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**Report on 2017 field activities and collection of
ground-thermal and active-layer data in the
Mackenzie corridor, Northwest Territories**

S.L. Smith, J. Chartrand, and C. Duchesne

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ABSTRACT

This report presents a summary of field activities conducted in 2017 in the Mackenzie corridor Northwest Territories (NWT). Air temperature, ground-thermal and active-layer data acquired from permafrost monitoring sites visited in 2017 are provided in graphical and tabular format. Ground temperature records for the 2007-2017 period are also presented and indicate that permafrost is generally warming throughout the corridor and for a majority of sites, permafrost is currently warmer than the baseline established during the International Polar Year (2007-09). 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 improves the characterization of regional baseline ground-thermal conditions and can support development decisions in the Mackenzie corridor.

This report provides a summary of the field activities to collect air and ground temperature, and active-layer data during summer and fall 2017 in the Mackenzie corridor. Graphical and tabular summaries of data are provided. Since many of the ground-thermal monitoring sites were established in 2007, time series for selected sites are also provided to show the fluctuations in ground temperature over the 2007-2017 period. A summary of changes in active-layer thickness since 1991 is also provided.

A 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 Dehcho Settlement Regions were visited in either late July or late September 2017. The location and brief description of each site visited in 2017 are provided in Figures 1, 2 and 3 and in Table 1. 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 $\pm 0.01^\circ\text{C}$ and an accuracy of $\pm 0.1^\circ\text{C}$. Further details on the site establishment, site characteristics and instrumentation can be found in Smith et al. (2007, 2008b, 2009a and 2010a). At other sites, ground temperatures are only measured manually during site visits using a Fluke® Multimeter to measure thermistor resistance. Many of the sites were established in 2006-07 (e.g. Smith et al., 2009a; Wolfe et al., 2010) 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).

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). In late July 2017, sites in the Gwich'in, Inuvialuit and Dehcho regions were visited (Table 2, Figure 1 and 3). 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 2017 site visits therefore allows the determination of the active-layer thickness

for 2016. 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 (Tables 1 and 2). 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 as described by Taylor (2000) and Duchesne et al. (2014). Ground surface temperatures are recorded using similar data loggers but with an internal temperature sensor that is inserted 3 to 5 cm below the ground surface. The data loggers have a resolution of 0.5°C at -20°C and an accuracy ranging from 0.5°C at -20°C to 0.2°C at 0°C and record temperature every 3 hours.

Table 1. Thermal monitoring sites in the Inuvialuit, Gwich'in, Sahtu and Dehcho 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 2017
Inuvialuit	North Head Shore	90TT13	3	69.719	134.462	Thermokarst coastal plain	Tundra	Air / Ground	19/07/2017
Inuvialuit	Big Lake	Big Lake 1	n/a	69.389	134.963	Polygonal wetlands	Sedge	None	18/07/2017
Inuvialuit		Big Lake 2	n/a	69.389	134.965	Polygonal wetlands	Sedge	None	18/07/2017
Inuvialuit	Taglu	TAG04 Sedge	n/a	69.371	134.986	Point bar	Horsetail	None	18/07/2017
Inuvialuit		TAG04 SWIL	n/a	69.371	134.982	Point bar	Dwarf willow shrubs	None	18/07/2017
Inuvialuit		91TTC	15	69.368	134.958	Surface of Holocene Mackenzie delta	Low shrub tundra	Air / Ground	18/07/2017
Inuvialuit	Kumak	KUM02 SWIL	n/a	69.322	135.211	Point bar	Dwarf willow shrubs	None	18/07/2017
Inuvialuit		KUM02 TWIL	n/a	69.323	135.210	Point bar	Tall willow shrubs	None	18/07/2017
Inuvialuit	KC-07	KC-07	n/a	69.311	135.249	Tundra upland	Grass and moss tundra	None	18/07/2017
Inuvialuit	Dennis Lake T7	T7 Upland	n/a	69.308	134.538	Moraine uplands	Dwarf birch tundra with willow and alder shrubs	None	19/07/2017
Inuvialuit	Lousy Point Ridge	90TT05	n/a	69.219	134.285	Glaciofluvial ridge	Low shrub tundra	Air / Ground	19/07/2017
Inuvialuit	Lousy Point Low Terrace	90TT06	n/a	69.216	134.280	Glaciofluvial ridge	Low shrub tundra	None	19/07/2017
Inuvialuit	Yaya Lake low	90TT04	10	69.143	134.704	Ice contact complex	Shrub tundra	Air / Ground	19/07/2017
Inuvialuit	East Channel T6	T6 Upland	n/a	69.119	134.185	Moraine uplands	Dwarf birch tundra with willow and alder shrubs	None	19/07/2017
Inuvialuit	Parsons Lake T5	T5 Upland	n/a	68.958	133.838	Moraine uplands	Dwarf birch tundra with willow and alder shrubs	None	21/07/2017
Inuvialuit		T5 Slump	n/a	68.957	133.837	Thaw slump	Willow and alder shrubs	None	21/07/2017
Inuvialuit	Reindeer Station plateau	91TT12	152	68.689	134.111	Plateau surface, till plain	Shrub tundra	Air / Ground	21/07/2017

Table 1. (Continued)

