Peace River Project Water Use Plan

Peace River Baseline TDGP/Temperature

Implementation Year 4

Reference: GMSWORKS-2

Study Period: January 2012 to December 2012

Diversified Environmental Services
Box 6263,
Fort St. John, B.C.
V1J 4H7

June 30, 2013

PEACE RIVER WATER USE PLAN
IMPLEMENTATION PROGRAM

PEACE RIVER BASELINE TDGP/TEMPERATURE
GMSWorks-2
YEAR 4 MONITORING PROGRAM - INTERIM REPORT
January 2012 to December 2012

Prepared for:
BC HYDRO
6911 Southpoint Drive, 11th Floor
Burnaby, BC
V3N 4H8

Prepared by:
Diversified Environmental Services
Box 6263
Fort St. John, BC
V1J 4H7

JUNE 30, 2013

EXECUTIVE SUMMARY

Long-term monitoring of baseline water temperature and total dissolved gas pressure (TDGP) in the vicinity of the WAC Bennett and Peace Canyon dams is an essential component of the Peace Spill Protocol and the Peace River Flood Pulse Plan as set out by the Peace Water Use Plan Committee and the Peace Water Use Plan (WUP; BC Hydro 2010). Data collected through the monitoring of these parameters will be used to help assess and quantify the environmental effects of spills, as well as to provide information on the temperature regime of the Peace River under normal operating conditions and the influence of reservoir operations on downstream temperature. Long-term baseline temperature data will also be available for use in other projects and monitoring programs within and outside of the Peace WUP. This report summarizes data collection and maintenance activities conducted at 18 monitoring sites located between the WAC Bennett Dam forebay (Williston Reservoir) and a point approximately 6.5 km downstream of the confluence of the Pine and Peace rivers during Year 4 (Jan 01, 2012 to Dec 31, 2012).

In situ reference temperatures were recorded at the time of each field download event using a certified laboratory-grade mercury thermometer calibrated in increments of 0.1°C, for comparison to the corresponding hourly logger readings. With the exception of 1 site (halfUP2), mean calibration errors for all temperature loggers were ≤ 0.3°C.

Results of Year 4 water temperature monitoring over the 132 km length of the study area indicate a moderating effect of hypolimnetic withdrawal from Williston Reservoir and seasonal effects associated with ambient air temperature. Minimum winter temperatures decrease and maximum summer temperatures increase with distance downstream from the facilities.

No significant logistical problems were encountered in Year 4. Short-term data gaps were observed at some stations downstream of tributary mouths due to loggers becoming stranded by out-flowing ice and large woody debris. Data gaps were generally covered by functioning back-up loggers at these locations.

On April 30, 2012, TDGP meters were deployed at 5 locations downstream of the WAC Bennett and Peace Canyon dams due to high probability of spill events at Peace Canyon. A sixth meter was deployed in the Williston Reservoir forebay on June 25 when spill events at the WAC Bennett Dam became imminent. TDGP data was downloaded in the field and sent to BC Hydro technical staff for use in operations planning and potential impact assessment and mitigation.

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1.0 INTRODUCTION

Long-term monitoring of baseline water temperature and total dissolved gas pressure (TDGP) in the vicinity of the WAC Bennett and Peace Canyon dams has been identified as an essential component of the Peace Spill Protocol and the Peace River Flood Pulse Plan as set out by the Peace Water Use Plan Committee and the Peace Water Use Plan (WUP; BC Hydro 2010). Data collected through the monitoring of these parameters will be used to help assess and quantify the environmental effects of spills, as well as to provide information on the temperature regime of the Peace River under normal operating conditions and the influence of reservoir operations on downstream temperature. Long-term baseline temperature data will also be available for use by other projects and monitoring programs within and outside the Peace WUP.

The objectives of this program are to collect data on spatial and temporal variations in water temperature between the WAC Bennett Dam forebay (Williston Reservoir) and a point 6.5 km downstream of the Pine River confluence for up to 10 years, and to maintain TDGP data loggers and related equipment for immediate deployment in the event of a spill event at either the Gordon M. Shrum (GMS) or Peace Canyon (PCN) generating stations. This report summarizes data collection activities completed during Year 4 of the monitoring program (January 01, 2012 to December 31, 2012).

2.0 METHODS

Temperature and TDGP data presented in this summary were recorded between January 01, 2012 and December 31, 2012.

2.1 Temperature Monitoring

Upon commencement of the Peace River baseline temperature monitoring program in September 2008 (Year 1), 20 Tidbit v2 Model #UTBI-001 temperature sensor/logger units (0.2°C accuracy over 0°C to 50°C; 0.02°C resolution @ 25°C; Onset Corp., Bourne, MA) were deployed at 18 locations between the WAC Bennett Dam forebay and a site approximately 6.5 km downstream of the confluence of the Pine and Peace rivers (Fig. 1). During Years 2 and 3, revisions were made to monitoring site positioning and configuration to account for changes in bank conditions, to reduce the potential for logger stranding due to debris and flow level extremes, to increase redundancy in case of logger failure or loss, and to improve accessibility during high flow stage.

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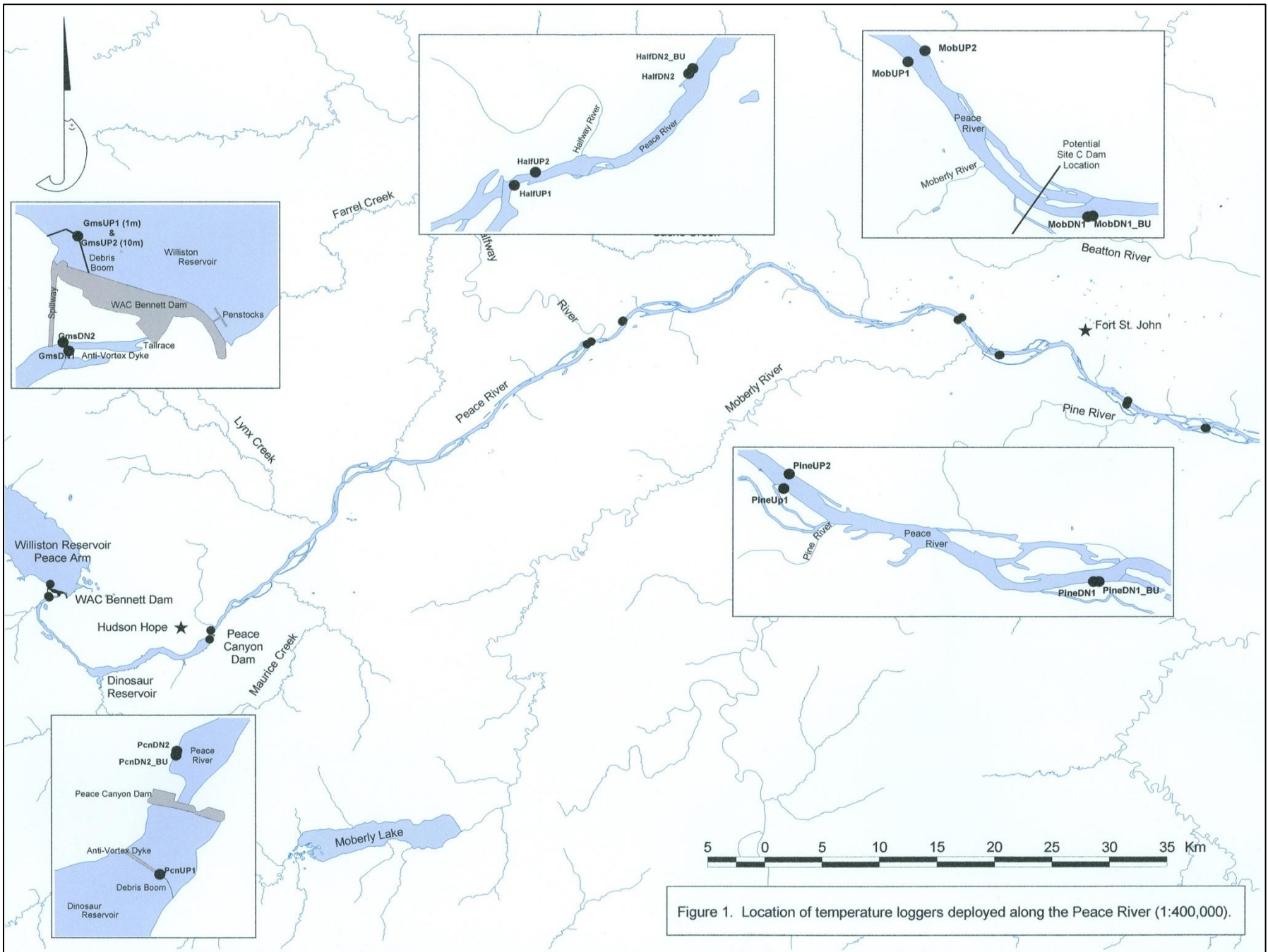
Figure 1. Location of temperature loggers deployed along the Peace River (1:400,000).

Monitoring stations are typically maintained in pairs at each general location in order to minimize the risk of data gaps in the event of logger stranding, failure, or loss. At Peace River locations upstream of major tributaries (Halfway, Moberly, and Pine rivers), monitoring stations are maintained on opposing banks of the river in order to provide redundancy and confirm temperature consistency across the channel. At Peace River locations downstream of major tributaries, paired station configuration was revised in 2011 (Year 3) from opposing banks to common banks in order to provide better redundancy in tributary outflow paths prone to stranding by passing ice and debris. Temperature loggers originally located downstream and opposite of major tributary mouths, which were providing redundancy for upstream opposite sites, were moved across the channel to provide redundancy for downstream sites in the path of tributary outflow.

Two loggers were originally deployed at the Peace Canyon Dam forebay, the first at 1 m depth and the second at 10 m depth. A comparison of temperatures recorded at 1 m and 10 m depths during Year 1 and part of Year 2 showed little evidence of thermal stratification within the upper 10 m of the forebay, although daytime surface warming in the range of 3-5°C was documented on the warmest days of summer. For this reason the 10 m depth logger was not replaced when it was lost due to a parted cable in Year 2. The two Peace Canyon Dam tailrace loggers were originally located on opposite river banks, approximately 200 m downstream of the dam face. During Years 1 and 2, the south bank location (pcnDN1) frequently experienced stranding due to the lack of a suitable monitoring site. Winter access for downloading was also poor. A comparison of temperatures recorded on the north and south banks between September 2008 and May 2010 indicated a differential of less than 0.2°C. As recommended in the Year 2 interim report, the south bank logger (pcnDN1) was moved to the north bank next to pcnDN2 and renamed pcnDN2BU in Year 3.

By late in Year 3, the program had been revised to include 21 data loggers at 18 monitoring sites. This configuration was maintained throughout Year 4. A summary of temperature monitoring station location information for Year 4 appears in Appendix I.

Temperature loggers were programmed to record water temperature (°C) at 1 hour intervals throughout Year 4. Loggers continued to be housed in 38 mm x 100 mm steel nipples with threaded steel end caps, weighted with 5 kg steel anchors, and tethered to rooted trees or large bedrock fragments using either 6.35 mm galvanized steel cable or 3.18 mm stainless steel cable.

Temperature data recorded and stored on each logger during 2012 were downloaded at approximately 3 month intervals (May, July, October, and early January 2013) by field transfer to a Model U-DTW-1

Hobo® waterproof shuttle (Onset Corp., Bourne, MA). Data from the shuttle were then downloaded to a desktop computer after each field session. Logger sites at the WAC Bennett Dam and Peace Canyon Dam forebay and tailrace locations were accessed by vehicle, while all Peace River mainstem sites were accessed by riverboat. Conditions and observations at the time of each download event were documented in the field on hardcopy Download Information Forms and subsequently entered into digital format. *In situ* reference temperatures were recorded at the time of each field download event using a certified laboratory-grade mercury thermometer calibrated in increments of 0.1°C for comparison to the corresponding hourly logger readings (within 30 minutes of reference temperature). In addition to scheduled download events, temperature loggers at some Peace River mainstem locations were visually checked and re-positioned by DES staff during the course of activities unrelated to the temperature monitoring program.

Data files were exported as MS Office Excel and Access compatible text files using Onset® Hoboware Pro software (Ver. 2.3.0), amalgamated into single Excel worksheets for each data logger, and plotted relative to time.

2.1.1 Year 4 Site Logistics

Few logistical problems were encountered during Year 4, partially due to refinements in station location and configuration made in Years 2 and 3. Occasional stranding of loggers above the waterline during Year 4 was largely associated with the accumulation of debris on cables during flood events, and was confined to station halfDN2, located directly downstream of the confluence with the Halfway River.

Several tether cables required replacement during Year 4 due to ongoing corrosion of the 6.35 mm galvanized cable used in Years 1 to 3. Beginning in Year 4, corroded galvanized tether cables were replaced with 3.18 mm stainless steel cable, which appears to have a longer lifespan.

2.2 Total Dissolved Gas Pressure (TDGP)

Six Model TBO-DL6(F) TDGP monitors (Common Sensing Inc., Clark Fork, ID) were purchased by BC Hydro in Year 1, and stored at the office of Diversified Environmental Services (DES) in Fort St. John, BC. Appendix II contains an inventory of dissolved gas pressure meters and probes. Meters and probes were checked for functionality on a quarterly basis when not in use and battery charge was maintained. Initialization check routines were repeated and the condition of each probe oxygen sensor membrane was examined for evidence of ZnO precipitate build-up. In addition to routine quarterly

maintenance records, calibration statements were obtained for meters that were returned to the manufacturer for repair or factory re-calibration.

TDGP meters were deployed prior to spill events, which occurred between June 26 and August 02, 2012 at the WAC Bennett Dam and between June 25 and July 28, 2012 at the Peace Canyon Dam.

TDGP meters were deployed at 6 locations between Williston Reservoir and the confluence of the Peace and Pine rivers, including WAC Bennett Dam forebay, Peace Canyon Dam forebay anti-vortex dam, Peace Canyon tailrace south bank, Peace Canyon tailrace north bank, Hudson's Hope pumphouse, and upstream of the Pine River at Taylor, BC (Fig. 2). TDGP monitoring site location descriptions and coordinates are presented in Appendix III.

TDGP meters were programmed to record total dissolved gas pressure (mm HG and % saturation) at 15 minute intervals. Meter probes were attached to lead cannon balls, which were secured to shore with 3.18 mm stainless steel cable. Weatherproof meter housings were also secured with stainless steel cable.

3.0   RESULTS AND DISCUSSION

Figures 3 to 13 are presented following section 4.0.

3.1   Temperature Monitoring

Reference temperatures recorded during download events are presented in Appendix IV along with corresponding logger temperatures and indicated error values. With the exception of logger halfUP2 (serial# 2038572), which exhibits a consistent, correctable zero error of approximately 0.8 degrees C, calibration errors for all temperature loggers were typically within the range of 0.3°C. Corrected values for logger halfUP2 are provided in the accompanying 2012 dataset.

A summary of temperature data collection results and related conditions and limitations are discussed in the following 5 sections, which correspond to the 5 major generating station and tributary features. Download Information Forms completed during each download are provided in Appendix V.

