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ABSTRACT

This report presents a summary of field activities conducted in 2013 in the Mackenzie corridor, N.W.T. Air temperature, ground thermal and active layer data acquired from permafrost monitoring sites visited in 2013 throughout the corridor are provided in graphical and tabular format. The data presented provide essential baseline information that can be utilized by stakeholders and others for various purposes such as land management activities, regulatory processes and design of northern infrastructure. This report will be distributed to community organizations and stakeholders in the study region to provide an update on field activities.

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1. INTRODUCTION

The Geological Survey of Canada (GSC) has maintained a permafrost and active layer monitoring network in the Mackenzie Valley and Delta since the 1980s. This network provides information on ground thermal conditions and active layer thickness that is essential for land use planning decisions, engineering design of infrastructure, and for understanding the impacts of climate change on permafrost environments. The information collected from these monitoring sites is utilized to improve the characterization of regional baseline ground thermal conditions and to support development decisions in the Mackenzie corridor.

This report provides a summary of the field activities to collect air, ground temperature and active layer data during August and September 2013 in the Mackenzie corridor. Although the primary objective of this report is to update stakeholders in the region on our activities and to make the data collected available to them, this information is also of interest to those requiring regional permafrost and active layer information such as industry, engineers and the academic and modelling communities.

2. STUDY SITES AND INSTRUMENTATION

Ground thermal monitoring sites along the Mackenzie corridor in the Inuvialuit, Gwich'in, Sahtu, and Deh Cho Settlement Regions were visited in August and September 2013. The location and brief description of each site visited in 2013 is provided in Figures 1 and 2 and in Tables 1 and 2. Ground temperatures are measured with multi-sensor temperature cables installed in boreholes generally up to 20 m in depth. Data loggers are connected to most of the cables to record temperatures every eight hours and provide a continuous record of ground temperature throughout the year. The measurement system allows for a resolution of ±0.01°C and an accuracy of ±0.1°C. Further details on the site establishment, site characteristics and instrumentation can be found in Smith et al. (2007, 2008b, 2009a and 2010a, b). At other sites ground temperatures are only measured manually during site visits. Many of the sites were established in 2006-07 (e.g. Smith et al. 2009a) but some have been in operation since the 1980s such as those established along the Enbridge pipeline right-of-way (e.g. Pilon et al., 1989; Smith et al., 2008a).

It is not possible to visit all sites annually and some sites are only visited every two years. Accessibility, weather and other issues also resulted in some planned site visits not being conducted in 2013. Sites that were not visited in 2013 are included in the Tables 1 and 2 and Figures 1, 2 and 3 but not in the figures presented in Appendix A.

The GSC also maintains about 40 active layer monitoring sites throughout the Mackenzie corridor many of which have been in operation since the early 1990s. Thaw tubes have been installed at these sites to determine the maximum thaw penetration and the ground surface position during the period of maximum thaw in the year prior to the site visit. Data obtained during 2013 site visits therefore allow the determination of the active layer thickness for 2012. For sites visited in 2013 but not in 2012, the data acquired from the thaw tubes is used to determine the maximum thaw penetration and active layer thickness that has occurred over the

previous two years (i.e 2011-2012). Table 2 provides a list of sites from which data were obtained in August 2013. Further details on thaw tube establishment, instrumentation and site characteristics can be found in Nixon and Taylor (1994), Nixon et al. (1995) and Smith et al. (2009b).

Air and ground surface temperature data are collected at a number of ground thermal and active layer monitoring sites. Air temperatures are recorded using single channel data loggers connected to a temperature sensor inserted into radiation shields 1.5 m above the ground surface. Further details on air and ground temperature instrumentation can be found in Taylor (2000) and Duchesne et al. (2013). Ground surface temperatures are recorded using similar data loggers but with an internal temperature sensor. The data loggers are inserted about 5 cm below the ground surface. The data loggers have a resolution of 0.5ºC at -20ºC and an accuracy ranging from 0.5ºC at -20ºC to 0.2ºC at 0ºC. The data loggers record air and ground surface temperature every 3 hours.

3. DATA COLLECTION AND PRESENTATION

GSC permafrost monitoring sites were visited in August and September 2013 to collect ground temperature data from the data loggers, to take manual temperature measurements and to service the instrumentation. The temperature record acquired from the data loggers was checked visually and any irregular data were removed.

The continuous annual data record for each site was analyzed to determine the minimum and maximum temperature at each depth and to define the annual ground temperature envelope for the 2012-2013 period. For sites that were not visited in 2012, data acquired over a two year period were utilized to determine the annual ground temperature envelopes for both 2011-12 and 2012-13. These data are presented in graphical and tabular format for each site in Appendix A. The maximum thaw depth for each site was calculated by either interpolating between the maximum temperatures reached at the depths that bracket 0°C or by use of a frost probe at the time of visit. Maximum thaw depth is included with each temperature envelope in Appendix A. Previous data collected from the thermal monitoring sites have also been presented in Smith et al. (2008b, 2009a, 2010a, 2010b) and Ednie et al. (2011, 2012, 2013).

At some sites the data logger malfunctioned or was damaged so that a continuous temperature record could not be acquired. For these sites the manual temperature measurements made during the August or September 2013 site visit are presented in Appendix A. For sites which do not have data loggers connected to the cables, a ground temperature profile for August or September 2013 is provided.

Mean ground temperatures for 2012-13 at a depth of 5 and 10 m are summarized in Figure 4 which shows the range in ground temperatures along a north-south transect. South of Fort Good Hope (66º15’20” N) permafrost is generally warmer than -2°C with colder ground conditions found in the northern portion of the corridor where mean ground temperatures can be below -4°C.

Air and ground surface temperature records were visually checked and any irregularities were removed. Monthly averages of air and ground surface temperatures were determined and are presented in graphical and tabular format in Appendix A. Tables 1and 2 identify air and ground surface temperature records associated with or next to a permafrost monitoring site or an active layer monitoring site. The air and ground surface temperature data collected prior to 2013 can be found in Duchesne et al. (2013) and Ednie et al (2012, 2013).

Air and ground surface temperatures are summarized in Figure 5. Although both air and ground surface temperatures decrease with latitude, there is more scatter in the ground surface temperature-latitude relationship. This spatial variability in ground surface temperature is related to variable ground surface conditions including snow cover. Mean air temperature along the transect is below 0°C but mean ground surface temperatures can be above 0°C indicating a considerable surface offset and significant influence of snow cover.

The 2012 active layer thickness data determined from thaw tubes are presented in Table 2 for all active layer monitoring sites that were visited in August 2013. Data collected prior to 2012 have been published in Smith et al. (2009b, 2010b) and Ednie et al. (2011, 2012, 2013). For active layer monitoring sites not visited in 2012, the values represent the estimated maximum depth of thaw penetration of the previous two summers. The active layer thickness for 2012 determined from the thaw tubes is also summarized for the corridor in Figure 6. The active layer at a majority of the sites is less than 1 m. However, active layer thicknesses of 2 m or greater have been observed and at some of the southern sites thaw has penetrated below the depth of the thaw tube.

4. SUMMARY

This report provided a summary of field activities in the Mackenzie corridor. A summary of the ground thermal data collected at permafrost monitoring sites in August and September 2013 for the previous one-year period has been presented in graphical and tabular format. The 2012 active layer thickness data for active layer monitoring sites visited in 2013 were also provided. This report will be distributed to the various community organizations and stakeholders within the region in order to provide them with an update of our activities. The data presented can be utilized for land management activities, regulatory processes and for engineering design. The addition of these data to existing records builds up the ground temperature time-series and also improves the quality of baseline permafrost data against which change may be measured.

5. ACKNOWLEDGEMENTS

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Table 1. Thermal monitoring sites in the Inuvialuit, Gwich'in, Sahtu and Deh Cho Settlement Regions

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited in 2013
Inuvialuit	KC-07	KC-07	n/a	69.31	135.25	Tundra upland	Grass and moss tundra	None	09/08/2013
Inuvialuit	H-01	H-01	n/a	69.17	136.01	Surface of Holocene Mackenzie delta	Grass and shrub tundra	None	18/08/2013
Gwich'in	Navy Channel	03TC1	5	68.42	133.79	Surface of Holocene Mackenzie delta adjacent to eastern edge rising 10s of meters to till plain	Riparian high willow shrub, open, incomplete ground cover of forbs and sedge (forest tundra)	Air (failed)/ Ground	05/08/2013
Gwich'in	Norris Creek	NC-01	15	68.41	133.29	Thick organic material over moraine plain	Shrub tundra	None	01/08/2013
Gwich'in	Navy Road	01TC1	60	68.40	133.76	Fine grained colluvium sloping toward river, post glacial (~10Ka)	Taiga post fire succession, scattered birch and alder, open dwarf birch, heath ground cover	Ground	04/08/2013
Gwich'in	Inuvik Airport Trees	01TC2	84	68.32	133.44	Fluted till plain, glacial (>10Ka)	Taiga open black spruce, heath ground cover	None	31/07/2013
	Inuvik Airport Bog	12TC1	68	68.32	133.43	Bog between ridges on fluted till plain, glacial (>10Ka)	Taiga open bog, scattered shrub, heath ground cover (forest tundra)	Ground	31/07/2013

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited in 2013
Gwich'in	Campbell Lake	CaL-01	115	68.24	133.10	Moraine plain	Peatland	None	01/08/2013
		CaL-02	118	68.24	133.10	Moraine plain	Cutline	None	01/08/2013
		CaL-03	118	68.24	133.10	Moraine plain	Black spruce forest	None	01/08/2013
Gwich'in	North Caribou Lake	NCL-01	209	68.15	132.93	Moraine plain	Peatland	None	01/08/2013
		NCL-02	217	68.15	132.93	Moraine plain	Stunted black spruce forest	None	01/08/2013
Gwich'in	Hill Lake	HL-01	229	67.99	132.49	Moraine plain	Tundra	None	01/08/2013
		HL-02	234	67.99	132.49	Moraine plain	Shrub tundra	None	01/08/2013
Gwich'in	Wood Bridge Lake	WBL-01	204	67.90	132.18	Alluvial plain	Black spruce forest	None	01/08/2013
Sahtu	Jackfish Creek	JF-02	90	66.29	128.47	Eolian dune on moraine plain, well drained, elevated area	Black spruce forest and moss cover	None	23/09/2013
Sahtu	Fort Good Hope South	FGHS-01	134	66.21	128.50	Hummocky peatland	Dense shrub and open black spruce	Air / Ground	23/09/2013 Cable failed
		FGHS-02	134	66.21	128.50	Hummocky peatland	Peat plateau, lichen, open black spruce	None	23/09/2013

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited in 2013
Sahtu	Snafu Creek	SC-01	100	66.00	128.35	Moraine plain	Peat bog, open black spruce forest, and lichen cover	None	23/09/2013
Sahtu	Chick Lake	CL-01	122	65.90	128.24	Moraine plain	Peat and organic soil with open black spruce forest and shrubs	None	Cable destroyed
Sahtu	Gibson Lake	GL-01	228	65.75	127.89	Hummocky moraine plain	Recovering burnt area with peat and shrubs	Air / Ground	23/09/2013 Cable destroyed
Sahtu	Hanna River	HR-01	104	65.67	127.83	Lacustrine plain	Boggy burnt area	None	23/09/2013
Sahtu	Elliot Creek	EC-01	54	65.52	127.62	Lacustrine undulating plain, well drained elevated area	Peat cover on edge of open, mature black spruce forest	None	23/09/2013
		EC-02	54	65.52	127.62	Lacustrine plain overlain by alluvial sediments	Peat cover on edge of dense, mature black spruce forest	None	23/09/2013
Sahtu	Oscar Creek	OC-01	64	65.44	127.44	Undulating glaciolacustrine terrain overlain by alluvial sediments	Peat cover with dense-forested birch and black spruce	None	23/09/2013
Sahtu	Billy Creek North	BCN-01	90	65.40	127.32	Alluvial and eolian sediments overlying low-lying lacustrine plain	Peat cover with dense-forested black spruce and mixed shrub	None	23/09/2013

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited in 2013
Sahtu	Kee Scarp	Kee Scarp-HT	270	65.30	126.72	Top of narrow ridge. Borehole is in shale (which is underlain by limestone) with 20 cm moss and organic cover at surface	Boreal forest, mixture aspen birch pine and spruce with ground cover of grasses and small shrub	None	21/09/2013
Sahtu	NW Fen	99TC5	n/a	65.30	126.86	Thermokarst surface of glaciolacustrine plain (near small fen)	Large white and black spruce with smaller birch closed canopy, moss with lichen ground cover	Ground	Not visited
Sahtu	Norman Wells Pump Station	84-1-T4	61	65.29	126.89	Ground moraine	Moss, lichen, ericaceous shrubs with black spruce and tamarack	None	21/09/2013
Sahtu	Kp5 BH6 Offrow Cable	85-11-T2	90	65.29	126.79	Lacustrine plain	Forested, moss, lichen, black spruce	None	20/09/2013
Sahtu	Normal Wells Town	Arena	80	65.28	126.83	Ground moraine	Disturbed area adjacent to parking lot	None	21/09/2013
		Water Treatment Plant	80	65.28	126.84	Ground Moraine	Disturbed area adjacent to parking lot	None	21/09/2013
Sahtu	Van Everdingen	30m	n/a	65.27	126.75	Lacustrine plain	Open forest, moss, shrub, spruce/tamarack	None	20/09/2013

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited in 2013
Sahtu	Canyon Creek North A	84-2A-HT	110	65.23	126.50	Ground moraine	Lichen, moss, ericaceous shrubs with black spruce and tamarack	None	22/09/2013
		84-2A-T4	110	65.23	126.50	Ground moraine	Lichen, moss, ericaceous shrubs with black spruce and tamarack	None	22/09/2013
Sahtu	Canyon Creek North B	84-2B-T4	110	65.23	126.52	Ground moraine	Moss with white spruce	Ground	22/09/2013
Sahtu	Vermillion Creek	VC-01	92	65.10	126.14	Moraine plain (site at approach to water crossing)	NW side of creek, on top of ridge in black spruce forest	Air / Ground	22/09/2013
		VC-02	92	65.10	126.13	Moraine plain (site at approach to water crossing)	SE side of creek on plateau in area of burnt black spruce	None	22/09/2013
Sahtu	Police Island	PI-01	113	64.83	125.012	Lacustrine plain	Recovering burn (burnt black spruce forest)	None	22/09/2013
		PI-02	113	64.83	125.01	Lacustrine plain	Unburnt, black spruce forest with moss and lichen ground cover	None	22/09/2013
Sahtu	Old Fort Point	OFP-01	112	64.65	124.84	Lacustrine plain	Open mixed spruce, pine deciduous forest adjacent to open, low-lying fen	None	22/09/2013

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited in 2013
Sahtu	Little Smith Creek	LS-01	80	64.43	124.74	Alluvial flood plain	Open mature black spruce forest	None	22/09/2013
		LS-02	112	64.43	124.73	Glaciofluvial outwash plain	Tamarack, birch, poplar, and pine forest transition to spruce	None	22/09/2013
Sahtu	Saline River	SR-02	140	64.29	124.49	Glaciofluvial veneer over lacustrine	Burnt black spruce forest	None	22/09/2013
Sahtu	KP182	Unburnt	200	64.28	124.47	Lacustrine plain	Forested - white spruce, white birch with black spruce, moss and peat ground cover	Ground	22/09/2013
Sahtu	Steep Creek	Steep-01	62	64.19	124.37	Alluvial and colluvial, north facing slope of stream valley (site at edge of right-of-way)	Mixed, white spruce, jackpine, aspen, birch	None	22/09/2013
		Steep-02	134	64.18	124.38	Alluvial and colluvial, north facing slope of stream valley (site at edge of cleared right-of-way)	Mixed, white spruce, jackpine, aspen, birch	None	22/09/2013
		Steep-03	N/A	64.19	124.38	Alluvial and colluvial, north facing slope of stream valley (site on edge of wood chip insulated right-of-way)	Mixed, white spruce, jackpine, aspen, birch	None	Cable removed

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited in 2013
Deh cho	Table Mountain A	85-7A-HA108	255	63.61	123.64	Ground moraine	Lichen, moss, ericaceous shrubs with black spruce and alder	None	24/09/2013
Deh cho	KP313	KP313 T2	250	63.26	123.43	Lacustrine plain, bottom of slope	Moss cover and peat, forested, mix of birch and spruce	Ground	24/09/2013
		KP313 T4	250	63.26	123.43	Lacustrine plain, mid slope, W side of ROW	Moss cover and peat, forested, mix of birch and spruce	None	24/09/2013
		KP313 T5	250	63.26	123.43	Lacustrine plain, mid slope, E side of ROW	Moss cover and peat, forested, mix of birch and spruce	None	24/09/2013
		KP313 T6	250	63.26	123.43	Lacustrine plain, top of slope	Thin moss and organic cover, forested, mix of birch and spruce	Air / Ground	24/09/2013
Deh cho	River Between Two Mountains	RBTM-01	120	62.95	123.21	Transition lacustrine to alluvial to moraine terrain	Dense black spruce forest	None	13/08/2013
		RBTM-02	150	62.93	123.18	Transition lacustrine to alluvial to moraine terrain	Dense black spruce forest	None	13/08/2013
Deh cho	Willow Lake River	WLR-01	122	62.72	123.08	Alluvial fan	Open mixed forest	None	10/08/2013

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited in 2013
Deh cho	Wrigley Peatland	99TC4	n/a	62.28	122.60	Organic terrain on till plain, post glacial (>10Ka)	Boreal burn, scattered small spruce, pine and aspen, heath ground cover	Air / Ground	13/08/2013
Deh cho	Trail River	TR-01	181	62.09	121.76	Lacustrine plain and eolian landforms	Black spruce and tamarack forest with sphagnum and feathermoss ground cover	None	Not visited
Deh cho	Fort Simpson Bog High	99TC1	165	61.98	121.88	Peat plateau on surface of glaciolacustrine delta, post glacial (>10Ka)	Boreal, open black spruce (coniferous forest)	None	14/08/2013
	Fort Simpson Bog Low	99TC2	165	61.98	121.88	Thermokarst depression in the surface of glaciolacustrine delta, post glacial (>10Ka)	Boreal, sedge and sphagnum in depression surrounded by black spruce on raised peat rim	None	13/08/2013
Deh cho	Wrigley ferry transition	97TC5	165	61.98	121.88	Surface of glaciolacustrine delta, post glacial	Boreal, open spruce (coniferous forest)	Air / Ground	14/08/2013 Cable removed
Deh cho	Aspen (Wrigley Highway)	97TC1	165	61.95	121.76	Surface of glaciolacustrine delta, post glacial (>10Ka)	Boreal, aspen grove (deciduous forest)	Ground	14/08/2013
Deh cho	Mature Black Spruce (Wrigley highway)	97TC2	165	61.92	121.71	Surface of glaciolacustrine delta, post glacial (>10Ka)	Boreal, black spruce (coniferous forest)	Air (failed) / Ground (failed)	14/08/2013 Cable removed
Deh cho	Harris River	HAR-01	146	61.88	121.29	Moraine	Predominantly birch	None	Not visited

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited in 2013
Deh cho	Open Black Spruce	99TC3	183	61.66	121.34	Surface of glaciolacustrine delta, post glacial (>10Ka)	Small black spruce thicket with willow shrub, 100% cover of moss with lichen and boreal heath (coniferous)	Air / Ground	11/08/2013
Deh cho	Manners Sources	MS-01 (Fen)	182	61.63	121.11	Eolian interdune	Thermokarst shrub fen	None	Not visited
		MS-02 (Crest)	182	61.63	121.10	Eolian dune crest	Pine forest	None	Not visited
Deh cho	Liard Spruce	97TC4	180	61.55	121.39	Surface of glaciolacustrine delta, late glacial (>10Ka)	Boreal, wetland shrub and sedge	Ground	13/08/2013
Deh cho	Jean-Marie Creek	JMC-01	198	61.44	120.95	Transition alluvial flood plain to organic (fen) over lacustrine plain	Poorly drained shrub fen	None	Not visited
		JMC-02	198	61.44	120.95	Transition alluvial flood plain to organic (fen) over lacustrine plain	Sandy ridge with spruce, pine forest	None	Not visited
Deh cho	Trout River	Trout R	350	61.02	120.59	Organic terrain	Peatland with scattered spruce and sphagnum ground cover	None	Not visited
Deh cho	Trout Road Crossing	TRC	420	60.83	120.48	Bog-dominated moraine plain	Dry peatland vegetation consisting of black spruce, tamarack, and feathermoss	None	Not visited

Table 2. Active layer and air/ground surface temperature monitoring sites throughout the corridor. Active layer thickness in 2012 determined from thaw tubes at active layer monitoring sites is provided.

Note: Site IDs that include "AG" are only air and ground surface temperature sites and do not have a thaw tube. Probed active layer depths are taken on day of visit and are for the 2013 thaw season. Probed active layer values at ground temperature sites are presented in Appendix A. Sites identified with * were not visited in 2012 and therefore active layer reading is maximum thaw for summer 2011 or 2012.

Site Name	Site ID	Lat (°N)	Long (°W)	2012 Active Layer (m)	Air / Ground Temperature Record	Date Visited
North Head shore	90TT13	69.72	134.46	n/a	Air / Ground	Not visited
North Head ridge	90TT01	69.71	134.49	n/a	Abandoned	Not visited
North Point summit	90TT02	69.66	134.39	0.58	None	02/08/2013
North Point mid-slope	90TT11	69.66	134.38	0.70	None	02/08/2013
North Point shore	90TT12	69.66	134.36	0.53	None	02/08/2013
Mason Bay high	90TT08	69.53	134.02	0.71	None	02/08/2013
Mason Bay shore	90TT09	69.53	134.01	0.69	None	02/08/2013
Mason Bay inlet	90TT10	69.53	134.04	n/a	None	02/08/2013
Illasarvik	94TT01	69.49	134.55	0.59	None	02/08/2013
Harry Channel mouth	91TTA	69.48	134.83	0.85	None	03/08/2013
Involuted Hill top	92TT01	69.47	132.63	n/a	None	Not visited
Involuted Hill flat	92TT02	69.47	132.63	n/a	Air / Ground	Not visited
Kendall Island Meadow	91TTF	69.45	135.34	n/a	None	03/08/2013
Taglu	91TTC	69.37	134.95	>1.35 (probe)	Air / Ground	03/08/2013
Lousy Point hollow	91TT09	69.22	134.30	0.34	None	02/08/2013
Lousy Point ridge	90TT05	69.22	134.28	0.65 (probe)	Air / Ground	02/08/2013
Lousy Point low terrace	90TT06	69.22	134.28	0.53	Air / Ground	02/08/2013
Lousy Point flood plain	90TT07	69.22	134.27	0.71	None	Not visited
YaYa Lake high	90TT03	69.15	134.71	1.07	None	03/08/2013
YaYa Lake low	90TT04	69.14	134.70	0.95	Air / Ground	03/08/2013
Swimming Point slope	91TT01	69.11	134.40	0.64	None	03/08/2013
Swimming Point shore	91TT02	69.11	134.38	thawed	None	Not visited
Swimming Point Holmes	91TT03	69.11	134.35	n/a	None	Not visited
Trail Valley Creek	91TT11	68.74	133.49	0.66	None	04/08/2013
Reindeer Station plateau	91TT12	68.69	134.11	0.77	Air / Ground	03/08/2013
Williams Island	91TT13	68.68	134.14	1.54	Air failed) / Ground (failed)	04/08/2013
Navy Channel	90TT17	68.42	133.79	>1.33 (probe)	Air (failed) / Ground	05/08/2013
Inuvik Airport	01TT02	68.32	133.43	0.70	None	06/08/2013
Upper Air	90TT16	68.32	133.53	0.81	None	31/07/2013
Havikpak Creek	93TT02	68.32	133.52	0.76	None	31/07/2013
Caribou Creek	93TT01	68.11	133.48	0.77	None	01/08/2013
Rengleng River mouth	91TT14	67.80	134.13	n/a	Air / Ground	Not visited
Tsiigehtchic	91TT16	67.48	133.77	n/a	Air / Ground	Not visited
Ochre River cabin	92TT10	63.47	123.69	0.69*	None	12/08/2013
Ochre River	92TT09	63.46	123.70	0.47*	None	12/08/2013
River between two mountains	92TT08	62.96	123.21	0.80*	Air / Ground	13/08/2013

Site Name	Site ID	Lat (°N)	Long (°W)	2012 Active Layer (m)	Air / Ground Temperature Record	Date Visited
Willow Lake burn	93AG4	62.70	123.06	0.63 (probe)	Air / Ground	10/08/2013
Willlow Lake River	92TT7	62.70	123.06	0.91*	Air / Ground	10/08/2013
Wrigley Pines	94AG2	62.32	122.69	n/a	Air / Ground	13/08/2013
Fort Simpson bog	93AG2	61.98	122.88	n/a	Air / Ground	14/08/2013
Spruce cutline	93AG3	61.97	121.82	1.16 (probe)	Air / Ground	14/08/2013
FS aspen dune	94AG3	61.89	121.52	n/a	Air / Ground	Not visited
Martin River	92TT6	61.89	121.60	>1.30 (probe)	Air / Ground	09/089/2013
FS deep	94AG1	61.84	121.34	n/a	Air / Ground	14/08/2013

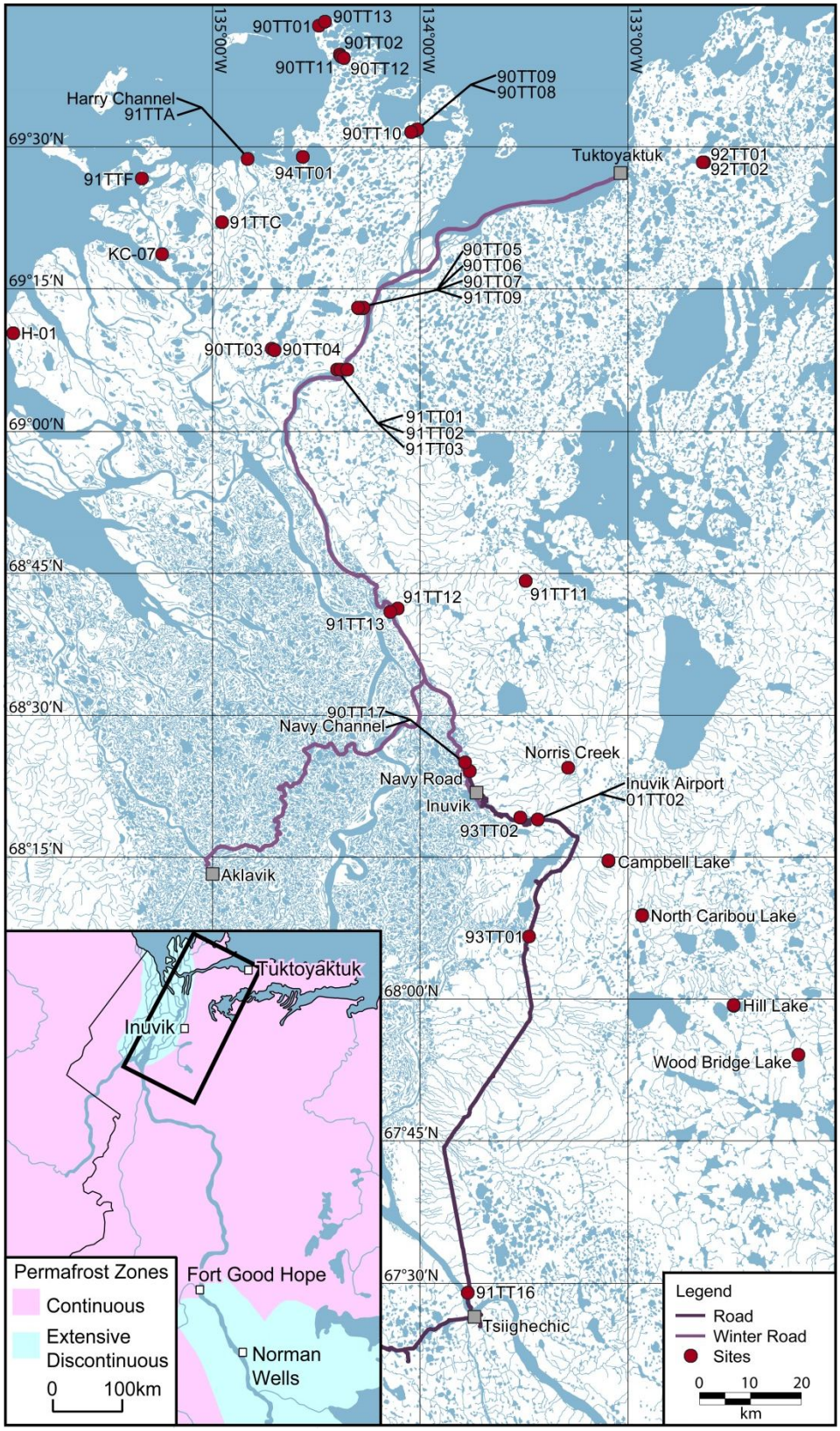


Figure 1. Permafrost and active layer monitoring sites north and south of Inuvik.

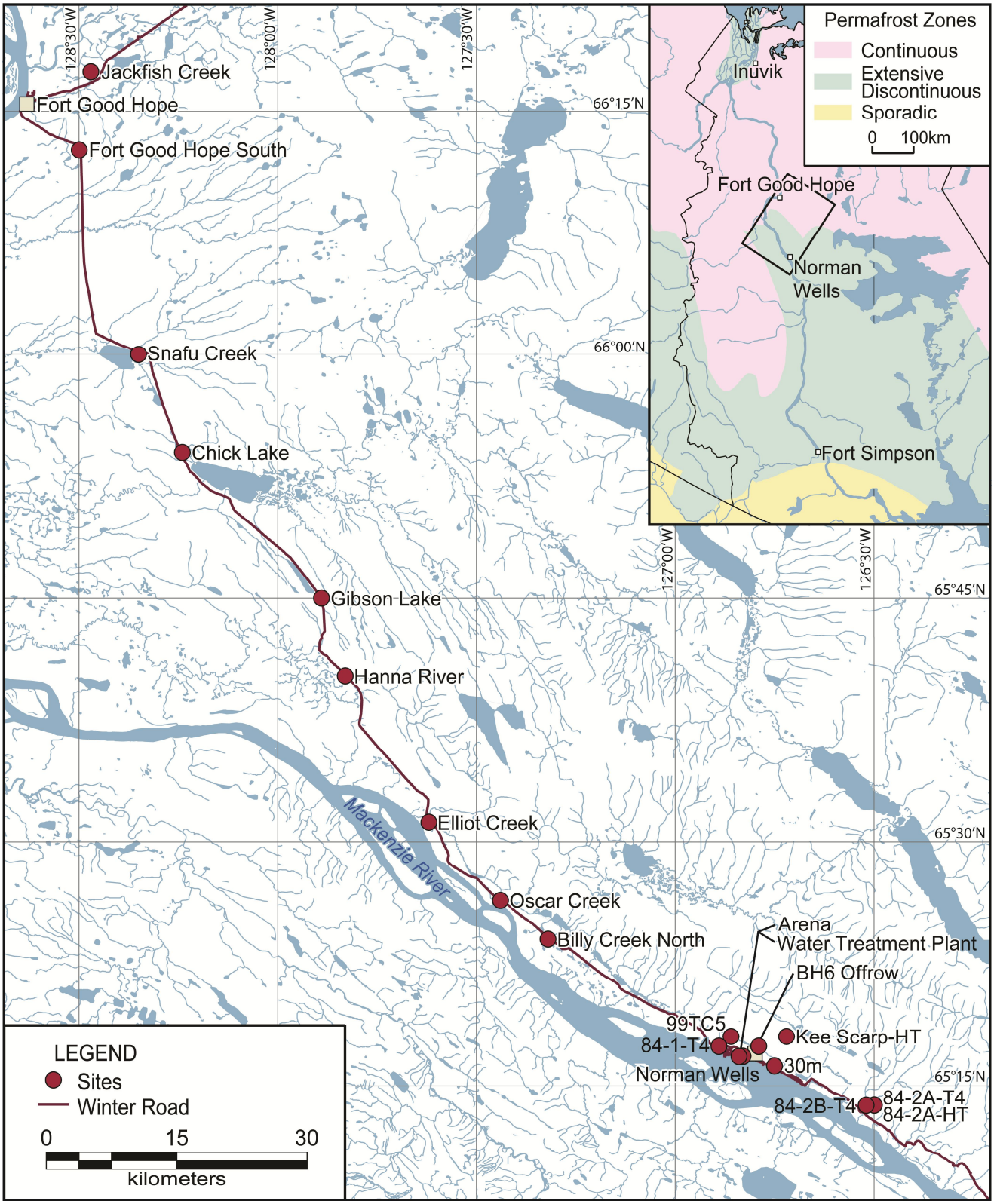


Figure 2. Permafrost monitoring sites between Fort Good Hope and Norman Wells in the Sahtu Settlement Region.