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 2017
Inuvialuit	Reindeer Depot (Williams Island)	91TT13	5	68.683	134.145	Surface of bar in Mackenzie Delta	Riparian willow and alder shrub	Air / Ground	23/07/2017
Inuvialuit	Jimmy Creek Valley	JV-1 Bottom	n/a	68.626	133.632	Moraine uplands	Dwarf birch tundra with willow and alder shrubs	None	21/07/2017
Inuvialuit	Navy Channel	03TC01	5	68.415	133.794	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 / Ground	23/07/2017
Gwich'in	Norris Creek	NC-01	15	68.407	133.290	Thick organic material over moraine plain	Shrub tundra	None	21/07/2017
Gwich'in	Navy Road	01TC01	60	68.401	133.762	Fine grained colluvium sloping toward river, post glacial (~10Ka)	Taiga post fire succession, scattered birch and alder, open dwarf birch, heath ground cover	Ground	21/07/2017
Gwich'in	Inuvik Airport (trees)	01TC02	84	68.316	133.436	Fluted till plain, glacial (>10Ka)	Taiga open black spruce, heath ground cover	Ground	21/07/2017
Gwich'in	Inuvik Airport (bog)	12TC01	68	68.316	133.432	Bog between ridges on fluted till plain, glacial (>10Ka)	Taiga open bog, scattered shrub, heath ground cover (forest tundra)	Ground	21/07/2017
Gwich'in	Campbell Lake	CaL-01	115	68.243	133.094	Moraine plain	Peatland	None	21/07/2017
		CaL-02	118	68.243	133.096	Moraine plain	Cutline	None	21/07/2017
		CaL-03	118	68.244	133.096	Moraine plain	Black spruce forest	None	21/07/2017
Gwich'in	North Caribou Lake	NCL-01	209	68.148	132.933	Moraine plain	Peatland	None	21/07/2017
		NCL-02	217	68.147	132.932	Moraine plain	Stunted black spruce forest	None	21/07/2017
Gwich'in	Hill Lake	HL-01	229	67.989	132.491	Moraine plain	Tundra	None	21/07/2017
		HL-02	234	67.989	132.490	Moraine plain	Shrub tundra	None	21/07/2017

Table 1. (Continued)

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 2017
Gwich'in	Wood Bridge Lake	WBL-01	204	67.902	132.178	Alluvial plain	Black spruce forest	None	21/07/2017
Gwich'in	Rengleng River mouth	91TT14	8	67.795	134.126	Alluvial plain	Mixed spruce and hardwood forest	Air / Ground	22/07/2017
Sahtu	Jackfish Creek	JF-02	90	66.285	128.469	Eolian dune on moraine plain, well drained, elevated area	Black spruce forest and moss cover	None	21/07/2017
Sahtu	Fort Good Hope South	FGHS-01	134	66.202	128.486	Hummocky peatland	Dense shrub and open black spruce	Air	21/07/2017
		FGHS-02	134	66.209	128.496	Hummocky peatland	Peat plateau, lichen, open black spruce	None	21/07/2017
Sahtu	Snafu Creek	SC-01	100	66.002	128.351	Moraine plain	Peat bog, open black spruce forest, and lichen cover	None	21/09/2017
Sahtu	Chick Lake	CL-01	122	65.896	128.240	Moraine plain	Peat and organic soil with open black spruce forest and shrubs	None	21/09/2017
Sahtu	Gibson Lake	GL-01	228	65.747	127.888	Hummocky moraine plain	Recovering burnt area with peat and shrubs	Ground	21/09/2017
Sahtu	Hanna River	HR-01	104	65.670	127.834	Lacustrine plain	Boggy burnt area	None	21/09/2017
Sahtu	Elliot Creek	EC-01	54	65.520	127.621	Lacustrine undulating plain, well drained elevated area	Peat cover on edge of open, mature black spruce forest	None	21/09/2017
		EC-02	54	65.523	127.622	Lacustrine plain overlain by alluvial sediments	Peat cover on edge of dense, mature black spruce forest	None	21/09/2017
Sahtu	Oscar Creek	OC-01	64	65.437	127.438	Undulating glaciolacustrine terrain overlain by alluvial sediments	Peat cover with dense-forested birch and black spruce	None	21/09/2017
Sahtu	Billy Creek North	BCN-01	90	65.403	127.318	Alluvial and eolian sediments overlying low-lying lacustrine plain	Peat cover with dense-forested black spruce and mixed shrub	None	21/09/2017

Table 1. (Continued)

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 2017
Sahtu	Kee Scarp	Kee Scarp-HT	270	65.308	126.720	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	23/09/2017
Sahtu	Norman Wells Pump Station	84-1-T4	61	65.290	126.885	Ground moraine	Moss, lichen, ericaceous shrubs with black spruce and tamarack	Air / Ground	23/09/2017
Sahtu	Normal Wells Town	Arena	80	65.281	126.837	Ground moraine	Disturbed area adjacent to parking lot	None	21/09/2017
		Water treatment plant	80	65.282	126.833	Ground Moraine	Disturbed area adjacent to parking lot	None	21/09/2017
Sahtu	Van Everdingen	30m	n/a	65.273	126.754	Lacustrine plain	Open forest, moss, shrub, spruce/tamarack	Air / Ground	23/09/2017
Sahtu	Canyon Creek North A	84-2A-HT	110	65.234	126.526	Ground moraine	Lichen, moss, ericaceous shrubs with black spruce and tamarack	None	21/09/2017
		84-2A-T4	110	65.234	126.526	Ground moraine	Lichen, moss, ericaceous shrubs with black spruce and tamarack	None	21/09/2017
Sahtu	Canyon Creek North B	84-2B-T4	110	65.232	126.520	Ground moraine	Moss with white spruce	Ground	21/09/2017
Sahtu	Vermillion Creek	VC-01	92	65.098	126.137	Moraine plain	NW side of creek, on top of ridge in black spruce forest	Air	22/09/2017
		VC-02	92	65.095	126.127	Moraine plain	SE side of creek on plateau in area of burnt black spruce	None	22/09/2017
Sahtu	Police Island	PI-01	113	64.836	125.015	Lacustrine plain	Recovering burn (burnt black spruce forest)	None	22/09/2017
		PI-02	113	64.835	125.014	Lacustrine plain	Unburnt, black spruce forest with moss and lichen ground cover	None	22/09/2017