3.1.1   WAC Bennett Dam Forebay and Tailrace

The WAC Bennett Dam forebay temperature monitoring station is located at the GMS spillway log boom and consists of a vertical cable suspended from the northernmost log boom steel buoy. Temperature is recorded with 2 loggers, the first located at 1 m depth and the second suspended at a
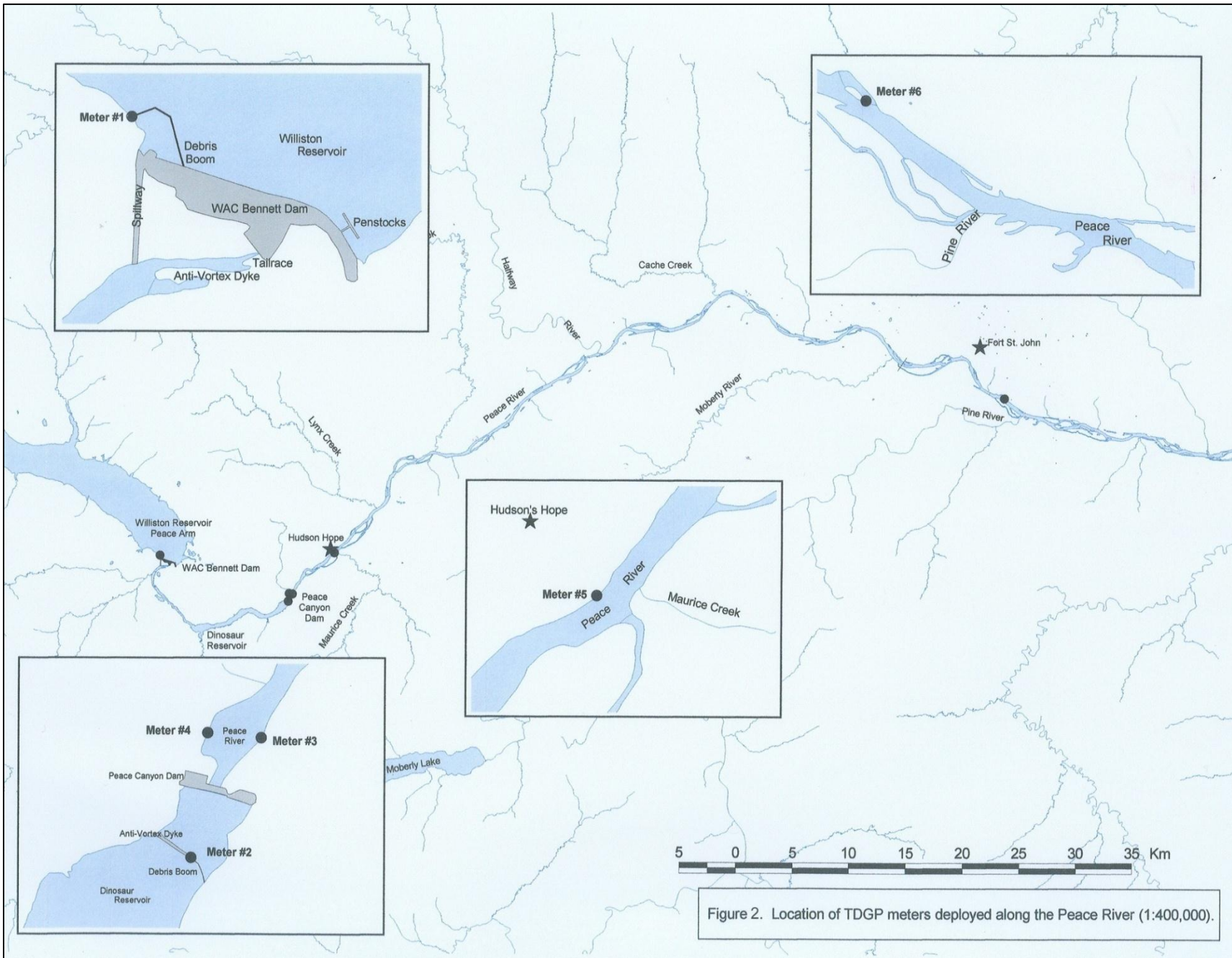
Figure 2. Location of TDGP meters deployed along the Peace River (1:400,000).

depth of 10 m. Continuous hourly data for Year 4 were recorded at 1 m depth (gmsUP1); however, data for the 10 m depth (gmsUP2) could not be recovered for the period between January 25 and June 15, 2012. Although the unit's LED indicated the logger was collecting data normally, it would not communicate with the optical shuttle during a download attempted on May 14. The logger was replaced on June 15 after a second unsuccessful attempt to retrieve the stored data. Continuous hourly data from June 15 to December 31 was subsequently downloaded from the replacement logger and spans the 2012 GMS spill period. Temperature data recovered from both units for Year 4 is presented in Figure 3. Although seasonal thermal stratification of Williston Reservoir is evident, the relatively small temperature differential (mean=0.6 °C) suggests the primary thermocline may lie deeper than 10 m. Maximum temperature differentials of 5-6 °C were recorded during periods of significant daytime surface warming on July 18-20. Temperature profiles recorded further up the Peace Reach during unrelated work in August 2012 indicated a thermocline at approximately 26 m depth (B. Culling, pers. obs.).

The GMS tailrace monitoring sites are located on opposite banks, approximately 700 m downstream of the outflow manifolds. Logger gmsDN1 records the temperature of water flowing from the south tailrace manifold, which originates from the shallowest penstock depth. Logger gmsDN2 measures water from the north tailrace manifold, which originates from a deeper withdrawal point. The tethered steel capsule at both stations contains a back-up logger in addition to the primary unit (gmsDN1BU and gmsDN2BU). All 4 loggers collected seamless data through Year 4, with the exception of November 3 and 4, 2012, when extremely low water levels caused the south manifold loggers to become exposed. Loggers at the north manifold site (gmsDN2) could not be accessed for downloading during the spring of 2012 due to safety concerns associated with rock scaling work at the spillway bucket. All data was successfully retrieved after completion of the work.

As in previous years, water temperatures at gmsDN2 showed the lowest annual variation and are consistently cooler in the summer and warmer in the winter than gmsDN1 flow, which originates closer to the surface of Williston Reservoir. Temperatures recorded at gmsUP1 (forebay surface) exhibit greater annual variation than tailrace values (Fig. 4).

3.1.2 Peace Canyon Dam Forebay and Tailrace

The data logger recording temperature at the Peace Canyon Dam forebay (pcnUP1) is attached to the anti-vortex dam log boom, approximately 450 m upstream of the dam face. Forebay water temperature at 1 m depth was recorded seamlessly through Year 4.

Both Peace Canyon Tailrace loggers (pcnDN2 and pcnDN2BU) provided continuous data throughout Year 4, although both were periodically embedded in substrate mobilized by summer spill events. A comparison of PCN tailrace temperature (pcnDN2) and GMS tailrace temperature (mean of GMSDN1 and GMSDN2) indicates a relatively small temperature change through Dinosaur Reservoir during all seasons (Fig. 5). For example, mean differentials of 0.2°C were recorded in winter (December through February) and 0.6°C in summer (June through August). Figure 4 also illustrates limited thermal stratification of the Peace Canyon forebay during peak ambient temperatures in August (i.e., water exiting the Peace Canyon powerhouse (pcnDN2) was slightly cooler than forebay temperatures at 1 m depth (pcnUP1)).

3.1.3   Halfway River Confluence

Peace River water temperature was monitored at points approximately 1 km upstream and 2.5 km downstream of the Halfway River confluence. Upstream stations were maintained on opposing banks throughout Year 4 (halfUP1 and halfUP2) and logged continuous data. As in previous years, no cross-channel differential was recorded between the opposing upstream stations.

Both the primary and back-up loggers at the Halfway downstream station (halfDN2) were swung into shallow water on 2 occasions by debris flowing from the Halfway River. Although this caused gaps in the halfwayDN2 logger, data loss from the back-up logger (halfDN2BU) was confined to a short period immediately prior to the October 23, 2012 download.

As in previous years, Peace River temperature values recorded at stations upstream and downstream of the Halfway confluence differed markedly. Temperatures collected downstream of the confluence exhibited a greater degree of daily and annual variability (Fig. 6). Halfway River inputs typically have a cooling effect during the winter period (October through April) and a warming effect during the summer (May through September). Temperatures within the Halfway River upstream of its confluence with the Peace are not recorded as part of this project.

3.1.4   Moberly River Confluence

Peace River water temperature was monitored at points approximately 2.6 km upstream and 2.5 km downstream of the Moberly River confluence. Upstream stations were maintained on opposing banks (mobUP1 and mobUP2) and both recorded seamless hourly data throughout Year 4. No cross-channel differential was recorded, indicating complete cross-channel mixing of tributary inputs from Cache Creek and the Halfway River, located 20 km and 36 km upstream, respectively.

The Moberly downstream logger and downstream back-up logger were both located on the south river bank, within the influence of outfall from the Moberly River. Both downstream loggers recorded continuous data through Year 4.

As in previous years, Peace River temperatures recorded within the influence of the Moberly River (downstream of confluence), were warmer than upstream stations from May through July and cooler than upstream stations from October through December (Fig. 7). The influence of the Moberly River is significantly less than that of the Halfway River and appears to correspond to the difference in relative contributed volumes. Temperatures within the Moberly River upstream of its confluence with the Peace are not recorded as part of this project.

3.1.5   Pine River Confluence

Peace River water temperature was monitored at points approximately 2.0 km upstream and 6.5 km downstream of the Pine River confluence. During Year 4, upstream stations were maintained on opposing banks (pineUP1 and pineUP2) and both downstream loggers (pnDN1 and pnDN1BU) were located on the south river bank, within the influence of inputs from the Pine River.

Both upstream loggers recorded continuous hourly data throughout Year 4; little cross-channel differential was noted. The primary downstream logger was dislodged and dragged ashore by ice flow in early April and was re-positioned on May 09, 2012. This logger also became exposed periodically by low flows during the first week in December. The nearby downstream back-up logger remained functional and recorded continuous data throughout Year 4.

Temperature values recorded within the downstream influence of the Pine River (pineDN1) were typically cooler than the Pine River upstream stations from late September through December and slightly warmer from July through mid September (Fig. 8). As is typical, maximum temperature values were attained around August 1st.

Figure 9 presents comparative seasonal temperature changes over the 132 km length of the study area between the WAC Bennett Dam tailrace (gmsDN2) and the Pine River confluence (pineUP1) during 2012. Data appearing in this figure includes Halfway and Pine confluence stations not directly influenced by their respective tributary inputs. The graph illustrates the moderating effect of hypolimnetic withdrawal from Williston Reservoir on downstream temperatures in the Peace River and the seasonal impact of ambient air temperature on downstream water temperatures, i.e., winter

temperatures decrease and summer temperatures increase with distance downstream. Brief periods of homogeneity occurred in March and October, with gradients inverting on either side of these dates to form the typical annual pattern.

Figures 10 and 11 represent temporal comparisons of water temperatures over the 4 calendar years encompassed by the current monitoring program for WAC Bennett Dam tailrace and Pine River confluence sites, respectively. Year to year temperature differences in output from the north manifold of the GMS tailrace suggest corresponding inter-annual variation in Williston Reservoir hypolimnion temperature, with 2012 being considerably cooler than 2010 during all seasons (Fig. 10). Possible factors for this variation may include the proportion of reservoir input contributed by snow melt versus precipitation and annual variations in storage level and drawdown rate and timing. Year to year variations in Peace River water temperature immediately above the Pine River confluence (pnUP1) appear to follow a pattern similar to that observed at the GMS tailrace, with 2012 being generally cooler than 2010 (Fig. 11). While downstream temperature gradient is primarily governed by ambient temperature, particularly during mid-summer and mid-winter, trends in far field downstream temperature appear to be also influenced by Williston Reservoir hypolimnetic temperature.

Spill events at the Peace Canyon Dam during 2012 appear to have had little effect on downstream water temperatures in the Peace River. Due to the shallow depth and relatively high exchange rate of Dinosaur Reservoir, persistent thermal stratification does not typically develop. The resulting lack of temperature differential between spilled water (surface) and turbine output (depth) precludes the potential influence of Peace canyon spilling on water temperature downstream in the Peace River. There was no change in mean temperature differential between Peace Canyon Forebay (pcnUP1) and Peace Canyon Tailrace (pcnDN2) temperatures through the June 25-July 07 spill period (0.1°C) as compared to the 10 days immediately prior to the spill (0.1°C).

Figure 12 represents a comparison of water temperatures between the WAC Bennett Dam forebay (1 m depth), the WAC Bennett Dam tailrace (mean of north and south manifolds), and the Peace Canyon Dam forebay, encompassing the period that spilling occurred from the WAC Bennett Dam. As evidenced by the increasing differential between the Bennett Dam forebay (gmsUP1) and tailrace temperatures (gmsDN), the 2012 Bennett Dam spill events occurred during a period of rapid summer surface warming in Williston Reservoir during which reservoir hypolimnion temperatures remained relatively stable. It is therefore assumed that spilling operations would have a warming effect on Dinosaur Reservoir due to the introduction of warmer Williston surface water and a decreased

proportion of cooler hypolimnetic turbine output. Because both GMS tailrace monitoring sites lie upstream of the spillway, no temperature data was recorded within the initial mixing zone of the upper Dinosaur Reservoir and this potential effect could not be measured. Although Figure 12 indicates a slight elevation in temperature at the PCN forebay (pcnUP1) 22 km downstream, during the GMS spill period, this differential may have also been partially influenced by variability in daily ambient temperatures, fluctuations in the ratios between turbine output volumes and spill rates, and variability in reservoir exchange rate.

3.2   Total Dissolved Gas Pressure (TDGP) Monitoring

With high probability of spill events at Peace Canyon forecast for early summer, TDGP meters were deployed on April 30, 2012 at 5 sites downstream of the WAC Bennett and Peace Canyon dams. These included PCN forebay (site #2), PCN tailrace LDB[1] (site #3), PCN tailrace RDB[2] (site #4), Hudson's Hope pumphouse (site #5), and upstream of Pine River confluence (site #6). On June 25, the sixth meter, which was previously being used for spot measurements, was deployed at the Williston Reservoir forebay (site #1) to confirm upstream baseline TDGP values as spills at the WAC Bennett Dam became imminent.

Each meter was connected to a large capacity external battery to extend the monitoring period and reduce the risk of data loss. Stored data was downloaded in the field onto a laptop computer on May 15, June 08, July 03, and July 13, and then sent electronically to BC Hydro technical staff in Burnaby for use in operational planning and impact assessment and mitigation. During the July 13 download, all meters were temporarily removed and shipped by courier to Point Four Systems Inc. for re-calibration. Due to mishandling by the return courier, redeployment of the re-calibrated meters was delayed until July 26; therefore a portion of the spill program was not recorded.

Although no significant logistical problems related to site location and maintenance were encountered, several technical issues arose with meters and/or probes. Calibration problems were apparent in some meters prior to July 13, 2012, including meter #3 in the Peace Canyon tailrace and meter #1 at the Williston Reservoir forebay. In addition, a beaver severed the probe cable at the Hudson's Hope pumphouse site on July 30.

