

RAMP

**Regional Aquatics
Monitoring Program**



2010 TECHNICAL REPORT

APPENDICES



REGIONAL AQUATICS MONITORING PROGRAM

2010 Technical Report – Appendices

FINAL

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Appendix A

**Estimating Area of Land Change
for the RAMP Focus Study Area**

A ESTIMATING AREA OF LAND CHANGE FOR THE RAMP FOCUS STUDY AREA

A.1 INTRODUCTION

This appendix documents the methodology used to quantify the location, extent, and type of land change in the RAMP Focus Study Area (FSA) as of 2010 related to:

- focal projects (i.e., those projects owned by 2010 RAMP industry members, which were under construction or operational in 2010 in the RAMP FSA); and
- oil sands projects within the RAMP FSA that were under active development in 2010 by companies that were not members of RAMP in 2010.

This land change information was used to designate RAMP sampling stations and locations as *baseline* and *test* and to provide information to the hydrologic analysis of effects of focal project activities.

A.2 METHODOLOGY

A.2.1 Satellite Imagery Acquisition

A total of seven SPOT-5 10-meter resolution scenes were obtained by RAMP (Figure A.2-1); these images were acquired on June 19, July 17, July 27, August 11, August 24, August 25, and August 26, 2010. One Landsat-5 30 m resolution scene was also obtained by RAMP; this image was acquired on October 3, 2010 (Figure A.2-1).

A.2.2 Ortho-Rectification of Image Data

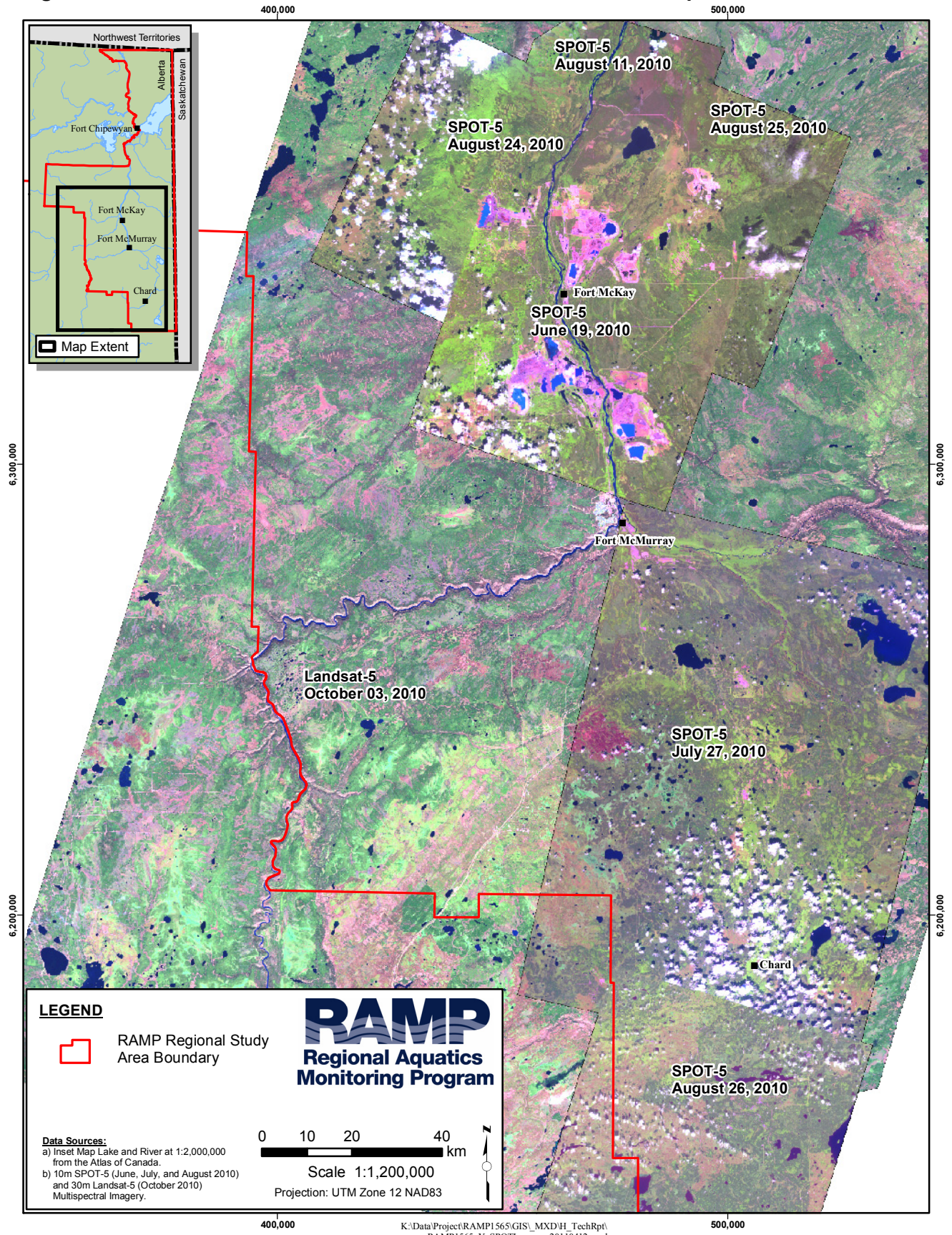
To ensure that the assessments made from the earth observation (EO) imagery were spatially correct, the imagery was first geometrically corrected. The procedure was undertaken using PCI Geomatica image processing software and entailed the alignment of the image data to a known map projection, essentially georeferencing all pixel values in the data to a known location on the Earth's surface.

The procedure for ortho-rectifying the image data to a map projection involved the application of previously-collected control points, topographic maps, existing ortho-rectified satellite imagery¹ and a digital elevation model (DEM)² to identify common ground control points (GCPs, known reference locations that can be identified on the satellite image). A total of 20 to 30 GCPs for each satellite image were identified to provide enough input values for the image processing software to solve the ortho-rectification algorithm. Once the collection of GCPs was complete, the ortho-rectification model was executed, creating a copy of the image, with the new positions, aligned to the reference maps and the elevation data.

¹ Geobase Landsat 7 ETM+ ortho-rectified images from 1999, 2000 and 2001.

² Geobase 1:50,000 scale Digital Elevation Model.

Figure A.2-1 Illustration of the SPOT-5 and Landsat-5 scenes acquired, 2010.



A.2.3 Atmospheric Correction

Atmospheric correction³ was applied to the SPOT-5 and Landsat-5 images using an automated routine within the PCI Geomatica image processing software as well as a spatially-adaptive atmospheric correction model for flat terrain.

A.2.4 Classification of Land Change

The 2010 areas of land change were digitized beginning with the results of the 2009 classification (RAMP 2010, Appendix A). New land change areas were added and changed areas were modified based on 2010 SPOT-5 and Landsat-5, and the digitized polygons were coded to one of two land change classes: closed-circuited; or not closed-circuited. Draft land change maps were then distributed to the RAMP Technical Program Committee in fall 2010 for review and comment, and a final set of land change maps was then prepared.

A GIS overlay analysis was then performed to estimate the area of each land change class in each of the RAMP FSA watersheds. The results of the overlay analysis were exported to MS Excel[®] for data summary.

A.3 RESULTS

Table A.3-1 and Table A.3-2 provide tabular summaries of the land changes in each of the main watersheds by each land change type, for focal projects and non-RAMP oil sands projects within the RAMP FSA. These land change areas are also shown in Figure A.3-1 and Figure A.3-2 for the area north of Fort McMurray and in Figure A.3-3 and Figure A.3-4 for the area south of Fort McMurray.

Land change as of 2010 within the RAMP FSA is estimated at approximately 86,000 ha for focal projects and 2,100 ha for oil sands projects operated by oil sands companies that were not members of RAMP in 2010, for a total of slightly more than 88,100 ha. This represents approximately 2.5% of the area of the RAMP FSA. The percentage of the area of watersheds with land change as of 2010 varies from less than 1% for many watersheds (MacKay, Ells, Christina, Hangingstone, Horse, and Firebag rivers), to 1% to 5% for the Calumet, Poplar and Steepbank watersheds, to 5% to 10% for the Upper Beaver watershed, to more than 10% for the Muskeg River, Fort Creek, Mills Creek, Tar River, Shipyard Lake, and McLean Creek watersheds, as well as the smaller Athabasca River tributaries from Fort McMurray to the confluence of the Firebag River.

³ Optical satellite imagery captures solar radiation reflected from the earth's surface. As visible light is susceptible to interference created by the presence of water vapor in the atmosphere, it is necessary to correct the imagery to remove these effects.

Table A.3-1 Area of watersheds with land change as of 2010, summarized by land change type.

| Watershed | Total Watershed Area (ha) | Watershed Area with Land Change (ha) | | | | | | Watershed Total |
|--|---------------------------|--------------------------------------|------------------|---------------------------------------|------------------|----------------------|------------------|-----------------|
| | | Focal Projects | | Other Oils Sands Projects in RAMP FSA | | Total | | |
| | | Not-Closed Circuited | Closed-Circuited | Not-Closed Circuited | Closed-Circuited | Not-Closed Circuited | Closed-Circuited | |
| Minor Athabasca River Tributaries ¹ | 160,730 | 8,593 | 27,176 | | | 8,593 | 27,176 | 35,769 |
| Mills Creek | 890 | 47 | 207 | | | 47 | 207 | 255 |
| Shipyard Lake | 4,047 | 546 | 3,208 | | | 546 | 3,208 | 3,753 |
| Calumet | 17,354 | 35 | 179 | | | 35 | 179 | 214 |
| Christina | 1,303,805 | 3,303 | 314 | 1,317 | 343 | 4,620 | 657 | 5,277 |
| Ells | 245,000 | 775 | 162 | | | 775 | 162 | 937 |
| Firebag | 568,174 | 3,909 | 257 | | | 3,909 | 257 | 4,166 |
| Fort Creek | 3,193 | 1,966 | 30 | | | 1,966 | 30 | 1,996 |
| Hangingstone | 106,641 | | | 9 | 47 | 9 | 47 | 56 |
| Horse | 215,741 | | | 279 | 104 | 279 | 104 | 383 |
| Mackay | 557,000 | 1,336 | 441 | | | 1,336 | 441 | 1,777 |
| McLean | 4,712 | 83 | 1,103 | | | 83 | 1,103 | 1,187 |
| Muskeg | 146,000 | 5,149 | 12,065 | | | 5,149 | 12,065 | 17,214 |
| Original Poplar ² | 13,856 | 168 | 307 | | | 168 | 307 | 475 |
| Steepbank | 135,491 | 4,036 | 431 | | | 4,036 | 431 | 4,467 |
| Tar | 33,261 | 1,477 | 5,870 | | | 1,477 | 5,870 | 7,347 |
| Upper Beaver ² | 28,711 | 794 | 1,928 | | | 794 | 1,928 | 2,722 |
| FSA Total | 3,544,606 | 31,568 | 54,327 | 1,605 | 494 | 33,173 | 54,821 | 87,995 |

Only land changes within the RAMP FSA were delineated.

¹ Refers to Athabasca River tributaries from Fort McMurray to the mouth of the Firebag River excluding the watersheds explicitly listed in this table. All land change areas in the minor Athabasca River tributaries in 2010 were above RAMP hydrology station S24.

² Original Poplar refers to the Poplar Creek watershed prior to the Beaver Creek diversion, while "Upper Beaver" refers to that part of the Beaver Creek drainage that now drains into Poplar Creek as a result of the Beaver Creek diversion. Drainage boundaries were estimated from maps provided in Syncrude Canada Ltd. (1977).

Table A.3-2 Percent of total area of watershed with land change as of 2010, summarized by type of land change.

| Watershed | Total Watershed Area (ha) | Watershed Area with Land Change (ha) | | | | | | Watershed Total |
|--|---------------------------|--------------------------------------|------------------|--------------------------------------|------------------|----------------------|------------------|-----------------|
| | | Focal Projects | | Other Oil Sands Projects in RAMP FSA | | Total | | |
| | | Not-Closed Circuited | Closed-Circuited | Not-Closed Circuited | Closed-Circuited | Not-Closed Circuited | Closed-Circuited | |
| Minor Athabasca River Tributaries ¹ | 160,730 | 5.35 | 16.91 | - | - | 5.35 | 16.91 | 22.25 |
| Mills Creek | 890 | 5.31 | 23.31 | - | - | 5.31 | 23.31 | 28.62 |
| Shipyards Lake | 4,047 | 13.48 | 79.26 | - | - | 13.48 | 79.26 | 92.75 |
| Calumet | 17,354 | 0.20 | 1.03 | - | - | 0.20 | 1.03 | 1.23 |
| Christina | 1,303,805 | 0.25 | 0.02 | 0.10 | 0.03 | 0.35 | 0.05 | 0.40 |
| Ells | 245,000 | 0.32 | 0.07 | - | - | 0.32 | 0.07 | 0.38 |
| Firebag | 568,174 | 0.69 | 0.05 | - | - | 0.69 | 0.05 | 0.73 |
| Fort Creek | 3,193 | 61.57 | 0.93 | - | - | 61.57 | 0.93 | 62.50 |
| Hangingstone | 106,641 | - | - | 0.01 | 0.04 | 0.01 | 0.04 | 0.05 |
| Horse | 215,741 | - | - | 0.13 | 0.05 | 0.13 | 0.05 | 0.18 |
| MacKay | 557,000 | 0.24 | 0.08 | - | - | 0.24 | 0.08 | 0.32 |
| McLean | 4,712 | 1.77 | 23.42 | - | - | 1.77 | 23.42 | 25.19 |
| Muskeg | 146,000 | 3.53 | 8.26 | - | - | 3.53 | 8.26 | 11.79 |
| Original Poplar ² | 13,856 | 1.21 | 2.22 | - | - | 1.21 | 2.22 | 3.43 |
| Steepbank | 135,491 | 2.98 | 0.32 | - | - | 2.98 | 0.32 | 3.30 |
| Tar | 33,261 | 4.44 | 17.65 | - | - | 4.44 | 17.65 | 22.09 |
| Upper Beaver ² | 28,711 | 2.77 | 6.72 | - | - | 2.77 | 6.72 | 9.48 |
| FSA Total | 3,544,606 | 0.89 | 1.53 | 0.05 | 0.01 | 0.94 | 1.55 | 2.48 |

Only land changes within the RAMP FSA were delineated.

¹ Refers to Athabasca River tributaries from Fort McMurray to the mouth of the Firebag River excluding the watersheds explicitly listed in this table. All land change areas in the minor Athabasca River tributaries in 2010 were above RAMP hydrology station S24.

² Original Poplar refers to the Poplar Creek watershed prior to the Beaver Creek diversion, while "Upper Beaver" refers to that part of the Beaver Creek drainage that now drains into Poplar Creek as a result of the Beaver Creek diversion. Drainage boundaries were estimated from maps provided in Syncrude Canada Ltd. (1977).

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Figure A.3-1 RAMP land change classes derived from SPOT-5 (June and August 2010) satellite imagery, north of Fort McMurray.

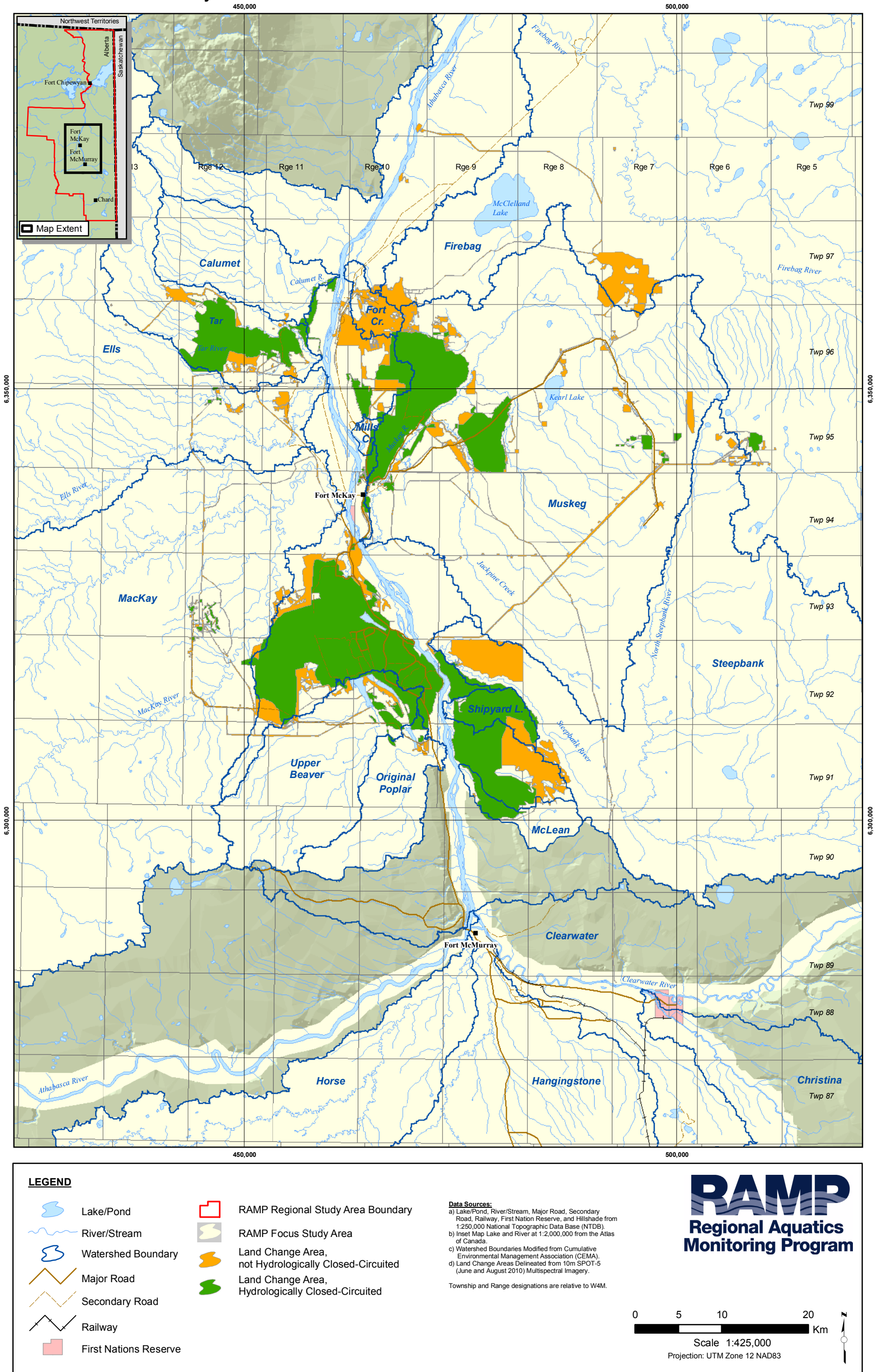


Figure A.3-2 RAMP land change classes overlaid on a satellite imagery mosaic of SPOT-5 (June and August 2010), north of Fort McMurray.

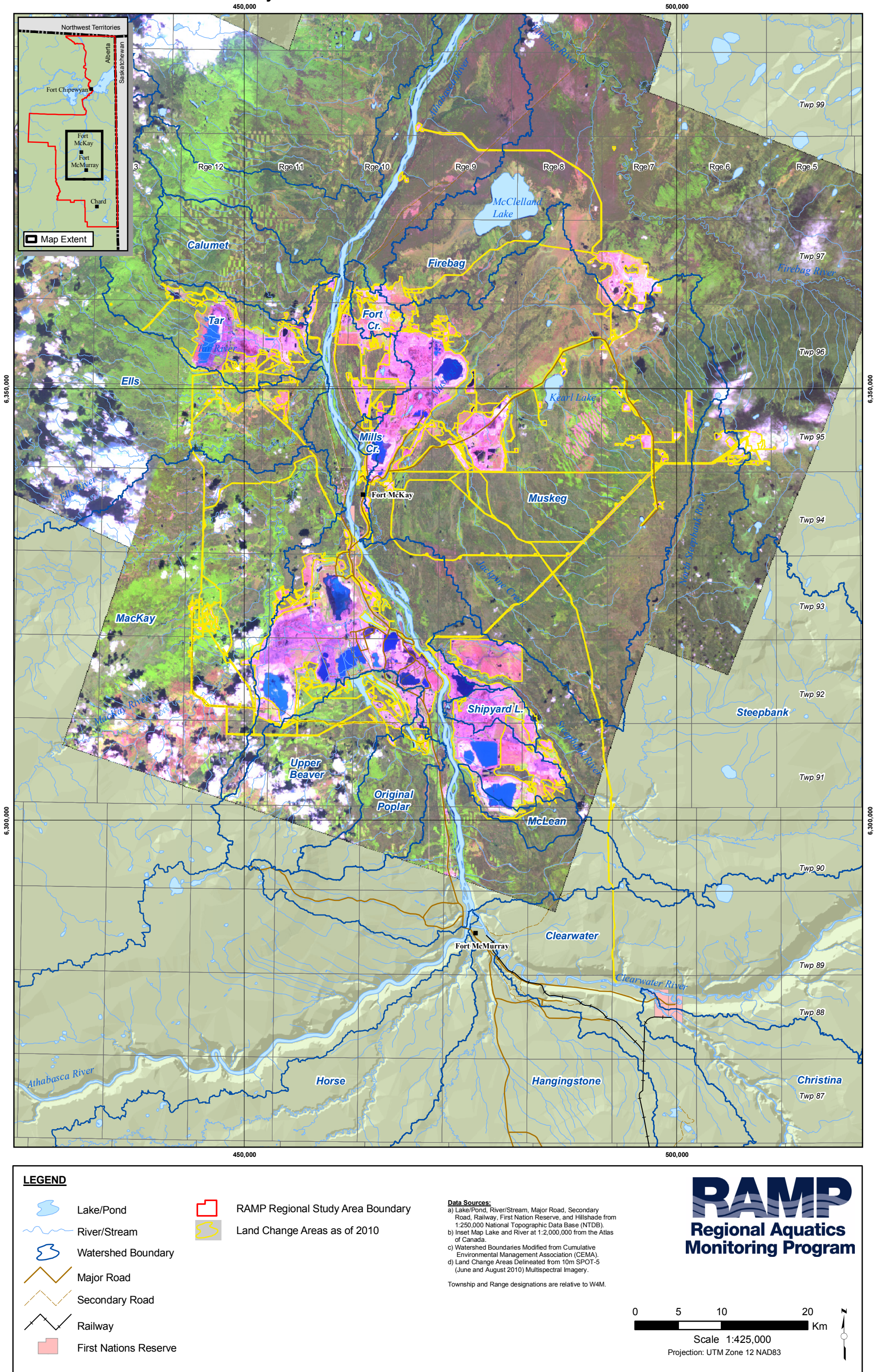


Figure A.3-3 RAMP land change classes derived from SPOT-5 (July and August 2010) and Landsat-5 (October 2010) satellite imagery, south of Fort McMurray.

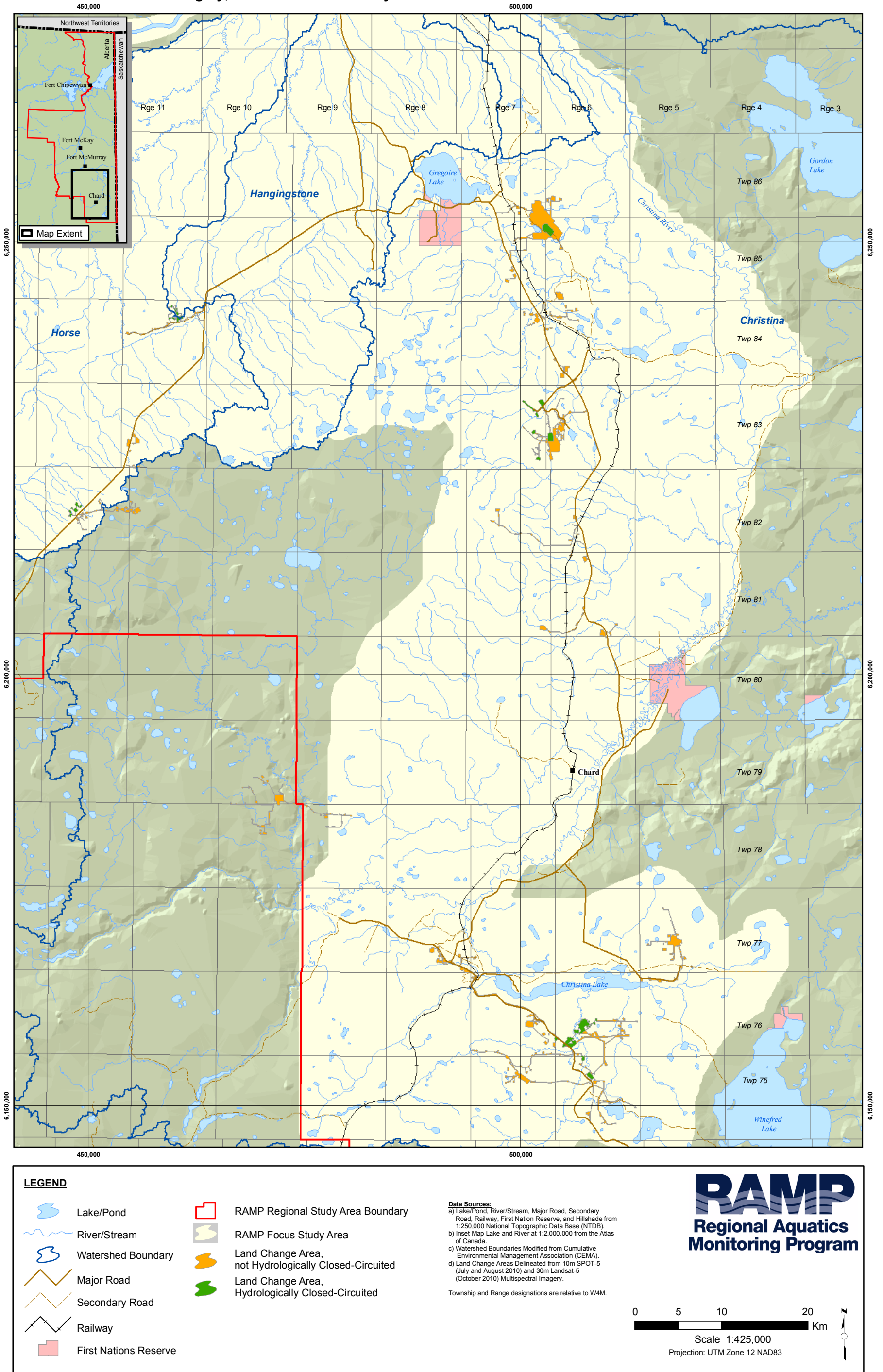
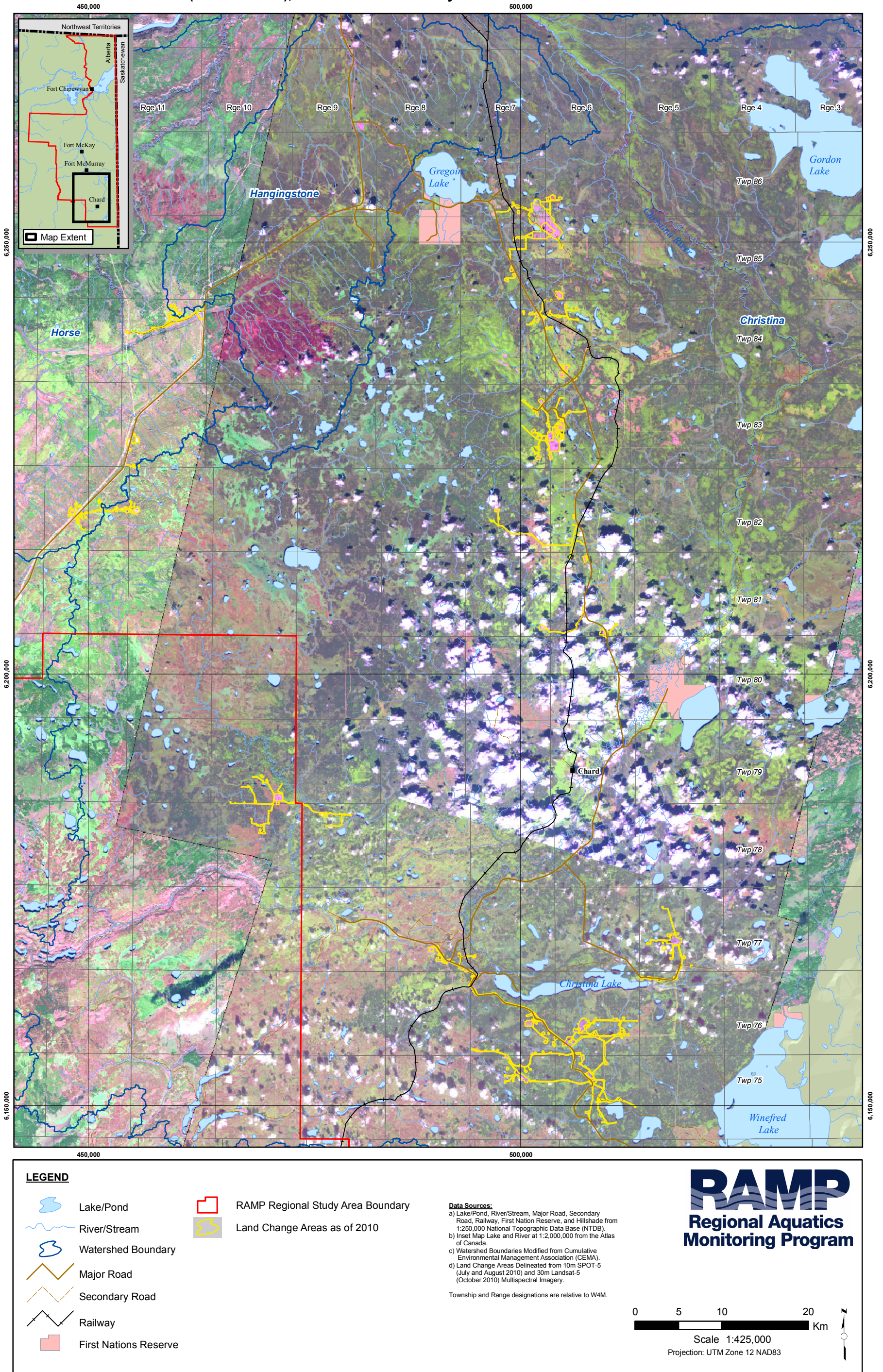


Figure A.3-4 RAMP land change classes overlaid on satellite imagery mosaics of SPOT-5 (July and August 2010) and Landsat-5 (October 2010), south of Fort McMurray.



Appendix B

**Quality Assurance and Quality
Control Procedures for 2010**

B QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES FOR 2010

B.1 QUALITY ASSURANCE PROCEDURES

Each technical component under RAMP is required to complete a series of procedures to facilitate the collection of a high level of data quality. Environment Canada (2010) defines quality assurance (QA) as:

Plans or programs that encompass a wide range of internal and external management and technical practices designed to ensure that the collection of data of known quality matches the intended use of the data.

The following sections present the general procedures used by the RAMP implementation team for all RAMP-related data collection, handling and management. More detailed information regarding quality control for each technical component of RAMP follows the presentation of this general information.

A more detailed explanation of the sampling procedures used by the RAMP implementation team can be found in Appendix A4 of the RAMP Technical Design and Rationale document (RAMP 2009b or www.ramp-alberta.org).

B.1.1 Field Staff Training

All personnel participating in 2010 field studies were professional biologists/engineers or technicians with specific training in the subject-matter area in which they were involved. Field crews were assembled based on level of expertise and seniority; although qualifications varied based on level of experience, crews typically included a field crew leader who may be either a Master's- or Ph.D.-level professional and a trained environmental field technician (B.Sc. or Dip. Tech.). All 2010 field-crew members had experience conducting data collection in support of scientifically defensible environmental monitoring programs.

Field crew responsibilities were clearly established prior to beginning fieldwork through the use of Field Work Instructions (FWIs) prepared by the component or task leader. FWIs contained detailed information regarding sampling locations (e.g., coordinate location, access method), appropriate collection methodology, and required supporting variables (e.g., water velocity, field water chemistry). FWIs were prepared and discussed prior to each field sampling trip (typically when the crew was still in the office).

2010 crew members had been trained in field sampling techniques through traditional education (i.e., university or college), work experience and participation in workshops/seminars. In addition, crews had training in Standard First Aid and CPR, as well as any oil sands-specific site training that may have been necessary to access mine sites. In many cases, field personnel have additional training on the Workplace Hazardous Materials Information System (WHMIS), Transportation of Dangerous Goods (TDG) Regulations, Pleasure Craft Operators (as required by the Federal government), swift water rescue, ice safety training, and wilderness first aid.

B.1.2 Field Operations

B.1.2.1 Equipment

Sampling gear and equipment used for the RAMP field programs were maintained at the offices of the respective RAMP team members (i.e., Hatfield – Fort McMurray and North Vancouver). Each RAMP component manager (i.e., lead consultant responsible for a RAMP component) controlled specialized field equipment used to complete field studies. Where necessary, routine maintenance was conducted according to manufacturer's instructions to ensure valid data collection.

General field equipment that were used during field surveys (all components) included:

- Provincial sampling permits (e.g., fish collection permits from Alberta Sustainable Resource Development);
- Waterproof paper/data sheets, waterproof labels, indelible markers, pencils, pens, and other stationery (for recording data);
- Topographical maps, hydrographic charts, and/or aerial photos of the oil sands area;
- Garmin 45, 45XL, 12XL or GPSII Global Positioning System (GPS) for obtaining data on sampling station position (latitude and longitude; accurate to approximately ± 15 m);
- Digital camera (to record sampling areas, specimens captured, unusual features in the environment, etc.);
- Instruments for measuring the following water quality variables *in situ*: temperature, dissolved oxygen, conductivity, pH, current velocity and depth;
- Miscellaneous equipment: tarpaulin, rope, measuring tape, coolers, plastic buckets, and tool box;
- Waterproof clothing, including rain suits, rubber boots, etc.;
- Floater jackets and/or survival suits, first aid kit and other safety equipment (including boat safety equipment); and
- Publications and previous reports for reference.

Field operations were coordinated through the Hatfield Fort McMurray office. This role included coordination of personnel, sample handling and shipping, and end-of-day safety check-ins for field crews.

Information regarding specialized field equipment used for the RAMP program is provided in the following sections and in Appendices C to G for specific components.

B.1.2.2 Data Collection, Data Tracking and Field Data Sheets

The following general data were typically recorded for field sampling activities conducted for RAMP (with some minor variability among technical components):

- Date and time of sampling;
- Sample numbers;

- Station location (UTM coordinate, datum, zone);
- Initials of field crew members;
- Sampling methods/gear used;
- Number of samples collected (water/sediment/benthos), number of specimens retained/ released/dissected/archived (biota), number of measurements taken (climate and hydrology);
- Volume of sample collected (water/sediment);
- Number of samples in a composite sample;
- Handling techniques, preservation methods, sampling containers used; and
- Photographs of sampling stations.

Field data collection was conducted according to procedures used for all previous RAMP studies (as described in RAMP 2009b).

B.1.3 Laboratory Analyses

Laboratories used to analyze water, sediment and fish tissue samples collected under the RAMP program are required to be accredited by the Canadian Association for Environmental Analytical Laboratories (CAEL). Responsibilities associated with this accreditation include participation in an annual performance evaluation assessment of the laboratory's procedures, methods and internal quality control.

Other samples, such as benthic invertebrate sorting and taxonomy, fish tissue analyses, and fish ageing, are conducted for RAMP by small independent laboratories or boutique consulting companies. These laboratories and companies are required to conduct QA/QC procedures that are considered industry standard for the respective disciplines. For example, QA/QC procedures for benthic invertebrate taxonomy meet or exceed guidelines established by Environment Canada (2010) for environmental effects monitoring (EEM) studies.

B.1.4 Data Management

Field data were entered into Microsoft Excel spreadsheets to facilitate production of tables, figures, etc., for reports.

Information on samples collected (biota/benthos/sediment/water) were carefully recorded on field data sheets, and secured at the end of each field day. All data sheets, field notes, photographs, maps and other supporting documentation were filed within appropriate team members' secure offices. All hard-copy information will be retained for five years after the sampling date.

All products of field sampling (e.g., field notes, analytical results) were checked upon receipt for errors, analytical limits, and reasonable results and, prior to data analysis and reporting, entered data were checked for transcription errors.

B.1.5 Sample Management

All samples were handled (including preservation, storage and shipping) in accordance with established procedures (Golder 2002) and with guidelines from respective

laboratories. Sample tracking was conducted by field crew leaders (or Fort McMurray-based team members).

Detailed lists of samples shipped to analytical laboratories were made, such that samples could be tracked from point of shipment to the laboratory (water/sediment/benthic taxonomy). Chain of Custody (COC) forms (commonly issued by the receiving laboratory) were used to notify receiving laboratories of the number and type of samples that were being shipped. Data provided on this sheet included date, project, sample type (fish, sediment, water, benthic invertebrates, etc.), sampling location, sender's name, and any preservation added/required. Sample numbers of all specimens/containers collected, corresponding to field sample numbers, were listed. A description of each sample shipped was provided (i.e., station number, sediment, date and time collected, analyses to be performed). The receiver was required to check the shipping list to ensure all samples were accounted for and in good condition, and confirm (via fax and/or e-mail) samples received, date, and analyses to be performed. To facilitate this process, a standard RAMP COC form was used by the Hatfield team, which simplified the management of sample processing and analysis.

B.1.6 RAMP Quality Assurance Plan

In 2002, a formal RAMP-specific Quality Assurance Plan (QAP) was developed and implemented to cover all routine QA-related activities for the project. These methods were used in 2010 by the Hatfield RAMP team to ensure consistency of methods among years. Activities covered in the RAMP QAP include:

- Pre-field meetings to discuss field methods (i.e., FWIs) and specifics of field tasks;
- Post-field meetings to discuss results of the field activities and identify areas for improvement in future;
- Routine check-ins with component leaders (24 or 48-hour interval) or the RAMP project manager during field work, as required;
- Designation of a staff member for each component/trip (i.e., water quality, fall field trip) to track sample handling, labeling (including COC forms), shipping and to confirm timely receipt of samples by the analytical laboratory;
- Internal check of COC forms by component leaders upon the return of the field crew (to confirm analyses requested were correct);
- Internal check of data upon receipt from external labs; and
- Internal check of entered field data for transcription errors.

B.2 QUALITY CONTROL PROCEDURES

Quality control (QC) is a component of QA that pertains to internal techniques used to measure and assess data quality (APHA 1989, in RAMP 2009b). QC activities for each RAMP technical component used in 2010 are described below.

B.2.1 Climate and Hydrology Component

B.2.1.1 Quality Control Activities – Field

Climatic and hydrologic data collection and processing were subject to the following quality control field procedures to ensure that the published data were as accurate as possible:

- Stream discharge measurements and water level surveys were performed in accordance with standard procedures. Each discharge measurement was qualified according to the criteria presented in the standard operating procedures in RAMP (2009b), based on observations of station conditions and analysis of the collected data;
- Sensors from climatic and hydrologic monitoring stations were calibrated on a regular basis. Sensors at climatic stations have been rotated with spare units on a two-year frequency and the units retrieved from the field were recalibrated by the manufacturer. Calibration curves for pressure transducers were verified prior to installation. Pressure transducers at year-round monitoring stations were checked on a less frequent basis, but consistency between water level surveys and pressure transducer readings was checked during every field visit;
- Manual discharge measurements and concurrent water levels were compared on a plot of stage versus discharge, to check for consistency between measurements and consistency with previously established stage-discharge relationships. Rating curve shifts due to changes in channel geometry, beaver dams and obstructions or roughness changes were accounted for by revision of stage-discharge rating curves or application of backwater shift corrections;
- Vertical velocity distributions were collected at representative locations for ice-covered discharge measurements to derive and verify ice correction factors; and
- Snow course surveys were performed according to standard protocols as presented in RAMP (2009b).

B.2.1.2 Quality Control Activities – Office

Climatic and hydrologic data collection and processing were subject to the following quality control office procedures to ensure that the published data were as accurate as possible:

- Apparent transducer elevations were calculated after each field visit as the difference between the surveyed water surface elevation and the sensor reading. The history of apparent transducer elevations was plotted for each station to check for physical sensor movement or calibration drift. Continuous water levels measured by the transducer were subsequently converted to elevations, adjusting for movement or drift.
- Rainfall, snowfall, air temperature, humidity, and wind speed data from automated climate sensors were compared to other local and regional records as well as manual observations recorded during site visits.
- All discharge measurements and site visit records were prepared by one person and checked by another.

- Velocity distributions at measurement cross sections were plotted and reviewed to ensure reasonable variation in velocity with flow depth and bed roughness.
- Hydrographs computed from continuous water level measurements and the stage-discharge rating curve were compared with manual measurements on the same plot. The resulting hydrographs were reviewed for consistency.
- Anomalies in the hydrographs, such as rapid changes in water level or discharge, were examined in detail to confirm authenticity. In cases where the data were inconsistent with other local and regional data (for instance, an isolated high water reading, without a subsequent recession curve), they were interpreted or discarded.
- Hydrographs computed for different stations in the same region were compared to identify anomalies and verify similarity in the timing and magnitude of runoff responses. Hydrographs were also analyzed to ensure anticipated effects such as time lag, attenuation by river or lake routing and increments in discharge with drainage area were apparent in the records.

B.2.2 Water Quality Component

B.2.2.1 Methods

Sample Collection

The following precautions were used in the field to prevent sample contamination:

- All sample bottles used were provided to the RAMP sampling team as “certified clean” by labs (ultra-trace mercury bottles were filled using specific procedures stipulated by AITF);
- Grab samples were collected upstream of the boat and the person collecting the sample to avoid disturbing the substrate;
- Latex powder-free gloves were worn during sample collection;
- Sample containers were kept covered during collection of composite samples;
- Winter samples were collected from approximately 20 cm below the ice where possible to minimize potential contamination from auger disturbance; and
- Samples for analysis of dissolved metals were filtered in the lab instead of in the field.

Potential contamination of samples during collection, handling, and transport was assessed using field blanks and trip blanks. Field blanks were used to assess potential contamination from sample handling, and were prepared in the field by filling sample bottles with deionized water provided by the lab. Trip blanks were prepared in the analytical laboratory prior to sampling and kept sealed for the duration of the sampling trip; these were used to evaluate potential contamination from the sample container and the efficacy of storage conditions. Field blanks and trip blanks were utilized in all four seasons of sampling, and were analyzed for the same variables as RAMP samples. Field and trip blanks were labeled with dummy RAMP-style codes (i.e., BAR-1, DAR-1) to ensure “blind” laboratory analysis.

Field and trip blank analytical results were compared to analytical detection limits. Analyte concentrations greater than five times the detection limit in the blank samples may demonstrate potential contamination of samples during sample collection or analysis or analytical error. Blanks with analyte concentrations below or near detection limits represent samples that were collected, handled, and analyzed without contamination or potential errors.

Duplicate samples were collected from the Beaver River upstream of all focal project developments (BER-2, Winter and Fall), MacKay River upstream of Suncor Dover developments (MAR-2a, Spring), Athabasca River, west bank upstream of Donald Creek (ATR-DC-W, Summer), and near the mouth of the MacKay River (MAR-1, Fall). Duplicate samples were taken to assess environmental heterogeneity. Analytical results for duplicate samples were compared, and the relative percent difference (RPD, difference between data values / average of data values, multiplied by 100%) was calculated for each analyte. Relative percent differences greater than 20% were noted as potentially unacceptable levels of precision. However, because precision decreases as the analyte concentration approaches the detection limit, relative percent differences greater than 20% were considered to be of significance only if analyte concentrations in both samples were greater than five times the detection limit.

Sample Analysis

Chemical laboratories analyzed a number of their own QA/QC samples to ensure that sample contamination did not occur during analysis and that results reported were precise and accurate. A method blank, consisting of a de-ionized water sample prepared at the initiation of the analysis, was used to assess potential contamination during analyses. A sample split into two aliquots (duplicate sample) was used to assess the precision of the analyses. Spiked samples, reference standards, and laboratory controls were used to establish the accuracy of the analyses.

All laboratory QA/QC samples were assessed using in-house laboratory protocols to identify potential contamination and determine the precision and accuracy of the analyses. Any deviations from QA/QC criteria were identified in the laboratory reports and are noted in the results section that follows.

Any anomalous values identified in laboratory reports were followed up with the laboratory to determine if the value was a measurable value or due to a transcription or analytical error.

B.2.2.2 Results and Discussion

Field and Trip Blanks

Field blanks were completed during all sampling seasons - one field blank was filled in winter, spring and summer, and two field blanks were filled in fall. Concentrations of all conventional variables, major ions, nutrients, hydrocarbons, dissolved metals and total metals in field blanks were less than five times the detection limit in 2010 (Table B.2-1), with the exception of total lead (summer).

One trip blank was analyzed in each sampling season. Concentrations of all conventional variables, major ions, nutrients, hydrocarbons, dissolved metals and total metals in trip blanks were less than five times the detection limits (Table B.2-2).

Duplicate Samples

Duplicate samples were taken at four stations in 2010: BER-2 in winter and fall, MAR-1 in fall, MAR-2a in spring, and ATR-DC-W in summer. Conventional variables, major ions, nutrients, and hydrocarbon concentrations were generally quite similar in the duplicate samples. The RPD for all conventional variables, major ions, nutrients, and hydrocarbons was less than 20% for those analytes where concentrations in both samples were greater than five times the detection limit (Table B.2-3 to Table B.2-6) with the exception total Kjeldahl nitrogen (TKN) at MAR-1 and BER-2 (fall), total phenols at MAR-1 (fall), dissolved phosphorus at MAR-2A (spring) and BER-2 (winter); and naphthenic acids at MAR-2a (spring). The RPD for most analytes was less than 20% for those analytes where concentrations in both samples were less than five times the detection limit (Table B.2-3 to Table B.2-6) with the exception of potassium at MAR-1 (fall), dissolved phosphorus and naphthenic acids at ATR-DC-W (summer), total suspended solids at MAR-2a (spring), and sulphide and total Kjeldahl nitrogen at BER-2 (winter).

The number of metals concentrations with RPD >20% in duplicate samples varied among stations, suggesting that different rivers exhibited varying degrees of environmental heterogeneity. In winter, the duplicate sample collected at station BER-2 had concentrations of dissolved manganese, total selenium, and total silver with RPD greater than 20% from the sample (Table B.2-3). In spring, the duplicate sample taken at station MAR-2A had concentrations of dissolved and total beryllium, selenium, thallium, and zinc, chlorine, and ultra-trace mercury with RPD >20% from the sample (Table B.2-4). In summer, the duplicate sample collected from ATR-DC-W had concentrations of dissolved iron, dissolve vanadium, and total lead with RPD >20% from the sample (Table B.2-5). In fall, duplicate samples collected at BER-2 showed concentrations of total silver, total copper, and total zinc with RPD >20% from the sample (Table B.2-6); and the duplicate sample collected at MAR-1 had concentrations of dissolved zinc with RPD >20% from the sample (Table B.2-7).

B.2.2.3 Conclusions and Recommendations

Results from the QA/QC evaluation of water quality data indicate that overall, data collected for the water quality component was of high quality. The results of trip and field blank analyses suggest that laboratory-generated concentrations are reliable. The analysis of duplicate samples indicated some variability within stations, likely related to local-scale heterogeneity among samples.

Table B.2-1 Results of analysis of field blanks prepared during RAMP Water quality surveys in winter, spring, summer and fall, 2010.

| Variable | Unit | Detection Limit | Concentration in Field Blank | | | | |
|----------------------------------|----------|-----------------|------------------------------|------------|-----------|----------|-----------|
| | | | 8-Mar-10 | 14-May-10 | 14-Jul-10 | 7-Sep-10 | 14-Sep-10 |
| Conventional Variables | | | | | | | |
| Conductivity | µS/cm | 0.2 | 0.56 | 0.8 | 1.25 | 0.78 | 0.69 |
| Dissolved Organic Carbon | mg/L | 1 | <1 | <1 | <1 | <1 | 1.1 |
| Hardness (as CaCO ₃) | mg/L | - | <1 | <1 | <1 | <1 | <1 |
| pH | pH units | 0.1 | 5.69 | 6.08 | 6.23 | 6.11 | 6.26 |
| Total Alkalinity | mg/L | 5 | <5 | <5 | <5 | <5 | <5 |
| Total Dissolved Solids | mg/L | 5 | <5 | - | <5 | - | - |
| Total Dissolved Solids | mg/L | 10 | - | <10 | - | <10 | <5 |
| Total Organic Carbon | mg/L | 1 | <1 | <1 | <1 | <1 | <1 |
| Total Suspended Solids | mg/L | 3 | <3 | <3 | <3 | <3 | <3 |
| True Colour | T.C.U. | 2 | <2 | <2 | <2 | <2 | <2 |
| Major Ions | | | | | | | |
| Bicarbonate (HCO ₃) | mg/L | 5 | <5 | <5 | <5 | <5 | <5 |
| Calcium (Ca) | mg/L | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Carbonate (CO ₃) | mg/L | 5 | <5 | <5 | <5 | <5 | <5 |
| Chloride (Cl) | mg/L | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Hydroxide (OH) | mg/L | 5 | <5 | <5 | <5 | <5 | <5 |
| Magnesium (Mg) | mg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Potassium (K) | mg/L | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Sodium (Na) | mg/L | 1 | <1 | <1 | <1 | <1 | <1 |
| Sulfate (SO ₄) | mg/L | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Sulphide (S ₂) | mg/L | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Nutrients and BOD | | | | | | | |
| Ammonia-N | mg/L | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Biochemical Oxygen Demand | mg/L | 2 | <2 | <2 | <2 | <2 | <2 |
| Nitrate+Nitrite | mg/L | 0.071 | <0.071 | <0.071 | <0.071 | <0.071 | <0.071 |
| Phosphorus, dissolved | mg/L | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Phosphorus, total | mg/L | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Total Kjeldahl Nitrogen | mg/L | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Total Nitrogen | mg/L | - | 0.271 | 0.271 | 0.271 | 0.271 | 0.271 |
| Hydrocarbons | | | | | | | |
| Naphthenic Acids | mg/L | 0.02 | - | <0.02 | <0.02 | <0.02 | <0.02 |
| Total Phenolics | mg/L | 0.001 | <0.001 | <0.001 | <0.001 | 0.0025 | <0.001 |
| Total Rec. Hydrocarbons | mg/L | 1 | <1 | <1 | <1 | <1 | <1 |
| Dissolved Metals | | | | | | | |
| Aluminum (Al) | mg/L | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Antimony (Sb) | mg/L | 0.000001 | <0.000001 | 0.00000115 | 0.000002 | | |
| Antimony (Sb) | mg/L | 0.00005 | - | - | - | <0.00005 | <0.00005 |
| Arsenic (As) | mg/L | 0.00004 | <0.00004 | <0.00004 | <0.00004 | - | - |
| Arsenic (As) | mg/L | 0.00006 | - | - | - | - | - |
| Arsenic (As) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Barium (Ba) | mg/L | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Beryllium (Be) | mg/L | 0.00001 | <0.00001 | <0.00001 | <0.00001 | - | - |
| Beryllium (Be) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Bismuth (Bi) | mg/L | 0.00001 | <0.00001 | <0.00001 | <0.00001 | - | - |
| Bismuth (Bi) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Boron (B) | mg/L | 0.0008 | <0.0008 | <0.0008 | <0.0008 | <0.0008 | <0.0008 |
| Cadmium (Cd) | mg/L | 0.000006 | <0.000006 | <0.000006 | <0.000006 | - | - |
| Cadmium (Cd) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Calcium (Ca) | mg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |

Indicates sample concentration is greater than five times the detection limit.

Table B.2-1 (Cont'd.)

| Variable | Unit | Detection Limit | Concentration in Field Blank | | | | |
|-----------------------------------|------|-----------------|------------------------------|-----------|-----------|----------|-----------|
| | | | 8-Mar-10 | 14-May-10 | 14-Jul-10 | 7-Sep-10 | 14-Sep-10 |
| Dissolved Metals (Cont'd.) | | | | | | | |
| Chlorine (Cl) | mg/L | 0.3 | 0.306 | <0.3 | <0.3 | <0.3 | <0.3 |
| Chromium (Cr) | mg/L | 0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Cobalt (Co) | mg/L | 0.00001 | <0.00001 | <0.00001 | <0.00001 | - | - |
| Cobalt (Co) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Copper (Cu) | mg/L | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Iron (Fe) | mg/L | 0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 |
| Lead (Pb) | mg/L | 0.000006 | <0.000006 | <0.000006 | - | - | - |
| Lead (Pb) | mg/L | 0.00001 | - | - | <0.00001 | - | - |
| Lead (Pb) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Lithium (Li) | mg/L | 0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Manganese (Mn) | mg/L | 0.00003 | <0.00003 | <0.00003 | <0.00003 | - | - |
| Manganese (Mn) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Molybdenum (Mo) | mg/L | 0.000008 | <0.000008 | <0.000008 | <0.000008 | - | - |
| Molybdenum (Mo) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Nickel (Ni) | mg/L | 0.00006 | <0.00006 | <0.00006 | <0.00006 | - | - |
| Nickel (Ni) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Selenium (Se) | mg/L | 0.0002 | <0.0002 | - | - | - | - |
| Selenium (Se) | mg/L | 0.0003 | - | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Silver (Ag) | mg/L | 0.000005 | <0.000005 | <0.000005 | <0.000005 | - | - |
| Silver (Ag) | mg/L | 0.00001 | - | - | - | <0.00001 | <0.00001 |
| Strontium (Sr) | mg/L | 0.000008 | 0.000075 | <0.000008 | 0.0000658 | - | - |
| Strontium (Sr) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Sulphur (S) | mg/L | 0.6 | 0.817 | <0.6 | <0.6 | - | - |
| Sulphur (S) | mg/L | 2 | - | - | - | <2 | <2 |
| Thallium (Tl) | mg/L | 0.000003 | <0.000003 | 0.0000037 | <0.000003 | - | - |
| Thallium (Tl) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Thorium (Th) | mg/L | 0.00003 | <0.00003 | <0.00003 | <0.00003 | - | - |
| Thorium (Th) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Tin (Sn) | mg/L | 0.00007 | <0.00007 | <0.00007 | <0.00007 | - | - |
| Tin (Sn) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Titanium (Ti) | mg/L | 0.00007 | <0.00007 | <0.00007 | <0.00007 | - | - |
| Titanium (Ti) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Uranium (U) | mg/L | 0.000003 | <0.000003 | <0.000003 | <0.000003 | - | - |
| Uranium (U) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Vanadium (V) | mg/L | 0.00005 | - | <0.00005 | <0.00005 | - | - |
| Vanadium (V) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Vanadium (V) | mg/L | 0.0002 | <0.0002 | - | - | - | - |
| Zinc (Zn) | mg/L | 0.0002 | <0.0002 | <0.0002 | 0.000242 | <0.0002 | 0.000218 |
| Total Metals | | | | | | | |
| Aluminum (Al) | mg/L | 0.002 | <0.002 | <0.002 | <0.002 | - | - |
| Aluminum (Al) | mg/L | 0.003 | - | - | - | <0.003 | <0.003 |
| Antimony (Sb) | mg/L | 0.000001 | <0.000001 | 0.0000012 | 0.000002 | - | - |
| Antimony (Sb) | mg/L | 0.00005 | - | - | - | <0.00005 | <0.00005 |
| Arsenic (As) | mg/L | 0.00004 | <0.00004 | <0.00004 | <0.00004 | - | - |
| Arsenic (As) | mg/L | 0.00006 | - | - | - | - | - |
| Arsenic (As) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |

Indicates sample concentration is greater than five times the detection limit.

Table B.2-1 (Cont'd.)

| Variable | Unit | Detection Limit | Concentration in Field Blank | | | | |
|-------------------------------|------|-----------------|------------------------------|-----------|-----------|----------|-----------|
| | | | 8-Mar-10 | 14-May-10 | 14-Jul-10 | 7-Sep-10 | 14-Sep-10 |
| Total Metals (Cont'd.) | | | | | | | |
| Barium (Ba) | mg/L | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Beryllium (Be) | mg/L | 0.00001 | 0.0000133 | <0.00001 | <0.00001 | - | - |
| Beryllium (Be) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Bismuth (Bi) | mg/L | 0.00001 | <0.00001 | <0.00001 | <0.00001 | - | - |
| Bismuth (Bi) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Boron (B) | mg/L | 0.0008 | <0.0008 | <0.0008 | <0.0008 | <0.0008 | <0.0008 |
| Cadmium (Cd) | mg/L | 0.000006 | <0.000006 | <0.000006 | <0.000006 | - | - |
| Cadmium (Cd) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Calcium (Ca) | mg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chlorine (Cl) | mg/L | 0.3 | 0.309 | <0.3 | <0.3 | <0.3 | <0.3 |
| Chromium (Cr) | mg/L | 0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Cobalt (Co) | mg/L | 0.00001 | <0.00001 | <0.00001 | <0.00001 | - | - |
| Cobalt (Co) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Copper (Cu) | mg/L | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Iron (Fe) | mg/L | 0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 |
| Lead (Pb) | mg/L | 0.000006 | <0.000006 | 0.0000175 | - | - | - |
| Lead (Pb) | mg/L | 0.00001 | - | - | 0.0000514 | - | - |
| Lead (Pb) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Lithium (Li) | mg/L | 0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Manganese (Mn) | mg/L | 0.00003 | <0.00003 | <0.00003 | <0.00003 | - | - |
| Manganese (Mn) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Mercury (Hg), ultra-trace | ng/L | 0.6 | - | - | <0.6 | <0.6 | <0.6 |
| Mercury (Hg), ultra-trace | ng/L | 1.2 | <1.2 | <1.2 | - | - | - |
| Molybdenum (Mo) | mg/L | 0.000008 | <0.000008 | <0.000008 | <0.000008 | - | - |
| Molybdenum (Mo) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Nickel (Ni) | mg/L | 0.00006 | <0.00006 | <0.00006 | 0.0000971 | - | - |
| Nickel (Ni) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Selenium (Se) | mg/L | 0.0002 | <0.0002 | - | - | - | - |
| Selenium (Se) | mg/L | 0.0003 | - | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Silver (Ag) | mg/L | 0.000005 | <0.000005 | <0.000005 | <0.000005 | - | - |
| Silver (Ag) | mg/L | 0.00001 | - | - | - | <0.00001 | <0.00001 |
| Strontium (Sr) | mg/L | 0.000008 | 0.0000755 | 0.0000207 | 0.0000746 | - | - |
| Strontium (Sr) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Sulphur (S) | mg/L | 0.6 | 0.825 | <0.6 | <0.6 | - | - |
| Sulphur (S) | mg/L | 2 | - | - | - | <2 | <2 |
| Thallium (Tl) | mg/L | 0.000003 | <0.000003 | 0.0000037 | <0.000003 | - | - |
| Thallium (Tl) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Thorium (Th) | mg/L | 0.00003 | <0.00003 | <0.00003 | <0.00003 | - | - |
| Thorium (Th) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Tin (Sn) | mg/L | 0.00007 | <0.00007 | <0.00007 | <0.00007 | - | - |
| Tin (Sn) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Titanium (Ti) | mg/L | 0.00007 | <0.00007 | <0.00007 | 0.000095 | - | - |
| Titanium (Ti) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Uranium (U) | mg/L | 0.000003 | <0.000003 | <0.000003 | <0.000003 | - | - |
| Uranium (U) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Vanadium (V) | mg/L | 0.00005 | - | <0.00005 | <0.00005 | - | - |
| Vanadium (V) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Vanadium (V) | mg/L | 0.0002 | <0.0002 | - | - | - | - |
| Zinc (Zn) | mg/L | 0.0002 | <0.0002 | 0.000218 | 0.000297 | <0.0002 | 0.00022 |

Indicates sample concentration is greater than five times the detection limit.

Table B.2-2 Results of analysis of trip blanks prepared during RAMP water quality surveys in winter, spring, summer and fall, 2010.

| Variable | Unit | Detection Limit | Concentration in Trip Blank | | | | |
|----------------------------------|----------|-----------------|-----------------------------|-----------|-----------|----------|----------|
| | | | 8-Mar-10 | 14-May-10 | 14-Jul-10 | 7-Sep-10 | 9-Sep-10 |
| Conventional Variables | | | | | | | |
| Conductivity | µS/cm | 0.2 | 0.4 | 0.83 | 1.13 | 0.69 | 0.97 |
| Dissolved Organic Carbon | mg/L | 1 | <1 | <1 | <1 | <1 | <1 |
| Hardness (as CaCO ₃) | mg/L | - | <1 | <1 | <1 | <1 | <1 |
| pH | pH units | 0.1 | 5.59 | 6.16 | 6.41 | 5.78 | 6.43 |
| Total Alkalinity | mg/L | 5 | <5 | <5 | <5 | <5 | <5 |
| Total Dissolved Solids | mg/L | 5 | <5 | - | <5 | - | - |
| Total Dissolved Solids | mg/L | 10 | - | <10 | - | <10 | <10 |
| Total Organic Carbon | mg/L | 1 | <1 | <1 | <1 | <1 | <1 |
| Total Suspended Solids | mg/L | 3 | <3 | <3 | <3 | 3 | <3 |
| True Colour | T.C.U. | 2 | <2 | <2 | <2 | 2 | <2 |
| Major Ions | | | | | | | |
| Bicarbonate (HCO ₃) | mg/L | 5 | <5 | <5 | <5 | <5 | <5 |
| Calcium (Ca) | mg/L | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Carbonate (CO ₃) | mg/L | 5 | <5 | <5 | <5 | <5 | <5 |
| Chloride (Cl) | mg/L | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Hydroxide (OH) | mg/L | 5 | <5 | <5 | <5 | <5 | <5 |
| Magnesium (Mg) | mg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Potassium (K) | mg/L | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Sodium (Na) | mg/L | 1 | <1 | <1 | <1 | <1 | <1 |
| Sulfate (SO ₄) | mg/L | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Sulphide (S ₂) | mg/L | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Nutrients and BOD | | | | | | | |
| AmmoniaN | mg/L | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Biochemical Oxygen Demand | mg/L | 2 | <2 | <2 | <2 | <2 | <2 |
| Nitrate+Nitrite | mg/L | 0.071 | <0.071 | <0.071 | <0.071 | <0.071 | <0.071 |
| Phosphorus, dissolved | mg/L | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Phosphorus, total | mg/L | 0.001 | 0.0033 | <0.001 | <0.001 | <0.001 | <0.001 |
| Total Kjeldahl Nitrogen | mg/L | 0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Total Nitrogen | mg/L | - | 0.271 | 0.271 | 0.271 | 0.271 | 0.271 |
| Hydrocarbons | | | | | | | |
| Naphthenic Acids | mg/L | 0.02 | - | <0.02 | 0.06 | <0.02 | <0.02 |
| Total Phenolics | mg/L | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Total Rec. Hydrocarbons | mg/L | 1 | <1 | <1 | <1 | <1 | <1 |
| Dissolved Metals | | | | | | | |
| Aluminum (Al) | mg/L | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Antimony (Sb) | mg/L | 0.000001 | 0.0000036 | 0.0000033 | 0.000002 | - | - |
| Antimony (Sb) | mg/L | 0.00005 | - | - | - | <0.00005 | <0.00005 |
| Arsenic (As) | mg/L | 0.00004 | - | - | <0.00004 | - | - |
| Arsenic (As) | mg/L | 0.00006 | <0.00006 | <0.00006 | - | - | - |
| Arsenic (As) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Barium (Ba) | mg/L | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Beryllium (Be) | mg/L | 0.00001 | <0.00001 | <0.00001 | <0.00001 | - | - |
| Beryllium (Be) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Bismuth (Bi) | mg/L | 0.00001 | <0.00001 | <0.00001 | <0.00001 | - | - |
| Bismuth (Bi) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Boron (B) | mg/L | 0.0008 | <0.0008 | <0.0008 | <0.0008 | <0.0008 | <0.0008 |
| Cadmium (Cd) | mg/L | 0.000006 | <0.000006 | <0.000006 | <0.000006 | - | - |
| Cadmium (Cd) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Calcium (Ca) | mg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |

Indicates sample concentration is greater than five times the detection limit.

Table B.2-2 (Cont'd.)

| Variable | Unit | Detection Limit | Concentration in Trip Blank | | | | |
|-----------------------------------|------|-----------------|-----------------------------|-----------|-----------|----------|----------|
| | | | 8-Mar-10 | 14-May-10 | 14-Jul-10 | 7-Sep-10 | 9-Sep-10 |
| Dissolved Metals (Cont'd.) | | | | | | | |
| Chlorine (Cl) | mg/L | 0.3 | 0.5 | <0.3 | <0.3 | <0.3 | <0.3 |
| Chromium (Cr) | mg/L | 0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Cobalt (Co) | mg/L | 0.00001 | <0.00001 | <0.00001 | <0.00001 | - | - |
| Cobalt (Co) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Copper (Cu) | mg/L | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Iron (Fe) | mg/L | 0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 |
| Lead (Pb) | mg/L | 0.000006 | <0.000006 | <0.000006 | - | - | - |
| Lead (Pb) | mg/L | 0.00001 | - | - | 0.0000113 | - | - |
| Lead (Pb) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Lithium (Li) | mg/L | 0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Manganese (Mn) | mg/L | 0.00003 | <0.00003 | <0.00003 | <0.00003 | - | - |
| Manganese (Mn) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Molybdenum (Mo) | mg/L | 0.000008 | <0.000008 | <0.000008 | <0.000008 | - | - |
| Molybdenum (Mo) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Nickel (Ni) | mg/L | 0.00006 | <0.00006 | <0.00006 | <0.00006 | - | - |
| Nickel (Ni) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Selenium (Se) | mg/L | 0.0002 | <0.0002 | - | - | - | - |
| Selenium (Se) | mg/L | 0.0003 | - | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Silver (Ag) | mg/L | 0.000005 | <0.000005 | <0.000005 | <0.000005 | - | - |
| Silver (Ag) | mg/L | 0.00001 | - | - | - | <0.00001 | <0.00001 |
| Strontium (Sr) | mg/L | 0.000008 | 0.0000114 | 0.0000201 | 0.0000894 | - | - |
| Strontium (Sr) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Sulphur (S) | mg/L | 0.6 | 0.783 | <0.6 | <0.6 | - | - |
| Sulphur (S) | mg/L | 2 | - | - | - | <2 | <2 |
| Thallium (Tl) | mg/L | 0.000003 | <0.000003 | <0.000003 | <0.000003 | - | - |
| Thallium (Tl) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Thorium (Th) | mg/L | 0.00003 | <0.00003 | <0.00003 | <0.00003 | - | - |
| Thorium (Th) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Tin (Sn) | mg/L | 0.00007 | <0.00007 | <0.00007 | <0.00007 | - | - |
| Tin (Sn) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Titanium (Ti) | mg/L | 0.00007 | <0.00007 | <0.00007 | <0.00007 | - | - |
| Titanium (Ti) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Uranium (U) | mg/L | 0.000003 | <0.000003 | <0.000003 | <0.000003 | - | - |
| Uranium (U) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Vanadium (V) | mg/L | 0.00005 | - | - | <0.00005 | - | - |
| Vanadium (V) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Vanadium (V) | mg/L | 0.0002 | <0.0002 | <0.0002 | - | - | - |
| Zinc (Zn) | mg/L | 0.0002 | 0.000276 | <0.0002 | 0.00027 | <0.0002 | <0.0002 |
| Total Metals | | | | | | | |
| Aluminum (Al) | mg/L | 0.002 | <0.002 | <0.002 | <0.002 | - | - |
| Aluminum (Al) | mg/L | 0.003 | - | - | - | <0.003 | <0.003 |
| Antimony (Sb) | mg/L | 0.000001 | 0.0000036 | 0.0000033 | 0.000002 | - | - |
| Antimony (Sb) | mg/L | 0.00005 | - | - | - | <0.00005 | <0.00005 |
| Arsenic (As) | mg/L | 0.00004 | - | - | <0.00004 | - | - |
| Arsenic (As) | mg/L | 0.00006 | <0.00006 | <0.00006 | - | - | - |
| Arsenic (As) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |

Indicates sample concentration is greater than five times the detection limit.

Table B.2-2 (Cont'd.)

| Variable | Unit | Detection Limit | Concentration in Field Blank | | | | |
|-------------------------------|------|-----------------|------------------------------|-----------|-----------|----------|-----------|
| | | | 8-Mar-10 | 14-May-10 | 14-Jul-10 | 7-Sep-10 | 14-Sep-10 |
| Total Metals (Cont'd.) | | | | | | | |
| Barium (Ba) | mg/L | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Beryllium (Be) | mg/L | 0.00001 | <0.00001 | <0.00001 | <0.00001 | - | - |
| Beryllium (Be) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Bismuth (Bi) | mg/L | 0.00001 | <0.00001 | <0.00001 | <0.00001 | - | - |
| Bismuth (Bi) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Boron (B) | mg/L | 0.0008 | <0.0008 | 0.0009 | <0.0008 | <0.0008 | <0.0008 |
| Cadmium (Cd) | mg/L | 0.000006 | <0.000006 | <0.000006 | <0.000006 | - | - |
| Cadmium (Cd) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Calcium (Ca) | mg/L | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chlorine (Cl) | mg/L | 0.3 | 0.7 | <0.3 | <0.3 | <0.3 | <0.3 |
| Chromium (Cr) | mg/L | 0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Cobalt (Co) | mg/L | 0.00001 | <0.00001 | <0.00001 | <0.00001 | - | - |
| Cobalt (Co) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Copper (Cu) | mg/L | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Iron (Fe) | mg/L | 0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 |
| Lead (Pb) | mg/L | 0.000006 | <0.000006 | 0.0000079 | - | - | - |
| Lead (Pb) | mg/L | 0.00001 | - | - | 0.0000114 | - | - |
| Lead (Pb) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Lithium (Li) | mg/L | 0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Manganese (Mn) | mg/L | 0.00003 | <0.00003 | <0.00003 | <0.00003 | - | - |
| Manganese (Mn) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Mercury (Hg), ultratrace | ng/L | 0.6 | - | - | <0.6 | <0.6 | <0.6 |
| Mercury (Hg), ultratrace | ng/L | 1.2 | <1.2 | <1.2 | - | - | - |
| Molybdenum (Mo) | mg/L | 0.000008 | <0.000008 | <0.000008 | <0.000008 | - | - |
| Molybdenum (Mo) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Nickel (Ni) | mg/L | 0.00006 | <0.00006 | <0.00006 | <0.00006 | - | - |
| Nickel (Ni) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Selenium (Se) | mg/L | 0.0002 | <0.0002 | - | - | - | - |
| Selenium (Se) | mg/L | 0.0003 | - | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Silver (Ag) | mg/L | 0.000005 | <0.000005 | <0.000005 | <0.000005 | - | - |
| Silver (Ag) | mg/L | 0.00001 | - | - | - | <0.00001 | <0.00001 |
| Strontium (Sr) | mg/L | 0.000008 | 0.0000115 | 0.0000248 | 0.0000903 | - | - |
| Strontium (Sr) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Sulphur (S) | mg/L | 0.6 | 0.835 | <0.6 | <0.6 | - | - |
| Sulphur (S) | mg/L | 2 | - | - | - | <2 | <2 |
| Thallium (Tl) | mg/L | 0.000003 | <0.000003 | <0.000003 | <0.000003 | - | - |
| Thallium (Tl) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Thorium (Th) | mg/L | 0.00003 | <0.00003 | <0.00003 | <0.00003 | - | - |
| Thorium (Th) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Tin (Sn) | mg/L | 0.00007 | <0.00007 | <0.00007 | <0.00007 | - | - |
| Tin (Sn) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Titanium (Ti) | mg/L | 0.00007 | <0.00007 | <0.00007 | <0.00007 | - | - |
| Titanium (Ti) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Uranium (U) | mg/L | 0.000003 | <0.000003 | <0.000003 | <0.000003 | - | - |
| Uranium (U) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Vanadium (V) | mg/L | 0.00005 | - | - | <0.00005 | - | - |
| Vanadium (V) | mg/L | 0.0001 | - | - | - | <0.0001 | <0.0001 |
| Vanadium (V) | mg/L | 0.0002 | <0.0002 | <0.0002 | - | - | - |
| Zinc (Zn) | mg/L | 0.0002 | 0.000358 | 0.000214 | 0.000273 | <0.0002 | <0.0002 |

Indicates sample concentration is greater than five times the detection limit.

Table B.2-3 Relative percent difference between duplicate water quality samples collected from the Beaver River (BER-2), winter 2010.

| Analyte | Unit | Detection Limit | BER-2 8-March-10 | Duplicate 8-March-10 | Relative Percent Difference (%) |
|----------------------------------|----------|-----------------|---------------------|-------------------------|------------------------------------|
| Conventional Variables | | | | | |
| Conductivity | µS/cm | 0.2 | 936 | 923 | 1.4 |
| Dissolved Organic Carbon | mg/L | 1 | 13.8 | 15 | 8.3 |
| Hardness (as CaCO ₃) | mg/L | - | 171 | 162 | 5.4 |
| pH | pH units | 0.1 | 8.01 | 8.03 | 0.2 |
| Total Alkalinity | mg/L | 5 | 478 | 470 | 1.7 |
| Total Dissolved Solids | mg/L | 5 | 613 | 602 | 1.8 |
| Total Organic Carbon | mg/L | 1 | 13.2 | 12.7 | 3.9 |
| Total Suspended Solids | mg/L | 3 | 8 | 7 | 13.3 |
| True Colour | T.C.U. | 2 | 45 | 41 | 9.3 |
| Major Ions | | | | | |
| Bicarbonate (HCO ₃) | mg/L | 5 | 583 | 574 | 1.6 |
| Calcium (Ca) | mg/L | 0.5 | 36.4 | 34.7 | 4.8 |
| Carbonate (CO ₃) | mg/L | 5 | <5 | <5 | 0.0 |
| Chloride (Cl) | mg/L | 0.5 | 3.16 | 3.14 | 0.6 |
| Hydroxide (OH) | mg/L | 5 | <5 | <5 | 0.0 |
| Magnesium (Mg) | mg/L | 0.1 | 19.4 | 18.4 | 5.3 |
| Potassium (K) | mg/L | 0.5 | 3.63 | 3.42 | 6.0 |
| Sodium (Na) | mg/L | 1 | 185 | 167 | 10.2 |
| Sulfate (SO ₄) | mg/L | 0.5 | 44.3 | 43.7 | 1.4 |
| Sulphide (S ₂) | mg/L | 0.002 | 0.0028 | 0.002 | 33.3 |
| Nutrients and BOD | | | | | |
| Ammonia-N | mg/L | 0.05 | <0.05 | <0.05 | 0.0 |
| Biochemical Oxygen Demand | mg/L | 2 | <2 | <2 | 0.0 |
| Nitrate+Nitrite | mg/L | 0.071 | 0.344 | 0.347 | 0.9 |
| Phosphorus, dissolved | mg/L | 0.001 | 0.0226 | 0.0142 | 45.7 |
| Phosphorus, total | mg/L | 0.001 | 0.0679 | 0.0662 | 2.5 |
| Total Kjeldahl Nitrogen | mg/L | 0.2 | 0.75 | 0.98 | 26.6 |
| Total Nitrogen | mg/L | - | 1.094 | 1.327 | 19.2 |
| Hydrocarbons | | | | | |
| Naphthenic Acids | mg/L | 0.02 | 0.97 | 1.22 | 22.8 |
| Total Phenolics | mg/L | 0.001 | 0.0057 | 0.0062 | 8.4 |
| Total Rec. Hydrocarbons | mg/L | 1 | <1 | <1 | 0.0 |
| Dissolved Metals | | | | | |
| Aluminum (Al) | mg/L | 0.001 | 0.006 | 0.00632 | 5.2 |
| Antimony (Sb) | mg/L | 0.000001 | 0.0000483 | 0.0000491 | 1.6 |
| Arsenic (As) | mg/L | 0.00006 | 0.000384 | 0.000375 | 2.4 |
| Barium (Ba) | mg/L | 0.0001 | 0.0361 | 0.0388 | 7.2 |
| Beryllium (Be) | mg/L | 0.00001 | <0.00001 | <0.00001 | 0.0 |
| Bismuth (Bi) | mg/L | 0.00001 | <0.00001 | <0.00001 | 0.0 |
| Boron (B) | mg/L | 0.0008 | 0.85 | 0.859 | 1.1 |
| Cadmium (Cd) | mg/L | 0.000006 | 0.000009 | 0.0000097 | 7.5 |
| Calcium (Ca) | mg/L | 0.1 | 28.3 | 27.8 | 1.8 |
| Chlorine (Cl) | mg/L | 0.3 | 3.53 | 3.3 | 6.7 |
| Chromium (Cr) | mg/L | 0.0003 | 0.000505 | 0.000442 | 13.3 |
| Cobalt (Co) | mg/L | 0.00001 | 0.000106 | 0.000125 | 16.5 |
| Copper (Cu) | mg/L | 0.0001 | 0.000742 | 0.000739 | 0.4 |
| Iron (Fe) | mg/L | 0.004 | 0.247 | 0.259 | 4.7 |
| Lead (Pb) | mg/L | 0.000006 | 0.0000142 | 0.0000161 | 12.5 |
| Lithium (Li) | mg/L | 0.0002 | 0.0542 | 0.0515 | 5.1 |
| Manganese (Mn) | mg/L | 0.00003 | 0.0211 | 0.0291 | 31.9 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | 0.0 |
| Molybdenum (Mo) | mg/L | 0.000008 | 0.000829 | 0.000809 | 2.4 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable analytes (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

| | |
|---|---|
| # | Analytes differ by > 20% between duplicates but 1 or both concentrations are < 5 times the detection limit. |
| # | Analytes differ by > 20% between duplicates and concentrations are > 5 times the detection limit. |

Table B.2-3 (Cont'd.)

| Analyte | Unit | Detection Limit | BER-2 8-March-10 | Duplicate 8-March-10 | Relative Percent Difference (%) |
|-----------------------------------|------|-----------------|---------------------|-------------------------|------------------------------------|
| Dissolved Metals (Cont'd.) | | | | | |
| Nickel (Ni) | mg/L | 0.00006 | 0.000803 | 0.000958 | 17.6 |
| Selenium (Se) | mg/L | 0.0002 | <0.0002 | <0.0002 | 0.0 |
| Silver (Ag) | mg/L | 0.000005 | <0.000005 | <0.000005 | 0.0 |
| Strontium (Sr) | mg/L | 0.000008 | 0.251 | 0.249 | 0.8 |
| Sulphur (S) | mg/L | 0.6 | 15.2 | 16.1 | 5.8 |
| Thallium (Tl) | mg/L | 0.000003 | <0.000003 | <0.000003 | 0.0 |
| Thorium (Th) | mg/L | 0.00003 | <0.00003 | <0.00003 | 0.0 |
| Tin (Sn) | mg/L | 0.00007 | <0.00007 | <0.00007 | 0.0 |
| Titanium (Ti) | mg/L | 0.00007 | 0.00163 | 0.00156 | 4.4 |
| Uranium (U) | mg/L | 0.000003 | 0.000262 | 0.000274 | 4.5 |
| Vanadium (V) | mg/L | 0.00005 | 0.00054 | 0.000498 | 8.1 |
| Zinc (Zn) | mg/L | 0.0002 | 0.00104 | 0.00107 | 2.8 |
| Total Metals | | | | | |
| Aluminum (Al) | mg/L | 0.002 | 0.192 | 0.193 | 0.5 |
| Antimony (Sb) | mg/L | 0.00001 | 0.0000488 | 0.0000496 | 1.6 |
| Arsenic (As) | mg/L | 0.00006 | 0.000615 | 0.000606 | 1.5 |
| Barium (Ba) | mg/L | 0.0001 | 0.0458 | 0.046 | 0.4 |
| Beryllium (Be) | mg/L | 0.00001 | 0.0000239 | 0.0000232 | 3.0 |
| Bismuth (Bi) | mg/L | 0.00001 | <0.00001 | <0.00001 | 0.0 |
| Boron (B) | mg/L | 0.0008 | 0.892 | 0.868 | 2.7 |
| Cadmium (Cd) | mg/L | 0.000006 | 0.0000168 | 0.000018 | 6.9 |
| Calcium (Ca) | mg/L | 0.1 | 29 | 28.6 | 1.4 |
| Chlorine (Cl) | mg/L | 0.3 | 3.57 | 3.33 | 7.0 |
| Chromium (Cr) | mg/L | 0.0003 | 0.000541 | 0.000504 | 7.1 |
| Cobalt (Co) | mg/L | 0.00001 | 0.000251 | 0.000251 | 0.0 |
| Copper (Cu) | mg/L | 0.0001 | 0.000903 | 0.000888 | 1.7 |
| Iron (Fe) | mg/L | 0.004 | 1.07 | 1.06 | 0.9 |
| Lead (Pb) | mg/L | 0.000006 | 0.000123 | 0.00012 | 2.5 |
| Lithium (Li) | mg/L | 0.0002 | 0.0547 | 0.052 | 5.1 |
| Manganese (Mn) | mg/L | 0.00003 | 0.0639 | 0.0638 | 0.2 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | 0.0 |
| Mercury (Hg), ultra-trace | ng/L | 1.2 | <1.2 | <1.2 | 0.0 |
| Molybdenum (Mo) | mg/L | 0.000008 | 0.000833 | 0.000817 | 1.9 |
| Nickel (Ni) | mg/L | 0.00006 | 0.00107 | 0.00106 | 0.9 |
| Selenium (Se) | mg/L | 0.0002 | 0.000253 | <0.0002 | 23.4 |
| Silver (Ag) | mg/L | 0.000005 | 0.0000155 | 0.0000089 | 54.1 |
| Strontium (Sr) | mg/L | 0.000008 | 0.258 | 0.257 | 0.4 |
| Sulphur (S) | mg/L | 0.6 | 16.6 | 16.2 | 2.4 |
| Thallium (Tl) | mg/L | 0.000003 | <0.000003 | <0.000003 | 0.0 |
| Thorium (Th) | mg/L | 0.00003 | 0.0000377 | 0.0000378 | 0.3 |
| Tin (Sn) | mg/L | 0.00007 | <0.00007 | <0.00007 | 0.0 |
| Titanium (Ti) | mg/L | 0.00007 | 0.0077 | 0.00766 | 0.5 |
| Uranium (U) | mg/L | 0.000003 | 0.000295 | 0.000283 | 4.2 |
| Vanadium (V) | mg/L | 0.0002 | 0.00101 | 0.00099 | 2.0 |
| Zinc (Zn) | mg/L | 0.0002 | 0.00186 | 0.00183 | 1.6 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable analytes (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

- # Analytes differ by > 20% between duplicates but 1 or both concentrations are < 5 times the detection limit.
- # Analytes differ by > 20% between duplicates and concentrations are > 5 times the detection limit.

Table B.2-4 Relative percent difference between duplicate water quality samples collected from the MacKay River (MAR-2A), spring 2010.

| Analyte | Unit | Detection Limit | MAR-2a 14-May-10 | Duplicate 14-May-10 | Relative Percent Difference (%) |
|----------------------------------|----------|-----------------|---------------------|------------------------|------------------------------------|
| Conventional Variables | | | | | |
| Conductivity | µS/cm | 0.2 | 176 | 176 | 0.0 |
| Dissolved Organic Carbon | mg/L | 1 | 26.4 | 26.6 | 0.8 |
| Hardness (as CaCO ₃) | mg/L | - | 69 | 73 | 6.1 |
| pH | pH units | 0.1 | 7.73 | 7.71 | 0.3 |
| Total Alkalinity | mg/L | 5 | 73.7 | 73.0 | 1.0 |
| Total Dissolved Solids | mg/L | 10 | 168 | 167 | 0.6 |
| Total Organic Carbon | mg/L | 1 | 27.7 | 28.4 | 2.5 |
| Total Suspended Solids | mg/L | 3 | 8 | 5 | 46.2 |
| True Colour | T.C.U. | 2 | 133 | 132 | 0.8 |
| Major Ions | | | | | |
| Bicarbonate (HCO ₃) | mg/L | 5 | 89.9 | 89.1 | 0.9 |
| Calcium (Ca) | mg/L | 0.5 | 17.6 | 18.9 | 7.1 |
| Carbonate (CO ₃) | mg/L | 5 | <5 | <5 | 0.0 |
| Chloride (Cl) | mg/L | 0.5 | 0.99 | 0.99 | 0.0 |
| Hydroxide (OH) | mg/L | 5 | <5 | <5 | 0.0 |
| Magnesium (Mg) | mg/L | 0.1 | 6.0 | 6.3 | 4.2 |
| Potassium (K) | mg/L | 0.5 | 1.47 | 1.57 | 6.6 |
| Sodium (Na) | mg/L | 1 | 12.4 | 12.9 | 4.0 |
| Sulfate (SO ₄) | mg/L | 0.5 | 16.2 | 16.3 | 0.6 |
| Sulphide (S ₂) | mg/L | 0.002 | 0.0075 | 0.0085 | 12.5 |
| Nutrients and BOD | | | | | |
| Ammonia-N | mg/L | 0.05 | <0.05 | <0.05 | 0.0 |
| Biochemical Oxygen Demand | mg/L | 2 | <2 | <2 | 0.0 |
| Nitrate+Nitrite | mg/L | 0.071 | <0.071 | <0.071 | 0.0 |
| Phosphorus, dissolved | mg/L | 0.001 | 0.0285 | 0.0194 | 38.0 |
| Phosphorus, total | mg/L | 0.001 | 0.0478 | 0.0464 | 3.0 |
| Total Kjeldahl Nitrogen | mg/L | 0.2 | 1.85 | 2.02 | 8.8 |
| Total Nitrogen | mg/L | - | 1.921 | 2.091 | 8.5 |
| Hydrocarbons | | | | | |
| Naphthenic Acids | mg/L | 0.02 | 0.40 | 0.31 | 25.4 |
| Total Phenolics | mg/L | 0.001 | 0.009 | 0.008 | 10.7 |
| Total Rec. Hydrocarbons | mg/L | 1 | <1 | <1 | 0.0 |
| Dissolved Metals | | | | | |
| Aluminum (Al) | mg/L | 0.001 | 0.0199 | 0.0197 | 1.0 |
| Antimony (Sb) | mg/L | 0.000001 | 0.000043 | 0.000042 | 3.3 |
| Arsenic (As) | mg/L | 0.00006 | 0.000558 | 0.000594 | 6.3 |
| Barium (Ba) | mg/L | 0.0001 | 0.0170 | 0.0173 | 1.7 |
| Beryllium (Be) | mg/L | 0.00001 | 0.000014 | <0.000010 | 29.8 |
| Bismuth (Bi) | mg/L | 0.00001 | <0.00001 | <0.00001 | 0.0 |
| Boron (B) | mg/L | 0.0008 | 0.0585 | 0.0572 | 2.2 |
| Cadmium (Cd) | mg/L | 0.000006 | <0.000006 | <0.000006 | 0.0 |
| Calcium (Ca) | mg/L | 0.1 | 17.5 | 17.2 | 1.7 |
| Chlorine (Cl) | mg/L | 0.3 | 0.629 | 0.603 | 4.2 |
| Chromium (Cr) | mg/L | 0.0003 | <0.0003 | <0.0003 | 0.0 |
| Cobalt (Co) | mg/L | 0.00001 | 0.0000561 | 0.0000543 | 3.3 |
| Copper (Cu) | mg/L | 0.0001 | 0.000719 | 0.000609 | 16.6 |
| Iron (Fe) | mg/L | 0.004 | 0.543 | 0.533 | 1.9 |
| Lead (Pb) | mg/L | 0.000006 | 0.0000863 | 0.0000754 | 13.5 |
| Lithium (Li) | mg/L | 0.0002 | 0.0122 | 0.0116 | 5.0 |
| Manganese (Mn) | mg/L | 0.00003 | 0.0015 | 0.0015 | 2.6 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | 0.0 |
| Molybdenum (Mo) | mg/L | 0.000008 | 0.000363 | 0.000369 | 1.6 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable analytes (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

#

Analytes differ by > 20% between duplicates but 1 or both concentrations are < 5 times the detection limit.

#

Analytes differ by > 20% between duplicates and concentrations are > 5 times the detection limit.

Table B.2-4 (Cont'd.)

| Analyte | Unit | Detection Limit | MAR-2a 14-May-10 | Duplicate 14-May-10 | Relative Percent Difference (%) |
|-----------------------------------|------|-----------------|---------------------|------------------------|------------------------------------|
| Dissolved Metals (Cont'd.) | | | | | |
| Nickel (Ni) | mg/L | 0.00006 | 0.000812 | 0.000794 | 2.2 |
| Selenium (Se) | mg/L | 0.0002 | <0.0002 | <0.0003 | 40.0 |
| Silver (Ag) | mg/L | 0.000005 | <0.000005 | <0.000005 | 0.0 |
| Strontium (Sr) | mg/L | 0.000008 | 0.0820 | 0.0878 | 6.8 |
| Sulphur (S) | mg/L | 0.6 | 5.72 | 5.58 | 2.5 |
| Thallium (Tl) | mg/L | 0.000003 | 0.0000049 | <0.000003 | 48.1 |
| Thorium (Th) | mg/L | 0.00003 | 0.000037 | 0.0000322 | 13.9 |
| Tin (Sn) | mg/L | 0.00007 | <0.00007 | <0.00007 | 0.0 |
| Titanium (Ti) | mg/L | 0.00007 | 0.00155 | 0.00158 | 1.9 |
| Uranium (U) | mg/L | 0.000003 | 0.00013 | 0.00013 | 0.8 |
| Vanadium (V) | mg/L | 0.00005 | 0.000345 | 0.000303 | 13.0 |
| Zinc (Zn) | mg/L | 0.0002 | 0.00155 | 0.000732 | 71.7 |
| Total Metals | | | | | |
| Aluminum (Al) | mg/L | 0.002 | 0.503 | 0.510 | 1.4 |
| Antimony (Sb) | mg/L | 0.00001 | 0.0000438 | 0.0000424 | 3.2 |
| Arsenic (As) | mg/L | 0.00006 | 0.000791 | 0.000812 | 2.6 |
| Barium (Ba) | mg/L | 0.0001 | 0.0213 | 0.0213 | 0.0 |
| Beryllium (Be) | mg/L | 0.00001 | 0.0000258 | 0.0000191 | 29.8 |
| Bismuth (Bi) | mg/L | 0.00001 | <0.00001 | <0.00001 | 0.0 |
| Boron (B) | mg/L | 0.0008 | 0.0610 | 0.0614 | 0.7 |
| Cadmium (Cd) | mg/L | 0.000006 | 0.0000074 | 0.0000063 | 16.1 |
| Calcium (Ca) | mg/L | 0.1 | 18 | 18 | 0.0 |
| Chlorine (Cl) | mg/L | 0.3 | 0.64 | 1.05 | 49.3 |
| Chromium (Cr) | mg/L | 0.0003 | 0.000561 | 0.000489 | 13.7 |
| Cobalt (Co) | mg/L | 0.00001 | 0.000192 | 0.000198 | 3.1 |
| Copper (Cu) | mg/L | 0.0001 | 0.000726 | 0.000749 | 3.1 |
| Iron (Fe) | mg/L | 0.004 | 1.04 | 1.05 | 1.0 |
| Lead (Pb) | mg/L | 0.000006 | 0.000236 | 0.000201 | 16.0 |
| Lithium (Li) | mg/L | 0.0002 | 0.013 | 0.0122 | 6.3 |
| Manganese (Mn) | mg/L | 0.00003 | 0.0293 | 0.0306 | 4.3 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | 0.0 |
| Mercury (Hg), ultra-trace | ng/L | 1.2 | 1.6 | <1.2 | 28.6 |
| Molybdenum (Mo) | mg/L | 0.000008 | 0.000375 | 0.000373 | 0.5 |
| Nickel (Ni) | mg/L | 0.00006 | 0.00099 | 0.00101 | 2.0 |
| Selenium (Se) | mg/L | 0.0002 | <0.0002 | <0.0003 | 40.0 |
| Silver (Ag) | mg/L | 0.000005 | <0.000005 | <0.000005 | 0.0 |
| Strontium (Sr) | mg/L | 0.000008 | 0.106 | 0.118 | 10.7 |
| Sulphur (S) | mg/L | 0.6 | 5.93 | 5.75 | 3.1 |
| Thallium (Tl) | mg/L | 0.000003 | 0.000007 | 0.0000055 | 24.0 |
| Thorium (Th) | mg/L | 0.00003 | 0.0000629 | 0.0000665 | 5.6 |
| Tin (Sn) | mg/L | 0.00007 | <0.00007 | <0.00007 | 0.0 |
| Titanium (Ti) | mg/L | 0.00007 | 0.00804 | 0.00819 | 1.8 |
| Uranium (U) | mg/L | 0.000003 | 0.000148 | 0.000148 | 0.0 |
| Vanadium (V) | mg/L | 0.0002 | 0.0011 | 0.0011 | 2.7 |
| Zinc (Zn) | mg/L | 0.0002 | 0.00157 | 0.00249 | 45.3 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable analytes (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

| | |
|---|---|
| # | Analytes differ by > 20% between duplicates but 1 or both concentrations are < 5 times the detection limit. |
| # | Analytes differ by > 20% between duplicates and concentrations are > 5 times the detection limit. |

Table B.2-5 Relative percent differences between duplicate water quality samples collected from the Athabasca River (ATR-DC-W), summer 2010.

| Analyte | Unit | Detection Limit | ATR-DC-W 13-July-10 | Duplicate 13-July-10 | Relative Percent Difference (%) |
|----------------------------------|----------|-----------------|------------------------|-------------------------|------------------------------------|
| Conventional Variables | | | | | |
| Conductivity | µS/cm | 0.2 | 261 | 263 | 0.8 |
| Dissolved Organic Carbon | mg/L | 1 | 5.3 | 5.3 | 0.0 |
| Hardness (as CaCO ₃) | mg/L | - | 112 | 117 | 4.4 |
| pH | pH units | 0.1 | 8.35 | 8.33 | 0.2 |
| Total Alkalinity | mg/L | 5 | 102 | 102 | 0.0 |
| Total Dissolved Solids | mg/L | 5 | 157 | 165 | 5.0 |
| Total Organic Carbon | mg/L | 1 | 4.8 | 5.3 | 9.9 |
| Total Suspended Solids | mg/L | 3 | 38 | 31 | 20.3 |
| True Colour | T.C.U. | 2 | 15 | 15 | 0.0 |
| Major Ions | | | | | |
| Bicarbonate (HCO ₃) | mg/L | 5 | 116 | 116 | 0.0 |
| Calcium (Ca) | mg/L | 0.5 | 30.3 | 31.9 | 5.1 |
| Carbonate (CO ₃) | mg/L | 5 | <5 | <5 | 0.0 |
| Chloride (Cl) | mg/L | 0.5 | 2.23 | 2.22 | 0.4 |
| Hydroxide (OH) | mg/L | 5 | <5 | <5 | 0.0 |
| Magnesium (Mg) | mg/L | 0.1 | 8.88 | 9.16 | 3.1 |
| Potassium (K) | mg/L | 0.5 | 0.88 | 0.76 | 14.6 |
| Sodium (Na) | mg/L | 1 | 7.3 | 7.6 | 4.0 |
| Sulfate (SO ₄) | mg/L | 0.5 | 28.1 | 28.1 | 0.0 |
| Sulphide (S ₂) | mg/L | 0.002 | <0.002 | <0.002 | 0.0 |
| Nutrients and BOD | | | | | |
| Ammonia-N | mg/L | 0.05 | <0.05 | <0.05 | 0.0 |
| Biochemical Oxygen Demand | mg/L | 2 | <2 | <2 | 0.0 |
| Nitrate+Nitrite | mg/L | 0.071 | <0.071 | <0.071 | 0.0 |
| Phosphorus, dissolved | mg/L | 0.001 | <0.001 | 0.002 | 66.7 |
| Phosphorus, total | mg/L | 0.001 | 0.0303 | 0.0359 | 16.9 |
| Total Kjeldahl Nitrogen | mg/L | 0.2 | 0.51 | 0.53 | 3.8 |
| Total Nitrogen | mg/L | - | 0.581 | 0.601 | 3.4 |
| Hydrocarbons | | | | | |
| Naphthenic Acids | mg/L | 0.02 | 0.04 | 0.05 | 22.2 |
| Total Phenolics | mg/L | 0.001 | 0.0011 | <0.001 | 9.5 |
| Total Rec. Hydrocarbons | mg/L | 1 | <1 | <1 | 0.0 |
| Dissolved Metals | | | | | |
| Aluminum (Al) | mg/L | 0.001 | 0.0102 | 0.0102 | 0.0 |
| Antimony (Sb) | mg/L | 0.000001 | 0.0000703 | 0.0000728 | 3.5 |
| Arsenic (As) | mg/L | 0.00004 | 0.000409 | 0.000424 | 3.6 |
| Barium (Ba) | mg/L | 0.0001 | 0.0489 | 0.0481 | 1.6 |
| Beryllium (Be) | mg/L | 0.00001 | <0.00001 | <0.00001 | 0.0 |
| Bismuth (Bi) | mg/L | 0.00001 | <0.00001 | <0.00001 | 0.0 |
| Boron (B) | mg/L | 0.0008 | 0.0178 | 0.0188 | 5.5 |
| Cadmium (Cd) | mg/L | 0.000006 | 0.0000126 | 0.0000137 | 8.4 |
| Calcium (Ca) | mg/L | 0.1 | 30.5 | 30.7 | 0.7 |
| Chlorine (Cl) | mg/L | 0.3 | 1.59 | 1.55 | 2.5 |
| Chromium (Cr) | mg/L | 0.0003 | 0.000301 | <0.0003 | 0.3 |
| Cobalt (Co) | mg/L | 0.00001 | 0.0000555 | 0.0000481 | 14.3 |
| Copper (Cu) | mg/L | 0.0001 | 0.000744 | 0.000747 | 0.4 |
| Iron (Fe) | mg/L | 0.004 | 0.00567 | <0.004 | 34.5 |
| Lead (Pb) | mg/L | 0.00001 | 0.0000133 | 0.0000128 | 3.8 |
| Lithium (Li) | mg/L | 0.0002 | 0.00414 | 0.00443 | 6.8 |
| Manganese (Mn) | mg/L | 0.00003 | 0.000334 | 0.000324 | 3.0 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | 0.0 |
| Molybdenum (Mo) | mg/L | 0.000008 | 0.000674 | 0.000655 | 2.9 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable analytes (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

Analytes differ by > 20% between duplicates but 1 or both concentrations are < 5 times the detection limit.

Analytes differ by > 20% between duplicates and concentrations are > 5 times the detection limit.

Table B.2-5 (Cont'd.)

| Analyte | Unit | Detection Limit | ATR-DC-W 13-July-10 | Duplicate 13-July-10 | Relative Percent Difference (%) |
|-----------------------------------|------|-----------------|------------------------|-------------------------|------------------------------------|
| Dissolved Metals (Cont'd.) | | | | | |
| Nickel (Ni) | mg/L | 0.00006 | 0.000356 | 0.000337 | 5.5 |
| Selenium (Se) | mg/L | 0.0003 | <0.0003 | <0.0003 | 0.0 |
| Silver (Ag) | mg/L | 0.000005 | <0.000005 | <0.000005 | 0.0 |
| Strontium (Sr) | mg/L | 0.000008 | 0.227 | 0.227 | 0.0 |
| Sulphur (S) | mg/L | 0.6 | 9.09 | 9.28 | 2.1 |
| Thallium (Tl) | mg/L | 0.000003 | 0.0000076 | 0.0000067 | 12.6 |
| Thorium (Th) | mg/L | 0.00003 | <0.00003 | <0.00003 | 0.0 |
| Tin (Sn) | mg/L | 0.00007 | <0.00007 | <0.00007 | 0.0 |
| Titanium (Ti) | mg/L | 0.00007 | 0.000668 | 0.00067 | 0.3 |
| Uranium (U) | mg/L | 0.000003 | 0.000388 | 0.00039 | 0.5 |
| Vanadium (V) | mg/L | 0.00005 | 0.000299 | 0.000238 | 22.7 |
| Zinc (Zn) | mg/L | 0.0002 | 0.000542 | 0.000611 | 12.0 |
| Total Metals | | | | | |
| Aluminum (Al) | mg/L | 0.002 | 1.85 | 1.81 | 2.2 |
| Antimony (Sb) | mg/L | 0.000001 | 0.000071 | 0.0000735 | 3.5 |
| Arsenic (As) | mg/L | 0.00004 | 0.000775 | 0.000809 | 4.3 |
| Barium (Ba) | mg/L | 0.0001 | 0.0657 | 0.0648 | 1.4 |
| Beryllium (Be) | mg/L | 0.00001 | 0.0000556 | 0.000048 | 14.7 |
| Bismuth (Bi) | mg/L | 0.00001 | <0.00001 | <0.00001 | 0.0 |
| Boron (B) | mg/L | 0.0008 | 0.019 | 0.0199 | 4.6 |
| Cadmium (Cd) | mg/L | 0.000006 | 0.0000287 | 0.0000267 | 7.2 |
| Calcium (Ca) | mg/L | 0.1 | 31.2 | 31.8 | 1.9 |
| Chlorine (Cl) | mg/L | 0.3 | 1.61 | 1.57 | 2.5 |
| Chromium (Cr) | mg/L | 0.0003 | 0.00163 | 0.00156 | 4.4 |
| Cobalt (Co) | mg/L | 0.00001 | 0.000444 | 0.000434 | 2.3 |
| Copper (Cu) | mg/L | 0.0001 | 0.00152 | 0.00151 | 0.7 |
| Iron (Fe) | mg/L | 0.004 | 1.01 | 0.986 | 2.4 |
| Lead (Pb) | mg/L | 0.00001 | 0.000496 | 0.000641 | 25.5 |
| Lithium (Li) | mg/L | 0.0002 | 0.00463 | 0.00468 | 1.1 |
| Manganese (Mn) | mg/L | 0.00003 | 0.04 | 0.0394 | 1.5 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | 0.0 |
| Mercury (Hg), ultra-trace | ng/L | 0.6 | 2.4 | 2 | 18.2 |
| Molybdenum (Mo) | mg/L | 0.000008 | 0.000681 | 0.000662 | 2.8 |
| Nickel (Ni) | mg/L | 0.00006 | 0.00131 | 0.00119 | 9.6 |
| Selenium (Se) | mg/L | 0.0003 | 0.000311 | <0.0003 | 3.6 |
| Silver (Ag) | mg/L | 0.000005 | 0.0000077 | 0.0000071 | 8.1 |
| Strontium (Sr) | mg/L | 0.000008 | 0.232 | 0.232 | 0.0 |
| Sulphur (S) | mg/L | 0.6 | 9.18 | 9.37 | 2.0 |
| Thallium (Tl) | mg/L | 0.000003 | 0.0000238 | 0.0000227 | 4.7 |
| Thorium (Th) | mg/L | 0.00003 | 0.000197 | 0.000179 | 9.6 |
| Tin (Sn) | mg/L | 0.00007 | <0.00007 | <0.00007 | 0.0 |
| Titanium (Ti) | mg/L | 0.00007 | 0.0265 | 0.0233 | 12.9 |
| Uranium (U) | mg/L | 0.000003 | 0.000449 | 0.000444 | 1.1 |
| Vanadium (V) | mg/L | 0.00005 | 0.00341 | 0.00329 | 3.6 |
| Zinc (Zn) | mg/L | 0.0002 | 0.00469 | 0.00438 | 6.8 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable analytes (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

Analytes differ by > 20% between duplicates but 1 or both concentrations are < 5 times the detection limit.

Analytes differ by > 20% between duplicates and concentrations are > 5 times the detection limit.

Table B.2-6 Relative percent difference between duplicate water quality samples collected from the Beaver River (BER-2), fall 2010.

| Analyte | Unit | Detection Limit | BER-2 7-Sept-10 | Duplicate 7-Sept-10 | Relative Percent Difference (%) |
|----------------------------------|----------|-----------------|-----------------|---------------------|---------------------------------|
| Conventional Variables | | | | | |
| Conductivity | µS/cm | 0.2 | 255 | 255 | 0.0 |
| Dissolved Organic Carbon | mg/L | 1 | 32.0 | 31.8 | 0.6 |
| Hardness (as CaCO ₃) | mg/L | - | 87.1 | 85.1 | 2.3 |
| pH | pH units | 0.1 | 7.83 | 7.91 | 1.0 |
| Total Alkalinity | mg/L | 5 | 118 | 119 | 0.8 |
| Total Dissolved Solids | mg/L | 10 | 210 | 213 | 1.4 |
| Total Organic Carbon | mg/L | 1 | 33.5 | 33.9 | 1.2 |
| Total Suspended Solids | mg/L | 3 | 93 | 99 | 6.3 |
| True Colour | T.C.U. | 2 | 178 | 179 | 0.6 |
| Major Ions | | | | | |
| Bicarbonate (HCO ₃) | mg/L | 5 | 144 | 145 | 0.7 |
| Calcium (Ca) | mg/L | 0.5 | 22.5 | 21.9 | 2.7 |
| Carbonate (CO ₃) | mg/L | 5 | <5 | <5 | 0.0 |
| Chloride (Cl) | mg/L | 0.5 | 0.68 | 0.68 | 0.0 |
| Hydroxide (OH) | mg/L | 5 | <5 | <5 | 0.0 |
| Magnesium (Mg) | mg/L | 0.1 | 7.52 | 7.39 | 1.7 |
| Potassium (K) | mg/L | 0.5 | 1.07 | 0.91 | 16.2 |
| Sodium (Na) | mg/L | 1 | 20.9 | 20.3 | 2.9 |
| Sulfate (SO ₄) | mg/L | 0.5 | 13.2 | 13.2 | 0.0 |
| Sulphide (S ₂) | mg/L | 0.002 | 0.0135 | 0.0132 | 2.2 |
| Nutrients and BOD | | | | | |
| Ammonia-N | mg/L | 0.05 | <0.05 | <0.05 | 0.0 |
| Biochemical Oxygen Demand | mg/L | 2 | <2 | <2 | 0.0 |
| Nitrate+Nitrite | mg/L | 0.071 | <0.071 | <0.071 | 0.0 |
| Phosphorus, dissolved | mg/L | 0.001 | 0.0371 | 0.0392 | 5.5 |
| Phosphorus, total | mg/L | 0.001 | 0.144 | 0.149 | 3.4 |
| Total Kjeldahl Nitrogen | mg/L | 0.2 | 2.37 | 3.02 | 24.1 |
| Total Nitrogen | mg/L | - | 2.441 | 3.041 | 21.9 |
| Hydrocarbons | | | | | |
| Naphthenic Acids | mg/L | 0.02 | 0.12 | 0.14 | 15.4 |
| Total Phenolics | mg/L | 0.001 | 0.009 | 0.009 | 2.2 |
| Total Rec. Hydrocarbons | mg/L | 1 | <1 | <1 | 0.0 |
| Dissolved Metals | | | | | |
| Aluminum (Al) | mg/L | 0.001 | 0.0344 | 0.0344 | 0.0 |
| Antimony (Sb) | mg/L | 0.00005 | 0.0000606 | 0.0000732 | 18.8 |
| Arsenic (As) | mg/L | 0.0001 | 0.00085 | 0.00089 | 4.9 |
| Barium (Ba) | mg/L | 0.0001 | 0.0285 | 0.0286 | 0.4 |
| Beryllium (Be) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Bismuth (Bi) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Boron (B) | mg/L | 0.0008 | 0.0884 | 0.0929 | 5.0 |
| Cadmium (Cd) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Calcium (Ca) | mg/L | 0.1 | 26.6 | 27.6 | 3.7 |
| Chlorine (Cl) | mg/L | 0.3 | 0.585 | 0.620 | 5.8 |
| Chromium (Cr) | mg/L | 0.0003 | 0.00038 | 0.00033 | 14.7 |
| Cobalt (Co) | mg/L | 0.0001 | 0.000189 | 0.000185 | 2.1 |
| Copper (Cu) | mg/L | 0.0001 | 0.000644 | 0.000564 | 13.2 |
| Iron (Fe) | mg/L | 0.004 | 0.806 | 0.788 | 2.3 |
| Lead (Pb) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Lithium (Li) | mg/L | 0.0002 | 0.0142 | 0.0138 | 2.9 |
| Manganese (Mn) | mg/L | 0.0001 | 0.0404 | 0.0366 | 9.9 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | 0.0 |
| Molybdenum (Mo) | mg/L | 0.0001 | 0.000193 | 0.000198 | 2.6 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable analytes (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

Analytes differ by > 20% between duplicates but 1 or both concentrations are < 5 times the detection limit.

Analytes differ by > 20% between duplicates and concentrations are > 5 times the detection limit.

Table B.2-6 (Cont'd.)

| Analyte | Unit | Detection Limit | BER-2 7-Sept-10 | Duplicate 7-Sept-10 | Relative Percent Difference (%) |
|---------------------------------|------|-----------------|-----------------|---------------------|---------------------------------|
| Dissolved Metals cont'd. | | | | | |
| Nickel (Ni) | mg/L | 0.0001 | 0.000897 | 0.000833 | 7.4 |
| Selenium (Se) | mg/L | 0.0003 | <0.0003 | <0.0003 | 0.0 |
| Silver (Ag) | mg/L | 0.00001 | <0.00001 | <0.00001 | 0.0 |
| Strontium (Sr) | mg/L | 0.0001 | 0.14 | 0.14 | 2.8 |
| Sulphur (S) | mg/L | 2 | 4.03 | 4.17 | 3.4 |
| Thallium (Tl) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Thorium (Th) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Tin (Sn) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Titanium (Ti) | mg/L | 0.0001 | 0.00307 | 0.00296 | 3.6 |
| Uranium (U) | mg/L | 0.0001 | 0.000101 | 0.000105 | 3.9 |
| Vanadium (V) | mg/L | 0.0001 | 0.00091 | 0.000858 | 5.9 |
| Zinc (Zn) | mg/L | 0.0002 | 0.000236 | <0.0002 | 16.5 |
| Total Metals | | | | | |
| Aluminum (Al) | mg/L | 0.003 | 2.17 | 1.91 | 12.7 |
| Antimony (Sb) | mg/L | 0.00005 | 0.0000612 | 0.0000739 | 18.8 |
| Arsenic (As) | mg/L | 0.0001 | 0.00175 | 0.00158 | 10.2 |
| Barium (Ba) | mg/L | 0.0001 | 0.0645 | 0.0579 | 10.8 |
| Beryllium (Be) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Bismuth (Bi) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Boron (B) | mg/L | 0.0008 | 0.0893 | 0.0938 | 4.9 |
| Cadmium (Cd) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Calcium (Ca) | mg/L | 0.1 | 26.7 | 27.7 | 3.7 |
| Chlorine (Cl) | mg/L | 0.3 | 0.591 | 0.626 | 5.8 |
| Chromium (Cr) | mg/L | 0.0003 | 0.0036 | 0.00306 | 16.2 |
| Cobalt (Co) | mg/L | 0.0001 | 0.00123 | 0.00114 | 7.6 |
| Copper (Cu) | mg/L | 0.0001 | 0.00177 | 0.00354 | 66.7 |
| Iron (Fe) | mg/L | 0.004 | 3.23 | 2.99 | 7.7 |
| Lead (Pb) | mg/L | 0.0001 | 0.0013 | 0.00123 | 5.5 |
| Lithium (Li) | mg/L | 0.0002 | 0.0142 | 0.014 | 1.4 |
| Manganese (Mn) | mg/L | 0.0001 | 0.114 | 0.11 | 3.6 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | 0.0 |
| Mercury (Hg), ultra-trace | ng/L | 0.6 | 10.6 | 9.7 | 8.9 |
| Molybdenum (Mo) | mg/L | 0.0001 | 0.000195 | 0.0002 | 2.5 |
| Nickel (Ni) | mg/L | 0.0001 | 0.0027 | 0.00323 | 17.9 |
| Selenium (Se) | mg/L | 0.0003 | <0.0003 | <0.0003 | 0.0 |
| Silver (Ag) | mg/L | 0.00001 | 0.0000114 | 0.0000448 | 118.9 |
| Strontium (Sr) | mg/L | 0.0001 | 0.146 | 0.147 | 0.7 |
| Sulphur (S) | mg/L | 2 | 4.07 | 4.21 | 3.4 |
| Thallium (Tl) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Thorium (Th) | mg/L | 0.0001 | 0.000396 | 0.000395 | 0.3 |
| Tin (Sn) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Titanium (Ti) | mg/L | 0.0001 | 0.0449 | 0.0413 | 8.4 |
| Uranium (U) | mg/L | 0.0001 | 0.000188 | 0.000177 | 6.0 |
| Vanadium (V) | mg/L | 0.0001 | 0.0075 | 0.00652 | 14.0 |
| Zinc (Zn) | mg/L | 0.0002 | 0.0094 | 0.012 | 24.3 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable analytes (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

Analytes differ by > 20% between duplicates but 1 or both concentrations are < 5 times the detection limit.

Analytes differ by > 20% between duplicates and concentrations are > 5 times the detection limit.

Table B.2-7 Relative percent difference between duplicate water quality samples collected from the MacKay River (MAR-1), fall 2010.

| Analyte | Unit | Detection Limit | MAR-1 9-Sept-10 | Duplicate 9-Sept-10 | Relative Percent Difference (%) |
|----------------------------------|----------|-----------------|-----------------|---------------------|---------------------------------|
| Conventional Variables | | | | | |
| Conductivity | µS/cm | 0.2 | 183 | 184 | 0.5 |
| Dissolved Organic Carbon | mg/L | 1 | 39.7 | 39.2 | 1.3 |
| Hardness (as CaCO ₃) | mg/L | - | 81.8 | 73.3 | 11.0 |
| pH | pH units | 0.1 | 7.93 | 7.98 | 0.6 |
| Total Alkalinity | mg/L | 5 | 80.2 | 80.6 | 0.5 |
| Total Dissolved Solids | mg/L | 10 | 178 | 201 | 12.1 |
| Total Organic Carbon | mg/L | 1 | 37.2 | 37.6 | 1.1 |
| Total Suspended Solids | mg/L | 3 | 41 | 38 | 7.6 |
| True Colour | T.C.U. | 2 | 220 | 233 | 5.7 |
| Major Ions | | | | | |
| Bicarbonate (HCO ₃) | mg/L | 5 | 97.8 | 98.4 | 0.6 |
| Calcium (Ca) | mg/L | 0.5 | 20.8 | 18.8 | 10.1 |
| Carbonate (CO ₃) | mg/L | 5 | <5 | <5 | 0.0 |
| Chloride (Cl) | mg/L | 0.5 | 1.2 | 1.2 | 3.3 |
| Hydroxide (OH) | mg/L | 5 | <5 | <5 | 0.0 |
| Magnesium (Mg) | mg/L | 0.1 | 7.26 | 6.39 | 12.7 |
| Potassium (K) | mg/L | 0.5 | 0.85 | 0.51 | 50.0 |
| Sodium (Na) | mg/L | 1 | 15.4 | 14.1 | 8.8 |
| Sulfate (SO ₄) | mg/L | 0.5 | 9.6 | 9.7 | 1.1 |
| Sulphide (S ₂) | mg/L | 0.002 | 0.0191 | 0.0204 | 6.6 |
| Nutrients and BOD | | | | | |
| Ammonia-N | mg/L | 0.05 | <0.05 | <0.05 | 0.0 |
| Biochemical Oxygen Demand | mg/L | 2 | <2 | <2 | 0.0 |
| Nitrate+Nitrite | mg/L | 0.071 | <0.071 | <0.071 | 0.0 |
| Phosphorus, dissolved | mg/L | 0.001 | 0.0265 | 0.0290 | 9.0 |
| Phosphorus, total | mg/L | 0.001 | 0.0715 | 0.0757 | 5.7 |
| Total Kjeldahl Nitrogen | mg/L | 0.2 | 2.05 | 1.27 | 47.0 |
| Total Nitrogen | mg/L | - | 2.121 | 1.341 | 45.1 |
| Hydrocarbons | | | | | |
| Naphthenic Acids | mg/L | 0.02 | 0.18 | 0.20 | 10.5 |
| Total Phenolics | mg/L | 0.001 | 0.0203 | 0.0095 | 72.5 |
| Total Rec. Hydrocarbons | mg/L | 1 | <1 | <1 | 0.0 |
| Dissolved Metals | | | | | |
| Aluminum (Al) | mg/L | 0.001 | 0.0464 | 0.0451 | 2.8 |
| Antimony (Sb) | mg/L | 0.00005 | 0.0000527 | 0.0000543 | 3.0 |
| Arsenic (As) | mg/L | 0.0001 | 0.000759 | 0.000762 | 0.4 |
| Barium (Ba) | mg/L | 0.0001 | 0.0189 | 0.019 | 0.5 |
| Beryllium (Be) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Bismuth (Bi) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Boron (B) | mg/L | 0.0008 | 0.0507 | 0.0514 | 1.4 |
| Cadmium (Cd) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Calcium (Ca) | mg/L | 0.1 | 21.6 | 21.6 | 0.0 |
| Chlorine (Cl) | mg/L | 0.3 | 1.02 | 1.04 | 1.9 |
| Chromium (Cr) | mg/L | 0.0003 | <0.00030 | 0.00032 | 4.9 |
| Cobalt (Co) | mg/L | 0.0001 | 0.000149 | 0.000157 | 5.2 |
| Copper (Cu) | mg/L | 0.0001 | 0.000518 | 0.00053 | 2.3 |
| Iron (Fe) | mg/L | 0.004 | 0.429 | 0.428 | 0.2 |
| Lead (Pb) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Lithium (Li) | mg/L | 0.0002 | 0.0103 | 0.0103 | 0.0 |
| Manganese (Mn) | mg/L | 0.0001 | 0.00877 | 0.00945 | 7.5 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | 0.0 |
| Molybdenum (Mo) | mg/L | 0.0001 | 0.000152 | 0.000156 | 2.6 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable analytes (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

| | |
|---|---|
| # | Analytes differ by > 20% between duplicates but 1 or both concentrations are < 5 times the detection limit. |
| # | Analytes differ by > 20% between duplicates and concentrations are > 5 times the detection limit. |

Table B.2-7 (Cont'd.)

| Analyte | Unit | Detection Limit | MAR-1 9-Sept-10 | Duplicate 9-Sept-10 | Relative Percent Difference (%) |
|-----------------------------------|------|-----------------|--------------------|------------------------|------------------------------------|
| Dissolved Metals (Cont'd.) | | | | | |
| Nickel (Ni) | mg/L | 0.0001 | 0.000932 | 0.000881 | 5.6 |
| Selenium (Se) | mg/L | 0.0003 | <0.0003 | <0.0003 | 0.0 |
| Silver (Ag) | mg/L | 0.00001 | <0.00001 | <0.00001 | 0.0 |
| Strontium (Sr) | mg/L | 0.0001 | 0.106 | 0.106 | 0.0 |
| Sulphur (S) | mg/L | 2 | 3.27 | 3.28 | 0.3 |
| Thallium (Tl) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Thorium (Th) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Tin (Sn) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Titanium (Ti) | mg/L | 0.0001 | 0.0039 | 0.0038 | 2.9 |
| Uranium (U) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Vanadium (V) | mg/L | 0.0001 | 0.000432 | 0.000467 | 7.8 |
| Zinc (Zn) | mg/L | 0.0002 | 0.00077 | <0.00020 | 117.9 |
| Total Metals | | | | | |
| Aluminum (Al) | mg/L | 0.003 | 1.74 | 1.69 | 2.9 |
| Antimony (Sb) | mg/L | 0.00005 | 0.0000532 | 0.0000548 | 3.0 |
| Arsenic (As) | mg/L | 0.0001 | 0.00131 | 0.00133 | 1.5 |
| Barium (Ba) | mg/L | 0.0001 | 0.0360 | 0.0355 | 1.4 |
| Beryllium (Be) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Bismuth (Bi) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Boron (B) | mg/L | 0.0008 | 0.0512 | 0.0519 | 1.4 |
| Cadmium (Cd) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Calcium (Ca) | mg/L | 0.1 | 21.6 | 21.7 | 0.5 |
| Chlorine (Cl) | mg/L | 0.3 | 1.03 | 1.05 | 1.9 |
| Chromium (Cr) | mg/L | 0.0003 | 0.00257 | 0.00255 | 0.8 |
| Cobalt (Co) | mg/L | 0.0001 | 0.000649 | 0.000673 | 3.6 |
| Copper (Cu) | mg/L | 0.0001 | 0.00135 | 0.00135 | 0.0 |
| Iron (Fe) | mg/L | 0.004 | 2.08 | 2.06 | 1.0 |
| Lead (Pb) | mg/L | 0.0001 | 0.00074 | 0.00073 | 1.9 |
| Lithium (Li) | mg/L | 0.0002 | 0.0104 | 0.0106 | 1.9 |
| Manganese (Mn) | mg/L | 0.0001 | 0.074 | 0.076 | 2.4 |
| Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 | 0.0 |
| Mercury (Hg), ultra-trace | ng/L | 0.6 | 6.3 | 6.3 | 0.0 |
| Molybdenum (Mo) | mg/L | 0.0001 | 0.000163 | 0.000163 | 0.0 |
| Nickel (Ni) | mg/L | 0.0001 | 0.00195 | 0.00196 | 0.5 |
| Selenium (Se) | mg/L | 0.0003 | <0.0003 | <0.0003 | 0.0 |
| Silver (Ag) | mg/L | 0.00001 | <0.00001 | <0.00001 | 0.0 |
| Strontium (Sr) | mg/L | 0.0001 | 0.108 | 0.109 | 0.9 |
| Sulphur (S) | mg/L | 2 | 3.3 | 3.3 | 0.3 |
| Thallium (Tl) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Thorium (Th) | mg/L | 0.0001 | 0.000276 | 0.000263 | 4.8 |
| Tin (Sn) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0.0 |
| Titanium (Ti) | mg/L | 0.0001 | 0.0439 | 0.0377 | 15.2 |
| Uranium (U) | mg/L | 0.0001 | 0.00015 | 0.00015 | 2.0 |
| Vanadium (V) | mg/L | 0.0001 | 0.00505 | 0.00499 | 1.2 |
| Zinc (Zn) | mg/L | 0.0002 | 0.00453 | 0.00527 | 15.1 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable analytes (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

Analytes differ by > 20% between duplicates but 1 or both concentrations are < 5 times the detection limit.

Analytes differ by > 20% between duplicates and concentrations are > 5 times the detection limit.

B.2.3 Benthic Invertebrate Communities Component

B.2.3.1 Quality Control Activities – Field

Field methods used for benthic invertebrate collection are considered to follow accepted methods for environmental effects monitoring (Anderson 1990, Environment Canada, 2010). Instruments used for measuring supporting variables (e.g., temperature, dissolved oxygen, conductivity, pH, current velocity and depth) were calibrated according to manufacturer instructions (generally daily for water quality meters).

B.2.3.2 Quality Control Activities – Laboratory

Taxonomic samples were sorted and identified by Dr. Jack Zloty of Summerland, BC, who has analyzed benthic invertebrate samples on behalf of RAMP consistently since the program began. Laboratory methods used by Dr. Zloty in 2010 included resorting of 5% of samples as a confirmation of the overall sorting efficiency of all samples. In 2010, a total of 12 samples were re-sorted. Sorted portions were verified by an independent analyst. As a result of large volumes of organic material and low abundance in some samples collected from depositional sites, a minimum removal efficiency of 90% was considered acceptable (as for previous RAMP studies). This objective is considered acceptable by Environment Canada under current Environmental Effects Monitoring (EEM) strategies (Environment Canada 2010).

Data were received in electronic format (Microsoft Excel) from the taxonomist. All data were checked upon data entry for transcription errors or other inconsistencies. Data analysis was conducted iteratively, using duplicate data files for processing. Original data were retained in back-up files for the project. Printed output from statistical analyses was retained in project files in the event that analyses may be reviewed and reproduced if needed.

B.2.3.3 Quality Control Activities – Results

Results for quality control samples (5% re-sorts) from the 2010 RAMP benthic invertebrate community component indicate that this objective was consistently achieved (Table B.2-8).

Invertebrate sorting efficiency was always greater than 96%, with an average of 98.5%. Based on the criterion of 90% sorting efficiency, these results were considered acceptable and additional QC activities were not required.

$$\text{sorting efficiency} = \left(1 - \frac{A}{A + B}\right) * 100,$$

Where,

A is the number of animals found in the re-sorted sample; and

B is the number of animals found in the original sorting of that sample.

Table B.2-8 Results of quality control checks on sorting efficiency of benthic invertebrate samples, 2010.

| Reach | % Sorting Efficiency |
|-----------|----------------------------------|
| KEL-1 #1 | $[1-(12/(860+12))] * 100 = 98.6$ |
| SHL-1 #6 | $[1-(17/(620+17))] * 100 = 97.3$ |
| JAC-D1 #2 | $[1-(0/(47+0))] * 100 = 100$ |
| JAC-D2 #2 | $[1-(8/(223+8))] * 100 = 96.5$ |
| MAR-E2 #4 | $[1-(1/(72+1))] * 100 = 98.6$ |
| MUR-E1 #6 | $[1-(17/(834+17))] * 100 = 98.0$ |
| ELR-D1 #9 | $[1-(4/(169+4))] * 100 = 97.7$ |
| FOC-D1 #4 | $[1-(0/(7+0))] * 100 = 100$ |
| MAR-E1 #5 | $[1-(10/(750+10))] * 100 = 98.7$ |
| STR-E1 #6 | $[1-(3/(278+3))] * 100 = 98.9$ |
| BER-D2 #3 | $[1-(0/(77+0))] * 100 = 100$ |
| POC-D1 #5 | $[1-(4/(203+4))] * 100 = 98.1$ |

Note: Average efficiency – 98,.5%; 12 samples - ~5% of all samples.

B.2.4 Sediment Quality Component

The 2010 RAMP sediment quality QA/QC program was conducted to assess potential sample contamination during collection and analysis, the precision and accuracy of the chemical and toxicological analyses, and environmental heterogeneity.

B.2.4.1 Methods

The following field procedures were used to prevent sample contamination:

- Sampling equipment was washed with metal-free soap and rinsed with ambient site water, rinsed with hexane and then acetone, and triple-rinsed with ambient water prior to sample collection at a given station;
- Sample grabs were kept only if they contained no large foreign objects, obtained adequate sediment penetration depth, and were not overfilled or leaking; and
- Staff wore powder-free latex gloves during equipment washing and sampling.

Split samples (in which a single, large sample was subsampled) were collected from Jackpine Creek (JAC-D1) and the Tar River (TAR-D1). Duplicate samples (in which two unique samples were taken from the same location) were collected from Jackpine Creek (JAC-D1) and the Tar River (TAR-D1).

The relative percent difference (RPD) in the results obtained for the split and duplicate samples was calculated. Analytes for which the relative percent difference between duplicate / split sample and the site sample exceeded 20% (with concentrations greater than five times the detection limit in both samples) were considered to exhibit unacceptable levels of imprecision).

In addition, two sampling-equipment rinsate blanks were collected in fall 2010. Sampling equipment (i.e., Ekman dredge, stainless steel tray, and spoons) were washed with Liquinox soap, ambient water, hexane, acetone, and deionized water, as per the standard operating procedure at sampling locations; rinsate samples were collected by washing down the dredge with deionized water, which was collected into the tray (containing spoons) and decanted into a sample analysis bottle. PAHs were analyzed in this rinsate

(at ng/L) by AXYS Analytical Services (the same laboratory that analyzed PAHs in sediments); metals were analyzed in this rinsate (at mg/L) by AITF in Edmonton. Concentrations of metals in sediments were compared against 5 times their analytical detection limit and PAHs were assessed against 5 times the laboratory blank concentration, to assess potential sample contamination related to equipment.

B.2.4.2 Results and Discussion

Duplicate Samples

Concentrations of numerous metals and several PAHs differed by over 20% between duplicate samples collected at JAC-D1 and TAR-D1 (Table B.2-9 and Table B.2-10). These results suggest high within-location variability in metal and PAH concentrations, which has been observed historically, in both laboratory-generated and field-collected duplicates.

Split Samples

Several variables in the split samples at JAC-D1 and TAR-D1 differed by greater than 20% from the sample (Table B.2-9 and Table B.2-10); there was more variation in split samples analyzed for PAHs than for samples analyzed for metals. These results are consistent with split-sample analyses undertaken in previous years of RAMP, suggesting that although concentrations of metals are generally consistent within the sediment matrix in a given sample, PAHs were unevenly distributed in sediments, or within a single sample.

Rinsate Samples

Some metals and PAHs were detected at concentrations greater than 5 times the analytical detection limit in rinsate blanks taken in fall 2010 (Table B.2-11 and Table B.2-12). Metals measurable in both rinsate samples included total aluminum, iron, manganese, strontium, titanium and zinc, and dissolved barium and zinc. The majority of PAHs measured above (>5x) detection limits in the rinsate were lighter, more soluble species, such as parent and alkylated naphthalenes and phenanthrenes, and biphenyl. These results for PAHs were consistent with previous years' rinsate samples.

B.2.4.3 Conclusions and Recommendations

Results of QA/QC samples collected for sediments by the RAMP program in 2010 were consistent with those collected in previous years of the RAMP program. These samples generally indicate high variability of PAHs in sediments within a sampling location and that spatial variation can occur on a scale smaller than the Ekman dredge. Concentrations of metals are generally more consistent within samples and within locations, although some variability between samples from a given station may occur.

Some metals and PAHs were present at low concentrations in rinsate blanks, which may suggest insufficient rinsing of sampling equipment with deionized waters to remove all traces of ambient (creek) waters prior to decanting of deionized waters for rinsate analysis, and/or insufficient scrubbing or solvent use in advance of sampling to remove attached all particulates from sampler/tray surfaces. Concentrations were generally very low relative to concentrations measured in sediment (e.g., for PAHs, parts per trillion in rinsate versus parts per million in sediment); therefore, these concentrations in rinsate would not likely substantially affect measured concentrations in sediment. However, clean technique remains critical in sampling of sediments, particularly for strongly hydrophobic variables like many PAHs.

Table B.2-9 Relative percent difference between duplicate and split sediment quality samples, lower Jackpine Creek (JAC-D1), September 2010.

| Category | Analyte | Unit | DLs | Sample | | | RPD ¹ from JAC-D1 | |
|--------------------------|------------------------------------|-------|-------|-----------|-----------|-----------|------------------------------|-----------|
| | | | | Station | Split | Duplicate | Split | Duplicate |
| | | | | JAC-D1 | SAL-D1 | COL-D1 | SAL-D1 | COL-D1 |
| Organic Compounds | Benzene | mg/kg | 0.005 | <0.005 | <0.005 | <0.005 | 0.0 | 0.0 |
| | CCME Fraction 1 (BTEX) | mg/kg | 10 | <10 | <10 | <10 | 0.0 | 0.0 |
| | CCME Fraction 1 (C6-C10) | mg/kg | 10 | <10 | <10 | <10 | 0.0 | 0.0 |
| | CCME Fraction 2 (C10-C16) | mg/kg | 20 | <20 | <20 | <20 | 0.0 | 0.0 |
| | CCME Fraction 3 (C16-C34) | mg/kg | 20 | 242 | 466 | 503 | 63.3 | 70.1 |
| | CCME Fraction 4 (C34-C50) | mg/kg | 20 | 312 | 645 | 638 | 69.6 | 68.6 |
| | Ethylbenzene | mg/kg | 0.015 | <0.015 | <0.015 | <0.015 | 0.0 | 0.0 |
| | m+p-Xylene | mg/kg | 0.05 | <0.05 | <0.05 | <0.05 | 0.0 | 0.0 |
| | o-Xylene | mg/kg | 0.05 | <0.05 | <0.05 | <0.05 | 0.0 | 0.0 |
| | Toluene | mg/kg | 0.05 | <0.05 | <0.05 | <0.05 | 0.0 | 0.0 |
| | Total Hydrocarbons (C6-C50) | mg/kg | 20 | 554 | 1110 | 1140 | 66.8 | 69.2 |
| | Xylenes | mg/kg | 0.1 | <0.10 | <0.10 | <0.10 | 0.0 | 0.0 |
| PAHs | % Moisture_PAH sample | mg/kg | - | 21.2 | 18 | 24.5 | 16.3 | 14.4 |
| | Acenaphthene | mg/kg | - | 0.00043 | 0.000267 | 0.00285 | 46.8 | 147.6 |
| | Acenaphthylene | mg/kg | - | 0.000264 | 0.000168 | 0.000372 | 44.4 | 34.0 |
| | Anthracene | mg/kg | - | 0.000391 | <0.000249 | 0.0268 | 44.4 | 194.2 |
| | Benz[a]anthracene | mg/kg | - | 0.00158 | 0.000973 | 0.00486 | 47.6 | 101.9 |
| | Benzo[a]pyrene | mg/kg | - | <0.000751 | 0.00119 | <0.00323 | 45.2 | 124.5 |
| | Benzo[b,j,k]fluoranthene | mg/kg | - | 0.00188 | 0.0022 | 0.00559 | 15.7 | 99.3 |
| | Benzo[g,h,i]perylene | mg/kg | - | 0.0083 | 0.00932 | 0.0169 | 11.6 | 68.3 |
| | C1 Phenanthrenes/Anthracenes | mg/kg | - | 0.0227 | 0.0135 | 0.0852 | 50.8 | 115.8 |
| | C1-Benzo[a]anthracenes/Chrysenes | mg/kg | - | 0.0378 | 0.0405 | 0.0857 | 6.9 | 77.6 |
| | C1-Benzofluoranthenes/Benzopyrenes | mg/kg | - | 0.0452 | 0.05 | 0.112 | 10.1 | 85.0 |
| | C1-Dibenzothiophenes | mg/kg | - | 0.0116 | 0.0073 | 0.0373 | 45.5 | 105.1 |
| | C1-Fluoranthenes/Pyrenes | mg/kg | - | 0.0555 | 0.0594 | 0.15 | 6.8 | 92.0 |
| | C1-Fluorenes | mg/kg | - | 0.00395 | 0.00327 | 0.0323 | 18.8 | 156.4 |
| | C1-Naphthalenes | mg/kg | - | 0.00276 | 0.00216 | 0.0025 | 24.4 | 9.9 |
| | C2-Phenanthrenes/Anthracenes | mg/kg | - | 0.0449 | 0.0362 | 0.164 | 21.5 | 114.0 |
| | C2-Benzo[a]anthracenes/Chrysenes | mg/kg | - | 0.0582 | 0.0583 | 0.167 | 0.2 | 96.6 |
| | C2-Benzofluoranthenes/Benzopyrenes | mg/kg | - | 0.0363 | 0.0405 | 0.0762 | 10.9 | 70.9 |
| | C2-Dibenzothiophenes | mg/kg | - | 0.048 | 0.0476 | 0.249 | 0.8 | 135.4 |
| | C2-Fluoranthenes/Pyrenes | mg/kg | - | 0.00122 | 0.124 | 0.329 | 196.1 | 198.5 |
| | C2-Fluorenes | mg/kg | - | 0.0172 | 0.0138 | 0.0805 | 21.9 | 129.6 |
| | C2-Naphthalenes | mg/kg | - | 0.00808 | 0.00455 | 0.0129 | 55.9 | 45.9 |
| | C3-Dibenzothiophenes | mg/kg | - | 0.124 | 0.123 | 0.583 | 0.8 | 129.8 |
| | C3-Fluoranthenes/Pyrenes | mg/kg | - | 0.159 | 0.155 | 0.341 | 2.5 | 72.8 |
| | C3-Fluorenes | mg/kg | - | 0.0261 | 0.0315 | 0.195 | 18.8 | 152.8 |
| | C3-Naphthalenes | mg/kg | - | 0.0176 | 0.00971 | 0.032 | 57.8 | 58.1 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable variables (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

Analytes differ by > 20% between duplicate/split but 1 or both concentrations are < 5 times the detection limit.

Analytes differ by > 20% between duplicate/split and concentrations are > 5 times the detection limit, or for PAHs, are both detectable.

Table B.2-9 (Cont'd.)

| Category | Analyte | Unit | DLs | Sample | | | RPD ¹ from JAC-D1 | |
|---------------------------|------------------------------|-------|------|----------|----------|-----------|------------------------------|-----------|
| | | | | Station | Split | Duplicate | Split | Duplicate |
| | | | | JAC-D1 | SAL-D1 | COL-D1 | SAL-D1 | COL-D1 |
| PAHs (Cont'd.) | C3-Phenanthrenes/Anthracenes | mg/kg | - | 0.0606 | 0.0731 | 0.21 | 18.7 | 110.4 |
| | C4-Dibenzothiophenes | mg/kg | - | 0.109 | 0.118 | 0.523 | 7.9 | 131.0 |
| | C4-Naphthalenes | mg/kg | - | 0.0243 | 0.0205 | 0.0827 | 17.0 | 109.2 |
| | C4-Phenanthrenes/Anthracenes | mg/kg | - | 0.232 | 0.235 | 1.09 | 1.3 | 129.8 |
| | Chrysene | mg/kg | - | 0.0116 | 0.0129 | 0.0353 | 10.6 | 101.1 |
| | Dibenz[a,h]anthracene | mg/kg | - | 0.00113 | <0.00156 | 0.0021 | 32.0 | 60.1 |
| | Dibenzothiophene | mg/kg | - | 0.00153 | 0.00104 | 0.00335 | 38.1 | 74.6 |
| | Fluoranthene | mg/kg | - | 0.000628 | 0.000677 | <0.00146 | 7.5 | 79.7 |
| | Fluorene | mg/kg | - | 0.000385 | 0.000378 | 0.000941 | 1.8 | 83.9 |
| | Indeno[1,2,3-c,d]-pyrene | mg/kg | - | 0.00224 | 0.0019 | 0.00631 | 16.4 | 95.2 |
| | Naphthalene | mg/kg | - | 0.00278 | 0.00242 | 0.00737 | 13.8 | 90.4 |
| | Phenanthrene | mg/kg | - | 0.00644 | 0.0036 | 0.0257 | 56.6 | 119.9 |
| | Pyrene | mg/kg | - | 0.00347 | 0.00346 | 0.0102 | 0.3 | 98.5 |
| | Retene | mg/kg | - | 0.0229 | 0.0324 | 0.424 | 34.4 | 179.5 |
| Total Metals | Aluminum (Al) | mg/kg | 50 | 801 | 890 | 718 | 10.5 | 10.9 |
| | Antimony (Sb) | mg/kg | 0.1 | <0.1 | <0.1 | <0.1 | 0.0 | 0.0 |
| | Arsenic (As) | mg/kg | 0.1 | 0.45 | 0.39 | 0.38 | 14.3 | 16.9 |
| | Barium (Ba) | mg/kg | 0.5 | 13.2 | 12.5 | 11.3 | 5.4 | 15.5 |
| | Beryllium (Be) | mg/kg | 0.2 | <0.2 | <0.2 | <0.2 | 0.0 | 0.0 |
| | Bismuth (Bi) | mg/kg | 0.2 | <0.2 | <0.2 | <0.2 | 0.0 | 0.0 |
| | Cadmium (Cd) | mg/kg | 0.1 | <0.1 | <0.1 | <0.1 | 0.0 | 0.0 |
| | Calcium (Ca) | mg/kg | 100 | 590 | 480 | 450 | 20.6 | 26.9 |
| | Chromium (Cr) | mg/kg | 0.5 | 2.04 | 2.07 | 1.67 | 1.5 | 19.9 |
| | Cobalt (Co) | mg/kg | 0.1 | 0.91 | 0.78 | 0.72 | 15.4 | 23.3 |
| | Copper (Cu) | mg/kg | 0.5 | 1.08 | 0.85 | 0.73 | 23.8 | 38.7 |
| | Iron (Fe) | mg/kg | 200 | 2120 | 2090 | 1680 | 1.4 | 23.2 |
| | Lead (Pb) | mg/kg | 0.5 | 1.32 | 1.28 | 1.12 | 3.1 | 16.4 |
| | Lithium (Li) | mg/kg | 0.5 | 1.33 | 1.29 | 1.11 | 3.1 | 18.0 |
| | Magnesium (Mg) | mg/kg | 20 | 290 | 280 | 234 | 3.5 | 21.4 |
| | Manganese (Mn) | mg/kg | 1 | 33.2 | 25 | 24.9 | 28.2 | 28.6 |
| | Mercury (Hg) | mg/kg | 0.05 | <0.05 | 0.12 | <0.05 | 82.4 | 0.0 |
| | Molybdenum (Mo) | mg/kg | 0.1 | 0.14 | 1.77 | 0.11 | 170.7 | 24.0 |
| | Nickel (Ni) | mg/kg | 0.5 | 1.93 | <100 | 1.55 | 192.4 | 21.8 |
| | Potassium (K) | mg/kg | 100 | 140 | 140 | 110 | 0.0 | 24.0 |
| | Selenium (Se) | mg/kg | 0.2 | <0.2 | <0.2 | <0.2 | 0.0 | 0.0 |
| | Silver (Ag) | mg/kg | 0.2 | <0.2 | <0.2 | <0.2 | 0.0 | 0.0 |
| | Sodium (Na) | mg/kg | 100 | <100 | <100 | <100 | 0.0 | 0.0 |
| | Strontium (Sr) | mg/kg | 1 | 5.6 | 5 | 5.3 | 11.3 | 5.5 |
| | Thallium (Tl) | mg/kg | 0.05 | <0.05 | <0.05 | <0.05 | 0.0 | 0.0 |
| | Tin (Sn) | mg/kg | 2 | <2 | <2 | <2 | 0.0 | 0.0 |
| | Titanium (Ti) | mg/kg | 1 | 30.4 | 31 | 29 | 2.0 | 4.7 |
| | Uranium (U) | mg/kg | 0.05 | 0.167 | 0.271 | 0.134 | 47.5 | 21.9 |
| | Vanadium (V) | mg/kg | 0.2 | 4.56 | 4.26 | 3.68 | 6.8 | 21.4 |
| | Zinc (Zn) | mg/kg | 5 | 5.3 | 5.1 | <5 | 3.8 | 5.8 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable variables (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

Analytes differ by > 20% between duplicate/split but 1 or both concentrations are < 5 times the detection limit.

Analytes differ by > 20% between duplicate/split and concentrations are > 5 times the detection limit, or for PAHs, are both detectable.

Table B.2-10 Relative percent difference between duplicate and split sediment quality samples, lower Tar River (TAR-D1), September 2010.

| Category | Analyte | Unit | DLs | Sample | | | RPD ¹ from TAR-D1 | |
|--------------------------|------------------------------------|-------|-------|-----------|-----------|-----------|------------------------------|-----------|
| | | | | Station | Split | Duplicate | Split | Duplicate |
| | | | | TAR-D1 | MUD-D1 | PAD-D1 | MUD-D1 | PAD-D1 |
| Organic Compounds | Benzene | mg/kg | 0.005 | <0.005 | <0.005 | <0.005 | 0.00 | 0.00 |
| | CCME Fraction 1 (BTEX) | mg/kg | 10 | <10 | <10 | <10 | 0.00 | 0.00 |
| | CCME Fraction 1 (C6-C10) | mg/kg | 10 | <10 | <10 | <10 | 0.00 | 0.00 |
| | CCME Fraction 2 (C10-C16) | mg/kg | 20 | 43 | 45 | 25 | 4.55 | 52.94 |
| | CCME Fraction 3 (C16-C34) | mg/kg | 20 | 667 | 638 | 471 | 4.44 | 34.45 |
| | CCME Fraction 4 (C34-C50) | mg/kg | 20 | 434 | 469 | 402 | 7.75 | 7.66 |
| | Ethylbenzene | mg/kg | 0.015 | <0.015 | <0.015 | <0.015 | 0.00 | 0.00 |
| | m+p-Xylene | mg/kg | 0.05 | <0.05 | <0.05 | <0.05 | 0.00 | 0.00 |
| | o-Xylene | mg/kg | 0.05 | <0.05 | <0.05 | <0.05 | 0.00 | 0.00 |
| | Toluene | mg/kg | 0.05 | <0.05 | <0.05 | <0.05 | 0.00 | 0.00 |
| | Total Hydrocarbons (C6-C50) | mg/kg | 20 | 1140 | 1150 | 898 | 0.87 | 23.75 |
| | Xylenes | mg/kg | 0.1 | <0.1 | <0.1 | <0.1 | 0.00 | 0.00 |
| PAHs | % Moisture_PAH sample | mg/kg | - | 23.5 | 26.8 | 20.9 | 13.12 | 11.71 |
| | Acenaphthene | mg/kg | - | 0.00175 | 0.00244 | <0.000198 | 32.94 | 159.34 |
| | Acenaphthylene | mg/kg | - | <0.000314 | <0.000284 | <0.000125 | 10.03 | 86.10 |
| | Anthracene | mg/kg | - | 0.00261 | 0.0035 | <0.000249 | 29.13 | 165.16 |
| | Benz[a]anthracene | mg/kg | - | 0.0302 | 0.0184 | 0.000654 | 48.56 | 191.52 |
| | Benzo[a]pyrene | mg/kg | - | 0.0229 | 0.0205 | 0.00106 | 11.06 | 182.30 |
| | Benzo[b,j,k]fluoranthene | mg/kg | - | 0.0219 | 0.0177 | 0.00328 | 21.21 | 147.90 |
| | Benzo[g,h,i]perylene | mg/kg | - | 0.0268 | 0.0217 | 0.00276 | 21.03 | 162.65 |
| | C1 Phenanthrenes/Anthracenes | mg/kg | - | 0.0822 | 0.0786 | 0.0138 | 4.48 | 142.50 |
| | C1-Benzo[a]anthracenes/Chrysenes | mg/kg | - | 0.319 | 0.18 | 0.0157 | 55.71 | 181.24 |
| | C1-Benzofluoranthenes/Benzopyrenes | mg/kg | - | 0.218 | 0.176 | 0.00988 | 21.32 | 182.66 |
| | C1-Dibenzothiophenes | mg/kg | - | 0.0997 | 0.0848 | 0.00335 | 16.15 | 187.00 |
| | C1-Fluoranthenes/Pyrenes | mg/kg | - | 0.439 | 0.215 | 0.018 | 68.50 | 184.25 |
| | C1-Fluorenes | mg/kg | - | 0.0459 | 0.0569 | 0.0077 | 21.40 | 142.54 |
| | C1-Naphthalenes | mg/kg | - | 0.00972 | 0.0227 | 0.00333 | 80.07 | 97.93 |
| | C2-Phenanthrenes/Anthracenes | mg/kg | - | 0.15 | 0.138 | 0.0217 | 8.33 | 149.45 |
| | C2-Benzo[a]anthracenes/Chrysenes | mg/kg | - | 0.424 | 0.197 | 0.0119 | 73.11 | 189.08 |
| | C2-Benzofluoranthenes/Benzopyrenes | mg/kg | - | 0.117 | 0.0801 | 0.0045 | 37.44 | 185.19 |
| | C2-Dibenzothiophenes | mg/kg | - | 0.688 | 0.424 | 0.0266 | 47.48 | 185.11 |
| | C2-Fluoranthenes/Pyrenes | mg/kg | - | 0.88 | 0.411 | 0.0246 | 72.66 | 189.12 |
| | C2-Fluorenes | mg/kg | - | 0.151 | 0.15 | 0.0146 | 0.66 | 164.73 |
| | C2-Naphthalenes | mg/kg | - | 0.029 | 0.0401 | 0.00725 | 32.13 | 120.00 |
| | C3-Dibenzothiophenes | mg/kg | - | 1.99 | 0.587 | 0.0167 | 108.89 | 196.67 |
| | C3-Fluoranthenes/Pyrenes | mg/kg | - | 0.774 | 0.396 | 0.0213 | 64.62 | 189.29 |
| | C3-Fluorenes | mg/kg | - | 0.451 | 0.318 | 0.0186 | 34.59 | 184.16 |
| | C3-Naphthalenes | mg/kg | - | 0.067 | 0.0913 | 0.00441 | 30.70 | 175.30 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable variables (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

| | |
|---|--|
| # | Analytes differ by > 20% between duplicate/split but 1 or both concentrations are < 5 times the detection limit. |
| # | Analytes differ by > 20% between duplicate/split and concentrations are > 5 times the detection limit, or for PAHs, are both detectable. |

Table B.2-10 (Cont'd.)

| Category | Analyte | Unit | DLs | Sample | | | RPD ¹ from TAR-D1 | |
|---------------------------|------------------------------|-------|------|---------|---------|-----------|------------------------------|-----------|
| | | | | Station | Split | Duplicate | Split | Duplicate |
| | | | | TAR-D1 | MUD-D1 | PAD-D1 | MUD-D1 | PAD-D1 |
| PAHs (Cont'd.) | C3-Phenanthrenes/Anthracenes | mg/kg | - | 0.398 | 0.179 | 0.0198 | 75.91 | 181.04 |
| | C4-Dibenzothiophenes | mg/kg | - | 1.71 | 0.531 | 0.0487 | 105.22 | 188.92 |
| | C4-Naphthalenes | mg/kg | - | 0.14 | 0.158 | 0.00508 | 12.08 | 185.99 |
| | C4-Phenanthrenes/Anthracenes | mg/kg | - | 4.66 | 1.19 | 0.068 | 118.63 | 194.25 |
| | Chrysene | mg/kg | - | 0.0926 | 0.0519 | 0.00239 | 56.33 | 189.94 |
| | Dibenz[a,h]anthracene | mg/kg | - | 0.0084 | 0.00675 | <0.000855 | 21.78 | 163.05 |
| | Dibenzothiophene | mg/kg | - | 0.00837 | 0.00859 | 0.0006 | 2.59 | 173.24 |
| | Fluoranthene | mg/kg | - | 0.00383 | 0.00401 | 0.000772 | 4.59 | 132.90 |
| | Fluorene | mg/kg | - | 0.00194 | 0.00205 | 0.000444 | 5.51 | 125.50 |
| | Indeno[1,2,3-c,d]-pyrene | mg/kg | - | 0.00906 | 0.00651 | 0.00244 | 32.76 | 115.13 |
| | Naphthalene | mg/kg | - | 0.00424 | 0.00917 | 0.00209 | 73.53 | 67.93 |
| | Phenanthrene | mg/kg | - | 0.02 | 0.0188 | 0.00414 | 6.19 | 131.40 |
| | Pyrene | mg/kg | - | 0.0281 | 0.0231 | 0.00132 | 19.53 | 182.05 |
| | Retene | mg/kg | - | 2.19 | 0.0616 | 0.0193 | 189.06 | 196.51 |
| Total Metals | Aluminum (Al) | mg/kg | 50 | 3010 | 3690 | 2360 | 20.30 | 24.21 |
| | Antimony (Sb) | mg/kg | 0.1 | 0.16 | 0.28 | 0.18 | 54.55 | 11.76 |
| | Arsenic (As) | mg/kg | 0.1 | 6.51 | 6.92 | 6.18 | 6.11 | 5.20 |
| | Barium (Ba) | mg/kg | 0.5 | 72.2 | 105 | 72.9 | 37.02 | 0.96 |
| | Beryllium (Be) | mg/kg | 0.2 | 0.28 | 0.5 | 0.42 | 56.41 | 40.00 |
| | Bismuth (Bi) | mg/kg | 0.2 | <0.2 | <0.2 | <0.2 | 0.00 | 0.00 |
| | Cadmium (Cd) | mg/kg | 0.1 | <0.1 | 0.15 | <0.1 | 40.00 | 0.00 |
| | Calcium (Ca) | mg/kg | 100 | 3310 | 4240 | 2640 | 24.64 | 22.52 |
| | Chromium (Cr) | mg/kg | 0.5 | 5.26 | 7.5 | 4.71 | 35.11 | 11.03 |
| | Cobalt (Co) | mg/kg | 0.1 | 5.49 | 5.69 | 3.82 | 3.58 | 35.88 |
| | Copper (Cu) | mg/kg | 0.5 | 8.09 | 8.3 | 4.64 | 2.56 | 54.20 |
| | Iron (Fe) | mg/kg | 200 | 15000 | 16600 | 13500 | 10.13 | 10.53 |
| | Lead (Pb) | mg/kg | 0.5 | 4.13 | 5.67 | 3.94 | 31.43 | 4.71 |
| | Lithium (Li) | mg/kg | 0.5 | 4.61 | 5.27 | 3.07 | 13.36 | 40.10 |
| | Magnesium (Mg) | mg/kg | 20 | 1680 | 1820 | 1180 | 8.00 | 34.97 |
| | Manganese (Mn) | mg/kg | 1 | 311 | 367 | 193 | 16.52 | 46.83 |
| | Mercury (Hg) | mg/kg | 0.05 | <0.05 | | | 200.00 | 200.00 |
| | Molybdenum (Mo) | mg/kg | 0.1 | 0.6 | 0.67 | 0.6 | 11.02 | 0.00 |
| | Nickel (Ni) | mg/kg | 0.5 | 10.4 | 11.3 | 8.93 | 8.29 | 15.21 |
| | Potassium (K) | mg/kg | 100 | 570 | 800 | 520 | 33.58 | 9.17 |
| | Selenium (Se) | mg/kg | 0.2 | 0.25 | 0.58 | 0.24 | 79.52 | 4.08 |
| | Silver (Ag) | mg/kg | 0.2 | <0.2 | <0.2 | <0.2 | 0.00 | 0.00 |
| | Sodium (Na) | mg/kg | 100 | <100 | <100 | <100 | 0.00 | 0.00 |
| | Strontium (Sr) | mg/kg | 1 | 23 | 32.3 | 23.2 | 33.63 | 0.87 |
| | Thallium (Tl) | mg/kg | 0.05 | <0.05 | <0.05 | <0.05 | 0.00 | 0.00 |
| | Tin (Sn) | mg/kg | 2 | <2 | <2 | <2 | 0.00 | 0.00 |
| | Titanium (Ti) | mg/kg | 1 | 24.2 | 35.3 | 26 | 37.31 | 7.17 |
| | Uranium (U) | mg/kg | 0.05 | 0.388 | 0.619 | 0.362 | 45.88 | 6.93 |
| | Vanadium (V) | mg/kg | 0.2 | 11.6 | 15.5 | 10.2 | 28.78 | 12.84 |
| | Zinc (Zn) | mg/kg | 5 | 32 | 40.9 | 27.3 | 24.42 | 15.85 |

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable variables (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

Analytes differ by > 20% between duplicate/split but 1 or both concentrations are < 5 times the detection limit.

Analytes differ by > 20% between duplicate/split and concentrations are > 5 times the detection limit, or for PAHs, are both detectable.

Table B.2-11 Concentration of metals in sediment sampling equipment rinsate blank, September 2010.

| Category | Analyte | Units | DL | Rinsate | |
|-------------------------|-----------------|--------|-----------------|-----------------|-----------------|
| | | | | JAZ-1 | JAL-1 |
| Dissolved Metals | Aluminum (Al) | mg/L | 0.001 | <0.001 | 0.0054 |
| | Antimony (Sb) | mg/L | 0.00005 | <0.00005 | <0.00005 |
| | Arsenic (As) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Barium (Ba) | mg/L | 0.0001 | 0.000512 | 0.000585 |
| | Beryllium (Be) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Bismuth (Bi) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Boron (B) | mg/L | 0.0008 | <0.0008 | 0.00137 |
| | Cadmium (Cd) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Calcium (Ca) | mg/L | 0.1 | <0.1 | 0.338 |
| | Chlorine (Cl) | mg/L | 0.3 | <0.3 | <0.3 |
| | Chromium (Cr) | mg/L | 0.0003 | <0.0003 | 0.00336 |
| | Cobalt (Co) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Copper (Cu) | mg/L | 0.0001 | 0.00014 | 0.000649 |
| | Iron (Fe) | mg/L | 0.004 | <0.004 | 0.0102 |
| | Lead (Pb) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Lithium (Li) | mg/L | 0.0002 | <0.0002 | 0.000691 |
| | Manganese (Mn) | mg/L | 0.0001 | 0.000402 | 0.00477 |
| | Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 |
| | Molybdenum (Mo) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Nickel (Ni) | mg/L | 0.0001 | <0.0001 | 0.000179 |
| | Selenium (Se) | mg/L | 0.0003 | <0.0003 | <0.0003 |
| | Silver (Ag) | mg/L | 0.00001 | <0.00001 | <0.00001 |
| | Strontium (Sr) | mg/L | 0.0001 | 0.00124 | 0.00169 |
| | Sulphur (S) | mg/L | 2 | <2 | <2 |
| | Thallium (Tl) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Thorium (Th) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Tin (Sn) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| Titanium (Ti) | mg/L | 0.0001 | <0.0001 | 0.000689 | |
| Uranium (U) | mg/L | 0.0001 | <0.0001 | <0.0001 | |
| Vanadium (V) | mg/L | 0.0001 | <0.0001 | 0.000118 | |
| Zinc (Zn) | mg/L | 0.0002 | 0.00451 | 0.0095 | |
| Total Metals | Aluminum (Al) | mg/L | 0.003 | 0.0471 | 0.0783 |
| | Antimony (Sb) | mg/L | 0.00005 | <0.00005 | <0.00005 |
| | Arsenic (As) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Barium (Ba) | mg/L | 0.0001 | 0.00108 | 0.00145 |
| | Beryllium (Be) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Bismuth (Bi) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Boron (B) | mg/L | 0.0008 | 0.000885 | 0.00207 |
| | Cadmium (Cd) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Calcium (Ca) | mg/L | 0.1 | <0.1 | 0.453 |
| | Chlorine (Cl) | mg/L | 0.3 | <0.3 | <0.3 |
| | Chromium (Cr) | mg/L | 0.0003 | <0.0003 | 0.00339 |
| | Cobalt (Co) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Copper (Cu) | mg/L | 0.0001 | 0.000191 | 0.00096 |
| | Iron (Fe) | mg/L | 0.004 | 0.0326 | 0.0974 |
| | Lead (Pb) | mg/L | 0.0001 | <0.0001 | 0.000177 |
| | Lithium (Li) | mg/L | 0.0002 | <0.0002 | 0.000698 |
| | Manganese (Mn) | mg/L | 0.0001 | 0.000852 | 0.00746 |
| | Mercury (Hg) | mg/L | 0.00005 | <0.00005 | <0.00005 |
| | Molybdenum (Mo) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Nickel (Ni) | mg/L | 0.0001 | 0.000114 | 0.000605 |
| | Selenium (Se) | mg/L | 0.0003 | <0.0003 | <0.0003 |
| | Silver (Ag) | mg/L | 0.00001 | <0.00001 | <0.00001 |
| | Strontium (Sr) | mg/L | 0.0001 | 0.00151 | 0.00193 |
| | Sulphur (S) | mg/L | 2 | <2 | <2 |
| | Thallium (Tl) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Thorium (Th) | mg/L | 0.0001 | <0.0001 | <0.0001 |
| | Tin (Sn) | mg/L | 0.0001 | <0.0001 | 0.000121 |
| Titanium (Ti) | mg/L | 0.0001 | 0.000622 | 0.00134 | |
| Uranium (U) | mg/L | 0.0001 | <0.0001 | <0.0001 | |
| Vanadium (V) | mg/L | 0.0001 | 0.000128 | 0.000328 | |
| Zinc (Zn) | mg/L | 0.0002 | 0.00537 | 0.0131 | |

Variables are > 5 times the detection limit

Table B.2-12 Concentration of PAHs in sediment sampling equipment rinsate blank, September 2010.

| Analyte | Units | Lab Blank | Rinsate | |
|------------------------------------|-------|-----------|---------|--------|
| | | | JAZ-1 | JAL-1 |
| Acenaphthene | ng/L | 0.434 | 4.31 | 1.24 |
| Acenaphthylene | ng/L | 0.172 | <0.787 | 0.598 |
| Anthracene | ng/L | <0.178 | <1.47 | <0.683 |
| Benz[a]anthracene | ng/L | <0.07 | 0.621 | 0.448 |
| Benzo[a]pyrene | ng/L | <0.213 | <3.34 | <0.691 |
| Benzo[b,j,k]fluoranthene | ng/L | 0.595 | <0.165 | <0.41 |
| Benzo[g,h,i]perylene | ng/L | <0.177 | <0.69 | <0.688 |
| Biphenyl | ng/L | 0.836 | 6.61 | 3.95 |
| C1 Phenanthrenes/Anthracenes | ng/L | 0.44 | 10.5 | 6.54 |
| C1-Acenaphthenes | ng/L | 1.01 | 7.53 | 4.6 |
| C1-Benzo[a]anthracenes/Chrysenes | ng/L | <0.324 | 3.67 | 2.35 |
| C1-Benzofluoranthenes/Benzopyrenes | ng/L | 0.531 | 2.25 | <1.54 |
| C1-Biphenyl | ng/L | <0.185 | <1.48 | <0.84 |
| C1-Dibenzothiophenes | ng/L | <0.231 | 3.11 | 1.38 |
| C1-Fluoranthenes/Pyrenes | ng/L | <0.386 | 7.31 | <2.69 |
| C1-Fluorenes | ng/L | 0.483 | 31.2 | 15.2 |
| C1-Naphthalenes | ng/L | 3.95 | 67.3 | 26.2 |
| C2-Phenanthrenes/Anthracenes | ng/L | 0.381 | 8.2 | 5.84 |
| C2-Benzo[a]anthracenes/Chrysenes | ng/L | 0.3 | 4.26 | 2.31 |
| C2-Benzofluoranthenes/Benzopyrenes | ng/L | <0.215 | 1.22 | <1.17 |
| C2-Biphenyl | ng/L | 12.6 | 203 | 82.2 |
| C2-Dibenzothiophenes | ng/L | 0.561 | 8.54 | 9.59 |
| C2-Fluoranthenes/Pyrenes | ng/L | 0.549 | 11.5 | <2.33 |
| C2-Fluorenes | ng/L | 0.889 | 22.1 | 15.2 |
| C2-Naphthalenes | ng/L | 6.69 | 53.3 | 42.4 |
| C3-Dibenzothiophenes | ng/L | 0.491 | 13.7 | 13.9 |
| C3-Fluoranthenes/Pyrenes | ng/L | 0.939 | 13.2 | 5.01 |
| C3-Fluorenes | ng/L | 1.59 | 30.8 | 18.7 |
| C3-Naphthalenes | ng/L | 5.96 | 38.8 | 28.7 |
| C3-Phenanthrenes/Anthracenes | ng/L | 0.949 | 21.5 | 12.2 |
| C4-Dibenzothiophenes | ng/L | 1.03 | 12.7 | 9.69 |
| C4-Naphthalenes | ng/L | 5.63 | 25.5 | 12.7 |
| C4-Phenanthrenes/Anthracenes | ng/L | 2.2 | 26 | 24.1 |
| Chrysene | ng/L | 0.236 | 1.36 | 1.18 |
| Dibenz[a,h]anthracene | ng/L | <0.173 | <0.645 | <1.81 |
| Dibenzothiophene | ng/L | <0.096 | 1.42 | 0.891 |
| Fluoranthene | ng/L | 0.236 | 3.05 | 1.38 |
| Fluorene | ng/L | 0.316 | 2.56 | 1.39 |
| Indeno[1,2,3-c,d]-pyrene | ng/L | <0.182 | <0.759 | <0.708 |
| Naphthalene | ng/L | 3.43 | 61.4 | 34.3 |
| Phenanthrene | ng/L | 1.06 | 8.22 | 5.4 |
| Pyrene | ng/L | 0.469 | 5.15 | 1.73 |
| Retene | ng/L | 0.344 | 3.33 | 1.85 |

* Values shown for the detection limit are concentrations found in the lab blank.

Indicates the sample concentration was greater than five times the concentration in the lab blank.

B.2.5 Fish Populations Component

B.2.5.1 Quality Control Activities – Field

Fish and fish habitat sampling field activities were conducted in accordance with field methods considered to be standard scientific practice (e.g., Environment Canada 2010) and methods used in previous RAMP studies (RAMP 2009b). Prior to every field program, fieldwork instructions (FWIs) were prepared by the Component Manager. These FWIs provided technical detail on all field data collection activities planned for the program and were reviewed by all members of the field crew prior to starting the field program.

All field personnel were trained in the proper use of all field equipment to ensure accurate and safe data collection. Instruments used for measuring supporting field water quality variables (e.g., temperature, dissolved oxygen, conductivity, pH, current velocity and depth) were calibrated according to recommendations from the respective manufacturer (as frequently as daily for pH and dissolved oxygen meters). Site locations were recorded using a GPS unit. All sampling details (e.g., date, time, methods used, personnel, measurements) were recorded on project-specific field data sheets and/or in waterproof field books. Upon completion of the fieldwork, all datasheets and field books were stored in a fireproof cabinet in the Hatfield office.

Sample shipping (e.g., for fish tissues sent to Flett Research Ltd.) was conducted using lab-provided COC forms.

B.2.5.2 Quality Control Activities – Laboratory

Fish tissue analysis results from Flett Research Ltd. (Flett) include a description of QC techniques used. If relevant, comments on the results of the analyses are indicated on the printed results received from the lab. QC results meet acceptable guidelines for the lab's own internal quality procedures (a condition of membership in the Canadian Association for Environmental Analytical Laboratories [CAEAL]). In the event alternate procedures were required to achieve a result, this information is also detailed on the laboratory output. QC procedures used by Flett include laboratory duplicates, spike samples, calibration control, use of certified reference standards and internal standards. Duplicate samples for mercury analyses were completed for twenty individual tissue samples (Table B.2-13). Ageing structures (otoliths) were provided to North/South Consultants in Winnipeg, MB for the sentinel species program.

Data were received in electronic format (Microsoft Excel) from the analytical lab or entered by hand for other field programs. All data were checked upon data entry for transcription errors or other inconsistencies. Analysis of collected data was done using an iterative approach, using duplicate data files for processing. Original data were retained in back-up files for the project. Where used, printed output from statistical analyses was retained in project files in the event that analyses may be reviewed and reproduced if needed.

Results of QA/QC laboratory duplicate samples indicated low variability between the original sample and the duplicate samples. The relative percent difference was less than 20% for all samples where QA/QC analyses were performed, indicating consistent laboratory procedures for analyzing mercury in fish tissue.

Table B.2-13 Relative percent difference between duplicate mercury fish tissue samples collected from Brutus, Net, and Keith lakes, fall 2010.

| Waterbody | Sample ID | Units | Sample Date | Sample | Duplicate | Relative Percent Difference | Type of Sample |
|--------------------|-------------|-----------------|-------------|---------|-----------|-----------------------------|----------------|
| Keith Lake | KL-LKWH-2-3 | ng/g wet weight | 1-Oct-10 | 57.20 | 58.50 | 2.2 | Duplicate |
| | KL-NRPK-5-1 | Hg recovery (%) | 1-Oct-10 | 102.84 | 104.19 | 1.3 | Spike |
| Brutus Lake | BL-NRPK-5-3 | Hg recovery (%) | 1-Oct-10 | 103.74 | 104.36 | 0.6 | Spike |
| | BL-LKWH-3-5 | Hg recovery (%) | 1-Oct-10 | 101.40 | 100.43 | 1.0 | Spike |
| | BL-WALL-3-1 | ng/g wet weight | 1-Oct-10 | 354.00 | 365.00 | 3.1 | Duplicate |
| | BL-NRPK-5-1 | Hg recovery (%) | 1-Oct-10 | 100.46 | 100.20 | 0.3 | Spike |
| | BL-WALL-1-1 | Hg recovery (%) | 1-Oct-10 | 100.71 | 102.54 | 1.8 | Spike |
| | BL-NRPK-4-5 | ng/g wet weight | 1-Oct-10 | 471.00 | 466.00 | 1.1 | Duplicate |
| Net Lake | NL-WALL-1-5 | Hg recovery (%) | 1-Oct-10 | 95.21 | 99.02 | 3.9 | Spike |
| | NL-LKWH-3-2 | Hg recovery (%) | 1-Oct-10 | 99.59 | 100.89 | 1.3 | Spike |
| | NL-NRPK-3-3 | ng/g wet weight | 1-Oct-10 | 420.00 | 428.00 | 1.9 | Duplicate |
| | NL-LKWH-2-2 | Hg recovery (%) | 1-Oct-10 | 102.93 | 101.01 | 1.9 | Spike |
| | NL-LKWH-2-1 | Hg recovery (%) | 1-Oct-10 | 102.72 | 105.70 | 2.9 | Spike |
| | NL-NRPK-5-1 | ng/g wet weight | 1-Oct-10 | 1080.00 | 1100.00 | 1.8 | Duplicate |

B.2.6 Acid-Sensitive Lakes Component

Field sampling under the Acid-Sensitive Lakes Component of RAMP is conducted entirely by personnel from Alberta Environment. Water samples collected at each lake are analyzed by the University of Alberta Limnology Laboratory. The lab uses a series of set procedures, outlined in detail below, for analytical quality control; the procedures used are identical to those used in previous RAMP studies (e.g., RAMP 2009b).

B.2.6.1 Quality Control Activities – Field

Water sample collection in the field utilizes standard practices for quality control of samples to avoid contamination. Field instruments (e.g., water quality meters) are cared for so as to maximize data quality (i.e., proper calibration according to manufacturer specifications). Procedures used include the following:

- Collection of samples away from the influence of the boat or float plane (i.e., to minimize chance of sample contamination from fuel that may be in the water);
- All sampling equipment is thoroughly cleaned between lakes;
- Sample containers are tripled-rinsed prior to filling (cap included);
- Sample containers are filled to the top (i.e., no head space);
- Samples are stored under cool (4°C) conditions and in the dark (i.e., in a refrigerator); and
- Samples are submitted to the appropriate analytical laboratory within established maximum holding period (typically 48 hours).

Duplicate samples were collected during the ASL component sampling program, which accounted for approximately 10% of the total number of samples collected. Variability between duplicate samples was assessed as high when the relative percent difference between sample concentrations for an analyte was greater than 20% when both concentrations were greater than or equal to five times the MDL.

B.2.6.2 Quality Control Activities – Laboratory

The University of Alberta Limnology Laboratory maintains an internal QA/QC program to maximize quality of analytical results. Programs used include use of standard reference samples and periodic comparison samples (i.e., blanks) sent to other laboratories. In the event that QC objectives are not achieved, corrective actions are initiated to determine the cause. The laboratory prepares standard QC sample for each group of analyses from analytical grade chemicals or standard reference samples. Annually, 10 samples of known chemistry are submitted by Environment Canada's National Water Research Institute (NWRI) for blind analysis and comparison. Two times per year, quality control samples are sent to the University of Alberta Limnology Laboratory by the Norwegian Institute for Water Research for analysis and comparison.

In all cases, analytical samples are run along with standard laboratory reference samples to create a standard results curve. QC solutions are then run in duplicate. If results for control are consistent for a series of analyses, no additional QC testing is required. If results from QC samples are divergent from standards, corrective action is initiated to determine the cause and results that may be affected. When new QC samples are

prepared, each one is tested against the previous QC sample (for a given variable) to assess comparability.

B.2.6.3 Results and Discussion

Duplicate Samples

Duplicate samples were taken in three lakes for conventional variables, ions, and nutrients (Table B.2-14). The results of the duplicate samples are provided in Tables B-14 and B-15. All of the conventional variables were compliant with the conditions stated above. Although there were a few analytes with a relative percentage difference that exceeded 20% (e.g., DIC in BM7), the concentrations of these analytes were less than five times the MDL.

A duplicate sample was taken in one lake (SM5) for total and dissolved metals (Table B.2-15). The results for the metals analyses show high variability between samples. A number of analytes exceeding a 20% RPD when both concentrations were greater than five times the detection limit, including total and dissolved aluminum, barium, cobalt, and iron. The high variability in the RPD these analytes suggests the possibility of either contamination of the samples or heterogeneity within the aquatic environment.

Table B.2-14 Relative percent difference between duplicate water quality samples collected for conventional variables from three lakes, 2010.

| Analyte | Unit | Detection Limit | BM7 31-Aug-10 | Duplicate 31-Aug-10 | Relative Percent Difference (%) ¹ | NE11 2-Sep-10 | Duplicate 2-Sep-10 | Relative Percent Difference (%) | SM8 3-Sep-10 | Duplicate 3-Sep-10 | Relative Percent Difference (%) |
|---------------------------------|-------|-----------------|------------------|------------------------|---|------------------|-----------------------|------------------------------------|-----------------|-----------------------|------------------------------------|
| Conventional Variables | | | | | | | | | | | |
| Conductivity | µS/cm | - | 17.2 | 17.4 | -1.2 | 172.5 | 151 | 13.3 | 10.36 | 10.47 | -1.1 |
| pH | mg/L | - | 4.38 | 4.37 | 0.2 | 8.32 | 8.32 | 0 | 5.32 | 5.46 | -2.6 |
| Total Dissolved Solids | mg/L | 0.04 | 42 | - | - | 128 | 126 | 1.6 | 17 | 7 | 83.3 |
| Total Suspended Solids | mg/L | - | 8 | 9 | -11.8 | 1.33 | 1.33 | 0 | <LOD | 0.5 | - |
| Total alkalinity | mg/L | - | - | - | - | 86.5 | 86 | 0.6 | 2.1 | 2.4 | -13.3 |
| Gran alkalinity | mg/L | - | -1.76 | -1.9 | -7.7 | 86.4 | 86.2 | 0.2 | 0.5 | 0.7 | -33.3 |
| Dissolved Organic Carbon | mg/L | 0.1 | 21.9 | 20.3 | 7.6 | 28.2 | 26.2 | 7.4 | 11.4 | 11.7 | -2.6 |
| Dissolved Inorganic Carbon | mg/L | 0.1 | 0.4 | 0.7 | -54.5 | 18.1 | 18.6 | -2.7 | 0.2 | 0.4 | -66.7 |
| Major Ions | | | | | | | | | | | |
| Bicarbonate (HCO ₃) | mg/L | - | - | - | - | 105.2 | 104.6 | 0.6 | 2.6 | 2.9 | -10.9 |
| Carbonate (CO ₃) | mg/L | - | - | - | - | 0.4 | 0.4 | 0 | 0 | 0 | - |
| Chloride (Cl) | mg/L | 0.03 | 0.16 | 0.07 | 78.3 | 0.21 | 0.21 | 0 | 0.08 | 0.1 | -22.2 |
| Sulfate (SO ₄) | mg/L | 0.04 | 0.24 | <0.04 | - | 2.47 | 2.52 | -2 | 1.51 | 1.52 | -0.7 |
| Sodium (Na) | mg/L | 0.002 | 1.5 | 1.4 | 6.9 | 9.9 | 9.4 | 5.2 | 0.6 | 0.7 | -15.4 |
| Potassium (K) | mg/L | 0.005 | 0.13 | 0.13 | 0 | 0.54 | 0.55 | -1.8 | 0.29 | 0.27 | 7.1 |
| Calcium (Ca) | mg/L | 0.003 | 0.13 | <0.003 | - | 21.2 | 21 | 0.9 | 0.07 | <0.003 | - |
| Magnesium (Mg) | mg/L | 0.0005 | 0.17 | 0.17 | 0 | 7.72 | 7.8 | -1 | 0.32 | 0.31 | 3.2 |
| Iron (Fe) | mg/L | 0.004 | 0.42 | 0.43 | -2.4 | - | - | - | - | - | - |
| Nutrients and BOD | | | | | | | | | | | |
| Ammonia-N | µg/L | 2 | 13 | 13 | 0 | 12 | 11 | 8.7 | 16 | 16 | 0 |
| Nitrate+Nitrite | µg/L | 1 | <1 | <1 | 0 | <1 | <1 | 0 | <1 | <1 | 0 |
| Total Nitrogen | µg/L | 7 | 767 | 779 | -1.6 | 1,180 | 1,180 | 0 | 633 | 574 | 9.8 |
| Total Kjeldahl Nitrogen | µg/L | - | 767 | 779 | -1.6 | 1180 | 1180 | 0 | 633 | 574 | 9.8 |
| Total Dissolved Phosphorus | µg/L | 1 | 11 | 10 | 9.5 | 6 | 6 | 0 | 17 | 17 | 0 |
| Total Phosphorus | µg/L | 1 | 39 | 39 | 0 | 30 | 29 | 3.4 | 31 | 27 | 13.8 |
| Chlorophyll | µg/L | - | 22.49 | 20.58 | 8.9 | 7.69 | 8.41 | -8.9 | 2.38 | 1.74 | 31.1 |

Note: <LOD = less than detection limit

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable analytes (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

Table B.2-15 Relative percent difference between duplicate water quality samples for total and dissolved metals collected from Lake SM5, 2010.

| Analyte | Unit | Lake SM5 2-Sep-10 | Duplicate 2-Sep-10 | Relative Percent Difference (%) ¹ |
|-------------------------|------|----------------------|-----------------------|---|
| Dissolved Metals | | | | |
| Al | µg/L | 126 | 52.9 | 81.7 |
| Sb | µg/L | 0.0337 | 0.0124 | 92.4 |
| As | µg/L | 0.231 | 0.299 | -25.7 |
| Ba | µg/L | 9.23 | 6.31 | 37.6 |
| Be | µg/L | 0.0166 | 0.0103 | 46.8 |
| Bi | µg/L | 0.0062 | 0.0017 | 113.9 |
| B | µg/L | 4.18 | 6.94 | -49.6 |
| Cd | µg/L | 0.0137 | 0.0038 | 113.1 |
| Ca | µg/L | 0.892 | 1.3 | -37.2 |
| Cr | µg/L | 0.171 | 0.156 | 9.2 |
| Co | µg/L | 0.247 | 0.0508 | 131.8 |
| Cu | µg/L | 0.396 | 0.126 | 103.4 |
| Fe | µg/L | 400 | 91.7 | 125.4 |
| Pb | µg/L | 0.158 | 0.0416 | 116.6 |
| Li | µg/L | 0.488 | 0.77 | -44.8 |
| Mg | µg/L | 0.248 | 0.361 | -37.1 |
| Mn | µg/L | 60.2 | 19.4 | 102.5 |
| Hg | µg/L | <0.01 | <0.01 | - |
| Mb | µg/L | 0.0851 | 0.047 | 57.7 |
| Ni | µg/L | 0.273 | 0.148 | 59.4 |
| K | µg/L | 255 | 243 | 4.8 |
| Se | µg/L | <0.1 | <0.1 | - |
| Ag | µg/L | <0.0005 | <0.0005 | - |
| Sr | µg/L | 5.99 | 6.94 | -14.7 |
| Tl | µg/L | 0.004 | 0.0033 | 19.2 |
| Th | µg/L | 0.0358 | 0.0102 | 111.3 |
| Sn | µg/L | L0.03 | L0.03 | - |
| Ti | µg/L | 2.64 | 0.372 | 150.6 |
| U | µg/L | 0.0137 | 0.0043 | 104.4 |
| V | µg/L | 0.796 | 0.141 | 139.8 |
| Zn | µg/L | 3.81 | 1.51 | 86.5 |
| Total Metals | | | | |
| Al | µg/L | 274 | 78.2 | 111.2 |
| Sb | µg/L | 0.034 | 0.0125 | 92.5 |
| As | µg/L | 0.264 | 0.327 | -21.3 |
| Ba | µg/L | 10.8 | 7.39 | 37.5 |
| Be | µg/L | 0.0337 | 0.0104 | 105.7 |

Note: T - Total metals; D - Dissolved metals.

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable analytes (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

Table B.2-15 (Cont'd.)

| Analyte | Unit | Lake SM5 2-Sep-10 | Duplicate 2-Sep-10 | Relative Percent Difference (%) ¹ |
|-------------------------------|------|----------------------|-----------------------|---|
| Total Metals (Cont'd.) | | | | |
| Bi | µg/L | 0.0066 | 0.0017 | 118.1 |
| B | µg/L | 6.69 | 7.71 | -14.2 |
| Cd | µg/L | 0.0165 | 0.0082 | 67.2 |
| Ca | µg/L | 0.96 | 1.4 | -37.3 |
| Cr | µg/L | 0.306 | 0.158 | 63.8 |
| Co | µg/L | 0.28 | 0.117 | 82.1 |
| Cu | µg/L | 0.4 | 0.127 | 103.6 |
| Fe | µg/L | 525 | 256 | 68.9 |
| Pb | µg/L | 0.217 | 0.0784 | 93.8 |
| Li | µg/L | 0.493 | 0.778 | -44.8 |
| Mg | µg/L | 0.269 | 0.385 | -35.5 |
| Mn | µg/L | 64 | 36.5 | 54.7 |
| Hg | µg/L | <0.01 | <0.01 | - |
| Mb | µg/L | 0.0977 | 0.0613 | 45.8 |
| Ni | µg/L | 0.357 | 0.15 | 81.7 |
| K | µg/L | 290 | 267 | 8.3 |
| Se | µg/L | <0.1 | 0.12 | - |
| Ag | µg/L | 0.0021 | 0.0006 | 111.1 |
| Sr | µg/L | 6.42 | 7.37 | -13.8 |
| Tl | µg/L | 0.0053 | 0.005 | 5.8 |
| Th | µg/L | 0.0362 | 0.0103 | 111.4 |
| Sn | µg/L | L0.03 | L0.03 | - |
| Ti | µg/L | 3.83 | 0.814 | 129.9 |
| Ur | µg/L | 0.0179 | 0.0056 | 104.7 |
| V | µg/L | 1.15 | 0.291 | 119.2 |
| Zn | µg/L | 3.81 | 1.53 | 85.4 |

Note: T - Total metals; D - Dissolved metals.

¹ Relative percent difference (RPD) = (difference between sample 1 and 2)/(average of sample 1 and 2) x 100%. RPD for undetectable analytes (i.e., < detection limit) was calculated assuming a concentration equal to the detection limit.

Precision is influenced by how close the analytical value is to the method detection limit. Thus, assessing percent mean differences is valid only for analytical values that are at least five times the detection limit.

Appendix C

**Climate and Hydrology
Component**

C CLIMATE AND HYDROLOGY COMPONENT

C.1 CLIMATE DATA COLLECTED IN 2010 WATER YEAR¹

C.1.1 RAMP Climate Data

C.1.1.1 Aurora Climate Station (C1)

The Aurora Climate Station (C1) sensors monitored air temperature, wind speed and direction, precipitation, solar radiation, and relative humidity during the 2010 water year¹ (WY). Table C.1-1 lists the data monitored at the station. Monthly observations for the 2010 WY are summarized in Table C.1-2, and daily observations are contained in the RAMP database.

Temporary periods of datalogger malfunction were experienced at the C1 station resulting in the decision to upgrade the station with a new datalogger and recalibrated sensors to ensure station reliability. The periods of malfunction of the old datalogger and the down-time needed to complete station upgrades are described below:

- From October 16, 2009 to November 3, 2009 and December 14, 2009 to January 12, 2010 datalogger malfunctions were experienced. Air temperature, relative humidity and precipitation were estimated for these periods using the L2 Kearl Lake station data; and
- No data were collected from August 9 to 10, 2010 due to the installation of a new datalogger, and recalibrated sensors.

Table C.1-1 Data collected at the RAMP Aurora Climate Station (C1), 2010.

| Climate Element and Sensor | Variable | Units | Derivation |
|---|-----------------------|----------------------|---|
| Air Temperature Thermistor | Minimum | (°C) | Minimum of 1 minute means from readings every 5 sec. |
| | Mean | (°C) | Mean of readings every 5 sec. |
| | Maximum | (°C) | Maximum of 1 minute means from readings every 5 sec. |
| Total Precipitation Pluvio2 Weighing Precipitation Gauge | Total | (mm) | Sum of 0.254 mm readings. |
| Depth of Snow on Ground Sonic level sensor | Total | (cm) | Average of 5 second readings made in the last minute of each hour. |
| Mean Relative Humidity Humidity sensor | Mean | (%) | Mean of readings every 5 sec. |
| Total Global Solar Radiation Pyranometer | Mean | (kW/m ²) | Mean of time integrated readings every 5 sec. |
| Wind Speed and Direction Wind Vane and Propeller | Direction | (degrees) | Direction of daily mean wind vector from readings averaged every 5 sec. |
| | 5 sec. Gust Speed | (km/h) | Maximum scalar wind speed from 5 sec readings. |
| | 2 min. Gust Speed | (km/h) | Maximum of 2 minute scalar wind speed means from readings every 5 sec. |
| | 10 min. Gust Speed | (km/h) | Maximum of 10 minute scalar wind speed means from readings every 5 sec. |

¹ 2010 water year defined as the period from November 1, 2009 to October 31, 2010.

Table C.1-2 Summary of 2010 WY monthly climate data collected at C1 Aurora Climate Station.

| Month | Temperature | | | Total Precipitation Pluvio2 (mm) | Month End Depth of Snow on Ground (cm) | Mean Relative Humidity (%) | Mean Total Global Solar Radiation (kW/m ²) | Maximum Sustained Wind Speeds | | |
|-------------------|-------------|--------------|-------------|---|--|-------------------------------------|---|-------------------------------|------------------|-------------------|
| | Min (°C) | Mean (°C) | Max (°C) | | | | | 5 sec. (km/h) | 2 min. (km/h) | 10 min. (km/h) |
| Nov-09 | -14.2 E | -4.1 E | 6.3 E | 16.5 E | 8.0 | 84.3 E | 0.023 P | 28.2 P | 17.9 P | 15.0 P |
| Dec-09 | -39.8 E | -18.3 E | -2.1 E | 2.8 E | M | 82.9 E | 0.009 P | 55.8 P | 41.1 P | 38.6 P |
| Jan-10 | -34.4 E | -15.9 E | -2.3 E | 10.8 E | 32.6 | 86.0 E | 0.003 P | 32.4 P | 22.3 P | 18.4 P |
| Feb-10 | -28.3 | -9.3 | 7.2 | 2.0 | 31.5 | 81.3 | 0.038 | 33.4 | 25.4 | 21.2 |
| Mar-10 | -24.2 | -0.9 | 15.0 | 9.0 | 0.3 | 64.0 | 0.115 | 47.0 | 33.9 | 29.0 |
| Apr-10 | -6.7 | 5.9 | 26.4 | 36.3 | 0.0 | 61.9 | 0.162 | 44.3 | 32.7 | 29.8 |
| May-10 | -4.4 | 9.8 | 26.6 | 23.3 | 0.0 | 59.6 | 0.197 | 40.9 | 28.8 | 26.7 |
| Jun-10 | 3.4 | 16.9 | 29.1 | 20.9 | 0.0 | 57.1 | 0.241 | 39.7 | 28.3 | 21.5 |
| Jul-10 | 5.5 | 18.2 | 31.0 | 63.4 | 0.0 | 65.5 | 0.228 | 61.5 | 41.8 | 35.1 |
| Aug-10 | 2.2 P | 15.5 P | 29.8 P | 73.6 P | 0.0 | 75.9 P | 0.150 P | 47.3 P | 37.9 P | 30.8 P |
| Sep-10 | -2.2 | 9.3 | 26.9 | 56.6 | 0.0 | 80.9 | 0.098 | 39.6 | 29.1 | 22.3 |
| Oct-10 | -6.4 | 5.2 | 22.3 | 3.5 | 0.0 | 69.1 | 0.063 | 58.9 | 34.3 | 28.1 |
| 2010 WY Annual | -39.8 P | 2.7 P | 31.0 P | 318.6 P | | 72.4 P | 0.111 P | 61.5 P | 41.8 P | 38.6 P |

Note: E = Estimated; M = Missing; P = Partial; See additional notes in sections C.1.1.1 and C.1.1.4

C.1.1.2 Horizon Climate Station (C2)

The Horizon Climate Station (C2) was established in October 2008 and became fully operational in June 2009. The Horizon Station monitored air temperature, wind speed and direction, solar radiation, relative humidity, barometric pressure, snow depth, and precipitation during the 2010 WY. Table C.1-3 lists the data elements monitored at the station. Monthly observations for 2010 WY are summarized in Table C.1-4, and daily observations are contained in the RAMP database.

Records at the station are complete for the full 2010 WY with the exception of snow-depth data. Snow-depth data are not available until mid-January 2010 when a malfunctioning snow-depth sensor was replaced.

Table C.1-3 Horizon Climate Station (C2) daily data elements.

| Climate Element and Sensor | Parameter | Units | Derivation |
|---|-----------------------|----------------------|---|
| Air Temperature Thermistor | Minimum | (°C) | Minimum of 1 minute means from readings every 5 sec. |
| | Mean | (°C) | Mean of readings every 5 sec. |
| | Maximum | (°C) | Maximum of 1 minute means from readings every 5 sec. |
| Total Precipitation | Total | (mm) | Sum of 0.01 mm readings. |
| Depth of Snow on Ground Sonic level sensor | Total | (cm) | Average of 5 second readings made in the last minute of each hour. |
| Mean Relative Humidity Humidity sensor | Mean | (%) | Mean of readings every 5 sec. |
| Total Global Solar Radiation Pyranometer | Mean | (kW/m ²) | Mean of time integrated readings every 5 sec. |
| Barometric pressure | Mean | KPa | Recorded for every minute and averaged per 1 hour |
| Wind Speed and Direction Wind Vane and Propeller | Direction | (degrees) | Direction of daily mean wind vector from readings averaged every 5 sec. |
| | 5 sec. Gust Speed | (km/h) | Maximum scalar wind speed from 5 sec readings. |
| | 2 min. Gust Speed | (km/h) | Maximum of 2 minute scalar wind speed means from readings every 5 sec. |
| | 10 min. Gust Speed | (km/h) | Maximum of 10 minute scalar wind speed means from readings every 5 sec. |

Table C.1-4 Summary of the 2010 WY monthly climate data collected at C2 Horizon Climate Station.

| Month | Temperature | | | Total Precipitation (mm) | Month End Depth of Snow on Ground (cm) | Mean Relative Humidity (%) | Mean Total Global Solar Radiation (kW/m ²) | Station Pressure (kPa) | Maximum Sustained Wind Speeds | | |
|-------------------|--------------|--------------|--------------|--------------------------------|--|-------------------------------------|--|------------------------------|-------------------------------|------------------|-------------------|
| | Min. (°C) | Mean (°C) | Max. (°C) | | | | | | 5 sec. (km/h) | 2 min. (km/h) | 10 min. (km/h) |
| Nov-09 | -15.2 | -4.0 | 7.8 | 11.8 | M | 80.4 | 0.033 | 95.5 | 47.2 | 34.0 | 32.6 |
| Dec-09 | -37.9 | -18.3 | -1.6 | 3.9 | M | 78.5 | 0.015 | 97.2 | 51.4 | 35.4 | 31.0 |
| Jan-10 | -31.7 | -15.8 | -0.7 | 9.7 | 29.4 | 84.8 | 0.009 | 96.8 | 30.2 | 22.5 | 19.3 |
| Feb-10 | -26.2 | -9.0 | 8.0 | 2.2 | 31.2 | 81.2 | 0.047 | 96.8 | 28.9 | 19.0 | 18.2 |
| Mar-10 | -27.4 | -0.9 | 14.7 | 11.4 | 20 | 58.5 | 0.121 | 96.2 | 42.1 | 28.3 | 25.6 |
| Apr-10 | -40.0 | 5.3 | 24.4 | 14.5 | 0 | 59.8 | 0.166 | 96.2 | 67.6 | 48.9 | 40.5 |
| May-10 | -5.0 | 9.1 | 24.8 | 41.4 | 0 | 59.2 | 0.199 | 96.6 | 43.5 | 27.2 | 23.3 |
| Jun-10 | 2.7 | 15.7 | 27.8 | 13.5 | 0 | 59.9 | 0.238 | 96.2 | 44.2 | 32.0 | 26.4 |
| Jul-10 | 4.9 | 17.6 | 31.0 | 68.5 | 0 | 64.3 | 0.230 | 96.1 | 56.4 | 37.7 | 34.3 |
| Aug-10 | 1.9 | 15.0 | 28.5 | 113.3 | 0 | 74.1 | 0.165 | 96.2 | 48.3 | 35.3 | 27.2 |
| Sep-10 | -2.8 | 8.7 | 25.8 | 44.7 | 0 | 79.4 | 0.110 | 96.4 | 60.3 | 37.9 | 28.2 |
| Oct-10 | -7.7 | 4.5 | 22.1 | 14.8 | 0 | 68.2 | 0.072 | 96.2 | 59.9 | 42.6 | 36.1 |
| 2010 WY Annual | -40.0 | 2.3 | 31.0 | 349.8 | | 70.7 | 0.117 | 96.4 | 67.6 | 48.9 | 40.5 |

Note: M = Missing, P = Partial. See additional notes in sections C1.1.2 and C 1.1.4.

C.1.1.3 Other RAMP Climate Stations

Table C.1-5 summarizes the climate and water temperature variables monitored at RAMP stations other than the Aurora and Horizon Climate Stations.

Water Temperature was monitored year-round at Stations L1, L2, S14A, S15A, S33, S34, S40, S43 and S45. At Stations S2, S5, S5A, S10, S11, S15A and S32, water temperature monitoring began when the thermistor was installed in the spring.

Precipitation was monitored at Stations S3, S19, S31, S40, and S43 from April to October 2010. Precipitation was monitored year-round at Station C3, with the exception of June 26 to August 18, when equipment malfunction prevented precipitation data collection.

Barometric pressure was monitored at Station S5A throughout the 2010 WY.

Table C.1-6 to C.1-8 provide a monthly summary of the data collected at the other RAMP climate stations. Daily monitoring data are included in the RAMP database. Daily and cumulative precipitation depths at the various stations are compared to precipitation recorded at other regional stations in Figure C.1-1. Water temperatures are illustrated in Figure C.1-2.

Table C.1-5 Sensors at other RAMP climate stations.

| Station | Variable | Sensor |
|--|----------------------------|----------------------------|
| C3 Steepbank Climate Station | Precipitation ¹ | Weighing Gauge |
| L1 McClelland Lake | Precipitation | Weighing Gauge |
| | Water Temperature | Thermistor |
| | Air Temperature | Thermistor |
| | Relative Humidity | Humidity Sensor |
| L2 Kearl Lake | Precipitation | Geonor Precipitation Gauge |
| | Water Temperature | Thermistor |
| | Air Temperature | Thermistor |
| | Relative Humidity | Humidity Sensor |
| S3 Iyininim Creek above Kearl Lake | Precipitation | Tipping Bucket |
| S5 Muskeg River above Stanley Creek | Water Temperature | Thermistor |
| S5A Muskeg River above Muskeg Creek | Barometric Pressure | Pressure Transducer |
| | Water Temperature | Thermistor |
| S10 Wapasu Creek at Canterra Road | Water Temperature | Thermistor |
| S11 Poplar Creek at Highway 63 | Water Temperature | Thermistor |
| S14A Ells River at CNRL Bridge | Water Temperature | Thermistor |
| S15A Tar River near the mouth | Water Temperature | Thermistor |
| S19 Tar River Lowland Tributary near the mouth | Precipitation | Tipping Bucket |

¹ Monitoring of air temperature, relative humidity, snow depth, global solar radiation, and wind speed and direction began at C3 in November 2010, outside the reporting period of the 2010 WY.

Table C.1-5 (Cont'd.)

| Station | Parameter | Sensor |
|--|------------------------------------|------------------------------|
| S31 Hanginstone Creek at North Star Road | Precipitation | Tipping Bucket |
| S32 Surmont Creek at Highway 881 | Water Temperature | Thermistor |
| S33 Muskeg River at Aurora/Albian Boundary | Water Temperature | Thermistor |
| S34 Tar River above CNRL Lake | Water Temperature | Thermistor |
| S40 Mackay River at Petro-Canada Bridge | Water Temperature Precipitation | Thermistor Tipping Bucket |
| S43 Firebag River upstream of Suncor Firebag | Water Temperature Precipitation | Thermistor Tipping Bucket |
| S45 Ells River above Joslyn Creek diversion | Water Temperature | Thermistor |

Table C.1-6 Summary of the 2010 WY climate data collected at Stations L1 McClelland Lake and L2 Kearl Lake.

| Station | L1 McClelland Lake | | | | L2 Kearl Lake | | | |
|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Period of Operation | Nov 1, 2009 to Oct 31, 2010 | Nov 1, 2009 to Oct 31, 2010 | Nov 1, 2009 to Oct 31, 2010 | Nov 1, 2009 to Oct 31, 2010 | Nov 1, 2009 to Oct 31, 2010 | Nov 1, 2009 to Oct 31, 2010 | Nov 1, 2009 to Oct 31, 2010 | Nov 1, 2009 to Oct 31, 2010 |
| Month | Precipitation Depth (mm) | Water Temperature (°C) | Air Temperature (°C) | Relative Humidity (%) | Precipitation Depth (mm) | Water Temperature (°C) | Air Temperature (°C) | Relative Humidity (%) |
| Nov-09 | 13.9 | 2.5 | -3.9 | 85.0 | 14.7 | 5.8 | -3.2 | 85.2 |
| Dec-09 | 3.7 | 1.6 | -18.1 | 81.9 | 5.1 | 4.0 | -17.9 | 85.7 |
| Jan-10 | 12.3 | 0.7 | -16.3 | 83.5 | 11.9 | 2.9 | -15.7 | 87.3 |
| Feb-10 | 4.7 | 0.4 | -9.8 | 80.8 | 1.9 | 2.4 | -9.5 | 84.9 |
| Mar-10 | 11.8 | 0.3 | -1.4 | 66.3 | 8.2 | 2.1 | -0.9 | 66.9 |
| Apr-10 | 14.5 | 1.5 | 5.0 | 64.4 | 24.3 | 2.8 | 5.5 | 64.7 |
| May-10 | 24.8 | 9.4 | 9.4 | 65.4 | 20.7 | 8.1 | 9.9 | 62.6 |
| Jun-10 | 48.2 | 17.5 | 16.1 | 66.0 | 17.3 | 13.9 | 16.6 | 62.5 |
| Jul-10 | 34.4 | 19.5 | 18.2 | 69.9 | 88.3 | 16.5 | 18.0 | 69.4 |
| Aug-10 | 54.8 | 18.8 | 15.4 | 77.1 | 68.1 | 17.0 | 15.5 | 78.6 |
| Sep-10 | 58.5 | 12.9 | 9.1 | 82.0 | 57.4 | 13.3 | 9.5 | 81.7 |
| Oct-10 | 2.9 | 8.2 | 4.8 | 73.5 | 1.6 | 9.6 | 5.7 | 70.2 |
| Annual 2010 WY (Precipitation Sum; Mean Temperatures & RH) | 284.5 | 7.8 | 2.4 | 74.6 | 319.5 | 8.2 | 2.8 | 75.0 |

Table C.1-7 Summary of 2010 WY water temperature data collected at other RAMP climate stations.

| Station | S2 Jackpine Creek at Canterra Road | S5 Muskeg River above Stanley Creek | S5A Muskeg River above Muskeg Creek | S10 Wapasu Creek at Canterra Road | S11 Poplar Creek at Highway 63 (07DA007) | S14A Ells River at CNRL Bridge | S15A Tar River near the Mouth | S32 Surmont Creek at Highway 881 | S33 Muskeg River at Aurora/ Albian Boundary | S34 Tar River above CNRL Lake | S40 Mackay River at Petro- Canada bridge | S43 Firebag River upstream of Suncor Firebag | S45 Ells River above Joslyn Creek Diversion |
|------------------------|---|--|--|--|---|--|--|---|--|---|---|---|--|
| Period of Operation | Jun 26 to Oct 31 | Aug 13 to Oct 31 | Jan 1 to Oct 31 | Jun 26 to Oct 31 | Apr 23 to Oct 31 | Nov 1 to Oct 31 | Apr 21 to Oct 26 | Apr 23 to Oct 31 | Nov 1 to Oct 31 | Nov 1 to Oct 31 | Nov 1 to Oct 31 | Nov 1 to Oct 31 | Nov 1 to Oct 31 |
| Nov-09 | | | | | | 0.0 | | | 0.2 | -0.1 | 0.2 | 0.2 | 0.1 |
| Dec-09 | | | | | | 0.2 | | | 0.2 | 0.0 | 0.2 | 0.2 | 0.2 |
| Jan-10 | | | 0.2 E | | | 0.0 | | | 0.2 | 0.0 | 0.2 | 0.2 | 0.1 |
| Feb-10 | | | 0.2 E | | | 0.0 | | | 0.2 | 0.0 | 0.2 | 0.2 | 0.1 |
| Mar-10 | | | 0.2 E | | | -0.1 | | | 0.2 | 0.0 | 0.2 | 0.1 | 0.1 |
| Apr-10 | | | 2.6 E | | 2.0 P | 0.0 | 4.8 P | 1.4 P | 2.6 | 0.0 | 1.1 | 2.2 | 0.1 |
| May-10 | | | 9.3 | | 10.2 | 8.7 | 9.4 | 4.7 | 10.0 | 3.4 | 9.2 | 10.6 | 8.2 |
| Jun-10 | 18.3 P | | 16.0 | 17.3 P | 17.8 | 17.5 | 16.8 | 8.8 | 17.5 | 12.7 | 17.1 | 17.1 | 16.4 |
| Jul-10 | 18.6 | | 18.1 | 16.6 | 19.1 | 20.0 | 18.4 | 12.2 | 19.7 | 15.4 | 20.2 | 19.3 | 19.3 |
| Aug-10 | 16.3 | 13.9 P | 16.0 | 14.9 | 17.6 | 19.9 P | 16.1 | 12.7 | 17.3 | 13.8 | 16.7 | 16.7 | 17.5 |
| Sep-10 | 9.2 | 9.3 | 9.3 | 9.2 | 11.7 | | 10.0 | 8.9 | 10.0 | 7.4 | 9.3 | 9.4 | 9.9 |
| Oct-10 | 4.5 | 4.4 | 5.2 | 4.8 | 7.2 | | 4.9 P | 6.1 P | 5.5 | 3.1 | 4.4 | 4.5 | 4.1 |
| Annual Mean | 13.4 P | 9.2 P | 7.7 | 12.6 P | 12.2 P | 6.6 P | 11.5 P | 7.8 P | 7.0 | 4.6 | 6.6 | 6.7 | 6.3 |

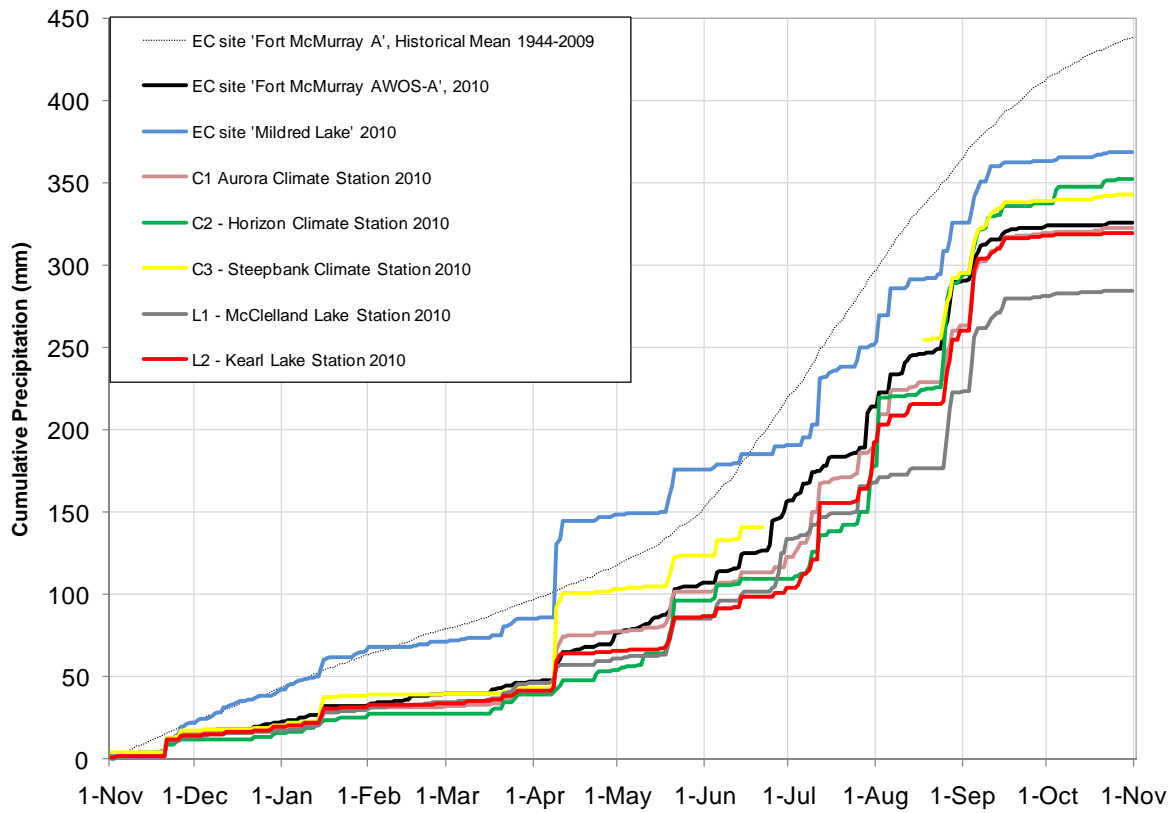
Note: M = Missing; P = Partial; E = Estimated. See additional notes in section C 1.1.4.

Table C.1-8 Summary of the 2010 WY total precipitation and station pressure data collected at other RAMP climate and hydrometric stations.

| Station | S3 Iyininim Creek above Kearn Lake | S19 Tar River Lowland Tributary near the Mouth | S31 Hangingstone Creek at North Star Road | S40 Mackay River at Petro-Canada Bridge | S43 Firebag River upstream of Suncor Firebag | C3 Steepbank Climate Station | S5A Muskeg River above Muskeg Creek |
|---------------------|--|---|--|--|---|------------------------------------|---|
| Variable | Total Precipitation (mm) | | | | | | Station Pressure (kPa) |
| Period of Operation | Apr 25 to Oct 31 | Apr 22 to Oct 26 | Apr 23 to Oct 31 | Nov 1 to Oct 31 | Apr 14 to Oct 31 | Nov 1 to Oct 31 | Nov 1 to Oct 31 |
| Nov-09 | | | | | | 17.3 | 97.1 |
| Dec-09 | | | | | | 3.5 | 98.8 |
| Jan-10 | | | | | | 18.0 | 98.8 |
| Feb-10 | | | | | | 1.2 | 98.4 |
| Mar-10 | | | | | | 3.6 | 97.7 |
| Apr-10 | 2.0 P | 4.4 P | 11.3 P | 14.0 P | 4.2 P | 59.5 | 97.7 |
| May-10 | 23.1 | 35.4 | 19.9 | 52.6 | 30.1 | 20.3 | 98.1 |
| Jun-10 | 26.0 | 17.6 | 39.3 | 58.2 | 63.3 | 17.2 P | 97.7 |
| Jul-10 | 40.9 | 13.9 | 58.4 | 50.8 | 22.4 | M | 97.5 |
| Aug-10 | 106.8 | 49.4 | 58.4 | 141.2 | 114.1 | 40.8 P | 97.6 |
| Sep-10 | 77.3 | 39.7 | 26.3 | 46.0 | 77.7 | 43.8 | 98.0 |
| Oct-10 | 4.1 P | 7.2 P | 5.7 P | 10.4 P | 5.3 P | 3.7 | 97.8 |
| Annual Sum | 280.1 P | 167.6 P | 219.3 P | 373.1 P | 317.1 P | 342.7 P | |
| Annual Mean | | | | | | | 97.9 |

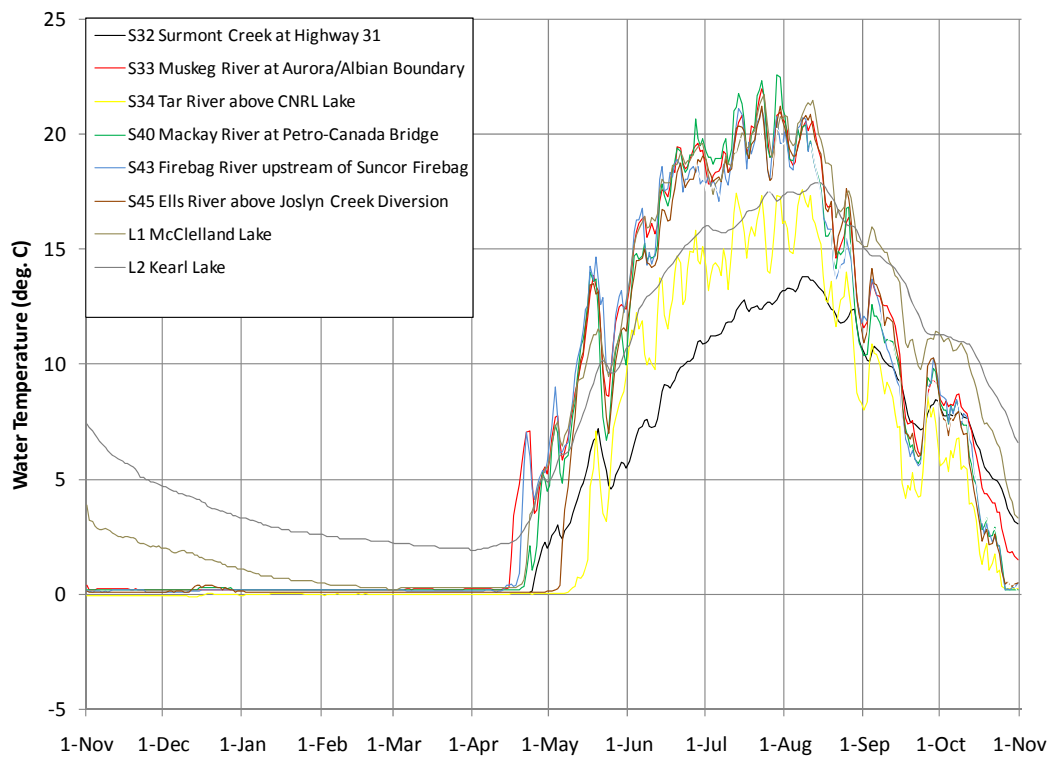
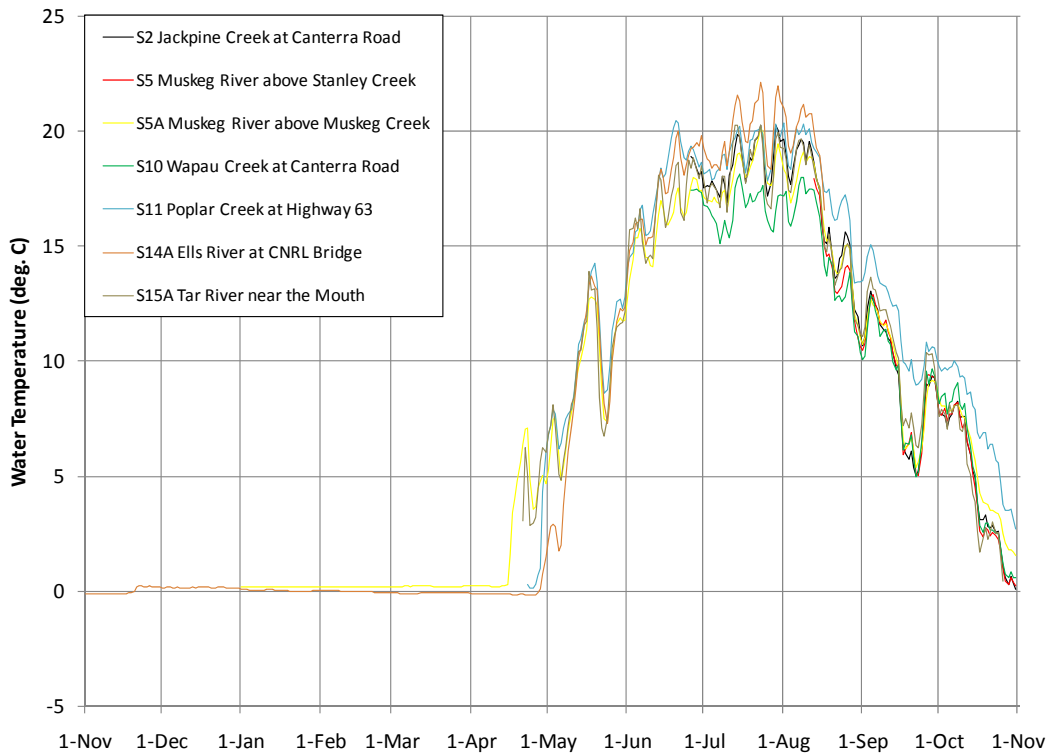
Note: M = Missing; P = Partial. See additional notes in sections C1.1.1 and C1.1.4.

Figure C.1-1 Precipitation at Fort McMurray and RAMP climate stations, 2010 WY.



Note: Data at Station C3 is missing from June 26 to August 17. The gap was interpolated by using the cumulative average from three nearby stations (i.e., stations C1 Aurora, EC Mildred Lake, and S40 MacKay River) to complete the cumulative annual record.

Figure C.1-2 2010 WY daily water temperature measured at RAMP hydrology stations.



C.1.1.4 Notes to Climate Data Tables

The following notes apply to the monthly climate data (Table C.1-2, C.1-4, C.1-6 and C.1-7) and to the daily data provided in the RAMP database (www.ramp-alberta.org):

- Time distribution of snowfall is sometimes recorded with a lag-time of approximately 3 to 6 hours (and less than one day);
- Precipitation measurement, including tipping bucket rain gauges, do not differentiate between rainfall and snowfall; therefore, the values recorded represent total precipitation for the associated period of record;
- Wind direction, from which the wind is blowing, is reported in degrees clockwise from North;
- Reported monthly climate data includes: extreme minimum and maximum temperature data; mean temperature and relative humidity; and total precipitation and solar radiation; and
- Reported annual values include: extreme minimum and maximum temperature; mean temperature, relative humidity and solar radiation; and total precipitation.

C.1.1.5 2010 Snow Course Survey Results

Snow course surveys were completed at sites representing four general terrain types across the RAMP study area:

- Flat Low Lying areas (FL);
- Open Land or Lake areas (OP);
- Mixed Deciduous (MD); and
- Jack Pine (JP).

Locations of the snow courses are shown on Figure 3.1-1 in the main report.

Snow course surveys were completed from February 4 to 9, February 26 to March 6, April 6 to 7, 2010, and selected extra surveys on April 13 following a late-season snowfall event. The results are shown in Table C.1-9.

C.1.2 Climate Data from Government Agencies

Daily climate data published by Environment Canada for climate stations in the study area have been incorporated into the RAMP database. An inventory of the data obtained for the stations is provided in Section C.5, below.

As of 2009, Environment Canada climate data includes data collected at the Fort McMurray and Mildred Lake stations. Forestry lookout station data is no longer being processed by Environment Canada.

Table C.1-9 Summary of snow course surveys conducted by RAMP, 2010.

| Terrain Type | Survey ID | February (Feb 4 to 9) | | March (Feb 26 to Mar 6) | | April (Apr 6 to 7) | | April, after snowfall (April 13) | |
|------------------------|----------------|--------------------------|-------------|----------------------------|-------------|-----------------------|-------------|--|-------------|
| | | Snow Depth [cm] | SWE [mm] | Snow Depth [cm] | SWE [mm] | Snow Depth [cm] | SWE [mm] | Snow Depth [cm] | SWE [mm] |
| Flat Low Lying | FL-00-1 | 42 | 65 | 32 | 68 | 0 | 0 | - | - |
| | FL-04-1 | 50 | 60 | 39 | 60 | 0 | 0 | - | - |
| | FL-04-4 | 41 | 63 | 34 | 52 | 0 | 0 | - | - |
| | FL-06-1 | 36 | 58 | 27 | 51 | 0 | 0 | - | - |
| | <i>Average</i> | 42 | <u>61</u> | 33 | 57 | 0 | 0 | - | - |
| Open Land/Lake Area | OP-04-1 | 27 | 60 | 23 | 55 | 0 | 0 | - | - |
| | OP-97-1 | 36 | 67 | 31 | 67 | 0 | 0 | - | - |
| | OP-99-2 | 33 | 61 | 26 | 60 | 0 | 0 | 21 | 35 |
| | OP-06-1 | 24 | 49 | 12 | 44 | - | - | - | - |
| | <i>Average</i> | 30 | <u>60</u> | 23 | 56 | 0 | 0 | (21) | (35) |
| Mixed Deciduous | MD-00-2 | 34 | 61 | 28 | 60 | 0 | 0 | - | - |
| | MD-06-1 | 34 | 44 | 25 | 57 | - | - | - | - |
| | MD-04-1 | 31 | 59 | 18 | 49 | - | - | - | - |
| | MD-04-2 | 32 | 52 | 19 | 41 | - | - | - | - |
| | <i>Average</i> | 33 | <u>54</u> | 22 | 52 | 0 | 0 | - | - |
| Jackpine | JP-00-1 | 42 | 69 | 33 | 64 | 0 | 0 | - | - |
| | JP-07-2 | 36 | 63 | 30 | 56 | 0 | 0 | - | - |
| | JP-01-1 | 26 | 45 | 24 | 46 | 0 | 0 | - | - |
| | JP-06-1 | 23 | 39 | 25 | 52 | 6 | 8 | 22 | 23 |
| | <i>Average</i> | 32 | 54 | 28 | <u>54</u> | 1 | 2 | (22) | (23) |

Note: Underlined average values are the maximum observed values for a given terrain type in 2010. These values are plotted in Figure 4.1-4.

C.2 HYDROMETRIC DATA COLLECTED IN THE 2010 WY

C.2.1 RAMP Hydrometric Data

C.2.1.1 Water Level and Discharge

Table C.2-1 summarizes RAMP hydrometric monitoring in the 2010 WY. Daily discharge and water level data are contained in the RAMP database. The quality assessment shown for each station record is based on an assessment matrix which considers the number and quality of discharge measurements made during the year, the quality and extent of the stage-discharge rating curve, and the record completeness.

Data quality for the 2010 WY is generally good (30 of 39 locations) with wildlife impacts and equipment attrition affecting the 2010 WY hydrometric record at nine stations as described below:

- The pressure transducer and water temperature probe was damaged by beaver activity at Station S2, Jackpine Creek at Canterra Road, after the October 2009 field visit prior to freeze-up. The probe was replaced when the creek was ice free on April 26, 2010.
- At Station S19, Tar River Lowland Tributary near the Mouth, the tipping bucket rain gauge was damaged by wildlife causing a power interruption of 36 days. The station was successfully reactivated on the next field visit.
- Wildlife damaged Station S25, Susan Lake Outlet, in August. The station was successfully restored within 15 days after the station was damaged.
- Station C3, Steepbank Climate Station, required adjustment to support function of the precipitation gauge. The housing of the gauge was successfully realigned with data collection resuming on August 18.
- The pressure transducer at Station S37, East Jackpine Creek at the 1,300 ft contour, malfunctioned in late August and was replaced with a newly-calibrated pressure transducer on the September field visit. Data collection successfully resumed within 13 days of the malfunction.

Data quality at the following 6 stations was compromised due to backwater effects caused by beaver activity:

- S2, Jackpine Creek at Canterra Road;
- S09, Kearl Lake Outlet;
- S10, Wapasu Creek at Canterra Road;
- S19, Tar River Lowland Tributary;
- S20, Muskeg River Upland; and
- S36, McClelland Lake Outlet above Firebag River.

Table C.2-1 Summary of 2010 WY hydrometric monitoring.

| Watershed and Station | Catchment Area (km ²) | Monitored Period 2010 WY | Maximum Daily Discharge (Water Year: Nov 1 2009 - Oct 31 2010) | | Minimum Daily Discharge (Open Water Season: May 1 - Oct 31 2010) | | Runoff Volume (Open Water Season: May 1 - Oct 31 2010) | |
|---|--|---------------------------------|--|---------------------|--|---------------------|--|---------------------|
| | | | 2010 WY | Historic Mean | 2010 WY | Historic Mean | 2010 WY | Historic Mean |
| | | | (m ³ /s) | (m ³ /s) | (m ³ /s) | (m ³ /s) | (dam ³) | (dam ³) |
| <i>Athabasca River</i> | | | | | | | | |
| S24 - Athabasca River below Eymundson Creek | 146,000 | Nov 1 - Oct 31 | 1224 | 2081 | 416 | 354 | 11,700,000 | 13,800,000 |
| Athabasca River at Fort McMurray (07DA001) | 133,000 | Nov 1 - Oct 31 | 1160 | 2504 | 372 | 429 | 11,100,000 | 15,600,000 |
| <i>Muskeg River Watershed</i> | | | | | | | | |
| S2 - Jackpine Creek at Canterra Road | 358 | Apr 26 - Oct 31 | 4.2 | 8.0 | 0.10 | 0.32 | 16,900 | 33,500 |
| S3 - Iyininim Creek above Kearl Lake | 32.2 | Apr 25 - Oct 31 | 1.4 | - | 0.01 | 0.03 | 3,370 | 3,620 |
| S5 - Muskeg River above Stanley Creek | 395 | Nov 1 - Oct 31 | 4.8 | 9.3 | 0.00 | 0.22 | 21,300 | 28,900 |
| S5A - Muskeg River above Muskeg Creek | 552 | Nov 1 - Oct 31 | 5.5 | 8.8 | 0.34 | 0.37 | 25,200 | 34,300 |
| S7 - Muskeg River near Fort McKay (07DA008) | 1,460 | Nov 1 - Oct 31 | 13.0 | 22.7 | 0.55 | 1.10 | 71,000 | 105,000 |
| S9 - Kearl Lake Outlet | 73.6 | Nov 27 - Oct 31 | 0.2 | 0.5 | 0.000 | 0.04 | 940 | 2,680 |
| S10 - Wapasu Creek at Canterra Road | 90.7 | Nov 1 - Oct 31 | 2.1 | 3.9 | 0.04 | 0.07 | 8,100 | 7,830 |
| S20 - Muskeg River Upland | 157 | Apr 26 - Oct 31 | 2.2 | - | 0.12 | 0.06 | 8,200 | 10,000 |
| S22 - Muskeg Creek near the Mouth | 157 | Apr 26 - Oct 31 | 3.8 | - | 0.01 | 0.19 | 15,300 | 21,200 |
| S33 - Muskeg River at Aurora/Albian Boundary | 728 | Nov 1 - Oct 31 | 7.0 | 15.9 | 0.29 | 0.51 | 34,800 | 52,600 |
| S37 - East Jackpine Creek near the 1300m Contour | 33 | Apr 25 - Oct 28 | 0.8 | - | 0.00 | - | 3,440 | - |
| <i>Athabasca River Tributaries Upstream of Fort McMurray</i> | | | | | | | | |
| S29 - Christina River near Chard (07CE002) | 4,860 | Nov 1 - Oct 31 | 80.0 | 94.0 | 11.00 | 6.33 | 443,000 | 365,000 |
| S31 - Hangingstone Creek at North Star Road | 160 | Apr 23 - Oct 31 | 3.4 | - | 0.18 | 0.18 | 14,830 | 13,800 |
| S32 - Surmount Creek at Highway 881 | 158 | Apr 23 - Oct 31 | 2.8 | - | 0.23 | 0.12 | 14,900 | 16,800 |
| S42 - Clearwater River above Christina River (07CD005) | 1,7017 | Nov 1 - Oct 31 | 151.0 | 196.3 | 55.40 | 59.82 | 1,220,000 | 1,470,000 |
| <i>Athabasca River Tributaries Downstream of Fort McMurray</i> | | | | | | | | |
| S6 - Mills Creek at Highway 63 | 8.9 | Nov 1 - Oct 31 | 0.1 | 0.1 | 0.01 | 0.02 | 497 | 762 |
| S11 - Poplar Creek at Highway 63 (07DA007) | 151 | Nov 30 - Oct 31 | 10.2 | 9.8 | 0.11 | 0.06 | 22,200 | 21,600 |
| S12 - Fort Creek at Highway 63 | 45.6 | Apr 27 - Oct 30 | 0.4 | - | 0.02 | 0.02 | 1,880 | 1,430 |
| S14A - Ells River at CNRL Bridge | 2,430 | Nov 1 - Oct 31 | 27.4 | 45.9 | 2.89 | 2.51 | 120,000 | 162,000 |

* See Section C.2.1.1 for details of missing data

Means were calculated from years with greater than 85% of data for the required period.

Volumes presented to 3 significant figures.

Table C.2-1 (Cont'd.)

| Watershed and Station | Catchment Area (km ²) | Monitored Period 2010 WY | Maximum Daily Discharge (Water Year: Nov 1 2009 - Oct 31 2010) | | Minimum Daily Discharge (Open Water Season: May 1 - Oct 31 2010) | | Runoff Volume (Open Water Season: May 1 - Oct 31 2010) | |
|--|--------------------------------------|-----------------------------|--|---------------------|--|---------------------|--|---------------------|
| | | | 2010 WY | Historic Mean | 2010 WY | Historic Mean | 2010 WY | Historic Mean |
| | | | (m ³ /s) | (m ³ /s) | (m ³ /s) | (m ³ /s) | (dam ³) | (dam ³) |
| Athabasca River Tributaries Downstream of Fort McMurray (Cont'd.) | | | | | | | | |
| S15A - Tar River near the Mouth | 301 | Apr 21 - Oct 26 | 3.0 | 2.8 | 0.10 | 0.20 | 9,200 | 12,400 |
| S16A / S16A / CR-1 - Calumet River | 173.5 | Apr 24 - Oct 27 | 0.8 | - | 0.01 | 0.02 | 2,500 | 3,800 |
| S19 - Tar River Lowland Tributary near the Mouth | 11.5 | Apr 22 - Oct 26 | 0.052 | - | 0.002 | 0.002 | 225 | 226 |
| S25 - Susan Lake Outlet | 13.6 | Jun 28 - Oct 30 | 0.1 | - | 0.02 | 0.01 | 397 | 830 |
| S26 - MacKay River near Fort McKay (07DB001) | 5,570 | Nov 1 - Oct 31 | 48 | 114 | 1.87 | 3.70 | 287,000 | 374,000 |
| S27 - Firebag River near the Mouth (07DC001) | 5,990 | Nov 1 - Oct 31 | 70 | 122 | 11.80 | 15.60 | 485,000 | 599,000 |
| S34 - Tar River above CNRL Lake | 134 | Nov 1 - Oct 31 | 5.3 | - | 0.05 | 0.12 | 8,200 | 12,300 |
| S36 - McClelland Lake Outlet above Firebag River | 330 | Apr 24 - Oct 27 | 0.9 | - | 0.28 | 0.37 | 6,900 | 8,000 |
| S38 - Steepbank River near Fort McMurray (07DA006) | 1,320 | Apr 25 - Oct 28 | 25.4 | 34.5 | 1.28 | 1.69 | 106,000 | 137,000 |
| S39 - Beaver River above Syncrude (07DA018) | 165 | Nov 1 - Oct 31 | 2.9 | 9.6 | 0.23 | 0.13 | 10,640 | 13,280 |
| S40 - MacKay River at Petro-Canada Bridge | 5,290 | Nov 1 - Oct 31 | 41 | 36 | 1.39 | 3.54 | 220,000 | 265,000 |
| S43 - Firebag River above Suncor Firebag | 5,990 | Apr 14 - Oct 31 | 36.1 | - | 4.57 | - | 165,000 | - |
| S44 - Pierre River near Fort McKay (07DA013) | 123 | Apr 24 - Oct 27 | 1.6 | - | 0.04 | - | 4,390 | - |
| S45 - Ells River above Joslyn Creek Diversion | 2,450 | Nov 1 - Oct 31 | 30.1 | - | 3.03 | - | 131,080 | - |
| | | | Maximum Water Level | | Maximum Water Level | | | |
| Water Level Stations | | | 2010 WY | Historic Mean | 2010 WY | Historic Mean | | |
| L1 - McClelland Lake | 28 | Nov 1 - Oct 31 | 294.652 | 294.590 | 294.449 | 294.308 | | |
| L2 - Kearl Lake | 72.6 | Nov 1 - Oct 31 | 331.981 | 332.139 | 331.785 | 331.755 | | |
| L3 - Isadore`s Lake | 191 | Nov 1 - Oct 31 | 233.901 | 233.940 | 233.733 | 233.672 | | |

* See Section C.2.1.1 for details of missing data
Means were calculated from years with greater than 85% of data for the required period.
Volumes presented to 3 significant figures.

Suspended sediment samples were collected at 28 RAMP stream flow stations for a total of 134 measurements during 2010. The total suspended sediment (TSS) data are provided in Table C.2-2. Discharge (Q) shown in the table is the discharge measured at the time the sample was collected.

Table C.2-2 Suspended sediment data collected at RAMP hydrometric stations in 2010.

| Station | | April 23 to 28 | June 21 to 29 | Aug 10 to 19 | Sept 14 to 24 | Oct 25 to Nov 4 |
|---------|-----------------------|----------------|---------------|--------------|---------------|-----------------|
| S02 | TSS (mg/L) | 13 | <3.0 | 3 | <3.0 | <3.0 |
| | Q (m ³ /s) | 4.324 | 0.268 | 0.113 | 2.516 | 0.644 |
| S03 | TSS (mg/L) | 120 | 4 | 7 | 41 | 5 |
| | Q (m ³ /s) | 0.821 | 0.035 | 0.086 | 0.731 | 0.069 |
| S5 | TSS (mg/L) | 3 | 7 | 4 | 21 | 4 |
| | Q (m ³ /s) | 4.299 | 0.474 | 0.232 | 4.315 | 0.921 |
| S5A | TSS (mg/L) | 5 | 3 | <3.0 | 6 | <3.0 |
| | Q (m ³ /s) | 4.426 | 0.522 | 0.393 | 4.159 | 1.053 |
| S6 | TSS (mg/L) | <3.0 | <3.0 | 3 | 4 | <3.0 |
| | Q (m ³ /s) | 0.087 | 0.014 | 0.013 | 0.044 | 0.018 |
| S7 | TSS (mg/L) | 12 | <3.0 | <3.0 | 3 | * |
| | Q (m ³ /s) | 10.428 | n/a | 0.764 | n/a | * |
| S9 | TSS (mg/L) | <3.0 | <3.0 | <3.0 | 4 | <3.0 |
| | Q (m ³ /s) | 0.155 | 0.017 | 0.003 | 0.143 | 0.066 |
| S10 | TSS (mg/L) | <3.0 | <3.0 | <3.0 | <3.0 | 6 |
| | Q (m ³ /s) | 1.895 | 0.108 | 0.046 | 1.728 | 0.264 |
| S11 | TSS (mg/L) | 187 | <3.0 | 7 | 15 | 4 |
| | Q (m ³ /s) | 6.120 | 0.595 | 0.697 | 3.024 | 0.769 |
| S12 | TSS (mg/L) | 7 | 5 | <3.0 | 3 | <3.0 |
| | Q (m ³ /s) | 0.142 | 0.070 | 0.033 | 0.155 | 0.100 |
| S14A | TSS (mg/L) | 168 | <3.0 | <3.0 | 12 | 11 |
| | Q (m ³ /s) | 11.113 | 6.493 | 2.551 | 10.696 | 6.249 |
| S15A | TSS (mg/L) | 84 | 10 | 6 | 7 | 8 |
| | Q (m ³ /s) | 1.967 | 0.280 | 0.141 | 1.098 | 0.146 |
| S16A | TSS (mg/L) | 4 | <3.0 | <3.0 | <3.0 | <3.0 |
| | Q (m ³ /s) | 0.122 | 0.022 | 0.114 | 0.390 | 0.089 |
| S19 | TSS (mg/L) | <3.0 | 3 | 19 | 6 | <3.0 |
| | Q (m ³ /s) | 0.052 | 0.003 | 0.003 | 0.033 | 0.007 |
| S20 | TSS (mg/L) | <3.0 | 5 | 45 | <3.0 | <3.0 |
| | Q (m ³ /s) | 1.383 | 0.132 | 0.233 | 1.533 | 0.171 |
| S22 | TSS (mg/L) | 8 | <3.0 | 3 | 7 | 3 |
| | Q (m ³ /s) | 3.739 | 0.280 | 0.010 | 3.002 | 0.520 |
| S24 | TSS (mg/L) | * | 57 | 17 | 33 | 28 |
| | Q (m ³ /s) | * | 784.359 | 751.125 | 679.313 | 435.780 |

* - Not measured

Table C.2-2 (Cont'd.)

| | Station | April 23 to 28 | June 21 to 29 | Aug 10 to 19 | Sept 14 to 24 | Oct 25 to Nov 4 |
|-----|-----------------------|----------------|---------------|--------------|---------------|-----------------|
| S25 | TSS (mg/L) | * | <3.0 | <3.0 | <3.0 | 3 |
| | Q (m ³ /s) | * | 0.020 | 0.024 | 0.062 | 0.053 |
| S31 | TSS (mg/L) | 25 | 7 | 9 | 15 | 4 |
| | Q (m ³ /s) | 2.513 | 0.375 | 0.893 | 1.655 | 0.331 |
| S32 | TSS (mg/L) | 144 | 10 | 9 | 9 | <3.0 |
| | Q (m ³ /s) | 3.979 | 0.605 | 0.203 | 1.136 | 0.251 |
| S33 | TSS (mg/L) | 13 | <3.0 | <3.0 | <3.0 | <3.0 |
| | Q (m ³ /s) | 5.840 | 0.843 | 0.445 | 5.277 | 1.725 |
| S34 | TSS (mg/L) | 13 | <3.0 | 3 | 6 | 5 |
| | Q (m ³ /s) | 0.741 | 0.126 | 0.111 | 0.645 | 0.214 |
| S36 | TSS (mg/L) | 26 | <3.0 | 3 | <3.0 | <3.0 |
| | Q (m ³ /s) | 0.469 | 0.369 | 0.314 | 0.448 | 0.428 |
| S37 | TSS (mg/L) | 3 | <3.0 | <3.0 | 3 | 3 |
| | Q (m ³ /s) | 0.689 | 0.040 | 0.166 | 0.763 | 0.119 |
| S40 | TSS (mg/L) | 35 | 4 | 3 | 13 | 5 |
| | Q (m ³ /s) | 17.375 | 6.033 | 6.524 | 24.398 | 9.397 |
| S43 | TSS (mg/L) | 10 | <3.0 | 3 | 3 | 3 |
| | Q (m ³ /s) | 26.061 | 5.502 | 6.313 | 25.437 | 3.410 |
| S44 | TSS (mg/L) | 30 | <3.0 | <3.0 | <3.0 | <3.0 |
| | Q (m ³ /s) | 0.326 | 0.037 | 0.088 | 0.494 | 0.117 |
| S45 | TSS (mg/L) | 24 | <3.0 | <3.0 | 12 | <3.0 |
| | Q (m ³ /s) | * | 5.994 | 3.319 | 11.061 | 5.864 |

* - Not measured

C.2.2 Hydrometric Data from Focal Projects

Several oil sands operators provided stream flow and operational water withdrawal and release information to RAMP, as summarized in Table C.2-3. Data provided at a daily time interval are contained in the RAMP database.

C.2.3 Hydrometric Data from Government Agencies

Daily data published by Environment Canada for hydrometric stations in the study area have been incorporated into the RAMP database. An inventory of the data obtained for the stations is provided in Section C.5.

Table C.2-3 Hydrometric information for 2010 received from oil sands operators.

| Operator | Watershed | Activity | Annual Volume (dam ³) | Location (if provided) | Time-step |
|----------------------------------|---------------------|--|-----------------------------------|------------------------------|-----------|
| Suncor Energy Ltd. | Athabasca | Withdrawals from the Athabasca River | 34,848 | Various | Daily |
| | | Releases to the Athabasca River | 6,478 | | Daily |
| Nexen | Christina | Withdrawals from lakes and borrow pit | 2 | Various | Daily |
| Hammerstone | Muskeg | Releases from quarry project into Muskeg River | 182 | 465980 E, 6338006 N | Daily |
| CNRL - Horizon | Athabasca | Withdrawals from Athabasca River | 15,206 | SW14-96 W4M | Daily |
| Total E&P Canada Ltd. | Ells | Water withdrawals from various sites | 13 | Various | Daily |
| Synchrude | Muskeg | Aurora Clean Water Diversion to Stanley Creek | 9,305 | 21-096-09-W4M | Daily |
| | Athabasca | Treated Sewage Releases to Athabasca River | 317 | 02-093-10-W4M | Daily |
| | | Withdrawals from Athabasca River | 34,130 | 35-096-09-W4M | Monthly |
| | Poplar Creek | Diversion from Beaver Creek into Poplar Creek | 5,184 | | Daily |
| Shell – Jackpine Mine | Muskeg | Withdrawal from Pond 2 for dust suppression | 119 | 476508E, 6347999N | Daily |
| Shell – Muskeg River Mine | Athabasca | Withdrawals from Athabasca River | 13,596 | 461422.87E , 6346082.31N | Daily |
| Husky Oil Operations Ltd. | Muskeg | Releases from plant and well pads | 370 | Plant at 4-15-95-7 W4M | Daily |
| Imperial Oil Resources | Muskeg | Withdrawals from Pond 1 and Compensation Lake sedimentation pond | 532 | Pond 1 and Compensation Lake | Daily |
| | | Withdrawals from three sources in Firebag watershed | 12 | Various | Daily |
| | Athabasca | Withdrawals from Athabasca River/Fort Hills polishing pond | 70 | NW 24-096-11-W4 | Daily |

Note: This data was used in the water balance calculations as displayed in Chapter 5. For clarity, further information received but not included within these calculations is not summarized here, including: (i) data classified as muskeg dewatering or groundwater extraction; (ii) operator withdrawal and discharge data located downstream of the corresponding observed test monitoring location; and (iii) focal project withdrawal and discharges not occurring at the same time as the observed test monitoring.

C.2.4 2010 WY Hydrographs in Historical Context

Discharge and water level hydrographs for the 2010 WY, for each RAMP station, are presented in Figure C.2-1 through Figure C.2-33 below. Historical maximum, minimum, and median daily values are also provided to assist in interpretation. Stations S40, S43, S44 and S45 do not contain more than two open-water seasons of historical data, and historical data are therefore not shown for these sites. In all cases, the current year is excluded from the calculation of the historical context, so that the current year is compared to the previous years.

Figure C.2-1 2010 WY water level hydrograph and historical context for Station L1, McClelland Lake.

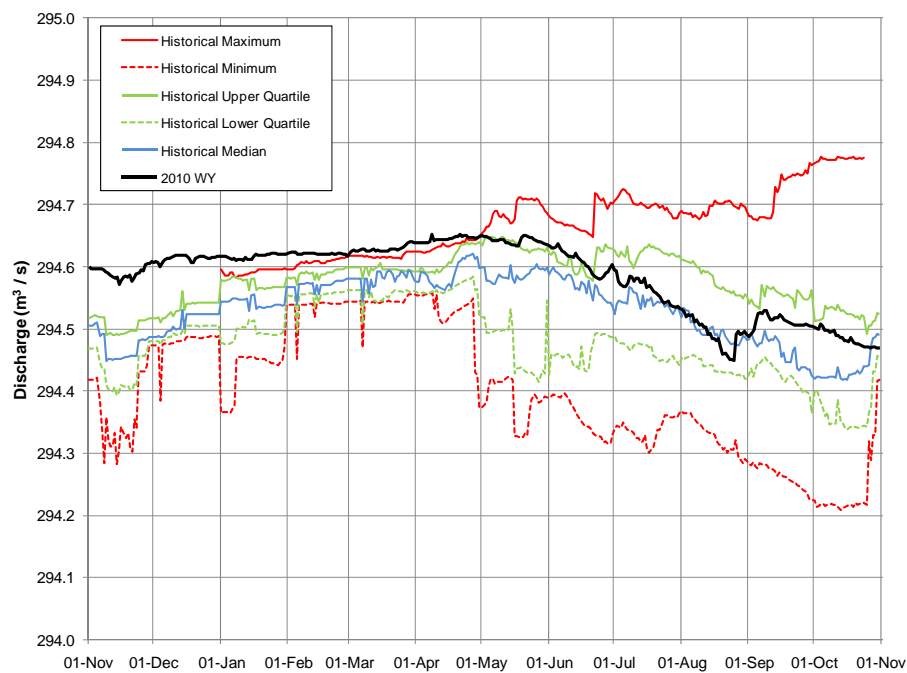


Figure C.2-2 2010 WY water level hydrograph and historical context for Station L2, Kearl Lake.

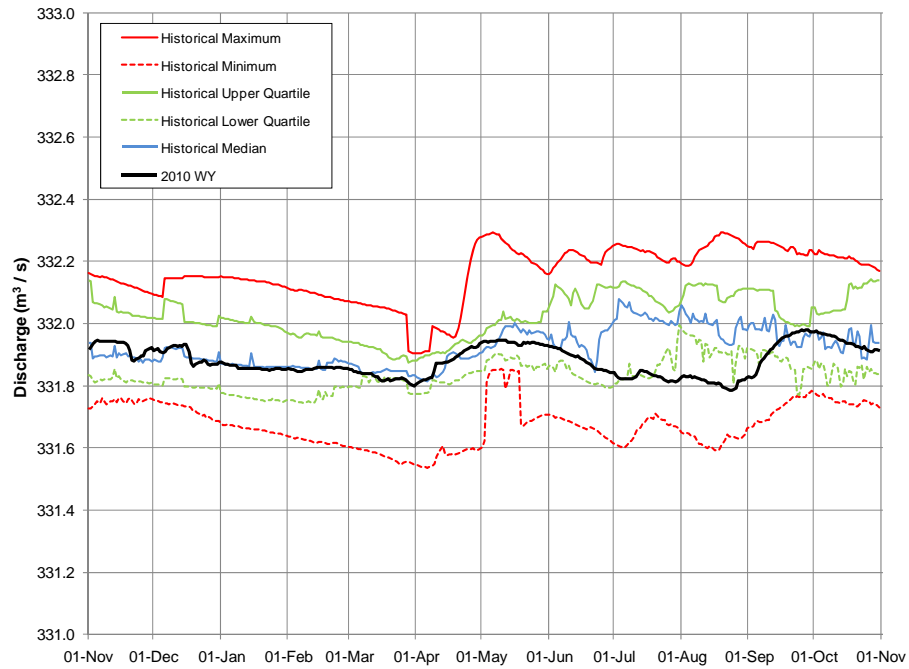
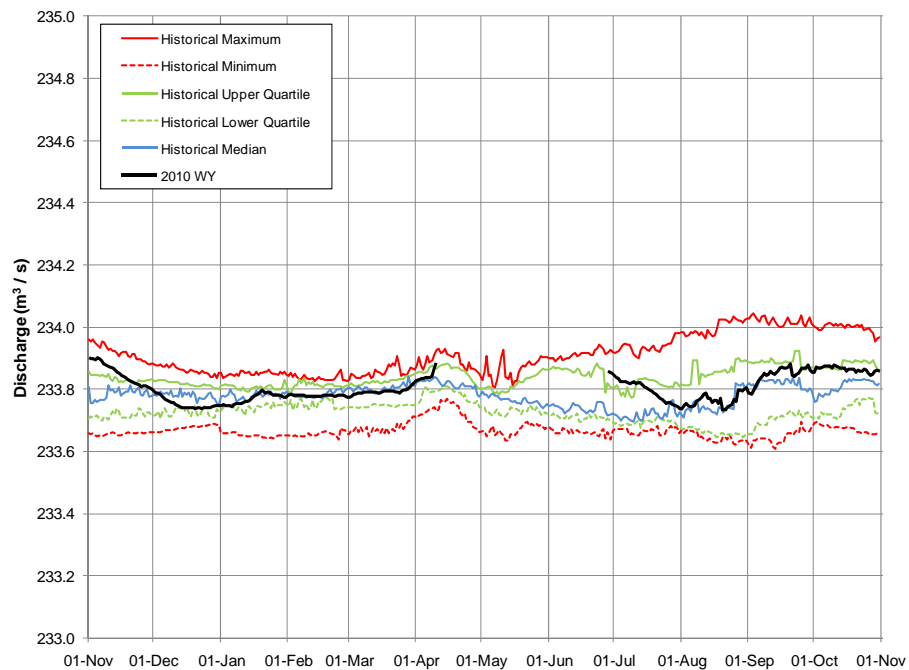
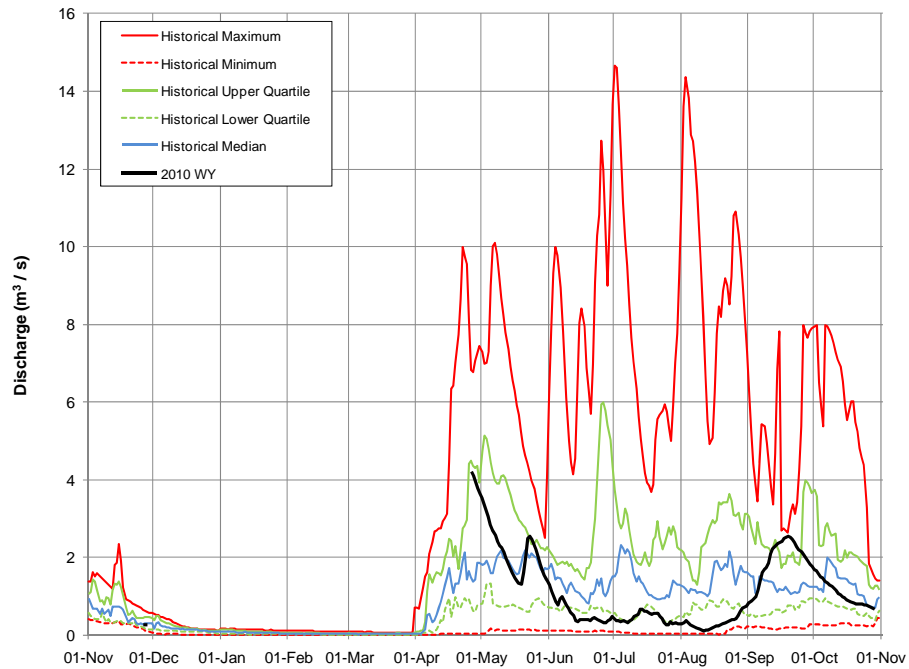


Figure C.2-3 2010 WY water level hydrograph and historical context for Station L3, Isadore's lake.



Note: Data was removed from June 27 to October 8 due to erroneous data logger readings.

Figure C.2-4 2010 WY discharge hydrograph and historical context for Station S2, Jackpine Creek at Canterra Road.



Note: The pressure transducer and water temperature probe was damaged by beaver activity at Station S2, Jackpine Creek at Canterra Road, after the October 2009 field visit prior to freeze-up.

Figure C.2-5 2010 WY discharge hydrograph and historical context for Station S3, Iyininim Creek above Kearn Lake.

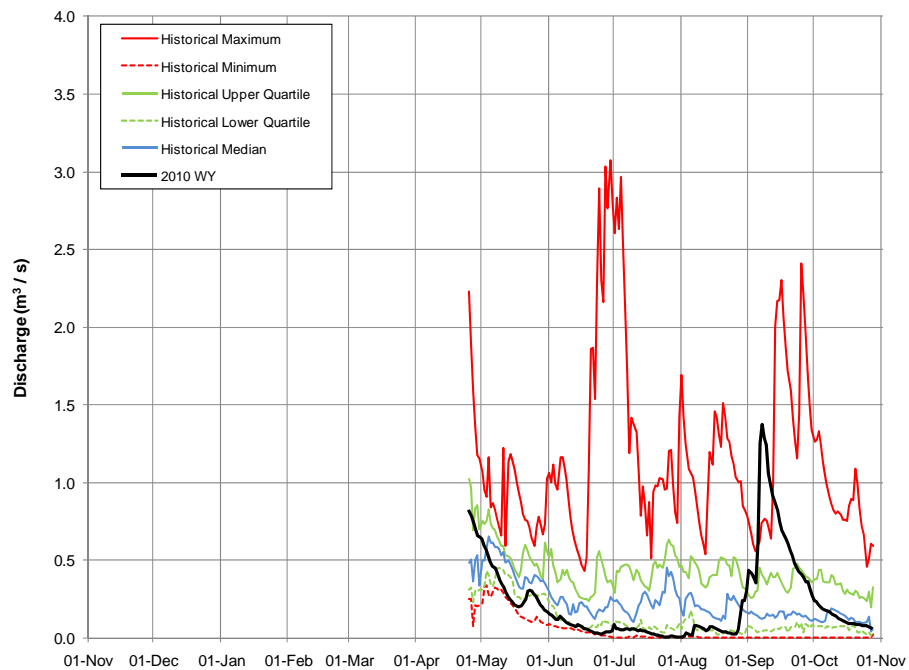


Figure C.2-6 2010 WY discharge hydrograph and historical context for Station S5, Muskeg River above Stanley Creek.

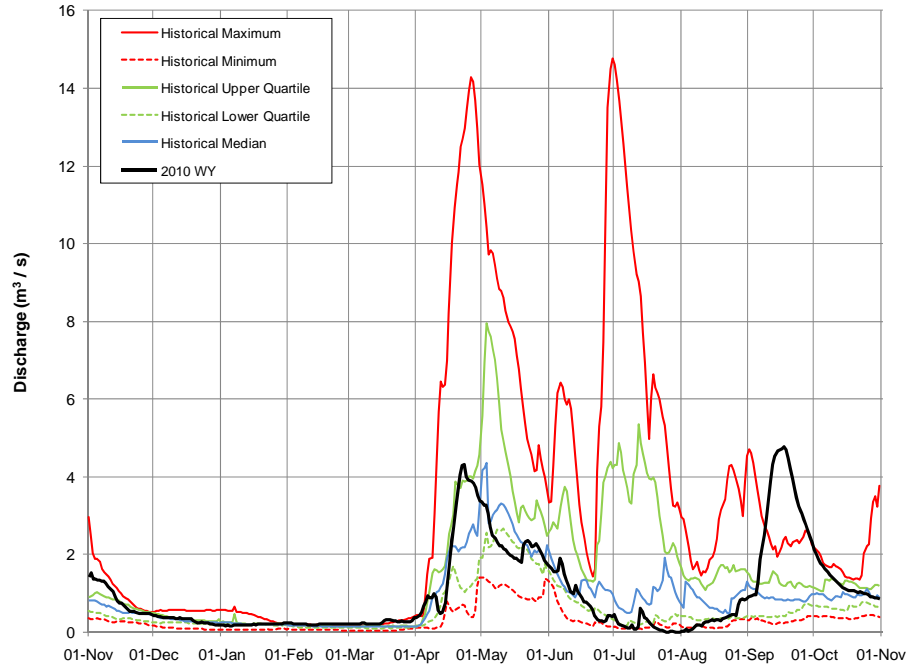


Figure C.2-7 2010 WY discharge hydrograph and historical context for Station S5A, Muskeg River above Muskeg Creek.

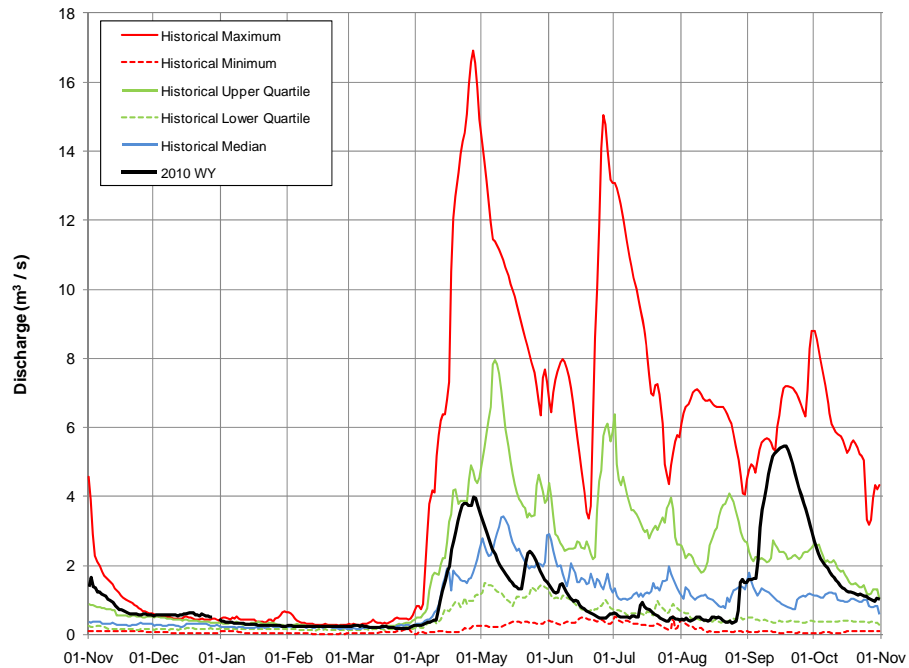


Figure C.2-8 2010 WY discharge hydrograph and historical context for Station S6, Mills Creek at Highway 63.

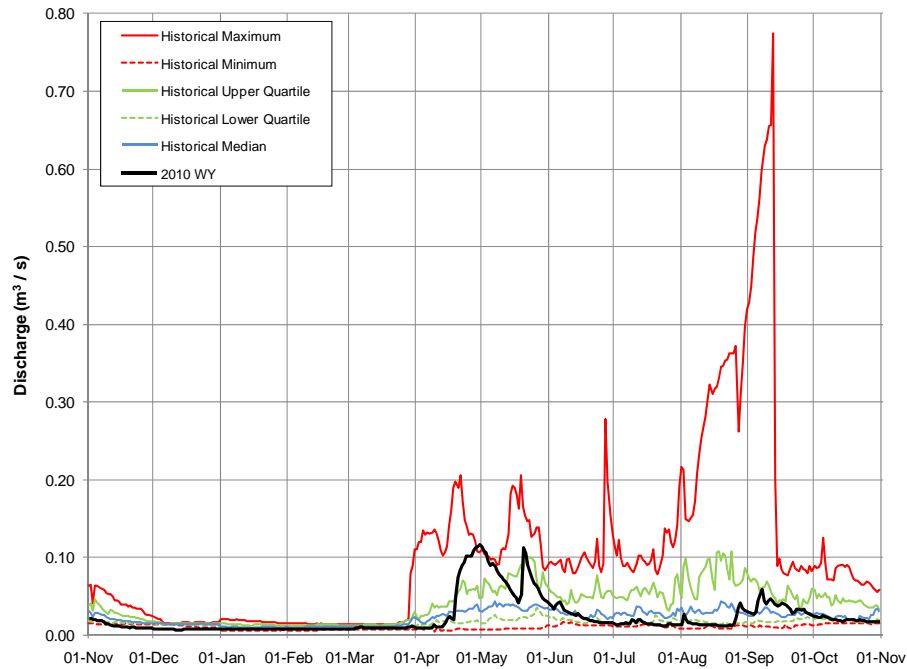
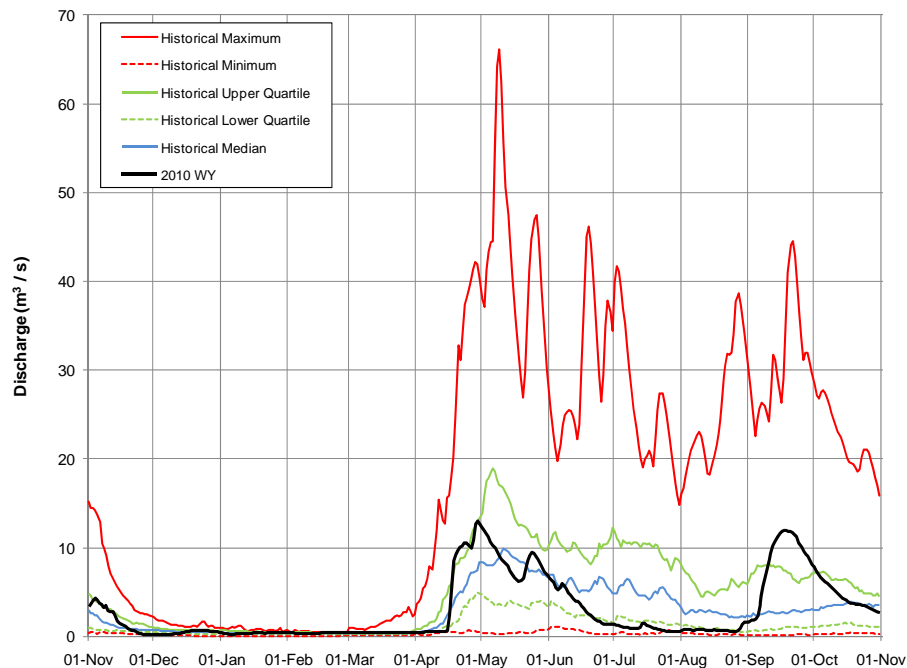


Figure C.2-9 2010 WY discharge hydrograph and historical context for Station S7, Muskeg River near Fort McKay (07DA008).



Note: Hydrograph is composed of WSC data from station 07DA008 from March 1 to October 31, 2010 WY, and RAMP Station S7 data from 1 January 1 to February 28 and November 1 to December 31, 2010 WY.

Figure C.2-10 2010 WY discharge hydrograph and historical context for Station S9, Kearl Lake Outlet.

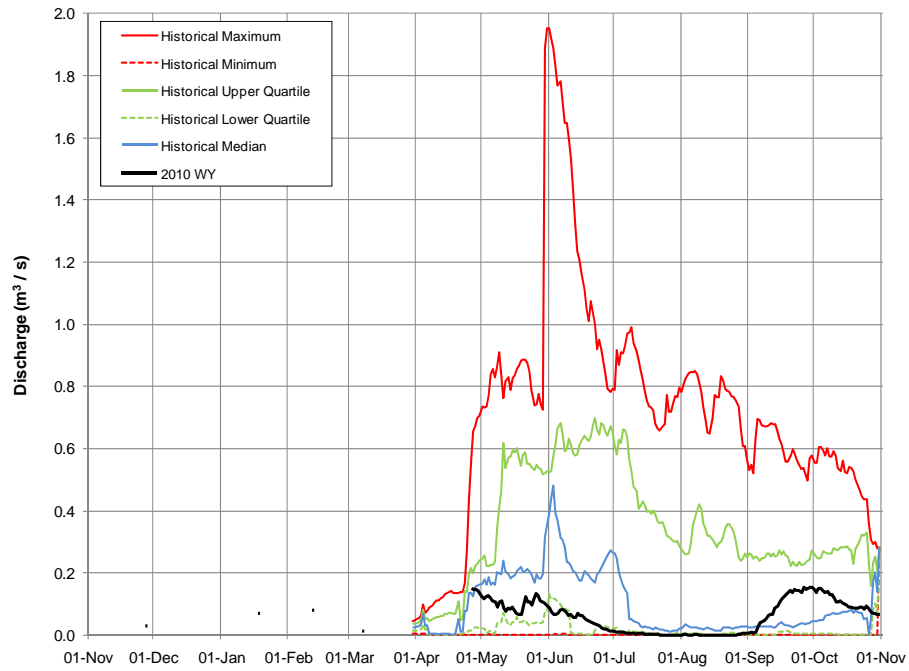
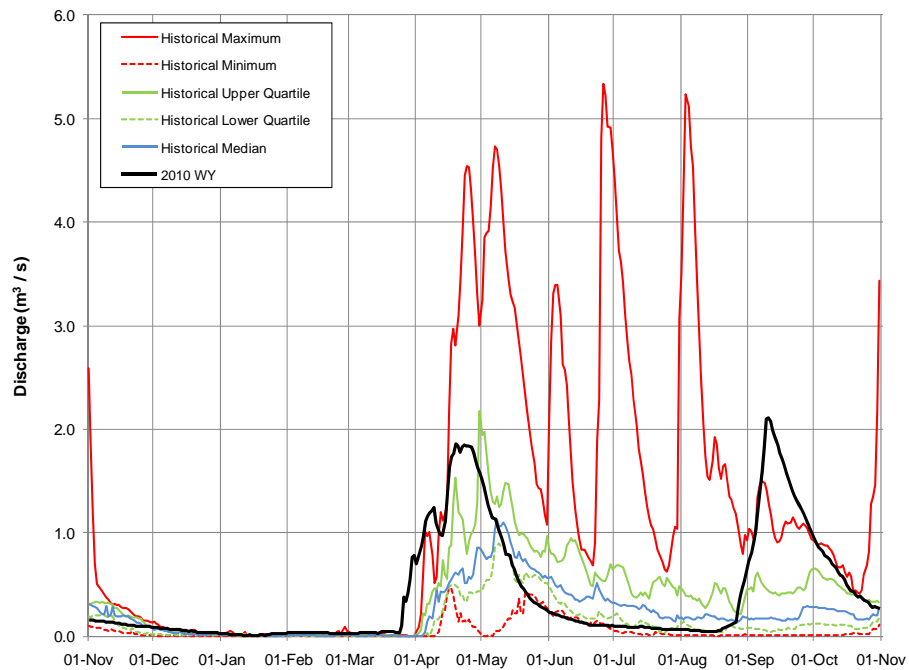


Figure C.2-11 2010 WY discharge hydrograph and historical context for Station S10, Wapasu Creek at Canterra Road.



Note: The 2010 WY hydrograph for Wapasu Creek at Canterra Road is an estimate and is presented for reference only.

Figure C.2-12 2010 WY discharge hydrograph and historical context for Station S11, Poplar Creek at Highway 63 (07DA007).

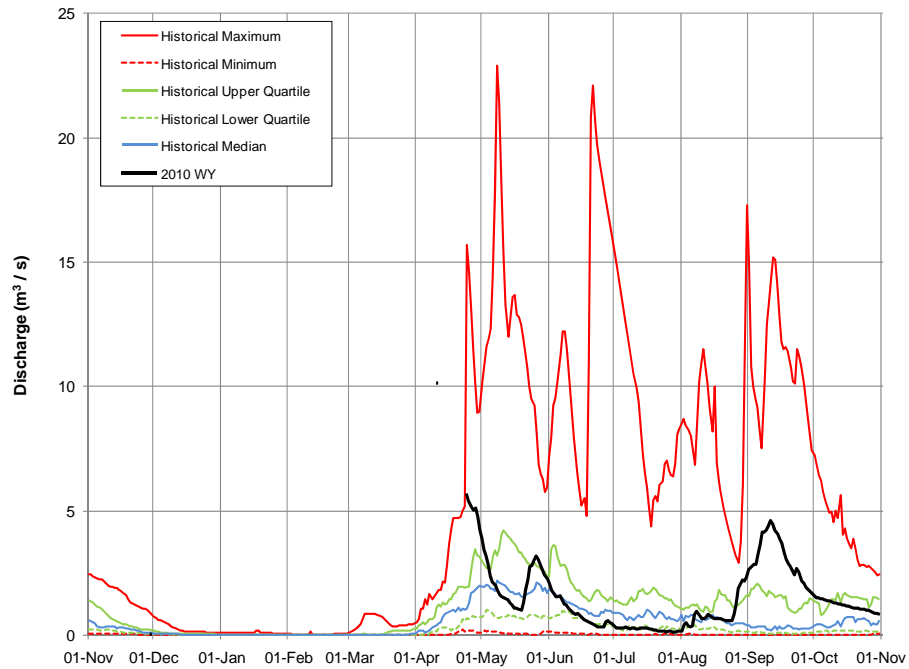


Figure C.2-13 2010 WY discharge hydrograph and historical context for Station S12, Fort Creek at Highway 63.

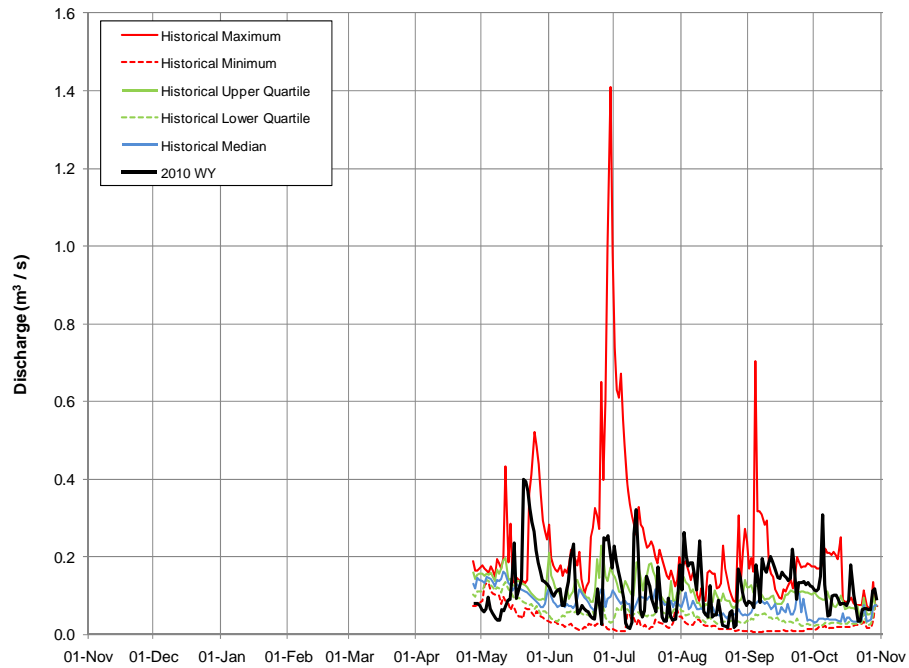


Figure C.2-14 2010 WY discharge hydrograph and historical context for Station S14A, Ells River at the CNRL Bridge.

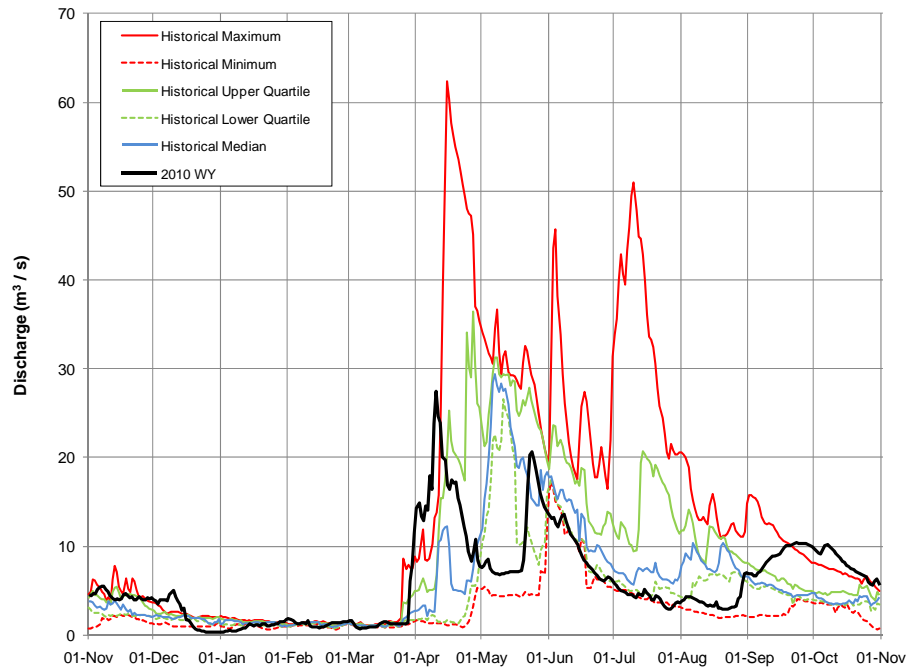
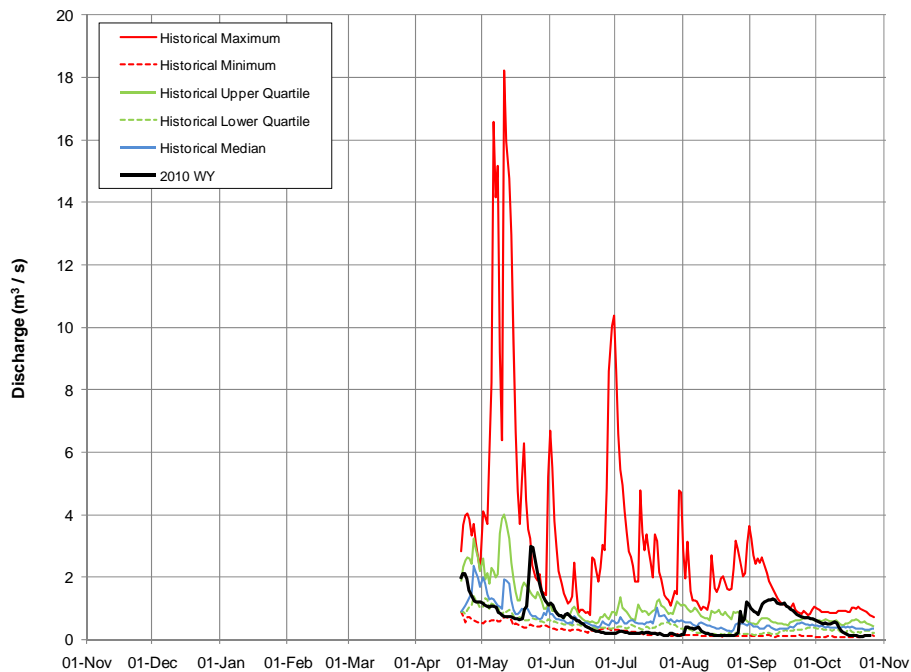


Figure C.2-15 2010 WY discharge hydrograph for Station S15A, Tar River near the Mouth.



Note: The 2010 WY hydrograph consists of data from RAMP S15A. Historic statistics are based on WSC Station 07DA015 (1975 to 1977), RAMP Station S15 (2001-2006), and RAMP Station S15A (2007 to 2008).

Figure C.2-16 2010 WY discharge hydrograph and historical context for Station S16A, Calumet River Upland Tributary.

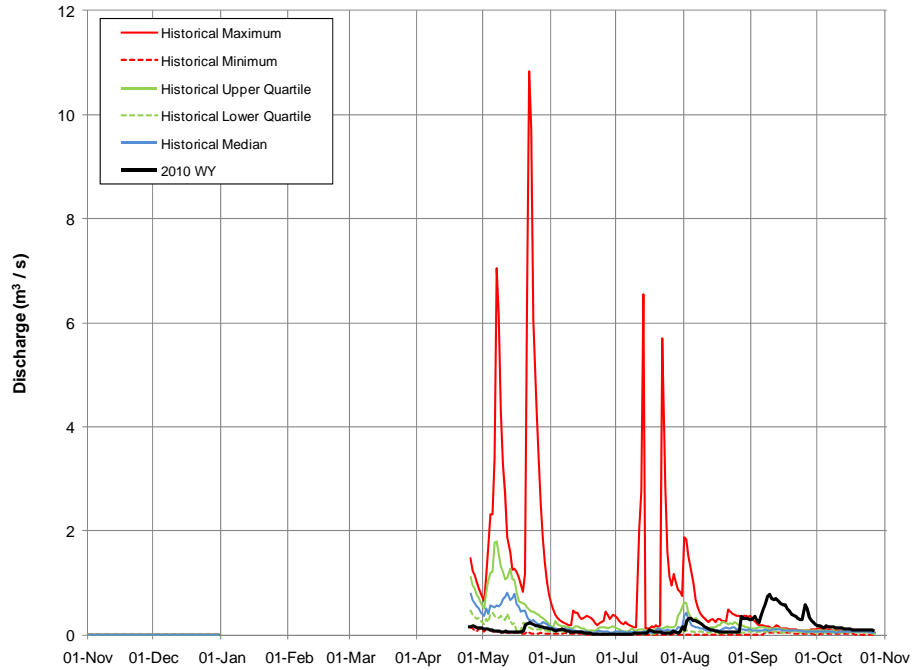
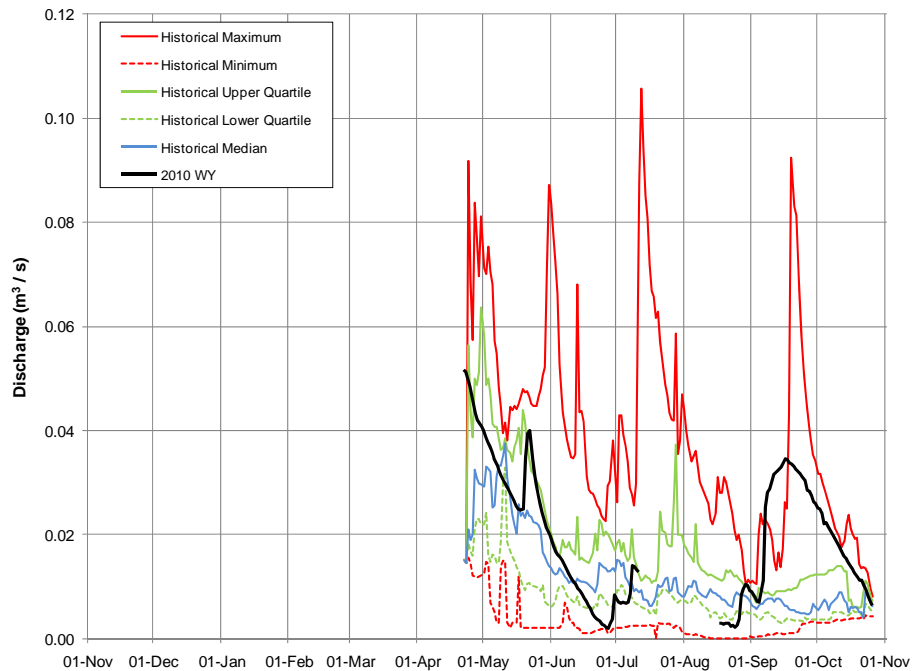


Figure C.2-17 2010 WY discharge hydrograph and historical context for Station S19, Tar River Lowland Tributary near the Mouth.



Note: The station was affected by wildlife damage in July and August 2010.

Figure C.2-18 2010 WY discharge hydrograph and historical context for Station S20, Muskeg River Upland.

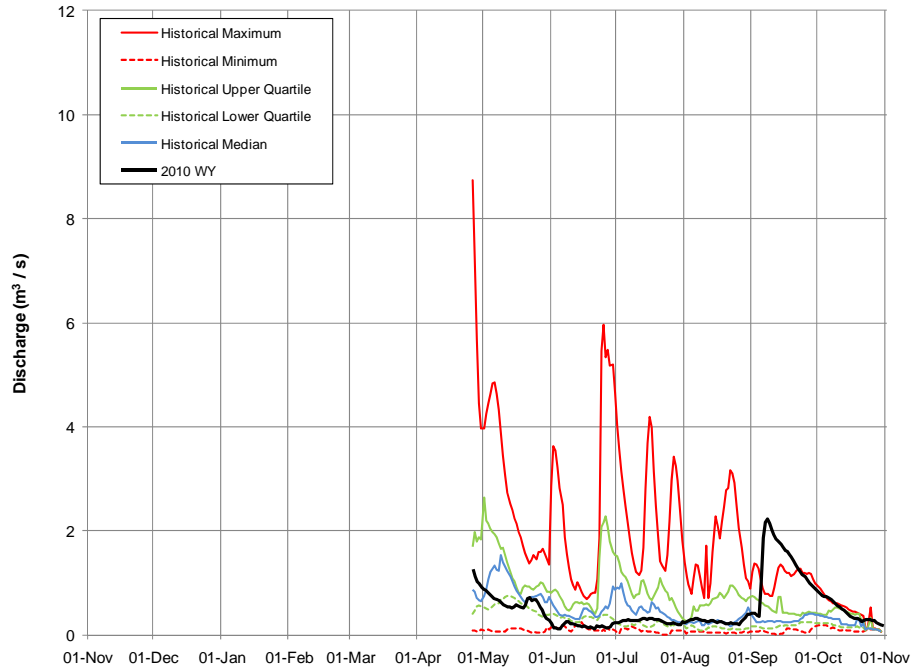


Figure C.2-19 2010 WY discharge hydrograph and historical context for Station S22, Muskeg Creek near the Mouth.

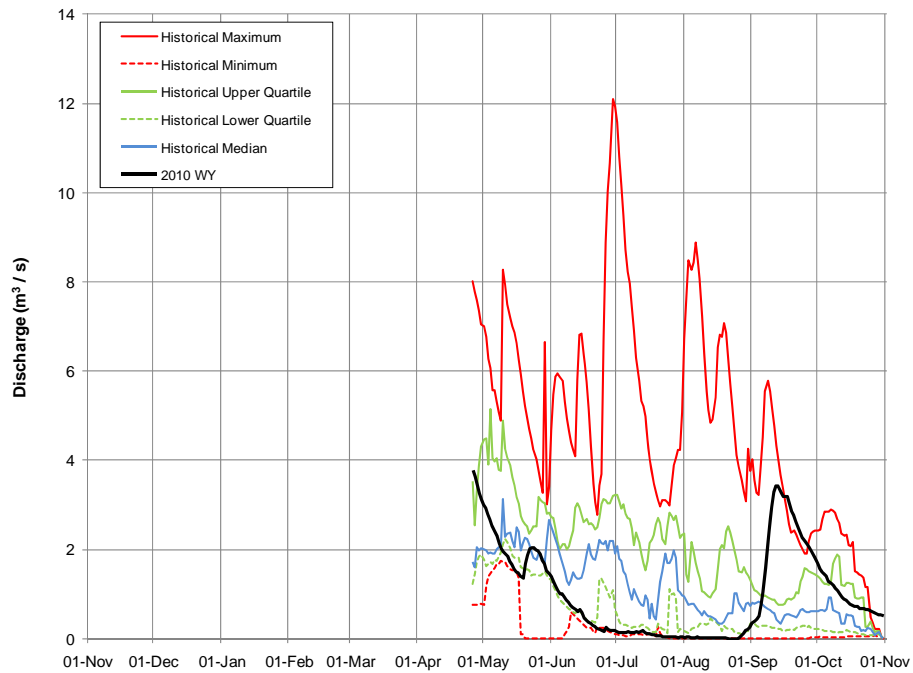


Figure C.2-20 2010 WY discharge hydrograph and historical context for Station S24, Athabasca River below Eymundson Creek.

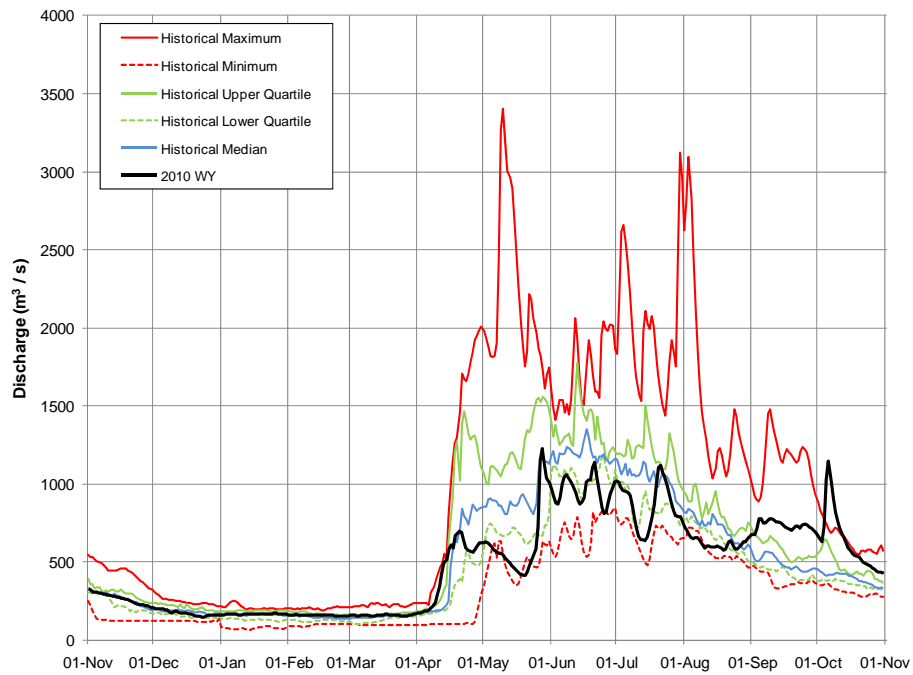
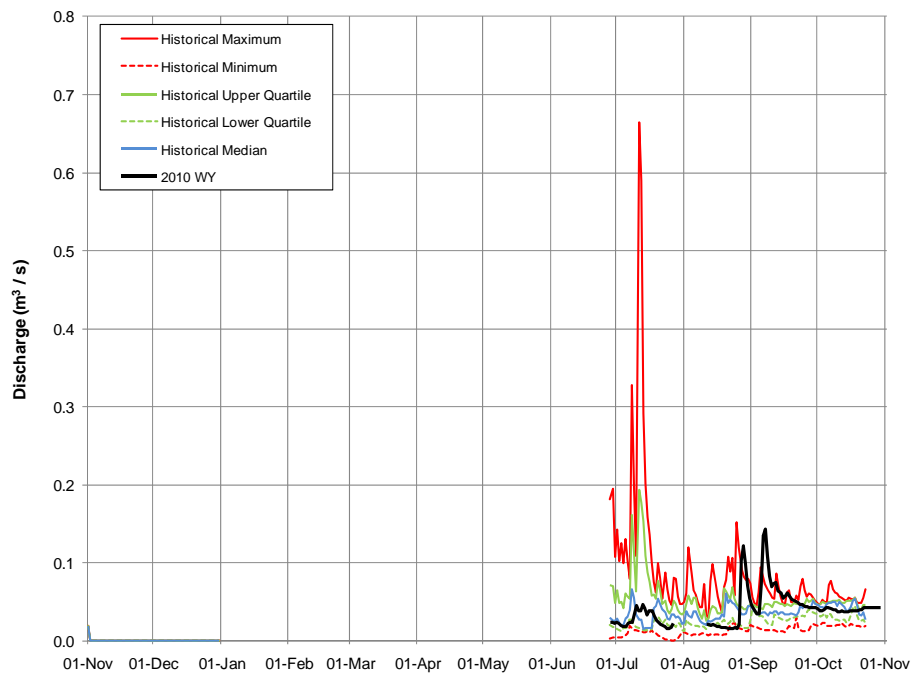
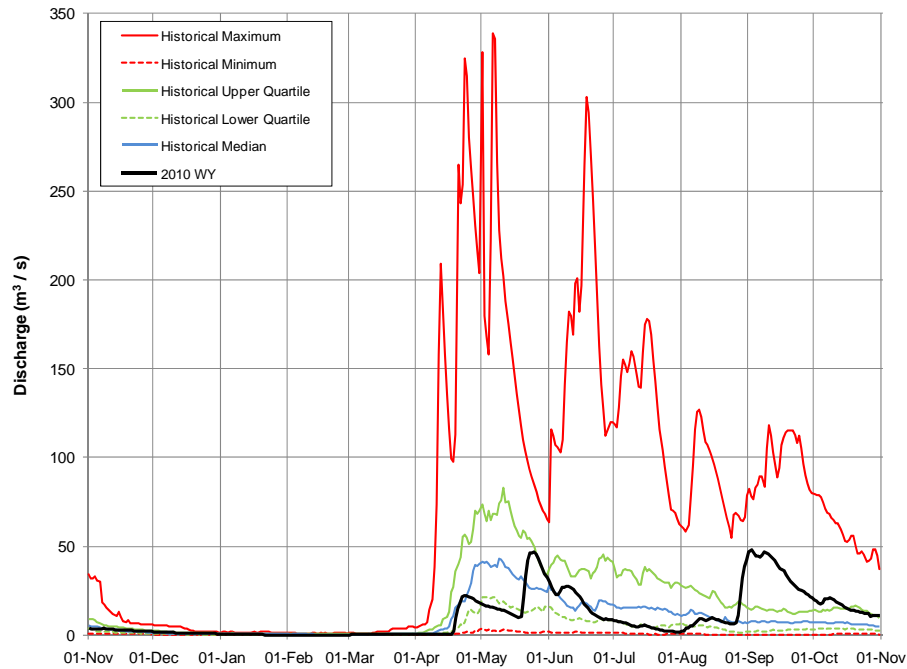


Figure C.2-21 2010 WY discharge hydrograph for Station S25, Susan Lake Outlet.



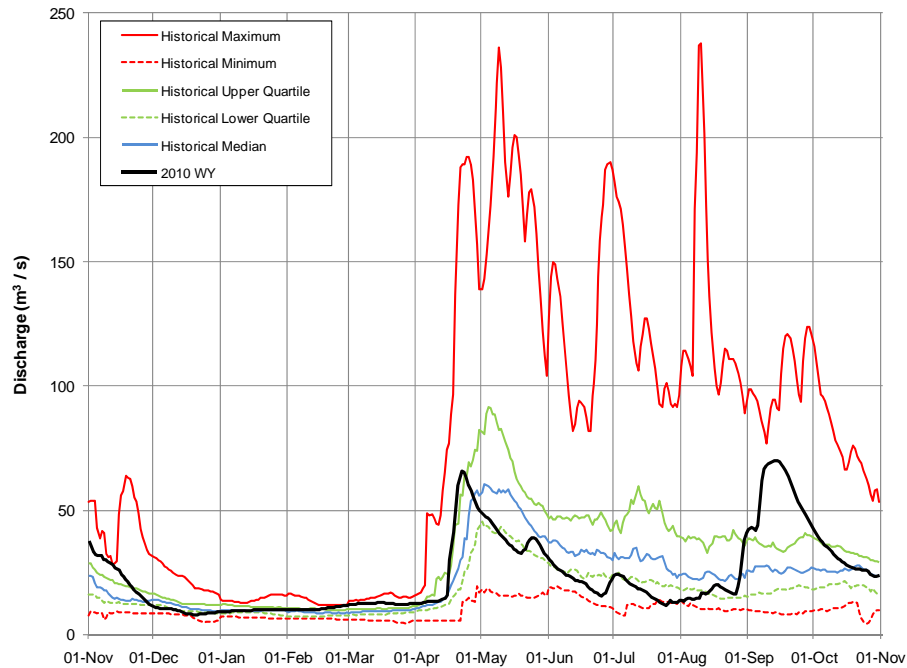
Note: Wildlife damage resulted in the loss of data for a period in July and August, 2010.

Figure C.2-22 2010 WY discharge hydrograph and historical context for Station S26, MacKay River near Fort McKay (07DB001).



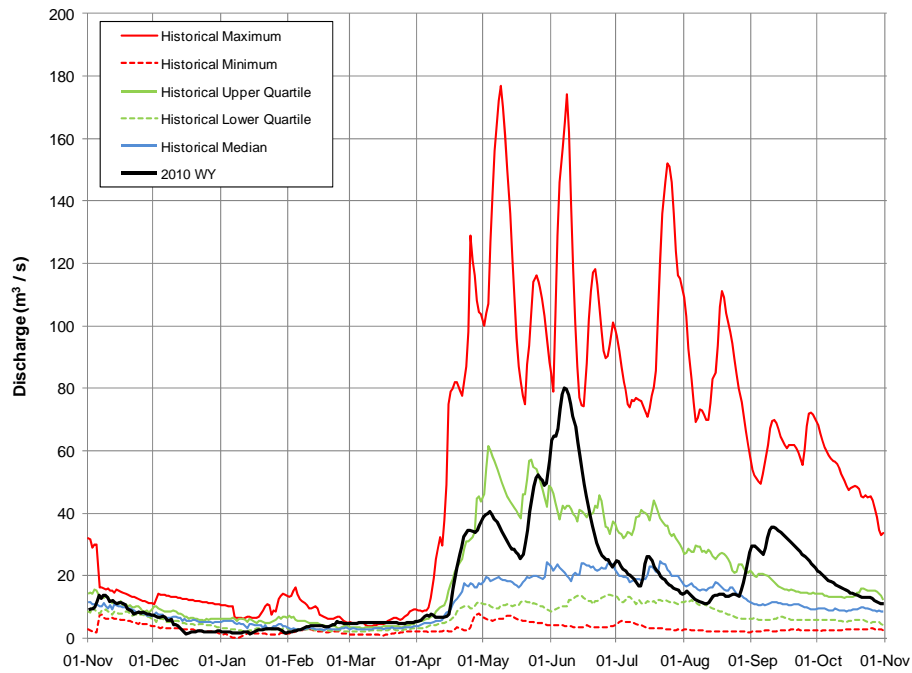
Note: Hydrograph is composed of WSC data from station 07DB001 from March 1 to October 31, 2010 WY, and RAMP Station S26 data from November 1, 2009 to February 28, 2010.

Figure C.2-23 2010 WY discharge hydrograph and historical context for Station S27, Firebag River near the Mouth (07DC001).



Note: Hydrograph is composed of WSC data from station 07DB001 from March 1 to October 31, 2010 WY, and RAMP Station S26 data from November 1, 2009 to February 28, 2010.

Figure C.2-24 2010 WY discharge hydrograph and historical context for Station S29, Christina River near Chard (07CE002).



Note: Hydrograph is composed of WSC data from Station 07CE002 from March 1 to October 31, 2010 WY, and RAMP Station S29 data from November 1, 2009 to February 28, 2010.

Figure C.2-25 2010 WY discharge hydrograph and historical context for Station S31, Hangingstone Creek at North Star Road.

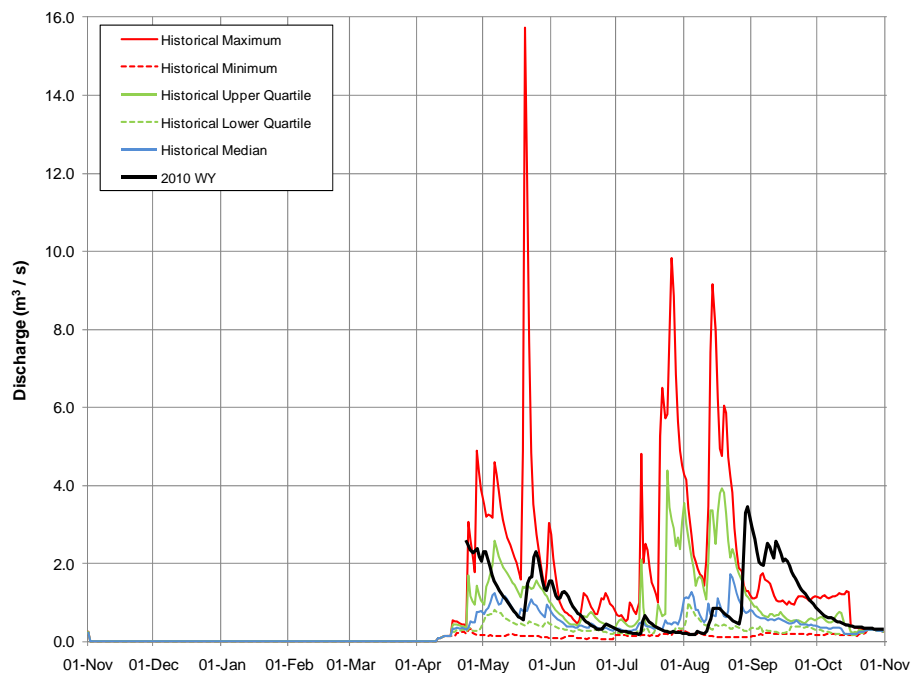


Figure C.2-26 2010 WY discharge hydrograph and historical context for Station S32, Surmont Creek at Highway 881.

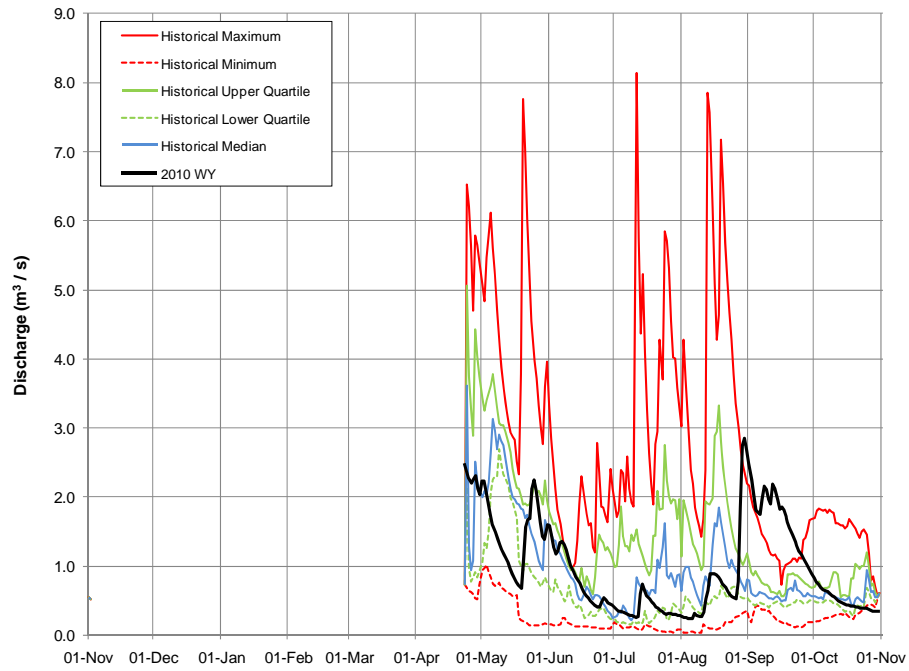


Figure C.2-27 2010 WY discharge hydrograph and historical context for Station S33, Muskeg River at the Aurora/Albian Boundary.

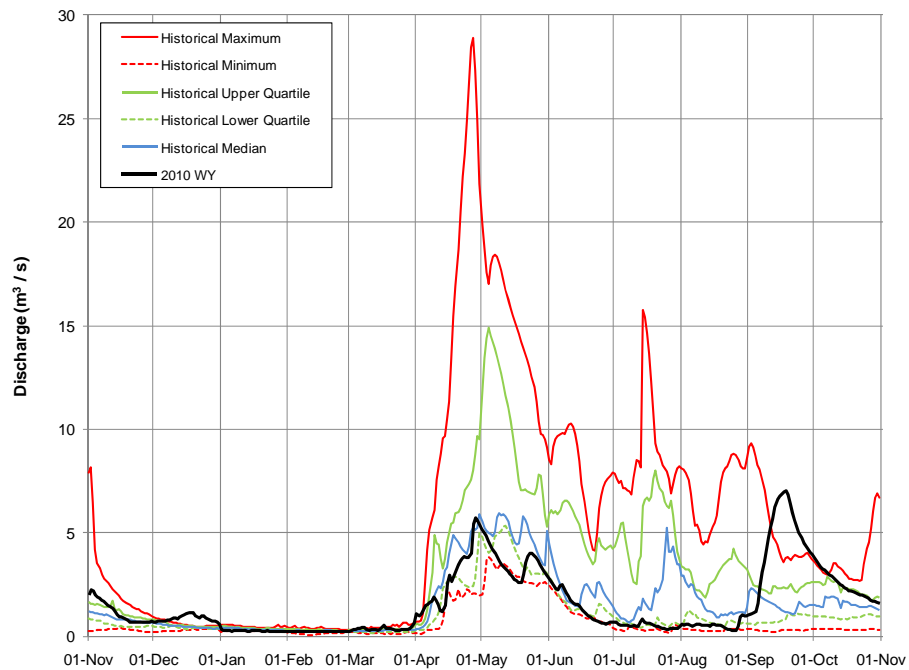


Figure C.2-28 2010 WY discharge hydrograph and historical context for Station S34, Tar River above CNRL Lake.

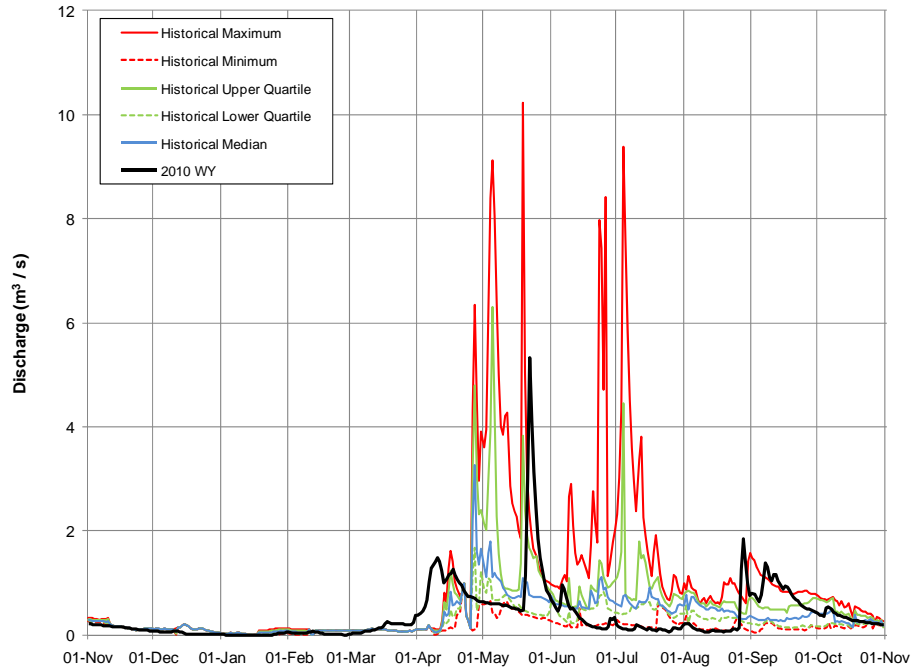
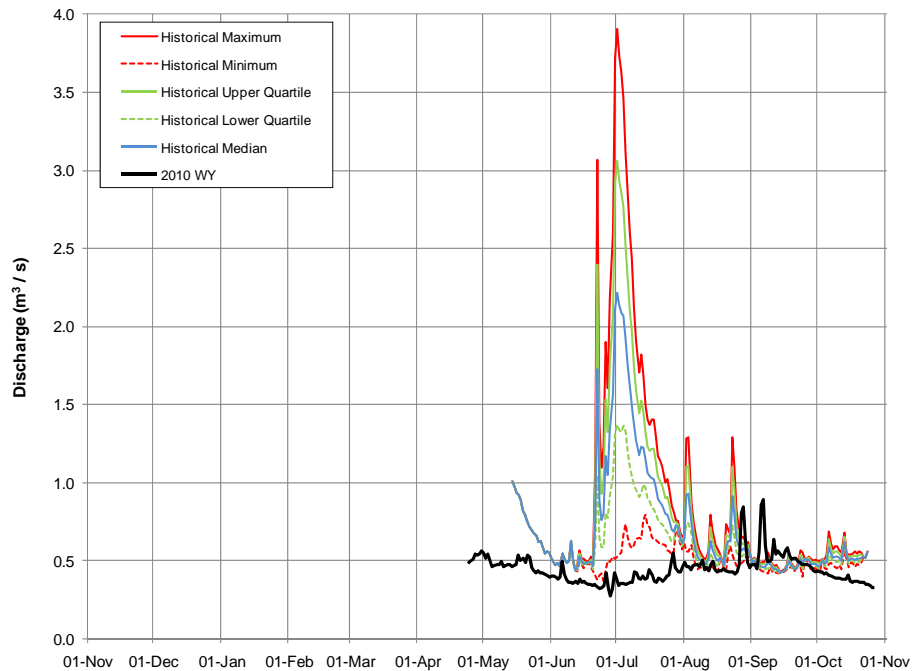
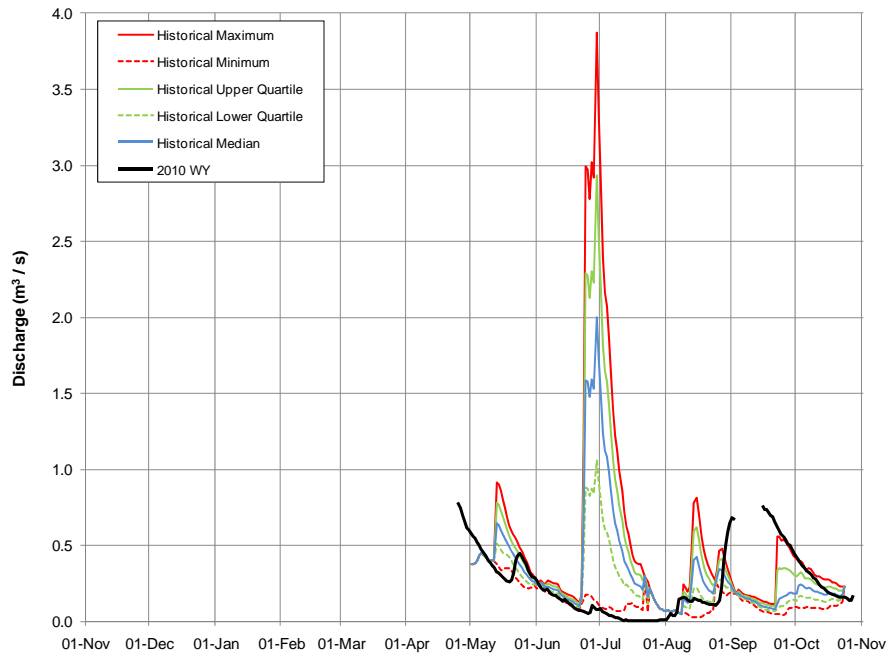


Figure C.2-29 2010 WY discharge hydrograph for Station S36, McClelland Lake Outlet above Firebag River.



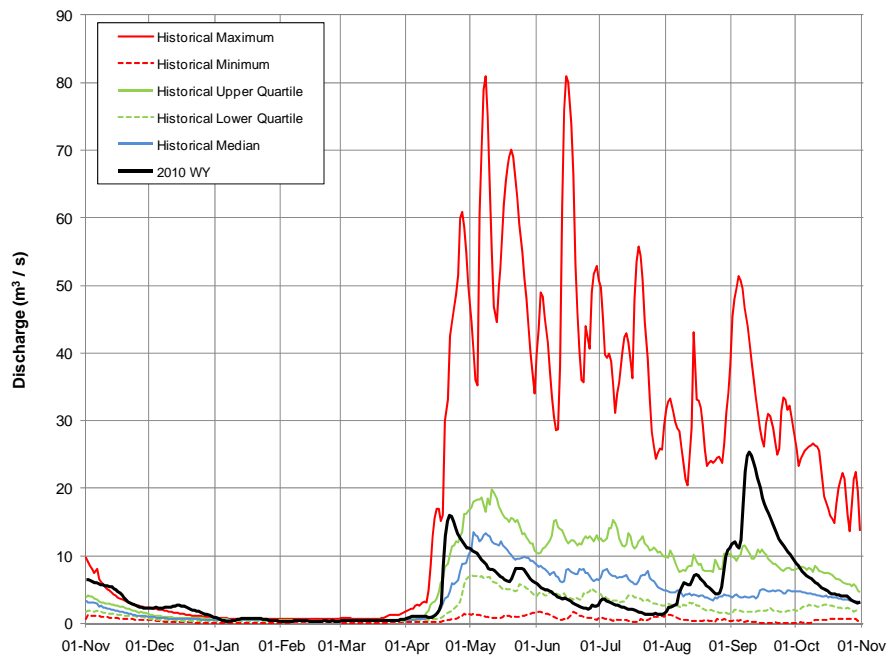
Note: The 2010 WY hydrograph is an estimate and for reference purposes only. There was substantial movement in the stream bed during the 2010 WY open water period resulting in a poor stage-discharge relationship.

Figure C.2-30 2010 WY discharge hydrograph and historical context for Station S37, East Jackpine Creek near the 1300 m contour.



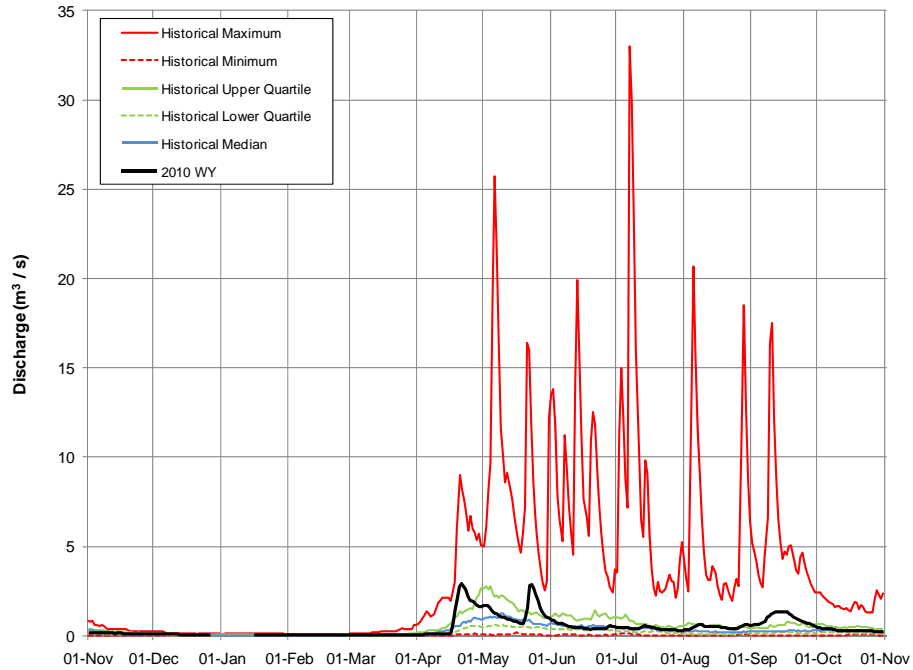
Note: The pressure transducer at Station S37, East Jackpine Creek at the 1,300 ft contour, malfunctioned in late August and was replaced with a newly-calibrated pressure transducer on the September field visit.

Figure C.2-31 2010 WY discharge hydrograph and historical context for Station S38, Steepbank River near Fort McMurray (07DA006).



Note: Hydrograph is composed of WSC data from station 07DA006 from March 1 to October 31, 2010 WY, and RAMP Station S38 data from November 1, 2009 to February 28, 2010.

Figure C.2-32 2010 WY discharge hydrograph and historical context for Station S39, Beaver River above Syncrude (07DA018).



Note: Hydrograph is composed of WSC data from station 07DA018 from March 1 to October 31, 2010 WY, and RAMP Station S39 data from November 1, 2009 to February 28, 2010.

Figure C.2-33 2010 WY discharge hydrograph Station S40, Mackay River at Petro-Canada Bridge.

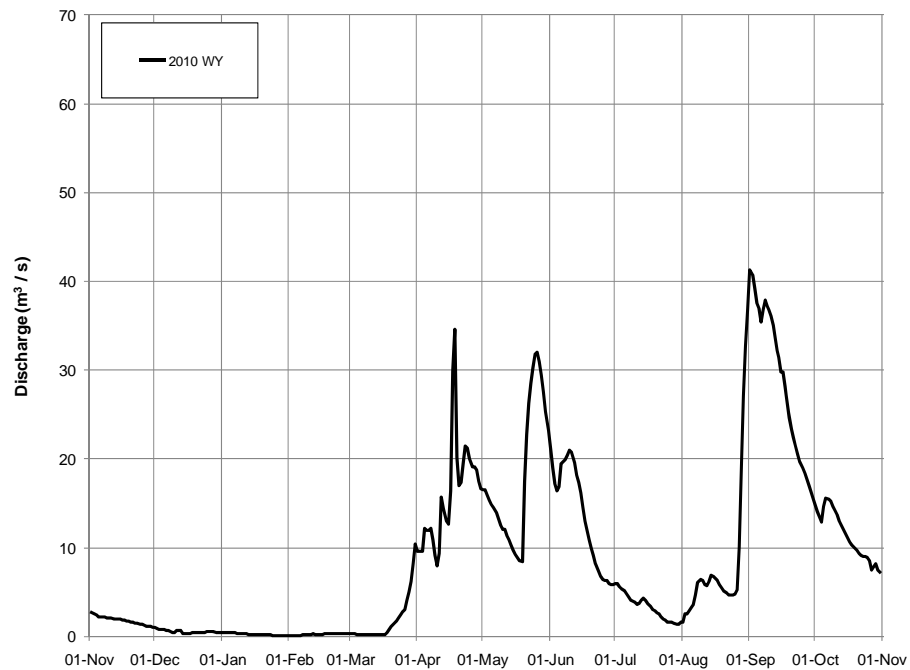
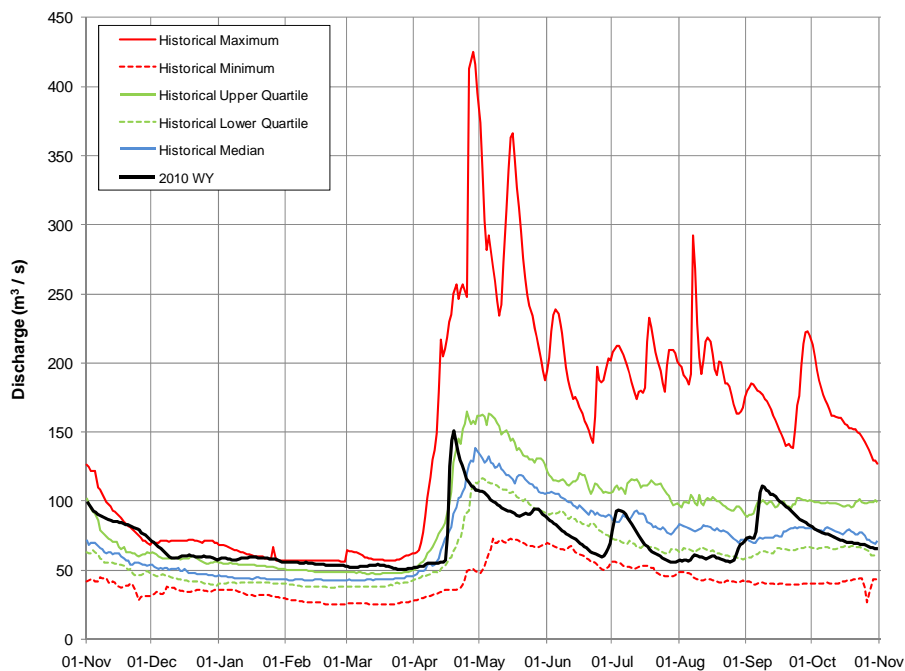


Figure C.2-34 2010 WY discharge hydrograph Station S42, Clearwater River above Christina River (07CD005).



Note: Hydrograph is composed of WSC data from station 07CD005 from March 1 to October 31, 2010 WY, and RAMP Station S42 data from November 1, 2009 to February 28, 2010.

Figure C.2-35 2010 WY discharge hydrograph Station S43, Firebag River above Syncrude Firebag.

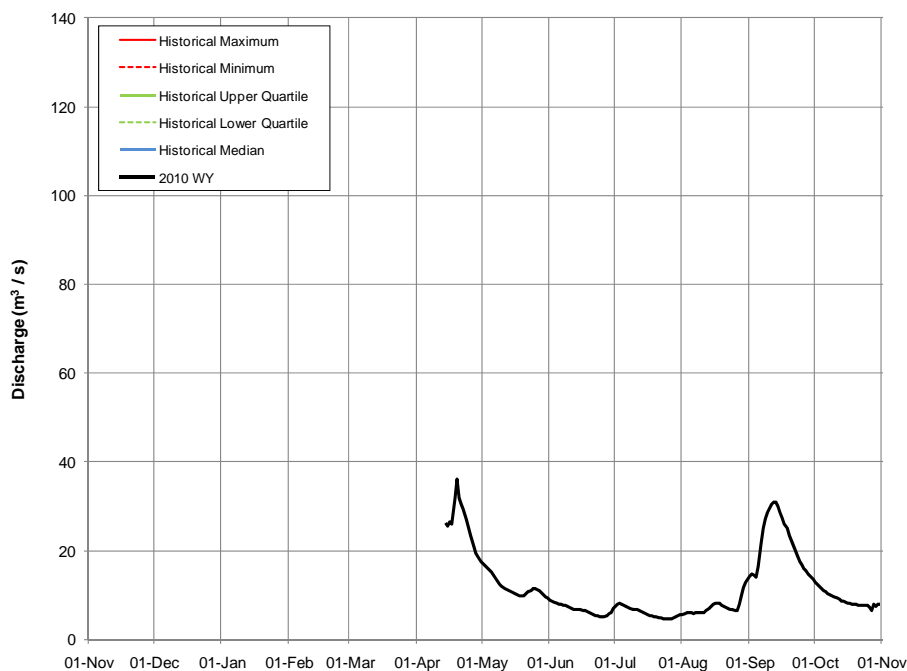


Figure C.2-36 2010 WY discharge hydrograph Station S44, Pierre River near Fort McKay (07DA013).

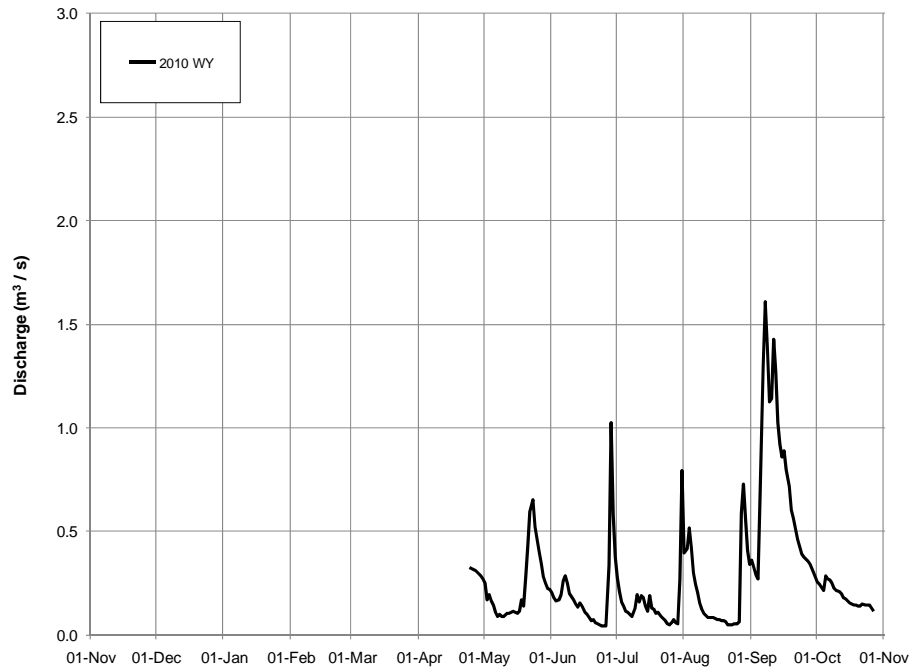
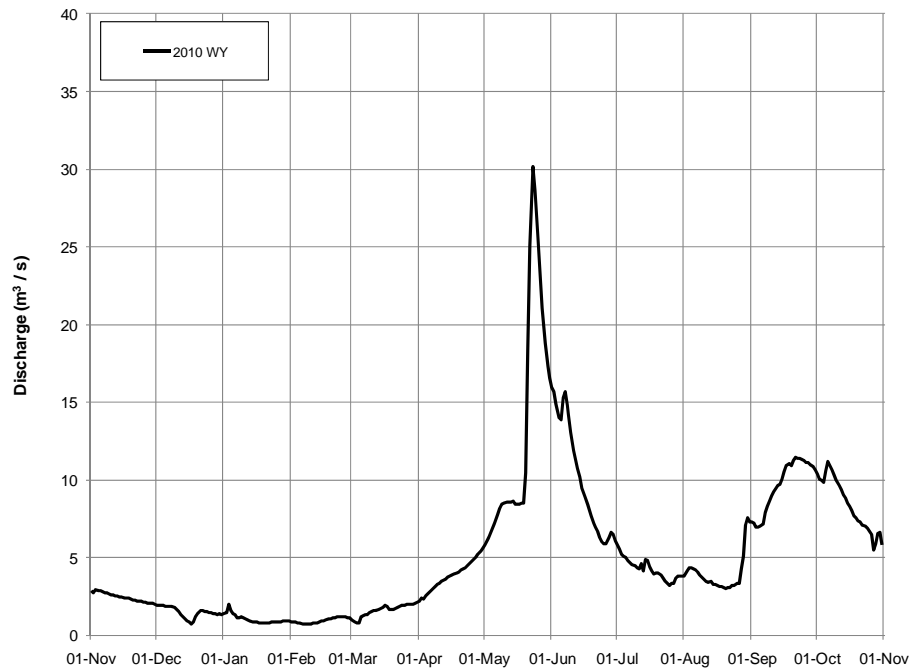


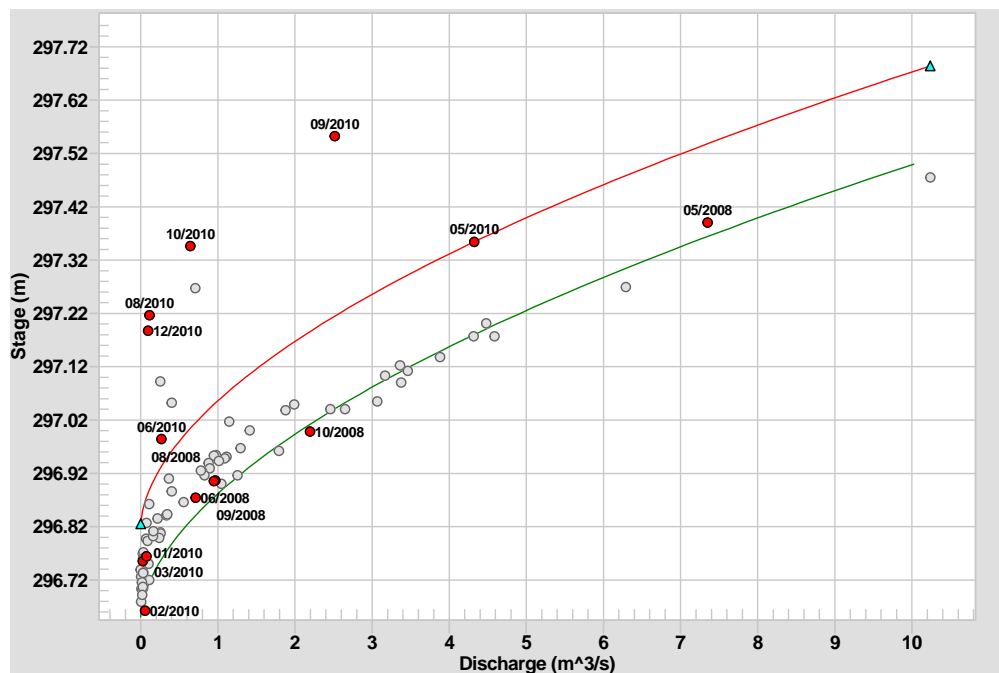
Figure C.2-37 2010 WY discharge hydrograph Station S45, Ells Rive above Joslyn Creek Diversion.



C.2.5 Stage-Discharge Rating Curves

Water level and discharge measurements were used to derive and/or update stage-discharge rating curves. The derived rating curves are shown graphically for each station in Figure C.2-38 through Figure C.2-67 below. In each graph, the red line denotes the most current stage-discharge rating curve; green line denotes the previous stage-discharge rating curve; grey dots denote historical manual discharge measurements; red dots denote manual discharge measurements used to develop the current stage-discharge rating curve; and the green triangles denote rating points that define the stage-discharge rating curve. In cases where there is no green line, the current stage-discharge rating curve had not changed from the previous sampling year.

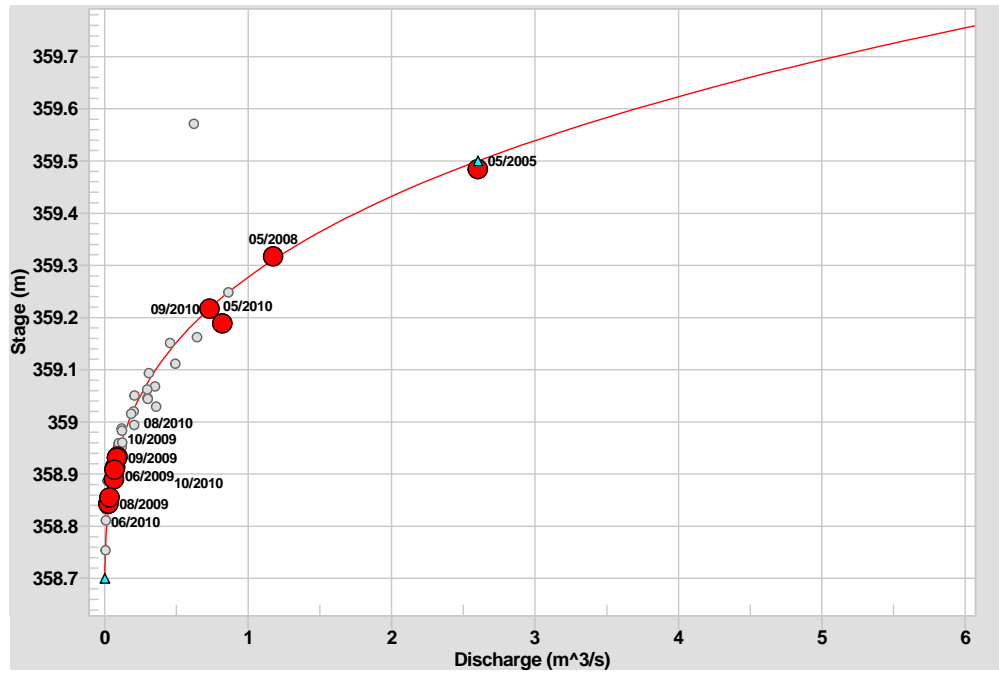
Figure C.2-38 Stage-discharge rating curve for RAMP Station S2, Jackpine Creek at Canterra Road.



Period of Use: 31/10/2009 Open ended

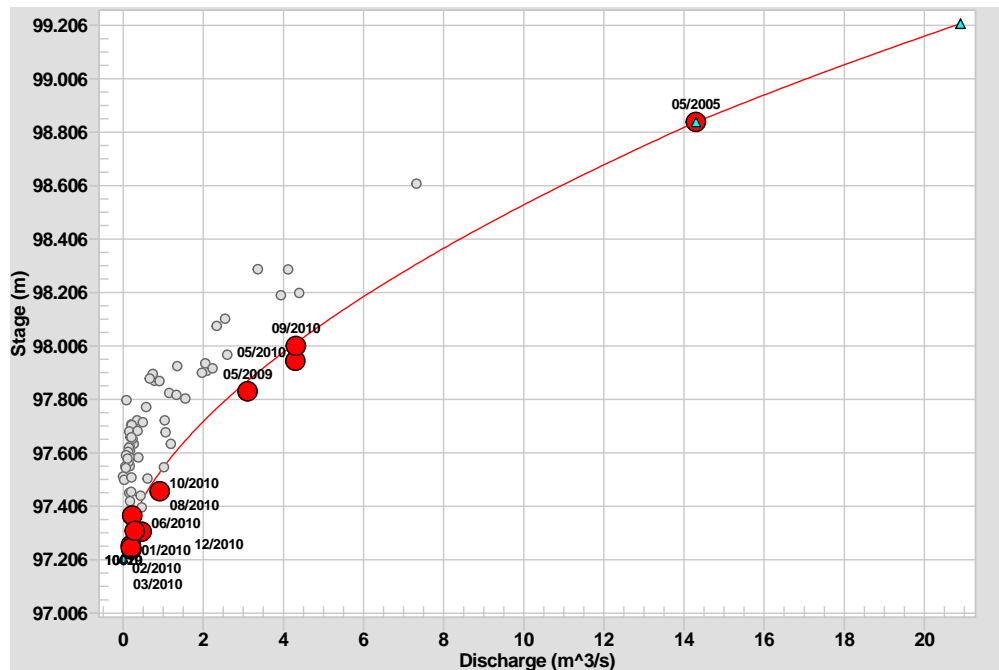
Note: The data quality at this station was compromised in the 2010 WY due to backwater effects caused by beaver activity.

Figure C.2-39 Stage-discharge rating curve for RAMP Station S3, Iyininim Creek above Kears Lake.



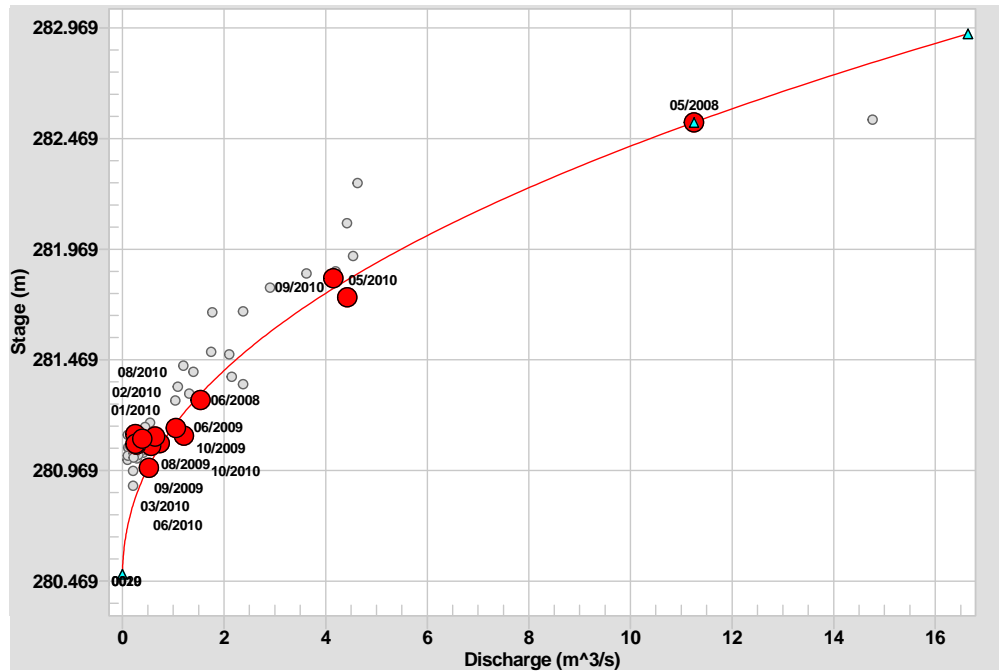
Period of Use: 01/01/2005 Open ended

Figure C.2-40 Stage-discharge rating curve for RAMP Station S5, Muskeg River above Stanley Creek.



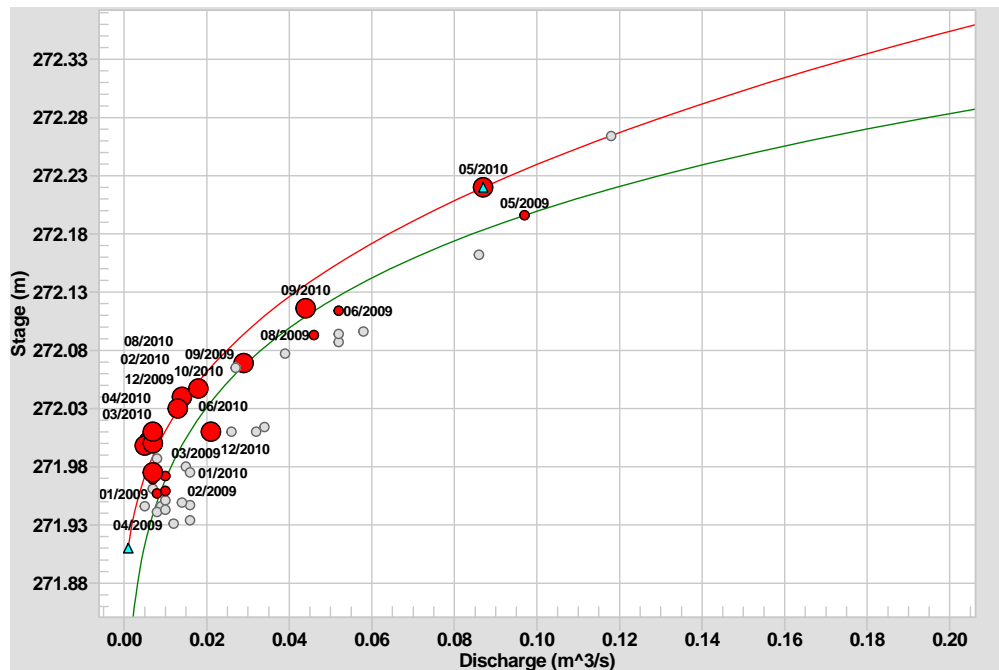
Period of Use: 01/01/2009 Open ended

Figure C.2-41 Stage-discharge rating curve for RAMP Station S5A, Muskeg River above Muskeg Creek.