Table 1. (Continued)

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 2017
Sahtu	Old Fort Point	OFP-01	112	64.654	124.838	Lacustrine plain	Open mixed spruce, pine deciduous forest adjacent to open, low-lying fen	None	22/09/2017
Sahtu	Little Smith Creek	LS-01	80	64.433	124.740	Alluvial flood plain	Open mature black spruce forest	None	22/09/2017
		LS-02	112	64.429	124.733	Glaciofluvial outwash plain	Tamarack, birch, poplar, and pine forest transition to spruce	None	22/09/2017
Sahtu	Saline River	SR-02	140	64.290	124.485	Glaciofluvial veneer over lacustrine	Burnt black spruce forest	Air	22/09/2017
Sahtu	Steep Creek	Steep-02 (crest)	134	64.185	124.370	Alluvial and colluvial, north facing slope of stream valley (site at edge of cleared right-of-way)	Mixed, white spruce, jackpine, aspen, birch	None	22/09/2017
Dehcho	Table Mountain A	85-7A-HA108	255	63.613	123.645	Ground moraine	Lichen, moss, ericaceous shrubs with black spruce and alder	None	22/09/2017
Dehcho	KP313	KP313 T2	250	63.262	123.425	Lacustrine plain, bottom of slope	Moss cover and peat, forested, mix of birch and spruce	Ground	22/09/2017
		KP313 T4	250	63.262	123.425	Lacustrine plain, mid slope, W side of ROW	Moss cover and peat, forested, mix of birch and spruce	None	22/09/2017
		KP313 T5	250	63.262	123.425	Lacustrine plain, mid slope, E side of ROW	Moss cover and peat, forested, mix of birch and spruce	None	22/09/2017
		KP313 T6	250	63.262	123.425	Lacustrine plain, top of slope	Thin moss and organic cover, forested, mix of birch and spruce	Air	22/09/2017
Dehcho	River Between Two Mountains	RBTM-01	120	62.949	123.205	Transition lacustrine to alluvial to moraine terrain	Dense black spruce forest	None	30/07/2017

Table 1. (Continued)

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 2017
Dehcho	River Between Two Mountains	RBTM-02	150	62.933	123.180	Transition lacustrine to alluvial to moraine terrain	Dense black spruce forest	None	30/07/2017
Dehcho	Willowlake River	WLR-01	122	62.715	123.084	Alluvial fan	Open mixed forest	None	30/07/2017
Dehcho	Wrigley Peatland	99TC04	n/a	62.275	122.603	Organic terrain on till plain, post glacial (>10Ka)	Boreal burn, scattered small spruce, pine and aspen, heath ground cover	Ground	30/07/2017
Dehcho	Fort Simpson bog low	99TC02	165	61.976	121.878	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	29/07/2017
Dehcho	Aspen (Wrigley Highway)	97TC01	165	61.953	121.761	Surface of glaciolacustrine delta, post glacial (>10Ka)	Boreal, aspen grove (deciduous forest)	Air / Ground	29/07/2017
Dehcho	Mature Black Spruce (Wrigley highway)	97TC02	165	61.916	121.712	Surface of glaciolacustrine delta, post glacial (>10Ka)	Boreal, black spruce (coniferous forest)	Air / Ground	29/07/2017
Dehcho	Harris River	HAR-01	146	61.877	121.290	Moraine	Predominantly birch	None	28/07/2017
Dehcho	Manners Sources	MS-02 (Crest)	182	61.625	121.104	Eolian dune crest	Pine forest	None	28/07/2017
Dehcho	Jean-Marie Creek	JMC-01	198	61.440	120.948	Transition alluvial flood plain to organic (fen) over lacustrine plain	Poorly drained shrub fen	None	28/07/2017
Dehcho	Jean-Marie Creek	JMC-02	198	61.439	120.948	Transition alluvial flood plain to organic (fen) over lacustrine plain	Sandy ridge with spruce, pine forest	None	28/07/2017
Dehcho	Pump Station 3	85-9-T4	223	61.397	120.904	Lacustrine veneer over ground moraine (unfrozen granular)	Open black spruce, ericaceous shrubs, moss-lichen woodland	Air / Ground	28/07/2017
Dehcho	Jean Marie Creek A	85-12A-T4	300	61.193	120.708	Ground moraine	Open black spruce, ericaceous shrubs, moss-lichen woodland (peat plateau)	None	28/07/2017

Table 1. (Continued)

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 2017
Dehcho	Trout River	Trout R	350	61.018	120.588	Organic terrain	Peatland with scattered spruce and sphagnum ground cover	None	28/07/2017
Dehcho	Trout Road Crossing	TRC	420	60.834	120.485	Bog-dominated moraine plain	Dry peatland vegetation consisting of black spruce, tamarack, and feathermoss	None	28/07/2017
Dehcho	Petitot River North B	84-5B-T4	552	59.757	119.514	Ground moraine	Recovering burn (burned 2004), originally stunted black spruce, ericaceous shrubs, moss woodland (peat plateau)	Air / Ground	28/07/2017
Dehcho	Petitot River North A	84-5A-T4	552	59.759	119.516	Ground moraine	Recovering burn (burned 2004), originally stunted black spruce, ericaceous shrubs, moss woodland (peat plateau)	None	28/07/2017

Table 2. Active-layer and air/ground surface temperature monitoring sites throughout the corridor. Active-layer thickness for 2016 determined from thaw tubes at active-layer monitoring sites are provided.

Note: Probed thaw depths (where indicated in table) are taken on day of visit and are for the 2017 thaw season. Probed active-layer values at ground temperature sites are presented in Appendix A. (*) Indicate maximum active-layer thickness occurring over 2 years.