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[1] LDB – left downstream bank
[2] RDB – right downstream bank

Table 1 summarizes spill duration and rates at the WAC Bennett and Peace Canyon dams between late June and early August 2013. Detailed analysis and interpretation of TDGP data was conducted by BC Hydro technical staff as part of the GMSMON-11 program; results are presented in the GMSMON-11 2012 report.

Table 1. Summary of spill duration and rates at the WAC Bennett and Peace Canyon dams between late June and early August 2012.

Spillway ID	Start Date/Time		End Date/Time		Spill Rate
WAC Bennett	June 26, 2013	12:00 hrs	June 27, 2013	14:00 hrs	570 m³/sec
	June 27, 2013	14:00 hrs	July 09, 2013	15:00 hrs	1,500 m³/sec
	July 09, 2013	15:00 hrs	July 11, 2013	08:00 hrs	1,000 m³/sec
	July 24, 2013	10:00 hrs	Aug 02, 2013	14:00 hrs	580 m³/sec
Peace Canyon	June 25, 2013	11:00 hrs	June 26, 2013	09:00 hrs	500 m³/sec
	June 26, 2013	15:00 hrs	June 27, 2013	20:00 hrs	500 m³/sec
	June 27, 2013	20:00 hrs	July 07, 2013	17:00 hrs	1,200 m³/sec
	July 07, 2013	17:00 hrs	July 09, 2013	18:00 hrs	1,400 m³/sec
	July 09, 2013	18:00 hrs	July 11, 2013	09:00 hrs	1,000 m³/sec
	July 13, 2013	17:00 hrs	July 13, 2013	22:00 hrs	400 m³/sec
	July 24, 2013	14:00 hrs	July 28, 2013	08:00 hrs	310 m³/sec

Spot measurements recorded at 6 stations spanning the river channel at the Hudson's Hope pumphouse (Site #6) during a PCN spill on July 03, 2012 indicated uniform TDGP values across the wetted profile.

4.0   RECOMMENDATIONS

The 6.35 mm galvanized cable used during the initial years of the program has proven to have low resistance to corrosion and should continue to be replaced by the smaller diameter stainless steel cable due to its apparent higher longevity.

In the event that beavers continue to cause problems with TDGP probe cables, a section of the cable at the waterline could be installed through rigid metal EMT conduit to provide protection.

In the event of future spills from the WAC Bennett Dam, an additional temperature logger could be temporarily installed immediately downstream of the spillway mixing zone to document potential affects of the introduction of Williston surface water on upper Dinosaur Reservoir temperatures.