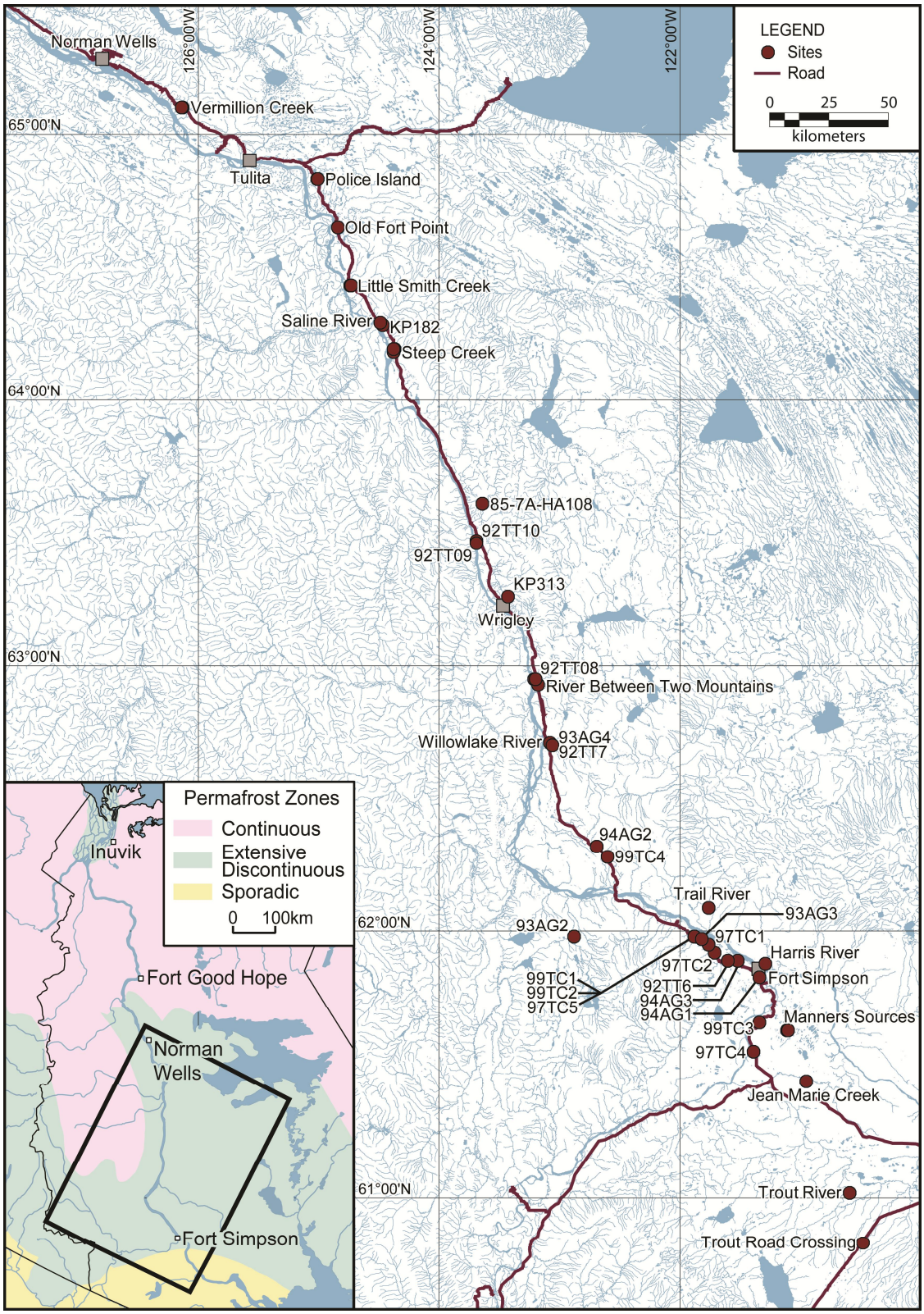
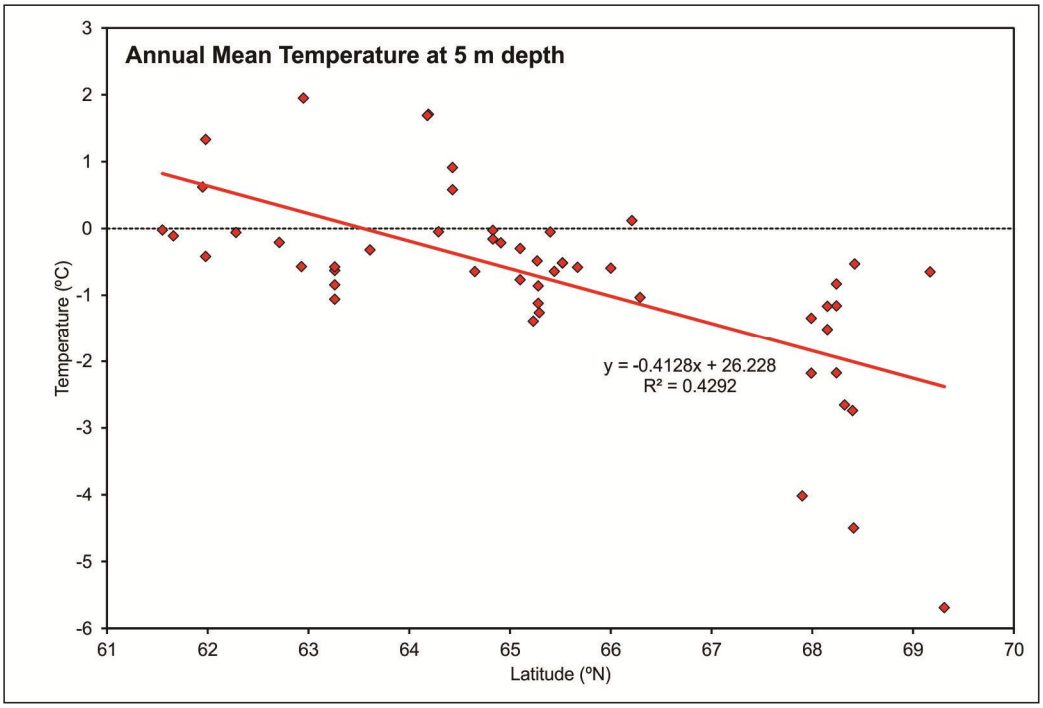


Figure 3. Permafrost and active layer monitoring sites south of Norman Wells in the Sahtu and Deh Cho Settlement Regions**.**



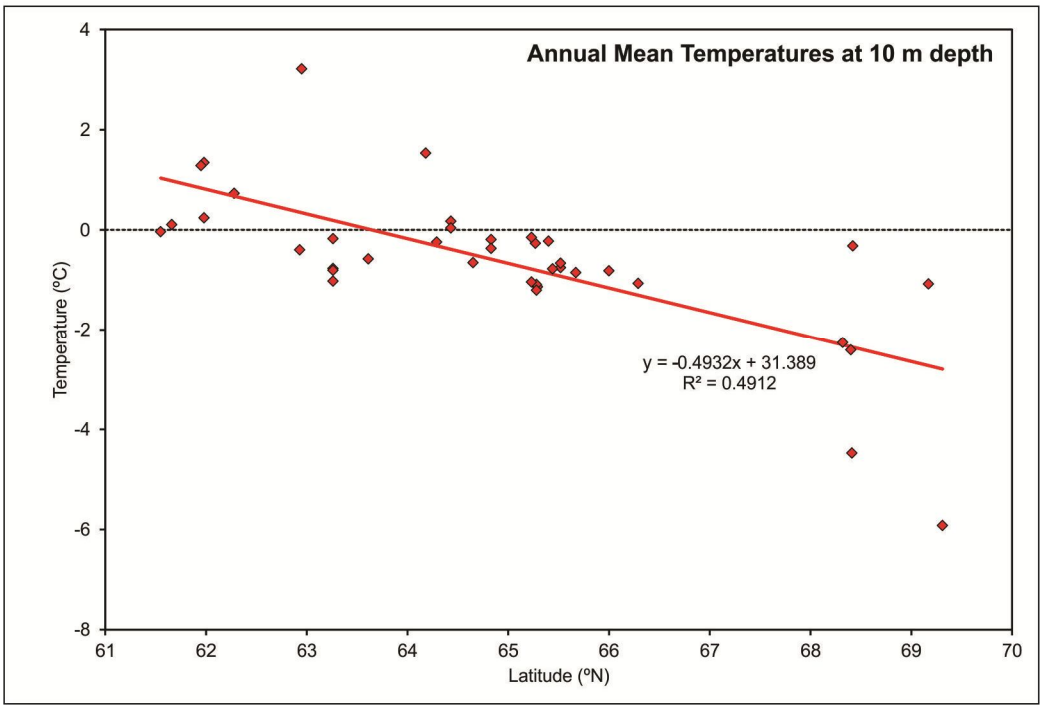


Figure 4. Annual mean ground temperature at 5 and 10 m depth for 2012-13 along the Mackenzie corridor. The best fit linear regression line for the temperature-latitude relationship is also provided.

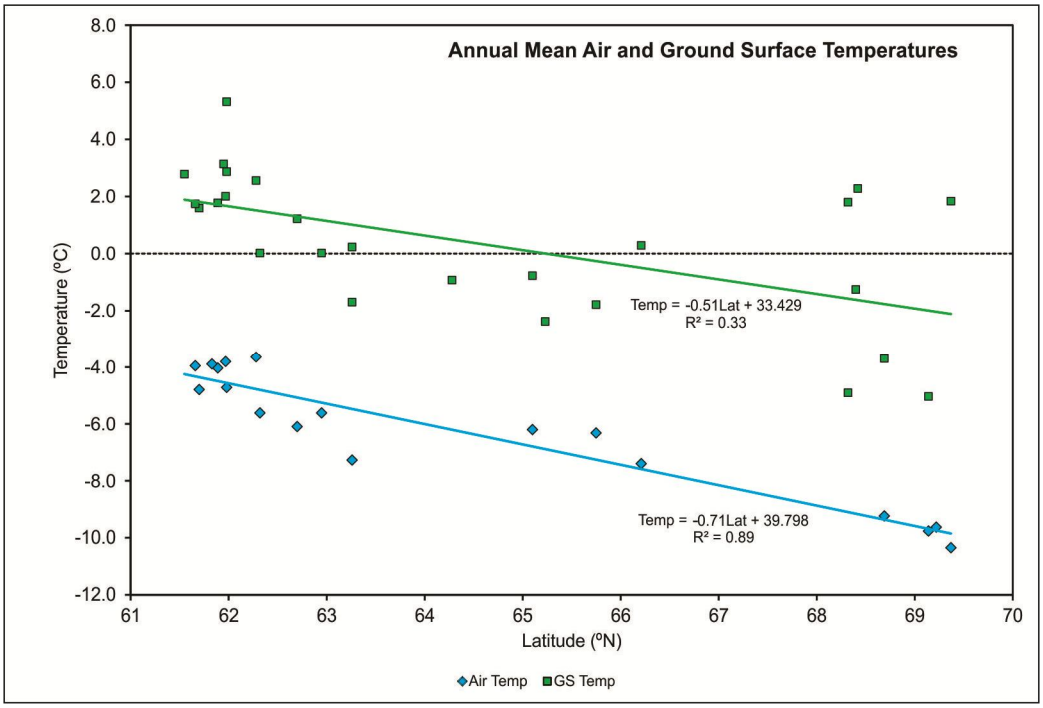


Figure 5. Mean air and ground surface (GS) temperature for 2012-13. The best fit linear regression line describing the temperature-latitude relationship for the air and ground surface is also shown.

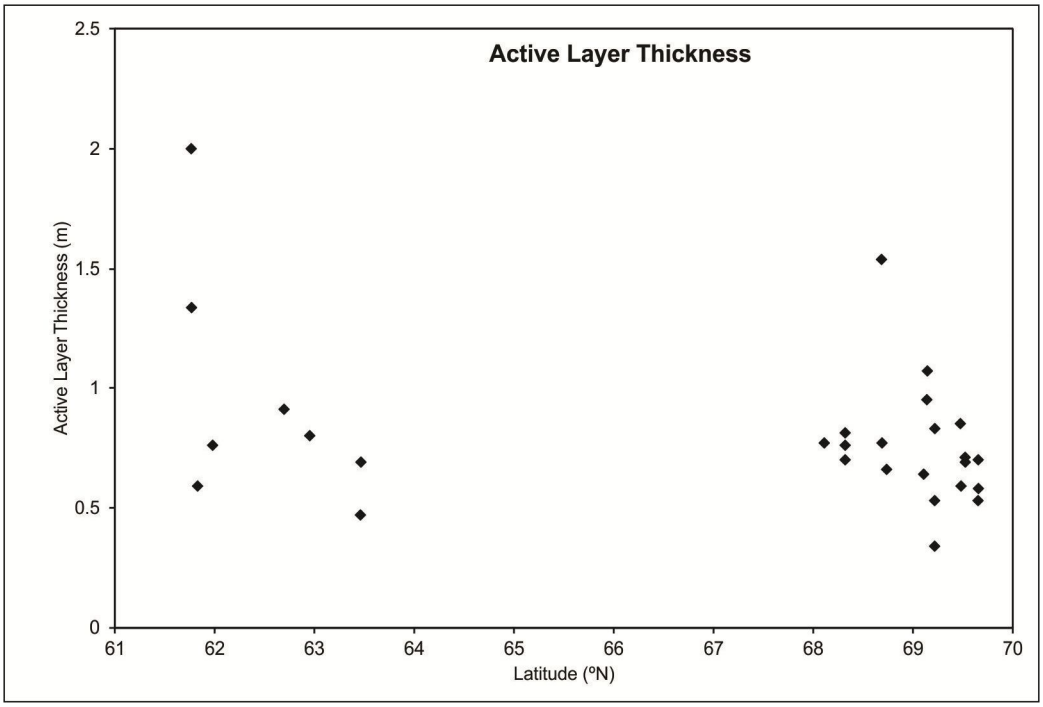


Figure 6. Active layer thickness along the transect in 2012 determined from thaw tubes.

APPENDIX A

GRAPHICAL AND TABULAR PRESENTATION OF GROUND TEMPERATURE DATA FOR THE PERIOD 2012-13

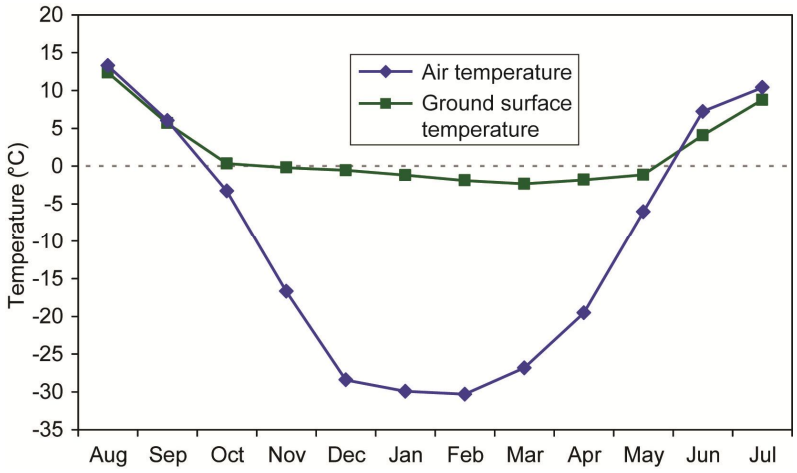
The annual maximum (red line) and minimum (blue line) temperature profile, or ground temperature envelope, is provided for each site for which a continuous 2012-13 record of ground temperature is available. For sites that do not have a continuous record for 2012-13, the ground temperature profile based on a single manual measurement during the 2013 site visit (in August or September) is provided (green line). For sites not visited in 2012 but visited in 2013, the ground temperature envelopes for 2011-12 and 2012-13 are provided. The thaw depth is provided for each site and is based on interpolation of temperature profiles unless otherwise noted. Where insufficient temperature data are available to determine the thaw depth, the measurement obtained through probing on the day of the site visit is provided. Mean monthly air and ground surface temperature (5 cm depth) data for the 2012-13 period (or 2011-13 periods if site not visited in 2012) is presented graphically and in table format for each site where available.

Taglu — 91TTC

Inuvialuit Settlement Region

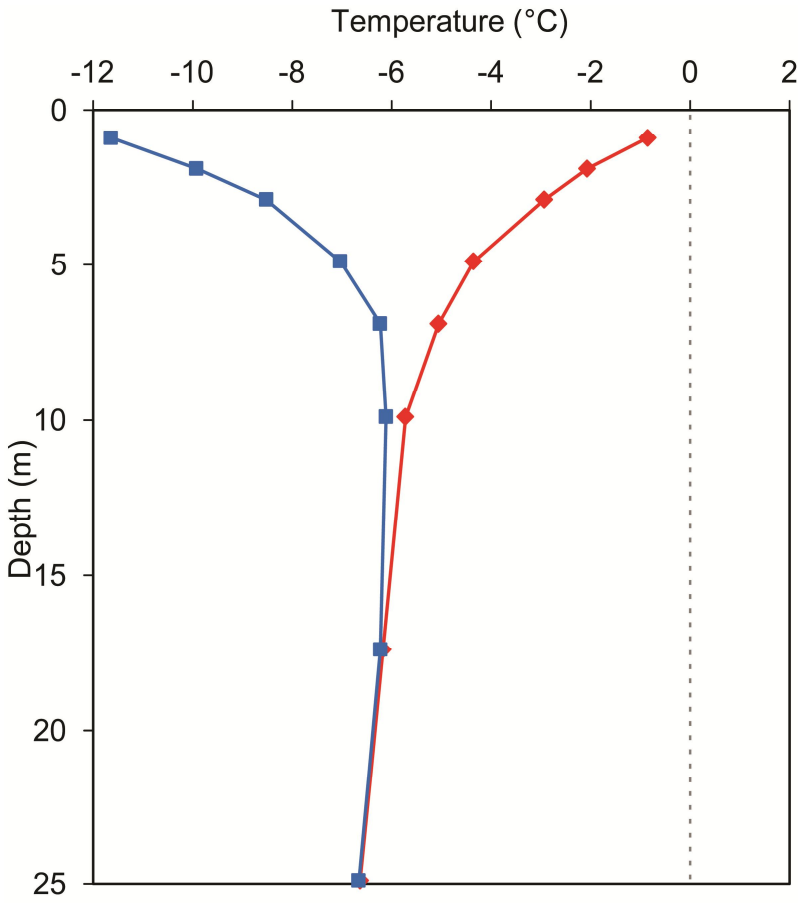
Latitude: 69.37 N Longitude: 134.95 W
Elevation: 15 m a.s.l.
Landform: Surface of Holocene Mackenzie delta
Vegetation cover: Low shrub tundra
Thaw Depth: >1.35 m (probed)
Site visit: August 3, 2013
*Note: Ground surface logger buried by ~10 cm of sediment.

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	13.28	12.37
Sept / 2012	6.03	5.68
Oct / 2012	-3.30	0.33
Nov / 2012	-16.70	-0.20
Dec / 2012	-28.42	-0.55
Jan / 2013	-29.93	-1.20
Feb / 2013	-30.32	-1.90
Mar / 2013	-26.83	-2.34
Apr / 2013	-19.54	-1.82
May / 2013	-6.06	-1.15
Jun / 2013	7.22	4.08
Jul / 2013	10.40	8.76



KC-07
Inuvialuit Settlement Region

Latitude: 69.31 N Longitude: 135.25 W
Elevation: n/a
Landform: Tundra upland
Vegetation cover: Grass and moss tundra
Thaw Depth: n/a
Site visit: August 9, 2013



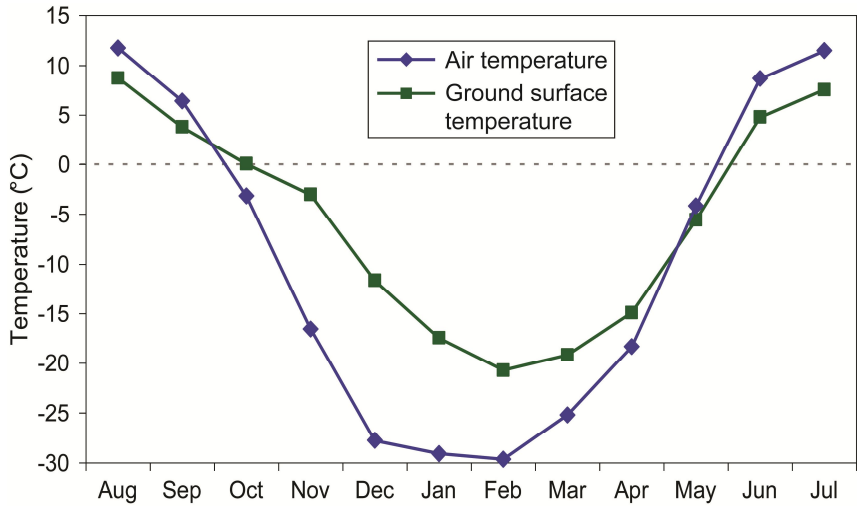
Depth (m)	Max (°C)	Min (°C)
0.9	-0.85	-11.64
1.9	-2.07	-9.92
2.9	-2.93	-8.52
4.9	-4.35	-7.03
6.9	-5.06	-6.23
9.9	-5.72	-6.11
17.4	-6.18	-6.23
24.9	-6.64	-6.66

Lousy Point ridge — 90TT05

Inuvialuit Settlement Region

Latitude: 69.22 N Longitude: 134.28 W
Elevation: 118 m a.s.l.
Landform: Glaciofluvial ridge
Vegetation cover: Low shrub tundra
Thaw depth: 0.65 m (probed)
Site visit: August 2, 2013

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	11.78	8.74
Sept / 2012	6.42	3.78
Oct / 2012	-3.16	0.06
Nov / 2012	-16.55	-3.02
Dec / 2012	-27.76	-11.62
Jan / 2013	-29.07	-17.45
Feb / 2013	-29.63	-20.72
Mar / 2013	-25.19	-19.18
Apr / 2013	-18.35	-14.89
May / 2013	-4.16	-5.56
Jun / 2013	8.68	4.78
Jul / 2013	11.49	7.56

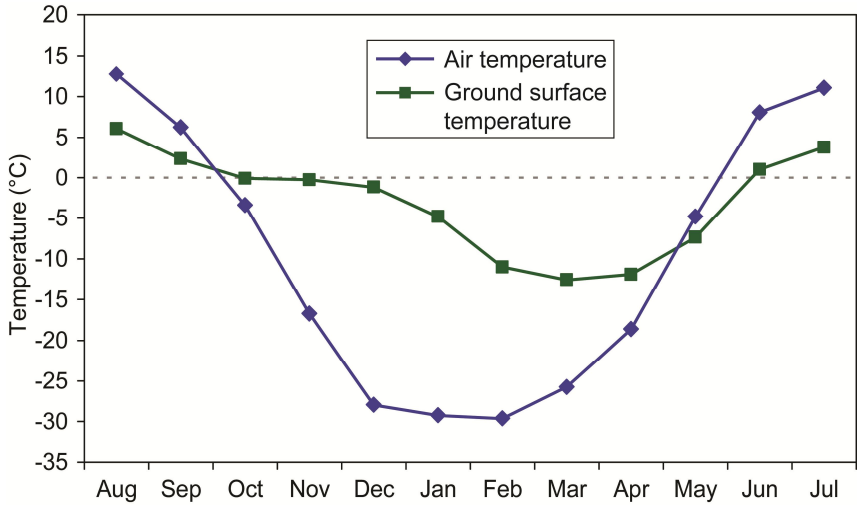


Lousy Point low terrace — 90TT06

Inuvialuit Settlement Region

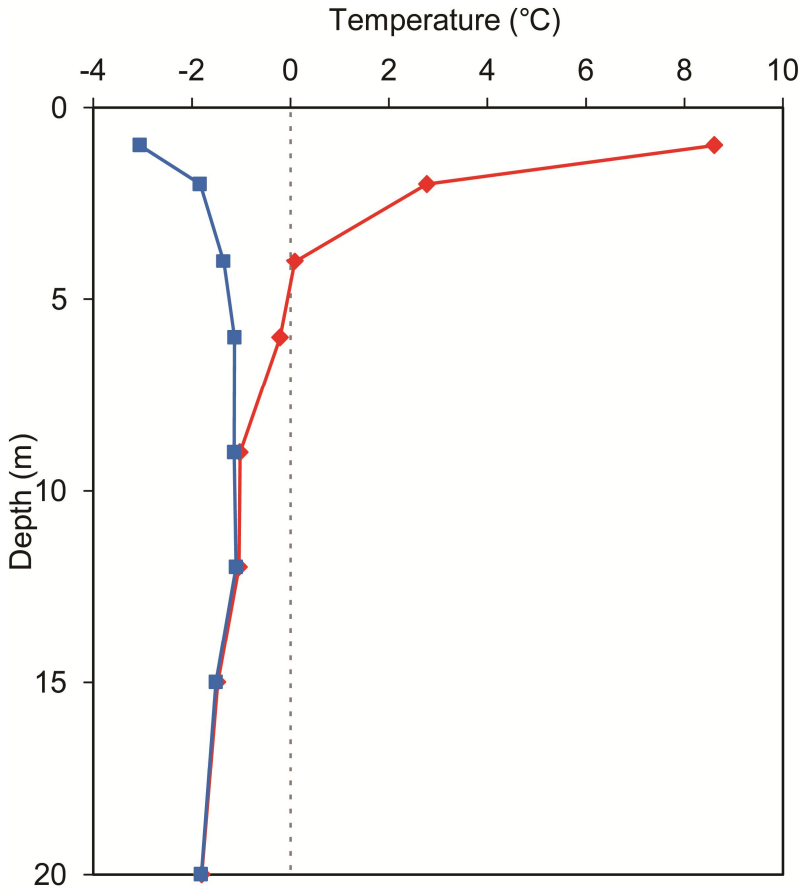
Latitude: 69.22 N Longitude: 134.28 W
Elevation: 39 m a.s.l.
Landform: Glaciofluvial ridge
Vegetation cover: Low shrub tundra
Thaw depth: 0.53 m
Site visit: August 2, 2013

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	12.75	6.06
Sept / 2012	6.20	2.34
Oct / 2012	-3.42	-0.09
Nov / 2012	-16.72	-0.26
Dec / 2012	-27.97	-1.18
Jan / 2013	-29.25	-4.83
Feb / 2013	-29.64	-11.00
Mar / 2013	-25.74	-12.57
Apr / 2013	-18.63	-11.92
May / 2013	-4.84	-7.36
Jun / 2013	8.03	1.02
Jul / 2013	11.03	3.78



H-01
Inuvialuit Settlement Region

Latitude: 69.17 N Longitude: 136.01 W
Elevation: n/a
Landform: Surface of Holocene Mackenzie delta
Vegetation cover: Grass and shrub tundra
Thaw Depth: 4.63 m
Site visit: August 18, 2013



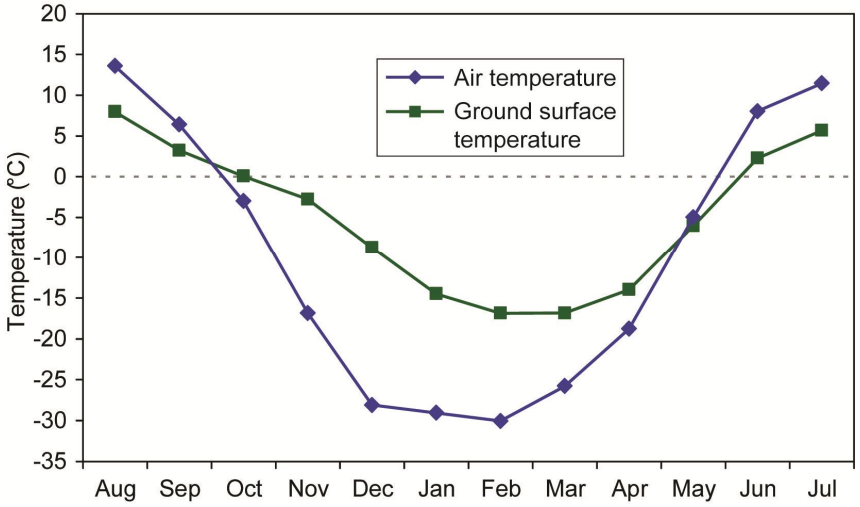
Depth (m)	Max (°C)	Min (°C)
1	8.61	-3.06
2	2.77	-1.83
4	0.10	-1.36
6	-0.21	-1.13
9	-1.02	-1.14
12	-1.04	-1.10
15	-1.48	-1.51
20	-1.80	-1.81

YaYa Lake low — 90TT04

Inuvialuit Settlement Region

Latitude: 69.14 N Longitude: 134.70 W
Elevation: 10 m a.s.l.
Landform: Ice contact complex
Vegetation cover: shrub tundra
Thaw Depth: 0.87 m (probed)
Site visit: August 3, 2013

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	13.57	7.97
Sept / 2012	6.40	3.24
Oct / 2012	-2.99	0.06
Nov / 2012	-16.83	-2.75
Dec / 2012	-28.10	-8.74
Jan / 2013	-29.06	-14.48
Feb / 2013	-30.06	-16.85
Mar / 2013	-25.79	-16.83
Apr / 2013	-18.78	-13.96
May / 2013	-5.00	-6.05
Jun / 2013	8.03	2.27
Jul / 2013	11.45	5.67

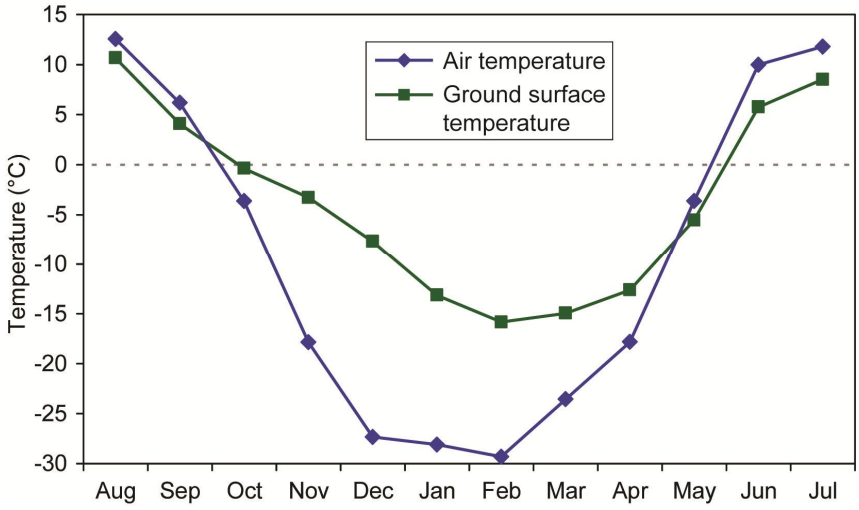


Reindeer Station plateau — 91TT12

Inuvialuit Settlement Region

Latitude: 68.69 N Longitude: 134.11 W
Elevation: 152 m a.s.l.
Landform: Plateau surface, till plain
Vegetation cover: Shrub tundra
Thaw Depth: 0.61 m (Probed)
Site visit: August 3, 2013