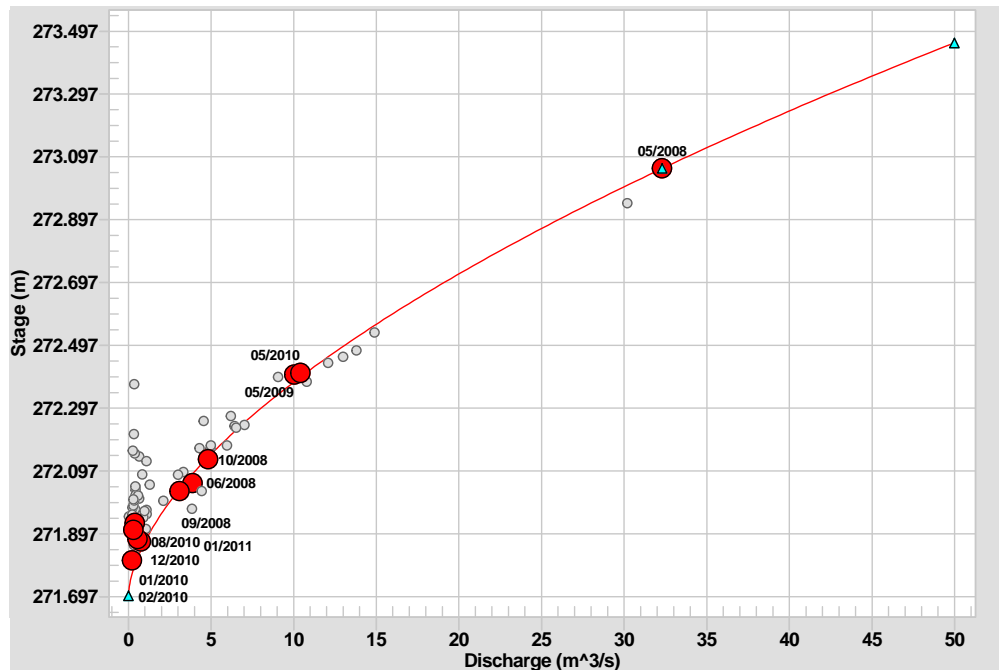
Period of Use: 02/01/2008 Open ended

Figure C.2-42 Stage-discharge rating curve for RAMP Station S6, Mills Creek at Highway 63.



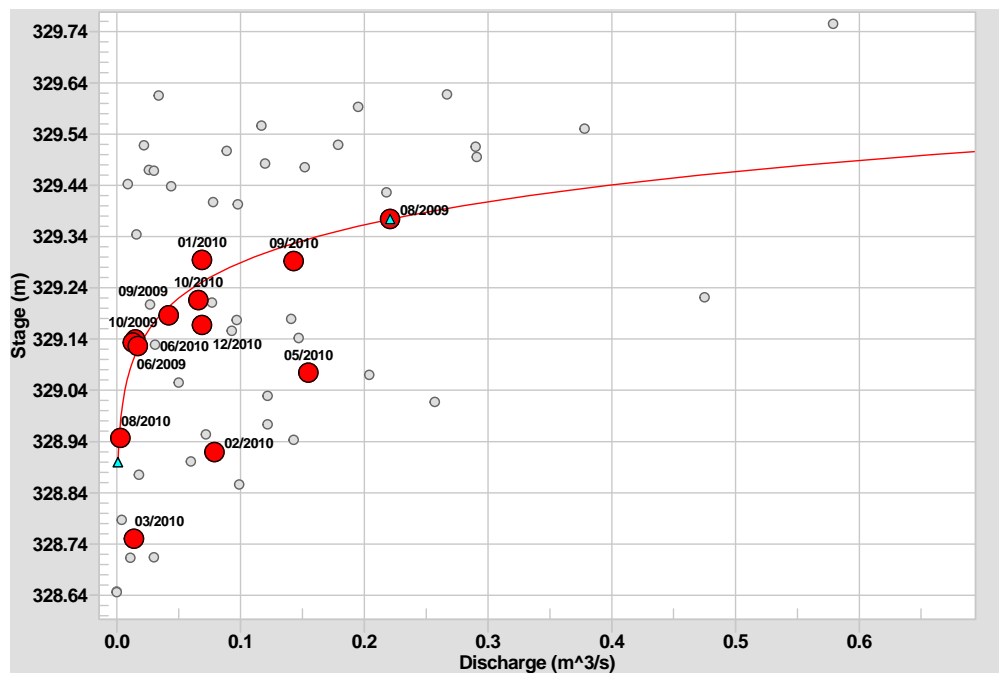
Period of Use: 01/11/2009 Open ended

Figure C.2-43 Stage-discharge rating curve for WSC Station 07DA008, RAMP Station S7, Muskeg River near Fort McKay.



Period of Use: 01/01/2008 Open ended

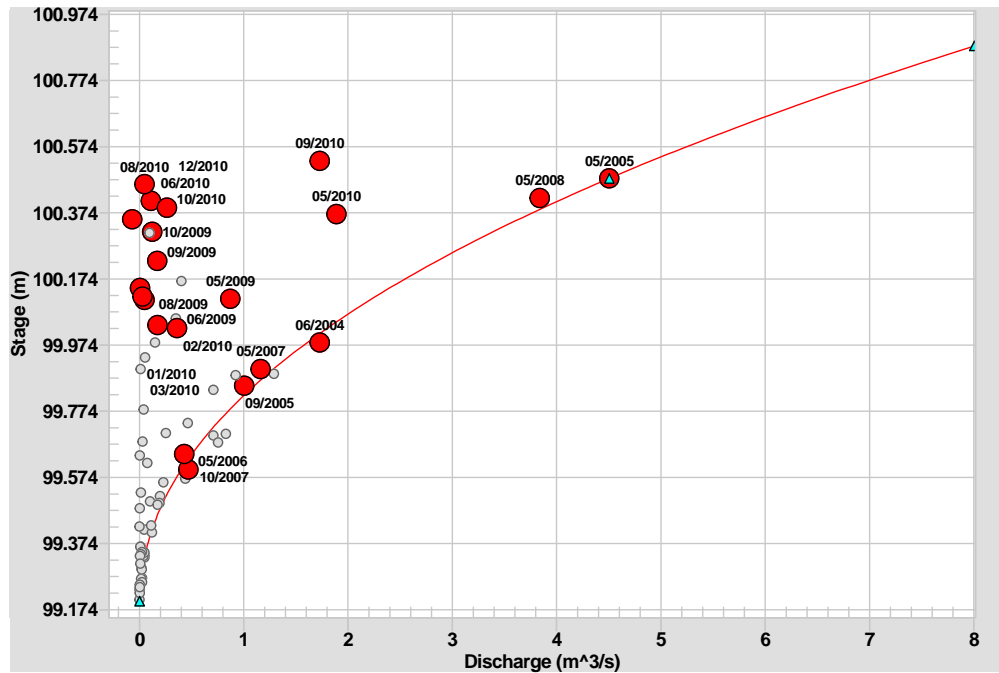
Figure C.2-44 Stage-discharge rating curve for RAMP Station S9, Kearn Lake Outlet.



Period of Use: 01/05/2009 Open ended

Note: The data quality at this station was compromised in the 2010 WY due to backwater effects caused by beaver activity.

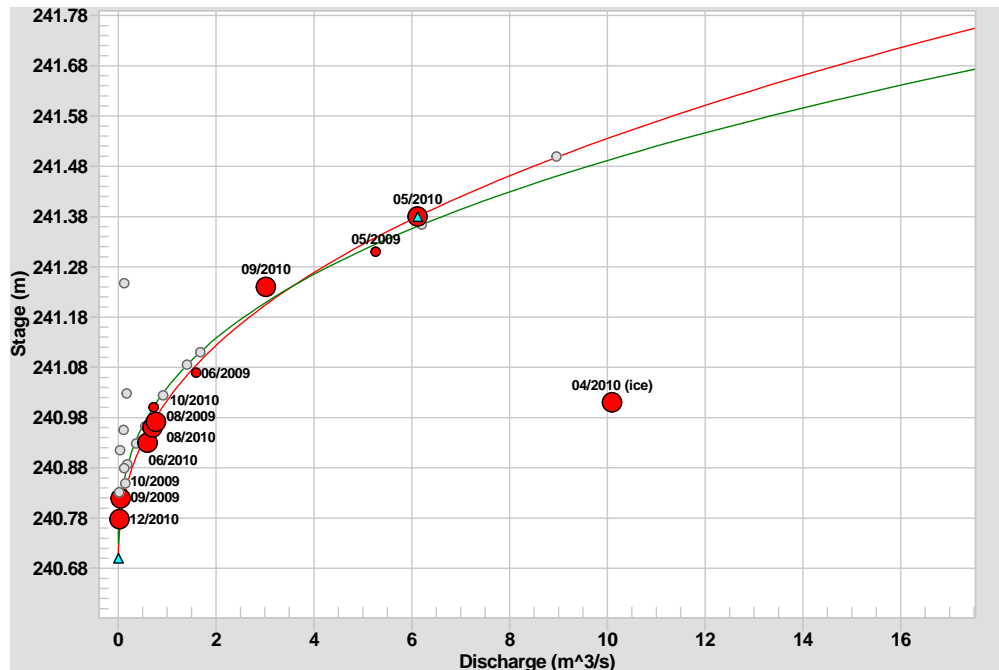
Figure C.2-45 Stage-discharge rating curve for RAMP Station S10, Wapasu Creek at Canterra Road.



Period of Use: 26/04/2007 Open ended

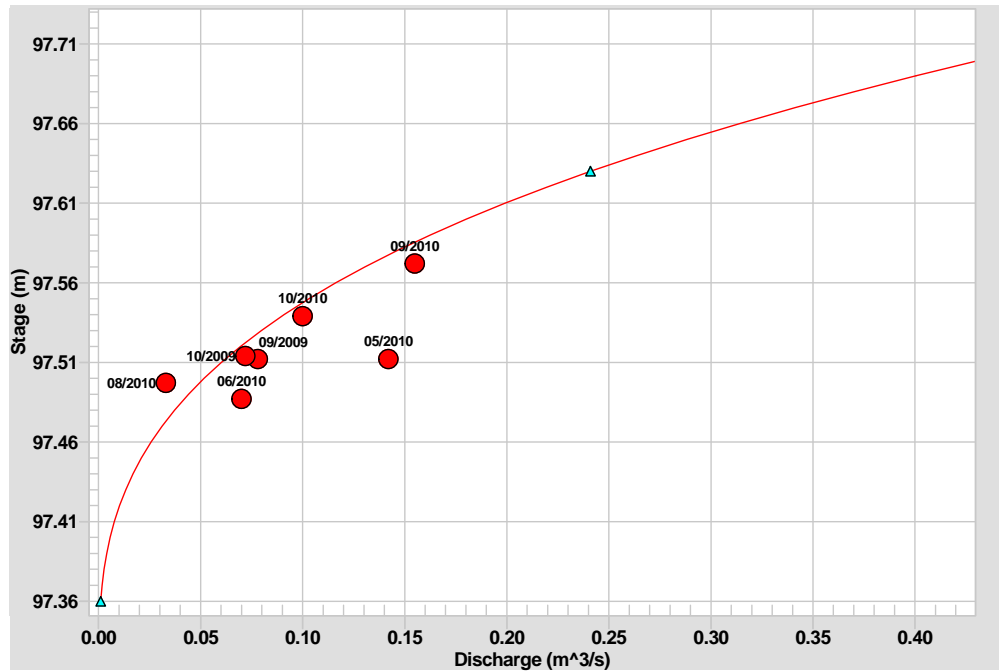
Note: The data quality at this station was compromised in the 2010 WY due to backwater effects caused by beaver activity.

Figure C.2-46 Stage-discharge rating curve for WSC Station 07DA007, RAMP Station S11, Poplar Creek at Highway 63.



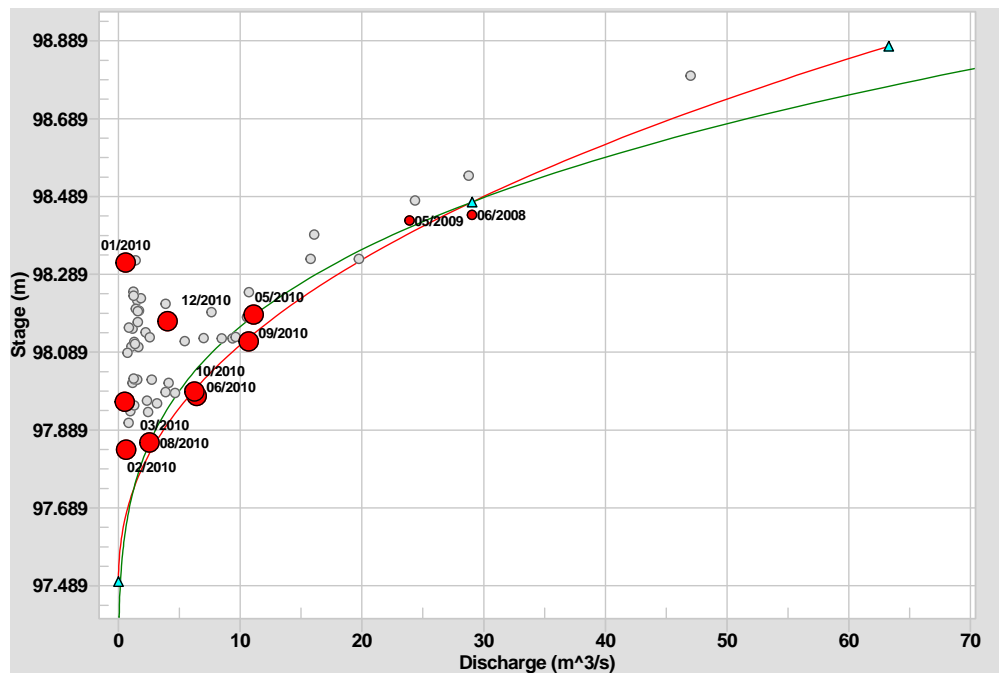
Period of Use: 01/11/2009 Open ended

Figure C.2-47 Stage-discharge rating curve for RAMP Station S12, Fort Creek at Highway 63.



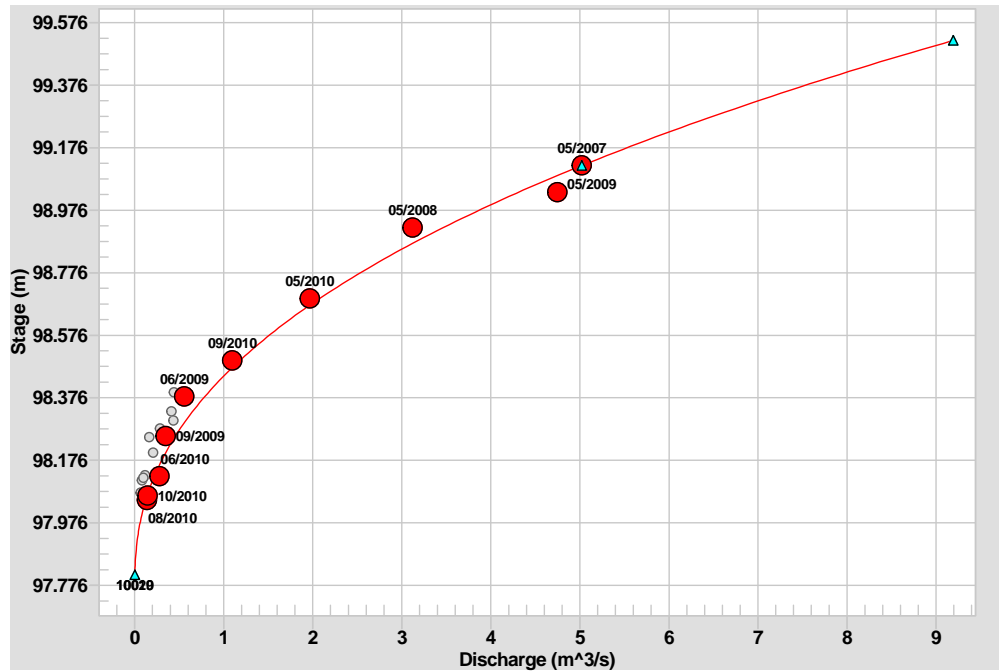
Period of Use: 05/01/2011 Open ended

Figure C.2-48 Stage-discharge rating curve for RAMP Station S14A, Ells River at the CNRL Bridge.



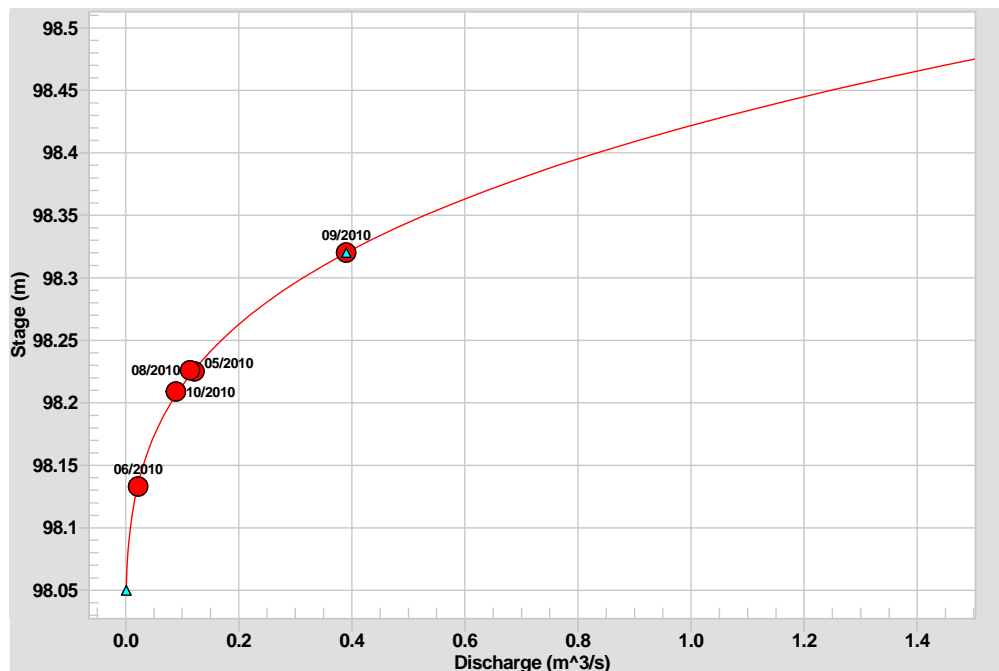
Period of Use: 01/11/2009 Open ended

Figure C.2-49 Stage-discharge rating curve for RAMP Station S15A, Tar River near the Mouth.



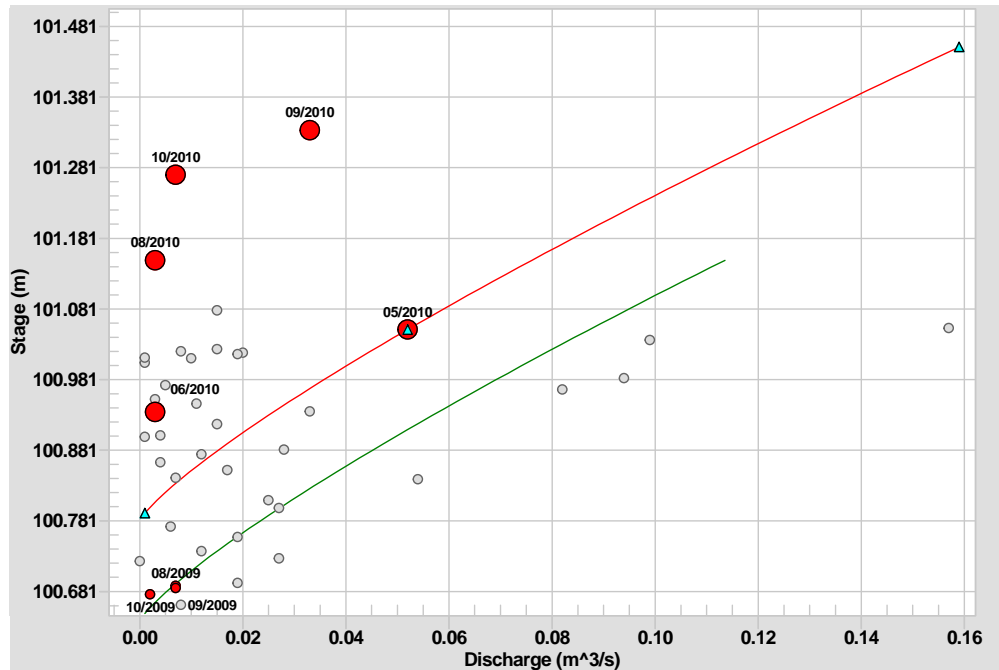
Period of Use: 01/04/2010 Open ended

Figure C.2-50 Stage-discharge rating curve for RAMP Station S16A, Calumet River near the Mouth.



Period of Use: 01/04/2010 Open ended

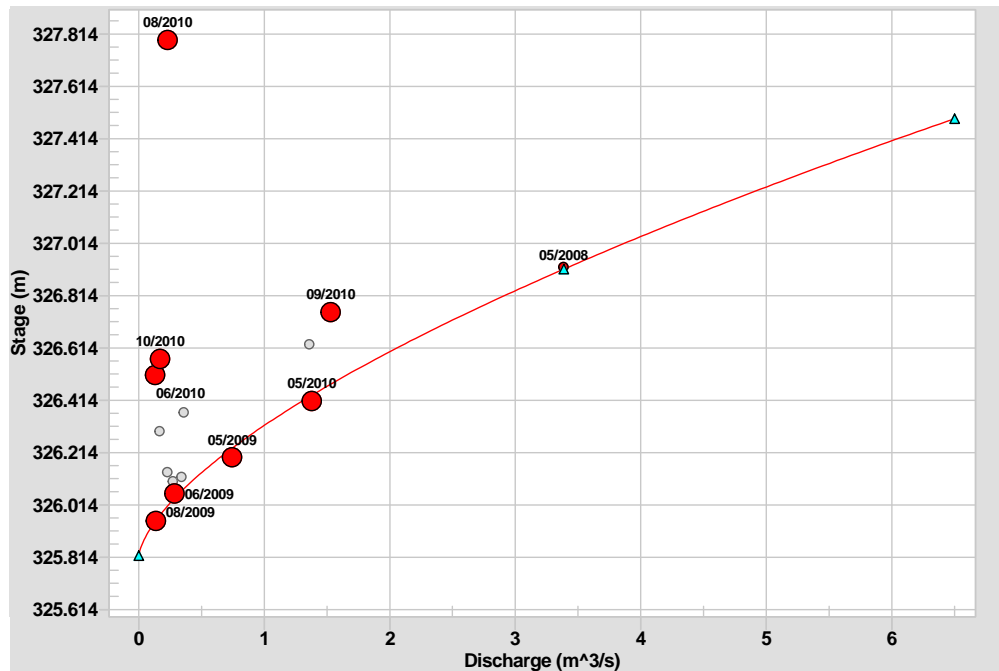
Figure C.2-51 Stage-discharge rating curve for RAMP Station S19, Tar River Lowland Tributary near the Mouth.



Period of Use: 01/04/2010 Open ended

Note: The data quality at this station was compromised in the 2010 WY due to backwater effects caused by beaver activity.

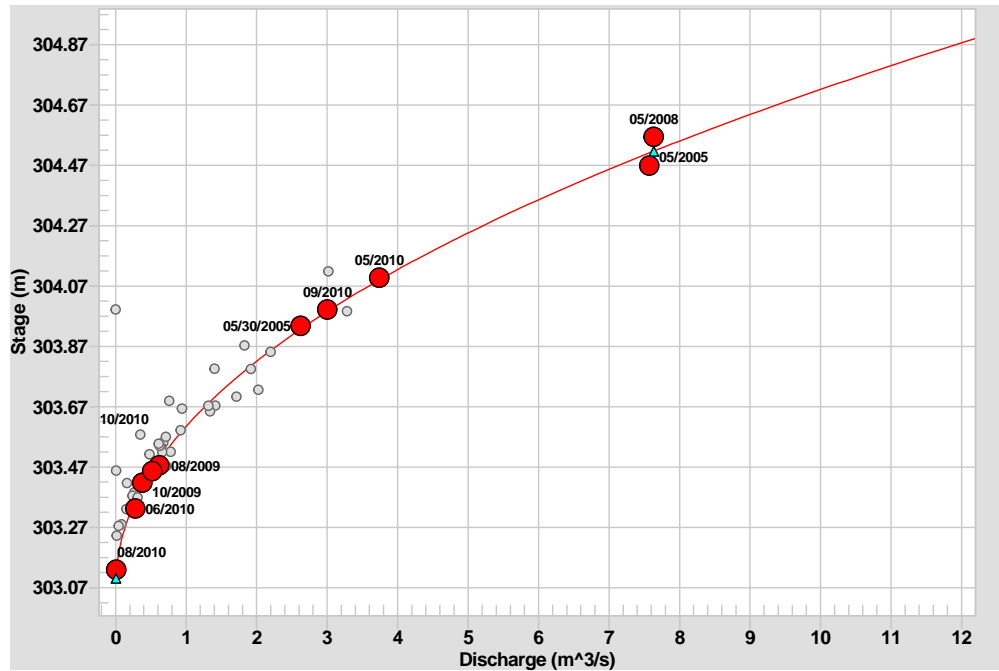
Figure C.2-52 Stage-discharge rating curve for RAMP Station S20, Muskeg River Upland.



Period of Use: 01/01/2008 Open ended

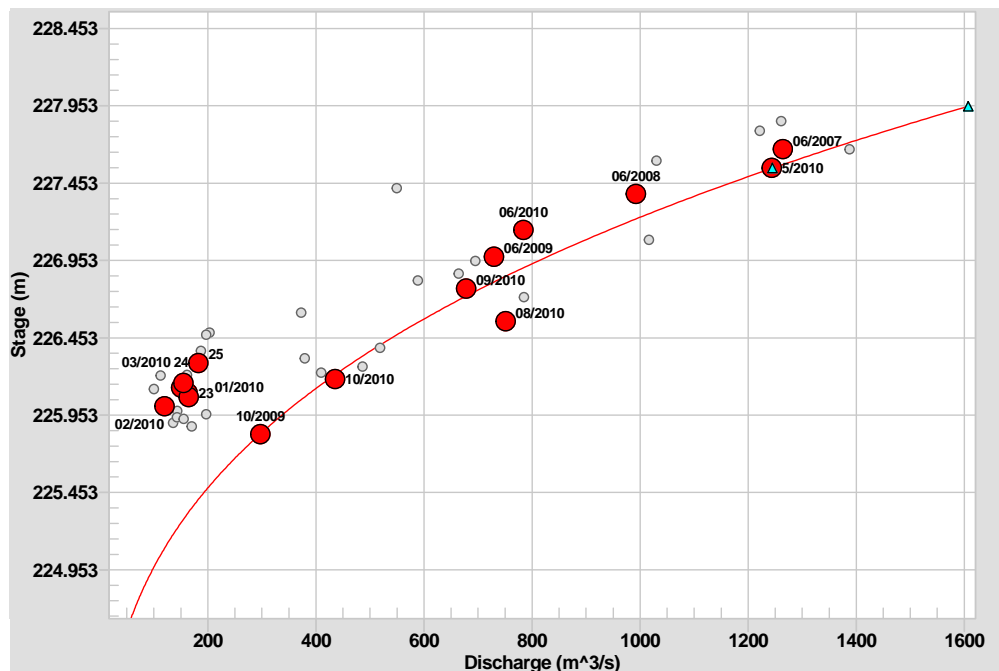
Note: The data quality at this station was compromised in the 2010 WY due to backwater effects caused by beaver activity.

Figure C.2-53 Stage-discharge rating curve for RAMP Station S22, Muskeg Creek near the Mouth.



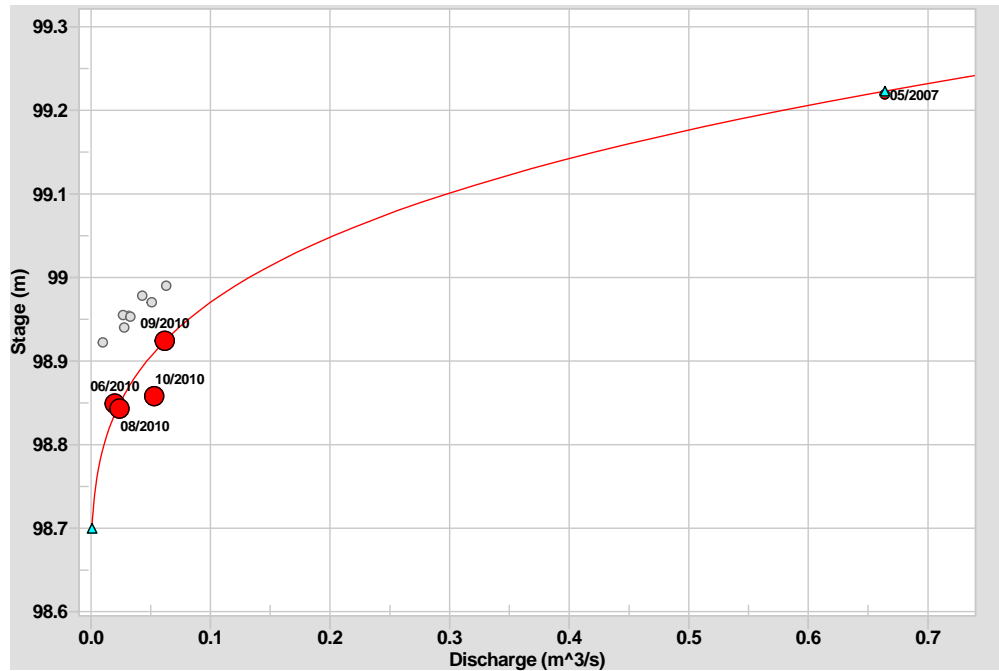
Period of Use: 01/01/2010 Open ended

Figure C.2-54 Stage-discharge rating curve for RAMP Station S24, Athabasca River below Eymundson Creek.



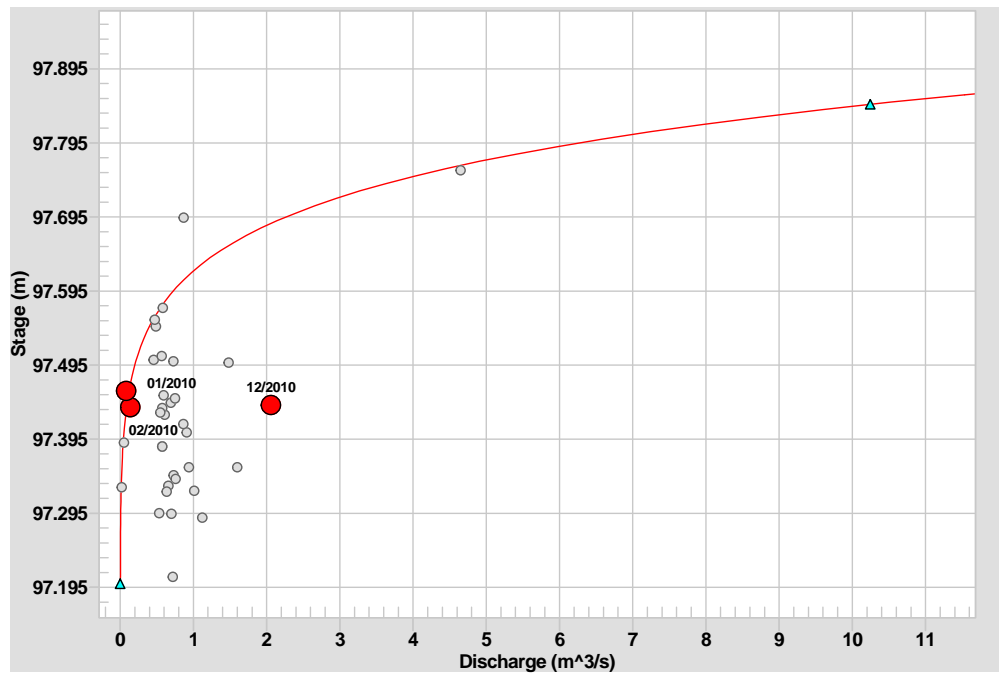
Period of Use: 11/01/2009 Open ended

Figure C.2-55 Stage-discharge rating curve for RAMP Station S25, Susan Lake Outlet.



Period of Use: 01/05/2010 Open ended

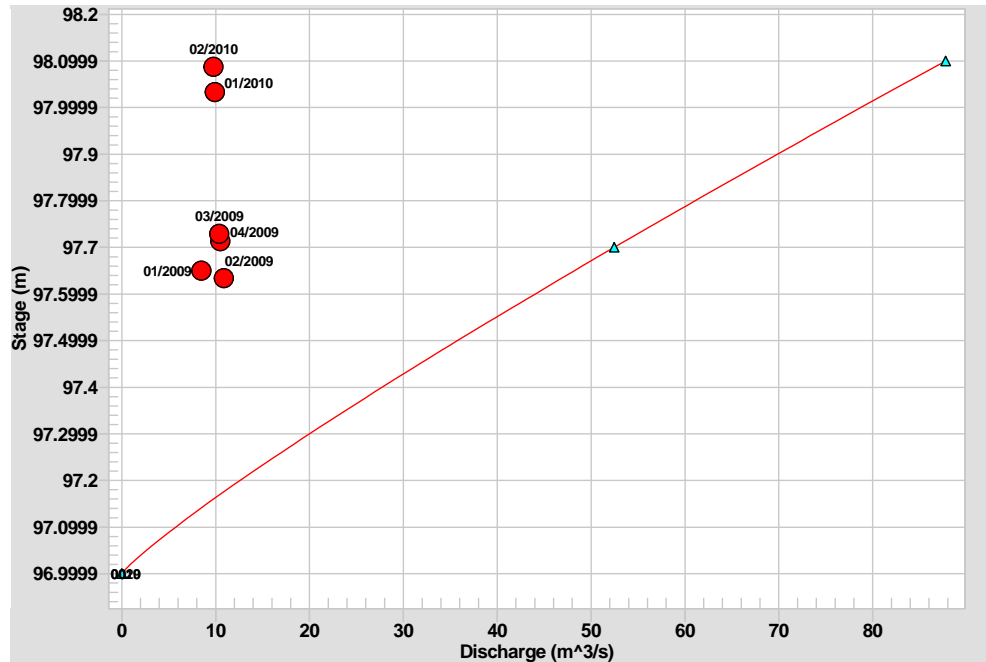
Figure C.2-56 Stage-discharge rating curve for WSC Station 07DB001, RAMP Station S26, MacKay River near Fort McKay.



Period of Use: 01/03/2004 Open ended

Note: Winter manual measurements collected by RAMP; rating curve developed by Water Survey of Canada based on open-water flows.

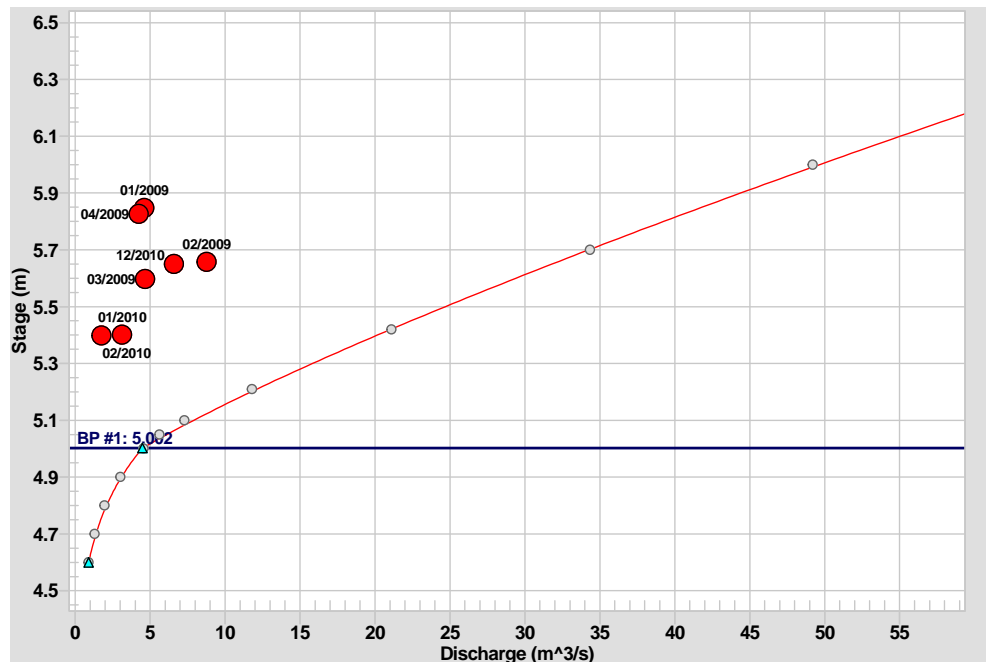
Figure C.2-57 Stage-discharge rating curve for WSC Station 07DC001, RAMP Station S27, Firebag River near the Mouth.



Period of Use: 01/01/2008 Open ended

Note: Winter manual measurements collected by RAMP; rating curve developed by Water Survey of Canada based on open-water flows.

Figure C.2-58 Stage-discharge rating curve for WSC Station 07CE002, RAMP Station S29, Christina River near Chard.

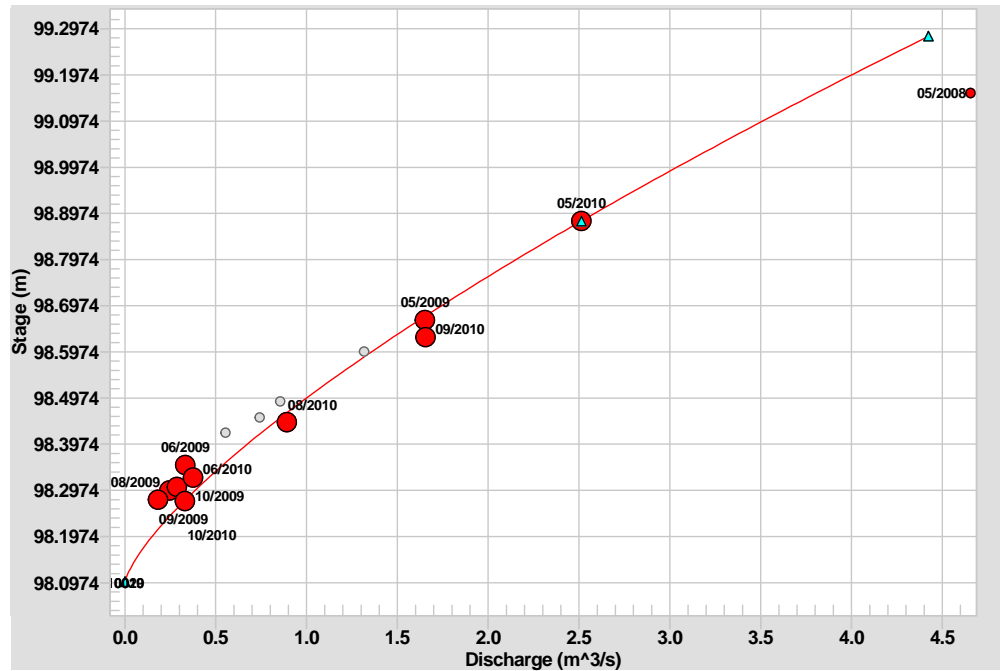


Period of Use: 01/01/2009 Open ended

Note: Winter manual measurements collected by RAMP; rating curve developed by Water Survey of Canada based on open-water flows.

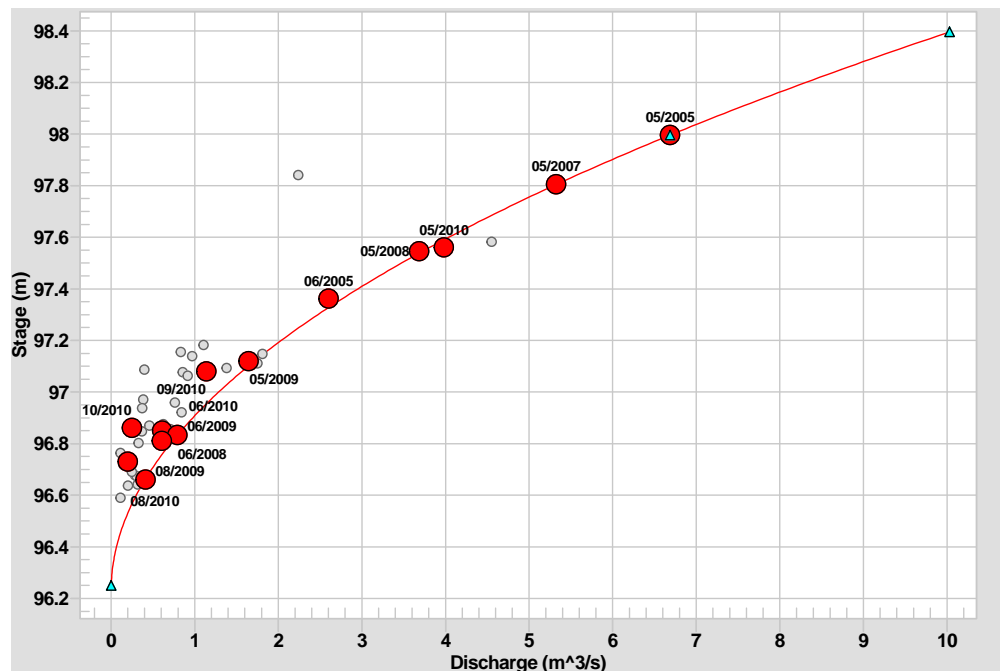
Note: The blue line denotes the break point in the discharge rating curve.

Figure C.2-59 Stage-discharge rating curve for RAMP Station S31, Hangingstone Creek at North Star Road.



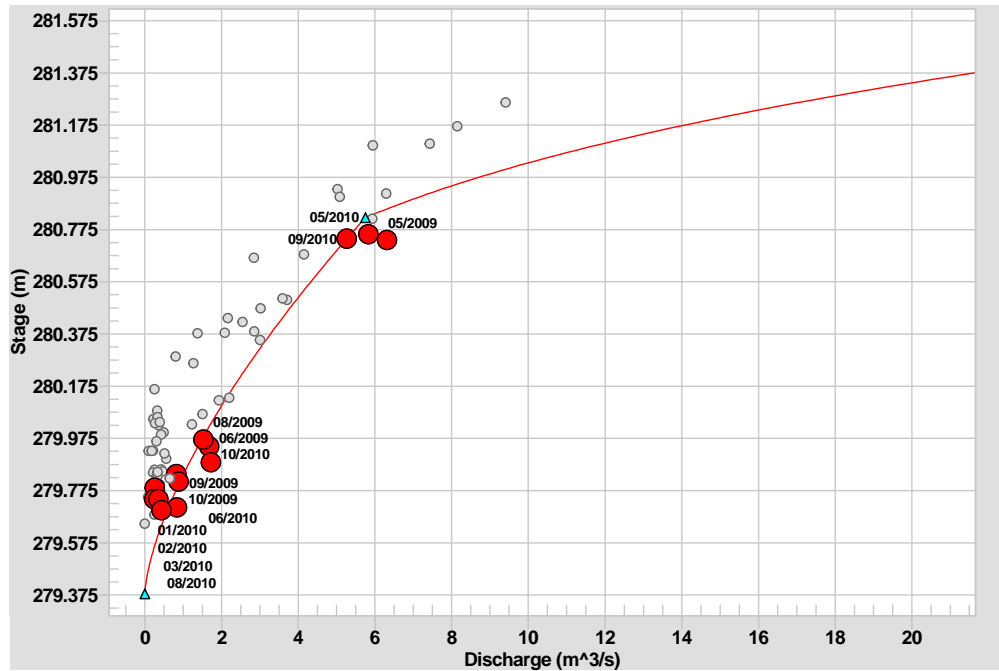
Period of Use: 15/04/2010 Open ended

Figure C.2-60 Stage-discharge rating curve for RAMP Station S32, Surmont Creek at Highway 881.



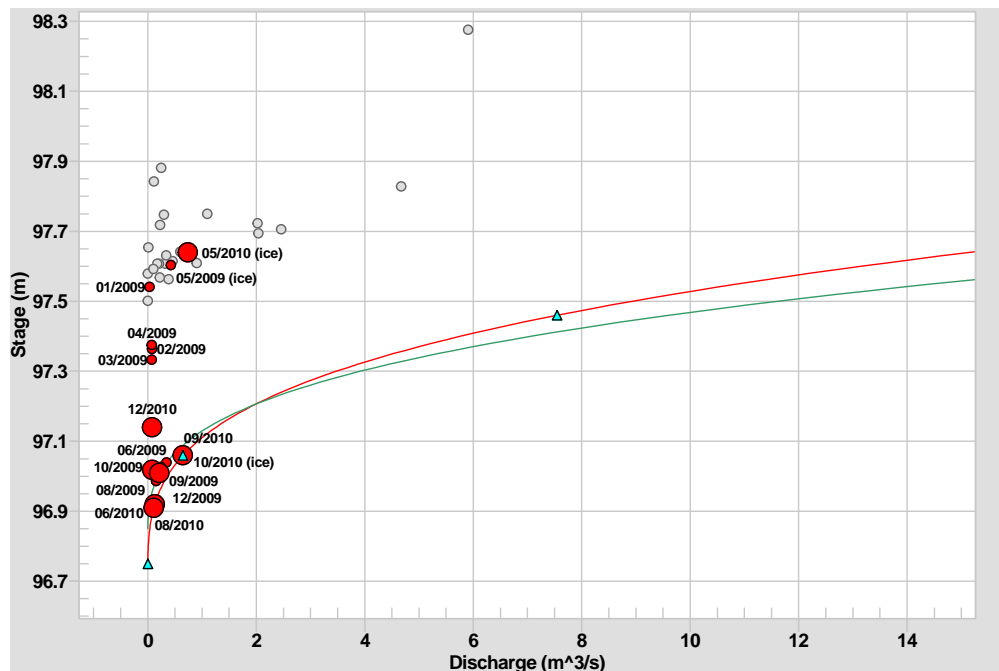
Period of Use: 01/05/2009 Open ended

Figure C.2-61 Stage-discharge rating curve for RAMP Station S33, Muskeg River at the Aurora/Albian Boundary.



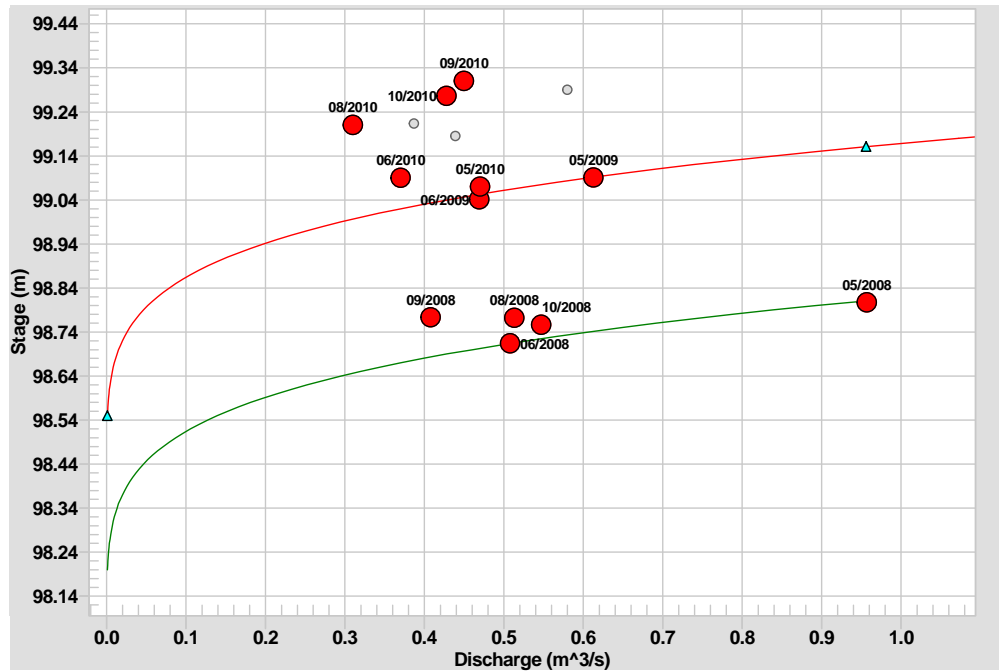
Period of Use: 01/11/2009 Open ended

Figure C.2-62 Stage-discharge rating curve for RAMP Station S34, Tar River above CNRL Lake.



Period of Use: 11/01/2009 Open ended

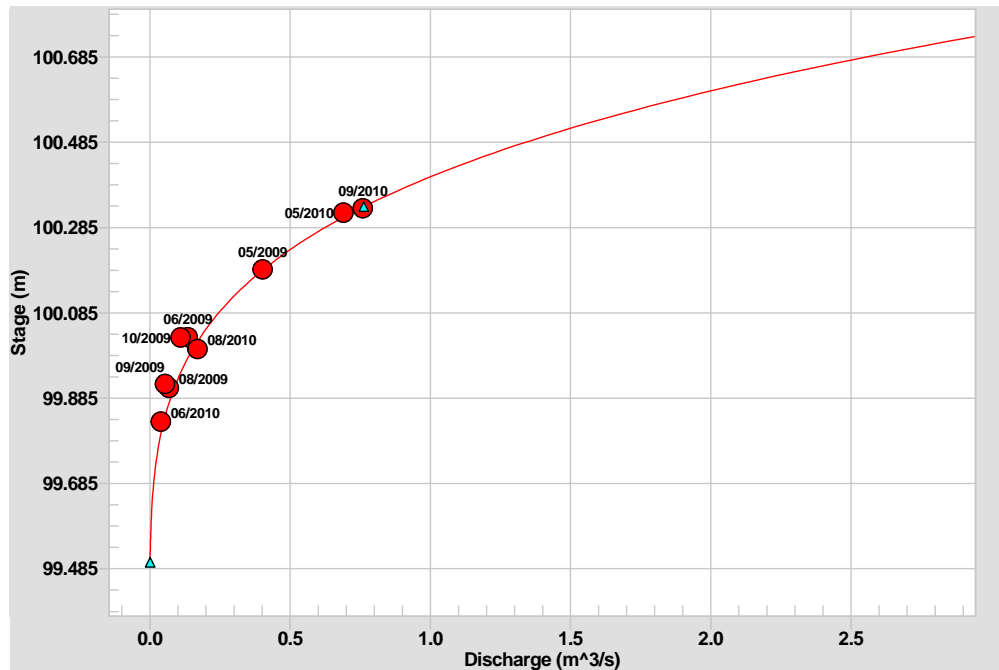
Figure C.2-63 Stage-discharge rating curve for RAMP Station S36, McClelland Lake Outlet above Firebag River.



Period of Use: 01/05/2009 Open ended

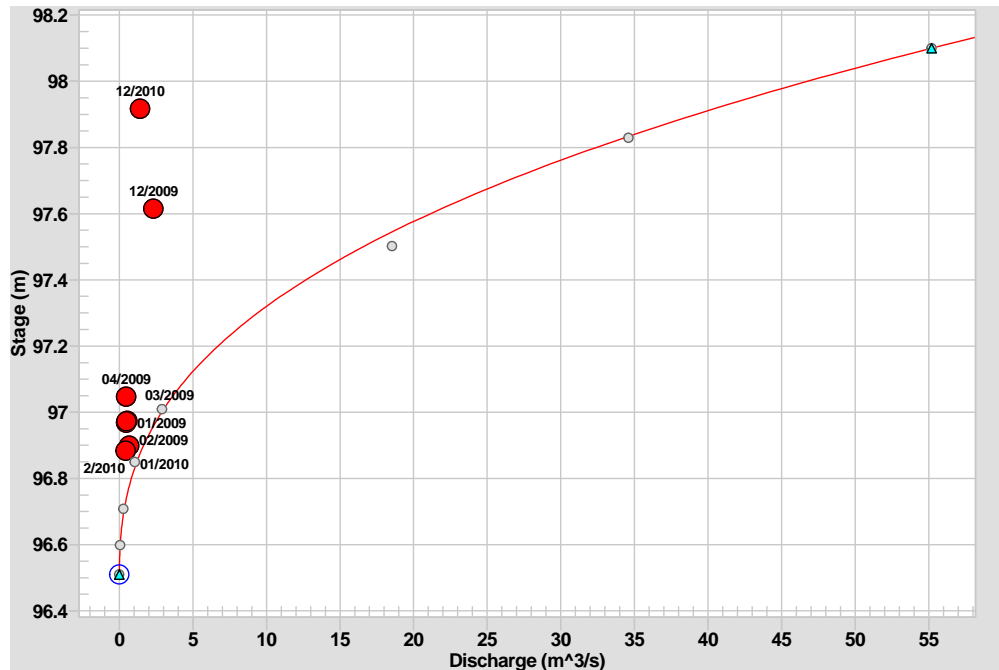
Note: The data quality at this station was compromised in the 2010 WY due to backwater effects caused by beaver activity.

Figure C.2-64 Stage-discharge rating curve for RAMP Station S37, East Jackpine Creek near the 1300 m contour.



Period of Use: 25/04/2010 Open ended

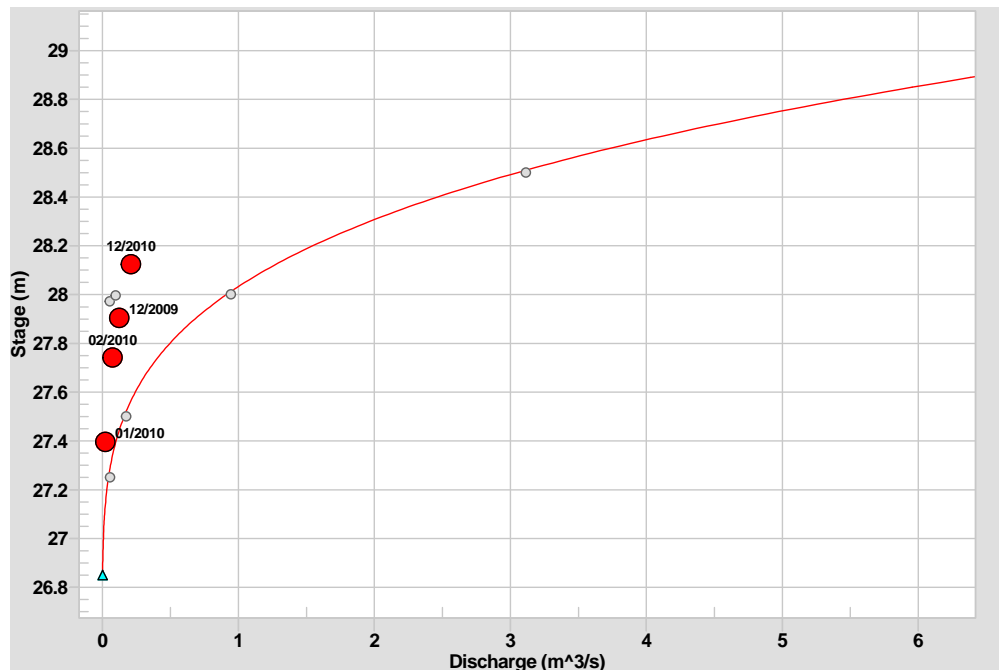
Figure C.2-65 Stage-discharge rating curve for WSC Station 07DA006, RAMP Station S38, Steepbank River.



Period of Use: 31/10/2009 Open ended

Note: Winter manual measurements collected by RAMP; rating curve developed by Water Survey of Canada based on open-water flows.

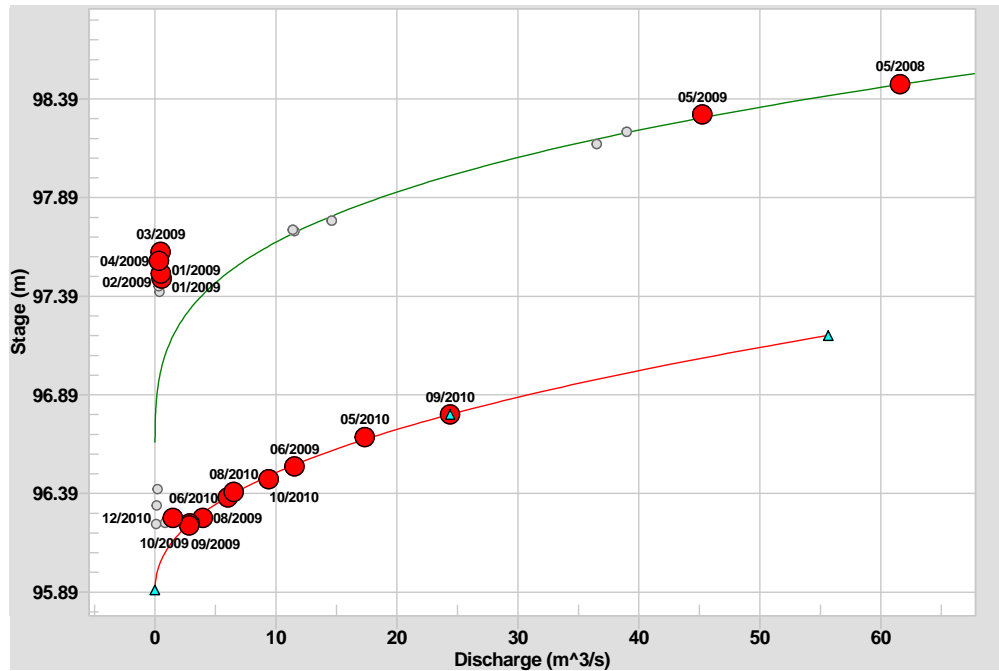
Figure C.2-66 Stage-discharge rating curve for WSC Station 07DA018, RAMP Station S39, Beaver River above Syncrude.



Period of Use: 31/10/2009 Open ended

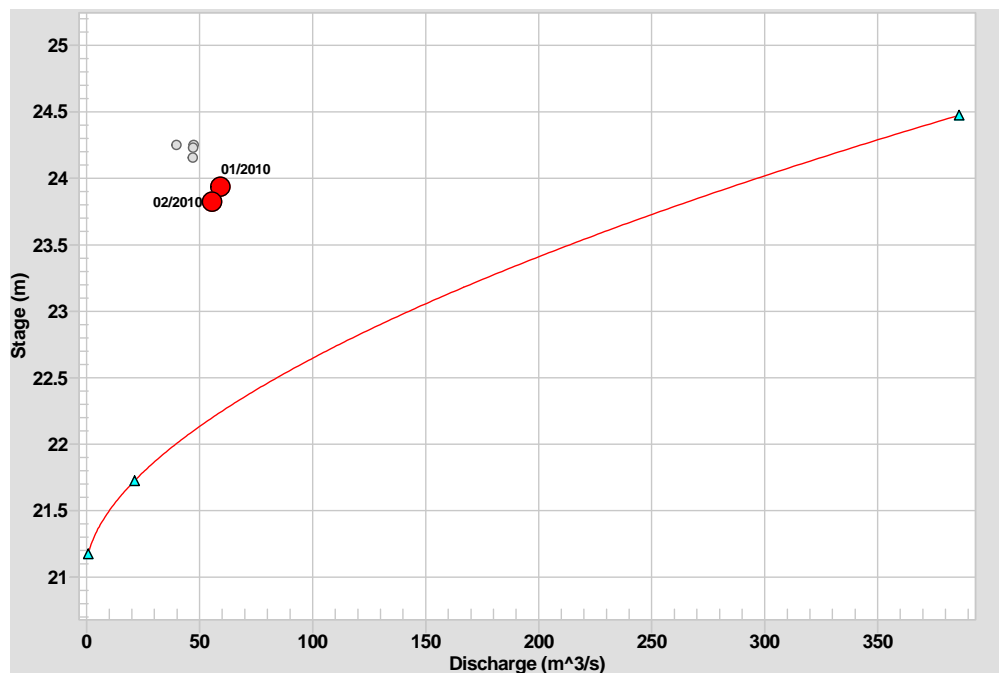
Note: Winter manual measurements collected by RAMP; rating curve developed by Water Survey of Canada based on open-water flows.

Figure C.2-67 Stage-discharge rating curve for RAMP Station S40, MacKay River at Petro-Canada Bridge.



Period of Use: 14/06/2009 Open ended

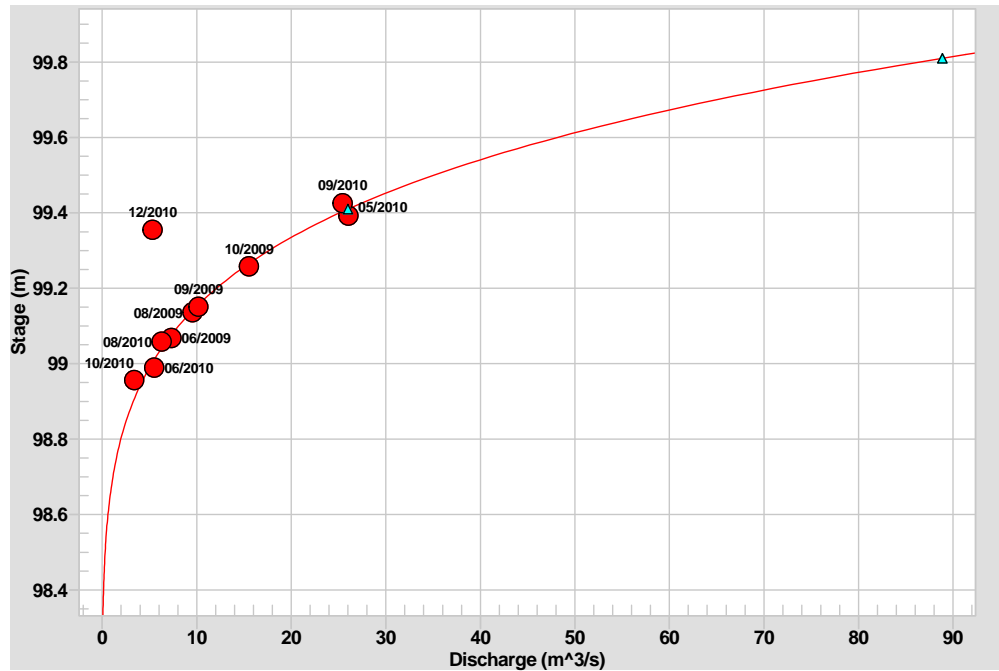
Figure C.2-68 Stage-discharge rating curve for RAMP Station S42, Clearwater River above Christina.



Period of Use: 01/01/2009 Open ended

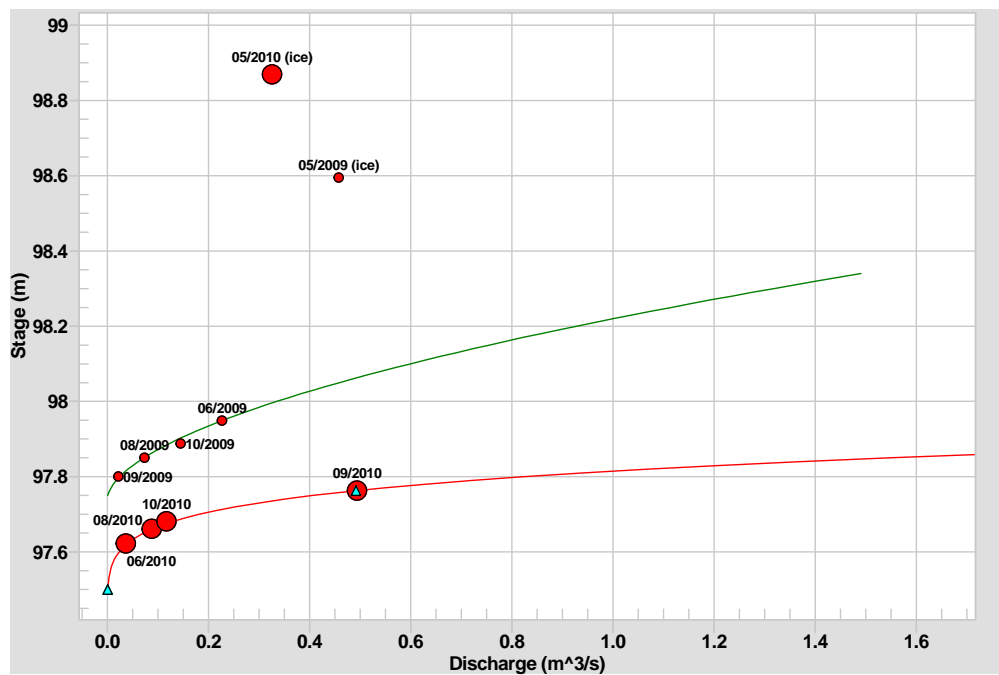
Note: Winter manual measurements collected by RAMP; rating curve developed by Water Survey of Canada based on open-water flows.

Figure C.2-69 Stage-discharge rating curve for RAMP Station S43, Firebag River above Suncor Firebag.



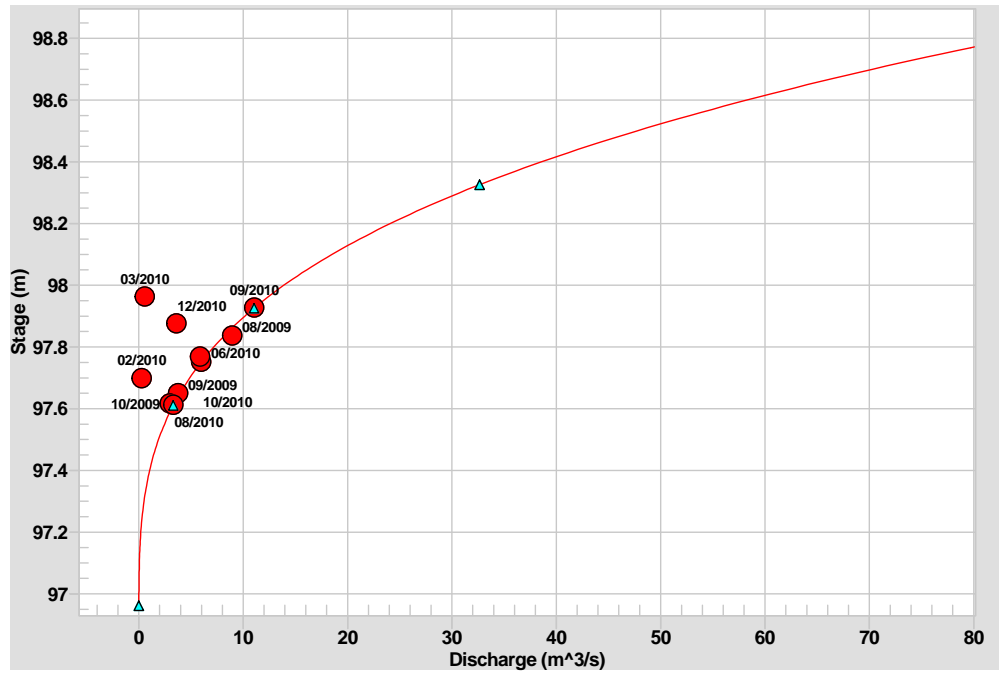
Period of Use: 01/05/2009 Open ended

Figure C.2-70 Stage-discharge rating curve for WSC Station 07DA013, RAMP Station S44, Pierre River near Fort McKay.



Period of Use: 01/05/2010 Open ended

Figure C.2-71 Stage-discharge rating curve for RAMP Station S45, Upper Ells River.



Period of Use: 08/08/2009 Open ended

C.3 NATURALIZED FLOW CALCULATION

C.3.1 Introduction

A water balance approach was used to assess hydrologic impacts on the flow regime experienced at the mouth of major tributaries of the Athabasca River within the oil sands region. This analytical approach is considered useful in that the difference between observed and naturalized flows can be calculated using recorded and calculated flow inputs and outputs.

The water balance approach involves the calculation of a naturalized hydrograph by accounting for flow inputs and outputs that have affected the observed hydrograph at a particular location. By adding back into the observed hydrograph flows that would have occurred under natural conditions, and by subtracting flows that would not have occurred naturally, but have been added to the system through human intervention (flows added as a result of industrial activity such as industrial flow releases and land-use changes), a naturalized hydrograph for the location is calculated. The observed hydrograph and the naturalized hydrograph are compared to assess the impacts to the flow regime at the specified location.

Details of the procedure are provided below.

C.3.2 Rationale

C.3.2.1 Water Balance

In general, the water balance for a partially-developed catchment (that is, a catchment that has been affected by land clearing, hydrologic isolation, and water withdrawals and releases from streams) may be considered as follows:

$$Q_{obs} = Q_{nat} - Q_{HI} + Q_C - Q_O + Q_I \quad (1)$$

where:

- Q_{obs} is the observed discharge at the catchment outlet;
- Q_{nat} is the natural discharge that would have occurred at the catchment outlet in the absence of development;
- Q_{HI} is the runoff that would have occurred from hydrologically isolated (closed-circuit) areas; areas that no longer contribute runoff to the catchment;
- Q_C is the incremental runoff that occurs due to land clearing;
- Q_O is outflow; water removed from the stream; and
- Q_I is inflow; water released to the stream from sources that would not have contributed to the stream in the absence of development.

For catchments monitored as part of the RAMP program, the observed discharge is the discharge measured at streamflow stations near the catchment outlet. Most streamflow stations are operated by RAMP, but some are operated by government, by a combination of government and RAMP, or by industry.

Water withdrawals and releases are obtained from industry reports. In some cases, daily discharges are reported. In other cases the withdrawal or release discharge is reported as a monthly or annual volume, and the corresponding daily discharges are estimated by RAMP.

The effects of clearing and of hydrologic isolation are estimated as discussed in the following sections.

The natural flow, Q_{nat} is initially unknown and is estimated by solving Equation 1 using information on the other components of the water balance. Because some of the other components are not known precisely, and because the water balance equation omits factors such as changes in surface water discharge in response to groundwater extraction, Q_{nat} is hereinafter referred to as “naturalized”, rather than “natural”.

C.3.2.2 Effect of Clearing

The effect of clearing is estimated by assuming a 20% increase in average runoff depth in cleared areas. This assumption provides an approximate estimate of increased runoff. A more precise assessment would require consideration of the following factors:

- The effect of clearing on runoff is not well defined and may vary significantly depending on the soil type, initial vegetation, and other factors; and
- When land is cleared, the runoff is frequently treated in settling ponds, which may have sufficient capacity to attenuate the runoff and appreciably affect the discharge hydrograph.

Using an assumption of a constant increase in average runoff depth is considered to be appropriate for reviewing changes in flow characteristics when evaluated at the mouth of the tributaries, because the cleared area is usually small compared to the total catchment area.

C.3.2.3 Closed-Circuited Areas

Closed-circuited (or hydrologically isolated) areas were delineated based on satellite imagery and reviewed by oil sands operators (Table C.3-1). It is assumed that zero runoff is released to the environment from closed-circuit areas.

The definition of “effective area” used in the water balance analyses is the area of the catchment remaining after removal of the closed-circuited areas. The effective area includes both cleared and natural areas that are not closed-circuited by development activities. All not closed-circuited areas of the watershed are included in the effective area for the purposes of the water balance analyses. The effective area as defined for this analysis may include areas that are ineffective in the classic hydrological sense of areas that do not contribute runoff to the stream during normal (up to 1:2 year) runoff events.

Table C.3-1 Closed-circuited and cleared watershed areas, 2010.

| Watershed | Total Area¹ (km²) | Closed-Circuit Area (km²) | Cleared Area (km²) |
|------------------------------|--|---|--|
| Athabasca River ² | 146,000 | 335 | 102.9 |
| Muskeg River | 1,457 | 120.7 | 51.5 |
| Steepbank River | 1,320 | 4.3 | 40.4 |
| Tar River | 326 | 65.2 | 8.3 |
| MacKay River | 5,569 | 4.4 | 13.4 |
| Calumet River | 173.5 | 1.8 | 0.4 |
| Firebag River | 5,988 | 2.6 | 39.1 |
| Ells River | 2,450 | 1.6 | 7.8 |
| Christina River ² | 13,038 | 6.6 | 46.2 |
| Hangingstone River | 962 | 0.5 | 0.1 |
| Poplar Creek | 151 | 3.1 | 1.7 |
| Fort Creek | 31.9 | 0.3 | 19.7 |

¹ Area is reported for the stream monitoring station.

² Values reported for all oil sands projects in these watersheds.

C.3.3 Water Balance Procedure

In order to calculate the naturalized hydrograph, the observed discharge is first adjusted to remove the effects of industrial water withdrawals and releases. The resulting discharge represents the observed runoff (R) from the contributing portion of the catchment. The observed runoff is then converted to a naturalized runoff depth (d), accounting for the effects of clearing. The naturalized runoff depth is used to calculate the naturalized discharge for the catchment (Q_{nat}). The natural flow that would have occurred from industrially closed-circuited areas (Q_{HI}), and the incremental flow from cleared areas (Q_C) are also calculated. This process is shown in equation form below:

$$R = Q_{obs} + Q_O - Q_I \quad (2)$$

$$d = \frac{R}{[A_E + (A_C \times F)]} \times C \quad (3)$$

$$Q_{nat} = \frac{A \times d}{C} \quad (4)$$

$$Q_{HI} = \frac{A_{HI} \times d}{C} \quad (5)$$

$$Q_C = \frac{A_C \times d \times F}{C} \quad (6)$$

where:

- A is the total catchment area (km²);
- A_C is the cleared area in the catchment (km²);
- A_E is the effective area (i.e. A - A_{HI}) (km²);
- A_{HI} is the closed-circuit area (km²);
- C is the conversion factor from m³/s/km² to mm/yr;
- d is the naturalized runoff depth (mm);
- F is the adjustment factor to account for clearing (0.20);
- R is the observed runoff from the effective area adjusted for reported industrial withdrawals and releases (m³/s); and

other symbols are as defined previously. The water balance calculation is done at a daily time step.

C.3.4 Previously Published Estimates

Naturalized flows provided in the RAMP reports in 2005–2007 were estimated using methods similar to, but slightly different than, the procedure described above. Estimates for 2005–2007 were revised to be consistent with the method used from 2008 to 2010, which reflects more accurately a naturalized water balance, and these revisions were presented in the RAMP 2008 report. The assumption of differences in runoff response between upland and lowland terrain, previously applied to closed-circuited areas, is not applied due to the lack of a reliable and consistent approach for all watersheds.

C.4 UPDATED STATION DESCRIPTION SHEETS

Updated station description sheets are provided below for all of the stations that were active in the 2010 WY.

Revised 24 March, 2011

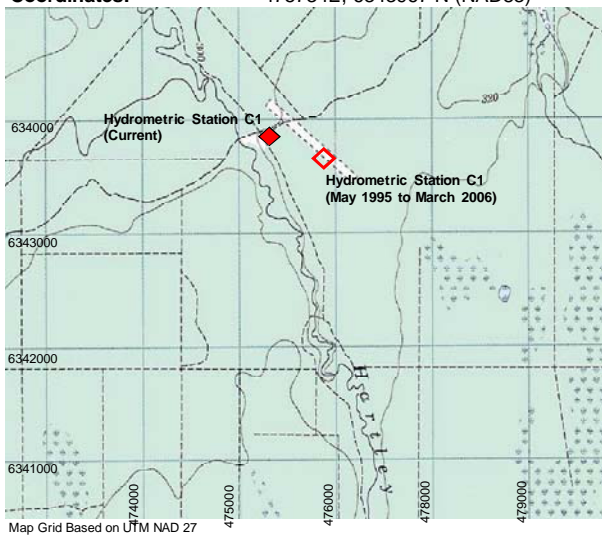
Location and Purpose

Established in May 1995 to monitor climate conditions in the Muskeg River basin. Formerly Station 271 for the OSLO project - 1988 data available.

| | | | |
|----------------------------|--|------------------|---------------------------|
| Variables Measured: | Temperature, Wind Speed, Snow Depth, Humidity, Precipitation | ATS: | SW-16-95-9-W4 |
| Period of Record: | March 2006 to Present | Lat/Long: | 57°14'20" N, 111°24'37" W |
| Access: | 2WD Truck Via Canterra Road and Jackpine Mine | NTS Map: | 74E03 |
| Coordinates: | 475230 E, 6344049 N (NAD 83) | | |

Previous Locations

Period: May 1995 to March 2006
Coordinates: 475734E, 6343967 N (NAD83)



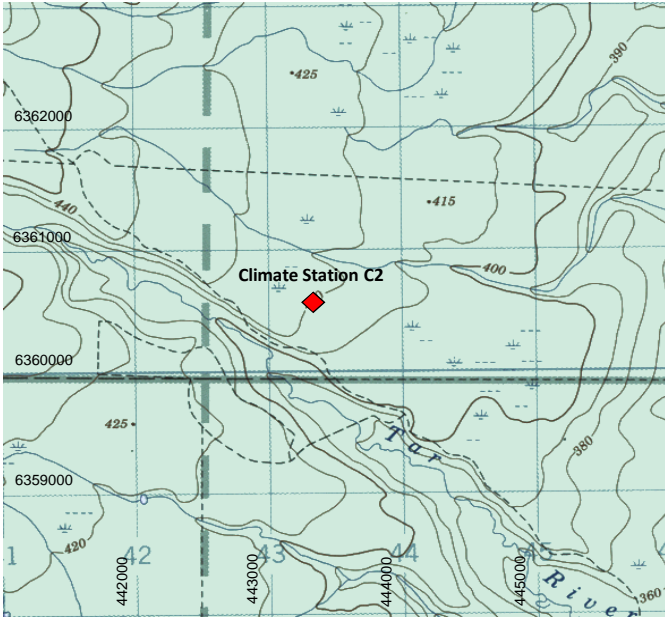
Revised 24 March, 2011

Location and Purpose

Established in October 2008 to monitor climate conditions in the Tar River basin.

| | |
|----------------------------|--|
| Variables Measured: | Temperature, Wind Speed, Snow Depth, Humidity, Precipitation, Solar Radiation, Barometric Pressure |
| Period of Record: | October 2008 to Present |
| Access: | 4WD Truck Via CNRL |
| Coordinates: | 12 V 443364 E, 6360515 N (NAD 83) |

ATS:
Lat/Long: 57°23'02" N, 111°56'31" W
NTS Map: 74E05



Map Grid Based on UTM NAD 27

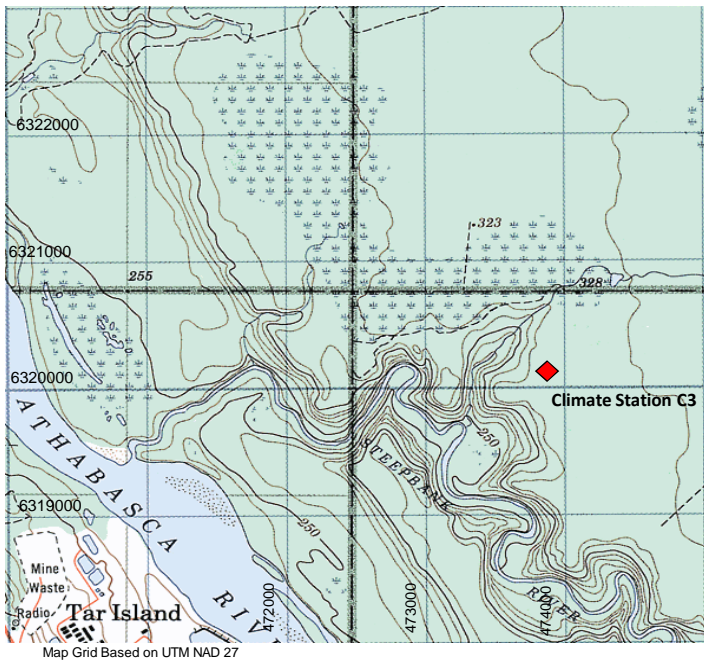


Revised 24 March, 2011

Location and Purpose

Established in August 2009 to monitor precipitation in the Steepbank River area.

| | |
|----------------------------|--|
| Variables Measured: | Temperature, Wind Speed, Snow Depth, Humidity, Precipitation, Solar Radiation, Barometric Pressure |
| Period of Record: | August 2009 to Present |
| Access: | 4WD Truck Via Suncor |
| Coordinates: | 12 V 473950 E, 6320500 N (NAD 83) |
| | ATS: |
| | Lat/Long: 57°01'38.4" N, 111°25'45.1" W |
| | NTS Map: 74E03 |

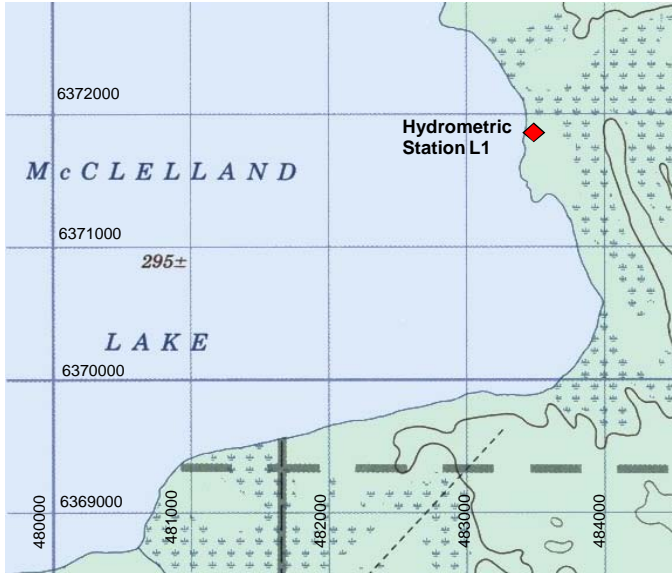


Revised 24 March, 2011

Location and Purpose:

Established on the East side of McClelland Lake to monitor Water Levels. Climate data is also collected at this station including: temperature, precipitation, and relative humidity.

Variables Measured: Level (1997 -), precipitation (2004 -), temperature (2007 -), relative humidity (2007 -)
Period of Record: July 1997 to Present **ATS:** NW-12-98-9-W4
Access: Helicopter **Lat/Long:** 57°29'30" N, 111°16'37" W
Drainage Area: 191 km² **NTS Map:** 74E06
Coordinates: 483430 E, 6371950 N

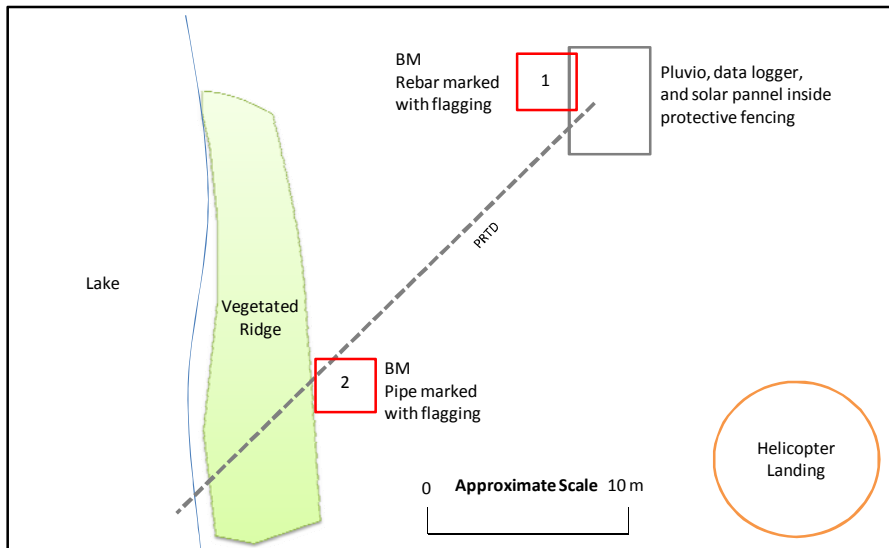


Map Grid Based on UTM NAD 27

Benchmarks:

BM: 1
Elevation: 294.865 (geodetic)
Basis: unknown
Location: Next to fence towards lake
Description: Iron rod, 0.4 m out of ground

BM: 2
Elevation: 296.865 m (geodetic)
Basis: Level survey from B.M. 1
Location: 2m towards fencing from old station mast
Description: Steel pipe, 0.4 m out of water



Revised 24 March, 2011

Location and Purpose

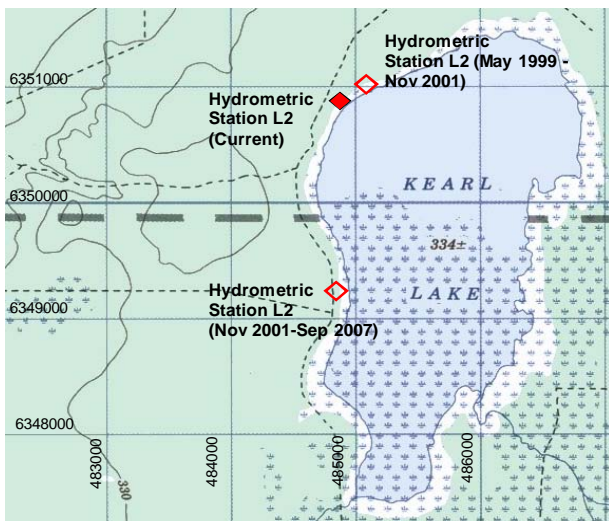
Established to monitor water levels in Kearl Lake.

| | | | |
|---------------------------|---|------------------|---------------------------------|
| Variable Measured: | Level, Precipitation, Water Temperature, Air Temperature, Relative Humidity | ATS: | 4-16-96-11-W4 |
| Period of Record: | May 1999 to Present | Lat/Long: | 57° 18' 8.3" N, 111 °15' 5.8" W |
| Access: | 2WD Access via Canerra Road | NTS Map: | 74E06 |
| Drainage Area: | 72.6 km ² | | |
| Coordinates: | 484839 E, 6351065 N (UTM NAD 83) | | |

Previous Locations:

Period: May 1999 to November 2001
Coordinates: 485184 E, 6351267 N (UTM NAD 83)

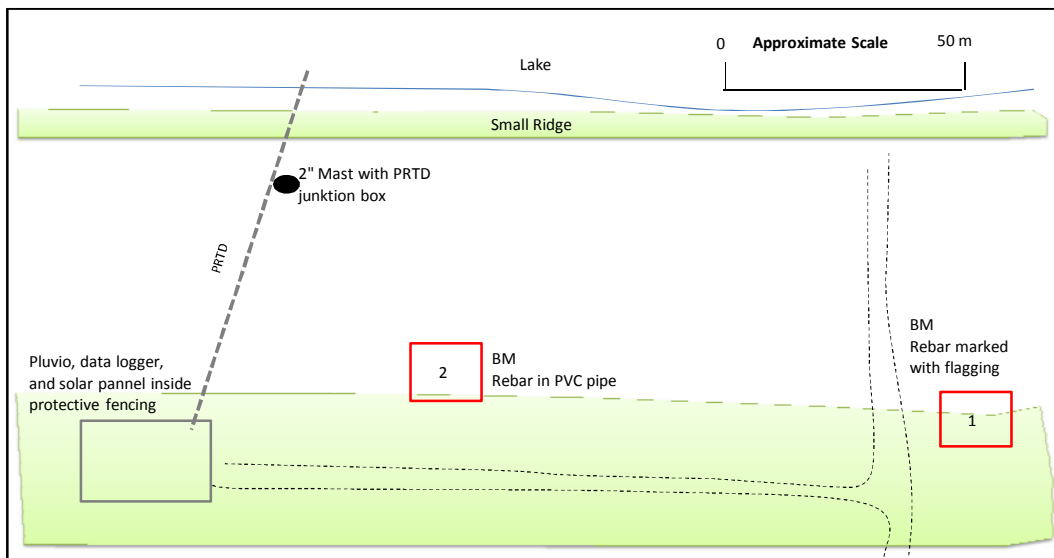
Period: November 2001 to September 2007
Coordinates: 484935 E, 6349023 N (UTM NAD 83)



Benchmarks

BM: 1
Elevation: 333.324
Basis: Assumed
Location: 3 m south of trail at edge of tree line.
Description: Re-bar extending 0.3 m from ground

BM: 2
Elevation: 332.424 (geodetic)
Basis: GPS Survey ± 13 mm referenced to Kearl Project
Location: 20 m South of logger at edge of tree line
Description: Iron rod in PVC cover



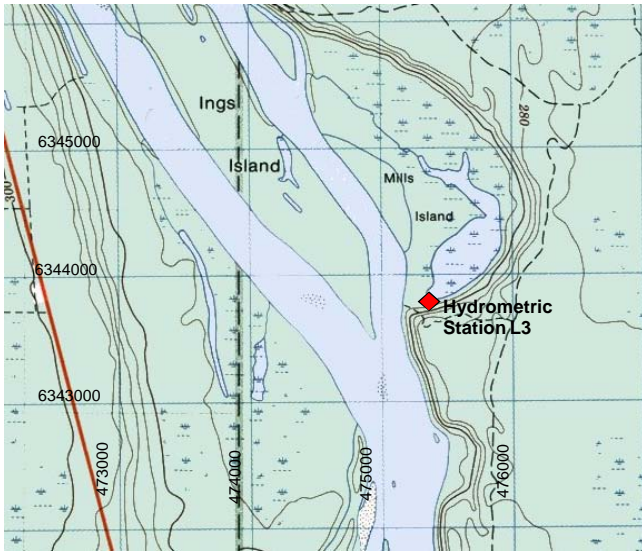
Revised 16 March, 2011

Location and Purpose:

Established to monitor water levels in Isadore's Lake.

Variable Measured: Level
Period of Record: February 2000 to Present
Access: 4WD road access off Highway 63
Drainage Area: 28.0 km²
Coordinates: 463305 E, 6342967 N (UTM NAD 83)

LSD: 16-7-95-10-W4
Lat/Long: 57°13'42.6" N, 111°36'28.5" W
NTS Map: 74E04



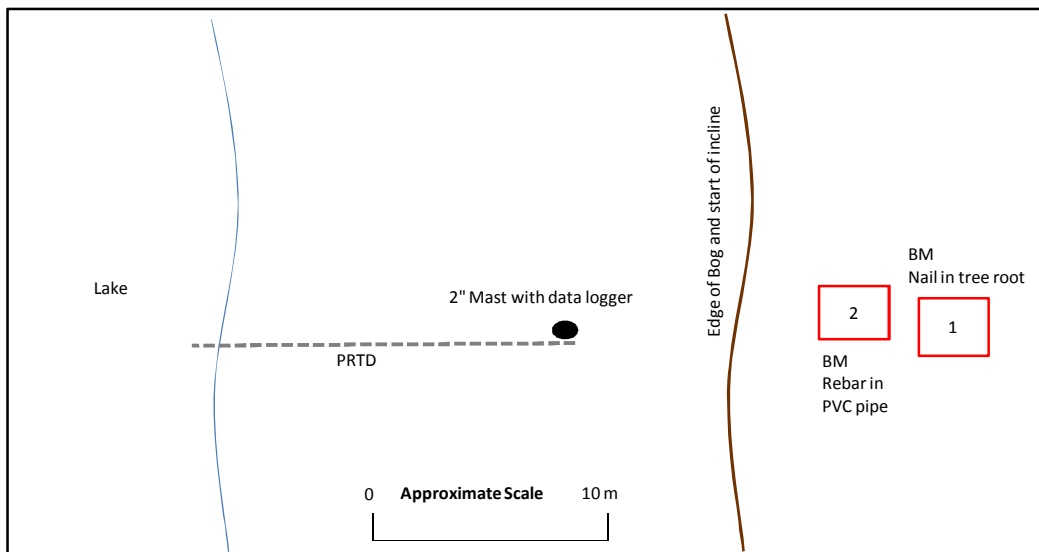
Map Grid Based on UTM NAD 27



Benchmarks

BM: 1
Elevation: 235.903 m (geodetic)
Basis: unknown
Location: 35 m south of data logger box
Description: Nail in root of spruce tree upslope of lake, nail is flagged with orange tape

BM: 2
Elevation: 234.506 m (geodetic)
Basis: Level survey from B.M. 1
Location: 30 m south of data logger box
Description: T-bar near ground elevation in PVC pipe between BM #1 and data logger box



Revised 24 March, 2011

Location and Purpose:

Established to monitor discharge on Jackpine Creek upstream of the Muskeg River. Replaced an Environment Canada hydrometric station (07DA009) that previously operated at the original site from 1975 to 1993. Station was moved to present location in 2000 to allow road access and avoid beaver dams.

Variable Measured: Dischage and water temperature

Period of Record: May 1995 to Present

Access: 2WD Access on Canterra Rd.

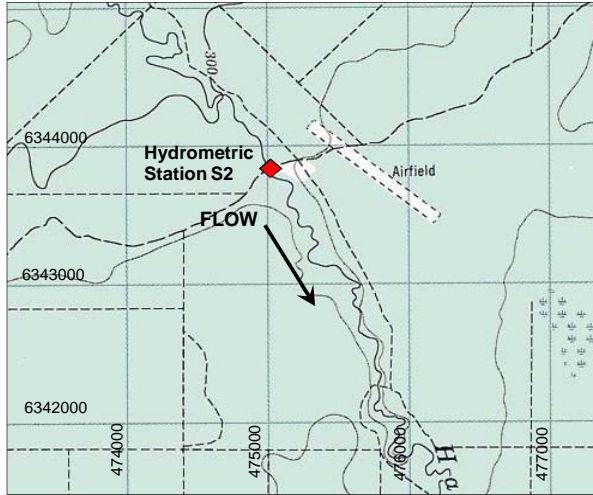
Drainage Area: 358 km²

Coordinates: 474961 E, 6344087 N (UTM NAD 83)

LSD: SE-17-95-9-W4

Lat/Long: 57°14'21" N, 111°24'53" W

NTS Map: 74E / 3

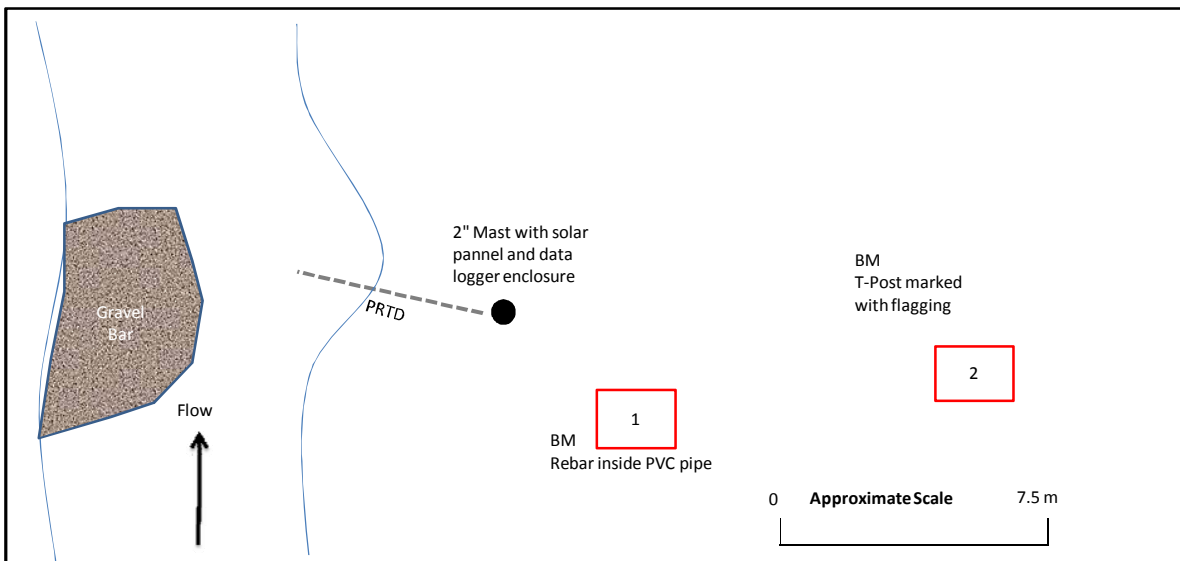


Map Grid Based on UTM NAD 27

Benchmarks

BM: 1
Elevation: 297.990 m (geodetic)
Basis: unknown
Location: 5 m South of data logger
Description: Rebar in white PVC pipe on right bank just upstream of the logger box

BM: 2
Elevation: 298.069 m (geodetic)
Basis: Level Survey from BM 1
Location: 6 m SE of data logger
Description: T-Post marked with pink flagging



Updated 24 March, 2011

Location and Purpose:

Established to monitor discharge on Iyininim Creek upstream of Kearl Lake. This station is intended to characterize runoff from the North / West slopes of Muskeg Mountain and provide input to Kearl Lake water balance calculations. A rain gauge was added to the station in 1998.

Variables Measured: Water Level, Discharge, Rainfall (since 1998)

Period of Record: May 1995 to October 1999; May 2001 to Present

Access: Helicopter

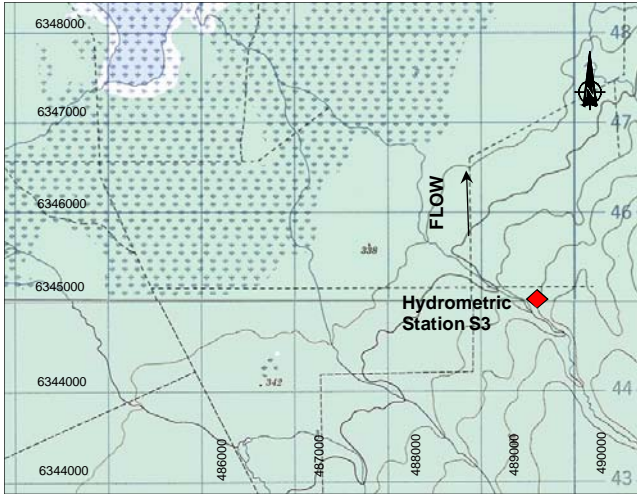
Drainage Area: 32.2 km²

Coordinates: 489491 E, 6345029 N (UTM NAD 83)

LSD: NE-14-95-8-W4

Lat/Long: 57° 15' 00 " N, 111° 10'

NTS Map: 74E06



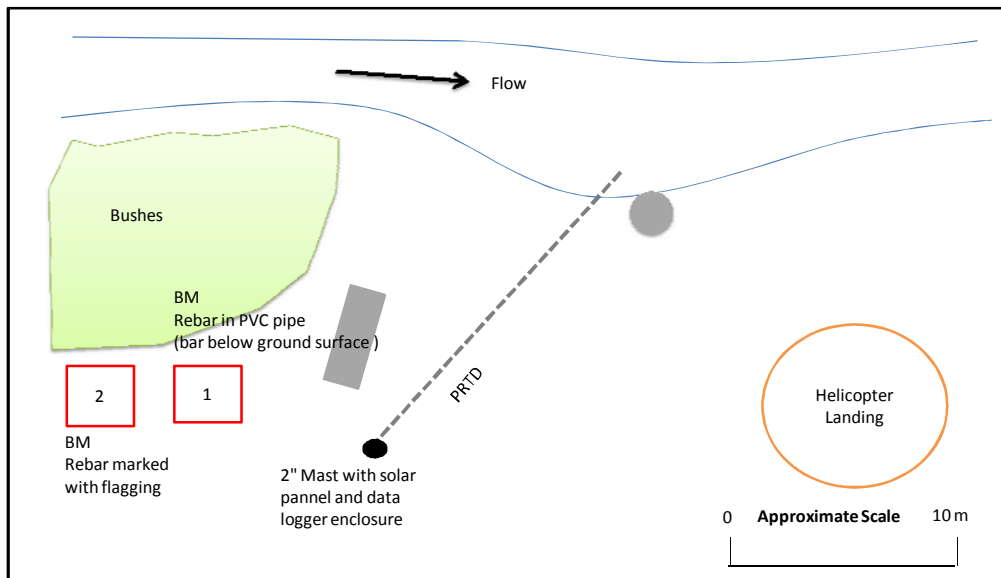
Map Grid Based on UTM NAD 27



Benchmarks:

BM: 1
Elevation: 360.610 m (geodetic)
Basis: unknown
Location: 5 m west of data logger, 1 m away from rain gauge
Description: T-bar in PVC pipe, sunk underground,

BM: 2
Elevation: 361.201 m (geodetic)
Basis: unknown
Location: 3 m west of PVC pipe for BM 1
Description: Re-bar marked with pink flagging



Revised 24 March, 2011

Location and Purpose:

Established originally in 1995 to monitor discharge on the Muskeg River above disturbed watersheds. Decommissioned in 1996, station was re-activated in 2003 in accordance with regulatory monitoring.

Variable Measured: Discharge and water temperature

Period of Record: Aug 1995 to Dec 1996; Feb 2003 to Present

Access: Helicopter

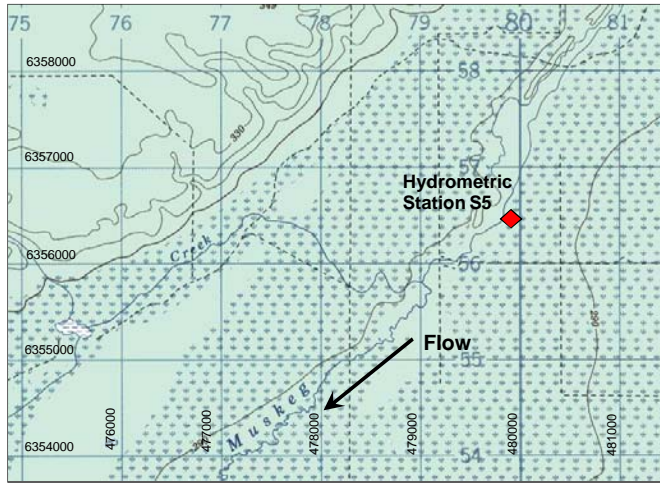
Drainage Area: 395 km²

Coordinates: 479760 E, 6356755 N (UTM NAD 83)

LSD: SE-26-96-9-W4

Lat/Long: 57°21'11" N, 111°20'10" W

NTS Map: 74E06

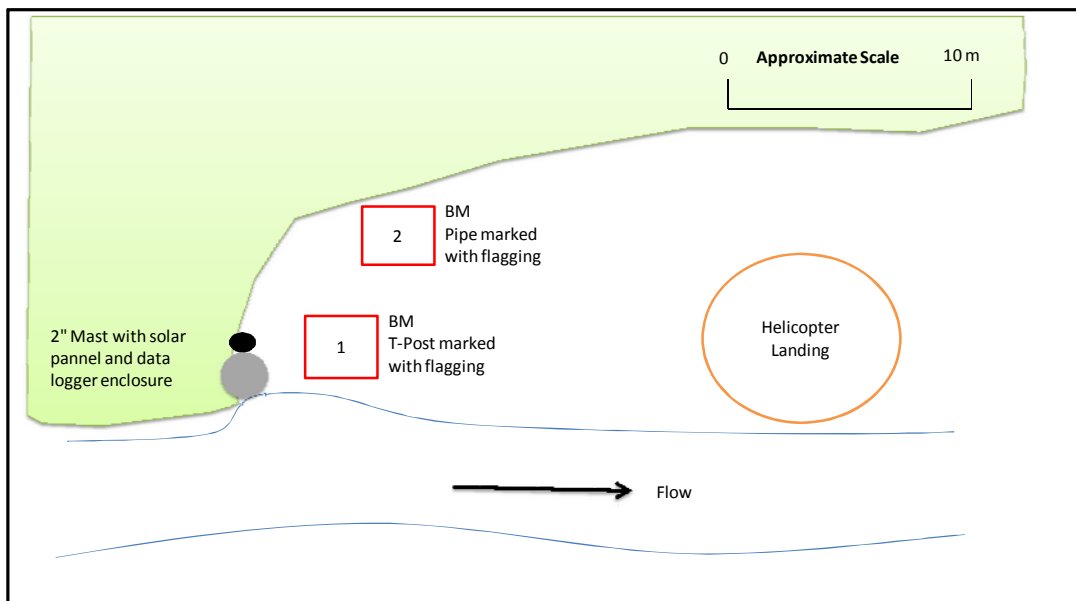


Map Grid Based on UTM NAD 27

Benchmarks

BM: 1
Elevation: 98.250 m (assumed)
Basis: assumed
Location: 3 metres downstream of stilling well
Description: T-post 0.4 m from surface

BM: 2
Elevation: 98.369 m (assumed)
Basis: assumed
Location: 6 metres south of stilling well under bushes
Description: pipe 0.4 m from surface marked with pink flag



Location and Purpose:

Established to monitor discharge on the Muskeg River upstream of disturbed watersheds. The station was relocated in 1998 to allow road access.

Variable Measured: Discharge, barometric pressure, and water temperature

Period of Record: Aug 1995 to Present

Access: 2WD road via the Syncrude Aurora North Mine

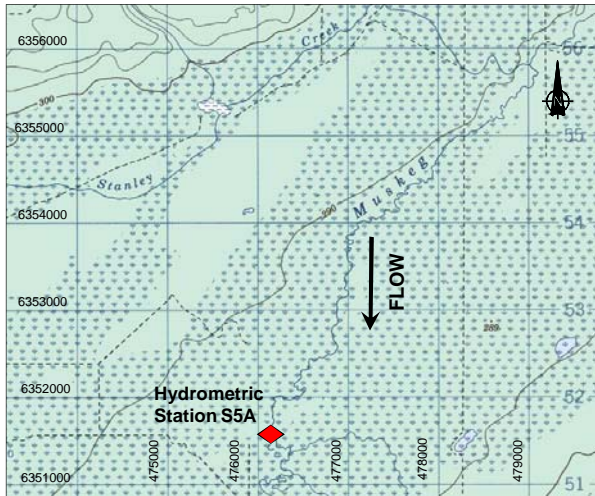
Drainage Area: 552 km² (was 390 km² until 1998)

Coordinates: 476100 E, 6351600 N (UTM NAD 83)

LSD: SE-9-96-9-W4

Lat/Long: 57°18'30" N, 111°23'43" W

NTS Map: 74E06



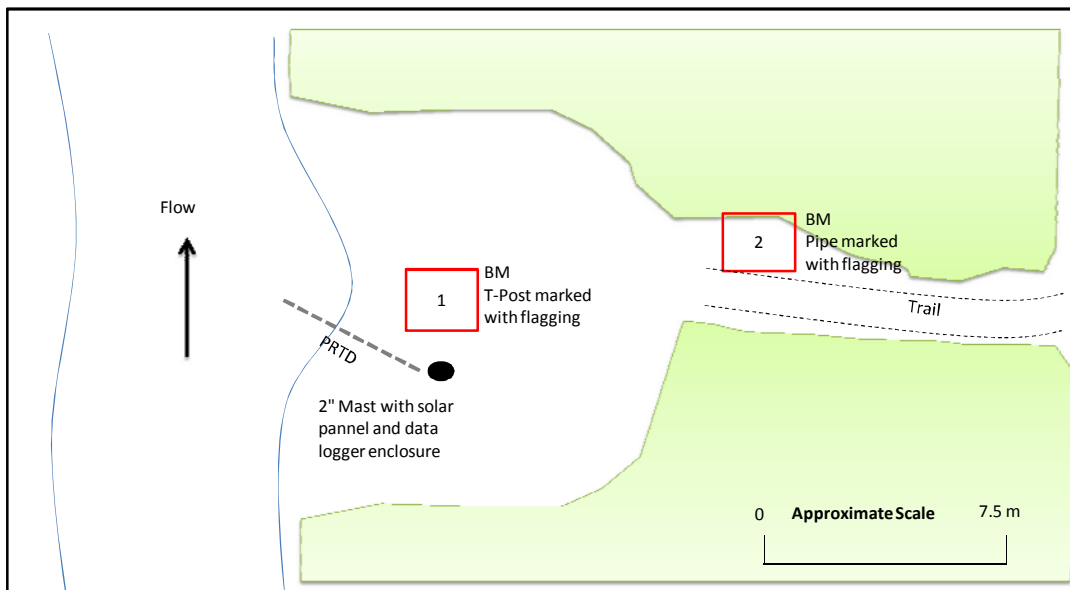
Map Grid Based on UTM NAD 27



Benchmarks:

BM: 1
Elevation: 282.662 m (geodetic)
Basis: unknown
Location: 6 m east of data logger
Description: T-Post near data logger marked with orange flagging

BM: 2
Elevation: 282.159 m (geodetic)
Basis: unknown
Location: 2 m past edge of willow to south of path
Description: pipe driven to 0.4 m of ground



Revised 24 March, 2011

Location and Purpose:

Established to monitor discharge on Mills Creek, downstream of the Mills Creek fen and upstream of Isadore's Lake. The original plywood and timber pile V-notch weir was replaced with steel piles and sheet steel weir in October 2005.

Variable Measured: Discharge

Period of Record: May 1997 to Present

Access: 2WD road access along Highway 63 (paved)

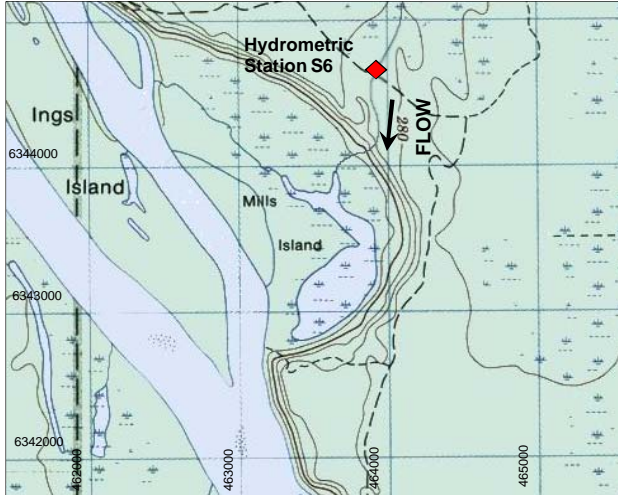
Drainage Area: 23.8 km²

Coordinates: 463829 E, 6344743 N(UTM NAD 83)

LSD: NW-17-95-10-W4

Lat/Long: 57°14'44" N, 111°35'57" W

NTS Map: 74E04



Map Grid Based on UTM NAD 27

Benchmarks: BM1

Elevation: 273.600 m (geodetic)

Basis:

Location: 7 m north west of data logger

Description: Rebar in white PVC pipe just uphill (in gully) from the data logger

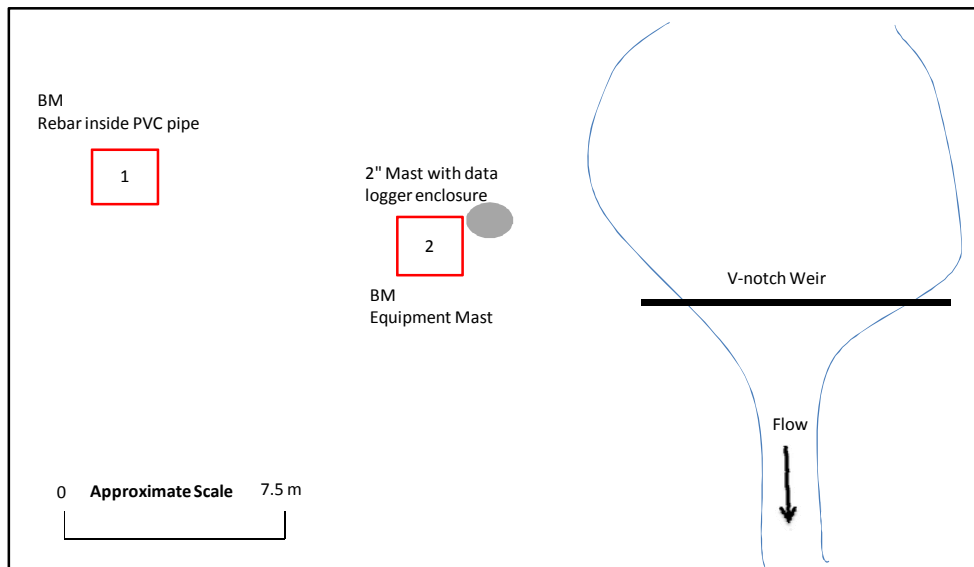
BM2

Elevation: 274.119 m

Basis:

Location: At the equipment mast itself

Description: top of equipment mast or steel pipe on which the logger box is mounted, beside the stilling well



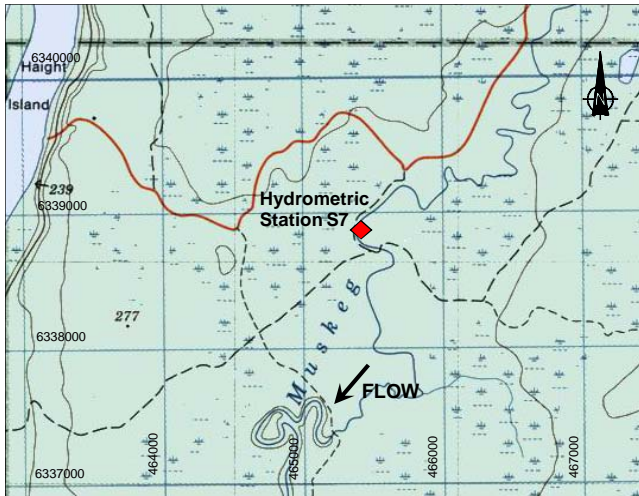
Revised 24 March, 2011

Location and Purpose:

Established to monitor winter discharge on the Muskeg River at the Environment Canada hydrometric station 07DA008. The Environment Canada hydrometric station has operated since 1975 but discharges are only published for the March-October period.

Variable Measured: Discharge and water temperature
Period of Record: October 1999 to Present
Access: 2WD access off of Canterra Road (gravel)
Drainage Area: 1460 km²
Coordinates: 465408 E, 6338944 N (UTM NAD 83)

LSD: SE-32-94-10-W4
Lat/Long: 57°11'32" N, 111°34'21" W
NTS Map: 74E04

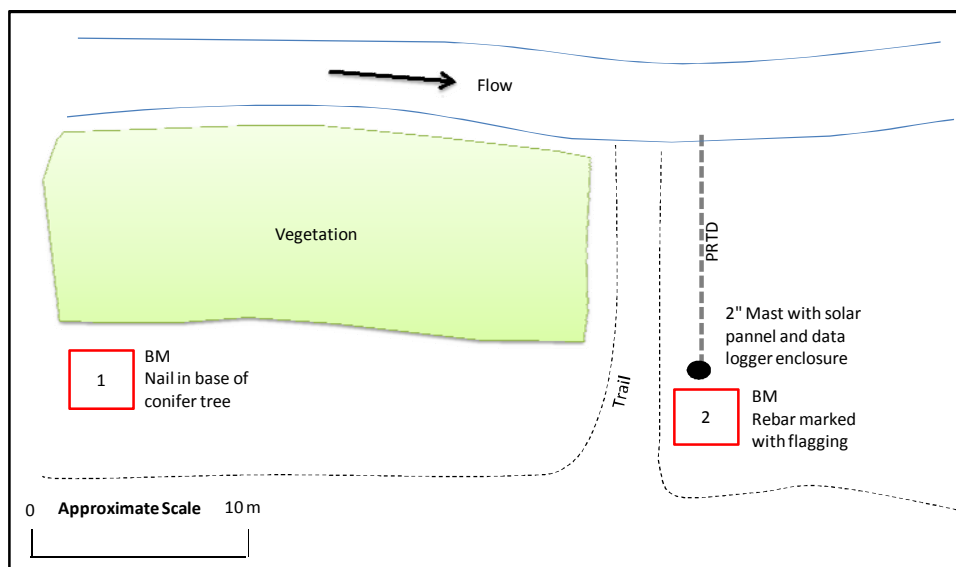


Map Grid Based on UTM NAD 27

Benchmarks:

Elevation: 275.565 m (geodetic)
Basis:
Location: 25 m west of data logger
Description: Nail in tree ~ 3 m north of road and ~ 25 m west of data logger box

Elevation: 275.406 m (to be checked)
Basis:
Location: ~2 m SW of data logger box
Description: Rebar in black PVC with orange cap



Location and Purpose:

Established to monitor discharge on the Kearl Lake Outlet channel to provide data for the Kearl Lake water balance and to assess the effects of development on the lake. The station was relocated approximately 50 m downstream in November 2005 to avoid the influence of beaver dams. The station was located just upstream of a road culvert crossing before the move and is currently of the crossing.

Variable Measured: Discharge

Period of Record: May 2000 - Oct. 2002; April 2006 - Present

Access: 4WD road access

Drainage Area: 73.6 km²

Coordinates: 483962 E, 6346990 N (UTM NAD 83)

LSD: SE-29-95-8-W4

Lat/Long: 57°15'56.38" N, 111°15'57.27"

NTS Map: 74E06



Map Grid Based on UTM NAD 27

Benchmarks:

BM : 1

Elevation: 329.796 m

Basis: Geodetic

Location: Birch tree 6 m North of data logger enclosure

Description: Nail in base of Birch tree

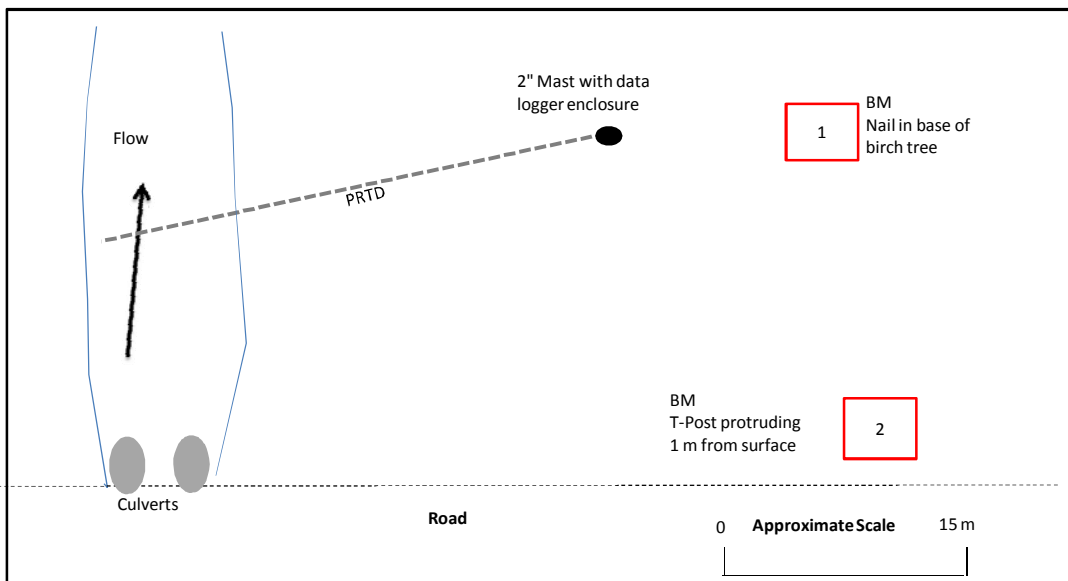
BM : 2

Elevation: 330.979 m

Basis: Geodetic

Location: 6 m West of road towards data logger enclosure

Description: T-Post protruding 0.75 m from ground

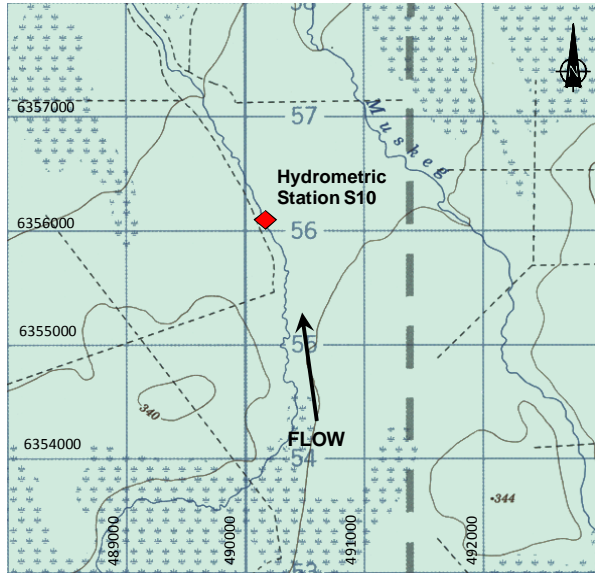


Location and Purpose:

Established to monitor discharge on the Wapasu Creek upstream of the Muskeg River. Extensive beaver activity since 2009 has flooded most of the area.

Variable Measured: Discharge and water temperature
Period of Record: March 1998 - Oct. 1999; May 2001 - Present
Access: 4WD road access on Canterra Rd.
Drainage Area: 90.7 km²
Coordinates: 490350 E, 6355500 N (UTM NAD 83)

LSD: NW-24-96-8-W4
Lat/Long: 57°20'35" N, 111°09'40" W
NTS Map: 74E06



Map Grid Based on UTM NAD 27

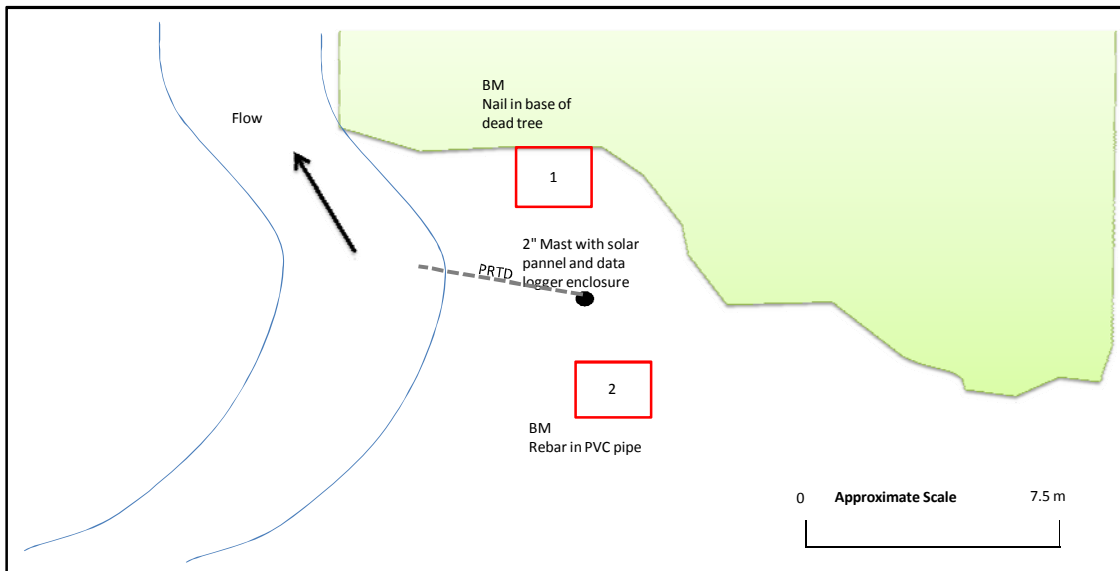
Benchmarks:

BM : 1

Elevation: 100.721
Basis: Geodetic
Location: Large tree 6 m North of data logger enclosure
Description: Nail in base of tree

BM : 2

Elevation: 100.657
Basis: Geodetic
Location: 4 m South of data logger enclosure
Description: Rebar in PVC Pipe



Revised 24 March, 2011

Location and Purpose:

Established to monitor discharge on Poplar Creek upstream of the Athabasca River. The station is at the site of Environment Canada hydrometric station (07DA007) that operated from 1973 to 1986.

Variable Measured: Discharge

Period of Record: May 1997 to Present

Access: 2WD access on Hwy 63 (paved)

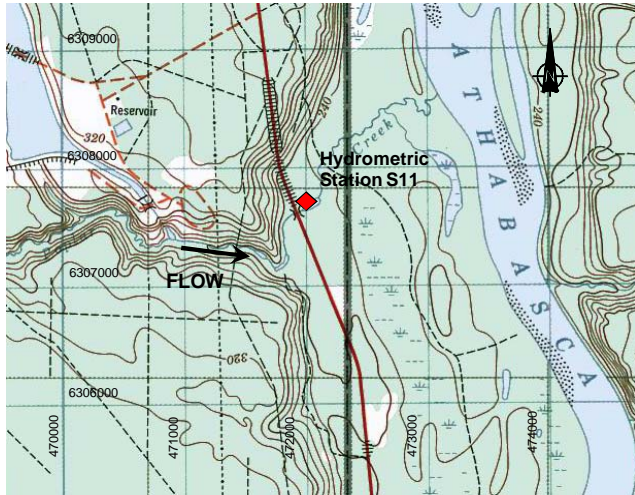
Drainage Area: 422 km²

Coordinates: 472000 E, 6307650 N (UTM NAD 83)

LSD: NE-24-91-19-W4

Lat/Long: 56°54'46" N, 111°27'44" W

NTS Map: 74D14



Map Grid Based UTM NAD 27



Benchmarks:

Elevation: 242.081 m (Geodetic)

Basis:

Location: On river right, 15 m upstream from the logger

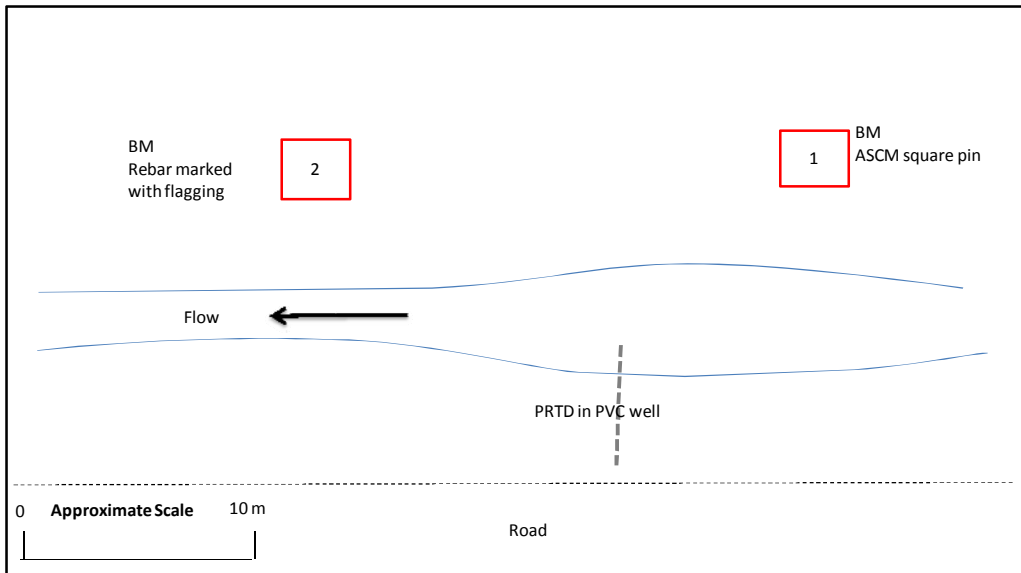
Description: ASCM marker, square pin next to orange stake

Elevation: 242.382 m (Geodetic)

Basis: Level Survey from BM1

Location: On river right 25 m downstream of ASCM Monument

Description: Rebar protruding 0.3m from ground surface



Location and Purpose:

Established in May 2000 to monitor discharge on Fort Creek upstream of the Athabasca River and was discontinued in 2002. The station was reactivated in 2006 to monitor streamflow downstream of the Fort Hills development. In August 2009 the station was moved 50 m downstream due to road construction.

Variable Measured: Discharge

Period of Record: May 2000 - Oct. 2002; April 2006 - Present

Access: 4WD road access

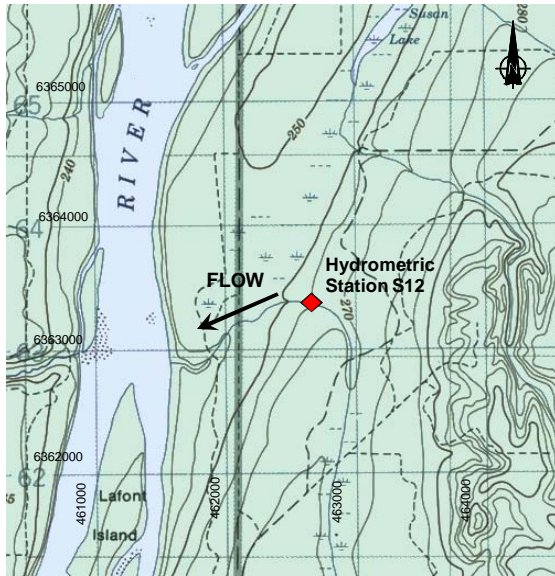
Drainage Area: 45.6 km²

Coordinates: 462600 E, 6363400 N (UTM NAD 83)

LSD: SW-18-97-10-W4

Lat/Long: 57°24'48" N, 111°37'18" W

NTS Map: 74E05



Map Grid Based on UTM NAD 27



Benchmarks:

BM : 1

Elevation: 100.000 m

Basis: assumed

Location: 5 m upstream of data logger on left bank

Description: T-Post protruding 0.3 m from ground

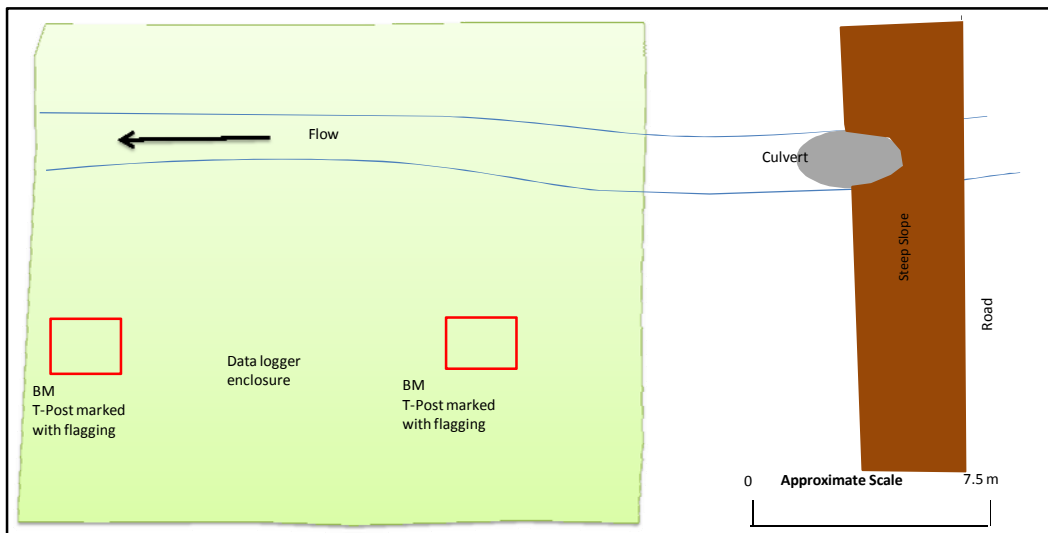
BM : 2

Elevation: 100.010 m

Basis: assumed

Location: 5 m downstream of data logger on left bank

Description: T-Post protruding 0.3 m from ground



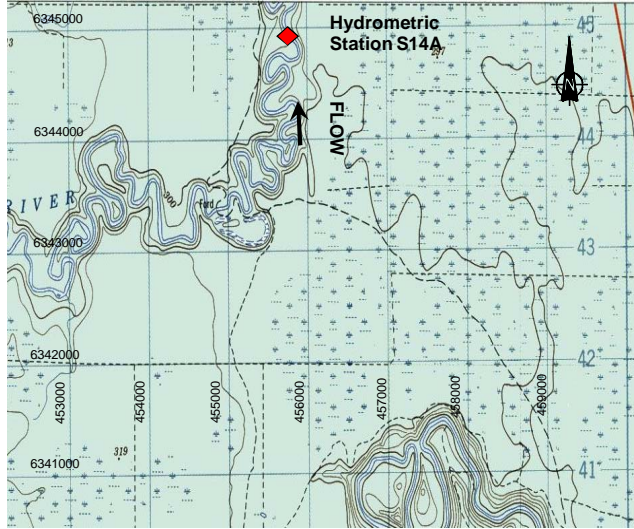
Revised 24 March, 2011

Location and Purpose

Established in October 2004 to monitor discharge on the Ells River. This station replaced station S14.

Variable Measured: Discharge and water temperature
Period of Record: October 2004 to present
Access: Truck
Drainage Area: 2430 km²
Coordinates: 455748 E, 6344947 N (UTM NAD 83)

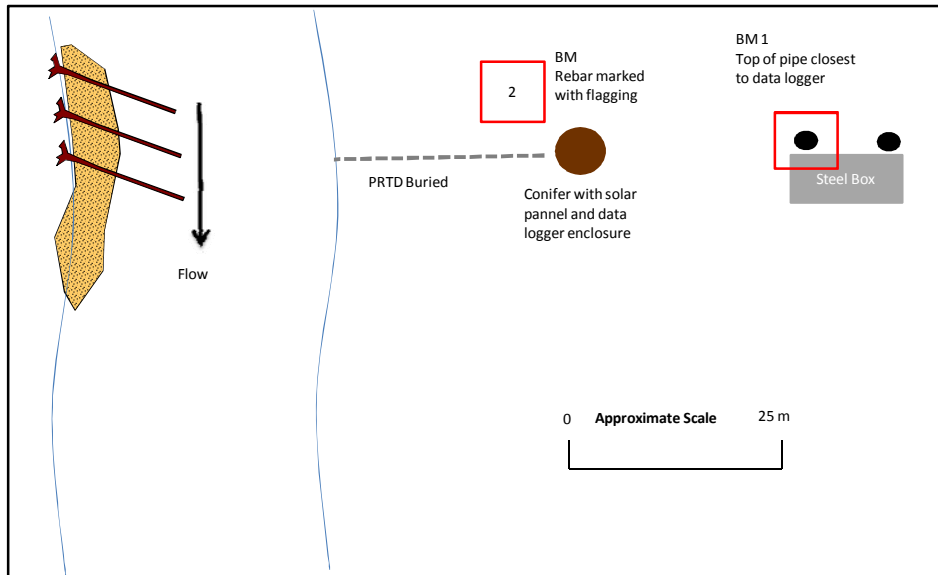
ATS: NW-16-95-11-W4
Lat/Long: 57°14'44" N, 111°43'56" W
NTS Map: 74E04



Benchmarks

BM: 1
Elevation: 101.980 m
Basis: Level survey from B.M. 2
Location: 8 m north east of data logger box
Description: Top of pipe closer to left bank that supports the bubbler

BM: 2
Elevation: 100.000 m (datum)
Basis: Assumed
Location: 3 m to the left of data logger
Description: Rebar in ground marked with orange flagging tape



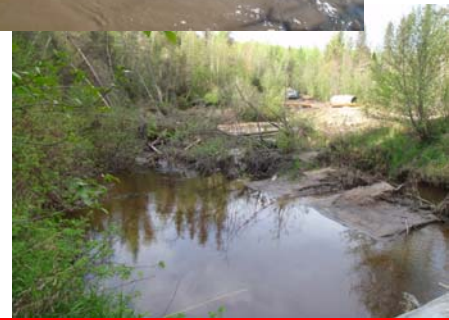
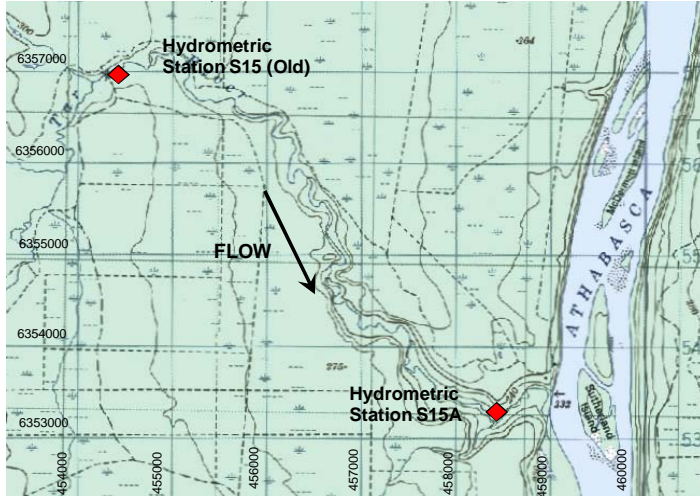
Revised 24 March, 2011

Location and Purpose

Established on May 1, 2007 to replace station S15. The purpose of the station is to monitor the discharge on the Tar River below development.

Variable Measured: Water Level, Discharge and Water temperature
Period of Record: May 1st 2007 to present
Access: Truck
Drainage Area: 324 km²
Coordinates: 458395 E, 6353391 N (UTM NAD 83)

ATS: 16-10-96-11-W4
Lat/Long: 57°19'17.57" N, 111°41'27.08" W
NTS Map: 74E05

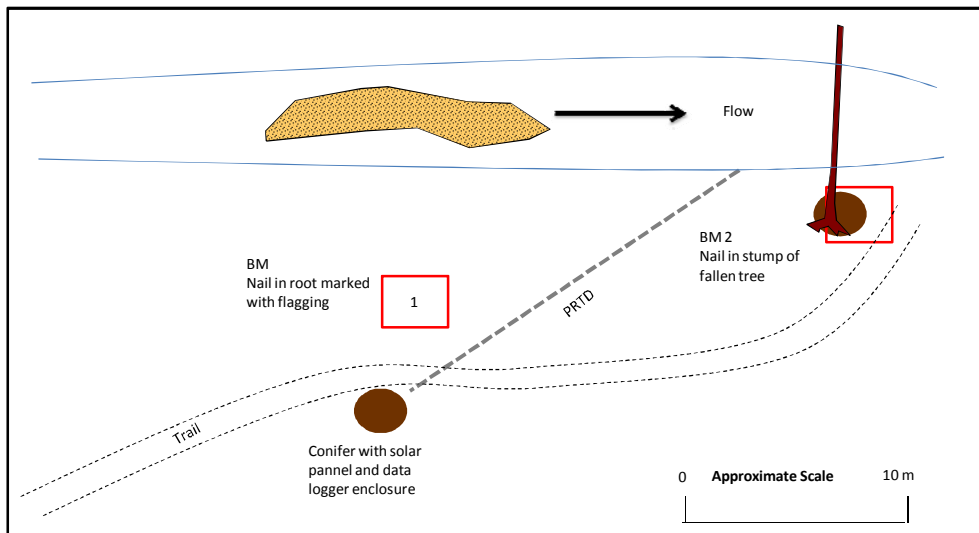


Map Grid Based on UTM NAD 27

Benchmarks

BM: 1
Elevation: 100.000 m (assumed)
Basis: Assumed
Location: At base of large log spanning river on RB side
Description: Nail in stump with purple flagging.

BM: 2
Elevation: 100.912 m (assumed)
Basis: Level survey from BM 1
Location: 1 metre DS from logger box on tree root
Description: Nail in tree root with purple flagging.



Revised 24 March, 2011

Location and Purpose:

Established to monitor discharge on Calumet River near the Mouth. Located approximately 2 km upstream of abandoned Environment Canada hydrometric station (07DA014) from 1975-1977. Station was operated as S16 from 2001 to 2004, CR-1 2005-2009 by CNRL Horizon, and as S16A 2010 - Present.

Variable Measured: Discharge

Period of Record: May 2001 to Present

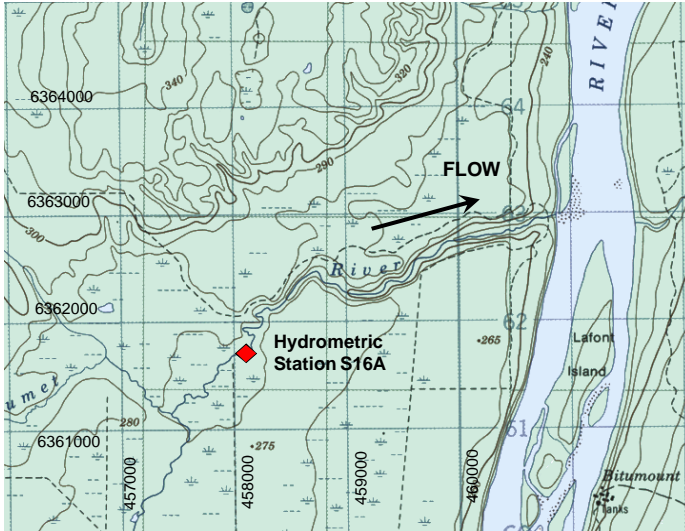
Access: Helicopter

Drainage Area: 183 km²

Coordinates: 458147 E, 6361695 N (UTM NAD 83)

Lat/Long: 57°23'46" N, 111°41'47" W

NTS Map: 74E / 5

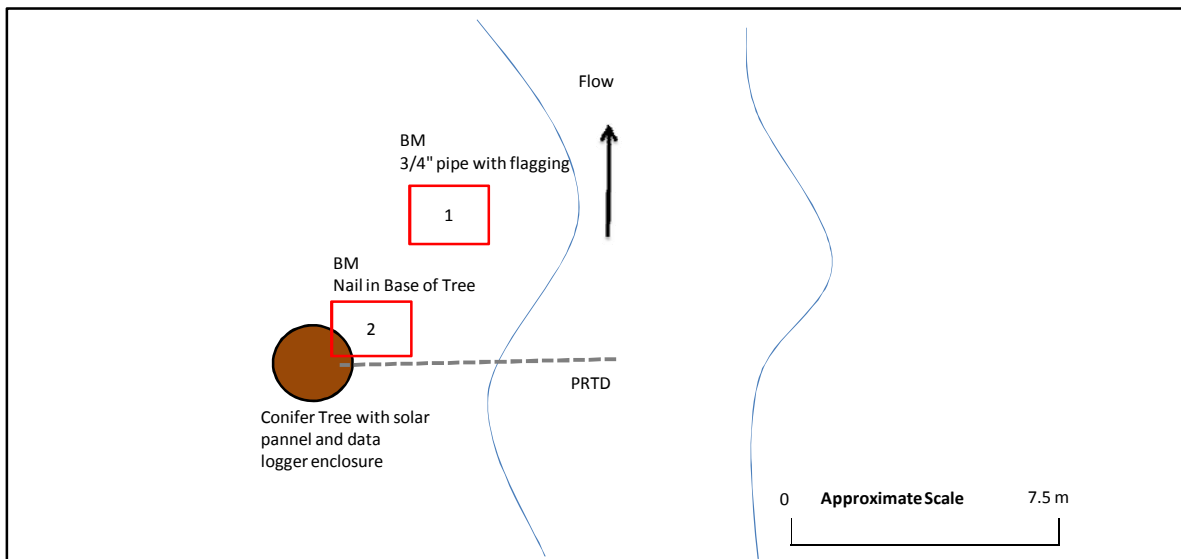


Map Grid Based on UTM NAD 27

Benchmarks

BM: 1
Elevation: 99.540 m
Basis: Level survey from BM2
Location: 5 m downstream of tree with logger
Description: 3/4" pipe protruding 0.4 m from ground with flagging

BM: 2
Elevation: 100.000 m
Basis: Assumed
Location: Nail in base of Tree with Logger
Description: Nail with flagging in base of tree



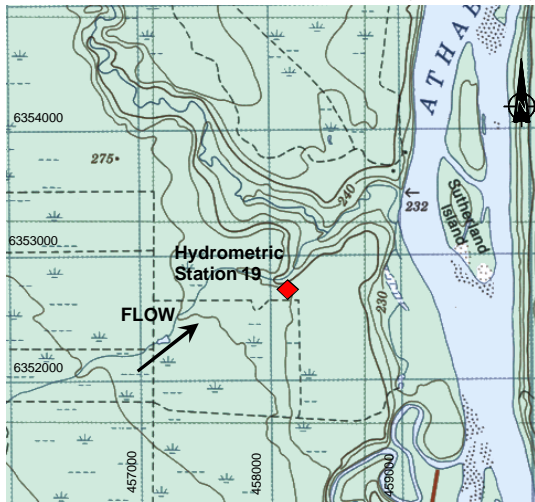
Revised 24 March, 2011

Location and Purpose:

Established to monitor discharge and rainfall data adjacent to CNRL mine

Variable Measured: Discharge and rainfall
Period of Record: June 2002 to Present
Access: Truck access via Fort McKay
Drainage Area: 1200 km²
Coordinates: 457315 E, 6352863 N (UTM NAD 83)

LSD: SE-4-97-12-14 SE/C 1114.2 6
Lat/Long: N57 18 59.5 W 111 42 30.5
NTS Map: 74E05



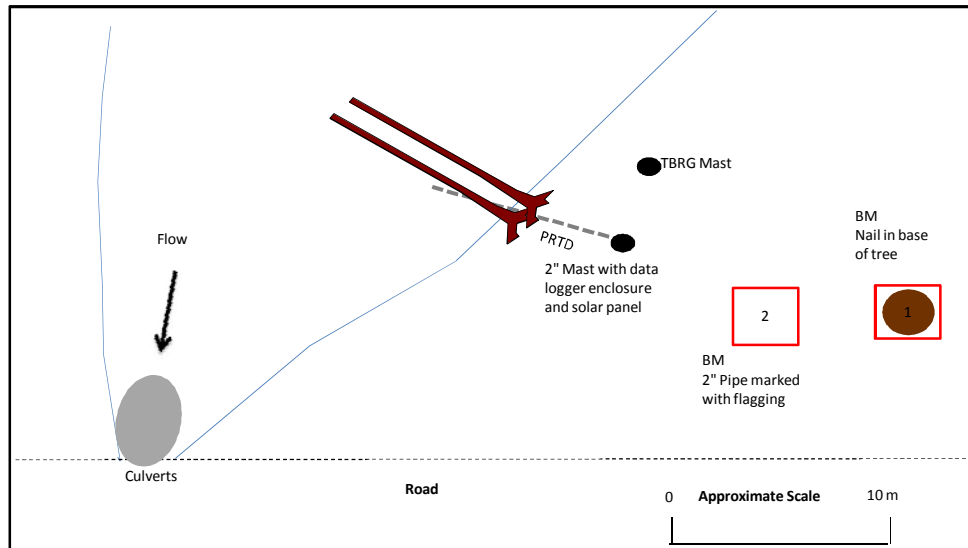
Map Grid Based on UTM NAD 27



Benchmarks:

Elevation: 101.478 m (assumed)
Basis:
Location: 6 m West of road
Description: Nail in the base of a tree marked with pink flagging

Elevation: 101.355 m (assumed)
Basis:
Location: 5 m East of BM 1
Description: 2 inch pipe protruding 0.3 m from ground

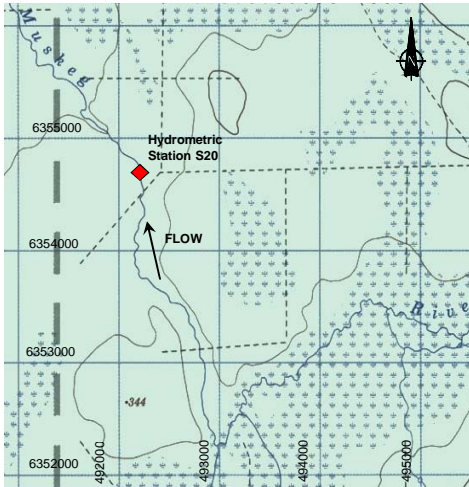


Revised 28 March, 2011

Location and Purpose

Established to monitor discharge on the upper reach of the Muskeg River

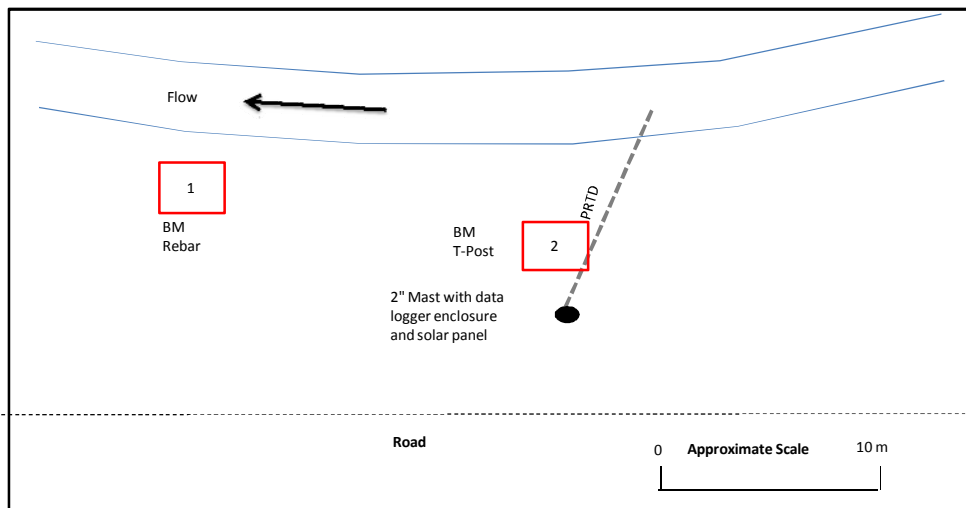
| | | | |
|---------------------------|--|------------------|---------------------------|
| Variable Measured: | Discharge | ATS: | SE-19-96-7-W4 |
| Period of Record: | May 2001 to present | Lat/Long: | 57°20'09" N, 111°07'48" W |
| Access: | Truck access on Canterra Rd. in Kearsy Project | NTS Map: | 74E06 |
| Drainage Area: | 157 km ² | | |
| Coordinates: | 49178 E, 6354787 N (UTM NAD 83) | | |



Map Grid Based on UTM NAD 27

Benchmarks

| | | | |
|---------------------|------------------------------------|---------------------|------------------------------|
| BM: | 1 | BM: | 2 |
| Elevation: | 327.811 m | Elevation: | 328.976 m |
| Basis: | Geodetic Survey | Basis: | Geodetic Survey |
| Location: | 15 m down river of station | Location: | 2 m downslope of data logger |
| Description: | Rebar protruding 0.5 m from ground | Description: | T-post |



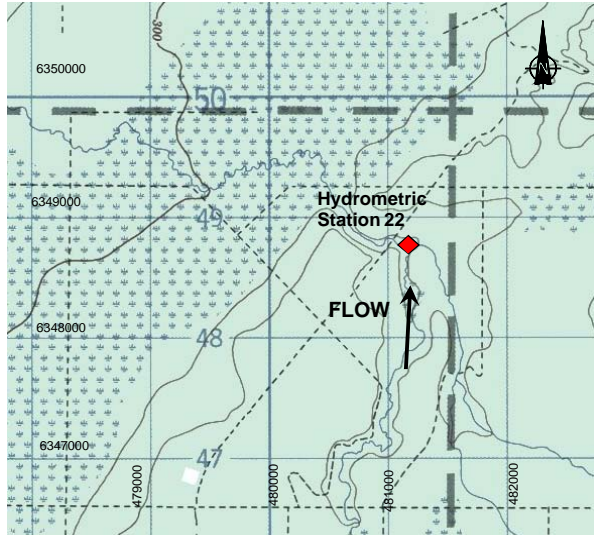
Revised 20 January, 2011

Location and Purpose:

Established to monitor discharge on Muskeg Creek upstream of the Muskeg River.

Variables Measured: Water Level and Discharge
Period of Record: May 2001 to Present
Access: 2WD road access on Canterra Road
Drainage Area: 369 km²
Coordinates: 481036 E, 6348856 N (UTM NAD 83)

LSD: SE-36-95-9-W4
Lat/Long: 57°17'3.5" N, 111°18'56.5" W
NTS Map: 74E06



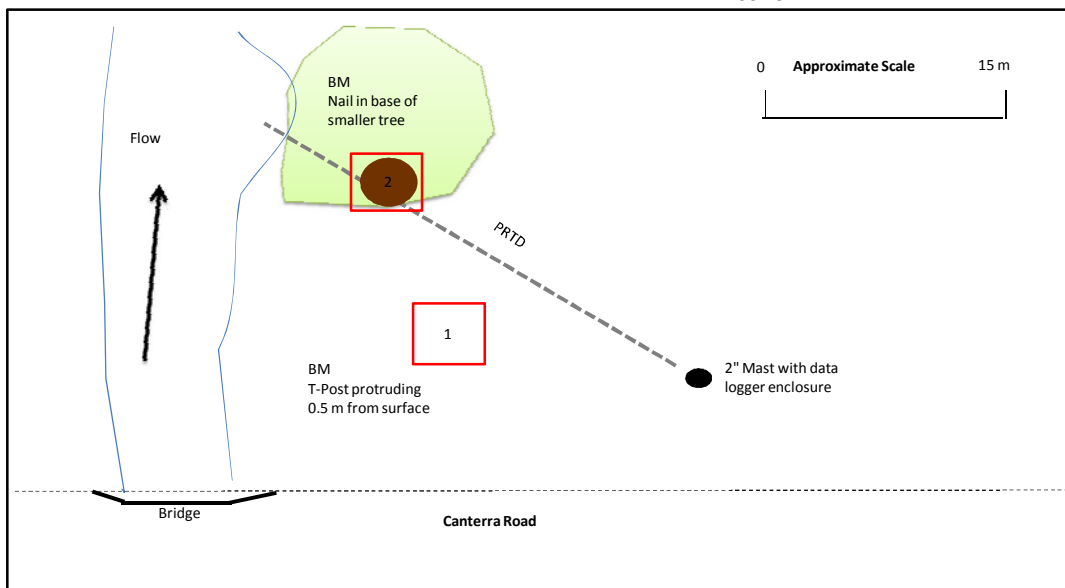
Map Grid Based on UTM NAD 27



Benchmarks:

BM 1:
Elevation: 306.476 m (geodetic)
Basis: unknown (shown on 2002 fact sheet)
Location: 1.5 m SW of data logger
Description: Metal T-bar on right bank near equipment mast

BM 2:
Elevation: 305.225 (geodetic)
Basis: Level survey from BM 1
Location: ~2 m NW of the datalogger box
Description: Nail in tree, on right bank, marked with orange flagging.



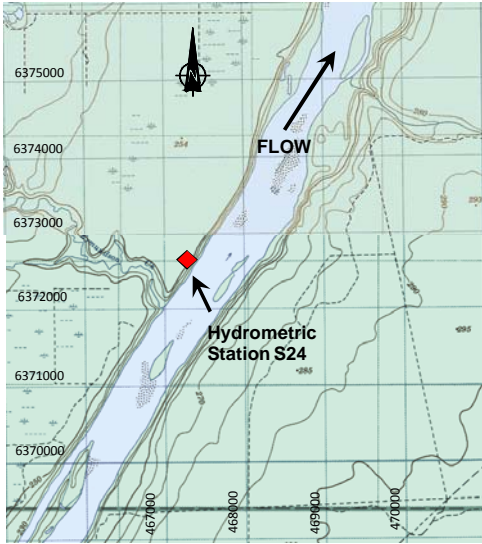
Revised 24 March, 2011

Location and Purpose:

Established to monitor discharge on the Athabasca River downstream of existing and proposed mine developments.

Variable Measured: Discharge and water temperature
Period of Record: May 2001 to Present
Access: Boat (summer) or snowmobile (winter)
Drainage Area: 146000 km²
Station: 466313 E, 6372760 N (UTM NAD 83)
Manual Discharge: 467570 E, 6375010 N (UTM NAD 83)

LSD: NE-9-98-10-W4
Lat/Long: 57°29'46" N, 111°33'43" W
NTS Map: 74E05

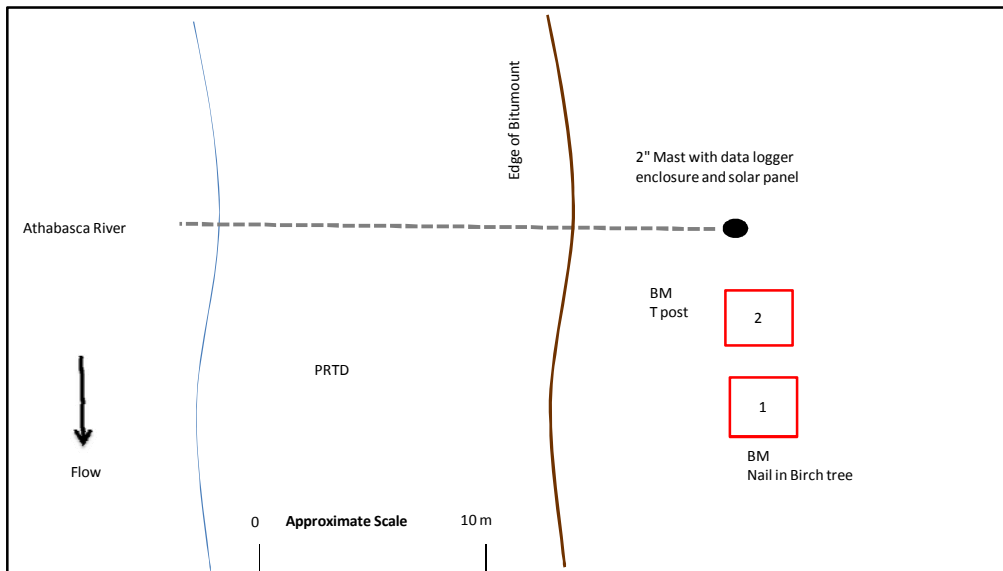


Map Grid Based on UTM NAD 27

Benchmarks:

Elevation: 231.347 m (geodetic)
Basis:
Location: 2 m North of data logger box
Description: T-bar, rusty, about 1 m tall

Elevation: 231.096 (geodetic)
Basis:
Location: 4 m North of the datalogger box
Description: Nail in birch tree at base of tree, tree and nail marked with yellow flags.



Revised 28 March, 2011

Location and Purpose:

Established in May 2002 to monitor discharge on Susan Lake Outlet upstream of the Athabasca River. The station was discontinued after the 2002 season, and was reactivated in May 2006 to monitor flows downstream of the Fort Hills development.

Variable Measured: Discharge

Period of Record: Aug. - Oct. 2002; May 2006 - present

Access: Boat (summer) or snowmobile (winter)

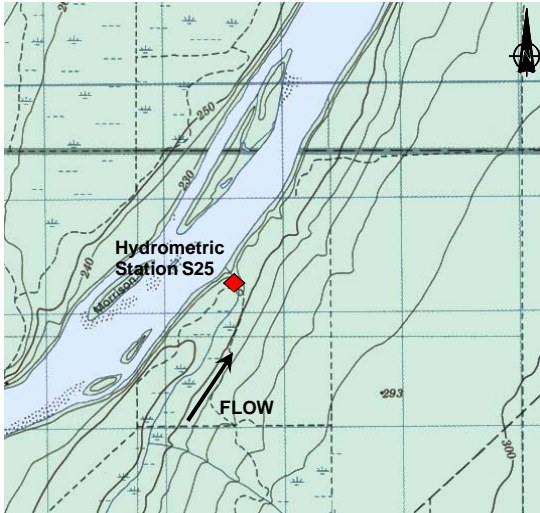
Drainage Area: 22.9 km² (including Susan Lake)

Coordinates: 464491 E, 6368503 N (UTM NAD 83)

LSD: SW-32-97-10-W4

Lat/Long: 57°27'28" N, 111°35'30" W

NTS Map: 74E05



Map Based on UTM NAD 27

Benchmarks:

Elevation: 100.000 m

Basis: Assumed

Location: 2 m north from the logger

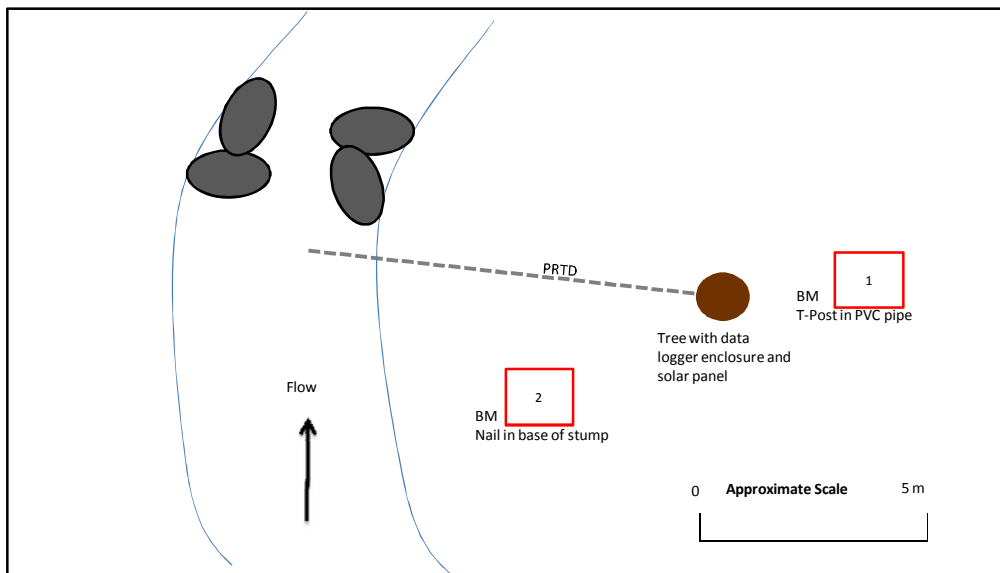
Description: Tpost in PVC

Elevation: 99.977 m

Basis: Level Survey from BM 1

Location: Spike in stump west of logger

Description: Spike in tree with orange flagging



Revised 24 March, 2011

Location and Purpose:

Established to monitor winter discharge on the Mackay River at the Water Survey of Canada gauging station 07DB001. The WSC station has operated since 1972 but discharges are currently only published for the March-October period.

Variable Measured: Discharge

Period of Record: November 2001 to Present

Access: Truck or Helicopter

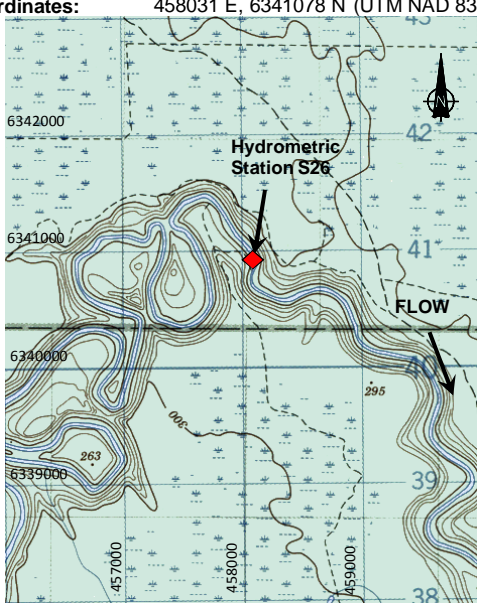
Drainage Area: 5570 km²

Coordinates: 458031 E, 6341078 N (UTM NAD 83)

LSD: SE-3-95-11-W4

Lat/Long: 57°12'39" N, 111°41'41" W

NTS Map: 74E04



Map Grid Based on UTM NAD 27

Benchmarks:

Elevation: 100.000 m (assumed)

Basis:

Location: 5 m upstream from WSC shack

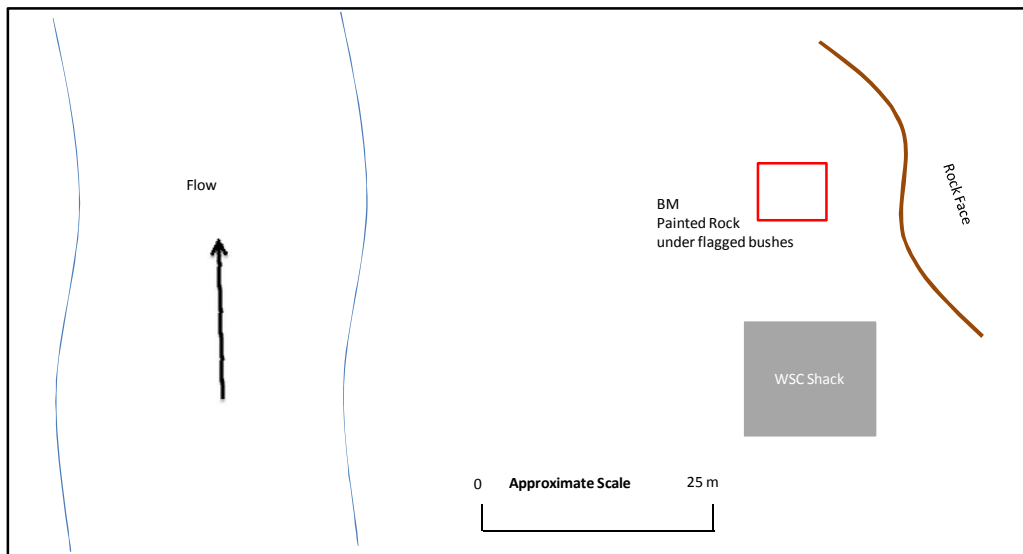
Description: Rock with yellow paint in circular shape. Branch/bush above flagged with orange flagging.

Elevation:

Basis:

Location:

Description:



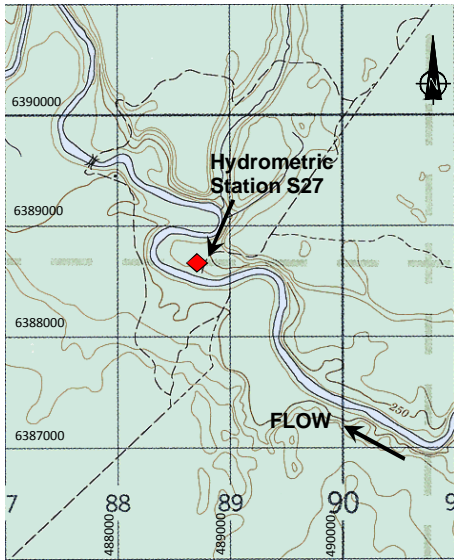
Revised 24 March, 2011

Location and Purpose:

Established to monitor winter discharge on the Firebag River just upstream of Environment Canada hydrometric station 07DC001. The Environment Canada hydrometric station has operated since 1971 but discharges are currently only published for the March-October period.

Variable Measured: Discharge
Period of Record: November 2001 to Present
Access: Helicopter or Winter Road
Drainage Area: 5990 km²
Coordinates: 488685 E, 6388706 N (UTM NAD 83)

LSD: SE-35-99-8-W4
Lat/Long: 57°38'26" N, 111°11'22" W
NTS Map: 74E / 11



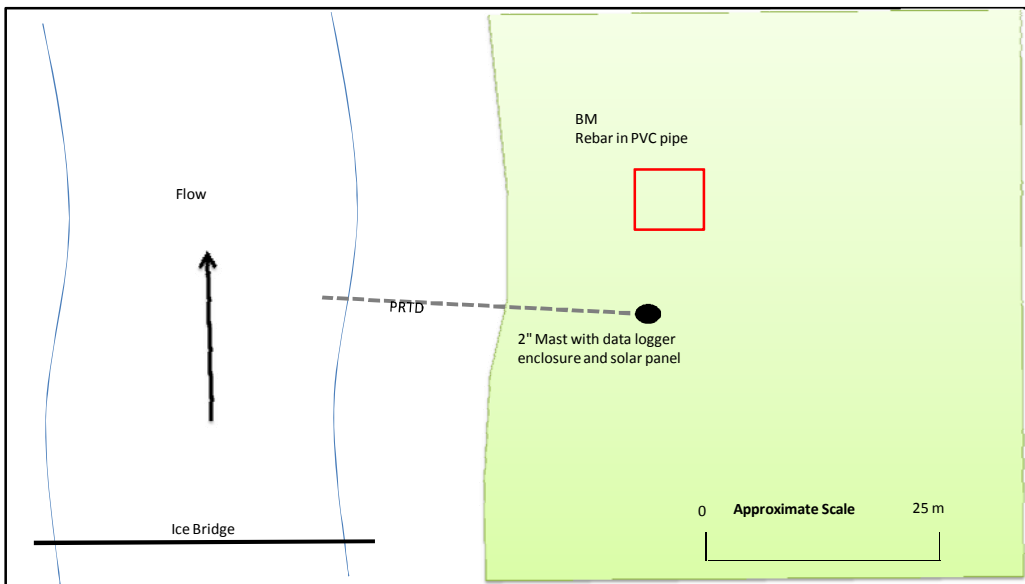
Map Grid Based on UTM NAD 27



Benchmarks:

Elevation: 100.000 m (assumed)
Basis:
Location: 1 m West of logger box
Description: Rebar in PVC Located on right bank immediately west of the logger housing.

Elevation:
Basis:
Location:
Description:



Revised 24 March, 2011

Location and Purpose:

Established to monitor discharge on Christina River during the winter period to supllment the WSC data record from March - October.

Variable Measured: Discharge
Period of Record: April 2004 to Present
Access: Truck
Drainage Area: 4862.9 km²
Coordinates: 508183 E, 6187926 N (UTM NAD 83)

ATS: 16-9-79-6-W4
Lat/Long: 110° 52' 9.64" W 55° 50' 12.55" N
NTS Map: 73M10



Map Grid Based on UTM NAD 27

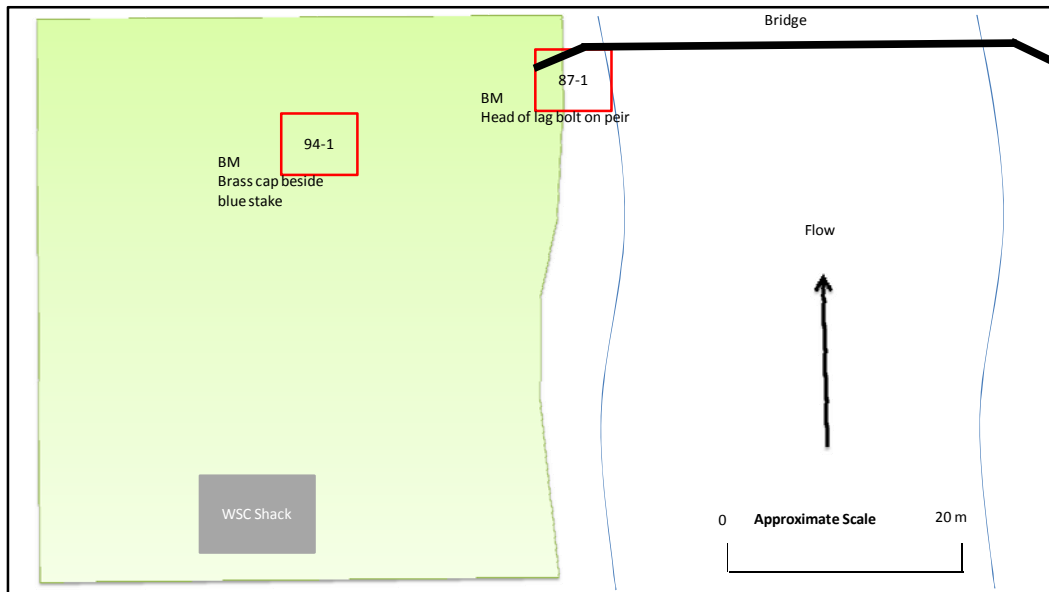


BM 87-1

Elevation: 6.963 m
Basis:
Location: On bridge pier, left bank and upstream side
Description: Lag bolt marked with orange paint "BM"

BM 94-1

Elevation: 9.838 m
Basis:
Location: 20 m north of shelter
Description: Brass cap beside blue stake



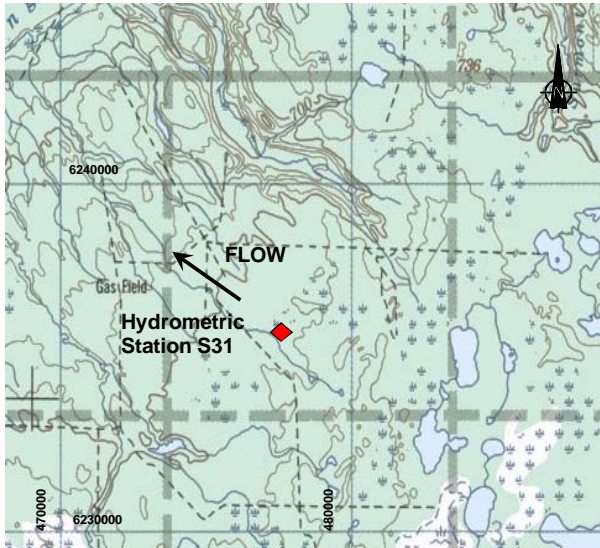
Revised 24 March, 2011

Location and Purpose:

Established to monitor discharge on Hangingsstone Creek.

Variable Measured: Discharge and Rainfall
Period of Record: April 2004 to Present
Access: Truck
Drainage Area:
Coordinates: 476969 E, 6236095 N (UTM NAD 83)

ATS: 12-9-84-9-W4
Lat/Long: 111° 22' 18.72" W, 56° 16' 8.84" N
NTS Map: 74D06



Map Grid Based on UTM NAD 27

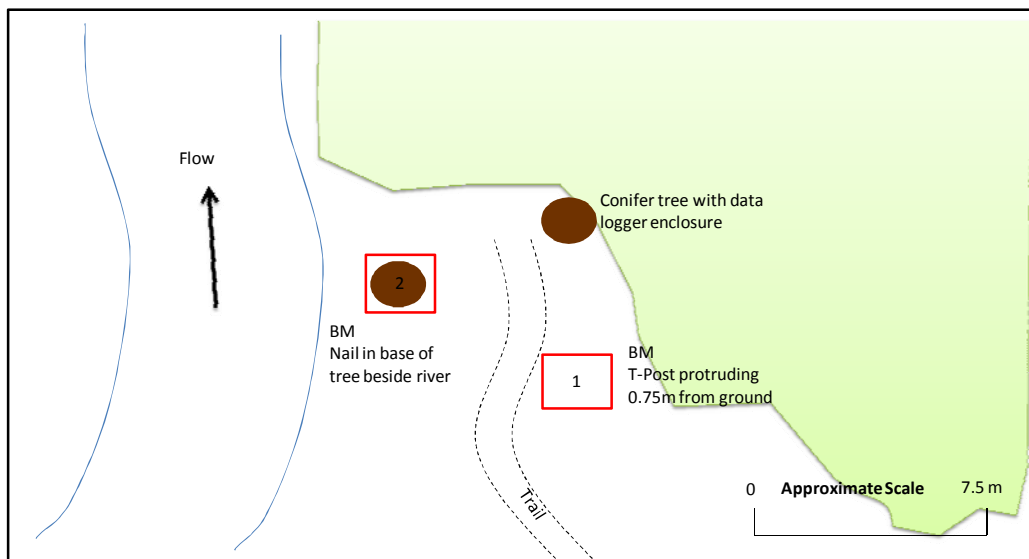


BM1

Elevation: 100.128 m
Basis:
Location: 7 m upstream of data logger enclosure
Description: T-Post on Right Bank

BM2

Elevation: 99.418 m
Basis: Level survey from BM1
Location: 3 m West of data logger enclosure
Description: Nail in large tree on right bank
3 m West of data logger enclosure



Location and Purpose:

Established to monitor discharge on Surmont Creek..

Variable Measured: Discharge

Period of Record: April 2004 to Present

Access: Truck

Drainage Area:

Coordinates: 490252 E, 6254511 N (UTM NAD 83)

LSD: 14-2-86-8-W4

Lat/Long: 111° 9' 29.08" W, 56° 26' 6.14" N

NTS Map: 74D06



Map Grid Based on UTM NAD 27



BM1

Elevation: 97.942 m (assumed)

Basis:

Location: 15 m upstream of logger box

Description: Nail in wooden pile supporting abutment on downstream left side of bridge

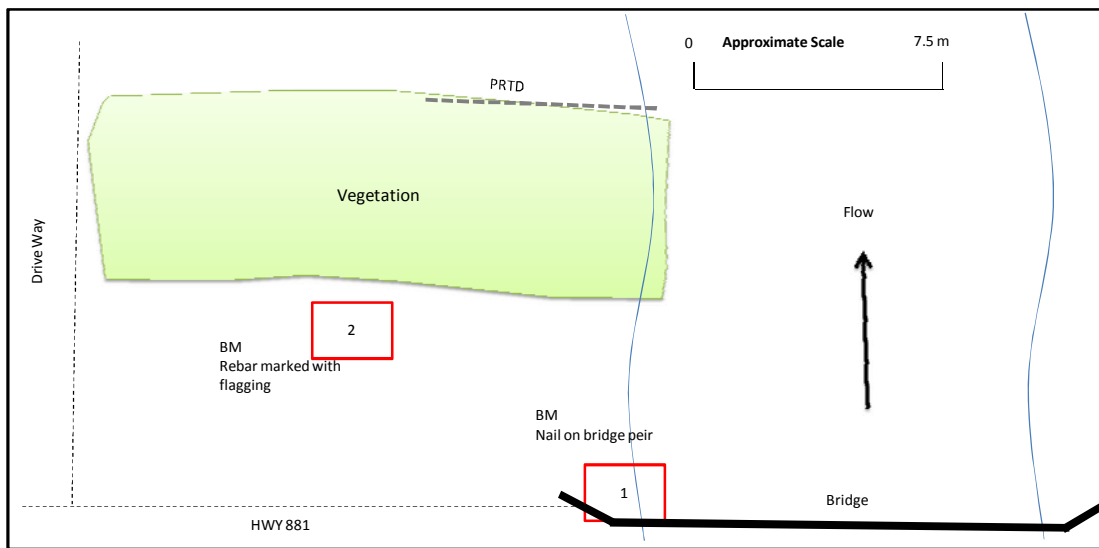
BM2

Elevation: 98.981 (assumed)

Basis:

Location: 3 m upstream of logger box

Description: Iron rod roughly 1.5 feet out of the ground on LB.



Revised 24 March, 2011

Location and Purpose:

Established in April 2003 to monitor discharge on the Muskeg River at the Aurora - Albian lease boundary in compliance with monitoring requirements. LOC # 040365

Variable Measured: Discharge and water temperature

Period of Record: April 2003 to Present

Access: 2WD road via the Syncrude Aurora North mine site

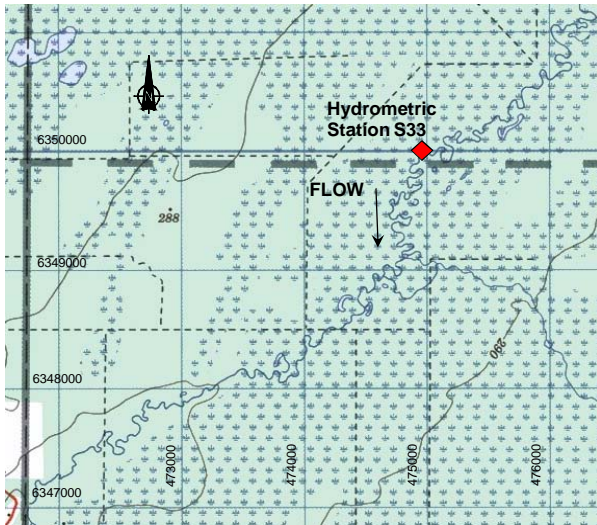
Drainage Area: 728 km²

Coordinates: 474876 E, 6350204 N (UTM NAD 83)

LSD: SE-5-96-9-W4

Lat/Long: 57°17'39" N, 111°25'1" W

NTS Map: 74E06



Map Grid Based on UTM NAD 27



Benchmarks:

Elevation: 281.74 m (Geodetic)

Basis:

Location: On the right bank in the upstream brush

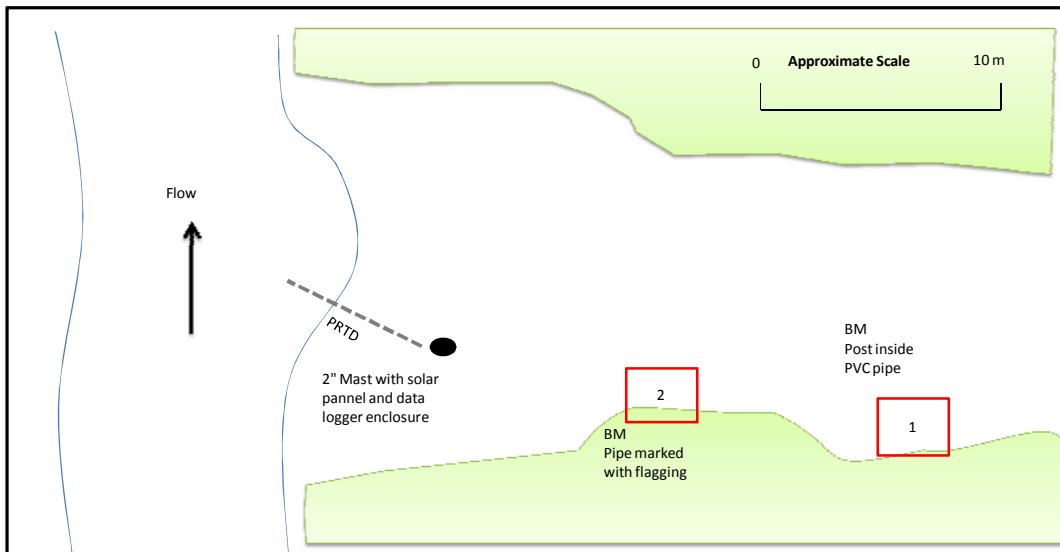
Description: Rebar sticking up approximately 0.3 m from ground with PVC cover

Elevation: 281.74 m (Geodetic)

Basis:

Location: Half way between BM1 and data logger mast

Description: Pipe sticking up approximately 0.3 m from ground marked with flagging



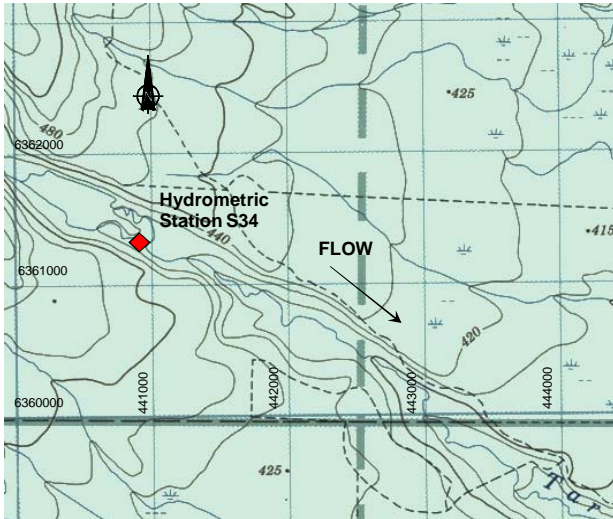
Revised 24 March, 2011

Location and Purpose:

Established in April 2005 to monitor discharge on the Tar River above a proposed lake to be developed by CNRL.

Variable Measured: Discharge, and water temperature
Period of Record: April 2005 to Present
Access: Helicopter
Drainage Area: 136 km²
Coordinates: 440712 E, 6361615 N (UTM NAD 83)

LSD: NW-2-97-13-W4
Lat/Long: 57°23'38.84" N, 111°59'10.17"
NTS Map: 74E05

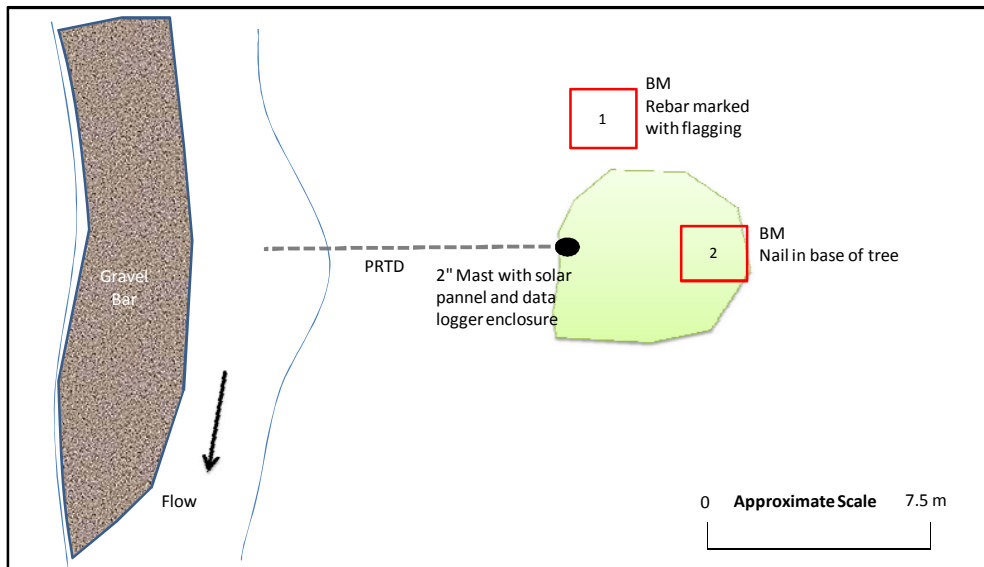


Map Grid Based on UTM NAD 27

Benchmarks:

Elevation: 98.630 m (Assumed)
Basis:
Location: 2 m north of data logger
Description: Rebar on Left Bank, about 0.3 m above the ground

Elevation: 98.656 m (Assumed)
Basis:
Location: Bottom of tree below the logger box, facing north
Description: Nail in base of logger tree

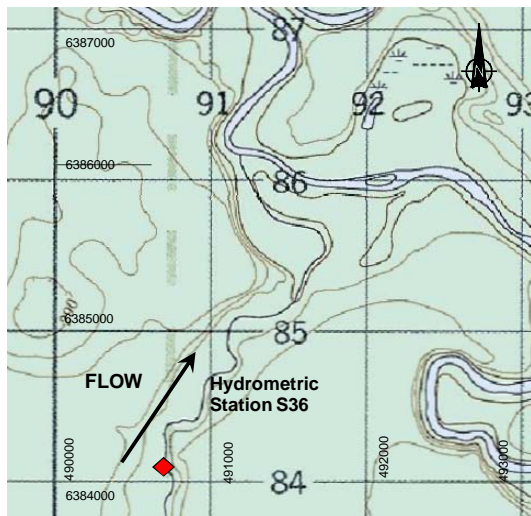


Location and Purpose:

Established in May 2008 to assist in monitoring runoff values for the entire catchment surrounding McClelland Lake. This is an open water station.

Variables Measured: Water Level and Discharge
Period of Record: May 2008 - Present
Access: Helicopter
Drainage Area:
Coordinates: 490626 E, 6384064 N (UTM NAD 83)

LSD: SE-13-99-8-W4
Lat/Long: 111° 09' 24.62" W , 57° 35' 55.95" N

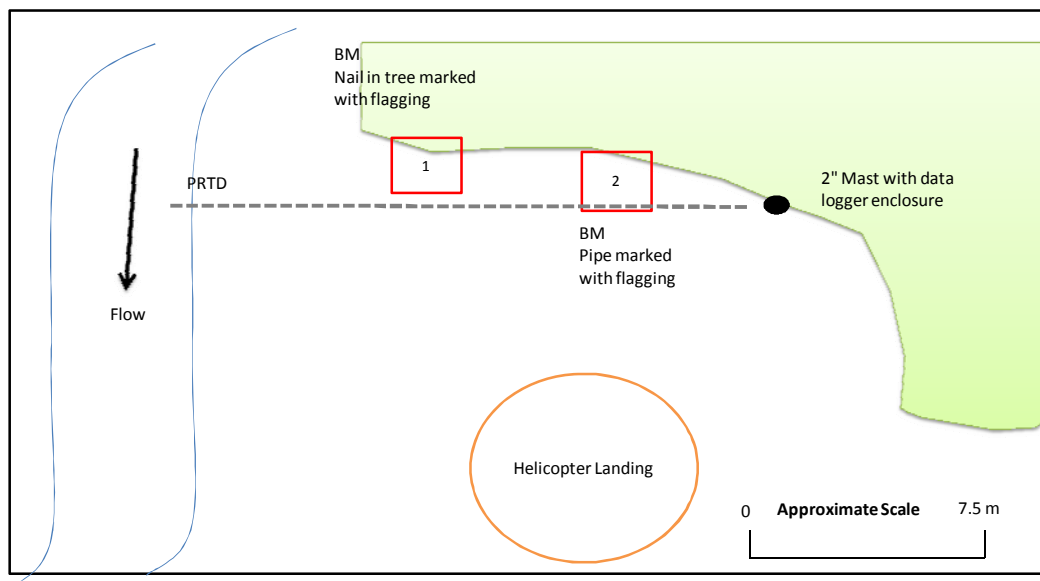


Map Grid Based on UTM NAD 27

Benchmarks:

BM 1:
Elevation: 100.000 m (assumed)
Basis:
Location: Left bank immediately upstream of helicopter landing site
Description: nail in tree 3 meters away from the river

BM 2:
Elevation: 99.900 m (to be checked)
Basis:
Location: 3 metres East of BM1
Description: Pipe protruding 0.4 m from gro



Location and Purpose

Established to monitor discharge on an upland reference location in the Muskeg River catchment.

Variable Measured: Discharge

Period of Record: September 2007 to Present

Access: Helicopter

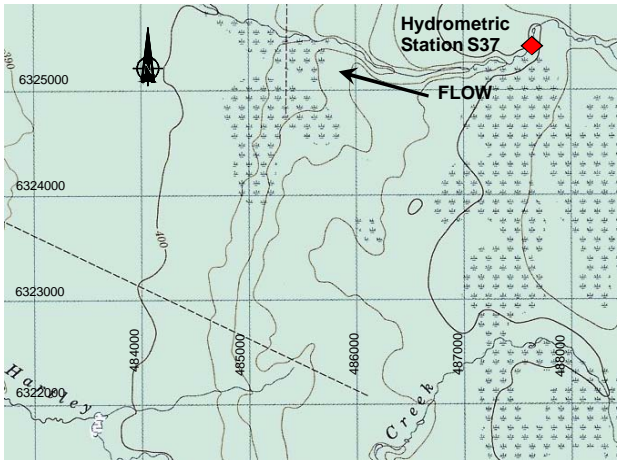
Drainage Area: 33.0 km²

Coordinates: 487840 E, 6325424 N (UTM NAD 83)

ATS: SE-15-8-93-W4

Lat/Long: 57°4'19.4' N, 111°12'2.0' W

NTS Map: 74E03



Map Grid Based on UTM NAD 27

Benchmarks

BM 1

Elevation: 100.000 m (assumed)

Basis: Assumed

Location: Furthest upstream LB post

Description: Nail in post

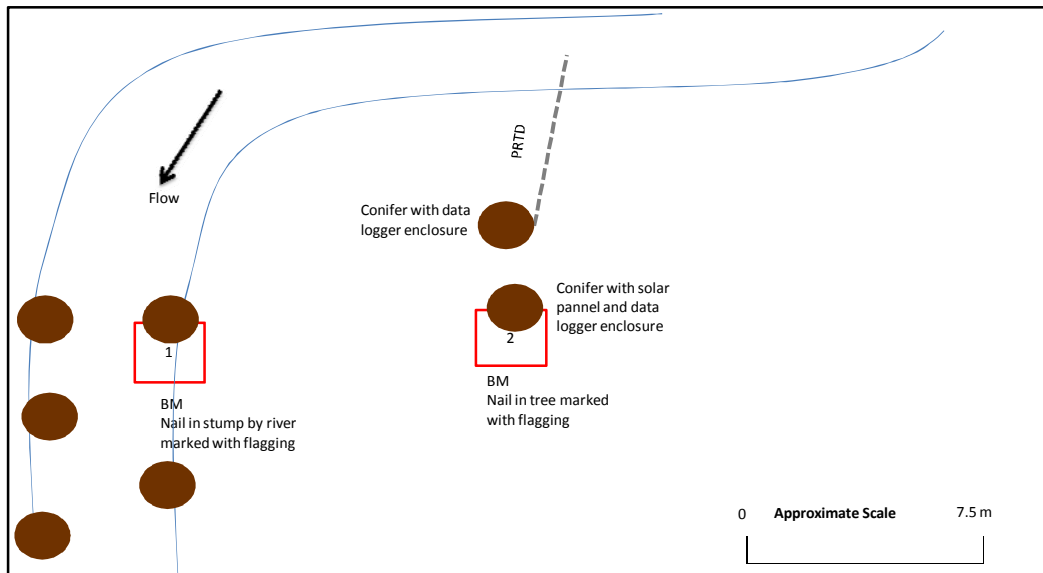
BM 2

Elevation: 101.365 m (assumed)

Basis: Level survey from BM1

Location: Tree with solar panel attached

Description: Nail in tree



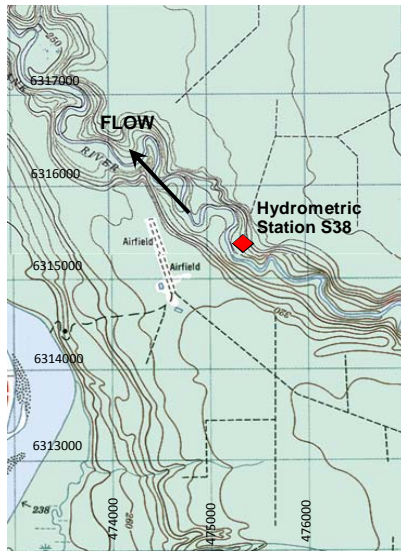
Revised 24 March, 2011

Location and Purpose:

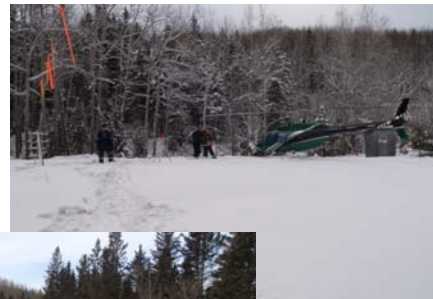
Established by Water Survey of Canada in 1972 to monitor discharge on Steepbank River 7 km upstream of the confluence of the Athabasca River. Station was moved 700 m upstream to present location on October 3, 2006. WSC continues to operate station, RAMP collects winter flow measurements.

Variable Measured: Discharge
Period of Record: 1972 - present
Access: Helicopter access
Drainage Area: 1320 km²
Coordinates: 12 V 475293 E, 6317385 N (UTM)

Active: Winter only
LSD:
Lat/Long: 56°59'58" N, 111°24'24" W
NTS Map:



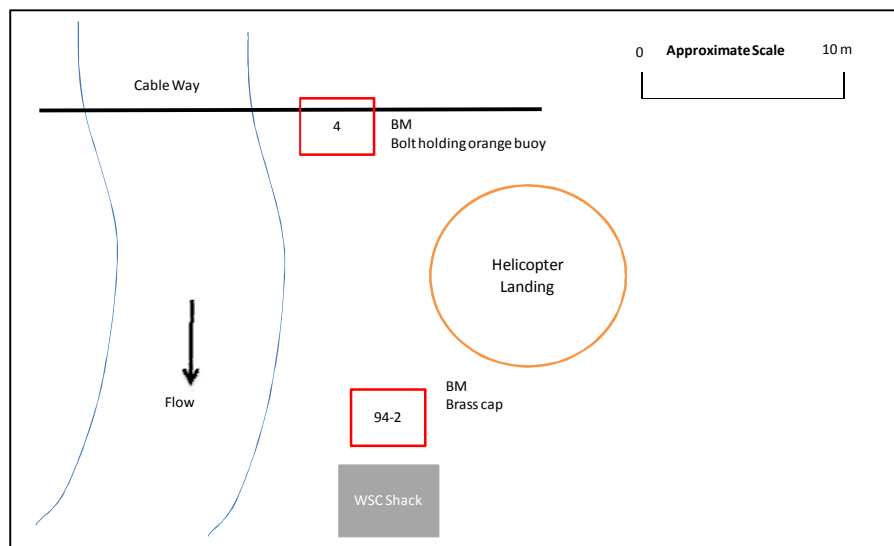
Map Grid Based on UTM NAD 27



Benchmarks

BM: BM 06-3
Elevation: 98.672 m (ref from BM 06-1)
Basis: unknown
Location: 6 m, 50° from gauge.
Description: WSC brass cap on 3 m rod.

BM: 4
Elevation: 98.464 m
Basis: Level survey from BM-06-3
Location: Left bank, below cable.
Description: Bolt holding Buoy



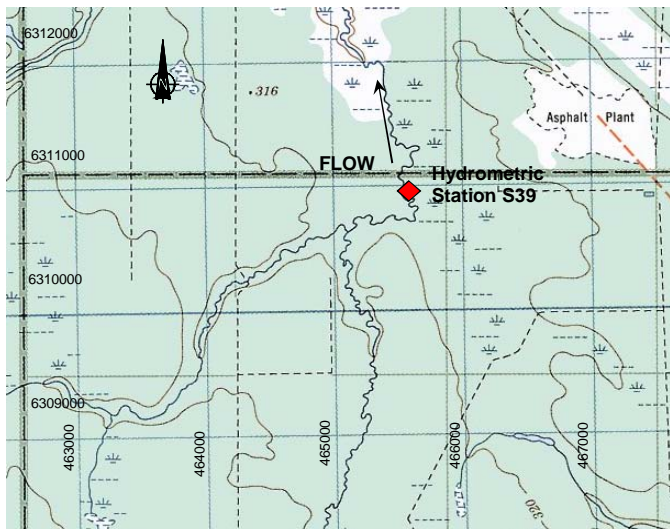
Revised: 24 March3, 2011

Location and Purpose:

Established to monitor winter discharge on Beaver River above Syncrude at WSC station 07DA018. The Environment Canada hydrometric station has operated since 1975, but discharges are currently only published for the March-October period.

Variable Measured: Discharge
Period of Record: January 2008 to Present
Access: Truck
Drainage Area: 165 km²
Coordinates: 465542 E, 6311435 N (UTM NAD 83)

ATS: 9-32-91-10-W4
Lat/Long: 111° 33' 59" W, 56° 56' 42" N
NTS Map: 74D13



Map Grid Based on UTM NAD 27

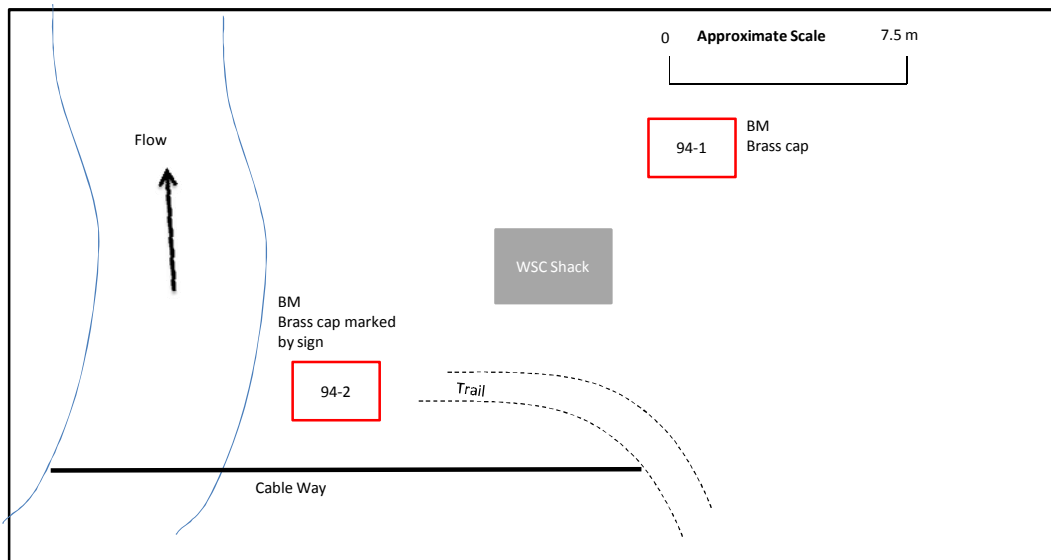


BM94-2

Elevation: 29.696 m (assumed)
Bases:
Location: 6.9 m S of SW corner of gauge.
Description: Brass cap on top of rebar driven to refusal

BM94-1

Elevation: 30.469 m (assumed)
Bases:
Location: 4.4 m from NW corner of gauge.
Description: Brass cap on top of rebar driven to refusal



Revised 24 March, 2011

Location and Purpose:

Established to monitor discharge on Mackay River at the Petro-Canada Bridge.

Variable Measured: Discharge, rainfall, and water temperature

Period of Record: January 2008 to Present

Access: Truck

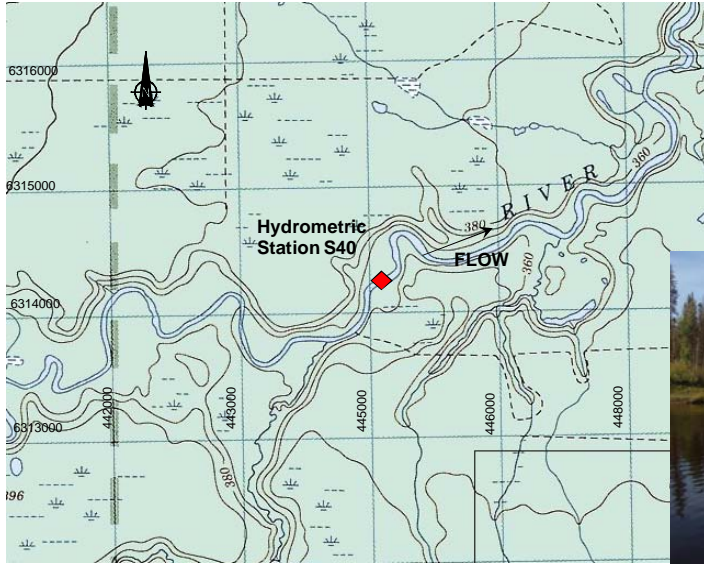
Drainage Area:

Coordinates: 445023 E, 6314256 N (UTM NAD 83)

ATS: 12-8-92-12-W4

Lat/Long: 111° 54' 15.33" W, 56° 58' 7.01" N

NTS Map: 74D13



Map Grid Based on UTM NAD 27

BM1

Elevation: 100.000 (Assumed)

Bases:

Location: On right bank behind data logger enclosure and vegetation

Description: 3/4" pipe marked with flagging

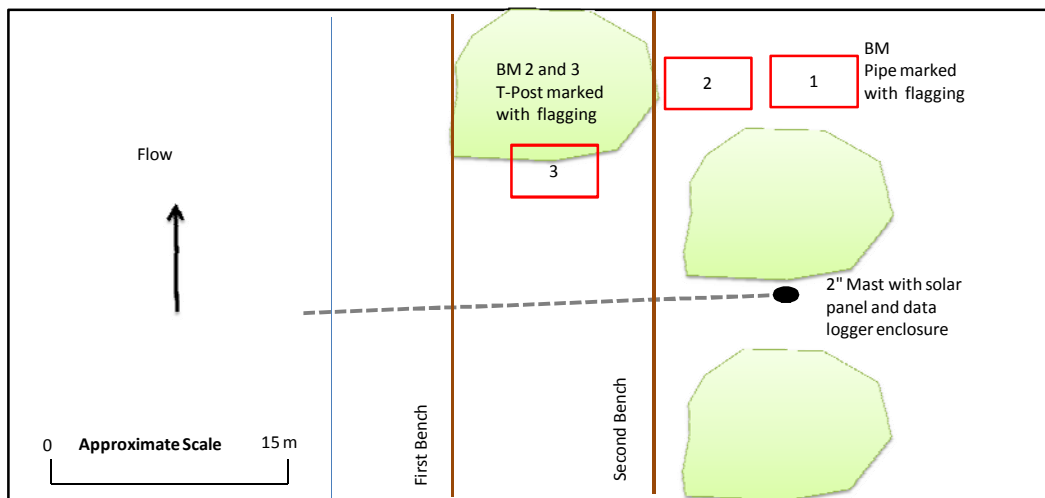
BM2

Elevation: 100.135 m (Assumed)

Bases:

Location: On right bank, on second bench to East of BM 1.

Description: T-Post sticking approximately 0.25 m out of the ground



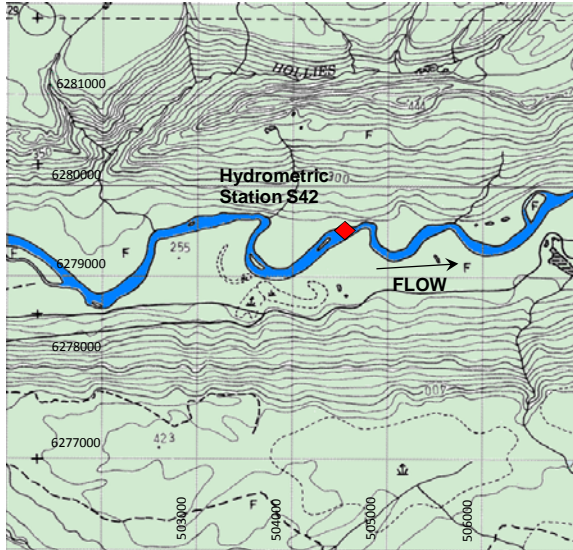
Revised 24 March, 2011

Location and Purpose:

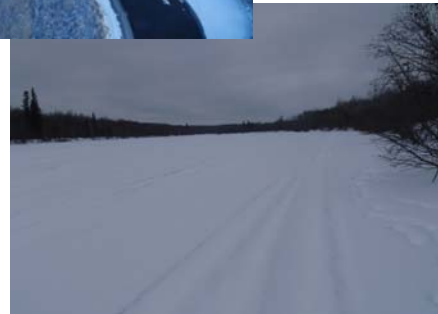
Water Survey of Canada monitoring site which is monitored by RAMP in the winter period to provide year round monitoring. This site is monitored to estimate values on the Christina River using a mass balance approach this site and the Clearwater River at Draper site.

Variable Measured: Discharge
Period of Record: September 1975 RAMP Winter 2008/2009
Access: Helicopter
Drainage Area: 17,016.6 km²
Coordinates: 12 V 504427 E, 6279666 N

Active: Year around
LSD: NW29 6 88W4
Lat/Long: 56°39'40" N, 110°55'40" W
NTS Map: 74D10



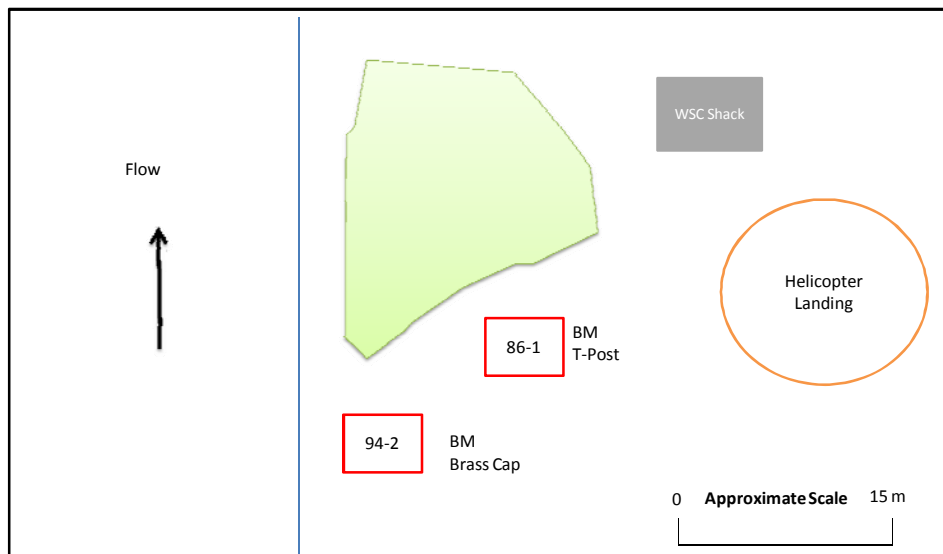
Map Grid Based on UTM NAD 27



Benchmarks

BM: 94-2
Elevation: 25.299 (assumed)
Basis: unknown
Location: Under BM Sign on Right Bank
Description: Brass cap on Right Bank

BM: 86-1
Elevation: 26.735 (assumed)
Basis: unknown
Location: Under BM Sign on Right Bank
Description: T-Post



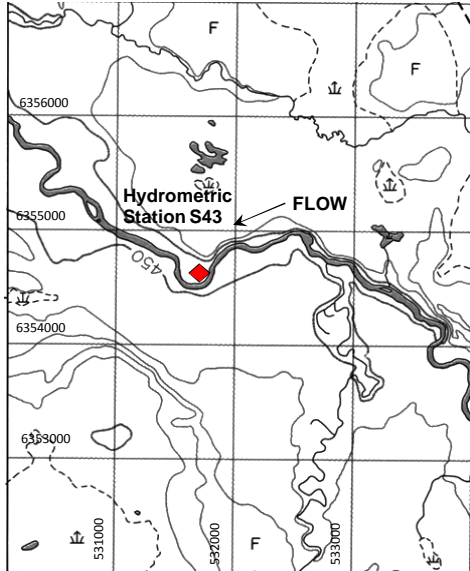
Revised 24 March, 2011

Location and Purpose:

Established in May 2009 to monitor discharge on the Firebag River upstream of oil sands operations.

Variable Measured: Discharge, rainfall, and water temperature
Period of Record: May 2009 to Present
Access: Helicopter
Drainage Area: ??? km²
Coordinates: 12 V 531528 E, 6354782 N

Active: Year around
LSD:
Lat/Long: 57°20'05" N, 110°28'35" W
NTS Map: 74E08

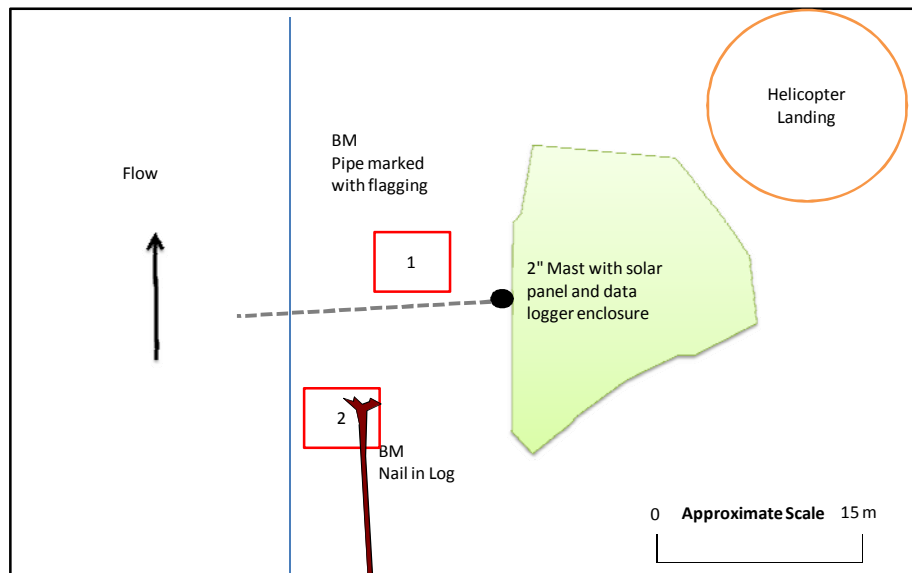


Map Grid Based on UTM NAD 27

Benchmarks

BM 1
Elevation: 100.270 (assumed)
Basis: Level survey from BM 2
Location: 4 m towards river from station
Description: Pipe protruding from ground 0.4 m marked with flagging

BM 2
Elevation: 100.000 (assumed)
Basis:
Location: Log on right bank 25 m up:
Description: Nail in log marked with flagging.



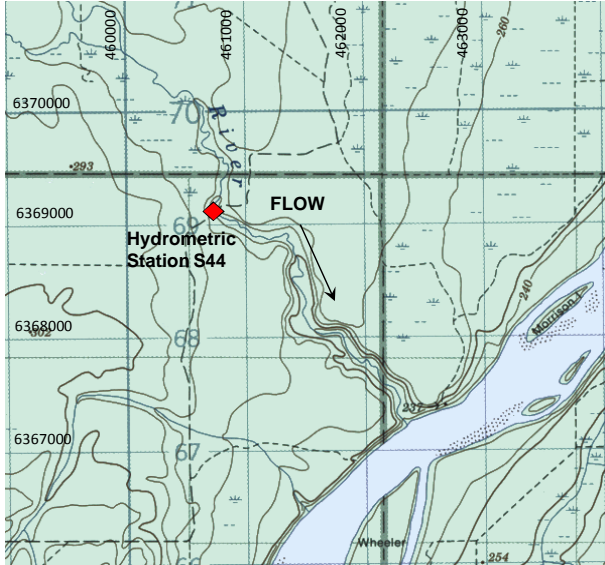
Revised 24 March, 2011

Location and Purpose:

Established to monitor discharge on Pierre River. Installed at Environment Canada hydrometric station (07DA013) that previously operated from 1975 to 1977.

Variable Measured: Discharge
Period of Record: 1975-1977, May 2009 - present
Access: Helicopter access
Drainage Area: 123 km²
Coordinates: 12 V 460775 E, 6369400 N

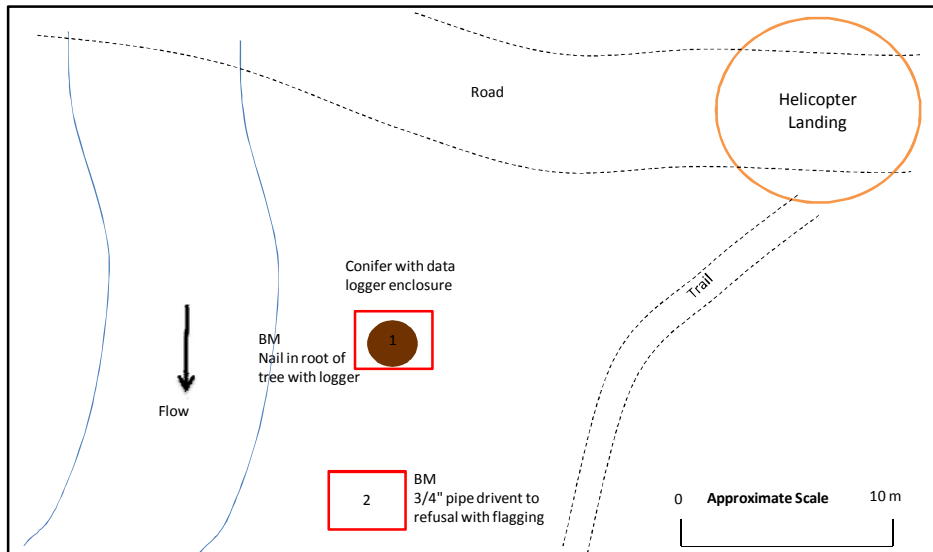
Active: Year around
LSD:
Lat/Long: 57°27'52.5" N, 111°39'14.9" W
NTS Map: 74E05



Benchmarks

BM: 1
Elevation: 100.00 (assumed)
Basis: unknown
Location: Tree with data logger enclosure attached
Description: Nail in tree root.

BM: 2
Elevation: 99.886 m
Basis: Level Survey from BM 1
Location: 3/4" pipe driven to refusal
Description: Pipe with flagging



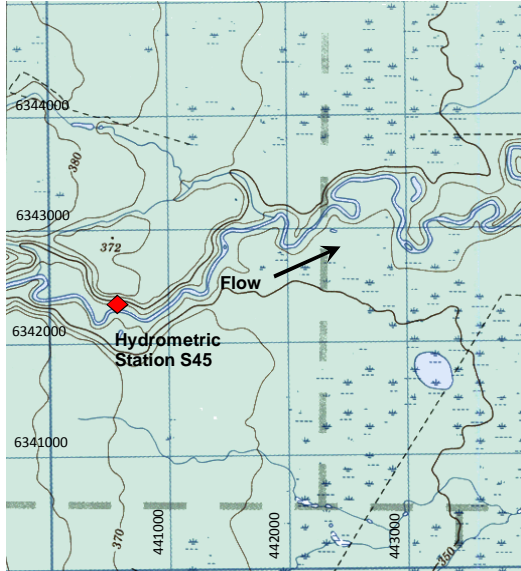
Revised 24 March, 2011

Location and Purpose:

Established to monitor discharge on Ells River upstream of the proposed Joslyn Creek Diversion and the Fort McKay water intake.

Variable Measured: Discharge and water temperature
Period of Record: June 2009 - present
Access: Helicopter access
Drainage Area: NA km²
Coordinates: 12V 440605 E, 6342459 N

Active: Year around
LSD:
Lat/Long: 57°13'17" N, 111°59'01" W
NTS Map: 74E04



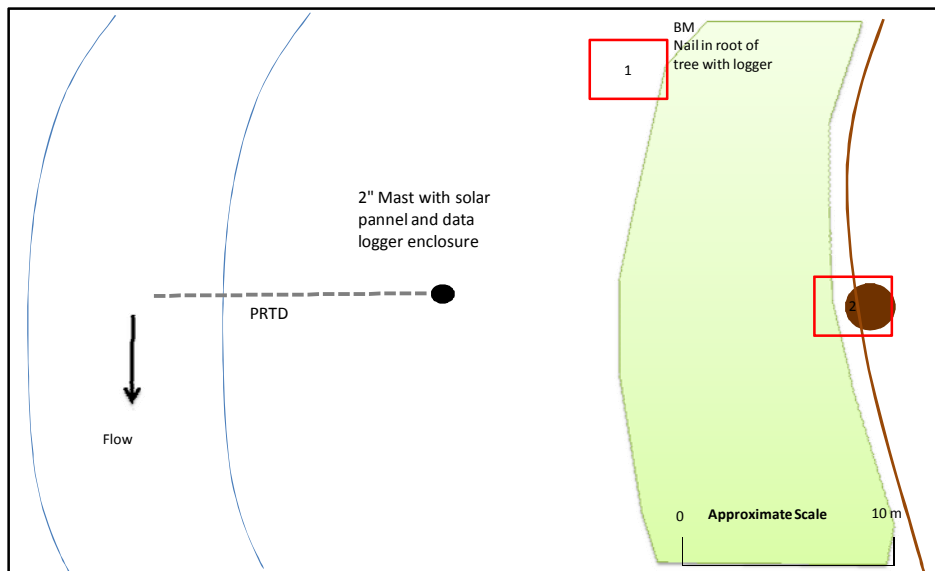
Map Grid Based on UTM NAD 27



Benchmarks

BM: 1
Elevation: 100.00 (assumed)
Basis: unknown
Location: 15 m upstream of data logger set up on left bank
Description: 3/4" pipe protruding 0.4m from surface

BM: 2
Elevation: 101.161 (assumed)
Basis: Level survey from BM1
Location: 10 m behind data logger set up
Description: Nail in stump on ledge



C.5 INVENTORY OF CLIMATE AND HYDROLOGIC DATA IN THE RAMP DATABASE

An inventory of the climate and hydrologic data collected by RAMP, and contained in the RAMP database is provided on the following pages (Table C.5-1). These data will be made available on the RAMP website, subsequent to this report being published.

In addition to the data collected by the RAMP program, data from the following sources contribute to the analyses in the 2010 WY RAMP Technical Report and Appendices including:

- Water Survey of Canada (WSC)
(<http://www.wsc.ec.gc.ca/>)
 - Provisional WSC hydrologic data has been used when final data are not yet available. The inventory displays the full length of record for joint WSC/RAMP Stations. In the RAMP database, data for a joint WSC/RAMP Station are provided starting with the year in which RAMP monitoring began.
- Environment Canada (EC)
(http://climate.weatheroffice.gc.ca/climateData/canada_e.html)
 - Provisional EC climate data has been used when final data are not yet available.
- Industry Data
 - Volumes of water released and withdrawn, as part of RAMP focal activities, were supplied by each company.

Table C.5-1 Inventory of climate and hydrologic data collected by RAMP.

| Hydrometric Station | Data Type | From Date | To Date |
|--|-------------------|------------------|----------------|
| S01 - Alsands Drain | Discharge | 1995-08-10 | 2002-12-31 |
| | Water Level | 1997-04-16 | 2002-12-30 |
| S02 - Jackpine Creek at Canterra Road | Discharge | 1995-05-06 | 2010-10-31 |
| | Water Level | 1997-04-17 | 2010-10-31 |
| | Water Temperature | 2007-10-20 | 2010-10-31 |
| S03 - Iyininim Creek above Kearn Lake | Total Rainfall | 1999-04-30 | 2010-10-28 |
| | Discharge | 1989-01-18 | 2010-10-28 |
| | Water Level | 1989-04-20 | 2010-10-28 |
| S04 - Blackfly Creek near the Mouth | Discharge | 1989-02-15 | 1998-10-27 |
| S04A - Blackfly Creek near the Mouth | Discharge | 2007-04-25 | 2007-10-25 |
| | Water Level | 2007-04-25 | 2007-10-25 |
| S05 - Muskeg River above Stanley Creek | Discharge | 2003-05-04 | 2010-10-31 |
| | Water Level | 2003-02-12 | 2010-10-31 |
| | Water Temperature | 2010-06-26 | 2010-10-31 |
| S05A - Muskeg River above Muskeg Creek | Station Pressure | 2002-03-16 | 2010-10-31 |
| | Discharge | 1995-08-11 | 2010-10-31 |
| | Water Level | 1997-04-17 | 2010-10-31 |
| | Water Temperature | 2004-09-01 | 2010-10-31 |
| S06 - Mills Creek at Highway 63 | Discharge | 1997-04-16 | 2010-10-31 |
| | Water Level | 1997-04-16 | 2010-10-31 |
| S07 - Muskeg River near Fort McKay (07DA008) | Discharge | 1974-01-01 | 2010-10-31 |
| | Water Level | 2000-01-01 | 2010-10-31 |
| S08 - Stanley Creek near the Mouth | Water Level | 1999-09-14 | 2003-10-14 |
| S09 - Kearn Lake Outlet | Discharge | 1989-01-18 | 2010-10-31 |
| | Water Level | 1989-01-18 | 2010-10-31 |
| | Station Pressure | 1999-04-07 | 2001-04-20 |
| S10 - Wapasu Creek at Canterra Road | Discharge | 1997-05-08 | 2010-10-31 |
| | Water Level | 1997-05-08 | 2010-10-31 |
| | Water Temperature | 2008-01-01 | 2010-10-31 |
| S11 - Poplar Creek at Highway 63 (07DA007) | Discharge | 1972-03-16 | 2010-10-31 |
| | Water Level | 1995-05-05 | 2010-10-31 |
| | Water Temperature | 2008-05-14 | 2010-10-31 |
| S12 - Fort Creek at Highway 63 | Discharge | 2000-04-02 | 2010-10-31 |
| | Water Level | 2000-04-02 | 2010-10-31 |
| S13 - Albion Pond 3 Outlet | Discharge | 2000-03-02 | 2002-12-07 |
| | Water Level | 2000-03-02 | 2002-12-07 |
| S14 - Elys River above Joslyn Creek | Discharge | 2001-03-15 | 2007-10-24 |
| | Water Level | 2001-05-13 | 2007-10-24 |
| S14A - Elys River at CNRL Bridge | Discharge | 2004-10-30 | 2010-10-31 |
| | Water Level | 2004-10-30 | 2010-10-31 |
| | Water Temperature | 2005-07-14 | 2010-10-31 |
| S15 - Tar River near the Mouth (07DA015) | Discharge | 1975-08-24 | 2006-10-28 |
| | Water Level | 2001-05-09 | 2006-10-28 |

Table C.5-1 (Cont'd.)

| Hydrometric Station (Cont'd.) | Data Type | From Date | To Date |
|--|---------------------------|------------------|----------------|
| S15A - Tar River near the Mouth | Discharge | 2007-05-01 | 2010-10-26 |
| | Water Level | 2007-05-01 | 2010-10-26 |
| | Water Temperature | 2007-09-21 | 2010-10-26 |
| S16 - Calumet River near the Mouth | Daily Maximum Temperature | 2001-06-11 | 2005-10-11 |
| | Daily Minimum Temperature | 2001-06-11 | 2005-10-11 |
| | Daily Mean Temperature | 2001-06-11 | 2005-10-11 |
| | Total Rainfall | 2001-06-11 | 2005-05-02 |
| | Total Snowfall | 2001-06-11 | 2005-03-23 |
| | Total Precipitation | 2001-06-11 | 2005-05-02 |
| | Discharge | 2001-05-12 | 2004-10-31 |
| | Water Level | 2001-05-12 | 2004-10-31 |
| | Water Temperature | 2003-05-27 | 2004-10-31 |
| S16A - Calumet River near the Mouth | Discharge | 2010-04-12 | 2010-10-31 |
| | Water Level | 2010-05-12 | 2010-10-31 |
| S17 - Tar River Upland Tributary | Discharge | 2001-05-12 | 2003-06-24 |
| | Water Level | 2001-05-12 | 2004-10-31 |
| S18A - Calumet River Upland Tributary | Discharge | 2002-06-10 | 2009-10-25 |
| | Water Level | 2002-06-10 | 2009-10-25 |
| S19 - Tar River Lowland Tributary near the Mouth | Total Rainfall | 2002-06-13 | 2005-12-31 |
| | Total Precipitation | 2006-01-01 | 2010-10-26 |
| | Discharge | 2001-05-09 | 2010-10-26 |
| | Water Level | 2001-05-09 | 2010-10-26 |
| S20 - Muskeg River Upland | Discharge | 2001-05-08 | 2010-10-31 |
| | Water Level | 2001-05-08 | 2010-10-31 |
| S21 - Shelley Creek near the Mouth | Water Level | 2001-05-14 | 2003-10-14 |
| S22 - Muskeg Creek near the Mouth | Discharge | 1989-01-17 | 2010-10-31 |
| | Water Level | 1989-01-17 | 2010-10-31 |
| S23 - Aurora Boundary Weir | Discharge | 2001-01-01 | 2002-12-31 |
| | Water Level | 2001-01-01 | 2002-12-31 |
| S24 - Athabasca River below Eymundson Creek | Discharge | 2001-06-20 | 2010-10-31 |
| | Water Level | 2001-06-20 | 2010-10-31 |
| S25 - Susan Lake Outlet | Discharge | 2002-06-11 | 2010-10-31 |
| | Water Level | 2002-06-11 | 2010-10-31 |
| S26 - MacKay River near Fort McKay (07DB001) | Discharge | 1972-03-15 | 2010-10-31 |
| | Water Level | 2001-10-31 | 2010-10-31 |
| S27 - Firebag River near the Mouth (07DC001) | Discharge | 1971-05-06 | 2010-10-31 |
| | Water Level | 2002-01-01 | 2010-10-31 |
| S28 - Khahago Creek below Black Fly Creek | Discharge | 1989-01-19 | 2007-10-25 |
| | Water Level | 1989-01-19 | 2007-10-25 |
| S29 - Christina River near Chard (07CE002) | Discharge | 1982-05-20 | 2010-10-31 |
| | Water Level | 2002-01-13 | 2010-10-31 |
| | Total Rainfall | 2002-07-08 | 2003-10-10 |

Table C.5-1 (Cont'd.)

| Hydrometric Station (Cont'd.) | Data Type | From Date | To Date |
|--|---------------------------|------------------|----------------|
| S31 - Hangingstone Creek at North Star Road | Discharge | 2002-04-10 | 2010-10-31 |
| | Water Level | 2002-04-10 | 2010-10-31 |
| | Total Rainfall | 2010-04-23 | 2010-10-31 |
| S32 - Surmount Creek at Highway 881 | Discharge | 2002-05-18 | 2010-10-31 |
| | Water Level | 2002-01-14 | 2010-10-31 |
| | Water Temperature | 2008-06-24 | 2010-10-31 |
| S33 - Muskeg River at Aurora/Albian Boundary | Discharge | 2003-01-29 | 2010-10-31 |
| | Water Level | 2003-04-30 | 2010-10-31 |
| S34 - Tar River above CNRL Lake | Discharge | 2005-04-26 | 2010-10-31 |
| | Water Level | 2005-04-26 | 2010-10-31 |
| | Water Temperature | 2008-04-08 | 2010-10-31 |
| S35 - McClelland Lake Outlet | Water Level | 2008-06-29 | 2008-10-08 |
| S36 - McClelland Lake Outlet above Firebag River | Discharge | 2008-05-14 | 2010-10-31 |
| | Water Level | 2008-05-14 | 2010-10-31 |
| S37 - East Jackpine Creek near the 1300 m Contour | Discharge | 2007-09-22 | 2010-10-28 |
| | Water Level | 2007-09-22 | 2010-10-28 |
| S38 - Steepbank River near Fort McMurray (07DA006) | Discharge | 1972-09-20 | 2010-10-31 |
| | Water Level | 1972-09-20 | 2010-10-31 |
| S39 - Beaver River above Syncrude (07DA018) | Discharge | 1975-08-19 | 2010-04-03 |
| | Water Level | 1975-08-19 | 2010-04-03 |
| S40 - MacKay River at Petro-Canada Bridge | Discharge | 2008-01-01 | 2010-10-31 |
| | Water Level | 2008-01-01 | 2010-10-31 |
| | Total Rainfall | 2010-04-23 | 2010-10-31 |
| | Water Temperature | 2008-09-19 | 2010-10-31 |
| S42 - Clearwater River above Christina River (07CD005) | Discharge | 1966-06-16 | 2010-10-31 |
| | Water Level | 1966-06-16 | 2010-10-31 |
| S43 - Firebag River above Suncor Firebag | Discharge | 2009-05-01 | 2010-10-31 |
| | Water Level | 2009-05-01 | 2010-10-31 |
| | Total Rainfall | 2010-04-12 | 2010-10-31 |
| | Water Temperature | 2009-09-18 | 2010-10-31 |
| S44 - Pierre River near Fort McKay (07DA013) | Discharge | 1975-07-18 | 2010-10-27 |
| | Water Level | 2009-05-01 | 2010-10-27 |
| S45 - Ells River above Joslyn Creek Diversion | Discharge | 2009-06-13 | 2010-10-31 |
| | Water Level | 2009-06-13 | 2010-10-31 |
| | Water Temperature | 2009-06-13 | 2010-10-31 |
| CR1 - Calumet River | Discharge | 2005-05-04 | 2009-10-18 |
| L1 - McClelland Lake | Daily Maximum Temperature | 2007-03-29 | 2010-10-31 |
| | Daily Minimum Temperature | 2007-03-29 | 2010-10-31 |
| | Daily Mean Temperature | 2007-02-09 | 2010-10-31 |
| | Total Rainfall | 2002-08-09 | 2010-10-31 |
| | Total Precipitation | 2006-04-15 | 2010-10-31 |
| | Relative Humidity | 2006-09-06 | 2010-10-31 |
| | Discharge | 1997-06-22 | 2010-10-31 |
| | Water Level | 1997-06-22 | 2010-10-31 |
| Water Temperature | 2008-03-14 | 2010-10-31 | |

Table C.5-1 (Cont'd.)

| Hydrometric Station (Cont'd.) | Data Type | From Date | To Date |
|--------------------------------------|---------------------------------|---------------------|----------------|
| L2 - Kearl Lake | Daily Maximum Temperature | 2008-01-01 | 2010-10-31 |
| | Daily Minimum Temperature | 2008-01-01 | 2010-10-31 |
| | Daily Mean Temperature | 2007-09-25 | 2010-10-31 |
| | Total Precipitation | 2008-01-01 | 2010-10-31 |
| | Relative Humidity | 2007-09-25 | 2010-10-31 |
| | Discharge | 2007-04-26 | 2007-10-17 |
| | Water Level | 1989-01-19 | 2010-10-31 |
| | Water Temperature | 2007-09-25 | 2009-12-31 |
| L3 - Isadores Lake | Water Level | 2000-02-22 | 2010-10-31 |
| Climate Station | Data Type | From Date | To Date |
| C1 - Aurora Climate Station | Daily Maximum Temperature | 1995-05-10 | 2010-10-31 |
| | Daily Minimum Temperature | 1995-05-10 | 2010-10-31 |
| | Daily Mean Temperature | 1988-03-11 | 2010-10-31 |
| | Total Rainfall | 1995-05-10 | 2008-12-31 |
| | Total Snowfall | 1996-01-01 | 2008-12-31 |
| | Total Precipitation | 1988-03-10 | 2010-10-31 |
| | Snow on the Ground | 1995-10-26 | 2010-10-31 |
| | Speed of Extreme Gust | 1995-05-10 | 2010-10-31 |
| | Global Solar Radiation (RF1) | 1988-03-11 | 2010-10-31 |
| | Relative Humidity | 1995-05-10 | 2010-10-31 |
| | Maximum 2-Minute Wind Speed | 1995-05-10 | 2010-10-31 |
| | Maximum 10-Minute Wind Speed | 1995-05-10 | 2010-10-31 |
| C2 - Horizon Climate Station | Daily Maximum Temperature | 2008-10-16 | 2010-10-31 |
| | Daily Minimum Temperature | 2008-10-16 | 2010-10-31 |
| | Daily Mean Temperature | 2008-10-16 | 2010-10-31 |
| | Snow on the Ground | 2009-01-01 | 2010-10-31 |
| | Speed of Extreme Gust | 2008-10-16 | 2010-10-31 |
| | Global Solar Radiation (RF1) | 2008-10-16 | 2010-10-31 |
| | Station pressure | 2008-10-16 | 2010-10-31 |
| | Relative Humidity | 2008-10-16 | 2010-10-31 |
| | Maximum 2-Minute Wind Speed | 2008-10-16 | 2010-10-31 |
| | Maximum 10-Minute Wind Speed | 2008-10-16 | 2010-10-31 |
| | Total Precipitation | 2009-06-11 | 2010-10-31 |
| | C3 - Steepbank Climate Station* | Total Precipitation | 2009-08-13 |

* Monitoring of variables identical to those at C1 began on November 10 2010.

Table C.5-2 2010 WY data provided by oil sands operators who are members of RAMP.

| Operator | Activity | Timestep |
|------------------------------|--|-----------------|
| Suncor Energy Ltd. | Withdrawals from the Athabasca River | Daily |
| | Releases to the Athabasca River | Daily |
| Nexen | Withdrawals from lakes and borrow pit | Daily |
| Hammerstone | Releases from quarry project into Muskeg River | Daily |
| CNRL – Horizon | Withdrawals from Athabasca River | Daily |
| Total E&P Canada Ltd. | Water withdrawals from various sites | Daily |
| Syncrude | Aurora Clean Water Diversion to Stanley Creek | Daily |
| | Treated Sewage Releases to Athabasca River | Daily |
| | Withdrawals from Athabasca River | Monthly |
| | Diversion from Beaver Creek into Poplar Creek | Daily |
| Shell - Jackpine Mine | Water withdrawal for dust suppression | Daily |
| Shell - Muskeg River Mine | Withdrawals from Athabasca River | Daily |
| Husky Oil Operations Ltd. | Releases from plant and well pads | Daily |
| Imperial Oil Resources | Withdrawals from Pond 1 and Compensation Lake sedimentation pond | Daily |
| | Withdrawals from three sources in Firebag catchment | Daily |
| | Withdrawals from Athabasca River/Fort Hills Pond | Daily |

Note: This data was used in the water balance calculations as displayed in Chapter 5 of the 2010 Technical Report. For clarity, further information received but not included within these calculations is not summarized here, including: (i) data classified as muskeg dewatering or groundwater extraction; (ii) operator withdrawal and discharge data located downstream of the corresponding observed test monitoring location; and (iii) operator withdrawal and discharges not occurring at the same time as the observed test monitoring.

C.6 MANUAL WATER LEVEL AND DISCHARGE MEASUREMENTS

Records of the manual measurements made during each site visit are provided on the following pages. The quality and expected precision of each manual discharge measurement was assessed considering the hydraulic conditions, at the measurement section, at the time of the measurement.

Hatfield Consultants Hydrometric Site Visit Field Record



| | | | |
|---|-------------------|----------------|--|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: L1 - McClelland Lake (483430 E, 6371950 N) | | | |
| Personnel: SG, CE | Date: 21 Jan 2010 | | |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: SG | Checked By: DB | |

| | |
|-----------------------------|----------------|
| Measurement Details: | |
| Start Time (MST): | 905 |
| End Time (MST): | 910 |
| Lake Condition: | Ice Covered |
| Weather: | -5 C, Overcast |

| |
|---------------------|
| Other Notes: |
| |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 0.649 |
| Battery (Main): | 13.06 |
| Battery (Aux): | NA |
| Datalogger Clock: | 856 |
| Laptop Clock: | 857 |
| Air Temp: | -6.3 |
| Air Pressure: | NA |
| RH: | 96.7 |
| Water °C: | 0.6 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rod near pluvio | 1.198 | 294.865 | 1.177 | 294.865 | - |
| Bench Mark 2: | Pipe nr old logger | 1.013 | 294.865 | 0.992 | 294.865 | - |
| Top of Ice: | | 1.438 | 294.625 | 1.416 | 294.626 | 294.626 |
| Water Level: | | 1.441 | 294.622 | 1.418 | 294.624 | 294.623 |
| Transducer: | | 0.649 | 293.973 | 0.649 | 293.975 | 293.974 |
| Other: | | | | | | |

| | | | |
|---|------------------|----------------|--|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: L1 - McClelland Lake (483430 E, 6371950 N) | | | |
| Personnel: GB, CE | Date: 9 Feb 2010 | | |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: SG | Checked By: DB | |

| | |
|-----------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1500 |
| End Time (MST): | 1600 |
| Lake Condition: | Ice cover |
| Weather: | sunny -18C |

| |
|---------------------|
| Other Notes: |
| |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 0.652 |
| Battery (Main): | 15.1 |
| Battery (Aux): | - |
| Datalogger Clock: | 1504 |
| Laptop Clock: | 1505 |
| Air Temp: | -6.9 |
| Air Pressure: | - |
| RH: | 76.06 |
| Water °C: | 0.4 |
| Memory used: | - |
| Dessicant: | Good |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rod near pluvio | 1.310 | 294.865 | 1.290 | 294.865 | - |
| Bench Mark 2: | Pipe nr old logger | 1.130 | 294.865 | 1.109 | 294.865 | - |
| Top of Ice: | | 1.561 | 294.614 | 1.540 | 294.615 | 294.615 |
| Water Level: | | 1.561 | 294.614 | 1.539 | 294.616 | 294.615 |
| Transducer: | | 0.652 | 293.962 | 0.652 | 293.964 | 293.963 |
| Other: | | | | | | |

Hatfield Consultants Hydrometric Site Visit Field Record

| | | | |
|---|--------------------|----------------|--|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: L1 - McClelland Lake (483430 E, 6371950 N) | | | |
| Personnel: JE, SG, Josh Pilot | Date: 5 March 2010 | | |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: SG | Checked By: JP | |

| | |
|-----------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 1200 |
| End Time (MST): | 1215 |
| Lake Condition: | Ice Covered |
| Weather: | Sunny 10°C |

| |
|---------------------|
| Other Notes: |
| Pluvio 1/4 Full |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 0.655 |
| Battery (Main): | 14.75 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1157 |
| Laptop Clock: | 1156 |
| Air Temp: | 7.21 |
| Air Pressure: | NA |
| RH: | 55.7 |
| Water °C: | 0.3 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rod near pluvio | 1.364 | 294.865 | 1.351 | 294.865 | - |
| Bench Mark 2: | Pipe nr old logger | 1.189 | 294.865 | 1.172 | 294.865 | - |
| Top of Ice: | | 1.610 | 294.619 | 1.592 | 294.624 | 294.622 |
| Water Level: | | 1.605 | 294.624 | 1.590 | 294.626 | 294.625 |
| Transducer: | | 0.655 | 293.969 | 0.655 | 293.971 | 293.970 |
| Other: | | | | | | |

| | | | |
|---|-------------------|----------------|--|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: L1 - McClelland Lake (483430 E, 6371950 N) | | | |
| Personnel: SG DB | Date: 12-Apr-2010 | | |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: DB | Checked By: JP | |

| | |
|-----------------------------|-----|
| Measurement Details: | |
| Start Time (MST): | 830 |
| End Time (MST): | 850 |
| Lake Condition: | |
| Weather: | |

| |
|---------------------|
| Other Notes: |
| |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 0.699 |
| Battery (Main): | 13.79 |
| Battery (Aux): | - |
| Datalogger Clock: | 832 |
| Laptop Clock: | 831 |
| Air Temp: | -0.14 |
| Air Pressure: | - |
| RH: | 84% |
| Water °C: | 0.3 |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rod near pluvio | 1.240 | 294.865 | 1.201 | 294.865 | - |
| Bench Mark 2: | Pipe nr old logger | 1.052 | 294.865 | 1.015 | 294.865 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.452 | 294.653 | 1.417 | 294.649 | 294.651 |
| Transducer: | | 0.699 | 293.954 | 0.699 | 293.950 | 293.952 |
| Other: | | | | | | |

| | | | |
|---|-------------------|----------------|--|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: L1 - McClelland Lake (483430 E, 6371950 N) | | | |
| Personnel: DB SG | Date: 24-Apr-2010 | | |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: DB | Checked By: JP | |

| | |
|-----------------------------|--|
| Measurement Details: | |
| Start Time (MST): | |
| End Time (MST): | |
| Lake Condition: | |
| Weather: | |

| |
|---------------------|
| Other Notes: |
| |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 0.705 |
| Battery (Main): | 14.61 |
| Battery (Aux): | - |
| Datalogger Clock: | 1105 |
| Laptop Clock: | 1106 |
| Air Temp: | 1.22 |
| Air Pressure: | - |
| RH: | 61.26 |
| Water °C: | 3.6 |
| Memory used: | - |
| Dessicant: | Good |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rod near pluvio | 1.248 | 294.865 | 1.157 | 294.865 | - |
| Bench Mark 2: | Pipe nr old logger | 1.065 | 294.865 | 0.975 | 294.865 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.450 | 294.663 | 1.362 | 294.660 | 294.662 |
| Transducer: | | 0.705 | 293.958 | 0.705 | 293.955 | 293.957 |
| Other: | | | | | | |

Hatfield Consultants Hydrometric Site Visit Field Record



| | | |
|---|-------------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | |
| Site: L1 - McClelland Lake (483430 E, 6371950 N) | | |
| Personnel: DB BL | Date: 24-Jun-2010 | |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: DB | Checked By: JP |

| | |
|-----------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1320 |
| End Time (MST): | 1340 |
| Lake Condition: | Open |
| Weather: | Partly cloudy |

| |
|---------------------|
| Other Notes: |
| |

| | |
|---|---------|
| Logger Details: | |
| Transducer Reading: | 0.637 |
| Battery (Main): | 14.34 |
| Battery (Aux): | - |
| Datalogger Clock: | 1326 |
| Laptop Clock: | 1325 |
| Air Temp: | 20.89 |
| Air Pressure: | - |
| RH: | 56.25 |
| Water °C: | 18.7 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger/data notes (e.g. s-depth,ppt.): Ppt partially emptied 13:30 MST | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rod near pluvio | 0.998 | 294.865 | 0.989 | 294.865 | - |
| Bench Mark 2: | Pipe nr old logger | 0.808 | 294.865 | 0.802 | 294.865 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.285 | 294.578 | 1.280 | 294.574 | 294.576 |
| Transducer: | | 0.637 | 293.941 | 0.637 | 293.937 | 293.939 |
| Other: | | | | | | |

| | | |
|--|-----------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | |
| Site: L1 - McClelland Lake (483430 E, 6371950 N) | | |
| Personnel: BL, SG | Date: 13-Aug-10 | |
| Photos taken?: <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> | Entered By: SG | Checked By: DB |

| | |
|-----------------------------|------------------|
| Measurement Details: | |
| Start Time (MST): | 950 |
| End Time (MST): | 1000 |
| Lake Condition: | Open |
| Weather: | Cloudy Wind 15°C |

| |
|---------------------|
| Other Notes: |
| |

| | |
|--|---------|
| Logger Details: | |
| Transducer Reading: | 0.534 |
| Battery (Main): | 13.2 |
| Battery (Aux): | - |
| Datalogger Clock: | 945 |
| Laptop Clock: | 946 |
| Air Temp: | 17.83 |
| Air Pressure: | - |
| RH: | 85.16 |
| Water °C: | 21.2 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger/data notes (e.g. s-depth,ppt.): Pluvio 1/3 full, ~70 mm since last download. | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rod near pluvio | 1.078 | 294.865 | 1.024 | 294.865 | - |
| Bench Mark 2: | Pipe nr old logger | 0.891 | 294.865 | 0.840 | 294.865 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.476 | 294.467 | 1.421 | 294.468 | 294.468 |
| Transducer: | | 0.534 | 293.933 | 0.534 | 293.934 | 293.934 |
| Other: | | | | | | |

| | | |
|---|--------------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | |
| Site: L1 - McClelland Lake (483430 E, 6371950 N) | | |
| Personnel: DB SG Matt (pilot) | Date: 20 Sept 2010 | |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: DB | Checked By: JP |

| | |
|-----------------------------|------|
| Measurement Details: | |
| Start Time (MST): | 910 |
| End Time (MST): | - |
| Lake Condition: | Open |
| Weather: | - |

| |
|--|
| Other Notes: |
| RSSI -86 Connection OK with 30DB antenna |

| | |
|--|---------|
| Logger Details: | |
| Transducer Reading: | 0.565 |
| Battery (Main): | 13.05 |
| Battery (Aux): | - |
| Datalogger Clock: | 916 |
| Laptop Clock: | 917 |
| Air Temp: | 4.16 |
| Air Pressure: | - |
| RH: | 92.1 |
| Water °C: | 11.2 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger/data notes (e.g. s-depth,ppt.): ~100mm since aug | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rod near pluvio | 1.008 | 294.865 | 0.995 | 294.865 | - |
| Bench Mark 2: | Pipe nr old logger | 0.825 | 294.865 | 0.812 | 294.865 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.376 | 294.497 | 1.363 | 294.497 | 294.497 |
| Transducer: | | 0.565 | 293.932 | 0.565 | 293.932 | 293.932 |
| Other: | | | | | | |

| | | |
|---|-------------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | |
| Site: L1 - McClelland Lake (483430 E, 6371950 N) | | |
| Personnel: DB BL Matt (pilot) | Date: 27-Oct-2010 | |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: DB | Checked By: JP |

| | |
|-----------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1140 |
| End Time (MST): | - |
| Lake Condition: | Open |
| Weather: | Partly Cloudy -3°C |

| |
|---|
| Other Notes: |
| Emptied pluvio contents into bucket. 4 litres antifreeze mix/oil added. 4 litres left at site |

| | |
|--|---------|
| Logger Details: | |
| Transducer Reading: | 0.526 |
| Battery (Main): | 15.03 |
| Battery (Aux): | - |
| Datalogger Clock: | 1138 |
| Laptop Clock: | 1139 |
| Air Temp: | -3.25 |
| Air Pressure: | - |
| RH: | 79.69 |
| Water °C: | 4.60 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rod near pluvio | 1.171 | 294.865 | 1.122 | 294.865 | - |
| Bench Mark 2: | Pipe nr old logger | 0.990 | 294.865 | 0.941 | 294.865 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.566 | 294.470 | 1.521 | 294.466 | 294.468 |
| Transducer: | | 0.526 | 293.944 | 0.526 | 293.940 | 293.942 |
| Other: | | | | | | |

| | | |
|---|----------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | |
| Site: L1 - McClelland Lake (483430 E, 6371950 N) | | |
| Personnel: SG, JP | Date: 4-Dec-10 | |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: JP | Checked By: SG |

| | |
|-----------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 12:00 |
| End Time (MST): | 1230 |
| Lake Condition: | Ice |
| Weather: | -15° overcast |

| |
|---------------------|
| Other Notes: |
| |

| | |
|--|--------|
| Logger Details: | |
| Transducer Reading: | 0.439 |
| Battery (Main): | 13.71 |
| Battery (Aux): | - |
| Datalogger Clock: | 11:58 |
| Laptop Clock: | 11:59 |
| Air Temp: | -16.18 |
| Air Pressure: | - |
| RH: | 83.56 |
| Water °C: | 1.7 |
| Memory used: | - |
| Dessicant: | - |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger/data notes (e.g. s-depth,ppt.): Bucket 1/4 full. 10 min activity | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rod near pluvio | 1.224 | 294.865 | 1.221 | 294.865 | - |
| Bench Mark 2: | Pipe nr old logger | 1.050 | 294.865 | 1.049 | 294.865 | - |
| Top of Ice: | | 1.654 | 294.435 | 1.653 | 294.433 | 294.434 |
| Water Level: | | 1.621 | 294.468 | 1.619 | 294.467 | 294.468 |
| Transducer: | | 0.439 | 294.029 | 0.439 | 294.028 | 294.029 |
| Other: | | | | | | |

Hatfield Consultants Hydrometric Site Visit Field Record



| | | |
|---|--------------------------|-----------------------|
| Project: 1565 RAMP HYDROLOGY | | |
| Site: L2 - Kearn Lake (484935 E, 6349023 N) | | |
| Personnel: SG, CE | Date: 18 Jan 2010 | |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: SG | Checked By: JP |

| | |
|-----------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 1205 |
| End Time (MST): | 1210 |
| Lake Condition: | Ice Covered |
| Weather: | -5 C, Clear |

| |
|---------------------|
| Other Notes: |
| |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 0.956 |
| Battery (Main): | 13.2 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1205 |
| Laptop Clock: | 1208 |
| Air Temp: | -5.82 |
| Air Pressure: | NA |
| RH: | 89.2 |
| Water °C: | 2.8 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging by Trail | 0.656 | 333.324 | 0.648 | 333.324 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.538 | 332.424 | 1.529 | 332.424 | - |
| Top of Ice: | | 2.059 | 331.903 | 2.053 | 331.900 | 331.902 |
| Water Level: | | 2.093 | 331.869 | 2.085 | 331.868 | 331.869 |
| Transducer: | | 0.956 | 330.913 | 0.956 | 330.912 | 330.913 |
| Other: | | | | | | |

| | | |
|--|--------------------------|-----------------------|
| Project: 1565 RAMP HYDROLOGY | | |
| Site: L2 - Kearn Lake (484935 E, 6349023 N) | | |
| Personnel: GB, SE | Date: 12 Feb 2010 | |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: SG | Checked By: JP |

| | |
|-----------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1530 |
| End Time (MST): | 1540 |
| Lake Condition: | Ice cover |
| Weather: | clear -10C |

| |
|---------------------|
| Other Notes: |
| |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 0.952 |
| Battery (Main): | 15.43 |
| Battery (Aux): | - |
| Datalogger Clock: | 1522 |
| Laptop Clock: | 1524 |
| Air Temp: | -9.91 |
| Air Pressure: | - |
| RH: | 78.9 |
| Water °C: | 2.4 |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging by Trail | 0.255 | 333.324 | 0.169 | 333.324 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.139 | 332.424 | 1.051 | 332.424 | - |
| Top of Ice: | | 1.701 | 331.862 | 1.615 | 331.860 | 331.861 |
| Water Level: | | 1.701 | 331.862 | 1.615 | 331.860 | 331.861 |
| Transducer: | | 0.952 | 330.910 | 0.952 | 330.908 | 330.909 |
| Other: | | | | | | |

| | | |
|---|---------------------------|-----------------------|
| Project: 1565 RAMP HYDROLOGY | | |
| Site: L2 - Kearn Lake (484935 E, 6349023 N) | | |
| Personnel: SE, SG | Date: 7 March 2010 | |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: SG | Checked By: JP |

| | |
|-----------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 1415 |
| End Time (MST): | 1425 |
| Lake Condition: | Ice Covered |
| Weather: | Sunny 10°C |

| |
|---|
| Other Notes: |
| Removed Solar Panel and sensors from old station. |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 0.941 |
| Battery (Main): | |
| Battery (Aux): | NA |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | 11.92 |
| Air Pressure: | NA |
| RH: | 38.27 |
| Water °C: | 2.2 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |
| Geonor 1/3 Full | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging by Trail | 0.595 | 333.324 | 0.581 | 333.324 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.477 | 332.424 | 1.464 | 332.424 | - |
| Top of Ice: | | 2.035 | 331.866 | 2.026 | 331.862 | 331.864 |
| Water Level: | | 2.085 | 331.816 | 2.072 | 331.816 | 331.816 |
| Transducer: | | 0.941 | 330.875 | 0.941 | 330.875 | 330.875 |
| Other: | | | | | | |

| | | |
|---|-------------------------|-----------------------|
| Project: 1565 RAMP HYDROLOGY | | |
| Site: L2 - Kearn Lake (484935 E, 6349023 N) | | |
| Personnel: DB GB | Date: 8-Apr-2010 | |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: DB | Checked By: JP |

| | |
|-----------------------------|---------------------|
| Measurement Details: | |
| Start Time (MST): | 1500 |
| End Time (MST): | 1530 |
| Lake Condition: | Frozen but breaking |
| Weather: | Overcast |

| |
|---------------------|
| Other Notes: |
| |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 0.93 |
| Battery (Main): | 14.36 |
| Battery (Aux): | - |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | 14.25 |
| Air Pressure: | - |
| RH: | 30.2 |
| Water °C: | 2.1 |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |
| Antifreeze added, old freq 18.1Hz, New Freq. 20.27 | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging by Trail | 0.205 | 333.324 | 0.138 | 333.324 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.076 | 332.424 | 1.010 | 332.424 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.672 | 331.828 | 1.601 | 331.833 | 331.831 |
| Transducer: | | 0.93 | 330.898 | 0.93 | 330.903 | 330.901 |
| Other: | | | | | | |

Hatfield Consultants Hydrometric Site Visit Field Record



| | | |
|--|-----------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | |
| Site: L2 - Kearl Lake (484935 E, 6349023 N) | | |
| Personnel: DB SG | Date: 26-Apr-10 | |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: DB | Checked By: JP |

| | |
|-----------------------------|----------|
| Measurement Details: | |
| Start Time (MST): | 830 |
| End Time (MST): | 845 |
| Lake Condition: | Open |
| Weather: | Overcast |

| |
|---------------------|
| Other Notes: |
| |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 1.026 |
| Battery (Main): | 14.7 |
| Battery (Aux): | - |
| Datalogger Clock: | 831 |
| Laptop Clock: | 830 |
| Air Temp: | 2.6 |
| Air Pressure: | - |
| RH: | 69% |
| Water °C: | 4 |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): Geonor Emptied | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging by Trail | 0.570 | 333.324 | 0.557 | 333.324 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.450 | 332.424 | 1.435 | 332.424 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.952 | 331.922 | 1.940 | 331.919 | 331.921 |
| Transducer: | | 1.026 | 330.896 | 1.026 | 330.893 | 330.895 |
| Other: | | | | | | |

| | | |
|--|-----------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | |
| Site: L2 - Kearl Lake (484935 E, 6349023 N) | | |
| Personnel: DB SG | Date: 29-Apr-10 | |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: DB | Checked By: JP |

| | |
|-----------------------------|----------|
| Measurement Details: | |
| Start Time (MST): | 815 |
| End Time (MST): | 820 |
| Lake Condition: | Open |
| Weather: | Overcast |

| |
|---------------------|
| Other Notes: |
| |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 0.895 |
| Battery (Main): | |
| Battery (Aux): | - |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | - |
| RH: | |
| Water °C: | |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging by Trail | 0.543 | 333.324 | 0.523 | 333.324 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.422 | 332.424 | 1.400 | 332.424 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.920 | 331.926 | 1.898 | 331.926 | 331.926 |
| Transducer: | | 0.895 | 331.031 | 0.895 | 331.031 | 331.031 |
| Other: | | | | | | |

| | | |
|---|-------------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | |
| Site: L2 - Kearl Lake (484935 E, 6349023 N) | | |
| Personnel: DB BL | Date: 26-Jun-2010 | |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: DB | Checked By: JP |

| | |
|-----------------------------|------|
| Measurement Details: | |
| Start Time (MST): | 1336 |
| End Time (MST): | 1420 |
| Lake Condition: | Open |
| Weather: | Rain |

| |
|--|
| Other Notes: |
| New dessicant system installed in junction box |

| | |
|---|-------|
| Logger Details: | |
| Transducer Reading: | 0.817 |
| Battery (Main): | |
| Battery (Aux): | 14.14 |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | 17.17 |
| Air Pressure: | - |
| RH: | 93.26 |
| Water °C: | |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): Freq. 1583.41 | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging by Trail | 0.218 | 333.324 | 0.138 | 333.324 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.090 | 332.424 | 1.010 | 332.424 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.661 | 331.853 | 1.581 | 331.853 | 331.853 |
| Transducer: | | 0.817 | 331.036 | 0.817 | 331.036 | 331.036 |
| Other: | | | | | | |

Hatfield Consultants Hydrometric Site Visit Field Record



| | |
|---|-------------------------------|
| Project: 1565 RAMP HYDROLOGY | |
| Site: L2 - Kearl Lake (484935 E, 6349023 N) | |
| Personnel: DB BL | Date: 26-Jun-2010 |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: DB Checked By: JP |

| | |
|-----------------------------|------|
| Measurement Details: | |
| Start Time (MST): | 1336 |
| End Time (MST): | 1420 |
| Lake Condition: | Open |
| Weather: | Rain |

| | |
|--|--|
| Other Notes: | |
| New dessicant system installed in junction box | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging by Trail | 0.218 | 333.324 | 0.138 | 333.324 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.090 | 332.424 | 1.010 | 332.424 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.661 | 331.853 | 1.581 | 331.853 | 331.853 |
| Transducer: | | 0.817 | 331.036 | 0.817 | 331.036 | 331.036 |
| Other: | | | | | | |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 0.817 |
| Battery (Main): | |
| Battery (Aux): | 14.14 |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | 17.17 |
| Air Pressure: | - |
| RH: | 93.26 |
| Water °C: | |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |
| Freq. 1583.41 | |

| | |
|---|-------------------------------|
| Project: 1565 RAMP HYDROLOGY | |
| Site: L2 - Kearl Lake (484935 E, 6349023 N) | |
| Personnel: BL, SG | Date: 15-Aug-10 |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: SG Checked By: DB |

| | |
|-----------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 1230 |
| End Time (MST): | 1310 |
| Lake Condition: | Open |
| Weather: | Partly 20°C |

| | |
|---------------------|--|
| Other Notes: | |
| | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging by Trail | 0.264 | 333.324 | 0.298 | 333.324 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.142 | 332.424 | 1.177 | 332.424 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.749 | 331.817 | 1.788 | 331.813 | 331.815 |
| Transducer: | | 0.776 | 331.041 | 0.776 | 331.037 | 331.039 |
| Other: | | | | | | |

| | |
|--|---------|
| Logger Details: | |
| Transducer Reading: | 0.776 |
| Battery (Main): | 14.2 |
| Battery (Aux): | - |
| Datalogger Clock: | 1224 |
| Laptop Clock: | 1223 |
| Air Temp: | 16.5 |
| Air Pressure: | - |
| RH: | 64 |
| Water °C: | 17.9 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |
| Geonor 1/2 Full | |

| | |
|---|-------------------------------|
| Project: 1565 RAMP HYDROLOGY | |
| Site: L2 - Kearl Lake (484935 E, 6349023 N) | |
| Personnel: DB SG HB | Date: 18 Sept 2010 |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: DB Checked By: JP |

| | |
|-----------------------------|-------------------|
| Measurement Details: | |
| Start Time (MST): | 835 |
| End Time (MST): | 905 |
| Lake Condition: | Open |
| Weather: | Partly Cloudy 5°C |

| | |
|---|--|
| Other Notes: | |
| Antifreeze and hydraulic fluid added after emptying | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging by Trail | 0.352 | 333.324 | 0.333 | 333.324 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.223 | 332.424 | 1.207 | 332.424 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.692 | 331.955 | 1.677 | 331.954 | 331.955 |
| Transducer: | | 0.932 | 331.023 | 0.932 | 331.022 | 331.023 |
| Other: | | | | | | |

| | |
|--|---------|
| Logger Details: | |
| Transducer Reading: | 0.932 |
| Battery (Main): | 14.67 |
| Battery (Aux): | - |
| Datalogger Clock: | 840 |
| Laptop Clock: | 841 |
| Air Temp: | 4.42 |
| Air Pressure: | - |
| RH: | 82.62 |
| Water °C: | 13.3 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| | |
|---|-------------------------------|
| Project: 1565 RAMP HYDROLOGY | |
| Site: L2 - Kearl Lake (484935 E, 6349023 N) | |
| Personnel: DB BL | Date: 31-Oct-2010 |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: DB Checked By: JP |

| | |
|-----------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1100 |
| End Time (MST): | |
| Lake Condition: | Open, some ice @ shore. |
| Weather: | Sunny 4°C |

| | |
|---|--|
| Other Notes: | |
| Emptied Pluvio. Added ~3L antifreeze mix. | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging by Trail | 0.480 | 333.324 | 0.467 | 333.324 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.363 | 332.424 | 1.349 | 332.424 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.877 | 331.910 | 1.860 | 331.913 | 331.912 |
| Transducer: | | 0.9 | 331.010 | 0.9 | 331.013 | 331.012 |
| Other: | | | | | | |

| | |
|--|---------|
| Logger Details: | |
| Transducer Reading: | 0.90 |
| Battery (Main): | 14.68 |
| Battery (Aux): | - |
| Datalogger Clock: | 1103 |
| Laptop Clock: | 1105 |
| Air Temp: | 3.81 |
| Air Pressure: | - |
| RH: | 74.66 |
| Water °C: | 6.6 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| | |
|---|-------------------------------|
| Project: 1565 RAMP HYDROLOGY | |
| Site: L2 - Kearl Lake (484935 E, 6349023 N) | |
| Personnel: SG, JO | Date: 2-Dec-2010 |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: JP Checked By: SG |

| | |
|-----------------------------|----------------|
| Measurement Details: | |
| Start Time (MST): | 11:50 |
| End Time (MST): | 12:15 |
| Lake Condition: | Ice |
| Weather: | - 10, Overcast |

| | |
|---------------------|--|
| Other Notes: | |
| | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging by Trail | 0.170 | 333.324 | 0.168 | 333.324 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.045 | 332.424 | 1.045 | 332.424 | - |
| Top of Ice: | | 1.595 | 331.874 | 1.591 | 331.878 | 331.876 |
| Water Level: | | 1.582 | 331.887 | 1.575 | 331.894 | 331.891 |
| Transducer: | | 0.886 | 331.001 | 0.886 | 331.008 | 331.005 |
| Other: | | | | | | |

| | |
|--|---------|
| Logger Details: | |
| Transducer Reading: | 0.886 |
| Battery (Main): | 13.41 |
| Battery (Aux): | - |
| Datalogger Clock: | 11:51 |
| Laptop Clock: | 11:49 |
| Air Temp: | -11.5 |
| Air Pressure: | - |
| RH: | 92 |
| Water °C: | 3.8 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |
| Geonor 1/4 full | |

Hatfield Consultants Hydrometric Site Visit Field Record



| | | | |
|--|---|-------------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: L3 - Isadore's Lake (463305 E, 6342967 N) | | | |
| Personnel: SG, CE | | Date: 20 Jan 2010 | |
| Photos taken?: | √ | x | Entered By: SG |
| | | Checked By: DB | |

| | |
|-----------------------------|----------------|
| Measurement Details: | |
| Start Time (MST): | 1310 |
| End Time (MST): | 1315 |
| Lake Condition: | Ice Covered |
| Weather: | -5 C, Overcast |

| |
|---------------------|
| Other Notes: |
| |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree root w/orange flg | 0.518 | 235.903 | 0.481 | 235.903 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.925 | 234.506 | 1.884 | 234.506 | - |
| Top of Ice: | | 2.629 | 233.802 | 2.590 | 233.800 | 233.801 |
| Water Level: | | 2.630 | 233.801 | 2.594 | 233.796 | 233.799 |
| Transducer: | | 1.176 | 232.625 | 1.176 | 232.620 | 232.623 |
| Other: | | | | | | |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 1.176 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.39 |
| Datalogger Clock: | Reset |
| Laptop Clock: | 1305 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | Reset |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| | | | |
|--|---|------------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: L3 - Isadore's Lake (463305 E, 6342967 N) | | | |
| Personnel: GB, CE | | Date: 9 Feb 2010 | |
| Photos taken?: | √ | x | Entered By: SG |
| | | Checked By: JP | |

| | |
|-----------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1635 |
| End Time (MST): | 1700 |
| Lake Condition: | Ice cover |
| Weather: | sunny -20C |

| |
|---------------------|
| Other Notes: |
| |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree root w/orange flg | 0.214 | 235.903 | 0.219 | 235.903 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.617 | 234.506 | 1.622 | 234.506 | - |
| Top of Ice: | | 2.345 | 233.778 | 2.350 | 233.778 | 233.778 |
| Water Level: | | 2.346 | 233.777 | 2.350 | 233.778 | 233.778 |
| Transducer: | | | | | | |
| Other: | | | | | | |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | 11.34 |
| Battery (Aux): | 11.92 |
| Datalogger Clock: | 1650 |
| Laptop Clock: | 1652 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | - |
| Dessicant: | Good |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

Hatfield Consultants Hydrometric Site Visit Field Record

| | | | |
|--|---|--------------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: L3 - Isadore's Lake (463305 E, 6342967 N) | | | |
| Personnel: JE, SG | | Date: 5 March 2010 | |
| Photos taken?: | √ | x | Entered By: SG |
| | | Checked By: JP | |

| | |
|-----------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 1545 |
| End Time (MST): | 1555 |
| Lake Condition: | Ice Covered |
| Weather: | |

| |
|---------------------|
| Other Notes: |
| |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree root w/orange flg | 0.638 | 235.903 | 0.628 | 235.903 | - |
| Bench Mark 2: | Rebar in PVC pipe | 2.039 | 234.506 | 2.030 | 234.506 | - |
| Top of Ice: | | 2.726 | 233.819 | 2.719 | 233.817 | 233.818 |
| Water Level: | | 2.760 | 233.785 | 2.752 | 233.784 | 233.785 |
| Transducer: | | 1.243 | 232.542 | 1.243 | 232.541 | 232.542 |
| Other: | | | | | | |

| | |
|--|----------|
| Logger Details: | |
| Transducer Reading: | 1.243 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.17 |
| Datalogger Clock: | 1535 |
| Laptop Clock: | 1537 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 10% |
| Dessicant: | Replaced |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

Hatfield Consultants Hydrometric Site Visit Field Record

| | | | |
|--|---|--------------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: L3 - Isadore's Lake (463305 E, 6342967 N) | | | |
| Personnel: DB, BL | | Date: 28 June 2010 | |
| Photos taken?: | √ | Entered By: DB | Checked By: JP |

| | |
|-----------------------------|-------|
| Measurement Details: | |
| Start Time (MST): | 17:15 |
| End Time (MST): | 18:15 |
| Lake Condition: | Open |
| Weather: | Sunny |

| |
|---|
| Other Notes: |
| Check FMT file (L3 2008) used to get March-June data is correct. Now using L3 2010 fmt |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree root w/orange flg | 0.412 | 235.903 | 0.407 | 235.903 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.806 | 234.506 | 1.800 | 234.506 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.452 | 233.860 | 2.442 | 233.864 | 233.862 |
| Transducer: | | 1.174 | 232.686 | 1.174 | 232.690 | 232.688 |
| Other: | | | | | | |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 1.174 |
| Battery (Main): | 100% |
| Battery (Aux): | 77% |
| Datalogger Clock: | 17:10 |
| Laptop Clock: | 17:16 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 26% |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |
| New PT (Lakewood- red) installed 17:50 | |

Hatfield Consultants Hydrometric Site Visit Field Record



| | | | |
|---|-----------------|----------------|--|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: L3 - Isadore's Lake (463305 E, 6342967 N) | | | |
| Personnel: DB, SG | Date: 11-Aug-10 | | |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: SG | Checked By: DB | |

| | |
|-----------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1600 |
| End Time (MST): | 1620 |
| Lake Condition: | Open |
| Weather: | Clear 20°C |

| |
|---------------------|
| Other Notes: |
| |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree root w/orange flg | 0.442 | 235.903 | 0.414 | 235.903 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.846 | 234.506 | 1.818 | 234.506 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.557 | 233.795 | 2.533 | 233.791 | 233.793 |
| Transducer: | | 1.133 | 232.662 | 1.133 | 232.658 | 232.660 |
| Other: | | | | | | |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 1.133 |
| Battery (Main): | 11.8 |
| Battery (Aux): | 11.34 |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 33% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| | | | |
|--|--------------------|----------------|--|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: L3 - Isadore's Lake (463305 E, 6342967 N) | | | |
| Personnel: DB HB SG Arnie (boat) | Date: 17 Sept 2010 | | |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: DB | Checked By: JP | |

| | |
|-----------------------------|-------------------|
| Measurement Details: | |
| Start Time (MST): | 1440 |
| End Time (MST): | 1500 |
| Lake Condition: | Open |
| Weather: | Partly Cloudy 5°C |

| |
|---------------------|
| Other Notes: |
| |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree root w/orange flg | 0.487 | 235.903 | 0.446 | 235.903 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.886 | 234.506 | 1.848 | 234.506 | - |
| Top of Ice: | | | 236.392 | | 236.354 | 236.373 |
| Water Level: | | 2.524 | 233.868 | 2.487 | 233.867 | 233.868 |
| Transducer: | | 1.220 | 232.649 | 1.220 | 232.648 | 232.648 |
| Other: | | | | | | |

| | |
|--|---------|
| Logger Details: | |
| Transducer Reading: | 1.220 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.65 |
| Datalogger Clock: | 1436 |
| Laptop Clock: | 1443 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 40% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| | | | |
|--|-------------------|----------------|--|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: L3 - Isadore's Lake (463305 E, 6342967 N) | | | |
| Personnel: DB BL | Date: 30-Oct-2010 | | |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: DB | Checked By: JP | |

| | |
|-----------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1502 |
| End Time (MST): | 1530 |
| Lake Condition: | Open |
| Weather: | Clear, 9°C |

| |
|---------------------|
| Other Notes: |
| |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree root w/orange flg | 0.483 | 235.903 | 0.457 | 235.903 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.883 | 234.506 | 1.854 | 234.506 | - |
| Top of Ice: | | | 236.389 | | 236.360 | 236.375 |
| Water Level: | | 2.520 | 233.869 | 2.493 | 233.867 | 233.868 |
| Transducer: | | 1.181 | 232.688 | 1.181 | 232.686 | 232.687 |
| Other: | | | | | | |

| | |
|--|-----------|
| Logger Details: | |
| Transducer Reading: | 1.181 |
| Battery (Main): | 100% |
| Battery (Aux): | 78% 12.17 |
| Datalogger Clock: | 1500 |
| Laptop Clock: | 1508 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 45% |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

| | | | |
|--|----------------|----------------|--|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: L3 - Isadore's Lake (463305 E, 6342967 N) | | | |
| Personnel: SG, JO | Date: 5-Dec-10 | | |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: JP | Checked By: SG | |

| | |
|-----------------------------|-----------------|
| Measurement Details: | |
| Start Time (MST): | 10:45 |
| End Time (MST): | 11:15 |
| Lake Condition: | Ice |
| Weather: | - 18, 2/8 cloud |

| |
|---------------------|
| Other Notes: |
| |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree root w/orange flg | 0.467 | 235.903 | 0.469 | 235.903 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.862 | 234.506 | 1.862 | 234.506 | - |
| Top of Ice: | | 2.538 | 233.832 | 2.538 | 233.834 | 233.833 |
| Water Level: | | 2.539 | 233.831 | 2.535 | 233.837 | 233.834 |
| Transducer: | | 1.177 | 232.654 | 1.177 | 232.660 | 232.657 |
| Other: | | | | | | |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 1.177 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 11.68 |
| Datalogger Clock: | 10:36 |
| Laptop Clock: | 10:46 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 50% |
| Dessicant: | - |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger/data notes (e.g. s-depth,ppt.): | |

Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S2 - Jackpine Creek at Canterra Road (474961 E, 6344087 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 18-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | Damaged |
| Battery (Main): | 4.68 |
| Battery (Aux): | 14.19 |
| Datalogger Clock: | 1307 |
| Laptop Clock: | 1325 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 1.5 |
| Memory used: | 26% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | | |
|------------------------------|----------------|---------------------|
| Measurement Details: | | |
| Start Time (MST): | | 1410 |
| End Time (MST): | | 1429 |
| Equipment: | ADV | Other: |
| Method: | Ice | Wading Fishcat Boat |
| River Condition: | | Ice |
| Code ('Ice' or 'Open'): | | Ice |
| Quality/Error (see reverse): | | Good |
| Weather: | -5 C, overcast | |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.827 | 297.990 | 0.806 | 297.990 | - |
| Bench Mark 2: | T-post w/pink flagging | 0.738 | 298.069 | 0.709 | 298.069 | - |
| Top of Ice: | | 1.729 | 297.088 | 1.708 | 297.088 | 297.088 |
| Water Level: | | 2.064 | 296.753 | 2.039 | 296.757 | 296.755 |
| Transducer: | | n/a | n/a | n/a | n/a | n/a |
| Other: | | | | | | |

General Notes:

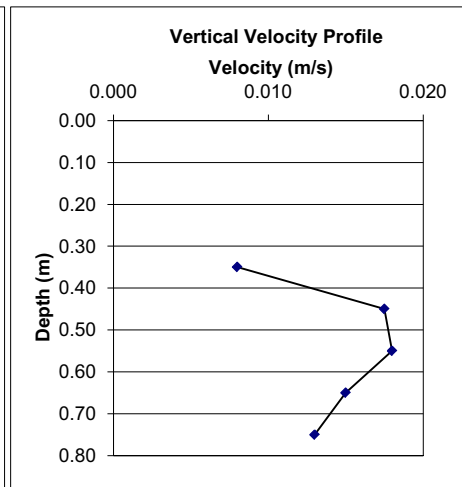
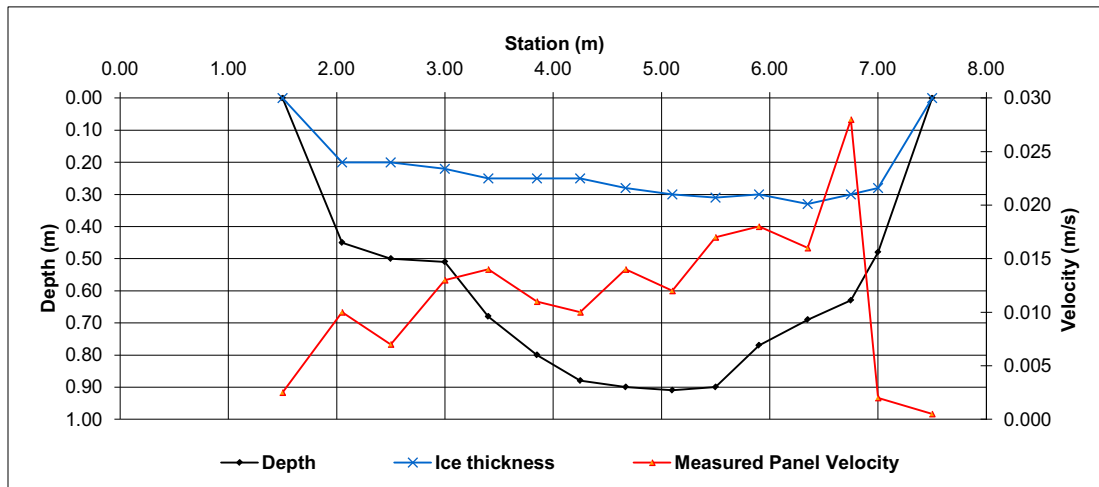
Pressure transducer is damaged under the ice. Unable to access to repair or replace the transducer.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 1.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.9 | 1.50 | 1.78 | 0.28 | 0.06 | 0.003 | 0.002 | 0.02 | 0.000 | 0% |
| 1 | 2.05 | 0.45 | 0.20 | 0.010 | | | 0.9 | 1.78 | 2.28 | 0.50 | 0.25 | 0.010 | 0.009 | 0.13 | 0.001 | 4% |
| 2 | 2.50 | 0.50 | 0.20 | 0.007 | | | 0.9 | 2.28 | 2.75 | 0.48 | 0.30 | 0.007 | 0.006 | 0.14 | 0.001 | 3% |
| 3 | 3.00 | 0.51 | 0.22 | 0.013 | | | 0.9 | 2.75 | 3.20 | 0.45 | 0.29 | 0.013 | 0.012 | 0.13 | 0.002 | 5% |
| 4 | 3.40 | 0.68 | 0.25 | 0.014 | | | 0.9 | 3.20 | 3.63 | 0.43 | 0.43 | 0.014 | 0.013 | 0.18 | 0.002 | 8% |
| 5 | 3.85 | 0.80 | 0.25 | 0.011 | | | 0.9 | 3.63 | 4.05 | 0.43 | 0.55 | 0.011 | 0.010 | 0.23 | 0.002 | 8% |
| 6 | 4.25 | 0.88 | 0.25 | 0.010 | | | 0.9 | 4.05 | 4.46 | 0.41 | 0.63 | 0.010 | 0.009 | 0.26 | 0.002 | 8% |
| 7 | 4.67 | 0.90 | 0.28 | 0.014 | | | 0.9 | 4.46 | 4.89 | 0.43 | 0.62 | 0.014 | 0.013 | 0.26 | 0.003 | 12% |
| 8 | 5.10 | 0.91 | 0.30 | 0.012 | | | 0.9 | 4.89 | 5.30 | 0.42 | 0.61 | 0.012 | 0.011 | 0.25 | 0.003 | 10% |
| 9 | 5.50 | 0.90 | 0.31 | 0.017 | | | 0.9 | 5.30 | 5.70 | 0.40 | 0.59 | 0.017 | 0.015 | 0.24 | 0.004 | 13% |
| 10 | 5.90 | 0.77 | 0.30 | 0.018 | | | 0.9 | 5.70 | 6.13 | 0.43 | 0.47 | 0.018 | 0.016 | 0.20 | 0.003 | 11% |
| 11 | 6.35 | 0.69 | 0.33 | 0.016 | | | 0.9 | 6.13 | 6.55 | 0.43 | 0.36 | 0.016 | 0.014 | 0.15 | 0.002 | 8% |
| 12 | 6.75 | 0.63 | 0.30 | 0.028 | | | 0.9 | 6.55 | 6.88 | 0.33 | 0.33 | 0.028 | 0.025 | 0.11 | 0.003 | 9% |
| 13 | 7.00 | 0.48 | 0.28 | 0.002 | | | 0.9 | 6.88 | 7.25 | 0.38 | 0.20 | 0.002 | 0.002 | 0.08 | 0.000 | 0% |
| Right | 7.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 7.25 | 7.50 | 0.25 | 0.05 | 0.001 | 0.001 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.028 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.028 | (m ³ /s) |
| Perceived Measurement Quality: | | Good | |
| Total Area: | | 2.38 | (m ²) |
| Wetted Width: | | 5.75 | (m) |
| Hydraulic Depth: | | 0.414 | (m) |
| Mean Velocity: | | 0.012 | (m/s) |
| Froude Number: | | 0.006 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|--------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.013 |
| Offset | 5.10 | 0.91 | 0 | - | Panel V.@Ofst | 0.012 |
| Depth | 0.91 | 0.80 | 0.013 | 0.86 | 60% Depth | 0.666 |
| Ice Depth | 0.30 | 0.70 | 0.013 | 0.75 | 20% Depth | 0.42 |
| | | 0.60 | 0.017 | 0.65 | 80% Depth | 0.79 |
| | | 0.50 | 0.019 | 0.55 | | |
| | | 0.40 | 0.016 | 0.45 | | |
| | | 0.30 | 0 | 0.35 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S2 - Jackpine Creek at Canterra Road (474961 E, 6344087 N) | | | |
| Field Personnel: | GB, JE | Trip Date: | 14-Feb-10 |
| Data Entry Personnel: | SG | Date: | 18-Feb-10 |
| Data Check Personnel: | DB | Date: | 12-Mar-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | Damaged |
| Battery (Main): | 4.65 |
| Battery (Aux): | 14.02 |
| Datalogger Clock: | 850 |
| Laptop Clock: | 910 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 1.42 |
| Memory used: | 30% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 946 |
| End Time (MST): | 1002 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Clear -13C |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.864 | 297.990 | 0.825 | 297.990 | - |
| Bench Mark 2: | T-post w/pink flagging | 0.964 | 298.069 | 0.927 | 298.069 | - |
| Top of Ice: | | 1.867 | 296.987 | 1.840 | 296.975 | 296.981 |
| Water Level: | | 2.191 | 296.663 | 2.154 | 296.661 | 296.662 |
| Transducer: | | n/a | n/a | n/a | n/a | n/a |
| Other: | | | | | | |

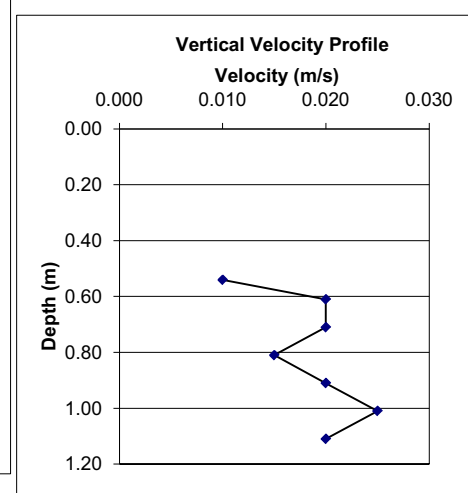
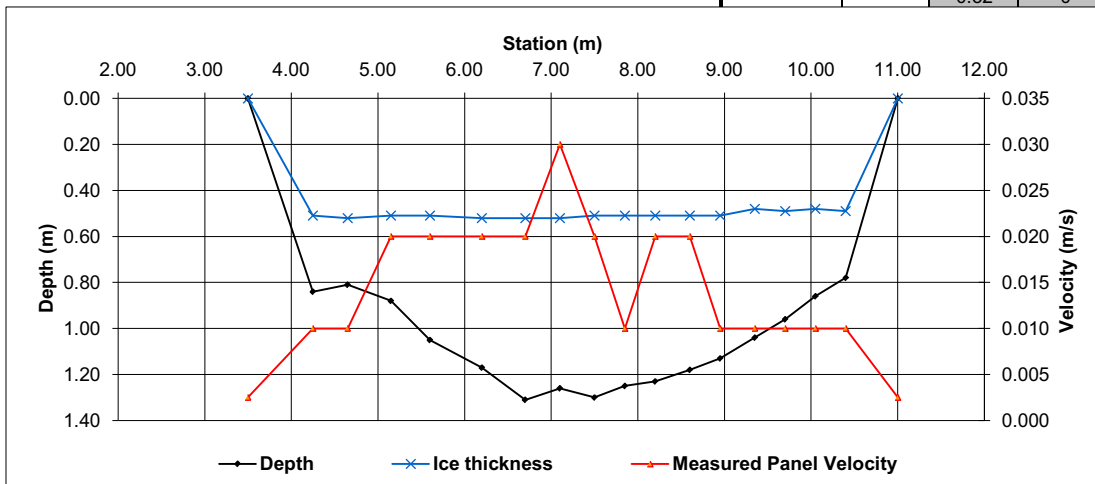
General Notes:
Pressure transducer is damaged under the ice. Unable to access to repair or replace the transducer.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | Calculated Data | | | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 3.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.9 | 3.50 | 3.88 | 0.38 | 0.08 | 0.003 | 0.002 | 0.03 | 0.000 | 6% |
| 2 | 4.25 | 0.84 | 0.51 | 0.010 | | | 0.9 | 3.88 | 4.45 | 0.58 | 0.33 | 0.010 | 0.009 | 0.19 | 0.002 | 3% |
| 3 | 4.65 | 0.81 | 0.52 | 0.010 | | | 0.9 | 4.45 | 4.90 | 0.45 | 0.29 | 0.010 | 0.009 | 0.13 | 0.001 | 2% |
| 4 | 5.15 | 0.88 | 0.51 | 0.020 | | | 0.9 | 4.90 | 5.38 | 0.48 | 0.37 | 0.020 | 0.018 | 0.18 | 0.003 | 6% |
| 5 | 5.60 | 1.05 | 0.51 | 0.020 | | | 0.9 | 5.38 | 5.90 | 0.53 | 0.54 | 0.020 | 0.018 | 0.28 | 0.005 | 9% |
| 6 | 6.20 | 1.17 | 0.52 | 0.020 | | | 0.9 | 5.90 | 6.45 | 0.55 | 0.65 | 0.020 | 0.018 | 0.36 | 0.006 | 11% |
| 7 | 6.70 | 1.31 | 0.52 | 0.020 | | | 0.9 | 6.45 | 6.90 | 0.45 | 0.79 | 0.020 | 0.018 | 0.36 | 0.006 | 11% |
| 8 | 7.10 | 1.26 | 0.52 | 0.030 | | | 0.9 | 6.90 | 7.30 | 0.40 | 0.74 | 0.030 | 0.027 | 0.30 | 0.008 | 14% |
| 9 | 7.50 | 1.30 | 0.51 | 0.020 | | | 0.9 | 7.30 | 7.68 | 0.38 | 0.79 | 0.020 | 0.018 | 0.30 | 0.005 | 9% |
| 10 | 7.85 | 1.25 | 0.51 | 0.010 | | | 0.9 | 7.68 | 8.03 | 0.35 | 0.74 | 0.010 | 0.009 | 0.26 | 0.002 | 4% |
| 11 | 8.20 | 1.23 | 0.51 | 0.020 | | | 0.9 | 8.03 | 8.40 | 0.38 | 0.72 | 0.020 | 0.018 | 0.27 | 0.005 | 9% |
| 12 | 8.60 | 1.18 | 0.51 | 0.020 | | | 0.9 | 8.40 | 8.78 | 0.38 | 0.67 | 0.020 | 0.018 | 0.25 | 0.005 | 8% |
| 13 | 8.95 | 1.13 | 0.51 | 0.010 | | | 0.9 | 8.78 | 9.15 | 0.38 | 0.62 | 0.010 | 0.009 | 0.23 | 0.002 | 4% |
| 14 | 9.35 | 1.04 | 0.48 | 0.010 | | | 0.9 | 9.15 | 9.53 | 0.38 | 0.56 | 0.010 | 0.009 | 0.21 | 0.002 | 3% |
| 15 | 9.70 | 0.96 | 0.49 | 0.010 | | | 0.9 | 9.53 | 9.88 | 0.35 | 0.47 | 0.010 | 0.009 | 0.16 | 0.001 | 3% |
| 16 | 10.05 | 0.86 | 0.48 | 0.010 | | | 0.9 | 9.88 | 10.23 | 0.35 | 0.38 | 0.010 | 0.009 | 0.13 | 0.001 | 2% |
| 17 | 10.40 | 0.78 | 0.49 | 0.010 | | | 0.9 | 10.23 | 10.70 | 0.47 | 0.29 | 0.010 | 0.009 | 0.14 | 0.001 | 2% |
| Left | 11.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 10.70 | 11.00 | 0.30 | 0.07 | 0.003 | 0.003 | 0.02 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.057 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.057 | (m ³ /s) |
| Perceived Measurement Quality: | | Good | |
| Total Area: | | 3.77 | (m ²) |
| Wetted Width: | | 7.20 | (m) |
| Hydraulic Depth: | | 0.524 | (m) |
| Mean Velocity: | | 0.015 | (m/s) |
| Froude Number: | | 0.007 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|--------|-------|----------|------------|---------------|--------------------|
| Velocity Profile | Offset | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. |
| | 7.10 | 1.26 | 0 | - | - | Panel V.@Ofst 0.03 |
| Depth | 1.26 | 1.16 | 0.02 | 1.21 | 0.010 | 60% Depth 0.964 |
| Ice Depth | 0.52 | 1.06 | 0.02 | 1.11 | 0.020 | 20% Depth 0.67 |
| | | 0.96 | 0.030 | 1.01 | 0.025 | 80% Depth 1.11 |
| | | 0.86 | 0.010 | 0.91 | 0.020 | |
| | | 0.76 | 0.020 | 0.81 | 0.015 | |
| | | 0.66 | 0.020 | 0.71 | 0.020 | |
| | | 0.56 | 0.02 | 0.61 | 0.020 | |
| | | 0.52 | 0 | 0.54 | 0.010 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S2 - Jackpine Creek at Canterra Road (474961 E, 6344087 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 09-Mar-10 |
| Data Entry Personnel: | SG | Date: | 18-Mar-10 |
| Data Check Personnel: | JP | Date: | 02-Jun-10 |

| | |
|------------------------|------------|
| Logger Details: | |
| Transducer Reading: | Damaged |
| Battery (Main): | 4.72 |
| Battery (Aux): | 14.04 |
| Datalogger Clock: | 1138 |
| Laptop Clock: | 1159 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 1.447 |
| Memory used: | 33% |
| Dessicant: | OK |
| Logger# (if Δ): | 0204100602 |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1240 |
| End Time (MST): | 1259 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Ice Covered |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | Sunny 2°C |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.871 | 297.990 | 0.865 | 297.990 | - |
| Bench Mark 2: | T-post w/pink flagging | 0.770 | 298.069 | 0.761 | 298.069 | - |
| Top of Ice: | | 1.798 | 297.063 | 0.787 | 298.068 | 297.566 |
| Water Level: | | 2.098 | 296.763 | 2.091 | 296.764 | 296.764 |
| Transducer: | | n/a | n/a | n/a | n/a | n/a |
| Other: | | | | | | |

General Notes:

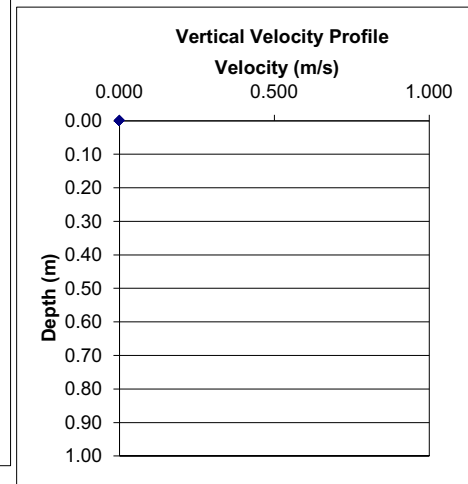
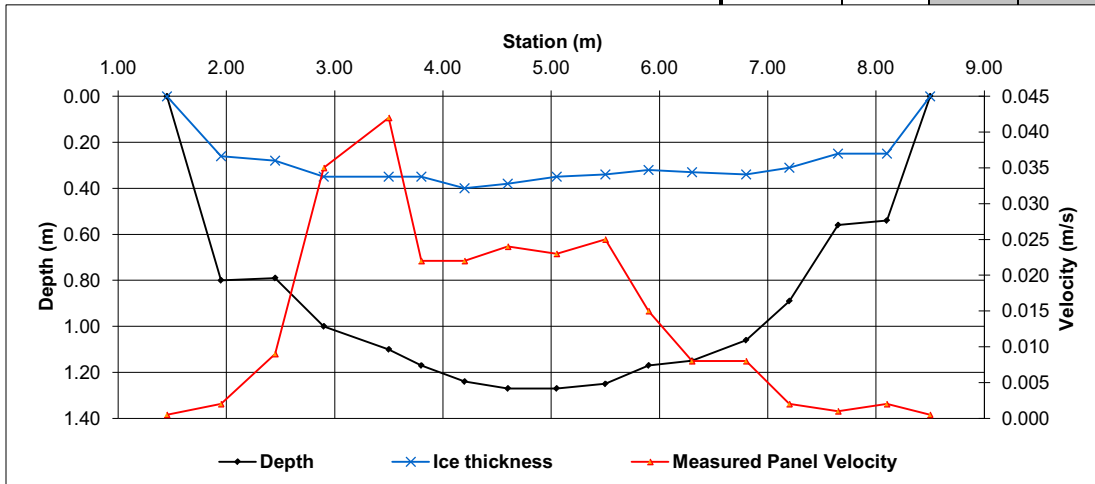
Pressure transducer is damaged under the ice. Unable to access to repair or replace the transducer.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 1.45 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.9 | 1.45 | 1.70 | 0.25 | 0.14 | 0.001 | 0.000 | 0.03 | 0.000 | 7% |
| 1 | 1.95 | 0.80 | 0.26 | 0.002 | | | 0.9 | 1.70 | 2.20 | 0.50 | 0.54 | 0.002 | 0.002 | 0.27 | 0.000 | 1% |
| 2 | 2.45 | 0.79 | 0.28 | 0.009 | | | 0.9 | 2.20 | 2.68 | 0.48 | 0.51 | 0.009 | 0.008 | 0.24 | 0.002 | 3% |
| 3 | 2.90 | 1.00 | 0.35 | 0.035 | | | 0.9 | 2.68 | 3.20 | 0.53 | 0.65 | 0.035 | 0.032 | 0.34 | 0.011 | 15% |
| 4 | 3.50 | 1.10 | 0.35 | 0.042 | | | 0.9 | 3.20 | 3.65 | 0.45 | 0.75 | 0.042 | 0.038 | 0.34 | 0.013 | 17% |
| 5 | 3.80 | 1.17 | 0.35 | 0.022 | | | 0.9 | 3.65 | 4.00 | 0.35 | 0.82 | 0.022 | 0.020 | 0.29 | 0.006 | 8% |
| 6 | 4.20 | 1.24 | 0.40 | 0.022 | | | 0.9 | 4.00 | 4.40 | 0.40 | 0.84 | 0.022 | 0.020 | 0.34 | 0.007 | 9% |
| 7 | 4.60 | 1.27 | 0.38 | 0.024 | | | 0.9 | 4.40 | 4.83 | 0.42 | 0.89 | 0.024 | 0.022 | 0.38 | 0.008 | 11% |
| 8 | 5.05 | 1.27 | 0.35 | 0.023 | | | 0.9 | 4.83 | 5.28 | 0.45 | 0.92 | 0.023 | 0.021 | 0.41 | 0.009 | 12% |
| 9 | 5.50 | 1.25 | 0.34 | 0.025 | | | 0.9 | 5.28 | 5.70 | 0.43 | 0.91 | 0.025 | 0.023 | 0.39 | 0.009 | 12% |
| 10 | 5.90 | 1.17 | 0.32 | 0.015 | | | 0.9 | 5.70 | 6.10 | 0.40 | 0.85 | 0.015 | 0.014 | 0.34 | 0.005 | 6% |
| 11 | 6.30 | 1.15 | 0.33 | 0.008 | | | 0.9 | 6.10 | 6.55 | 0.45 | 0.82 | 0.008 | 0.007 | 0.37 | 0.003 | 4% |
| 12 | 6.80 | 1.06 | 0.34 | 0.008 | | | 0.9 | 6.55 | 7.00 | 0.45 | 0.72 | 0.008 | 0.007 | 0.32 | 0.002 | 3% |
| 13 | 7.20 | 0.89 | 0.31 | 0.002 | | | 0.9 | 7.00 | 7.43 | 0.43 | 0.58 | 0.002 | 0.002 | 0.25 | 0.000 | 1% |
| 14 | 7.65 | 0.56 | 0.25 | 0.001 | | | 0.9 | 7.43 | 7.88 | 0.45 | 0.31 | 0.001 | 0.001 | 0.14 | 0.000 | 0% |
| 15 | 8.10 | 0.54 | 0.25 | 0.002 | | | 0.9 | 7.88 | 8.30 | 0.43 | 0.29 | 0.002 | 0.002 | 0.12 | 0.000 | 0% |
| Right | 8.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 8.30 | 8.50 | 0.20 | 0.07 | 0.001 | 0.001 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.074 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 0.074 (m ³ /s) |
| Perceived Measurement Quality: | Fair |
| Total Area: | 4.57 (m ²) |
| Wetted Width: | 6.85 (m) |
| Hydraulic Depth: | 0.667 (m) |
| Mean Velocity: | 0.016 (m/s) |
| Froude Number: | 0.006 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|----------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V. @Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S2 - Jackpine Creek at Canterra Road (474961 E, 6344087 N) | | | |
| Field Personnel: | DB CE | Trip Date: | 06-Apr-10 |
| Data Entry Personnel: | DB | Date: | 04-May-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|----------|
| Logger Details: | |
| Transducer Reading: | 3.495181 |
| Battery (Main): | 4.75 |
| Battery (Aux): | 13.44 |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | -5.318 |
| Memory used: | |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|--------------|
| Measurement Details: | |
| Start Time (MST): | 1430 |
| End Time (MST): | 1445 |
| Equipment: | - |
| Method: | - |
| River Condition: | Partly open |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Warm + sunny |

| Level Survey: | | | | | | |
|----------------------|------------------------|----------|---------|----------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.800 | 297.990 | 0.753 | 297.990 | - |
| Bench Mark 2: | T-post w/pink flagging | 0.698 | 298.069 | 0.647 | 298.069 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.695 | 297.095 | 1.648 | 297.095 | 297.095 |
| Transducer: | | 3.495181 | 293.600 | 3.495181 | 293.600 | 293.600 |
| Other: | | | | | | |

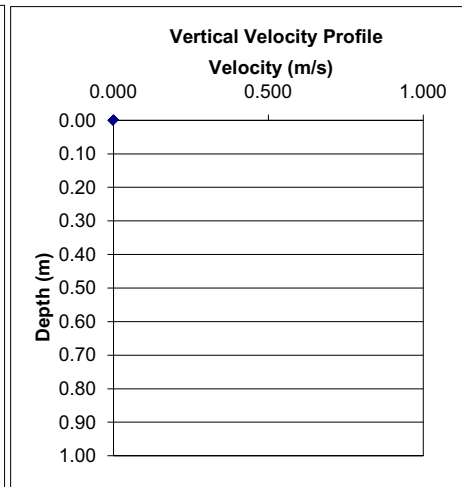
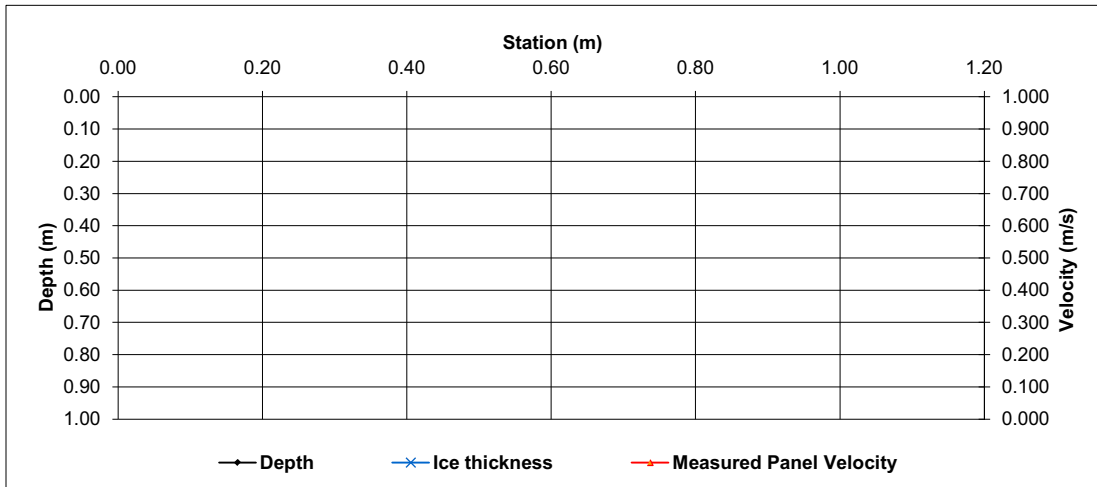
General Notes:

Transducer damaged + irretrievable

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | |

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | NOT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | | Poor | |
| Total Area: | | #VALUE! | (m ²) |
| Wetted Width: | | 0.00 | (m) |
| Hydraulic Depth: | | #VALUE! | (m) |
| Mean Velocity: | | #VALUE! | (m/s) |
| Froude Number: | | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S2 - Jackpine Creek at Canterra Road (474961 E, 6344087 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 26-Apr-10 |
| Data Entry Personnel: | DB | Date: | 30-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|-----------|
| Logger Details: | |
| Transducer Reading: | 0.678 |
| Battery (Main): | 6.72 |
| Battery (Aux): | 13.32 |
| Datalogger Clock: | 1717 |
| Laptop Clock: | 1717 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | |
| Memory used: | 39% |
| Dessicant: | OK |
| Logger# (if Δ): | 204100602 |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1700 |
| End Time (MST): | 1720 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Sunny 10°C |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 1.243 | 297.990 | 1.193 | 297.990 | - |
| Bench Mark 2: | T-post w/pink flagging | 1.142 | 298.069 | 1.092 | 298.069 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.880 | 297.353 | 1.828 | 297.355 | 297.354 |
| Transducer: | | 0.678 | 296.675 | 0.678 | 296.677 | 296.676 |
| Other: | | | | | | |

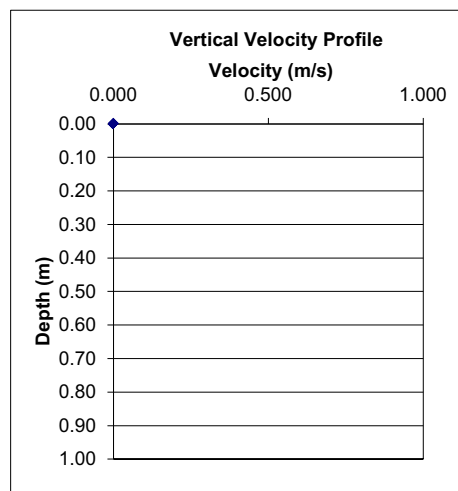
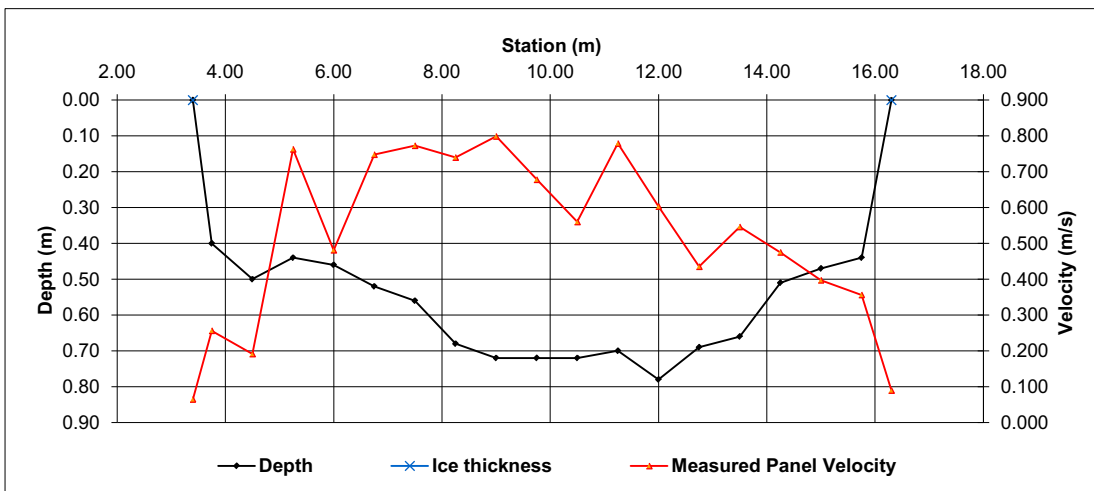
| | |
|----------------------------|--|
| General Notes: | |
| Installed PRTD and solinst | |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | |
| Right | 16.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 16.30 | 16.03 | 0.28 | 0.11 | 0.089 | 0.089 | 0.03 | 0.003 | 1% | | | |
| 2 | 15.75 | 0.44 | | 0.356 | | | 1.0 | 16.03 | 15.38 | 0.65 | 0.44 | 0.356 | 0.356 | 0.29 | 0.102 | 2% | | | |
| 3 | 15.00 | 0.47 | | 0.397 | | | 1.0 | 15.38 | 14.63 | 0.75 | 0.47 | 0.397 | 0.397 | 0.35 | 0.140 | 3% | | | |
| 4 | 14.25 | 0.51 | | 0.475 | | | 1.0 | 14.63 | 13.88 | 0.75 | 0.51 | 0.475 | 0.475 | 0.38 | 0.182 | 4% | | | |
| 5 | 13.50 | 0.66 | | 0.546 | | | 1.0 | 13.88 | 13.13 | 0.75 | 0.66 | 0.546 | 0.546 | 0.50 | 0.270 | 6% | | | |
| 6 | 12.75 | 0.69 | | 0.435 | | | 1.0 | 13.13 | 12.38 | 0.75 | 0.69 | 0.435 | 0.435 | 0.52 | 0.225 | 5% | | | |
| 7 | 12.00 | 0.78 | | 0.603 | | | 1.0 | 12.38 | 11.63 | 0.75 | 0.78 | 0.603 | 0.603 | 0.59 | 0.353 | 8% | | | |
| 8 | 11.25 | 0.70 | | 0.779 | | | 1.0 | 11.63 | 10.88 | 0.75 | 0.70 | 0.779 | 0.779 | 0.53 | 0.409 | 9% | | | |
| 9 | 10.50 | 0.72 | | 0.560 | | | 1.0 | 10.88 | 10.13 | 0.75 | 0.72 | 0.560 | 0.560 | 0.54 | 0.302 | 7% | | | |
| 10 | 9.75 | 0.72 | | 0.678 | | | 1.0 | 10.13 | 9.38 | 0.75 | 0.72 | 0.678 | 0.678 | 0.54 | 0.366 | 8% | | | |
| 11 | 9.00 | 0.72 | | 0.799 | | | 1.0 | 9.38 | 8.63 | 0.75 | 0.72 | 0.799 | 0.799 | 0.54 | 0.431 | 10% | | | |
| 12 | 8.25 | 0.68 | | 0.740 | | | 1.0 | 8.63 | 7.88 | 0.75 | 0.68 | 0.740 | 0.740 | 0.51 | 0.377 | 9% | | | |
| 13 | 7.50 | 0.56 | | 0.773 | | | 1.0 | 7.88 | 7.13 | 0.75 | 0.56 | 0.773 | 0.773 | 0.42 | 0.325 | 8% | | | |
| 14 | 6.75 | 0.52 | | 0.748 | | | 1.0 | 7.13 | 6.38 | 0.75 | 0.52 | 0.748 | 0.748 | 0.39 | 0.292 | 7% | | | |
| 15 | 6.00 | 0.46 | | 0.481 | | | 1.0 | 6.38 | 5.63 | 0.75 | 0.46 | 0.481 | 0.481 | 0.35 | 0.166 | 4% | | | |
| 16 | 5.25 | 0.44 | | 0.763 | | | 1.0 | 5.63 | 4.88 | 0.75 | 0.44 | 0.763 | 0.763 | 0.33 | 0.252 | 6% | | | |
| 17 | 4.50 | 0.50 | | 0.191 | | | 1.0 | 4.88 | 4.13 | 0.75 | 0.50 | 0.191 | 0.191 | 0.38 | 0.072 | 2% | | | |
| 18 | 3.75 | 0.40 | | 0.256 | | | 1.0 | 4.13 | 3.58 | 0.55 | 0.40 | 0.256 | 0.256 | 0.22 | 0.056 | 1% | | | |
| Left | 3.40 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.58 | 3.40 | 0.18 | 0.10 | 0.064 | 0.064 | 0.02 | 0.001 | 0% | | | |
| Total Flow | | | | | | | | | | | | | | | 4.324 | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-----------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 4.324 | (m ³ /s) |
| Perceived Measurement Quality: | | Excellent | |
| Total Area: | | 7.16 | (m ²) |
| Wetted Width: | | 11.15 | (m) |
| Hydraulic Depth: | | 0.642 | (m) |
| Mean Velocity: | | 0.604 | (m/s) |
| Froude Number: | | 0.241 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|----------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V. @Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S2 - Jackpine Creek at Canterra Road (474961 E, 6344087 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 26-Jun-10 |
| Data Entry Personnel: | DB | Date: | 02-Jul-10 |
| Data Check Personnel: | JP | Date: | 13-Jul-10 |

| | |
|------------------------|----------|
| Logger Details: | |
| Transducer Reading: | 0.307492 |
| Battery (Main): | 4.75 |
| Battery (Aux): | 13.42 |
| Datalogger Clock: | 16:41 |
| Laptop Clock: | 16:45 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | |
| Memory used: | 48% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|--------|
| Measurement Details: | |
| Start Time (MST): | 1640 |
| End Time (MST): | 1720 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------|----------|---------|----------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.781 | 297.990 | 0.773 | 297.990 | - |
| Bench Mark 2: | T-post w/pink flagging | 0.681 | 298.069 | 0.672 | 298.069 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.789 | 296.982 | 1.777 | 296.986 | 296.984 |
| Transducer: | | 0.307492 | 296.675 | 0.307492 | 296.679 | 296.677 |
| Other: | | | | | | |

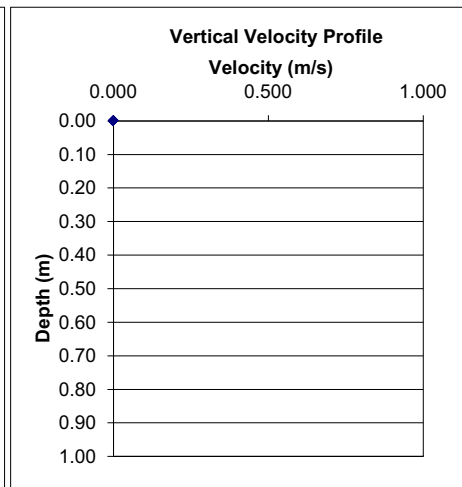
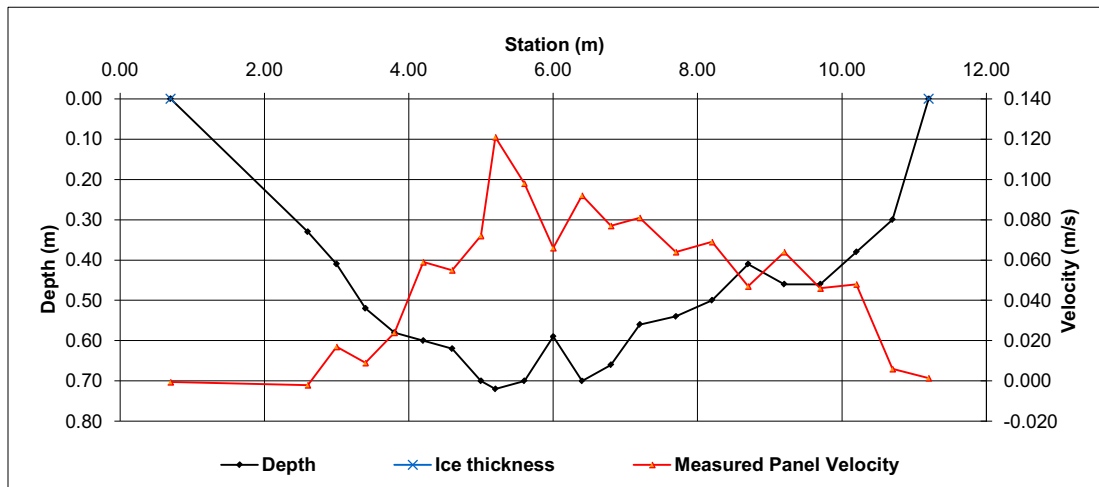
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 11.20 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 11.20 | 10.95 | 0.25 | 0.08 | 0.002 | 0.002 | 0.02 | 0.000 | 0% |
| 2 | 10.70 | 0.30 | | 0.006 | | | 1.0 | 10.95 | 10.45 | 0.50 | 0.30 | 0.006 | 0.006 | 0.15 | 0.001 | 0% |
| 3 | 10.20 | 0.38 | | 0.048 | | | 1.0 | 10.45 | 9.95 | 0.50 | 0.38 | 0.048 | 0.048 | 0.19 | 0.009 | 3% |
| 4 | 9.70 | 0.46 | | 0.046 | | | 1.0 | 9.95 | 9.45 | 0.50 | 0.46 | 0.046 | 0.046 | 0.23 | 0.011 | 4% |
| 5 | 9.20 | 0.46 | | 0.064 | | | 1.0 | 9.45 | 8.95 | 0.50 | 0.46 | 0.064 | 0.064 | 0.23 | 0.015 | 6% |
| 6 | 8.70 | 0.41 | | 0.047 | | | 1.0 | 8.95 | 8.45 | 0.50 | 0.41 | 0.047 | 0.047 | 0.21 | 0.010 | 4% |
| 7 | 8.20 | 0.50 | | 0.069 | | | 1.0 | 8.45 | 7.95 | 0.50 | 0.50 | 0.069 | 0.069 | 0.25 | 0.017 | 6% |
| 8 | 7.70 | 0.54 | | 0.064 | | | 1.0 | 7.95 | 7.45 | 0.50 | 0.54 | 0.064 | 0.064 | 0.27 | 0.017 | 6% |
| 9 | 7.20 | 0.56 | | 0.081 | | | 1.0 | 7.45 | 7.00 | 0.45 | 0.56 | 0.081 | 0.081 | 0.25 | 0.020 | 8% |
| 10 | 6.80 | 0.66 | | 0.077 | | | 1.0 | 7.00 | 6.60 | 0.40 | 0.66 | 0.077 | 0.077 | 0.26 | 0.020 | 8% |
| 11 | 6.40 | 0.70 | | 0.092 | | | 1.0 | 6.60 | 6.20 | 0.40 | 0.70 | 0.092 | 0.092 | 0.28 | 0.026 | 10% |
| 12 | 6.00 | 0.59 | | 0.066 | | | 1.0 | 6.20 | 5.80 | 0.40 | 0.59 | 0.066 | 0.066 | 0.24 | 0.016 | 6% |
| 13 | 5.60 | 0.70 | | 0.098 | | | 1.0 | 5.80 | 5.40 | 0.40 | 0.70 | 0.098 | 0.098 | 0.28 | 0.027 | 10% |
| 14 | 5.20 | 0.72 | | 0.121 | | | 1.0 | 5.40 | 5.10 | 0.30 | 0.72 | 0.121 | 0.121 | 0.22 | 0.026 | 10% |
| 15 | 5.00 | 0.70 | | 0.072 | | | 1.0 | 5.10 | 4.80 | 0.30 | 0.70 | 0.072 | 0.072 | 0.21 | 0.015 | 6% |
| 16 | 4.60 | 0.62 | | 0.055 | | | 1.0 | 4.80 | 4.40 | 0.40 | 0.62 | 0.055 | 0.055 | 0.25 | 0.014 | 5% |
| 17 | 4.20 | 0.60 | | 0.059 | | | 1.0 | 4.40 | 4.00 | 0.40 | 0.60 | 0.059 | 0.059 | 0.24 | 0.014 | 5% |
| 18 | 3.80 | 0.58 | | 0.024 | | | 1.0 | 4.00 | 3.60 | 0.40 | 0.58 | 0.024 | 0.024 | 0.23 | 0.006 | 2% |
| 19 | 3.40 | 0.52 | | 0.009 | | | 1.0 | 3.60 | 3.20 | 0.40 | 0.52 | 0.009 | 0.009 | 0.21 | 0.002 | 1% |
| 20 | 3.00 | 0.41 | | 0.017 | | | 1.0 | 3.20 | 2.80 | 0.40 | 0.41 | 0.017 | 0.017 | 0.16 | 0.003 | 1% |
| 21 | 2.60 | 0.33 | | -0.002 | | | 1.0 | 2.80 | 1.65 | 1.15 | 0.33 | -0.002 | -0.002 | 0.38 | -0.001 | 0% |
| Left | 0.70 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.65 | 0.70 | 0.95 | 0.08 | -0.001 | -0.001 | 0.08 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.268 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.268 | (m ³ /s) |
| Perceived Measurement Quality: | | Good | |
| Total Area: | | 3.77 | (m ²) |
| Wetted Width: | | 6.55 | (m) |
| Hydraulic Depth: | | 0.576 | (m) |
| Mean Velocity: | | 0.071 | (m/s) |
| Froude Number: | | 0.030 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S2 - Jackpine Creek at Canterra Road (474961 E, 6344087 N) | | | |
| Field Personnel: | DB, SG | Trip Date: | 10-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.537 |
| Battery (Main): | 4.76 |
| Battery (Aux): | 13.57 |
| Datalogger Clock: | 1346 |
| Laptop Clock: | 1350 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 18.96 |
| Memory used: | 5% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|----------------------|
| Measurement Details: | |
| Start Time (MST): | 1350 |
| End Time (MST): | 1430 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open, Backwater |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | overcast, wind, 25°C |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.947 | 297.990 | 0.907 | 297.990 | - |
| Bench Mark 2: | T-post w/pink flagging | 0.847 | 298.069 | 0.808 | 298.069 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.720 | 297.217 | 1.683 | 297.214 | 297.216 |
| Transducer: | | 0.537 | 296.680 | 0.537 | 296.677 | 296.679 |
| Other: | | | | | | |

General Notes:

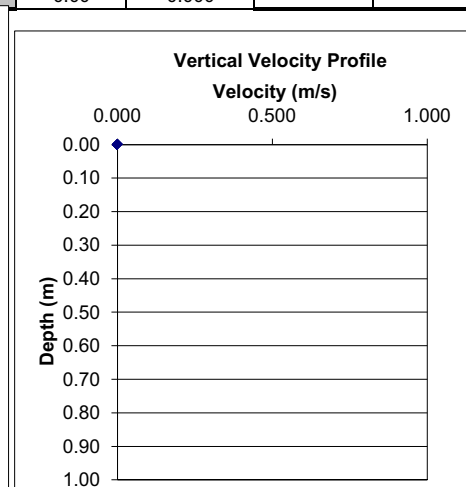
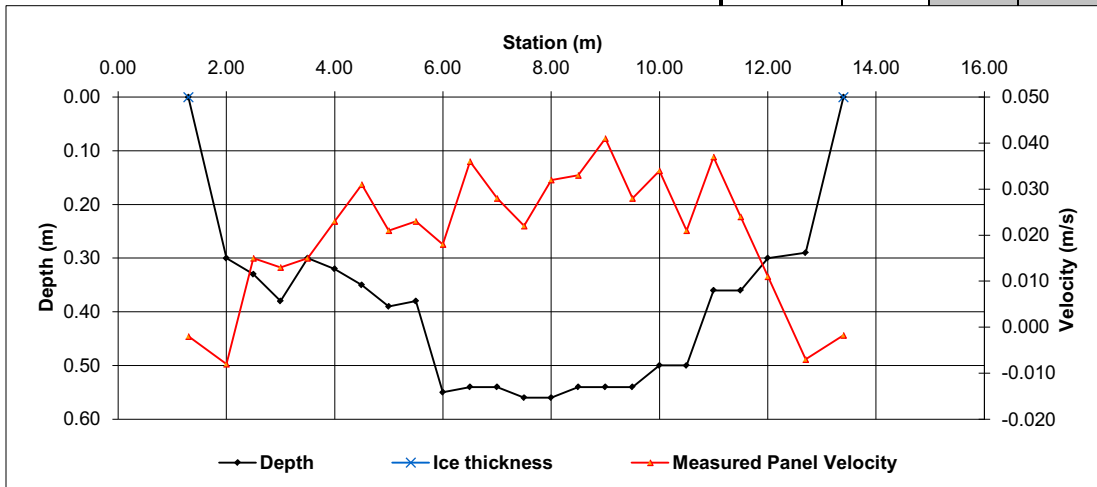
Water level is increasing, backwater is likely occurring.