The battery life of the Tidbit v2 Model #UTBI-001 temperature sensors is estimated at approximately 5 years. Scheduled replacement of units should begin in 2014 as per the table presented in Appendix 6.
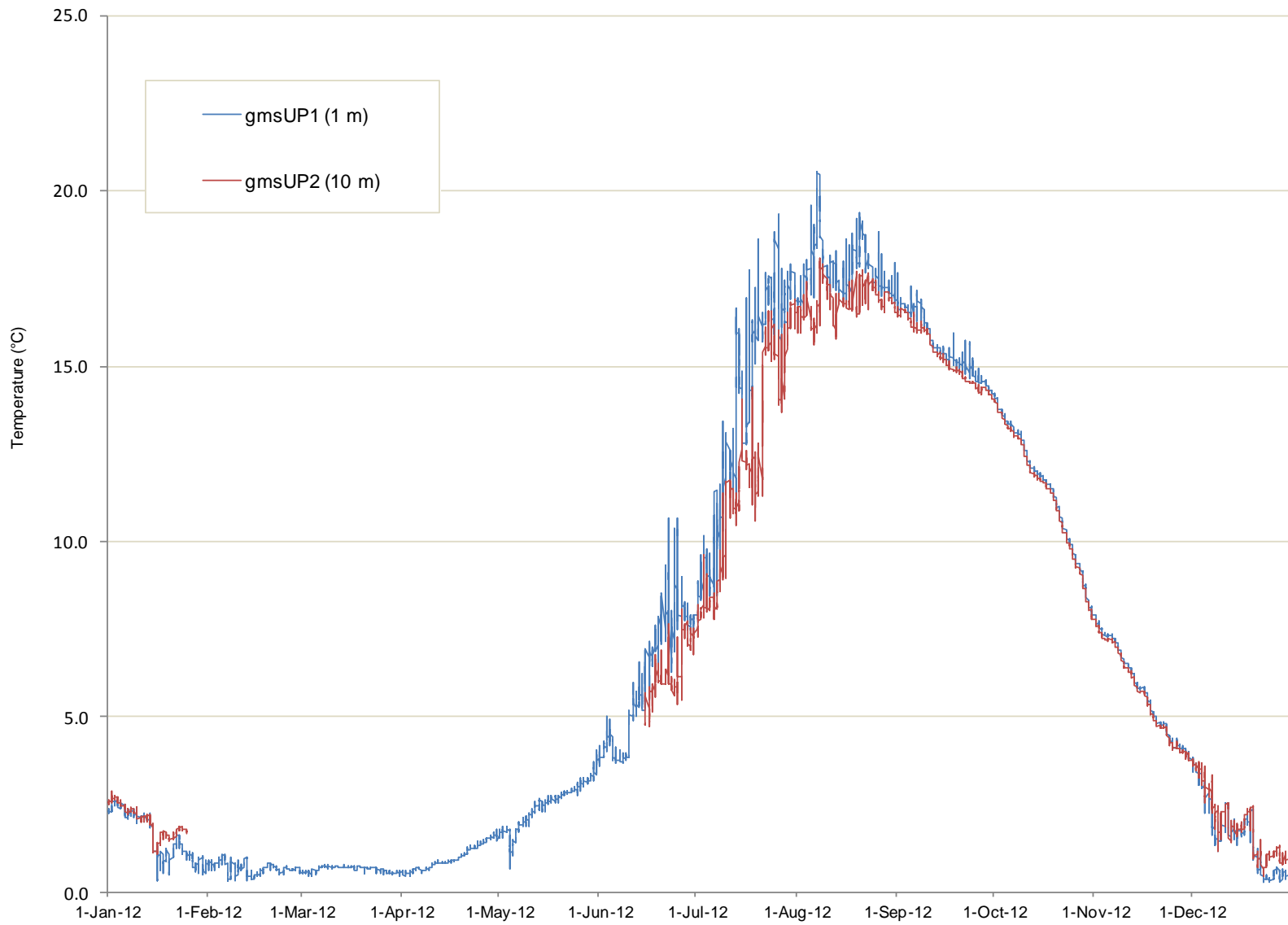
Figure 3. Comparison of water temperature at WAC Bennett Dam forebay station from 1 m depth (gmsUP1) and 10 m depth (gmsUP2) during Year 4, January 01, 2012 – December 31, 2012.
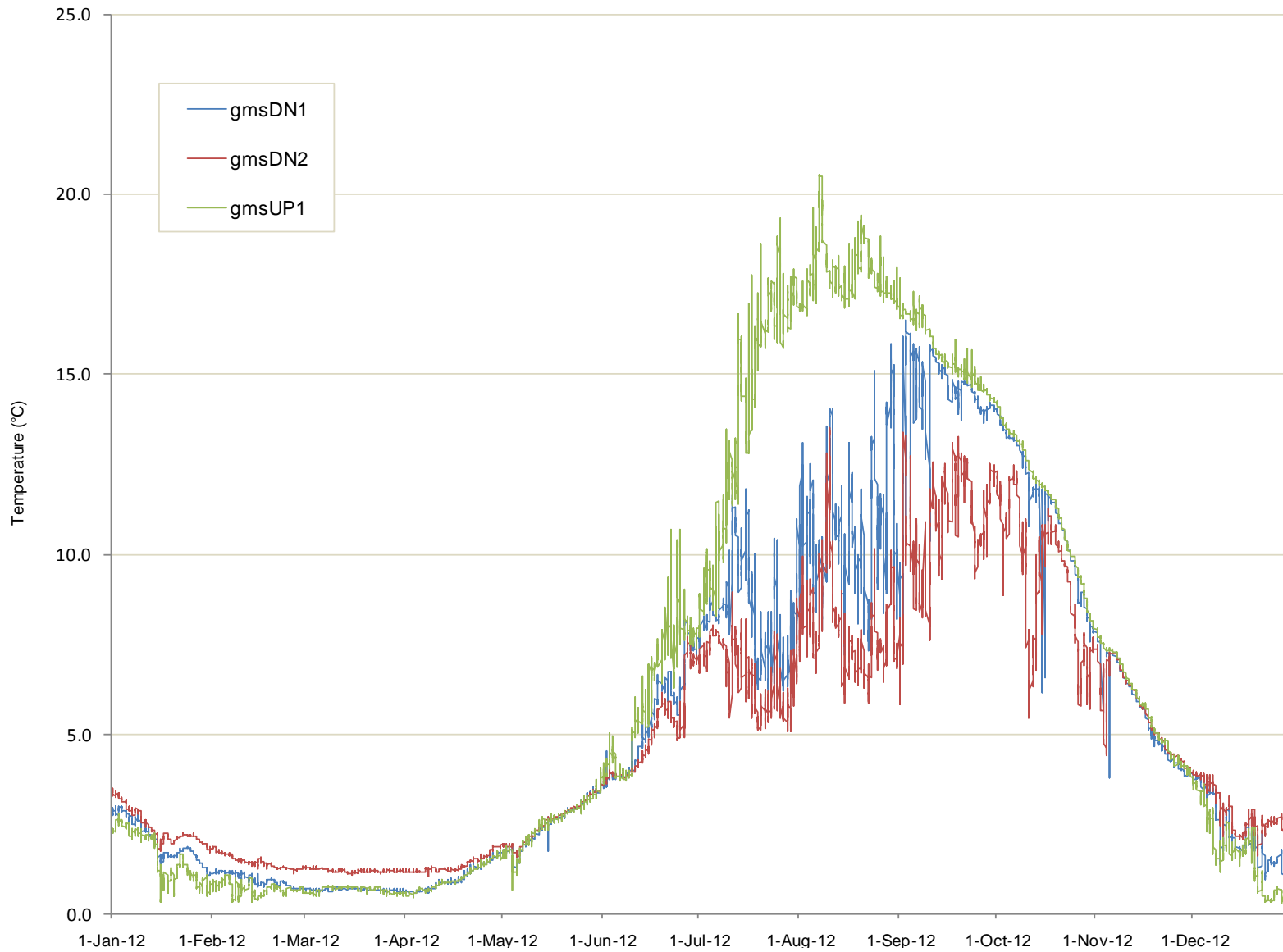
Figure 4. Comparison of water temperature at WAC Bennett Dam forebay surface (gmsUP1), and WAC Bennett Dam tailrace (gmsDN1 and gmsDN2) during Year 4, January 01, 2012 – December 31, 2012.
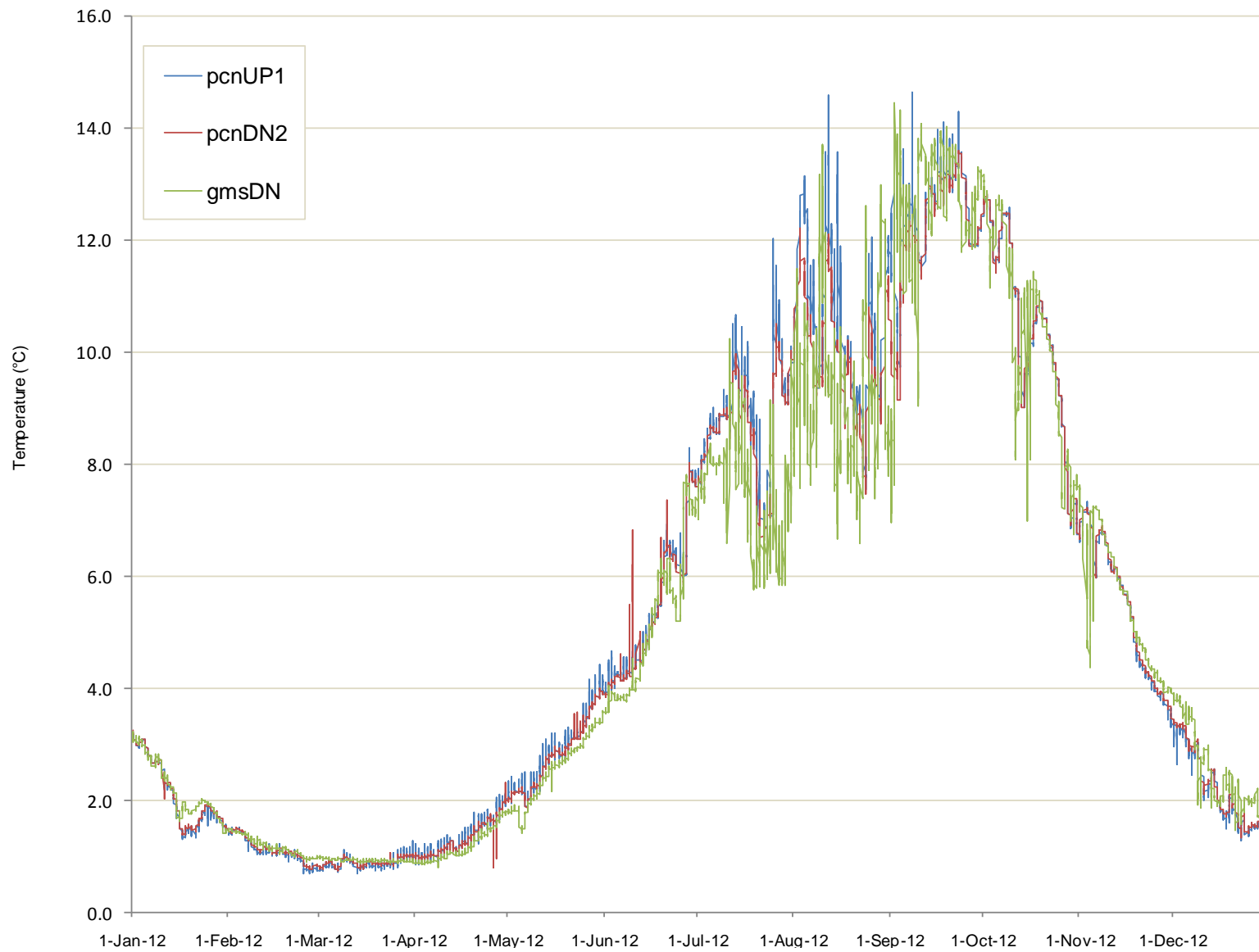
Figure 5. Comparison of water temperature at Peace Canyon forebay surface (pcnUP1), Peace Canyon tailrace (pcnDN2), and WAC Bennett Dam tailrace (gmsDN) during Year 4, January 01, 2012 – December 31, 2012.
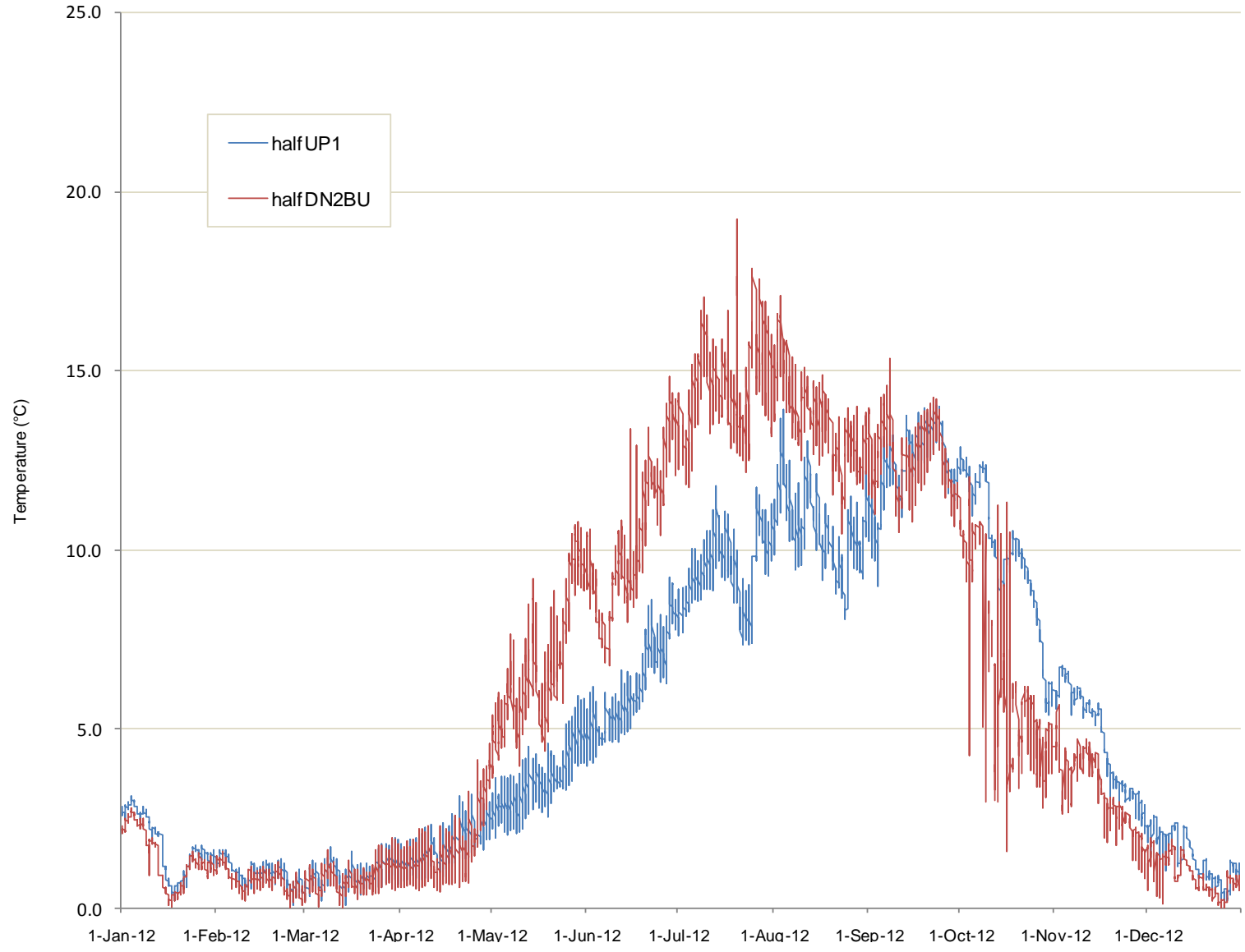
Figure 6. Comparison of Peace River water temperature upstream of Halfway River confluence (halfUP1) and downstream of Halfway River confluence (halfDN2) during Year 4, January 01, 2012 – December 31, 2012.
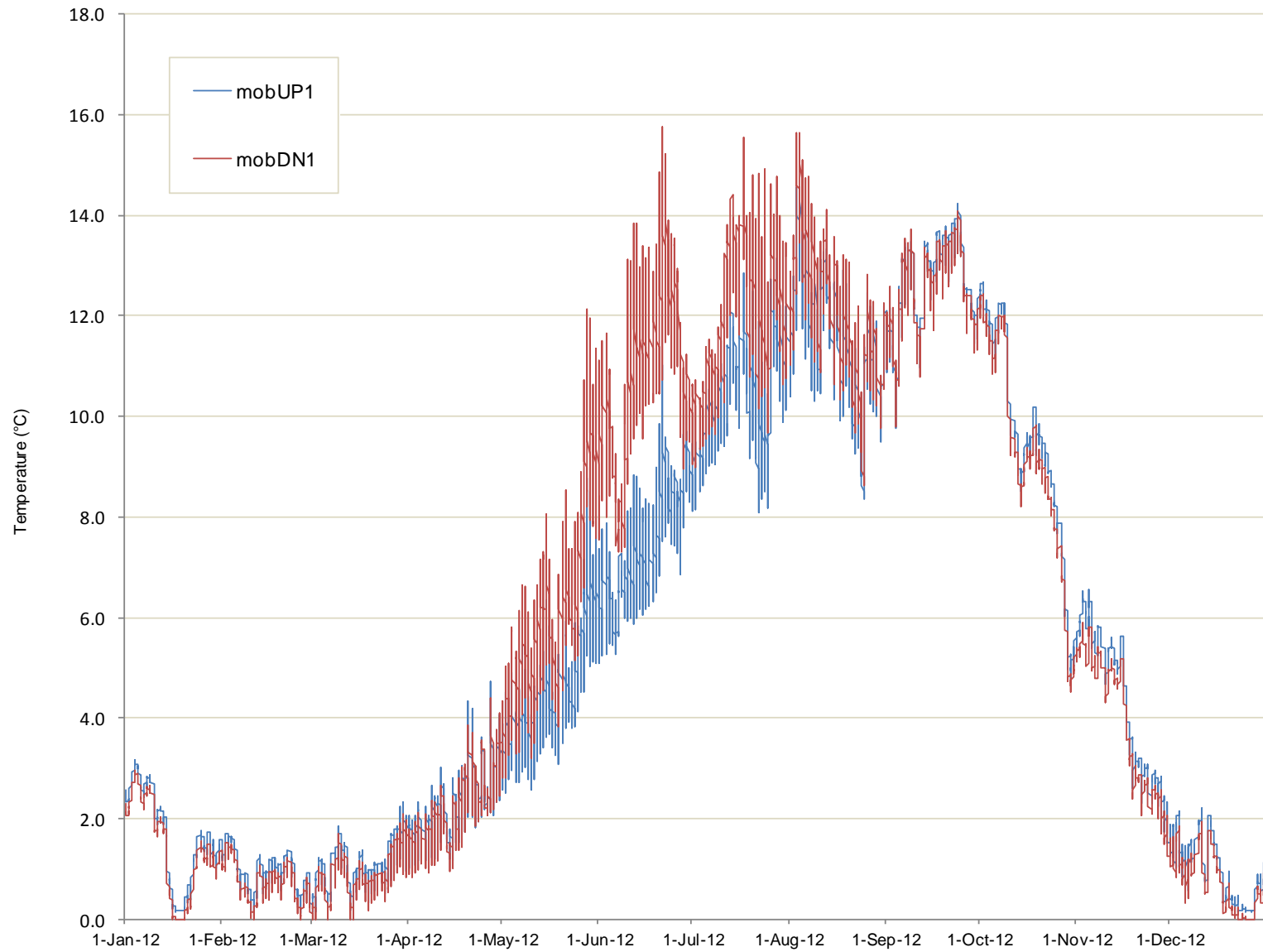
Figure 7. Comparison of Peace River water temperature upstream of Moberly River confluence (mobUP1) and downstream of Moberly River confluence (mobDN1) during Year 4, January 01, 2012 – December 31, 2012.
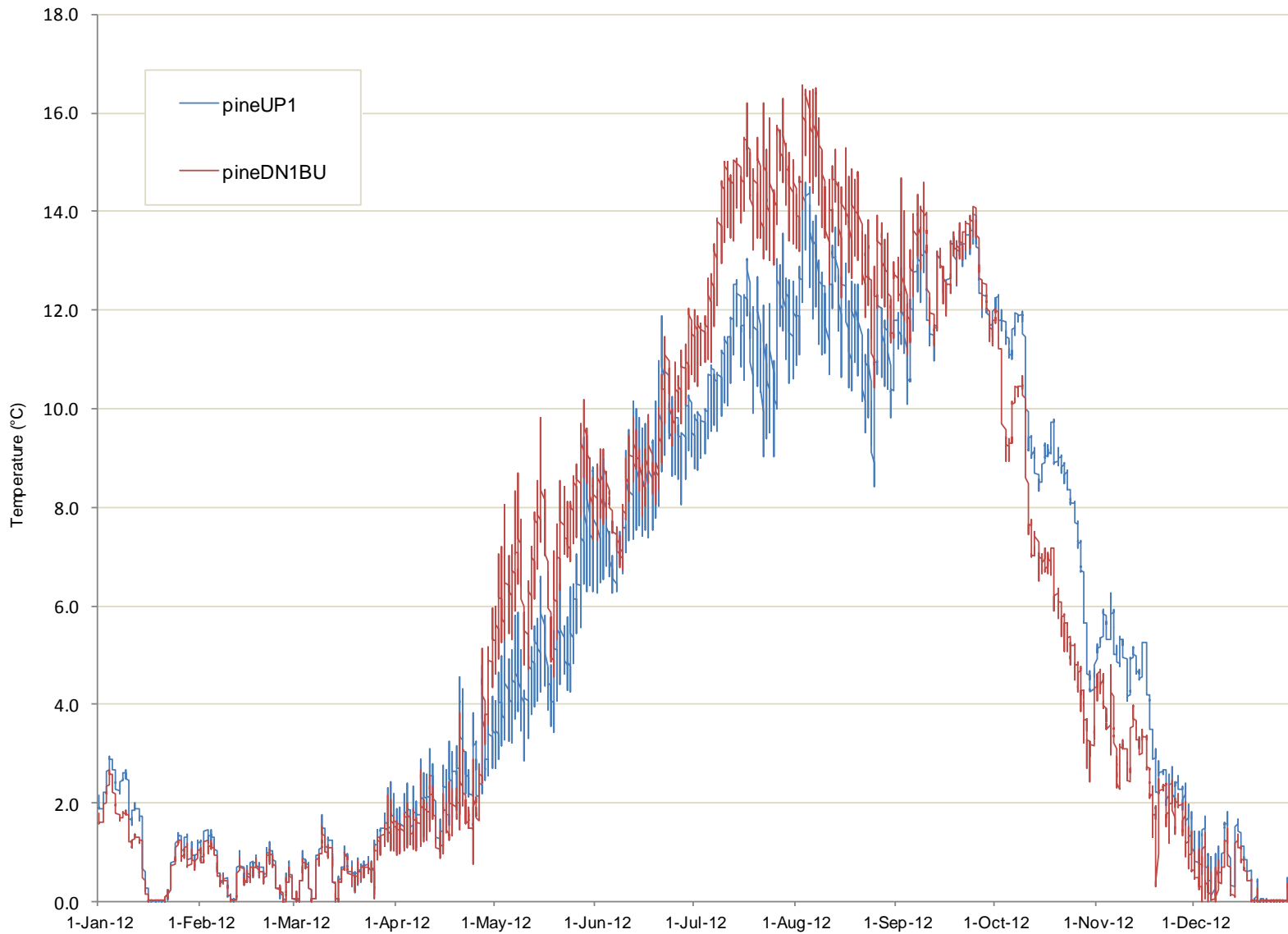
Figure 8. Comparison of Peace River water temperature upstream of Pine River confluence (pineUP1) and downstream of Pine River confluence (pineDN1) during Year 4, January 01, 2012 – December 31, 2012.
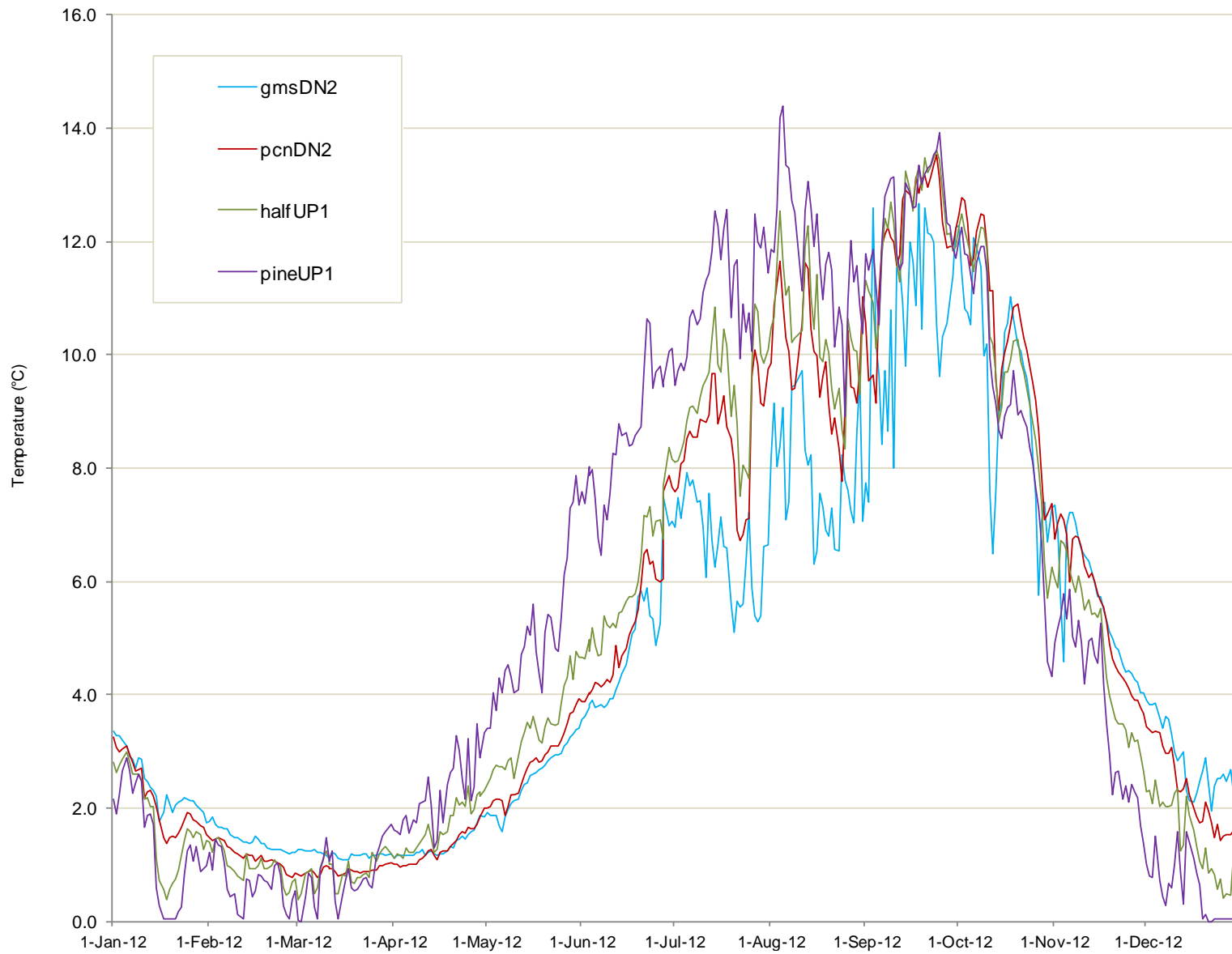
Figure 9. Peace River water temperature gradient from WAC Bennett Dam tailrace, downstream to Pine River confluence, during Year 4, January 01, 2012 – December 31, 2012.
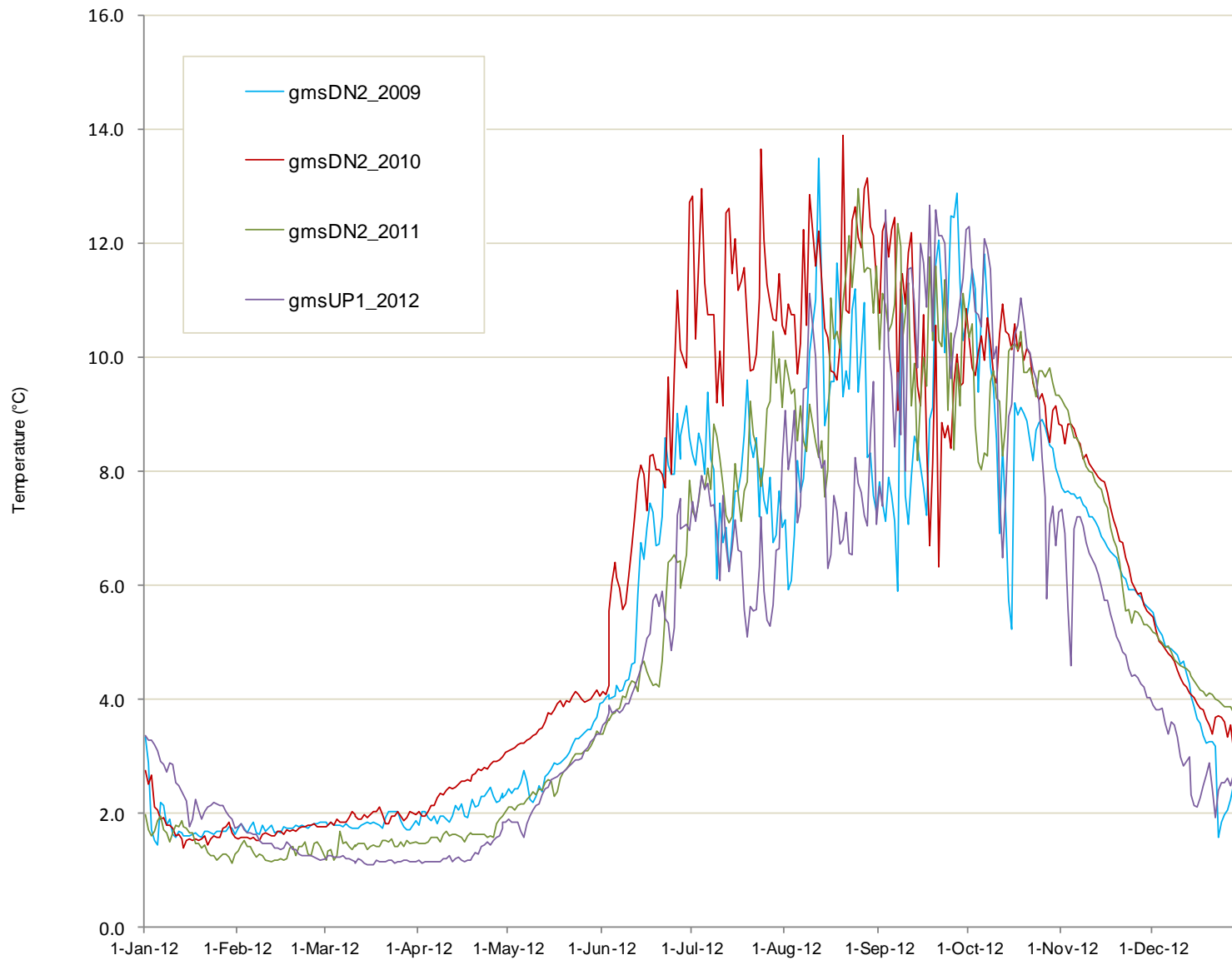
Figure 10. Comparison of water temperature at WAC Bennett Dam tailrace south manifold (gmsDN1) from January 2009 to December 2012.
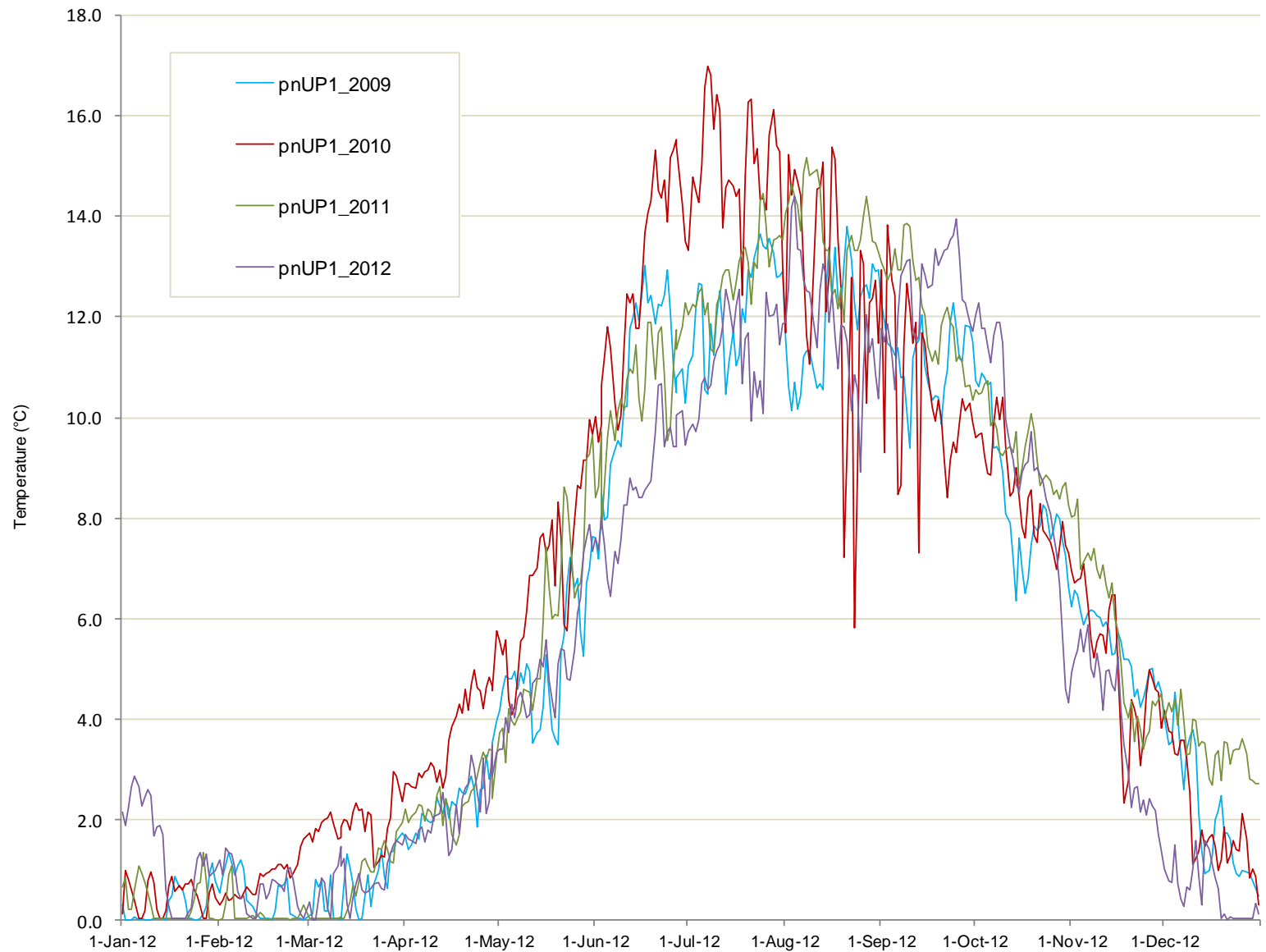
Figure 11. Comparison of water temperature upstream of the Pine River confluence (pnUP1) from January 2009 to December 2012.
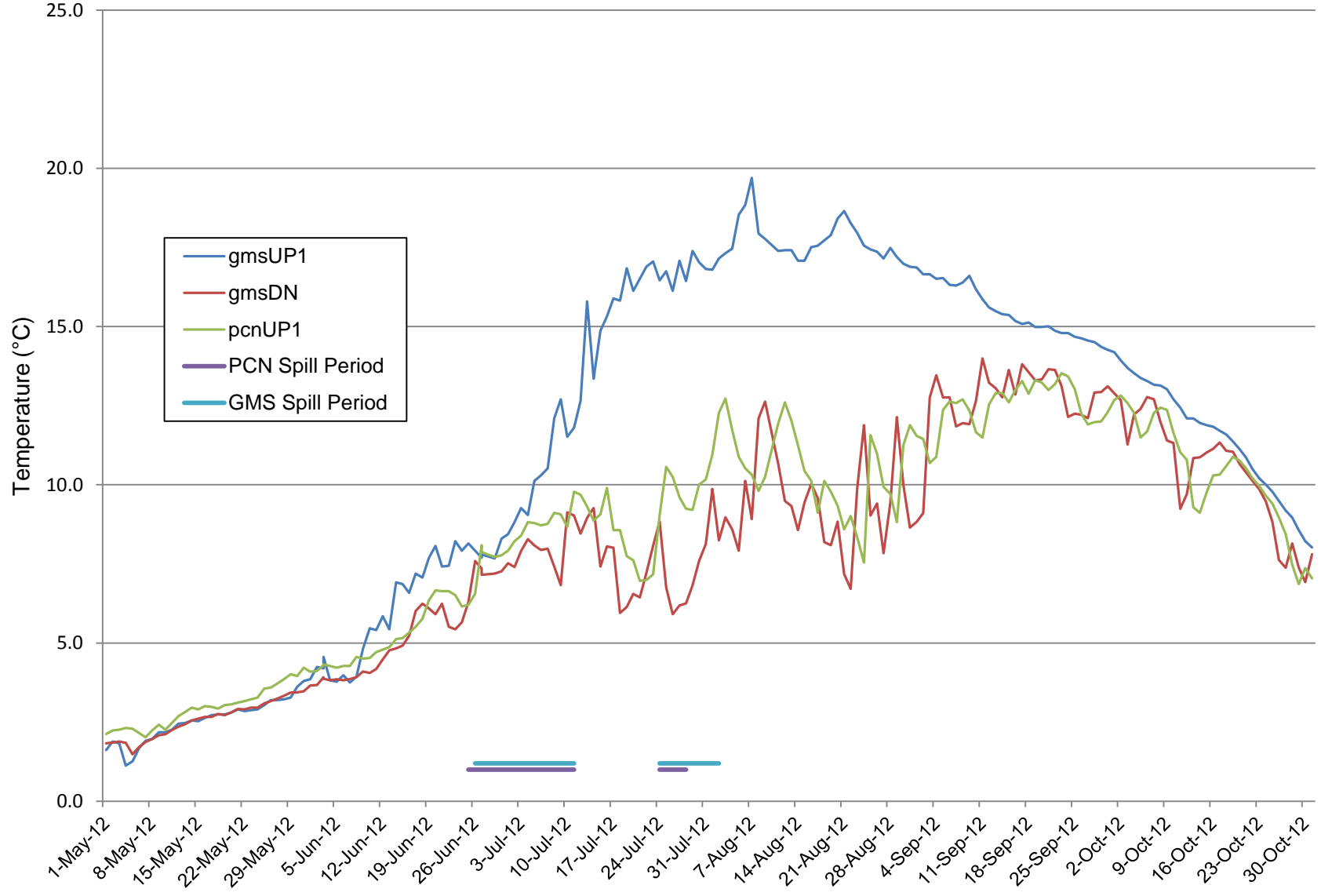
Figure 12. Comparison of water temperature at WAC Bennett Dam forebay (gmsUP1), WAC Bennett Dam tailrace (mean of gmsDN1 and gmsDN2), and Peace Canyon forebay (pcnUP1), May 01, 2012 to October 30, 2012.