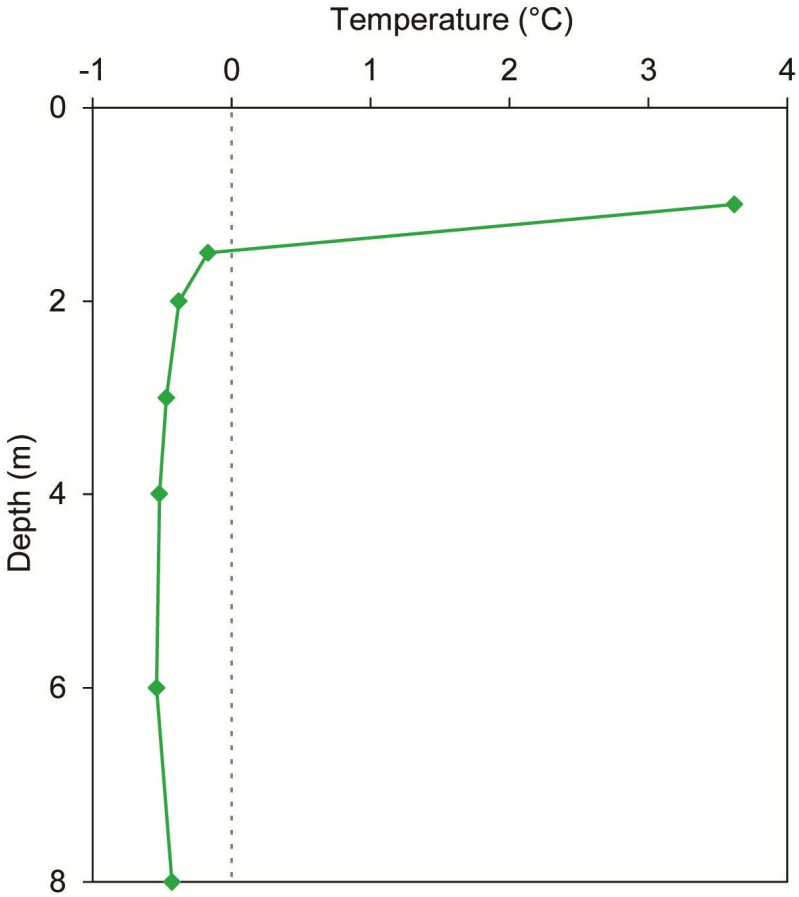
Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	12.54	10.65
Sept / 2012	6.16	4.08
Oct / 2012	-3.64	-0.38
Nov / 2012	-17.85	-3.28
Dec / 2012	-27.35	-7.68
Jan / 2013	-28.11	-13.14
Feb / 2013	-29.32	-15.83
Mar / 2013	-23.57	-14.95
Apr / 2013	-17.84	-12.62
May / 2013	-3.62	-5.53
Jun / 2013	9.97	5.75
Jul / 2013	11.79	8.50



Navy Channel — 03TC1

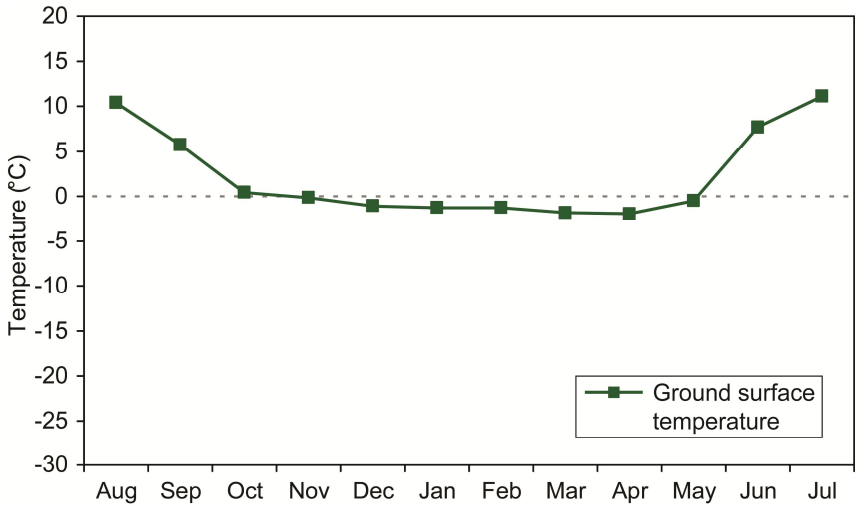
Inuvialuit Settlement Region

Latitude: 68.42 N Longitude: 133.79 W
Elevation: 5 m a.s.l.
Landform: Surface of Holocene Mackenzie delta adjacent to eastern edge rising 10s of meters to till plain
Vegetation cover: Riparian high willow shrub, open, incomplete ground cover of forbs and sedge (forest tundra)
Thaw Depth: 1.48 m
Site visit: August 5, 2013



Depth (m)	Temp (°C)
1	3.62
1.5	-0.17
2	-0.38
3	-0.47
4	-0.52
6	-0.54
8	-0.43

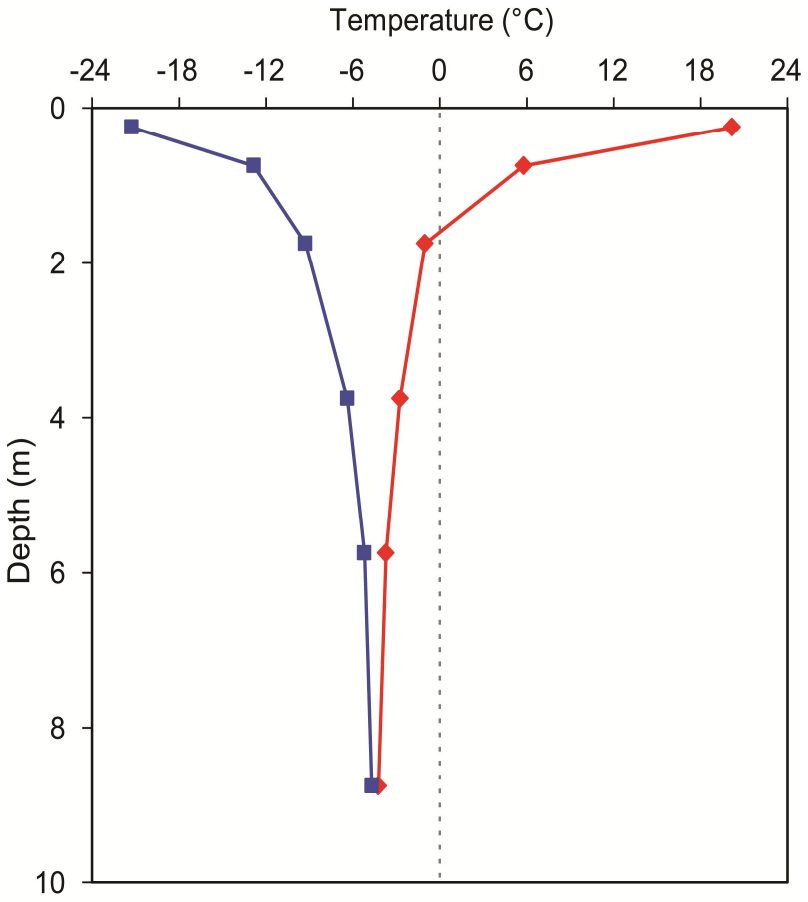
Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	n/a	10.39
Sept / 2012	n/a	5.76
Oct / 2012	n/a	0.44
Nov / 2012	n/a	-0.13
Dec / 2012	n/a	-1.06
Jan / 2013	n/a	-1.27
Feb / 2013	n/a	-1.26
Mar / 2013	n/a	-1.82
Apr / 2013	n/a	-1.94
May / 2013	n/a	-0.48
Jun / 2013	n/a	7.68
Jul / 2013	n/a	11.07



Norris Creek — NC-01

Gwich'in Settlement Region

Latitude: 68.41 N Longitude: 133.29 W
Elevation: 15 m a.s.l.
Landform: Thick organic material over moraine plain
Vegetation cover: Shrub Tundra
Thaw Depth: 1.61 m
Site visit: August 1, 2013

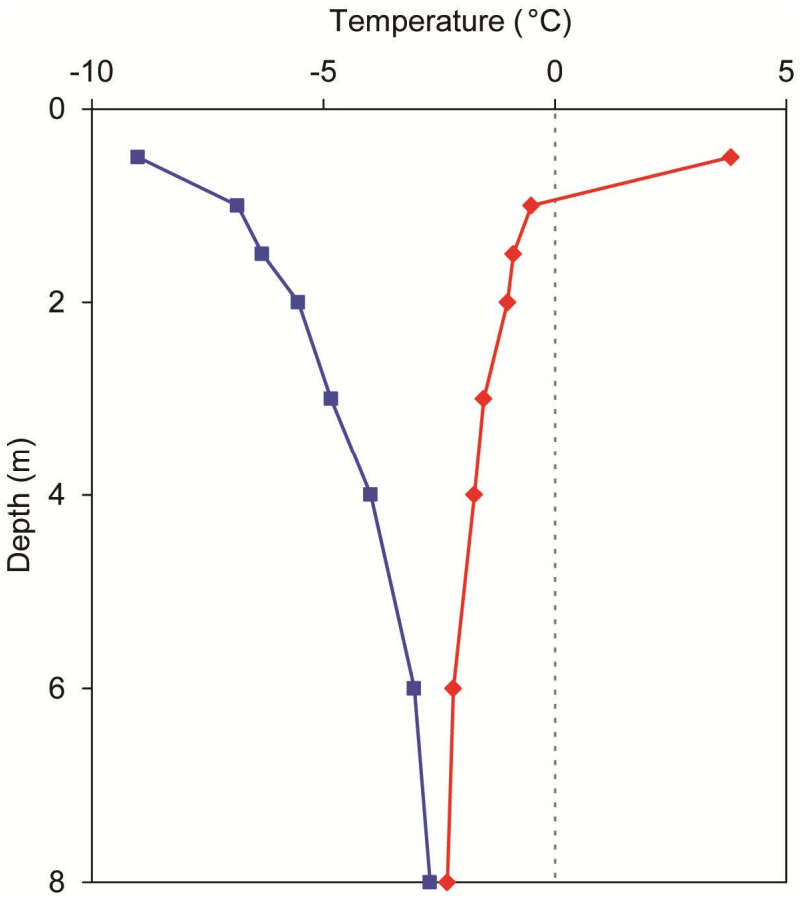


Depth (m)	Max (°C)	Min (°C)
0.25	20.17	-21.28
0.75	5.78	-12.84
1.75	-1.02	-9.28
3.75	-2.75	-6.38
5.75	-3.72	-5.20
8.75	-4.24	-4.70

Navy Road — 01TC1

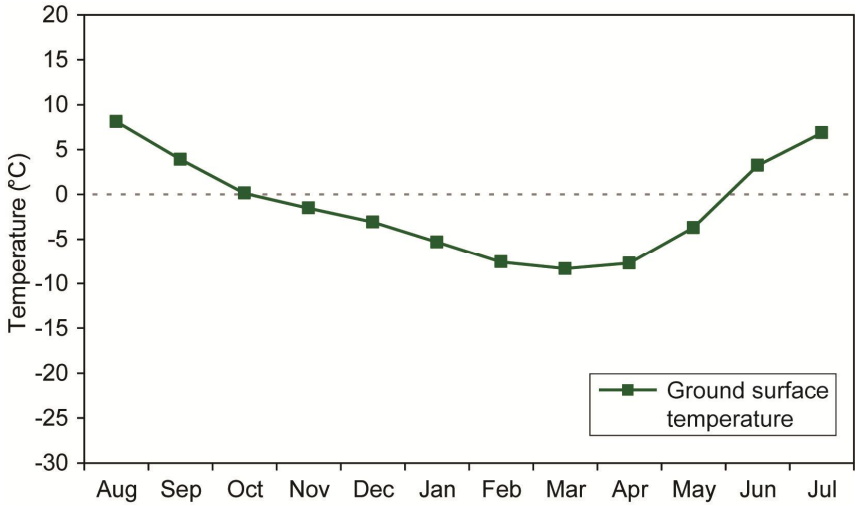
Inuvialuit Settlement Region

Latitude: 68.40 N Longitude: 133.76 W
Elevation: 60 m a.s.l.
Landform: Fine grained colluvium sloping toward river, post glacial (~10Ka)
Vegetation cover: Taiga post fire succession, scattered birch and alder, open dwarf birch, heath ground cover
Thaw Depth: 0.94 m
Site visit: August 4, 2013



Depth (m)	Max (°C)	Min (°C)
0.5	3.80	-9.01
1	-0.51	-6.86
1.5	-0.90	-6.32
2	-1.03	-5.54
3	-1.54	-4.84
4	-1.74	-3.98
6	-2.20	-3.04
8	-2.33	-2.70

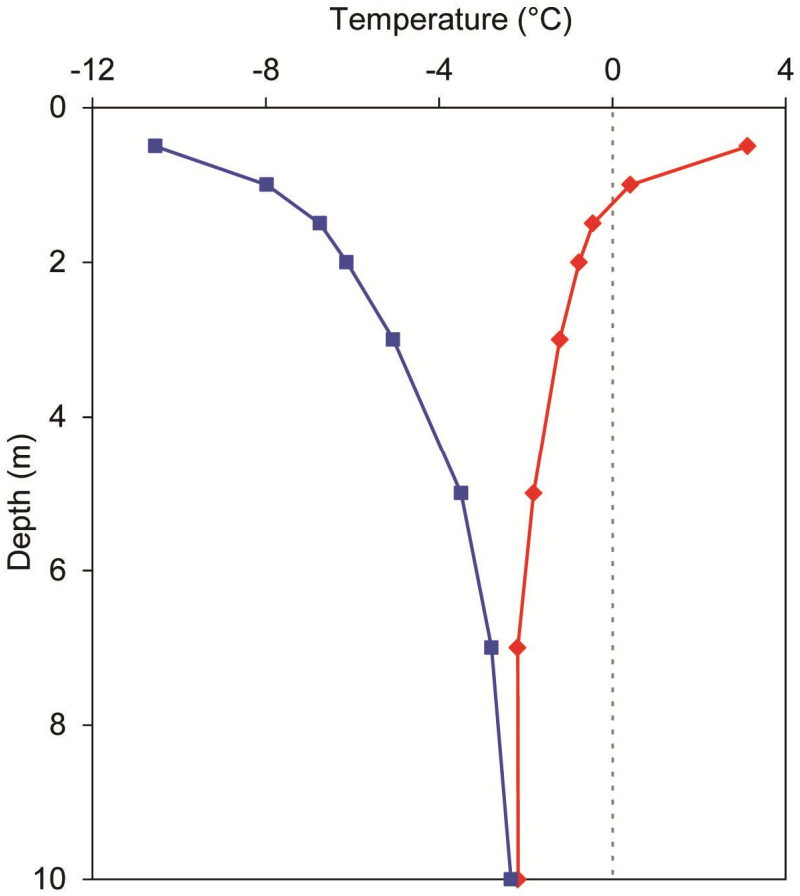
Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	n/a	8.12
Sept / 2012	n/a	3.90
Oct / 2012	n/a	0.14
Nov / 2012	n/a	-1.52
Dec / 2012	n/a	-3.09
Jan / 2013	n/a	-5.33
Feb / 2013	n/a	-7.59
Mar / 2013	n/a	-8.34
Apr / 2013	n/a	-7.72
May / 2013	n/a	-3.72
Jun / 2013	n/a	3.23
Jul / 2013	n/a	6.85



Inuvik Airport (trees) — 01TC2

Gwich'in Settlement Region

Latitude: 68.32 N Longitude: 133.44 W
Elevation: 84 m a.s.l.
Landform: Fluted till plain glacial (>10Ka)
Vegetation cover: Taiga open black spruce, health ground cover
Thaw Depth: 1.24 m
Site visit: July 31, 2013

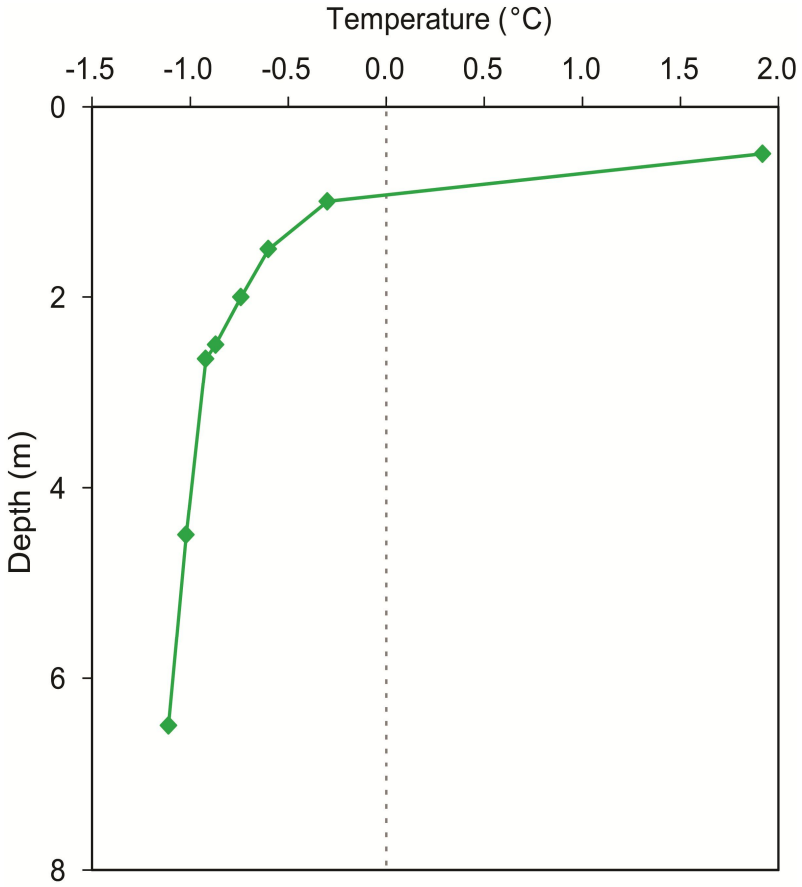


Depth (m)	Max (°C)	Min (°C)
0.5	3.12	-10.55
1	0.41	-7.97
1.5	-0.45	-6.75
2	-0.77	-6.13
3	-1.22	-5.06
5	-1.82	-3.49
7	-2.19	-2.79
10	-2.18	-2.34

Inuvik Airport (bog) — 12TC1

Gwich'in Settlement Area

Latitude: 68.32 N Longitude: 133.43 W
Elevation: 68 m a.s.l.
Landform: Bog between ridges on fluted till plain, glacial (>10Ka)
Vegetation cover: Taiga open bog, scattered shrub, heath ground cover (forest tundra)
Thaw Depth: 0.93 m
Site visit: July 31, 2013

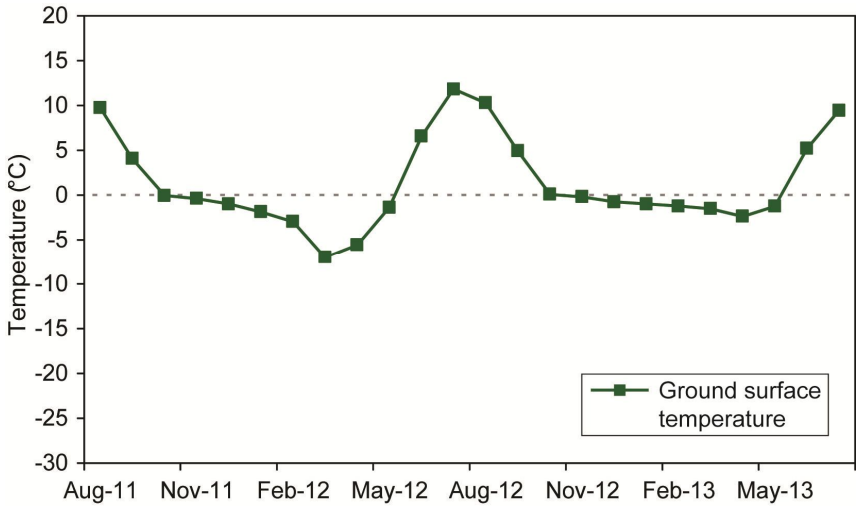


Depth (m)	Temp (°C)
0.5	1.92
1	-0.3
1.5	-0.6
2	-0.74
2.5	-0.87
2.65	-0.92
4.5	-1.02
6.5	-1.11

Inuvik Airport (bog) — 12TC1

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	n/a	9.73
Sept / 2011	n/a	4.07
Oct / 2011	n/a	-0.07
Nov / 2011	n/a	-0.39
Dec / 2011	n/a	-0.99
Jan / 2012	n/a	-1.87
Feb / 2012	n/a	-2.97
Mar / 2012	n/a	-6.99
Apr / 2012	n/a	-5.59
May / 2012	n/a	-1.39
Jun / 2012	n/a	6.56
Jul / 2012	n/a	11.82

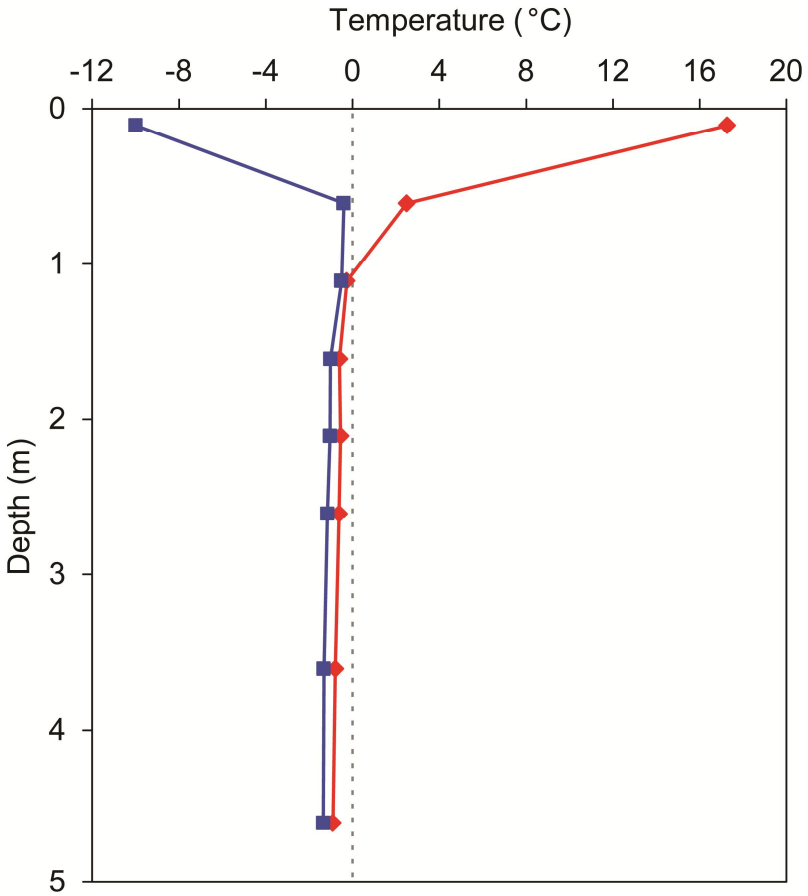
Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	n/a	10.28
Sept / 2012	n/a	4.93
Oct / 2012	n/a	0.08
Nov / 2012	n/a	-0.20
Dec / 2012	n/a	-0.76
Jan / 2013	n/a	-0.99
Feb / 2013	n/a	-1.24
Mar / 2013	n/a	-1.51
Apr / 2013	n/a	-2.39
May / 2013	n/a	-1.25
Jun / 2013	n/a	5.20
Jul / 2013	n/a	9.44



Campbell Lake — CaL-01

Gwich'in Settlement Region

Latitude: 68.24 N Longitude: 133.10 W
Elevation: 115 m a.s.l.
Landform: Moraine plain
Vegetation cover: Peatland
Thaw Depth: 1.06 m
Site visit: August 1, 2013

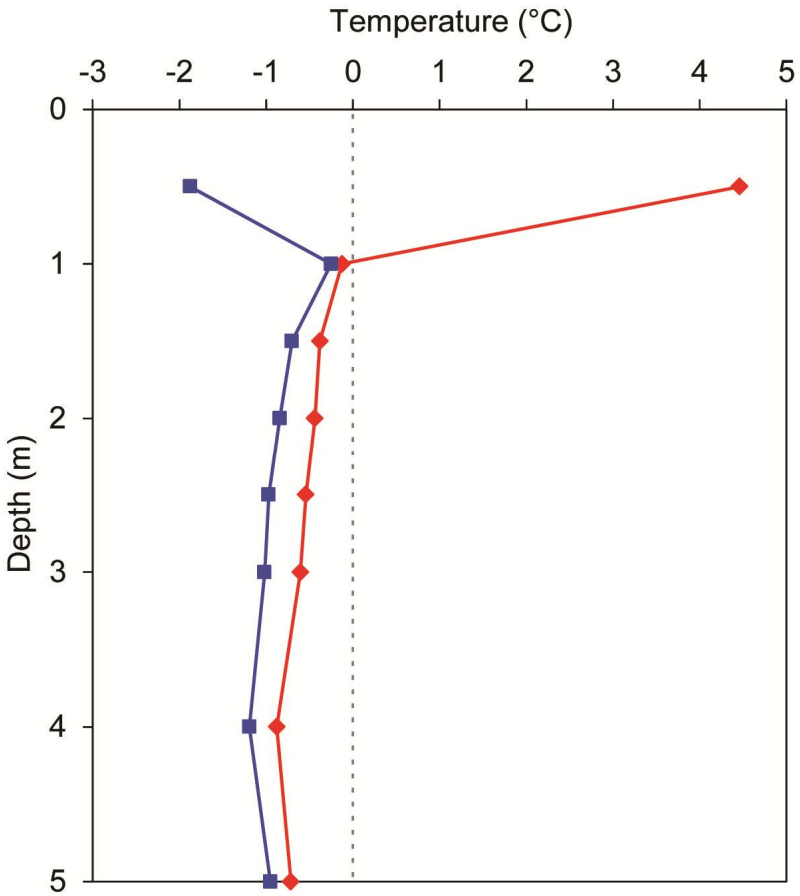


Depth (m)	Max (°C)	Min (°C)
0.11	17.27	-9.99
0.61	2.50	-0.41
1.11	-0.26	-0.51
1.61	-0.60	-1.01
2.11	-0.55	-1.03
2.61	-0.62	-1.15
3.61	-0.79	-1.32
4.61	-0.91	-1.35

Campbell Lake — CaL-02

Gwich'in Settlement Region

Latitude: 68.24 N Longitude: 133.10 W
Elevation: 118 m a.s.l.
Landform: Moraine plain
Vegetation cover: Cutline through Black spruce forest
Thaw Depth: 0.99 m
Site visit: August 1, 2013

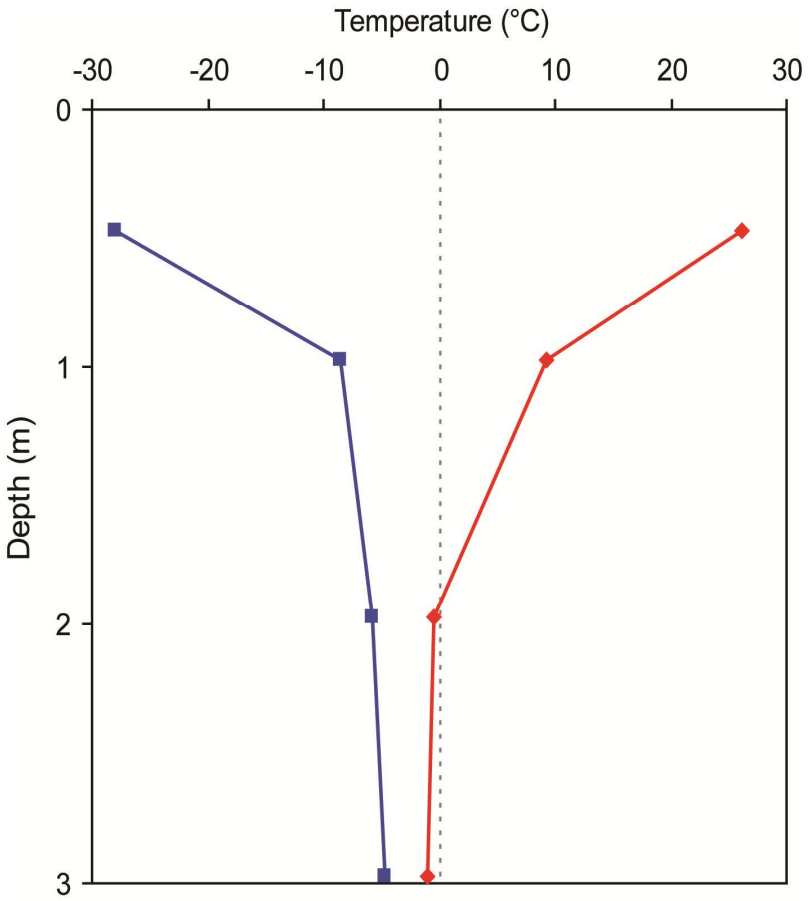


Depth (m)	Max (°C)	Min (°C)
0.5	4.46	-1.88
1	-0.12	-0.25
1.5	-0.38	-0.70
2	-0.44	-0.84
2.5	-0.54	-0.97
3	-0.60	-1.02
4	-0.88	-1.19
5	-0.71	-0.95

Campbell Lake — CaL-03

Gwich'in Settlement Region

Latitude: 68.24 N Longitude: 133.10 W
Elevation: 118 m a.s.l.
Landform: Moraine plain
Vegetation cover: Black spruce forest
Thaw Depth: 1.92 m
Site visit: August 1, 2013

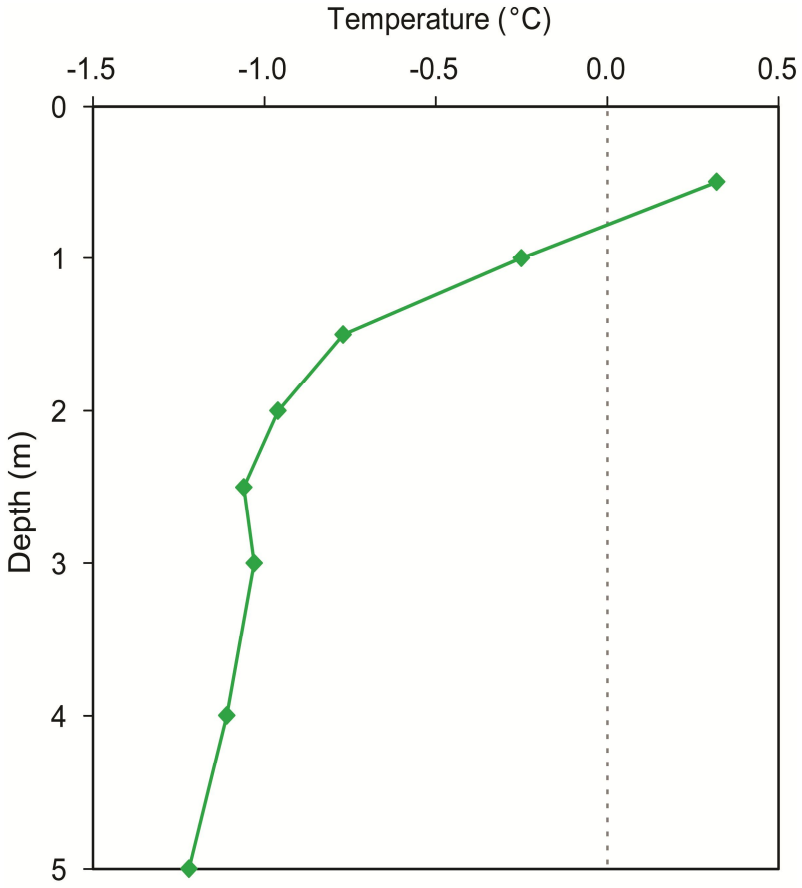


Depth (m)	Max (°C)	Min (°C)
0.47	22.74	-22.93
0.97	8.14	-10.39
1.97	-0.46	-6.95
2.97	-0.91	-5.49