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 1.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.30 | 1.65 | 0.35 | 0.08 | -0.002 | -0.002 | 0.03 | 0.000 | -1% | |
| 1 | 2.00 | 0.30 | | -0.008 | | | 1.0 | 1.65 | 2.25 | 0.60 | 0.30 | -0.008 | -0.008 | 0.18 | -0.001 | -1% | |
| 2 | 2.50 | 0.33 | | 0.015 | | | 1.0 | 2.25 | 2.75 | 0.50 | 0.33 | 0.015 | 0.015 | 0.17 | 0.002 | 2% | |
| 3 | 3.00 | 0.38 | | 0.013 | | | 1.0 | 2.75 | 3.25 | 0.50 | 0.38 | 0.013 | 0.013 | 0.19 | 0.002 | 2% | |
| 4 | 3.50 | 0.30 | | 0.015 | | | 1.0 | 3.25 | 3.75 | 0.50 | 0.30 | 0.015 | 0.015 | 0.15 | 0.002 | 2% | |
| 5 | 4.00 | 0.32 | | 0.023 | | | 1.0 | 3.75 | 4.25 | 0.50 | 0.32 | 0.023 | 0.023 | 0.16 | 0.004 | 3% | |
| 6 | 4.50 | 0.35 | | 0.031 | | | 1.0 | 4.25 | 4.75 | 0.50 | 0.35 | 0.031 | 0.031 | 0.18 | 0.005 | 5% | |
| 7 | 5.00 | 0.39 | | 0.021 | | | 1.0 | 4.75 | 5.25 | 0.50 | 0.39 | 0.021 | 0.021 | 0.20 | 0.004 | 4% | |
| 8 | 5.50 | 0.38 | | 0.023 | | | 1.0 | 5.25 | 5.75 | 0.50 | 0.38 | 0.023 | 0.023 | 0.19 | 0.004 | 4% | |
| 9 | 6.00 | 0.55 | | 0.018 | | | 1.0 | 5.75 | 6.25 | 0.50 | 0.55 | 0.018 | 0.018 | 0.28 | 0.005 | 4% | |
| 10 | 6.50 | 0.54 | | 0.036 | | | 1.0 | 6.25 | 6.75 | 0.50 | 0.54 | 0.036 | 0.036 | 0.27 | 0.010 | 9% | |
| 11 | 7.00 | 0.54 | | 0.028 | | | 1.0 | 6.75 | 7.25 | 0.50 | 0.54 | 0.028 | 0.028 | 0.27 | 0.008 | 7% | |
| 12 | 7.50 | 0.56 | | 0.022 | | | 1.0 | 7.25 | 7.75 | 0.50 | 0.56 | 0.022 | 0.022 | 0.28 | 0.006 | 5% | |
| 13 | 8.00 | 0.56 | | 0.032 | | | 1.0 | 7.75 | 8.25 | 0.50 | 0.56 | 0.032 | 0.032 | 0.28 | 0.009 | 8% | |
| 14 | 8.50 | 0.54 | | 0.033 | | | 1.0 | 8.25 | 8.75 | 0.50 | 0.54 | 0.033 | 0.033 | 0.27 | 0.009 | 8% | |
| 15 | 9.00 | 0.54 | | 0.041 | | | 1.0 | 8.75 | 9.25 | 0.50 | 0.54 | 0.041 | 0.041 | 0.27 | 0.011 | 10% | |
| 16 | 9.50 | 0.54 | | 0.028 | | | 1.0 | 9.25 | 9.75 | 0.50 | 0.54 | 0.028 | 0.028 | 0.27 | 0.008 | 7% | |
| 17 | 10.00 | 0.50 | | 0.034 | | | 1.0 | 9.75 | 10.25 | 0.50 | 0.50 | 0.034 | 0.034 | 0.25 | 0.009 | 7% | |
| 18 | 10.50 | 0.50 | | 0.021 | | | 1.0 | 10.25 | 10.75 | 0.50 | 0.50 | 0.021 | 0.021 | 0.25 | 0.005 | 5% | |
| 19 | 11.00 | 0.36 | | 0.037 | | | 1.0 | 10.75 | 11.25 | 0.50 | 0.36 | 0.037 | 0.037 | 0.18 | 0.007 | 6% | |
| 20 | 11.50 | 0.36 | | 0.024 | | | 1.0 | 11.25 | 11.75 | 0.50 | 0.36 | 0.024 | 0.024 | 0.18 | 0.004 | 4% | |
| 21 | 12.00 | 0.30 | | 0.011 | | | 1.0 | 11.75 | 12.35 | 0.60 | 0.30 | 0.011 | 0.011 | 0.18 | 0.002 | 2% | |
| 22 | 12.70 | 0.29 | | -0.007 | | | 1.0 | 12.35 | 13.05 | 0.70 | 0.29 | -0.007 | -0.007 | 0.20 | -0.001 | -1% | |
| Left | 13.40 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 13.05 | 13.40 | 0.35 | 0.07 | -0.002 | -0.002 | 0.03 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 0.113 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-----------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.113 | (m ³ /s) |
| Perceived Measurement Quality: | | Excellent | |
| Total Area: | | 4.86 | (m ²) |
| Wetted Width: | | 11.75 | (m) |
| Hydraulic Depth: | | 0.414 | (m) |
| Mean Velocity: | | 0.023 | (m/s) |
| Froude Number: | | 0.012 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S2 - Jackpine Creek at Canterra Road (474961 E, 6344087 N) | | | |
| Field Personnel: | HB DB SG | Trip Date: | 18-Sep-10 |
| Data Entry Personnel: | DB | Date: | 28-Sep-10 |
| Data Check Personnel: | JP | Date: | 07-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.875 |
| Battery (Main): | 4.25 |
| Battery (Aux): | 13.64 |
| Datalogger Clock: | 14.53 |
| Laptop Clock: | 14.57 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 6.46 |
| Memory used: | 10% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------------|
| Measurement Details: | |
| Start Time (MST): | 1455 |
| End Time (MST): | 1545 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open, Backwater |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Clear 10 degC |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 1.151 | 297.990 | 1.087 | 297.990 | - |
| Bench Mark 2: | T-post w/pink flagging | 1.049 | 298.069 | 0.986 | 298.069 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.589 | 297.552 | 1.525 | 297.552 | 297.552 |
| Transducer: | | 0.875 | 296.677 | 0.875 | 296.677 | 296.677 |
| Other: | | | | | | |

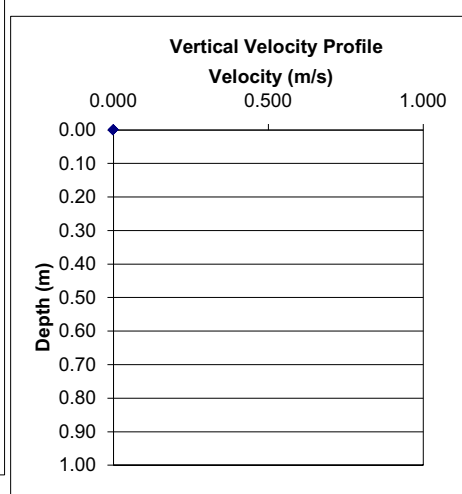
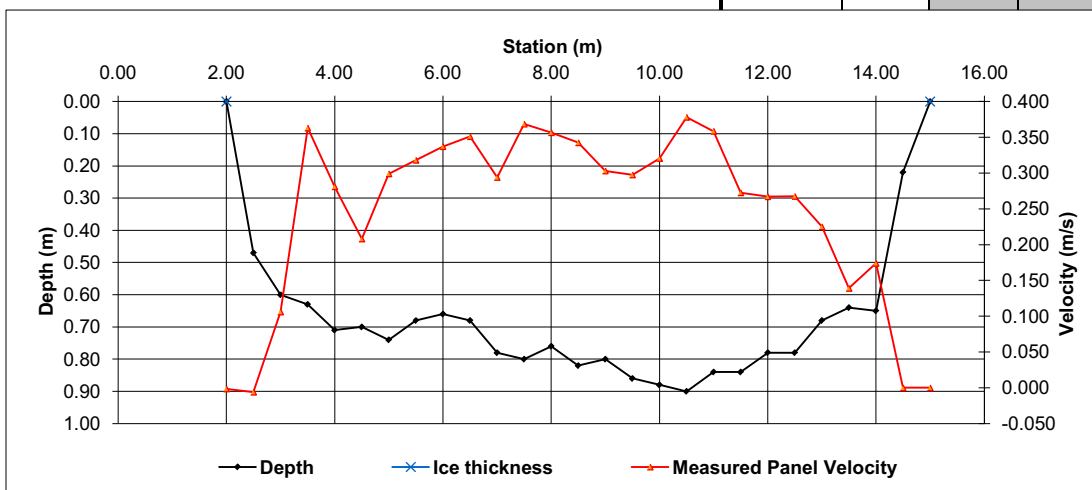
General Notes:

Heavily backwatered.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 2.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.00 | 2.25 | 0.25 | 0.12 | -0.002 | -0.002 | 0.03 | 0.000 | 0% |
| 1 | 2.50 | 0.47 | | -0.006 | | | 1.0 | 2.25 | 2.75 | 0.50 | 0.47 | -0.006 | -0.006 | 0.24 | -0.001 | 0% |
| 2 | 3.00 | 0.60 | | 0.106 | | | 1.0 | 2.75 | 3.25 | 0.50 | 0.60 | 0.106 | 0.106 | 0.30 | 0.032 | 1% |
| 3 | 3.50 | 0.63 | | 0.363 | | | 1.0 | 3.25 | 3.75 | 0.50 | 0.63 | 0.363 | 0.363 | 0.32 | 0.114 | 5% |
| 4 | 4.00 | 0.71 | | 0.281 | | | 1.0 | 3.75 | 4.25 | 0.50 | 0.71 | 0.281 | 0.281 | 0.36 | 0.100 | 4% |
| 5 | 4.50 | 0.70 | | 0.208 | | | 1.0 | 4.25 | 4.75 | 0.50 | 0.70 | 0.208 | 0.208 | 0.35 | 0.073 | 3% |
| 6 | 5.00 | 0.74 | | 0.299 | | | 1.0 | 4.75 | 5.25 | 0.50 | 0.74 | 0.299 | 0.299 | 0.37 | 0.111 | 4% |
| 7 | 5.50 | 0.68 | | 0.318 | | | 1.0 | 5.25 | 5.75 | 0.50 | 0.68 | 0.318 | 0.318 | 0.34 | 0.108 | 4% |
| 8 | 6.00 | 0.66 | | 0.337 | | | 1.0 | 5.75 | 6.25 | 0.50 | 0.66 | 0.337 | 0.337 | 0.33 | 0.111 | 4% |
| 9 | 6.50 | 0.68 | | 0.351 | | | 1.0 | 6.25 | 6.75 | 0.50 | 0.68 | 0.351 | 0.351 | 0.34 | 0.119 | 5% |
| 10 | 7.00 | 0.78 | | | 0.196 | 0.392 | 1.0 | 6.75 | 7.25 | 0.50 | 0.78 | 0.294 | 0.294 | 0.39 | 0.115 | 5% |
| 11 | 7.50 | 0.80 | | | 0.290 | 0.447 | 1.0 | 7.25 | 7.75 | 0.50 | 0.80 | 0.369 | 0.369 | 0.40 | 0.147 | 6% |
| 12 | 8.00 | 0.76 | | | 0.307 | 0.406 | 1.0 | 7.75 | 8.25 | 0.50 | 0.76 | 0.357 | 0.357 | 0.38 | 0.135 | 5% |
| 13 | 8.50 | 0.82 | | | 0.280 | 0.405 | 1.0 | 8.25 | 8.75 | 0.50 | 0.82 | 0.343 | 0.343 | 0.41 | 0.140 | 6% |
| 14 | 9.00 | 0.80 | | | 0.272 | 0.334 | 1.0 | 8.75 | 9.25 | 0.50 | 0.80 | 0.303 | 0.303 | 0.40 | 0.121 | 5% |
| 15 | 9.50 | 0.86 | | | 0.208 | 0.387 | 1.0 | 9.25 | 9.75 | 0.50 | 0.86 | 0.298 | 0.298 | 0.43 | 0.128 | 5% |
| 16 | 10.00 | 0.88 | | | 0.264 | 0.377 | 1.0 | 9.75 | 10.25 | 0.50 | 0.88 | 0.321 | 0.321 | 0.44 | 0.141 | 6% |
| 17 | 10.50 | 0.90 | | | 0.365 | 0.391 | 1.0 | 10.25 | 10.75 | 0.50 | 0.90 | 0.378 | 0.378 | 0.45 | 0.170 | 7% |
| 18 | 11.00 | 0.84 | | | 0.307 | 0.410 | 1.0 | 10.75 | 11.25 | 0.50 | 0.84 | 0.359 | 0.359 | 0.42 | 0.151 | 6% |
| 19 | 11.50 | 0.84 | | | 0.217 | 0.328 | 1.0 | 11.25 | 11.75 | 0.50 | 0.84 | 0.273 | 0.273 | 0.42 | 0.114 | 5% |
| 20 | 12.00 | 0.78 | | | 0.213 | 0.321 | 1.0 | 11.75 | 12.25 | 0.50 | 0.78 | 0.267 | 0.267 | 0.39 | 0.104 | 4% |
| 21 | 12.50 | 0.78 | | | 0.217 | 0.318 | 1.0 | 12.25 | 12.75 | 0.50 | 0.78 | 0.268 | 0.268 | 0.39 | 0.104 | 4% |
| 22 | 13.00 | 0.68 | | 0.225 | | | 1.0 | 12.75 | 13.25 | 0.50 | 0.68 | 0.225 | 0.225 | 0.34 | 0.077 | 3% |
| 23 | 13.50 | 0.64 | | 0.139 | | | 1.0 | 13.25 | 13.75 | 0.50 | 0.64 | 0.139 | 0.139 | 0.32 | 0.044 | 2% |
| 24 | 14.00 | 0.65 | | 0.174 | | | 1.0 | 13.75 | 14.25 | 0.50 | 0.65 | 0.174 | 0.174 | 0.33 | 0.057 | 2% |
| 25 | 14.50 | 0.22 | | 0.000 | | | 1.0 | 14.25 | 14.75 | 0.50 | 0.22 | 0.000 | 0.000 | 0.11 | 0.000 | 0% |
| Right | 15.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 14.75 | 15.00 | 0.25 | 0.06 | 0.000 | 0.000 | 0.01 | 0.000 | 0% |
| *denotes position of TSS sample | | | | | | | | | | | | | | | Total Flow | 2.516 |

| | | | |
|--------------------------------|--|-----------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 2.516 | (m ³ /s) |
| Perceived Measurement Quality: | | Excellent | |
| Total Area: | | 5.81 | (m ²) |
| Wetted Width: | | 8.25 | (m) |
| Hydraulic Depth: | | 0.705 | (m) |
| Mean Velocity: | | 0.433 | (m/s) |
| Froude Number: | | 0.165 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S2 - Jackpine Creek at Canterra Road (474961 E, 6344087 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 29-Oct-10 |
| Data Entry Personnel: | DB | Date: | 08-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|----------|
| Logger Details: | |
| Transducer Reading: | 0.671791 |
| Battery (Main): | 4.7 |
| Battery (Aux): | 13.49 |
| Datalogger Clock: | 16:15 |
| Laptop Clock: | 16:20 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.865 |
| Memory used: | 17% |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-----------------|
| Measurement Details: | |
| Start Time (MST): | 16:18 |
| End Time (MST): | 16:55 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open, Backwater |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly Cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------|----------|---------|----------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.993 | 297.990 | 0.969 | 297.990 | - |
| Bench Mark 2: | T-post w/pink flagging | 0.893 | 298.069 | 0.870 | 298.069 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.638 | 297.345 | 1.612 | 297.347 | 297.346 |
| Transducer: | | 0.671791 | 296.673 | 0.671791 | 296.675 | 296.674 |
| Other: | | | | | | |

General Notes:

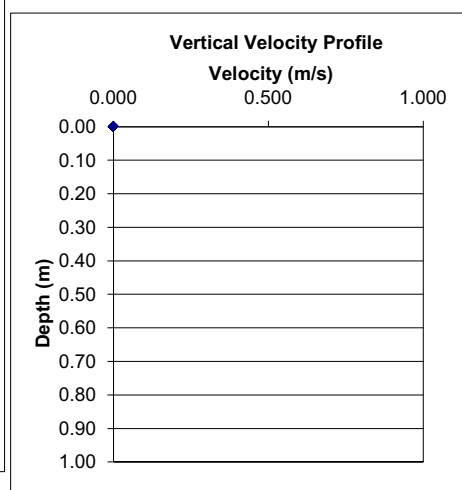
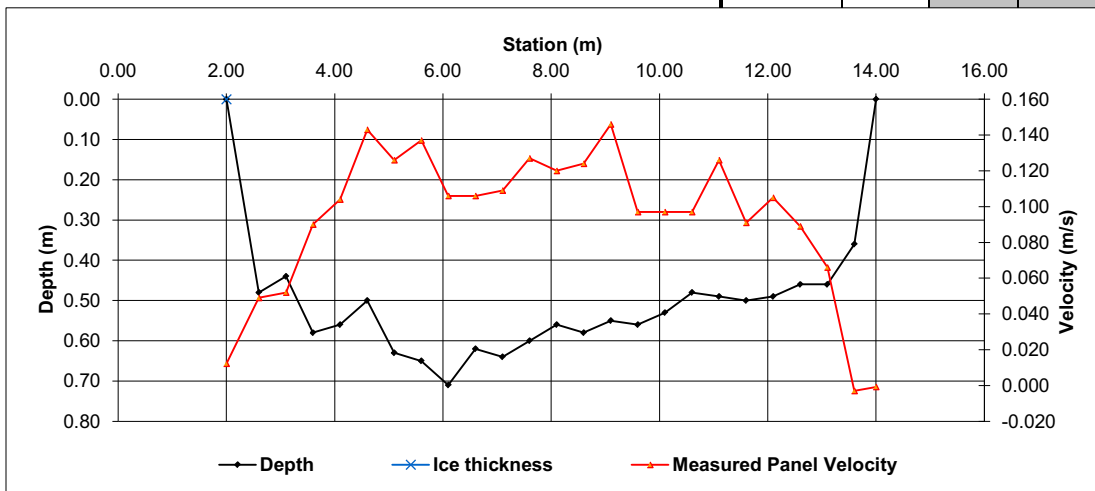
TSS- 8m. Beaver observed swimming D/S with sticks. Heavily backwatered.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 2.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.00 | 2.30 | 0.30 | 0.12 | 0.012 | 0.012 | 0.04 | 0.000 | 2% |
| 2 | 2.60 | 0.48 | | 0.049 | | | 1.0 | 2.30 | 2.85 | 0.55 | 0.48 | 0.049 | 0.049 | 0.26 | 0.013 | 2% |
| 3 | 3.10 | 0.44 | | 0.052 | | | 1.0 | 2.85 | 3.35 | 0.50 | 0.44 | 0.052 | 0.052 | 0.22 | 0.011 | 2% |
| 4 | 3.60 | 0.58 | | 0.090 | | | 1.0 | 3.35 | 3.85 | 0.50 | 0.58 | 0.090 | 0.090 | 0.29 | 0.026 | 4% |
| 5 | 4.10 | 0.56 | | 0.104 | | | 1.0 | 3.85 | 4.35 | 0.50 | 0.56 | 0.104 | 0.104 | 0.28 | 0.029 | 5% |
| 6 | 4.60 | 0.50 | | 0.143 | | | 1.0 | 4.35 | 4.85 | 0.50 | 0.50 | 0.143 | 0.143 | 0.25 | 0.036 | 6% |
| 7 | 5.10 | 0.63 | | 0.126 | | | 1.0 | 4.85 | 5.35 | 0.50 | 0.63 | 0.126 | 0.126 | 0.32 | 0.040 | 6% |
| 8 | 5.60 | 0.65 | | 0.137 | | | 1.0 | 5.35 | 5.85 | 0.50 | 0.65 | 0.137 | 0.137 | 0.33 | 0.045 | 7% |
| 9 | 6.10 | 0.71 | | 0.106 | | | 1.0 | 5.85 | 6.35 | 0.50 | 0.71 | 0.106 | 0.106 | 0.36 | 0.038 | 6% |
| 10 | 6.60 | 0.62 | | 0.106 | | | 1.0 | 6.35 | 6.85 | 0.50 | 0.62 | 0.106 | 0.106 | 0.31 | 0.033 | 5% |
| 11 | 7.10 | 0.64 | | 0.109 | | | 1.0 | 6.85 | 7.35 | 0.50 | 0.64 | 0.109 | 0.109 | 0.32 | 0.035 | 5% |
| 12 | 7.60 | 0.60 | | 0.127 | | | 1.0 | 7.35 | 7.85 | 0.50 | 0.60 | 0.127 | 0.127 | 0.30 | 0.038 | 6% |
| 13 | 8.10 | 0.56 | | 0.120 | | | 1.0 | 7.85 | 8.35 | 0.50 | 0.56 | 0.120 | 0.120 | 0.28 | 0.034 | 5% |
| 14 | 8.60 | 0.58 | | 0.124 | | | 1.0 | 8.35 | 8.85 | 0.50 | 0.58 | 0.124 | 0.124 | 0.29 | 0.036 | 6% |
| 15 | 9.10 | 0.55 | | 0.146 | | | 1.0 | 8.85 | 9.35 | 0.50 | 0.55 | 0.146 | 0.146 | 0.28 | 0.040 | 6% |
| 16 | 9.60 | 0.56 | | 0.097 | | | 1.0 | 9.35 | 9.85 | 0.50 | 0.56 | 0.097 | 0.097 | 0.28 | 0.027 | 4% |
| 17 | 10.10 | 0.53 | | 0.097 | | | 1.0 | 9.85 | 10.35 | 0.50 | 0.53 | 0.097 | 0.097 | 0.27 | 0.026 | 4% |
| 18 | 10.60 | 0.48 | | 0.097 | | | 1.0 | 10.35 | 10.85 | 0.50 | 0.48 | 0.097 | 0.097 | 0.24 | 0.023 | 4% |
| 19 | 11.10 | 0.49 | | 0.126 | | | 1.0 | 10.85 | 11.35 | 0.50 | 0.49 | 0.126 | 0.126 | 0.25 | 0.031 | 5% |
| 20 | 11.60 | 0.50 | | 0.091 | | | 1.0 | 11.35 | 11.85 | 0.50 | 0.50 | 0.091 | 0.091 | 0.25 | 0.023 | 4% |
| 21 | 12.10 | 0.49 | | 0.105 | | | 1.0 | 11.85 | 12.35 | 0.50 | 0.49 | 0.105 | 0.105 | 0.25 | 0.026 | 4% |
| 22 | 12.60 | 0.46 | | 0.089 | | | 1.0 | 12.35 | 12.85 | 0.50 | 0.46 | 0.089 | 0.089 | 0.23 | 0.020 | 3% |
| 23 | 13.10 | 0.46 | | 0.066 | | | 1.0 | 12.85 | 13.35 | 0.50 | 0.46 | 0.066 | 0.066 | 0.23 | 0.015 | 2% |
| 24 | 13.60 | 0.36 | | -0.003 | | | 1.0 | 13.35 | 13.80 | 0.45 | 0.36 | -0.003 | -0.003 | 0.16 | 0.000 | 0% |
| Left | 14.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 13.80 | 14.00 | 0.20 | 0.09 | -0.001 | -0.001 | 0.02 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.644 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|------------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.644 | (m ³ /s) |
| Perceived Measurement Quality: | | Excellent | |
| Total Area: | | 5.87 | (m ²) |
| Wetted Width: | | 10.85 | (m) |
| Hydraulic Depth: | | 0.541 | (m) |
| Mean Velocity: | | 0.110 | (m/s) |
| Froude Number: | | 0.048 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S2 - Jackpine Creek at Canterra Road (474961 E, 6344087 N) | | | |
| Field Personnel: | SG, JO | Trip Date: | 02-Dec-10 |
| Data Entry Personnel: | DB | Date: | 09-Dec-10 |
| Data Check Personnel: | JP | Date: | 17-Dec-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.512 |
| Battery (Main): | 4.67 |
| Battery (Aux): | 12.85 |
| Datalogger Clock: | 1515 |
| Laptop Clock: | 1521 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.09 |
| Memory used: | 22% |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|------------------|
| Measurement Details: | |
| Start Time (MST): | 14:45 |
| End Time (MST): | 16:00 |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | -11°C, 8/8 cloud |

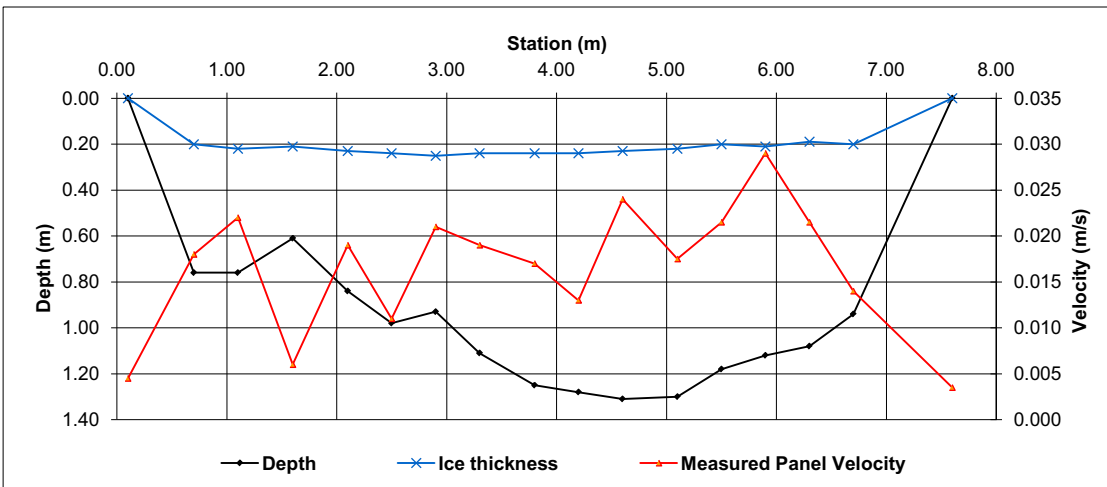
| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.842 | 297.990 | 0.842 | 297.990 | - |
| Bench Mark 2: | T-post w/pink flagging | 0.475 | 298.069 | 0.474 | 298.069 | - |
| Top of Ice: | | 1.615 | 297.217 | 1.610 | 297.222 | 297.220 |
| Water Level: | | 1.642 | 297.190 | 1.649 | 297.183 | 297.187 |
| Transducer: | | 0.512 | 296.678 | 0.512 | 296.671 | 296.675 |
| Other: | | | | | | |

| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 0.10 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.9 | 0.10 | 0.40 | 0.30 | 0.14 | 0.005 | 0.004 | 0.04 | 0.000 | 0% | |
| 2 | 0.70 | 0.76 | 0.20 | 0.018 | | | 0.9 | 0.40 | 0.90 | 0.50 | 0.56 | 0.018 | 0.016 | 0.28 | 0.005 | 5% | |
| 3 | 1.10 | 0.76 | 0.22 | 0.022 | | | 0.9 | 0.90 | 1.35 | 0.45 | 0.54 | 0.022 | 0.020 | 0.24 | 0.005 | 5% | |
| 4 | 1.60 | 0.61 | 0.21 | 0.006 | | | 0.9 | 1.35 | 1.85 | 0.50 | 0.40 | 0.006 | 0.005 | 0.20 | 0.001 | 1% | |
| 5 | 2.10 | 0.84 | 0.23 | 0.019 | | | 0.9 | 1.85 | 2.30 | 0.45 | 0.61 | 0.019 | 0.017 | 0.27 | 0.005 | 5% | |
| 6 | 2.50 | 0.98 | 0.24 | 0.011 | | | 0.9 | 2.30 | 2.70 | 0.40 | 0.74 | 0.011 | 0.010 | 0.30 | 0.003 | 3% | |
| 7 | 2.90 | 0.93 | 0.25 | 0.021 | | | 0.9 | 2.70 | 3.10 | 0.40 | 0.68 | 0.021 | 0.019 | 0.27 | 0.005 | 5% | |
| 8 | 3.30 | 1.11 | 0.24 | | 0.028 | 0.010 | 1.0 | 3.10 | 3.55 | 0.45 | 0.87 | 0.019 | 0.019 | 0.39 | 0.007 | 8% | |
| 9 | 3.80 | 1.25 | 0.24 | | 0.012 | 0.022 | 1.0 | 3.55 | 4.00 | 0.45 | 1.01 | 0.017 | 0.017 | 0.45 | 0.008 | 8% | |
| 10 | 4.20 | 1.28 | 0.24 | | 0.012 | 0.014 | 1.0 | 4.00 | 4.40 | 0.40 | 1.04 | 0.013 | 0.013 | 0.42 | 0.005 | 6% | |
| 11 | 4.60 | 1.31 | 0.23 | | 0.016 | 0.032 | 1.0 | 4.40 | 4.85 | 0.45 | 1.08 | 0.024 | 0.024 | 0.49 | 0.012 | 12% | |
| 12 | 5.10 | 1.30 | 0.22 | | 0.007 | 0.028 | 1.0 | 4.85 | 5.30 | 0.45 | 1.08 | 0.018 | 0.018 | 0.49 | 0.009 | 9% | |
| 13 | 5.50 | 1.18 | 0.20 | | 0.030 | 0.013 | 1.0 | 5.30 | 5.70 | 0.40 | 0.98 | 0.022 | 0.022 | 0.39 | 0.008 | 9% | |
| 14 | 5.90 | 1.12 | 0.21 | | 0.023 | 0.035 | 1.0 | 5.70 | 6.10 | 0.40 | 0.91 | 0.029 | 0.029 | 0.36 | 0.011 | 11% | |
| 15 | 6.30 | 1.08 | 0.19 | | 0.022 | 0.021 | 1.0 | 6.10 | 6.50 | 0.40 | 0.89 | 0.022 | 0.022 | 0.36 | 0.008 | 8% | |
| 16 | 6.70 | 0.94 | 0.20 | 0.014 | | | 0.9 | 6.50 | 7.15 | 0.65 | 0.74 | 0.014 | 0.013 | 0.48 | 0.006 | 6% | |
| Left | 7.60 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 1.0 | 7.15 | 7.60 | 0.45 | 0.19 | 0.004 | 0.004 | 0.08 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 0.097 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 0.097 (m ³ /s) |
| Perceived Measurement Quality: | Good |
| Total Area: | 5.43 (m ²) |
| Wetted Width: | 7.05 (m) |
| Hydraulic Depth: | 0.771 (m) |
| Mean Velocity: | 0.018 (m/s) |
| Froude Number: | 0.007 |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S3 - Iyininim Creek above Kearn Lake (489491 E, 6345029 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 25-Apr-10 |
| Data Entry Personnel: | DB | Date: | 25-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.597 |
| Battery (Main): | 5.04 |
| Battery (Aux): | 12.45 |
| Datalogger Clock: | 10.18 |
| Laptop Clock: | 10.21 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | 2059 |
| Other Logger Notes: | |

| | |
|------------------------------|--------------------------|
| Measurement Details: | |
| Start Time (MST): | 1030 |
| End Time (MST): | 1050 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open, some ice on bottom |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar in PVC pipe | | 360.610 | | 360.610 | - |
| Bench Mark 2: | Rebar w/ pink flagging | 1.177 | 361.201 | 1.160 | 361.201 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 3.189 | 359.189 | 3.173 | 359.188 | 359.189 |
| Transducer: | | 0.597 | 358.592 | 0.597 | 358.591 | 358.591 |
| Other: | | | | | | |

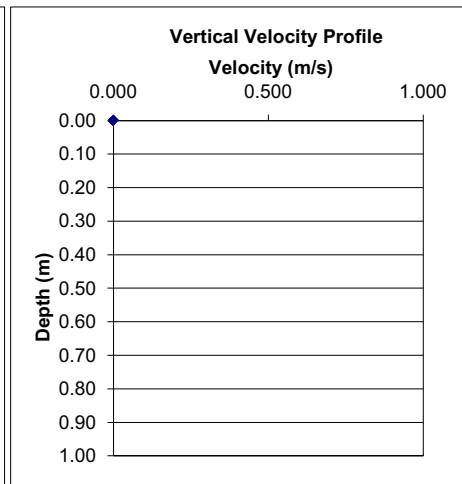
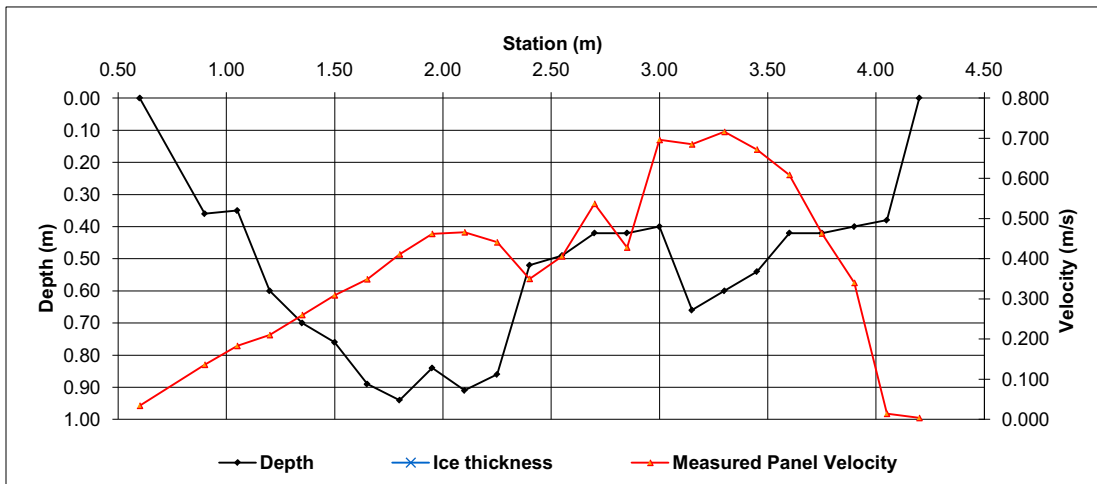
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.60 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.60 | 0.75 | 0.15 | 0.09 | 0.034 | 0.034 | 0.01 | 0.000 | 0% |
| 1 | 0.90 | 0.36 | | 0.136 | | | 1.0 | 0.75 | 0.98 | 0.23 | 0.36 | 0.136 | 0.136 | 0.08 | 0.011 | 1% |
| 2 | 1.05 | 0.35 | | 0.183 | | | 1.0 | 0.98 | 1.13 | 0.15 | 0.35 | 0.183 | 0.183 | 0.05 | 0.010 | 1% |
| 3 | 1.20 | 0.60 | | 0.210 | | | 1.0 | 1.13 | 1.28 | 0.15 | 0.60 | 0.210 | 0.210 | 0.09 | 0.019 | 2% |
| 4 | 1.35 | 0.70 | | 0.260 | | | 1.0 | 1.28 | 1.43 | 0.15 | 0.70 | 0.260 | 0.260 | 0.11 | 0.027 | 3% |
| 5 | 1.50 | 0.76 | | 0.309 | | | 1.0 | 1.43 | 1.58 | 0.15 | 0.76 | 0.309 | 0.309 | 0.11 | 0.035 | 4% |
| 6 | 1.65 | 0.89 | | 0.349 | | | 1.0 | 1.58 | 1.73 | 0.15 | 0.89 | 0.349 | 0.349 | 0.13 | 0.047 | 6% |
| 7 | 1.80 | 0.94 | | 0.411 | | | 1.0 | 1.73 | 1.88 | 0.15 | 0.94 | 0.411 | 0.411 | 0.14 | 0.058 | 7% |
| 8 | 1.95 | 0.84 | | 0.462 | | | 1.0 | 1.88 | 2.03 | 0.15 | 0.84 | 0.462 | 0.462 | 0.13 | 0.058 | 7% |
| 9 | 2.10 | 0.91 | | 0.466 | | | 1.0 | 2.03 | 2.18 | 0.15 | 0.91 | 0.466 | 0.466 | 0.14 | 0.064 | 8% |
| 10 | 2.25 | 0.86 | | 0.441 | | | 1.0 | 2.18 | 2.33 | 0.15 | 0.86 | 0.441 | 0.441 | 0.13 | 0.057 | 7% |
| 11 | 2.40 | 0.52 | | 0.350 | | | 1.0 | 2.33 | 2.48 | 0.15 | 0.52 | 0.350 | 0.350 | 0.08 | 0.027 | 3% |
| 12 | 2.55 | 0.49 | | 0.406 | | | 1.0 | 2.48 | 2.63 | 0.15 | 0.49 | 0.406 | 0.406 | 0.07 | 0.030 | 4% |
| 13 | 2.70 | 0.42 | | 0.537 | | | 1.0 | 2.63 | 2.78 | 0.15 | 0.42 | 0.537 | 0.537 | 0.06 | 0.034 | 4% |
| 14 | 2.85 | 0.42 | | 0.428 | | | 1.0 | 2.78 | 2.93 | 0.15 | 0.42 | 0.428 | 0.428 | 0.06 | 0.027 | 3% |
| 15 | 3.00 | 0.40 | | 0.696 | | | 1.0 | 2.93 | 3.08 | 0.15 | 0.40 | 0.696 | 0.696 | 0.06 | 0.042 | 5% |
| 16 | 3.15 | 0.66 | | 0.685 | | | 1.0 | 3.08 | 3.23 | 0.15 | 0.66 | 0.685 | 0.685 | 0.10 | 0.068 | 8% |
| 17 | 3.30 | 0.60 | | 0.716 | | | 1.0 | 3.23 | 3.38 | 0.15 | 0.60 | 0.716 | 0.716 | 0.09 | 0.064 | 8% |
| 18 | 3.45 | 0.54 | | 0.672 | | | 1.0 | 3.38 | 3.53 | 0.15 | 0.54 | 0.672 | 0.672 | 0.08 | 0.054 | 7% |
| 19 | 3.60 | 0.42 | | 0.609 | | | 1.0 | 3.53 | 3.68 | 0.15 | 0.42 | 0.609 | 0.609 | 0.06 | 0.038 | 5% |
| 20 | 3.75 | 0.42 | | 0.463 | | | 1.0 | 3.68 | 3.83 | 0.15 | 0.42 | 0.463 | 0.463 | 0.06 | 0.029 | 4% |
| 21 | 3.90 | 0.40 | | 0.340 | | | 1.0 | 3.83 | 3.98 | 0.15 | 0.40 | 0.340 | 0.340 | 0.06 | 0.020 | 2% |
| 22 | 4.05 | 0.38 | | 0.014 | | | 1.0 | 3.98 | 4.13 | 0.15 | 0.38 | 0.014 | 0.014 | 0.06 | 0.001 | 0% |
| Left | 4.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.13 | 4.20 | 0.08 | 0.10 | 0.004 | 0.004 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.821 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.821 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 1.98 | (m ²) |
| Wetted Width: | 3.60 | (m) |
| Hydraulic Depth: | 0.550 | (m) |
| Mean Velocity: | 0.415 | (m/s) |
| Foude Number: | 0.179 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S3 - Iyininim Creek above Kearn Lake (489491 E, 6345029 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 25-Jun-10 |
| Data Entry Personnel: | DB | Date: | 02-Jul-10 |
| Data Check Personnel: | JP | Date: | 13-Jul-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.315 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 12.78 |
| Datalogger Clock: | 10:03 |
| Laptop Clock: | 10:11 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 2% |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Rain 0mm | |

| | | |
|------------------------------|--|---------------|
| Measurement Details: | | |
| Start Time (MST): | | 1113 |
| End Time (MST): | | 1205 |
| Equipment: | | ADV |
| Method: | | Wading |
| River Condition: | | Open |
| Code ('Ice' or 'Open'): | | Open |
| Quality/Error (see reverse): | | Excellent |
| Weather: | | Partly Cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar in PVC pipe | 1.157 | 360.610 | 1.138 | 360.610 | - |
| Bench Mark 2: | Rebar w/ pink flagging | 0.686 | 361.201 | 0.670 | 361.201 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.912 | 358.855 | 2.893 | 358.855 | 358.855 |
| Transducer: | | 0.315 | 358.540 | 0.315 | 358.540 | 358.540 |
| Other: | | | | | | |

General Notes:

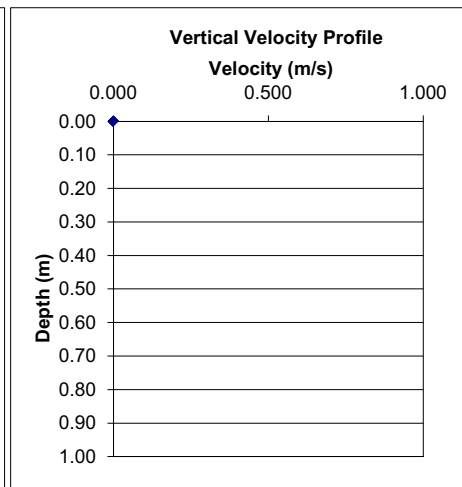
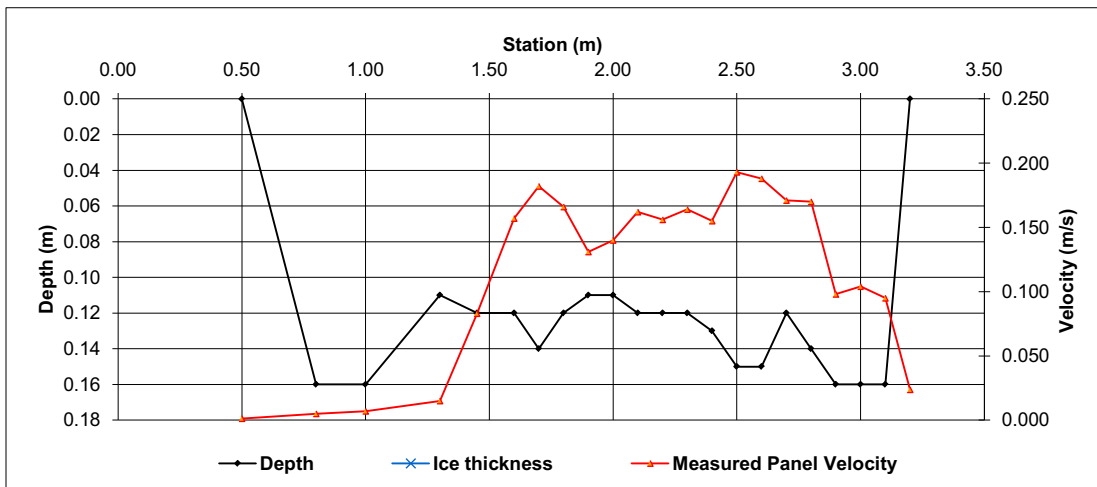
Battery, Transducer changed and memory cleared at 11:10 MST:
Old Battery 11.84 V, Old PT 0.236496m, Old Rain 44.196mm

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 3.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.20 | 3.15 | 0.05 | 0.04 | 0.024 | 0.024 | 0.00 | 0.000 | 0% |
| 1 | 3.10 | 0.16 | | 0.095 | | | 1.0 | 3.15 | 3.05 | 0.10 | 0.16 | 0.095 | 0.095 | 0.02 | 0.002 | 4% |
| 2 | 3.00 | 0.16 | | 0.104 | | | 1.0 | 3.05 | 2.95 | 0.10 | 0.16 | 0.104 | 0.104 | 0.02 | 0.002 | 5% |
| 3 | 2.90 | 0.16 | | 0.098 | | | 1.0 | 2.95 | 2.85 | 0.10 | 0.16 | 0.098 | 0.098 | 0.02 | 0.002 | 4% |
| 4 | 2.80 | 0.14 | | 0.170 | | | 1.0 | 2.85 | 2.75 | 0.10 | 0.14 | 0.170 | 0.170 | 0.01 | 0.002 | 7% |
| 5 | 2.70 | 0.12 | | 0.171 | | | 1.0 | 2.75 | 2.65 | 0.10 | 0.12 | 0.171 | 0.171 | 0.01 | 0.002 | 6% |
| 6 | 2.60 | 0.15 | | 0.188 | | | 1.0 | 2.65 | 2.55 | 0.10 | 0.15 | 0.188 | 0.188 | 0.02 | 0.003 | 8% |
| 7 | 2.50 | 0.15 | | 0.193 | | | 1.0 | 2.55 | 2.45 | 0.10 | 0.15 | 0.193 | 0.193 | 0.01 | 0.003 | 8% |
| 8 | 2.40 | 0.13 | | 0.155 | | | 1.0 | 2.45 | 2.35 | 0.10 | 0.13 | 0.155 | 0.155 | 0.01 | 0.002 | 6% |
| 9 | 2.30 | 0.12 | | 0.164 | | | 1.0 | 2.35 | 2.25 | 0.10 | 0.12 | 0.164 | 0.164 | 0.01 | 0.002 | 6% |
| 10 | 2.20 | 0.12 | | 0.156 | | | 1.0 | 2.25 | 2.15 | 0.10 | 0.12 | 0.156 | 0.156 | 0.01 | 0.002 | 5% |
| 11 | 2.10 | 0.12 | | 0.162 | | | 1.0 | 2.15 | 2.05 | 0.10 | 0.12 | 0.162 | 0.162 | 0.01 | 0.002 | 6% |
| 12 | 2.00 | 0.11 | | 0.140 | | | 1.0 | 2.05 | 1.95 | 0.10 | 0.11 | 0.140 | 0.140 | 0.01 | 0.002 | 4% |
| 13 | 1.90 | 0.11 | | 0.131 | | | 1.0 | 1.95 | 1.85 | 0.10 | 0.11 | 0.131 | 0.131 | 0.01 | 0.001 | 4% |
| 14 | 1.80 | 0.12 | | 0.166 | | | 1.0 | 1.85 | 1.75 | 0.10 | 0.12 | 0.166 | 0.166 | 0.01 | 0.002 | 6% |
| 15 | 1.70 | 0.14 | | 0.182 | | | 1.0 | 1.75 | 1.65 | 0.10 | 0.14 | 0.182 | 0.182 | 0.01 | 0.003 | 7% |
| 16 | 1.60 | 0.12 | | 0.157 | | | 1.0 | 1.65 | 1.53 | 0.13 | 0.12 | 0.157 | 0.157 | 0.02 | 0.002 | 7% |
| 17 | 1.45 | 0.12 | | 0.083 | | | 1.0 | 1.53 | 1.38 | 0.15 | 0.12 | 0.083 | 0.083 | 0.02 | 0.001 | 4% |
| 18 | 1.30 | 0.11 | | 0.015 | | | 1.0 | 1.38 | 1.15 | 0.23 | 0.11 | 0.015 | 0.015 | 0.02 | 0.000 | 1% |
| 19 | 1.00 | 0.16 | | 0.007 | | | 1.0 | 1.15 | 0.90 | 0.25 | 0.16 | 0.007 | 0.007 | 0.04 | 0.000 | 1% |
| 20 | 0.80 | 0.16 | | 0.005 | | | 1.0 | 0.90 | 0.65 | 0.25 | 0.16 | 0.005 | 0.005 | 0.04 | 0.000 | 1% |
| Left | 0.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.65 | 0.50 | 0.15 | 0.04 | 0.001 | 0.001 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.035 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.035 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 0.35 | (m ²) |
| Wetted Width: | 2.50 | (m) |
| Hydraulic Depth: | 0.139 | (m) |
| Mean Velocity: | 0.101 | (m/s) |
| Foude Number: | 0.087 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|---------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S3 - Iyininim Creek above Kearn Lake (489491 E, 6345029 N) | | | |
| Field Personnel: | BL, SG, Jim (pilot) | Trip Date: | 14-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.400 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 12.17 |
| Datalogger Clock: | 1249 |
| Laptop Clock: | 1253 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 4% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Rain 100.33 mm | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1300 |
| End Time (MST): | 1330 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | partly, wind, 20°C |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar in PVC pipe | 1.964 | 360.610 | 1.921 | 360.610 | - |
| Bench Mark 2: | Rebar w/ pink flagging | 1.378 | 361.201 | 1.335 | 361.201 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 3.642 | 358.932 | 3.605 | 358.931 | 358.932 |
| Transducer: | | 0.400 | 358.532 | 0.400 | 358.531 | 358.532 |
| Other: | | | | | | |

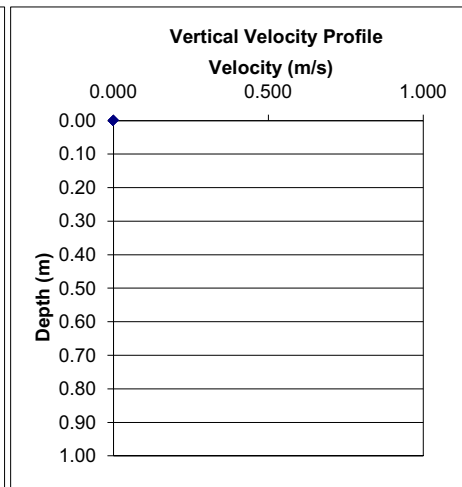
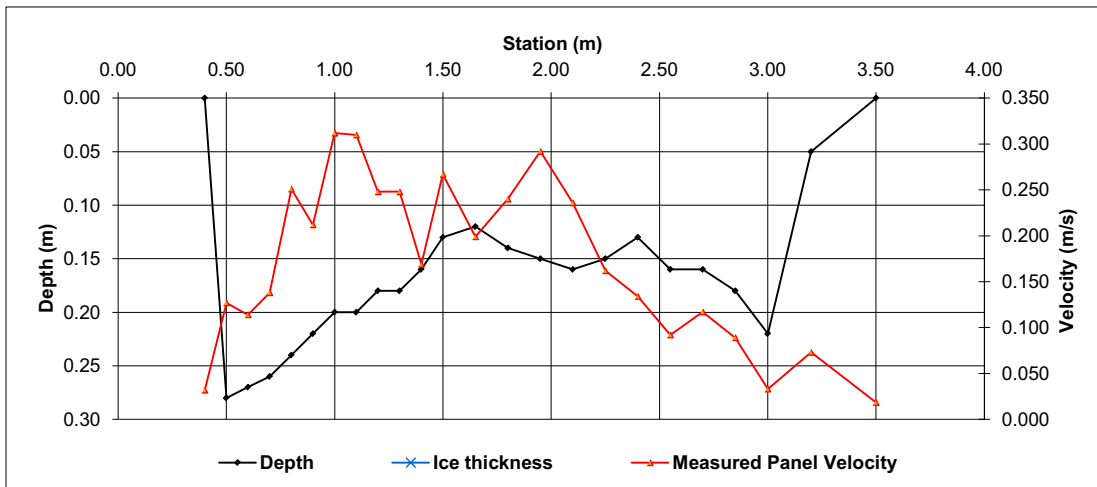
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.40 | 0.45 | 0.05 | 0.07 | 0.032 | 0.032 | 0.00 | 0.000 | 0% |
| 1 | 0.50 | 0.28 | | 0.127 | | | 1.0 | 0.45 | 0.55 | 0.10 | 0.28 | 0.127 | 0.127 | 0.03 | 0.004 | 4% |
| 2 | 0.60 | 0.27 | | 0.114 | | | 1.0 | 0.55 | 0.65 | 0.10 | 0.27 | 0.114 | 0.114 | 0.03 | 0.003 | 4% |
| 3 | 0.70 | 0.26 | | 0.138 | | | 1.0 | 0.65 | 0.75 | 0.10 | 0.26 | 0.138 | 0.138 | 0.03 | 0.004 | 4% |
| 4 | 0.80 | 0.24 | | 0.251 | | | 1.0 | 0.75 | 0.85 | 0.10 | 0.24 | 0.251 | 0.251 | 0.02 | 0.006 | 7% |
| 5 | 0.90 | 0.22 | | 0.212 | | | 1.0 | 0.85 | 0.95 | 0.10 | 0.22 | 0.212 | 0.212 | 0.02 | 0.005 | 5% |
| 6 | 1.00 | 0.20 | | 0.312 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.20 | 0.312 | 0.312 | 0.02 | 0.006 | 7% |
| 7 | 1.10 | 0.20 | | 0.310 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.20 | 0.310 | 0.310 | 0.02 | 0.006 | 7% |
| 8 | 1.20 | 0.18 | | 0.248 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.18 | 0.248 | 0.248 | 0.02 | 0.004 | 5% |
| 9 | 1.30 | 0.18 | | 0.248 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.18 | 0.248 | 0.248 | 0.02 | 0.004 | 5% |
| 10 | 1.40 | 0.16 | | 0.169 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.16 | 0.169 | 0.169 | 0.02 | 0.003 | 3% |
| 11 | 1.50 | 0.13 | | 0.267 | | | 1.0 | 1.45 | 1.58 | 0.13 | 0.13 | 0.267 | 0.267 | 0.02 | 0.004 | 5% |
| 12 | 1.65 | 0.12 | | 0.199 | | | 1.0 | 1.58 | 1.73 | 0.15 | 0.12 | 0.199 | 0.199 | 0.02 | 0.004 | 4% |
| 13 | 1.80 | 0.14 | | 0.240 | | | 1.0 | 1.73 | 1.88 | 0.15 | 0.14 | 0.240 | 0.240 | 0.02 | 0.005 | 6% |
| 14 | 1.95 | 0.15 | | 0.292 | | | 1.0 | 1.88 | 2.03 | 0.15 | 0.15 | 0.292 | 0.292 | 0.02 | 0.007 | 8% |
| 15 | 2.10 | 0.16 | | 0.236 | | | 1.0 | 2.03 | 2.18 | 0.15 | 0.16 | 0.236 | 0.236 | 0.02 | 0.006 | 7% |
| 16 | 2.25 | 0.15 | | 0.162 | | | 1.0 | 2.18 | 2.33 | 0.15 | 0.15 | 0.162 | 0.162 | 0.02 | 0.004 | 4% |
| 17 | 2.40 | 0.13 | | 0.134 | | | 1.0 | 2.33 | 2.48 | 0.15 | 0.13 | 0.134 | 0.134 | 0.02 | 0.003 | 3% |
| 18 | 2.55 | 0.16 | | 0.092 | | | 1.0 | 2.48 | 2.63 | 0.15 | 0.16 | 0.092 | 0.092 | 0.02 | 0.002 | 3% |
| 19 | 2.70 | 0.16 | | 0.117 | | | 1.0 | 2.63 | 2.78 | 0.15 | 0.16 | 0.117 | 0.117 | 0.02 | 0.003 | 3% |
| 20 | 2.85 | 0.18 | | 0.089 | | | 1.0 | 2.78 | 2.93 | 0.15 | 0.18 | 0.089 | 0.089 | 0.03 | 0.002 | 3% |
| 21 | 3.00 | 0.22 | | 0.033 | | | 1.0 | 2.93 | 3.10 | 0.18 | 0.22 | 0.033 | 0.033 | 0.04 | 0.001 | 1% |
| 22 | 3.20 | 0.05 | | 0.073 | | | 1.0 | 3.10 | 3.35 | 0.25 | 0.05 | 0.073 | 0.073 | 0.01 | 0.001 | 1% |
| Left | 3.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.35 | 3.50 | 0.15 | 0.01 | 0.018 | 0.018 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.086 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.086 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 0.49 | (m ²) |
| Wetted Width: | 3.10 | (m) |
| Hydraulic Depth: | 0.159 | (m) |
| Mean Velocity: | 0.174 | (m/s) |
| Foude Number: | 0.140 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S3 - Iyininin Creek above Kearn Lake (489491 E, 6345029 N) | | | |
| Field Personnel: | DB SG Matt (Pilot) | Trip Date: | 15-Sep-10 |
| Data Entry Personnel: | DB | Date: | 28-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.698 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 12.53 |
| Datalogger Clock: | 10.50 |
| Laptop Clock: | 10.53 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 5% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Rain 119.126 | |

| | |
|------------------------------|--------------|
| Measurement Details: | |
| Start Time (MST): | 1050 |
| End Time (MST): | 1130 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Overcast 6°C |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar in PVC pipe | 1.785 | 360.610 | 1.757 | 360.610 | - |
| Bench Mark 2: | Rebar w/ pink flagging | 1.205 | 361.201 | 1.178 | 361.201 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 3.185 | 359.210 | 3.155 | 359.224 | 359.217 |
| Transducer: | | 0.698 | 358.512 | 0.698 | 358.526 | 358.519 |
| Other: | | | | | | |

General Notes:

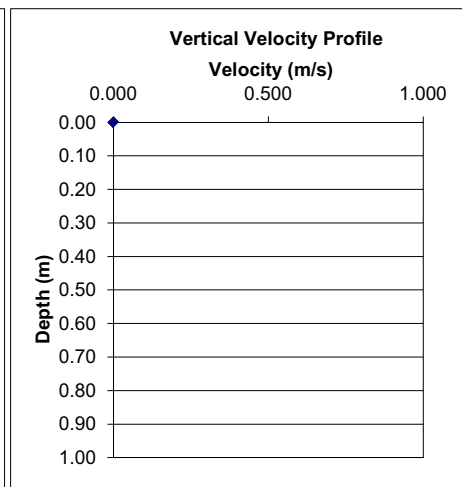
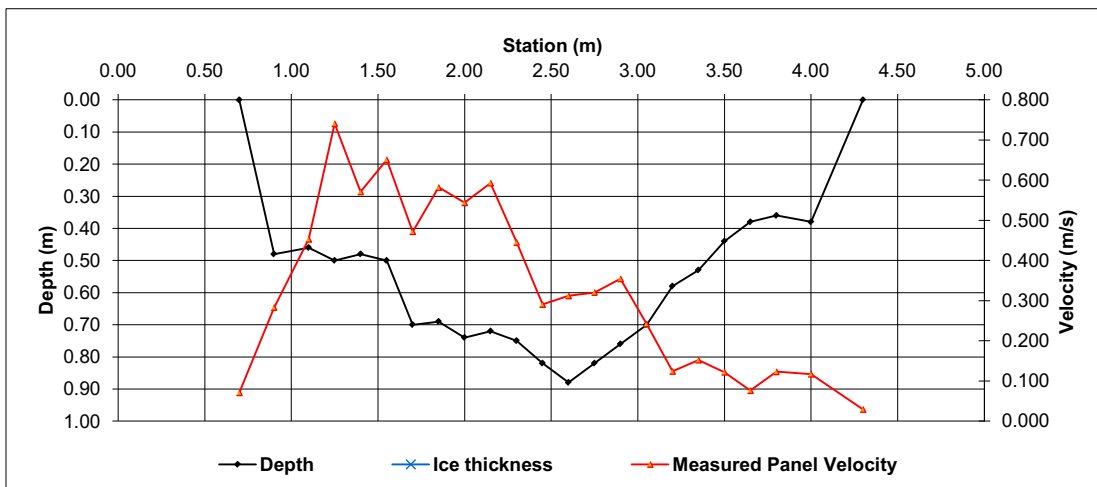
Tipping bucket was tested by tipping 3 times ~ 11am, noted on datalogger file

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 0.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.70 | 0.80 | 0.10 | 0.12 | 0.071 | 0.071 | 0.01 | 0.001 | 0% | |
| 1 | 0.90 | 0.48 | | 0.283 | | | 1.0 | 0.80 | 1.00 | 0.20 | 0.48 | 0.283 | 0.283 | 0.10 | 0.027 | 4% | |
| 2 | 1.10 | 0.46 | | 0.453 | | | 1.0 | 1.00 | 1.18 | 0.18 | 0.46 | 0.453 | 0.453 | 0.08 | 0.036 | 5% | |
| 3 | 1.25 | 0.50 | | 0.741 | | | 1.0 | 1.18 | 1.33 | 0.15 | 0.50 | 0.741 | 0.741 | 0.08 | 0.056 | 8% | |
| 4 | 1.40 | 0.48 | | 0.571 | | | 1.0 | 1.33 | 1.48 | 0.15 | 0.48 | 0.571 | 0.571 | 0.07 | 0.041 | 6% | |
| 5 | 1.55 | 0.50 | | 0.651 | | | 1.0 | 1.48 | 1.63 | 0.15 | 0.50 | 0.651 | 0.651 | 0.08 | 0.049 | 7% | |
| 6 | 1.70 | 0.70 | | 0.472 | | | 1.0 | 1.63 | 1.78 | 0.15 | 0.70 | 0.472 | 0.472 | 0.11 | 0.050 | 7% | |
| 7 | 1.85 | 0.69 | | 0.582 | | | 1.0 | 1.78 | 1.93 | 0.15 | 0.69 | 0.582 | 0.582 | 0.10 | 0.060 | 8% | |
| 8 | 2.00 | 0.74 | | 0.544 | | | 1.0 | 1.93 | 2.08 | 0.15 | 0.74 | 0.544 | 0.544 | 0.11 | 0.060 | 8% | |
| 9 | 2.15 | 0.72 | | 0.593 | | | 1.0 | 2.08 | 2.23 | 0.15 | 0.72 | 0.593 | 0.593 | 0.11 | 0.064 | 9% | |
| 10 | 2.30 | 0.75 | | | 0.290 | 0.600 | 1.0 | 2.23 | 2.38 | 0.15 | 0.75 | 0.445 | 0.445 | 0.11 | 0.050 | 7% | |
| 11 | 2.45 | 0.82 | | | 0.101 | 0.480 | 1.0 | 2.38 | 2.53 | 0.15 | 0.82 | 0.291 | 0.291 | 0.12 | 0.036 | 5% | |
| 12 | 2.60 | 0.88 | | | 0.061 | 0.563 | 1.0 | 2.53 | 2.68 | 0.15 | 0.88 | 0.312 | 0.312 | 0.13 | 0.041 | 6% | |
| 13 | 2.75 | 0.82 | | | 0.177 | 0.464 | 1.0 | 2.68 | 2.83 | 0.15 | 0.82 | 0.321 | 0.321 | 0.12 | 0.039 | 5% | |
| 14 | 2.90 | 0.76 | | | 0.265 | 0.444 | 1.0 | 2.83 | 2.98 | 0.15 | 0.76 | 0.355 | 0.355 | 0.11 | 0.040 | 6% | |
| 15 | 3.05 | 0.70 | | 0.242 | | | 1.0 | 2.98 | 3.13 | 0.15 | 0.70 | 0.242 | 0.242 | 0.11 | 0.025 | 3% | |
| 16 | 3.20 | 0.58 | | 0.124 | | | 1.0 | 3.13 | 3.28 | 0.15 | 0.58 | 0.124 | 0.124 | 0.09 | 0.011 | 1% | |
| 17 | 3.35 | 0.53 | | 0.152 | | | 1.0 | 3.28 | 3.43 | 0.15 | 0.53 | 0.152 | 0.152 | 0.08 | 0.012 | 2% | |
| 18 | 3.50 | 0.44 | | 0.122 | | | 1.0 | 3.43 | 3.58 | 0.15 | 0.44 | 0.122 | 0.122 | 0.07 | 0.008 | 1% | |
| 19 | 3.65 | 0.38 | | 0.076 | | | 1.0 | 3.58 | 3.73 | 0.15 | 0.38 | 0.076 | 0.076 | 0.06 | 0.004 | 1% | |
| 20 | 3.80 | 0.36 | | 0.123 | | | 1.0 | 3.73 | 3.90 | 0.18 | 0.36 | 0.123 | 0.123 | 0.06 | 0.008 | 1% | |
| 21 | 4.00 | 0.38 | | 0.117 | | | 1.0 | 3.90 | 4.15 | 0.25 | 0.38 | 0.117 | 0.117 | 0.10 | 0.011 | 2% | |
| Right | 4.30 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.0 | 4.30 | 4.30 | 0.00 | 0.00 | 0.029 | 0.000 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 0.731 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.731 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 2.00 | (m ²) |
| Wetted Width: | 3.60 | (m) |
| Hydraulic Depth: | 0.554 | (m) |
| Mean Velocity: | 0.366 | (m/s) |
| Foude Number: | 0.157 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | |
| Offset | | | - | - | Panel V.@Ofst | 0.000 |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S2 - Jackpine Creek at Canterra Road (474961 E, 6344087 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 28-Oct-10 |
| Data Entry Personnel: | DB | Date: | 08-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 0.391 |
| Battery (Main): | 12.02 |
| Battery (Aux): | 5.44 |
| Datalogger Clock: | 1234 |
| Laptop Clock: | 1240 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | - |
| Dessicant: | - |
| Logger# (if Δ): | 2059 |
| PT# (if Δ): | - |
| Other Logger Notes: | |
| Rain137.67mm. SNOW&ICE FOUND IN TBRG. | |

| | |
|------------------------------|----------------------------|
| Measurement Details: | |
| Start Time (MST): | 12:30 |
| End Time (MST): | 13:30 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Iced over, broken manually |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 1.804 | 360.610 | 1.791 | 360.610 | - |
| Bench Mark 2: | T-post w/pink flagging | 1.225 | 361.201 | 1.212 | 361.201 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 3.514 | 358.900 | 3.497 | 358.916 | 358.908 |
| Transducer: | | 0.391 | 358.509 | 0.391 | 358.525 | 358.517 |
| Other: | | | | | | |

General Notes:

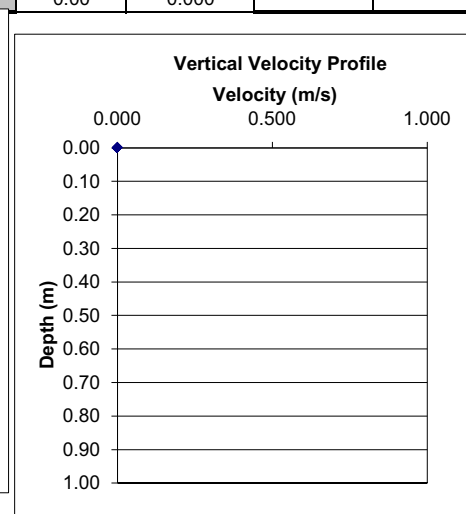
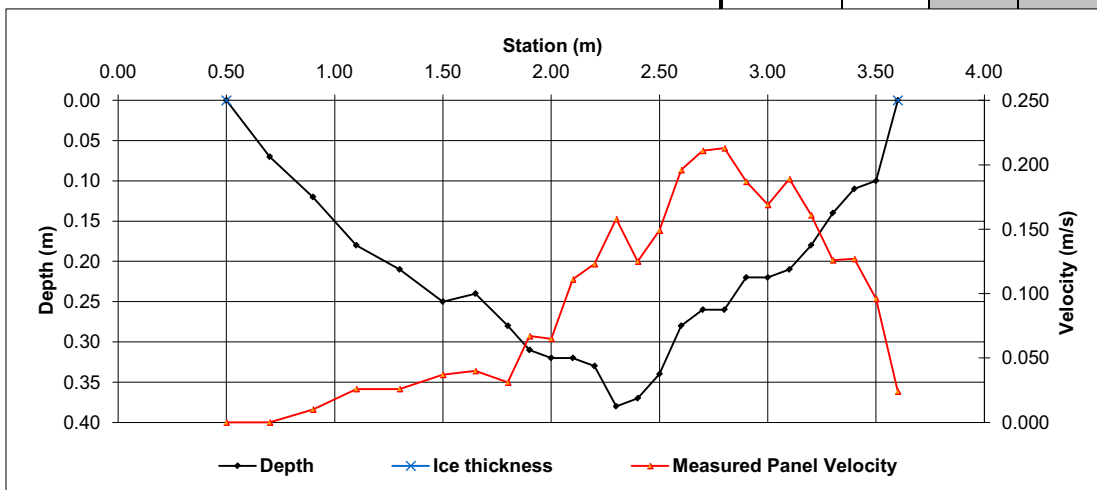
Heli landing in bigger clearcut. Better landing pad required next to station. TBRG brought back due to lack of bags.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.50 | 0.60 | 0.10 | 0.02 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| 2 | 0.70 | 0.07 | | 0.000 | | | 1.0 | 0.60 | 0.80 | 0.20 | 0.07 | 0.000 | 0.000 | 0.01 | 0.000 | 0% |
| 3 | 0.90 | 0.12 | | 0.010 | | | 1.0 | 0.80 | 1.00 | 0.20 | 0.12 | 0.010 | 0.010 | 0.02 | 0.000 | 0% |
| 4 | 1.10 | 0.18 | | 0.026 | | | 1.0 | 1.00 | 1.20 | 0.20 | 0.18 | 0.026 | 0.026 | 0.04 | 0.001 | 1% |
| 5 | 1.30 | 0.21 | | 0.026 | | | 1.0 | 1.20 | 1.40 | 0.20 | 0.21 | 0.026 | 0.026 | 0.04 | 0.001 | 2% |
| 6 | 1.50 | 0.25 | | 0.037 | | | 1.0 | 1.40 | 1.58 | 0.18 | 0.25 | 0.037 | 0.037 | 0.04 | 0.002 | 2% |
| 7 | 1.65 | 0.24 | | 0.040 | | | 1.0 | 1.58 | 1.73 | 0.15 | 0.24 | 0.040 | 0.040 | 0.04 | 0.001 | 2% |
| 8 | 1.80 | 0.28 | | 0.031 | | | 1.0 | 1.73 | 1.85 | 0.13 | 0.28 | 0.031 | 0.031 | 0.04 | 0.001 | 2% |
| 9 | 1.90 | 0.31 | | 0.067 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.31 | 0.067 | 0.067 | 0.03 | 0.002 | 3% |
| 10 | 2.00 | 0.32 | | 0.065 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.32 | 0.065 | 0.065 | 0.03 | 0.002 | 3% |
| 11 | 2.10 | 0.32 | | 0.111 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.32 | 0.111 | 0.111 | 0.03 | 0.004 | 5% |
| 12 | 2.20 | 0.33 | | 0.123 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.33 | 0.123 | 0.123 | 0.03 | 0.004 | 6% |
| 13 | 2.30 | 0.38 | | 0.158 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.38 | 0.158 | 0.158 | 0.04 | 0.006 | 9% |
| 14 | 2.40 | 0.37 | | 0.125 | | | 1.0 | 2.35 | 2.45 | 0.10 | 0.37 | 0.125 | 0.125 | 0.04 | 0.005 | 7% |
| 15 | 2.50 | 0.34 | | 0.149 | | | 1.0 | 2.45 | 2.55 | 0.10 | 0.34 | 0.149 | 0.149 | 0.03 | 0.005 | 7% |
| 16 | 2.60 | 0.28 | | 0.196 | | | 1.0 | 2.55 | 2.65 | 0.10 | 0.28 | 0.196 | 0.196 | 0.03 | 0.005 | 8% |
| 17 | 2.70 | 0.26 | | 0.211 | | | 1.0 | 2.65 | 2.75 | 0.10 | 0.26 | 0.211 | 0.211 | 0.03 | 0.005 | 8% |
| 18 | 2.80 | 0.26 | | 0.213 | | | 1.0 | 2.75 | 2.85 | 0.10 | 0.26 | 0.213 | 0.213 | 0.03 | 0.006 | 8% |
| 19 | 2.90 | 0.22 | | 0.187 | | | 1.0 | 2.85 | 2.95 | 0.10 | 0.22 | 0.187 | 0.187 | 0.02 | 0.004 | 6% |
| 20 | 3.00 | 0.22 | | 0.169 | | | 1.0 | 2.95 | 3.05 | 0.10 | 0.22 | 0.169 | 0.169 | 0.02 | 0.004 | 5% |
| 21 | 3.10 | 0.21 | | 0.189 | | | 1.0 | 3.05 | 3.15 | 0.10 | 0.21 | 0.189 | 0.189 | 0.02 | 0.004 | 6% |
| 22 | 3.20 | 0.18 | | 0.161 | | | 1.0 | 3.15 | 3.25 | 0.10 | 0.18 | 0.161 | 0.161 | 0.02 | 0.003 | 4% |
| 23 | 3.30 | 0.14 | | 0.126 | | | 1.0 | 3.25 | 3.35 | 0.10 | 0.14 | 0.126 | 0.126 | 0.01 | 0.002 | 3% |
| 24 | 3.40 | 0.11 | | 0.127 | | | 1.0 | 3.35 | 3.45 | 0.10 | 0.11 | 0.127 | 0.127 | 0.01 | 0.001 | 2% |
| 25 | 3.50 | 0.10 | | 0.096 | | | 1.0 | 3.45 | 3.55 | 0.10 | 0.10 | 0.096 | 0.096 | 0.01 | 0.001 | 1% |
| Right | 3.60 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.55 | 3.60 | 0.05 | 0.03 | 0.024 | 0.024 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.069 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-----------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.069 | (m ³ /s) |
| Perceived Measurement Quality: | | Excellent | |
| Total Area: | | 0.52 | (m ²) |
| Wetted Width: | | 2.25 | (m) |
| Hydraulic Depth: | | 0.233 | (m) |
| Mean Velocity: | | 0.132 | (m/s) |
| Froude Number: | | 0.088 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5 - Muskeg River above Stanley Creek (479760 E, 6356755 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 21-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.022 |
| Battery (Main): | 4.25 |
| Battery (Aux): | 12.67 |
| Datalogger Clock: | 913 |
| Laptop Clock: | 935 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 47% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1025 |
| End Time (MST): | 1055 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast -6C |

| Level Survey: | | | | | | |
|----------------------|-----------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post near logger | 0.962 | 98.250 | 1.125 | 98.250 | - |
| Bench Mark 2: | Pipe w/ pink flagging | 0.858 | 98.369 | 1.024 | 98.369 | - |
| Top of Ice: | | 1.948 | 97.264 | 2.115 | 97.260 | 97.262 |
| Water Level: | | 1.966 | 97.246 | 2.134 | 97.241 | 97.244 |
| Transducer: | 1046640 | 1.022 | 96.224 | 1.022 | 96.219 | 96.222 |
| Other: | Spare Transducer | 1.412 | 95.834 | 1.412 | 95.829 | |

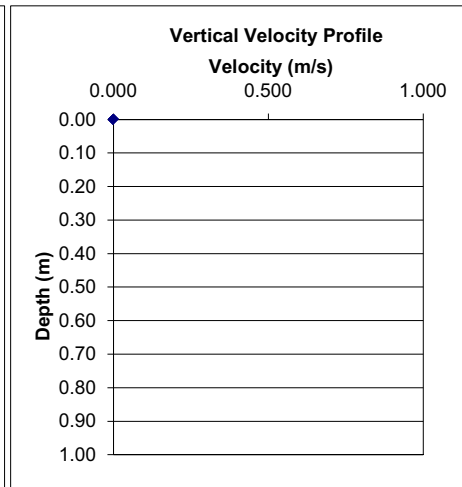
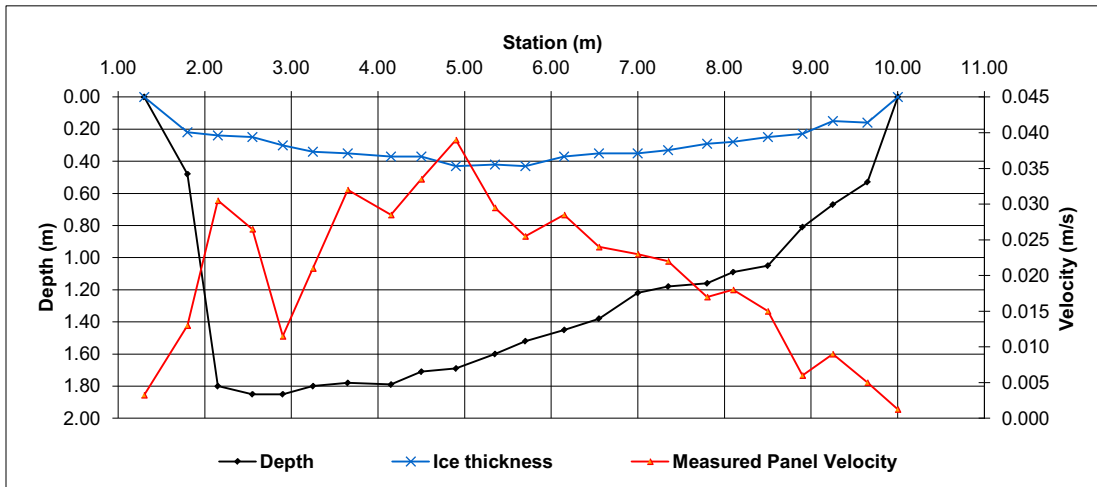
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 1.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.9 | 1.30 | 1.55 | 0.25 | 0.07 | 0.003 | 0.003 | 0.02 | 0.000 | 0% |
| 1 | 1.80 | 0.48 | 0.22 | 0.013 | | | 0.9 | 1.55 | 1.98 | 0.43 | 0.26 | 0.013 | 0.012 | 0.11 | 0.001 | 1% |
| 2 | 2.15 | 1.80 | 0.24 | | 0.034 | 0.027 | 1.0 | 1.98 | 2.35 | 0.38 | 1.56 | 0.031 | 0.031 | 0.58 | 0.018 | 9% |
| 3 | 2.55 | 1.85 | 0.25 | | 0.037 | 0.016 | 1.0 | 2.35 | 2.73 | 0.38 | 1.60 | 0.027 | 0.027 | 0.60 | 0.016 | 8% |
| 4 | 2.90 | 1.85 | 0.30 | | 0.013 | 0.010 | 1.0 | 2.73 | 3.08 | 0.35 | 1.55 | 0.012 | 0.012 | 0.54 | 0.006 | 3% |
| 5 | 3.25 | 1.80 | 0.34 | | 0.013 | 0.029 | 1.0 | 3.08 | 3.45 | 0.38 | 1.46 | 0.021 | 0.021 | 0.55 | 0.011 | 6% |
| 6 | 3.65 | 1.78 | 0.35 | | 0.043 | 0.021 | 1.0 | 3.45 | 3.90 | 0.45 | 1.43 | 0.032 | 0.032 | 0.64 | 0.021 | 10% |
| 7 | 4.15 | 1.79 | 0.37 | | 0.035 | 0.022 | 1.0 | 3.90 | 4.33 | 0.43 | 1.42 | 0.029 | 0.029 | 0.60 | 0.017 | 8% |
| 8 | 4.50 | 1.71 | 0.37 | | 0.038 | 0.029 | 1.0 | 4.33 | 4.70 | 0.38 | 1.34 | 0.034 | 0.034 | 0.50 | 0.017 | 8% |
| 9 | 4.90 | 1.69 | 0.43 | | 0.042 | 0.036 | 1.0 | 4.70 | 5.13 | 0.43 | 1.26 | 0.039 | 0.039 | 0.54 | 0.021 | 10% |
| 10 | 5.35 | 1.60 | 0.42 | | 0.022 | 0.037 | 1.0 | 5.13 | 5.53 | 0.40 | 1.18 | 0.030 | 0.030 | 0.47 | 0.014 | 7% |
| 11 | 5.70 | 1.52 | 0.43 | | 0.032 | 0.019 | 1.0 | 5.53 | 5.93 | 0.40 | 1.09 | 0.026 | 0.026 | 0.44 | 0.011 | 5% |
| 12 | 6.15 | 1.45 | 0.37 | | 0.029 | 0.028 | 1.0 | 5.93 | 6.35 | 0.42 | 1.08 | 0.029 | 0.029 | 0.46 | 0.013 | 6% |
| 13 | 6.55 | 1.38 | 0.35 | | 0.022 | 0.026 | 1.0 | 6.35 | 6.78 | 0.43 | 1.03 | 0.024 | 0.024 | 0.44 | 0.011 | 5% |
| 14 | 7.00 | 1.22 | 0.35 | 0.023 | | | 0.9 | 6.78 | 7.18 | 0.40 | 0.87 | 0.023 | 0.021 | 0.35 | 0.007 | 3% |
| 15 | 7.35 | 1.18 | 0.33 | 0.022 | | | 0.9 | 7.18 | 7.58 | 0.40 | 0.85 | 0.022 | 0.020 | 0.34 | 0.007 | 3% |
| 16 | 7.80 | 1.16 | 0.29 | 0.017 | | | 0.9 | 7.58 | 7.95 | 0.38 | 0.87 | 0.017 | 0.015 | 0.33 | 0.005 | 2% |
| 17 | 8.10 | 1.09 | 0.28 | 0.018 | | | 0.9 | 7.95 | 8.30 | 0.35 | 0.81 | 0.018 | 0.016 | 0.28 | 0.005 | 2% |
| 18 | 8.50 | 1.05 | 0.25 | 0.015 | | | 0.9 | 8.30 | 8.70 | 0.40 | 0.80 | 0.015 | 0.014 | 0.32 | 0.004 | 2% |
| 19 | 8.90 | 0.81 | 0.23 | 0.006 | | | 0.9 | 8.70 | 9.08 | 0.38 | 0.58 | 0.006 | 0.005 | 0.22 | 0.001 | 1% |
| 20 | 9.25 | 0.67 | 0.15 | 0.009 | | | 0.9 | 9.08 | 9.45 | 0.38 | 0.52 | 0.009 | 0.008 | 0.20 | 0.002 | 1% |
| 21 | 9.65 | 0.53 | 0.16 | 0.005 | | | 0.9 | 9.45 | 9.83 | 0.38 | 0.37 | 0.005 | 0.005 | 0.14 | 0.001 | 0% |
| Right | 10.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.9 | 9.83 | 10.00 | 0.18 | 0.09 | 0.001 | 0.001 | 0.02 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.208 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 0.208 (m ³ /s) |
| Perceived Measurement Quality: | Good |
| Total Area: | 8.68 (m ²) |
| Wetted Width: | 8.70 (m) |
| Hydraulic Depth: | 0.997 (m) |
| Mean Velocity: | 0.024 (m/s) |
| Froude Number: | 0.008 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5 - Muskeg River above Stanley Creek (479760 E, 6356755 N) | | | |
| Field Personnel: | GB, CE | Trip Date: | 10-Feb-10 |
| Data Entry Personnel: | SG | Date: | 18-Feb-10 |
| Data Check Personnel: | DB | Date: | 12-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.026 |
| Battery (Main): | 9.25 |
| Battery (Aux): | 13.12 |
| Datalogger Clock: | 1034 |
| Laptop Clock: | 1057 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 50% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1050 |
| End Time (MST): | 1200 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Ice cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | overcast -19C |

| Level Survey: | | | | | | |
|----------------------|-----------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post near logger | 1.341 | 98.250 | 1.350 | 98.250 | - |
| Bench Mark 2: | Pipe w/ pink flagging | 0.945 | 98.369 | 0.955 | 98.369 | - |
| Top of Ice: | | 2.320 | 97.271 | 2.330 | 97.270 | 97.271 |
| Water Level: | | 2.327 | 97.264 | 2.335 | 97.265 | 97.265 |
| Transducer: | 1046640 | 1.026 | 96.238 | 1.026 | 96.239 | 96.239 |
| Other: | Spare Transducer | 1.415 | 95.849 | 1.419 | 95.846 | |

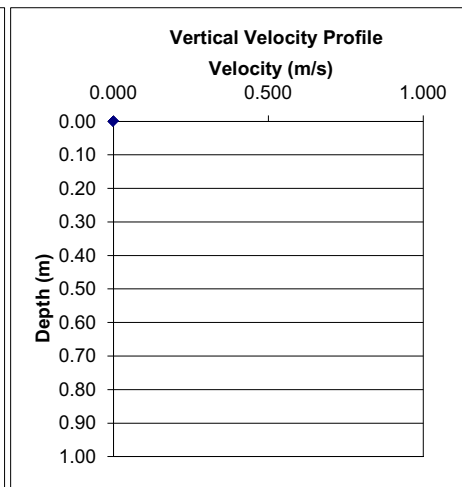
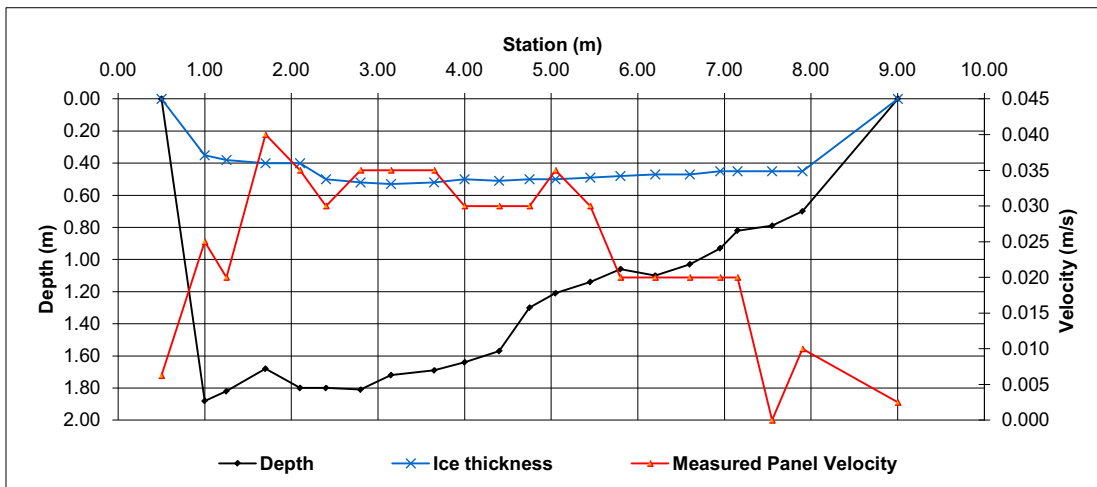
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Left | 0.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.50 | 0.75 | 0.25 | 0.38 | 0.006 | 0.006 | 0.10 | 0.001 | 0% | | | | | | | |
| 1 | 1.00 | 1.88 | 0.35 | | 0.040 | 0.010 | 1.0 | 0.75 | 1.13 | 0.38 | 1.53 | 0.025 | 0.025 | 0.57 | 0.014 | 7% | | | | | | | |
| 2 | 1.25 | 1.82 | 0.38 | | 0.030 | 0.010 | 1.0 | 1.13 | 1.48 | 0.35 | 1.44 | 0.020 | 0.020 | 0.50 | 0.010 | 5% | | | | | | | |
| 3 | 1.70 | 1.68 | 0.40 | | 0.050 | 0.030 | 1.0 | 1.48 | 1.90 | 0.43 | 1.28 | 0.040 | 0.040 | 0.54 | 0.022 | 11% | | | | | | | |
| 4 | 2.10 | 1.80 | 0.40 | | 0.030 | 0.040 | 1.0 | 1.90 | 2.25 | 0.35 | 1.40 | 0.035 | 0.035 | 0.49 | 0.017 | 9% | | | | | | | |
| 5 | 2.40 | 1.80 | 0.50 | | 0.040 | 0.020 | 1.0 | 2.25 | 2.60 | 0.35 | 1.30 | 0.030 | 0.030 | 0.46 | 0.014 | 7% | | | | | | | |
| 6 | 2.80 | 1.81 | 0.52 | | 0.030 | 0.040 | 1.0 | 2.60 | 2.98 | 0.38 | 1.29 | 0.035 | 0.035 | 0.48 | 0.017 | 9% | | | | | | | |
| 7 | 3.15 | 1.72 | 0.53 | | 0.030 | 0.040 | 1.0 | 2.98 | 3.40 | 0.43 | 1.19 | 0.035 | 0.035 | 0.51 | 0.018 | 9% | | | | | | | |
| 8 | 3.65 | 1.69 | 0.52 | | 0.040 | 0.030 | 1.0 | 3.40 | 3.83 | 0.43 | 1.17 | 0.035 | 0.035 | 0.50 | 0.017 | 9% | | | | | | | |
| 9 | 4.00 | 1.64 | 0.50 | | 0.030 | 0.030 | 1.0 | 3.83 | 4.20 | 0.38 | 1.14 | 0.030 | 0.030 | 0.43 | 0.013 | 7% | | | | | | | |
| 10 | 4.40 | 1.57 | 0.51 | | 0.030 | 0.030 | 1.0 | 4.20 | 4.58 | 0.38 | 1.06 | 0.030 | 0.030 | 0.40 | 0.012 | 6% | | | | | | | |
| 11 | 4.75 | 1.30 | 0.50 | | 0.030 | 0.030 | 1.0 | 4.58 | 4.90 | 0.33 | 0.80 | 0.030 | 0.030 | 0.26 | 0.008 | 4% | | | | | | | |
| 12 | 5.05 | 1.21 | 0.50 | | 0.040 | 0.030 | 1.0 | 4.90 | 5.25 | 0.35 | 0.71 | 0.035 | 0.035 | 0.25 | 0.009 | 4% | | | | | | | |
| 13 | 5.45 | 1.14 | 0.49 | 0.030 | | | 0.9 | 5.25 | 5.63 | 0.38 | 0.65 | 0.030 | 0.027 | 0.24 | 0.007 | 3% | | | | | | | |
| 14 | 5.80 | 1.06 | 0.48 | 0.020 | | | 0.9 | 5.63 | 6.00 | 0.38 | 0.58 | 0.020 | 0.018 | 0.22 | 0.004 | 2% | | | | | | | |
| 15 | 6.20 | 1.10 | 0.47 | 0.020 | | | 0.9 | 6.00 | 6.40 | 0.40 | 0.63 | 0.020 | 0.018 | 0.25 | 0.005 | 2% | | | | | | | |
| 16 | 6.60 | 1.03 | 0.47 | 0.020 | | | 0.9 | 6.40 | 6.78 | 0.38 | 0.56 | 0.020 | 0.018 | 0.21 | 0.004 | 2% | | | | | | | |
| 17 | 6.95 | 0.93 | 0.45 | 0.020 | | | 0.9 | 6.78 | 7.05 | 0.28 | 0.48 | 0.020 | 0.018 | 0.13 | 0.002 | 1% | | | | | | | |
| 18 | 7.15 | 0.82 | 0.45 | 0.020 | | | 0.9 | 7.05 | 7.35 | 0.30 | 0.37 | 0.020 | 0.018 | 0.11 | 0.002 | 1% | | | | | | | |
| 19 | 7.55 | 0.79 | 0.45 | 0.000 | | | 1.0 | 7.35 | 7.73 | 0.38 | 0.34 | 0.000 | 0.000 | 0.13 | 0.000 | 0% | | | | | | | |
| 20 | 7.90 | 0.70 | 0.45 | 0.010 | | | 0.9 | 7.73 | 8.45 | 0.73 | 0.25 | 0.010 | 0.009 | 0.18 | 0.002 | 1% | | | | | | | |
| Right | 9.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 8.45 | 9.00 | 0.55 | 0.06 | 0.003 | 0.003 | 0.03 | 0.000 | 0% | | | | | | | |
| Total Flow | | | | | | | | | | | | | | | 0.196 | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.196 | (m ³ /s) |
| Perceived Measurement Quality: | | Good | |
| Total Area: | | 6.99 | (m ²) |
| Wetted Width: | | 8.50 | (m) |
| Hydraulic Depth: | | 0.823 | (m) |
| Mean Velocity: | | 0.028 | (m/s) |
| Froude Number: | | 0.010 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5 - Muskeg River above Stanley Creek (479760 E, 6356755 N) | | | |
| Field Personnel: | JE, SG | Trip Date: | 05-Mar-10 |
| Data Entry Personnel: | SG | Date: | 18-Mar-10 |
| Data Check Personnel: | JP | Date: | 02-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.024 |
| Battery (Main): | 4.30 |
| Battery (Aux): | 14.42 |
| Datalogger Clock: | 1413 |
| Laptop Clock: | 1414 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 53% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1450 |
| End Time (MST): | 1502 |
| Equipment: | ADV Other: Flo Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Sunny Windy 10°C |

| Level Survey: | | | | | | |
|----------------------|-----------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post near logger | 1.178 | 98.250 | 1.173 | 98.250 | - |
| Bench Mark 2: | Pipe w/ pink flagging | 1.080 | 98.369 | 1.074 | 98.369 | - |
| Top of Ice: | | 2.156 | 97.272 | 2.151 | 97.272 | 97.272 |
| Water Level: | | 2.178 | 97.250 | 2.176 | 97.247 | 97.249 |
| Transducer: | 1046640 | 1.024 | 96.226 | 1.024 | 96.223 | 96.225 |
| Other: | Spare Transducer | | 97.250 | | 97.247 | |

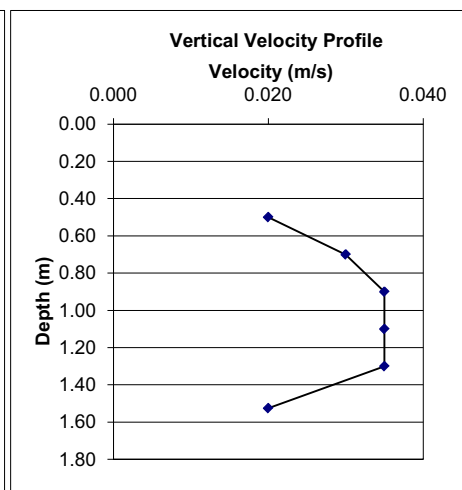
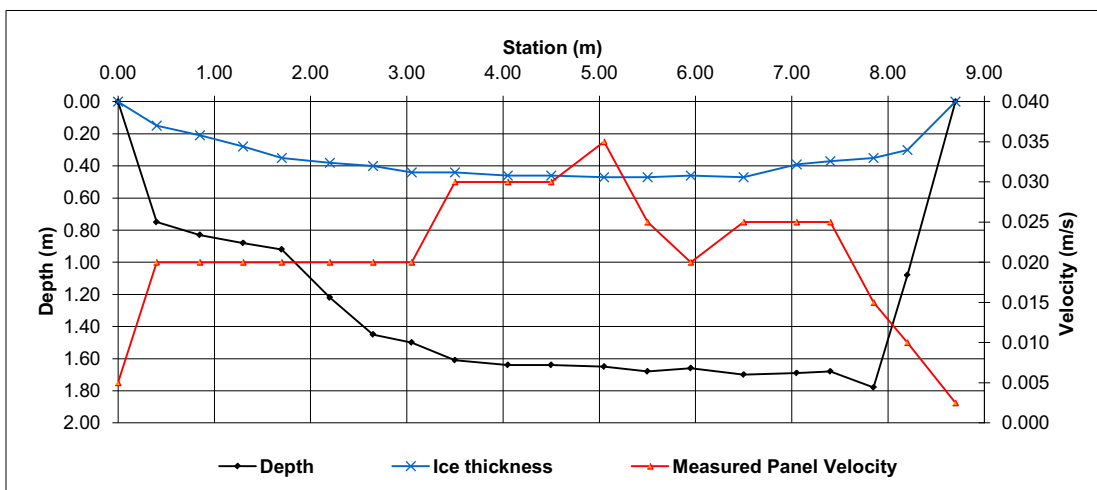
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|------------------|-------------------------|--------------------------|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m²) | Pannel Discharge (m³/s) | Percentage of total flow | | | |
| Left | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.9 | 0.00 | 0.20 | 0.20 | 0.15 | 0.005 | 0.005 | 0.03 | 0.000 | 0% | | | |
| 1 | 0.40 | 0.75 | 0.15 | 0.020 | | | 0.9 | 0.20 | 0.63 | 0.42 | 0.60 | 0.020 | 0.018 | 0.25 | 0.005 | 2% | | | |
| 2 | 0.85 | 0.83 | 0.21 | 0.020 | | | 0.9 | 0.63 | 1.08 | 0.45 | 0.62 | 0.020 | 0.018 | 0.28 | 0.005 | 3% | | | |
| 3 | 1.30 | 0.88 | 0.28 | 0.020 | | | 0.9 | 1.08 | 1.50 | 0.43 | 0.60 | 0.020 | 0.018 | 0.26 | 0.005 | 2% | | | |
| 4 | 1.70 | 0.92 | 0.35 | 0.020 | | | 0.9 | 1.50 | 1.95 | 0.45 | 0.57 | 0.020 | 0.018 | 0.26 | 0.005 | 2% | | | |
| 5 | 2.20 | 1.22 | 0.38 | 0.020 | | | 0.9 | 1.95 | 2.43 | 0.48 | 0.84 | 0.020 | 0.018 | 0.40 | 0.007 | 4% | | | |
| 6 | 2.65 | 1.45 | 0.40 | | 0.010 | 0.030 | 1.0 | 2.43 | 2.85 | 0.43 | 1.05 | 0.020 | 0.020 | 0.45 | 0.009 | 4% | | | |
| 7 | 3.05 | 1.50 | 0.44 | | 0.020 | 0.020 | 1.0 | 2.85 | 3.28 | 0.43 | 1.06 | 0.020 | 0.020 | 0.45 | 0.009 | 5% | | | |
| 8 | 3.50 | 1.61 | 0.44 | | 0.030 | 0.030 | 1.0 | 3.28 | 3.78 | 0.50 | 1.17 | 0.030 | 0.030 | 0.59 | 0.018 | 9% | | | |
| 9 | 4.05 | 1.64 | 0.46 | | 0.030 | 0.030 | 1.0 | 3.78 | 4.28 | 0.50 | 1.18 | 0.030 | 0.030 | 0.59 | 0.018 | 9% | | | |
| 10 | 4.50 | 1.64 | 0.46 | | 0.030 | 0.030 | 1.0 | 4.28 | 4.78 | 0.50 | 1.18 | 0.030 | 0.030 | 0.59 | 0.018 | 9% | | | |
| 11 | 5.05 | 1.65 | 0.47 | | 0.030 | 0.040 | 1.0 | 4.78 | 5.28 | 0.50 | 1.18 | 0.035 | 0.035 | 0.59 | 0.021 | 10% | | | |
| 12 | 5.50 | 1.68 | 0.47 | | 0.020 | 0.030 | 1.0 | 5.28 | 5.73 | 0.45 | 1.21 | 0.025 | 0.025 | 0.54 | 0.014 | 7% | | | |
| 13 | 5.95 | 1.66 | 0.46 | | 0.020 | 0.020 | 1.0 | 5.73 | 6.23 | 0.50 | 1.20 | 0.020 | 0.020 | 0.60 | 0.012 | 6% | | | |
| 14 | 6.50 | 1.70 | 0.47 | | 0.020 | 0.030 | 1.0 | 6.23 | 6.78 | 0.55 | 1.23 | 0.025 | 0.025 | 0.68 | 0.017 | 8% | | | |
| 15 | 7.05 | 1.69 | 0.39 | | 0.020 | 0.030 | 1.0 | 6.78 | 7.23 | 0.45 | 1.30 | 0.025 | 0.025 | 0.59 | 0.015 | 7% | | | |
| 16 | 7.40 | 1.68 | 0.37 | | 0.020 | 0.030 | 1.0 | 7.23 | 7.63 | 0.40 | 1.31 | 0.025 | 0.025 | 0.52 | 0.013 | 7% | | | |
| 17 | 7.85 | 1.78 | 0.35 | | 0.010 | 0.020 | 1.0 | 7.63 | 8.03 | 0.40 | 1.43 | 0.015 | 0.015 | 0.57 | 0.009 | 4% | | | |
| 18 | 8.20 | 1.08 | 0.30 | | 0.020 | | 1.0 | 8.03 | 8.45 | 0.42 | 0.78 | 0.010 | 0.010 | 0.33 | 0.003 | 2% | | | |
| Right | 8.70 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 8.45 | 8.70 | 0.25 | 0.20 | 0.003 | 0.003 | 0.05 | 0.000 | 0% | | | |
| Total Flow | | | | | | | | | | | | | | | 0.200 | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|--------------|
| Flow characteristics: | |
| Total Flow: | 0.200 (m³/s) |
| Perceived Measurement Quality: | Good |
| Total Area: | 8.61 (m²) |
| Wetted Width: | 8.70 (m) |
| Hydraulic Depth: | 0.989 (m) |
| Mean Velocity: | 0.023 (m/s) |
| Froude Number: | 0.007 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.029 |
| Offset | 5.05 | 1.65 | 0.000 | - | - | Panel V.@Ofst 0.035 |
| Depth | 1.65 | 1.40 | 0.040 | 1.53 | 0.020 | 60% Depth 1.178 |
| Ice Depth | 0.47 | 1.20 | 0.030 | 1.30 | 0.035 | 20% Depth 0.71 |
| | | 1.00 | 0.040 | 1.10 | 0.035 | 80% Depth 1.41 |
| | | 0.80 | 0.030 | 0.90 | 0.035 | |
| | | 0.60 | 0.030 | 0.70 | 0.030 | |
| | | 0.40 | 0.010 | 0.50 | 0.020 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5 - Muskeg River above Stanley Creek (479760 E, 6356755 N) | | | |
| Field Personnel: | SG DB | Trip Date: | 12-Apr-10 |
| Data Entry Personnel: | DB | Date: | 04-May-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|--------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.265 |
| Battery (Main): | 4.28 |
| Battery (Aux): | 14.52 |
| Datalogger Clock: | 1140 |
| Laptop Clock: | 1143 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 57% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Spare Pt - 1.627m | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1130 |
| End Time (MST): | 1140 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Broken |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|-----------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post near logger | 1.320 | 98.250 | 1.286 | 98.250 | - |
| Bench Mark 2: | Pipe w/ pink flagging | 1.244 | 98.369 | 1.208 | 98.369 | - |
| Top of Ice: | | | 99.570 | | 99.536 | 99.553 |
| Water Level: | | 2.111 | 97.459 | 2.078 | 97.458 | 97.459 |
| Transducer: | 1046640 | 1.265 | 96.194 | 1.265 | 96.193 | 96.194 |
| Other: | Spare Transducer | | 97.459 | | 97.458 | |

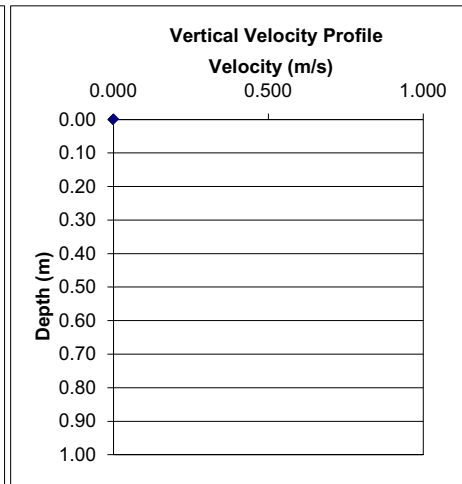
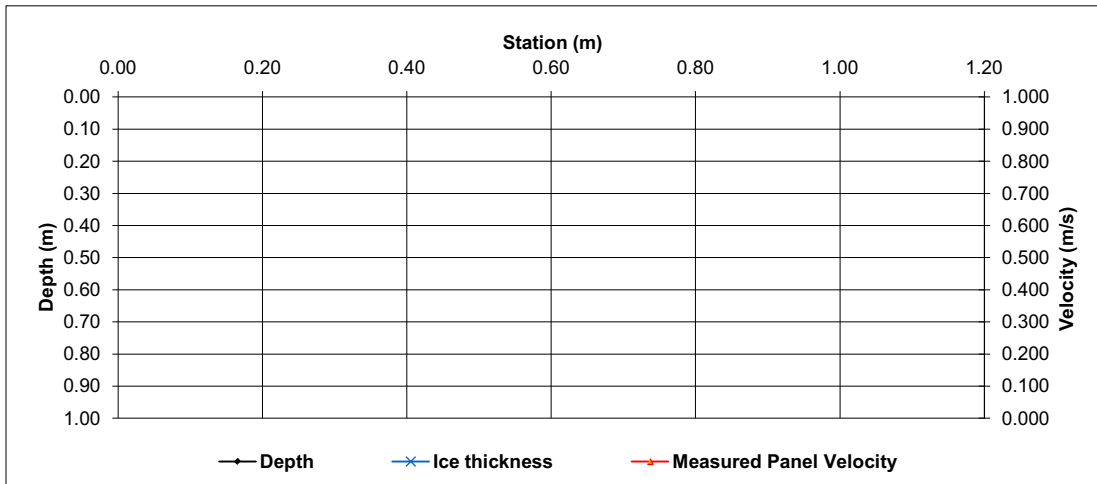
General Notes:

Breakup in progress with water over ice. Conditions considered unsafe.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | Calculated Data | | | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | Total Flow NOT MEASURED | |

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | NOT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | | 0 | |
| Total Area: | | #VALUE! | (m ²) |
| Wetted Width: | | 0.00 | (m) |
| Hydraulic Depth: | | #VALUE! | (m) |
| Mean Velocity: | | #VALUE! | (m/s) |
| Froude Number: | | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5 - Muskeg River above Stanley Creek (479760 E, 6356755 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 25-Apr-10 |
| Data Entry Personnel: | DB | Date: | 30-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|--------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.824 |
| Battery (Main): | 4.72 |
| Battery (Aux): | 14.72 |
| Datalogger Clock: | 816 |
| Laptop Clock: | 819 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 1% |
| Dessicant: | New |
| Logger# (if Δ): | 845 |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Spare Pt 2.159264 | |

| | |
|------------------------------|--------------|
| Measurement Details: | |
| Start Time (MST): | 900 |
| End Time (MST): | 945 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast 0°C |

| Level Survey: | | | | | | |
|----------------------|-----------------------|---------|--------|---------|--------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post near logger | 1.328 | 98.250 | 1.308 | 98.250 | - |
| Bench Mark 2: | Pipe w/ pink flagging | 1.287 | 98.369 | 1.267 | 98.369 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.628 | 97.950 | 1.611 | 97.947 | 97.949 |
| Transducer: | 1046640 | 1.824 | 96.126 | 1.824 | 96.123 | 96.125 |
| Other: | Spare Transducer | | 97.950 | | 97.947 | |

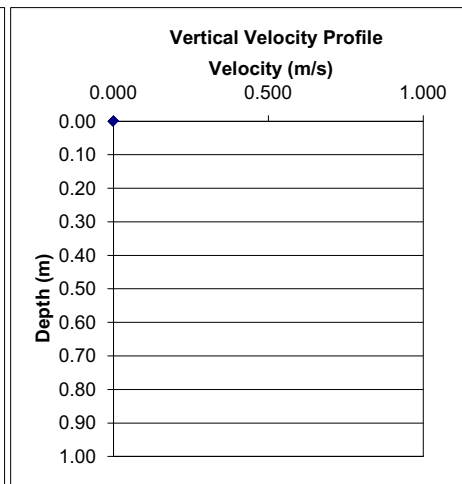
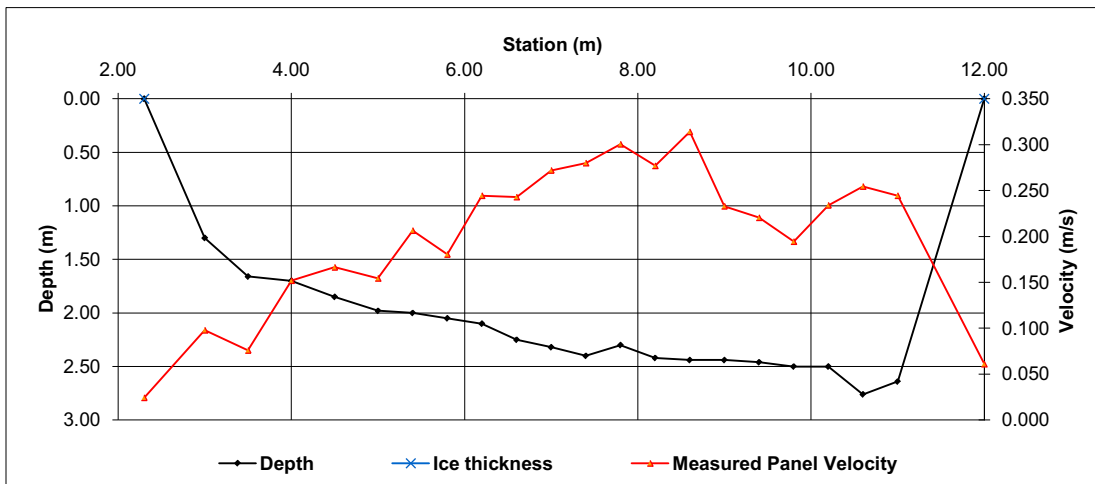
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Measured Data | | | | | | | Calculated Data | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 12.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 12.00 | 11.50 | 0.50 | 0.66 | 0.061 | 0.061 | 0.33 | 0.020 | 0% | |
| 1 | 11.00 | 2.64 | | | 0.191 | 0.298 | 1.0 | 11.50 | 10.80 | 0.70 | 2.64 | 0.245 | 0.245 | 1.85 | 0.452 | 11% | |
| 2 | 10.60 | 2.76 | | | 0.166 | 0.343 | 1.0 | 10.80 | 10.40 | 0.40 | 2.76 | 0.255 | 0.255 | 1.10 | 0.281 | 7% | |
| 3 | 10.20 | 2.50 | | | 0.280 | 0.188 | 1.0 | 10.40 | 10.00 | 0.40 | 2.50 | 0.234 | 0.234 | 1.00 | 0.234 | 5% | |
| 4 | 9.80 | 2.50 | | | 0.116 | 0.273 | 1.0 | 10.00 | 9.60 | 0.40 | 2.50 | 0.195 | 0.195 | 1.00 | 0.194 | 5% | |
| 5 | 9.40 | 2.46 | | | 0.142 | 0.299 | 1.0 | 9.60 | 9.20 | 0.40 | 2.46 | 0.221 | 0.221 | 0.98 | 0.217 | 5% | |
| 6 | 9.00 | 2.44 | | | 0.174 | 0.292 | 1.0 | 9.20 | 8.80 | 0.40 | 2.44 | 0.233 | 0.233 | 0.98 | 0.227 | 5% | |
| 7 | 8.60 | 2.44 | | | 0.304 | 0.324 | 1.0 | 8.80 | 8.40 | 0.40 | 2.44 | 0.314 | 0.314 | 0.98 | 0.306 | 7% | |
| 8 | 8.20 | 2.42 | | | 0.249 | 0.305 | 1.0 | 8.40 | 8.00 | 0.40 | 2.42 | 0.277 | 0.277 | 0.97 | 0.268 | 6% | |
| 9 | 7.80 | 2.30 | | | 0.283 | 0.318 | 1.0 | 8.00 | 7.60 | 0.40 | 2.30 | 0.301 | 0.301 | 0.92 | 0.276 | 6% | |
| 10 | 7.40 | 2.40 | | | 0.308 | 0.252 | 1.0 | 7.60 | 7.20 | 0.40 | 2.40 | 0.280 | 0.280 | 0.96 | 0.269 | 6% | |
| 11 | 7.00 | 2.32 | | | 0.262 | 0.282 | 1.0 | 7.20 | 6.80 | 0.40 | 2.32 | 0.272 | 0.272 | 0.93 | 0.252 | 6% | |
| 12 | 6.60 | 2.25 | | | 0.210 | 0.276 | 1.0 | 6.80 | 6.40 | 0.40 | 2.25 | 0.243 | 0.243 | 0.90 | 0.219 | 5% | |
| 13 | 6.20 | 2.10 | | | 0.255 | 0.234 | 1.0 | 6.40 | 6.00 | 0.40 | 2.10 | 0.245 | 0.245 | 0.84 | 0.205 | 5% | |
| 14 | 5.80 | 2.05 | | | 0.134 | 0.227 | 1.0 | 6.00 | 5.60 | 0.40 | 2.05 | 0.181 | 0.181 | 0.82 | 0.148 | 3% | |
| 15 | 5.40 | 2.00 | | | 0.176 | 0.237 | 1.0 | 5.60 | 5.20 | 0.40 | 2.00 | 0.207 | 0.207 | 0.80 | 0.165 | 4% | |
| 16 | 5.00 | 1.98 | | | 0.116 | 0.193 | 1.0 | 5.20 | 4.75 | 0.45 | 1.98 | 0.155 | 0.155 | 0.89 | 0.138 | 3% | |
| 17 | 4.50 | 1.85 | | | 0.119 | 0.214 | 1.0 | 4.75 | 4.25 | 0.50 | 1.85 | 0.167 | 0.167 | 0.92 | 0.154 | 4% | |
| 18 | 4.00 | 1.70 | | | 0.143 | 0.161 | 1.0 | 4.25 | 3.75 | 0.50 | 1.70 | 0.152 | 0.152 | 0.85 | 0.129 | 3% | |
| 19 | 3.50 | 1.66 | | | 0.026 | 0.126 | 1.0 | 3.75 | 3.25 | 0.50 | 1.66 | 0.076 | 0.076 | 0.83 | 0.063 | 1% | |
| 20 | 3.00 | 1.30 | | | 0.074 | 0.122 | 1.0 | 3.25 | 2.65 | 0.60 | 1.30 | 0.098 | 0.098 | 0.78 | 0.076 | 2% | |
| Right | 2.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.65 | 2.30 | 0.35 | 0.33 | 0.025 | 0.025 | 0.11 | 0.003 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 4.299 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 4.299 | (m ³ /s) |
| Perceived Measurement Quality: | | Good | |
| Total Area: | | 19.74 | (m ²) |
| Wetted Width: | | 8.85 | (m) |
| Hydraulic Depth: | | 2.231 | (m) |
| Mean Velocity: | | 0.218 | (m/s) |
| Froude Number: | | 0.047 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5 - Muskeg River above Stanley Creek (479760 E, 6356755 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 25-Jun-10 |
| Data Entry Personnel: | DB | Date: | 02-Jul-10 |
| Data Check Personnel: | JP | Date: | 13-Jul-10 |

| | |
|---------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.318 |
| Battery (Main): | 13.92 |
| Battery (Aux): | 4.34 |
| Datalogger Clock: | 12:23 |
| Laptop Clock: | 12:26 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 9% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Spare Pt: 1.456098 | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1230 |
| End Time (MST): | 1330 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Partly Cloudy |

| Level Survey: | | | | | | |
|----------------------|-----------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post near logger | 1.059 | 98.250 | 1.057 | 98.250 | - |
| Bench Mark 2: | Pipe w/ pink flagging | 1.004 | 98.369 | 1.001 | 98.369 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.997 | 97.376 | 1.991 | 97.379 | 97.378 |
| Transducer: | 1046640 | 1.318 | 96.058 | 1.318 | 96.061 | 96.059 |
| Other: | Spare Transducer | 1.456 | 95.920 | 1.456 | 95.923 | |

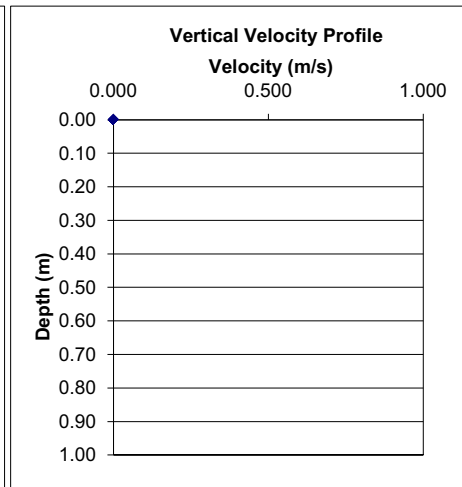
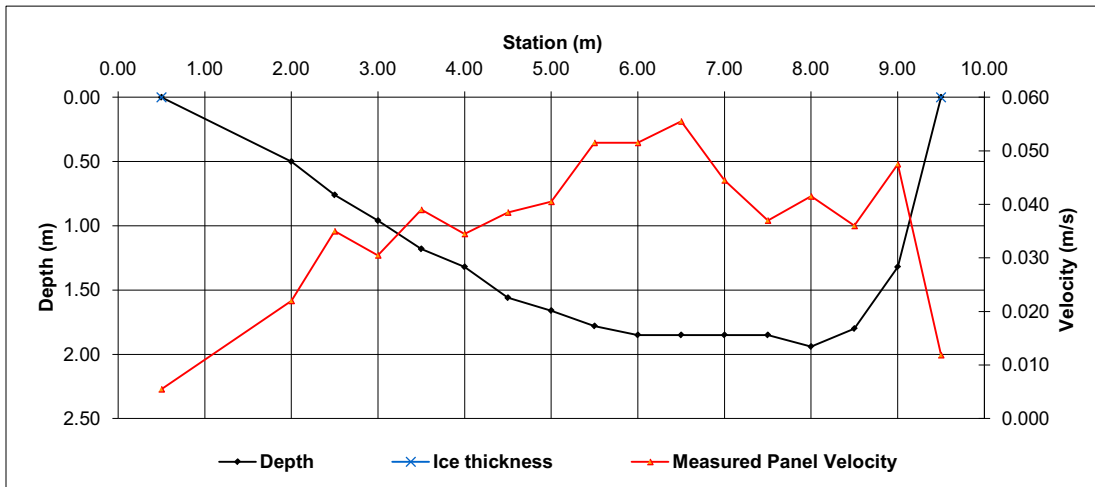
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 9.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 9.50 | 9.25 | 0.25 | 0.33 | 0.012 | 0.012 | 0.08 | 0.001 | 0% | |
| 1 | 9.00 | 1.32 | | | 0.047 | 0.048 | 1.0 | 9.25 | 8.75 | 0.50 | 1.32 | 0.048 | 0.048 | 0.66 | 0.031 | 7% | |
| 2 | 8.50 | 1.80 | | | 0.019 | 0.053 | 1.0 | 8.75 | 8.25 | 0.50 | 1.80 | 0.036 | 0.036 | 0.90 | 0.032 | 7% | |
| 3 | 8.00 | 1.94 | | | 0.021 | 0.062 | 1.0 | 8.25 | 7.75 | 0.50 | 1.94 | 0.042 | 0.042 | 0.97 | 0.040 | 8% | |
| 4 | 7.50 | 1.85 | | | 0.006 | 0.068 | 1.0 | 7.75 | 7.25 | 0.50 | 1.85 | 0.037 | 0.037 | 0.93 | 0.034 | 7% | |
| 5 | 7.00 | 1.85 | | | 0.039 | 0.050 | 1.0 | 7.25 | 6.75 | 0.50 | 1.85 | 0.045 | 0.045 | 0.93 | 0.041 | 9% | |
| 6 | 6.50 | 1.85 | | | 0.043 | 0.068 | 1.0 | 6.75 | 6.25 | 0.50 | 1.85 | 0.056 | 0.056 | 0.93 | 0.051 | 11% | |
| 7 | 6.00 | 1.85 | | | 0.045 | 0.058 | 1.0 | 6.25 | 5.75 | 0.50 | 1.85 | 0.052 | 0.052 | 0.93 | 0.048 | 10% | |
| 8 | 5.50 | 1.78 | | | 0.054 | 0.049 | 1.0 | 5.75 | 5.25 | 0.50 | 1.78 | 0.052 | 0.052 | 0.89 | 0.046 | 10% | |
| 9 | 5.00 | 1.66 | | | 0.039 | 0.042 | 1.0 | 5.25 | 4.75 | 0.50 | 1.66 | 0.041 | 0.041 | 0.83 | 0.034 | 7% | |
| 10 | 4.50 | 1.56 | | | 0.035 | 0.042 | 1.0 | 4.75 | 4.25 | 0.50 | 1.56 | 0.039 | 0.039 | 0.78 | 0.030 | 6% | |
| 11 | 4.00 | 1.32 | | | 0.034 | 0.035 | 1.0 | 4.25 | 3.75 | 0.50 | 1.32 | 0.035 | 0.035 | 0.66 | 0.023 | 5% | |
| 12 | 3.50 | 1.18 | | | 0.039 | 0.039 | 1.0 | 3.75 | 3.25 | 0.50 | 1.18 | 0.039 | 0.039 | 0.59 | 0.023 | 5% | |
| 13 | 3.00 | 0.96 | | | 0.033 | 0.028 | 1.0 | 3.25 | 2.75 | 0.50 | 0.96 | 0.031 | 0.031 | 0.48 | 0.015 | 3% | |
| 14 | 2.50 | 0.76 | | | 0.039 | 0.031 | 1.0 | 2.75 | 2.25 | 0.50 | 0.76 | 0.035 | 0.035 | 0.38 | 0.013 | 3% | |
| 15 | 2.00 | 0.50 | | | 0.024 | 0.020 | 1.0 | 2.25 | 1.25 | 1.00 | 0.50 | 0.022 | 0.022 | 0.50 | 0.011 | 2% | |
| Right | 0.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.25 | 0.50 | 0.75 | 0.13 | 0.006 | 0.006 | 0.09 | 0.001 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.474 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 0.474 (m ³ /s) |
| Perceived Measurement Quality: | Good |
| Total Area: | 11.52 (m ²) |
| Wetted Width: | 8.00 (m) |
| Hydraulic Depth: | 1.440 (m) |
| Mean Velocity: | 0.041 (m/s) |
| Froude Number: | 0.011 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|---------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5 - Muskeg River above Stanley Creek (479760 E, 6356755 N) | | | |
| Field Personnel: | BL, SG, Jim (pilot) | Trip Date: | 13-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|---|-------|
| Logger Details: | |
| Transducer Reading: | 1.279 |
| Battery (Main): | 13.61 |
| Battery (Aux): | - |
| Datalogger Clock: | 1038 |
| Laptop Clock: | 1040 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 18.2 |
| Memory used: | - |
| Dessicant: | New |
| Logger# (if Δ): | 13900 |
| PT# (if Δ): | |
| Other Logger Notes: New CR800 installed, DD128 PRTD = 1.394m, spare = 1.588m | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1130 |
| End Time (MST): | 1220 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | partly, wind, 20°C |

| Level Survey: | | | | | | |
|----------------------|-----------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post near logger | 0.996 | 98.250 | 0.963 | 98.250 | - |
| Bench Mark 2: | Pipe w/ pink flagging | 0.939 | 98.369 | 0.907 | 98.369 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.876 | 97.370 | 1.846 | 97.367 | 97.369 |
| Transducer: | | 1.279 | 96.091 | 1.279 | 96.088 | 96.090 |
| Other: | | | | | | |

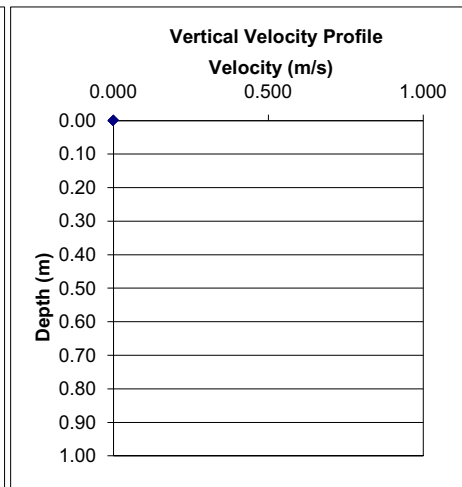
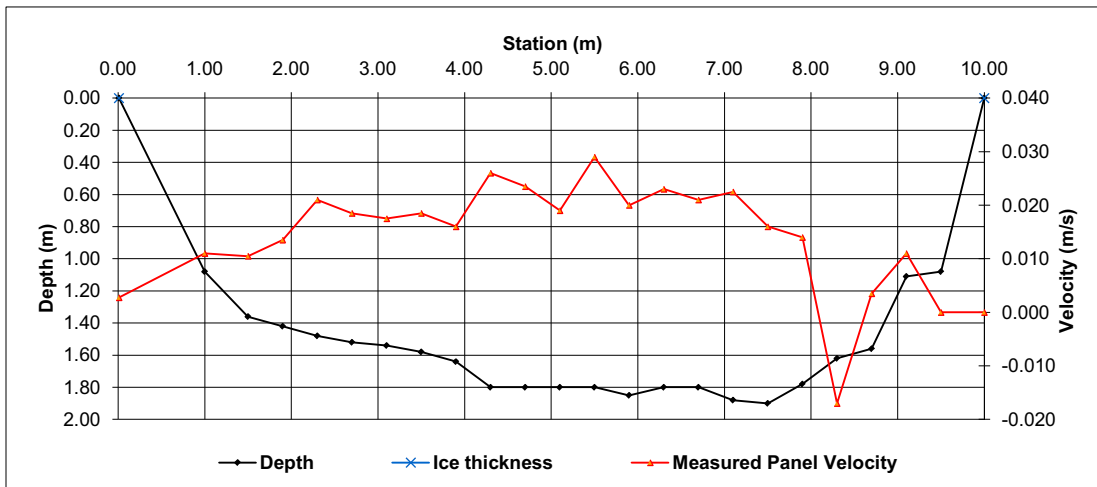
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 10.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 10.00 | 9.75 | 0.25 | 0.27 | 0.000 | 0.000 | 0.07 | 0.000 | 0% |
| 1 | 9.50 | 1.08 | | 0.000 | 0.008 | | 1.0 | 9.75 | 9.30 | 0.45 | 1.08 | 0.000 | 0.000 | 0.49 | 0.000 | 0% |
| 2 | 9.10 | 1.11 | | -0.001 | 0.023 | | 1.0 | 9.30 | 8.90 | 0.40 | 1.11 | 0.011 | 0.011 | 0.44 | 0.005 | 2% |
| 3 | 8.70 | 1.56 | | -0.004 | 0.011 | | 1.0 | 8.90 | 8.50 | 0.40 | 1.56 | 0.004 | 0.004 | 0.62 | 0.002 | 1% |
| 4 | 8.30 | 1.62 | | 0.004 | -0.038 | | 1.0 | 8.50 | 8.10 | 0.40 | 1.62 | -0.017 | -0.017 | 0.65 | -0.011 | -5% |
| 5 | 7.90 | 1.78 | | 0.015 | 0.013 | | 1.0 | 8.10 | 7.70 | 0.40 | 1.78 | 0.014 | 0.014 | 0.71 | 0.010 | 4% |
| 6 | 7.50 | 1.90 | | 0.029 | 0.003 | | 1.0 | 7.70 | 7.30 | 0.40 | 1.90 | 0.016 | 0.016 | 0.76 | 0.012 | 5% |
| 7 | 7.10 | 1.88 | | 0.015 | 0.030 | | 1.0 | 7.30 | 6.90 | 0.40 | 1.88 | 0.023 | 0.023 | 0.75 | 0.017 | 7% |
| 8 | 6.70 | 1.80 | | 0.014 | 0.028 | | 1.0 | 6.90 | 6.50 | 0.40 | 1.80 | 0.021 | 0.021 | 0.72 | 0.015 | 7% |
| 9 | 6.30 | 1.80 | | 0.019 | 0.027 | | 1.0 | 6.50 | 6.10 | 0.40 | 1.80 | 0.023 | 0.023 | 0.72 | 0.017 | 7% |
| 10 | 5.90 | 1.85 | | 0.022 | 0.018 | | 1.0 | 6.10 | 5.70 | 0.40 | 1.85 | 0.020 | 0.020 | 0.74 | 0.015 | 6% |
| 11 | 5.50 | 1.80 | | 0.021 | 0.037 | | 1.0 | 5.70 | 5.30 | 0.40 | 1.80 | 0.029 | 0.029 | 0.72 | 0.021 | 9% |
| 12 | 5.10 | 1.80 | | 0.024 | 0.014 | | 1.0 | 5.30 | 4.90 | 0.40 | 1.80 | 0.019 | 0.019 | 0.72 | 0.014 | 6% |
| 13 | 4.70 | 1.80 | | 0.025 | 0.022 | | 1.0 | 4.90 | 4.50 | 0.40 | 1.80 | 0.024 | 0.024 | 0.72 | 0.017 | 7% |
| 14 | 4.30 | 1.80 | | 0.024 | 0.028 | | 1.0 | 4.50 | 4.10 | 0.40 | 1.80 | 0.026 | 0.026 | 0.72 | 0.019 | 8% |
| 15 | 3.90 | 1.64 | | 0.018 | 0.014 | | 1.0 | 4.10 | 3.70 | 0.40 | 1.64 | 0.016 | 0.016 | 0.66 | 0.010 | 5% |
| 16 | 3.50 | 1.58 | | 0.016 | 0.021 | | 1.0 | 3.70 | 3.30 | 0.40 | 1.58 | 0.019 | 0.019 | 0.63 | 0.012 | 5% |
| 17 | 3.10 | 1.54 | | 0.017 | 0.018 | | 1.0 | 3.30 | 2.90 | 0.40 | 1.54 | 0.018 | 0.018 | 0.62 | 0.011 | 5% |
| 18 | 2.70 | 1.52 | | 0.010 | 0.027 | | 1.0 | 2.90 | 2.50 | 0.40 | 1.52 | 0.019 | 0.019 | 0.61 | 0.011 | 5% |
| 19 | 2.30 | 1.48 | | 0.017 | 0.025 | | 1.0 | 2.50 | 2.10 | 0.40 | 1.48 | 0.021 | 0.021 | 0.59 | 0.012 | 5% |
| 20 | 1.90 | 1.42 | | 0.016 | 0.011 | | 1.0 | 2.10 | 1.70 | 0.40 | 1.42 | 0.014 | 0.014 | 0.57 | 0.008 | 3% |
| 21 | 1.50 | 1.36 | | 0.011 | 0.010 | | 1.0 | 1.70 | 1.25 | 0.45 | 1.36 | 0.011 | 0.011 | 0.61 | 0.006 | 3% |
| 22 | 1.00 | 1.08 | | 0.002 | 0.020 | | 1.0 | 1.25 | 0.51 | 0.74 | 1.08 | 0.011 | 0.011 | 0.80 | 0.009 | 4% |
| Right | 0.01 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.51 | 0.01 | 0.50 | 0.27 | 0.003 | 0.003 | 0.13 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.232 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-----------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.232 | (m ³ /s) |
| Perceived Measurement Quality: | | Excellent | |
| Total Area: | | 14.78 | (m ²) |
| Wetted Width: | | 9.25 | (m) |
| Hydraulic Depth: | | 1.598 | (m) |
| Mean Velocity: | | 0.016 | (m/s) |
| Froude Number: | | 0.004 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5 - Muskeg River above Stanley Creek (479760 E, 6356755 N) | | | |
| Field Personnel: | DB SG Matt (Pilot) | Trip Date: | 20-Sep-10 |
| Data Entry Personnel: | DB | Date: | 28-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.473 |
| Battery (Main): | 13.03 |
| Battery (Aux): | |
| Datalogger Clock: | 734 |
| Laptop Clock: | 738 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 6.8 |
| Memory used: | |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 735 |
| End Time (MST): | 845 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Drizzle 0°C |

| Level Survey: | | | | | | |
|----------------------|-----------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post near logger | 1.287 | 98.250 | 1.266 | 98.250 | - |
| Bench Mark 2: | Pipe w/ pink flagging | 1.234 | 98.369 | 1.213 | 98.369 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.533 | 98.004 | 1.509 | 98.007 | 98.006 |
| Transducer: | 1046640 | 1.473 | 96.531 | 1.473 | 96.534 | 96.533 |
| Other: | Spare Transducer | | 98.004 | | 98.007 | |

General Notes:

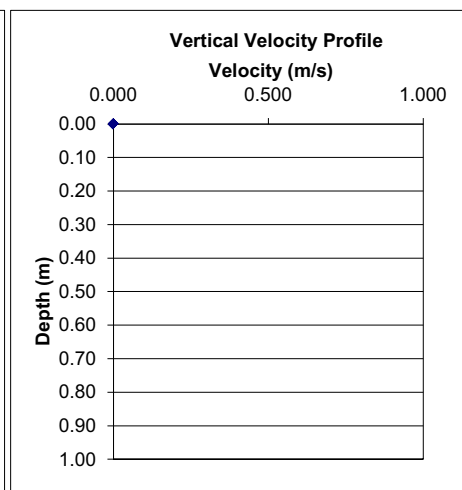
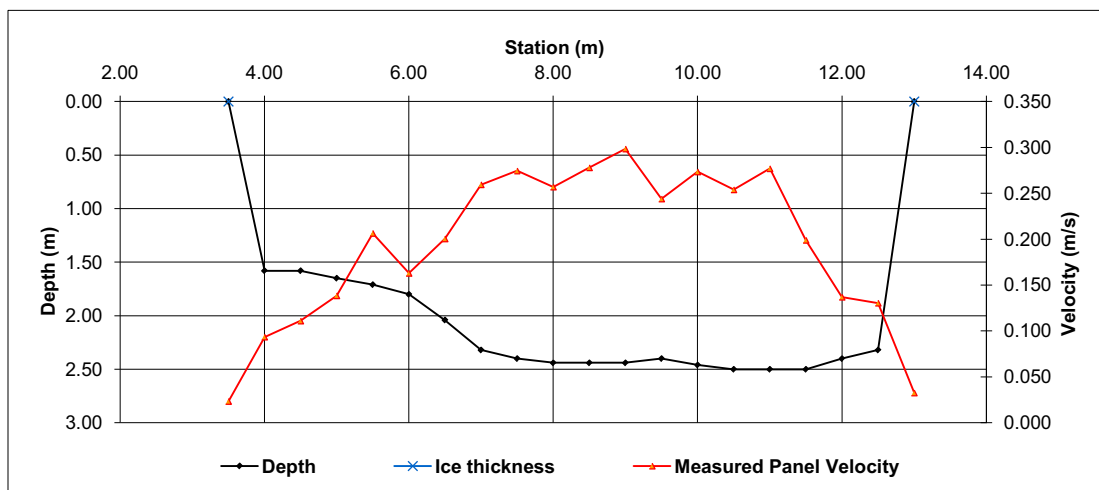
River is at bankfull width.
3db modem: -95 RSSI connection.

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 13.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 13.00 | 12.75 | 0.25 | 0.58 | 0.033 | 0.033 | 0.15 | 0.005 | 0% | |
| 1 | 12.50 | 2.32 | | 0.137 | 0.124 | | 1.0 | 12.75 | 12.25 | 0.50 | 2.32 | 0.131 | 0.131 | 1.16 | 0.151 | 4% | |
| 2 | 12.00 | 2.40 | | 0.110 | 0.164 | | 1.0 | 12.25 | 11.75 | 0.50 | 2.40 | 0.137 | 0.137 | 1.20 | 0.164 | 4% | |
| 3 | 11.50 | 2.50 | | 0.241 | 0.157 | | 1.0 | 11.75 | 11.25 | 0.50 | 2.50 | 0.199 | 0.199 | 1.25 | 0.249 | 6% | |
| 4 | 11.00 | 2.50 | | 0.330 | 0.224 | | 1.0 | 11.25 | 10.75 | 0.50 | 2.50 | 0.277 | 0.277 | 1.25 | 0.346 | 8% | |
| 5 | 10.50 | 2.50 | | 0.237 | 0.271 | | 1.0 | 10.75 | 10.25 | 0.50 | 2.50 | 0.254 | 0.254 | 1.25 | 0.318 | 7% | |
| 6 | 10.00 | 2.46 | | 0.242 | 0.305 | | 1.0 | 10.25 | 9.75 | 0.50 | 2.46 | 0.274 | 0.274 | 1.23 | 0.336 | 8% | |
| 7 | 9.50 | 2.40 | | 0.198 | 0.290 | | 1.0 | 9.75 | 9.25 | 0.50 | 2.40 | 0.244 | 0.244 | 1.20 | 0.293 | 7% | |
| 8 | 9.00 | 2.44 | | 0.295 | 0.302 | | 1.0 | 9.25 | 8.75 | 0.50 | 2.44 | 0.299 | 0.299 | 1.22 | 0.364 | 8% | |
| 9 | 8.50 | 2.44 | | 0.314 | 0.242 | | 1.0 | 8.75 | 8.25 | 0.50 | 2.44 | 0.278 | 0.278 | 1.22 | 0.339 | 8% | |
| 10 | 8.00 | 2.44 | | 0.286 | 0.228 | | 1.0 | 8.25 | 7.75 | 0.50 | 2.44 | 0.257 | 0.257 | 1.22 | 0.314 | 7% | |
| 11 | 7.50 | 2.40 | | 0.351 | 0.198 | | 1.0 | 7.75 | 7.25 | 0.50 | 2.40 | 0.275 | 0.275 | 1.20 | 0.329 | 8% | |
| 12 | 7.00 | 2.32 | | 0.285 | 0.234 | | 1.0 | 7.25 | 6.75 | 0.50 | 2.32 | 0.260 | 0.260 | 1.16 | 0.301 | 7% | |
| 13 | 6.50 | 2.04 | | 0.170 | 0.231 | | 1.0 | 6.75 | 6.25 | 0.50 | 2.04 | 0.201 | 0.201 | 1.02 | 0.205 | 5% | |
| 14 | 6.00 | 1.80 | | 0.152 | 0.174 | | 1.0 | 6.25 | 5.75 | 0.50 | 1.80 | 0.163 | 0.163 | 0.90 | 0.147 | 3% | |
| 15 | 5.50 | 1.71 | | 0.234 | 0.179 | | 1.0 | 5.75 | 5.25 | 0.50 | 1.71 | 0.207 | 0.207 | 0.86 | 0.177 | 4% | |
| 16 | 5.00 | 1.65 | | 0.138 | 0.139 | | 1.0 | 5.25 | 4.75 | 0.50 | 1.65 | 0.139 | 0.139 | 0.83 | 0.114 | 3% | |
| 17 | 4.50 | 1.58 | | 0.089 | 0.133 | | 1.0 | 4.75 | 4.25 | 0.50 | 1.58 | 0.111 | 0.111 | 0.79 | 0.088 | 2% | |
| 18 | 4.00 | 1.58 | | 0.093 | 0.094 | | 1.0 | 4.25 | 3.75 | 0.50 | 1.58 | 0.094 | 0.094 | 0.79 | 0.074 | 2% | |
| Right | 3.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.75 | 3.50 | 0.25 | 0.40 | 0.023 | 0.023 | 0.10 | 0.002 | 0% | |
| Total Flow | | | | | | | | | | | | | | 4.315 | | | |

**denotes position of TSS sample*

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 4.315 (m ³ /s) |
| Perceived Measurement Quality: | Excellent |
| Total Area: | 19.98 (m ²) |
| Wetted Width: | 9.00 (m) |
| Hydraulic Depth: | 2.220 (m) |
| Mean Velocity: | 0.216 (m/s) |
| Froude Number: | 0.046 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5 - Muskeg River above Stanley Creek (479760 E, 6356755 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 28-Oct-10 |
| Data Entry Personnel: | DB | Date: | 08-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.415 |
| Battery (Main): | 13.99 |
| Battery (Aux): | - |
| Datalogger Clock: | 1023 |
| Laptop Clock: | 1022 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 0.2 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|---|
| Measurement Details: | |
| Start Time (MST): | 1015 |
| End Time (MST): | 1135 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Surf. Ice across width; manually broken |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Overcast ~0°C |

| Level Survey: | | | | | | |
|----------------------|-----------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post near logger | 1.273 | 98.250 | 1.258 | 98.250 | - |
| Bench Mark 2: | Pipe w/ pink flagging | 1.220 | 98.369 | 1.202 | 98.369 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.062 | 97.461 | 2.045 | 97.463 | 97.462 |
| Transducer: | 1046640 | 1.415 | 96.046 | 1.415 | 96.048 | 96.047 |
| Other: | Spare Transducer | | 97.461 | | 97.463 | |

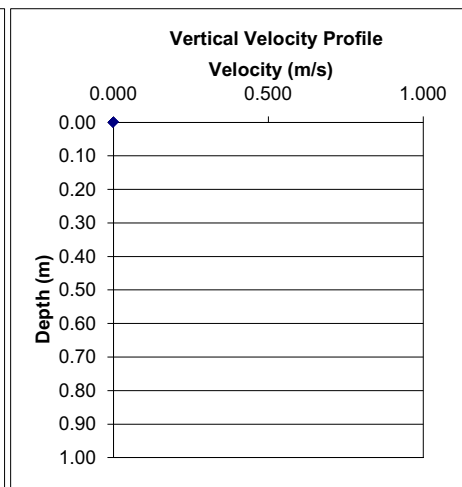
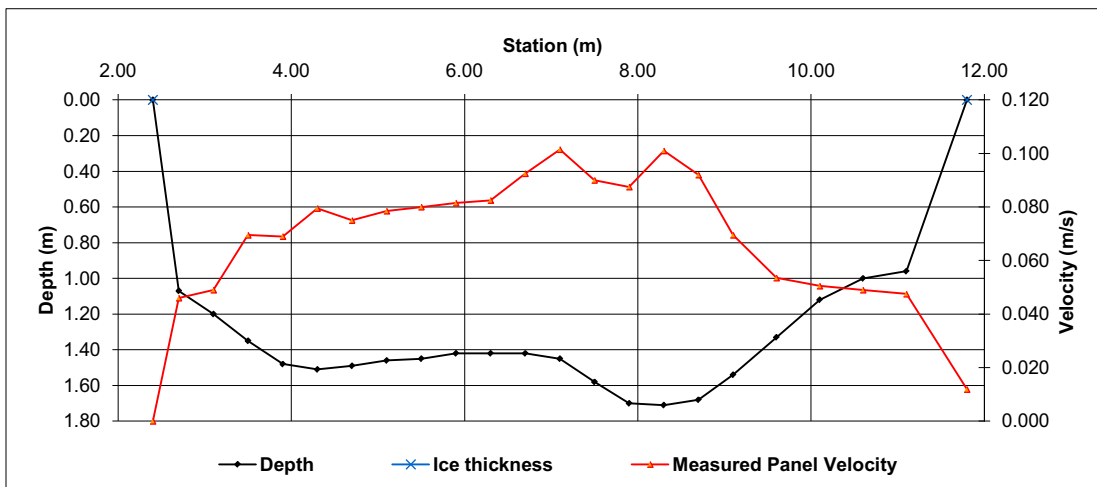
| | |
|-----------------------|--|
| General Notes: | |
| TSS @ 7.5m offset | |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | |
| Left | 11.80 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 11.80 | 11.45 | 0.35 | 0.24 | 0.012 | 0.012 | 0.08 | 0.001 | 0% | | |
| 1 | 11.10 | 0.96 | | | 0.033 | 0.062 | 1.0 | 11.45 | 10.85 | 0.60 | 0.96 | 0.048 | 0.048 | 0.58 | 0.027 | 3% | | |
| 2 | 10.60 | 1.00 | | | 0.013 | 0.085 | 1.0 | 10.85 | 10.35 | 0.50 | 1.00 | 0.049 | 0.049 | 0.50 | 0.025 | 3% | | |
| 3 | 10.10 | 1.12 | | | 0.019 | 0.082 | 1.0 | 10.35 | 9.85 | 0.50 | 1.12 | 0.051 | 0.051 | 0.56 | 0.028 | 3% | | |
| 4 | 9.60 | 1.33 | | | 0.028 | 0.079 | 1.0 | 9.85 | 9.35 | 0.50 | 1.33 | 0.054 | 0.054 | 0.67 | 0.036 | 4% | | |
| 5 | 9.10 | 1.54 | | | 0.055 | 0.084 | 1.0 | 9.35 | 8.90 | 0.45 | 1.54 | 0.070 | 0.070 | 0.69 | 0.048 | 5% | | |
| 6 | 8.70 | 1.68 | | | 0.089 | 0.095 | 1.0 | 8.90 | 8.50 | 0.40 | 1.68 | 0.092 | 0.092 | 0.67 | 0.062 | 7% | | |
| 7 | 8.30 | 1.71 | | | 0.106 | 0.096 | 1.0 | 8.50 | 8.10 | 0.40 | 1.71 | 0.101 | 0.101 | 0.68 | 0.069 | 8% | | |
| 8 | 7.90 | 1.70 | | | 0.100 | 0.075 | 1.0 | 8.10 | 7.70 | 0.40 | 1.70 | 0.088 | 0.088 | 0.68 | 0.060 | 6% | | |
| 9 | 7.50 | 1.58 | | | 0.105 | 0.075 | 1.0 | 7.70 | 7.30 | 0.40 | 1.58 | 0.090 | 0.090 | 0.63 | 0.057 | 6% | | |
| 10 | 7.10 | 1.45 | | | 0.100 | 0.103 | 1.0 | 7.30 | 6.90 | 0.40 | 1.45 | 0.102 | 0.102 | 0.58 | 0.059 | 6% | | |
| 11 | 6.70 | 1.42 | | | 0.108 | 0.077 | 1.0 | 6.90 | 6.50 | 0.40 | 1.42 | 0.093 | 0.093 | 0.57 | 0.053 | 6% | | |
| 12 | 6.30 | 1.42 | | | 0.101 | 0.064 | 1.0 | 6.50 | 6.10 | 0.40 | 1.42 | 0.083 | 0.083 | 0.57 | 0.047 | 5% | | |
| 13 | 5.90 | 1.42 | | | 0.081 | 0.082 | 1.0 | 6.10 | 5.70 | 0.40 | 1.42 | 0.082 | 0.082 | 0.57 | 0.046 | 5% | | |
| 14 | 5.50 | 1.45 | | | 0.102 | 0.058 | 1.0 | 5.70 | 5.30 | 0.40 | 1.45 | 0.080 | 0.080 | 0.58 | 0.046 | 5% | | |
| 15 | 5.10 | 1.46 | | | 0.080 | 0.077 | 1.0 | 5.30 | 4.90 | 0.40 | 1.46 | 0.079 | 0.079 | 0.58 | 0.046 | 5% | | |
| 16 | 4.70 | 1.49 | | | 0.069 | 0.081 | 1.0 | 4.90 | 4.50 | 0.40 | 1.49 | 0.075 | 0.075 | 0.60 | 0.045 | 5% | | |
| 17 | 4.30 | 1.51 | | | 0.088 | 0.071 | 1.0 | 4.50 | 4.10 | 0.40 | 1.51 | 0.080 | 0.080 | 0.60 | 0.048 | 5% | | |
| 18 | 3.90 | 1.48 | | | 0.083 | 0.055 | 1.0 | 4.10 | 3.70 | 0.40 | 1.48 | 0.069 | 0.069 | 0.59 | 0.041 | 4% | | |
| 19 | 3.50 | 1.35 | | | 0.083 | 0.056 | 1.0 | 3.70 | 3.30 | 0.40 | 1.35 | 0.070 | 0.070 | 0.54 | 0.038 | 4% | | |
| 20 | 3.10 | 1.20 | | | 0.051 | 0.047 | 1.0 | 3.30 | 2.90 | 0.40 | 1.20 | 0.049 | 0.049 | 0.48 | 0.024 | 3% | | |
| 21 | 2.70 | 1.07 | | | 0.055 | 0.037 | 1.0 | 2.90 | 2.55 | 0.35 | 1.07 | 0.046 | 0.046 | 0.37 | 0.017 | 2% | | |
| Right | 2.40 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.55 | 2.40 | 0.15 | 0.27 | 0.000 | 0.000 | 0.04 | 0.000 | 0% | | |
| Total Flow | | | | | | | | | | | | | | 0.921 | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-----------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.921 | (m ³ /s) |
| Perceived Measurement Quality: | | Excellent | |
| Total Area: | | 12.42 | (m ²) |
| Wetted Width: | | 8.90 | (m) |
| Hydraulic Depth: | | 1.396 | (m) |
| Mean Velocity: | | 0.074 | (m/s) |
| Froude Number: | | 0.020 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5 - Muskeg River above Stanley Creek (479760 E, 6356755 N) | | | |
| Field Personnel: | JO, SG | Trip Date: | 04-Dec-10 |
| Data Entry Personnel: | JP | Date: | 16-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.289 |
| Battery (Main): | 14.66 |
| Battery (Aux): | - |
| Datalogger Clock: | 12:40 |
| Laptop Clock: | 12:39 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.2 |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 12:35 |
| End Time (MST): | 1345 |
| Equipment: | ADV |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | - 15, sunny |

| Level Survey: | | | | | | |
|----------------------|-----------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post near logger | 1.284 | 98.250 | 1.282 | 98.250 | - |
| Bench Mark 2: | Pipe w/ pink flagging | 1.239 | 98.369 | 1.234 | 98.369 | - |
| Top of Ice: | | 2.205 | 97.329 | 2.209 | 97.323 | 97.326 |
| Water Level: | | 2.219 | 97.315 | 2.219 | 97.313 | 97.314 |
| Transducer: | 1046640 | 1.289 | 96.026 | 1.289 | 96.024 | 96.025 |
| Other: | Spare Transducer | | 97.315 | | 97.313 | |

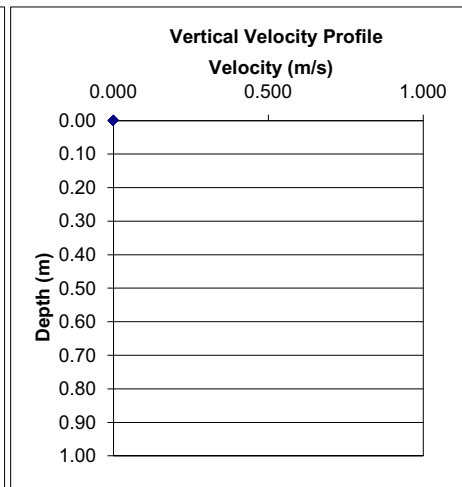
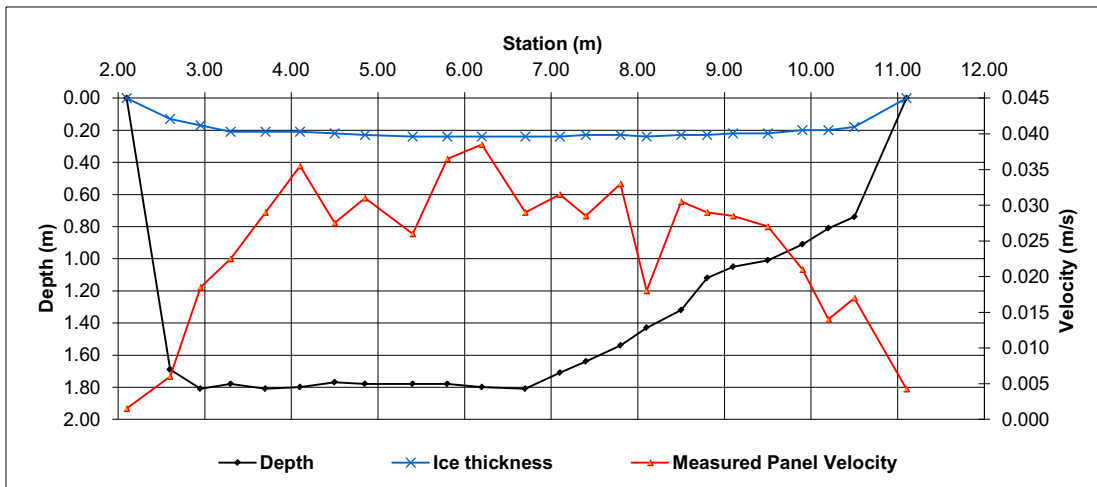
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 2.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.10 | 2.35 | 0.25 | 0.39 | 0.002 | 0.002 | 0.10 | 0.000 | 0% | |
| 2 | 2.60 | 1.69 | 0.13 | | 0.002 | 0.010 | 1.0 | 2.35 | 2.78 | 0.43 | 1.56 | 0.006 | 0.006 | 0.66 | 0.004 | 1% | |
| 3 | 2.95 | 1.81 | 0.17 | | 0.025 | 0.012 | 1.0 | 2.78 | 3.13 | 0.35 | 1.64 | 0.019 | 0.019 | 0.57 | 0.011 | 4% | |
| 4 | 3.30 | 1.78 | 0.21 | | 0.027 | 0.018 | 1.0 | 3.13 | 3.50 | 0.38 | 1.57 | 0.023 | 0.023 | 0.59 | 0.013 | 4% | |
| 5 | 3.70 | 1.81 | 0.21 | | 0.029 | 0.029 | 1.0 | 3.50 | 3.90 | 0.40 | 1.60 | 0.029 | 0.029 | 0.64 | 0.019 | 6% | |
| 6 | 4.10 | 1.80 | 0.21 | | 0.035 | 0.036 | 1.0 | 3.90 | 4.30 | 0.40 | 1.59 | 0.036 | 0.036 | 0.64 | 0.023 | 8% | |
| 7 | 4.50 | 1.77 | 0.22 | | 0.024 | 0.031 | 1.0 | 4.30 | 4.68 | 0.38 | 1.55 | 0.028 | 0.028 | 0.58 | 0.016 | 5% | |
| 8 | 4.85 | 1.78 | 0.23 | | 0.022 | 0.040 | 1.0 | 4.68 | 5.13 | 0.45 | 1.55 | 0.031 | 0.031 | 0.70 | 0.022 | 7% | |
| 9 | 5.40 | 1.78 | 0.24 | | 0.023 | 0.029 | 1.0 | 5.13 | 5.60 | 0.48 | 1.54 | 0.026 | 0.026 | 0.73 | 0.019 | 6% | |
| 10 | 5.80 | 1.78 | 0.24 | | 0.037 | 0.036 | 1.0 | 5.60 | 6.00 | 0.40 | 1.54 | 0.037 | 0.037 | 0.62 | 0.022 | 8% | |
| 11 | 6.20 | 1.80 | 0.24 | | 0.037 | 0.040 | 1.0 | 6.00 | 6.45 | 0.45 | 1.56 | 0.039 | 0.039 | 0.70 | 0.027 | 9% | |
| 12 | 6.70 | 1.81 | 0.24 | | 0.034 | 0.024 | 1.0 | 6.45 | 6.90 | 0.45 | 1.57 | 0.029 | 0.029 | 0.71 | 0.020 | 7% | |
| 13 | 7.10 | 1.71 | 0.24 | | 0.031 | 0.032 | 1.0 | 6.90 | 7.25 | 0.35 | 1.47 | 0.032 | 0.032 | 0.51 | 0.016 | 5% | |
| 14 | 7.40 | 1.64 | 0.23 | | 0.032 | 0.025 | 1.0 | 7.25 | 7.60 | 0.35 | 1.41 | 0.029 | 0.029 | 0.49 | 0.014 | 5% | |
| 15 | 7.80 | 1.54 | 0.23 | | 0.036 | 0.030 | 1.0 | 7.60 | 7.95 | 0.35 | 1.31 | 0.033 | 0.033 | 0.46 | 0.015 | 5% | |
| 16 | 8.10 | 1.43 | 0.24 | | 0.017 | 0.019 | 1.0 | 7.95 | 8.30 | 0.35 | 1.19 | 0.018 | 0.018 | 0.42 | 0.007 | 3% | |
| 17 | 8.50 | 1.32 | 0.23 | | 0.023 | 0.038 | 1.0 | 8.30 | 8.65 | 0.35 | 1.09 | 0.031 | 0.031 | 0.38 | 0.012 | 4% | |
| 18 | 8.80 | 1.12 | 0.23 | | 0.032 | 0.026 | 1.0 | 8.65 | 8.95 | 0.30 | 0.89 | 0.029 | 0.029 | 0.27 | 0.008 | 3% | |
| 19 | 9.10 | 1.05 | 0.22 | | 0.028 | 0.029 | 1.0 | 8.95 | 9.30 | 0.35 | 0.83 | 0.029 | 0.029 | 0.29 | 0.008 | 3% | |
| 20 | 9.50 | 1.01 | 0.22 | | 0.024 | 0.030 | 1.0 | 9.30 | 9.70 | 0.40 | 0.79 | 0.027 | 0.027 | 0.32 | 0.009 | 3% | |
| 21 | 9.90 | 0.91 | 0.20 | 0.021 | | | 0.9 | 9.70 | 10.05 | 0.35 | 0.71 | 0.021 | 0.019 | 0.25 | 0.005 | 2% | |
| 22 | 10.20 | 0.81 | 0.20 | 0.014 | | | 0.9 | 10.05 | 10.35 | 0.30 | 0.61 | 0.014 | 0.013 | 0.18 | 0.002 | 1% | |
| 23 | 10.50 | 0.74 | 0.18 | 0.017 | | | 0.9 | 10.35 | 10.80 | 0.45 | 0.56 | 0.017 | 0.015 | 0.25 | 0.004 | 1% | |
| Right | 11.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 10.80 | 11.10 | 0.30 | 0.14 | 0.004 | 0.004 | 0.04 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 0.296 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.296 | (m ³ /s) |
| Perceived Measurement Quality: | | Good | |
| Total Area: | | 11.10 | (m ²) |
| Wetted Width: | | 9.00 | (m) |
| Hydraulic Depth: | | 1.233 | (m) |
| Mean Velocity: | | 0.027 | (m/s) |
| Froude Number: | | 0.008 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5A - Muskeg River above Muskeg Creek (476100 E, 6351600 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 19-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|------------------------|--------|
| Logger Details: | |
| Transducer Reading: | 1.160 |
| Battery (Main): | 12.91 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1043 |
| Laptop Clock: | 1041 |
| Air Temp: | NA |
| Air Pressure: | 964.55 |
| RH: | NA |
| Water °C: | NA |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1045 |
| End Time (MST): | 1140 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | Overcast -5C |

| Level Survey: | | | | | | |
|----------------------|-------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T post near logger | 0.971 | 282.662 | 0.967 | 282.662 | - |
| Bench Mark 2: | Pipe by trail before clearing | 1.478 | 282.159 | 1.473 | 282.159 | - |
| Top of Ice: | | 2.430 | 281.203 | 2.426 | 281.203 | 281.203 |
| Water Level: | | 2.500 | 281.133 | 2.496 | 281.133 | 281.133 |
| Transducer: | | 1.160 | 279.973 | 1.160 | 279.973 | 279.973 |
| Other: | | | | | | |

General Notes:

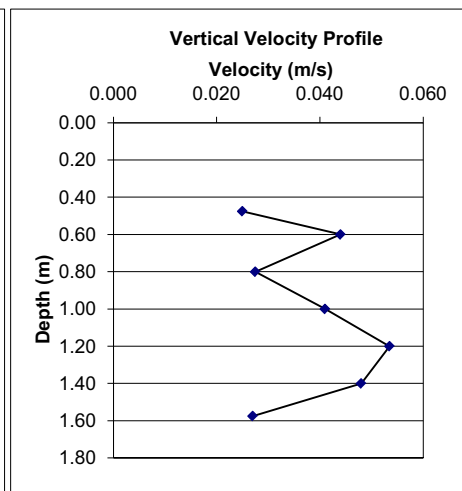
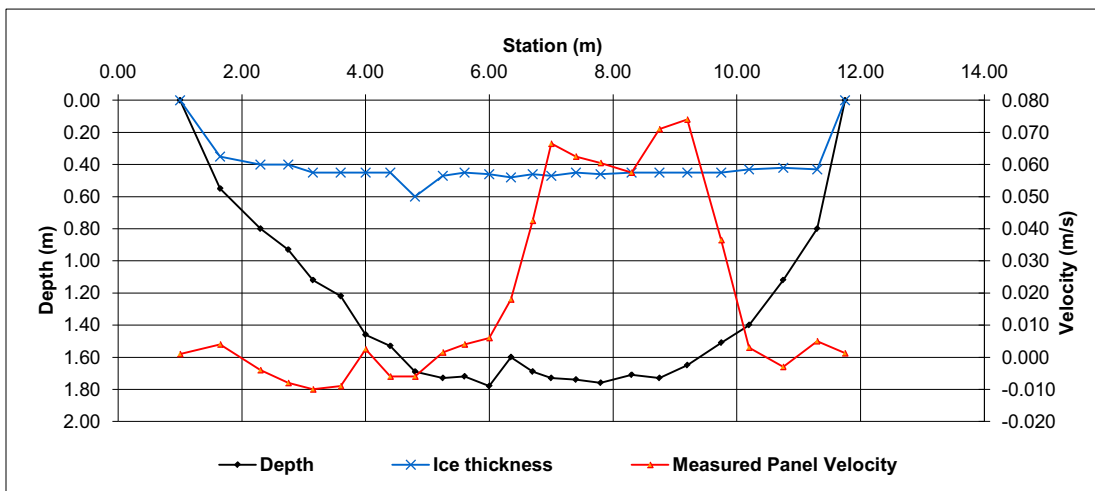
Water Temperature probe was damaged by wildlife will be replaced during open water period.

| Flow Measurement: | | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | | |
| Right | 1.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.9 | 1.00 | 1.33 | 0.33 | 0.05 | 0.001 | 0.001 | 0.02 | 0.000 | 0% | | | | | | | | |
| 1 | 1.65 | 0.55 | 0.35 | 0.004 | | | 0.9 | 1.33 | 1.98 | 0.65 | 0.20 | 0.004 | 0.004 | 0.13 | 0.000 | 0% | | | | | | | | |
| 2 | 2.30 | 0.80 | 0.40 | -0.004 | | | 0.9 | 1.98 | 2.53 | 0.55 | 0.40 | -0.004 | -0.004 | 0.22 | -0.001 | 0% | | | | | | | | |
| 3 | 2.75 | 0.93 | 0.40 | -0.008 | | | 0.9 | 2.53 | 2.95 | 0.43 | 0.53 | -0.008 | -0.007 | 0.23 | -0.002 | -1% | | | | | | | | |
| 4 | 3.15 | 1.12 | 0.45 | -0.010 | | | 0.9 | 2.95 | 3.38 | 0.43 | 0.67 | -0.010 | -0.009 | 0.28 | -0.003 | -1% | | | | | | | | |
| 5 | 3.60 | 1.22 | 0.45 | -0.009 | | | 0.9 | 3.38 | 3.80 | 0.43 | 0.77 | -0.009 | -0.008 | 0.33 | -0.003 | -1% | | | | | | | | |
| 6 | 4.00 | 1.46 | 0.45 | | 0.008 | -0.003 | 1.0 | 3.80 | 4.20 | 0.40 | 1.01 | 0.003 | 0.003 | 0.40 | 0.001 | 0% | | | | | | | | |
| 7 | 4.40 | 1.53 | 0.45 | | -0.012 | 0.000 | 1.0 | 4.20 | 4.60 | 0.40 | 1.08 | -0.006 | -0.006 | 0.43 | -0.003 | -1% | | | | | | | | |
| 8 | 4.80 | 1.69 | 0.60 | | -0.018 | 0.006 | 1.0 | 4.60 | 5.03 | 0.43 | 1.09 | -0.006 | -0.006 | 0.46 | -0.003 | -1% | | | | | | | | |
| 9 | 5.25 | 1.73 | 0.47 | | -0.005 | 0.008 | 1.0 | 5.03 | 5.43 | 0.40 | 1.26 | 0.002 | 0.002 | 0.50 | 0.001 | 0% | | | | | | | | |
| 10 | 5.60 | 1.72 | 0.45 | | 0.004 | 0.004 | 1.0 | 5.43 | 5.80 | 0.38 | 1.27 | 0.004 | 0.004 | 0.48 | 0.002 | 1% | | | | | | | | |
| 11 | 6.00 | 1.78 | 0.46 | | -0.001 | 0.013 | 1.0 | 5.80 | 6.18 | 0.38 | 1.32 | 0.006 | 0.006 | 0.50 | 0.003 | 1% | | | | | | | | |
| 12 | 6.35 | 1.60 | 0.48 | | 0.010 | 0.026 | 1.0 | 6.18 | 6.53 | 0.35 | 1.12 | 0.018 | 0.018 | 0.39 | 0.007 | 3% | | | | | | | | |
| 13 | 6.70 | 1.69 | 0.46 | | 0.041 | 0.044 | 1.0 | 6.53 | 6.85 | 0.32 | 1.23 | 0.043 | 0.043 | 0.40 | 0.017 | 7% | | | | | | | | |
| 14 | 7.00 | 1.73 | 0.47 | | 0.055 | 0.078 | 1.0 | 6.85 | 7.20 | 0.35 | 1.26 | 0.067 | 0.067 | 0.44 | 0.029 | 11% | | | | | | | | |
| 15 | 7.40 | 1.74 | 0.45 | | 0.057 | 0.068 | 1.0 | 7.20 | 7.60 | 0.40 | 1.29 | 0.063 | 0.063 | 0.52 | 0.032 | 13% | | | | | | | | |
| 16 | 7.80 | 1.76 | 0.46 | | 0.056 | 0.065 | 1.0 | 7.60 | 8.05 | 0.45 | 1.30 | 0.061 | 0.061 | 0.59 | 0.035 | 14% | | | | | | | | |
| 17 | 8.30 | 1.71 | 0.45 | | 0.051 | 0.064 | 1.0 | 8.05 | 8.53 | 0.48 | 1.26 | 0.058 | 0.058 | 0.60 | 0.034 | 13% | | | | | | | | |
| 18 | 8.75 | 1.73 | 0.45 | | 0.101 | 0.041 | 1.0 | 8.53 | 8.98 | 0.45 | 1.28 | 0.071 | 0.071 | 0.58 | 0.041 | 16% | | | | | | | | |
| 19 | 9.20 | 1.65 | 0.45 | | 0.089 | 0.059 | 1.0 | 8.98 | 9.48 | 0.50 | 1.20 | 0.074 | 0.074 | 0.60 | 0.044 | 17% | | | | | | | | |
| 20 | 9.75 | 1.51 | 0.45 | | 0.025 | 0.048 | 1.0 | 9.48 | 9.98 | 0.50 | 1.06 | 0.037 | 0.037 | 0.53 | 0.019 | 8% | | | | | | | | |
| 21 | 10.20 | 1.40 | 0.43 | | 0.003 | 0.003 | 1.0 | 9.98 | 10.48 | 0.50 | 0.97 | 0.003 | 0.003 | 0.49 | 0.001 | 1% | | | | | | | | |
| 22 | 10.75 | 1.12 | 0.42 | -0.003 | | | 0.9 | 10.48 | 11.03 | 0.55 | 0.70 | -0.003 | -0.003 | 0.39 | -0.001 | 0% | | | | | | | | |
| 23 | 11.30 | 0.80 | 0.43 | 0.005 | | | 0.9 | 11.03 | 11.53 | 0.50 | 0.37 | 0.005 | 0.005 | 0.19 | 0.001 | 0% | | | | | | | | |
| Left | 11.75 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.9 | 11.53 | 11.75 | 0.23 | 0.09 | 0.001 | 0.001 | 0.02 | 0.000 | 0% | | | | | | | | |
| Total Flow | | | | | | | | | | | | | | 0.255 | | | | | | | | | | |

**Add/delete # rows as necessary, remembering to autofill calculations/graphs etc*

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 0.255 (m ³ /s) |
| Perceived Measurement Quality: | Fair |
| Total Area: | 9.69 (m ²) |
| Wetted Width: | 10.75 (m) |
| Hydraulic Depth: | 0.902 (m) |
| Mean Velocity: | 0.026 (m/s) |
| Froude Number: | 0.009 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.040 |
| Offset | 9.2 | 1.65 | 0.000 | - | - | Panel V.@Ofst 0.074 |
| Depth | 1.65 | 1.50 | 0.054 | 1.58 | 0.027 | 60% Depth 1.17 |
| Ice Depth | 0.45 | 1.30 | 0.042 | 1.40 | 0.048 | 20% Depth 0.69 |
| | | 1.10 | 0.065 | 1.20 | 0.054 | 80% Depth 1.41 |
| | | 0.90 | 0.017 | 1.00 | 0.041 | |
| | | 0.70 | 0.038 | 0.80 | 0.028 | |
| | | 0.50 | 0.050 | 0.60 | 0.044 | |
| | | 0.45 | 0.000 | 0.48 | 0.025 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5A - Muskeg River above Muskeg Creek (476100 E, 6351600 N) | | | |
| Field Personnel: | GB, JE | Trip Date: | 13-Feb-10 |
| Data Entry Personnel: | SG | Date: | 17-Feb-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.106 |
| Battery (Main): | 14.81 |
| Battery (Aux): | 13.18 |
| Datalogger Clock: | 1300 |
| Laptop Clock: | 1331 |
| Air Temp: | NA |
| Air Pressure: | |
| RH: | NA |
| Water °C: | NA |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1414 |
| End Time (MST): | 1452 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Clear |

| Level Survey: | | | | | | |
|----------------------|-------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T post near logger | 1.044 | 282.662 | 1.037 | 282.662 | - |
| Bench Mark 2: | Pipe by trail before clearing | 1.352 | 282.159 | 1.350 | 282.159 | - |
| Top of Ice: | | 2.551 | 281.155 | 2.545 | 281.154 | 281.155 |
| Water Level: | | 2.621 | 281.085 | 2.615 | 281.084 | 281.085 |
| Transducer: | | 1.106 | 279.979 | 1.106 | 279.978 | 279.979 |
| Other: | | | | | | |

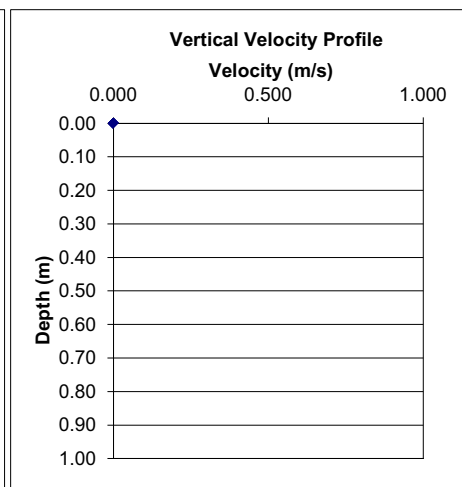
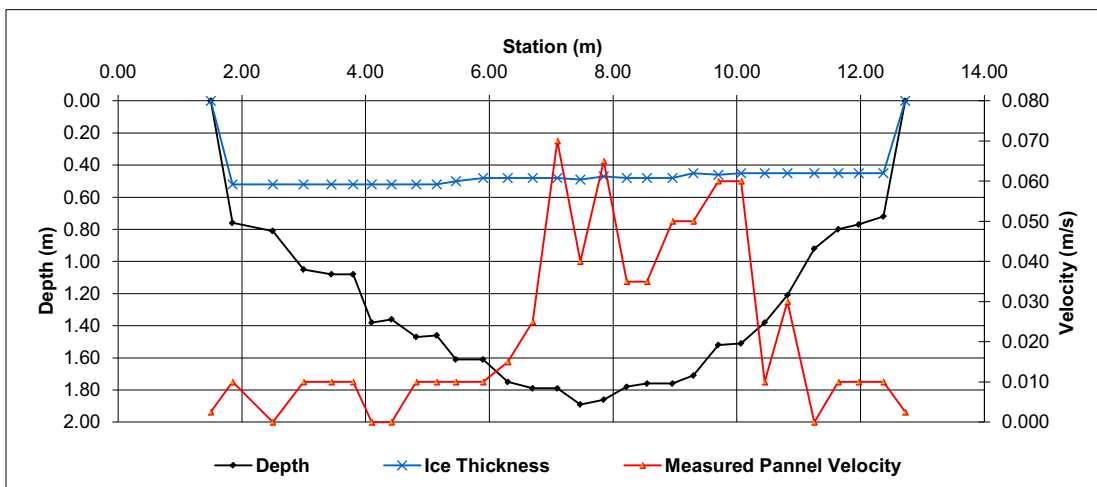
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | Calculated Data | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 1.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.9 | 1.50 | 1.68 | 0.18 | 0.06 | 0.003 | 0.002 | 0.01 | 0.000 | 0% |
| 1 | 1.85 | 0.76 | 0.52 | 0.010 | | | 0.9 | 1.68 | 2.18 | 0.50 | 0.24 | 0.010 | 0.009 | 0.12 | 0.001 | 0% |
| 2 | 2.50 | 0.81 | 0.52 | 0.000 | | | 1.0 | 2.18 | 2.75 | 0.58 | 0.29 | 0.000 | 0.000 | 0.17 | 0.000 | 0% |
| 3 | 3.00 | 1.05 | 0.52 | 0.010 | | | 0.9 | 2.75 | 3.23 | 0.48 | 0.53 | 0.010 | 0.009 | 0.25 | 0.002 | 1% |
| 4 | 3.45 | 1.08 | 0.52 | 0.010 | | | 0.9 | 3.23 | 3.63 | 0.40 | 0.56 | 0.010 | 0.009 | 0.22 | 0.002 | 1% |
| 5 | 3.80 | 1.08 | 0.52 | 0.010 | | | 0.9 | 3.63 | 3.95 | 0.33 | 0.56 | 0.010 | 0.009 | 0.18 | 0.002 | 1% |
| 6 | 4.10 | 1.38 | 0.52 | 0.000 | | | 1.0 | 3.95 | 4.26 | 0.31 | 0.86 | 0.000 | 0.000 | 0.27 | 0.000 | 0% |
| 7 | 4.42 | 1.36 | 0.52 | 0.000 | | | 1.0 | 4.26 | 4.62 | 0.36 | 0.84 | 0.000 | 0.000 | 0.30 | 0.000 | 0% |
| 8 | 4.82 | 1.47 | 0.52 | 0.010 | | | 0.9 | 4.62 | 4.99 | 0.37 | 0.95 | 0.010 | 0.009 | 0.35 | 0.003 | 1% |
| 9 | 5.15 | 1.46 | 0.52 | 0.010 | | | 0.9 | 4.99 | 5.31 | 0.32 | 0.94 | 0.010 | 0.009 | 0.30 | 0.003 | 1% |
| 10 | 5.46 | 1.61 | 0.50 | | 0.010 | 0.010 | 1.0 | 5.31 | 5.68 | 0.38 | 1.11 | 0.010 | 0.010 | 0.42 | 0.004 | 2% |
| 11 | 5.90 | 1.61 | 0.48 | | 0.010 | 0.010 | 1.0 | 5.68 | 6.10 | 0.42 | 1.13 | 0.010 | 0.010 | 0.47 | 0.005 | 2% |
| 12 | 6.30 | 1.75 | 0.48 | | 0.020 | 0.010 | 1.0 | 6.10 | 6.50 | 0.40 | 1.27 | 0.015 | 0.015 | 0.51 | 0.008 | 3% |
| 13 | 6.70 | 1.79 | 0.48 | | 0.030 | 0.020 | 1.0 | 6.50 | 6.90 | 0.40 | 1.31 | 0.025 | 0.025 | 0.52 | 0.013 | 5% |
| 14 | 7.10 | 1.79 | 0.48 | | 0.070 | 0.070 | 1.0 | 6.90 | 7.29 | 0.39 | 1.31 | 0.070 | 0.070 | 0.50 | 0.035 | 13% |
| 15 | 7.47 | 1.89 | 0.49 | | 0.040 | 0.040 | 1.0 | 7.29 | 7.66 | 0.38 | 1.40 | 0.040 | 0.040 | 0.53 | 0.021 | 8% |
| 16 | 7.85 | 1.86 | 0.47 | | 0.060 | 0.070 | 1.0 | 7.66 | 8.04 | 0.38 | 1.39 | 0.065 | 0.065 | 0.52 | 0.034 | 12% |
| 17 | 8.22 | 1.78 | 0.48 | | 0.030 | 0.040 | 1.0 | 8.04 | 8.39 | 0.35 | 1.30 | 0.035 | 0.035 | 0.46 | 0.016 | 6% |
| 18 | 8.55 | 1.76 | 0.48 | | 0.040 | 0.030 | 1.0 | 8.39 | 8.76 | 0.37 | 1.28 | 0.035 | 0.035 | 0.47 | 0.017 | 6% |
| 19 | 8.96 | 1.76 | 0.48 | | 0.050 | 0.050 | 1.0 | 8.76 | 9.13 | 0.38 | 1.28 | 0.050 | 0.050 | 0.48 | 0.024 | 9% |
| 20 | 9.30 | 1.71 | 0.45 | | 0.040 | 0.060 | 1.0 | 9.13 | 9.50 | 0.37 | 1.26 | 0.050 | 0.050 | 0.47 | 0.023 | 8% |
| 21 | 9.70 | 1.52 | 0.46 | | 0.060 | 0.060 | 1.0 | 9.50 | 9.89 | 0.39 | 1.06 | 0.060 | 0.060 | 0.41 | 0.024 | 9% |
| 22 | 10.07 | 1.51 | 0.45 | | 0.060 | 0.060 | 1.0 | 9.89 | 10.26 | 0.38 | 1.06 | 0.060 | 0.060 | 0.40 | 0.024 | 9% |
| 23 | 10.45 | 1.38 | 0.45 | 0.010 | | | 0.9 | 10.26 | 10.64 | 0.38 | 0.93 | 0.010 | 0.009 | 0.35 | 0.003 | 1% |
| 24 | 10.82 | 1.21 | 0.45 | 0.030 | | | 0.9 | 10.64 | 11.04 | 0.40 | 0.76 | 0.030 | 0.027 | 0.30 | 0.008 | 3% |
| 25 | 11.25 | 0.92 | 0.45 | 0.000 | | | 1.0 | 11.04 | 11.45 | 0.41 | 0.47 | 0.000 | 0.000 | 0.19 | 0.000 | 0% |
| 26 | 11.64 | 0.80 | 0.45 | 0.010 | | | 0.9 | 11.45 | 11.81 | 0.36 | 0.35 | 0.010 | 0.009 | 0.13 | 0.001 | 0% |
| 27 | 11.97 | 0.77 | 0.45 | 0.010 | | | 0.9 | 11.81 | 12.17 | 0.37 | 0.32 | 0.010 | 0.009 | 0.12 | 0.001 | 0% |
| 28 | 12.37 | 0.72 | 0.45 | 0.010 | | | 0.9 | 12.17 | 12.55 | 0.38 | 0.27 | 0.010 | 0.009 | 0.10 | 0.001 | 0% |
| Left | 12.72 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 12.55 | 12.72 | 0.18 | 0.07 | 0.003 | 0.003 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.275 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 0.275 (m ³ /s) |
| Perceived Measurement Quality: | Good |
| Total Area: | 9.53 (m ²) |
| Wetted Width: | 11.22 (m) |
| Hydraulic Depth: | 0.849 (m) |
| Mean Velocity: | 0.029 (m/s) |
| Froude Number: | 0.010 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5A - Muskeg River above Muskeg Creek (476100 E, 6351600 N) | | | |
| Field Personnel: | SE, SG | Trip Date: | 07-Mar-10 |
| Data Entry Personnel: | SG | Date: | 17-Mar-10 |
| Data Check Personnel: | JP | Date: | 02-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.119 |
| Battery (Main): | 13.6 |
| Battery (Aux): | - |
| Datalogger Clock: | 955 |
| Laptop Clock: | 956 |
| Air Temp: | NA |
| Air Pressure: | 96.94 |
| RH: | NA |
| Water °C: | NA |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1000 |
| End Time (MST): | 1015 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Sunny 5°C |

| Level Survey: | | | | | | |
|----------------------|-------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T post near logger | 1.142 | 282.662 | 1.122 | 282.662 | - |
| Bench Mark 2: | Pipe by trail before clearing | 1.564 | 282.159 | 1.545 | 282.159 | - |
| Top of Ice: | | 2.606 | 281.198 | 2.586 | 281.198 | 281.198 |
| Water Level: | | 2.717 | 281.087 | 2.693 | 281.091 | 281.089 |
| Transducer: | | 1.119 | 279.968 | 1.119 | 279.972 | 279.970 |
| Other: | | | | | | |

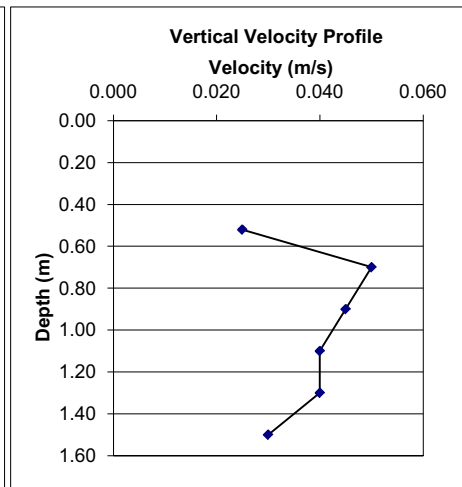
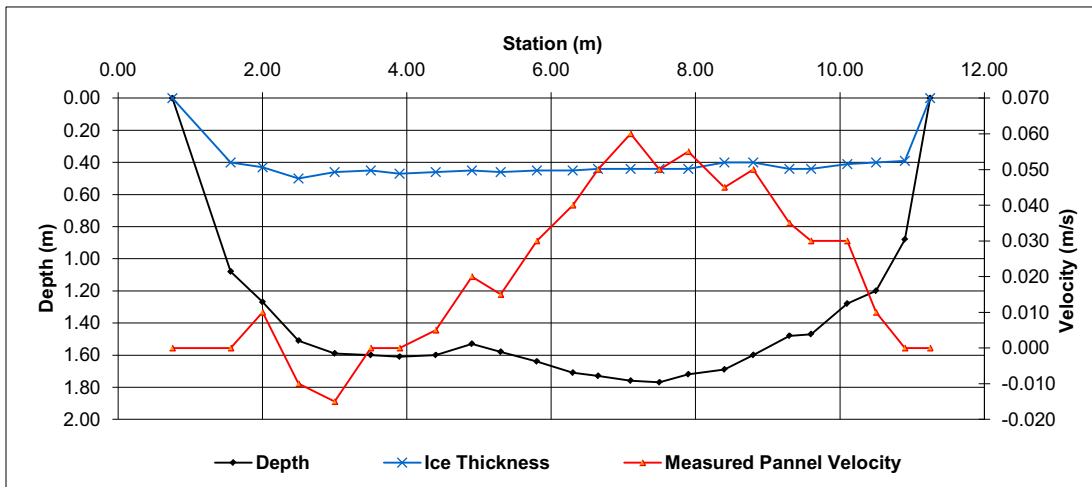
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 0.75 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.75 | 1.16 | 0.41 | 0.17 | 0.000 | 0.000 | 0.07 | 0.000 | 0% | |
| 1 | 1.56 | 1.08 | 0.40 | 0.000 | | | 1.0 | 1.16 | 1.78 | 0.63 | 0.68 | 0.000 | 0.000 | 0.43 | 0.000 | 0% | |
| 2 | 2.00 | 1.27 | 0.43 | 0.010 | | | 0.9 | 1.78 | 2.25 | 0.47 | 0.84 | 0.010 | 0.009 | 0.39 | 0.004 | 1% | |
| 3 | 2.50 | 1.51 | 0.50 | | -0.010 | -0.010 | 1.0 | 2.25 | 2.75 | 0.50 | 1.01 | -0.010 | -0.010 | 0.51 | -0.005 | -2% | |
| 4 | 3.00 | 1.59 | 0.46 | | -0.010 | -0.020 | 1.0 | 2.75 | 3.25 | 0.50 | 1.13 | -0.015 | -0.015 | 0.57 | -0.008 | -3% | |
| 5 | 3.50 | 1.60 | 0.45 | | 0.000 | -0.010 | 1.0 | 3.25 | 3.70 | 0.45 | 1.15 | 0.000 | 0.000 | 0.52 | 0.000 | 0% | |
| 6 | 3.90 | 1.61 | 0.47 | | 0.000 | 0.000 | 1.0 | 3.70 | 4.15 | 0.45 | 1.14 | 0.000 | 0.000 | 0.51 | 0.000 | 0% | |
| 7 | 4.40 | 1.60 | 0.46 | | 0.010 | 0.000 | 1.0 | 4.15 | 4.65 | 0.50 | 1.14 | 0.005 | 0.005 | 0.57 | 0.003 | 1% | |
| 8 | 4.90 | 1.53 | 0.45 | | 0.020 | 0.020 | 1.0 | 4.65 | 5.10 | 0.45 | 1.08 | 0.020 | 0.020 | 0.49 | 0.010 | 4% | |
| 9 | 5.30 | 1.58 | 0.46 | | 0.020 | 0.010 | 1.0 | 5.10 | 5.55 | 0.45 | 1.12 | 0.015 | 0.015 | 0.50 | 0.008 | 3% | |
| 10 | 5.80 | 1.64 | 0.45 | | 0.030 | 0.030 | 1.0 | 5.55 | 6.05 | 0.50 | 1.19 | 0.030 | 0.030 | 0.60 | 0.018 | 7% | |
| 11 | 6.30 | 1.71 | 0.45 | | 0.040 | 0.040 | 1.0 | 6.05 | 6.48 | 0.43 | 1.26 | 0.040 | 0.040 | 0.54 | 0.021 | 8% | |
| 12 | 6.65 | 1.73 | 0.44 | | 0.050 | 0.050 | 1.0 | 6.48 | 6.88 | 0.40 | 1.29 | 0.050 | 0.050 | 0.52 | 0.026 | 10% | |
| 13 | 7.10 | 1.76 | 0.44 | | 0.070 | 0.050 | 1.0 | 6.88 | 7.30 | 0.43 | 1.32 | 0.060 | 0.060 | 0.56 | 0.034 | 13% | |
| 14 | 7.50 | 1.77 | 0.44 | | 0.060 | 0.040 | 1.0 | 7.30 | 7.70 | 0.40 | 1.33 | 0.050 | 0.050 | 0.53 | 0.027 | 10% | |
| 15 | 7.90 | 1.72 | 0.44 | | 0.060 | 0.050 | 1.0 | 7.70 | 8.15 | 0.45 | 1.28 | 0.055 | 0.055 | 0.58 | 0.032 | 12% | |
| 16 | 8.40 | 1.69 | 0.40 | | 0.060 | 0.030 | 1.0 | 8.15 | 8.60 | 0.45 | 1.29 | 0.045 | 0.045 | 0.58 | 0.026 | 10% | |
| 17 | 8.80 | 1.60 | 0.40 | | 0.070 | 0.030 | 1.0 | 8.60 | 9.05 | 0.45 | 1.20 | 0.050 | 0.050 | 0.54 | 0.027 | 10% | |
| 18 | 9.30 | 1.48 | 0.44 | | 0.050 | 0.020 | 1.0 | 9.05 | 9.45 | 0.40 | 1.04 | 0.035 | 0.035 | 0.42 | 0.015 | 6% | |
| 19 | 9.60 | 1.47 | 0.44 | | 0.050 | 0.010 | 1.0 | 9.45 | 9.85 | 0.40 | 1.03 | 0.030 | 0.030 | 0.41 | 0.012 | 5% | |
| 20 | 10.10 | 1.28 | 0.41 | 0.030 | | | 0.9 | 9.85 | 10.30 | 0.45 | 0.87 | 0.030 | 0.027 | 0.39 | 0.011 | 4% | |
| 21 | 10.50 | 1.20 | 0.40 | 0.010 | | | 0.9 | 10.30 | 10.70 | 0.40 | 0.80 | 0.010 | 0.009 | 0.32 | 0.003 | 1% | |
| 22 | 10.90 | 0.88 | 0.39 | 0.000 | | | 1.0 | 10.70 | 11.08 | 0.38 | 0.49 | 0.000 | 0.000 | 0.18 | 0.000 | 0% | |
| Left | 11.25 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 11.08 | 11.25 | 0.18 | 0.12 | 0.000 | 0.000 | 0.02 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.261 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.261 | (m ³ /s) |
| Perceived Measurement Quality: | | Good | |
| Total Area: | | 10.73 | (m ²) |
| Wetted Width: | | 10.50 | (m) |
| Hydraulic Depth: | | 1.022 | (m) |
| Mean Velocity: | | 0.024 | (m/s) |
| Froude Number: | | 0.008 | |

| Velocity Profile for Ice Conditions: | | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.036 | |
| Offset | 7.10 | 1.76 | 0.000 | - | - | Panel V.@Ofst | 0.060 |
| Depth | 1.76 | 1.60 | 0.020 | 1.68 | 0.010 | 60% Depth | 1.232 |
| Ice Depth | 0.44 | 1.40 | 0.040 | 1.50 | 0.030 | 20% Depth | 0.70 |
| | | 1.20 | 0.040 | 1.30 | 0.040 | 80% Depth | 1.50 |
| | | 1.00 | 0.040 | 1.10 | 0.040 | | |
| | | 0.80 | 0.050 | 0.90 | 0.045 | | |
| | | 0.60 | 0.050 | 0.70 | 0.050 | | |
| | | 0.44 | 0.000 | 0.52 | 0.025 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5A - Muskeg River above Muskeg Creek (476100 E, 6351600 N) | | | |
| Field Personnel: | DB GB | Trip Date: | 08-Apr-10 |
| Data Entry Personnel: | DB | Date: | 10-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.267 |
| Battery (Main): | 14.44 |
| Battery (Aux): | - |
| Datalogger Clock: | 1115 |
| Laptop Clock: | 1112 |
| Air Temp: | NA |
| Air Pressure: | - |
| RH: | NA |
| Water °C: | NA |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------------|
| Measurement Details: | |
| Start Time (MST): | 1100 |
| End Time (MST): | 1130 |
| Equipment: | - |
| Method: | - |
| River Condition: | Broken Ice |
| Code ('Ice' or 'Open'): | Broken Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Warm + hazy sun |

| Level Survey: | | | | | | |
|----------------------|-------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T post near logger | 0.888 | 282.662 | 1.022 | 282.662 | - |
| Bench Mark 2: | Pipe by trail before clearing | 1.199 | 282.159 | 1.333 | 282.159 | - |
| Top of Ice: | | | 283.550 | | 283.684 | 283.617 |
| Water Level: | | 2.317 | 281.233 | 2.449 | 281.235 | 281.234 |
| Transducer: | | 1.267 | 279.966 | 1.267 | 279.968 | 279.967 |
| Other: | | | | | | |

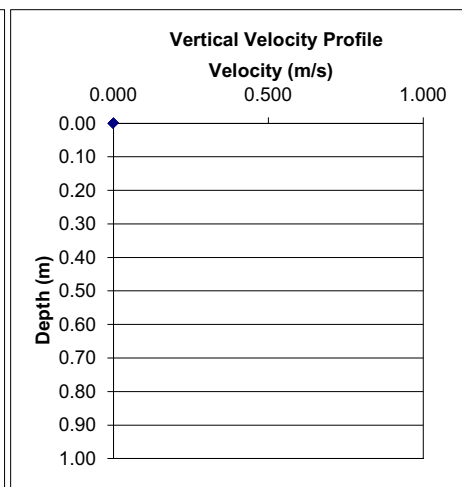
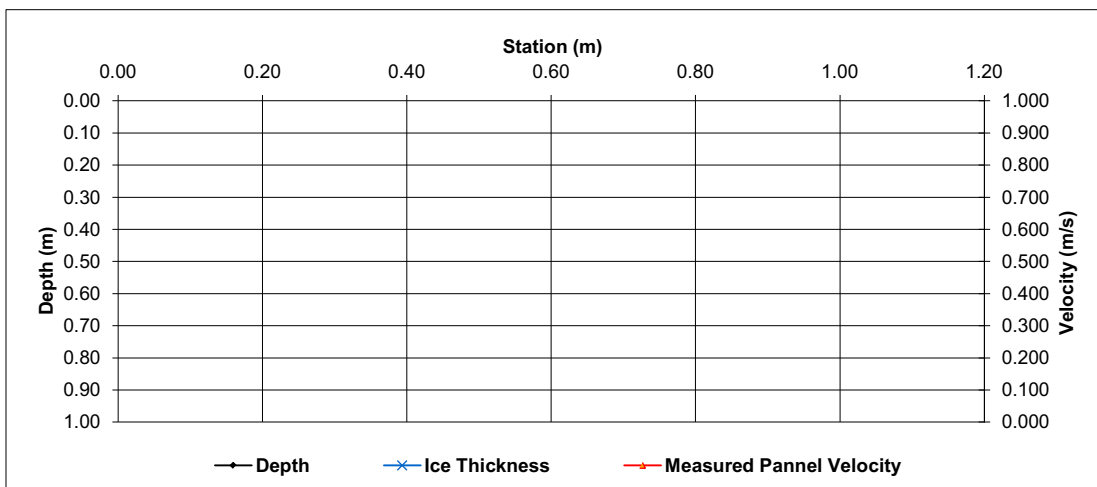
General Notes:

Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 26 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 27 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 28 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | | | | | | | | |
| Total Flow | | | | | | | | | | | | | | | NOT MEASURED | | | | | | | | |

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | NOT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | | Poor | |
| Total Area: | | #VALUE! | (m ²) |
| Wetted Width: | | 0.00 | (m) |
| Hydraulic Depth: | | #VALUE! | (m) |
| Mean Velocity: | | #VALUE! | (m/s) |
| Froude Number: | | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5A - Muskeg River above Muskeg Creek (476100 E, 6351600 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 27-Apr-10 |
| Data Entry Personnel: | DB | Date: | 30-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 2.234 |
| Battery (Main): | 14.47 |
| Battery (Aux): | - |
| Datalogger Clock: | 1036 |
| Laptop Clock: | 1034 |
| Air Temp: | NA |
| Air Pressure: | 97.64 |
| RH: | NA |
| Water °C: | 3.5 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Installed 107 probe. PT reading was 1.789 | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 1155 |
| End Time (MST): | 1130 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Clear 5°C |

| Level Survey: | | | | | | |
|----------------------|-------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T post near logger | 1.064 | 282.662 | 1.037 | 282.662 | - |
| Bench Mark 2: | Pipe by trail before clearing | 1.578 | 282.159 | 1.552 | 282.159 | - |
| Top of Ice: | | | 283.726 | | 283.699 | 283.713 |
| Water Level: | | 1.977 | 281.749 | 1.946 | 281.753 | 281.751 |
| Transducer: | | 2.234 | 279.515 | 2.234 | 279.519 | 279.517 |
| Other: | | | | | | |

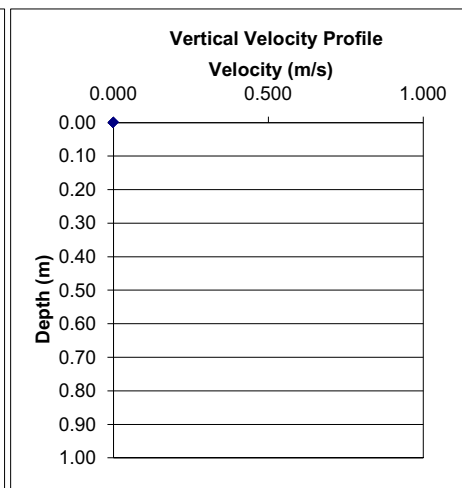
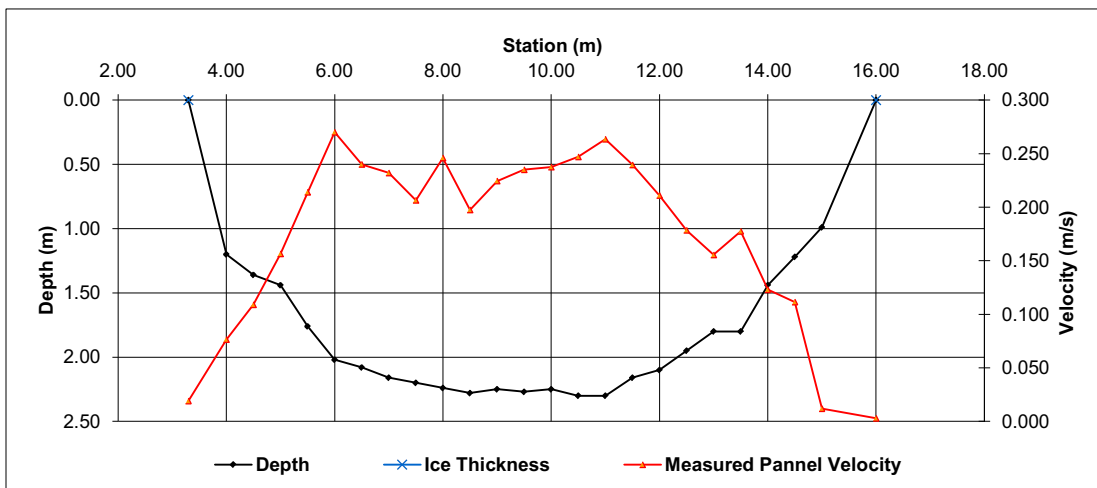
| |
|-----------------------|
| General Notes: |
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| |

| Measured Data | | | | | | | Calculated Data | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 3.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.30 | 3.65 | 0.35 | 0.30 | 0.019 | 0.019 | 0.11 | 0.002 | 0% | |
| 1 | 4.00 | 1.20 | | | 0.079 | 0.074 | 1.0 | 3.65 | 4.25 | 0.60 | 1.20 | 0.077 | 0.077 | 0.72 | 0.055 | 1% | |
| 2 | 4.50 | 1.36 | | | 0.110 | 0.108 | 1.0 | 4.25 | 4.75 | 0.50 | 1.36 | 0.109 | 0.109 | 0.68 | 0.074 | 2% | |
| 3 | 5.00 | 1.44 | | | 0.108 | 0.205 | 1.0 | 4.75 | 5.25 | 0.50 | 1.44 | 0.157 | 0.157 | 0.72 | 0.113 | 3% | |
| 4 | 5.50 | 1.76 | | | 0.161 | 0.267 | 1.0 | 5.25 | 5.75 | 0.50 | 1.76 | 0.214 | 0.214 | 0.88 | 0.188 | 4% | |
| 5 | 6.00 | 2.02 | | | 0.200 | 0.340 | 1.0 | 5.75 | 6.25 | 0.50 | 2.02 | 0.270 | 0.270 | 1.01 | 0.273 | 6% | |
| 6 | 6.50 | 2.08 | | | 0.192 | 0.288 | 1.0 | 6.25 | 6.75 | 0.50 | 2.08 | 0.240 | 0.240 | 1.04 | 0.250 | 6% | |
| 7 | 7.00 | 2.16 | | | 0.169 | 0.295 | 1.0 | 6.75 | 7.25 | 0.50 | 2.16 | 0.232 | 0.232 | 1.08 | 0.251 | 6% | |
| 8 | 7.50 | 2.20 | | | 0.151 | 0.262 | 1.0 | 7.25 | 7.75 | 0.50 | 2.20 | 0.207 | 0.207 | 1.10 | 0.227 | 5% | |
| 9 | 8.00 | 2.24 | | | 0.209 | 0.283 | 1.0 | 7.75 | 8.25 | 0.50 | 2.24 | 0.246 | 0.246 | 1.12 | 0.276 | 6% | |
| 10 | 8.50 | 2.28 | | | 0.146 | 0.249 | 1.0 | 8.25 | 8.75 | 0.50 | 2.28 | 0.198 | 0.198 | 1.14 | 0.225 | 5% | |
| 11 | 9.00 | 2.25 | | | 0.166 | 0.283 | 1.0 | 8.75 | 9.25 | 0.50 | 2.25 | 0.225 | 0.225 | 1.13 | 0.253 | 6% | |
| 12 | 9.50 | 2.27 | | | 0.194 | 0.276 | 1.0 | 9.25 | 9.75 | 0.50 | 2.27 | 0.235 | 0.235 | 1.14 | 0.267 | 6% | |
| 13 | 10.00 | 2.25 | | | 0.202 | 0.273 | 1.0 | 9.75 | 10.25 | 0.50 | 2.25 | 0.238 | 0.238 | 1.13 | 0.267 | 6% | |
| 14 | 10.50 | 2.30 | | | 0.147 | 0.347 | 1.0 | 10.25 | 10.75 | 0.50 | 2.30 | 0.247 | 0.247 | 1.15 | 0.284 | 6% | |
| 15 | 11.00 | 2.30 | | | 0.271 | 0.256 | 1.0 | 10.75 | 11.25 | 0.50 | 2.30 | 0.264 | 0.264 | 1.15 | 0.303 | 7% | |
| 16 | 11.50 | 2.16 | | | 0.176 | 0.303 | 1.0 | 11.25 | 11.75 | 0.50 | 2.16 | 0.240 | 0.240 | 1.08 | 0.259 | 6% | |
| 17 | 12.00 | 2.10 | | | 0.151 | 0.271 | 1.0 | 11.75 | 12.25 | 0.50 | 2.10 | 0.211 | 0.211 | 1.05 | 0.222 | 5% | |
| 18 | 12.50 | 1.95 | | | 0.131 | 0.226 | 1.0 | 12.25 | 12.75 | 0.50 | 1.95 | 0.179 | 0.179 | 0.98 | 0.174 | 4% | |
| 19 | 13.00 | 1.80 | | | 0.094 | 0.217 | 1.0 | 12.75 | 13.25 | 0.50 | 1.80 | 0.156 | 0.156 | 0.90 | 0.140 | 3% | |
| 20 | 13.50 | 1.80 | | | 0.140 | 0.215 | 1.0 | 13.25 | 13.75 | 0.50 | 1.80 | 0.178 | 0.178 | 0.90 | 0.160 | 4% | |
| 21 | 14.00 | 1.44 | | | 0.072 | 0.174 | 1.0 | 13.75 | 14.25 | 0.50 | 1.44 | 0.123 | 0.123 | 0.72 | 0.089 | 2% | |
| 22 | 14.50 | 1.22 | | | 0.065 | 0.158 | 1.0 | 14.25 | 14.75 | 0.50 | 1.22 | 0.112 | 0.112 | 0.61 | 0.068 | 2% | |
| 23 | 15.00 | 0.99 | | 0.012 | | | 1.0 | 14.75 | 15.50 | 0.75 | 0.99 | 0.012 | 0.012 | 0.74 | 0.009 | 0% | |
| Right | 16.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 15.50 | 16.00 | 0.50 | 0.25 | 0.003 | 0.003 | 0.12 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 4.426 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 4.426 (m ³ /s) |
| Perceived Measurement Quality: | Excellent |
| Total Area: | 22.38 (m ²) |
| Wetted Width: | 12.70 (m) |
| Hydraulic Depth: | 1.762 (m) |
| Mean Velocity: | 0.198 (m/s) |
| Froude Number: | 0.048 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5A - Muskeg River above Muskeg Creek (476100 E, 6351600 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 27-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 13-Jul-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.442 |
| Battery (Main): | 14.1 |
| Battery (Aux): | |
| Datalogger Clock: | 10:58 |
| Laptop Clock: | 10:59 |
| Air Temp: | NA |
| Air Pressure: | 97.38 |
| RH: | NA |
| Water °C: | 17.46 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 11:00 |
| End Time (MST): | 12:26 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Hot sunny |

| Level Survey: | | | | | | |
|----------------------|-------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T post near logger | 1.035 | 282.662 | 1.024 | 282.662 | - |
| Bench Mark 2: | Pipe by trail before clearing | 1.545 | 282.159 | 1.532 | 282.159 | - |
| Top of Ice: | | | 283.697 | | 283.686 | 283.692 |
| Water Level: | | 2.718 | 280.979 | 2.705 | 280.981 | 280.980 |
| Transducer: | | 1.442 | 279.537 | 1.442 | 279.539 | 279.538 |
| Other: | | | | | | |

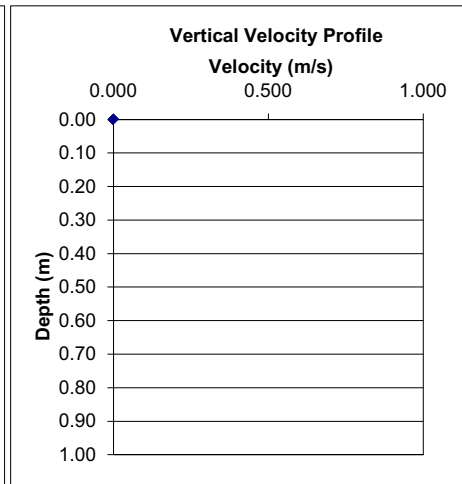
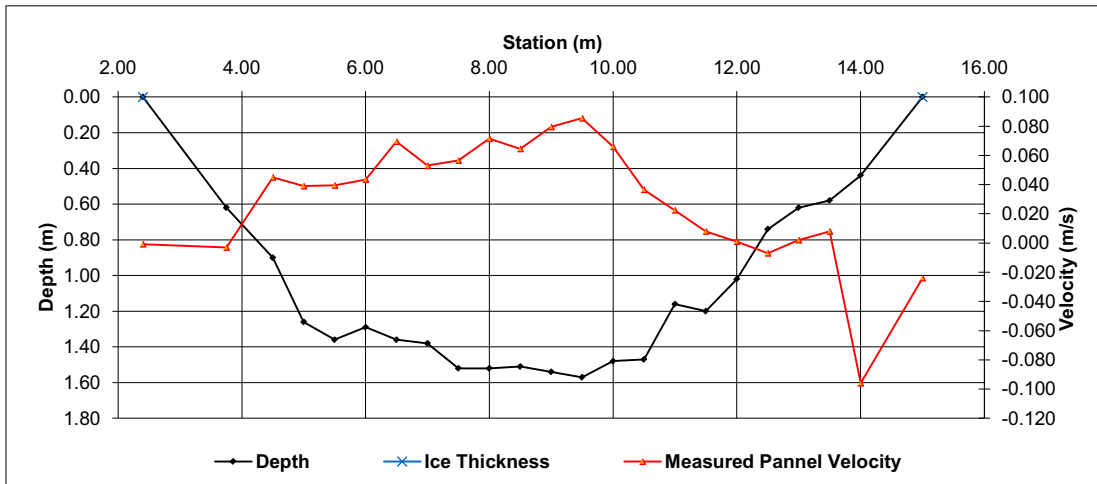
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | |
| Right | 15.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 15.00 | 14.50 | 0.50 | 0.11 | -0.024 | -0.024 | 0.06 | -0.001 | 0% | | |
| 1 | 14.00 | 0.44 | | -0.096 | | | 1.0 | 14.50 | 13.75 | 0.75 | 0.44 | -0.096 | -0.096 | 0.33 | -0.032 | -6% | | |
| 2 | 13.50 | 0.58 | | 0.008 | | | 1.0 | 13.75 | 13.25 | 0.50 | 0.58 | 0.008 | 0.008 | 0.29 | 0.002 | 0% | | |
| 3 | 13.00 | 0.62 | | 0.002 | | | 1.0 | 13.25 | 12.75 | 0.50 | 0.62 | 0.002 | 0.002 | 0.31 | 0.001 | 0% | | |
| 4 | 12.50 | 0.74 | | -0.007 | | | 1.0 | 12.75 | 12.25 | 0.50 | 0.74 | -0.007 | -0.007 | 0.37 | -0.003 | 0% | | |
| 5 | 12.00 | 1.02 | | | 0.009 | -0.007 | 1.0 | 12.25 | 11.75 | 0.50 | 1.02 | 0.001 | 0.001 | 0.51 | 0.001 | 0% | | |
| 6 | 11.50 | 1.20 | | | 0.007 | 0.009 | 1.0 | 11.75 | 11.25 | 0.50 | 1.20 | 0.008 | 0.008 | 0.60 | 0.005 | 1% | | |
| 7 | 11.00 | 1.16 | | | 0.018 | 0.027 | 1.0 | 11.25 | 10.75 | 0.50 | 1.16 | 0.023 | 0.023 | 0.58 | 0.013 | 2% | | |
| 8 | 10.50 | 1.47 | | | 0.052 | 0.021 | 1.0 | 10.75 | 10.25 | 0.50 | 1.47 | 0.037 | 0.037 | 0.74 | 0.027 | 5% | | |
| 9 | 10.00 | 1.48 | | | 0.067 | 0.065 | 1.0 | 10.25 | 9.75 | 0.50 | 1.48 | 0.066 | 0.066 | 0.74 | 0.049 | 9% | | |
| 10 | 9.50 | 1.57 | | | 0.084 | 0.087 | 1.0 | 9.75 | 9.25 | 0.50 | 1.57 | 0.086 | 0.086 | 0.79 | 0.067 | 13% | | |
| 11 | 9.00 | 1.54 | | | 0.086 | 0.073 | 1.0 | 9.25 | 8.75 | 0.50 | 1.54 | 0.080 | 0.080 | 0.77 | 0.061 | 12% | | |
| 12 | 8.50 | 1.51 | | | 0.064 | 0.065 | 1.0 | 8.75 | 8.25 | 0.50 | 1.51 | 0.065 | 0.065 | 0.76 | 0.049 | 9% | | |
| 13 | 8.00 | 1.52 | | | 0.080 | 0.063 | 1.0 | 8.25 | 7.75 | 0.50 | 1.52 | 0.072 | 0.072 | 0.76 | 0.054 | 10% | | |
| 14 | 7.50 | 1.52 | | | 0.052 | 0.061 | 1.0 | 7.75 | 7.25 | 0.50 | 1.52 | 0.057 | 0.057 | 0.76 | 0.043 | 8% | | |
| 15 | 7.00 | 1.38 | | | 0.046 | 0.060 | 1.0 | 7.25 | 6.75 | 0.50 | 1.38 | 0.053 | 0.053 | 0.69 | 0.037 | 7% | | |
| 16 | 6.50 | 1.36 | | | 0.080 | 0.059 | 1.0 | 6.75 | 6.25 | 0.50 | 1.36 | 0.070 | 0.070 | 0.68 | 0.047 | 9% | | |
| 17 | 6.00 | 1.29 | | | 0.042 | 0.045 | 1.0 | 6.25 | 5.75 | 0.50 | 1.29 | 0.044 | 0.044 | 0.65 | 0.028 | 5% | | |
| 18 | 5.50 | 1.36 | | | 0.043 | 0.036 | 1.0 | 5.75 | 5.25 | 0.50 | 1.36 | 0.040 | 0.040 | 0.68 | 0.027 | 5% | | |
| 19 | 5.00 | 1.26 | | | 0.026 | 0.052 | 1.0 | 5.25 | 4.75 | 0.50 | 1.26 | 0.039 | 0.039 | 0.63 | 0.025 | 5% | | |
| 20 | 4.50 | 0.90 | | | 0.030 | 0.060 | 1.0 | 4.75 | 4.13 | 0.63 | 0.90 | 0.045 | 0.045 | 0.56 | 0.025 | 5% | | |
| 21 | 3.75 | 0.62 | | -0.003 | | | 1.0 | 4.13 | 3.08 | 1.05 | 0.62 | -0.003 | -0.003 | 0.65 | -0.002 | 0% | | |
| Left | 2.40 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.08 | 2.40 | 0.68 | 0.16 | -0.001 | -0.001 | 0.10 | 0.000 | 0% | | |
| Total Flow | | | | | | | | | | | | | | | 0.522 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.522 | (m ³ /s) |
| Perceived Measurement Quality: | | Good | |
| Total Area: | | 12.99 | (m ²) |
| Wetted Width: | | 11.43 | (m) |
| Hydraulic Depth: | | 1.137 | (m) |
| Mean Velocity: | | 0.040 | (m/s) |
| Froude Number: | | 0.012 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5A - Muskeg River above Muskeg Creek (476100 E, 6351600 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 18-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.570 |
| Battery (Main): | 14.4 |
| Battery (Aux): | - |
| Datalogger Clock: | 802 |
| Laptop Clock: | 800 |
| Air Temp: | NA |
| Air Pressure: | 97.7 |
| RH: | NA |
| Water °C: | 14.54 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 815 |
| End Time (MST): | 900 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | clear 15°C |

| Level Survey: | | | | | | |
|----------------------|-------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T post near logger | 1.038 | 282.662 | 0.994 | 282.662 | - |
| Bench Mark 2: | Pipe by trail before clearing | 1.546 | 282.159 | 1.505 | 282.159 | - |
| Top of Ice: | | | 283.700 | | 283.656 | 283.678 |
| Water Level: | | 2.588 | 281.112 | 2.544 | 281.112 | 281.112 |
| Transducer: | | 1.570 | 279.542 | 1.570 | 279.542 | 279.542 |
| Other: | | | | | | |

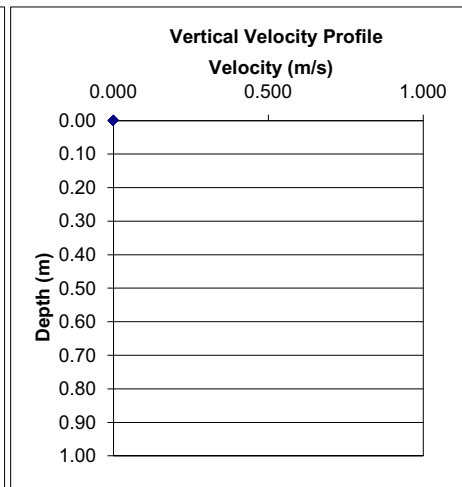
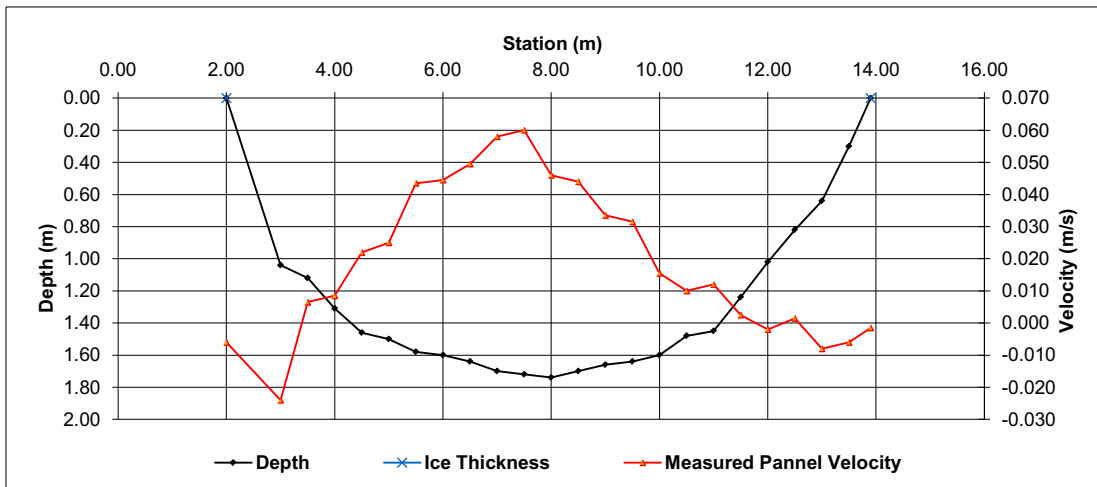
| |
|-----------------------|
| General Notes: |
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| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 13.90 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 13.90 | 13.70 | 0.20 | 0.08 | -0.002 | -0.002 | 0.02 | 0.000 | 0% |
| 1 | 13.50 | 0.30 | | -0.006 | | | 1.0 | 13.70 | 13.25 | 0.45 | 0.30 | -0.006 | -0.006 | 0.14 | -0.001 | 0% |
| 2 | 13.00 | 0.64 | | -0.008 | | | 1.0 | 13.25 | 12.75 | 0.50 | 0.64 | -0.008 | -0.008 | 0.32 | -0.003 | -1% |
| 3 | 12.50 | 0.82 | | | 0.001 | 0.002 | 1.0 | 12.75 | 12.25 | 0.50 | 0.82 | 0.002 | 0.002 | 0.41 | 0.001 | 0% |
| 4 | 12.00 | 1.02 | | | -0.004 | 0.000 | 1.0 | 12.25 | 11.75 | 0.50 | 1.02 | -0.002 | -0.002 | 0.51 | -0.001 | 0% |
| 5 | 11.50 | 1.24 | | | -0.003 | 0.008 | 1.0 | 11.75 | 11.25 | 0.50 | 1.24 | 0.003 | 0.003 | 0.62 | 0.002 | 0% |
| 6 | 11.00 | 1.45 | | | 0.007 | 0.017 | 1.0 | 11.25 | 10.75 | 0.50 | 1.45 | 0.012 | 0.012 | 0.73 | 0.009 | 2% |
| 7 | 10.50 | 1.48 | | | 0.008 | 0.012 | 1.0 | 10.75 | 10.25 | 0.50 | 1.48 | 0.010 | 0.010 | 0.74 | 0.007 | 2% |
| 8 | 10.00 | 1.60 | | | 0.024 | 0.007 | 1.0 | 10.25 | 9.75 | 0.50 | 1.60 | 0.016 | 0.016 | 0.80 | 0.012 | 3% |
| 9 | 9.50 | 1.64 | | | 0.035 | 0.028 | 1.0 | 9.75 | 9.25 | 0.50 | 1.64 | 0.032 | 0.032 | 0.82 | 0.026 | 7% |
| 10 | 9.00 | 1.66 | | | 0.043 | 0.024 | 1.0 | 9.25 | 8.75 | 0.50 | 1.66 | 0.034 | 0.034 | 0.83 | 0.028 | 7% |
| 11 | 8.50 | 1.70 | | | 0.054 | 0.034 | 1.0 | 8.75 | 8.25 | 0.50 | 1.70 | 0.044 | 0.044 | 0.85 | 0.037 | 10% |
| 12 | 8.00 | 1.74 | | | 0.062 | 0.030 | 1.0 | 8.25 | 7.75 | 0.50 | 1.74 | 0.046 | 0.046 | 0.87 | 0.040 | 10% |
| 13 | 7.50 | 1.72 | | | 0.072 | 0.048 | 1.0 | 7.75 | 7.25 | 0.50 | 1.72 | 0.060 | 0.060 | 0.86 | 0.052 | 13% |
| 14 | 7.00 | 1.70 | | | 0.074 | 0.042 | 1.0 | 7.25 | 6.75 | 0.50 | 1.70 | 0.058 | 0.058 | 0.85 | 0.049 | 13% |
| 15 | 6.50 | 1.64 | | | 0.063 | 0.036 | 1.0 | 6.75 | 6.25 | 0.50 | 1.64 | 0.050 | 0.050 | 0.82 | 0.041 | 10% |
| 16 | 6.00 | 1.60 | | | 0.032 | 0.057 | 1.0 | 6.25 | 5.75 | 0.50 | 1.60 | 0.045 | 0.045 | 0.80 | 0.036 | 9% |
| 17 | 5.50 | 1.58 | | | 0.013 | 0.074 | 1.0 | 5.75 | 5.25 | 0.50 | 1.58 | 0.044 | 0.044 | 0.79 | 0.034 | 9% |
| 18 | 5.00 | 1.50 | | | 0.021 | 0.029 | 1.0 | 5.25 | 4.75 | 0.50 | 1.50 | 0.025 | 0.025 | 0.75 | 0.019 | 5% |
| 19 | 4.50 | 1.46 | | | 0.018 | 0.026 | 1.0 | 4.75 | 4.25 | 0.50 | 1.46 | 0.022 | 0.022 | 0.73 | 0.016 | 4% |
| 20 | 4.00 | 1.31 | | | 0.009 | 0.008 | 1.0 | 4.25 | 3.75 | 0.50 | 1.31 | 0.009 | 0.009 | 0.66 | 0.006 | 1% |
| 21 | 3.50 | 1.12 | | | -0.007 | 0.020 | 1.0 | 3.75 | 3.25 | 0.50 | 1.12 | 0.007 | 0.007 | 0.56 | 0.004 | 1% |
| 22 | 3.00 | 1.04 | | | -0.043 | -0.005 | 1.0 | 3.25 | 2.50 | 0.75 | 1.04 | -0.024 | -0.024 | 0.78 | -0.019 | -5% |
| Right | 2.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.50 | 2.00 | 0.50 | 0.26 | -0.006 | -0.006 | 0.13 | -0.001 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.393 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.393 | (m ³ /s) |
| Perceived Measurement Quality: | | Good | |
| Total Area: | | 15.37 | (m ²) |
| Wetted Width: | | 11.20 | (m) |
| Hydraulic Depth: | | 1.372 | (m) |
| Mean Velocity: | | 0.026 | (m/s) |
| Froude Number: | | 0.007 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5A - Muskeg River above Muskeg Creek (476100 E, 6351600 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 23-Sep-10 |
| Data Entry Personnel: | DB | Date: | 27-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|--|---------|
| Logger Details: | |
| Transducer Reading: | 2.270 |
| Battery (Main): | 14.57 |
| Battery (Aux): | - |
| Datalogger Clock: | - |
| Laptop Clock: | - |
| Air Temp: | NA |
| Air Pressure: | 97.58 |
| RH: | NA |
| Water °C: | 6.1 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Replaced PT for calibration: put PLS in | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 810 |
| End Time (MST): | 1000 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Clear 0°C |

| Level Survey: | | | | | | |
|----------------------|-------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T post near logger | 0.993 | 282.662 | 0.978 | 282.662 | - |
| Bench Mark 2: | Pipe by trail before clearing | 1.507 | 282.159 | 1.491 | 282.159 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.818 | 281.837 | 1.803 | 281.837 | 281.837 |
| Transducer: | | 2.270 | 279.567 | 2.270 | 279.567 | 279.567 |
| Other: | | | | | | |

General Notes:

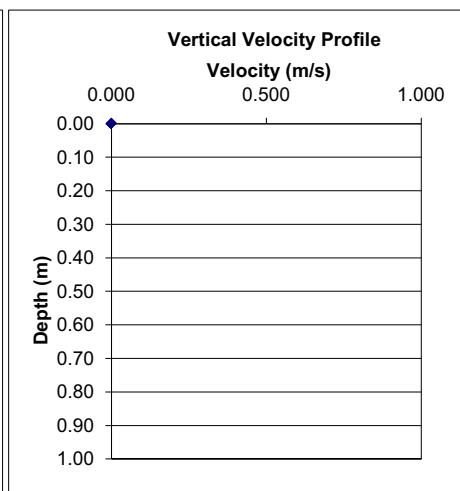
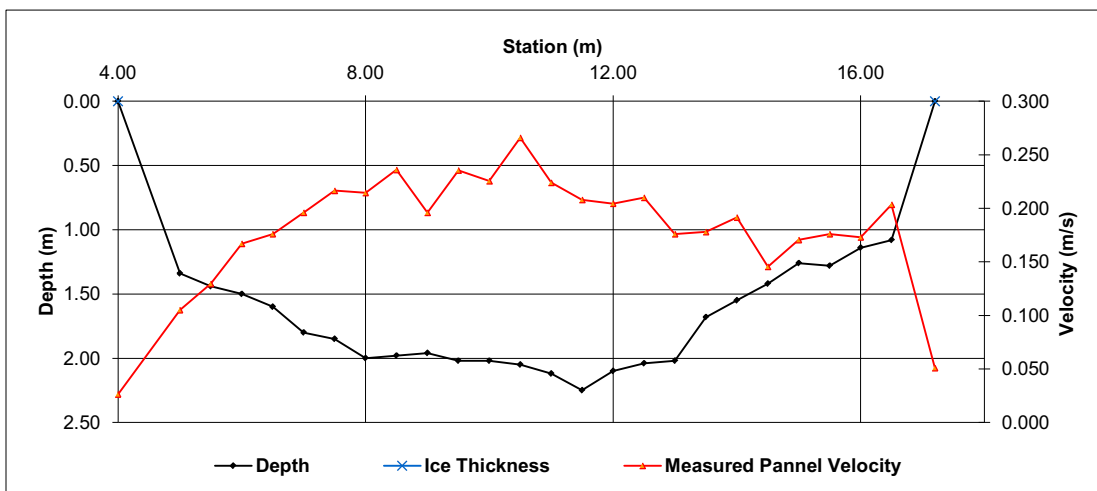
Good measurement- river near bankfull.
TSS sample obtained at 11 m.

| Flow Measurement: Measured Data | | | | | | | Calculated Data | | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 4.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 4.00 | 4.50 | 0.50 | 0.34 | 0.026 | 0.026 | 0.17 | 0.004 | 0% | |
| 1 | 5.00 | 1.34 | | 0.142 | 0.068 | | 1.0 | 4.50 | 5.25 | 0.75 | 1.34 | 0.105 | 0.105 | 1.01 | 0.106 | 3% | |
| 2 | 5.50 | 1.44 | | 0.108 | 0.151 | | 1.0 | 5.25 | 5.75 | 0.50 | 1.44 | 0.130 | 0.130 | 0.72 | 0.093 | 2% | |
| 3 | 6.00 | 1.50 | | 0.144 | 0.190 | | 1.0 | 5.75 | 6.25 | 0.50 | 1.50 | 0.167 | 0.167 | 0.75 | 0.125 | 3% | |
| 4 | 6.50 | 1.60 | | 0.145 | 0.207 | | 1.0 | 6.25 | 6.75 | 0.50 | 1.60 | 0.176 | 0.176 | 0.80 | 0.141 | 3% | |
| 5 | 7.00 | 1.80 | | 0.185 | 0.207 | | 1.0 | 6.75 | 7.25 | 0.50 | 1.80 | 0.196 | 0.196 | 0.90 | 0.176 | 4% | |
| 6 | 7.50 | 1.85 | | 0.175 | 0.258 | | 1.0 | 7.25 | 7.75 | 0.50 | 1.85 | 0.217 | 0.217 | 0.93 | 0.200 | 5% | |
| 7 | 8.00 | 2.00 | | 0.191 | 0.238 | | 1.0 | 7.75 | 8.25 | 0.50 | 2.00 | 0.215 | 0.215 | 1.00 | 0.215 | 5% | |
| 8 | 8.50 | 1.98 | | 0.194 | 0.278 | | 1.0 | 8.25 | 8.75 | 0.50 | 1.98 | 0.236 | 0.236 | 0.99 | 0.234 | 6% | |
| 9 | 9.00 | 1.96 | | 0.155 | 0.237 | | 1.0 | 8.75 | 9.25 | 0.50 | 1.96 | 0.196 | 0.196 | 0.98 | 0.192 | 5% | |
| 10 | 9.50 | 2.02 | | 0.202 | 0.269 | | 1.0 | 9.25 | 9.75 | 0.50 | 2.02 | 0.236 | 0.236 | 1.01 | 0.238 | 6% | |
| 11 | 10.00 | 2.02 | | 0.230 | 0.221 | | 1.0 | 9.75 | 10.25 | 0.50 | 2.02 | 0.226 | 0.226 | 1.01 | 0.228 | 5% | |
| 12 | 10.50 | 2.05 | | 0.238 | 0.294 | | 1.0 | 10.25 | 10.75 | 0.50 | 2.05 | 0.266 | 0.266 | 1.03 | 0.273 | 7% | |
| 13 | 11.00 | 2.12 | | 0.162 | 0.286 | | 1.0 | 10.75 | 11.25 | 0.50 | 2.12 | 0.224 | 0.224 | 1.06 | 0.237 | 6% | |
| 14 | 11.50 | 2.25 | | 0.119 | 0.297 | | 1.0 | 11.25 | 11.75 | 0.50 | 2.25 | 0.208 | 0.208 | 1.13 | 0.234 | 6% | |
| 15 | 12.00 | 2.10 | | 0.170 | 0.239 | | 1.0 | 11.75 | 12.25 | 0.50 | 2.10 | 0.205 | 0.205 | 1.05 | 0.215 | 5% | |
| 16 | 12.50 | 2.04 | | 0.117 | 0.303 | | 1.0 | 12.25 | 12.75 | 0.50 | 2.04 | 0.210 | 0.210 | 1.02 | 0.214 | 5% | |
| 17 | 13.00 | 2.02 | | 0.106 | 0.246 | | 1.0 | 12.75 | 13.25 | 0.50 | 2.02 | 0.176 | 0.176 | 1.01 | 0.178 | 4% | |
| 18 | 13.50 | 1.68 | | 0.129 | 0.227 | | 1.0 | 13.25 | 13.75 | 0.50 | 1.68 | 0.178 | 0.178 | 0.84 | 0.150 | 4% | |
| 19 | 14.00 | 1.55 | | 0.129 | 0.254 | | 1.0 | 13.75 | 14.25 | 0.50 | 1.55 | 0.192 | 0.192 | 0.78 | 0.148 | 4% | |
| 20 | 14.50 | 1.42 | | 0.080 | 0.211 | | 1.0 | 14.25 | 14.75 | 0.50 | 1.42 | 0.146 | 0.146 | 0.71 | 0.103 | 2% | |
| 21 | 15.00 | 1.26 | | 0.076 | 0.265 | | 1.0 | 14.75 | 15.25 | 0.50 | 1.26 | 0.171 | 0.171 | 0.63 | 0.107 | 3% | |
| 22 | 15.50 | 1.28 | | 0.052 | 0.300 | | 1.0 | 15.25 | 15.75 | 0.50 | 1.28 | 0.176 | 0.176 | 0.64 | 0.113 | 3% | |
| 23 | 16.00 | 1.14 | | 0.101 | 0.245 | | 1.0 | 15.75 | 16.25 | 0.50 | 1.14 | 0.173 | 0.173 | 0.57 | 0.099 | 2% | |
| 24 | 16.50 | 1.08 | | 0.157 | 0.250 | | 1.0 | 16.25 | 16.85 | 0.60 | 1.08 | 0.204 | 0.204 | 0.65 | 0.132 | 3% | |
| Right | 17.20 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 16.85 | 17.20 | 0.35 | 0.27 | 0.051 | 0.051 | 0.09 | 0.005 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 4.159 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-----------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 4.159 | (m ³ /s) |
| Perceived Measurement Quality: | | Excellent | |
| Total Area: | | 21.46 | (m ²) |
| Wetted Width: | | 13.20 | (m) |
| Hydraulic Depth: | | 1.625 | (m) |
| Mean Velocity: | | 0.194 | (m/s) |
| Froude Number: | | 0.049 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5A - Muskeg River above Muskeg Creek (476100 E, 6351600 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 29-Oct-10 |
| Data Entry Personnel: | DB | Date: | 08-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.580 |
| Battery (Main): | 12.9 |
| Battery (Aux): | |
| Datalogger Clock: | 757 |
| Laptop Clock: | 755 |
| Air Temp: | NA |
| Air Pressure: | 97.71 |
| RH: | NA |
| Water °C: | 1.7 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|--------------|
| Measurement Details: | |
| Start Time (MST): | 750 |
| End Time (MST): | 905 |
| Equipment: | ADV |
| Method: | Fischcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Overcast 2°C |

| Level Survey: | | | | | | |
|----------------------|-------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T post near logger | 0.999 | 282.662 | 0.973 | 282.662 | - |
| Bench Mark 2: | Pipe by trail before clearing | 1.509 | 282.159 | 1.485 | 282.159 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.500 | 281.161 | 2.475 | 281.160 | 281.161 |
| Transducer: | | 1.580 | 279.581 | 1.580 | 279.580 | 279.581 |
| Other: | | | | | | |

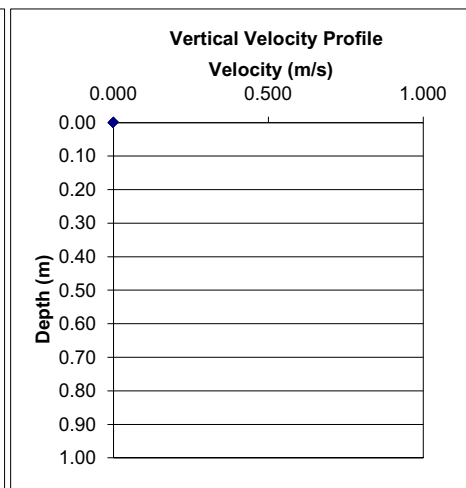
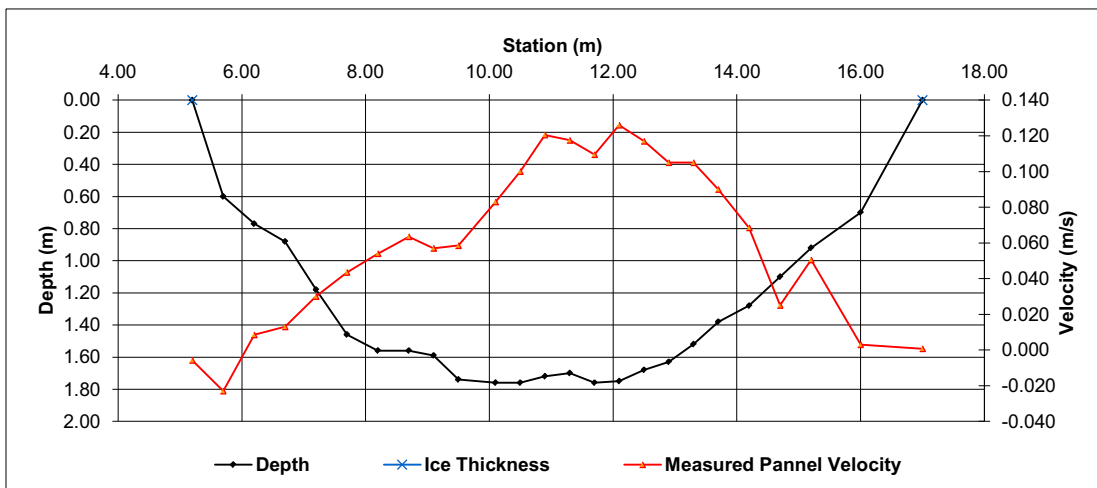
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | |
| Left | 5.20 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 5.20 | 5.45 | 0.25 | 0.15 | -0.006 | -0.006 | 0.04 | 0.000 | 0% | | |
| 1 | 5.70 | 0.60 | | -0.023 | | | 1.0 | 5.45 | 5.95 | 0.50 | 0.60 | -0.023 | -0.023 | 0.30 | -0.007 | -1% | | |
| 2 | 6.20 | 0.77 | | | 0.015 | 0.002 | 1.0 | 5.95 | 6.45 | 0.50 | 0.77 | 0.009 | 0.009 | 0.39 | 0.003 | 0% | | |
| 3 | 6.70 | 0.88 | | | 0.012 | 0.014 | 1.0 | 6.45 | 6.95 | 0.50 | 0.88 | 0.013 | 0.013 | 0.44 | 0.006 | 1% | | |
| 4 | 7.20 | 1.18 | | | 0.016 | 0.044 | 1.0 | 6.95 | 7.45 | 0.50 | 1.18 | 0.030 | 0.030 | 0.59 | 0.018 | 2% | | |
| 5 | 7.70 | 1.46 | | | 0.028 | 0.059 | 1.0 | 7.45 | 7.95 | 0.50 | 1.46 | 0.044 | 0.044 | 0.73 | 0.032 | 3% | | |
| 6 | 8.20 | 1.56 | | | 0.045 | 0.063 | 1.0 | 7.95 | 8.45 | 0.50 | 1.56 | 0.054 | 0.054 | 0.78 | 0.042 | 4% | | |
| 7 | 8.70 | 1.56 | | | 0.048 | 0.079 | 1.0 | 8.45 | 8.90 | 0.45 | 1.56 | 0.064 | 0.064 | 0.70 | 0.045 | 4% | | |
| 8 | 9.10 | 1.59 | | | 0.046 | 0.068 | 1.0 | 8.90 | 9.30 | 0.40 | 1.59 | 0.057 | 0.057 | 0.64 | 0.036 | 3% | | |
| 9 | 9.50 | 1.74 | | | 0.036 | 0.081 | 1.0 | 9.30 | 9.80 | 0.50 | 1.74 | 0.059 | 0.059 | 0.87 | 0.051 | 5% | | |
| 10 | 10.10 | 1.76 | | | 0.085 | 0.081 | 1.0 | 9.80 | 10.30 | 0.50 | 1.76 | 0.083 | 0.083 | 0.88 | 0.073 | 7% | | |
| 11 | 10.50 | 1.76 | | | 0.075 | 0.125 | 1.0 | 10.30 | 10.70 | 0.40 | 1.76 | 0.100 | 0.100 | 0.70 | 0.070 | 7% | | |
| 12 | 10.90 | 1.72 | | | 0.116 | 0.125 | 1.0 | 10.70 | 11.10 | 0.40 | 1.72 | 0.121 | 0.121 | 0.69 | 0.083 | 8% | | |
| 13 | 11.30 | 1.70 | | | 0.113 | 0.122 | 1.0 | 11.10 | 11.50 | 0.40 | 1.70 | 0.118 | 0.118 | 0.68 | 0.080 | 8% | | |
| 14 | 11.70 | 1.76 | | | 0.096 | 0.123 | 1.0 | 11.50 | 11.90 | 0.40 | 1.76 | 0.110 | 0.110 | 0.70 | 0.077 | 7% | | |
| 15 | 12.10 | 1.75 | | | 0.124 | 0.128 | 1.0 | 11.90 | 12.30 | 0.40 | 1.75 | 0.126 | 0.126 | 0.70 | 0.088 | 8% | | |
| 16 | 12.50 | 1.68 | | | 0.083 | 0.151 | 1.0 | 12.30 | 12.70 | 0.40 | 1.68 | 0.117 | 0.117 | 0.67 | 0.079 | 7% | | |
| 17 | 12.90 | 1.63 | | | 0.079 | 0.131 | 1.0 | 12.70 | 13.10 | 0.40 | 1.63 | 0.105 | 0.105 | 0.65 | 0.068 | 6% | | |
| 18 | 13.30 | 1.52 | | | 0.066 | 0.144 | 1.0 | 13.10 | 13.50 | 0.40 | 1.52 | 0.105 | 0.105 | 0.61 | 0.064 | 6% | | |
| 19 | 13.70 | 1.38 | | | 0.083 | 0.097 | 1.0 | 13.50 | 13.95 | 0.45 | 1.38 | 0.090 | 0.090 | 0.62 | 0.056 | 5% | | |
| 20 | 14.20 | 1.28 | | | 0.032 | 0.105 | 1.0 | 13.95 | 14.45 | 0.50 | 1.28 | 0.069 | 0.069 | 0.64 | 0.044 | 4% | | |
| 21 | 14.70 | 1.10 | | | 0.032 | 0.018 | 1.0 | 14.45 | 14.95 | 0.50 | 1.10 | 0.025 | 0.025 | 0.55 | 0.014 | 1% | | |
| 22 | 15.20 | 0.92 | | | 0.035 | 0.066 | 1.0 | 14.95 | 15.60 | 0.65 | 0.92 | 0.051 | 0.051 | 0.60 | 0.030 | 3% | | |
| 23 | 16.00 | 0.70 | | 0.003 | | | 1.0 | 15.60 | 16.50 | 0.90 | 0.70 | 0.003 | 0.003 | 0.63 | 0.002 | 0% | | |
| Right | 17.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 16.50 | 17.00 | 0.50 | 0.18 | 0.001 | 0.001 | 0.09 | 0.000 | 0% | | |
| Total Flow | | | | | | | | | | | | | | | 1.053 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 1.053 (m ³ /s) |
| Perceived Measurement Quality: | Excellent |
| Total Area: | 14.89 (m ²) |
| Wetted Width: | 11.80 (m) |
| Hydraulic Depth: | 1.261 (m) |
| Mean Velocity: | 0.071 (m/s) |
| Froude Number: | 0.020 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S5A - Muskeg River above Muskeg Creek (476100 E, 6351600 N) | | | |
| Field Personnel: | SG, JO | Trip Date: | 03-Dec-10 |
| Data Entry Personnel: | DB | Date: | 14-Dec-10 |
| Data Check Personnel: | JP | Date: | 16-Dec-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.470 |
| Battery (Main): | 14.09 |
| Battery (Aux): | |
| Datalogger Clock: | 13:06 |
| Laptop Clock: | 13:01 |
| Air Temp: | NA |
| Air Pressure: | 99.5 |
| RH: | NA |
| Water °C: | |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1300 |
| End Time (MST): | |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | - |
| Weather: | -10deg., 1/8 cloud |

| Level Survey: | | | | | | |
|----------------------|-------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T post near logger | 1.089 | 282.662 | 1.085 | 282.662 | - |
| Bench Mark 2: | Pipe by trail before clearing | 1.602 | 282.159 | 1.602 | 282.159 | - |
| Top of Ice: | | 2.710 | 281.041 | 2.709 | 281.038 | 281.040 |
| Water Level: | | 2.715 | 281.036 | 2.716 | 281.031 | 281.034 |
| Transducer: | | 1.470 | 279.566 | 1.470 | 279.561 | 279.564 |
| Other: | | | | | | |

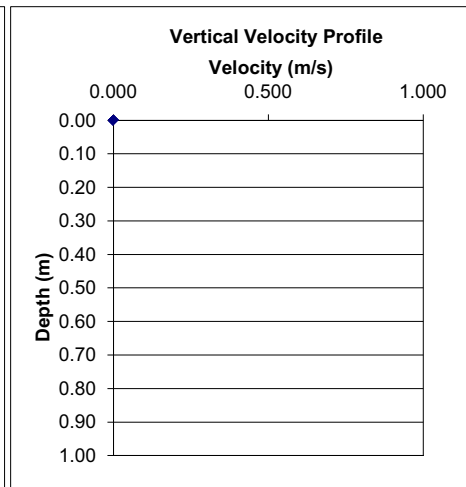
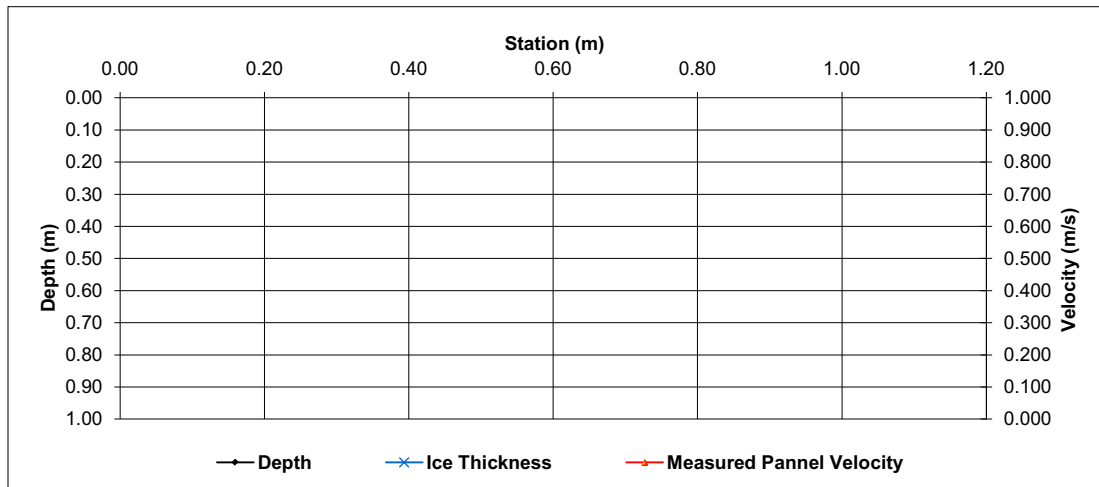
General Notes:
Ice < 15cm. Augering suspended. Ice Condition considered unsafe for manual discharge measurement.

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|--------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 26 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 27 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 28 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | NOT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | | - | |
| Total Area: | | #VALUE! | (m ²) |
| Wetted Width: | | 0.00 | (m) |
| Hydraulic Depth: | | #VALUE! | (m) |
| Mean Velocity: | | #VALUE! | (m/s) |
| Froude Number: | | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S6 - Mills Creek at Hwy 63 (463829 E, 6344743 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 19-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.623 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.04 |
| Datalogger Clock: | 908 |
| Laptop Clock: | 916 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | Reset |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

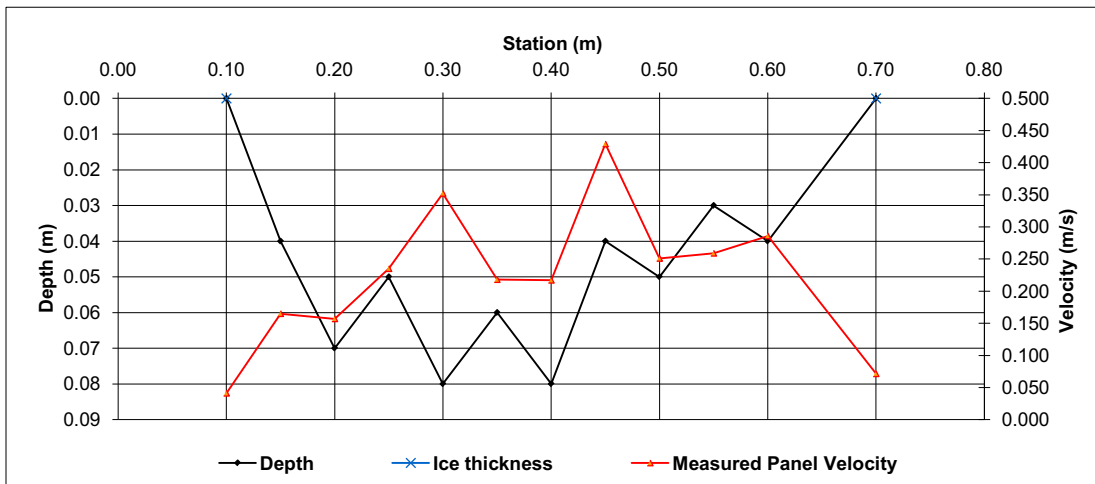
| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 930 |
| End Time (MST): | 945 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Partial Ice Cover |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | -5 C, Overcast |

| Level Survey: | | | | | | |
|----------------------|----------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC | 0.803 | 273.600 | 0.799 | 273.600 | - |
| Bench Mark 2: | Equipment Mast | 0.236 | 274.119 | 0.232 | 274.119 | - |
| Top of Ice: | | - | | - | | 0.000 |
| Water Level: | | 2.428 | 271.975 | 2.424 | 271.975 | 271.975 |
| Transducer: | | 0.623 | 271.352 | 0.623 | 271.352 | 271.352 |
| Other: | | | | | | |

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| General Notes: |
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| Flow Measurement: | | | | | | | | | | | | | | | | |
|---|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mnt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.10 | 0.13 | 0.03 | 0.01 | 0.041 | 0.041 | 0.00 | 0.000 | 0% |
| 1 | 0.15 | 0.04 | | 0.165 | | | 1.0 | 0.13 | 0.18 | 0.05 | 0.04 | 0.165 | 0.165 | 0.00 | 0.000 | 5% |
| 2 | 0.20 | 0.07 | | 0.157 | | | 1.0 | 0.18 | 0.23 | 0.05 | 0.07 | 0.157 | 0.157 | 0.00 | 0.001 | 8% |
| 3 | 0.25 | 0.05 | | 0.235 | | | 1.0 | 0.23 | 0.28 | 0.05 | 0.05 | 0.235 | 0.235 | 0.00 | 0.001 | 8% |
| 4 | 0.30 | 0.08 | | 0.352 | | | 1.0 | 0.28 | 0.33 | 0.05 | 0.08 | 0.352 | 0.352 | 0.00 | 0.001 | 20% |
| 5 | 0.35 | 0.06 | | 0.218 | | | 1.0 | 0.33 | 0.38 | 0.05 | 0.06 | 0.218 | 0.218 | 0.00 | 0.001 | 9% |
| 6 | 0.40 | 0.08 | | 0.217 | | | 1.0 | 0.38 | 0.43 | 0.05 | 0.08 | 0.217 | 0.217 | 0.00 | 0.001 | 12% |
| 7 | 0.45 | 0.04 | | 0.429 | | | 1.0 | 0.43 | 0.48 | 0.05 | 0.04 | 0.429 | 0.429 | 0.00 | 0.001 | 12% |
| 8 | 0.50 | 0.05 | | 0.251 | | | 1.0 | 0.48 | 0.53 | 0.05 | 0.05 | 0.251 | 0.251 | 0.00 | 0.001 | 9% |
| 9 | 0.55 | 0.03 | | 0.259 | | | 1.0 | 0.53 | 0.58 | 0.05 | 0.03 | 0.259 | 0.259 | 0.00 | 0.000 | 5% |
| 10 | 0.60 | 0.04 | | 0.286 | | | 1.0 | 0.58 | 0.65 | 0.08 | 0.04 | 0.286 | 0.286 | 0.00 | 0.001 | 12% |
| Left | 0.70 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.65 | 0.70 | 0.05 | 0.01 | 0.072 | 0.072 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.007 | | |
| <small>*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc</small> | | | | | | | | | | | | | | | | |

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.007 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 0.03 | (m ²) |
| Wetted Width: | 0.60 | (m) |
| Hydraulic Depth: | 0.048 | (m) |
| Mean Velocity: | 0.250 | (m/s) |
| Froude Number: | 0.364 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S6 - Mills Creek at Hwy 63 (463829 E, 6344743 N) | | | |
| Field Personnel: | GB, JE | Trip Date: | 13-Feb-10 |
| Data Entry Personnel: | SG | Date: | 18-Feb-10 |
| Data Check Personnel: | DB | Date: | 12-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | 11.34 |
| Battery (Aux): | 11.44 |
| Datalogger Clock: | 831 |
| Laptop Clock: | 833 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 1.000 |
| Dessicant: | OK |
| Logger# (if Δ): | 0.998 |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1738 |
| End Time (MST): | |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | clear |

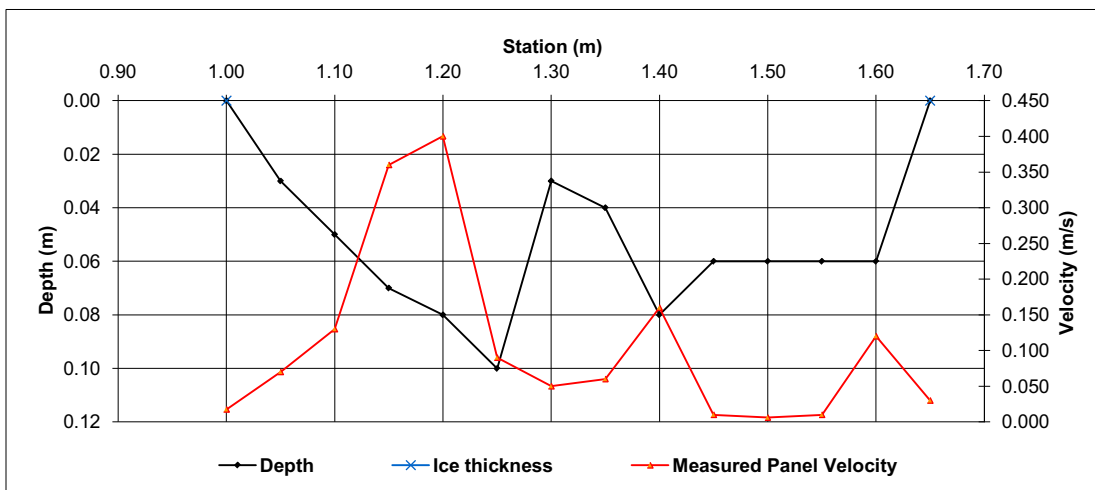
| Level Survey: | | | | | | |
|----------------------|----------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC | 1.000 | 273.600 | 0.998 | 273.600 | - |
| Bench Mark 2: | Equipment Mast | 0.425 | 274.119 | 0.425 | 274.119 | - |
| Top of Ice: | | - | | - | | 0.000 |
| Water Level: | | 2.602 | 271.998 | 2.600 | 271.998 | 271.998 |
| Transducer: | | | | | | |
| Other: | | | | | | |

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| General Notes: |
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| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 1.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.00 | 1.03 | 0.02 | 0.01 | 0.018 | 0.018 | 0.00 | 0.000 | 0% | |
| 1 | 1.05 | 0.03 | | 0.070 | | | 1.0 | 1.03 | 1.08 | 0.05 | 0.03 | 0.070 | 0.070 | 0.00 | 0.000 | 2% | |
| 2 | 1.10 | 0.05 | | 0.130 | | | 1.0 | 1.08 | 1.13 | 0.05 | 0.05 | 0.130 | 0.130 | 0.00 | 0.000 | 6% | |
| 3 | 1.15 | 0.07 | | 0.360 | | | 1.0 | 1.13 | 1.18 | 0.05 | 0.07 | 0.360 | 0.360 | 0.00 | 0.001 | 25% | |
| 4 | 1.20 | 0.08 | | 0.400 | | | 1.0 | 1.18 | 1.23 | 0.05 | 0.08 | 0.400 | 0.400 | 0.00 | 0.002 | 32% | |
| 5 | 1.25 | 0.10 | | 0.090 | | | 1.0 | 1.23 | 1.28 | 0.05 | 0.10 | 0.090 | 0.090 | 0.00 | 0.000 | 9% | |
| 6 | 1.30 | 0.03 | | 0.050 | | | 1.0 | 1.28 | 1.33 | 0.05 | 0.03 | 0.050 | 0.050 | 0.00 | 0.000 | 1% | |
| 7 | 1.35 | 0.04 | | 0.060 | | | 1.0 | 1.33 | 1.38 | 0.05 | 0.04 | 0.060 | 0.060 | 0.00 | 0.000 | 2% | |
| 8 | 1.40 | 0.08 | | 0.160 | | | 1.0 | 1.38 | 1.43 | 0.05 | 0.08 | 0.160 | 0.160 | 0.00 | 0.001 | 13% | |
| 9 | 1.45 | 0.06 | | 0.010 | | | 1.0 | 1.43 | 1.48 | 0.05 | 0.06 | 0.010 | 0.010 | 0.00 | 0.000 | 1% | |
| 10 | 1.50 | 0.06 | | 0.006 | | | 1.0 | 1.48 | 1.53 | 0.05 | 0.06 | 0.006 | 0.006 | 0.00 | 0.000 | 0% | |
| 11 | 1.55 | 0.06 | | 0.010 | | | 1.0 | 1.53 | 1.58 | 0.05 | 0.06 | 0.010 | 0.010 | 0.00 | 0.000 | 1% | |
| 12 | 1.60 | 0.06 | | 0.120 | | | 1.0 | 1.58 | 1.63 | 0.05 | 0.06 | 0.120 | 0.120 | 0.00 | 0.000 | 7% | |
| Left | 1.65 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.63 | 1.65 | 0.02 | 0.02 | 0.030 | 0.030 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.005 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.005 | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | 0.04 | (m ²) |
| Wetted Width: | 0.65 | (m) |
| Hydraulic Depth: | 0.056 | (m) |
| Mean Velocity: | 0.138 | (m/s) |
| Froude Number: | 0.185 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S6 - Mills Creek at Hwy 63 (463829 E, 6344743 N) | | | |
| Field Personnel: | SE, SG | Trip Date: | 07-Mar-10 |
| Data Entry Personnel: | SG | Date: | 18-Mar-10 |
| Data Check Personnel: | JP | Date: | 02-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.627 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 11.92 |
| Datalogger Clock: | 748 |
| Laptop Clock: | 750 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 20% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|--------------------------------|
| Measurement Details: | |
| Start Time (MST): | 805 |
| End Time (MST): | 813 |
| Equipment: | ADV Other: Flo Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Clear -5°C |

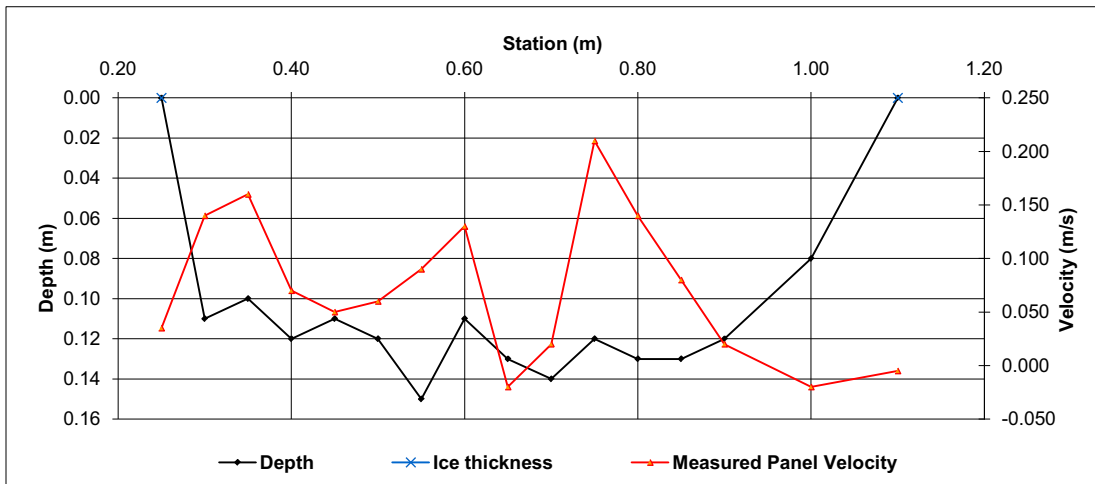
| Level Survey: | | | | | | |
|----------------------|----------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC | 1.404 | 273.600 | 1.412 | 273.600 | - |
| Bench Mark 2: | Equipment Mast | 0.833 | 274.119 | 0.839 | 274.119 | - |
| Top of Ice: | | - | | - | | - |
| Water Level: | | 3.002 | 272.002 | 3.008 | 272.004 | 272.003 |
| Transducer: | | 0.627 | 271.375 | 0.627 | 271.377 | 271.376 |
| Other: | | | | | | |

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| General Notes: |
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| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.25 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.25 | 0.28 | 0.03 | 0.03 | 0.035 | 0.035 | 0.00 | 0.000 | 0% |
| 1 | 0.30 | 0.11 | | 0.140 | | | 1.0 | 0.28 | 0.33 | 0.05 | 0.11 | 0.140 | 0.140 | 0.01 | 0.001 | 11% |
| 2 | 0.35 | 0.10 | | 0.160 | | | 1.0 | 0.33 | 0.38 | 0.05 | 0.10 | 0.160 | 0.160 | 0.01 | 0.001 | 12% |
| 3 | 0.40 | 0.12 | | 0.070 | | | 1.0 | 0.38 | 0.43 | 0.05 | 0.12 | 0.070 | 0.070 | 0.01 | 0.000 | 6% |
| 4 | 0.45 | 0.11 | | 0.050 | | | 1.0 | 0.43 | 0.48 | 0.05 | 0.11 | 0.050 | 0.050 | 0.01 | 0.000 | 4% |
| 5 | 0.50 | 0.12 | | 0.060 | | | 1.0 | 0.48 | 0.53 | 0.05 | 0.12 | 0.060 | 0.060 | 0.01 | 0.000 | 5% |
| 6 | 0.55 | 0.15 | | 0.090 | | | 1.0 | 0.53 | 0.58 | 0.05 | 0.15 | 0.090 | 0.090 | 0.01 | 0.001 | 10% |
| 7 | 0.60 | 0.11 | | 0.130 | | | 1.0 | 0.58 | 0.63 | 0.05 | 0.11 | 0.130 | 0.130 | 0.01 | 0.001 | 11% |
| 8 | 0.65 | 0.13 | | -0.020 | | | 1.0 | 0.63 | 0.68 | 0.05 | 0.13 | -0.020 | -0.020 | 0.01 | 0.000 | -2% |
| 9 | 0.70 | 0.14 | | 0.020 | | | 1.0 | 0.68 | 0.73 | 0.05 | 0.14 | 0.020 | 0.020 | 0.01 | 0.000 | 2% |
| 10 | 0.75 | 0.12 | | 0.210 | | | 1.0 | 0.73 | 0.78 | 0.05 | 0.12 | 0.210 | 0.210 | 0.01 | 0.001 | 19% |
| 11 | 0.80 | 0.13 | | 0.140 | | | 1.0 | 0.78 | 0.83 | 0.05 | 0.13 | 0.140 | 0.140 | 0.01 | 0.001 | 13% |
| 12 | 0.85 | 0.13 | | 0.080 | | | 1.0 | 0.83 | 0.88 | 0.05 | 0.13 | 0.080 | 0.080 | 0.01 | 0.001 | 8% |
| 13 | 0.90 | 0.12 | | 0.020 | | | 1.0 | 0.88 | 0.95 | 0.08 | 0.12 | 0.020 | 0.020 | 0.01 | 0.000 | 3% |
| 14 | 1.00 | 0.08 | | -0.020 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.08 | -0.020 | -0.020 | 0.01 | 0.000 | -2% |
| Left | 1.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.05 | 1.10 | 0.05 | 0.02 | -0.005 | -0.005 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.007 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.007 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 0.09 | (m ²) |
| Wetted Width: | 0.85 | (m) |
| Hydraulic Depth: | 0.108 | (m) |
| Mean Velocity: | 0.073 | (m/s) |
| Froude Number: | 0.071 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S6 - Mills Creek at Hwy 63 (463829 E, 6344743 N) | | | |
| Field Personnel: | DB CE | Trip Date: | 06-Apr-10 |
| Data Entry Personnel: | DB | Date: | 10-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|--|---------|
| Logger Details: | |
| Transducer Reading: | 0.635 |
| Battery (Main): | 100% |
| Battery (Aux): | 77% |
| Datalogger Clock: | 726 |
| Laptop Clock: | 731 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 23% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Data from 8-April, w.level measured 6-April | |

| | |
|------------------------------|-------------------|
| Measurement Details: | |
| Start Time (MST): | 1700 |
| End Time (MST): | 1715 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Poor |
| Weather: | 15 degrees, sunny |

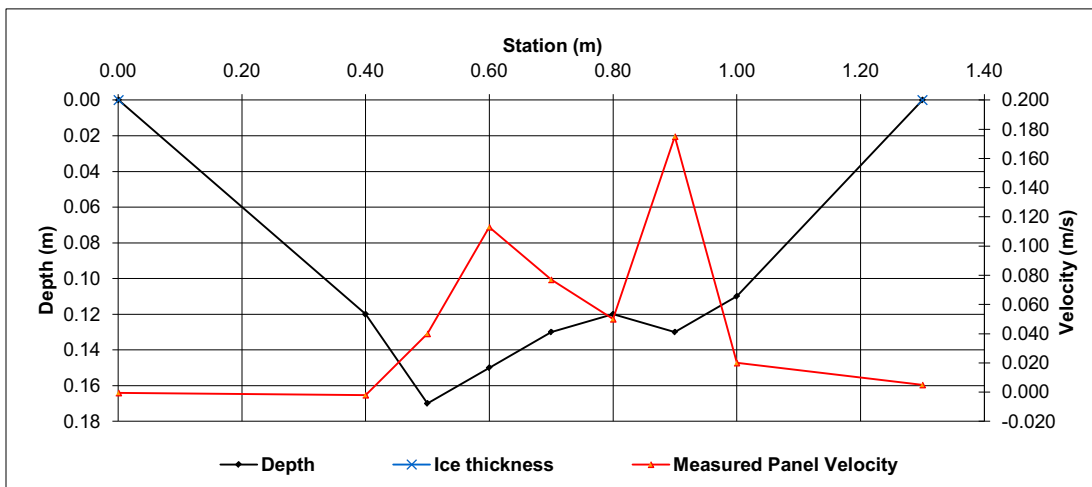
| Level Survey: | | | | | | |
|----------------------|----------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC | 1.165 | 273.600 | 1.156 | 273.600 | - |
| Bench Mark 2: | Equipment Mast | 0.589 | 274.119 | 0.580 | 274.119 | - |
| Top of Ice: | | - | | - | | 0.000 |
| Water Level: | | 2.760 | 272.005 | 2.750 | 272.006 | 272.006 |
| Transducer: | *ON 8-APRIL* | 0.635 | 271.370 | 0.635 | 271.371 | 271.371 |
| Other: | | | | | | |

General Notes:
Benchmarks slanting heavily. BM2 told CE to hold vertically above, not possible ith BM1. Rock near 0.9 and 0.4m of flw measurements.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mnt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 1.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.30 | 1.15 | 0.15 | 0.03 | 0.005 | 0.005 | 0.00 | 0.000 | 0% |
| 1 | 1.00 | 0.11 | | 0.020 | | | 1.0 | 1.15 | 0.95 | 0.20 | 0.11 | 0.020 | 0.020 | 0.02 | 0.000 | 7% |
| 2 | 0.90 | 0.13 | | 0.175 | | | 1.0 | 0.95 | 0.85 | 0.10 | 0.13 | 0.175 | 0.175 | 0.01 | 0.002 | 34% |
| 3 | 0.80 | 0.12 | | 0.050 | | | 1.0 | 0.85 | 0.75 | 0.10 | 0.12 | 0.050 | 0.050 | 0.01 | 0.001 | 9% |
| 4 | 0.70 | 0.13 | | 0.077 | | | 1.0 | 0.75 | 0.65 | 0.10 | 0.13 | 0.077 | 0.077 | 0.01 | 0.001 | 15% |
| 5 | 0.60 | 0.15 | | 0.113 | | | 1.0 | 0.65 | 0.55 | 0.10 | 0.15 | 0.113 | 0.113 | 0.02 | 0.002 | 25% |
| 6 | 0.50 | 0.17 | | 0.040 | | | 1.0 | 0.55 | 0.45 | 0.10 | 0.17 | 0.040 | 0.040 | 0.02 | 0.001 | 10% |
| 7 | 0.40 | 0.12 | | -0.002 | | | 1.0 | 0.45 | 0.20 | 0.25 | 0.12 | -0.002 | -0.002 | 0.03 | 0.000 | -1% |
| Left | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.20 | 0.00 | 0.20 | 0.03 | -0.001 | -0.001 | 0.01 | 0.000 | 0% |
| | | | | | | | | | | | | | | Total Flow | 0.007 | |

**Add/delete # rows as necessary, remembering to autofill calculations/graphs etc*

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.007 | (m ³ /s) |
| Percieved Measurement Quality: | Poor | |
| Total Area: | 0.13 | (m ²) |
| Wetted Width: | 0.95 | (m) |
| Hydraulic Depth: | 0.139 | (m) |
| Mean Velocity: | 0.050 | (m/s) |
| Froude Number: | 0.043 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S6 - Mills Creek at Hwy 63 (463829 E, 6344743 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 27-Apr-10 |
| Data Entry Personnel: | DB | Date: | 30-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.876 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 11.92 |
| Datalogger Clock: | 650 |
| Laptop Clock: | 655 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 30% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 705 |
| End Time (MST): | 720 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | 0°C clear |

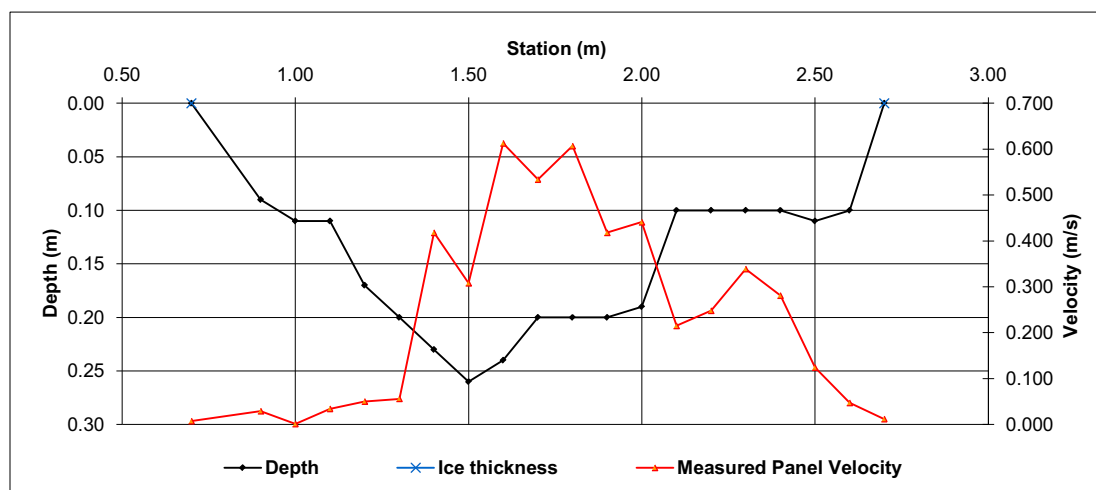
| Level Survey: | | | | | | |
|----------------------|----------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC | 0.986 | 273.600 | 0.966 | 273.600 | - |
| Bench Mark 2: | Equipment Mast | 0.458 | 274.119 | 0.438 | 274.119 | - |
| Top of Ice: | | - | | - | | |
| Water Level: | | 2.363 | 272.223 | 2.341 | 272.225 | 272.224 |
| Transducer: | | 0.876 | 271.347 | 0.876 | 271.349 | 271.348 |
| Other: | | | | | | |

| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|---------------|--------------|-------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|------------------------|----------------------|------------------------|-------------------------------------|---|---|-------------------------------------|--|-----------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 0.70 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.70 | 0.80 | 0.10 | 0.02 | 0.007 | 0.007 | 0.00 | 0.000 | 0% | |
| 1 | 0.90 | 0.09 | | 0.029 | | | 1.0 | 0.80 | 0.95 | 0.15 | 0.09 | 0.029 | 0.029 | 0.01 | 0.000 | 0% | |
| 2 | 1.00 | 0.11 | | 0.001 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.11 | 0.001 | 0.001 | 0.01 | 0.000 | 0% | |
| 3 | 1.10 | 0.11 | | 0.034 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.11 | 0.034 | 0.034 | 0.01 | 0.000 | 0% | |
| 4 | 1.20 | 0.17 | | 0.050 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.17 | 0.050 | 0.050 | 0.02 | 0.001 | 1% | |
| 5 | 1.30 | 0.20 | | 0.056 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.20 | 0.056 | 0.056 | 0.02 | 0.001 | 1% | |
| 6 | 1.40 | 0.23 | | 0.418 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.23 | 0.418 | 0.418 | 0.02 | 0.010 | 11% | |
| 7 | 1.50 | 0.26 | | 0.308 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.26 | 0.308 | 0.308 | 0.03 | 0.008 | 9% | |
| 8 | 1.60 | 0.24 | | 0.613 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.24 | 0.613 | 0.613 | 0.02 | 0.015 | 17% | |
| 9 | 1.70 | 0.20 | | 0.534 | | | 1.0 | 1.65 | 1.75 | 0.10 | 0.20 | 0.534 | 0.534 | 0.02 | 0.011 | 12% | |
| 10 | 1.80 | 0.20 | | 0.607 | | | 1.0 | 1.75 | 1.85 | 0.10 | 0.20 | 0.607 | 0.607 | 0.02 | 0.012 | 14% | |
| 11 | 1.90 | 0.20 | | 0.418 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.20 | 0.418 | 0.418 | 0.02 | 0.008 | 10% | |
| 12 | 2.00 | 0.19 | | 0.441 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.19 | 0.441 | 0.441 | 0.02 | 0.008 | 10% | |
| 13 | 2.10 | 0.10 | | 0.215 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.10 | 0.215 | 0.215 | 0.01 | 0.002 | 2% | |
| 14 | 2.20 | 0.10 | | 0.248 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.10 | 0.248 | 0.248 | 0.01 | 0.002 | 3% | |
| 15 | 2.30 | 0.10 | | 0.339 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.10 | 0.339 | 0.339 | 0.01 | 0.003 | 4% | |
| 16 | 2.40 | 0.10 | | 0.281 | | | 1.0 | 2.35 | 2.45 | 0.10 | 0.10 | 0.281 | 0.281 | 0.01 | 0.003 | 3% | |
| 17 | 2.50 | 0.11 | | 0.124 | | | 1.0 | 2.45 | 2.55 | 0.10 | 0.11 | 0.124 | 0.124 | 0.01 | 0.001 | 2% | |
| 18 | 2.60 | 0.10 | | 0.047 | | | 1.0 | 2.55 | 2.65 | 0.10 | 0.10 | 0.047 | 0.047 | 0.01 | 0.000 | 1% | |
| Right | 2.70 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.65 | 2.70 | 0.05 | 0.03 | 0.012 | 0.012 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 0.087 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.087 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 0.29 | (m ²) |
| Wetted Width: | 2.00 | (m) |
| Hydraulic Depth: | 0.145 | (m) |
| Mean Velocity: | 0.302 | (m/s) |
| Froude Number: | 0.254 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S6 - Mills Creek at Hwy 63 (463829 E, 6344743 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 27-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 13-Jul-10 |

| | |
|------------------------|------------|
| Logger Details: | |
| Transducer Reading: | 0.664 |
| Battery (Main): | 100.00 |
| Battery (Aux): | 78% 12.17V |
| Datalogger Clock: | 7:11 |
| Laptop Clock: | 7:17 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|--------|
| Measurement Details: | |
| Start Time (MST): | 818 |
| End Time (MST): | 910 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Cloudy |

| Level Survey: | | | | | | |
|----------------------|----------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC | 0.805 | 273.600 | 0.800 | 273.600 | - |
| Bench Mark 2: | Equipment Mast | 0.286 | 274.119 | 0.283 | 274.119 | - |
| Top of Ice: | | - | | - | | |
| Water Level: | | 2.365 | 272.040 | 2.364 | 272.036 | 272.038 |
| Transducer: | | 0.664 | 271.376 | 0.664 | 271.372 | 271.374 |
| Other: | | | | | | |

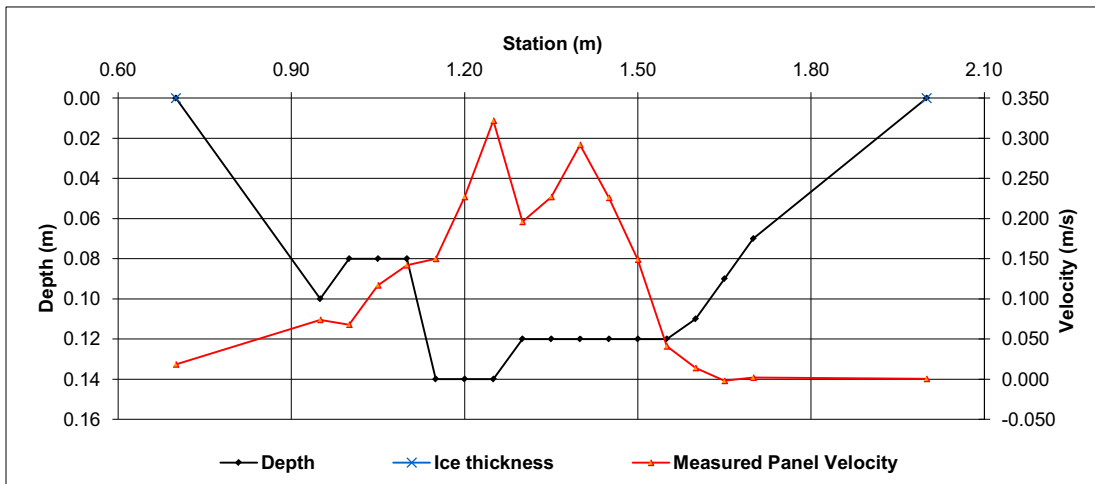
General Notes:

Post seems heavily leaning, check stability?

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mnt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.70 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.70 | 0.83 | 0.13 | 0.03 | 0.019 | 0.019 | 0.00 | 0.000 | 0% |
| 1 | 0.95 | 0.10 | | 0.074 | | | 1.0 | 0.83 | 0.98 | 0.15 | 0.10 | 0.074 | 0.074 | 0.02 | 0.001 | 8% |
| 2 | 1.00 | 0.08 | | 0.068 | | | 1.0 | 0.98 | 1.03 | 0.05 | 0.08 | 0.068 | 0.068 | 0.00 | 0.000 | 2% |
| 3 | 1.05 | 0.08 | | 0.117 | | | 1.0 | 1.03 | 1.08 | 0.05 | 0.08 | 0.117 | 0.117 | 0.00 | 0.000 | 3% |
| 4 | 1.10 | 0.08 | | 0.142 | | | 1.0 | 1.08 | 1.13 | 0.05 | 0.08 | 0.142 | 0.142 | 0.00 | 0.001 | 4% |
| 5 | 1.15 | 0.14 | | 0.150 | | | 1.0 | 1.13 | 1.18 | 0.05 | 0.14 | 0.150 | 0.150 | 0.01 | 0.001 | 7% |
| 6 | 1.20 | 0.14 | | 0.227 | | | 1.0 | 1.18 | 1.23 | 0.05 | 0.14 | 0.227 | 0.227 | 0.01 | 0.002 | 11% |
| 7 | 1.25 | 0.14 | | 0.322 | | | 1.0 | 1.23 | 1.28 | 0.05 | 0.14 | 0.322 | 0.322 | 0.01 | 0.002 | 16% |
| 8 | 1.30 | 0.12 | | 0.196 | | | 1.0 | 1.28 | 1.33 | 0.05 | 0.12 | 0.196 | 0.196 | 0.01 | 0.001 | 8% |
| 9 | 1.35 | 0.12 | | 0.227 | | | 1.0 | 1.33 | 1.38 | 0.05 | 0.12 | 0.227 | 0.227 | 0.01 | 0.001 | 10% |
| 10 | 1.40 | 0.12 | | 0.292 | | | 1.0 | 1.38 | 1.43 | 0.05 | 0.12 | 0.292 | 0.292 | 0.01 | 0.002 | 12% |
| 11 | 1.45 | 0.12 | | 0.226 | | | 1.0 | 1.43 | 1.48 | 0.05 | 0.12 | 0.226 | 0.226 | 0.01 | 0.001 | 10% |
| 12 | 1.50 | 0.12 | | 0.149 | | | 1.0 | 1.48 | 1.53 | 0.05 | 0.12 | 0.149 | 0.149 | 0.01 | 0.001 | 6% |
| 13 | 1.55 | 0.12 | | 0.041 | | | 1.0 | 1.53 | 1.58 | 0.05 | 0.12 | 0.041 | 0.041 | 0.01 | 0.000 | 2% |
| 14 | 1.60 | 0.11 | | 0.014 | | | 1.0 | 1.58 | 1.63 | 0.05 | 0.11 | 0.014 | 0.014 | 0.01 | 0.000 | 1% |
| 15 | 1.65 | 0.09 | | -0.002 | | | 1.0 | 1.63 | 1.68 | 0.05 | 0.09 | -0.002 | -0.002 | 0.00 | 0.000 | 0% |
| 16 | 1.70 | 0.07 | | 0.002 | | | 1.0 | 1.68 | 1.85 | 0.18 | 0.07 | 0.002 | 0.002 | 0.01 | 0.000 | 0% |
| Left | 2.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.85 | 2.00 | 0.15 | 0.02 | 0.001 | 0.001 | 0.00 | 0.000 | 0% |
| | | | | | | | | | | | | | | Total Flow | 0.014 | |

**Add/delete # rows as necessary, remembering to autofill calculations/graphs etc*

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.014 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 0.11 | (m ²) |
| Wetted Width: | 1.30 | (m) |
| Hydraulic Depth: | 0.086 | (m) |
| Mean Velocity: | 0.127 | (m/s) |
| Froude Number: | 0.138 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S6 - Mills Creek at Hwy 63 (463829 E, 6344743 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 15-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------------|
| Logger Details: | |
| Transducer Reading: | 0.644 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 11.68 - 12.04 |
| Datalogger Clock: | 651 |
| Laptop Clock: | 657 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 60% cleared |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 710 |
| End Time (MST): | 730 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | clear 15°C |

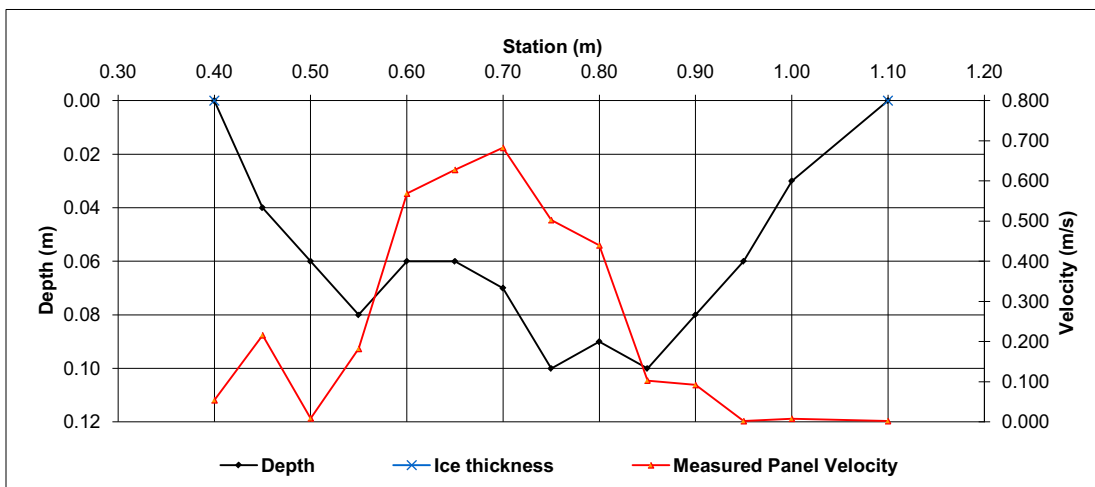
| Level Survey: | | | | | | |
|----------------------|----------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC | 1.100 | 273.600 | 1.083 | 273.600 | - |
| Bench Mark 2: | Equipment Mast | 0.584 | 274.119 | 0.572 | 274.119 | - |
| Top of Ice: | | - | | - | | |
| Water Level: | | 2.674 | 272.026 | 2.657 | 272.026 | 272.026 |
| Transducer: | | 0.644 | 271.382 | 0.644 | 271.382 | 271.382 |
| Other: | | | | | | |

| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.40 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.40 | 0.43 | 0.03 | 0.01 | 0.054 | 0.054 | 0.00 | 0.000 | 0% |
| 1 | 0.45 | 0.04 | | 0.216 | | | 1.0 | 0.43 | 0.48 | 0.05 | 0.04 | 0.216 | 0.216 | 0.00 | 0.000 | 3% |
| 2 | 0.50 | 0.06 | | 0.009 | | | 1.0 | 0.48 | 0.53 | 0.05 | 0.06 | 0.009 | 0.009 | 0.00 | 0.000 | 0% |
| 3 | 0.55 | 0.08 | | 0.182 | | | 1.0 | 0.53 | 0.58 | 0.05 | 0.08 | 0.182 | 0.182 | 0.00 | 0.001 | 6% |
| 4 | 0.60 | 0.06 | | 0.569 | | | 1.0 | 0.58 | 0.63 | 0.05 | 0.06 | 0.569 | 0.569 | 0.00 | 0.002 | 14% |
| 5 | 0.65 | 0.06 | | 0.628 | | | 1.0 | 0.63 | 0.68 | 0.05 | 0.06 | 0.628 | 0.628 | 0.00 | 0.002 | 15% |
| 6 | 0.70 | 0.07 | | 0.683 | | | 1.0 | 0.68 | 0.73 | 0.05 | 0.07 | 0.683 | 0.683 | 0.00 | 0.002 | 19% |
| 7 | 0.75 | 0.10 | | 0.503 | | | 1.0 | 0.73 | 0.78 | 0.05 | 0.10 | 0.503 | 0.503 | 0.01 | 0.003 | 20% |
| 8 | 0.80 | 0.09 | | 0.440 | | | 1.0 | 0.78 | 0.83 | 0.05 | 0.09 | 0.440 | 0.440 | 0.00 | 0.002 | 16% |
| 9 | 0.85 | 0.10 | | 0.103 | | | 1.0 | 0.83 | 0.88 | 0.05 | 0.10 | 0.103 | 0.103 | 0.01 | 0.001 | 4% |
| 10 | 0.90 | 0.08 | | 0.092 | | | 1.0 | 0.88 | 0.93 | 0.05 | 0.08 | 0.092 | 0.092 | 0.00 | 0.000 | 3% |
| 11 | 0.95 | 0.06 | | 0.002 | | | 1.0 | 0.93 | 0.98 | 0.05 | 0.06 | 0.002 | 0.002 | 0.00 | 0.000 | 0% |
| 12 | 1.00 | 0.03 | | 0.008 | | | 1.0 | 0.98 | 1.05 | 0.08 | 0.03 | 0.008 | 0.008 | 0.00 | 0.000 | 0% |
| Right | 1.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.05 | 1.10 | 0.05 | 0.01 | 0.002 | 0.002 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.013 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.013 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 0.04 | (m ²) |
| Wetted Width: | 0.70 | (m) |
| Hydraulic Depth: | 0.061 | (m) |
| Mean Velocity: | 0.294 | (m/s) |
| Froude Number: | 0.379 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S6 - Mills Creek at Hwy 63 (463829 E, 6344743 N) | | | |
| Field Personnel: | DB HB SG | Trip Date: | 19-Sep-10 |
| Data Entry Personnel: | DB | Date: | 28-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.69 |
| Battery (Main): | 13.71 |
| Battery (Aux): | |
| Datalogger Clock: | 1201 |
| Laptop Clock: | 1201 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | 9.5 |
| Memory used: | 0% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

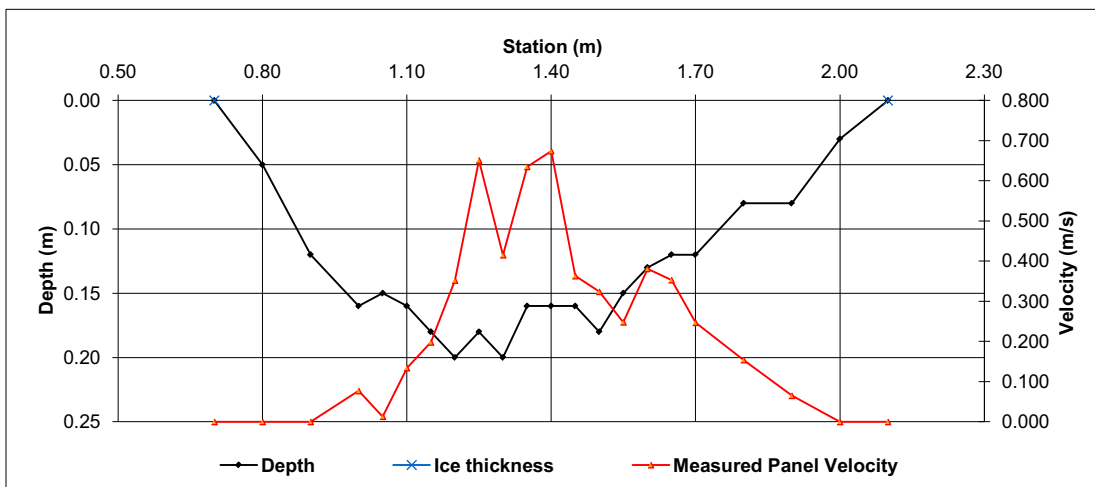
| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1030 |
| End Time (MST): | |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Sunny 10°C |

| Level Survey: | | | | | | |
|----------------------|----------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC | 1.169 | 273.600 | 1.129 | 273.600 | - |
| Bench Mark 2: | Equipment Mast | 0.656 | 274.119 | 0.617 | 274.119 | - |
| Top of Ice: | | - | | - | | |
| Water Level: | | 2.651 | 272.118 | 2.615 | 272.114 | 272.116 |
| Transducer: | | 0.69 | 271.428 | 0.69 | 271.424 | 271.426 |
| Other: | | | | | | |

| | |
|---|--|
| General Notes: | |
| Weir Calcs- 2.881m and 2.658m, vs 2.840m and 2.618m | |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 0.70 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.70 | 0.75 | 0.05 | 0.01 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| 1 | 0.80 | 0.05 | | 0.000 | | | 1.0 | 0.75 | 0.85 | 0.10 | 0.05 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | |
| 2 | 0.90 | 0.12 | | 0.000 | | | 1.0 | 0.85 | 0.95 | 0.10 | 0.12 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | |
| 3 | 1.00 | 0.16 | | 0.077 | | | 1.0 | 0.95 | 1.03 | 0.08 | 0.16 | 0.077 | 0.077 | 0.01 | 0.001 | 2% | |
| 4 | 1.05 | 0.15 | | 0.013 | | | 1.0 | 1.03 | 1.08 | 0.05 | 0.15 | 0.013 | 0.013 | 0.01 | 0.000 | 0% | |
| 5 | 1.10 | 0.16 | | 0.134 | | | 1.0 | 1.08 | 1.13 | 0.05 | 0.16 | 0.134 | 0.134 | 0.01 | 0.001 | 2% | |
| 6 | 1.15 | 0.18 | | 0.198 | | | 1.0 | 1.13 | 1.18 | 0.05 | 0.18 | 0.198 | 0.198 | 0.01 | 0.002 | 4% | |
| 7 | 1.20 | 0.20 | | 0.352 | | | 1.0 | 1.18 | 1.23 | 0.05 | 0.20 | 0.352 | 0.352 | 0.01 | 0.004 | 8% | |
| 8 | 1.25 | 0.18 | | 0.651 | | | 1.0 | 1.23 | 1.28 | 0.05 | 0.18 | 0.651 | 0.651 | 0.01 | 0.006 | 13% | |
| 9 | 1.30 | 0.20 | | 0.415 | | | 1.0 | 1.28 | 1.33 | 0.05 | 0.20 | 0.415 | 0.415 | 0.01 | 0.004 | 9% | |
| 10 | 1.35 | 0.16 | | 0.635 | | | 1.0 | 1.33 | 1.38 | 0.05 | 0.16 | 0.635 | 0.635 | 0.01 | 0.005 | 12% | |
| 11 | 1.40 | 0.16 | | 0.674 | | | 1.0 | 1.38 | 1.43 | 0.05 | 0.16 | 0.674 | 0.674 | 0.01 | 0.005 | 12% | |
| 12 | 1.45 | 0.16 | | 0.363 | | | 1.0 | 1.43 | 1.48 | 0.05 | 0.16 | 0.363 | 0.363 | 0.01 | 0.003 | 7% | |
| 13 | 1.50 | 0.18 | | 0.324 | | | 1.0 | 1.48 | 1.53 | 0.05 | 0.18 | 0.324 | 0.324 | 0.01 | 0.003 | 7% | |
| 14 | 1.55 | 0.15 | | 0.248 | | | 1.0 | 1.53 | 1.58 | 0.05 | 0.15 | 0.248 | 0.248 | 0.01 | 0.002 | 4% | |
| 15 | 1.60 | 0.13 | | 0.381 | | | 1.0 | 1.58 | 1.63 | 0.05 | 0.13 | 0.381 | 0.381 | 0.01 | 0.002 | 6% | |
| 16 | 1.65 | 0.12 | | 0.353 | | | 1.0 | 1.63 | 1.68 | 0.05 | 0.12 | 0.353 | 0.353 | 0.01 | 0.002 | 5% | |
| 17 | 1.70 | 0.12 | | 0.247 | | | 1.0 | 1.68 | 1.75 | 0.08 | 0.12 | 0.247 | 0.247 | 0.01 | 0.002 | 5% | |
| 18 | 1.80 | 0.08 | | 0.154 | | | 1.0 | 1.75 | 1.85 | 0.10 | 0.08 | 0.154 | 0.154 | 0.01 | 0.001 | 3% | |
| 19 | 1.90 | 0.08 | | 0.065 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.08 | 0.065 | 0.065 | 0.01 | 0.001 | 1% | |
| 20 | 2.00 | 0.03 | | 0.000 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.03 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| Right | 2.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.05 | 2.10 | 0.05 | 0.01 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| *denotes position of TSS sample | | | | | | | | | | | | | | | Total Flow | 0.044 | |

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.044 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.16 | (m ²) |
| Wetted Width: | 1.40 | (m) |
| Hydraulic Depth: | 0.118 | (m) |
| Mean Velocity: | 0.268 | (m/s) |
| Froude Number: | 0.250 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S6 - Mills Creek at Hwy 63 (463829 E, 6344743 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 31-Oct-10 |
| Data Entry Personnel: | DB | Date: | 08-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|---|---------|
| Logger Details: | |
| Transducer Reading: | 0.62 |
| Battery (Main): | 13.58 |
| Battery (Aux): | - |
| Datalogger Clock: | 1717 |
| Laptop Clock: | 1717 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 4.7 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: Sent new program, double checked- PT reading 0.62, water temp 4.7 | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 1645 |
| End Time (MST): | 1725 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Clear 4°C |

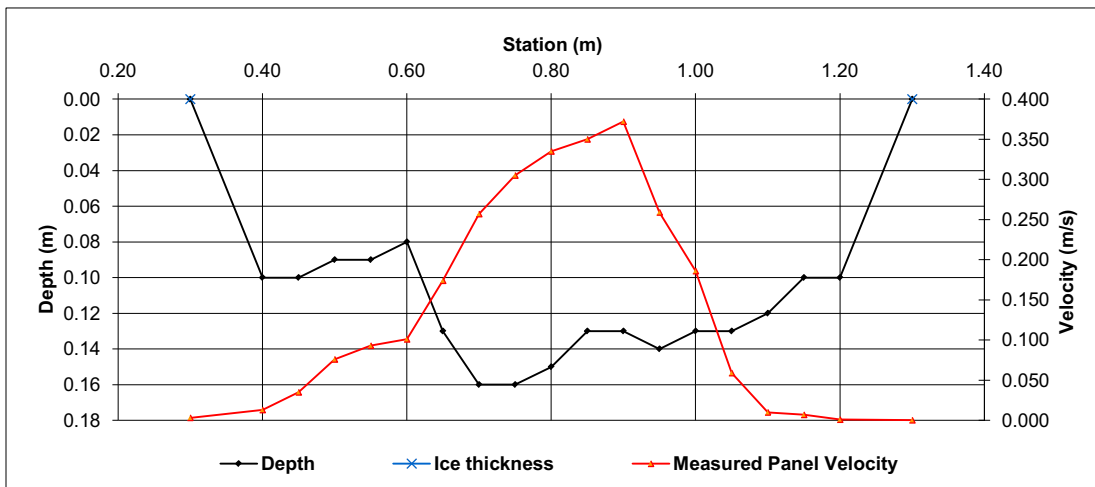
| Level Survey: | | | | | | |
|----------------------|----------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC | 1.224 | 273.600 | 1.203 | 273.600 | - |
| Bench Mark 2: | Equipment Mast | 0.711 | 274.119 | 0.691 | 274.119 | - |
| Top of Ice: | | - | | - | | |
| Water Level: | | 2.778 | 272.046 | 2.755 | 272.048 | 272.047 |
| Transducer: | | 0.62 | 271.426 | 0.62 | 271.428 | 271.427 |
| Other: | | | | | | |

| | |
|-----------------------|--|
| General Notes: | |
| TSS taken at 9m | |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|---------------|--------------|-------------------------|----------------------------------|----------------------------------|----------------------------------|---|------------------------|----------------------|------------------------|-------------------------------------|---|---|-------------------------------------|--|-----------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.30 | 0.35 | 0.05 | 0.03 | 0.003 | 0.003 | 0.00 | 0.000 | 0% |
| 1 | 0.40 | 0.10 | | 0.013 | | | 1.0 | 0.35 | 0.43 | 0.08 | 0.10 | 0.013 | 0.013 | 0.01 | 0.000 | 1% |
| 2 | 0.45 | 0.10 | | 0.035 | | | 1.0 | 0.43 | 0.48 | 0.05 | 0.10 | 0.035 | 0.035 | 0.00 | 0.000 | 1% |
| 3 | 0.50 | 0.09 | | 0.076 | | | 1.0 | 0.48 | 0.53 | 0.05 | 0.09 | 0.076 | 0.076 | 0.00 | 0.000 | 2% |
| 4 | 0.55 | 0.09 | | 0.093 | | | 1.0 | 0.53 | 0.58 | 0.05 | 0.09 | 0.093 | 0.093 | 0.00 | 0.000 | 2% |
| 5 | 0.60 | 0.08 | | 0.101 | | | 1.0 | 0.58 | 0.63 | 0.05 | 0.08 | 0.101 | 0.101 | 0.00 | 0.000 | 2% |
| 6 | 0.65 | 0.13 | | 0.174 | | | 1.0 | 0.63 | 0.68 | 0.05 | 0.13 | 0.174 | 0.174 | 0.01 | 0.001 | 6% |
| 7 | 0.70 | 0.16 | | 0.257 | | | 1.0 | 0.68 | 0.73 | 0.05 | 0.16 | 0.257 | 0.257 | 0.01 | 0.002 | 12% |
| 8 | 0.75 | 0.16 | | 0.305 | | | 1.0 | 0.73 | 0.78 | 0.05 | 0.16 | 0.305 | 0.305 | 0.01 | 0.002 | 14% |
| 9 | 0.80 | 0.15 | | 0.335 | | | 1.0 | 0.78 | 0.83 | 0.05 | 0.15 | 0.335 | 0.335 | 0.01 | 0.003 | 14% |
| 10 | 0.85 | 0.13 | | 0.350 | | | 1.0 | 0.83 | 0.88 | 0.05 | 0.13 | 0.350 | 0.350 | 0.01 | 0.002 | 13% |
| 11 | 0.90 | 0.13 | | 0.372 | | | 1.0 | 0.88 | 0.93 | 0.05 | 0.13 | 0.372 | 0.372 | 0.01 | 0.002 | 14% |
| 12 | 0.95 | 0.14 | | 0.259 | | | 1.0 | 0.93 | 0.98 | 0.05 | 0.14 | 0.259 | 0.259 | 0.01 | 0.002 | 10% |
| 13 | 1.00 | 0.13 | | 0.186 | | | 1.0 | 0.98 | 1.03 | 0.05 | 0.13 | 0.186 | 0.186 | 0.01 | 0.001 | 7% |
| 14 | 1.05 | 0.13 | | 0.059 | | | 1.0 | 1.03 | 1.08 | 0.05 | 0.13 | 0.059 | 0.059 | 0.01 | 0.000 | 2% |
| 15 | 1.10 | 0.12 | | 0.010 | | | 1.0 | 1.08 | 1.13 | 0.05 | 0.12 | 0.010 | 0.010 | 0.01 | 0.000 | 0% |
| 16 | 1.15 | 0.10 | | 0.007 | | | 1.0 | 1.13 | 1.18 | 0.05 | 0.10 | 0.007 | 0.007 | 0.00 | 0.000 | 0% |
| 17 | 1.20 | 0.10 | | 0.001 | | | 1.0 | 1.18 | 1.25 | 0.08 | 0.10 | 0.001 | 0.001 | 0.01 | 0.000 | 0% |
| Right | 1.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.25 | 1.30 | 0.05 | 0.03 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.018 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.018 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.11 | (m ²) |
| Wetted Width: | 1.00 | (m) |
| Hydraulic Depth: | 0.110 | (m) |
| Mean Velocity: | 0.162 | (m/s) |
| Froude Number: | 0.157 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S6 - Mills Creek at Hwy 63 (463829 E, 6344743 N) | | | |
| Field Personnel: | SG, JO | Trip Date: | 03-Dec-10 |
| Data Entry Personnel: | JP | Date: | 16-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.610 |
| Battery (Main): | 15.31 |
| Battery (Aux): | - |
| Datalogger Clock: | 14:21 |
| Laptop Clock: | 14:20 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | - |
| Dessicant: | - |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 1400 |
| End Time (MST): | 1430 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | - 14, Clear |

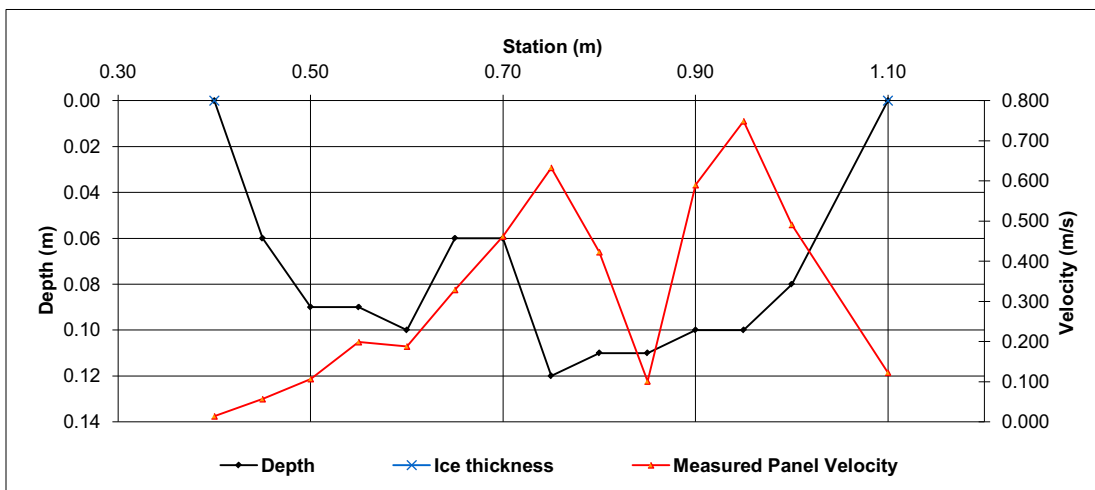
| Level Survey: | | | | | | |
|----------------------|----------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC | 1.137 | 273.600 | 1.128 | 273.600 | - |
| Bench Mark 2: | Equipment Mast | 0.602 | 274.119 | 0.591 | 274.119 | - |
| Top of Ice: | | - | | - | | |
| Water Level: | | 2.727 | 272.010 | 2.718 | 272.010 | 272.010 |
| Transducer: | | 0.610 | 271.400 | 0.610 | 271.400 | 271.400 |
| Other: | | | | | | |

| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mnt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.40 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.40 | 0.43 | 0.03 | 0.02 | 0.014 | 0.014 | 0.00 | 0.000 | 0% |
| 1 | 0.45 | 0.06 | | 0.057 | | | 1.0 | 0.43 | 0.48 | 0.05 | 0.06 | 0.057 | 0.057 | 0.00 | 0.000 | 1% |
| 2 | 0.50 | 0.09 | | 0.107 | | | 1.0 | 0.48 | 0.53 | 0.05 | 0.09 | 0.107 | 0.107 | 0.00 | 0.000 | 2% |
| 3 | 0.55 | 0.09 | | 0.199 | | | 1.0 | 0.53 | 0.58 | 0.05 | 0.09 | 0.199 | 0.199 | 0.00 | 0.001 | 4% |
| 4 | 0.60 | 0.10 | | 0.188 | | | 1.0 | 0.58 | 0.63 | 0.05 | 0.10 | 0.188 | 0.188 | 0.01 | 0.001 | 4% |
| 5 | 0.65 | 0.06 | | 0.329 | | | 1.0 | 0.63 | 0.68 | 0.05 | 0.06 | 0.329 | 0.329 | 0.00 | 0.001 | 5% |
| 6 | 0.70 | 0.06 | | 0.462 | | | 1.0 | 0.68 | 0.73 | 0.05 | 0.06 | 0.462 | 0.462 | 0.00 | 0.001 | 7% |
| 7 | 0.75 | 0.12 | | 0.633 | | | 1.0 | 0.73 | 0.78 | 0.05 | 0.12 | 0.633 | 0.633 | 0.01 | 0.004 | 18% |
| 8 | 0.80 | 0.11 | | 0.423 | | | 1.0 | 0.78 | 0.83 | 0.05 | 0.11 | 0.423 | 0.423 | 0.01 | 0.002 | 11% |
| 9 | 0.85 | 0.11 | | 0.101 | | | 1.0 | 0.83 | 0.88 | 0.05 | 0.11 | 0.101 | 0.101 | 0.01 | 0.001 | 3% |
| 10 | 0.90 | 0.10 | | 0.590 | | | 1.0 | 0.88 | 0.93 | 0.05 | 0.10 | 0.590 | 0.590 | 0.01 | 0.003 | 14% |
| 11 | 0.95 | 0.10 | | 0.749 | | | 1.0 | 0.93 | 0.98 | 0.05 | 0.10 | 0.749 | 0.749 | 0.00 | 0.004 | 18% |
| 12 | 1.00 | 0.08 | | 0.491 | | | 1.0 | 0.98 | 1.05 | 0.08 | 0.08 | 0.491 | 0.491 | 0.01 | 0.003 | 14% |
| Left | 1.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.05 | 1.10 | 0.05 | 0.02 | 0.123 | 0.123 | 0.00 | 0.000 | 1% |
| Total Flow | | | | | | | | | | | | | | | 0.021 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.021 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 0.06 | (m ²) |
| Wetted Width: | 0.70 | (m) |
| Hydraulic Depth: | 0.082 | (m) |
| Mean Velocity: | 0.371 | (m/s) |
| Froude Number: | 0.414 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S7 - Muskeg River near Fort McKay (465408 E, 6338944 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 19-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.816 |
| Battery (Main): | 4.63 |
| Battery (Aux): | 12.82 |
| Datalogger Clock: | 1339 |
| Laptop Clock: | 1340 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 37% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1420 |
| End Time (MST): | 1440 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast -5C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 0.270 | 275.565 | 0.264 | 275.565 | - |
| Bench Mark 2: | Rebar in black PVC | 0.423 | 275.406 | 0.416 | 275.406 | - |
| Top of Ice: | | 3.813 | 272.022 | 3.802 | 272.027 | 272.025 |
| Water Level: | | 3.905 | 271.930 | 3.895 | 271.934 | 271.932 |
| Transducer: | | 0.816 | 271.114 | 0.816 | 271.118 | 271.116 |
| Other: | | | | | | |

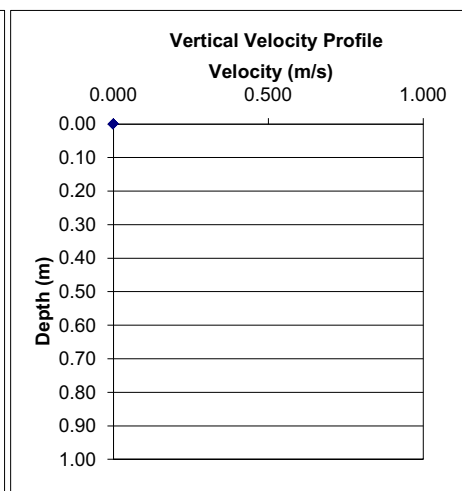
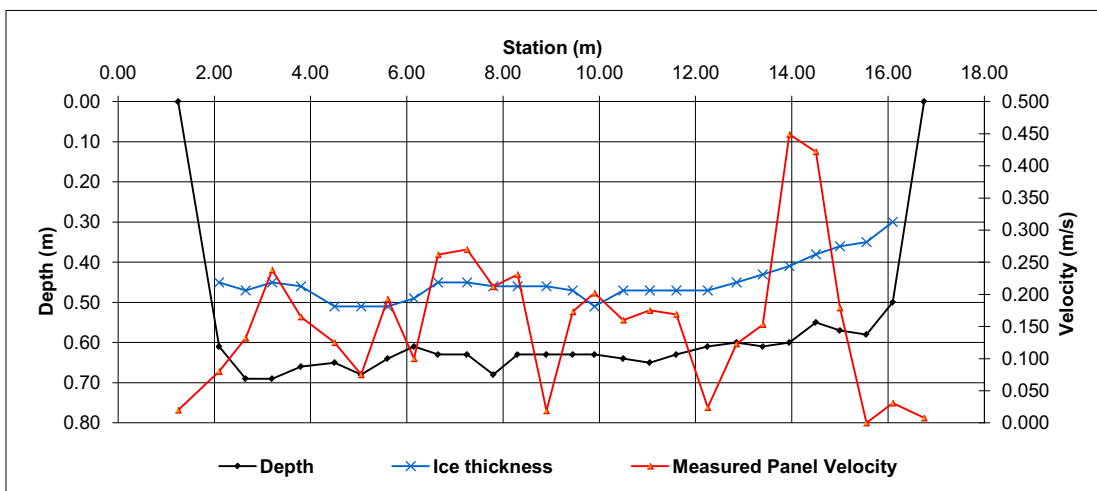
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|-----------------------|
| General Notes: |
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| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 1.25 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.25 | 1.68 | 0.43 | 0.04 | 0.020 | 0.018 | 0.02 | 0.000 | 0% |
| 1 | 2.10 | 0.61 | 0.45 | 0.080 | | | 0.9 | 1.68 | 2.38 | 0.70 | 0.16 | 0.080 | 0.072 | 0.11 | 0.008 | 2% |
| 2 | 2.65 | 0.69 | 0.47 | 0.132 | | | 0.9 | 2.38 | 2.93 | 0.55 | 0.22 | 0.132 | 0.119 | 0.12 | 0.014 | 4% |
| 3 | 3.20 | 0.69 | 0.45 | 0.238 | | | 0.9 | 2.93 | 3.50 | 0.58 | 0.24 | 0.238 | 0.214 | 0.14 | 0.030 | 8% |
| 4 | 3.80 | 0.66 | 0.46 | 0.165 | | | 0.9 | 3.50 | 4.15 | 0.65 | 0.20 | 0.165 | 0.149 | 0.13 | 0.019 | 5% |
| 5 | 4.50 | 0.65 | 0.51 | 0.125 | | | 0.9 | 4.15 | 4.78 | 0.63 | 0.14 | 0.125 | 0.113 | 0.09 | 0.010 | 3% |
| 6 | 5.05 | 0.68 | 0.51 | 0.075 | | | 0.9 | 4.78 | 5.33 | 0.55 | 0.17 | 0.075 | 0.068 | 0.09 | 0.006 | 2% |
| 7 | 5.60 | 0.64 | 0.51 | 0.193 | | | 0.9 | 5.33 | 5.88 | 0.55 | 0.13 | 0.193 | 0.174 | 0.07 | 0.012 | 3% |
| 8 | 6.15 | 0.61 | 0.49 | 0.100 | | | 0.9 | 5.88 | 6.40 | 0.53 | 0.12 | 0.100 | 0.090 | 0.06 | 0.006 | 1% |
| 9 | 6.65 | 0.63 | 0.45 | 0.262 | | | 0.9 | 6.40 | 6.95 | 0.55 | 0.18 | 0.262 | 0.236 | 0.10 | 0.023 | 6% |
| 10 | 7.25 | 0.63 | 0.45 | 0.270 | | | 0.9 | 6.95 | 7.53 | 0.58 | 0.18 | 0.270 | 0.243 | 0.10 | 0.025 | 6% |
| 11 | 7.80 | 0.68 | 0.46 | 0.212 | | | 0.9 | 7.53 | 8.05 | 0.53 | 0.22 | 0.212 | 0.191 | 0.12 | 0.022 | 6% |
| 12 | 8.30 | 0.63 | 0.46 | 0.231 | | | 0.9 | 8.05 | 8.60 | 0.55 | 0.17 | 0.231 | 0.208 | 0.09 | 0.019 | 5% |
| 13 | 8.90 | 0.63 | 0.46 | 0.019 | | | 0.9 | 8.60 | 9.18 | 0.57 | 0.17 | 0.019 | 0.017 | 0.10 | 0.002 | 0% |
| 14 | 9.45 | 0.63 | 0.47 | 0.173 | | | 0.9 | 9.18 | 9.68 | 0.50 | 0.16 | 0.173 | 0.156 | 0.08 | 0.012 | 3% |
| 15 | 9.90 | 0.63 | 0.51 | 0.202 | | | 0.9 | 9.68 | 10.20 | 0.52 | 0.12 | 0.202 | 0.182 | 0.06 | 0.011 | 3% |
| 16 | 10.50 | 0.64 | 0.47 | 0.160 | | | 0.9 | 10.20 | 10.78 | 0.58 | 0.17 | 0.160 | 0.144 | 0.10 | 0.014 | 4% |
| 17 | 11.05 | 0.65 | 0.47 | 0.175 | | | 0.9 | 10.78 | 11.33 | 0.55 | 0.18 | 0.175 | 0.158 | 0.10 | 0.016 | 4% |
| 18 | 11.60 | 0.63 | 0.47 | 0.169 | | | 0.9 | 11.33 | 11.93 | 0.60 | 0.16 | 0.169 | 0.152 | 0.10 | 0.015 | 4% |
| 19 | 12.25 | 0.61 | 0.47 | 0.024 | | | 0.9 | 11.93 | 12.55 | 0.63 | 0.14 | 0.024 | 0.022 | 0.09 | 0.002 | 0% |
| 20 | 12.85 | 0.60 | 0.45 | 0.123 | | | 0.9 | 12.55 | 13.13 | 0.57 | 0.15 | 0.123 | 0.111 | 0.09 | 0.010 | 2% |
| 21 | 13.40 | 0.61 | 0.43 | 0.153 | | | 0.9 | 13.13 | 13.68 | 0.55 | 0.18 | 0.153 | 0.138 | 0.10 | 0.014 | 4% |
| 22 | 13.95 | 0.60 | 0.41 | 0.449 | | | 0.9 | 13.68 | 14.23 | 0.55 | 0.19 | 0.449 | 0.404 | 0.10 | 0.042 | 11% |
| 23 | 14.50 | 0.55 | 0.38 | 0.422 | | | 0.9 | 14.23 | 14.75 | 0.53 | 0.17 | 0.422 | 0.380 | 0.09 | 0.034 | 9% |
| 24 | 15.00 | 0.57 | 0.36 | 0.179 | | | 0.9 | 14.75 | 15.28 | 0.53 | 0.21 | 0.179 | 0.161 | 0.11 | 0.018 | 5% |
| 25 | 15.55 | 0.58 | 0.35 | 0.000 | | | 1.0 | 15.28 | 15.83 | 0.55 | 0.23 | 0.000 | 0.000 | 0.13 | 0.000 | 0% |
| 26 | 16.10 | 0.50 | 0.30 | 0.031 | | | 0.9 | 15.83 | 16.43 | 0.60 | 0.20 | 0.031 | 0.028 | 0.12 | 0.003 | 1% |
| Left | 16.75 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 16.43 | 16.75 | 0.32 | 0.05 | 0.008 | 0.007 | 0.02 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.388 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 0.388 (m ³ /s) |
| Perceived Measurement Quality: | Good |
| Total Area: | 2.62 (m ²) |
| Wetted Width: | 15.50 (m) |
| Hydraulic Depth: | 0.169 (m) |
| Mean Velocity: | 0.148 (m/s) |
| Froude Number: | 0.115 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S7 - Muskeg River near Fort McKay (465408 E, 6338944 N) | | | |
| Field Personnel: | GB, JE | Trip Date: | 14-Feb-10 |
| Data Entry Personnel: | SG | Date: | 17-Feb-10 |
| Data Check Personnel: | DB | Date: | 12-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.772 |
| Battery (Main): | 4.58 |
| Battery (Aux): | 15.03 |
| Datalogger Clock: | 1022 |
| Laptop Clock: | 1029 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 39% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1110 |
| End Time (MST): | 1127 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Clear -12C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 0.485 | 275.565 | 0.492 | 275.565 | - |
| Bench Mark 2: | Rebar in black PVC | 0.635 | 275.406 | 0.645 | 275.406 | - |
| Top of Ice: | | 4.091 | 271.959 | 4.011 | 272.046 | 272.003 |
| Water Level: | | 4.140 | 271.910 | 4.148 | 271.909 | 271.910 |
| Transducer: | | 0.772 | 271.138 | 0.772 | 271.137 | 271.138 |
| Other: | | | | | | |

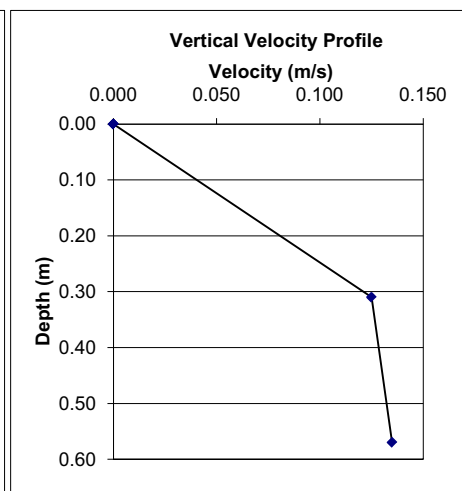
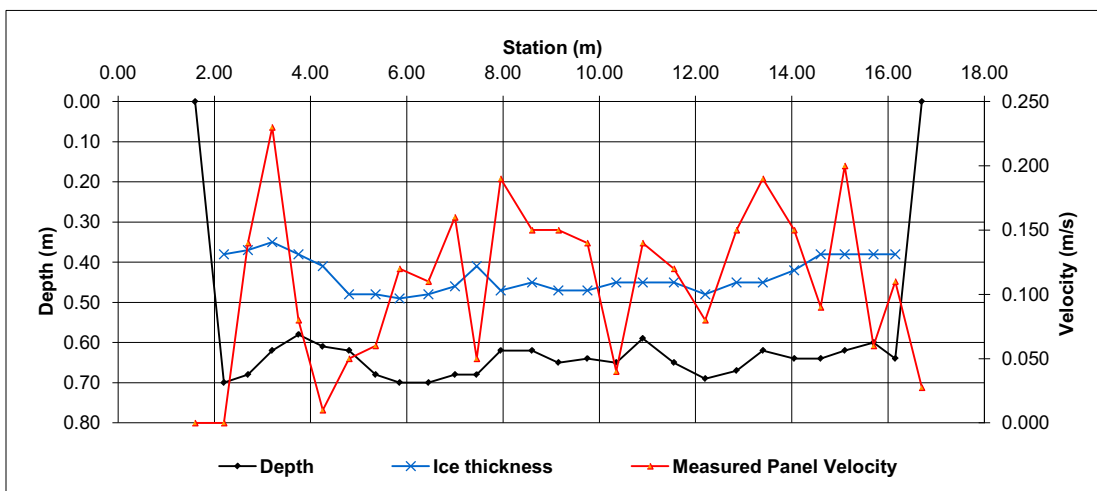
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|-----------------------|
| General Notes: |
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| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 1.60 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.60 | 1.90 | 0.30 | 0.08 | 0.000 | 0.000 | 0.02 | 0.000 | 0% | |
| 1 | 2.20 | 0.70 | 0.38 | 0.000 | | | 1.0 | 1.90 | 2.45 | 0.55 | 0.32 | 0.000 | 0.000 | 0.18 | 0.000 | 0% | |
| 2 | 2.70 | 0.68 | 0.37 | 0.140 | | | 0.9 | 2.45 | 2.95 | 0.50 | 0.31 | 0.140 | 0.126 | 0.16 | 0.020 | 6% | |
| 3 | 3.20 | 0.62 | 0.35 | 0.230 | | | 0.9 | 2.95 | 3.48 | 0.53 | 0.27 | 0.230 | 0.207 | 0.14 | 0.029 | 9% | |
| 4 | 3.75 | 0.58 | 0.38 | 0.080 | | | 0.9 | 3.48 | 4.00 | 0.53 | 0.20 | 0.080 | 0.072 | 0.11 | 0.008 | 2% | |
| 5 | 4.25 | 0.61 | 0.41 | 0.010 | | | 0.9 | 4.00 | 4.53 | 0.53 | 0.20 | 0.010 | 0.009 | 0.11 | 0.001 | 0% | |
| 6 | 4.80 | 0.62 | 0.48 | 0.050 | | | 0.9 | 4.53 | 5.08 | 0.55 | 0.14 | 0.050 | 0.045 | 0.08 | 0.003 | 1% | |
| 7 | 5.35 | 0.68 | 0.48 | 0.060 | | | 0.9 | 5.08 | 5.60 | 0.53 | 0.20 | 0.060 | 0.054 | 0.11 | 0.006 | 2% | |
| 8 | 5.85 | 0.70 | 0.49 | 0.120 | | | 0.9 | 5.60 | 6.15 | 0.55 | 0.21 | 0.120 | 0.108 | 0.12 | 0.012 | 4% | |
| 9 | 6.45 | 0.70 | 0.48 | 0.110 | | | 0.9 | 6.15 | 6.73 | 0.57 | 0.22 | 0.110 | 0.099 | 0.13 | 0.013 | 4% | |
| 10 | 7.00 | 0.68 | 0.46 | 0.160 | | | 0.9 | 6.73 | 7.23 | 0.50 | 0.22 | 0.160 | 0.144 | 0.11 | 0.016 | 5% | |
| 11 | 7.45 | 0.68 | 0.41 | 0.050 | | | 0.9 | 7.23 | 7.70 | 0.48 | 0.27 | 0.050 | 0.045 | 0.13 | 0.006 | 2% | |
| 12 | 7.95 | 0.62 | 0.47 | 0.190 | | | 0.9 | 7.70 | 8.28 | 0.58 | 0.15 | 0.190 | 0.171 | 0.09 | 0.015 | 5% | |
| 13 | 8.60 | 0.62 | 0.45 | 0.150 | | | 0.9 | 8.28 | 8.88 | 0.60 | 0.17 | 0.150 | 0.135 | 0.10 | 0.014 | 4% | |
| 14 | 9.15 | 0.65 | 0.47 | 0.150 | | | 0.9 | 8.88 | 9.45 | 0.57 | 0.18 | 0.150 | 0.135 | 0.10 | 0.014 | 4% | |
| 15 | 9.75 | 0.64 | 0.47 | 0.140 | | | 0.9 | 9.45 | 10.05 | 0.60 | 0.17 | 0.140 | 0.126 | 0.10 | 0.013 | 4% | |
| 16 | 10.35 | 0.65 | 0.45 | 0.040 | | | 0.9 | 10.05 | 10.63 | 0.57 | 0.20 | 0.040 | 0.036 | 0.12 | 0.004 | 1% | |
| 17 | 10.90 | 0.59 | 0.45 | 0.140 | | | 0.9 | 10.63 | 11.23 | 0.60 | 0.14 | 0.140 | 0.126 | 0.08 | 0.011 | 3% | |
| 18 | 11.55 | 0.65 | 0.45 | 0.120 | | | 0.9 | 11.23 | 11.88 | 0.65 | 0.20 | 0.120 | 0.108 | 0.13 | 0.014 | 4% | |
| 19 | 12.20 | 0.69 | 0.48 | 0.080 | | | 0.9 | 11.88 | 12.53 | 0.65 | 0.21 | 0.080 | 0.072 | 0.14 | 0.010 | 3% | |
| 20 | 12.85 | 0.67 | 0.45 | 0.150 | | | 0.9 | 12.53 | 13.13 | 0.60 | 0.22 | 0.150 | 0.135 | 0.13 | 0.018 | 6% | |
| 21 | 13.40 | 0.62 | 0.45 | 0.190 | | | 0.9 | 13.13 | 13.73 | 0.60 | 0.17 | 0.190 | 0.171 | 0.10 | 0.017 | 6% | |
| 22 | 14.05 | 0.64 | 0.42 | 0.150 | | | 0.9 | 13.73 | 14.33 | 0.60 | 0.22 | 0.150 | 0.135 | 0.13 | 0.018 | 6% | |
| 23 | 14.60 | 0.64 | 0.38 | 0.090 | | | 0.9 | 14.33 | 14.85 | 0.53 | 0.26 | 0.090 | 0.081 | 0.14 | 0.011 | 4% | |
| 24 | 15.10 | 0.62 | 0.38 | 0.200 | | | 0.9 | 14.85 | 15.40 | 0.55 | 0.24 | 0.200 | 0.180 | 0.13 | 0.024 | 8% | |
| 25 | 15.70 | 0.60 | 0.38 | 0.060 | | | 0.9 | 15.40 | 15.93 | 0.53 | 0.22 | 0.060 | 0.054 | 0.12 | 0.006 | 2% | |
| 26 | 16.15 | 0.64 | 0.38 | 0.110 | | | 0.9 | 15.93 | 16.43 | 0.50 | 0.26 | 0.110 | 0.099 | 0.13 | 0.013 | 4% | |
| Left | 16.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 16.43 | 16.70 | 0.28 | 0.07 | 0.028 | 0.028 | 0.02 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 0.315 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 0.315 (m ³ /s) |
| Perceived Measurement Quality: | Good |
| Total Area: | 3.13 (m ²) |
| Wetted Width: | 15.10 (m) |
| Hydraulic Depth: | 0.207 (m) |
| Mean Velocity: | 0.101 (m/s) |
| Froude Number: | 0.071 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.045 |
| Offset | 15.1 | 0.62 | 0 | - | - | Panel V.@Ofst 0.2 |
| Depth | 0.62 | 0.52 | 0.02 | 0.57 | 0.010 | 60% Depth 0.524 |
| Ice Depth | 0.38 | 0.62 | 0.250 | 0.57 | 0.135 | 20% Depth 0.43 |
| | | | | 0.31 | 0.125 | 80% Depth 0.57 |
| | | | | 0.00 | 0.000 | |
| | | | | 0.00 | 0.000 | |
| | | | | 0.00 | 0.000 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S7 - Muskeg River near Fort McKay (465408 E, 6338944 N) | | | |
| Field Personnel: | SG, CE | Trip Date: | 09-Mar-10 |
| Data Entry Personnel: | SG | Date: | 17-Mar-10 |
| Data Check Personnel: | JP | Date: | 02-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.962 |
| Battery (Main): | 4.67 |
| Battery (Aux): | 14.47 |
| Datalogger Clock: | 1350 |
| Laptop Clock: | 1356 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 41% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1405 |
| End Time (MST): | 1415 |
| Equipment: | ADV |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Floating Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Sunny 5°C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 0.609 | 275.565 | 0.528 | 275.565 | - |
| Bench Mark 2: | Rebar in black PVC | 0.762 | 275.406 | 0.682 | 275.406 | - |
| Top of Ice: | | 4.071 | 272.103 | 3.994 | 272.099 | 272.101 |
| Water Level: | | 4.071 | 272.103 | 3.994 | 272.099 | 272.101 |
| Transducer: | | 0.962 | 271.141 | 0.962 | 271.137 | 271.139 |
| Other: | | | | | | |

General Notes:

Ice sheet was detached from left downstream bank and floating. Condition was not considered safe for manual flow measurement.