Site name	Site ID	Latitude (°N)	Longitude (°W)	2016 Active layer (m)	Air / ground surface temperature	Date visited
North Head shore	90TT13	69.719	134.462	0.57	Ground	18/07/2017
North Point summit	90TT02	69.663	134.385	0.54	None	19/07/2017
North Point mid-slope	90TT11	69.659	134.384	0.69	None	19/07/2017
North Point shore	90TT12	69.656	134.371	0.49	None	19/07/2017
Mason Bay high	90TT08	69.528	134.025	0.75	None	19/07/2017
Mason Bay shore	90TT09	69.530	134.014	0.66	None	19/07/2017
Illasarvik	94TT01	69.483	134.566	0.61	None	19/07/2017
Harry Channel mouth	91TTA	69.478	134.832	0.84 *	None	18/07/2017
Kendall Island Meadow	91TTF	69.444	135.342	1.37 *	None	18/07/2017
Taglu	91TTC	69.368	134.958	>1.30 (probe)	Air / Ground	18/07/2017
Lousy Point hollow	91TT09	69.217	134.301	0.32	None	19/07/2017
Lousy Point ridge	90TT05	69.219	134.285	0.77	Air / Ground	19/07/2017
Lousy Point low terrace	90TT06	69.216	134.280	0.47	Air / Ground	19/07/2017
YaYa Lake high	90TT03	69.146	134.713	1.11 (probe)	None	18/07/2017
YaYa Lake low	90TT04	69.143	134.704	0.90	Air / Ground	18/07/2017
Swimming Point slope	91TT01	69.108	134.399	0.60	None	19/07/2017
Trail Valley Creek	91TT11	68.736	133.494	0.66	None	21/07/2017
Reindeer Station plateau	91TT12	68.689	134.111	0.72	Air / Ground	21/07/2017
Williams Island	91TT13	68.683	134.145	1.51	Air / Ground	23/07/2017
Navy Channel	90TT17	68.417	133.787	1.79	Air / Ground	23/07/2017
Inuvik Airport	01TT02	68.316	133.432	1.15	None	21/07/2017
Upper Air	90TT16	68.317	133.531	0.76	None	21/07/2017
Havikpak Creek	93TT02	68.319	133.518	0.74	None	21/07/2017
Caribou Creek	93TT01	68.110	133.477	0.78	None	20/07/2017
Rengleng River mouth	91TT14	67.795	134.126	1.12	Air / Ground	22/07/2017
Arctic Red	92TT03	67.496	133.766	1.17	None	20/07/2017
Willowlake River	92TT07	62.697	123.065	0.91 *	Air / Ground	30/07/2017
River Between Two Mountains	92TT08	62.958	123.209	0.82 *	Air / Ground	30/07/2017
Boundary Creek ridge	11TT01	62.528	114.959	1.22	None	26/07/2017
Boundary Creek peat	11TT02	62.528	114.960	0.45	None	26/07/2017