North Caribou Lake — NCL-01

Gwich'in Settlement Region

Latitude: 68.15 N Longitude: 132.93 W
Elevation: 209 m a.s.l.
Landform: Moraine plain
Vegetation cover: Peatland
Thaw Depth: 0.781 m
Site visit: August 1, 2013

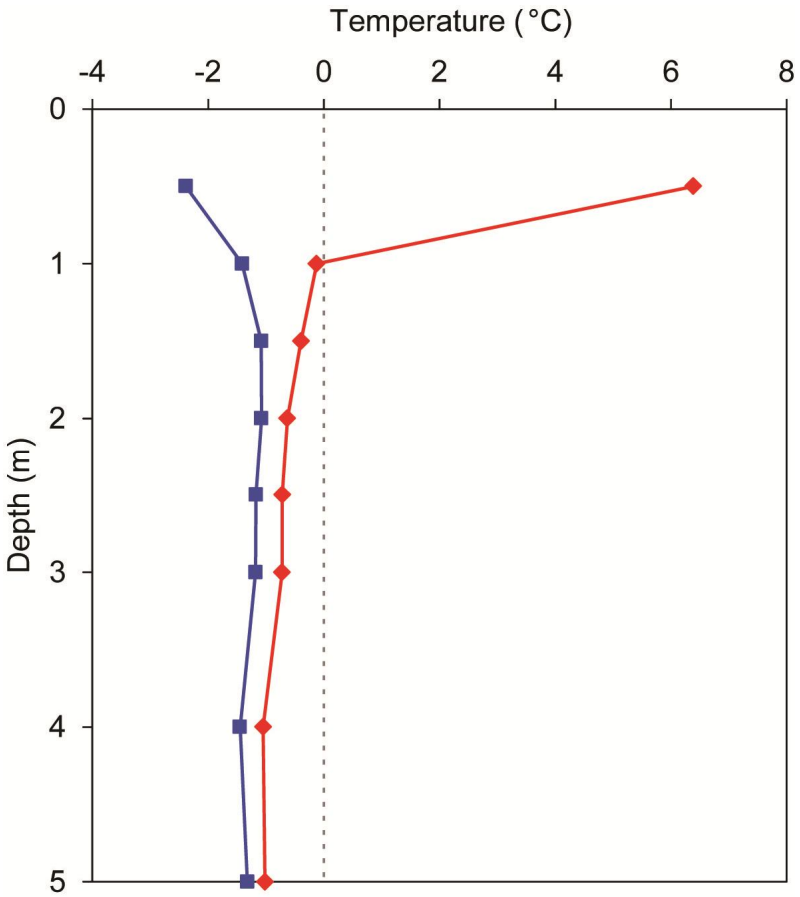


Depth (m)	Temp (°C)
0.5	0.32
1	-0.25
1.5	-0.77
2	-0.96
2.5	-1.06
3	-1.03
4	-1.11
5	-1.22

North Caribou Lake — NCL-02

Gwich'in Settlement Region

Latitude: 68.15 N Longitude: 132.93 W
Elevation: 217 m a.s.l.
Landform: Moraine plain
Vegetation cover: Stunted black spruce forest
Thaw Depth: 0.99 m
Site visit: August 1, 2013

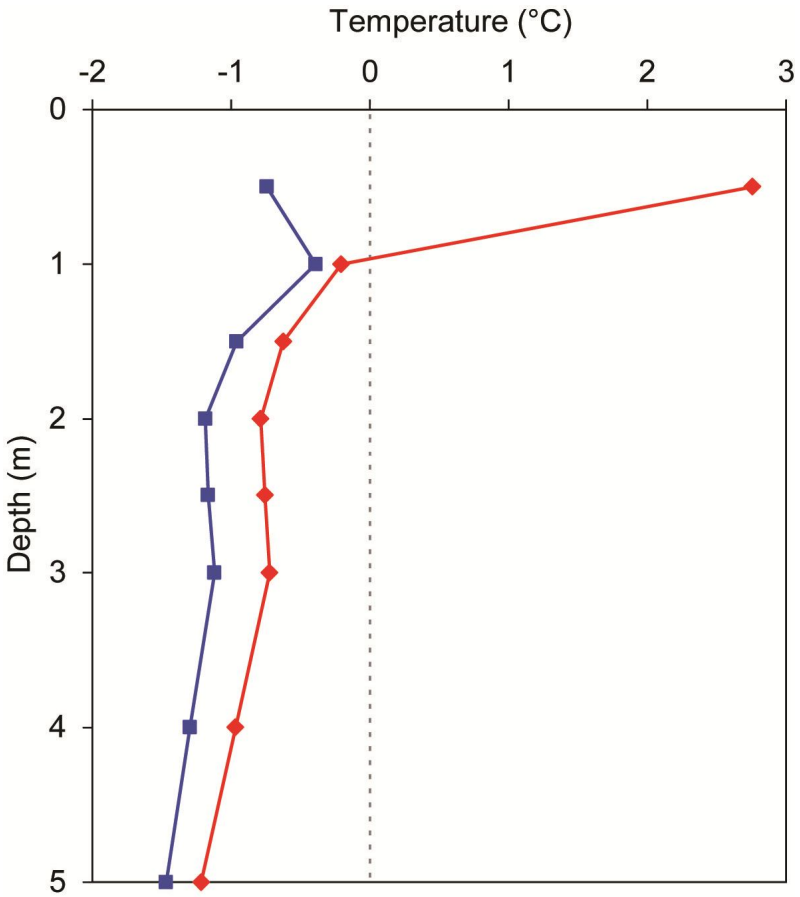


Depth (m)	Max (°C)	Min (°C)
0.5	6.39	-2.39
1	-0.12	-1.41
1.5	-0.39	-1.08
2	-0.63	-1.08
2.5	-0.72	-1.17
3	-0.72	-1.18
4	-1.05	-1.45
5	-1.01	-1.32

Hill Lake — HL-01

Gwich'in Settlement Region

Latitude: 67.99 N Longitude: 132.49 W
Elevation: 229 m a.s.l.
Landform: Moraine plain
Vegetation cover: Tundra
Thaw Depth : 0.97 m
Site visit: August 1, 2013

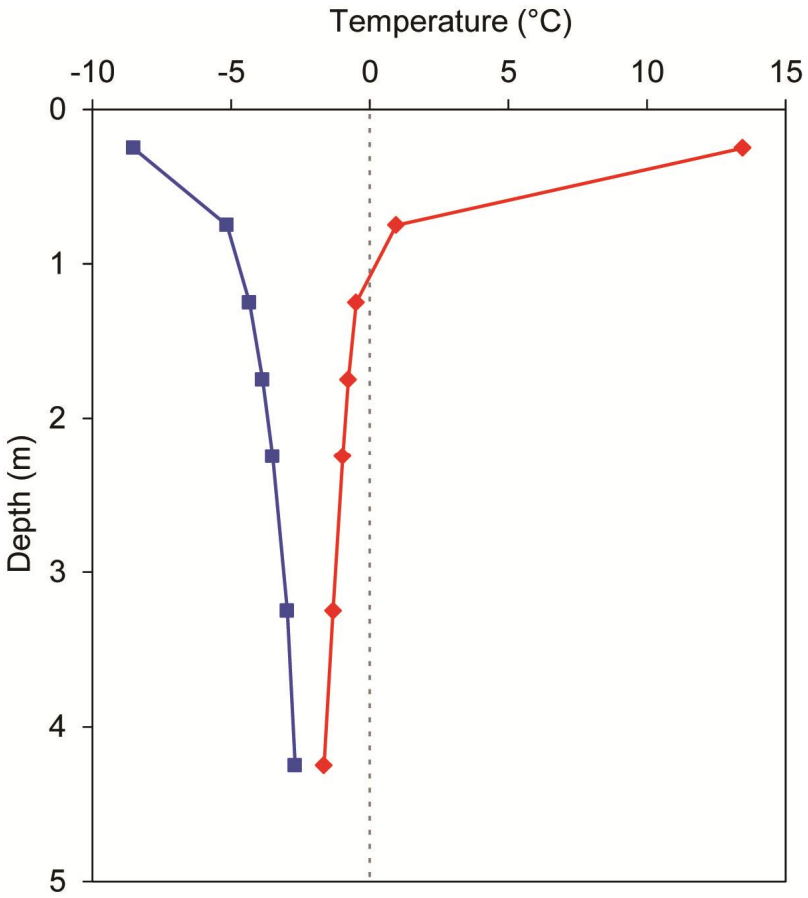


Depth (m)	Max (°C)	Min (°C)
0.5	2.76	-0.74
1	-0.21	-0.39
1.5	-0.62	-0.96
2	-0.79	-1.19
2.5	-0.76	-1.17
3	-0.72	-1.12
4	-0.97	-1.30
5	-1.22	-1.47

Hill Lake — HL-02

Gwich'in Settlement Region

Latitude: 67.99 N Longitude: 132.49 W
Elevation: 234 m a.s.l.
Landform: Moraine plain
Vegetation cover: Shrub Tundra
Thaw Depth: 1.08 m
Site visit: August 1, 2013

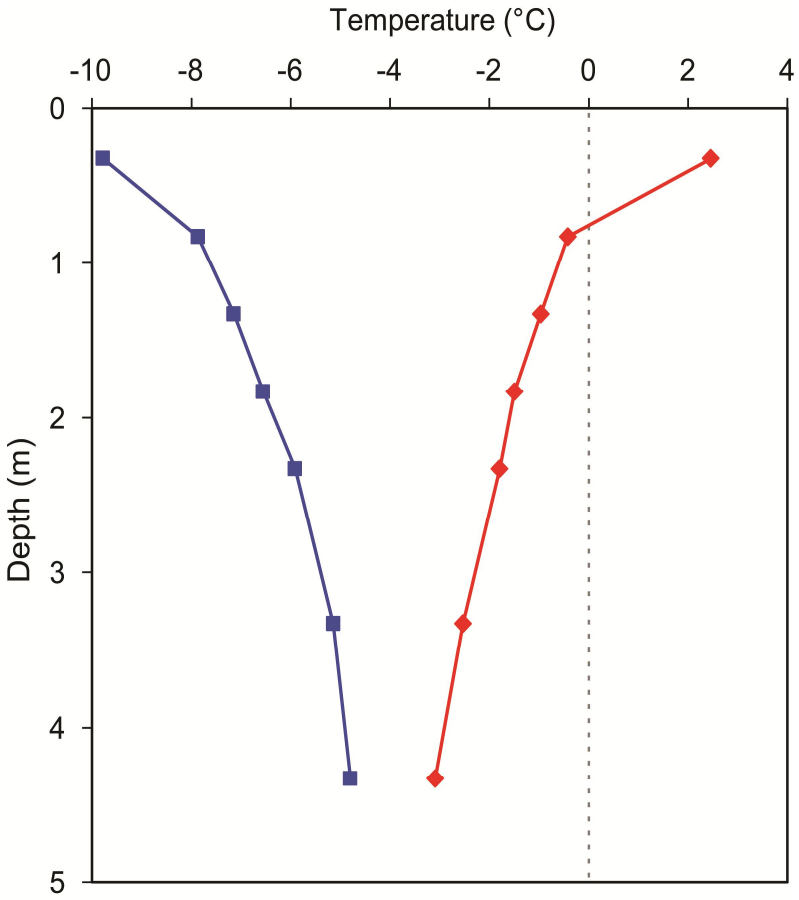


Depth (m)	Max (°C)	Min (°C)
0.25	13.45	-8.53
0.75	0.95	-5.15
1.25	-0.50	-4.35
1.75	-0.78	-3.87
2.25	-0.98	-3.51
3.25	-1.33	-2.98
4.25	-1.65	-2.69

Wood Bridge Lake — WBL-01

Gwich'in Settlement Region

Latitude: 67.90 N Longitude: 132.18 W
Elevation: 204 m a.s.l.
Landform: Alluvial plain
Vegetation: Black spruce forest
Thaw Depth: 0.76 m
Site visit: August 1, 2013

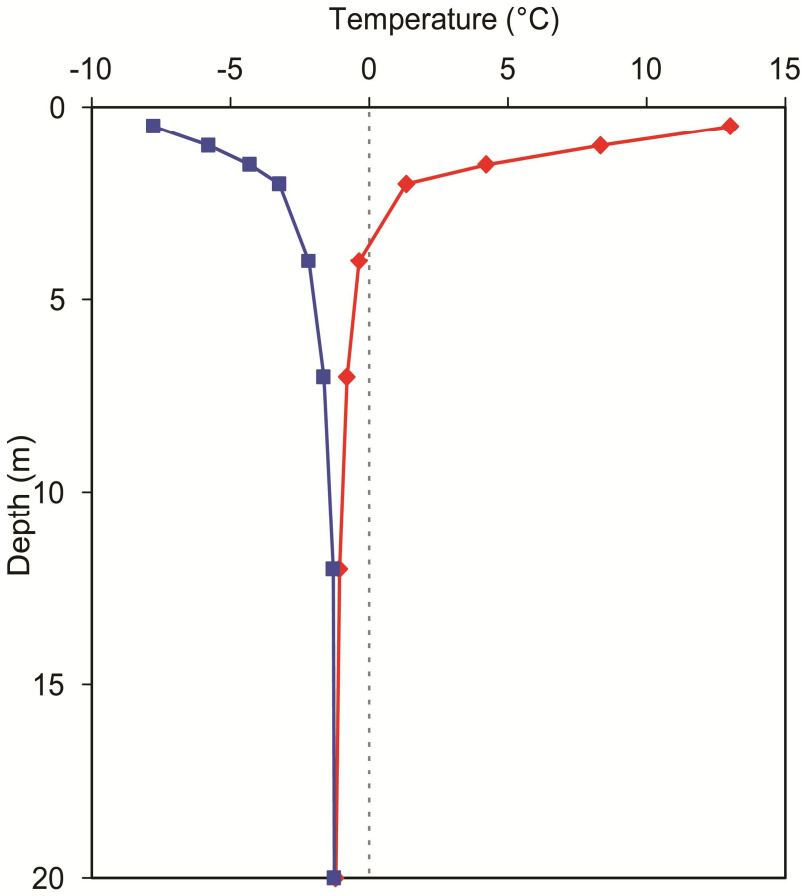


Aug 2012 – Jul 2013		
Depth (m)	Max (°C)	Min (°C)
0.33	2.46	-9.78
0.83	-0.42	-7.87
1.33	-0.97	-7.14
1.83	-1.50	-6.55
2.33	-1.79	-5.91
3.33	-2.53	-5.14
4.33	-3.09	-4.80

Jackfish Creek — JF-02

Sahtu Settlement Region

Latitude: 66.29 N Longitude: 128.47 W
Elevation: 90 m a.s.l.
Landform: Eolian dune on moraine plain, well drained, elevated area
Vegetation cover: Black spruce forest and moss cover
Thaw Depth: 3.57 m
Site visit: September 23, 2013



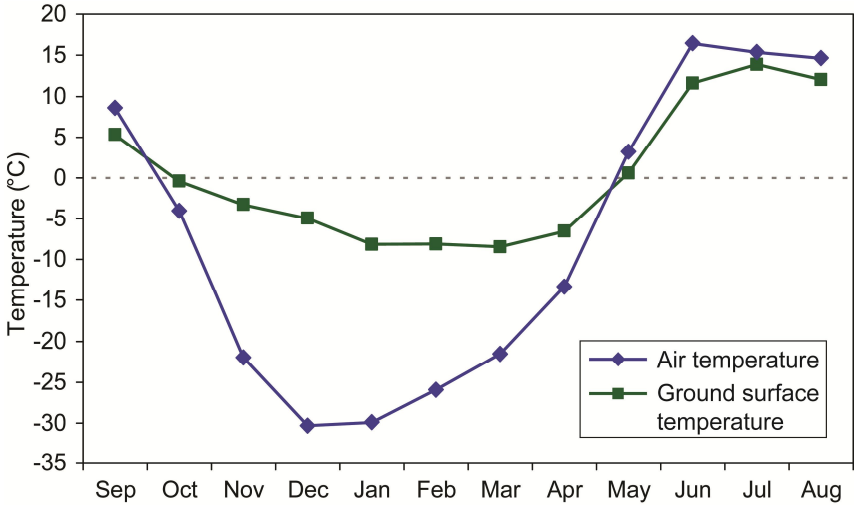
Depth (m)	Max (°C)	Min (°C)
0.5	13.02	-7.78
1	8.34	-5.79
1.5	4.22	-4.30
2	1.33	-3.25
4	-0.37	-2.18
7	-0.80	-1.64
12	-1.08	-1.31
20	-1.21	-1.26

Fort Good Hope South — FGHS-01

Sahtu Settlement Region

Latitude: 66.21 N Longitude: 128.50 W
Elevation: 134 m a.s.l.
Landform: Hummocky peatland
Vegetation cover: Dense shrub and open black spruce
Thaw Depth: n/a
Site visit: September 23, 2013

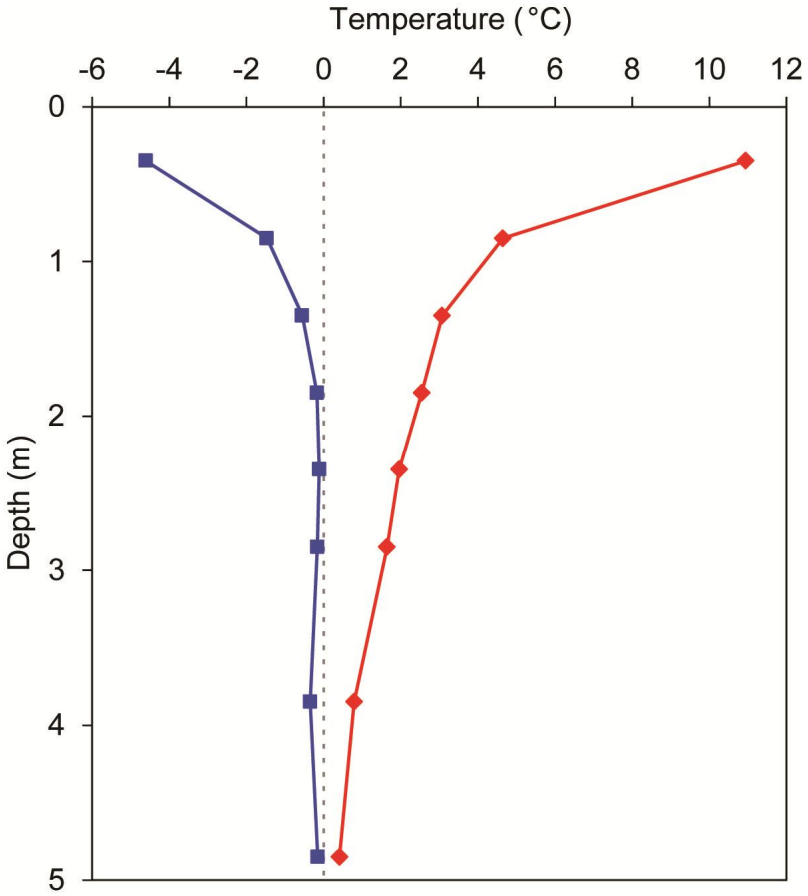
Month / Year	Temperature (°C)	
	Air	Surface
Sept / 2012	8.57	5.32
Oct / 2012	-4.04	-0.42
Nov / 2012	-21.97	-3.28
Dec / 2012	-30.30	-4.96
Jan / 2013	-29.89	-8.17
Feb / 2013	-25.91	-8.13
Mar / 2013	-21.54	-8.47
Apr / 2013	-13.36	-6.57
May / 2013	3.21	0.60
Jun / 2013	16.44	11.60
Jul / 2013	15.36	13.88
Aug / 2013	14.64	12.04



Fort Good Hope South — FGHS-02

Sahtu Settlement Region

Latitude: 66.21 N Longitude: 128.50 W
Elevation: 134 m a.s.l.
Landform: Hummocky peatland
Vegetation cover: Peat plateau, lichen, open black spruce
Thaw Depth: 5.94 m (thaw depth was extrapolated from bottom two temperature measurements)
Site visit: September 23, 2013

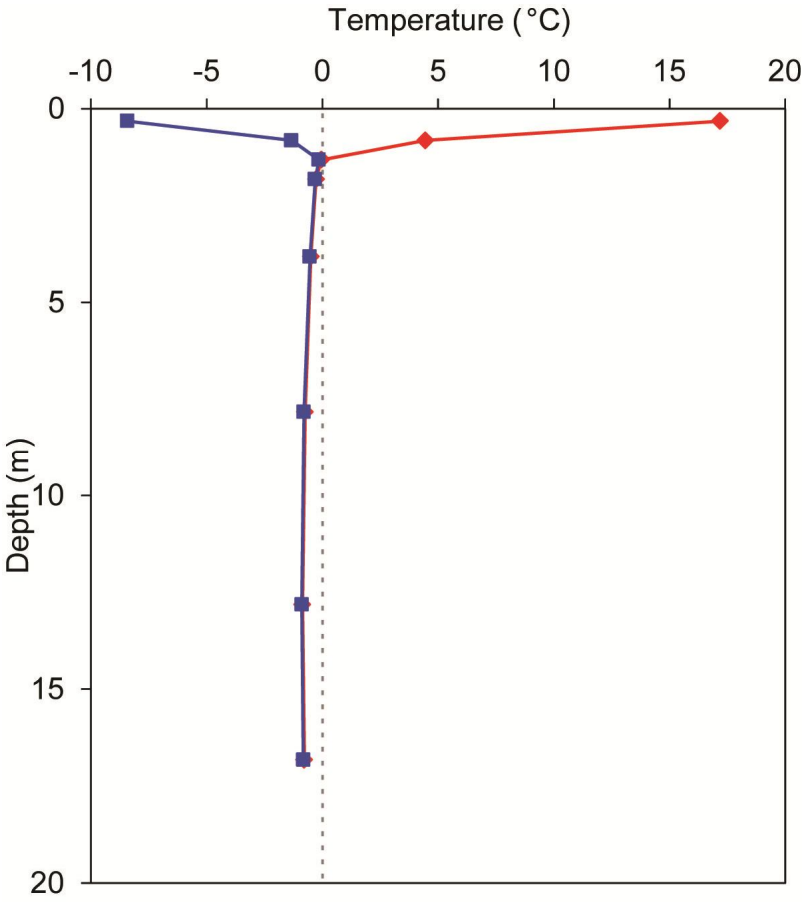


Depth (m)	Max (°C)	Min (°C)
0.35	10.94	-4.61
0.85	4.65	-1.47
1.35	3.07	-0.56
1.85	2.55	-0.17
2.35	1.96	-0.11
2.85	1.64	-0.16
3.85	0.79	-0.35
4.85	0.41	-0.15

Snafu Creek — SC-01

Sahtu Settlement Region

Latitude: 66.00 N Longitude: 128.35 W
Elevation: 100 m a.s.l.
Landform: Moraine plain
Vegetation cover: Peat bog, open black spruce forest, and lichen cover
Thaw Depth: 1.32 m
Site visit: September 23, 2013



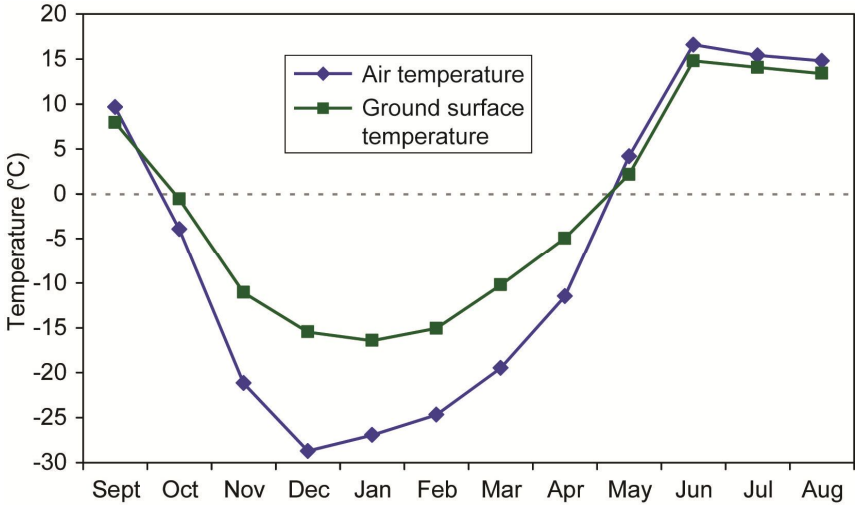
Depth (m)	Max (°C)	Min (°C)
0.32	17.19	-8.42
0.82	4.45	-1.34
1.32	-0.05	-0.15
1.82	-0.27	-0.31
3.82	-0.50	-0.54
7.82	-0.75	-0.79
12.82	-0.86	-0.89
16.82	-0.78	-0.82

Gibson Lake — GL-01

Sahtu Settlement Region

Latitude: 65.75 N Longitude: 127.89 W
Elevation: 228 m a.s.l.
Landform: Hummocky moraine plain
Vegetation cover: Recovering burnt area with peat and shrubs
Thaw Depth: n/a
Site visit: September 23, 2013

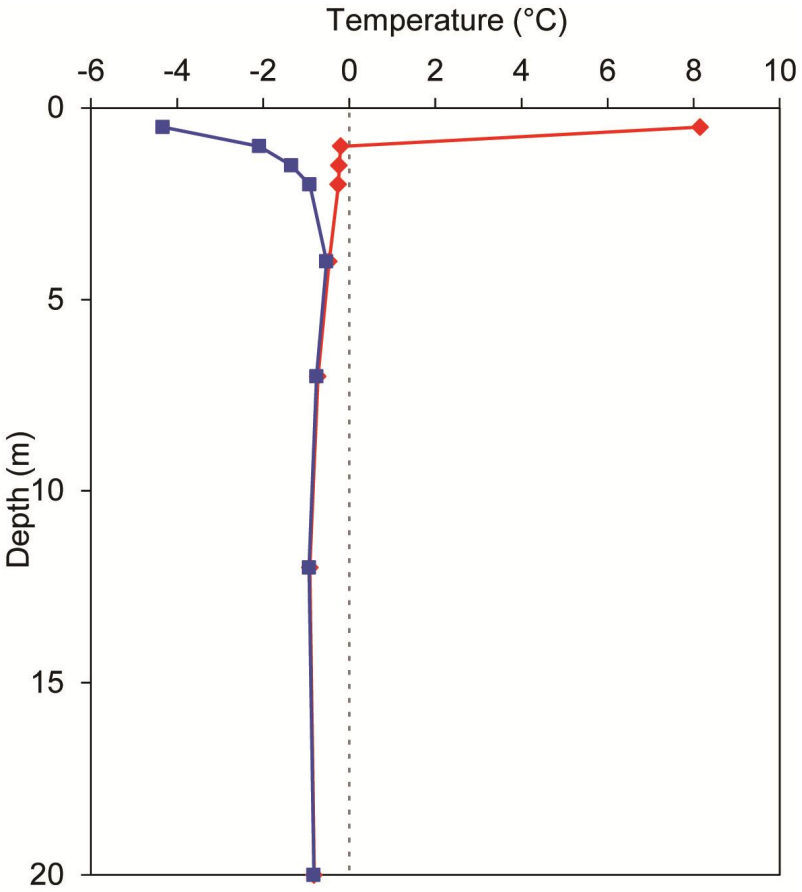
Month / Year	Temperature (°C)	
	Air	Surface
Sept / 2012	9.64	7.95
Oct / 2012	-3.95	-0.58
Nov / 2012	-21.16	-11.07
Dec / 2012	-28.74	-15.46
Jan / 2013	-26.95	-16.42
Feb / 2013	-24.68	-15.06
Mar / 2013	-19.48	-10.23
Apr / 2013	-11.48	-4.95
May / 2013	4.19	2.16
Jun / 2013	16.60	14.80
Jul / 2013	15.40	14.06
Aug / 2013	14.79	13.39



Hanna River — HR-01

Sahtu Settlement Region

Latitude: 65.67 N Longitude: 127.83 W
Elevation: 104 m a.s.l.
Landform: Lacustrine plain
Vegetation cover: Boggy burnt area
Thaw Depth: 0.99 m
Site visit: September 23, 2013

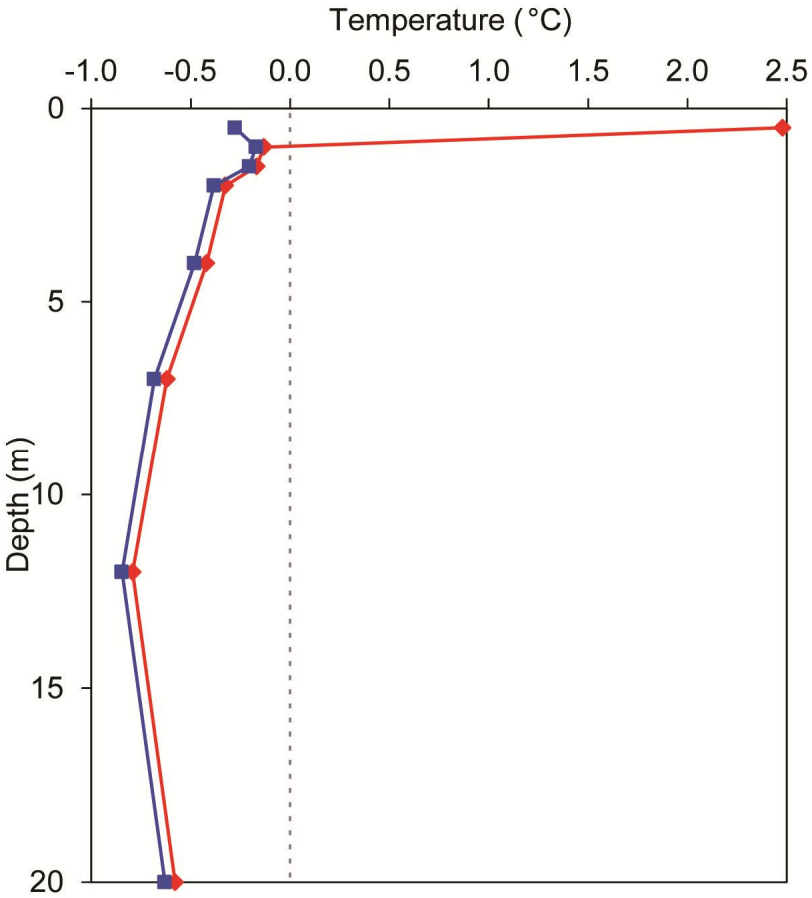


Depth (m)	Max (°C)	Min (°C)
0.5	8.15	-4.33
1	-0.20	-2.09
1.5	-0.24	-1.35
2	-0.25	-0.92
4	-0.47	-0.53
7	-0.73	-0.76
12	-0.92	-0.93
20	-0.81	-0.82

Elliot Creek — EC-01

Sahtu Settlement Region

Latitude: 65.52 N Longitude: 127.62 W
Elevation: 54 m a.s.l.
Landform: Lacustrine undulating plain, well-drained elevated area
Vegetation cover: Peat cover on edge of open, mature black spruce forest
Thaw Depth: 0.97 m
Site visit: September 23, 2013