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BC Hydro. 2010. Peace River Water Use Plan; monitoring program terms of reference – Peace River
    Baseline TGP/Temp. BC Hydro, Vancouver, BC. 7pp.

Point Four Systems Inc. No date. Dissolved gas pressure and oxygen meter/logger Model TBO-DL6(F)
    Instruction Manual. Revision 3. Prepared by Point Four Systems Inc., Coquitlam, BC.

Appendix I. Temperature monitoring station location information for Year 4, January 01, 2012 to December 31, 2012.

Site ID	Serial #	Location	UTM		Comment
			East	North	
gmsUP1	2038617	WAC Bennett Forebay	548841	6209022	Steel buoy; 1 m depth
gmsUP2	10156318	WAC Bennett Forebay	548841	6209022	Steel buoy; 10 m depth
gmsDN1	2038619	GMS Tailrace	548881	6207761	South bank; deflection weir riprap
gmsDN1backup	2038613	GMS Tailrace	548881	6207761	South bank; deflection weir riprap
gmsDN2	2038620	GMS Tailrace	548828	6207836	North bank; riprap below Tunnel portal #3
gmsDN2backup	2038614	GMS Tailrace	548828	6207836	North bank; riprap below Tunnel portal #3
pcnUP1	2225325	Peace Canyon Forebay	562684	6204075	Anti-vortex log boom; 1 m depth
pcnDN2	2038621	Peace Canyon Tailrace	562803	6204854	North bank; rock slab
pcnDN2BU	2038568	Peace Canyon Tailrace	562803	6204854	North bank; rock slab
halfUP1	9767573	Halfway Confluence - upstream	595165	6230094	South bank; spruce tree
halfUP2	2038572	Halfway Confluence - upstream	595569	6230541	North bank; spruce tree
halfDN2	2038574	Halfway Confluence - downstream	598198	6232169	North bank; balsam poplar
halfDN2BU	2038623	Halfway Confluence - downstream	598179	6232144	North bank; balsam poplar
mobUP1	2038612	Moberly Confluence - upstream	627158	6232349	South bank; alder
mobUP2	2038616	Moberly Confluence - upstream	627501	6232563	North bank; birch tree
mobDN1	2038622	Moberly Confluence - downstream	630583	6229281	South bank; alder
mobDN1BU	2038576	Moberly Confluence - downstream	630402	6229275	South bank; alder
pineUP1	2038624	Pine Confluence - upstream	641034	6225375	South bank; alder
pineUP2	9767572	Pine Confluence - upstream	641653	6225304	North bank; balsam poplar
pineDN1	2225322	Pine Confluence - downstream	648427	6222837	South bank; alder
pineDN1BU	9762095	Pine Confluence - downstream	648362	6222823	South bank; alder

Appendix II. Inventory of dissolved gas pressure meters and probes.

Meter Number	Serial Number	Probe Number	Cable Length (ft)
1	231	1	50
2	228	2	100
3	230	3	100
4	227	4	100
5	226	5	100
6	229	6	100

Appendix III. TDGP monitoring station locations established during Year 4, January 01, 2012 to December 31, 2012.