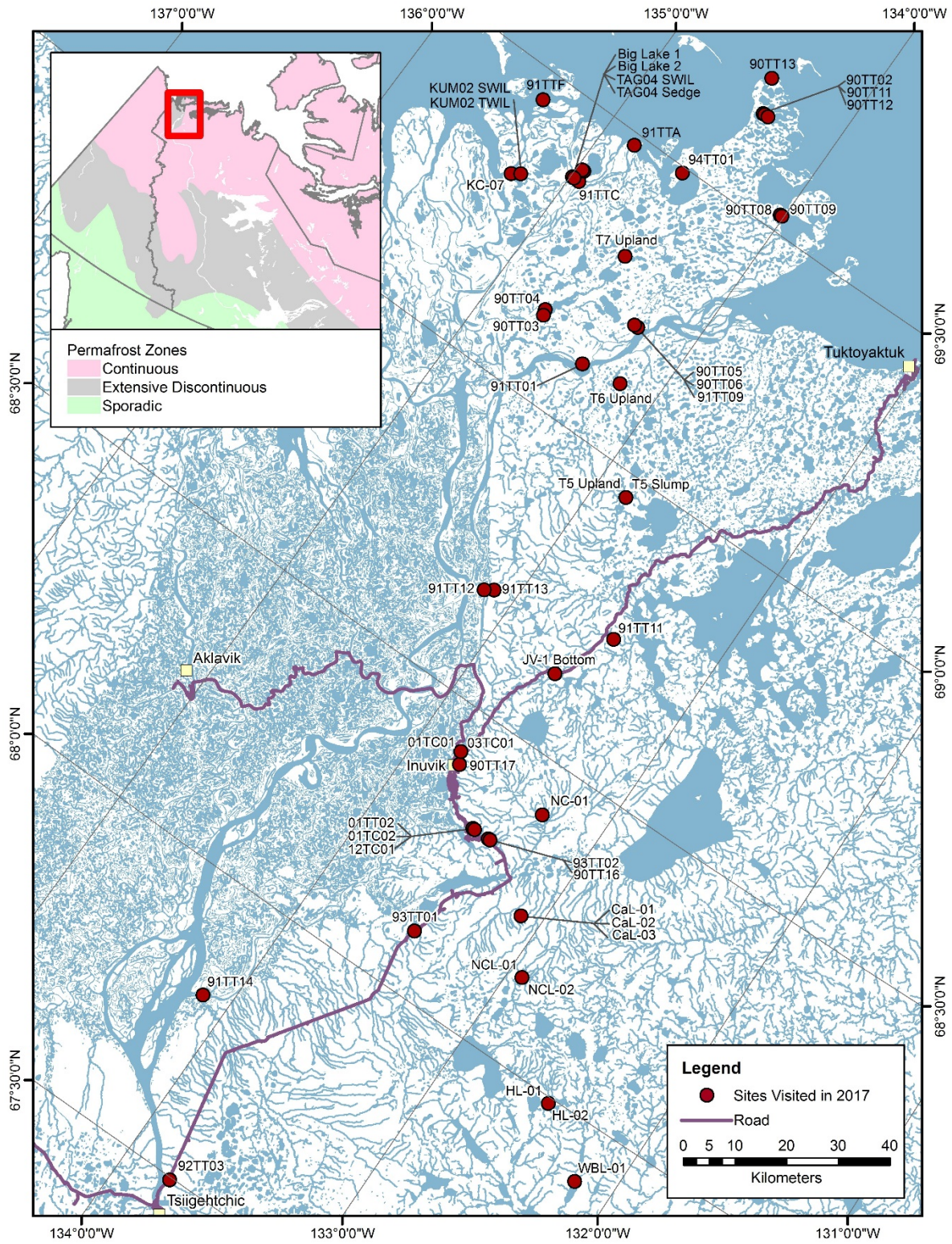


Figure 1. Permafrost and active-layer monitoring sites north and south of Inuvik, visited in 2017.

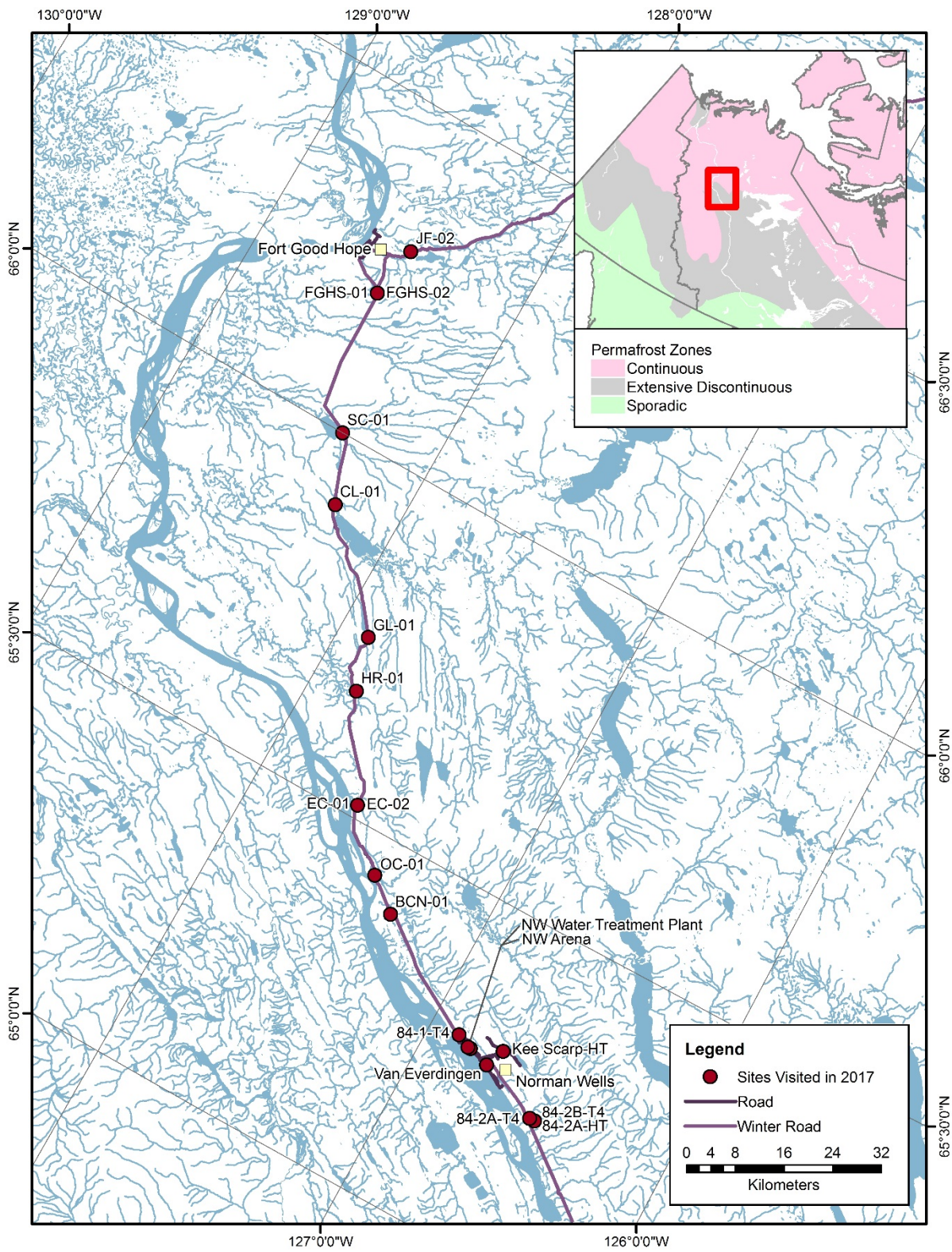


Figure 2. Permafrost monitoring sites between Fort Good Hope and Norman Wells in the Sahtu Settlement Region, visited in 2017.