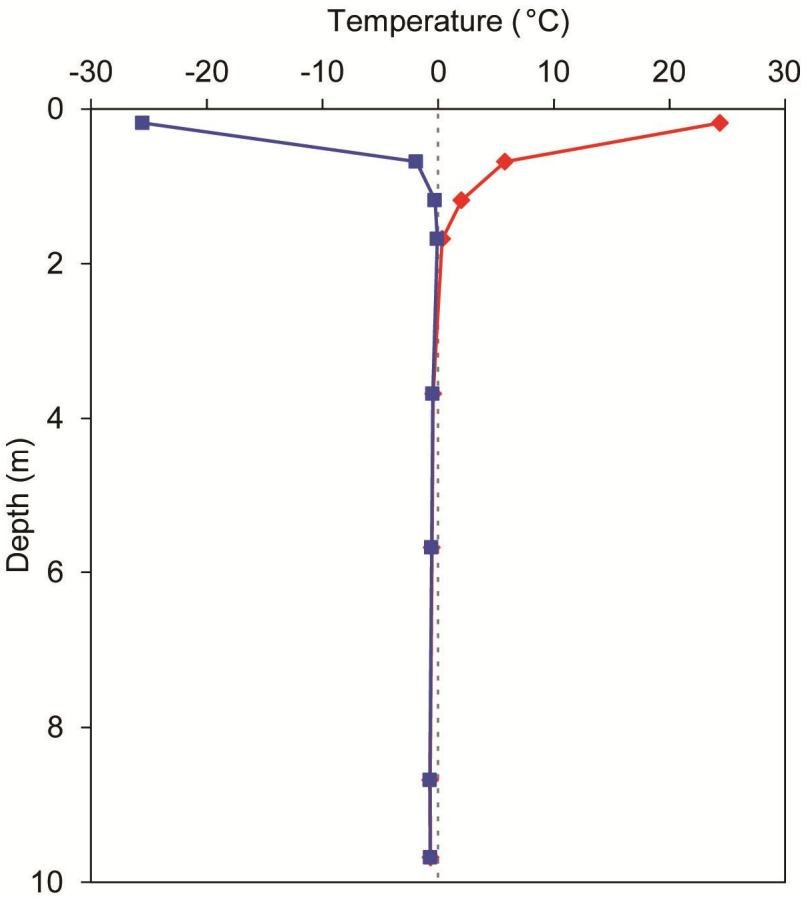


Depth (m)	Max (°C)	Min (°C)
0.5	2.48	-0.28
1	-0.13	-0.17
1.5	-0.17	-0.21
2	-0.33	-0.38
4	-0.42	-0.48
7	-0.62	-0.68
12	-0.79	-0.85
20	-0.58	-0.63

Elliot Creek — EC-02

Sahtu Settlement Region

Latitude: 65.52 N Longitude: 127.62 W
Elevation: 54 m a.s.l.
Landform: Lacustrine plain overlain by alluvial sediments
Vegetation cover: Peat cover on edge of dense, mature black spruce forest
Thaw Depth: 2.59 m
Site visit: September 23, 2013

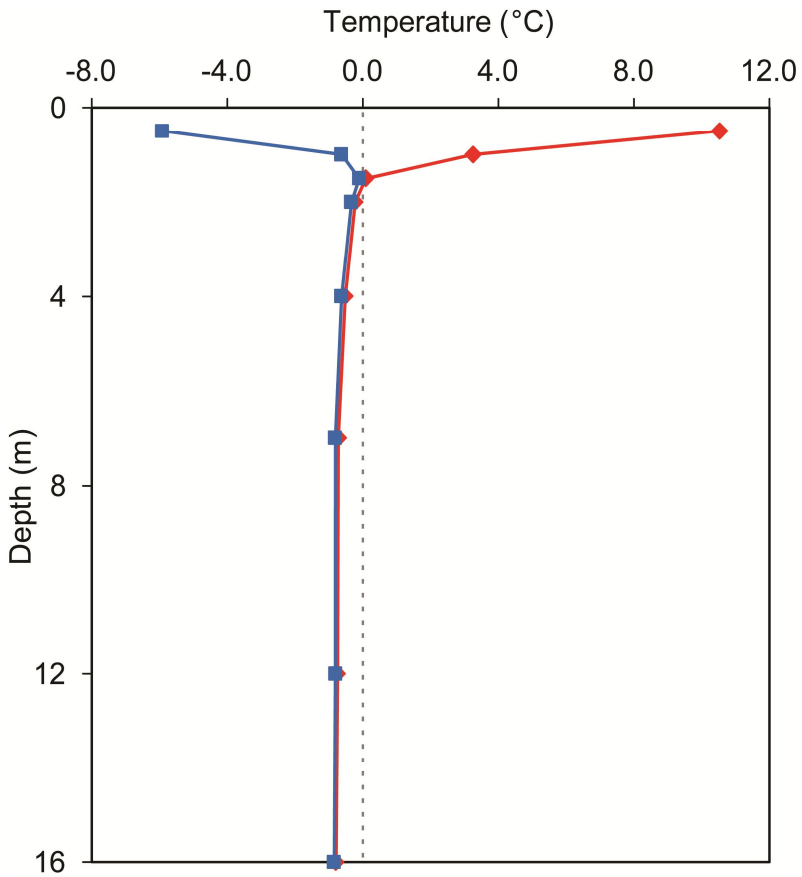


Depth (m)	Max (°C)	Min (°C)
0.18	24.35	-25.54
0.68	5.79	-1.89
1.18	2.03	-0.28
1.68	0.36	-0.08
3.68	-0.43	-0.47
5.68	-0.53	-0.57
8.68	-0.67	-0.71
9.68	-0.65	-0.69

Oscar Creek — OC-01

Sahtu Settlement Region

Latitude: 65.44 N Longitude: 127.44 W
Elevation: 64 m a.s.l.
Landform: Undulating glaciolacustrine terrain overlain by alluvial sediments
Vegetation cover: Peat cover with dense-forested birch and black spruce
Thaw Depth: 1.64 m
Site visit: September 23, 2013

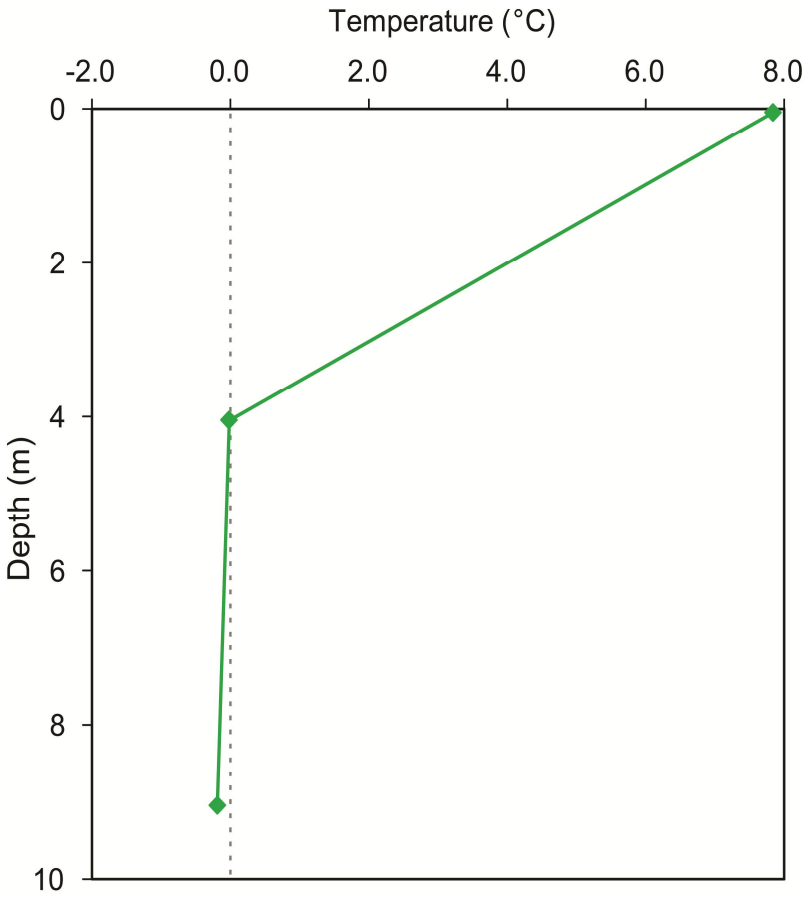


Depth (m)	Max (°C)	Min (°C)
0.5	10.53	-5.92
1	3.26	-0.63
1.5	0.09	-0.11
2	-0.23	-0.34
4	-0.52	-0.63
7	-0.73	-0.82
12	-0.75	-0.81
16	-0.80	-0.85

Billy Creek North — BCN-01

Sahtu Settlement Region

Latitude: 65.40 N Longitude: 127.32 W
Elevation: 90 m a.s.l.
Landform: Alluvial and eolian sediments overlying low-lying lacustrine plain
Vegetation cover: Peat cover with dense-forested black spruce and mixed shrub
Thaw Depth: 4.04 m
Site visit: September 23, 2013

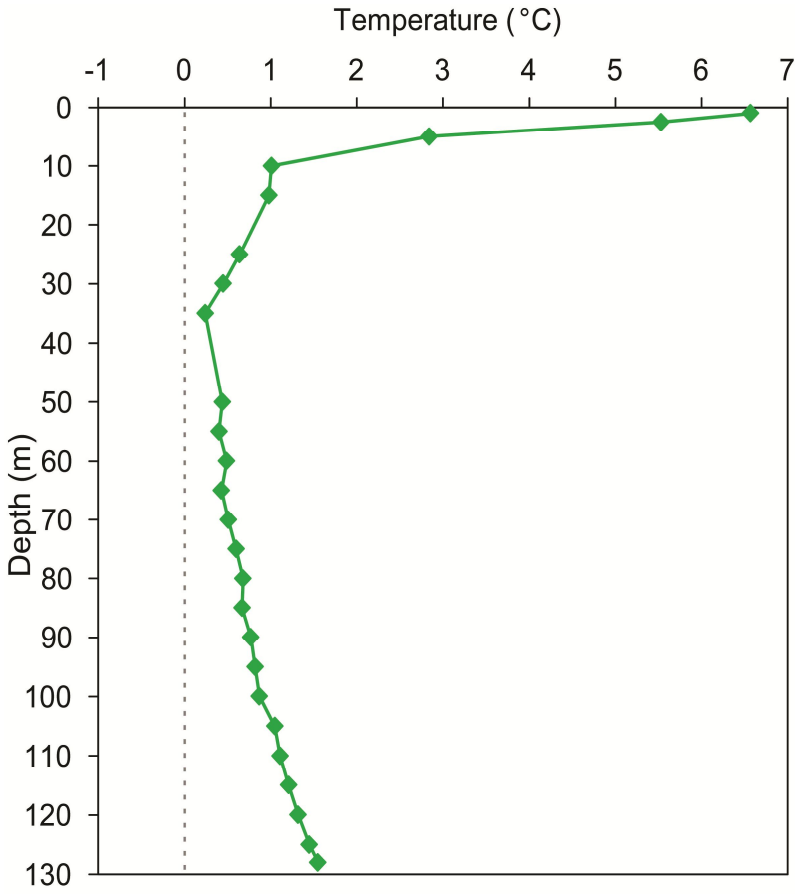


Depth (m)	Temp (°C)
0.05	7.84
4.05	-0.02
9.05	-0.19

Kee Scarp HT

Sahtu Settlement Region

Latitude: 65.30 N Longitude: 126.72 W
Elevation: 270 m a.s.l.
Landform: Top of narrow ridge. Borehole is in shale (which is underlain by limestone) with 20 cm moss and organic cover at surface
Vegetation cover: Boreal forest, mixture aspen birch pine and spruce with ground cover of grasses and small shrub
Thaw Depth: n/a
Site visit: September 21, 2013

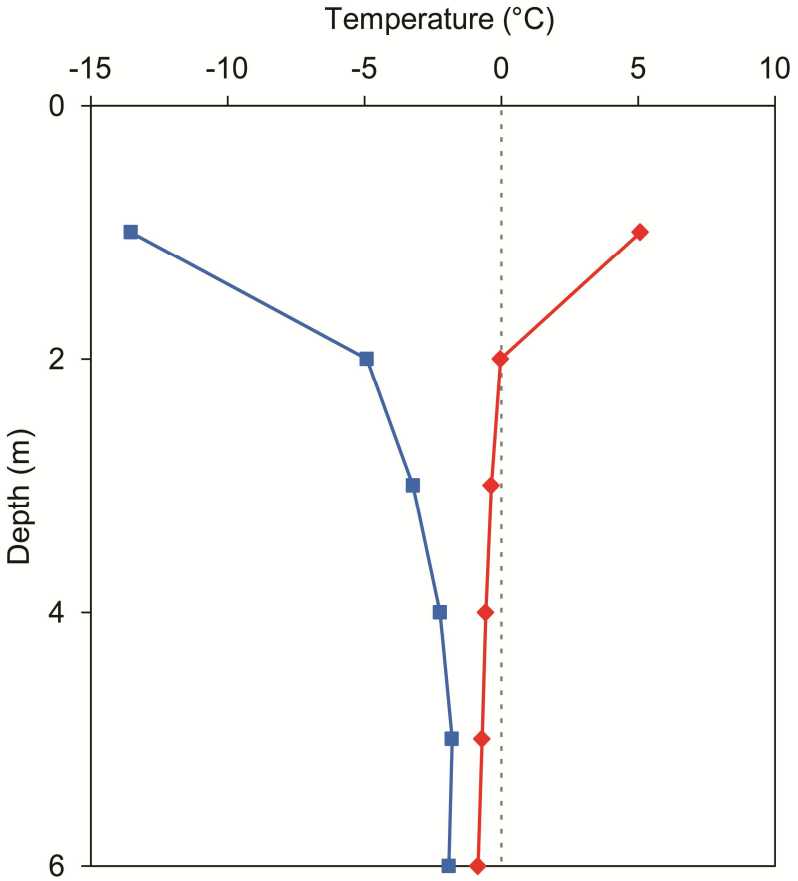


Depth (m)	Temp (°C)
1	6.57
2.5	5.53
5	2.84
10	1.01
15	0.98
25	0.64
30	0.45
35	0.24
50	0.44
55	0.4
60	0.49
65	0.43
70	0.51
75	0.6
80	0.68
85	0.67
90	0.77
95	0.82
100	0.87
105	1.05
110	1.11
115	1.21
120	1.32
125	1.45
128	1.55

Norman Wells Pump Station — 84-1-T4

Sahtu Settlement Region

Latitude: 65.29 N Longitude: 126.89 W
Elevation: 61 m a.s.l.
Landform: Ground moraine
Vegetation cover: Moss, lichen, ericaceous shrubs with black spruce and tamarack
Thaw Depth: 1.99 m
Site visit: September 21, 2013

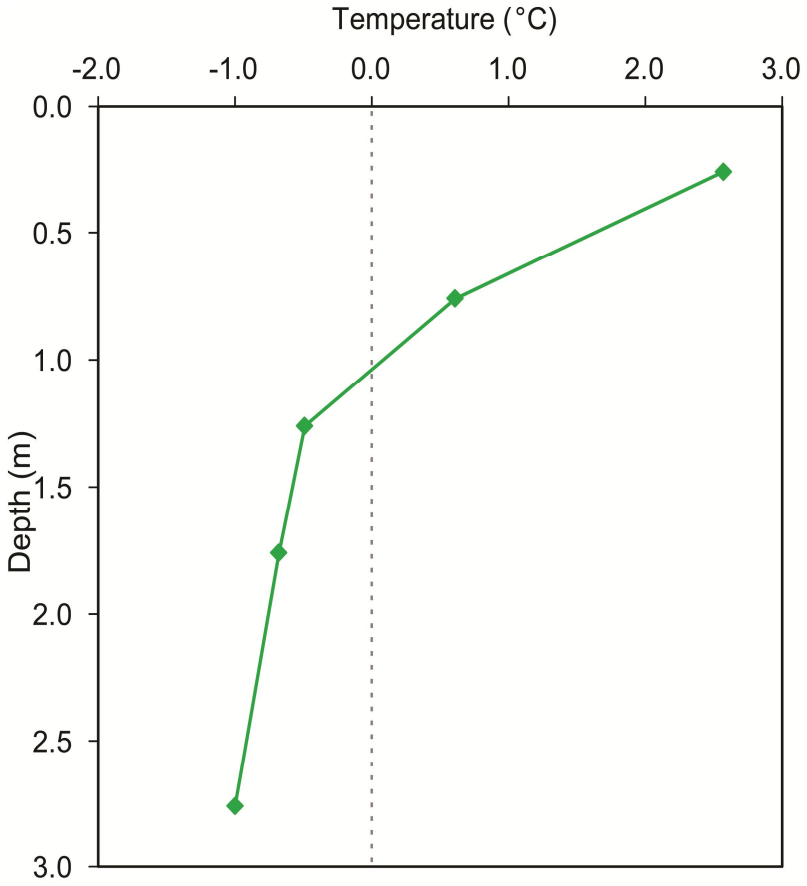


Sep 2012 – Aug 2013		
Depth (m)	Max (°C)	Min (°C)
1	5.07	-13.54
2	-0.04	-4.92
3	-0.37	-3.23
4	-0.57	-2.24
5	-0.71	-1.81
6	-0.86	-1.92

KP5 BH6 Offrow Cable — 85-11-T2

Sahtu Settlement Region

Latitude: 65.29 N Longitude: 126.79 W
Elevation: 90 m a.s.l.
Landform: lacustrine plain
Vegetation cover: forested, moss, lichen, black spruce
Thaw Depth: 1.04 m
Site visit: September 20, 2013

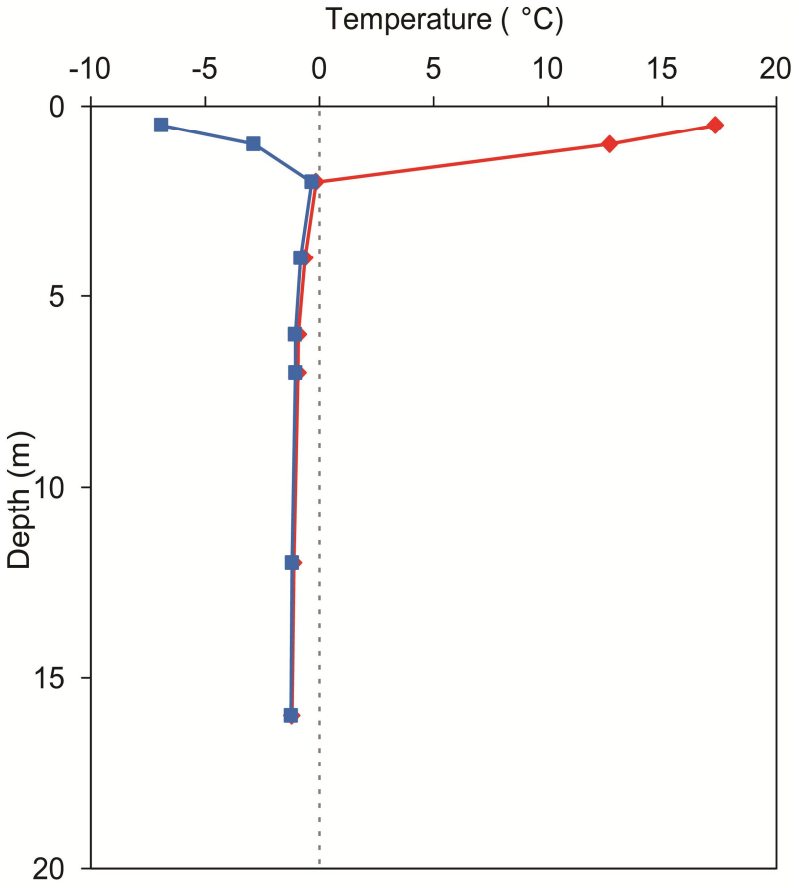


Depth (m)	Temp (°C)
0.26	2.57
0.76	0.61
1.26	-0.49
1.76	-0.68
2.76	-1

Norman Wells — Arena

Sahtu Settlement Region

Latitude: 65.28 N Longitude: 126.83 W
Elevation: 80 m a.s.l.
Landform: Ground moraine
Vegetation cover: Disturbed area adjacent to parking lot
Thaw Depth: 1.99 m
Site visit: September 21, 2013

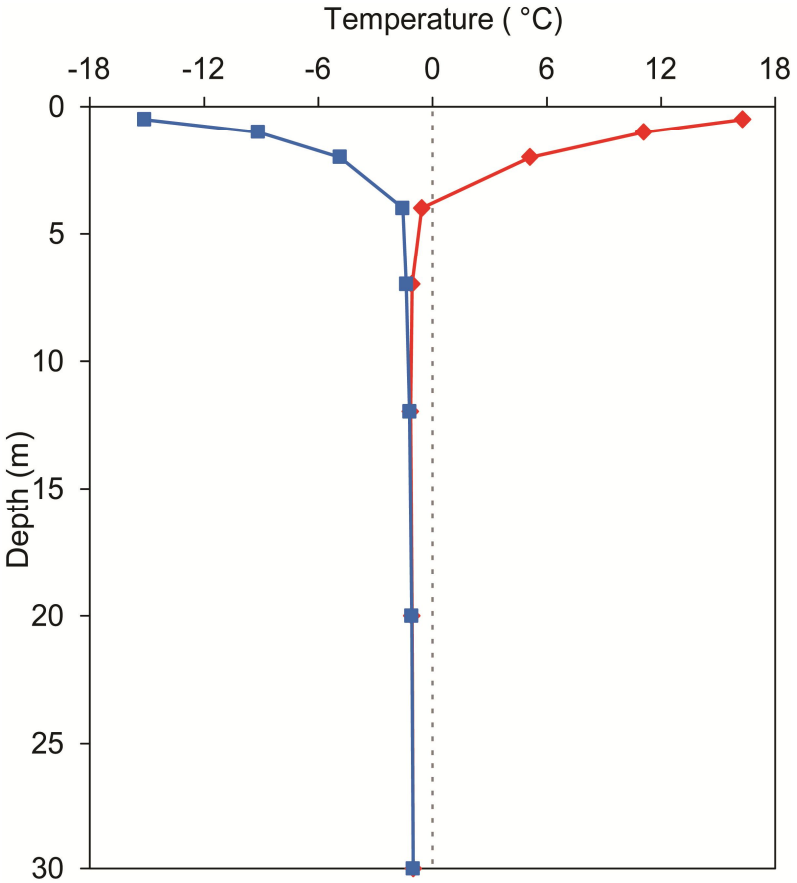


Sep 2012 – Aug 2013		
Depth (m)	Max (°C)	Min (°C)
0.5	17.33	-6.91
1	12.71	-2.87
2	-0.15	-0.34
4	-0.64	-0.82
6	-0.92	-1.06
7	-0.93	-1.05
12	-1.12	-1.19
16	-1.21	-1.24

Norman Wells — Water treatment plant

Sahtu Settlement Region

Latitude: 65.28 N Longitude: 126.84 W
Elevation: 80 m a.s.l.
Landform: Ground moraine
Vegetation cover: Disturbed area adjacent to parking lot
Thaw Depth: 3.8 m
Site visit: September 21, 2013

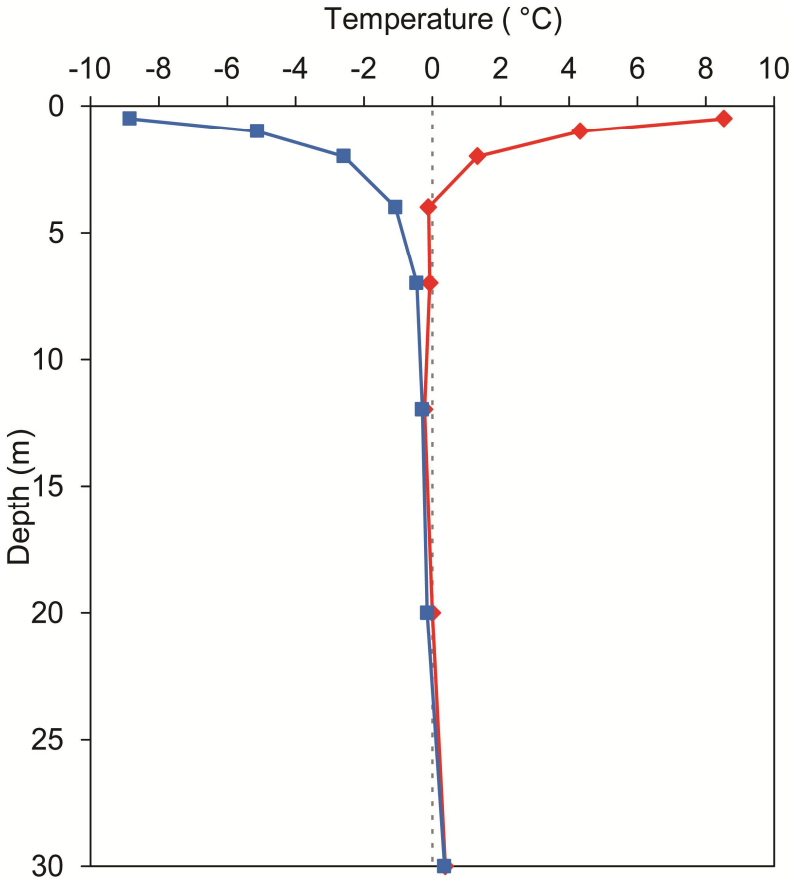


Sep 2012 – Aug 2013		
Depth (m)	Max (°C)	Min (°C)
0.5	16.28	-15.13
1	11.10	-9.17
2	5.13	-4.87
4	-0.56	-1.57
7	-1.08	-1.38
12	-1.16	-1.21
20	-1.08	-1.10
30	-1.01	-1.02

Van Everdingen — 30m

Sahtu Settlement Region

Latitude: 65.27 N Longitude: 126.75 W
Elevation: n/a
Landform: Lacustrine plain
Vegetation cover: Open forest, moss, shrub, spruce/tamarack
Thaw Depth: 3.84 m
Site visit: September 20, 2013

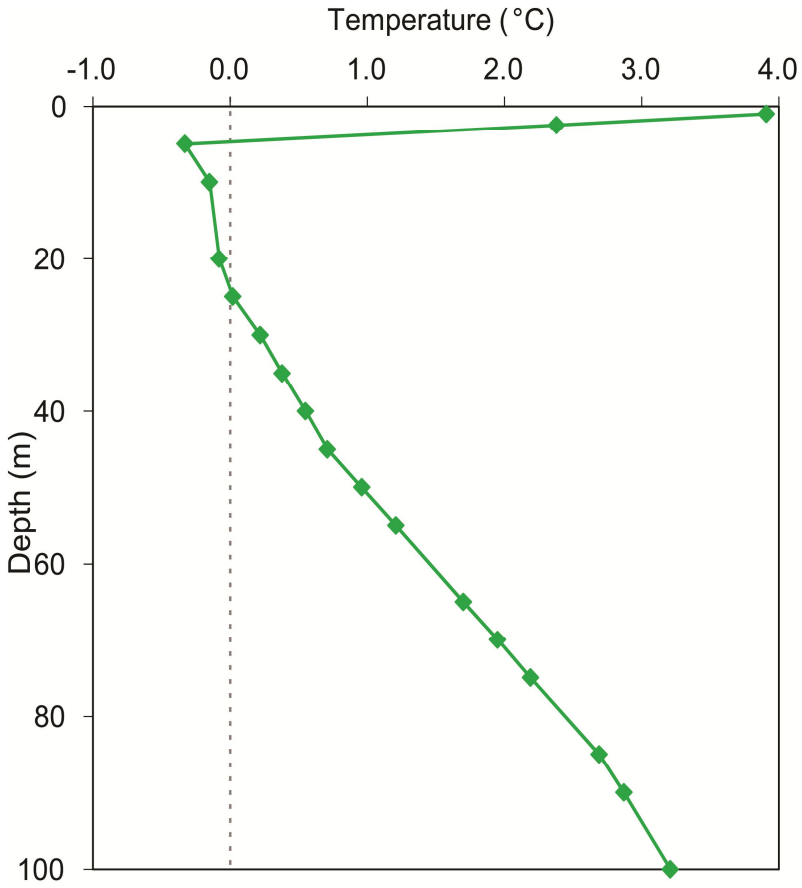


Sep 2012 – Aug 2013		
Depth (m)	Max (°C)	Min (°C)
0.5	8.54	-8.85
1.0	4.33	-5.12
2.0	1.32	-2.59
4.0	-0.11	-1.08
7.0	-0.08	-0.46
12.0	-0.23	-0.30
20.0	0.00	-0.15
30.0	0.38	0.35

Canyon Creek North A — 84-2A-HT

Sahtu Settlement Region

Latitude: 65.23 N Longitude: 126.50 W
Elevation: 110 m a.s.l.
Landform: Ground moraine
Vegetation cover: Lichen, moss, ericaceous shrubs with black spruce and tamarack
Thaw Depth: 4.70 m
Site visit: September 22, 2013

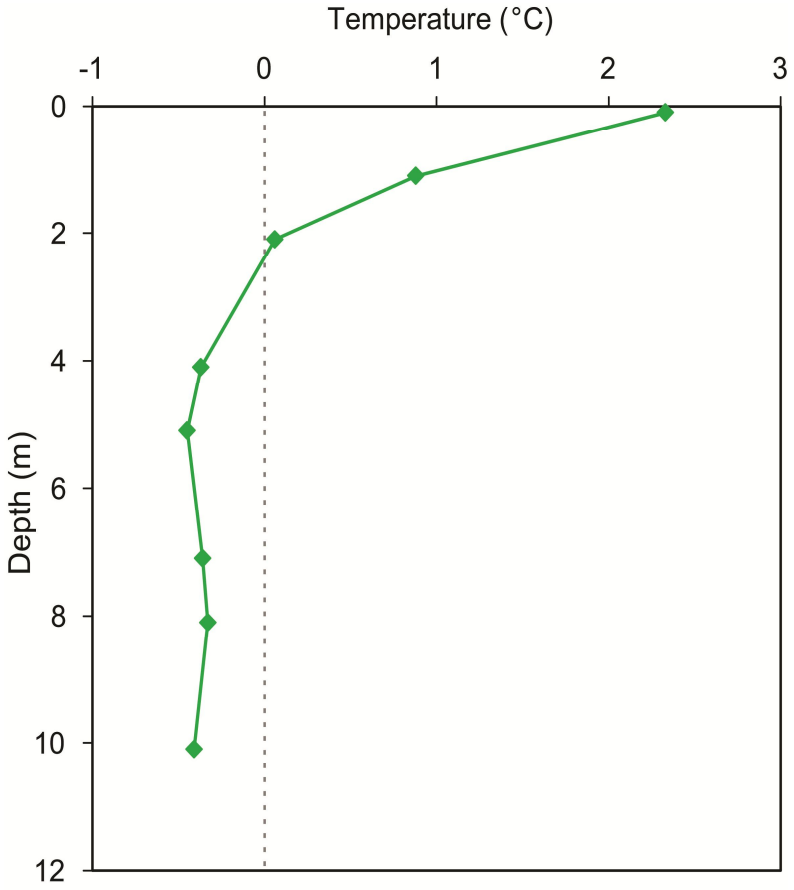


Depth (m)	Temp (°C)
1	3.91
2.5	2.38
5	-0.33
10	-0.15
20	-0.08
25	0.02
30	0.22
35	0.38
40	0.55
45	0.71
50	0.96
55	1.21
65	1.7
70	1.95
75	2.19
85	2.69
90	2.87
100	3.21

Canyon Creek North A — 84-2A-T4

Sahtu Settlement Region

Latitude: 65.23 N Longitude: 126.50 W
Elevation: 110 m a.s.l.
Landform: Ground moraine
Vegetation cover: Lichen, moss, ericaceous shrubs with black spruce and tamarack
Thaw Depth: 2.38 m
Site visit: September 22, 2013