Site ID	Serial #	Location	UTM East	UTM North	Comment
TDGP #1	00231	WAC Bennett Forebay	548590	6208980	At west spillway log boom anchor cable
TDGP #2	00238	PCN Forebay - Anti-Vortex Dam	562686	6204080	Supsended from anti-vortes log boom
TDGP #3	00230	PCN Tailrace - South Bank	563161	6204949	Right downstream bank (RDB)
TDGP #4	00227	PCN Tailrace - North Bank	562791	6204840	Left downstream bank (LDB)
TDGP #5	00226	Hudson's Hope Pumphouse	567716	6209250	LDB 7.2 km downstream form PCN
TDGP #6	00229	Upstream of Pine River Confluence	642589	6224532	Mid channel island 98 km downstream from PCN

Appendix IV. Reference temperature values and corresponding logger fix values recorded during download events in Year 4, January 01, 2012 to December 31, 2012.

Logger ID	Date	Fix	Reference	Error
gmsUP1	25-Jan-12	1.0	0.2	0.8
	14-May-12	2.6	2.7	-0.1
gmsUP2	15-Jun-12	7.2	7.0	0.2
gmsDN1	25-Jan-12	1.8	1.5	0.3
	14-May-12	2.5	2.5	0.0
	7-Aug-12	10.2	10.1	0.1
	9-Oct-12	12.8	12.8	0.0
gmsDN1_BU	25-Jan-12	1.8	1.5	0.3
	14-May-12	2.6	2.5	0.1
	7-Aug-12	10.2	10.1	0.1
	9-Oct-12	12.9	12.8	0.1
gmsDN2	25-Jan-12	2.1	1.8	0.3
	15-Jun-13	4.6	4.5	0.1
	7-Aug-12	9.7	9.8	-0.1
	9-Oct-12	10.0	10.0	0.0
gmsDN2_BU	25-Jan-12	2.1	1.8	0.3
	15-Jun-13	4.6	4.5	0.1
	7-Aug-12	9.8	9.8	0.0
	9-Oct-12	10.0	10.0	0.0
pcnUP1	25-Jan-12	1.8	1.0	0.8
	30-Apr-12	2.0	1.8	0.2
	13-Jul-12	9.8	9.9	-0.1
	9-Oct-12	12.4	12.3	0.1
pcnDN2	25-Jan-12	1.9	1.6	0.3
	30-Apr-12	2.0	1.8	0.2
	13-Jul-12	9.7	9.5	0.2
	9-Oct-12	12.3	12.2	0.1

Appendix IV. Reference temperature values and corresponding logger fix values recorded during download events in Year 4, January 01, 2012 to December 31, 2012, cont.

Logger ID	Date	Fix	Reference	Error
pcnDN2_BU	25-Jan-12	1.9	1.6	0.3
	30-Apr-12	2.0	1.8	0.2
	13-Jul-12	9.7	9.5	0.2
	9-Oct-12	12.3	12.2	0.1
halfUP1	6-Jan-12	2.6	2.3	0.3
	13-May-12	4.1	3.9	0.2
	23-Jul-12	8.6	8.5	0.1
	23-Oct-12	9.2	9.1	0.1
halfUP2	6-Jan-12	1.7	2.4	-0.7
	13-May-12	3.3	4.0	-0.7
	23-Jul-12	7.7	8.5	-0.8
	23-Oct-12	8.2	9.1	-0.9
halfDN2	6-Jan-12	2.3	2.0	0.3
	13-May-12	7.1	6.9	0.2
	23-Jul-12	n/a	13.8	n/a
	23-Oct-12	n/a	5.6	n/a
halfDN2_BU	6-Jan-12	2.3	2	0.3
	13-May-12	6.9	6.9	0.0
	23-Jul-12	13.7	13.8	-0.1
	23-Oct-12	6.1	5.6	0.5
mobUP1	8-Jan-12	2.8	2.6	0.2
	9-May-12	4.4	4.1	0.3
	27-Jul-12	11.1	11.0	0.1
	18-Oct-12	9.7	9.5	0.2
mobUP2	8-Jan-12	2.6	2.5	0.1
	9-May-12	4.6	4.5	0.1
	27-Jul-12	11.9	11.9	0.0
	18-Oct-12	9.2	9.2	

Appendix IV. Reference temperature values and corresponding logger fix values recorded during download events in Year 4, January 01, 2012 to December 31, 2012, cont.

Logger ID	Date	Fix	Reference	Error
mobDN1	8-Jan-12	2.6	2.5	0.1
	9-May-12	5.8	5.8	0.0
	27-Jul-12	12.7	12.9	-0.2
	18-Oct-12	9.3	9.2	0.1
mobDN1_BU	8-Jan-12	2.6	2.5	0.1
	9-May-12	5.8	5.8	0.0
	27-Jul-12	12.9	12.9	0.0
	18-Oct-12	9.2	9.2	0.0
pineUP1	8-Jan-12	2.6	2.6	0.0
	9-May-12	5.0	5.0	0.0
	13-Jul-12	12.0	12.1	-0.1
	18-Oct-12	9.2	9.1	0.1
pineUP2	8-Jan-12	2.7	2.6	0.1
	9-May-12	4.2	4.0	0.2
	13-Jul-12	11.6	11.7	-0.1
	18-Oct-12	9.2	9.1	0.1
pineDN1	8-Jan-12	1.8	1.7	0.1
	9-May-12	7.4	7.4	0.0
	13-Jul-12	14.6	14.7	-0.1
	18-Oct-12	6.7	6.5	0.2
pineDN1_BU	8-Jan-12	1.8	1.7	0.1
	9-May-12	7.4	7.4	0.0
	13-Jul-12	14.5	14.7	-0.2
	18-Oct-12	6.7	6.5	0.2

Appendix V. Year 4 download information forms, January 01, 2012 to December 31, 2012.

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM						
SITE ID	pcnUP1	**LOCATION**	PCN Forebay	**BANK**		north
LOGGER TYPE	Tidbit	**LOGGER SERIAL #**	2225325	**UTM**	562684	6204075
DOWNLOAD DATE	30 Apr 2012	**DOWNLOAD TIME**	14:05	**CREW**	BC TE	
TEST RECORDER TYPE	merc	**WATER TEMP** 1.8	**AIR TEMP** 12.0	**ICE CONDITIONS**	free	

LOGGER CONDITIONS						
WATER DEPTH	100 cm	**DISLODGED** no	**REASON**			
BURIED no		**FUNCTIONAL** w et	**IF DRY, HEIGHT ABOVE WATER**	cm	**TETHER TYPE**	log boom

COMMENTS
dow nload OK
reference temperature taken at surface

SITE ID	pcnDN2_BU	**LOCATION**	PCN Tailrace	**BANK**		north
LOGGER TYPE	Tidbit	**LOGGER SERIAL #**	2038568	**UTM**	562803	6204854
DOWNLOAD DATE	30 Apr 2012	**DOWNLOAD TIME**	15:26	**CREW**	BC TE	
TEST RECORDER TYPE	merc	**WATER TEMP** 1.8	**AIR TEMP** 12.0	**ICE CONDITIONS**	free	

LOGGER CONDITIONS						
WATER DEPTH	150 cm	**DISLODGED** no	**REASON**			
BURIED no		**FUNCTIONAL** w et	**IF DRY, HEIGHT ABOVE WATER**	cm	**TETHER TYPE**	rock

COMMENTS
dow nload OK
Anchored to same rock as pcnDN2

SITE ID	pcnDN2	**LOCATION**	PCN Tailrace	**BANK**		north
LOGGER TYPE	Tidbit	**LOGGER SERIAL #**	2038621	**UTM**	562803	6204854
DOWNLOAD DATE	30 Apr 2012	**DOWNLOAD TIME**	15:29	**CREW**	BC TE	
TEST RECORDER TYPE	merc	**WATER TEMP** 1.8	**AIR TEMP** 12.0	**ICE CONDITIONS**	free	

LOGGER CONDITIONS						
WATER DEPTH	150 cm	**DISLODGED** no	**REASON**			
BURIED no		**FUNCTIONAL** w et	**IF DRY, HEIGHT ABOVE WATER**	cm	**TETHER TYPE**	rock

COMMENTS
dow nload OK

SITE ID		**LOCATION**		**BANK**		
LOGGER TYPE		**LOGGER SERIAL #**		**UTM**		
DOWNLOAD DATE		**DOWNLOAD TIME**		**CREW**		
TEST RECORDER TYPE		**WATER TEMP**	**AIR TEMP**	**ICE CONDITIONS**		

LOGGER CONDITIONS						
WATER DEPTH	cm	**DISLODGED**	**REASON**			
BURIED		**FUNCTIONAL**	**IF DRY, HEIGHT ABOVE WATER**	cm	**TETHER TYPE**	

COMMENTS

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	pineDN1	LOCATION	d/s of Pine River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2225322	UTM	648427	6222837
DOWNLOAD DATE	9 May 2012	DOWNLOAD TIME	16:12	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 7.4	AIR TEMP 15.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	200	cm	DISLODGED	yes	REASON		debris	
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

download OK
Dragged downstream by debris; found at edge opf water.

SITE ID	pineDN1_BU	LOCATION	d/s of Pine River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	9762095	UTM	648362	6222823
DOWNLOAD DATE	9 May 2012	DOWNLOAD TIME	16:22	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 7.4	AIR TEMP 15.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	200	cm	DISLODGED	yes	REASON		debris	
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

download OK
Dislodged by debris but still functioning.

SITE ID	pineUP2	LOCATION	u/s of Pine River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #	9767572	UTM	641653	6225304
DOWNLOAD DATE	9 May 2012	DOWNLOAD TIME	17:04	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 4.0	AIR TEMP 15.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	>200	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	balsam pop

COMMENTS

download OK

SITE ID	pineUP1	LOCATION	u/s of Pine River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038624	UTM	641034	6225375
DOWNLOAD DATE	9 May 2012	DOWNLOAD TIME	17:12	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 5.0	AIR TEMP 15.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	>200	cm	DISLODGED	yes	REASON		debris	
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

download OK
Dragged downstream but still functioning (1.0 m deep)

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	mobDN1	LOCATION	d/s of Moberly River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038622	UTM	630583	6229281
DOWNLOAD DATE	9 May 2012	DOWNLOAD TIME	17:39	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 5.8	AIR TEMP 14.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	>200 cm	DISLODGED	no	REASON		
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm TETHER TYPE	alder

COMMENTS

download OK

SITE ID	mobDN1_BU	LOCATION	d/s of Moberly River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038576	UTM	630403	6229275
DOWNLOAD DATE	9 May 2012	DOWNLOAD TIME	17:45	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 5.8	AIR TEMP 14.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	>200 cm	DISLODGED	no	REASON		
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm TETHER TYPE	alder

COMMENTS

download OK

SITE ID	mobUP1	LOCATION	u/s of Moberly River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038612	UTM	627158	6232349
DOWNLOAD DATE	9 May 2012	DOWNLOAD TIME	18:02	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 4.1	AIR TEMP 14.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	>200 cm	DISLODGED	no	REASON		
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm TETHER TYPE	alder

COMMENTS

download OK

SITE ID	mobUP2	LOCATION	u/s of Moberly River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038616	UTM	627501	6232563
DOWNLOAD DATE	9 May 2012	DOWNLOAD TIME	18:08	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 4.5	AIR TEMP 14.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	>200 cm	DISLODGED	no	REASON		
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm TETHER TYPE	birch

COMMENTS

download Ok

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	gmsUP1	LOCATION		GMS Forebay	BANK		
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038617	UTM	548841	6209022
DOWNLOAD DATE	14 May 2012	DOWNLOAD TIME		10:38	CREW	BC SC	
TEST RECORDER TYPE	merc	WATER TEMP	2.7	AIR TEMP 18	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	100	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	steel buoy

COMMENTS

download OK

SITE ID	gmsUP2	LOCATION		GMS Forebay	BANK		
LOGGER TYPE	Tidbit	LOGGER SERIAL #		9767574	UTM	548841	6209022
DOWNLOAD DATE	14 May 2012	DOWNLOAD TIME		10:39	CREW	BC SC	
TEST RECORDER TYPE	merc	WATER TEMP	n/a	AIR TEMP 18	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	10 m		DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	steel buoy

COMMENTS

LED blinking but logger won't download; left in replace.
No ref temperature taken at 10 m depth

SITE ID	gmsDN1	LOCATION		GMS Tailrace LDB	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038619	UTM	548881	6207761
DOWNLOAD DATE	14 May 2012	DOWNLOAD TIME		11:22	CREW	BC SC	
TEST RECORDER TYPE	merc	WATER TEMP	2.5	AIR TEMP 18	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	rock

COMMENTS

Back-up logger 2038613 in same capsule
both downloads OK

SITE ID	gmsDN2	LOCATION		GMS Tailrace RDB	BANK	north	
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038620	UTM	548828	6207836
DOWNLOAD DATE	14 May 2012	DOWNLOAD TIME			CREW	BC SC	
TEST RECORDER TYPE	merc	WATER TEMP		AIR TEMP 18	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH		cm	DISLODGED		REASON			
BURIED			FUNCTIONAL		IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	rock

COMMENTS

Couldn't access loggers due to work on spillway above site.

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	half UP2	LOCATION	u/s of Halfway River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038572	UTM	595565	6230548
DOWNLOAD DATE	14 May 2012	DOWNLOAD TIME	16:17	CREW	BC SC	
TEST RECORDER TYPE	merc	WATER TEMP	4.0	AIR TEMP	16	ICE CONDITIONS free

LOGGER CONDITIONS

WATER DEPTH	150	cm	DISLODGED	no	REASON		
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	spruce

COMMENTS

dow nload Ok

Re-anchored logger 15 m upstream.

SITE ID	half UP1	LOCATION	u/s of Halfway River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	9767573	UTM	595165	6230094
DOWNLOAD DATE	14 May 2012	DOWNLOAD TIME	16:42	CREW	BC SC	
TEST RECORDER TYPE	merc	WATER TEMP	4.1	AIR TEMP	16	ICE CONDITIONS free

LOGGER CONDITIONS

WATER DEPTH	200	cm	DISLODGED	no	REASON		
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	spruce tree

COMMENTS

dow nload OK

SITE ID	half DN2_BU	LOCATION	d/s of Halfway River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038623	UTM	598179	6263144
DOWNLOAD DATE	14 May 2012	DOWNLOAD TIME	16:57	CREW	BC SC	
TEST RECORDER TYPE	merc	WATER TEMP	6.9	AIR TEMP	16	ICE CONDITIONS free

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON		
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	balsam pop

COMMENTS

dow nload OK

SITE ID	half DN2	LOCATION	d/s of Halfway River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038574	UTM	598198	6232169
DOWNLOAD DATE	14 May 2012	DOWNLOAD TIME	17:05	CREW	BC SC	
TEST RECORDER TYPE	merc	WATER TEMP	6.9	AIR TEMP	16	ICE CONDITIONS free

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON		
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	balsam pop

COMMENTS

dow nload OK

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	gmsUP2	LOCATION		GMS Forebay		BANK		
LOGGER TYPE	Tidbit	LOGGER SERIAL #		9767574		UTM	548841	6209022
DOWNLOAD DATE	15 June 2012	DOWNLOAD TIME		12:50		CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	n/a	AIR TEMP	14	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	10 m	DISLODGED	no	REASON				
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER		cm	TETHER TYPE	steel buoy

COMMENTS

Logger 9767574 still won't download; removed and replaced with new logger #10156318.
No ref temperature taken at 10 m depth
1300 hr fix taken at surface with 7.0 degree reference.