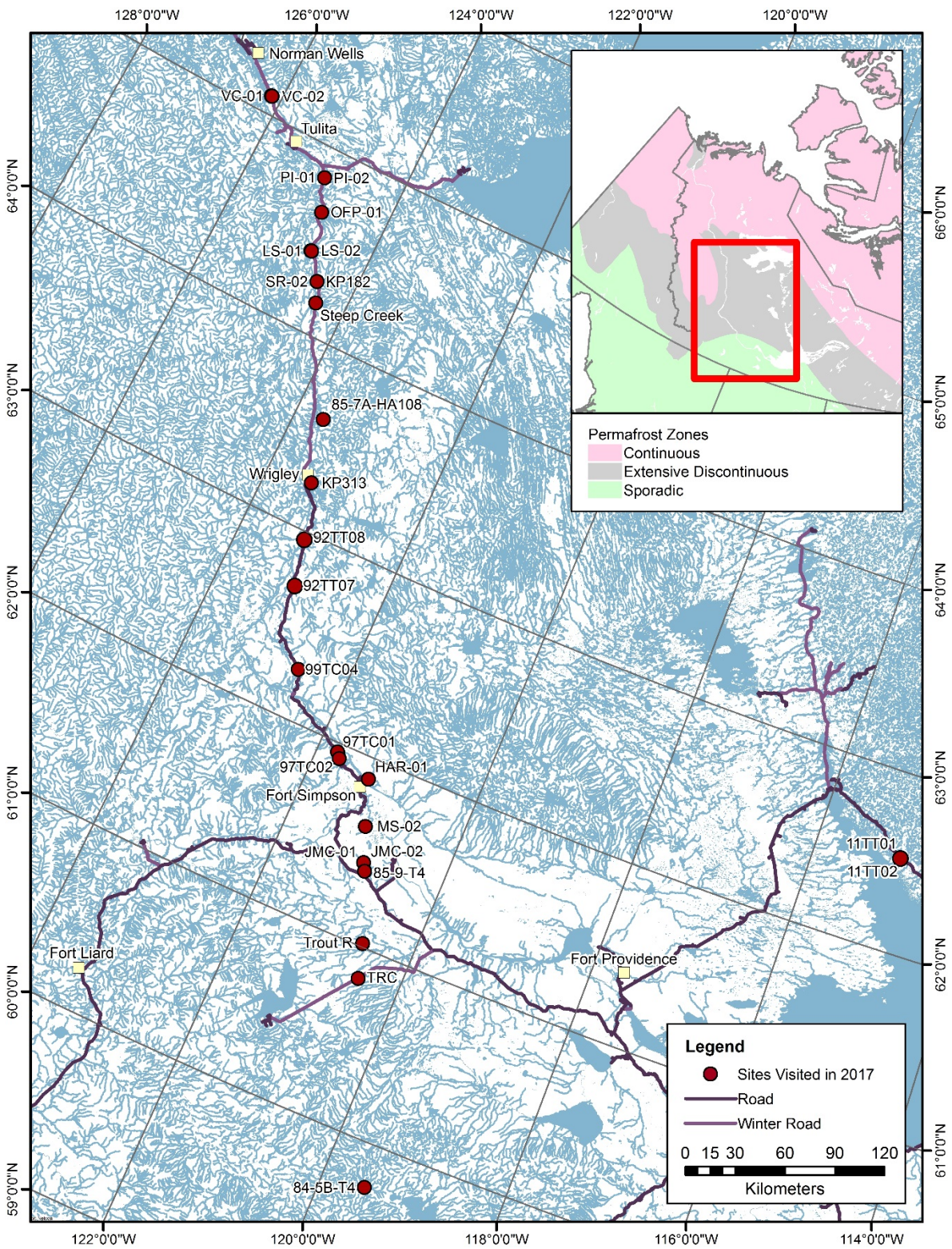


Figure 3. Permafrost and active-layer monitoring sites south of Norman Wells in the Sahtu and Dehcho Settlement Regions, visited in 2017.

3. DATA COLLECTION AND PRESENTATION

Sites were visited in late July and late September 2017 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 data record acquired for each site was analyzed to determine the annual minimum and maximum temperature at each depth and to define the annual ground temperature envelope for the 2016-17 period. Temperature envelopes are presented in graphical and tabular format for each site in Appendix A. The maximum thaw depth for each site was determined 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 were summarized in earlier annual reports (e.g. Smith et al., 2017).

For sites without data loggers, data acquired from manual measurements made during site visits are presented in Appendix A. Manually measured data are also provided for sites where a continuous temperature record was not available due to equipment malfunction.

Mean annual ground temperature (MAGT) for each site was determined at the depth of zero annual amplitude (ZAA). For practical purposes the ZAA depth is defined as the depth where seasonal variation is less than 0.1°C. For sites where the temperature cable extends below this depth, the MAGT was determined for the depth of the shallowest sensor for which the seasonal variation is less than 0.1°C. For sites with cables shallower than the ZAA depth, MAGT at the deepest measurement depth was used. The MAGT for the 2016-17 period is summarized in Figure 4. Colder permafrost is found in the northern portion of the corridor with MAGT below -4°C at many sites. However, warmer permafrost can be found at northern sites close to water bodies or with deep snow cover (e.g. Burn and Kokelj, 2009; Smith et al., 2010b). Warmer permafrost is found in the discontinuous permafrost zone with MAGT generally above -2°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. The air and ground surface temperature data collected prior to 2017 are summarized in Duchesne et al. (2014) as well as previous annual reports (e.g. Smith et al., 2017).

The 2016 active-layer thickness data determined from thaw tubes are presented in Table 2 for all active-layer monitoring sites that were visited in late July 2017. Previous data have been summarized elsewhere (e.g. Duchesne et al., 2015a,b; Smith et al., 2009b, 2017). Some of the thaw tube sites visited in 2017, particularly those in the southern portion of the corridor, were not visited in 2016. The value presented in Table 2 therefore is the maximum active-layer thickness occurring over the two year period.