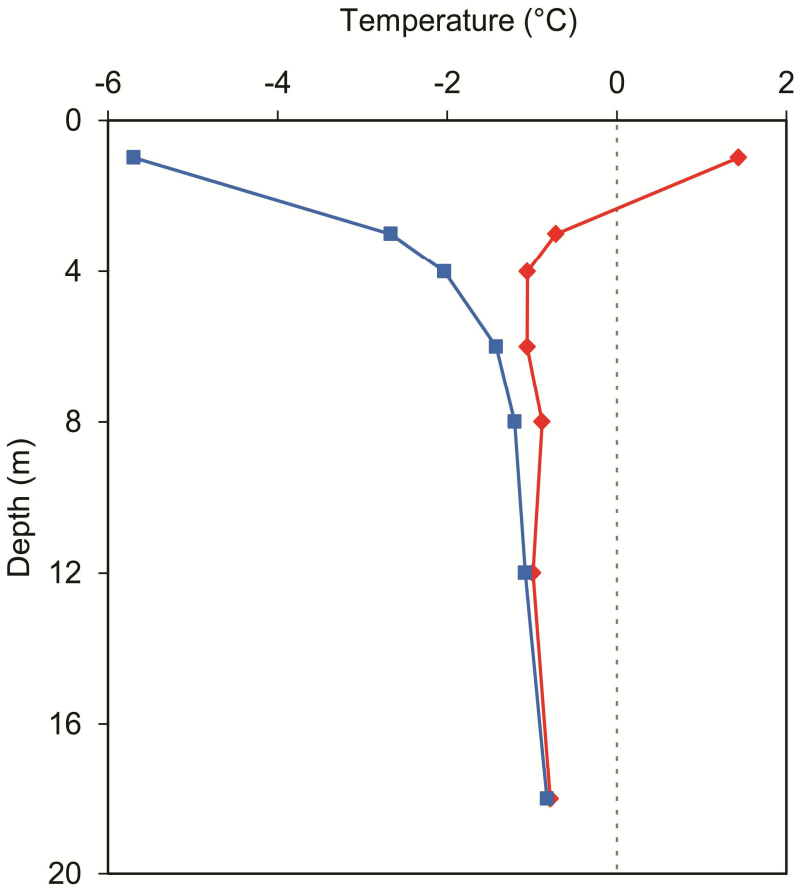


Depth (m)	Temp (°C)
0.1	2.33
1.1	0.88
2.1	0.06
4.1	-0.37
5.1	-0.45
7.1	-0.36
8.1	-0.33
10.1	-0.41

Canyon Creek North B — 84-2B-T4

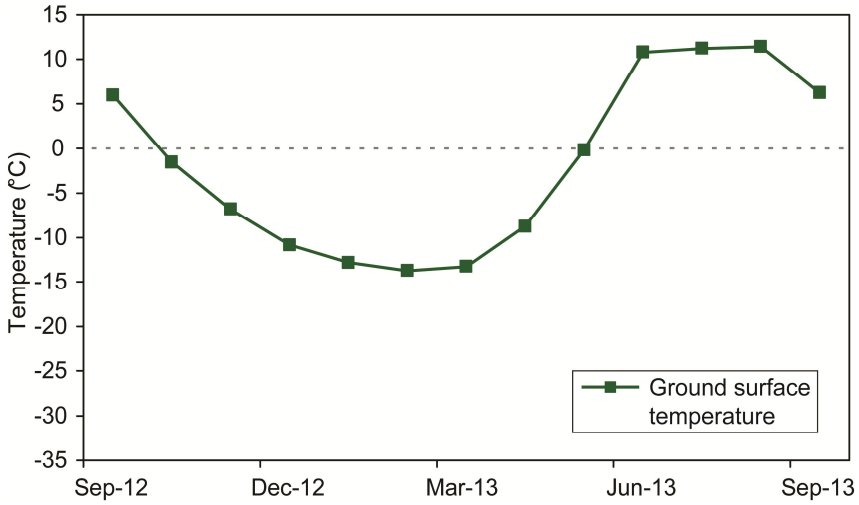
Sahtu Settlement Region

Latitude: 65.23N Longitude: 126.52 W
Elevation: 110 m a.s.l.
Landform: Ground moraine
Vegetation cover: Moss with white spruce
Thaw Depth: 1.51 m
Site visit: September 22, 2013



Sep 2012 – Aug 2013		
Depth (m)	Max (°C)	Min (°C)
1	1.43	-5.70
3	-0.72	-2.67
4	-1.05	-2.03
6	-1.06	-1.42
8	-0.88	-1.21
12	-0.99	-1.08
18	-0.79	-0.82

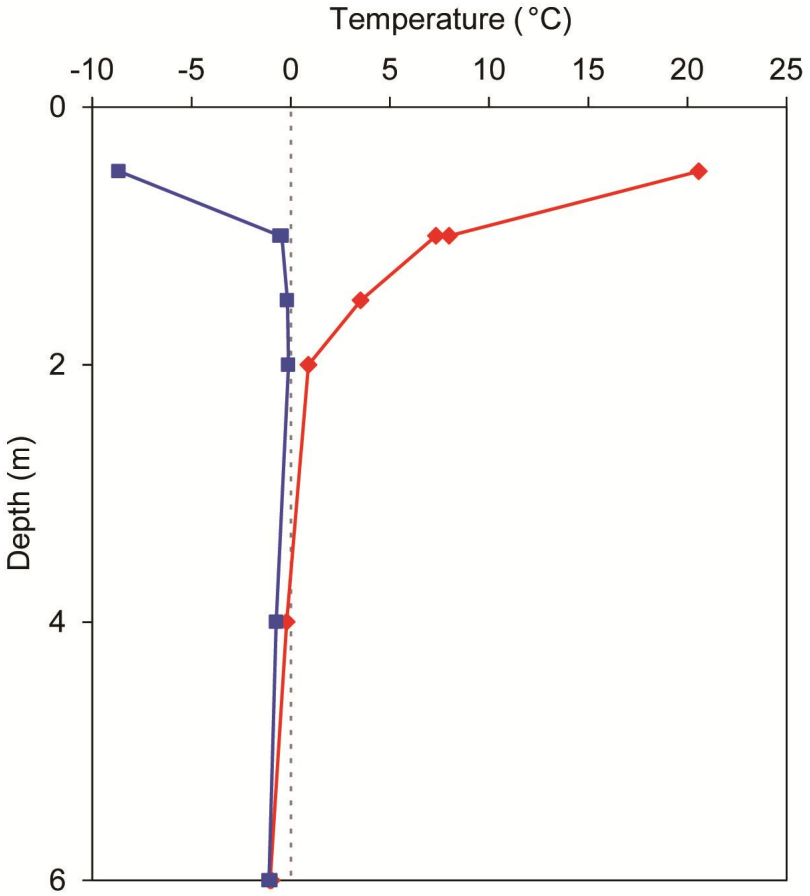
Month / Year	Temperature (°C)	
	Air	Surface
Sept / 2012	n/a	5.97
Oct / 2012	n/a	-1.55
Nov / 2012	n/a	-6.79
Dec / 2012	n/a	-10.84
Jan / 2013	n/a	-12.84
Feb / 2013	n/a	-13.75
Mar / 2013	n/a	-13.28
Apr / 2013	n/a	-8.72
May / 2013	n/a	-0.18
Jun / 2013	n/a	10.78
Jul / 2013	n/a	11.22
Aug / 2013	n/a	11.41
Sept / 2013	n/a	6.21



Vermillion Creek — VC-01

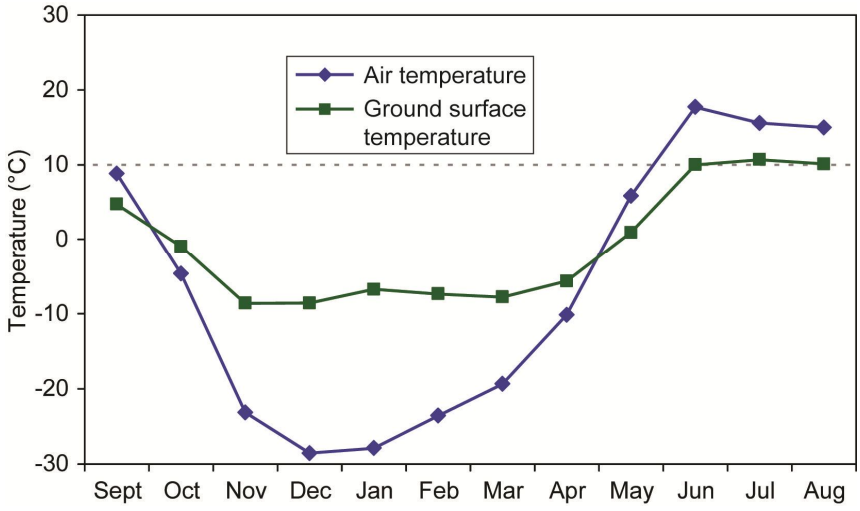
Sahtu Settlement Region

Latitude: 65.10 N Longitude: 126.14 W
Elevation: 92 m a.s.l.
Landform: Moraine plain (site at approach to water crossing)
Vegetation cover: NW side of creek, on top of ridge in black spruce forest
Thaw Depth: 3.63 m
Site visit: September 22, 2013



Depth (m)	Max (°C)	Min (°C)
0.5	20.58	-8.67
1	8.00	-0.55
1	7.33	-0.45
1.5	3.53	-0.17
2	0.90	-0.12
4	-0.20	-0.73
6	-1.04	-1.10
6	-0.95	-1.01

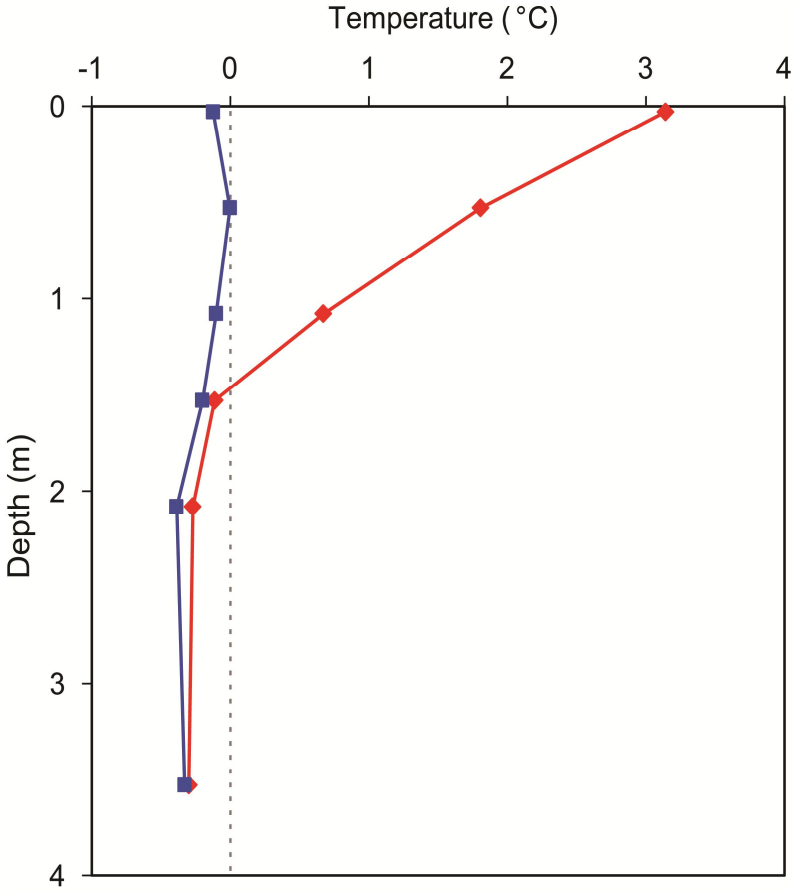
Month / Year	Temperature (°C)	
	Air	Surface
Sept / 2012	8.82	4.72
Oct / 2012	-4.64	-0.97
Nov / 2012	-23.14	-8.60
Dec / 2012	-28.57	-8.59
Jan / 2013	-27.90	-6.74
Feb / 2013	-23.59	-7.36
Mar / 2013	-19.36	-7.77
Apr / 2013	-10.15	-5.65
May / 2013	5.84	0.92
Jun / 2013	17.71	9.99
Jul / 2013	15.57	10.70
Aug / 2013	14.99	10.11



Vermillion Creek — VC-02

Sahtu Settlement Region

Latitude: 66.10 N Longitude: 126.13 W
Elevation: 92 m a.s.l.
Landform: Moraine plain (site at approach to water crossing)
Vegetation cover: SE side of creek on plateau in area of burnt black spruce
Thaw Depth: 1.47 m
Site visit: September 22, 2013

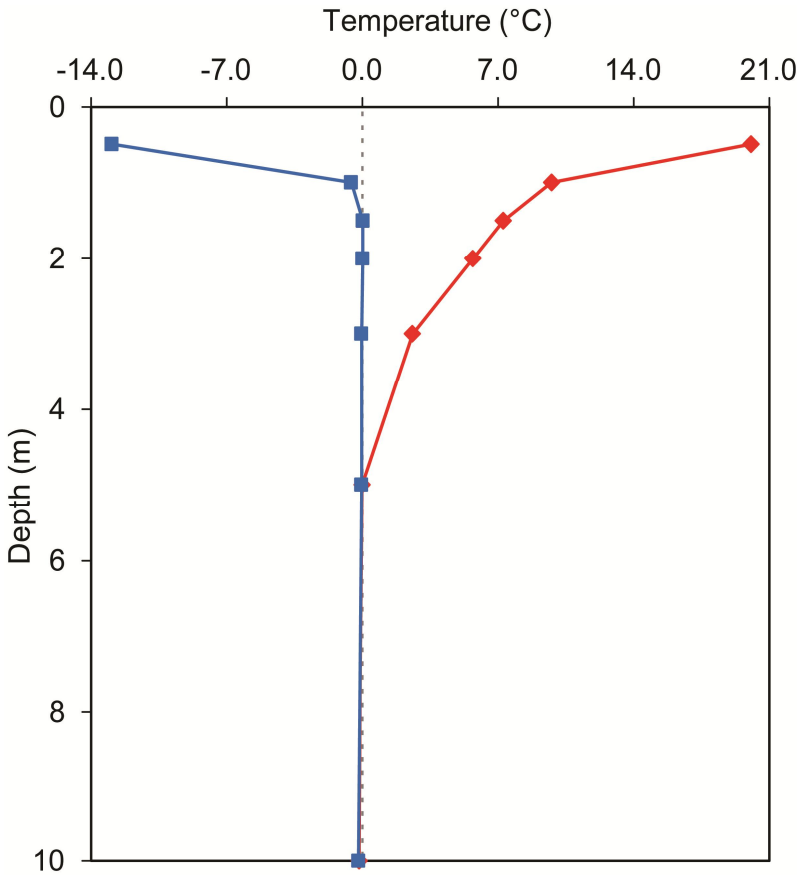


Depth (m)	Max (°C)	Min (°C)
0.03	3.14	-0.12
0.53	1.81	0.00
1.08	0.67	-0.10
1.53	-0.11	-0.20
2.08	-0.27	-0.39
3.53	-0.30	-0.33

Police Island — PI-01

Sahtu Settlement Region

Latitude: 64.83 N Longitude: 125.02 W
Elevation: 113 m a.s.l.
Landform: Lacustrine plain
Vegetation cover: Recovering burn (burnt black spruce forest)
Thaw Depth: 4.99 m
Site visit: September 22, 2013

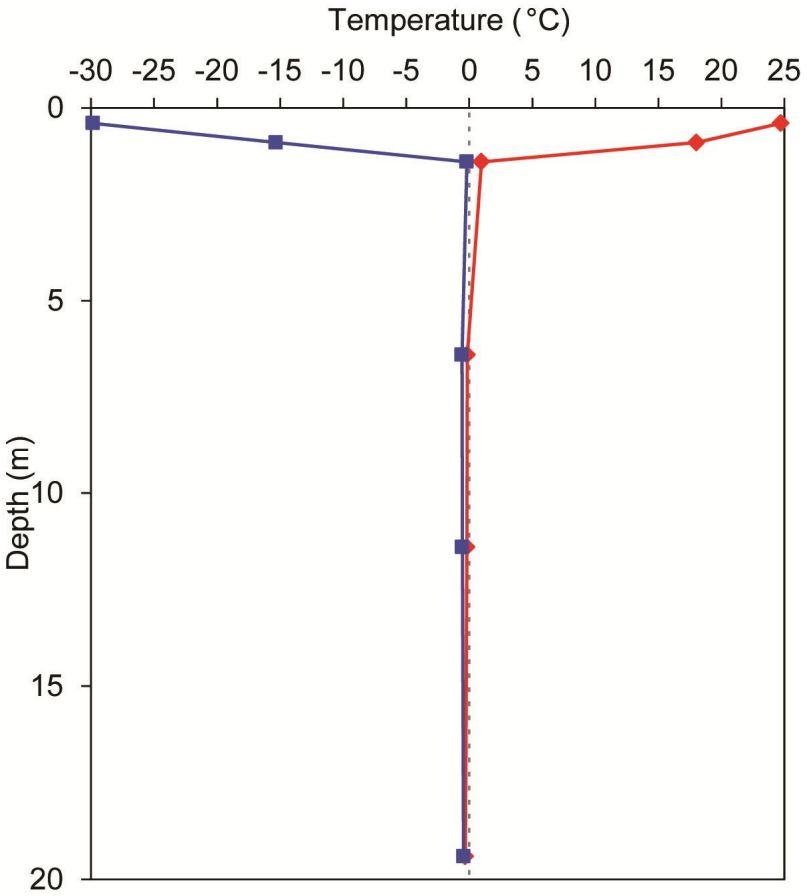


Depth (m)	Max (°C)	Min (°C)
0.5	20.06	-12.94
1	9.77	-0.57
1.5	7.27	0.02
2	5.70	0.01
3	2.58	-0.04
5	-0.02	-0.04
10	-0.17	-0.21

Police Island — PI-02

Sahtu Settlement Region

Latitude: 64.83 N Longitude: 125.01 W
Elevation: 113 m a.s.l.
Landform: Lacustrine plain
Vegetation cover: Unburnt, black spruce forest with moss and lichen ground cover
Thaw Depth: 5.67 m
Site visit: September 22, 2013

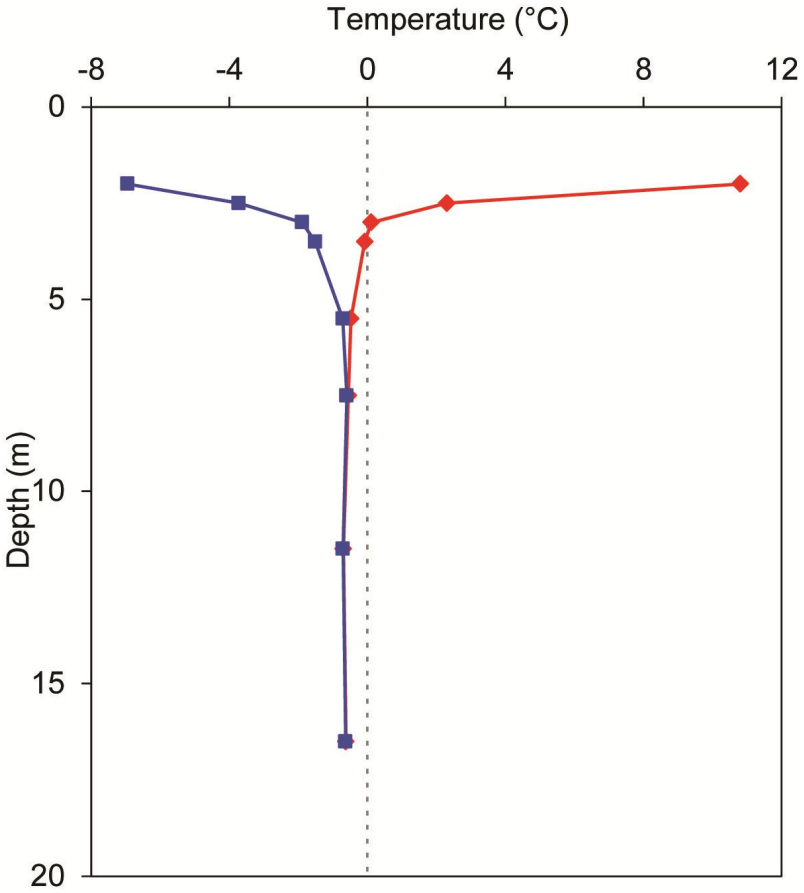


Depth (m)	Max (°C)	Min (°C)
0.4	24.70	-29.84
0.9	18.03	-15.34
1.4	0.96	-0.19
6.4	-0.16	-0.58
11.4	-0.19	-0.55
19.4	-0.32	-0.45

Old Fort Point — OFP-01

Sahtu Settlement Region

Latitude: 64.65 N Longitude: 124.84 W
Elevation: 112 m a.s.l.
Landform: Lacustrine plain
Vegetation cover: Open mixed spruce, pine deciduous forest adjacent to open, low-lying fen
Thaw Depth: 3.30 m
Site visit: September 12, 2013

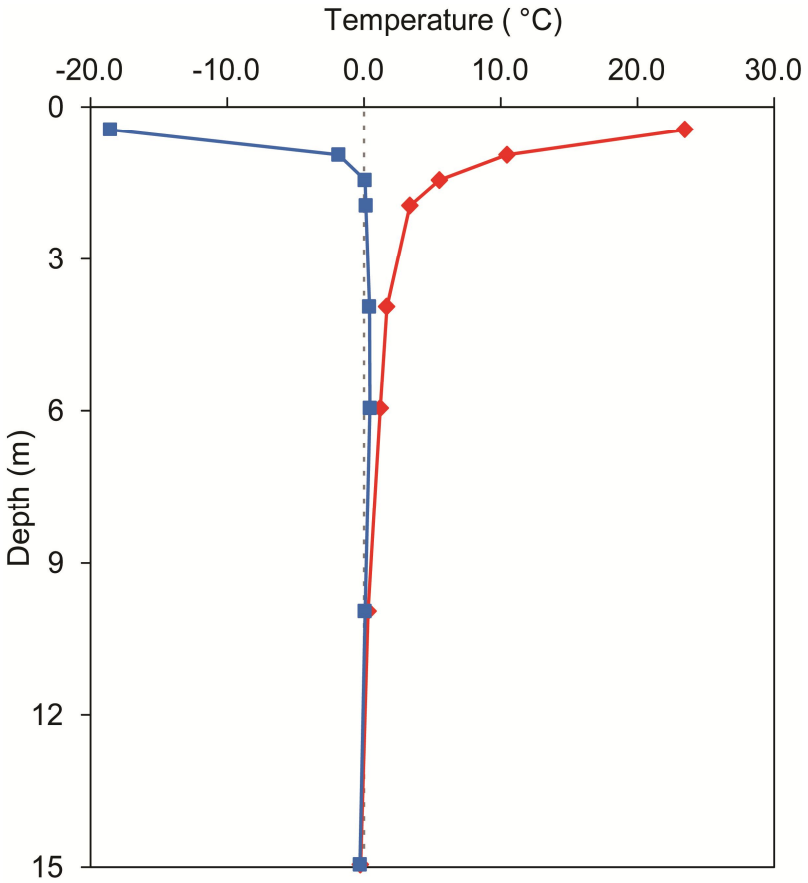


Depth (m)	Max (°C)	Min (°C)
2	10.80	-6.95
2.5	2.30	-3.73
3	0.11	-1.89
3.5	-0.07	-1.52
5.5	-0.48	-0.71
7.5	-0.55	-0.60
11.5	-0.69	-0.71
16.5	-0.62	-0.63

Little Smith Creek — LS-01

Sahtu Settlement Region

Latitude: 64.43 N Longitude: 124.74 W
Elevation: 80 m a.s.l.
Landform: Alluvial flood plain
Vegetation cover: Open mature black spruce forest
Thaw Depth: 12.58 m
Site visit: September 22, 2013

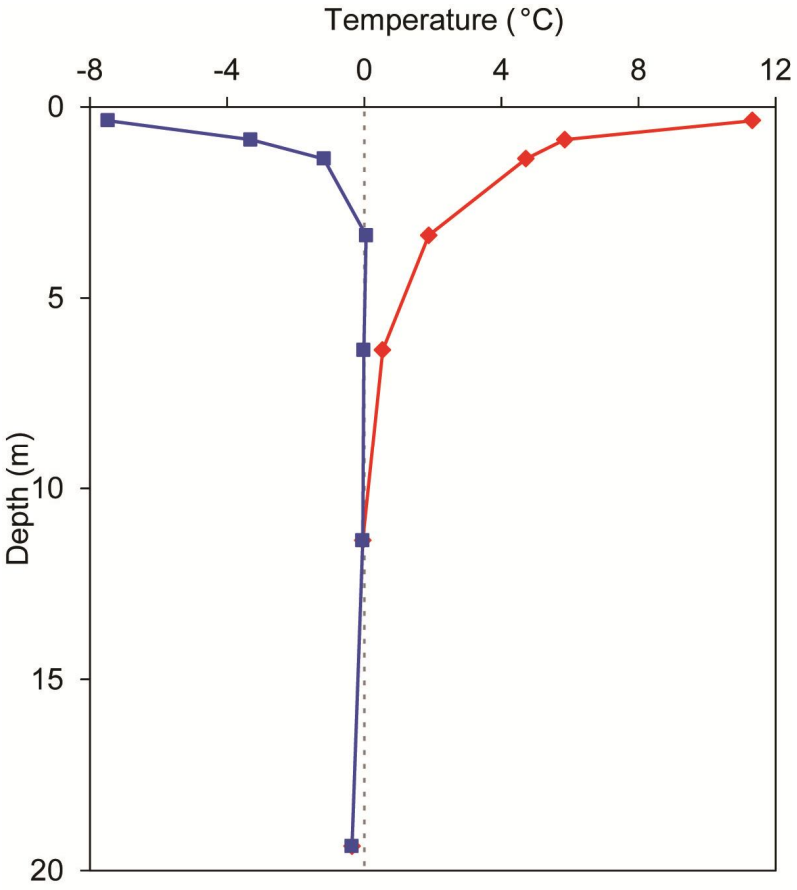


Depth (m)	Max (°C)	Min (°C)
0.45	23.47	-18.56
0.95	10.45	-1.87
1.45	5.52	0.06
1.95	3.35	0.14
3.95	1.66	0.39
5.95	1.19	0.43
9.95	0.29	0.07
14.95	-0.26	-0.29

Little Smith Creek— LS-02

Sahtu Settlement Region

Latitude: 64.43 N Longitude: 124.73 W
Elevation: 112 m a.s.l.
Landform: Glaciofluvial outwash plain
Vegetation cover: Tamarack birch poplar, and pine forest transition to spruce
Thaw Depth: 10.98 m
Site visit: September 22, 2013

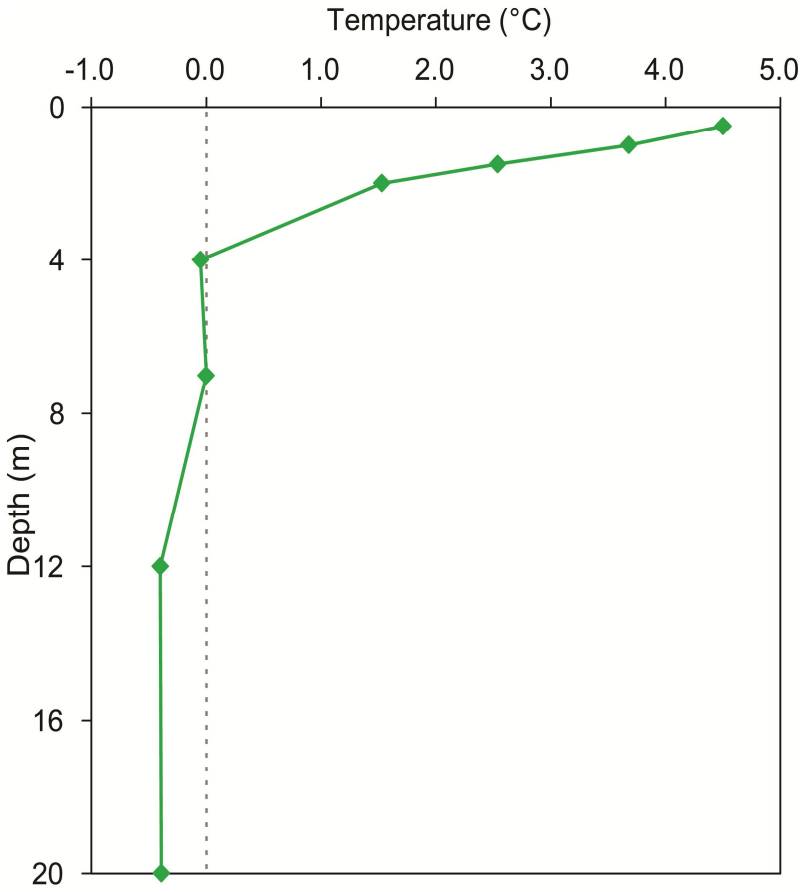


Depth (m)	Max (°C)	Min (°C)
0.36	11.32	-7.48
0.86	5.85	-3.31
1.36	4.71	-1.18
3.36	1.88	0.05
6.36	0.54	-0.02
11.36	-0.04	-0.05
19.36	-0.36	-0.36

Saline River — SR-02

Sahtu Settlement Region

Latitude: 64.29 N Longitude: 124.49 W
Elevation: 140 m a.s.l.
Landform: Glaciofluvial veneer over lacustrine
Vegetation cover: Burnt black spruce forest
Thaw Depth: 3.94 m
Site visit: September 22, 2013

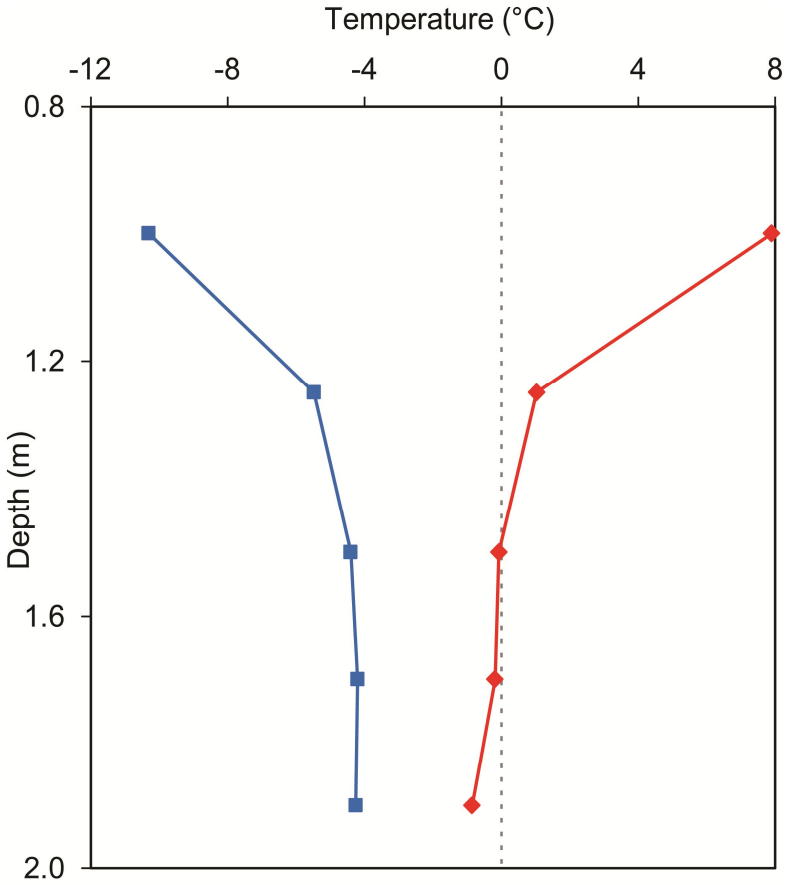


Depth (m)	Temp (°C)
0.5	4.5
1	3.68
1.5	2.54
2	1.53
4	-0.05
7	0
12	-0.4
20	-0.39

KP182 — Unburnt

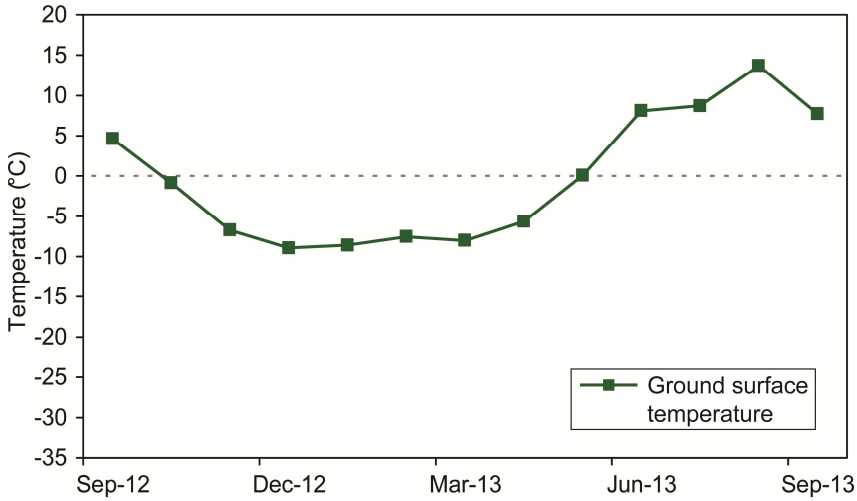
Sahtu Settlement Region

Latitude: 64.28 N Longitude: 124.47 W
Elevation: 200 m a.s.l.
Landform: Lacustrine plain
Vegetation cover: Forested - white spruce, white birch with black spruce, moss and peat ground cover
Thaw Depth: 1.48 m
Site visit: September 22, 2013