SITE ID	gmsDN2	LOCATION		GMS Tailrace RDB		BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038620		UTM	548828	6207836
DOWNLOAD DATE	15 June 2012	DOWNLOAD TIME		14:40		CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	4.5	AIR TEMP	14	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	140 cm	DISLODGED	no	REASON				
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER		cm	TETHER TYPE	rock

COMMENTS

Back-up logger 2038614 in same capsule.
Both downloads OK

SITE ID		LOCATION				BANK		
LOGGER TYPE		LOGGER SERIAL #				UTM		
DOWNLOAD DATE		DOWNLOAD TIME				CREW		
TEST RECORDER TYPE		WATER TEMP		AIR TEMP		ICE CONDITIONS		

LOGGER CONDITIONS

WATER DEPTH	cm	DISLODGED		REASON				
BURIED		FUNCTIONAL		IF DRY, HEIGHT ABOVE WATER		cm	TETHER TYPE	

COMMENTS

SITE ID		LOCATION				BANK		
LOGGER TYPE		LOGGER SERIAL #				UTM		
DOWNLOAD DATE		DOWNLOAD TIME				CREW		
TEST RECORDER TYPE		WATER TEMP		AIR TEMP		ICE CONDITIONS		

LOGGER CONDITIONS

WATER DEPTH	cm	DISLODGED		REASON				
BURIED		FUNCTIONAL		IF DRY, HEIGHT ABOVE WATER		cm	TETHER TYPE	

COMMENTS

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	pcnUP1	LOCATION		PCN Forebay		BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2225325		UTM	562684	6204075
DOWNLOAD DATE	13 July 2012	DOWNLOAD TIME		11:19		CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	9.9	AIR TEMP	24.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	100	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	log boom

COMMENTS

dow nload OK

reference temperature taken at surface

SITE ID	pcnDN2	LOCATION		PCN Tailrace		BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038621		UTM	562803	6204854
DOWNLOAD DATE	13 July 2012	DOWNLOAD TIME		12:07		CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	9.5	AIR TEMP	24.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	150	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	rock

COMMENTS

dow nload OK

SITE ID	pcnDN2_BU	LOCATION		PCN Tailrace		BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038568		UTM	562803	6204854
DOWNLOAD DATE	13 July 2012	DOWNLOAD TIME		12:10		CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	9.5	AIR TEMP	24.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	150	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	rock

COMMENTS

dow nload OK

Anchored to same rock as pcnDN2

SITE ID		LOCATION				BANK		
LOGGER TYPE		LOGGER SERIAL #				UTM		
DOWNLOAD DATE		DOWNLOAD TIME				CREW		
TEST RECORDER TYPE		WATER TEMP		AIR TEMP		ICE CONDITIONS		

LOGGER CONDITIONS

WATER DEPTH		cm	DISLODGED		REASON			
BURIED			FUNCTIONAL		IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	

COMMENTS

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	pineUP2	LOCATION		u/s of Pine River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		9767572	UTM	641653	6225304
DOWNLOAD DATE	13 July 2012	DOWNLOAD TIME		15:22	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	11.7	AIR TEMP 28.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	>200	cm	DISLODGED	no	REASON		
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm TETHER TYPE	balsam pop

COMMENTS

download OK

SITE ID	pineUP1	LOCATION		u/s of Pine River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038624	UTM	641034	6225375
DOWNLOAD DATE	13 July 2012	DOWNLOAD TIME		15:47	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	12.1	AIR TEMP 28.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	>200	cm	DISLODGED	no	REASON		
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm TETHER TYPE	alder

COMMENTS

download OK

SITE ID	pineDN1_BU	LOCATION		d/s of Pine River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #		9762095	UTM	648362	6222823
DOWNLOAD DATE	13 July 2012	DOWNLOAD TIME		16:15	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	14.7	AIR TEMP 28.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	160	cm	DISLODGED	no	REASON		
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm TETHER TYPE	alder

COMMENTS

download OK

SITE ID	pineDN1	LOCATION		d/s of Pine River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2225322	UTM	648427	6222837
DOWNLOAD DATE	13 July 2012	DOWNLOAD TIME		16:23	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	14.7	AIR TEMP 28.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	160	cm	DISLODGED	no	REASON		
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm TETHER TYPE	alder

COMMENTS

download OK

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	halfUP2	LOCATION		u/s of Halfway River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038572	UTM	595565	6230548
DOWNLOAD DATE	23 July 2012	DOWNLOAD TIME		15:37	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	8.5	AIR TEMP 24	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	80	cm	DISLODGED	yes	REASON		flood	
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	spruce

COMMENTS

download Ok
Logger swung toward shore but still functional; re-positioned to >2.0 m depth.

SITE ID	halfUP1	LOCATION		u/s of Halfway River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #		9767573	UTM	595165	6230094
DOWNLOAD DATE	23 July 2012	DOWNLOAD TIME		15:48	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	8.5	AIR TEMP 24	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	130	cm	DISLODGED	yes	REASON		flood	
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	spruce tree

COMMENTS

download OK
Logger swung toward shore but still functional; re-positioned.

SITE ID	halfDN2_BU	LOCATION		d/s of Halfway River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038623	UTM	598179	6263144
DOWNLOAD DATE	23 July 2012	DOWNLOAD TIME		15:57	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	13.8	AIR TEMP 24	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	50	cm	DISLODGED	yes	REASON	debris	flood	
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	balsam pop

COMMENTS

download OK
Logger pulled ashore by debris but still wet; re-positioned to >2.0 m depth.

SITE ID	halfDN2	LOCATION		d/s of Halfway River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038574	UTM	598198	6232169
DOWNLOAD DATE	23 July 2012	DOWNLOAD TIME		16:18	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	13.8	AIR TEMP 24	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	50	cm	DISLODGED	yes	REASON	debris	flood	
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	balsam pop

COMMENTS

download OK
Logger pulled ashore by debris but still wet; re-positioned to >2.0 m depth.

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	mobUP1	LOCATION	u/s of Moberly River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038612	UTM	627158	6232349
DOWNLOAD DATE	27 July 2012	DOWNLOAD TIME	10:37	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 11.0	AIR TEMP 20.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	>200 cm	DISLODGED	no	REASON			
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

download OK

SITE ID	mobUP2	LOCATION	u/s of Moberly River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038616	UTM	627501	6232563
DOWNLOAD DATE	27 July 2012	DOWNLOAD TIME	10:46	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 11.9	AIR TEMP 20.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	>200 cm	DISLODGED	no	REASON			
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	birch

COMMENTS

download Ok

Re-Anchored to spruce tree 10 m upstream.

SITE ID	mobDN1_BU	LOCATION	d/s of Moberly River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038576	UTM	630403	6229275
DOWNLOAD DATE	27 July 2012	DOWNLOAD TIME	11:05	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 12.9	AIR TEMP 20.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	0 cm	DISLODGED	yes	REASON	debris	flood	
BURIED	no	FUNCTIONAL	dry	IF DRY, HEIGHT ABOVE WATER	5 cm	TETHER TYPE	alder

COMMENTS

download OK

Logger pulled ashore; re-positioned in 180 cm of water.

SITE ID	mobDN1	LOCATION	d/s of Moberly River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038622	UTM	630583	6229281
DOWNLOAD DATE	27 July 2012	DOWNLOAD TIME	11:14	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 12.9	AIR TEMP 20.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	180 cm	DISLODGED	no	REASON			
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

download OK

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	gmsDN2	LOCATION	GMS Tailrace RDB	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038620	UTM	548828	6207836
DOWNLOAD DATE	7 Aug 2012	DOWNLOAD TIME	10:04	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 9.8	AIR TEMP 20	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	100	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	rock

COMMENTS

Back-up logger 2038614 in same capsule
both downloads OK

SITE ID	gmsDN1	LOCATION	GMS Tailrace LDB	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038619	UTM	548881	6207761
DOWNLOAD DATE	7 Aug 2012	DOWNLOAD TIME	10:17	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 10.1	AIR TEMP 20	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	100	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	rock

COMMENTS

Back-up logger 2038613 in same capsule
both downloads OK

SITE ID		LOCATION		BANK		
LOGGER TYPE		LOGGER SERIAL #		UTM		
DOWNLOAD DATE		DOWNLOAD TIME		CREW		
TEST RECORDER TYPE		WATER TEMP	AIR TEMP	ICE CONDITIONS		

LOGGER CONDITIONS

WATER DEPTH		cm	DISLODGED		REASON			
BURIED			FUNCTIONAL		IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	

COMMENTS

SITE ID		LOCATION		BANK		
LOGGER TYPE		LOGGER SERIAL #		UTM		
DOWNLOAD DATE		DOWNLOAD TIME		CREW		
TEST RECORDER TYPE		WATER TEMP	AIR TEMP	ICE CONDITIONS		

LOGGER CONDITIONS

WATER DEPTH		cm	DISLODGED		REASON			
BURIED			FUNCTIONAL		IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	

COMMENTS

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	gmsDN2	LOCATION		GMS Tailrace RDB		BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038620		UTM	548828	6207836
DOWNLOAD DATE	9	Oct	2012	DOWNLOAD TIME	11:34	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	10.0	AIR TEMP	6	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	150	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	rock

COMMENTS

Back-up logger 2038614 in same capsule
both download OK

SITE ID	gmsDN1	LOCATION		GMS Tailrace LDB		BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038619		UTM	548881	6207761
DOWNLOAD DATE	9	Oct	2012	DOWNLOAD TIME	1150	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	12.8	AIR TEMP	6	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	rock

COMMENTS

Back-up logger 2038613 in same capsule
both download OK

Cable deteriorating - replace next download

SITE ID	gmsUP1	LOCATION		GMS Forebay		BANK		
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038617		UTM	548841	6209022
DOWNLOAD DATE	9	Oct	2012	DOWNLOAD TIME		CREW	BC TE	
TEST RECORDER TYPE		WATER TEMP		AIR TEMP		ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH		cm	DISLODGED		REASON			
BURIED			FUNCTIONAL		IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	steel buoy

COMMENTS

Couldn't access due to high winds, rough water.

SITE ID		LOCATION				BANK		
LOGGER TYPE		LOGGER SERIAL #				UTM		
DOWNLOAD DATE		DOWNLOAD TIME				CREW		
TEST RECORDER TYPE		WATER TEMP		AIR TEMP		ICE CONDITIONS		

LOGGER CONDITIONS

WATER DEPTH		cm	DISLODGED		REASON			
BURIED			FUNCTIONAL		IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	

COMMENTS

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	pcnUP1	LOCATION		PCN Forebay		BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2225325		UTM	562684	6204075
DOWNLOAD DATE	9 Oct 2012	DOWNLOAD TIME		12:55		CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	12.3	AIR TEMP	5.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	100	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	log boom

COMMENTS

download OK

reference temperature taken at surface

SITE ID	pcnDN2	LOCATION		PCN Tailrace		BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038621		UTM	562803	6204854
DOWNLOAD DATE	9 Oct 2012	DOWNLOAD TIME		13:08		CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	12.2	AIR TEMP	5.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON			
BURIED	yes		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	rock

COMMENTS

download OK

buried from wave action form summer spill.

SITE ID	pcnDN2_BU	LOCATION		PCN Tailrace		BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038568		UTM	562803	6204854
DOWNLOAD DATE	9 Oct 2012	DOWNLOAD TIME		13:11		CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	12.2	AIR TEMP	5.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON			
BURIED	yes		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	rock

COMMENTS

download OK

Anchored to same rock as pcnDN2

buried from wave action form summer spill.

SITE ID		LOCATION				BANK		
LOGGER TYPE		LOGGER SERIAL #				UTM		
DOWNLOAD DATE		DOWNLOAD TIME				CREW		
TEST RECORDER TYPE		WATER TEMP		AIR TEMP		ICE CONDITIONS		

LOGGER CONDITIONS

WATER DEPTH		cm	DISLODGED		REASON			
BURIED			FUNCTIONAL		IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	

COMMENTS

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	pineDN1_BU	LOCATION		d/s of Pine River		BANK	south	
LOGGER TYPE	Tidbit		LOGGER SERIAL #		9762095	UTM	648362	6222823
DOWNLOAD DATE	18	Oct	2012	DOWNLOAD TIME	10:10	CREW	BC TE	
TEST RECORDER TYPE		merc	WATER TEMP	6.5	AIR TEMP 5.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	130	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

download OK

SITE ID	pineDN1	LOCATION		d/s of Pine River		BANK	south	
LOGGER TYPE	Tidbit		LOGGER SERIAL #		2225322	UTM	648427	6222837
DOWNLOAD DATE	18	Oct	2012	DOWNLOAD TIME	10:15	CREW	BC TE	
TEST RECORDER TYPE		merc	WATER TEMP	6.5	AIR TEMP 5.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

download OK

SITE ID	pineUP2	LOCATION		u/s of Pine River		BANK		north
LOGGER TYPE	Tidbit		LOGGER SERIAL #		9767572	UTM	641653	6225304
DOWNLOAD DATE	18	Oct	2012	DOWNLOAD TIME	10:33	CREW	BC TE	
TEST RECORDER TYPE		merc	WATER TEMP	9.1	AIR TEMP 5.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	140	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	balsam pop

COMMENTS

download OK

SITE ID	pineUP1	LOCATION		u/s of Pine River		BANK	south	
LOGGER TYPE	Tidbit		LOGGER SERIAL #		2038624	UTM	641034	6225375
DOWNLOAD DATE	18	Oct	2012	DOWNLOAD TIME	10:42	CREW	BC TE	
TEST RECORDER TYPE		merc	WATER TEMP	9.1	AIR TEMP 5.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

download OK

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	mobUP2	LOCATION	u/s of Moberly River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038616	UTM	627501	6232563
DOWNLOAD DATE	18 Oct 2012	DOWNLOAD TIME	11:15	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 9.2	AIR TEMP 5.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	130	cm	DISLODGED	no	REASON		
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	spruce

COMMENTS

download Ok

SITE ID	mobUP1	LOCATION	u/s of Moberly River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038612	UTM	627158	6232349
DOWNLOAD DATE	18 Oct 2012	DOWNLOAD TIME	11:20	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 9.5	AIR TEMP 5.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON		
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

download OK

SITE ID	mobDN1_BU	LOCATION	d/s of Moberly River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038576	UTM	630403	6229275
DOWNLOAD DATE	18 Oct 2012	DOWNLOAD TIME	11:30	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 9.2	AIR TEMP 5.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON		
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

download OK

SITE ID	mobDN1	LOCATION	d/s of Moberly River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038622	UTM	630583	6229281
DOWNLOAD DATE	18 Oct 2012	DOWNLOAD TIME	11:39	CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP 9.2	AIR TEMP 5.0	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON		
BURIED	no	FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

download OK

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	halfUP2	LOCATION		u/s of Halfway River		BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038572		UTM	595569	6230541
DOWNLOAD DATE	23 Oct 2012	DOWNLOAD TIME		12:58		CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	9.1	AIR TEMP	-6	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	150	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	w et	IF DRY, HEIGHT ABOVE WATER		cm TETHER TYPE	spruce