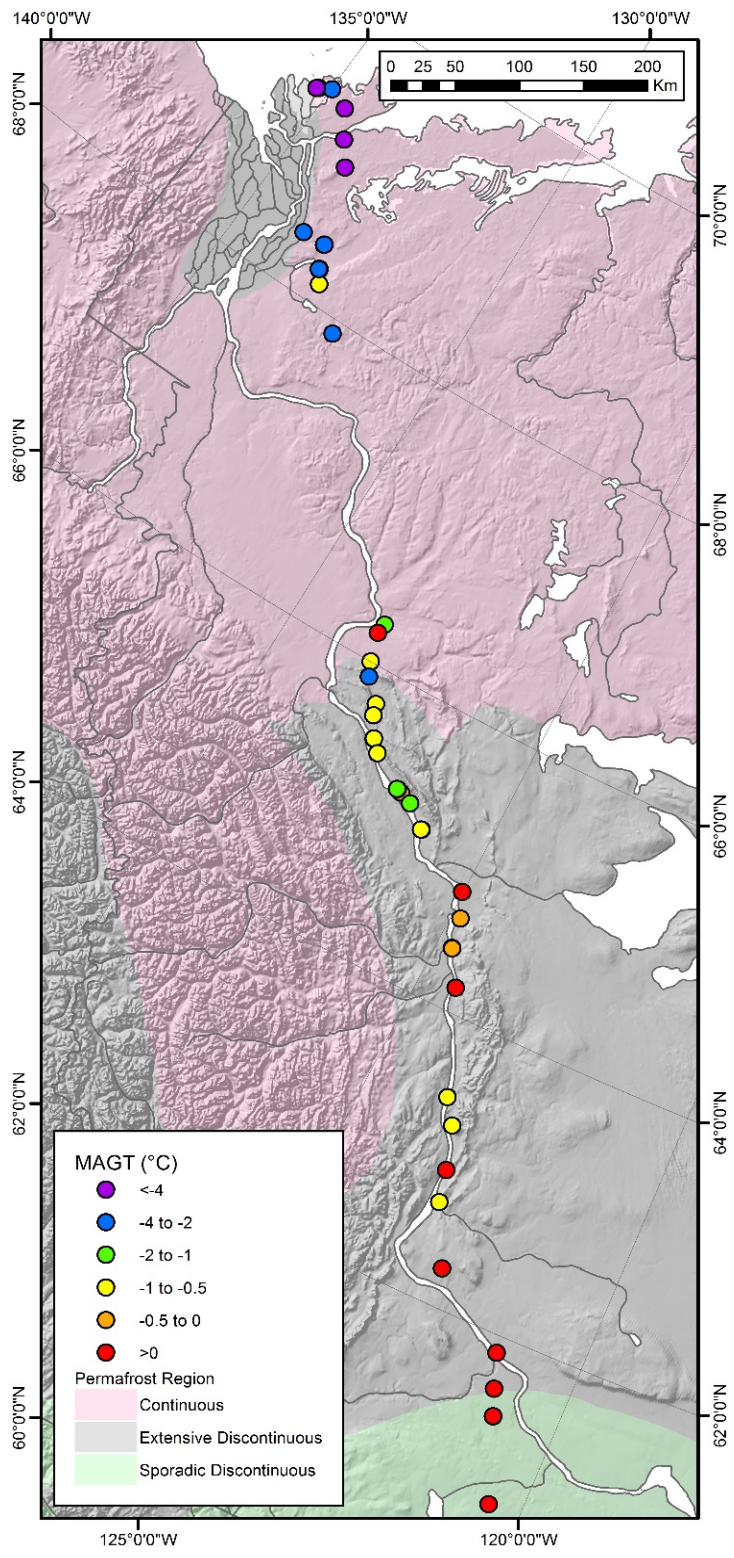


Figure 4. Current (2016-17) MAGT for the Mackenzie corridor based on temperature at ZAA depth or the measurement depth closest to it.

4. CHANGES OVER TIME

4.1 Changes in Ground Temperatures 2007-2017

Many of the monitoring sites were established in 2007 and data are now available for about ten full years. Although data records are too short to assess any long-term trends in ground temperatures, they can be used to characterize recent temperature fluctuations and the range in ground temperature that may occur at an individual site.

MAGTs from 2007 to 2017 are reported from the depth of ZAA or nearest sensor. Temperatures at the ZAA depth are desirable for tracking long-term trends whereas temperatures at shallower depths will reflect shorter term fluctuations. For sites with data loggers, the annual period for MAGT calculation is either September 1 to August 31 or August 1 to July 31 depending on the schedule for the site visit and data acquisition for the sites. For sites where only manual measurements are available the temperature recorded during site visit at previously determined ZAA depths is used as the MAGT. Time series for selected permafrost sites in the continuous and discontinuous permafrost regions (Figure 5 and 6) are discussed below.