Sep 2012 – Aug 2013		
Depth (m)	Max (°C)	Min (°C)
1.00	7.90	-10.31
1.25	1.03	-5.48
1.50	-0.08	-4.40
1.70	-0.19	-4.21
1.90	-0.86	-4.26

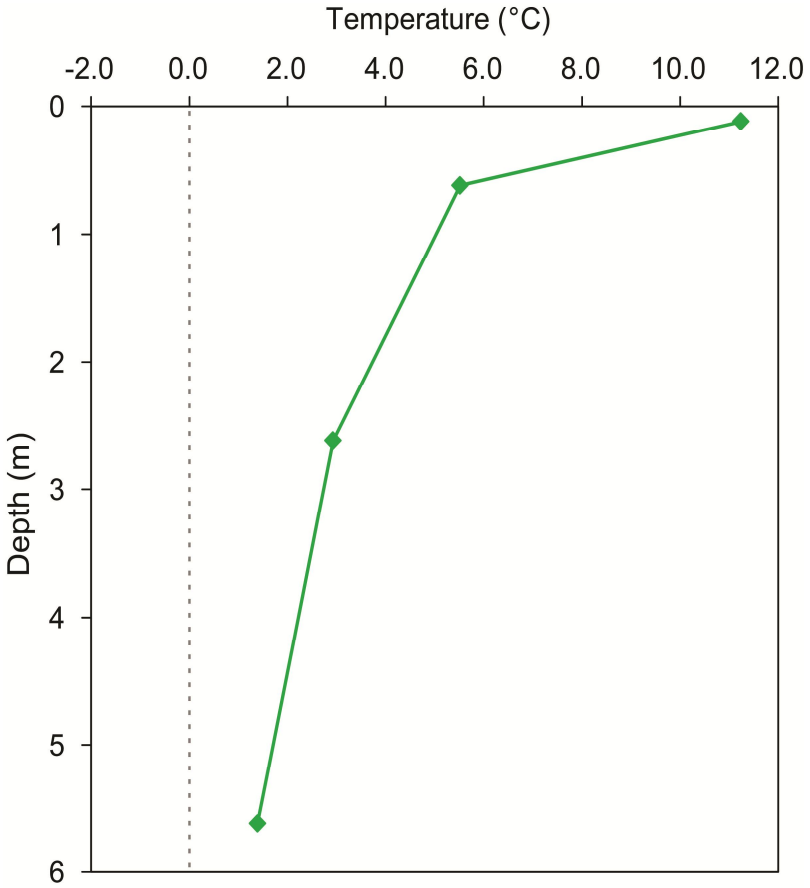
Month / Year	Temperature (°C)	
	Air	Surface
Sept / 2012	n/a	4.63
Oct / 2012	n/a	-0.89
Nov / 2012	n/a	-6.73
Dec / 2012	n/a	-8.95
Jan / 2013	n/a	-8.59
Feb / 2013	n/a	-7.55
Mar / 2013	n/a	-8.01
Apr / 2013	n/a	-5.66
May / 2013	n/a	0.07
Jun / 2013	n/a	8.10
Jul / 2013	n/a	8.73
Aug / 2013	n/a	13.68
Sept / 2013	n/a	7.73



Steep Creek Base — Steep-01

Sahtu Settlement Region

Latitude: 64.19 N Longitude: 124.37 W
Elevation: 62 m a.s.l.
Landform: Alluvial and colluvial, north facing slope of stream valley (site at edge of right-of-way)
Vegetation cover: Mixed, white spruce, jackpine, aspen, birch
Thaw Depth: n/a
Site visit: September 22, 2013

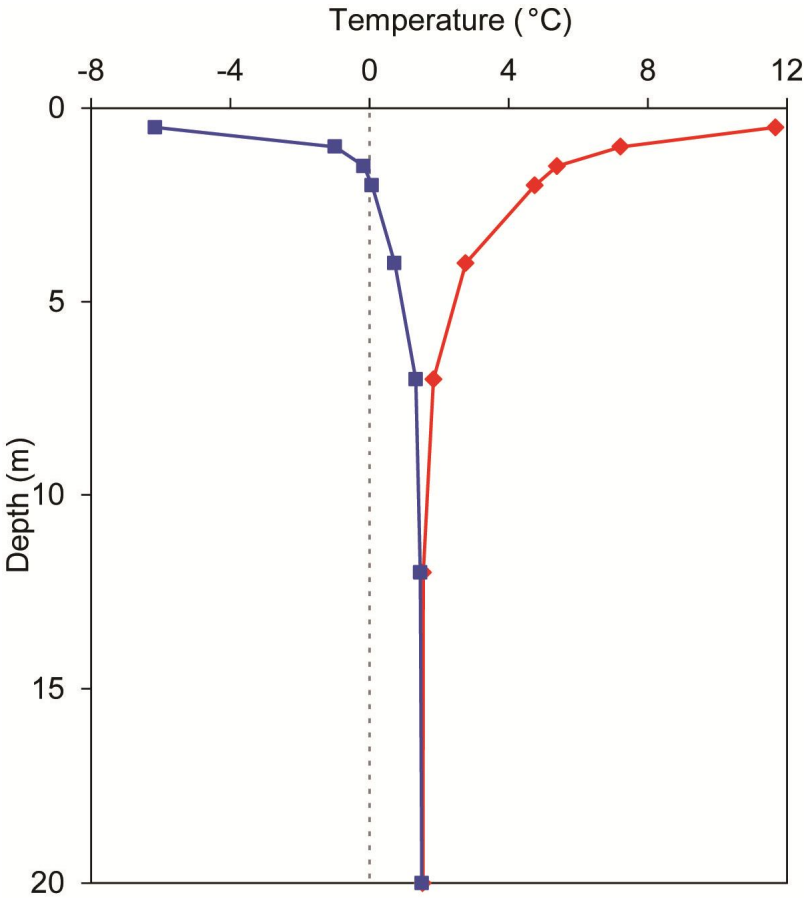


Depth (m)	Temp (°C)
0.12	11.24
0.62	5.52
2.62	2.93
5.62	1.39

Steep Creek Top — Steep-02

Sahtu Settlement Region

Latitude: 64.18 N Longitude: 124.38 W
Elevation: 134 m a.s.l.
Landform: Alluvial and colluvial, north facing slope of stream valley (site at edge of cleared right-of-way)
Vegetation cover: Mixed, white spruce, jackpine, aspen, birch
Thaw Depth: n/a
Site visit: September 22, 2013

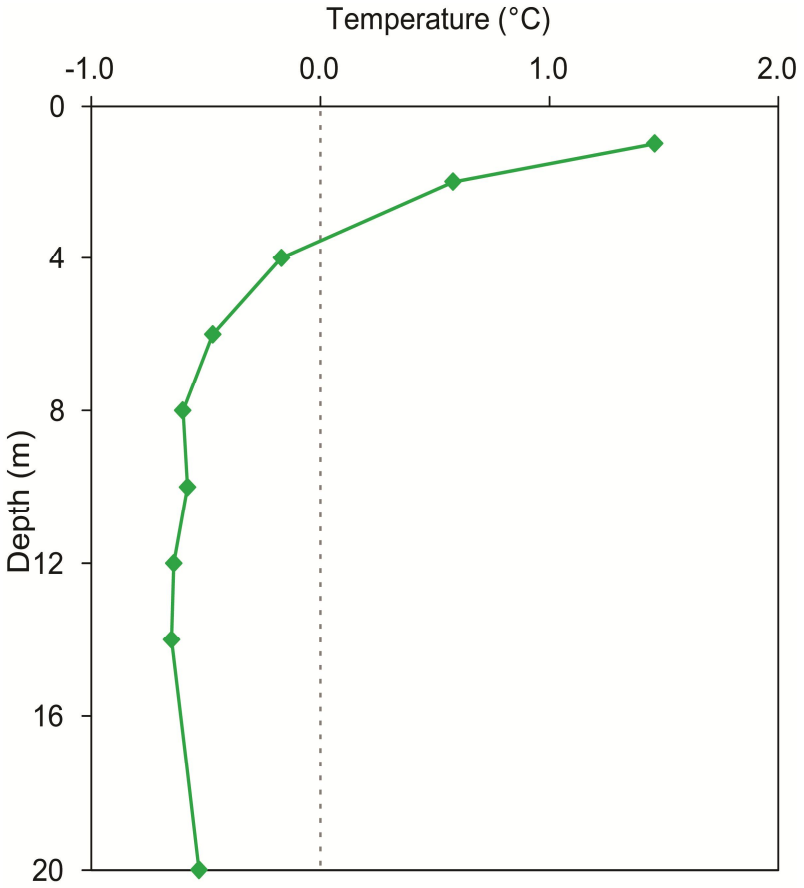


Depth (m)	Max (°C)	Min (°C)
0.5	11.67	-6.16
1	7.22	-0.99
1.5	5.39	-0.17
2	4.75	0.07
4	2.76	0.72
7	1.84	1.33
12	1.54	1.46
20	1.53	1.50

Table Mountain A — 85-7A-HA108

Deh cho Settlement Region

Latitude: 63.61 N Longitude: 123.64 W
Elevation: 255 m a.s.l.
Landform: Ground moraine
Vegetation cover: Lichen, moss, ericaceous shrubs with black spruce and alder
Thaw Depth: 3.55 m
Site visit: September 24, 2013

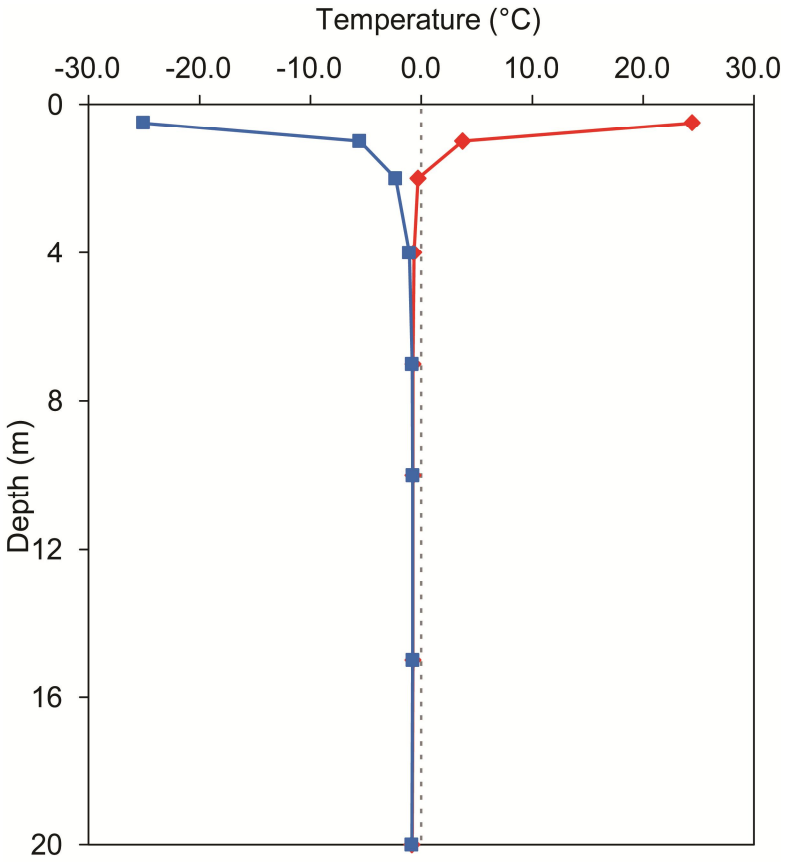


Depth (m)	Temp (°C)
1	1.46
2	0.58
4	-0.17
6	-0.47
8	-0.6
10	-0.58
12	-0.64
14	-0.65
20	-0.53

KP313 T2

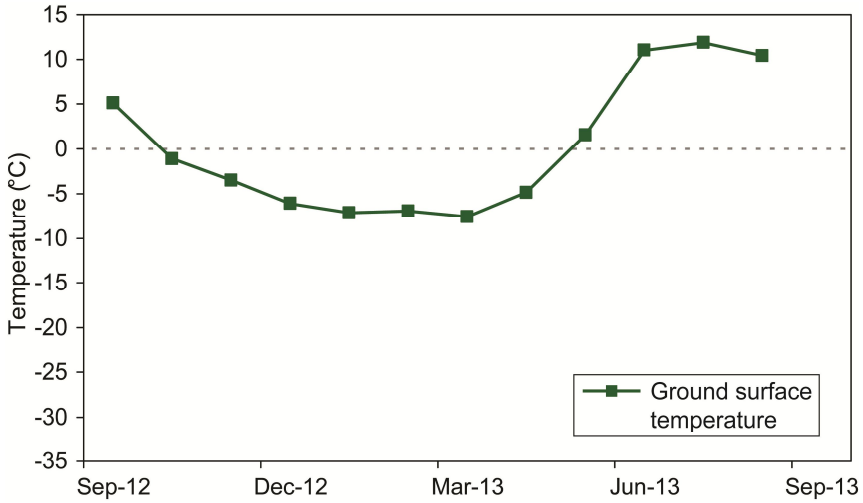
Deh cho Settlement Region

Latitude: 63.26 N Longitude: 123.43 W
Elevation: 250 m a.s.l.
Landform: Lacustrine plain, bottom of slope
Vegetation cover: Moss cover and peat, forested, mix of birch and spruce
Thaw Depth: 1.77 m
Site visit: September 24, 2013



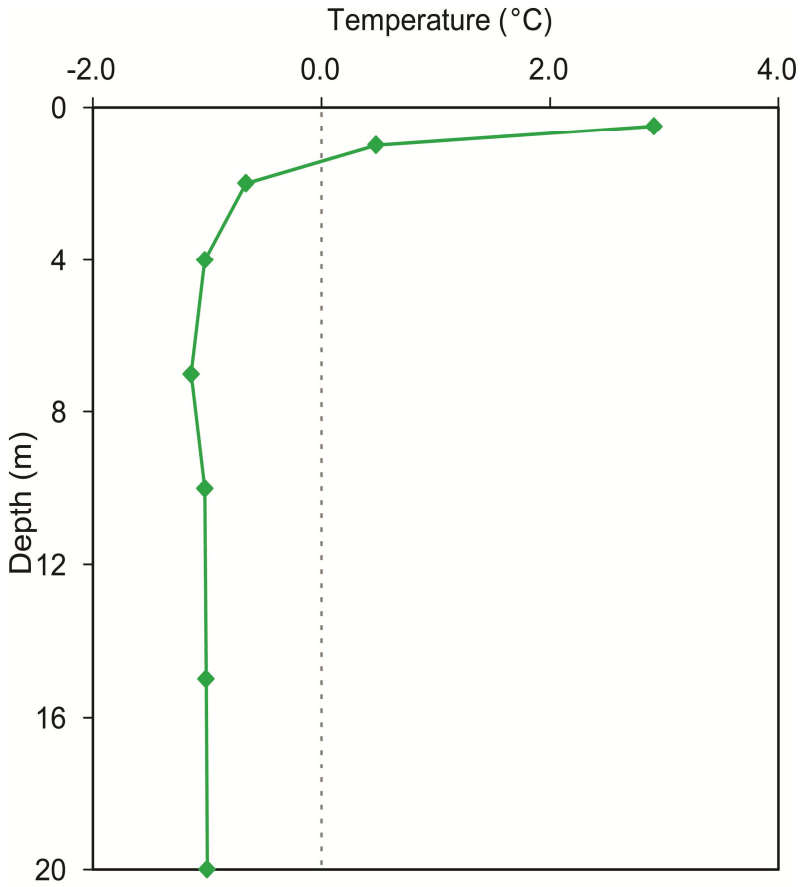
Sep 2012 – Aug 2013		
Depth (m)	Max (°C)	Min (°C)
0.5	24.42	-25.06
1	3.73	-5.56
2	-0.30	-2.32
4	-0.67	-1.08
7	-0.75	-0.82
10	-0.75	-0.79
15	-0.75	-0.79
20	-0.82	-0.86

Month / Year	Temperature (°C)	
	Air	Surface
Sept / 2012	n/a	5.07
Oct / 2012	n/a	-1.12
Nov / 2012	n/a	-3.49
Dec / 2012	n/a	-6.09
Jan / 2012	n/a	-7.13
Feb / 2013	n/a	-6.93
Mar / 2013	n/a	-7.56
Apr / 2013	n/a	-4.86
May / 2013	n/a	1.55
Jun / 2013	n/a	11.03
Jul / 2013	n/a	11.87
Aug / 2013	n/a	10.42



KP313 T4
Deh cho Settlement Region

Latitude: 63.26 N Longitude: 123.43 W
Elevation: 250 m a.s.l.
Landform: Lacustrine plain, mid slope, W side of ROW
Vegetation cover: Moss cover and peat, forested, mix of birch and spruce
Thaw Depth: 1.42 m
Site visit: September 24, 2013

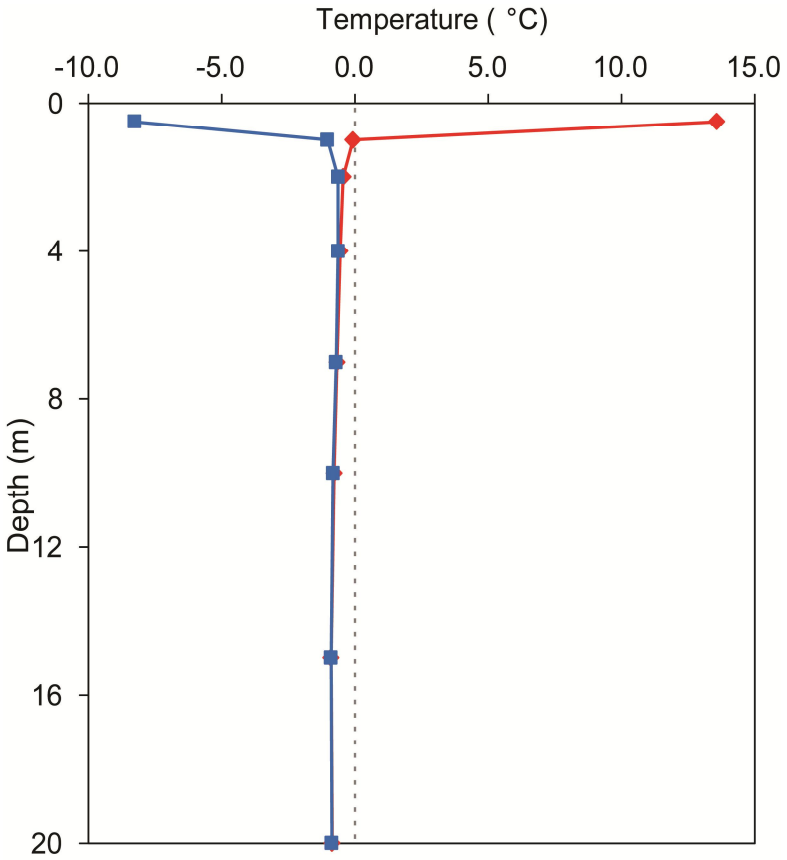


Depth (m)	Temp (°C)
0.5	2.91
1	0.48
2	-0.66
4	-1.02
7	-1.14
10	-1.02
15	-1.01
20	-1

KP313 T5

Deh cho Settlement Region

Latitude: 63.26 N Longitude: 123.43 W
Elevation: 250 m a.s.l.
Landform: Lacustrine plain, mid slope, E side of ROW
Vegetation cover: Moss cover and peat, forested, mix of birch and spruce
Thaw Depth: 1.0 m
Site visit: September 24, 2013



Sep 2012 – Aug 2013		
Depth (m)	Max (°C)	Min (°C)
0.5	13.57	-8.27
1	-0.08	-1.03
2	-0.45	-0.64
4	-0.56	-0.64
7	-0.67	-0.71
10	-0.79	-0.82
15	-0.90	-0.90
20	-0.86	-0.87

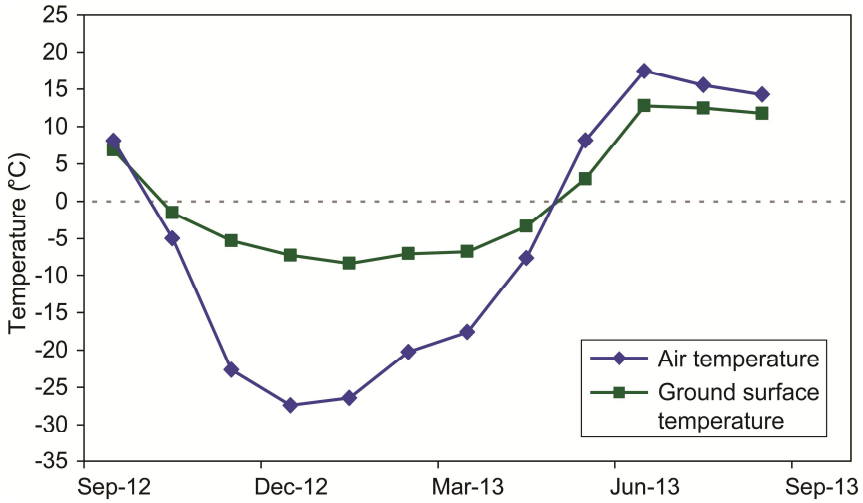
KP313 T6

Deh cho Settlement Region

Latitude: 63.26 N Longitude: 123.43 W
Elevation: 250 m a.s.l.
Landform: Lacustrine plain, top of slope
Vegetation cover: Thin moss and organic cover, forested, mix of birch and spruce
Thaw Depth: 3.21 m
Site visit: September 24, 2013

Depth (m)	Temp (°C)
0.5	3.27
3.5	-0.35
5.5	-0.65
7.5	-0.65
11.5	-0.67
16.5	-0.76

Month / Year	Temperature (°C)	
	Air	Surface
Sept / 2012	8.11	6.89
Oct / 2012	-4.75	-1.78
Nov / 2012	-24.07	-9.17
Dec / 2012	-30.56	-13.88
Jan / 2012	-28.46	-13.60
Feb / 2013	-25.12	-10.69
Mar / 2013	-21.25	-10.34
Apr / 2013	-11.77	-6.89
May / 2013	4.50	1.74
Jun / 2013	16.55	12.77
Jul / 2013	14.91	12.27
Aug / 2013	14.62	12.25



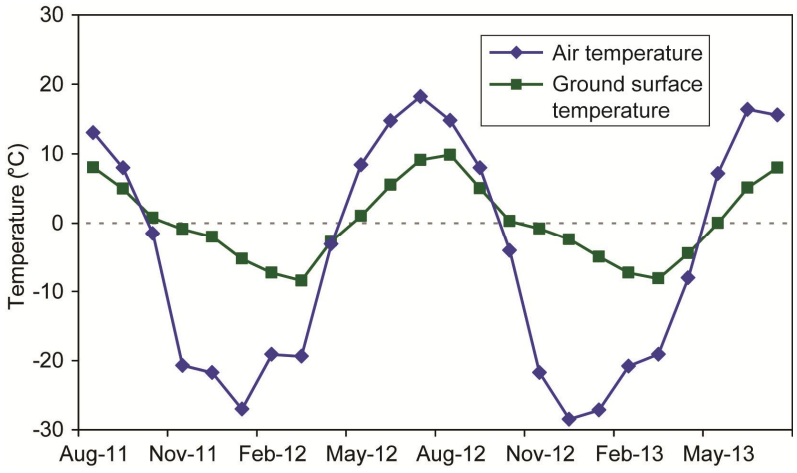
River Between Two Mountains — 92TT8

Deh cho Settlement Region

Latitude: 62.96 N Longitude: 123.21 W
Elevation: 120 m a.s.l.
Landform: Transition lacustrine to alluvial to moraine terrain
Vegetation cover: Dense black spruce forest
Thaw Depth: n/a
Site visit: August 13, 2013

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	13.06	8.04
Sept / 2011	7.97	4.95
Oct / 2011	-1.54	0.73
Nov / 2011	-20.72	-0.88
Dec / 2011	-21.76	-2.02
Jan / 2012	-27.05	-5.25
Feb / 2012	-19.12	-7.29
Mar / 2012	-19.40	-8.42
Apr / 2012	-3.10	-2.65
May / 2012	8.42	1.01
Jun / 2012	14.74	5.51
Jul / 2012	18.25	9.12

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	14.80	9.85
Sept / 2012	8.00	5.02
Oct / 2012	-4.04	0.28
Nov / 2012	-21.72	-0.83
Dec / 2012	-28.50	-2.40
Jan / 2013	-27.18	-4.95
Feb / 2013	-20.81	-7.30
Mar / 2013	-19.08	-8.11
Apr / 2013	-8.03	-4.43
May / 2013	7.16	-0.01
Jun / 2013	16.39	5.13
Jul / 2013	15.58	8.00



River Between Two Mountains — RBTM-01

Deh cho Settlement Region

Latitude: 62.95 N Longitude: 123.21 W
Elevation: 120 m a.s.l.
Landform: Transition lacustrine to alluvial to moraine terrain
Vegetation cover: Dense black spruce forest
Thaw Depth: n/a
Site visit: August 13, 2013

Aug 2011 – Jul 2012		
Depth (m)	Max (°C)	Min (°C)
0.5	6.38	-0.92
1	4.52	-0.03
1.5	3.73	0.34
2	3.05	0.49
4	2.24	1.34
6	2.35	1.87
10	3.26	3.14
15	4.64	4.19

Aug 2012 – Jul 2013		
Depth (m)	Max (°C)	Min (°C)
0.5	6.42	-1.61
1	4.87	0.01
1.5	4.07	0.35
2	3.37	0.44
4	2.47	1.39
6	2.50	1.94
10	3.25	3.18
15	4.47	4.18

River Between Two Mountains — RBTM-02

Deh cho Settlement Region

Latitude: 62.93 N Longitude: 123.18 W
Elevation: 150 m a.s.l.
Landform: Transition lacustrine to alluvial to moraine terrain
Vegetation cover: Dense black spruce forest
Thaw Depth: n/a
Site visit: August 13, 2013

Aug 2011 – Jul 2012		
Depth (m)	Max (°C)	Min (°C)
1.5	-0.39	-1.03
3.5	-0.54	-0.74
7.5	-0.49	-0.53
12.5	-0.31	-0.32

Aug 2012 – Jul 2013		
Depth (m)	Max (°C)	Min (°C)
1.5	-0.37	-1.26
3.5	-0.51	-0.73
7.5	-0.47	-0.51
12.5	-0.30	-0.31

Willowlake River — WLR-01

Deh cho Settlement Region

Latitude: 62.72 N Longitude: 123.08 W
Elevation: 122 m a.s.l.
Landform: Alluvial fan
Vegetation cover: Open mixed forest
Thaw Depth: 1.60 m for 2012, 1.67 m for 2013
Site visit: August 10, 2013

Aug 2011 – Jul 2012		
Depth (m)	Max (°C)	Min (°C)
0.4	7.13	-5.03
0.9	1.86	-2.59
1.4	0.09	-1.52
2.4	-0.38	-0.77
3.4	-0.38	-0.49

Aug 2012 – Jul 2013		
Depth (m)	Max (°C)	Min (°C)
0.4	7.60	-5.09
0.9	2.39	-2.64
1.4	0.14	-1.52
2.4	-0.38	-0.82
3.4	-0.38	-0.52

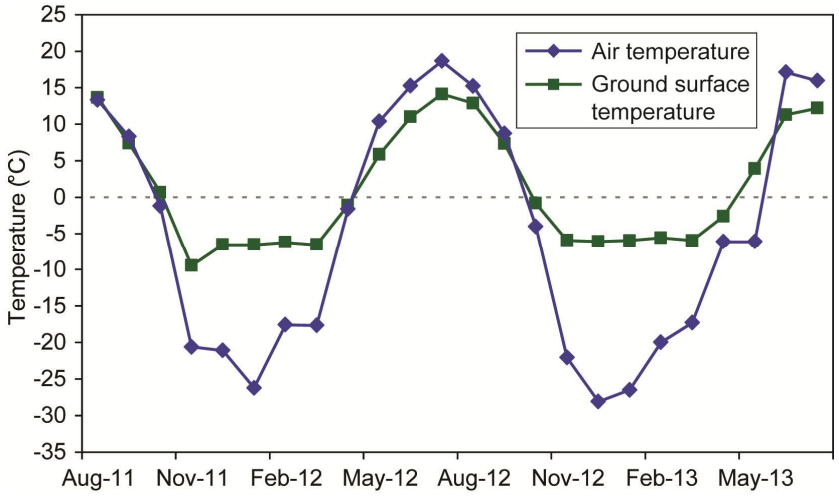
Willow Lake Burn — 93AG04

Deh cho Settlement Region

Latitude: 62.70 N Longitude: 123.06 W
Elevation: 103 m a.s.l.
Landform: Top of inactive fluvial bar
Vegetation cover: Recolonized from burn. Tall willow and birch forest.
Thaw depth: 0.63 (probed)
Site visit: August 10, 2013

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	13.31	13.66
Sept / 2011	8.30	7.40
Oct / 2011	-1.20	0.67
Nov / 2011	-20.61	-9.45
Dec / 2011	-21.09	-6.53
Jan / 2012	-26.22	-6.53
Feb / 2012	-17.56	-6.22
Mar / 2012	-17.67	-6.55
Apr / 2012	-1.59	-1.10
May / 2012	10.38	5.84
Jun / 2012	15.26	11.00
Jul / 2012	18.65	14.13

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	15.22	12.87
Sept / 2012	8.75	7.36
Oct / 2012	-4.01	-0.83
Nov / 2012	-22.08	-5.94
Dec / 2012	-28.10	-6.10
Jan / 2013	-26.51	-5.96
Feb / 2013	-19.98	-5.58
Mar / 2013	-17.29	-5.95
Apr / 2013	-6.13	-2.62
May / 2013	-6.13	3.91
Jun / 2013	17.11	11.29
Jul / 2013	15.96	12.20