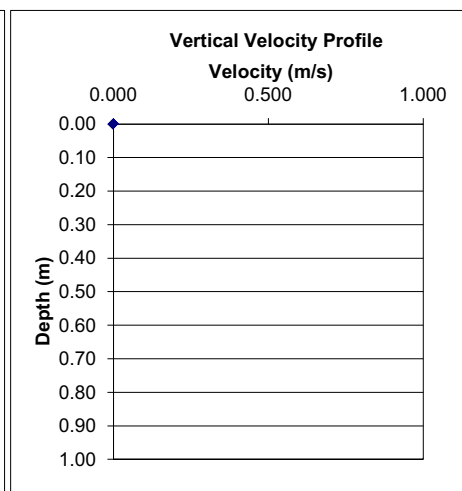
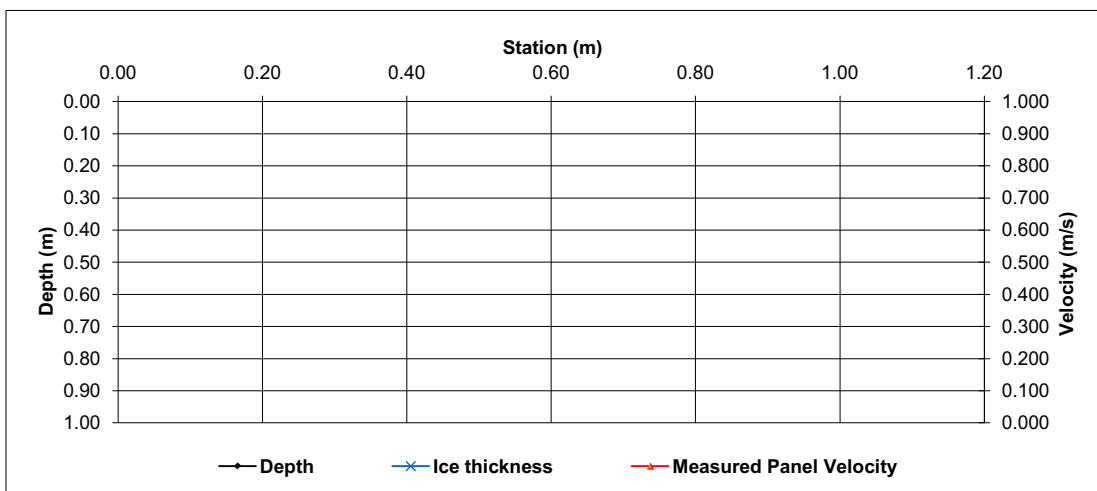
| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 26 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |

**Add/delete # rows as necessary, remembering to autofill calculations/graphs etc*

Total Flow NOT MEASURED

| | |
|--------------------------------|----------------------------------|
| Flow characteristics: | |
| Total Flow: | NOT MEASURED (m ³ /s) |
| Perceived Measurement Quality: | Good |
| Total Area: | #VALUE! (m ²) |
| Wetted Width: | 0.00 (m) |
| Hydraulic Depth: | #VALUE! (m) |
| Mean Velocity: | #VALUE! (m/s) |
| Froude Number: | #VALUE! |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S7 - Muskeg River near Fort McKay (465408 E, 6338944 N) | | | |
| Field Personnel: | DB GB | Trip Date: | 08-Apr-10 |
| Data Entry Personnel: | DB | Date: | 10-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.008 |
| Battery (Main): | 4.69 |
| Battery (Aux): | 14.25 |
| Datalogger Clock: | 1321 |
| Laptop Clock: | 1328 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 43% |
| Dessicant: | Changed |
| Logger# (if Δ): | 269 |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1320 |
| End Time (MST): | 1335 |
| Equipment: | ADV |
| Method: | - |
| River Condition: | Heavily Broken Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | - |
| Weather: | Hazy sun |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 0.283 | 275.565 | 0.347 | 275.565 | - |
| Bench Mark 2: | Rebar in black PVC | 0.443 | 275.406 | 0.507 | 275.406 | - |
| Top of Ice: | | | 275.848 | | 275.912 | 275.880 |
| Water Level: | | 3.712 | 272.136 | 3.770 | 272.142 | 272.139 |
| Transducer: | | 1.008 | 271.128 | 1.008 | 271.134 | 271.131 |
| Other: | | | | | | |

General Notes:

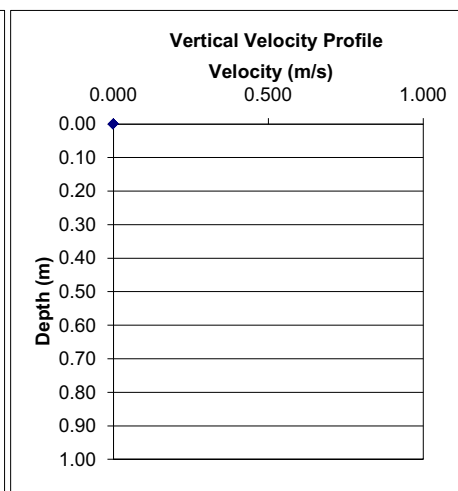
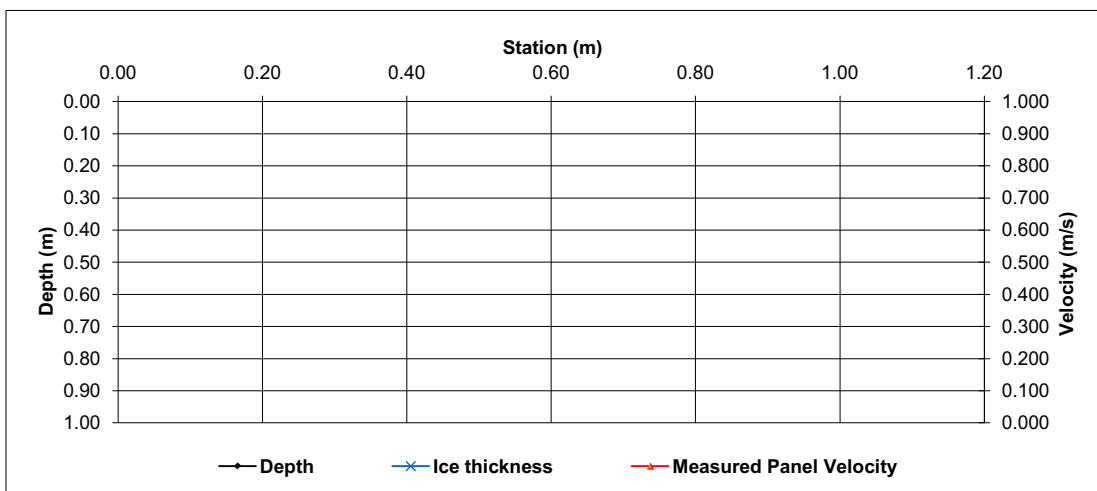
Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|--------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 26 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | NOT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | | - | |
| Total Area: | | #VALUE! | (m ²) |
| Wetted Width: | | 0.00 | (m) |
| Hydraulic Depth: | | #VALUE! | (m) |
| Mean Velocity: | | #VALUE! | (m/s) |
| Froude Number: | | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S7 - Muskeg River near Fort McKay (465408 E, 6338944 N) | | | |
| Field Personnel: | DB, SG | Trip Date: | 27-Apr-10 |
| Data Entry Personnel: | DB | Date: | 30-Apr-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.284 |
| Battery (Main): | 4.62 |
| Battery (Aux): | 13.99 |
| Datalogger Clock: | 1329 |
| Laptop Clock: | 1326 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 45% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1430 |
| End Time (MST): | 1450 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Sunny 10°C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 0.599 | 275.565 | 0.580 | 275.565 | - |
| Bench Mark 2: | Rebar in black PVC | 0.751 | 275.406 | 0.733 | 275.406 | - |
| Top of Ice: | | | | | | 0.000 |
| Water Level: | | 3.753 | 272.411 | 3.738 | 272.407 | 272.409 |
| Transducer: | | 1.284 | 271.127 | 1.284 | 271.123 | 271.125 |
| Other: | | | | | | |

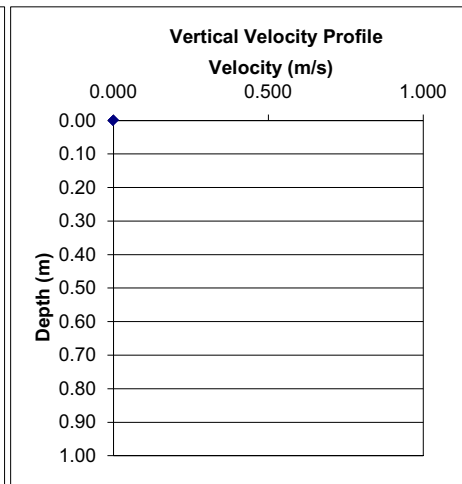
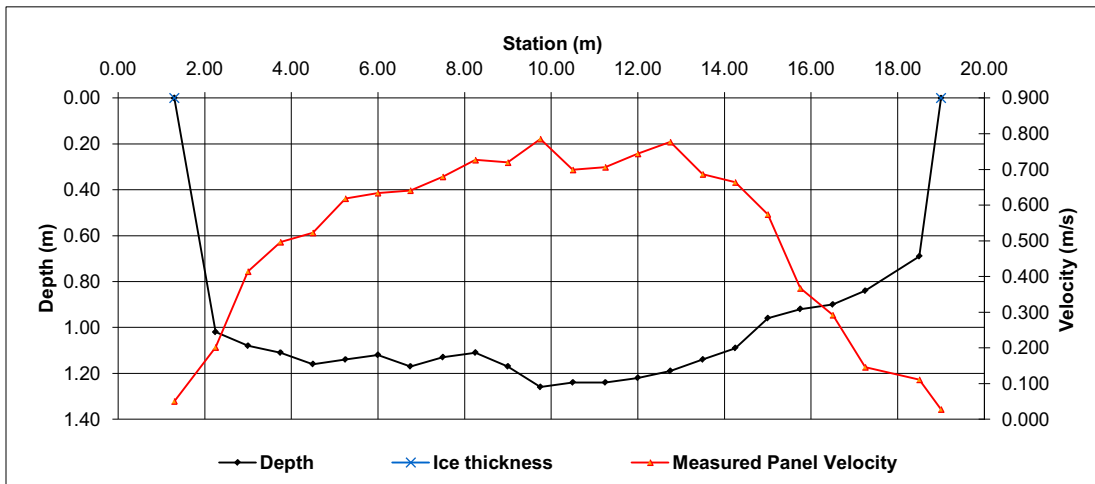
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | Calculated Data | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 19.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 19.00 | 18.75 | 0.25 | 0.17 | 0.028 | 0.028 | 0.04 | 0.001 | 0% |
| 1 | 18.50 | 0.69 | | 0.111 | | | 1.0 | 18.75 | 17.88 | 0.88 | 0.69 | 0.111 | 0.111 | 0.60 | 0.067 | 1% |
| 2 | 17.25 | 0.84 | | 0.146 | | | 1.0 | 17.88 | 16.88 | 1.00 | 0.84 | 0.146 | 0.146 | 0.84 | 0.123 | 1% |
| 3 | 16.50 | 0.90 | | 0.292 | | | 1.0 | 16.88 | 16.13 | 0.75 | 0.90 | 0.292 | 0.292 | 0.68 | 0.197 | 2% |
| 4 | 15.75 | 0.92 | | 0.367 | | | 1.0 | 16.13 | 15.38 | 0.75 | 0.92 | 0.367 | 0.367 | 0.69 | 0.253 | 2% |
| 5 | 15.00 | 0.96 | | 0.574 | | | 1.0 | 15.38 | 14.63 | 0.75 | 0.96 | 0.574 | 0.574 | 0.72 | 0.413 | 4% |
| 6 | 14.25 | 1.09 | | | 0.615 | 0.713 | 1.0 | 14.63 | 13.88 | 0.75 | 1.09 | 0.664 | 0.664 | 0.82 | 0.543 | 5% |
| 7 | 13.50 | 1.14 | | | 0.609 | 0.764 | 1.0 | 13.88 | 13.13 | 0.75 | 1.14 | 0.687 | 0.687 | 0.86 | 0.587 | 6% |
| 8 | 12.75 | 1.19 | | | 0.705 | 0.849 | 1.0 | 13.13 | 12.38 | 0.75 | 1.19 | 0.777 | 0.777 | 0.89 | 0.693 | 7% |
| 9 | 12.00 | 1.22 | | | 0.632 | 0.856 | 1.0 | 12.38 | 11.63 | 0.75 | 1.22 | 0.744 | 0.744 | 0.92 | 0.681 | 7% |
| 10 | 11.25 | 1.24 | | | 0.642 | 0.771 | 1.0 | 11.63 | 10.88 | 0.75 | 1.24 | 0.707 | 0.707 | 0.93 | 0.657 | 6% |
| 11 | 10.50 | 1.24 | | | 0.637 | 0.761 | 1.0 | 10.88 | 10.13 | 0.75 | 1.24 | 0.699 | 0.699 | 0.93 | 0.650 | 6% |
| 12 | 9.75 | 1.26 | | | 0.732 | 0.839 | 1.0 | 10.13 | 9.38 | 0.75 | 1.26 | 0.786 | 0.786 | 0.95 | 0.742 | 7% |
| 13 | 9.00 | 1.17 | | | 0.687 | 0.752 | 1.0 | 9.38 | 8.63 | 0.75 | 1.17 | 0.720 | 0.720 | 0.88 | 0.631 | 6% |
| 14 | 8.25 | 1.11 | | | 0.724 | 0.729 | 1.0 | 8.63 | 7.88 | 0.75 | 1.11 | 0.727 | 0.727 | 0.83 | 0.605 | 6% |
| 15 | 7.50 | 1.13 | | | 0.605 | 0.754 | 1.0 | 7.88 | 7.13 | 0.75 | 1.13 | 0.680 | 0.680 | 0.85 | 0.576 | 6% |
| 16 | 6.75 | 1.17 | | | 0.548 | 0.734 | 1.0 | 7.13 | 6.38 | 0.75 | 1.17 | 0.641 | 0.641 | 0.88 | 0.562 | 5% |
| 17 | 6.00 | 1.12 | | | 0.599 | 0.669 | 1.0 | 6.38 | 5.63 | 0.75 | 1.12 | 0.634 | 0.634 | 0.84 | 0.533 | 5% |
| 18 | 5.25 | 1.14 | | | 0.604 | 0.633 | 1.0 | 5.63 | 4.88 | 0.75 | 1.14 | 0.619 | 0.619 | 0.86 | 0.529 | 5% |
| 19 | 4.50 | 1.16 | | | 0.452 | 0.593 | 1.0 | 4.88 | 4.13 | 0.75 | 1.16 | 0.523 | 0.523 | 0.87 | 0.455 | 4% |
| 20 | 3.75 | 1.11 | | | 0.451 | 0.542 | 1.0 | 4.13 | 3.38 | 0.75 | 1.11 | 0.497 | 0.497 | 0.83 | 0.413 | 4% |
| 21 | 3.00 | 1.08 | | | 0.387 | 0.441 | 1.0 | 3.38 | 2.63 | 0.75 | 1.08 | 0.414 | 0.414 | 0.81 | 0.335 | 3% |
| 22 | 2.25 | 1.02 | | | 0.102 | 0.301 | 1.0 | 2.63 | 1.78 | 0.85 | 1.02 | 0.202 | 0.202 | 0.87 | 0.175 | 2% |
| Left | 1.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.78 | 1.30 | 0.48 | 0.26 | 0.050 | 0.050 | 0.12 | 0.006 | 0% |
| Total Flow | | | | | | | | | | | | | | | 10.428 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-----------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 10.428 | (m ³ /s) |
| Perceived Measurement Quality: | | Excellent | |
| Total Area: | | 18.49 | (m ²) |
| Wetted Width: | | 16.98 | (m) |
| Hydraulic Depth: | | 1.089 | (m) |
| Mean Velocity: | | 0.564 | (m/s) |
| Froude Number: | | 0.173 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S7 - Muskeg River near Fort McKay (465408 E, 6338944 N) | | | |
| Field Personnel: | DB SG BL | Trip Date: | 22-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 13-Jul-10 |

| | |
|---|-------|
| Logger Details: | |
| Transducer Reading: | 0.81 |
| Battery (Main): | 4.7 |
| Battery (Aux): | 14 |
| Datalogger Clock: | 17:03 |
| Laptop Clock: | 17:03 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 49% |
| Dessicant: | New |
| Logger# (if Δ): | 12686 |
| PT# (if Δ): | |
| Other Logger Notes: Changed to CR800. PT pulled out by public on June-9 | |

| | |
|------------------------------|---------------------|
| Measurement Details: | |
| Start Time (MST): | 1200 |
| End Time (MST): | |
| Equipment: | No flow measurement |
| Method: | |
| River Condition: | |
| Code ('Ice' or 'Open'): | |
| Quality/Error (see reverse): | |
| Weather: | |

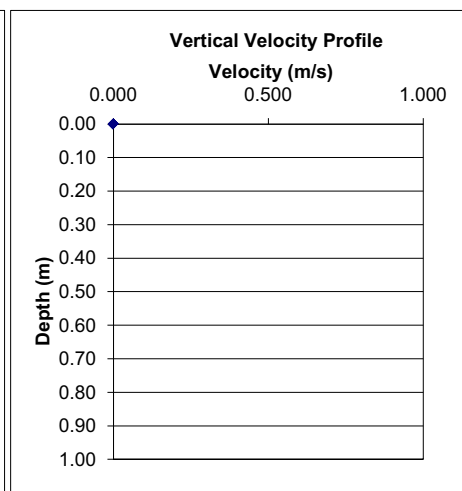
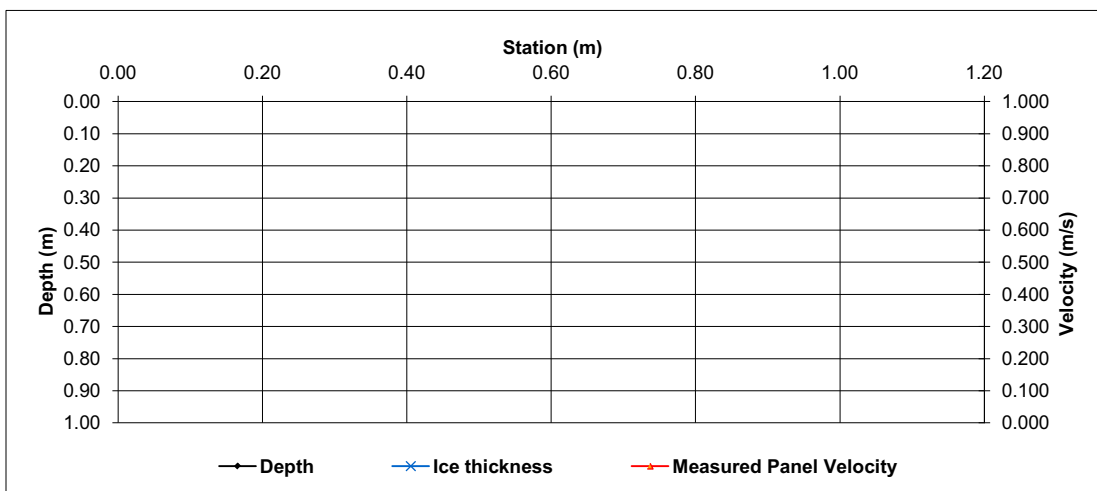
| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 0.528 | 275.565 | 0.513 | 275.565 | - |
| Bench Mark 2: | Rebar in black PVC | 0.687 | 275.406 | 0.673 | 275.406 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 4.127 | 271.966 | 4.109 | 271.969 | 271.968 |
| Transducer: | | 0.810 | 271.156 | 0.810 | 271.159 | 271.158 |
| Other: | | | | | | |

| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 26 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | | | | | | | | |
| Total Flow | | | | | | | | | | | | | | | NOT MEASURED | | | | | | | | |

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | NOT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | | 0 | |
| Total Area: | | #VALUE! | (m ²) |
| Wetted Width: | | 0.00 | (m) |
| Hydraulic Depth: | | #VALUE! | (m) |
| Mean Velocity: | | #VALUE! | (m/s) |
| Froude Number: | | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S7 - Muskeg River near Fort McKay (465408 E, 6338944 N) | | | |
| Field Personnel: | DB, SG | Trip Date: | 10-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.75 |
| Battery (Main): | 13.92 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1511 |
| Laptop Clock: | 1512 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 19.5 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|------------------|
| Measurement Details: | |
| Start Time (MST): | 1520 |
| End Time (MST): | 1550 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Clear, hot, 25°C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 0.544 | 275.565 | 0.525 | 275.565 | - |
| Bench Mark 2: | Rebar in black PVC | 0.702 | 275.406 | 0.684 | 275.406 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 4.236 | 271.873 | 4.218 | 271.872 | 271.873 |
| Transducer: | | 0.750 | 271.123 | 0.750 | 271.122 | 271.123 |
| Other: | | | | | | |

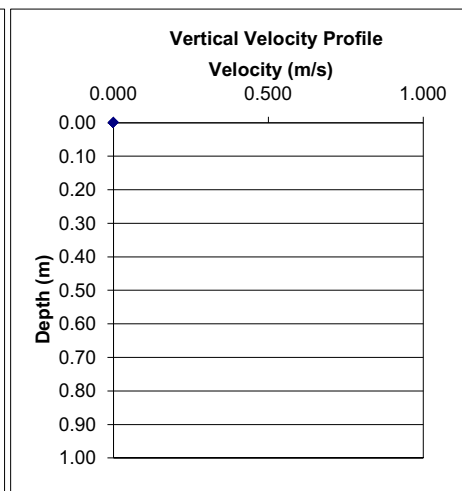
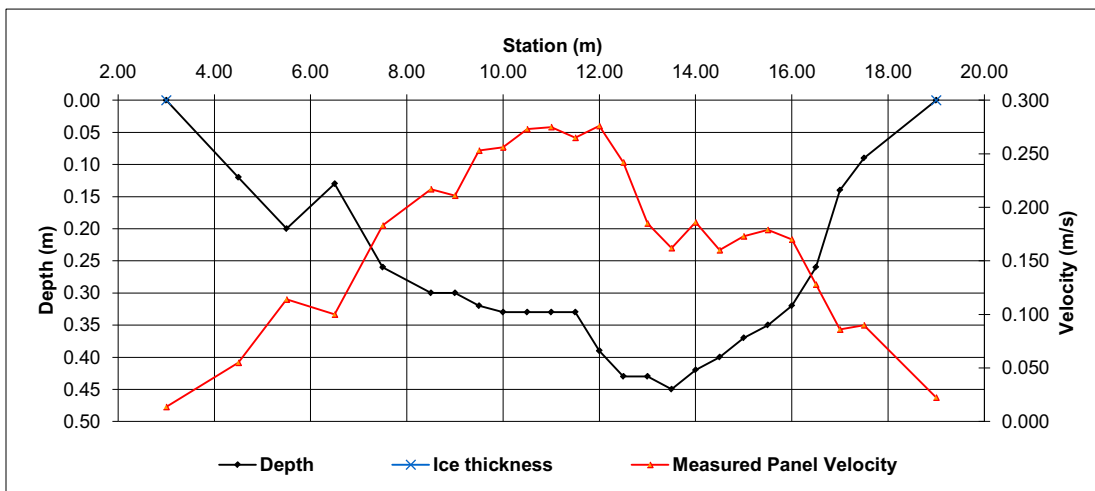
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 3.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.00 | 3.75 | 0.75 | 0.03 | 0.014 | 0.014 | 0.02 | 0.000 | 0% | |
| 1 | 4.50 | 0.12 | | 0.055 | | | 1.0 | 3.75 | 5.00 | 1.25 | 0.12 | 0.055 | 0.055 | 0.15 | 0.008 | 1% | |
| 2 | 5.50 | 0.20 | | 0.114 | | | 1.0 | 5.00 | 6.00 | 1.00 | 0.20 | 0.114 | 0.114 | 0.20 | 0.023 | 3% | |
| 3 | 6.50 | 0.13 | | 0.100 | | | 1.0 | 6.00 | 7.00 | 1.00 | 0.13 | 0.100 | 0.100 | 0.13 | 0.013 | 2% | |
| 4 | 7.50 | 0.26 | | 0.183 | | | 1.0 | 7.00 | 8.00 | 1.00 | 0.26 | 0.183 | 0.183 | 0.26 | 0.048 | 6% | |
| 5 | 8.50 | 0.30 | | 0.217 | | | 1.0 | 8.00 | 8.75 | 0.75 | 0.30 | 0.217 | 0.217 | 0.23 | 0.049 | 6% | |
| 6 | 9.00 | 0.30 | | 0.211 | | | 1.0 | 8.75 | 9.25 | 0.50 | 0.30 | 0.211 | 0.211 | 0.15 | 0.032 | 4% | |
| 7 | 9.50 | 0.32 | | 0.253 | | | 1.0 | 9.25 | 9.75 | 0.50 | 0.32 | 0.253 | 0.253 | 0.16 | 0.040 | 5% | |
| 8 | 10.00 | 0.33 | | 0.256 | | | 1.0 | 9.75 | 10.25 | 0.50 | 0.33 | 0.256 | 0.256 | 0.17 | 0.042 | 6% | |
| 9 | 10.50 | 0.33 | | 0.273 | | | 1.0 | 10.25 | 10.75 | 0.50 | 0.33 | 0.273 | 0.273 | 0.17 | 0.045 | 6% | |
| 10 | 11.00 | 0.33 | | 0.275 | | | 1.0 | 10.75 | 11.25 | 0.50 | 0.33 | 0.275 | 0.275 | 0.17 | 0.045 | 6% | |
| 11 | 11.50 | 0.33 | | 0.265 | | | 1.0 | 11.25 | 11.75 | 0.50 | 0.33 | 0.265 | 0.265 | 0.17 | 0.044 | 6% | |
| 12 | 12.00 | 0.39 | | 0.276 | | | 1.0 | 11.75 | 12.25 | 0.50 | 0.39 | 0.276 | 0.276 | 0.20 | 0.054 | 7% | |
| 13 | 12.50 | 0.43 | | 0.242 | | | 1.0 | 12.25 | 12.75 | 0.50 | 0.43 | 0.242 | 0.242 | 0.22 | 0.052 | 7% | |
| 14 | 13.00 | 0.43 | | 0.185 | | | 1.0 | 12.75 | 13.25 | 0.50 | 0.43 | 0.185 | 0.185 | 0.22 | 0.040 | 5% | |
| 15 | 13.50 | 0.45 | | 0.162 | | | 1.0 | 13.25 | 13.75 | 0.50 | 0.45 | 0.162 | 0.162 | 0.23 | 0.036 | 5% | |
| 16 | 14.00 | 0.42 | | 0.186 | | | 1.0 | 13.75 | 14.25 | 0.50 | 0.42 | 0.186 | 0.186 | 0.21 | 0.039 | 5% | |
| 17 | 14.50 | 0.40 | | 0.160 | | | 1.0 | 14.25 | 14.75 | 0.50 | 0.40 | 0.160 | 0.160 | 0.20 | 0.032 | 4% | |
| 18 | 15.00 | 0.37 | | 0.173 | | | 1.0 | 14.75 | 15.25 | 0.50 | 0.37 | 0.173 | 0.173 | 0.19 | 0.032 | 4% | |
| 19 | 15.50 | 0.35 | | 0.179 | | | 1.0 | 15.25 | 15.75 | 0.50 | 0.35 | 0.179 | 0.179 | 0.18 | 0.031 | 4% | |
| 20 | 16.00 | 0.32 | | 0.170 | | | 1.0 | 15.75 | 16.25 | 0.50 | 0.32 | 0.170 | 0.170 | 0.16 | 0.027 | 4% | |
| 21 | 16.50 | 0.26 | | 0.128 | | | 1.0 | 16.25 | 16.75 | 0.50 | 0.26 | 0.128 | 0.128 | 0.13 | 0.017 | 2% | |
| 22 | 17.00 | 0.14 | | 0.086 | | | 1.0 | 16.75 | 17.25 | 0.50 | 0.14 | 0.086 | 0.086 | 0.07 | 0.006 | 1% | |
| 23 | 17.50 | 0.09 | | 0.090 | | | 1.0 | 17.25 | 18.25 | 1.00 | 0.09 | 0.090 | 0.090 | 0.09 | 0.008 | 1% | |
| Right | 19.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 18.25 | 19.00 | 0.75 | 0.02 | 0.023 | 0.023 | 0.02 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.764 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-----------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.764 | (m ³ /s) |
| Perceived Measurement Quality: | | Excellent | |
| Total Area: | | 4.04 | (m ²) |
| Wetted Width: | | 16.00 | (m) |
| Hydraulic Depth: | | 0.253 | (m) |
| Mean Velocity: | | 0.189 | (m/s) |
| Froude Number: | | 0.120 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S7 - Muskeg River near Fort McKay (465408 E, 6338944 N) | | | |
| Field Personnel: | DB SG HB | Trip Date: | 18-Sep-10 |
| Data Entry Personnel: | DB | Date: | 27-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.305 |
| Battery (Main): | 14.06 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1614 |
| Laptop Clock: | 1614 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 8.5 |
| Memory used: | |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|------|
| Measurement Details: | |
| Start Time (MST): | 1615 |
| End Time (MST): | 1635 |
| Equipment: | - |
| Method: | - |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 0.505 | 275.565 | 0.483 | 275.565 | - |
| Bench Mark 2: | Rebar in black PVC | 0.660 | 275.406 | 0.637 | 275.406 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 3.643 | 272.427 | 3.624 | 272.424 | 272.426 |
| Transducer: | | 1.305 | 271.122 | 1.305 | 271.119 | 271.121 |
| Other: | | | | | | |

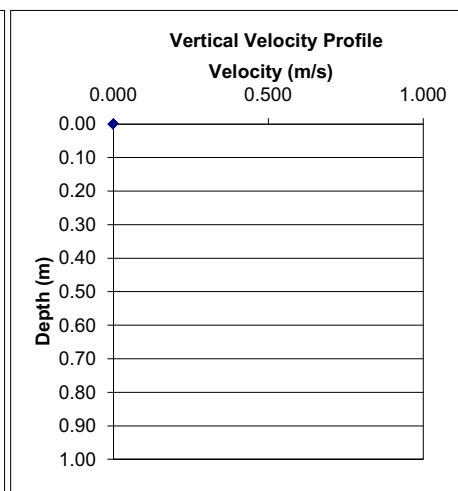
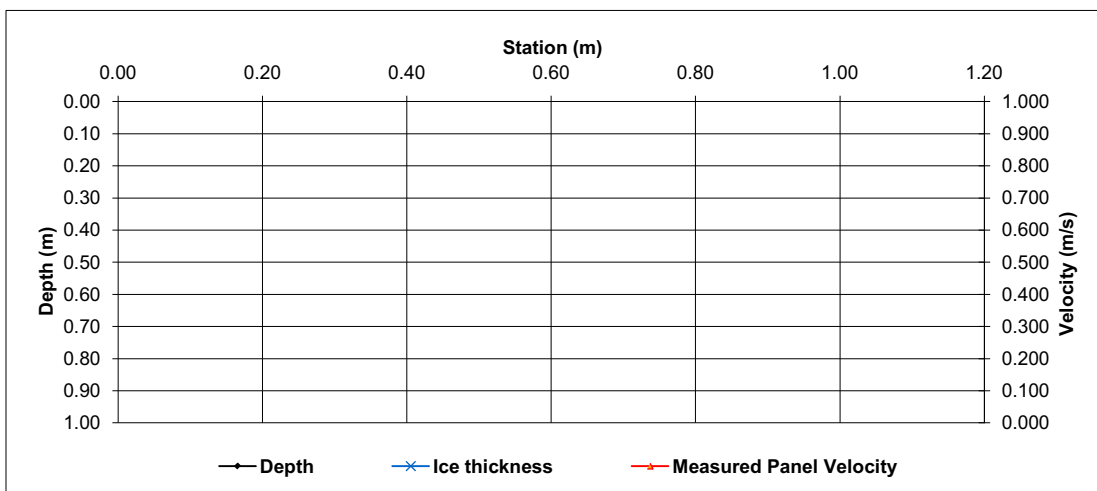
General Notes:

TSS 1m from RB. RSSI -86 decent connection with antenna

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 26 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | | | | | | | | |
| Total Flow | | | | | | | | | | | | | | | NOT MEASURED | | | | | | | | |

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | NOT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | | 0 | |
| Total Area: | | #VALUE! | (m ²) |
| Wetted Width: | | 0.00 | (m) |
| Hydraulic Depth: | | #VALUE! | (m) |
| Mean Velocity: | | #VALUE! | (m/s) |
| Froude Number: | | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S7 - Muskeg River near Fort McKay (465408 E, 6338944 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 29-Oct-10 |
| Data Entry Personnel: | DB | Date: | 08-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.883 |
| Battery (Main): | 12.93 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1718 |
| Laptop Clock: | 1717 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 2.2 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|------|
| Measurement Details: | |
| Start Time (MST): | 1700 |
| End Time (MST): | 1730 |
| Equipment: | - |
| Method: | - |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | - |
| Weather: | Dusk |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 0.854 | 275.565 | 0.840 | 275.565 | - |
| Bench Mark 2: | Rebar in black PVC | 1.005 | 275.406 | 0.991 | 275.406 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 4.410 | 272.009 | 4.395 | 272.010 | 272.010 |
| Transducer: | | 0.883 | 271.126 | 0.883 | 271.127 | 271.127 |
| Other: | | | | | | |

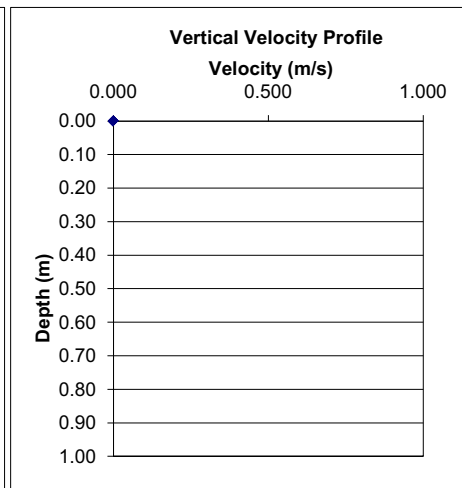
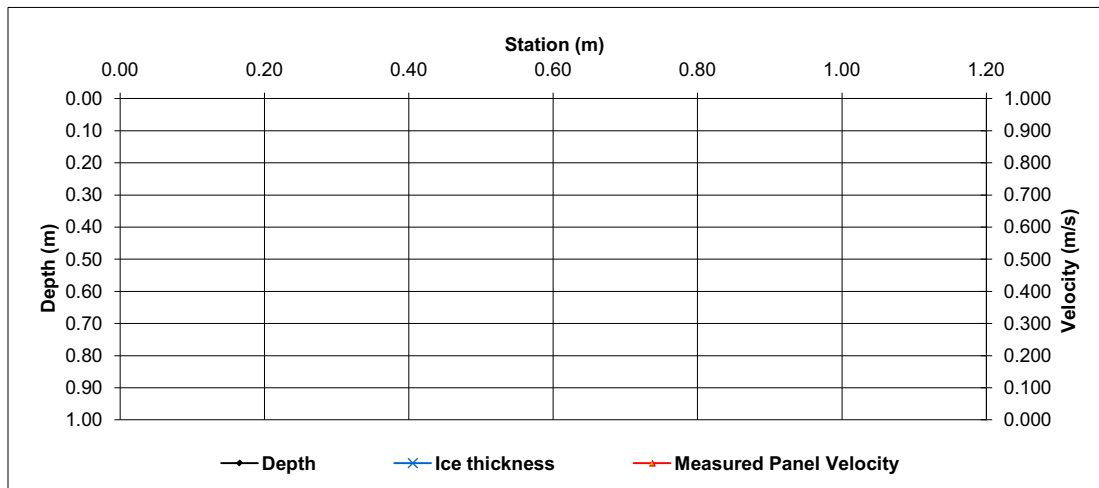
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|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|--------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 26 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | NOT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | | - | |
| Total Area: | | #VALUE! | (m ²) |
| Wetted Width: | | 0.00 | (m) |
| Hydraulic Depth: | | #VALUE! | (m) |
| Mean Velocity: | | #VALUE! | (m/s) |
| Froude Number: | | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S7 - Muskeg River near Fort McKay (465408 E, 6338944 N) | | | |
| Field Personnel: | SG, JO | Trip Date: | 03-Dec-10 |
| Data Entry Personnel: | DB | Date: | 09-Dec-10 |
| Data Check Personnel: | JP | Date: | 16-Dec-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.761 |
| Battery (Main): | 12.63 |
| Battery (Aux): | |
| Datalogger Clock: | 837 |
| Laptop Clock: | 835 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|------------------|
| Measurement Details: | |
| Start Time (MST): | 830 |
| End Time (MST): | 930 |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | -18°C. 7/8 cloud |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 0.451 | 275.565 | 0.452 | 275.565 | - |
| Bench Mark 2: | Rebar in black PVC | 0.601 | 275.406 | 0.599 | 275.406 | - |
| Top of Ice: | | 4.149 | 271.867 | 4.145 | 271.872 | 271.870 |
| Water Level: | | 4.132 | 271.884 | 4.140 | 271.877 | 271.881 |
| Transducer: | | 0.761 | 271.123 | 0.761 | 271.116 | 271.120 |
| Other: | | | | | | |

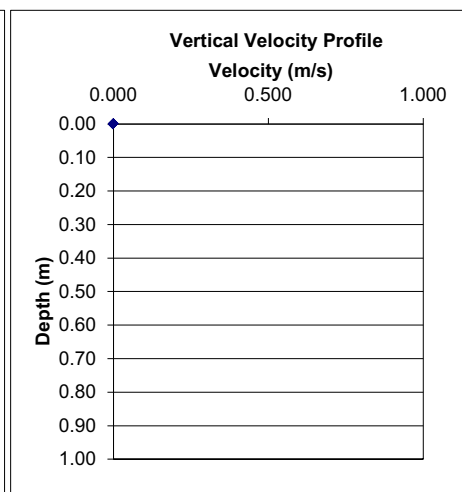
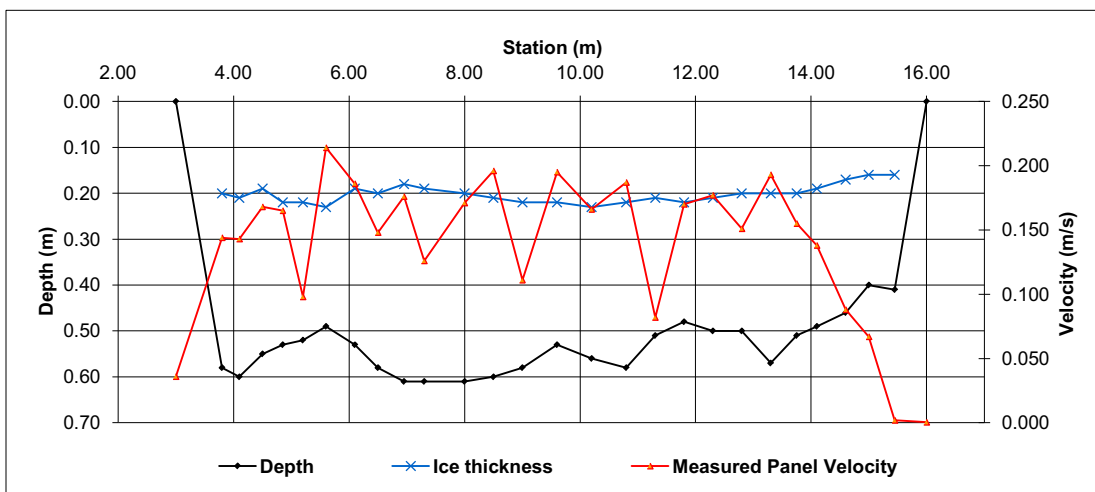
| |
|-----------------------|
| General Notes: |
| |
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| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 3.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 3.00 | 3.40 | 0.40 | 0.10 | 0.036 | 0.032 | 0.04 | 0.001 | 0% | |
| 1 | 3.80 | 0.58 | 0.20 | 0.144 | | | 0.9 | 3.40 | 3.95 | 0.55 | 0.38 | 0.144 | 0.130 | 0.21 | 0.027 | 5% | |
| 2 | 4.10 | 0.60 | 0.21 | 0.143 | | | 0.9 | 3.95 | 4.30 | 0.35 | 0.39 | 0.143 | 0.129 | 0.14 | 0.018 | 3% | |
| 3 | 4.50 | 0.55 | 0.19 | 0.168 | | | 0.9 | 4.30 | 4.68 | 0.38 | 0.36 | 0.168 | 0.151 | 0.14 | 0.020 | 4% | |
| 4 | 4.85 | 0.53 | 0.22 | 0.165 | | | 0.9 | 4.68 | 5.03 | 0.35 | 0.31 | 0.165 | 0.149 | 0.11 | 0.016 | 3% | |
| 5 | 5.20 | 0.52 | 0.22 | 0.098 | | | 0.9 | 5.03 | 5.40 | 0.38 | 0.30 | 0.098 | 0.088 | 0.11 | 0.010 | 2% | |
| 6 | 5.60 | 0.49 | 0.23 | 0.214 | | | 0.9 | 5.40 | 5.85 | 0.45 | 0.26 | 0.214 | 0.193 | 0.12 | 0.023 | 4% | |
| 7 | 6.10 | 0.53 | 0.19 | 0.186 | | | 0.9 | 5.85 | 6.30 | 0.45 | 0.34 | 0.186 | 0.167 | 0.15 | 0.026 | 5% | |
| 8 | 6.50 | 0.58 | 0.20 | 0.148 | | | 0.9 | 6.30 | 6.73 | 0.43 | 0.38 | 0.148 | 0.133 | 0.16 | 0.022 | 4% | |
| 9 | 6.95 | 0.61 | 0.18 | 0.176 | | | 0.9 | 6.73 | 7.13 | 0.40 | 0.43 | 0.176 | 0.158 | 0.17 | 0.027 | 5% | |
| 10 | 7.30 | 0.61 | 0.19 | 0.126 | | | 0.9 | 7.13 | 7.65 | 0.53 | 0.42 | 0.126 | 0.113 | 0.22 | 0.025 | 4% | |
| 11 | 8.00 | 0.61 | 0.20 | 0.171 | | | 0.9 | 7.65 | 8.25 | 0.60 | 0.41 | 0.171 | 0.154 | 0.25 | 0.038 | 7% | |
| 12 | 8.50 | 0.60 | 0.21 | 0.196 | | | 0.9 | 8.25 | 8.75 | 0.50 | 0.39 | 0.196 | 0.176 | 0.20 | 0.034 | 6% | |
| 13 | 9.00 | 0.58 | 0.22 | 0.111 | | | 0.9 | 8.75 | 9.30 | 0.55 | 0.36 | 0.111 | 0.100 | 0.20 | 0.020 | 4% | |
| 14 | 9.60 | 0.53 | 0.22 | 0.195 | | | 0.9 | 9.30 | 9.90 | 0.60 | 0.31 | 0.195 | 0.176 | 0.19 | 0.033 | 6% | |
| 15 | 10.20 | 0.56 | 0.23 | 0.166 | | | 0.9 | 9.90 | 10.50 | 0.60 | 0.33 | 0.166 | 0.149 | 0.20 | 0.030 | 5% | |
| 16 | 10.80 | 0.58 | 0.22 | 0.187 | | | 0.9 | 10.50 | 11.05 | 0.55 | 0.36 | 0.187 | 0.168 | 0.20 | 0.033 | 6% | |
| 17 | 11.30 | 0.51 | 0.21 | 0.082 | | | 0.9 | 11.05 | 11.55 | 0.50 | 0.30 | 0.082 | 0.074 | 0.15 | 0.011 | 2% | |
| 18 | 11.80 | 0.48 | 0.22 | 0.170 | | | 0.9 | 11.55 | 12.05 | 0.50 | 0.26 | 0.170 | 0.153 | 0.13 | 0.020 | 4% | |
| 19 | 12.30 | 0.50 | 0.21 | 0.177 | | | 0.9 | 12.05 | 12.55 | 0.50 | 0.29 | 0.177 | 0.159 | 0.15 | 0.023 | 4% | |
| 20 | 12.80 | 0.50 | 0.20 | 0.151 | | | 0.9 | 12.55 | 13.05 | 0.50 | 0.30 | 0.151 | 0.136 | 0.15 | 0.020 | 4% | |
| 21 | 13.30 | 0.57 | 0.20 | 0.193 | | | 0.9 | 13.05 | 13.53 | 0.48 | 0.37 | 0.193 | 0.174 | 0.18 | 0.031 | 5% | |
| 22 | 13.75 | 0.51 | 0.20 | 0.155 | | | 0.9 | 13.53 | 13.93 | 0.40 | 0.31 | 0.155 | 0.140 | 0.12 | 0.017 | 3% | |
| 23 | 14.10 | 0.49 | 0.19 | 0.138 | | | 0.9 | 13.93 | 14.35 | 0.42 | 0.30 | 0.138 | 0.124 | 0.13 | 0.016 | 3% | |
| 24 | 14.60 | 0.46 | 0.17 | 0.088 | | | 0.9 | 14.35 | 14.80 | 0.45 | 0.29 | 0.088 | 0.079 | 0.13 | 0.010 | 2% | |
| 25 | 15.00 | 0.40 | 0.16 | 0.067 | | | 0.9 | 14.80 | 15.23 | 0.42 | 0.24 | 0.067 | 0.060 | 0.10 | 0.006 | 1% | |
| 26 | 15.45 | 0.41 | 0.16 | 0.002 | | | 0.9 | 15.23 | 15.73 | 0.50 | 0.25 | 0.002 | 0.002 | 0.13 | 0.000 | 0% | |
| Left | 16.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 15.73 | 16.00 | 0.28 | 0.06 | 0.001 | 0.001 | 0.02 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 0.557 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 0.557 (m ³ /s) |
| Perceived Measurement Quality: | Good |
| Total Area: | 4.16 (m ²) |
| Wetted Width: | 13.00 (m) |
| Hydraulic Depth: | 0.320 (m) |
| Mean Velocity: | 0.134 (m/s) |
| Froude Number: | 0.076 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|----------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V. @Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S9 - Kearl Lake Outlet (483962 E, 6346990 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 18-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|---|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data Logger installed during Winter | |

| | | |
|------------------------------|--------------------|---------------------|
| Measurement Details: | | |
| Start Time (MST): | | 1245 |
| End Time (MST): | | 1255 |
| Equipment: | ADV | Other: |
| Method: | Ice | Wading Fishcat Boat |
| River Condition: | Complete Ice Cover | |
| Code ('Ice' or 'Open'): | Ice | |
| Quality/Error (see reverse): | Fair | |
| Weather: | Clear -5C | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Birch Tree | 1.413 | 329.796 | 1.410 | 329.796 | - |
| Bench Mark 2: | T-post | 0.195 | 330.979 | 0.912 | 330.979 | - |
| Top of Ice: | | 1.928 | 329.281 | 1.925 | 329.281 | 329.281 |
| Water Level: | | 1.914 | 329.295 | 1.913 | 329.293 | 329.294 |
| Transducer: | | | | | | |
| Other: | | | | | | |

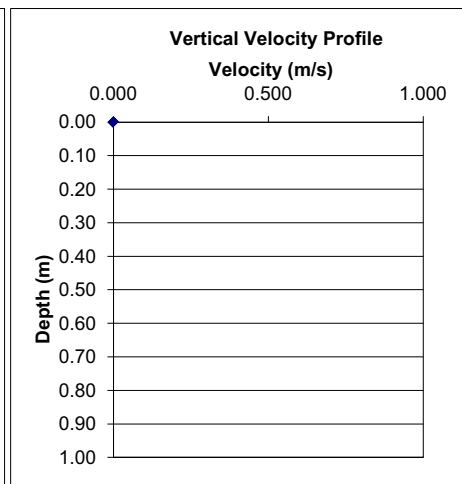
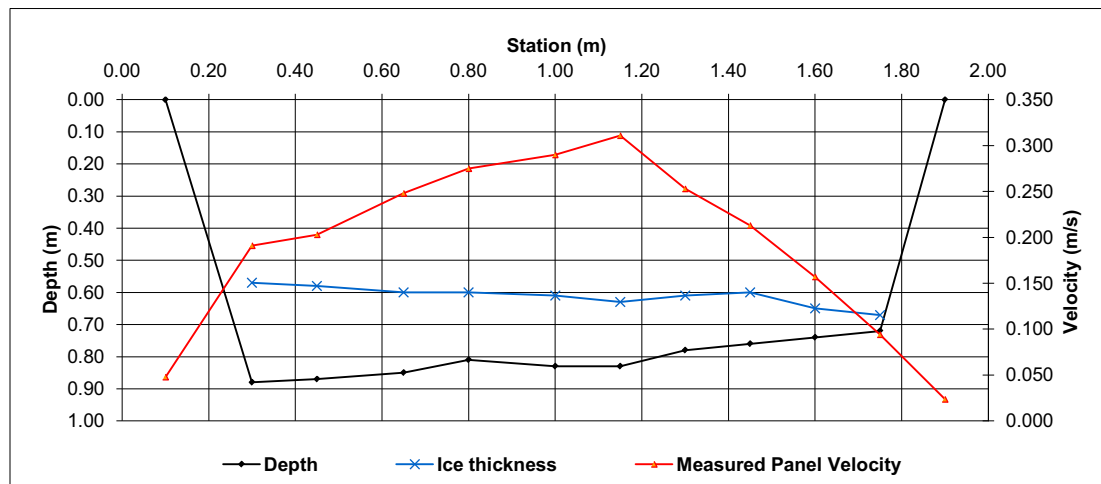
| |
|-----------------------|
| General Notes: |
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| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 0.10 | 0.20 | 0.10 | 0.08 | 0.048 | 0.043 | 0.01 | 0.000 | 0% |
| 1 | 0.30 | 0.88 | 0.57 | 0.191 | | | 0.9 | 0.20 | 0.38 | 0.18 | 0.31 | 0.191 | 0.172 | 0.05 | 0.009 | 13% |
| 2 | 0.45 | 0.87 | 0.58 | 0.203 | | | 0.9 | 0.38 | 0.55 | 0.18 | 0.29 | 0.203 | 0.183 | 0.05 | 0.009 | 13% |
| 3 | 0.65 | 0.85 | 0.60 | 0.248 | | | 0.9 | 0.55 | 0.73 | 0.18 | 0.25 | 0.248 | 0.223 | 0.04 | 0.010 | 14% |
| 4 | 0.80 | 0.81 | 0.60 | 0.275 | | | 0.9 | 0.73 | 0.90 | 0.18 | 0.21 | 0.275 | 0.248 | 0.04 | 0.009 | 13% |
| 5 | 1.00 | 0.83 | 0.61 | 0.290 | | | 0.9 | 0.90 | 1.08 | 0.18 | 0.22 | 0.290 | 0.261 | 0.04 | 0.010 | 15% |
| 6 | 1.15 | 0.83 | 0.63 | 0.311 | | | 0.9 | 1.08 | 1.23 | 0.15 | 0.20 | 0.311 | 0.280 | 0.03 | 0.008 | 12% |
| 7 | 1.30 | 0.78 | 0.61 | 0.253 | | | 0.9 | 1.23 | 1.38 | 0.15 | 0.17 | 0.253 | 0.228 | 0.03 | 0.006 | 8% |
| 8 | 1.45 | 0.76 | 0.60 | 0.213 | | | 0.9 | 1.38 | 1.53 | 0.15 | 0.16 | 0.213 | 0.192 | 0.02 | 0.005 | 7% |
| 9 | 1.60 | 0.74 | 0.65 | 0.157 | | | 0.9 | 1.53 | 1.68 | 0.15 | 0.09 | 0.157 | 0.141 | 0.01 | 0.002 | 3% |
| 10 | 1.75 | 0.72 | 0.67 | 0.094 | | | 0.9 | 1.68 | 1.83 | 0.15 | 0.05 | 0.094 | 0.085 | 0.01 | 0.001 | 1% |
| Right | 1.90 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.83 | 1.90 | 0.08 | 0.01 | 0.024 | 0.021 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.069 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|--------------|--------------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.069 | (m³/s) |
| Perceived Measurement Quality: | | Fair | |
| Total Area: | | 0.33 | (m²) |
| Wetted Width: | | 1.80 | (m) |
| Hydraulic Depth: | | 0.185 | (m) |
| Mean Velocity: | | 0.208 | (m/s) |
| Froude Number: | | 0.154 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S9 - Kears Lake Outlet (483962 E, 6346990 N) | | | |
| Field Personnel: | GB, SK | Trip Date: | 12-Feb-10 |
| Data Entry Personnel: | SG | Date: | 18-Feb-10 |
| Data Check Personnel: | DB | Date: | 12-Mar-10 |

| | |
|---|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data Logger installed during Winter | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1650 |
| End Time (MST): | 1705 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | ice cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | sunny -10C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Birch Tree | 2.451 | 329.796 | 2.505 | 329.796 | - |
| Bench Mark 2: | T-post | 1.235 | 330.979 | 1.288 | 330.979 | - |
| Top of Ice: | | 2.979 | 329.268 | 3.009 | 329.292 | 329.280 |
| Water Level: | | 3.339 | 328.908 | 3.372 | 328.929 | 328.919 |
| Transducer: | | | | | | |
| Other: | | | | | | |

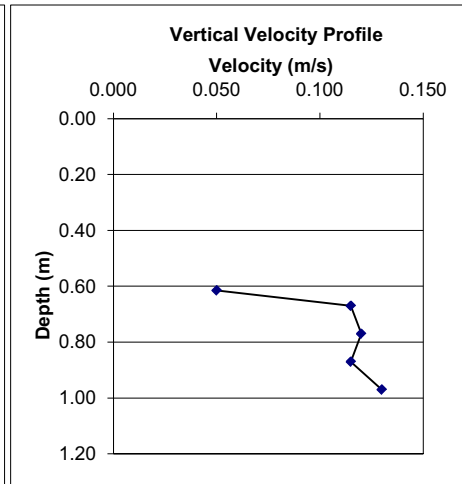
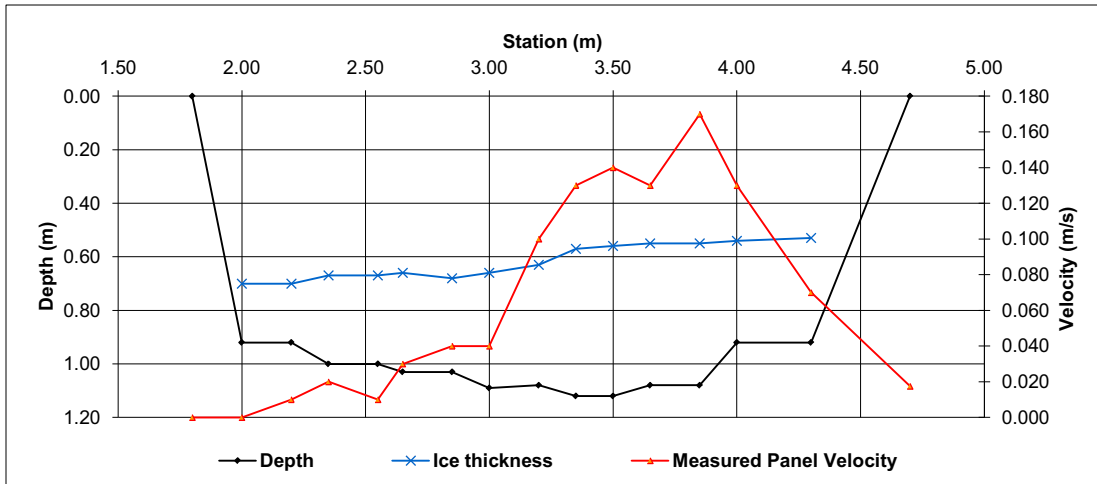
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 1.80 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.80 | 1.90 | 0.10 | 0.06 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | |
| 1 | 2.00 | 0.92 | 0.70 | 0.000 | | | 1.0 | 1.90 | 2.10 | 0.20 | 0.22 | 0.000 | 0.000 | 0.04 | 0.000 | 0% | |
| 2 | 2.20 | 0.92 | 0.70 | 0.010 | | | 0.9 | 2.10 | 2.28 | 0.18 | 0.22 | 0.010 | 0.009 | 0.04 | 0.000 | 0% | |
| 3 | 2.35 | 1.00 | 0.67 | 0.020 | | | 0.9 | 2.28 | 2.45 | 0.18 | 0.33 | 0.020 | 0.018 | 0.06 | 0.001 | 1% | |
| 4 | 2.55 | 1.00 | 0.67 | 0.010 | | | 0.9 | 2.45 | 2.60 | 0.15 | 0.33 | 0.010 | 0.009 | 0.05 | 0.000 | 1% | |
| 5 | 2.65 | 1.03 | 0.66 | 0.030 | | | 0.9 | 2.60 | 2.75 | 0.15 | 0.37 | 0.030 | 0.027 | 0.06 | 0.001 | 2% | |
| 6 | 2.85 | 1.03 | 0.68 | 0.040 | | | 0.9 | 2.75 | 2.93 | 0.18 | 0.35 | 0.040 | 0.036 | 0.06 | 0.002 | 3% | |
| 7 | 3.00 | 1.09 | 0.66 | 0.040 | | | 0.9 | 2.93 | 3.10 | 0.18 | 0.43 | 0.040 | 0.036 | 0.08 | 0.003 | 3% | |
| 8 | 3.20 | 1.08 | 0.63 | 0.100 | | | 0.9 | 3.10 | 3.28 | 0.18 | 0.45 | 0.100 | 0.090 | 0.08 | 0.007 | 9% | |
| 9 | 3.35 | 1.12 | 0.57 | 0.130 | | | 0.9 | 3.28 | 3.43 | 0.15 | 0.55 | 0.130 | 0.117 | 0.08 | 0.010 | 12% | |
| 10 | 3.50 | 1.12 | 0.56 | 0.140 | | | 0.9 | 3.43 | 3.58 | 0.15 | 0.56 | 0.140 | 0.126 | 0.08 | 0.011 | 13% | |
| 11 | 3.65 | 1.08 | 0.55 | 0.130 | | | 0.9 | 3.58 | 3.75 | 0.18 | 0.53 | 0.130 | 0.117 | 0.09 | 0.011 | 14% | |
| 12 | 3.85 | 1.08 | 0.55 | 0.170 | | | 0.9 | 3.75 | 3.93 | 0.18 | 0.53 | 0.170 | 0.153 | 0.09 | 0.014 | 18% | |
| 13 | 4.00 | 0.92 | 0.54 | 0.130 | | | 0.9 | 3.93 | 4.15 | 0.23 | 0.38 | 0.130 | 0.117 | 0.09 | 0.010 | 13% | |
| 14 | 4.30 | 0.92 | 0.53 | 0.070 | | | 0.9 | 4.15 | 4.50 | 0.35 | 0.39 | 0.070 | 0.063 | 0.14 | 0.009 | 11% | |
| Right | 4.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.50 | 4.70 | 0.20 | 0.10 | 0.018 | 0.018 | 0.02 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.080 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.080 | (m ³ /s) |
| Perceived Measurement Quality: | | Fair | |
| Total Area: | | 1.06 | (m ²) |
| Wetted Width: | | 2.90 | (m) |
| Hydraulic Depth: | | 0.365 | (m) |
| Mean Velocity: | | 0.075 | (m/s) |
| Froude Number: | | 0.040 | |

| Velocity Profile for Ice Conditions: | | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.100 | |
| Offset | 3.5 | 1.12 | 0 | - | - | Panel V.@Ofst | 0.14 |
| Depth | 1.12 | 1.02 | 0.14 | 1.07 | 0.070 | 60% Depth | 0.916 |
| Ice Depth | 0.61 | 0.92 | 0.120 | 0.97 | 0.130 | 20% Depth | 0.71 |
| | | 0.82 | 0.110 | 0.87 | 0.115 | 80% Depth | 1.02 |
| | | 0.72 | 0.130 | 0.77 | 0.120 | | |
| | | 0.62 | 0.100 | 0.67 | 0.115 | | |
| | | 0.61 | 0 | 0.62 | 0.050 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S9 - Kears Lake Outlet (483962 E, 6346990 N) | | | |
| Field Personnel: | SE, SG | Trip Date: | 07-Mar-10 |
| Data Entry Personnel: | SG | Date: | 18-Mar-10 |
| Data Check Personnel: | DB | Date: | 05-May-10 |

| | |
|---|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data Logger installed during Winter | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1245 |
| End Time (MST): | 1255 |
| Equipment: | ADV |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Ice Covered |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Sunny 10°C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Birch Tree | 2.503 | 329.796 | 2.498 | 329.796 | - |
| Bench Mark 2: | T-post | 1.288 | 330.979 | 1.284 | 330.979 | - |
| Top of Ice: | | 2.994 | 329.305 | 2.989 | 329.305 | 329.305 |
| Water Level: | | 3.548 | 328.751 | 3.545 | 328.749 | 328.750 |
| Transducer: | | | | | | |
| Other: | | | | | | |

General Notes:

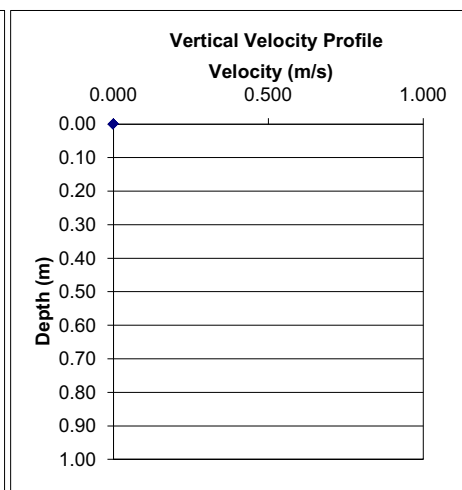
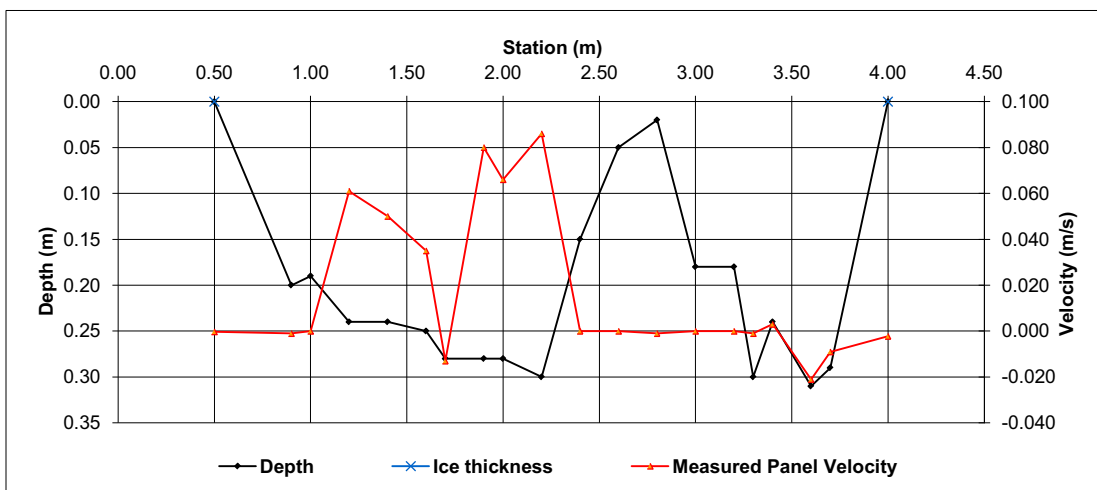
Ice Sheet was hanging no ice measurements made during manual measurement

| Flow Measurement: | | | | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | |
| Right | 0.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.9 | 0.50 | 0.70 | 0.20 | 0.05 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | | | |
| 1 | 0.90 | 0.20 | | -0.001 | | | 0.9 | 0.70 | 0.95 | 0.25 | 0.20 | -0.001 | -0.001 | 0.05 | 0.000 | 0% | | | |
| 2 | 1.00 | 0.19 | | 0.000 | | | 1.0 | 0.95 | 1.10 | 0.15 | 0.19 | 0.000 | 0.000 | 0.03 | 0.000 | 0% | | | |
| 3 | 1.20 | 0.24 | | 0.061 | | | 0.9 | 1.10 | 1.30 | 0.20 | 0.24 | 0.061 | 0.055 | 0.05 | 0.003 | 18% | | | |
| 4 | 1.40 | 0.24 | | 0.050 | | | 0.9 | 1.30 | 1.50 | 0.20 | 0.24 | 0.050 | 0.045 | 0.05 | 0.002 | 15% | | | |
| 5 | 1.60 | 0.25 | | 0.035 | | | 0.9 | 1.50 | 1.65 | 0.15 | 0.25 | 0.035 | 0.032 | 0.04 | 0.001 | 8% | | | |
| 6 | 1.70 | 0.28 | | -0.013 | | | 0.9 | 1.65 | 1.80 | 0.15 | 0.28 | -0.013 | -0.012 | 0.04 | 0.000 | -3% | | | |
| 7 | 1.90 | 0.28 | | 0.080 | | | 0.9 | 1.80 | 1.95 | 0.15 | 0.28 | 0.080 | 0.072 | 0.04 | 0.003 | 21% | | | |
| 8 | 2.00 | 0.28 | | 0.066 | | | 0.9 | 1.95 | 2.10 | 0.15 | 0.28 | 0.066 | 0.059 | 0.04 | 0.002 | 17% | | | |
| 9 | 2.20 | 0.30 | | 0.086 | | | 0.9 | 2.10 | 2.30 | 0.20 | 0.30 | 0.086 | 0.077 | 0.06 | 0.005 | 32% | | | |
| 10 | 2.40 | 0.15 | | 0.000 | | | 1.0 | 2.30 | 2.50 | 0.20 | 0.15 | 0.000 | 0.000 | 0.03 | 0.000 | 0% | | | |
| 11 | 2.60 | 0.05 | | 0.000 | | | 1.0 | 2.50 | 2.70 | 0.20 | 0.05 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | | | |
| 12 | 2.80 | 0.02 | | -0.001 | | | 0.9 | 2.70 | 2.90 | 0.20 | 0.02 | -0.001 | -0.001 | 0.00 | 0.000 | 0% | | | |
| 13 | 3.00 | 0.18 | | 0.000 | | | 1.0 | 2.90 | 3.10 | 0.20 | 0.18 | 0.000 | 0.000 | 0.04 | 0.000 | 0% | | | |
| 14 | 3.20 | 0.18 | | 0.000 | | | 1.0 | 3.10 | 3.25 | 0.15 | 0.18 | 0.000 | 0.000 | 0.03 | 0.000 | 0% | | | |
| 15 | 3.30 | 0.30 | | -0.001 | | | 0.9 | 3.25 | 3.35 | 0.10 | 0.30 | -0.001 | -0.001 | 0.03 | 0.000 | 0% | | | |
| 16 | 3.40 | 0.24 | | 0.003 | | | 0.9 | 3.35 | 3.50 | 0.15 | 0.24 | 0.003 | 0.003 | 0.04 | 0.000 | 1% | | | |
| 17 | 3.60 | 0.31 | | -0.021 | | | 0.9 | 3.50 | 3.65 | 0.15 | 0.31 | -0.021 | -0.019 | 0.05 | -0.001 | -6% | | | |
| 18 | 3.70 | 0.29 | | -0.009 | | | 0.9 | 3.65 | 3.85 | 0.20 | 0.29 | -0.009 | -0.008 | 0.06 | 0.000 | -3% | | | |
| Right | 4.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.85 | 4.00 | 0.15 | 0.07 | -0.002 | -0.002 | 0.01 | 0.000 | 0% | | | |
| Total Flow | | | | | | | | | | | | | | | 0.014 | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 0.014 (m ³ /s) |
| Perceived Measurement Quality: | Poor |
| Total Area: | 0.70 (m ²) |
| Wetted Width: | 3.50 (m) |
| Hydraulic Depth: | 0.199 (m) |
| Mean Velocity: | 0.021 (m/s) |
| Froude Number: | 0.015 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S9 - Kears Lake Outlet (483962 E, 6346990 N) | | | |
| Field Personnel: | SE, SG | Trip Date: | 07-Mar-10 |
| Data Entry Personnel: | DB | Date: | 05-May-10 |
| Data Check Personnel: | JP | Date: | 02-Jun-10 |

| | |
|---|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data Logger installed during Winter | |

| | |
|------------------------------|--------------|
| Measurement Details: | |
| Start Time (MST): | 1300 |
| End Time (MST): | 1310 |
| Equipment: | Flowmate |
| Method: | Ice |
| River Condition: | Complete Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Sunny 10°C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Birch Tree | 2.503 | 329.796 | 2.498 | 329.796 | - |
| Bench Mark 2: | T-post | 1.288 | 330.979 | 1.284 | 330.979 | - |
| Top of Ice: | | 2.994 | 329.305 | 2.989 | 329.305 | 329.305 |
| Water Level: | | 3.548 | 328.751 | 3.545 | 328.749 | 328.750 |
| Transducer: | | | | | | |
| Other: | | | | | | |

General Notes:

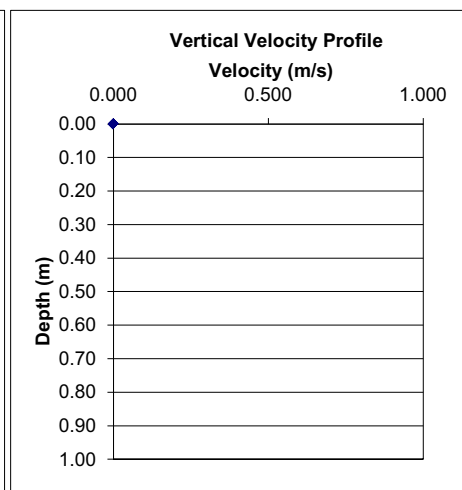
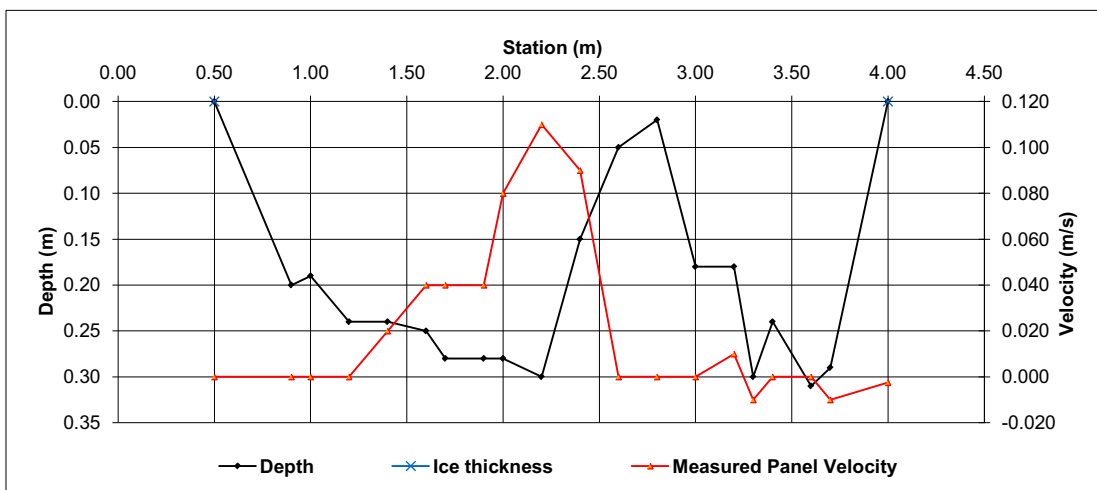
Ice Sheet was hanging no ice measurements made during manual measurement

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 0.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.50 | 0.70 | 0.20 | 0.05 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | |
| 1 | 0.90 | 0.20 | | 0.000 | | | 1.0 | 0.70 | 0.95 | 0.25 | 0.20 | 0.000 | 0.000 | 0.05 | 0.000 | 0% | |
| 2 | 1.00 | 0.19 | | 0.000 | | | 1.0 | 0.95 | 1.10 | 0.15 | 0.19 | 0.000 | 0.000 | 0.03 | 0.000 | 0% | |
| 3 | 1.20 | 0.24 | | 0.000 | | | 1.0 | 1.10 | 1.30 | 0.20 | 0.24 | 0.000 | 0.000 | 0.05 | 0.000 | 0% | |
| 4 | 1.40 | 0.24 | | 0.020 | | | 0.9 | 1.30 | 1.50 | 0.20 | 0.24 | 0.020 | 0.018 | 0.05 | 0.001 | 5% | |
| 5 | 1.60 | 0.25 | | 0.040 | | | 0.9 | 1.50 | 1.65 | 0.15 | 0.25 | 0.040 | 0.036 | 0.04 | 0.001 | 8% | |
| 6 | 1.70 | 0.28 | | 0.040 | | | 0.9 | 1.65 | 1.80 | 0.15 | 0.28 | 0.040 | 0.036 | 0.04 | 0.002 | 9% | |
| 7 | 1.90 | 0.28 | | 0.040 | | | 0.9 | 1.80 | 1.95 | 0.15 | 0.28 | 0.040 | 0.036 | 0.04 | 0.002 | 9% | |
| 8 | 2.00 | 0.28 | | 0.080 | | | 0.9 | 1.95 | 2.10 | 0.15 | 0.28 | 0.080 | 0.072 | 0.04 | 0.003 | 19% | |
| 9 | 2.20 | 0.30 | | 0.110 | | | 0.9 | 2.10 | 2.30 | 0.20 | 0.30 | 0.110 | 0.099 | 0.06 | 0.006 | 37% | |
| 10 | 2.40 | 0.15 | | 0.090 | | | 0.9 | 2.30 | 2.50 | 0.20 | 0.15 | 0.090 | 0.081 | 0.03 | 0.002 | 15% | |
| 11 | 2.60 | 0.05 | | 0.000 | | | 1.0 | 2.50 | 2.70 | 0.20 | 0.05 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | |
| 12 | 2.80 | 0.02 | | 0.000 | | | 1.0 | 2.70 | 2.90 | 0.20 | 0.02 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| 13 | 3.00 | 0.18 | | 0.000 | | | 1.0 | 2.90 | 3.10 | 0.20 | 0.18 | 0.000 | 0.000 | 0.04 | 0.000 | 0% | |
| 14 | 3.20 | 0.18 | | 0.010 | | | 0.9 | 3.10 | 3.25 | 0.15 | 0.18 | 0.010 | 0.009 | 0.03 | 0.000 | 2% | |
| 15 | 3.30 | 0.30 | | -0.010 | | | 0.9 | 3.25 | 3.35 | 0.10 | 0.30 | -0.010 | -0.009 | 0.03 | 0.000 | -2% | |
| 16 | 3.40 | 0.24 | | 0.000 | | | 1.0 | 3.35 | 3.50 | 0.15 | 0.24 | 0.000 | 0.000 | 0.04 | 0.000 | 0% | |
| 17 | 3.60 | 0.31 | | 0.000 | | | 1.0 | 3.50 | 3.65 | 0.15 | 0.31 | 0.000 | 0.000 | 0.05 | 0.000 | 0% | |
| 18 | 3.70 | 0.29 | | -0.010 | | | 0.9 | 3.65 | 3.85 | 0.20 | 0.29 | -0.010 | -0.009 | 0.06 | -0.001 | -3% | |
| Left | 4.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.85 | 4.00 | 0.15 | 0.07 | -0.003 | -0.003 | 0.01 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 0.016 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.016 | (m ³ /s) |
| Perceived Measurement Quality: | | Poor | |
| Total Area: | | 0.70 | (m ²) |
| Wetted Width: | | 3.50 | (m) |
| Hydraulic Depth: | | 0.199 | (m) |
| Mean Velocity: | | 0.023 | (m/s) |
| Froude Number: | | 0.017 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S9 - Kears Lake Outlet (483962 E, 6346990 N) | | | |
| Field Personnel: | DB CE | Trip Date: | 06-Apr-10 |
| Data Entry Personnel: | DB CE | Date: | 10-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|---|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data Logger installed during Winter | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1300 |
| End Time (MST): | 1330 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Birch Tree | 1.268 | 329.796 | 1.331 | 329.796 | - |
| Bench Mark 2: | T-post | 0.056 | 330.979 | 0.117 | 330.979 | - |
| Top of Ice: | | 2.155 | 328.909 | 2.219 | 328.908 | 328.909 |
| Water Level: | | 2.341 | 328.723 | 2.405 | 328.722 | 328.723 |
| Transducer: | | | | | | |
| Other: | | | | | | |

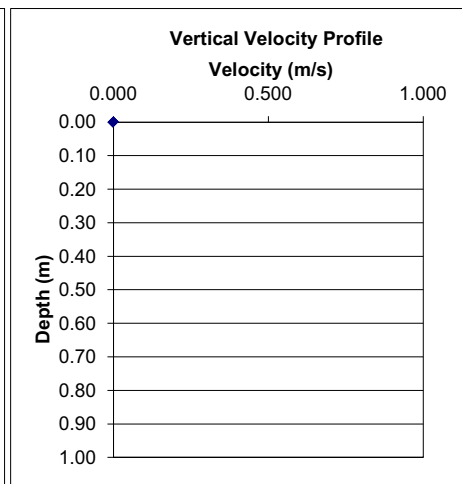
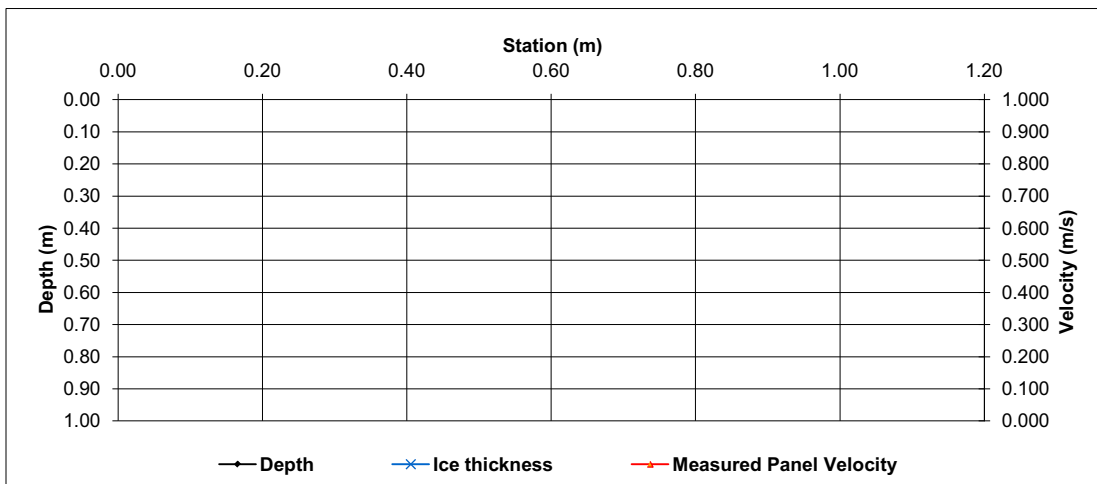
General Notes:

Air separation between water and ice. LB main flow but ice suspended well above. Right side, much is frozen and some limited flow underneath. Auger cores stretch all the way. See photos.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | |

| | |
|--------------------------------|----------------------------------|
| Flow characteristics: | |
| Total Flow: | NOT MEASURED (m ³ /s) |
| Perceived Measurement Quality: | Fair |
| Total Area: | #VALUE! (m ²) |
| Wetted Width: | 0.00 (m) |
| Hydraulic Depth: | #VALUE! (m) |
| Mean Velocity: | #VALUE! (m/s) |
| Froude Number: | #VALUE! |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S9 - Kears Lake Outlet (483962 E, 6346990 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 26-Apr-10 |
| Data Entry Personnel: | DB | Date: | 30-Apr-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|---|-------|
| Logger Details: | |
| Transducer Reading: | 0.599 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.04 |
| Datalogger Clock: | 736 |
| Laptop Clock: | 736 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data Logger installed during Winter | |

| | |
|------------------------------|--------|
| Measurement Details: | |
| Start Time (MST): | 730 |
| End Time (MST): | 750 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Sunny |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Birch Tree | 1.325 | 329.796 | 1.289 | 329.796 | - |
| Bench Mark 2: | T-post | 0.126 | 330.979 | 0.088 | 330.979 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.049 | 329.072 | 2.009 | 329.076 | 329.074 |
| Transducer: | | 0.599 | 328.473 | 0.599 | 328.477 | 328.475 |
| Other: | | | | | | |

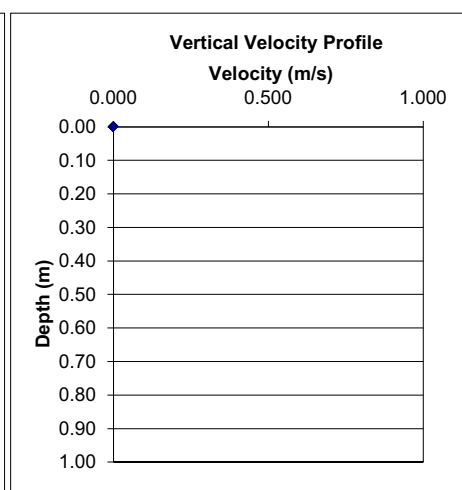
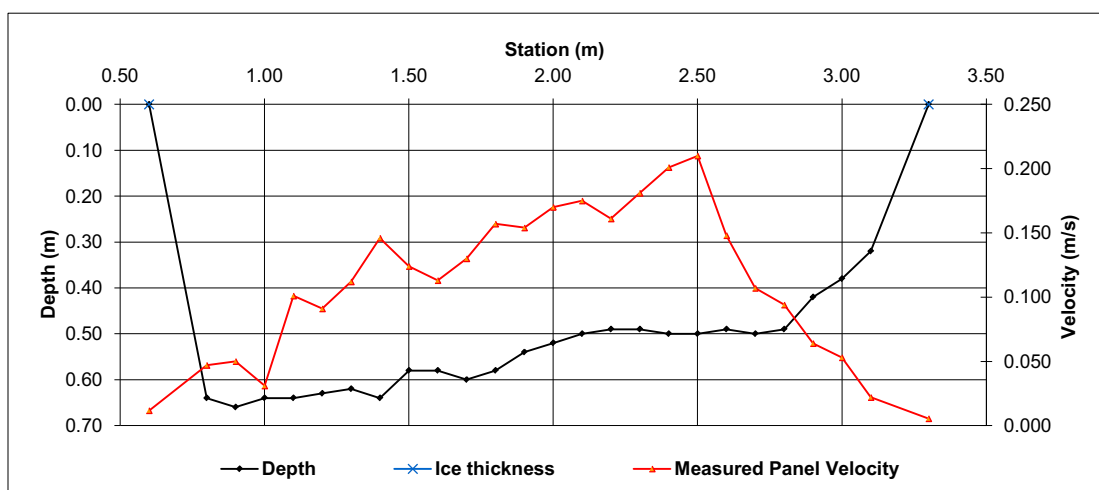
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.60 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.60 | 0.70 | 0.10 | 0.16 | 0.012 | 0.012 | 0.02 | 0.000 | 0% |
| 1 | 0.80 | 0.64 | | 0.047 | | | 1.0 | 0.70 | 0.85 | 0.15 | 0.64 | 0.047 | 0.047 | 0.10 | 0.005 | 3% |
| 2 | 0.90 | 0.66 | | 0.050 | | | 1.0 | 0.85 | 0.95 | 0.10 | 0.66 | 0.050 | 0.050 | 0.07 | 0.003 | 2% |
| 3 | 1.00 | 0.64 | | 0.031 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.64 | 0.031 | 0.031 | 0.06 | 0.002 | 1% |
| 4 | 1.10 | 0.64 | | 0.101 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.64 | 0.101 | 0.101 | 0.06 | 0.006 | 4% |
| 5 | 1.20 | 0.63 | | 0.091 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.63 | 0.091 | 0.091 | 0.06 | 0.006 | 4% |
| 6 | 1.30 | 0.62 | | 0.112 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.62 | 0.112 | 0.112 | 0.06 | 0.007 | 4% |
| 7 | 1.40 | 0.64 | | 0.146 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.64 | 0.146 | 0.146 | 0.06 | 0.009 | 6% |
| 8 | 1.50 | 0.58 | | 0.124 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.58 | 0.124 | 0.124 | 0.06 | 0.007 | 5% |
| 9 | 1.60 | 0.58 | | 0.113 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.58 | 0.113 | 0.113 | 0.06 | 0.007 | 4% |
| 10 | 1.70 | 0.60 | | 0.130 | | | 1.0 | 1.65 | 1.75 | 0.10 | 0.60 | 0.130 | 0.130 | 0.06 | 0.008 | 5% |
| 11 | 1.80 | 0.58 | | 0.157 | | | 1.0 | 1.75 | 1.85 | 0.10 | 0.58 | 0.157 | 0.157 | 0.06 | 0.009 | 6% |
| 12 | 1.90 | 0.54 | | 0.154 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.54 | 0.154 | 0.154 | 0.05 | 0.008 | 5% |
| 13 | 2.00 | 0.52 | | 0.170 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.52 | 0.170 | 0.170 | 0.05 | 0.009 | 6% |
| 14 | 2.10 | 0.50 | | 0.175 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.50 | 0.175 | 0.175 | 0.05 | 0.009 | 6% |
| 15 | 2.20 | 0.49 | | 0.161 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.49 | 0.161 | 0.161 | 0.05 | 0.008 | 5% |
| 16 | 2.30 | 0.49 | | 0.181 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.49 | 0.181 | 0.181 | 0.05 | 0.009 | 6% |
| 17 | 2.40 | 0.50 | | 0.201 | | | 1.0 | 2.35 | 2.45 | 0.10 | 0.50 | 0.201 | 0.201 | 0.05 | 0.010 | 6% |
| 18 | 2.50 | 0.50 | | 0.210 | | | 1.0 | 2.45 | 2.55 | 0.10 | 0.50 | 0.210 | 0.210 | 0.05 | 0.011 | 7% |
| 19 | 2.60 | 0.49 | | 0.148 | | | 1.0 | 2.55 | 2.65 | 0.10 | 0.49 | 0.148 | 0.148 | 0.05 | 0.007 | 5% |
| 20 | 2.70 | 0.50 | | 0.107 | | | 1.0 | 2.65 | 2.75 | 0.10 | 0.50 | 0.107 | 0.107 | 0.05 | 0.005 | 3% |
| 21 | 2.80 | 0.49 | | 0.094 | | | 1.0 | 2.75 | 2.85 | 0.10 | 0.49 | 0.094 | 0.094 | 0.05 | 0.005 | 3% |
| 22 | 2.90 | 0.42 | | 0.064 | | | 1.0 | 2.85 | 2.95 | 0.10 | 0.42 | 0.064 | 0.064 | 0.04 | 0.003 | 2% |
| 23 | 3.00 | 0.38 | | 0.053 | | | 1.0 | 2.95 | 3.05 | 0.10 | 0.38 | 0.053 | 0.053 | 0.04 | 0.002 | 1% |
| 24 | 3.10 | 0.32 | | 0.022 | | | 1.0 | 3.05 | 3.20 | 0.15 | 0.32 | 0.022 | 0.022 | 0.05 | 0.001 | 1% |
| Right | 3.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.20 | 3.30 | 0.10 | 0.08 | 0.006 | 0.006 | 0.01 | 0.000 | 1% |
| Total Flow | | | | | | | | | | | | | | | 0.155 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.155 | (m ³ /s) |
| Perceived Measurement Quality: | | Good | |
| Total Area: | | 1.37 | (m ²) |
| Wetted Width: | | 2.70 | (m) |
| Hydraulic Depth: | | 0.506 | (m) |
| Mean Velocity: | | 0.114 | (m/s) |
| Froude Number: | | 0.051 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S9 - Kears Lake Outlet (483962 E, 6346990 N) | | | |
| Field Personnel: | DB BL Harold Funk | Trip Date: | 26-Jun-10 |
| Data Entry Personnel: | DB | Date: | 02-Jul-10 |
| Data Check Personnel: | JP | Date: | 13-Jul-10 |

| | |
|---|-------------|
| Logger Details: | |
| Transducer Reading: | 0.624 |
| Battery (Main): | 100% |
| Battery (Aux): | 75% New 80% |
| Datalogger Clock: | 10:06 |
| Laptop Clock: | 10:08 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | ~60% |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data Logger installed during Winter | |

| | |
|------------------------------|--------|
| Measurement Details: | |
| Start Time (MST): | 1005 |
| End Time (MST): | 1207 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Poor |
| Weather: | Cloudy |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Birch Tree | 1.300 | 329.796 | 1.298 | 329.796 | - |
| Bench Mark 2: | T-post | 0.067 | 330.979 | 0.067 | 330.979 | - |
| Top of Ice: | | | 331.096 | | 331.094 | 331.095 |
| Water Level: | | 1.970 | 329.126 | 1.968 | 329.126 | 329.126 |
| Transducer: | | 0.624 | 328.502 | 0.624 | 328.502 | 328.502 |
| Other: | | | | | | |

General Notes:

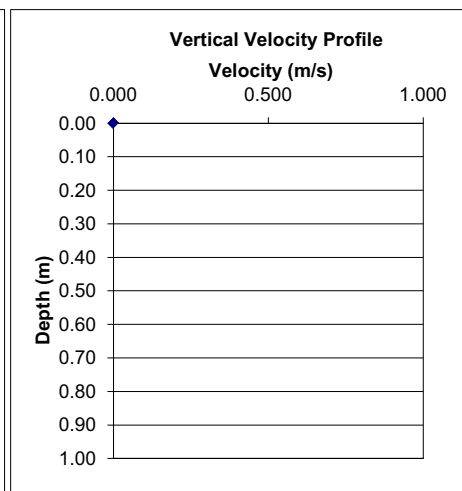
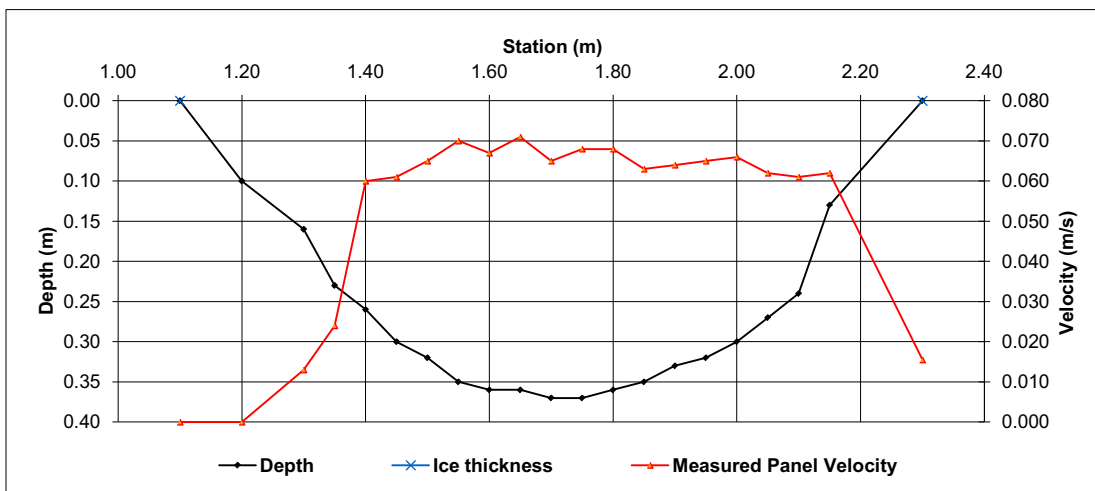
Measured in culvert. Culvert lifted up at end and possible flow loss, flow from other culvert appears stagnant.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 1.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.10 | 1.15 | 0.05 | 0.03 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| 1 | 1.20 | 0.10 | | 0.000 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.10 | 0.000 | 0.000 | 0.01 | 0.000 | 0% |
| 2 | 1.30 | 0.16 | | 0.013 | | | 1.0 | 1.25 | 1.33 | 0.08 | 0.16 | 0.013 | 0.013 | 0.01 | 0.000 | 1% |
| 3 | 1.35 | 0.23 | | 0.024 | | | 1.0 | 1.33 | 1.38 | 0.05 | 0.23 | 0.024 | 0.024 | 0.01 | 0.000 | 2% |
| 4 | 1.40 | 0.26 | | 0.060 | | | 1.0 | 1.38 | 1.43 | 0.05 | 0.26 | 0.060 | 0.060 | 0.01 | 0.001 | 5% |
| 5 | 1.45 | 0.30 | | 0.061 | | | 1.0 | 1.43 | 1.48 | 0.05 | 0.30 | 0.061 | 0.061 | 0.02 | 0.001 | 5% |
| 6 | 1.50 | 0.32 | | 0.065 | | | 1.0 | 1.48 | 1.53 | 0.05 | 0.32 | 0.065 | 0.065 | 0.02 | 0.001 | 6% |
| 7 | 1.55 | 0.35 | | 0.070 | | | 1.0 | 1.53 | 1.58 | 0.05 | 0.35 | 0.070 | 0.070 | 0.02 | 0.001 | 7% |
| 8 | 1.60 | 0.36 | | 0.067 | | | 1.0 | 1.58 | 1.63 | 0.05 | 0.36 | 0.067 | 0.067 | 0.02 | 0.001 | 7% |
| 9 | 1.65 | 0.36 | | 0.071 | | | 1.0 | 1.63 | 1.68 | 0.05 | 0.36 | 0.071 | 0.071 | 0.02 | 0.001 | 7% |
| 10 | 1.70 | 0.37 | | 0.065 | | | 1.0 | 1.68 | 1.73 | 0.05 | 0.37 | 0.065 | 0.065 | 0.02 | 0.001 | 7% |
| 11 | 1.75 | 0.37 | | 0.068 | | | 1.0 | 1.73 | 1.78 | 0.05 | 0.37 | 0.068 | 0.068 | 0.02 | 0.001 | 7% |
| 12 | 1.80 | 0.36 | | 0.068 | | | 1.0 | 1.78 | 1.83 | 0.05 | 0.36 | 0.068 | 0.068 | 0.02 | 0.001 | 7% |
| 13 | 1.85 | 0.35 | | 0.063 | | | 1.0 | 1.83 | 1.88 | 0.05 | 0.35 | 0.063 | 0.063 | 0.02 | 0.001 | 6% |
| 14 | 1.90 | 0.33 | | 0.064 | | | 1.0 | 1.88 | 1.93 | 0.05 | 0.33 | 0.064 | 0.064 | 0.02 | 0.001 | 6% |
| 15 | 1.95 | 0.32 | | 0.065 | | | 1.0 | 1.93 | 1.98 | 0.05 | 0.32 | 0.065 | 0.065 | 0.02 | 0.001 | 6% |
| 16 | 2.00 | 0.30 | | 0.066 | | | 1.0 | 1.98 | 2.03 | 0.05 | 0.30 | 0.066 | 0.066 | 0.01 | 0.001 | 6% |
| 17 | 2.05 | 0.27 | | 0.062 | | | 1.0 | 2.03 | 2.08 | 0.05 | 0.27 | 0.062 | 0.062 | 0.01 | 0.001 | 5% |
| 18 | 2.10 | 0.24 | | 0.061 | | | 1.0 | 2.08 | 2.13 | 0.05 | 0.24 | 0.061 | 0.061 | 0.01 | 0.001 | 4% |
| 19 | 2.15 | 0.13 | | 0.062 | | | 1.0 | 2.13 | 2.23 | 0.10 | 0.13 | 0.062 | 0.062 | 0.01 | 0.001 | 5% |
| Right | 2.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.23 | 2.30 | 0.08 | 0.03 | 0.016 | 0.016 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.017 | |

**Add/delete # rows as necessary, remembering to autofill calculations/graphs etc*

| | | | |
|--------------------------------|--|-------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.017 | (m ³ /s) |
| Perceived Measurement Quality: | | Poor | |
| Total Area: | | 0.29 | (m ²) |
| Wetted Width: | | 1.20 | (m) |
| Hydraulic Depth: | | 0.244 | (m) |
| Mean Velocity: | | 0.059 | (m/s) |
| Froude Number: | | 0.038 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | 0.000 |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S9 - Kears Lake Outlet (483962 E, 6346990 N) | | | |
| Field Personnel: | DB BL Harold Funk | Trip Date: | 26-Jun-10 |
| Data Entry Personnel: | DB | Date: | 02-Jul-10 |
| Data Check Personnel: | | Date: | |

| | |
|---|-------------|
| Logger Details: | |
| Transducer Reading: | 0.624 |
| Battery (Main): | 100% |
| Battery (Aux): | 75% New 80% |
| Datalogger Clock: | 10:06 |
| Laptop Clock: | 10:08 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | ~60% |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data Logger installed during Winter | |

| | |
|------------------------------|--------|
| Measurement Details: | |
| Start Time (MST): | 10:05 |
| End Time (MST): | 12:07 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Poor |
| Weather: | Cloudy |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Birch Tree | 1.300 | 329.796 | 1.298 | 329.796 | - |
| Bench Mark 2: | T-post | 0.067 | 330.979 | 0.067 | 330.979 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.970 | 329.126 | 1.968 | 329.126 | 329.126 |
| Transducer: | | 0.624 | 328.502 | 0.624 | 328.502 | 328.502 |
| Other: | | | | | | |

General Notes:

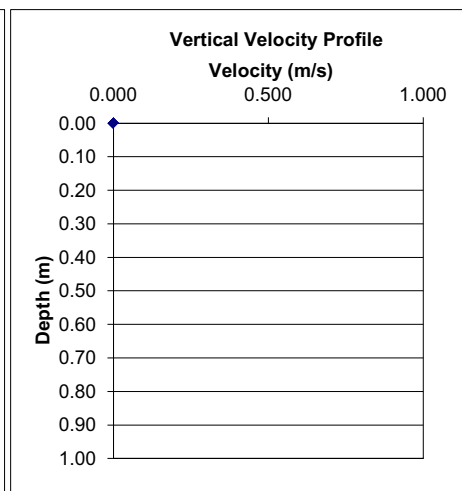
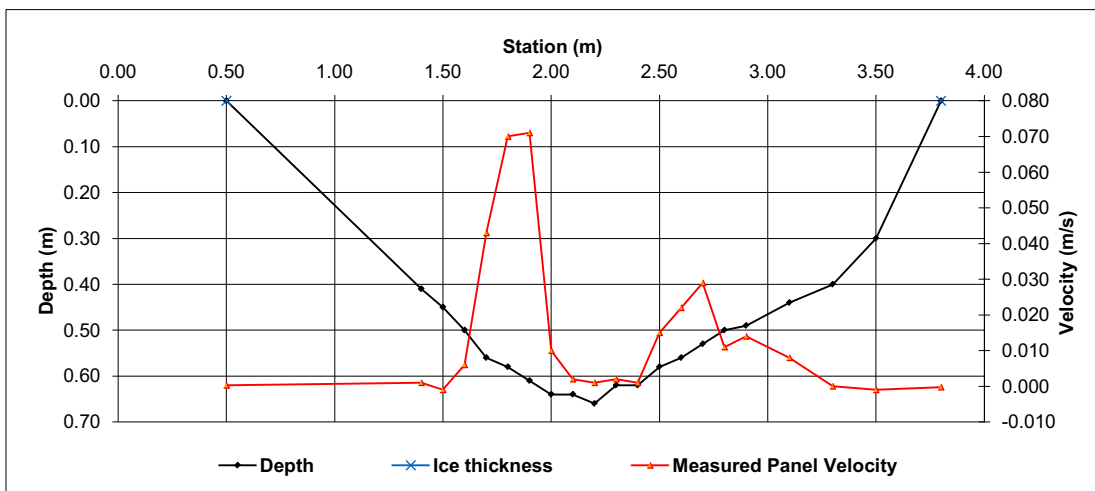
Measurement in only non-weedy spot 30-40 m downstream of flow. Orange markers at x-section. UTM 483931/6346996

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 3.80 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.80 | 3.65 | 0.15 | 0.08 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | |
| 1 | 3.50 | 0.30 | | -0.001 | | | 1.0 | 3.65 | 3.40 | 0.25 | 0.30 | -0.001 | -0.001 | 0.08 | 0.000 | 0% | |
| 2 | 3.30 | 0.40 | | 0.000 | | | 1.0 | 3.40 | 3.20 | 0.20 | 0.40 | 0.000 | 0.000 | 0.08 | 0.000 | 0% | |
| 3 | 3.10 | 0.44 | | 0.008 | | | 1.0 | 3.20 | 3.00 | 0.20 | 0.44 | 0.008 | 0.008 | 0.09 | 0.001 | 4% | |
| 4 | 2.90 | 0.49 | | 0.014 | | | 1.0 | 3.00 | 2.85 | 0.15 | 0.49 | 0.014 | 0.014 | 0.07 | 0.001 | 6% | |
| 5 | 2.80 | 0.50 | | 0.011 | | | 1.0 | 2.85 | 2.75 | 0.10 | 0.50 | 0.011 | 0.011 | 0.05 | 0.001 | 3% | |
| 6 | 2.70 | 0.53 | | 0.029 | | | 1.0 | 2.75 | 2.65 | 0.10 | 0.53 | 0.029 | 0.029 | 0.05 | 0.002 | 8% | |
| 7 | 2.60 | 0.56 | | 0.022 | | | 1.0 | 2.65 | 2.55 | 0.10 | 0.56 | 0.022 | 0.022 | 0.06 | 0.001 | 7% | |
| 8 | 2.50 | 0.58 | | 0.015 | | | 1.0 | 2.55 | 2.45 | 0.10 | 0.58 | 0.015 | 0.015 | 0.06 | 0.001 | 5% | |
| 9 | 2.40 | 0.62 | | 0.001 | | | 1.0 | 2.45 | 2.35 | 0.10 | 0.62 | 0.001 | 0.001 | 0.06 | 0.000 | 0% | |
| 10 | 2.30 | 0.62 | | 0.002 | | | 1.0 | 2.35 | 2.25 | 0.10 | 0.62 | 0.002 | 0.002 | 0.06 | 0.000 | 1% | |
| 11 | 2.20 | 0.66 | | 0.001 | | | 1.0 | 2.25 | 2.15 | 0.10 | 0.66 | 0.001 | 0.001 | 0.07 | 0.000 | 0% | |
| 12 | 2.10 | 0.64 | | 0.002 | | | 1.0 | 2.15 | 2.05 | 0.10 | 0.64 | 0.002 | 0.002 | 0.06 | 0.000 | 1% | |
| 13 | 2.00 | 0.64 | | 0.010 | | | 1.0 | 2.05 | 1.95 | 0.10 | 0.64 | 0.010 | 0.010 | 0.06 | 0.001 | 4% | |
| 14 | 1.90 | 0.61 | | 0.071 | | | 1.0 | 1.95 | 1.85 | 0.10 | 0.61 | 0.071 | 0.071 | 0.06 | 0.004 | 24% | |
| 15 | 1.80 | 0.58 | | 0.070 | | | 1.0 | 1.85 | 1.75 | 0.10 | 0.58 | 0.070 | 0.070 | 0.06 | 0.004 | 22% | |
| 16 | 1.70 | 0.56 | | 0.043 | | | 1.0 | 1.75 | 1.65 | 0.10 | 0.56 | 0.043 | 0.043 | 0.06 | 0.002 | 13% | |
| 17 | 1.60 | 0.50 | | 0.006 | | | 1.0 | 1.65 | 1.55 | 0.10 | 0.50 | 0.006 | 0.006 | 0.05 | 0.000 | 2% | |
| 18 | 1.50 | 0.45 | | -0.001 | | | 1.0 | 1.55 | 1.45 | 0.10 | 0.45 | -0.001 | -0.001 | 0.05 | 0.000 | 0% | |
| 19 | 1.40 | 0.41 | | 0.001 | | | 1.0 | 1.45 | 0.95 | 0.50 | 0.41 | 0.001 | 0.001 | 0.21 | 0.000 | 1% | |
| Left | 0.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.95 | 0.50 | 0.45 | 0.10 | 0.000 | 0.000 | 0.05 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.018 | | |

**Add/delete # rows as necessary, remembering to autofill calculations/graphs etc*

| | | | |
|--------------------------------|-------|---------------------|--|
| Flow characteristics: | | | |
| Total Flow: | 0.018 | (m ³ /s) | |
| Perceived Measurement Quality: | Poor | | |
| Total Area: | 1.38 | (m ²) | |
| Wetted Width: | 2.70 | (m) | |
| Hydraulic Depth: | 0.513 | (m) | |
| Mean Velocity: | 0.013 | (m/s) | |
| Froude Number: | 0.006 | | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S9 - Kears Lake Outlet (483962 E, 6346990 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 15-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|-----------|
| Logger Details: | |
| Transducer Reading: | 0.374 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.04 |
| Datalogger Clock: | 1127 |
| Laptop Clock: | 1129 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 70% reset |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 1130 |
| End Time (MST): | 1200 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Poor |
| Weather: | partly 20°C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Birch Tree | 1.387 | 329.796 | 1.329 | 329.796 | - |
| Bench Mark 2: | T-post | 0.154 | 330.979 | 0.095 | 330.979 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.237 | 328.946 | 2.178 | 328.947 | 328.947 |
| Transducer: | | 0.374 | 328.572 | 0.374 | 328.573 | 328.573 |
| Other: | | | | | | |

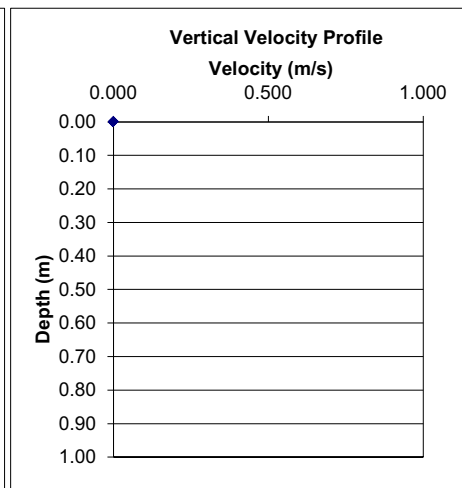
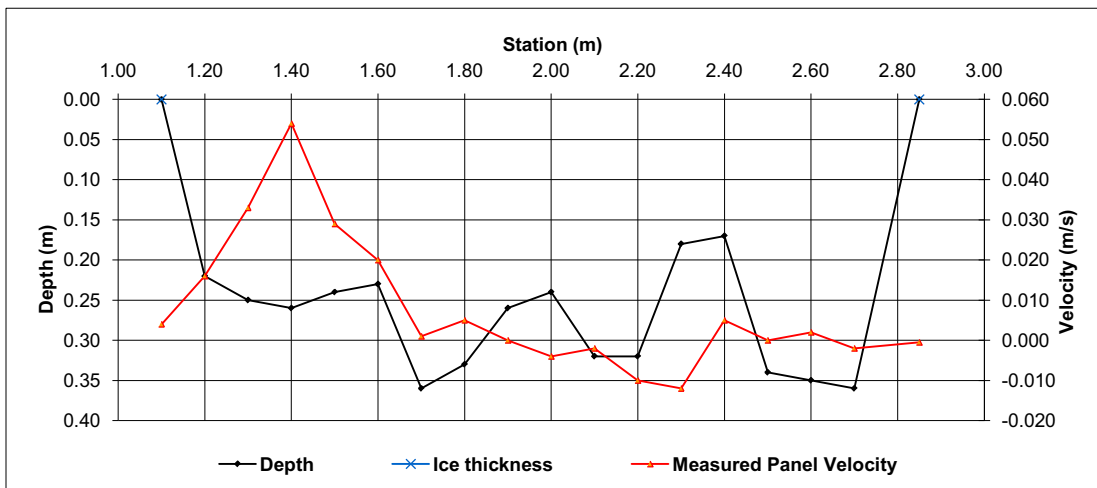
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 1.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.10 | 1.15 | 0.05 | 0.06 | 0.004 | 0.004 | 0.00 | 0.000 | 0% |
| 1 | 1.20 | 0.22 | | 0.016 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.22 | 0.016 | 0.016 | 0.02 | 0.000 | 11% |
| 2 | 1.30 | 0.25 | | 0.033 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.25 | 0.033 | 0.033 | 0.03 | 0.001 | 25% |
| 3 | 1.40 | 0.26 | | 0.054 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.26 | 0.054 | 0.054 | 0.03 | 0.001 | 42% |
| 4 | 1.50 | 0.24 | | 0.029 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.24 | 0.029 | 0.029 | 0.02 | 0.001 | 21% |
| 5 | 1.60 | 0.23 | | 0.020 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.23 | 0.020 | 0.020 | 0.02 | 0.000 | 14% |
| 6 | 1.70 | 0.36 | | 0.001 | | | 1.0 | 1.65 | 1.75 | 0.10 | 0.36 | 0.001 | 0.001 | 0.04 | 0.000 | 1% |
| 7 | 1.80 | 0.33 | | 0.005 | | | 1.0 | 1.75 | 1.85 | 0.10 | 0.33 | 0.005 | 0.005 | 0.03 | 0.000 | 5% |
| 8 | 1.90 | 0.26 | | 0.000 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.26 | 0.000 | 0.000 | 0.03 | 0.000 | 0% |
| 9 | 2.00 | 0.24 | | -0.004 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.24 | -0.004 | -0.004 | 0.02 | 0.000 | -3% |
| 10 | 2.10 | 0.32 | | -0.002 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.32 | -0.002 | -0.002 | 0.03 | 0.000 | -2% |
| 11 | 2.20 | 0.32 | | -0.010 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.32 | -0.010 | -0.010 | 0.03 | 0.000 | -10% |
| 12 | 2.30 | 0.18 | | -0.012 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.18 | -0.012 | -0.012 | 0.02 | 0.000 | -7% |
| 13 | 2.40 | 0.17 | | 0.005 | | | 1.0 | 2.35 | 2.45 | 0.10 | 0.17 | 0.005 | 0.005 | 0.02 | 0.000 | 3% |
| 14 | 2.50 | 0.34 | | 0.000 | | | 1.0 | 2.45 | 2.55 | 0.10 | 0.34 | 0.000 | 0.000 | 0.03 | 0.000 | 0% |
| 15 | 2.60 | 0.35 | | 0.002 | | | 1.0 | 2.55 | 2.65 | 0.10 | 0.35 | 0.002 | 0.002 | 0.04 | 0.000 | 2% |
| 16 | 2.70 | 0.36 | | -0.002 | | | 1.0 | 2.65 | 2.78 | 0.13 | 0.36 | -0.002 | -0.002 | 0.05 | 0.000 | -3% |
| Left | 2.85 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.78 | 2.85 | 0.07 | 0.09 | -0.001 | -0.001 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.003 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.003 | (m ³ /s) |
| Perceived Measurement Quality: | | Poor | |
| Total Area: | | 0.46 | (m ²) |
| Wetted Width: | | 1.75 | (m) |
| Hydraulic Depth: | | 0.264 | (m) |
| Mean Velocity: | | 0.007 | (m/s) |
| Froude Number: | | 0.004 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | 0.000 |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S9 - Kearl Lake Outlet (483962 E, 6346990 N) | | | |
| Field Personnel: | DB HB SG | Trip Date: | 18-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.745 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.65 |
| Datalogger Clock: | 723 |
| Laptop Clock: | 724 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 40% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|------------------|
| Measurement Details: | |
| Start Time (MST): | 720 |
| End Time (MST): | 805 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Partly Cloudy 0° |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Birch Tree | 1.261 | 329.796 | 1.308 | 329.796 | - |
| Bench Mark 2: | T-post | 0.029 | 330.979 | 0.076 | 330.979 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.766 | 329.291 | 1.811 | 329.293 | 329.292 |
| Transducer: | | 0.745 | 328.546 | 0.745 | 328.548 | 328.547 |
| Other: | | | | | | |

General Notes:

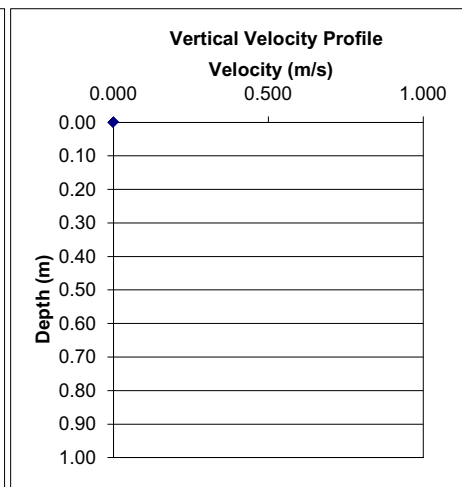
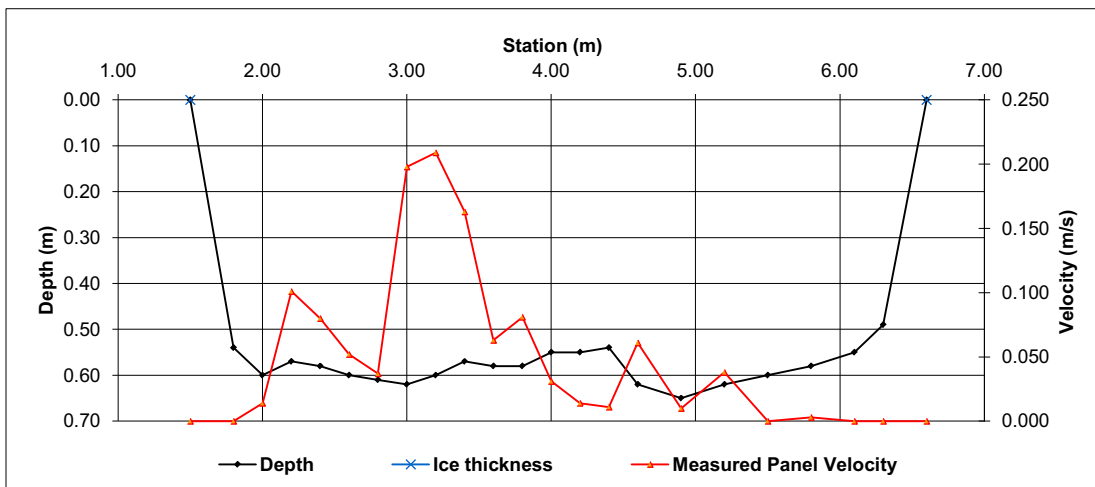
Most measurements affected by vegetation at this site

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 1.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.50 | 1.65 | 0.15 | 0.14 | 0.000 | 0.000 | 0.02 | 0.000 | 0% |
| 1 | 1.80 | 0.54 | | 0.000 | | | 1.0 | 1.65 | 1.90 | 0.25 | 0.54 | 0.000 | 0.000 | 0.14 | 0.000 | 0% |
| 2 | 2.00 | 0.60 | | 0.014 | | | 1.0 | 1.90 | 2.10 | 0.20 | 0.60 | 0.014 | 0.014 | 0.12 | 0.002 | 1% |
| 3 | 2.20 | 0.57 | | 0.101 | | | 1.0 | 2.10 | 2.30 | 0.20 | 0.57 | 0.101 | 0.101 | 0.11 | 0.012 | 8% |
| 4 | 2.40 | 0.58 | | 0.080 | | | 1.0 | 2.30 | 2.50 | 0.20 | 0.58 | 0.080 | 0.080 | 0.12 | 0.009 | 6% |
| 5 | 2.60 | 0.60 | | 0.052 | | | 1.0 | 2.50 | 2.70 | 0.20 | 0.60 | 0.052 | 0.052 | 0.12 | 0.006 | 4% |
| 6 | 2.80 | 0.61 | | 0.037 | | | 1.0 | 2.70 | 2.90 | 0.20 | 0.61 | 0.037 | 0.037 | 0.12 | 0.005 | 3% |
| 7 | 3.00 | 0.62 | | 0.198 | | | 1.0 | 2.90 | 3.10 | 0.20 | 0.62 | 0.198 | 0.198 | 0.12 | 0.025 | 17% |
| 8 | 3.20 | 0.60 | | 0.209 | | | 1.0 | 3.10 | 3.30 | 0.20 | 0.60 | 0.209 | 0.209 | 0.12 | 0.025 | 18% |
| 9 | 3.40 | 0.57 | | 0.163 | | | 1.0 | 3.30 | 3.50 | 0.20 | 0.57 | 0.163 | 0.163 | 0.11 | 0.019 | 13% |
| 10 | 3.60 | 0.58 | | 0.063 | | | 1.0 | 3.50 | 3.70 | 0.20 | 0.58 | 0.063 | 0.063 | 0.12 | 0.007 | 5% |
| 11 | 3.80 | 0.58 | | 0.081 | | | 1.0 | 3.70 | 3.90 | 0.20 | 0.58 | 0.081 | 0.081 | 0.12 | 0.009 | 7% |
| 12 | 4.00 | 0.55 | | 0.031 | | | 1.0 | 3.90 | 4.10 | 0.20 | 0.55 | 0.031 | 0.031 | 0.11 | 0.003 | 2% |
| 13 | 4.20 | 0.55 | | 0.014 | | | 1.0 | 4.10 | 4.30 | 0.20 | 0.55 | 0.014 | 0.014 | 0.11 | 0.002 | 1% |
| 14 | 4.40 | 0.54 | | 0.011 | | | 1.0 | 4.30 | 4.50 | 0.20 | 0.54 | 0.011 | 0.011 | 0.11 | 0.001 | 1% |
| 15 | 4.60 | 0.62 | | 0.061 | | | 1.0 | 4.50 | 4.75 | 0.25 | 0.62 | 0.061 | 0.061 | 0.16 | 0.009 | 7% |
| 16 | 4.90 | 0.65 | | 0.010 | | | 1.0 | 4.75 | 5.05 | 0.30 | 0.65 | 0.010 | 0.010 | 0.20 | 0.002 | 1% |
| 17 | 5.20 | 0.62 | | 0.038 | | | 1.0 | 5.05 | 5.35 | 0.30 | 0.62 | 0.038 | 0.038 | 0.19 | 0.007 | 5% |
| 18 | 5.50 | 0.60 | | 0.000 | | | 1.0 | 5.35 | 5.65 | 0.30 | 0.60 | 0.000 | 0.000 | 0.18 | 0.000 | 0% |
| 19 | 5.80 | 0.58 | | 0.003 | | | 1.0 | 5.65 | 5.95 | 0.30 | 0.58 | 0.003 | 0.003 | 0.17 | 0.001 | 0% |
| 20 | 6.10 | 0.55 | | 0.000 | | | 1.0 | 5.95 | 6.20 | 0.25 | 0.55 | 0.000 | 0.000 | 0.14 | 0.000 | 0% |
| 21 | 6.30 | 0.49 | | 0.000 | | | 1.0 | 6.20 | 6.45 | 0.25 | 0.49 | 0.000 | 0.000 | 0.12 | 0.000 | 0% |
| Right | 6.60 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 6.45 | 6.60 | 0.15 | 0.12 | 0.000 | 0.000 | 0.02 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.143 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.143 | (m ³ /s) |
| Perceived Measurement Quality: | | Fair | |
| Total Area: | | 2.83 | (m ²) |
| Wetted Width: | | 5.10 | (m) |
| Hydraulic Depth: | | 0.556 | (m) |
| Mean Velocity: | | 0.051 | (m/s) |
| Froude Number: | | 0.022 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S9 - Kearsal Lake Outlet (483962 E, 6346990 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 31-Oct-10 |
| Data Entry Personnel: | DB | Date: | 08-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|---------------------------|--------|
| Logger Details: | |
| Transducer Reading: | 0.274 |
| Battery (Main): | 12.41 |
| Battery (Aux): | - |
| Datalogger Clock: | 1201 |
| Laptop Clock: | 1202 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 45% |
| Dessicant: | Used |
| Logger# (if Δ): | 203058 |
| PT# (if Δ): | - |
| Other Logger Notes: | |
| Datalogger Removed | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 1200 |
| End Time (MST): | 1251 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Sunny 4°C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Birch Tree | 1.434 | 329.796 | 1.414 | 329.796 | - |
| Bench Mark 2: | T-post | 0.200 | 330.979 | 0.179 | 330.979 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.015 | 329.215 | 1.993 | 329.217 | 329.216 |
| Transducer: | | 0.274 | 328.941 | 0.274 | 328.943 | 328.942 |
| Other: | | | | | | |

General Notes:

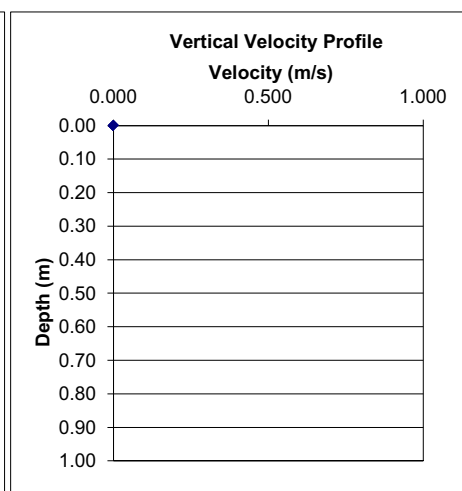
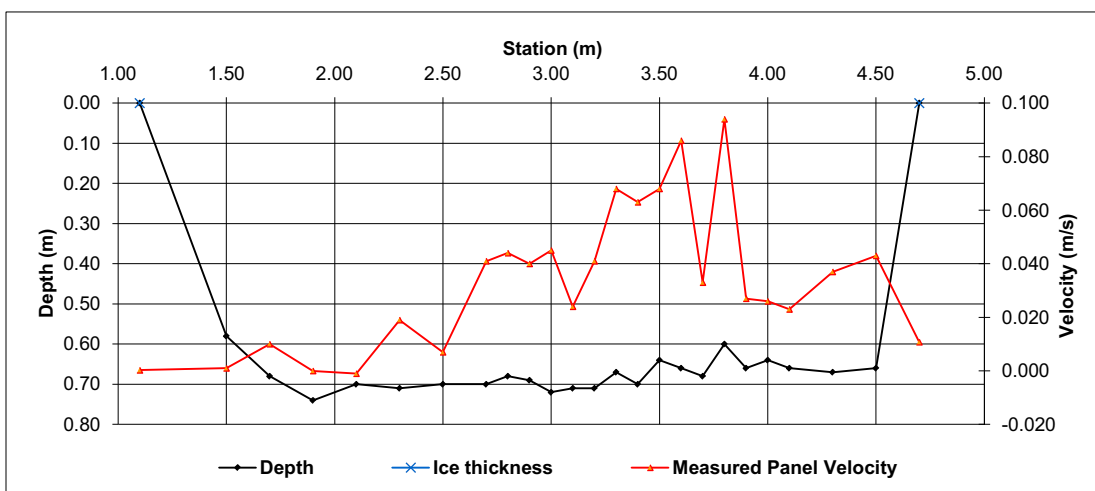
TSS @ 3.0m. Significant aquatic vegetation, especially L/B. Flow measured 50m D/S of station.

| Flow Measurement: Measured Data | | | | | | | Calculated Data | | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 1.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.10 | 1.30 | 0.20 | 0.15 | 0.000 | 0.000 | 0.03 | 0.000 | 0% | |
| 1 | 1.50 | 0.58 | | 0.001 | | | 1.0 | 1.30 | 1.60 | 0.30 | 0.58 | 0.001 | 0.001 | 0.17 | 0.000 | 0% | |
| 2 | 1.70 | 0.68 | | 0.010 | | | 1.0 | 1.60 | 1.80 | 0.20 | 0.68 | 0.010 | 0.010 | 0.14 | 0.001 | 2% | |
| 3 | 1.90 | 0.74 | | 0.000 | | | 1.0 | 1.80 | 2.00 | 0.20 | 0.74 | 0.000 | 0.000 | 0.15 | 0.000 | 0% | |
| 4 | 2.10 | 0.70 | | -0.001 | | | 1.0 | 2.00 | 2.20 | 0.20 | 0.70 | -0.001 | -0.001 | 0.14 | 0.000 | 0% | |
| 5 | 2.30 | 0.71 | | 0.019 | | | 1.0 | 2.20 | 2.40 | 0.20 | 0.71 | 0.019 | 0.019 | 0.14 | 0.003 | 4% | |
| 6 | 2.50 | 0.70 | | 0.007 | | | 1.0 | 2.40 | 2.60 | 0.20 | 0.70 | 0.007 | 0.007 | 0.14 | 0.001 | 1% | |
| 7 | 2.70 | 0.70 | | 0.041 | | | 1.0 | 2.60 | 2.75 | 0.15 | 0.70 | 0.041 | 0.041 | 0.11 | 0.004 | 6% | |
| 8 | 2.80 | 0.68 | | 0.044 | | | 1.0 | 2.75 | 2.85 | 0.10 | 0.68 | 0.044 | 0.044 | 0.07 | 0.003 | 5% | |
| 9 | 2.90 | 0.69 | | 0.040 | | | 1.0 | 2.85 | 2.95 | 0.10 | 0.69 | 0.040 | 0.040 | 0.07 | 0.003 | 4% | |
| 10 | 3.00 | 0.72 | | 0.045 | | | 1.0 | 2.95 | 3.05 | 0.10 | 0.72 | 0.045 | 0.045 | 0.07 | 0.003 | 5% | |
| 11 | 3.10 | 0.71 | | 0.024 | | | 1.0 | 3.05 | 3.15 | 0.10 | 0.71 | 0.024 | 0.024 | 0.07 | 0.002 | 3% | |
| 12 | 3.20 | 0.71 | | 0.041 | | | 1.0 | 3.15 | 3.25 | 0.10 | 0.71 | 0.041 | 0.041 | 0.07 | 0.003 | 4% | |
| 13 | 3.30 | 0.67 | | 0.068 | | | 1.0 | 3.25 | 3.35 | 0.10 | 0.67 | 0.068 | 0.068 | 0.07 | 0.005 | 7% | |
| 14 | 3.40 | 0.70 | | 0.063 | | | 1.0 | 3.35 | 3.45 | 0.10 | 0.70 | 0.063 | 0.063 | 0.07 | 0.004 | 7% | |
| 15 | 3.50 | 0.64 | | 0.068 | | | 1.0 | 3.45 | 3.55 | 0.10 | 0.64 | 0.068 | 0.068 | 0.06 | 0.004 | 7% | |
| 16 | 3.60 | 0.66 | | 0.086 | | | 1.0 | 3.55 | 3.65 | 0.10 | 0.66 | 0.086 | 0.086 | 0.07 | 0.006 | 9% | |
| 17 | 3.70 | 0.68 | | 0.033 | | | 1.0 | 3.65 | 3.75 | 0.10 | 0.68 | 0.033 | 0.033 | 0.07 | 0.002 | 3% | |
| 18 | 3.80 | 0.60 | | 0.094 | | | 1.0 | 3.75 | 3.85 | 0.10 | 0.60 | 0.094 | 0.094 | 0.06 | 0.006 | 8% | |
| 19 | 3.90 | 0.66 | | 0.027 | | | 1.0 | 3.85 | 3.95 | 0.10 | 0.66 | 0.027 | 0.027 | 0.07 | 0.002 | 3% | |
| 20 | 4.00 | 0.64 | | 0.026 | | | 1.0 | 3.95 | 4.05 | 0.10 | 0.64 | 0.026 | 0.026 | 0.06 | 0.002 | 3% | |
| 21 | 4.10 | 0.66 | | 0.023 | | | 1.0 | 4.05 | 4.20 | 0.15 | 0.66 | 0.023 | 0.023 | 0.10 | 0.002 | 3% | |
| 22 | 4.30 | 0.67 | | 0.037 | | | 1.0 | 4.20 | 4.40 | 0.20 | 0.67 | 0.037 | 0.037 | 0.13 | 0.005 | 7% | |
| 23 | 4.50 | 0.66 | | 0.043 | | | 1.0 | 4.40 | 4.60 | 0.20 | 0.66 | 0.043 | 0.043 | 0.13 | 0.006 | 9% | |
| Right | 4.70 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 4.60 | 4.70 | 0.10 | 0.17 | 0.011 | 0.011 | 0.02 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.066 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-----------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.066 | (m ³ /s) |
| Perceived Measurement Quality: | | Excellent | |
| Total Area: | | 2.27 | (m ²) |
| Wetted Width: | | 3.60 | (m) |
| Hydraulic Depth: | | 0.631 | (m) |
| Mean Velocity: | | 0.029 | (m/s) |
| Froude Number: | | 0.012 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S9 - Kears Lake Outlet (483962 E, 6346990 N) | | | |
| Field Personnel: | JO, SG | Trip Date: | 02-Dec-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | |
|---|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data Logger installed in Winter | |

| | |
|------------------------------|-----------------|
| Measurement Details: | |
| Start Time (MST): | 1100 |
| End Time (MST): | 1120 |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | - 12, 8/8 cloud |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Birch Tree | 1.591 | 329.796 | 1.595 | 329.796 | - |
| Bench Mark 2: | T-post | 0.352 | 330.979 | 0.351 | 330.979 | - |
| Top of Ice: | | 2.159 | 329.228 | 2.159 | 329.232 | 329.230 |
| Water Level: | | 2.221 | 329.166 | 2.223 | 329.168 | 329.167 |
| Transducer: | | | | | | |
| Other: | | | | | | |

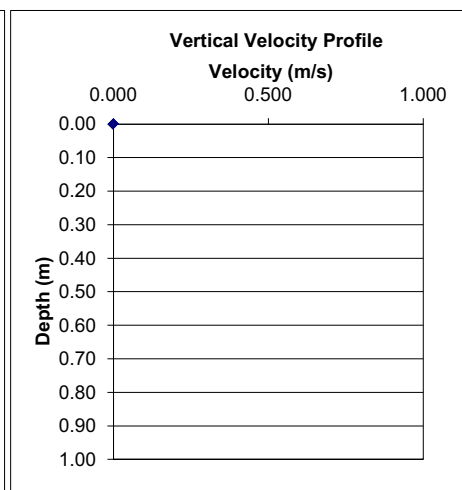
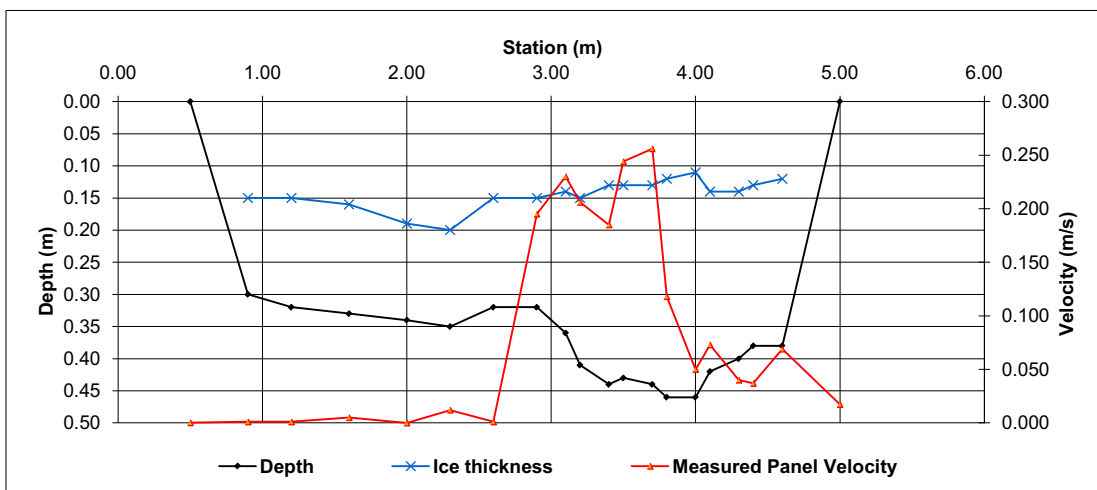
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 0.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 0.50 | 0.70 | 0.20 | 0.04 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | |
| 1 | 0.90 | 0.30 | 0.15 | 0.001 | | | 0.9 | 0.70 | 1.05 | 0.35 | 0.15 | 0.001 | 0.001 | 0.05 | 0.000 | 0% | |
| 2 | 1.20 | 0.32 | 0.15 | 0.001 | | | 0.9 | 1.05 | 1.40 | 0.35 | 0.17 | 0.001 | 0.001 | 0.06 | 0.000 | 0% | |
| 3 | 1.60 | 0.33 | 0.16 | 0.005 | | | 0.9 | 1.40 | 1.80 | 0.40 | 0.17 | 0.005 | 0.005 | 0.07 | 0.000 | 0% | |
| 4 | 2.00 | 0.34 | 0.19 | 0.000 | | | 1.0 | 1.80 | 2.15 | 0.35 | 0.15 | 0.000 | 0.000 | 0.05 | 0.000 | 0% | |
| 5 | 2.30 | 0.35 | 0.20 | 0.012 | | | 0.9 | 2.15 | 2.45 | 0.30 | 0.15 | 0.012 | 0.011 | 0.05 | 0.000 | 1% | |
| 6 | 2.60 | 0.32 | 0.15 | 0.001 | | | 0.9 | 2.45 | 2.75 | 0.30 | 0.17 | 0.001 | 0.001 | 0.05 | 0.000 | 0% | |
| 7 | 2.90 | 0.32 | 0.15 | 0.195 | | | 0.9 | 2.75 | 3.00 | 0.25 | 0.17 | 0.195 | 0.176 | 0.04 | 0.007 | 11% | |
| 8 | 3.10 | 0.36 | 0.14 | 0.230 | | | 0.9 | 3.00 | 3.15 | 0.15 | 0.22 | 0.230 | 0.207 | 0.03 | 0.007 | 10% | |
| 9 | 3.20 | 0.41 | 0.15 | 0.206 | | | 0.9 | 3.15 | 3.30 | 0.15 | 0.26 | 0.206 | 0.185 | 0.04 | 0.007 | 10% | |
| 10 | 3.40 | 0.44 | 0.13 | 0.185 | | | 0.9 | 3.30 | 3.45 | 0.15 | 0.31 | 0.185 | 0.167 | 0.05 | 0.008 | 11% | |
| 11 | 3.50 | 0.43 | 0.13 | 0.244 | | | 0.9 | 3.45 | 3.60 | 0.15 | 0.30 | 0.244 | 0.220 | 0.05 | 0.010 | 14% | |
| 12 | 3.70 | 0.44 | 0.13 | 0.256 | | | 0.9 | 3.60 | 3.75 | 0.15 | 0.31 | 0.256 | 0.230 | 0.05 | 0.011 | 16% | |
| 13 | 3.80 | 0.46 | 0.12 | 0.118 | | | 0.9 | 3.75 | 3.90 | 0.15 | 0.34 | 0.118 | 0.106 | 0.05 | 0.005 | 8% | |
| 14 | 4.00 | 0.46 | 0.11 | 0.050 | | | 0.9 | 3.90 | 4.05 | 0.15 | 0.35 | 0.050 | 0.045 | 0.05 | 0.002 | 3% | |
| 15 | 4.10 | 0.42 | 0.14 | 0.073 | | | 0.9 | 4.05 | 4.20 | 0.15 | 0.28 | 0.073 | 0.066 | 0.04 | 0.003 | 4% | |
| 16 | 4.30 | 0.40 | 0.14 | 0.040 | | | 0.9 | 4.20 | 4.35 | 0.15 | 0.26 | 0.040 | 0.036 | 0.04 | 0.001 | 2% | |
| 17 | 4.40 | 0.38 | 0.13 | 0.037 | | | 0.9 | 4.35 | 4.50 | 0.15 | 0.25 | 0.037 | 0.033 | 0.04 | 0.001 | 2% | |
| 18 | 4.60 | 0.38 | 0.12 | 0.069 | | | 0.9 | 4.50 | 4.80 | 0.30 | 0.26 | 0.069 | 0.062 | 0.08 | 0.005 | 7% | |
| Left | 5.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.80 | 5.00 | 0.20 | 0.07 | 0.017 | 0.017 | 0.01 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 0.069 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 0.069 (m ³ /s) |
| Perceived Measurement Quality: | Fair |
| Total Area: | 0.90 (m ²) |
| Wetted Width: | 4.50 (m) |
| Hydraulic Depth: | 0.200 (m) |
| Mean Velocity: | 0.077 (m/s) |
| Froude Number: | 0.055 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S10 - Wapasu Creek at Canterra Road (490350 E, 6355500 N) | | | |
| Field Personnel: | CE, CW | Trip Date: | 13-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.203 |
| Battery (Main): | 4.53 |
| Battery (Aux): | 15.39 |
| Datalogger Clock: | 1234 |
| Laptop Clock: | 1243 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 22% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1300 |
| End Time (MST): | 1330 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|-------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 1.371 | 100.721 | 1.367 | 100.721 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.387 | 100.720 | 1.381 | 100.720 | - |
| Top of Ice: | | 1.786 | 100.306 | 1.780 | 100.308 | 100.307 |
| Water Level: | | 1.948 | 100.144 | 1.941 | 100.147 | 100.146 |
| Transducer: | | 1.203 | 98.941 | 1.203 | 98.944 | 98.943 |
| Other: | | | | | | |

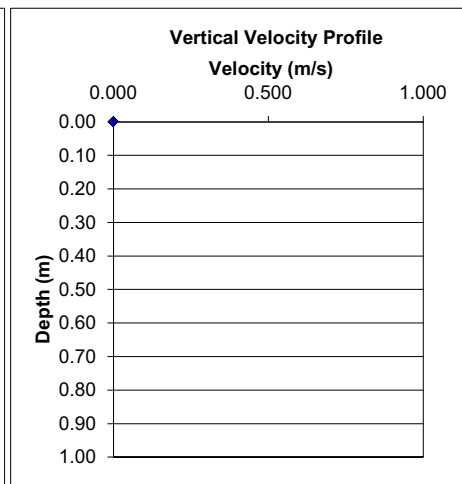
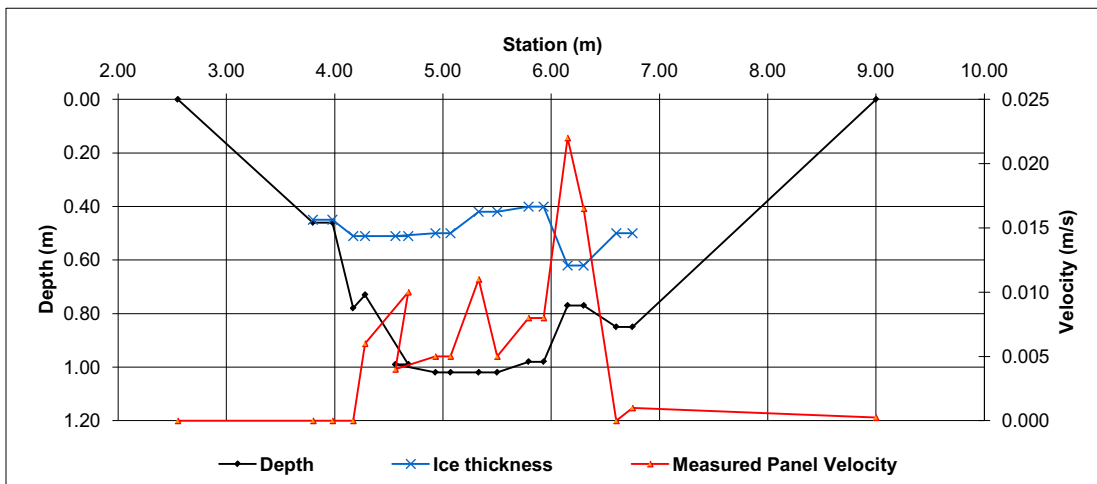
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 9.00 | 0.00 | | 0.000 | 0.000 | 0.000 | | | | | | | | | | | |
| 1 | 6.75 | 0.85 | 0.50 | 0.001 | | | 0.9 | 9.00 | 7.88 | 1.13 | 0.09 | 0.000 | 0.000 | 0.10 | 0.000 | 0% | |
| 2 | 6.60 | 0.85 | 0.50 | 0.000 | | | 0.9 | 7.88 | 6.68 | 1.20 | 0.35 | 0.001 | 0.001 | 0.42 | 0.000 | 5% | |
| 3 | 6.30 | 0.77 | 0.62 | 0.017 | | | 1.0 | 6.68 | 6.45 | 0.23 | 0.35 | 0.000 | 0.000 | 0.08 | 0.000 | 0% | |
| 4 | 6.15 | 0.77 | 0.62 | 0.022 | | | 0.9 | 6.45 | 6.23 | 0.23 | 0.15 | 0.017 | 0.015 | 0.03 | 0.001 | 7% | |
| 5 | 5.93 | 0.98 | 0.40 | 0.008 | | | 0.9 | 6.23 | 6.04 | 0.19 | 0.15 | 0.022 | 0.020 | 0.03 | 0.001 | 8% | |
| 6 | 5.79 | 0.98 | 0.40 | 0.008 | | | 0.9 | 6.04 | 5.86 | 0.18 | 0.58 | 0.008 | 0.007 | 0.10 | 0.001 | 10% | |
| 7 | 5.50 | 1.02 | 0.42 | 0.005 | | | 0.9 | 5.86 | 5.65 | 0.22 | 0.58 | 0.008 | 0.007 | 0.12 | 0.001 | 12% | |
| 8 | 5.33 | 1.02 | 0.42 | 0.011 | | | 0.9 | 5.65 | 5.42 | 0.23 | 0.60 | 0.005 | 0.005 | 0.14 | 0.001 | 9% | |
| 9 | 5.07 | 1.02 | 0.50 | 0.005 | | | 0.9 | 5.42 | 5.20 | 0.22 | 0.60 | 0.011 | 0.010 | 0.13 | 0.001 | 18% | |
| 10 | 4.93 | 1.02 | 0.50 | 0.005 | | | 0.9 | 5.20 | 5.00 | 0.20 | 0.52 | 0.005 | 0.005 | 0.10 | 0.000 | 7% | |
| 11 | 4.56 | 0.99 | 0.51 | 0.004 | | | 0.9 | 5.00 | 4.75 | 0.26 | 0.52 | 0.005 | 0.005 | 0.13 | 0.001 | 8% | |
| 12 | 4.68 | 0.99 | 0.51 | 0.010 | | | 0.9 | 4.75 | 4.62 | 0.13 | 0.48 | 0.004 | 0.004 | 0.06 | 0.000 | 3% | |
| 13 | 4.28 | 0.73 | 0.51 | 0.006 | | | 0.9 | 4.62 | 4.48 | 0.14 | 0.48 | 0.010 | 0.009 | 0.07 | 0.001 | 8% | |
| 14 | 4.17 | 0.78 | 0.51 | 0.000 | | | 0.9 | 4.48 | 4.23 | 0.26 | 0.22 | 0.006 | 0.005 | 0.06 | 0.000 | 4% | |
| 15 | 3.98 | 0.46 | 0.45 | 0.000 | | | 1.0 | 4.23 | 4.08 | 0.15 | 0.27 | 0.000 | 0.000 | 0.04 | 0.000 | 0% | |
| 16 | 3.80 | 0.46 | 0.45 | 0.000 | | | 1.0 | 4.08 | 3.89 | 0.19 | 0.01 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| Right | 2.55 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.89 | 3.18 | 0.72 | 0.01 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.007 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.007 | (m ³ /s) |
| Perceived Measurement Quality: | | Fair | |
| Total Area: | | 1.63 | (m ²) |
| Wetted Width: | | 4.70 | (m) |
| Hydraulic Depth: | | 0.346 | (m) |
| Mean Velocity: | | 0.004 | (m/s) |
| Froude Number: | | 0.002 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | 0.000 |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S10 - Wapasu Creek at Canterra Road (490350 E, 6355500 N) | | | |
| Field Personnel: | GB, SK | Trip Date: | 12-Feb-10 |
| Data Entry Personnel: | SG | Date: | 18-Feb-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.170 |
| Battery (Main): | 15.05 |
| Battery (Aux): | 4.6 |
| Datalogger Clock: | 1247 |
| Laptop Clock: | 1255 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 25% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 1325 |
| End Time (MST): | 1410 |
| Equipment: | Flow Mate |
| Method: | Ice |
| River Condition: | Ice cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | sunny -9C |

| Level Survey: | | | | | | |
|----------------------|-------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 1.126 | 100.721 | 0.872 | 100.721 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.129 | 100.720 | 0.875 | 100.720 | - |
| Top of Ice: | | 1.595 | 100.252 | 1.339 | 100.254 | 100.253 |
| Water Level: | | 1.734 | 100.113 | 1.479 | 100.114 | 100.114 |
| Transducer: | | 1.170 | 98.943 | 1.170 | 98.944 | 98.943 |
| Other: | | | | | | |

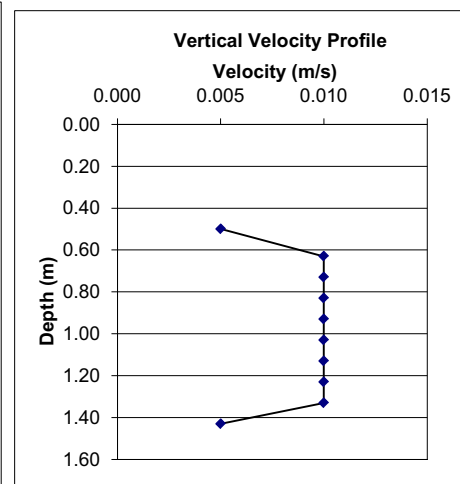
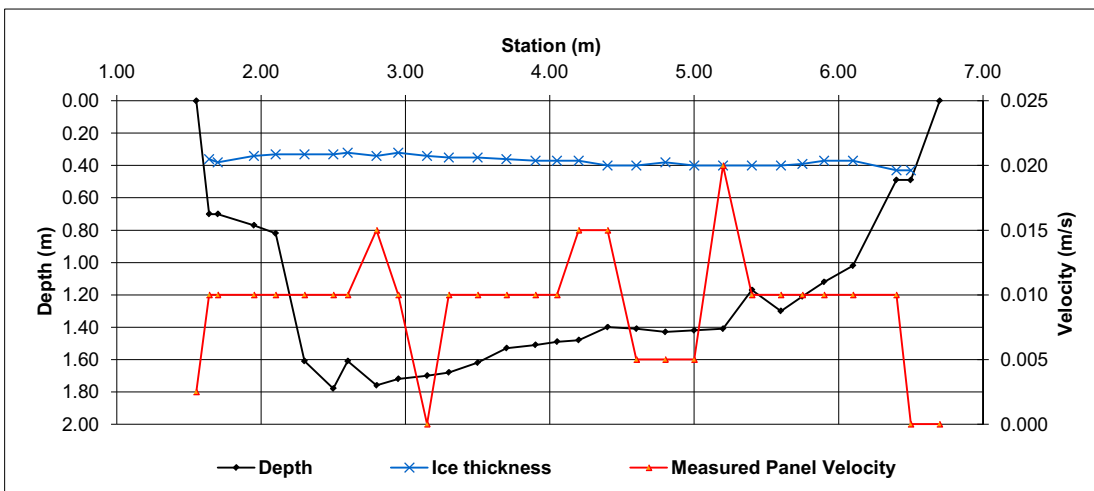
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 1.55 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.55 | 1.60 | 0.04 | 0.09 | 0.003 | 0.002 | 0.00 | 0.000 | 0% | |
| 1 | 1.64 | 0.70 | 0.36 | 0.010 | | | 0.9 | 1.60 | 1.67 | 0.08 | 0.34 | 0.010 | 0.009 | 0.03 | 0.000 | 1% | |
| 2 | 1.70 | 0.70 | 0.38 | 0.010 | | | 0.9 | 1.67 | 1.83 | 0.16 | 0.32 | 0.010 | 0.009 | 0.05 | 0.000 | 1% | |
| 3 | 1.95 | 0.77 | 0.34 | 0.010 | | | 0.9 | 1.83 | 2.03 | 0.20 | 0.43 | 0.010 | 0.009 | 0.09 | 0.001 | 2% | |
| 4 | 2.10 | 0.82 | 0.33 | 0.010 | | | 0.9 | 2.03 | 2.20 | 0.18 | 0.49 | 0.010 | 0.009 | 0.09 | 0.001 | 2% | |
| 5 | 2.30 | 1.61 | 0.33 | | 0.010 | 0.010 | 1.0 | 2.20 | 2.40 | 0.20 | 1.28 | 0.010 | 0.010 | 0.26 | 0.003 | 6% | |
| 6 | 2.50 | 1.78 | 0.33 | | 0.010 | 0.010 | 1.0 | 2.40 | 2.55 | 0.15 | 1.45 | 0.010 | 0.010 | 0.22 | 0.002 | 5% | |
| 7 | 2.60 | 1.61 | 0.32 | | 0.010 | 0.010 | 1.0 | 2.55 | 2.70 | 0.15 | 1.29 | 0.010 | 0.010 | 0.19 | 0.002 | 4% | |
| 8 | 2.80 | 1.76 | 0.34 | | 0.010 | 0.020 | 1.0 | 2.70 | 2.88 | 0.18 | 1.42 | 0.015 | 0.015 | 0.25 | 0.004 | 8% | |
| 9 | 2.95 | 1.72 | 0.32 | | 0.010 | 0.010 | 1.0 | 2.88 | 3.05 | 0.18 | 1.40 | 0.010 | 0.010 | 0.25 | 0.002 | 5% | |
| 10 | 3.15 | 1.70 | 0.34 | | 0.000 | 0.010 | 1.0 | 3.05 | 3.23 | 0.18 | 1.36 | 0.000 | 0.000 | 0.24 | 0.000 | 0% | |
| 11 | 3.30 | 1.68 | 0.35 | | 0.010 | 0.010 | 1.0 | 3.23 | 3.40 | 0.18 | 1.33 | 0.010 | 0.010 | 0.23 | 0.002 | 5% | |
| 12 | 3.50 | 1.62 | 0.35 | | 0.010 | 0.010 | 1.0 | 3.40 | 3.60 | 0.20 | 1.27 | 0.010 | 0.010 | 0.25 | 0.003 | 6% | |
| 13 | 3.70 | 1.53 | 0.36 | | 0.010 | 0.010 | 1.0 | 3.60 | 3.80 | 0.20 | 1.17 | 0.010 | 0.010 | 0.23 | 0.002 | 5% | |
| 14 | 3.90 | 1.51 | 0.37 | | 0.010 | 0.010 | 1.0 | 3.80 | 3.98 | 0.18 | 1.14 | 0.010 | 0.010 | 0.20 | 0.002 | 4% | |
| 15 | 4.05 | 1.49 | 0.37 | | 0.010 | 0.010 | 1.0 | 3.98 | 4.13 | 0.15 | 1.12 | 0.010 | 0.010 | 0.17 | 0.002 | 4% | |
| 16 | 4.20 | 1.48 | 0.37 | | 0.010 | 0.020 | 1.0 | 4.13 | 4.30 | 0.18 | 1.11 | 0.015 | 0.015 | 0.19 | 0.003 | 6% | |
| 17 | 4.40 | 1.40 | 0.40 | | 0.020 | 0.010 | 1.0 | 4.30 | 4.50 | 0.20 | 1.00 | 0.015 | 0.015 | 0.20 | 0.003 | 7% | |
| 18 | 4.60 | 1.41 | 0.40 | | 0.010 | 0.000 | 1.0 | 4.50 | 4.70 | 0.20 | 1.01 | 0.005 | 0.005 | 0.20 | 0.001 | 2% | |
| 19 | 4.80 | 1.43 | 0.38 | | 0.010 | 0.000 | 1.0 | 4.70 | 4.90 | 0.20 | 1.05 | 0.005 | 0.005 | 0.21 | 0.001 | 2% | |
| 20 | 5.00 | 1.42 | 0.40 | | 0.010 | 0.000 | 1.0 | 4.90 | 5.10 | 0.20 | 1.02 | 0.005 | 0.005 | 0.20 | 0.001 | 2% | |
| 21 | 5.20 | 1.41 | 0.40 | | 0.030 | 0.010 | 1.0 | 5.10 | 5.30 | 0.20 | 1.01 | 0.020 | 0.020 | 0.20 | 0.004 | 9% | |
| 22 | 5.40 | 1.17 | 0.40 | 0.010 | | | 0.9 | 5.30 | 5.50 | 0.20 | 0.77 | 0.010 | 0.009 | 0.15 | 0.001 | 3% | |
| 23 | 5.60 | 1.30 | 0.40 | 0.010 | | | 0.9 | 5.50 | 5.68 | 0.18 | 0.90 | 0.010 | 0.009 | 0.16 | 0.001 | 3% | |
| 24 | 5.75 | 1.21 | 0.39 | 0.010 | | | 0.9 | 5.68 | 5.83 | 0.15 | 0.82 | 0.010 | 0.009 | 0.12 | 0.001 | 2% | |
| 25 | 5.90 | 1.12 | 0.37 | 0.010 | | | 0.9 | 5.83 | 6.00 | 0.18 | 0.75 | 0.010 | 0.009 | 0.13 | 0.001 | 3% | |
| 26 | 6.10 | 1.02 | 0.37 | 0.010 | | | 0.9 | 6.00 | 6.25 | 0.25 | 0.65 | 0.010 | 0.009 | 0.16 | 0.001 | 3% | |
| 27 | 6.40 | 0.49 | 0.43 | 0.010 | | | 0.9 | 6.25 | 6.45 | 0.20 | 0.06 | 0.010 | 0.009 | 0.01 | 0.000 | 0% | |
| 28 | 6.50 | 0.49 | 0.43 | 0.000 | | | 1.0 | 6.45 | 6.60 | 0.15 | 0.06 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | |
| Left | 6.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 6.60 | 6.70 | 0.10 | 0.02 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.046 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 0.046 (m ³ /s) |
| Perceived Measurement Quality: | Good |
| Total Area: | 4.70 (m ²) |
| Wetted Width: | 5.15 (m) |
| Hydraulic Depth: | 0.913 (m) |
| Mean Velocity: | 0.010 (m/s) |
| Froude Number: | 0.003 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.009 |
| Offset | 4.2 | 1.48 | 0 | - | - | Panel V.@Ofst 0.015 |
| Depth | 1.48 | 1.38 | 0.01 | 1.43 | 0.005 | 60% Depth 1.056 |
| Ice Depth | 0.42 | 1.28 | 0.01 | 1.33 | 0.010 | 20% Depth 0.63 |
| | | 1.18 | 0.01 | 1.23 | 0.010 | 80% Depth 1.27 |
| | | 1.08 | 0.01 | 1.13 | 0.010 | |
| | | 0.98 | 0.01 | 1.03 | 0.010 | |
| | | 0.88 | 0.01 | 0.93 | 0.010 | |
| | | 0.78 | 0.01 | 0.83 | 0.010 | |
| | | 0.68 | 0.01 | 0.73 | 0.010 | |
| | | 0.58 | 0.01 | 0.63 | 0.010 | |
| | | 0.42 | 0 | 0.50 | 0.005 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S10 - Wapasu Creek at Canterra Road (490350 E, 6355500 N) | | | |
| Field Personnel: | SE, SG | Trip Date: | 07-Mar-10 |
| Data Entry Personnel: | SG | Date: | 18-Mar-10 |
| Data Check Personnel: | JP | Date: | 02-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.189 |
| Battery (Main): | 4.82 |
| Battery (Aux): | 14.45 |
| Datalogger Clock: | 1455 |
| Laptop Clock: | 1456 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 28% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1520 |
| End Time (MST): | 1538 |
| Equipment: | ADV |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Compleat Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Sunny 5°C |

| Level Survey: | | | | | | |
|----------------------|-------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 1.253 | 100.721 | 1.253 | 100.721 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.250 | 100.720 | 1.248 | 100.720 | - |
| Top of Ice: | | 1.764 | 100.210 | 1.763 | 100.211 | 100.211 |
| Water Level: | | 1.851 | 100.123 | 1.854 | 100.120 | 100.122 |
| Transducer: | | 1.189 | 98.934 | 1.189 | 98.931 | 98.933 |
| Other: | | | | | | |

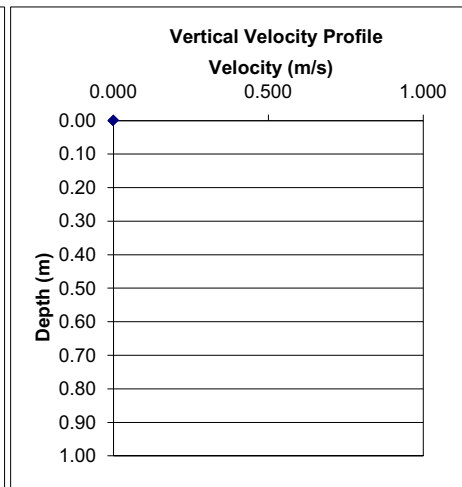
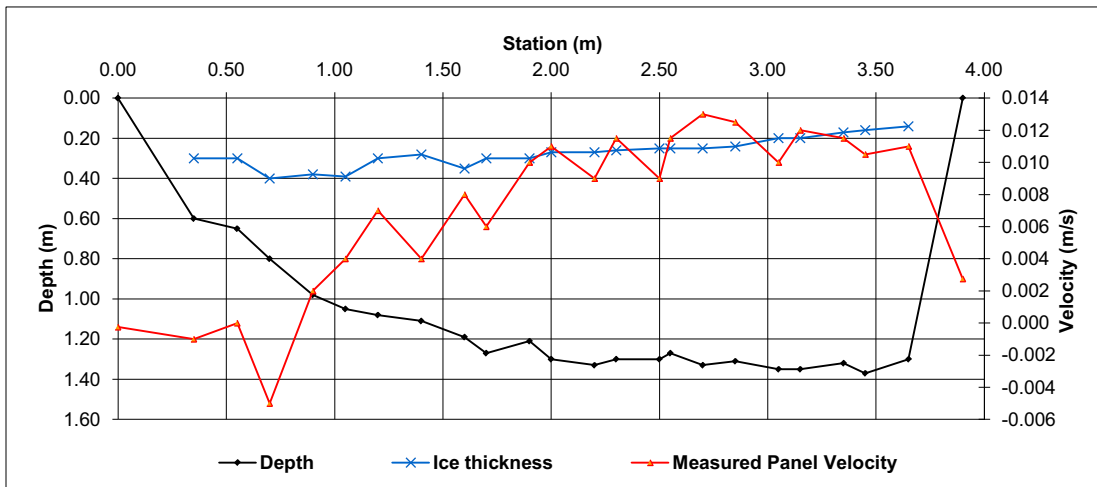
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|------------------|-------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m²) | Pannel Discharge (m³/s) | Percentage of total flow |
| Left | 0.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 0.00 | 0.18 | 0.17 | 0.08 | 0.000 | 0.000 | 0.01 | 0.000 | 0% |
| 1 | 0.35 | 0.60 | 0.30 | -0.001 | | | 0.9 | 0.18 | 0.45 | 0.27 | 0.30 | -0.001 | -0.001 | 0.08 | 0.000 | 0% |
| 2 | 0.55 | 0.65 | 0.30 | 0.000 | | | 1.0 | 0.45 | 0.63 | 0.18 | 0.35 | 0.000 | 0.000 | 0.06 | 0.000 | 0% |
| 3 | 0.70 | 0.80 | 0.40 | -0.005 | | | 0.9 | 0.63 | 0.80 | 0.18 | 0.40 | -0.005 | -0.005 | 0.07 | 0.000 | -1% |
| 4 | 0.90 | 0.98 | 0.38 | 0.002 | | | 0.9 | 0.80 | 0.98 | 0.18 | 0.60 | 0.002 | 0.002 | 0.11 | 0.000 | 1% |
| 5 | 1.05 | 1.05 | 0.39 | 0.004 | | | 0.9 | 0.98 | 1.13 | 0.15 | 0.66 | 0.004 | 0.004 | 0.10 | 0.000 | 1% |
| 6 | 1.20 | 1.08 | 0.30 | 0.007 | | | 0.9 | 1.13 | 1.30 | 0.18 | 0.78 | 0.007 | 0.006 | 0.14 | 0.001 | 3% |
| 7 | 1.40 | 1.11 | 0.28 | 0.004 | | | 0.9 | 1.30 | 1.50 | 0.20 | 0.83 | 0.004 | 0.004 | 0.17 | 0.001 | 2% |
| 8 | 1.60 | 1.19 | 0.35 | 0.008 | | | 0.9 | 1.50 | 1.65 | 0.15 | 0.84 | 0.008 | 0.007 | 0.13 | 0.001 | 3% |
| 9 | 1.70 | 1.27 | 0.30 | 0.006 | | | 0.9 | 1.65 | 1.80 | 0.15 | 0.97 | 0.006 | 0.005 | 0.15 | 0.001 | 3% |
| 10 | 1.90 | 1.21 | 0.30 | 0.010 | | | 0.9 | 1.80 | 1.95 | 0.15 | 0.91 | 0.010 | 0.009 | 0.14 | 0.001 | 5% |
| 11 | 2.00 | 1.30 | 0.27 | 0.011 | | | 0.9 | 1.95 | 2.10 | 0.15 | 1.03 | 0.011 | 0.010 | 0.15 | 0.002 | 6% |
| 12 | 2.20 | 1.33 | 0.27 | | 0.008 | 0.010 | 1.0 | 2.10 | 2.25 | 0.15 | 1.06 | 0.009 | 0.009 | 0.16 | 0.001 | 5% |
| 13 | 2.30 | 1.30 | 0.26 | | 0.013 | 0.010 | 1.0 | 2.25 | 2.40 | 0.15 | 1.04 | 0.012 | 0.012 | 0.16 | 0.002 | 7% |
| 14 | 2.50 | 1.30 | 0.25 | | 0.006 | 0.012 | 1.0 | 2.40 | 2.53 | 0.13 | 1.05 | 0.009 | 0.009 | 0.13 | 0.001 | 4% |
| 15 | 2.55 | 1.27 | 0.25 | | 0.012 | 0.011 | 1.0 | 2.53 | 2.63 | 0.10 | 1.02 | 0.012 | 0.012 | 0.10 | 0.001 | 4% |
| 16 | 2.70 | 1.33 | 0.25 | | 0.013 | 0.013 | 1.0 | 2.63 | 2.78 | 0.15 | 1.08 | 0.013 | 0.013 | 0.16 | 0.002 | 8% |
| 17 | 2.85 | 1.31 | 0.24 | | 0.012 | 0.013 | 1.0 | 2.78 | 2.95 | 0.18 | 1.07 | 0.013 | 0.013 | 0.19 | 0.002 | 9% |
| 18 | 3.05 | 1.35 | 0.20 | | 0.009 | 0.011 | 1.0 | 2.95 | 3.10 | 0.15 | 1.15 | 0.010 | 0.010 | 0.17 | 0.002 | 6% |
| 19 | 3.15 | 1.35 | 0.20 | | 0.009 | 0.015 | 1.0 | 3.10 | 3.25 | 0.15 | 1.15 | 0.012 | 0.012 | 0.17 | 0.002 | 8% |
| 20 | 3.35 | 1.32 | 0.17 | | 0.012 | 0.011 | 1.0 | 3.25 | 3.40 | 0.15 | 1.15 | 0.012 | 0.012 | 0.17 | 0.002 | 7% |
| 21 | 3.45 | 1.37 | 0.16 | | 0.013 | 0.008 | 1.0 | 3.40 | 3.55 | 0.15 | 1.21 | 0.011 | 0.011 | 0.18 | 0.002 | 7% |
| 22 | 3.65 | 1.30 | 0.14 | | 0.012 | 0.010 | 1.0 | 3.55 | 3.78 | 0.23 | 1.16 | 0.011 | 0.011 | 0.26 | 0.003 | 11% |
| Right | 3.90 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.78 | 3.90 | 0.13 | 0.29 | 0.003 | 0.003 | 0.04 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.027 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-------|--------|
| Flow characteristics: | | | |
| Total Flow: | | 0.027 | (m³/s) |
| Perceived Measurement Quality: | | Good | |
| Total Area: | | 3.19 | (m²) |
| Wetted Width: | | 3.90 | (m) |
| Hydraulic Depth: | | 0.818 | (m) |
| Mean Velocity: | | 0.008 | (m/s) |
| Froude Number: | | 0.003 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S10 - Wapasu Creek at Canterra Road (490350 E, 6355500 N) | | | |
| Field Personnel: | DB CE | Trip Date: | 06-Apr-10 |
| Data Entry Personnel: | DB | Date: | 10-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.323 |
| Battery (Main): | 4.73 |
| Battery (Aux): | 14.52 |
| Datalogger Clock: | 10.17 |
| Laptop Clock: | 10.20 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | Broken |
| Memory used: | 32% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|--|
| Measurement Details: | |
| Start Time (MST): | 1120 |
| End Time (MST): | 1130 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Thinner ice at edge, ice and slush in middle |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Sunny and warm |

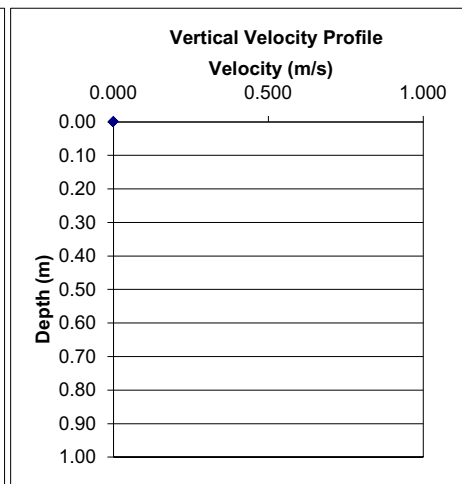
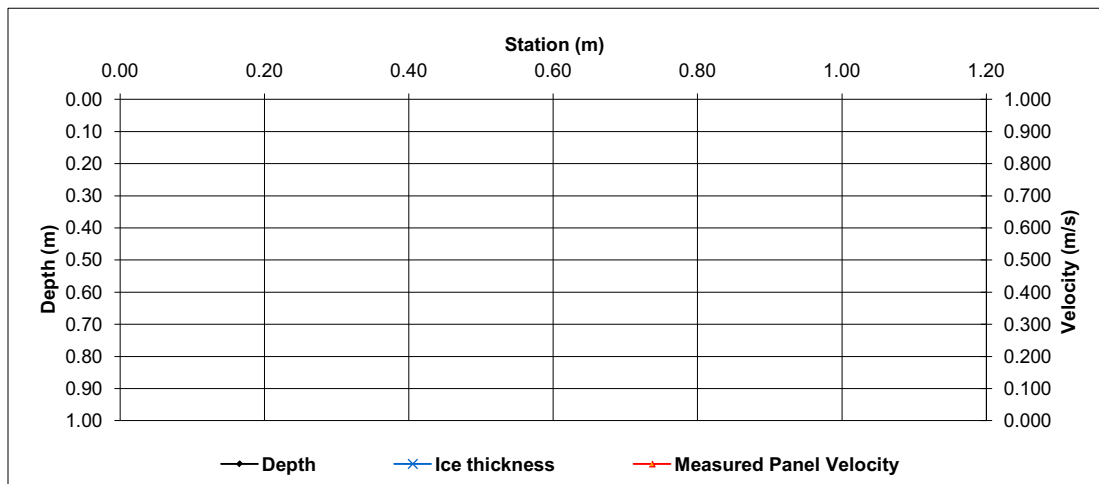
| Level Survey: | | | | | | |
|----------------------|-------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 1.355 | 100.721 | 1.299 | 100.721 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.352 | 100.720 | 1.297 | 100.720 | - |
| Top of Ice: | | 1.828 | 100.248 | 1.780 | 100.240 | 100.244 |
| Water Level: | | 1.833 | 100.243 | 1.774 | 100.246 | 100.245 |
| Transducer: | | 1.323 | 98.920 | 1.323 | 98.923 | 98.922 |
| Other: | | | | | | |

General Notes:
Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | Total Flow NOT MEASURED | |

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | NOT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | | Poor | |
| Total Area: | | #VALUE! | (m ²) |
| Wetted Width: | | 0.00 | (m) |
| Hydraulic Depth: | | #VALUE! | (m) |
| Mean Velocity: | | #VALUE! | (m/s) |
| Froude Number: | | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S10 - Wapasu Creek at Canterra Road (490350 E, 6355500 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 26-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------------|
| Logger Details: | |
| Transducer Reading: | 1.469 |
| Battery (Main): | 4.72 |
| Battery (Aux): | 14.6 |
| Datalogger Clock: | 1149 |
| Laptop Clock: | 1147 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | not working |
| Memory used: | 34% |
| Dessicant: | changed |
| Logger# (if Δ): | DD128 |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 1150 |
| End Time (MST): | 1250 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Sunny 5°C |

| Level Survey: | | | | | | |
|----------------------|-------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 1.372 | 100.721 | 1.362 | 100.721 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.385 | 100.720 | 1.377 | 100.720 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.726 | 100.367 | 1.716 | 100.367 | 100.367 |
| Transducer: | | 1.469 | 98.898 | 1.469 | 98.898 | 98.898 |
| Other: | | | | | | |

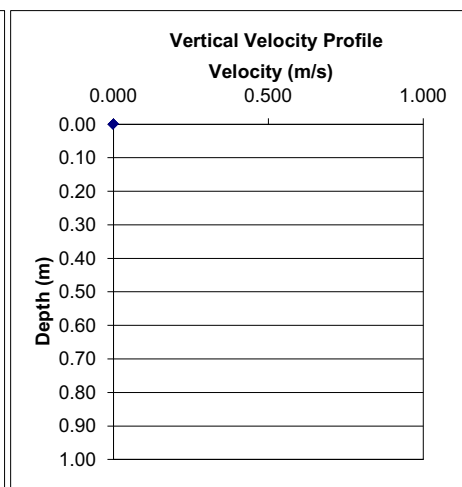
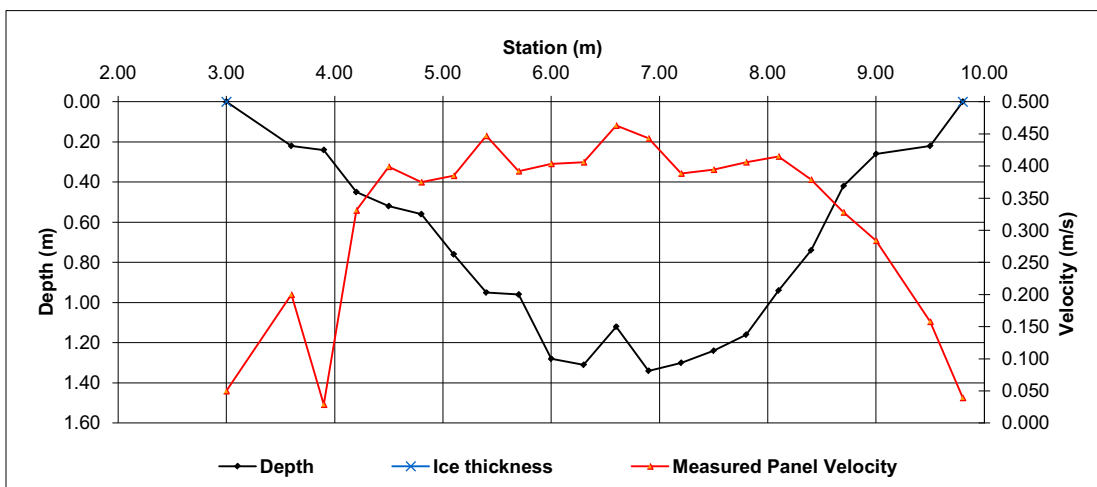
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: Measured Data | | | | | | | Calculated Data | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 3.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.00 | 3.30 | 0.30 | 0.06 | 0.050 | 0.050 | 0.02 | 0.001 | 0% |
| 1 | 3.60 | 0.22 | | 0.200 | | | 1.0 | 3.30 | 3.75 | 0.45 | 0.22 | 0.200 | 0.200 | 0.10 | 0.020 | 1% |
| 2 | 3.90 | 0.24 | | 0.029 | | | 1.0 | 3.75 | 4.05 | 0.30 | 0.24 | 0.029 | 0.029 | 0.07 | 0.002 | 0% |
| 3 | 4.20 | 0.45 | | 0.331 | | | 1.0 | 4.05 | 4.35 | 0.30 | 0.45 | 0.331 | 0.331 | 0.14 | 0.045 | 2% |
| 4 | 4.50 | 0.52 | | 0.399 | | | 1.0 | 4.35 | 4.65 | 0.30 | 0.52 | 0.399 | 0.399 | 0.16 | 0.062 | 3% |
| 5 | 4.80 | 0.56 | | 0.375 | | | 1.0 | 4.65 | 4.95 | 0.30 | 0.56 | 0.375 | 0.375 | 0.17 | 0.063 | 3% |
| 6 | 5.10 | 0.76 | | 0.385 | | | 1.0 | 4.95 | 5.25 | 0.30 | 0.76 | 0.385 | 0.385 | 0.23 | 0.088 | 5% |
| 7 | 5.40 | 0.95 | | 0.447 | | | 1.0 | 5.25 | 5.55 | 0.30 | 0.95 | 0.447 | 0.447 | 0.29 | 0.127 | 7% |
| 8 | 5.70 | 0.96 | | 0.392 | | | 1.0 | 5.55 | 5.85 | 0.30 | 0.96 | 0.392 | 0.392 | 0.29 | 0.113 | 6% |
| 9 | 6.00 | 1.28 | | | 0.325 | 0.482 | 1.0 | 5.85 | 6.15 | 0.30 | 1.28 | 0.404 | 0.404 | 0.38 | 0.155 | 8% |
| 10 | 6.30 | 1.31 | | | 0.358 | 0.454 | 1.0 | 6.15 | 6.45 | 0.30 | 1.31 | 0.406 | 0.406 | 0.39 | 0.160 | 8% |
| 11 | 6.60 | 1.12 | | | 0.418 | 0.508 | 1.0 | 6.45 | 6.75 | 0.30 | 1.12 | 0.463 | 0.463 | 0.34 | 0.156 | 8% |
| 12 | 6.90 | 1.34 | | | 0.426 | 0.460 | 1.0 | 6.75 | 7.05 | 0.30 | 1.34 | 0.443 | 0.443 | 0.40 | 0.178 | 9% |
| 13 | 7.20 | 1.30 | | | 0.335 | 0.442 | 1.0 | 7.05 | 7.35 | 0.30 | 1.30 | 0.389 | 0.389 | 0.39 | 0.152 | 8% |
| 14 | 7.50 | 1.24 | | | 0.325 | 0.464 | 1.0 | 7.35 | 7.65 | 0.30 | 1.24 | 0.395 | 0.395 | 0.37 | 0.147 | 8% |
| 15 | 7.80 | 1.16 | | | 0.346 | 0.466 | 1.0 | 7.65 | 7.95 | 0.30 | 1.16 | 0.406 | 0.406 | 0.35 | 0.141 | 7% |
| 16 | 8.10 | 0.94 | | 0.415 | | | 1.0 | 7.95 | 8.25 | 0.30 | 0.94 | 0.415 | 0.415 | 0.28 | 0.117 | 6% |
| 17 | 8.40 | 0.74 | | 0.379 | | | 1.0 | 8.25 | 8.55 | 0.30 | 0.74 | 0.379 | 0.379 | 0.22 | 0.084 | 4% |
| 18 | 8.70 | 0.42 | | 0.328 | | | 1.0 | 8.55 | 8.85 | 0.30 | 0.42 | 0.328 | 0.328 | 0.13 | 0.041 | 2% |
| 19 | 9.00 | 0.26 | | 0.284 | | | 1.0 | 8.85 | 9.25 | 0.40 | 0.26 | 0.284 | 0.284 | 0.10 | 0.030 | 2% |
| 20 | 9.50 | 0.22 | | 0.158 | | | 1.0 | 9.25 | 9.65 | 0.40 | 0.22 | 0.158 | 0.158 | 0.09 | 0.014 | 1% |
| Right | 9.80 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 9.65 | 9.80 | 0.15 | 0.06 | 0.040 | 0.040 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 1.895 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 1.895 (m ³ /s) |
| Perceived Measurement Quality: | Good |
| Total Area: | 4.90 (m ²) |
| Wetted Width: | 6.80 (m) |
| Hydraulic Depth: | 0.721 (m) |
| Mean Velocity: | 0.386 (m/s) |
| Froude Number: | 0.145 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S10 - Wapasu Creek at Canterra Road (490350 E, 6355500 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 26-Jun-10 |
| Data Entry Personnel: | DB BL | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 13-Jul-10 |

| | |
|-----------------------------|--------|
| Logger Details: | |
| Transducer Reading: | 1.494 |
| Battery (Main): | 4.85 |
| Battery (Aux): | 13.77 |
| Datalogger Clock: | 13:48 |
| Laptop Clock: | 13:52 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | 17.726 |
| Memory used: | 2% |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Temp probe installed | |

| | |
|------------------------------|--------|
| Measurement Details: | |
| Start Time (MST): | 1455 |
| End Time (MST): | 1540 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Rain |

| Level Survey: | | | | | | |
|----------------------|-------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 1.301 | 100.721 | 1.239 | 100.721 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.291 | 100.720 | 1.225 | 100.720 | - |
| Top of Ice: | | | 102.022 | | 101.960 | 101.991 |
| Water Level: | | 1.611 | 100.411 | 1.545 | 100.415 | 100.413 |
| Transducer: | | 1.494 | 98.917 | 1.494 | 98.921 | 98.919 |
| Other: | | | | | | |

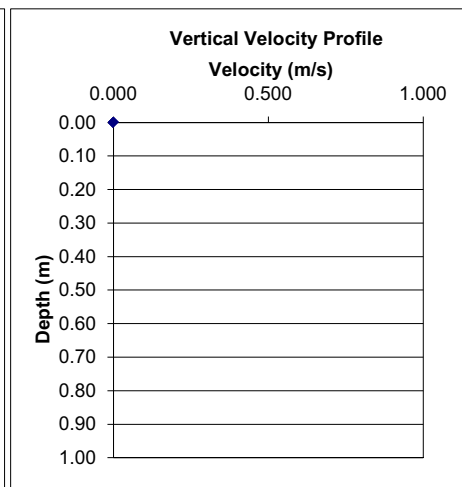
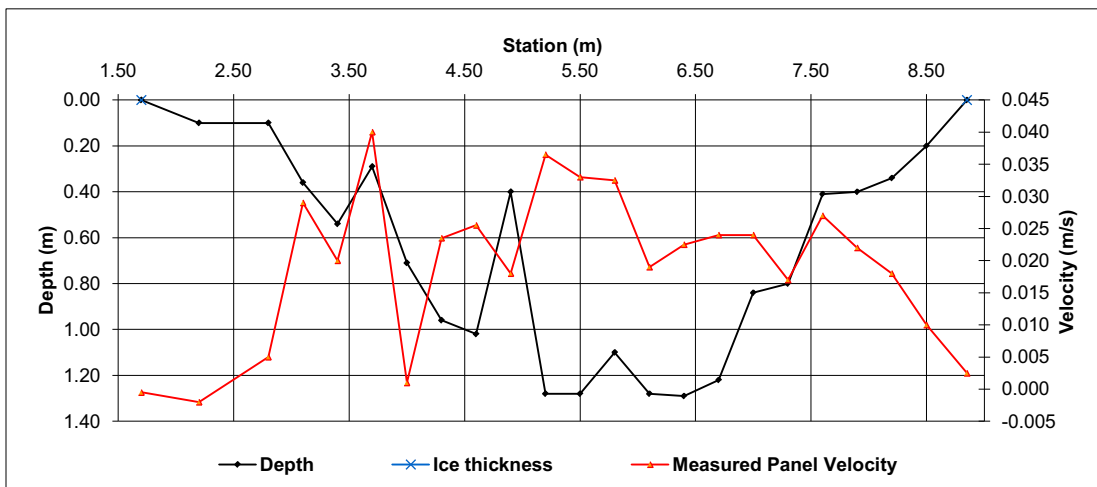
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 8.85 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 8.85 | 8.68 | 0.17 | 0.05 | 0.003 | 0.003 | 0.01 | 0.000 | 0% |
| 1 | 8.50 | 0.20 | | 0.010 | | | 1.0 | 8.68 | 8.35 | 0.33 | 0.20 | 0.010 | 0.010 | 0.07 | 0.001 | 1% |
| 2 | 8.20 | 0.34 | | 0.018 | | | 1.0 | 8.35 | 8.05 | 0.30 | 0.34 | 0.018 | 0.018 | 0.10 | 0.002 | 2% |
| 3 | 7.90 | 0.40 | | 0.022 | | | 1.0 | 8.05 | 7.75 | 0.30 | 0.40 | 0.022 | 0.022 | 0.12 | 0.003 | 2% |
| 4 | 7.60 | 0.41 | | 0.027 | | | 1.0 | 7.75 | 7.45 | 0.30 | 0.41 | 0.027 | 0.027 | 0.12 | 0.003 | 3% |
| 5 | 7.30 | 0.80 | | | 0.010 | 0.024 | 1.0 | 7.45 | 7.15 | 0.30 | 0.80 | 0.017 | 0.017 | 0.24 | 0.004 | 4% |
| 6 | 7.00 | 0.84 | | | 0.023 | 0.025 | 1.0 | 7.15 | 6.85 | 0.30 | 0.84 | 0.024 | 0.024 | 0.25 | 0.006 | 6% |
| 7 | 6.70 | 1.22 | | | 0.022 | 0.026 | 1.0 | 6.85 | 6.55 | 0.30 | 1.22 | 0.024 | 0.024 | 0.37 | 0.009 | 8% |
| 8 | 6.40 | 1.29 | | | 0.010 | 0.035 | 1.0 | 6.55 | 6.25 | 0.30 | 1.29 | 0.023 | 0.023 | 0.39 | 0.009 | 8% |
| 9 | 6.10 | 1.28 | | | 0.019 | 0.019 | 1.0 | 6.25 | 5.95 | 0.30 | 1.28 | 0.019 | 0.019 | 0.38 | 0.007 | 7% |
| 10 | 5.80 | 1.10 | | | 0.035 | 0.030 | 1.0 | 5.95 | 5.65 | 0.30 | 1.10 | 0.033 | 0.033 | 0.33 | 0.011 | 10% |
| 11 | 5.50 | 1.28 | | | 0.031 | 0.035 | 1.0 | 5.65 | 5.35 | 0.30 | 1.28 | 0.033 | 0.033 | 0.38 | 0.013 | 12% |
| 12 | 5.20 | 1.28 | | | 0.034 | 0.039 | 1.0 | 5.35 | 5.05 | 0.30 | 1.28 | 0.037 | 0.037 | 0.38 | 0.014 | 13% |
| 13 | 4.90 | 0.40 | | 0.018 | | | 1.0 | 5.05 | 4.75 | 0.30 | 0.40 | 0.018 | 0.018 | 0.12 | 0.002 | 2% |
| 14 | 4.60 | 1.02 | | | 0.025 | 0.026 | 1.0 | 4.75 | 4.45 | 0.30 | 1.02 | 0.026 | 0.026 | 0.31 | 0.008 | 7% |
| 15 | 4.30 | 0.96 | | | 0.004 | 0.043 | 1.0 | 4.45 | 4.15 | 0.30 | 0.96 | 0.024 | 0.024 | 0.29 | 0.007 | 6% |
| 16 | 4.00 | 0.71 | | 0.001 | | | 1.0 | 4.15 | 3.85 | 0.30 | 0.71 | 0.001 | 0.001 | 0.21 | 0.000 | 0% |
| 17 | 3.70 | 0.29 | | 0.040 | | | 1.0 | 3.85 | 3.55 | 0.30 | 0.29 | 0.040 | 0.040 | 0.09 | 0.003 | 3% |
| 18 | 3.40 | 0.54 | | 0.020 | | | 1.0 | 3.55 | 3.25 | 0.30 | 0.54 | 0.020 | 0.020 | 0.16 | 0.003 | 3% |
| 19 | 3.10 | 0.36 | | 0.029 | | | 1.0 | 3.25 | 2.95 | 0.30 | 0.36 | 0.029 | 0.029 | 0.11 | 0.003 | 3% |
| 20 | 2.80 | 0.10 | | 0.005 | | | 1.0 | 2.95 | 2.50 | 0.45 | 0.10 | 0.005 | 0.005 | 0.05 | 0.000 | 0% |
| 21 | 2.20 | 0.10 | | -0.002 | | | 1.0 | 2.50 | 1.95 | 0.55 | 0.10 | -0.002 | -0.002 | 0.06 | 0.000 | 0% |
| Left | 1.70 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.95 | 1.70 | 0.25 | 0.03 | -0.001 | -0.001 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.108 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.108 | (m ³ /s) |
| Perceived Measurement Quality: | | Good | |
| Total Area: | | 4.54 | (m ²) |
| Wetted Width: | | 6.73 | (m) |
| Hydraulic Depth: | | 0.674 | (m) |
| Mean Velocity: | | 0.024 | (m/s) |
| Froude Number: | | 0.009 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S10 - Wapasu Creek at Canterra Road (490350 E, 6355500 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 15-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.535 |
| Battery (Main): | 4.86 |
| Battery (Aux): | 13.97 |
| Datalogger Clock: | 1329 |
| Laptop Clock: | 1331 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 16.2 |
| Memory used: | 6% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------------|
| Measurement Details: | |
| Start Time (MST): | 1340 |
| End Time (MST): | 1400 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open, Backwater |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | partly 20°C |

| Level Survey: | | | | | | |
|----------------------|-------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 1.331 | 100.721 | 1.332 | 100.721 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.311 | 100.720 | 1.311 | 100.720 | - |
| Top of Ice: | | | | | | 0.000 |
| Water Level: | | 1.592 | 100.460 | 1.593 | 100.460 | 100.460 |
| Transducer: | | 1.535 | 98.925 | 1.535 | 98.925 | 98.925 |
| Other: | | | | | | |

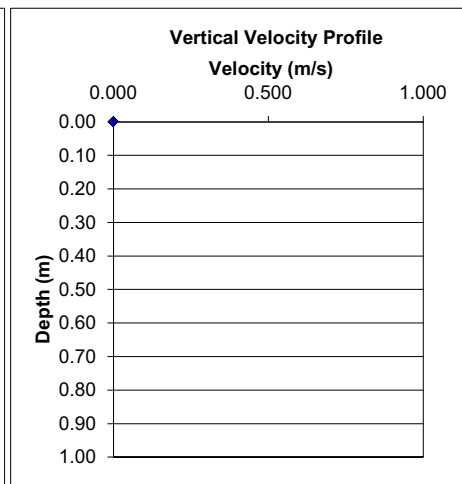
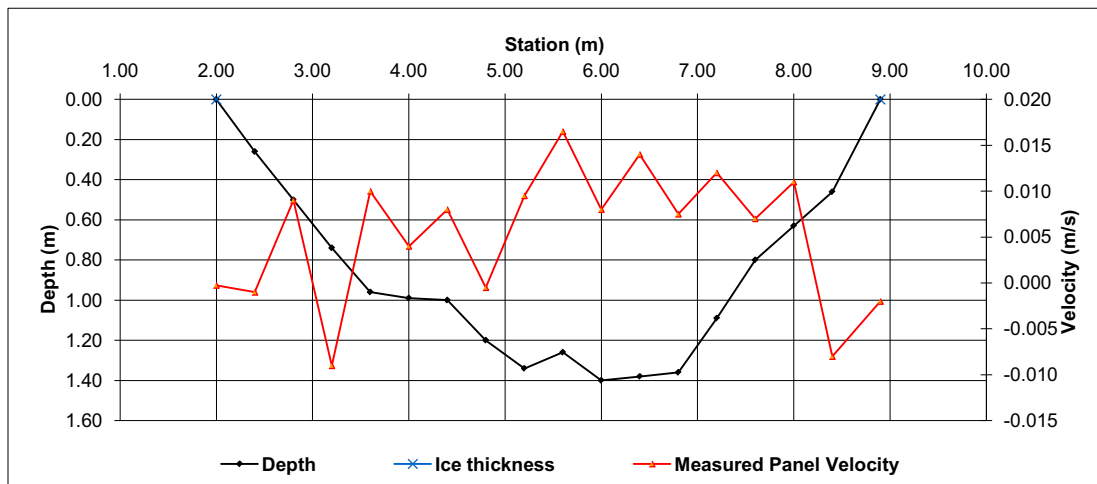
| |
|-----------------------|
| General Notes: |
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| |

| Flow Measurement: | | | | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | |
| Right | 8.90 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 8.90 | 8.65 | 0.25 | 0.12 | -0.002 | -0.002 | 0.03 | 0.000 | 0% | | | |
| 1 | 8.40 | 0.46 | | -0.008 | | | 1.0 | 8.65 | 8.20 | 0.45 | 0.46 | -0.008 | -0.008 | 0.21 | -0.002 | -4% | | | |
| 2 | 8.00 | 0.63 | | 0.011 | | | 1.0 | 8.20 | 7.80 | 0.40 | 0.63 | 0.011 | 0.011 | 0.25 | 0.003 | 6% | | | |
| 3 | 7.60 | 0.80 | | | 0.001 | 0.013 | 1.0 | 7.80 | 7.40 | 0.40 | 0.80 | 0.007 | 0.007 | 0.32 | 0.002 | 5% | | | |
| 4 | 7.20 | 1.09 | | | 0.010 | 0.014 | 1.0 | 7.40 | 7.00 | 0.40 | 1.09 | 0.012 | 0.012 | 0.44 | 0.005 | 11% | | | |
| 5 | 6.80 | 1.36 | | | 0.009 | 0.006 | 1.0 | 7.00 | 6.60 | 0.40 | 1.36 | 0.008 | 0.008 | 0.54 | 0.004 | 9% | | | |
| 6 | 6.40 | 1.38 | | | 0.021 | 0.007 | 1.0 | 6.60 | 6.20 | 0.40 | 1.38 | 0.014 | 0.014 | 0.55 | 0.008 | 17% | | | |
| 7 | 6.00 | 1.40 | | | 0.013 | 0.003 | 1.0 | 6.20 | 5.80 | 0.40 | 1.40 | 0.008 | 0.008 | 0.56 | 0.004 | 10% | | | |
| 8 | 5.60 | 1.26 | | | 0.014 | 0.019 | 1.0 | 5.80 | 5.40 | 0.40 | 1.26 | 0.017 | 0.017 | 0.50 | 0.008 | 18% | | | |
| 9 | 5.20 | 1.34 | | | 0.005 | 0.014 | 1.0 | 5.40 | 5.00 | 0.40 | 1.34 | 0.010 | 0.010 | 0.54 | 0.005 | 11% | | | |
| 10 | 4.80 | 1.20 | | | 0.002 | -0.003 | 1.0 | 5.00 | 4.60 | 0.40 | 1.20 | -0.001 | -0.001 | 0.48 | 0.000 | -1% | | | |
| 11 | 4.40 | 1.00 | | | 0.006 | 0.010 | 1.0 | 4.60 | 4.20 | 0.40 | 1.00 | 0.008 | 0.008 | 0.40 | 0.003 | 7% | | | |
| 12 | 4.00 | 0.99 | | | -0.003 | 0.011 | 1.0 | 4.20 | 3.80 | 0.40 | 0.99 | 0.004 | 0.004 | 0.40 | 0.002 | 3% | | | |
| 13 | 3.60 | 0.96 | | | 0.007 | 0.013 | 1.0 | 3.80 | 3.40 | 0.40 | 0.96 | 0.010 | 0.010 | 0.38 | 0.004 | 8% | | | |
| 14 | 3.20 | 0.74 | | -0.009 | | | 1.0 | 3.40 | 3.00 | 0.40 | 0.74 | -0.009 | -0.009 | 0.30 | -0.003 | -6% | | | |
| 15 | 2.80 | 0.50 | | 0.009 | | | 1.0 | 3.00 | 2.60 | 0.40 | 0.50 | 0.009 | 0.009 | 0.20 | 0.002 | 4% | | | |
| 16 | 2.40 | 0.26 | | -0.001 | | | 1.0 | 2.60 | 2.20 | 0.40 | 0.26 | -0.001 | -0.001 | 0.10 | 0.000 | 0% | | | |
| Left | 2.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.20 | 2.00 | 0.20 | 0.07 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | | | |
| Total Flow | | | | | | | | | | | | | | | 0.046 | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|--------------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | 0.046 | (m ³ /s) |
| Perceived Measurement Quality: | | Fair | |
| Total Area: | | 6.21 | (m ²) |
| Wetted Width: | | 6.45 | (m) |
| Hydraulic Depth: | | 0.963 | (m) |
| Mean Velocity: | | 0.007 | (m/s) |
| Froude Number: | | 0.002 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|--------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | 0.000 |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S10 - Wapasu Creek at Canterra Road (490350 E, 6355500 N) | | | |
| Field Personnel: | SG HB DB | Trip Date: | 18-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.625 |
| Battery (Main): | 4.70 |
| Battery (Aux): | 14.60 |
| Datalogger Clock: | 927 |
| Laptop Clock: | 929 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | 5.83 |
| Memory used: | 10% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1155 |
| End Time (MST): | 1245 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly Cloudy, 5°C |

| Level Survey: | | | | | | |
|----------------------|-------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in Tree | 1.382 | 100.721 | 1.342 | 100.721 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.404 | 100.720 | 1.366 | 100.720 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.572 | 100.531 | 1.537 | 100.526 | 100.529 |
| Transducer: | | 1.625 | 98.906 | 1.625 | 98.901 | 98.904 |
| Other: | | | | | | |

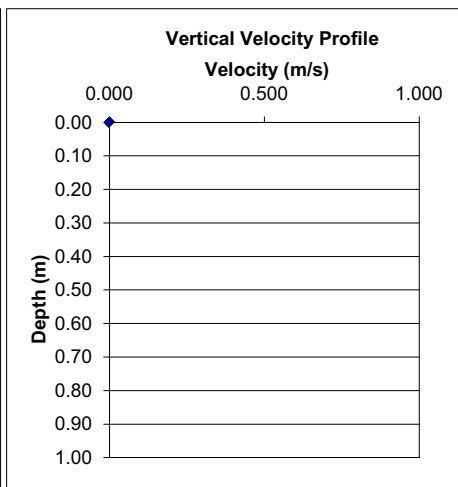
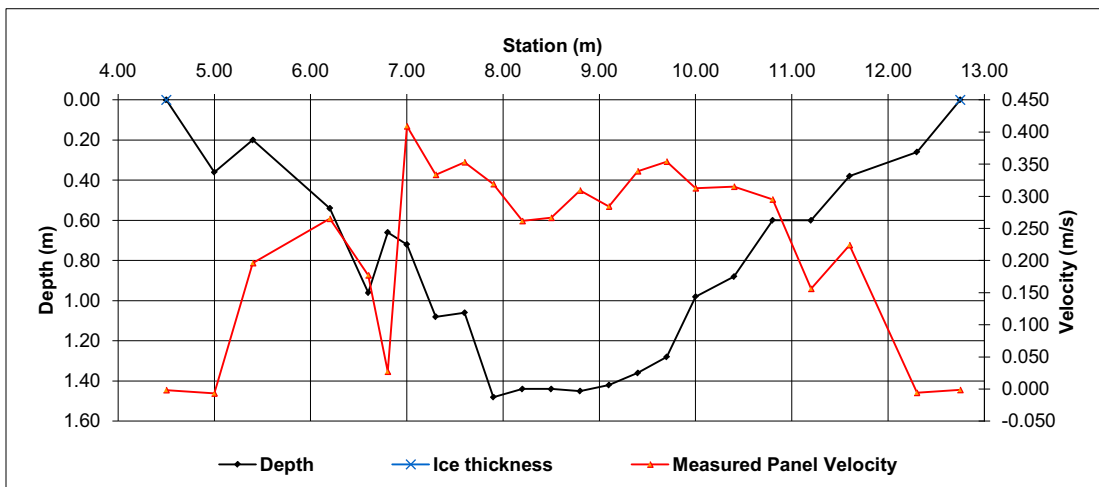
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | |
| Left | 4.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 4.50 | 4.75 | 0.25 | 0.09 | -0.002 | -0.002 | 0.02 | 0.000 | 0% | | | |
| 1 | 5.00 | 0.36 | | -0.007 | | | 1.0 | 4.75 | 5.20 | 0.45 | 0.36 | -0.007 | -0.007 | 0.16 | -0.001 | 0% | | | |
| 2 | 5.40 | 0.20 | | 0.196 | | | 1.0 | 5.20 | 5.80 | 0.60 | 0.20 | 0.196 | 0.196 | 0.12 | 0.024 | 1% | | | |
| 3 | 6.20 | 0.54 | | 0.265 | | | 1.0 | 5.80 | 6.40 | 0.60 | 0.54 | 0.265 | 0.265 | 0.32 | 0.086 | 5% | | | |
| 4 | 6.60 | 0.96 | | | 0.020 | 0.334 | 1.0 | 6.40 | 6.70 | 0.30 | 0.96 | 0.177 | 0.177 | 0.29 | 0.051 | 3% | | | |
| 5 | 6.80 | 0.66 | | 0.027 | | | 1.0 | 6.70 | 6.90 | 0.20 | 0.66 | 0.027 | 0.027 | 0.13 | 0.004 | 0% | | | |
| 6 | 7.00 | 0.72 | | 0.409 | | | 1.0 | 6.90 | 7.15 | 0.25 | 0.72 | 0.409 | 0.409 | 0.18 | 0.074 | 4% | | | |
| 7 | 7.30 | 1.08 | | | 0.286 | 0.381 | 1.0 | 7.15 | 7.45 | 0.30 | 1.08 | 0.334 | 0.334 | 0.32 | 0.108 | 6% | | | |
| 8 | 7.60 | 1.06 | | | 0.321 | 0.385 | 1.0 | 7.45 | 7.75 | 0.30 | 1.06 | 0.353 | 0.353 | 0.32 | 0.112 | 6% | | | |
| 9 | 7.90 | 1.48 | | | 0.299 | 0.339 | 1.0 | 7.75 | 8.05 | 0.30 | 1.48 | 0.319 | 0.319 | 0.44 | 0.142 | 8% | | | |
| 10 | 8.20 | 1.44 | | | 0.198 | 0.325 | 1.0 | 8.05 | 8.35 | 0.30 | 1.44 | 0.262 | 0.262 | 0.43 | 0.113 | 7% | | | |
| 11 | 8.50 | 1.44 | | | 0.204 | 0.329 | 1.0 | 8.35 | 8.65 | 0.30 | 1.44 | 0.267 | 0.267 | 0.43 | 0.115 | 7% | | | |
| 12 | 8.80 | 1.45 | | | 0.257 | 0.361 | 1.0 | 8.65 | 8.95 | 0.30 | 1.45 | 0.309 | 0.309 | 0.43 | 0.134 | 8% | | | |
| 13 | 9.10 | 1.42 | | | 0.220 | 0.348 | 1.0 | 8.95 | 9.25 | 0.30 | 1.42 | 0.284 | 0.284 | 0.43 | 0.121 | 7% | | | |
| 14 | 9.40 | 1.36 | | | 0.311 | 0.367 | 1.0 | 9.25 | 9.55 | 0.30 | 1.36 | 0.339 | 0.339 | 0.41 | 0.138 | 8% | | | |
| 15 | 9.70 | 1.28 | | | 0.335 | 0.373 | 1.0 | 9.55 | 9.85 | 0.30 | 1.28 | 0.354 | 0.354 | 0.38 | 0.136 | 8% | | | |
| 16 | 10.00 | 0.98 | | | 0.275 | 0.350 | 1.0 | 9.85 | 10.20 | 0.35 | 0.98 | 0.313 | 0.313 | 0.34 | 0.107 | 6% | | | |
| 17 | 10.40 | 0.88 | | | | 0.313 | 1.0 | 10.20 | 10.60 | 0.40 | 0.88 | 0.315 | 0.315 | 0.35 | 0.111 | 6% | | | |
| 18 | 10.80 | 0.60 | | 0.295 | | | 1.0 | 10.60 | 11.00 | 0.40 | 0.60 | 0.295 | 0.295 | 0.24 | 0.071 | 4% | | | |
| 19 | 11.20 | 0.60 | | 0.156 | | | 1.0 | 11.00 | 11.40 | 0.40 | 0.60 | 0.156 | 0.156 | 0.24 | 0.037 | 2% | | | |
| 20 | 11.60 | 0.38 | | 0.224 | | | 1.0 | 11.40 | 11.95 | 0.55 | 0.38 | 0.224 | 0.224 | 0.21 | 0.047 | 3% | | | |
| 21 | 12.30 | 0.26 | | -0.006 | | | 1.0 | 11.95 | 12.53 | 0.58 | 0.26 | -0.006 | -0.006 | 0.15 | -0.001 | 0% | | | |
| Right | 12.75 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 12.53 | 12.75 | 0.23 | 0.07 | -0.002 | -0.002 | 0.01 | 0.000 | 0% | | | |
| Total Flow | | | | | | | | | | | | | | 1.728 | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | |
|--------------------------------|---------------------------|
| Flow characteristics: | |
| Total Flow: | 1.728 (m ³ /s) |
| Perceived Measurement Quality: | Excellent |
| Total Area: | 6.38 (m ²) |
| Wetted Width: | 8.25 (m) |
| Hydraulic Depth: | 0.773 (m) |
| Mean Velocity: | 0.271 (m/s) |
| Froude Number: | 0.098 |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S10 - Wapasu Creek at Canterra Road (490350 E, 6355500 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 31-Oct-10 |
| Data Entry Personnel: | DB | Date: | 08-Nov-10 |
| Data Check Personnel: | | Date: | |

| | |
|------------------------|----------|
| Logger Details: | |
| Transducer Reading: | 1.543 |
| Battery (Main): | 4.65 |
| Battery (Aux): | 13.59 |
| Datalogger Clock: | 919 |
| Laptop Clock: | 921 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 0.398746 |
| Memory used: | 17% |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 915 |
| End Time (MST): | 1135 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Clear |

| Level Survey: | | | | | | |
|----------------------|-------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | NEW Nail in Tree | 1.298 | 100.910 | 1.280 | 100.912 | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.488 | 100.720 | 1.472 | 100.720 | - |
| Top of Ice: | | | | 102.192 | | 51.096 |
| Water Level: | | 1.758 | 100.450 | 1.738 | 100.454 | 100.452 |
| Transducer: | | 1.543 | 98.907 | 1.543 | 98.911 | 98.909 |
| Other: | | | | | | |

General Notes:

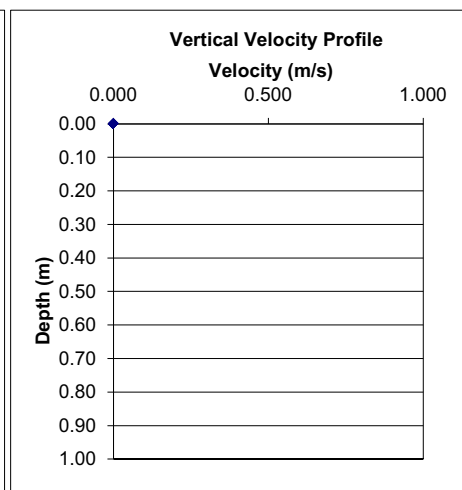
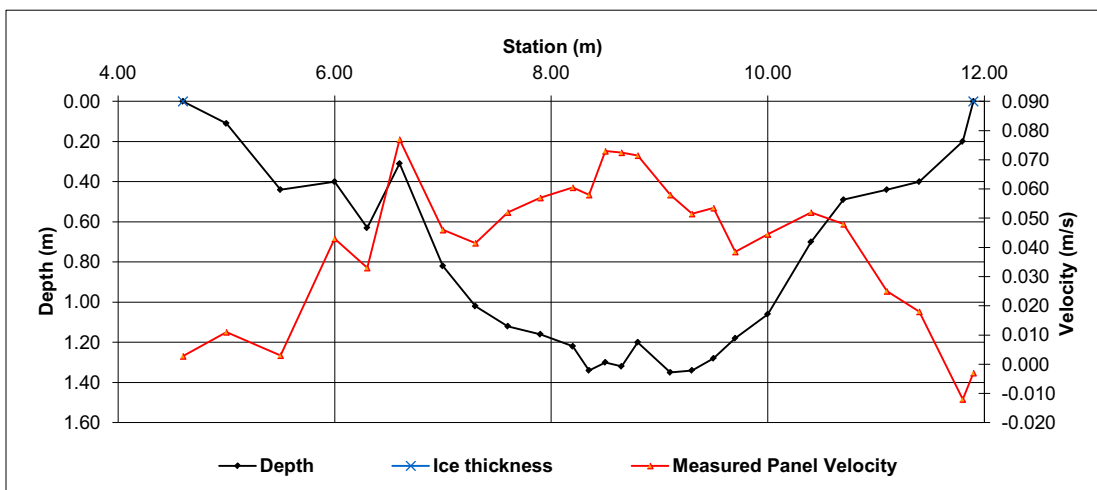
Tree with BM1 (Nail in base of tree) had fallen. Used another big log with new nail, and pink flag tape inbetween truck/logger. TSS @ 8.0m

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|------------------|-------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m²) | Pannel Discharge (m³/s) | Percentage of total flow |
| Left | 4.60 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 4.60 | 4.80 | 0.20 | 0.03 | 0.003 | 0.003 | 0.01 | 0.000 | 0% |
| 1 | 5.00 | 0.11 | | 0.01 | | | 1.0 | 4.80 | 5.25 | 0.45 | 0.11 | 0.011 | 0.011 | 0.05 | 0.001 | 0% |
| 2 | 5.50 | 0.44 | | 0.00 | | | 1.0 | 5.25 | 5.75 | 0.50 | 0.44 | 0.003 | 0.003 | 0.22 | 0.001 | 0% |
| 3 | 6.00 | 0.40 | | 0.04 | | | 1.0 | 5.75 | 6.15 | 0.40 | 0.40 | 0.043 | 0.043 | 0.16 | 0.007 | 3% |
| 4 | 6.30 | 0.63 | | 0.03 | | | 1.0 | 6.15 | 6.45 | 0.30 | 0.63 | 0.033 | 0.033 | 0.19 | 0.006 | 2% |
| 5 | 6.60 | 0.31 | | 0.08 | | | 1.0 | 6.45 | 6.80 | 0.35 | 0.31 | 0.077 | 0.077 | 0.11 | 0.008 | 3% |
| 6 | 7.00 | 0.82 | | | 0.027 | 0.065 | 1.0 | 6.80 | 7.15 | 0.35 | 0.82 | 0.046 | 0.046 | 0.29 | 0.013 | 5% |
| 7 | 7.30 | 1.02 | | | 0.026 | 0.057 | 1.0 | 7.15 | 7.45 | 0.30 | 1.02 | 0.042 | 0.042 | 0.31 | 0.013 | 5% |
| 8 | 7.60 | 1.12 | | | 0.037 | 0.067 | 1.0 | 7.45 | 7.75 | 0.30 | 1.12 | 0.052 | 0.052 | 0.34 | 0.017 | 7% |
| 9 | 7.90 | 1.16 | | | 0.049 | 0.065 | 1.0 | 7.75 | 8.05 | 0.30 | 1.16 | 0.057 | 0.057 | 0.35 | 0.020 | 8% |
| 10 | 8.20 | 1.22 | | | 0.057 | 0.064 | 1.0 | 8.05 | 8.28 | 0.22 | 1.22 | 0.061 | 0.061 | 0.27 | 0.017 | 6% |
| 11 | 8.35 | 1.34 | | | 0.056 | 0.060 | 1.0 | 8.28 | 8.43 | 0.15 | 1.34 | 0.058 | 0.058 | 0.20 | 0.012 | 4% |
| 12 | 8.50 | 1.30 | | | 0.064 | 0.082 | 1.0 | 8.43 | 8.58 | 0.15 | 1.30 | 0.073 | 0.073 | 0.19 | 0.014 | 5% |
| 13 | 8.65 | 1.32 | | | 0.065 | 0.080 | 1.0 | 8.58 | 8.73 | 0.15 | 1.32 | 0.073 | 0.073 | 0.20 | 0.014 | 5% |
| 14 | 8.80 | 1.20 | | | 0.063 | 0.080 | 1.0 | 8.73 | 8.95 | 0.22 | 1.20 | 0.072 | 0.072 | 0.27 | 0.019 | 7% |
| 15 | 9.10 | 1.35 | | | 0.043 | 0.073 | 1.0 | 8.95 | 9.20 | 0.25 | 1.35 | 0.058 | 0.058 | 0.34 | 0.020 | 7% |
| 16 | 9.30 | 1.34 | | | 0.035 | 0.068 | 1.0 | 9.20 | 9.40 | 0.20 | 1.34 | 0.052 | 0.052 | 0.27 | 0.014 | 5% |
| 17 | 9.50 | 1.28 | | | 0.034 | 0.073 | 1.0 | 9.40 | 9.60 | 0.20 | 1.28 | 0.054 | 0.054 | 0.26 | 0.014 | 5% |
| 18 | 9.70 | 1.18 | | | 0.032 | 0.045 | 1.0 | 9.60 | 9.85 | 0.25 | 1.18 | 0.039 | 0.039 | 0.30 | 0.011 | 4% |
| 19 | 10.00 | 1.06 | | | | 0.063 | 1.0 | 9.85 | 10.20 | 0.35 | 1.06 | 0.045 | 0.045 | 0.37 | 0.017 | 6% |
| 20 | 10.40 | 0.70 | | 0.052 | | | 1.0 | 10.20 | 10.55 | 0.35 | 0.70 | 0.052 | 0.052 | 0.25 | 0.013 | 5% |
| 21 | 10.70 | 0.49 | | 0.048 | | | 1.0 | 10.55 | 10.90 | 0.35 | 0.49 | 0.048 | 0.048 | 0.17 | 0.008 | 3% |
| 22 | 11.10 | 0.44 | | 0.025 | | | 1.0 | 10.90 | 11.25 | 0.35 | 0.44 | 0.025 | 0.025 | 0.15 | 0.004 | 1% |
| 23 | 11.40 | 0.40 | | 0.018 | | | 1.0 | 11.25 | 11.60 | 0.35 | 0.40 | 0.018 | 0.018 | 0.14 | 0.003 | 1% |
| 24 | 11.80 | 0.20 | | -0.012 | | | 1.0 | 11.60 | 11.85 | 0.25 | 0.20 | -0.012 | -0.012 | 0.05 | -0.001 | 0% |
| Right | 11.90 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 11.85 | 11.90 | 0.05 | 0.05 | -0.003 | -0.003 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.264 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|-----------|--------|
| Flow characteristics: | | | |
| Total Flow: | | 0.264 | (m³/s) |
| Perceived Measurement Quality: | | Excellent | |
| Total Area: | | 5.44 | (m²) |
| Wetted Width: | | 7.30 | (m) |
| Hydraulic Depth: | | 0.745 | (m) |
| Mean Velocity: | | 0.048 | (m/s) |
| Froude Number: | | 0.018 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S10 - Wapasu Creek at Canterra Road (490350 E, 6355500 N) | | | |
| Field Personnel: | SG, JO | Trip Date: | 02-Dec-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | |
|------------------------|---------------|
| Logger Details: | |
| Transducer Reading: | 1.504 |
| Battery (Main): | 4.58 |
| Battery (Aux): | 11.99 / 12.92 |
| Datalogger Clock: | 12:48 |
| Laptop Clock: | 12:52 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 0.29 |
| Memory used: | 23% |
| Dessicant: | OK |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-----------------|
| Measurement Details: | |
| Start Time (MST): | 1240 |
| End Time (MST): | 1410 |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | - 10, 8/8 cloud |

| Level Survey: | | | | | | |
|----------------------|-------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | NEW Nail in Tree | | | | | - |
| Bench Mark 2: | Rebar in PVC pipe | 1.321 | 100.720 | 1.314 | 100.720 | - |
| Top of Ice: | | 1.618 | 100.423 | 1.608 | 100.426 | 100.425 |
| Water Level: | | 1.625 | 100.416 | 1.617 | 100.417 | 100.417 |
| Transducer: | | 1.504 | 98.912 | 1.504 | 98.913 | 98.913 |
| Other: | | | | | | |

General Notes:

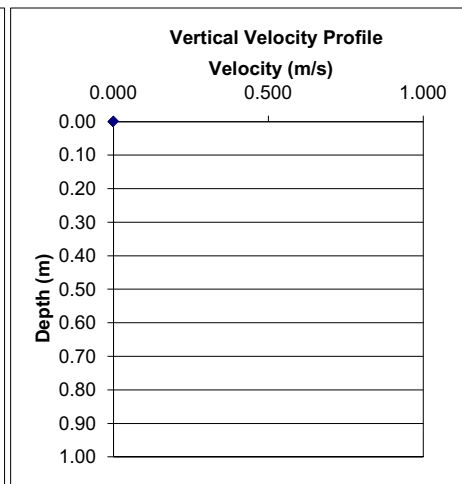
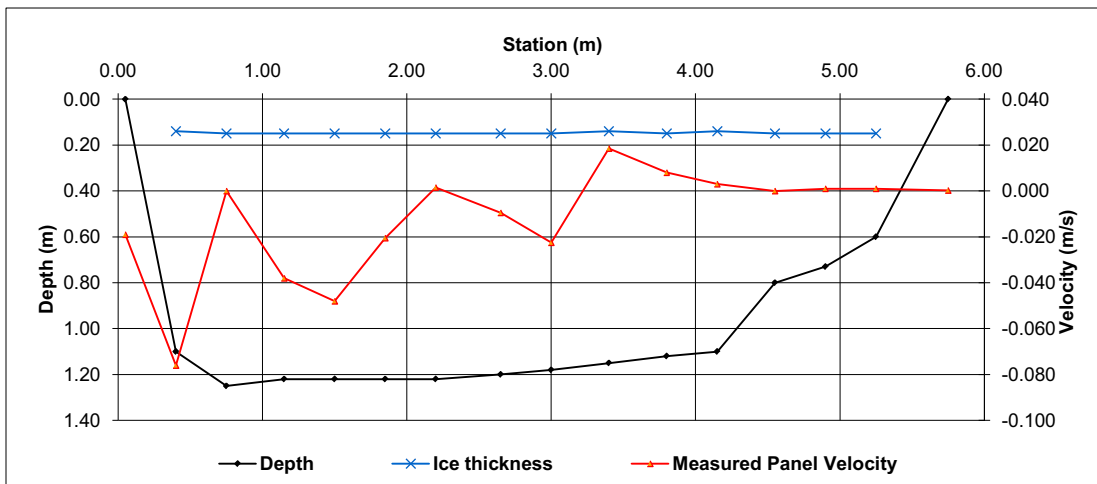
Measurement very poor quality. Most values hovering around 0 with errors equal to that of measurement value.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.05 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.05 | 0.23 | 0.18 | 0.24 | -0.019 | -0.019 | 0.04 | -0.001 | 1% |
| 1 | 0.40 | 1.10 | 0.14 | | -0.061 | -0.091 | 1.0 | 0.23 | 0.58 | 0.35 | 0.96 | -0.076 | -0.076 | 0.34 | -0.026 | 38% |
| 2 | 0.75 | 1.25 | 0.15 | | 0.000 | -0.020 | 1.0 | 0.58 | 0.95 | 0.38 | 1.10 | 0.000 | 0.000 | 0.41 | 0.000 | 0% |
| 3 | 1.15 | 1.22 | 0.15 | | -0.092 | 0.016 | 1.0 | 0.95 | 1.33 | 0.38 | 1.07 | -0.038 | -0.038 | 0.40 | -0.015 | 23% |
| 4 | 1.50 | 1.22 | 0.15 | | 0.013 | -0.109 | 1.0 | 1.33 | 1.68 | 0.35 | 1.07 | -0.048 | -0.048 | 0.37 | -0.018 | 27% |
| 5 | 1.85 | 1.22 | 0.15 | | -0.005 | -0.036 | 1.0 | 1.68 | 2.03 | 0.35 | 1.07 | -0.021 | -0.021 | 0.37 | -0.008 | 11% |
| 6 | 2.20 | 1.22 | 0.15 | | -0.007 | 0.010 | 1.0 | 2.03 | 2.43 | 0.40 | 1.07 | 0.002 | 0.002 | 0.43 | 0.001 | -1% |
| 7 | 2.65 | 1.20 | 0.15 | | -0.035 | 0.016 | 1.0 | 2.43 | 2.83 | 0.40 | 1.05 | -0.010 | -0.010 | 0.42 | -0.004 | 6% |
| 8 | 3.00 | 1.18 | 0.15 | | -0.048 | 0.003 | 1.0 | 2.83 | 3.20 | 0.38 | 1.03 | -0.023 | -0.023 | 0.39 | -0.009 | 13% |
| 9 | 3.40 | 1.15 | 0.14 | | 0.020 | 0.017 | 1.0 | 3.20 | 3.60 | 0.40 | 1.01 | 0.019 | 0.019 | 0.40 | 0.007 | -11% |
| 10 | 3.80 | 1.12 | 0.15 | | 0.011 | 0.005 | 1.0 | 3.60 | 3.98 | 0.38 | 0.97 | 0.008 | 0.008 | 0.36 | 0.003 | -4% |
| 11 | 4.15 | 1.10 | 0.14 | | 0.002 | 0.004 | 1.0 | 3.98 | 4.35 | 0.38 | 0.96 | 0.003 | 0.003 | 0.36 | 0.001 | -2% |
| 12 | 4.55 | 0.80 | 0.15 | 0.000 | | | 1.0 | 4.35 | 4.73 | 0.38 | 0.65 | 0.000 | 0.000 | 0.24 | 0.000 | 0% |
| 13 | 4.90 | 0.73 | 0.15 | 0.001 | | | 0.9 | 4.73 | 5.08 | 0.35 | 0.58 | 0.001 | 0.001 | 0.20 | 0.000 | 0% |
| 14 | 5.25 | 0.60 | 0.15 | 0.001 | | | 0.9 | 5.08 | 5.50 | 0.43 | 0.45 | 0.001 | 0.001 | 0.19 | 0.000 | 0% |
| Left | 5.75 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 5.50 | 5.75 | 0.25 | 0.11 | 0.000 | 0.000 | 0.03 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | -0.067 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | | |
|--------------------------------|--|--------|---------------------|
| Flow characteristics: | | | |
| Total Flow: | | -0.067 | (m ³ /s) |
| Perceived Measurement Quality: | | Poor | |
| Total Area: | | 4.97 | (m ²) |
| Wetted Width: | | 5.70 | (m) |
| Hydraulic Depth: | | 0.872 | (m) |
| Mean Velocity: | | -0.014 | (m/s) |
| Froude Number: | | -0.005 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S11 - Poplar Creek at Hwy 63 (472000 E, 6307650 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 19-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Jan-10 |

| | |
|---|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data Logger installed in Winter | |

| | | | |
|------------------------------|--------------------|--------|--------------|
| Measurement Details: | | | |
| Start Time (MST): | | 1545 | |
| End Time (MST): | | NA | |
| Equipment: | ADV | Other: | |
| Method: | Ice | Wading | Fishcat Boat |
| River Condition: | Complete Ice Cover | | |
| Code ('Ice' or 'Open'): | Ice | | |
| Quality/Error (see reverse): | Fair | | |
| Weather: | Overcast -5C | | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | ASCM sq. pin nxt to stake | | 242.081 | | 242.081 | - |
| Bench Mark 2: | Rebar w/flagging | | 242.382 | | 242.382 | - |
| Top of Ice: | | | 242.081 | | 242.081 | 242.081 |
| Water Level: | | | 242.382 | | 242.382 | 242.382 |
| Transducer: | | | | | | |
| Other: | Pin on bridge | | 245.550 | | 245.550 | |

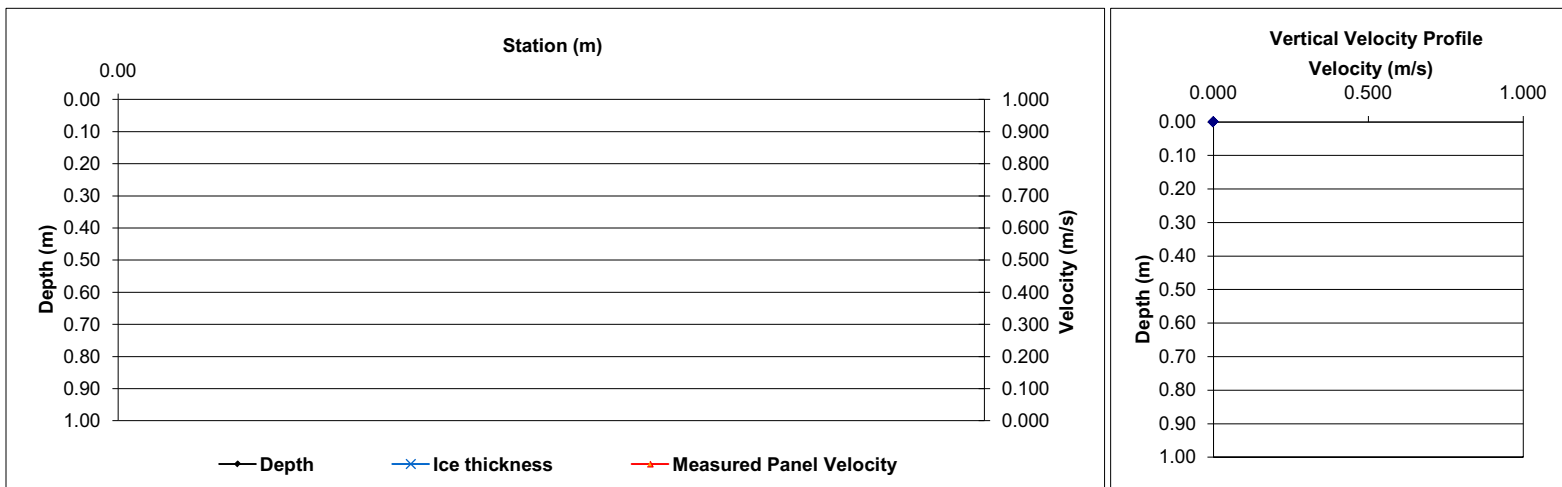
General Notes:

No Water Found. Creek Frozen to Depth

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | | | | | | | | |

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S11 - Poplar Creek at Hwy 63 (472000 E, 6307650 N) | | | |
| Field Personnel: | GB, JE | Trip Date: | 15-Feb-10 |
| Data Entry Personnel: | SG | Date: | 18-Feb-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|---|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data Logger installed in Winter | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1330 |
| End Time (MST): | NA |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | clear -6C |

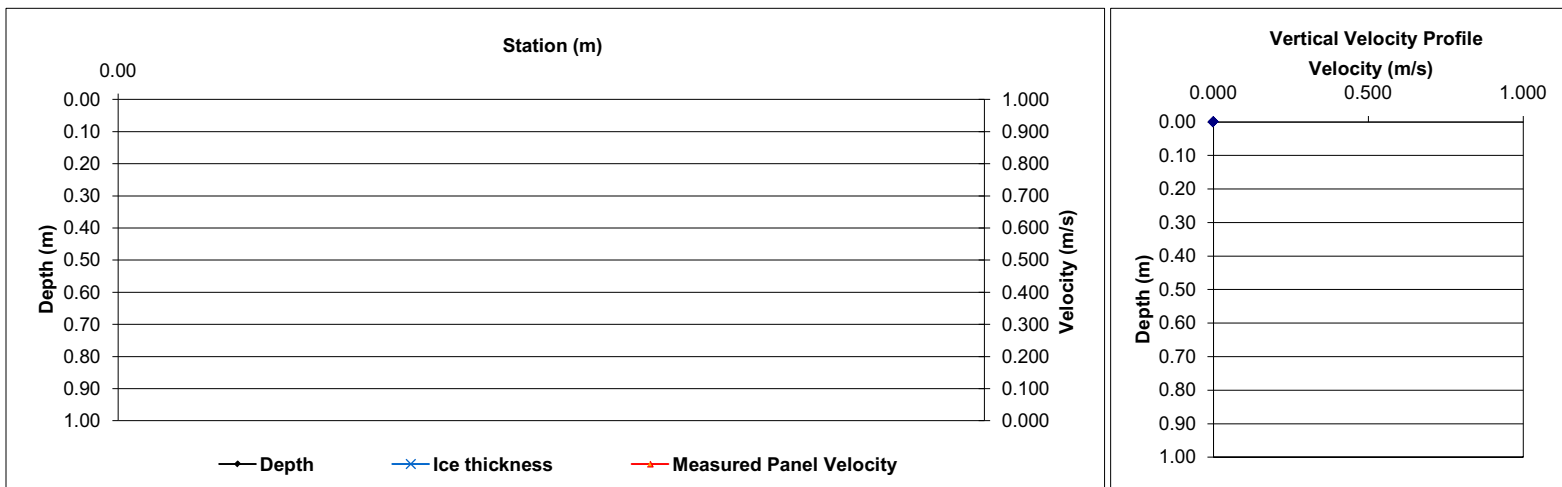
| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | ASCM sq. pin nxt to stake | | 242.081 | | 242.081 | - |
| Bench Mark 2: | Rebar w/flagging | | 242.382 | | 242.382 | - |
| Top of Ice: | | | 242.081 | | 242.081 | 242.081 |
| Water Level: | | | 242.382 | | 242.382 | 242.382 |
| Transducer: | | | | | | |
| Other: | Pin on bridge | | 245.550 | | 245.550 | |

| | |
|---------------------------------------|--|
| General Notes: | |
| No Water Found. Creek Frozen to Depth | |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | Total Flow | | NOT MEASURED |

| | | |
|--------------------------------|------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURE | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S11 - Poplar Creek at Hwy 63 (472000 E, 6307650 N) | | | |
| Field Personnel: | SG, CE | Trip Date: | 08-Mar-10 |
| Data Entry Personnel: | SG | Date: | 18-Mar-10 |
| Data Check Personnel: | JP | Date: | 02-Jun-10 |

| | |
|---|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data Logger installed in Winter | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1615 |
| End Time (MST): | 1625 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | Overcast 5°C |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | ASCM sq. pin nxt to stake | | 242.081 | | 242.081 | - |
| Bench Mark 2: | Rebar w/flagging | 1.064 | 242.382 | 1.024 | 242.382 | - |
| Top of Ice: | | 1.709 | 240.372 | 1.673 | 240.408 | 240.390 |
| Water Level: | | 2.465 | 240.981 | 2.380 | 241.026 | 241.004 |
| Transducer: | | | | | | |
| Other: | Pin on bridge | | 245.550 | | 245.550 | |

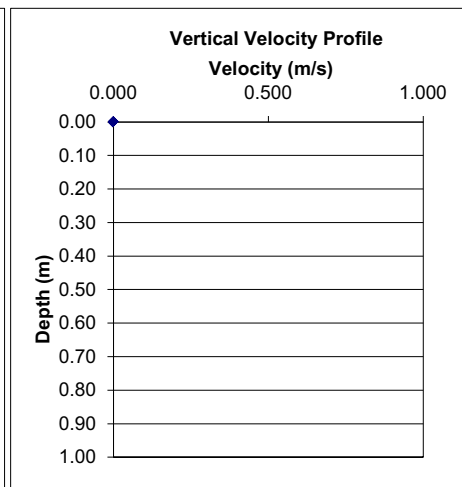
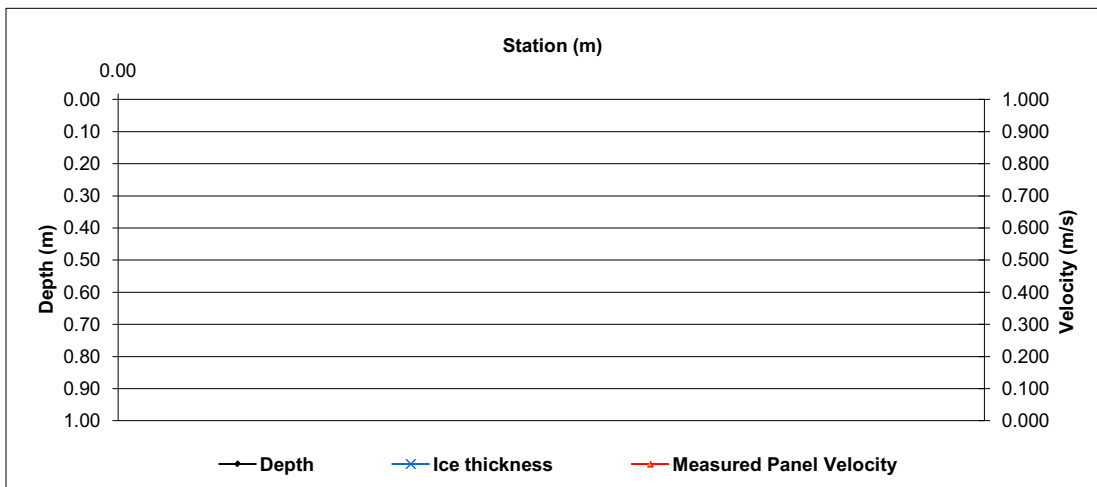
General Notes:

Water found but under pressure, very shallow not able to measure flow. Survey should be considered poor due to water pressure under ice.

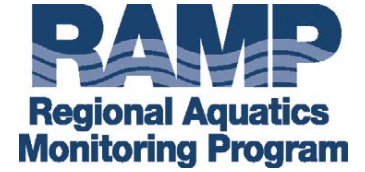
| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | Total Flow | | NOT MEASURED | | | | | | | |

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S11 - Poplar Creek at Hwy 63 (472000 E, 6307650 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 10-Apr-10 |
| Data Entry Personnel: | DB | Date: | 10-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|---|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data Logger installed in Winter | |

| | |
|------------------------------|-----------------------------------|
| Measurement Details: | |
| Start Time (MST): | 910 |
| End Time (MST): | 945 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open, some flow under ice to side |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Moderate snowfall |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | ASCM sq. pin nxt to stake | 1.288 | 242.081 | 1.316 | 242.081 | - |
| Bench Mark 2: | Rebar w/flagging | 1.015 | 242.382 | 1.042 | 242.382 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.386 | 241.011 | 2.412 | 241.012 | 241.012 |
| Transducer: | | | | | | |
| Other: | Pin on bridge | | 245.550 | | 245.550 | |

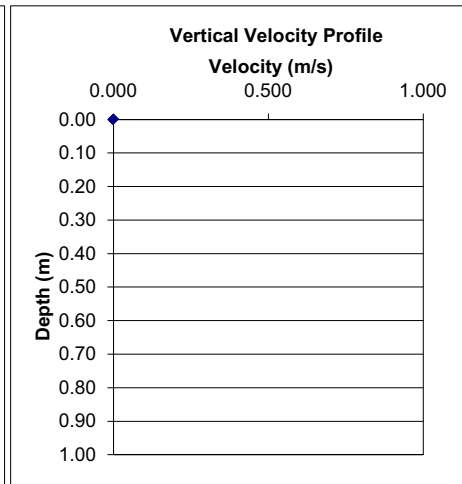
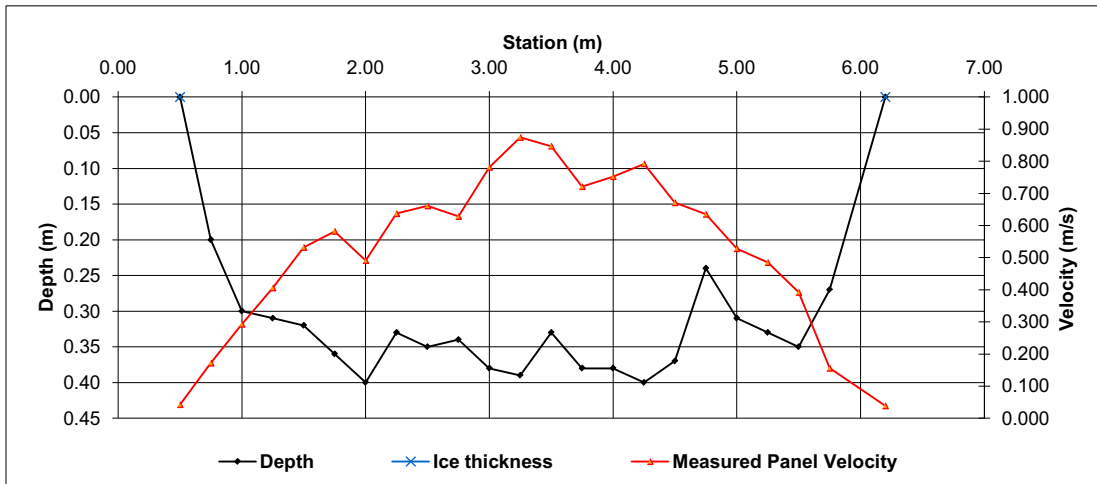
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.50 | 0.63 | 0.13 | 0.19 | 0.043 | 0.043 | 0.02 | 0.001 | 0% |
| 1 | 0.75 | 0.20 | | 0.172 | | | 1.0 | 0.63 | 0.88 | 0.25 | 0.75 | 0.172 | 0.172 | 0.19 | 0.032 | 0% |
| 2 | 1.00 | 0.30 | | 0.293 | | | 1.0 | 0.88 | 1.13 | 0.25 | 1.00 | 0.293 | 0.293 | 0.25 | 0.073 | 1% |
| 3 | 1.25 | 0.31 | | 0.406 | | | 1.0 | 1.13 | 1.38 | 0.25 | 1.25 | 0.406 | 0.406 | 0.31 | 0.127 | 1% |
| 4 | 1.50 | 0.32 | | 0.532 | | | 1.0 | 1.38 | 1.63 | 0.25 | 1.50 | 0.532 | 0.532 | 0.38 | 0.200 | 2% |
| 5 | 1.75 | 0.36 | | 0.582 | | | 1.0 | 1.63 | 1.88 | 0.25 | 1.75 | 0.582 | 0.582 | 0.44 | 0.255 | 3% |
| 6 | 2.00 | 0.40 | | 0.491 | | | 1.0 | 1.88 | 2.13 | 0.25 | 2.00 | 0.491 | 0.491 | 0.50 | 0.246 | 2% |
| 7 | 2.25 | 0.33 | | 0.637 | | | 1.0 | 2.13 | 2.38 | 0.25 | 2.25 | 0.637 | 0.637 | 0.56 | 0.358 | 4% |
| 8 | 2.50 | 0.35 | | 0.661 | | | 1.0 | 2.38 | 2.63 | 0.25 | 2.50 | 0.661 | 0.661 | 0.63 | 0.413 | 4% |
| 9 | 2.75 | 0.34 | | 0.628 | | | 1.0 | 2.63 | 2.88 | 0.25 | 2.75 | 0.628 | 0.628 | 0.69 | 0.432 | 4% |
| 10 | 3.00 | 0.38 | | 0.781 | | | 1.0 | 2.88 | 3.13 | 0.25 | 3.00 | 0.781 | 0.781 | 0.75 | 0.586 | 6% |
| 11 | 3.25 | 0.39 | | 0.874 | | | 1.0 | 3.13 | 3.38 | 0.25 | 3.25 | 0.874 | 0.874 | 0.81 | 0.710 | 7% |
| 12 | 3.50 | 0.33 | | 0.847 | | | 1.0 | 3.38 | 3.63 | 0.25 | 3.50 | 0.847 | 0.847 | 0.88 | 0.741 | 7% |
| 13 | 3.75 | 0.38 | | 0.721 | | | 1.0 | 3.63 | 3.88 | 0.25 | 3.75 | 0.721 | 0.721 | 0.94 | 0.676 | 7% |
| 14 | 4.00 | 0.38 | | 0.752 | | | 1.0 | 3.88 | 4.13 | 0.25 | 4.00 | 0.752 | 0.752 | 1.00 | 0.752 | 7% |
| 15 | 4.25 | 0.40 | | 0.792 | | | 1.0 | 4.13 | 4.38 | 0.25 | 4.25 | 0.792 | 0.792 | 1.06 | 0.842 | 8% |
| 16 | 4.50 | 0.37 | | 0.671 | | | 1.0 | 4.38 | 4.63 | 0.25 | 4.50 | 0.671 | 0.671 | 1.13 | 0.755 | 7% |
| 17 | 4.75 | 0.24 | | 0.635 | | | 1.0 | 4.63 | 4.88 | 0.25 | 4.75 | 0.635 | 0.635 | 1.19 | 0.754 | 7% |
| 18 | 5.00 | 0.31 | | 0.528 | | | 1.0 | 4.88 | 5.13 | 0.25 | 5.00 | 0.528 | 0.528 | 1.25 | 0.660 | 6% |
| 19 | 5.25 | 0.33 | | 0.485 | | | 1.0 | 5.13 | 5.38 | 0.25 | 5.25 | 0.485 | 0.485 | 1.31 | 0.637 | 6% |
| 20 | 5.50 | 0.35 | | 0.392 | | | 1.0 | 5.38 | 5.63 | 0.25 | 5.50 | 0.392 | 0.392 | 1.38 | 0.539 | 5% |
| 21 | 5.75 | 0.27 | | 0.156 | | | 1.0 | 5.63 | 5.98 | 0.35 | 5.75 | 0.156 | 0.156 | 2.01 | 0.314 | 3% |
| Left | 6.20 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 5.98 | 6.20 | 0.23 | 6.20 | 0.039 | 0.039 | 1.40 | 0.054 | 1% |
| Total Flow | | | | | | | | | | | | | | | 10.155 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|--------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 10.155 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 19.06 | (m ²) |
| Wetted Width: | 5.70 | (m) |
| Hydraulic Depth: | 3.343 | (m) |
| Mean Velocity: | 0.533 | (m/s) |
| Froude Number: | 0.093 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S11 - Poplar Creek at Hwy 63 (472000 E, 6307650 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 22-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.678 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 13.26 |
| Datalogger Clock: | - |
| Laptop Clock: | - |
| Air Temp: | 0.3 |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 0.3 |
| Memory used: | 0 |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Installed station now | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 1520 |
| End Time (MST): | 1540 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | ASCM sq. pin nxt to stake | 1.253 | 242.081 | 1.235 | 242.081 | - |
| Bench Mark 2: | Rebar w/flagging | 0.982 | 242.382 | 0.962 | 242.382 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.985 | 241.379 | 1.967 | 241.377 | 241.378 |
| Transducer: | | 0.678 | 240.701 | 0.678 | 240.699 | 240.700 |
| Other: | Pin on bridge | | 245.550 | | 245.550 | |

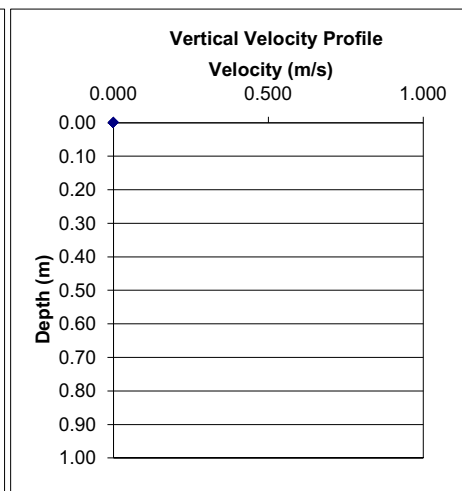
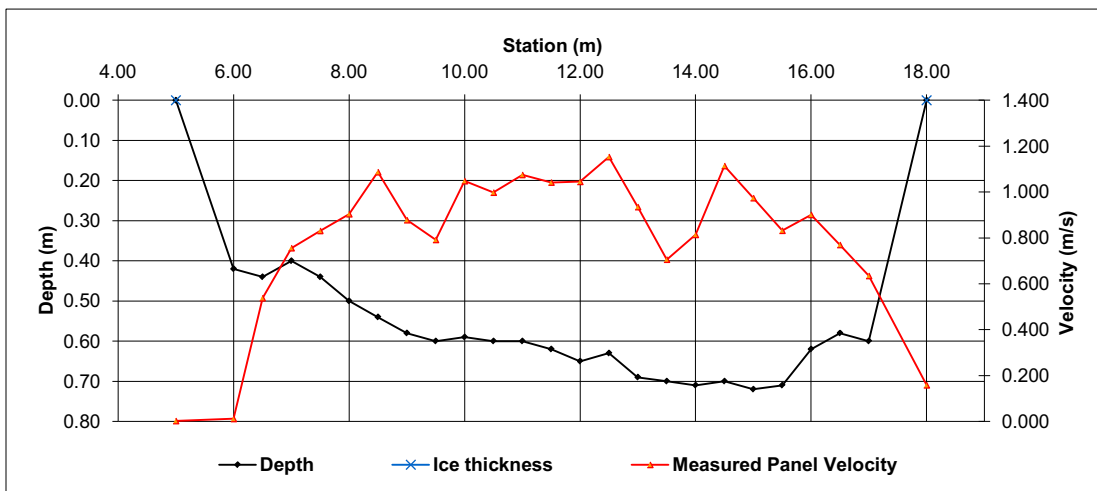
| |
|-----------------------|
| General Notes: |
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| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 18.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 18.00 | 17.50 | 0.50 | 0.15 | 0.159 | 0.159 | 0.08 | 0.012 | 0% |
| 1 | 17.00 | 0.60 | | 0.635 | | | 1.0 | 17.50 | 16.75 | 0.75 | 0.60 | 0.635 | 0.635 | 0.45 | 0.286 | 5% |
| 2 | 16.50 | 0.58 | | 0.770 | | | 1.0 | 16.75 | 16.25 | 0.50 | 0.58 | 0.770 | 0.770 | 0.29 | 0.223 | 4% |
| 3 | 16.00 | 0.62 | | 0.901 | | | 1.0 | 16.25 | 15.75 | 0.50 | 0.62 | 0.901 | 0.901 | 0.31 | 0.279 | 5% |
| 4 | 15.50 | 0.71 | | 0.832 | | | 1.0 | 15.75 | 15.25 | 0.50 | 0.71 | 0.832 | 0.832 | 0.36 | 0.295 | 5% |
| 5 | 15.00 | 0.72 | | 0.974 | | | 1.0 | 15.25 | 14.75 | 0.50 | 0.72 | 0.974 | 0.974 | 0.36 | 0.351 | 6% |
| 6 | 14.50 | 0.70 | | 1.114 | | | 1.0 | 14.75 | 14.25 | 0.50 | 0.70 | 1.114 | 1.114 | 0.35 | 0.390 | 6% |
| 7 | 14.00 | 0.71 | | 0.814 | | | 1.0 | 14.25 | 13.75 | 0.50 | 0.71 | 0.814 | 0.814 | 0.36 | 0.289 | 5% |
| 8 | 13.50 | 0.70 | | 0.706 | | | 1.0 | 13.75 | 13.25 | 0.50 | 0.70 | 0.706 | 0.706 | 0.35 | 0.247 | 4% |
| 9 | 13.00 | 0.69 | | 0.935 | | | 1.0 | 13.25 | 12.75 | 0.50 | 0.69 | 0.935 | 0.935 | 0.35 | 0.323 | 5% |
| 10 | 12.50 | 0.63 | | 1.153 | | | 1.0 | 12.75 | 12.25 | 0.50 | 0.63 | 1.153 | 1.153 | 0.32 | 0.363 | 6% |
| 11 | 12.00 | 0.65 | | 1.045 | | | 1.0 | 12.25 | 11.75 | 0.50 | 0.65 | 1.045 | 1.045 | 0.33 | 0.340 | 6% |
| 12 | 11.50 | 0.62 | | 1.042 | | | 1.0 | 11.75 | 11.25 | 0.50 | 0.62 | 1.042 | 1.042 | 0.31 | 0.323 | 5% |
| 13 | 11.00 | 0.60 | | 1.075 | | | 1.0 | 11.25 | 10.75 | 0.50 | 0.60 | 1.075 | 1.075 | 0.30 | 0.323 | 5% |
| 14 | 10.50 | 0.60 | | 0.998 | | | 1.0 | 10.75 | 10.25 | 0.50 | 0.60 | 0.998 | 0.998 | 0.30 | 0.299 | 5% |
| 15 | 10.00 | 0.59 | | 1.048 | | | 1.0 | 10.25 | 9.75 | 0.50 | 0.59 | 1.048 | 1.048 | 0.30 | 0.309 | 5% |
| 16 | 9.50 | 0.60 | | 0.792 | | | 1.0 | 9.75 | 9.25 | 0.50 | 0.60 | 0.792 | 0.792 | 0.30 | 0.238 | 4% |
| 17 | 9.00 | 0.58 | | 0.878 | | | 1.0 | 9.25 | 8.75 | 0.50 | 0.58 | 0.878 | 0.878 | 0.29 | 0.255 | 4% |
| 18 | 8.50 | 0.54 | | 1.087 | | | 1.0 | 8.75 | 8.25 | 0.50 | 0.54 | 1.087 | 1.087 | 0.27 | 0.293 | 5% |
| 19 | 8.00 | 0.50 | | 0.904 | | | 1.0 | 8.25 | 7.75 | 0.50 | 0.50 | 0.904 | 0.904 | 0.25 | 0.226 | 4% |
| 20 | 7.50 | 0.44 | | 0.831 | | | 1.0 | 7.75 | 7.25 | 0.50 | 0.44 | 0.831 | 0.831 | 0.22 | 0.183 | 3% |
| 21 | 7.00 | 0.40 | | 0.756 | | | 1.0 | 7.25 | 6.75 | 0.50 | 0.40 | 0.756 | 0.756 | 0.20 | 0.151 | 2% |
| 22 | 6.50 | 0.44 | | 0.538 | | | 1.0 | 6.75 | 6.25 | 0.50 | 0.44 | 0.538 | 0.538 | 0.22 | 0.118 | 2% |
| 23 | 6.00 | 0.42 | | 0.012 | | | 1.0 | 6.25 | 5.50 | 0.75 | 0.42 | 0.012 | 0.012 | 0.32 | 0.004 | 0% |
| Right | 5.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 5.50 | 5.00 | 0.50 | 0.11 | 0.003 | 0.003 | 0.05 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 6.120 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 6.120 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 7.20 | (m ²) |
| Wetted Width: | 12.00 | (m) |
| Hydraulic Depth: | 0.600 | (m) |
| Mean Velocity: | 0.850 | (m/s) |
| Froude Number: | 0.350 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S11 - Poplar Creek at Hwy 63 (472000 E, 6307650 N) | | | |
| Field Personnel: | SG DB BL | Trip Date: | 21-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 13-Jul-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.254 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.65 |
| Datalogger Clock: | 618 |
| Laptop Clock: | 626 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | 19.5 |
| Memory used: | 45% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 725 |
| End Time (MST): | 807 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Overcast 15°C |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | ASCM sq. pin nxt to stake | | 242.081 | 1.294 | 242.081 | - |
| Bench Mark 2: | Rebar w/flagging | 1.099 | 242.382 | 1.002 | 242.382 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.556 | 240.925 | 2.456 | 240.928 | 240.927 |
| Transducer: | | 0.254 | 240.671 | 0.254 | 240.674 | 240.673 |
| Other: | Pin on bridge | | 245.550 | | 245.550 | |

| |
|-----------------------|
| General Notes: |
|-----------------------|

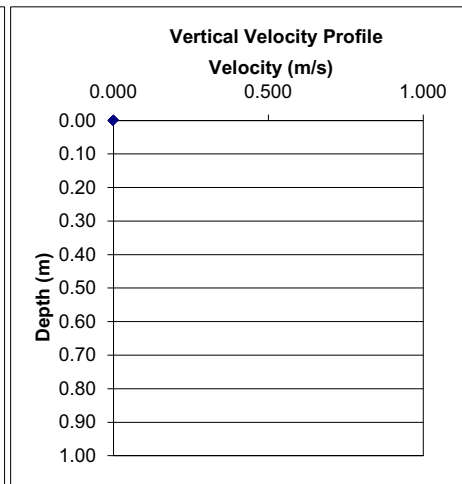
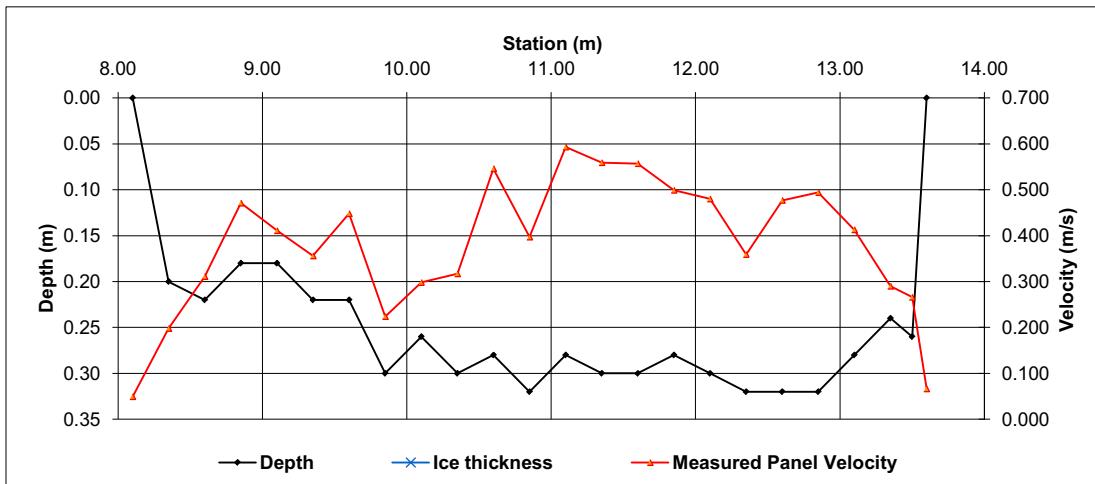
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|----------------|---------------|--------------|-------------------------|----------------------------------|----------------------------------|----------------------------------|---|------------------------|----------------------|------------------------|-------------------------------------|---|---|-------------------------------------|--|-----------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 8.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 8.10 | 8.23 | 0.13 | 0.05 | 0.050 | 0.050 | 0.01 | 0.000 | 0% | |
| 1 | 8.35 | 0.20 | | 0.198 | | | 1.0 | 8.23 | 8.48 | 0.25 | 0.20 | 0.198 | 0.198 | 0.05 | 0.010 | 2% | |
| 2 | 8.60 | 0.22 | | 0.311 | | | 1.0 | 8.48 | 8.73 | 0.25 | 0.22 | 0.311 | 0.311 | 0.06 | 0.017 | 3% | |
| 3 | 8.85 | 0.18 | | 0.471 | | | 1.0 | 8.73 | 8.98 | 0.25 | 0.18 | 0.471 | 0.471 | 0.05 | 0.021 | 4% | |
| 4 | 9.10 | 0.18 | | 0.411 | | | 1.0 | 8.98 | 9.23 | 0.25 | 0.18 | 0.411 | 0.411 | 0.05 | 0.018 | 3% | |
| 5 | 9.35 | 0.22 | | 0.356 | | | 1.0 | 9.23 | 9.48 | 0.25 | 0.22 | 0.356 | 0.356 | 0.06 | 0.020 | 3% | |
| 6 | 9.60 | 0.22 | | 0.448 | | | 1.0 | 9.48 | 9.73 | 0.25 | 0.22 | 0.448 | 0.448 | 0.06 | 0.025 | 4% | |
| 7 | 9.85 | 0.30 | | 0.224 | | | 1.0 | 9.73 | 9.98 | 0.25 | 0.30 | 0.224 | 0.224 | 0.08 | 0.017 | 3% | |
| 8 | 10.10 | 0.26 | | 0.298 | | | 1.0 | 9.98 | 10.23 | 0.25 | 0.26 | 0.298 | 0.298 | 0.07 | 0.019 | 3% | |
| 9 | 10.35 | 0.30 | | 0.317 | | | 1.0 | 10.23 | 10.48 | 0.25 | 0.30 | 0.317 | 0.317 | 0.08 | 0.024 | 4% | |
| 10 | 10.60 | 0.28 | | 0.546 | | | 1.0 | 10.48 | 10.73 | 0.25 | 0.28 | 0.546 | 0.546 | 0.07 | 0.038 | 6% | |
| 11 | 10.85 | 0.32 | | 0.397 | | | 1.0 | 10.73 | 10.98 | 0.25 | 0.32 | 0.397 | 0.397 | 0.08 | 0.032 | 5% | |
| 12 | 11.10 | 0.28 | | 0.593 | | | 1.0 | 10.98 | 11.23 | 0.25 | 0.28 | 0.593 | 0.593 | 0.07 | 0.042 | 7% | |
| 13 | 11.35 | 0.30 | | 0.559 | | | 1.0 | 11.23 | 11.48 | 0.25 | 0.30 | 0.559 | 0.559 | 0.08 | 0.042 | 7% | |
| 14 | 11.60 | 0.30 | | 0.557 | | | 1.0 | 11.48 | 11.73 | 0.25 | 0.30 | 0.557 | 0.557 | 0.08 | 0.042 | 7% | |
| 15 | 11.85 | 0.28 | | 0.499 | | | 1.0 | 11.73 | 11.98 | 0.25 | 0.28 | 0.499 | 0.499 | 0.07 | 0.035 | 6% | |
| 16 | 12.10 | 0.30 | | 0.480 | | | 1.0 | 11.98 | 12.23 | 0.25 | 0.30 | 0.480 | 0.480 | 0.08 | 0.036 | 6% | |
| 17 | 12.35 | 0.32 | | 0.359 | | | 1.0 | 12.23 | 12.48 | 0.25 | 0.32 | 0.359 | 0.359 | 0.08 | 0.029 | 5% | |
| 18 | 12.60 | 0.32 | | 0.477 | | | 1.0 | 12.48 | 12.73 | 0.25 | 0.32 | 0.477 | 0.477 | 0.08 | 0.038 | 6% | |
| 19 | 12.85 | 0.32 | | 0.494 | | | 1.0 | 12.73 | 12.98 | 0.25 | 0.32 | 0.494 | 0.494 | 0.08 | 0.040 | 7% | |
| 20 | 13.10 | 0.28 | | 0.413 | | | 1.0 | 12.98 | 13.23 | 0.25 | 0.28 | 0.413 | 0.413 | 0.07 | 0.029 | 5% | |
| 21 | 13.35 | 0.24 | | 0.290 | | | 1.0 | 13.23 | 13.43 | 0.20 | 0.24 | 0.290 | 0.290 | 0.05 | 0.014 | 2% | |
| 22 | 13.50 | 0.26 | | 0.266 | | | 1.0 | 13.43 | 13.55 | 0.13 | 0.26 | 0.266 | 0.266 | 0.03 | 0.009 | 1% | |
| Right | 13.60 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 13.55 | 13.60 | 0.05 | 0.07 | 0.067 | 0.067 | 0.00 | 0.000 | 0% | |

Total Flow 0.595

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.595 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 1.44 | (m ²) |
| Wetted Width: | 5.50 | (m) |
| Hydraulic Depth: | 0.261 | (m) |
| Mean Velocity: | 0.415 | (m/s) |
| Froude Number: | 0.259 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S11 - Poplar Creek at Hwy 63 (472000 E, 6307650 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 18-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|-----------|
| Logger Details: | |
| Transducer Reading: | 0.268 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.53 |
| Datalogger Clock: | 1325 |
| Laptop Clock: | 1333 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 18 |
| Memory used: | 65% reset |
| Dessicant: | changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1350 |
| End Time (MST): | 1415 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | overcast 20°C |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | ASCM sq. pin nxt to stake | 1.369 | 242.081 | 1.314 | 242.081 | - |
| Bench Mark 2: | Rebar w/flagging | 1.076 | 242.382 | 1.023 | 242.382 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.493 | 240.965 | 2.442 | 240.963 | 240.964 |
| Transducer: | | 0.268 | 240.697 | 0.268 | 240.695 | 240.696 |
| Other: | Pin on bridge | | 245.550 | | 245.550 | |

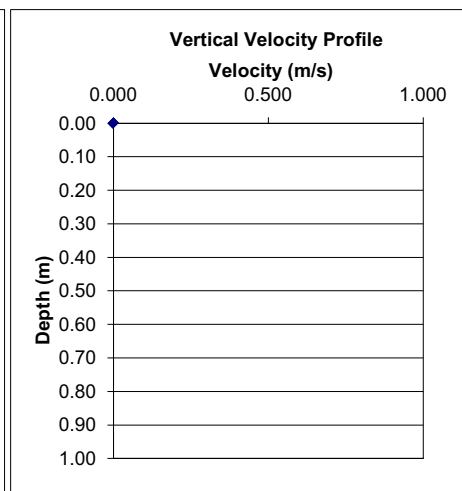
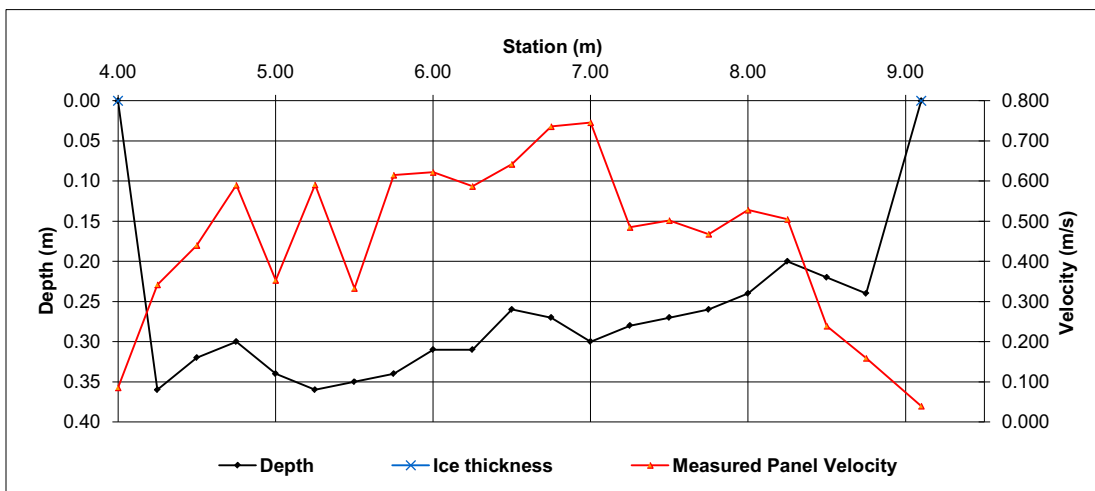
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|------------------|-------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m²) | Pannel Discharge (m³/s) | Percentage of total flow |
| Left | 4.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 4.00 | 4.13 | 0.13 | 0.09 | 0.086 | 0.086 | 0.01 | 0.001 | 0% |
| 1 | 4.25 | 0.36 | | 0.342 | | | 1.0 | 4.13 | 4.38 | 0.25 | 0.36 | 0.342 | 0.342 | 0.09 | 0.031 | 4% |
| 2 | 4.50 | 0.32 | | 0.440 | | | 1.0 | 4.38 | 4.63 | 0.25 | 0.32 | 0.440 | 0.440 | 0.08 | 0.035 | 5% |
| 3 | 4.75 | 0.30 | | 0.590 | | | 1.0 | 4.63 | 4.88 | 0.25 | 0.30 | 0.590 | 0.590 | 0.08 | 0.044 | 6% |
| 4 | 5.00 | 0.34 | | 0.353 | | | 1.0 | 4.88 | 5.13 | 0.25 | 0.34 | 0.353 | 0.353 | 0.09 | 0.030 | 4% |
| 5 | 5.25 | 0.36 | | 0.591 | | | 1.0 | 5.13 | 5.38 | 0.25 | 0.36 | 0.591 | 0.591 | 0.09 | 0.053 | 8% |
| 6 | 5.50 | 0.35 | | 0.333 | | | 1.0 | 5.38 | 5.63 | 0.25 | 0.35 | 0.333 | 0.333 | 0.09 | 0.029 | 4% |
| 7 | 5.75 | 0.34 | | 0.615 | | | 1.0 | 5.63 | 5.88 | 0.25 | 0.34 | 0.615 | 0.615 | 0.09 | 0.052 | 7% |
| 8 | 6.00 | 0.31 | | 0.622 | | | 1.0 | 5.88 | 6.13 | 0.25 | 0.31 | 0.622 | 0.622 | 0.08 | 0.048 | 7% |
| 9 | 6.25 | 0.31 | | 0.587 | | | 1.0 | 6.13 | 6.38 | 0.25 | 0.31 | 0.587 | 0.587 | 0.08 | 0.045 | 7% |
| 10 | 6.50 | 0.26 | | 0.642 | | | 1.0 | 6.38 | 6.63 | 0.25 | 0.26 | 0.642 | 0.642 | 0.07 | 0.042 | 6% |
| 11 | 6.75 | 0.27 | | 0.736 | | | 1.0 | 6.63 | 6.88 | 0.25 | 0.27 | 0.736 | 0.736 | 0.07 | 0.050 | 7% |
| 12 | 7.00 | 0.30 | | 0.746 | | | 1.0 | 6.88 | 7.13 | 0.25 | 0.30 | 0.746 | 0.746 | 0.08 | 0.056 | 8% |
| 13 | 7.25 | 0.28 | | 0.485 | | | 1.0 | 7.13 | 7.38 | 0.25 | 0.28 | 0.485 | 0.485 | 0.07 | 0.034 | 5% |
| 14 | 7.50 | 0.27 | | 0.502 | | | 1.0 | 7.38 | 7.63 | 0.25 | 0.27 | 0.502 | 0.502 | 0.07 | 0.034 | 5% |
| 15 | 7.75 | 0.26 | | 0.468 | | | 1.0 | 7.63 | 7.88 | 0.25 | 0.26 | 0.468 | 0.468 | 0.07 | 0.030 | 4% |
| 16 | 8.00 | 0.24 | | 0.528 | | | 1.0 | 7.88 | 8.13 | 0.25 | 0.24 | 0.528 | 0.528 | 0.06 | 0.032 | 5% |
| 17 | 8.25 | 0.20 | | 0.505 | | | 1.0 | 8.13 | 8.38 | 0.25 | 0.20 | 0.505 | 0.505 | 0.05 | 0.025 | 4% |
| 18 | 8.50 | 0.22 | | 0.239 | | | 1.0 | 8.38 | 8.63 | 0.25 | 0.22 | 0.239 | 0.239 | 0.06 | 0.013 | 2% |
| 19 | 8.75 | 0.24 | | 0.159 | | | 1.0 | 8.63 | 8.93 | 0.30 | 0.24 | 0.159 | 0.159 | 0.07 | 0.011 | 2% |
| Right | 9.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 8.93 | 9.10 | 0.17 | 0.06 | 0.040 | 0.040 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.697 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|--------|
| Flow characteristics: | | |
| Total Flow: | 0.697 | (m³/s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 1.42 | (m²) |
| Wetted Width: | 5.10 | (m) |
| Hydraulic Depth: | 0.278 | (m) |
| Mean Velocity: | 0.492 | (m/s) |
| Froude Number: | 0.298 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S11 - Poplar Creek at Hwy 63 (472000 E, 6307650 N) | | | |
| Field Personnel: | DB SG HB | Trip Date: | 19-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|--------------|
| Logger Details: | |
| Transducer Reading: | 0.489 |
| Battery (Main): | 11.34 (100%) |
| Battery (Aux): | 12.29 (79%) |
| Datalogger Clock: | 1527 |
| Laptop Clock: | 1528 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | 10.22 |
| Memory used: | 20% |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1530 |
| End Time (MST): | 1600 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Overcast 10°C |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | ASCM sq. pin nxt to stake | 1.212 | 242.081 | 1.191 | 242.081 | - |
| Bench Mark 2: | Rebar w/flagging | 0.917 | 242.382 | 0.896 | 242.382 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.062 | 241.237 | 2.045 | 241.233 | 241.235 |
| Transducer: | | 0.489 | 240.748 | 0.489 | 240.744 | 240.746 |
| Other: | Pin on bridge | | 245.550 | | 245.550 | |

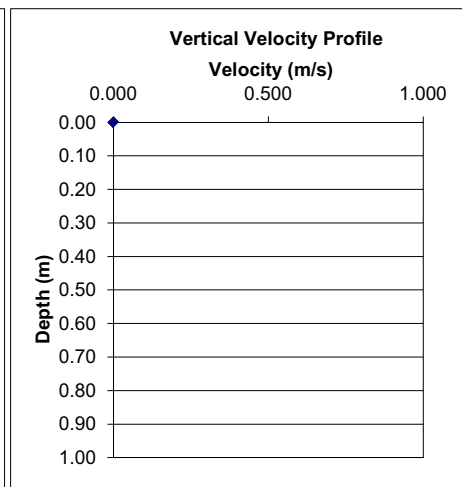
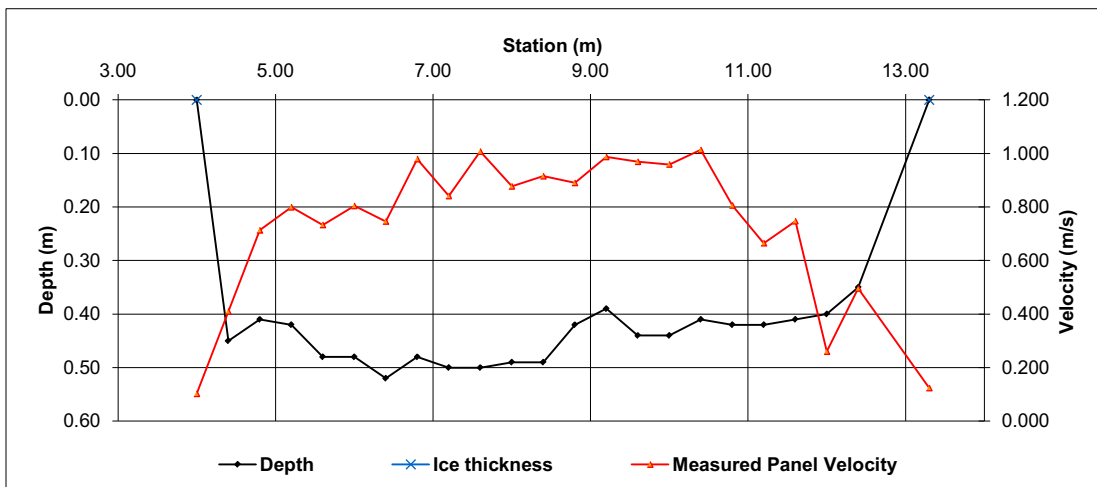
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Measured Data | | | | | | | Calculated Data | | | | | | | | | | |
|---------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 4.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 4.00 | 4.20 | 0.20 | 0.11 | 0.103 | 0.103 | 0.02 | 0.002 | 0% | |
| 1 | 4.40 | 0.45 | | 0.410 | | | 1.0 | 4.20 | 4.60 | 0.40 | 0.45 | 0.410 | 0.410 | 0.18 | 0.074 | 2% | |
| 2 | 4.80 | 0.41 | | 0.713 | | | 1.0 | 4.60 | 5.00 | 0.40 | 0.41 | 0.713 | 0.713 | 0.16 | 0.117 | 4% | |
| 3 | 5.20 | 0.42 | | 0.799 | | | 1.0 | 5.00 | 5.40 | 0.40 | 0.42 | 0.799 | 0.799 | 0.17 | 0.134 | 4% | |
| 4 | 5.60 | 0.48 | | 0.733 | | | 1.0 | 5.40 | 5.80 | 0.40 | 0.48 | 0.733 | 0.733 | 0.19 | 0.141 | 5% | |
| 5 | 6.00 | 0.48 | | 0.804 | | | 1.0 | 5.80 | 6.20 | 0.40 | 0.48 | 0.804 | 0.804 | 0.19 | 0.154 | 5% | |
| 6 | 6.40 | 0.52 | | 0.746 | | | 1.0 | 6.20 | 6.60 | 0.40 | 0.52 | 0.746 | 0.746 | 0.21 | 0.155 | 5% | |
| 7 | 6.80 | 0.48 | | 0.979 | | | 1.0 | 6.60 | 7.00 | 0.40 | 0.48 | 0.979 | 0.979 | 0.19 | 0.188 | 6% | |
| 8 | 7.20 | 0.50 | | 0.841 | | | 1.0 | 7.00 | 7.40 | 0.40 | 0.50 | 0.841 | 0.841 | 0.20 | 0.168 | 6% | |
| 9 | 7.60 | 0.50 | | 1.007 | | | 1.0 | 7.40 | 7.80 | 0.40 | 0.50 | 1.007 | 1.007 | 0.20 | 0.201 | 7% | |
| 10 | 8.00 | 0.49 | | 0.877 | | | 1.0 | 7.80 | 8.20 | 0.40 | 0.49 | 0.877 | 0.877 | 0.20 | 0.172 | 6% | |
| 11 | 8.40 | 0.49 | | 0.915 | | | 1.0 | 8.20 | 8.60 | 0.40 | 0.49 | 0.915 | 0.915 | 0.20 | 0.179 | 6% | |
| 12 | 8.80 | 0.42 | | 0.890 | | | 1.0 | 8.60 | 9.00 | 0.40 | 0.42 | 0.890 | 0.890 | 0.17 | 0.150 | 5% | |
| 13 | 9.20 | 0.39 | | 0.987 | | | 1.0 | 9.00 | 9.40 | 0.40 | 0.39 | 0.987 | 0.987 | 0.16 | 0.154 | 5% | |
| 14 | 9.60 | 0.44 | | 0.969 | | | 1.0 | 9.40 | 9.80 | 0.40 | 0.44 | 0.969 | 0.969 | 0.18 | 0.171 | 6% | |
| 15 | 10.00 | 0.44 | | 0.959 | | | 1.0 | 9.80 | 10.20 | 0.40 | 0.44 | 0.959 | 0.959 | 0.18 | 0.169 | 6% | |
| 16 | 10.40 | 0.41 | | 1.013 | | | 1.0 | 10.20 | 10.60 | 0.40 | 0.41 | 1.013 | 1.013 | 0.16 | 0.166 | 5% | |
| 17 | 10.80 | 0.42 | | 0.806 | | | 1.0 | 10.60 | 11.00 | 0.40 | 0.42 | 0.806 | 0.806 | 0.17 | 0.135 | 4% | |
| 18 | 11.20 | 0.42 | | 0.665 | | | 1.0 | 11.00 | 11.40 | 0.40 | 0.42 | 0.665 | 0.665 | 0.17 | 0.112 | 4% | |
| 19 | 11.60 | 0.41 | | 0.747 | | | 1.0 | 11.40 | 11.80 | 0.40 | 0.41 | 0.747 | 0.747 | 0.16 | 0.123 | 4% | |
| 20 | 12.00 | 0.40 | | 0.260 | | | 1.0 | 11.80 | 12.20 | 0.40 | 0.40 | 0.260 | 0.260 | 0.16 | 0.042 | 1% | |
| 21 | 12.40 | 0.35 | | 0.496 | | | 1.0 | 12.20 | 12.85 | 0.65 | 0.35 | 0.496 | 0.496 | 0.23 | 0.113 | 4% | |
| Right | 13.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 12.85 | 13.30 | 0.45 | 0.09 | 0.124 | 0.124 | 0.04 | 0.005 | 0% | |
| | | | | | | | | | | | | | | Total Flow | 3.024 | | |

**denotes position of TSS sample*

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 3.024 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 3.88 | (m ²) |
| Wetted Width: | 9.30 | (m) |
| Hydraulic Depth: | 0.417 | (m) |
| Mean Velocity: | 0.780 | (m/s) |
| Froude Number: | 0.386 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S11 - Poplar Creek at Hwy 63 (472000 E, 6307650 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 04-Nov-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.254 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 11.92 |
| Datalogger Clock: | 1106 |
| Laptop Clock: | 1107 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 2.179 |
| Memory used: | 45% |
| Dessicant: | - |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 1105 |
| End Time (MST): | 1200 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Sunny 8°C |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | ASCM sq. pin nxt to stake | 1.405 | 242.081 | 1.380 | 242.081 | - |
| Bench Mark 2: | Rebar w/flagging | 1.109 | 242.382 | 1.082 | 242.382 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.520 | 240.971 | 2.494 | 240.970 | 240.971 |
| Transducer: | | 0.254 | 240.717 | 0.2542 | 240.716 | 240.716 |
| Other: | Pin on bridge | | 245.550 | | 245.550 | |

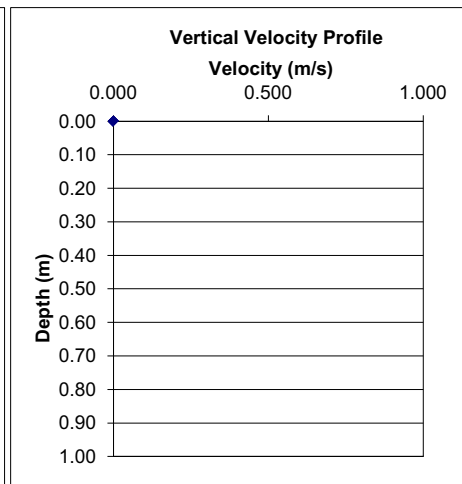
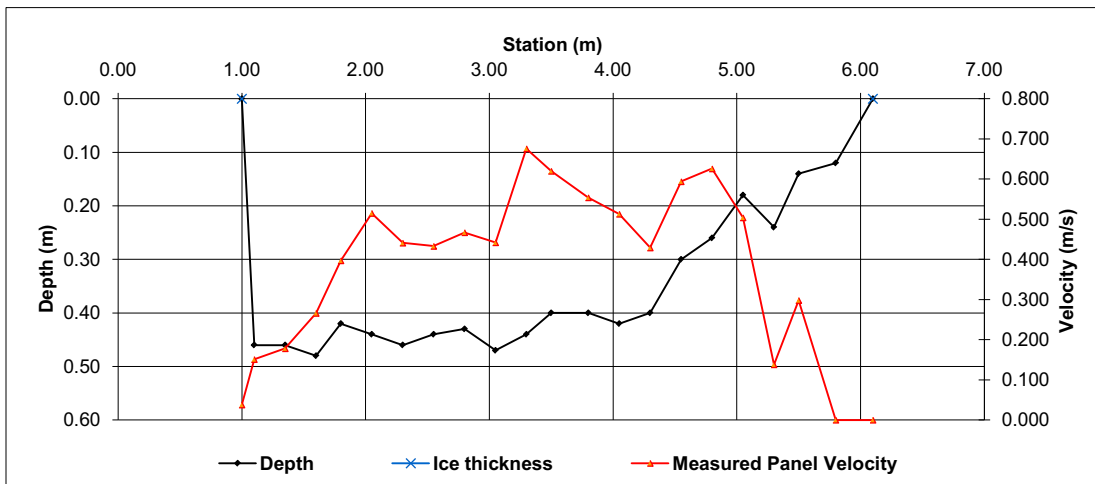
| | |
|-----------------------|--|
| General Notes: | |
| TSS @ 5m | |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|---------------|--------------|-------------------------|----------------------------------|----------------------------------|----------------------------------|---|------------------------|----------------------|------------------------|-------------------------------------|---|---|-------------------------------------|--|-----------------------------|----|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 1.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.00 | 1.05 | 1.23 | 0.05 | 0.12 | 0.038 | 0.038 | 0.01 | 0.000 | 0% |
| 1 | 1.10 | 0.46 | | 0.151 | | | 1.0 | 1.05 | 1.23 | 0.18 | 0.46 | 0.151 | 0.151 | 0.08 | 0.012 | 2% | |
| 2 | 1.35 | 0.46 | | 0.178 | | | 1.0 | 1.23 | 1.48 | 0.25 | 0.46 | 0.178 | 0.178 | 0.12 | 0.020 | 3% | |
| 3 | 1.60 | 0.48 | | 0.266 | | | 1.0 | 1.48 | 1.70 | 0.23 | 0.48 | 0.266 | 0.266 | 0.11 | 0.029 | 4% | |
| 4 | 1.80 | 0.42 | | 0.397 | | | 1.0 | 1.70 | 1.93 | 0.23 | 0.42 | 0.397 | 0.397 | 0.09 | 0.038 | 5% | |
| 5 | 2.05 | 0.44 | | 0.515 | | | 1.0 | 1.93 | 2.18 | 0.25 | 0.44 | 0.515 | 0.515 | 0.11 | 0.057 | 7% | |
| 6 | 2.30 | 0.46 | | 0.441 | | | 1.0 | 2.18 | 2.43 | 0.25 | 0.46 | 0.441 | 0.441 | 0.12 | 0.051 | 7% | |
| 7 | 2.55 | 0.44 | | 0.433 | | | 1.0 | 2.43 | 2.68 | 0.25 | 0.44 | 0.433 | 0.433 | 0.11 | 0.048 | 6% | |
| 8 | 2.80 | 0.43 | | 0.467 | | | 1.0 | 2.68 | 2.93 | 0.25 | 0.43 | 0.467 | 0.467 | 0.11 | 0.050 | 7% | |
| 9 | 3.05 | 0.47 | | 0.442 | | | 1.0 | 2.93 | 3.18 | 0.25 | 0.47 | 0.442 | 0.442 | 0.12 | 0.052 | 7% | |
| 10 | 3.30 | 0.44 | | 0.676 | | | 1.0 | 3.18 | 3.40 | 0.23 | 0.44 | 0.676 | 0.676 | 0.10 | 0.067 | 9% | |
| 11 | 3.50 | 0.40 | | 0.620 | | | 1.0 | 3.40 | 3.65 | 0.25 | 0.40 | 0.620 | 0.620 | 0.10 | 0.062 | 8% | |
| 12 | 3.80 | 0.40 | | 0.554 | | | 1.0 | 3.65 | 3.93 | 0.28 | 0.40 | 0.554 | 0.554 | 0.11 | 0.061 | 8% | |
| 13 | 4.05 | 0.42 | | 0.513 | | | 1.0 | 3.93 | 4.18 | 0.25 | 0.42 | 0.513 | 0.513 | 0.11 | 0.054 | 7% | |
| 14 | 4.30 | 0.40 | | 0.429 | | | 1.0 | 4.18 | 4.43 | 0.25 | 0.40 | 0.429 | 0.429 | 0.10 | 0.043 | 6% | |
| 15 | 4.55 | 0.30 | | 0.594 | | | 1.0 | 4.43 | 4.68 | 0.25 | 0.30 | 0.594 | 0.594 | 0.08 | 0.045 | 6% | |
| 16 | 4.80 | 0.26 | | 0.626 | | | 1.0 | 4.68 | 4.93 | 0.25 | 0.26 | 0.626 | 0.626 | 0.07 | 0.041 | 5% | |
| 17 | 5.05 | 0.18 | | 0.504 | | | 1.0 | 4.93 | 5.18 | 0.25 | 0.18 | 0.504 | 0.504 | 0.05 | 0.023 | 3% | |
| 18 | 5.30 | 0.24 | | 0.138 | | | 1.0 | 5.18 | 5.40 | 0.23 | 0.24 | 0.138 | 0.138 | 0.05 | 0.007 | 1% | |
| 19 | 5.50 | 0.14 | | 0.298 | | | 1.0 | 5.40 | 5.65 | 0.25 | 0.14 | 0.298 | 0.298 | 0.04 | 0.010 | 1% | |
| 20 | 5.80 | 0.12 | | 0.000 | | | 1.0 | 5.65 | 5.95 | 0.30 | 0.12 | 0.000 | 0.000 | 0.04 | 0.000 | 0% | |
| Right | 6.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 5.95 | 6.10 | 0.15 | 0.03 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.769 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.769 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 1.79 | (m ²) |
| Wetted Width: | 5.10 | (m) |
| Hydraulic Depth: | 0.351 | (m) |
| Mean Velocity: | 0.429 | (m/s) |
| Froude Number: | 0.231 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S11 - Poplar Creek at Hwy 63 (472000 E, 6307650 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 08-Dec-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | |
|---|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No Data logger installed in winter | |

| | |
|------------------------------|----------------|
| Measurement Details: | |
| Start Time (MST): | 11:45 |
| End Time (MST): | 12:15 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | - 10, overcast |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | ASCM sq. pin nxt to stake | 0.808 | 242.081 | 0.803 | 242.081 | - |
| Bench Mark 2: | Rebar w/flagging | 0.513 | 242.382 | 0.508 | 242.382 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.116 | 240.779 | 2.113 | 240.777 | 240.778 |
| Transducer: | | | | | | |
| Other: | Pin on bridge | | 245.550 | | 245.550 | |

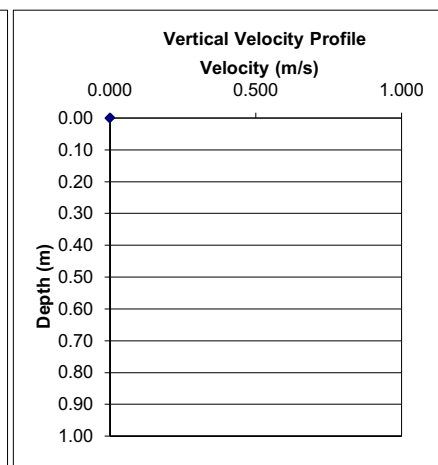
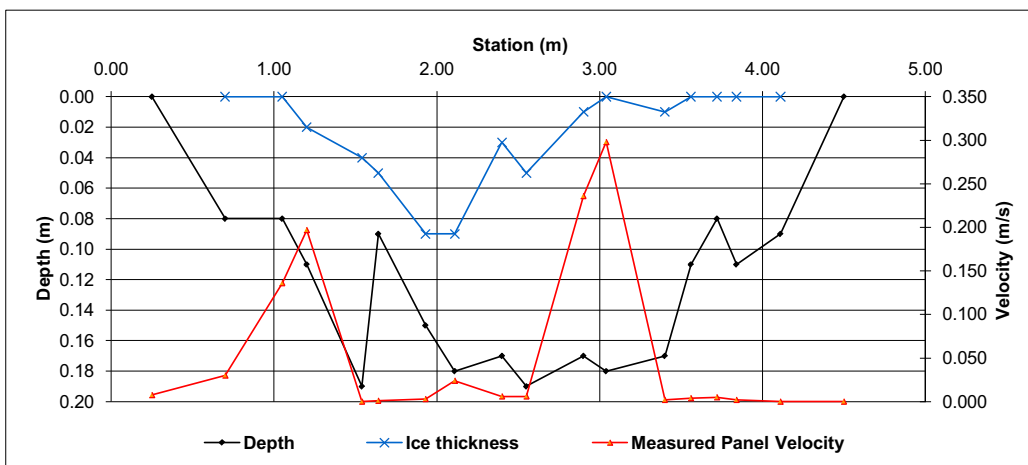
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: Measured Data | | | | | | | Calculated Data | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.25 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 0.25 | 0.48 | 0.23 | 0.02 | 0.008 | 0.007 | 0.00 | 0.000 | 0% |
| 1 | 0.70 | 0.08 | 0.00 | 0.030 | | | 0.9 | 0.48 | 0.88 | 0.40 | 0.08 | 0.030 | 0.027 | 0.03 | 0.001 | 3% |
| 2 | 1.05 | 0.08 | 0.00 | 0.136 | | | 0.9 | 0.88 | 1.13 | 0.25 | 0.08 | 0.136 | 0.122 | 0.02 | 0.002 | 9% |
| 3 | 1.20 | 0.11 | 0.02 | 0.197 | | | 0.9 | 1.13 | 1.37 | 0.25 | 0.09 | 0.197 | 0.177 | 0.02 | 0.004 | 14% |
| 4 | 1.54 | 0.19 | 0.04 | 0.000 | | | 1.0 | 1.37 | 1.59 | 0.22 | 0.15 | 0.000 | 0.000 | 0.03 | 0.000 | 0% |
| 5 | 1.64 | 0.09 | 0.05 | 0.001 | | | 0.9 | 1.59 | 1.79 | 0.20 | 0.04 | 0.001 | 0.001 | 0.01 | 0.000 | 0% |
| 6 | 1.93 | 0.15 | 0.09 | 0.003 | | | 0.9 | 1.79 | 2.02 | 0.24 | 0.06 | 0.003 | 0.003 | 0.01 | 0.000 | 0% |
| 7 | 2.11 | 0.18 | 0.09 | 0.024 | | | 0.9 | 2.02 | 2.26 | 0.24 | 0.09 | 0.024 | 0.022 | 0.02 | 0.000 | 2% |
| 8 | 2.40 | 0.17 | 0.03 | 0.006 | | | 0.9 | 2.26 | 2.48 | 0.22 | 0.14 | 0.006 | 0.005 | 0.03 | 0.000 | 1% |
| 9 | 2.55 | 0.19 | 0.05 | 0.006 | | | 0.9 | 2.48 | 2.73 | 0.25 | 0.14 | 0.006 | 0.005 | 0.04 | 0.000 | 1% |
| 10 | 2.90 | 0.17 | 0.01 | 0.236 | | | 0.9 | 2.73 | 2.97 | 0.25 | 0.16 | 0.236 | 0.212 | 0.04 | 0.008 | 29% |
| 11 | 3.04 | 0.18 | 0.00 | 0.298 | | | 0.9 | 2.97 | 3.22 | 0.25 | 0.18 | 0.298 | 0.268 | 0.05 | 0.012 | 42% |
| 12 | 3.40 | 0.17 | 0.01 | 0.002 | | | 0.9 | 3.22 | 3.48 | 0.26 | 0.16 | 0.002 | 0.002 | 0.04 | 0.000 | 0% |
| 13 | 3.56 | 0.11 | 0.00 | 0.004 | | | 0.9 | 3.48 | 3.64 | 0.16 | 0.11 | 0.004 | 0.004 | 0.02 | 0.000 | 0% |
| 14 | 3.72 | 0.08 | 0.00 | 0.005 | | | 0.9 | 3.64 | 3.78 | 0.14 | 0.08 | 0.005 | 0.005 | 0.01 | 0.000 | 0% |
| 15 | 3.84 | 0.11 | 0.00 | 0.002 | | | 0.9 | 3.78 | 3.98 | 0.20 | 0.11 | 0.002 | 0.002 | 0.02 | 0.000 | 0% |
| 16 | 4.11 | 0.09 | 0.00 | 0.000 | | | 1.0 | 3.98 | 4.31 | 0.33 | 0.09 | 0.000 | 0.000 | 0.03 | 0.000 | 0% |
| Right | 4.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.31 | 4.50 | 0.20 | 0.02 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.029 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.029 | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | 0.43 | (m ²) |
| Wetted Width: | 4.25 | (m) |
| Hydraulic Depth: | 0.101 | (m) |
| Mean Velocity: | 0.067 | (m/s) |
| Froude Number: | 0.067 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S12 - Fort Creek at Highway 63 (462600 E, 6363400 N) | | | |
| Field Personnel: | DB GB | Trip Date: | 08-Apr-10 |
| Data Entry Personnel: | DB | Date: | 10-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|--------------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No logger in April trip | |

| | |
|------------------------------|---------------------------------------|
| Measurement Details: | |
| Start Time (MST): | 840 |
| End Time (MST): | 850 |
| Equipment: | - |
| Method: | - |
| River Condition: | Broken Ice, small flow through middle |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post closest to road | 0.808 | 98.699 | 0.754 | 98.699 | - |
| Bench Mark 2: | Other T-post | 0.805 | 98.702 | 0.752 | 98.701 | - |
| Top of Ice: | - | - | - | - | - | - |
| Water Level: | | 2.043 | 97.464 | 1.987 | 97.466 | 97.465 |
| Transducer: | | | | | | |
| Other: | | | | | | |

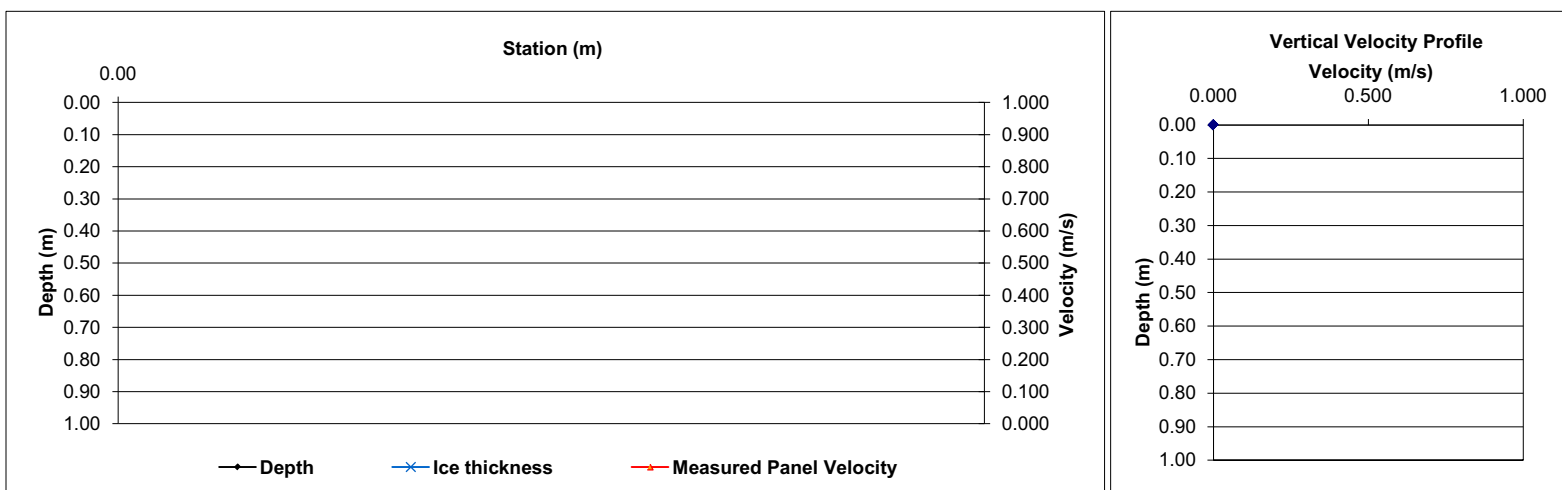
General Notes:

Erosion mat installed, timberline cut back along hwy. Hydro seeding along road side, caution walking on landscape mat. Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | Total Flow | | NOT MEASURED |

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Foude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S12 - Fort Creek at Highway 63 (462600 E, 6363400 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 27-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.228 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.53 |
| Datalogger Clock: | 829 |
| Laptop Clock: | 829 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 0% |
| Dessicant: | New |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 810 |
| End Time (MST): | 830 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | 5°C sunny |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post closest to road | 1.216 | 98.699 | 1.174 | 98.699 | - |
| Bench Mark 2: | Other T-post | 1.214 | 98.701 | 1.173 | 98.700 | - |
| Top of Ice: | - | - | - | - | - | - |
| Water Level: | | 2.403 | 97.512 | 2.362 | 97.511 | 97.512 |
| Transducer: | | 0.228 | 97.284 | 0.228 | 97.283 | 97.284 |
| Other: | | | | | | |

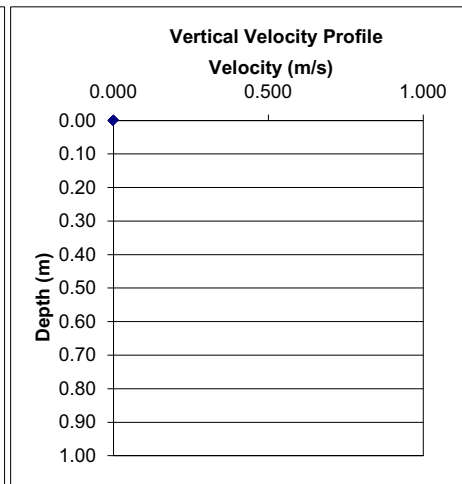
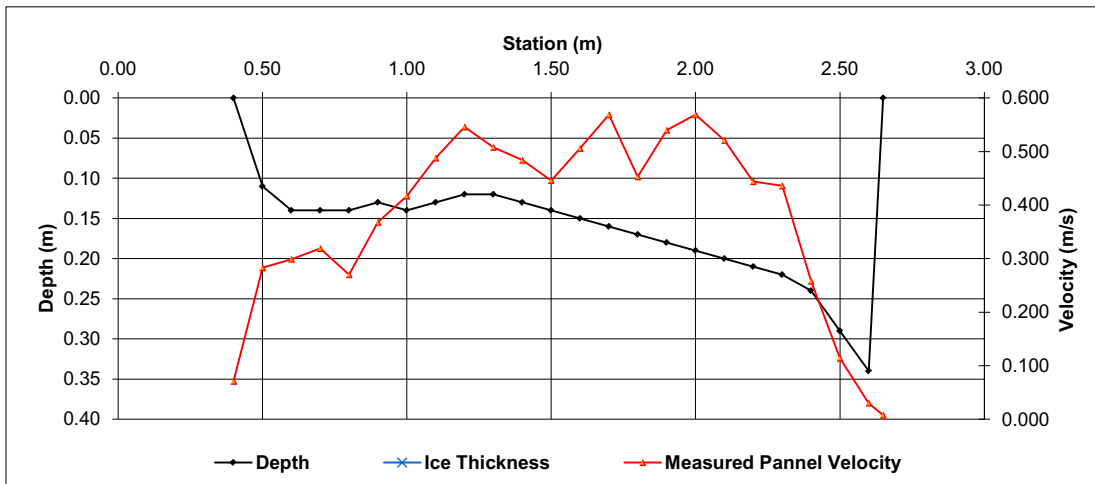
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 0.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.40 | 0.45 | 0.05 | 0.03 | 0.071 | 0.071 | 0.00 | 0.000 | 0% | |
| 1 | 0.50 | 0.11 | | 0.283 | | | 1.0 | 0.45 | 0.55 | 0.10 | 0.11 | 0.283 | 0.283 | 0.01 | 0.003 | 2% | |
| 2 | 0.60 | 0.14 | | 0.299 | | | 1.0 | 0.55 | 0.65 | 0.10 | 0.14 | 0.299 | 0.299 | 0.01 | 0.004 | 3% | |
| 3 | 0.70 | 0.14 | | 0.319 | | | 1.0 | 0.65 | 0.75 | 0.10 | 0.14 | 0.319 | 0.319 | 0.01 | 0.004 | 3% | |
| 4 | 0.80 | 0.14 | | 0.270 | | | 1.0 | 0.75 | 0.85 | 0.10 | 0.14 | 0.270 | 0.270 | 0.01 | 0.004 | 3% | |
| 5 | 0.90 | 0.13 | | 0.368 | | | 1.0 | 0.85 | 0.95 | 0.10 | 0.13 | 0.368 | 0.368 | 0.01 | 0.005 | 3% | |
| 6 | 1.00 | 0.14 | | 0.417 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.14 | 0.417 | 0.417 | 0.01 | 0.006 | 4% | |
| 7 | 1.10 | 0.13 | | 0.488 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.13 | 0.488 | 0.488 | 0.01 | 0.006 | 4% | |
| 8 | 1.20 | 0.12 | | 0.546 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.12 | 0.546 | 0.546 | 0.01 | 0.007 | 5% | |
| 9 | 1.30 | 0.12 | | 0.508 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.12 | 0.508 | 0.508 | 0.01 | 0.006 | 4% | |
| 10 | 1.40 | 0.13 | | 0.484 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.13 | 0.484 | 0.484 | 0.01 | 0.006 | 4% | |
| 11 | 1.50 | 0.14 | | 0.446 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.14 | 0.446 | 0.446 | 0.01 | 0.006 | 4% | |
| 12 | 1.60 | 0.15 | | 0.506 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.15 | 0.506 | 0.506 | 0.02 | 0.008 | 5% | |
| 13 | 1.70 | 0.16 | | 0.569 | | | 1.0 | 1.65 | 1.75 | 0.10 | 0.16 | 0.569 | 0.569 | 0.02 | 0.009 | 6% | |
| 14 | 1.80 | 0.17 | | 0.453 | | | 1.0 | 1.75 | 1.85 | 0.10 | 0.17 | 0.453 | 0.453 | 0.02 | 0.008 | 5% | |
| 15 | 1.90 | 0.18 | | 0.540 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.18 | 0.540 | 0.540 | 0.02 | 0.010 | 7% | |
| 16 | 2.00 | 0.19 | | 0.569 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.19 | 0.569 | 0.569 | 0.02 | 0.011 | 8% | |
| 17 | 2.10 | 0.20 | | 0.521 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.20 | 0.521 | 0.521 | 0.02 | 0.010 | 7% | |
| 18 | 2.20 | 0.21 | | 0.444 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.21 | 0.444 | 0.444 | 0.02 | 0.009 | 7% | |
| 19 | 2.30 | 0.22 | | 0.436 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.22 | 0.436 | 0.436 | 0.02 | 0.010 | 7% | |
| 20 | 2.40 | 0.24 | | 0.258 | | | 1.0 | 2.35 | 2.45 | 0.10 | 0.24 | 0.258 | 0.258 | 0.02 | 0.006 | 4% | |
| 21 | 2.50 | 0.29 | | 0.114 | | | 1.0 | 2.45 | 2.55 | 0.10 | 0.29 | 0.114 | 0.114 | 0.03 | 0.003 | 2% | |
| 22 | 2.60 | 0.34 | | 0.030 | | | 1.0 | 2.55 | 2.63 | 0.08 | 0.34 | 0.030 | 0.030 | 0.03 | 0.001 | 1% | |
| Left | 2.65 | 0.00 | | | | | 1.0 | 2.63 | 2.65 | 0.02 | 0.09 | 0.008 | 0.008 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.142 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.142 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.37 | (m ²) |
| Wetted Width: | 2.25 | (m) |
| Hydraulic Depth: | 0.166 | (m) |
| Mean Velocity: | 0.381 | (m/s) |
| Foude Number: | 0.298 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S12 - Fort Creek at Highway 63 (462600 E, 6363400 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 27-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 13-Jul-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.261 |
| Battery (Main): | |
| Battery (Aux): | 80% |
| Datalogger Clock: | 836 |
| Laptop Clock: | 837 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 40% |
| Dessicant: | Good |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|----------|
| Measurement Details: | |
| Start Time (MST): | 840 |
| End Time (MST): | 910 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post closest to road | 0.585 | 98.699 | 0.580 | 98.699 | - |
| Bench Mark 2: | Other T-post | 0.582 | 98.702 | 0.578 | 98.701 | - |
| Top of Ice: | - | - | - | - | - | - |
| Water Level: | | 1.798 | 97.486 | 1.791 | 97.488 | 97.487 |
| Transducer: | | 0.261 | 97.225 | 0.261 | 97.227 | 97.226 |
| Other: | | | | | | |

General Notes:

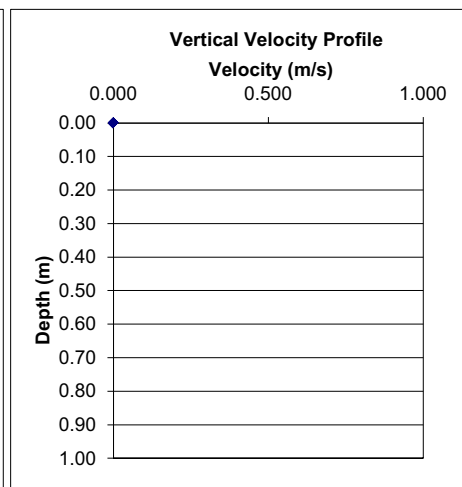
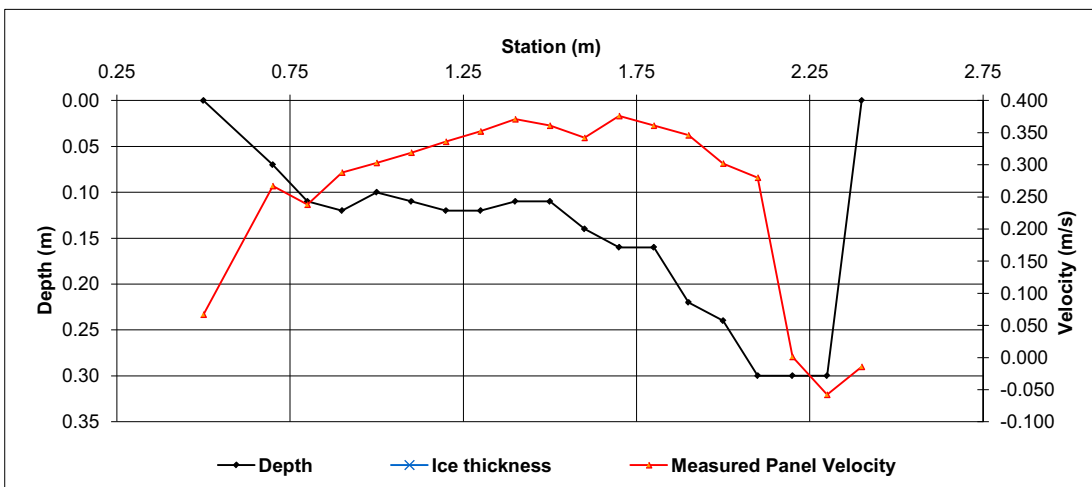
Appears big daily fluctuations in water level- double check this is heavily regulated upstream

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.50 | 0.60 | 0.10 | 0.02 | 0.067 | 0.067 | 0.00 | 0.000 | 0% |
| 1 | 0.70 | 0.07 | | 0.267 | | | 1.0 | 0.60 | 0.75 | 0.15 | 0.07 | 0.267 | 0.267 | 0.01 | 0.003 | 4% |
| 2 | 0.80 | 0.11 | | 0.238 | | | 1.0 | 0.75 | 0.85 | 0.10 | 0.11 | 0.238 | 0.238 | 0.01 | 0.003 | 4% |
| 3 | 0.90 | 0.12 | | 0.288 | | | 1.0 | 0.85 | 0.95 | 0.10 | 0.12 | 0.288 | 0.288 | 0.01 | 0.003 | 5% |
| 4 | 1.00 | 0.10 | | 0.303 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.10 | 0.303 | 0.303 | 0.01 | 0.003 | 4% |
| 5 | 1.10 | 0.11 | | 0.319 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.11 | 0.319 | 0.319 | 0.01 | 0.004 | 5% |
| 6 | 1.20 | 0.12 | | 0.336 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.12 | 0.336 | 0.336 | 0.01 | 0.004 | 6% |
| 7 | 1.30 | 0.12 | | 0.352 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.12 | 0.352 | 0.352 | 0.01 | 0.004 | 6% |
| 8 | 1.40 | 0.11 | | 0.371 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.11 | 0.371 | 0.371 | 0.01 | 0.004 | 6% |
| 9 | 1.50 | 0.11 | | 0.361 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.11 | 0.361 | 0.361 | 0.01 | 0.004 | 6% |
| 10 | 1.60 | 0.14 | | 0.342 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.14 | 0.342 | 0.342 | 0.01 | 0.005 | 7% |
| 11 | 1.70 | 0.16 | | 0.376 | | | 1.0 | 1.65 | 1.75 | 0.10 | 0.16 | 0.376 | 0.376 | 0.02 | 0.006 | 9% |
| 12 | 1.80 | 0.16 | | 0.361 | | | 1.0 | 1.75 | 1.85 | 0.10 | 0.16 | 0.361 | 0.361 | 0.02 | 0.006 | 8% |
| 13 | 1.90 | 0.22 | | 0.346 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.22 | 0.346 | 0.346 | 0.02 | 0.008 | 11% |
| 14 | 2.00 | 0.24 | | 0.302 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.24 | 0.302 | 0.302 | 0.02 | 0.007 | 10% |
| 15 | 2.10 | 0.30 | | 0.280 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.30 | 0.280 | 0.280 | 0.03 | 0.008 | 12% |
| 16 | 2.20 | 0.30 | | 0.001 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.30 | 0.001 | 0.001 | 0.03 | 0.000 | 0% |
| 17 | 2.30 | 0.30 | | -0.058 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.30 | -0.058 | -0.058 | 0.03 | -0.002 | -2% |
| Right | 2.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.35 | 2.40 | 0.05 | 0.08 | -0.015 | -0.015 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.070 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.070 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 0.29 | (m ²) |
| Wetted Width: | 1.90 | (m) |
| Hydraulic Depth: | 0.152 | (m) |
| Mean Velocity: | 0.243 | (m/s) |
| Foude Number: | 0.199 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S12 - Fort Creek at Highway 63 (462600 E, 6363400 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 15-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|-----------|
| Logger Details: | |
| Transducer Reading: | 0.270 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.17 |
| Datalogger Clock: | 803 |
| Laptop Clock: | 805 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 65% reset |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 759 |
| End Time (MST): | 840 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly Cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post closest to road | 1.014 | 98.699 | 0.973 | 98.699 | - |
| Bench Mark 2: | Other T-post | 1.011 | 98.702 | 0.967 | 98.705 | - |
| Top of Ice: | - | - | - | - | - | - |
| Water Level: | | 2.218 | 97.495 | 2.174 | 97.498 | 97.497 |
| Transducer: | | 0.270 | 97.225 | 0.270 | 97.228 | 97.227 |
| Other: | | | | | | |

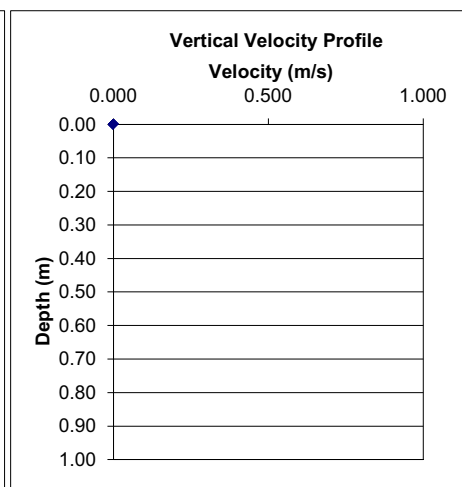
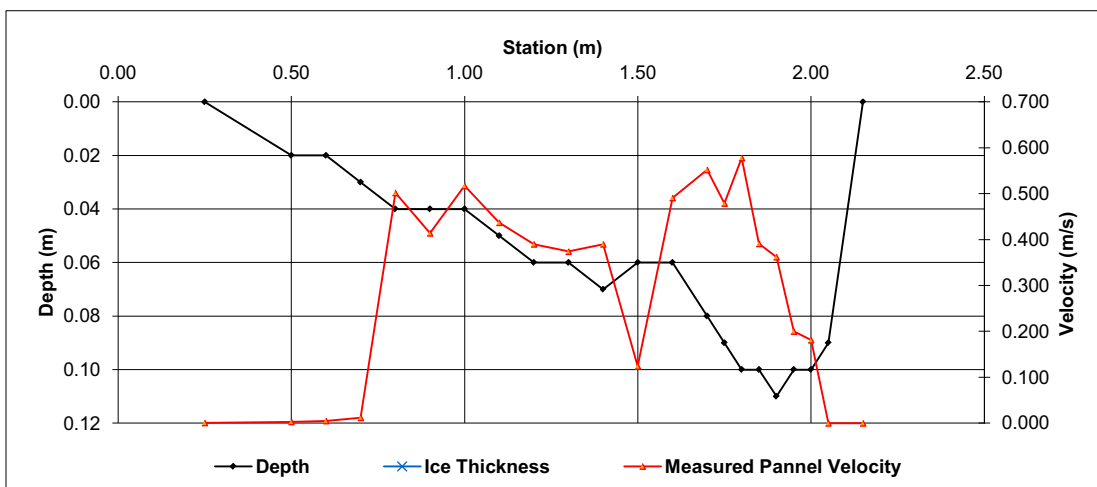
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.25 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.25 | 0.38 | 0.13 | 0.01 | 0.001 | 0.001 | 0.00 | 0.000 | 0% |
| 1 | 0.50 | 0.02 | | 0.003 | | | 1.0 | 0.38 | 0.55 | 0.18 | 0.02 | 0.003 | 0.003 | 0.00 | 0.000 | 0% |
| 2 | 0.60 | 0.02 | | 0.005 | | | 1.0 | 0.55 | 0.65 | 0.10 | 0.02 | 0.005 | 0.005 | 0.00 | 0.000 | 0% |
| 3 | 0.70 | 0.03 | | 0.012 | | | 1.0 | 0.65 | 0.75 | 0.10 | 0.03 | 0.012 | 0.012 | 0.00 | 0.000 | 0% |
| 4 | 0.80 | 0.04 | | 0.502 | | | 1.0 | 0.75 | 0.85 | 0.10 | 0.04 | 0.502 | 0.502 | 0.00 | 0.002 | 6% |
| 5 | 0.90 | 0.04 | | 0.414 | | | 1.0 | 0.85 | 0.95 | 0.10 | 0.04 | 0.414 | 0.414 | 0.00 | 0.002 | 5% |
| 6 | 1.00 | 0.04 | | 0.517 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.04 | 0.517 | 0.517 | 0.00 | 0.002 | 6% |
| 7 | 1.10 | 0.05 | | 0.437 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.05 | 0.437 | 0.437 | 0.00 | 0.002 | 7% |
| 8 | 1.20 | 0.06 | | 0.390 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.06 | 0.390 | 0.390 | 0.01 | 0.002 | 7% |
| 9 | 1.30 | 0.06 | | 0.374 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.06 | 0.374 | 0.374 | 0.01 | 0.002 | 7% |
| 10 | 1.40 | 0.07 | | 0.390 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.07 | 0.390 | 0.390 | 0.01 | 0.003 | 8% |
| 11 | 1.50 | 0.06 | | 0.124 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.06 | 0.124 | 0.124 | 0.01 | 0.001 | 2% |
| 12 | 1.60 | 0.06 | | 0.491 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.06 | 0.491 | 0.491 | 0.01 | 0.003 | 9% |
| 13 | 1.70 | 0.08 | | 0.552 | | | 1.0 | 1.65 | 1.73 | 0.08 | 0.08 | 0.552 | 0.552 | 0.01 | 0.003 | 10% |
| 14 | 1.75 | 0.09 | | 0.479 | | | 1.0 | 1.73 | 1.78 | 0.05 | 0.09 | 0.479 | 0.479 | 0.00 | 0.002 | 6% |
| 15 | 1.80 | 0.10 | | 0.578 | | | 1.0 | 1.78 | 1.83 | 0.05 | 0.10 | 0.578 | 0.578 | 0.01 | 0.003 | 9% |
| 16 | 1.85 | 0.10 | | 0.391 | | | 1.0 | 1.83 | 1.88 | 0.05 | 0.10 | 0.391 | 0.391 | 0.00 | 0.002 | 6% |
| 17 | 1.90 | 0.11 | | 0.362 | | | 1.0 | 1.88 | 1.93 | 0.05 | 0.11 | 0.362 | 0.362 | 0.01 | 0.002 | 6% |
| 18 | 1.95 | 0.10 | | 0.200 | | | 1.0 | 1.93 | 1.98 | 0.05 | 0.10 | 0.200 | 0.200 | 0.01 | 0.001 | 3% |
| 19 | 2.00 | 0.10 | | 0.181 | | | 1.0 | 1.98 | 2.03 | 0.05 | 0.10 | 0.181 | 0.181 | 0.00 | 0.001 | 3% |
| 20 | 2.05 | 0.09 | | 0.000 | | | 1.0 | 2.03 | 2.10 | 0.07 | 0.09 | 0.000 | 0.000 | 0.01 | 0.000 | 0% |
| Left | 2.15 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.10 | 2.15 | 0.05 | 0.02 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.033 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.033 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 0.10 | (m ²) |
| Wetted Width: | 1.90 | (m) |
| Hydraulic Depth: | 0.053 | (m) |
| Mean Velocity: | 0.329 | (m/s) |
| Foude Number: | 0.455 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S12 - Fort Creek at Highway 63 (462600 E, 6363400 N) | | | |
| Field Personnel: | DB SG HB | Trip Date: | 19-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.352 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.1 |
| Datalogger Clock: | 919 |
| Laptop Clock: | 919 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 35% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 910 |
| End Time (MST): | 950 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Clear 5°C |

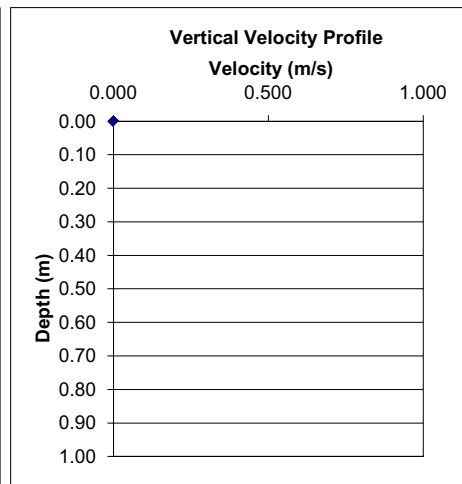
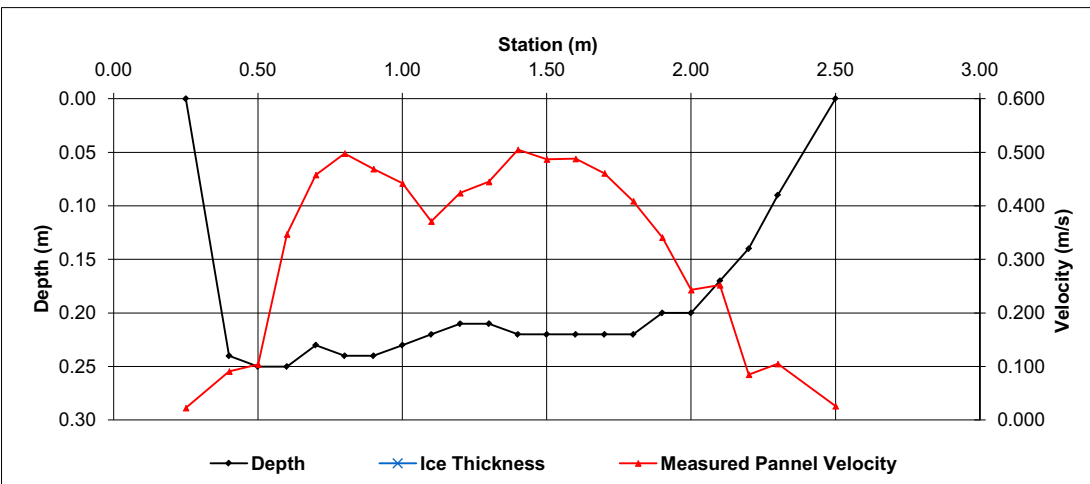
| Level Survey: | | | | | | |
|----------------------|------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post closest to road | 0.909 | 98.699 | 0.873 | 98.699 | - |
| Bench Mark 2: | Other T-post | 0.909 | 98.699 | 0.872 | 98.700 | - |
| Top of Ice: | - | - | - | - | - | - |
| Water Level: | | 2.037 | 97.571 | 2.000 | 97.572 | 97.572 |
| Transducer: | | 0.352 | 97.219 | 0.352 | 97.220 | 97.220 |
| Other: | | | | | | |

| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 0.25 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.25 | 0.33 | 0.08 | 0.06 | 0.023 | 0.023 | 0.00 | 0.000 | 0% | |
| 1 | 0.40 | 0.24 | | 0.091 | | | 1.0 | 0.33 | 0.45 | 0.13 | 0.24 | 0.091 | 0.091 | 0.03 | 0.003 | 2% | |
| 2 | 0.50 | 0.25 | | 0.104 | | | 1.0 | 0.45 | 0.55 | 0.10 | 0.25 | 0.104 | 0.104 | 0.03 | 0.003 | 2% | |
| 3 | 0.60 | 0.25 | | 0.347 | | | 1.0 | 0.55 | 0.65 | 0.10 | 0.25 | 0.347 | 0.347 | 0.03 | 0.009 | 6% | |
| 4 | 0.70 | 0.23 | | 0.458 | | | 1.0 | 0.65 | 0.75 | 0.10 | 0.23 | 0.458 | 0.458 | 0.02 | 0.011 | 7% | |
| 5 | 0.80 | 0.24 | | 0.498 | | | 1.0 | 0.75 | 0.85 | 0.10 | 0.24 | 0.498 | 0.498 | 0.02 | 0.012 | 8% | |
| 6 | 0.90 | 0.24 | | 0.469 | | | 1.0 | 0.85 | 0.95 | 0.10 | 0.24 | 0.469 | 0.469 | 0.02 | 0.011 | 7% | |
| 7 | 1.00 | 0.23 | | 0.442 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.23 | 0.442 | 0.442 | 0.02 | 0.010 | 7% | |
| 8 | 1.10 | 0.22 | | 0.371 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.22 | 0.371 | 0.371 | 0.02 | 0.008 | 5% | |
| 9 | 1.20 | 0.21 | | 0.424 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.21 | 0.424 | 0.424 | 0.02 | 0.009 | 6% | |
| 10 | 1.30 | 0.21 | | 0.445 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.21 | 0.445 | 0.445 | 0.02 | 0.009 | 6% | |
| 11 | 1.40 | 0.22 | | 0.505 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.22 | 0.505 | 0.505 | 0.02 | 0.011 | 7% | |
| 12 | 1.50 | 0.22 | | 0.487 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.22 | 0.487 | 0.487 | 0.02 | 0.011 | 7% | |
| 13 | 1.60 | 0.22 | | 0.488 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.22 | 0.488 | 0.488 | 0.02 | 0.011 | 7% | |
| 14 | 1.70 | 0.22 | | 0.461 | | | 1.0 | 1.65 | 1.75 | 0.10 | 0.22 | 0.461 | 0.461 | 0.02 | 0.010 | 7% | |
| 15 | 1.80 | 0.22 | | 0.409 | | | 1.0 | 1.75 | 1.85 | 0.10 | 0.22 | 0.409 | 0.409 | 0.02 | 0.009 | 6% | |
| 16 | 1.90 | 0.20 | | 0.341 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.20 | 0.341 | 0.341 | 0.02 | 0.007 | 4% | |
| 17 | 2.00 | 0.20 | | 0.243 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.20 | 0.243 | 0.243 | 0.02 | 0.005 | 3% | |
| 18 | 2.10 | 0.17 | | 0.252 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.17 | 0.252 | 0.252 | 0.02 | 0.004 | 3% | |
| 19 | 2.20 | 0.14 | | 0.085 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.14 | 0.085 | 0.085 | 0.01 | 0.001 | 1% | |
| 20 | 2.30 | 0.09 | | 0.105 | | | 1.0 | 2.25 | 2.40 | 0.15 | 0.09 | 0.105 | 0.105 | 0.01 | 0.001 | 1% | |
| Right | 2.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.40 | 2.50 | 0.10 | 0.02 | 0.026 | 0.026 | 0.00 | 0.000 | 0% | |
| *denotes position of TSS sample | | | | | | | | | | | | | | | Total Flow | 0.155 | |

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.155 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 0.44 | (m ²) |
| Wetted Width: | 2.25 | (m) |
| Hydraulic Depth: | 0.195 | (m) |
| Mean Velocity: | 0.352 | (m/s) |
| Foude Number: | 0.255 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S12 - Fort Creek at Highway 63 (462600 E, 6363400 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 30-Oct-10 |
| Data Entry Personnel: | DB | Date: | 08-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.313 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 11.44 |
| Datalogger Clock: | 1628 |
| Laptop Clock: | 1629 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 45% |
| Dessicant: | - |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|--------|
| Measurement Details: | |
| Start Time (MST): | 1625 |
| End Time (MST): | |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Clear |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post closest to road | 0.651 | 98.699 | 0.638 | 98.699 | - |
| Bench Mark 2: | Other T-post | 0.648 | 98.702 | 0.636 | 98.701 | - |
| Top of Ice: | - | - | - | - | - | - |
| Water Level: | | 1.811 | 97.539 | 1.799 | 97.538 | 97.539 |
| Transducer: | | 0.313 | 97.226 | 0.313 | 97.225 | 97.226 |
| Other: | | | | | | |

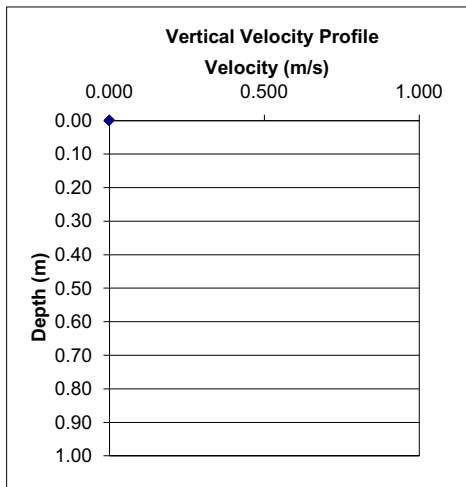
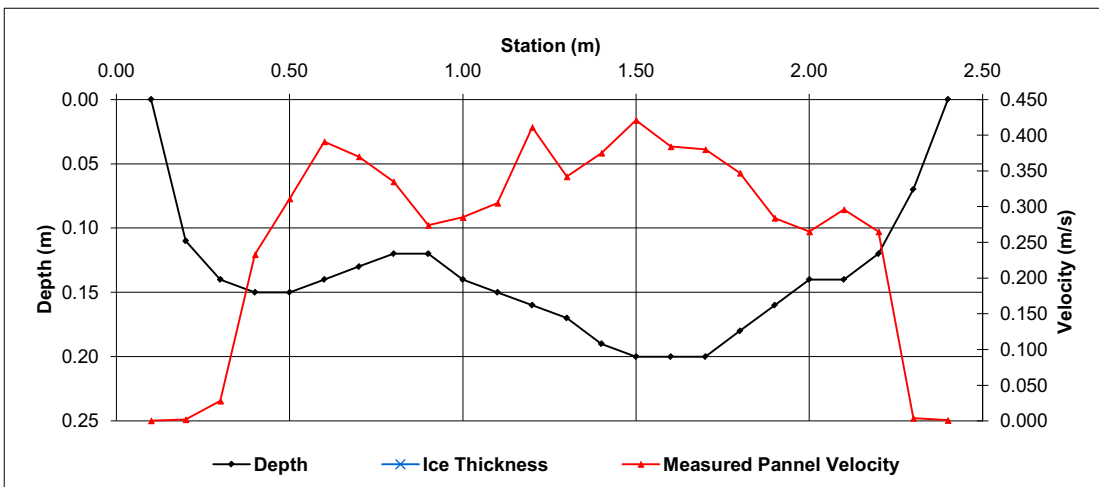
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.10 | 0.15 | 0.05 | 0.03 | 0.001 | 0.001 | 0.00 | 0.000 | 0% |
| 1 | 0.20 | 0.11 | | 0.002 | | | 1.0 | 0.15 | 0.25 | 0.10 | 0.11 | 0.002 | 0.002 | 0.01 | 0.000 | 0% |
| 2 | 0.30 | 0.14 | | 0.028 | | | 1.0 | 0.25 | 0.35 | 0.10 | 0.14 | 0.028 | 0.028 | 0.01 | 0.000 | 0% |
| 3 | 0.40 | 0.15 | | 0.233 | | | 1.0 | 0.35 | 0.45 | 0.10 | 0.15 | 0.233 | 0.233 | 0.02 | 0.003 | 4% |
| 4 | 0.50 | 0.15 | | 0.311 | | | 1.0 | 0.45 | 0.55 | 0.10 | 0.15 | 0.311 | 0.311 | 0.02 | 0.005 | 5% |
| 5 | 0.60 | 0.14 | | 0.391 | | | 1.0 | 0.55 | 0.65 | 0.10 | 0.14 | 0.391 | 0.391 | 0.01 | 0.005 | 5% |
| 6 | 0.70 | 0.13 | | 0.370 | | | 1.0 | 0.65 | 0.75 | 0.10 | 0.13 | 0.370 | 0.370 | 0.01 | 0.005 | 5% |
| 7 | 0.80 | 0.12 | | 0.335 | | | 1.0 | 0.75 | 0.85 | 0.10 | 0.12 | 0.335 | 0.335 | 0.01 | 0.004 | 4% |
| 8 | 0.90 | 0.12 | | 0.274 | | | 1.0 | 0.85 | 0.95 | 0.10 | 0.12 | 0.274 | 0.274 | 0.01 | 0.003 | 3% |
| 9 | 1.00 | 0.14 | | 0.285 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.14 | 0.285 | 0.285 | 0.01 | 0.004 | 4% |
| 10 | 1.10 | 0.15 | | 0.305 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.15 | 0.305 | 0.305 | 0.02 | 0.005 | 5% |
| 11 | 1.20 | 0.16 | | 0.411 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.16 | 0.411 | 0.411 | 0.02 | 0.007 | 7% |
| 12 | 1.30 | 0.17 | | 0.342 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.17 | 0.342 | 0.342 | 0.02 | 0.006 | 6% |
| 13 | 1.40 | 0.19 | | 0.375 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.19 | 0.375 | 0.375 | 0.02 | 0.007 | 7% |
| 14 | 1.50 | 0.20 | | 0.421 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.20 | 0.421 | 0.421 | 0.02 | 0.008 | 8% |
| 15 | 1.60 | 0.20 | | 0.384 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.20 | 0.384 | 0.384 | 0.02 | 0.008 | 8% |
| 16 | 1.70 | 0.20 | | 0.380 | | | 1.0 | 1.65 | 1.75 | 0.10 | 0.20 | 0.380 | 0.380 | 0.02 | 0.008 | 8% |
| 17 | 1.80 | 0.18 | | 0.347 | | | 1.0 | 1.75 | 1.85 | 0.10 | 0.18 | 0.347 | 0.347 | 0.02 | 0.006 | 6% |
| 18 | 1.90 | 0.16 | | 0.284 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.16 | 0.284 | 0.284 | 0.02 | 0.005 | 5% |
| 19 | 2.00 | 0.14 | | 0.265 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.14 | 0.265 | 0.265 | 0.01 | 0.004 | 4% |
| 20 | 2.10 | 0.14 | | 0.296 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.14 | 0.296 | 0.296 | 0.01 | 0.004 | 4% |
| 21 | 2.20 | 0.12 | | 0.265 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.12 | 0.265 | 0.265 | 0.01 | 0.003 | 3% |
| 22 | 2.30 | 0.07 | | 0.004 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.07 | 0.004 | 0.004 | 0.01 | 0.000 | 0% |
| Right | 2.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.35 | 2.40 | 0.05 | 0.02 | 0.001 | 0.001 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.100 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.100 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 0.33 | (m ²) |
| Wetted Width: | 2.30 | (m) |
| Hydraulic Depth: | 0.144 | (m) |
| Mean Velocity: | 0.302 | (m/s) |
| Foude Number: | 0.255 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S14A - Eils River at the CNRL Bridge (455748 E, 6344947 N) | | | |
| Field Personnel: | CE, CW | Trip Date: | 13-Jan-09 |
| Data Entry Personnel: | SG | Date: | 25-Jan-09 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.230 |
| Battery (Main): | 4.59 |
| Battery (Aux): | 12.46 |
| Datalogger Clock: | 1241 |
| Laptop Clock: | 1240 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1300 |
| End Time (MST): | 1330 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Overcast -20C |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Top of pipe w/bubbler | 0.400 | 101.980 | 0.349 | 101.980 | - |
| Bench Mark 2: | Rebar w/orange flagging | 2.257 | 100.000 | 2.202 | 100.000 | - |
| Top of Ice: | | 3.936 | 98.321 | 3.886 | 98.316 | 98.319 |
| Water Level: | | 3.935 | 98.322 | 3.886 | 98.316 | 98.319 |
| Transducer: | | 1.230 | 97.092 | 1.230 | 97.086 | 97.089 |
| Other: | | | | | | |

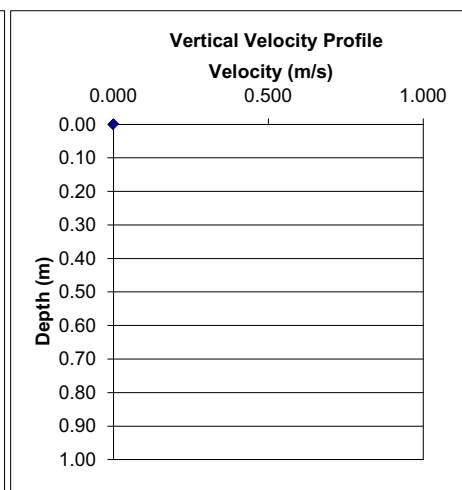
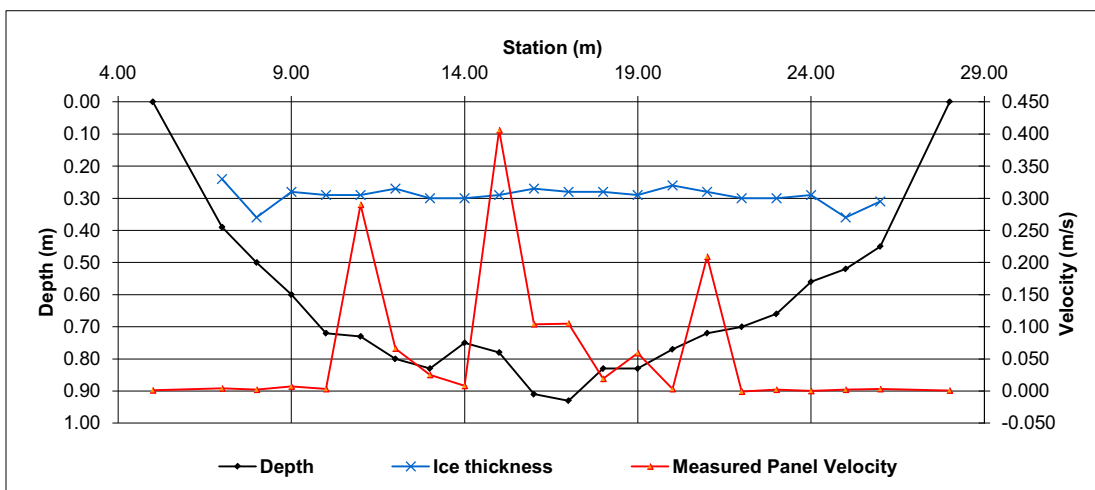
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 28.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 28.00 | 27.00 | 1.00 | 0.04 | 0.001 | 0.001 | 0.04 | 0.000 | 0% | |
| 1 | 26.00 | 0.45 | 0.31 | 0.003 | | | 0.9 | 27.00 | 25.50 | 1.50 | 0.14 | 0.003 | 0.003 | 0.21 | 0.001 | 0% | |
| 2 | 25.00 | 0.52 | 0.36 | 0.002 | | | 0.9 | 25.50 | 24.50 | 1.00 | 0.16 | 0.002 | 0.002 | 0.16 | 0.000 | 0% | |
| 3 | 24.00 | 0.56 | 0.29 | 0.000 | | | 1.0 | 24.50 | 23.50 | 1.00 | 0.27 | 0.000 | 0.000 | 0.27 | 0.000 | 0% | |
| 4 | 23.00 | 0.66 | 0.30 | 0.002 | | | 0.9 | 23.50 | 22.50 | 1.00 | 0.36 | 0.002 | 0.002 | 0.36 | 0.001 | 0% | |
| 5 | 22.00 | 0.70 | 0.30 | -0.001 | | | 0.9 | 22.50 | 21.50 | 1.00 | 0.40 | -0.001 | -0.001 | 0.40 | 0.000 | 0% | |
| 6 | 21.00 | 0.72 | 0.28 | 0.209 | | | 0.9 | 21.50 | 20.50 | 1.00 | 0.44 | 0.209 | 0.188 | 0.44 | 0.083 | 14% | |
| 7 | 20.00 | 0.77 | 0.26 | 0.003 | | | 0.9 | 20.50 | 19.50 | 1.00 | 0.51 | 0.003 | 0.003 | 0.51 | 0.001 | 0% | |
| 8 | 19.00 | 0.83 | 0.29 | 0.059 | | | 0.9 | 19.50 | 18.50 | 1.00 | 0.54 | 0.059 | 0.053 | 0.54 | 0.029 | 5% | |
| 9 | 18.00 | 0.83 | 0.28 | 0.019 | | | 0.9 | 18.50 | 17.50 | 1.00 | 0.55 | 0.019 | 0.017 | 0.55 | 0.009 | 2% | |
| 10 | 17.00 | 0.93 | 0.28 | 0.105 | | | 0.9 | 17.50 | 16.50 | 1.00 | 0.65 | 0.105 | 0.095 | 0.65 | 0.061 | 10% | |
| 11 | 16.00 | 0.91 | 0.27 | 0.104 | | | 0.9 | 16.50 | 15.50 | 1.00 | 0.64 | 0.104 | 0.094 | 0.64 | 0.060 | 10% | |
| 12 | 15.00 | 0.78 | 0.29 | 0.406 | | | 0.9 | 15.50 | 14.50 | 1.00 | 0.49 | 0.406 | 0.365 | 0.49 | 0.179 | 30% | |
| 13 | 14.00 | 0.75 | 0.30 | 0.008 | | | 0.9 | 14.50 | 13.50 | 1.00 | 0.45 | 0.008 | 0.007 | 0.45 | 0.003 | 1% | |
| 14 | 13.00 | 0.83 | 0.30 | 0.025 | | | 0.9 | 13.50 | 12.50 | 1.00 | 0.53 | 0.025 | 0.023 | 0.53 | 0.012 | 2% | |
| 15 | 12.00 | 0.80 | 0.27 | 0.066 | | | 0.9 | 12.50 | 11.50 | 1.00 | 0.53 | 0.066 | 0.059 | 0.53 | 0.031 | 5% | |
| 16 | 11.00 | 0.73 | 0.29 | 0.290 | | | 0.9 | 11.50 | 10.50 | 1.00 | 0.44 | 0.290 | 0.261 | 0.44 | 0.115 | 19% | |
| 17 | 10.00 | 0.72 | 0.29 | 0.003 | | | 0.9 | 10.50 | 9.50 | 1.00 | 0.43 | 0.003 | 0.003 | 0.43 | 0.001 | 0% | |
| 18 | 9.00 | 0.60 | 0.28 | 0.007 | | | 0.9 | 9.50 | 8.50 | 1.00 | 0.32 | 0.007 | 0.006 | 0.32 | 0.002 | 0% | |
| 19 | 8.00 | 0.50 | 0.36 | 0.002 | | | 0.9 | 8.50 | 7.50 | 1.00 | 0.14 | 0.002 | 0.002 | 0.14 | 0.000 | 0% | |
| 20 | 7.00 | 0.39 | 0.24 | 0.004 | | | 0.9 | 7.50 | 6.00 | 1.50 | 0.15 | 0.004 | 0.004 | 0.23 | 0.001 | 0% | |
| Right | 5.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 6.00 | 5.00 | 1.00 | 0.04 | 0.001 | 0.001 | 0.04 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.590 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.590 | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | 8.36 | (m ²) |
| Wetted Width: | 21.00 | (m) |
| Hydraulic Depth: | 0.398 | (m) |
| Mean Velocity: | 0.071 | (m/s) |
| Froude Number: | 0.036 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S14A - Eils River at the CNRL Bridge (455748 E, 6344947 N) | | | |
| Field Personnel: | GB, JE | Trip Date: | 14-Feb-10 |
| Data Entry Personnel: | SG | Date: | 18-Feb-10 |
| Data Check Personnel: | DB | Date: | 15-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.772 |
| Battery (Main): | 4.62 |
| Battery (Aux): | 14.62 |
| Datalogger Clock: | 1227 |
| Laptop Clock: | 1238 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1320 |
| End Time (MST): | 1349 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Ice covered |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Clear -12 |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Temporary | 1.009 | | 1.002 | 0.000 | - |
| Bench Mark 2: | Rebar w/orange flagging | 0.921 | 100.000 | 0.914 | 100.000 | - |
| Top of Ice: | | 3.011 | 97.910 | 3.002 | 97.912 | 97.911 |
| Water Level: | | 3.081 | 97.840 | 3.078 | 97.836 | 97.838 |
| Transducer: | | 0.772 | 97.068 | 0.772 | 97.064 | 97.066 |
| Other: | | | | | | |

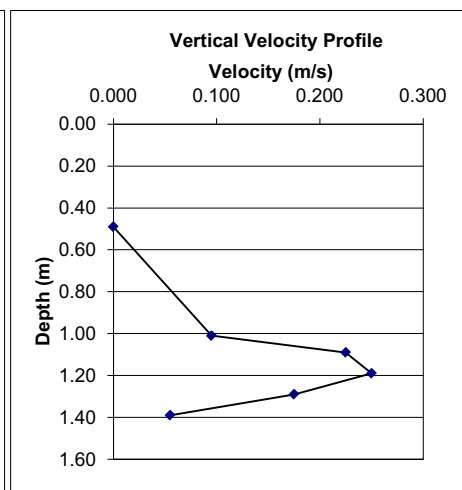
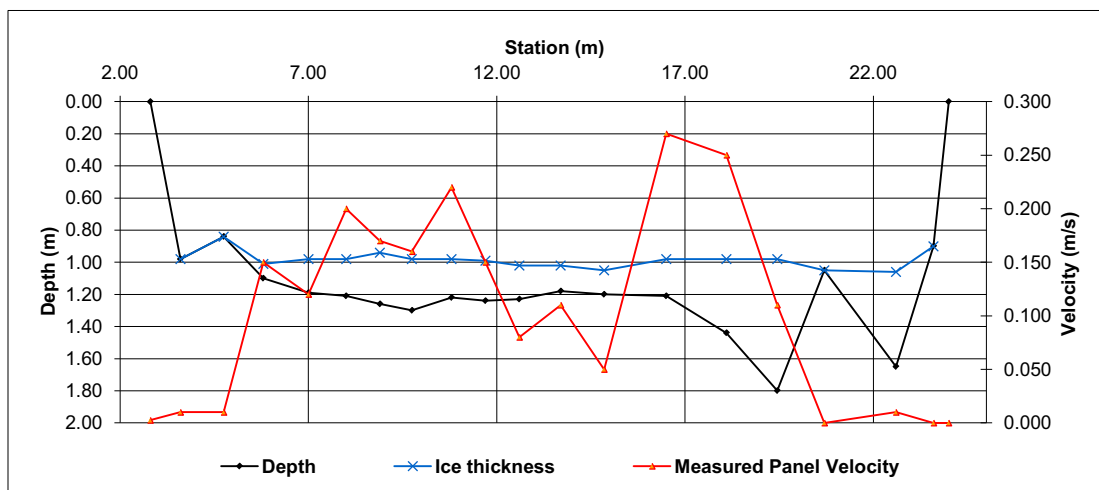
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 2.80 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 2.80 | 3.20 | 0.40 | 0.00 | 0.003 | 0.002 | 0.00 | 0.000 | 0% | |
| 1 | 3.60 | 0.98 | 0.98 | 0.010 | | | 0.9 | 3.20 | 4.18 | 0.98 | 0.00 | 0.010 | 0.009 | 0.00 | 0.000 | 0% | |
| 2 | 4.75 | 0.84 | 0.84 | 0.010 | | | 0.9 | 4.18 | 5.28 | 1.10 | 0.00 | 0.010 | 0.009 | 0.00 | 0.000 | 0% | |
| 3 | 5.80 | 1.10 | 1.01 | 0.150 | | | 0.9 | 5.28 | 6.40 | 1.13 | 0.09 | 0.150 | 0.135 | 0.10 | 0.014 | 2% | |
| 4 | 7.00 | 1.19 | 0.98 | 0.120 | | | 0.9 | 6.40 | 7.50 | 1.10 | 0.21 | 0.120 | 0.108 | 0.23 | 0.025 | 4% | |
| 5 | 8.00 | 1.21 | 0.98 | 0.200 | | | 0.9 | 7.50 | 8.45 | 0.95 | 0.23 | 0.200 | 0.180 | 0.22 | 0.039 | 6% | |
| 6 | 8.90 | 1.26 | 0.94 | 0.170 | | | 0.9 | 8.45 | 9.33 | 0.88 | 0.32 | 0.170 | 0.153 | 0.28 | 0.043 | 7% | |
| 7 | 9.75 | 1.30 | 0.98 | 0.160 | | | 0.9 | 9.33 | 10.28 | 0.95 | 0.32 | 0.160 | 0.144 | 0.30 | 0.044 | 7% | |
| 8 | 10.80 | 1.22 | 0.98 | 0.220 | | | 0.9 | 10.28 | 11.25 | 0.98 | 0.24 | 0.220 | 0.198 | 0.23 | 0.046 | 7% | |
| 9 | 11.70 | 1.24 | 0.99 | 0.150 | | | 0.9 | 11.25 | 12.15 | 0.90 | 0.25 | 0.150 | 0.135 | 0.23 | 0.030 | 5% | |
| 10 | 12.60 | 1.23 | 1.02 | 0.080 | | | 0.9 | 12.15 | 13.15 | 1.00 | 0.21 | 0.080 | 0.072 | 0.21 | 0.015 | 2% | |
| 11 | 13.70 | 1.18 | 1.02 | 0.110 | | | 0.9 | 13.15 | 14.28 | 1.13 | 0.16 | 0.110 | 0.099 | 0.18 | 0.018 | 3% | |
| 12 | 14.85 | 1.20 | 1.05 | 0.050 | | | 0.9 | 14.28 | 15.68 | 1.40 | 0.15 | 0.050 | 0.045 | 0.21 | 0.009 | 1% | |
| 13 | 16.50 | 1.21 | 0.98 | 0.270 | | | 0.9 | 15.68 | 17.30 | 1.63 | 0.23 | 0.270 | 0.243 | 0.37 | 0.091 | 14% | |
| 14 | 18.10 | 1.44 | 0.98 | 0.250 | | | 0.9 | 17.30 | 18.78 | 1.48 | 0.46 | 0.250 | 0.225 | 0.68 | 0.153 | 24% | |
| 15 | 19.45 | 1.80 | 0.98 | 0.110 | | | 0.9 | 18.78 | 20.08 | 1.30 | 0.82 | 0.110 | 0.099 | 1.07 | 0.106 | 16% | |
| 16 | 20.70 | 1.05 | 1.05 | 0.000 | | | 1.0 | 20.08 | 21.65 | 1.58 | 0.00 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| 17 | 22.60 | 1.65 | 1.06 | 0.010 | | | 0.9 | 21.65 | 23.10 | 1.45 | 0.59 | 0.010 | 0.009 | 0.86 | 0.008 | 1% | |
| 18 | 23.60 | 0.90 | 0.90 | 0.000 | | | 1.0 | 23.10 | 23.80 | 0.70 | 0.00 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| Right | 24.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 23.80 | 24.00 | 0.20 | 0.00 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 0.640 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.640 | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | 5.17 | (m ²) |
| Wetted Width: | 21.20 | (m) |
| Hydraulic Depth: | 0.244 | (m) |
| Mean Velocity: | 0.124 | (m/s) |
| Froude Number: | 0.080 | |

| Velocity Profile for Ice Conditions: | | | | | | | |
|---|-------|----------|------------|---------------|---------------|--------------------|--|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.133 | |
| Offset | 18.1 | 1.44 | 0 | - | - | Panel V.@Ofst 0.25 | |
| Depth | 1.44 | 1.34 | 0.11 | 1.39 | 0.055 | 60% Depth 1.256 | |
| Ice Depth | 0.98 | 1.24 | 0.240 | 1.29 | 0.175 | 20% Depth 1.07 | |
| | | 1.14 | 0.260 | 1.19 | 0.250 | 80% Depth 1.35 | |
| | | 1.04 | 0.190 | 1.09 | 0.225 | | |
| | | 0.98 | 0.000 | 1.01 | 0.095 | | |
| | | | | 0.49 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S14A - Eils River at the CNRL Bridge (455748 E, 6344947 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 04-Mar-10 |
| Data Entry Personnel: | SG | Date: | 18-Mar-10 |
| Data Check Personnel: | JP | Date: | 02-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.870 |
| Battery (Main): | 4.64 |
| Battery (Aux): | 14.26 |
| Datalogger Clock: | 1339 |
| Laptop Clock: | 1403 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 23 |
| Dessicant: | OK |
| Logger# (if Δ): | 1797 |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1430 |
| End Time (MST): | 1500 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Water on Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Sunny 0°C |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Top of pipe w/bubbler | 0.235 | 101.980 | 0.228 | 101.980 | - |
| Bench Mark 2: | Rebar w/orange flagging | 2.077 | 100.000 | 2.070 | 100.000 | - |
| Top of Ice: | | 3.926 | 98.151 | 3.918 | 98.152 | 98.152 |
| Water Level: | | 4.115 | 97.962 | 4.111 | 97.959 | 97.961 |
| Transducer: | | 0.870 | 97.092 | 0.870 | 97.089 | 97.091 |
| Other: | | | | | | |

General Notes:

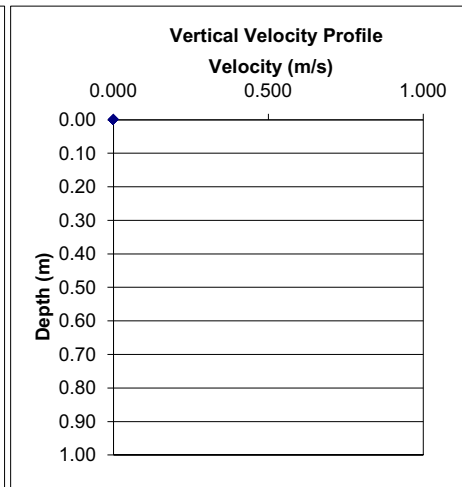
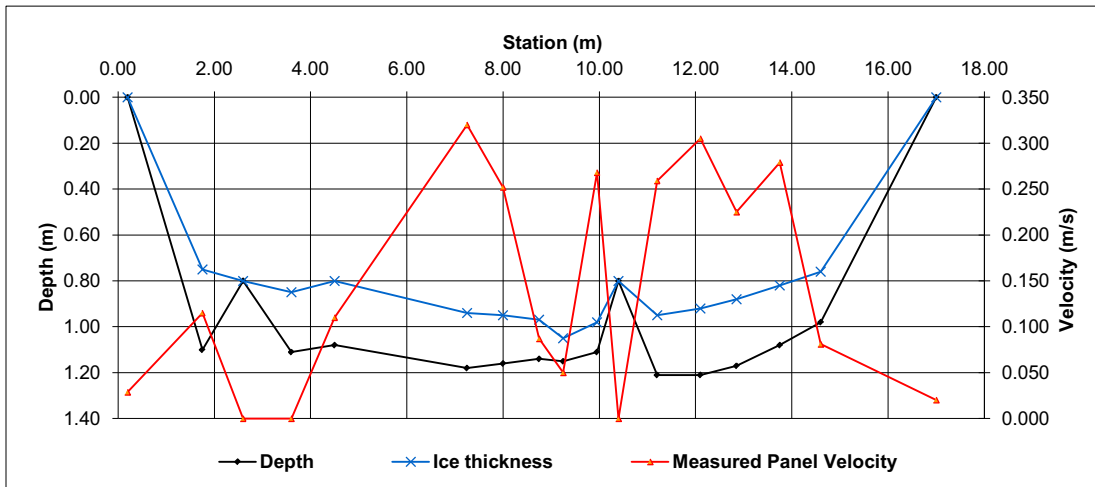
Obtaining good cross section is difficult due to debris in ice.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.20 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.9 | 0.20 | 0.98 | 0.78 | 0.09 | 0.029 | 0.026 | 0.07 | 0.002 | 0% |
| 1 | 1.75 | 1.10 | 0.75 | 0.115 | | | 0.9 | 0.98 | 2.18 | 1.20 | 0.35 | 0.115 | 0.104 | 0.42 | 0.043 | 8% |
| 2 | 2.60 | 0.80 | 0.80 | 0.000 | | | 1.0 | 2.18 | 3.10 | 0.93 | 0.00 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| 3 | 3.60 | 1.11 | 0.85 | 0.000 | | | 1.0 | 3.10 | 4.05 | 0.95 | 0.26 | 0.000 | 0.000 | 0.25 | 0.000 | 0% |
| 4 | 4.50 | 1.08 | 0.80 | 0.110 | | | 0.9 | 4.05 | 5.88 | 1.83 | 0.28 | 0.110 | 0.099 | 0.51 | 0.051 | 10% |
| 5 | 7.25 | 1.18 | 0.94 | 0.320 | | | 0.9 | 5.88 | 7.63 | 1.75 | 0.24 | 0.320 | 0.288 | 0.42 | 0.121 | 23% |
| 6 | 8.00 | 1.16 | 0.95 | 0.252 | | | 0.9 | 7.63 | 8.38 | 0.75 | 0.21 | 0.252 | 0.227 | 0.16 | 0.036 | 7% |
| 7 | 8.75 | 1.14 | 0.97 | 0.087 | | | 0.9 | 8.38 | 9.00 | 0.63 | 0.17 | 0.087 | 0.078 | 0.11 | 0.008 | 2% |
| 8 | 9.25 | 1.15 | 1.05 | 0.050 | | | 0.9 | 9.00 | 9.60 | 0.60 | 0.10 | 0.050 | 0.045 | 0.06 | 0.003 | 1% |
| 9 | 9.95 | 1.11 | 0.98 | 0.268 | | | 0.9 | 9.60 | 10.18 | 0.58 | 0.13 | 0.268 | 0.241 | 0.07 | 0.018 | 3% |
| 10 | 10.40 | 0.80 | 0.80 | 0.000 | | | 1.0 | 10.18 | 10.80 | 0.63 | 0.00 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| 11 | 11.20 | 1.21 | 0.95 | 0.259 | | | 0.9 | 10.80 | 11.65 | 0.85 | 0.26 | 0.259 | 0.233 | 0.22 | 0.052 | 10% |
| 12 | 12.10 | 1.21 | 0.92 | 0.305 | | | 0.9 | 11.65 | 12.48 | 0.83 | 0.29 | 0.305 | 0.275 | 0.24 | 0.066 | 12% |
| 13 | 12.85 | 1.17 | 0.88 | 0.225 | | | 0.9 | 12.48 | 13.30 | 0.83 | 0.29 | 0.225 | 0.203 | 0.24 | 0.048 | 9% |
| 14 | 13.75 | 1.08 | 0.82 | 0.279 | | | 0.9 | 13.30 | 14.18 | 0.88 | 0.26 | 0.279 | 0.251 | 0.23 | 0.057 | 11% |
| 15 | 14.60 | 0.98 | 0.76 | 0.081 | | | 0.9 | 14.18 | 15.80 | 1.63 | 0.22 | 0.081 | 0.073 | 0.36 | 0.026 | 5% |
| Right | 17.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 15.80 | 17.00 | 1.20 | 0.06 | 0.020 | 0.020 | 0.07 | 0.001 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.532 | | |

**Add/delete # rows as necessary, remembering to autofill calculations/graphs etc*

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.532 | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | 3.41 | (m ²) |
| Wetted Width: | 16.80 | (m) |
| Hydraulic Depth: | 0.203 | (m) |
| Mean Velocity: | 0.156 | (m/s) |
| Froude Number: | 0.110 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S14A - Eils River at the CNRL Bridge (455748 E, 6344947 N) | | | |
| Field Personnel: | DB CE | Trip Date: | 07-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|-----------------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.290 |
| Battery (Main): | 4.64 |
| Battery (Aux): | 14.27 |
| Datalogger Clock: | 14:32 |
| Laptop Clock: | 14:35 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 24 |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Needs screwdriver for site | |

| | |
|------------------------------|--|
| Measurement Details: | |
| Start Time (MST): | 1425 |
| End Time (MST): | 1445 |
| Equipment: | - |
| Method: | - |
| River Condition: | Some ice towards sides |
| Code ('Ice' or 'Open'): | Semi open, thin ice sheets floating down |
| Quality/Error (see reverse): | |
| Weather: | Sunny 12°C |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Top of pipe w/bubbler | 0.433 | 101.980 | 0.418 | 101.980 | - |
| Bench Mark 2: | Rebar w/orange flagging | 2.275 | 100.000 | 2.262 | 100.000 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 3.903 | 98.372 | 3.894 | 98.368 | 98.370 |
| Transducer: | | 1.290 | 97.082 | 1.290 | 97.078 | 97.080 |
| Other: | | | | | | |

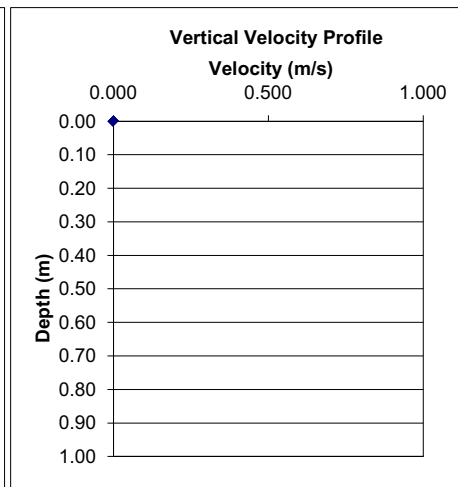
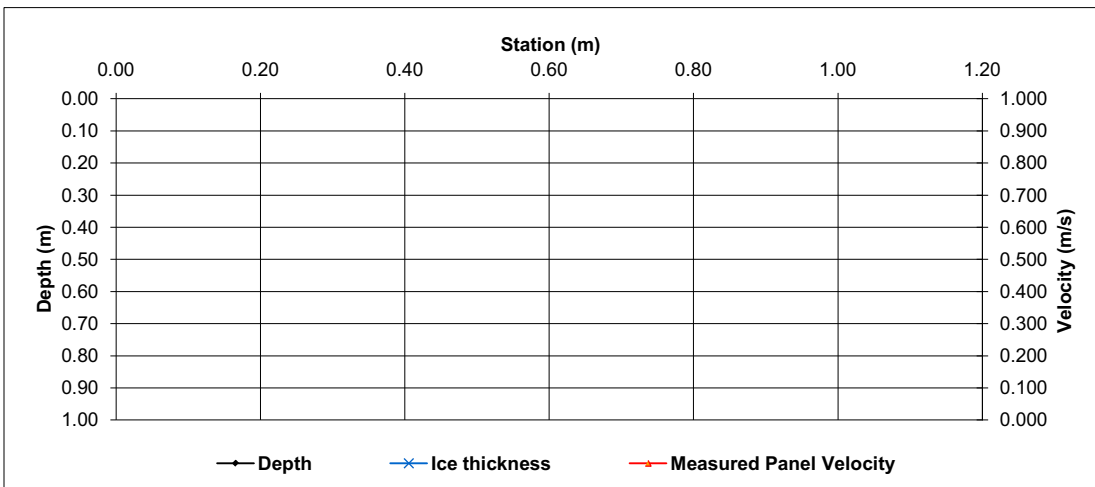
General Notes:

Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | |
| Total Flow | | | | | | | | | | | | | | | NOT MEASURED | |

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | 0 | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S14A - Eils River at the CNRL Bridge (455748 E, 6344947 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 22-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.156 |
| Battery (Main): | 4.66 |
| Battery (Aux): | 13.96 |
| Datalogger Clock: | 12.35 |
| Laptop Clock: | 12.41 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 25% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------------------------------|
| Measurement Details: | |
| Start Time (MST): | 1230 |
| End Time (MST): | 1350 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open d-stream of bridge, lcy u-stream |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Top of pipe w/bubbler | 0.448 | 101.980 | 0.399 | 101.980 | - |
| Bench Mark 2: | Rebar w/orange flagging | 2.284 | 100.000 | 2.236 | 100.000 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 4.100 | 98.184 | 4.050 | 98.186 | 98.185 |
| Transducer: | | 1.156 | 97.028 | 1.156 | 97.030 | 97.029 |
| Other: | | | | | | |

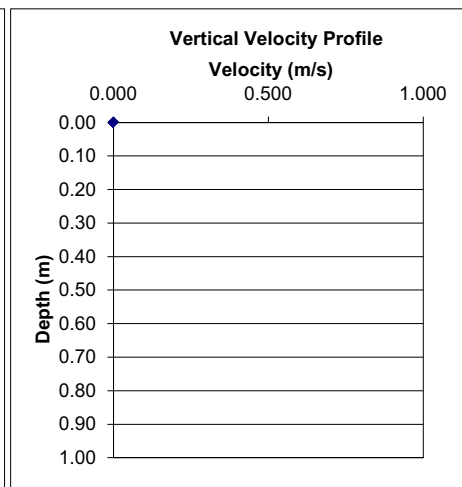
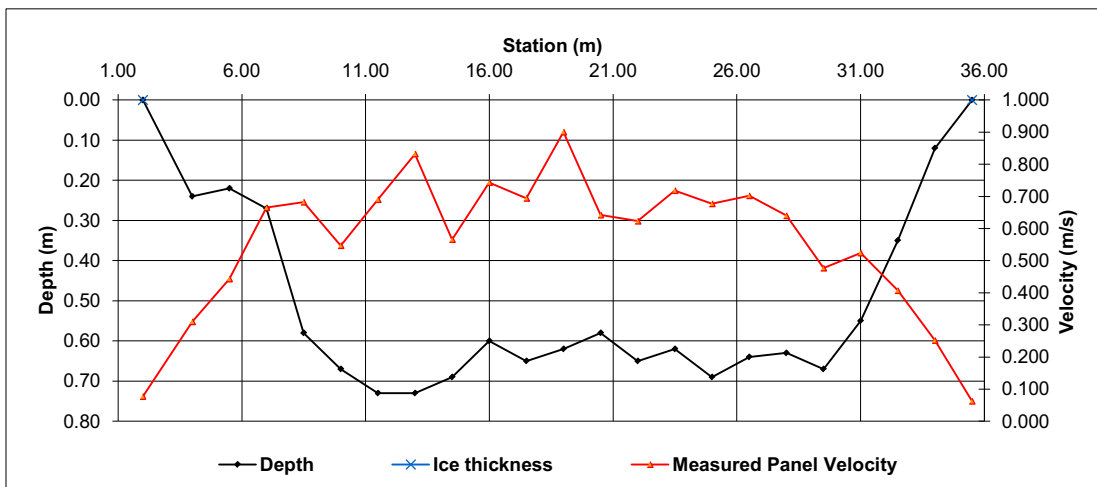
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|-----------------------|
| General Notes: |
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| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 35.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 35.50 | 34.75 | 0.75 | 0.03 | 0.063 | 0.063 | 0.02 | 0.001 | 0% |
| 1 | 34.00 | 0.12 | | 0.252 | | | 1.0 | 34.75 | 33.25 | 1.50 | 0.12 | 0.252 | 0.252 | 0.18 | 0.045 | 0% |
| 2 | 32.50 | 0.35 | | 0.407 | | | 1.0 | 33.25 | 31.75 | 1.50 | 0.35 | 0.407 | 0.407 | 0.53 | 0.214 | 2% |
| 3 | 31.00 | 0.55 | | 0.524 | | | 1.0 | 31.75 | 30.25 | 1.50 | 0.55 | 0.524 | 0.524 | 0.83 | 0.432 | 4% |
| 4 | 29.50 | 0.67 | | 0.477 | | | 1.0 | 30.25 | 28.75 | 1.50 | 0.67 | 0.477 | 0.477 | 1.01 | 0.479 | 4% |
| 5 | 28.00 | 0.63 | | 0.640 | | | 1.0 | 28.75 | 27.25 | 1.50 | 0.63 | 0.640 | 0.640 | 0.95 | 0.605 | 5% |
| 6 | 26.50 | 0.64 | | 0.702 | | | 1.0 | 27.25 | 25.75 | 1.50 | 0.64 | 0.702 | 0.702 | 0.96 | 0.674 | 6% |
| 7 | 25.00 | 0.69 | | 0.677 | | | 1.0 | 25.75 | 24.25 | 1.50 | 0.69 | 0.677 | 0.677 | 1.04 | 0.701 | 6% |
| 8 | 23.50 | 0.62 | | 0.718 | | | 1.0 | 24.25 | 22.75 | 1.50 | 0.62 | 0.718 | 0.718 | 0.93 | 0.668 | 6% |
| 9 | 22.00 | 0.65 | | 0.623 | | | 1.0 | 22.75 | 21.25 | 1.50 | 0.65 | 0.623 | 0.623 | 0.98 | 0.607 | 5% |
| 10 | 20.50 | 0.58 | | 0.642 | | | 1.0 | 21.25 | 19.75 | 1.50 | 0.58 | 0.642 | 0.642 | 0.87 | 0.559 | 5% |
| 11 | 19.00 | 0.62 | | 0.900 | | | 1.0 | 19.75 | 18.25 | 1.50 | 0.62 | 0.900 | 0.900 | 0.93 | 0.837 | 8% |
| 12 | 17.50 | 0.65 | | 0.694 | | | 1.0 | 18.25 | 16.75 | 1.50 | 0.65 | 0.694 | 0.694 | 0.98 | 0.677 | 6% |
| 13 | 16.00 | 0.60 | | 0.743 | | | 1.0 | 16.75 | 15.25 | 1.50 | 0.60 | 0.743 | 0.743 | 0.90 | 0.669 | 6% |
| 14 | 14.50 | 0.69 | | 0.566 | | | 1.0 | 15.25 | 13.75 | 1.50 | 0.69 | 0.566 | 0.566 | 1.04 | 0.586 | 5% |
| 15 | 13.00 | 0.73 | | 0.832 | | | 1.0 | 13.75 | 12.25 | 1.50 | 0.73 | 0.832 | 0.832 | 1.10 | 0.911 | 8% |
| 16 | 11.50 | 0.73 | | 0.690 | | | 1.0 | 12.25 | 10.75 | 1.50 | 0.73 | 0.690 | 0.690 | 1.10 | 0.756 | 7% |
| 17 | 10.00 | 0.67 | | 0.547 | | | 1.0 | 10.75 | 9.25 | 1.50 | 0.67 | 0.547 | 0.547 | 1.01 | 0.550 | 5% |
| 18 | 8.50 | 0.58 | | 0.682 | | | 1.0 | 9.25 | 7.75 | 1.50 | 0.58 | 0.682 | 0.682 | 0.87 | 0.593 | 5% |
| 19 | 7.00 | 0.27 | | 0.665 | | | 1.0 | 7.75 | 6.25 | 1.50 | 0.27 | 0.665 | 0.665 | 0.41 | 0.269 | 2% |
| 20 | 5.50 | 0.22 | | 0.443 | | | 1.0 | 6.25 | 4.75 | 1.50 | 0.22 | 0.443 | 0.443 | 0.33 | 0.146 | 1% |
| 21 | 4.00 | 0.24 | | 0.310 | | | 1.0 | 4.75 | 3.00 | 1.75 | 0.24 | 0.310 | 0.310 | 0.42 | 0.130 | 1% |
| Right | 2.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.00 | 2.00 | 1.00 | 0.06 | 0.078 | 0.078 | 0.06 | 0.005 | 0% |
| Total Flow | | | | | | | | | | | | | | | 11.113 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|--------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 11.113 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 17.39 | (m ²) |
| Wetted Width: | 31.75 | (m) |
| Hydraulic Depth: | 0.548 | (m) |
| Mean Velocity: | 0.639 | (m/s) |
| Froude Number: | 0.276 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S14A - Eils River at the CNRL Bridge (455748 E, 6344947 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 23-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 14-Jul-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.974 |
| Battery (Main): | 4.66 |
| Battery (Aux): | 13.72 |
| Datalogger Clock: | 16:17 |
| Laptop Clock: | 16:24 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 27% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1730 |
| End Time (MST): | 1907 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly cloudy |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Top of pipe w/bubbler | 0.468 | 101.980 | 0.456 | 101.980 | - |
| Bench Mark 2: | Rebar w/orange flagging | 2.298 | 100.000 | 2.286 | 100.000 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 4.325 | 97.973 | 4.307 | 97.979 | 97.976 |
| Transducer: | | 0.974 | 96.999 | 0.974 | 97.005 | 97.002 |
| Other: | | | | | | |

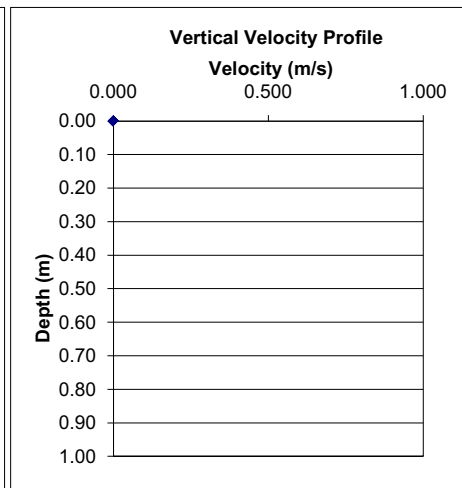
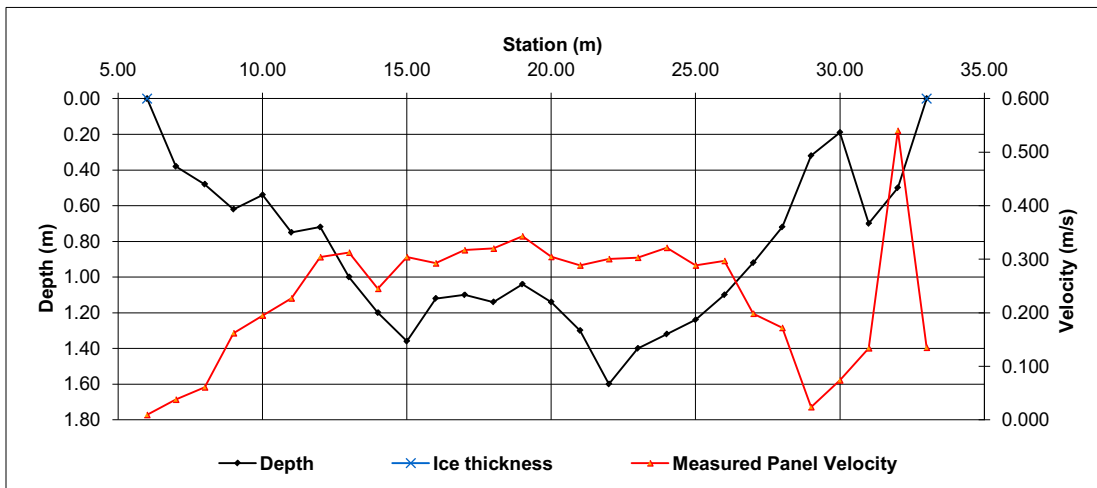
| |
|-----------------------|
| General Notes: |
| |
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| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 33.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 33.00 | 32.50 | 0.50 | 0.13 | 0.135 | 0.135 | 0.06 | 0.008 | 0% | |
| 1 | 32.00 | 0.50 | | 0.540 | | | 1.0 | 32.50 | 31.50 | 1.00 | 0.50 | 0.540 | 0.540 | 0.50 | 0.270 | 4% | |
| 2 | 31.00 | 0.70 | | 0.134 | | | 1.0 | 31.50 | 30.50 | 1.00 | 0.70 | 0.134 | 0.134 | 0.70 | 0.094 | 1% | |
| 3 | 30.00 | 0.19 | | 0.074 | | | 1.0 | 30.50 | 29.50 | 1.00 | 0.19 | 0.074 | 0.074 | 0.19 | 0.014 | 0% | |
| 4 | 29.00 | 0.32 | | 0.024 | | | 1.0 | 29.50 | 28.50 | 1.00 | 0.32 | 0.024 | 0.024 | 0.32 | 0.008 | 0% | |
| 5 | 28.00 | 0.72 | | 0.172 | | | 1.0 | 28.50 | 27.50 | 1.00 | 0.72 | 0.172 | 0.172 | 0.72 | 0.124 | 2% | |
| 6 | 27.00 | 0.92 | | | 0.184 | 0.213 | 1.0 | 27.50 | 26.50 | 1.00 | 0.92 | 0.199 | 0.199 | 0.92 | 0.183 | 3% | |
| 7 | 26.00 | 1.10 | | | 0.284 | 0.310 | 1.0 | 26.50 | 25.50 | 1.00 | 1.10 | 0.297 | 0.297 | 1.10 | 0.327 | 5% | |
| 8 | 25.00 | 1.24 | | | 0.252 | 0.325 | 1.0 | 25.50 | 24.50 | 1.00 | 1.24 | 0.289 | 0.289 | 1.24 | 0.358 | 6% | |
| 9 | 24.00 | 1.32 | | | 0.296 | 0.347 | 1.0 | 24.50 | 23.50 | 1.00 | 1.32 | 0.322 | 0.322 | 1.32 | 0.424 | 7% | |
| 10 | 23.00 | 1.40 | | | 0.255 | 0.351 | 1.0 | 23.50 | 22.50 | 1.00 | 1.40 | 0.303 | 0.303 | 1.40 | 0.424 | 7% | |
| 11 | 22.00 | 1.60 | | | 0.239 | 0.362 | 1.0 | 22.50 | 21.50 | 1.00 | 1.60 | 0.301 | 0.301 | 1.60 | 0.481 | 7% | |
| 12 | 21.00 | 1.30 | | | 0.218 | 0.359 | 1.0 | 21.50 | 20.50 | 1.00 | 1.30 | 0.289 | 0.289 | 1.30 | 0.375 | 6% | |
| 13 | 20.00 | 1.14 | | | 0.256 | 0.353 | 1.0 | 20.50 | 19.50 | 1.00 | 1.14 | 0.305 | 0.305 | 1.14 | 0.347 | 5% | |
| 14 | 19.00 | 1.04 | | | 0.293 | 0.393 | 1.0 | 19.50 | 18.50 | 1.00 | 1.04 | 0.343 | 0.343 | 1.04 | 0.357 | 5% | |
| 15 | 18.00 | 1.14 | | | 0.286 | 0.354 | 1.0 | 18.50 | 17.50 | 1.00 | 1.14 | 0.320 | 0.320 | 1.14 | 0.365 | 6% | |
| 16 | 17.00 | 1.10 | | | 0.297 | 0.337 | 1.0 | 17.50 | 16.50 | 1.00 | 1.10 | 0.317 | 0.317 | 1.10 | 0.349 | 5% | |
| 17 | 16.00 | 1.12 | | | 0.272 | 0.313 | 1.0 | 16.50 | 15.50 | 1.00 | 1.12 | 0.293 | 0.293 | 1.12 | 0.328 | 5% | |
| 18 | 15.00 | 1.36 | | | 0.290 | 0.318 | 1.0 | 15.50 | 14.50 | 1.00 | 1.36 | 0.304 | 0.304 | 1.36 | 0.413 | 6% | |
| 19 | 14.00 | 1.20 | | | 0.179 | 0.311 | 1.0 | 14.50 | 13.50 | 1.00 | 1.20 | 0.245 | 0.245 | 1.20 | 0.294 | 5% | |
| 20 | 13.00 | 1.00 | | | 0.308 | 0.317 | 1.0 | 13.50 | 12.50 | 1.00 | 1.00 | 0.313 | 0.313 | 1.00 | 0.313 | 5% | |
| 21 | 12.00 | 0.72 | | 0.304 | | | 1.0 | 12.50 | 11.50 | 1.00 | 0.72 | 0.304 | 0.304 | 0.72 | 0.219 | 3% | |
| 22 | 11.00 | 0.75 | | 0.227 | | | 1.0 | 11.50 | 10.50 | 1.00 | 0.75 | 0.227 | 0.227 | 0.75 | 0.170 | 3% | |
| 23 | 10.00 | 0.54 | | 0.195 | | | 1.0 | 10.50 | 9.50 | 1.00 | 0.54 | 0.195 | 0.195 | 0.54 | 0.105 | 2% | |
| 24 | 9.00 | 0.62 | | 0.162 | | | 1.0 | 9.50 | 8.50 | 1.00 | 0.62 | 0.162 | 0.162 | 0.62 | 0.100 | 2% | |
| 25 | 8.00 | 0.48 | | 0.061 | | | 1.0 | 8.50 | 7.50 | 1.00 | 0.48 | 0.061 | 0.061 | 0.48 | 0.029 | 0% | |
| 26 | 7.00 | 0.38 | | 0.038 | | | 1.0 | 7.50 | 6.50 | 1.00 | 0.38 | 0.038 | 0.038 | 0.38 | 0.014 | 0% | |
| Right | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.0 | 6.50 | 6.00 | 0.50 | 0.10 | 0.010 | 0.010 | 0.05 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 6.493 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 6.493 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 24.01 | (m ²) |
| Wetted Width: | 26.00 | (m) |
| Hydraulic Depth: | 0.923 | (m) |
| Mean Velocity: | 0.270 | (m/s) |
| Froude Number: | 0.090 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S14A - Elys River at the CNRL Bridge (455748 E, 6344947 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 17-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|---|-------|
| Logger Details: | |
| Transducer Reading: | 0.994 |
| Battery (Main): | 4.64 |
| Battery (Aux): | 14.1 |
| Datalogger Clock: | 1442 |
| Laptop Clock: | 1443 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 18.2 |
| Memory used: | 0% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | 25892 |
| Other Logger Notes: Replaced PRTD and added water temperature probe. | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1500 |
| End Time (MST): | 1540 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | clear 20°C |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Top of pipe w/bubbler | 0.324 | 101.980 | 0.291 | 101.980 | - |
| Bench Mark 2: | Rebar w/orange flagging | 2.153 | 100.000 | 2.121 | 100.000 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 4.298 | 97.855 | 4.262 | 97.859 | 97.857 |
| Transducer: | | 0.994 | 96.861 | 0.994 | 96.865 | 96.863 |
| Other: | | | | | | |

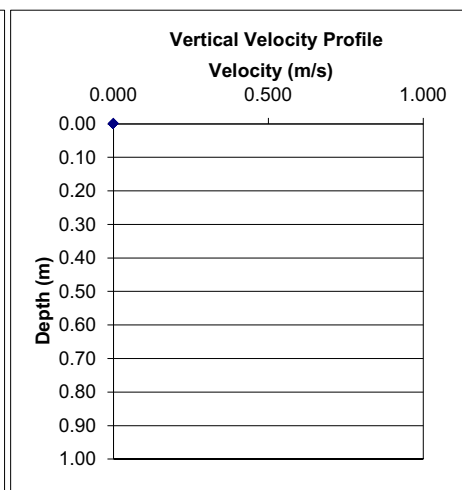
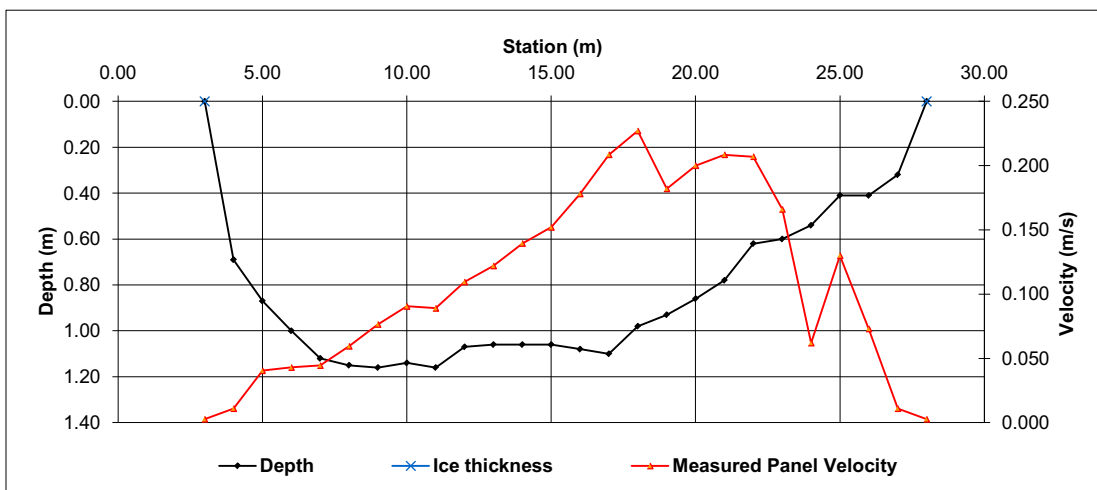
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|-----------------------|
| General Notes: |
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| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 28.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 28.00 | 27.50 | 0.50 | 0.08 | 0.003 | 0.003 | 0.04 | 0.000 | 0% |
| 1 | 27.00 | 0.32 | | 0.011 | | | 1.0 | 27.50 | 26.50 | 1.00 | 0.32 | 0.011 | 0.011 | 0.32 | 0.004 | 0% |
| 2 | 26.00 | 0.41 | | 0.073 | | | 1.0 | 26.50 | 25.50 | 1.00 | 0.41 | 0.073 | 0.073 | 0.41 | 0.030 | 1% |
| 3 | 25.00 | 0.41 | | 0.130 | | | 1.0 | 25.50 | 24.50 | 1.00 | 0.41 | 0.130 | 0.130 | 0.41 | 0.053 | 2% |
| 4 | 24.00 | 0.54 | | 0.062 | | | 1.0 | 24.50 | 23.50 | 1.00 | 0.54 | 0.062 | 0.062 | 0.54 | 0.033 | 1% |
| 5 | 23.00 | 0.60 | | 0.166 | | | 1.0 | 23.50 | 22.50 | 1.00 | 0.60 | 0.166 | 0.166 | 0.60 | 0.100 | 4% |
| 6 | 22.00 | 0.62 | | 0.207 | | | 1.0 | 22.50 | 21.50 | 1.00 | 0.62 | 0.207 | 0.207 | 0.62 | 0.128 | 5% |
| 7 | 21.00 | 0.78 | | | 0.194 | 0.223 | 1.0 | 21.50 | 20.50 | 1.00 | 0.78 | 0.209 | 0.209 | 0.78 | 0.163 | 6% |
| 8 | 20.00 | 0.86 | | | 0.170 | 0.230 | 1.0 | 20.50 | 19.50 | 1.00 | 0.86 | 0.200 | 0.200 | 0.86 | 0.172 | 7% |
| 9 | 19.00 | 0.93 | | | 0.156 | 0.208 | 1.0 | 19.50 | 18.50 | 1.00 | 0.93 | 0.182 | 0.182 | 0.93 | 0.169 | 7% |
| 10 | 18.00 | 0.98 | | | 0.211 | 0.243 | 1.0 | 18.50 | 17.50 | 1.00 | 0.98 | 0.227 | 0.227 | 0.98 | 0.222 | 9% |
| 11 | 17.00 | 1.10 | | | 0.219 | 0.198 | 1.0 | 17.50 | 16.50 | 1.00 | 1.10 | 0.209 | 0.209 | 1.10 | 0.229 | 9% |
| 12 | 16.00 | 1.08 | | | 0.179 | 0.177 | 1.0 | 16.50 | 15.50 | 1.00 | 1.08 | 0.178 | 0.178 | 1.08 | 0.192 | 8% |
| 13 | 15.00 | 1.06 | | | 0.147 | 0.157 | 1.0 | 15.50 | 14.50 | 1.00 | 1.06 | 0.152 | 0.152 | 1.06 | 0.161 | 6% |
| 14 | 14.00 | 1.06 | | | 0.153 | 0.126 | 1.0 | 14.50 | 13.50 | 1.00 | 1.06 | 0.140 | 0.140 | 1.06 | 0.148 | 6% |
| 15 | 13.00 | 1.06 | | | 0.129 | 0.115 | 1.0 | 13.50 | 12.50 | 1.00 | 1.06 | 0.122 | 0.122 | 1.06 | 0.129 | 5% |
| 16 | 12.00 | 1.07 | | | 0.109 | 0.110 | 1.0 | 12.50 | 11.50 | 1.00 | 1.07 | 0.110 | 0.110 | 1.07 | 0.117 | 5% |
| 17 | 11.00 | 1.16 | | | 0.090 | 0.088 | 1.0 | 11.50 | 10.50 | 1.00 | 1.16 | 0.089 | 0.089 | 1.16 | 0.103 | 4% |
| 18 | 10.00 | 1.14 | | | 0.089 | 0.092 | 1.0 | 10.50 | 9.50 | 1.00 | 1.14 | 0.091 | 0.091 | 1.14 | 0.103 | 4% |
| 19 | 9.00 | 1.16 | | | 0.079 | 0.074 | 1.0 | 9.50 | 8.50 | 1.00 | 1.16 | 0.077 | 0.077 | 1.16 | 0.089 | 3% |
| 20 | 8.00 | 1.15 | | | 0.065 | 0.054 | 1.0 | 8.50 | 7.50 | 1.00 | 1.15 | 0.060 | 0.060 | 1.15 | 0.068 | 3% |
| 21 | 7.00 | 1.12 | | | 0.035 | 0.054 | 1.0 | 7.50 | 6.50 | 1.00 | 1.12 | 0.045 | 0.045 | 1.12 | 0.050 | 2% |
| 22 | 6.00 | 1.00 | | | 0.046 | 0.040 | 1.0 | 6.50 | 5.50 | 1.00 | 1.00 | 0.043 | 0.043 | 1.00 | 0.043 | 2% |
| 23 | 5.00 | 0.87 | | | 0.040 | 0.041 | 1.0 | 5.50 | 4.50 | 1.00 | 0.87 | 0.041 | 0.041 | 0.87 | 0.035 | 1% |
| 24 | 4.00 | 0.69 | | 0.011 | | | 1.0 | 4.50 | 3.50 | 1.00 | 0.69 | 0.011 | 0.011 | 0.69 | 0.008 | 0% |
| Right | 3.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.50 | 3.00 | 0.50 | 0.17 | 0.003 | 0.003 | 0.09 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 2.551 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 2.551 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 21.30 | (m ²) |
| Wetted Width: | 24.00 | (m) |
| Hydraulic Depth: | 0.887 | (m) |
| Mean Velocity: | 0.120 | (m/s) |
| Froude Number: | 0.041 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S14A - Eils River at the CNRL Bridge (455748 E, 6344947 N) | | | |
| Field Personnel: | DB HB SG | Trip Date: | 19-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.197 |
| Battery (Main): | 12.72 |
| Battery (Aux): | 4.57 |
| Datalogger Clock: | 705 |
| Laptop Clock: | 709 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 6.04 |
| Memory used: | 1% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| RSSI -116, no communication | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 710 |
| End Time (MST): | 815 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Sunny, 0°C |

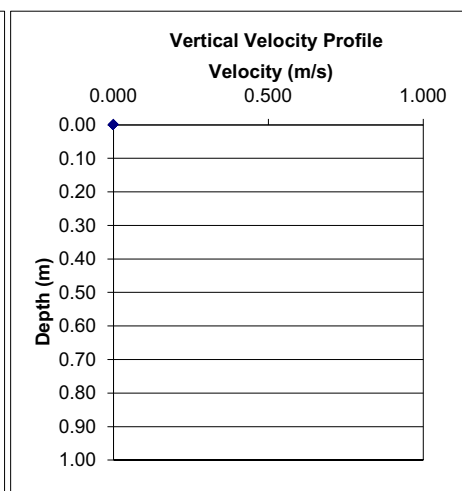
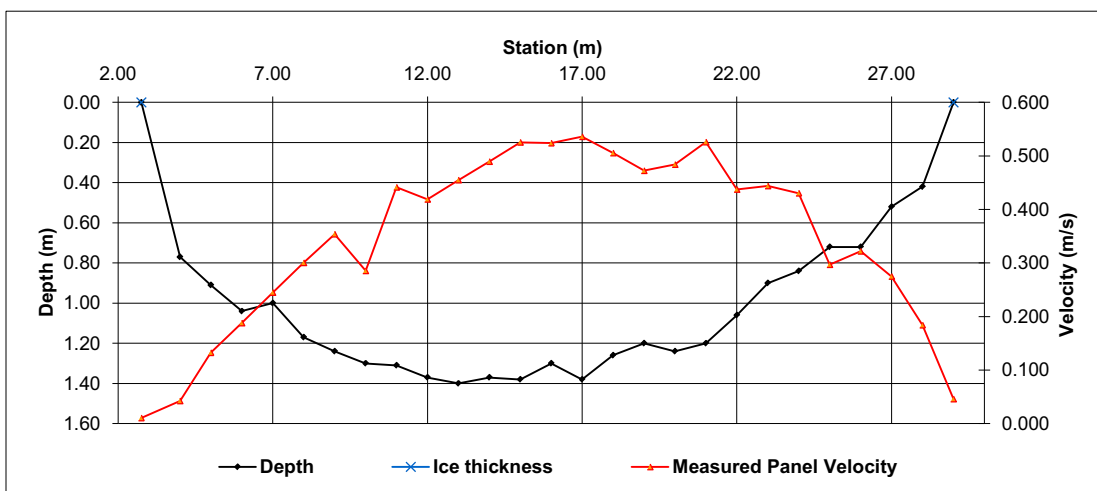
| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Top of pipe w/bubbler | 0.150 | 101.980 | 0.138 | 101.980 | - |
| Bench Mark 2: | Rebar w/orange flagging | 1.983 | 100.000 | 1.969 | 100.000 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 3.868 | 98.115 | 3.853 | 98.116 | 98.116 |
| Transducer: | | 1.197 | 96.918 | 1.197 | 96.919 | 96.919 |
| Other: | | | | | | |

| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | Calculated Data | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 29.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 29.00 | 28.50 | 0.50 | 0.11 | 0.046 | 0.046 | 0.05 | 0.002 | 0% |
| 1 | 28.00 | 0.42 | | 0.184 | | | 1.0 | 28.50 | 27.50 | 1.00 | 0.42 | 0.184 | 0.184 | 0.42 | 0.077 | 1% |
| 2 | 27.00 | 0.52 | | 0.275 | | | 1.0 | 27.50 | 26.50 | 1.00 | 0.52 | 0.275 | 0.275 | 0.52 | 0.143 | 1% |
| 3 | 26.00 | 0.72 | | 0.322 | | | 1.0 | 26.50 | 25.50 | 1.00 | 0.72 | 0.322 | 0.322 | 0.72 | 0.232 | 2% |
| 4 | 25.00 | 0.72 | | 0.297 | | | 1.0 | 25.50 | 24.50 | 1.00 | 0.72 | 0.297 | 0.297 | 0.72 | 0.214 | 2% |
| 5 | 24.00 | 0.84 | | | 0.357 | 0.504 | 1.0 | 24.50 | 23.50 | 1.00 | 0.84 | 0.431 | 0.431 | 0.84 | 0.362 | 3% |
| 6 | 23.00 | 0.90 | | | 0.348 | 0.540 | 1.0 | 23.50 | 22.50 | 1.00 | 0.90 | 0.444 | 0.444 | 0.90 | 0.400 | 4% |
| 7 | 22.00 | 1.06 | | | 0.363 | 0.512 | 1.0 | 22.50 | 21.50 | 1.00 | 1.06 | 0.438 | 0.438 | 1.06 | 0.464 | 4% |
| 8 | 21.00 | 1.20 | | | 0.452 | 0.600 | 1.0 | 21.50 | 20.50 | 1.00 | 1.20 | 0.526 | 0.526 | 1.20 | 0.631 | 6% |
| 9 | 20.00 | 1.24 | | | 0.406 | 0.562 | 1.0 | 20.50 | 19.50 | 1.00 | 1.24 | 0.484 | 0.484 | 1.24 | 0.600 | 6% |
| 10 | 19.00 | 1.20 | | | 0.387 | 0.558 | 1.0 | 19.50 | 18.50 | 1.00 | 1.20 | 0.473 | 0.473 | 1.20 | 0.567 | 5% |
| 11 | 18.00 | 1.26 | | | 0.468 | 0.543 | 1.0 | 18.50 | 17.50 | 1.00 | 1.26 | 0.506 | 0.506 | 1.26 | 0.637 | 6% |
| 12 | 17.00 | 1.38 | | | 0.508 | 0.564 | 1.0 | 17.50 | 16.50 | 1.00 | 1.38 | 0.536 | 0.536 | 1.38 | 0.740 | 7% |
| 13 | 16.00 | 1.30 | | | 0.468 | 0.580 | 1.0 | 16.50 | 15.50 | 1.00 | 1.30 | 0.524 | 0.524 | 1.30 | 0.681 | 6% |
| 14 | 15.00 | 1.38 | | | 0.478 | 0.573 | 1.0 | 15.50 | 14.50 | 1.00 | 1.38 | 0.526 | 0.526 | 1.38 | 0.725 | 7% |
| 15 | 14.00 | 1.37 | | | 0.465 | 0.514 | 1.0 | 14.50 | 13.50 | 1.00 | 1.37 | 0.490 | 0.490 | 1.37 | 0.671 | 6% |
| 16 | 13.00 | 1.40 | | | 0.462 | 0.448 | 1.0 | 13.50 | 12.50 | 1.00 | 1.40 | 0.455 | 0.455 | 1.40 | 0.637 | 6% |
| 17 | 12.00 | 1.37 | | | 0.449 | 0.389 | 1.0 | 12.50 | 11.50 | 1.00 | 1.37 | 0.419 | 0.419 | 1.37 | 0.574 | 5% |
| 18 | 11.00 | 1.31 | | | 0.463 | 0.420 | 1.0 | 11.50 | 10.50 | 1.00 | 1.31 | 0.442 | 0.442 | 1.31 | 0.578 | 5% |
| 19 | 10.00 | 1.30 | | | 0.226 | 0.345 | 1.0 | 10.50 | 9.50 | 1.00 | 1.30 | 0.286 | 0.286 | 1.30 | 0.371 | 3% |
| 20 | 9.00 | 1.24 | | | 0.385 | 0.323 | 1.0 | 9.50 | 8.50 | 1.00 | 1.24 | 0.354 | 0.354 | 1.24 | 0.439 | 4% |
| 21 | 8.00 | 1.17 | | | 0.250 | 0.351 | 1.0 | 8.50 | 7.50 | 1.00 | 1.17 | 0.301 | 0.301 | 1.17 | 0.352 | 3% |
| 22 | 7.00 | 1.00 | | | 0.277 | 0.213 | 1.0 | 7.50 | 6.50 | 1.00 | 1.00 | 0.245 | 0.245 | 1.00 | 0.245 | 2% |
| 23 | 6.00 | 1.04 | | | 0.137 | 0.239 | 1.0 | 6.50 | 5.50 | 1.00 | 1.04 | 0.188 | 0.188 | 1.04 | 0.196 | 2% |
| 24 | 5.00 | 0.91 | | | 0.130 | 0.135 | 1.0 | 5.50 | 4.50 | 1.00 | 0.91 | 0.133 | 0.133 | 0.91 | 0.121 | 1% |
| 25 | 4.00 | 0.77 | | | -0.001 | 0.086 | 1.0 | 4.50 | 3.38 | 1.13 | 0.77 | 0.043 | 0.043 | 0.87 | 0.037 | 0% |
| Left | 2.75 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.38 | 2.75 | 0.63 | 0.19 | 0.011 | 0.011 | 0.12 | 0.001 | 0% |
| *denotes position of TSS sample | | | | | | | | | | | | | | | Total Flow | 10.696 |

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 10.696 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 27.29 | (m ²) |
| Wetted Width: | 25.13 | (m) |
| Hydraulic Depth: | 1.086 | (m) |
| Mean Velocity: | 0.392 | (m/s) |
| Froude Number: | 0.120 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S14A - Ells River at the CNRL Bridge (455748 E, 6344947 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 26-Oct-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.082 |
| Battery (Main): | 4.57 |
| Battery (Aux): | 13.77 |
| Datalogger Clock: | 1447 |
| Laptop Clock: | 1450 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.21 |
| Memory used: | <3% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|----------------------|
| Measurement Details: | |
| Start Time (MST): | 1445 |
| End Time (MST): | 1638 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open, some short ice |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Cloudy/sleet, -3°C |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Top of pipe w/bubbler | 0.736 | 101.980 | 0.710 | 101.980 | - |
| Bench Mark 2: | Rebar w/orange flagging | 2.565 | 100.000 | 2.541 | 100.000 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 4.579 | 97.986 | 4.552 | 97.989 | 97.988 |
| Transducer: | | 1.082 | 96.904 | 1.082 | 96.907 | 96.905 |
| Other: | | | | | | |

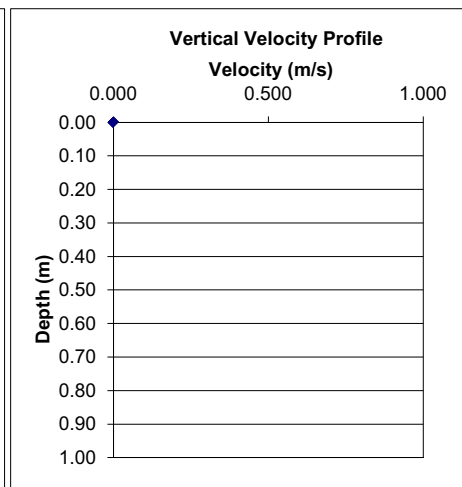
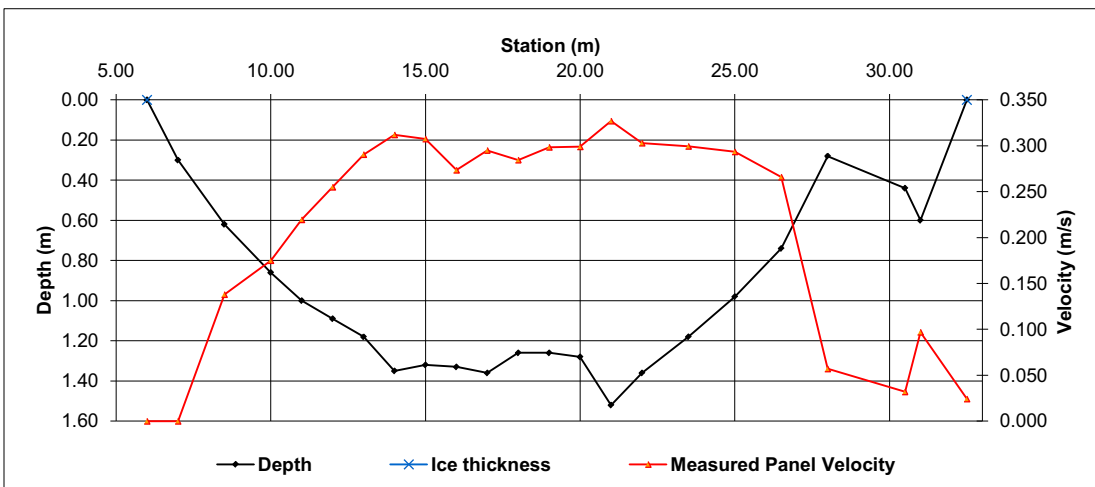
| | |
|-----------------------|--|
| General Notes: | |
| TSS at 13.5m | |

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | | Calculated Data | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| Left | 32.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 32.50 | 31.75 | 0.75 | 0.15 | 0.024 | 0.024 | 0.11 | 0.003 | 0% | | | | | | | | |
| 1 | 31.00 | 0.60 | | 0.097 | | | 1.0 | 31.75 | 30.75 | 1.00 | 0.60 | 0.097 | 0.097 | 0.60 | 0.058 | 1% | | | | | | | | |
| 2 | 30.50 | 0.44 | | 0.032 | | | 1.0 | 30.75 | 29.25 | 1.50 | 0.44 | 0.032 | 0.032 | 0.66 | 0.021 | 0% | | | | | | | | |
| 3 | 28.00 | 0.28 | | 0.057 | | | 1.0 | 29.25 | 27.25 | 2.00 | 0.28 | 0.057 | 0.057 | 0.56 | 0.032 | 1% | | | | | | | | |
| 4 | 26.50 | 0.74 | | 0.266 | | | 1.0 | 27.25 | 25.75 | 1.50 | 0.74 | 0.266 | 0.266 | 1.11 | 0.295 | 5% | | | | | | | | |
| 5 | 25.00 | 0.98 | | | 0.275 | 0.312 | 1.0 | 25.75 | 24.25 | 1.50 | 0.98 | 0.294 | 0.294 | 1.47 | 0.431 | 7% | | | | | | | | |
| 6 | 23.50 | 1.18 | | | 0.275 | 0.324 | 1.0 | 24.25 | 22.75 | 1.50 | 1.18 | 0.300 | 0.300 | 1.77 | 0.530 | 8% | | | | | | | | |
| 7 | 22.00 | 1.36 | | | 0.256 | 0.350 | 1.0 | 22.75 | 21.50 | 1.25 | 1.36 | 0.303 | 0.303 | 1.70 | 0.515 | 8% | | | | | | | | |
| 8 | 21.00 | 1.52 | | | 0.279 | 0.375 | 1.0 | 21.50 | 20.50 | 1.00 | 1.52 | 0.327 | 0.327 | 1.52 | 0.497 | 8% | | | | | | | | |
| 9 | 20.00 | 1.28 | | | 0.264 | 0.334 | 1.0 | 20.50 | 19.50 | 1.00 | 1.28 | 0.299 | 0.299 | 1.28 | 0.383 | 6% | | | | | | | | |
| 10 | 19.00 | 1.26 | | | 0.243 | 0.354 | 1.0 | 19.50 | 18.50 | 1.00 | 1.26 | 0.299 | 0.299 | 1.26 | 0.376 | 6% | | | | | | | | |
| 11 | 18.00 | 1.26 | | | 0.241 | 0.328 | 1.0 | 18.50 | 17.50 | 1.00 | 1.26 | 0.285 | 0.285 | 1.26 | 0.358 | 6% | | | | | | | | |
| 12 | 17.00 | 1.36 | | | 0.282 | 0.308 | 1.0 | 17.50 | 16.50 | 1.00 | 1.36 | 0.295 | 0.295 | 1.36 | 0.401 | 6% | | | | | | | | |
| 13 | 16.00 | 1.33 | | | 0.230 | 0.317 | 1.0 | 16.50 | 15.50 | 1.00 | 1.33 | 0.274 | 0.274 | 1.33 | 0.364 | 6% | | | | | | | | |
| 14 | 15.00 | 1.32 | | | 0.276 | 0.339 | 1.0 | 15.50 | 14.50 | 1.00 | 1.32 | 0.308 | 0.308 | 1.32 | 0.406 | 6% | | | | | | | | |
| 15 | 14.00 | 1.35 | | | 0.293 | 0.331 | 1.0 | 14.50 | 13.50 | 1.00 | 1.35 | 0.312 | 0.312 | 1.35 | 0.421 | 7% | | | | | | | | |
| 16 | 13.00 | 1.18 | | | 0.245 | 0.336 | 1.0 | 13.50 | 12.50 | 1.00 | 1.18 | 0.291 | 0.291 | 1.18 | 0.343 | 5% | | | | | | | | |
| 17 | 12.00 | 1.09 | | | 0.231 | 0.279 | 1.0 | 12.50 | 11.50 | 1.00 | 1.09 | 0.255 | 0.255 | 1.09 | 0.278 | 4% | | | | | | | | |
| 18 | 11.00 | 1.00 | | | 0.229 | 0.210 | 1.0 | 11.50 | 10.50 | 1.00 | 1.00 | 0.220 | 0.220 | 1.00 | 0.220 | 4% | | | | | | | | |
| 19 | 10.00 | 0.86 | | | | 0.197 | 1.0 | 10.50 | 9.25 | 1.25 | 0.86 | 0.175 | 0.175 | 1.08 | 0.188 | 3% | | | | | | | | |
| 20 | 8.50 | 0.62 | | 0.138 | | | 1.0 | 9.25 | 7.75 | 1.50 | 0.62 | 0.138 | 0.138 | 0.93 | 0.128 | 2% | | | | | | | | |
| 21 | 7.00 | 0.30 | | 0.000 | | | 1.0 | 7.75 | 6.50 | 1.25 | 0.30 | 0.000 | 0.000 | 0.38 | 0.000 | 0% | | | | | | | | |
| Right | 6.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 6.50 | 6.00 | 0.50 | 0.08 | 0.000 | 0.000 | 0.04 | 0.000 | 0% | | | | | | | | |
| Total Flow | | | | | | | | | | | | | | 6.249 | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 6.249 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 24.35 | (m ²) |
| Wetted Width: | 25.25 | (m) |
| Hydraulic Depth: | 0.964 | (m) |
| Mean Velocity: | 0.257 | (m/s) |
| Froude Number: | 0.083 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S14A - Eils River at the CNRL Bridge (455748 E, 6344947 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 30-Nov-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.277 |
| Battery (Main): | 4.53 |
| Battery (Aux): | 13.63 |
| Datalogger Clock: | 10:49 |
| Laptop Clock: | 10:54 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.22 |
| Memory used: | 5% |
| Dessicant: | OK |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|---------------------|
| Measurement Details: | |
| Start Time (MST): | 10:56 |
| End Time (MST): | 12:10 |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | - 10, partly cloudy |

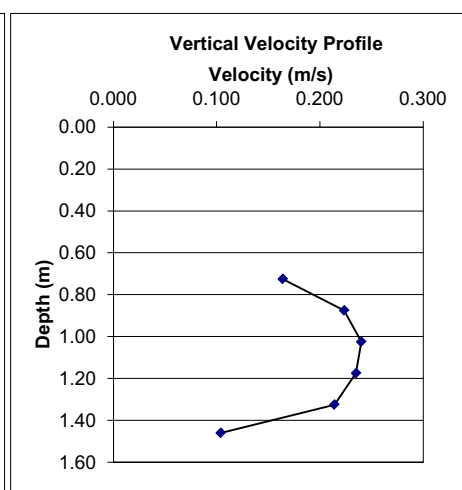
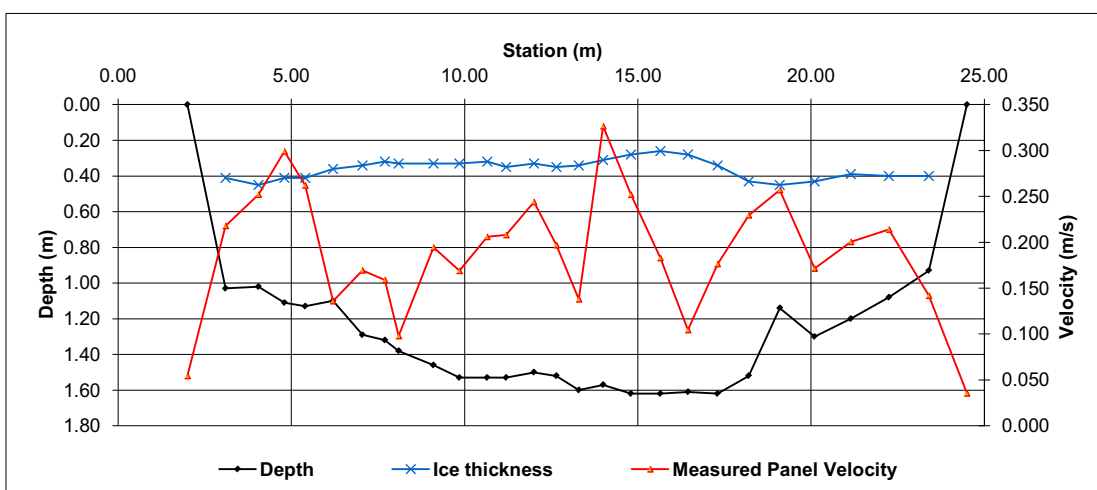
| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Top of pipe w/bubbler | 0.599 | 101.980 | 0.587 | 101.980 | - |
| Bench Mark 2: | Rebar w/orange flagging | 2.428 | 100.000 | 2.416 | 100.000 | - |
| Top of Ice: | | 4.268 | 98.160 | 4.257 | 98.159 | 98.160 |
| Water Level: | | 4.258 | 98.170 | 4.250 | 98.166 | 98.168 |
| Transducer: | | 1.277 | 96.893 | 1.277 | 96.889 | 96.891 |
| Other: | | | | | | |

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|-----------------------|
| General Notes: |
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| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|---|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 2.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 2.00 | 2.55 | 0.55 | 0.16 | 0.055 | 0.049 | 0.09 | 0.004 | 0% |
| 1 | 3.10 | 1.03 | 0.41 | 0.218 | | | 0.9 | 2.55 | 3.58 | 1.03 | 0.62 | 0.218 | 0.196 | 0.64 | 0.125 | 3% |
| 2 | 4.05 | 1.02 | 0.45 | 0.252 | | | 0.9 | 3.58 | 4.43 | 0.85 | 0.57 | 0.252 | 0.227 | 0.48 | 0.110 | 3% |
| 3 | 4.80 | 1.11 | 0.41 | 0.299 | | | 0.9 | 4.43 | 5.10 | 0.68 | 0.70 | 0.299 | 0.269 | 0.47 | 0.127 | 3% |
| 4 | 5.40 | 1.13 | 0.41 | 0.262 | | | 0.9 | 5.10 | 5.80 | 0.70 | 0.72 | 0.262 | 0.236 | 0.50 | 0.119 | 3% |
| 5 | 6.20 | 1.10 | 0.36 | 0.136 | | | 0.9 | 5.80 | 6.63 | 0.82 | 0.74 | 0.136 | 0.122 | 0.61 | 0.075 | 2% |
| 6 | 7.05 | 1.29 | 0.34 | | 0.336 | 0.003 | 1.0 | 6.63 | 7.38 | 0.75 | 0.95 | 0.170 | 0.170 | 0.71 | 0.121 | 3% |
| 7 | 7.70 | 1.32 | 0.32 | | 0.317 | 0.001 | 1.0 | 7.38 | 7.90 | 0.53 | 1.00 | 0.159 | 0.159 | 0.53 | 0.083 | 2% |
| 8 | 8.10 | 1.38 | 0.33 | | 0.194 | 0.002 | 1.0 | 7.90 | 8.60 | 0.70 | 1.05 | 0.098 | 0.098 | 0.73 | 0.072 | 2% |
| 9 | 9.10 | 1.46 | 0.33 | | 0.389 | 0.000 | 1.0 | 8.60 | 9.48 | 0.88 | 1.13 | 0.195 | 0.195 | 0.99 | 0.192 | 5% |
| 10 | 9.85 | 1.53 | 0.33 | | 0.336 | 0.002 | 1.0 | 9.48 | 10.25 | 0.78 | 1.20 | 0.169 | 0.169 | 0.93 | 0.157 | 4% |
| 11 | 10.65 | 1.53 | 0.32 | | 0.405 | 0.007 | 1.0 | 10.25 | 10.93 | 0.68 | 1.21 | 0.206 | 0.206 | 0.82 | 0.168 | 4% |
| 12 | 11.20 | 1.53 | 0.35 | | 0.414 | 0.002 | 1.0 | 10.93 | 11.60 | 0.67 | 1.18 | 0.208 | 0.208 | 0.80 | 0.166 | 4% |
| 13 | 12.00 | 1.50 | 0.33 | | 0.426 | 0.062 | 1.0 | 11.60 | 12.33 | 0.73 | 1.17 | 0.244 | 0.244 | 0.85 | 0.207 | 5% |
| 14 | 12.65 | 1.52 | 0.35 | | 0.394 | 0.000 | 1.0 | 12.33 | 12.98 | 0.65 | 1.17 | 0.197 | 0.197 | 0.76 | 0.150 | 4% |
| 15 | 13.30 | 1.60 | 0.34 | | 0.273 | 0.003 | 1.0 | 12.98 | 13.65 | 0.67 | 1.26 | 0.138 | 0.138 | 0.85 | 0.117 | 3% |
| 16 | 14.00 | 1.57 | 0.31 | | 0.394 | 0.259 | 1.0 | 13.65 | 14.40 | 0.75 | 1.26 | 0.327 | 0.327 | 0.95 | 0.309 | 8% |
| 17 | 14.80 | 1.62 | 0.28 | | 0.321 | 0.183 | 1.0 | 14.40 | 15.23 | 0.83 | 1.34 | 0.252 | 0.252 | 1.11 | 0.279 | 7% |
| 18 | 15.65 | 1.62 | 0.26 | | 0.317 | 0.049 | 1.0 | 15.23 | 16.05 | 0.82 | 1.36 | 0.183 | 0.183 | 1.12 | 0.205 | 5% |
| 19 | 16.45 | 1.61 | 0.28 | | 0.202 | 0.007 | 1.0 | 16.05 | 16.88 | 0.82 | 1.33 | 0.105 | 0.105 | 1.10 | 0.115 | 3% |
| 20 | 17.30 | 1.62 | 0.34 | | 0.269 | 0.084 | 1.0 | 16.88 | 17.75 | 0.88 | 1.28 | 0.177 | 0.177 | 1.12 | 0.198 | 5% |
| 21 | 18.20 | 1.52 | 0.43 | | 0.252 | 0.207 | 1.0 | 17.75 | 18.65 | 0.90 | 1.09 | 0.230 | 0.230 | 0.98 | 0.225 | 6% |
| 22 | 19.10 | 1.14 | 0.45 | 0.257 | | | 0.9 | 18.65 | 19.60 | 0.95 | 0.69 | 0.257 | 0.231 | 0.66 | 0.152 | 4% |
| 23 | 20.10 | 1.30 | 0.43 | | 0.225 | 0.118 | 1.0 | 19.60 | 20.63 | 1.03 | 0.87 | 0.172 | 0.172 | 0.89 | 0.153 | 4% |
| 24 | 21.15 | 1.20 | 0.39 | | 0.216 | 0.185 | 1.0 | 20.63 | 21.70 | 1.08 | 0.81 | 0.201 | 0.201 | 0.87 | 0.175 | 4% |
| 25 | 22.25 | 1.08 | 0.40 | 0.214 | | | 0.9 | 21.70 | 22.83 | 1.13 | 0.68 | 0.214 | 0.193 | 0.77 | 0.147 | 4% |
| 26 | 23.40 | 0.93 | 0.40 | 0.142 | | | 0.9 | 22.83 | 23.95 | 1.13 | 0.53 | 0.142 | 0.128 | 0.60 | 0.076 | 2% |
| Right | 24.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 23.95 | 24.50 | 0.55 | 0.13 | 0.036 | 0.036 | 0.07 | 0.003 | 0% |
| Total Flow | | | | | | | | | | | | | | 4.029 | | |
| <small>*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc</small> | | | | | | | | | | | | | | | | |

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 4.029 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 20.98 | (m ²) |
| Wetted Width: | 22.50 | (m) |
| Hydraulic Depth: | 0.932 | (m) |
| Mean Velocity: | 0.192 | (m/s) |
| Froude Number: | 0.064 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.197 |
| Offset | 18.2 | 1.52 | 0 | - | Panel V.@Ofst | 0.23 |
| Depth | 1.52 | 1.40 | 0.208 | 1.46 | 60% Depth | 1.084 |
| Ice Depth | 0.43 | 1.25 | 0.220 | 1.33 | 20% Depth | 0.65 |
| | | 1.10 | 0.250 | 1.18 | 80% Depth | 1.30 |
| | | 0.95 | 0.230 | 1.03 | | |
| | | 0.80 | 0.217 | 0.88 | | |
| | | 0.65 | 0.111 | 0.73 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S15A - Tar River near the Mouth (458395 E, 6353391 N) | | | |
| Field Personnel: | DB CE | Trip Date: | 07-Apr-10 |
| Data Entry Personnel: | DB | Date: | 10-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|---------------------------------------|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | 14.56 |
| Battery (Aux): | |
| Datalogger Clock: | 1211 |
| Laptop Clock: | 1210 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | Significant woodpecker damage at tree |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1200 |
| End Time (MST): | 1220 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Ice, badly broken |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in root nr. Solar panel | 0.750 | 100.912 | 0.711 | 100.912 | - |
| Bench Mark 2: | Nail in stump of fallen tree | 1.650 | 100.000 | 1.612 | 100.000 | - |
| Top of Ice: | (*v variable) | | | | | - |
| Water Level: | | 2.800 | 98.850 | 2.761 | 98.851 | 98.851 |
| Transducer: | | | | | | |
| Other: | | | | | | |

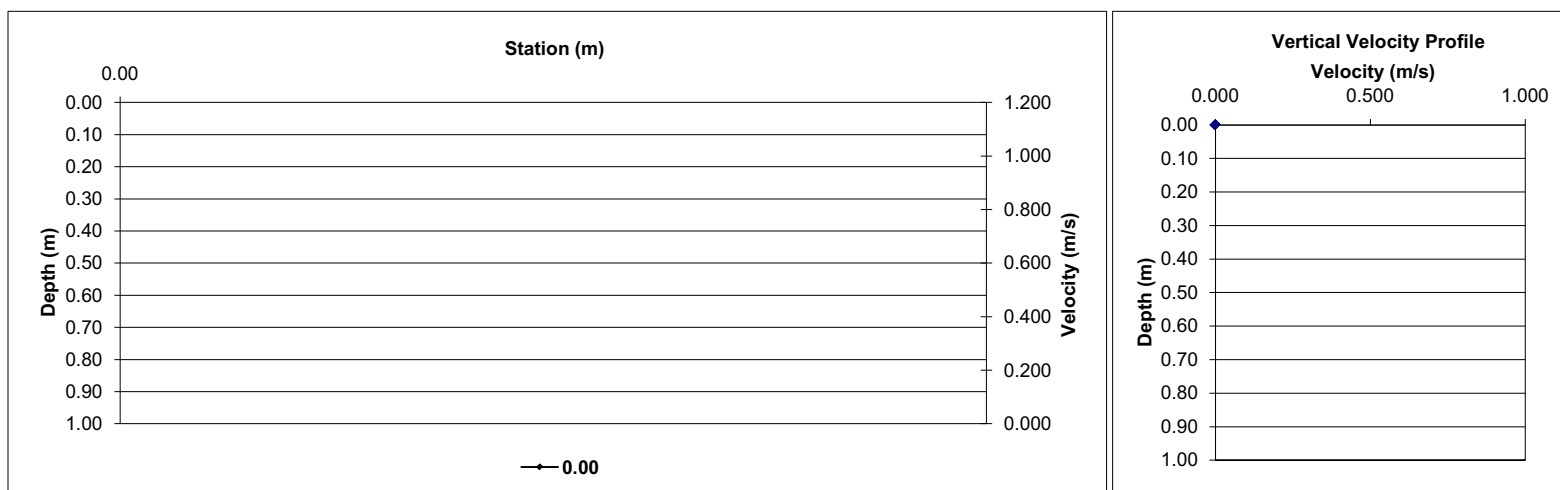
General Notes:

Ice too broken to measure, significant flow under suspended ice

| Flow Measurement: | | | | | | | Measured Data | | | | | | | Calculated Data | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | |
| Left | | 0.00 | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | |
| Right | | 0.00 | | | | | | | | | | | | | | | | | | |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | | | | | |

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | 0 | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Foude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S15A - Tar River near the Mouth (458395 E, 6353391 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 22-Apr-10 |
| Data Entry Personnel: | DB | Date: | 23-Apr-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.776 |
| Battery (Main): | 13.76 |
| Battery (Aux): | |
| Datalogger Clock: | 1015 |
| Laptop Clock: | 1015 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | 5.9 |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------|
| Measurement Details: | |
| Start Time (MST): | 1010 |
| End Time (MST): | 1035 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open, Ice on side |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Sunny |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in root nr. Solar panel | 2.494 | 100.912 | 2.437 | 100.912 | - |
| Bench Mark 2: | Nail in stump of fallen tree | 3.400 | 100.000 | 3.340 | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 4.706 | 98.694 | 4.648 | 98.692 | 98.693 |
| Transducer: | | 0.776 | 97.918 | 0.776 | 97.916 | 97.917 |
| Other: | | | | | | |

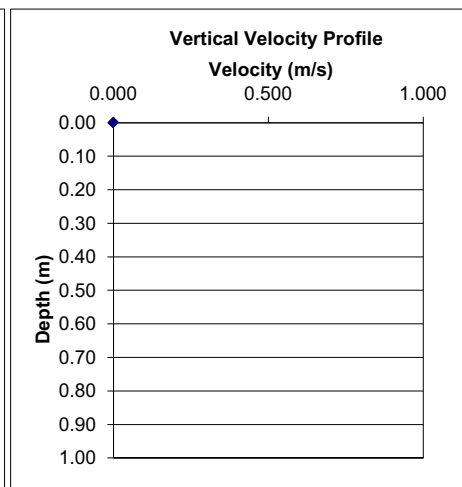
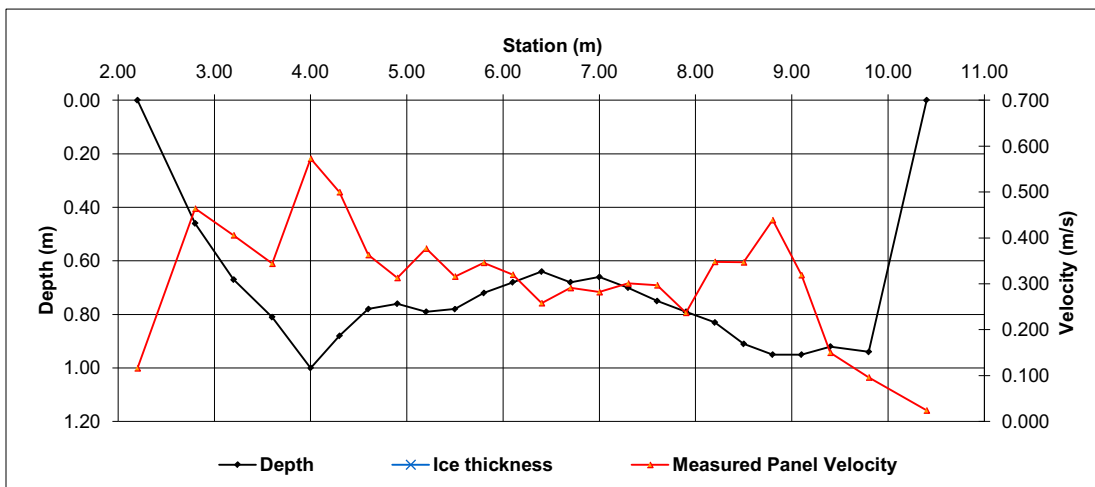
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 2.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.20 | 2.50 | 0.30 | 0.12 | 0.116 | 0.116 | 0.03 | 0.004 | 0% |
| 1 | 2.80 | 0.46 | | 0.464 | | | 1.0 | 2.50 | 3.00 | 0.50 | 0.46 | 0.464 | 0.464 | 0.23 | 0.107 | 5% |
| 2 | 3.20 | 0.67 | | 0.406 | | | 1.0 | 3.00 | 3.40 | 0.40 | 0.67 | 0.406 | 0.406 | 0.27 | 0.109 | 6% |
| 3 | 3.60 | 0.81 | | 0.344 | | | 1.0 | 3.40 | 3.80 | 0.40 | 0.81 | 0.344 | 0.344 | 0.32 | 0.111 | 6% |
| 4 | 4.00 | 1.00 | | | 0.597 | 0.549 | 1.0 | 3.80 | 4.15 | 0.35 | 1.00 | 0.573 | 0.573 | 0.35 | 0.201 | 10% |
| 5 | 4.30 | 0.88 | | 0.500 | | | 1.0 | 4.15 | 4.45 | 0.30 | 0.88 | 0.500 | 0.500 | 0.26 | 0.132 | 7% |
| 6 | 4.60 | 0.78 | | 0.363 | | | 1.0 | 4.45 | 4.75 | 0.30 | 0.78 | 0.363 | 0.363 | 0.23 | 0.085 | 4% |
| 7 | 4.90 | 0.76 | | 0.313 | | | 1.0 | 4.75 | 5.05 | 0.30 | 0.76 | 0.313 | 0.313 | 0.23 | 0.071 | 4% |
| 8 | 5.20 | 0.79 | | 0.377 | | | 1.0 | 5.05 | 5.35 | 0.30 | 0.79 | 0.377 | 0.377 | 0.24 | 0.089 | 5% |
| 9 | 5.50 | 0.78 | | 0.316 | | | 1.0 | 5.35 | 5.65 | 0.30 | 0.78 | 0.316 | 0.316 | 0.23 | 0.074 | 4% |
| 10 | 5.80 | 0.72 | | 0.346 | | | 1.0 | 5.65 | 5.95 | 0.30 | 0.72 | 0.346 | 0.346 | 0.22 | 0.075 | 4% |
| 11 | 6.10 | 0.68 | | 0.320 | | | 1.0 | 5.95 | 6.25 | 0.30 | 0.68 | 0.320 | 0.320 | 0.20 | 0.065 | 3% |
| 12 | 6.40 | 0.64 | | 0.258 | | | 1.0 | 6.25 | 6.55 | 0.30 | 0.64 | 0.258 | 0.258 | 0.19 | 0.050 | 3% |
| 13 | 6.70 | 0.68 | | 0.291 | | | 1.0 | 6.55 | 6.85 | 0.30 | 0.68 | 0.291 | 0.291 | 0.20 | 0.059 | 3% |
| 14 | 7.00 | 0.66 | | 0.282 | | | 1.0 | 6.85 | 7.15 | 0.30 | 0.66 | 0.282 | 0.282 | 0.20 | 0.056 | 3% |
| 15 | 7.30 | 0.70 | | 0.301 | | | 1.0 | 7.15 | 7.45 | 0.30 | 0.70 | 0.301 | 0.301 | 0.21 | 0.063 | 3% |
| 16 | 7.60 | 0.75 | | 0.297 | | | 1.0 | 7.45 | 7.75 | 0.30 | 0.75 | 0.297 | 0.297 | 0.23 | 0.067 | 3% |
| 17 | 7.90 | 0.79 | | 0.237 | | | 1.0 | 7.75 | 8.05 | 0.30 | 0.79 | 0.237 | 0.237 | 0.24 | 0.056 | 3% |
| 18 | 8.20 | 0.83 | | 0.348 | | | 1.0 | 8.05 | 8.35 | 0.30 | 0.83 | 0.348 | 0.348 | 0.25 | 0.087 | 4% |
| 19 | 8.50 | 0.91 | | 0.347 | | | 1.0 | 8.35 | 8.65 | 0.30 | 0.91 | 0.347 | 0.347 | 0.27 | 0.095 | 5% |
| 20 | 8.80 | 0.95 | | 0.439 | | | 1.0 | 8.65 | 8.95 | 0.30 | 0.95 | 0.439 | 0.439 | 0.28 | 0.125 | 6% |
| 21 | 9.10 | 0.95 | | 0.319 | | | 1.0 | 8.95 | 9.25 | 0.30 | 0.95 | 0.319 | 0.319 | 0.29 | 0.091 | 5% |
| 22 | 9.40 | 0.92 | | 0.150 | | | 1.0 | 9.25 | 9.60 | 0.35 | 0.92 | 0.150 | 0.150 | 0.32 | 0.048 | 2% |
| 23 | 9.80 | 0.94 | | 0.096 | | | 1.0 | 9.60 | 10.10 | 0.50 | 0.94 | 0.096 | 0.096 | 0.47 | 0.045 | 2% |
| Left | 10.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 10.10 | 10.40 | 0.30 | 0.24 | 0.024 | 0.024 | 0.07 | 0.002 | 0% |
| Total Flow | | | | | | | | | | | | | | 1.967 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 1.967 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 6.04 | (m ²) |
| Wetted Width: | 8.20 | (m) |
| Hydraulic Depth: | 0.737 | (m) |
| Mean Velocity: | 0.325 | (m/s) |
| Foude Number: | 0.121 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S15A - Tar River near the Mouth (458395 E, 6353391 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 23-Jun-10 |
| Data Entry Personnel: | DB | Date: | 5-Jul-10 |
| Data Check Personnel: | JP | Date: | 14-Jul-10 |

| | |
|--|---------|
| Logger Details: | |
| Transducer Reading: | 0.481 |
| Battery (Main): | 14.23 |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | 17.1 |
| Memory used: | |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Old PT depth 0.172, moved, SG updated realtime | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1315 |
| End Time (MST): | 1430 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly Cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in root nr. Solar panel | 2.275 | 100.912 | 2.182 | 100.912 | - |
| Bench Mark 2: | Nail in stump of fallen tree | 3.210 | 100.000 | 3.115 | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 5.082 | 98.128 | 4.993 | 98.122 | 98.125 |
| Transducer: | | 0.481 | 97.647 | 0.481 | 97.641 | 97.644 |
| Other: | | | | | | |

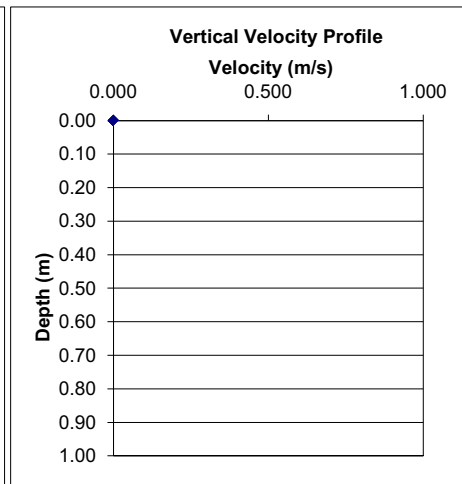
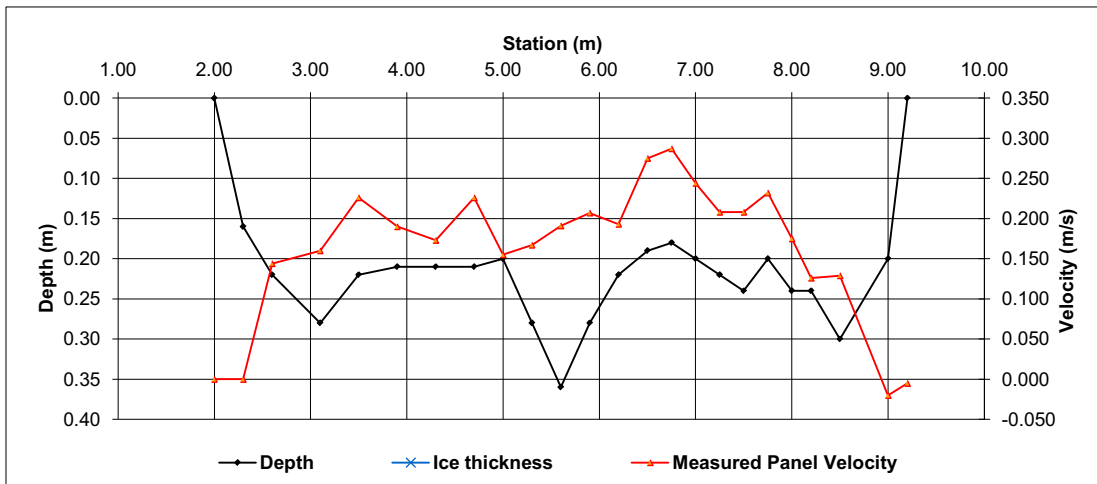
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 9.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 9.20 | 9.10 | 0.10 | 0.05 | -0.005 | -0.005 | 0.00 | 0.000 | 0% |
| 1 | 9.00 | 0.20 | | -0.020 | | | 1.0 | 9.10 | 8.75 | 0.35 | 0.20 | -0.020 | -0.020 | 0.07 | -0.001 | -1% |
| 2 | 8.50 | 0.30 | | 0.129 | | | 1.0 | 8.75 | 8.35 | 0.40 | 0.30 | 0.129 | 0.129 | 0.12 | 0.015 | 6% |
| 3 | 8.20 | 0.24 | | 0.126 | | | 1.0 | 8.35 | 8.10 | 0.25 | 0.24 | 0.126 | 0.126 | 0.06 | 0.008 | 3% |
| 4 | 8.00 | 0.24 | | 0.175 | | | 1.0 | 8.10 | 7.88 | 0.23 | 0.24 | 0.175 | 0.175 | 0.05 | 0.009 | 3% |
| 5 | 7.75 | 0.20 | | 0.232 | | | 1.0 | 7.88 | 7.63 | 0.25 | 0.20 | 0.232 | 0.232 | 0.05 | 0.012 | 4% |
| 6 | 7.50 | 0.24 | | 0.208 | | | 1.0 | 7.63 | 7.38 | 0.25 | 0.24 | 0.208 | 0.208 | 0.06 | 0.012 | 4% |
| 7 | 7.25 | 0.22 | | 0.208 | | | 1.0 | 7.38 | 7.13 | 0.25 | 0.22 | 0.208 | 0.208 | 0.06 | 0.011 | 4% |
| 8 | 7.00 | 0.20 | | 0.244 | | | 1.0 | 7.13 | 6.88 | 0.25 | 0.20 | 0.244 | 0.244 | 0.05 | 0.012 | 4% |
| 9 | 6.75 | 0.18 | | 0.287 | | | 1.0 | 6.88 | 6.63 | 0.25 | 0.18 | 0.287 | 0.287 | 0.05 | 0.013 | 5% |
| 10 | 6.50 | 0.19 | | 0.275 | | | 1.0 | 6.63 | 6.35 | 0.28 | 0.19 | 0.275 | 0.275 | 0.05 | 0.014 | 5% |
| 11 | 6.20 | 0.22 | | 0.193 | | | 1.0 | 6.35 | 6.05 | 0.30 | 0.22 | 0.193 | 0.193 | 0.07 | 0.013 | 5% |
| 12 | 5.90 | 0.28 | | 0.207 | | | 1.0 | 6.05 | 5.75 | 0.30 | 0.28 | 0.207 | 0.207 | 0.08 | 0.017 | 6% |
| 13 | 5.60 | 0.36 | | 0.191 | | | 1.0 | 5.75 | 5.45 | 0.30 | 0.36 | 0.191 | 0.191 | 0.11 | 0.021 | 7% |
| 14 | 5.30 | 0.28 | | 0.167 | | | 1.0 | 5.45 | 5.15 | 0.30 | 0.28 | 0.167 | 0.167 | 0.08 | 0.014 | 5% |
| 15 | 5.00 | 0.20 | | 0.155 | | | 1.0 | 5.15 | 4.85 | 0.30 | 0.20 | 0.155 | 0.155 | 0.06 | 0.009 | 3% |
| 16 | 4.70 | 0.21 | | 0.226 | | | 1.0 | 4.85 | 4.50 | 0.35 | 0.21 | 0.226 | 0.226 | 0.07 | 0.017 | 6% |
| 17 | 4.30 | 0.21 | | 0.173 | | | 1.0 | 4.50 | 4.10 | 0.40 | 0.21 | 0.173 | 0.173 | 0.08 | 0.015 | 5% |
| 18 | 3.90 | 0.21 | | 0.190 | | | 1.0 | 4.10 | 3.70 | 0.40 | 0.21 | 0.190 | 0.190 | 0.08 | 0.016 | 6% |
| 19 | 3.50 | 0.22 | | 0.226 | | | 1.0 | 3.70 | 3.30 | 0.40 | 0.22 | 0.226 | 0.226 | 0.09 | 0.020 | 7% |
| 20 | 3.10 | 0.28 | | 0.160 | | | 1.0 | 3.30 | 2.85 | 0.45 | 0.28 | 0.160 | 0.160 | 0.13 | 0.020 | 7% |
| 21 | 2.60 | 0.22 | | 0.144 | | | 1.0 | 2.85 | 2.45 | 0.40 | 0.22 | 0.144 | 0.144 | 0.09 | 0.013 | 5% |
| 22 | 2.30 | 0.16 | | 0.000 | | | 1.0 | 2.45 | 2.15 | 0.30 | 0.16 | 0.000 | 0.000 | 0.05 | 0.000 | 0% |
| Left | 2.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.15 | 2.00 | 0.15 | 0.04 | 0.000 | 0.000 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.280 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.280 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 1.62 | (m ²) |
| Wetted Width: | 6.95 | (m) |
| Hydraulic Depth: | 0.233 | (m) |
| Mean Velocity: | 0.173 | (m/s) |
| Foude Number: | 0.114 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S15A - Tar River near the Mouth (458395 E, 6353391 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 17-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 1-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.391 |
| Battery (Main): | 13.65 |
| Battery (Aux): | - |
| Datalogger Clock: | 1048 |
| Laptop Clock: | 1048 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 14.3 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1055 |
| End Time (MST): | 1125 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Partly Cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in root nr. Solar panel | 2.418 | 100.912 | 2.386 | 100.912 | - |
| Bench Mark 2: | Nail in stump of fallen tree | 3.352 | 100.000 | 3.322 | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 5.305 | 98.047 | 5.272 | 98.050 | 98.049 |
| Transducer: | | 0.391 | 97.656 | 0.391 | 97.659 | 97.658 |
| Other: | | | | | | |

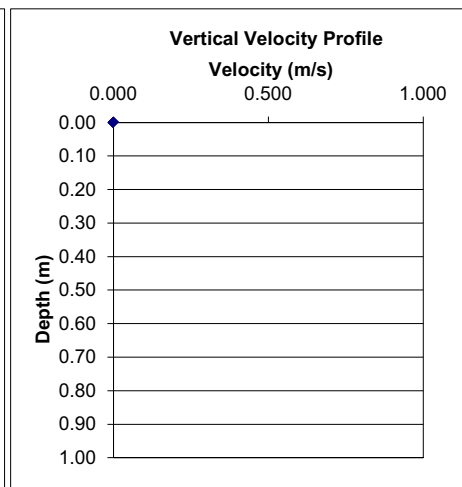
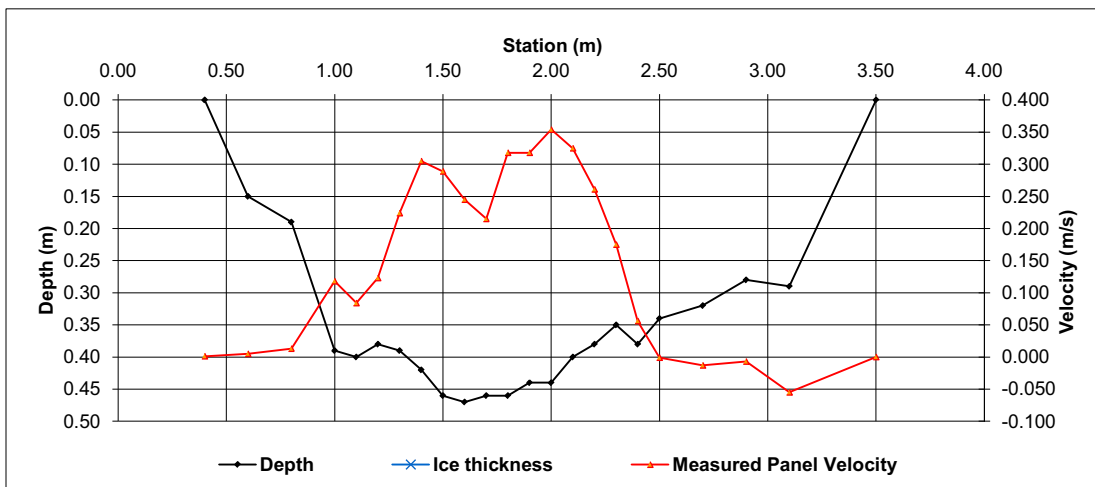
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.40 | 0.50 | 0.10 | 0.04 | 0.001 | 0.001 | 0.00 | 0.000 | 0% |
| 1 | 0.60 | 0.15 | | 0.005 | | | 1.0 | 0.50 | 0.70 | 0.20 | 0.15 | 0.005 | 0.005 | 0.03 | 0.000 | 0% |
| 2 | 0.80 | 0.19 | | 0.013 | | | 1.0 | 0.70 | 0.90 | 0.20 | 0.19 | 0.013 | 0.013 | 0.04 | 0.000 | 0% |
| 3 | 1.00 | 0.39 | | 0.118 | | | 1.0 | 0.90 | 1.05 | 0.15 | 0.39 | 0.118 | 0.118 | 0.06 | 0.007 | 5% |
| 4 | 1.10 | 0.40 | | 0.084 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.40 | 0.084 | 0.084 | 0.04 | 0.003 | 2% |
| 5 | 1.20 | 0.38 | | 0.123 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.38 | 0.123 | 0.123 | 0.04 | 0.005 | 3% |
| 6 | 1.30 | 0.39 | | 0.224 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.39 | 0.224 | 0.224 | 0.04 | 0.009 | 6% |
| 7 | 1.40 | 0.42 | | 0.305 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.42 | 0.305 | 0.305 | 0.04 | 0.013 | 9% |
| 8 | 1.50 | 0.46 | | 0.289 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.46 | 0.289 | 0.289 | 0.05 | 0.013 | 9% |
| 9 | 1.60 | 0.47 | | 0.245 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.47 | 0.245 | 0.245 | 0.05 | 0.012 | 8% |
| 10 | 1.70 | 0.46 | | 0.215 | | | 1.0 | 1.65 | 1.75 | 0.10 | 0.46 | 0.215 | 0.215 | 0.05 | 0.010 | 7% |
| 11 | 1.80 | 0.46 | | 0.318 | | | 1.0 | 1.75 | 1.85 | 0.10 | 0.46 | 0.318 | 0.318 | 0.05 | 0.015 | 10% |
| 12 | 1.90 | 0.44 | | 0.318 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.44 | 0.318 | 0.318 | 0.04 | 0.014 | 10% |
| 13 | 2.00 | 0.44 | | 0.354 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.44 | 0.354 | 0.354 | 0.04 | 0.016 | 11% |
| 14 | 2.10 | 0.40 | | 0.325 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.40 | 0.325 | 0.325 | 0.04 | 0.013 | 9% |
| 15 | 2.20 | 0.38 | | 0.261 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.38 | 0.261 | 0.261 | 0.04 | 0.010 | 7% |
| 16 | 2.30 | 0.35 | | 0.175 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.35 | 0.175 | 0.175 | 0.03 | 0.006 | 4% |
| 17 | 2.40 | 0.38 | | 0.056 | | | 1.0 | 2.35 | 2.45 | 0.10 | 0.38 | 0.056 | 0.056 | 0.04 | 0.002 | 2% |
| 18 | 2.50 | 0.34 | | -0.001 | | | 1.0 | 2.45 | 2.60 | 0.15 | 0.34 | -0.001 | -0.001 | 0.05 | 0.000 | 0% |
| 19 | 2.70 | 0.32 | | -0.013 | | | 1.0 | 2.60 | 2.80 | 0.20 | 0.32 | -0.013 | -0.013 | 0.06 | -0.001 | -1% |
| 20 | 2.90 | 0.28 | | -0.007 | | | 1.0 | 2.80 | 3.00 | 0.20 | 0.28 | -0.007 | -0.007 | 0.06 | 0.000 | 0% |
| 21 | 3.10 | 0.29 | | -0.055 | | | 1.0 | 3.00 | 3.30 | 0.30 | 0.29 | -0.055 | -0.055 | 0.09 | -0.005 | -3% |
| Right | 3.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.30 | 3.50 | 0.20 | 0.07 | 0.000 | -0.014 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.141 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.141 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.99 | (m ²) |
| Wetted Width: | 3.10 | (m) |
| Hydraulic Depth: | 0.318 | (m) |
| Mean Velocity: | 0.143 | (m/s) |
| Foude Number: | 0.081 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S15A - Tar River near the Mouth (458395 E, 6353391 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 14-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 8-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.822 |
| Battery (Main): | 13.22 |
| Battery (Aux): | |
| Datalogger Clock: | 1114 |
| Laptop Clock: | 1114 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | 9.4 |
| Memory used: | |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1105 |
| End Time (MST): | 1145 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Clear 10°C |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in root nr. Solar panel | 2.447 | 100.912 | 2.438 | 100.912 | - |
| Bench Mark 2: | Nail in stump of fallen tree | 3.382 | 100.000 | 3.374 | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 4.888 | 98.494 | 4.878 | 98.496 | 98.495 |
| Transducer: | | 0.822 | 97.672 | 0.822 | 97.674 | 97.673 |
| Other: | | | | | | |

General Notes:

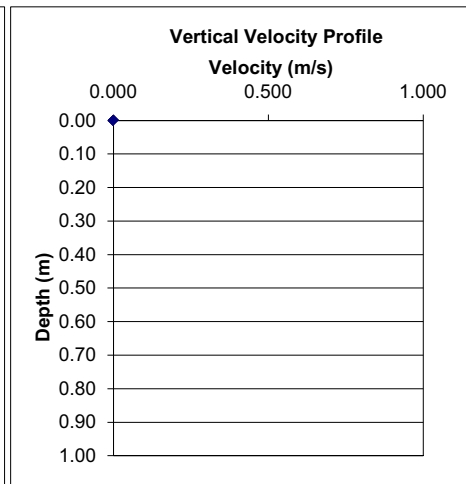
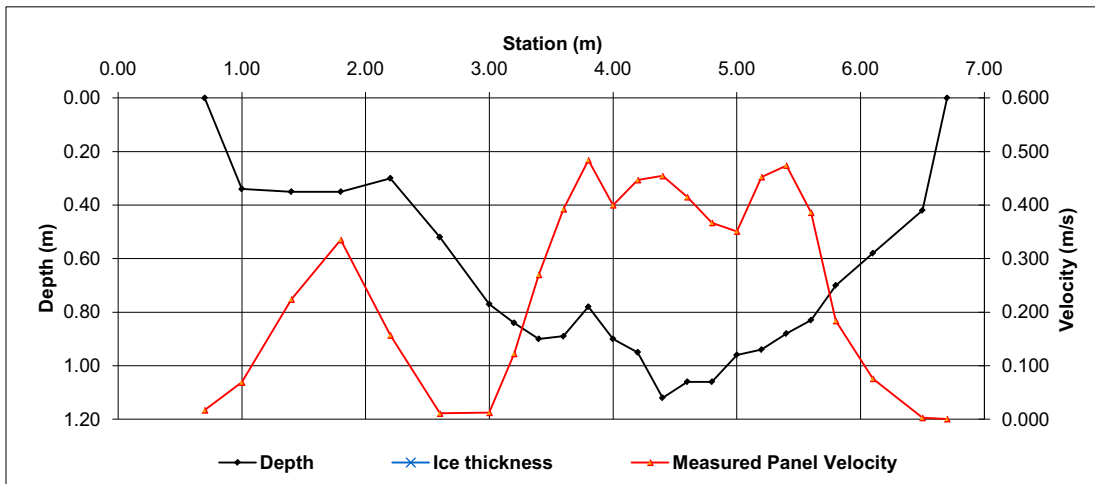
Large fish observed, white dorsal fin, 2-3lbs maybe carp/bottom feeder.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|---------------|--------------|-------------------------|----------------------------------|----------------------------------|----------------------------------|---|------------------------|----------------------|------------------------|-------------------------------------|---|---|-------------------------------------|--|-----------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.70 | 0.85 | 0.15 | 0.09 | 0.017 | 0.017 | 0.01 | 0.000 | 0% |
| 1 | 1.00 | 0.34 | | 0.069 | | | 1.0 | 0.85 | 1.20 | 0.35 | 0.34 | 0.069 | 0.069 | 0.12 | 0.008 | 1% |
| 2 | 1.40 | 0.35 | | 0.224 | | | 1.0 | 1.20 | 1.60 | 0.40 | 0.35 | 0.224 | 0.224 | 0.14 | 0.031 | 3% |
| 3 | 1.80 | 0.35 | | 0.335 | | | 1.0 | 1.60 | 2.00 | 0.40 | 0.35 | 0.335 | 0.335 | 0.14 | 0.047 | 4% |
| 4 | 2.20 | 0.30 | | 0.157 | | | 1.0 | 2.00 | 2.40 | 0.40 | 0.30 | 0.157 | 0.157 | 0.12 | 0.019 | 2% |
| 5 | 2.60 | 0.52 | | 0.011 | | | 1.0 | 2.40 | 2.80 | 0.40 | 0.52 | 0.011 | 0.011 | 0.21 | 0.002 | 0% |
| 6 | 3.00 | 0.77 | | | -0.050 | 0.075 | 1.0 | 2.80 | 3.10 | 0.30 | 0.77 | 0.013 | 0.013 | 0.23 | 0.003 | 0% |
| 7 | 3.20 | 0.84 | | | 0.112 | 0.133 | 1.0 | 3.10 | 3.30 | 0.20 | 0.84 | 0.123 | 0.123 | 0.17 | 0.021 | 2% |
| 8 | 3.40 | 0.90 | | | 0.308 | 0.232 | 1.0 | 3.30 | 3.50 | 0.20 | 0.90 | 0.270 | 0.270 | 0.18 | 0.049 | 4% |
| 9 | 3.60 | 0.89 | | | 0.443 | 0.342 | 1.0 | 3.50 | 3.70 | 0.20 | 0.89 | 0.393 | 0.393 | 0.18 | 0.070 | 6% |
| 10 | 3.80 | 0.78 | | | 0.469 | 0.499 | 1.0 | 3.70 | 3.90 | 0.20 | 0.78 | 0.484 | 0.484 | 0.16 | 0.076 | 7% |
| 11 | 4.00 | 0.90 | | | 0.381 | 0.419 | 1.0 | 3.90 | 4.10 | 0.20 | 0.90 | 0.400 | 0.400 | 0.18 | 0.072 | 7% |
| 12 | 4.20 | 0.95 | | | 0.406 | 0.488 | 1.0 | 4.10 | 4.30 | 0.20 | 0.95 | 0.447 | 0.447 | 0.19 | 0.085 | 8% |
| 13 | 4.40 | 1.12 | | | 0.395 | 0.514 | 1.0 | 4.30 | 4.50 | 0.20 | 1.12 | 0.455 | 0.455 | 0.22 | 0.102 | 9% |
| 14 | 4.60 | 1.06 | | | 0.360 | 0.470 | 1.0 | 4.50 | 4.70 | 0.20 | 1.06 | 0.415 | 0.415 | 0.21 | 0.088 | 8% |
| 15 | 4.80 | 1.06 | | | 0.239 | 0.495 | 1.0 | 4.70 | 4.90 | 0.20 | 1.06 | 0.367 | 0.367 | 0.21 | 0.078 | 7% |
| 16 | 5.00 | 0.96 | | | 0.349 | 0.353 | 1.0 | 4.90 | 5.10 | 0.20 | 0.96 | 0.351 | 0.351 | 0.19 | 0.067 | 6% |
| 17 | 5.20 | 0.94 | | | 0.352 | 0.553 | 1.0 | 5.10 | 5.30 | 0.20 | 0.94 | 0.453 | 0.453 | 0.19 | 0.085 | 8% |
| 18 | 5.40 | 0.88 | | | 0.366 | 0.582 | 1.0 | 5.30 | 5.50 | 0.20 | 0.88 | 0.474 | 0.474 | 0.18 | 0.083 | 8% |
| 19 | 5.60 | 0.83 | | | 0.380 | 0.392 | 1.0 | 5.50 | 5.70 | 0.20 | 0.83 | 0.386 | 0.386 | 0.17 | 0.064 | 6% |
| 20 | 5.80 | 0.70 | | 0.184 | | | 1.0 | 5.70 | 5.95 | 0.25 | 0.70 | 0.184 | 0.184 | 0.18 | 0.032 | 3% |
| 21 | 6.10 | 0.58 | | 0.076 | | | 1.0 | 5.95 | 6.30 | 0.35 | 0.58 | 0.076 | 0.076 | 0.20 | 0.015 | 1% |
| 22 | 6.50 | 0.42 | | 0.003 | | | 1.0 | 6.30 | 6.60 | 0.30 | 0.42 | 0.003 | 0.003 | 0.13 | 0.000 | 0% |
| Right | 6.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 6.60 | 6.70 | 0.10 | 0.11 | 0.001 | 0.001 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 1.098 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 1.098 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 3.91 | (m ²) |
| Wetted Width: | 6.00 | (m) |
| Hydraulic Depth: | 0.651 | (m) |
| Mean Velocity: | 0.281 | (m/s) |
| Foude Number: | 0.111 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S15A - Tar River near the Mouth (458395 E, 6353391 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 26-Oct-10 |
| Data Entry Personnel: | DB | Date: | 9-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.466 |
| Battery (Main): | 13.34 |
| Battery (Aux): | |
| Datalogger Clock: | 1035 |
| Laptop Clock: | 1034 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | 0.5 |
| Memory used: | |
| Dessicant: | Removed |
| Logger# (if Δ): | 9723 |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 1032 |
| End Time (MST): | 1210 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in root nr. Solar panel | 2.311 | 100.912 | 2.250 | 100.912 | - |
| Bench Mark 2: | Nail in stump of fallen tree | 3.249 | 100.000 | 3.190 | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 5.190 | 98.059 | 5.124 | 98.066 | 98.063 |
| Transducer: | | 0.466 | 97.593 | 0.466 | 97.600 | 97.597 |
| Other: | | | | | | |

General Notes:

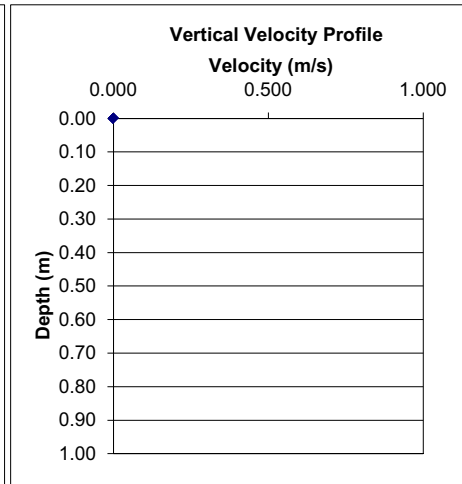
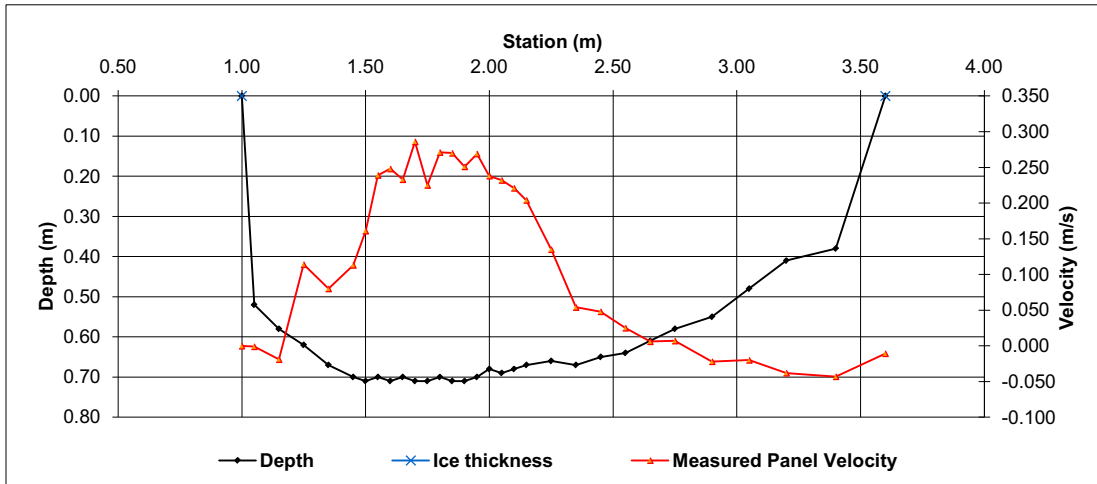
TSS @ 2.3m

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 3.60 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.60 | 3.50 | 0.10 | 0.10 | -0.011 | -0.011 | 0.01 | 0.000 | 0% |
| 1 | 3.40 | 0.38 | | -0.043 | | | 1.0 | 3.50 | 3.30 | 0.20 | 0.38 | -0.043 | -0.043 | 0.08 | -0.003 | -2% |
| 2 | 3.20 | 0.41 | | -0.038 | | | 1.0 | 3.30 | 3.13 | 0.18 | 0.41 | -0.038 | -0.038 | 0.07 | -0.003 | -2% |
| 3 | 3.05 | 0.48 | | -0.020 | | | 1.0 | 3.13 | 2.98 | 0.15 | 0.48 | -0.020 | -0.020 | 0.07 | -0.001 | -1% |
| 4 | 2.90 | 0.55 | | -0.022 | | | 1.0 | 2.98 | 2.83 | 0.15 | 0.55 | -0.022 | -0.022 | 0.08 | -0.002 | -1% |
| 5 | 2.75 | 0.58 | | 0.007 | | | 1.0 | 2.83 | 2.70 | 0.13 | 0.58 | 0.007 | 0.007 | 0.07 | 0.001 | 0% |
| 6 | 2.65 | 0.61 | | 0.006 | | | 1.0 | 2.70 | 2.60 | 0.10 | 0.61 | 0.006 | 0.006 | 0.06 | 0.000 | 0% |
| 7 | 2.55 | 0.64 | | 0.025 | | | 1.0 | 2.60 | 2.50 | 0.10 | 0.64 | 0.025 | 0.025 | 0.06 | 0.002 | 1% |
| 8 | 2.45 | 0.65 | | 0.048 | | | 1.0 | 2.50 | 2.40 | 0.10 | 0.65 | 0.048 | 0.048 | 0.06 | 0.003 | 2% |
| 9 | 2.35 | 0.67 | | 0.054 | | | 1.0 | 2.40 | 2.30 | 0.10 | 0.67 | 0.054 | 0.054 | 0.07 | 0.004 | 2% |
| 10 | 2.25 | 0.66 | | 0.135 | | | 1.0 | 2.30 | 2.20 | 0.10 | 0.66 | 0.135 | 0.135 | 0.07 | 0.009 | 6% |
| 11 | 2.15 | 0.67 | | 0.204 | | | 1.0 | 2.20 | 2.13 | 0.08 | 0.67 | 0.204 | 0.204 | 0.05 | 0.010 | 7% |
| 12 | 2.10 | 0.68 | | 0.221 | | | 1.0 | 2.13 | 2.08 | 0.05 | 0.68 | 0.221 | 0.221 | 0.03 | 0.008 | 5% |
| 13 | 2.05 | 0.69 | | 0.232 | | | 1.0 | 2.08 | 2.03 | 0.05 | 0.69 | 0.232 | 0.232 | 0.03 | 0.008 | 5% |
| 14 | 2.00 | 0.68 | | 0.238 | | | 1.0 | 2.03 | 1.98 | 0.05 | 0.68 | 0.238 | 0.238 | 0.03 | 0.008 | 6% |
| 15 | 1.95 | 0.70 | | 0.269 | | | 1.0 | 1.98 | 1.93 | 0.05 | 0.70 | 0.269 | 0.269 | 0.04 | 0.009 | 6% |
| 16 | 1.90 | 0.71 | | 0.251 | | | 1.0 | 1.93 | 1.88 | 0.05 | 0.71 | 0.251 | 0.251 | 0.04 | 0.009 | 6% |
| 17 | 1.85 | 0.71 | | 0.270 | | | 1.0 | 1.88 | 1.83 | 0.05 | 0.71 | 0.270 | 0.270 | 0.04 | 0.010 | 7% |
| 18 | 1.80 | 0.70 | | 0.271 | | | 1.0 | 1.83 | 1.78 | 0.05 | 0.70 | 0.271 | 0.271 | 0.04 | 0.009 | 6% |
| 19 | 1.75 | 0.71 | | 0.225 | | | 1.0 | 1.78 | 1.73 | 0.05 | 0.71 | 0.225 | 0.225 | 0.04 | 0.008 | 5% |
| 20 | 1.70 | 0.71 | | 0.286 | | | 1.0 | 1.73 | 1.68 | 0.05 | 0.71 | 0.286 | 0.286 | 0.04 | 0.010 | 7% |
| 21 | 1.65 | 0.70 | | 0.233 | | | 1.0 | 1.68 | 1.63 | 0.05 | 0.70 | 0.233 | 0.233 | 0.03 | 0.008 | 6% |
| 22 | 1.60 | 0.71 | | 0.248 | | | 1.0 | 1.63 | 1.58 | 0.05 | 0.71 | 0.248 | 0.248 | 0.04 | 0.009 | 6% |
| 23 | 1.55 | 0.70 | | 0.239 | | | 1.0 | 1.58 | 1.53 | 0.05 | 0.70 | 0.239 | 0.239 | 0.04 | 0.008 | 6% |
| 24 | 1.50 | 0.71 | | 0.161 | | | 1.0 | 1.53 | 1.48 | 0.05 | 0.71 | 0.161 | 0.161 | 0.04 | 0.006 | 4% |
| 25 | 1.45 | 0.70 | | 0.113 | | | 1.0 | 1.48 | 1.40 | 0.08 | 0.70 | 0.113 | 0.113 | 0.05 | 0.006 | 4% |
| 26 | 1.35 | 0.67 | | 0.080 | | | 1.0 | 1.40 | 1.30 | 0.10 | 0.67 | 0.080 | 0.080 | 0.07 | 0.005 | 4% |
| 27 | 1.25 | 0.62 | | 0.114 | | | 1.0 | 1.30 | 1.20 | 0.10 | 0.62 | 0.114 | 0.114 | 0.06 | 0.007 | 5% |
| 28 | 1.15 | 0.58 | | -0.019 | | | 1.0 | 1.20 | 1.10 | 0.10 | 0.58 | -0.019 | -0.019 | 0.06 | -0.001 | -1% |
| 29 | 1.05 | 0.52 | | -0.001 | | | 1.0 | 1.10 | 1.03 | 0.08 | 0.52 | -0.001 | -0.001 | 0.04 | 0.000 | 0% |
| Right | 1.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.03 | 1.00 | 0.02 | 0.13 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.146 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.146 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 1.49 | (m ²) |
| Wetted Width: | 2.48 | (m) |
| Hydraulic Depth: | 0.604 | (m) |
| Mean Velocity: | 0.098 | (m/s) |
| Foude Number: | 0.040 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S16A - Calumet River Upland Tributary | | | |
| Field Personnel: | DB SG | Trip Date: | 24-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-----------|
| Logger Details: | |
| Transducer Reading: | 0.758 |
| Battery (Main): | 4.27 |
| Battery (Aux): | 13.04 |
| Datalogger Clock: | 1502 |
| Laptop Clock: | 1502 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 0% |
| Dessicant: | New |
| Logger# (if Δ): | 204100608 |
| PT# (if Δ): | 101356 |
| Other Logger Notes: | |

| | |
|------------------------------|----------|
| Measurement Details: | |
| Start Time (MST): | 1515 |
| End Time (MST): | 1540 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in root of logger tree | 0.878 | 100.000 | 0.871 | 100.000 | - |
| Bench Mark 2: | NO BM2 | - | 100.000 | - | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.655 | 98.223 | 2.644 | 98.227 | 98.225 |
| Transducer: | | 0.758 | 97.465 | 0.758 | 97.469 | 97.467 |
| Other: | | | | | | |

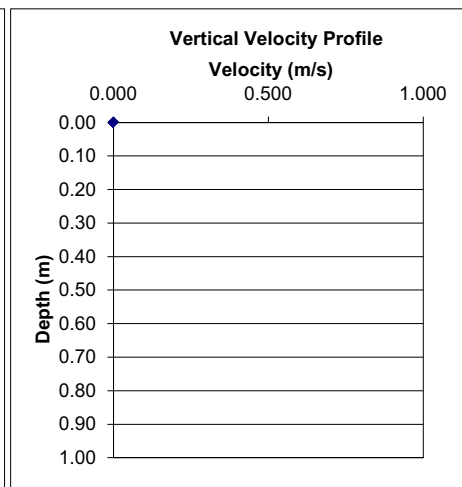
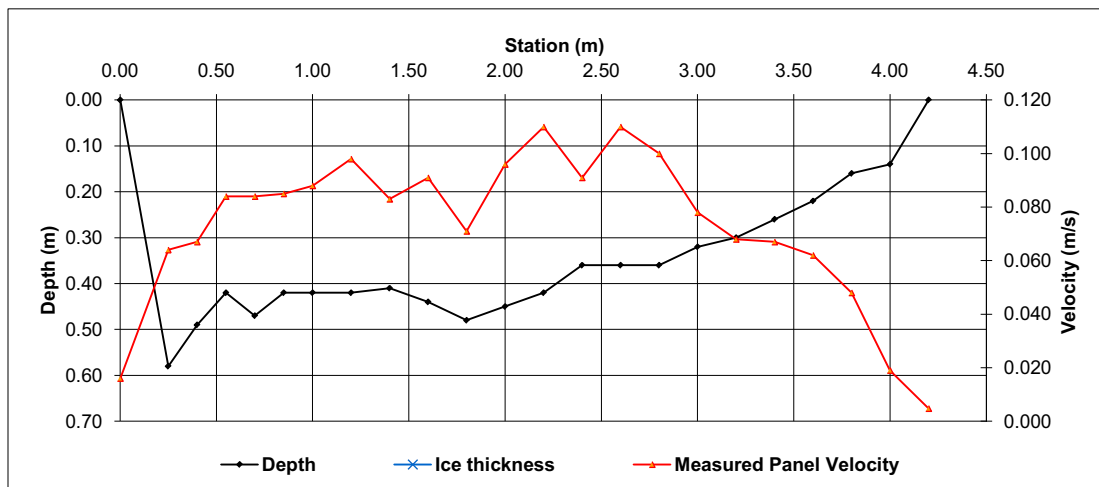
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | 0.13 | 0.12 | 0.15 | 0.016 | 0.016 | 0.02 | 0.000 | 0% |
| 1 | 0.25 | 0.58 | | 0.064 | | | 1.0 | 0.13 | 0.33 | 0.20 | 0.58 | 0.064 | 0.064 | 0.12 | 0.007 | 6% |
| 2 | 0.40 | 0.49 | | 0.067 | | | 1.0 | 0.33 | 0.48 | 0.15 | 0.49 | 0.067 | 0.067 | 0.07 | 0.005 | 4% |
| 3 | 0.55 | 0.42 | | 0.084 | | | 1.0 | 0.48 | 0.63 | 0.15 | 0.42 | 0.084 | 0.084 | 0.06 | 0.005 | 4% |
| 4 | 0.70 | 0.47 | | 0.084 | | | 1.0 | 0.63 | 0.78 | 0.15 | 0.47 | 0.084 | 0.084 | 0.07 | 0.006 | 5% |
| 5 | 0.85 | 0.42 | | 0.085 | | | 1.0 | 0.78 | 0.93 | 0.15 | 0.42 | 0.085 | 0.085 | 0.06 | 0.005 | 4% |
| 6 | 1.00 | 0.42 | | 0.088 | | | 1.0 | 0.93 | 1.10 | 0.18 | 0.42 | 0.088 | 0.088 | 0.07 | 0.006 | 5% |
| 7 | 1.20 | 0.42 | | 0.098 | | | 1.0 | 1.10 | 1.30 | 0.20 | 0.42 | 0.098 | 0.098 | 0.08 | 0.008 | 7% |
| 8 | 1.40 | 0.41 | | 0.083 | | | 1.0 | 1.30 | 1.50 | 0.20 | 0.41 | 0.083 | 0.083 | 0.08 | 0.007 | 6% |
| 9 | 1.60 | 0.44 | | 0.091 | | | 1.0 | 1.50 | 1.70 | 0.20 | 0.44 | 0.091 | 0.091 | 0.09 | 0.008 | 7% |
| 10 | 1.80 | 0.48 | | 0.071 | | | 1.0 | 1.70 | 1.90 | 0.20 | 0.48 | 0.071 | 0.071 | 0.10 | 0.007 | 6% |
| 11 | 2.00 | 0.45 | | 0.096 | | | 1.0 | 1.90 | 2.10 | 0.20 | 0.45 | 0.096 | 0.096 | 0.09 | 0.009 | 7% |
| 12 | 2.20 | 0.42 | | 0.110 | | | 1.0 | 2.10 | 2.30 | 0.20 | 0.42 | 0.110 | 0.110 | 0.08 | 0.009 | 8% |
| 13 | 2.40 | 0.36 | | 0.091 | | | 1.0 | 2.30 | 2.50 | 0.20 | 0.36 | 0.091 | 0.091 | 0.07 | 0.007 | 5% |
| 14 | 2.60 | 0.36 | | 0.110 | | | 1.0 | 2.50 | 2.70 | 0.20 | 0.36 | 0.110 | 0.110 | 0.07 | 0.008 | 6% |
| 15 | 2.80 | 0.36 | | 0.100 | | | 1.0 | 2.70 | 2.90 | 0.20 | 0.36 | 0.100 | 0.100 | 0.07 | 0.007 | 6% |
| 16 | 3.00 | 0.32 | | 0.078 | | | 1.0 | 2.90 | 3.10 | 0.20 | 0.32 | 0.078 | 0.078 | 0.06 | 0.005 | 4% |
| 17 | 3.20 | 0.30 | | 0.068 | | | 1.0 | 3.10 | 3.30 | 0.20 | 0.30 | 0.068 | 0.068 | 0.06 | 0.004 | 3% |
| 18 | 3.40 | 0.26 | | 0.067 | | | 1.0 | 3.30 | 3.50 | 0.20 | 0.26 | 0.067 | 0.067 | 0.05 | 0.003 | 3% |
| 19 | 3.60 | 0.22 | | 0.062 | | | 1.0 | 3.50 | 3.70 | 0.20 | 0.22 | 0.062 | 0.062 | 0.04 | 0.003 | 2% |
| 20 | 3.80 | 0.16 | | 0.048 | | | 1.0 | 3.70 | 3.90 | 0.20 | 0.16 | 0.048 | 0.048 | 0.03 | 0.002 | 1% |
| 21 | 4.00 | 0.14 | | 0.019 | | | 1.0 | 3.90 | 4.10 | 0.20 | 0.14 | 0.019 | 0.019 | 0.03 | 0.001 | 0% |
| Left | 4.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.10 | 4.20 | 0.10 | 0.04 | 0.005 | 0.005 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.122 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.122 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 1.50 | (m ²) |
| Wetted Width: | 4.20 | (m) |
| Hydraulic Depth: | 0.357 | (m) |
| Mean Velocity: | 0.082 | (m/s) |
| Foude Number: | 0.044 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|-------------------------------------|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S16A - Calumet River | | | |
| Field Personnel: | DB, BL | Trip Date: | 25-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 14-Jul-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.646 |
| Battery (Main): | 4.37 |
| Battery (Aux): | 13.87 |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 5% |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1524 |
| End Time (MST): | 1618 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Partly cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree to NW of logger | 1.102 | 100.000 | 1.105 | 100.000 | - |
| Bench Mark 2: | NO BM2 | - | 100.000 | - | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.969 | 98.133 | 2.972 | 98.133 | 98.133 |
| Transducer: | | 0.646 | 97.487 | 0.646 | 97.487 | 97.487 |
| Other: | | | | | | |

General Notes:

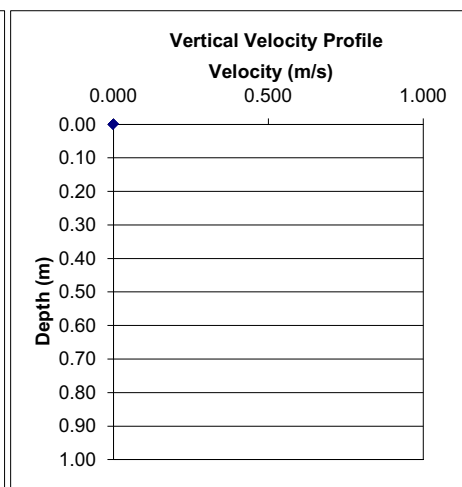
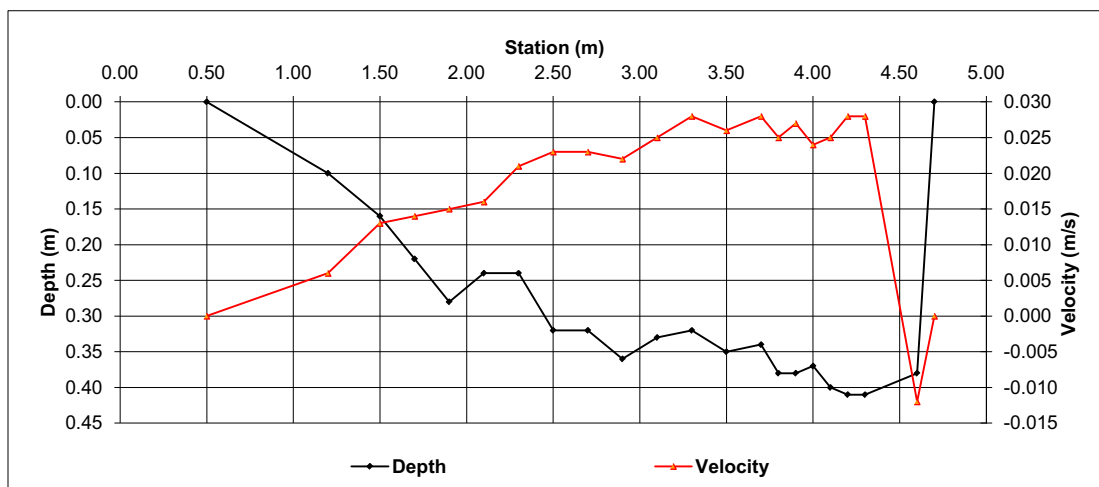
4.4m-4.7m on flow measurement adjacent to small woody debris in water.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.50 | 0.85 | 0.35 | 0.03 | 0.002 | 0.002 | 0.01 | 0.000 | 0% |
| 1 | 1.20 | 0.10 | | 0.006 | | | 1.0 | 0.85 | 1.35 | 0.50 | 0.10 | 0.006 | 0.006 | 0.05 | 0.000 | 1% |
| 2 | 1.50 | 0.16 | | 0.013 | | | 1.0 | 1.35 | 1.60 | 0.25 | 0.16 | 0.013 | 0.013 | 0.04 | 0.001 | 2% |
| 3 | 1.70 | 0.22 | | 0.014 | | | 1.0 | 1.60 | 1.80 | 0.20 | 0.22 | 0.014 | 0.014 | 0.04 | 0.001 | 3% |
| 4 | 1.90 | 0.28 | | 0.015 | | | 1.0 | 1.80 | 2.00 | 0.20 | 0.28 | 0.015 | 0.015 | 0.06 | 0.001 | 4% |
| 5 | 2.10 | 0.24 | | 0.016 | | | 1.0 | 2.00 | 2.20 | 0.20 | 0.24 | 0.016 | 0.016 | 0.05 | 0.001 | 4% |
| 6 | 2.30 | 0.24 | | 0.021 | | | 1.0 | 2.20 | 2.40 | 0.20 | 0.24 | 0.021 | 0.021 | 0.05 | 0.001 | 5% |
| 7 | 2.50 | 0.32 | | 0.023 | | | 1.0 | 2.40 | 2.60 | 0.20 | 0.32 | 0.023 | 0.023 | 0.06 | 0.001 | 7% |
| 8 | 2.70 | 0.32 | | 0.023 | | | 1.0 | 2.60 | 2.80 | 0.20 | 0.32 | 0.023 | 0.023 | 0.06 | 0.001 | 7% |
| 9 | 2.90 | 0.36 | | 0.022 | | | 1.0 | 2.80 | 3.00 | 0.20 | 0.36 | 0.022 | 0.022 | 0.07 | 0.002 | 7% |
| 10 | 3.10 | 0.33 | | 0.025 | | | 1.0 | 3.00 | 3.20 | 0.20 | 0.33 | 0.025 | 0.025 | 0.07 | 0.002 | 8% |
| 11 | 3.30 | 0.32 | | 0.028 | | | 1.0 | 3.20 | 3.40 | 0.20 | 0.32 | 0.028 | 0.028 | 0.06 | 0.002 | 8% |
| 12 | 3.50 | 0.35 | | 0.026 | | | 1.0 | 3.40 | 3.60 | 0.20 | 0.35 | 0.026 | 0.026 | 0.07 | 0.002 | 8% |
| 13 | 3.70 | 0.34 | | 0.028 | | | 1.0 | 3.60 | 3.75 | 0.15 | 0.34 | 0.028 | 0.028 | 0.05 | 0.001 | 7% |
| 14 | 3.80 | 0.38 | | 0.025 | | | 1.0 | 3.75 | 3.85 | 0.10 | 0.38 | 0.025 | 0.025 | 0.04 | 0.001 | 4% |
| 15 | 3.90 | 0.38 | | 0.027 | | | 1.0 | 3.85 | 3.95 | 0.10 | 0.38 | 0.027 | 0.027 | 0.04 | 0.001 | 5% |
| 16 | 4.00 | 0.37 | | 0.024 | | | 1.0 | 3.95 | 4.05 | 0.10 | 0.37 | 0.024 | 0.024 | 0.04 | 0.001 | 4% |
| 17 | 4.10 | 0.40 | | 0.025 | | | 1.0 | 4.05 | 4.15 | 0.10 | 0.40 | 0.025 | 0.025 | 0.04 | 0.001 | 5% |
| 18 | 4.20 | 0.41 | | 0.028 | | | 1.0 | 4.15 | 4.25 | 0.10 | 0.41 | 0.028 | 0.028 | 0.04 | 0.001 | 5% |
| 19 | 4.30 | 0.41 | | 0.028 | | | 1.0 | 4.25 | 4.45 | 0.20 | 0.41 | 0.028 | 0.028 | 0.08 | 0.002 | 11% |
| 20 | 4.60 | 0.38 | | -0.012 | | | 1.0 | 4.45 | 4.65 | 0.20 | 0.38 | -0.012 | -0.012 | 0.08 | -0.001 | -4% |
| Left | 4.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.65 | 4.70 | 0.05 | 0.10 | -0.003 | -0.003 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.022 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.022 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 1.10 | (m ²) |
| Wetted Width: | 4.20 | (m) |
| Hydraulic Depth: | 0.263 | (m) |
| Mean Velocity: | 0.020 | (m/s) |
| Foude Number: | 0.012 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|-------------------------------------|---------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S16A - Calumet River | | | |
| Field Personnel: | BL, SG, Jim (pilot) | Trip Date: | 13-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.736 |
| Battery (Main): | 4.38 |
| Battery (Aux): | 14.52 |
| Datalogger Clock: | 1350 |
| Laptop Clock: | 1352 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 9% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 1400 |
| End Time (MST): | 1420 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly 20°C |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree to NW of logger | 0.631 | 100.000 | 0.554 | 100.000 | - |
| Bench Mark 2: | NO BM2 | - | 100.000 | - | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.406 | 98.225 | 2.328 | 98.226 | 98.226 |
| Transducer: | | 0.736 | 97.489 | 0.736 | 97.490 | 97.490 |
| Other: | | | | | | |

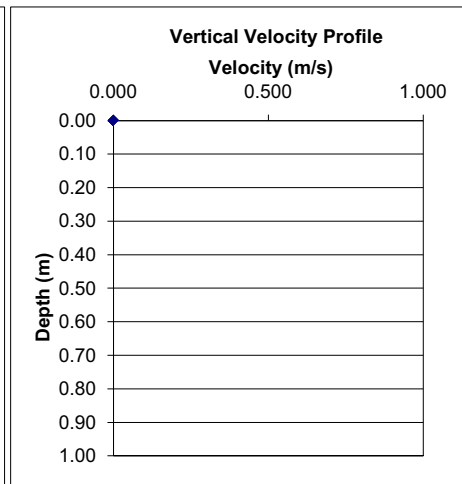
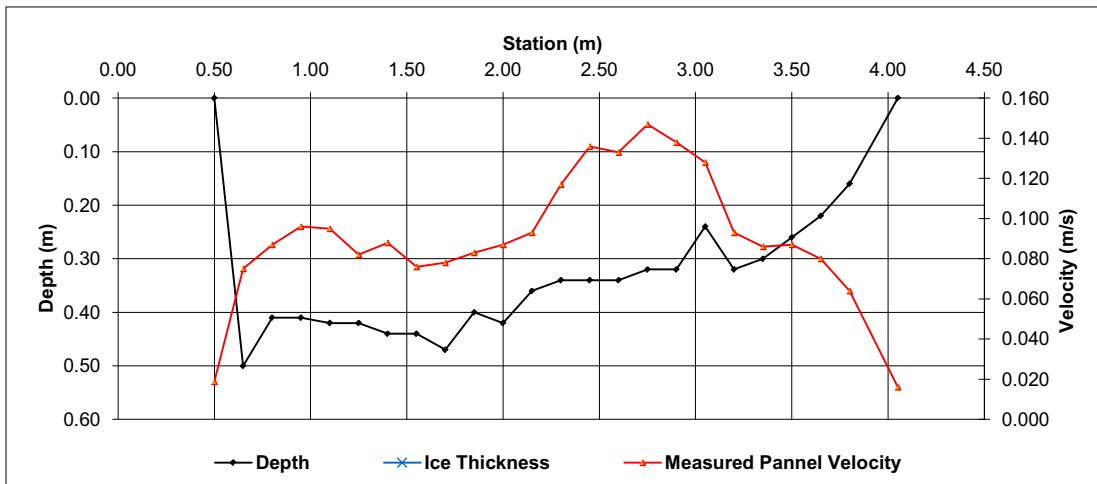
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.50 | 0.58 | 0.08 | 0.13 | 0.019 | 0.019 | 0.01 | 0.000 | 0% |
| 1 | 0.65 | 0.50 | | 0.075 | | | 1.0 | 0.58 | 0.73 | 0.15 | 0.50 | 0.075 | 0.075 | 0.08 | 0.006 | 5% |
| 2 | 0.80 | 0.41 | | 0.087 | | | 1.0 | 0.73 | 0.88 | 0.15 | 0.41 | 0.087 | 0.087 | 0.06 | 0.005 | 5% |
| 3 | 0.95 | 0.41 | | 0.096 | | | 1.0 | 0.88 | 1.03 | 0.15 | 0.41 | 0.096 | 0.096 | 0.06 | 0.006 | 5% |
| 4 | 1.10 | 0.42 | | 0.095 | | | 1.0 | 1.03 | 1.18 | 0.15 | 0.42 | 0.095 | 0.095 | 0.06 | 0.006 | 5% |
| 5 | 1.25 | 0.42 | | 0.082 | | | 1.0 | 1.18 | 1.33 | 0.15 | 0.42 | 0.082 | 0.082 | 0.06 | 0.005 | 5% |
| 6 | 1.40 | 0.44 | | 0.088 | | | 1.0 | 1.33 | 1.48 | 0.15 | 0.44 | 0.088 | 0.088 | 0.07 | 0.006 | 5% |
| 7 | 1.55 | 0.44 | | 0.076 | | | 1.0 | 1.48 | 1.63 | 0.15 | 0.44 | 0.076 | 0.076 | 0.07 | 0.005 | 4% |
| 8 | 1.70 | 0.47 | | 0.078 | | | 1.0 | 1.63 | 1.78 | 0.15 | 0.47 | 0.078 | 0.078 | 0.07 | 0.005 | 5% |
| 9 | 1.85 | 0.40 | | 0.083 | | | 1.0 | 1.78 | 1.93 | 0.15 | 0.40 | 0.083 | 0.083 | 0.06 | 0.005 | 4% |
| 10 | 2.00 | 0.42 | | 0.087 | | | 1.0 | 1.93 | 2.08 | 0.15 | 0.42 | 0.087 | 0.087 | 0.06 | 0.005 | 5% |
| 11 | 2.15 | 0.36 | | 0.093 | | | 1.0 | 2.08 | 2.23 | 0.15 | 0.36 | 0.093 | 0.093 | 0.05 | 0.005 | 4% |
| 12 | 2.30 | 0.34 | | 0.117 | | | 1.0 | 2.23 | 2.38 | 0.15 | 0.34 | 0.117 | 0.117 | 0.05 | 0.006 | 5% |
| 13 | 2.45 | 0.34 | | 0.136 | | | 1.0 | 2.38 | 2.53 | 0.15 | 0.34 | 0.136 | 0.136 | 0.05 | 0.007 | 6% |
| 14 | 2.60 | 0.34 | | 0.133 | | | 1.0 | 2.53 | 2.68 | 0.15 | 0.34 | 0.133 | 0.133 | 0.05 | 0.007 | 6% |
| 15 | 2.75 | 0.32 | | 0.147 | | | 1.0 | 2.68 | 2.83 | 0.15 | 0.32 | 0.147 | 0.147 | 0.05 | 0.007 | 6% |
| 16 | 2.90 | 0.32 | | 0.138 | | | 1.0 | 2.83 | 2.98 | 0.15 | 0.32 | 0.138 | 0.138 | 0.05 | 0.007 | 6% |
| 17 | 3.05 | 0.24 | | 0.128 | | | 1.0 | 2.98 | 3.13 | 0.15 | 0.24 | 0.128 | 0.128 | 0.04 | 0.005 | 4% |
| 18 | 3.20 | 0.32 | | 0.093 | | | 1.0 | 3.13 | 3.28 | 0.15 | 0.32 | 0.093 | 0.093 | 0.05 | 0.004 | 4% |
| 19 | 3.35 | 0.30 | | 0.086 | | | 1.0 | 3.28 | 3.43 | 0.15 | 0.30 | 0.086 | 0.086 | 0.04 | 0.004 | 3% |
| 20 | 3.50 | 0.26 | | 0.087 | | | 1.0 | 3.43 | 3.58 | 0.15 | 0.26 | 0.087 | 0.087 | 0.04 | 0.003 | 3% |
| 21 | 3.65 | 0.22 | | 0.080 | | | 1.0 | 3.58 | 3.73 | 0.15 | 0.22 | 0.080 | 0.080 | 0.03 | 0.003 | 2% |
| 22 | 3.80 | 0.16 | | 0.064 | | | 1.0 | 3.73 | 3.93 | 0.20 | 0.16 | 0.064 | 0.064 | 0.03 | 0.002 | 2% |
| Left | 4.05 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.93 | 4.05 | 0.13 | 0.04 | 0.016 | 0.016 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.114 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.114 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 1.20 | (m ²) |
| Wetted Width: | 3.55 | (m) |
| Hydraulic Depth: | 0.338 | (m) |
| Mean Velocity: | 0.095 | (m/s) |
| Foude Number: | 0.052 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|-------------------------------------|------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S16A - Calumet River | | | |
| Field Personnel: | DB SG Matt Pilot | Trip Date: | 20-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.840 |
| Battery (Main): | 4.34 |
| Battery (Aux): | 14.32 |
| Datalogger Clock: | 1248 |
| Laptop Clock: | 1250 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 12% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 1250 |
| End Time (MST): | 1340 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Drizzle 5°C |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree to NW of logger | 1.099 | 100.000 | 1.078 | 100.000 | - |
| Bench Mark 2: | POST | 1.558 | 99.541 | 1.540 | 99.538 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.778 | 98.321 | 2.759 | 98.319 | 98.320 |
| Transducer: | | 0.840 | 97.481 | 0.840 | 97.479 | 97.480 |
| Other: | | | | | | |

General Notes:

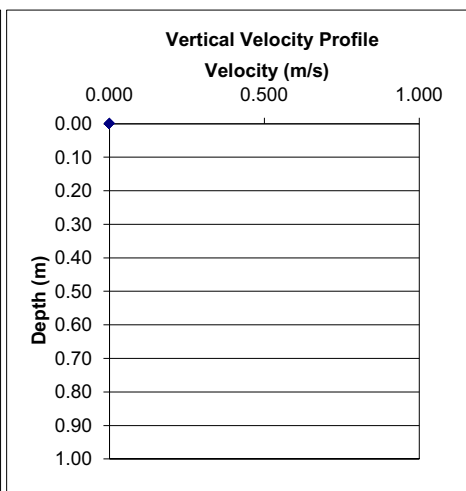
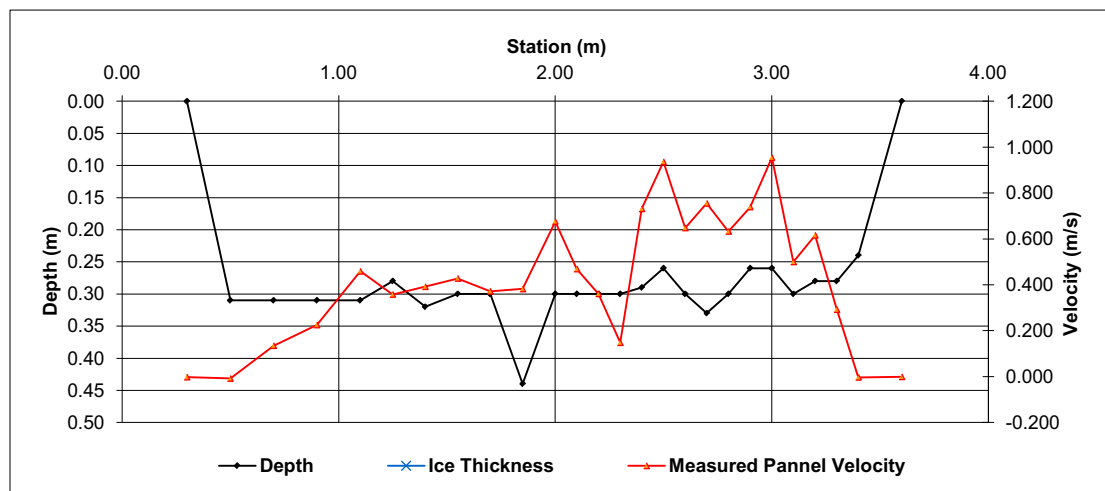
Installed new benchmark 0.75" diameter 3m long. Flow measured close to helicopter.

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | |
| Right | 0.30 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.30 | 0.40 | 0.10 | 0.08 | -0.002 | -0.002 | 0.01 | 0.000 | 0% | | |
| 1 | 0.50 | 0.31 | | -0.008 | | | 1.0 | 0.40 | 0.60 | 0.20 | 0.31 | -0.008 | -0.008 | 0.06 | 0.000 | 0% | | |
| 2 | 0.70 | 0.31 | | 0.135 | | | 1.0 | 0.60 | 0.80 | 0.20 | 0.31 | 0.135 | 0.135 | 0.06 | 0.008 | 2% | | |
| 3 | 0.90 | 0.31 | | 0.225 | | | 1.0 | 0.80 | 1.00 | 0.20 | 0.31 | 0.225 | 0.225 | 0.06 | 0.014 | 4% | | |
| 4 | 1.10 | 0.31 | | 0.459 | | | 1.0 | 1.00 | 1.18 | 0.18 | 0.31 | 0.459 | 0.459 | 0.05 | 0.025 | 6% | | |
| 5 | 1.25 | 0.28 | | 0.358 | | | 1.0 | 1.18 | 1.33 | 0.15 | 0.28 | 0.358 | 0.358 | 0.04 | 0.015 | 4% | | |
| 6 | 1.40 | 0.32 | | 0.392 | | | 1.0 | 1.33 | 1.48 | 0.15 | 0.32 | 0.392 | 0.392 | 0.05 | 0.019 | 5% | | |
| 7 | 1.55 | 0.30 | | 0.428 | | | 1.0 | 1.48 | 1.63 | 0.15 | 0.30 | 0.428 | 0.428 | 0.05 | 0.019 | 5% | | |
| 8 | 1.70 | 0.30 | | 0.372 | | | 1.0 | 1.63 | 1.78 | 0.15 | 0.30 | 0.372 | 0.372 | 0.05 | 0.017 | 4% | | |
| 9 | 1.85 | 0.44 | | 0.382 | | | 1.0 | 1.78 | 1.93 | 0.15 | 0.44 | 0.382 | 0.382 | 0.07 | 0.025 | 6% | | |
| 10 | 2.00 | 0.30 | | 0.676 | | | 1.0 | 1.93 | 2.05 | 0.13 | 0.30 | 0.676 | 0.676 | 0.04 | 0.025 | 7% | | |
| 11 | 2.10 | 0.30 | | 0.469 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.30 | 0.469 | 0.469 | 0.03 | 0.014 | 4% | | |
| 12 | 2.20 | 0.30 | | 0.361 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.30 | 0.361 | 0.361 | 0.03 | 0.011 | 3% | | |
| 13 | 2.30 | 0.30 | | 0.148 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.30 | 0.148 | 0.148 | 0.03 | 0.004 | 1% | | |
| 14 | 2.40 | 0.29 | | 0.731 | | | 1.0 | 2.35 | 2.45 | 0.10 | 0.29 | 0.731 | 0.731 | 0.03 | 0.021 | 5% | | |
| 15 | 2.50 | 0.26 | | 0.936 | | | 1.0 | 2.45 | 2.55 | 0.10 | 0.26 | 0.936 | 0.936 | 0.03 | 0.024 | 6% | | |
| 16 | 2.60 | 0.30 | | 0.648 | | | 1.0 | 2.55 | 2.65 | 0.10 | 0.30 | 0.648 | 0.648 | 0.03 | 0.019 | 5% | | |
| 17 | 2.70 | 0.33 | | 0.755 | | | 1.0 | 2.65 | 2.75 | 0.10 | 0.33 | 0.755 | 0.755 | 0.03 | 0.025 | 6% | | |
| 18 | 2.80 | 0.30 | | 0.633 | | | 1.0 | 2.75 | 2.85 | 0.10 | 0.30 | 0.633 | 0.633 | 0.03 | 0.019 | 5% | | |
| 19 | 2.90 | 0.26 | | 0.739 | | | 1.0 | 2.85 | 2.95 | 0.10 | 0.26 | 0.739 | 0.739 | 0.03 | 0.019 | 5% | | |
| 20 | 3.00 | 0.26 | | 0.954 | | | 1.0 | 2.95 | 3.05 | 0.10 | 0.26 | 0.954 | 0.954 | 0.03 | 0.025 | 6% | | |
| 21 | 3.10 | 0.30 | | 0.500 | | | 1.0 | 3.05 | 3.15 | 0.10 | 0.30 | 0.500 | 0.500 | 0.03 | 0.015 | 4% | | |
| 22 | 3.20 | 0.28 | | 0.616 | | | 1.0 | 3.15 | 3.25 | 0.10 | 0.28 | 0.616 | 0.616 | 0.03 | 0.017 | 4% | | |
| 23 | 3.30 | 0.28 | | 0.292 | | | 1.0 | 3.25 | 3.35 | 0.10 | 0.28 | 0.292 | 0.292 | 0.03 | 0.008 | 2% | | |
| 24 | 3.40 | 0.24 | | -0.003 | | | 1.0 | 3.35 | 3.50 | 0.15 | 0.24 | -0.003 | -0.003 | 0.04 | 0.000 | 0% | | |
| Left | 3.60 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.50 | 3.60 | 0.10 | 0.06 | -0.001 | -0.001 | 0.01 | 0.000 | 0% | | |
| Total Flow | | | | | | | | | | | | | | | 0.390 | | | |

**denotes position of TSS sample*

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.390 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 0.95 | (m ²) |
| Wetted Width: | 3.30 | (m) |
| Hydraulic Depth: | 0.288 | (m) |
| Mean Velocity: | 0.410 | (m/s) |
| Foude Number: | 0.244 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|-------------------------------------|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S16A - Calumet River | | | |
| Field Personnel: | DB BL | Trip Date: | 27-Oct-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|-----------|
| Logger Details: | |
| Transducer Reading: | 0.725 |
| Battery (Main): | 4.32 |
| Battery (Aux): | 13.87 |
| Datalogger Clock: | 1402 |
| Laptop Clock: | 1405 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 15% |
| Dessicant: | - |
| Logger# (if Δ): | 204100608 |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1400 |
| End Time (MST): | 1442 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Overcast ~0°C |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree to NW of logger | 1.040 | 100.000 | 1.007 | 100.000 | - |
| Bench Mark 2: | POST | 1.500 | 99.540 | 1.468 | 99.539 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.831 | 98.209 | 2.799 | 98.208 | 98.209 |
| Transducer: | | 0.725 | 97.484 | 0.725 | 97.483 | 97.484 |
| Other: | | | | | | |

General Notes:

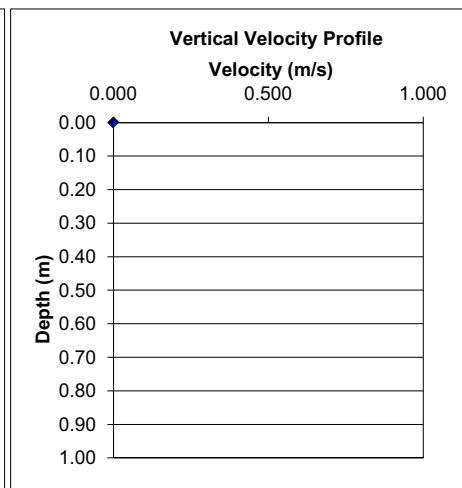
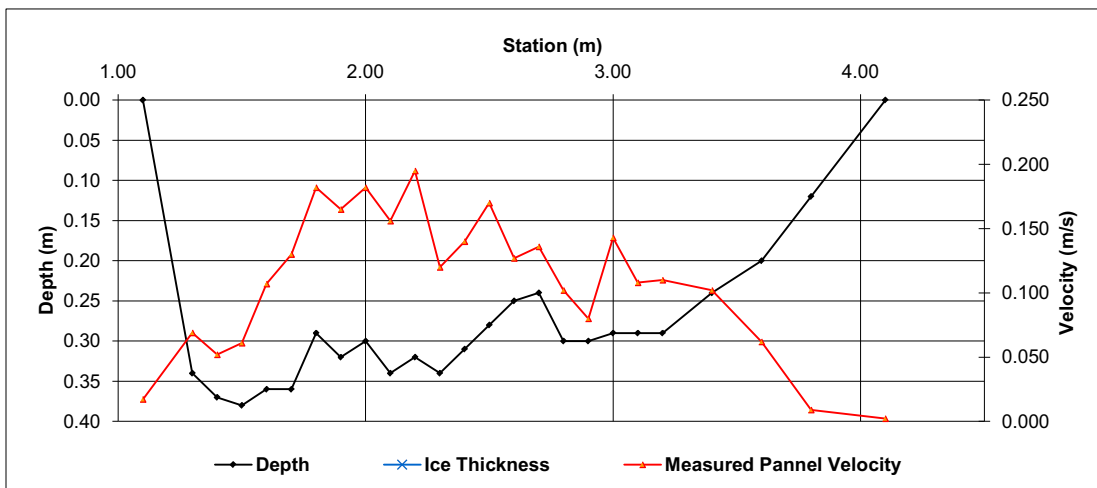
TSS @ 2.4m. No helicopter radio contact possible below tree tops possible issue with jets arriving/departing CNRL.

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 4.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.10 | 3.95 | 0.15 | 0.03 | 0.002 | 0.002 | 0.00 | 0.000 | 0% | |
| 1 | 3.80 | 0.12 | | 0.009 | | | 1.0 | 3.95 | 3.70 | 0.25 | 0.12 | 0.009 | 0.009 | 0.03 | 0.000 | 0% | |
| 2 | 3.60 | 0.20 | | 0.062 | | | 1.0 | 3.70 | 3.50 | 0.20 | 0.20 | 0.062 | 0.062 | 0.04 | 0.002 | 3% | |
| 3 | 3.40 | 0.24 | | 0.102 | | | 1.0 | 3.50 | 3.30 | 0.20 | 0.24 | 0.102 | 0.102 | 0.05 | 0.005 | 6% | |
| 4 | 3.20 | 0.29 | | 0.110 | | | 1.0 | 3.30 | 3.15 | 0.15 | 0.29 | 0.110 | 0.110 | 0.04 | 0.005 | 5% | |
| 5 | 3.10 | 0.29 | | 0.108 | | | 1.0 | 3.15 | 3.05 | 0.10 | 0.29 | 0.108 | 0.108 | 0.03 | 0.003 | 4% | |
| 6 | 3.00 | 0.29 | | 0.143 | | | 1.0 | 3.05 | 2.95 | 0.10 | 0.29 | 0.143 | 0.143 | 0.03 | 0.004 | 5% | |
| 7 | 2.90 | 0.30 | | 0.080 | | | 1.0 | 2.95 | 2.85 | 0.10 | 0.30 | 0.080 | 0.080 | 0.03 | 0.002 | 3% | |
| 8 | 2.80 | 0.30 | | 0.102 | | | 1.0 | 2.85 | 2.75 | 0.10 | 0.30 | 0.102 | 0.102 | 0.03 | 0.003 | 3% | |
| 9 | 2.70 | 0.24 | | 0.136 | | | 1.0 | 2.75 | 2.65 | 0.10 | 0.24 | 0.136 | 0.136 | 0.02 | 0.003 | 4% | |
| 10 | 2.60 | 0.25 | | 0.127 | | | 1.0 | 2.65 | 2.55 | 0.10 | 0.25 | 0.127 | 0.127 | 0.03 | 0.003 | 4% | |
| 11 | 2.50 | 0.28 | | 0.170 | | | 1.0 | 2.55 | 2.45 | 0.10 | 0.28 | 0.170 | 0.170 | 0.03 | 0.005 | 5% | |
| 12 | 2.40 | 0.31 | | 0.140 | | | 1.0 | 2.45 | 2.35 | 0.10 | 0.31 | 0.140 | 0.140 | 0.03 | 0.004 | 5% | |
| 13 | 2.30 | 0.34 | | 0.120 | | | 1.0 | 2.35 | 2.25 | 0.10 | 0.34 | 0.120 | 0.120 | 0.03 | 0.004 | 5% | |
| 14 | 2.20 | 0.32 | | 0.195 | | | 1.0 | 2.25 | 2.15 | 0.10 | 0.32 | 0.195 | 0.195 | 0.03 | 0.006 | 7% | |
| 15 | 2.10 | 0.34 | | 0.156 | | | 1.0 | 2.15 | 2.05 | 0.10 | 0.34 | 0.156 | 0.156 | 0.03 | 0.005 | 6% | |
| 16 | 2.00 | 0.30 | | 0.182 | | | 1.0 | 2.05 | 1.95 | 0.10 | 0.30 | 0.182 | 0.182 | 0.03 | 0.005 | 6% | |
| 17 | 1.90 | 0.32 | | 0.165 | | | 1.0 | 1.95 | 1.85 | 0.10 | 0.32 | 0.165 | 0.165 | 0.03 | 0.005 | 6% | |
| 18 | 1.80 | 0.29 | | 0.182 | | | 1.0 | 1.85 | 1.75 | 0.10 | 0.29 | 0.182 | 0.182 | 0.03 | 0.005 | 6% | |
| 19 | 1.70 | 0.36 | | 0.130 | | | 1.0 | 1.75 | 1.65 | 0.10 | 0.36 | 0.130 | 0.130 | 0.04 | 0.005 | 5% | |
| 20 | 1.60 | 0.36 | | 0.107 | | | 1.0 | 1.65 | 1.55 | 0.10 | 0.36 | 0.107 | 0.107 | 0.04 | 0.004 | 4% | |
| 21 | 1.50 | 0.38 | | 0.061 | | | 1.0 | 1.55 | 1.45 | 0.10 | 0.38 | 0.061 | 0.061 | 0.04 | 0.002 | 3% | |
| 22 | 1.40 | 0.37 | | 0.052 | | | 1.0 | 1.45 | 1.35 | 0.10 | 0.37 | 0.052 | 0.052 | 0.04 | 0.002 | 2% | |
| 23 | 1.30 | 0.34 | | 0.069 | | | 1.0 | 1.35 | 1.20 | 0.15 | 0.34 | 0.069 | 0.069 | 0.05 | 0.004 | 4% | |
| Left | 1.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.20 | 1.10 | 0.10 | 0.09 | 0.017 | 0.017 | 0.01 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.089 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.089 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 0.79 | (m ²) |
| Wetted Width: | 2.75 | (m) |
| Hydraulic Depth: | 0.287 | (m) |
| Mean Velocity: | 0.112 | (m/s) |
| Foude Number: | 0.067 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S19 - Tar River Lowland Tributary near the mouth (457315 E, 6352863 N) | | | |
| Field Personnel: | DB CE | Trip Date: | 07-Apr-10 |
| Data Entry Personnel: | DB | Date: | 10-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|----------------------------------|
| Measurement Details: | |
| Start Time (MST): | 1300 |
| End Time (MST): | 1315 |
| Equipment: | - |
| Method: | Ice |
| River Condition: | Thin ice, frozen and breaking up |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Hazy sun |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree w/pink flagging | 1.399 | 101.748 | 1.364 | 101.748 | - |
| Bench Mark 2: | 2" pipe 5m east of BM1 | 1.498 | 101.355 | 1.464 | 101.355 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 1.685 | 101.462 | 1.650 | 101.462 | 101.462 |
| Transducer: | | | | | | |
| Other: | | | | | | |

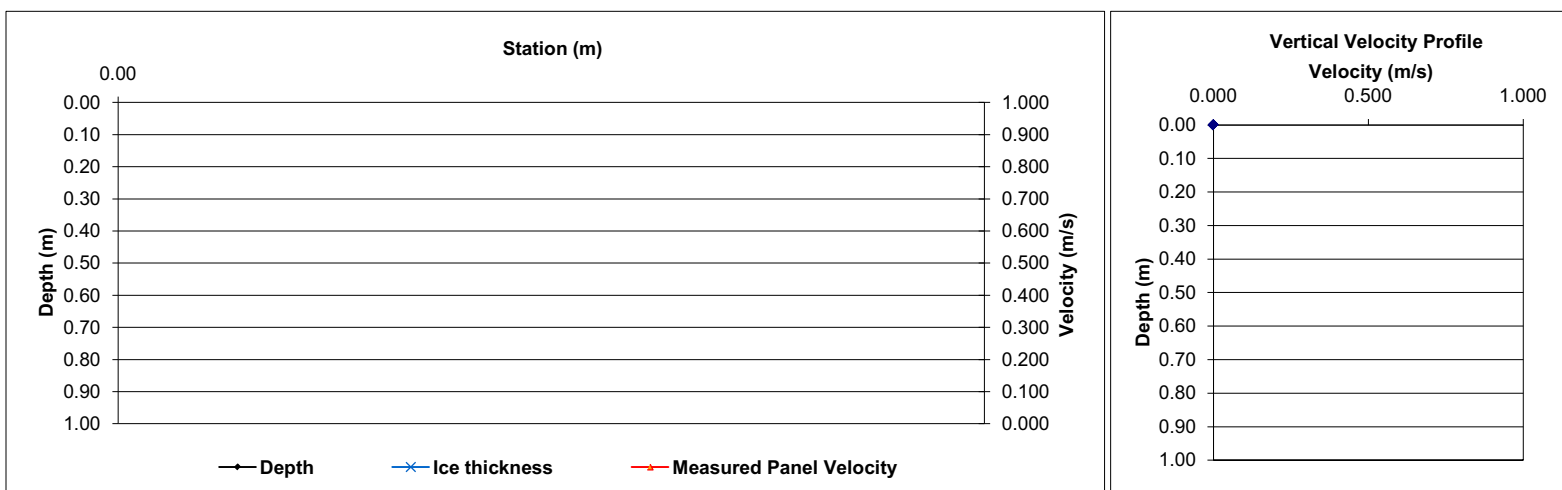
General Notes:

Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|---------|---------|--|
| Measured Data | | | | | Calculated Data | | | | | | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | |
| Left | | 0.00 | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 2 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 3 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 4 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 5 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 6 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 7 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 8 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 9 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 10 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 11 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 12 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 13 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 14 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 15 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 16 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 17 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 18 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 19 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 20 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 21 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 22 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 23 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 24 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| 25 | | | | | | | 1.0 | | | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | |
| Right | | 0.00 | | | | | | | | | | | | | | | | | |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | | | | |

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Foude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S19 - Tar River Lowland Tributary near the mouth (457315 E, 6352863 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 22-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.434 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 14.13 |
| Datalogger Clock: | 11.21 |
| Laptop Clock: | 11.24 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 0.2 |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | 2078 |
| Other Logger Notes: | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1115 |
| End Time (MST): | 1145 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open below culvert |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree w/pink flagging | 0.951 | 101.748 | 1.003 | 101.748 | - |
| Bench Mark 2: | 2" pipe 5m east of BM1 | 1.044 | 101.355 | 1.099 | 101.355 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 1.646 | 101.053 | 1.700 | 101.051 | 101.052 |
| Transducer: | | 0.434 | 100.619 | 0.434 | 100.617 | 100.618 |
| Other: | | | | | | |

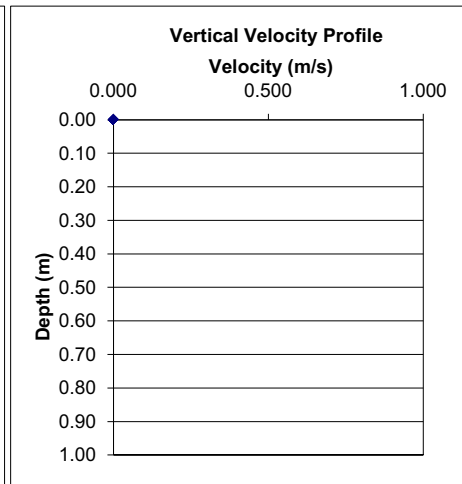
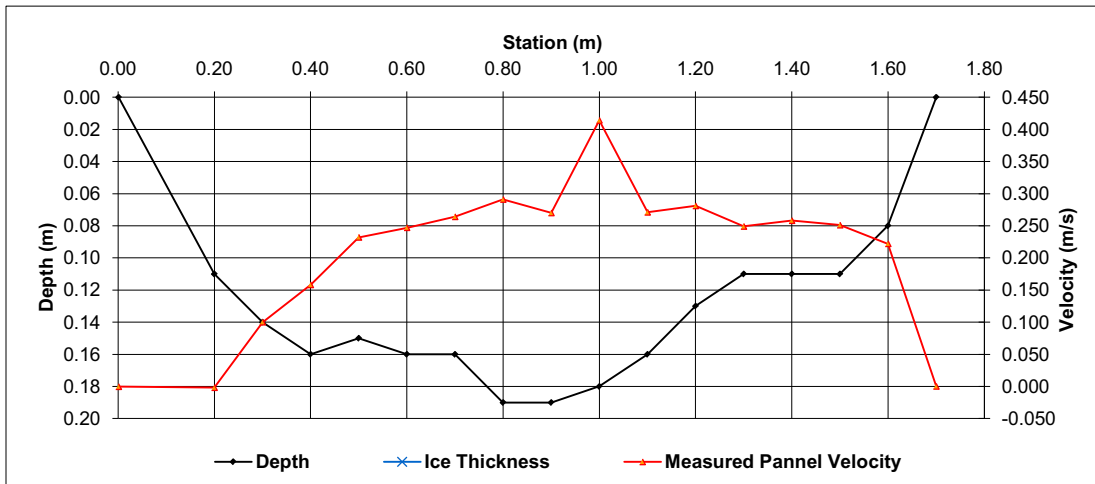
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | 0.10 | 0.10 | 0.03 | -0.001 | -0.001 | 0.00 | 0.000 | 0% |
| 1 | 0.20 | 0.11 | | -0.002 | | | 1.0 | 0.10 | 0.25 | 0.15 | 0.11 | -0.002 | -0.002 | 0.02 | 0.000 | 0% |
| 2 | 0.30 | 0.14 | | 0.100 | | | 1.0 | 0.25 | 0.35 | 0.10 | 0.14 | 0.100 | 0.100 | 0.01 | 0.001 | 3% |
| 3 | 0.40 | 0.16 | | 0.158 | | | 1.0 | 0.35 | 0.45 | 0.10 | 0.16 | 0.158 | 0.158 | 0.02 | 0.003 | 5% |
| 4 | 0.50 | 0.15 | | 0.232 | | | 1.0 | 0.45 | 0.55 | 0.10 | 0.15 | 0.232 | 0.232 | 0.02 | 0.003 | 7% |
| 5 | 0.60 | 0.16 | | 0.247 | | | 1.0 | 0.55 | 0.65 | 0.10 | 0.16 | 0.247 | 0.247 | 0.02 | 0.004 | 8% |
| 6 | 0.70 | 0.16 | | 0.264 | | | 1.0 | 0.65 | 0.75 | 0.10 | 0.16 | 0.264 | 0.264 | 0.02 | 0.004 | 8% |
| 7 | 0.80 | 0.19 | | 0.291 | | | 1.0 | 0.75 | 0.85 | 0.10 | 0.19 | 0.291 | 0.291 | 0.02 | 0.006 | 11% |
| 8 | 0.90 | 0.19 | | 0.270 | | | 1.0 | 0.85 | 0.95 | 0.10 | 0.19 | 0.270 | 0.270 | 0.02 | 0.005 | 10% |
| 9 | 1.00 | 0.18 | | 0.414 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.18 | 0.414 | 0.414 | 0.02 | 0.007 | 14% |
| 10 | 1.10 | 0.16 | | 0.271 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.16 | 0.271 | 0.271 | 0.02 | 0.004 | 8% |
| 11 | 1.20 | 0.13 | | 0.281 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.13 | 0.281 | 0.281 | 0.01 | 0.004 | 7% |
| 12 | 1.30 | 0.11 | | 0.249 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.11 | 0.249 | 0.249 | 0.01 | 0.003 | 5% |
| 13 | 1.40 | 0.11 | | 0.258 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.11 | 0.258 | 0.258 | 0.01 | 0.003 | 5% |
| 14 | 1.50 | 0.11 | | 0.251 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.11 | 0.251 | 0.251 | 0.01 | 0.003 | 5% |
| 15 | 1.60 | 0.08 | | 0.222 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.08 | 0.222 | 0.222 | 0.01 | 0.002 | 3% |
| Right | 1.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.65 | 1.70 | 0.05 | 0.02 | 0.000 | 0.056 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.052 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.052 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.22 | (m ²) |
| Wetted Width: | 1.70 | (m) |
| Hydraulic Depth: | 0.131 | (m) |
| Mean Velocity: | 0.232 | (m/s) |
| Foude Number: | 0.205 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S19 - Tar River Lowland Tributary near the mouth (457315 E, 6352863 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 23-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 14-Jul-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.245 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 13.74 |
| Datalogger Clock: | 14:38 |
| Laptop Clock: | 14:45 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 2% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Rain 54.1mm | |

| | |
|------------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 1435 |
| End Time (MST): | 1505 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Sunny + hot |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree w/pink flagging | 1.058 | 101.748 | 1.050 | 101.748 | - |
| Bench Mark 2: | 2" pipe 5m east of BM1 | 1.144 | 101.355 | 1.135 | 101.355 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.872 | 100.934 | 1.862 | 100.936 | 100.935 |
| Transducer: | | 0.245 | 100.689 | 0.245 | 100.691 | 100.690 |
| Other: | | | | | | |

General Notes:

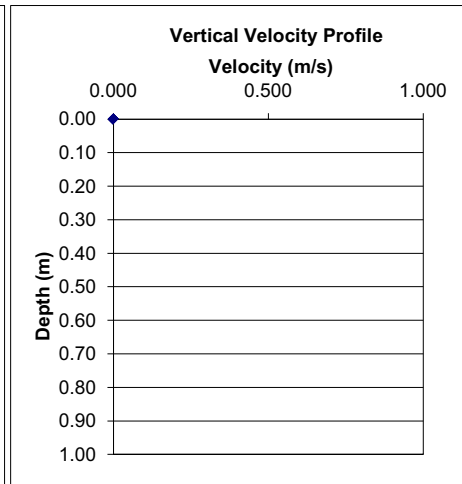
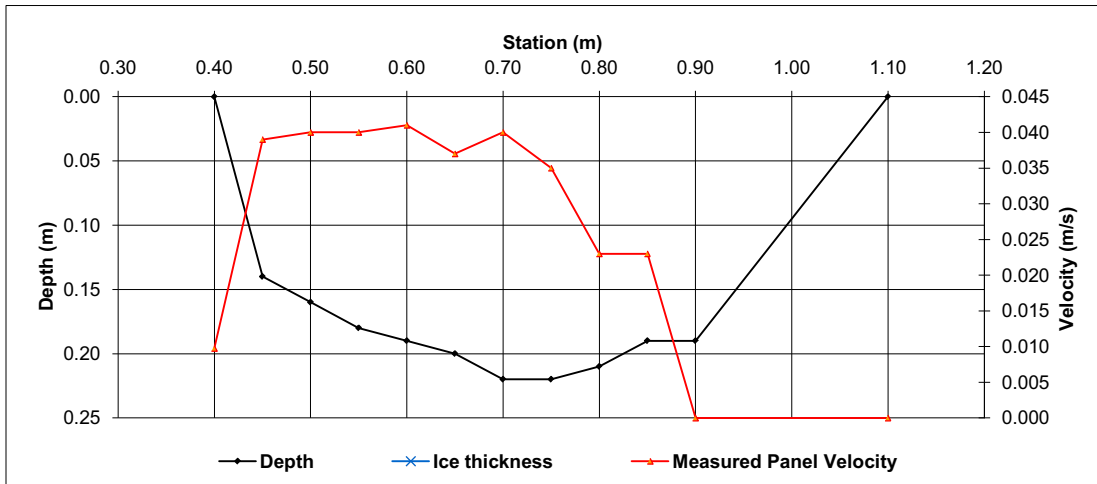
Not many visibly deeper places to move transducer so not moved. Generally poor/fair measurement, taken 30-40m downstream of culvert due to insufficient depth and in-stream vegetation.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mnt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.40 | 0.43 | 0.03 | 0.04 | 0.010 | 0.010 | 0.00 | 0.000 | 0% |
| 1 | 0.45 | 0.14 | | 0.039 | | | 1.0 | 0.43 | 0.48 | 0.05 | 0.14 | 0.039 | 0.039 | 0.01 | 0.000 | 9% |
| 2 | 0.50 | 0.16 | | 0.040 | | | 1.0 | 0.48 | 0.53 | 0.05 | 0.16 | 0.040 | 0.040 | 0.01 | 0.000 | 11% |
| 3 | 0.55 | 0.18 | | 0.040 | | | 1.0 | 0.53 | 0.58 | 0.05 | 0.18 | 0.040 | 0.040 | 0.01 | 0.000 | 12% |
| 4 | 0.60 | 0.19 | | 0.041 | | | 1.0 | 0.58 | 0.63 | 0.05 | 0.19 | 0.041 | 0.041 | 0.01 | 0.000 | 13% |
| 5 | 0.65 | 0.20 | | 0.037 | | | 1.0 | 0.63 | 0.68 | 0.05 | 0.20 | 0.037 | 0.037 | 0.01 | 0.000 | 12% |
| 6 | 0.70 | 0.22 | | 0.040 | | | 1.0 | 0.68 | 0.73 | 0.05 | 0.22 | 0.040 | 0.040 | 0.01 | 0.000 | 15% |
| 7 | 0.75 | 0.22 | | 0.035 | | | 1.0 | 0.73 | 0.78 | 0.05 | 0.22 | 0.035 | 0.035 | 0.01 | 0.000 | 13% |
| 8 | 0.80 | 0.21 | | 0.023 | | | 1.0 | 0.78 | 0.83 | 0.05 | 0.21 | 0.023 | 0.023 | 0.01 | 0.000 | 8% |
| 9 | 0.85 | 0.19 | | 0.023 | | | 1.0 | 0.83 | 0.88 | 0.05 | 0.19 | 0.023 | 0.023 | 0.01 | 0.000 | 7% |
| 10 | 0.90 | 0.19 | | 0.000 | | | 1.0 | 0.88 | 1.00 | 0.13 | 0.19 | 0.000 | 0.000 | 0.02 | 0.000 | 0% |
| Right | 1.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.00 | 1.10 | 0.10 | 0.05 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.003 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.003 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 0.11 | (m ²) |
| Wetted Width: | 0.70 | (m) |
| Hydraulic Depth: | 0.164 | (m) |
| Mean Velocity: | 0.026 | (m/s) |
| Foude Number: | 0.021 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S19 - Tar River Lowland Tributary near the mouth (457315 E, 6352863 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 17-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.455 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 14.17 |
| Datalogger Clock: | 1148 |
| Laptop Clock: | 1148 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 3% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1145 |
| End Time (MST): | 1225 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Poor |
| Weather: | partly cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree w/pink flagging | 1.046 | 101.748 | 1.009 | 101.748 | - |
| Bench Mark 2: | 2" pipe 5m east of BM1 | 1.128 | 101.355 | 1.091 | 101.355 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.643 | 101.151 | 1.608 | 101.149 | 101.150 |
| Transducer: | | 0.455 | 100.696 | 0.455 | 100.694 | 100.695 |
| Other: | | | | | | |

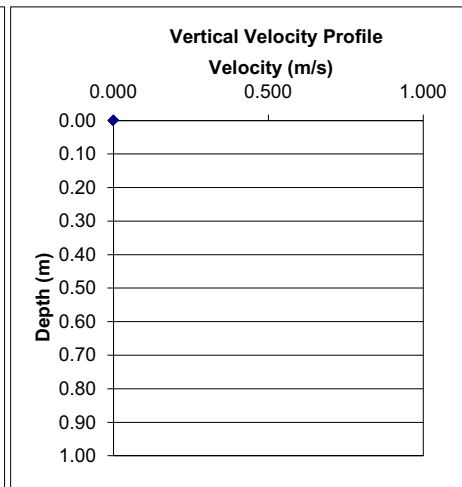
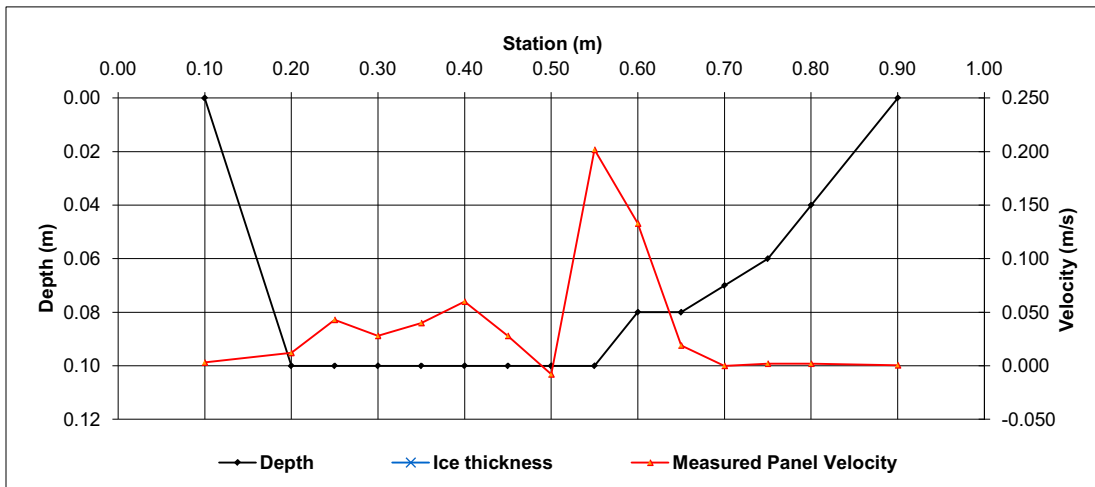
General Notes:
Data loss from July 11 - Aug 17, Damage to TBRG from wildlife may have caused disconnection of power and resultant data loss power plug in logger was not tightly connected.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.10 | 0.15 | 0.05 | 0.03 | 0.003 | 0.003 | 0.00 | 0.000 | 0% |
| 1 | 0.20 | 0.10 | | 0.012 | | | 1.0 | 0.15 | 0.23 | 0.08 | 0.10 | 0.012 | 0.012 | 0.01 | 0.000 | 3% |
| 2 | 0.25 | 0.10 | | 0.043 | | | 1.0 | 0.23 | 0.28 | 0.05 | 0.10 | 0.043 | 0.043 | 0.01 | 0.000 | 8% |
| 3 | 0.30 | 0.10 | | 0.028 | | | 1.0 | 0.28 | 0.33 | 0.05 | 0.10 | 0.028 | 0.028 | 0.00 | 0.000 | 5% |
| 4 | 0.35 | 0.10 | | 0.040 | | | 1.0 | 0.33 | 0.38 | 0.05 | 0.10 | 0.040 | 0.040 | 0.01 | 0.000 | 7% |
| 5 | 0.40 | 0.10 | | 0.060 | | | 1.0 | 0.38 | 0.43 | 0.05 | 0.10 | 0.060 | 0.060 | 0.01 | 0.000 | 11% |
| 6 | 0.45 | 0.10 | | 0.028 | | | 1.0 | 0.43 | 0.48 | 0.05 | 0.10 | 0.028 | 0.028 | 0.00 | 0.000 | 5% |
| 7 | 0.50 | 0.10 | | -0.008 | | | 1.0 | 0.48 | 0.53 | 0.05 | 0.10 | -0.008 | -0.008 | 0.01 | 0.000 | -1% |
| 8 | 0.55 | 0.10 | | 0.202 | | | 1.0 | 0.53 | 0.58 | 0.05 | 0.10 | 0.202 | 0.202 | 0.00 | 0.001 | 38% |
| 9 | 0.60 | 0.08 | | 0.133 | | | 1.0 | 0.58 | 0.63 | 0.05 | 0.08 | 0.133 | 0.133 | 0.00 | 0.001 | 20% |
| 10 | 0.65 | 0.08 | | 0.019 | | | 1.0 | 0.63 | 0.68 | 0.05 | 0.08 | 0.019 | 0.019 | 0.00 | 0.000 | 3% |
| 11 | 0.70 | 0.07 | | 0.000 | | | 1.0 | 0.68 | 0.73 | 0.05 | 0.07 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| 12 | 0.75 | 0.06 | | 0.002 | | | 1.0 | 0.73 | 0.78 | 0.05 | 0.06 | 0.002 | 0.002 | 0.00 | 0.000 | 0% |
| 13 | 0.80 | 0.04 | | 0.002 | | | 1.0 | 0.78 | 0.85 | 0.08 | 0.04 | 0.002 | 0.002 | 0.00 | 0.000 | 0% |
| Right | 0.90 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.85 | 0.90 | 0.05 | 0.01 | 0.001 | 0.001 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.003 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.003 | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | 0.06 | (m ²) |
| Wetted Width: | 0.80 | (m) |
| Hydraulic Depth: | 0.077 | (m) |
| Mean Velocity: | 0.043 | (m/s) |
| Foude Number: | 0.050 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S19 - Tar River Lowland Tributary near the mouth (457315 E, 6352863 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 14-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.654 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 14.32 |
| Datalogger Clock: | 1157 |
| Laptop Clock: | 1200 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 4% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Rain 84.1mm | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1200 |
| End Time (MST): | 1230 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly Cloudy 15°C |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree w/pink flagging | 1.108 | 101.748 | 1.077 | 101.748 | - |
| Bench Mark 2: | 2" pipe 5m east of BM1 | 1.193 | 101.355 | 1.163 | 101.355 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.523 | 101.333 | 1.491 | 101.334 | 101.334 |
| Transducer: | | 0.654 | 100.679 | 0.654 | 100.680 | 100.680 |
| Other: | | | | | | |

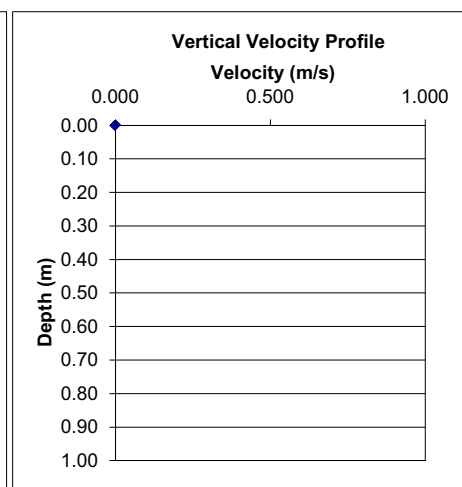
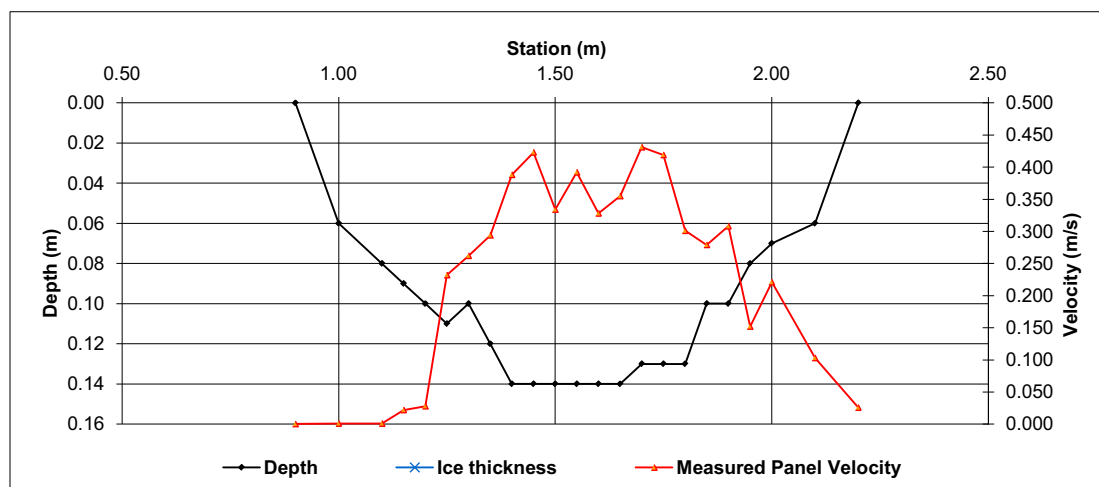
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 0.90 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.90 | 0.95 | 0.05 | 0.02 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| 1 | 1.00 | 0.06 | | 0.001 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.06 | 0.001 | 0.001 | 0.01 | 0.000 | 0% | |
| 2 | 1.10 | 0.08 | | 0.001 | | | 1.0 | 1.05 | 1.13 | 0.08 | 0.08 | 0.001 | 0.001 | 0.01 | 0.000 | 0% | |
| 3 | 1.15 | 0.09 | | 0.022 | | | 1.0 | 1.13 | 1.18 | 0.05 | 0.09 | 0.022 | 0.022 | 0.00 | 0.000 | 0% | |
| 4 | 1.20 | 0.10 | | 0.028 | | | 1.0 | 1.18 | 1.23 | 0.05 | 0.10 | 0.028 | 0.028 | 0.01 | 0.000 | 0% | |
| 5 | 1.25 | 0.11 | | 0.232 | | | 1.0 | 1.23 | 1.28 | 0.05 | 0.11 | 0.232 | 0.232 | 0.01 | 0.001 | 4% | |
| 6 | 1.30 | 0.10 | | 0.262 | | | 1.0 | 1.28 | 1.33 | 0.05 | 0.10 | 0.262 | 0.262 | 0.01 | 0.001 | 4% | |
| 7 | 1.35 | 0.12 | | 0.294 | | | 1.0 | 1.33 | 1.38 | 0.05 | 0.12 | 0.294 | 0.294 | 0.01 | 0.002 | 5% | |
| 8 | 1.40 | 0.14 | | 0.388 | | | 1.0 | 1.38 | 1.43 | 0.05 | 0.14 | 0.388 | 0.388 | 0.01 | 0.003 | 8% | |
| 9 | 1.45 | 0.14 | | 0.423 | | | 1.0 | 1.43 | 1.48 | 0.05 | 0.14 | 0.423 | 0.423 | 0.01 | 0.003 | 9% | |
| 10 | 1.50 | 0.14 | | 0.334 | | | 1.0 | 1.48 | 1.53 | 0.05 | 0.14 | 0.334 | 0.334 | 0.01 | 0.002 | 7% | |
| 11 | 1.55 | 0.14 | | 0.392 | | | 1.0 | 1.53 | 1.58 | 0.05 | 0.14 | 0.392 | 0.392 | 0.01 | 0.003 | 8% | |
| 12 | 1.60 | 0.14 | | 0.328 | | | 1.0 | 1.58 | 1.63 | 0.05 | 0.14 | 0.328 | 0.328 | 0.01 | 0.002 | 7% | |
| 13 | 1.65 | 0.14 | | 0.355 | | | 1.0 | 1.63 | 1.68 | 0.05 | 0.14 | 0.355 | 0.355 | 0.01 | 0.002 | 8% | |
| 14 | 1.70 | 0.13 | | 0.431 | | | 1.0 | 1.68 | 1.73 | 0.05 | 0.13 | 0.431 | 0.431 | 0.01 | 0.003 | 8% | |
| 15 | 1.75 | 0.13 | | 0.419 | | | 1.0 | 1.73 | 1.78 | 0.05 | 0.13 | 0.419 | 0.419 | 0.01 | 0.003 | 8% | |
| 16 | 1.80 | 0.13 | | 0.301 | | | 1.0 | 1.78 | 1.83 | 0.05 | 0.13 | 0.301 | 0.301 | 0.01 | 0.002 | 6% | |
| 17 | 1.85 | 0.10 | | 0.279 | | | 1.0 | 1.83 | 1.88 | 0.05 | 0.10 | 0.279 | 0.279 | 0.00 | 0.001 | 4% | |
| 18 | 1.90 | 0.10 | | 0.308 | | | 1.0 | 1.88 | 1.93 | 0.05 | 0.10 | 0.308 | 0.308 | 0.00 | 0.002 | 5% | |
| 19 | 1.95 | 0.08 | | 0.152 | | | 1.0 | 1.93 | 1.98 | 0.05 | 0.08 | 0.152 | 0.152 | 0.00 | 0.001 | 2% | |
| 20 | 2.00 | 0.07 | | 0.221 | | | 1.0 | 1.98 | 2.05 | 0.07 | 0.07 | 0.221 | 0.221 | 0.01 | 0.001 | 4% | |
| 21 | 2.10 | 0.06 | | 0.103 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.06 | 0.103 | 0.103 | 0.01 | 0.001 | 2% | |
| Right | 2.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.15 | 2.20 | 0.05 | 0.02 | 0.026 | 0.026 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 0.033 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.033 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 0.13 | (m ²) |
| Wetted Width: | 1.30 | (m) |
| Hydraulic Depth: | 0.097 | (m) |
| Mean Velocity: | 0.261 | (m/s) |
| Foude Number: | 0.268 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | |
| Offset | | | - | - | Panel V.@Ofst | 0.000 |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S19 - Tar River Lowland Tributary near the mouth (457315 E, 6352863 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 26-Oct-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|---|-----------------|
| Logger Details: | |
| Transducer Reading: | 0.602 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 14.76 |
| Datalogger Clock: | 1243 |
| Laptop Clock: | 1250 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 6% |
| Dessicant: | Lid left in box |
| Logger# (if Δ): | 2078 |
| PT# (if Δ): | |
| Other Logger Notes: Rain total 99.3. TBRG bagged. Took anchor/weight | |

| | |
|------------------------------|--------|
| Measurement Details: | |
| Start Time (MST): | 1240 |
| End Time (MST): | 1400 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree w/pink flagging | 1.105 | 101.748 | 1.079 | 101.748 | - |
| Bench Mark 2: | 2" pipe 5m east of BM1 | 1.190 | 101.355 | 1.165 | 101.355 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.585 | 101.268 | 1.554 | 101.273 | 101.271 |
| Transducer: | | 0.602 | 100.666 | 0.602 | 100.671 | 100.668 |
| Other: | | | | | | |

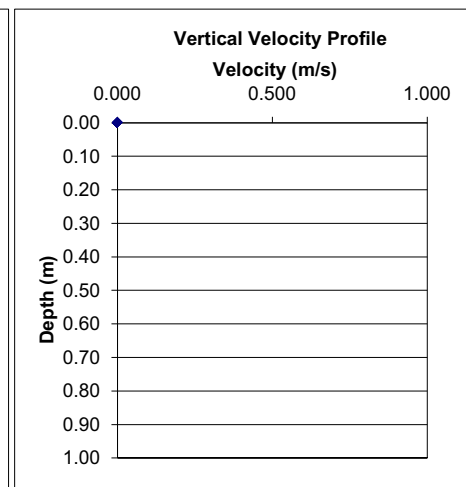
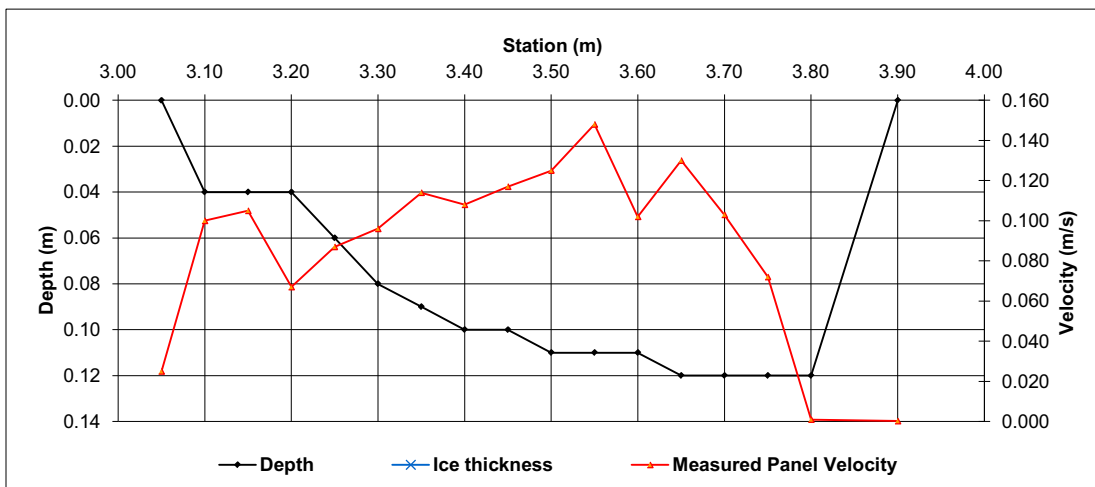
| | |
|-----------------------|--|
| General Notes: | |
| TSS @ 3.5m | |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 3.05 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.05 | 3.08 | 0.03 | 0.01 | 0.025 | 0.025 | 0.00 | 0.000 | 0% | |
| 1 | 3.10 | 0.04 | | 0.100 | | | 1.0 | 3.08 | 3.13 | 0.05 | 0.04 | 0.100 | 0.100 | 0.00 | 0.000 | 3% | |
| 2 | 3.15 | 0.04 | | 0.105 | | | 1.0 | 3.13 | 3.18 | 0.05 | 0.04 | 0.105 | 0.105 | 0.00 | 0.000 | 3% | |
| 3 | 3.20 | 0.04 | | 0.067 | | | 1.0 | 3.18 | 3.23 | 0.05 | 0.04 | 0.067 | 0.067 | 0.00 | 0.000 | 2% | |
| 4 | 3.25 | 0.06 | | 0.087 | | | 1.0 | 3.23 | 3.28 | 0.05 | 0.06 | 0.087 | 0.087 | 0.00 | 0.000 | 4% | |
| 5 | 3.30 | 0.08 | | 0.096 | | | 1.0 | 3.28 | 3.33 | 0.05 | 0.08 | 0.096 | 0.096 | 0.00 | 0.000 | 6% | |
| 6 | 3.35 | 0.09 | | 0.114 | | | 1.0 | 3.33 | 3.38 | 0.05 | 0.09 | 0.114 | 0.114 | 0.00 | 0.001 | 8% | |
| 7 | 3.40 | 0.10 | | 0.108 | | | 1.0 | 3.38 | 3.43 | 0.05 | 0.10 | 0.108 | 0.108 | 0.00 | 0.001 | 8% | |
| 8 | 3.45 | 0.10 | | 0.117 | | | 1.0 | 3.43 | 3.48 | 0.05 | 0.10 | 0.117 | 0.117 | 0.01 | 0.001 | 9% | |
| 9 | 3.50 | 0.11 | | 0.125 | | | 1.0 | 3.48 | 3.53 | 0.05 | 0.11 | 0.125 | 0.125 | 0.01 | 0.001 | 10% | |
| 10 | 3.55 | 0.11 | | 0.148 | | | 1.0 | 3.53 | 3.58 | 0.05 | 0.11 | 0.148 | 0.148 | 0.01 | 0.001 | 12% | |
| 11 | 3.60 | 0.11 | | 0.102 | | | 1.0 | 3.58 | 3.63 | 0.05 | 0.11 | 0.102 | 0.102 | 0.01 | 0.001 | 8% | |
| 12 | 3.65 | 0.12 | | 0.130 | | | 1.0 | 3.63 | 3.68 | 0.05 | 0.12 | 0.130 | 0.130 | 0.01 | 0.001 | 12% | |
| 13 | 3.70 | 0.12 | | 0.103 | | | 1.0 | 3.68 | 3.73 | 0.05 | 0.12 | 0.103 | 0.103 | 0.01 | 0.001 | 9% | |
| 14 | 3.75 | 0.12 | | 0.072 | | | 1.0 | 3.73 | 3.78 | 0.05 | 0.12 | 0.072 | 0.072 | 0.01 | 0.000 | 6% | |
| 15 | 3.80 | 0.12 | | 0.001 | | | 1.0 | 3.78 | 3.85 | 0.07 | 0.12 | 0.001 | 0.001 | 0.01 | 0.000 | 0% | |
| Left | 3.90 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.85 | 3.90 | 0.05 | 0.03 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 0.007 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.007 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.07 | (m ²) |
| Wetted Width: | 0.85 | (m) |
| Hydraulic Depth: | 0.086 | (m) |
| Mean Velocity: | 0.093 | (m/s) |
| Foude Number: | 0.101 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S20 - Muqeg River Upland (49178 E, 6354787 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 26-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-----------|
| Logger Details: | |
| Transducer Reading: | 0.825 |
| Battery (Main): | 14.2 |
| Battery (Aux): | 4.23 |
| Datalogger Clock: | 1110 |
| Laptop Clock: | 1110 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 0% |
| Dessicant: | changed |
| Logger# (if Δ): | 109050402 |
| PT# (if Δ): | 602354 |
| Other Logger Notes: | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 1050 |
| End Time (MST): | 1210 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Sunny 5°C |

| Level Survey: | | | | | | |
|----------------------|------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar | 4.191 | 327.811 | 4.148 | 327.811 | - |
| Bench Mark 2: | T-post nr logger | 3.073 | 328.976 | 3.036 | 328.976 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 5.635 | 326.414 | 5.597 | 326.415 | 326.415 |
| Transducer: | | 0.825 | 325.589 | 0.825 | 325.590 | 325.590 |
| Other: | | | | | | |

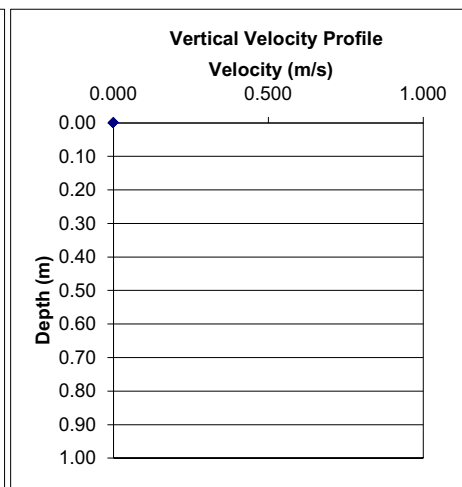
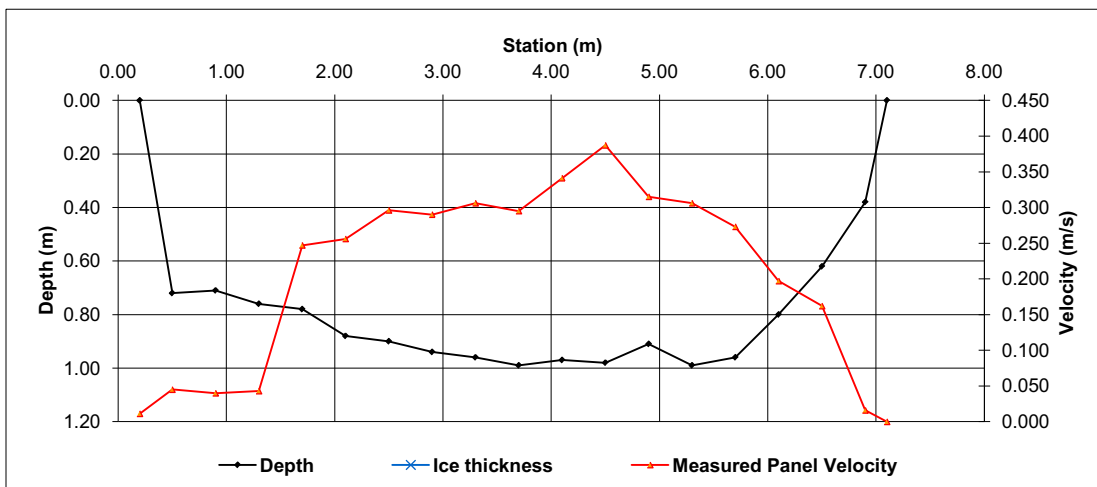
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | |
| Left | 0.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.20 | 0.35 | 0.15 | 0.18 | 0.011 | 0.011 | 0.03 | 0.000 | 0% | | |
| 1 | 0.50 | 0.72 | | 0.045 | | | 1.0 | 0.35 | 0.70 | 0.35 | 0.72 | 0.045 | 0.045 | 0.25 | 0.011 | 1% | | |
| 2 | 0.90 | 0.71 | | 0.040 | | | 1.0 | 0.70 | 1.10 | 0.40 | 0.71 | 0.040 | 0.040 | 0.28 | 0.011 | 1% | | |
| 3 | 1.30 | 0.76 | | 0.043 | | | 1.0 | 1.10 | 1.50 | 0.40 | 0.76 | 0.043 | 0.043 | 0.30 | 0.013 | 1% | | |
| 4 | 1.70 | 0.78 | | 0.247 | | | 1.0 | 1.50 | 1.90 | 0.40 | 0.78 | 0.247 | 0.247 | 0.31 | 0.077 | 6% | | |
| 5 | 2.10 | 0.88 | | 0.256 | | | 1.0 | 1.90 | 2.30 | 0.40 | 0.88 | 0.256 | 0.256 | 0.35 | 0.090 | 7% | | |
| 6 | 2.50 | 0.90 | | 0.296 | | | 1.0 | 2.30 | 2.70 | 0.40 | 0.90 | 0.296 | 0.296 | 0.36 | 0.107 | 8% | | |
| 7 | 2.90 | 0.94 | | 0.290 | | | 1.0 | 2.70 | 3.10 | 0.40 | 0.94 | 0.290 | 0.290 | 0.38 | 0.109 | 8% | | |
| 8 | 3.30 | 0.96 | | 0.306 | | | 1.0 | 3.10 | 3.50 | 0.40 | 0.96 | 0.306 | 0.306 | 0.38 | 0.118 | 8% | | |
| 9 | 3.70 | 0.99 | | 0.295 | | | 1.0 | 3.50 | 3.90 | 0.40 | 0.99 | 0.295 | 0.295 | 0.40 | 0.117 | 8% | | |
| 10 | 4.10 | 0.97 | | 0.341 | | | 1.0 | 3.90 | 4.30 | 0.40 | 0.97 | 0.341 | 0.341 | 0.39 | 0.132 | 10% | | |
| 11 | 4.50 | 0.98 | | 0.387 | | | 1.0 | 4.30 | 4.70 | 0.40 | 0.98 | 0.387 | 0.387 | 0.39 | 0.152 | 11% | | |
| 12 | 4.90 | 0.91 | | 0.315 | | | 1.0 | 4.70 | 5.10 | 0.40 | 0.91 | 0.315 | 0.315 | 0.36 | 0.115 | 8% | | |
| 13 | 5.30 | 0.99 | | 0.306 | | | 1.0 | 5.10 | 5.50 | 0.40 | 0.99 | 0.306 | 0.306 | 0.40 | 0.121 | 9% | | |
| 14 | 5.70 | 0.96 | | 0.273 | | | 1.0 | 5.50 | 5.90 | 0.40 | 0.96 | 0.273 | 0.273 | 0.38 | 0.105 | 8% | | |
| 15 | 6.10 | 0.80 | | 0.197 | | | 1.0 | 5.90 | 6.30 | 0.40 | 0.80 | 0.197 | 0.197 | 0.32 | 0.063 | 5% | | |
| 16 | 6.50 | 0.62 | | 0.162 | | | 1.0 | 6.30 | 6.70 | 0.40 | 0.62 | 0.162 | 0.162 | 0.25 | 0.040 | 3% | | |
| 17 | 6.90 | 0.38 | | 0.016 | | | 1.0 | 6.70 | 7.00 | 0.30 | 0.38 | 0.016 | 0.016 | 0.11 | 0.002 | 0% | | |
| Right | 7.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 7.00 | 7.10 | 0.10 | 0.10 | 0.000 | 0.004 | 0.01 | 0.000 | 0% | | |
| Total Flow | | | | | | | | | | | | | | | 1.383 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 1.383 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 5.66 | (m ²) |
| Wetted Width: | 6.90 | (m) |
| Hydraulic Depth: | 0.821 | (m) |
| Mean Velocity: | 0.244 | (m/s) |
| Foude Number: | 0.086 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S20 - Mukey River Upland (49178 E, 635478 N) | | | |
| Field Personnel: | DB BL Harold Funk | Trip Date: | 26-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 14-Jul-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.866 |
| Battery (Main): | 14.25 |
| Battery (Aux): | 4.28 |
| Datalogger Clock: | 816 |
| Laptop Clock: | 817 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 5% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|----------|
| Measurement Details: | |
| Start Time (MST): | 810 |
| End Time (MST): | 1008 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar | 2.745 | 327.811 | 2.742 | 327.811 | - |
| Bench Mark 2: | T-post nr logger | 1.574 | 328.976 | 1.568 | 328.976 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 4.037 | 326.513 | 4.030 | 326.514 | 326.514 |
| Transducer: | | 0.866 | 325.647 | 0.866 | 325.648 | 325.647 |
| Other: | | | | | | |

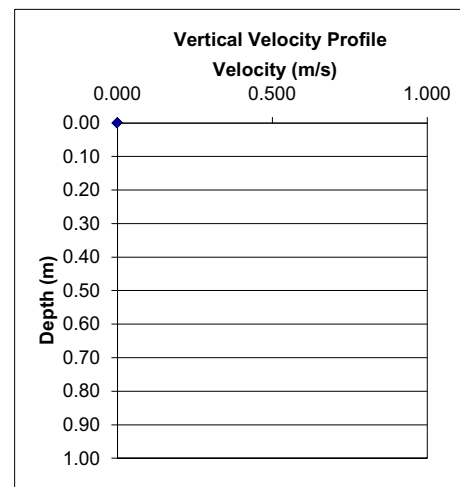
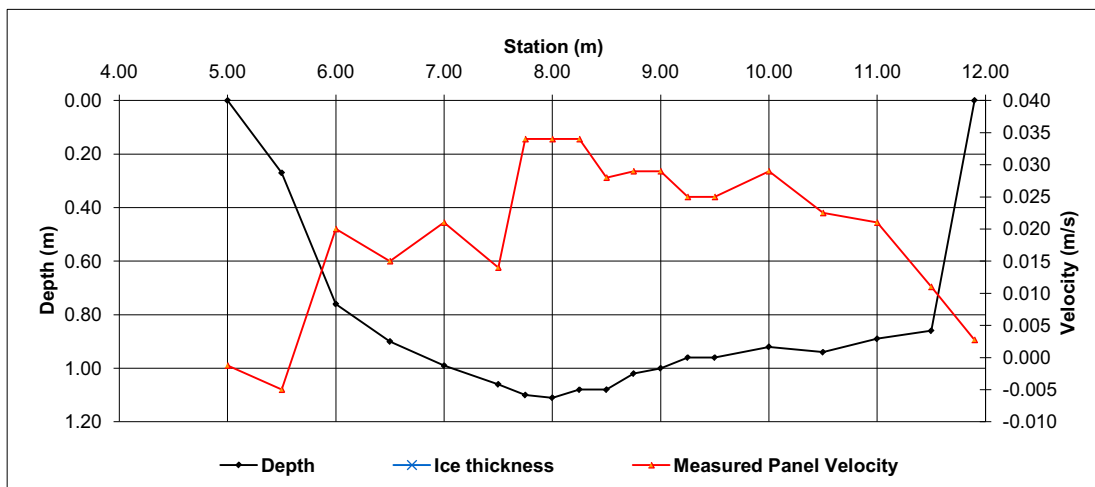
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | |
| Left | 11.90 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 11.90 | 11.70 | 0.20 | 0.22 | 0.003 | 0.003 | 0.04 | 0.000 | 0% | | |
| 1 | 11.50 | 0.86 | | | 0.006 | 0.016 | 1.0 | 11.70 | 11.25 | 0.45 | 0.86 | 0.011 | 0.011 | 0.39 | 0.004 | 3% | | |
| 2 | 11.00 | 0.89 | | | 0.008 | 0.034 | 1.0 | 11.25 | 10.75 | 0.50 | 0.89 | 0.021 | 0.021 | 0.45 | 0.009 | 7% | | |
| 3 | 10.50 | 0.94 | | | 0.007 | 0.038 | 1.0 | 10.75 | 10.25 | 0.50 | 0.94 | 0.023 | 0.023 | 0.47 | 0.011 | 8% | | |
| 4 | 10.00 | 0.92 | | | 0.021 | 0.037 | 1.0 | 10.25 | 9.75 | 0.50 | 0.92 | 0.029 | 0.029 | 0.46 | 0.013 | 10% | | |
| 5 | 9.50 | 0.96 | | | 0.009 | 0.041 | 1.0 | 9.75 | 9.38 | 0.38 | 0.96 | 0.025 | 0.025 | 0.36 | 0.009 | 7% | | |
| 6 | 9.25 | 0.96 | | | 0.018 | 0.032 | 1.0 | 9.38 | 9.13 | 0.25 | 0.96 | 0.025 | 0.025 | 0.24 | 0.006 | 5% | | |
| 7 | 9.00 | 1.00 | | | 0.022 | 0.036 | 1.0 | 9.13 | 8.88 | 0.25 | 1.00 | 0.029 | 0.029 | 0.25 | 0.007 | 5% | | |
| 8 | 8.75 | 1.02 | | | 0.025 | 0.033 | 1.0 | 8.88 | 8.63 | 0.25 | 1.02 | 0.029 | 0.029 | 0.26 | 0.007 | 6% | | |
| 9 | 8.50 | 1.08 | | | 0.021 | 0.035 | 1.0 | 8.63 | 8.38 | 0.25 | 1.08 | 0.028 | 0.028 | 0.27 | 0.008 | 6% | | |
| 10 | 8.25 | 1.08 | | | 0.036 | 0.032 | 1.0 | 8.38 | 8.13 | 0.25 | 1.08 | 0.034 | 0.034 | 0.27 | 0.009 | 7% | | |
| 11 | 8.00 | 1.11 | | | 0.032 | 0.036 | 1.0 | 8.13 | 7.88 | 0.25 | 1.11 | 0.034 | 0.034 | 0.28 | 0.009 | 7% | | |
| 12 | 7.75 | 1.10 | | | 0.035 | 0.033 | 1.0 | 7.88 | 7.63 | 0.25 | 1.10 | 0.034 | 0.034 | 0.28 | 0.009 | 7% | | |
| 13 | 7.50 | 1.06 | | | 0.019 | 0.009 | 1.0 | 7.63 | 7.25 | 0.38 | 1.06 | 0.014 | 0.014 | 0.40 | 0.006 | 4% | | |
| 14 | 7.00 | 0.99 | | | 0.026 | 0.016 | 1.0 | 7.25 | 6.75 | 0.50 | 0.99 | 0.021 | 0.021 | 0.50 | 0.010 | 8% | | |
| 15 | 6.50 | 0.90 | | | 0.022 | 0.008 | 1.0 | 6.75 | 6.25 | 0.50 | 0.90 | 0.015 | 0.015 | 0.45 | 0.007 | 5% | | |
| 16 | 6.00 | 0.76 | | | 0.011 | 0.029 | 1.0 | 6.25 | 5.75 | 0.50 | 0.76 | 0.020 | 0.020 | 0.38 | 0.008 | 6% | | |
| 17 | 5.50 | 0.27 | | -0.005 | | | 1.0 | 5.75 | 5.25 | 0.50 | 0.27 | -0.005 | -0.005 | 0.14 | -0.001 | -1% | | |
| Right | 5.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 5.25 | 5.00 | 0.25 | 0.07 | -0.001 | -0.001 | 0.02 | 0.000 | 0% | | |
| Total Flow | | | | | | | | | | | | | | | 0.132 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.132 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 5.88 | (m ²) |
| Wetted Width: | 6.45 | (m) |
| Hydraulic Depth: | 0.911 | (m) |
| Mean Velocity: | 0.023 | (m/s) |
| Foude Number: | 0.008 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S20 - Mukey River Upland (49178 E, 6354787 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 16-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.977 |
| Battery (Main): | 4.27 |
| Battery (Aux): | 14.35 |
| Datalogger Clock: | 1203 |
| Laptop Clock: | 1204 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 9% |
| Dessicant: | changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------------|
| Measurement Details: | |
| Start Time (MST): | 1210 |
| End Time (MST): | 1300 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open, Backwater |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | overcast 20°C |

| Level Survey: | | | | | | |
|----------------------|------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar | 4.308 | 327.811 | 4.285 | 327.811 | - |
| Bench Mark 2: | T-post nr logger | 3.139 | 328.976 | 3.115 | 328.976 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 5.495 | 326.620 | 5.471 | 326.620 | 326.620 |
| Transducer: | | 0.977 | 325.643 | 0.977 | 325.643 | 325.643 |
| Other: | | | | | | |

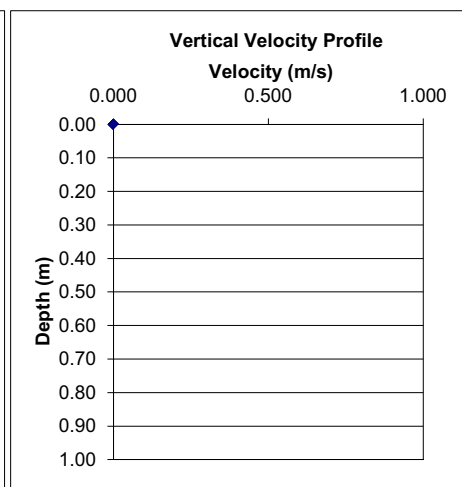
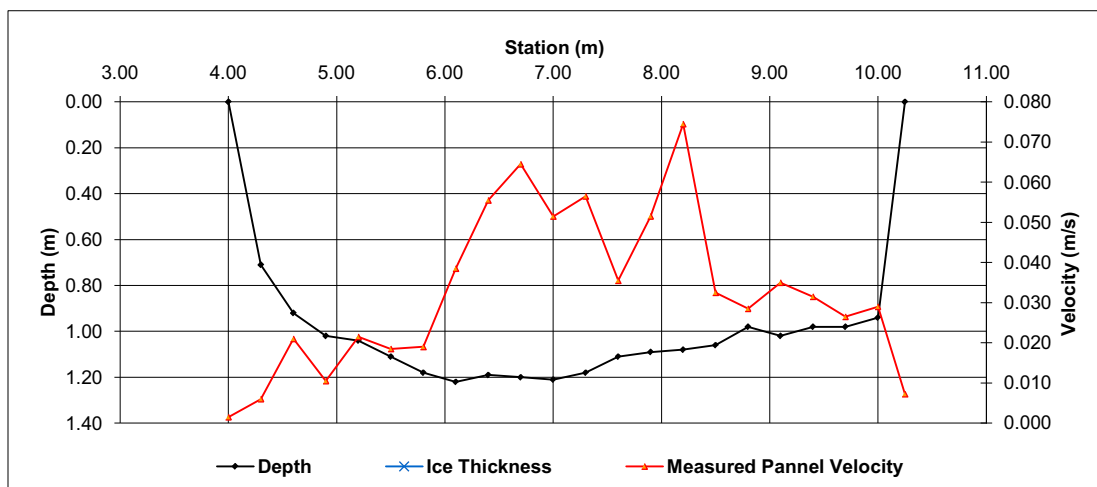
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 4.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.00 | 4.15 | 0.15 | 0.18 | 0.002 | 0.002 | 0.03 | 0.000 | 0% |
| 1 | 4.30 | 0.71 | | 0.006 | | | 1.0 | 4.15 | 4.45 | 0.30 | 0.71 | 0.006 | 0.006 | 0.21 | 0.001 | 1% |
| 2 | 4.60 | 0.92 | | | 0.011 | 0.031 | 1.0 | 4.45 | 4.75 | 0.30 | 0.92 | 0.021 | 0.021 | 0.28 | 0.006 | 2% |
| 3 | 4.90 | 1.02 | | | 0.003 | 0.018 | 1.0 | 4.75 | 5.05 | 0.30 | 1.02 | 0.011 | 0.011 | 0.31 | 0.003 | 1% |
| 4 | 5.20 | 1.04 | | | 0.027 | 0.016 | 1.0 | 5.05 | 5.35 | 0.30 | 1.04 | 0.022 | 0.022 | 0.31 | 0.007 | 3% |
| 5 | 5.50 | 1.11 | | | 0.015 | 0.022 | 1.0 | 5.35 | 5.65 | 0.30 | 1.11 | 0.019 | 0.019 | 0.33 | 0.006 | 3% |
| 6 | 5.80 | 1.18 | | | 0.019 | 0.019 | 1.0 | 5.65 | 5.95 | 0.30 | 1.18 | 0.019 | 0.019 | 0.35 | 0.007 | 3% |
| 7 | 6.10 | 1.22 | | | 0.053 | 0.024 | 1.0 | 5.95 | 6.25 | 0.30 | 1.22 | 0.039 | 0.039 | 0.37 | 0.014 | 6% |
| 8 | 6.40 | 1.19 | | | 0.058 | 0.053 | 1.0 | 6.25 | 6.55 | 0.30 | 1.19 | 0.056 | 0.056 | 0.36 | 0.020 | 9% |
| 9 | 6.70 | 1.20 | | | 0.066 | 0.063 | 1.0 | 6.55 | 6.85 | 0.30 | 1.20 | 0.065 | 0.065 | 0.36 | 0.023 | 10% |
| 10 | 7.00 | 1.21 | | | 0.036 | 0.067 | 1.0 | 6.85 | 7.15 | 0.30 | 1.21 | 0.052 | 0.052 | 0.36 | 0.019 | 8% |
| 11 | 7.30 | 1.18 | | | 0.053 | 0.060 | 1.0 | 7.15 | 7.45 | 0.30 | 1.18 | 0.057 | 0.057 | 0.35 | 0.020 | 9% |
| 12 | 7.60 | 1.11 | | | 0.013 | 0.058 | 1.0 | 7.45 | 7.75 | 0.30 | 1.11 | 0.036 | 0.036 | 0.33 | 0.012 | 5% |
| 13 | 7.90 | 1.09 | | | 0.048 | 0.055 | 1.0 | 7.75 | 8.05 | 0.30 | 1.09 | 0.052 | 0.052 | 0.33 | 0.017 | 7% |
| 14 | 8.20 | 1.08 | | | 0.101 | 0.048 | 1.0 | 8.05 | 8.35 | 0.30 | 1.08 | 0.075 | 0.075 | 0.32 | 0.024 | 10% |
| 15 | 8.50 | 1.06 | | | 0.009 | 0.056 | 1.0 | 8.35 | 8.65 | 0.30 | 1.06 | 0.033 | 0.033 | 0.32 | 0.010 | 4% |
| 16 | 8.80 | 0.98 | | | 0.003 | 0.054 | 1.0 | 8.65 | 8.95 | 0.30 | 0.98 | 0.029 | 0.029 | 0.29 | 0.008 | 4% |
| 17 | 9.10 | 1.02 | | | 0.009 | 0.061 | 1.0 | 8.95 | 9.25 | 0.30 | 1.02 | 0.035 | 0.035 | 0.31 | 0.011 | 5% |
| 18 | 9.40 | 0.98 | | | 0.020 | 0.043 | 1.0 | 9.25 | 9.55 | 0.30 | 0.98 | 0.032 | 0.032 | 0.29 | 0.009 | 4% |
| 19 | 9.70 | 0.98 | | | 0.013 | 0.040 | 1.0 | 9.55 | 9.85 | 0.30 | 0.98 | 0.027 | 0.027 | 0.29 | 0.008 | 3% |
| 20 | 10.00 | 0.94 | | | 0.030 | 0.028 | 1.0 | 9.85 | 10.13 | 0.28 | 0.94 | 0.029 | 0.029 | 0.26 | 0.007 | 3% |
| Right | 10.25 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 10.13 | 10.25 | 0.13 | 0.24 | 0.007 | 0.007 | 0.03 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.233 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.233 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 6.40 | (m ²) |
| Wetted Width: | 6.25 | (m) |
| Hydraulic Depth: | 1.024 | (m) |
| Mean Velocity: | 0.036 | (m/s) |
| Foude Number: | 0.011 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|----------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S20 - Muqeg River Upland (49178 E, 6354787 N) | | | |
| Field Personnel: | DB HB SG James Clark | Trip Date: | 18-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.112 |
| Battery (Main): | 1.52 |
| Battery (Aux): | 14.57 |
| Datalogger Clock: | 1025 |
| Laptop Clock: | 1026 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 12% |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------|
| Measurement Details: | |
| Start Time (MST): | 1020 |
| End Time (MST): | 1130 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly Cloudy 5°C |

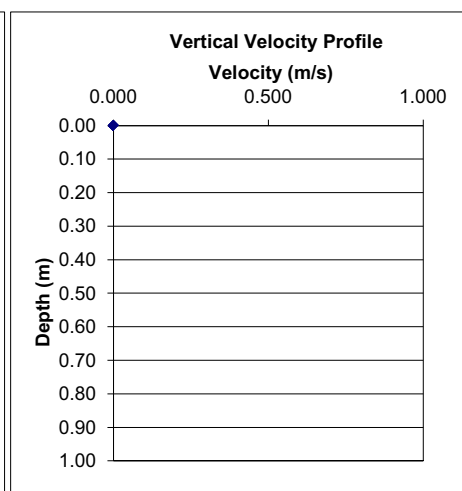
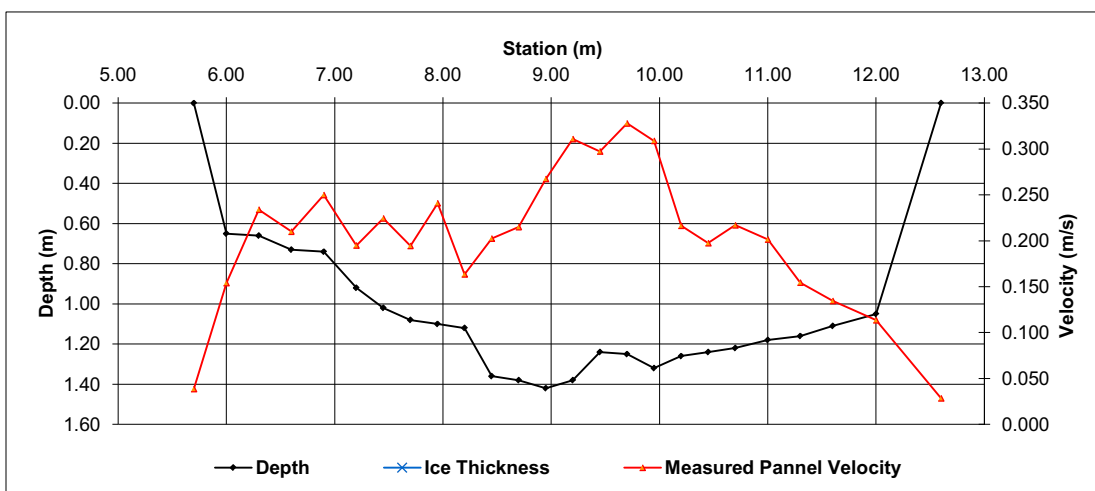
| Level Survey: | | | | | | |
|----------------------|------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar | 4.224 | 327.811 | 4.179 | 327.811 | - |
| Bench Mark 2: | T-post nr logger | 3.050 | 328.976 | 3.006 | 328.976 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 5.277 | 326.749 | 5.234 | 326.748 | 326.749 |
| Transducer: | | 1.112 | 325.637 | 1.112 | 325.636 | 325.637 |
| Other: | | | | | | |

| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
|---------------------------------|---------------|--------------|-------------------------|----------------------------------|----------------------------------|----------------------------------|---|------------------------|----------------------|------------------------|-------------------------------------|---|---|-------------------------------------|--|-----------------------------|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | |
| Right | 5.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 5.70 | 5.85 | 0.15 | 0.16 | 0.039 | 0.039 | 0.02 | 0.001 | 0% | | |
| 1 | 6.00 | 0.65 | | 0.154 | | | 1.0 | 5.85 | 6.15 | 0.30 | 0.65 | 0.154 | 0.154 | 0.20 | 0.030 | 2% | | |
| 2 | 6.30 | 0.66 | | 0.234 | | | 1.0 | 6.15 | 6.45 | 0.30 | 0.66 | 0.234 | 0.234 | 0.20 | 0.046 | 3% | | |
| 3 | 6.60 | 0.73 | | 0.210 | | | 1.0 | 6.45 | 6.75 | 0.30 | 0.73 | 0.210 | 0.210 | 0.22 | 0.046 | 3% | | |
| 4 | 6.90 | 0.74 | | 0.250 | | | 1.0 | 6.75 | 7.05 | 0.30 | 0.74 | 0.250 | 0.250 | 0.22 | 0.056 | 4% | | |
| 5 | 7.20 | 0.92 | | | 0.156 | 0.234 | 1.0 | 7.05 | 7.33 | 0.27 | 0.92 | 0.195 | 0.195 | 0.25 | 0.049 | 3% | | |
| 6 | 7.45 | 1.02 | | | 0.166 | 0.283 | 1.0 | 7.33 | 7.58 | 0.25 | 1.02 | 0.225 | 0.225 | 0.26 | 0.057 | 4% | | |
| 7 | 7.70 | 1.08 | | | 0.090 | 0.299 | 1.0 | 7.58 | 7.83 | 0.25 | 1.08 | 0.195 | 0.195 | 0.27 | 0.053 | 3% | | |
| 8 | 7.95 | 1.10 | | | 0.191 | 0.291 | 1.0 | 7.83 | 8.08 | 0.25 | 1.10 | 0.241 | 0.241 | 0.27 | 0.066 | 4% | | |
| 9 | 8.20 | 1.12 | | | 0.008 | 0.319 | 1.0 | 8.08 | 8.33 | 0.25 | 1.12 | 0.164 | 0.164 | 0.28 | 0.046 | 3% | | |
| 10 | 8.45 | 1.36 | | | 0.060 | 0.345 | 1.0 | 8.33 | 8.58 | 0.25 | 1.36 | 0.203 | 0.203 | 0.34 | 0.069 | 4% | | |
| 11 | 8.70 | 1.38 | | | 0.099 | 0.331 | 1.0 | 8.58 | 8.83 | 0.25 | 1.38 | 0.215 | 0.215 | 0.35 | 0.074 | 5% | | |
| 12 | 8.95 | 1.42 | | | 0.206 | 0.329 | 1.0 | 8.83 | 9.08 | 0.25 | 1.42 | 0.268 | 0.268 | 0.36 | 0.095 | 6% | | |
| 13 | 9.20 | 1.38 | | | 0.264 | 0.358 | 1.0 | 9.08 | 9.33 | 0.25 | 1.38 | 0.311 | 0.311 | 0.35 | 0.107 | 7% | | |
| 14 | 9.45 | 1.24 | | | 0.271 | 0.324 | 1.0 | 9.33 | 9.58 | 0.25 | 1.24 | 0.298 | 0.298 | 0.31 | 0.092 | 6% | | |
| 15 | 9.70 | 1.25 | | | 0.311 | 0.345 | 1.0 | 9.58 | 9.83 | 0.25 | 1.25 | 0.328 | 0.328 | 0.31 | 0.103 | 7% | | |
| 16 | 9.95 | 1.32 | | | 0.306 | 0.312 | 1.0 | 9.83 | 10.08 | 0.25 | 1.32 | 0.309 | 0.309 | 0.33 | 0.102 | 7% | | |
| 17 | 10.20 | 1.26 | | | 0.161 | 0.272 | 1.0 | 10.08 | 10.33 | 0.25 | 1.26 | 0.217 | 0.217 | 0.32 | 0.068 | 4% | | |
| 18 | 10.45 | 1.24 | | | 0.097 | 0.298 | 1.0 | 10.33 | 10.58 | 0.25 | 1.24 | 0.198 | 0.198 | 0.31 | 0.061 | 4% | | |
| 19 | 10.70 | 1.22 | | | 0.160 | 0.274 | 1.0 | 10.58 | 10.85 | 0.28 | 1.22 | 0.217 | 0.217 | 0.34 | 0.073 | 5% | | |
| 20 | 11.00 | 1.18 | | | 0.167 | 0.236 | 1.0 | 10.85 | 11.15 | 0.30 | 1.18 | 0.202 | 0.202 | 0.35 | 0.071 | 5% | | |
| 21 | 11.30 | 1.16 | | | 0.179 | 0.130 | 1.0 | 11.15 | 11.45 | 0.30 | 1.16 | 0.155 | 0.155 | 0.35 | 0.054 | 4% | | |
| 22 | 11.60 | 1.11 | | | 0.162 | 0.107 | 1.0 | 11.45 | 11.80 | 0.35 | 1.11 | 0.135 | 0.135 | 0.39 | 0.052 | 3% | | |
| 23 | 12.00 | 1.05 | | | 0.135 | 0.092 | 1.0 | 11.80 | 12.30 | 0.50 | 1.05 | 0.114 | 0.114 | 0.53 | 0.060 | 4% | | |
| Left | 12.60 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 12.30 | 12.60 | 0.30 | 0.26 | 0.028 | 0.028 | 0.08 | 0.002 | 0% | | |
| *denotes position of TSS sample | | | | | | | | | | | | | | Total Flow | | 1.533 | | |

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 1.533 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 7.18 | (m ²) |
| Wetted Width: | 6.90 | (m) |
| Hydraulic Depth: | 1.041 | (m) |
| Mean Velocity: | 0.213 | (m/s) |
| Foude Number: | 0.067 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S20 - Mukey River Upland (49178 E, 635478 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 31-Oct-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|--------------|
| Logger Details: | |
| Transducer Reading: | 0.927 |
| Battery (Main): | 2.21 |
| Battery (Aux): | 12.97 |
| Datalogger Clock: | 738 |
| Laptop Clock: | 739 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 17% |
| Dessicant: | - |
| Logger# (if Δ): | 198.228.1725 |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-----------------------------|
| Measurement Details: | |
| Start Time (MST): | 740 |
| End Time (MST): | 900 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Ice, broken to measure flow |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Clear |

| Level Survey: | | | | | | |
|----------------------|------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar | 1.345 | 327.811 | 1.269 | 327.811 | - |
| Bench Mark 2: | T-post nr logger | 0.172 | 328.976 | 0.094 | 328.976 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.578 | 326.570 | 2.498 | 326.572 | 326.571 |
| Transducer: | | 0.927 | 325.643 | 0.927 | 325.645 | 325.644 |
| Other: | | | | | | |

General Notes:

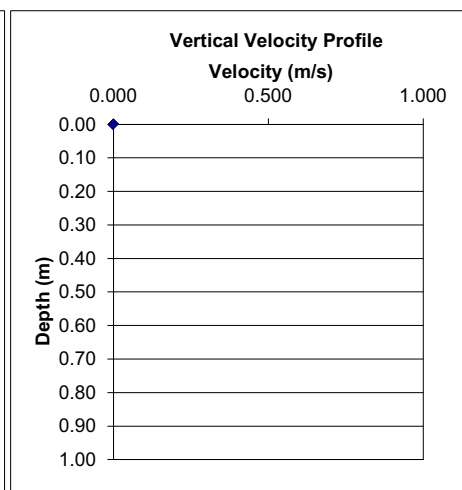
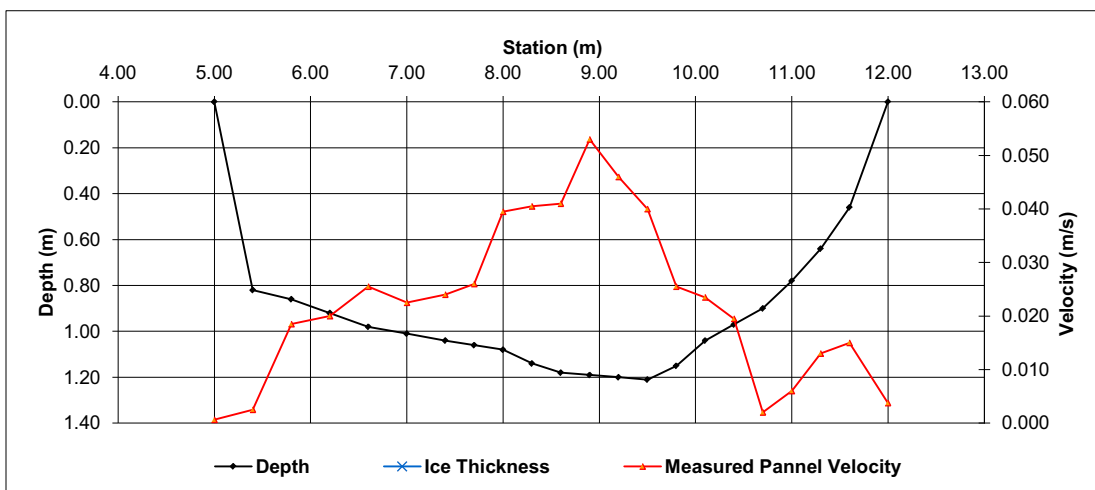
TSS @ 8m. Dead beaver @ site, wolf observed upon arrival.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 5.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 5.00 | 5.20 | 0.20 | 0.21 | 0.001 | 0.001 | 0.04 | 0.000 | 0% |
| 1 | 5.40 | 0.82 | | | 0.006 | -0.001 | 1.0 | 5.20 | 5.60 | 0.40 | 0.82 | 0.003 | 0.003 | 0.33 | 0.001 | 0% |
| 2 | 5.80 | 0.86 | | | 0.012 | 0.025 | 1.0 | 5.60 | 6.00 | 0.40 | 0.86 | 0.019 | 0.019 | 0.34 | 0.006 | 4% |
| 3 | 6.20 | 0.92 | | | 0.013 | 0.027 | 1.0 | 6.00 | 6.40 | 0.40 | 0.92 | 0.020 | 0.020 | 0.37 | 0.007 | 4% |
| 4 | 6.60 | 0.98 | | | 0.009 | 0.042 | 1.0 | 6.40 | 6.80 | 0.40 | 0.98 | 0.026 | 0.026 | 0.39 | 0.010 | 6% |
| 5 | 7.00 | 1.01 | | | 0.019 | 0.026 | 1.0 | 6.80 | 7.20 | 0.40 | 1.01 | 0.023 | 0.023 | 0.40 | 0.009 | 5% |
| 6 | 7.40 | 1.04 | | | 0.007 | 0.041 | 1.0 | 7.20 | 7.55 | 0.35 | 1.04 | 0.024 | 0.024 | 0.36 | 0.009 | 5% |
| 7 | 7.70 | 1.06 | | | 0.013 | 0.039 | 1.0 | 7.55 | 7.85 | 0.30 | 1.06 | 0.026 | 0.026 | 0.32 | 0.008 | 5% |
| 8 | 8.00 | 1.08 | | | 0.046 | 0.033 | 1.0 | 7.85 | 8.15 | 0.30 | 1.08 | 0.040 | 0.040 | 0.32 | 0.013 | 8% |
| 9 | 8.30 | 1.14 | | | 0.034 | 0.047 | 1.0 | 8.15 | 8.45 | 0.30 | 1.14 | 0.041 | 0.041 | 0.34 | 0.014 | 8% |
| 10 | 8.60 | 1.18 | | | 0.046 | 0.036 | 1.0 | 8.45 | 8.75 | 0.30 | 1.18 | 0.041 | 0.041 | 0.35 | 0.015 | 9% |
| 11 | 8.90 | 1.19 | | | 0.034 | 0.072 | 1.0 | 8.75 | 9.05 | 0.30 | 1.19 | 0.053 | 0.053 | 0.36 | 0.019 | 11% |
| 12 | 9.20 | 1.20 | | | 0.042 | 0.050 | 1.0 | 9.05 | 9.35 | 0.30 | 1.20 | 0.046 | 0.046 | 0.36 | 0.017 | 10% |
| 13 | 9.50 | 1.21 | | | 0.029 | 0.051 | 1.0 | 9.35 | 9.65 | 0.30 | 1.21 | 0.040 | 0.040 | 0.36 | 0.015 | 9% |
| 14 | 9.80 | 1.15 | | | 0.015 | 0.036 | 1.0 | 9.65 | 9.95 | 0.30 | 1.15 | 0.026 | 0.026 | 0.34 | 0.009 | 5% |
| 15 | 10.10 | 1.04 | | | 0.012 | 0.035 | 1.0 | 9.95 | 10.25 | 0.30 | 1.04 | 0.024 | 0.024 | 0.31 | 0.007 | 4% |
| 16 | 10.40 | 0.97 | | | | 0.035 | 1.0 | 10.25 | 10.55 | 0.30 | 0.97 | 0.020 | 0.020 | 0.29 | 0.006 | 3% |
| 17 | 10.70 | 0.90 | | 0.002 | | | 1.0 | 10.55 | 10.85 | 0.30 | 0.90 | 0.002 | 0.002 | 0.27 | 0.001 | 0% |
| 18 | 11.00 | 0.78 | | 0.006 | | | 1.0 | 10.85 | 11.15 | 0.30 | 0.78 | 0.006 | 0.006 | 0.23 | 0.001 | 1% |
| 19 | 11.30 | 0.64 | | 0.013 | | | 1.0 | 11.15 | 11.45 | 0.30 | 0.64 | 0.013 | 0.013 | 0.19 | 0.002 | 1% |
| 20 | 11.60 | 0.46 | | 0.015 | | | 1.0 | 11.45 | 11.80 | 0.35 | 0.46 | 0.015 | 0.015 | 0.16 | 0.002 | 1% |
| Right | 12.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 11.80 | 12.00 | 0.20 | 0.12 | 0.004 | 0.004 | 0.02 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.171 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.171 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 6.49 | (m ²) |
| Wetted Width: | 7.00 | (m) |
| Hydraulic Depth: | 0.927 | (m) |
| Mean Velocity: | 0.026 | (m/s) |
| Foude Number: | 0.009 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S22 - Muskeg Creek near the mouth (481036 E, 6348856 N) | | | |
| Field Personnel: | DB GB | Trip Date: | 08-Apr-10 |
| Data Entry Personnel: | DB | Date: | 10-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| No logger | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1640 |
| End Time (MST): | 1700 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Frozen bottom |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | - |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|----------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar on RH bank nr mast | 0.362 | 306.476 | 0.338 | 306.476 | - |
| Bench Mark 2: | Nail in tree w/orange flag | 1.617 | 305.225 | 1.593 | 305.225 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.846 | 303.992 | 2.823 | 303.991 | 303.992 |
| Transducer: | | | | | | |
| Other: | | | | | | |

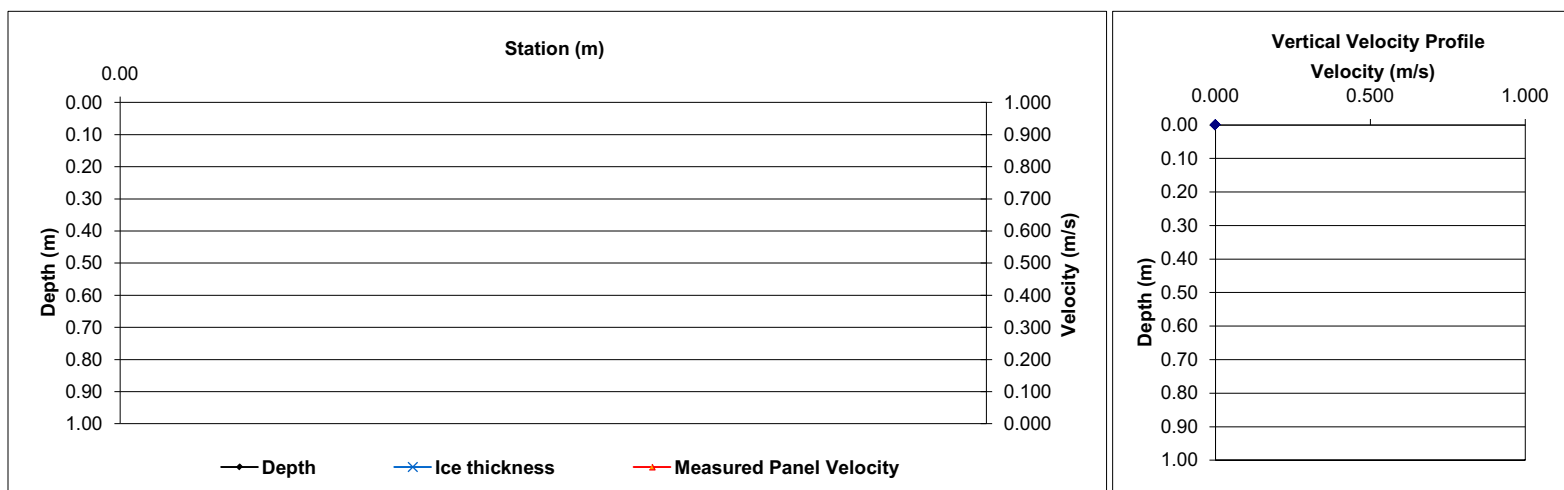
General Notes:

Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | Total Flow | NOT MEASURED |

| | | |
|--------------------------------|------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURE | (m ³ /s) |
| Perceived Measurement Quality: | - | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Foude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S22 - Muskeg Creek near the mouth (481036 E, 6348856 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 26-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.928 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 14.22 |
| Datalogger Clock: | 1541 |
| Laptop Clock: | 1541 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 0.30% |
| Dessicant: | New |
| Logger# (if Δ): | 2081 |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1520 |
| End Time (MST): | 1550 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Sunny 10°C |

| Level Survey: | | | | | | |
|----------------------|----------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar on RH bank nr mast | 0.457 | 306.476 | 0.437 | 306.476 | - |
| Bench Mark 2: | Nail in tree w/orange flag | 1.713 | 305.225 | 1.693 | 305.225 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.836 | 304.097 | 2.816 | 304.097 | 304.097 |
| Transducer: | | 0.928 | 303.169 | 0.928 | 303.169 | 303.169 |
| Other: | | | | | | |

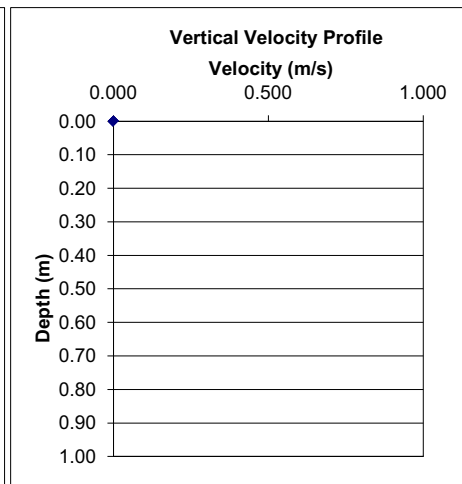
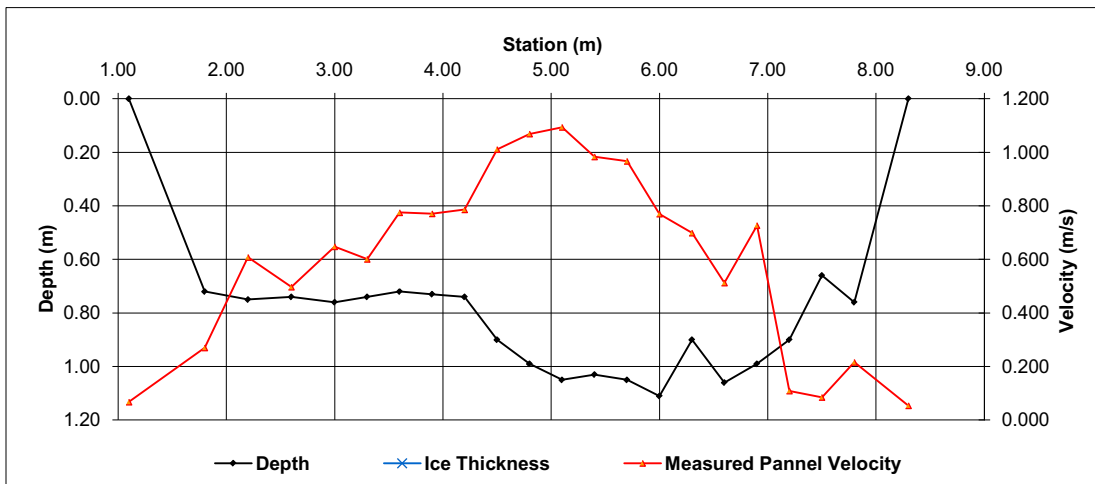
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 8.30 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 8.30 | 8.05 | 0.25 | 0.19 | 0.054 | 0.054 | 0.05 | 0.003 | #DIV/0! | |
| 1 | 7.80 | 0.76 | | 0.216 | | | 1.0 | 8.05 | 7.65 | 0.40 | 0.76 | 0.216 | 0.216 | 0.30 | 0.066 | 2% | |
| 2 | 7.50 | 0.66 | | 0.085 | | | 1.0 | 7.65 | 7.35 | 0.30 | 0.66 | 0.085 | 0.085 | 0.20 | 0.017 | 0% | |
| 3 | 7.20 | 0.90 | | 0.109 | | | 1.0 | 7.35 | 7.05 | 0.30 | 0.90 | 0.109 | 0.109 | 0.27 | 0.029 | 1% | |
| 4 | 6.90 | 0.99 | | 0.727 | | | 1.0 | 7.05 | 6.75 | 0.30 | 0.99 | 0.727 | 0.727 | 0.30 | 0.216 | 6% | |
| 5 | 6.60 | 1.06 | | | 0.223 | 0.802 | 1.0 | 6.75 | 6.45 | 0.30 | 1.06 | 0.513 | 0.513 | 0.32 | 0.163 | 4% | |
| 6 | 6.30 | 0.90 | | | 0.312 | 1.086 | 1.0 | 6.45 | 6.15 | 0.30 | 0.90 | 0.699 | 0.699 | 0.27 | 0.189 | 5% | |
| 7 | 6.00 | 1.11 | | | 0.433 | 1.107 | 1.0 | 6.15 | 5.85 | 0.30 | 1.11 | 0.770 | 0.770 | 0.33 | 0.256 | 7% | |
| 8 | 5.70 | 1.05 | | | 0.831 | 1.103 | 1.0 | 5.85 | 5.55 | 0.30 | 1.05 | 0.967 | 0.967 | 0.31 | 0.305 | 8% | |
| 9 | 5.40 | 1.03 | | | 0.927 | 1.040 | 1.0 | 5.55 | 5.25 | 0.30 | 1.03 | 0.984 | 0.984 | 0.31 | 0.304 | 8% | |
| 10 | 5.10 | 1.05 | | | 1.154 | 1.034 | 1.0 | 5.25 | 4.95 | 0.30 | 1.05 | 1.094 | 1.094 | 0.32 | 0.345 | 9% | |
| 11 | 4.80 | 0.99 | | 1.069 | | | 1.0 | 4.95 | 4.65 | 0.30 | 0.99 | 1.069 | 1.069 | 0.30 | 0.317 | 8% | |
| 12 | 4.50 | 0.90 | | 1.011 | | | 1.0 | 4.65 | 4.35 | 0.30 | 0.90 | 1.011 | 1.011 | 0.27 | 0.273 | 7% | |
| 13 | 4.20 | 0.74 | | 0.786 | | | 1.0 | 4.35 | 4.05 | 0.30 | 0.74 | 0.786 | 0.786 | 0.22 | 0.174 | 5% | |
| 14 | 3.90 | 0.73 | | 0.771 | | | 1.0 | 4.05 | 3.75 | 0.30 | 0.73 | 0.771 | 0.771 | 0.22 | 0.169 | 5% | |
| 15 | 3.60 | 0.72 | | 0.775 | | | 1.0 | 3.75 | 3.45 | 0.30 | 0.72 | 0.775 | 0.775 | 0.22 | 0.167 | 4% | |
| 16 | 3.30 | 0.74 | | 0.601 | | | 1.0 | 3.45 | 3.15 | 0.30 | 0.74 | 0.601 | 0.601 | 0.22 | 0.133 | 4% | |
| 17 | 3.00 | 0.76 | | 0.648 | | | 1.0 | 3.15 | 2.80 | 0.35 | 0.76 | 0.648 | 0.648 | 0.27 | 0.172 | 5% | |
| 18 | 2.60 | 0.74 | | 0.497 | | | 1.0 | 2.80 | 2.40 | 0.40 | 0.74 | 0.497 | 0.497 | 0.30 | 0.147 | 4% | |
| 19 | 2.20 | 0.75 | | 0.608 | | | 1.0 | 2.40 | 2.00 | 0.40 | 0.75 | 0.608 | 0.608 | 0.30 | 0.182 | 5% | |
| 20 | 1.80 | 0.72 | | 0.270 | | | 1.0 | 2.00 | 1.45 | 0.55 | 0.72 | 0.270 | 0.270 | 0.40 | 0.107 | 3% | |
| Left | 1.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.45 | 1.10 | 0.35 | 0.18 | 0.068 | 0.068 | 0.06 | 0.004 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 3.739 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 3.739 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 5.74 | (m ²) |
| Wetted Width: | 6.60 | (m) |
| Hydraulic Depth: | 0.870 | (m) |
| Mean Velocity: | 0.651 | (m/s) |
| Foude Number: | 0.223 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S22 - Muskeg Creek near the mouth (481036 E, 6348856 N) | | | |
| Field Personnel: | DB BL SG | Trip Date: | 22-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 14-Jul-10 |

| | |
|-----------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.527 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 14.13 |
| Datalogger Clock: | 1450 |
| Laptop Clock: | 1555 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 1% |
| Dessicant: | changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| PT moved, was 0.1636 | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1619 |
| End Time (MST): | 1631 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Clear 25°C |

| Level Survey: | | | | | | |
|----------------------|----------------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar on RH bank nr mast | 1.005 | 306.476 | 0.980 | 306.476 | - |
| Bench Mark 2: | Nail in tree w/orange flag | 2.266 | 305.225 | 2.240 | 305.225 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 4.150 | 303.331 | 4.123 | 303.333 | 303.332 |
| Transducer: | | 0.527 | 302.804 | 0.527 | 302.806 | 302.805 |
| Other: | | | | | | |

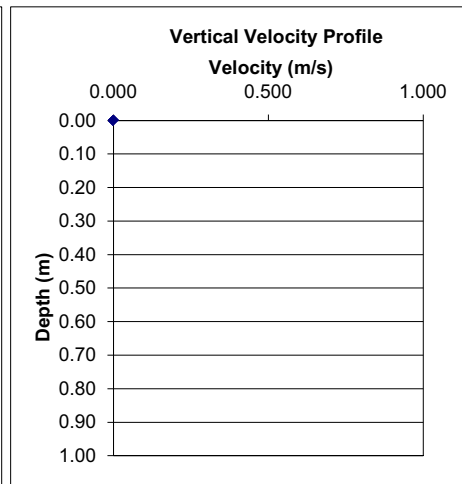
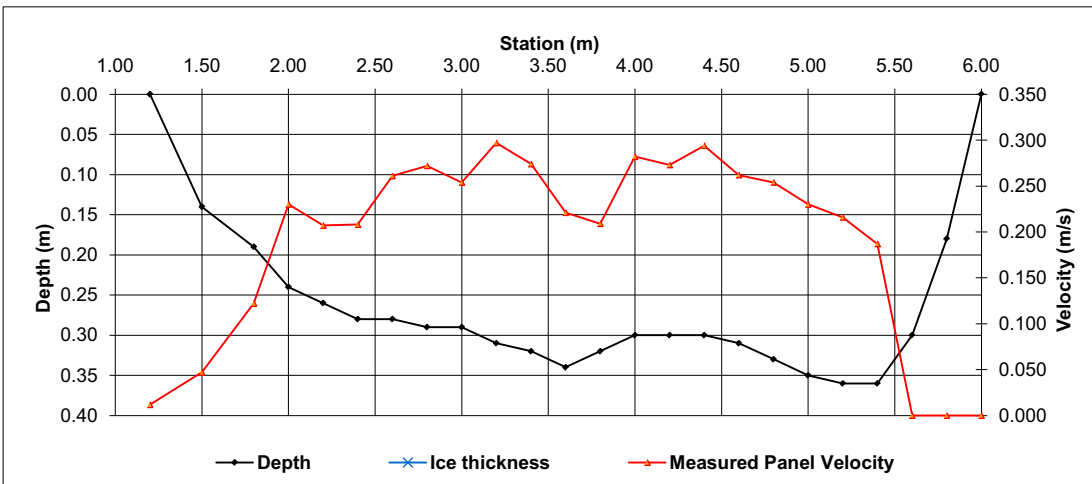
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Measured Data | | | | | | | | | | Calculated Data | | | | | | | | | |
|-------------------|---------------|--------------|-------------------------|----------------------------------|----------------------------------|----------------------------------|---|------------------------|----------------------|------------------------|-------------------------------------|---|---|-------------------------------------|--|-----------------------------|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | |
| Left | 6.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 6.00 | 5.90 | 0.10 | 0.05 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | | | |
| 1 | 5.80 | 0.18 | | 0.000 | | | 1.0 | 5.90 | 5.70 | 0.20 | 0.18 | 0.000 | 0.000 | 0.04 | 0.000 | 0% | | | |
| 2 | 5.60 | 0.30 | | 0.000 | | | 1.0 | 5.70 | 5.50 | 0.20 | 0.30 | 0.000 | 0.000 | 0.06 | 0.000 | 0% | | | |
| 3 | 5.40 | 0.36 | | 0.187 | | | 1.0 | 5.50 | 5.30 | 0.20 | 0.36 | 0.187 | 0.187 | 0.07 | 0.013 | 5% | | | |
| 4 | 5.20 | 0.36 | | 0.216 | | | 1.0 | 5.30 | 5.10 | 0.20 | 0.36 | 0.216 | 0.216 | 0.07 | 0.016 | 6% | | | |
| 5 | 5.00 | 0.35 | | 0.230 | | | 1.0 | 5.10 | 4.90 | 0.20 | 0.35 | 0.230 | 0.230 | 0.07 | 0.016 | 6% | | | |
| 6 | 4.80 | 0.33 | | 0.254 | | | 1.0 | 4.90 | 4.70 | 0.20 | 0.33 | 0.254 | 0.254 | 0.07 | 0.017 | 6% | | | |
| 7 | 4.60 | 0.31 | | 0.262 | | | 1.0 | 4.70 | 4.50 | 0.20 | 0.31 | 0.262 | 0.262 | 0.06 | 0.016 | 6% | | | |
| 8 | 4.40 | 0.30 | | 0.294 | | | 1.0 | 4.50 | 4.30 | 0.20 | 0.30 | 0.294 | 0.294 | 0.06 | 0.018 | 6% | | | |
| 9 | 4.20 | 0.30 | | 0.273 | | | 1.0 | 4.30 | 4.10 | 0.20 | 0.30 | 0.273 | 0.273 | 0.06 | 0.016 | 6% | | | |
| 10 | 4.00 | 0.30 | | 0.282 | | | 1.0 | 4.10 | 3.90 | 0.20 | 0.30 | 0.282 | 0.282 | 0.06 | 0.017 | 6% | | | |
| 11 | 3.80 | 0.32 | | 0.209 | | | 1.0 | 3.90 | 3.70 | 0.20 | 0.32 | 0.209 | 0.209 | 0.06 | 0.013 | 5% | | | |
| 12 | 3.60 | 0.34 | | 0.221 | | | 1.0 | 3.70 | 3.50 | 0.20 | 0.34 | 0.221 | 0.221 | 0.07 | 0.015 | 5% | | | |
| 13 | 3.40 | 0.32 | | 0.274 | | | 1.0 | 3.50 | 3.30 | 0.20 | 0.32 | 0.274 | 0.274 | 0.06 | 0.018 | 6% | | | |
| 14 | 3.20 | 0.31 | | 0.297 | | | 1.0 | 3.30 | 3.10 | 0.20 | 0.31 | 0.297 | 0.297 | 0.06 | 0.018 | 7% | | | |
| 15 | 3.00 | 0.29 | | 0.254 | | | 1.0 | 3.10 | 2.90 | 0.20 | 0.29 | 0.254 | 0.254 | 0.06 | 0.015 | 5% | | | |
| 16 | 2.80 | 0.29 | | 0.272 | | | 1.0 | 2.90 | 2.70 | 0.20 | 0.29 | 0.272 | 0.272 | 0.06 | 0.016 | 6% | | | |
| 17 | 2.60 | 0.28 | | 0.261 | | | 1.0 | 2.70 | 2.50 | 0.20 | 0.28 | 0.261 | 0.261 | 0.06 | 0.015 | 5% | | | |
| 18 | 2.40 | 0.28 | | 0.208 | | | 1.0 | 2.50 | 2.30 | 0.20 | 0.28 | 0.208 | 0.208 | 0.06 | 0.012 | 4% | | | |
| 19 | 2.20 | 0.26 | | 0.207 | | | 1.0 | 2.30 | 2.10 | 0.20 | 0.26 | 0.207 | 0.207 | 0.05 | 0.011 | 4% | | | |
| 20 | 2.00 | 0.24 | | 0.230 | | | 1.0 | 2.10 | 1.90 | 0.20 | 0.24 | 0.230 | 0.230 | 0.05 | 0.011 | 4% | | | |
| 21 | 1.80 | 0.19 | | 0.122 | | | 1.0 | 1.90 | 1.65 | 0.25 | 0.19 | 0.122 | 0.122 | 0.05 | 0.006 | 2% | | | |
| 22 | 1.50 | 0.14 | | 0.047 | | | 1.0 | 1.65 | 1.35 | 0.30 | 0.14 | 0.047 | 0.047 | 0.04 | 0.002 | 1% | | | |
| Right | 1.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.35 | 1.20 | 0.15 | 0.04 | 0.012 | 0.012 | 0.01 | 0.000 | 0% | | | |
| Total Flow | | | | | | | | | | | | | | | 0.280 | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.280 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 1.30 | (m ²) |
| Wetted Width: | 4.55 | (m) |
| Hydraulic Depth: | 0.286 | (m) |
| Mean Velocity: | 0.215 | (m/s) |
| Foude Number: | 0.128 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S22 - Muskeg Creek near the mouth (481036 E, 6348856 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 15-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.516 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 14.14 |
| Datalogger Clock: | 1447 |
| Laptop Clock: | 1458 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 3% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|----------------|
| Measurement Details: | |
| Start Time (MST): | 1500 |
| End Time (MST): | 1530 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open, Very Low |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly 20°C |

| Level Survey: | | | | | | |
|----------------------|----------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar on RH bank nr mast | 0.413 | 306.476 | 0.394 | 306.476 | - |
| Bench Mark 2: | Nail in tree w/orange flag | 1.679 | 305.225 | 1.657 | 305.225 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 3.760 | 303.129 | 3.741 | 303.129 | 303.129 |
| Transducer: | | 0.516 | 302.613 | 0.516 | 302.613 | 302.613 |
| Other: | | | | | | |

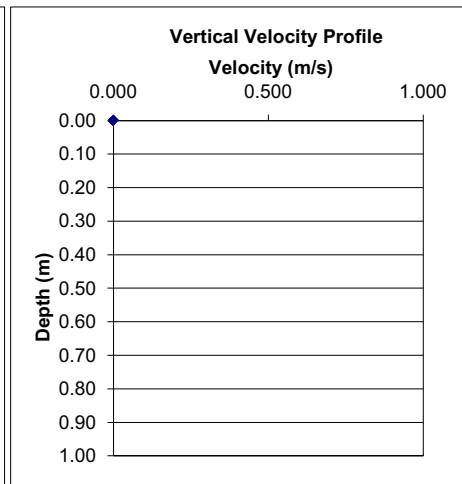
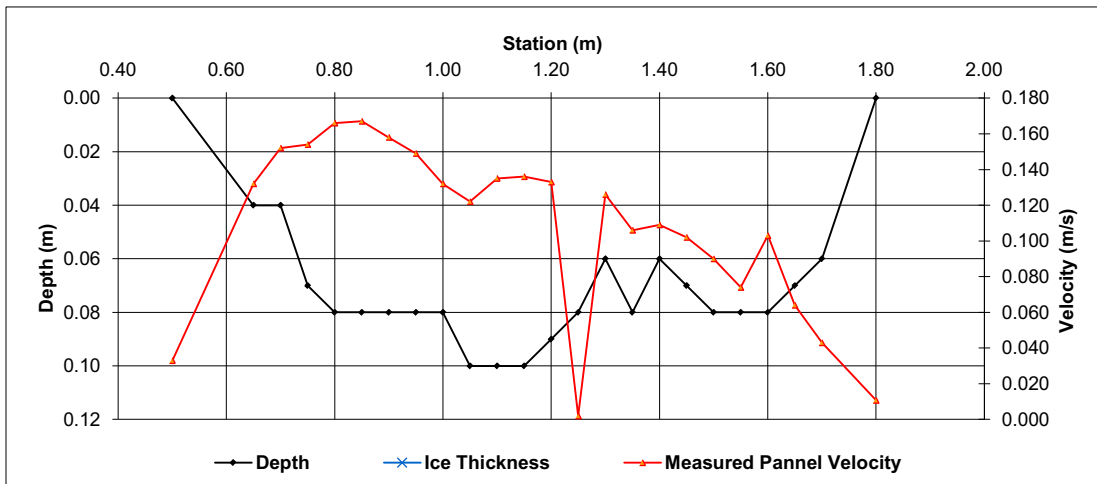
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|-----------------------|
| General Notes: |
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| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.50 | 0.58 | 0.08 | 0.01 | 0.033 | 0.033 | 0.00 | 0.000 | 0% |
| 1 | 0.65 | 0.04 | | 0.132 | | | 1.0 | 0.58 | 0.68 | 0.10 | 0.04 | 0.132 | 0.132 | 0.00 | 0.001 | 5% |
| 2 | 0.70 | 0.04 | | 0.152 | | | 1.0 | 0.68 | 0.73 | 0.05 | 0.04 | 0.152 | 0.152 | 0.00 | 0.000 | 3% |
| 3 | 0.75 | 0.07 | | 0.154 | | | 1.0 | 0.73 | 0.78 | 0.05 | 0.07 | 0.154 | 0.154 | 0.00 | 0.001 | 5% |
| 4 | 0.80 | 0.08 | | 0.166 | | | 1.0 | 0.78 | 0.83 | 0.05 | 0.08 | 0.166 | 0.166 | 0.00 | 0.001 | 7% |
| 5 | 0.85 | 0.08 | | 0.167 | | | 1.0 | 0.83 | 0.88 | 0.05 | 0.08 | 0.167 | 0.167 | 0.00 | 0.001 | 7% |
| 6 | 0.90 | 0.08 | | 0.158 | | | 1.0 | 0.88 | 0.93 | 0.05 | 0.08 | 0.158 | 0.158 | 0.00 | 0.001 | 6% |
| 7 | 0.95 | 0.08 | | 0.149 | | | 1.0 | 0.93 | 0.98 | 0.05 | 0.08 | 0.149 | 0.149 | 0.00 | 0.001 | 6% |
| 8 | 1.00 | 0.08 | | 0.132 | | | 1.0 | 0.98 | 1.03 | 0.05 | 0.08 | 0.132 | 0.132 | 0.00 | 0.001 | 5% |
| 9 | 1.05 | 0.10 | | 0.122 | | | 1.0 | 1.03 | 1.08 | 0.05 | 0.10 | 0.122 | 0.122 | 0.01 | 0.001 | 6% |
| 10 | 1.10 | 0.10 | | 0.135 | | | 1.0 | 1.08 | 1.13 | 0.05 | 0.10 | 0.135 | 0.135 | 0.00 | 0.001 | 7% |
| 11 | 1.15 | 0.10 | | 0.136 | | | 1.0 | 1.13 | 1.18 | 0.05 | 0.10 | 0.136 | 0.136 | 0.00 | 0.001 | 7% |
| 12 | 1.20 | 0.09 | | 0.133 | | | 1.0 | 1.18 | 1.23 | 0.05 | 0.09 | 0.133 | 0.133 | 0.00 | 0.001 | 6% |
| 13 | 1.25 | 0.08 | | 0.002 | | | 1.0 | 1.23 | 1.28 | 0.05 | 0.08 | 0.002 | 0.002 | 0.00 | 0.000 | 0% |
| 14 | 1.30 | 0.06 | | 0.126 | | | 1.0 | 1.28 | 1.33 | 0.05 | 0.06 | 0.126 | 0.126 | 0.00 | 0.000 | 4% |
| 15 | 1.35 | 0.08 | | 0.106 | | | 1.0 | 1.33 | 1.38 | 0.05 | 0.08 | 0.106 | 0.106 | 0.00 | 0.000 | 4% |
| 16 | 1.40 | 0.06 | | 0.109 | | | 1.0 | 1.38 | 1.43 | 0.05 | 0.06 | 0.109 | 0.109 | 0.00 | 0.000 | 3% |
| 17 | 1.45 | 0.07 | | 0.102 | | | 1.0 | 1.43 | 1.48 | 0.05 | 0.07 | 0.102 | 0.102 | 0.00 | 0.000 | 4% |
| 18 | 1.50 | 0.08 | | 0.090 | | | 1.0 | 1.48 | 1.53 | 0.05 | 0.08 | 0.090 | 0.090 | 0.00 | 0.000 | 4% |
| 19 | 1.55 | 0.08 | | 0.074 | | | 1.0 | 1.53 | 1.58 | 0.05 | 0.08 | 0.074 | 0.074 | 0.00 | 0.000 | 3% |
| 20 | 1.60 | 0.08 | | 0.103 | | | 1.0 | 1.58 | 1.63 | 0.05 | 0.08 | 0.103 | 0.103 | 0.00 | 0.000 | 4% |
| 21 | 1.65 | 0.07 | | 0.064 | | | 1.0 | 1.63 | 1.68 | 0.05 | 0.07 | 0.064 | 0.064 | 0.00 | 0.000 | 2% |
| 22 | 1.70 | 0.06 | | 0.043 | | | 1.0 | 1.68 | 1.75 | 0.08 | 0.06 | 0.043 | 0.043 | 0.00 | 0.000 | 2% |
| Left | 1.80 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.75 | 1.80 | 0.05 | 0.02 | 0.011 | 0.011 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.010 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.010 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 0.09 | (m ²) |
| Wetted Width: | 1.30 | (m) |
| Hydraulic Depth: | 0.068 | (m) |
| Mean Velocity: | 0.114 | (m/s) |
| Foude Number: | 0.140 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S22 - Muskeg Creek near the mouth (481036 E, 6348856 N) | | | |
| Field Personnel: | DB SG HB | Trip Date: | 18-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.363 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 14.36 |
| Datalogger Clock: | 1304 |
| Laptop Clock: | 1317 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 3% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1315 |
| End Time (MST): | 1400 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Clear 10°C |

| Level Survey: | | | | | | |
|----------------------|----------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar on RH bank nr mast | 0.387 | 306.476 | 0.333 | 306.476 | - |
| Bench Mark 2: | Nail in tree w/orange flag | 1.648 | 305.225 | 1.594 | 305.225 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.873 | 303.990 | 2.815 | 303.994 | 303.992 |
| Transducer: | | 1.363 | 302.627 | 1.363 | 302.631 | 302.629 |
| Other: | | | | | | |

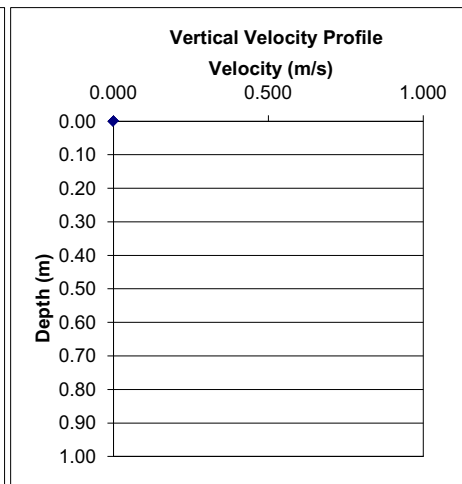
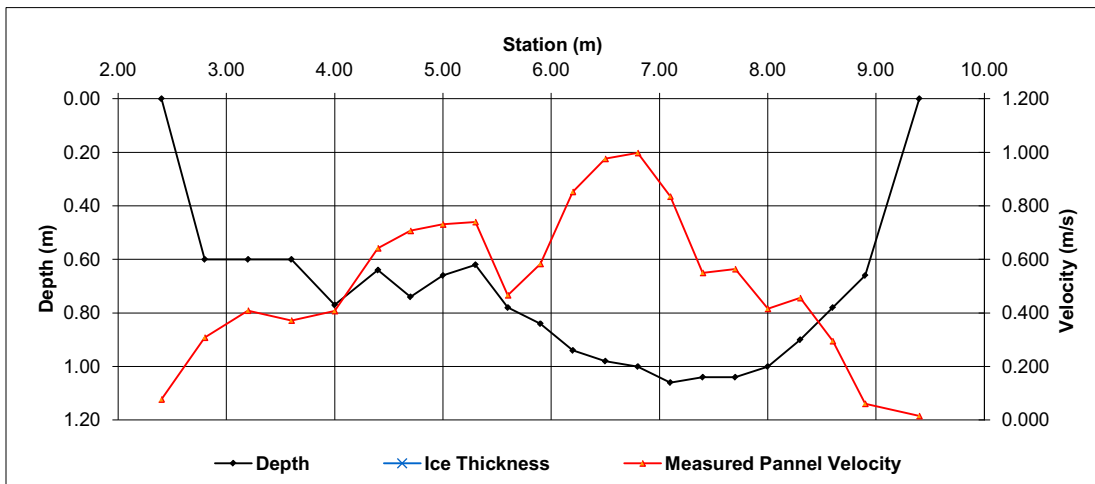
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 2.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.40 | 2.60 | 0.20 | 0.15 | 0.077 | 0.077 | 0.03 | 0.002 | 0% | |
| 1 | 2.80 | 0.60 | | 0.308 | | | 1.0 | 2.60 | 3.00 | 0.40 | 0.60 | 0.308 | 0.308 | 0.24 | 0.074 | 2% | |
| 2 | 3.20 | 0.60 | | 0.409 | | | 1.0 | 3.00 | 3.40 | 0.40 | 0.60 | 0.409 | 0.409 | 0.24 | 0.088 | 3% | |
| 3 | 3.60 | 0.60 | | 0.372 | | | 1.0 | 3.40 | 3.80 | 0.40 | 0.60 | 0.372 | 0.372 | 0.24 | 0.089 | 3% | |
| 4 | 4.00 | 0.77 | | | 0.246 | 0.569 | 1.0 | 3.80 | 4.20 | 0.40 | 0.77 | 0.408 | 0.408 | 0.31 | 0.126 | 4% | |
| 5 | 4.40 | 0.64 | | 0.642 | | | 1.0 | 4.20 | 4.55 | 0.35 | 0.64 | 0.642 | 0.642 | 0.22 | 0.144 | 5% | |
| 6 | 4.70 | 0.74 | | 0.707 | | | 1.0 | 4.55 | 4.85 | 0.30 | 0.74 | 0.707 | 0.707 | 0.22 | 0.157 | 5% | |
| 7 | 5.00 | 0.66 | | 0.731 | | | 1.0 | 4.85 | 5.15 | 0.30 | 0.66 | 0.731 | 0.731 | 0.20 | 0.145 | 5% | |
| 8 | 5.30 | 0.62 | | 0.740 | | | 1.0 | 5.15 | 5.45 | 0.30 | 0.62 | 0.740 | 0.740 | 0.19 | 0.138 | 5% | |
| 9 | 5.60 | 0.78 | | | 0.101 | 0.832 | 1.0 | 5.45 | 5.75 | 0.30 | 0.78 | 0.467 | 0.467 | 0.23 | 0.109 | 4% | |
| 10 | 5.90 | 0.84 | | | 0.215 | 0.952 | 1.0 | 5.75 | 6.05 | 0.30 | 0.84 | 0.584 | 0.584 | 0.25 | 0.147 | 5% | |
| 11 | 6.20 | 0.94 | | | 0.871 | 0.834 | 1.0 | 6.05 | 6.35 | 0.30 | 0.94 | 0.853 | 0.853 | 0.28 | 0.240 | 8% | |
| 12 | 6.50 | 0.98 | | | 1.054 | 0.898 | 1.0 | 6.35 | 6.65 | 0.30 | 0.98 | 0.976 | 0.976 | 0.29 | 0.287 | 9.56% | |
| 13 | 6.80 | 1.00 | | | 0.971 | 1.025 | 1.0 | 6.65 | 6.95 | 0.30 | 1.00 | 0.998 | 0.998 | 0.30 | 0.299 | 9.97% | |
| 14 | 7.10 | 1.06 | | | 0.574 | 1.096 | 1.0 | 6.95 | 7.25 | 0.30 | 1.06 | 0.835 | 0.835 | 0.32 | 0.266 | 9% | |
| 15 | 7.40 | 1.04 | | | 0.136 | 0.964 | 1.0 | 7.25 | 7.55 | 0.30 | 1.04 | 0.550 | 0.550 | 0.31 | 0.172 | 6% | |
| 16 | 7.70 | 1.04 | | | 0.090 | 1.038 | 1.0 | 7.55 | 7.85 | 0.30 | 1.04 | 0.564 | 0.564 | 0.31 | 0.176 | 6% | |
| 17 | 8.00 | 1.00 | | | -0.040 | 0.871 | 1.0 | 7.85 | 8.15 | 0.30 | 1.00 | 0.416 | 0.416 | 0.30 | 0.125 | 4% | |
| 18 | 8.30 | 0.90 | | | -0.091 | 1.003 | 1.0 | 8.15 | 8.45 | 0.30 | 0.90 | 0.456 | 0.456 | 0.27 | 0.123 | 4% | |
| 19 | 8.60 | 0.78 | | | -0.031 | 0.621 | 1.0 | 8.45 | 8.75 | 0.30 | 0.78 | 0.295 | 0.295 | 0.23 | 0.069 | 2% | |
| 20 | 8.90 | 0.66 | | 0.061 | | | 1.0 | 8.75 | 9.15 | 0.40 | 0.66 | 0.061 | 0.061 | 0.26 | 0.016 | 1% | |
| Right | 9.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 9.15 | 9.40 | 0.25 | 0.17 | 0.015 | 0.015 | 0.04 | 0.001 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 3.002 | | |

*denotes position of TSS sample

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 3.002 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 5.30 | (m ²) |
| Wetted Width: | 7.00 | (m) |
| Hydraulic Depth: | 0.757 | (m) |
| Mean Velocity: | 0.566 | (m/s) |
| Foude Number: | 0.208 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S22 - Muskeg Creek near the mouth (481036 E, 6348856 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 31-Oct-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|----------|
| Logger Details: | |
| Transducer Reading: | 0.834587 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 14.48 |
| Datalogger Clock: | 1305 |
| Laptop Clock: | 1322 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 4% |
| Dessicant: | OK |
| Logger# (if Δ): | - |
| PT# (if Δ): | 208 |
| Other Logger Notes: | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 1320 |
| End Time (MST): | 1356 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Sunny |

| Level Survey: | | | | | | |
|----------------------|----------------------------|----------|---------|----------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar on RH bank nr mast | 0.413 | 306.476 | 0.408 | 306.476 | - |
| Bench Mark 2: | Nail in tree w/orange flag | 1.675 | 305.225 | 1.671 | 305.225 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 3.434 | 303.455 | 3.428 | 303.456 | 303.456 |
| Transducer: | | 0.834587 | 302.620 | 0.834587 | 302.621 | 302.621 |
| Other: | | | | | | |

General Notes:

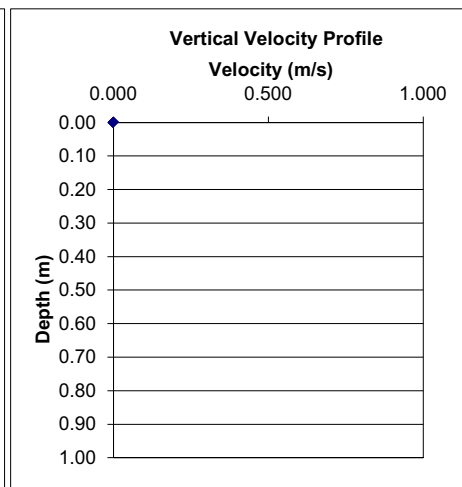
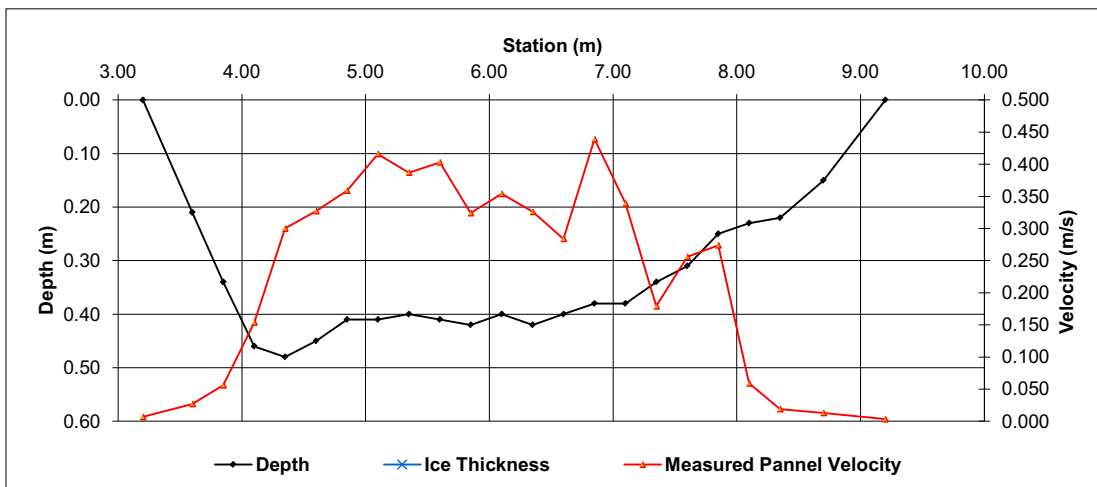
TSS @ 6m. Flow taken between Orange Posts, good location.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 3.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.20 | 3.40 | 0.20 | 0.05 | 0.007 | 0.007 | 0.01 | 0.000 | 0% |
| 1 | 3.60 | 0.21 | | 0.027 | | | 1.0 | 3.40 | 3.73 | 0.33 | 0.21 | 0.027 | 0.027 | 0.07 | 0.002 | 0% |
| 2 | 3.85 | 0.34 | | 0.056 | | | 1.0 | 3.73 | 3.98 | 0.25 | 0.34 | 0.056 | 0.056 | 0.08 | 0.005 | 1% |
| 3 | 4.10 | 0.46 | | 0.154 | | | 1.0 | 3.98 | 4.23 | 0.25 | 0.46 | 0.154 | 0.154 | 0.12 | 0.018 | 3% |
| 4 | 4.35 | 0.48 | | 0.300 | | | 1.0 | 4.23 | 4.48 | 0.25 | 0.48 | 0.300 | 0.300 | 0.12 | 0.036 | 7% |
| 5 | 4.60 | 0.45 | | 0.327 | | | 1.0 | 4.48 | 4.73 | 0.25 | 0.45 | 0.327 | 0.327 | 0.11 | 0.037 | 7% |
| 6 | 4.85 | 0.41 | | 0.359 | | | 1.0 | 4.73 | 4.98 | 0.25 | 0.41 | 0.359 | 0.359 | 0.10 | 0.037 | 7% |
| 7 | 5.10 | 0.41 | | 0.416 | | | 1.0 | 4.98 | 5.23 | 0.25 | 0.41 | 0.416 | 0.416 | 0.10 | 0.043 | 8% |
| 8 | 5.35 | 0.40 | | 0.387 | | | 1.0 | 5.23 | 5.48 | 0.25 | 0.40 | 0.387 | 0.387 | 0.10 | 0.039 | 7% |
| 9 | 5.60 | 0.41 | | 0.403 | | | 1.0 | 5.48 | 5.73 | 0.25 | 0.41 | 0.403 | 0.403 | 0.10 | 0.041 | 8% |
| 10 | 5.85 | 0.42 | | 0.324 | | | 1.0 | 5.73 | 5.98 | 0.25 | 0.42 | 0.324 | 0.324 | 0.11 | 0.034 | 7% |
| 11 | 6.10 | 0.40 | | 0.354 | | | 1.0 | 5.98 | 6.23 | 0.25 | 0.40 | 0.354 | 0.354 | 0.10 | 0.035 | 7% |
| 12 | 6.35 | 0.42 | | 0.326 | | | 1.0 | 6.23 | 6.48 | 0.25 | 0.42 | 0.326 | 0.326 | 0.11 | 0.034 | 7% |
| 13 | 6.60 | 0.40 | | 0.284 | | | 1.0 | 6.48 | 6.73 | 0.25 | 0.40 | 0.284 | 0.284 | 0.10 | 0.028 | 5% |
| 14 | 6.85 | 0.38 | | 0.439 | | | 1.0 | 6.73 | 6.98 | 0.25 | 0.38 | 0.439 | 0.439 | 0.10 | 0.042 | 8% |
| 15 | 7.10 | 0.38 | | 0.339 | | | 1.0 | 6.98 | 7.23 | 0.25 | 0.38 | 0.339 | 0.339 | 0.10 | 0.032 | 6% |
| 16 | 7.35 | 0.34 | | 0.179 | | | 1.0 | 7.23 | 7.48 | 0.25 | 0.34 | 0.179 | 0.179 | 0.09 | 0.015 | 3% |
| 17 | 7.60 | 0.31 | | 0.256 | | | 1.0 | 7.48 | 7.73 | 0.25 | 0.31 | 0.256 | 0.256 | 0.08 | 0.020 | 4% |
| 18 | 7.85 | 0.25 | | 0.274 | | | 1.0 | 7.73 | 7.98 | 0.25 | 0.25 | 0.274 | 0.274 | 0.06 | 0.017 | 3% |
| 19 | 8.10 | 0.23 | | 0.059 | | | 1.0 | 7.98 | 8.23 | 0.25 | 0.23 | 0.059 | 0.059 | 0.06 | 0.003 | 1% |
| 20 | 8.35 | 0.22 | | 0.019 | | | 1.0 | 8.23 | 8.53 | 0.30 | 0.22 | 0.019 | 0.019 | 0.07 | 0.001 | 0% |
| 21 | 8.70 | 0.15 | | 0.013 | | | 1.0 | 8.53 | 8.95 | 0.43 | 0.15 | 0.013 | 0.013 | 0.06 | 0.001 | 0% |
| Right | 9.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 8.95 | 9.20 | 0.25 | 0.04 | 0.003 | 0.003 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.520 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.520 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 1.94 | (m ²) |
| Wetted Width: | 6.00 | (m) |
| Hydraulic Depth: | 0.323 | (m) |
| Mean Velocity: | 0.268 | (m/s) |
| Foude Number: | 0.151 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S24 - Athabasca River below Eymundson Creek (466313 E, 6372760 N) | | | |
| Field Personnel: | SG, CE | Trip Date: | 20-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

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|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 2.507 |
| Battery (Main): | 4.66 |
| Battery (Aux): | 12.53 |
| Datalogger Clock: | 825 |
| Laptop Clock: | 855 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 7% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

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|------------------------------|---------------------------|
| Measurement Details: | |
| Start Time (MST): | 1030 |
| End Time (MST): | 1100 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast, light snow, -5C |

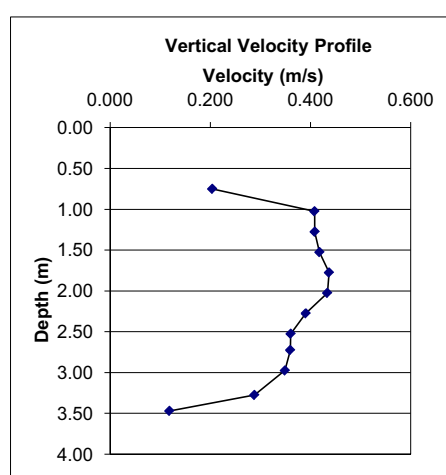
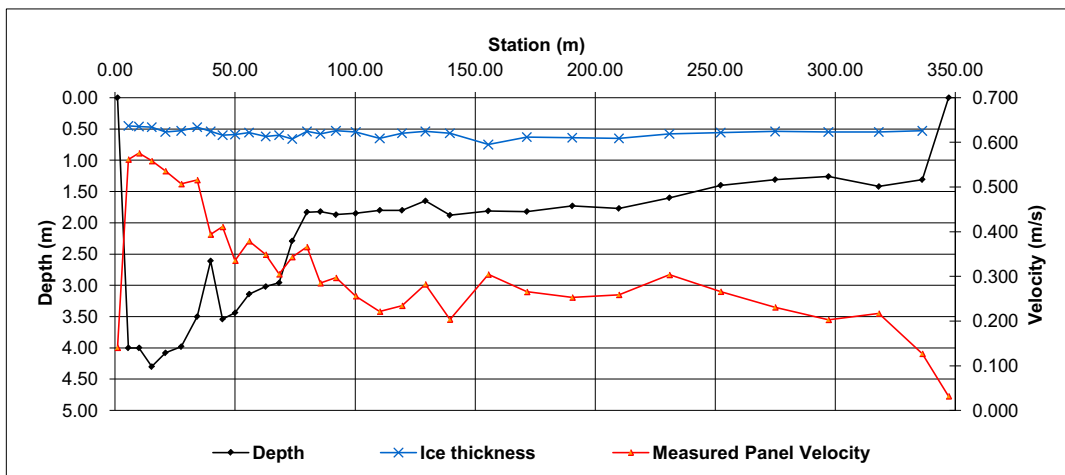
| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar 1m tall | 0.242 | 231.347 | 0.148 | 231.347 | - |
| Bench Mark 2: | Nail in birch tree | 0.504 | 231.096 | 0.408 | 231.096 | - |
| Top of Ice: | | 5.503 | 226.086 | 5.410 | 226.085 | 226.086 |
| Water Level: | | 5.526 | 226.074 | 5.430 | 226.074 | 226.074 |
| Transducer: | 14528 | 2.507 | 223.567 | 2.507 | 223.567 | 223.567 |
| Other: | Spare Transducer | | 226.074 | | 226.074 | 226.074 |

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| General Notes: |
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| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|------------------|-------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m²) | Pannel Discharge (m³/s) | Percentage of total flow | |
| Left | 1.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.00 | 3.25 | 2.25 | 0.89 | 0.141 | 0.141 | 2.00 | 0.281 | 0% | |
| 1 | 5.50 | 4.00 | 0.45 | 0.595 | 0.529 | | 1.0 | 3.25 | 7.75 | 4.50 | 3.55 | 0.562 | 0.562 | 15.98 | 8.978 | 5% | |
| 2 | 10.00 | 4.00 | 0.46 | 0.610 | 0.542 | | 1.0 | 7.75 | 12.63 | 4.88 | 3.54 | 0.576 | 0.576 | 17.26 | 9.940 | 6% | |
| 3 | 15.25 | 4.30 | 0.47 | 0.586 | 0.531 | | 1.0 | 12.63 | 18.10 | 5.48 | 3.83 | 0.559 | 0.559 | 20.97 | 11.711 | 7% | |
| 4 | 20.95 | 4.08 | 0.55 | 0.551 | 0.521 | | 1.0 | 18.10 | 24.25 | 6.15 | 3.53 | 0.536 | 0.536 | 21.71 | 11.636 | 7% | |
| 5 | 27.55 | 3.98 | 0.53 | 0.512 | 0.502 | | 1.0 | 24.25 | 30.88 | 6.63 | 3.45 | 0.507 | 0.507 | 22.86 | 11.588 | 7% | |
| 6 | 34.20 | 3.50 | 0.47 | 0.556 | 0.476 | | 1.0 | 30.88 | 36.98 | 6.10 | 3.03 | 0.516 | 0.516 | 18.48 | 9.537 | 6% | |
| 7 | 39.75 | 2.61 | 0.54 | 0.378 | 0.410 | | 1.0 | 36.98 | 42.28 | 5.30 | 2.07 | 0.394 | 0.394 | 10.97 | 4.323 | 3% | |
| 8 | 44.80 | 3.54 | 0.60 | 0.396 | 0.426 | | 1.0 | 42.28 | 47.40 | 5.13 | 2.94 | 0.411 | 0.411 | 15.07 | 6.193 | 4% | |
| 9 | 50.00 | 3.44 | 0.59 | 0.321 | 0.350 | | 1.0 | 47.40 | 52.93 | 5.53 | 2.85 | 0.336 | 0.336 | 15.75 | 5.283 | 3% | |
| 10 | 55.85 | 3.14 | 0.56 | 0.376 | 0.382 | | 1.0 | 52.93 | 59.30 | 6.38 | 2.58 | 0.379 | 0.379 | 16.45 | 6.234 | 4% | |
| 11 | 62.75 | 3.02 | 0.62 | 0.326 | 0.372 | | 1.0 | 59.30 | 65.55 | 6.25 | 2.40 | 0.349 | 0.349 | 15.00 | 5.235 | 3% | |
| 12 | 68.35 | 2.96 | 0.60 | 0.360 | 0.250 | | 1.0 | 65.55 | 71.05 | 5.50 | 2.36 | 0.305 | 0.305 | 12.98 | 3.959 | 2% | |
| 13 | 73.75 | 2.29 | 0.66 | 0.340 | 0.347 | | 1.0 | 71.05 | 76.83 | 5.78 | 1.63 | 0.344 | 0.344 | 9.41 | 3.233 | 2% | |
| 14 | 79.90 | 1.83 | 0.54 | 0.382 | 0.350 | | 1.0 | 76.83 | 82.70 | 5.88 | 1.29 | 0.366 | 0.366 | 7.58 | 2.774 | 2% | |
| 15 | 85.50 | 1.82 | 0.58 | 0.285 | 0.285 | | 1.0 | 82.70 | 88.75 | 6.05 | 1.24 | 0.285 | 0.285 | 7.50 | 2.138 | 1% | |
| 16 | 92.00 | 1.87 | 0.53 | 0.318 | 0.276 | | 1.0 | 88.75 | 96.13 | 7.38 | 1.34 | 0.297 | 0.297 | 9.88 | 2.935 | 2% | |
| 17 | 100.25 | 1.85 | 0.55 | 0.226 | 0.286 | | 1.0 | 96.13 | 105.25 | 9.13 | 1.30 | 0.256 | 0.256 | 11.86 | 3.037 | 2% | |
| 18 | 110.25 | 1.80 | 0.65 | 0.222 | 0.221 | | 1.0 | 105.25 | 114.90 | 9.65 | 1.15 | 0.222 | 0.222 | 11.10 | 2.458 | 1% | |
| 19 | 119.55 | 1.80 | 0.57 | 0.235 | 0.234 | | 1.0 | 114.90 | 124.40 | 9.50 | 1.23 | 0.235 | 0.235 | 11.69 | 2.740 | 2% | |
| 20 | 129.25 | 1.65 | 0.54 | 0.230 | 0.335 | | 1.0 | 124.40 | 134.35 | 9.95 | 1.11 | 0.283 | 0.283 | 11.04 | 3.120 | 2% | |
| 21 | 139.45 | 1.88 | 0.57 | 0.151 | 0.256 | | 1.0 | 134.35 | 147.45 | 13.10 | 1.31 | 0.204 | 0.204 | 17.16 | 3.492 | 2% | |
| 22 | 155.45 | 1.81 | 0.75 | 0.316 | 0.293 | | 1.0 | 147.45 | 163.50 | 16.05 | 1.06 | 0.305 | 0.305 | 17.01 | 5.180 | 3% | |
| 23 | 171.55 | 1.82 | 0.63 | 0.254 | 0.277 | | 1.0 | 163.50 | 181.00 | 17.50 | 1.19 | 0.266 | 0.266 | 20.83 | 5.529 | 3% | |
| 24 | 190.45 | 1.73 | 0.64 | 0.255 | 0.251 | | 1.0 | 181.00 | 200.15 | 19.15 | 1.09 | 0.253 | 0.253 | 20.87 | 5.281 | 3% | |
| 25 | 209.85 | 1.77 | 0.65 | 0.265 | 0.253 | | 1.0 | 200.15 | 220.38 | 20.23 | 1.12 | 0.259 | 0.259 | 22.65 | 5.867 | 4% | |
| 26 | 230.90 | 1.60 | 0.58 | 0.266 | 0.341 | | 1.0 | 220.38 | 241.58 | 21.20 | 1.02 | 0.304 | 0.304 | 21.62 | 6.563 | 4% | |
| 27 | 252.25 | 1.40 | 0.56 | 0.266 | | | 0.9 | 241.58 | 263.60 | 22.03 | 0.84 | 0.266 | 0.266 | 18.50 | 4.429 | 3% | |
| 28 | 274.95 | 1.31 | 0.54 | 0.231 | | | 0.9 | 263.60 | 286.05 | 22.45 | 0.77 | 0.231 | 0.231 | 17.29 | 3.594 | 2% | |
| 29 | 297.15 | 1.26 | 0.55 | 0.203 | | | 0.9 | 286.05 | 307.65 | 21.60 | 0.71 | 0.203 | 0.183 | 15.34 | 2.802 | 2% | |
| 30 | 318.15 | 1.42 | 0.55 | 0.217 | | | 0.9 | 307.65 | 327.20 | 19.55 | 0.87 | 0.217 | 0.195 | 17.01 | 3.322 | 2% | |
| 31 | 336.25 | 1.31 | 0.53 | 0.127 | | | 0.9 | 327.20 | 341.75 | 14.55 | 0.78 | 0.127 | 0.114 | 11.35 | 1.297 | 1% | |
| Right | 347.25 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 341.75 | 347.25 | 5.50 | 0.20 | 0.032 | 0.032 | 1.07 | 0.034 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 164.723 | | |

| | | |
|--------------------------------|---------|--------|
| Flow characteristics: | | |
| Total Flow: | 164.723 | (m³/s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 486.23 | (m²) |
| Wetted Width: | 346.25 | (m) |
| Hydraulic Depth: | 1.404 | (m) |
| Mean Velocity: | 0.339 | (m/s) |
| Froude Number: | 0.091 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.311 |
| Offset | 44.8 | 3.54 | 0 | - | - | Panel V.@Ofst |
| Depth | 3.54 | 3.40 | 0.237 | 3.47 | 0.119 | 60% Depth |
| Ice Depth | 0.6 | 3.15 | 0.339 | 3.28 | 0.288 | 20% Depth |
| | | 2.80 | 0.359 | 2.98 | 0.349 | 80% Depth |
| | | 2.65 | 0.360 | 2.73 | 0.360 | |
| | | 2.40 | 0.361 | 2.53 | 0.361 | |
| | | 2.15 | 0.42 | 2.28 | 0.391 | |
| | | 1.90 | 0.447 | 2.03 | 0.434 | |
| | | 1.65 | 0.427 | 1.78 | 0.437 | |
| | | 1.4 | 0.409 | 1.53 | 0.418 | |
| | | 1.15 | 0.408 | 1.28 | 0.409 | |
| | | 0.9 | 0.408 | 1.03 | 0.408 | |
| | | 0.6 | 0 | 0.75 | 0.204 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S24 - Athabasca River below Eymundson Creek (466313 E, 6372760 N) | | | |
| Field Personnel: | JE, SG, Josh Pilot | Trip Date: | 05-Mar-10 |
| Data Entry Personnel: | SG | Date: | 18-Mar-10 |
| Data Check Personnel: | JP | Date: | 02-Jun-10 |

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|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 2.482 |
| Battery (Main): | 4.67 |
| Battery (Aux): | 14.72 |
| Datalogger Clock: | 825 |
| Laptop Clock: | 826 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 11% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 945 |
| End Time (MST): | 1035 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Sunny 5°C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar 1m tall | 0.277 | 231.347 | 0.284 | 231.347 | - |
| Bench Mark 2: | Nail in birch tree | 0.538 | 231.096 | 0.546 | 231.096 | - |
| Top of Ice: | | 5.533 | 226.091 | 5.546 | 226.085 | 226.088 |
| Water Level: | | 5.570 | 226.064 | 5.580 | 226.062 | 226.063 |
| Transducer: | 14528 | 2.482 | 223.582 | 2.482 | 223.580 | 223.581 |
| Other: | | | | | | 0.000 |

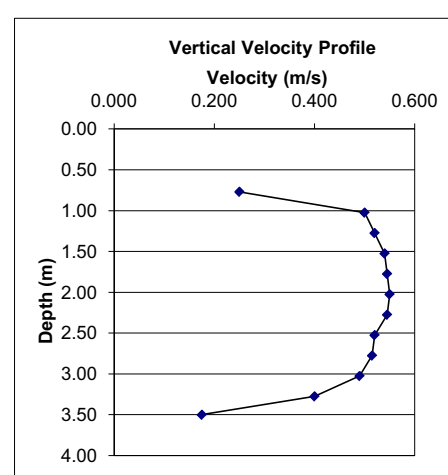
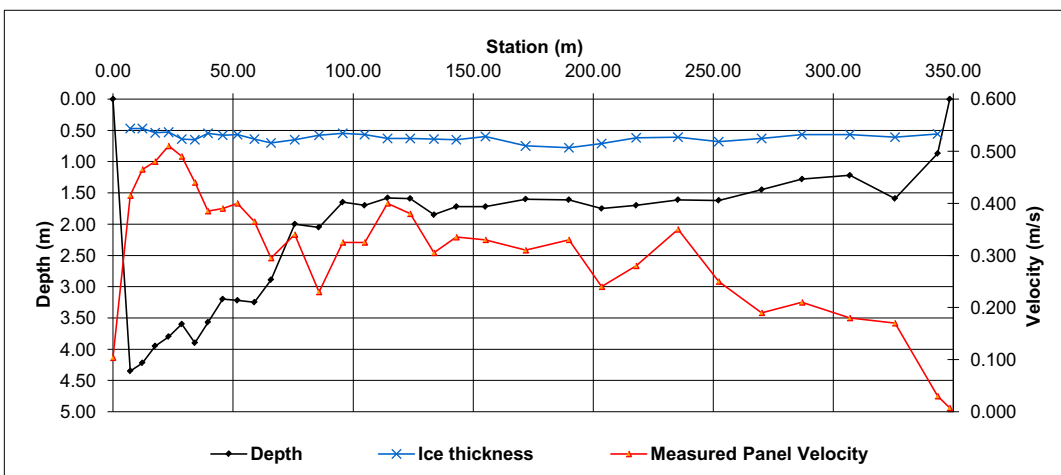
| |
|-----------------------|
| General Notes: |
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| Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|------------------|-------------------------|--------------------------|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m²) | Pannel Discharge (m³/s) | Percentage of total flow | | |
| Left | 0.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | 3.60 | 3.60 | 0.97 | 0.104 | 0.104 | 3.49 | 0.362 | 0% | | |
| 1 | 7.20 | 4.35 | 0.47 | | 0.380 | 0.450 | 1.0 | 3.60 | 9.70 | 6.10 | 3.88 | 0.415 | 0.415 | 23.67 | 9.822 | 6% | | |
| 2 | 12.20 | 4.22 | 0.47 | | 0.400 | 0.530 | 1.0 | 9.70 | 14.85 | 5.15 | 3.75 | 0.465 | 0.465 | 19.31 | 8.980 | 6% | | |
| 3 | 17.50 | 3.95 | 0.54 | | 0.440 | 0.520 | 1.0 | 14.85 | 20.30 | 5.45 | 3.41 | 0.480 | 0.480 | 18.58 | 8.921 | 6% | | |
| 4 | 23.10 | 3.80 | 0.53 | | 0.420 | 0.600 | 1.0 | 20.30 | 25.85 | 5.55 | 3.27 | 0.510 | 0.510 | 18.15 | 9.256 | 6% | | |
| 5 | 28.60 | 3.60 | 0.64 | | 0.430 | 0.550 | 1.0 | 25.85 | 31.35 | 5.50 | 2.96 | 0.490 | 0.490 | 16.28 | 7.977 | 5% | | |
| 6 | 34.10 | 3.90 | 0.65 | | 0.380 | 0.500 | 1.0 | 31.35 | 36.80 | 5.45 | 3.25 | 0.440 | 0.440 | 17.71 | 7.793 | 5% | | |
| 7 | 39.50 | 3.57 | 0.55 | | 0.330 | 0.440 | 1.0 | 36.80 | 42.58 | 5.78 | 3.02 | 0.385 | 0.385 | 17.44 | 6.715 | 4% | | |
| 8 | 45.65 | 3.20 | 0.58 | | 0.370 | 0.410 | 1.0 | 42.58 | 48.73 | 6.15 | 2.62 | 0.390 | 0.390 | 16.11 | 6.284 | 4% | | |
| 9 | 51.80 | 3.22 | 0.57 | | 0.380 | 0.420 | 1.0 | 48.73 | 55.35 | 6.62 | 2.65 | 0.400 | 0.400 | 17.56 | 7.022 | 5% | | |
| 10 | 58.90 | 3.25 | 0.64 | | 0.370 | 0.360 | 1.0 | 55.35 | 62.35 | 7.00 | 2.61 | 0.365 | 0.365 | 18.27 | 6.669 | 4% | | |
| 11 | 65.80 | 2.89 | 0.70 | | 0.270 | 0.320 | 1.0 | 62.35 | 70.75 | 8.40 | 2.19 | 0.295 | 0.295 | 18.40 | 5.427 | 4% | | |
| 12 | 75.70 | 2.00 | 0.65 | | 0.320 | 0.360 | 1.0 | 70.75 | 80.73 | 9.97 | 1.35 | 0.340 | 0.340 | 13.47 | 4.579 | 3% | | |
| 13 | 85.75 | 2.05 | 0.58 | | 0.210 | 0.250 | 1.0 | 80.73 | 90.70 | 9.98 | 1.47 | 0.230 | 0.230 | 14.66 | 3.373 | 2% | | |
| 14 | 95.65 | 1.65 | 0.55 | | 0.310 | 0.340 | 1.0 | 90.70 | 100.23 | 9.52 | 1.10 | 0.325 | 0.325 | 10.48 | 3.405 | 2% | | |
| 15 | 104.80 | 1.70 | 0.57 | | 0.310 | 0.340 | 1.0 | 100.23 | 109.58 | 9.35 | 1.13 | 0.325 | 0.325 | 10.57 | 3.434 | 2% | | |
| 16 | 114.35 | 1.58 | 0.63 | 0.400 | | | 0.9 | 109.58 | 119.05 | 9.48 | 0.95 | 0.400 | 0.360 | 9.00 | 3.240 | 2% | | |
| 17 | 123.75 | 1.59 | 0.63 | 0.380 | | | 0.9 | 119.05 | 128.73 | 9.68 | 0.96 | 0.380 | 0.342 | 9.29 | 3.176 | 2% | | |
| 18 | 133.70 | 1.85 | 0.64 | | 0.290 | 0.320 | 1.0 | 128.73 | 138.35 | 9.63 | 1.21 | 0.305 | 0.305 | 11.65 | 3.552 | 2% | | |
| 19 | 143.00 | 1.72 | 0.65 | | 0.330 | 0.340 | 1.0 | 138.35 | 149.08 | 10.73 | 1.07 | 0.335 | 0.335 | 11.48 | 3.844 | 2% | | |
| 20 | 155.15 | 1.72 | 0.60 | | 0.320 | 0.340 | 1.0 | 149.08 | 163.50 | 14.43 | 1.12 | 0.330 | 0.330 | 16.16 | 5.331 | 3% | | |
| 21 | 171.85 | 1.60 | 0.75 | 0.310 | | | 0.9 | 163.50 | 180.85 | 17.35 | 0.85 | 0.310 | 0.279 | 14.75 | 4.115 | 3% | | |
| 22 | 189.85 | 1.61 | 0.78 | 0.330 | | | 0.9 | 180.85 | 196.70 | 15.85 | 0.83 | 0.330 | 0.297 | 13.16 | 3.907 | 3% | | |
| 23 | 203.55 | 1.75 | 0.71 | | 0.230 | 0.250 | 1.0 | 196.70 | 210.73 | 14.03 | 1.04 | 0.240 | 0.240 | 14.59 | 3.501 | 2% | | |
| 24 | 217.90 | 1.70 | 0.62 | | 0.270 | 0.290 | 1.0 | 210.73 | 226.60 | 15.88 | 1.08 | 0.280 | 0.280 | 17.15 | 4.801 | 3% | | |
| 25 | 235.30 | 1.61 | 0.61 | | 0.370 | 0.330 | 1.0 | 226.60 | 243.80 | 17.20 | 1.00 | 0.350 | 0.350 | 17.20 | 6.020 | 4% | | |
| 26 | 252.30 | 1.62 | 0.68 | 0.250 | | | 0.9 | 243.80 | 261.25 | 17.45 | 0.94 | 0.250 | 0.225 | 16.40 | 3.691 | 2% | | |
| 27 | 270.20 | 1.45 | 0.63 | 0.190 | | | 0.9 | 261.25 | 278.60 | 17.35 | 0.82 | 0.190 | 0.171 | 14.23 | 2.433 | 2% | | |
| 28 | 287.00 | 1.28 | 0.57 | 0.210 | | | 0.9 | 278.60 | 296.95 | 18.35 | 0.71 | 0.210 | 0.189 | 13.03 | 2.462 | 2% | | |
| 29 | 306.90 | 1.22 | 0.57 | 0.180 | | | 0.9 | 296.95 | 316.30 | 19.35 | 0.65 | 0.180 | 0.162 | 12.58 | 2.038 | 1% | | |
| 30 | 325.70 | 1.59 | 0.61 | 0.170 | | | 0.9 | 316.30 | 334.60 | 18.30 | 0.98 | 0.170 | 0.153 | 17.93 | 2.744 | 2% | | |
| 31 | 343.50 | 0.87 | 0.56 | 0.030 | | | 0.9 | 334.60 | 346.00 | 11.40 | 0.31 | 0.030 | 0.027 | 3.53 | 0.095 | 0% | | |
| Right | 348.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 346.00 | 348.50 | 2.50 | 0.08 | 0.008 | 0.008 | 0.19 | 0.001 | 0% | | |
| Total Flow | | | | | | | | | | | | | | | 154.970 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|---------|--------|
| Flow characteristics: | | |
| Total Flow: | 154.970 | (m³/s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 466.45 | (m²) |
| Wetted Width: | 348.50 | (m) |
| Hydraulic Depth: | 1.338 | (m) |
| Mean Velocity: | 0.332 | (m/s) |
| Froude Number: | 0.092 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.441 |
| Offset | 28.6 | 3.60 | 0.000 | - | - | Panel V.@Ofst 0.490 |
| Depth | 3.6 | 3.40 | 0.350 | 3.50 | 0.175 | 60% Depth 2.416 |
| Ice Depth | 0.64 | 3.15 | 0.450 | 3.28 | 0.400 | 20% Depth 1.23 |
| | | 2.90 | 0.530 | 3.03 | 0.490 | 80% Depth 3.01 |
| | | 2.65 | 0.500 | 2.78 | 0.515 | |
| | | 2.40 | 0.540 | 2.53 | 0.520 | |
| | | 2.15 | 0.550 | 2.28 | 0.545 | |
| | | 1.90 | 0.550 | 2.03 | 0.550 | |
| | | 1.65 | 0.540 | 1.78 | 0.545 | |
| | | 1.40 | 0.540 | 1.53 | 0.540 | |
| | | 1.15 | 0.500 | 1.28 | 0.520 | |
| | | 0.90 | 0.500 | 1.03 | 0.500 | |
| | | 0.64 | 0.000 | 0.77 | 0.250 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|---------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S24 - Athabasca River below Eymundson Creek (466313 E, 6372760 N) | | | |
| Field Personnel: | DB BL Arnie H | Trip Date: | 28-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 14-Jul-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 3.561 |
| Battery (Main): | 4.77 |
| Battery (Aux): | 13.97 |
| Datalogger Clock: | 927 |
| Laptop Clock: | 932 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 20% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 930 |
| End Time (MST): | 1200 |
| Equipment: | Crane+Marsh |
| Method: | Boat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar 1m tall | 0.377 | 231.347 | 0.373 | 231.347 | - |
| Bench Mark 2: | Nail in birch tree | 0.642 | 231.096 | 0.639 | 231.096 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 4.589 | 227.149 | 4.587 | 227.148 | 227.149 |
| Transducer: | 14528 | 3.561 | 223.588 | 3.561 | 223.587 | 223.588 |
| Other: | | | | | | 0.000 |

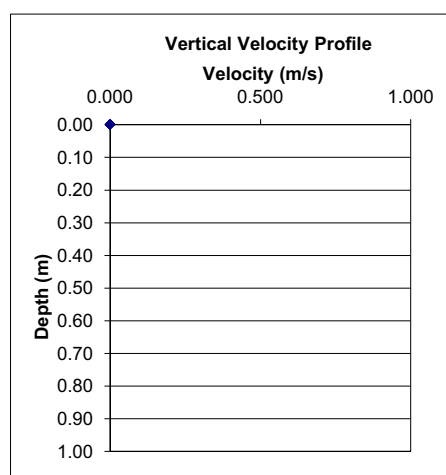
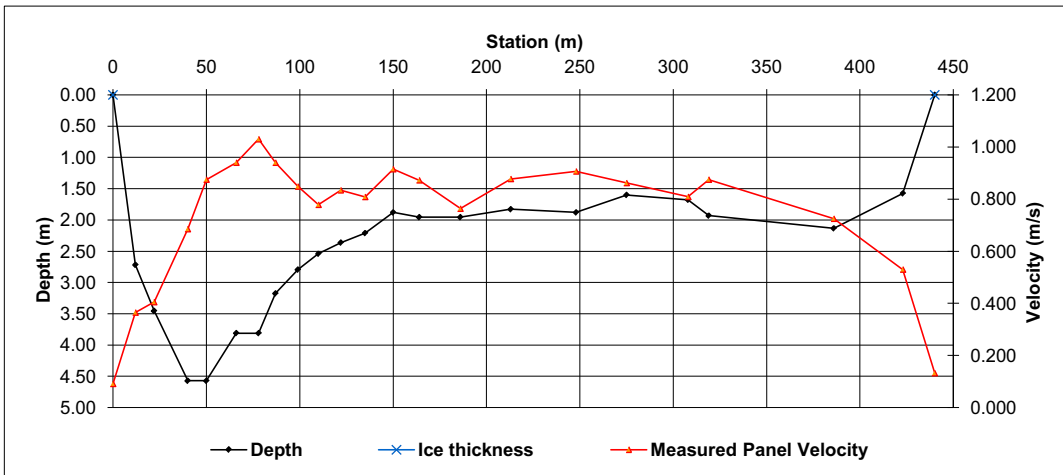
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | 6.00 | 6.00 | 0.68 | 0.091 | 0.091 | 4.08 | 0.372 | 0% |
| 1 | 12 | 2.72 | | 0.33 | 0.40 | | 1.0 | 6.00 | 17.00 | 11.00 | 2.72 | 0.365 | 0.365 | 29.89 | 10.911 | 1% |
| 2 | 22 | 3.45 | | 0.38 | 0.43 | | 1.0 | 17.00 | 31.00 | 14.00 | 3.45 | 0.405 | 0.405 | 48.36 | 19.586 | 2% |
| 3 | 40 | 4.57 | | 0.64 | 0.73 | | 1.0 | 31.00 | 45.00 | 14.00 | 4.57 | 0.685 | 0.685 | 64.01 | 43.845 | 6% |
| 4 | 50 | 4.57 | | 0.81 | 0.94 | | 1.0 | 45.00 | 58.00 | 13.00 | 4.57 | 0.875 | 0.875 | 59.44 | 52.007 | 7% |
| 5 | 66 | 3.81 | | 0.84 | 1.04 | | 1.0 | 58.00 | 72.00 | 14.00 | 3.81 | 0.940 | 0.940 | 53.34 | 50.140 | 6% |
| 6 | 78 | 3.81 | | 0.91 | 1.15 | | 1.0 | 72.00 | 82.50 | 10.50 | 3.81 | 1.030 | 1.030 | 40.01 | 41.205 | 5% |
| 7 | 87 | 3.18 | | 0.85 | 1.03 | | 1.0 | 82.50 | 93.00 | 10.50 | 3.18 | 0.940 | 0.940 | 33.34 | 31.337 | 4% |
| 8 | 99 | 2.79 | | 0.77 | 0.93 | | 1.0 | 93.00 | 104.50 | 11.50 | 2.79 | 0.849 | 0.849 | 32.13 | 27.263 | 3% |
| 9 | 110 | 2.54 | | 0.63 | 0.93 | | 1.0 | 104.50 | 116.00 | 11.50 | 2.54 | 0.779 | 0.779 | 29.21 | 22.740 | 3% |
| 10 | 122 | 2.36 | | 0.75 | 0.92 | | 1.0 | 116.00 | 128.50 | 12.50 | 2.36 | 0.834 | 0.834 | 29.53 | 24.626 | 3% |
| 11 | 135 | 2.21 | | 0.69 | 0.93 | | 1.0 | 128.50 | 142.50 | 14.00 | 2.21 | 0.809 | 0.809 | 30.94 | 25.013 | 3% |
| 12 | 150 | 1.88 | | 0.84 | 0.99 | | 1.0 | 142.50 | 157.00 | 14.50 | 1.88 | 0.915 | 0.915 | 27.25 | 24.938 | 3% |
| 13 | 164 | 1.96 | | 0.80 | 0.95 | | 1.0 | 157.00 | 175.00 | 18.00 | 1.96 | 0.873 | 0.873 | 35.20 | 30.716 | 4% |
| 14 | 186 | 1.96 | | 0.69 | 0.84 | | 1.0 | 175.00 | 199.50 | 24.50 | 1.96 | 0.764 | 0.764 | 47.92 | 36.585 | 5% |
| 15 | 213 | 1.83 | | 0.81 | 0.95 | | 1.0 | 199.50 | 230.50 | 31.00 | 1.83 | 0.878 | 0.878 | 56.69 | 49.748 | 6% |
| 16 | 248 | 1.88 | | 0.85 | 0.96 | | 1.0 | 230.50 | 261.50 | 31.00 | 1.88 | 0.907 | 0.907 | 58.27 | 52.820 | 7% |
| 17 | 275 | 1.60 | | 0.77 | 0.95 | | 1.0 | 261.50 | 291.50 | 30.00 | 1.60 | 0.862 | 0.862 | 48.01 | 41.381 | 5% |
| 18 | 308 | 1.68 | | 0.70 | 0.92 | | 1.0 | 291.50 | 313.50 | 22.00 | 1.68 | 0.809 | 0.809 | 36.88 | 29.837 | 4% |
| 19 | 319 | 1.93 | | 0.76 | 0.99 | | 1.0 | 313.50 | 352.50 | 39.00 | 1.93 | 0.875 | 0.875 | 75.29 | 65.875 | 8% |
| 20 | 386 | 2.13 | | 0.63 | 0.82 | | 1.0 | 352.50 | 404.50 | 52.00 | 2.13 | 0.725 | 0.725 | 110.95 | 80.437 | 10% |
| 21 | 423 | 1.57 | | 0.43 | 0.63 | | 1.0 | 404.50 | 431.50 | 27.00 | 1.57 | 0.530 | 0.530 | 42.52 | 22.535 | 3% |
| Right | 440.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 431.50 | 440.00 | 8.50 | 0.39 | 0.133 | 0.133 | 3.35 | 0.443 | 0% |
| Total Flow | | | | | | | | | | | | | | 784.359 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|---------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 784.359 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 996.59 | (m ²) |
| Wetted Width: | 440.00 | (m) |
| Hydraulic Depth: | 2.265 | (m) |
| Mean Velocity: | 0.787 | (m/s) |
| Froude Number: | 0.167 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S24 - Athabasca River below Eymundson Creek (466313 E, 6372760 N) | | | |
| Field Personnel: | DB, SG | Trip Date: | 11-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB, SG | Date: | 01-Sep-10 |

| | |
|---------------------------------|---------|
| Logger Details: | |
| WL Acculevel: | 3.070 |
| WL PLS: | 1.040 |
| Battery (Main): | 13.77 |
| Datalogger Clock: | 812 |
| Laptop Clock: | 816 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | - |
| Memory used: | |
| Dessicant: | Changed |
| Logger# (if Δ): | 13899 |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Replaced Data logger with CR800 | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1045 |
| End Time (MST): | 1250 |
| Equipment: | ADC and Crane |
| Method: | Boat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Hot, Sunny |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar 1m tall | 0.123 | 231.347 | 0.093 | 231.347 | - |
| Bench Mark 2: | Nail in birch tree | 0.386 | 231.096 | 0.357 | 231.096 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 4.925 | 226.557 | 4.894 | 226.559 | 226.558 |
| Transducer: | 14528 | 3.070 | 223.487 | 3.070 | 223.489 | 223.488 |
| Other: | PLS | 1.040 | 225.517 | 1.040 | 225.519 | 225.518 |

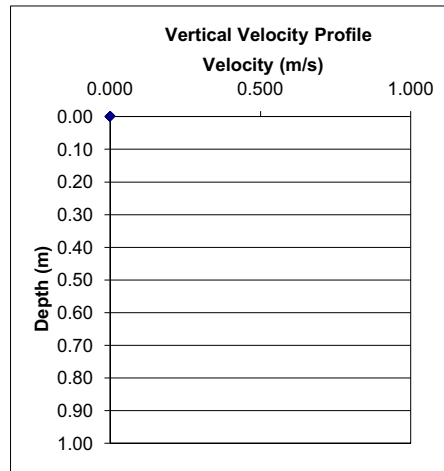
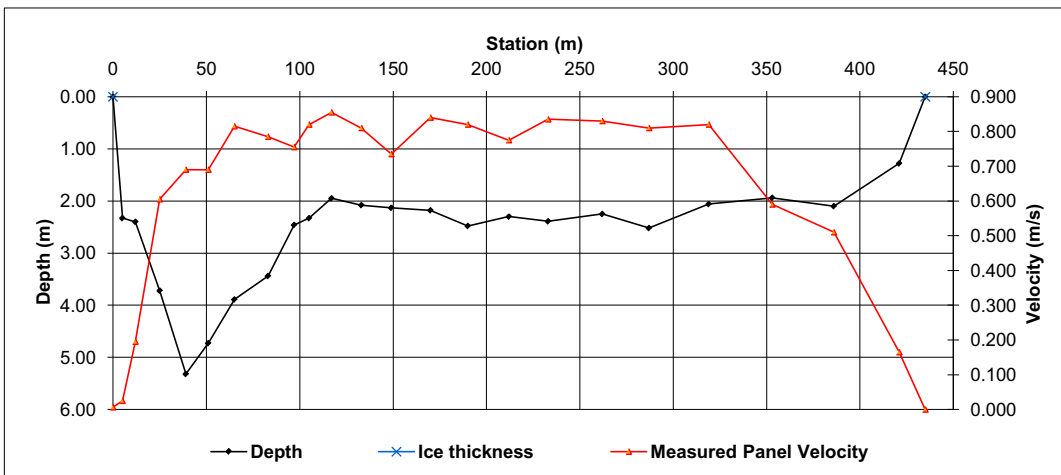
| | |
|---|--|
| General Notes: | |
| Acculevel: m = 2.812356, b = -0.1040572 | |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|---------------|--------------|-------------------------|----------------------------------|----------------------------------|----------------------------------|---|------------------------|----------------------|------------------------|-------------------------------------|---|---|-------------------------------------|--|-----------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.0 | 0.00 | 2.50 | 2.50 | 0.58 | 0.006 | 0.006 | 1.46 | 0.009 | 0% |
| 1 | 5 | 2.33 | | | -0.04 | 0.09 | 1.0 | 2.50 | 8.50 | 6.00 | 2.33 | 0.025 | 0.025 | 13.98 | 0.349 | 0% |
| 2 | 12 | 2.40 | | | 0.24 | 0.15 | 1.0 | 8.50 | 18.50 | 10.00 | 2.40 | 0.195 | 0.195 | 24.00 | 4.680 | 1% |
| 3 | 25 | 3.72 | | | 0.49 | 0.72 | 1.0 | 18.50 | 32.00 | 13.50 | 3.72 | 0.605 | 0.605 | 50.22 | 30.383 | 4% |
| 4 | 39 | 5.32 | | | 0.60 | 0.78 | 1.0 | 32.00 | 45.00 | 13.00 | 5.32 | 0.690 | 0.690 | 69.16 | 47.720 | 6% |
| 5 | 51 | 4.73 | | | 0.66 | 0.72 | 1.0 | 45.00 | 58.00 | 13.00 | 4.73 | 0.690 | 0.690 | 61.49 | 42.428 | 6% |
| 6 | 65 | 3.89 | | | 0.77 | 0.86 | 1.0 | 58.00 | 74.00 | 16.00 | 3.89 | 0.815 | 0.815 | 62.24 | 50.726 | 7% |
| 7 | 83 | 3.44 | | | 0.67 | 0.90 | 1.0 | 74.00 | 90.00 | 16.00 | 3.44 | 0.785 | 0.785 | 55.04 | 43.206 | 6% |
| 8 | 97 | 2.46 | | | 0.63 | 0.88 | 1.0 | 90.00 | 101.00 | 11.00 | 2.46 | 0.755 | 0.755 | 27.06 | 20.430 | 3% |
| 9 | 105 | 2.33 | | | 0.72 | 0.92 | 1.0 | 101.00 | 111.00 | 10.00 | 2.33 | 0.820 | 0.820 | 23.30 | 19.106 | 3% |
| 10 | 117 | 1.95 | | | 0.79 | 0.92 | 1.0 | 111.00 | 125.00 | 14.00 | 1.95 | 0.855 | 0.855 | 27.30 | 23.342 | 3% |
| 11 | 133 | 2.08 | | | 0.76 | 0.86 | 1.0 | 125.00 | 141.00 | 16.00 | 2.08 | 0.810 | 0.810 | 33.28 | 26.957 | 4% |
| 12 | 149 | 2.13 | | | 0.63 | 0.84 | 1.0 | 141.00 | 159.50 | 18.50 | 2.13 | 0.735 | 0.735 | 39.41 | 28.963 | 4% |
| 13 | 170 | 2.18 | | | 0.79 | 0.89 | 1.0 | 159.50 | 180.00 | 20.50 | 2.18 | 0.840 | 0.840 | 44.69 | 37.540 | 5% |
| 14 | 190 | 2.48 | | | 0.73 | 0.91 | 1.0 | 180.00 | 201.00 | 21.00 | 2.48 | 0.820 | 0.820 | 52.08 | 42.706 | 6% |
| 15 | 212 | 2.30 | | | 0.69 | 0.86 | 1.0 | 201.00 | 222.50 | 21.50 | 2.30 | 0.775 | 0.775 | 49.45 | 38.324 | 5% |
| 16 | 233 | 2.39 | | | 0.75 | 0.92 | 1.0 | 222.50 | 247.50 | 25.00 | 2.39 | 0.835 | 0.835 | 59.75 | 49.891 | 7% |
| 17 | 262 | 2.25 | | | 0.84 | 0.82 | 1.0 | 247.50 | 274.50 | 27.00 | 2.25 | 0.830 | 0.830 | 60.75 | 50.423 | 7% |
| 18 | 287 | 2.52 | | | 0.80 | 0.82 | 1.0 | 274.50 | 303.00 | 28.50 | 2.52 | 0.810 | 0.810 | 71.82 | 58.174 | 8% |
| 19 | 319 | 2.06 | | | 0.73 | 0.91 | 1.0 | 303.00 | 336.00 | 33.00 | 2.06 | 0.820 | 0.820 | 67.98 | 55.744 | 7% |
| 20 | 353 | 1.94 | | | 0.50 | 0.68 | 1.0 | 336.00 | 369.50 | 33.50 | 1.94 | 0.590 | 0.590 | 64.99 | 38.344 | 5% |
| 21 | 386 | 2.10 | | | 0.46 | 0.56 | 1.0 | 369.50 | 403.50 | 34.00 | 2.10 | 0.510 | 0.510 | 71.40 | 36.414 | 5% |
| 22 | 421 | 1.28 | | | 0.11 | 0.22 | 1.0 | 403.50 | 428.00 | 24.50 | 1.28 | 0.165 | 0.165 | 31.36 | 5.174 | 1% |
| Right | 435 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.0 | 428.00 | 435.00 | 7.00 | 0.32 | 0.000 | 0.041 | 2.24 | 0.092 | 0% |
| Total Flow | | | | | | | | | | | | | | | 751.125 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 751.125 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 1064.44 | (m ²) |
| Wetted Width: | 435.00 | (m) |
| Hydraulic Depth: | 2.447 | (m) |
| Mean Velocity: | 0.706 | (m/s) |
| Froude Number: | 0.144 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-----------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S24 - Athabasca River below Eymundson Creek (466313 E, 6372760 N) | | | |
| Field Personnel: | DB SG HB Arnie (boat) | Trip Date: | 17-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| WL Acculevel: | 3.277 |
| WL PLS: | 1.544 |
| Battery (Main): | 14.44 |
| Datalogger Clock: | 1038 |
| Laptop Clock: | 1038 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 10°C |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 830 |
| End Time (MST): | 1025 |
| Equipment: | ADC |
| Method: | Boat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly Cloudy |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar 1m tall | 0.235 | 231.347 | 0.206 | 231.347 | - |
| Bench Mark 2: | Nail in birch tree | 0.500 | 231.096 | 0.469 | 231.096 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 4.825 | 226.771 | 4.796 | 226.769 | 226.770 |
| Transducer: | 14528 | 3.277 | 223.494 | 3.277 | 223.492 | 223.493 |
| Other: | PLS | 1.544 | 221.950 | 1.544 | 221.948 | 221.949 |

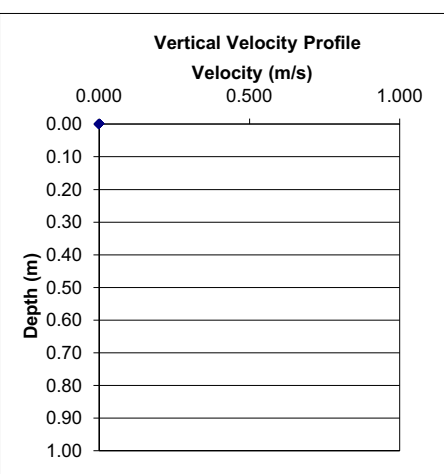
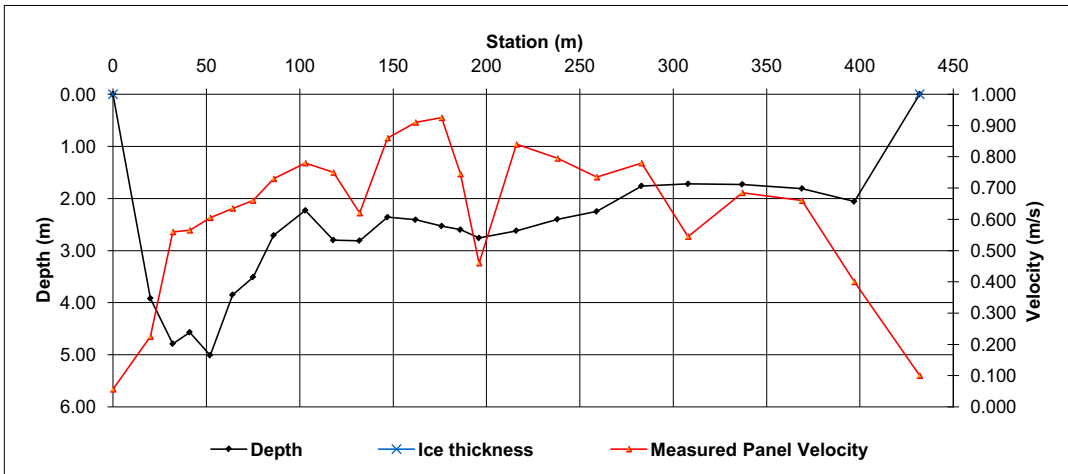
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.0 | 0.00 | 10.00 | 10.00 | 0.98 | 0.056 | 0.056 | 9.80 | 0.551 | 0% |
| 1 | 20 | 3.92 | | | 0.040 | 0.410 | 1.0 | 10.00 | 26.00 | 16.00 | 3.92 | 0.225 | 0.225 | 62.72 | 14.112 | 2% |
| 2 | 32 | 4.79 | | | 0.480 | 0.640 | 1.0 | 26.00 | 36.50 | 10.50 | 4.79 | 0.560 | 0.560 | 50.30 | 28.165 | 4% |
| 3 | 41 | 4.57 | | | 0.500 | 0.630 | 1.0 | 36.50 | 46.50 | 10.00 | 4.57 | 0.565 | 0.565 | 45.70 | 25.821 | 4% |
| 4 | 52 | 5.01 | | | 0.550 | 0.660 | 1.0 | 46.50 | 58.00 | 11.50 | 5.01 | 0.605 | 0.605 | 57.62 | 34.857 | 5% |
| 5 | 64 | 3.85 | | | 0.570 | 0.700 | 1.0 | 58.00 | 69.50 | 11.50 | 3.85 | 0.635 | 0.635 | 44.28 | 28.115 | 4% |
| 6 | 75 | 3.51 | | | 0.600 | 0.720 | 1.0 | 69.50 | 80.50 | 11.00 | 3.51 | 0.660 | 0.660 | 38.61 | 25.483 | 4% |
| 7 | 86 | 2.71 | | | 0.690 | 0.770 | 1.0 | 80.50 | 94.50 | 14.00 | 2.71 | 0.730 | 0.730 | 37.94 | 27.696 | 4% |
| 8 | 103 | 2.23 | | | 0.700 | 0.860 | 1.0 | 94.50 | 110.50 | 16.00 | 2.23 | 0.780 | 0.780 | 35.68 | 27.830 | 4% |
| 9 | 118 | 2.80 | | | 0.660 | 0.840 | 1.0 | 110.50 | 125.00 | 14.50 | 2.80 | 0.750 | 0.750 | 40.60 | 30.450 | 4% |
| 10 | 132 | 2.81 | | | 0.420 | 0.820 | 1.0 | 125.00 | 139.50 | 14.50 | 2.81 | 0.620 | 0.620 | 40.75 | 25.262 | 4% |
| 11 | 147 | 2.36 | | | 0.830 | 0.890 | 1.0 | 139.50 | 154.50 | 15.00 | 2.36 | 0.860 | 0.860 | 35.40 | 30.444 | 4% |
| 12 | 162 | 2.41 | | | 0.890 | 0.930 | 1.0 | 154.50 | 169.00 | 14.50 | 2.41 | 0.910 | 0.910 | 34.95 | 31.800 | 5% |
| 13 | 176 | 2.53 | | | 0.780 | 1.070 | 1.0 | 169.00 | 181.00 | 12.00 | 2.53 | 0.925 | 0.925 | 30.36 | 28.083 | 4% |
| 14 | 186 | 2.60 | | | 0.580 | 0.910 | 1.0 | 181.00 | 191.00 | 10.00 | 2.60 | 0.745 | 0.745 | 26.00 | 19.370 | 3% |
| 15 | 196 | 2.76 | | | 0.300 | 0.620 | 1.0 | 191.00 | 206.00 | 15.00 | 2.76 | 0.460 | 0.460 | 41.40 | 19.044 | 3% |
| 16 | 216 | 2.62 | | | 0.720 | 0.960 | 1.0 | 206.00 | 227.00 | 21.00 | 2.62 | 0.840 | 0.840 | 55.02 | 46.217 | 7% |
| 17 | 238 | 2.40 | | | 0.690 | 0.900 | 1.0 | 227.00 | 248.50 | 21.50 | 2.40 | 0.795 | 0.795 | 51.60 | 41.022 | 6% |
| 18 | 259 | 2.25 | | | 0.650 | 0.820 | 1.0 | 248.50 | 271.00 | 22.50 | 2.25 | 0.735 | 0.735 | 50.63 | 37.209 | 5% |
| 19 | 283 | 1.76 | | | 0.670 | 0.890 | 1.0 | 271.00 | 295.50 | 24.50 | 1.76 | 0.780 | 0.780 | 43.12 | 33.634 | 5% |
| 20 | 308 | 1.72 | | | 0.400 | 0.690 | 1.0 | 295.50 | 322.50 | 27.00 | 1.72 | 0.545 | 0.545 | 46.44 | 25.310 | 4% |
| 21 | 337 | 1.73 | | | 0.650 | 0.720 | 1.0 | 322.50 | 353.00 | 30.50 | 1.73 | 0.685 | 0.685 | 52.77 | 36.144 | 5% |
| 22 | 369 | 1.81 | | | 0.620 | 0.700 | 1.0 | 353.00 | 383.00 | 30.00 | 1.81 | 0.660 | 0.660 | 54.30 | 35.838 | 5% |
| 23 | 397 | 2.06 | | | 0.330 | 0.470 | 1.0 | 383.00 | 414.50 | 31.50 | 2.06 | 0.400 | 0.400 | 64.89 | 25.956 | 4% |
| Right | 432 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 414.50 | 432.00 | 17.50 | 0.52 | 0.100 | 0.100 | 9.01 | 0.901 | 0% |
| Total Flow | | | | | | | | | | | | | | | 679.313 | |

*denotes position of TSS sample

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 679.313 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 1059.86 | (m ²) |
| Wetted Width: | 432.00 | (m) |
| Hydraulic Depth: | 2.453 | (m) |
| Mean Velocity: | 0.641 | (m/s) |
| Froude Number: | 0.131 | |

| Velocity Profile for Ice Conditions: | | | | | |
|---|-------|----------|------------|---------------|---------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst |
| Depth | | | 0.00 | 0.000 | 60% Depth |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth |
| | | | 0.00 | 0.000 | 80% Depth |
| | | | 0.00 | 0.000 | |
| | | | 0.00 | 0.000 | |
| | | | 0.00 | 0.000 | |
| | | | 0.00 | 0.000 | |
| | | | 0.00 | 0.000 | |
| | | | 0.00 | 0.000 | |
| | | | 0.00 | 0.000 | |
| | | | 0.00 | 0.000 | |
| | | | 0.00 | 0.000 | |
| | | | 0.00 | 0.000 | |
| | | | 0.00 | 0.000 | |



Hydrometric Measurement / Site Visit Record



| | | |
|--|----------------------|-----------------------------|
| Project: 1565 RAMP HYDROLOGY | | |
| Site: S24 - Athabasca River below Eymundson Creek (466313 E, 6372760 N) | | |
| Field Personnel: | DB BL Arnie H (boat) | Trip Date: 30-Oct-10 |
| Data Entry Personnel: | DB | Date: 09-Nov-10 |
| Data Check Personnel: | | Date: |

| | |
|--|-------|
| Logger Details: | |
| WL Acculevel: | 2.696 |
| WL PLS: | 1.135 |
| Battery (Main): | 14.36 |
| Datalogger Clock: | - |
| Laptop Clock: | - |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 2.9 |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: Tried to move PLS sensor and move to deeper water, but not possible to move | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 950 |
| End Time (MST): | 1250 |
| Equipment: | ADC |
| Method: | Boat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Sunny |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar 1m tall | 0.194 | 231.347 | 0.184 | 231.347 | - |
| Bench Mark 2: | Nail in birch tree | 0.460 | 231.096 | 0.449 | 231.096 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 5.371 | 226.185 | 5.361 | 226.184 | 226.185 |
| Transducer: | 14528 | 2.696 | 223.489 | 2.696 | 223.488 | 223.489 |
| Other: | PLS | 1.135 | 222.354 | 1.135 | 222.353 | 222.354 |

General Notes:

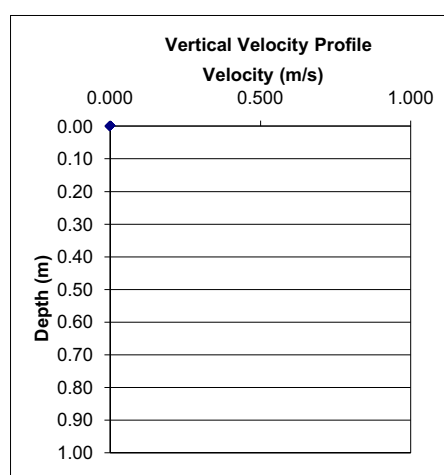
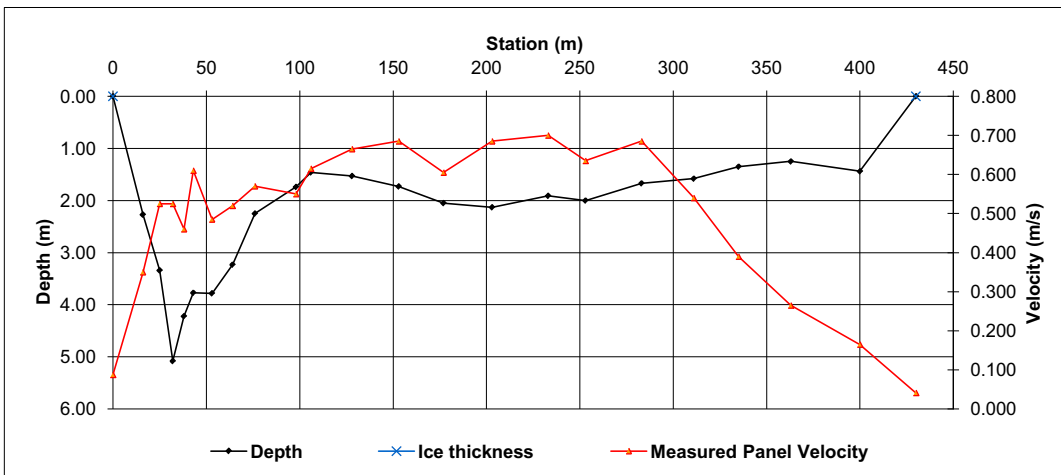
Low water and occasional slush made boat travel difficult in places.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.0 | 0.00 | 8.00 | 8.00 | 0.57 | 0.088 | 0.088 | 4.54 | 0.397 | 0% |
| 1 | 16 | 2.27 | | 0.38 | 0.32 | | 1.0 | 8.00 | 20.50 | 12.50 | 2.27 | 0.350 | 0.350 | 28.37 | 9.931 | 2% |
| 2 | 25 | 3.34 | | 0.55 | 0.50 | | 1.0 | 20.50 | 28.50 | 8.00 | 3.34 | 0.525 | 0.525 | 26.72 | 14.028 | 3% |
| 3 | 32 | 5.08 | | 0.46 | 0.59 | | 1.0 | 28.50 | 35.00 | 6.50 | 5.08 | 0.525 | 0.525 | 33.02 | 17.336 | 4% |
| 4 | 38 | 4.22 | | 0.38 | 0.54 | | 1.0 | 35.00 | 40.50 | 5.50 | 4.22 | 0.460 | 0.460 | 23.21 | 10.677 | 2% |
| 5 | 43 | 3.77 | | 0.63 | 0.59 | | 1.0 | 40.50 | 48.00 | 7.50 | 3.77 | 0.610 | 0.610 | 28.28 | 17.248 | 4% |
| 6 | 53 | 3.78 | | 0.38 | 0.59 | | 1.0 | 48.00 | 58.50 | 10.50 | 3.78 | 0.485 | 0.485 | 39.69 | 19.250 | 4% |
| 7 | 64 | 3.23 | | 0.46 | 0.58 | | 1.0 | 58.50 | 70.00 | 11.50 | 3.23 | 0.520 | 0.520 | 37.15 | 19.315 | 4% |
| 8 | 76 | 2.25 | | 0.53 | 0.61 | | 1.0 | 70.00 | 87.00 | 17.00 | 2.25 | 0.570 | 0.570 | 38.25 | 21.803 | 5% |
| 9 | 98 | 1.74 | | 0.45 | 0.65 | | 1.0 | 87.00 | 102.00 | 15.00 | 1.74 | 0.550 | 0.550 | 26.10 | 14.355 | 3% |
| 10 | 106 | 1.46 | | 0.55 | 0.68 | | 1.0 | 102.00 | 117.00 | 15.00 | 1.46 | 0.615 | 0.615 | 21.90 | 13.469 | 3% |
| 11 | 128 | 1.53 | | 0.61 | 0.72 | | 1.0 | 117.00 | 140.50 | 23.50 | 1.53 | 0.665 | 0.665 | 35.96 | 23.910 | 5% |
| 12 | 153 | 1.73 | | 0.59 | 0.78 | | 1.0 | 140.50 | 165.00 | 24.50 | 1.73 | 0.685 | 0.685 | 42.39 | 29.034 | 7% |
| 13 | 177 | 2.05 | | 0.42 | 0.79 | | 1.0 | 165.00 | 190.00 | 25.00 | 2.05 | 0.605 | 0.605 | 51.25 | 31.006 | 7% |
| 14 | 203 | 2.13 | | 0.70 | 0.67 | | 1.0 | 190.00 | 218.00 | 28.00 | 2.13 | 0.685 | 0.685 | 59.64 | 40.853 | 9% |
| 15 | 233 | 1.91 | | 0.64 | 0.76 | | 1.0 | 218.00 | 243.00 | 25.00 | 1.91 | 0.700 | 0.700 | 47.75 | 33.425 | 8% |
| 16 | 253 | 2.00 | | 0.55 | 0.72 | | 1.0 | 243.00 | 268.00 | 25.00 | 2.00 | 0.635 | 0.635 | 50.00 | 31.750 | 7% |
| 17 | 283 | 1.67 | | 0.66 | 0.71 | | 1.0 | 268.00 | 297.00 | 29.00 | 1.67 | 0.685 | 0.685 | 48.43 | 33.175 | 8% |
| 18 | 311 | 1.58 | | 0.49 | 0.59 | | 1.0 | 297.00 | 323.00 | 26.00 | 1.58 | 0.540 | 0.540 | 41.08 | 22.183 | 5% |
| 19 | 335 | 1.35 | | 0.34 | 0.44 | | 1.0 | 323.00 | 349.00 | 26.00 | 1.35 | 0.390 | 0.390 | 35.10 | 13.689 | 3% |
| 20 | 363 | 1.25 | | 0.20 | 0.33 | | 1.0 | 349.00 | 381.50 | 32.50 | 1.25 | 0.265 | 0.265 | 40.63 | 10.766 | 2% |
| 21 | 400 | 1.44 | | 0.19 | 0.14 | | 1.0 | 381.50 | 415.00 | 33.50 | 1.44 | 0.165 | 0.165 | 48.24 | 7.960 | 2% |
| Right | 430 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 415.00 | 430.00 | 15.00 | 0.36 | 0.041 | 0.041 | 5.40 | 0.223 | 0% |
| Total Flow | | | | | | | | | | | | | | 435.780 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 435.780 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 813.08 | (m ²) |
| Wetted Width: | 430.00 | (m) |
| Hydraulic Depth: | 1.891 | (m) |
| Mean Velocity: | 0.536 | (m/s) |
| Froude Number: | 0.125 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | 0.000 |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S24 - Athabasca River below Eymundson Creek (466313 E, 6372760 N) | | | |
| Field Personnel: | SG, JO | Trip Date: | 04-Dec-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | |
|------------------------|----|
| Logger Details: | |
| WL Acculevel: | |
| WL PLS: | |
| Battery (Main): | - |
| Datalogger Clock: | - |
| Laptop Clock: | - |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | |
| End Time (MST): | |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-bar 1m tall | | 231.347 | | 231.347 | - |
| Bench Mark 2: | Nail in birch tree | | 231.096 | | 231.096 | - |
| Top of Ice: | | | 231.347 | | 231.347 | 231.347 |
| Water Level: | | | 231.096 | | 231.096 | 231.096 |
| Transducer: | 14528 | | | | | |
| Other: | PLS | | | | | |

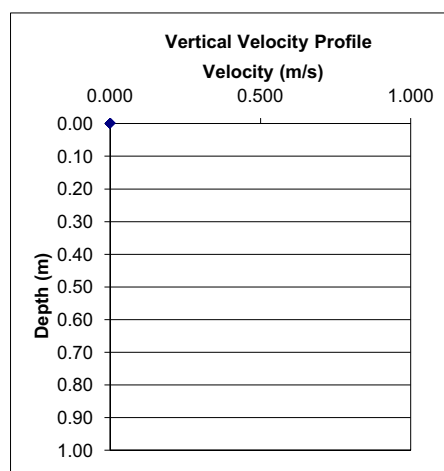
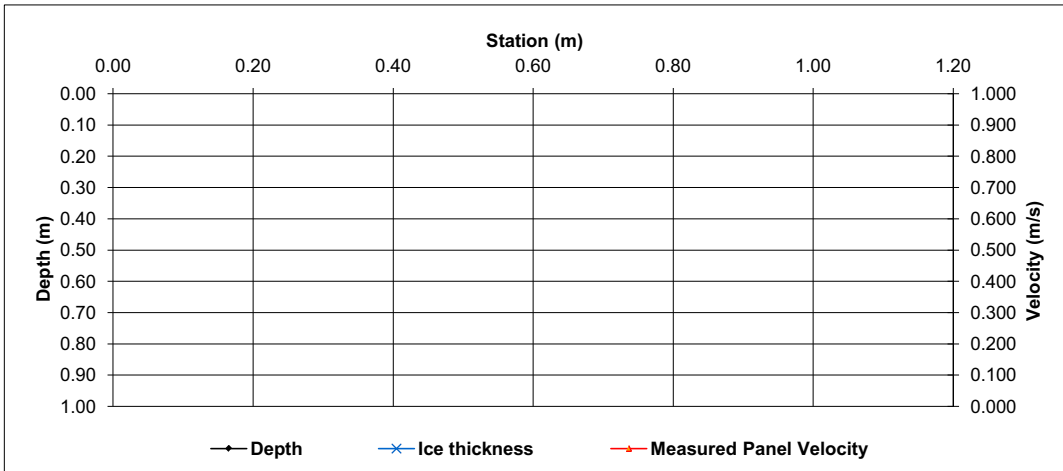
| | |
|--|--|
| General Notes: | |
| Large open areas upstream of flow measurement. Location considered unsafe. | |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 26 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 27 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 28 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 29 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 30 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 31 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| | | | | | | | | | | | | | Total Flow | NOT MEASURED | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--------------------------------------|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S25 - Susan Lake Outlet | | | |
| Field Personnel: | DB BL | Trip Date: | 28-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 14-Jul-10 |

| | |
|------------------------|------------|
| Logger Details: | |
| Transducer Reading: | 0.176 |
| Battery (Main): | 13.11 |
| Battery (Aux): | 1.6 |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 0% cleared |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|--------|
| Measurement Details: | |
| Start Time (MST): | 1504 |
| End Time (MST): | 1701 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Sunny |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Tbar in PVC | 1.140 | 100.000 | 1.135 | 100.000 | - |
| Bench Mark 2: | Nail in stump to W of logger | 1.162 | 100.000 | 1.156 | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | At PT | 2.290 | 98.850 | 2.287 | 98.848 | 98.849 |
| Transducer: | | 0.176 | 98.674 | 0.176 | 98.672 | 98.673 |
| Other: | | | | | | |

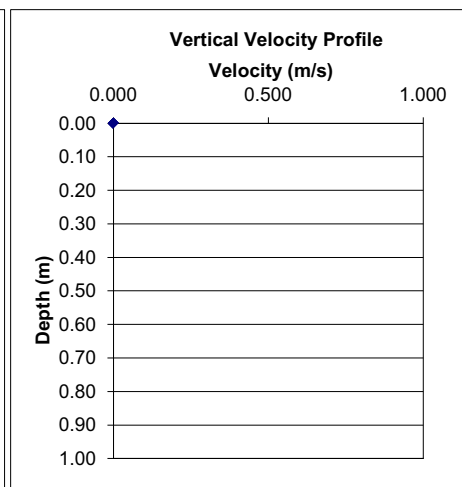
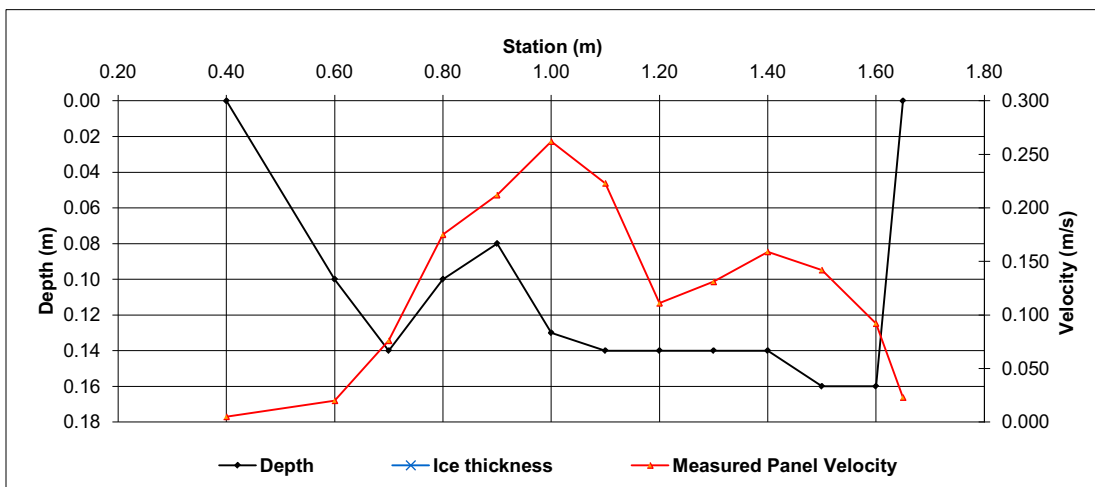
General Notes:
 PT placed in concrete block used for former PT measurements; stream not v deep anywhere nearby. PT installed S/N 304988; m=1.4240798, b=-0.051362. Flow taken just upstream of PT between exposed boulders.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 1.65 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.65 | 1.63 | 0.02 | 0.04 | 0.023 | 0.023 | 0.00 | 0.000 | 0% |
| 1 | 1.60 | 0.16 | | 0.092 | | | 1.0 | 1.63 | 1.55 | 0.08 | 0.16 | 0.092 | 0.092 | 0.01 | 0.001 | 5% |
| 2 | 1.50 | 0.16 | | 0.142 | | | 1.0 | 1.55 | 1.45 | 0.10 | 0.16 | 0.142 | 0.142 | 0.02 | 0.002 | 11% |
| 3 | 1.40 | 0.14 | | 0.159 | | | 1.0 | 1.45 | 1.35 | 0.10 | 0.14 | 0.159 | 0.159 | 0.01 | 0.002 | 11% |
| 4 | 1.30 | 0.14 | | 0.131 | | | 1.0 | 1.35 | 1.25 | 0.10 | 0.14 | 0.131 | 0.131 | 0.01 | 0.002 | 9% |
| 5 | 1.20 | 0.14 | | 0.111 | | | 1.0 | 1.25 | 1.15 | 0.10 | 0.14 | 0.111 | 0.111 | 0.01 | 0.002 | 8% |
| 6 | 1.10 | 0.14 | | 0.223 | | | 1.0 | 1.15 | 1.05 | 0.10 | 0.14 | 0.223 | 0.223 | 0.01 | 0.003 | 15% |
| 7 | 1.00 | 0.13 | | 0.262 | | | 1.0 | 1.05 | 0.95 | 0.10 | 0.13 | 0.262 | 0.262 | 0.01 | 0.003 | 17% |
| 8 | 0.90 | 0.08 | | 0.212 | | | 1.0 | 0.95 | 0.85 | 0.10 | 0.08 | 0.212 | 0.212 | 0.01 | 0.002 | 8% |
| 9 | 0.80 | 0.10 | | 0.175 | | | 1.0 | 0.85 | 0.75 | 0.10 | 0.10 | 0.175 | 0.175 | 0.01 | 0.002 | 9% |
| 10 | 0.70 | 0.14 | | 0.076 | | | 1.0 | 0.75 | 0.65 | 0.10 | 0.14 | 0.076 | 0.076 | 0.01 | 0.001 | 5% |
| 11 | 0.60 | 0.10 | | 0.020 | | | 1.0 | 0.65 | 0.50 | 0.15 | 0.10 | 0.020 | 0.020 | 0.01 | 0.000 | 1% |
| Right | 0.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.50 | 0.40 | 0.10 | 0.03 | 0.005 | 0.005 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.020 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.020 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 0.15 | (m ²) |
| Wetted Width: | 1.13 | (m) |
| Hydraulic Depth: | 0.131 | (m) |
| Mean Velocity: | 0.138 | (m/s) |
| Foude Number: | 0.122 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--------------------------------------|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S25 - Susan Lake Outlet | | | |
| Field Personnel: | DB, SG | Trip Date: | 11-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|---|---------|
| Logger Details: | |
| Transducer Reading: | 0.212 |
| Battery (Main): | 14.17 |
| Battery (Aux): | 0.9 |
| Datalogger Clock: | 1402 |
| Laptop Clock: | 1402 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 0.60% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: Station was interfered with by wildlife caused data loss. Moved Transducer into deeper water | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1345 |
| End Time (MST): | 1400 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Hot and Sunny |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Tbar in PVC | 1.015 | 100.000 | 0.990 | 100.000 | - |
| Bench Mark 2: | Nail in stump to W of logger | 1.037 | 100.000 | 1.012 | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.172 | 98.843 | 2.148 | 98.842 | 98.843 |
| Transducer: | | 0.212 | 98.631 | 0.212 | 98.630 | 98.631 |
| Other: | | | | | | |

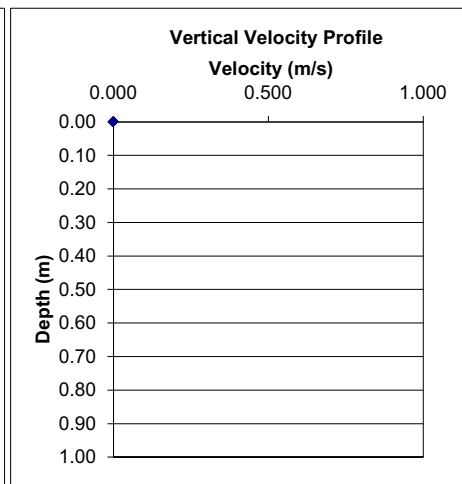
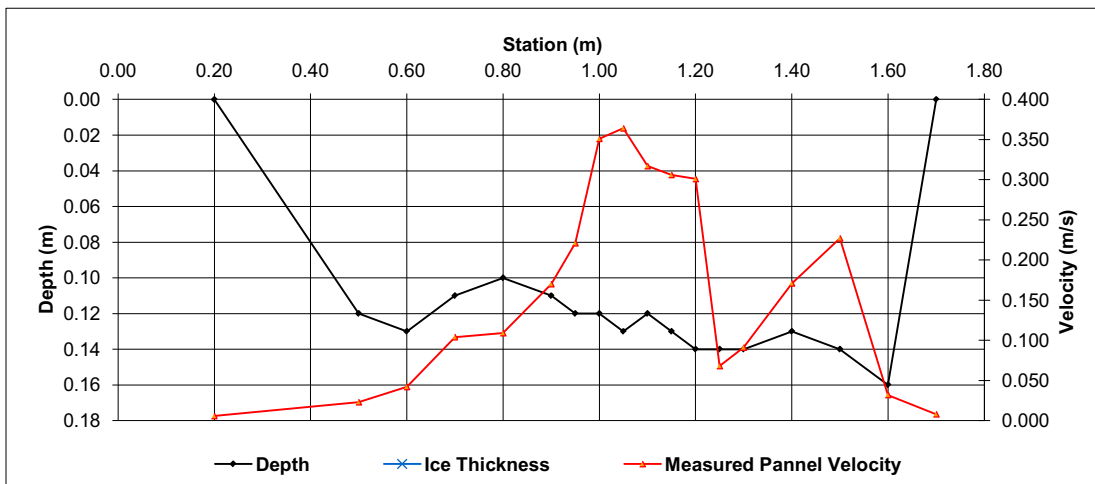
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.20 | 0.35 | 0.15 | 0.03 | 0.006 | 0.006 | 0.00 | 0.000 | 0% |
| 1 | 0.50 | 0.12 | | 0.023 | | | 1.0 | 0.35 | 0.55 | 0.20 | 0.12 | 0.023 | 0.023 | 0.02 | 0.001 | 2% |
| 2 | 0.60 | 0.13 | | 0.042 | | | 1.0 | 0.55 | 0.65 | 0.10 | 0.13 | 0.042 | 0.042 | 0.01 | 0.001 | 2% |
| 3 | 0.70 | 0.11 | | 0.104 | | | 1.0 | 0.65 | 0.75 | 0.10 | 0.11 | 0.104 | 0.104 | 0.01 | 0.001 | 5% |
| 4 | 0.80 | 0.10 | | 0.109 | | | 1.0 | 0.75 | 0.85 | 0.10 | 0.10 | 0.109 | 0.109 | 0.01 | 0.001 | 5% |
| 5 | 0.90 | 0.11 | | 0.170 | | | 1.0 | 0.85 | 0.93 | 0.08 | 0.11 | 0.170 | 0.170 | 0.01 | 0.001 | 6% |
| 6 | 0.95 | 0.12 | | 0.221 | | | 1.0 | 0.93 | 0.98 | 0.05 | 0.12 | 0.221 | 0.221 | 0.01 | 0.001 | 6% |
| 7 | 1.00 | 0.12 | | 0.351 | | | 1.0 | 0.98 | 1.03 | 0.05 | 0.12 | 0.351 | 0.351 | 0.01 | 0.002 | 9% |
| 8 | 1.05 | 0.13 | | 0.364 | | | 1.0 | 1.03 | 1.08 | 0.05 | 0.13 | 0.364 | 0.364 | 0.01 | 0.002 | 10% |
| 9 | 1.10 | 0.12 | | 0.317 | | | 1.0 | 1.08 | 1.13 | 0.05 | 0.12 | 0.317 | 0.317 | 0.01 | 0.002 | 8% |
| 10 | 1.15 | 0.13 | | 0.306 | | | 1.0 | 1.13 | 1.18 | 0.05 | 0.13 | 0.306 | 0.306 | 0.01 | 0.002 | 8% |
| 11 | 1.20 | 0.14 | | 0.301 | | | 1.0 | 1.18 | 1.23 | 0.05 | 0.14 | 0.301 | 0.301 | 0.01 | 0.002 | 9% |
| 12 | 1.25 | 0.14 | | 0.068 | | | 1.0 | 1.23 | 1.28 | 0.05 | 0.14 | 0.068 | 0.068 | 0.01 | 0.000 | 2% |
| 13 | 1.30 | 0.14 | | 0.091 | | | 1.0 | 1.28 | 1.35 | 0.08 | 0.14 | 0.091 | 0.091 | 0.01 | 0.001 | 4% |
| 14 | 1.40 | 0.13 | | 0.171 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.13 | 0.171 | 0.171 | 0.01 | 0.002 | 9% |
| 15 | 1.50 | 0.14 | | 0.227 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.14 | 0.227 | 0.227 | 0.01 | 0.003 | 13% |
| 16 | 1.60 | 0.16 | | 0.032 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.16 | 0.032 | 0.032 | 0.02 | 0.001 | 2% |
| Right | 1.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.65 | 1.70 | 0.05 | 0.04 | 0.008 | 0.008 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.024 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.024 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.17 | (m ²) |
| Wetted Width: | 1.50 | (m) |
| Hydraulic Depth: | 0.114 | (m) |
| Mean Velocity: | 0.140 | (m/s) |
| Foude Number: | 0.132 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|----------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V. @Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--------------------------------------|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S25 - Susan Lake Outlet | | | |
| Field Personnel: | HB SG DB | Trip Date: | 17-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.324 |
| Battery (Main): | 1.63 |
| Battery (Aux): | 14.87 |
| Datalogger Clock: | 1121 |
| Laptop Clock: | 1123 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 1% |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------|
| Measurement Details: | |
| Start Time (MST): | 1120 |
| End Time (MST): | 1200 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Partly Cloudy 5°C |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Tbar in PVC | 1.063 | 100.000 | 1.049 | 100.000 | - |
| Bench Mark 2: | Nail in stump to W of logger | 1.088 | 100.000 | 1.072 | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.139 | 98.924 | 2.126 | 98.923 | 98.924 |
| Transducer: | | 0.324 | 98.600 | 0.324 | 98.599 | 98.600 |
| Other: | | | | | | |

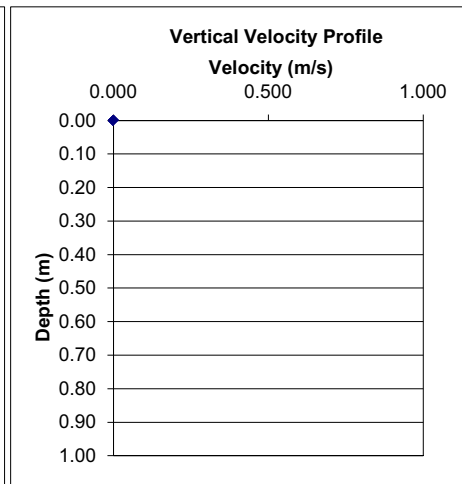
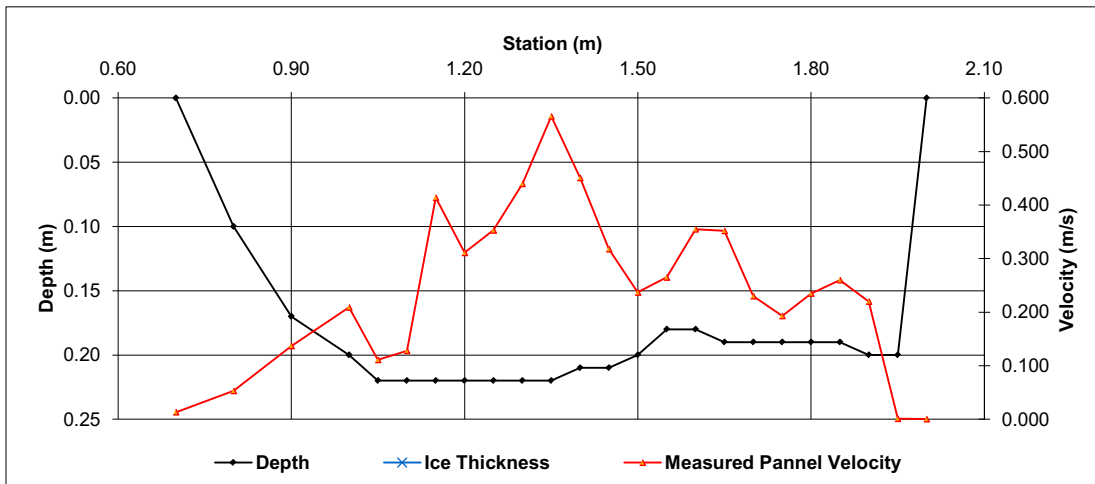
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 0.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.70 | 0.75 | 0.05 | 0.03 | 0.013 | 0.013 | 0.00 | 0.000 | 0% | |
| 1 | 0.80 | 0.10 | | 0.053 | | | 1.0 | 0.75 | 0.85 | 0.10 | 0.10 | 0.053 | 0.053 | 0.01 | 0.001 | 1% | |
| 2 | 0.90 | 0.17 | | 0.137 | | | 1.0 | 0.85 | 0.95 | 0.10 | 0.17 | 0.137 | 0.137 | 0.02 | 0.002 | 4% | |
| 3 | 1.00 | 0.20 | | 0.209 | | | 1.0 | 0.95 | 1.03 | 0.08 | 0.20 | 0.209 | 0.209 | 0.02 | 0.003 | 5% | |
| 4 | 1.05 | 0.22 | | 0.111 | | | 1.0 | 1.03 | 1.08 | 0.05 | 0.22 | 0.111 | 0.111 | 0.01 | 0.001 | 2% | |
| 5 | 1.10 | 0.22 | | 0.128 | | | 1.0 | 1.08 | 1.13 | 0.05 | 0.22 | 0.128 | 0.128 | 0.01 | 0.001 | 2% | |
| 6 | 1.15 | 0.22 | | 0.414 | | | 1.0 | 1.13 | 1.18 | 0.05 | 0.22 | 0.414 | 0.414 | 0.01 | 0.005 | 7% | |
| 7 | 1.20 | 0.22 | | 0.311 | | | 1.0 | 1.18 | 1.23 | 0.05 | 0.22 | 0.311 | 0.311 | 0.01 | 0.003 | 6% | |
| 8 | 1.25 | 0.22 | | 0.353 | | | 1.0 | 1.23 | 1.28 | 0.05 | 0.22 | 0.353 | 0.353 | 0.01 | 0.004 | 6% | |
| 9 | 1.30 | 0.22 | | 0.440 | | | 1.0 | 1.28 | 1.33 | 0.05 | 0.22 | 0.440 | 0.440 | 0.01 | 0.005 | 8% | |
| 10 | 1.35 | 0.22 | | 0.566 | | | 1.0 | 1.33 | 1.38 | 0.05 | 0.22 | 0.566 | 0.566 | 0.01 | 0.006 | 10% | |
| 11 | 1.40 | 0.21 | | 0.451 | | | 1.0 | 1.38 | 1.43 | 0.05 | 0.21 | 0.451 | 0.451 | 0.01 | 0.005 | 8% | |
| 12 | 1.45 | 0.21 | | 0.318 | | | 1.0 | 1.43 | 1.48 | 0.05 | 0.21 | 0.318 | 0.318 | 0.01 | 0.003 | 5% | |
| 13 | 1.50 | 0.20 | | 0.237 | | | 1.0 | 1.48 | 1.53 | 0.05 | 0.20 | 0.237 | 0.237 | 0.01 | 0.002 | 4% | |
| 14 | 1.55 | 0.18 | | 0.265 | | | 1.0 | 1.53 | 1.58 | 0.05 | 0.18 | 0.265 | 0.265 | 0.01 | 0.002 | 4% | |
| 15 | 1.60 | 0.18 | | 0.355 | | | 1.0 | 1.58 | 1.63 | 0.05 | 0.18 | 0.355 | 0.355 | 0.01 | 0.003 | 5% | |
| 16 | 1.65 | 0.19 | | 0.352 | | | 1.0 | 1.63 | 1.68 | 0.05 | 0.19 | 0.352 | 0.352 | 0.01 | 0.003 | 5% | |
| 17 | 1.70 | 0.19 | | 0.230 | | | 1.0 | 1.68 | 1.73 | 0.05 | 0.19 | 0.230 | 0.230 | 0.01 | 0.002 | 4% | |
| 18 | 1.75 | 0.19 | | 0.193 | | | 1.0 | 1.73 | 1.78 | 0.05 | 0.19 | 0.193 | 0.193 | 0.01 | 0.002 | 3% | |
| 19 | 1.80 | 0.19 | | 0.235 | | | 1.0 | 1.78 | 1.83 | 0.05 | 0.19 | 0.235 | 0.235 | 0.01 | 0.002 | 4% | |
| 20 | 1.85 | 0.19 | | 0.260 | | | 1.0 | 1.83 | 1.88 | 0.05 | 0.19 | 0.260 | 0.260 | 0.01 | 0.002 | 4% | |
| 21 | 1.90 | 0.20 | | 0.220 | | | 1.0 | 1.88 | 1.93 | 0.05 | 0.20 | 0.220 | 0.220 | 0.01 | 0.002 | 4% | |
| 22 | 1.95 | 0.20 | | 0.001 | | | 1.0 | 1.93 | 1.98 | 0.05 | 0.20 | 0.001 | 0.001 | 0.01 | 0.000 | 0% | |
| Right | 2.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.98 | 2.00 | 0.02 | 0.05 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.062 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.062 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.24 | (m ²) |
| Wetted Width: | 1.30 | (m) |
| Hydraulic Depth: | 0.183 | (m) |
| Mean Velocity: | 0.260 | (m/s) |
| Foude Number: | 0.194 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--------------------------------------|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S25 - Susan Lake Outlet | | | |
| Field Personnel: | DB BL | Trip Date: | 30-Oct-10 |
| Data Entry Personnel: | DB | Date: | 9-Nov-10 |
| Data Check Personnel: | JP | Date: | 23-Nov-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.273 |
| Battery (Main): | 1.72 |
| Battery (Aux): | 13.75 |
| Datalogger Clock: | 1303 |
| Laptop Clock: | 1308 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 3% |
| Dessicant: | - |
| Logger# (if Δ): | 1303 |
| PT# (if Δ): | |
| Other Logger Notes: | |
| TSS @ 1.2m | |

| | |
|------------------------------|----------------|
| Measurement Details: | |
| Start Time (MST): | 1300 |
| End Time (MST): | 1340 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Clear and Cool |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Tbar in PVC | 1.117 | 100.000 | 1.102 | 100.000 | - |
| Bench Mark 2: | Nail in stump to W of logger | 1.140 | 100.000 | 1.125 | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.261 | 98.856 | 2.243 | 98.859 | 98.858 |
| Transducer: | | 0.273 | 98.583 | 0.273 | 98.586 | 98.584 |
| Other: | | | | | | |

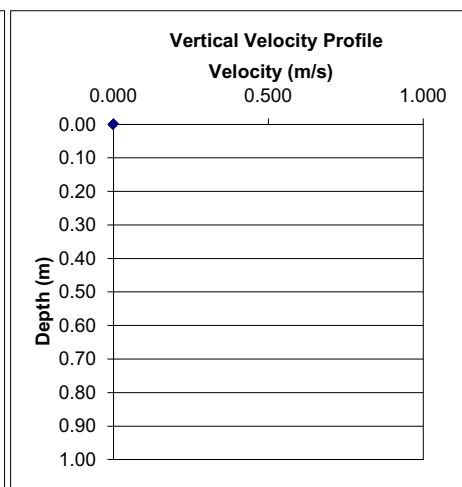
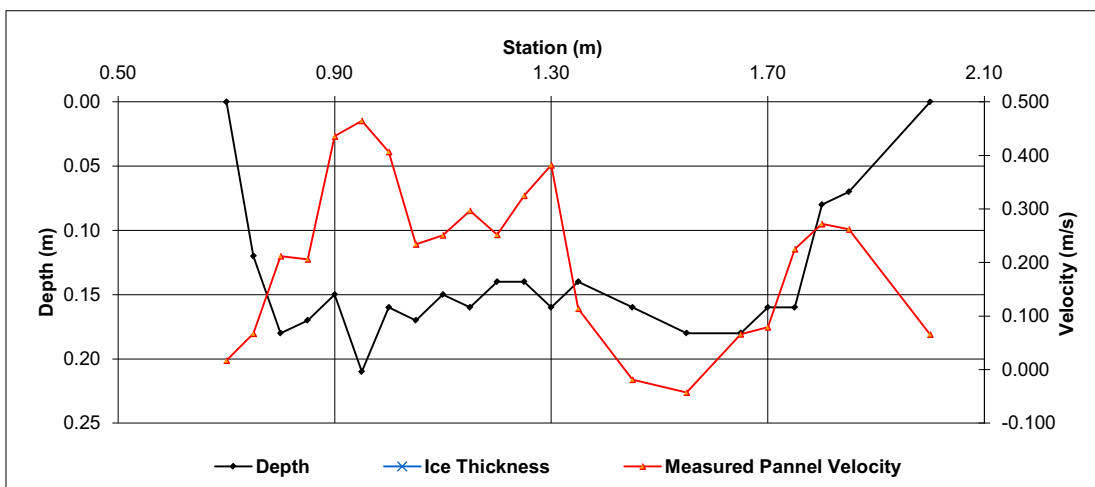
| | |
|-----------------------|--|
| General Notes: | |
| TSS @ 1.2m | |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.70 | 0.73 | 0.03 | 0.03 | 0.017 | 0.017 | 0.00 | 0.000 | 0% |
| 1 | 0.75 | 0.12 | | 0.067 | | | 1.0 | 0.73 | 0.80 | 0.08 | 0.12 | 0.067 | 0.067 | 0.01 | 0.001 | 1% |
| 2 | 0.80 | 0.18 | | 0.212 | | | 1.0 | 0.78 | 0.85 | 0.08 | 0.18 | 0.212 | 0.212 | 0.01 | 0.003 | 5% |
| 3 | 0.85 | 0.17 | | 0.206 | | | 1.0 | 0.83 | 0.90 | 0.08 | 0.17 | 0.206 | 0.206 | 0.01 | 0.003 | 5% |
| 4 | 0.90 | 0.15 | | 0.436 | | | 1.0 | 0.88 | 0.95 | 0.08 | 0.15 | 0.436 | 0.436 | 0.01 | 0.005 | 9% |
| 5 | 0.95 | 0.21 | | 0.465 | | | 1.0 | 0.93 | 1.00 | 0.08 | 0.21 | 0.465 | 0.465 | 0.02 | 0.007 | 14% |
| 6 | 1.00 | 0.16 | | 0.407 | | | 1.0 | 0.98 | 1.05 | 0.08 | 0.16 | 0.407 | 0.407 | 0.01 | 0.005 | 9% |
| 7 | 1.05 | 0.17 | | 0.234 | | | 1.0 | 1.03 | 1.10 | 0.08 | 0.17 | 0.234 | 0.234 | 0.01 | 0.003 | 6% |
| 8 | 1.10 | 0.15 | | 0.251 | | | 1.0 | 1.08 | 1.15 | 0.07 | 0.15 | 0.251 | 0.251 | 0.01 | 0.003 | 5% |
| 9 | 1.15 | 0.16 | | 0.297 | | | 1.0 | 1.13 | 1.20 | 0.08 | 0.16 | 0.297 | 0.297 | 0.01 | 0.004 | 7% |
| 10 | 1.20 | 0.14 | | 0.252 | | | 1.0 | 1.18 | 1.25 | 0.08 | 0.14 | 0.252 | 0.252 | 0.01 | 0.003 | 5% |
| 11 | 1.25 | 0.14 | | 0.325 | | | 1.0 | 1.23 | 1.30 | 0.08 | 0.14 | 0.325 | 0.325 | 0.01 | 0.003 | 6% |
| 12 | 1.30 | 0.16 | | 0.382 | | | 1.0 | 1.28 | 1.38 | 0.10 | 0.16 | 0.382 | 0.382 | 0.02 | 0.006 | 11% |
| 13 | 1.35 | 0.14 | | 0.114 | | | 1.0 | 1.33 | 1.45 | 0.13 | 0.14 | 0.114 | 0.114 | 0.02 | 0.002 | 4% |
| 14 | 1.45 | 0.16 | | -0.019 | | | 1.0 | 1.40 | 1.55 | 0.15 | 0.16 | -0.019 | -0.019 | 0.02 | 0.000 | -1% |
| 15 | 1.55 | 0.18 | | -0.043 | | | 1.0 | 1.50 | 1.63 | 0.13 | 0.18 | -0.043 | -0.043 | 0.02 | -0.001 | -2% |
| 16 | 1.65 | 0.18 | | 0.066 | | | 1.0 | 1.60 | 1.70 | 0.10 | 0.18 | 0.066 | 0.066 | 0.02 | 0.001 | 2% |
| 17 | 1.70 | 0.16 | | 0.079 | | | 1.0 | 1.68 | 1.75 | 0.08 | 0.16 | 0.079 | 0.079 | 0.01 | 0.001 | 2% |
| 18 | 1.75 | 0.16 | | 0.225 | | | 1.0 | 1.73 | 1.80 | 0.08 | 0.16 | 0.225 | 0.225 | 0.01 | 0.003 | 5% |
| 19 | 1.80 | 0.08 | | 0.272 | | | 1.0 | 1.78 | 1.90 | 0.13 | 0.08 | 0.272 | 0.272 | 0.01 | 0.003 | 5% |
| 20 | 1.85 | 0.07 | | 0.262 | | | 1.0 | 1.83 | 1.85 | 0.02 | 0.07 | 0.262 | 0.262 | 0.00 | 0.000 | 1% |
| Right | 2.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.93 | 2.00 | 0.08 | 0.02 | 0.066 | 0.066 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.053 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.053 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.27 | (m ²) |
| Wetted Width: | 1.30 | (m) |
| Hydraulic Depth: | 0.205 | (m) |
| Mean Velocity: | 0.200 | (m/s) |
| Foude Number: | 0.141 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|----------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V. @Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S26 - MacKay River near Fort MacKay (458031 E, 6341078 N) | | | |
| Field Personnel: | SG, CE | Trip Date: | 21-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| WSC Station | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1205 |
| End Time (MST): | 1230 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | overcast -10C |

| Level Survey: | | | | | | |
|----------------------|--------------------------|---------|---------|---------|---------|---------|
| Position | Description | Setup 1 | | Setup 2 | | Average |
| | | (m) | El (m) | (m) | El (m) | El (m) |
| Bench Mark 1: | Rock under flagged bush. | 0.954 | 100.000 | 0.959 | 100.000 | - |
| Bench Mark 2: | NO BM2 | | | | | - |
| Top of Ice: | | 3.504 | 97.450 | 3.510 | 97.449 | 97.450 |
| Water Level: | | 3.517 | 97.437 | 3.521 | 97.438 | 97.438 |
| Transducer: | | | | | | |
| Other: | | | | | | |

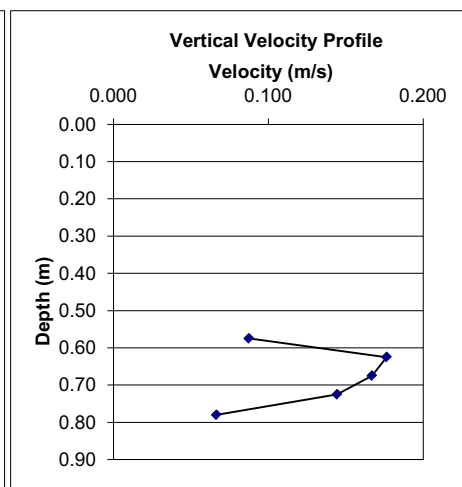
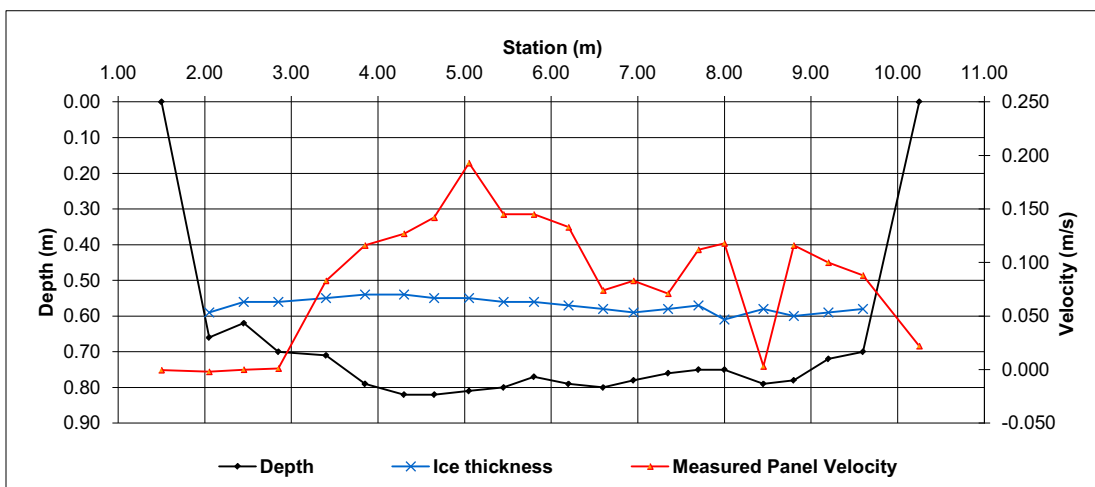
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|-----------------------|
| General Notes: |
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| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 1.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.50 | 1.78 | 0.28 | 0.02 | -0.001 | 0.000 | 0.00 | 0.000 | 0% |
| 1 | 2.05 | 0.66 | 0.59 | -0.002 | | | 0.9 | 1.78 | 2.25 | 0.48 | 0.07 | -0.002 | -0.002 | 0.03 | 0.000 | 0% |
| 2 | 2.45 | 0.62 | 0.56 | 0.000 | | | 1.0 | 2.25 | 2.65 | 0.40 | 0.06 | 0.000 | 0.000 | 0.02 | 0.000 | 0% |
| 3 | 2.85 | 0.70 | 0.56 | 0.001 | | | 0.9 | 2.65 | 3.13 | 0.48 | 0.14 | 0.001 | 0.001 | 0.07 | 0.000 | 0% |
| 4 | 3.40 | 0.71 | 0.55 | 0.083 | | | 0.9 | 3.13 | 3.63 | 0.50 | 0.16 | 0.083 | 0.075 | 0.08 | 0.006 | 4% |
| 5 | 3.85 | 0.79 | 0.54 | 0.116 | | | 0.9 | 3.63 | 4.08 | 0.45 | 0.25 | 0.116 | 0.104 | 0.11 | 0.012 | 9% |
| 6 | 4.30 | 0.82 | 0.54 | 0.127 | | | 0.9 | 4.08 | 4.48 | 0.40 | 0.28 | 0.127 | 0.114 | 0.11 | 0.013 | 9% |
| 7 | 4.65 | 0.82 | 0.55 | 0.142 | | | 0.9 | 4.48 | 4.85 | 0.38 | 0.27 | 0.142 | 0.128 | 0.10 | 0.013 | 9% |
| 8 | 5.05 | 0.81 | 0.55 | 0.193 | | | 0.9 | 4.85 | 5.25 | 0.40 | 0.26 | 0.193 | 0.174 | 0.10 | 0.018 | 13% |
| 9 | 5.45 | 0.80 | 0.56 | 0.145 | | | 0.9 | 5.25 | 5.63 | 0.38 | 0.24 | 0.145 | 0.131 | 0.09 | 0.012 | 9% |
| 10 | 5.80 | 0.77 | 0.56 | 0.145 | | | 0.9 | 5.63 | 6.00 | 0.38 | 0.21 | 0.145 | 0.131 | 0.08 | 0.010 | 7% |
| 11 | 6.20 | 0.79 | 0.57 | 0.133 | | | 0.9 | 6.00 | 6.40 | 0.40 | 0.22 | 0.133 | 0.120 | 0.09 | 0.011 | 8% |
| 12 | 6.60 | 0.80 | 0.58 | 0.074 | | | 0.9 | 6.40 | 6.78 | 0.38 | 0.22 | 0.074 | 0.067 | 0.08 | 0.005 | 4% |
| 13 | 6.95 | 0.78 | 0.59 | 0.083 | | | 0.9 | 6.78 | 7.15 | 0.38 | 0.19 | 0.083 | 0.075 | 0.07 | 0.005 | 4% |
| 14 | 7.35 | 0.76 | 0.58 | 0.071 | | | 0.9 | 7.15 | 7.53 | 0.38 | 0.18 | 0.071 | 0.064 | 0.07 | 0.004 | 3% |
| 15 | 7.70 | 0.75 | 0.57 | 0.112 | | | 0.9 | 7.53 | 7.85 | 0.32 | 0.18 | 0.112 | 0.101 | 0.06 | 0.006 | 4% |
| 16 | 8.00 | 0.75 | 0.61 | 0.118 | | | 0.9 | 7.85 | 8.23 | 0.38 | 0.14 | 0.118 | 0.106 | 0.05 | 0.006 | 4% |
| 17 | 8.45 | 0.79 | 0.58 | 0.003 | | | 0.9 | 8.23 | 8.63 | 0.40 | 0.21 | 0.003 | 0.003 | 0.08 | 0.000 | 0% |
| 18 | 8.80 | 0.78 | 0.60 | 0.116 | | | 0.9 | 8.63 | 9.00 | 0.38 | 0.18 | 0.116 | 0.104 | 0.07 | 0.007 | 5% |
| 19 | 9.20 | 0.72 | 0.59 | 0.100 | | | 0.9 | 9.00 | 9.40 | 0.40 | 0.13 | 0.100 | 0.090 | 0.05 | 0.005 | 3% |
| 20 | 9.60 | 0.70 | 0.58 | 0.088 | | | 0.9 | 9.40 | 9.93 | 0.53 | 0.12 | 0.088 | 0.079 | 0.06 | 0.005 | 4% |
| Right | 10.25 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 9.93 | 10.25 | 0.32 | 0.03 | 0.022 | 0.020 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.138 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.138 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 1.50 | (m ²) |
| Wetted Width: | 8.75 | (m) |
| Hydraulic Depth: | 0.172 | (m) |
| Mean Velocity: | 0.092 | (m/s) |
| Froude Number: | 0.071 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|----------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.128 |
| Offset | 5.05 | 0.81 | 0 | - | Panel V. @Ofst | 0.193 |
| Depth | 0.81 | 0.75 | 0.133 | 0.78 | 60% Depth | 0.706 |
| Ice Depth | 0.55 | 0.70 | 0.156 | 0.73 | 20% Depth | 0.60 |
| | | 0.65 | 0.178 | 0.68 | 80% Depth | 0.76 |
| | | 0.60 | 0.175 | 0.63 | | |
| | | 0.55 | 0.000 | 0.58 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S26 - MacKay River near Fort MacKay (458031 E, 6341078 N) | | | |
| Field Personnel: | GB, JE | Trip Date: | 14-Feb-10 |
| Data Entry Personnel: | SG | Date: | 19-Feb-10 |
| Data Check Personnel: | DB | Date: | 15-Mar-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| WSC Station | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1530 |
| End Time (MST): | 1615 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | flooded ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | clear |

| Level Survey: | | | | | | |
|----------------------|--------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rock under flagged bush. | 1.066 | 100.000 | 1.061 | 100.000 | - |
| Bench Mark 2: | NO BM2 | | | | | - |
| Top of Ice: | | 3.608 | 97.458 | 3.600 | 97.461 | 97.460 |
| Water Level: | | 3.429 | 97.637 | 3.424 | 97.637 | 97.637 |
| Transducer: | | | | | | |
| Other: | | | | | | |

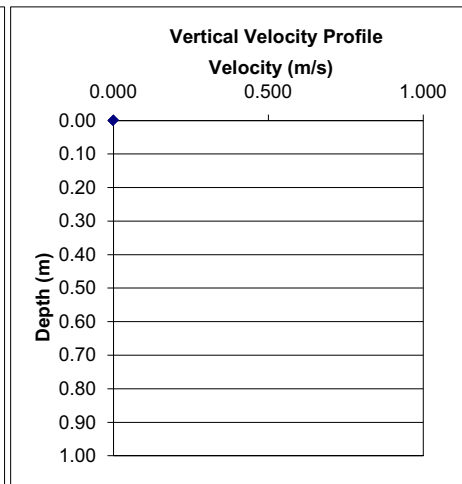
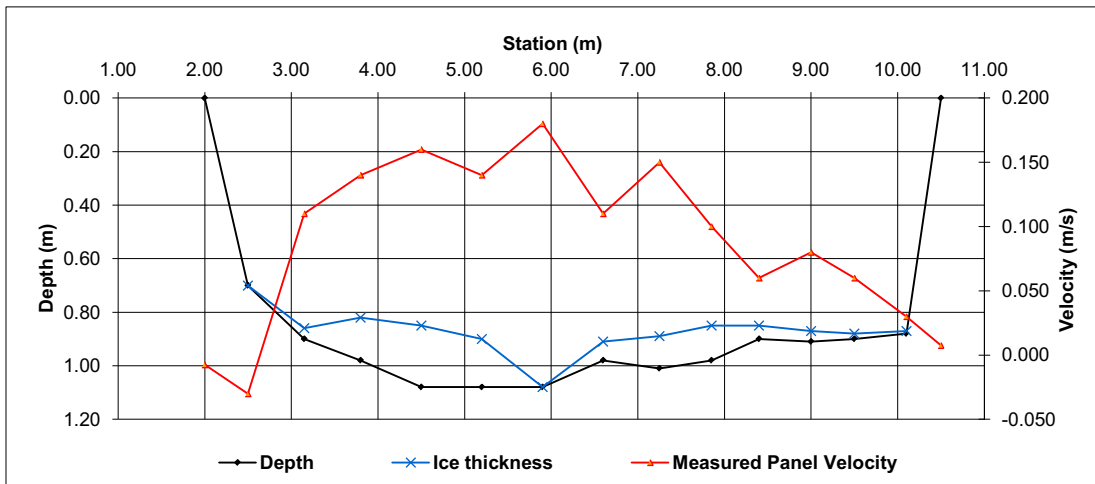
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|-----------------------|
| General Notes: |
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| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 2.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 2.00 | 2.25 | 0.25 | 0.00 | -0.008 | -0.007 | 0.00 | 0.000 | 0% |
| 1 | 2.50 | 0.70 | 0.70 | -0.030 | | | 0.9 | 2.25 | 2.83 | 0.58 | 0.00 | -0.030 | -0.027 | 0.00 | 0.000 | 0% |
| 2 | 3.15 | 0.90 | 0.86 | 0.110 | | | 0.9 | 2.83 | 3.48 | 0.65 | 0.04 | 0.110 | 0.099 | 0.03 | 0.003 | 3% |
| 3 | 3.80 | 0.98 | 0.82 | 0.140 | | | 0.9 | 3.48 | 4.15 | 0.68 | 0.16 | 0.140 | 0.126 | 0.11 | 0.014 | 17% |
| 4 | 4.50 | 1.08 | 0.85 | 0.160 | | | 0.9 | 4.15 | 4.85 | 0.70 | 0.23 | 0.160 | 0.144 | 0.16 | 0.023 | 29% |
| 5 | 5.20 | 1.08 | 0.90 | 0.140 | | | 0.9 | 4.85 | 5.55 | 0.70 | 0.18 | 0.140 | 0.126 | 0.13 | 0.016 | 20% |
| 6 | 5.90 | 1.08 | 1.08 | 0.180 | | | 0.9 | 5.55 | 6.25 | 0.70 | 0.00 | 0.180 | 0.162 | 0.00 | 0.000 | 0% |
| 7 | 6.60 | 0.98 | 0.91 | 0.110 | | | 0.9 | 6.25 | 6.93 | 0.68 | 0.07 | 0.110 | 0.099 | 0.05 | 0.005 | 6% |
| 8 | 7.25 | 1.01 | 0.89 | 0.150 | | | 0.9 | 6.93 | 7.55 | 0.63 | 0.12 | 0.150 | 0.135 | 0.08 | 0.010 | 13% |
| 9 | 7.85 | 0.98 | 0.85 | 0.100 | | | 0.9 | 7.55 | 8.13 | 0.58 | 0.13 | 0.100 | 0.090 | 0.07 | 0.007 | 8% |
| 10 | 8.40 | 0.90 | 0.85 | 0.060 | | | 0.9 | 8.13 | 8.70 | 0.57 | 0.05 | 0.060 | 0.054 | 0.03 | 0.002 | 2% |
| 11 | 9.00 | 0.91 | 0.87 | 0.080 | | | 0.9 | 8.70 | 9.25 | 0.55 | 0.04 | 0.080 | 0.072 | 0.02 | 0.002 | 2% |
| 12 | 9.50 | 0.90 | 0.88 | 0.060 | | | 0.9 | 9.25 | 9.80 | 0.55 | 0.02 | 0.060 | 0.054 | 0.01 | 0.001 | 1% |
| 13 | 10.10 | 0.88 | 0.87 | 0.030 | | | 0.9 | 9.80 | 10.30 | 0.50 | 0.01 | 0.030 | 0.027 | 0.01 | 0.000 | 0% |
| Right | 10.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 10.30 | 10.50 | 0.20 | 0.00 | 0.008 | 0.008 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.081 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.081 | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | 0.69 | (m ²) |
| Wetted Width: | 8.50 | (m) |
| Hydraulic Depth: | 0.081 | (m) |
| Mean Velocity: | 0.118 | (m/s) |
| Froude Number: | 0.132 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S26 - MacKay River near Fort MacKay (458031 E, 6341078 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 30-Nov-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| WSC Station | |

| | |
|------------------------------|----------------|
| Measurement Details: | |
| Start Time (MST): | 13:00 |
| End Time (MST): | 13:45 |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | ice |
| Code ('Ice' or 'Open'): | ice |
| Quality/Error (see reverse): | Good |
| Weather: | - 10, overcast |

| Level Survey: | | | | | | |
|----------------------|--------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rock under flagged bush. | 1.449 | 100.000 | 1.428 | 100.000 | - |
| Bench Mark 2: | NO BM2 | | | | | - |
| Top of Ice: | | 3.978 | 97.471 | 3.955 | 97.473 | 97.472 |
| Water Level: | | 4.010 | 97.439 | 3.985 | 97.443 | 97.441 |
| Transducer: | | | | | | |
| Other: | | | | | | |

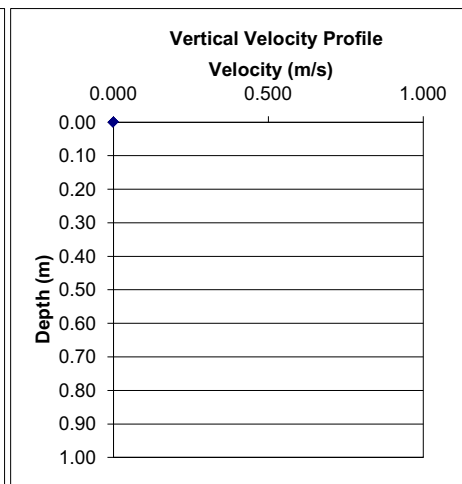
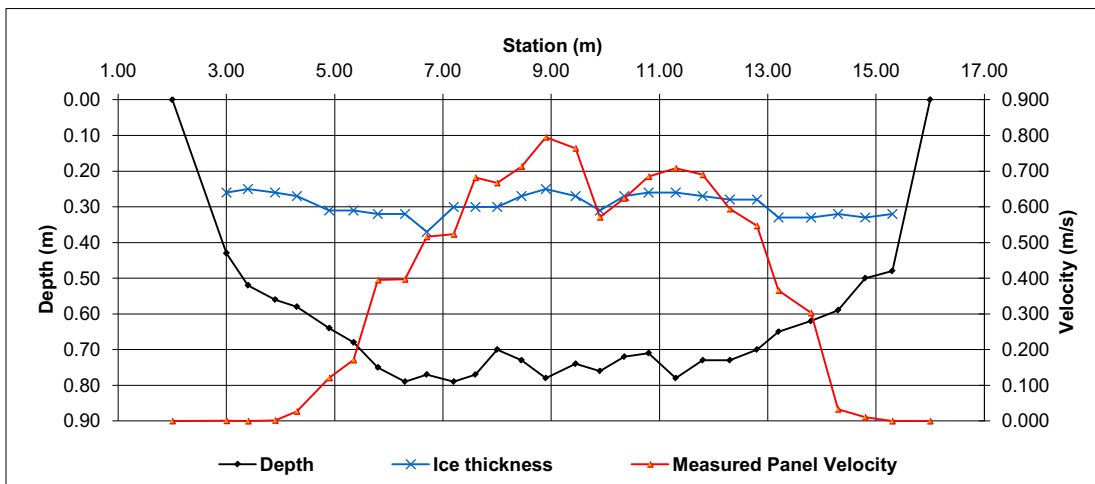
| |
|-----------------------|
| General Notes: |
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| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 2.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 2.00 | 2.50 | 0.50 | 0.04 | 0.000 | 0.000 | 0.02 | 0.000 | 0% |
| 1 | 3.00 | 0.43 | 0.26 | 0.001 | | | 0.9 | 2.50 | 3.20 | 0.70 | 0.17 | 0.001 | 0.001 | 0.12 | 0.000 | 0% |
| 2 | 3.40 | 0.52 | 0.25 | 0.000 | | | 1.0 | 3.20 | 3.65 | 0.45 | 0.27 | 0.000 | 0.000 | 0.12 | 0.000 | 0% |
| 3 | 3.90 | 0.56 | 0.26 | 0.002 | | | 0.9 | 3.65 | 4.10 | 0.45 | 0.30 | 0.002 | 0.002 | 0.14 | 0.000 | 0% |
| 4 | 4.30 | 0.58 | 0.27 | 0.027 | | | 0.9 | 4.10 | 4.60 | 0.50 | 0.31 | 0.027 | 0.024 | 0.16 | 0.004 | 0% |
| 5 | 4.90 | 0.64 | 0.31 | 0.121 | | | 0.9 | 4.60 | 5.13 | 0.53 | 0.33 | 0.121 | 0.109 | 0.17 | 0.019 | 1% |
| 6 | 5.35 | 0.68 | 0.31 | 0.171 | | | 0.9 | 5.13 | 5.58 | 0.45 | 0.37 | 0.171 | 0.154 | 0.17 | 0.026 | 1% |
| 7 | 5.80 | 0.75 | 0.32 | 0.395 | | | 0.9 | 5.58 | 6.05 | 0.48 | 0.43 | 0.395 | 0.356 | 0.20 | 0.073 | 4% |
| 8 | 6.30 | 0.79 | 0.32 | 0.397 | | | 0.9 | 6.05 | 6.50 | 0.45 | 0.47 | 0.397 | 0.357 | 0.21 | 0.076 | 4% |
| 9 | 6.70 | 0.77 | 0.37 | 0.516 | | | 0.9 | 6.50 | 6.95 | 0.45 | 0.40 | 0.516 | 0.464 | 0.18 | 0.084 | 4% |
| 10 | 7.20 | 0.79 | 0.30 | 0.523 | | | 0.9 | 6.95 | 7.40 | 0.45 | 0.49 | 0.523 | 0.471 | 0.22 | 0.104 | 5% |
| 11 | 7.60 | 0.77 | 0.30 | 0.682 | | | 0.9 | 7.40 | 7.80 | 0.40 | 0.47 | 0.682 | 0.614 | 0.19 | 0.115 | 6% |
| 12 | 8.00 | 0.70 | 0.30 | 0.667 | | | 0.9 | 7.80 | 8.23 | 0.43 | 0.40 | 0.667 | 0.600 | 0.17 | 0.102 | 5% |
| 13 | 8.45 | 0.73 | 0.27 | 0.713 | | | 0.9 | 8.23 | 8.68 | 0.45 | 0.46 | 0.713 | 0.642 | 0.21 | 0.133 | 6% |
| 14 | 8.90 | 0.78 | 0.25 | 0.795 | | | 0.9 | 8.68 | 9.18 | 0.50 | 0.53 | 0.795 | 0.716 | 0.27 | 0.190 | 9% |
| 15 | 9.45 | 0.74 | 0.27 | 0.764 | | | 0.9 | 9.18 | 9.68 | 0.50 | 0.47 | 0.764 | 0.688 | 0.24 | 0.162 | 8% |
| 16 | 9.90 | 0.76 | 0.31 | 0.571 | | | 0.9 | 9.68 | 10.13 | 0.45 | 0.45 | 0.571 | 0.514 | 0.20 | 0.104 | 5% |
| 17 | 10.35 | 0.72 | 0.27 | 0.624 | | | 0.9 | 10.13 | 10.58 | 0.45 | 0.45 | 0.624 | 0.562 | 0.20 | 0.114 | 6% |
| 18 | 10.80 | 0.71 | 0.26 | 0.685 | | | 0.9 | 10.58 | 11.05 | 0.48 | 0.45 | 0.685 | 0.617 | 0.21 | 0.132 | 6% |
| 19 | 11.30 | 0.78 | 0.26 | 0.708 | | | 0.9 | 11.05 | 11.55 | 0.50 | 0.52 | 0.708 | 0.637 | 0.26 | 0.166 | 8% |
| 20 | 11.80 | 0.73 | 0.27 | 0.690 | | | 0.9 | 11.55 | 12.05 | 0.50 | 0.46 | 0.690 | 0.621 | 0.23 | 0.143 | 7% |
| 21 | 12.30 | 0.73 | 0.28 | 0.594 | | | 0.9 | 12.05 | 12.55 | 0.50 | 0.45 | 0.594 | 0.535 | 0.23 | 0.120 | 6% |
| 22 | 12.80 | 0.70 | 0.28 | 0.547 | | | 0.9 | 12.55 | 13.00 | 0.45 | 0.42 | 0.547 | 0.492 | 0.19 | 0.093 | 5% |
| 23 | 13.20 | 0.65 | 0.33 | 0.366 | | | 0.9 | 13.00 | 13.50 | 0.50 | 0.32 | 0.366 | 0.329 | 0.16 | 0.053 | 3% |
| 24 | 13.80 | 0.62 | 0.33 | 0.303 | | | 0.9 | 13.50 | 14.05 | 0.55 | 0.29 | 0.303 | 0.273 | 0.16 | 0.043 | 2% |
| 25 | 14.30 | 0.59 | 0.32 | 0.033 | | | 0.9 | 14.05 | 14.55 | 0.50 | 0.27 | 0.033 | 0.030 | 0.14 | 0.004 | 0% |
| 26 | 14.80 | 0.50 | 0.33 | 0.011 | | | 0.9 | 14.55 | 15.05 | 0.50 | 0.17 | 0.011 | 0.010 | 0.09 | 0.001 | 0% |
| 27 | 15.30 | 0.48 | 0.32 | 0.000 | | | 1.0 | 15.05 | 15.65 | 0.60 | 0.16 | 0.000 | 0.000 | 0.10 | 0.000 | 0% |
| Right | 16.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 15.65 | 16.00 | 0.35 | 0.04 | 0.000 | 0.000 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 2.058 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 2.058 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 4.95 | (m ²) |
| Wetted Width: | 14.00 | (m) |
| Hydraulic Depth: | 0.353 | (m) |
| Mean Velocity: | 0.416 | (m/s) |
| Froude Number: | 0.224 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S27 - Firebag River WSC (488685 E, 6388706 N) | | | |
| Field Personnel: | SG, CE | Trip Date: | 18-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.275 |
| Battery (Main): | 4.75 |
| Battery (Aux): | 12.75 |
| Datalogger Clock: | 8.54 |
| Laptop Clock: | 911 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 15% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 925 |
| End Time (MST): | 1005 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Clear, -5C |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC 1m from lggr | 1.300 | 100.000 | 1.265 | 100.000 | - |
| Bench Mark 2: | NO BM2 | | | | | - |
| Top of Ice: | | 3.214 | 98.086 | 3.179 | 98.086 | 98.086 |
| Water Level: | | 3.265 | 98.035 | 3.235 | 98.030 | 98.033 |
| Transducer: | | 1.275 | 96.760 | 1.275 | 96.755 | 96.758 |
| Other: | | | | | | |

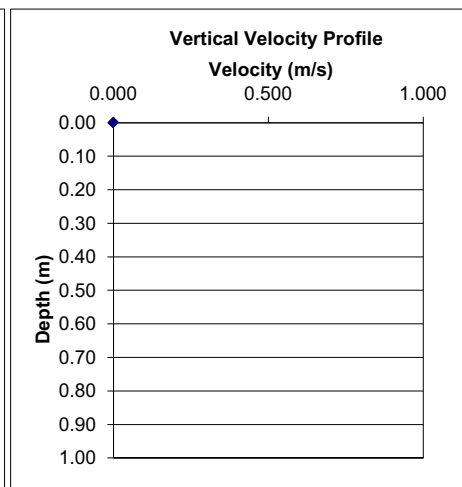
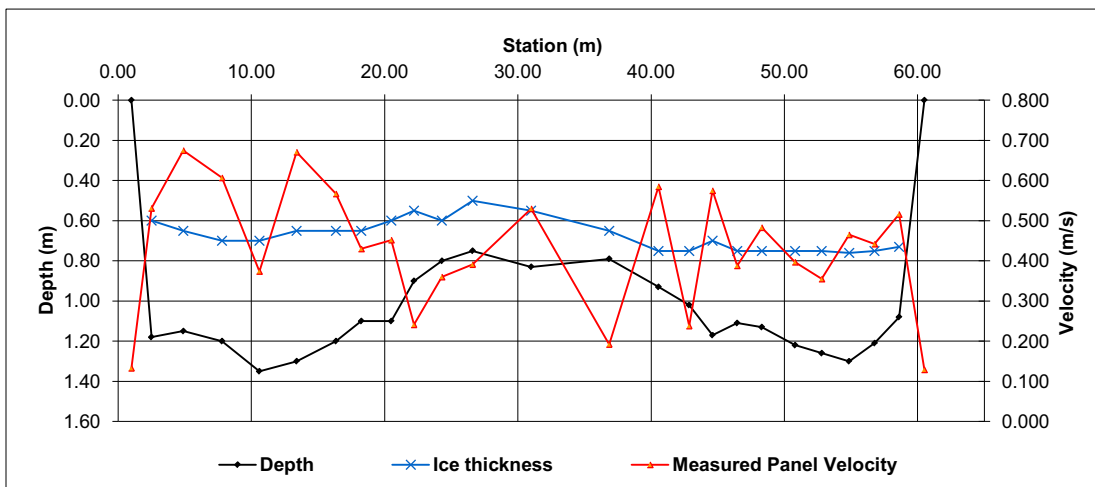
| |
|-----------------------|
| General Notes: |
| |
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| |

| Flow Measurement: | | | | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | |
| Left | 1.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.00 | 1.75 | 0.75 | 0.15 | 0.133 | 0.119 | 0.11 | 0.013 | 0% | | | |
| 1 | 2.50 | 1.18 | 0.60 | 0.531 | | | 0.9 | 1.75 | 3.70 | 1.95 | 0.58 | 0.531 | 0.478 | 1.13 | 0.541 | 5% | | | |
| 2 | 4.90 | 1.15 | 0.65 | 0.675 | | | 0.9 | 3.70 | 6.35 | 2.65 | 0.50 | 0.675 | 0.608 | 1.33 | 0.805 | 8% | | | |
| 3 | 7.80 | 1.20 | 0.70 | 0.607 | | | 0.9 | 6.35 | 9.20 | 2.85 | 0.50 | 0.607 | 0.546 | 1.43 | 0.778 | 8% | | | |
| 4 | 10.60 | 1.35 | 0.70 | 0.374 | | | 0.9 | 9.20 | 12.00 | 2.80 | 0.65 | 0.374 | 0.337 | 1.82 | 0.613 | 6% | | | |
| 5 | 13.40 | 1.30 | 0.65 | 0.671 | | | 0.9 | 12.00 | 14.88 | 2.88 | 0.65 | 0.671 | 0.604 | 1.87 | 1.129 | 11% | | | |
| 6 | 16.35 | 1.20 | 0.65 | 0.567 | | | 0.9 | 14.88 | 17.30 | 2.43 | 0.55 | 0.567 | 0.510 | 1.33 | 0.681 | 7% | | | |
| 7 | 18.25 | 1.10 | 0.65 | 0.430 | | | 0.9 | 17.30 | 19.38 | 2.08 | 0.45 | 0.430 | 0.387 | 0.93 | 0.361 | 4% | | | |
| 8 | 20.50 | 1.10 | 0.60 | 0.452 | | | 0.9 | 19.38 | 21.35 | 1.98 | 0.50 | 0.452 | 0.407 | 0.99 | 0.402 | 4% | | | |
| 9 | 22.20 | 0.90 | 0.55 | 0.241 | | | 0.9 | 21.35 | 23.25 | 1.90 | 0.35 | 0.241 | 0.217 | 0.66 | 0.144 | 1% | | | |
| 10 | 24.30 | 0.80 | 0.60 | 0.360 | | | 0.9 | 23.25 | 25.45 | 2.20 | 0.20 | 0.360 | 0.324 | 0.44 | 0.143 | 1% | | | |
| 11 | 26.60 | 0.75 | 0.50 | 0.391 | | | 0.9 | 25.45 | 28.80 | 3.35 | 0.25 | 0.391 | 0.352 | 0.84 | 0.295 | 3% | | | |
| 12 | 31.00 | 0.83 | 0.55 | 0.530 | | | 0.9 | 28.80 | 33.93 | 5.13 | 0.28 | 0.530 | 0.477 | 1.44 | 0.684 | 7% | | | |
| 13 | 36.85 | 0.79 | 0.65 | 0.192 | | | 0.9 | 33.93 | 38.70 | 4.78 | 0.14 | 0.192 | 0.173 | 0.67 | 0.116 | 1% | | | |
| 14 | 40.55 | 0.93 | 0.75 | 0.585 | | | 0.9 | 38.70 | 41.70 | 3.00 | 0.18 | 0.585 | 0.527 | 0.54 | 0.284 | 3% | | | |
| 15 | 42.85 | 1.02 | 0.75 | 0.238 | | | 0.9 | 41.70 | 43.73 | 2.03 | 0.27 | 0.238 | 0.214 | 0.55 | 0.117 | 1% | | | |
| 16 | 44.60 | 1.17 | 0.70 | 0.575 | | | 0.9 | 43.73 | 45.53 | 1.80 | 0.47 | 0.575 | 0.518 | 0.85 | 0.438 | 4% | | | |
| 17 | 46.45 | 1.11 | 0.75 | 0.388 | | | 0.9 | 45.53 | 47.38 | 1.85 | 0.36 | 0.388 | 0.349 | 0.67 | 0.233 | 2% | | | |
| 18 | 48.30 | 1.13 | 0.75 | 0.483 | | | 0.9 | 47.38 | 49.55 | 2.18 | 0.38 | 0.483 | 0.435 | 0.83 | 0.359 | 4% | | | |
| 19 | 50.80 | 1.22 | 0.75 | 0.397 | | | 0.9 | 49.55 | 51.80 | 2.25 | 0.47 | 0.397 | 0.357 | 1.06 | 0.378 | 4% | | | |
| 20 | 52.80 | 1.26 | 0.75 | 0.355 | | | 0.9 | 51.80 | 53.83 | 2.03 | 0.51 | 0.355 | 0.320 | 1.03 | 0.330 | 3% | | | |
| 21 | 54.85 | 1.30 | 0.76 | 0.465 | | | 0.9 | 53.83 | 55.81 | 1.99 | 0.54 | 0.465 | 0.419 | 1.07 | 0.449 | 5% | | | |
| 22 | 56.77 | 1.21 | 0.75 | 0.442 | | | 0.9 | 55.81 | 57.69 | 1.88 | 0.46 | 0.442 | 0.398 | 0.86 | 0.343 | 3% | | | |
| 23 | 58.60 | 1.08 | 0.73 | 0.516 | | | 0.9 | 57.69 | 59.55 | 1.86 | 0.35 | 0.516 | 0.464 | 0.65 | 0.303 | 3% | | | |
| Right | 60.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 59.55 | 60.50 | 0.95 | 0.09 | 0.129 | 0.116 | 0.08 | 0.010 | 0% | | | |
| Total Flow | | | | | | | | | | | | | | 9.947 | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 9.947 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 23.17 | (m ²) |
| Wetted Width: | 59.50 | (m) |
| Hydraulic Depth: | 0.389 | (m) |
| Mean Velocity: | 0.429 | (m/s) |
| Froude Number: | 0.220 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S27 - Firebag River WSC (488685 E, 6388706 N) | | | |
| Field Personnel: | GB, JE | Trip Date: | 13-Feb-10 |
| Data Entry Personnel: | SG | Date: | 19-Feb-10 |
| Data Check Personnel: | DB | Date: | 15-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.306 |
| Battery (Main): | 4.72 |
| Battery (Aux): | 12.73 |
| Datalogger Clock: | 848 |
| Laptop Clock: | 905 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 15% |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1003 |
| End Time (MST): | 1055 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Clear |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC 1m from lggr | 1.372 | 100.000 | 1.365 | 100.000 | - |
| Bench Mark 2: | NO BM2 | | | | | - |
| Top of Ice: | | 3.265 | 98.107 | 3.255 | 98.110 | 98.109 |
| Water Level: | | 3.285 | 98.087 | 3.279 | 98.086 | 98.087 |
| Transducer: | | 1.306 | 96.781 | 1.306 | 96.780 | 96.781 |
| Other: | | | | | | |

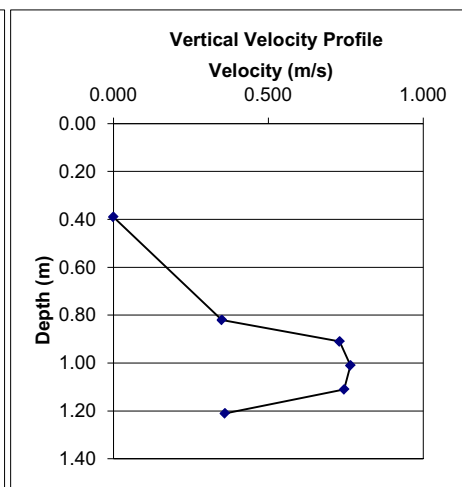
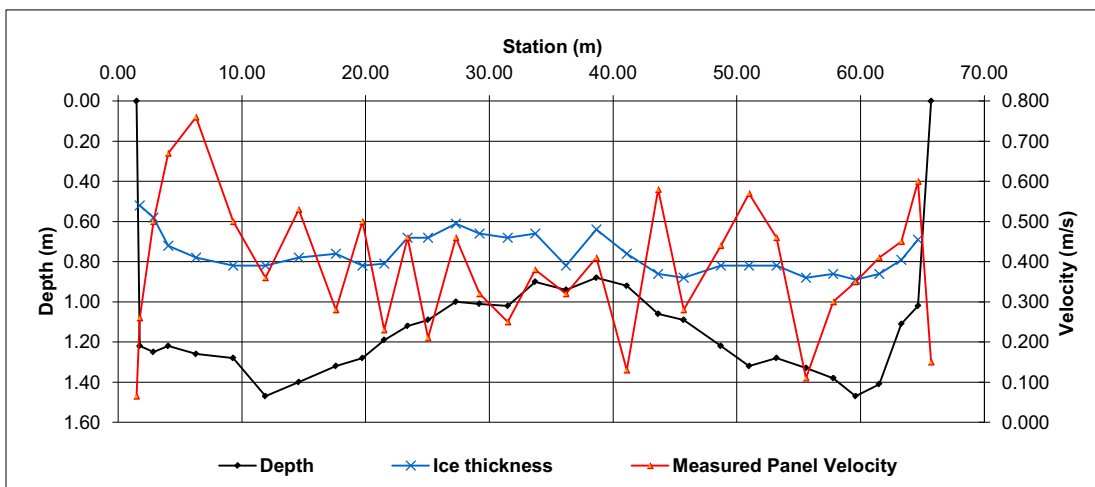
| |
|-----------------------|
| General Notes: |
| |
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| |

| Flow Measurement: | | | | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | |
| Right | 1.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.50 | 1.63 | 0.13 | 0.18 | 0.065 | 0.059 | 0.02 | 0.001 | 0% | | | |
| 1 | 1.75 | 1.22 | 0.52 | 0.260 | | | 0.9 | 1.63 | 2.30 | 0.68 | 0.70 | 0.260 | 0.234 | 0.47 | 0.111 | 1% | | | |
| 2 | 2.85 | 1.25 | 0.58 | 0.500 | | | 0.9 | 2.30 | 3.45 | 1.15 | 0.67 | 0.500 | 0.450 | 0.77 | 0.347 | 4% | | | |
| 3 | 4.05 | 1.22 | 0.72 | 0.670 | | | 0.9 | 3.45 | 5.18 | 1.73 | 0.50 | 0.670 | 0.603 | 0.86 | 0.520 | 5% | | | |
| 4 | 6.30 | 1.26 | 0.78 | 0.760 | | | 0.9 | 5.18 | 7.80 | 2.63 | 0.48 | 0.760 | 0.684 | 1.26 | 0.862 | 9% | | | |
| 5 | 9.30 | 1.28 | 0.82 | 0.500 | | | 0.9 | 7.80 | 10.60 | 2.80 | 0.46 | 0.500 | 0.450 | 1.29 | 0.580 | 6% | | | |
| 6 | 11.90 | 1.47 | 0.82 | 0.360 | | | 0.9 | 10.60 | 13.25 | 2.65 | 0.65 | 0.360 | 0.324 | 1.72 | 0.558 | 6% | | | |
| 7 | 14.60 | 1.40 | 0.78 | 0.530 | | | 0.9 | 13.25 | 16.10 | 2.85 | 0.62 | 0.530 | 0.477 | 1.77 | 0.843 | 9% | | | |
| 8 | 17.60 | 1.32 | 0.76 | 0.280 | | | 0.9 | 16.10 | 18.68 | 2.58 | 0.56 | 0.280 | 0.252 | 1.44 | 0.363 | 4% | | | |
| 9 | 19.75 | 1.28 | 0.82 | 0.500 | | | 0.9 | 18.68 | 20.63 | 1.95 | 0.46 | 0.500 | 0.450 | 0.90 | 0.404 | 4% | | | |
| 10 | 21.50 | 1.19 | 0.81 | 0.230 | | | 0.9 | 20.63 | 22.45 | 1.83 | 0.38 | 0.230 | 0.207 | 0.69 | 0.144 | 1% | | | |
| 11 | 23.40 | 1.12 | 0.68 | 0.460 | | | 0.9 | 22.45 | 24.23 | 1.78 | 0.44 | 0.460 | 0.414 | 0.78 | 0.323 | 3% | | | |
| 12 | 25.05 | 1.09 | 0.68 | 0.210 | | | 0.9 | 24.23 | 26.18 | 1.95 | 0.41 | 0.210 | 0.189 | 0.80 | 0.151 | 2% | | | |
| 13 | 27.30 | 1.00 | 0.61 | 0.460 | | | 0.9 | 26.18 | 28.25 | 2.08 | 0.39 | 0.460 | 0.414 | 0.81 | 0.335 | 3% | | | |
| 14 | 29.20 | 1.01 | 0.66 | 0.320 | | | 0.9 | 28.25 | 30.35 | 2.10 | 0.35 | 0.320 | 0.288 | 0.74 | 0.212 | 2% | | | |
| 15 | 31.50 | 1.02 | 0.68 | 0.250 | | | 0.9 | 30.35 | 32.60 | 2.25 | 0.34 | 0.250 | 0.225 | 0.77 | 0.172 | 2% | | | |
| 16 | 33.70 | 0.90 | 0.66 | 0.380 | | | 0.9 | 32.60 | 34.95 | 2.35 | 0.24 | 0.380 | 0.342 | 0.56 | 0.193 | 2% | | | |
| 17 | 36.20 | 0.94 | 0.82 | 0.320 | | | 0.9 | 34.95 | 37.43 | 2.47 | 0.12 | 0.320 | 0.288 | 0.30 | 0.086 | 1% | | | |
| 18 | 38.65 | 0.88 | 0.64 | 0.410 | | | 0.9 | 37.43 | 39.88 | 2.45 | 0.24 | 0.410 | 0.369 | 0.59 | 0.217 | 2% | | | |
| 19 | 41.10 | 0.92 | 0.76 | 0.130 | | | 0.9 | 39.88 | 42.38 | 2.50 | 0.16 | 0.130 | 0.117 | 0.40 | 0.047 | 0% | | | |
| 20 | 43.65 | 1.06 | 0.86 | 0.580 | | | 0.9 | 42.38 | 44.68 | 2.30 | 0.20 | 0.580 | 0.522 | 0.46 | 0.240 | 2% | | | |
| 21 | 45.70 | 1.09 | 0.88 | 0.280 | | | 0.9 | 44.68 | 47.20 | 2.53 | 0.21 | 0.280 | 0.252 | 0.53 | 0.134 | 1% | | | |
| 22 | 48.70 | 1.22 | 0.82 | 0.440 | | | 0.9 | 47.20 | 49.85 | 2.65 | 0.40 | 0.440 | 0.396 | 1.06 | 0.420 | 4% | | | |
| 23 | 51.00 | 1.32 | 0.82 | 0.570 | | | 0.9 | 49.85 | 52.10 | 2.25 | 0.50 | 0.570 | 0.513 | 1.13 | 0.577 | 6% | | | |
| 24 | 53.20 | 1.28 | 0.82 | 0.460 | | | 0.9 | 52.10 | 54.40 | 2.30 | 0.46 | 0.460 | 0.414 | 1.06 | 0.438 | 4% | | | |
| 25 | 55.60 | 1.33 | 0.88 | 0.110 | | | 0.9 | 54.40 | 56.70 | 2.30 | 0.45 | 0.110 | 0.099 | 1.04 | 0.102 | 1% | | | |
| 26 | 57.80 | 1.38 | 0.86 | 0.300 | | | 0.9 | 56.70 | 58.70 | 2.00 | 0.52 | 0.300 | 0.270 | 1.04 | 0.281 | 3% | | | |
| 27 | 59.60 | 1.47 | 0.89 | 0.350 | | | 0.9 | 58.70 | 60.55 | 1.85 | 0.58 | 0.350 | 0.315 | 1.07 | 0.338 | 3% | | | |
| 28 | 61.50 | 1.41 | 0.86 | 0.410 | | | 0.9 | 60.55 | 62.40 | 1.85 | 0.55 | 0.410 | 0.369 | 1.02 | 0.375 | 4% | | | |
| 29 | 63.30 | 1.11 | 0.79 | 0.450 | | | 0.9 | 62.40 | 63.98 | 1.58 | 0.32 | 0.450 | 0.405 | 0.50 | 0.204 | 2% | | | |
| 30 | 64.65 | 1.02 | 0.69 | 0.600 | | | 0.9 | 63.98 | 65.18 | 1.20 | 0.33 | 0.600 | 0.540 | 0.40 | 0.214 | 2% | | | |
| Left | 65.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 65.18 | 65.70 | 0.52 | 0.08 | 0.150 | 0.150 | 0.04 | 0.006 | 0% | | | |
| Total Flow | | | | | | | | | | | | | | | 9.797 | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 9.797 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 26.28 | (m ²) |
| Wetted Width: | 64.20 | (m) |
| Hydraulic Depth: | 0.409 | (m) |
| Mean Velocity: | 0.373 | (m/s) |
| Froude Number: | 0.186 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.492 |
| Offset | 6.3 | 1.26 | 0.000 | - | - | Panel V.@Ofst 0.760 |
| Depth | 1.26 | 1.16 | 0.720 | 1.21 | 0.360 | 60% Depth 1.068 |
| Ice Depth | 0.78 | 1.06 | 0.770 | 1.11 | 0.745 | 20% Depth 0.88 |
| | | 0.96 | 0.760 | 1.01 | 0.765 | 80% Depth 1.16 |
| | | 0.86 | 0.700 | 0.91 | 0.730 | |
| | | 0.78 | 0.000 | 0.82 | 0.350 | |
| | | | | 0.39 | 0.000 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S27 - Firebag River WSC (488685 E, 6388706 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 12-Apr-10 |
| Data Entry Personnel: | DB | Date: | 19-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|---------------------------------|-----------|
| Logger Details: | |
| Transducer Reading: | 1.422 |
| Battery (Main): | 4.72 |
| Battery (Aux): | 12.63 |
| Datalogger Clock: | 649 |
| Laptop Clock: | 710 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | NA |
| Memory used: | 17% |
| Dessicant: | OK |
| Logger# (if Δ): | 106040333 |
| PT# (if Δ): | |
| Other Logger Notes: | |
| logger number 0106040333 | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 710 |
| End Time (MST): | 730 |
| Equipment: | - |
| Method: | - |
| River Condition: | - |
| Code ('Ice' or 'Open'): | Broken Ice |
| Quality/Error (see reverse): | - |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC 1m from lggr | 1.542 | 100.000 | 1.468 | 100.000 | - |
| Bench Mark 2: | NO BM2 | | | | | |
| Top of Ice: | | | | | | |
| Water Level: | | 3.333 | 98.209 | 3.264 | 98.204 | 98.207 |
| Transducer: | | 1.422 | 96.787 | 1.422 | 96.782 | 96.785 |
| Other: | | | | | | |

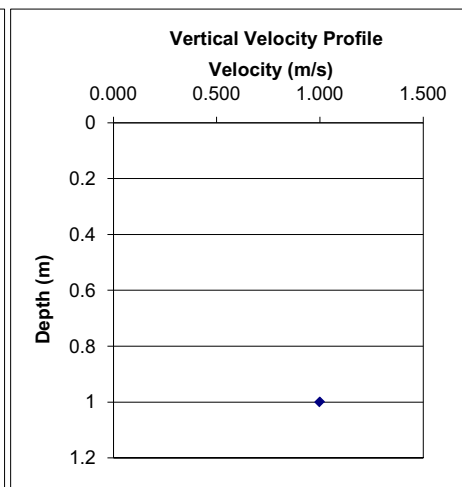
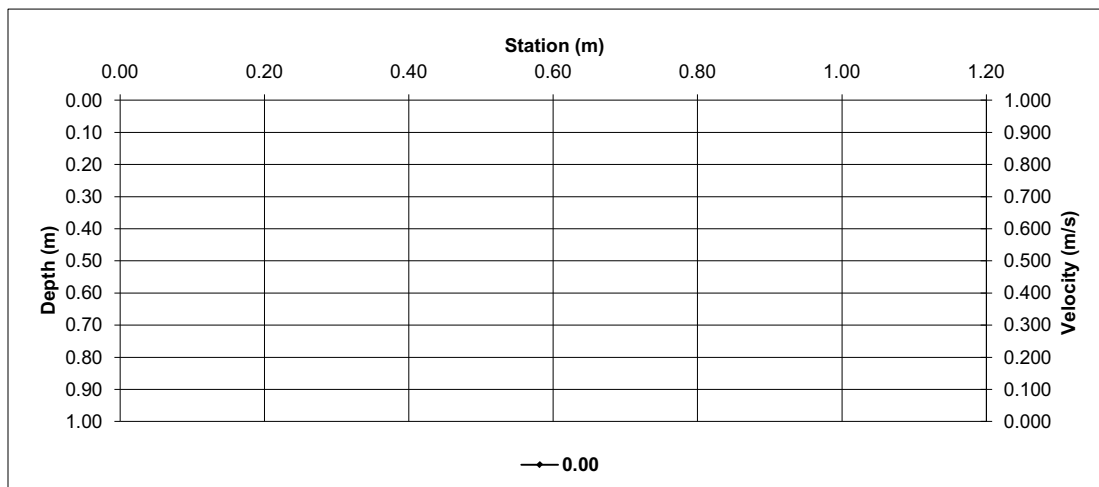
General Notes:

Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | |
| Total Flow | | | | | | | | | | | | | | | NOT MEASURED | |

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | - | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S27 - Firebag River WSC (488685 E, 6388706 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 20-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Oct-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|---------------------------------|-------------|
| Logger Details: | |
| Transducer Reading: | 1.297 |
| Battery (Main): | 4.77 |
| Battery (Aux): | 12.47 |
| Datalogger Clock: | 1001 |
| Laptop Clock: | 1023 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | - |
| Memory used: | 20% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | Old = 45186 |
| Other Logger Notes: | |
| logger number 0106040333 | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1001 |
| End Time (MST): | 1020 |
| Equipment: | - |
| Method: | - |
| River Condition: | - |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | - |
| Weather: | Light Rain |

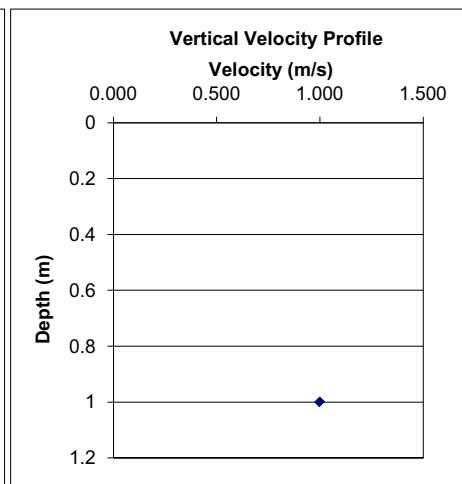
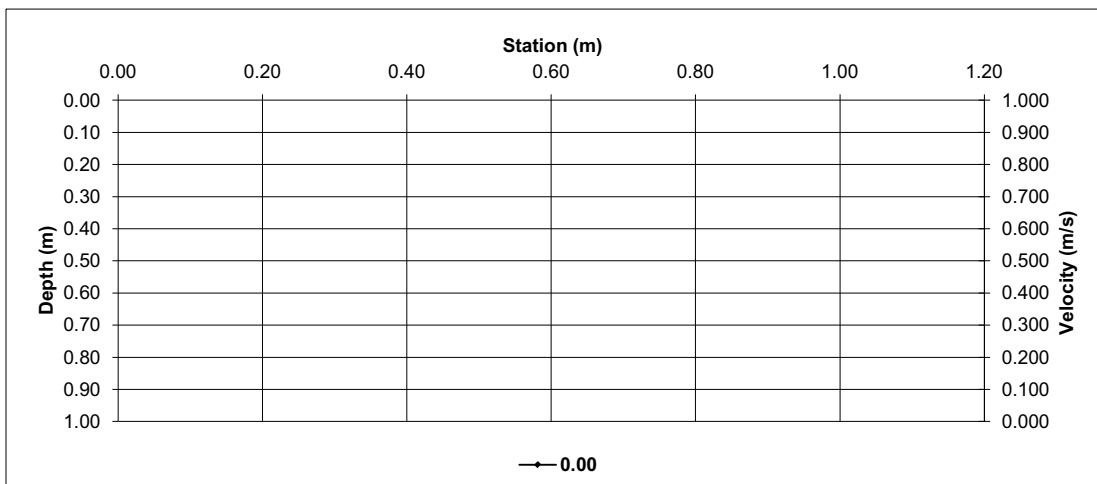
| Level Survey: | | | | | | |
|----------------------|---------------------------|----------|---------|----------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC 1m from lggr | 1.365 | 100.000 | 1.358 | 100.000 | - |
| Bench Mark 2: | NO BM2 | | | | | |
| Top of Ice: | | | | | | |
| Water Level: | | 3.393 | 97.972 | 3.387 | 97.971 | 97.972 |
| Transducer: | | 1.297144 | 96.675 | 1.297144 | 96.674 | 96.674 |
| Other: | | | | | | |

| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | |
| Total Flow | | | | | | | | | | | | | | | NOT MEASURED | |

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | - | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S27 - Firebag River WSC (488685 E, 6388706 N) | | | |
| Field Personnel: | JO, SG | Trip Date: | 04-Dec-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | | |
|------------------------|---------|-------|
| Logger Details: | | |
| Transducer Reading: | 1.114 | 1.115 |
| Battery (Main): | 4.71 | |
| Battery (Aux): | 12.3 | 12.9 |
| Datalogger Clock: | 1108 | |
| Laptop Clock: | 1110 | |
| Air Temp: | NA | |
| Air Pressure: | NA | |
| RH: | NA | |
| Water °C: | - | |
| Memory used: | 21% | |
| Dessicant: | Changed | |
| Logger# (if Δ): | | |
| PT# (if Δ): | | |
| Other Logger Notes: | | |

| | |
|------------------------------|------------------|
| Measurement Details: | |
| Start Time (MST): | 1110 |
| End Time (MST): | 1130 |
| Equipment: | - |
| Method: | - |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | - |
| Weather: | - 15, light rain |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC 1m from lggr | 1.486 | 100.000 | 1.483 | 100.000 | - |
| Bench Mark 2: | NO BM2 | | | | | - |
| Top of Ice: | | 3.538 | 97.948 | 3.533 | 97.950 | 97.949 |
| Water Level: | | 3.601 | 97.885 | 3.597 | 97.886 | 97.886 |
| Transducer: | | 1.114 | 96.771 | 1.114 | 96.772 | 96.772 |
| Other: | | | | | | |

General Notes:

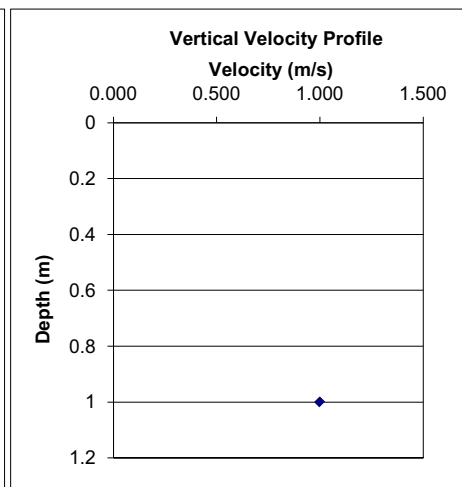
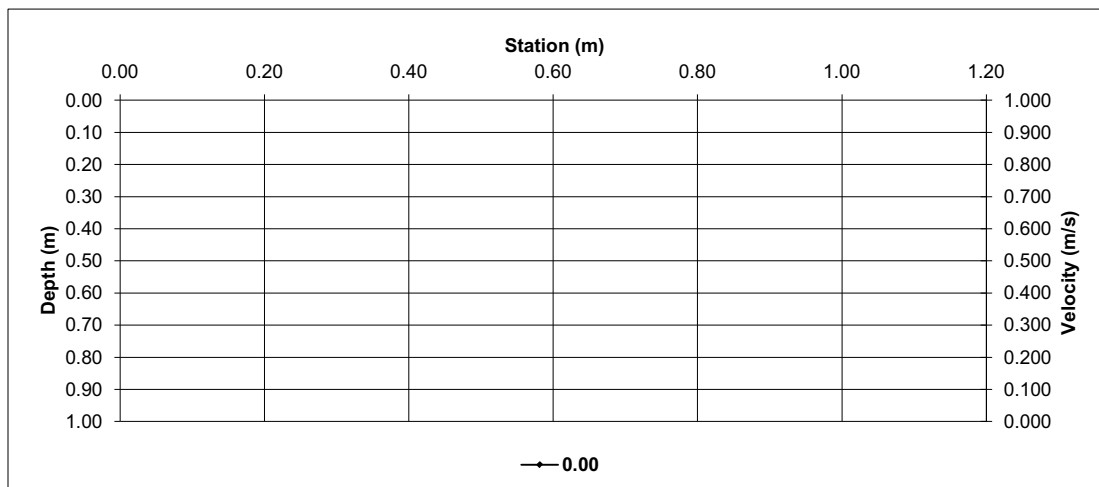
Ice considered unsafe for flow measurement.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURE | (m ³ /s) |
| Perceived Measurement Quality: | - | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S29 - Christina River near Chard (508183 E, 6187926 N) | | | |
| Field Personnel: | SE, SG | Trip Date: | 22-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| WSC Station | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1500 |
| End Time (MST): | 1520 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Overcast -5C |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 87-1: Bolt w/orange 'BM' | 4.568 | 6.963 | 4.564 | 6.963 | - |
| Bench Mark 2: | 94-1: Brass cap by blue stk | 1.706 | 9.838 | 1.700 | 9.838 | - |
| Top of Ice: | | 6.157 | 5.374 | 6.156 | 5.371 | 5.373 |
| Water Level: | | 6.129 | 5.402 | 6.128 | 5.399 | 5.401 |
| Transducer: | | | | | | |
| Other: | | | | | | |

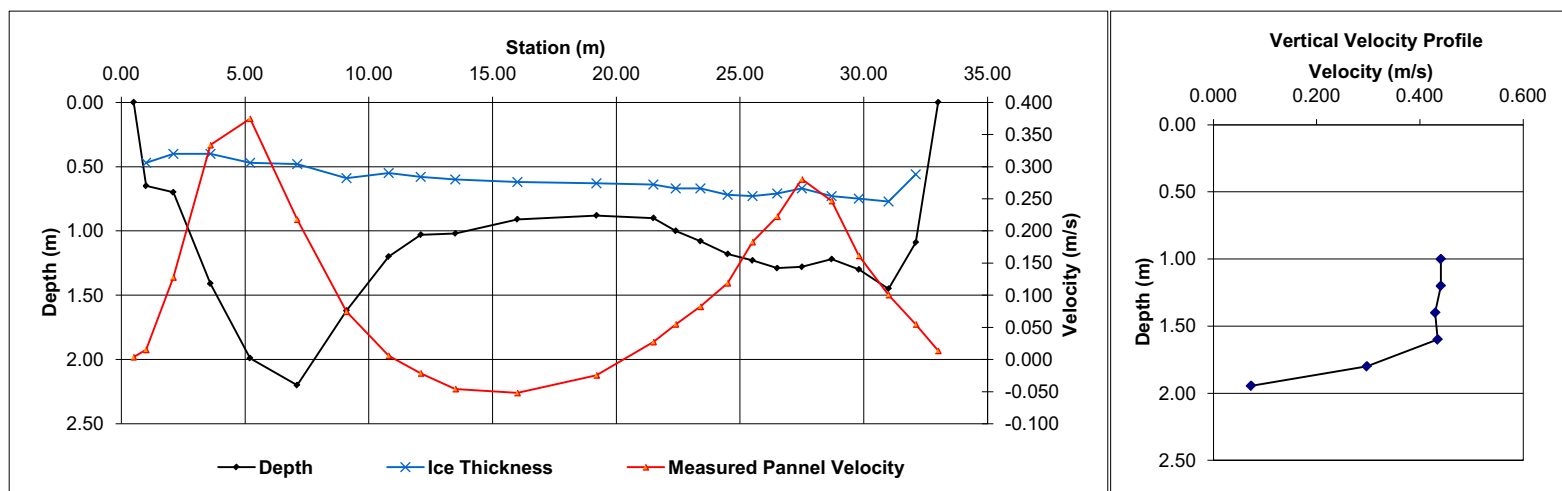
| |
|-----------------------|
| General Notes: |
| |
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| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 0.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 0.50 | 0.75 | 0.25 | 0.05 | 0.004 | 0.003 | 0.01 | 0.000 | 0% | |
| 1 | 1.00 | 0.65 | 0.47 | 0.015 | | | 0.9 | 0.75 | 1.55 | 0.80 | 0.18 | 0.015 | 0.014 | 0.14 | 0.002 | 0% | |
| 2 | 2.10 | 0.70 | 0.40 | 0.128 | | | 0.9 | 1.55 | 2.85 | 1.30 | 0.30 | 0.128 | 0.115 | 0.39 | 0.045 | 1% | |
| 3 | 3.60 | 1.41 | 0.40 | | 0.314 | 0.354 | 1.0 | 2.85 | 4.40 | 1.55 | 1.01 | 0.334 | 0.334 | 1.57 | 0.522 | 17% | |
| 4 | 5.20 | 1.99 | 0.47 | | 0.360 | 0.390 | 1.0 | 4.40 | 6.15 | 1.75 | 1.52 | 0.375 | 0.375 | 2.66 | 0.997 | 32% | |
| 5 | 7.10 | 2.20 | 0.48 | | 0.256 | 0.180 | 1.0 | 6.15 | 8.10 | 1.95 | 1.72 | 0.218 | 0.218 | 3.35 | 0.731 | 23% | |
| 6 | 9.10 | 1.62 | 0.59 | | 0.125 | 0.024 | 1.0 | 8.10 | 9.95 | 1.85 | 1.03 | 0.075 | 0.075 | 1.91 | 0.142 | 5% | |
| 7 | 10.80 | 1.20 | 0.55 | 0.006 | | | 0.9 | 9.95 | 11.45 | 1.50 | 0.65 | 0.006 | 0.005 | 0.98 | 0.005 | 0% | |
| 8 | 12.10 | 1.03 | 0.58 | -0.021 | | | 0.9 | 11.45 | 12.80 | 1.35 | 0.45 | -0.021 | -0.019 | 0.61 | -0.012 | 0% | |
| 9 | 13.50 | 1.02 | 0.60 | -0.046 | | | 0.9 | 12.80 | 14.75 | 1.95 | 0.42 | -0.046 | -0.041 | 0.82 | -0.034 | -1% | |
| 10 | 16.00 | 0.91 | 0.62 | -0.052 | | | 0.9 | 14.75 | 17.60 | 2.85 | 0.29 | -0.052 | -0.047 | 0.83 | -0.039 | -1% | |
| 11 | 19.20 | 0.88 | 0.63 | -0.024 | | | 0.9 | 17.60 | 20.35 | 2.75 | 0.25 | -0.024 | -0.022 | 0.69 | -0.015 | 0% | |
| 12 | 21.50 | 0.90 | 0.64 | 0.027 | | | 0.9 | 20.35 | 21.95 | 1.60 | 0.26 | 0.027 | 0.025 | 0.42 | 0.010 | 0% | |
| 13 | 22.40 | 1.00 | 0.67 | 0.055 | | | 0.9 | 21.95 | 22.90 | 0.95 | 0.33 | 0.055 | 0.049 | 0.31 | 0.015 | 0% | |
| 14 | 23.40 | 1.08 | 0.67 | 0.082 | | | 0.9 | 22.90 | 23.95 | 1.05 | 0.41 | 0.082 | 0.074 | 0.43 | 0.032 | 1% | |
| 15 | 24.50 | 1.18 | 0.72 | 0.119 | | | 0.9 | 23.95 | 25.00 | 1.05 | 0.46 | 0.119 | 0.107 | 0.48 | 0.052 | 2% | |
| 16 | 25.50 | 1.23 | 0.73 | 0.183 | | | 0.9 | 25.00 | 26.00 | 1.00 | 0.50 | 0.183 | 0.165 | 0.50 | 0.082 | 3% | |
| 17 | 26.50 | 1.29 | 0.71 | 0.223 | | | 0.9 | 26.00 | 27.00 | 1.00 | 0.58 | 0.223 | 0.200 | 0.58 | 0.116 | 4% | |
| 18 | 27.50 | 1.28 | 0.67 | 0.280 | | | 0.9 | 27.00 | 28.10 | 1.10 | 0.61 | 0.280 | 0.252 | 0.67 | 0.169 | 5% | |
| 19 | 28.70 | 1.22 | 0.73 | 0.247 | | | 0.9 | 28.10 | 29.25 | 1.15 | 0.49 | 0.247 | 0.222 | 0.56 | 0.125 | 4% | |
| 20 | 29.80 | 1.30 | 0.75 | 0.162 | | | 0.9 | 29.25 | 30.40 | 1.15 | 0.55 | 0.162 | 0.145 | 0.63 | 0.092 | 3% | |
| 21 | 31.00 | 1.45 | 0.77 | 0.101 | | | 0.9 | 30.40 | 31.55 | 1.15 | 0.68 | 0.101 | 0.091 | 0.78 | 0.071 | 2% | |
| 22 | 32.10 | 1.09 | 0.56 | 0.055 | | | 0.9 | 31.55 | 32.55 | 1.00 | 0.53 | 0.055 | 0.049 | 0.53 | 0.026 | 1% | |
| Right | 33.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 32.55 | 33.00 | 0.45 | 0.13 | 0.014 | 0.012 | 0.06 | 0.001 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 3.138 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 3.138 | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | 19.91 | (m ²) |
| Wetted Width: | 32.50 | (m) |
| Hydraulic Depth: | 0.613 | (m) |
| Mean Velocity: | 0.158 | (m/s) |
| Foude Number: | 0.064 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.353 |
| Offset | 5.2 | 1.99 | 0 | - | - | Panel V.@Ofst |
| Depth | 1.99 | 1.90 | 0.146 | 1.95 | 0.073 | 60% Depth |
| Ice Depth | 0.47 | 1.70 | 0.448 | 1.80 | 0.297 | 20% Depth |
| | | 1.50 | 0.421 | 1.60 | 0.434 | 80% Depth |
| | | 1.30 | 0.439 | 1.40 | 0.430 | |
| | | 1.10 | 0.442 | 1.20 | 0.440 | |
| | | 0.90 | 0.439 | 1.00 | 0.440 | |
| | | 0.70 | 0.460 | 0.80 | 0.450 | |
| | | 0.47 | 0 | 0.59 | 0.230 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S29 - Christina River near Chard (508183 E, 6187926 N) | | | |
| Field Personnel: | GB, CE | Trip Date: | 08-Feb-10 |
| Data Entry Personnel: | SG | Date: | 19-Feb-10 |
| Data Check Personnel: | DB | Date: | 15-Mar-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| WSC Station | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1215 |
| End Time (MST): | 1350 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | sunny -19 C |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 87-1: Bolt w/orange 'BM' | 3.995 | 6.963 | 3.985 | 6.963 | - |
| Bench Mark 2: | 94-1: Brass cap by blue stk | 1.130 | 9.838 | 1.118 | 9.838 | - |
| Top of Ice: | | 5.560 | 5.398 | 5.550 | 5.398 | 5.398 |
| Water Level: | | 5.561 | 5.397 | 5.550 | 5.398 | 5.398 |
| Transducer: | | | | | | |
| Other: | | | | | | |

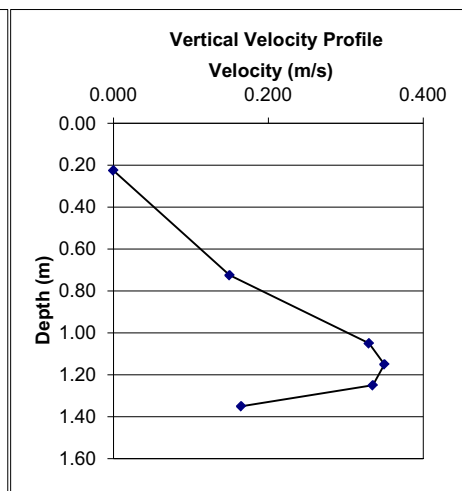
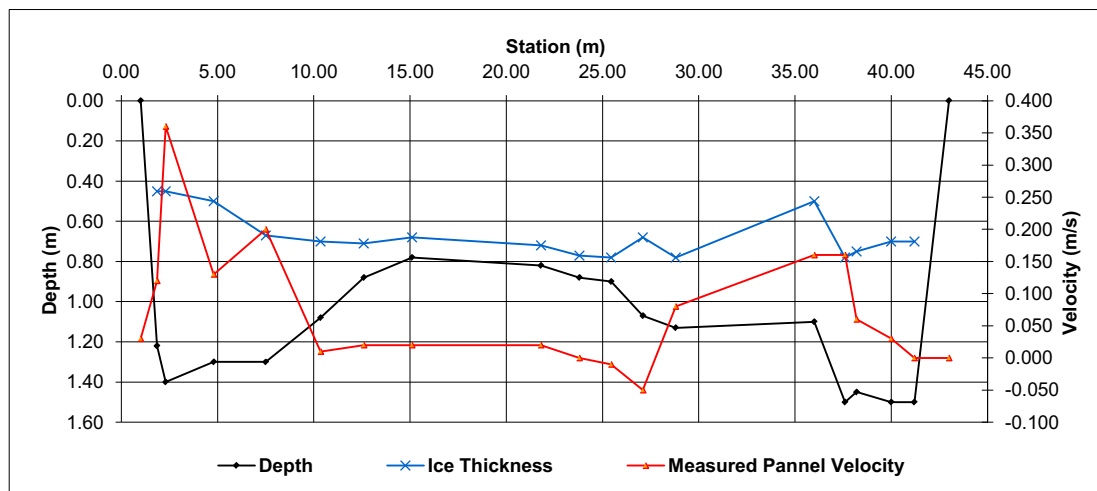
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|-----------------------|
| General Notes: |
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| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 1.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.00 | 1.43 | 0.43 | 0.19 | 0.030 | 0.027 | 0.08 | 0.002 | 0% |
| 1 | 1.85 | 1.22 | 0.45 | 0.120 | | | 0.9 | 1.43 | 2.08 | 0.65 | 0.77 | 0.120 | 0.108 | 0.50 | 0.054 | 3% |
| 2 | 2.30 | 1.40 | 0.45 | 0.360 | | | 0.9 | 2.08 | 3.55 | 1.48 | 0.95 | 0.360 | 0.324 | 1.40 | 0.454 | 26% |
| 3 | 4.80 | 1.30 | 0.50 | 0.130 | | | 0.9 | 3.55 | 6.15 | 2.60 | 0.80 | 0.130 | 0.117 | 2.08 | 0.243 | 14% |
| 4 | 7.50 | 1.30 | 0.67 | 0.200 | | | 0.9 | 6.15 | 8.93 | 2.78 | 0.63 | 0.200 | 0.180 | 1.75 | 0.315 | 18% |
| 5 | 10.35 | 1.08 | 0.70 | 0.010 | | | 0.9 | 8.93 | 11.48 | 2.55 | 0.38 | 0.010 | 0.009 | 0.97 | 0.009 | 0% |
| 6 | 12.60 | 0.88 | 0.71 | 0.020 | | | 0.9 | 11.48 | 13.85 | 2.38 | 0.17 | 0.020 | 0.018 | 0.40 | 0.007 | 0% |
| 7 | 15.10 | 0.78 | 0.68 | 0.020 | | | 0.9 | 13.85 | 18.45 | 4.60 | 0.10 | 0.020 | 0.018 | 0.46 | 0.008 | 0% |
| 8 | 21.80 | 0.82 | 0.72 | 0.020 | | | 0.9 | 18.45 | 22.80 | 4.35 | 0.10 | 0.020 | 0.018 | 0.44 | 0.008 | 0% |
| 9 | 23.80 | 0.88 | 0.77 | 0.000 | | | 1.0 | 22.80 | 24.63 | 1.83 | 0.11 | 0.000 | 0.000 | 0.20 | 0.000 | 0% |
| 10 | 25.45 | 0.90 | 0.78 | -0.010 | | | 0.9 | 24.63 | 26.28 | 1.65 | 0.12 | -0.010 | -0.009 | 0.20 | -0.002 | 0% |
| 11 | 27.10 | 1.07 | 0.68 | -0.050 | | | 0.9 | 26.28 | 27.95 | 1.68 | 0.39 | -0.050 | -0.045 | 0.65 | -0.029 | -2% |
| 12 | 28.80 | 1.13 | 0.78 | 0.080 | | | 0.9 | 27.95 | 32.40 | 4.45 | 0.35 | 0.080 | 0.072 | 1.56 | 0.112 | 6% |
| 13 | 36.00 | 1.10 | 0.50 | 0.160 | | | 0.9 | 32.40 | 36.80 | 4.40 | 0.60 | 0.160 | 0.144 | 2.64 | 0.380 | 22% |
| 14 | 37.60 | 1.50 | 0.78 | 0.160 | | | 0.9 | 36.80 | 37.90 | 1.10 | 0.72 | 0.160 | 0.144 | 0.79 | 0.114 | 7% |
| 15 | 38.20 | 1.45 | 0.75 | 0.060 | | | 0.9 | 37.90 | 39.10 | 1.20 | 0.70 | 0.060 | 0.054 | 0.84 | 0.045 | 3% |
| 16 | 40.00 | 1.50 | 0.70 | 0.030 | | | 0.9 | 39.10 | 40.60 | 1.50 | 0.80 | 0.030 | 0.027 | 1.20 | 0.032 | 2% |
| 17 | 41.20 | 1.50 | 0.70 | 0.000 | | | 1.0 | 40.60 | 42.10 | 1.50 | 0.80 | 0.000 | 0.000 | 1.20 | 0.000 | 0% |
| Right | 43.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 42.10 | 43.00 | 0.90 | 0.20 | 0.000 | 0.000 | 0.18 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 1.753 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 1.753 | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | 17.54 | (m ²) |
| Wetted Width: | 42.00 | (m) |
| Hydraulic Depth: | 0.418 | (m) |
| Mean Velocity: | 0.100 | (m/s) |
| Foude Number: | 0.049 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|--------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.222 |
| Offset | 2.3 | 1.40 | 0.000 | - | - | Panel V.@Ofst 0.36 |
| Depth | 1.4 | 1.30 | 0.330 | 1.35 | 0.165 | 60% Depth 1.02 |
| Ice Depth | 0.45 | 1.20 | 0.340 | 1.25 | 0.335 | 20% Depth 0.64 |
| | | 1.10 | 0.360 | 1.15 | 0.350 | 80% Depth 1.21 |
| | | 1.00 | 0.300 | 1.05 | 0.330 | |
| | | 0.45 | 0.000 | 0.73 | 0.150 | |
| | | | | 0.23 | 0.000 | |
| | | | | 0.00 | 0.000 | |
| | | | | 0.00 | 0.000 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S29 - Christina River near Chard (508183 E, 6187926 N) | | | |
| Field Personnel: | SG, BL | Trip Date: | 01-Dec-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|----------------------|
| Measurement Details: | |
| Start Time (MST): | 8:00 |
| End Time (MST): | 910 |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast, light snow |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 87-1: Bolt w/orange 'BM' | 4.611 | 6.963 | 4.592 | 6.963 | - |
| Bench Mark 2: | 94-1: Brass cap by blue stk | 1.738 | 9.838 | 1.721 | 9.838 | - |
| Top of Ice: | | 5.898 | 5.676 | 5.877 | 5.678 | 5.677 |
| Water Level: | | 5.926 | 5.648 | 5.904 | 5.651 | 5.650 |
| Transducer: | | | | | | |
| Other: | | | | | | |

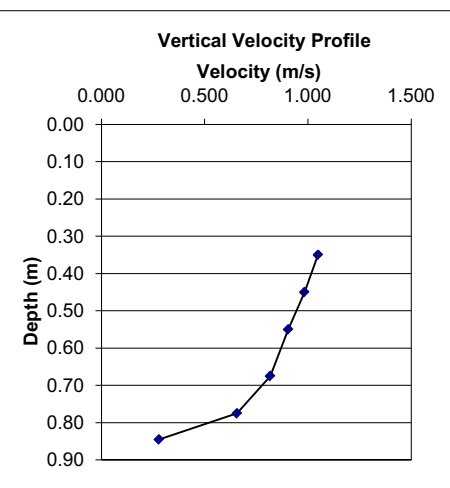
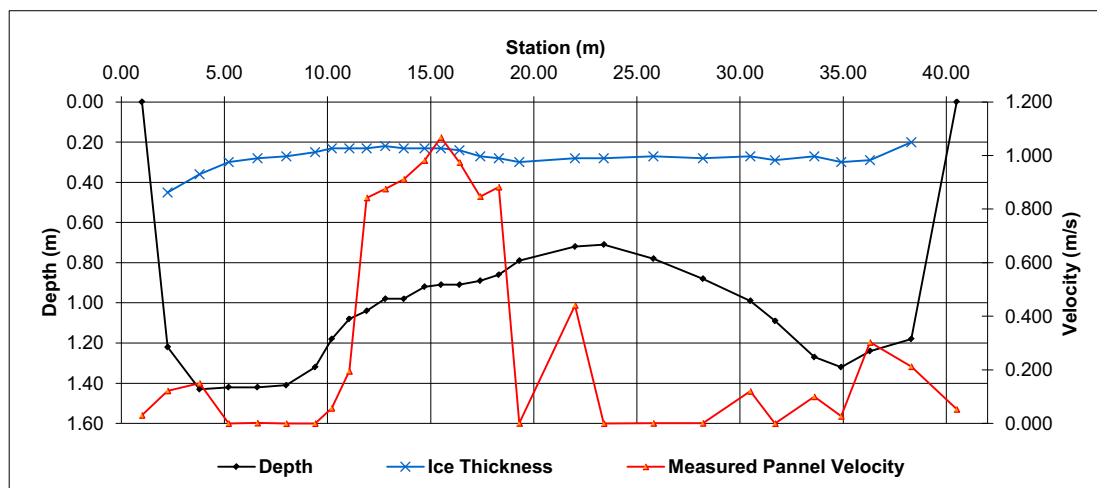
| |
|-----------------------|
| General Notes: |
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| |

| Flow Measurement: | | | | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|--|-----------------|--|--|--|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | | | | | | | |
| Left | 1.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.00 | 1.63 | 0.63 | 0.19 | 0.031 | 0.031 | 0.12 | 0.004 | 0% | | | | | | | | | | | | | |
| 1 | 2.25 | 1.22 | 0.45 | | 0.010 | 0.234 | 1.0 | 1.63 | 3.03 | 1.40 | 0.77 | 0.122 | 0.122 | 1.08 | 0.132 | 2% | | | | | | | | | | | | | |
| 2 | 3.80 | 1.43 | 0.36 | | 0.300 | 0.000 | 1.0 | 3.03 | 4.50 | 1.48 | 1.07 | 0.150 | 0.150 | 1.58 | 0.237 | 4% | | | | | | | | | | | | | |
| 3 | 5.20 | 1.42 | 0.30 | | 0.000 | 0.000 | 1.0 | 4.50 | 5.90 | 1.40 | 1.12 | 0.000 | 0.000 | 1.57 | 0.000 | 0% | | | | | | | | | | | | | |
| 4 | 6.60 | 1.42 | 0.28 | | 0.002 | 0.002 | 1.0 | 5.90 | 7.30 | 1.40 | 1.14 | 0.002 | 0.002 | 1.60 | 0.003 | 0% | | | | | | | | | | | | | |
| 5 | 8.00 | 1.41 | 0.27 | | 0.000 | 0.000 | 1.0 | 7.30 | 8.70 | 1.40 | 1.14 | 0.000 | 0.000 | 1.60 | 0.000 | 0% | | | | | | | | | | | | | |
| 6 | 9.40 | 1.32 | 0.25 | | 0.000 | 0.001 | 1.0 | 8.70 | 9.80 | 1.10 | 1.07 | 0.000 | 0.000 | 1.18 | 0.000 | 0% | | | | | | | | | | | | | |
| 7 | 10.20 | 1.18 | 0.23 | | 0.114 | 0.000 | 1.0 | 9.80 | 10.63 | 0.82 | 0.95 | 0.057 | 0.057 | 0.78 | 0.045 | 1% | | | | | | | | | | | | | |
| 8 | 11.05 | 1.08 | 0.23 | | 0.390 | 0.000 | 1.0 | 10.63 | 11.48 | 0.85 | 0.85 | 0.195 | 0.195 | 0.72 | 0.141 | 2% | | | | | | | | | | | | | |
| 9 | 11.90 | 1.04 | 0.23 | | 0.777 | 0.907 | 1.0 | 11.48 | 12.35 | 0.88 | 0.81 | 0.842 | 0.842 | 0.71 | 0.597 | 9% | | | | | | | | | | | | | |
| 10 | 12.80 | 0.98 | 0.22 | | 0.843 | 0.907 | 1.0 | 12.35 | 13.25 | 0.90 | 0.76 | 0.875 | 0.875 | 0.68 | 0.598 | 9% | | | | | | | | | | | | | |
| 11 | 13.70 | 0.98 | 0.23 | | 0.833 | 0.989 | 1.0 | 13.25 | 14.20 | 0.95 | 0.75 | 0.911 | 0.911 | 0.71 | 0.649 | 10% | | | | | | | | | | | | | |
| 12 | 14.70 | 0.92 | 0.23 | 0.981 | | | 0.9 | 14.20 | 15.10 | 0.90 | 0.69 | 0.981 | 0.883 | 0.62 | 0.548 | 8% | | | | | | | | | | | | | |
| 13 | 15.50 | 0.91 | 0.23 | 1.067 | | | 0.9 | 15.10 | 15.95 | 0.85 | 0.68 | 1.067 | 0.960 | 0.58 | 0.555 | 8% | | | | | | | | | | | | | |
| 14 | 16.40 | 0.91 | 0.24 | 0.974 | | | 0.9 | 15.95 | 16.90 | 0.95 | 0.67 | 0.974 | 0.877 | 0.64 | 0.558 | 8% | | | | | | | | | | | | | |
| 15 | 17.40 | 0.89 | 0.27 | 0.847 | | | 0.9 | 16.90 | 17.85 | 0.95 | 0.62 | 0.847 | 0.762 | 0.59 | 0.449 | 7% | | | | | | | | | | | | | |
| 16 | 18.30 | 0.86 | 0.28 | 0.882 | | | 0.9 | 17.85 | 18.80 | 0.95 | 0.58 | 0.882 | 0.794 | 0.55 | 0.437 | 7% | | | | | | | | | | | | | |
| 17 | 19.30 | 0.79 | 0.30 | 0.001 | | | 0.9 | 18.80 | 20.65 | 1.85 | 0.49 | 0.001 | 0.001 | 0.91 | 0.001 | 0% | | | | | | | | | | | | | |
| 18 | 22.00 | 0.72 | 0.28 | 0.441 | | | 0.9 | 20.65 | 22.70 | 2.05 | 0.44 | 0.441 | 0.397 | 0.90 | 0.358 | 5% | | | | | | | | | | | | | |
| 19 | 23.40 | 0.71 | 0.28 | 0.000 | | | 1.0 | 22.70 | 24.60 | 1.90 | 0.43 | 0.000 | 0.000 | 0.82 | 0.000 | 0% | | | | | | | | | | | | | |
| 20 | 25.80 | 0.78 | 0.27 | 0.001 | | | 0.9 | 24.60 | 27.00 | 2.40 | 0.51 | 0.001 | 0.001 | 1.22 | 0.001 | 0% | | | | | | | | | | | | | |
| 21 | 28.20 | 0.88 | 0.28 | 0.001 | | | 0.9 | 27.00 | 29.35 | 2.35 | 0.60 | 0.001 | 0.001 | 1.41 | 0.001 | 0% | | | | | | | | | | | | | |
| 22 | 30.50 | 0.99 | 0.27 | 0.120 | | | 0.9 | 29.35 | 31.10 | 1.75 | 0.72 | 0.120 | 0.108 | 1.26 | 0.136 | 2% | | | | | | | | | | | | | |
| 23 | 31.70 | 1.09 | 0.29 | | 0.000 | 0.000 | 1.0 | 31.10 | 32.65 | 1.55 | 0.80 | 0.000 | 0.000 | 1.24 | 0.000 | 0% | | | | | | | | | | | | | |
| 24 | 33.60 | 1.27 | 0.27 | | 0.002 | 0.198 | 1.0 | 32.65 | 34.25 | 1.60 | 1.00 | 0.100 | 0.100 | 1.60 | 0.160 | 2% | | | | | | | | | | | | | |
| 25 | 34.90 | 1.32 | 0.30 | | 0.054 | 0.000 | 1.0 | 34.25 | 35.60 | 1.35 | 1.02 | 0.027 | 0.027 | 1.38 | 0.037 | 1% | | | | | | | | | | | | | |
| 26 | 36.30 | 1.24 | 0.29 | | 0.246 | 0.359 | 1.0 | 35.60 | 37.30 | 1.70 | 0.95 | 0.303 | 0.303 | 1.62 | 0.489 | 7% | | | | | | | | | | | | | |
| 27 | 38.30 | 1.18 | 0.20 | | 0.244 | 0.181 | 1.0 | 37.30 | 39.40 | 2.10 | 0.98 | 0.213 | 0.213 | 2.06 | 0.437 | 7% | | | | | | | | | | | | | |
| Right | 40.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 39.40 | 40.50 | 1.10 | 0.25 | 0.053 | 0.053 | 0.27 | 0.014 | 0% | | | | | | | | | | | | | |
| Total Flow | | | | | | | | | | | | | | | 6.587 | | | | | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 6.587 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 29.98 | (m ²) |
| Wetted Width: | 39.50 | (m) |
| Hydraulic Depth: | 0.759 | (m) |
| Mean Velocity: | 0.220 | (m/s) |
| Foude Number: | 0.081 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.782 |
| Offset | 17.4 | 0.89 | 0.000 | - | - | Panel V.@Ofst 0.847 |
| Depth | 0.89 | 0.80 | 0.557 | 0.85 | 0.279 | 60% Depth 0.642 |
| Ice Depth | 0.27 | 0.75 | 0.756 | 0.78 | 0.657 | 20% Depth 0.39 |
| | | 0.60 | 0.879 | 0.68 | 0.818 | 80% Depth 0.77 |
| | | 0.50 | 0.931 | 0.55 | 0.905 | |
| | | 0.40 | 1.036 | 0.45 | 0.984 | |
| | | 0.30 | 1.063 | 0.35 | 1.050 | |
| | | | | 0.15 | 0.532 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S31 - Hangingstone Creek at North Star Road (476969 E, 6236095 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 23-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 1.038 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 13.05 |
| Datalogger Clock: | 844 |
| Laptop Clock: | 845 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 0% |
| Dessicant: | New |
| Logger# (if Δ): | 20.79 |
| PT# (if Δ): | 2594 |
| Other Logger Notes: | |
| Rain of 2.3mm not present. test | |

| | |
|------------------------------|--------------|
| Measurement Details: | |
| Start Time (MST): | 810 |
| End Time (MST): | 850 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast 5°C |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post right of trail | 0.529 | 100.128 | 0.506 | 100.128 | - |
| Bench Mark 2: | Nail in tree 3m west of lggr | 1.231 | 99.418 | 1.205 | 99.418 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 1.778 | 98.879 | 1.752 | 98.882 | 98.881 |
| Transducer: | | 1.038 | 97.841 | 1.038 | 97.844 | 97.843 |
| Other: | | | | | | |

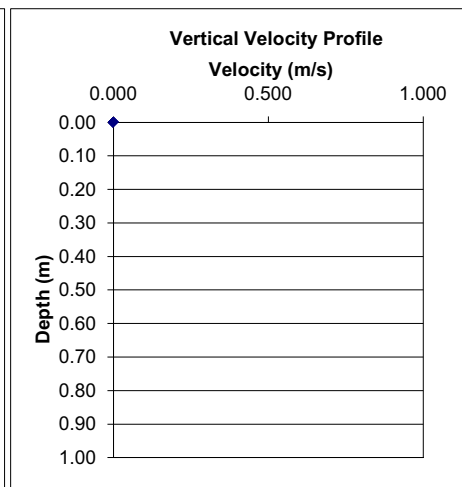
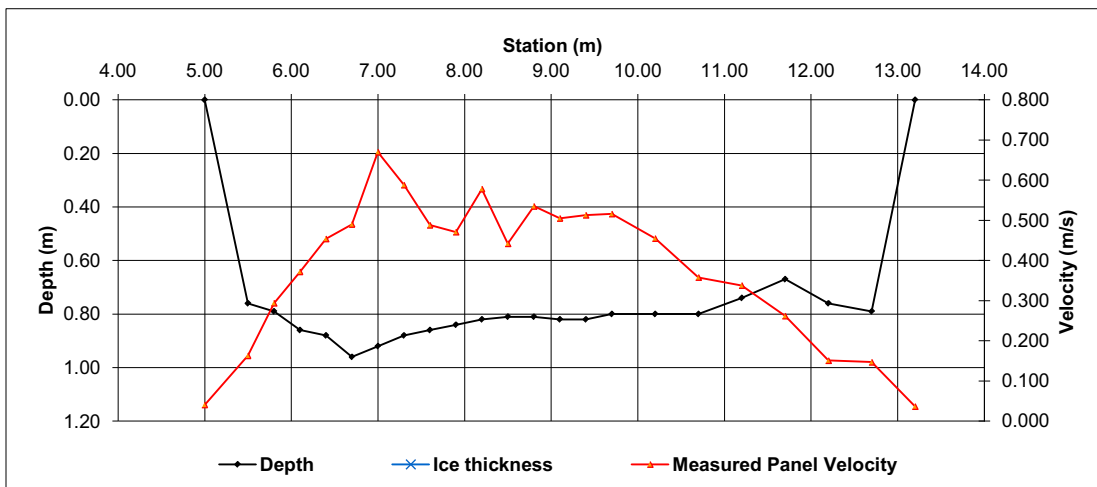
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|-----------------------|
| General Notes: |
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| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 13.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 13.20 | 12.95 | 0.25 | 0.20 | 0.037 | 0.037 | 0.05 | 0.002 | 0% | |
| 1 | 12.70 | 0.79 | | 0.147 | | | 1.0 | 12.95 | 12.45 | 0.50 | 0.79 | 0.147 | 0.147 | 0.40 | 0.058 | 2% | |
| 2 | 12.20 | 0.76 | | 0.151 | | | 1.0 | 12.45 | 11.95 | 0.50 | 0.76 | 0.151 | 0.151 | 0.38 | 0.057 | 2% | |
| 3 | 11.70 | 0.67 | | 0.262 | | | 1.0 | 11.95 | 11.45 | 0.50 | 0.67 | 0.262 | 0.262 | 0.34 | 0.088 | 3% | |
| 4 | 11.20 | 0.74 | | 0.338 | | | 1.0 | 11.45 | 10.95 | 0.50 | 0.74 | 0.338 | 0.338 | 0.37 | 0.125 | 5% | |
| 5 | 10.70 | 0.80 | | 0.358 | | | 1.0 | 10.95 | 10.45 | 0.50 | 0.80 | 0.358 | 0.358 | 0.40 | 0.143 | 6% | |
| 6 | 10.20 | 0.80 | | 0.455 | | | 1.0 | 10.45 | 9.95 | 0.50 | 0.80 | 0.455 | 0.455 | 0.40 | 0.182 | 7% | |
| 7 | 9.70 | 0.80 | | 0.516 | | | 1.0 | 9.95 | 9.55 | 0.40 | 0.80 | 0.516 | 0.516 | 0.32 | 0.165 | 7% | |
| 8 | 9.40 | 0.82 | | 0.513 | | | 1.0 | 9.55 | 9.25 | 0.30 | 0.82 | 0.513 | 0.513 | 0.25 | 0.126 | 5% | |
| 9 | 9.10 | 0.82 | | 0.505 | | | 1.0 | 9.25 | 8.95 | 0.30 | 0.82 | 0.505 | 0.505 | 0.25 | 0.124 | 5% | |
| 10 | 8.80 | 0.81 | | 0.535 | | | 1.0 | 8.95 | 8.65 | 0.30 | 0.81 | 0.535 | 0.535 | 0.24 | 0.130 | 5% | |
| 11 | 8.50 | 0.81 | | 0.442 | | | 1.0 | 8.65 | 8.35 | 0.30 | 0.81 | 0.442 | 0.442 | 0.24 | 0.107 | 4% | |
| 12 | 8.20 | 0.82 | | 0.578 | | | 1.0 | 8.35 | 8.05 | 0.30 | 0.82 | 0.578 | 0.578 | 0.25 | 0.142 | 6% | |
| 13 | 7.90 | 0.84 | | 0.471 | | | 1.0 | 8.05 | 7.75 | 0.30 | 0.84 | 0.471 | 0.471 | 0.25 | 0.119 | 5% | |
| 14 | 7.60 | 0.86 | | 0.488 | | | 1.0 | 7.75 | 7.45 | 0.30 | 0.86 | 0.488 | 0.488 | 0.26 | 0.126 | 5% | |
| 15 | 7.30 | 0.88 | | 0.588 | | | 1.0 | 7.45 | 7.15 | 0.30 | 0.88 | 0.588 | 0.588 | 0.26 | 0.155 | 6% | |
| 16 | 7.00 | 0.92 | | 0.670 | | | 1.0 | 7.15 | 6.85 | 0.30 | 0.92 | 0.670 | 0.670 | 0.28 | 0.185 | 7% | |
| 17 | 6.70 | 0.96 | | 0.490 | | | 1.0 | 6.85 | 6.55 | 0.30 | 0.96 | 0.490 | 0.490 | 0.29 | 0.141 | 6% | |
| 18 | 6.40 | 0.88 | | 0.454 | | | 1.0 | 6.55 | 6.25 | 0.30 | 0.88 | 0.454 | 0.454 | 0.26 | 0.120 | 5% | |
| 19 | 6.10 | 0.86 | | 0.372 | | | 1.0 | 6.25 | 5.95 | 0.30 | 0.86 | 0.372 | 0.372 | 0.26 | 0.096 | 4% | |
| 20 | 5.80 | 0.79 | | 0.294 | | | 1.0 | 5.95 | 5.65 | 0.30 | 0.79 | 0.294 | 0.294 | 0.24 | 0.070 | 3% | |
| 21 | 5.50 | 0.76 | | 0.163 | | | 1.0 | 5.65 | 5.25 | 0.40 | 0.76 | 0.163 | 0.163 | 0.30 | 0.050 | 2% | |
| Left | 5.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 5.25 | 5.00 | 0.25 | 0.19 | 0.041 | 0.041 | 0.05 | 0.002 | 0% | |
| Total Flow | | | | | | | | | | | | | | 2.513 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 2.513 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 6.32 | (m ²) |
| Wetted Width: | 7.70 | (m) |
| Hydraulic Depth: | 0.821 | (m) |
| Mean Velocity: | 0.398 | (m/s) |
| Foude Number: | 0.140 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S31 - Hangingstone Creek at North Star Road (476969 E, 6236095 N) | | | |
| Field Personnel: | DB BL SG | Trip Date: | 21-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 16-Jul-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.483 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 14.06 |
| Datalogger Clock: | 1433 |
| Laptop Clock: | 1438 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 2% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| 52.6 mm rain | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1545 |
| End Time (MST): | 1620 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Partly cloudy 25°C |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post right of trail | 0.609 | 100.128 | 0.574 | 100.128 | - |
| Bench Mark 2: | Nail in tree 3m west of lggr | 1.310 | 99.418 | 1.280 | 99.418 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.411 | 98.326 | 2.379 | 98.323 | 98.325 |
| Transducer: | | 0.483 | 97.843 | 0.483 | 97.840 | 97.842 |
| Other: | | | | | | |

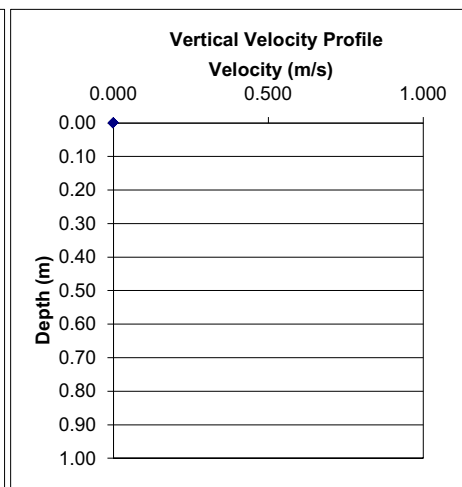
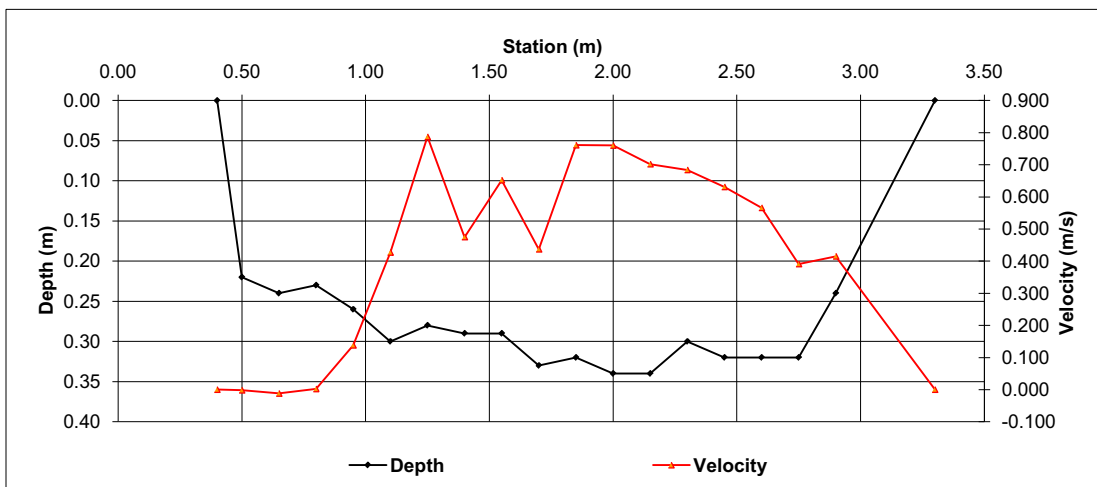
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|-----------------------|
| General Notes: |
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| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 3.30 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.30 | 3.10 | 0.20 | 0.06 | 0.104 | 0.104 | 0.01 | 0.001 | 0% |
| 1 | 2.90 | 0.24 | | 0.415 | | | 1.0 | 3.10 | 2.83 | 0.27 | 0.24 | 0.415 | 0.415 | 0.07 | 0.027 | 7% |
| 2 | 2.75 | 0.32 | | 0.391 | | | 1.0 | 2.83 | 2.68 | 0.15 | 0.32 | 0.391 | 0.391 | 0.05 | 0.019 | 5% |
| 3 | 2.60 | 0.32 | | 0.566 | | | 1.0 | 2.68 | 2.53 | 0.15 | 0.32 | 0.566 | 0.566 | 0.05 | 0.027 | 7% |
| 4 | 2.45 | 0.32 | | 0.631 | | | 1.0 | 2.53 | 2.38 | 0.15 | 0.32 | 0.631 | 0.631 | 0.05 | 0.030 | 8% |
| 5 | 2.30 | 0.30 | | 0.684 | | | 1.0 | 2.38 | 2.23 | 0.15 | 0.30 | 0.684 | 0.684 | 0.05 | 0.031 | 8% |
| 6 | 2.15 | 0.34 | | 0.702 | | | 1.0 | 2.23 | 2.08 | 0.15 | 0.34 | 0.702 | 0.702 | 0.05 | 0.036 | 10% |
| 7 | 2.00 | 0.34 | | 0.760 | | | 1.0 | 2.08 | 1.93 | 0.15 | 0.34 | 0.760 | 0.760 | 0.05 | 0.039 | 10% |
| 8 | 1.85 | 0.32 | | 0.761 | | | 1.0 | 1.93 | 1.78 | 0.15 | 0.32 | 0.761 | 0.761 | 0.05 | 0.037 | 10% |
| 9 | 1.70 | 0.33 | | 0.437 | | | 1.0 | 1.78 | 1.63 | 0.15 | 0.33 | 0.437 | 0.437 | 0.05 | 0.022 | 6% |
| 10 | 1.55 | 0.29 | | 0.652 | | | 1.0 | 1.63 | 1.48 | 0.15 | 0.29 | 0.652 | 0.652 | 0.04 | 0.028 | 8% |
| 11 | 1.40 | 0.29 | | 0.475 | | | 1.0 | 1.48 | 1.33 | 0.15 | 0.29 | 0.475 | 0.475 | 0.04 | 0.021 | 6% |
| 12 | 1.25 | 0.28 | | 0.787 | | | 1.0 | 1.33 | 1.18 | 0.15 | 0.28 | 0.787 | 0.787 | 0.04 | 0.033 | 9% |
| 13 | 1.10 | 0.30 | | 0.427 | | | 1.0 | 1.18 | 1.03 | 0.15 | 0.30 | 0.427 | 0.427 | 0.05 | 0.019 | 5% |
| 14 | 0.95 | 0.26 | | 0.138 | | | 1.0 | 1.03 | 0.88 | 0.15 | 0.26 | 0.138 | 0.138 | 0.04 | 0.005 | 1% |
| 15 | 0.80 | 0.23 | | 0.002 | | | 1.0 | 0.88 | 0.73 | 0.15 | 0.23 | 0.002 | 0.002 | 0.03 | 0.000 | 0% |
| 16 | 0.65 | 0.24 | | -0.012 | | | 1.0 | 0.73 | 0.58 | 0.15 | 0.24 | -0.012 | -0.012 | 0.04 | 0.000 | 0% |
| 17 | 0.50 | 0.22 | | -0.002 | | | 1.0 | 0.58 | 0.45 | 0.13 | 0.22 | -0.002 | -0.002 | 0.03 | 0.000 | 0% |
| Left | 0.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.45 | 0.40 | 0.05 | 0.06 | -0.001 | -0.001 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.375 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.375 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.78 | (m ²) |
| Wetted Width: | 2.65 | (m) |
| Hydraulic Depth: | 0.294 | (m) |
| Mean Velocity: | 0.480 | (m/s) |
| Foude Number: | 0.283 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S31 - Hangingstone Creek at North Star Road (476969 E, 6236095 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 18-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.602 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 14.24 |
| Datalogger Clock: | 1529 |
| Laptop Clock: | 1539 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 4% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Precip = 185.7mm | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1545 |
| End Time (MST): | 1615 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Overcast 20°C |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post right of trail | 0.623 | 100.128 | 0.577 | 100.128 | - |
| Bench Mark 2: | Nail in tree 3m west of lggr | 1.329 | 99.418 | 1.283 | 99.418 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.304 | 98.447 | 2.262 | 98.443 | 98.445 |
| Transducer: | | 0.602 | 97.845 | 0.602 | 97.841 | 97.843 |
| Other: | | | | | | |

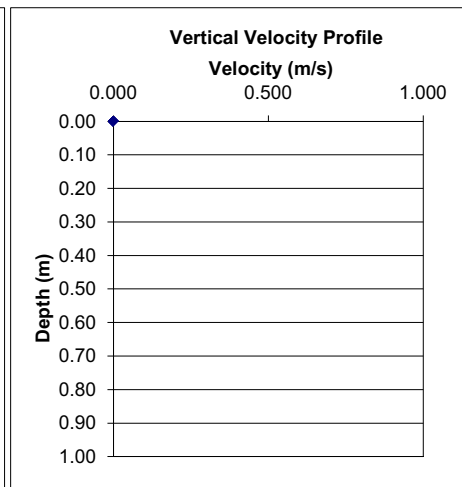
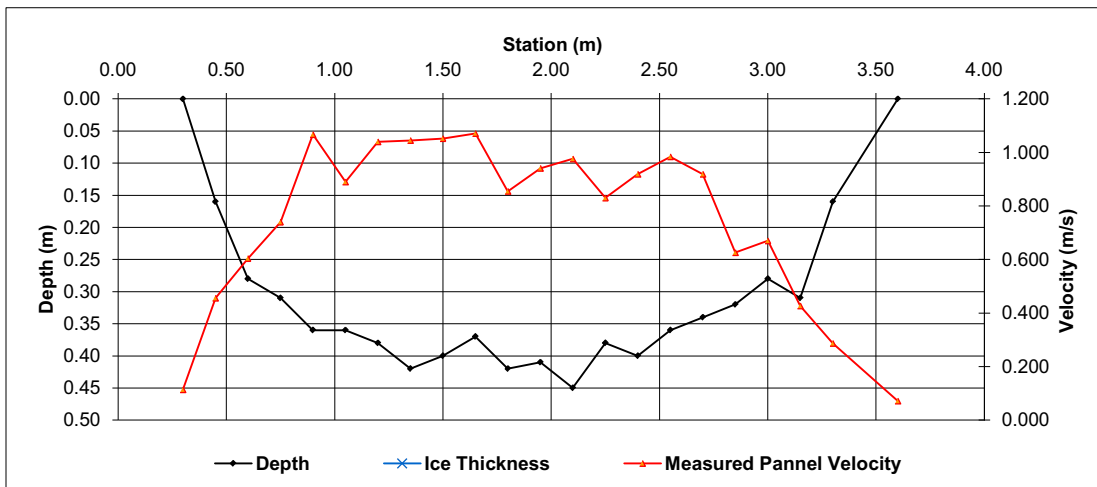
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|-----------------------|
| General Notes: |
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| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.30 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.30 | 0.38 | 0.08 | 0.04 | 0.114 | 0.114 | 0.00 | 0.000 | 0% |
| 1 | 0.45 | 0.16 | | 0.456 | | | 1.0 | 0.38 | 0.53 | 0.15 | 0.16 | 0.456 | 0.456 | 0.02 | 0.011 | 1% |
| 2 | 0.60 | 0.28 | | 0.604 | | | 1.0 | 0.53 | 0.68 | 0.15 | 0.28 | 0.604 | 0.604 | 0.04 | 0.025 | 3% |
| 3 | 0.75 | 0.31 | | 0.740 | | | 1.0 | 0.68 | 0.83 | 0.15 | 0.31 | 0.740 | 0.740 | 0.05 | 0.034 | 4% |
| 4 | 0.90 | 0.36 | | 1.067 | | | 1.0 | 0.83 | 0.98 | 0.15 | 0.36 | 1.067 | 1.067 | 0.05 | 0.058 | 6% |
| 5 | 1.05 | 0.36 | | 0.890 | | | 1.0 | 0.98 | 1.13 | 0.15 | 0.36 | 0.890 | 0.890 | 0.05 | 0.048 | 5% |
| 6 | 1.20 | 0.38 | | 1.040 | | | 1.0 | 1.13 | 1.28 | 0.15 | 0.38 | 1.040 | 1.040 | 0.06 | 0.059 | 7% |
| 7 | 1.35 | 0.42 | | 1.045 | | | 1.0 | 1.28 | 1.43 | 0.15 | 0.42 | 1.045 | 1.045 | 0.06 | 0.066 | 7% |
| 8 | 1.50 | 0.40 | | 1.052 | | | 1.0 | 1.43 | 1.58 | 0.15 | 0.40 | 1.052 | 1.052 | 0.06 | 0.063 | 7% |
| 9 | 1.65 | 0.37 | | 1.071 | | | 1.0 | 1.58 | 1.73 | 0.15 | 0.37 | 1.071 | 1.071 | 0.06 | 0.059 | 7% |
| 10 | 1.80 | 0.42 | | 0.855 | | | 1.0 | 1.73 | 1.88 | 0.15 | 0.42 | 0.855 | 0.855 | 0.06 | 0.054 | 6% |
| 11 | 1.95 | 0.41 | | 0.941 | | | 1.0 | 1.88 | 2.03 | 0.15 | 0.41 | 0.941 | 0.941 | 0.06 | 0.058 | 6% |
| 12 | 2.10 | 0.45 | | 0.976 | | | 1.0 | 2.03 | 2.18 | 0.15 | 0.45 | 0.976 | 0.976 | 0.07 | 0.066 | 7% |
| 13 | 2.25 | 0.38 | | 0.830 | | | 1.0 | 2.18 | 2.33 | 0.15 | 0.38 | 0.830 | 0.830 | 0.06 | 0.047 | 5% |
| 14 | 2.40 | 0.40 | | 0.919 | | | 1.0 | 2.33 | 2.48 | 0.15 | 0.40 | 0.919 | 0.919 | 0.06 | 0.055 | 6% |
| 15 | 2.55 | 0.36 | | 0.984 | | | 1.0 | 2.48 | 2.63 | 0.15 | 0.36 | 0.984 | 0.984 | 0.05 | 0.053 | 6% |
| 16 | 2.70 | 0.34 | | 0.919 | | | 1.0 | 2.63 | 2.78 | 0.15 | 0.34 | 0.919 | 0.919 | 0.05 | 0.047 | 5% |
| 17 | 2.85 | 0.32 | | 0.626 | | | 1.0 | 2.78 | 2.93 | 0.15 | 0.32 | 0.626 | 0.626 | 0.05 | 0.030 | 3% |
| 18 | 3.00 | 0.28 | | 0.670 | | | 1.0 | 2.93 | 3.08 | 0.15 | 0.28 | 0.670 | 0.670 | 0.04 | 0.028 | 3% |
| 19 | 3.15 | 0.31 | | 0.427 | | | 1.0 | 3.08 | 3.23 | 0.15 | 0.31 | 0.427 | 0.427 | 0.05 | 0.020 | 2% |
| 20 | 3.30 | 0.16 | | 0.287 | | | 1.0 | 3.23 | 3.45 | 0.23 | 0.16 | 0.287 | 0.287 | 0.04 | 0.010 | 1% |
| Left | 3.60 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.45 | 3.60 | 0.15 | 0.04 | 0.072 | 0.072 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.893 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.893 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 1.05 | (m ²) |
| Wetted Width: | 3.30 | (m) |
| Hydraulic Depth: | 0.319 | (m) |
| Mean Velocity: | 0.850 | (m/s) |
| Foude Number: | 0.481 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S31 - Hangingstone Creek at North Star Road (476969 E, 6236095 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 21-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | | Date: | |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.780 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 14.53 |
| Datalogger Clock: | 1339 |
| Laptop Clock: | 1352 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 5% |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |
| 215.1mm precip | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1350 |
| End Time (MST): | 1440 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly Cloudy 10°C |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post right of trail | 0.576 | 100.128 | 0.559 | 100.128 | - |
| Bench Mark 2: | Nail in tree 3m west of lggr | 1.282 | 99.418 | 1.268 | 99.418 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.075 | 98.629 | 2.058 | 98.629 | 98.629 |
| Transducer: | | 0.780 | 97.849 | 0.780 | 97.849 | 97.849 |
| Other: | | | | | | |

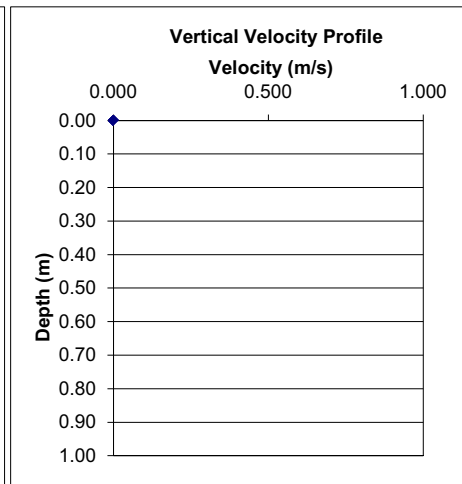
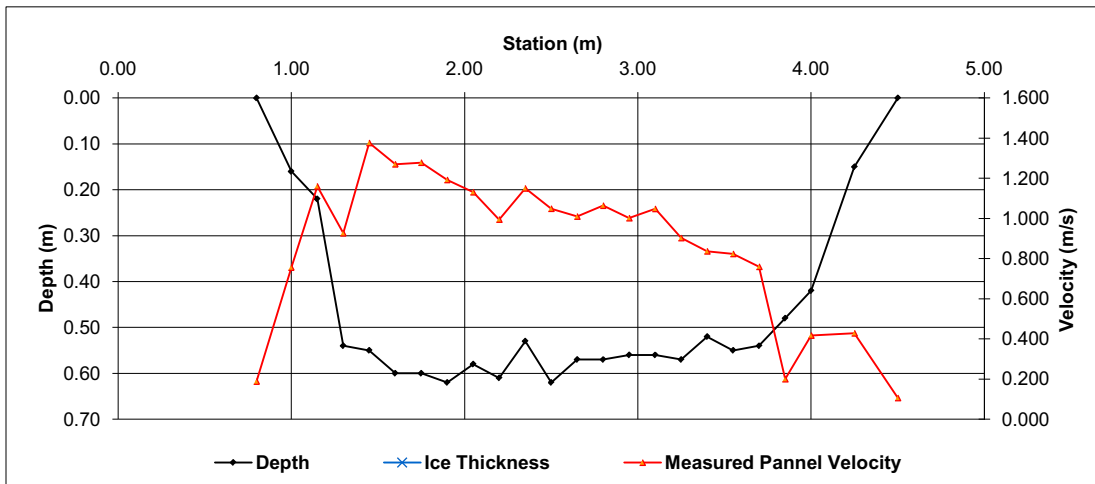
| |
|-----------------------|
| General Notes: |
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| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
|---------------------------------|---------------|--------------|-------------------------|----------------------------------|----------------------------------|----------------------------------|---|------------------------|----------------------|------------------------|-------------------------------------|---|---|-------------------------------------|--|-----------------------------|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | |
| Right | 0.80 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.80 | 0.90 | 0.10 | 0.04 | 0.189 | 0.189 | 0.00 | 0.001 | 0% | | |
| 1 | 1.00 | 0.16 | | 0.756 | | | 1.0 | 0.90 | 1.08 | 0.18 | 0.16 | 0.756 | 0.756 | 0.03 | 0.021 | 1% | | |
| 2 | 1.15 | 0.22 | | 1.160 | | | 1.0 | 1.08 | 1.23 | 0.15 | 0.22 | 1.160 | 1.160 | 0.03 | 0.038 | 2% | | |
| 3 | 1.30 | 0.54 | | 0.927 | | | 1.0 | 1.23 | 1.38 | 0.15 | 0.54 | 0.927 | 0.927 | 0.08 | 0.075 | 5% | | |
| 4 | 1.45 | 0.55 | | 1.376 | | | 1.0 | 1.38 | 1.53 | 0.15 | 0.55 | 1.376 | 1.376 | 0.08 | 0.114 | 7% | | |
| 5 | 1.60 | 0.60 | | 1.270 | | | 1.0 | 1.53 | 1.68 | 0.15 | 0.60 | 1.270 | 1.270 | 0.09 | 0.114 | 7% | | |
| 6 | 1.75 | 0.60 | | 1.278 | | | 1.0 | 1.68 | 1.83 | 0.15 | 0.60 | 1.278 | 1.278 | 0.09 | 0.115 | 7% | | |
| 7 | 1.90 | 0.62 | | 1.192 | | | 1.0 | 1.83 | 1.98 | 0.15 | 0.62 | 1.192 | 1.192 | 0.09 | 0.111 | 7% | | |
| 8 | 2.05 | 0.58 | | 1.131 | | | 1.0 | 1.98 | 2.13 | 0.15 | 0.58 | 1.131 | 1.131 | 0.09 | 0.098 | 6% | | |
| 9 | 2.20 | 0.61 | | 0.995 | | | 1.0 | 2.13 | 2.28 | 0.15 | 0.61 | 0.995 | 0.995 | 0.09 | 0.091 | 6% | | |
| 10 | 2.35 | 0.53 | | 1.150 | | | 1.0 | 2.28 | 2.43 | 0.15 | 0.53 | 1.150 | 1.150 | 0.08 | 0.091 | 6% | | |
| 11 | 2.50 | 0.62 | | 1.049 | | | 1.0 | 2.43 | 2.58 | 0.15 | 0.62 | 1.049 | 1.049 | 0.09 | 0.098 | 6% | | |
| 12 | 2.65 | 0.57 | | 1.010 | | | 1.0 | 2.58 | 2.73 | 0.15 | 0.57 | 1.010 | 1.010 | 0.09 | 0.086 | 5% | | |
| 13 | 2.80 | 0.57 | | 1.064 | | | 1.0 | 2.73 | 2.88 | 0.15 | 0.57 | 1.064 | 1.064 | 0.09 | 0.091 | 5% | | |
| 14 | 2.95 | 0.56 | | 1.002 | | | 1.0 | 2.88 | 3.03 | 0.15 | 0.56 | 1.002 | 1.002 | 0.08 | 0.084 | 5% | | |
| 15 | 3.10 | 0.56 | | 1.048 | | | 1.0 | 3.03 | 3.18 | 0.15 | 0.56 | 1.048 | 1.048 | 0.08 | 0.088 | 5% | | |
| 16 | 3.25 | 0.57 | | 0.903 | | | 1.0 | 3.18 | 3.33 | 0.15 | 0.57 | 0.903 | 0.903 | 0.09 | 0.077 | 5% | | |
| 17 | 3.40 | 0.52 | | 0.837 | | | 1.0 | 3.33 | 3.48 | 0.15 | 0.52 | 0.837 | 0.837 | 0.08 | 0.065 | 4% | | |
| 18 | 3.55 | 0.55 | | 0.824 | | | 1.0 | 3.48 | 3.63 | 0.15 | 0.55 | 0.824 | 0.824 | 0.08 | 0.068 | 4% | | |
| 19 | 3.70 | 0.54 | | 0.760 | | | 1.0 | 3.63 | 3.78 | 0.15 | 0.54 | 0.760 | 0.760 | 0.08 | 0.062 | 4% | | |
| 20 | 3.85 | 0.48 | | 0.201 | | | 1.0 | 3.78 | 3.93 | 0.15 | 0.48 | 0.201 | 0.201 | 0.07 | 0.014 | 1% | | |
| 21 | 4.00 | 0.42 | | 0.418 | | | 1.0 | 3.93 | 4.13 | 0.20 | 0.42 | 0.418 | 0.418 | 0.08 | 0.035 | 2% | | |
| 22 | 4.25 | 0.15 | | 0.429 | | | 1.0 | 4.13 | 4.38 | 0.25 | 0.15 | 0.429 | 0.429 | 0.04 | 0.016 | 1% | | |
| Left | 4.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.38 | 4.50 | 0.13 | 0.04 | 0.107 | 0.107 | 0.00 | 0.001 | 0% | | |
| Total Flow | | | | | | | | | | | | | | 1.655 | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 1.655 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 1.72 | (m ²) |
| Wetted Width: | 3.70 | (m) |
| Hydraulic Depth: | 0.464 | (m) |
| Mean Velocity: | 0.964 | (m/s) |
| Foude Number: | 0.452 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S31 - Hangingstone Creek at North Star Road (476969 E, 6236095 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 04-Nov-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 23-Nov-10 |

| | |
|------------------------|----------------|
| Logger Details: | |
| Transducer Reading: | 0.433 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 12.93 |
| Datalogger Clock: | 704 |
| Laptop Clock: | 721 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 7% |
| Dessicant: | - |
| Logger# (if Δ): | Firmware 16114 |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Rain 223.1mm | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 720 |
| End Time (MST): | 812 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Clear ~0°C |

| Level Survey: | | | | | | |
|----------------------|------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | T-post right of trail | 0.599 | 100.128 | 0.567 | 100.128 | - |
| Bench Mark 2: | Nail in tree 3m west of lggr | 1.312 | 99.418 | 1.282 | 99.418 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.452 | 98.275 | 2.422 | 98.273 | 98.274 |
| Transducer: | | 0.433 | 97.842 | 0.433 | 97.840 | 97.841 |
| Other: | | | | | | |

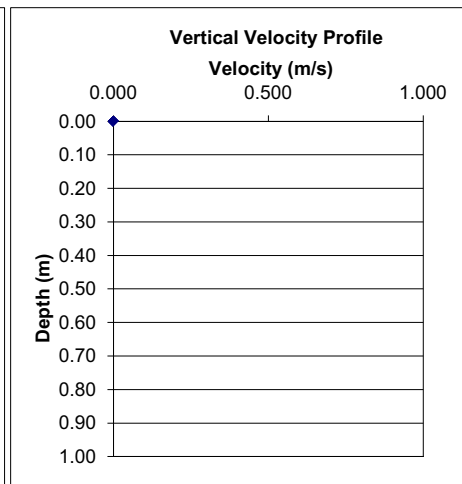
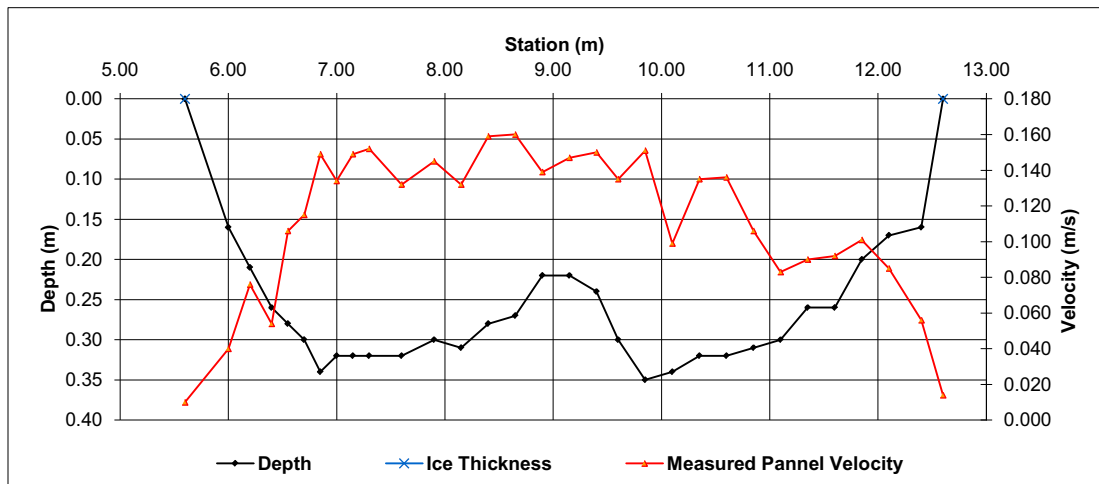
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 5.60 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 5.60 | 5.80 | 0.20 | 0.04 | 0.010 | 0.010 | 0.01 | 0.000 | 0% | |
| 1 | 6.00 | 0.16 | | 0.040 | | | 1.0 | 5.80 | 6.20 | 0.40 | 0.16 | 0.040 | 0.040 | 0.06 | 0.003 | 1% | |
| 2 | 6.20 | 0.21 | | 0.076 | | | 1.0 | 6.10 | 6.38 | 0.28 | 0.21 | 0.076 | 0.076 | 0.06 | 0.004 | 1% | |
| 3 | 6.40 | 0.26 | | 0.054 | | | 1.0 | 6.30 | 6.55 | 0.25 | 0.26 | 0.054 | 0.054 | 0.07 | 0.004 | 1% | |
| 4 | 6.55 | 0.28 | | 0.106 | | | 1.0 | 6.48 | 6.70 | 0.23 | 0.28 | 0.106 | 0.106 | 0.06 | 0.007 | 2% | |
| 5 | 6.70 | 0.30 | | 0.115 | | | 1.0 | 6.63 | 6.85 | 0.23 | 0.30 | 0.115 | 0.115 | 0.07 | 0.008 | 2% | |
| 6 | 6.85 | 0.34 | | 0.149 | | | 1.0 | 6.78 | 7.00 | 0.23 | 0.34 | 0.149 | 0.149 | 0.08 | 0.011 | 3% | |
| 7 | 7.00 | 0.32 | | 0.134 | | | 1.0 | 6.93 | 7.15 | 0.23 | 0.32 | 0.134 | 0.134 | 0.07 | 0.010 | 3% | |
| 8 | 7.15 | 0.32 | | 0.149 | | | 1.0 | 7.08 | 7.38 | 0.30 | 0.32 | 0.149 | 0.149 | 0.10 | 0.014 | 4% | |
| 9 | 7.30 | 0.32 | | 0.152 | | | 1.0 | 7.23 | 7.60 | 0.38 | 0.32 | 0.152 | 0.152 | 0.12 | 0.018 | 6% | |
| 10 | 7.60 | 0.32 | | 0.132 | | | 1.0 | 7.45 | 7.88 | 0.43 | 0.32 | 0.132 | 0.132 | 0.14 | 0.018 | 5% | |
| 11 | 7.90 | 0.30 | | 0.145 | | | 1.0 | 7.75 | 8.15 | 0.40 | 0.30 | 0.145 | 0.145 | 0.12 | 0.017 | 5% | |
| 12 | 8.15 | 0.31 | | 0.132 | | | 1.0 | 8.03 | 8.40 | 0.38 | 0.31 | 0.132 | 0.132 | 0.12 | 0.015 | 5% | |
| 13 | 8.40 | 0.28 | | 0.159 | | | 1.0 | 8.28 | 8.65 | 0.38 | 0.28 | 0.159 | 0.159 | 0.11 | 0.017 | 5% | |
| 14 | 8.65 | 0.27 | | 0.160 | | | 1.0 | 8.53 | 8.90 | 0.38 | 0.27 | 0.160 | 0.160 | 0.10 | 0.016 | 5% | |
| 15 | 8.90 | 0.22 | | 0.139 | | | 1.0 | 8.78 | 9.15 | 0.38 | 0.22 | 0.139 | 0.139 | 0.08 | 0.011 | 3% | |
| 16 | 9.15 | 0.22 | | 0.147 | | | 1.0 | 9.03 | 9.38 | 0.35 | 0.22 | 0.147 | 0.147 | 0.08 | 0.011 | 3% | |
| 17 | 9.40 | 0.24 | | 0.150 | | | 1.0 | 9.28 | 9.63 | 0.35 | 0.24 | 0.150 | 0.150 | 0.08 | 0.013 | 4% | |
| 18 | 9.60 | 0.30 | | 0.135 | | | 1.0 | 9.50 | 9.85 | 0.35 | 0.30 | 0.135 | 0.135 | 0.11 | 0.014 | 4% | |
| 19 | 9.85 | 0.35 | | 0.151 | | | 1.0 | 9.73 | 10.10 | 0.38 | 0.35 | 0.151 | 0.151 | 0.13 | 0.020 | 6% | |
| 20 | 10.10 | 0.34 | | 0.099 | | | 1.0 | 9.98 | 10.35 | 0.38 | 0.34 | 0.099 | 0.099 | 0.13 | 0.013 | 4% | |
| 21 | 10.35 | 0.32 | | 0.135 | | | 1.0 | 10.23 | 10.60 | 0.38 | 0.32 | 0.135 | 0.135 | 0.12 | 0.016 | 5% | |
| 22 | 10.60 | 0.32 | | 0.136 | | | 1.0 | 10.48 | 10.85 | 0.38 | 0.32 | 0.136 | 0.136 | 0.12 | 0.016 | 5% | |
| 23 | 10.85 | 0.31 | | 0.106 | | | 1.0 | 10.73 | 11.10 | 0.38 | 0.31 | 0.106 | 0.106 | 0.12 | 0.012 | 4% | |
| 24 | 11.10 | 0.30 | | 0.083 | | | 1.0 | 10.98 | 11.35 | 0.38 | 0.30 | 0.083 | 0.083 | 0.11 | 0.009 | 3% | |
| 25 | 11.35 | 0.26 | | 0.090 | | | 1.0 | 11.23 | 11.60 | 0.38 | 0.26 | 0.090 | 0.090 | 0.10 | 0.009 | 3% | |
| 26 | 11.60 | 0.26 | | 0.092 | | | 1.0 | 11.48 | 11.85 | 0.38 | 0.26 | 0.092 | 0.092 | 0.10 | 0.009 | 3% | |
| 27 | 11.85 | 0.20 | | 0.101 | | | 1.0 | 11.73 | 12.13 | 0.40 | 0.20 | 0.101 | 0.101 | 0.08 | 0.008 | 2% | |
| 28 | 12.10 | 0.17 | | 0.085 | | | 1.0 | 11.98 | 12.35 | 0.38 | 0.17 | 0.085 | 0.085 | 0.06 | 0.005 | 2% | |
| 29 | 12.40 | 0.16 | | 0.056 | | | 1.0 | 12.25 | 12.40 | 0.15 | 0.16 | 0.056 | 0.056 | 0.02 | 0.001 | 0% | |
| Right | 12.60 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 12.50 | 12.60 | 0.10 | 0.04 | 0.014 | 0.014 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.331 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.331 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 2.71 | (m ²) |
| Wetted Width: | 7.00 | (m) |
| Hydraulic Depth: | 0.387 | (m) |
| Mean Velocity: | 0.122 | (m/s) |
| Foude Number: | 0.063 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S32 - Surrmont Creek at Highway 881 (490252 E, 6254511 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 23-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.735 |
| Battery (Main): | 11.2 |
| Battery (Aux): | 11.44 |
| Datalogger Clock: | 1109 |
| Laptop Clock: | 1109 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | 0.206 |
| Memory used: | 0% |
| Dessicant: | new |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------------|
| Measurement Details: | |
| Start Time (MST): | 1010 |
| End Time (MST): | 1045 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open, ice on bottom |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|---------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail on bridge | 1.979 | 97.942 | 1.938 | 97.942 | - |
| Bench Mark 2: | Rebar with flagging | 0.926 | 98.981 | 0.885 | 98.981 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.365 | 97.556 | 2.325 | 97.555 | 97.556 |
| Transducer: | | 1.735 | 95.821 | 1.735 | 95.820 | 95.821 |
| Other: | | | | | | |

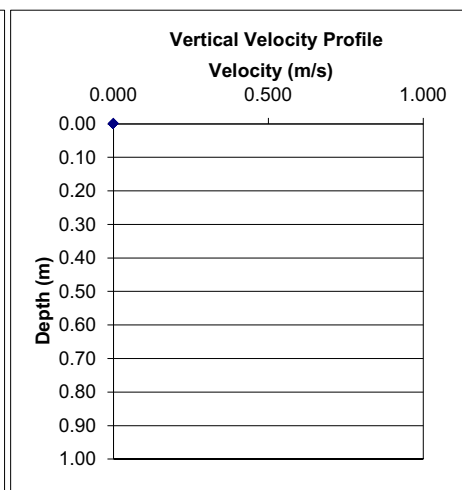
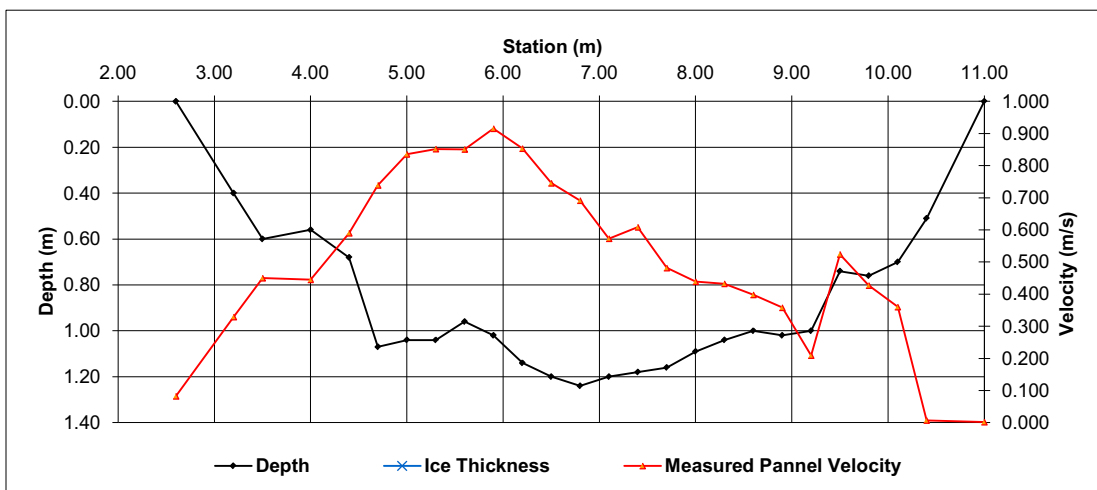
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 11.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 11.00 | 10.70 | 0.30 | 0.13 | 0.002 | 0.002 | 0.04 | 0.000 | 0% |
| 1 | 10.40 | 0.51 | | 0.007 | | | 1.0 | 10.70 | 10.25 | 0.45 | 0.51 | 0.007 | 0.007 | 0.23 | 0.002 | 0% |
| 2 | 10.10 | 0.70 | | 0.360 | | | 1.0 | 10.25 | 9.95 | 0.30 | 0.70 | 0.360 | 0.360 | 0.21 | 0.076 | 2% |
| 3 | 9.80 | 0.76 | | 0.427 | | | 1.0 | 9.95 | 9.65 | 0.30 | 0.76 | 0.427 | 0.427 | 0.23 | 0.097 | 2% |
| 4 | 9.50 | 0.74 | | 0.524 | | | 1.0 | 9.65 | 9.35 | 0.30 | 0.74 | 0.524 | 0.524 | 0.22 | 0.116 | 3% |
| 5 | 9.20 | 1.00 | | | 0.005 | 0.413 | 1.0 | 9.35 | 9.05 | 0.30 | 1.00 | 0.209 | 0.209 | 0.30 | 0.063 | 2% |
| 6 | 8.90 | 1.02 | | | 0.304 | 0.412 | 1.0 | 9.05 | 8.75 | 0.30 | 1.02 | 0.358 | 0.358 | 0.31 | 0.110 | 3% |
| 7 | 8.60 | 1.00 | | | 0.315 | 0.481 | 1.0 | 8.75 | 8.45 | 0.30 | 1.00 | 0.398 | 0.398 | 0.30 | 0.119 | 3% |
| 8 | 8.30 | 1.04 | | | 0.395 | 0.470 | 1.0 | 8.45 | 8.15 | 0.30 | 1.04 | 0.433 | 0.433 | 0.31 | 0.135 | 3% |
| 9 | 8.00 | 1.09 | | | 0.375 | 0.503 | 1.0 | 8.15 | 7.85 | 0.30 | 1.09 | 0.439 | 0.439 | 0.33 | 0.144 | 4% |
| 10 | 7.70 | 1.16 | | | 0.324 | 0.639 | 1.0 | 7.85 | 7.55 | 0.30 | 1.16 | 0.482 | 0.482 | 0.35 | 0.168 | 4% |
| 11 | 7.40 | 1.18 | | | 0.526 | 0.691 | 1.0 | 7.55 | 7.25 | 0.30 | 1.18 | 0.609 | 0.609 | 0.35 | 0.215 | 5% |
| 12 | 7.10 | 1.20 | | | 0.427 | 0.719 | 1.0 | 7.25 | 6.95 | 0.30 | 1.20 | 0.573 | 0.573 | 0.36 | 0.206 | 5% |
| 13 | 6.80 | 1.24 | | | 0.599 | 0.784 | 1.0 | 6.95 | 6.65 | 0.30 | 1.24 | 0.692 | 0.692 | 0.37 | 0.257 | 6% |
| 14 | 6.50 | 1.20 | | | 0.649 | 0.842 | 1.0 | 6.65 | 6.35 | 0.30 | 1.20 | 0.746 | 0.746 | 0.36 | 0.268 | 7% |
| 15 | 6.20 | 1.14 | | | 0.767 | 0.940 | 1.0 | 6.35 | 6.05 | 0.30 | 1.14 | 0.854 | 0.854 | 0.34 | 0.292 | 7% |
| 16 | 5.90 | 1.02 | | | 0.908 | 0.923 | 1.0 | 6.05 | 5.75 | 0.30 | 1.02 | 0.916 | 0.916 | 0.31 | 0.280 | 7% |
| 17 | 5.60 | 0.96 | | 0.851 | | | 1.0 | 5.75 | 5.45 | 0.30 | 0.96 | 0.851 | 0.851 | 0.29 | 0.245 | 6% |
| 18 | 5.30 | 1.04 | | | 0.795 | 0.909 | 1.0 | 5.45 | 5.15 | 0.30 | 1.04 | 0.852 | 0.852 | 0.31 | 0.266 | 7% |
| 19 | 5.00 | 1.04 | | | 0.810 | 0.861 | 1.0 | 5.15 | 4.85 | 0.30 | 1.04 | 0.836 | 0.836 | 0.31 | 0.261 | 7% |
| 20 | 4.70 | 1.07 | | | 0.782 | 0.696 | 1.0 | 4.85 | 4.55 | 0.30 | 1.07 | 0.739 | 0.739 | 0.32 | 0.237 | 6% |
| 21 | 4.40 | 0.68 | | 0.590 | | | 1.0 | 4.55 | 4.20 | 0.35 | 0.68 | 0.590 | 0.590 | 0.24 | 0.140 | 4% |
| 22 | 4.00 | 0.56 | | 0.445 | | | 1.0 | 4.20 | 3.75 | 0.45 | 0.56 | 0.445 | 0.445 | 0.25 | 0.112 | 3% |
| 23 | 3.50 | 0.60 | | 0.450 | | | 1.0 | 3.75 | 3.35 | 0.40 | 0.60 | 0.450 | 0.450 | 0.24 | 0.108 | 3% |
| 24 | 3.20 | 0.40 | | 0.329 | | | 1.0 | 3.35 | 2.90 | 0.45 | 0.40 | 0.329 | 0.329 | 0.18 | 0.059 | 1% |
| Right | 2.60 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.90 | 2.60 | 0.30 | 0.10 | 0.082 | 0.082 | 0.03 | 0.002 | 0% |
| Total Flow | | | | | | | | | | | | | | | 3.979 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 3.979 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 7.09 | (m ²) |
| Wetted Width: | 7.80 | (m) |
| Hydraulic Depth: | 0.909 | (m) |
| Mean Velocity: | 0.561 | (m/s) |
| Foude Number: | 0.188 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S32 - Surrmont Creek at Highway 881 (490252 E, 6254511 N) | | | |
| Field Personnel: | DB BL SG | Trip Date: | 21-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 16-Jul-10 |

| | |
|------------------------|---------------------|
| Logger Details: | |
| Transducer Reading: | 1.016 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.17 |
| Datalogger Clock: | 1558 |
| Laptop Clock: | 1559 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | 9.86 |
| Memory used: | 95% full and erased |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1600 |
| End Time (MST): | |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly cloudy 20°C |

| Level Survey: | | | | | | |
|----------------------|---------------------|---------|--------|---------|--------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail on bridge | 2.137 | 97.942 | 2.092 | 97.942 | - |
| Bench Mark 2: | Rebar with flagging | 1.094 | 98.981 | 1.050 | 98.981 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 3.267 | 96.812 | 3.225 | 96.809 | 96.811 |
| Transducer: | | 1.016 | 95.796 | 1.016 | 95.793 | 95.795 |
| Other: | | | | | | |

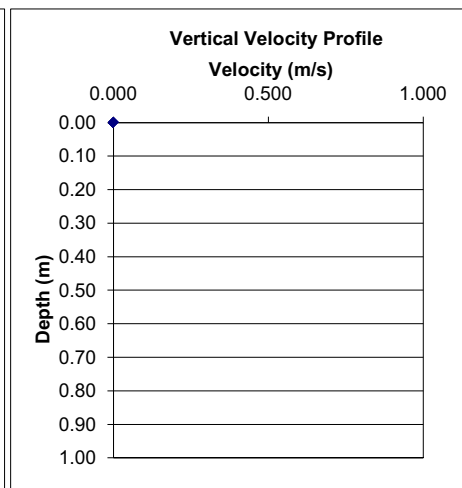
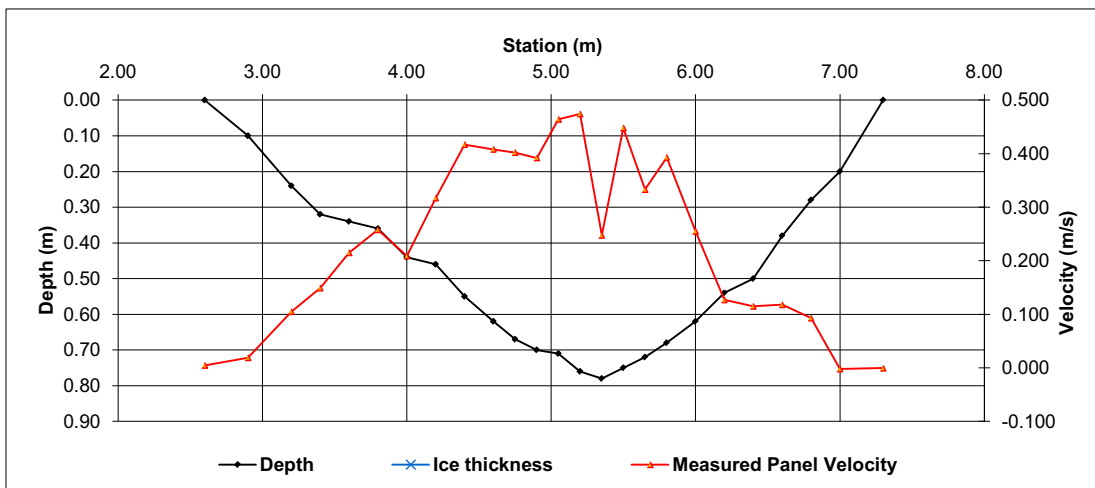
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
|---------------------------------|---------------|--------------|-------------------------|----------------------------------|----------------------------------|----------------------------------|---|------------------------|----------------------|------------------------|-------------------------------------|---|---|-------------------------------------|--|-----------------------------|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | |
| Left | 7.30 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 7.30 | 7.15 | 0.15 | 0.05 | -0.001 | -0.001 | 0.01 | 0.000 | 0% | | |
| 1 | 7.00 | 0.20 | | -0.002 | | | 1.0 | 7.15 | 6.90 | 0.25 | 0.20 | -0.002 | -0.002 | 0.05 | 0.000 | 0% | | |
| 2 | 6.80 | 0.28 | | 0.093 | | | 1.0 | 6.90 | 6.70 | 0.20 | 0.28 | 0.093 | 0.093 | 0.06 | 0.005 | 1% | | |
| 3 | 6.60 | 0.38 | | 0.118 | | | 1.0 | 6.70 | 6.50 | 0.20 | 0.38 | 0.118 | 0.118 | 0.08 | 0.009 | 1% | | |
| 4 | 6.40 | 0.50 | | 0.115 | | | 1.0 | 6.50 | 6.30 | 0.20 | 0.50 | 0.115 | 0.115 | 0.10 | 0.012 | 2% | | |
| 5 | 6.20 | 0.54 | | 0.127 | | | 1.0 | 6.30 | 6.10 | 0.20 | 0.54 | 0.127 | 0.127 | 0.11 | 0.014 | 2% | | |
| 6 | 6.00 | 0.62 | | 0.255 | | | 1.0 | 6.10 | 5.90 | 0.20 | 0.62 | 0.255 | 0.255 | 0.12 | 0.032 | 5% | | |
| 7 | 5.80 | 0.68 | | 0.393 | | | 1.0 | 5.90 | 5.73 | 0.18 | 0.68 | 0.393 | 0.393 | 0.12 | 0.047 | 8% | | |
| 8 | 5.65 | 0.72 | | 0.333 | | | 1.0 | 5.73 | 5.58 | 0.15 | 0.72 | 0.333 | 0.333 | 0.11 | 0.036 | 6% | | |
| 9 | 5.50 | 0.75 | | 0.448 | | | 1.0 | 5.58 | 5.43 | 0.15 | 0.75 | 0.448 | 0.448 | 0.11 | 0.050 | 8% | | |
| 10 | 5.35 | 0.78 | | | 0.131 | 0.364 | 1.0 | 5.43 | 5.28 | 0.15 | 0.78 | 0.248 | 0.248 | 0.12 | 0.029 | 5% | | |
| 11 | 5.20 | 0.76 | | | 0.443 | 0.505 | 1.0 | 5.28 | 5.13 | 0.15 | 0.76 | 0.474 | 0.474 | 0.11 | 0.054 | 9% | | |
| 12 | 5.05 | 0.71 | | 0.464 | | | 1.0 | 5.13 | 4.98 | 0.15 | 0.71 | 0.464 | 0.464 | 0.11 | 0.049 | 8% | | |
| 13 | 4.90 | 0.70 | | 0.392 | | | 1.0 | 4.98 | 4.83 | 0.15 | 0.70 | 0.392 | 0.392 | 0.11 | 0.041 | 7% | | |
| 14 | 4.75 | 0.67 | | 0.402 | | | 1.0 | 4.83 | 4.68 | 0.15 | 0.67 | 0.402 | 0.402 | 0.10 | 0.040 | 7% | | |
| 15 | 4.60 | 0.62 | | 0.408 | | | 1.0 | 4.68 | 4.50 | 0.18 | 0.62 | 0.408 | 0.408 | 0.11 | 0.044 | 7% | | |
| 16 | 4.40 | 0.55 | | 0.417 | | | 1.0 | 4.50 | 4.30 | 0.20 | 0.55 | 0.417 | 0.417 | 0.11 | 0.046 | 8% | | |
| 17 | 4.20 | 0.46 | | 0.317 | | | 1.0 | 4.30 | 4.10 | 0.20 | 0.46 | 0.317 | 0.317 | 0.09 | 0.029 | 5% | | |
| 18 | 4.00 | 0.44 | | 0.209 | | | 1.0 | 4.10 | 3.90 | 0.20 | 0.44 | 0.209 | 0.209 | 0.09 | 0.018 | 3% | | |
| 19 | 3.80 | 0.36 | | 0.258 | | | 1.0 | 3.90 | 3.70 | 0.20 | 0.36 | 0.258 | 0.258 | 0.07 | 0.019 | 3% | | |
| 20 | 3.60 | 0.34 | | 0.215 | | | 1.0 | 3.70 | 3.50 | 0.20 | 0.34 | 0.215 | 0.215 | 0.07 | 0.015 | 2% | | |
| 21 | 3.40 | 0.32 | | 0.149 | | | 1.0 | 3.50 | 3.30 | 0.20 | 0.32 | 0.149 | 0.149 | 0.06 | 0.010 | 2% | | |
| 22 | 3.20 | 0.24 | | 0.105 | | | 1.0 | 3.30 | 3.05 | 0.25 | 0.24 | 0.105 | 0.105 | 0.06 | 0.006 | 1% | | |
| 23 | 2.90 | 0.10 | | 0.019 | | | 1.0 | 3.05 | 2.75 | 0.30 | 0.10 | 0.019 | 0.019 | 0.03 | 0.001 | 0% | | |
| Right | 2.60 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.75 | 2.60 | 0.15 | 0.03 | 0.005 | 0.005 | 0.00 | 0.000 | 0% | | |
| Total Flow | | | | | | | | | | | | | | 0.605 | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.605 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 2.10 | (m ²) |
| Wetted Width: | 4.40 | (m) |
| Hydraulic Depth: | 0.477 | (m) |
| Mean Velocity: | 0.288 | (m/s) |
| Foude Number: | 0.133 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S32 - Surrmont Creek at Highway 881 (490252 E, 6254511 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 19-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|------------|
| Logger Details: | |
| Transducer Reading: | 0.939 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 11.56-12.3 |
| Datalogger Clock: | 833 |
| Laptop Clock: | 833 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 12.4 |
| Memory used: | 100% Reset |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 845 |
| End Time (MST): | 910 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Smoke, Windy, 20°C |

| Level Survey: | | | | | | |
|----------------------|---------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail on bridge | 2.172 | 97.942 | 2.149 | 97.942 | - |
| Bench Mark 2: | Rebar with flagging | 1.135 | 98.981 | 1.111 | 98.981 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 3.382 | 96.732 | 3.361 | 96.730 | 96.731 |
| Transducer: | | 0.939 | 95.793 | 0.939 | 95.791 | 95.792 |
| Other: | | | | | | |

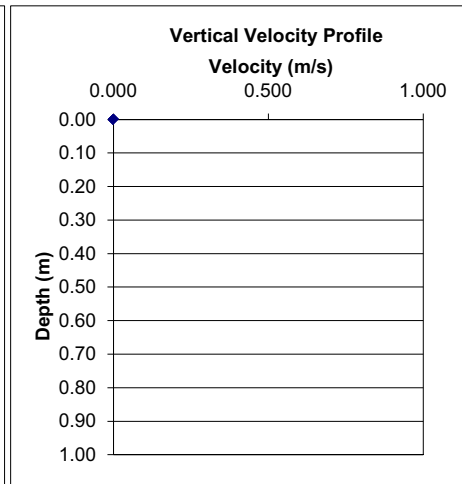
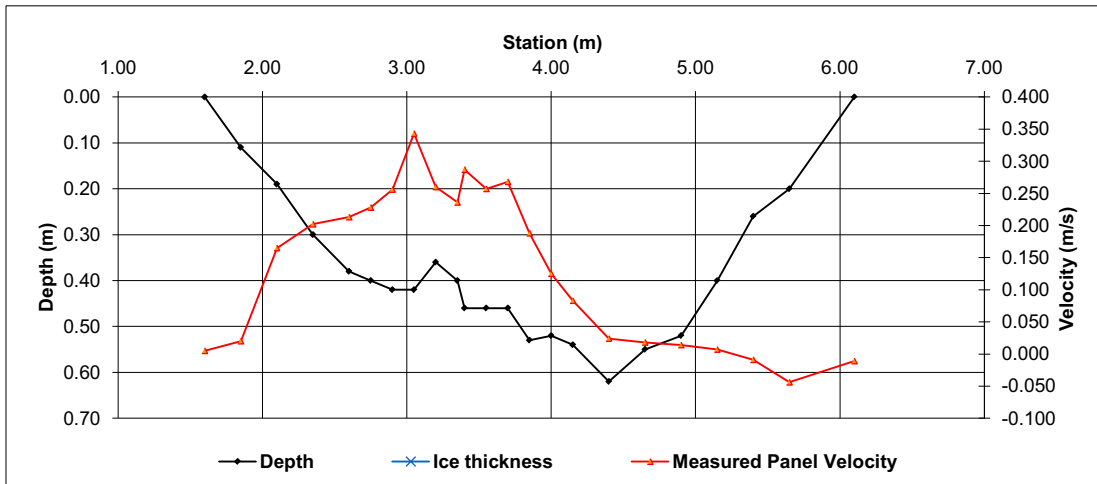
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|-----------------------|
| General Notes: |
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| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 1.60 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.60 | 1.73 | 0.13 | 0.03 | 0.005 | 0.005 | 0.00 | 0.000 | 0% |
| 1 | 1.85 | 0.11 | | 0.020 | | | 1.0 | 1.73 | 1.98 | 0.25 | 0.11 | 0.020 | 0.020 | 0.03 | 0.001 | 0% |
| 2 | 2.10 | 0.19 | | 0.165 | | | 1.0 | 1.98 | 2.23 | 0.25 | 0.19 | 0.165 | 0.165 | 0.05 | 0.008 | 4% |
| 3 | 2.35 | 0.30 | | 0.202 | | | 1.0 | 2.23 | 2.48 | 0.25 | 0.30 | 0.202 | 0.202 | 0.08 | 0.015 | 7% |
| 4 | 2.60 | 0.38 | | 0.213 | | | 1.0 | 2.48 | 2.68 | 0.20 | 0.38 | 0.213 | 0.213 | 0.08 | 0.016 | 8% |
| 5 | 2.75 | 0.40 | | 0.228 | | | 1.0 | 2.68 | 2.83 | 0.15 | 0.40 | 0.228 | 0.228 | 0.06 | 0.014 | 7% |
| 6 | 2.90 | 0.42 | | 0.256 | | | 1.0 | 2.83 | 2.98 | 0.15 | 0.42 | 0.256 | 0.256 | 0.06 | 0.016 | 8% |
| 7 | 3.05 | 0.42 | | 0.343 | | | 1.0 | 2.98 | 3.13 | 0.15 | 0.42 | 0.343 | 0.343 | 0.06 | 0.022 | 11% |
| 8 | 3.20 | 0.36 | | 0.260 | | | 1.0 | 3.13 | 3.28 | 0.15 | 0.36 | 0.260 | 0.260 | 0.05 | 0.014 | 7% |
| 9 | 3.35 | 0.40 | | 0.236 | | | 1.0 | 3.28 | 3.38 | 0.10 | 0.40 | 0.236 | 0.236 | 0.04 | 0.009 | 5% |
| 10 | 3.40 | 0.46 | | 0.287 | | | 1.0 | 3.38 | 3.48 | 0.10 | 0.46 | 0.287 | 0.287 | 0.05 | 0.013 | 7% |
| 11 | 3.55 | 0.46 | | 0.257 | | | 1.0 | 3.48 | 3.63 | 0.15 | 0.46 | 0.257 | 0.257 | 0.07 | 0.018 | 9% |
| 12 | 3.70 | 0.46 | | 0.268 | | | 1.0 | 3.63 | 3.78 | 0.15 | 0.46 | 0.268 | 0.268 | 0.07 | 0.018 | 9% |
| 13 | 3.85 | 0.53 | | 0.188 | | | 1.0 | 3.78 | 3.93 | 0.15 | 0.53 | 0.188 | 0.188 | 0.08 | 0.015 | 7% |
| 14 | 4.00 | 0.52 | | 0.125 | | | 1.0 | 3.93 | 4.08 | 0.15 | 0.52 | 0.125 | 0.125 | 0.08 | 0.010 | 5% |
| 15 | 4.15 | 0.54 | | 0.083 | | | 1.0 | 4.08 | 4.28 | 0.20 | 0.54 | 0.083 | 0.083 | 0.11 | 0.009 | 4% |
| 16 | 4.40 | 0.62 | | 0.024 | | | 1.0 | 4.28 | 4.53 | 0.25 | 0.62 | 0.024 | 0.024 | 0.16 | 0.004 | 2% |
| 17 | 4.65 | 0.55 | | 0.018 | | | 1.0 | 4.53 | 4.78 | 0.25 | 0.55 | 0.018 | 0.018 | 0.14 | 0.002 | 1% |
| 18 | 4.90 | 0.52 | | 0.014 | | | 1.0 | 4.78 | 5.03 | 0.25 | 0.52 | 0.014 | 0.014 | 0.13 | 0.002 | 1% |
| 19 | 5.15 | 0.40 | | 0.007 | | | 1.0 | 5.03 | 5.28 | 0.25 | 0.40 | 0.007 | 0.007 | 0.10 | 0.001 | 0% |
| 20 | 5.40 | 0.26 | | -0.009 | | | 1.0 | 5.28 | 5.53 | 0.25 | 0.26 | -0.009 | -0.009 | 0.07 | -0.001 | 0% |
| 21 | 5.65 | 0.20 | | -0.044 | | | 1.0 | 5.53 | 5.88 | 0.35 | 0.20 | -0.044 | -0.044 | 0.07 | -0.003 | -2% |
| Right | 6.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 5.88 | 6.10 | 0.23 | 0.05 | -0.011 | -0.011 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.203 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.203 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 1.63 | (m ²) |
| Wetted Width: | 4.50 | (m) |
| Hydraulic Depth: | 0.362 | (m) |
| Mean Velocity: | 0.125 | (m/s) |
| Foude Number: | 0.066 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S32 - Surrmont Creek at Highway 881 (490252 E, 6254511 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 21-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|-----------|
| Logger Details: | |
| Transducer Reading: | 1.292 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.53 |
| Datalogger Clock: | 1521 |
| Laptop Clock: | 1521 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 7.35 |
| Memory used: | 70% reset |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------|
| Measurement Details: | |
| Start Time (MST): | 1520 |
| End Time (MST): | 1600 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Partly Cloudy 5°C |

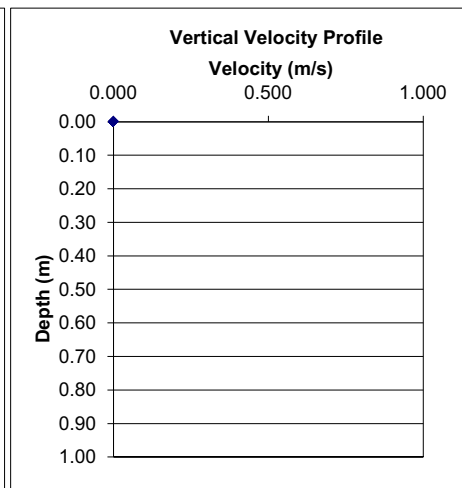
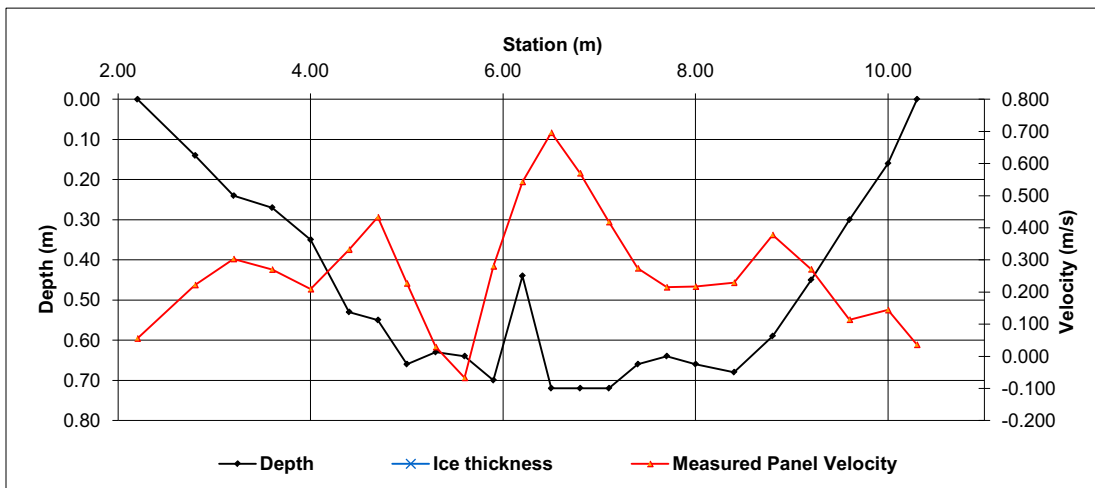
| Level Survey: | | | | | | |
|----------------------|---------------------|---------|--------|---------|--------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail on bridge | 1.996 | 97.942 | 1.979 | 97.942 | - |
| Bench Mark 2: | Rebar with flagging | 0.955 | 98.981 | 0.940 | 98.981 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.853 | 97.085 | 2.838 | 97.083 | 97.084 |
| Transducer: | | 1.292 | 95.793 | 1.292 | 95.791 | 95.792 |
| Other: | | | | | | |

| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: | | | | | | | | | | | | | | | | |
|---------------------------------|---------------|--------------|-------------------------|----------------------------------|----------------------------------|----------------------------------|---|------------------------|----------------------|------------------------|-------------------------------------|---|---|-------------------------------------|--|-----------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 2.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.20 | 2.50 | 0.30 | 0.04 | 0.056 | 0.056 | 0.01 | 0.001 | 0% |
| 1 | 2.80 | 0.14 | | 0.222 | | | 1.0 | 2.50 | 3.00 | 0.50 | 0.14 | 0.222 | 0.222 | 0.07 | 0.016 | 1% |
| 2 | 3.20 | 0.24 | | 0.303 | | | 1.0 | 3.00 | 3.40 | 0.40 | 0.24 | 0.303 | 0.303 | 0.10 | 0.029 | 3% |
| 3 | 3.60 | 0.27 | | 0.270 | | | 1.0 | 3.40 | 3.80 | 0.40 | 0.27 | 0.270 | 0.270 | 0.11 | 0.029 | 3% |
| 4 | 4.00 | 0.35 | | 0.209 | | | 1.0 | 3.80 | 4.20 | 0.40 | 0.35 | 0.209 | 0.209 | 0.14 | 0.029 | 3% |
| 5 | 4.40 | 0.53 | | 0.332 | | | 1.0 | 4.20 | 4.55 | 0.35 | 0.53 | 0.332 | 0.332 | 0.19 | 0.062 | 5% |
| 6 | 4.70 | 0.55 | | 0.433 | | | 1.0 | 4.55 | 4.85 | 0.30 | 0.55 | 0.433 | 0.433 | 0.16 | 0.071 | 6% |
| 7 | 5.00 | 0.66 | | 0.227 | | | 1.0 | 4.85 | 5.15 | 0.30 | 0.66 | 0.227 | 0.227 | 0.20 | 0.045 | 4% |
| 8 | 5.30 | 0.63 | | 0.029 | | | 1.0 | 5.15 | 5.45 | 0.30 | 0.63 | 0.029 | 0.029 | 0.19 | 0.005 | 0% |
| 9 | 5.60 | 0.64 | | -0.067 | | | 1.0 | 5.45 | 5.75 | 0.30 | 0.64 | -0.067 | -0.067 | 0.19 | -0.013 | -1% |
| 10 | 5.90 | 0.70 | | 0.280 | | | 1.0 | 5.75 | 6.05 | 0.30 | 0.70 | 0.280 | 0.280 | 0.21 | 0.059 | 5% |
| 11 | 6.20 | 0.44 | | 0.543 | | | 1.0 | 6.05 | 6.35 | 0.30 | 0.44 | 0.543 | 0.543 | 0.13 | 0.072 | 6% |
| 12 | 6.50 | 0.72 | | 0.696 | | | 1.0 | 6.35 | 6.65 | 0.30 | 0.72 | 0.696 | 0.696 | 0.22 | 0.150 | 13% |
| 13 | 6.80 | 0.72 | | 0.570 | | | 1.0 | 6.65 | 6.95 | 0.30 | 0.72 | 0.570 | 0.570 | 0.22 | 0.123 | 11% |
| 14 | 7.10 | 0.72 | | 0.418 | | | 1.0 | 6.95 | 7.25 | 0.30 | 0.72 | 0.418 | 0.418 | 0.22 | 0.090 | 8% |
| 15 | 7.40 | 0.66 | | 0.274 | | | 1.0 | 7.25 | 7.55 | 0.30 | 0.66 | 0.274 | 0.274 | 0.20 | 0.054 | 5% |
| 16 | 7.70 | 0.64 | | 0.215 | | | 1.0 | 7.55 | 7.85 | 0.30 | 0.64 | 0.215 | 0.215 | 0.19 | 0.041 | 4% |
| 17 | 8.00 | 0.66 | | 0.217 | | | 1.0 | 7.85 | 8.20 | 0.35 | 0.66 | 0.217 | 0.217 | 0.23 | 0.050 | 4% |
| 18 | 8.40 | 0.68 | | 0.229 | | | 1.0 | 8.20 | 8.60 | 0.40 | 0.68 | 0.229 | 0.229 | 0.27 | 0.062 | 5% |
| 19 | 8.80 | 0.59 | | 0.378 | | | 1.0 | 8.60 | 9.00 | 0.40 | 0.59 | 0.378 | 0.378 | 0.24 | 0.089 | 8% |
| 20 | 9.20 | 0.45 | | 0.271 | | | 1.0 | 9.00 | 9.40 | 0.40 | 0.45 | 0.271 | 0.271 | 0.18 | 0.049 | 4% |
| 21 | 9.60 | 0.30 | | 0.114 | | | 1.0 | 9.40 | 9.80 | 0.40 | 0.30 | 0.114 | 0.114 | 0.12 | 0.014 | 1% |
| 22 | 10.00 | 0.16 | | 0.144 | | | 1.0 | 9.80 | 10.15 | 0.35 | 0.16 | 0.144 | 0.144 | 0.06 | 0.008 | 1% |
| Right | 10.30 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 10.15 | 10.30 | 0.15 | 0.04 | 0.036 | 0.036 | 0.01 | 0.000 | 0% |
| *denotes position of TSS sample | | | | | | | | | | | | | | | Total Flow | 1.136 |

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 1.136 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 3.84 | (m ²) |
| Wetted Width: | 8.10 | (m) |
| Hydraulic Depth: | 0.473 | (m) |
| Mean Velocity: | 0.296 | (m/s) |
| Foude Number: | 0.138 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S32 - Surrmont Creek at Highway 881 (490252 E, 6254511 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 04-Nov-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 23-Nov-10 |

| | |
|------------------------|-----------|
| Logger Details: | |
| Transducer Reading: | 0.946 |
| Battery (Main): | 11.34 |
| Battery (Aux): | 12.04 |
| Datalogger Clock: | 908 |
| Laptop Clock: | 909 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 2.85 |
| Memory used: | 30% |
| Dessicant: | |
| Logger# (if Δ): | 203149 |
| PT# (if Δ): | BLUE TAPE |
| Other Logger Notes: | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 910 |
| End Time (MST): | |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Clear, 5°C |

| Level Survey: | | | | | | |
|----------------------|---------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail on bridge | 1.969 | 97.942 | 1.942 | 97.942 | - |
| Bench Mark 2: | Rebar with flagging | 0.929 | 98.981 | 0.902 | 98.981 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 3.051 | 96.860 | 3.023 | 96.861 | 96.861 |
| Transducer: | | 0.946 | 95.914 | 0.946 | 95.915 | 95.915 |
| Other: | | | | | | |

General Notes:

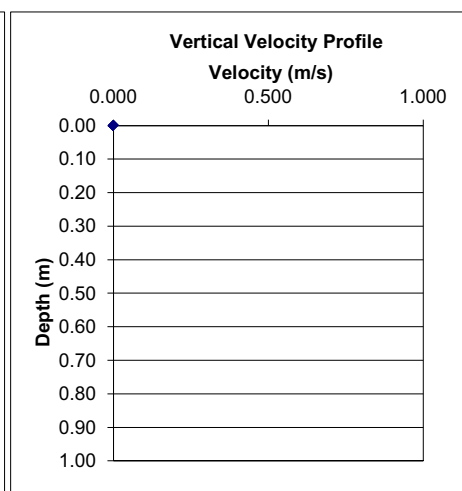
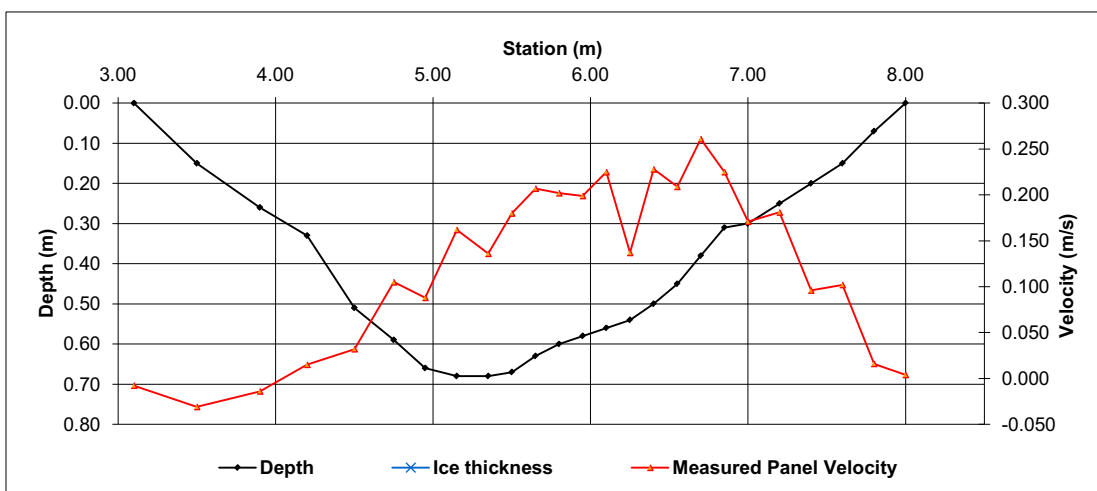
TSS @ 4.3m. PT & weight frozen into substrate, couldn't get weight out, PT pulled up without plastic housing.

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | |
| Left | 3.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.10 | 3.30 | 0.20 | 0.04 | -0.008 | -0.008 | 0.01 | 0.000 | 0% | | |
| 1 | 3.50 | 0.15 | | -0.031 | | | 1.0 | 3.30 | 3.70 | 0.40 | 0.15 | -0.031 | -0.031 | 0.06 | -0.002 | -1% | | |
| 2 | 3.90 | 0.26 | | -0.014 | | | 1.0 | 3.70 | 4.05 | 0.35 | 0.26 | -0.014 | -0.014 | 0.09 | -0.001 | -1% | | |
| 3 | 4.20 | 0.33 | | 0.015 | | | 1.0 | 4.05 | 4.35 | 0.30 | 0.33 | 0.015 | 0.015 | 0.10 | 0.001 | 1% | | |
| 4 | 4.50 | 0.51 | | 0.032 | | | 1.0 | 4.35 | 4.63 | 0.28 | 0.51 | 0.032 | 0.032 | 0.14 | 0.004 | 2% | | |
| 5 | 4.75 | 0.59 | | 0.105 | | | 1.0 | 4.63 | 4.85 | 0.23 | 0.59 | 0.105 | 0.105 | 0.13 | 0.014 | 6% | | |
| 6 | 4.95 | 0.66 | | 0.088 | | | 1.0 | 4.85 | 5.05 | 0.20 | 0.66 | 0.088 | 0.088 | 0.13 | 0.012 | 5% | | |
| 7 | 5.15 | 0.68 | | 0.162 | | | 1.0 | 5.05 | 5.25 | 0.20 | 0.68 | 0.162 | 0.162 | 0.14 | 0.022 | 9% | | |
| 8 | 5.35 | 0.68 | | 0.136 | | | 1.0 | 5.25 | 5.43 | 0.18 | 0.68 | 0.136 | 0.136 | 0.12 | 0.016 | 6% | | |
| 9 | 5.50 | 0.67 | | 0.180 | | | 1.0 | 5.43 | 5.58 | 0.15 | 0.67 | 0.180 | 0.180 | 0.10 | 0.018 | 7% | | |
| 10 | 5.65 | 0.63 | | 0.207 | | | 1.0 | 5.58 | 5.73 | 0.15 | 0.63 | 0.207 | 0.207 | 0.09 | 0.020 | 8% | | |
| 11 | 5.80 | 0.60 | | 0.202 | | | 1.0 | 5.73 | 5.88 | 0.15 | 0.60 | 0.202 | 0.202 | 0.09 | 0.018 | 7% | | |
| 12 | 5.95 | 0.58 | | 0.199 | | | 1.0 | 5.88 | 6.03 | 0.15 | 0.58 | 0.199 | 0.199 | 0.09 | 0.017 | 7% | | |
| 13 | 6.10 | 0.56 | | 0.225 | | | 1.0 | 6.03 | 6.18 | 0.15 | 0.56 | 0.225 | 0.225 | 0.08 | 0.019 | 8% | | |
| 14 | 6.25 | 0.54 | | 0.137 | | | 1.0 | 6.18 | 6.33 | 0.15 | 0.54 | 0.137 | 0.137 | 0.08 | 0.011 | 4% | | |
| 15 | 6.40 | 0.50 | | 0.228 | | | 1.0 | 6.33 | 6.48 | 0.15 | 0.50 | 0.228 | 0.228 | 0.07 | 0.017 | 7% | | |
| 16 | 6.55 | 0.45 | | 0.209 | | | 1.0 | 6.48 | 6.63 | 0.15 | 0.45 | 0.209 | 0.209 | 0.07 | 0.014 | 6% | | |
| 17 | 6.70 | 0.38 | | 0.261 | | | 1.0 | 6.63 | 6.78 | 0.15 | 0.38 | 0.261 | 0.261 | 0.06 | 0.015 | 6% | | |
| 18 | 6.85 | 0.31 | | 0.225 | | | 1.0 | 6.78 | 6.93 | 0.15 | 0.31 | 0.225 | 0.225 | 0.05 | 0.010 | 4% | | |
| 19 | 7.00 | 0.30 | | 0.171 | | | 1.0 | 6.93 | 7.10 | 0.18 | 0.30 | 0.171 | 0.171 | 0.05 | 0.009 | 4% | | |
| 20 | 7.20 | 0.25 | | 0.181 | | | 1.0 | 7.10 | 7.30 | 0.20 | 0.25 | 0.181 | 0.181 | 0.05 | 0.009 | 4% | | |
| 21 | 7.40 | 0.20 | | 0.096 | | | 1.0 | 7.30 | 7.50 | 0.20 | 0.20 | 0.096 | 0.096 | 0.04 | 0.004 | 2% | | |
| 22 | 7.60 | 0.15 | | 0.102 | | | 1.0 | 7.50 | 7.70 | 0.20 | 0.15 | 0.102 | 0.102 | 0.03 | 0.003 | 1% | | |
| 23 | 7.80 | 0.07 | | 0.016 | | | 1.0 | 7.70 | 7.90 | 0.20 | 0.07 | 0.016 | 0.016 | 0.01 | 0.000 | 0% | | |
| Right | 8.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 7.90 | 8.00 | 0.10 | 0.02 | 0.004 | 0.004 | 0.00 | 0.000 | 0% | | |
| Total Flow | | | | | | | | | | | | | | | 0.251 | | | |

**Add/delete # rows as necessary, remembering to autofill calculations/graphs etc*

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.251 | (m ³ /s) |
| Percieved Measurement Quality: | Excellent | |
| Total Area: | 1.89 | (m ²) |
| Wetted Width: | 4.90 | (m) |
| Hydraulic Depth: | 0.385 | (m) |
| Mean Velocity: | 0.133 | (m/s) |
| Foude Number: | 0.068 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S33 - Muskeg River @ Aurora / Albian Boundary (474876 E, 6350204 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 19-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.209 |
| Battery (Main): | 12.98 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1207 |
| Laptop Clock: | 1208 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.2 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1240 |
| End Time (MST): | 1255 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast -5C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.642 | 281.740 | 0.642 | 281.740 | - |
| Bench Mark 2: | Pipe with flagging | 0.905 | 281.740 | 0.905 | 281.740 | - |
| Top of Ice: | | 2.389 | 279.993 | 2.389 | 279.993 | 279.993 |
| Water Level: | | 2.596 | 279.786 | 2.596 | 279.786 | 279.786 |
| Transducer: | | 1.209 | 278.577 | 1.209 | 278.577 | 278.577 |
| Other: | | | | | | |

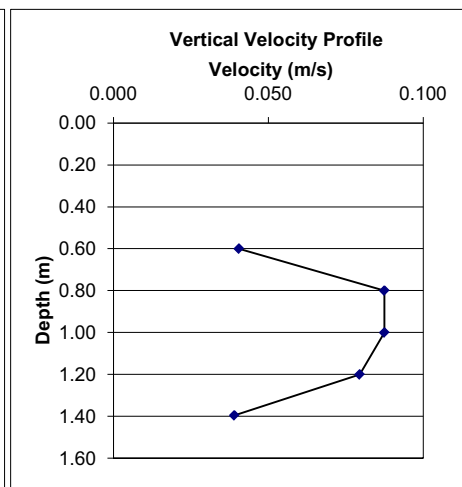
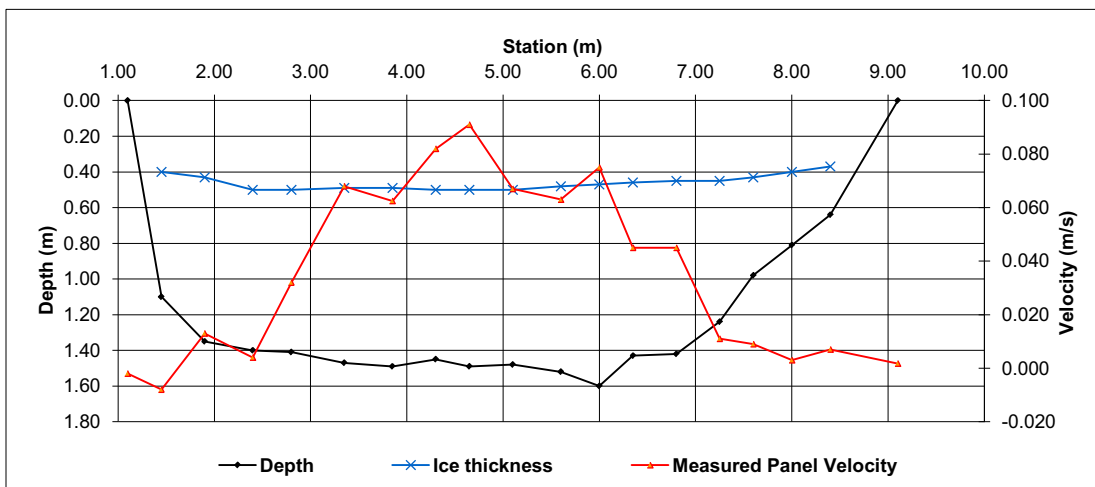
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 1.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.10 | 1.28 | 0.18 | 0.18 | -0.002 | -0.002 | 0.03 | 0.000 | 0% |
| 1 | 1.45 | 1.10 | 0.40 | -0.008 | | | 0.9 | 1.28 | 1.68 | 0.40 | 0.70 | -0.008 | -0.007 | 0.28 | -0.002 | -1% |
| 2 | 1.90 | 1.35 | 0.43 | 0.013 | | | 0.9 | 1.68 | 2.15 | 0.48 | 0.92 | 0.013 | 0.012 | 0.44 | 0.005 | 2% |
| 3 | 2.40 | 1.40 | 0.50 | 0.004 | | | 0.9 | 2.15 | 2.60 | 0.45 | 0.90 | 0.004 | 0.004 | 0.41 | 0.001 | 1% |
| 4 | 2.80 | 1.41 | 0.50 | 0.032 | | | 0.9 | 2.60 | 3.08 | 0.48 | 0.91 | 0.032 | 0.029 | 0.43 | 0.012 | 5% |
| 5 | 3.35 | 1.47 | 0.49 | 0.068 | | | 0.9 | 3.08 | 3.60 | 0.53 | 0.98 | 0.068 | 0.061 | 0.51 | 0.031 | 12% |
| 6 | 3.85 | 1.49 | 0.49 | | 0.077 | 0.048 | 1.0 | 3.60 | 4.08 | 0.48 | 1.00 | 0.063 | 0.063 | 0.48 | 0.030 | 11% |
| 7 | 4.30 | 1.45 | 0.50 | 0.082 | | | 0.9 | 4.08 | 4.48 | 0.40 | 0.95 | 0.082 | 0.074 | 0.38 | 0.028 | 11% |
| 8 | 4.65 | 1.49 | 0.50 | 0.091 | | | 0.9 | 4.48 | 4.88 | 0.40 | 0.99 | 0.091 | 0.082 | 0.40 | 0.032 | 12% |
| 9 | 5.10 | 1.48 | 0.50 | 0.067 | | | 0.9 | 4.88 | 5.35 | 0.48 | 0.98 | 0.067 | 0.060 | 0.47 | 0.028 | 11% |
| 10 | 5.60 | 1.52 | 0.48 | | 0.077 | 0.049 | 1.0 | 5.35 | 5.80 | 0.45 | 1.04 | 0.063 | 0.063 | 0.47 | 0.029 | 11% |
| 11 | 6.00 | 1.60 | 0.47 | 0.075 | | | 0.9 | 5.80 | 6.18 | 0.38 | 1.13 | 0.075 | 0.068 | 0.42 | 0.029 | 11% |
| 12 | 6.35 | 1.43 | 0.46 | 0.045 | | | 0.9 | 6.18 | 6.58 | 0.40 | 0.97 | 0.045 | 0.041 | 0.39 | 0.016 | 6% |
| 13 | 6.80 | 1.42 | 0.45 | 0.045 | | | 0.9 | 6.58 | 7.03 | 0.45 | 0.97 | 0.045 | 0.041 | 0.44 | 0.018 | 7% |
| 14 | 7.25 | 1.24 | 0.45 | 0.011 | | | 0.9 | 7.03 | 7.43 | 0.40 | 0.79 | 0.011 | 0.010 | 0.32 | 0.003 | 1% |
| 15 | 7.60 | 0.98 | 0.43 | 0.009 | | | 0.9 | 7.43 | 7.80 | 0.38 | 0.55 | 0.009 | 0.008 | 0.21 | 0.002 | 1% |
| 16 | 8.00 | 0.81 | 0.40 | 0.003 | | | 0.9 | 7.80 | 8.20 | 0.40 | 0.41 | 0.003 | 0.003 | 0.16 | 0.000 | 0% |
| 17 | 8.40 | 0.64 | 0.37 | 0.007 | | | 0.9 | 8.20 | 8.75 | 0.55 | 0.27 | 0.007 | 0.006 | 0.15 | 0.001 | 0% |
| Right | 9.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 8.75 | 9.10 | 0.35 | 0.07 | 0.002 | 0.002 | 0.02 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.264 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.264 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 6.39 | (m ²) |
| Wetted Width: | 8.00 | (m) |
| Hydraulic Depth: | 0.799 | (m) |
| Mean Velocity: | 0.041 | (m/s) |
| Froude Number: | 0.015 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.067 |
| Offset | 4.65 | 1.49 | 0 | - | - | Panel V.@Ofst 0.091 |
| Depth | 1.49 | 1.30 | 0.078 | 1.40 | 0.039 | 60% Depth 1.094 |
| Ice Depth | 0.5 | 1.10 | 0.081 | 1.20 | 0.080 | 20% Depth 0.70 |
| | | 0.90 | 0.094 | 1.00 | 0.088 | 80% Depth 1.29 |
| | | 0.70 | 0.081 | 0.80 | 0.088 | |
| | | 0.50 | 0.000 | 0.60 | 0.041 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S33 - Muskeg River @ Aurora / Albian Boundary (474876 E, 6350204 N) | | | |
| Field Personnel: | GB, JE | Trip Date: | 13-Feb-10 |
| Data Entry Personnel: | SG | Date: | 17-Feb-10 |
| Data Check Personnel: | DB | Date: | 15-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.106 |
| Battery (Main): | 12.94 |
| Battery (Aux): | - |
| Datalogger Clock: | 1556 |
| Laptop Clock: | 1556 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1618 |
| End Time (MST): | 1637 |
| Equipment: | ADV Other: Marsh |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | Clear |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.826 | 281.740 | 0.822 | 281.740 | - |
| Bench Mark 2: | Pipe with flagging | 1.096 | 281.740 | 1.089 | 281.740 | - |
| Top of Ice: | | 2.635 | 279.931 | 2.630 | 279.932 | 279.932 |
| Water Level: | | 2.872 | 279.694 | 2.874 | 279.688 | 279.691 |
| Transducer: | | 1.106 | 278.588 | 1.106 | 278.582 | 278.585 |
| Other: | | | | | | |

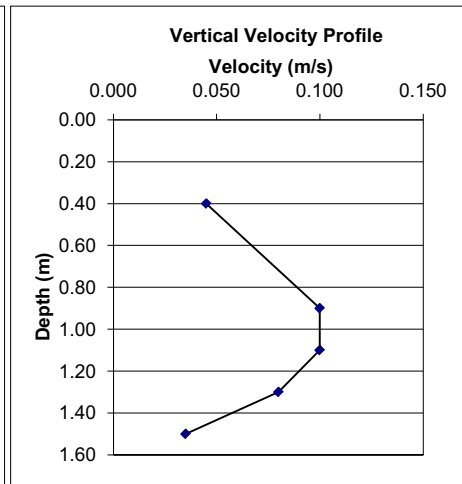
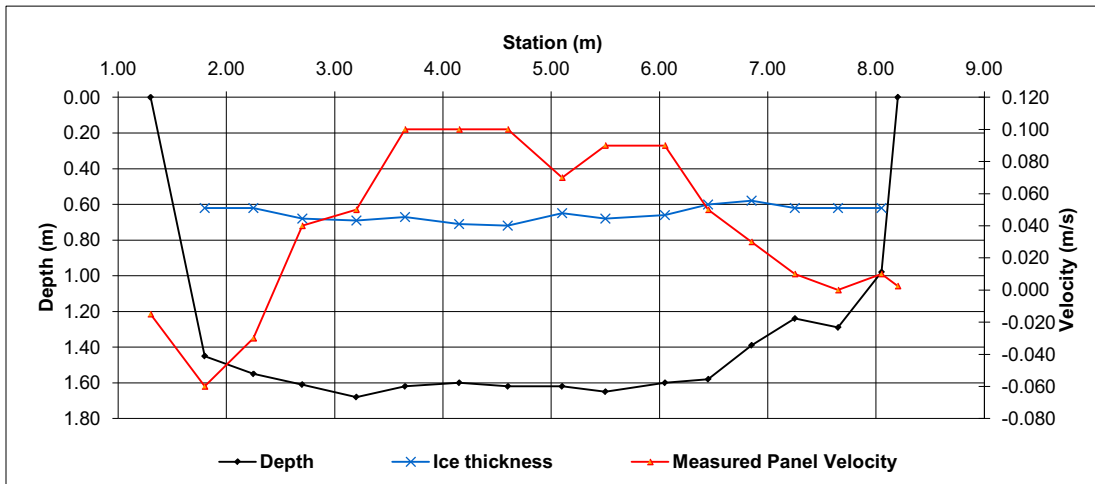
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 1.30 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.30 | 1.55 | 0.25 | 0.21 | -0.015 | -0.014 | 0.05 | -0.001 | 0% |
| 1 | 1.80 | 1.45 | 0.62 | -0.060 | | | 0.9 | 1.55 | 2.03 | 0.48 | 0.83 | -0.060 | -0.054 | 0.39 | -0.021 | -8% |
| 2 | 2.25 | 1.55 | 0.62 | -0.030 | | | 0.9 | 2.03 | 2.48 | 0.45 | 0.93 | -0.030 | -0.027 | 0.42 | -0.011 | -4% |
| 3 | 2.70 | 1.61 | 0.68 | 0.040 | | | 0.9 | 2.48 | 2.95 | 0.48 | 0.93 | 0.040 | 0.036 | 0.44 | 0.016 | 6% |
| 4 | 3.20 | 1.68 | 0.69 | 0.050 | | | 0.9 | 2.95 | 3.43 | 0.48 | 0.99 | 0.050 | 0.045 | 0.47 | 0.021 | 8% |
| 5 | 3.65 | 1.62 | 0.67 | 0.100 | | | 0.9 | 3.43 | 3.90 | 0.48 | 0.95 | 0.100 | 0.090 | 0.45 | 0.041 | 16% |
| 6 | 4.15 | 1.60 | 0.71 | 0.100 | | | 0.9 | 3.90 | 4.38 | 0.48 | 0.89 | 0.100 | 0.090 | 0.42 | 0.038 | 15% |
| 7 | 4.60 | 1.62 | 0.72 | 0.100 | | | 0.9 | 4.38 | 4.85 | 0.48 | 0.90 | 0.100 | 0.090 | 0.43 | 0.038 | 15% |
| 8 | 5.10 | 1.62 | 0.65 | 0.070 | | | 0.9 | 4.85 | 5.30 | 0.45 | 0.97 | 0.070 | 0.063 | 0.44 | 0.027 | 11% |
| 9 | 5.50 | 1.65 | 0.68 | 0.090 | | | 0.9 | 5.30 | 5.78 | 0.48 | 0.97 | 0.090 | 0.081 | 0.46 | 0.037 | 15% |
| 10 | 6.05 | 1.60 | 0.66 | 0.090 | | | 0.9 | 5.78 | 6.25 | 0.48 | 0.94 | 0.090 | 0.081 | 0.45 | 0.036 | 14% |
| 11 | 6.45 | 1.58 | 0.60 | 0.050 | | | 0.9 | 6.25 | 6.65 | 0.40 | 0.98 | 0.050 | 0.045 | 0.39 | 0.018 | 7% |
| 12 | 6.85 | 1.39 | 0.58 | 0.030 | | | 0.9 | 6.65 | 7.05 | 0.40 | 0.81 | 0.030 | 0.027 | 0.32 | 0.009 | 3% |
| 13 | 7.25 | 1.24 | 0.62 | 0.010 | | | 0.9 | 7.05 | 7.45 | 0.40 | 0.62 | 0.010 | 0.009 | 0.25 | 0.002 | 1% |
| 14 | 7.65 | 1.29 | 0.62 | 0.000 | | | 1.0 | 7.45 | 7.85 | 0.40 | 0.67 | 0.000 | 0.000 | 0.27 | 0.000 | 0% |
| 15 | 8.05 | 0.98 | 0.62 | 0.010 | | | 0.9 | 7.85 | 8.13 | 0.27 | 0.36 | 0.010 | 0.009 | 0.10 | 0.001 | 0% |
| Left | 8.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 8.13 | 8.20 | 0.07 | 0.09 | 0.003 | 0.003 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.251 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.251 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 5.76 | (m ²) |
| Wetted Width: | 6.90 | (m) |
| Hydraulic Depth: | 0.835 | (m) |
| Mean Velocity: | 0.044 | (m/s) |
| Froude Number: | 0.015 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.072 |
| Offset | 4.15 | 1.60 | 0 | - | Panel V.@Ofst | 0.1 |
| Depth | 1.6 | 1.40 | 0.07 | 1.50 | 60% Depth | 1.244 |
| Ice Depth | 0.71 | 1.20 | 0.090 | 1.30 | 20% Depth | 0.89 |
| | | 1.00 | 0.110 | 1.10 | 80% Depth | 1.42 |
| | | 0.80 | 0.090 | 0.90 | | |
| | | | 0.40 | 0.045 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S33 - Muskeg River @ Aurora / Albion Boundary (474876 E, 6350204 N) | | | |
| Field Personnel: | SE, SG | Trip Date: | 07-Mar-10 |
| Data Entry Personnel: | SG | Date: | 17-Mar-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.167 |
| Battery (Main): | 13.6 |
| Battery (Aux): | - |
| Datalogger Clock: | 1103 |
| Laptop Clock: | 1106 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 0.2 |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1105 |
| End Time (MST): | 1115 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | Clear 3°C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.930 | 281.740 | 0.889 | 281.740 | - |
| Bench Mark 2: | Pipe with flagging | 1.203 | 281.740 | 1.160 | 281.740 | - |
| Top of Ice: | | 2.732 | 279.938 | 2.687 | 279.942 | 279.940 |
| Water Level: | | 2.928 | 279.742 | 2.887 | 279.742 | 279.742 |
| Transducer: | | 1.167 | 278.575 | 1.167 | 278.575 | 278.575 |
| Other: | | | | | | |

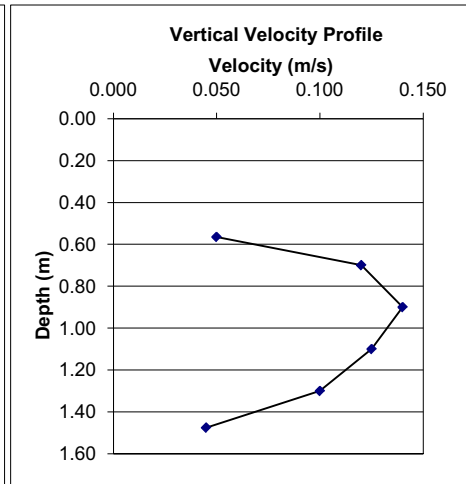
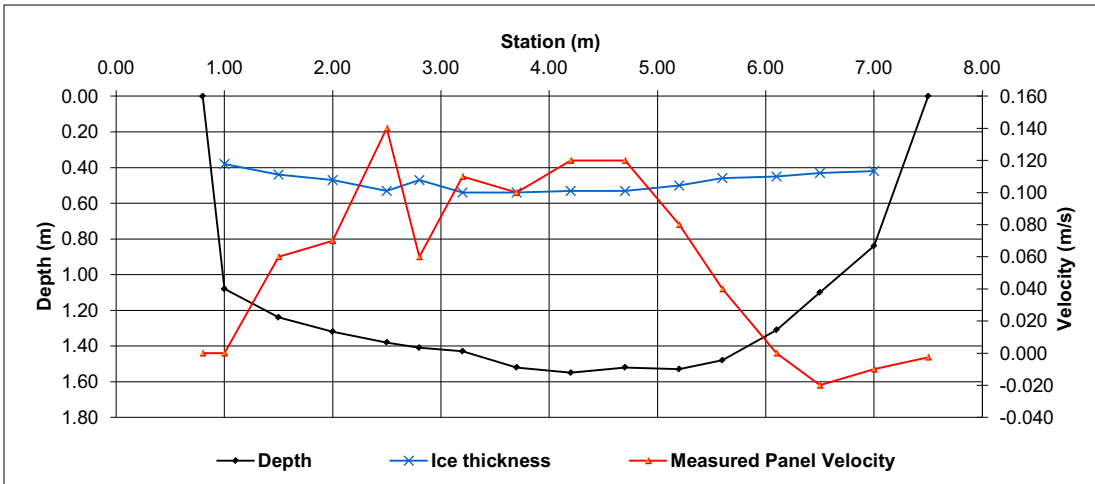
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 0.80 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.80 | 0.90 | 0.10 | 0.18 | 0.000 | 0.000 | 0.02 | 0.000 | 0% | |
| 1 | 1.00 | 1.08 | 0.38 | 0.000 | | | 1.0 | 0.90 | 1.25 | 0.35 | 0.70 | 0.000 | 0.000 | 0.25 | 0.000 | 0% | |
| 2 | 1.50 | 1.24 | 0.44 | 0.060 | | | 0.9 | 1.25 | 1.75 | 0.50 | 0.80 | 0.060 | 0.054 | 0.40 | 0.022 | 6% | |
| 3 | 2.00 | 1.32 | 0.47 | 0.070 | | | 0.9 | 1.75 | 2.25 | 0.50 | 0.85 | 0.070 | 0.063 | 0.43 | 0.027 | 8% | |
| 4 | 2.50 | 1.38 | 0.53 | 0.140 | | | 0.9 | 2.25 | 2.65 | 0.40 | 0.85 | 0.140 | 0.126 | 0.34 | 0.043 | 12% | |
| 5 | 2.80 | 1.41 | 0.47 | 0.060 | | | 0.9 | 2.65 | 3.00 | 0.35 | 0.94 | 0.060 | 0.054 | 0.33 | 0.018 | 5% | |
| 6 | 3.20 | 1.43 | 0.54 | 0.110 | | | 0.9 | 3.00 | 3.45 | 0.45 | 0.89 | 0.110 | 0.099 | 0.40 | 0.040 | 11% | |
| 7 | 3.70 | 1.52 | 0.54 | 0.100 | | | 0.9 | 3.45 | 3.95 | 0.50 | 0.98 | 0.100 | 0.090 | 0.49 | 0.044 | 12% | |
| 8 | 4.20 | 1.55 | 0.53 | | 0.100 | 0.140 | 1.0 | 3.95 | 4.45 | 0.50 | 1.02 | 0.120 | 0.120 | 0.51 | 0.061 | 17% | |
| 9 | 4.70 | 1.52 | 0.53 | 0.120 | | | 0.9 | 4.45 | 4.95 | 0.50 | 0.99 | 0.120 | 0.108 | 0.50 | 0.053 | 15% | |
| 10 | 5.20 | 1.53 | 0.50 | | 0.070 | 0.090 | 1.0 | 4.95 | 5.40 | 0.45 | 1.03 | 0.080 | 0.080 | 0.46 | 0.037 | 10% | |
| 11 | 5.60 | 1.48 | 0.46 | | 0.040 | 0.040 | 1.0 | 5.40 | 5.85 | 0.45 | 1.02 | 0.040 | 0.040 | 0.46 | 0.018 | 5% | |
| 12 | 6.10 | 1.31 | 0.45 | 0.000 | | | 1.0 | 5.85 | 6.30 | 0.45 | 0.86 | 0.000 | 0.000 | 0.39 | 0.000 | 0% | |
| 13 | 6.50 | 1.10 | 0.43 | -0.020 | | | 0.9 | 6.30 | 6.75 | 0.45 | 0.67 | -0.020 | -0.018 | 0.30 | -0.005 | -2% | |
| 14 | 7.00 | 0.84 | 0.42 | -0.010 | | | 0.9 | 6.75 | 7.25 | 0.50 | 0.42 | -0.010 | -0.009 | 0.21 | -0.002 | -1% | |
| Left | 7.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 7.25 | 7.50 | 0.25 | 0.11 | -0.003 | -0.003 | 0.03 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.355 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.355 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 5.50 | (m ²) |
| Wetted Width: | 6.70 | (m) |
| Hydraulic Depth: | 0.821 | (m) |
| Mean Velocity: | 0.065 | (m/s) |
| Froude Number: | 0.023 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|--------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.097 |
| Offset | 4.20 | 1.55 | 0.000 | - | - | Panel V.@Ofst 0.12 |
| Depth | 1.55 | 1.40 | 0.090 | 1.48 | 0.045 | 60% Depth 1.142 |
| Ice Depth | 0.53 | 1.20 | 0.110 | 1.30 | 0.100 | 20% Depth 0.73 |
| | | 1.00 | 0.140 | 1.10 | 0.125 | 80% Depth 1.35 |
| | | 0.80 | 0.140 | 0.90 | 0.140 | |
| | | 0.60 | 0.100 | 0.70 | 0.120 | |
| | | 0.53 | 0.000 | 0.57 | 0.050 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S33 - Muskeg River @ Aurora / Albion Boundary (474876 E, 6350204 N) | | | |
| Field Personnel: | DB GB | Trip Date: | 08-Apr-10 |
| Data Entry Personnel: | DB | Date: | 10-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.438 |
| Battery (Main): | 14.56 |
| Battery (Aux): | - |
| Datalogger Clock: | 1200 |
| Laptop Clock: | 1200 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 0.3 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|----------------|
| Measurement Details: | |
| Start Time (MST): | 1145 |
| End Time (MST): | 1200 |
| Equipment: | - |
| Method: | - |
| River Condition: | Mostly Open |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Calm, hazy sun |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.777 | 281.740 | 0.731 | 281.740 | - |
| Bench Mark 2: | Pipe with flagging | 1.066 | 281.740 | 1.022 | 281.740 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.517 | 280.000 | 2.466 | 280.005 | 280.003 |
| Transducer: | | 1.438 | 278.562 | 1.438 | 278.567 | 278.565 |
| Other: | | | | | | |

General Notes:

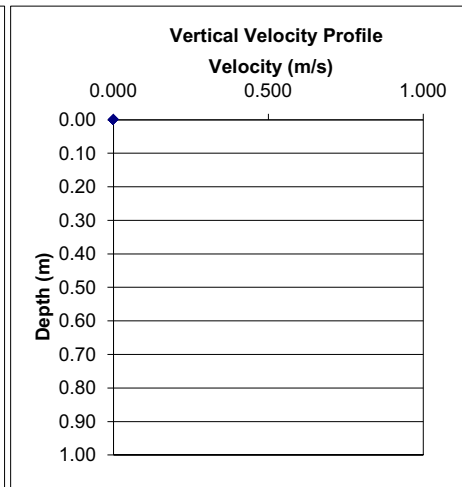
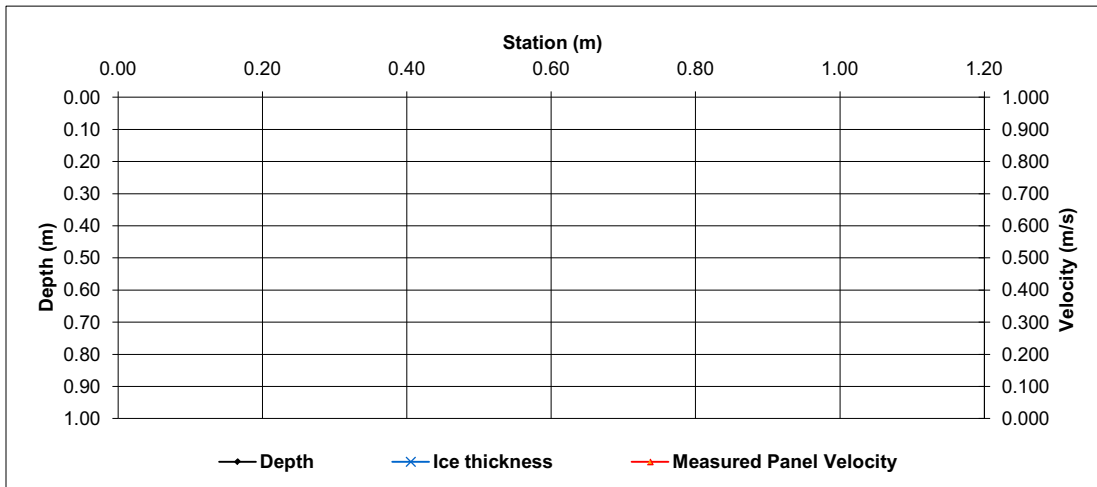
Mostly open, can still see augering holes on the bottom. Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S33 - Muskeg River @ Aurora / Albion Boundary (474876 E, 6350204 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 27-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 2.2 |
| Battery (Main): | 14.44 |
| Battery (Aux): | - |
| Datalogger Clock: | 1203 |
| Laptop Clock: | 1204 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 4.2°C |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1210 |
| End Time (MST): | 1250 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Sunny 10°C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.728 | 281.740 | 0.703 | 281.740 | - |
| Bench Mark 2: | Pipe with flagging | 1.027 | 281.740 | 1.002 | 281.740 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.713 | 280.755 | 1.686 | 280.757 | 280.756 |
| Transducer: | | 2.2 | 278.555 | 2.2 | 278.557 | 278.556 |
| Other: | | | | | | |

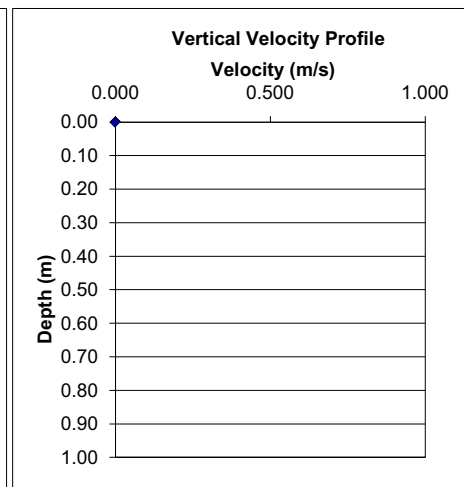
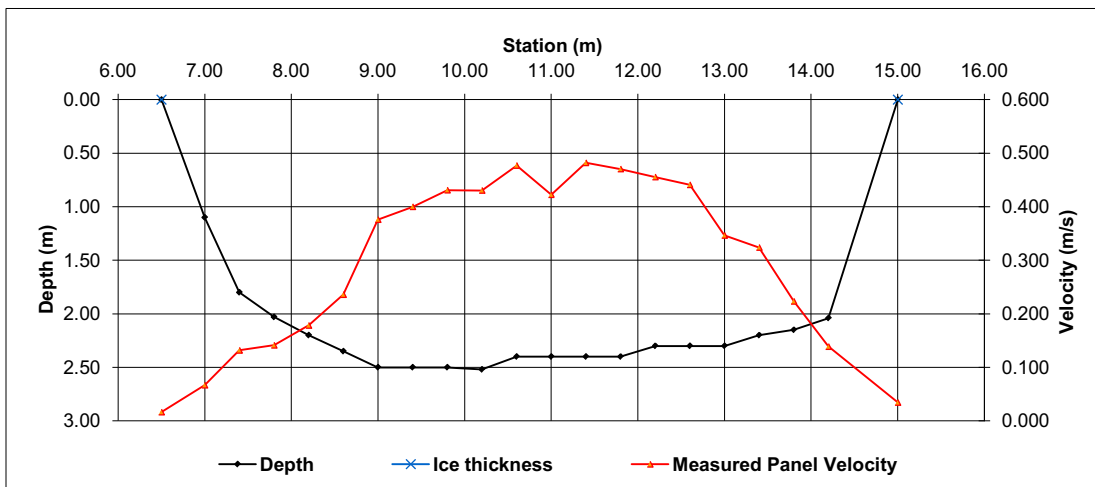
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: Measured Data | | | | | | | Calculated Data | | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 6.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 6.50 | 6.75 | 0.25 | 0.28 | 0.017 | 0.017 | 0.07 | 0.001 | 0% | |
| 1 | 7.00 | 1.10 | | 0.031 | 0.103 | | 1.0 | 6.75 | 7.20 | 0.45 | 1.10 | 0.067 | 0.067 | 0.50 | 0.033 | 1% | |
| 2 | 7.40 | 1.80 | | 0.156 | 0.108 | | 1.0 | 7.20 | 7.60 | 0.40 | 1.80 | 0.132 | 0.132 | 0.72 | 0.095 | 2% | |
| 3 | 7.80 | 2.03 | | 0.104 | 0.179 | | 1.0 | 7.60 | 8.00 | 0.40 | 2.03 | 0.142 | 0.142 | 0.81 | 0.115 | 2% | |
| 4 | 8.20 | 2.20 | | 0.113 | 0.244 | | 1.0 | 8.00 | 8.40 | 0.40 | 2.20 | 0.179 | 0.179 | 0.88 | 0.157 | 3% | |
| 5 | 8.60 | 2.35 | | 0.309 | 0.163 | | 1.0 | 8.40 | 8.80 | 0.40 | 2.35 | 0.236 | 0.236 | 0.94 | 0.222 | 4% | |
| 6 | 9.00 | 2.50 | | 0.432 | 0.320 | | 1.0 | 8.80 | 9.20 | 0.40 | 2.50 | 0.376 | 0.376 | 1.00 | 0.376 | 6% | |
| 7 | 9.40 | 2.50 | | 0.445 | 0.355 | | 1.0 | 9.20 | 9.60 | 0.40 | 2.50 | 0.400 | 0.400 | 1.00 | 0.400 | 7% | |
| 8 | 9.80 | 2.50 | | 0.494 | 0.368 | | 1.0 | 9.60 | 10.00 | 0.40 | 2.50 | 0.431 | 0.431 | 1.00 | 0.431 | 7% | |
| 9 | 10.20 | 2.52 | | 0.400 | 0.461 | | 1.0 | 10.00 | 10.40 | 0.40 | 2.52 | 0.431 | 0.431 | 1.01 | 0.434 | 7% | |
| 10 | 10.60 | 2.40 | | 0.494 | 0.460 | | 1.0 | 10.40 | 10.80 | 0.40 | 2.40 | 0.477 | 0.477 | 0.96 | 0.458 | 8% | |
| 11 | 11.00 | 2.40 | | 0.364 | 0.481 | | 1.0 | 10.80 | 11.20 | 0.40 | 2.40 | 0.423 | 0.423 | 0.96 | 0.406 | 7% | |
| 12 | 11.40 | 2.40 | | 0.473 | 0.491 | | 1.0 | 11.20 | 11.60 | 0.40 | 2.40 | 0.482 | 0.482 | 0.96 | 0.463 | 8% | |
| 13 | 11.80 | 2.40 | | 0.456 | 0.485 | | 1.0 | 11.60 | 12.00 | 0.40 | 2.40 | 0.471 | 0.471 | 0.96 | 0.452 | 8% | |
| 14 | 12.20 | 2.30 | | 0.417 | 0.494 | | 1.0 | 12.00 | 12.40 | 0.40 | 2.30 | 0.456 | 0.456 | 0.92 | 0.419 | 7% | |
| 15 | 12.60 | 2.30 | | 0.471 | 0.411 | | 1.0 | 12.40 | 12.80 | 0.40 | 2.30 | 0.441 | 0.441 | 0.92 | 0.406 | 7% | |
| 16 | 13.00 | 2.30 | | 0.329 | 0.364 | | 1.0 | 12.80 | 13.20 | 0.40 | 2.30 | 0.347 | 0.347 | 0.92 | 0.319 | 5% | |
| 17 | 13.40 | 2.20 | | 0.423 | 0.225 | | 1.0 | 13.20 | 13.60 | 0.40 | 2.20 | 0.324 | 0.324 | 0.88 | 0.285 | 5% | |
| 18 | 13.80 | 2.15 | | 0.287 | 0.160 | | 1.0 | 13.60 | 14.00 | 0.40 | 2.15 | 0.224 | 0.224 | 0.86 | 0.192 | 3% | |
| 19 | 14.20 | 2.04 | | 0.207 | 0.071 | | 1.0 | 14.00 | 14.60 | 0.60 | 2.04 | 0.139 | 0.139 | 1.22 | 0.170 | 3% | |
| Right | 15.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 14.60 | 15.00 | 0.40 | 0.51 | 0.035 | 0.035 | 0.20 | 0.007 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 5.840 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 5.840 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 17.69 | (m ²) |
| Wetted Width: | 8.50 | (m) |
| Hydraulic Depth: | 2.081 | (m) |
| Mean Velocity: | 0.330 | (m/s) |
| Froude Number: | 0.073 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|----------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V. @Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S33 - Muskeg River @ Aurora / Albian Boundary (474876 E, 6350204 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 27-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 16-Jul-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.125 |
| Battery (Main): | 14.09 |
| Battery (Aux): | - |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 19.6 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|----------------------|
| Measurement Details: | |
| Start Time (MST): | 1300 |
| End Time (MST): | 1501 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Hot, distant thunder |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.647 | 281.740 | 0.640 | 281.740 | - |
| Bench Mark 2: | Pipe with flagging | 0.937 | 281.740 | 0.929 | 281.740 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.684 | 279.703 | 2.673 | 279.707 | 279.705 |
| Transducer: | | 1.125 | 278.578 | 1.125 | 278.582 | 278.580 |
| Other: | | | | | | |

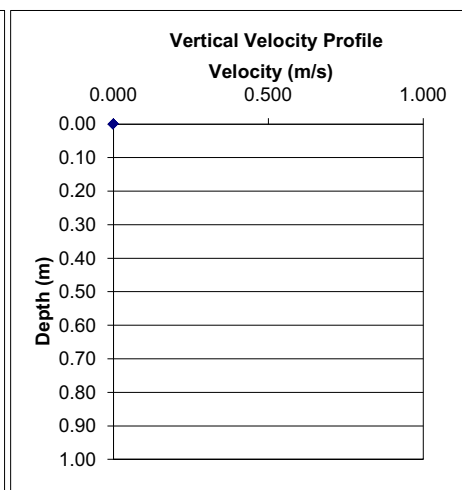
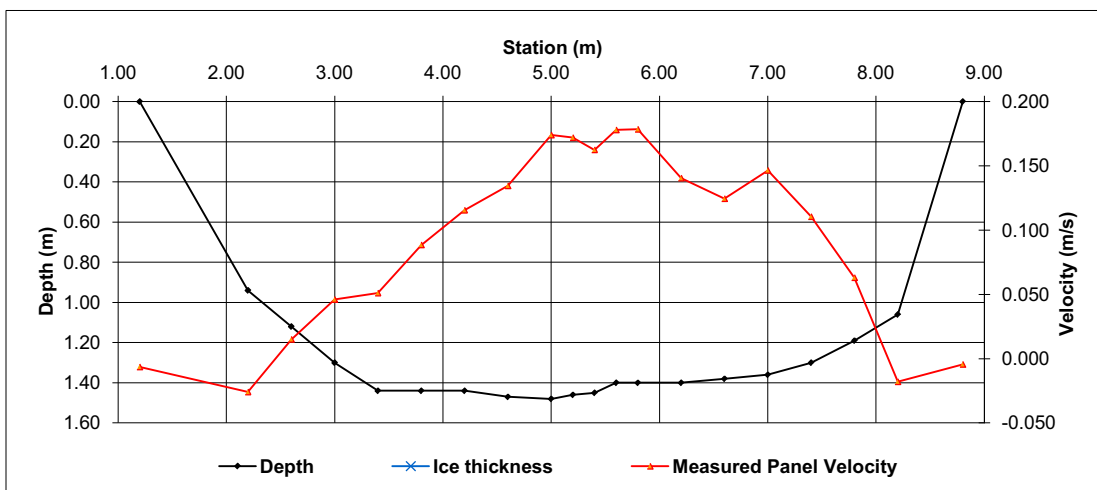
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 8.80 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 8.80 | 8.50 | 0.30 | 0.27 | -0.005 | -0.005 | 0.08 | 0.000 | 0% |
| 1 | 8.20 | 1.06 | | | -0.013 | -0.023 | 1.0 | 8.50 | 8.00 | 0.50 | 1.06 | -0.018 | -0.018 | 0.53 | -0.010 | -1% |
| 2 | 7.80 | 1.19 | | | 0.064 | 0.062 | 1.0 | 8.00 | 7.60 | 0.40 | 1.19 | 0.063 | 0.063 | 0.48 | 0.030 | 4% |
| 3 | 7.40 | 1.30 | | | 0.080 | 0.141 | 1.0 | 7.60 | 7.20 | 0.40 | 1.30 | 0.111 | 0.111 | 0.52 | 0.057 | 7% |
| 4 | 7.00 | 1.36 | | | 0.139 | 0.154 | 1.0 | 7.20 | 6.80 | 0.40 | 1.36 | 0.147 | 0.147 | 0.54 | 0.080 | 9% |
| 5 | 6.60 | 1.38 | | | 0.075 | 0.174 | 1.0 | 6.80 | 6.40 | 0.40 | 1.38 | 0.125 | 0.125 | 0.55 | 0.069 | 8% |
| 6 | 6.20 | 1.40 | | | 0.138 | 0.143 | 1.0 | 6.40 | 6.00 | 0.40 | 1.40 | 0.141 | 0.141 | 0.56 | 0.079 | 9% |
| 7 | 5.80 | 1.40 | | | 0.156 | 0.201 | 1.0 | 6.00 | 5.70 | 0.30 | 1.40 | 0.179 | 0.179 | 0.42 | 0.075 | 9% |
| 8 | 5.60 | 1.40 | | | 0.198 | 0.158 | 1.0 | 5.70 | 5.50 | 0.20 | 1.40 | 0.178 | 0.178 | 0.28 | 0.050 | 6% |
| 9 | 5.40 | 1.45 | | | 0.137 | 0.188 | 1.0 | 5.50 | 5.30 | 0.20 | 1.45 | 0.163 | 0.163 | 0.29 | 0.047 | 6% |
| 10 | 5.20 | 1.46 | | | 0.185 | 0.159 | 1.0 | 5.30 | 5.10 | 0.20 | 1.46 | 0.172 | 0.172 | 0.29 | 0.050 | 6% |
| 11 | 5.00 | 1.48 | | | 0.193 | 0.155 | 1.0 | 5.10 | 4.80 | 0.30 | 1.48 | 0.174 | 0.174 | 0.44 | 0.077 | 9% |
| 12 | 4.60 | 1.47 | | | 0.164 | 0.105 | 1.0 | 4.80 | 4.40 | 0.40 | 1.47 | 0.135 | 0.135 | 0.59 | 0.079 | 9% |
| 13 | 4.20 | 1.44 | | | 0.124 | 0.107 | 1.0 | 4.40 | 4.00 | 0.40 | 1.44 | 0.116 | 0.116 | 0.58 | 0.067 | 8% |
| 14 | 3.80 | 1.44 | | | 0.084 | 0.093 | 1.0 | 4.00 | 3.60 | 0.40 | 1.44 | 0.089 | 0.089 | 0.58 | 0.051 | 6% |
| 15 | 3.40 | 1.44 | | | 0.053 | 0.049 | 1.0 | 3.60 | 3.20 | 0.40 | 1.44 | 0.051 | 0.051 | 0.58 | 0.029 | 3% |
| 16 | 3.00 | 1.30 | | | 0.040 | 0.052 | 1.0 | 3.20 | 2.80 | 0.40 | 1.30 | 0.046 | 0.046 | 0.52 | 0.024 | 3% |
| 17 | 2.60 | 1.12 | | | 0.008 | 0.022 | 1.0 | 2.80 | 2.40 | 0.40 | 1.12 | 0.015 | 0.015 | 0.45 | 0.007 | 1% |
| 18 | 2.20 | 0.94 | | | -0.011 | -0.041 | 1.0 | 2.40 | 1.70 | 0.70 | 0.94 | -0.026 | -0.026 | 0.66 | -0.017 | -2% |
| Left | 1.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.70 | 1.20 | 0.50 | 0.24 | -0.007 | -0.007 | 0.12 | -0.001 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.843 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.843 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 9.05 | (m ²) |
| Wetted Width: | 6.80 | (m) |
| Hydraulic Depth: | 1.330 | (m) |
| Mean Velocity: | 0.093 | (m/s) |
| Froude Number: | 0.026 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S33 - Muskeg River @ Aurora / Albion Boundary (474876 E, 6350204 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 18-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.104 |
| Battery (Main): | 14.33 |
| Battery (Aux): | - |
| Datalogger Clock: | 936 |
| Laptop Clock: | 934 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 16.5 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 945 |
| End Time (MST): | 1020 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Clear 20°C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.703 | 281.740 | 0.645 | 281.740 | - |
| Bench Mark 2: | Pipe with flagging | 0.987 | 281.740 | 0.924 | 281.740 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.747 | 279.696 | 2.688 | 279.697 | 279.697 |
| Transducer: | | 1.104 | 278.592 | 1.104 | 278.593 | 278.593 |
| Other: | | | | | | |

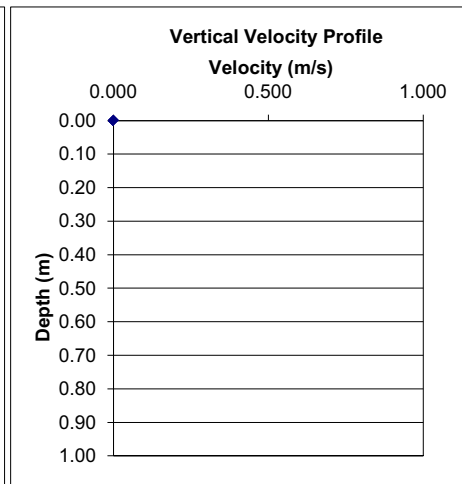
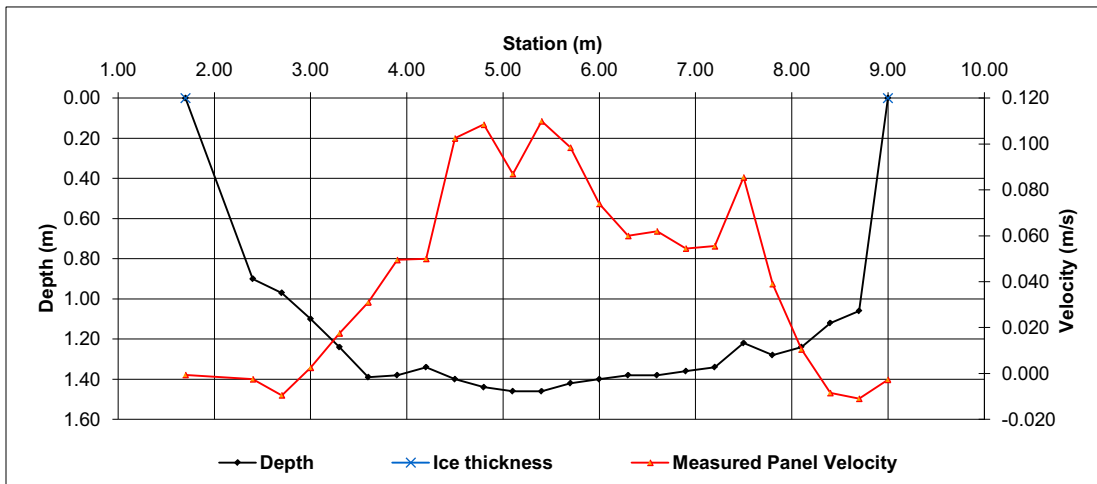
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 9.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 9.00 | 8.85 | 0.15 | 0.27 | -0.003 | -0.003 | 0.04 | 0.000 | 0% |
| 1 | 8.70 | 1.06 | | | -0.020 | -0.002 | 1.0 | 8.85 | 8.55 | 0.30 | 1.06 | -0.011 | -0.011 | 0.32 | -0.003 | -1% |
| 2 | 8.40 | 1.12 | | | -0.022 | 0.005 | 1.0 | 8.55 | 8.25 | 0.30 | 1.12 | -0.009 | -0.009 | 0.34 | -0.003 | -1% |
| 3 | 8.10 | 1.24 | | | -0.003 | 0.024 | 1.0 | 8.25 | 7.95 | 0.30 | 1.24 | 0.011 | 0.011 | 0.37 | 0.004 | 1% |
| 4 | 7.80 | 1.28 | | | 0.023 | 0.055 | 1.0 | 7.95 | 7.65 | 0.30 | 1.28 | 0.039 | 0.039 | 0.38 | 0.015 | 3% |
| 5 | 7.50 | 1.22 | | | 0.078 | 0.093 | 1.0 | 7.65 | 7.35 | 0.30 | 1.22 | 0.086 | 0.086 | 0.37 | 0.031 | 7% |
| 6 | 7.20 | 1.34 | | | 0.058 | 0.053 | 1.0 | 7.35 | 7.05 | 0.30 | 1.34 | 0.056 | 0.056 | 0.40 | 0.022 | 5% |
| 7 | 6.90 | 1.36 | | | 0.045 | 0.064 | 1.0 | 7.05 | 6.75 | 0.30 | 1.36 | 0.055 | 0.055 | 0.41 | 0.022 | 5% |
| 8 | 6.60 | 1.38 | | | 0.027 | 0.097 | 1.0 | 6.75 | 6.45 | 0.30 | 1.38 | 0.062 | 0.062 | 0.41 | 0.026 | 6% |
| 9 | 6.30 | 1.38 | | | 0.032 | 0.088 | 1.0 | 6.45 | 6.15 | 0.30 | 1.38 | 0.060 | 0.060 | 0.41 | 0.025 | 6% |
| 10 | 6.00 | 1.40 | | | 0.055 | 0.093 | 1.0 | 6.15 | 5.85 | 0.30 | 1.40 | 0.074 | 0.074 | 0.42 | 0.031 | 7% |
| 11 | 5.70 | 1.42 | | | 0.091 | 0.106 | 1.0 | 5.85 | 5.55 | 0.30 | 1.42 | 0.099 | 0.099 | 0.43 | 0.042 | 9% |
| 12 | 5.40 | 1.46 | | | 0.128 | 0.092 | 1.0 | 5.55 | 5.25 | 0.30 | 1.46 | 0.110 | 0.110 | 0.44 | 0.048 | 11% |
| 13 | 5.10 | 1.46 | | | 0.069 | 0.105 | 1.0 | 5.25 | 4.95 | 0.30 | 1.46 | 0.087 | 0.087 | 0.44 | 0.038 | 9% |
| 14 | 4.80 | 1.44 | | | 0.120 | 0.097 | 1.0 | 4.95 | 4.65 | 0.30 | 1.44 | 0.109 | 0.109 | 0.43 | 0.047 | 11% |
| 15 | 4.50 | 1.40 | | | 0.127 | 0.078 | 1.0 | 4.65 | 4.35 | 0.30 | 1.40 | 0.103 | 0.103 | 0.42 | 0.043 | 10% |
| 16 | 4.20 | 1.34 | | | 0.063 | 0.037 | 1.0 | 4.35 | 4.05 | 0.30 | 1.34 | 0.050 | 0.050 | 0.40 | 0.020 | 5% |
| 17 | 3.90 | 1.38 | | | 0.041 | 0.058 | 1.0 | 4.05 | 3.75 | 0.30 | 1.38 | 0.050 | 0.050 | 0.41 | 0.020 | 5% |
| 18 | 3.60 | 1.39 | | | 0.032 | 0.030 | 1.0 | 3.75 | 3.45 | 0.30 | 1.39 | 0.031 | 0.031 | 0.42 | 0.013 | 3% |
| 19 | 3.30 | 1.24 | | | 0.019 | 0.016 | 1.0 | 3.45 | 3.15 | 0.30 | 1.24 | 0.018 | 0.018 | 0.37 | 0.007 | 1% |
| 20 | 3.00 | 1.10 | | | 0.007 | -0.002 | 1.0 | 3.15 | 2.85 | 0.30 | 1.10 | 0.003 | 0.003 | 0.33 | 0.001 | 0% |
| 21 | 2.70 | 0.97 | | | -0.002 | -0.017 | 1.0 | 2.85 | 2.55 | 0.30 | 0.97 | -0.010 | -0.010 | 0.29 | -0.003 | -1% |
| 22 | 2.40 | 0.90 | | | 0.002 | -0.007 | 1.0 | 2.55 | 2.05 | 0.50 | 0.90 | -0.003 | -0.003 | 0.45 | -0.001 | 0% |
| Right | 1.70 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.05 | 1.70 | 0.35 | 0.23 | -0.001 | -0.001 | 0.08 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.445 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.445 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 8.78 | (m ²) |
| Wetted Width: | 6.80 | (m) |
| Hydraulic Depth: | 1.292 | (m) |
| Mean Velocity: | 0.051 | (m/s) |
| Froude Number: | 0.014 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S33 - Muskeg River @ Aurora / Albian Boundary (474876 E, 6350204 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 23-Sep-10 |
| Data Entry Personnel: | DB | Date: | 27-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 2.171 |
| Battery (Main): | 14.5 |
| Battery (Aux): | - |
| Datalogger Clock: | 1035 |
| Laptop Clock: | 1034 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 5.7 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1030 |
| End Time (MST): | 1145 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Clear 10°C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.686 | 281.740 | 0.640 | 281.740 | - |
| Bench Mark 2: | Pipe with flagging | 0.978 | 281.740 | 0.934 | 281.740 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.687 | 280.739 | 1.642 | 280.738 | 280.739 |
| Transducer: | | 2.171 | 278.568 | 2.171 | 278.567 | 278.568 |
| Other: | | | | | | |

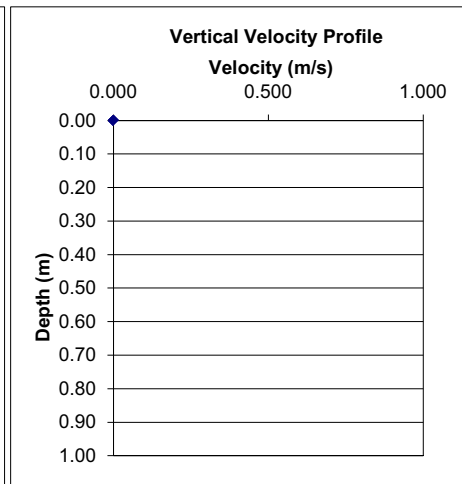
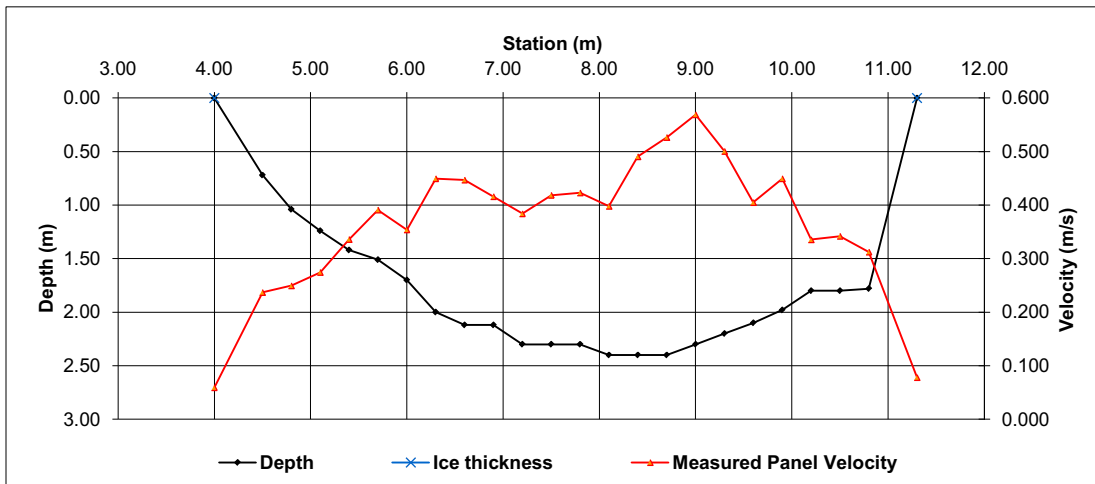
| | |
|--|--|
| General Notes: | |
| River near bankfull. TSS obtained at 8m. | |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | | |
|---------------------------------|---------------|--------------|-------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|------------------------|----------------------|------------------------|-------------------------------------|---|---|-------------------------------------|--|-----------------------------|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | |
| Right | 4.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 4.00 | 4.25 | 0.25 | 0.18 | 0.059 | 0.059 | 0.05 | 0.003 | 0% | | | |
| 1 | 4.50 | 0.72 | | 0.237 | | | 1.0 | 4.25 | 4.65 | 0.40 | 0.72 | 0.237 | 0.237 | 0.29 | 0.068 | 1% | | | |
| 2 | 4.80 | 1.04 | | | 0.195 | 0.304 | 1.0 | 4.65 | 4.95 | 0.30 | 1.04 | 0.250 | 0.250 | 0.31 | 0.078 | 1% | | | |
| 3 | 5.10 | 1.24 | | | 0.266 | 0.283 | 1.0 | 4.95 | 5.25 | 0.30 | 1.24 | 0.275 | 0.275 | 0.37 | 0.102 | 2% | | | |
| 4 | 5.40 | 1.42 | | | 0.336 | 0.336 | 1.0 | 5.25 | 5.55 | 0.30 | 1.42 | 0.336 | 0.336 | 0.43 | 0.143 | 3% | | | |
| 5 | 5.70 | 1.51 | | | 0.420 | 0.362 | 1.0 | 5.55 | 5.85 | 0.30 | 1.51 | 0.391 | 0.391 | 0.45 | 0.177 | 3% | | | |
| 6 | 6.00 | 1.70 | | | 0.348 | 0.360 | 1.0 | 5.85 | 6.15 | 0.30 | 1.70 | 0.354 | 0.354 | 0.51 | 0.181 | 3% | | | |
| 7 | 6.30 | 2.00 | | | 0.527 | 0.372 | 1.0 | 6.15 | 6.45 | 0.30 | 2.00 | 0.450 | 0.450 | 0.60 | 0.270 | 5% | | | |
| 8 | 6.60 | 2.12 | | | 0.500 | 0.394 | 1.0 | 6.45 | 6.75 | 0.30 | 2.12 | 0.447 | 0.447 | 0.64 | 0.284 | 5% | | | |
| 9 | 6.90 | 2.12 | | | 0.486 | 0.346 | 1.0 | 6.75 | 7.05 | 0.30 | 2.12 | 0.416 | 0.416 | 0.64 | 0.265 | 5% | | | |
| 10 | 7.20 | 2.30 | | | 0.421 | 0.347 | 1.0 | 7.05 | 7.35 | 0.30 | 2.30 | 0.384 | 0.384 | 0.69 | 0.265 | 5% | | | |
| 11 | 7.50 | 2.30 | | | 0.449 | 0.388 | 1.0 | 7.35 | 7.65 | 0.30 | 2.30 | 0.419 | 0.419 | 0.69 | 0.289 | 5% | | | |
| 12 | 7.80 | 2.30 | | | 0.502 | 0.344 | 1.0 | 7.65 | 7.95 | 0.30 | 2.30 | 0.423 | 0.423 | 0.69 | 0.292 | 6% | | | |
| 13 | 8.10 | 2.40 | | | 0.441 | 0.355 | 1.0 | 7.95 | 8.25 | 0.30 | 2.40 | 0.398 | 0.398 | 0.72 | 0.287 | 5% | | | |
| 14 | 8.40 | 2.40 | | | 0.523 | 0.458 | 1.0 | 8.25 | 8.55 | 0.30 | 2.40 | 0.491 | 0.491 | 0.72 | 0.353 | 7% | | | |
| 15 | 8.70 | 2.40 | | | 0.554 | 0.499 | 1.0 | 8.55 | 8.85 | 0.30 | 2.40 | 0.527 | 0.527 | 0.72 | 0.379 | 7% | | | |
| 16 | 9.00 | 2.30 | | | 0.630 | 0.508 | 1.0 | 8.85 | 9.15 | 0.30 | 2.30 | 0.569 | 0.569 | 0.69 | 0.393 | 7% | | | |
| 17 | 9.30 | 2.20 | | | 0.596 | 0.405 | 1.0 | 9.15 | 9.45 | 0.30 | 2.20 | 0.501 | 0.501 | 0.66 | 0.330 | 6% | | | |
| 18 | 9.60 | 2.10 | | | 0.498 | 0.312 | 1.0 | 9.45 | 9.75 | 0.30 | 2.10 | 0.405 | 0.405 | 0.63 | 0.255 | 5% | | | |
| 19 | 9.90 | 1.98 | | | 0.598 | 0.301 | 1.0 | 9.75 | 10.05 | 0.30 | 1.98 | 0.450 | 0.450 | 0.59 | 0.267 | 5% | | | |
| 20 | 10.20 | 1.80 | | | 0.524 | 0.147 | 1.0 | 10.05 | 10.35 | 0.30 | 1.80 | 0.336 | 0.336 | 0.54 | 0.181 | 3% | | | |
| 21 | 10.50 | 1.80 | | | 0.495 | 0.189 | 1.0 | 10.35 | 10.65 | 0.30 | 1.80 | 0.342 | 0.342 | 0.54 | 0.185 | 3% | | | |
| 22 | 10.80 | 1.78 | | | 0.423 | 0.202 | 1.0 | 10.65 | 11.05 | 0.40 | 1.78 | 0.313 | 0.313 | 0.71 | 0.223 | 4% | | | |
| Left | 11.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 11.05 | 11.30 | 0.25 | 0.45 | 0.078 | 0.078 | 0.11 | 0.009 | 0% | | | |
| Total Flow | | | | | | | | | | | | | | | 5.277 | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 5.277 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 12.99 | (m ²) |
| Wetted Width: | 7.30 | (m) |
| Hydraulic Depth: | 1.779 | (m) |
| Mean Velocity: | 0.406 | (m/s) |
| Froude Number: | 0.097 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S33 - Muskeg River @ Aurora / Albion Boundary (474876 E, 6350204 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 29-Oct-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.303 |
| Battery (Main): | 12.86 |
| Battery (Aux): | - |
| Datalogger Clock: | 944 |
| Laptop Clock: | 942 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 1.80 |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|--------------|
| Measurement Details: | |
| Start Time (MST): | 940 |
| End Time (MST): | 1050 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Overcast 1°C |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.604 | 281.740 | 0.583 | 281.740 | - |
| Bench Mark 2: | Pipe with flagging | 0.891 | 281.740 | 0.869 | 281.740 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.462 | 279.882 | 2.439 | 279.884 | 279.883 |
| Transducer: | | 1.303 | 278.579 | 1.303 | 278.581 | 278.580 |
| Other: | | | | | | |

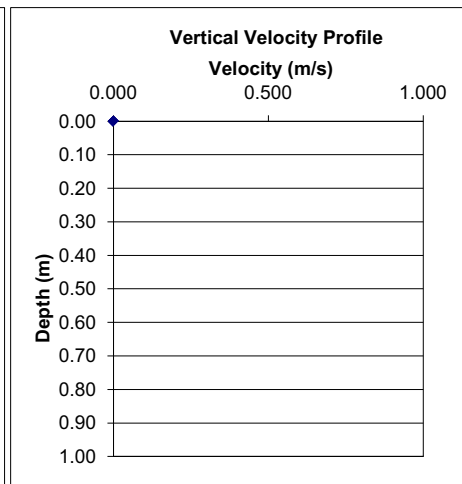
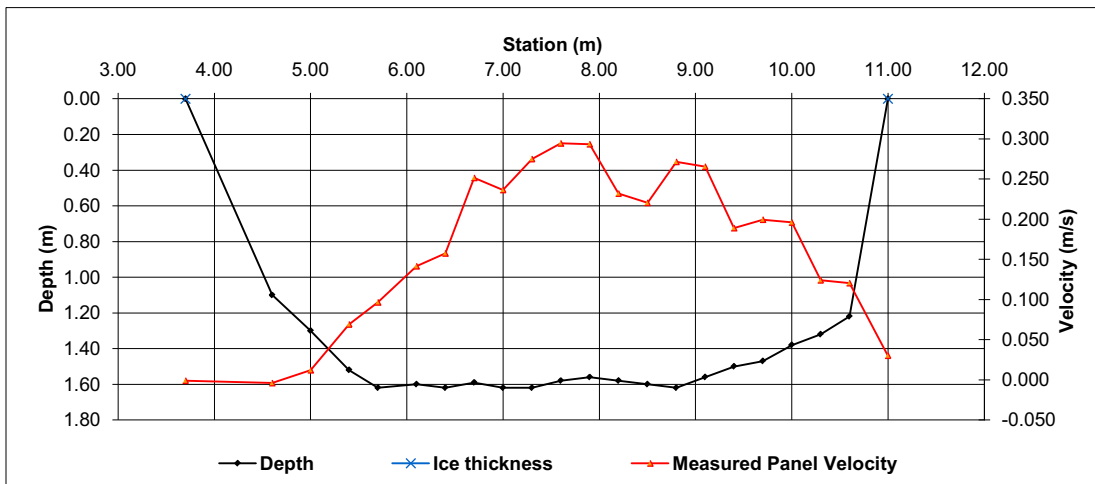
| | |
|-----------------------|--|
| General Notes: | |
| TSS @ 8m | |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 3.70 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.70 | 4.15 | 0.45 | 0.28 | -0.001 | -0.001 | 0.12 | 0.000 | 0% | |
| 1 | 4.60 | 1.10 | | | -0.023 | 0.015 | 1.0 | 4.15 | 4.80 | 0.65 | 1.10 | -0.004 | -0.004 | 0.72 | -0.003 | 0% | |
| 2 | 5.00 | 1.30 | | | 0.025 | -0.001 | 1.0 | 4.80 | 5.20 | 0.40 | 1.30 | 0.012 | 0.012 | 0.52 | 0.006 | 0% | |
| 3 | 5.40 | 1.52 | | | 0.056 | 0.082 | 1.0 | 5.20 | 5.55 | 0.35 | 1.52 | 0.069 | 0.069 | 0.53 | 0.037 | 2% | |
| 4 | 5.70 | 1.62 | | | 0.073 | 0.120 | 1.0 | 5.55 | 5.90 | 0.35 | 1.62 | 0.097 | 0.097 | 0.57 | 0.055 | 3% | |
| 5 | 6.10 | 1.60 | | | 0.126 | 0.157 | 1.0 | 5.90 | 6.25 | 0.35 | 1.60 | 0.142 | 0.142 | 0.56 | 0.079 | 5% | |
| 6 | 6.40 | 1.62 | | | 0.110 | 0.205 | 1.0 | 6.25 | 6.55 | 0.30 | 1.62 | 0.158 | 0.158 | 0.49 | 0.077 | 4% | |
| 7 | 6.70 | 1.59 | | | 0.276 | 0.227 | 1.0 | 6.55 | 6.85 | 0.30 | 1.59 | 0.252 | 0.252 | 0.48 | 0.120 | 7% | |
| 8 | 7.00 | 1.62 | | | 0.287 | 0.186 | 1.0 | 6.85 | 7.15 | 0.30 | 1.62 | 0.237 | 0.237 | 0.49 | 0.115 | 7% | |
| 9 | 7.30 | 1.62 | | | 0.316 | 0.234 | 1.0 | 7.15 | 7.45 | 0.30 | 1.62 | 0.275 | 0.275 | 0.49 | 0.134 | 8% | |
| 10 | 7.60 | 1.58 | | | 0.304 | 0.285 | 1.0 | 7.45 | 7.75 | 0.30 | 1.58 | 0.295 | 0.295 | 0.47 | 0.140 | 8% | |
| 11 | 7.90 | 1.56 | | | 0.306 | 0.281 | 1.0 | 7.75 | 8.05 | 0.30 | 1.56 | 0.294 | 0.294 | 0.47 | 0.137 | 8% | |
| 12 | 8.20 | 1.58 | | | 0.204 | 0.260 | 1.0 | 8.05 | 8.35 | 0.30 | 1.58 | 0.232 | 0.232 | 0.47 | 0.110 | 6% | |
| 13 | 8.50 | 1.60 | | | 0.181 | 0.260 | 1.0 | 8.35 | 8.65 | 0.30 | 1.60 | 0.221 | 0.221 | 0.48 | 0.106 | 6% | |
| 14 | 8.80 | 1.62 | | | 0.254 | 0.289 | 1.0 | 8.65 | 8.95 | 0.30 | 1.62 | 0.272 | 0.272 | 0.49 | 0.132 | 8% | |
| 15 | 9.10 | 1.56 | | | 0.265 | 0.266 | 1.0 | 8.95 | 9.25 | 0.30 | 1.56 | 0.266 | 0.266 | 0.47 | 0.124 | 7% | |
| 16 | 9.40 | 1.50 | | | 0.183 | 0.195 | 1.0 | 9.25 | 9.55 | 0.30 | 1.50 | 0.189 | 0.189 | 0.45 | 0.085 | 5% | |
| 17 | 9.70 | 1.47 | | | 0.195 | 0.204 | 1.0 | 9.55 | 9.85 | 0.30 | 1.47 | 0.200 | 0.200 | 0.44 | 0.088 | 5% | |
| 18 | 10.00 | 1.38 | | | 0.190 | 0.202 | 1.0 | 9.85 | 10.15 | 0.30 | 1.38 | 0.196 | 0.196 | 0.41 | 0.081 | 5% | |
| 19 | 10.30 | 1.32 | | | 0.080 | 0.168 | 1.0 | 10.15 | 10.45 | 0.30 | 1.32 | 0.124 | 0.124 | 0.40 | 0.049 | 3% | |
| 20 | 10.60 | 1.22 | | | 0.068 | 0.173 | 1.0 | 10.45 | 10.80 | 0.35 | 1.22 | 0.121 | 0.121 | 0.43 | 0.051 | 3% | |
| Right | 11.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 10.80 | 11.00 | 0.20 | 0.31 | 0.030 | 0.030 | 0.06 | 0.002 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 1.725 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 1.725 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 9.99 | (m ²) |
| Wetted Width: | 7.30 | (m) |
| Hydraulic Depth: | 1.369 | (m) |
| Mean Velocity: | 0.173 | (m/s) |
| Froude Number: | 0.047 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S33 - Muskeg River @ Aurora / Albion Boundary (474876 E, 6350204 N) | | | |
| Field Personnel: | SG, JO | Trip Date: | 03-Dec-10 |
| Data Entry Personnel: | DB | Date: | 09-Dec-10 |
| Data Check Personnel: | JP | Date: | 16-Dec-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.059 |
| Battery (Main): | 14.38 |
| Battery (Aux): | - |
| Datalogger Clock: | 11:53 |
| Laptop Clock: | 11:51 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-----------------|
| Measurement Details: | |
| Start Time (MST): | 1145 |
| End Time (MST): | - |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | - |
| Weather: | -11°C 6/8 cloud |

| Level Survey: | | | | | | |
|----------------------|--------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar in PVC pipe | 0.738 | 281.740 | 0.739 | 281.740 | - |
| Bench Mark 2: | Pipe with flagging | 1.008 | 281.740 | 1.012 | 281.740 | - |
| Top of Ice: | | 2.860 | 279.618 | 2.865 | 279.614 | 279.616 |
| Water Level: | | 2.830 | 279.648 | 2.831 | 279.648 | 279.648 |
| Transducer: | | 1.059 | 278.589 | 1.059 | 278.589 | 278.589 |
| Other: | | | | | | |

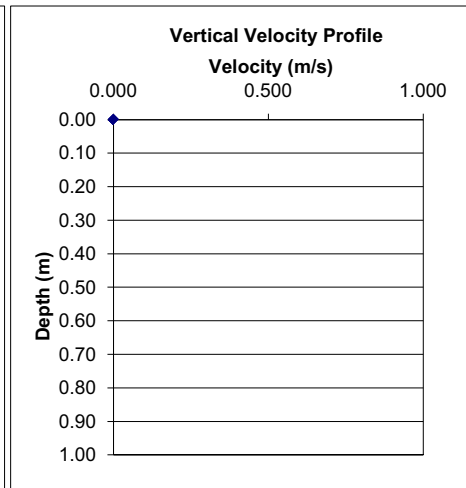
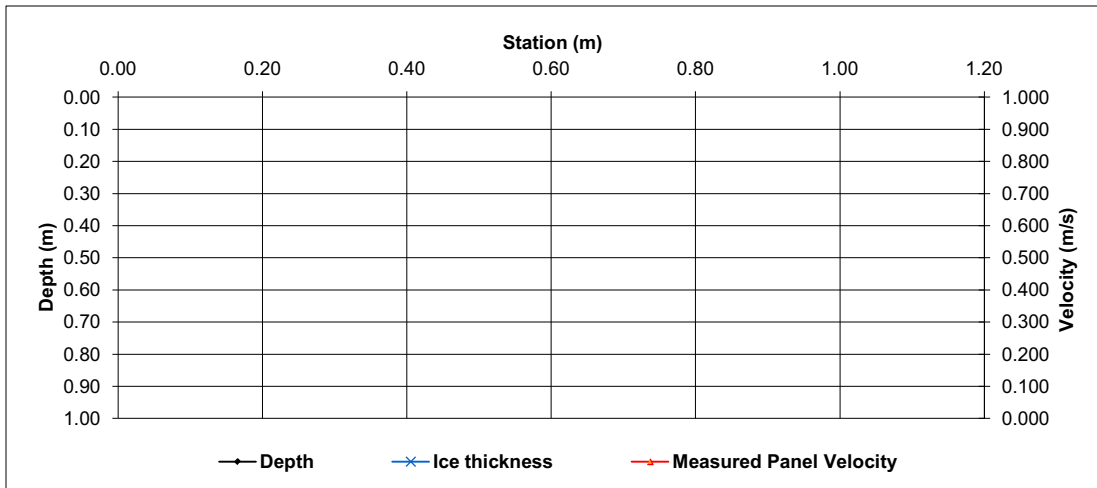
General Notes:

Ice thickness < 15cm. Survey discontinued.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | Total Flow NOT MEASURED | |

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | - | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S34 - Tar River above CNRL Lake (440712 E, 6361615 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 20-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.134 |
| Battery (Main): | 12.87 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1151 |
| Laptop Clock: | 1149 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.02 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1200 |
| End Time (MST): | NA |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | Overcast -5C |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging | 1.136 | 98.630 | 1.096 | 98.630 | - |
| Bench Mark 2: | Nail in base of logger tree | 1.196 | 98.656 | 1.156 | 98.630 | - |
| Top of Ice: | | 1.954 | 97.812 | 1.916 | 97.810 | 97.811 |
| Water Level: | | 2.991 | 96.775 | 2.952 | 96.774 | 96.775 |
| Transducer: | | 0.134 | 96.641 | 0.134 | 96.640 | 96.641 |
| Other: | | | | | | |

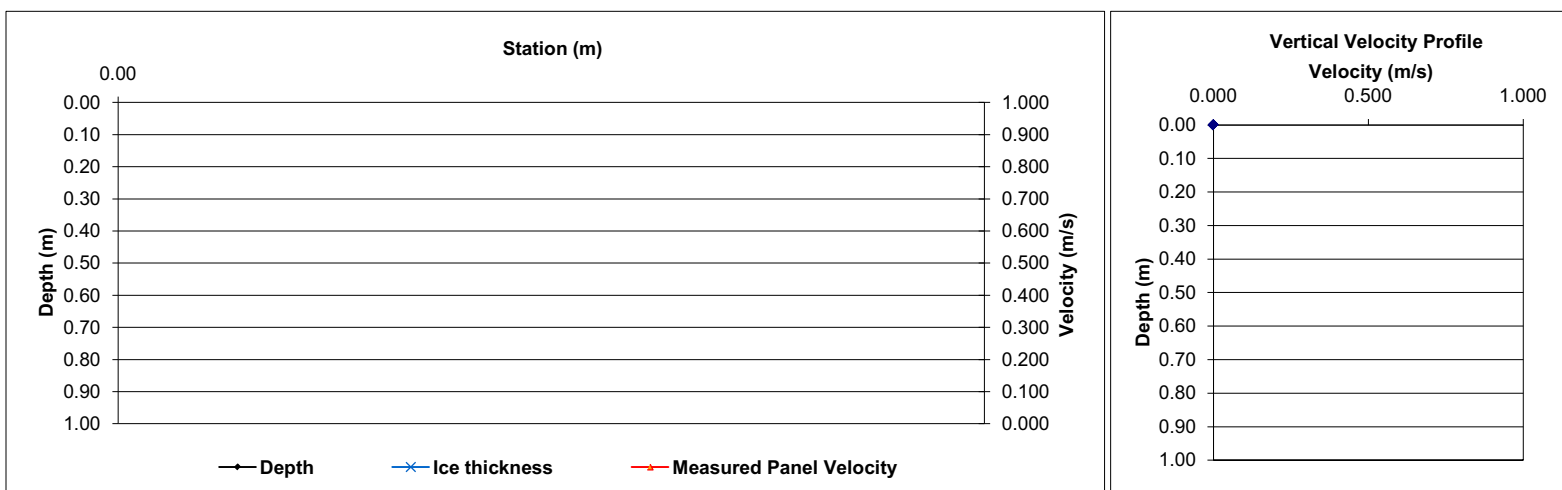
General Notes:

No Flow present only slush. Ice was in two layers over 40 cm of snow between layers.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | Total Flow NOT MEASURED | |

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S34 - Tar River above CNRL Lake (440712 E, 6361615 N) | | | |
| Field Personnel: | CE, GB | Trip Date: | 09-Feb-10 |
| Data Entry Personnel: | SG | Date: | 19-Feb-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.263 |
| Battery (Main): | 14.71 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1352 |
| Laptop Clock: | 1351 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | -0.02 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1400 |
| End Time (MST): | 1400 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | Overcast -5C |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging | 1.208 | 98.630 | 1.209 | 98.630 | - |
| Bench Mark 2: | Nail in base of logger tree | 1.256 | 98.656 | 1.255 | 98.630 | - |
| Top of Ice: | | 1.761 | 98.077 | 1.762 | 98.077 | 98.077 |
| Water Level: | | 2.961 | 96.877 | 2.962 | 96.877 | 96.877 |
| Transducer: | | 0.263 | 96.614 | 0.263 | 96.614 | 96.614 |
| Other: | | | | | | |

General Notes:

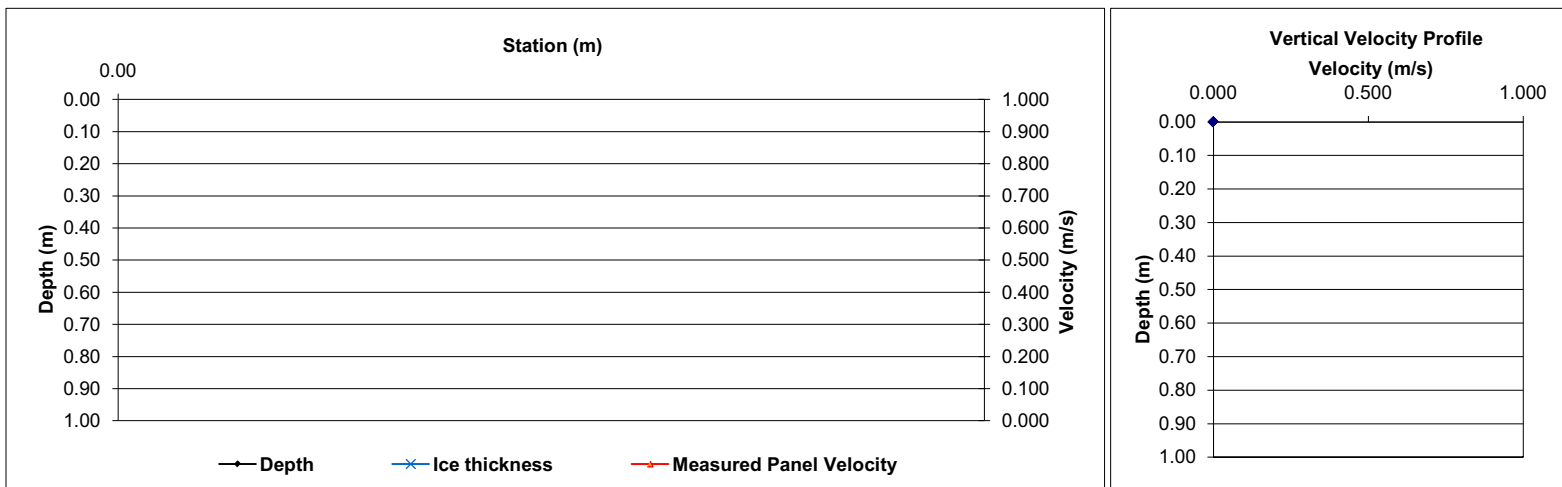
No Flow present only slush. Ice was in two layers over 40 cm of snow between layers.

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|--------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S34 - Tar River above CNRL Lake (440712 E, 6361615 N) | | | |
| Field Personnel: | SE, SG | Trip Date: | 06-Mar-10 |
| Data Entry Personnel: | SG | Date: | 18-Mar-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|--|-------|
| Logger Details: | |
| Transducer Reading: | 0.251 |
| Battery (Main): | 13.11 |
| Battery (Aux): | NA |
| Datalogger Clock: | 840 |
| Laptop Clock: | 839 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.01 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: Removed Antena and Modem to be installed at S15A | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 920 |
| End Time (MST): | 930 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Sunny 0°C |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging | 1.294 | 98.630 | 1.273 | 98.630 | - |
| Bench Mark 2: | Nail in base of logger tree | 1.347 | 98.656 | 1.327 | 98.630 | - |
| Top of Ice: | | 1.769 | 98.155 | 1.746 | 98.157 | 98.156 |
| Water Level: | | 3.074 | 96.850 | 3.049 | 96.854 | 96.852 |
| Transducer: | | 0.251 | 96.599 | 0.251 | 96.603 | 96.601 |
| Other: | | | | | | |

General Notes:

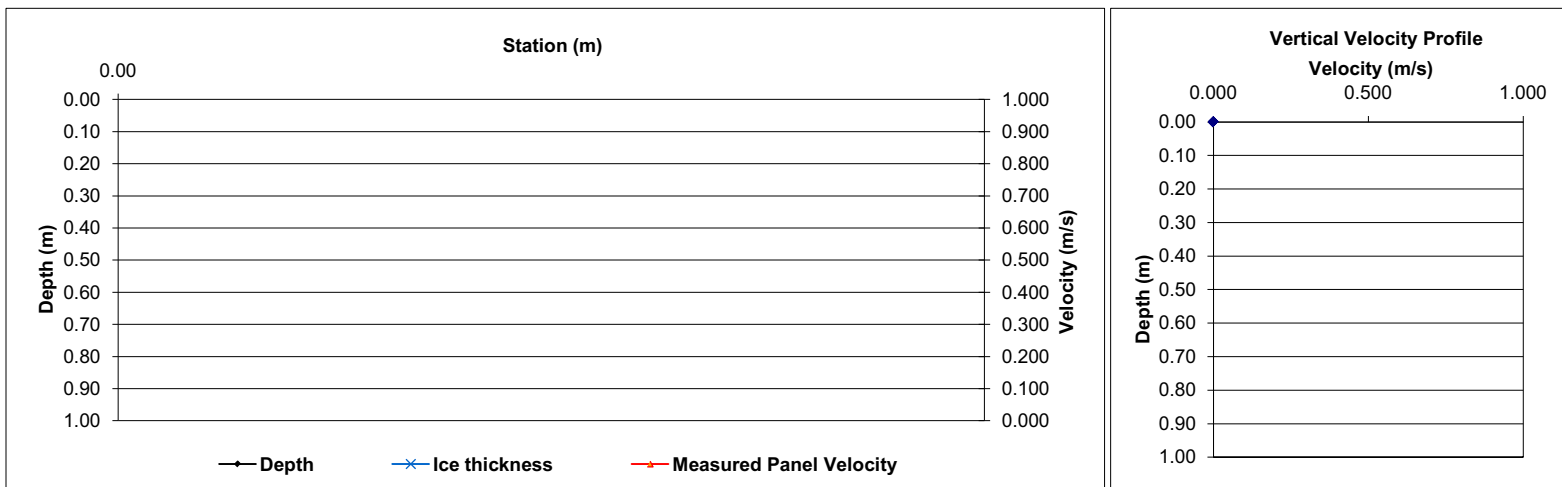
Could not conduct flow measurement. Ice was very thick and low water volume under ice.