COMMENTS

dow nload OK

SITE ID	halfUP1	LOCATION		u/s of Halfway River		BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #		9767573		UTM	595165	6230094
DOWNLOAD DATE	23 Oct 2012	DOWNLOAD TIME		13:05		CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	9.1	AIR TEMP	-6	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH	200	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	w et	IF DRY, HEIGHT ABOVE WATER		cm TETHER TYPE	spruce tree

COMMENTS

dow nload OK

SITE ID	halfDN2	LOCATION		d/s of Halfway River		BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038574		UTM	598198	6232169
DOWNLOAD DATE	23 Oct 2012	DOWNLOAD TIME		13:29		CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	5.6	AIR TEMP	-5	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH		cm	DISLODGED	yes	REASON	tampered		
BURIED	no		FUNCTIONAL	dry	IF DRY, HEIGHT ABOVE WATER	30	cm TETHER TYPE	balsam pop

COMMENTS

dow nload OK
logger pulled onto shore

SITE ID	halfDN2_BU	LOCATION		d/s of Halfway River		BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #		2038623		UTM	598179	6263144
DOWNLOAD DATE	23 Oct 2012	DOWNLOAD TIME		13:31		CREW	BC TE	
TEST RECORDER TYPE	merc	WATER TEMP	5.6	AIR TEMP	-5	ICE CONDITIONS	free	

LOGGER CONDITIONS

WATER DEPTH		cm	DISLODGED	yes	REASON	tampered		
BURIED	no		FUNCTIONAL	dry	IF DRY, HEIGHT ABOVE WATER	30	cm TETHER TYPE	balsam pop

COMMENTS

dow nload OK
logger pulled onto shore

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	pineDN1_BU	LOCATION		d/s of Pine River		BANK	south	
LOGGER TYPE	Tidbit		LOGGER SERIAL #		9762095	UTM	648362	6222823
DOWNLOAD DATE	18 Oct 2012		DOWNLOAD TIME		10:10	CREW	BC TE	
TEST RECORDER TYPE		merc	WATER TEMP	6.5	AIR TEMP 5.0	ICE CONDITIONS		free

LOGGER CONDITIONS

WATER DEPTH	130	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

dow nload OK

SITE ID	pineDN1	LOCATION		d/s of Pine River		BANK	south	
LOGGER TYPE	Tidbit		LOGGER SERIAL #		2225322	UTM	648427	6222837
DOWNLOAD DATE	18 Oct 2012		DOWNLOAD TIME		10:15	CREW	BC TE	
TEST RECORDER TYPE		merc	WATER TEMP	6.5	AIR TEMP 5.0	ICE CONDITIONS		free

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

dow nload OK

SITE ID	pineUP2	LOCATION		u/s of Pine River		BANK		north
LOGGER TYPE	Tidbit		LOGGER SERIAL #		9767572	UTM	641653	6225304
DOWNLOAD DATE	18 Oct 2012		DOWNLOAD TIME		10:33	CREW	BC TE	
TEST RECORDER TYPE		merc	WATER TEMP	9.1	AIR TEMP 5.0	ICE CONDITIONS		free

LOGGER CONDITIONS

WATER DEPTH	140	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	balsam pop

COMMENTS

dow nload OK

SITE ID	pineUP1	LOCATION		u/s of Pine River		BANK	south	
LOGGER TYPE	Tidbit		LOGGER SERIAL #		2038624	UTM	641034	6225375
DOWNLOAD DATE	18 Oct 2012		DOWNLOAD TIME		10:42	CREW	BC TE	
TEST RECORDER TYPE		merc	WATER TEMP	9.1	AIR TEMP 5.0	ICE CONDITIONS		free

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	alder

COMMENTS

dow nload OK

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	halfUP2	LOCATION	u/s of Halfway River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038572	UTM	595569	6230541
DOWNLOAD DATE	1 Jan 2013	DOWNLOAD TIME	14:09	CREW	BC MC	
TEST RECORDER TYPE	merc	WATER TEMP	0.7	AIR TEMP -10	ICE CONDITIONS	free

LOGGER CONDITIONS

WATER DEPTH	30	cm	DISLODGED	yes	REASON				unk
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER		cm	TETHER TYPE	spruce

COMMENTS

download OK

logger swung to shore in 30 cm of water

SITE ID	halfUP1	LOCATION	u/s of Halfway River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	9767573	UTM	595165	6230094
DOWNLOAD DATE	1 Jan 2013	DOWNLOAD TIME	14:22	CREW	BC MC	
TEST RECORDER TYPE	merc	WATER TEMP	0.7	AIR TEMP -10	ICE CONDITIONS	free

LOGGER CONDITIONS

WATER DEPTH	180	cm	DISLODGED	no	REASON				
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER		cm	TETHER TYPE	spruce tree

COMMENTS

download OK

SITE ID	halfDN2	LOCATION	d/s of Halfway River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038574	UTM	598198	6232169
DOWNLOAD DATE	1 Jan 2013	DOWNLOAD TIME	15:07	CREW	BC MC	
TEST RECORDER TYPE	merc	WATER TEMP	0.0	AIR TEMP -10	ICE CONDITIONS	free

LOGGER CONDITIONS

WATER DEPTH	30	cm	DISLODGED	yes	REASON	tampered			ukn
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	30	cm	TETHER TYPE	balsam pop

COMMENTS

download OK

logger swung to shore in 30 cm of water

SITE ID	halfDN2_BU	LOCATION	d/s of Halfway River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038623	UTM	598179	6263144
DOWNLOAD DATE	1 Jan 2013	DOWNLOAD TIME	15:17	CREW	BC MC	
TEST RECORDER TYPE	merc	WATER TEMP	0.0	AIR TEMP -10	ICE CONDITIONS	free

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON				
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	30	cm	TETHER TYPE	balsam pop

COMMENTS

download OK

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	pineUP2	LOCATION	u/s of Pine River	BANK		north
LOGGER TYPE	Tidbit	LOGGER SERIAL #	9767572	UTM	641653	6225304
DOWNLOAD DATE	2 Jan 2013	DOWNLOAD TIME	13:17	CREW	BC MC	
TEST RECORDER TYPE	merc	WATER TEMP 0.3	AIR TEMP -10.0	ICE CONDITIONS	shore ice	

LOGGER CONDITIONS

WATER DEPTH	180	cm	DISLODGED	no	REASON		
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm TETHER TYPE	balsam pop

COMMENTS

download OK

SITE ID	pineUP1	LOCATION	u/s of Pine River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2038624	UTM	641034	6225375
DOWNLOAD DATE	2 Jan 2013	DOWNLOAD TIME	13:37	CREW	BC MC	
TEST RECORDER TYPE	merc	WATER TEMP 0.4	AIR TEMP -10.0	ICE CONDITIONS	shore ice	

LOGGER CONDITIONS

WATER DEPTH	150	cm	DISLODGED	no	REASON		
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm TETHER TYPE	alder

COMMENTS

download OK

SITE ID	pineDN1_BU	LOCATION	d/s of Pine River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	9762095	UTM	648362	6222823
DOWNLOAD DATE	2 Jan 2013	DOWNLOAD TIME	14:08	CREW	BC MC	
TEST RECORDER TYPE	merc	WATER TEMP 0.0	AIR TEMP -10.0	ICE CONDITIONS	shore ice	

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON		
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm TETHER TYPE	alder

COMMENTS

download OK

SITE ID	pineDN1	LOCATION	d/s of Pine River	BANK	south	
LOGGER TYPE	Tidbit	LOGGER SERIAL #	2225322	UTM	648427	6222837
DOWNLOAD DATE	2 Jan 2013	DOWNLOAD TIME	14:17	CREW	BC MC	
TEST RECORDER TYPE	merc	WATER TEMP 0.0	AIR TEMP -10.0	ICE CONDITIONS	shore ice	

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON		
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm TETHER TYPE	alder

COMMENTS

download OK

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID	gmsUP1	LOCATION		GMS Forebay		BANK		
LOGGER TYPE	Tidbit		LOGGER SERIAL #		2038617	UTM	548841	6209022
DOWNLOAD DATE	4	Jan	2013 DOWNLOAD TIME		10:38	CREW	BC TE	
TEST RECORDER TYPE		merc	WATER TEMP	0.1	AIR TEMP	-4	ICE CONDITIONS	frozen

LOGGER CONDITIONS

WATER DEPTH	100	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	steel buoy

COMMENTS

Download OK

Reference temperature taken at surface.

SITE ID	gmsUP2	LOCATION		GMS Forebay		BANK		
LOGGER TYPE	Tidbit		LOGGER SERIAL #		10156318	UTM	548841	6209022
DOWNLOAD DATE	4	Jan	2013 DOWNLOAD TIME		10:39	CREW	BC TE	
TEST RECORDER TYPE		merc	WATER TEMP	n/a	AIR TEMP	-4	ICE CONDITIONS	free

LOGGER CONDITIONS

WATER DEPTH	10 m		DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	steel buoy

COMMENTS

Download OK
No ref temperature taken at 10 m depth

SITE ID	gmsDN2	LOCATION		GMS Tailrace RDB		BANK		north
LOGGER TYPE	Tidbit		LOGGER SERIAL #		2038620	UTM	548828	6207836
DOWNLOAD DATE	4	Jan	2013 DOWNLOAD TIME		11:16	CREW	BC TE	
TEST RECORDER TYPE		merc	WATER TEMP	1.4	AIR TEMP	-4	ICE CONDITIONS	free

LOGGER CONDITIONS

WATER DEPTH	120	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	rock

COMMENTS

Back-up logger 2038614 in same capsule
both downloads OK

SITE ID	gmsDN1	LOCATION		GMS Tailrace LDB		BANK	south	
LOGGER TYPE	Tidbit		LOGGER SERIAL #		2038619	UTM	548881	6207761
DOWNLOAD DATE	4	Jan	2013 DOWNLOAD TIME		11:40	CREW	BC TE	
TEST RECORDER TYPE		merc	WATER TEMP	0.7	AIR TEMP	-4	ICE CONDITIONS	free

LOGGER CONDITIONS

WATER DEPTH	150	cm	DISLODGED	no	REASON			
BURIED	no		FUNCTIONAL	wet	IF DRY, HEIGHT ABOVE WATER	cm	TETHER TYPE	rock

COMMENTS

Back-up logger 2038613 in same capsule
both downloads OK

BC HYDRO PEACE RIVER TEMPERATURE MONITORING - DOWNLOAD INFORMATION FORM

SITE ID pcnUP1	**LOCATION**	PCN Forebay	**BANK**	north
LOGGER TYPE Tidbit	**LOGGER SERIAL #**	2225325	**UTM**	562684 6204075
DOWNLOAD DATE 4 Jan 2013	**DOWNLOAD TIME**	13:10	**CREW**	BC TE
TEST RECORDER TYPE merc	**WATER TEMP** 1.0	**AIR TEMP** -2.0	**ICE CONDITIONS**	free

LOGGER CONDITIONS

WATER DEPTH 100 cm	**DISLODGED** no	**REASON**	
BURIED no	**FUNCTIONAL** wet	**IF DRY, HEIGHT ABOVE WATER** cm	**TETHER TYPE** log boom

COMMENTS

dow nload OK

reference temperature taken at surface

SITE ID pcnDN2	**LOCATION**	PCN Tailrace	**BANK**	north
LOGGER TYPE Tidbit	**LOGGER SERIAL #**	2038621	**UTM**	562803 6204854
DOWNLOAD DATE 4 Jan 2013	**DOWNLOAD TIME**	13:43	**CREW**	BC TE
TEST RECORDER TYPE merc	**WATER TEMP** 1.0	**AIR TEMP** -2.0	**ICE CONDITIONS**	free

LOGGER CONDITIONS

WATER DEPTH 110 cm	**DISLODGED** no	**REASON**	
BURIED no	**FUNCTIONAL** wet	**IF DRY, HEIGHT ABOVE WATER** cm	**TETHER TYPE** rock

COMMENTS

dow nload OK

cable corroded; change out next dow nload.

SITE ID pcnDN2_BU	**LOCATION**	PCN Tailrace	**BANK**	north
LOGGER TYPE Tidbit	**LOGGER SERIAL #**	2038568	**UTM**	562803 6204854
DOWNLOAD DATE 4 Jan 2013	**DOWNLOAD TIME**	13:44	**CREW**	BC TE
TEST RECORDER TYPE merc	**WATER TEMP** 1.0	**AIR TEMP** -2.0	**ICE CONDITIONS**	free

LOGGER CONDITIONS

WATER DEPTH 110 cm	**DISLODGED** no	**REASON**	
BURIED no	**FUNCTIONAL** wet	**IF DRY, HEIGHT ABOVE WATER** cm	**TETHER TYPE** rock

COMMENTS

dow nload OK

Anchored to same rock as pcnDN2

SITE ID	**LOCATION**		**BANK**	
LOGGER TYPE	**LOGGER SERIAL #**		**UTM**	
DOWNLOAD DATE	**DOWNLOAD TIME**		**CREW**	
TEST RECORDER TYPE	**WATER TEMP**	**AIR TEMP**	**ICE CONDITIONS**	

LOGGER CONDITIONS

WATER DEPTH cm	**DISLODGED**	**REASON**	
BURIED	**FUNCTIONAL**	**IF DRY, HEIGHT ABOVE WATER** cm	**TETHER TYPE**

COMMENTS

Appendix VI. Summary of temperature logger deployment dates and anticipated replacement dates.

Site ID	Serial #	Location	Date Deployed	Replace Date
gmsUP1	2038617	WAC Bennett Forebay	Sep 2008	2014
gmsUP2	10156318	WAC Bennett Forebay	June 2012	2018
gmsDN1	2038619	GMS Tailrace	Sep 2008	2014
gmsDN1backup	2038613	GMS Tailrace	Nov 2009	2015
gmsDN2	2038620	GMS Tailrace	Sep 2008	2014
gmsDN2backup	2038614	GMS Tailrace	Nov 2009	2015
pcnUP1	2225325	Peace Canyon Forebay	Sep 2008	2014
pcnDN2	2038621	Peace Canyon Tailrace	Sep 2008	2014
pcnDN2BU	2038568	Peace Canyon Tailrace	Sep 2008	2014
HalfUP1	9767573	Halfway Confluence - upstream	May 2011	2017
HalfUP2	2038572	Halfway Confluence - upstream	Sep 2010	2015
HalfDN2	2038574	Halfway Confluence - downstream	Sep 2008	2014
HalfDN2BU	2038623	Halfway Confluence - downstream	Sep 2008	2014
MobUP1	2038612	Moberly Confluence - upstream	Sep 2008	2014
MobUP2	2038616	Moberly Confluence - upstream	Sep 2008	2014
MobDN1	2038622	Moberly Confluence - downstream	Sep 2008	2014
MobDN1BU	2038576	Moberly Confluence - downstream	Sep 2008	2014
PineUP1	2038624	Pine Confluence - upstream	Sep 2008	2014
PineUP2	9767572	Pine Confluence - upstream	May 2011	2017
PineDN1	2225322	Pine Confluence - downstream	Sep 2008	2014
PineDN1BU	9762095	Pine Confluence - downstream	July 2011	2017