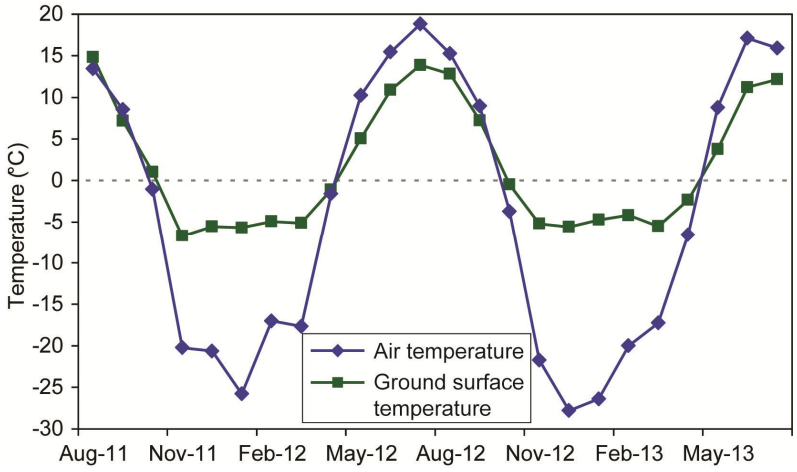
Willow Lake River — 92TT7

Deh cho Settlement Region

Latitude: 62.70 N Longitude: 123.06 W
Elevation: 103 m a.s.l.
Landform: Top of inactive fluvial bar
Vegetation cover: White spruce forest, low to moderate canopy density
Thaw Depth: 0.89 m (probed)
Site visit: August 10, 2013

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	13.43	14.83
Sept / 2011	8.55	7.19
Oct / 2011	-1.06	1.02
Nov / 2011	-20.22	-6.71
Dec / 2011	-20.64	-5.55
Jan / 2012	-25.79	-5.68
Feb / 2012	-17.01	-4.93
Mar / 2012	-17.66	-5.12
Apr / 2012	-1.61	-1.11
May / 2012	10.22	5.05
Jun / 2012	15.44	10.88
Jul / 2012	18.80	13.87

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	15.24	12.81
Sept / 2012	8.94	7.23
Oct / 2012	-3.74	-0.49
Nov / 2012	-21.72	-5.19
Dec / 2012	-27.81	-5.58
Jan / 2013	-26.40	-4.74
Feb / 2013	-20.00	-4.18
Mar / 2013	-17.25	-5.51
Apr / 2013	-6.57	-2.34
May / 2013	8.77	3.78
Jun / 2013	17.09	11.20
Jul / 2013	15.92	12.16



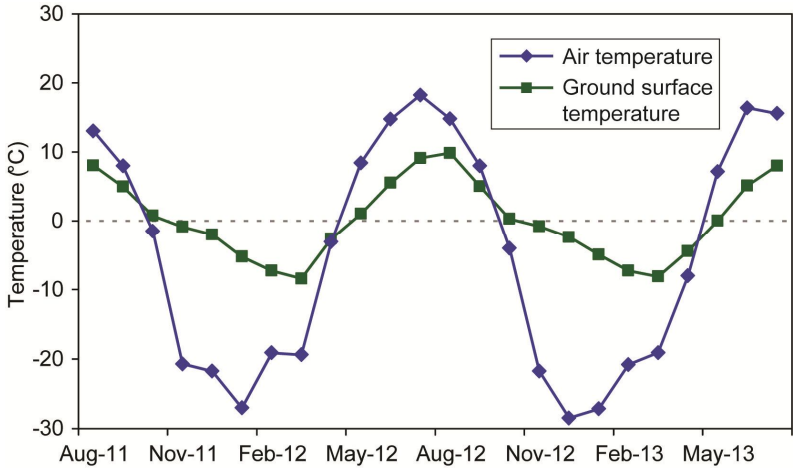
Wrigley Pines — 94AG2

Deh cho Settlement Region

Latitude: 62.32 N Longitude: 122.69 W
Elevation: n/a
Landform: Upland till plain
Vegetation cover: Dense canopy pure jack pine burn succession
Thaw Depth: n/a
Site visit: August 13, 2013

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	13.06	8.04
Sept / 2011	7.97	4.95
Oct / 2011	-1.54	0.73
Nov / 2011	-20.72	-0.88
Dec / 2011	-21.76	-2.02
Jan / 2012	-27.05	-5.25
Feb / 2012	-19.12	-7.29
Mar / 2012	-19.40	-8.42
Apr / 2012	-3.10	-2.65
May / 2012	8.42	1.01
Jun / 2012	14.74	5.51
Jul / 2012	18.25	9.12

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	14.80	9.85
Sept / 2012	8.00	5.02
Oct / 2012	-4.04	0.28
Nov / 2012	-21.72	-0.83
Dec / 2012	-28.50	-2.40
Jan / 2013	-27.18	-4.95
Feb / 2013	-20.81	-7.30
Mar / 2013	-19.08	-8.11
Apr / 2013	-8.03	-4.43
May / 2013	7.16	-0.01
Jun / 2013	16.39	5.13
Jul / 2013	15.58	8.00



Wrigley Peatland — 99TC4

Deh cho Settlement Region

Latitude: 62.28 N Longitude: 122.60 W
Elevation: n/a
Landform: Organic terrain on till plain, post glacial (>10Ka)
Vegetation cover: Boreal burn, scattered small spruce, pine and aspen, health ground cover
Thaw Depth: 2.61 m for 2012, 2.75 m for 2013
Site visit: August 13, 2013

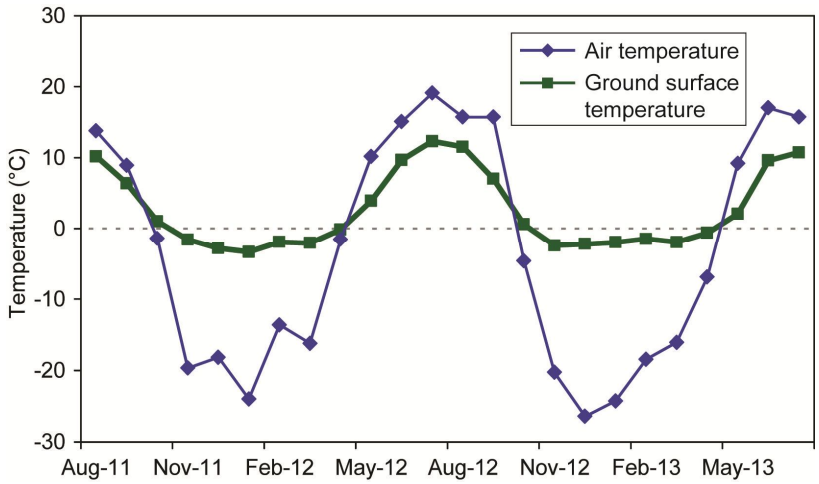
Aug 2011 – Jul 2012		
Depth (m)	Max (°C)	Min (°C)
0.35	25.89	-26.37
0.85	9.62	-1.22
1.35	4.41	-0.07
1.85	0.31	-0.08
2.85	-0.10	-0.12
4.85	-0.08	-0.11
6.85	0.24	0.15
9.35	0.60	0.53

Aug 2012 – Jul 2013		
Depth (m)	Max (°C)	Min (°C)
0.35	28.85	-22.03
0.85	9.96	-2.12
1.35	4.49	-0.07
1.85	0.89	-0.08
2.85	-0.10	-0.14
4.85	-0.07	-0.11
6.85	0.34	0.23
9.35	0.68	0.60

Wrigley Peatland — 99TC4

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	13.76	10.17
Sept / 2011	8.91	6.38
Oct / 2011	-1.42	0.99
Nov / 2011	-19.67	-1.60
Dec / 2011	-18.16	-2.84
Jan / 2012	-24.01	-3.38
Feb / 2012	-13.62	-1.96
Mar / 2012	-16.21	-2.09
Apr / 2012	-1.59	-0.16
May / 2012	10.16	3.88
Jun / 2012	15.07	9.67
Jul / 2012	19.09	12.30

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	15.72	11.53
Sept / 2012	15.72	7.02
Oct / 2012	-4.65	0.56
Nov / 2012	-20.27	-2.44
Dec / 2012	-26.44	-2.24
Jan / 2013	-24.28	-1.99
Feb / 2013	-18.44	-1.50
Mar / 2013	-16.07	-1.98
Apr / 2013	-6.91	-0.66
May / 2013	9.18	2.06
Jun / 2013	17.02	9.60
Jul / 2013	15.73	10.73



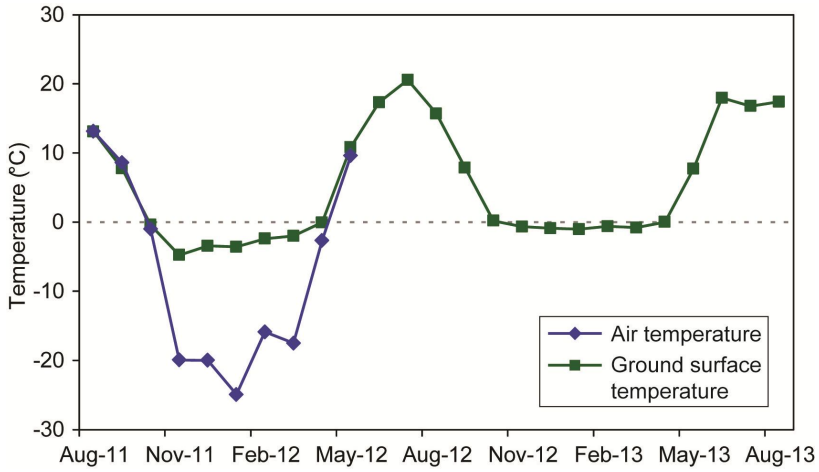
Fort Simpson Bog — 93AG2

Deh cho Settlement Region

Latitude: 61.98 N Longitude: 121.88 W
Elevation: n/a
Landform: Raised bog with collapse depression on lacustrine plain
Vegetation cover: Open black spruce
Thaw Depth: n/a
Site visit: August 14, 2013

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	13.11	13.10
Sept / 2011	8.58	7.75
Oct / 2011	-1.00	-0.41
Nov / 2011	-19.95	-4.78
Dec / 2011	-20.00	-3.47
Jan / 2012	-24.94	-3.60
Feb / 2012	-15.88	-2.43
Mar / 2012	-17.52	-2.02
Apr / 2012	-2.67	-0.07
May / 2012	9.60	10.81
Jun / 2012	n/a	17.32
Jul / 2012	n/a	20.56

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	n/a	15.69
Sept / 2012	n/a	7.85
Oct / 2012	n/a	0.17
Nov / 2012	n/a	-0.67
Dec / 2012	n/a	-0.90
Jan / 2013	n/a	-1.04
Feb / 2013	n/a	-0.63
Mar / 2013	n/a	-0.83
Apr / 2013	n/a	-0.01
May / 2013	n/a	7.72
Jun / 2013	n/a	17.96
Jul / 2013	n/a	16.78



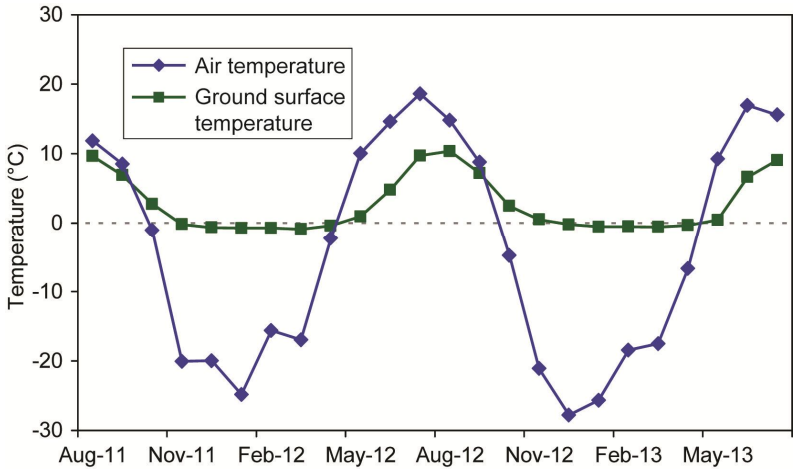
Wrigley Ferry Transition — 97TC5

Deh cho Settlement Region

Latitude: 61.98 N Longitude: 121.88 W
Elevation: 165 m a.s.l.
Landform: Surface of glaciolacustrine delta, post glacial (>10Ka)
Vegetation cover: Boreal, open spruce (coniferous forest)
Thaw Depth: >1.30 m (probed)
Site visit: August 14, 2013

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	11.84	9.64
Sept / 2011	8.51	6.90
Oct / 2011	-1.08	2.76
Nov / 2011	-20.07	-0.18
Dec / 2011	-19.97	-0.66
Jan / 2012	-24.84	-0.72
Feb / 2012	-15.62	-0.73
Mar / 2012	-16.96	-0.89
Apr / 2012	-2.29	-0.40
May / 2012	10.02	0.94
Jun / 2012	14.60	4.80
Jul / 2012	18.60	9.70

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	14.79	10.35
Sept / 2012	8.77	7.20
Oct / 2012	-4.75	2.46
Nov / 2012	-21.10	0.51
Dec / 2012	-27.81	-0.22
Jan / 2013	-25.68	-0.54
Feb / 2013	-18.44	-0.50
Mar / 2013	-17.52	-0.56
Apr / 2013	-6.65	-0.33
May / 2013	9.24	0.43
Jun / 2013	16.95	6.62
Jul / 2013	15.58	9.06



Fort Simpson Bog High — 99TC1

Deh cho Settlement Region

Latitude: 61.98 N Longitude: 121.88 W
Elevation: 165 m a.s.l.
Landform: Peat plateau on surface of glaciolacustrine delta, post glacial (>10Ka)
Vegetation cover: Boreal, open black spruce (coniferous forest)
Thaw Depth: 0.51 m for 2012, 0.50 m for 2013
Site visit: August 14, 2013

Aug 2011 – Jul 2012		
Depth (m)	Max (°C)	Min (°C)
0.5	0.01	-3.05
1	-0.45	-2.16
2	-0.52	-1.16
4	-0.36	-0.45
6	-0.18	-0.19
9	0.11	0.10
12	0.54	0.53
14.5	0.69	0.68

Aug 2012 – Jul 2013		
Depth (m)	Max (°C)	Min (°C)
0.5	0.00	-3.12
1	-0.68	-2.56
2	-0.82	-1.71
4	-0.45	-0.82
6	-0.19	-0.22
9	0.11	0.10
12	0.53	0.49
14.5	0.68	0.60

Fort Simpson Bog Low — 99TC2

Deh cho Settlement Region

Latitude: 61.98 N Longitude: 121.88 W
Elevation: 165 m a.s.l.
Landform: Thermokarst depression in the surface of glaciolacustrine delta, post glacial (>10Ka)
Vegetation cover: Boreal, sedge and sphagnum in depression surrounded by black spruce on raised peat rim
Thaw Depth: n/a
Site visit: August 13, 2013

Aug 2011 – Jul 2012		
Depth (m)	Max (°C)	Min (°C)
0.35	11.70	-0.34
0.85	7.21	0.40
1.85	3.78	0.75
3.85	2.28	1.09
5.85	1.62	1.13
8.85	1.43	1.35
11.85	1.40	1.35
14.85	1.46	1.40

Aug 2012 – Jul 2013		
Depth (m)	Max (°C)	Min (°C)
0.35	10.87	-0.15
0.85	6.36	0.41
1.85	3.20	0.71
3.85	1.97	1.02
5.85	1.40	1.02
8.85	1.36	1.28
11.85	1.40	1.36
14.85	1.47	1.43

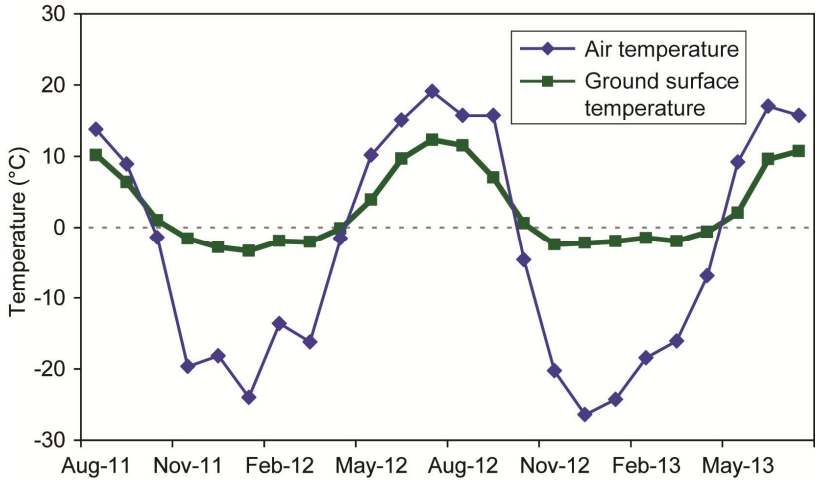
Spruce cutline — 93AG3

Deh cho Settlement Region

Latitude: 61.97 N Longitude: 121.82 W
Elevation: n/a
Landform: Lacustrine plain
Vegetation cover: Closed canopy upland spruce with hardwood, complete ground cover of moss
Thaw Depth: 1.16 m for 2013 (probed)
Site visit: August 14, 2013

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	12.82	8.99
Sept / 2011	8.95	6.67
Oct / 2011	-0.61	3.47
Nov / 2011	-19.22	0.51
Dec / 2011	-18.94	-0.80
Jan / 2012	-24.06	-1.29
Feb / 2012	-14.76	-1.26
Mar / 2012	-16.22	-1.36
Apr / 2012	-1.79	-0.51
May / 2012	10.26	-0.14
Jun / 2012	14.92	1.38
Jul / 2012	19.19	5.56

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	15.42	8.26
Sept / 2012	9.52	6.84
Oct / 2012	-3.91	3.41
Nov / 2012	-20.19	0.38
Dec / 2012	-27.00	-0.47
Jan / 2013	-24.90	-0.85
Feb / 2013	-17.75	-0.79
Mar / 2013	-16.58	-0.96
Apr / 2013	-6.01	-0.55
May / 2013	9.66	-0.11
Jun / 2013	17.46	1.98
Jul / 2013	16.17	6.32



Aspen (Wrigley Highway) — 97TC1

Deh cho Settlement Region

Latitude: 61.95 N Longitude: 121.76 W
Elevation: 165 m a.s.l.
Landform: Surface of glaciolacustrine delta, post glacial (>10Ka)
Vegetation cover: Boreal, aspen grove (deciduous forest)
Thaw Depth: n/a
Site visit: August 14, 2013

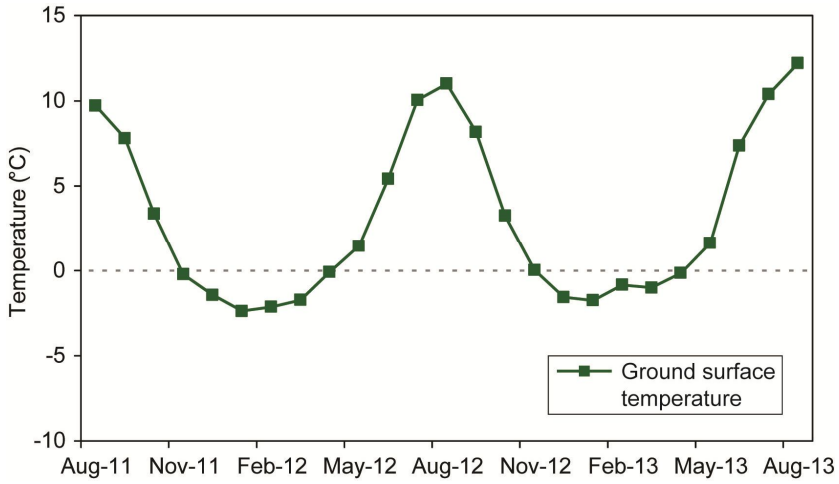
Aug 2011 – Jul 2012		
Depth (m)	Max (°C)	Min (°C)
0.5	9.28	-0.75
1	6.54	0.00
1.5	4.19	0.04
2	3.00	0.49
3	2.35	0.75
5	1.05	0.11
7	1.59	1.32
10	1.93	1.59

Aug 2012 – Jul 2013		
Depth (m)	Max (°C)	Min (°C)
0.5	9.36	-1.29
1	6.96	-0.08
1.5	4.09	-0.15
2	3.00	0.30
3	2.35	0.77
5	1.05	0.19
7	1.62	1.26
10	1.59	0.98

Aspen (Wrigley Highway) — 97TC1

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	n/a	9.72
Sept / 2011	n/a	7.80
Oct / 2011	n/a	3.38
Nov / 2011	n/a	-0.22
Dec / 2011	n/a	-1.44
Jan / 2012	n/a	-2.39
Feb / 2012	n/a	-2.14
Mar / 2012	n/a	-1.74
Apr / 2012	n/a	-0.08
May / 2012	n/a	1.46
Jun / 2012	n/a	5.42
Jul / 2012	n/a	10.05

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	n/a	11.00
Sept / 2012	n/a	8.16
Oct / 2012	n/a	3.25
Nov / 2012	n/a	0.03
Dec / 2012	n/a	-1.57
Jan / 2013	n/a	-1.76
Feb / 2013	n/a	-0.84
Mar / 2013	n/a	-1.01
Apr / 2013	n/a	-0.15
May / 2013	n/a	1.63
Jun / 2013	n/a	7.36
Jul / 2013	n/a	10.39



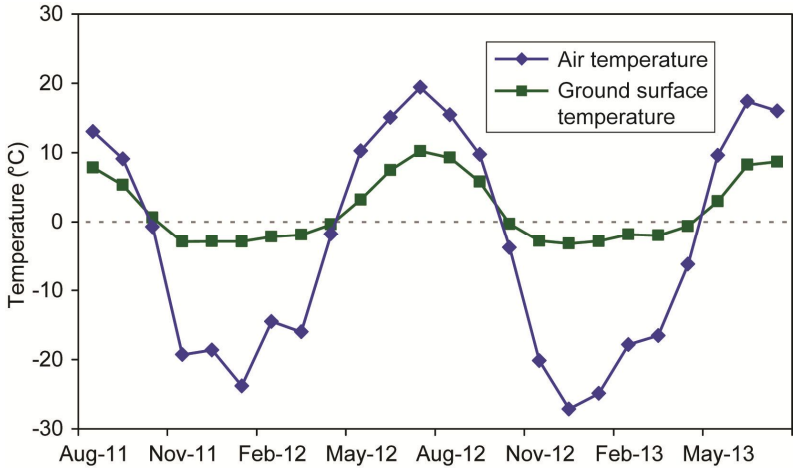
Martin River — 92TT6

Deh cho Settlement Region

Latitude: 61.89 N Longitude: 121.60 W
Elevation: 165 m a.s.l.
Landform: Glaciolacustrine plain
Vegetation cover: Mixed spruce, low to moderate density canopy
Thaw Depth: >1.30 m (probed)
Site visit: August 9, 2013

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	13.05	7.86
Sept / 2011	9.11	5.34
Oct / 2011	-0.72	0.59
Nov / 2011	-19.30	-2.93
Dec / 2011	-18.62	-2.87
Jan / 2012	-23.81	-2.90
Feb / 2012	-14.49	-2.19
Mar / 2012	-16.00	-1.91
Apr / 2012	-1.80	-0.37
May / 2012	10.27	3.21
Jun / 2012	15.09	7.49
Jul / 2012	19.43	10.21

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	15.44	9.28
Sept / 2012	9.74	5.79
Oct / 2012	-3.80	-0.30
Nov / 2012	-20.15	-2.82
Dec / 2012	-27.16	-3.22
Jan / 2013	-24.90	-2.85
Feb / 2013	-17.83	-1.87
Mar / 2013	-16.54	-2.01
Apr / 2013	-6.21	-0.63
May / 2013	9.63	2.96
Jun / 2013	17.38	8.24
Jul / 2013	16.01	8.70



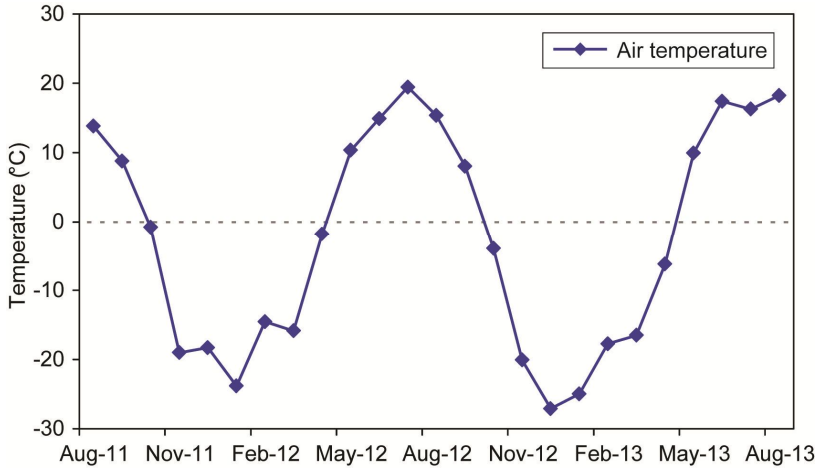
FS Deep — 94AG1

Deh cho Settlement Region

Latitude: 61.84 N Longitude: 121.34 W
Elevation: n/a
Landform:Eolian surface formed on lacustrine delta surface
Vegetation cover: Black spruce forest with scattered hardwood and shrub, moderate canopy density
Thaw Depth: 0.58 m
Site visit: August 14, 2013

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	13.82	n/a
Sept / 2011	8.78	n/a
Oct / 2011	-0.79	n/a
Nov / 2011	-19.01	n/a
Dec / 2011	-18.31	n/a
Jan / 2012	-23.83	n/a
Feb / 2012	-14.54	n/a
Mar / 2012	-15.87	n/a
Apr / 2012	-1.79	n/a
May / 2012	10.34	n/a
Jun / 2012	14.89	n/a
Jul / 2012	19.44	n/a

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	15.34	n/a
Sept / 2012	8.05	n/a
Oct / 2012	-3.92	n/a
Nov / 2012	-20.09	n/a
Dec / 2012	-27.12	n/a
Jan / 2013	-24.99	n/a
Feb / 2013	-17.74	n/a
Mar / 2013	-16.51	n/a
Apr / 2013	-6.22	n/a
May / 2013	9.95	n/a
Jun / 2013	17.40	n/a
Jul / 2013	16.26	n/a



Open Black Spruce — 99TC3

Deh cho Settlement Region

Latitude: 61.66 N Longitude: 121.34 W
Elevation: 183 m a.s.l.
Landform: Surface of glaciolacustrine delta, late glacial (>10Ka)
Vegetation cover: Small black spruce thicket with willow shrub, 100% cover of moss with lichen and boreal health (coniferous)
Thaw Depth: 2.31 m for 2012, 3.01 m for 2013
Site visit: August 11, 2013

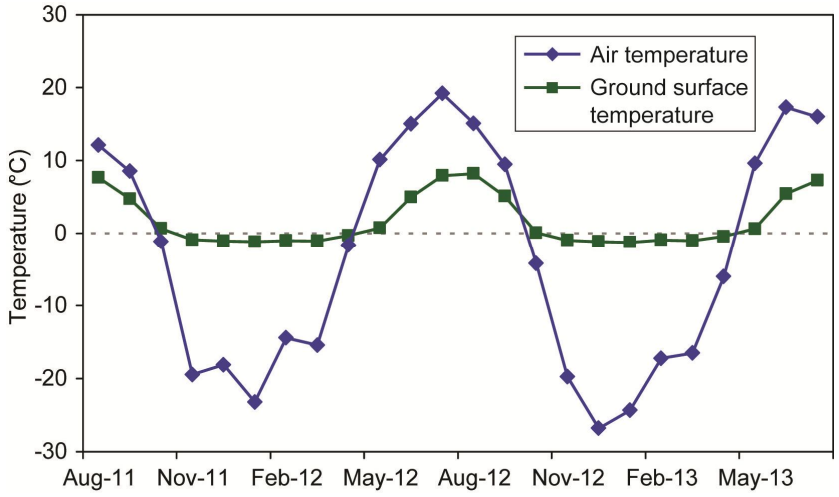
Aug 2011 – Jul 2012		
Depth (m)	Max (°C)	Min (°C)
0.5	6.39	-1.91
1	2.42	-0.04
2	0.06	-0.03
4	-0.08	-0.11
6	-0.09	-0.13
9	-0.01	-0.12
12	0.52	0.38
14	0.68	0.55

Aug 2012 – Jul 2013		
Depth (m)	Max (°C)	Min (°C)
0.5	6.56	-1.36
1	1.81	-0.04
2	0.10	-0.03
4	-0.10	-0.10
6	-0.12	-0.13
9	-0.12	-0.12
12	0.38	0.38
14	0.55	0.55

Open Black Spruce — 99TC3

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	12.10	7.64
Sept / 2011	8.52	4.76
Oct / 2011	-1.14	0.63
Nov / 2011	-19.46	-0.91
Dec / 2011	-18.12	-1.07
Jan / 2012	-23.22	-1.20
Feb / 2012	-14.42	-1.02
Mar / 2012	-15.42	-1.06
Apr / 2012	-1.65	-0.31
May / 2012	10.10	0.73
Jun / 2012	15.04	4.99
Jul / 2012	19.19	7.94

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	15.10	8.21
Sept / 2012	9.45	5.10
Oct / 2012	-4.19	0.07
Nov / 2012	-19.74	-0.99
Dec / 2012	-26.82	-1.18
Jan / 2013	-24.35	-1.25
Feb / 2013	-17.24	-0.93
Mar / 2013	-16.52	-1.02
Apr / 2013	-6.04	-0.45
May / 2013	9.59	0.61
Jun / 2013	17.30	5.44
Jul / 2013	16.00	7.28



Liard Spruce — 97TC4

Deh cho Settlement Region

Latitude: 61.55 N Longitude: 121.39 W
Elevation: 180 m a.s.l.
Landform: Surface of glaciolacustrine delta, late glacial (>10Ka)
Vegetation cover: Boreal, wetland shrub and sedge
Thaw Depth: 4.70 m for 2012, 4.68 m for 2013
Site visit: August 13, 2013

Aug 2011 – Jul 2012		
Depth (m)	Max (°C)	Min (°C)
0.25	13.82	-7.59
0.75	4.50	-0.38
1.25	2.73	-0.15
1.75	1.89	-0.12
2.75	0.72	-0.10
4.75	-0.02	-0.03
6.75	-0.04	-0.06
9.75	0.04	-0.01

Aug 2012 – Jul 2013		
Depth (m)	Max (°C)	Min (°C)
0.25	15.18	-8.57
0.75	4.07	-0.56
1.25	2.07	-0.18
1.75	1.33	-0.13
2.75	0.50	-0.10
4.75	-0.02	-0.02
6.75	-0.04	-0.05
9.75	-0.01	-0.06

Liard Spruce — 97TC4

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	n/a	13.07
Sept / 2011	n/a	7.22
Oct / 2011	n/a	1.17
Nov / 2011	n/a	-2.58
Dec / 2011	n/a	-2.90
Jan / 2012	n/a	-4.17
Feb / 2012	n/a	-3.47
Mar / 2012	n/a	-3.60
Apr / 2012	n/a	-0.49
May / 2012	n/a	4.44
Jun / 2012	n/a	10.07
Jul / 2012	n/a	12.52

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2012	n/a	11.14
Sept / 2012	n/a	6.77
Oct / 2012	n/a	0.09
Nov / 2012	n/a	-2.48
Dec / 2012	n/a	-2.75
Jan / 2013	n/a	-2.65
Feb / 2013	n/a	-1.95
Mar / 2013	n/a	-2.20
Apr / 2013	n/a	-0.81
May / 2013	n/a	4.05
Jun / 2013	n/a	10.73
Jul / 2013	n/a	11.29