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|--------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S34 - Tar River above CNRL Lake (440712 E, 6361615 N) | | | |
| Field Personnel: | SG DB | Trip Date: | 12-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|----------|
| Logger Details: | |
| Transducer Reading: | 1.501 |
| Battery (Main): | 14.42 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1020 |
| Laptop Clock: | 1020 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | -0.02 |
| Memory used: | NA |
| Dessicant: | Replaced |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1020 |
| End Time (MST): | 1030 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging | 1.437 | 98.630 | 1.448 | 98.630 | - |
| Bench Mark 2: | Nail in base of logger tree | 1.488 | 98.656 | 1.501 | 98.656 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.950 | 98.117 | 1.965 | 98.113 | 98.115 |
| Transducer: | | 1.501 | 96.616 | 1.501 | 96.612 | 96.614 |
| Other: | | | | | | |

General Notes:

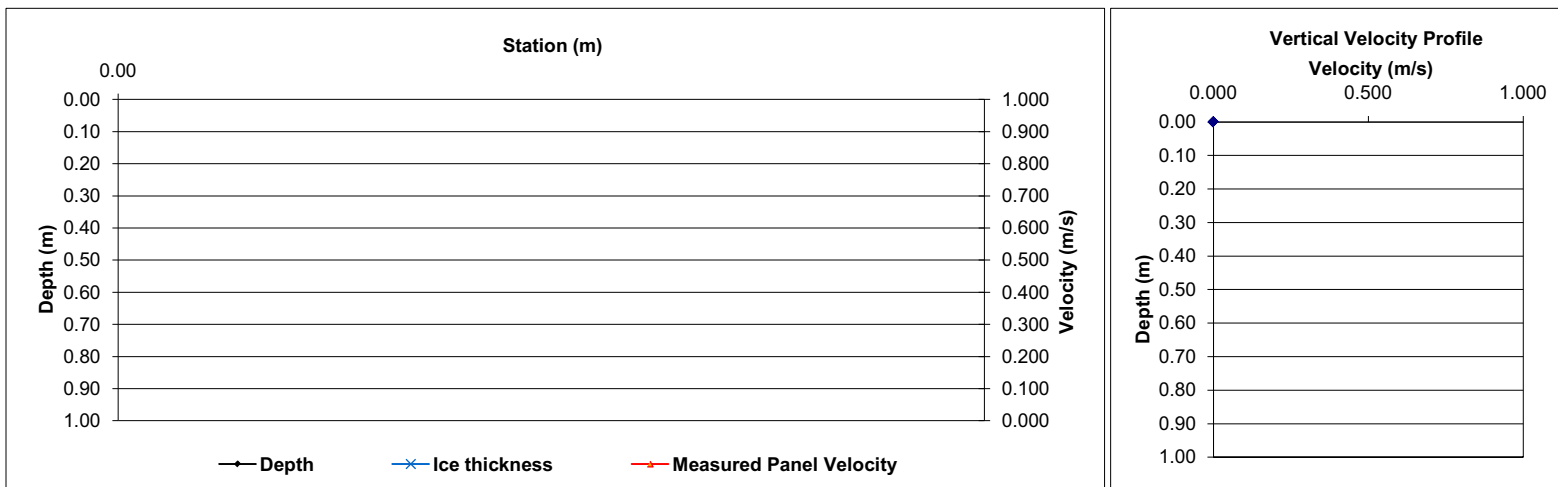
Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|--------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|----------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V. @Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S34 - Tar River above CNRL Lake (440712 E, 6361615 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 24-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------------------|
| Logger Details: | |
| Transducer Reading: | 1.03 |
| Battery (Main): | 14.75 |
| Battery (Aux): | NA |
| Datalogger Clock: | 4.22 |
| Laptop Clock: | 4.23 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.01 |
| Memory used: | NA |
| Dessicant: | Vent Tube changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1630 |
| End Time (MST): | 1650 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open (Ice further down) |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging | 1.145 | 98.630 | 1.115 | 98.630 | - |
| Bench Mark 2: | Nail in base of logger tree | 1.197 | 98.656 | 1.166 | 98.630 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.139 | 97.636 | 2.108 | 97.637 | 97.637 |
| Transducer: | | 1.03 | 96.606 | 1.03 | 96.607 | 96.607 |
| Other: | | | | | | |

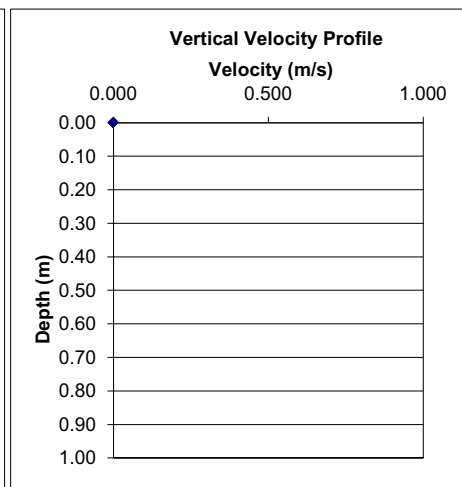
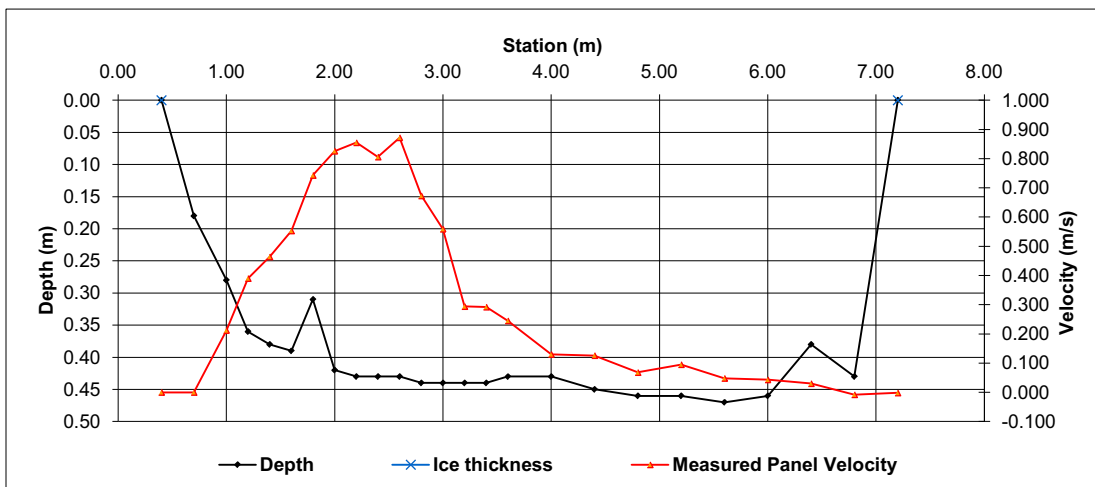
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.40 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.40 | 0.55 | 0.15 | 0.05 | 0.000 | 0.000 | 0.01 | 0.000 | 0% |
| 1 | 0.70 | 0.18 | | 0.000 | | | 1.0 | 0.55 | 0.85 | 0.30 | 0.18 | 0.000 | 0.000 | 0.05 | 0.000 | 0% |
| 2 | 1.00 | 0.28 | | 0.212 | | | 1.0 | 0.85 | 1.10 | 0.25 | 0.28 | 0.212 | 0.212 | 0.07 | 0.015 | 2% |
| 3 | 1.20 | 0.36 | | 0.390 | | | 1.0 | 1.10 | 1.30 | 0.20 | 0.36 | 0.390 | 0.390 | 0.07 | 0.028 | 4% |
| 4 | 1.40 | 0.38 | | 0.464 | | | 1.0 | 1.30 | 1.50 | 0.20 | 0.38 | 0.464 | 0.464 | 0.08 | 0.035 | 5% |
| 5 | 1.60 | 0.39 | | 0.553 | | | 1.0 | 1.50 | 1.70 | 0.20 | 0.39 | 0.553 | 0.553 | 0.08 | 0.043 | 6% |
| 6 | 1.80 | 0.31 | | 0.743 | | | 1.0 | 1.70 | 1.90 | 0.20 | 0.31 | 0.743 | 0.743 | 0.06 | 0.046 | 6% |
| 7 | 2.00 | 0.42 | | 0.826 | | | 1.0 | 1.90 | 2.10 | 0.20 | 0.42 | 0.826 | 0.826 | 0.08 | 0.069 | 9% |
| 8 | 2.20 | 0.43 | | 0.855 | | | 1.0 | 2.10 | 2.30 | 0.20 | 0.43 | 0.855 | 0.855 | 0.09 | 0.074 | 10% |
| 9 | 2.40 | 0.43 | | 0.806 | | | 1.0 | 2.30 | 2.50 | 0.20 | 0.43 | 0.806 | 0.806 | 0.09 | 0.069 | 9% |
| 10 | 2.60 | 0.43 | | 0.872 | | | 1.0 | 2.50 | 2.70 | 0.20 | 0.43 | 0.872 | 0.872 | 0.09 | 0.075 | 10% |
| 11 | 2.80 | 0.44 | | 0.673 | | | 1.0 | 2.70 | 2.90 | 0.20 | 0.44 | 0.673 | 0.673 | 0.09 | 0.059 | 8% |
| 12 | 3.00 | 0.44 | | 0.559 | | | 1.0 | 2.90 | 3.10 | 0.20 | 0.44 | 0.559 | 0.559 | 0.09 | 0.049 | 7% |
| 13 | 3.20 | 0.44 | | 0.294 | | | 1.0 | 3.10 | 3.30 | 0.20 | 0.44 | 0.294 | 0.294 | 0.09 | 0.026 | 3% |
| 14 | 3.40 | 0.44 | | 0.292 | | | 1.0 | 3.30 | 3.50 | 0.20 | 0.44 | 0.292 | 0.292 | 0.09 | 0.026 | 3% |
| 15 | 3.60 | 0.43 | | 0.245 | | | 1.0 | 3.50 | 3.80 | 0.30 | 0.43 | 0.245 | 0.245 | 0.13 | 0.032 | 4% |
| 16 | 4.00 | 0.43 | | 0.130 | | | 1.0 | 3.80 | 4.20 | 0.40 | 0.43 | 0.130 | 0.130 | 0.17 | 0.022 | 3% |
| 17 | 4.40 | 0.45 | | 0.126 | | | 1.0 | 4.20 | 4.60 | 0.40 | 0.45 | 0.126 | 0.126 | 0.18 | 0.023 | 3% |
| 18 | 4.80 | 0.46 | | 0.068 | | | 1.0 | 4.60 | 5.00 | 0.40 | 0.46 | 0.068 | 0.068 | 0.18 | 0.013 | 2% |
| 19 | 5.20 | 0.46 | | 0.095 | | | 1.0 | 5.00 | 5.40 | 0.40 | 0.46 | 0.095 | 0.095 | 0.18 | 0.017 | 2% |
| 20 | 5.60 | 0.47 | | 0.048 | | | 1.0 | 5.40 | 5.80 | 0.40 | 0.47 | 0.048 | 0.048 | 0.19 | 0.009 | 1% |
| 21 | 6.00 | 0.46 | | 0.043 | | | 1.0 | 5.80 | 6.20 | 0.40 | 0.46 | 0.043 | 0.043 | 0.18 | 0.008 | 1% |
| 22 | 6.40 | 0.38 | | 0.030 | | | 1.0 | 6.20 | 6.60 | 0.40 | 0.38 | 0.030 | 0.030 | 0.15 | 0.005 | 1% |
| 23 | 6.80 | 0.43 | | -0.008 | | | 1.0 | 6.60 | 7.00 | 0.40 | 0.43 | -0.008 | -0.008 | 0.17 | -0.001 | 0% |
| Right | 7.20 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 7.00 | 7.20 | 0.20 | 0.11 | -0.002 | -0.002 | 0.02 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.741 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.741 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 2.68 | (m ²) |
| Wetted Width: | 6.80 | (m) |
| Hydraulic Depth: | 0.394 | (m) |
| Mean Velocity: | 0.277 | (m/s) |
| Froude Number: | 0.141 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S34 - Tar River above CNRL Lake (440712 E, 6361615 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 26-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 16-Jul-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.31 |
| Battery (Main): | 14.22 |
| Battery (Aux): | 13.42 |
| Datalogger Clock: | 1618 |
| Laptop Clock: | 1619 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 15.64 |
| Memory used: | N/A |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1714 |
| End Time (MST): | 1740 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Partly Cloudy |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging | 1.214 | 98.630 | 1.206 | 98.630 | - |
| Bench Mark 2: | Nail in base of logger tree | 1.321 | 98.656 | 1.312 | 98.630 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.924 | 96.920 | 2.919 | 96.917 | 96.919 |
| Transducer: | | 0.31 | 96.610 | 0.31 | 96.607 | 96.609 |
| Other: | | | | | | |

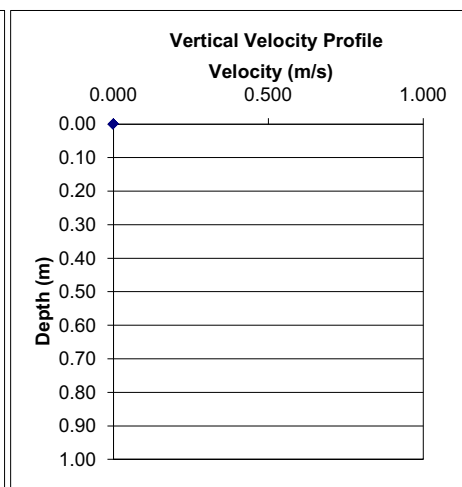
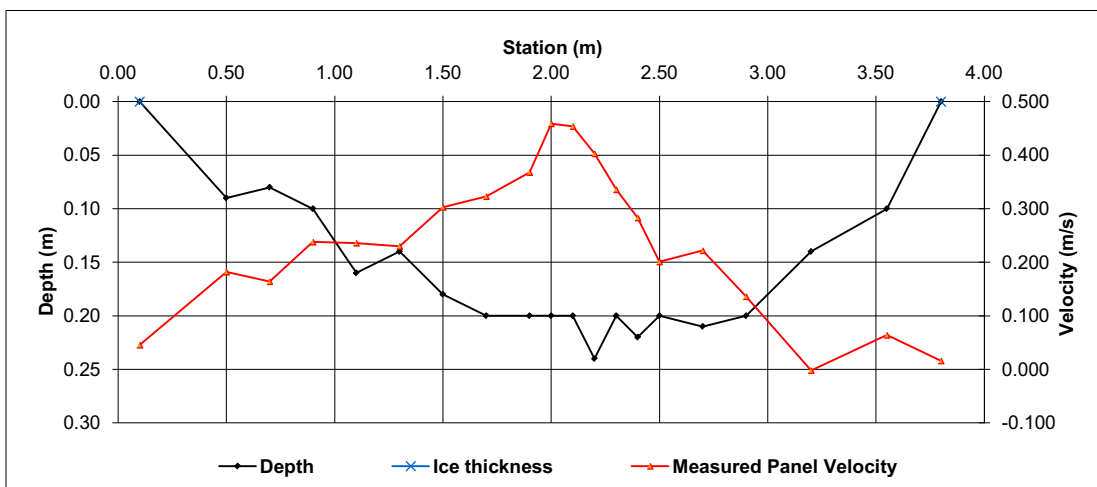
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.10 | 0.30 | 0.20 | 0.02 | 0.046 | 0.046 | 0.00 | 0.000 | 0% |
| 1 | 0.50 | 0.09 | | 0.182 | | | 1.0 | 0.30 | 0.60 | 0.30 | 0.09 | 0.182 | 0.182 | 0.03 | 0.005 | 4% |
| 2 | 0.70 | 0.08 | | 0.164 | | | 1.0 | 0.60 | 0.80 | 0.20 | 0.08 | 0.164 | 0.164 | 0.02 | 0.003 | 2% |
| 3 | 0.90 | 0.10 | | 0.238 | | | 1.0 | 0.80 | 1.00 | 0.20 | 0.10 | 0.238 | 0.238 | 0.02 | 0.005 | 4% |
| 4 | 1.10 | 0.16 | | 0.236 | | | 1.0 | 1.00 | 1.20 | 0.20 | 0.16 | 0.236 | 0.236 | 0.03 | 0.008 | 6% |
| 5 | 1.30 | 0.14 | | 0.230 | | | 1.0 | 1.20 | 1.40 | 0.20 | 0.14 | 0.230 | 0.230 | 0.03 | 0.006 | 5% |
| 6 | 1.50 | 0.18 | | 0.303 | | | 1.0 | 1.40 | 1.60 | 0.20 | 0.18 | 0.303 | 0.303 | 0.04 | 0.011 | 9% |
| 7 | 1.70 | 0.20 | | 0.323 | | | 1.0 | 1.60 | 1.80 | 0.20 | 0.20 | 0.323 | 0.323 | 0.04 | 0.013 | 10% |
| 8 | 1.90 | 0.20 | | 0.368 | | | 1.0 | 1.80 | 1.95 | 0.15 | 0.20 | 0.368 | 0.368 | 0.03 | 0.011 | 9% |
| 9 | 2.00 | 0.20 | | 0.459 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.20 | 0.459 | 0.459 | 0.02 | 0.009 | 7% |
| 10 | 2.10 | 0.20 | | 0.454 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.20 | 0.454 | 0.454 | 0.02 | 0.009 | 7% |
| 11 | 2.20 | 0.24 | | 0.403 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.24 | 0.403 | 0.403 | 0.02 | 0.010 | 8% |
| 12 | 2.30 | 0.20 | | 0.336 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.20 | 0.336 | 0.336 | 0.02 | 0.007 | 5% |
| 13 | 2.40 | 0.22 | | 0.283 | | | 1.0 | 2.35 | 2.45 | 0.10 | 0.22 | 0.283 | 0.283 | 0.02 | 0.006 | 5% |
| 14 | 2.50 | 0.20 | | 0.201 | | | 1.0 | 2.45 | 2.60 | 0.15 | 0.20 | 0.201 | 0.201 | 0.03 | 0.006 | 5% |
| 15 | 2.70 | 0.21 | | 0.222 | | | 1.0 | 2.60 | 2.80 | 0.20 | 0.21 | 0.222 | 0.222 | 0.04 | 0.009 | 7% |
| 16 | 2.90 | 0.20 | | 0.136 | | | 1.0 | 2.80 | 3.05 | 0.25 | 0.20 | 0.136 | 0.136 | 0.05 | 0.007 | 5% |
| 17 | 3.20 | 0.14 | | -0.002 | | | 1.0 | 3.05 | 3.38 | 0.33 | 0.14 | -0.002 | -0.002 | 0.05 | 0.000 | 0% |
| 18 | 3.55 | 0.10 | | 0.064 | | | 1.0 | 3.38 | 3.68 | 0.30 | 0.10 | 0.064 | 0.064 | 0.03 | 0.002 | 2% |
| Left | 3.80 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.68 | 3.80 | 0.13 | 0.03 | 0.016 | 0.016 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.126 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.126 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.54 | (m ²) |
| Wetted Width: | 3.70 | (m) |
| Hydraulic Depth: | 0.146 | (m) |
| Mean Velocity: | 0.234 | (m/s) |
| Froude Number: | 0.195 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|---------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S34 - Tar River above CNRL Lake (440712 E, 6361615 N) | | | |
| Field Personnel: | BL, SG, Jim (pilot) | Trip Date: | 13-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.281 |
| Battery (Main): | 14.29 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1515 |
| Laptop Clock: | 1517 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 17.21 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 1520 |
| End Time (MST): | 1540 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly 20°C |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging | 1.256 | 98.630 | 1.218 | 98.630 | - |
| Bench Mark 2: | Nail in base of logger tree | 1.372 | 98.656 | 1.337 | 98.630 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.980 | 96.906 | 2.944 | 96.904 | 96.905 |
| Transducer: | | 0.281 | 96.625 | 0.281 | 96.623 | 96.624 |
| Other: | | | | | | |

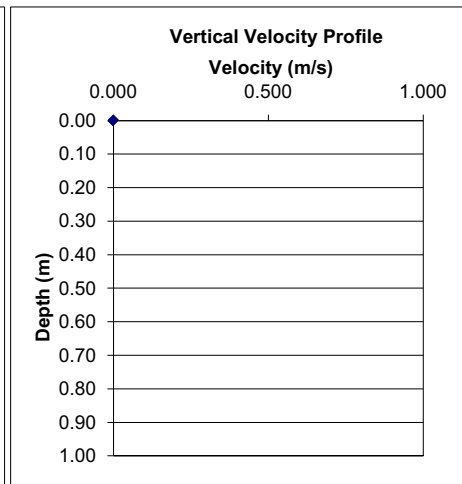
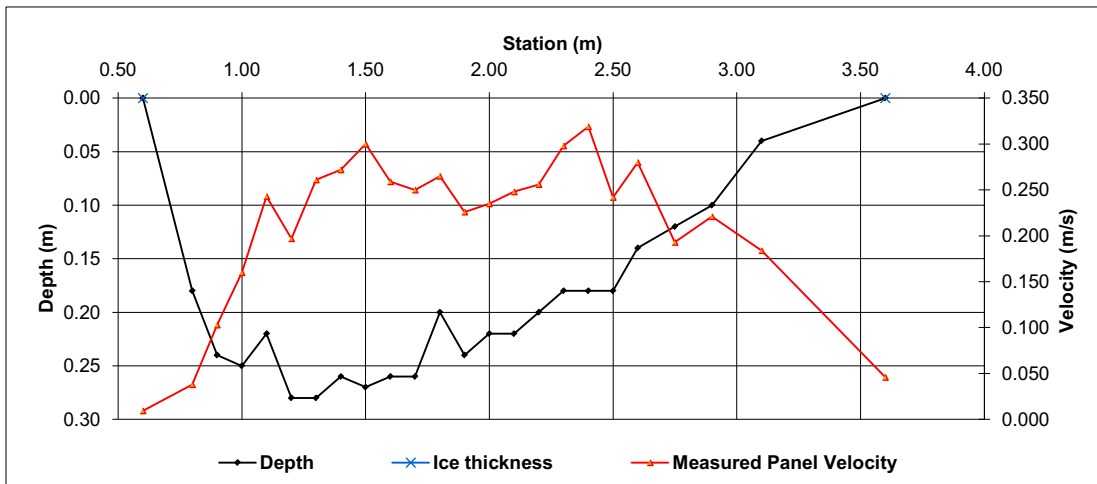
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.60 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.60 | 0.70 | 0.10 | 0.05 | 0.010 | 0.010 | 0.00 | 0.000 | 0% |
| 1 | 0.80 | 0.18 | | 0.038 | | | 1.0 | 0.70 | 0.85 | 0.15 | 0.18 | 0.038 | 0.038 | 0.03 | 0.001 | 1% |
| 2 | 0.90 | 0.24 | | 0.103 | | | 1.0 | 0.85 | 0.95 | 0.10 | 0.24 | 0.103 | 0.103 | 0.02 | 0.002 | 2% |
| 3 | 1.00 | 0.25 | | 0.160 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.25 | 0.160 | 0.160 | 0.03 | 0.004 | 4% |
| 4 | 1.10 | 0.22 | | 0.243 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.22 | 0.243 | 0.243 | 0.02 | 0.005 | 5% |
| 5 | 1.20 | 0.28 | | 0.197 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.28 | 0.197 | 0.197 | 0.03 | 0.006 | 5% |
| 6 | 1.30 | 0.28 | | 0.261 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.28 | 0.261 | 0.261 | 0.03 | 0.007 | 7% |
| 7 | 1.40 | 0.26 | | 0.272 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.26 | 0.272 | 0.272 | 0.03 | 0.007 | 6% |
| 8 | 1.50 | 0.27 | | 0.300 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.27 | 0.300 | 0.300 | 0.03 | 0.008 | 7% |
| 9 | 1.60 | 0.26 | | 0.259 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.26 | 0.259 | 0.259 | 0.03 | 0.007 | 6% |
| 10 | 1.70 | 0.26 | | 0.250 | | | 1.0 | 1.65 | 1.75 | 0.10 | 0.26 | 0.250 | 0.250 | 0.03 | 0.007 | 6% |
| 11 | 1.80 | 0.20 | | 0.265 | | | 1.0 | 1.75 | 1.85 | 0.10 | 0.20 | 0.265 | 0.265 | 0.02 | 0.005 | 5% |
| 12 | 1.90 | 0.24 | | 0.226 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.24 | 0.226 | 0.226 | 0.02 | 0.005 | 5% |
| 13 | 2.00 | 0.22 | | 0.235 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.22 | 0.235 | 0.235 | 0.02 | 0.005 | 5% |
| 14 | 2.10 | 0.22 | | 0.248 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.22 | 0.248 | 0.248 | 0.02 | 0.005 | 5% |
| 15 | 2.20 | 0.20 | | 0.256 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.20 | 0.256 | 0.256 | 0.02 | 0.005 | 5% |
| 16 | 2.30 | 0.18 | | 0.298 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.18 | 0.298 | 0.298 | 0.02 | 0.005 | 5% |
| 17 | 2.40 | 0.18 | | 0.319 | | | 1.0 | 2.35 | 2.45 | 0.10 | 0.18 | 0.319 | 0.319 | 0.02 | 0.006 | 5% |
| 18 | 2.50 | 0.18 | | 0.242 | | | 1.0 | 2.45 | 2.55 | 0.10 | 0.18 | 0.242 | 0.242 | 0.02 | 0.004 | 4% |
| 19 | 2.60 | 0.14 | | 0.280 | | | 1.0 | 2.55 | 2.68 | 0.13 | 0.14 | 0.280 | 0.280 | 0.02 | 0.005 | 4% |
| 20 | 2.75 | 0.12 | | 0.193 | | | 1.0 | 2.68 | 2.83 | 0.15 | 0.12 | 0.193 | 0.193 | 0.02 | 0.003 | 3% |
| 21 | 2.90 | 0.10 | | 0.221 | | | 1.0 | 2.83 | 3.00 | 0.18 | 0.10 | 0.221 | 0.221 | 0.02 | 0.004 | 3% |
| 22 | 3.10 | 0.04 | | 0.184 | | | 1.0 | 3.00 | 3.35 | 0.35 | 0.04 | 0.184 | 0.184 | 0.01 | 0.003 | 2% |
| Right | 3.60 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.35 | 3.60 | 0.25 | 0.01 | 0.046 | 0.046 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.111 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.111 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 0.50 | (m ²) |
| Wetted Width: | 3.00 | (m) |
| Hydraulic Depth: | 0.165 | (m) |
| Mean Velocity: | 0.224 | (m/s) |
| Froude Number: | 0.176 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S34 - Tar River above CNRL Lake (440712 E, 6361615 N) | | | |
| Field Personnel: | DB SG Matt (pilot) | Trip Date: | 20-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.469 |
| Battery (Main): | 14.63 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1439 |
| Laptop Clock: | 1438 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 5.83 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1435 |
| End Time (MST): | 1530 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast 10°C |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging | 1.086 | 98.630 | 1.062 | 98.630 | - |
| Bench Mark 2: | Nail in base of logger tree | 1.189 | 98.656 | 1.165 | 98.630 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.655 | 97.061 | 2.629 | 97.063 | 97.062 |
| Transducer: | | 0.469 | 96.592 | 0.469 | 96.594 | 96.593 |
| Other: | | | | | | |

| |
|-----------------------|
| General Notes: |
|-----------------------|

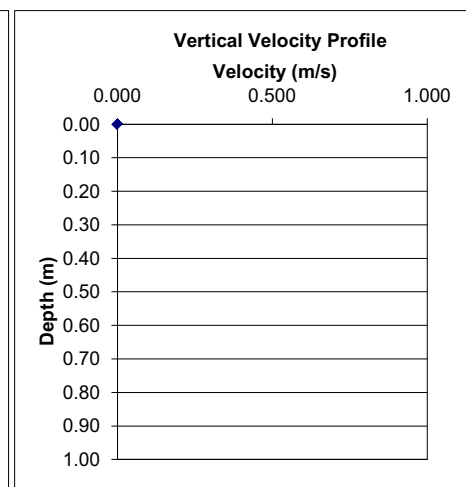
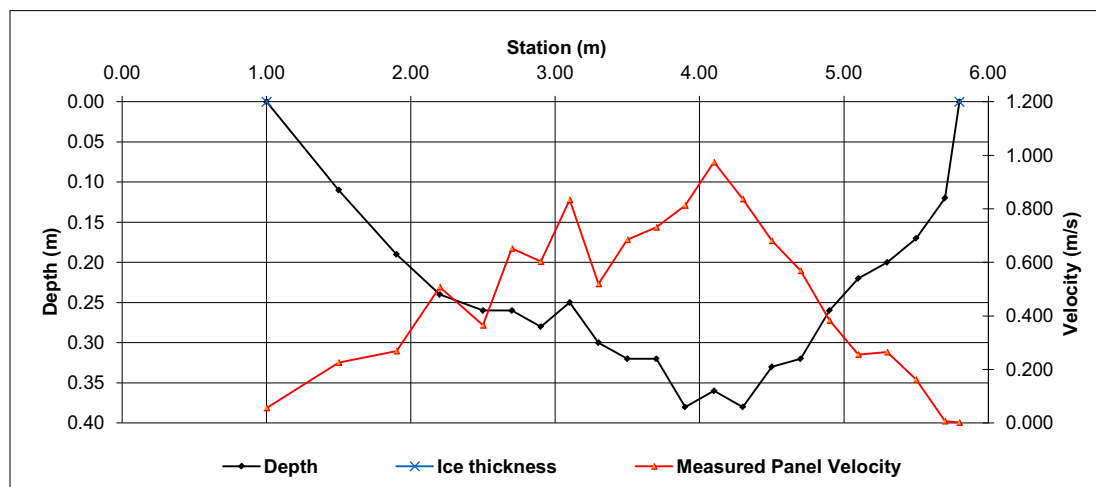
| Measured Data | | | | | | | Calculated Data | | | | | | | | | | |
|---------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 1.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.00 | 1.25 | 0.25 | 0.03 | 0.057 | 0.057 | 0.01 | 0.000 | 0% | |
| 1 | 1.50 | 0.11 | | 0.226 | | | 1.0 | 1.25 | 1.70 | 0.45 | 0.11 | 0.226 | 0.226 | 0.05 | 0.011 | 2% | |
| 2 | 1.90 | 0.19 | | 0.269 | | | 1.0 | 1.70 | 2.05 | 0.35 | 0.19 | 0.269 | 0.269 | 0.07 | 0.018 | 3% | |
| 3 | 2.20 | 0.24 | | 0.508 | | | 1.0 | 2.05 | 2.35 | 0.30 | 0.24 | 0.508 | 0.508 | 0.07 | 0.037 | 6% | |
| 4 | 2.50 | 0.26 | | 0.365 | | | 1.0 | 2.35 | 2.60 | 0.25 | 0.26 | 0.365 | 0.365 | 0.07 | 0.024 | 4% | |
| 5 | 2.70 | 0.26 | | 0.652 | | | 1.0 | 2.60 | 2.80 | 0.20 | 0.26 | 0.652 | 0.652 | 0.05 | 0.034 | 5% | |
| 6 | 2.90 | 0.28 | | 0.603 | | | 1.0 | 2.80 | 3.00 | 0.20 | 0.28 | 0.603 | 0.603 | 0.06 | 0.034 | 5% | |
| 7 | 3.10 | 0.25 | | 0.834 | | | 1.0 | 3.00 | 3.20 | 0.20 | 0.25 | 0.834 | 0.834 | 0.05 | 0.042 | 6% | |
| 8 | 3.30 | 0.30 | | 0.520 | | | 1.0 | 3.20 | 3.40 | 0.20 | 0.30 | 0.520 | 0.520 | 0.06 | 0.031 | 5% | |
| 9 | 3.50 | 0.32 | | 0.685 | | | 1.0 | 3.40 | 3.60 | 0.20 | 0.32 | 0.685 | 0.685 | 0.06 | 0.044 | 7% | |
| 10 | 3.70 | 0.32 | | 0.731 | | | 1.0 | 3.60 | 3.80 | 0.20 | 0.32 | 0.731 | 0.731 | 0.06 | 0.047 | 7% | |
| 11 | 3.90 | 0.38 | | 0.813 | | | 1.0 | 3.80 | 4.00 | 0.20 | 0.38 | 0.813 | 0.813 | 0.08 | 0.062 | 10% | |
| 12 | 4.10 | 0.36 | | 0.975 | | | 1.0 | 4.00 | 4.20 | 0.20 | 0.36 | 0.975 | 0.975 | 0.07 | 0.070 | 11% | |
| 13 | 4.30 | 0.38 | | 0.837 | | | 1.0 | 4.20 | 4.40 | 0.20 | 0.38 | 0.837 | 0.837 | 0.08 | 0.064 | 10% | |
| 14 | 4.50 | 0.33 | | 0.681 | | | 1.0 | 4.40 | 4.60 | 0.20 | 0.33 | 0.681 | 0.681 | 0.07 | 0.045 | 7% | |
| 15 | 4.70 | 0.32 | | 0.569 | | | 1.0 | 4.60 | 4.80 | 0.20 | 0.32 | 0.569 | 0.569 | 0.06 | 0.036 | 6% | |
| 16 | 4.90 | 0.26 | | 0.383 | | | 1.0 | 4.80 | 5.00 | 0.20 | 0.26 | 0.383 | 0.383 | 0.05 | 0.020 | 3% | |
| 17 | 5.10 | 0.22 | | 0.256 | | | 1.0 | 5.00 | 5.20 | 0.20 | 0.22 | 0.256 | 0.256 | 0.04 | 0.011 | 2% | |
| 18 | 5.30 | 0.20 | | 0.265 | | | 1.0 | 5.20 | 5.40 | 0.20 | 0.20 | 0.265 | 0.265 | 0.04 | 0.011 | 2% | |
| 19 | 5.50 | 0.17 | | 0.162 | | | 1.0 | 5.40 | 5.60 | 0.20 | 0.17 | 0.162 | 0.162 | 0.03 | 0.006 | 1% | |
| 20 | 5.70 | 0.12 | | 0.007 | | | 1.0 | 5.60 | 5.75 | 0.15 | 0.12 | 0.007 | 0.007 | 0.02 | 0.000 | 0% | |
| Left | 5.80 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 5.75 | 5.80 | 0.05 | 0.03 | 0.002 | 0.002 | 0.00 | 0.000 | 0% | |

*denotes position of TSS sample

Total Flow 0.645

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.645 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 1.15 | (m ²) |
| Wetted Width: | 4.80 | (m) |
| Hydraulic Depth: | 0.239 | (m) |
| Mean Velocity: | 0.561 | (m/s) |
| Froude Number: | 0.367 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S34 - Tar River above CNRL Lake (440712 E, 6361615 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 27-Oct-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|---|---------|
| Logger Details: | |
| Transducer Reading: | 0.375 |
| Battery (Main): | 14.40 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1522 |
| Laptop Clock: | 1520 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.30 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |
| PT under ice. Ice was broken to view position. Moved to reduce slack, so new offset | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1515 |
| End Time (MST): | 1600 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast ~0°C |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging | 1.179 | 98.630 | 1.168 | 98.630 | - |
| Bench Mark 2: | Nail in base of logger tree | 1.282 | 98.656 | 1.273 | 98.630 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.800 | 97.009 | 2.790 | 97.008 | 97.009 |
| Transducer: | | 0.375 | 96.634 | 0.375 | 96.633 | 96.634 |
| Other: | | | | | | |

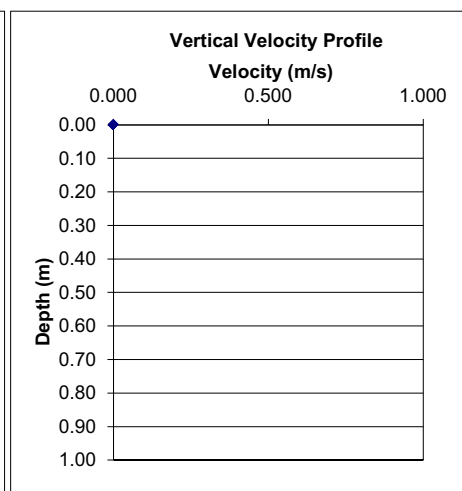
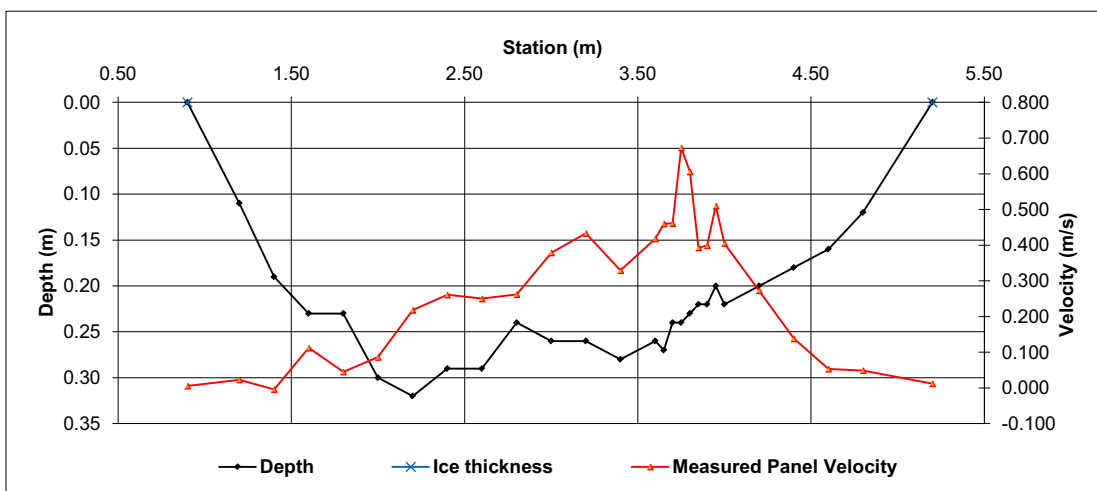
| | |
|---|--|
| General Notes: | |
| TSS @ 3.6. Flow was diverted around upstream ice. | |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 0.90 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.90 | 1.05 | 0.15 | 0.03 | 0.006 | 0.006 | 0.00 | 0.000 | 0% | |
| 1 | 1.20 | 0.11 | | 0.023 | | | 1.0 | 1.05 | 1.30 | 0.25 | 0.11 | 0.023 | 0.023 | 0.03 | 0.001 | 0% | |
| 2 | 1.40 | 0.19 | | -0.004 | | | 1.0 | 1.30 | 1.50 | 0.20 | 0.19 | -0.004 | -0.004 | 0.04 | 0.000 | 0% | |
| 3 | 1.60 | 0.23 | | 0.112 | | | 1.0 | 1.50 | 1.70 | 0.20 | 0.23 | 0.112 | 0.112 | 0.05 | 0.005 | 2% | |
| 4 | 1.80 | 0.23 | | 0.045 | | | 1.0 | 1.70 | 1.90 | 0.20 | 0.23 | 0.045 | 0.045 | 0.05 | 0.002 | 1% | |
| 5 | 2.00 | 0.30 | | 0.086 | | | 1.0 | 1.90 | 2.10 | 0.20 | 0.30 | 0.086 | 0.086 | 0.06 | 0.005 | 2% | |
| 6 | 2.20 | 0.32 | | 0.218 | | | 1.0 | 2.10 | 2.30 | 0.20 | 0.32 | 0.218 | 0.218 | 0.06 | 0.014 | 7% | |
| 7 | 2.40 | 0.29 | | 0.261 | | | 1.0 | 2.30 | 2.50 | 0.20 | 0.29 | 0.261 | 0.261 | 0.06 | 0.015 | 7% | |
| 8 | 2.60 | 0.29 | | 0.250 | | | 1.0 | 2.50 | 2.70 | 0.20 | 0.29 | 0.250 | 0.250 | 0.06 | 0.015 | 7% | |
| 9 | 2.80 | 0.24 | | 0.262 | | | 1.0 | 2.70 | 2.90 | 0.20 | 0.24 | 0.262 | 0.262 | 0.05 | 0.013 | 6% | |
| 10 | 3.00 | 0.26 | | 0.379 | | | 1.0 | 2.90 | 3.10 | 0.20 | 0.26 | 0.379 | 0.379 | 0.05 | 0.020 | 9% | |
| 11 | 3.20 | 0.26 | | 0.433 | | | 1.0 | 3.10 | 3.30 | 0.20 | 0.26 | 0.433 | 0.433 | 0.05 | 0.023 | 10% | |
| 12 | 3.40 | 0.28 | | 0.329 | | | 1.0 | 3.30 | 3.50 | 0.20 | 0.28 | 0.329 | 0.329 | 0.06 | 0.018 | 9% | |
| 13 | 3.60 | 0.26 | | 0.418 | | | 1.0 | 3.50 | 3.63 | 0.13 | 0.26 | 0.418 | 0.418 | 0.03 | 0.014 | 6% | |
| 14 | 3.65 | 0.27 | | 0.460 | | | 1.0 | 3.63 | 3.68 | 0.05 | 0.27 | 0.460 | 0.460 | 0.01 | 0.006 | 3% | |
| 15 | 3.70 | 0.24 | | 0.461 | | | 1.0 | 3.68 | 3.73 | 0.05 | 0.24 | 0.461 | 0.461 | 0.01 | 0.006 | 3% | |
| 16 | 3.75 | 0.24 | | 0.673 | | | 1.0 | 3.73 | 3.78 | 0.05 | 0.24 | 0.673 | 0.673 | 0.01 | 0.008 | 4% | |
| 17 | 3.80 | 0.23 | | 0.606 | | | 1.0 | 3.78 | 3.83 | 0.05 | 0.23 | 0.606 | 0.606 | 0.01 | 0.007 | 3% | |
| 18 | 3.85 | 0.22 | | 0.393 | | | 1.0 | 3.83 | 3.88 | 0.05 | 0.22 | 0.393 | 0.393 | 0.01 | 0.004 | 2% | |
| 19 | 3.90 | 0.22 | | 0.399 | | | 1.0 | 3.88 | 3.93 | 0.05 | 0.22 | 0.399 | 0.399 | 0.01 | 0.004 | 2% | |
| 20 | 3.95 | 0.20 | | 0.510 | | | 1.0 | 3.93 | 3.98 | 0.05 | 0.20 | 0.510 | 0.510 | 0.01 | 0.005 | 2% | |
| 21 | 4.00 | 0.22 | | 0.405 | | | 1.0 | 3.98 | 4.10 | 0.13 | 0.22 | 0.405 | 0.405 | 0.03 | 0.011 | 5% | |
| 22 | 4.20 | 0.20 | | 0.273 | | | 1.0 | 4.10 | 4.30 | 0.20 | 0.20 | 0.273 | 0.273 | 0.04 | 0.011 | 5% | |
| 23 | 4.40 | 0.18 | | 0.138 | | | 1.0 | 4.30 | 4.50 | 0.20 | 0.18 | 0.138 | 0.138 | 0.04 | 0.005 | 2% | |
| 24 | 4.60 | 0.16 | | 0.053 | | | 1.0 | 4.50 | 4.70 | 0.20 | 0.16 | 0.053 | 0.053 | 0.03 | 0.002 | 1% | |
| 25 | 4.80 | 0.12 | | 0.049 | | | 1.0 | 4.70 | 5.00 | 0.30 | 0.12 | 0.049 | 0.049 | 0.04 | 0.002 | 1% | |
| Right | 5.20 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 5.00 | 5.20 | 0.20 | 0.03 | 0.012 | 0.012 | 0.01 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.214 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.214 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.90 | (m ²) |
| Wetted Width: | 4.30 | (m) |
| Hydraulic Depth: | 0.209 | (m) |
| Mean Velocity: | 0.238 | (m/s) |
| Froude Number: | 0.166 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S34 - Tar River above CNRL Lake (440712 E, 6361615 N) | | | |
| Field Personnel: | SG, JO | Trip Date: | 04-Dec-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.468 |
| Battery (Main): | 15.3 |
| Battery (Aux): | - |
| Datalogger Clock: | 1421 |
| Laptop Clock: | 1419 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|------|
| Measurement Details: | |
| Start Time (MST): | 1415 |
| End Time (MST): | |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|-----------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Rebar w/flagging | 1.138 | 98.630 | 1.132 | 98.630 | - |
| Bench Mark 2: | Nail in base of logger tree | 1.252 | 98.656 | 1.249 | 98.630 | - |
| Top of Ice: | | 2.700 | 97.068 | 2.691 | 97.071 | 97.070 |
| Water Level: | | 2.629 | 97.139 | 2.622 | 97.140 | 97.140 |
| Transducer: | | 0.468 | 96.671 | 0.468 | 96.672 | 96.672 |
| Other: | | | | | | |

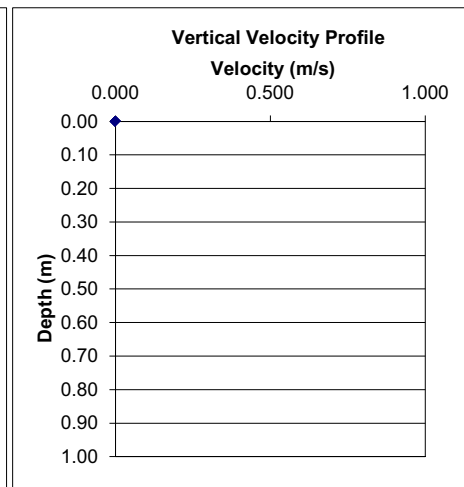
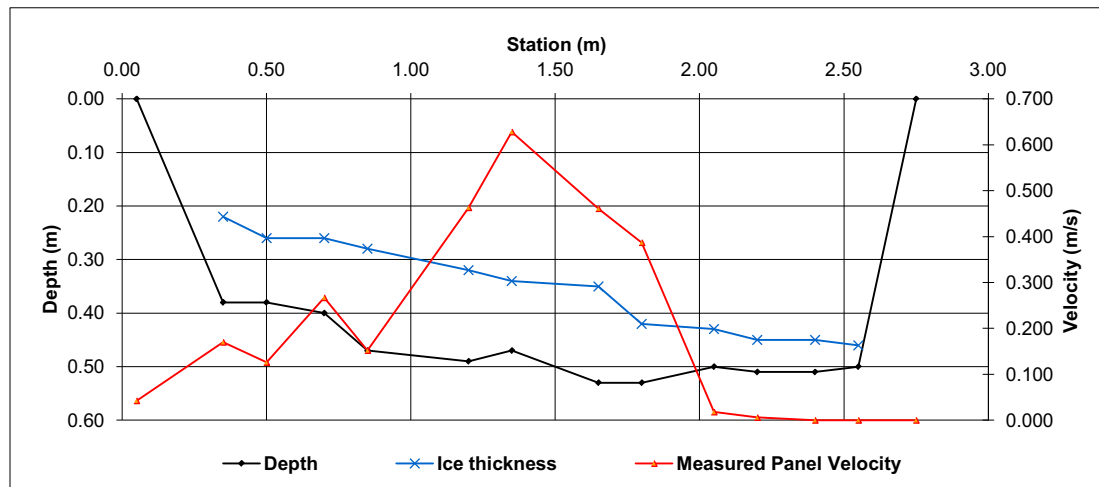
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.05 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 0.05 | 0.20 | 0.15 | 0.04 | 0.043 | 0.038 | 0.01 | 0.000 | 0% |
| 1 | 0.35 | 0.38 | 0.22 | 0.170 | | | 0.9 | 0.20 | 0.43 | 0.23 | 0.16 | 0.170 | 0.153 | 0.04 | 0.006 | 7% |
| 2 | 0.50 | 0.38 | 0.26 | 0.126 | | | 0.9 | 0.43 | 0.60 | 0.18 | 0.12 | 0.126 | 0.113 | 0.02 | 0.002 | 3% |
| 3 | 0.70 | 0.40 | 0.26 | 0.267 | | | 0.9 | 0.60 | 0.78 | 0.18 | 0.14 | 0.267 | 0.240 | 0.02 | 0.006 | 7% |
| 4 | 0.85 | 0.47 | 0.28 | 0.152 | | | 0.9 | 0.78 | 1.03 | 0.25 | 0.19 | 0.152 | 0.137 | 0.05 | 0.006 | 8% |
| 5 | 1.20 | 0.49 | 0.32 | 0.463 | | | 0.9 | 1.03 | 1.28 | 0.25 | 0.17 | 0.463 | 0.417 | 0.04 | 0.018 | 22% |
| 6 | 1.35 | 0.47 | 0.34 | 0.628 | | | 0.9 | 1.28 | 1.50 | 0.23 | 0.13 | 0.628 | 0.565 | 0.03 | 0.017 | 21% |
| 7 | 1.65 | 0.53 | 0.35 | 0.461 | | | 0.9 | 1.50 | 1.73 | 0.23 | 0.18 | 0.461 | 0.415 | 0.04 | 0.017 | 21% |
| 8 | 1.80 | 0.53 | 0.42 | 0.387 | | | 0.9 | 1.73 | 1.93 | 0.20 | 0.11 | 0.387 | 0.348 | 0.02 | 0.008 | 10% |
| 9 | 2.05 | 0.50 | 0.43 | 0.018 | | | 0.9 | 1.93 | 2.13 | 0.20 | 0.07 | 0.018 | 0.016 | 0.01 | 0.000 | 0% |
| 10 | 2.20 | 0.51 | 0.45 | 0.006 | | | 0.9 | 2.13 | 2.30 | 0.18 | 0.06 | 0.006 | 0.005 | 0.01 | 0.000 | 0% |
| 11 | 2.40 | 0.51 | 0.45 | 0.000 | | | 1.0 | 2.30 | 2.48 | 0.18 | 0.06 | 0.000 | 0.000 | 0.01 | 0.000 | 0% |
| 12 | 2.55 | 0.50 | 0.46 | 0.000 | | | 1.0 | 2.48 | 2.65 | 0.18 | 0.04 | 0.000 | 0.000 | 0.01 | 0.000 | 0% |
| Left | 2.75 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.65 | 2.75 | 0.10 | 0.01 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.079 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.079 | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | 0.31 | (m ²) |
| Wetted Width: | 2.70 | (m) |
| Hydraulic Depth: | 0.116 | (m) |
| Mean Velocity: | 0.255 | (m/s) |
| Froude Number: | 0.239 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S36 - McClelland Lake Outlet (490626 E, 6384064 N) | | | |
| Field Personnel: | SG DB | Trip Date: | 12-Apr-10 |
| Data Entry Personnel: | DB | Date: | 20-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|--------|
| Measurement Details: | |
| Start Time (MST): | 1200 |
| End Time (MST): | 1215 |
| Equipment: | - |
| Method: | - |
| River Condition: | Broken |
| Code ('Ice' or 'Open'): | - |
| Quality/Error (see reverse): | - |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|----------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree w/flagging | 1.538 | 100.000 | 1.501 | 100.000 | - |
| Bench Mark 2: | Pipe w/flagging 3mE of BM1 | 1.743 | 99.923 | 1.705 | 99.923 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.501 | 99.037 | 2.459 | 99.042 | 99.040 |
| Transducer: | | | | | | |
| Other: | | | | | | |

General Notes:

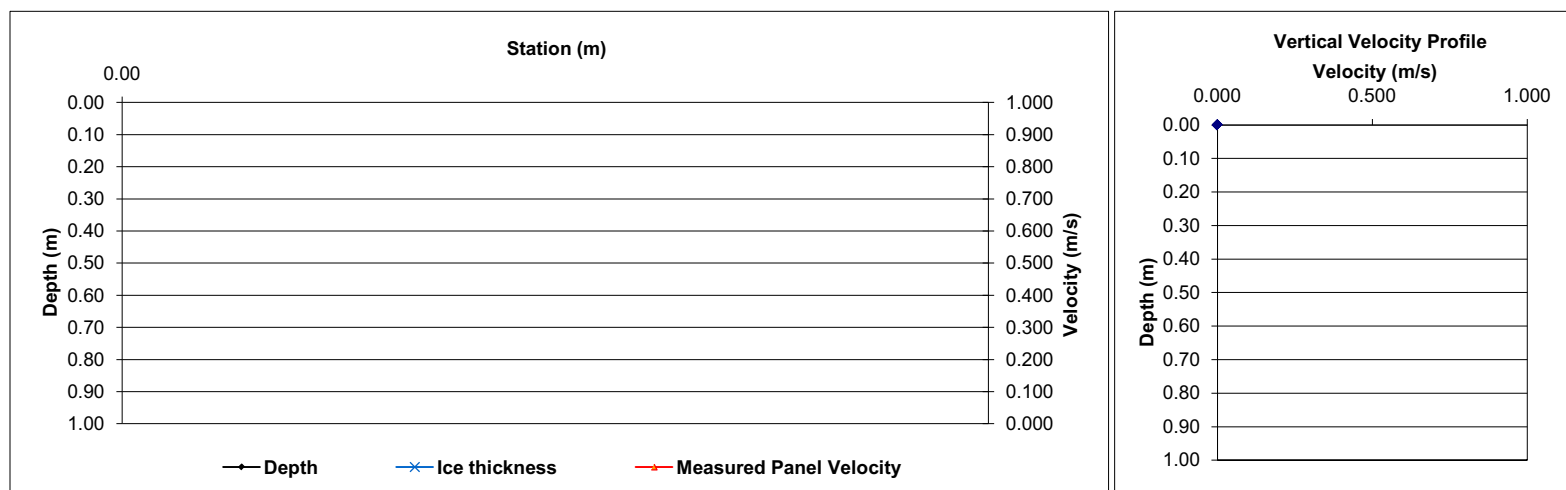
Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | Calculated Data | | | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | | | | | | | | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | | | | | | | | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURE | (m ³ /s) |
| Perceived Measurement Quality: | - | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Foude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S36 - McClelland Lake Outlet (490626 E, 6384064 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 24-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|--------------------------------------|--------|
| Logger Details: | |
| Transducer Reading: | 0.288 |
| Battery (Main): | 4.31 |
| Battery (Aux): | 14.84 |
| Datalogger Clock: | 956 |
| Laptop Clock: | 956 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 0% |
| Dessicant: | New |
| Logger# (if Δ): | 1810 |
| PT# (if Δ): | 602738 |
| Other Logger Notes: | |
| m = 1.4246631, b = -0.2129382 | |

| | |
|------------------------------|--------------|
| Measurement Details: | |
| Start Time (MST): | 1005 |
| End Time (MST): | 1025 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Overcast 0°C |

| Level Survey: | | | | | | |
|----------------------|----------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree w/flagging | 1.243 | 100.000 | 1.241 | 100.000 | - |
| Bench Mark 2: | Pipe w/flagging 3mE of BM1 | 1.450 | 99.923 | 1.449 | 99.923 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.174 | 99.069 | 2.173 | 99.068 | 99.069 |
| Transducer: | | 0.288 | 98.781 | 0.288 | 98.780 | 98.781 |
| Other: | | | | | | |

General Notes:

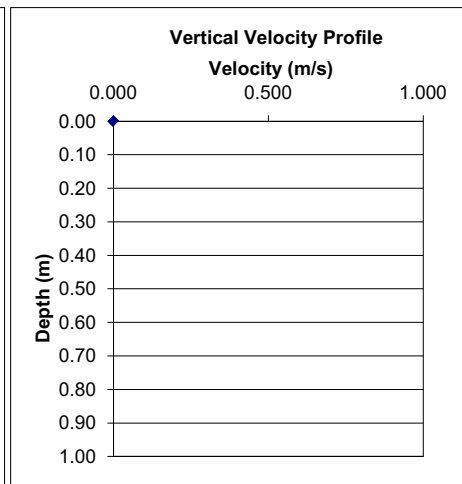
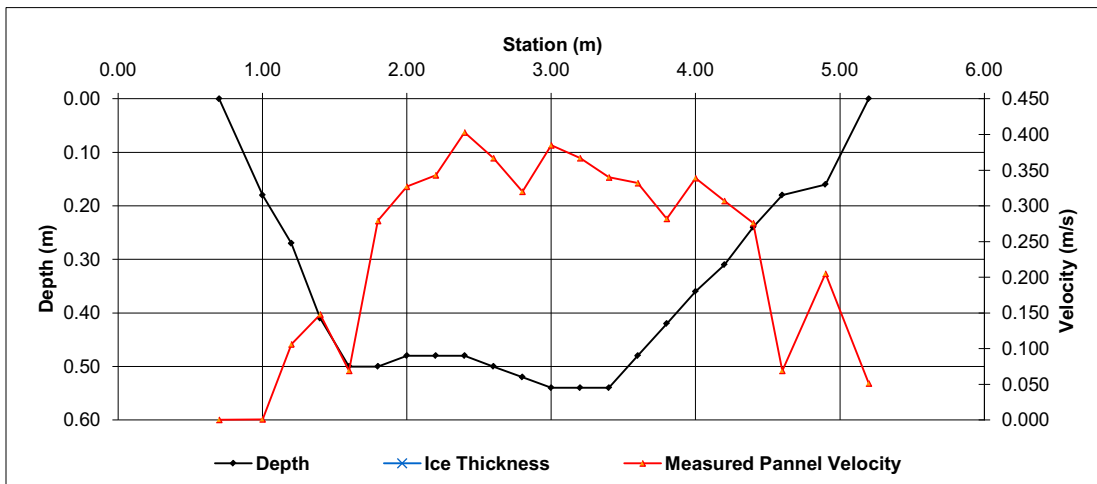
Measured Level above PT ~0.45 m. Calib coefficients double checked

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 0.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.70 | 0.85 | 0.15 | 0.05 | 0.000 | 0.000 | 0.01 | 0.000 | #DIV/0! | |
| 1 | 1.00 | 0.18 | | 0.001 | | | 1.0 | 0.85 | 1.10 | 0.25 | 0.18 | 0.001 | 0.001 | 0.05 | 0.000 | 0% | |
| 2 | 1.20 | 0.27 | | 0.106 | | | 1.0 | 1.10 | 1.30 | 0.20 | 0.27 | 0.106 | 0.106 | 0.05 | 0.006 | 1% | |
| 3 | 1.40 | 0.41 | | 0.148 | | | 1.0 | 1.30 | 1.50 | 0.20 | 0.41 | 0.148 | 0.148 | 0.08 | 0.012 | 3% | |
| 4 | 1.60 | 0.50 | | 0.069 | | | 1.0 | 1.50 | 1.70 | 0.20 | 0.50 | 0.069 | 0.069 | 0.10 | 0.007 | 1% | |
| 5 | 1.80 | 0.50 | | 0.279 | | | 1.0 | 1.70 | 1.90 | 0.20 | 0.50 | 0.279 | 0.279 | 0.10 | 0.028 | 6% | |
| 6 | 2.00 | 0.48 | | 0.327 | | | 1.0 | 1.90 | 2.10 | 0.20 | 0.48 | 0.327 | 0.327 | 0.10 | 0.031 | 7% | |
| 7 | 2.20 | 0.48 | | 0.343 | | | 1.0 | 2.10 | 2.30 | 0.20 | 0.48 | 0.343 | 0.343 | 0.10 | 0.033 | 7% | |
| 8 | 2.40 | 0.48 | | 0.403 | | | 1.0 | 2.30 | 2.50 | 0.20 | 0.48 | 0.403 | 0.403 | 0.10 | 0.039 | 8% | |
| 9 | 2.60 | 0.50 | | 0.367 | | | 1.0 | 2.50 | 2.70 | 0.20 | 0.50 | 0.367 | 0.367 | 0.10 | 0.037 | 8% | |
| 10 | 2.80 | 0.52 | | 0.320 | | | 1.0 | 2.70 | 2.90 | 0.20 | 0.52 | 0.320 | 0.320 | 0.10 | 0.033 | 7% | |
| 11 | 3.00 | 0.54 | | 0.385 | | | 1.0 | 2.90 | 3.10 | 0.20 | 0.54 | 0.385 | 0.385 | 0.11 | 0.042 | 9% | |
| 12 | 3.20 | 0.54 | | 0.367 | | | 1.0 | 3.10 | 3.30 | 0.20 | 0.54 | 0.367 | 0.367 | 0.11 | 0.040 | 8% | |
| 13 | 3.40 | 0.54 | | 0.340 | | | 1.0 | 3.30 | 3.50 | 0.20 | 0.54 | 0.340 | 0.340 | 0.11 | 0.037 | 8% | |
| 14 | 3.60 | 0.48 | | 0.332 | | | 1.0 | 3.50 | 3.70 | 0.20 | 0.48 | 0.332 | 0.332 | 0.10 | 0.032 | 7% | |
| 15 | 3.80 | 0.42 | | 0.282 | | | 1.0 | 3.70 | 3.90 | 0.20 | 0.42 | 0.282 | 0.282 | 0.08 | 0.024 | 5% | |
| 16 | 4.00 | 0.36 | | 0.339 | | | 1.0 | 3.90 | 4.10 | 0.20 | 0.36 | 0.339 | 0.339 | 0.07 | 0.024 | 5% | |
| 17 | 4.20 | 0.31 | | 0.307 | | | 1.0 | 4.10 | 4.30 | 0.20 | 0.31 | 0.307 | 0.307 | 0.06 | 0.019 | 4% | |
| 18 | 4.40 | 0.24 | | 0.276 | | | 1.0 | 4.30 | 4.50 | 0.20 | 0.24 | 0.276 | 0.276 | 0.05 | 0.013 | 3% | |
| 19 | 4.60 | 0.18 | | 0.069 | | | 1.0 | 4.50 | 4.75 | 0.25 | 0.18 | 0.069 | 0.069 | 0.05 | 0.003 | 1% | |
| 20 | 4.90 | 0.16 | | 0.205 | | | 1.0 | 4.75 | 5.05 | 0.30 | 0.16 | 0.205 | 0.205 | 0.05 | 0.010 | 2% | |
| Right | 5.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 5.05 | 5.20 | 0.15 | 0.04 | 0.051 | 0.051 | 0.01 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.469 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.469 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 1.66 | (m ²) |
| Wetted Width: | 4.50 | (m) |
| Hydraulic Depth: | 0.370 | (m) |
| Mean Velocity: | 0.282 | (m/s) |
| Foude Number: | 0.148 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S36 - McClelland Lake Outlet (490626 E, 6384064 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 24-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 16-Jul-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.411 |
| Battery (Main): | |
| Battery (Aux): | 4.42 |
| Datalogger Clock: | 14.23 |
| Laptop Clock: | 1211 |
| Air Temp: | 1214 |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 1% |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1230 |
| End Time (MST): | 1250 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Partly Cloudy |

| Level Survey: | | | | | | |
|----------------------|----------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree w/flagging | 0.914 | 100.000 | 0.904 | 100.000 | - |
| Bench Mark 2: | Pipe w/flagging 3mE of BM1 | 1.116 | 99.923 | 1.108 | 99.923 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 1.823 | 99.091 | 1.813 | 99.091 | 99.091 |
| Transducer: | | 0.411 | 98.680 | 0.411 | 98.680 | 98.680 |
| Other: | | | | | | |

General Notes:

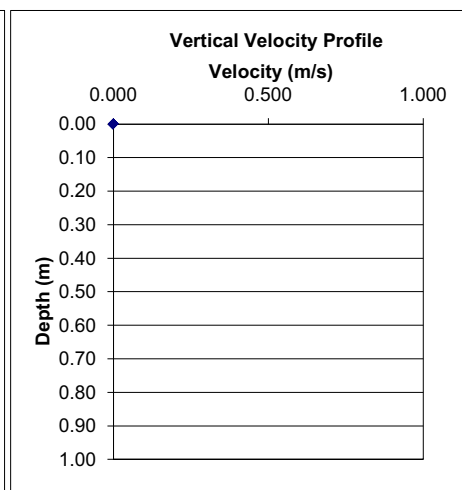
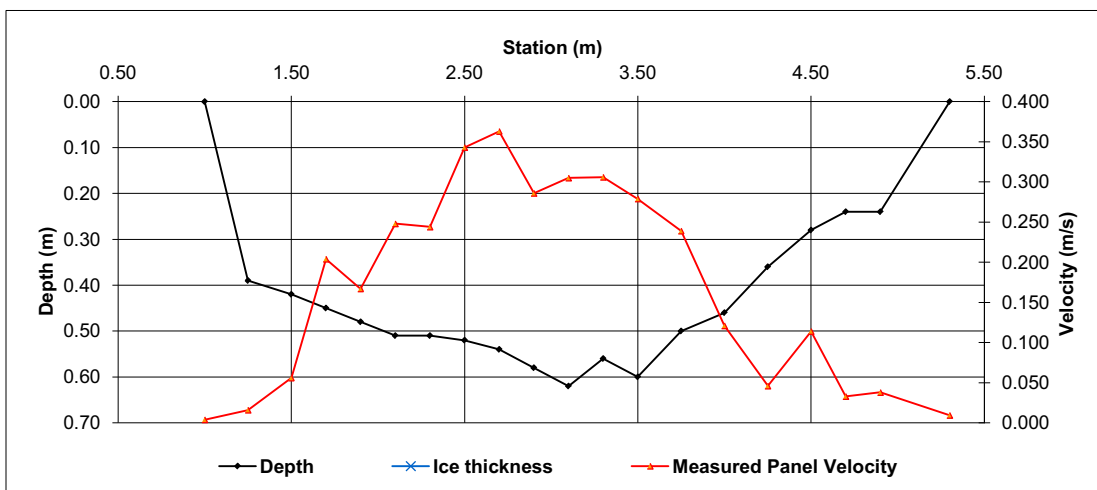
Water level gone up since April. Measured level above PT = 0.49

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 5.30 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 5.30 | 5.10 | 0.20 | 0.06 | 0.010 | 0.010 | 0.01 | 0.000 | 0% |
| 1 | 4.90 | 0.24 | | 0.038 | | | 1.0 | 5.10 | 4.80 | 0.30 | 0.24 | 0.038 | 0.038 | 0.07 | 0.003 | 1% |
| 2 | 4.70 | 0.24 | | 0.033 | | | 1.0 | 4.80 | 4.60 | 0.20 | 0.24 | 0.033 | 0.033 | 0.05 | 0.002 | 0% |
| 3 | 4.50 | 0.28 | | 0.114 | | | 1.0 | 4.60 | 4.38 | 0.23 | 0.28 | 0.114 | 0.114 | 0.06 | 0.007 | 2% |
| 4 | 4.25 | 0.36 | | 0.046 | | | 1.0 | 4.38 | 4.13 | 0.25 | 0.36 | 0.046 | 0.046 | 0.09 | 0.004 | 1% |
| 5 | 4.00 | 0.46 | | 0.121 | | | 1.0 | 4.13 | 3.88 | 0.25 | 0.46 | 0.121 | 0.121 | 0.12 | 0.014 | 4% |
| 6 | 3.75 | 0.50 | | 0.239 | | | 1.0 | 3.88 | 3.63 | 0.25 | 0.50 | 0.239 | 0.239 | 0.13 | 0.030 | 8% |
| 7 | 3.50 | 0.60 | | 0.279 | | | 1.0 | 3.63 | 3.40 | 0.23 | 0.60 | 0.279 | 0.279 | 0.14 | 0.038 | 10% |
| 8 | 3.30 | 0.56 | | 0.306 | | | 1.0 | 3.40 | 3.20 | 0.20 | 0.56 | 0.306 | 0.306 | 0.11 | 0.034 | 9% |
| 9 | 3.10 | 0.62 | | 0.305 | | | 1.0 | 3.20 | 3.00 | 0.20 | 0.62 | 0.305 | 0.305 | 0.12 | 0.038 | 10% |
| 10 | 2.90 | 0.58 | | 0.286 | | | 1.0 | 3.00 | 2.80 | 0.20 | 0.58 | 0.286 | 0.286 | 0.12 | 0.033 | 9% |
| 11 | 2.70 | 0.54 | | 0.363 | | | 1.0 | 2.80 | 2.60 | 0.20 | 0.54 | 0.363 | 0.363 | 0.11 | 0.039 | 11% |
| 12 | 2.50 | 0.52 | | 0.343 | | | 1.0 | 2.60 | 2.40 | 0.20 | 0.52 | 0.343 | 0.343 | 0.10 | 0.036 | 10% |
| 13 | 2.30 | 0.51 | | 0.244 | | | 1.0 | 2.40 | 2.20 | 0.20 | 0.51 | 0.244 | 0.244 | 0.10 | 0.025 | 7% |
| 14 | 2.10 | 0.51 | | 0.248 | | | 1.0 | 2.20 | 2.00 | 0.20 | 0.51 | 0.248 | 0.248 | 0.10 | 0.025 | 7% |
| 15 | 1.90 | 0.48 | | 0.167 | | | 1.0 | 2.00 | 1.80 | 0.20 | 0.48 | 0.167 | 0.167 | 0.10 | 0.016 | 4% |
| 16 | 1.70 | 0.45 | | 0.204 | | | 1.0 | 1.80 | 1.60 | 0.20 | 0.45 | 0.204 | 0.204 | 0.09 | 0.018 | 5% |
| 17 | 1.50 | 0.42 | | 0.056 | | | 1.0 | 1.60 | 1.38 | 0.23 | 0.42 | 0.056 | 0.056 | 0.09 | 0.005 | 1% |
| 18 | 1.25 | 0.39 | | 0.016 | | | 1.0 | 1.38 | 1.13 | 0.25 | 0.39 | 0.016 | 0.016 | 0.10 | 0.002 | 0% |
| Left | 1.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.13 | 1.00 | 0.13 | 0.10 | 0.004 | 0.004 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.369 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.369 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 1.82 | (m ²) |
| Wetted Width: | 3.98 | (m) |
| Hydraulic Depth: | 0.457 | (m) |
| Mean Velocity: | 0.203 | (m/s) |
| Foude Number: | 0.096 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|---------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S36 - McClelland Lake Outlet (490626 E, 6384064 N) | | | |
| Field Personnel: | BL, SG, Jim (pilot) | Trip Date: | 13-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.565 |
| Battery (Main): | 13.42 |
| Battery (Aux): | 4.41 |
| Datalogger Clock: | 840 |
| Laptop Clock: | 845 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 2% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| m = 1.424663, b = -0.2129382 | |

| | |
|------------------------------|---------|
| Measurement Details: | |
| Start Time (MST): | 850 |
| End Time (MST): | 920 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Raining |

| Level Survey: | | | | | | |
|----------------------|----------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree w/flagging | 1.297 | 100.000 | 1.221 | 100.000 | - |
| Bench Mark 2: | Pipe w/flagging 3mE of BM1 | 1.432 | 99.923 | 1.354 | 99.923 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.084 | 99.213 | 2.006 | 99.215 | 99.214 |
| Transducer: | | 0.565 | 98.648 | 0.565 | 98.650 | 98.649 |
| Other: | | | | | | |

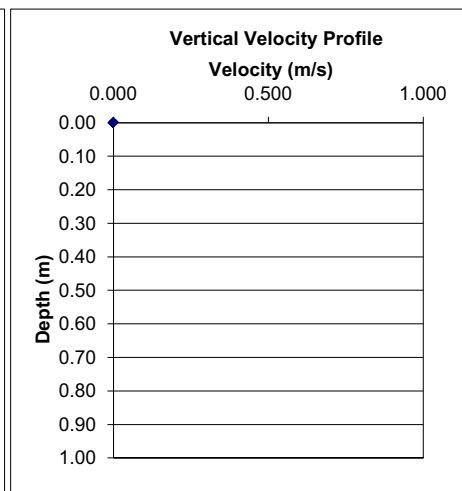
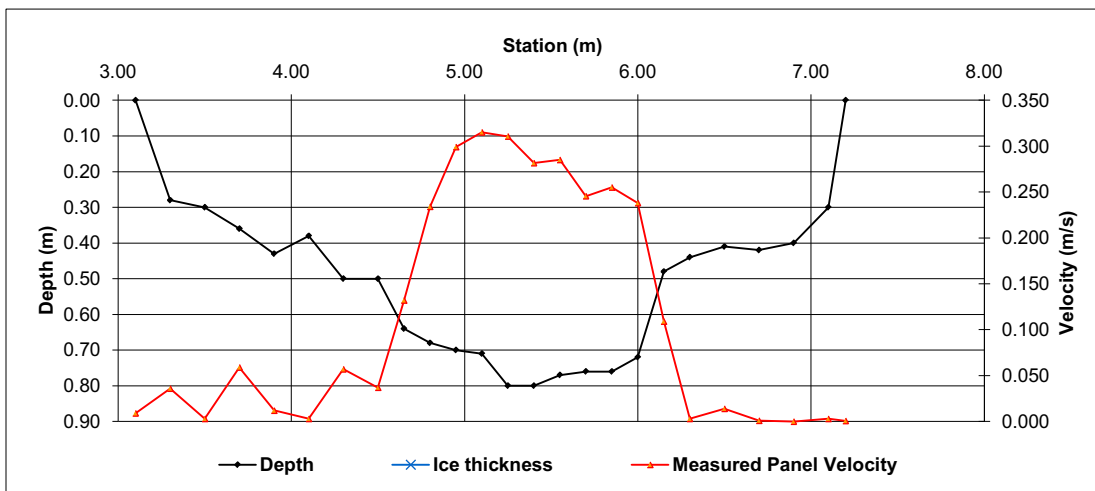
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 7.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 7.20 | 7.15 | 0.05 | 0.08 | 0.001 | 0.001 | 0.00 | 0.000 | 0% | |
| 1 | 7.10 | 0.30 | | 0.003 | | | 1.0 | 7.15 | 7.00 | 0.15 | 0.30 | 0.003 | 0.003 | 0.05 | 0.000 | 0% | |
| 2 | 6.90 | 0.40 | | 0.000 | | | 1.0 | 7.00 | 6.80 | 0.20 | 0.40 | 0.000 | 0.000 | 0.08 | 0.000 | 0% | |
| 3 | 6.70 | 0.42 | | 0.001 | | | 1.0 | 6.80 | 6.60 | 0.20 | 0.42 | 0.001 | 0.001 | 0.08 | 0.000 | 0% | |
| 4 | 6.50 | 0.41 | | 0.014 | | | 1.0 | 6.60 | 6.40 | 0.20 | 0.41 | 0.014 | 0.014 | 0.08 | 0.001 | 0% | |
| 5 | 6.30 | 0.44 | | 0.003 | | | 1.0 | 6.40 | 6.23 | 0.18 | 0.44 | 0.003 | 0.003 | 0.08 | 0.000 | 0% | |
| 6 | 6.15 | 0.48 | | 0.109 | | | 1.0 | 6.23 | 6.08 | 0.15 | 0.48 | 0.109 | 0.109 | 0.07 | 0.008 | 2% | |
| 7 | 6.00 | 0.72 | | 0.238 | | | 1.0 | 6.08 | 5.93 | 0.15 | 0.72 | 0.238 | 0.238 | 0.11 | 0.026 | 8% | |
| 8 | 5.85 | 0.76 | | 0.255 | | | 1.0 | 5.93 | 5.78 | 0.15 | 0.76 | 0.255 | 0.255 | 0.11 | 0.029 | 9% | |
| 9 | 5.70 | 0.76 | | | 0.262 | 0.229 | 1.0 | 5.78 | 5.63 | 0.15 | 0.76 | 0.246 | 0.246 | 0.11 | 0.028 | 9% | |
| 10 | 5.55 | 0.77 | | | 0.297 | 0.273 | 1.0 | 5.63 | 5.48 | 0.15 | 0.77 | 0.285 | 0.285 | 0.12 | 0.033 | 10% | |
| 11 | 5.40 | 0.80 | | | 0.295 | 0.268 | 1.0 | 5.48 | 5.33 | 0.15 | 0.80 | 0.282 | 0.282 | 0.12 | 0.034 | 11% | |
| 12 | 5.25 | 0.80 | | | 0.282 | 0.339 | 1.0 | 5.33 | 5.18 | 0.15 | 0.80 | 0.311 | 0.311 | 0.12 | 0.037 | 12% | |
| 13 | 5.10 | 0.71 | | 0.315 | | | 1.0 | 5.18 | 5.03 | 0.15 | 0.71 | 0.315 | 0.315 | 0.11 | 0.034 | 11% | |
| 14 | 4.95 | 0.70 | | 0.299 | | | 1.0 | 5.03 | 4.88 | 0.15 | 0.70 | 0.299 | 0.299 | 0.10 | 0.031 | 10% | |
| 15 | 4.80 | 0.68 | | 0.234 | | | 1.0 | 4.88 | 4.73 | 0.15 | 0.68 | 0.234 | 0.234 | 0.10 | 0.024 | 8% | |
| 16 | 4.65 | 0.64 | | 0.132 | | | 1.0 | 4.73 | 4.58 | 0.15 | 0.64 | 0.132 | 0.132 | 0.10 | 0.013 | 4% | |
| 17 | 4.50 | 0.50 | | 0.037 | | | 1.0 | 4.58 | 4.40 | 0.18 | 0.50 | 0.037 | 0.037 | 0.09 | 0.003 | 1% | |
| 18 | 4.30 | 0.50 | | 0.057 | | | 1.0 | 4.40 | 4.20 | 0.20 | 0.50 | 0.057 | 0.057 | 0.10 | 0.006 | 2% | |
| 19 | 4.10 | 0.38 | | 0.003 | | | 1.0 | 4.20 | 4.00 | 0.20 | 0.38 | 0.003 | 0.003 | 0.08 | 0.000 | 0% | |
| 20 | 3.90 | 0.43 | | 0.012 | | | 1.0 | 4.00 | 3.80 | 0.20 | 0.43 | 0.012 | 0.012 | 0.09 | 0.001 | 0% | |
| 21 | 3.70 | 0.36 | | 0.059 | | | 1.0 | 3.80 | 3.60 | 0.20 | 0.36 | 0.059 | 0.059 | 0.07 | 0.004 | 1% | |
| 22 | 3.50 | 0.30 | | 0.003 | | | 1.0 | 3.60 | 3.40 | 0.20 | 0.30 | 0.003 | 0.003 | 0.06 | 0.000 | 0% | |
| 23 | 3.30 | 0.28 | | 0.036 | | | 1.0 | 3.40 | 3.20 | 0.20 | 0.28 | 0.036 | 0.036 | 0.06 | 0.002 | 1% | |
| Right | 3.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.20 | 3.10 | 0.10 | 0.07 | 0.009 | 0.009 | 0.01 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.314 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.314 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 2.09 | (m ²) |
| Wetted Width: | 3.95 | (m) |
| Hydraulic Depth: | 0.529 | (m) |
| Mean Velocity: | 0.150 | (m/s) |
| Foude Number: | 0.066 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S36 - McClelland Lake Outlet (490626 E, 6384064 N) | | | |
| Field Personnel: | DB SG Matt (pilot) | Trip Date: | 15-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.605 |
| Battery (Main): | 14.05 |
| Battery (Aux): | 4.39 |
| Datalogger Clock: | 932 |
| Laptop Clock: | 938 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 3% |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 930 |
| End Time (MST): | 1015 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast 10°C |

| Level Survey: | | | | | | |
|----------------------|----------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree w/flagging | 1.117 | 100.000 | 1.094 | 100.000 | - |
| Bench Mark 2: | Pipe w/flagging 3mE of BM1 | 1.193 | 99.923 | 1.173 | 99.923 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 1.804 | 99.313 | 1.784 | 99.310 | 99.312 |
| Transducer: | | 0.605 | 98.708 | 0.605 | 98.705 | 98.707 |
| Other: | | | | | | |

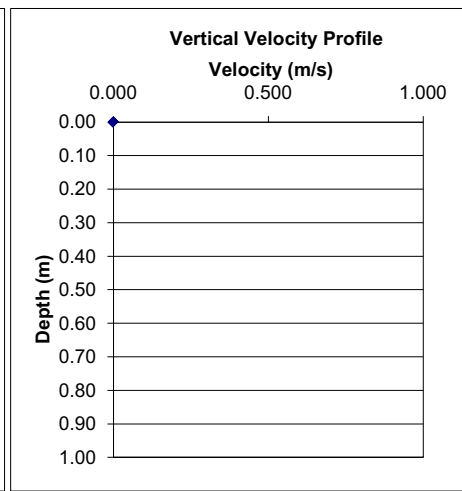
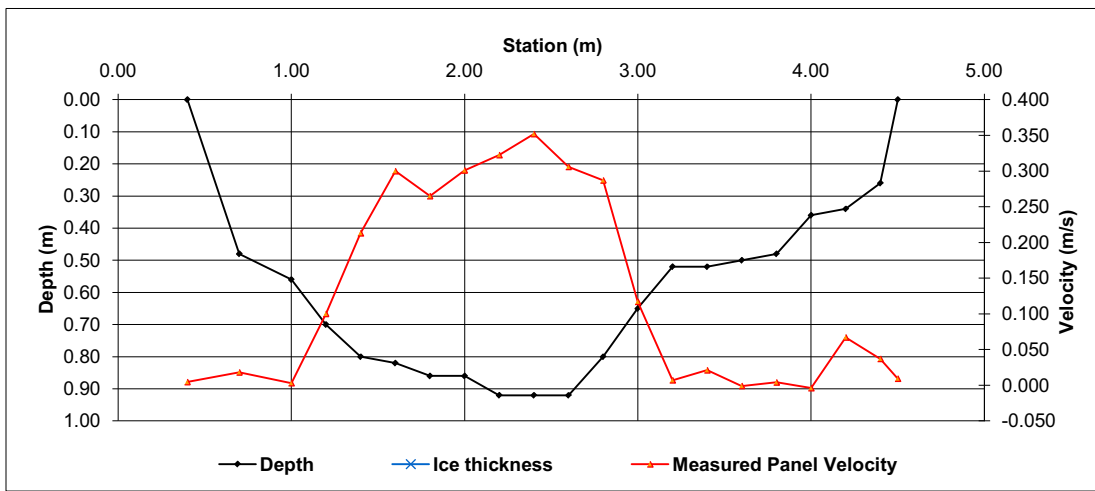
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 0.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.40 | 0.55 | 0.15 | 0.12 | 0.005 | 0.005 | 0.02 | 0.000 | 0% | |
| 1 | 0.70 | 0.48 | | 0.018 | | | 1.0 | 0.55 | 0.85 | 0.30 | 0.48 | 0.018 | 0.018 | 0.14 | 0.003 | 1% | |
| 2 | 1.00 | 0.56 | | 0.003 | | | 1.0 | 0.85 | 1.10 | 0.25 | 0.56 | 0.003 | 0.003 | 0.14 | 0.000 | 0% | |
| 3 | 1.20 | 0.70 | | 0.100 | | | 1.0 | 1.10 | 1.30 | 0.20 | 0.70 | 0.100 | 0.100 | 0.14 | 0.014 | 3% | |
| 4 | 1.40 | 0.80 | | | 0.148 | 0.278 | 1.0 | 1.30 | 1.50 | 0.20 | 0.80 | 0.213 | 0.213 | 0.16 | 0.034 | 8% | |
| 5 | 1.60 | 0.82 | | | 0.272 | 0.328 | 1.0 | 1.50 | 1.70 | 0.20 | 0.82 | 0.300 | 0.300 | 0.16 | 0.049 | 11% | |
| 6 | 1.80 | 0.86 | | | 0.276 | 0.254 | 1.0 | 1.70 | 1.90 | 0.20 | 0.86 | 0.265 | 0.265 | 0.17 | 0.046 | 10% | |
| 7 | 2.00 | 0.86 | | | 0.284 | 0.318 | 1.0 | 1.90 | 2.10 | 0.20 | 0.86 | 0.301 | 0.301 | 0.17 | 0.052 | 12% | |
| 8 | 2.20 | 0.92 | | | 0.282 | 0.363 | 1.0 | 2.10 | 2.30 | 0.20 | 0.92 | 0.323 | 0.323 | 0.18 | 0.059 | 13% | |
| 9 | 2.40 | 0.92 | | | 0.318 | 0.386 | 1.0 | 2.30 | 2.50 | 0.20 | 0.92 | 0.352 | 0.352 | 0.18 | 0.065 | 14% | |
| 10 | 2.60 | 0.92 | | | 0.233 | 0.379 | 1.0 | 2.50 | 2.70 | 0.20 | 0.92 | 0.306 | 0.306 | 0.18 | 0.056 | 13% | |
| 11 | 2.80 | 0.80 | | | 0.216 | 0.358 | 1.0 | 2.70 | 2.90 | 0.20 | 0.80 | 0.287 | 0.287 | 0.16 | 0.046 | 10% | |
| 12 | 3.00 | 0.65 | | 0.117 | | | 1.0 | 2.90 | 3.10 | 0.20 | 0.65 | 0.117 | 0.117 | 0.13 | 0.015 | 3% | |
| 13 | 3.20 | 0.52 | | 0.007 | | | 1.0 | 3.10 | 3.30 | 0.20 | 0.52 | 0.007 | 0.007 | 0.10 | 0.001 | 0% | |
| 14 | 3.40 | 0.52 | | 0.021 | | | 1.0 | 3.30 | 3.50 | 0.20 | 0.52 | 0.021 | 0.021 | 0.10 | 0.002 | 0% | |
| 15 | 3.60 | 0.50 | | -0.001 | | | 1.0 | 3.50 | 3.70 | 0.20 | 0.50 | -0.001 | -0.001 | 0.10 | 0.000 | 0% | |
| 16 | 3.80 | 0.48 | | 0.004 | | | 1.0 | 3.70 | 3.90 | 0.20 | 0.48 | 0.004 | 0.004 | 0.10 | 0.000 | 0% | |
| 17 | 4.00 | 0.36 | | -0.004 | | | 1.0 | 3.90 | 4.10 | 0.20 | 0.36 | -0.004 | -0.004 | 0.07 | 0.000 | 0% | |
| 18 | 4.20 | 0.34 | | 0.067 | | | 1.0 | 4.10 | 4.30 | 0.20 | 0.34 | 0.067 | 0.067 | 0.07 | 0.005 | 1% | |
| 19 | 4.40 | 0.26 | | 0.037 | | | 1.0 | 4.30 | 4.45 | 0.15 | 0.26 | 0.037 | 0.037 | 0.04 | 0.001 | 0% | |
| Right | 4.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.45 | 4.50 | 0.05 | 0.07 | 0.009 | 0.009 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.448 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.448 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 2.54 | (m ²) |
| Wetted Width: | 4.10 | (m) |
| Hydraulic Depth: | 0.619 | (m) |
| Mean Velocity: | 0.177 | (m/s) |
| Foude Number: | 0.072 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S36 - McClelland Lake Outlet (490626 E, 6384064 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 27-Oct-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|----------------------------------|----------|
| Logger Details: | |
| Transducer Reading: | 0.561506 |
| Battery (Main): | 13.44 |
| Battery (Aux): | 4.35 |
| Datalogger Clock: | 10.05 |
| Laptop Clock: | 10.12 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 2% |
| Dessicant: | Removed |
| Logger# (if Δ): | 1810 |
| PT# (if Δ): | - |
| Other Logger Notes: | |
| Manual depth of PT ~0.85m | |

| | |
|------------------------------|--------|
| Measurement Details: | |
| Start Time (MST): | 1010 |
| End Time (MST): | 1105 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Cloudy |

| Level Survey: | | | | | | |
|----------------------|----------------------------|----------|---------|----------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in tree w/flagging | 1.173 | 100.000 | 1.135 | 100.000 | - |
| Bench Mark 2: | Pipe w/flagging 3mE of BM1 | 1.248 | 99.923 | 1.210 | 99.923 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 1.898 | 99.275 | 1.858 | 99.277 | 99.276 |
| Transducer: | | 0.561506 | 98.713 | 0.561506 | 98.715 | 98.714 |
| Other: | | | | | | |

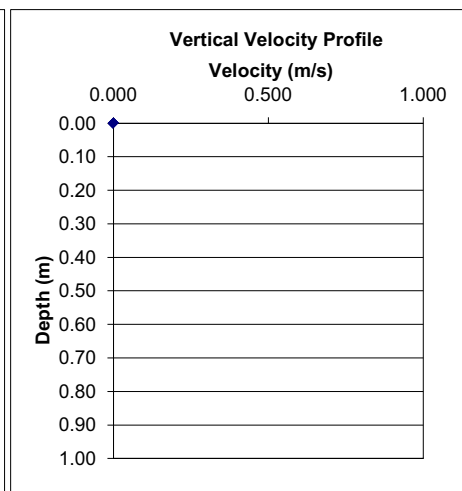
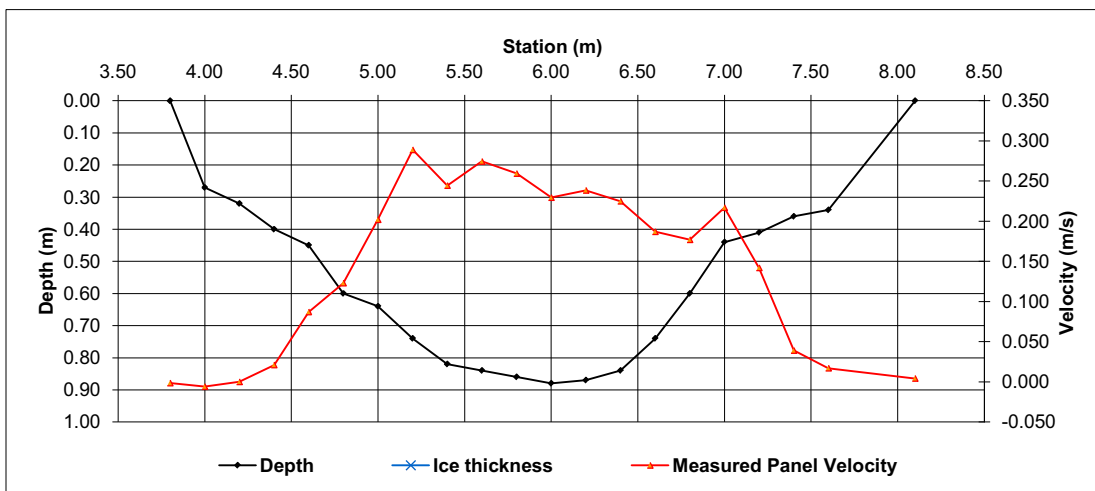
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 3.80 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.80 | 3.90 | 0.10 | 0.07 | -0.002 | -0.002 | 0.01 | 0.000 | 0% | |
| 1 | 4.00 | 0.27 | | -0.006 | | | 1.0 | 3.90 | 4.10 | 0.20 | 0.27 | -0.006 | -0.006 | 0.05 | 0.000 | 0% | |
| 2 | 4.20 | 0.32 | | 0.000 | | | 1.0 | 4.10 | 4.30 | 0.20 | 0.32 | 0.000 | 0.000 | 0.06 | 0.000 | 0% | |
| 3 | 4.40 | 0.40 | | 0.021 | | | 1.0 | 4.30 | 4.50 | 0.20 | 0.40 | 0.021 | 0.021 | 0.08 | 0.002 | 0% | |
| 4 | 4.60 | 0.45 | | 0.087 | | | 1.0 | 4.50 | 4.70 | 0.20 | 0.45 | 0.087 | 0.087 | 0.09 | 0.008 | 2% | |
| 5 | 4.80 | 0.60 | | 0.123 | | | 1.0 | 4.70 | 4.90 | 0.20 | 0.60 | 0.123 | 0.123 | 0.12 | 0.015 | 3% | |
| 6 | 5.00 | 0.64 | | 0.202 | | | 1.0 | 4.90 | 5.10 | 0.20 | 0.64 | 0.202 | 0.202 | 0.13 | 0.026 | 6% | |
| 7 | 5.20 | 0.74 | | 0.289 | | | 1.0 | 5.10 | 5.30 | 0.20 | 0.74 | 0.289 | 0.289 | 0.15 | 0.043 | 10% | |
| 8 | 5.40 | 0.82 | | | 0.191 | 0.298 | 1.0 | 5.30 | 5.50 | 0.20 | 0.82 | 0.245 | 0.245 | 0.16 | 0.040 | 9% | |
| 9 | 5.60 | 0.84 | | | 0.213 | 0.336 | 1.0 | 5.50 | 5.70 | 0.20 | 0.84 | 0.275 | 0.275 | 0.17 | 0.046 | 11% | |
| 10 | 5.80 | 0.86 | | | 0.219 | 0.300 | 1.0 | 5.70 | 5.90 | 0.20 | 0.86 | 0.260 | 0.260 | 0.17 | 0.045 | 10% | |
| 11 | 6.00 | 0.88 | | | 0.158 | 0.301 | 1.0 | 5.90 | 6.10 | 0.20 | 0.88 | 0.230 | 0.230 | 0.18 | 0.040 | 9% | |
| 12 | 6.20 | 0.87 | | | 0.205 | 0.272 | 1.0 | 6.10 | 6.30 | 0.20 | 0.87 | 0.239 | 0.239 | 0.17 | 0.041 | 10% | |
| 13 | 6.40 | 0.84 | | | 0.174 | 0.276 | 1.0 | 6.30 | 6.50 | 0.20 | 0.84 | 0.225 | 0.225 | 0.17 | 0.038 | 9% | |
| 14 | 6.60 | 0.74 | | 0.187 | | | 1.0 | 6.50 | 6.70 | 0.20 | 0.74 | 0.187 | 0.187 | 0.15 | 0.028 | 6% | |
| 15 | 6.80 | 0.60 | | 0.177 | | | 1.0 | 6.70 | 6.90 | 0.20 | 0.60 | 0.177 | 0.177 | 0.12 | 0.021 | 5% | |
| 16 | 7.00 | 0.44 | | 0.217 | | | 1.0 | 6.90 | 7.10 | 0.20 | 0.44 | 0.217 | 0.217 | 0.09 | 0.019 | 4% | |
| 17 | 7.20 | 0.41 | | 0.142 | | | 1.0 | 7.10 | 7.30 | 0.20 | 0.41 | 0.142 | 0.142 | 0.08 | 0.012 | 3% | |
| 18 | 7.40 | 0.36 | | 0.039 | | | 1.0 | 7.30 | 7.50 | 0.20 | 0.36 | 0.039 | 0.039 | 0.07 | 0.003 | 1% | |
| 19 | 7.60 | 0.34 | | 0.017 | | | 1.0 | 7.50 | 7.85 | 0.35 | 0.34 | 0.017 | 0.017 | 0.12 | 0.002 | 0% | |
| Right | 8.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 7.85 | 8.10 | 0.25 | 0.09 | 0.004 | 0.004 | 0.02 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.428 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.428 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 2.36 | (m ²) |
| Wetted Width: | 4.30 | (m) |
| Hydraulic Depth: | 0.550 | (m) |
| Mean Velocity: | 0.181 | (m/s) |
| Foude Number: | 0.078 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S37 - East Jackpine Creek (487840 E, 6325424 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 25-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.908 |
| Battery (Main): | 5.44 |
| Battery (Aux): | 13.50 |
| Datalogger Clock: | 1142 |
| Laptop Clock: | 1143 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 0% |
| Dessicant: | New |
| Logger# (if Δ): | 1909 |
| PT# (if Δ): | 25892 |
| Other Logger Notes: | |

| | |
|------------------------------|--------------|
| Measurement Details: | |
| Start Time (MST): | 1200 |
| End Time (MST): | 1215 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast 0°C |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in stump by river | 2.250 | 100.000 | 2.225 | 100.000 | - |
| Bench Mark 2: | Nail in tree w/logger | 0.876 | 101.365 | 0.852 | 101.365 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 1.932 | 100.318 | 1.904 | 100.321 | 100.320 |
| Transducer: | | 0.908 | 99.410 | 0.908 | 99.413 | 99.412 |
| Other: | | | | | | |

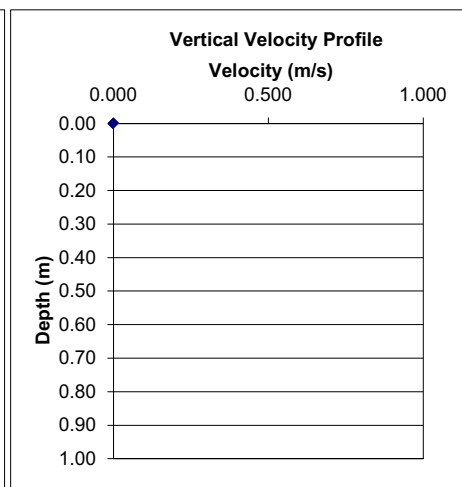
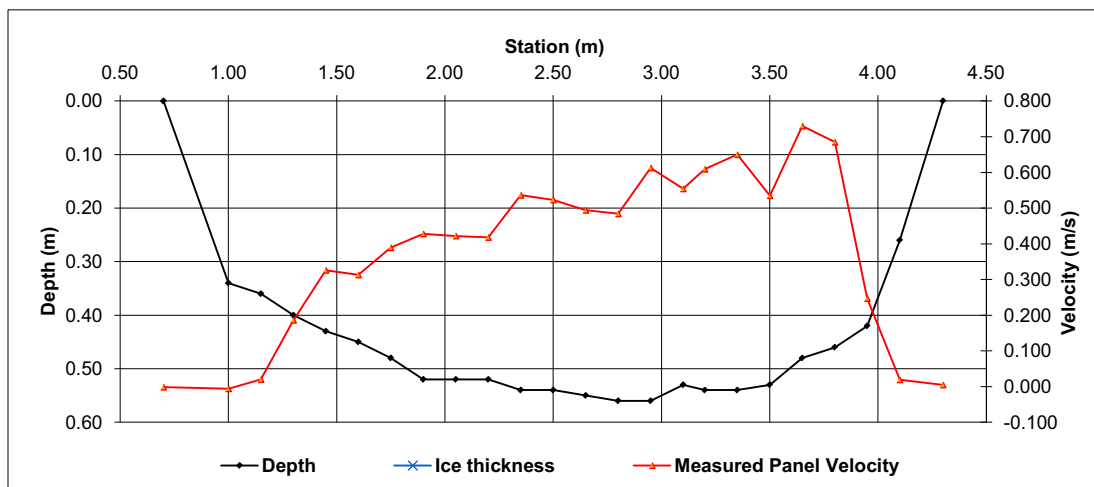
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | |
| Left | 0.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.70 | 0.85 | 0.15 | 0.09 | -0.002 | -0.002 | 0.01 | 0.000 | #DIV/0! | | |
| 1 | 1.00 | 0.34 | | -0.006 | | | 1.0 | 0.85 | 1.08 | 0.23 | 0.34 | -0.006 | -0.006 | 0.08 | 0.000 | 0% | | |
| 2 | 1.15 | 0.36 | | 0.020 | | | 1.0 | 1.08 | 1.23 | 0.15 | 0.36 | 0.020 | 0.020 | 0.05 | 0.001 | 0% | | |
| 3 | 1.30 | 0.40 | | 0.186 | | | 1.0 | 1.23 | 1.38 | 0.15 | 0.40 | 0.186 | 0.186 | 0.06 | 0.011 | 2% | | |
| 4 | 1.45 | 0.43 | | 0.326 | | | 1.0 | 1.38 | 1.53 | 0.15 | 0.43 | 0.326 | 0.326 | 0.06 | 0.021 | 3% | | |
| 5 | 1.60 | 0.45 | | 0.313 | | | 1.0 | 1.53 | 1.68 | 0.15 | 0.45 | 0.313 | 0.313 | 0.07 | 0.021 | 3% | | |
| 6 | 1.75 | 0.48 | | 0.389 | | | 1.0 | 1.68 | 1.83 | 0.15 | 0.48 | 0.389 | 0.389 | 0.07 | 0.028 | 4% | | |
| 7 | 1.90 | 0.52 | | 0.428 | | | 1.0 | 1.83 | 1.98 | 0.15 | 0.52 | 0.428 | 0.428 | 0.08 | 0.033 | 5% | | |
| 8 | 2.05 | 0.52 | | 0.422 | | | 1.0 | 1.98 | 2.13 | 0.15 | 0.52 | 0.422 | 0.422 | 0.08 | 0.033 | 5% | | |
| 9 | 2.20 | 0.52 | | 0.418 | | | 1.0 | 2.13 | 2.28 | 0.15 | 0.52 | 0.418 | 0.418 | 0.08 | 0.033 | 5% | | |
| 10 | 2.35 | 0.54 | | 0.536 | | | 1.0 | 2.28 | 2.43 | 0.15 | 0.54 | 0.536 | 0.536 | 0.08 | 0.043 | 6% | | |
| 11 | 2.50 | 0.54 | | 0.523 | | | 1.0 | 2.43 | 2.58 | 0.15 | 0.54 | 0.523 | 0.523 | 0.08 | 0.042 | 6% | | |
| 12 | 2.65 | 0.55 | | 0.494 | | | 1.0 | 2.58 | 2.73 | 0.15 | 0.55 | 0.494 | 0.494 | 0.08 | 0.041 | 6% | | |
| 13 | 2.80 | 0.56 | | 0.484 | | | 1.0 | 2.73 | 2.88 | 0.15 | 0.56 | 0.484 | 0.484 | 0.08 | 0.041 | 6% | | |
| 14 | 2.95 | 0.56 | | 0.613 | | | 1.0 | 2.88 | 3.03 | 0.15 | 0.56 | 0.613 | 0.613 | 0.08 | 0.051 | 7% | | |
| 15 | 3.10 | 0.53 | | 0.554 | | | 1.0 | 3.03 | 3.15 | 0.13 | 0.53 | 0.554 | 0.554 | 0.07 | 0.037 | 5% | | |
| 16 | 3.20 | 0.54 | | 0.609 | | | 1.0 | 3.15 | 3.28 | 0.13 | 0.54 | 0.609 | 0.609 | 0.07 | 0.041 | 6% | | |
| 17 | 3.35 | 0.54 | | 0.650 | | | 1.0 | 3.28 | 3.43 | 0.15 | 0.54 | 0.650 | 0.650 | 0.08 | 0.053 | 8% | | |
| 18 | 3.50 | 0.53 | | 0.535 | | | 1.0 | 3.43 | 3.58 | 0.15 | 0.53 | 0.535 | 0.535 | 0.08 | 0.043 | 6% | | |
| 19 | 3.65 | 0.48 | | 0.730 | | | 1.0 | 3.58 | 3.73 | 0.15 | 0.48 | 0.730 | 0.730 | 0.07 | 0.053 | 8% | | |
| 20 | 3.80 | 0.46 | | 0.685 | | | 1.0 | 3.73 | 3.88 | 0.15 | 0.46 | 0.685 | 0.685 | 0.07 | 0.047 | 7% | | |
| 21 | 3.95 | 0.42 | | 0.247 | | | 1.0 | 3.88 | 4.03 | 0.15 | 0.42 | 0.247 | 0.247 | 0.06 | 0.016 | 2% | | |
| 22 | 4.10 | 0.26 | | 0.019 | | | 1.0 | 4.03 | 4.20 | 0.17 | 0.26 | 0.019 | 0.019 | 0.05 | 0.001 | 0% | | |
| Right | 4.30 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.20 | 4.30 | 0.10 | 0.07 | 0.005 | 0.005 | 0.01 | 0.000 | 0% | | |
| Total Flow | | | | | | | | | | | | | | | 0.689 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.689 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 1.60 | (m ²) |
| Wetted Width: | 3.60 | (m) |
| Hydraulic Depth: | 0.446 | (m) |
| Mean Velocity: | 0.429 | (m/s) |
| Foude Number: | 0.206 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S37 - East Jackpine Creek (487840 E, 6325424 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 24-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 16-Jul-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.414 |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|----------|
| Measurement Details: | |
| Start Time (MST): | 900 |
| End Time (MST): | 10:31 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in stump by river | 2.170 | 100.000 | 2.163 | 100.000 | - |
| Bench Mark 2: | Nail in tree w/logger | 0.811 | 101.365 | 0.805 | 101.365 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.345 | 99.825 | 2.335 | 99.828 | 99.827 |
| Transducer: | | 0.414 | 99.411 | 0.414 | 99.414 | 99.412 |
| Other: | | | | | | |

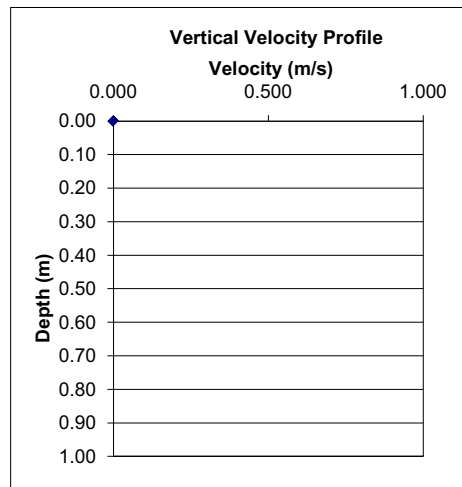
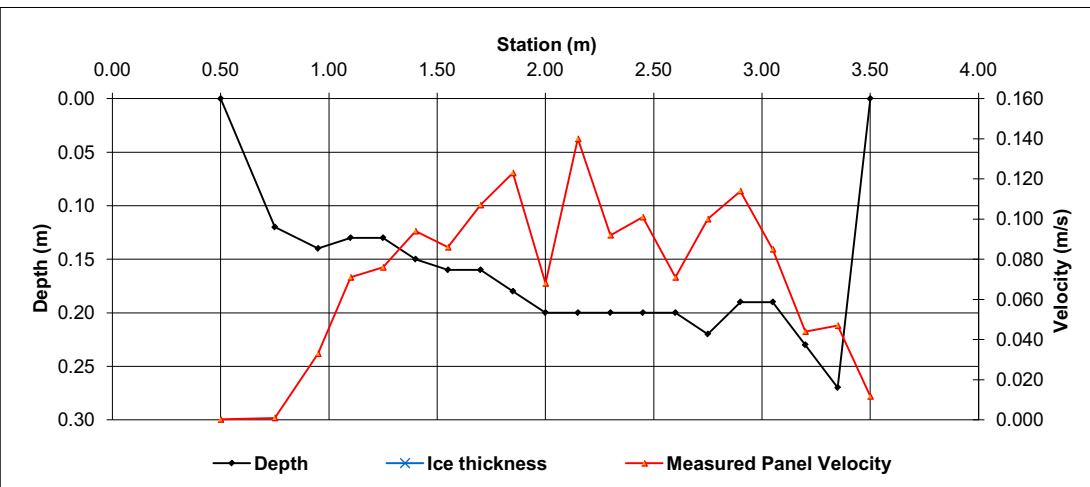
General Notes:

Top threads in plastic enclosure were in poor shape and data logger fell off support during download, no data lost. Put it back up next day using two spikes as support and wire to hold, PT was replaced... now S/N 0000899

| Flow Measurement: | | | | | | | | | | | | | | | | |
|---|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 3.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.50 | 3.43 | 0.08 | 0.07 | 0.012 | 0.012 | 0.01 | 0.000 | #DIV/0! |
| 1 | 3.35 | 0.27 | | 0.047 | | | 1.0 | 3.43 | 3.28 | 0.15 | 0.27 | 0.047 | 0.047 | 0.04 | 0.002 | 5% |
| 2 | 3.20 | 0.23 | | 0.044 | | | 1.0 | 3.28 | 3.13 | 0.15 | 0.23 | 0.044 | 0.044 | 0.03 | 0.002 | 4% |
| 3 | 3.05 | 0.19 | | 0.085 | | | 1.0 | 3.13 | 2.98 | 0.15 | 0.19 | 0.085 | 0.085 | 0.03 | 0.002 | 6% |
| 4 | 2.90 | 0.19 | | 0.114 | | | 1.0 | 2.98 | 2.83 | 0.15 | 0.19 | 0.114 | 0.114 | 0.03 | 0.003 | 8% |
| 5 | 2.75 | 0.22 | | 0.100 | | | 1.0 | 2.83 | 2.68 | 0.15 | 0.22 | 0.100 | 0.100 | 0.03 | 0.003 | 8% |
| 6 | 2.60 | 0.20 | | 0.071 | | | 1.0 | 2.68 | 2.53 | 0.15 | 0.20 | 0.071 | 0.071 | 0.03 | 0.002 | 5% |
| 7 | 2.45 | 0.20 | | 0.101 | | | 1.0 | 2.53 | 2.38 | 0.15 | 0.20 | 0.101 | 0.101 | 0.03 | 0.003 | 8% |
| 8 | 2.30 | 0.20 | | 0.092 | | | 1.0 | 2.38 | 2.23 | 0.15 | 0.20 | 0.092 | 0.092 | 0.03 | 0.003 | 7% |
| 9 | 2.15 | 0.20 | | 0.140 | | | 1.0 | 2.23 | 2.08 | 0.15 | 0.20 | 0.140 | 0.140 | 0.03 | 0.004 | 10% |
| 10 | 2.00 | 0.20 | | 0.068 | | | 1.0 | 2.08 | 1.93 | 0.15 | 0.20 | 0.068 | 0.068 | 0.03 | 0.002 | 5% |
| 11 | 1.85 | 0.18 | | 0.123 | | | 1.0 | 1.93 | 1.78 | 0.15 | 0.18 | 0.123 | 0.123 | 0.03 | 0.003 | 8% |
| 12 | 1.70 | 0.16 | | 0.107 | | | 1.0 | 1.78 | 1.63 | 0.15 | 0.16 | 0.107 | 0.107 | 0.02 | 0.003 | 6% |
| 13 | 1.55 | 0.16 | | 0.086 | | | 1.0 | 1.63 | 1.48 | 0.15 | 0.16 | 0.086 | 0.086 | 0.02 | 0.002 | 5% |
| 14 | 1.40 | 0.15 | | 0.094 | | | 1.0 | 1.48 | 1.33 | 0.15 | 0.15 | 0.094 | 0.094 | 0.02 | 0.002 | 5% |
| 15 | 1.25 | 0.13 | | 0.076 | | | 1.0 | 1.33 | 1.18 | 0.15 | 0.13 | 0.076 | 0.076 | 0.02 | 0.001 | 4% |
| 16 | 1.10 | 0.13 | | 0.071 | | | 1.0 | 1.18 | 1.03 | 0.15 | 0.13 | 0.071 | 0.071 | 0.02 | 0.001 | 3% |
| 17 | 0.95 | 0.14 | | 0.033 | | | 1.0 | 1.03 | 0.85 | 0.18 | 0.14 | 0.033 | 0.033 | 0.02 | 0.001 | 2% |
| 18 | 0.75 | 0.12 | | 0.001 | | | 1.0 | 0.85 | 0.63 | 0.23 | 0.12 | 0.001 | 0.001 | 0.03 | 0.000 | 0% |
| Left | 0.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.63 | 0.50 | 0.13 | 0.03 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.040 | | |
| <small>*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc</small> | | | | | | | | | | | | | | | | |

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.040 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.51 | (m ²) |
| Wetted Width: | 2.80 | (m) |
| Hydraulic Depth: | 0.183 | (m) |
| Mean Velocity: | 0.079 | (m/s) |
| Foude Number: | 0.059 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|---------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S37 - East Jackpine Creek (487840 E, 6325424 N) | | | |
| Field Personnel: | BL, SG, Jim (pilot) | Trip Date: | 14-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.418 |
| Battery (Main): | 4.67 |
| Battery (Aux): | 14.17 |
| Datalogger Clock: | 1142 |
| Laptop Clock: | 1143 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 4% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 1200 |
| End Time (MST): | 1230 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly 20°C |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in stump by river | 2.238 | 100.000 | 2.184 | 100.000 | - |
| Bench Mark 2: | Nail in tree w/logger | 0.874 | 101.365 | 0.822 | 101.365 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.242 | 99.996 | 2.186 | 99.998 | 99.997 |
| Transducer: | | 0.418 | 99.578 | 0.418 | 99.580 | 99.579 |
| Other: | | | | | | |

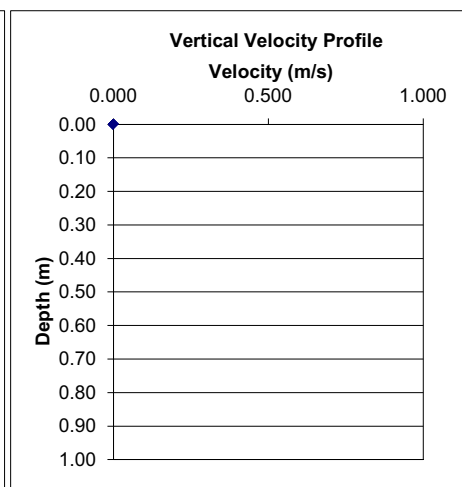
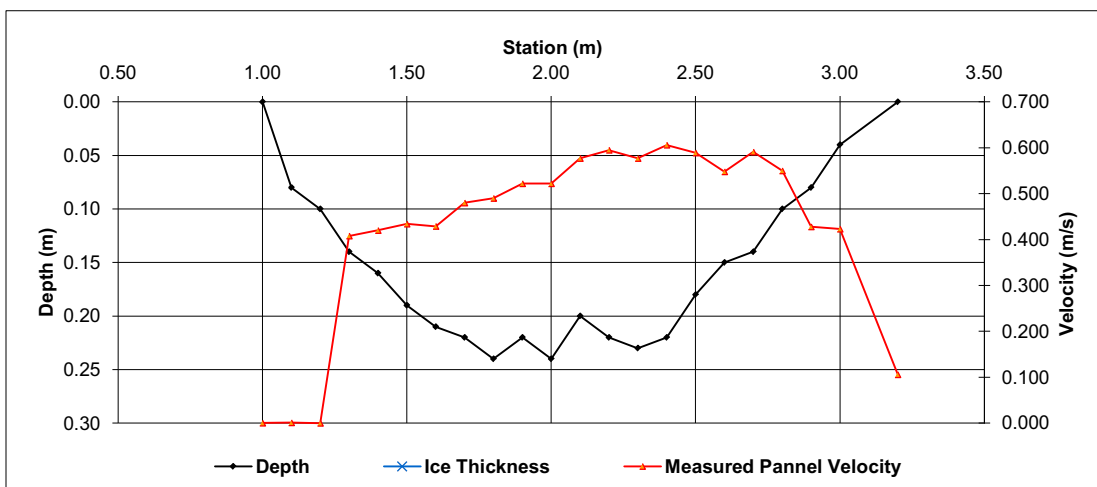
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 1.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.00 | 1.05 | 0.05 | 0.02 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| 1 | 1.10 | 0.08 | | 0.001 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.08 | 0.001 | 0.001 | 0.01 | 0.000 | 0% |
| 2 | 1.20 | 0.10 | | 0.000 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.10 | 0.000 | 0.000 | 0.01 | 0.000 | 0% |
| 3 | 1.30 | 0.14 | | 0.408 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.14 | 0.408 | 0.408 | 0.01 | 0.006 | 3% |
| 4 | 1.40 | 0.16 | | 0.420 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.16 | 0.420 | 0.420 | 0.02 | 0.007 | 4% |
| 5 | 1.50 | 0.19 | | 0.434 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.19 | 0.434 | 0.434 | 0.02 | 0.008 | 5% |
| 6 | 1.60 | 0.21 | | 0.429 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.21 | 0.429 | 0.429 | 0.02 | 0.009 | 5% |
| 7 | 1.70 | 0.22 | | 0.480 | | | 1.0 | 1.65 | 1.75 | 0.10 | 0.22 | 0.480 | 0.480 | 0.02 | 0.011 | 6% |
| 8 | 1.80 | 0.24 | | 0.490 | | | 1.0 | 1.75 | 1.85 | 0.10 | 0.24 | 0.490 | 0.490 | 0.02 | 0.012 | 7% |
| 9 | 1.90 | 0.22 | | 0.522 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.22 | 0.522 | 0.522 | 0.02 | 0.011 | 7% |
| 10 | 2.00 | 0.24 | | 0.522 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.24 | 0.522 | 0.522 | 0.02 | 0.013 | 8% |
| 11 | 2.10 | 0.20 | | 0.577 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.20 | 0.577 | 0.577 | 0.02 | 0.012 | 7% |
| 12 | 2.20 | 0.22 | | 0.595 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.22 | 0.595 | 0.595 | 0.02 | 0.013 | 8% |
| 13 | 2.30 | 0.23 | | 0.577 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.23 | 0.577 | 0.577 | 0.02 | 0.013 | 8% |
| 14 | 2.40 | 0.22 | | 0.606 | | | 1.0 | 2.35 | 2.45 | 0.10 | 0.22 | 0.606 | 0.606 | 0.02 | 0.013 | 8% |
| 15 | 2.50 | 0.18 | | 0.589 | | | 1.0 | 2.45 | 2.55 | 0.10 | 0.18 | 0.589 | 0.589 | 0.02 | 0.011 | 6% |
| 16 | 2.60 | 0.15 | | 0.548 | | | 1.0 | 2.55 | 2.65 | 0.10 | 0.15 | 0.548 | 0.548 | 0.02 | 0.008 | 5% |
| 17 | 2.70 | 0.14 | | 0.591 | | | 1.0 | 2.65 | 2.75 | 0.10 | 0.14 | 0.591 | 0.591 | 0.01 | 0.008 | 5% |
| 18 | 2.80 | 0.10 | | 0.550 | | | 1.0 | 2.75 | 2.85 | 0.10 | 0.10 | 0.550 | 0.550 | 0.01 | 0.005 | 3% |
| 19 | 2.90 | 0.08 | | 0.428 | | | 1.0 | 2.85 | 2.95 | 0.10 | 0.08 | 0.428 | 0.428 | 0.01 | 0.003 | 2% |
| 20 | 3.00 | 0.04 | | 0.423 | | | 1.0 | 2.95 | 3.10 | 0.15 | 0.04 | 0.423 | 0.423 | 0.01 | 0.003 | 2% |
| Right | 3.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.10 | 3.20 | 0.10 | 0.01 | 0.106 | 0.106 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.166 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.166 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 0.34 | (m ²) |
| Wetted Width: | 2.20 | (m) |
| Hydraulic Depth: | 0.155 | (m) |
| Mean Velocity: | 0.488 | (m/s) |
| Foude Number: | 0.397 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S37 - East Jackpine Creek (487840 E, 6325424 N) | | | |
| Field Personnel: | DB SG Matt (pilot) | Trip Date: | 15-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|--------------------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.907 |
| Battery (Main): | 4.65 |
| Battery (Aux): | 14.55 |
| Datalogger Clock: | 1204 |
| Laptop Clock: | 1204 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 7% |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | 101353 |
| Other Logger Notes: | |
| PRTD not working? Replaced it | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1150 |
| End Time (MST): | 1300 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Light drizzle 10°C |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in stump by river | 2.086 | 100.000 | 2.040 | 100.000 | - |
| Bench Mark 2: | Nail in tree w/logger | 0.726 | 101.365 | 0.682 | 101.365 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 1.753 | 100.333 | 1.705 | 100.335 | 100.334 |
| Transducer: | | 0.907 | 99.426 | 0.907 | 99.428 | 99.427 |
| Other: | | | | | | |

General Notes:

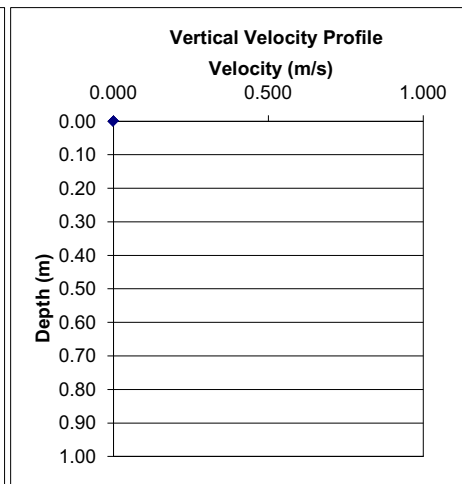
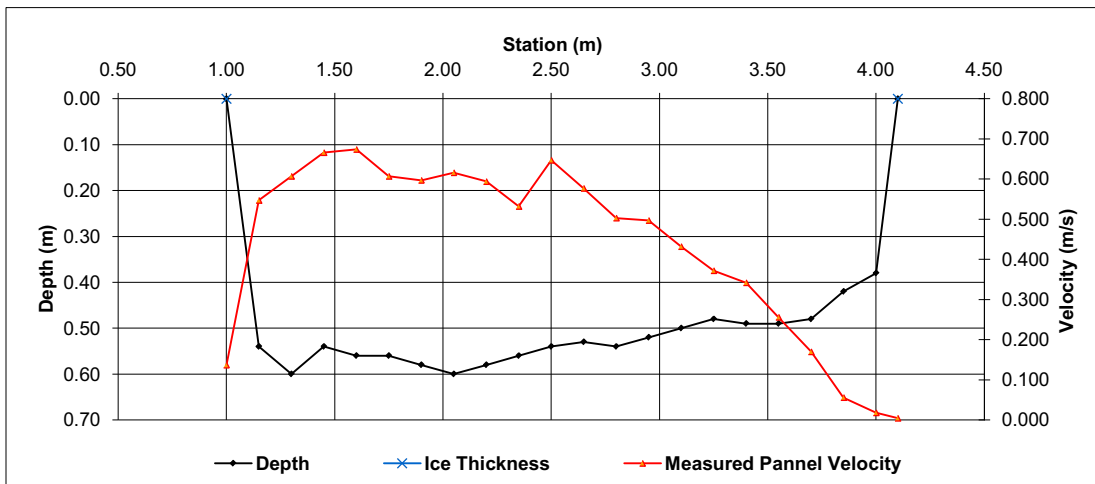
Modem with omni directional antenna very low RSSI -120

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 1.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.00 | 1.08 | 0.08 | 0.14 | 0.137 | 0.137 | 0.01 | 0.001 | 0% | |
| 1 | 1.15 | 0.54 | | 0.547 | | | 1.0 | 1.08 | 1.23 | 0.15 | 0.54 | 0.547 | 0.547 | 0.08 | 0.044 | 6% | |
| 2 | 1.30 | 0.60 | | 0.607 | | | 1.0 | 1.23 | 1.38 | 0.15 | 0.60 | 0.607 | 0.607 | 0.09 | 0.055 | 7% | |
| 3 | 1.45 | 0.54 | | 0.666 | | | 1.0 | 1.38 | 1.53 | 0.15 | 0.54 | 0.666 | 0.666 | 0.08 | 0.054 | 7% | |
| 4 | 1.60 | 0.56 | | 0.674 | | | 1.0 | 1.53 | 1.68 | 0.15 | 0.56 | 0.674 | 0.674 | 0.08 | 0.057 | 7% | |
| 5 | 1.75 | 0.56 | | 0.607 | | | 1.0 | 1.68 | 1.83 | 0.15 | 0.56 | 0.607 | 0.607 | 0.08 | 0.051 | 7% | |
| 6 | 1.90 | 0.58 | | 0.597 | | | 1.0 | 1.83 | 1.98 | 0.15 | 0.58 | 0.597 | 0.597 | 0.09 | 0.052 | 7% | |
| 7 | 2.05 | 0.60 | | 0.616 | | | 1.0 | 1.98 | 2.13 | 0.15 | 0.60 | 0.616 | 0.616 | 0.09 | 0.055 | 7% | |
| 8 | 2.20 | 0.58 | | 0.594 | | | 1.0 | 2.13 | 2.28 | 0.15 | 0.58 | 0.594 | 0.594 | 0.09 | 0.052 | 7% | |
| 9 | 2.35 | 0.56 | | 0.532 | | | 1.0 | 2.28 | 2.43 | 0.15 | 0.56 | 0.532 | 0.532 | 0.08 | 0.045 | 6% | |
| 10 | 2.50 | 0.54 | | 0.647 | | | 1.0 | 2.43 | 2.58 | 0.15 | 0.54 | 0.647 | 0.647 | 0.08 | 0.052 | 7% | |
| 11 | 2.65 | 0.53 | | 0.577 | | | 1.0 | 2.58 | 2.73 | 0.15 | 0.53 | 0.577 | 0.577 | 0.08 | 0.046 | 6% | |
| 12 | 2.80 | 0.54 | | 0.503 | | | 1.0 | 2.73 | 2.88 | 0.15 | 0.54 | 0.503 | 0.503 | 0.08 | 0.041 | 5% | |
| 13 | 2.95 | 0.52 | | 0.497 | | | 1.0 | 2.88 | 3.03 | 0.15 | 0.52 | 0.497 | 0.497 | 0.08 | 0.039 | 5% | |
| 14 | 3.10 | 0.50 | | 0.432 | | | 1.0 | 3.03 | 3.18 | 0.15 | 0.50 | 0.432 | 0.432 | 0.07 | 0.032 | 4% | |
| 15 | 3.25 | 0.48 | | 0.372 | | | 1.0 | 3.18 | 3.33 | 0.15 | 0.48 | 0.372 | 0.372 | 0.07 | 0.027 | 4% | |
| 16 | 3.40 | 0.49 | | 0.342 | | | 1.0 | 3.33 | 3.48 | 0.15 | 0.49 | 0.342 | 0.342 | 0.07 | 0.025 | 3% | |
| 17 | 3.55 | 0.49 | | 0.256 | | | 1.0 | 3.48 | 3.63 | 0.15 | 0.49 | 0.256 | 0.256 | 0.07 | 0.019 | 2% | |
| 18 | 3.70 | 0.48 | | 0.170 | | | 1.0 | 3.63 | 3.78 | 0.15 | 0.48 | 0.170 | 0.170 | 0.07 | 0.012 | 2% | |
| 19 | 3.85 | 0.42 | | 0.056 | | | 1.0 | 3.78 | 3.93 | 0.15 | 0.42 | 0.056 | 0.056 | 0.06 | 0.004 | 0% | |
| 20 | 4.00 | 0.38 | | 0.018 | | | 1.0 | 3.93 | 4.05 | 0.13 | 0.38 | 0.018 | 0.018 | 0.05 | 0.001 | 0% | |
| Left | 4.10 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 4.05 | 4.10 | 0.05 | 0.10 | 0.005 | 0.005 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.763 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.763 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 1.58 | (m ²) |
| Wetted Width: | 3.10 | (m) |
| Hydraulic Depth: | 0.509 | (m) |
| Mean Velocity: | 0.483 | (m/s) |
| Foude Number: | 0.216 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S37 - East Jackpine Creek (487840 E, 6325424 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 28-Oct-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|--------|
| Logger Details: | |
| Transducer Reading: | 0.527 |
| Battery (Main): | 4.63 |
| Battery (Aux): | 13.52 |
| Datalogger Clock: | - |
| Laptop Clock: | - |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 12% |
| Dessicant: | - |
| Logger# (if Δ): | 101350 |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 1410 |
| End Time (MST): | 1455 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in stump by river | 2.228 | 100.000 | 2.210 | 100.000 | - |
| Bench Mark 2: | Nail in tree w/logger | 0.859 | 101.365 | 0.842 | 101.365 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 2.228 | 100.000 | 2.212 | 99.998 | 99.999 |
| Transducer: | | 0.527 | 99.473 | 0.527 | 99.471 | 99.472 |
| Other: | | | | | | |

General Notes:

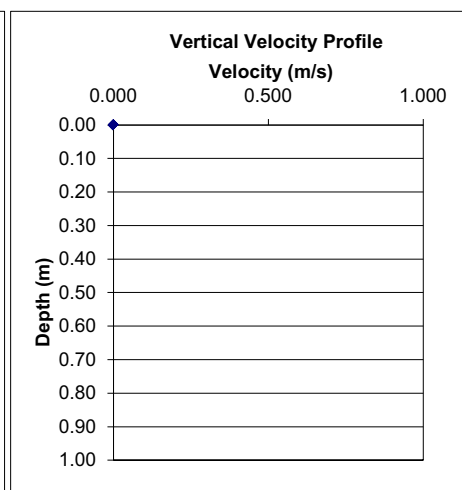
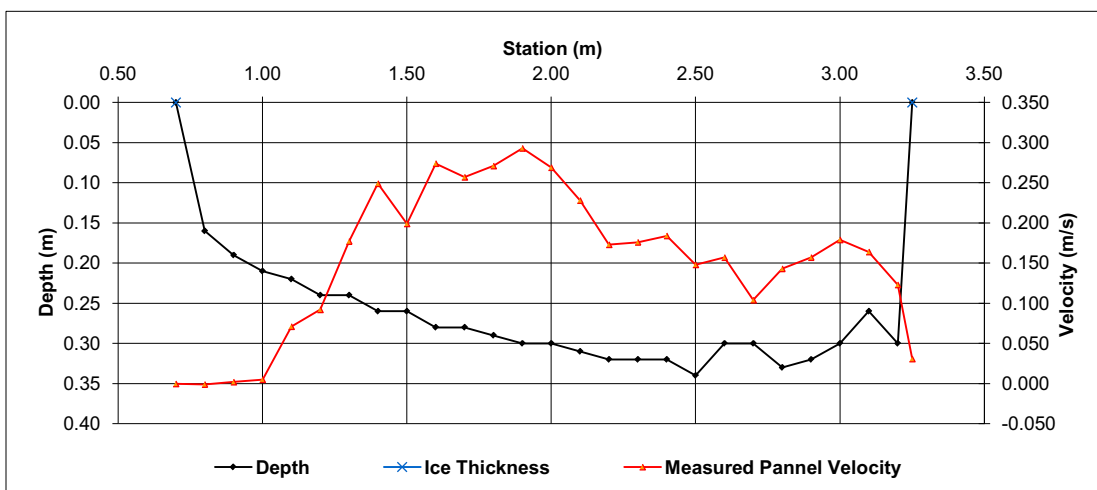
TSS @ 13m

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.70 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.70 | 0.75 | 0.05 | 0.04 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| 1 | 0.80 | 0.16 | | -0.001 | | | 1.0 | 0.75 | 0.85 | 0.10 | 0.16 | -0.001 | -0.001 | 0.02 | 0.000 | 0% |
| 2 | 0.90 | 0.19 | | 0.002 | | | 1.0 | 0.85 | 0.95 | 0.10 | 0.19 | 0.002 | 0.002 | 0.02 | 0.000 | 0% |
| 3 | 1.00 | 0.21 | | 0.005 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.21 | 0.005 | 0.005 | 0.02 | 0.000 | 0% |
| 4 | 1.10 | 0.22 | | 0.071 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.22 | 0.071 | 0.071 | 0.02 | 0.002 | 1% |
| 5 | 1.20 | 0.24 | | 0.092 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.24 | 0.092 | 0.092 | 0.02 | 0.002 | 2% |
| 6 | 1.30 | 0.24 | | 0.177 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.24 | 0.177 | 0.177 | 0.02 | 0.004 | 4% |
| 7 | 1.40 | 0.26 | | 0.249 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.26 | 0.249 | 0.249 | 0.03 | 0.006 | 5% |
| 8 | 1.50 | 0.26 | | 0.199 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.26 | 0.199 | 0.199 | 0.03 | 0.005 | 4% |
| 9 | 1.60 | 0.28 | | 0.274 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.28 | 0.274 | 0.274 | 0.03 | 0.008 | 6% |
| 10 | 1.70 | 0.28 | | 0.257 | | | 1.0 | 1.65 | 1.75 | 0.10 | 0.28 | 0.257 | 0.257 | 0.03 | 0.007 | 6% |
| 11 | 1.80 | 0.29 | | 0.271 | | | 1.0 | 1.75 | 1.85 | 0.10 | 0.29 | 0.271 | 0.271 | 0.03 | 0.008 | 7% |
| 12 | 1.90 | 0.30 | | 0.293 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.30 | 0.293 | 0.293 | 0.03 | 0.009 | 7% |
| 13 | 2.00 | 0.30 | | 0.269 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.30 | 0.269 | 0.269 | 0.03 | 0.008 | 7% |
| 14 | 2.10 | 0.31 | | 0.228 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.31 | 0.228 | 0.228 | 0.03 | 0.007 | 6% |
| 15 | 2.20 | 0.32 | | 0.173 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.32 | 0.173 | 0.173 | 0.03 | 0.006 | 5% |
| 16 | 2.30 | 0.32 | | 0.176 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.32 | 0.176 | 0.176 | 0.03 | 0.006 | 5% |
| 17 | 2.40 | 0.32 | | 0.184 | | | 1.0 | 2.35 | 2.45 | 0.10 | 0.32 | 0.184 | 0.184 | 0.03 | 0.006 | 5% |
| 18 | 2.50 | 0.34 | | 0.148 | | | 1.0 | 2.45 | 2.55 | 0.10 | 0.34 | 0.148 | 0.148 | 0.03 | 0.005 | 4% |
| 19 | 2.60 | 0.30 | | 0.157 | | | 1.0 | 2.55 | 2.65 | 0.10 | 0.30 | 0.157 | 0.157 | 0.03 | 0.005 | 4% |
| 20 | 2.70 | 0.30 | | 0.104 | | | 1.0 | 2.65 | 2.75 | 0.10 | 0.30 | 0.104 | 0.104 | 0.03 | 0.003 | 3% |
| 21 | 2.80 | 0.33 | | 0.143 | | | 1.0 | 2.75 | 2.85 | 0.10 | 0.33 | 0.143 | 0.143 | 0.03 | 0.005 | 4% |
| 22 | 2.90 | 0.32 | | 0.157 | | | 1.0 | 2.85 | 2.95 | 0.10 | 0.32 | 0.157 | 0.157 | 0.03 | 0.005 | 4% |
| 23 | 3.00 | 0.30 | | 0.179 | | | 1.0 | 2.95 | 3.05 | 0.10 | 0.30 | 0.179 | 0.179 | 0.03 | 0.005 | 5% |
| 24 | 3.10 | 0.26 | | 0.164 | | | 1.0 | 3.05 | 3.15 | 0.10 | 0.26 | 0.164 | 0.164 | 0.03 | 0.004 | 4% |
| 25 | 3.20 | 0.30 | | 0.123 | | | 1.0 | 3.15 | 3.23 | 0.07 | 0.30 | 0.123 | 0.123 | 0.02 | 0.003 | 2% |
| Right | 3.25 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.23 | 3.25 | 0.02 | 0.08 | 0.031 | 0.031 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.119 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.119 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 0.69 | (m ²) |
| Wetted Width: | 2.55 | (m) |
| Hydraulic Depth: | 0.271 | (m) |
| Mean Velocity: | 0.171 | (m/s) |
| Foude Number: | 0.105 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S38 - Steepbank River near Ft. McMurray (475293 E, 6317385 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 19-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | DB | Date: | 29-Mar-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| WSC Station | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1527 |
| End Time (MST): | 1550 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|--------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | WSC Brass Cap near cabin | | 98.672 | 98.672 | | - |
| Bench Mark 2: | Bolt holding orange buoy | 1.366 | 98.464 | 1.360 | 98.464 | - |
| Top of Ice: | | 2.659 | 97.171 | 2.652 | 97.172 | 97.172 |
| Water Level: | | 2.932 | 96.898 | 2.925 | 96.899 | 96.899 |
| Transducer: | | | | | | |
| Other: | | | | | | |

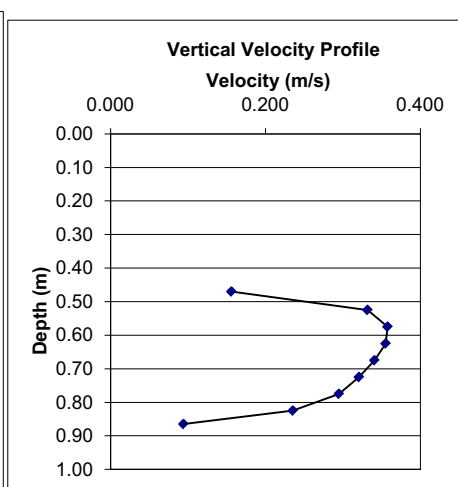
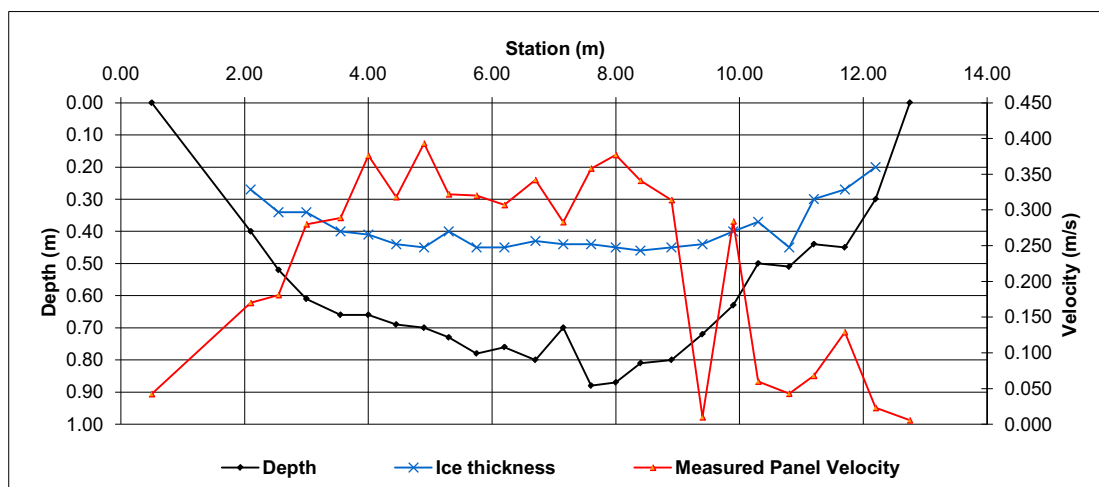
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 0.50 | 1.30 | 0.80 | 0.03 | 0.043 | 0.038 | 0.03 | 0.001 | 0% |
| 1 | 2.10 | 0.40 | 0.27 | 0.170 | | | 0.9 | 1.30 | 2.33 | 1.03 | 0.13 | 0.170 | 0.13 | 0.13 | 0.020 | 3% |
| 2 | 2.55 | 0.52 | 0.34 | 0.181 | | | 0.9 | 2.33 | 2.78 | 0.45 | 0.18 | 0.181 | 0.163 | 0.08 | 0.013 | 2% |
| 3 | 3.00 | 0.61 | 0.34 | 0.280 | | | 0.9 | 2.78 | 3.28 | 0.50 | 0.27 | 0.280 | 0.252 | 0.14 | 0.034 | 5% |
| 4 | 3.55 | 0.66 | 0.40 | 0.289 | | | 0.9 | 3.28 | 3.78 | 0.50 | 0.26 | 0.289 | 0.260 | 0.13 | 0.034 | 5% |
| 5 | 4.00 | 0.66 | 0.41 | 0.376 | | | 0.9 | 3.78 | 4.23 | 0.45 | 0.25 | 0.376 | 0.338 | 0.11 | 0.038 | 6% |
| 6 | 4.45 | 0.69 | 0.44 | 0.318 | | | 0.9 | 4.23 | 4.68 | 0.45 | 0.25 | 0.318 | 0.286 | 0.11 | 0.032 | 5% |
| 7 | 4.90 | 0.70 | 0.45 | 0.393 | | | 0.9 | 4.68 | 5.10 | 0.42 | 0.25 | 0.393 | 0.354 | 0.11 | 0.038 | 6% |
| 8 | 5.30 | 0.73 | 0.40 | 0.322 | | | 0.9 | 5.10 | 5.53 | 0.43 | 0.33 | 0.322 | 0.290 | 0.14 | 0.041 | 6% |
| 9 | 5.75 | 0.78 | 0.45 | 0.320 | | | 0.9 | 5.53 | 5.98 | 0.45 | 0.33 | 0.320 | 0.288 | 0.15 | 0.043 | 6% |
| 10 | 6.20 | 0.76 | 0.45 | 0.307 | | | 0.9 | 5.98 | 6.45 | 0.48 | 0.31 | 0.307 | 0.276 | 0.15 | 0.041 | 6% |
| 11 | 6.70 | 0.80 | 0.43 | 0.342 | | | 0.9 | 6.45 | 6.93 | 0.48 | 0.37 | 0.342 | 0.308 | 0.18 | 0.054 | 8% |
| 12 | 7.15 | 0.70 | 0.44 | 0.283 | | | 0.9 | 6.93 | 7.38 | 0.45 | 0.26 | 0.283 | 0.255 | 0.12 | 0.030 | 4% |
| 13 | 7.60 | 0.88 | 0.44 | 0.358 | | | 0.9 | 7.38 | 7.80 | 0.43 | 0.44 | 0.358 | 0.322 | 0.19 | 0.060 | 9% |
| 14 | 8.00 | 0.87 | 0.45 | 0.377 | | | 0.9 | 7.80 | 8.20 | 0.40 | 0.42 | 0.377 | 0.339 | 0.17 | 0.057 | 8% |
| 15 | 8.40 | 0.81 | 0.46 | 0.341 | | | 0.9 | 8.20 | 8.65 | 0.45 | 0.35 | 0.341 | 0.307 | 0.16 | 0.048 | 7% |
| 16 | 8.90 | 0.80 | 0.45 | 0.314 | | | 0.9 | 8.65 | 9.15 | 0.50 | 0.35 | 0.314 | 0.283 | 0.18 | 0.049 | 7% |
| 17 | 9.40 | 0.72 | 0.44 | 0.010 | | | 0.9 | 9.15 | 9.65 | 0.50 | 0.28 | 0.010 | 0.009 | 0.14 | 0.001 | 0% |
| 18 | 9.90 | 0.63 | 0.40 | 0.284 | | | 0.9 | 9.65 | 10.10 | 0.45 | 0.23 | 0.284 | 0.256 | 0.10 | 0.026 | 4% |
| 19 | 10.30 | 0.50 | 0.37 | 0.060 | | | 0.9 | 10.10 | 10.55 | 0.45 | 0.13 | 0.060 | 0.054 | 0.06 | 0.003 | 0% |
| 20 | 10.80 | 0.51 | 0.45 | 0.043 | | | 0.9 | 10.55 | 11.00 | 0.45 | 0.06 | 0.043 | 0.039 | 0.03 | 0.001 | 0% |
| 21 | 11.20 | 0.44 | 0.30 | 0.068 | | | 0.9 | 11.00 | 11.45 | 0.45 | 0.14 | 0.068 | 0.061 | 0.06 | 0.004 | 1% |
| 22 | 11.70 | 0.45 | 0.27 | 0.129 | | | 0.9 | 11.45 | 11.95 | 0.50 | 0.18 | 0.129 | 0.116 | 0.09 | 0.010 | 2% |
| 23 | 12.20 | 0.30 | 0.20 | 0.023 | | | 0.9 | 11.95 | 12.48 | 0.53 | 0.10 | 0.023 | 0.021 | 0.05 | 0.001 | 0% |
| Right | 12.75 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 12.48 | 12.75 | 0.28 | 0.03 | 0.006 | 0.005 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.681 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|--------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.681 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 2.79 | (m ²) |
| Wetted Width: | 12.25 | (m) |
| Hydraulic Depth: | 0.228 | (m) |
| Mean Velocity: | 0.244 | (m/s) |
| Froude Number: | 0.163 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.274 |
| Offset | 7.6 | 0.88 | 0.000 | - | Panel V.@Ofst | 0.358 |
| Depth | 0.88 | 0.85 | 0.188 | 0.87 | 60% Depth | 0.704 |
| Ice Depth | 0.44 | 0.80 | 0.283 | 0.83 | 20% Depth | 0.53 |
| | | 0.75 | 0.307 | 0.78 | 80% Depth | 0.79 |
| | | 0.70 | 0.335 | 0.73 | | |
| | | 0.65 | 0.347 | 0.68 | | |
| | | 0.60 | 0.364 | 0.63 | | |
| | | 0.55 | 0.352 | 0.58 | | |
| | | 0.50 | 0.312 | 0.53 | | |
| | | 0.44 | 0.000 | 0.47 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S38 - Steepbank River near Ft. McMurray (475293 E, 6317385 N) | | | |
| Field Personnel: | GB, CE | Trip Date: | 10-Feb-10 |
| Data Entry Personnel: | SG | Date: | 19-Feb-10 |
| Data Check Personnel: | DB | Date: | 15-Mar-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| WSC Station | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1213 |
| End Time (MST): | 1315 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast -19C |

| Level Survey: | | | | | | |
|----------------------|--------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | WSC Brass Cap near cabin | | 98.672 | | 98.672 | - |
| Bench Mark 2: | Bolt holding orange buoy | 1.515 | 98.464 | 1.510 | 98.464 | - |
| Top of Ice: | | 2.987 | 96.992 | 2.982 | 96.992 | 96.992 |
| Water Level: | | 3.095 | 96.884 | 3.090 | 96.884 | 96.884 |
| Transducer: | | | | | | |
| Other: | | | | | | |

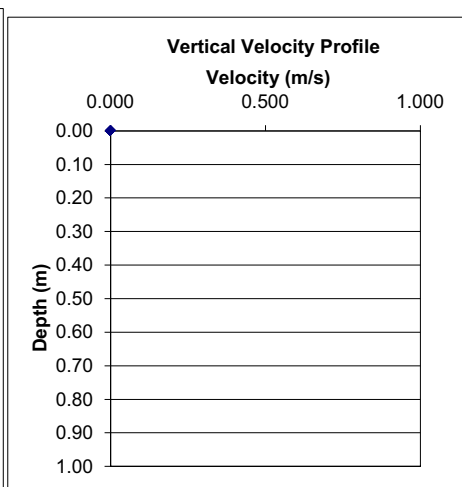
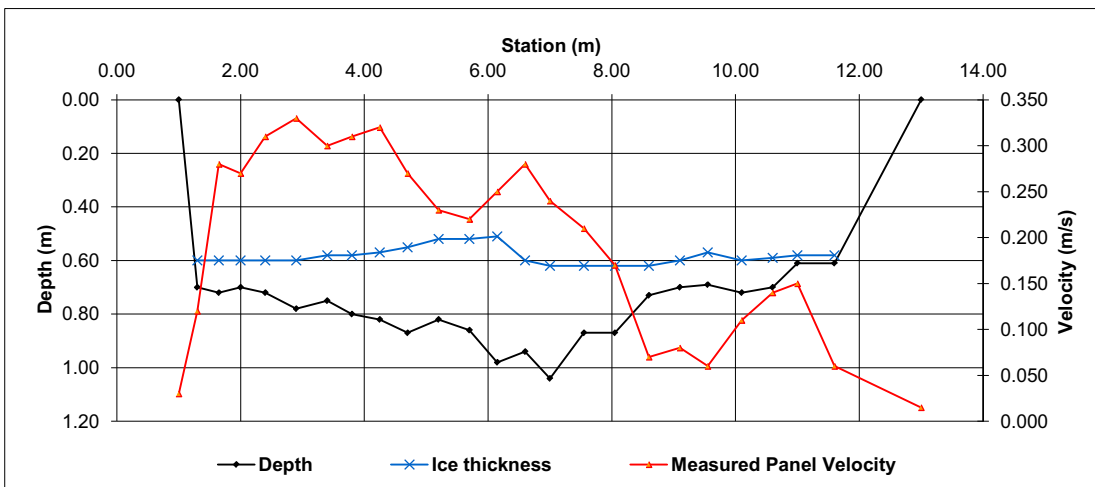
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 1.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.00 | 1.15 | 0.15 | 0.03 | 0.030 | 0.027 | 0.00 | 0.000 | 0% |
| 1 | 1.30 | 0.70 | 0.60 | 0.120 | | | 0.9 | 1.15 | 1.48 | 0.33 | 0.10 | 0.120 | 0.108 | 0.03 | 0.004 | 1% |
| 2 | 1.65 | 0.72 | 0.60 | 0.280 | | | 0.9 | 1.48 | 1.83 | 0.35 | 0.12 | 0.280 | 0.252 | 0.04 | 0.011 | 2% |
| 3 | 2.00 | 0.70 | 0.60 | 0.270 | | | 0.9 | 1.83 | 2.20 | 0.38 | 0.10 | 0.270 | 0.243 | 0.04 | 0.009 | 2% |
| 4 | 2.40 | 0.72 | 0.60 | 0.310 | | | 0.9 | 2.20 | 2.65 | 0.45 | 0.12 | 0.310 | 0.279 | 0.05 | 0.015 | 3% |
| 5 | 2.90 | 0.78 | 0.60 | 0.330 | | | 0.9 | 2.65 | 3.15 | 0.50 | 0.18 | 0.330 | 0.297 | 0.09 | 0.027 | 6% |
| 6 | 3.40 | 0.75 | 0.58 | 0.300 | | | 0.9 | 3.15 | 3.60 | 0.45 | 0.17 | 0.300 | 0.270 | 0.08 | 0.021 | 5% |
| 7 | 3.80 | 0.80 | 0.58 | 0.310 | | | 0.9 | 3.60 | 4.03 | 0.43 | 0.22 | 0.310 | 0.279 | 0.09 | 0.026 | 6% |
| 8 | 4.25 | 0.82 | 0.57 | 0.320 | | | 0.9 | 4.03 | 4.48 | 0.45 | 0.25 | 0.320 | 0.288 | 0.11 | 0.032 | 7% |
| 9 | 4.70 | 0.87 | 0.55 | 0.270 | | | 0.9 | 4.48 | 4.95 | 0.48 | 0.32 | 0.270 | 0.243 | 0.15 | 0.037 | 8% |
| 10 | 5.20 | 0.82 | 0.52 | 0.230 | | | 0.9 | 4.95 | 5.45 | 0.50 | 0.30 | 0.230 | 0.207 | 0.15 | 0.031 | 7% |
| 11 | 5.70 | 0.86 | 0.52 | 0.220 | | | 0.9 | 5.45 | 5.93 | 0.48 | 0.34 | 0.220 | 0.198 | 0.16 | 0.032 | 7% |
| 12 | 6.15 | 0.98 | 0.51 | 0.250 | | | 0.9 | 5.93 | 6.38 | 0.45 | 0.47 | 0.250 | 0.225 | 0.21 | 0.048 | 11% |
| 13 | 6.60 | 0.94 | 0.60 | 0.280 | | | 0.9 | 6.38 | 6.80 | 0.43 | 0.34 | 0.280 | 0.252 | 0.14 | 0.036 | 8% |
| 14 | 7.00 | 1.04 | 0.62 | 0.240 | | | 0.9 | 6.80 | 7.28 | 0.48 | 0.42 | 0.240 | 0.216 | 0.20 | 0.043 | 10% |
| 15 | 7.55 | 0.87 | 0.62 | 0.210 | | | 0.9 | 7.28 | 7.80 | 0.53 | 0.25 | 0.210 | 0.189 | 0.13 | 0.025 | 6% |
| 16 | 8.05 | 0.87 | 0.62 | 0.170 | | | 0.9 | 7.80 | 8.33 | 0.52 | 0.25 | 0.170 | 0.153 | 0.13 | 0.020 | 5% |
| 17 | 8.60 | 0.73 | 0.62 | 0.070 | | | 0.9 | 8.33 | 8.85 | 0.53 | 0.11 | 0.070 | 0.063 | 0.06 | 0.004 | 1% |
| 18 | 9.10 | 0.70 | 0.60 | 0.080 | | | 0.9 | 8.85 | 9.33 | 0.48 | 0.10 | 0.080 | 0.072 | 0.05 | 0.003 | 1% |
| 19 | 9.55 | 0.69 | 0.57 | 0.060 | | | 0.9 | 9.33 | 9.83 | 0.50 | 0.12 | 0.060 | 0.054 | 0.06 | 0.003 | 1% |
| 20 | 10.10 | 0.72 | 0.60 | 0.110 | | | 0.9 | 9.83 | 10.35 | 0.53 | 0.12 | 0.110 | 0.099 | 0.06 | 0.006 | 1% |
| 21 | 10.60 | 0.70 | 0.59 | 0.140 | | | 0.9 | 10.35 | 10.80 | 0.45 | 0.11 | 0.140 | 0.126 | 0.05 | 0.006 | 1% |
| 22 | 11.00 | 0.61 | 0.58 | 0.150 | | | 0.9 | 10.80 | 11.30 | 0.50 | 0.03 | 0.150 | 0.135 | 0.02 | 0.002 | 0% |
| 23 | 11.60 | 0.61 | 0.58 | 0.060 | | | 0.9 | 11.30 | 12.30 | 1.00 | 0.03 | 0.060 | 0.054 | 0.03 | 0.002 | 0% |
| Right | 13.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 12.30 | 13.00 | 0.70 | 0.01 | 0.015 | 0.015 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.443 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.443 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 2.15 | (m ²) |
| Wetted Width: | 12.00 | (m) |
| Hydraulic Depth: | 0.179 | (m) |
| Mean Velocity: | 0.206 | (m/s) |
| Froude Number: | 0.155 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S38 - Steepbank River near Ft. McMurray (475293 E, 6317385 N) | | | |
| Field Personnel: | SG, JO | Trip Date: | 05-Dec-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------------|
| Measurement Details: | |
| Start Time (MST): | 1200 |
| End Time (MST): | 1300 |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | - 16, 7/8 cloud |

| Level Survey: | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | WSC Brass Cap near cabin | | 98.672 | | 98.672 | - |
| Bench Mark 2: | Brass Cap away from shack | 1.252 | 100.000 | 1.252 | 100.000 | - |
| Top of Ice: | | 3.347 | 97.905 | 3.349 | 97.903 | 97.904 |
| Water Level: | | 3.331 | 97.921 | 3.339 | 97.913 | 97.917 |
| Transducer: | | | | | | |
| Other: | | | | | | |

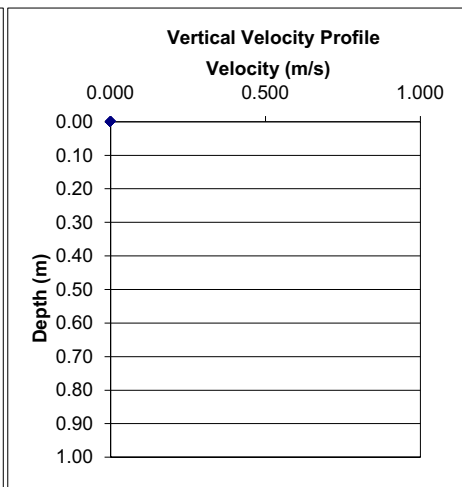
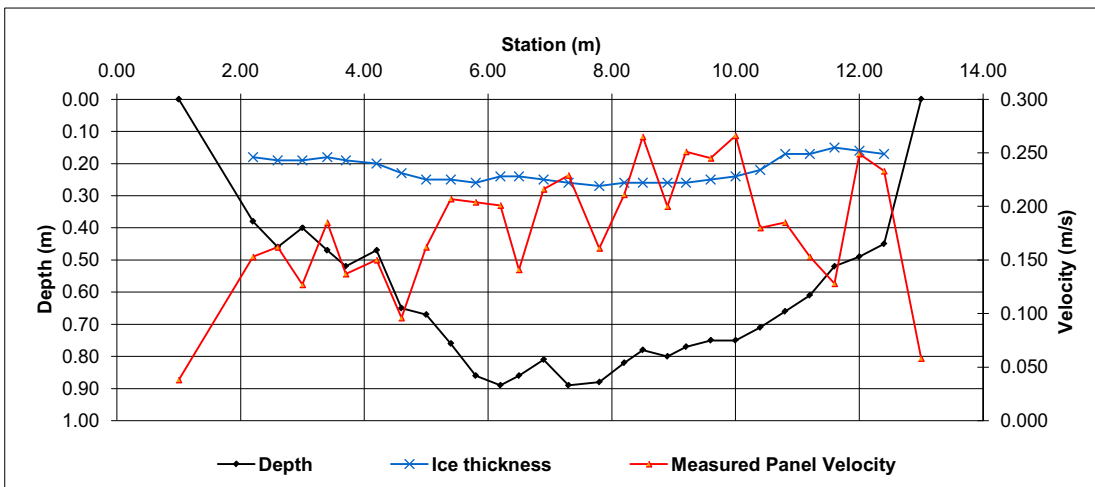
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 1.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.00 | 1.60 | 0.60 | 0.05 | 0.038 | 0.034 | 0.03 | 0.001 | 0% |
| 1 | 2.20 | 0.38 | 0.18 | 0.153 | | | 0.9 | 1.60 | 2.40 | 0.80 | 0.20 | 0.153 | 0.138 | 0.16 | 0.022 | 2% |
| 2 | 2.60 | 0.46 | 0.19 | 0.162 | | | 0.9 | 2.40 | 2.80 | 0.40 | 0.27 | 0.162 | 0.146 | 0.11 | 0.016 | 1% |
| 3 | 3.00 | 0.40 | 0.19 | 0.127 | | | 0.9 | 2.80 | 3.20 | 0.40 | 0.21 | 0.127 | 0.114 | 0.08 | 0.010 | 1% |
| 4 | 3.40 | 0.47 | 0.18 | 0.185 | | | 0.9 | 3.20 | 3.55 | 0.35 | 0.29 | 0.185 | 0.167 | 0.10 | 0.017 | 1% |
| 5 | 3.70 | 0.52 | 0.19 | 0.137 | | | 0.9 | 3.55 | 3.95 | 0.40 | 0.33 | 0.137 | 0.123 | 0.13 | 0.016 | 1% |
| 6 | 4.20 | 0.47 | 0.20 | 0.150 | | | 0.9 | 3.95 | 4.40 | 0.45 | 0.27 | 0.150 | 0.135 | 0.12 | 0.016 | 1% |
| 7 | 4.60 | 0.65 | 0.23 | 0.096 | | | 0.9 | 4.40 | 4.80 | 0.40 | 0.42 | 0.096 | 0.086 | 0.17 | 0.015 | 1% |
| 8 | 5.00 | 0.67 | 0.25 | 0.162 | | | 0.9 | 4.80 | 5.20 | 0.40 | 0.42 | 0.162 | 0.146 | 0.17 | 0.024 | 2% |
| 9 | 5.40 | 0.76 | 0.25 | 0.207 | | | 0.9 | 5.20 | 5.60 | 0.40 | 0.51 | 0.207 | 0.186 | 0.20 | 0.038 | 3% |
| 10 | 5.80 | 0.86 | 0.26 | 0.204 | | | 0.9 | 5.60 | 6.00 | 0.40 | 0.60 | 0.204 | 0.184 | 0.24 | 0.044 | 3% |
| 11 | 6.20 | 0.89 | 0.24 | 0.201 | | | 0.9 | 6.00 | 6.35 | 0.35 | 0.65 | 0.201 | 0.181 | 0.23 | 0.041 | 3% |
| 12 | 6.50 | 0.86 | 0.24 | 0.141 | | | 0.9 | 6.35 | 6.70 | 0.35 | 0.62 | 0.141 | 0.127 | 0.22 | 0.028 | 2% |
| 13 | 6.90 | 0.81 | 0.25 | 0.216 | | | 0.9 | 6.70 | 7.10 | 0.40 | 0.56 | 0.216 | 0.194 | 0.22 | 0.044 | 3% |
| 14 | 7.30 | 0.89 | 0.26 | 0.229 | | | 0.9 | 7.10 | 7.55 | 0.45 | 0.63 | 0.229 | 0.206 | 0.28 | 0.058 | 4% |
| 15 | 7.80 | 0.88 | 0.27 | 0.161 | | | 0.9 | 7.55 | 8.00 | 0.45 | 0.61 | 0.161 | 0.145 | 0.27 | 0.040 | 3% |
| 16 | 8.20 | 0.82 | 0.26 | 0.211 | | | 0.9 | 8.00 | 8.35 | 0.35 | 0.56 | 0.211 | 0.190 | 0.20 | 0.037 | 3% |
| 17 | 8.50 | 0.78 | 0.26 | 0.265 | | | 0.9 | 8.35 | 9.65 | 1.30 | 0.52 | 0.265 | 0.239 | 0.68 | 0.161 | 11% |
| 18 | 8.90 | 0.80 | 0.26 | 0.200 | | | 0.9 | 8.70 | 10.05 | 1.35 | 0.54 | 0.200 | 0.180 | 0.73 | 0.131 | 9% |
| 19 | 9.20 | 0.77 | 0.26 | 0.251 | | | 0.9 | 9.05 | 10.40 | 1.35 | 0.51 | 0.251 | 0.226 | 0.69 | 0.156 | 11% |
| 20 | 9.60 | 0.75 | 0.25 | 0.245 | | | 0.9 | 9.40 | 10.80 | 1.40 | 0.50 | 0.245 | 0.221 | 0.70 | 0.154 | 11% |
| 21 | 10.00 | 0.75 | 0.24 | 0.266 | | | 0.9 | 9.80 | 11.20 | 1.40 | 0.51 | 0.266 | 0.239 | 0.71 | 0.171 | 12% |
| 22 | 10.40 | 0.71 | 0.22 | 0.180 | | | 0.9 | 10.20 | 11.70 | 1.50 | 0.49 | 0.180 | 0.162 | 0.74 | 0.119 | 8% |
| 23 | 10.80 | 0.66 | 0.17 | 0.185 | | | 0.9 | 10.60 | 10.80 | 0.20 | 0.49 | 0.185 | 0.167 | 0.10 | 0.016 | 1% |
| 24 | 11.20 | 0.61 | 0.17 | 0.153 | | | 0.9 | 11.00 | 11.20 | 0.20 | 0.44 | 0.153 | 0.138 | 0.09 | 0.012 | 1% |
| 25 | 11.60 | 0.52 | 0.15 | 0.128 | | | 0.9 | 11.40 | 11.60 | 0.20 | 0.37 | 0.128 | 0.115 | 0.07 | 0.009 | 1% |
| 26 | 12.00 | 0.49 | 0.16 | 0.249 | | | 0.9 | 11.80 | 12.00 | 0.20 | 0.33 | 0.249 | 0.224 | 0.07 | 0.015 | 1% |
| 27 | 12.40 | 0.45 | 0.17 | 0.233 | | | 0.9 | 12.20 | 12.40 | 0.20 | 0.28 | 0.233 | 0.210 | 0.06 | 0.012 | 1% |
| Left | 13.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 12.70 | 13.00 | 0.30 | 0.07 | 0.058 | 0.058 | 0.02 | 0.001 | 0% |
| Total Flow | | | | | | | | | | | | | | | 1.424 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 1.424 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 7.59 | (m ²) |
| Wetted Width: | 12.00 | (m) |
| Hydraulic Depth: | 0.632 | (m) |
| Mean Velocity: | 0.188 | (m/s) |
| Froude Number: | 0.075 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0.000 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S39 - Beaver River above Syncrude WSC (465542 E, 6311435 N) | | | |
| Field Personnel: | SE, SG | Trip Date: | 22-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| WSC Station | |

| | |
|------------------------------|----------------------|
| Measurement Details: | |
| Start Time (MST): | 1130 |
| End Time (MST): | 1145 |
| Equipment: | Flow Mate |
| Method: | Ice |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | scattered clouds -7C |

| Level Survey: | | | | | | |
|----------------------|--------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Brass cap nr cable way | 0.907 | 29.696 | 0.918 | 29.696 | - |
| Bench Mark 2: | Brass cap ~4m from cabin | | 30.469 | | 30.469 | - |
| Top of Ice: | | 2.677 | 27.792 | 2.686 | 27.783 | 27.788 |
| Water Level: | | 3.065 | 27.404 | 3.082 | 27.387 | 27.396 |
| Transducer: | | | | | | |
| Other: | | | | | | |

General Notes:

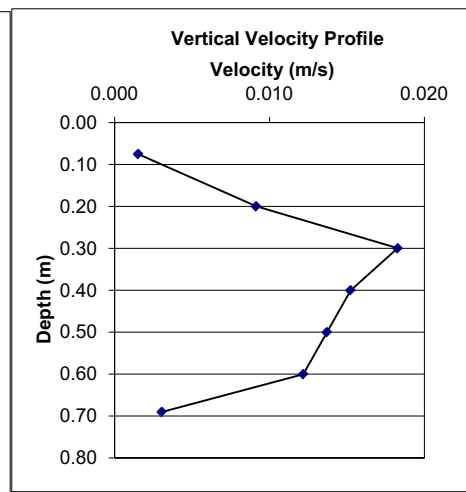
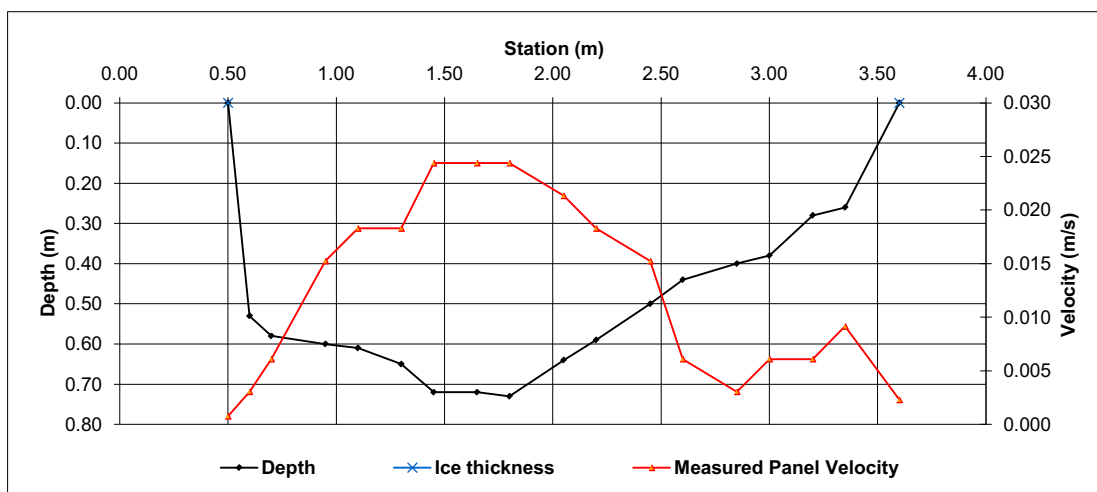
Ice was hanging above water level.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.9 | 0.50 | 0.55 | 0.05 | 0.13 | 0.001 | 0.001 | 0.01 | 0.000 | 0% |
| 1 | 0.60 | 0.53 | | 0.003 | | | 0.9 | 0.55 | 0.65 | 0.10 | 0.53 | 0.003 | 0.003 | 0.05 | 0.000 | 1% |
| 2 | 0.70 | 0.58 | | 0.006 | | | 0.9 | 0.65 | 0.83 | 0.18 | 0.58 | 0.006 | 0.005 | 0.10 | 0.001 | 3% |
| 3 | 0.95 | 0.60 | | 0.015 | | | 0.9 | 0.83 | 1.03 | 0.20 | 0.60 | 0.015 | 0.014 | 0.12 | 0.002 | 7% |
| 4 | 1.10 | 0.61 | | 0.018 | | | 0.9 | 1.03 | 1.20 | 0.18 | 0.61 | 0.018 | 0.016 | 0.11 | 0.002 | 8% |
| 5 | 1.30 | 0.65 | | 0.018 | | | 0.9 | 1.20 | 1.38 | 0.18 | 0.65 | 0.018 | 0.016 | 0.11 | 0.002 | 8% |
| 6 | 1.45 | 0.72 | | 0.024 | | | 0.9 | 1.38 | 1.55 | 0.18 | 0.72 | 0.024 | 0.022 | 0.13 | 0.003 | 12% |
| 7 | 1.65 | 0.72 | | 0.024 | | | 0.9 | 1.55 | 1.73 | 0.18 | 0.72 | 0.024 | 0.022 | 0.13 | 0.003 | 12% |
| 8 | 1.80 | 0.73 | | 0.024 | | | 0.9 | 1.73 | 1.93 | 0.20 | 0.73 | 0.024 | 0.022 | 0.15 | 0.003 | 14% |
| 9 | 2.05 | 0.64 | | 0.021 | | | 0.9 | 1.93 | 2.13 | 0.20 | 0.64 | 0.021 | 0.019 | 0.13 | 0.002 | 11% |
| 10 | 2.20 | 0.59 | | 0.018 | | | 0.9 | 2.13 | 2.33 | 0.20 | 0.59 | 0.018 | 0.016 | 0.12 | 0.002 | 9% |
| 11 | 2.45 | 0.50 | | 0.015 | | | 0.9 | 2.33 | 2.53 | 0.20 | 0.50 | 0.015 | 0.014 | 0.10 | 0.001 | 6% |
| 12 | 2.60 | 0.44 | | 0.006 | | | 0.9 | 2.53 | 2.73 | 0.20 | 0.44 | 0.006 | 0.005 | 0.09 | 0.000 | 2% |
| 13 | 2.85 | 0.40 | | 0.003 | | | 0.9 | 2.73 | 2.93 | 0.20 | 0.40 | 0.003 | 0.003 | 0.08 | 0.000 | 1% |
| 14 | 3.00 | 0.38 | | 0.006 | | | 0.9 | 2.93 | 3.10 | 0.18 | 0.38 | 0.006 | 0.005 | 0.07 | 0.000 | 2% |
| 15 | 3.20 | 0.28 | | 0.006 | | | 0.9 | 3.10 | 3.28 | 0.18 | 0.28 | 0.006 | 0.005 | 0.05 | 0.000 | 1% |
| 16 | 3.35 | 0.26 | | 0.009 | | | 0.9 | 3.28 | 3.48 | 0.20 | 0.26 | 0.009 | 0.008 | 0.05 | 0.000 | 2% |
| Right | 3.60 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.9 | 3.48 | 3.60 | 0.13 | 0.07 | 0.002 | 0.002 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.022 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.022 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 1.59 | (m ²) |
| Wetted Width: | 3.10 | (m) |
| Hydraulic Depth: | 0.513 | (m) |
| Mean Velocity: | 0.014 | (m/s) |
| Froude Number: | 0.006 | |

| Velocity Profile for Ice Conditions: | | | | | | | |
|---|-------|----------|------------|---------------|---------------|----------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.012 | |
| Offset | 1.8 | 0.73 | 0 | - | - | Panel V. @Ofst | 0.024 |
| Depth | 0.73 | 0.65 | 0.006 | 0.69 | 0.003 | 60% Depth | 0.438 |
| Ice Depth | 0 | 0.55 | 0.018 | 0.60 | 0.012 | 20% Depth | 0.15 |
| | | 0.45 | 0.009 | 0.50 | 0.014 | 80% Depth | 0.58 |
| | | 0.35 | 0.021 | 0.40 | 0.015 | | |
| | | 0.25 | 0.015 | 0.30 | 0.018 | | |
| | | 0.15 | 0.003 | 0.20 | 0.009 | | |
| | | 0.00 | 0.000 | 0.08 | 0.002 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S39 - Beaver River above Syncrude WSC (465542 E, 6311435 N) | | | |
| Field Personnel: | GB, JE | Trip Date: | 15-Feb-10 |
| Data Entry Personnel: | SG | Date: | 19-Feb-10 |
| Data Check Personnel: | DB | Date: | 15-Mar-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| WSC Station | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1148 |
| End Time (MST): | 1205 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | clear -6C |

| Level Survey: | | | | | | |
|----------------------|--------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Brass cap nr cable way | 1.884 | 29.696 | 1.890 | 29.696 | - |
| Bench Mark 2: | Brass cap ~4m from cabin | 1.119 | 30.469 | 1.124 | 30.469 | - |
| Top of Ice: | | 3.679 | 27.909 | 3.685 | 27.908 | 27.909 |
| Water Level: | | 3.848 | 27.740 | 3.850 | 27.743 | 27.742 |
| Transducer: | | | | | | |
| Other: | | | | | | |

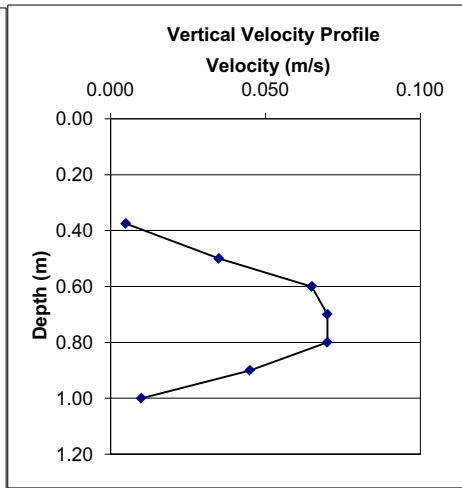
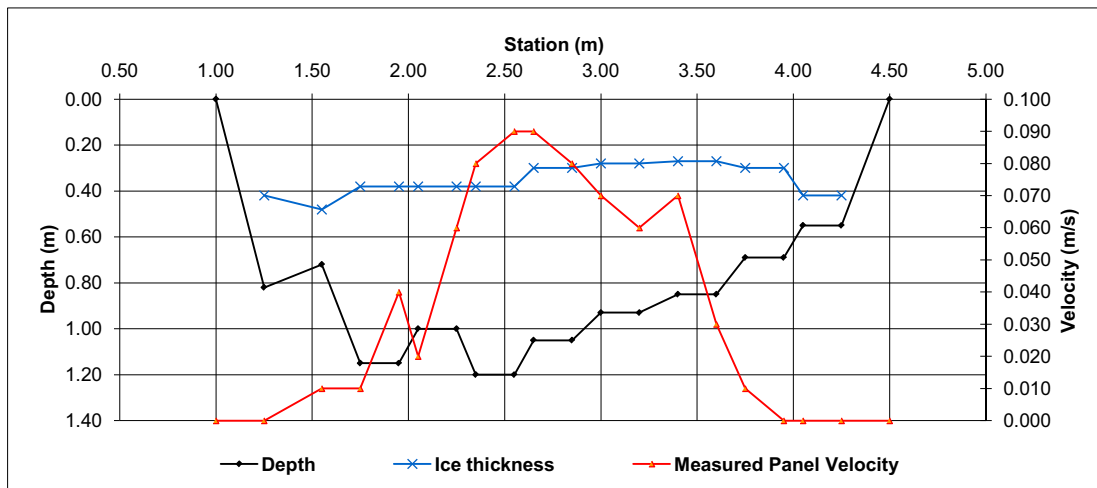
| |
|-----------------------|
| General Notes: |
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| Flow Measurement: | | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 1.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.00 | 1.13 | 0.13 | 0.10 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | |
| 1 | 1.25 | 0.82 | 0.42 | 0.000 | | | 1.0 | 1.13 | 1.40 | 0.28 | 0.40 | 0.000 | 0.000 | 0.11 | 0.000 | 0% | |
| 2 | 1.55 | 0.72 | 0.48 | 0.010 | | | 0.9 | 1.40 | 1.65 | 0.25 | 0.24 | 0.010 | 0.009 | 0.06 | 0.001 | 1% | |
| 3 | 1.75 | 1.15 | 0.38 | 0.010 | | | 0.9 | 1.65 | 1.85 | 0.20 | 0.77 | 0.010 | 0.009 | 0.15 | 0.001 | 2% | |
| 4 | 1.95 | 1.15 | 0.38 | 0.040 | | | 0.9 | 1.85 | 2.00 | 0.15 | 0.77 | 0.040 | 0.036 | 0.12 | 0.004 | 6% | |
| 5 | 2.05 | 1.00 | 0.38 | 0.020 | | | 0.9 | 2.00 | 2.15 | 0.15 | 0.62 | 0.020 | 0.018 | 0.09 | 0.002 | 2% | |
| 6 | 2.25 | 1.00 | 0.38 | 0.060 | | | 0.9 | 2.15 | 2.30 | 0.15 | 0.62 | 0.060 | 0.054 | 0.09 | 0.005 | 7% | |
| 7 | 2.35 | 1.20 | 0.38 | 0.080 | | | 0.9 | 2.30 | 2.45 | 0.15 | 0.82 | 0.080 | 0.072 | 0.12 | 0.009 | 12% | |
| 8 | 2.55 | 1.20 | 0.38 | 0.090 | | | 0.9 | 2.45 | 2.60 | 0.15 | 0.82 | 0.090 | 0.081 | 0.12 | 0.010 | 13% | |
| 9 | 2.65 | 1.05 | 0.30 | 0.090 | | | 0.9 | 2.60 | 2.75 | 0.15 | 0.75 | 0.090 | 0.081 | 0.11 | 0.009 | 12% | |
| 10 | 2.85 | 1.05 | 0.30 | 0.080 | | | 0.9 | 2.75 | 2.93 | 0.18 | 0.75 | 0.080 | 0.072 | 0.13 | 0.009 | 13% | |
| 11 | 3.00 | 0.93 | 0.28 | 0.070 | | | 0.9 | 2.93 | 3.10 | 0.18 | 0.65 | 0.070 | 0.063 | 0.11 | 0.007 | 10% | |
| 12 | 3.20 | 0.93 | 0.28 | 0.060 | | | 0.9 | 3.10 | 3.30 | 0.20 | 0.65 | 0.060 | 0.054 | 0.13 | 0.007 | 9% | |
| 13 | 3.40 | 0.85 | 0.27 | 0.070 | | | 0.9 | 3.30 | 3.50 | 0.20 | 0.58 | 0.070 | 0.063 | 0.12 | 0.007 | 10% | |
| 14 | 3.60 | 0.85 | 0.27 | 0.030 | | | 0.9 | 3.50 | 3.68 | 0.18 | 0.58 | 0.030 | 0.027 | 0.10 | 0.003 | 4% | |
| 15 | 3.75 | 0.69 | 0.30 | 0.010 | | | 0.9 | 3.68 | 3.85 | 0.18 | 0.39 | 0.010 | 0.009 | 0.07 | 0.001 | 1% | |
| 16 | 3.95 | 0.69 | 0.30 | 0.000 | | | 1.0 | 3.85 | 4.00 | 0.15 | 0.39 | 0.000 | 0.000 | 0.06 | 0.000 | 0% | |
| 17 | 4.05 | 0.55 | 0.42 | 0.000 | | | 1.0 | 4.00 | 4.15 | 0.15 | 0.13 | 0.000 | 0.000 | 0.02 | 0.000 | 0% | |
| 18 | 4.25 | 0.55 | 0.42 | 0.000 | | | 1.0 | 4.15 | 4.38 | 0.23 | 0.13 | 0.000 | 0.000 | 0.03 | 0.000 | 0% | |
| Right | 4.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.38 | 4.50 | 0.13 | 0.03 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 0.075 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.075 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 1.77 | (m ²) |
| Wetted Width: | 3.50 | (m) |
| Hydraulic Depth: | 0.505 | (m) |
| Mean Velocity: | 0.042 | (m/s) |
| Froude Number: | 0.019 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|--------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | |
| Offset | 2.65 | 1.05 | 0 | - | - | Panel V.@Ofst 0.09 |
| Depth | 1.05 | 0.95 | 0.020 | 1.00 | 0.010 | 60% Depth 0.75 |
| Ice Depth | 0.3 | 0.85 | 0.070 | 0.90 | 0.045 | 20% Depth 0.45 |
| | | 0.75 | 0.070 | 0.80 | 0.070 | 80% Depth 0.90 |
| | | 0.65 | 0.070 | 0.70 | 0.070 | |
| | | 0.55 | 0.060 | 0.60 | 0.065 | |
| | | 0.45 | 0.010 | 0.50 | 0.035 | |
| | | 0.30 | 0.000 | 0.38 | 0.005 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S39 - Beaver River above Syncrude WSC (465542 E, 6311435 N) | | | |
| Field Personnel: | SG, JO, BL | Trip Date: | 30-Nov-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

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|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|----------------|
| Measurement Details: | |
| Start Time (MST): | 1520 |
| End Time (MST): | 1615 |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | - 8, 5/8 Cloud |

| Level Survey: | | | | | | |
|----------------------|--------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Brass cap nr cable way | 0.695 | 29.696 | 0.703 | 29.696 | - |
| Bench Mark 2: | Brass cap ~4m from cabin | | 30.469 | | 30.469 | - |
| Top of Ice: | | 2.232 | 28.159 | 2.239 | 28.160 | 28.160 |
| Water Level: | | 2.269 | 28.122 | 2.273 | 28.126 | 28.124 |
| Transducer: | | | | | | |
| Other: | | | | | | |

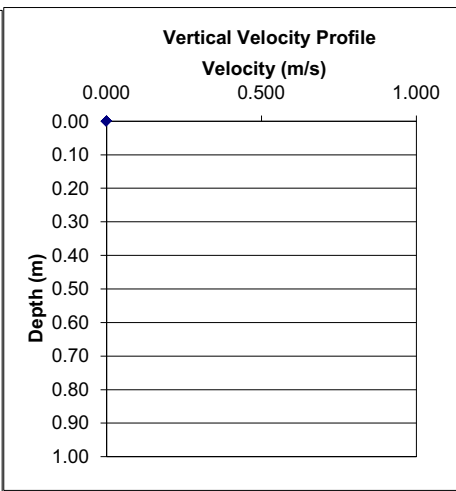
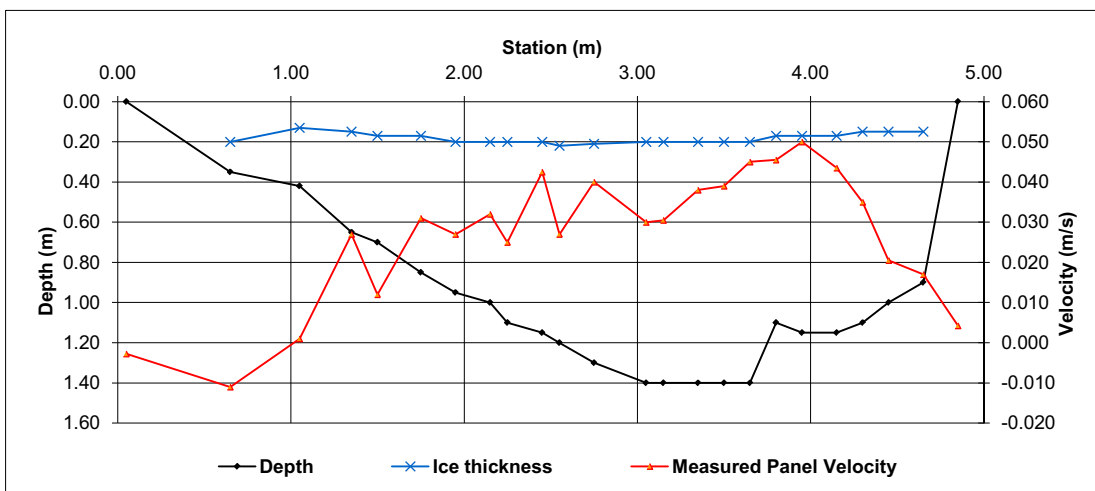
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|-----------------------|
| General Notes: |
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| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 0.05 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 0.05 | 0.35 | 0.30 | 0.04 | -0.003 | -0.002 | 0.01 | 0.000 | 0% | |
| 1 | 0.65 | 0.35 | 0.20 | -0.011 | | | 0.9 | 0.35 | 0.85 | 0.50 | 0.15 | -0.011 | -0.010 | 0.08 | -0.001 | 0% | |
| 2 | 1.05 | 0.42 | 0.13 | 0.001 | | | 0.9 | 0.85 | 1.20 | 0.35 | 0.29 | 0.001 | 0.001 | 0.10 | 0.000 | 0% | |
| 3 | 1.35 | 0.65 | 0.15 | 0.027 | | | 0.9 | 1.20 | 1.43 | 0.23 | 0.50 | 0.027 | 0.024 | 0.11 | 0.003 | 1% | |
| 4 | 1.50 | 0.70 | 0.17 | 0.012 | | | 0.9 | 1.43 | 1.63 | 0.20 | 0.53 | 0.012 | 0.011 | 0.11 | 0.001 | 1% | |
| 5 | 1.75 | 0.85 | 0.17 | 0.031 | | | 0.9 | 1.63 | 1.85 | 0.23 | 0.68 | 0.031 | 0.028 | 0.15 | 0.004 | 2% | |
| 6 | 1.95 | 0.95 | 0.20 | 0.027 | | | 0.9 | 1.85 | 2.05 | 0.20 | 0.75 | 0.027 | 0.024 | 0.15 | 0.004 | 2% | |
| 7 | 2.15 | 1.00 | 0.20 | | 0.041 | 0.023 | 1.0 | 2.05 | 2.20 | 0.15 | 0.80 | 0.032 | 0.032 | 0.12 | 0.004 | 2% | |
| 8 | 2.25 | 1.10 | 0.20 | | 0.042 | 0.008 | 1.0 | 2.20 | 2.35 | 0.15 | 0.90 | 0.025 | 0.025 | 0.14 | 0.003 | 2% | |
| 9 | 2.45 | 1.15 | 0.20 | | 0.052 | 0.033 | 1.0 | 2.35 | 2.50 | 0.15 | 0.95 | 0.043 | 0.043 | 0.14 | 0.006 | 3% | |
| 10 | 2.55 | 1.20 | 0.22 | | 0.036 | 0.018 | 1.0 | 2.50 | 3.18 | 0.68 | 0.98 | 0.027 | 0.027 | 0.66 | 0.018 | 8% | |
| 11 | 2.75 | 1.30 | 0.21 | | 0.044 | 0.036 | 1.0 | 2.65 | 3.35 | 0.70 | 1.09 | 0.040 | 0.040 | 0.76 | 0.031 | 15% | |
| 12 | 3.05 | 1.40 | 0.20 | | 0.049 | 0.011 | 1.0 | 2.90 | 3.60 | 0.70 | 1.20 | 0.030 | 0.030 | 0.84 | 0.025 | 12% | |
| 13 | 3.15 | 1.40 | 0.20 | | 0.040 | 0.021 | 1.0 | 3.10 | 3.73 | 0.63 | 1.20 | 0.031 | 0.031 | 0.75 | 0.023 | 11% | |
| 14 | 3.35 | 1.40 | 0.20 | | 0.051 | 0.025 | 1.0 | 3.25 | 4.00 | 0.75 | 1.20 | 0.038 | 0.038 | 0.90 | 0.034 | 16% | |
| 15 | 3.50 | 1.40 | 0.20 | | 0.050 | 0.028 | 1.0 | 3.43 | 4.18 | 0.75 | 1.20 | 0.039 | 0.039 | 0.90 | 0.035 | 17% | |
| 16 | 3.65 | 1.40 | 0.20 | | 0.053 | 0.037 | 1.0 | 3.58 | 3.65 | 0.07 | 1.20 | 0.045 | 0.045 | 0.09 | 0.004 | 2% | |
| 17 | 3.80 | 1.10 | 0.17 | | 0.059 | 0.032 | 1.0 | 3.73 | 3.80 | 0.08 | 0.93 | 0.046 | 0.046 | 0.07 | 0.003 | 2% | |
| 18 | 3.95 | 1.15 | 0.17 | | 0.058 | 0.042 | 1.0 | 3.88 | 3.95 | 0.08 | 0.98 | 0.050 | 0.050 | 0.07 | 0.004 | 2% | |
| 19 | 4.15 | 1.15 | 0.17 | | 0.042 | 0.045 | 1.0 | 4.05 | 4.15 | 0.10 | 0.98 | 0.044 | 0.044 | 0.10 | 0.004 | 2% | |
| 20 | 4.30 | 1.10 | 0.15 | | 0.037 | 0.033 | 1.0 | 4.23 | 4.30 | 0.08 | 0.95 | 0.035 | 0.035 | 0.07 | 0.002 | 1% | |
| 21 | 4.45 | 1.00 | 0.15 | | 0.009 | 0.032 | 1.0 | 4.38 | 4.45 | 0.08 | 0.85 | 0.021 | 0.021 | 0.06 | 0.001 | 1% | |
| 22 | 4.65 | 0.90 | 0.15 | | 0.003 | 0.031 | 1.0 | 4.55 | 4.65 | 0.10 | 0.75 | 0.017 | 0.017 | 0.07 | 0.001 | 1% | |
| Left | 4.85 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.75 | 4.85 | 0.10 | 0.19 | 0.004 | 0.004 | 0.02 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.210 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.210 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 6.48 | (m ²) |
| Wetted Width: | 4.80 | (m) |
| Hydraulic Depth: | 1.350 | (m) |
| Mean Velocity: | 0.032 | (m/s) |
| Froude Number: | 0.009 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S40 - MacKay River at Petro-Canada Bridge (445023 E, 6314256 N) | | | |
| Field Personnel: | SE, SG | Trip Date: | 22-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.635 |
| Battery (Main): | 12.8 |
| Battery (Aux): | NA |
| Datalogger Clock: | 822 |
| Laptop Clock: | 822 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.2 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

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|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 900 |
| End Time (MST): | 1110 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Light Snow -10C |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe, w/flag, behind lggr | 1.232 | 100.000 | 1.228 | 100.000 | - |
| Bench Mark 2: | T-post on second bench | 3.331 | 97.893 | 3.328 | 97.893 | - |
| Top of Ice: | | 4.844 | 96.388 | 4.842 | 96.386 | 96.387 |
| Water Level: | | 4.998 | 96.234 | 4.995 | 96.233 | 96.234 |
| Transducer: | | 0.635 | 95.599 | 0.635 | 95.598 | 95.599 |
| Other: | | | | | | |

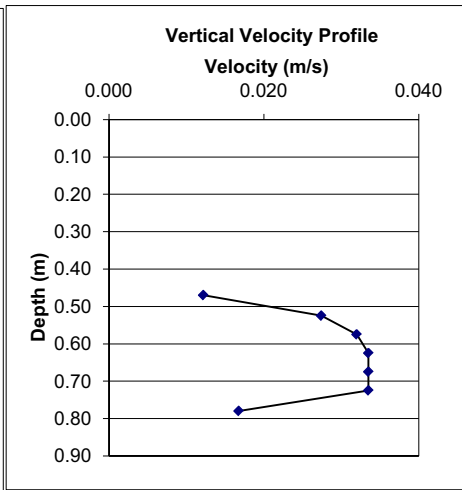
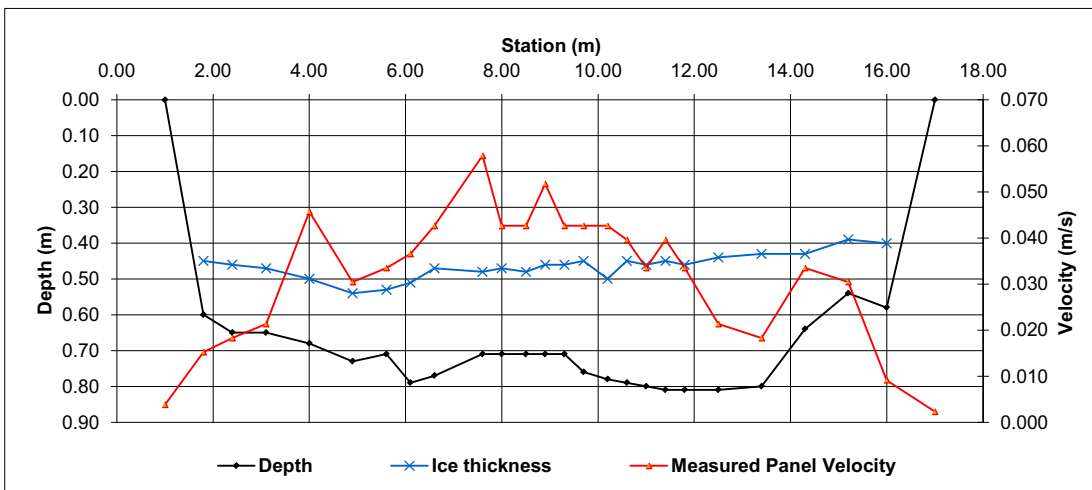
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|-----------------------|
| General Notes: |
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| Flow Measurement: | | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 1.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.00 | 1.40 | 0.40 | 0.04 | 0.004 | 0.003 | 0.02 | 0.000 | 0% | |
| 1 | 1.80 | 0.60 | 0.45 | 0.015 | | | 0.9 | 1.40 | 2.10 | 0.70 | 0.15 | 0.015 | 0.014 | 0.11 | 0.001 | 1% | |
| 2 | 2.40 | 0.65 | 0.46 | 0.018 | | | 0.9 | 2.10 | 2.75 | 0.65 | 0.19 | 0.018 | 0.016 | 0.12 | 0.002 | 2% | |
| 3 | 3.10 | 0.65 | 0.47 | 0.021 | | | 0.9 | 2.75 | 3.55 | 0.80 | 0.18 | 0.021 | 0.019 | 0.14 | 0.003 | 3% | |
| 4 | 4.00 | 0.68 | 0.50 | 0.046 | | | 0.9 | 3.55 | 4.45 | 0.90 | 0.18 | 0.046 | 0.041 | 0.16 | 0.007 | 6% | |
| 5 | 4.90 | 0.73 | 0.54 | 0.030 | | | 0.9 | 4.45 | 5.25 | 0.80 | 0.19 | 0.030 | 0.027 | 0.15 | 0.004 | 4% | |
| 6 | 5.60 | 0.71 | 0.53 | 0.034 | | | 0.9 | 5.25 | 5.85 | 0.60 | 0.18 | 0.034 | 0.030 | 0.11 | 0.003 | 3% | |
| 7 | 6.10 | 0.79 | 0.51 | 0.037 | | | 0.9 | 5.85 | 6.35 | 0.50 | 0.28 | 0.037 | 0.033 | 0.14 | 0.005 | 4% | |
| 8 | 6.60 | 0.77 | 0.47 | 0.043 | | | 0.9 | 6.35 | 7.10 | 0.75 | 0.30 | 0.043 | 0.038 | 0.23 | 0.009 | 8% | |
| 9 | 7.60 | 0.71 | 0.48 | 0.058 | | | 0.9 | 7.10 | 7.80 | 0.70 | 0.23 | 0.058 | 0.052 | 0.16 | 0.008 | 8% | |
| 10 | 8.00 | 0.71 | 0.47 | 0.043 | | | 0.9 | 7.80 | 8.25 | 0.45 | 0.24 | 0.043 | 0.038 | 0.11 | 0.004 | 4% | |
| 11 | 8.50 | 0.71 | 0.48 | 0.043 | | | 0.9 | 8.25 | 8.70 | 0.45 | 0.23 | 0.043 | 0.038 | 0.10 | 0.004 | 4% | |
| 12 | 8.90 | 0.71 | 0.46 | 0.052 | | | 0.9 | 8.70 | 9.10 | 0.40 | 0.25 | 0.052 | 0.047 | 0.10 | 0.005 | 4% | |
| 13 | 9.30 | 0.71 | 0.46 | 0.043 | | | 0.9 | 9.10 | 9.50 | 0.40 | 0.25 | 0.043 | 0.038 | 0.10 | 0.004 | 3% | |
| 14 | 9.70 | 0.76 | 0.45 | 0.043 | | | 0.9 | 9.50 | 9.95 | 0.45 | 0.31 | 0.043 | 0.038 | 0.14 | 0.005 | 5% | |
| 15 | 10.20 | 0.78 | 0.50 | 0.043 | | | 0.9 | 9.95 | 10.40 | 0.45 | 0.28 | 0.043 | 0.038 | 0.13 | 0.005 | 4% | |
| 16 | 10.60 | 0.79 | 0.45 | 0.040 | | | 0.9 | 10.40 | 10.80 | 0.40 | 0.34 | 0.040 | 0.036 | 0.14 | 0.005 | 4% | |
| 17 | 11.00 | 0.80 | 0.46 | 0.034 | | | 0.9 | 10.80 | 11.20 | 0.40 | 0.34 | 0.034 | 0.030 | 0.14 | 0.004 | 4% | |
| 18 | 11.40 | 0.81 | 0.45 | 0.040 | | | 0.9 | 11.20 | 11.60 | 0.40 | 0.36 | 0.040 | 0.036 | 0.14 | 0.005 | 5% | |
| 19 | 11.80 | 0.81 | 0.46 | 0.034 | | | 0.9 | 11.60 | 12.15 | 0.55 | 0.35 | 0.034 | 0.030 | 0.19 | 0.006 | 5% | |
| 20 | 12.50 | 0.81 | 0.44 | 0.021 | | | 0.9 | 12.15 | 12.95 | 0.80 | 0.37 | 0.021 | 0.019 | 0.30 | 0.006 | 5% | |
| 21 | 13.40 | 0.80 | 0.43 | 0.018 | | | 0.9 | 12.95 | 13.85 | 0.90 | 0.37 | 0.018 | 0.016 | 0.33 | 0.005 | 5% | |
| 22 | 14.30 | 0.64 | 0.43 | 0.034 | | | 0.9 | 13.85 | 14.75 | 0.90 | 0.21 | 0.034 | 0.030 | 0.19 | 0.006 | 5% | |
| 23 | 15.20 | 0.54 | 0.39 | 0.030 | | | 0.9 | 14.75 | 15.60 | 0.85 | 0.15 | 0.030 | 0.027 | 0.13 | 0.003 | 3% | |
| 24 | 16.00 | 0.58 | 0.40 | 0.009 | | | 0.9 | 15.60 | 16.50 | 0.90 | 0.18 | 0.009 | 0.008 | 0.16 | 0.001 | 1% | |
| Right | 17.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 16.50 | 17.00 | 0.50 | 0.05 | 0.002 | 0.002 | 0.02 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.110 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.110 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 3.75 | (m ²) |
| Wetted Width: | 16.00 | (m) |
| Hydraulic Depth: | 0.234 | (m) |
| Mean Velocity: | 0.029 | (m/s) |
| Foude Number: | 0.019 | |

| Velocity Profile for Ice Conditions: | | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.029 | |
| Offset | 12.5 | 0.81 | 0 | - | - | Panel V.@Ofst | 0.021 |
| Depth | 0.81 | 0.75 | 0.034 | 0.78 | 0.017 | 60% Depth | 0.662 |
| Ice Depth | 0.44 | 0.70 | 0.034 | 0.73 | 0.034 | 20% Depth | 0.51 |
| | | 0.65 | 0.034 | 0.68 | 0.034 | 80% Depth | 0.74 |
| | | 0.60 | 0.034 | 0.63 | 0.034 | | |
| | | 0.55 | 0.030 | 0.58 | 0.032 | | |
| | | 0.50 | 0.024 | 0.53 | 0.027 | | |
| | | 0.44 | 0.000 | 0.47 | 0.012 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S40 - MacKay River at Petro-Canada Bridge (445023 E, 6314256 N) | | | |
| Field Personnel: | GB, JE | Trip Date: | 15-Feb-10 |
| Data Entry Personnel: | SG | Date: | 19-Feb-10 |
| Data Check Personnel: | DB | Date: | 15-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.823 |
| Battery (Main): | 13.19 |
| Battery (Aux): | NA |
| Datalogger Clock: | 918 |
| Laptop Clock: | 917 |
| Air Temp: | -7.33 |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.2 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 956 |
| End Time (MST): | 1018 |
| Equipment: | ADV Other: Marsh |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | clear -7 C |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe, w/flag, behind lggr | 1.075 | 100.000 | 1.068 | 100.000 | - |
| Bench Mark 2: | T-post on second bench | 1.208 | 97.893 | 1.200 | 97.893 | - |
| Top of Ice: | | 4.615 | 96.460 | 4.605 | 96.463 | 96.462 |
| Water Level: | | 4.662 | 96.413 | 4.660 | 96.408 | 96.411 |
| Transducer: | | 0.823 | 95.590 | 0.823 | 95.585 | 95.588 |
| Other: | | | | | | |

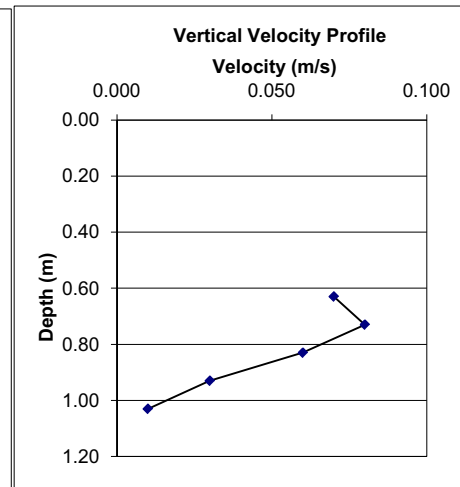
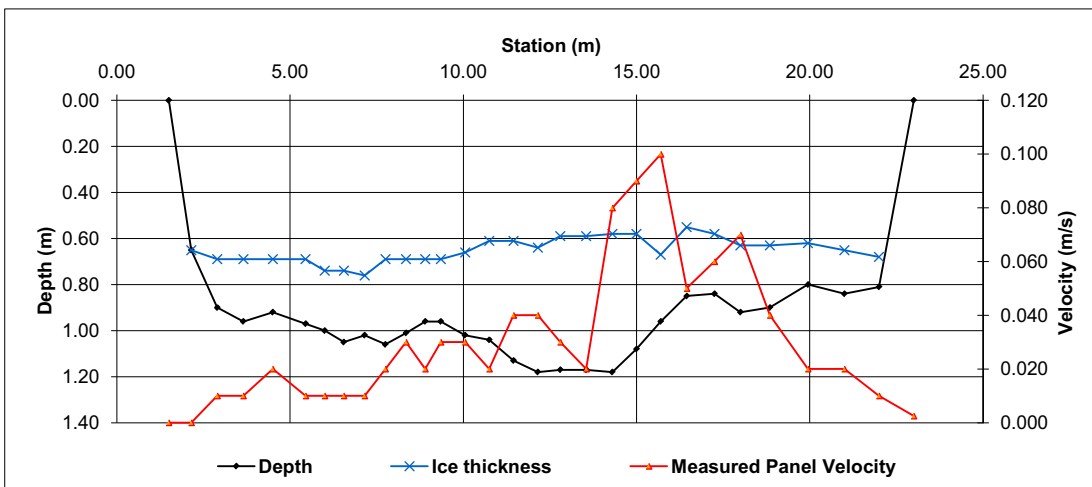
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 1.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.50 | 1.83 | 0.33 | 0.00 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| 1 | 2.15 | 0.65 | 0.65 | 0.000 | | | 1.0 | 1.83 | 2.53 | 0.70 | 0.00 | 0.000 | 0.000 | 0.00 | 0.000 | 0% | |
| 2 | 2.90 | 0.90 | 0.69 | 0.010 | | | 0.9 | 2.53 | 3.28 | 0.75 | 0.21 | 0.010 | 0.009 | 0.16 | 0.001 | 1% | |
| 3 | 3.65 | 0.96 | 0.69 | 0.010 | | | 0.9 | 3.28 | 4.08 | 0.80 | 0.27 | 0.010 | 0.009 | 0.22 | 0.002 | 1% | |
| 4 | 4.50 | 0.92 | 0.69 | 0.020 | | | 0.9 | 4.08 | 4.98 | 0.90 | 0.23 | 0.020 | 0.018 | 0.21 | 0.004 | 2% | |
| 5 | 5.45 | 0.97 | 0.69 | 0.010 | | | 0.9 | 4.98 | 5.73 | 0.75 | 0.28 | 0.010 | 0.009 | 0.21 | 0.002 | 1% | |
| 6 | 6.00 | 1.00 | 0.74 | 0.010 | | | 0.9 | 5.73 | 6.28 | 0.55 | 0.26 | 0.010 | 0.009 | 0.14 | 0.001 | 1% | |
| 7 | 6.55 | 1.05 | 0.74 | 0.010 | | | 0.9 | 6.28 | 6.85 | 0.57 | 0.31 | 0.010 | 0.009 | 0.18 | 0.002 | 1% | |
| 8 | 7.15 | 1.02 | 0.76 | 0.010 | | | 0.9 | 6.85 | 7.45 | 0.60 | 0.26 | 0.010 | 0.009 | 0.16 | 0.001 | 1% | |
| 9 | 7.75 | 1.06 | 0.69 | 0.020 | | | 0.9 | 7.45 | 8.05 | 0.60 | 0.37 | 0.020 | 0.018 | 0.22 | 0.004 | 2% | |
| 10 | 8.35 | 1.01 | 0.69 | 0.030 | | | 0.9 | 8.05 | 8.63 | 0.57 | 0.32 | 0.030 | 0.027 | 0.18 | 0.005 | 2% | |
| 11 | 8.90 | 0.96 | 0.69 | 0.020 | | | 0.9 | 8.63 | 9.13 | 0.50 | 0.27 | 0.020 | 0.018 | 0.14 | 0.002 | 1% | |
| 12 | 9.35 | 0.96 | 0.69 | 0.030 | | | 0.9 | 9.13 | 9.70 | 0.57 | 0.27 | 0.030 | 0.027 | 0.16 | 0.004 | 2% | |
| 13 | 10.05 | 1.02 | 0.66 | 0.030 | | | 0.9 | 9.70 | 10.40 | 0.70 | 0.36 | 0.030 | 0.027 | 0.25 | 0.007 | 3% | |
| 14 | 10.75 | 1.04 | 0.61 | 0.020 | | | 0.9 | 10.40 | 11.10 | 0.70 | 0.43 | 0.020 | 0.018 | 0.30 | 0.005 | 2% | |
| 15 | 11.45 | 1.13 | 0.61 | 0.040 | | | 0.9 | 11.10 | 11.80 | 0.70 | 0.52 | 0.040 | 0.036 | 0.36 | 0.013 | 6% | |
| 16 | 12.15 | 1.18 | 0.64 | 0.040 | | | 0.9 | 11.80 | 12.48 | 0.68 | 0.54 | 0.040 | 0.036 | 0.36 | 0.013 | 6% | |
| 17 | 12.80 | 1.17 | 0.59 | 0.030 | | | 0.9 | 12.48 | 13.18 | 0.70 | 0.58 | 0.030 | 0.027 | 0.41 | 0.011 | 5% | |
| 18 | 13.55 | 1.17 | 0.59 | 0.020 | | | 0.9 | 13.18 | 13.93 | 0.75 | 0.58 | 0.020 | 0.018 | 0.44 | 0.008 | 4% | |
| 19 | 14.30 | 1.18 | 0.58 | 0.080 | | | 0.9 | 13.93 | 14.65 | 0.73 | 0.60 | 0.080 | 0.072 | 0.44 | 0.031 | 14% | |
| 20 | 15.00 | 1.08 | 0.58 | 0.090 | | | 0.9 | 14.65 | 15.35 | 0.70 | 0.50 | 0.090 | 0.081 | 0.35 | 0.028 | 13% | |
| 21 | 15.70 | 0.96 | 0.67 | 0.100 | | | 0.9 | 15.35 | 16.08 | 0.73 | 0.29 | 0.100 | 0.090 | 0.21 | 0.019 | 9% | |
| 22 | 16.45 | 0.85 | 0.55 | 0.050 | | | 0.9 | 16.08 | 16.85 | 0.78 | 0.30 | 0.050 | 0.045 | 0.23 | 0.010 | 5% | |
| 23 | 17.25 | 0.84 | 0.58 | 0.060 | | | 0.9 | 16.85 | 17.63 | 0.77 | 0.26 | 0.060 | 0.054 | 0.20 | 0.011 | 5% | |
| 24 | 18.00 | 0.92 | 0.63 | 0.070 | | | 0.9 | 17.63 | 18.43 | 0.80 | 0.29 | 0.070 | 0.063 | 0.23 | 0.015 | 7% | |
| 25 | 18.85 | 0.90 | 0.63 | 0.040 | | | 0.9 | 18.43 | 19.40 | 0.97 | 0.27 | 0.040 | 0.036 | 0.26 | 0.009 | 4% | |
| 26 | 19.95 | 0.80 | 0.62 | 0.020 | | | 0.9 | 19.40 | 20.48 | 1.08 | 0.18 | 0.020 | 0.018 | 0.19 | 0.003 | 2% | |
| 27 | 21.00 | 0.84 | 0.65 | 0.020 | | | 0.9 | 20.48 | 21.50 | 1.03 | 0.19 | 0.020 | 0.018 | 0.19 | 0.004 | 2% | |
| 28 | 22.00 | 0.81 | 0.68 | 0.010 | | | 0.9 | 21.50 | 22.50 | 1.00 | 0.13 | 0.010 | 0.009 | 0.13 | 0.001 | 1% | |
| Left | 23.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 22.50 | 23.00 | 0.50 | 0.03 | 0.003 | 0.003 | 0.02 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 0.218 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.218 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 6.55 | (m ²) |
| Wetted Width: | 21.50 | (m) |
| Hydraulic Depth: | 0.304 | (m) |
| Mean Velocity: | 0.033 | (m/s) |
| Foude Number: | 0.019 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|----------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.050 |
| Offset | 15 | 1.08 | 0 | - | Panel V. @Ofst | 0.09 |
| Depth | 1.08 | 0.98 | 0.020 | 1.03 | 60% Depth | 0.88 |
| Ice Depth | 0.58 | 0.88 | 0.040 | 0.93 | 20% Depth | 0.68 |
| | | 0.78 | 0.080 | 0.83 | 80% Depth | 0.98 |
| | | 0.68 | 0.080 | 0.73 | | |
| | | 0.58 | 0.060 | 0.63 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S40 - MacKay River at Petro-Canada Bridge (445023 E, 6314256 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 04-Mar-10 |
| Data Entry Personnel: | SG | Date: | 18-Mar-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.735 |
| Battery (Main): | 14.29 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1619 |
| Laptop Clock: | 1617 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.2 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1700 |
| End Time (MST): | 1730 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Water on Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Sunny 10°C |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe, w/flag, behind lggr | 1.190 | 100.000 | 1.167 | 100.000 | - |
| Bench Mark 2: | T-post on second bench | 3.282 | 97.893 | 3.258 | 97.893 | - |
| Top of Ice: | | 4.731 | 96.459 | 4.735 | 96.432 | 96.446 |
| Water Level: | | 4.860 | 96.330 | 4.840 | 96.327 | 96.329 |
| Transducer: | | 0.735 | 95.595 | 0.735 | 95.592 | 95.594 |
| Other: | | | | | | |

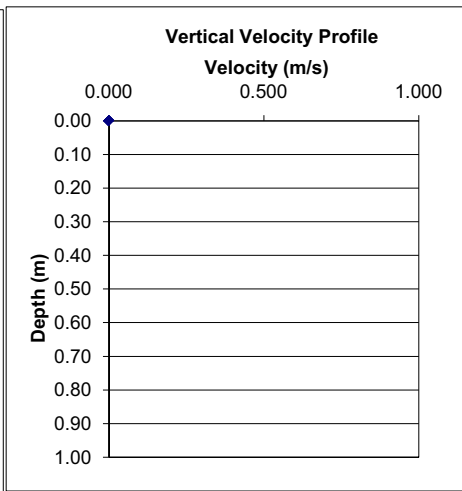
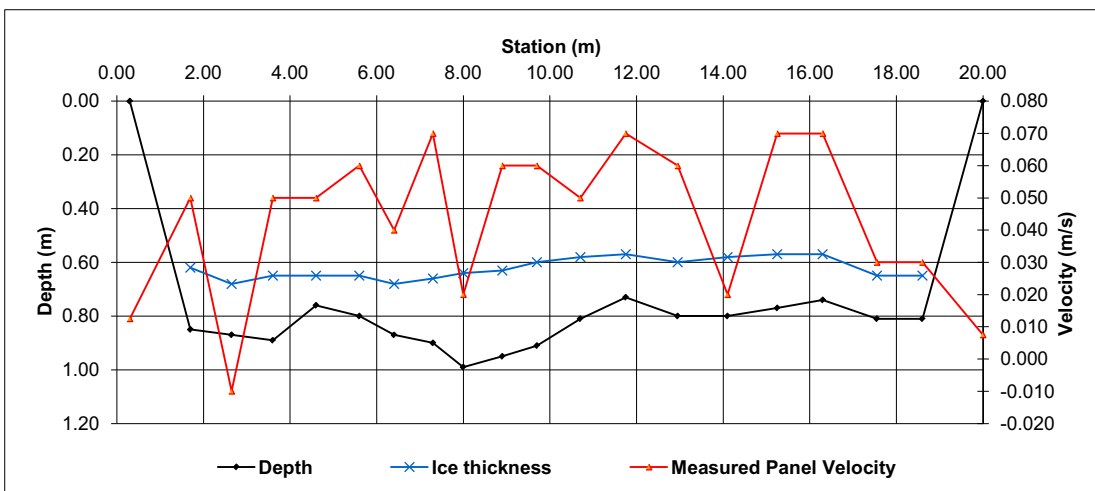
| |
|-----------------------|
| General Notes: |
|-----------------------|

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|------------------|-------------------------|--------------------------|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m²) | Pannel Discharge (m³/s) | Percentage of total flow | | |
| Left | 0.30 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 0.30 | 1.00 | 0.70 | 0.06 | 0.013 | 0.011 | 0.04 | 0.000 | 0% | | |
| 1 | 1.70 | 0.85 | 0.62 | 0.050 | | | 0.9 | 1.00 | 2.18 | 1.18 | 0.23 | 0.050 | 0.045 | 0.27 | 0.012 | 7% | | |
| 2 | 2.65 | 0.87 | 0.68 | -0.010 | | | 0.9 | 2.18 | 3.13 | 0.95 | 0.19 | -0.010 | -0.009 | 0.18 | -0.002 | -1% | | |
| 3 | 3.60 | 0.89 | 0.65 | 0.050 | | | 0.9 | 3.13 | 4.10 | 0.98 | 0.24 | 0.050 | 0.045 | 0.23 | 0.011 | 6% | | |
| 4 | 4.60 | 0.76 | 0.65 | 0.050 | | | 0.9 | 4.10 | 5.10 | 1.00 | 0.11 | 0.050 | 0.045 | 0.11 | 0.005 | 3% | | |
| 5 | 5.60 | 0.80 | 0.65 | 0.060 | | | 0.9 | 5.10 | 6.00 | 0.90 | 0.15 | 0.060 | 0.054 | 0.14 | 0.007 | 4% | | |
| 6 | 6.40 | 0.87 | 0.68 | 0.040 | | | 0.9 | 6.00 | 6.85 | 0.85 | 0.19 | 0.040 | 0.036 | 0.16 | 0.006 | 4% | | |
| 7 | 7.30 | 0.90 | 0.66 | 0.070 | | | 0.9 | 6.85 | 7.65 | 0.80 | 0.24 | 0.070 | 0.063 | 0.19 | 0.012 | 7% | | |
| 8 | 8.00 | 0.99 | 0.64 | 0.020 | | | 0.9 | 7.65 | 8.45 | 0.80 | 0.35 | 0.020 | 0.018 | 0.28 | 0.005 | 3% | | |
| 9 | 8.90 | 0.95 | 0.63 | 0.060 | | | 0.9 | 8.45 | 9.30 | 0.85 | 0.32 | 0.060 | 0.054 | 0.27 | 0.015 | 9% | | |
| 10 | 9.70 | 0.91 | 0.60 | 0.060 | | | 0.9 | 9.30 | 10.20 | 0.90 | 0.31 | 0.060 | 0.054 | 0.28 | 0.015 | 9% | | |
| 11 | 10.70 | 0.81 | 0.58 | 0.050 | | | 0.9 | 10.20 | 11.23 | 1.03 | 0.23 | 0.050 | 0.045 | 0.24 | 0.011 | 7% | | |
| 12 | 11.75 | 0.73 | 0.57 | 0.070 | | | 0.9 | 11.23 | 12.35 | 1.13 | 0.16 | 0.070 | 0.063 | 0.18 | 0.011 | 7% | | |
| 13 | 12.95 | 0.80 | 0.60 | 0.060 | | | 0.9 | 12.35 | 13.53 | 1.18 | 0.20 | 0.060 | 0.054 | 0.24 | 0.013 | 8% | | |
| 14 | 14.10 | 0.80 | 0.58 | 0.020 | | | 0.9 | 13.53 | 14.68 | 1.15 | 0.22 | 0.020 | 0.018 | 0.25 | 0.005 | 3% | | |
| 15 | 15.25 | 0.77 | 0.57 | 0.070 | | | 0.9 | 14.68 | 15.78 | 1.10 | 0.20 | 0.070 | 0.063 | 0.22 | 0.014 | 9% | | |
| 16 | 16.30 | 0.74 | 0.57 | 0.070 | | | 0.9 | 15.78 | 16.93 | 1.15 | 0.17 | 0.070 | 0.063 | 0.20 | 0.012 | 8% | | |
| 17 | 17.55 | 0.81 | 0.65 | 0.030 | | | 0.9 | 16.93 | 18.08 | 1.15 | 0.16 | 0.030 | 0.027 | 0.18 | 0.005 | 3% | | |
| 18 | 18.60 | 0.81 | 0.65 | 0.030 | | | 0.9 | 18.08 | 19.30 | 1.23 | 0.16 | 0.030 | 0.027 | 0.20 | 0.005 | 3% | | |
| Right | 20.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 19.30 | 20.00 | 0.70 | 0.04 | 0.008 | 0.008 | 0.03 | 0.000 | 0% | | |
| Total Flow | | | | | | | | | | | | | | 0.162 | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|--------|
| Flow characteristics: | | |
| Total Flow: | 0.162 | (m³/s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 3.88 | (m²) |
| Wetted Width: | 19.70 | (m) |
| Hydraulic Depth: | 0.197 | (m) |
| Mean Velocity: | 0.042 | (m/s) |
| Foude Number: | 0.030 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S40 - MacKay River at Petro-Canada Bridge (445023 E, 6314256 N) | | | |
| Field Personnel: | DB CE | Trip Date: | 07-Apr-10 |
| Data Entry Personnel: | DB | Date: | 10-Apr-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.949 |
| Battery (Main): | |
| Battery (Aux): | 14.27 |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | |
| Memory used: | NA |
| Dessicant: | changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|------------------------------------|
| Measurement Details: | |
| Start Time (MST): | 1610 |
| End Time (MST): | 1630 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Broken Ice (more open near bridge) |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe, w/flag, behind lggr | 0.907 | 100.000 | 1.175 | 100.000 | - |
| Bench Mark 2: | T-post on second bench | 1.035 | 97.893 | 1.305 | 97.893 | - |
| Top of Ice: | | 3.001 | 97.906 | 3.274 | 97.901 | 97.904 |
| Water Level: | | 4.382 | 96.525 | 4.655 | 96.520 | 96.523 |
| Transducer: | | 0.949 | 95.576 | 0.949 | 95.571 | 95.574 |
| Other: | | | | | | |

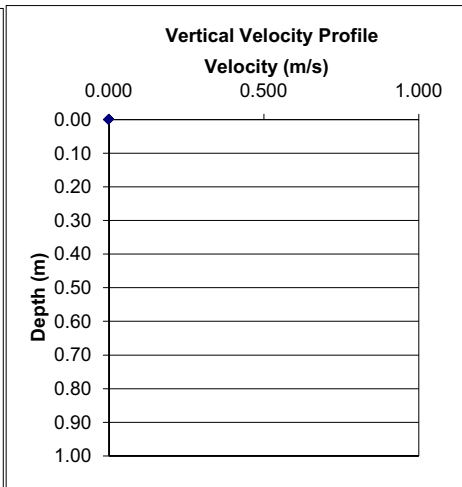
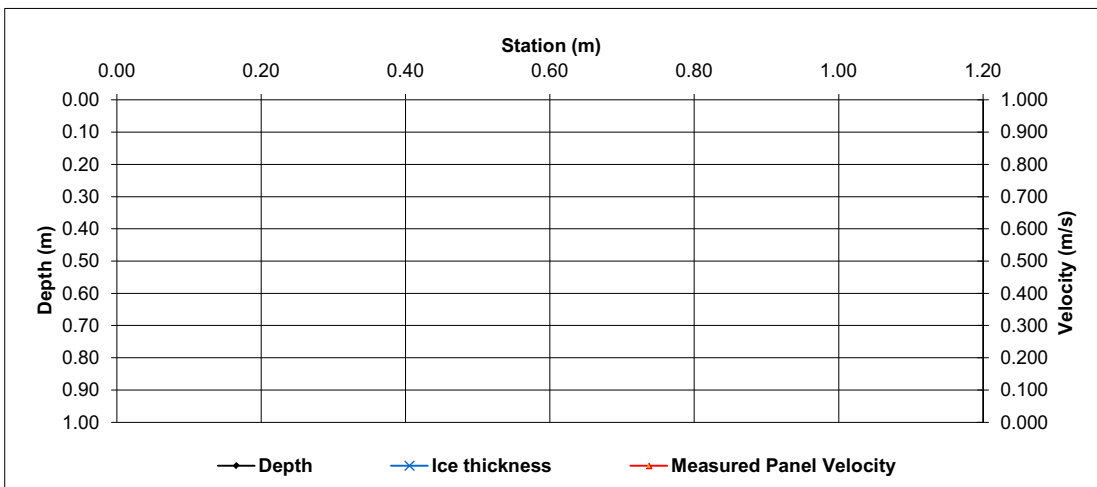
General Notes:
Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|--------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Foude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S40 - MacKay River at Petro-Canada Bridge (445023 E, 6314256 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 27-Apr-10 |
| Data Entry Personnel: | DB | Date: | 30-Apr-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.113 |
| Battery (Main): | 14.2 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1618 |
| Laptop Clock: | 1617 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 5.9 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|------------------|
| Measurement Details: | |
| Start Time (MST): | 1630 |
| End Time (MST): | 1735 |
| Equipment: | ADV + FlowMate |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly open 10°C |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|---------|
| Position | Description | Setup 1 | | Setup 2 | | Average |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe, w/flag, behind lggr | 1.134 | 100.000 | 1.111 | 100.000 | - |
| Bench Mark 2: | T-post on second bench | 3.232 | 97.893 | 3.206 | 97.893 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 4.460 | 96.674 | 4.435 | 96.676 | 96.675 |
| Transducer: | | 1.113 | 95.561 | 1.113 | 95.563 | 95.562 |
| Other: | | | | | | |

General Notes:

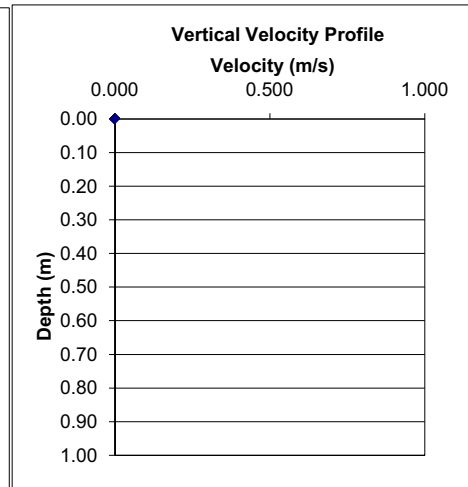
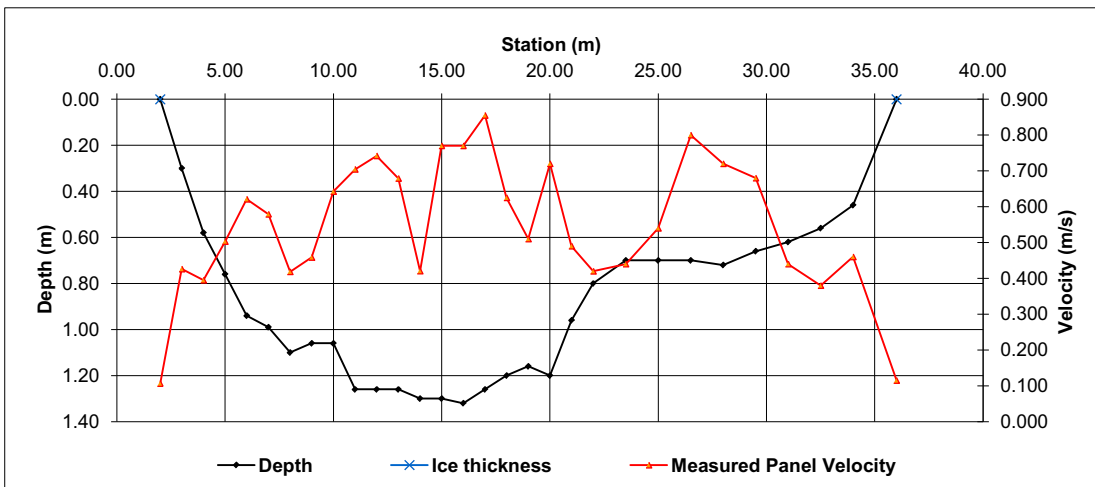
ADV used partway until offset 14m ; Flowmate after that. In hindsight the 0 velocity @ 14m was due to eddy behind big boulder (couldn't see due to water level); ADV probably working fine in this instance

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 2.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.00 | 2.50 | 0.50 | 0.08 | 0.107 | 0.107 | 0.04 | 0.004 | 0% | |
| 1 | 3.00 | 0.30 | | 0.426 | | | 1.0 | 2.50 | 3.50 | 1.00 | 0.30 | 0.426 | 0.426 | 0.30 | 0.128 | 1% | |
| 2 | 4.00 | 0.58 | | 0.395 | | | 1.0 | 3.50 | 4.50 | 1.00 | 0.58 | 0.395 | 0.395 | 0.58 | 0.229 | 1% | |
| 3 | 5.00 | 0.76 | | 0.503 | | | 1.0 | 4.50 | 5.50 | 1.00 | 0.76 | 0.503 | 0.503 | 0.76 | 0.382 | 2% | |
| 4 | 6.00 | 0.94 | | 0.621 | | | 1.0 | 5.50 | 6.50 | 1.00 | 0.94 | 0.621 | 0.621 | 0.94 | 0.584 | 3% | |
| 5 | 7.00 | 0.99 | | 0.579 | | | 1.0 | 6.50 | 7.50 | 1.00 | 0.99 | 0.579 | 0.579 | 0.99 | 0.573 | 3% | |
| 6 | 8.00 | 1.10 | | | 0.317 | 0.520 | 1.0 | 7.50 | 8.50 | 1.00 | 1.10 | 0.419 | 0.419 | 1.10 | 0.460 | 3% | |
| 7 | 9.00 | 1.06 | | | 0.453 | 0.464 | 1.0 | 8.50 | 9.50 | 1.00 | 1.06 | 0.459 | 0.459 | 1.06 | 0.486 | 3% | |
| 8 | 10.00 | 1.06 | | | 0.624 | 0.661 | 1.0 | 9.50 | 10.50 | 1.00 | 1.06 | 0.643 | 0.643 | 1.06 | 0.681 | 4% | |
| 9 | 11.00 | 1.26 | | | 0.616 | 0.793 | 1.0 | 10.50 | 11.50 | 1.00 | 1.26 | 0.705 | 0.705 | 1.26 | 0.888 | 5% | |
| 10 | 12.00 | 1.26 | | | 0.684 | 0.800 | 1.0 | 11.50 | 12.50 | 1.00 | 1.26 | 0.742 | 0.742 | 1.26 | 0.935 | 5% | |
| 11 | 13.00 | 1.26 | | | 0.520 | 0.838 | 1.0 | 12.50 | 13.50 | 1.00 | 1.26 | 0.679 | 0.679 | 1.26 | 0.856 | 5% | |
| 12 | 14.00 | 1.30 | | | 0.001 | 0.840 | 1.0 | 13.50 | 14.50 | 1.00 | 1.30 | 0.421 | 0.421 | 1.30 | 0.547 | 3% | |
| 13 | 15.00 | 1.30 | | | 0.660 | 0.880 | 1.0 | 14.50 | 15.50 | 1.00 | 1.30 | 0.770 | 0.770 | 1.30 | 1.001 | 6% | |
| 14 | 16.00 | 1.32 | | | 0.740 | 0.800 | 1.0 | 15.50 | 16.50 | 1.00 | 1.32 | 0.770 | 0.770 | 1.32 | 1.016 | 6% | |
| 15 | 17.00 | 1.26 | | | 0.830 | 0.880 | 1.0 | 16.50 | 17.50 | 1.00 | 1.26 | 0.855 | 0.855 | 1.26 | 1.077 | 6% | |
| 16 | 18.00 | 1.20 | | | 0.430 | 0.820 | 1.0 | 17.50 | 18.50 | 1.00 | 1.20 | 0.625 | 0.625 | 1.20 | 0.750 | 4% | |
| 17 | 19.00 | 1.16 | | | 0.420 | 0.600 | 1.0 | 18.50 | 19.50 | 1.00 | 1.16 | 0.510 | 0.510 | 1.16 | 0.592 | 3% | |
| 18 | 20.00 | 1.20 | | | 0.620 | 0.820 | 1.0 | 19.50 | 20.50 | 1.00 | 1.20 | 0.720 | 0.720 | 1.20 | 0.864 | 5% | |
| 19 | 21.00 | 0.96 | | 0.490 | | | 1.0 | 20.50 | 21.50 | 1.00 | 0.96 | 0.490 | 0.490 | 0.96 | 0.470 | 3% | |
| 20 | 22.00 | 0.80 | | 0.420 | | | 1.0 | 21.50 | 22.75 | 1.25 | 0.80 | 0.420 | 0.420 | 1.00 | 0.420 | 2% | |
| 21 | 23.50 | 0.70 | | 0.440 | | | 1.0 | 22.75 | 24.25 | 1.50 | 0.70 | 0.440 | 0.440 | 1.05 | 0.462 | 3% | |
| 22 | 25.00 | 0.70 | | 0.540 | | | 1.0 | 24.25 | 25.75 | 1.50 | 0.70 | 0.540 | 0.540 | 1.05 | 0.567 | 3% | |
| 23 | 26.50 | 0.70 | | 0.800 | | | 1.0 | 25.75 | 27.25 | 1.50 | 0.70 | 0.800 | 0.800 | 1.05 | 0.840 | 5% | |
| 24 | 28.00 | 0.72 | | 0.720 | | | 1.0 | 27.25 | 28.75 | 1.50 | 0.72 | 0.720 | 0.720 | 1.08 | 0.778 | 4% | |
| 25 | 29.50 | 0.66 | | 0.680 | | | 1.0 | 28.75 | 30.25 | 1.50 | 0.66 | 0.680 | 0.680 | 0.99 | 0.673 | 4% | |
| 26 | 31.00 | 0.62 | | 0.440 | | | 1.0 | 30.25 | 31.75 | 1.50 | 0.62 | 0.440 | 0.440 | 0.93 | 0.409 | 2% | |
| 27 | 32.50 | 0.56 | | 0.380 | | | 1.0 | 31.75 | 33.25 | 1.50 | 0.56 | 0.380 | 0.380 | 0.84 | 0.319 | 2% | |
| 28 | 34.00 | 0.46 | | 0.460 | | | 1.0 | 33.25 | 35.00 | 1.75 | 0.46 | 0.460 | 0.460 | 0.81 | 0.370 | 2% | |
| Left | 36.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 35.00 | 36.00 | 1.00 | 0.12 | 0.115 | 0.115 | 0.12 | 0.013 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 17.375 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 17.375 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 29.22 | (m ²) |
| Wetted Width: | 34.00 | (m) |
| Hydraulic Depth: | 0.859 | (m) |
| Mean Velocity: | 0.595 | (m/s) |
| Foude Number: | 0.205 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S40 - MacKay River at Petro-Canada Bridge (445023 E, 6314256 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 30-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 16-Jul-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.807 |
| Battery (Main): | 14.09 |
| Battery (Aux): | NA |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 19.2 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 920 |
| End Time (MST): | 1040 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe, w/flag, behind lggr | 1.186 | 100.000 | 1.182 | 100.000 | - |
| Bench Mark 2: | T-post on second bench | 1.315 | 97.893 | 1.311 | 97.893 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 4.816 | 96.370 | 4.813 | 96.369 | 96.370 |
| Transducer: | | 0.807 | 95.563 | 0.807 | 95.562 | 95.563 |
| Other: | | | | | | |

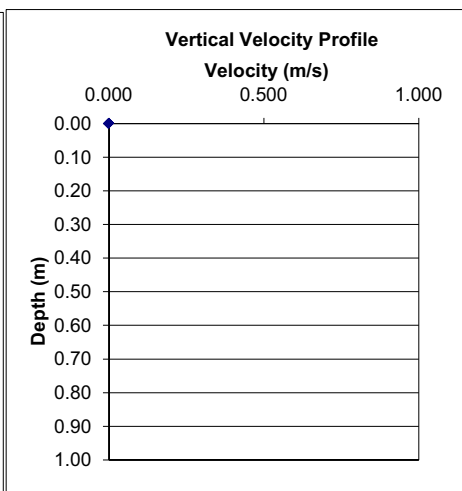
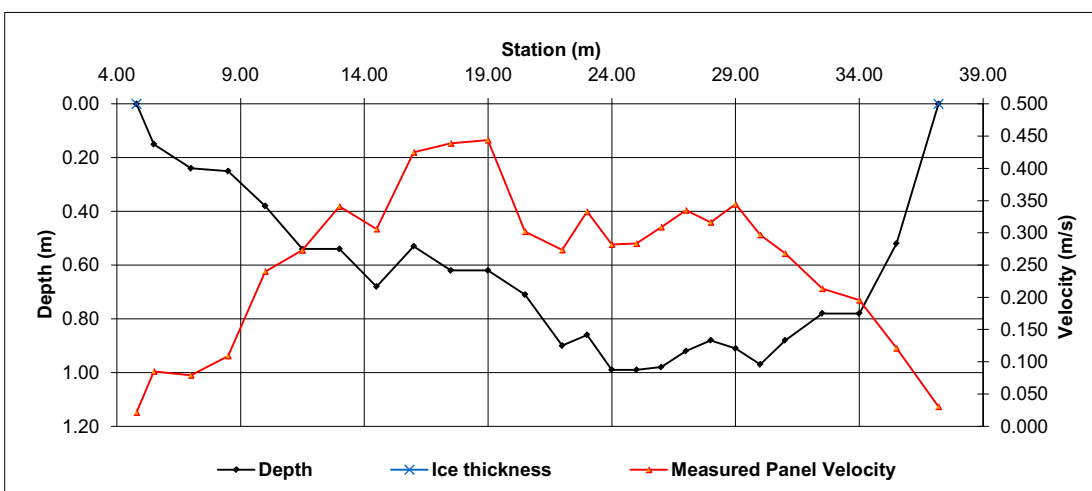
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 37.20 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 37.20 | 36.35 | 0.85 | 0.13 | 0.030 | 0.030 | 0.11 | 0.003 | 0% | |
| 1 | 35.50 | 0.52 | | 0.121 | | | 1.0 | 36.35 | 34.75 | 1.60 | 0.52 | 0.121 | 0.121 | 0.83 | 0.101 | 2% | |
| 2 | 34.00 | 0.78 | | | 0.178 | 0.213 | 1.0 | 34.75 | 33.25 | 1.50 | 0.78 | 0.196 | 0.196 | 1.17 | 0.229 | 4% | |
| 3 | 32.50 | 0.78 | | | 0.245 | 0.182 | 1.0 | 33.25 | 31.75 | 1.50 | 0.78 | 0.214 | 0.214 | 1.17 | 0.250 | 4% | |
| 4 | 31.00 | 0.88 | | | 0.239 | 0.297 | 1.0 | 31.75 | 30.50 | 1.25 | 0.88 | 0.268 | 0.268 | 1.10 | 0.295 | 5% | |
| 5 | 30.00 | 0.97 | | | 0.249 | 0.345 | 1.0 | 30.50 | 29.50 | 1.00 | 0.97 | 0.297 | 0.297 | 0.97 | 0.288 | 5% | |
| 6 | 29.00 | 0.91 | | | 0.203 | 0.386 | 1.0 | 29.50 | 28.50 | 1.00 | 0.91 | 0.345 | 0.345 | 0.91 | 0.313 | 5% | |
| 7 | 28.00 | 0.88 | | | 0.290 | 0.343 | 1.0 | 28.50 | 27.50 | 1.00 | 0.88 | 0.317 | 0.317 | 0.88 | 0.279 | 5% | |
| 8 | 27.00 | 0.92 | | | 0.265 | 0.405 | 1.0 | 27.50 | 26.50 | 1.00 | 0.92 | 0.335 | 0.335 | 0.92 | 0.308 | 5% | |
| 9 | 26.00 | 0.98 | | | 0.276 | 0.342 | 1.0 | 26.50 | 25.50 | 1.00 | 0.98 | 0.309 | 0.309 | 0.98 | 0.303 | 5% | |
| 10 | 25.00 | 0.99 | | | 0.219 | 0.348 | 1.0 | 25.50 | 24.50 | 1.00 | 0.99 | 0.284 | 0.284 | 0.99 | 0.281 | 5% | |
| 11 | 24.00 | 0.99 | | | 0.206 | 0.358 | 1.0 | 24.50 | 23.50 | 1.00 | 0.99 | 0.282 | 0.282 | 0.99 | 0.279 | 5% | |
| 12 | 23.00 | 0.86 | | | 0.263 | 0.403 | 1.0 | 23.50 | 22.50 | 1.00 | 0.86 | 0.333 | 0.333 | 0.86 | 0.286 | 5% | |
| 13 | 22.00 | 0.90 | | | 0.251 | 0.296 | 1.0 | 22.50 | 21.25 | 1.25 | 0.90 | 0.274 | 0.274 | 1.13 | 0.308 | 5% | |
| 14 | 20.50 | 0.71 | | 0.302 | | | 1.0 | 21.25 | 19.75 | 1.50 | 0.71 | 0.302 | 0.302 | 1.07 | 0.322 | 5% | |
| 15 | 19.00 | 0.62 | | 0.444 | | | 1.0 | 19.75 | 18.25 | 1.50 | 0.62 | 0.444 | 0.444 | 0.93 | 0.413 | 7% | |
| 16 | 17.50 | 0.62 | | 0.439 | | | 1.0 | 18.25 | 16.75 | 1.50 | 0.62 | 0.439 | 0.439 | 0.93 | 0.408 | 7% | |
| 17 | 16.00 | 0.53 | | 0.425 | | | 1.0 | 16.75 | 15.25 | 1.50 | 0.53 | 0.425 | 0.425 | 0.80 | 0.338 | 6% | |
| 18 | 14.50 | 0.68 | | 0.306 | | | 1.0 | 15.25 | 13.75 | 1.50 | 0.68 | 0.306 | 0.306 | 1.02 | 0.312 | 5% | |
| 19 | 13.00 | 0.54 | | 0.341 | | | 1.0 | 13.75 | 12.25 | 1.50 | 0.54 | 0.341 | 0.341 | 0.81 | 0.276 | 5% | |
| 20 | 11.50 | 0.54 | | 0.273 | | | 1.0 | 12.25 | 10.75 | 1.50 | 0.54 | 0.273 | 0.273 | 0.81 | 0.221 | 4% | |
| 21 | 10.00 | 0.38 | | 0.240 | | | 1.0 | 10.75 | 9.25 | 1.50 | 0.38 | 0.240 | 0.240 | 0.57 | 0.137 | 2% | |
| 22 | 8.50 | 0.25 | | 0.109 | | | 1.0 | 9.25 | 7.75 | 1.50 | 0.25 | 0.109 | 0.109 | 0.38 | 0.041 | 1% | |
| 23 | 7.00 | 0.24 | | 0.079 | | | 1.0 | 7.75 | 6.25 | 1.50 | 0.24 | 0.079 | 0.079 | 0.36 | 0.028 | 0% | |
| 24 | 5.50 | 0.15 | | 0.085 | | | 1.0 | 6.25 | 5.15 | 1.10 | 0.15 | 0.085 | 0.085 | 0.17 | 0.014 | 0% | |
| Left | 4.80 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 5.15 | 4.80 | 0.35 | 0.04 | 0.021 | 0.021 | 0.01 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 6.033 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 6.033 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 20.85 | (m ²) |
| Wetted Width: | 31.20 | (m) |
| Hydraulic Depth: | 0.668 | (m) |
| Mean Velocity: | 0.289 | (m/s) |
| Foude Number: | 0.113 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S40 - MacKay River at Petro-Canada Bridge (445023 E, 6314256 N) | | | |
| Field Personnel: | BL, SG | Trip Date: | 16-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.831 |
| Battery (Main): | 14.14 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1530 |
| Laptop Clock: | 1528 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 17.1 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1540 |
| End Time (MST): | 1610 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Overcast 20°C |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe, w/flag, behind lggr | 1.117 | 100.000 | 1.074 | 100.000 | - |
| Bench Mark 2: | T-post on second bench | 3.212 | 97.893 | 3.167 | 97.893 | - |
| Top of Ice: | | | | | | 0.000 |
| Water Level: | | 4.720 | 96.397 | 4.675 | 96.399 | 96.398 |
| Transducer: | | 0.831 | 95.566 | 0.831 | 95.568 | 95.567 |
| Other: | | | | | | |

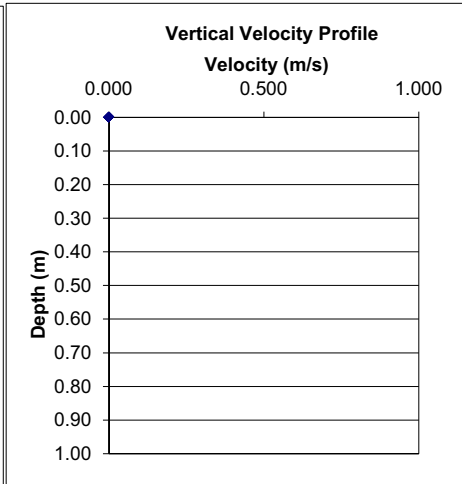
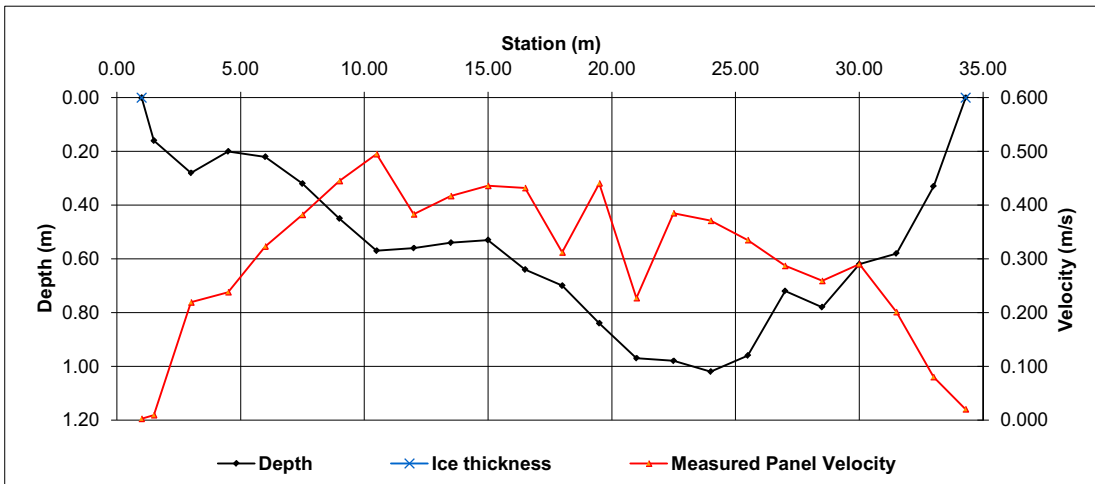
| |
|-----------------------|
| General Notes: |
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| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 34.30 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 34.30 | 33.65 | 0.65 | 0.08 | 0.020 | 0.020 | 0.05 | 0.001 | 0% |
| 1 | 33.00 | 0.33 | | 0.080 | | | 1.0 | 33.65 | 32.25 | 1.40 | 0.33 | 0.080 | 0.080 | 0.46 | 0.037 | 1% |
| 2 | 31.50 | 0.58 | | 0.201 | | | 1.0 | 32.25 | 30.75 | 1.50 | 0.58 | 0.201 | 0.201 | 0.87 | 0.175 | 3% |
| 3 | 30.00 | 0.62 | | 0.290 | | | 1.0 | 30.75 | 29.25 | 1.50 | 0.62 | 0.290 | 0.290 | 0.93 | 0.270 | 4% |
| 4 | 28.50 | 0.78 | | | 0.248 | 0.270 | 1.0 | 29.25 | 27.75 | 1.50 | 0.78 | 0.259 | 0.259 | 1.17 | 0.303 | 5% |
| 5 | 27.00 | 0.72 | | 0.287 | | | 1.0 | 27.75 | 26.25 | 1.50 | 0.72 | 0.287 | 0.287 | 1.08 | 0.310 | 5% |
| 6 | 25.50 | 0.96 | | | 0.254 | 0.416 | 1.0 | 26.25 | 24.75 | 1.50 | 0.96 | 0.335 | 0.335 | 1.44 | 0.482 | 7% |
| 7 | 24.00 | 1.02 | | | 0.369 | 0.373 | 1.0 | 24.75 | 23.25 | 1.50 | 1.02 | 0.371 | 0.371 | 1.53 | 0.568 | 9% |
| 8 | 22.50 | 0.98 | | | 0.366 | 0.404 | 1.0 | 23.25 | 21.75 | 1.50 | 0.98 | 0.385 | 0.385 | 1.47 | 0.566 | 9% |
| 9 | 21.00 | 0.97 | | | 0.027 | 0.427 | 1.0 | 21.75 | 20.25 | 1.50 | 0.97 | 0.227 | 0.227 | 1.46 | 0.330 | 5% |
| 10 | 19.50 | 0.84 | | | 0.389 | 0.492 | 1.0 | 20.25 | 18.75 | 1.50 | 0.84 | 0.441 | 0.441 | 1.26 | 0.555 | 9% |
| 11 | 18.00 | 0.70 | | 0.312 | | | 1.0 | 18.75 | 17.25 | 1.50 | 0.70 | 0.312 | 0.312 | 1.05 | 0.328 | 5% |
| 12 | 16.50 | 0.64 | | 0.432 | | | 1.0 | 17.25 | 15.75 | 1.50 | 0.64 | 0.432 | 0.432 | 0.96 | 0.415 | 6% |
| 13 | 15.00 | 0.53 | | 0.436 | | | 1.0 | 15.75 | 14.25 | 1.50 | 0.53 | 0.436 | 0.436 | 0.80 | 0.347 | 5% |
| 14 | 13.50 | 0.54 | | 0.417 | | | 1.0 | 14.25 | 12.75 | 1.50 | 0.54 | 0.417 | 0.417 | 0.81 | 0.338 | 5% |
| 15 | 12.00 | 0.56 | | 0.383 | | | 1.0 | 12.75 | 11.25 | 1.50 | 0.56 | 0.383 | 0.383 | 0.84 | 0.322 | 5% |
| 16 | 10.50 | 0.57 | | 0.495 | | | 1.0 | 11.25 | 9.75 | 1.50 | 0.57 | 0.495 | 0.495 | 0.86 | 0.423 | 6% |
| 17 | 9.00 | 0.45 | | 0.445 | | | 1.0 | 9.75 | 8.25 | 1.50 | 0.45 | 0.445 | 0.445 | 0.68 | 0.300 | 5% |
| 18 | 7.50 | 0.32 | | 0.382 | | | 1.0 | 8.25 | 6.75 | 1.50 | 0.32 | 0.382 | 0.382 | 0.48 | 0.183 | 3% |
| 19 | 6.00 | 0.22 | | 0.323 | | | 1.0 | 6.75 | 5.25 | 1.50 | 0.22 | 0.323 | 0.323 | 0.33 | 0.107 | 2% |
| 20 | 4.50 | 0.20 | | 0.238 | | | 1.0 | 5.25 | 3.75 | 1.50 | 0.20 | 0.238 | 0.238 | 0.30 | 0.071 | 1% |
| 21 | 3.00 | 0.28 | | 0.219 | | | 1.0 | 3.75 | 2.25 | 1.50 | 0.28 | 0.219 | 0.219 | 0.42 | 0.092 | 1% |
| 22 | 1.50 | 0.16 | | 0.009 | | | 1.0 | 2.25 | 1.25 | 1.00 | 0.16 | 0.009 | 0.009 | 0.16 | 0.001 | 0% |
| Left | 1.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.25 | 1.00 | 0.25 | 0.04 | 0.002 | 0.002 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 6.524 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 6.524 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 19.41 | (m ²) |
| Wetted Width: | 32.40 | (m) |
| Hydraulic Depth: | 0.599 | (m) |
| Mean Velocity: | 0.336 | (m/s) |
| Foude Number: | 0.139 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|----------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S40 - MacKay River at Petro-Canada Bridge (445023 E, 6314256 N) | | | |
| Field Personnel: | SG DB HB | Trip Date: | 19-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|-------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.230 |
| Battery (Main): | 14.06 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1338 |
| Laptop Clock: | 1336 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 6.6 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |
| Rain 233mm total | |

| | |
|------------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1330 |
| End Time (MST): | 1500 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Sunny 10°C |

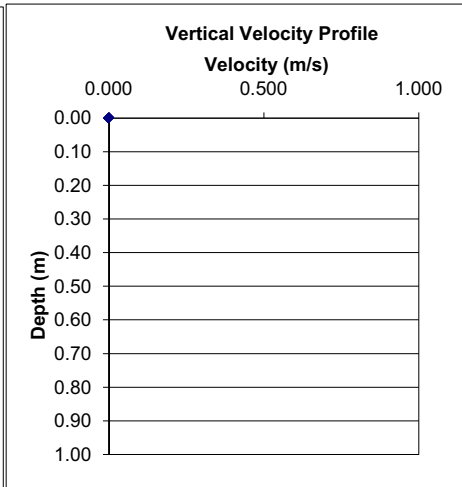
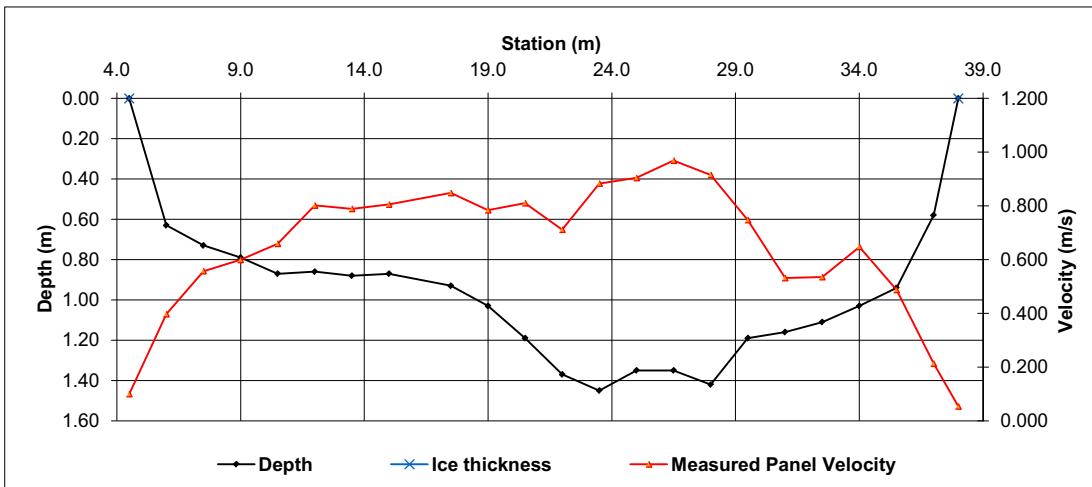
| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe, w/flag, behind lggr | 0.448 | 100.000 | 0.428 | 100.000 | - |
| Bench Mark 2: | T-post on second bench | 2.545 | 97.893 | 2.523 | 97.893 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 3.657 | 96.791 | 3.638 | 96.790 | 96.791 |
| Transducer: | | 1.230 | 95.561 | 1.230 | 95.560 | 95.561 |
| Other: | | | | | | |

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| General Notes: |
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| Flow Measurement: Measured Data | | | | | | | Calculated Data | | | | | | | | | | |
|---------------------------------|---------------|--------------|-------------------------|----------------------------------|----------------------------------|----------------------------------|---|------------------------|----------------------|------------------------|-------------------------------------|---|---|-------------------------------------|--|-----------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 38.0 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 38.00 | 37.50 | 0.50 | 0.15 | 0.053 | 0.053 | 0.07 | 0.004 | 0% | |
| 1 | 37.0 | 0.58 | | 0.213 | | | 1.0 | 37.50 | 36.25 | 1.25 | 0.58 | 0.213 | 0.213 | 0.73 | 0.154 | 1% | |
| 2 | 35.5 | 0.94 | | | 0.418 | 0.556 | 1.0 | 36.25 | 34.75 | 1.50 | 0.94 | 0.487 | 0.487 | 1.41 | 0.687 | 3% | |
| 3 | 34.0 | 1.03 | | | 0.659 | 0.636 | 1.0 | 34.75 | 33.25 | 1.50 | 1.03 | 0.648 | 0.648 | 1.55 | 1.000 | 4% | |
| 4 | 32.5 | 1.11 | | | 0.444 | 0.626 | 1.0 | 33.25 | 31.75 | 1.50 | 1.11 | 0.535 | 0.535 | 1.67 | 0.891 | 4% | |
| 5 | 31.0 | 1.16 | | | 0.505 | 0.558 | 1.0 | 31.75 | 30.25 | 1.50 | 1.16 | 0.532 | 0.532 | 1.74 | 0.925 | 4% | |
| 6 | 29.5 | 1.19 | | | 0.809 | 0.686 | 1.0 | 30.25 | 28.75 | 1.50 | 1.19 | 0.748 | 0.748 | 1.79 | 1.334 | 5% | |
| 7 | 28.0 | 1.42 | | | 0.892 | 0.939 | 1.0 | 28.75 | 27.25 | 1.50 | 1.42 | 0.916 | 0.916 | 2.13 | 1.950 | 8% | |
| 8 | 26.5 | 1.35 | | | 0.975 | 0.962 | 1.0 | 27.25 | 25.75 | 1.50 | 1.35 | 0.969 | 0.969 | 2.03 | 1.961 | 8% | |
| 9 | 25.0 | 1.35 | | | 0.972 | 0.836 | 1.0 | 25.75 | 24.25 | 1.50 | 1.35 | 0.904 | 0.904 | 2.03 | 1.831 | 8% | |
| 10 | 23.5 | 1.45 | | | 0.709 | 1.058 | 1.0 | 24.25 | 22.75 | 1.50 | 1.45 | 0.884 | 0.884 | 2.18 | 1.922 | 8% | |
| 11 | 22.0 | 1.37 | | | 0.492 | 0.931 | 1.0 | 22.75 | 21.25 | 1.50 | 1.37 | 0.712 | 0.712 | 2.06 | 1.462 | 6% | |
| 12 | 20.5 | 1.19 | | | 0.752 | 0.868 | 1.0 | 21.25 | 19.75 | 1.50 | 1.19 | 0.810 | 0.810 | 1.79 | 1.446 | 6% | |
| 13 | 19.0 | 1.03 | | | 0.605 | 0.963 | 1.0 | 19.75 | 18.25 | 1.50 | 1.03 | 0.784 | 0.784 | 1.55 | 1.211 | 5% | |
| 14 | 17.5 | 0.93 | | | 0.753 | 0.943 | 1.0 | 18.25 | 16.25 | 2.00 | 0.93 | 0.848 | 0.848 | 1.86 | 1.577 | 6% | |
| 15 | 15.0 | 0.87 | | | 0.727 | 0.883 | 1.0 | 16.25 | 14.25 | 2.00 | 0.87 | 0.805 | 0.805 | 1.74 | 1.401 | 6% | |
| 16 | 13.5 | 0.88 | | | 0.804 | 0.774 | 1.0 | 14.25 | 12.75 | 1.50 | 0.88 | 0.789 | 0.789 | 1.32 | 1.041 | 4% | |
| 17 | 12.0 | 0.86 | | | 0.701 | 0.902 | 1.0 | 12.75 | 11.25 | 1.50 | 0.86 | 0.802 | 0.802 | 1.29 | 1.034 | 4% | |
| 18 | 10.5 | 0.87 | | | 0.492 | 0.826 | 1.0 | 11.25 | 9.75 | 1.50 | 0.87 | 0.659 | 0.659 | 1.31 | 0.860 | 4% | |
| 19 | 9.0 | 0.79 | | | | 0.485 | 1.0 | 9.75 | 8.25 | 1.50 | 0.79 | 0.599 | 0.599 | 1.19 | 0.710 | 3% | |
| 20 | 7.5 | 0.73 | | | 0.557 | | 1.0 | 8.25 | 6.75 | 1.50 | 0.73 | 0.557 | 0.557 | 1.10 | 0.610 | 2% | |
| 21 | 6.0 | 0.63 | | | 0.397 | | 1.0 | 6.75 | 5.25 | 1.50 | 0.63 | 0.397 | 0.397 | 0.95 | 0.375 | 2% | |
| Left | 4.5 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 5.25 | 4.50 | 0.75 | 0.16 | 0.099 | 0.099 | 0.12 | 0.012 | 0% | |
| *denotes position of TSS sample | | | | | | | | | | | | | | Total Flow | | 24.398 | |

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 24.398 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 33.54 | (m ²) |
| Wetted Width: | 32.25 | (m) |
| Hydraulic Depth: | 1.040 | (m) |
| Mean Velocity: | 0.727 | (m/s) |
| Foude Number: | 0.228 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S40 - MacKay River at Petro-Canada Bridge (445023 E, 6314256 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 25-Oct-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|---------------------------------|-------------------|
| Logger Details: | |
| Transducer Reading: | 0.903 |
| Battery (Main): | 14.69 |
| Battery (Aux): | NA |
| Datalogger Clock: | 15.28 |
| Laptop Clock: | 15.26 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 1.5 |
| Memory used: | NA |
| Dessicant: | Vent Tube changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |
| TBRG stopped for winter. | |

| | |
|------------------------------|-------------------|
| Measurement Details: | |
| Start Time (MST): | 1515 |
| End Time (MST): | 1645 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly Sunny -2°C |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe, w/flag, behind lggr | 1.127 | 100.000 | 1.109 | 100.000 | - |
| Bench Mark 2: | T-post on second bench | 3.224 | 97.893 | 3.209 | 97.893 | - |
| Top of Ice: | | | 101.127 | | 101.109 | 101.118 |
| Water Level: | | 4.665 | 96.462 | 4.648 | 96.461 | 96.462 |
| Transducer: | | 0.903 | 95.559 | 0.903 | 95.558 | 95.559 |
| Other: | | | | | | |

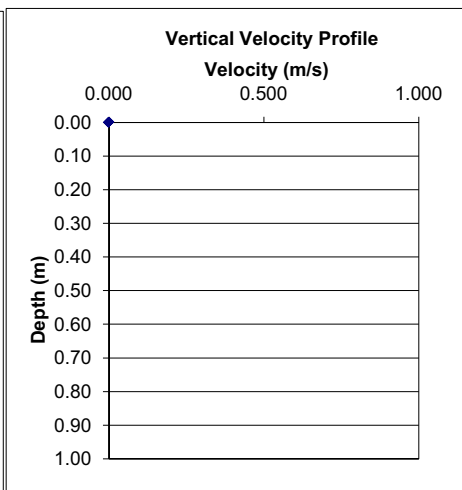
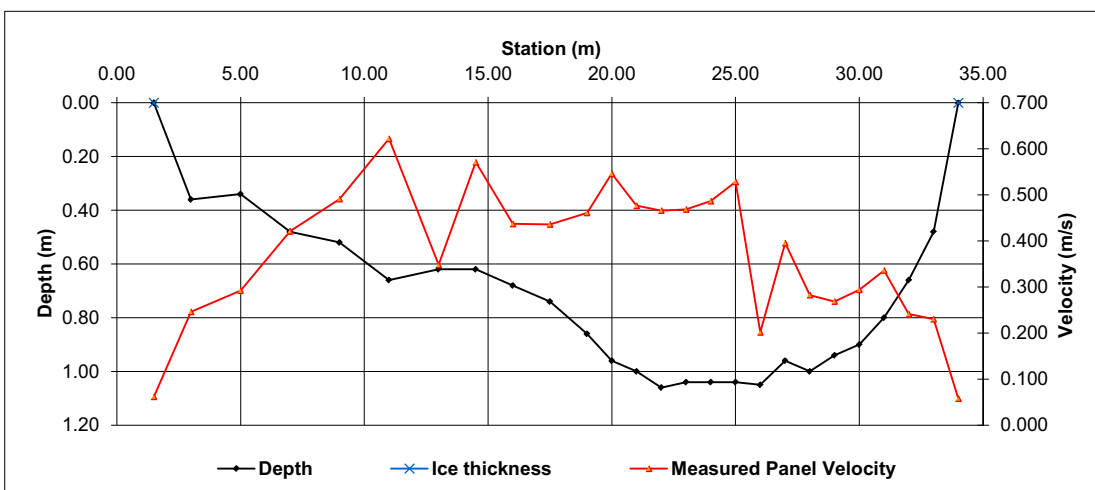
| | |
|-----------------------|--|
| General Notes: | |
| TSS @ 33m | |

| Measured Data | | | | | | | Calculated Data | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 34.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 34.00 | 33.50 | 0.50 | 0.12 | 0.058 | 0.058 | 0.06 | 0.003 | 0% | |
| 1 | 33.00 | 0.48 | | 0.230 | | | 1.0 | 33.50 | 32.50 | 1.00 | 0.48 | 0.230 | 0.230 | 0.48 | 0.110 | 1% | |
| 2 | 32.00 | 0.66 | | 0.241 | | | 1.0 | 32.50 | 31.50 | 1.00 | 0.66 | 0.241 | 0.241 | 0.66 | 0.159 | 2% | |
| 3 | 31.00 | 0.80 | | | 0.329 | 0.343 | 1.0 | 31.50 | 30.50 | 1.00 | 0.80 | 0.336 | 0.336 | 0.80 | 0.269 | 3% | |
| 4 | 30.00 | 0.90 | | | 0.255 | 0.333 | 1.0 | 30.50 | 29.50 | 1.00 | 0.90 | 0.294 | 0.294 | 0.90 | 0.265 | 3% | |
| 5 | 29.00 | 0.94 | | | 0.190 | 0.347 | 1.0 | 29.50 | 28.50 | 1.00 | 0.94 | 0.269 | 0.269 | 0.94 | 0.252 | 3% | |
| 6 | 28.00 | 1.00 | | | 0.265 | 0.300 | 1.0 | 28.50 | 27.50 | 1.00 | 1.00 | 0.283 | 0.283 | 1.00 | 0.283 | 3% | |
| 7 | 27.00 | 0.96 | | | 0.353 | 0.438 | 1.0 | 27.50 | 26.50 | 1.00 | 0.96 | 0.396 | 0.396 | 0.96 | 0.380 | 4% | |
| 8 | 26.00 | 1.05 | | | -0.079 | 0.482 | 1.0 | 26.50 | 25.50 | 1.00 | 1.05 | 0.202 | 0.202 | 1.05 | 0.212 | 2% | |
| 9 | 25.00 | 1.04 | | | 0.506 | 0.551 | 1.0 | 25.50 | 24.50 | 1.00 | 1.04 | 0.529 | 0.529 | 1.04 | 0.520 | 6% | |
| 10 | 24.00 | 1.04 | | | 0.445 | 0.528 | 1.0 | 24.50 | 23.50 | 1.00 | 1.04 | 0.487 | 0.487 | 1.04 | 0.506 | 5% | |
| 11 | 23.00 | 1.04 | | | 0.420 | 0.517 | 1.0 | 23.50 | 22.50 | 1.00 | 1.04 | 0.469 | 0.469 | 1.04 | 0.487 | 5% | |
| 12 | 22.00 | 1.06 | | | 0.387 | 0.545 | 1.0 | 22.50 | 21.50 | 1.00 | 1.06 | 0.466 | 0.466 | 1.06 | 0.494 | 5% | |
| 13 | 21.00 | 1.00 | | | 0.407 | 0.546 | 1.0 | 21.50 | 20.50 | 1.00 | 1.00 | 0.477 | 0.477 | 1.00 | 0.477 | 5% | |
| 14 | 20.00 | 0.96 | | | 0.477 | 0.615 | 1.0 | 20.50 | 19.50 | 1.00 | 0.96 | 0.546 | 0.546 | 0.96 | 0.524 | 6% | |
| 15 | 19.00 | 0.86 | | | 0.348 | 0.574 | 1.0 | 19.50 | 18.25 | 1.25 | 0.86 | 0.461 | 0.461 | 1.08 | 0.496 | 5% | |
| 16 | 17.50 | 0.74 | | 0.436 | | | 1.0 | 18.25 | 16.75 | 1.50 | 0.74 | 0.436 | 0.436 | 1.11 | 0.484 | 5% | |
| 17 | 16.00 | 0.68 | | 0.437 | | | 1.0 | 16.75 | 15.25 | 1.50 | 0.68 | 0.437 | 0.437 | 1.02 | 0.446 | 5% | |
| 18 | 14.50 | 0.62 | | 0.571 | | | 1.0 | 15.25 | 13.75 | 1.50 | 0.62 | 0.571 | 0.571 | 0.93 | 0.531 | 6% | |
| 19 | 13.00 | 0.62 | | 0.348 | | | 1.0 | 13.75 | 12.00 | 1.75 | 0.62 | 0.348 | 0.348 | 1.09 | 0.378 | 4% | |
| 20 | 11.00 | 0.66 | | 0.622 | | | 1.0 | 12.00 | 10.00 | 2.00 | 0.66 | 0.622 | 0.622 | 1.32 | 0.821 | 9% | |
| 21 | 9.00 | 0.52 | | 0.491 | | | 1.0 | 10.00 | 8.00 | 2.00 | 0.52 | 0.491 | 0.491 | 1.04 | 0.511 | 5% | |
| 22 | 7.00 | 0.48 | | 0.421 | | | 1.0 | 8.00 | 6.00 | 2.00 | 0.48 | 0.421 | 0.421 | 0.96 | 0.404 | 4% | |
| 23 | 5.00 | 0.34 | | 0.292 | | | 1.0 | 6.00 | 4.00 | 2.00 | 0.34 | 0.292 | 0.292 | 0.68 | 0.199 | 2% | |
| 24 | 3.00 | 0.36 | | 0.246 | | | 1.0 | 4.00 | 2.25 | 1.75 | 0.36 | 0.246 | 0.246 | 0.63 | 0.155 | 2% | |
| Right | 1.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 2.25 | 1.50 | 0.75 | 0.09 | 0.062 | 0.062 | 0.07 | 0.004 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 9.397 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 9.397 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 22.91 | (m ²) |
| Wetted Width: | 31.25 | (m) |
| Hydraulic Depth: | 0.733 | (m) |
| Mean Velocity: | 0.410 | (m/s) |
| Foude Number: | 0.153 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S40 - MacKay River at Petro-Canada Bridge (445023 E, 6314256 N) | | | |
| Field Personnel: | SG, JO | Trip Date: | 29-Nov-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.767 |
| Battery (Main): | 14.96 |
| Battery (Aux): | - |
| Datalogger Clock: | 957 |
| Laptop Clock: | 955 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 0.2 |
| Memory used: | - |
| Dessicant: | OK |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|--------------|
| Measurement Details: | |
| Start Time (MST): | 1000 |
| End Time (MST): | 1120 |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | - 15, Broken |

| Level Survey: | | | | | | |
|----------------------|--------------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe, w/flag, behind lggr | 1.238 | 100.000 | 1.230 | 100.000 | - |
| Bench Mark 2: | T-post on second bench | 3.335 | 97.893 | 3.326 | 97.893 | - |
| Top of Ice: | | 4.979 | 96.259 | 4.970 | 96.260 | 96.260 |
| Water Level: | | 4.972 | 96.266 | 4.967 | 96.263 | 96.265 |
| Transducer: | | 0.767 | 95.499 | 0.767 | 95.496 | 95.498 |
| Other: | | | | | | |

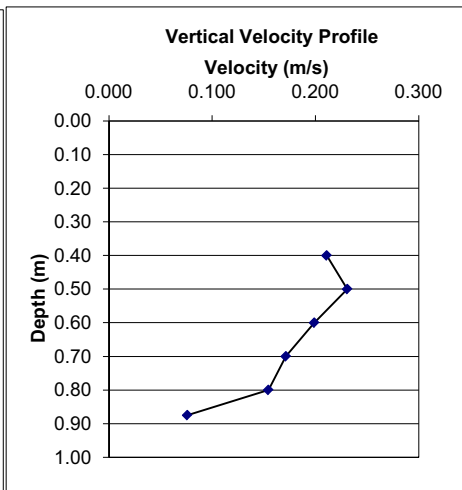
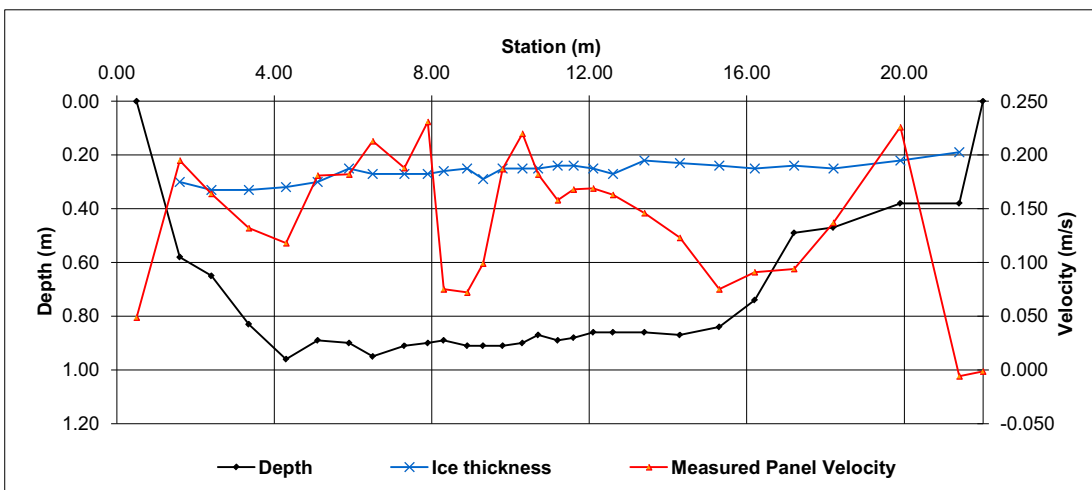
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 0.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 0.50 | 1.05 | 0.55 | 0.07 | 0.049 | 0.044 | 0.04 | 0.002 | 0% | |
| 1 | 1.60 | 0.58 | 0.30 | 0.195 | | | 0.9 | 1.05 | 2.00 | 0.95 | 0.28 | 0.195 | 0.176 | 0.27 | 0.047 | 3% | |
| 2 | 2.40 | 0.65 | 0.33 | 0.164 | | | 0.9 | 2.00 | 2.88 | 0.88 | 0.32 | 0.164 | 0.148 | 0.28 | 0.041 | 3% | |
| 3 | 3.35 | 0.83 | 0.33 | 0.132 | | | 0.9 | 2.88 | 3.83 | 0.95 | 0.50 | 0.132 | 0.119 | 0.48 | 0.056 | 4% | |
| 4 | 4.30 | 0.96 | 0.32 | 0.118 | | | 0.9 | 3.83 | 4.70 | 0.87 | 0.64 | 0.118 | 0.106 | 0.56 | 0.059 | 4% | |
| 5 | 5.10 | 0.89 | 0.30 | 0.181 | | | 0.9 | 4.70 | 5.50 | 0.80 | 0.59 | 0.181 | 0.163 | 0.47 | 0.077 | 5% | |
| 6 | 5.90 | 0.90 | 0.25 | 0.182 | | | 0.9 | 5.50 | 6.20 | 0.70 | 0.65 | 0.182 | 0.164 | 0.46 | 0.075 | 5% | |
| 7 | 6.50 | 0.95 | 0.27 | 0.213 | | | 0.9 | 6.20 | 6.90 | 0.70 | 0.68 | 0.213 | 0.192 | 0.48 | 0.091 | 6% | |
| 8 | 7.30 | 0.91 | 0.27 | 0.188 | | | 0.9 | 6.90 | 7.60 | 0.70 | 0.64 | 0.188 | 0.169 | 0.45 | 0.076 | 5% | |
| 9 | 7.90 | 0.90 | 0.27 | 0.231 | | | 0.9 | 7.60 | 8.10 | 0.50 | 0.63 | 0.231 | 0.208 | 0.32 | 0.065 | 4% | |
| 10 | 8.30 | 0.89 | 0.26 | 0.075 | | | 0.9 | 8.10 | 8.60 | 0.50 | 0.63 | 0.075 | 0.068 | 0.32 | 0.021 | 1% | |
| 11 | 8.90 | 0.91 | 0.25 | 0.072 | | | 0.9 | 8.60 | 9.10 | 0.50 | 0.66 | 0.072 | 0.065 | 0.33 | 0.021 | 1% | |
| 12 | 9.30 | 0.91 | 0.29 | 0.099 | | | 0.9 | 9.10 | 9.55 | 0.45 | 0.62 | 0.099 | 0.089 | 0.28 | 0.025 | 2% | |
| 13 | 9.80 | 0.91 | 0.25 | 0.187 | | | 0.9 | 9.55 | 10.05 | 0.50 | 0.66 | 0.187 | 0.168 | 0.33 | 0.056 | 4% | |
| 14 | 10.30 | 0.90 | 0.25 | 0.220 | | | 0.9 | 10.05 | 10.50 | 0.45 | 0.65 | 0.220 | 0.198 | 0.29 | 0.058 | 4% | |
| 15 | 10.70 | 0.87 | 0.25 | 0.182 | | | 0.9 | 10.50 | 10.95 | 0.45 | 0.62 | 0.182 | 0.164 | 0.28 | 0.046 | 3% | |
| 16 | 11.20 | 0.89 | 0.24 | 0.158 | | | 0.9 | 10.95 | 11.40 | 0.45 | 0.65 | 0.158 | 0.142 | 0.29 | 0.042 | 3% | |
| 17 | 11.60 | 0.88 | 0.24 | 0.168 | | | 0.9 | 11.40 | 11.85 | 0.45 | 0.64 | 0.168 | 0.151 | 0.29 | 0.044 | 3% | |
| 18 | 12.10 | 0.86 | 0.25 | 0.169 | | | 0.9 | 11.85 | 12.35 | 0.50 | 0.61 | 0.169 | 0.152 | 0.31 | 0.046 | 3% | |
| 19 | 12.60 | 0.86 | 0.27 | 0.163 | | | 0.9 | 12.35 | 13.00 | 0.65 | 0.59 | 0.163 | 0.147 | 0.38 | 0.056 | 4% | |
| 20 | 13.40 | 0.86 | 0.22 | 0.146 | | | 0.9 | 13.00 | 13.85 | 0.85 | 0.64 | 0.146 | 0.131 | 0.54 | 0.071 | 5% | |
| 21 | 14.30 | 0.87 | 0.23 | 0.123 | | | 0.9 | 13.85 | 14.80 | 0.95 | 0.64 | 0.123 | 0.111 | 0.61 | 0.067 | 5% | |
| 22 | 15.30 | 0.84 | 0.24 | 0.075 | | | 0.9 | 14.80 | 17.60 | 2.80 | 0.60 | 0.075 | 0.068 | 1.68 | 0.113 | 8% | |
| 23 | 16.20 | 0.74 | 0.25 | 0.091 | | | 0.9 | 15.75 | 18.80 | 3.05 | 0.49 | 0.091 | 0.082 | 1.49 | 0.122 | 8% | |
| 24 | 17.20 | 0.49 | 0.24 | 0.094 | | | 0.9 | 16.70 | 19.60 | 2.90 | 0.25 | 0.094 | 0.085 | 0.73 | 0.061 | 4% | |
| 25 | 18.20 | 0.47 | 0.25 | 0.137 | | | 0.9 | 17.70 | 18.20 | 0.50 | 0.22 | 0.137 | 0.123 | 0.11 | 0.014 | 1% | |
| 26 | 19.90 | 0.38 | 0.22 | 0.226 | | | 0.9 | 19.05 | 19.90 | 0.85 | 0.16 | 0.226 | 0.203 | 0.14 | 0.028 | 2% | |
| 27 | 21.40 | 0.38 | 0.19 | -0.006 | | | 0.9 | 20.65 | 21.40 | 0.75 | 0.19 | -0.006 | -0.005 | 0.14 | -0.001 | 0% | |
| Right | 22.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 21.70 | 22.00 | 0.30 | 0.05 | -0.002 | -0.002 | 0.01 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 1.480 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 1.480 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 12.33 | (m ²) |
| Wetted Width: | 21.50 | (m) |
| Hydraulic Depth: | 0.574 | (m) |
| Mean Velocity: | 0.120 | (m/s) |
| Foude Number: | 0.051 | |

| Velocity Profile for Ice Conditions: | | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------|------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.174 | |
| Offset | 10.3 | 0.90 | 0 | - | - | Panel V.@Ofst | 0.22 |
| Depth | 0.9 | 0.85 | 0.152 | 0.88 | 0.076 | 60% Depth | 0.64 |
| Ice Depth | 0.25 | 0.75 | 0.157 | 0.80 | 0.155 | 20% Depth | 0.38 |
| | | 0.65 | 0.186 | 0.70 | 0.172 | 80% Depth | 0.77 |
| | | 0.55 | 0.212 | 0.60 | 0.199 | | |
| | | 0.45 | 0.250 | 0.50 | 0.231 | | |
| | | 0.35 | 0.172 | 0.40 | 0.211 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S42 - Clearwater River above Christina River (504427 E, 6279666 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 21-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| WSC Station | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1402 |
| End Time (MST): | 1520 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast, wind, -10C |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Brass Cap on Right Bank | 2.805 | 25.299 | 2.793 | 25.299 | - |
| Bench Mark 2: | T-post | 1.364 | 26.735 | 1.349 | 26.735 | - |
| Top of Ice: | | 4.165 | 23.939 | 4.151 | 23.941 | 23.940 |
| Water Level: | | 4.167 | 23.937 | 4.156 | 23.936 | 23.937 |
| Transducer: | | | | | | |
| Other: | | | | | | |

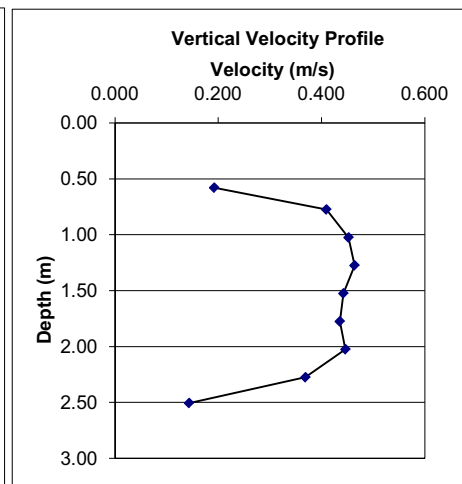
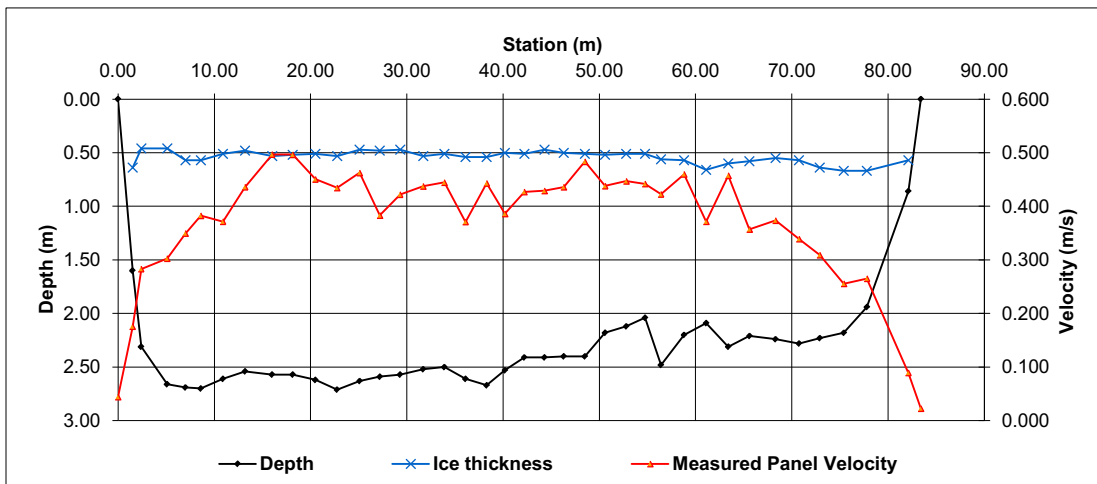
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 0.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | 0.75 | 0.75 | 0.24 | 0.044 | 0.044 | 0.18 | 0.008 | 0% | |
| 1 | 1.50 | 1.60 | 0.64 | 0.172 | 0.179 | 0.179 | 1.0 | 0.75 | 1.95 | 1.20 | 0.96 | 0.176 | 0.176 | 1.15 | 0.202 | 0% | |
| 2 | 2.40 | 2.31 | 0.46 | 0.329 | 0.237 | 0.237 | 1.0 | 1.95 | 3.75 | 1.80 | 1.85 | 0.283 | 0.283 | 3.33 | 0.942 | 2% | |
| 3 | 5.10 | 2.66 | 0.46 | 0.356 | 0.249 | 0.249 | 1.0 | 3.75 | 6.05 | 2.30 | 2.20 | 0.303 | 0.303 | 5.06 | 1.531 | 3% | |
| 4 | 7.00 | 2.69 | 0.57 | 0.383 | 0.316 | 0.316 | 1.0 | 6.05 | 7.80 | 1.75 | 2.12 | 0.350 | 0.350 | 3.71 | 1.297 | 2% | |
| 5 | 8.60 | 2.70 | 0.57 | 0.378 | 0.387 | 0.387 | 1.0 | 7.80 | 9.75 | 1.95 | 2.13 | 0.383 | 0.383 | 4.15 | 1.589 | 3% | |
| 6 | 10.90 | 2.61 | 0.51 | 0.329 | 0.414 | 0.414 | 1.0 | 9.75 | 12.05 | 2.30 | 2.10 | 0.372 | 0.372 | 4.83 | 1.794 | 3% | |
| 7 | 13.20 | 2.54 | 0.48 | 0.452 | 0.420 | 0.420 | 1.0 | 12.05 | 14.60 | 2.55 | 2.06 | 0.436 | 0.436 | 5.25 | 2.290 | 4% | |
| 8 | 16.00 | 2.57 | 0.53 | 0.513 | 0.481 | 0.481 | 1.0 | 14.60 | 17.08 | 2.48 | 2.04 | 0.497 | 0.497 | 5.05 | 2.509 | 4% | |
| 9 | 18.15 | 2.57 | 0.52 | 0.528 | 0.465 | 0.465 | 1.0 | 17.08 | 19.33 | 2.25 | 2.05 | 0.497 | 0.497 | 4.61 | 2.290 | 4% | |
| 10 | 20.50 | 2.62 | 0.51 | 0.457 | 0.444 | 0.444 | 1.0 | 19.33 | 21.63 | 2.30 | 2.11 | 0.451 | 0.451 | 4.85 | 2.186 | 4% | |
| 11 | 22.75 | 2.71 | 0.53 | 0.466 | 0.403 | 0.403 | 1.0 | 21.63 | 23.93 | 2.30 | 2.18 | 0.435 | 0.435 | 5.01 | 2.179 | 4% | |
| 12 | 25.10 | 2.63 | 0.47 | 0.479 | 0.446 | 0.446 | 1.0 | 23.93 | 26.15 | 2.23 | 2.16 | 0.463 | 0.463 | 4.81 | 2.223 | 4% | |
| 13 | 27.20 | 2.59 | 0.48 | 0.509 | 0.257 | 0.257 | 1.0 | 26.15 | 28.25 | 2.10 | 2.11 | 0.383 | 0.383 | 4.43 | 1.697 | 3% | |
| 14 | 29.30 | 2.57 | 0.47 | 0.382 | 0.462 | 0.462 | 1.0 | 28.25 | 30.50 | 2.25 | 2.10 | 0.422 | 0.422 | 4.73 | 1.994 | 3% | |
| 15 | 31.70 | 2.52 | 0.53 | 0.430 | 0.445 | 0.445 | 1.0 | 30.50 | 32.80 | 2.30 | 1.99 | 0.438 | 0.438 | 4.58 | 2.002 | 3% | |
| 16 | 33.90 | 2.50 | 0.51 | 0.422 | 0.467 | 0.467 | 1.0 | 32.80 | 35.00 | 2.20 | 1.99 | 0.445 | 0.445 | 4.38 | 1.946 | 3% | |
| 17 | 36.10 | 2.61 | 0.54 | 0.356 | 0.386 | 0.386 | 1.0 | 35.00 | 37.20 | 2.20 | 2.07 | 0.371 | 0.371 | 4.55 | 1.690 | 3% | |
| 18 | 38.30 | 2.67 | 0.54 | 0.402 | 0.484 | 0.484 | 1.0 | 37.20 | 39.25 | 2.05 | 2.13 | 0.443 | 0.443 | 4.37 | 1.934 | 3% | |
| 19 | 40.20 | 2.53 | 0.50 | 0.358 | 0.414 | 0.414 | 1.0 | 39.25 | 41.20 | 1.95 | 2.03 | 0.386 | 0.386 | 3.96 | 1.528 | 3% | |
| 20 | 42.20 | 2.41 | 0.51 | 0.464 | 0.390 | 0.390 | 1.0 | 41.20 | 43.25 | 2.05 | 1.90 | 0.427 | 0.427 | 3.89 | 1.663 | 3% | |
| 21 | 44.30 | 2.41 | 0.47 | 0.465 | 0.393 | 0.393 | 1.0 | 43.25 | 45.30 | 2.05 | 1.94 | 0.429 | 0.429 | 3.98 | 1.706 | 3% | |
| 22 | 46.30 | 2.40 | 0.50 | 0.458 | 0.414 | 0.414 | 1.0 | 45.30 | 47.40 | 2.10 | 1.90 | 0.436 | 0.436 | 3.99 | 1.740 | 3% | |
| 23 | 48.50 | 2.40 | 0.51 | 0.505 | 0.462 | 0.462 | 1.0 | 47.40 | 49.55 | 2.15 | 1.89 | 0.484 | 0.484 | 4.06 | 1.965 | 3% | |
| 24 | 50.60 | 2.18 | 0.52 | 0.473 | 0.403 | 0.403 | 1.0 | 49.55 | 51.70 | 2.15 | 1.66 | 0.438 | 0.438 | 3.57 | 1.563 | 3% | |
| 25 | 52.80 | 2.12 | 0.51 | 0.441 | 0.453 | 0.453 | 1.0 | 51.70 | 53.78 | 2.08 | 1.61 | 0.447 | 0.447 | 3.34 | 1.493 | 3% | |
| 26 | 54.75 | 2.04 | 0.51 | 0.488 | 0.396 | 0.396 | 1.0 | 53.78 | 55.58 | 1.80 | 1.53 | 0.442 | 0.442 | 2.75 | 1.217 | 2% | |
| 27 | 56.40 | 2.48 | 0.56 | 0.480 | 0.365 | 0.365 | 1.0 | 55.58 | 57.60 | 2.03 | 1.92 | 0.423 | 0.423 | 3.89 | 1.643 | 3% | |
| 28 | 58.80 | 2.20 | 0.57 | 0.480 | 0.440 | 0.440 | 1.0 | 57.60 | 59.95 | 2.35 | 1.63 | 0.460 | 0.460 | 3.83 | 1.762 | 3% | |
| 29 | 61.10 | 2.09 | 0.66 | 0.386 | 0.357 | 0.357 | 1.0 | 59.95 | 62.25 | 2.30 | 1.43 | 0.372 | 0.372 | 3.29 | 1.222 | 2% | |
| 30 | 63.40 | 2.31 | 0.60 | 0.395 | 0.520 | 0.520 | 1.0 | 62.25 | 64.50 | 2.25 | 1.71 | 0.458 | 0.458 | 3.85 | 1.760 | 3% | |
| 31 | 65.60 | 2.21 | 0.58 | 0.390 | 0.324 | 0.324 | 1.0 | 64.50 | 66.95 | 2.45 | 1.63 | 0.357 | 0.357 | 3.99 | 1.426 | 2% | |
| 32 | 68.30 | 2.24 | 0.55 | 0.384 | 0.363 | 0.363 | 1.0 | 66.95 | 69.53 | 2.57 | 1.69 | 0.374 | 0.374 | 4.35 | 1.625 | 3% | |
| 33 | 70.75 | 2.28 | 0.57 | 0.370 | 0.308 | 0.308 | 1.0 | 69.53 | 71.83 | 2.30 | 1.71 | 0.339 | 0.339 | 3.93 | 1.333 | 2% | |
| 34 | 72.90 | 2.23 | 0.64 | 0.321 | 0.297 | 0.297 | 1.0 | 71.83 | 74.15 | 2.33 | 1.59 | 0.309 | 0.309 | 3.70 | 1.142 | 2% | |
| 35 | 75.40 | 2.18 | 0.67 | 0.277 | 0.234 | 0.234 | 1.0 | 74.15 | 76.60 | 2.45 | 1.51 | 0.256 | 0.256 | 3.70 | 0.945 | 2% | |
| 36 | 77.80 | 1.94 | 0.67 | 0.292 | 0.238 | 0.238 | 1.0 | 76.60 | 79.95 | 3.35 | 1.27 | 0.265 | 0.265 | 4.25 | 1.127 | 2% | |
| 37 | 82.10 | 0.86 | 0.57 | 0.089 | | | 0.9 | 79.95 | 82.75 | 2.80 | 0.29 | 0.089 | 0.089 | 0.81 | 0.065 | 0% | |
| Right | 83.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 82.75 | 83.40 | 0.65 | 0.07 | 0.022 | 0.022 | 0.05 | 0.001 | 0% | |

Total Flow 59.231

| | | |
|--------------------------------|--------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 59.231 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 148.23 | (m ²) |
| Wetted Width: | 83.40 | (m) |
| Hydraulic Depth: | 1.777 | (m) |
| Mean Velocity: | 0.400 | (m/s) |
| Froude Number: | 0.096 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.384 |
| Offset | 10.9 | 2.61 | 0 | - | - | Panel V.@Ofst 0.372 |
| Depth | 2.61 | 2.40 | 0.288 | 2.51 | 0.144 | 60% Depth 1.77 |
| Ice Depth | 0.51 | 2.15 | 0.450 | 2.28 | 0.369 | 20% Depth 0.93 |
| | | 1.90 | 0.443 | 2.03 | 0.447 | 80% Depth 2.19 |
| | | 1.65 | 0.428 | 1.78 | 0.436 | |
| | | 1.40 | 0.457 | 1.53 | 0.443 | |
| | | 1.15 | 0.471 | 1.28 | 0.464 | |
| | | 0.90 | 0.434 | 1.03 | 0.453 | |
| | | 0.65 | 0.385 | 0.78 | 0.410 | |
| | | 0.51 | 0 | 0.58 | 0.193 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S42 - Clearwater River above Christina River (504427 E, 6279666 N) | | | |
| Field Personnel: | GB, CE | Trip Date: | 10-Feb-10 |
| Data Entry Personnel: | SG | Date: | 19-Feb-10 |
| Data Check Personnel: | DB | Date: | 15-Mar-10 |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| WSC Station | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1345 |
| End Time (MST): | 1450 |
| Equipment: | ADV Other: Marsh |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | overcast -12C |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Brass Cap on Right Bank | 2.950 | 25.299 | 2.965 | 25.299 | - |
| Bench Mark 2: | T-post | 1.515 | 26.735 | 1.530 | 26.735 | - |
| Top of Ice: | | 4.425 | 23.824 | 4.428 | 23.836 | 23.830 |
| Water Level: | | 4.425 | 23.824 | 4.440 | 23.824 | 23.824 |
| Transducer: | | | | | | |
| Other: | | | | | | |

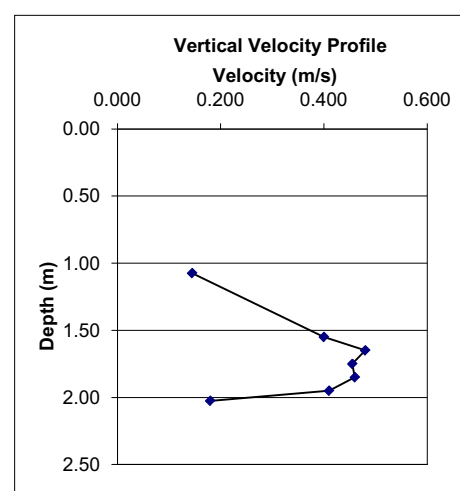
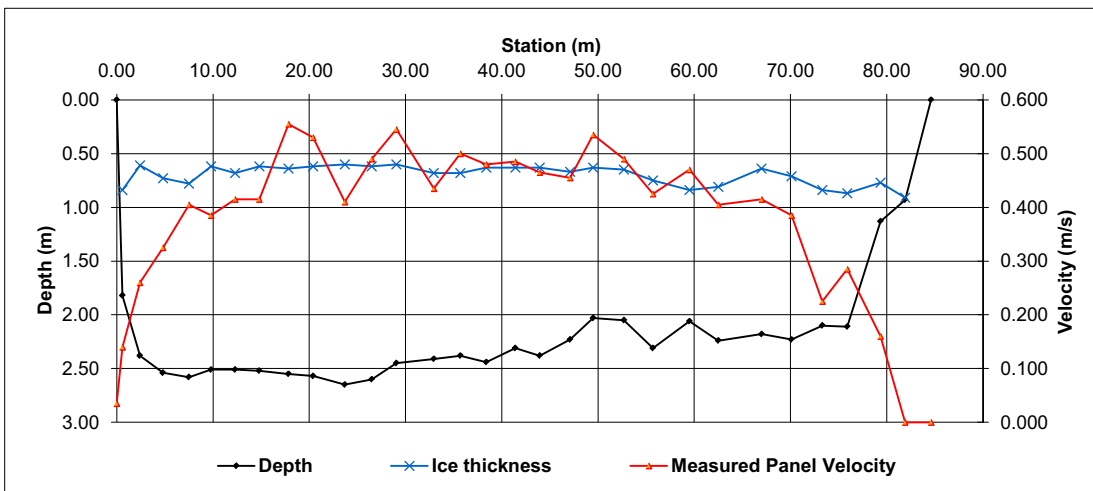
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | |
| Right | 0.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | 0.75 | 0.75 | 0.25 | 0.035 | 0.035 | 0.18 | 0.006 | 0% | | | |
| 1 | 0.60 | 1.82 | 0.84 | 0.200 | 0.080 | | 1.0 | 0.30 | 1.50 | 1.20 | 0.98 | 0.140 | 0.140 | 1.18 | 0.165 | 0% | | | |
| 2 | 2.40 | 2.38 | 0.61 | 0.300 | 0.220 | | 1.0 | 1.50 | 3.60 | 2.10 | 1.77 | 0.260 | 0.260 | 3.72 | 0.966 | 2% | | | |
| 3 | 4.80 | 2.54 | 0.73 | 0.330 | 0.320 | | 1.0 | 3.60 | 6.15 | 2.55 | 1.81 | 0.325 | 0.325 | 4.62 | 1.500 | 3% | | | |
| 4 | 7.50 | 2.58 | 0.78 | 0.450 | 0.360 | | 1.0 | 6.15 | 8.65 | 2.50 | 1.80 | 0.405 | 0.405 | 4.50 | 1.823 | 3% | | | |
| 5 | 9.80 | 2.51 | 0.62 | 0.420 | 0.350 | | 1.0 | 8.65 | 11.05 | 2.40 | 1.89 | 0.385 | 0.385 | 4.54 | 1.746 | 3% | | | |
| 6 | 12.30 | 2.51 | 0.68 | 0.470 | 0.360 | | 1.0 | 11.05 | 13.55 | 2.50 | 1.83 | 0.415 | 0.415 | 4.58 | 1.899 | 3% | | | |
| 7 | 14.80 | 2.52 | 0.62 | 0.430 | 0.400 | | 1.0 | 13.55 | 16.33 | 2.78 | 1.90 | 0.415 | 0.415 | 5.27 | 2.188 | 4% | | | |
| 8 | 17.85 | 2.55 | 0.64 | 0.540 | 0.570 | | 1.0 | 16.33 | 19.13 | 2.80 | 1.91 | 0.555 | 0.555 | 5.35 | 2.968 | 5% | | | |
| 9 | 20.40 | 2.57 | 0.62 | 0.540 | 0.520 | | 1.0 | 19.13 | 22.05 | 2.93 | 1.95 | 0.530 | 0.530 | 5.70 | 3.023 | 5% | | | |
| 10 | 23.70 | 2.65 | 0.60 | 0.500 | 0.320 | | 1.0 | 22.05 | 25.10 | 3.05 | 2.05 | 0.410 | 0.410 | 6.25 | 2.564 | 5% | | | |
| 11 | 26.50 | 2.60 | 0.62 | 0.460 | 0.520 | | 1.0 | 25.10 | 27.78 | 2.68 | 1.98 | 0.490 | 0.490 | 5.30 | 2.595 | 5% | | | |
| 12 | 29.05 | 2.45 | 0.60 | 0.560 | 0.530 | | 1.0 | 27.78 | 31.00 | 3.23 | 1.85 | 0.545 | 0.545 | 5.97 | 3.252 | 6% | | | |
| 13 | 32.95 | 2.41 | 0.68 | 0.440 | 0.430 | | 1.0 | 31.00 | 34.33 | 3.33 | 1.73 | 0.435 | 0.435 | 5.75 | 2.502 | 5% | | | |
| 14 | 35.70 | 2.38 | 0.68 | 0.460 | 0.540 | | 1.0 | 34.33 | 37.05 | 2.73 | 1.70 | 0.500 | 0.500 | 4.63 | 2.316 | 4% | | | |
| 15 | 38.40 | 2.44 | 0.63 | 0.540 | 0.420 | | 1.0 | 37.05 | 39.90 | 2.85 | 1.81 | 0.480 | 0.480 | 5.16 | 2.476 | 4% | | | |
| 16 | 41.40 | 2.31 | 0.63 | 0.520 | 0.450 | | 1.0 | 39.90 | 42.68 | 2.78 | 1.68 | 0.485 | 0.485 | 4.66 | 2.261 | 4% | | | |
| 17 | 43.95 | 2.38 | 0.63 | 0.440 | 0.490 | | 1.0 | 42.68 | 45.53 | 2.85 | 1.75 | 0.465 | 0.465 | 4.99 | 2.319 | 4% | | | |
| 18 | 47.10 | 2.23 | 0.67 | 0.460 | 0.450 | | 1.0 | 45.53 | 48.30 | 2.77 | 1.56 | 0.455 | 0.455 | 4.33 | 1.970 | 4% | | | |
| 19 | 49.50 | 2.03 | 0.63 | 0.530 | 0.540 | | 1.0 | 48.30 | 51.10 | 2.80 | 1.40 | 0.535 | 0.535 | 3.92 | 2.097 | 4% | | | |
| 20 | 52.70 | 2.05 | 0.65 | 0.510 | 0.470 | | 1.0 | 51.10 | 54.20 | 3.10 | 1.40 | 0.490 | 0.490 | 4.34 | 2.127 | 4% | | | |
| 21 | 55.70 | 2.31 | 0.75 | 0.470 | 0.380 | | 1.0 | 54.20 | 57.60 | 3.40 | 1.56 | 0.425 | 0.425 | 5.30 | 2.254 | 4% | | | |
| 22 | 59.50 | 2.06 | 0.84 | 0.450 | 0.490 | | 1.0 | 57.60 | 61.00 | 3.40 | 1.22 | 0.470 | 0.470 | 4.15 | 1.950 | 4% | | | |
| 23 | 62.50 | 2.24 | 0.81 | 0.420 | 0.390 | | 1.0 | 61.00 | 64.75 | 3.75 | 1.43 | 0.405 | 0.405 | 5.36 | 2.172 | 4% | | | |
| 24 | 67.00 | 2.18 | 0.64 | 0.400 | 0.430 | | 1.0 | 64.75 | 68.55 | 3.80 | 1.54 | 0.415 | 0.415 | 5.85 | 2.429 | 4% | | | |
| 25 | 70.10 | 2.23 | 0.71 | 0.380 | 0.390 | | 1.0 | 68.55 | 71.70 | 3.15 | 1.52 | 0.385 | 0.385 | 4.79 | 1.843 | 3% | | | |
| 26 | 73.30 | 2.10 | 0.84 | 0.240 | 0.210 | | 1.0 | 71.70 | 74.60 | 2.90 | 1.26 | 0.225 | 0.225 | 3.65 | 0.822 | 1% | | | |
| 27 | 75.90 | 2.11 | 0.87 | 0.320 | 0.250 | | 1.0 | 74.60 | 77.63 | 3.03 | 1.24 | 0.285 | 0.285 | 3.75 | 1.069 | 2% | | | |
| 28 | 79.35 | 1.13 | 0.77 | 0.160 | | | 0.9 | 77.63 | 80.63 | 3.00 | 0.36 | 0.160 | 0.144 | 1.08 | 0.156 | 0% | | | |
| 29 | 81.90 | 0.93 | 0.91 | 0.000 | | | 1.0 | 80.63 | 83.25 | 2.63 | 0.02 | 0.000 | 0.000 | 0.05 | 0.000 | 0% | | | |
| Left | 84.60 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 83.25 | 84.60 | 1.35 | 0.01 | 0.000 | 0.000 | 0.01 | 0.000 | 0% | | | |
| Total Flow | | | | | | | | | | | | | | | 55.457 | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|--------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 55.457 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 128.92 | (m ²) |
| Wetted Width: | 84.60 | (m) |
| Hydraulic Depth: | 1.524 | (m) |
| Mean Velocity: | 0.430 | (m/s) |
| Froude Number: | 0.111 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|--------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.398 |
| Offset | 8.8 | 2.05 | 0 | - | - | Panel V.@Ofst 0.49 |
| Depth | 2.05 | 2.00 | 0.36 | 2.03 | 0.180 | 60% Depth 1.49 |
| Ice Depth | 0.65 | 1.90 | 0.460 | 1.95 | 0.410 | 20% Depth 0.93 |
| | | 1.80 | 0.460 | 1.85 | 0.460 | 80% Depth 1.77 |
| | | 1.70 | 0.450 | 1.75 | 0.455 | |
| | | 1.60 | 0.510 | 1.65 | 0.480 | |
| | | 1.50 | 0.29 | 1.55 | 0.400 | |
| | | 0.65 | 0.000 | 1.08 | 0.145 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S42 - Clearwater River above Christina River (504427 E, 6279666 N) | | | |
| Field Personnel: | SG, JO | Trip Date: | 05-Dec-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | | Date: | |

| | |
|------------------------|--|
| Logger Details: | |
| Transducer Reading: | |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 15:30 |
| End Time (MST): | - |
| Equipment: | ADV Other: Marsh |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | |
| Code ('Ice' or 'Open'): | |
| Quality/Error (see reverse): | |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|--------|---------|--------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Brass Cap on Right Bank | | 25.299 | | 25.299 | - |
| Bench Mark 2: | T-post | | 26.735 | | 26.735 | - |
| Top of Ice: | | | 25.299 | | 25.299 | 25.299 |
| Water Level: | | | 25.299 | | 25.299 | 25.299 |
| Transducer: | | | | | | |
| Other: | | | | | | |

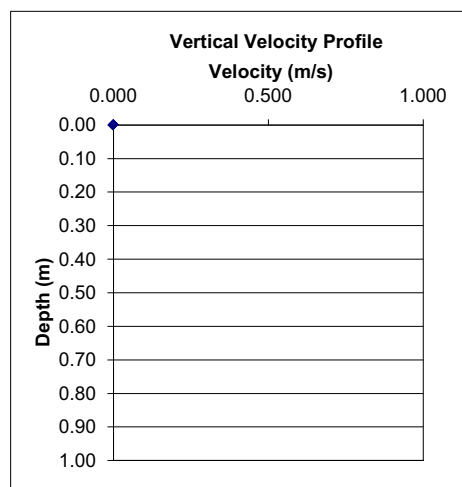
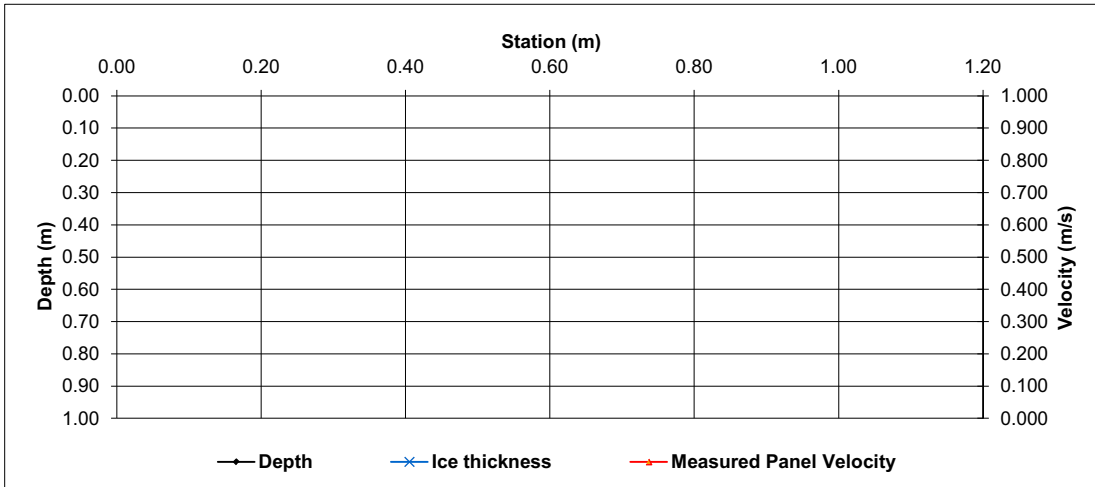
General Notes:

Ice considered unsafe to land helicopter.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | 0.75 | 0.75 | 0.00 | 0.000 | 0.000 | 0.00 | 0.000 | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 26 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 27 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 28 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 29 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | Total Flow | NOT MEASURED |

| | | |
|--------------------------------|------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURE | (m ³ /s) |
| Perceived Measurement Quality: | 0 | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.75 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Froude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S43 - Firebag River Upstream of Suncor Firebag (531528 E, 6354782 N) | | | |
| Field Personnel: | JE, SG, Josh Pilot | Trip Date: | 05-Mar-10 |
| Data Entry Personnel: | SG | Date: | 18-Mar-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.056 |
| Battery (Main): | 14.48 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1320 |
| Laptop Clock: | 1314 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.2 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1320 |
| End Time (MST): | 1330 13:35 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Ice covered |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | Sunny 10°C |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Pipe with flagging | 1.452 | 100.270 | 1.448 | 100.270 | - |
| Bench Mark 2: | Nail in log w/ flagging | | 100.000 | | 100.000 | - |
| Top of Ice: | | 2.277 | 99.445 | 2.274 | 99.444 | 99.445 |
| Water Level: | | 2.249 | 99.473 | 2.246 | 99.472 | 99.473 |
| Transducer: | | 1.056 | 98.417 | 1.056 | 98.416 | 98.417 |
| Other: | | | | | | |

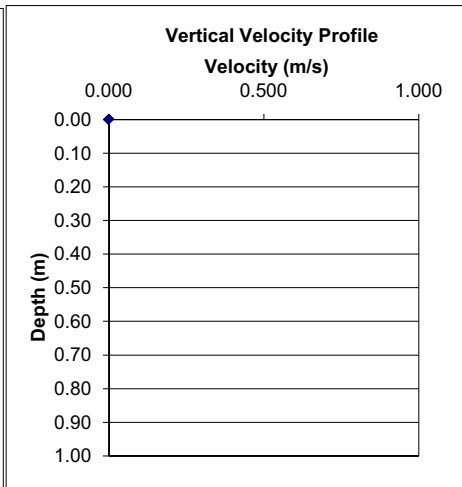
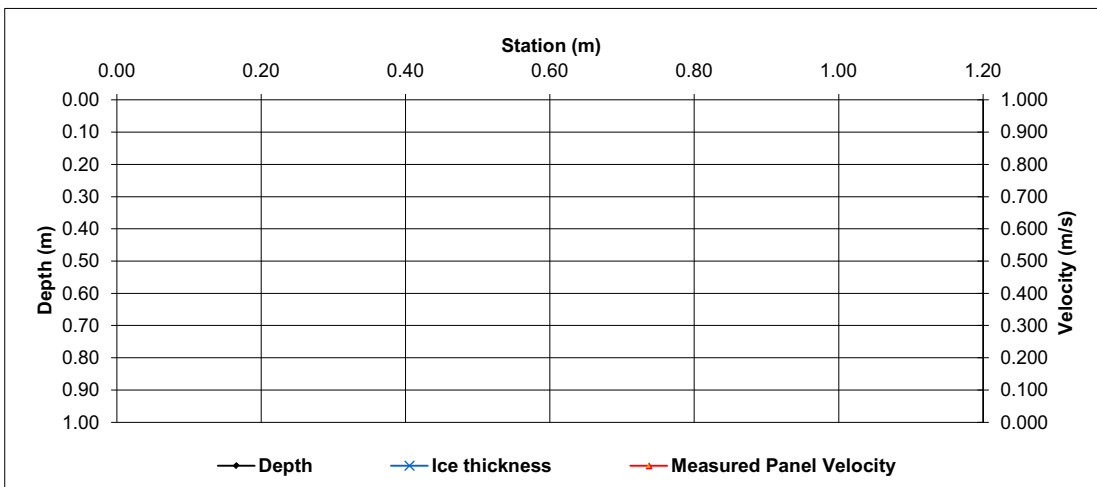
General Notes:

Ice conditions considered unsafe.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | |

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Foude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S43 - Firebag River Upstream of Suncor Firebag (531528 E, 6354782 N) | | | |
| Field Personnel: | SG, DB | Trip Date: | 12-Apr-10 |
| Data Entry Personnel: | JP | Date: | 04-Jun-10 |
| Data Check Personnel: | | Date: | |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.103 |
| Battery (Main): | 14.7 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1359 |
| Laptop Clock: | 1359 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.3 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1345 |
| End Time (MST): | 1400 |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Overcast |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Pipe with flagging | 1.466 | 100.270 | 1.418 | 100.270 | - |
| Bench Mark 2: | Nail in log w/ flagging | | 100.000 | | 100.000 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.223 | 99.513 | 2.172 | 99.516 | 99.515 |
| Transducer: | | 1.103 | 98.410 | 1.103 | 98.413 | 98.412 |
| Other: | | | | | | |

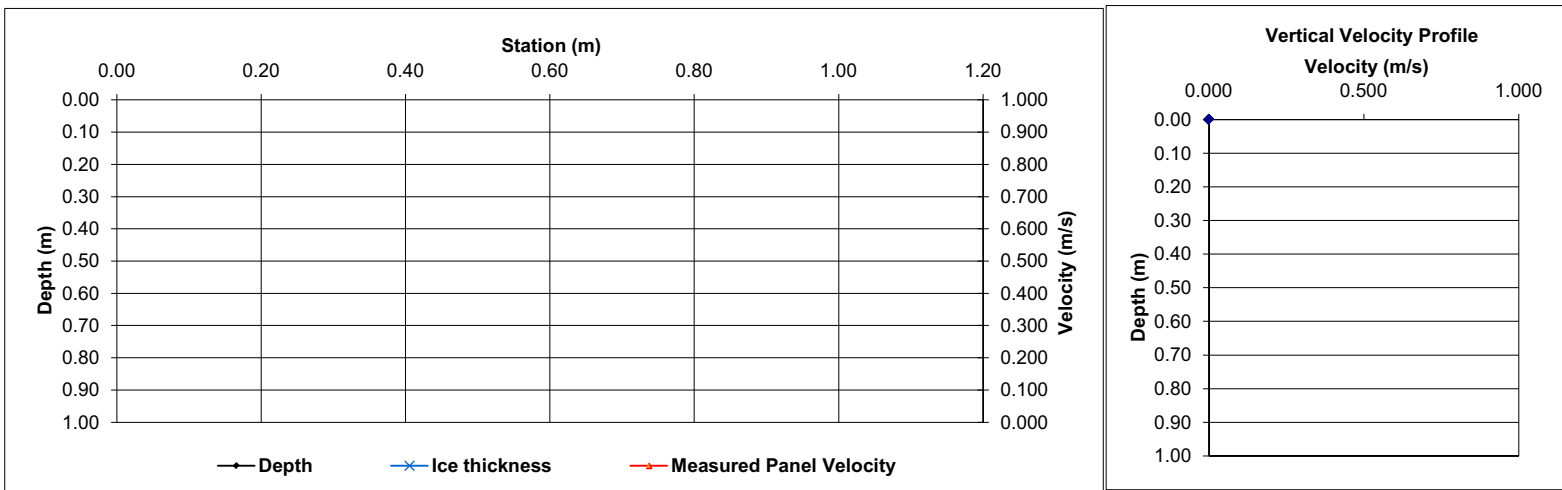
General Notes:

Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | |

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Foude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S43 - Firebag River Upstream of Suncor Firebag (531528 E, 6354782 N) | | | |
| Field Personnel: | SG DB | Trip Date: | 24-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.975 |
| Battery (Main): | - |
| Battery (Aux): | 14.95 |
| Datalogger Clock: | - |
| Laptop Clock: | - |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 4.2 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|----------------|
| Measurement Details: | |
| Start Time (MST): | 750 |
| End Time (MST): | 820 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Cold, flurries |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Pipe with flagging | 1.108 | 100.270 | 1.075 | 100.270 | - |
| Bench Mark 2: | Nail in log w/ flagging | 1.468 | 100.000 | 1.435 | 100.000 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.989 | 99.389 | 1.951 | 99.394 | 99.392 |
| Transducer: | | 0.975 | 98.414 | 0.975 | 98.419 | 98.417 |
| Other: | | | | | | |

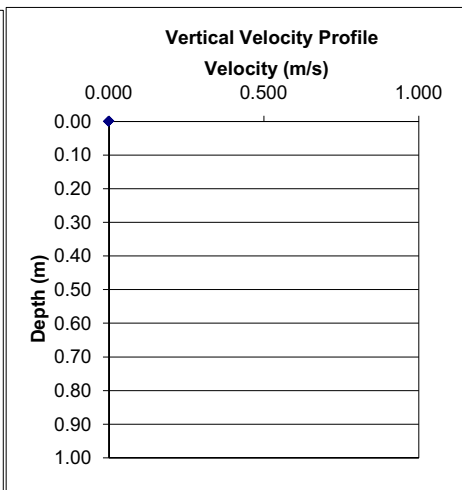
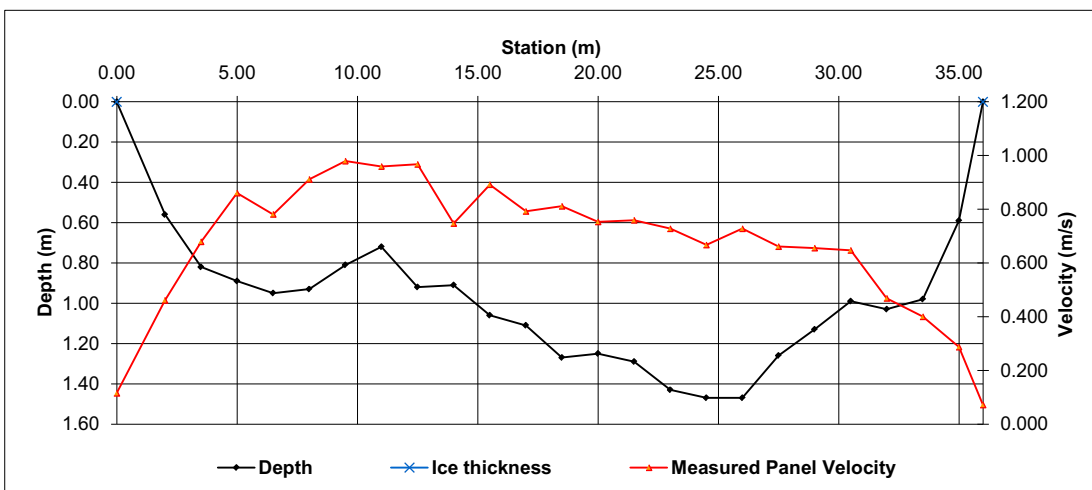
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 36.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 36.00 | 35.50 | 0.50 | 0.15 | 0.072 | 0.072 | 0.07 | 0.005 | 0% |
| 1 | 35.00 | 0.59 | | 0.287 | | | 1.0 | 35.50 | 34.25 | 1.25 | 0.59 | 0.287 | 0.287 | 0.74 | 0.212 | 1% |
| 2 | 33.50 | 0.98 | | 0.400 | | | 1.0 | 34.25 | 32.75 | 1.50 | 0.98 | 0.400 | 0.400 | 1.47 | 0.588 | 2% |
| 3 | 32.00 | 1.03 | | | 0.344 | 0.593 | 1.0 | 32.75 | 31.25 | 1.50 | 1.03 | 0.469 | 0.469 | 1.55 | 0.724 | 3% |
| 4 | 30.50 | 0.99 | | 0.647 | | | 1.0 | 31.25 | 29.75 | 1.50 | 0.99 | 0.647 | 0.647 | 1.49 | 0.961 | 4% |
| 5 | 29.00 | 1.13 | | | 0.597 | 0.714 | 1.0 | 29.75 | 28.25 | 1.50 | 1.13 | 0.656 | 0.656 | 1.70 | 1.111 | 4% |
| 6 | 27.50 | 1.26 | | | 0.581 | 0.741 | 1.0 | 28.25 | 26.75 | 1.50 | 1.26 | 0.661 | 0.661 | 1.89 | 1.249 | 5% |
| 7 | 26.00 | 1.47 | | | 0.589 | 0.866 | 1.0 | 26.75 | 25.25 | 1.50 | 1.47 | 0.728 | 0.728 | 2.21 | 1.604 | 6% |
| 8 | 24.50 | 1.47 | | | 0.622 | 0.712 | 1.0 | 25.25 | 23.75 | 1.50 | 1.47 | 0.667 | 0.667 | 2.21 | 1.471 | 6% |
| 9 | 23.00 | 1.43 | | | 0.734 | 0.721 | 1.0 | 23.75 | 22.25 | 1.50 | 1.43 | 0.728 | 0.728 | 2.15 | 1.560 | 6% |
| 10 | 21.50 | 1.29 | | | 0.718 | 0.800 | 1.0 | 22.25 | 20.75 | 1.50 | 1.29 | 0.759 | 0.759 | 1.94 | 1.469 | 6% |
| 11 | 20.00 | 1.25 | | | 0.681 | 0.825 | 1.0 | 20.75 | 19.25 | 1.50 | 1.25 | 0.753 | 0.753 | 1.88 | 1.412 | 5% |
| 12 | 18.50 | 1.27 | | | 0.753 | 0.869 | 1.0 | 19.25 | 17.75 | 1.50 | 1.27 | 0.811 | 0.811 | 1.91 | 1.545 | 6% |
| 13 | 17.00 | 1.11 | | | 0.679 | 0.905 | 1.0 | 17.75 | 16.25 | 1.50 | 1.11 | 0.792 | 0.792 | 1.67 | 1.319 | 5% |
| 14 | 15.50 | 1.06 | | | 0.874 | 0.909 | 1.0 | 16.25 | 14.75 | 1.50 | 1.06 | 0.892 | 0.892 | 1.59 | 1.417 | 5% |
| 15 | 14.00 | 0.91 | | 0.747 | | | 1.0 | 14.75 | 13.25 | 1.50 | 0.91 | 0.747 | 0.747 | 1.37 | 1.020 | 4% |
| 16 | 12.50 | 0.92 | | 0.967 | | | 1.0 | 13.25 | 11.75 | 1.50 | 0.92 | 0.967 | 0.967 | 1.38 | 1.334 | 5% |
| 17 | 11.00 | 0.72 | | 0.959 | | | 1.0 | 11.75 | 10.25 | 1.50 | 0.72 | 0.959 | 0.959 | 1.08 | 1.036 | 4% |
| 18 | 9.50 | 0.81 | | 0.979 | | | 1.0 | 10.25 | 8.75 | 1.50 | 0.81 | 0.979 | 0.979 | 1.22 | 1.189 | 5% |
| 19 | 8.00 | 0.93 | | 0.911 | | | 1.0 | 8.75 | 7.25 | 1.50 | 0.93 | 0.911 | 0.911 | 1.40 | 1.271 | 5% |
| 20 | 6.50 | 0.95 | | 0.781 | | | 1.0 | 7.25 | 5.75 | 1.50 | 0.95 | 0.781 | 0.781 | 1.43 | 1.113 | 4% |
| 21 | 5.00 | 0.89 | | 0.860 | | | 1.0 | 5.75 | 4.25 | 1.50 | 0.89 | 0.860 | 0.860 | 1.34 | 1.148 | 4% |
| 22 | 3.50 | 0.82 | | 0.679 | | | 1.0 | 4.25 | 2.75 | 1.50 | 0.82 | 0.679 | 0.679 | 1.23 | 0.835 | 3% |
| 23 | 2.00 | 0.56 | | 0.461 | | | 1.0 | 2.75 | 1.00 | 1.75 | 0.56 | 0.461 | 0.461 | 0.98 | 0.452 | 2% |
| Left | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.00 | 0.00 | 1.00 | 0.14 | 0.115 | 0.115 | 0.14 | 0.016 | 0% |
| Total Flow | | | | | | | | | | | | | | | 26.06 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|--------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 26.061 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 35.97 | (m ²) |
| Wetted Width: | 34.50 | (m) |
| Hydraulic Depth: | 1.043 | (m) |
| Mean Velocity: | 0.725 | (m/s) |
| Foude Number: | 0.227 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S43 - Firebag River Upstream of Suncor Firebag (531528 E, 6354782 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 24-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 16-Jul-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.557 |
| Battery (Main): | |
| Battery (Aux): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-----------------------|
| Measurement Details: | |
| Start Time (MST): | 1131 |
| End Time (MST): | 1230 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Overcast & Light Rain |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Pipe with flagging | 0.633 | 100.270 | 0.586 | 100.270 | - |
| Bench Mark 2: | Nail in log w/ flagging | 0.994 | 100.000 | 0.947 | 100.000 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 1.914 | 98.989 | 1.868 | 98.988 | 98.989 |
| Transducer: | | 0.557 | 98.432 | 0.557 | 98.431 | 98.432 |
| Other: | | | | | | |

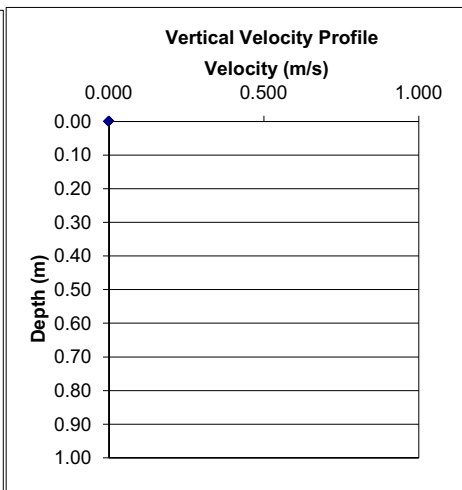
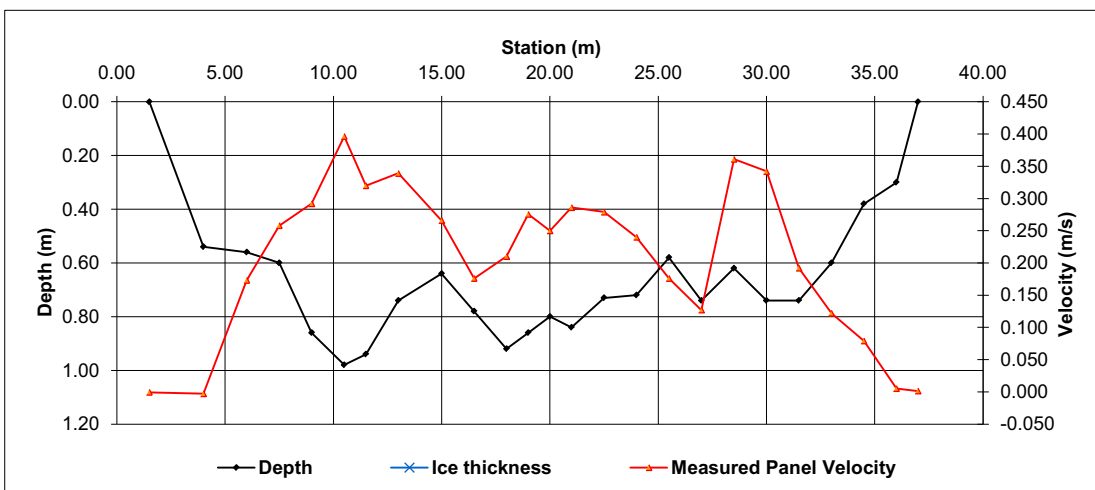
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 37.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 37.00 | 36.50 | 0.50 | 0.08 | 0.001 | 0.001 | 0.04 | 0.000 | 0% | |
| 1 | 36.00 | 0.30 | | 0.005 | | | 1.0 | 36.50 | 35.25 | 1.25 | 0.30 | 0.005 | 0.005 | 0.38 | 0.002 | 0% | |
| 2 | 34.50 | 0.38 | | 0.079 | | | 1.0 | 35.25 | 33.75 | 1.50 | 0.38 | 0.079 | 0.079 | 0.57 | 0.045 | 1% | |
| 3 | 33.00 | 0.60 | | 0.122 | | | 1.0 | 33.75 | 32.25 | 1.50 | 0.60 | 0.122 | 0.122 | 0.90 | 0.110 | 2% | |
| 4 | 31.50 | 0.74 | | 0.192 | | | 1.0 | 32.25 | 30.75 | 1.50 | 0.74 | 0.192 | 0.192 | 1.11 | 0.213 | 4% | |
| 5 | 30.00 | 0.74 | | 0.342 | | | 1.0 | 30.75 | 29.25 | 1.50 | 0.74 | 0.342 | 0.342 | 1.11 | 0.380 | 7% | |
| 6 | 28.50 | 0.62 | | 0.361 | | | 1.0 | 29.25 | 27.75 | 1.50 | 0.62 | 0.361 | 0.361 | 0.93 | 0.336 | 6% | |
| 7 | 27.00 | 0.74 | | 0.127 | | | 1.0 | 27.75 | 26.25 | 1.50 | 0.74 | 0.127 | 0.127 | 1.11 | 0.141 | 3% | |
| 8 | 25.50 | 0.58 | | 0.176 | | | 1.0 | 26.25 | 24.75 | 1.50 | 0.58 | 0.176 | 0.176 | 0.87 | 0.153 | 3% | |
| 9 | 24.00 | 0.72 | | 0.240 | | | 1.0 | 24.75 | 23.25 | 1.50 | 0.72 | 0.240 | 0.240 | 1.08 | 0.259 | 5% | |
| 10 | 22.50 | 0.73 | | 0.279 | | | 1.0 | 23.25 | 21.75 | 1.50 | 0.73 | 0.279 | 0.279 | 1.10 | 0.306 | 6% | |
| 11 | 21.00 | 0.84 | | | 0.214 | 0.358 | 1.0 | 21.75 | 20.50 | 1.25 | 0.84 | 0.286 | 0.286 | 1.05 | 0.300 | 5% | |
| 12 | 20.00 | 0.80 | | | 0.127 | 0.373 | 1.0 | 20.50 | 19.50 | 1.00 | 0.80 | 0.250 | 0.250 | 0.80 | 0.200 | 4% | |
| 13 | 19.00 | 0.86 | | | 0.136 | 0.415 | 1.0 | 19.50 | 18.50 | 1.00 | 0.86 | 0.276 | 0.276 | 0.86 | 0.237 | 4% | |
| 14 | 18.00 | 0.92 | | | 0.073 | 0.347 | 1.0 | 18.50 | 17.25 | 1.25 | 0.92 | 0.210 | 0.210 | 1.15 | 0.242 | 4% | |
| 15 | 16.50 | 0.78 | | | 0.036 | 0.316 | 1.0 | 17.25 | 15.75 | 1.50 | 0.78 | 0.176 | 0.176 | 1.17 | 0.206 | 4% | |
| 16 | 15.00 | 0.64 | | 0.266 | | | 1.0 | 15.75 | 14.00 | 1.75 | 0.64 | 0.266 | 0.266 | 1.12 | 0.298 | 5% | |
| 17 | 13.00 | 0.74 | | 0.339 | | | 1.0 | 14.00 | 12.25 | 1.75 | 0.74 | 0.339 | 0.339 | 1.30 | 0.439 | 8% | |
| 18 | 11.50 | 0.94 | | | 0.244 | 0.396 | 1.0 | 12.25 | 11.00 | 1.25 | 0.94 | 0.320 | 0.320 | 1.18 | 0.376 | 7% | |
| 19 | 10.50 | 0.98 | | | 0.306 | 0.487 | 1.0 | 11.00 | 9.75 | 1.25 | 0.98 | 0.397 | 0.397 | 1.23 | 0.486 | 9% | |
| 20 | 9.00 | 0.86 | | | 0.179 | 0.405 | 1.0 | 9.75 | 8.25 | 1.50 | 0.86 | 0.292 | 0.292 | 1.29 | 0.377 | 7% | |
| 21 | 7.50 | 0.60 | | 0.258 | | | 1.0 | 8.25 | 6.75 | 1.50 | 0.60 | 0.258 | 0.258 | 0.90 | 0.232 | 4% | |
| 22 | 6.00 | 0.56 | | 0.173 | | | 1.0 | 6.75 | 5.00 | 1.75 | 0.56 | 0.173 | 0.173 | 0.98 | 0.170 | 3% | |
| 23 | 4.00 | 0.54 | | -0.003 | | | 1.0 | 5.00 | 2.75 | 2.25 | 0.54 | -0.003 | -0.003 | 1.22 | -0.004 | 0% | |
| Left | 1.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.75 | 1.50 | 1.25 | 0.14 | -0.001 | -0.001 | 0.17 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 5.502 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 5.502 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 23.59 | (m ²) |
| Wetted Width: | 33.75 | (m) |
| Hydraulic Depth: | 0.699 | (m) |
| Mean Velocity: | 0.233 | (m/s) |
| Foude Number: | 0.089 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|---------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S43 - Firebag River Upstream of Suncor Firebag (531528 E, 6354782 N) | | | |
| Field Personnel: | BL, SG, Jim (pilot) | Trip Date: | 13-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.622 |
| Battery (Main): | 13.25 |
| Battery (Aux): | NA |
| Datalogger Clock: | 728 |
| Laptop Clock: | 727 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 18.4 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 730 |
| End Time (MST): | 900 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Overcast 15°C |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Pipe with flagging | 1.085 | 100.270 | 1.027 | 100.270 | - |
| Bench Mark 2: | Nail in log w/ flagging | 1.447 | 100.000 | 1.387 | 100.000 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.298 | 99.057 | 2.238 | 99.059 | 99.058 |
| Transducer: | | 0.622 | 98.435 | 0.622 | 98.437 | 98.436 |
| Other: | | | | | | |

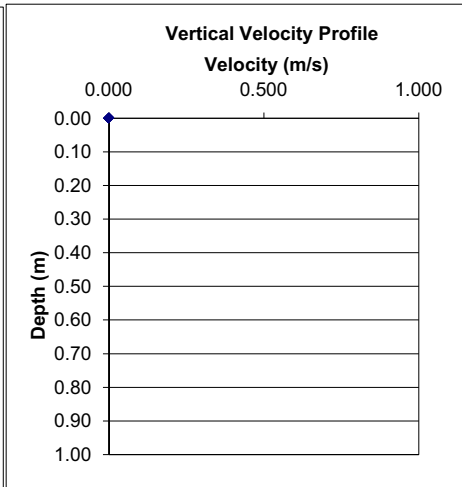
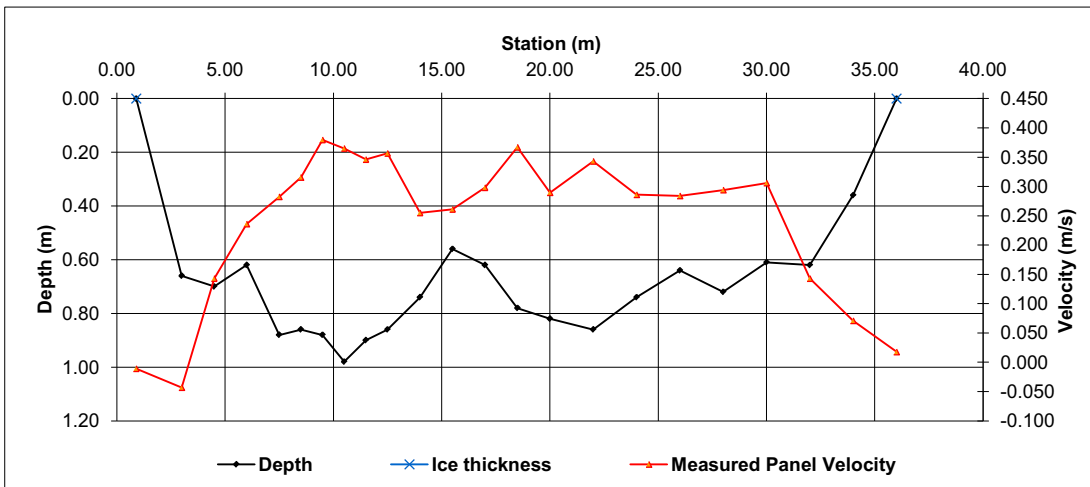
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|-----------------------|
| General Notes: |
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| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | |
| Left | 36.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 36.00 | 35.00 | 1.00 | 0.09 | 0.018 | 0.018 | 0.09 | 0.002 | 0% | | |
| 1 | 34.00 | 0.36 | | 0.071 | | | 1.0 | 35.00 | 33.00 | 2.00 | 0.36 | 0.071 | 0.071 | 0.72 | 0.051 | 1% | | |
| 2 | 32.00 | 0.62 | | 0.143 | | | 1.0 | 33.00 | 31.00 | 2.00 | 0.62 | 0.143 | 0.143 | 1.24 | 0.177 | 3% | | |
| 3 | 30.00 | 0.61 | | 0.306 | | | 1.0 | 31.00 | 29.00 | 2.00 | 0.61 | 0.306 | 0.306 | 1.22 | 0.373 | 6% | | |
| 4 | 28.00 | 0.72 | | 0.294 | | | 1.0 | 29.00 | 27.00 | 2.00 | 0.72 | 0.294 | 0.294 | 1.44 | 0.423 | 7% | | |
| 5 | 26.00 | 0.64 | | 0.284 | | | 1.0 | 27.00 | 25.00 | 2.00 | 0.64 | 0.284 | 0.284 | 1.28 | 0.364 | 6% | | |
| 6 | 24.00 | 0.74 | | 0.286 | | | 1.0 | 25.00 | 23.00 | 2.00 | 0.74 | 0.286 | 0.286 | 1.48 | 0.423 | 7% | | |
| 7 | 22.00 | 0.86 | | | 0.257 | 0.429 | 1.0 | 23.00 | 21.00 | 2.00 | 0.86 | 0.343 | 0.343 | 1.72 | 0.590 | 9% | | |
| 8 | 20.00 | 0.82 | | | 0.216 | 0.363 | 1.0 | 21.00 | 19.25 | 1.75 | 0.82 | 0.290 | 0.290 | 1.44 | 0.415 | 7% | | |
| 9 | 18.50 | 0.78 | | | 0.240 | 0.494 | 1.0 | 19.25 | 17.75 | 1.50 | 0.78 | 0.367 | 0.367 | 1.17 | 0.429 | 7% | | |
| 10 | 17.00 | 0.62 | | 0.298 | | | 1.0 | 17.75 | 16.25 | 1.50 | 0.62 | 0.298 | 0.298 | 0.93 | 0.277 | 4% | | |
| 11 | 15.50 | 0.56 | | 0.261 | | | 1.0 | 16.25 | 14.75 | 1.50 | 0.56 | 0.261 | 0.261 | 0.84 | 0.219 | 3% | | |
| 12 | 14.00 | 0.74 | | 0.255 | | | 1.0 | 14.75 | 13.25 | 1.50 | 0.74 | 0.255 | 0.255 | 1.11 | 0.283 | 4% | | |
| 13 | 12.50 | 0.86 | | | 0.326 | 0.387 | 1.0 | 13.25 | 12.00 | 1.25 | 0.86 | 0.357 | 0.357 | 1.08 | 0.383 | 6% | | |
| 14 | 11.50 | 0.90 | | | 0.293 | 0.399 | 1.0 | 12.00 | 11.00 | 1.00 | 0.90 | 0.346 | 0.346 | 0.90 | 0.311 | 5% | | |
| 15 | 10.50 | 0.98 | | | 0.250 | 0.480 | 1.0 | 11.00 | 10.00 | 1.00 | 0.98 | 0.365 | 0.365 | 0.98 | 0.358 | 6% | | |
| 16 | 9.50 | 0.88 | | | 0.269 | 0.490 | 1.0 | 10.00 | 9.00 | 1.00 | 0.88 | 0.380 | 0.380 | 0.88 | 0.334 | 5% | | |
| 17 | 8.50 | 0.86 | | | 0.222 | 0.409 | 1.0 | 9.00 | 8.00 | 1.00 | 0.86 | 0.316 | 0.316 | 0.86 | 0.271 | 4% | | |
| 18 | 7.50 | 0.88 | | | 0.195 | 0.370 | 1.0 | 8.00 | 6.75 | 1.25 | 0.88 | 0.283 | 0.283 | 1.10 | 0.311 | 5% | | |
| 19 | 6.00 | 0.62 | | 0.236 | | | 1.0 | 6.75 | 5.25 | 1.50 | 0.62 | 0.236 | 0.236 | 0.93 | 0.219 | 3% | | |
| 20 | 4.50 | 0.70 | | 0.143 | | | 1.0 | 5.25 | 3.75 | 1.50 | 0.70 | 0.143 | 0.143 | 1.05 | 0.150 | 2% | | |
| 21 | 3.00 | 0.66 | | -0.043 | | | 1.0 | 3.75 | 1.95 | 1.80 | 0.66 | -0.043 | -0.043 | 1.19 | -0.051 | -1% | | |
| Right | 0.90 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 1.95 | 0.90 | 1.05 | 0.17 | -0.011 | -0.011 | 0.17 | -0.002 | 0% | | |
| Total Flow | | | | | | | | | | | | | | | 6.313 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 6.313 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 23.81 | (m ²) |
| Wetted Width: | 33.05 | (m) |
| Hydraulic Depth: | 0.720 | (m) |
| Mean Velocity: | 0.265 | (m/s) |
| Foude Number: | 0.100 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S43 - Firebag River Upstream of Suncor Firebag (531528 E, 6354782 N) | | | |
| Field Personnel: | DB SG Matt (pilot) | Trip Date: | 15-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.001 |
| Battery (Main): | 13.47 |
| Battery (Aux): | NA |
| Datalogger Clock: | 740 |
| Laptop Clock: | 739 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 8.8 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |
| Rain 0 (total ~300mm) | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 740 |
| End Time (MST): | 850 |
| Equipment: | ADV |
| Method: | Fishcat |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Partly Cloudy 10°C |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|-------------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Pipe with flagging | 1.212 | 100.270 | 1.179 | 100.270 | - |
| Bench Mark 2: | Nail in log w/ flagging | 1.575 | 100.000 | 1.542 | 100.000 | - |
| Top of Ice: | | | 101.482 | | 101.449 | 101.466 |
| Water Level: | | 2.059 | 99.423 | 2.022 | 99.427 | 99.425 |
| Transducer: | | 1.001 | 98.422 | 1.001 | 98.426 | 98.424 |
| Other: | | | | | | |

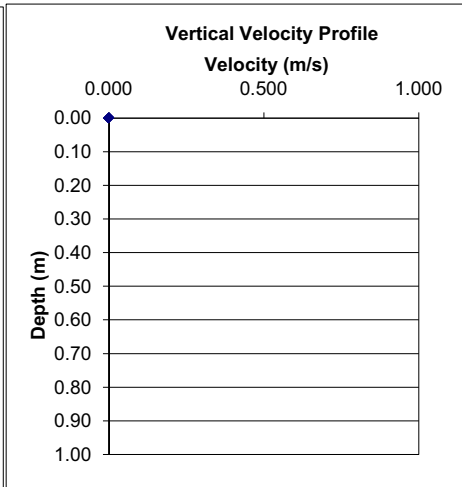
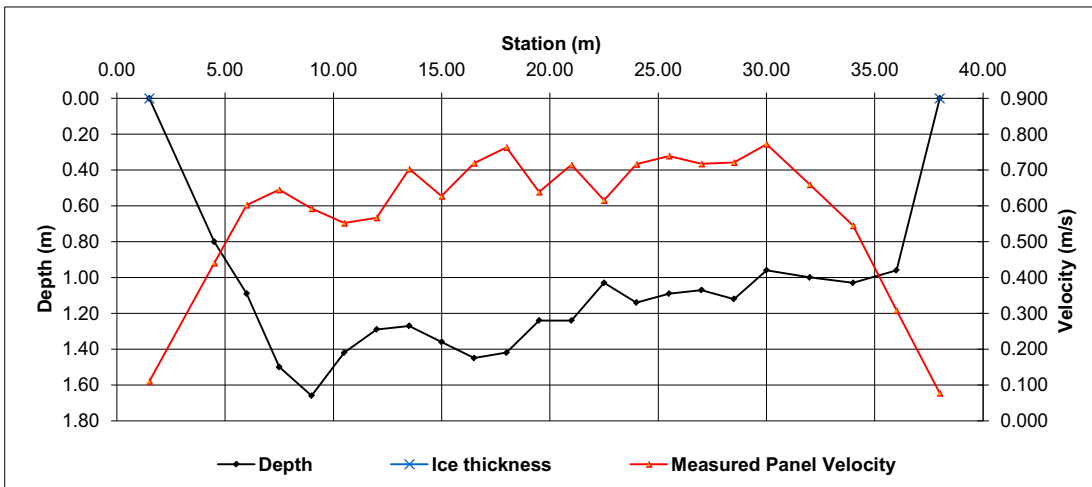
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|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 38.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 38.00 | 37.00 | 1.00 | 0.24 | 0.077 | 0.077 | 0.24 | 0.018 | 0% | |
| 1 | 36.00 | 0.96 | | | 0.185 | 0.431 | 1.0 | 37.00 | 35.00 | 2.00 | 0.96 | 0.308 | 0.308 | 1.92 | 0.591 | 2% | |
| 2 | 34.00 | 1.03 | | | 0.532 | 0.558 | 1.0 | 35.00 | 33.00 | 2.00 | 1.03 | 0.545 | 0.545 | 2.06 | 1.123 | 4% | |
| 3 | 32.00 | 1.00 | | | 0.638 | 0.681 | 1.0 | 33.00 | 31.00 | 2.00 | 1.00 | 0.660 | 0.660 | 2.00 | 1.319 | 5% | |
| 4 | 30.00 | 0.96 | | | 0.793 | 0.752 | 1.0 | 31.00 | 29.25 | 1.75 | 0.96 | 0.773 | 0.773 | 1.68 | 1.298 | 5% | |
| 5 | 28.50 | 1.12 | | | 0.696 | 0.747 | 1.0 | 29.25 | 27.75 | 1.50 | 1.12 | 0.722 | 0.722 | 1.68 | 1.212 | 5% | |
| 6 | 27.00 | 1.07 | | | 0.643 | 0.792 | 1.0 | 27.75 | 26.25 | 1.50 | 1.07 | 0.718 | 0.718 | 1.61 | 1.152 | 5% | |
| 7 | 25.50 | 1.09 | | | 0.697 | 0.782 | 1.0 | 26.25 | 24.75 | 1.50 | 1.09 | 0.740 | 0.740 | 1.64 | 1.209 | 5% | |
| 8 | 24.00 | 1.14 | | | 0.708 | 0.725 | 1.0 | 24.75 | 23.25 | 1.50 | 1.14 | 0.717 | 0.717 | 1.71 | 1.225 | 5% | |
| 9 | 22.50 | 1.03 | | | 0.590 | 0.641 | 1.0 | 23.25 | 21.75 | 1.50 | 1.03 | 0.616 | 0.616 | 1.55 | 0.951 | 4% | |
| 10 | 21.00 | 1.24 | | | 0.642 | 0.787 | 1.0 | 21.75 | 20.25 | 1.50 | 1.24 | 0.715 | 0.715 | 1.86 | 1.329 | 5% | |
| 11 | 19.50 | 1.24 | | | 0.513 | 0.765 | 1.0 | 20.25 | 18.75 | 1.50 | 1.24 | 0.639 | 0.639 | 1.86 | 1.189 | 5% | |
| 12 | 18.00 | 1.42 | | | 0.691 | 0.836 | 1.0 | 18.75 | 17.25 | 1.50 | 1.42 | 0.764 | 0.764 | 2.13 | 1.626 | 6% | |
| 13 | 16.50 | 1.45 | | | 0.643 | 0.796 | 1.0 | 17.25 | 15.75 | 1.50 | 1.45 | 0.720 | 0.720 | 2.18 | 1.565 | 6% | |
| 14 | 15.00 | 1.36 | | | 0.492 | 0.763 | 1.0 | 15.75 | 14.25 | 1.50 | 1.36 | 0.628 | 0.628 | 2.04 | 1.280 | 5% | |
| 15 | 13.50 | 1.27 | | | 0.616 | 0.790 | 1.0 | 14.25 | 12.75 | 1.50 | 1.27 | 0.703 | 0.703 | 1.91 | 1.339 | 5% | |
| 16 | 12.00 | 1.29 | | | 0.341 | 0.793 | 1.0 | 12.75 | 11.25 | 1.50 | 1.29 | 0.567 | 0.567 | 1.94 | 1.097 | 4% | |
| 17 | 10.50 | 1.42 | | | 0.183 | 0.921 | 1.0 | 11.25 | 9.75 | 1.50 | 1.42 | 0.552 | 0.552 | 2.13 | 1.176 | 5% | |
| 18 | 9.00 | 1.66 | | | 0.373 | 0.812 | 1.0 | 9.75 | 8.25 | 1.50 | 1.66 | 0.593 | 0.593 | 2.49 | 1.475 | 6% | |
| 19 | 7.50 | 1.50 | | | 0.447 | 0.843 | 1.0 | 8.25 | 6.75 | 1.50 | 1.50 | 0.645 | 0.645 | 2.25 | 1.451 | 6% | |
| 20 | 6.00 | 1.09 | | | 0.455 | 0.750 | 1.0 | 6.75 | 5.25 | 1.50 | 1.09 | 0.603 | 0.603 | 1.64 | 0.985 | 4% | |
| 21 | 4.50 | 0.80 | | | 0.306 | 0.575 | 1.0 | 5.25 | 3.00 | 2.25 | 0.80 | 0.441 | 0.441 | 1.80 | 0.793 | 3% | |
| Right | 1.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.00 | 1.50 | 1.50 | 0.20 | 0.110 | 0.110 | 0.30 | 0.033 | 0% | |
| Total Flow | | | | | | | | | | | | | | 25.437 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|--------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 25.437 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 40.59 | (m ²) |
| Wetted Width: | 34.00 | (m) |
| Hydraulic Depth: | 1.194 | (m) |
| Mean Velocity: | 0.627 | (m/s) |
| Foude Number: | 0.183 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S43 - Firebag River Upstream of Suncor Firebag (531528 E, 6354782 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 27-Oct-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|----------------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.523 |
| Battery (Main): | 12.97 |
| Battery (Aux): | NA |
| Datalogger Clock: | 835 |
| Laptop Clock: | 834 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | 0.5 |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |
| TBRG shut down for winter | |

| | |
|------------------------------|----------------|
| Measurement Details: | |
| Start Time (MST): | 830 |
| End Time (MST): | 925 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open. Some ice |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Overcast -3°C |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Pipe with flagging | 1.014 | 100.270 | 0.969 | 100.270 | - |
| Bench Mark 2: | Nail in log w/ flagging | 1.385 | 100.000 | 1.341 | 100.000 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.326 | 98.958 | 2.285 | 98.954 | 98.956 |
| Transducer: | | 0.523 | 98.435 | 0.523 | 98.431 | 98.433 |
| Other: | | | | | | |

General Notes:

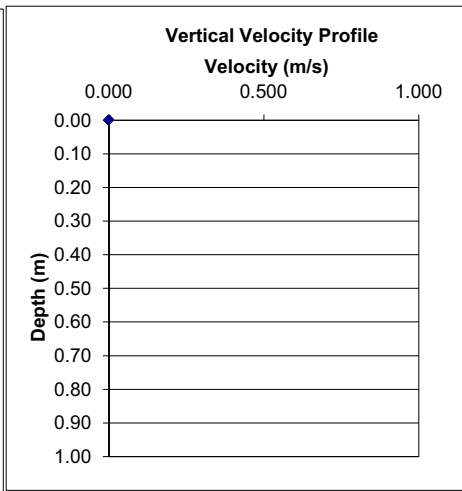
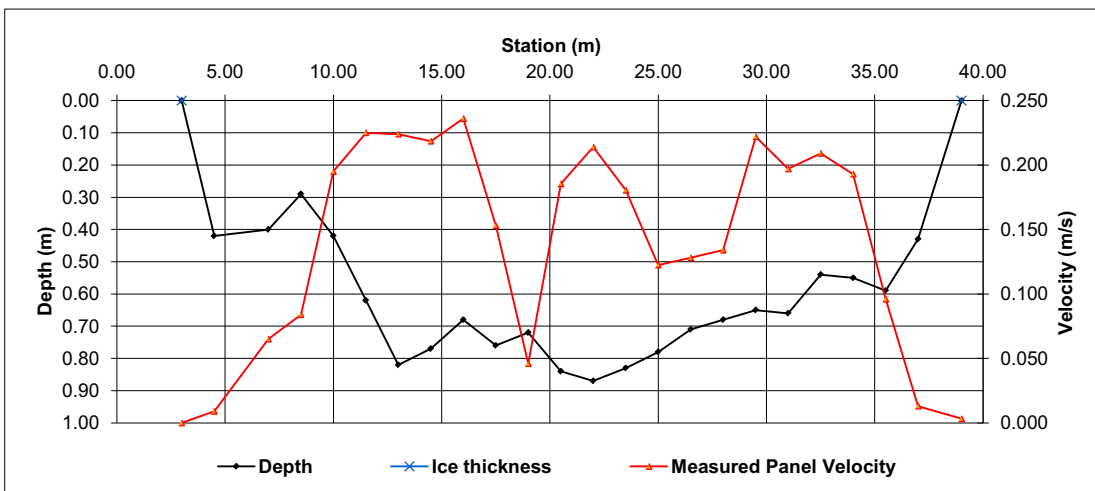
Ice along banks, 1-3m wide

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Right | 39.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 39.00 | 38.00 | 1.00 | 0.11 | 0.003 | 0.003 | 0.11 | 0.000 | 0% | |
| 1 | 37.00 | 0.43 | | 0.013 | | | 1.0 | 38.00 | 36.25 | 1.75 | 0.43 | 0.013 | 0.013 | 0.75 | 0.010 | 0% | |
| 2 | 35.50 | 0.59 | | 0.096 | | | 1.0 | 36.25 | 34.75 | 1.50 | 0.59 | 0.096 | 0.096 | 0.89 | 0.085 | 2% | |
| 3 | 34.00 | 0.55 | | 0.193 | | | 1.0 | 34.75 | 33.25 | 1.50 | 0.55 | 0.193 | 0.193 | 0.83 | 0.159 | 5% | |
| 4 | 32.50 | 0.54 | | 0.209 | | | 1.0 | 33.25 | 31.75 | 1.50 | 0.54 | 0.209 | 0.209 | 0.81 | 0.169 | 5% | |
| 5 | 31.00 | 0.66 | | 0.197 | | | 1.0 | 31.75 | 30.25 | 1.50 | 0.66 | 0.197 | 0.197 | 0.99 | 0.195 | 6% | |
| 6 | 29.50 | 0.65 | | 0.222 | | | 1.0 | 30.25 | 28.75 | 1.50 | 0.65 | 0.222 | 0.222 | 0.98 | 0.216 | 6% | |
| 7 | 28.00 | 0.68 | | 0.134 | | | 1.0 | 28.75 | 27.25 | 1.50 | 0.68 | 0.134 | 0.134 | 1.02 | 0.137 | 4% | |
| 8 | 26.50 | 0.71 | | 0.128 | | | 1.0 | 27.25 | 25.75 | 1.50 | 0.71 | 0.128 | 0.128 | 1.07 | 0.136 | 4% | |
| 9 | 25.00 | 0.78 | | | 0.014 | 0.231 | 1.0 | 25.75 | 24.25 | 1.50 | 0.78 | 0.123 | 0.123 | 1.17 | 0.143 | 4% | |
| 10 | 23.50 | 0.83 | | | 0.167 | 0.194 | 1.0 | 24.25 | 22.75 | 1.50 | 0.83 | 0.181 | 0.181 | 1.25 | 0.225 | 7% | |
| 11 | 22.00 | 0.87 | | | 0.204 | 0.224 | 1.0 | 22.75 | 21.25 | 1.50 | 0.87 | 0.214 | 0.214 | 1.31 | 0.279 | 8% | |
| 12 | 20.50 | 0.84 | | | 0.110 | 0.261 | 1.0 | 21.25 | 19.75 | 1.50 | 0.84 | 0.186 | 0.186 | 1.26 | 0.234 | 7% | |
| 13 | 19.00 | 0.72 | | 0.046 | | | 1.0 | 19.75 | 18.25 | 1.50 | 0.72 | 0.046 | 0.046 | 1.08 | 0.050 | 1% | |
| 14 | 17.50 | 0.76 | | | 0.096 | 0.210 | 1.0 | 18.25 | 16.75 | 1.50 | 0.76 | 0.153 | 0.153 | 1.14 | 0.174 | 5% | |
| 15 | 16.00 | 0.68 | | 0.236 | | | 1.0 | 16.75 | 15.25 | 1.50 | 0.68 | 0.236 | 0.236 | 1.02 | 0.241 | 7% | |
| 16 | 14.50 | 0.77 | | | 0.139 | 0.298 | 1.0 | 15.25 | 13.75 | 1.50 | 0.77 | 0.219 | 0.219 | 1.16 | 0.252 | 7% | |
| 17 | 13.00 | 0.82 | | | 0.166 | 0.282 | 1.0 | 13.75 | 12.25 | 1.50 | 0.82 | 0.224 | 0.224 | 1.23 | 0.276 | 8% | |
| 18 | 11.50 | 0.62 | | 0.225 | | | 1.0 | 12.25 | 10.75 | 1.50 | 0.62 | 0.225 | 0.225 | 0.93 | 0.209 | 6% | |
| 19 | 10.00 | 0.42 | | 0.195 | | | 1.0 | 10.75 | 9.25 | 1.50 | 0.42 | 0.195 | 0.195 | 0.63 | 0.123 | 4% | |
| 20 | 8.50 | 0.29 | | 0.084 | | | 1.0 | 9.25 | 7.75 | 1.50 | 0.29 | 0.084 | 0.084 | 0.44 | 0.037 | 1% | |
| 21 | 7.00 | 0.40 | | 0.065 | | | 1.0 | 7.75 | 5.75 | 2.00 | 0.40 | 0.065 | 0.065 | 0.80 | 0.052 | 2% | |
| 22 | 4.50 | 0.42 | | 0.009 | | | 1.0 | 5.75 | 3.75 | 2.00 | 0.42 | 0.009 | 0.009 | 0.84 | 0.008 | 0% | |
| Left | 3.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.75 | 3.00 | 0.75 | 0.11 | 0.000 | 0.000 | 0.08 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 3.410 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 3.410 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 21.75 | (m ²) |
| Wetted Width: | 34.25 | (m) |
| Hydraulic Depth: | 0.635 | (m) |
| Mean Velocity: | 0.157 | (m/s) |
| Foude Number: | 0.063 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S43 - Firebag River Upstream of Suncor Firebag (531528 E, 6354782 N) | | | |
| Field Personnel: | SG, JO | Trip Date: | 04-Dec-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.429 |
| Battery (Main): | 12.81 |
| Battery (Aux): | - |
| Datalogger Clock: | 918 |
| Laptop Clock: | 916 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | - |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|-----------------|
| Measurement Details: | |
| Start Time (MST): | 915 |
| End Time (MST): | 1030 |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | - 18, 7/8 cloud |

| Level Survey: | | | | | | |
|----------------------|-------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Pipe with flagging | 0.962 | 100.270 | 0.958 | 100.270 | - |
| Bench Mark 2: | Nail in log w/ flagging | 1.331 | 100.000 | 1.329 | 100.000 | - |
| Top of Ice: | | 1.770 | 99.462 | 1.678 | 99.550 | 99.506 |
| Water Level: | | 1.878 | 99.354 | 1.872 | 99.356 | 99.355 |
| Transducer: | | 0.429 | 98.925 | 0.429 | 98.927 | 98.926 |
| Other: | | | | | | |

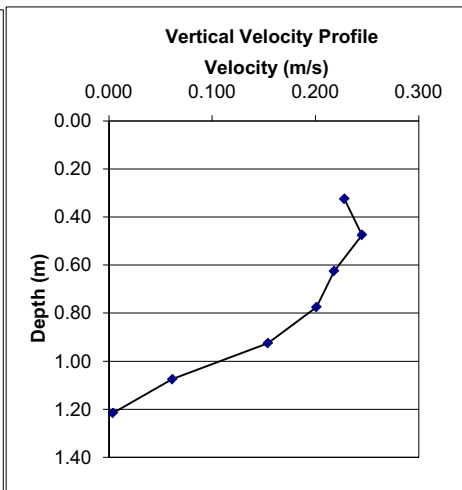
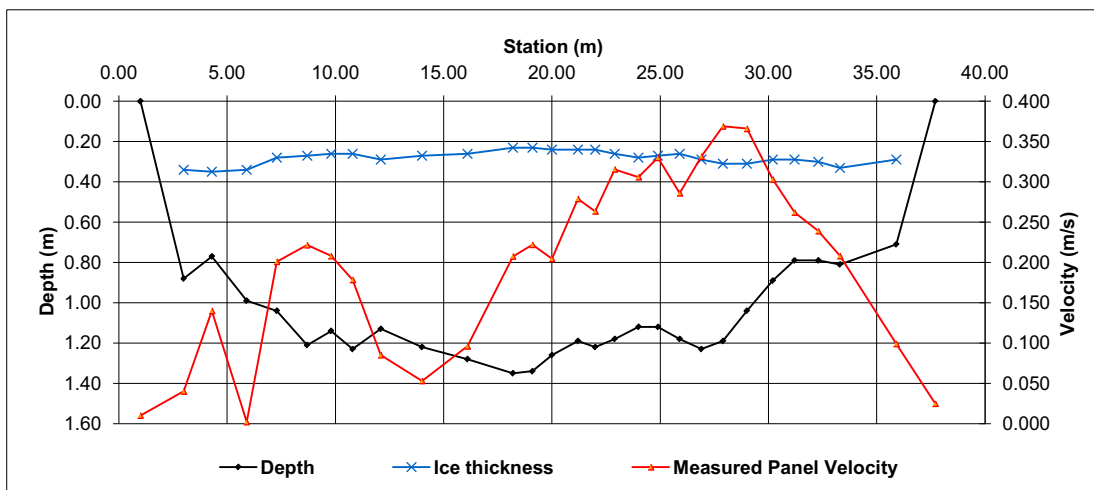
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|--|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | |
| Right | 1.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.00 | 2.00 | 1.00 | 0.14 | 0.010 | 0.009 | 0.14 | 0.001 | 0% | | | |
| 1 | 3.00 | 0.88 | 0.34 | 0.040 | | | 0.9 | 2.00 | 3.65 | 1.65 | 0.54 | 0.040 | 0.036 | 0.89 | 0.032 | 1% | | | |
| 2 | 4.30 | 0.77 | 0.35 | 0.140 | | | 0.9 | 3.65 | 5.10 | 1.45 | 0.42 | 0.140 | 0.126 | 0.61 | 0.077 | 1% | | | |
| 3 | 5.90 | 0.99 | 0.34 | 0.002 | | | 0.9 | 5.10 | 6.60 | 1.50 | 0.65 | 0.002 | 0.002 | 0.98 | 0.002 | 0% | | | |
| 4 | 7.30 | 1.04 | 0.28 | | 0.178 | 0.224 | 1.0 | 6.60 | 8.00 | 1.40 | 0.76 | 0.201 | 0.201 | 1.06 | 0.214 | 4% | | | |
| 5 | 8.70 | 1.21 | 0.27 | | 0.182 | 0.261 | 1.0 | 8.00 | 9.25 | 1.25 | 0.94 | 0.222 | 0.222 | 1.18 | 0.260 | 5% | | | |
| 6 | 9.80 | 1.14 | 0.26 | | 0.182 | 0.234 | 1.0 | 9.25 | 10.30 | 1.05 | 0.88 | 0.208 | 0.208 | 0.92 | 0.192 | 4% | | | |
| 7 | 10.80 | 1.23 | 0.26 | | 0.162 | 0.195 | 1.0 | 10.30 | 11.45 | 1.15 | 0.97 | 0.179 | 0.179 | 1.12 | 0.199 | 4% | | | |
| 8 | 12.10 | 1.13 | 0.29 | | 0.160 | 0.010 | 1.0 | 11.45 | 13.05 | 1.60 | 0.84 | 0.085 | 0.085 | 1.34 | 0.114 | 2% | | | |
| 9 | 14.00 | 1.22 | 0.27 | | 0.106 | 0.000 | 1.0 | 13.05 | 15.05 | 2.00 | 0.95 | 0.053 | 0.053 | 1.90 | 0.101 | 2% | | | |
| 10 | 16.10 | 1.28 | 0.26 | | 0.150 | 0.042 | 1.0 | 15.05 | 17.15 | 2.10 | 1.02 | 0.096 | 0.096 | 2.14 | 0.206 | 4% | | | |
| 11 | 18.20 | 1.35 | 0.23 | | 0.184 | 0.231 | 1.0 | 17.15 | 18.65 | 1.50 | 1.12 | 0.208 | 0.208 | 1.68 | 0.349 | 7% | | | |
| 12 | 19.10 | 1.34 | 0.23 | | 0.183 | 0.261 | 1.0 | 18.65 | 19.55 | 0.90 | 1.11 | 0.222 | 0.222 | 1.00 | 0.222 | 4% | | | |
| 13 | 20.00 | 1.26 | 0.24 | | 0.167 | 0.242 | 1.0 | 19.55 | 20.60 | 1.05 | 1.02 | 0.205 | 0.205 | 1.07 | 0.219 | 4% | | | |
| 14 | 21.20 | 1.19 | 0.24 | | 0.266 | 0.292 | 1.0 | 20.60 | 21.60 | 1.00 | 0.95 | 0.279 | 0.279 | 0.95 | 0.265 | 5% | | | |
| 15 | 22.00 | 1.22 | 0.24 | | 0.237 | 0.290 | 1.0 | 21.60 | 22.45 | 0.85 | 0.98 | 0.264 | 0.264 | 0.83 | 0.219 | 4% | | | |
| 16 | 22.90 | 1.18 | 0.26 | | 0.306 | 0.325 | 1.0 | 22.45 | 23.45 | 1.00 | 0.92 | 0.316 | 0.316 | 0.92 | 0.290 | 5% | | | |
| 17 | 24.00 | 1.12 | 0.28 | | 0.285 | 0.327 | 1.0 | 23.45 | 24.45 | 1.00 | 0.84 | 0.306 | 0.306 | 0.84 | 0.257 | 5% | | | |
| 18 | 24.90 | 1.12 | 0.27 | | 0.319 | 0.341 | 1.0 | 24.45 | 25.40 | 0.95 | 0.85 | 0.330 | 0.330 | 0.81 | 0.266 | 5% | | | |
| 19 | 25.90 | 1.18 | 0.26 | | 0.252 | 0.320 | 1.0 | 25.40 | 26.40 | 1.00 | 0.92 | 0.286 | 0.286 | 0.92 | 0.263 | 5% | | | |
| 20 | 26.90 | 1.23 | 0.29 | | 0.331 | 0.332 | 1.0 | 26.40 | 27.40 | 1.00 | 0.94 | 0.332 | 0.332 | 0.94 | 0.312 | 6% | | | |
| 21 | 27.90 | 1.19 | 0.31 | | 0.312 | 0.426 | 1.0 | 27.40 | 28.45 | 1.05 | 0.88 | 0.369 | 0.369 | 0.92 | 0.341 | 6% | | | |
| 22 | 29.00 | 1.04 | 0.31 | 0.366 | | | 0.9 | 28.45 | 29.60 | 1.15 | 0.73 | 0.366 | 0.329 | 0.84 | 0.277 | 5% | | | |
| 23 | 30.20 | 0.89 | 0.29 | 0.303 | | | 0.9 | 29.60 | 30.70 | 1.10 | 0.60 | 0.303 | 0.273 | 0.66 | 0.180 | 3% | | | |
| 24 | 31.20 | 0.79 | 0.29 | 0.262 | | | 0.9 | 30.70 | 31.75 | 1.05 | 0.50 | 0.262 | 0.236 | 0.53 | 0.124 | 2% | | | |
| 25 | 32.30 | 0.79 | 0.30 | 0.239 | | | 0.9 | 31.75 | 32.80 | 1.05 | 0.49 | 0.239 | 0.215 | 0.51 | 0.111 | 2% | | | |
| 26 | 33.30 | 0.81 | 0.33 | 0.208 | | | 0.9 | 32.80 | 34.60 | 1.80 | 0.48 | 0.208 | 0.187 | 0.86 | 0.162 | 3% | | | |
| 27 | 35.90 | 0.71 | 0.29 | 0.099 | | | 0.9 | 34.60 | 36.80 | 2.20 | 0.42 | 0.099 | 0.089 | 0.92 | 0.082 | 2% | | | |
| Left | 37.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 36.80 | 37.70 | 0.90 | 0.11 | 0.025 | 0.025 | 0.09 | 0.002 | 0% | | | |
| Total Flow | | | | | | | | | | | | | | | 5.339 | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 5.339 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 27.58 | (m ²) |
| Wetted Width: | 36.70 | (m) |
| Hydraulic Depth: | 0.752 | (m) |
| Mean Velocity: | 0.194 | (m/s) |
| Foude Number: | 0.071 | |

| Velocity Profile for Ice Conditions: | | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------------|--|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.147 | |
| Offset | 16.1 | 1.28 | 0 | - | - | Panel V.@Ofst 0.096 | |
| Depth | 1.28 | 1.15 | 0.008 | 1.22 | 0.004 | 60% Depth 0.88 | |
| Ice Depth | 0.28 | 1.00 | 0.115 | 1.08 | 0.062 | 20% Depth 0.48 | |
| | | 0.85 | 0.193 | 0.93 | 0.154 | 80% Depth 1.08 | |
| | | 0.70 | 0.209 | 0.78 | 0.201 | | |
| | | 0.55 | 0.227 | 0.63 | 0.218 | | |
| | | 0.40 | 0.263 | 0.48 | 0.245 | | |
| | | 0.25 | 0.193 | 0.33 | 0.228 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S44 - Pierre River near Ft. MacKay (460775 E, 6369400 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 24-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|--------------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 0.242 |
| Battery (Main): | 4.63 |
| Battery (Aux): | 13.69 |
| Datalogger Clock: | 1214 |
| Laptop Clock: | 1215 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 15 |
| Dessicant: | New |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Logger S/N = 0104170274 | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1230 |
| End Time (MST): | 1250 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Overcast, Flurries |

| Level Survey: | | | | | | |
|----------------------|--------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in logger tree root | 0.749 | 100.000 | 0.729 | 100.000 | - |
| Bench Mark 2: | NO BM2 | | 100.000 | | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 1.881 | 98.868 | 1.859 | 98.870 | 98.869 |
| Transducer: | | 0.242 | 98.626 | 0.242 | 98.628 | 98.627 |
| Other: | | | | | | |

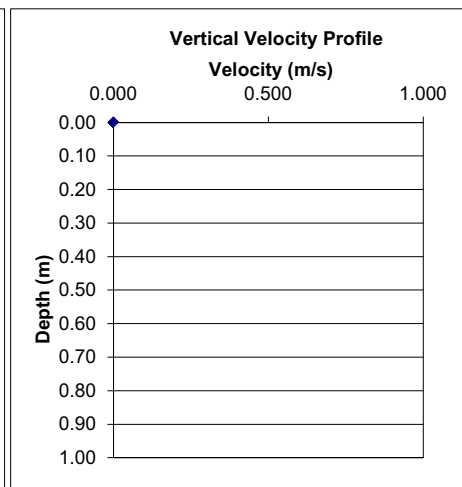
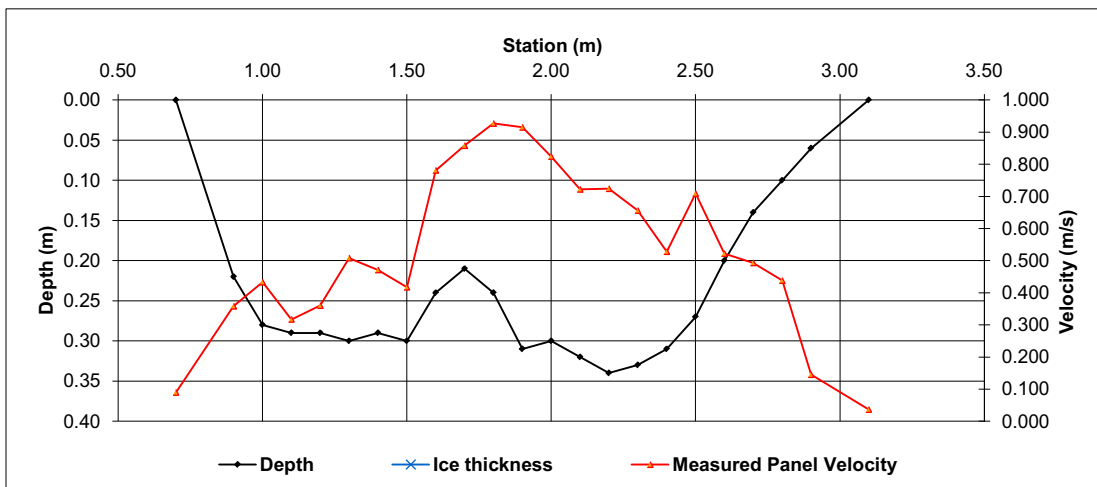
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.70 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.70 | 0.80 | 0.10 | 0.06 | 0.090 | 0.090 | 0.01 | 0.000 | 0% |
| 1 | 0.90 | 0.22 | | 0.358 | | | 1.0 | 0.80 | 0.95 | 0.15 | 0.22 | 0.358 | 0.358 | 0.03 | 0.012 | 4% |
| 2 | 1.00 | 0.28 | | 0.433 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.28 | 0.433 | 0.433 | 0.03 | 0.012 | 4% |
| 3 | 1.10 | 0.29 | | 0.317 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.29 | 0.317 | 0.317 | 0.03 | 0.009 | 3% |
| 4 | 1.20 | 0.29 | | 0.360 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.29 | 0.360 | 0.360 | 0.03 | 0.010 | 3% |
| 5 | 1.30 | 0.30 | | 0.508 | | | 1.0 | 1.25 | 1.35 | 0.10 | 0.30 | 0.508 | 0.508 | 0.03 | 0.015 | 5% |
| 6 | 1.40 | 0.29 | | 0.471 | | | 1.0 | 1.35 | 1.45 | 0.10 | 0.29 | 0.471 | 0.471 | 0.03 | 0.014 | 4% |
| 7 | 1.50 | 0.30 | | 0.417 | | | 1.0 | 1.45 | 1.55 | 0.10 | 0.30 | 0.417 | 0.417 | 0.03 | 0.013 | 4% |
| 8 | 1.60 | 0.24 | | 0.781 | | | 1.0 | 1.55 | 1.65 | 0.10 | 0.24 | 0.781 | 0.781 | 0.02 | 0.019 | 6% |
| 9 | 1.70 | 0.21 | | 0.858 | | | 1.0 | 1.65 | 1.75 | 0.10 | 0.21 | 0.858 | 0.858 | 0.02 | 0.018 | 6% |
| 10 | 1.80 | 0.24 | | 0.927 | | | 1.0 | 1.75 | 1.85 | 0.10 | 0.24 | 0.927 | 0.927 | 0.02 | 0.022 | 7% |
| 11 | 1.90 | 0.31 | | 0.915 | | | 1.0 | 1.85 | 1.95 | 0.10 | 0.31 | 0.915 | 0.915 | 0.03 | 0.028 | 9% |
| 12 | 2.00 | 0.30 | | 0.824 | | | 1.0 | 1.95 | 2.05 | 0.10 | 0.30 | 0.824 | 0.824 | 0.03 | 0.025 | 8% |
| 13 | 2.10 | 0.32 | | 0.722 | | | 1.0 | 2.05 | 2.15 | 0.10 | 0.32 | 0.722 | 0.722 | 0.03 | 0.023 | 7% |
| 14 | 2.20 | 0.34 | | 0.724 | | | 1.0 | 2.15 | 2.25 | 0.10 | 0.34 | 0.724 | 0.724 | 0.03 | 0.025 | 8% |
| 15 | 2.30 | 0.33 | | 0.656 | | | 1.0 | 2.25 | 2.35 | 0.10 | 0.33 | 0.656 | 0.656 | 0.03 | 0.022 | 7% |
| 16 | 2.40 | 0.31 | | 0.528 | | | 1.0 | 2.35 | 2.45 | 0.10 | 0.31 | 0.528 | 0.528 | 0.03 | 0.016 | 5% |
| 17 | 2.50 | 0.27 | | 0.709 | | | 1.0 | 2.45 | 2.55 | 0.10 | 0.27 | 0.709 | 0.709 | 0.03 | 0.019 | 6% |
| 18 | 2.60 | 0.20 | | 0.522 | | | 1.0 | 2.55 | 2.65 | 0.10 | 0.20 | 0.522 | 0.522 | 0.02 | 0.010 | 3% |
| 19 | 2.70 | 0.14 | | 0.493 | | | 1.0 | 2.65 | 2.75 | 0.10 | 0.14 | 0.493 | 0.493 | 0.01 | 0.007 | 2% |
| 20 | 2.80 | 0.10 | | 0.438 | | | 1.0 | 2.75 | 2.85 | 0.10 | 0.10 | 0.438 | 0.438 | 0.01 | 0.004 | 1% |
| 21 | 2.90 | 0.06 | | 0.145 | | | 1.0 | 2.85 | 3.00 | 0.15 | 0.06 | 0.145 | 0.145 | 0.01 | 0.001 | 0% |
| Left | 3.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.00 | 3.10 | 0.10 | 0.02 | 0.036 | 0.036 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.326 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.326 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 0.56 | (m ²) |
| Wetted Width: | 2.40 | (m) |
| Hydraulic Depth: | 0.231 | (m) |
| Mean Velocity: | 0.587 | (m/s) |
| Foude Number: | 0.390 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S44 - Pierre River near Ft. MacKay (460775 E, 6369400 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 24-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 16-Jul-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.350 |
| Battery (Main): | 4.77 |
| Battery (Aux): | 13.89 |
| Datalogger Clock: | 1441 |
| Laptop Clock: | 1442 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1415 |
| End Time (MST): | 1545 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Fair |
| Weather: | Partly Cloudy |

| Level Survey: | | | | | | |
|----------------------|--------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in logger tree root | 0.790 | 100.000 | 0.749 | 100.000 | - |
| Bench Mark 2: | NO BM2 | | 100.000 | | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 3.170 | 97.620 | 3.125 | 97.624 | 97.622 |
| Transducer: | | 0.350 | 97.270 | 0.350 | 97.274 | 97.272 |
| Other: | | | | | | |

General Notes:

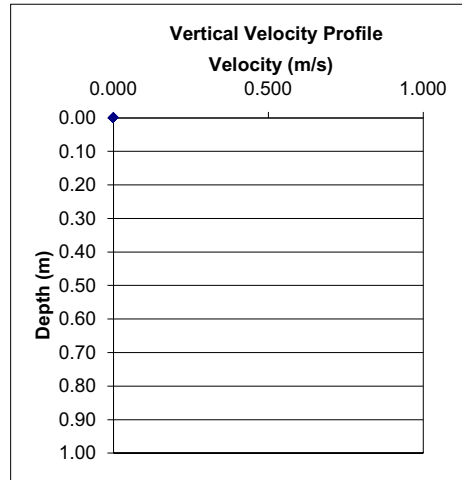
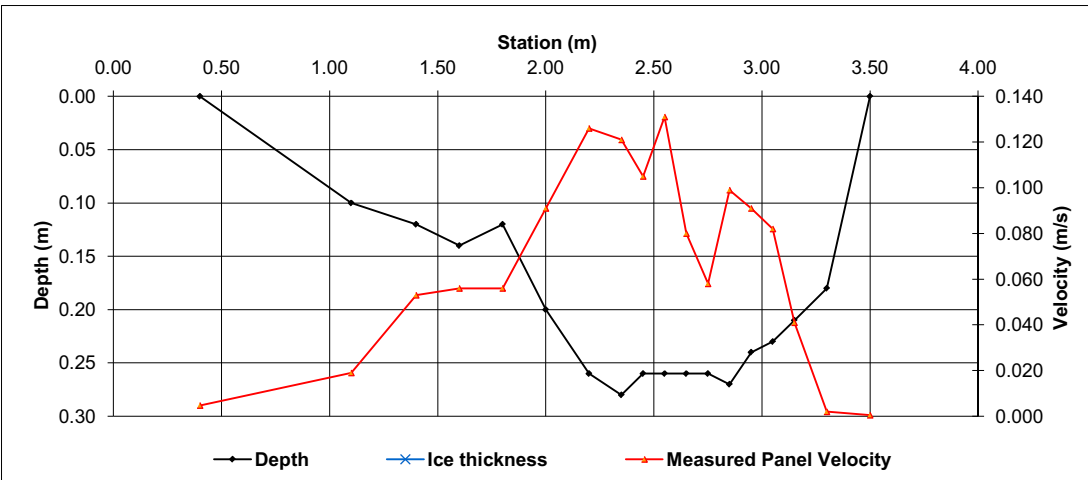
Check water level patterns at this location.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 0.40 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.40 | 0.75 | 0.35 | 0.03 | 0.005 | 0.005 | 0.01 | 0.000 | 0% |
| 1 | 1.10 | 0.10 | | 0.019 | | | 1.0 | 0.75 | 1.25 | 0.50 | 0.10 | 0.019 | 0.019 | 0.05 | 0.001 | 3% |
| 2 | 1.40 | 0.12 | | 0.053 | | | 1.0 | 1.25 | 1.50 | 0.25 | 0.12 | 0.053 | 0.053 | 0.03 | 0.002 | 4% |
| 3 | 1.60 | 0.14 | | 0.056 | | | 1.0 | 1.50 | 1.70 | 0.20 | 0.14 | 0.056 | 0.056 | 0.03 | 0.002 | 4% |
| 4 | 1.80 | 0.12 | | 0.056 | | | 1.0 | 1.70 | 1.90 | 0.20 | 0.12 | 0.056 | 0.056 | 0.02 | 0.001 | 4% |
| 5 | 2.00 | 0.20 | | 0.091 | | | 1.0 | 1.90 | 2.10 | 0.20 | 0.20 | 0.091 | 0.091 | 0.04 | 0.004 | 10% |
| 6 | 2.20 | 0.26 | | 0.126 | | | 1.0 | 2.10 | 2.28 | 0.18 | 0.26 | 0.126 | 0.126 | 0.05 | 0.006 | 16% |
| 7 | 2.35 | 0.28 | | 0.121 | | | 1.0 | 2.28 | 2.40 | 0.13 | 0.28 | 0.121 | 0.121 | 0.04 | 0.004 | 12% |
| 8 | 2.45 | 0.26 | | 0.105 | | | 1.0 | 2.40 | 2.50 | 0.10 | 0.26 | 0.105 | 0.105 | 0.03 | 0.003 | 7% |
| 9 | 2.55 | 0.26 | | 0.131 | | | 1.0 | 2.50 | 2.60 | 0.10 | 0.26 | 0.131 | 0.131 | 0.03 | 0.003 | 9% |
| 10 | 2.65 | 0.26 | | 0.080 | | | 1.0 | 2.60 | 2.70 | 0.10 | 0.26 | 0.080 | 0.080 | 0.03 | 0.002 | 6% |
| 11 | 2.75 | 0.26 | | 0.058 | | | 1.0 | 2.70 | 2.80 | 0.10 | 0.26 | 0.058 | 0.058 | 0.03 | 0.002 | 4% |
| 12 | 2.85 | 0.27 | | 0.099 | | | 1.0 | 2.80 | 2.90 | 0.10 | 0.27 | 0.099 | 0.099 | 0.03 | 0.003 | 7% |
| 13 | 2.95 | 0.24 | | 0.091 | | | 1.0 | 2.90 | 3.00 | 0.10 | 0.24 | 0.091 | 0.091 | 0.02 | 0.002 | 6% |
| 14 | 3.05 | 0.23 | | 0.082 | | | 1.0 | 3.00 | 3.10 | 0.10 | 0.23 | 0.082 | 0.082 | 0.02 | 0.002 | 5% |
| 15 | 3.15 | 0.21 | | 0.041 | | | 1.0 | 3.10 | 3.23 | 0.13 | 0.21 | 0.041 | 0.041 | 0.03 | 0.001 | 3% |
| 16 | 3.30 | 0.18 | | 0.002 | | | 1.0 | 3.23 | 3.40 | 0.18 | 0.18 | 0.002 | 0.002 | 0.03 | 0.000 | 0% |
| Left | 3.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.40 | 3.50 | 0.10 | 0.05 | 0.001 | 0.001 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.037 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.037 | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 0.50 | (m ²) |
| Wetted Width: | 3.10 | (m) |
| Hydraulic Depth: | 0.162 | (m) |
| Mean Velocity: | 0.073 | (m/s) |
| Foude Number: | 0.058 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|----------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V. @Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|---------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S44 - Pierre River near Ft. MacKay (460775 E, 6369400 N) | | | |
| Field Personnel: | BL, SG, Jim (pilot) | Trip Date: | 13-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.382 |
| Battery (Main): | 4.79 |
| Battery (Aux): | 13.27 |
| Datalogger Clock: | 1252 |
| Laptop Clock: | 1252 |
| Air Temp: | |
| Air Pressure: | |
| RH: | |
| Water °C: | |
| Memory used: | 24% |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1255 |
| End Time (MST): | 1330 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Partly Cloudy |

| Level Survey: | | | | | | |
|----------------------|--------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in logger tree root | 0.868 | 100.000 | 0.803 | 100.000 | - |
| Bench Mark 2: | NO BM2 | | 100.000 | | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 3.207 | 97.661 | 3.143 | 97.660 | 97.661 |
| Transducer: | | 0.382 | 97.279 | 0.382 | 97.278 | 97.279 |
| Other: | | | | | | |

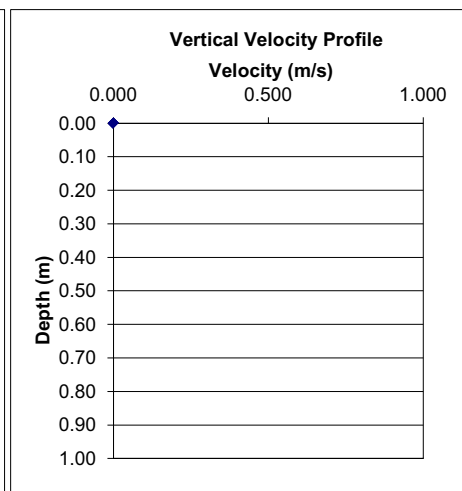
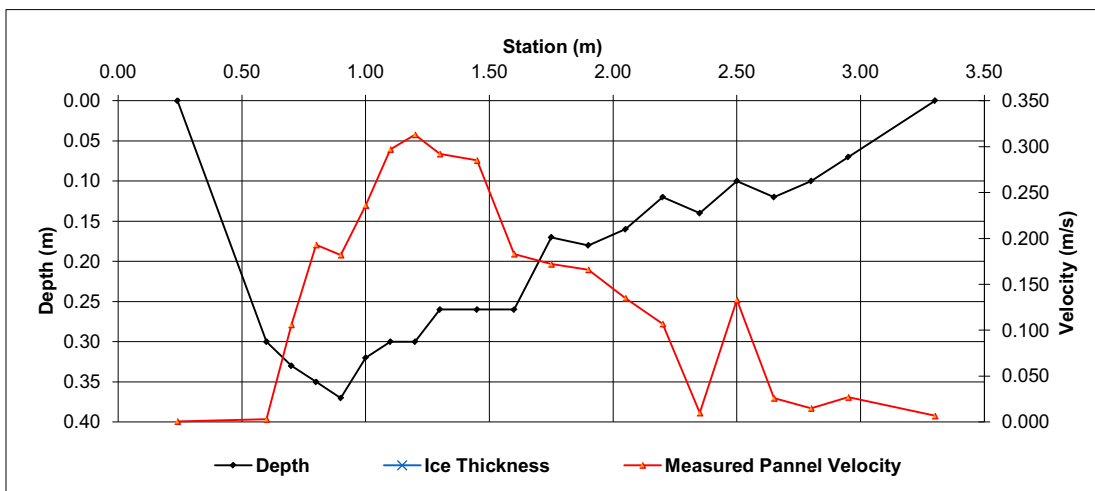
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 0.24 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 0.24 | 0.42 | 0.18 | 0.08 | 0.001 | 0.001 | 0.01 | 0.000 | 0% |
| 1 | 0.60 | 0.30 | | 0.003 | | | 1.0 | 0.42 | 0.65 | 0.23 | 0.30 | 0.003 | 0.003 | 0.07 | 0.000 | 0% |
| 2 | 0.70 | 0.33 | | 0.106 | | | 1.0 | 0.65 | 0.75 | 0.10 | 0.33 | 0.106 | 0.106 | 0.03 | 0.003 | 4% |
| 3 | 0.80 | 0.35 | | 0.193 | | | 1.0 | 0.75 | 0.85 | 0.10 | 0.35 | 0.193 | 0.193 | 0.04 | 0.007 | 8% |
| 4 | 0.90 | 0.37 | | 0.182 | | | 1.0 | 0.85 | 0.95 | 0.10 | 0.37 | 0.182 | 0.182 | 0.04 | 0.007 | 8% |
| 5 | 1.00 | 0.32 | | 0.236 | | | 1.0 | 0.95 | 1.05 | 0.10 | 0.32 | 0.236 | 0.236 | 0.03 | 0.008 | 9% |
| 6 | 1.10 | 0.30 | | 0.297 | | | 1.0 | 1.05 | 1.15 | 0.10 | 0.30 | 0.297 | 0.297 | 0.03 | 0.009 | 10% |
| 7 | 1.20 | 0.30 | | 0.313 | | | 1.0 | 1.15 | 1.25 | 0.10 | 0.30 | 0.313 | 0.313 | 0.03 | 0.009 | 11% |
| 8 | 1.30 | 0.26 | | 0.292 | | | 1.0 | 1.25 | 1.38 | 0.13 | 0.26 | 0.292 | 0.292 | 0.03 | 0.009 | 11% |
| 9 | 1.45 | 0.26 | | 0.285 | | | 1.0 | 1.38 | 1.53 | 0.15 | 0.26 | 0.285 | 0.285 | 0.04 | 0.011 | 13% |
| 10 | 1.60 | 0.26 | | 0.183 | | | 1.0 | 1.53 | 1.68 | 0.15 | 0.26 | 0.183 | 0.183 | 0.04 | 0.007 | 8% |
| 11 | 1.75 | 0.17 | | 0.172 | | | 1.0 | 1.68 | 1.83 | 0.15 | 0.17 | 0.172 | 0.172 | 0.03 | 0.004 | 5% |
| 12 | 1.90 | 0.18 | | 0.166 | | | 1.0 | 1.83 | 1.98 | 0.15 | 0.18 | 0.166 | 0.166 | 0.03 | 0.004 | 5% |
| 13 | 2.05 | 0.16 | | 0.135 | | | 1.0 | 1.98 | 2.13 | 0.15 | 0.16 | 0.135 | 0.135 | 0.02 | 0.003 | 4% |
| 14 | 2.20 | 0.12 | | 0.107 | | | 1.0 | 2.13 | 2.28 | 0.15 | 0.12 | 0.107 | 0.107 | 0.02 | 0.002 | 2% |
| 15 | 2.35 | 0.14 | | 0.010 | | | 1.0 | 2.28 | 2.43 | 0.15 | 0.14 | 0.010 | 0.010 | 0.02 | 0.000 | 0% |
| 16 | 2.50 | 0.10 | | 0.133 | | | 1.0 | 2.43 | 2.58 | 0.15 | 0.10 | 0.133 | 0.133 | 0.02 | 0.002 | 2% |
| 17 | 2.65 | 0.12 | | 0.026 | | | 1.0 | 2.58 | 2.73 | 0.15 | 0.12 | 0.026 | 0.026 | 0.02 | 0.000 | 1% |
| 18 | 2.80 | 0.10 | | 0.015 | | | 1.0 | 2.73 | 2.88 | 0.15 | 0.10 | 0.015 | 0.015 | 0.02 | 0.000 | 0% |
| 19 | 2.95 | 0.07 | | 0.027 | | | 1.0 | 2.88 | 3.13 | 0.25 | 0.07 | 0.027 | 0.027 | 0.02 | 0.000 | 1% |
| Right | 3.30 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 3.13 | 3.30 | 0.18 | 0.02 | 0.007 | 0.007 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.088 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.088 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.57 | (m ²) |
| Wetted Width: | 3.06 | (m) |
| Hydraulic Depth: | 0.188 | (m) |
| Mean Velocity: | 0.154 | (m/s) |
| Foude Number: | 0.113 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S44 - Pierre River near Ft. MacKay (460775 E, 6369400 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 20-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.498 |
| Battery (Main): | 4.63 |
| Battery (Aux): | 13.47 |
| Datalogger Clock: | 1130 |
| Laptop Clock: | 1130 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | 20% |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|---------|
| Measurement Details: | |
| Start Time (MST): | 1130 |
| End Time (MST): | 1210 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Drizzle |

| Level Survey: | | | | | | |
|----------------------|--------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in logger tree root | 0.773 | 100.000 | 0.723 | 100.000 | - |
| Bench Mark 2: | NEW 3/4" pipe | 0.896 | 100.000 | 0.847 | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 3.008 | 97.765 | 2.962 | 97.761 | 97.763 |
| Transducer: | | 0.498 | 97.267 | 0.498 | 97.263 | 97.265 |
| Other: | | | | | | |

General Notes:

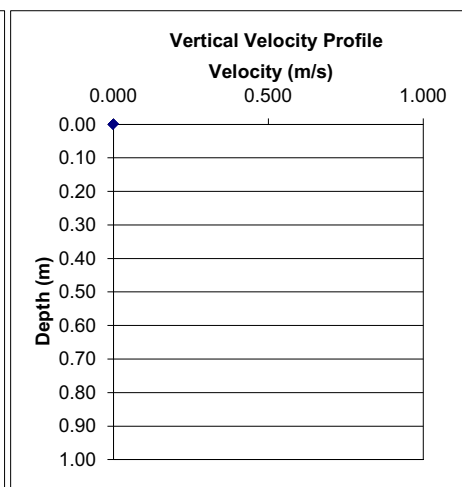
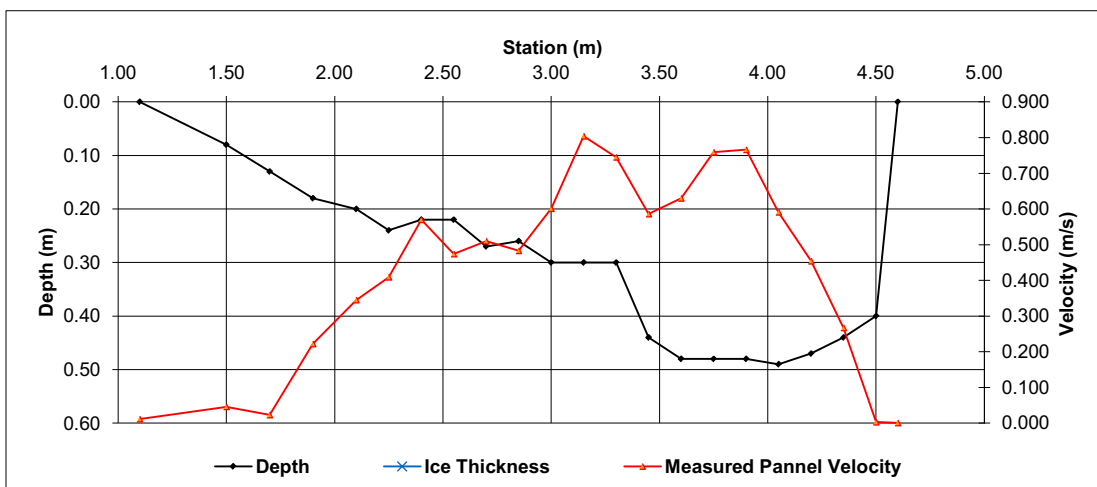
Installed new BM(2), 3m steel pipe

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 1.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.10 | 1.30 | 0.20 | 0.02 | 0.012 | 0.012 | 0.00 | 0.000 | 0% |
| 1 | 1.50 | 0.08 | | 0.046 | | | 1.0 | 1.30 | 1.60 | 0.30 | 0.08 | 0.046 | 0.046 | 0.02 | 0.001 | 0% |
| 2 | 1.70 | 0.13 | | 0.023 | | | 1.0 | 1.60 | 1.80 | 0.20 | 0.13 | 0.023 | 0.023 | 0.03 | 0.001 | 0% |
| 3 | 1.90 | 0.18 | | 0.222 | | | 1.0 | 1.80 | 2.00 | 0.20 | 0.18 | 0.222 | 0.222 | 0.04 | 0.008 | 2% |
| 4 | 2.10 | 0.20 | | 0.345 | | | 1.0 | 2.00 | 2.18 | 0.18 | 0.20 | 0.345 | 0.345 | 0.04 | 0.012 | 2% |
| 5 | 2.25 | 0.24 | | 0.409 | | | 1.0 | 2.18 | 2.33 | 0.15 | 0.24 | 0.409 | 0.409 | 0.04 | 0.015 | 3% |
| 6 | 2.40 | 0.22 | | 0.570 | | | 1.0 | 2.33 | 2.48 | 0.15 | 0.22 | 0.570 | 0.570 | 0.03 | 0.019 | 4% |
| 7 | 2.55 | 0.22 | | 0.474 | | | 1.0 | 2.48 | 2.63 | 0.15 | 0.22 | 0.474 | 0.474 | 0.03 | 0.016 | 3% |
| 8 | 2.70 | 0.27 | | 0.510 | | | 1.0 | 2.63 | 2.78 | 0.15 | 0.27 | 0.510 | 0.510 | 0.04 | 0.021 | 4% |
| 9 | 2.85 | 0.26 | | 0.483 | | | 1.0 | 2.78 | 2.93 | 0.15 | 0.26 | 0.483 | 0.483 | 0.04 | 0.019 | 4% |
| 10 | 3.00 | 0.30 | | 0.601 | | | 1.0 | 2.93 | 3.08 | 0.15 | 0.30 | 0.601 | 0.601 | 0.05 | 0.027 | 5% |
| 11 | 3.15 | 0.30 | | 0.804 | | | 1.0 | 3.08 | 3.23 | 0.15 | 0.30 | 0.804 | 0.804 | 0.04 | 0.036 | 7% |
| 12 | 3.30 | 0.30 | | 0.745 | | | 1.0 | 3.23 | 3.38 | 0.15 | 0.30 | 0.745 | 0.745 | 0.05 | 0.034 | 7% |
| 13 | 3.45 | 0.44 | | 0.586 | | | 1.0 | 3.38 | 3.53 | 0.15 | 0.44 | 0.586 | 0.586 | 0.07 | 0.039 | 8% |
| 14 | 3.60 | 0.48 | | 0.630 | | | 1.0 | 3.53 | 3.68 | 0.15 | 0.48 | 0.630 | 0.630 | 0.07 | 0.045 | 9% |
| 15 | 3.75 | 0.48 | | 0.759 | | | 1.0 | 3.68 | 3.83 | 0.15 | 0.48 | 0.759 | 0.759 | 0.07 | 0.055 | 11% |
| 16 | 3.90 | 0.48 | | 0.766 | | | 1.0 | 3.83 | 3.98 | 0.15 | 0.48 | 0.766 | 0.766 | 0.07 | 0.055 | 11% |
| 17 | 4.05 | 0.49 | | 0.591 | | | 1.0 | 3.98 | 4.13 | 0.15 | 0.49 | 0.591 | 0.591 | 0.07 | 0.043 | 9% |
| 18 | 4.20 | 0.47 | | 0.454 | | | 1.0 | 4.13 | 4.28 | 0.15 | 0.47 | 0.454 | 0.454 | 0.07 | 0.032 | 6% |
| 19 | 4.35 | 0.44 | | 0.267 | | | 1.0 | 4.28 | 4.43 | 0.15 | 0.44 | 0.267 | 0.267 | 0.07 | 0.018 | 4% |
| 20 | 4.50 | 0.40 | | 0.003 | | | 1.0 | 4.43 | 4.55 | 0.13 | 0.40 | 0.003 | 0.003 | 0.05 | 0.000 | 0% |
| Left | 4.60 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 4.55 | 4.60 | 0.05 | 0.10 | 0.001 | 0.001 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.494 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.494 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.99 | (m ²) |
| Wetted Width: | 3.50 | (m) |
| Hydraulic Depth: | 0.282 | (m) |
| Mean Velocity: | 0.500 | (m/s) |
| Foude Number: | 0.301 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|---|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S44 - Pierre River near Ft. MacKay (460775 E, 6369400 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 27-Oct-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|--|--------|
| Logger Details: | |
| Transducer Reading: | 0.397 |
| Battery (Main): | 4.60 |
| Battery (Aux): | 12.69 |
| Datalogger Clock: | 1253 |
| Laptop Clock: | 1255 |
| Air Temp: | - |
| Air Pressure: | - |
| RH: | - |
| Water °C: | - |
| Memory used: | - |
| Dessicant: | - |
| Logger# (if Δ): | 101346 |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Solar Panel and box (but no dess-jar lid) left | |

| | |
|------------------------------|--------|
| Measurement Details: | |
| Start Time (MST): | 1250 |
| End Time (MST): | 1333 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | - |

| Level Survey: | | | | | | |
|----------------------|--------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | Nail in logger tree root | 0.875 | 100.000 | 0.850 | 100.000 | - |
| Bench Mark 2: | PIPE | 0.989 | 100.000 | 0.963 | 100.000 | - |
| Top of Ice: | | - | - | - | - | - |
| Water Level: | | 3.194 | 97.681 | 3.169 | 97.681 | 97.681 |
| Transducer: | | 0.397 | 97.284 | 0.397 | 97.284 | 97.284 |
| Other: | | | | | | |

General Notes:

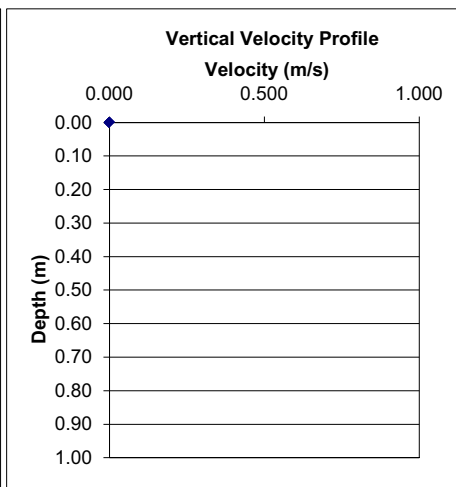
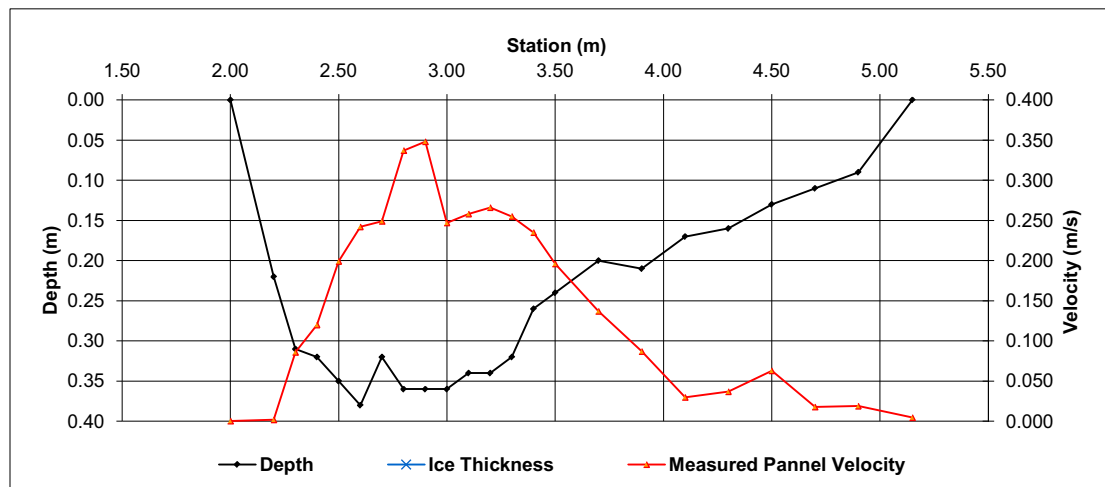
TSS @ 13m

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Right | 5.15 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 5.15 | 5.03 | 0.13 | 0.02 | 0.005 | 0.005 | 0.00 | 0.000 | 0% |
| 1 | 4.90 | 0.09 | | 0.019 | | | 1.0 | 5.03 | 4.80 | 0.23 | 0.09 | 0.019 | 0.019 | 0.02 | 0.000 | 0% |
| 2 | 4.70 | 0.11 | | 0.018 | | | 1.0 | 4.80 | 4.60 | 0.20 | 0.11 | 0.018 | 0.018 | 0.02 | 0.000 | 0% |
| 3 | 4.50 | 0.13 | | 0.063 | | | 1.0 | 4.60 | 4.40 | 0.20 | 0.13 | 0.063 | 0.063 | 0.03 | 0.002 | 1% |
| 4 | 4.30 | 0.16 | | 0.037 | | | 1.0 | 4.40 | 4.20 | 0.20 | 0.16 | 0.037 | 0.037 | 0.03 | 0.001 | 1% |
| 5 | 4.10 | 0.17 | | 0.030 | | | 1.0 | 4.20 | 4.00 | 0.20 | 0.17 | 0.030 | 0.030 | 0.03 | 0.001 | 1% |
| 6 | 3.90 | 0.21 | | 0.087 | | | 1.0 | 4.00 | 3.80 | 0.20 | 0.21 | 0.087 | 0.087 | 0.04 | 0.004 | 3% |
| 7 | 3.70 | 0.20 | | 0.137 | | | 1.0 | 3.80 | 3.60 | 0.20 | 0.20 | 0.137 | 0.137 | 0.04 | 0.005 | 5% |
| 8 | 3.50 | 0.24 | | 0.196 | | | 1.0 | 3.60 | 3.45 | 0.15 | 0.24 | 0.196 | 0.196 | 0.04 | 0.007 | 6% |
| 9 | 3.40 | 0.26 | | 0.235 | | | 1.0 | 3.45 | 3.35 | 0.10 | 0.26 | 0.235 | 0.235 | 0.03 | 0.006 | 5% |
| 10 | 3.30 | 0.32 | | 0.255 | | | 1.0 | 3.35 | 3.25 | 0.10 | 0.32 | 0.255 | 0.255 | 0.03 | 0.008 | 7% |
| 11 | 3.20 | 0.34 | | 0.266 | | | 1.0 | 3.25 | 3.15 | 0.10 | 0.34 | 0.266 | 0.266 | 0.03 | 0.009 | 8% |
| 12 | 3.10 | 0.34 | | 0.258 | | | 1.0 | 3.15 | 3.05 | 0.10 | 0.34 | 0.258 | 0.258 | 0.03 | 0.009 | 7% |
| 13 | 3.00 | 0.36 | | 0.247 | | | 1.0 | 3.05 | 2.95 | 0.10 | 0.36 | 0.247 | 0.247 | 0.04 | 0.009 | 8% |
| 14 | 2.90 | 0.36 | | 0.348 | | | 1.0 | 2.95 | 2.85 | 0.10 | 0.36 | 0.348 | 0.348 | 0.04 | 0.013 | 11% |
| 15 | 2.80 | 0.36 | | 0.337 | | | 1.0 | 2.85 | 2.75 | 0.10 | 0.36 | 0.337 | 0.337 | 0.04 | 0.012 | 10% |
| 16 | 2.70 | 0.32 | | 0.249 | | | 1.0 | 2.75 | 2.65 | 0.10 | 0.32 | 0.249 | 0.249 | 0.03 | 0.008 | 7% |
| 17 | 2.60 | 0.38 | | 0.242 | | | 1.0 | 2.65 | 2.55 | 0.10 | 0.38 | 0.242 | 0.242 | 0.04 | 0.009 | 8% |
| 18 | 2.50 | 0.35 | | 0.199 | | | 1.0 | 2.55 | 2.45 | 0.10 | 0.35 | 0.199 | 0.199 | 0.03 | 0.007 | 6% |
| 19 | 2.40 | 0.32 | | 0.120 | | | 1.0 | 2.45 | 2.35 | 0.10 | 0.32 | 0.120 | 0.120 | 0.03 | 0.004 | 3% |
| 20 | 2.30 | 0.31 | | 0.086 | | | 1.0 | 2.35 | 2.25 | 0.10 | 0.31 | 0.086 | 0.086 | 0.03 | 0.003 | 2% |
| 21 | 2.20 | 0.22 | | 0.002 | | | 1.0 | 2.25 | 2.10 | 0.15 | 0.22 | 0.002 | 0.002 | 0.03 | 0.000 | 0% |
| Left | 2.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.10 | 2.00 | 0.10 | 0.06 | 0.001 | 0.001 | 0.01 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.117 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.117 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 0.70 | (m ²) |
| Wetted Width: | 2.93 | (m) |
| Hydraulic Depth: | 0.238 | (m) |
| Mean Velocity: | 0.168 | (m/s) |
| Foude Number: | 0.110 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | | | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S45 - Elys River above Joslyn Creek Diversion (440605 E, 6342459 N) | | | |
| Field Personnel: | CE, SG | Trip Date: | 20-Jan-10 |
| Data Entry Personnel: | SG | Date: | 25-Jan-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.415 |
| Battery (Main): | 12.45 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1245 |
| Laptop Clock: | 1250 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.1 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1300 |
| End Time (MST): | NA |
| Equipment: | ADV Other: |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe | 0.710 | 100.000 | 0.706 | 100.000 | - |
| Bench Mark 2: | Nail in stump on ledge | | 101.161 | | 101.161 | - |
| Top of Ice: | | 2.261 | 98.449 | 2.258 | 98.448 | 98.449 |
| Water Level: | | 2.294 | 98.416 | 2.290 | 98.416 | 98.416 |
| Transducer: | | 1.415 | 97.001 | 1.415 | 97.001 | 97.001 |
| Other: | | | | | | |

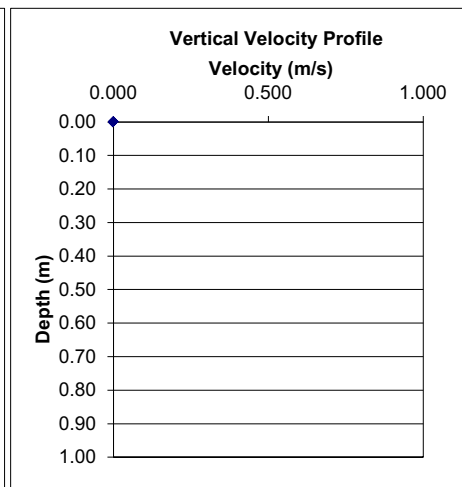
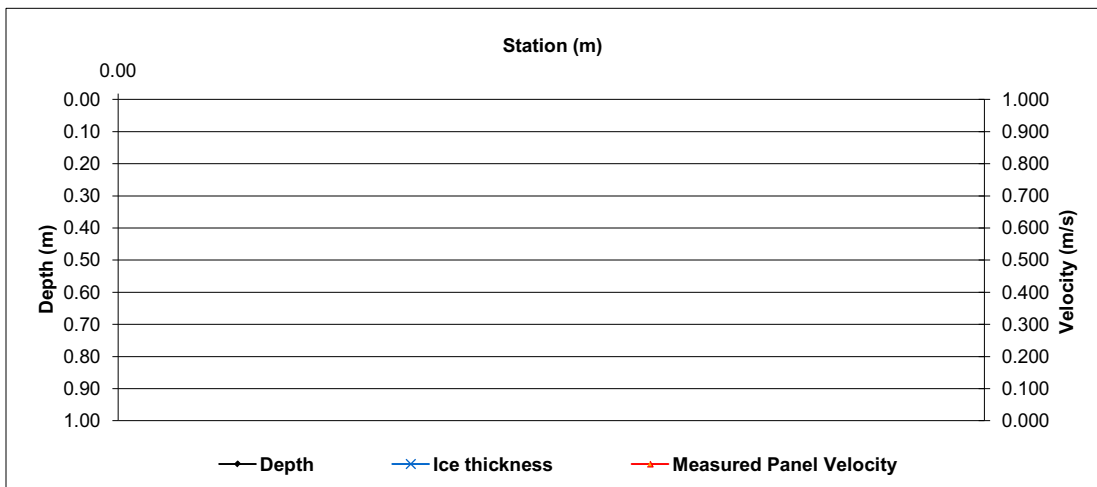
General Notes:
2 Layers of ice with water between layers. No flow measurement was possible because auger was not long enough to break through both layers of ice.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURED | (m ³ /s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Foude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S45 - Ells River above Joslyn Creek Diversion (440605 E, 6342459 N) | | | |
| Field Personnel: | GB, CE | Trip Date: | 10-Feb-10 |
| Data Entry Personnel: | SG | Date: | 19-Feb-10 |
| Data Check Personnel: | DB | Date: | 15-Mar-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.201 |
| Battery (Main): | 12.85 |
| Battery (Aux): | NA |
| Datalogger Clock: | 834 |
| Laptop Clock: | 835 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.1 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 830 |
| End Time (MST): | 1030 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Complete Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Poor |
| Weather: | overcast -11 C |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe | 1.200 | 100.000 | 1.196 | 100.000 | - |
| Bench Mark 2: | Nail in stump on ledge | 0.039 | 101.161 | 0.035 | 101.161 | - |
| Top of Ice: | | 2.752 | 98.448 | 2.749 | 98.447 | 98.448 |
| Water Level: | | 3.500 | 97.700 | 3.498 | 97.698 | 97.699 |
| Transducer: | | 1.201 | 96.499 | 1.201 | 96.497 | 96.498 |
| Other: | | | | | | |

General Notes:

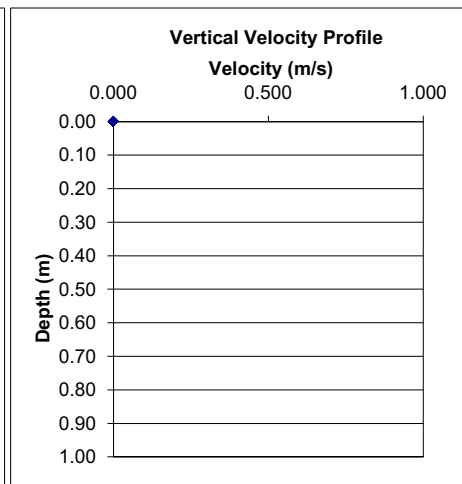
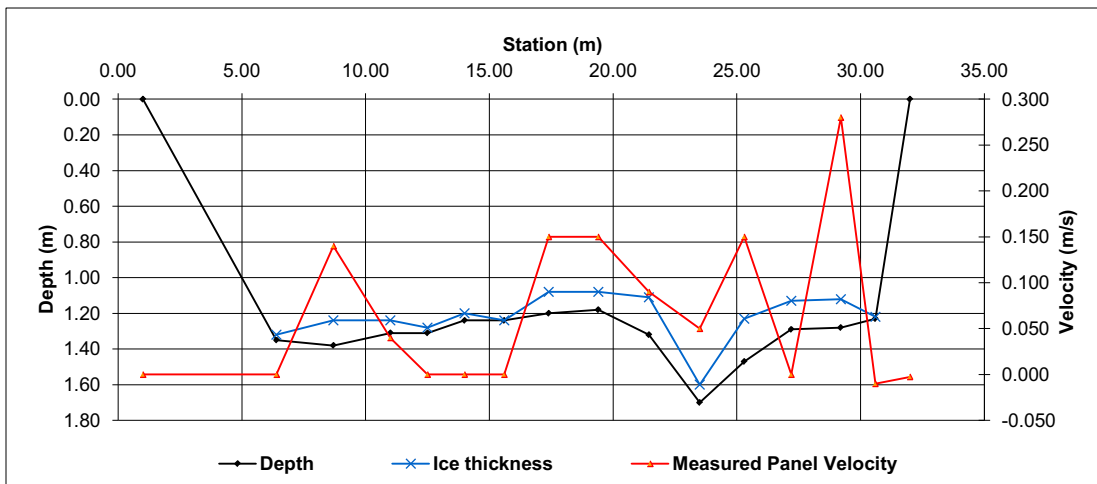
Multiple layers of ice, Poor measurement conditions

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 1.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 1.00 | 3.70 | 2.70 | 0.01 | 0.000 | 0.000 | 0.02 | 0.000 | 0% |
| 1 | 6.40 | 1.35 | 1.32 | 0.000 | | | 1.0 | 3.70 | 7.55 | 3.85 | 0.03 | 0.000 | 0.000 | 0.12 | 0.000 | 0% |
| 2 | 8.70 | 1.38 | 1.24 | 0.140 | | | 0.9 | 7.55 | 9.85 | 2.30 | 0.14 | 0.140 | 0.126 | 0.32 | 0.041 | 15% |
| 3 | 11.00 | 1.31 | 1.24 | 0.040 | | | 0.9 | 9.85 | 11.75 | 1.90 | 0.07 | 0.040 | 0.036 | 0.13 | 0.005 | 2% |
| 4 | 12.50 | 1.31 | 1.28 | 0.000 | | | 1.0 | 11.75 | 13.25 | 1.50 | 0.03 | 0.000 | 0.000 | 0.05 | 0.000 | 0% |
| 5 | 14.00 | 1.24 | 1.20 | 0.000 | | | 1.0 | 13.25 | 14.80 | 1.55 | 0.04 | 0.000 | 0.000 | 0.06 | 0.000 | 0% |
| 6 | 15.60 | 1.24 | 1.24 | 0.000 | | | 1.0 | 14.80 | 16.50 | 1.70 | 0.00 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| 7 | 17.40 | 1.20 | 1.08 | 0.150 | | | 0.9 | 16.50 | 18.40 | 1.90 | 0.12 | 0.150 | 0.135 | 0.23 | 0.031 | 11% |
| 8 | 19.40 | 1.18 | 1.08 | 0.150 | | | 0.9 | 18.40 | 20.43 | 2.03 | 0.10 | 0.150 | 0.135 | 0.20 | 0.027 | 10% |
| 9 | 21.45 | 1.32 | 1.11 | 0.090 | | | 0.9 | 20.43 | 22.48 | 2.05 | 0.21 | 0.090 | 0.081 | 0.43 | 0.035 | 13% |
| 10 | 23.50 | 1.70 | 1.60 | 0.050 | | | 0.9 | 22.48 | 24.40 | 1.93 | 0.10 | 0.050 | 0.045 | 0.19 | 0.009 | 3% |
| 11 | 25.30 | 1.47 | 1.23 | 0.150 | | | 0.9 | 24.40 | 26.25 | 1.85 | 0.24 | 0.150 | 0.135 | 0.44 | 0.060 | 22% |
| 12 | 27.20 | 1.29 | 1.13 | 0.000 | | | 1.0 | 26.25 | 28.20 | 1.95 | 0.16 | 0.000 | 0.000 | 0.31 | 0.000 | 0% |
| 13 | 29.20 | 1.28 | 1.12 | 0.280 | | | 0.9 | 28.20 | 29.90 | 1.70 | 0.16 | 0.280 | 0.252 | 0.27 | 0.069 | 25% |
| 14 | 30.60 | 1.23 | 1.22 | -0.010 | | | 0.9 | 29.90 | 31.30 | 1.40 | 0.01 | -0.010 | -0.009 | 0.01 | 0.000 | 0% |
| Right | 32.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 31.30 | 32.00 | 0.70 | 0.00 | -0.003 | -0.003 | 0.00 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | 0.275 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 0.275 | (m ³ /s) |
| Perceived Measurement Quality: | Poor | |
| Total Area: | 2.80 | (m ²) |
| Wetted Width: | 31.00 | (m) |
| Hydraulic Depth: | 0.090 | (m) |
| Mean Velocity: | 0.099 | (m/s) |
| Foude Number: | 0.105 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S45 - Elys River above Joslyn Creek Diversion (440605 E, 6342459 N) | | | |
| Field Personnel: | SE, SG, Josh Pilot | Trip Date: | 06-Mar-10 |
| Data Entry Personnel: | SG | Date: | 18-Mar-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|-------|
| Logger Details: | |
| Transducer Reading: | 1.025 |
| Battery (Main): | 14.68 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1208 |
| Laptop Clock: | 1208 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.1 |
| Memory used: | NA |
| Dessicant: | OK |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1100 |
| End Time (MST): | 1125 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | Compleat Ice Cover |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Fair |
| Weather: | Sunny 0°C |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe | 1.070 | 100.000 | 1.312 | 100.000 | - |
| Bench Mark 2: | Nail in stump on ledge | | 101.161 | | 101.161 | - |
| Top of Ice: | | 2.673 | 98.397 | 2.917 | 98.395 | 98.396 |
| Water Level: | | 3.109 | 97.961 | 3.347 | 97.965 | 97.963 |
| Transducer: | | 1.025 | 96.936 | 1.025 | 96.940 | 96.938 |
| Other: | | | | | | |

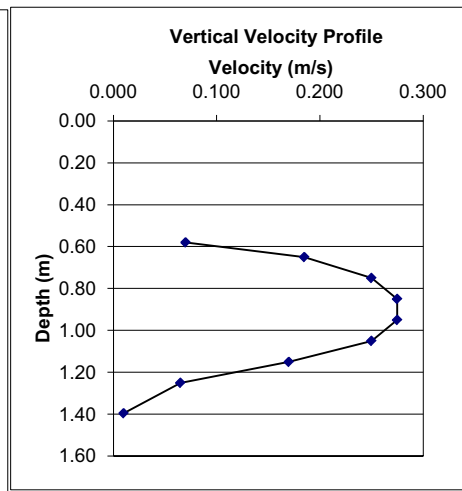
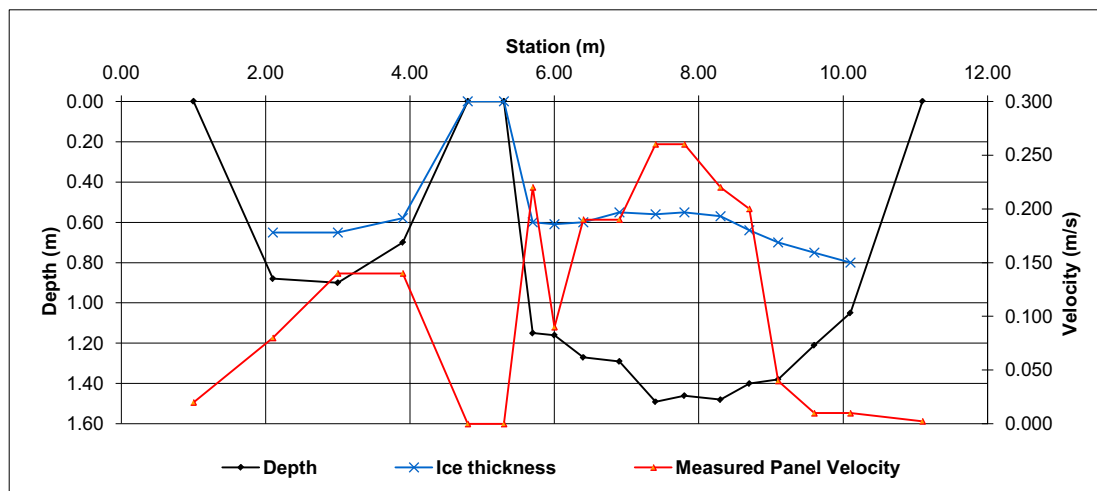
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|------------------|-------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m²) | Pannel Discharge (m³/s) | Percentage of total flow |
| Left | 1.00 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.00 | 1.55 | 0.55 | 0.06 | 0.020 | 0.018 | 0.03 | 0.001 | 0% |
| 1 | 2.10 | 0.88 | 0.65 | 0.080 | | | 0.9 | 1.55 | 2.55 | 1.00 | 0.23 | 0.080 | 0.072 | 0.23 | 0.017 | 3% |
| 2 | 3.00 | 0.90 | 0.65 | 0.140 | | | 0.9 | 2.55 | 3.45 | 0.90 | 0.25 | 0.140 | 0.126 | 0.23 | 0.028 | 5% |
| 3 | 3.90 | 0.70 | 0.58 | 0.140 | | | 0.9 | 3.45 | 4.35 | 0.90 | 0.12 | 0.140 | 0.126 | 0.11 | 0.014 | 2% |
| 4 | 4.80 | 0.00 | 0.00 | 0.000 | | | 1.0 | 4.35 | 5.05 | 0.70 | 0.03 | 0.000 | 0.000 | 0.02 | 0.000 | 0% |
| 5 | 5.30 | 0.00 | 0.00 | 0.000 | | | 1.0 | 5.05 | 5.50 | 0.45 | 0.00 | 0.000 | 0.000 | 0.00 | 0.000 | 0% |
| 6 | 5.70 | 1.15 | 0.60 | 0.220 | | | 0.9 | 5.50 | 5.85 | 0.35 | 0.55 | 0.220 | 0.198 | 0.19 | 0.038 | 7% |
| 7 | 6.00 | 1.16 | 0.61 | 0.090 | | | 0.9 | 5.85 | 6.20 | 0.35 | 0.55 | 0.090 | 0.081 | 0.19 | 0.016 | 3% |
| 8 | 6.40 | 1.27 | 0.60 | 0.190 | | | 0.9 | 6.20 | 6.65 | 0.45 | 0.67 | 0.190 | 0.171 | 0.30 | 0.052 | 9% |
| 9 | 6.90 | 1.29 | 0.55 | 0.190 | | | 0.9 | 6.65 | 7.15 | 0.50 | 0.74 | 0.190 | 0.171 | 0.37 | 0.063 | 11% |
| 10 | 7.40 | 1.49 | 0.56 | 0.260 | | | 0.9 | 7.15 | 7.60 | 0.45 | 0.93 | 0.260 | 0.234 | 0.42 | 0.098 | 17% |
| 11 | 7.80 | 1.46 | 0.55 | 0.260 | | | 0.9 | 7.60 | 8.05 | 0.45 | 0.91 | 0.260 | 0.234 | 0.41 | 0.096 | 17% |
| 12 | 8.30 | 1.48 | 0.57 | 0.220 | | | 0.9 | 8.05 | 8.50 | 0.45 | 0.91 | 0.220 | 0.198 | 0.41 | 0.081 | 14% |
| 13 | 8.70 | 1.40 | 0.64 | 0.200 | | | 0.9 | 8.50 | 8.90 | 0.40 | 0.76 | 0.200 | 0.180 | 0.30 | 0.055 | 10% |
| 14 | 9.10 | 1.38 | 0.70 | 0.040 | | | 0.9 | 8.90 | 9.35 | 0.45 | 0.68 | 0.040 | 0.036 | 0.31 | 0.011 | 2% |
| 15 | 9.60 | 1.21 | 0.75 | 0.010 | | | 0.9 | 9.35 | 9.85 | 0.50 | 0.46 | 0.010 | 0.009 | 0.23 | 0.002 | 0% |
| 16 | 10.10 | 1.05 | 0.80 | 0.010 | | | 0.9 | 9.85 | 10.60 | 0.75 | 0.25 | 0.010 | 0.009 | 0.19 | 0.002 | 0% |
| Right | 11.10 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 10.60 | 11.10 | 0.50 | 0.06 | 0.003 | 0.003 | 0.03 | 0.000 | 0% |
| Total Flow | | | | | | | | | | | | | | | 0.572 | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|--------|
| Flow characteristics: | | |
| Total Flow: | 0.572 | (m³/s) |
| Perceived Measurement Quality: | Fair | |
| Total Area: | 3.97 | (m²) |
| Wetted Width: | 10.10 | (m) |
| Hydraulic Depth: | 0.393 | (m) |
| Mean Velocity: | 0.144 | (m/s) |
| Foude Number: | 0.073 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|---------------------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.172 |
| Offset | 7.40 | 1.49 | 0.000 | - | - | Panel V.@Ofst 0.234 |
| Depth | 1.49 | 1.30 | 0.020 | 1.40 | 0.010 | 60% Depth 1.118 |
| Ice Depth | 0.56 | 1.20 | 0.110 | 1.25 | 0.065 | 20% Depth 0.75 |
| | | 1.10 | 0.230 | 1.15 | 0.170 | 80% Depth 1.30 |
| | | 1.00 | 0.270 | 1.05 | 0.250 | |
| | | 0.90 | 0.280 | 0.95 | 0.275 | |
| | | 0.80 | 0.270 | 0.85 | 0.275 | |
| | | 0.70 | 0.230 | 0.75 | 0.250 | |
| | | 0.60 | 0.140 | 0.65 | 0.185 | |
| | | 0.56 | 0.000 | 0.58 | 0.070 | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S45 - Elys River above Joslyn Creek Diversion (440605 E, 6342459 N) | | | |
| Field Personnel: | SG DB | Trip Date: | 12-Apr-10 |
| Data Entry Personnel: | DB | Date: | 04-May-10 |
| Data Check Personnel: | JP | Date: | 03-Jun-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 1.491 |
| Battery (Main): | 14.73 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1059 |
| Laptop Clock: | 1100 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.1 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|-------------------------|
| Measurement Details: | |
| Start Time (MST): | 1100 |
| End Time (MST): | 1110 |
| Equipment: | ADV Other: Flow Mate |
| Method: | Ice Wading Fishcat Boat |
| River Condition: | |
| Code ('Ice' or 'Open'): | Broken Ice |
| Quality/Error (see reverse): | |
| Weather: | |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe | 0.802 | 100.000 | 0.788 | 100.000 | - |
| Bench Mark 2: | Nail in stump on ledge | | 101.161 | | 101.161 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.301 | 98.501 | 2.288 | 98.500 | 98.501 |
| Transducer: | | 1.491 | 97.010 | 1.491 | 97.009 | 97.010 |
| Other: | | | | | | |

General Notes:

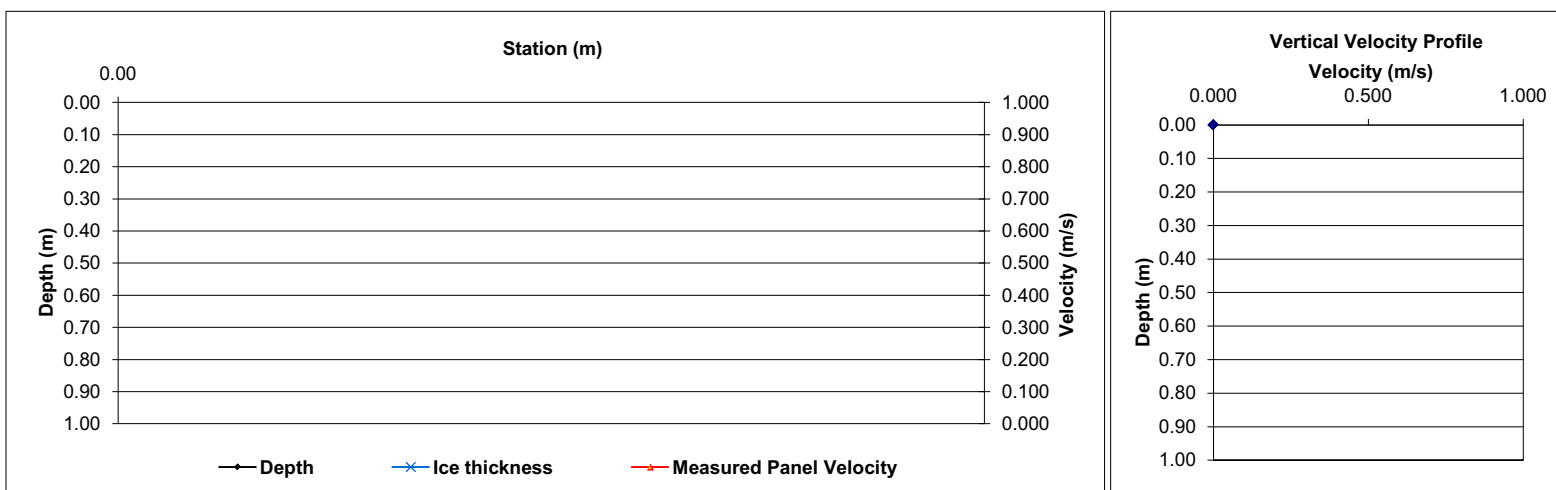
Breakup in progress. Ice conditions considered unsafe for manual discharge measurements.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Total Flow NOT MEASURED | | | | | | | | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURE | (m ³ /s) |
| Perceived Measurement Quality: | 0 | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Foude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S45 - Elys River above Joslyn Creek Diversion (440605 E, 6342459 N) | | | |
| Field Personnel: | DB SG | Trip Date: | 25-Apr-10 |
| Data Entry Personnel: | DB | Date: | 03-May-10 |
| Data Check Personnel: | JP | Date: | 04-Jun-10 |

| | |
|---|-------|
| Logger Details: | |
| Transducer Reading: | 1.350 |
| Battery (Main): | 14.78 |
| Battery (Aux): | NA |
| Datalogger Clock: | 728 |
| Laptop Clock: | 729 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.1 |
| Memory used: | NA |
| Dessicant: | Good |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |
| Look for orange and pink flag tape | |

| | |
|------------------------------|----------------|
| Measurement Details: | |
| Start Time (MST): | 720 |
| End Time (MST): | 745 |
| Equipment: | ADV |
| Method: | - |
| River Condition: | Broken Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | - |
| Weather: | Overcast, cold |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe | 0.816 | 100.000 | 0.792 | 100.000 | - |
| Bench Mark 2: | Nail in stump on ledge | 0.767 | 101.161 | 0.741 | 101.161 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 2.525 | 98.291 | 2.502 | 98.290 | 98.291 |
| Transducer: | | 1.35 | 96.941 | 1.35 | 96.940 | 96.941 |
| Other: | | | | | | |

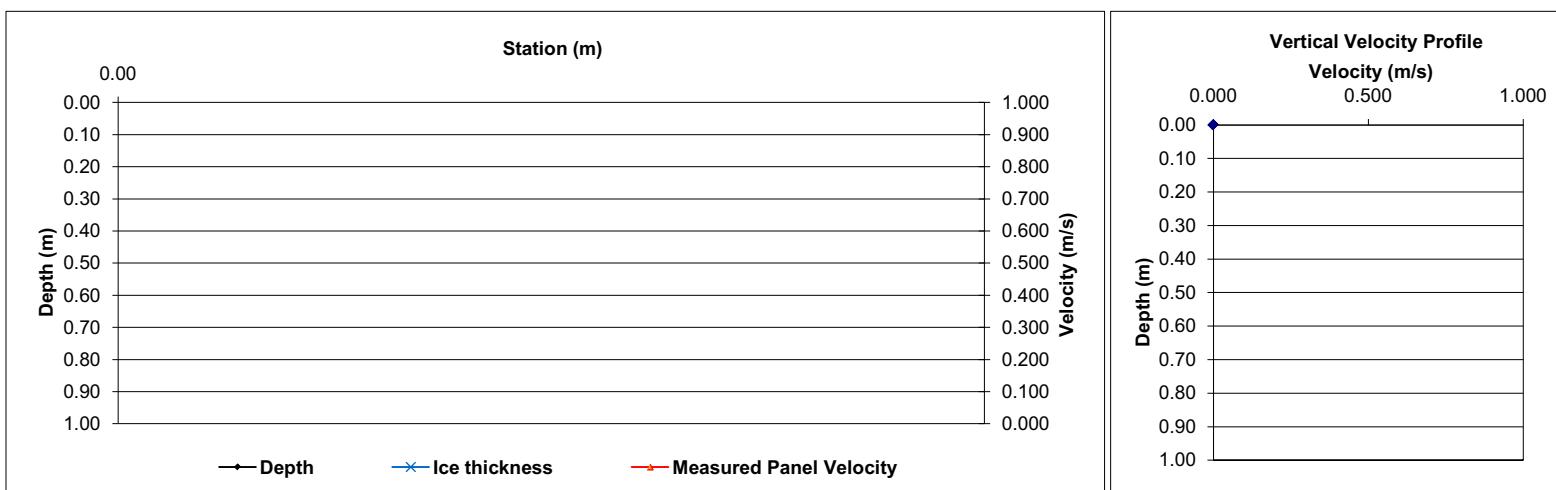
General Notes:

Broken ice no flow measurement, too dangerous. Lots of beaver activity visible in snow.

| Flow Measurement: | | | | | | | | | | | | | | | | |
|--|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.00 | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 1 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 2 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 3 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 4 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 5 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 6 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 7 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 8 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 9 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 10 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 11 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 12 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 13 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 14 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 15 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 16 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 17 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 18 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 19 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 20 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 21 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 22 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 23 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 24 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| 25 | | | | | | | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| Right | | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | | | #VALUE! | 0.00 | 0.000 | 0.000 | #VALUE! | #VALUE! | #VALUE! |
| *Add/delete # rows as necessary, remembering to autofill calculations/graphs etc | | | | | | | | | | | | | | | | |
| Total Flow | | | | | | | | | | | | | | | NOT MEASURED | |

| | | |
|--------------------------------|------------|---------------------|
| Flow characteristics: | | |
| Total Flow: | DT MEASURE | (m ³ /s) |
| Perceived Measurement Quality: | - | |
| Total Area: | #VALUE! | (m ²) |
| Wetted Width: | 0.00 | (m) |
| Hydraulic Depth: | #VALUE! | (m) |
| Mean Velocity: | #VALUE! | (m/s) |
| Foude Number: | #VALUE! | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S45 - Ells River above Joslyn Creek Diversion (440605 E, 6342459 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 24-Jun-10 |
| Data Entry Personnel: | DB | Date: | 05-Jul-10 |
| Data Check Personnel: | JP | Date: | 16-Jul-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.24 |
| Battery (Main): | 14.09 |
| Battery (Aux): | NA |
| Datalogger Clock: | 17:26 |
| Laptop Clock: | 17:27 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 18.1 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1720 |
| End Time (MST): | 1904 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe | 0.811 | 100.000 | 0.802 | 100.000 | - |
| Bench Mark 2: | Nail in stump on ledge | 0.760 | 101.161 | 0.752 | 101.161 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 3.060 | 97.751 | 3.050 | 97.752 | 97.752 |
| Transducer: | | 0.24 | 97.511 | 0.24 | 97.512 | 97.512 |
| Other: | | | | | | |

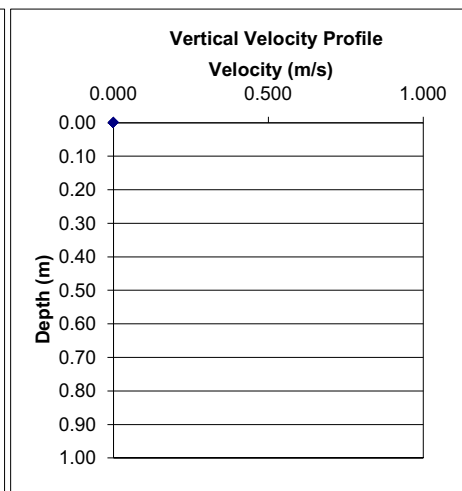
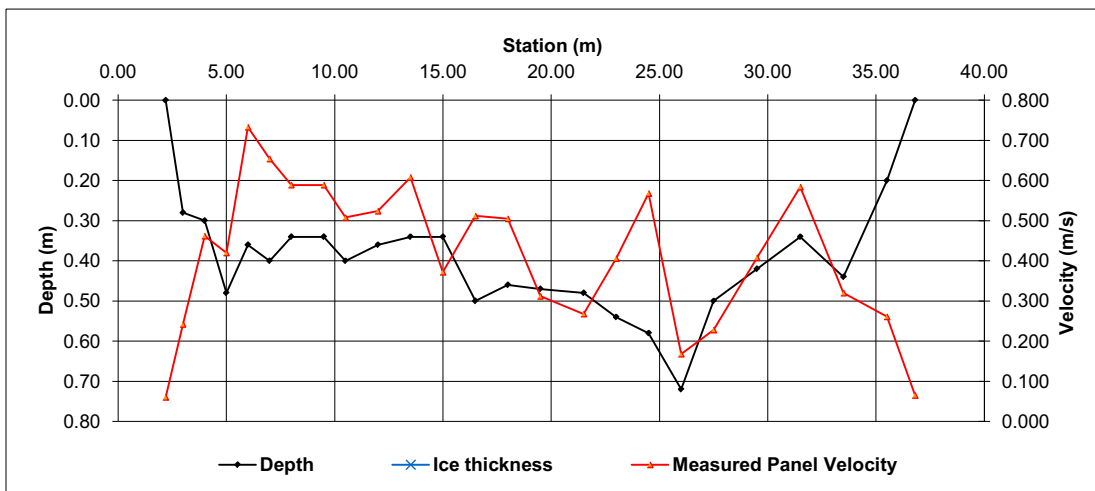
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: | | | | | | | | | | | | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 36.80 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 36.80 | 36.15 | 0.65 | 0.05 | 0.065 | 0.065 | 0.03 | 0.002 | 0% | |
| 1 | 35.50 | 0.20 | | 0.261 | | | 1.0 | 36.15 | 34.50 | 1.65 | 0.20 | 0.261 | 0.261 | 0.33 | 0.086 | 1% | |
| 2 | 33.50 | 0.44 | | 0.320 | | | 1.0 | 34.50 | 32.50 | 2.00 | 0.44 | 0.320 | 0.320 | 0.88 | 0.282 | 5% | |
| 3 | 31.50 | 0.34 | | 0.584 | | | 1.0 | 32.50 | 30.50 | 2.00 | 0.34 | 0.584 | 0.584 | 0.68 | 0.397 | 7% | |
| 4 | 29.50 | 0.42 | | 0.408 | | | 1.0 | 30.50 | 28.50 | 2.00 | 0.42 | 0.408 | 0.408 | 0.84 | 0.343 | 6% | |
| 5 | 27.50 | 0.50 | | 0.228 | | | 1.0 | 28.50 | 26.75 | 1.75 | 0.50 | 0.228 | 0.228 | 0.88 | 0.200 | 3% | |
| 6 | 26.00 | 0.72 | | 0.168 | | | 1.0 | 26.75 | 25.25 | 1.50 | 0.72 | 0.168 | 0.168 | 1.08 | 0.181 | 3% | |
| 7 | 24.50 | 0.58 | | 0.568 | | | 1.0 | 25.25 | 23.75 | 1.50 | 0.58 | 0.568 | 0.568 | 0.87 | 0.494 | 8% | |
| 8 | 23.00 | 0.54 | | 0.406 | | | 1.0 | 23.75 | 22.25 | 1.50 | 0.54 | 0.406 | 0.406 | 0.81 | 0.329 | 5% | |
| 9 | 21.50 | 0.48 | | 0.268 | | | 1.0 | 22.25 | 20.50 | 1.75 | 0.48 | 0.268 | 0.268 | 0.84 | 0.225 | 4% | |
| 10 | 19.50 | 0.47 | | 0.312 | | | 1.0 | 20.50 | 18.75 | 1.75 | 0.47 | 0.312 | 0.312 | 0.82 | 0.257 | 4% | |
| 11 | 18.00 | 0.46 | | 0.505 | | | 1.0 | 18.75 | 17.25 | 1.50 | 0.46 | 0.505 | 0.505 | 0.69 | 0.348 | 6% | |
| 12 | 16.50 | 0.50 | | 0.512 | | | 1.0 | 17.25 | 15.75 | 1.50 | 0.50 | 0.512 | 0.512 | 0.75 | 0.384 | 6% | |
| 13 | 15.00 | 0.34 | | 0.372 | | | 1.0 | 15.75 | 14.25 | 1.50 | 0.34 | 0.372 | 0.372 | 0.51 | 0.190 | 3% | |
| 14 | 13.50 | 0.34 | | 0.608 | | | 1.0 | 14.25 | 12.75 | 1.50 | 0.34 | 0.608 | 0.608 | 0.51 | 0.310 | 5% | |
| 15 | 12.00 | 0.36 | | 0.524 | | | 1.0 | 12.75 | 11.25 | 1.50 | 0.36 | 0.524 | 0.524 | 0.54 | 0.283 | 5% | |
| 16 | 10.50 | 0.40 | | 0.508 | | | 1.0 | 11.25 | 10.00 | 1.25 | 0.40 | 0.508 | 0.508 | 0.50 | 0.254 | 4% | |
| 17 | 9.50 | 0.34 | | 0.589 | | | 1.0 | 10.00 | 8.75 | 1.25 | 0.34 | 0.589 | 0.589 | 0.43 | 0.250 | 4% | |
| 18 | 8.00 | 0.34 | | 0.589 | | | 1.0 | 8.75 | 7.50 | 1.25 | 0.34 | 0.589 | 0.589 | 0.43 | 0.250 | 4% | |
| 19 | 7.00 | 0.40 | | 0.654 | | | 1.0 | 7.50 | 6.50 | 1.00 | 0.40 | 0.654 | 0.654 | 0.40 | 0.262 | 4% | |
| 20 | 6.00 | 0.36 | | 0.733 | | | 1.0 | 6.50 | 5.50 | 1.00 | 0.36 | 0.733 | 0.733 | 0.36 | 0.264 | 4% | |
| 21 | 5.00 | 0.48 | | 0.420 | | | 1.0 | 5.50 | 4.50 | 1.00 | 0.48 | 0.420 | 0.420 | 0.48 | 0.202 | 3% | |
| 22 | 4.00 | 0.30 | | 0.462 | | | 1.0 | 4.50 | 3.50 | 1.00 | 0.30 | 0.462 | 0.462 | 0.30 | 0.139 | 2% | |
| 23 | 3.00 | 0.28 | | 0.242 | | | 1.0 | 3.50 | 2.60 | 0.90 | 0.28 | 0.242 | 0.242 | 0.25 | 0.061 | 1% | |
| Right | 2.20 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 2.60 | 2.20 | 0.40 | 0.07 | 0.061 | 0.061 | 0.03 | 0.002 | 0% | |
| Total Flow | | | | | | | | | | | | | | | 5.994 | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 5.994 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 14.23 | (m ²) |
| Wetted Width: | 33.55 | (m) |
| Hydraulic Depth: | 0.424 | (m) |
| Mean Velocity: | 0.421 | (m/s) |
| Foude Number: | 0.207 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|---------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S45 - Elys River above Joslyn Creek Diversion (440605 E, 6342459 N) | | | |
| Field Personnel: | BL, SG, Jim (pilot) | Trip Date: | 13-Aug-10 |
| Data Entry Personnel: | SG | Date: | 24-Aug-10 |
| Data Check Personnel: | DB | Date: | 01-Sep-10 |

| | |
|--|---------|
| Logger Details: | |
| Transducer Reading: | 0.639 |
| Battery (Main): | 14.21 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1615 |
| Laptop Clock: | 1616 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 21.3 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: Pressure transducer was lowered in water column, old level was 0.115m | |

| | |
|------------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 1640 |
| End Time (MST): | 1530 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Partly 20°C |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe | 0.861 | 100.000 | 0.818 | 100.000 | - |
| Bench Mark 2: | Nail in stump on ledge | 0.813 | 101.161 | 0.771 | 101.161 | - |
| Top of Ice: | | | | | | |
| Water Level: | | 3.250 | 97.611 | 3.203 | 97.615 | 97.613 |
| Transducer: | | 0.639 | 96.972 | 0.639 | 96.976 | 96.974 |
| Other: | | | | | | |

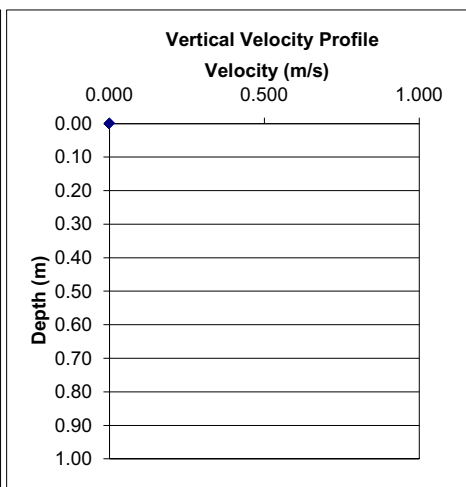
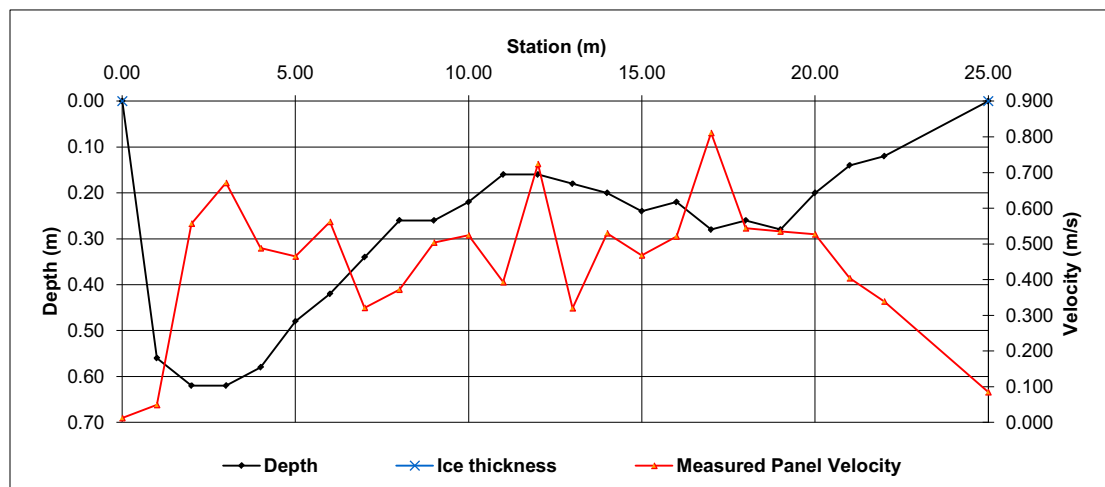
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|------------------|-------------------------|--------------------------|--|
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m²) | Pannel Discharge (m³/s) | Percentage of total flow | |
| Left | 25.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 25.00 | 23.50 | 1.50 | 0.03 | 0.085 | 0.085 | 0.05 | 0.004 | 0% | |
| 1 | 22.00 | 0.12 | | 0.339 | | | 1.0 | 23.50 | 21.50 | 2.00 | 0.12 | 0.339 | 0.339 | 0.24 | 0.081 | 2% | |
| 2 | 21.00 | 0.14 | | 0.404 | | | 1.0 | 21.50 | 20.50 | 1.00 | 0.14 | 0.404 | 0.404 | 0.14 | 0.057 | 2% | |
| 3 | 20.00 | 0.20 | | 0.527 | | | 1.0 | 20.50 | 19.50 | 1.00 | 0.20 | 0.527 | 0.527 | 0.20 | 0.105 | 3% | |
| 4 | 19.00 | 0.28 | | 0.535 | | | 1.0 | 19.50 | 18.50 | 1.00 | 0.28 | 0.535 | 0.535 | 0.28 | 0.150 | 5% | |
| 5 | 18.00 | 0.26 | | 0.544 | | | 1.0 | 18.50 | 17.50 | 1.00 | 0.26 | 0.544 | 0.544 | 0.26 | 0.141 | 4% | |
| 6 | 17.00 | 0.28 | | 0.811 | | | 1.0 | 17.50 | 16.50 | 1.00 | 0.28 | 0.811 | 0.811 | 0.28 | 0.227 | 7% | |
| 7 | 16.00 | 0.22 | | 0.521 | | | 1.0 | 16.50 | 15.50 | 1.00 | 0.22 | 0.521 | 0.521 | 0.22 | 0.115 | 3% | |
| 8 | 15.00 | 0.24 | | 0.468 | | | 1.0 | 15.50 | 14.50 | 1.00 | 0.24 | 0.468 | 0.468 | 0.24 | 0.112 | 3% | |
| 9 | 14.00 | 0.20 | | 0.530 | | | 1.0 | 14.50 | 13.50 | 1.00 | 0.20 | 0.530 | 0.530 | 0.20 | 0.106 | 3% | |
| 10 | 13.00 | 0.18 | | 0.320 | | | 1.0 | 13.50 | 12.50 | 1.00 | 0.18 | 0.320 | 0.320 | 0.18 | 0.058 | 2% | |
| 11 | 12.00 | 0.16 | | 0.724 | | | 1.0 | 12.50 | 11.50 | 1.00 | 0.16 | 0.724 | 0.724 | 0.16 | 0.116 | 3% | |
| 12 | 11.00 | 0.16 | | 0.393 | | | 1.0 | 11.50 | 10.50 | 1.00 | 0.16 | 0.393 | 0.393 | 0.16 | 0.063 | 2% | |
| 13 | 10.00 | 0.22 | | 0.524 | | | 1.0 | 10.50 | 9.50 | 1.00 | 0.22 | 0.524 | 0.524 | 0.22 | 0.115 | 3% | |
| 14 | 9.00 | 0.26 | | 0.504 | | | 1.0 | 9.50 | 8.50 | 1.00 | 0.26 | 0.504 | 0.504 | 0.26 | 0.131 | 4% | |
| 15 | 8.00 | 0.26 | | 0.372 | | | 1.0 | 8.50 | 7.50 | 1.00 | 0.26 | 0.372 | 0.372 | 0.26 | 0.097 | 3% | |
| 16 | 7.00 | 0.34 | | 0.321 | | | 1.0 | 7.50 | 6.50 | 1.00 | 0.34 | 0.321 | 0.321 | 0.34 | 0.109 | 3% | |
| 17 | 6.00 | 0.42 | | 0.562 | | | 1.0 | 6.50 | 5.50 | 1.00 | 0.42 | 0.562 | 0.562 | 0.42 | 0.236 | 7% | |
| 18 | 5.00 | 0.48 | | 0.465 | | | 1.0 | 5.50 | 4.50 | 1.00 | 0.48 | 0.465 | 0.465 | 0.48 | 0.223 | 7% | |
| 19 | 4.00 | 0.58 | | 0.488 | | | 1.0 | 4.50 | 3.50 | 1.00 | 0.58 | 0.488 | 0.488 | 0.58 | 0.283 | 9% | |
| 20 | 3.00 | 0.62 | | 0.671 | | | 1.0 | 3.50 | 2.50 | 1.00 | 0.62 | 0.671 | 0.671 | 0.62 | 0.416 | 13% | |
| 21 | 2.00 | 0.62 | | 0.557 | | | 1.0 | 2.50 | 1.50 | 1.00 | 0.62 | 0.557 | 0.557 | 0.62 | 0.345 | 10% | |
| 22 | 1.00 | 0.56 | | 0.049 | | | 1.0 | 1.50 | 0.50 | 1.00 | 0.56 | 0.049 | 0.049 | 0.56 | 0.027 | 1% | |
| Right | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 0.50 | 0.00 | 0.50 | 0.14 | 0.012 | 0.012 | 0.07 | 0.001 | 0% | |
| Total Flow | | | | | | | | | | | | | | 3.319 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|--------|
| Flow characteristics: | | |
| Total Flow: | 3.319 | (m³/s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 7.03 | (m²) |
| Wetted Width: | 23.00 | (m) |
| Hydraulic Depth: | 0.306 | (m) |
| Mean Velocity: | 0.472 | (m/s) |
| Foude Number: | 0.272 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------------------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S45 - Ells River above Joslyn Creek Diversion (440605 E, 6342459 N) | | | |
| Field Personnel: | DB SG Matt (pilot) | Trip Date: | 20-Sep-10 |
| Data Entry Personnel: | DB | Date: | 29-Sep-10 |
| Data Check Personnel: | JP | Date: | 08-Oct-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.937 |
| Battery (Main): | 13.64 |
| Battery (Aux): | NA |
| Datalogger Clock: | 1552 |
| Laptop Clock: | 1553 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 7 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | |
| PT# (if Δ): | |
| Other Logger Notes: | |

| | |
|------------------------------|--------------------|
| Measurement Details: | |
| Start Time (MST): | 1550 |
| End Time (MST): | 1700 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Good |
| Weather: | Partly Cloudy 10°C |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe | 0.572 | 100.000 | 0.560 | 100.000 | - |
| Bench Mark 2: | Nail in stump on ledge | 0.522 | 101.161 | 0.510 | 101.161 | - |
| Top of Ice: | | | 100.572 | | 100.560 | 100.566 |
| Water Level: | | 2.644 | 97.928 | 2.634 | 97.926 | 97.927 |
| Transducer: | | 0.937 | 96.991 | 0.937 | 96.989 | 96.990 |
| Other: | | | | | | |

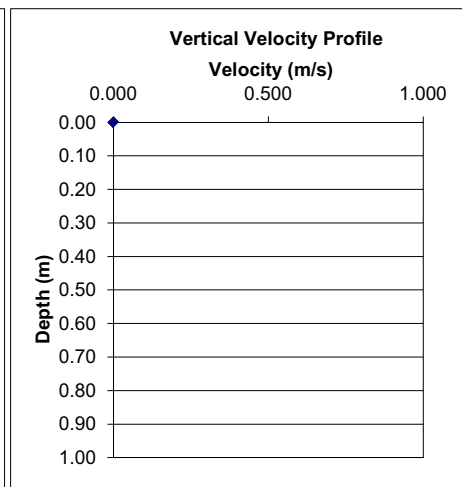
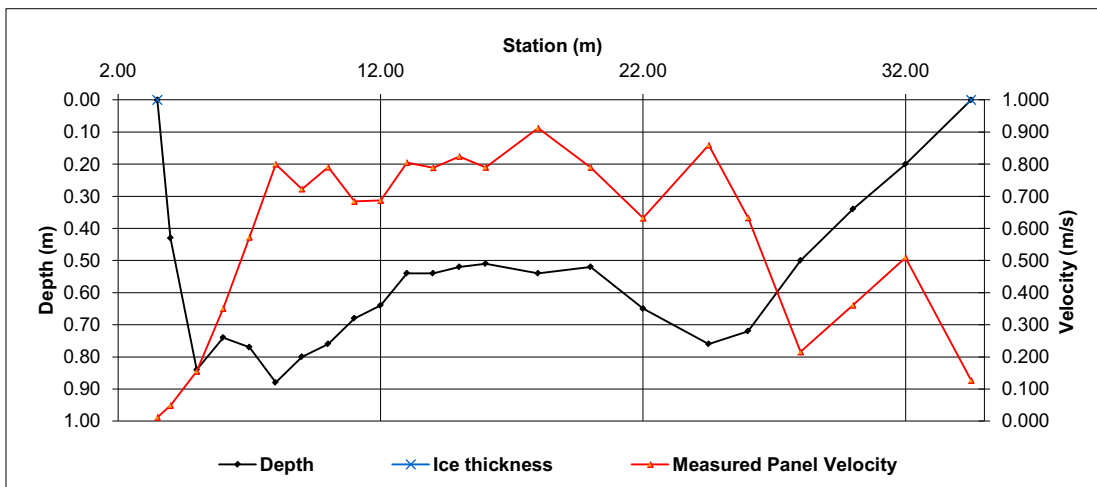
General Notes:

River near Bank Full (~10cm to go). Put flagging high up above Bmarks e.g. tree above nail

| Flow Measurement: | | | | | | | | | | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|
| Measured Data | | | | | | | Calculated Data | | | | | | | | | |
| Bank/ Mmt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow |
| Left | 34.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 34.50 | 33.25 | 1.25 | 0.05 | 0.127 | 0.127 | 0.06 | 0.008 | 0% |
| 1 | 32.00 | 0.20 | | 0.509 | | | 1.0 | 33.25 | 31.00 | 2.25 | 0.20 | 0.509 | 0.509 | 0.45 | 0.229 | 2% |
| 2 | 30.00 | 0.34 | | 0.361 | | | 1.0 | 31.00 | 29.00 | 2.00 | 0.34 | 0.361 | 0.361 | 0.68 | 0.245 | 2% |
| 3 | 28.00 | 0.50 | | 0.216 | | | 1.0 | 29.00 | 27.00 | 2.00 | 0.50 | 0.216 | 0.216 | 1.00 | 0.216 | 2% |
| 4 | 26.00 | 0.72 | | 0.633 | | | 1.0 | 27.00 | 25.25 | 1.75 | 0.72 | 0.633 | 0.633 | 1.26 | 0.798 | 7% |
| 5 | 24.50 | 0.76 | | | 0.528 | 1.190 | 1.0 | 25.25 | 23.25 | 2.00 | 0.76 | 0.859 | 0.859 | 1.52 | 1.306 | 12% |
| 6 | 22.00 | 0.65 | | 0.632 | | | 1.0 | 23.25 | 21.00 | 2.25 | 0.65 | 0.632 | 0.632 | 1.46 | 0.924 | 8% |
| 7 | 20.00 | 0.52 | | 0.790 | | | 1.0 | 21.00 | 19.00 | 2.00 | 0.52 | 0.790 | 0.790 | 1.04 | 0.822 | 7% |
| 8 | 18.00 | 0.54 | | 0.912 | | | 1.0 | 19.00 | 17.00 | 2.00 | 0.54 | 0.912 | 0.912 | 1.08 | 0.985 | 9% |
| 9 | 16.00 | 0.51 | | 0.790 | | | 1.0 | 17.00 | 15.50 | 1.50 | 0.51 | 0.790 | 0.790 | 0.77 | 0.604 | 5% |
| 10 | 15.00 | 0.52 | | 0.824 | | | 1.0 | 15.50 | 14.50 | 1.00 | 0.52 | 0.824 | 0.824 | 0.52 | 0.428 | 4% |
| 11 | 14.00 | 0.54 | | 0.789 | | | 1.0 | 14.50 | 13.50 | 1.00 | 0.54 | 0.789 | 0.789 | 0.54 | 0.426 | 4% |
| 12 | 13.00 | 0.54 | | 0.805 | | | 1.0 | 13.50 | 12.50 | 1.00 | 0.54 | 0.805 | 0.805 | 0.54 | 0.435 | 4% |
| 13 | 12.00 | 0.64 | | 0.687 | | | 1.0 | 12.50 | 11.50 | 1.00 | 0.64 | 0.687 | 0.687 | 0.64 | 0.440 | 4% |
| 14 | 11.00 | 0.68 | | 0.684 | | | 1.0 | 11.50 | 10.50 | 1.00 | 0.68 | 0.684 | 0.684 | 0.68 | 0.465 | 4% |
| 15 | 10.00 | 0.76 | | | 0.656 | 0.925 | 1.0 | 10.50 | 9.50 | 1.00 | 0.76 | 0.791 | 0.791 | 0.76 | 0.601 | 5% |
| 16 | 9.00 | 0.80 | | | 0.498 | 0.947 | 1.0 | 9.50 | 8.50 | 1.00 | 0.80 | 0.723 | 0.723 | 0.80 | 0.578 | 5% |
| 17 | 8.00 | 0.88 | | | 0.697 | 0.903 | 1.0 | 8.50 | 7.50 | 1.00 | 0.88 | 0.800 | 0.800 | 0.88 | 0.704 | 6% |
| 18 | 7.00 | 0.77 | | | 0.305 | 0.840 | 1.0 | 7.50 | 6.50 | 1.00 | 0.77 | 0.573 | 0.573 | 0.77 | 0.441 | 4% |
| 19 | 6.00 | 0.74 | | 0.351 | | | 1.0 | 6.50 | 5.50 | 1.00 | 0.74 | 0.351 | 0.351 | 0.74 | 0.260 | 2% |
| 20 | 5.00 | 0.84 | | | -0.004 | 0.315 | 1.0 | 5.50 | 4.50 | 1.00 | 0.84 | 0.156 | 0.156 | 0.84 | 0.131 | 1% |
| 21 | 4.00 | 0.43 | | 0.049 | | | 1.0 | 4.50 | 3.75 | 0.75 | 0.43 | 0.049 | 0.049 | 0.32 | 0.016 | 0% |
| Right | 3.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.75 | 3.50 | 0.25 | 0.11 | 0.012 | 0.012 | 0.03 | 0.000 | 0% |
| *denotes position of TSS sample | | | | | | | | | | | | | | Total Flow | 11.061 | |

| | | |
|--------------------------------|--------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 11.061 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 17.38 | (m ²) |
| Wetted Width: | 29.50 | (m) |
| Hydraulic Depth: | 0.589 | (m) |
| Mean Velocity: | 0.636 | (m/s) |
| Foude Number: | 0.265 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|-------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S45 - Ells River above Joslyn Creek Diversion (440605 E, 6342459 N) | | | |
| Field Personnel: | DB BL | Trip Date: | 28-Oct-10 |
| Data Entry Personnel: | DB | Date: | 09-Nov-10 |
| Data Check Personnel: | JP | Date: | 22-Nov-10 |

| | |
|------------------------|---------|
| Logger Details: | |
| Transducer Reading: | 0.777 |
| Battery (Main): | 12.71 |
| Battery (Aux): | NA |
| Datalogger Clock: | 843 |
| Laptop Clock: | 843 |
| Air Temp: | NA |
| Air Pressure: | NA |
| RH: | NA |
| Water °C: | 0.4 |
| Memory used: | NA |
| Dessicant: | Changed |
| Logger# (if Δ): | - |
| PT# (if Δ): | - |
| Other Logger Notes: | |

| | |
|------------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 840 |
| End Time (MST): | 1000 |
| Equipment: | ADV |
| Method: | Wading |
| River Condition: | Open |
| Code ('Ice' or 'Open'): | Open |
| Quality/Error (see reverse): | Excellent |
| Weather: | Partly Cloudy |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe | 0.681 | 100.000 | 0.672 | 100.000 | - |
| Bench Mark 2: | Nail in stump on ledge | 0.631 | 101.161 | 0.622 | 101.161 | - |
| Top of Ice: | | | 100.681 | | 100.672 | 100.677 |
| Water Level: | | 2.913 | 97.768 | 2.902 | 97.770 | 97.769 |
| Transducer: | | 0.777 | 96.991 | 0.777 | 96.993 | 96.992 |
| Other: | | | | | | |

General Notes:

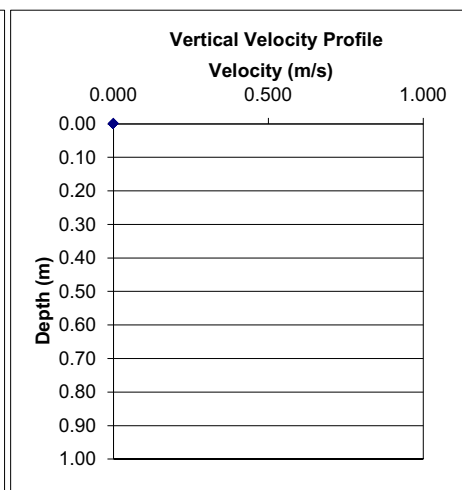
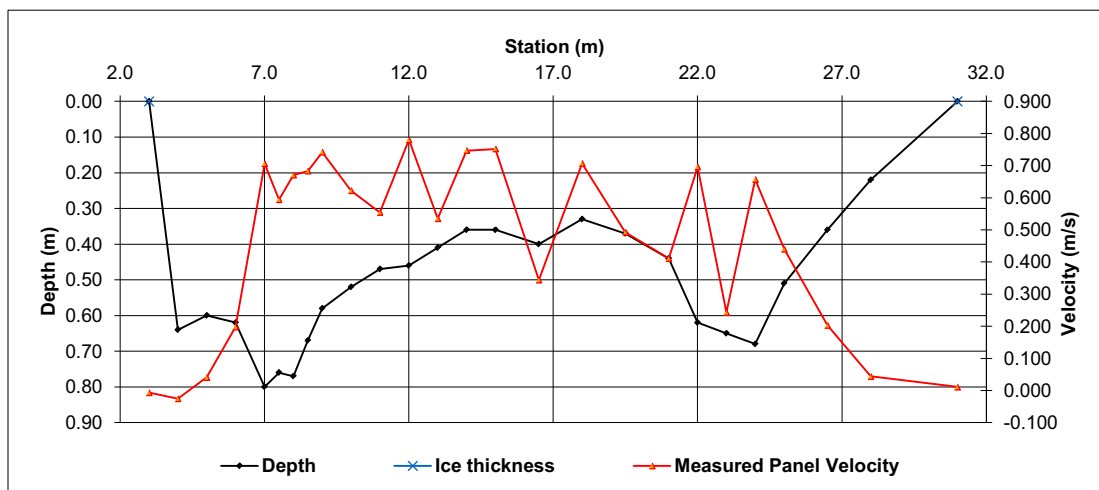
Ice 0.5-2" thick on banks extending up to 3m width from shore.
TSS @ 24m

| Flow Measurement: | | | | | | | Measured Data | | | | | | | | | | Calculated Data | | | | | | |
|-------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|-----------------|--|--|--|--|--|--|
| Bank/ Mnt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | | | | | | | |
| Left | 31.0 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 31.00 | 29.50 | 1.50 | 0.06 | 0.011 | 0.011 | 0.08 | 0.001 | 0% | | | | | | | |
| 1 | 28.0 | 0.22 | | 0.044 | | | 1.0 | 29.50 | 27.25 | 2.25 | 0.22 | 0.044 | 0.044 | 0.50 | 0.022 | 0% | | | | | | | |
| 2 | 26.5 | 0.36 | | 0.203 | | | 1.0 | 27.25 | 25.75 | 1.50 | 0.36 | 0.203 | 0.203 | 0.54 | 0.110 | 2% | | | | | | | |
| 3 | 25.0 | 0.51 | | 0.440 | | | 1.0 | 25.75 | 24.50 | 1.25 | 0.51 | 0.440 | 0.440 | 0.64 | 0.281 | 5% | | | | | | | |
| 4 | 24.0 | 0.68 | | 0.657 | | | 1.0 | 24.50 | 23.50 | 1.00 | 0.68 | 0.657 | 0.657 | 0.68 | 0.447 | 8% | | | | | | | |
| 5 | 23.0 | 0.65 | | 0.243 | | | 1.0 | 23.50 | 22.50 | 1.00 | 0.65 | 0.243 | 0.243 | 0.65 | 0.158 | 3% | | | | | | | |
| 6 | 22.0 | 0.62 | | 0.696 | | | 1.0 | 22.50 | 21.50 | 1.00 | 0.62 | 0.696 | 0.696 | 0.62 | 0.432 | 7% | | | | | | | |
| 7 | 21.0 | 0.44 | | 0.411 | | | 1.0 | 21.50 | 20.25 | 1.25 | 0.44 | 0.411 | 0.411 | 0.55 | 0.226 | 4% | | | | | | | |
| 8 | 19.5 | 0.37 | | 0.493 | | | 1.0 | 20.25 | 18.75 | 1.50 | 0.37 | 0.493 | 0.493 | 0.56 | 0.274 | 5% | | | | | | | |
| 9 | 18.0 | 0.33 | | 0.707 | | | 1.0 | 18.75 | 17.25 | 1.50 | 0.33 | 0.707 | 0.707 | 0.50 | 0.350 | 6% | | | | | | | |
| 10 | 16.5 | 0.40 | | 0.344 | | | 1.0 | 17.25 | 15.75 | 1.50 | 0.40 | 0.344 | 0.344 | 0.60 | 0.206 | 4% | | | | | | | |
| 11 | 15.0 | 0.36 | | 0.752 | | | 1.0 | 15.75 | 14.50 | 1.25 | 0.36 | 0.752 | 0.752 | 0.45 | 0.338 | 6% | | | | | | | |
| 12 | 14.0 | 0.36 | | 0.747 | | | 1.0 | 14.50 | 13.50 | 1.00 | 0.36 | 0.747 | 0.747 | 0.36 | 0.269 | 5% | | | | | | | |
| 13 | 13.0 | 0.41 | | 0.535 | | | 1.0 | 13.50 | 12.50 | 1.00 | 0.41 | 0.535 | 0.535 | 0.41 | 0.219 | 4% | | | | | | | |
| 14 | 12.0 | 0.46 | | 0.780 | | | 1.0 | 12.50 | 11.50 | 1.00 | 0.46 | 0.780 | 0.780 | 0.46 | 0.359 | 6% | | | | | | | |
| 15 | 11.0 | 0.47 | | 0.554 | | | 1.0 | 11.50 | 10.50 | 1.00 | 0.47 | 0.554 | 0.554 | 0.47 | 0.260 | 4% | | | | | | | |
| 16 | 10.0 | 0.52 | | 0.622 | | | 1.0 | 10.50 | 9.50 | 1.00 | 0.52 | 0.622 | 0.622 | 0.52 | 0.323 | 6% | | | | | | | |
| 17 | 9.0 | 0.58 | | 0.742 | | | 1.0 | 9.50 | 8.75 | 0.75 | 0.58 | 0.742 | 0.742 | 0.44 | 0.323 | 6% | | | | | | | |
| 18 | 8.5 | 0.67 | | 0.683 | | | 1.0 | 8.75 | 8.25 | 0.50 | 0.67 | 0.683 | 0.683 | 0.34 | 0.229 | 4% | | | | | | | |
| 19 | 8.0 | 0.77 | | | 0.429 | 0.912 | 1.0 | 8.25 | 7.75 | 0.50 | 0.77 | 0.671 | 0.671 | 0.39 | 0.258 | 4% | | | | | | | |
| 20 | 7.5 | 0.76 | | | 0.435 | 0.753 | 1.0 | 7.75 | 7.25 | 0.50 | 0.76 | 0.594 | 0.594 | 0.38 | 0.226 | 4% | | | | | | | |
| 21 | 7.0 | 0.80 | | | 0.586 | 0.826 | 1.0 | 7.25 | 6.50 | 0.75 | 0.80 | 0.706 | 0.706 | 0.60 | 0.424 | 7% | | | | | | | |
| 22 | 6.0 | 0.62 | | 0.198 | | | 1.0 | 6.50 | 5.50 | 1.00 | 0.62 | 0.198 | 0.198 | 0.62 | 0.123 | 2% | | | | | | | |
| 23 | 5.0 | 0.60 | | 0.041 | | | 1.0 | 5.50 | 4.50 | 1.00 | 0.60 | 0.041 | 0.041 | 0.60 | 0.025 | 0% | | | | | | | |
| 24 | 4.0 | 0.64 | | -0.025 | | | 1.0 | 4.50 | 3.50 | 1.00 | 0.64 | -0.025 | -0.025 | 0.64 | -0.016 | 0% | | | | | | | |
| Right | 3.0 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 1.0 | 3.50 | 3.00 | 0.50 | 0.16 | -0.006 | -0.006 | 0.08 | -0.001 | 0% | | | | | | | |
| Total Flow | | | | | | | | | | | | | | 5.864 | | | | | | | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-----------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 5.864 | (m ³ /s) |
| Perceived Measurement Quality: | Excellent | |
| Total Area: | 12.65 | (m ²) |
| Wetted Width: | 26.00 | (m) |
| Hydraulic Depth: | 0.487 | (m) |
| Mean Velocity: | 0.464 | (m/s) |
| Foude Number: | 0.212 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hydrometric Measurement / Site Visit Record



| | | | |
|--|--------|-------------------|-----------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: S45 - Ells River above Joslyn Creek Diversion (440605 E, 6342459 N) | | | |
| Field Personnel: | SG, JO | Trip Date: | 05-Dec-10 |
| Data Entry Personnel: | JP | Date: | 17-Dec-10 |
| Data Check Personnel: | SG | Date: | 22-Dec-10 |

| | | |
|------------------------|----------|-------|
| Logger Details: | | |
| Transducer Reading: | 0.906 | |
| Battery (Main): | 8.82 | 12.59 |
| Battery (Aux): | NA | |
| Datalogger Clock: | 921 | |
| Laptop Clock: | 922 | |
| Air Temp: | NA | |
| Air Pressure: | NA | |
| RH: | NA | |
| Water °C: | NA | |
| Memory used: | NA | |
| Dessicant: | Replaced | |
| Logger# (if Δ): | | |
| PT# (if Δ): | | |
| Other Logger Notes: | | |

| | |
|------------------------------|-------------|
| Measurement Details: | |
| Start Time (MST): | 915 |
| End Time (MST): | 1015 |
| Equipment: | ADV |
| Method: | Ice |
| River Condition: | Ice |
| Code ('Ice' or 'Open'): | Ice |
| Quality/Error (see reverse): | Good |
| Weather: | - 17, Clear |

| Level Survey: | | | | | | |
|----------------------|------------------------|---------|---------|---------|---------|----------------|
| Position | Description | Setup 1 | | Setup 2 | | Average El (m) |
| | | (m) | El (m) | (m) | El (m) | |
| Bench Mark 1: | 3/4" pipe | 0.781 | 100.000 | 0.768 | 100.000 | - |
| Bench Mark 2: | Nail in stump on ledge | 0.730 | 101.161 | 0.718 | 101.161 | - |
| Top of Ice: | | 2.919 | 97.862 | 2.908 | 97.860 | 97.861 |
| Water Level: | | 2.903 | 97.878 | 2.893 | 97.875 | 97.877 |
| Transducer: | | 0.906 | 96.972 | 0.906 | 96.969 | 96.971 |
| Other: | | | | | | |

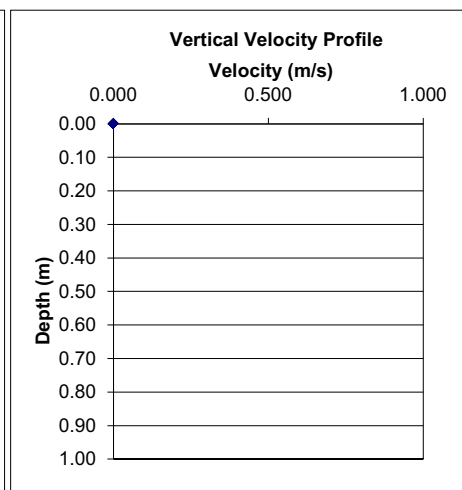
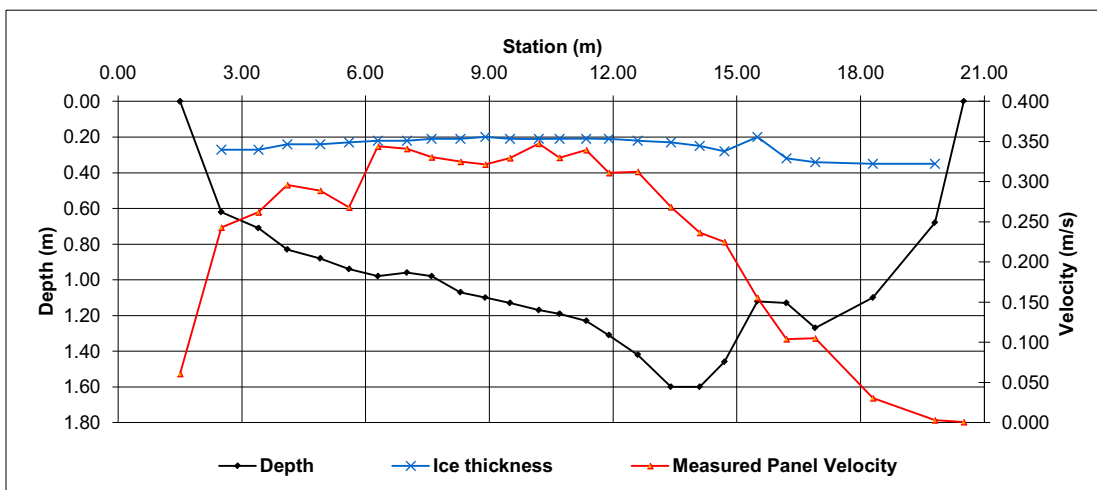
| |
|-----------------------|
| General Notes: |
| |
| |
| |

| Flow Measurement: Measured Data | | | | | | | | | | Calculated Data | | | | | | | |
|---------------------------------|------------|-----------|-------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------|----------------|------------------|----------------------------|--------------------------------|---|-------------------------------|--------------------------------------|--------------------------|--|
| Bank/ Mnt # | Offset (m) | Depth (m) | Ice Thickness (m) | Velocity @ 0.6 Depth (m/s) | Velocity @ 0.8 Depth (m/s) | Velocity @ 0.2 Depth (m/s) | Velocity Correction Factor (m) | Pannel Start (m) | Pannel End (m) | Pannel Width (m) | Effective Pannel Depth (m) | Measured Pannel Velocity (m/s) | Effective Average Pannel Velocity (m/s) | Pannel Area (m ²) | Pannel Discharge (m ³ /s) | Percentage of total flow | |
| Left | 1.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 0.9 | 1.50 | 2.00 | 0.50 | 0.09 | 0.061 | 0.055 | 0.04 | 0.002 | 0% | |
| 1 | 2.50 | 0.62 | 0.27 | 0.243 | | | 0.9 | 2.00 | 2.95 | 0.95 | 0.35 | 0.243 | 0.219 | 0.33 | 0.073 | 2% | |
| 2 | 3.40 | 0.71 | 0.27 | 0.262 | | | 0.9 | 2.95 | 3.75 | 0.80 | 0.44 | 0.262 | 0.236 | 0.35 | 0.083 | 2% | |
| 3 | 4.10 | 0.83 | 0.24 | 0.296 | | | 0.9 | 3.75 | 4.50 | 0.75 | 0.59 | 0.296 | 0.266 | 0.44 | 0.118 | 3% | |
| 4 | 4.90 | 0.88 | 0.24 | 0.289 | | | 0.9 | 4.50 | 5.25 | 0.75 | 0.64 | 0.289 | 0.260 | 0.48 | 0.125 | 3% | |
| 5 | 5.60 | 0.94 | 0.23 | 0.268 | | | 0.9 | 5.25 | 5.95 | 0.70 | 0.71 | 0.268 | 0.241 | 0.50 | 0.120 | 3% | |
| 6 | 6.30 | 0.98 | 0.22 | 0.344 | | | 0.9 | 5.95 | 6.65 | 0.70 | 0.76 | 0.344 | 0.310 | 0.53 | 0.165 | 5% | |
| 7 | 7.00 | 0.96 | 0.22 | 0.341 | | | 0.9 | 6.65 | 7.30 | 0.65 | 0.74 | 0.341 | 0.307 | 0.48 | 0.148 | 4% | |
| 8 | 7.60 | 0.98 | 0.21 | | 0.316 | 0.345 | 1.0 | 7.30 | 7.95 | 0.65 | 0.77 | 0.331 | 0.331 | 0.50 | 0.165 | 5% | |
| 9 | 8.30 | 1.07 | 0.21 | | 0.301 | 0.349 | 1.0 | 7.95 | 8.60 | 0.65 | 0.86 | 0.325 | 0.325 | 0.56 | 0.182 | 5% | |
| 10 | 8.90 | 1.10 | 0.20 | | 0.292 | 0.351 | 1.0 | 8.60 | 9.20 | 0.60 | 0.90 | 0.322 | 0.322 | 0.54 | 0.174 | 5% | |
| 11 | 9.50 | 1.13 | 0.21 | | 0.304 | 0.355 | 1.0 | 9.20 | 9.85 | 0.65 | 0.92 | 0.330 | 0.330 | 0.60 | 0.197 | 5% | |
| 12 | 10.20 | 1.17 | 0.21 | | 0.337 | 0.358 | 1.0 | 9.85 | 10.45 | 0.60 | 0.96 | 0.348 | 0.348 | 0.58 | 0.200 | 6% | |
| 13 | 10.70 | 1.19 | 0.21 | | 0.312 | 0.348 | 1.0 | 10.45 | 11.03 | 0.57 | 0.98 | 0.330 | 0.330 | 0.56 | 0.186 | 5% | |
| 14 | 11.35 | 1.23 | 0.21 | | 0.323 | 0.356 | 1.0 | 11.03 | 11.63 | 0.60 | 1.02 | 0.340 | 0.340 | 0.61 | 0.208 | 6% | |
| 15 | 11.90 | 1.31 | 0.21 | | 0.296 | 0.326 | 1.0 | 11.63 | 12.25 | 0.63 | 1.10 | 0.311 | 0.311 | 0.69 | 0.214 | 6% | |
| 16 | 12.60 | 1.42 | 0.22 | | 0.321 | 0.304 | 1.0 | 12.25 | 13.00 | 0.75 | 1.20 | 0.313 | 0.313 | 0.90 | 0.281 | 8% | |
| 17 | 13.40 | 1.60 | 0.23 | | 0.221 | 0.316 | 1.0 | 13.00 | 13.75 | 0.75 | 1.37 | 0.269 | 0.269 | 1.03 | 0.276 | 8% | |
| 18 | 14.10 | 1.60 | 0.25 | | 0.197 | 0.276 | 1.0 | 13.75 | 14.40 | 0.65 | 1.35 | 0.237 | 0.237 | 0.88 | 0.208 | 6% | |
| 19 | 14.70 | 1.46 | 0.28 | | 0.241 | 0.209 | 1.0 | 14.40 | 15.10 | 0.70 | 1.18 | 0.225 | 0.225 | 0.83 | 0.186 | 5% | |
| 20 | 15.50 | 1.12 | 0.20 | | 0.143 | 0.168 | 1.0 | 15.10 | 15.85 | 0.75 | 0.92 | 0.156 | 0.156 | 0.69 | 0.107 | 3% | |
| 21 | 16.20 | 1.13 | 0.32 | | 0.075 | 0.133 | 1.0 | 15.85 | 16.55 | 0.70 | 0.81 | 0.104 | 0.104 | 0.57 | 0.059 | 2% | |
| 22 | 16.90 | 1.27 | 0.34 | | 0.097 | 0.113 | 1.0 | 16.55 | 17.60 | 1.05 | 0.93 | 0.105 | 0.105 | 0.98 | 0.103 | 3% | |
| 23 | 18.30 | 1.10 | 0.35 | | 0.021 | 0.040 | 1.0 | 17.60 | 19.05 | 1.45 | 0.75 | 0.031 | 0.031 | 1.09 | 0.033 | 1% | |
| 24 | 19.80 | 0.68 | 0.35 | 0.003 | | | 0.9 | 19.05 | 20.15 | 1.10 | 0.33 | 0.003 | 0.003 | 0.36 | 0.001 | 0% | |
| Right | 20.50 | 0.00 | | 0.000 | 0.000 | 0.000 | 1.0 | 20.15 | 20.50 | 0.35 | 0.08 | 0.001 | 0.001 | 0.03 | 0.000 | 0% | |
| Total Flow | | | | | | | | | | | | | | 3.612 | | | |

*Add/delete # rows as necessary, remembering to autofill calculations/graphs etc

| | | |
|--------------------------------|-------|---------------------|
| Flow characteristics: | | |
| Total Flow: | 3.612 | (m ³ /s) |
| Perceived Measurement Quality: | Good | |
| Total Area: | 15.14 | (m ²) |
| Wetted Width: | 19.00 | (m) |
| Hydraulic Depth: | 0.797 | (m) |
| Mean Velocity: | 0.239 | (m/s) |
| Foude Number: | 0.085 | |

| Velocity Profile for Ice Conditions: | | | | | | |
|---|-------|----------|------------|---------------|---------------|-------|
| Velocity Profile | Depth | Velocity | Ave. Depth | Ave. Velocity | Mean Vert. V. | 0.000 |
| Offset | 0.00 | 0 | - | - | Panel V.@Ofst | |
| Depth | | | 0.00 | 0.000 | 60% Depth | 0 |
| Ice Depth | | | 0.00 | 0.000 | 20% Depth | 0.00 |
| | | | 0.00 | 0.000 | 80% Depth | 0.00 |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |
| | | | 0.00 | 0.000 | | |



Hatfield Consultants Hydrometric Site Visit Field Record



| | | | |
|---|---|--------------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: C1 - Aurora Climate Station (475734E, 6343967 N) | | | |
| Personnel: CE, SG Aspen Bennett | | Date: 9 March 2010 | |
| Photos taken?: | √ | x | Entered By: SG |
| | | Checked By: JP | |

| | |
|-----------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 1320 |
| End Time (MST): | 1330 |
| Weather: | Sunny 5°C |

| | |
|---------------------------------------|---|
| Logger Details: | |
| Battery (Main): | - |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp (°C): | |
| RH (%): | |
| Snow Depth (cm): | |
| Wind Speed (m/s): | |
| Wind Dir (deg): | |
| Solar Radiation (kw/m ²): | - |
| Dessicant: | |
| Logger# (if Δ): | |

| | |
|--|--|
| Other notes | |
| Pluvio 1/3 full. Added anti-freeze to tipping bucket adaptor, no rain during this time. Automatic download no manual readout performed | |

| | | | |
|---|---|-----------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: C1 - Aurora Climate Station (475734E, 6343967 N) | | | |
| Personnel: DB, SG | | Date: 10-Aug-10 | |
| Photos taken?: | √ | x | Entered By: SG |
| | | Checked By: DB | |

| | |
|-----------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | - |
| End Time (MST): | - |
| Weather: | Clear 20°C |

| | |
|---------------------------------------|-------|
| Logger Details: | |
| Battery (Main): | 13.18 |
| Datalogger Clock: | 1135 |
| Laptop Clock: | 1135 |
| Air Temp (°C): | 20.04 |
| RH (%): | 67.21 |
| Snow Depth (cm): | 0.018 |
| Wind Speed (m/s): | 0 |
| Wind Dir (deg): | 150 |
| Solar Radiation (kw/m ²): | 0.18 |
| Dessicant: | New |
| Logger# (if Δ): | 26631 |

| | |
|---|--|
| Other notes | |
| All sensors replaced with recalibrated sensors, Tower lowered OK with two people. Wind direction visually correct using compass. Snow depth set to 0. | |

| | | | |
|---|---|-----------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: C1 - Aurora Climate Station (475734E, 6343967 N) | | | |
| Personnel: DB, SG | | Date: 23-Sep-10 | |
| Photos taken?: | √ | | Entered By: DB |
| | | Checked By: JP | |

| | |
|-----------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 1245 |
| End Time (MST): | 1305 |
| Weather: | Clear 10°C |

| | |
|---------------------------------------|---------|
| Logger Details: | |
| Battery (Main): | 13.44 |
| Datalogger Clock: | 1249 |
| Laptop Clock: | 1249 |
| Air Temp (°C): | 14.95 |
| RH (%): | 51.99 |
| Snow Depth (cm): | 0.43 |
| Wind Speed (m/s): | 3.95 |
| Wind Dir (deg): | 167 |
| Solar Radiation (kw/m ²): | 0.18 |
| Dessicant: | Changed |
| Logger# (if Δ): | |

| | |
|--------------------|--|
| Other notes | |
| Precip 93.7mm | |

| | | | |
|---|---|------------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: C1 - Aurora Climate Station (475734E, 6343967 N) | | | |
| Personnel: SG, JO | | Date: 6-Dec 2010 | |
| Photos taken?: | √ | x | Entered By: JP |
| | | Checked By: SG | |

| | |
|-----------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 13:10 |
| End Time (MST): | 13:25 |
| Weather: | - 15, Snow |

| | |
|---------------------------------------|---------|
| Logger Details: | |
| Battery (Main): | 12.85 |
| Datalogger Clock: | 13:21 |
| Laptop Clock: | 13:20 |
| Air Temp (°C): | -13.7 |
| RH (%): | 89 |
| Snow Depth (cm): | 18.6 |
| Wind Speed (m/s): | - |
| Wind Dir (deg): | - |
| Solar Radiation (kw/m ²): | - |
| Dessicant: | Changed |
| Logger# (if Δ): | |

| | |
|---|--|
| Other notes | |
| Snow on all sensors. Removed some vegetation from sonic ranger field. Pluvio 1/4 full, needs more antifreeze. Bring new batteries in January. Snow depth 20cm; precip: 118mm; | |

Hatfield Consultants Hydrometric Site Visit Field Record



| | | | |
|--|--|--------------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: C2 - Horizon (CNRL) Climate Station (443364 E, 6360515 N) | | | |
| Personnel: CE, SG | | Date: 4 March 2010 | |
| Photos taken?: | <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: SG | Checked By: JP |

| | |
|-----------------------------|-----------|
| Measurement Details: | |
| Start Time (MST): | 910 |
| End Time (MST): | 926 |
| Weather: | Clear 5°C |

| | |
|----------------------------|--|
| Logger Details: | |
| Battery (Main): | |
| Datalogger Clock: | |
| Laptop Clock: | |
| Air Temp (°C): | |
| RH (%): | |
| Snow Depth (cm): | |
| Wind Speed (m/s): | |
| Wind Dir (deg): | |
| Solar Radiation (kw/m²) | |
| Barometric Pressure (kpa): | |
| Dessicant: | |
| Logger# (if Δ): | |

| | |
|---|--|
| Other notes | |
| Emptied GEONOR Bucket. Was 3/4 full. Added new antifreeze and hydraulic fluid. Snow depth was 8cm under sensor. Automatic download no manual readout was performed. | |

| | | | |
|--|--|-----------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: C2 - Horizon (CNRL) Climate Station (443364 E, 6360515 N) | | | |
| Personnel: DB CE | | Date: 07-Apr-10 | |
| Photos taken?: | <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: DB | Checked By: JP |

| | |
|-----------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 830 |
| End Time (MST): | 850 |
| Weather: | 3 deg + sunny |

| | |
|----------------------------|---------|
| Logger Details: | |
| Battery (Main): | 12.89 |
| Datalogger Clock: | 846 |
| Laptop Clock: | 843 |
| Air Temp (°C): | 7.2 |
| RH (%): | 38.57 |
| Snow Depth (cm): | |
| Wind Speed (m/s): | |
| Wind Dir (deg): | |
| Solar Radiation (kw/m²) | |
| Barometric Pressure (kpa): | 95.84 |
| Dessicant: | changed |
| Logger# (if Δ): | |

| | |
|--|--|
| Other notes | |
| check snow depth- data says 30cm, no snow or weeds. Antifreeze added @ 8.40 (1.8 to 4 units on bucket 45-50 mm full) | |

| | | | |
|--|--|---------------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: C2 - Horizon (CNRL) Climate Station (443364 E, 6360515 N) | | | |
| Personnel: SG DB | | Date: 22-April-2010 | |
| Photos taken?: | <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: DB | Checked By: JP |

| | |
|-----------------------------|-----|
| Measurement Details: | |
| Start Time (MST): | 815 |
| End Time (MST): | 830 |
| Weather: | |

| | |
|----------------------------|-------|
| Logger Details: | |
| Battery (Main): | 12.84 |
| Datalogger Clock: | 823 |
| Laptop Clock: | 821 |
| Air Temp (°C): | 1515 |
| RH (%): | 34.01 |
| Snow Depth (cm): | 0 |
| Wind Speed (m/s): | |
| Wind Dir (deg): | |
| Solar Radiation (kw/m²) | |
| Barometric Pressure (kpa): | |
| Dessicant: | |
| Logger# (if Δ): | |

| | |
|--------------------|--|
| Other notes | |
| Temperature @ 4m | |

| | | | |
|--|--|--------------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: C2 - Horizon (CNRL) Climate Station (443364 E, 6360515 N) | | | |
| Personnel: DB BL | | Date: 23-June-2010 | |
| Photos taken?: | <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: DB | Checked By: JP |

| | |
|-----------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 1235 |
| End Time (MST): | 1254 |
| Weather: | Partly cloudy |

| | |
|----------------------------|---------|
| Logger Details: | |
| Battery (Main): | 12.95 |
| Datalogger Clock: | 1146 |
| Laptop Clock: | 1144 |
| Air Temp (°C): | 20.6 |
| RH (%): | 31.2 |
| Snow Depth (cm): | |
| Wind Speed (m/s): | 0.86 |
| Wind Dir (deg): | 197 |
| Solar Radiation (kw/m²) | |
| Barometric Pressure (kpa): | |
| Dessicant: | Changed |
| Logger# (if Δ): | |

| | |
|--|--|
| Other notes | |
| Checked anti freeze/hyd. Fluid- levels were low, not changed | |

Hatfield Consultants Hydrometric Site Visit Field Record



| | |
|--|---|
| Project: 1565 RAMP HYDROLOGY | |
| Site: C2 - Horizon (CNRL) Climate Station (443364 E, 6360515 N) | |
| Personnel: BL, SG | Date: 17-Aug-10 |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: SG Checked By: DB |

| | |
|-----------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 800 |
| End Time (MST): | 900 |
| Weather: | Clear 20°C |

| | |
|----------------------------|---------|
| Logger Details: | |
| Battery (Main): | 14.93 |
| Datalogger Clock: | 810 |
| Laptop Clock: | 808 |
| Air Temp (°C): | 14.99 |
| RH (%): | 51.6 |
| Snow Depth (cm): | 0.07 |
| Wind Speed (m/s): | |
| Wind Dir (deg): | |
| Solar Radiation (kw/m²): | |
| Barometric Pressure (kpa): | 96.95 |
| Dessicant: | Changed |
| Logger# (if Δ): | |

| | |
|--|--|
| Other notes | |
| Calibrated Snow depth Sensor installed, set to 0 cm within error. Geonor 1/4 full. | |

| | |
|--|---|
| Project: 1565 RAMP HYDROLOGY | |
| Site: C2 - Horizon (CNRL) Climate Station (443364 E, 6360515 N) | |
| Personnel: DB, SG | Date: 14-Sep-10 |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: DB Checked By: JP |

| | |
|-----------------------------|------------|
| Measurement Details: | |
| Start Time (MST): | 925 |
| End Time (MST): | 935 |
| Weather: | Sunny 11°C |

| | |
|----------------------------|---------|
| Logger Details: | |
| Battery (Main): | 12.97 |
| Datalogger Clock: | 925 |
| Laptop Clock: | 927 |
| Air Temp (°C): | 11.78 |
| RH (%): | 62.34 |
| Snow Depth (cm): | |
| Wind Speed (m/s): | |
| Wind Dir (deg): | |
| Solar Radiation (kw/m²): | 0.4 |
| Barometric Pressure (kpa): | 97.22 |
| Dessicant: | Changed |
| Logger# (if Δ): | |

| | |
|--------------------|--|
| Other notes | |
| | |

| | |
|--|---|
| Project: 1565 RAMP HYDROLOGY | |
| Site: C2 - Horizon (CNRL) Climate Station (443364 E, 6360515 N) | |
| Personnel: DB BL | Date: 26-Oct-2010 |
| Photos taken?: <input checked="" type="checkbox"/> | Entered By: DB Checked By: JP |

| | |
|-----------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 820 |
| End Time (MST): | |
| Weather: | Overcast -5°C |

| | |
|----------------------------|---------|
| Logger Details: | |
| Battery (Main): | 12.42 |
| Datalogger Clock: | 829 |
| Laptop Clock: | 826 |
| Air Temp (°C): | -5.66 |
| RH (%): | 92.77 |
| Snow Depth (cm): | 0 |
| Wind Speed (m/s): | - |
| Wind Dir (deg): | - |
| Solar Radiation (kw/m²): | - |
| Barometric Pressure (kpa): | 96.3 |
| Dessicant: | Changed |
| Logger# (if Δ): | - |

| | |
|-----------------------------------|--|
| Other notes | |
| Added 2L mixture and hydro fluid. | |

| | |
|--|---|
| Project: 1565 RAMP HYDROLOGY | |
| Site: C2 - Horizon (CNRL) Climate Station (443364 E, 6360515 N) | |
| Personnel: BL, SG | Date: 30-Nov-2010 |
| Photos taken?: <input checked="" type="checkbox"/> <input type="checkbox"/> | Entered By: JP Checked By: SG |

| | |
|-----------------------------|---------------|
| Measurement Details: | |
| Start Time (MST): | 9:30 |
| End Time (MST): | 9:50 |
| Weather: | -10, overcast |

| | |
|----------------------------|-------|
| Logger Details: | |
| Battery (Main): | 12.39 |
| Datalogger Clock: | 9:39 |
| Laptop Clock: | 9:36 |
| Air Temp (°C): | -12.5 |
| RH (%): | 96.71 |
| Snow Depth (cm): | 21.72 |
| Wind Speed (m/s): | - |
| Wind Dir (deg): | - |
| Solar Radiation (kw/m²): | - |
| Barometric Pressure (kpa): | 97.75 |
| Dessicant: | OK |
| Logger# (if Δ): | - |

| | |
|---------------------------------------|--|
| Other notes | |
| Measured snow: 21cm; Geonor: 1/3 full | |

Hatfield Consultants Hydrometric Site Visit Field Record



| | | | |
|--|-------------------------------------|----------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: C3 - Steepbank (Suncor) Climate Station (473950 E, 6320500 N) | | | |
| Personnel: CE, SG | Date: 10 March 2010 | | |
| Photos taken?: <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Entered By: SG | Checked By: JP |

| | |
|-----------------------------|--------------|
| Measurement Details: | |
| Start Time (MST): | 940 |
| End Time (MST): | 1000 |
| Weather: | Overcast 0°C |

| | |
|-------------------------|---------|
| Logger Details: | |
| Battery (Main): | 14.81 |
| Datalogger Clock: | 908 |
| Laptop Clock: | 909 |
| Air Temp (°C): | |
| RH (%): | |
| Snow Depth (cm): | |
| Wind Speed (m/s): | |
| Wind Dir (deg): | |
| Solar Radiation (kw/m²) | |
| Dessicant: | Changed |
| Logger# (if Δ): | |

| | |
|---|--|
| Other notes | |
| Pluvio is 1/3 full. Mounted Solar Panel and data logger box to fence. | |

| | | | |
|--|-------------------------------------|----------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: C3 - Steepbank (Suncor) Climate Station (473950 E, 6320500 N) | | | |
| Personnel: DB, BL | Date: 21-June | | |
| Photos taken?: <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Entered By: DB | Checked By: JP |

| | |
|-----------------------------|--------------|
| Measurement Details: | |
| Start Time (MST): | 12:10 |
| End Time (MST): | 12:30 |
| Weather: | Overcast 0°C |

| | |
|-------------------------|---------|
| Logger Details: | |
| Battery (Main): | 14.16 |
| Datalogger Clock: | 1224 |
| Laptop Clock: | 1224 |
| Air Temp (°C): | |
| RH (%): | |
| Snow Depth (cm): | |
| Wind Speed (m/s): | |
| Wind Dir (deg): | |
| Solar Radiation (kw/m²) | |
| Dessicant: | Changed |
| Logger# (if Δ): | |

| | |
|---|--|
| Other notes | |
| Total Ppt 99.0mm, changed antifreeze/hydraulic fluid at 12:25pm, no precipitation today | |

| | | | |
|--|-------------------------------------|----------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: C3 - Steepbank (Suncor) Climate Station (473950 E, 6320500 N) | | | |
| Personnel: BL, SG | Date: 18-Aug-10 | | |
| Photos taken?: <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Entered By: SG | Checked By: DB |

| | |
|-----------------------------|---------------------|
| Measurement Details: | |
| Start Time (MST): | 1330 |
| End Time (MST): | 1345 |
| Weather: | Partly Cloudy, 20°C |

| | |
|-------------------------|---------|
| Logger Details: | |
| Battery (Main): | 14.17 |
| Datalogger Clock: | 1246 |
| Laptop Clock: | 1246 |
| Air Temp (°C): | |
| RH (%): | |
| Snow Depth (cm): | |
| Wind Speed (m/s): | |
| Wind Dir (deg): | |
| Solar Radiation (kw/m²) | |
| Dessicant: | Changed |
| Logger# (if Δ): | |

| | |
|---|--|
| Other notes | |
| Pluvio cover was touching scale. Data is incorrect since last site visit. | |

| | | | |
|--|-------------------------------------|----------------|----------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: C3 - Steepbank (Suncor) Climate Station (473950 E, 6320500 N) | | | |
| Personnel: DB SG Sarah Aho | Date: 14-Sep-10 | | |
| Photos taken?: <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Entered By: DB | Checked By: JP |

| | |
|-----------------------------|---------------------|
| Measurement Details: | |
| Start Time (MST): | 1430 |
| End Time (MST): | 1431 |
| Weather: | Partly Cloudy, 20°C |

| | |
|-------------------------|----------|
| Logger Details: | |
| Battery (Main): | 14.31 |
| Datalogger Clock: | 1430 |
| Laptop Clock: | 1431 |
| Air Temp (°C): | |
| RH (%): | |
| Snow Depth (cm): | |
| Wind Speed (m/s): | |
| Wind Dir (deg): | |
| Solar Radiation (kw/m²) | |
| Dessicant: | Replaced |
| Logger# (if Δ): | |

| | |
|--------------------------------------|--|
| Other notes | |
| 242.50 mm cumulative since last trip | |

| | | | |
|--|-------------------------------------|----------------|-------------|
| Project: 1565 RAMP HYDROLOGY | | | |
| Site: C3 - Steepbank (Suncor) Climate Station (473950 E, 6320500 N) | | | |
| Personnel: SG | Date: 06-Dec-10 | | |
| Photos taken?: <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Entered By: JP | Checked By: |

| | |
|-----------------------------|----------------|
| Measurement Details: | |
| Start Time (MST): | 9:30 |
| End Time (MST): | 10:00 |
| Weather: | - 20, Overcast |

| | |
|---------------------------|---------|
| Logger Details: | |
| Battery (Main): | 13:13 |
| Datalogger Clock: | 9:43 |
| Laptop Clock: | 9:43 |
| Air Temp (°C): | -19.1 |
| RH (%): | 87.3 |
| Snow Depth (cm): | 18 |
| Wind Speed (m/s): | - |
| Wind Dir (deg): | - |
| Solar Radiation (kw/m²) | - |
| Barometric Pressure (kpa) | 98.71 |
| Dessicant: | Changed |
| Logger# (if Δ): | - |

| | |
|---|--|
| Other notes | |
| Station covered in thin layer of frost. Precipitation: 27.75mm; Snow depth: 18 cm; Pluvio 1/4 full. | |

C.7 UPDATED NATURALIZED FLOW CALCULATION RESULTS

The method used to compute naturalized flows was outlined in Appendix C.3.3. The results from these calculations are presented below.

RAMP Station S24, Athabasca River below Eymondson Creek

All development

NOTES

| |
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| |
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LAND AREAS

| | Total Area | Other Areas | | |
|------------------------------|------------|-------------|------------------|------------|
| | | Cleared | Closed-circuited | Effective |
| RAMP site (ha) | 14,600,000 | 10,295 | 33,519 | 14,566,481 |
| RAMP site (km ²) | 146,000.0 | 102.9 | 335.2 | 145,664.8 |

Incremental Runoff from clearing

Factor

20%

RESULTS SUMMARY

| Observed (m ³ / s) | Endpoint | Baseline | |
|-------------------------------|---|-------------------------------|--------------------|
| | | Baseline (m ³ / s) | %change of natural |
| 15310.3 | Annual Sum (million cumecs) | 15433.9 | -0.8% |
| 737.4 | Mean open-water season (1-May : 31-Oct) | 742.1 | -0.6% |
| 184.2 | Mean winter discharge (1-Nov : 31-Mar) | 187.4 | -1.7% |
| 1224.4 | Annual maximum daily discharge | 1229.5 | -0.4% |
| 415.7 | Open-water season minimum daily discharge | 419.0 | -0.8% |

ANNUAL WATER BALANCE COMPONENTS

| | | |
|---------------------------------------|------------------------|---------|
| Observed Hydrograph | million m ³ | 15310.3 |
| Closed-circuit loss | million m ³ | -35.4 |
| Incremental runoff from land clearing | million m ³ | 2.2 |
| Withdrawals from the stream | million m ³ | -97.8 |
| Releases into the stream | million m ³ | 6.8 |
| Diversion into/out of watershed | million m ³ | 0.0 |
| Tributary changes | million m ³ | 0.6 |
| Incremental volume | million m ³ | -123.7 |
| Naturalized Hydrograph | million m ³ | 15433.9 |
| Incremental volume | % of natural | -0.8% |
| Naturalized Runoff Depth | mm | 105.7 |

WSC Station 07DA008 (RAMP Station S7), Muskeg River near Fort McKay

NOTES

Using WSC area of 1457 km², not total area (1460 km²): WSC area 0.2% lower. Negative baseline estimated values are set to zero when releases exceed observed flows.

LAND AREAS

| | Total Area | Other Areas | | |
|------------------------------|------------|-------------|------------------|-----------|
| | | Cleared | Closed-circuited | Effective |
| RAMP site (ha) | 145,700 | 5,149 | 12,065 | 133,635 |
| RAMP site (km ²) | 1,457.0 | 51.5 | 120.7 | 1,336.4 |

Incremental Runoff from clearing

Factor 20%

RESULTS SUMMARY

| Observed (m ³ / s) | Endpoint | Baseline | |
|-------------------------------|---|-------------------------------|--------------------|
| | | Baseline (m ³ / s) | %change of natural |
| 93.85 | Annual Sum (million cumecs) | 91.77 | 2.3% |
| 4.48 | Mean open-water season (1-May : 31-Oct) | 4.55 | -1.7% |
| 0.72 | Mean winter discharge (1-Nov : 31-Mar) | 0.47 | 52.1% |
| 13.00 | Annual maximum daily discharge | 13.41 | -3.0% |
| 0.55 | Open-water season minimum daily discharge | 0.33 | 64.1% |

ANNUAL WATER BALANCE COMPONENTS

| | | |
|---------------------------------------|------------------------|-------|
| Observed Hydrograph | million m ³ | 93.85 |
| Closed-circuit loss | million m ³ | -7.58 |
| Incremental runoff from land clearing | million m ³ | 0.65 |
| Withdrawals from the stream | million m ³ | -0.65 |
| Releases into the stream | million m ³ | 9.86 |
| Diversion into/out of watershed | million m ³ | 0.00 |
| Tributary changes | million m ³ | 0.00 |
| Incremental volume | million m ³ | 2.27 |
| Naturalized Hydrograph | million m ³ | 91.77 |
| Incremental volume | % of natural | 2.3% |
| Naturalized Runoff Depth | mm | 62.99 |

WSC Station 07DA006 (RAMP Station S38) Steepbank River near Fort McMurray

NOTES

WSC upstream drainage 1320km² is used.

LAND AREAS

| | Total Area | | Other Areas | |
|-------------------------------|----------------|--------------|------------------|----------------|
| | | Cleared | Closed-circuited | Effective |
| Joint site (ha) | 132,000 | 4,036 | 431 | 131,569 |
| Joint site (km ²) | 1,320.0 | 40.4 | 4.3 | 1,315.7 |

Incremental Runoff from clearing

Factor

20%

RESULTS SUMMARY

| Observed (m ³ / s) | Endpoint | Baseline | |
|-------------------------------|---|-------------------------------|--------------------|
| | | Baseline (m ³ / s) | %change of natural |
| 143.35 | Annual Sum (million cumecs) | 142.94 | 0.28% |
| 6.70 | Mean open-water season (1-May : 31-Oct) | 6.68 | 0.28% |
| 1.58 | Mean winter discharge (1-Nov : 31-Mar) | 1.57 | 0.28% |
| 25.40 | Annual maximum daily discharge | 25.33 | 0.28% |
| 1.28 | Open-water season minimum daily discharge | 1.28 | 0.28% |

ANNUAL WATER BALANCE COMPONENTS

| | | |
|---------------------------------------|------------------------|---------------|
| Observed Hydrograph | million m ³ | 143.35 |
| Closed-circuit loss | million m ³ | -0.47 |
| Incremental runoff from land clearing | million m ³ | 0.87 |
| Withdrawals from the stream | million m ³ | 0.00 |
| Releases into the stream | million m ³ | 0.00 |
| Diversion into/out of watershed | million m ³ | 0.00 |
| Tributary changes | million m ³ | 0.00 |
| Incremental volume | million m ³ | 0.41 |
| Naturalized Hydrograph | million m ³ | 142.94 |
| Incremental volume | % of natural | 0.28% |
| Naturalized Runoff Depth | mm | 108.29 |

RAMP Station S15A, Tar River near the mouth

NOTES

| |
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| |
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LAND AREAS

| | Total Area | Other Areas | | Effective |
|------------------------------|------------|-------------|------------------|-----------|
| | | Cleared | Closed-circuited | |
| RAMP site (ha) | 33,261 | 1,477 | 5,870 | 27,391 |
| RAMP site (km ²) | 332.6 | 14.8 | 58.7 | 273.9 |

Incremental Runoff from clearing Factor 20%

RESULTS SUMMARY

| Observed (m ³ / s) | Endpoint | Baseline | |
|-------------------------------|---|-------------------------------|--------------------|
| | | Baseline (m ³ / s) | %change of natural |
| 10.61 | Annual Sum (million cumecs) | 12.75 | -16.8% |
| 0.60 | Mean open-water season (1-May : 31-Oct) | 0.72 | -16.8% |
| n/a | Mean winter discharge (1-Nov : 31-Mar) | n/a | n/a |
| 2.96 | Annual maximum daily discharge | 3.56 | -16.8% |
| 0.10 | Open-water season minimum daily discharge | 0.12 | -16.8% |

ANNUAL WATER BALANCE COMPONENTS

| | | |
|---------------------------------------|------------------------|--------|
| Observed Hydrograph | million m ³ | 10.61 |
| Closed-circuit loss | million m ³ | -2.25 |
| Incremental runoff from land clearing | million m ³ | 0.11 |
| Withdrawals from the stream | million m ³ | 0.00 |
| Releases into the stream | million m ³ | 0.00 |
| Diversion into/out of watershed | million m ³ | 0.00 |
| Tributary changes | million m ³ | 0.00 |
| Incremental volume | million m ³ | -2.14 |
| Naturalized Hydrograph | million m ³ | 12.75 |
| Incremental volume | % of natural | -16.8% |
| Naturalized Runoff Depth | mm | 38.3 |

WSC Station 07DB001, RAMP Station S26, MacKay River near Fort McKay

NOTES

Using WSC area of 5569.3 km².

LAND AREAS

| | Total Area | Other Areas | | |
|-------------------------------|------------|-------------|------------------|-----------|
| | | Cleared | Closed-circuited | Effective |
| Joint site (ha) | 556,930 | 1,336 | 441 | 556,489 |
| Joint site (km ²) | 5,569.3 | 13.4 | 4.4 | 5,564.9 |

Incremental Runoff from clearing

Factor

20%

RESULTS SUMMARY

| Observed (m ³ / s) | Endpoint | Baseline | |
|-------------------------------|---|-------------------------------|--------------------|
| | | Baseline (m ³ / s) | %change of natural |
| 319.69 | Annual Sum (million cumecs) | 319.79 | -0.03% |
| 18.06 | Mean open-water season (1-May : 31-Oct) | 18.07 | -0.03% |
| 0.95 | Mean winter discharge (1-Nov : 31-Mar) | 0.95 | -0.03% |
| 47.80 | Annual maximum daily discharge | 47.81 | -0.03% |
| 1.87 | Open-water season minimum daily discharge | 1.87 | -0.03% |

ANNUAL WATER BALANCE COMPONENTS

| | | |
|---------------------------------------|------------------------|--------|
| Observed Hydrograph | million m ³ | 319.69 |
| Closed-circuit loss | million m ³ | -0.25 |
| Incremental runoff from land clearing | million m ³ | 0.15 |
| Withdrawals from the stream | million m ³ | 0.00 |
| Releases into the stream | million m ³ | 0.00 |
| Diversion into/out of watershed | million m ³ | 0.00 |
| Tributary changes | million m ³ | 0.00 |
| Incremental volume | million m ³ | -0.10 |
| Naturalized Hydrograph | million m ³ | 319.79 |
| Incremental volume | % of natural | -0.03% |
| Naturalized Runoff Depth | mm | 57.42 |

RAMP Station S16A, Calumet River

NOTES

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LAND AREAS

| | Total Area | Other Areas | | Effective |
|------------------------------|------------|-------------|------------------|-----------|
| | | Cleared | Closed-circuited | |
| RAMP site (ha) | 17,354 | 35 | 179 | 17,175 |
| RAMP site (km ²) | 173.5 | 0.4 | 1.8 | 171.8 |

Incremental Runoff from clearing *Factor* *20%*

RESULTS SUMMARY

| Observed (m ³ / s) | Endpoint | Baseline | |
|-------------------------------|---|-------------------------------|--------------------|
| | | Baseline (m ³ / s) | %change of natural |
| 2.59 | Annual Sum (million cumecs) | 2.62 | -0.99% |
| 0.161 | Mean open-water season (1-May : 31-Oct) | 0.162 | -0.99% |
| n/a | Mean winter discharge (1-Nov : 31-Mar) | n/a | n/a |
| 0.780 | Annual maximum daily discharge | 0.788 | -0.99% |
| 0.013 | Open-water season minimum daily discharge | 0.014 | -0.99% |

ANNUAL WATER BALANCE COMPONENTS

| | | |
|---------------------------------------|------------------------|---------------|
| Observed Hydrograph | million m ³ | 2.591 |
| Closed-circuit loss | million m ³ | -0.027 |
| Incremental runoff from land clearing | million m ³ | 0.001 |
| Withdrawals from the stream | million m ³ | 0.000 |
| Releases into the stream | million m ³ | 0.000 |
| Diversion into/out of watershed | million m ³ | 0.000 |
| Tributary changes | million m ³ | 0.000 |
| Incremental volume | million m ³ | -0.026 |
| Naturalized Hydrograph | million m ³ | 2.617 |
| Incremental volume | % of natural | -0.99% |
| Naturalized Runoff Depth | mm | 15.08 |

WSC Station 07DC001, RAMP Station S27, Firebag River near the mouth

NOTES

Using WSC catchment area of 5987.6 km², not total area (5681.7 km²): WSC area 5% higher.

LAND AREAS

| | Total Area | | Other Areas | |
|-------------------------------|----------------|--------------|------------------|----------------|
| | | Cleared | Closed-circuited | Effective |
| Joint site (ha) | 598,760 | 3,909 | 257 | 598,503 |
| Joint site (km ²) | 5,987.6 | 39.1 | 2.6 | 5,985.0 |

Incremental Runoff from clearing

Factor 20%

RESULTS SUMMARY

| Observed (m ³ / s) | Endpoint | Baseline | |
|-------------------------------|---|-------------------------------|--------------------|
| | | Baseline (m ³ / s) | %change of natural |
| 743.04 | Annual Sum (million cumecs) | 742.40 | 0.09% |
| 30.50 | Mean open-water season (1-May : 31-Oct) | 30.47 | 0.09% |
| 13.15 | Mean winter discharge (1-Nov : 31-Mar) | 13.14 | 0.08% |
| 70.00 | Annual maximum daily discharge | 69.94 | 0.09% |
| 11.80 | Open-water season minimum daily discharge | 11.79 | 0.09% |

ANNUAL WATER BALANCE COMPONENTS

| | | |
|---------------------------------------|------------------------|---------------|
| Observed Hydrograph | million m ³ | 743.04 |
| Closed-circuit loss | million m ³ | -0.32 |
| Incremental runoff from land clearing | million m ³ | 0.97 |
| Withdrawals from the stream | million m ³ | -0.01 |
| Releases into the stream | million m ³ | 0.00 |
| Diversion into/out of watershed | million m ³ | 0.00 |
| Tributary changes | million m ³ | 0.00 |
| Incremental volume | million m ³ | 0.64 |
| Naturalized Hydrograph | million m ³ | 742.40 |
| Incremental volume | % of natural | 0.09% |
| Naturalized Runoff Depth | mm | 123.99 |

WSC Station 07CD004, Hangingstone River at Fort McMurray

NOTES

Using WSC area of 962 km², not total area (1066.4 km²): WSC area 9.8% lower.

LAND AREAS

| | Total Area | | Other Areas | |
|-----------------------------|------------|---------|------------------|-----------|
| | | Cleared | Closed-circuited | Effective |
| WSC site (ha) | 96,200 | 9 | 47 | 96,153 |
| WSC site (km ²) | 962.0 | 0.1 | 0.5 | 961.5 |

Incremental Runoff from clearing

Factor

20%

RESULTS SUMMARY

| Observed (m ³ / s) | Endpoint | Baseline | |
|-------------------------------|---|-------------------------------|--------------------|
| | | Baseline (m ³ / s) | %change of natural |
| 110.65 | Annual Sum (million cumecs) | 110.70 | -0.05% |
| 5.37 | Mean open-water season (1-May : 31-Oct) | 5.37 | -0.05% |
| 0.30 | Mean winter discharge (1-Nov : 31-Mar) | 0.30 | -0.05% |
| 33.30 | Annual maximum daily discharge | 33.32 | -0.05% |
| 1.22 | Open-water season minimum daily discharge | 1.22 | -0.05% |

ANNUAL WATER BALANCE COMPONENTS

| | | |
|---------------------------------------|------------------------|---------|
| Observed Hydrograph | million m ³ | 110.648 |
| Closed-circuit loss | million m ³ | -0.054 |
| Incremental runoff from land clearing | million m ³ | 0.002 |
| Withdrawals from the stream | million m ³ | 0.000 |
| Releases into the stream | million m ³ | 0.000 |
| Diversion into/out of watershed | million m ³ | 0.000 |
| Tributary changes | million m ³ | 0.000 |
| Incremental volume | million m ³ | -0.052 |
| Naturalized Hydrograph | million m ³ | 110.700 |
| Incremental volume | % of natural | -0.05% |
| Naturalized Runoff Depth | mm | 115.1 |

WSC Station 07DA007 (RAMP Station S11), Poplar Creek at Highway 63

NOTES

Using WSC data for land area, 151km². Cleared and CC areas taken from geomatics data for 'Original Poplar' area. Negative baseline estimated values are set to zero when spillway releases exceed observed flows.

LAND AREAS

| | Total Area | Other Areas | | Effective |
|------------------------------|------------|-------------|------------------|-----------|
| | | Cleared | Closed-circuited | |
| RAMP site (ha) | 15,100 | 168 | 307 | 14,793 |
| RAMP site (km ²) | 151.0 | 1.7 | 3.1 | 147.9 |

Incremental Runoff from clearing

Factor

20%

RESULTS SUMMARY

| Observed (m ³ / s) | Endpoint | Baseline | |
|-------------------------------|---|-------------------------------|--------------------|
| | | Baseline (m ³ / s) | %change of natural |
| 25.30 | Annual Sum (million cumecs) | 21.11 | 19.9% |
| 1.40 | Mean open-water season (1-May : 31-Oct) | 1.13 | 23.4% |
| n/a | Mean winter discharge (1-Nov : 31-Mar) | n/a | n/a |
| 5.71 | Annual maximum daily discharge | 5.76 | -0.9% |
| 0.113 | Open-water season minimum daily discharge | 0.115 | -1.8% |

ANNUAL WATER BALANCE COMPONENTS

| | | |
|---------------------------------------|------------------------|--------|
| Observed Hydrograph | million m ³ | 25.30 |
| Closed-circuit loss | million m ³ | -0.42 |
| Incremental runoff from land clearing | million m ³ | 0.05 |
| Withdrawals from the stream | million m ³ | 0.00 |
| Releases into the stream | million m ³ | 0.00 |
| Diversion into/out of watershed | million m ³ | 5.18 |
| Tributary changes | million m ³ | 0.00 |
| Incremental volume | million m ³ | 4.81 |
| Naturalized Hydrograph | million m ³ | 21.11 |
| Incremental volume | % of natural | 19.9% |
| Naturalized Runoff Depth | mm | 139.78 |

RAMP Station S12, Fort Creek at Highway 63

NOTES

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LAND AREAS

| | Total Area | Other Areas | | Effective |
|------------------------------|--------------|--------------|------------------|--------------|
| | | Cleared | Closed-circuited | |
| RAMP site (ha) | 3,193 | 1,966 | 30 | 3,164 |
| RAMP site (km ²) | 31.9 | 19.7 | 0.3 | 31.6 |

Incremental Runoff from clearing *Factor* *20%*

RESULTS SUMMARY

| Observed (m ³ / s) | Endpoint | Baseline | |
|-------------------------------|---|-------------------------------|--------------------|
| | | Baseline (m ³ / s) | %change of natural |
| 1.90 | Annual Sum (million cumecs) | 1.71 | 11.4% |
| 0.12* | Mean open-water season (1-May : 31-Oct)* | 0.11* | 11.4%* |
| n/a | Mean winter discharge (1-Nov : 31-Mar) | n/a | n/a |
| 0.40 | Annual maximum daily discharge | not reported | not reported |
| 0.016 | Open-water season minimum daily discharge | not reported | not reported |

ANNUAL WATER BALANCE COMPONENTS

| | | |
|--|------------------------|----------------|
| Observed Hydrograph | million m ³ | 1.90 |
| Closed-circuit loss | million m ³ | -0.0159 |
| Incremental runoff from land clearing | million m ³ | 0.21 |
| Withdrawals from the stream | million m ³ | 0.00 |
| Releases into the stream | million m ³ | 0.00 |
| Diversion into/out of watershed | million m ³ | 0.00 |
| Tributary changes | million m ³ | 0.00 |
| Incremental volume | million m ³ | 0.19 |
| Naturalized Hydrograph | million m ³ | 1.71 |
| Incremental volume | % of natural | 11.4% |
| Naturalized Runoff Depth | mm | 53.5 |

*In Chapter 5, this information is presented as the discharge volume for the mean open-water period (May to October); please see section 5.11.6 for more details.

RAMP Station S6, Mills Creek at Highway 63

NOTES

Hatfield- Mills Creek 890ha, or 8.9 km². Using 600 km² as estimated upstream area from geomatics group.

LAND AREAS

| | Total Area | | Other Areas | |
|------------------------------|------------|---------|------------------|-----------|
| | | Cleared | Closed-circuited | Effective |
| RAMP site (ha) | 600 | 47 | 207 | 393 |
| RAMP site (km ²) | 6.0 | 0.5 | 2.1 | 3.9 |

Incremental Runoff from clearing

Factor

20%

RESULTS SUMMARY

| Observed (m ³ / s) | Endpoint | Baseline | |
|-------------------------------|---|-------------------------------|--------------------|
| | | Baseline (m ³ / s) | %change of natural |
| 0.73 | Annual Sum (million cumecs) | 1.09 | -32.9% |
| 0.03 | Mean open-water season (1-May : 31-Oct) | 0.05 | -32.9% |
| 0.01 | Mean winter discharge (1-Nov : 31-Mar) | 0.01 | -32.9% |
| 0.12 | Annual maximum daily discharge | 0.17 | -32.9% |
| 0.01 | Open-water season minimum daily discharge | 0.02 | -32.9% |

ANNUAL WATER BALANCE COMPONENTS

| | | |
|---------------------------------------|------------------------|---------|
| Observed Hydrograph | million m ³ | 0.733 |
| Closed-circuit loss | million m ³ | -0.377 |
| Incremental runoff from land clearing | million m ³ | 0.017 |
| Withdrawals from the stream | million m ³ | 0.000 |
| Releases into the stream | million m ³ | 0.000 |
| Diversion into/out of watershed | million m ³ | 0.000 |
| Tributary changes | million m ³ | 0.000 |
| Incremental volume | million m ³ | -0.360 |
| Naturalized Hydrograph | million m ³ | 1.093 |
| Incremental volume | % of natural | -32.93% |
| Naturalized Runoff Depth | mm | 182.1 |

Appendix D
Water Quality Component

D WATER QUALITY COMPONENT

D.1 ANALYTICAL CHEMISTRY METHODS

Analytical methods used for the RAMP Water Quality component, along with associated detection limits and analysis-specific Variable Method Values (VMV codes), are presented in Table D.1-1. Information about naphthenic acids analyses undertaken by AITF and ALS have been excluded from this table and are discussed in detail in Section 6 of the 2010 RAMP Technical Report.

Table D.1-1 Analytical methods, method detection limits, and Variable Method Values (VMV codes) for water quality variables measured by analytical laboratories for RAMP in 2010.

| Analyte Category | Analyte | Units | Detection Limit | Analytical Method | VMV Code | Lab |
|------------------------|---|--------|-----------------|-----------------------------------|----------|-----|
| Conventional variables | Alkalinity, Total (as CaCO ₃) | mg/L | 5 | APHA 4500-H, 2510, 2320 | 10165 | ALS |
| Conventional variables | Conductivity | µS/cm | 0.2 | APHA 4500-H, 2510, 2320 | 2041 | ALS |
| Conventional variables | Dissolved Organic Carbon | mg/L | 1 | APHA 5310 B-Instrumental | 6101 | ALS |
| Conventional variables | Hardness (as CaCO ₃) | mg/L | (Calculated) | APHA 1030E | 10602 | ALS |
| Conventional variables | pH | pH | 0.1 | APHA 4500-H, 2510, 2320 | 10301 | ALS |
| Conventional variables | Total Dissolved Solids | mg/L | 5 to 10 | APHA 2540 C | 10451 | ALS |
| Conventional variables | Total Organic Carbon | mg/L | 1 | APHA 5310 B-Instrumental | 6001 | ALS |
| Conventional variables | Total Suspended Solids | mg/L | 3 | APHA 2540 D-Gravimetric | 102455 | ALS |
| Conventional variables | True Colour | T.C.U. | 2 | APHA 2120 | 2021 | ALS |
| General Organics | Total Phenolics | mg/L | 0.001 | AB ENV.06537-COLORIMETRIC | 6537 | ALS |
| General Organics | Total Recoverable Hydrocarbons | mg/L | 1 | APHA 5520 C-Tetra Cl Ext Infrared | | ALS |
| Major ions | Bicarbonate (HCO ₃) | mg/L | 5 | APHA 4500-H, 2510, 2320 | 6201 | ALS |
| Major ions | Calcium (Ca) | mg/L | 0.5 | APHA 3120 B-ICP-OES | 104394 | ALS |
| Major ions | Carbonate (CO ₃) | mg/L | 5 | APHA 4500-H, 2510, 2320 | 6301 | ALS |
| Major ions | Chloride (Cl) | mg/L | 0.5 | APHA 4110 B-ION CHROMATOGRAPHY | 99494 | ALS |
| Major ions | Hydroxide (OH) | mg/L | 5 | APHA 4500-H, 2510, 2320 | 8501 | ALS |
| Major ions | Magnesium (Mg) | mg/L | 0.1 | APHA 3120 B-ICP-OES | 104407 | ALS |
| Major ions | Potassium (K) | mg/L | 0.5 | APHA 3120 B-ICP-OES | 104416 | ALS |
| Major ions | Sodium (Na) | mg/L | 1 | APHA 3120 B-ICP-OES | 104423 | ALS |
| Major ions | Sulfate (SO ₄) | mg/L | 0.5 | APHA 4110 B-ION CHROMATOGRAPHY | 98228 | ALS |
| Major ions | Sulphide | mg/L | 0.002 | APHA 4500 -S E-Auto-Colorimetry | 16003 | ALS |

Table D.1-1 (Cont'd.)

| Analyte Category | Analyte | Units | Detection Limit | Analytical Method | VMV Code | Lab |
|-------------------|---------------------------|-------|-----------------|---------------------------------------|----------|------|
| Nutrients and BOD | Ammonia-N | mg/L | 0.05 | APHA4500NH3F Colorimetry | 102626 | ALS |
| Nutrients and BOD | Biochemical Oxygen Demand | mg/L | 2 | APHA 5210 B-5 day Incub.-O2 electrode | 8202 | ALS |
| Nutrients and BOD | Chlorophyll <i>a</i> | µg/L | 0.1 | EPA 445.0 | | ALS |
| Nutrients and BOD | Nitrate | mg/L | 0.05 | APHA 4110 B-ION CHROMATOGRAPHY | | ALS |
| Nutrients and BOD | Nitrate+Nitrite | mg/L | 0.071 | CALCULATION | | ALS |
| Nutrients and BOD | Nitrite | mg/L | 0.05 | APHA 4110 B-ION CHROMATOGRAPHY | 102962 | ALS |
| Nutrients and BOD | Phosphorus, dissolved | mg/L | 0.001 | APHA 4500 P B,E - AUTO-COLORIMETRY | 15113 | ALS |
| Nutrients and BOD | Phosphorus, total | mg/L | 0.001 | APHA 4500 P B,E-Auto-Colorimetry | 15406 | ALS |
| Nutrients and BOD | Total Kjeldahl Nitrogen | mg/L | 0.2 | APHA 4500N-C -Dig.-Auto-Colorimetry | 7012 | ALS |
| Total metals | Aluminum | mg/L | 0.002 | ICPMS by DRC-II ¹ | 103999 | AITF |
| Total metals | Antimony | mg/L | 0.000001 | ICPMS by DRC-II ¹ | 80043 | AITF |
| Total metals | Arsenic | mg/L | 0.00006 | ICPMS by DRC-II ¹ | 80020 | AITF |
| Total metals | Barium | mg/L | 0.0001 | ICPMS by DRC-II ¹ | 80022 | AITF |
| Total metals | Beryllium | mg/L | 0.00001 | ICPMS by DRC-II ¹ | 80023 | AITF |
| Total metals | Bismuth | mg/L | 0.00001 | ICPMS by DRC-II ¹ | 80024 | AITF |
| Total metals | Boron | mg/L | 0.0008 | ICPMS by DRC-II ¹ | 80021 | AITF |
| Total metals | Cadmium | mg/L | 0.000006 | ICPMS by DRC-II ¹ | 80026 | AITF |
| Total metals | Calcium | mg/L | 0.1 | ICPMS by DRC-II ¹ | 80025 | AITF |
| Total metals | Chlorine | mg/L | 0.3 | ICPMS by DRC-II ¹ | 80027 | AITF |
| Total metals | Chromium | mg/L | 0.0003 | ICPMS by DRC-II ¹ | 80029 | AITF |
| Total metals | Cobalt | mg/L | 0.00001 | ICPMS by DRC-II ¹ | 80028 | AITF |
| Total metals | Copper | mg/L | 0.0001 | ICPMS by DRC-II ¹ | 80030 | AITF |
| Total metals | Iron | mg/L | 0.004 | ICPMS by DRC-II ¹ | 80031 | AITF |
| Total metals | Lead | mg/L | 0.000006 | ICPMS by DRC-II ¹ | 80041 | AITF |
| Total metals | Lithium | mg/L | 0.0002 | ICPMS by DRC-II ¹ | 80034 | AITF |
| Total metals | Manganese | mg/L | 0.00003 | ICPMS by DRC-II ¹ | 80036 | AITF |
| Total metals | Mercury | mg/L | 0.00005 | ICPMS by DRC-II ¹ | 80032 | AITF |
| Total metals | Molybdenum | mg/L | 0.000008 | ICPMS by DRC-II ¹ | 80037 | AITF |
| Total metals | Nickel | mg/L | 0.00006 | ICPMS by DRC-II ¹ | 80039 | AITF |
| Total metals | Selenium | mg/L | 0.0002 | ICPMS by DRC-II ¹ | 80044 | AITF |
| Total metals | Silver | mg/L | 0.000005 | ICPMS by DRC-II ¹ | 103998 | AITF |

¹ See attachment "Trace Metal Analysis of Waters by DRC-II (AITF)"

Table D.1-1 (Cont'd.)

| Analyte Category | Analyte | Units | Detection Limit | Analytical Method | VMV Code | Lab |
|------------------|---------------------------|-------|-----------------|------------------------------|----------|------|
| Total metals | Strontium | mg/L | 0.000008 | ICPMS by DRC-II ¹ | 80047 | AITF |
| Total metals | Sulphur | mg/L | 0.6 | ICPMS by DRC-II ¹ | 80042 | AITF |
| Total metals | Thallium | mg/L | 0.000003 | ICPMS by DRC-II ¹ | 80053 | AITF |
| Total metals | Thorium | mg/L | 0.00003 | ICPMS by DRC-II ¹ | 80048 | AITF |
| Total metals | Tin | mg/L | 0.00007 | ICPMS by DRC-II ¹ | 80046 | AITF |
| Total metals | Titanium | mg/L | 0.00007 | ICPMS by DRC-II ¹ | 80049 | AITF |
| Total metals | Uranium | mg/L | 0.000003 | ICPMS by DRC-II ¹ | 80054 | AITF |
| Total metals | Vanadium | mg/L | 0.0002 | ICPMS by DRC-II ¹ | 80055 | AITF |
| Total metals | Zinc | mg/L | 0.0002 | ICPMS by DRC-II ¹ | 80056 | AITF |
| Total metals | Mercury (Hg), ultra-trace | ng/L | 1.2 | ICPMS by DRC-II ¹ | 101979 | AITF |
| Dissolved metals | Aluminum | mg/L | 0.001 | ICPMS by DRC-II ¹ | 103927 | AITF |
| Dissolved metals | Antimony | mg/L | 0.000001 | ICPMS by DRC-II ¹ | 103951 | AITF |
| Dissolved metals | Arsenic | mg/L | 0.00006 | ICPMS by DRC-II ¹ | 103928 | AITF |
| Dissolved metals | Barium | mg/L | 0.0001 | ICPMS by DRC-II ¹ | 103930 | AITF |
| Dissolved metals | Beryllium | mg/L | 0.00001 | ICPMS by DRC-II ¹ | 103931 | AITF |
| Dissolved metals | Bismuth | mg/L | 0.00001 | ICPMS by DRC-II ¹ | 103932 | AITF |
| Dissolved metals | Boron | mg/L | 0.0008 | ICPMS by DRC-II ¹ | 103929 | AITF |
| Dissolved metals | Cadmium | mg/L | 0.000006 | ICPMS by DRC-II ¹ | 103934 | AITF |
| Dissolved metals | Calcium | mg/L | 0.1 | ICPMS by DRC-II ¹ | 103933 | AITF |
| Dissolved metals | Chlorine | mg/L | 0.3 | ICPMS by DRC-II ¹ | 103935 | AITF |
| Dissolved metals | Chromium | mg/L | 0.0003 | ICPMS by DRC-II ¹ | 103937 | AITF |
| Dissolved metals | Cobalt | mg/L | 0.00001 | ICPMS by DRC-II ¹ | 103936 | AITF |
| Dissolved metals | Copper | mg/L | 0.0001 | ICPMS by DRC-II ¹ | 103938 | AITF |
| Dissolved metals | Iron | mg/L | 0.004 | ICPMS by DRC-II ¹ | 103939 | AITF |
| Dissolved metals | Lead | mg/L | 0.000006 | ICPMS by DRC-II ¹ | 103949 | AITF |
| Dissolved metals | Lithium | mg/L | 0.0002 | ICPMS by DRC-II ¹ | 103942 | AITF |
| Dissolved metals | Manganese | mg/L | 0.00003 | ICPMS by DRC-II ¹ | 103944 | AITF |
| Dissolved metals | Mercury | mg/L | 0.00005 | ICPMS by DRC-II ¹ | 103940 | AITF |
| Dissolved metals | Molybdenum | mg/L | 0.000008 | ICPMS by DRC-II ¹ | 103945 | AITF |
| Dissolved metals | Nickel | mg/L | 0.00006 | ICPMS by DRC-II ¹ | 103947 | AITF |
| Dissolved metals | Selenium | mg/L | 0.0002 | ICPMS by DRC-II ¹ | 103952 | AITF |
| Dissolved metals | Silver | mg/L | 0.000005 | ICPMS by DRC-II ¹ | 103926 | AITF |
| Dissolved metals | Strontium | mg/L | 0.000008 | ICPMS by DRC-II ¹ | 103955 | AITF |

¹ See attachment "Trace Metal Analysis of Waters by DRC-II (AITF)"

Table D.1-1 (Cont'd.)

| Analyte Category | Analyte | Units | Detection Limit | Analytical Method | VMV Code | Lab |
|------------------|--------------------------------------|-------|-----------------|--|----------|------------|
| Dissolved metals | Sulphur | mg/L | 0.6 | ICPMS by DRC-II ¹ | 103950 | AITF |
| Dissolved metals | Thallium | mg/L | 0.000003 | ICPMS by DRC-II ¹ | 103958 | AITF |
| Dissolved metals | Thorium | mg/L | 0.00003 | ICPMS by DRC-II ¹ | 103956 | AITF |
| Dissolved metals | Tin | mg/L | 0.00007 | ICPMS by DRC-II ¹ | 103954 | AITF |
| Dissolved metals | Titanium | mg/L | 0.00007 | ICPMS by DRC-II ¹ | 103957 | AITF |
| Dissolved metals | Uranium | mg/L | 0.000003 | ICPMS by DRC-II ¹ | 103959 | AITF |
| Dissolved metals | Vanadium | mg/L | 0.0002 | ICPMS by DRC-II ¹ | 103960 | AITF |
| Dissolved metals | Zinc | mg/L | 0.0002 | ICPMS by DRC-II ¹ | 103961 | AITF |
| General Organics | Naphthenic Acids | mg/L | 0.02 | electron-trap GC/MS | | AITF |
| Toxicity | Algal Growth Inhibition Test (72 h) | % | - | Biological test method: Growth Inhibition test using a freshwater alga <i>Pseudokirchneriella subcapitata</i> (formerly <i>Selenastrum capricornutum</i>). Environment Canada, EPS 1/RM/25, 2nd Edition, March 2007 | | Hydro Qual |
| Toxicity | Ceriodaphnia 6-day survival test | % | - | Biological test method: Test of reproduction and survival using the cladoceran <i>Ceriodaphnia dubia</i> , 2007. Environment Canada, EPS 1/RM/21 | | Hydro Qual |
| Toxicity | Ceriodaphnia 6-day reproduction test | % | - | Biological test method: Test of reproduction and survival using the cladoceran <i>Ceriodaphnia dubia</i> , 2007. Environment Canada, EPS 1/RM/21 | | Hydro Qual |
| Toxicity | Fathead minnow 7-d survival test | % | - | Biological test method: Test of larval growth and survival using fathead minnows, 1992. Environment Canada, EPS 1/RM/22. (amended September 2008). | | Hydro Qual |
| Toxicity | Fathead minnow 7-d growth test | % | - | Biological test method: Test of larval growth and survival using fathead minnows, 1992. Environment Canada, EPS 1/RM/22. (amended September 2008). | | Hydro Qual |

¹ See attachment "Trace Metal Analysis of Waters by DRC-II (AITF)"

D.2 REGIONAL *BASELINE* RANGE CALCULATIONS

As described in detail in Section 3 of this report, one method used in RAMP to screen water quality data against a defined range of natural variability involves the definition and application of data ranges that describe regional conditions in RAMP *baseline* stations. Additional information is provided in this appendix to support that analysis.

Identification of groups of stations exhibiting similar water quality began with data screening, which included the following:

1. Using only fall data (to control for any effects of seasonality on data groupings);
2. Using data from 2002 to 2010 only (to ensure consistent [low] detection limits for total and dissolved metals within the dataset);
3. Excluding data for lakes (to address a stated concern of the RAMP 2010 Peer Review [AITF 2011] about combining data from lotic and lentic systems);
4. Excluding total nitrogen data (because it is calculated from other variables included in the analysis);
5. Excluding naphthenic acids data (because of historical changes in methods and uncertainty regarding current methods applied in 2009 and 2010, as well as because of a high proportion of non-detectable values from 2002 to 2008);
6. Removing total metals that are significantly ($p < 0.05$) co-linear with their dissolved counterparts (to ensure that these metals were not over-weighted in the analysis; this resulted in the use of dissolved values only for 11 metals, including barium, boron, calcium, chlorine, lithium, mercury, molybdenum, nickel, strontium, sulphur and uranium);
7. Excluding analytes that had greater than 50% of their values non-detect (to reduce the influence of non-detectable values on measured variability within the dataset); and
8. Removing analytes that were missing more than 15% of their data (to reduce the influence of missing data on measured variability within the dataset).

Data from all stations (*baseline* and *test*) were included in the clustering approach so that stations in watersheds with no *baseline* data could be assigned to appropriate groups for comparison, and to take into consideration the similarity of water quality characteristics of *test* stations with other *baseline* and other *test* stations.

Following data screening, the historical water chemistry dataset included 59 monitoring stations over nine years from 2002 to 2010 (Table D.2-1). A total of 190 station-year combinations were used in the cluster analysis.

Table D.2-1 RAMP water quality stations included in regional baseline data analysis, 2002 to 2010.

| Region | Station | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|-----------------------|-----------|------|------|------|------|------|------|------|------|------|
| Athabasca River | ATR-DC-CC | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | ATR-DC-E | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | ATR-DC-W | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | ATR-DD-CC | ✓ | ✓ | ✓ | ✓ | | | | | |
| | ATR-DD-E | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | ATR-DD-W | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | ATR-ER | | | ✓ | | | | | | |
| | ATR-FC-E | ✓ | ✓ | | | | | | | |
| | ATR-FC-W | ✓ | ✓ | | | | | | | |
| | ATR-FR-CC | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | ATR-MR-E | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | ATR-MR-W | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | ATR-SR-E | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | ATR-SR-W | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Athabasca River Delta | EMR-1 | | ✓ | | | | | | | |
| | ARD-1 | | ✓ | ✓ | | | | | | |
| Eastern Tributaries | FIR-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | FIR-2 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | FOC-1 | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | MCC-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Western Tributaries | BER-1 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | BER-2 | | | | | | | ✓ | ✓ | ✓ |
| | CAR-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | CAR-2 | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | DUR-1 | | | | | | | | ✓ | |
| | ELR-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | ELR-2 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | MAR-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | MAR-2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | MAR-2A | | | | | | | | | ✓ |
| | POC-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | TAR-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | TAR-2 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Southern Tributaries | CHR-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | CHR-2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | CHR-2A | | | | | | ✓ | | | |
| | CLR-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | CLR-2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | HAR-1 | | | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| | HOR-1 | | | | | | | | | ✓ |

Table D.2-1 (Cont'd.)

| Region | Station | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|--------------|-----------------|-------|------|------|------|------|------|------|------|------|
| Muskeg River | IYC-1 | | | | | | ✓ | ✓ | | ✓ |
| | JAC-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | JAC-2 | | | | | | | ✓ | ✓ | ✓ |
| | MUC-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| | MUR-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | MUR-6 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | SHC-1 | | | | | ✓ | ✓ | | ✓ | |
| | STC-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | WAC-1 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Steepbank River | NSR-1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| STR-1 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| STR-2 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| STR-3 | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

D.2.1 Results

Summary of Cluster Characteristics

Cluster analysis was performed on the water quality dataset resulting from the above data screening. The cluster dendrogram (Figure D.2-1), along with knowledge of the area, led to the decision that three clusters would be most appropriate for these data. Individual station-year cluster memberships are summarized in Table D.2-2. The final cluster membership for each station was determined by choosing the most common cluster assignment for that station over time.

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Figure D.2-1 Dendrogram of water quality stations used in the RAMP 2010 water quality analyses.

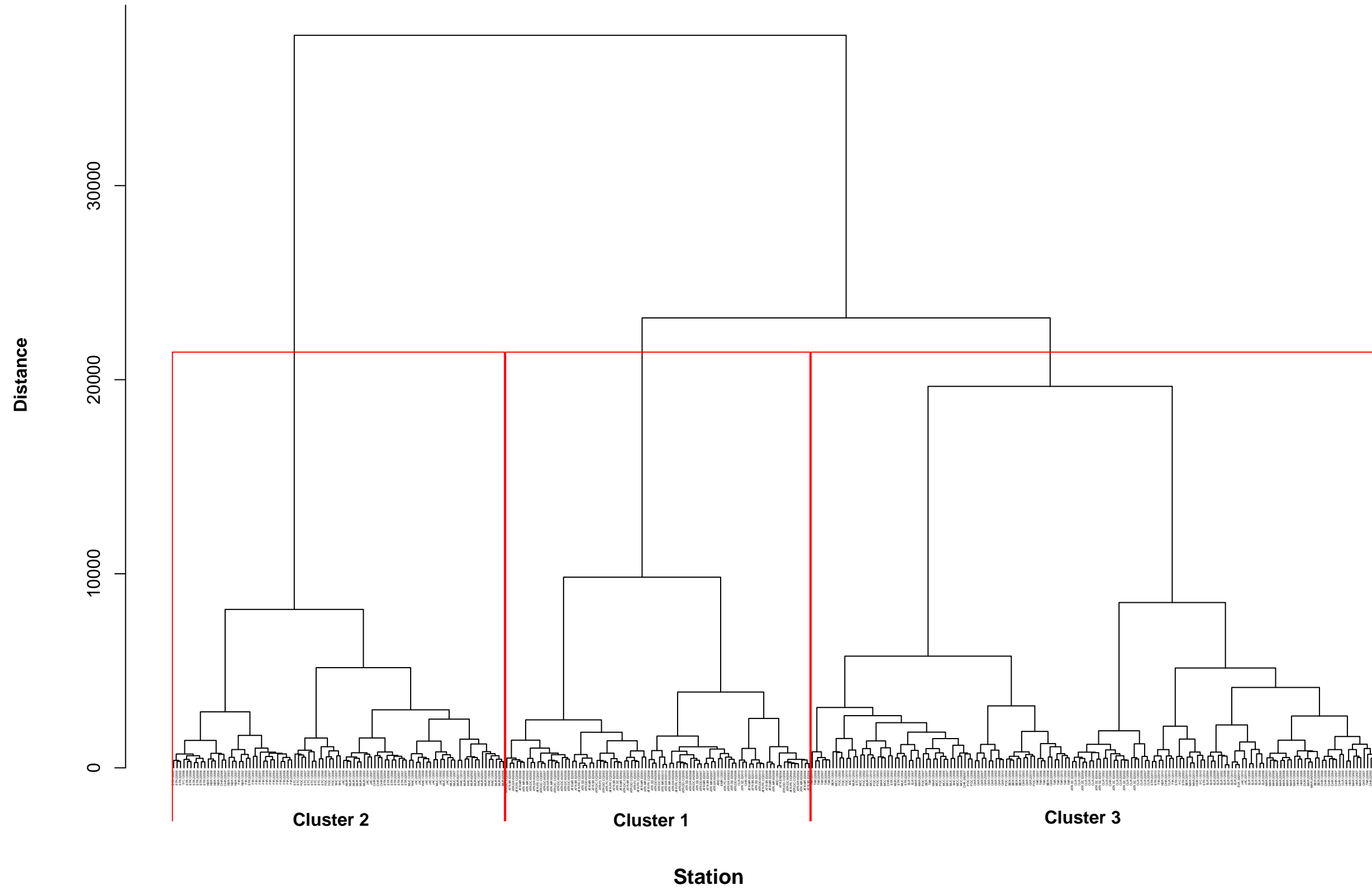


Table D.2-2 Summary of cluster membership by station and year for the water quality dataset.

| Region | Station-Year | Cluster | Region | Station-Year | Cluster |
|-----------|----------------|---------|-------------|----------------|---------|
| Athabasca | ATR-DC-CC-2002 | 1 | Athabasca | ATR-MR-W-2006 | 1 |
| River | ATR-DC-E-2002 | 1 | River | ATR-SR-E-2006 | 1 |
| | ATR-DC-W-2002 | 1 | | ATR-SR-W-2006 | 1 |
| | ATR-DD-CC-2002 | 1 | | ATR-DC-CC-2007 | 1 |
| | ATR-FC-E-2002 | 1 | | ATR-DC-E-2007 | 2 |
| | ATR-FC-W-2002 | 1 | | ATR-DC-W-2007 | 1 |
| | ATR-FR-CC-2002 | 1 | | ATR-DD-E-2007 | 1 |
| | ATR-MR-E-2002 | 1 | | ATR-DD-W-2007 | 1 |
| | ATR-MR-W-2002 | 1 | | ATR-FR-CC-2007 | 1 |
| | ATR-SR-E-2002 | 1 | | ATR-MR-E-2007 | 1 |
| | ATR-SR-W-2002 | 1 | | ATR-MR-W-2007 | 1 |
| | ATR-DC-CC-2003 | 1 | | ATR-SR-E-2007 | 1 |
| | ATR-DC-E-2003 | 2 | | ATR-SR-W-2007 | 1 |
| | ATR-DC-W-2003 | 1 | | ATR-DC-E-2008 | 2 |
| | ATR-DD-CC-2003 | 1 | | ATR-DC-W-2008 | 1 |
| | ATR-FC-E-2003 | 1 | | ATR-DD-E-2008 | 1 |
| | ATR-FC-W-2003 | 1 | | ATR-DD-W-2008 | 1 |
| | ATR-FR-CC-2003 | 1 | | ATR-FR-CC-2008 | 1 |
| | ATR-MR-E-2003 | 1 | | ATR-MR-E-2008 | 1 |
| | ATR-MR-W-2003 | 1 | | ATR-MR-W-2008 | 1 |
| | ATR-SR-E-2003 | 1 | | ATR-SR-E-2008 | 1 |
| | ATR-SR-W-2003 | 1 | | ATR-SR-W-2008 | 1 |
| | EMR-1-2003 | 1 | | ATR-DC-E-2009 | 2 |
| | ATR-DC-CC-2004 | 1 | | ATR-DC-W-2009 | 1 |
| | ATR-DC-E-2004 | 2 | | ATR-DD-E-2009 | 1 |
| | ATR-DC-W-2004 | 1 | | ATR-DD-W-2009 | 1 |
| | ATR-DD-CC-2004 | 1 | | ATR-FR-CC-2009 | 1 |
| | ATR-ER-2004 | 1 | | ATR-MR-E-2009 | 1 |
| | ATR-FR-2004 | 1 | | ATR-MR-W-2009 | 1 |
| | ATR-MR-E-2004 | 1 | | ATR-SR-E-2009 | 1 |
| | ATR-MR-W-2004 | 1 | | ATR-SR-W-2009 | 1 |
| | ATR-SR-E-2004 | 1 | | ATR-DC-E-2010 | 1 |
| | ATR-SR-W-2004 | 1 | | ATR-DC-W-2010 | 1 |
| | ATR-DC-CC-2005 | 1 | | ATR-DD-E-2010 | 1 |
| | ATR-DC-E-2005 | 2 | | ATR-DD-W-2010 | 1 |
| | ATR-DC-W-2005 | 1 | | ATR-FR-CC-2010 | 1 |
| | ATR-DD-CC-2005 | 1 | | ATR-MR-E-2010 | 1 |
| | ATR-DD-E-2005 | 1 | | ATR-MR-W-2010 | 1 |
| | ATR-DD-W-2005 | 1 | | ATR-SR-E-2010 | 1 |
| | ATR-FR-CC-2005 | 1 | | ATR-SR-W-2010 | 1 |
| | ATR-MR-E-2005 | 1 | Athabasca | ARD-1-2003 | 1 |
| | ATR-MR-W-2005 | 1 | Delta | ARD-1-2004 | 1 |
| | ATR-SR-E-2005 | 1 | Eastern | FIR-1-2002 | 3 |
| | ATR-SR-W-2005 | 1 | Tributaries | FIR-2-2002 | 3 |
| | ATR-DC-CC-2006 | 1 | | FOC-1-2002 | 3 |
| | ATR-DC-E-2006 | 2 | | MCC-1-2002 | 2 |
| | ATR-DC-W-2006 | 1 | | FIR-1-2003 | 3 |
| | ATR-DD-E-2006 | 1 | | FIR-2-2003 | 3 |
| | ATR-DD-W-2006 | 1 | | FOC-1-2003 | 2 |
| | ATR-FR-CC-2006 | 1 | | MCC-1-2003 | 2 |
| | ATR-MR-E-2006 | 1 | | FIR-1-2004 | 3 |

Table D.2-2 (Cont'd.)

| Region | Station-Year | Cluster | Region | Station-Year | Cluster |
|-------------|--------------|---------|-------------|--------------|---------|
| Eastern | FIR-2-2004 | 3 | Muskeg | STC-1-2006 | 3 |
| Tributaries | MCC-1-2004 | 2 | River | WAC-1-2006 | 3 |
| | FIR-1-2005 | 3 | | IYC-1-2007 | 2 |
| | FIR-2-2005 | 3 | | JAC-1-2007 | 3 |
| | MCC-1-2005 | 2 | | MUC-1-2007 | 3 |
| | FIR-2-2006 | 3 | | MUR-1-2007 | 3 |
| | FOC-1-2006 | 2 | | MUR-6-2007 | 3 |
| | MCC-1-2006 | 2 | | SHC-1-2007 | 3 |
| | FIR-1-2007 | 3 | | STC-1-2007 | 2 |
| | FIR-2-2007 | 3 | | WAC-1-2007 | 3 |
| | FOC-1-2007 | 3 | | IYC-1-2008 | 3 |
| | MCC-1-2007 | 2 | | JAC-1-2008 | 3 |
| | FIR-1-2008 | 3 | | JAC-2-2008 | 3 |
| | FIR-2-2008 | 3 | | MUC-1-2008 | 3 |
| | FOC-1-2008 | 3 | | MUR-1-2008 | 3 |
| | MCC-1-2008 | 2 | | MUR-6-2008 | 3 |
| | FIR-1-2009 | 3 | | STC-1-2008 | 3 |
| | FIR-2-2009 | 3 | | WAC-1-2008 | 3 |
| | FOC-1-2009 | 3 | | JAC-1-2009 | 3 |
| | MCC-1-2009 | 2 | | JAC-2-2009 | 3 |
| | FIR-1-2010 | 2 | | MUR-1-2009 | 3 |
| | FIR-2-2010 | 2 | | MUR-6-2009 | 3 |
| | FOC-1-2010 | 3 | | SHC-1-2009 | 3 |
| | MCC-1-2010 | 2 | | STC-1-2009 | 3 |
| Muskeg | JAC-1-2002 | 3 | | WAC-1-2009 | 3 |
| River | MUC-1-2002 | 3 | | IYC-1-2010 | 2 |
| | MUR-1-2002 | 3 | | JAC-1-2010 | 2 |
| | MUR-6-2002 | 3 | | JAC-2-2010 | 2 |
| | STC-1-2002 | 3 | | MUR-1-2010 | 2 |
| | JAC-1-2003 | 3 | | MUR-6-2010 | 3 |
| | MUC-1-2003 | 3 | | STC-1-2010 | 3 |
| | MUR-1-2003 | 3 | | WAC-1-2010 | 3 |
| | MUR-6-2003 | 3 | Southern | CHR-1-2002 | 2 |
| | STC-1-2003 | 3 | Tributaries | CHR-2-2002 | 3 |
| | JAC-1-2004 | 3 | | CLR-1-2002 | 2 |
| | MUC-1-2004 | 2 | | CLR-2-2002 | 2 |
| | MUR-1-2004 | 2 | | CHR-1-2003 | 2 |
| | MUR-6-2004 | 3 | | CHR-2-2003 | 3 |
| | STC-1-2004 | 3 | | CLR-1-2003 | 2 |
| | WAC-1-2004 | 3 | | CLR-2-2003 | 2 |
| | JAC-1-2005 | 3 | | CHR-1-2004 | 2 |
| | MUC-1-2005 | 3 | | CLR-1-2004 | 2 |
| | MUR-1-2005 | 3 | | CLR-2-2004 | 2 |
| | MUR-6-2005 | 3 | | HAR-1-2004 | 2 |
| | STC-1-2005 | 3 | | CHR-1-2005 | 2 |
| | WAC-1-2005 | 3 | | CHR-2-2005 | 2 |
| | JAC-1-2006 | 3 | | CLR-1-2005 | 2 |
| | MUC-1-2006 | 2 | | CLR-2-2005 | 2 |
| | MUR-1-2006 | 3 | | HAR-1-2005 | 2 |
| | MUR-6-2006 | 3 | | CHR-1-2006 | 2 |
| | SHC-1-2006 | 2 | | CHR-2-2006 | 3 |

Table D.2-2 (Cont'd.)

| Region | Station-Year | Cluster | Region | Station-Year | Cluster | |
|-------------------------|--------------------|------------|------------|--------------|------------|---|
| Southern Tributaries | CLR-1-2006 | 2 | | STR-3-2009 | 3 | |
| | CLR-2-2006 | 2 | | NSR-1-2010 | 2 | |
| | HAR-1-2006 | 2 | | STR-1-2010 | 2 | |
| | CHR-1-2007 | 2 | | STR-2-2010 | 2 | |
| | CHR-2-2007 | 3 | | STR-3-2010 | 2 | |
| | CHR-2A-2007 | 2 | | Western | CAR-1-2002 | 2 |
| | CLR-1-2007 | 2 | | Tributaries | ELR-1-2002 | 2 |
| | CLR-2-2007 | 2 | | | MAR-1-2002 | 2 |
| | HAR-1-2007 | 2 | | | MAR-2-2002 | 2 |
| | CHR-1-2008 | 2 | | | POC-1-2002 | 2 |
| | CHR-2-2008 | 2 | | | TAR-1-2002 | 2 |
| | CLR-1-2008 | 2 | | | BER-1-2003 | 2 |
| | CLR-2-2008 | 2 | | | CAR-1-2003 | 2 |
| | HAR-1-2008 | 2 | | | ELR-1-2003 | 2 |
| | CHR-1-2009 | 2 | | | MAR-1-2003 | 2 |
| | CHR-2-2009 | 3 | | | MAR-2-2003 | 2 |
| | CLR-1-2009 | 2 | | | POC-1-2003 | 2 |
| | CLR-2-2009 | 2 | | | TAR-1-2003 | 2 |
| | HOR-1-2009 | 2 | | | BER-1-2004 | 2 |
| | CHR-1-2010 | 1 | | | CAR-1-2004 | 2 |
| | CHR-2-2010 | 2 | | | ELR-1-2004 | 2 |
| | CLR-1-2010 | 2 | | | ELR-2-2004 | 2 |
| | CLR-2-2010 | 1 | | | MAR-1-2004 | 2 |
| | Steepbank River | NSR-1-2002 | 3 | | MAR-2-2004 | 2 |
| | | STR-1-2002 | 2 | | POC-1-2004 | 2 |
| | | STR-2-2002 | 3 | | TAR-1-2004 | 2 |
| | | NSR-1-2003 | 3 | | TAR-2-2004 | 2 |
| STR-1-2003 | | 2 | BER-1-2005 | | 2 | |
| STR-2-2003 | | 2 | CAR-1-2005 | | 2 | |
| NSR-1-2004 | | 3 | CAR-2-2005 | | 2 | |
| STR-1-2004 | | 2 | ELR-1-2005 | | 2 | |
| STR-2-2004 | | 2 | ELR-2-2005 | | 2 | |
| STR-3-2004 | | 3 | MAR-1-2005 | | 2 | |
| NSR-1-2005 | | 3 | MAR-2-2005 | 2 | | |
| STR-1-2005 | | 3 | POC-1-2005 | 2 | | |
| STR-2-2005 | | 3 | TAR-1-2005 | 2 | | |
| STR-3-2005 | | 3 | TAR-2-2005 | 2 | | |
| NSR-1-2006 | | 3 | CAR-2-2006 | 2 | | |
| STR-1-2006 | | 3 | ELR-1-2006 | 2 | | |
| STR-2-2006 | | 3 | ELR-2-2006 | 2 | | |
| STR-3-2006 | | 3 | MAR-1-2006 | 2 | | |
| NSR-1-2007 | | 3 | MAR-2-2006 | 2 | | |
| STR-1-2007 | | 3 | POC-1-2006 | 2 | | |
| STR-2-2007 | | 3 | TAR-1-2006 | 2 | | |
| STR-3-2007 | | 3 | TAR-2-2006 | 2 | | |
| NSR-1-2008 | | 3 | BER-1-2007 | 2 | | |
| STR-1-2008 | | 3 | CAR-1-2007 | 2 | | |
| STR-2-2008 | | 3 | CAR-2-2007 | 2 | | |
| STR-3-2008 | | 3 | ELR-1-2007 | 2 | | |
| NSR-1-2009 | | 3 | ELR-2-2007 | 2 | | |
| STR-1-2009 | 3 | MAR-1-2007 | 2 | | | |
| STR-2-2009 | 3 | MAR-2-2007 | 2 | | | |

Table D.2-2 (Cont'd.)

| Region | Station-Year | Cluster |
|--------|--------------|---------|
| | POC-1-2007 | 2 |
| | TAR-1-2007 | 2 |
| | TAR-2-2007 | 2 |
| | BER-1-2008 | 2 |
| | BER-2-2008 | 2 |
| | CAR-1-2008 | 2 |
| | CAR-2-2008 | 2 |
| | ELR-1-2008 | 2 |
| | ELR-2-2008 | 2 |
| | MAR-1-2008 | 2 |
| | MAR-2-2008 | 2 |
| | POC-1-2008 | 2 |
| | TAR-1-2008 | 2 |
| | TAR-2-2008 | 2 |
| | BER-1-2009 | 2 |
| | BER-2-2009 | 2 |
| | CAR-1-2009 | 2 |
| | CAR-2-2009 | 2 |
| | DUR-1-2009 | 2 |
| | ELR-1-2009 | 2 |
| | ELR-2-2009 | 2 |
| | MAR-1-2009 | 2 |
| | MAR-2-2009 | 2 |
| | MAR-2A-2009 | 2 |
| | POC-1-2009 | 2 |
| | TAR-1-2009 | 2 |
| | TAR-2-2009 | 2 |
| | BER-1-2010 | 2 |
| | BER-2-2010 | 2 |
| | CAR-1-2010 | 2 |
| | CAR-2-2010 | 2 |
| | ELR-1-2010 | 2 |
| | ELR-2-2010 | 2 |
| | ELR-2A-2010 | 2 |
| | MAR-1-2010 | 2 |
| | MAR-2-2010 | 2 |
| | POC-1-2010 | 2 |
| | TAR-1-2010 | 2 |
| | TAR-2-2010 | 2 |

D.3 CORRELATIONS AMONG WATER QUALITY VARIABLES

Analyte data were correlated with each other to better understand the qualities of each cluster. Data from 2002 to 2010, by cluster, were correlated using Spearman's rank correlation. Only correlations that were significant ($p < 0.05$) are reported (Table D.3-1 to Table D.3-6). These correlations are discussed further in Section 6.

Table D.3-1 Significant correlations (Spearman's rank, r_s) between water quality variables in the RAMP water quality data set, 2002 to 2010: Cluster 1 stations (Athabasca River and Delta).

Non-bold values indicate significant correlation ($p < 0.05$); bold values indicate highly significant correlation ($p < 0.01$); Positive correlations are green (underline=strong, $r_s > 0.75$, no underline=moderate, $0.50 < r_s < 0.75$); Negative correlations are red (underline=strong, $r_s > 0.75$, no underline=moderate, $0.50 < r_s < 0.75$).

| | Conductivity | pH | Total alkalinity | Carbonate (CO ₃) | Bicarbonate (HCO ₃) | Calcium (Ca) | Magnesium (Mg) | Potassium (K) | Sodium (Na) | Hardness (as CaCO ₃) | Chloride (Cl) | Sulphate (SO ₄) | Sulphide | TSS | TDS | TOC | DOC | BOD | True colour | Chlorophyll a | Total N | Total phenolics | Ammonia-N | Nitrate+Nitrite | Total Kjeldahl N | Dissolved P | Total P | Naphthenic acids | Total Rec. Hydroc. | Dissolved Al | Dissolved Sb | Dissolved As | Dissolved Ba | Dissolved Be | Dissolved Bi | Dissolved B | Dissolved Cd | Dissolved Ca | Dissolved Cl | Dissolved Cr | Dissolved Co | Dissolved Cu | Dissolved Fe | Dissolved Pb | Dissolved Li | Dissolved Mn | Dissolved Hg | | | | | |
|----------------------------------|--------------|----|------------------|------------------------------|---------------------------------|--------------|----------------|---------------|--------------|----------------------------------|---------------|-----------------------------|----------|-----|-----|-----|-----|-----|-------------|---------------|---------|-----------------|-----------|-----------------|------------------|-------------|---------|------------------|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--|--|--|--|--|
| Conductivity | | | 0.4 | 0.394 | 0.391 | 0.472 | 0.452 | 0.595 | 0.465 | 0.521 | 0.64 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | | | 0.349 | 0.331 | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total alkalinity | | | 0.349 | 0.331 | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Carbonate (CO ₃) | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bicarbonate (HCO ₃) | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calcium (Ca) | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Magnesium (Mg) | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Potassium (K) | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sodium (Na) | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hardness (as CaCO ₃) | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chloride (Cl) | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sulphate (SO ₄) | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sulphide | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TSS | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TDS | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOC | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DOC | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BOD | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| True colour | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chlorophyll a | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total N | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total phenolics | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ammonia-N | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nitrate+Nitrite | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Kjeldahl N | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved P | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total P | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Naphthenic acids | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Rec. Hydroc. | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved Al | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved Sb | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved As | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved Ba | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved Be | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved Bi | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved B | | | | | <u>0.995</u> | 0.691 | 0.506 | | | 0.665 | | | 0.329 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved Cd | | | | | <u>0.995</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Table D.3-4 (Cont'd.)

| | Disolved Hg | Disolved Mo | Disolved Ni | Disolved Se | Disolved Ag | Disolved Sr | Disolved S | Disolved TI | Disolved Th | Disolved Sn | Disolved TI | Disolved U | Disolved V | Disolved Zn | Total Al | Total Sb | Total As | Total Ba | Total Be | Total Bi | Total B | Total Cd | Total Ca | Total Cl | Total Cr | Total Co | Total Cu | Total Fe | Total Pb | Total U | Total Mg | Total Mn | Total Hg | Total Hg, ultra-trace | Total Mo | Total Ni | Total N | Total K | Total Se | Total Ag | Total Na | Total Sr | Total S | Total TI | Total Th | Total Sn | Total TI | Total U | Total V | Total Zn |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|-------------|-------------|-------------|-------------|------------|------------|-------------|----------|----------|----------|----------|----------|----------|---------|----------|----------|----------|----------|----------|----------|----------|----------|---------|----------|----------|----------|-----------------------|----------|----------|---------|---------|----------|----------|----------|----------|---------|----------|----------|----------|----------|---------|---------|----------|
| Conductivity | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| pH | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Total alkalinity | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Carbonate (CO ₃) | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Bicarbonate (HCO ₃) | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Hydroxide (OH) | 32 | 32 | 32 | 32 | 32 | 32 | 27 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 32 | 32 | 32 | 32 | 32 | 35 | 0 | 32 | 32 | 0 | 32 | 27 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | |
| Calcium (Ca) | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Magnesium (Mg) | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Potassium (K) | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Sodium (Na) | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Hardness (as CaCO ₃) | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Chloride (Cl) | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Sulphate (SO ₄) | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Sulphide | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| TSS | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| TDS | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| TOC | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| DOC | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| BOD | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| True colour | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Chlorophyll a | 13 | 13 | 13 | 13 | 13 | 13 | 9 | 13 | 9 | 9 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 9 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 9 | 13 | 13 | 14 | 4 | 13 | 13 | 4 | 13 | 9 | 13 | 9 | 13 | 13 | 13 | 13 | 13 | 13 | | |
| Total phenolics | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Ammonia-N | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Nitrate | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 0 | 6 | 6 | 6 | 6 | 6 | 6 | 0 | 6 | 6 | 0 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Nitrite | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 0 | 6 | 6 | 6 | 6 | 6 | 6 | 0 | 6 | 6 | 0 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Nitrate+Nitrite | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Total Kjeldahl N | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Dissolved P | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Total P | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Naphthenic acids | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Total Rec. Hydroc. | 36 | 36 | 36 | 36 | 36 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 32 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 4 | 36 | 36 | 32 | 36 | 36 | 39 | 4 | 36 | 36 | 4 | 36 | 27 | 36 | 32 | 32 | 36 | 36 | 36 | 36 | 36 |
| Dissolved Al | 38 | 38 | 38 | 38 | 38 | 38 | 28 | 38 | 34 | 34 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 34 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 4 | 38 | 38 | 34 | 38 | 38 | 36 | 4 | 38 | 38 | 4 | 38 | 28 | 38 | 34 | 34 | 38 | 38 | 38 | 38 | 38 |
| Dissolved Sb | 38 | 38 | 38 | 38 | 38 | 38 | 28 | 38 | 34 | 34 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 34 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 4 | 38 | 38 | 34 | 38 | 38 | 36 | 4 | 38 | 38 | 4 | 38 | 28 | 38 | 34 | 34 | 38 | 38 | 38 | 38 | 38 |
| Dissolved As | 38 | 38 | 38 | 38 | 38 | 38 | 28 | 38 | 34 | 34 | 38 | 38 | 38 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Table D.3-5 (Cont'd.)

| | Dissolved Mo | Dissolved Ni | Dissolved Se | Dissolved Ag | Dissolved Sr | Dissolved S | Dissolved Tl | Dissolved Th | Dissolved Sn | Dissolved Tl | Dissolved U | Dissolved V | Dissolved Zn | Total Al | Total Sb | Total As | Total Ba | Total Be | Total Bi | Total B | Total Cd | Total Ca | Total Cl | Total Cr | Total Co | Total Cu | Total Fe | Total Pb | Total Li | Total Mg | Total Mn | Total Hg | Total Hg, ultra-trace | Total Mo | Total Ni | Total N | Total K | Total Se | Total Ag | Total Na | Total Sr | Total S | Total Tl | Total Th | Total Sn | Total Tl | Total U | Total V | Total Zn | |
|----------------------------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|--------------|--------------|--------------|-------------|-------------|--------------|----------|----------|----------|----------|----------|----------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------------------|----------|----------|---------|---------|----------|----------|----------|----------|---------|----------|----------|----------|----------|---------|---------|----------|----|
| Conductivity | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | |
| pH | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Total alkalinity | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Carbonate (CO ₃) | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Bicarbonate (HCO ₃) | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Hydroxide (OH) | 42 | 42 | 42 | 42 | 42 | 37 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 44 | 0 | 42 | 42 | 0 | 42 | 42 | 0 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | |
| Calcium (Ca) | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Magnesium (Mg) | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Potassium (K) | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Sodium (Na) | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Hardness (as CaCO ₃) | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Chloride (Cl) | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Sulphate (SO ₄) | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Sulphide | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| TSS | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| TDS | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| TOC | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| DOC | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| BOD | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| True colour | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Chlorophyll a | 14 | 14 | 14 | 14 | 14 | 8 | 14 | 8 | 8 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 8 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 6 | 14 | 14 | 6 | 14 | 14 | 8 | 14 | 8 | 14 | 14 | 14 | 14 | 14 | |
| Total phenolics | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Ammonia-N | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Nitrate | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 13 | 0 | 12 | 12 | 0 | 12 | 12 | 0 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| Nitrite | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 13 | 0 | 12 | 12 | 0 | 12 | 12 | 0 | 12 | 12 | 12 | 12 | 12 | 12 | |
| Nitrate+Nitrite | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Total Kjeldahl N | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Dissolved P | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Total P | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Naphthenic acids | 49 | 49 | 49 | 49 | 49 | 38 | 49 | 43 | 43 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 43 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 6 | 49 | 49 | 43 | 49 | 49 | 50 | 6 | 49 | 49 | 6 | 49 | 49 | 38 | 49 | 43 | 43 | 49 | 49 | 49 | 49 |
| Total Rec. Hydroc. | 48 | 48 | 48 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 6 | 48 | 48 | 42 | 48 | 48 | 50 | 6 | 48 | 48 | 6 | 48 | 48 | 37 | 48 | 42 | 42 | 48 | 48 | 48 | 48 |
| Dissolved Al | 50 | 50 | 50 | 50 | 50 | 38 | 50 | 44 | 44 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 44 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 44 | 50 | 50 | 48 | 6 | 50 | 50 | 6 | 50 | 50 | 38 | 50 | 44 | 44 | 50 | 50 | 50 | 50 |
| Dissolved Sb | 50 | 50 | 50 | 50 | 50 | 38 | 50 | 44 | 44 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 44 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 44 | 50 | 50 | 48 | 6 | 50 | 50 | 6 | 50 | 50 | 38 | 50 | 44 | 44 | 50 | 50 | 50 | 50 |
| Dissolved As | 50 | 50 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Appendix E

**Benthic Invertebrate
Communities and
Sediment Quality Component**

E BENTHIC INVERTEBRATE COMMUNITIES AND SEDIMENT QUALITY COMPONENT

E.1 BENTHIC INVERTEBRATES COMMUNITIES COMPONENT

The objective of this appendix is to provide technical details on laboratory methods used for the processing and identification of the benthic samples, and further details regarding the calculation of regional *baseline* ranges. This appendix also documents the calculations used to estimate the *baseline* range of variability for benthic invertebrate community measurement endpoints that were used in Section 5 as a measure against which to assess the significance of temporal trends in *test* reaches.

E.1.1 Benthic invertebrate sample processing procedures

E.1.1.1 Laboratory Methods

In preparation for laboratory processing, samples were checked upon arrival at the laboratory to ensure that they were adequately sealed, labeled and that the preservative had effectively penetrated the entire sample. Samples were then rinsed of the residual fine debris and preservative (provided the sample had been exposed to formalin for a minimum of 72 hours). Samples were either sorted immediately, or transferred to 80% ethanol, prior to sorting and taxonomic work. After sorting and identification, freshwater macro-invertebrates were stored in a solution of 70 to 80% ethanol and 5% glycerin in vials or jars with airtight lids.

To expedite the sorting process, samples with large pieces of organic matter were divided in the laboratory into appropriate size fractions. The most commonly used fractions were coarse (> 1.00 mm) and fine (250 µm - 1.00 mm), which corresponded to the divisions used to define coarse and fine particulate organic matter (CPOM and FPOM), respectively. Where there were very large pieces of organic material or large invertebrates, they were separated from the rest of the sample with a 4-mm sieve. All fractions were sorted. If warranted by large numbers of organisms, the fractions were sub-sampled (as described below). After the initial washing and fractionation of samples, the invertebrates were sorted from the debris by trained technicians on a gridded tray or petri dish under a dissecting microscope at 10X to 20X magnification. Samples that contained large amounts of debris or large numbers of animals were further sub-sampled as per Figure E.2-1.

E.1.1.2 Coarse Fraction

The coarse fraction (contents of the 2-mm and 1-mm sieves) was transferred into individual containers and 70% alcohol added, prior to sorting. At least ¼ of the coarse fraction was sorted, with the amount of material sorted determined either by volume or weight.

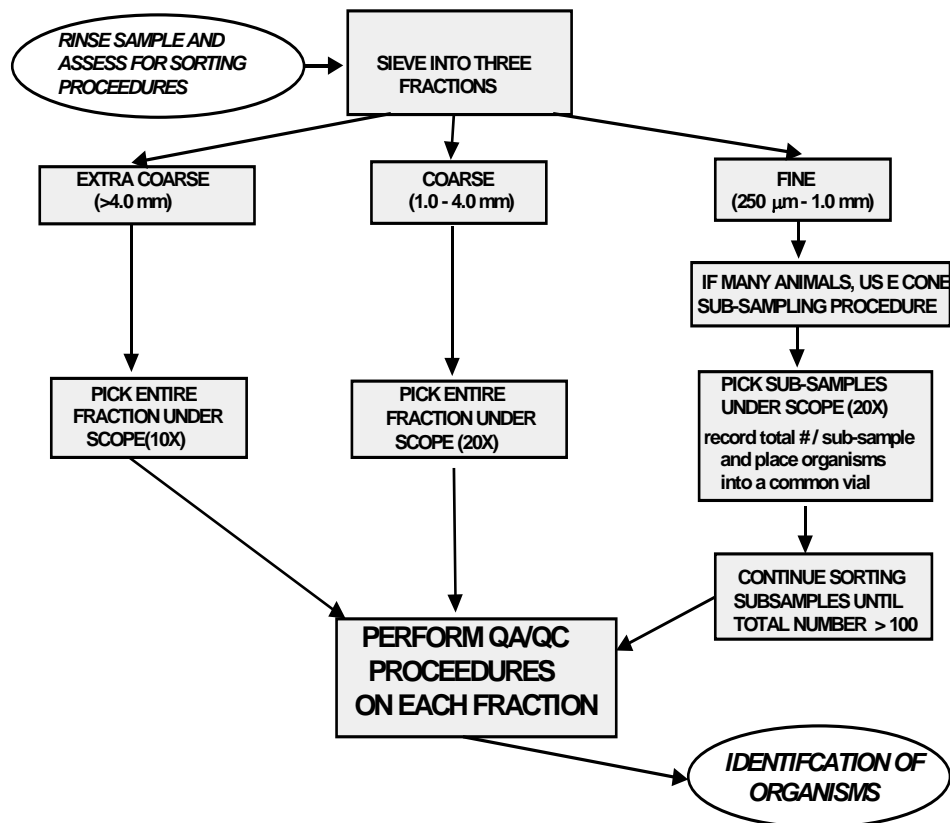
E.1.1.3 Fine Fraction

The fine fraction (contents of 0.180-mm sieve) was transferred into a 2-L container for decanting. Warm water was added to the 2-L container, swirled and decanted to mobilize organic material into a 0.180 mm sieve. This was repeated until all organic material was washed out of the sand. The sand was scanned under magnifying glass for heavy-shelled or stone-cased animals.

When there was a lot of organic material in the fine fractions and/or large numbers of organisms, a sub-sampling of the fine fractions was done as described below.

The fine fraction was sorted in its entirety when possible. When there were large amounts of the fine fraction, the material was sub-sampled using an Imhoff Cone and bubbler (Wrona *et al.* 1982). Either ¼ of the sample was sorted, or at least 100 animals were removed from the debris. The fine fraction was stained with haematoxylin or rose Bengal to improve sorting.

Figure E.2-1 Benthic invertebrate sorting and sub-sampling protocol, applicable for samples with large detrital material and large numbers of small organisms.



Note: This is an illustrative example only, which should be modified as necessary for station-specific samples.

E.1.1.4 Identification

Invertebrates were identified using recognized taxonomic keys (Brooks and Kelton 1967, Teskey 1969, Edmunds *et al.* 1976, Oliver and Roussel 1983, Currie 1986, Wiederholm 1986, McCafferty and Randolph 1988, Stewart and Stark 1988, Brinkhurst 1989, Pennak 1989, Clifford 1991, Merritt and Cummins 1996, Westfall and May 1996, Wiggins 1996, Zloty and Pritchard 1997, Epler 2001). Animals were identified to the lowest practical level, typically genus with the exception of Oligochaeta, which were identified to family (see Table E.2-1). Small, early-instar or damaged specimens were identified to the lowest level possible, generally to family.

Table E.2-1 Level of taxonomic identification.

| Group | Level |
|--------------|---------------------|
| Nematoda | Phylum |
| Oligochaeta | Family |
| Gastropoda | Genus/Species |
| Turbellaria | Family |
| Hirudinea | Species |
| Mollusca | Genus/Species |
| Hydracarina | Leave at this level |
| Cladocera | Leave at this level |
| Copepoda | Order |
| Ostracoda | Leave at this level |
| Amphipoda | Genus |
| Insecta | Genus/Species |
| Terrestrial | Leave at this level |

Organisms that require detailed microscopic examination for identification (e.g., Chironomidae and Oligochaeta) were mounted onto microscope slides using an appropriate mounting media (e.g., Canada balsam, Permount, Hohers's). The most common species that were distinguishable on the basis of gross morphology were mounted less frequently as double checks. All rare or less commonly occurring species are mounted for identification.

E.1.2 Calculating *Baseline* Ranges

Though rigorous analyses of variance can be used to test for changes from oil sands operations by comparison of *test* watercourses to those that are not, the RAMP design has considerable statistical power, and thus the potential to detect changes that are negligible. The variability observed in regional *baseline* locations can be used to set observed changes into context, as per Kilgour *et al.* (1998). Watercourses were classified as erosional or depositional river reaches, or a lake, and then the "*baseline* range of variability" was calculated for *baseline* watercourses within each of those habitat types. Observed variations in *test* watercourses were then compared to the observed ranges for *baseline* watercourses.

As in the main section of the report, the following measurement endpoints were calculated:

- Total abundance (No. individuals/m²);
- Richness (number of distinct taxa);
- Simpson's Diversity;
- Evenness; and
- % EPT (percent of the fauna as Ephemeroptera, Plecoptera and Trichoptera).

Baseline ranges for abundance, richness, diversity, evenness, and percent EPT were derived based on habitat type (erosional, depositional, lake) and are provided in the relevant figures for each reach or lake in the main body of the report.

Correspondence Analysis (CA), a multivariate ordination procedure, was also used to make comparisons between *baseline* and *test* reaches. CA orders such that a bi-plot of reach scores represents the similarities among reaches. Reaches close together in the bi-plots have similar fauna, while reaches far apart tend to have fewer similarities in their fauna. CA also orders the taxa, and a bi-plot of taxa can be overlain over the bi-plots of reaches. The position of taxa in the bi-plots indicates, roughly, the samples in which taxa are most abundant. The CA was generated using the data from both *baseline* and *test* watercourses. Separate analyses were performed for depositional river reaches, erosional river reaches, and for lakes, on the basis that those three habitat classes contained very different types of benthic invertebrates as determined from analyses from previous years. Differences in composition among those three basic habitat types were borne out again this year.

With CA, the configuration of ordination diagrams tends to be sensitive to rare taxa (Gauch 1982). Therefore, the taxonomy was summarized to family level identifications and only those taxa (i.e., families) found in at least 10% of samples from a system were retained for the analysis. Taxa abundances were log-transformed prior to analysis. The CA was conducted using an Excel add-in (Bi-plot 1.1; Lipkovich and Smith 2002).

The ordination was carried out using data for all available samples. Average CA axis scores were then computed for each reach (or lake) – year combination. CA annual-average axis scores were illustrated in a bi-plot, with a 95% confidence ellipse around the *baseline* data. Reaches that fall outside the ellipse for the *baseline* watercourses could be considered to be unusual and that may be considered evidence of a change (Kilgour *et al.* 1998).

Baseline data were identified for lake and river habitats. The *baseline* range of variability was non-parametrically computed as the range of values that included the 5th and 95th percentiles for each of abundance, number of taxa, diversity, evenness and percent EPT for each of lake, erosional river and depositional river habitats (similar to what is done with the water quality data; see Figure E.3-1). The ordination axis scores were treated somewhat differently. The *baseline* range of variability was depicted as an ellipse in a bi-plot of the first two CA axes with the *baseline* range being defined parametrically as the region enclosing the 95% region, equivalent to a non-parametric estimate of the 95th percentile (Figure E.3-2). The Athabasca River Delta (ARD) was considered unique in the analysis because there are no true regional *baseline* reaches that provide a truly adequate comparison. In this report, the *baseline* condition for the ARD habitat was considered to be all of the previous data from 1998 to 2009. This approach to estimating *baseline* conditions is roughly equivalent to control charting techniques that are designed to determine when processes are “out of control” (Shewart 1931).

Figure E.3-2 Example time trend chart for benthic invertebrate community abundance in relation to the baseline range of variability, in this case, for depositional *baseline* conditions.

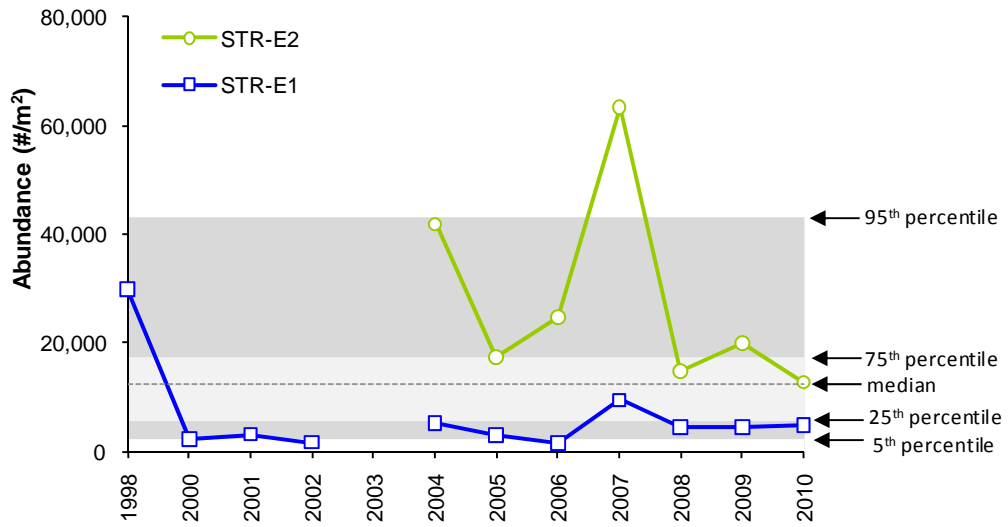
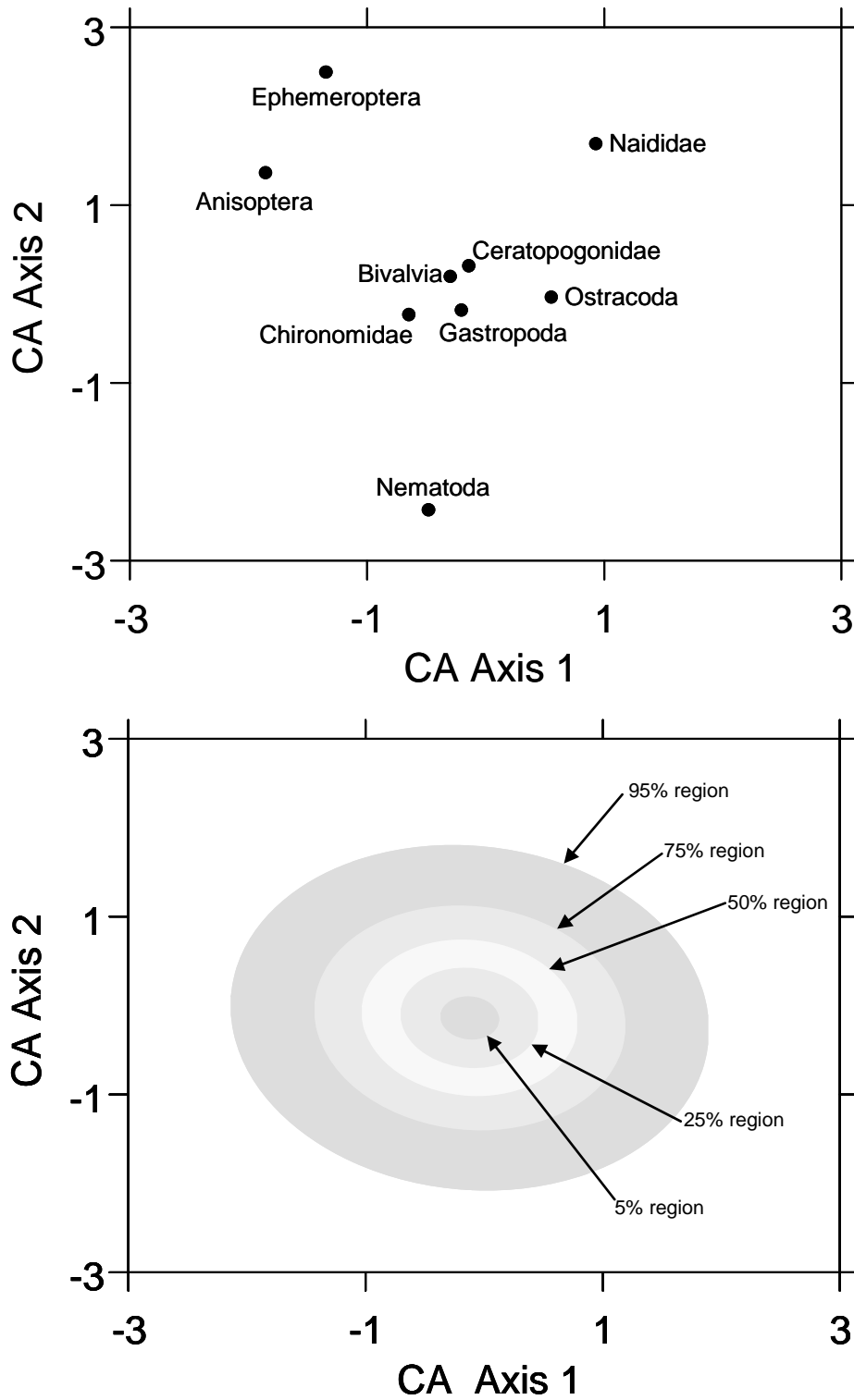


Figure E.3-3 Example biplot showing time trend of benthic invertebrate CA Axis scores in relation to the *baseline* range of variability, in this case, for samples from the Delta *baseline* conditions.



E.2 SEDIMENT QUALITY COMPONENT

E.2.1 Analytical Methods

Analytical methods used for sediment quality analysis for RAMP in 2010, along with associated detection limits and analysis-specific Variable Method Values (VMV codes, where available and provided by the laboratories) are presented in Table E.4-1.

For PAHs specifically, AXYS Analytical Ltd. used their AXYS Method MLA021 for the determination of concentrations of PAHs, and alkylated PAHs in solid (sediment, soil) and equipment rinsate (aqueous) matrices. This method is based upon USEPA Methods 1625 and 8270, with modifications. AXYS Analytical is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) (Lab ID A2637) in Canada for the analysis of PAHs in solids.

All samples for PAH analysis were spiked with a solution of fifteen deuterated surrogate standards prior to analysis. Solid samples were extracted by soxhlet extraction. Aqueous samples were solvent extracted. The sample extracts were fractionated on a silica gel chromatographic column and analyzed using capillary column gas chromatography with detection by low resolution mass spectrophotometry (GC/MS) for PAHs and alkylated PAHs. The GC/MS was operated at unit mass resolution. Concentrations are reported in ng/g on a dry weight basis for solids and ng/L for aqueous samples.

Detection limits for each PAH analysis varied based on surrogate and spike recoveries and other internal laboratory QA/QC measures conducted for each test. However, detection limits for individual PAH species were typically between 0.0002 and 0.002 mg/kg in 2010, depending on the species.

Table E.4-1 Analytical methods, method detection limits, and Variable Method Values (VMV codes) for sediment quality variables measured by analytical laboratories for RAMP in 2010.

| Analyte Category | Analyte | Units | Detection Limit | Analytical Method | VMV Code | Lab |
|------------------------------------|------------------------------|-------|-----------------|-----------------------------------|----------|-----|
| Hydrocarbons and Organic Compounds | 2-Bromobenzotrifluoride | % | 1 | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Hydrocarbons and Organic Compounds | Benzene | mg/kg | 0.005 | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Hydrocarbons and Organic Compounds | CCME Fraction 1 (BTEX) | mg/kg | 10 | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Hydrocarbons and Organic Compounds | CCME Fraction 1 (C6-C10) | mg/kg | 10* | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Hydrocarbons and Organic Compounds | CCME Fraction 2 (C10-C16) | mg/kg | 20* | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Hydrocarbons and Organic Compounds | CCME Fraction 3 (C16-C34) | mg/kg | 20* | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Hydrocarbons and Organic Compounds | CCME Fraction 4 (C34-C50) | mg/kg | 20 | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Hydrocarbons and Organic Compounds | Ethylbenzene | mg/kg | 0.015 | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Hydrocarbons and Organic Compounds | F4G-SG (GHH-Silica) | mg/kg | 500 | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Hydrocarbons and Organic Compounds | m+p-Xylene | mg/kg | 0.05 | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Hydrocarbons and Organic Compounds | o-Xylene | mg/kg | 0.05 | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Hydrocarbons and Organic Compounds | Toluene | mg/kg | 0.05 | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Hydrocarbons and Organic Compounds | Total Hydrocarbons (C6-C50) | mg/kg | 20 | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Hydrocarbons and Organic Compounds | Xylenes | mg/kg | 0.1 | CCME CWS-PHC Dec-2000 - Pub# 1310 | - | ALS |
| Physical properties | % Clay | % | 1 | CSSS 47.3 - Hydrometer | 97284 | ALS |
| Physical properties | % Moisture | % | 0.1 | Oven dry 105C-Gravimetric | 100424 | ALS |
| Physical properties | % Sand | % | 1 | CSSS 47.3 - Hydrometer | 97285 | ALS |
| Physical properties | % Silt | % | 1 | CSSS 47.3 - Hydrometer | 97286 | ALS |
| Physical properties | CaCO ₃ Equivalent | % | 0.8 | SSSA (1996) P455-456 | | ALS |
| Physical properties | Inorganic Carbon | % | 0.1 | SSSA (1996) P455-456 | 50303 | ALS |
| Physical properties | Texture | | (Descriptive) | CSSS 47.3 - Hydrometer | | ALS |
| Physical properties | Total Carbon by Combustion | % | 0.1 | SSSA (1996) P. 973-974 | 6075 | ALS |
| Physical properties | Total organic carbon | % | 0.1 | SSSA (1996) P455-456 | 6078 | ALS |
| Total metals | Aluminum (Al) | mg/kg | 50 | EPA 200.2/6020A | - | ALS |
| Total metals | Antimony (Sb) | mg/kg | 0.1 | EPA 200.2/6020A | - | ALS |
| Total metals | Arsenic (As) | mg/kg | 0.1 | EPA 200.2/6020A | - | ALS |
| Total metals | Barium (Ba) | mg/kg | 0.5 | EPA 200.2/6020A | - | ALS |
| Total metals | Beryllium (Be) | mg/kg | 0.2 | EPA 200.2/6020A | - | ALS |
| Total metals | Bismuth (Bi) | mg/kg | 0.2 | EPA 200.2/6020A | - | ALS |
| Total metals | Cadmium (Cd) | mg/kg | 0.1 | EPA 200.2/6020A | - | ALS |
| Total metals | Calcium (Ca) | mg/kg | 100 | EPA 200.2/6020A | - | ALS |
| Total metals | Chromium (Cr) | mg/kg | 0.5 | EPA 200.2/6020A | - | ALS |
| Total metals | Cobalt (Co) | mg/kg | 0.1 | EPA 200.2/6020A | - | ALS |
| Total metals | Copper (Cu) | mg/kg | 0.5 | EPA 200.2/6020A | - | ALS |
| Total metals | Iron (Fe) | mg/kg | 200 | EPA 200.2/6020A | - | ALS |
| Total metals | Lead (Pb) | mg/kg | 0.5 | EPA 200.2/6020A | - | ALS |
| Total metals | Lithium (Li) | mg/kg | 0.5 | EPA 200.2/6020A | - | ALS |
| Total metals | Magnesium (Mg) | mg/kg | 20 | EPA 200.2/6020A | - | ALS |
| Total metals | Manganese (Mn) | mg/kg | 1 | EPA 200.2/6020A | - | ALS |

¹ See text.

Table E.4-1 (Cont'd.)

| Analyte Category | Analyte | Units | Detection Limit | Analytical Method | VMV Code | Lab |
|------------------|----------------------------------|-------|---------------------|---|----------|------|
| Total metals | Mercury (Hg) | mg/kg | 0.05 | EPA 200.2/245.1 | - | ALS |
| Total metals | Molybdenum (Mo) | mg/kg | 0.1 | EPA 200.2/6020A | - | ALS |
| Total metals | Nickel (Ni) | mg/kg | 0.5 | EPA 200.2/6020A | - | ALS |
| Total metals | Phosphorus (P) | mg/kg | 100 | EPA 200.2/6020A | - | ALS |
| Total metals | Potassium (K) | mg/kg | 100 | EPA 200.2/6020A | - | ALS |
| Total metals | Selenium (Se) | mg/kg | 0.2 | EPA 200.2/6020A | - | ALS |
| Total metals | Silver (Ag) | mg/kg | 0.2 | EPA 200.2/6020A | - | ALS |
| Total metals | Sodium (Na) | mg/kg | 100 | EPA 200.2/6020A | - | ALS |
| Total metals | Strontium (Sr) | mg/kg | 1 | EPA 200.2/6020A | - | ALS |
| Total metals | Thallium (Tl) | mg/kg | 0.05 | EPA 200.2/6020A | - | ALS |
| Total metals | Tin (Sn) | mg/kg | 2 | EPA 200.2/6020A | - | ALS |
| Total metals | Titanium (Ti) | mg/kg | 1 | EPA 200.2/6020A | - | ALS |
| Total metals | Uranium (U) | mg/kg | 0.05 | EPA 200.2/6020A | - | ALS |
| Total metals | Vanadium (V) | mg/kg | 0.2 | EPA 200.2/6020A | - | ALS |
| Total metals | Zinc (Zn) | mg/kg | 5 | EPA 200.2/6020A | - | ALS |
| PAHs | Acenaphthene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Acenaphthylene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Anthracene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Benz[a]anthracene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Benzo[a]pyrene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Benzo[b,j,k]fluoranthene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Benzo[g,h,i]perylene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Biphenyl | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C1-Benzo[a]anthracenes/Chrysenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C1-Benzofluoranthenes/Pyrenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C1-Dibenzothiophenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C1-Fluoranthenes/Pyrenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C1-Fluorenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C1-Naphthalenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C1-Phenanthrenes/Anthracenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C2-Benzo[a]anthracenes/Chrysenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C2-Benzofluoranthenes/Pyrenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C2-Dibenzothiophenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C2-Fluoranthenes/Pyrenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C2-Fluorenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C2-Naphthalenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C2-Phenanthrenes/Anthracenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C3-Dibenzothiophenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C3-Fluoranthenes/Pyrenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C3-Fluorenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C3-Naphthalenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |

¹ See text.

Table E.4-1 (Cont'd.)

| Analyte Category | Analyte | Units | Detection Limit | Analytical Method | VMV Code | Lab |
|------------------|---|-------------|---------------------|--|----------|-----------|
| PAHs | C3-Phenanthrenes/Anthracenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C4-Dibenzothiophenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C4-Naphthalenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | C4-Phenanthrenes/Anthracenes | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Chrysene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Dibenz[a,h]anthracene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Dibenzothiophene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Dimethyl-Biphenyl | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Fluoranthene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Fluorene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Indeno[1,2,3-c,d]-pyrene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Methyl Acenaphthene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Methyl-Biphenyl | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Naphthalene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Phenanthrene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Pyrene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| PAHs | Retene | mg/kg | Varies ¹ | MLA021, based on USEPA methods 1625 and 8270 ¹ | - | AXYS |
| Toxicity | <i>Chironomus dilutus</i> - 10d growth | mg/organism | - | Biological test method: test for survival and growth in sediment using the larvae of freshwater midges (<i>Chironomus Dilutus</i> or <i>Chironomus riparius</i> , 1997. Environment Canada EPS 1/RM/32. | - | HydroQual |
| Toxicity | <i>Chironomus dilutus</i> - 10d growth - % of Control | % | - | Biological test method: test for survival and growth in sediment using the larvae of freshwater midges (<i>Chironomus Dilutus</i> or <i>Chironomus riparius</i> , 1997. Environment Canada EPS 1/RM/32. | - | HydroQual |
| Toxicity | <i>Chironomus dilutus</i> - 10d survival | # surviving | - | Biological test method: test for survival and growth in sediment using the larvae of freshwater midges (<i>Chironomus Dilutus</i> or <i>Chironomus riparius</i> , 1997. Environment Canada EPS 1/RM/32. | - | HydroQual |
| Toxicity | <i>Chironomus dilutus</i> - 10d survival - % of Control | % | - | Biological test method: test for survival and growth in sediment using the larvae of freshwater midges (<i>Chironomus Dilutus</i> or <i>Chironomus riparius</i> , 1997. Environment Canada EPS 1/RM/32. | - | HydroQual |
| Toxicity | <i>Hyalella azteca</i> - 14d growth | mg/organism | - | Biological test method: test for survival and growth in sediment using the freshwater amphipod <i>Hyalella azteca</i> , 1997. Environment Canada EPS 1/RM/33. | - | HydroQual |
| Toxicity | <i>Hyalella azteca</i> - 14d survival | # surviving | - | Biological test method: test for survival and growth in sediment using the freshwater amphipod <i>Hyalella azteca</i> , 1997. Environment Canada EPS 1/RM/33. | - | HydroQual |
| Toxicity | <i>Hyalella azteca</i> - 14d growth - % of Control | % | - | Biological test method: test for survival and growth in sediment using the freshwater amphipod <i>Hyalella azteca</i> , 1997. Environment Canada EPS 1/RM/33. | - | HydroQual |
| Toxicity | <i>Hyalella azteca</i> - 14d survival - % of Control | % | - | Biological test method: test for survival and growth in sediment using the freshwater amphipod <i>Hyalella azteca</i> , 1997. Environment Canada EPS 1/RM/33. | - | HydroQual |

¹ See text.

Appendix F
Fish Populations Component

F FISH POPULATIONS COMPONENT

F.1 COMMON AND SCIENTIFIC NAMES FOR FISH SPECIES CAPTURED IN THE 2010 FISH POPULATIONS COMPONENT

Table F.1-1 Common and scientific names for fish species captured during Fish Populations component activities, 2010.

| Common Name | Scientific Name | Code |
|--------------------|-------------------------------|-------------|
| Arctic grayling | <i>Thymallus arcticus</i> | ARGR |
| brook stickleback | <i>Culaea inconstans</i> | BRST |
| burbot | <i>Lota lota</i> | BURB |
| emerald shiner | <i>Notropis atherinoides</i> | EMSH |
| flathead chub | <i>Platygobio gracilis</i> | FLCH |
| goldeye | <i>Hiodon alosoides</i> | GOLD |
| lake chub | <i>Couesius plumbeus</i> | LKCH |
| lake whitefish | <i>Coregonus clupeaformis</i> | LKWH |
| longnose dace | <i>Rhinichthys cataractae</i> | LNDC |
| longnose sucker | <i>Catostomus catostomus</i> | LNSC |
| mountain whitefish | <i>Prosopium williamsoni</i> | MNWH |
| northern pike | <i>Esox lucius</i> | NRPK |
| pearl dace | <i>Semotilus margarita</i> | PRDC |
| slimy sculpin | <i>Cottus cognatus</i> | SLSC |
| spoonhead sculpin | <i>Cottus ricei</i> | SPSC |
| spottail shiner | <i>Notropis hudsonius</i> | SPSH |
| trout-perch | <i>Percopsis omiscomaycus</i> | TRPR |
| walleye | <i>Sander vitreus</i> | WALL |
| white sucker | <i>Catostomus commersoni</i> | WHSC |
| yellow perch | <i>Perca flavescens</i> | YLPR |

F.2 EXTERNAL HEALTH ASSESSMENT INDEX CODES FOR FISH EXAMINATION

Fish body part and abnormality codes were developed to assess the health of captured fish in a rapid process to minimize the fish holding time in the field (Table F.2-1). For each abnormality that is observed, the severity of the abnormality is recorded (1-mild; 2-moderate; 3-severe) and the location of the abnormality (Table F.2-2).

Table F.2-1 External and internal health assessment codes for fish examination.

| Variable | Variable Code | Variable Condition | Variable Condition Code |
|---------------|---------------|---|-------------------------|
| eyes | EYE | no aberrations; good "clear" eye | N |
| | | Exophthalmia (popeye) | EX |
| | | blind; an opaque eye (one or both) | BL |
| | | cloudy cornea | CC |
| | | lens deformed | LD |
| | | lens parasites | LP |
| | | lens cataract | LC |
| | | hemorrhaging or bleeding in the eye (one or both) | HM |
| | | missing one or both eyes | MI |
| | | other; any condition not covered above | OT |
| gills | GIL | normal; no apparent aberrations | N |
| | | frayed; erosion of tips of gill lamellae resulting in "ragged" gills | FR |
| | | clubbed; swelling of the tips of gill lamellae | CL |
| | | marginate; gills with light, discoloured margin along tips the lamellae | MA |
| | | pale; very light in colour | DI |
| | | parasites | PA |
| | | gas bubbles | GB |
| | | other; any condition not covered above | OT |
| pseudobranchs | PSD | normal; flat, containing no aberrations | N |
| | | swollen; convex in aspect | SW |
| | | lithic; mineral deposits, white, somewhat amorphous spots | LI |
| | | other; any condition not covered above | OT |
| thymus | THY | no hemorrhage | 0 |
| | | hemorrhagic | HM |
| | | other; any condition not covered above | OT |

Table F.2-1 (Cont'd.)

| Variable | Variable Code | Variable Condition | Variable Condition Code |
|------------------|----------------------|--|--------------------------------|
| skin | BOS | normal; no skin aberrations | N |
| | | lesion | LE |
| | | raised or missing scales | RM |
| | | reoriented scales | RS |
| | | swollen | SW |
| | | exceeds mucus | EX |
| | | growths and/or tumours | GR |
| | | parasites | PA |
| | | wounds and/or scars | WO |
| | | other; any condition not covered above | OT |
| fins | FIN | no active erosion | N |
| | | frayed-eroded | FE |
| | | parasites | PA |
| | | hemorrhagic | HM |
| | | gas bubbles | GB |
| | | other; any condition not covered above | OT |
| opercle | OPR | no shortening | N |
| | | incomplete | IN |
| | | other; any condition not covered above | OT |
| hindgut | ANU | normal; no inflammation or reddening | N |
| | | inflamed | IN |
| | | other; any condition not covered above | OT |
| body deformities | BOF | none | N |
| | | emaciated | EM |
| | | truncate | TR |
| | | scoliosis | SC |
| | | lordosis | LO |
| | | other; any condition not covered above | OT |
| mesenteric fat | MF | none | 0 |
| | | < 50 % coverage of mesentery | 1 |
| | | 50 % coverage of mesentery | 2 |
| | | > 50 % coverage of mesentery | 3 |
| | | 100% of mesentery covered | 4 |

Table F.2-1 (Cont'd.)

| Variable | Variable Code | Variable Condition | Variable Condition Code |
|-----------------|----------------------|--|--------------------------------|
| liver | LI | normal; solid red or light red colour | A |
| | | "fatty" liver; "coffee with cream" colour | C |
| | | nodules in the liver; cysts or nodules | D |
| | | focal discolouration; distinct localized colour changes | E |
| | | general discolouration; colour change in whole liver | F |
| | | other; any condition not covered above | OT |
| spleen | SP | normal; black, very dark red, or red | B |
| | | granular; rough appearance of spleen | G |
| | | nodular; containing fistulas or nodules of varying sizes | D |
| | | enlarged; noticeable enlarged | E |
| | | other; any condition not covered above | OT |
| gall bladder | GA | normal | 0 |
| | | enlarged | 1 |
| | | parasites | 2 |
| kidney | KI | normal; firm dark red colour, lying relatively flat along vertebral column | N |
| | | swollen; enlarged or swollen wholly or in part | S |
| | | mottled; gray discolouration | M |
| | | granular; granular appearance and texture | G |
| | | urolithiasis/nephrocalcinosis; white/cream mineral material in tubules | U |
| | | other; any condition not covered above | OT |
| parasites | PA | no observed parasites | 0 |
| | | few observed parasites | 1 |
| | | moderate parasite infestation | 2 |
| | | numerous parasites | 3 |

Table F.2-2 Codes for the location of external fish abnormalities.

| Variable | Location | Code |
|-----------------|-----------------|-------------|
| Body surface | fins | 1 |
| | head | 2 |
| | eyes | 3 |
| | mouth | 4 |
| | peduncle | 5 |
| | ventral | 6 |
| | dorsal | 7 |
| | lateral | 8 |
| Fins | dorsal | 1 |
| | pectoral | 2 |
| | pelvic | 3 |
| | anal | 4 |
| | adipose | 5 |
| | caudal | 6 |
| Eyes | right | 1 |
| | left | 2 |

Appendix G
Acid-Sensitive Lakes Component

G ACID-SENSITIVE LAKES COMPONENT

Appendix G presents the descriptive portion of the Acid-Sensitive Lakes (ASL) component for 2010. Summary statistics on the chemistry of the ASL component lakes, results of between-year comparisons of measurement endpoints, calculations of critical loads of acidity for each lake, and trend analyses on the measurement endpoints can be found in Section 5.12. Appendix G includes the following:

- Water yields and runoff estimates for the individual ASL component lakes;
- A test of the assumption that current base cation concentrations are the same as historical base cation concentrations in the ASL component lakes in the critical load calculations;
- Origin of the use of an ANC_{lim} concentration of 75 $\mu\text{eq/L}$ in the critical load calculations;
- The chemistry of the 50 ASL component lakes in 2010 compared to that in 450 lakes within the Oil Sands region reported by the NO_xSO_x Management Working Group (NSMWG);
- The ion chemistry of the ASL component lakes in 2010 using piper plots; and
- A summary of the trace metal concentrations in the RAMP ASL component lakes and relationships between metal concentrations, lake location and water chemistry.

Estimates of the seasonal variability in water quality variables in the ASL component lakes are not presented this year as in previous years. The 5-year seasonal sampling program, sponsored by CEMA and conducted by Alberta Environment, ended in 2008. The results of this program examining seasonal variability in measurement endpoints in a subset of 10 ASL component lakes are provided in RAMP 2009a.

G.1 RUNOFF CALCULATIONS FOR EACH ASL COMPONENT LAKE

The runoff (Q) to each lake was calculated from analyses of heavy isotopes of oxygen (^{18}O) and (^2H) conducted by John Gibson (University of Victoria). In this technique, the natural evaporative enrichment of ^{18}O and ^2H in each lake is used to partition water losses between evaporation and liquid outflow and hence derive an estimate of runoff (Gibson 2002, Gibson *et al.* 2002, Gibson and Edwards 2002; Gibson *et al.* 2010). This technique utilizes a different set of assumptions from traditional hydrometric methods, which extrapolate water yields from one or more gauged catchments to the ungauged lake catchments.

The water yields for each lake catchment and the runoff to each lake are provided in Table G.1-1 and G.1-2. The runoff is calculated from the water yield by incorporating the lake catchment areas. The runoff represents the discharge that would be measured at the lake outlet. In 2010, the runoff ranged from 0.001 m^3/s to 2.719 m^3/s (median: 0.082 m^3/s).

Table G.1-1 Water Yields to the ASL component lakes 2002 to 2010¹.

| Lake ID No. | AENV Label | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Lake Area (km ²) | Catchment Area (km ²) |
|-------------|------------|---------------------|------|------|------|------|------|------|------|------|------------------------------|-----------------------------------|
| | | Water Yields (mm/y) | | | | | | | | | | |
| 168 | SM10 | 95 | 124 | 136 | 135 | 149 | 90 | 195 | 197 | 154 | 1.4 | 18.18 |
| 169 | SM9 | 156 | 205 | 204 | 412 | 259 | 225 | 289 | 266 | 256 | 1.1 | 8.28 |
| 170 | SM6 | 39 | 51 | 60 | 84 | 69 | 53 | 86 | 84 | 74 | 0.7 | 13.06 |
| 167 | SM5 | 241 | 258 | 260 | 347 | 274 | 218 | 587 | 525 | 506 | 1.1 | 3.67 |
| 166 | SM7 | 56 | 117 | 142 | 193 | 171 | 116 | 295 | 338 | 263 | 1.5 | 6.94 |
| 287 | SM8 | 144 | 213 | 230 | 323 | 256 | 70 | 326 | 314 | 278 | 1.9 | 9.63 |
| 289 | SM3 | 182 | 260 | 236 | 433 | 296 | 211 | 359 | 428 | 374 | 1.9 | 7.39 |
| 290 | SM4 | 29 | 73 | 57 | 72 | 69 | 58 | 88 | 97 | 86 | 0.5 | 11.74 |
| 342 | SM2 | 31 | 33 | 72 | 126 | 65 | 10 | 129 | 141 | 118 | 2 | 15.36 |
| 354 | SM1 | 132 | 181 | 230 | 277 | 143 | 49 | 387 | 383 | 314 | 2.4 | 9.61 |
| 165 | WF1 | 98 | 235 | 252 | 305 | 218 | 200 | 523 | 427 | 311 | 3.2 | 10.43 |
| 171 | WF2 | 46 | 96 | 81 | 182 | 69 | | 232 | 161 | 119 | 0.8 | 4.30 |
| 172 | WF3 | 19 | 35 | 51 | 91 | 43 | 34 | 101 | 88 | 44 | 2.2 | 51.55 |
| 223 | WF4 | 9 | 8 | 10 | 78 | 17 | 9 | 29 | 28 | 16 | 0 | 1.79 |
| 225 | WF5 | 14 | 38 | 30 | 156 | 49 | 34 | 62 | 68 | 81 | 0.2 | 5.04 |
| 226 | WF6 | 27 | 99 | 77 | 196 | 81 | 61 | 78 | 133 | 121 | 0.2 | 4.19 |
| 227 | WF7 | 34 | 138 | 73 | 214 | 105 | 62 | 115 | 174 | 173 | 0.1 | 1.59 |
| 267 | WF8 | 20 | 42 | 38 | 93 | 61 | 25 | | 95 | 39 | 2 | 23.08 |
| 452 | NE1 | 197 | 194 | 133 | 265 | 180 | 98 | 383 | 201 | 88 | 0.7 | 16.75 |
| 470 | NE2 | 153 | 111 | 79 | 152 | 161 | 66 | 146 | 130 | 94 | 0.3 | 15.13 |
| 471 | NE3 | 88 | 132 | 112 | 232 | 248 | 58 | 140 | 136 | 104 | 0.6 | 23.98 |
| 400 | NE4 | 606 | 503 | 449 | 869 | 409 | 260 | 587 | 708 | 369 | 1.2 | 3.17 |
| 268 | NE5 | 267 | 488 | 379 | 480 | 303 | 101 | 410 | 560 | 426 | 1.9 | 7.32 |
| 182 | NE6 | 156 | 148 | 91 | 260 | 101 | 192 | 42 | 155 | 282 | 0.4 | 8.34 |
| 185 | NE7 | 166 | 125 | 101 | 162 | 126 | 132 | 172 | 121 | 140 | 0.1 | 5.91 |
| 209 | NE8 | 753 | 586 | 373 | 861 | 461 | 349 | 985 | 669 | 831 | 0.1 | 0.82 |
| 270 | NE9 | 176 | 245 | 255 | 339 | 319 | 106 | 279 | 491 | 354 | 3.2 | 11.21 |
| 271 | NE10 | 132 | 128 | 230 | 373 | 246 | 189 | 245 | 426 | 240 | 4.2 | 17.09 |
| 418 | NE11 | | 167 | 140 | 239 | 112 | 47 | 129 | 144 | 96 | 5.8 | 77.17 |
| 436 | BM2 | 353 | 536 | 472 | 410 | 487 | 263 | 551 | 577 | 518 | 44 | 165.55 |
| 442 | BM9 | 179 | 288 | 246 | 295 | 326 | 239 | 278 | 311 | 248 | 3.5 | 33.26 |
| 444 | BM1 | 431 | 660 | 595 | 435 | 607 | 343 | 703 | 697 | 615 | 17 | 58.72 |
| 447 | BM6 | 393 | 455 | 285 | 733 | 407 | 284 | 429 | 570 | 520 | 1.3 | 13.67 |
| 448 | BM7 | 430 | 444 | 531 | 514 | 287 | 245 | 351 | 509 | 365 | 0.7 | 4.66 |
| 454 | BM8 | 121 | 168 | 101 | 289 | 151 | 69 | 115 | 213 | 114 | 1.2 | 32.49 |
| 455 | BM4 | 167 | 232 | 119 | 455 | 274 | 112 | 303 | 422 | 270 | 4.3 | 37.33 |
| 457 | BM5 | 141 | 244 | 118 | 455 | 232 | 92 | 262 | 322 | 162 | 2.6 | 30.59 |
| 464 | BM3 | 77 | 141 | 87 | 168 | 112 | 59 | 134 | 182 | 97 | 1 | 29.75 |
| 175 | BM10 | 30 | 25 | 27 | 92 | 51 | 33 | 76 | 192 | 50 | 0.4 | 5.15 |
| 199 | BM11 | 75 | 117 | 121 | 133 | 116 | 69 | 79 | 130 | 87 | 0.1 | 0.57 |
| 473 | S4 | 23 | 30 | 24 | 57 | 38 | 38 | 42 | 39 | 28 | 1.4 | 114.65 |
| 118 | S1 | 425 | 482 | 387 | 389 | 452 | 349 | 502 | 438 | 424 | 3.4 | 13.40 |
| 84 | S2 | 43 | 51 | 42 | 65 | 39 | | 54 | 71 | 33 | 1 | 112.59 |
| 88 | S5 | 113 | 122 | 108 | 116 | 127 | | 118 | 144 | 81 | 0.3 | 4.48 |
| 90 | S3 | 112 | 159 | 130 | 140 | 148 | 139 | 150 | 187 | 115 | 1.4 | 37.89 |
| 146 | CM1 | 240 | 310 | 235 | 378 | 455 | 551 | 728 | 603 | 545 | 1.6 | 24.11 |
| 152 | CM2 | 304 | 328 | 234 | 447 | 404 | 328 | 401 | 485 | 452 | 9.6 | 46.77 |
| 89 | CM3 | 189 | 162 | 111 | 331 | 275 | 249 | 220 | 346 | 285 | 2.3 | 27.95 |
| 97 | CM4 | 242 | 275 | 182 | 219 | 228 | 308 | 394 | 503 | 383 | 2.6 | 38.05 |
| 91 | CM5 | 225 | 212 | 136 | 697 | 704 | 175 | 212 | 391 | 408 | 0.6 | 2.78 |
| | Min | 8.6 | 7.5 | 9.5 | 56.6 | 16.7 | 9.0 | 28.9 | 28.4 | 16.0 | | |
| | Max | 753 | 660 | 595 | 869 | 704 | 551 | 985 | 708 | 831 | | |
| | Mean | 171 | 209 | 177 | 295 | 220 | 150 | 276 | 300 | 243 | | |
| | Median | 141 | 165 | 131 | 263 | 176 | 106 | 232 | 240 | 207 | | |

¹ Data provided by Dr. John Gibson

Table G.1-2 Runoff (m³/s) to the ASL component lakes, 2002 to 2010.

| Lake ID No. | AENV Label | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|-------------|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 168 | SM10 | 0.055 | 0.071 | 0.078 | 0.078 | 0.086 | 0.052 | 0.112 | 0.114 | 0.089 |
| 169 | SM9 | 0.041 | 0.054 | 0.054 | 0.108 | 0.068 | 0.059 | 0.076 | 0.070 | 0.067 |
| 170 | SM6 | 0.016 | 0.021 | 0.025 | 0.035 | 0.029 | 0.022 | 0.036 | 0.035 | 0.031 |
| 167 | SM5 | 0.028 | 0.030 | 0.030 | 0.040 | 0.032 | 0.025 | 0.068 | 0.061 | 0.059 |
| 166 | SM7 | 0.012 | 0.026 | 0.031 | 0.042 | 0.038 | 0.025 | 0.065 | 0.074 | 0.058 |
| 287 | SM8 | 0.044 | 0.065 | 0.070 | 0.099 | 0.078 | 0.021 | 0.100 | 0.096 | 0.085 |
| 289 | SM3 | 0.043 | 0.061 | 0.055 | 0.101 | 0.069 | 0.049 | 0.084 | 0.100 | 0.088 |
| 290 | SM4 | 0.011 | 0.027 | 0.021 | 0.027 | 0.026 | 0.022 | 0.033 | 0.036 | 0.032 |
| 342 | SM2 | 0.015 | 0.016 | 0.035 | 0.062 | 0.032 | 0.005 | 0.063 | 0.069 | 0.057 |
| 354 | SM1 | 0.040 | 0.055 | 0.070 | 0.084 | 0.044 | 0.015 | 0.118 | 0.117 | 0.096 |
| 165 | WF1 | 0.032 | 0.078 | 0.083 | 0.101 | 0.072 | 0.066 | 0.173 | 0.141 | 0.103 |
| 171 | WF2 | 0.006 | 0.013 | 0.011 | 0.025 | 0.009 | | 0.032 | 0.022 | 0.016 |
| 172 | WF3 | 0.031 | 0.057 | 0.083 | 0.149 | 0.070 | 0.056 | 0.165 | 0.144 | 0.072 |
| 223 | WF4 | 0.0005 | 0.0004 | 0.0005 | 0.0044 | 0.0009 | 0.0005 | 0.0016 | 0.0016 | 0.0009 |
| 225 | WF5 | 0.002 | 0.006 | 0.005 | 0.025 | 0.008 | 0.005 | 0.010 | 0.011 | 0.013 |
| 226 | WF6 | 0.004 | 0.013 | 0.010 | 0.026 | 0.011 | 0.008 | 0.010 | 0.018 | 0.016 |
| 227 | WF7 | 0.002 | 0.007 | 0.004 | 0.011 | 0.005 | 0.003 | 0.006 | 0.009 | 0.009 |
| 267 | WF8 | 0.015 | 0.031 | 0.028 | 0.068 | 0.045 | 0.018 | | 0.070 | 0.029 |
| 452 | NE1 | 0.105 | 0.103 | 0.070 | 0.141 | 0.096 | 0.052 | 0.204 | 0.107 | 0.047 |
| 470 | NE2 | 0.073 | 0.053 | 0.038 | 0.073 | 0.077 | 0.032 | 0.070 | 0.062 | 0.045 |
| 471 | NE3 | 0.067 | 0.100 | 0.085 | 0.176 | 0.188 | 0.044 | 0.107 | 0.103 | 0.079 |
| 400 | NE4 | 0.061 | 0.051 | 0.045 | 0.087 | 0.041 | 0.026 | 0.059 | 0.071 | 0.037 |
| 268 | NE5 | 0.062 | 0.113 | 0.088 | 0.112 | 0.070 | 0.024 | 0.095 | 0.130 | 0.099 |
| 182 | NE6 | 0.041 | 0.039 | 0.024 | 0.069 | 0.027 | 0.051 | 0.011 | 0.041 | 0.075 |
| 185 | NE7 | 0.031 | 0.023 | 0.019 | 0.030 | 0.024 | 0.025 | 0.032 | 0.023 | 0.026 |
| 209 | NE8 | 0.020 | 0.015 | 0.010 | 0.022 | 0.012 | 0.009 | 0.026 | 0.017 | 0.022 |
| 270 | NE9 | 0.062 | 0.087 | 0.090 | 0.121 | 0.113 | 0.038 | 0.099 | 0.174 | 0.126 |
| 271 | NE10 | 0.072 | 0.069 | 0.125 | 0.202 | 0.133 | 0.103 | 0.133 | 0.231 | 0.130 |
| 418 | NE11 | | 0.409 | 0.342 | 0.584 | 0.273 | 0.115 | 0.315 | 0.353 | 0.235 |
| 436 | BM2 | 1.851 | 2.815 | 2.476 | 2.155 | 2.557 | 1.383 | 2.890 | 3.029 | 2.719 |
| 442 | BM9 | 0.189 | 0.304 | 0.259 | 0.311 | 0.344 | 0.253 | 0.294 | 0.328 | 0.262 |
| 444 | BM1 | 0.803 | 1.229 | 1.107 | 0.810 | 1.130 | 0.638 | 1.309 | 1.297 | 1.145 |
| 447 | BM6 | 0.170 | 0.197 | 0.123 | 0.318 | 0.177 | 0.123 | 0.186 | 0.247 | 0.225 |
| 448 | BM7 | 0.064 | 0.066 | 0.078 | 0.076 | 0.042 | 0.036 | 0.052 | 0.075 | 0.054 |
| 454 | BM8 | 0.125 | 0.174 | 0.104 | 0.298 | 0.155 | 0.071 | 0.119 | 0.220 | 0.117 |
| 455 | BM4 | 0.198 | 0.274 | 0.141 | 0.538 | 0.324 | 0.133 | 0.358 | 0.500 | 0.320 |
| 457 | BM5 | 0.137 | 0.237 | 0.115 | 0.441 | 0.225 | 0.089 | 0.254 | 0.312 | 0.157 |
| 464 | BM3 | 0.072 | 0.133 | 0.082 | 0.159 | 0.105 | 0.055 | 0.127 | 0.172 | 0.092 |
| 175 | BM10 | 0.005 | 0.004 | 0.004 | 0.015 | 0.008 | 0.005 | 0.012 | 0.031 | 0.008 |
| 199 | BM11 | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.001 | 0.001 | 0.002 | 0.002 |
| 473 | S4 | 0.082 | 0.110 | 0.089 | 0.206 | 0.138 | 0.139 | 0.152 | 0.143 | 0.102 |
| 118 | S1 | 0.180 | 0.205 | 0.165 | 0.165 | 0.192 | 0.148 | 0.213 | 0.186 | 0.180 |
| 84 | S2 | 0.153 | 0.182 | 0.149 | 0.232 | 0.139 | | 0.191 | 0.253 | 0.118 |
| 88 | S5 | 0.016 | 0.017 | 0.015 | 0.016 | 0.018 | | 0.017 | 0.020 | 0.012 |
| 90 | S3 | 0.135 | 0.191 | 0.156 | 0.169 | 0.178 | 0.167 | 0.180 | 0.225 | 0.138 |
| 146 | CM1 | 0.184 | 0.237 | 0.180 | 0.289 | 0.348 | 0.421 | 0.556 | 0.461 | 0.417 |
| 152 | CM2 | 0.452 | 0.487 | 0.347 | 0.662 | 0.599 | 0.487 | 0.594 | 0.720 | 0.670 |
| 89 | CM3 | 0.168 | 0.144 | 0.099 | 0.293 | 0.244 | 0.220 | 0.195 | 0.307 | 0.253 |
| 97 | CM4 | 0.292 | 0.332 | 0.220 | 0.264 | 0.275 | 0.371 | 0.476 | 0.607 | 0.462 |
| 91 | CM5 | 0.020 | 0.019 | 0.012 | 0.061 | 0.062 | 0.015 | 0.019 | 0.034 | 0.036 |
| | Min | 0.0005 | 0.0004 | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 | 0.002 | 0.001 |
| | Max | 1.851 | 2.815 | 2.476 | 2.155 | 2.557 | 1.383 | 2.890 | 3.029 | 2.719 |
| | Mean | 0.128 | 0.181 | 0.151 | 0.204 | 0.181 | 0.122 | 0.214 | 0.233 | 0.187 |
| | Median | 0.055 | 0.065 | 0.074 | 0.101 | 0.071 | 0.049 | 0.100 | 0.105 | 0.082 |

G.2 TEST OF THE ASSUMPTION THAT CURRENT BASE CATIONS ARE SIMILAR TO HISTORICAL BASE CATIONS IN THE ASL COMPONENT LAKES

During the process of acidification of a catchment, base cations are released from the soils to the lake waters. In applying the Henriksen model, it was assumed that base cations have not increased in the ASL component lakes as a result of acidic deposition; that is, the current base cation concentrations (BC_T) are equivalent to the original base cations concentrations (BC_o).

The discrepancy between the original and the current base cation concentrations in a lake is normally calculated by an equation presented in Brakke *et al.* (1990) based on increases in concentrations of sulphur in a lake resulting from aerial deposition. A study by Henriksen *et al.* (2001) in lakes in Ontario gives an example on the use of this equation. To test the assumption that the base cations have not changed significantly in the ASL component lakes, BC_o was calculated for each lake using the equation from Brakke *et al.* (1990). A value of S (one of the terms in the equation) equal to 400 $\mu\text{eq/L}$ and an original sulphate concentration of 6.4 $\mu\text{eq/L}$ (corresponding to the 5th percentile BC_o concentration) were used in the calculation. As in Henriksen *et al.* (2001), an F value of 1 was applied when the base cation concentrations were greater than 400 $\mu\text{eq/L}$. Table G.2-1 shows few significant differences between BC_o and BC_T across the 50 lakes. The assumption of using the current base cation concentrations for the original base cation concentrations appears to be valid and further supported by a recent study by Whitfield *et al.* (2010) in which the Magic Model was applied to soils in the oil sands region. This study concluded that, to date, sulphate deposition levels in the oil sands region have resulted in only a limited removal of base cations from the soil.

Table G.2-1 Comparison of the calculated original base cation concentration (BC₀) to the current base cation concentration (BC_T) in the ASL component lakes.

| Lake | S | SO ₄ mg/L | SO ₄ (µeq/L) | F | BC _T µeq/L | BC ₀ (µeq/L) | % Difference |
|------|-----|----------------------|-------------------------|-------|-----------------------|-------------------------|--------------|
| 1 | 400 | 1.14 | 23.8 | 0.534 | 143 | 134 | 6.5 |
| 2 | 400 | 1.04 | 21.7 | 0.448 | 118 | 111 | 5.8 |
| 3 | 400 | 1.29 | 26.9 | 0.530 | 142 | 131 | 7.6 |
| 4 | 400 | 0.51 | 10.6 | 0.657 | 183 | 180 | 1.5 |
| 5 | 400 | 1.74 | 36.3 | 0.943 | 314 | 286 | 9.0 |
| 6 | 400 | 1.63 | 34.0 | 0.419 | 110 | 99 | 10.5 |
| 7 | 400 | 1.12 | 23.3 | 0.653 | 181 | 170 | 6.1 |
| 8 | 400 | 0.76 | 15.8 | 0.672 | 188 | 181 | 3.4 |
| 9 | 400 | 0.17 | 3.5 | 0.912 | 292 | 295 | -0.9 |
| 10 | 400 | 0.55 | 11.5 | 1 | 511 | 506 | 1.0 |
| 11 | 400 | 0.35 | 7.3 | 1 | 738 | 737 | 0.1 |
| 12 | 400 | 1.06 | 22.1 | 1 | 410 | 395 | 3.8 |
| 13 | 400 | 0.84 | 17.5 | 0.954 | 322 | 312 | 3.3 |
| 14 | 400 | 10.22 | 212.9 | 1 | 1359 | 1153 | 15.2 |
| 15 | 400 | 1.27 | 26.5 | 1 | 802 | 782 | 2.5 |
| 16 | 400 | 1.48 | 30.8 | 1 | 530 | 506 | 4.6 |
| 17 | 400 | 1.67 | 34.8 | 1 | 1002 | 974 | 2.8 |
| 18 | 400 | 0.29 | 6.0 | 1 | 886 | 886 | 0.0 |
| 19 | 400 | 0.59 | 12.3 | 0.888 | 279 | 273 | 1.9 |
| 20 | 400 | 0.79 | 16.5 | 0.993 | 370 | 360 | 2.7 |
| 21 | 400 | 1.28 | 26.7 | 1 | 527 | 507 | 3.8 |
| 22 | 400 | 0.91 | 19.0 | 0.990 | 364 | 352 | 3.4 |
| 23 | 400 | 0.70 | 14.6 | 1 | 739 | 730 | 1.1 |
| 24 | 400 | 0.69 | 14.4 | 1 | 1309 | 1301 | 0.6 |
| 25 | 400 | 0.47 | 9.8 | 0.859 | 263 | 260 | 1.1 |
| 26 | 400 | 0.33 | 6.9 | 0.967 | 334 | 334 | 0.1 |
| 27 | 400 | 0.38 | 7.9 | 1 | 1434 | 1432 | 0.1 |
| 28 | 400 | 0.72 | 15.0 | 1 | 1236 | 1227 | 0.7 |
| 29 | 400 | 3.11 | 64.8 | 1 | 1973 | 1914 | 3.0 |
| 30 | 400 | 7.80 | 162.5 | 1 | 661 | 505 | 23.6 |
| 31 | 400 | 0.95 | 19.8 | 0.904 | 287 | 275 | 4.2 |
| 32 | 400 | 2.77 | 57.7 | 0.980 | 348 | 298 | 14.4 |
| 33 | 400 | 0.94 | 19.6 | 0.782 | 229 | 218 | 4.5 |
| 34 | 400 | 0.14 | 2.9 | 0.305 | 79 | 80 | -1.3 |
| 35 | 400 | 6.98 | 145.4 | 1 | 564 | 425 | 24.6 |
| 36 | 400 | 9.44 | 196.7 | 1 | 662 | 472 | 28.7 |
| 37 | 400 | 10.03 | 209.0 | 1 | 563 | 361 | 36.0 |
| 38 | 400 | 7.51 | 156.5 | 1 | 553 | 403 | 27.1 |
| 39 | 400 | 8.62 | 179.6 | 1 | 1822 | 1649 | 9.5 |
| 40 | 400 | 1.25 | 26.0 | 0.892 | 281 | 263 | 6.2 |
| 41 | 400 | 1.67 | 34.8 | 1 | 613 | 585 | 4.6 |
| 42 | 400 | 0.95 | 19.8 | 1 | 610 | 597 | 2.2 |
| 43 | 400 | 0.71 | 14.8 | 1 | 597 | 589 | 1.4 |
| 44 | 400 | 0.75 | 15.6 | 1 | 541 | 532 | 1.7 |
| 45 | 400 | 0.63 | 13.1 | 1 | 445 | 438 | 1.5 |
| 46 | 400 | 3.11 | 64.8 | 1 | 694 | 636 | 8.4 |
| 47 | 400 | 1.53 | 31.9 | 0.983 | 353 | 328 | 7.1 |
| 48 | 400 | 2.10 | 43.8 | 0.995 | 373 | 336 | 10.0 |
| 49 | 400 | 0.97 | 20.2 | 0.862 | 265 | 253 | 4.5 |
| 50 | 400 | 1.21 | 25.2 | 0.993 | 369 | 350 | 5.1 |

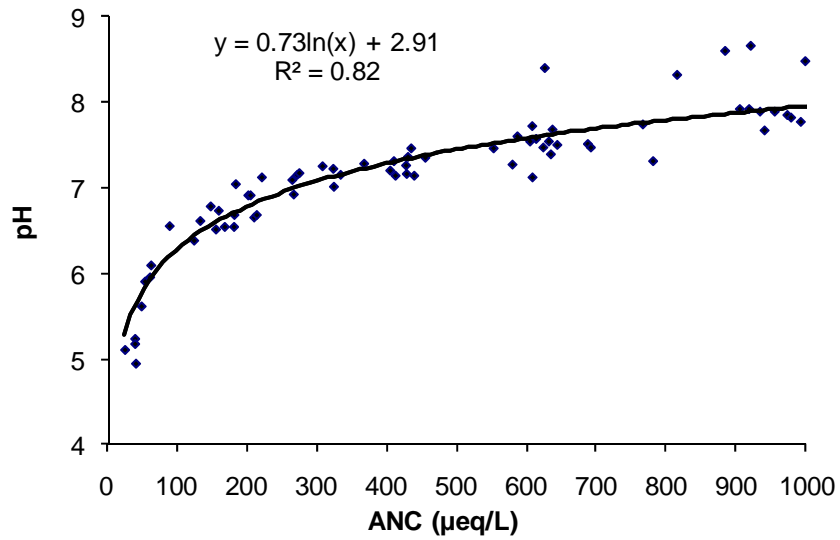
G.3 ORIGIN OF THE USE OF THE ANC_{LIM} CONCENTRATION OF 75 µEQ/L IN THE CRITICAL LOAD CALCULATIONS

The limiting critical load (ANC_{lim}) of 75 µeq/L used in calculating the critical loads was derived in WRS (2001) using data from 162 lakes in the oil sands region and relates to Environment Canada's assumption that a pH >6 is required to maintain a healthy aquatic ecosystem.

The critical load concept assumes a dose-response relationship between a water quality variable and an aquatic indicator organism. In this case, the water quality variable is the acid neutralizing capacity (alkalinity) required to maintain a healthy fish population. In applying the Henriksen model in Europe, a critical threshold ANC_{lim} is set to protect brown trout, the most common European salmonid, and ensures that no toxic acidic episodes occur to this species during the year. The ANC_{lim} was derived from a survey of water chemistry data, critical load exceedances, and fish populations status in 1,000 lakes in Norway in 1986 (Henriksen *et al.* 1988, Lien *et al.* 1992). A value of 20 µeq/L seemed to be the most appropriate for evaluating critical loads in Norway and this value has been adapted by most of the Scandinavian countries (Henriksen *et al.* 1992).

In North America, the effects of acidification on fish populations have been historically related to pH rather than ANC. Research on pH tolerance of a wide range of aquatic organisms has shown that a pH >6 is required to maintain aquatic ecosystem function and protect both fish and other organisms (RMCC 1990, Environment Canada 1997, Jeffries and Lam 1993). Within a given region, lake pH has been empirically and theoretically related to ANC (alkalinity) as an inverse hyperbolic sine function (Small and Sutton 1986) and this relationship has been used to equate the two variables for the purpose of critical load modeling (e.g., Jeffries and Lam 1993). A similar approach was taken in the WRS study to estimate ANC_{lim} (WRS 2001). The relationship between pH and alkalinity was derived for 162 lakes surveyed by ALPAC in 1998 (WRS 2001) (Figure G.3-1). For simplicity, a logarithmic function was fitted to the data. Interpolation indicated that across lakes, a pH of 6.0 is associated with an alkalinity of ~75 µeq/L. This value was therefore chosen for ANC_{lim}.

Figure G.3-1 Lake pH vs. alkalinity for 162 lakes from the oil sands region (WRS 2001).



G.4 COMPARISON OF ASL COMPONENT LAKE CHEMISTRY IN 2010 TO REGIONAL LAKES

The 50 RAMP ASL component lakes in 2010 displayed characteristics similar to 432 lakes in a database within the oil sands region reported by the NO_xSO_x Management Working Group (NSMWG), but with several distinct differences. The two populations are compared statistically in Table G.4-1 and selected variables are presented graphically in box plots (Figure G.4-1). Key results of this comparison are as follows:

- The RAMP ASL component lakes covered a slightly narrower pH range (4.38 to 8.74) with a lower median value (6.80 vs. 7.70 for the regional lakes). The mean pH of the RAMP ASL component lakes is significantly less than that of the NSMWG regional database ($p < 0.005$);
- Total alkalinity in the 2010 RAMP ASL component lakes ranged from 0 µeq/L to 1,730 µeq/L with a median of 233 µeq/L, much lower than the regional median (1,020 µeq/L). Mean total alkalinity in the RAMP ASL component lakes in 2010 was significantly less than that in the NSMWG database ($p < 0.05$);
- Conductivity was relatively low in the RAMP ASL component lakes and ranged from 10.36 µS/cm to 173 µS/cm (median: 31.95 µS/cm). The regional median for conductivity was 125 µS/cm. The mean conductivity of the RAMP ASL component lakes in 2010 was significantly less than that of the regional lakes;
- Consistent with the lower conductivity in the RAMP ASL component lakes, the mean and median concentrations of the principal cations (calcium, magnesium, sodium and potassium) and the sum of base cations (SBC) were all less than the values in the NSMWG database. Median SBC in the RAMP ASL component lakes in 2010 was 453 µeq/L compared to 1,247 µeq/L in the regional lakes. The mean values of these parameters were all significantly less in the RAMP ASL component lakes ($p < 0.05$);
- The mean and medium concentrations of the major anions (chloride, sulphate and titration bicarbonate) were less than those in the regional database;
- Concentrations of total phosphorus were variable in the ASL component lakes and regional lakes database with individual lakes attaining concentrations that would classify them as eutrophic or hypereutrophic (Wetzel 2001). The highest phosphorus concentration observed in the ASL component lakes in 2010 was 208 µg/L in Lake 175/BM10 in the Birch Mountains. The highest phosphorus concentration in the regional lake database was 495 µg/L. The median phosphorus concentration in the ASL component lakes was 37.0 µg/L compared with 49.0 µg/L in the regional lakes. There was no significant difference in total phosphorus between the 2010 RAMP ASL component lakes and the regional lakes;
- Concentrations of nitrates in the RAMP ASL component lakes were generally low (median: 1.4 µg/L), although several lakes had values two orders of magnitude greater than the median (e.g., 379 µg/L in Lake 171/WF2 in the West of Fort McMurray subregion). Concentrations of nitrate in the regional database were similarly variable with a median of only 2 µg/L and occasional lakes with concentrations as high as 1,860 µg/L. There was no significant difference in nitrates between the ASL component lakes and the regional lakes database. Statistical tests suggest that nitrates are decreasing in the RAMP ASL component lakes (Section 5.12); and

- The chemical differences between the RAMP ASL component lakes and the regional lakes reflect the bias in the selection process for the RAMP ASL component. Initially, the RAMP ASL component lakes were selected for their acid sensitivity which, in practice, meant selecting lakes having the lowest pH, alkalinity, and conductivity. These types of lakes are often the smallest lakes and often located in the upland regions where catchments were dominated by fens and organic soils.

Table G.4-1 Comparison between RAMP ASL lakes in 2010 and 450 regional lakes in the NSMWG database.

| Variable | Units | RAMP Lakes (2010) | | | | Regional Lakes | | | | |
|--------------------------|-------------------|-------------------|---------|--------|-------|----------------|-------|------|--------|-------|
| | | Min | Max | Median | Mean | No. | Min | Max | Median | Mean |
| Lake Area | km ² | 0.031 | 43.4 | 1.30 | 2.86 | 431 | 0.01 | 214 | 1.60 | 6.26 |
| Catchment Area | km ² | 0.700 | 224 | 15.3 | 28.1 | 432 | 0.08 | 1769 | 17.4 | 89.3 |
| Drainage Ratio | | 0.220 | 88.6 | 10.1 | 15.7 | 431 | 1.43 | 1178 | 13.0 | 26.2 |
| Runoff | m ³ /s | 0.00 | 8.57 | 0.04 | 0.300 | 432 | 0.00 | 5.00 | 0.00 | 0.258 |
| Lab pH | | 4.38 | 8.74 | 6.895 | 6.799 | 432 | 4.20 | 10.0 | 7.70 | 7.66 |
| Total Alkalinity | µeq/L | 0.00 | 1730 | 233 | 357 | 432 | 0.00 | 4797 | 1020 | 1241 |
| Specific Conductivity | µS/cm | 10.36 | 172.50 | 31.95 | 45.7 | 399 | 11.0 | 481 | 125 | 144 |
| Dissolved Organic Carbon | mg/L | 7.00 | 45.80 | 21.05 | 22.0 | 383 | 0.2 | 60.0 | 19.4 | 20.4 |
| Sodium | mg/L | 0.60 | 9.90 | 1.55 | 2.28 | 432 | 0.28 | 49.0 | 2.00 | 4.07 |
| Potassium | mg/L | 0.018 | 438.298 | 0.395 | 0.483 | 432 | 0.05 | 14.0 | 0.620 | 0.943 |
| Calcium | mg/L | 0.00 | 21.20 | 4.49 | 5.62 | 432 | 0.25 | 64.0 | 14.3 | 17.0 |
| Magnesium | mg/L | 0.17 | 7.72 | 1.58 | 1.96 | 432 | 0.05 | 28.0 | 4.3 | 5.34 |
| Sum of Base Cations | µeq/L | 8.79 | 1922.21 | 453 | 559. | 432 | 46.0 | 5770 | 1247 | 1487 |
| Chloride | mg/L | 0.02 | 2.21 | 0.14 | 0.27 | 429 | 0.01 | 18.0 | 0.490 | 1.09 |
| Sulphate | mg/L | 0.02 | 12.01 | 1.18 | 2.21 | 431 | 0.025 | 99.0 | 2.50 | 6.73 |
| Nitrate + Nitrite | µg/L | 0.5 | 379 | 1.5 | 29 | 329 | 0.02 | 1860 | 2.00 | 21.0 |
| Ammonia | µg/L | 8 | 71 | 18 | 21 | 320 | 0.22 | 650 | 11.4 | 31.8 |
| Total Nitrogen | µg/L | 357 | 5740 | 912 | 1181 | 150 | 183 | 1904 | 861 | 869 |
| Total Phosphorus | µg/L | 5 | 208 | 37 | 52 | 426 | 3.00 | 495 | 49.0 | 66.6 |

Note: Shaded variables represent significantly different means using a student's t-test or non-parametric test when variances were not homogenous (p<0.05).

Figure G.4-1 Box plots of selected variables for the RAMP ASL component lakes in 2010 versus 432 regional lakes reported by the NSMWG (WRS 2004).

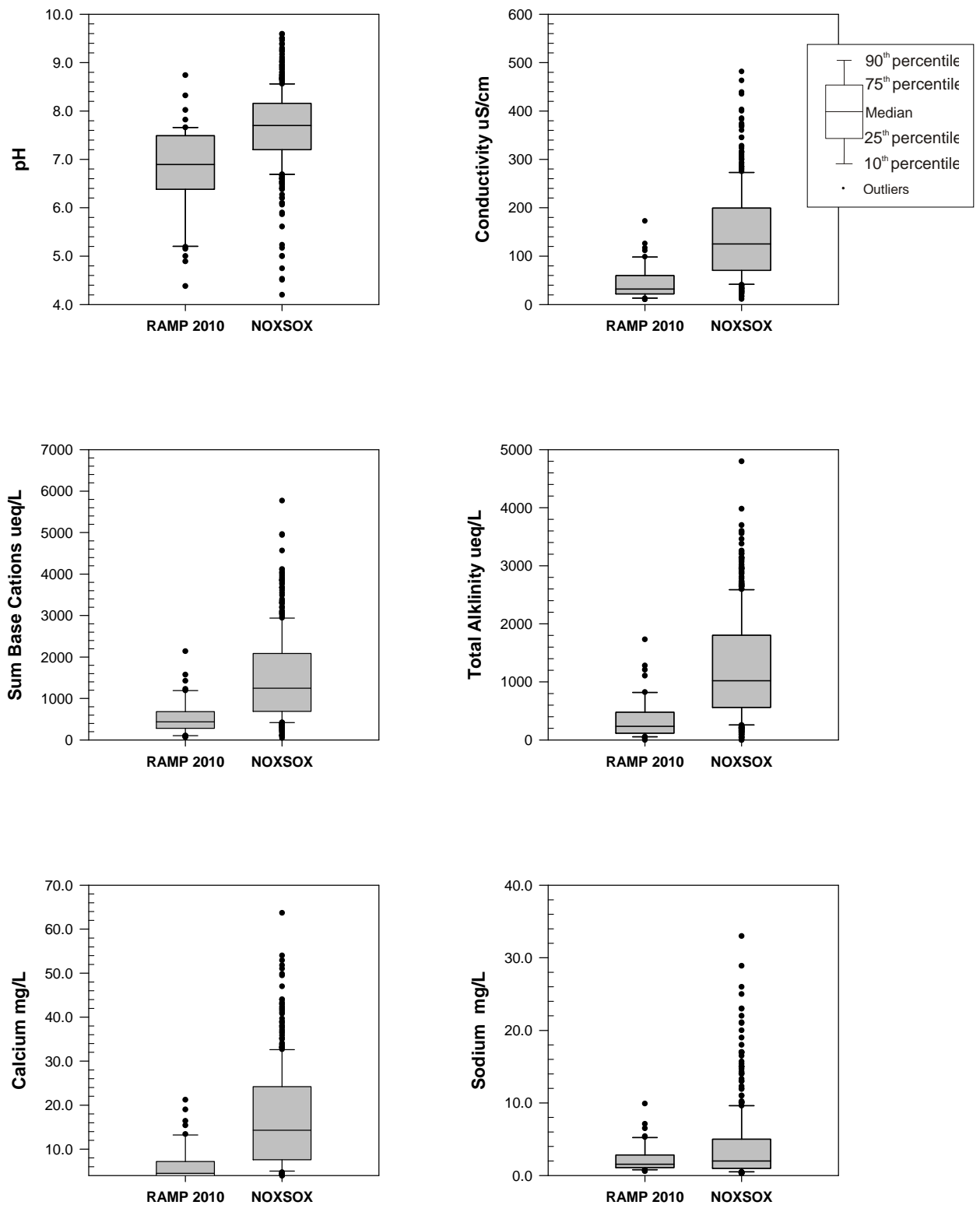
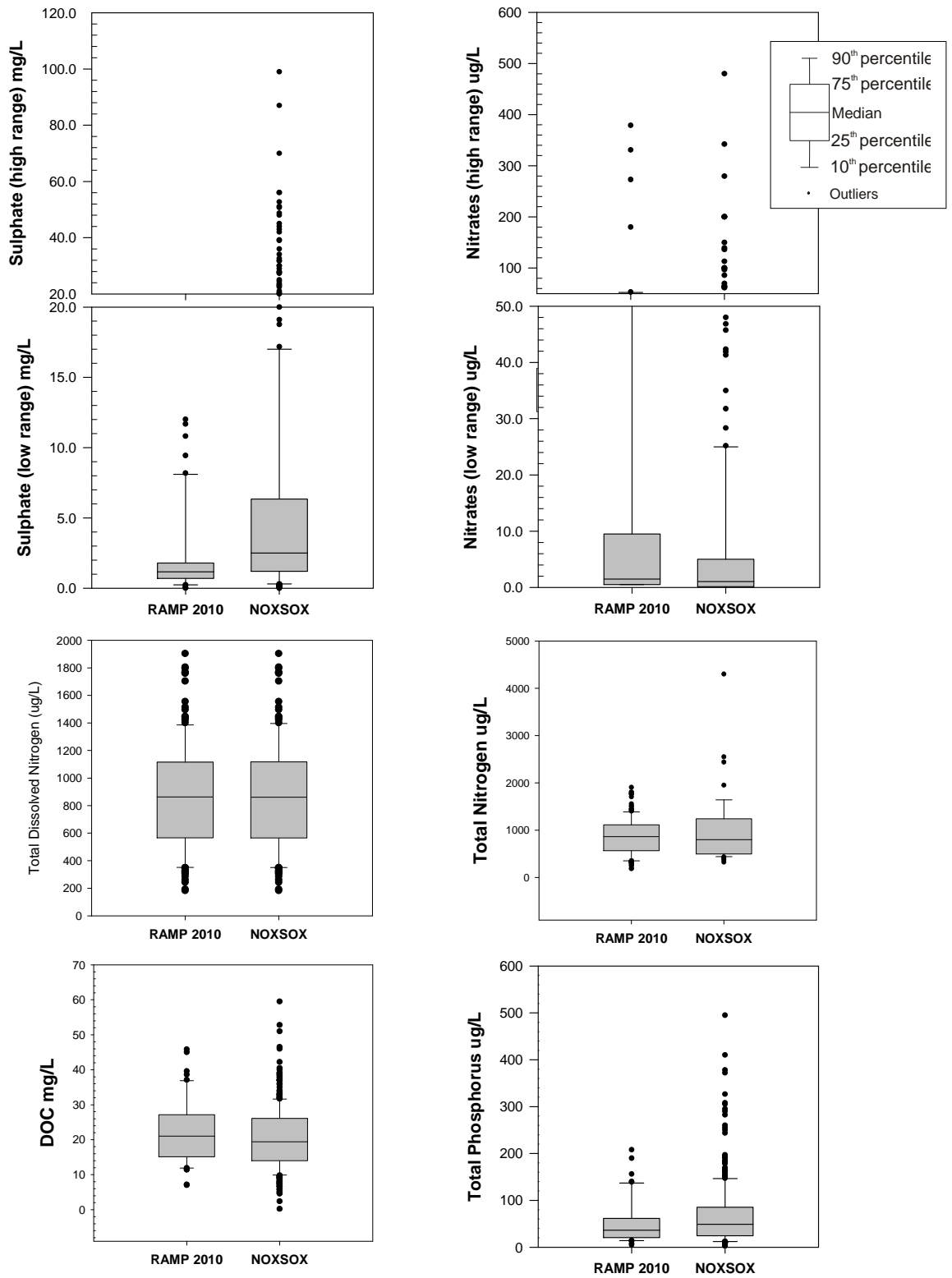


Figure G.4-1 (Cont'd.)



G.5 CHARACTERIZATION OF RAMP ASL COMPONENT LAKES BY ION COMPOSITION

In order to characterize water in each RAMP ASL component lake, the major anions and cations were displayed in piper plots (Figure G.6-1). A piper plot is a multivariate graphical technique that is used to divide the lakes into four types of water on the basis of major cation constituents (Güler *et al.* 2002, Freeze and Cherry 1979, Back and Hanshaw 1965):

- Type I Ca^{2+} - Mg^{2+} - HCO_3^- ;
- Type II Na^+ - K^+ - HCO_3^- ;
- Type III Na^+ - K^+ - Cl^- - SO_4^{2-} ; and
- Type IV Ca^{2+} - Mg^{2+} - Cl^- - SO_4^{2-} .

The piper plots for the 2010 data show that the majority of the lakes are of the Ca-Mg-Bicarbonate type (Type I). In 2010, seven lakes had greater than 40% of the anion charge attributed to sulphate and chloride rather than bicarbonates and carbonates and tended towards Type IV water. These seven lakes are listed in Table G.5-1 with other relevant chemical characteristics. Most of these lakes are found in the Birch Mountains and Stony Mountains subregions and represent lakes that are small (in both area and volume), with low Gran alkalinity, pH, conductivity, and relatively high DOC.

Seven lakes in 2010 had over 40% of the cationic charge attributable to sodium and potassium (Table G.5-2). Six of these lakes were found in the Stony and Birch Mountains subregions and one lake (Lake 88/S5) was found in the Canadian Shield region.

Table G.5-1 Key chemical characteristics of seven RAMP ASL component lakes with greater than 40% of anion charge attributed to sulphate and chloride, 2010.

| Lake | AENV Name | pH | Gran Alkalinity ($\mu\text{eq/L}$) | Conductivity ($\mu\text{S/cm}$) | DOC (mg/L) | Lake Area (km^2) | Lake Volume (10^9m^3) |
|-----------------------------------|-----------|------|--------------------------------------|-----------------------------------|------------|-----------------------------|----------------------------------|
| Stony Mountains Sub-Region | | | | | | | |
| 169 | SM 10 | 4.89 | -2.2 | 11.14 | 15.1 | 1.45 | 0.21 |
| 287 | SM 8 | 5.32 | 10.0 | 10.36 | 11.4 | 2.18 | 0.12 |
| Birch Mountains Sub-Region | | | | | | | |
| 448 | BM 7 | 4.38 | -35.2 | 17.2 | 21.9 | 0.65 | 0.56 |
| 454 | BM 8 | 6.74 | 212 | 48.6 | 19.9 | 1.20 | |
| 455 | BM 4 | 6.84 | 252 | 58.6 | 22.2 | 4.31 | 0.27 |
| 457 | BM 5 | 6.65 | 140 | 51.6 | 23.2 | 2.16 | 0.35 |
| 464 | BM 3 | 6.88 | 232 | 59.5 | 17.4 | 0.91 | |

Table G.5-2 Key chemical characteristics of seven RAMP ASL component lakes with greater than 40% of cation charge attributable to sodium and potassium, 2010.

| Lake | AENV Name | pH | Gran Alkalinity (µeq/L) | Conductivity (µS/cm) | DOC (mg/L) | Lake Area (km ²) |
|-----------------------------------|-----------|------|-------------------------|----------------------|------------|------------------------------|
| Stony Mountains Sub-Region | | | | | | |
| 168 | SM 10 | 5.19 | 14.0 | 12.87 | 17.0 | 1.38 |
| 170 | SM 6 | 5.77 | 34 | 11.6 | 14.8 | 0.71 |
| 169 | SM 9 | 4.89 | -2.2 | 11.14 | 15.1 | 1.45 |
| 167 | SM 5 | 5.98 | 46 | 10.48 | 13.1 | 1.05 |
| 287 | SM 8 | 5.32 | 10.0 | 10.36 | 11.4 | 2.18 |
| Birch Mountains Sub-Region | | | | | | |
| 448 | BM 7 | 4.38 | -35.2 | 17.2 | 21.9 | 0.65 |
| Canadian Shield Sub-Region | | | | | | |
| 88 | S 5 | 6.94 | 170 | 28.3 | 20.0 | 0.702 |

G.6 ANALYSIS OF METALS IN THE RAMP ASL COMPONENT LAKES

Metals, in particular, aluminum, can serve as important indicators of lake acidification. Concentrations of metals in the RAMP ASL component lakes are provided in the RAMP database and summarized in Table G.6-1 and Table G.6-2 for total and dissolved fractions, respectively. The mean concentration of trace metals in lakes in each sub-region are provided in Table G.6-3.

Generally, concentrations of trace metals were quite low and many were less than detection limits. The highest concentrations of trace metals were found in the upland regions, in particular the Birch Mountains (Table G.6-3). In the Birch Mountain sub-region, 52 individual metals in 11 lakes had mean concentrations greater than the 95th percentile for all lakes combined (Table G.6-3). The distribution of dissolved aluminum, lead and cobalt in the ASL component lakes show the higher concentrations of trace metals in these upland regions (Figure G.6-2 to Figure G.6-5).

Lakes with the highest concentrations of metals include those identified in the piper plots as having more than 40% of the anionic charge attributed to chloride and sulphate rather than bicarbonates (Figure G.6-1 and Table G.5-1). The reason for higher concentrations of metals in the Birch Mountains are unclear but may be related to the relatively low average pH in these lakes (Table G.6-4). The high levels of chlorides/sulphates as well as high levels of barium in the Birch Mountain subregion lakes suggest a potential groundwater source for these metals. The relatively high concentrations of metals in these lakes are natural in origin rather than the result of industrial emissions.

Figure G.6-1 Piper plots showing the proportion of major cations and anions in the RAMP ASL component lakes, 2010.

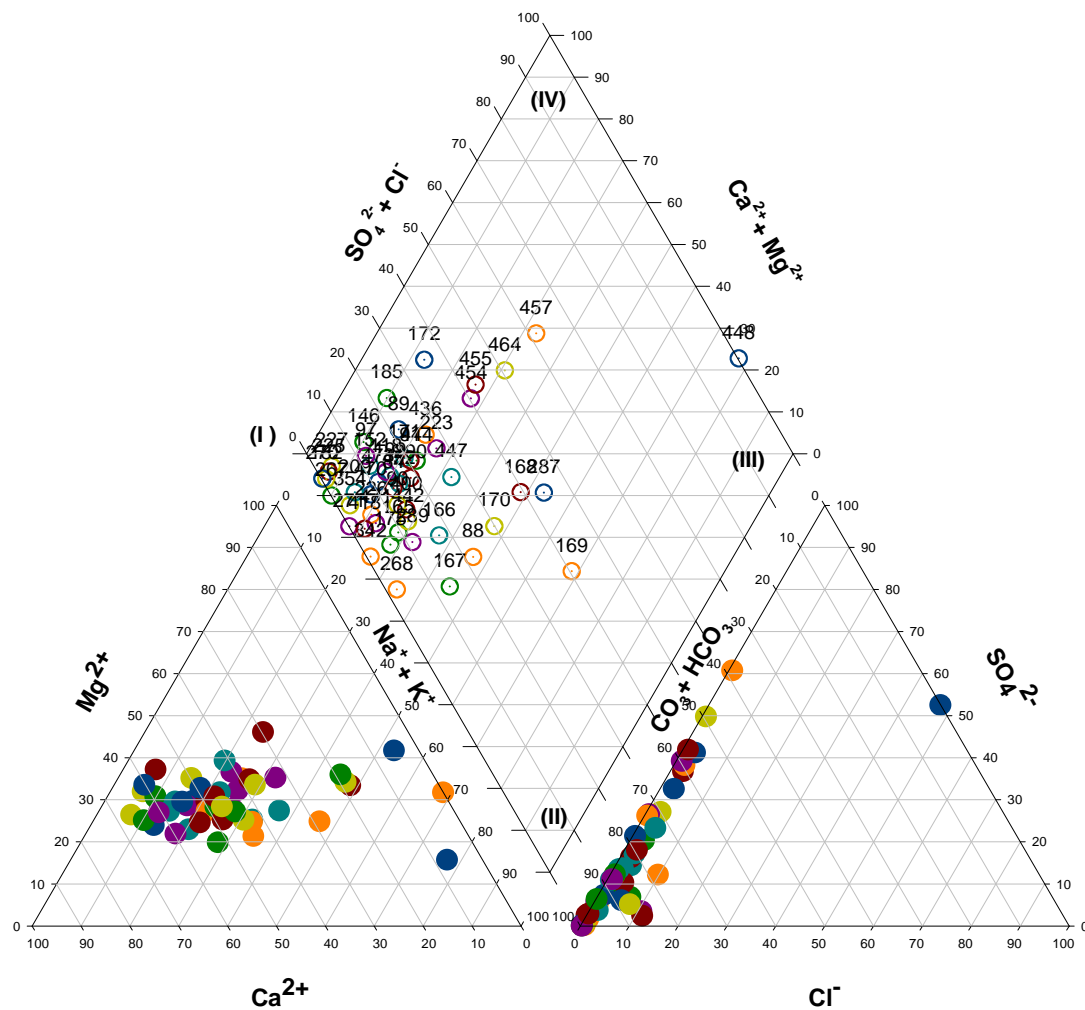


Table G.6-1 Statistical summary of total trace metals in the RAMP ASL component lakes across all lakes and years.

| Metal (µg/L) | All Years (2001 to 2010) | | | | | | 2010 | | | | | |
|--------------|--------------------------|---------|---------|--------|---------|-------|---------|---------|---------|---------|---------|---------------|
| | Maximum | Minimum | Mean | Median | 95%tile | Count | Maximum | Minimum | Mean | Median | 95%tile | % Non-Detects |
| Ag | 0.042 | 0.00025 | 0.00474 | 0.0025 | 0.02002 | 419 | 0.006 | 0.00025 | 0.00157 | 0.00105 | 0.0040 | 29.2 |
| Al | 8694 | 0.25 | 201.7 | 64.1 | 721.9 | 419 | 803 | 6.1 | 119 | 47.9 | 475 | 0 |
| As | 2.9 | 0.13 | 0.508 | 0.399 | 1.24 | 418 | 2.22 | 2.22 | 0.517 | 0.384 | 1.42 | 0 |
| Ba | 83.2 | 1.24 | 14.7 | 11.8 | 34.7 | 419 | 37.3 | 3.52 | 14.1 | 11.3 | 35.095 | 0 |
| Be | 55.7 | 0.0015 | 1.45 | 0.0135 | 9.73 | 419 | 0.0844 | 0.0015 | 0.0150 | 0.0106 | 0.0497 | 18.8 |
| Bi | 0.359 | 0.0005 | 0.00711 | 0.003 | 0.021 | 419 | 0.0134 | 0.0005 | 0.0035 | 0.0022 | 0.0102 | 20.8 |
| B | 62 | 0.0005 | 10.7 | 7.28 | 28.2 | 419 | 50.1 | 2.8 | 12.5 | 8.4 | 27.33 | 0 |
| Cd | 9.94 | 0.001 | 0.0444 | 0.0108 | 0.0642 | 419 | 0.0564 | 0.001 | 0.0111 | 0.0069 | 0.032 | 10.4 |
| Co | 2.2 | 0.0005 | 0.165 | 0.0874 | 0.528 | 419 | 0.813 | 0.0012 | 0.146 | 0.081 | 0.641 | 0 |
| Cr | 7.3 | 0.015 | 0.409 | 0.25 | 1.37 | 419 | 1.44 | 0.02 | 0.258 | 0.190 | 0.821 | 6.25 |
| Cu | 16.7 | 0.025 | 0.651 | 0.32 | 1.96 | 419 | 1.59 | 0.025 | 0.333 | 0.222 | 1.18 | 2.1 |
| Fe | 6528 | 2.37 | 617.8 | 369 | 2212.8 | 419 | 3480 | 7.78 | 565 | 342.5 | 2141 | 0 |
| Hg | 0.074 | 0.005 | 0.00692 | 0.005 | 0.0133 | 118 | - | - | - | - | - | - |
| Li | 16.9 | 0.01 | 2.55 | 1.7 | 8.12 | 419 | 9.53 | 0.116 | 2.465 | 1.725 | 7.57 | 0 |
| Mn | 260 | 3.24 | 42.2 | 29.6 | 119 | 419 | 177 | 3.24 | 38.945 | 26.6 | 97.57 | 0 |
| Mo | 1.1 | 0.0019 | 0.122 | 0.0879 | 0.369 | 419 | 0.471 | 0.004 | 0.101 | 0.0742 | 0.2602 | 0 |
| Ni | 46 | 0.0025 | 0.774 | 0.33 | 3.311 | 419 | 3.98 | 0.0025 | 0.536 | 0.2345 | 2.23 | 6.25 |
| Pb | 95.3 | 0.0079 | 0.463 | 0.139 | 0.7257 | 419 | 0.686 | 0.0155 | 0.137 | 0.0951 | 0.459 | 0 |
| Sb | 0.2 | 0.002 | 0.0293 | 0.02 | 0.09 | 419 | 0.117 | 0.0078 | 0.0265 | 0.0189 | 0.0761 | 0 |
| Se | 0.9 | 0.02 | 0.128 | 0.076 | 0.25 | 419 | 0.351 | 0.05 | 0.0810 | 0.05 | 0.192 | 70.8 |
| Sn | 3.02 | 0.015 | 0.111 | 0.015 | 0.387 | 419 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 100 |
| Sr | 109 | 2.61 | 23.5 | 19.1 | 57.53 | 419 | 69.3 | 2.86 | 24.5 | 19.1 | 53.22 | 0 |
| Th | 0.72 | 0.00015 | 0.0330 | 0.0109 | 0.1306 | 419 | 0.201 | 0.0007 | 0.0292 | 0.0111 | 0.115 | 0 |
| Ti | 79 | 0.1 | 3.14 | 1.1 | 13.04 | 419 | 15.4 | 0.257 | 2.0466 | 1.095 | 6.48 | 0 |
| Tl | 0.077 | 0.00015 | 0.00388 | 0.0022 | 0.0128 | 419 | 0.0186 | 0.0004 | 0.00402 | 0.00295 | 0.0110 | 0 |
| U | 0.432 | 0.0004 | 0.0427 | 0.0143 | 0.184 | 419 | 0.346 | 0.0004 | 0.0365 | 0.0122 | 0.131 | 0 |
| V | 15.5 | 0.0025 | 0.781 | 0.371 | 3.051 | 419 | 4.39 | 0.0299 | 0.605 | 0.342 | 2.20 | 0 |
| Zn | 34.4 | 0.131 | 3.81 | 3.12 | 9.073 | 419 | 13.9 | 0.131 | 2.52 | 1.625 | 6.91 | 0 |

For the purposes of calculating statistics, non-detectable metal concentrations were assumed to be one-half of the detection limit reported by the laboratory. Shaded values are non-detectable with the value in each cell equivalent to one-half of the detection limit.

Table G.6-2 Statistical summary of dissolved trace metals in the RAMP ASL component lakes across all lakes and years.

| Metal (µg/L) | 2003-2010 | | | | | | 2010 | | | | | |
|--------------|-----------|---------|---------|---------|---------|-------|---------|---------|---------|---------|---------|---------------|
| | Maximum | Minimum | Mean | Median | 95%tile | Count | Maximum | Minimum | Mean | Median | 95%tile | % Non-Detects |
| Ag | 0.0122 | 0.00025 | 0.00136 | 0.00025 | 0.006 | 316 | 0.006 | 0.00025 | 0.00085 | 0.00025 | 0.00359 | 66.7 |
| Al | 681 | 0.10 | 70.7 | 26.1 | 328.5 | 316 | 566 | 0.364 | 67.6 | 21.75 | 289 | 0 |
| As | 2 | 0.08 | 0.435 | 0.338 | 1.033 | 316 | 1.52 | 0.118 | 0.445 | 0.336 | 1.25 | 0 |
| Ba | 33.4 | 0.982 | 11.3 | 9.60 | 24.9 | 316 | 29.4 | 3.11 | 11.4 | 9.485 | 25.13 | 0 |
| Be | 0.3 | 0.0015 | 0.0162 | 0.00720 | 0.0570 | 316 | 0.0626 | 0.0015 | 0.0121 | 0.0076 | 0.0396 | 0 |
| Bi | 0.053 | 0.0005 | 0.00443 | 0.00250 | 0.014 | 316 | 0.0133 | 0.0005 | 0.00326 | 0.00185 | 0.0101 | 18.8 |
| B | 62.3 | 1.8 | 10.9 | 7.165 | 26.2 | 316 | 48.3 | 2.1 | 11.2 | 7.58 | 25.6 | 33.3 |
| Cd | 5.82 | 0.001 | 0.0313 | 0.00635 | 0.0411 | 316 | 0.0371 | 0.001 | 0.0075 | 0.0048 | 0.0242 | 31.3 |
| Co | 1.27 | 0.0005 | 0.112 | 0.0420 | 0.411 | 316 | 0.708 | 0.0005 | 0.111 | 0.0419 | 0.577 | 2.1 |
| Cr | 1.88 | 0.02 | 0.232 | 0.170 | 0.662 | 316 | 1.12 | 0.02 | 0.199 | 0.154 | 0.533 | 8.3 |
| Cu | 2.13 | 0.005 | 0.420 | 0.269 | 1.34 | 316 | 1.5 | 0.005 | 0.316 | 0.2195 | 1.08 | 2.1 |
| Fe | 3130 | 0.01 | 369.2 | 119.5 | 1595 | 316 | 2260 | 0.01 | 366 | 125.5 | 1921.5 | 4.2 |
| Li | 16.4 | 0.01 | 2.36 | 1.51 | 7.37 | 272 | 9.21 | 0.01 | 2.33 | 1.685 | 7.18 | 2.1 |
| Mn | 248 | 0.07 | 17.6 | 3.24 | 66.2 | 316 | 88.9 | 0.0899 | 15.0 | 3.715 | 61.9 | 0 |
| Mo | 1.43 | 0.0005 | 0.104 | 0.0708 | 0.329 | 316 | 0.454 | 0.0027 | 0.0899 | 0.0634 | 0.248 | 0 |
| Ni | 0.0025 | 0.0025 | 3.79 | 0.502 | 0.220 | 316 | 3.45 | 0.0025 | 0.466 | 0.206 | 1.91 | 4.2 |
| Pb | 16.3 | 0.0005 | 0.153 | 0.0471 | 0.390 | 316 | 0.567 | 0.0022 | 0.076 | 0.02915 | 0.299 | 0 |
| Sb | 0.167 | 0.002 | 0.0281 | 0.0192 | 0.0845 | 316 | 0.116 | 0.0077 | 0.0262 | 0.0187 | 0.0754 | 0 |
| Se | 0.9 | 0.005 | 0.0987 | 0.050 | 0.25 | 316 | 0.259 | 0.05 | 0.0704 | 0.05 | 0.177 | 81.3 |
| Sn | 0.065 | 0.015 | 0.0220 | 0.015 | 0.05 | 316 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 100.0 |
| Sr | 101 | 2.4 | 22.2 | 18 | 54.4 | 316 | 64.9 | 2.44 | 23.1 | 18.1 | 50.5 | 0 |
| Th | 0.281 | 0.00015 | 0.0262 | 0.0102 | 0.112 | 316 | 0.199 | 0.0007 | 0.028 | 0.011 | 0.11437 | 0 |
| Ti | 13.8 | 0.02 | 1.24 | 0.474 | 5.95 | 316 | 12.5 | 0.02 | 1.29 | 0.4815 | 5.65 | 2.1 |
| Tl | 0.043 | 0.00015 | 0.00301 | 0.0019 | 0.0084 | 316 | 0.0132 | 0.0004 | 0.00341 | 0.0027 | 0.00952 | 0 |
| U | 0.365 | 0.0002 | 0.0300 | 0.0088 | 0.130 | 316 | 0.299 | 0.0002 | 0.0302 | 0.00825 | 0.122 | 0 |
| V | 3.34 | 0.011 | 0.391 | 0.214 | 1.59 | 316 | 3.34 | 0.0296 | 0.379 | 0.1975 | 1.22 | 0 |
| Zn | 29.5 | 0.13 | 3.05 | 2.45 | 6.93 | 316 | 7.62 | 0.13 | 2.10 | 1.52 | 5.594 | 0 |

For the purposes of calculating statistics, non-detectable metal concentrations were assumed to be one-half of the detection limit reported by the laboratory. Shaded values are non-detectable with the value in each cell equivalent to one-half of the detection limit.

Table G.6-3 Mean concentrations of total and dissolved trace metals in the RAMP ASL component lakes in each sub-region (all years combined).

| Metal | Mean Concentrations µg/L - Dissolved Metals | | | | | | Mean Concentrations µg/L - Total Metals | | | | | |
|-------|---|--------|---------|--------|---------|--------|---|--------|---------|--------|---------|--------|
| | SM | WFM | NEFM | BM | CS | CM | SM | WFM | NEFM | BM | CS | CM |
| Ag | 0.0011 | 0.0008 | 0.0009 | 0.0025 | 0.0008 | 0.0016 | 0.0048 | 0.0032 | 0.0048 | 0.0069 | 0.0023 | 0.0043 |
| Al | 79.6 | 17.9 | 35.8 | 150.7 | 18.0 | 63.5 | 278.4 | 48.7 | 65.5 | 456.7 | 38.1 | 143.1 |
| As | 0.333 | 0.342 | 0.384 | 0.709 | 0.181 | 0.492 | 0.396 | 0.402 | 0.402 | 0.856 | 0.198 | 0.586 |
| Ba | 8.00 | 9.37 | 10.1 | 17.1 | 5.97 | 15.00 | 10.2 | 14.0 | 12.8 | 22.6 | 7.11 | 17.5 |
| B | 6.54 | 12.9 | 11.2 | 17.5 | 5.75 | 5.21 | 6.82 | 12.9 | 10.4 | 16.9 | 6.28 | 5.78 |
| Be | 0.0162 | 0.0048 | 0.0097 | 0.0287 | 0.0195 | 0.0144 | 0.908 | 1.87 | 1.64 | 2.07 | 0.796 | 0.716 |
| Bi | 0.0053 | 0.0035 | 0.0034 | 0.0055 | 0.0025 | 0.0054 | 0.0077 | 0.0057 | 0.0073 | 0.0094 | 0.0030 | 0.0062 |
| Cd | 0.0176 | 0.0120 | 0.0962 | 0.0177 | 0.0043 | 0.0101 | 0.0267 | 0.0211 | 0.0211 | 0.0272 | 0.00733 | 0.0192 |
| Co | 0.154 | 0.0463 | 0.0633 | 0.216 | 0.0167 | 0.0619 | 0.215 | 0.0857 | 0.0945 | 0.313 | 0.0375 | 0.119 |
| Cr | 0.212 | 0.142 | 0.198 | 0.348 | 0.228 | 0.228 | 0.351 | 0.204 | 0.293 | 0.792 | 0.246 | 0.358 |
| Cu | 0.379 | 0.197 | 0.237 | 0.698 | 0.339 | 0.664 | 0.579 | 0.557 | 0.540 | 0.887 | 0.360 | 0.902 |
| Fe | 263.3 | 107.0 | 187.8 | 835.3 | 162.2 | 478.4 | 445.3 | 297.2 | 407.0 | 1239.7 | 337.0 | 726.8 |
| Hg | | | | | | | 0.005 | 0.005 | 0.00661 | 0.005 | 0.005 | 0.0179 |
| Li | 0.839 | 2.63 | 1.93 | 4.94 | 1.11 | 1.45 | 0.892 | 2.86 | 1.94 | 5.28 | 1.34 | 1.64 |
| Mn | 26.3 | 19.04 | 11.9 | 24.1 | 1.80 | 6.52 | 41.4 | 68.6 | 41.3 | 46.1 | 24.7 | 16.8 |
| Mo | 0.102 | 0.0454 | 0.0449 | 0.178 | 0.141 | 0.117 | 0.103 | 0.0644 | 0.0631 | 0.195 | 0.179 | 0.140 |
| Ni | 0.341 | 0.132 | 0.147 | 1.302 | 0.115 | 0.641 | 1.036 | 0.273 | 0.220 | 1.65 | 0.147 | 0.779 |
| Pb | 0.105 | 0.0686 | 0.294 | 0.195 | 0.0300 | 0.105 | 0.225 | 0.166 | 1.22 | 0.389 | 0.187 | 0.210 |
| Sb | 0.0230 | 0.0179 | 0.0175 | 0.0535 | 0.0117 | 0.0323 | 0.024 | 0.0198 | 0.0179 | 0.057 | 0.0116 | 0.0325 |
| Se | 0.0940 | 0.0829 | 0.0848 | 0.128 | 0.104 | 0.0883 | 0.123 | 0.101 | 0.114 | 0.171 | 0.124 | 0.116 |
| Sn | 0.0203 | 0.0210 | 0.0230 | 0.0222 | 0.0241 | 0.0225 | 0.0927 | 0.0256 | 0.0645 | 0.151 | 0.183 | 0.206 |
| Sr | 9.32 | 32.7 | 24.8 | 26.6 | 29.6 | 12.4 | 9.87 | 34.6 | 24.8 | 28.2 | 31.5 | 13.1 |
| Th | 0.0222 | 0.0071 | 0.0096 | 0.0567 | 0.0176 | 0.0352 | 0.026 | 0.0109 | 0.0101 | 0.0808 | 0.0169 | 0.0343 |
| Ti | 1.11 | 1.11 | 0.524 | 2.93 | 0.446 | 1.03 | 2.96 | 1.13 | 1.20 | 7.72 | 0.852 | 0.852 |
| Tl | 0.0045 | 0.0016 | 0.00180 | 0.0037 | 0.00340 | 0.0024 | 0.0048 | 0.0023 | 0.0017 | 0.0071 | 0.0024 | 0.0030 |
| U | 0.0124 | 0.0047 | 0.0059 | 0.0467 | 0.1050 | 0.0535 | 0.0222 | 0.0084 | 0.0083 | 0.0646 | 0.1357 | 0.0640 |
| V | 0.345 | 0.192 | 0.309 | 0.783 | 0.0945 | 0.305 | 0.675 | 0.360 | 0.495 | 1.76 | 0.168 | 0.586 |
| Zn | 3.41 | 2.81 | 2.64 | 4.25 | 0.947 | 2.56 | 4.11 | 3.32 | 3.53 | 5.38 | 1.25 | 3.51 |

SM = Stony Mountains, WFM = west of Fort McMurray, NEFM = north east of Fort McMurray, BM = Birch Mountains, CS = Canadian Shield, CM = Caribou Mountains
 For purposes of calculating statistics, non-detectable metal concentrations were assumed to be one-half of the detection limit reported by the laboratory.

Figure G.6-2 Concentrations of dissolved aluminum in the ASL component lakes.

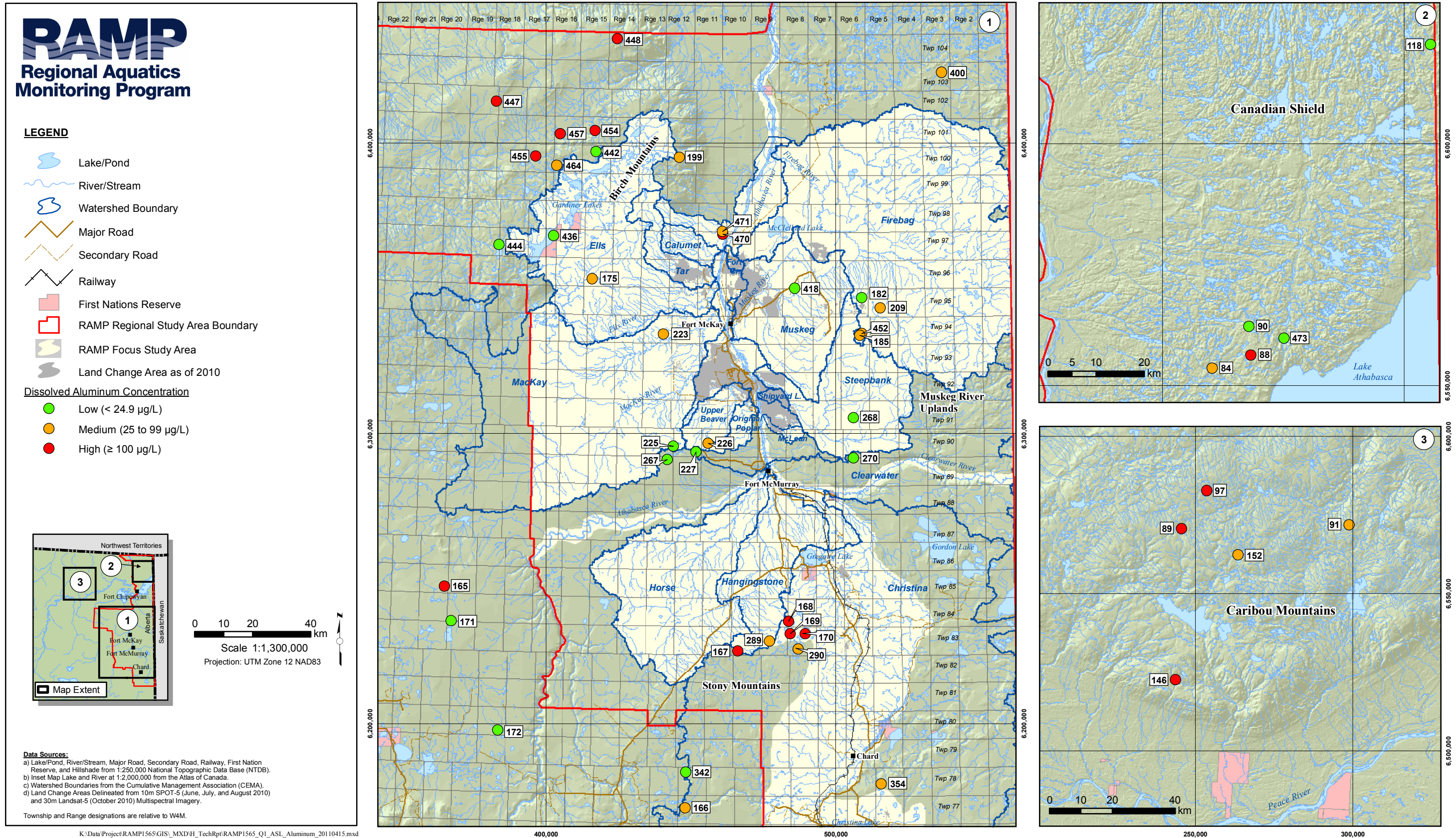


Figure G.6-3 Concentration of dissolved lead in the ASL component lakes.

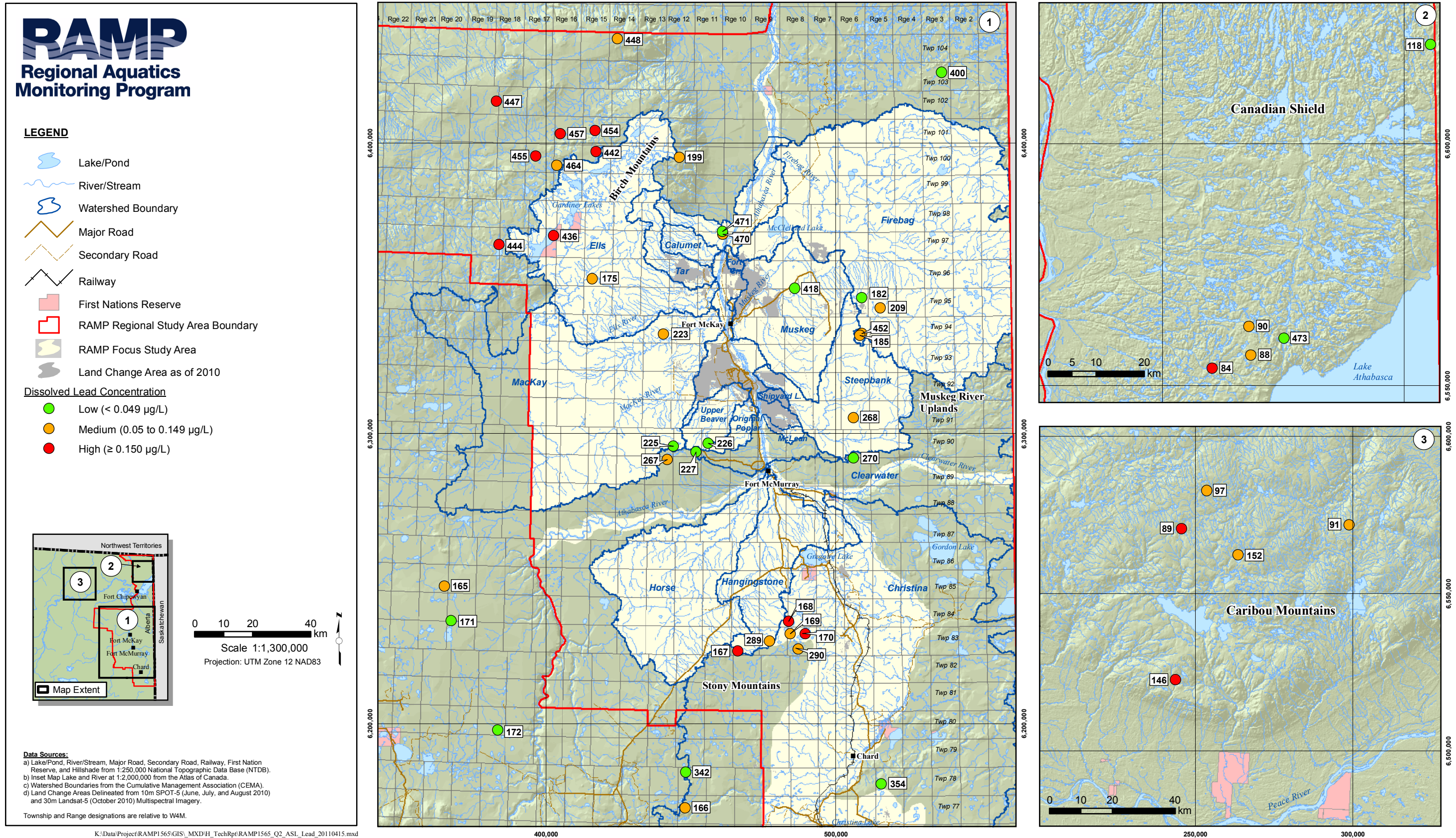
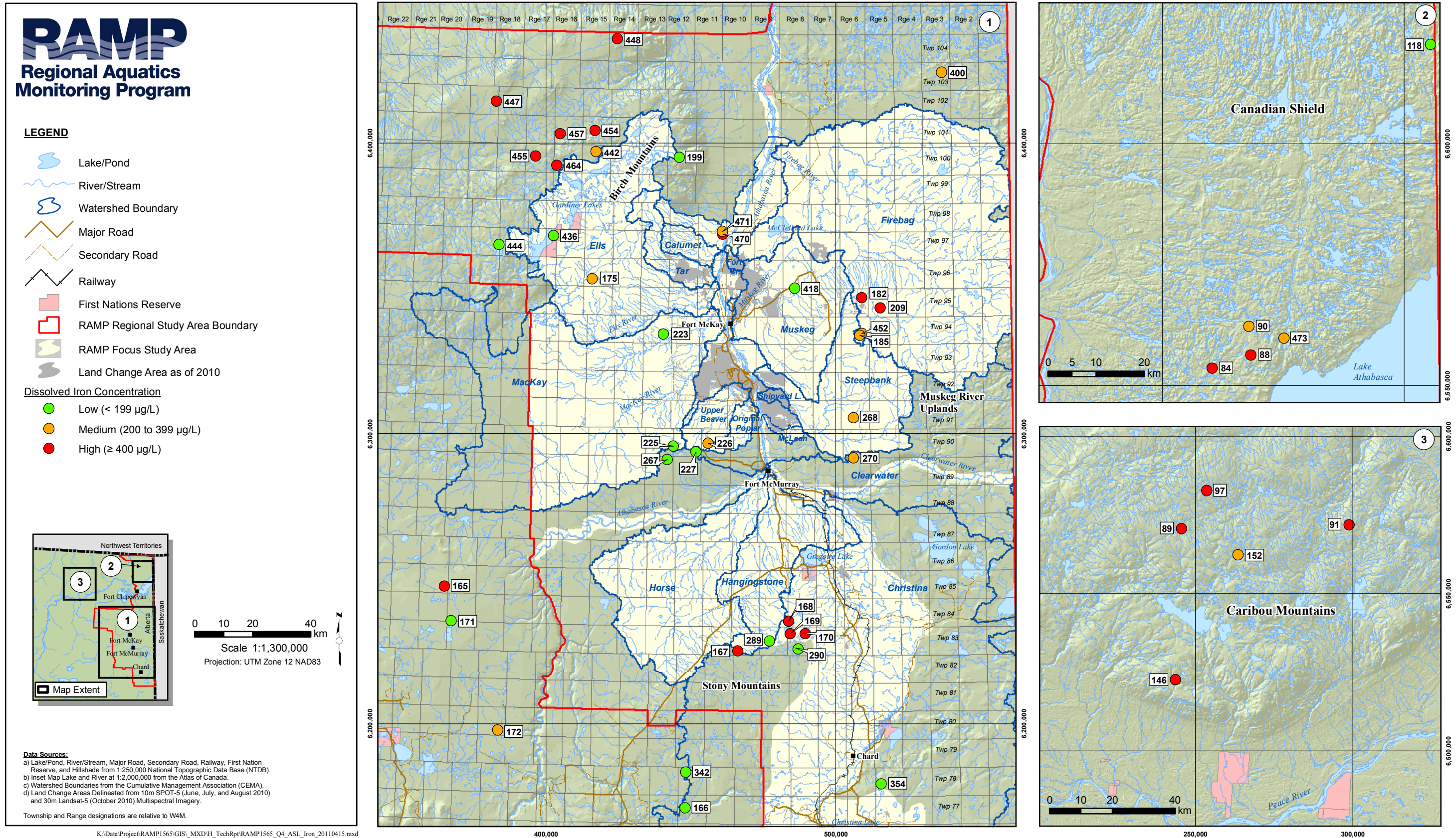


Figure G.6-5 Concentrations of dissolved iron in the ASL component lakes.



The number of exceedances of CCME Surface Water Quality Guidelines for the protection of aquatic life and the lakes in which these are found are indicated in Table G.6-5. Exceedances were observed in concentrations of aluminum, iron and cadmium, copper, and lead. The guideline exceedances are scattered throughout the various sub-regions, with a large proportion from lakes in the Birch Mountains subregion consistent with the high concentrations of metals found in this subregion. Concentrations of cadmium were exceeded in eight lakes. As the CCME guideline for cadmium (0.018 µg/L; hardness of 50 mg/L) is extremely low, exceedances of this metal occurs occasionally in surface waters in the Athabasca oil sands region. The exceedances in Table G.6-5 are considered to be natural occurrences.

Table G.6-4 Number of lakes in each subregion with mean concentrations of trace metals exceeding the 95th percentile.

| Sub-Region | No. of Lakes in Subregion | No. of Trace Metals Where Mean > 95 th Percentile ¹ | Ratio of No. of Trace Metals > 95 th Percentile to No. of Lakes ² | Mean pH (2010) |
|-----------------------------|---------------------------|---|---|----------------|
| Stony Mountains | 10 | 3 | 0.3 | 6.11 |
| West of Fort McMurray | 8 | 5 | 0.625 | 7.02 |
| North-East of Fort McMurray | 11 | 13 | 1.18 | 7.18 |
| Birch Mountains | 11 | 52 | 4.73 | 6.58 |
| Canadian Shield | 5 | 3 | 0.6 | 7.35 |
| Caribou Mountains | 5 | 1 | 0.2 | 6.93 |
| Sum | 50 | 77 | | |

¹ Mean metal concentration for each lake calculated over all years;

² 95th percentile calculated for each metal over all lakes and years.

Table G.6-5 List of exceedances of CCME surface water quality guidelines for concentrations of metals, 2010.

| Metal | Number of Exceedances | Lakes with Exceedances |
|-------|-----------------------|---|
| Al | 15 | 168, 169, 170, 167, 165, 470, 447, 448, 454, 455, 457, 88, 146, 89, 91 |
| Fe | 27 | 168, 169, 170, 167, 165, 172, 226, 470, 182, 185, 209, 442, 447, 448, 454, 455, 457, 464, 175, 84, 88, 90, 146, 152, 89, 97, 91 |
| Cd | 8 | 168, 169, 223, 442, 447, 448, 457, 455 |