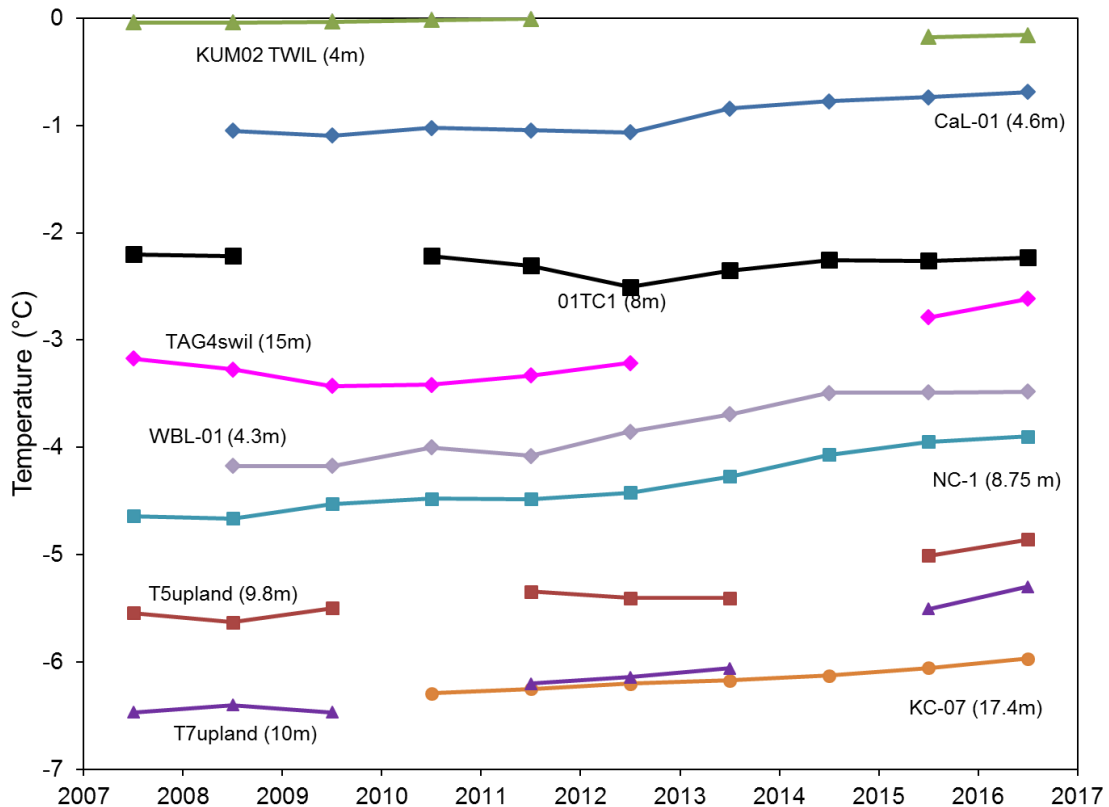


Figure 5. MAGT at measurement depth at or closest to ZAA depth for selected permafrost sites in the continuous permafrost zone.

Analysis of data collected in the continuous permafrost zone indicates that at most sites permafrost has been warming at rates as high as 0.1°C per year (Figure 5). However, at some of the warmer permafrost sites, (e.g. KUM02 TWIL, 01TC1), little warming or even slight cooling has occurred. An increase in the rate of warming at some sites since about 2011 may be associated with a period of higher air temperature since 2010 (Figure 7). It should also be noted that the measurement depths for some of the sites south of Inuvik (NC-01, WBL-01) is shallower than that for most of the more northerly sites, and also above the ZAA depth, which is part of the reason the change in ground temperature is greater for these sites.

The change in MAGT in warmer permafrost in the discontinuous zone has generally been less than that for the colder permafrost sites. MAGT, over the last decade has increased by up to $0.03^{\circ}\text{C}\text{y}^{-1}$ at sites between Norman Wells and Fort Good Hope and by less than $0.02^{\circ}\text{C}\text{y}^{-1}$ at sites south of Norman Wells (Figure 6). These changes in MAGT are in agreement with those acquired from longer records for the central Mackenzie Valley (see Smith et al. 2015; Romanovsky et al., 2018) which indicate permafrost has been warming since the mid 1980s. The increase in MAGT since 2010 at some sites (Figure 6) may be the result of higher air temperatures in the last 6 years compared to those between 2007 and 2009 (Figure 7).

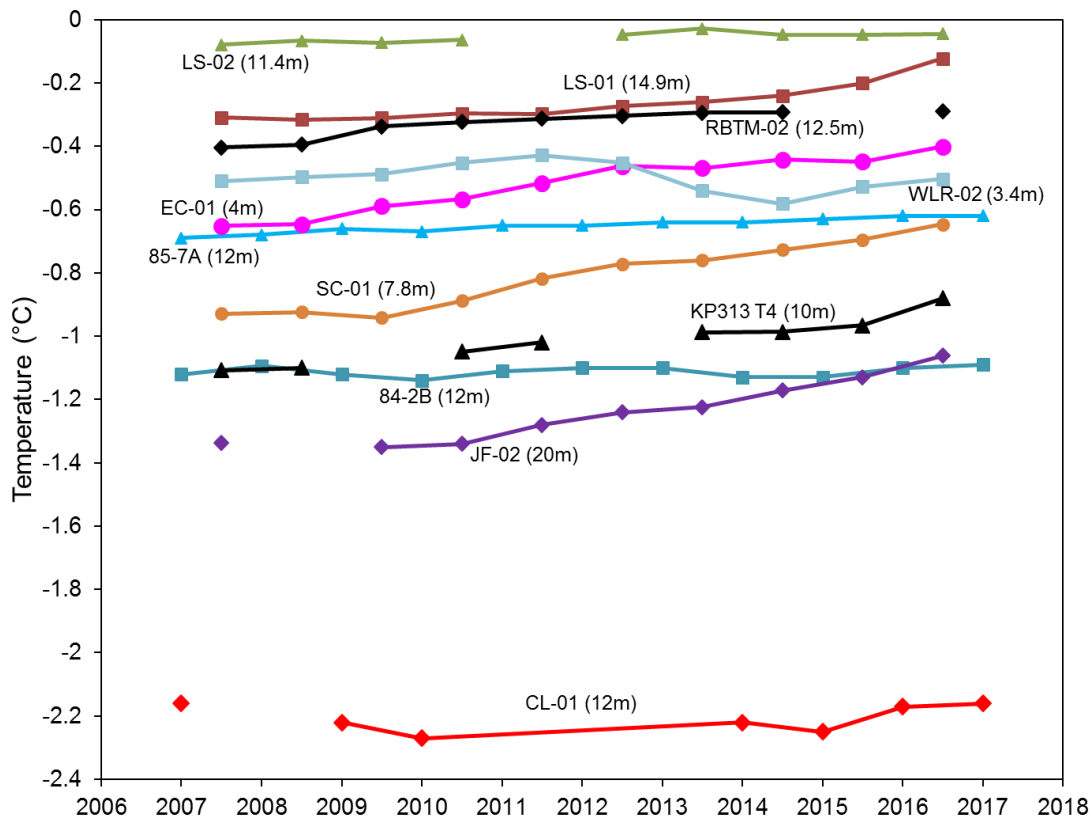


Figure 6. MAGT at the measurement at or closest to ZAA depth for selected permafrost sites in the discontinuous permafrost zone.

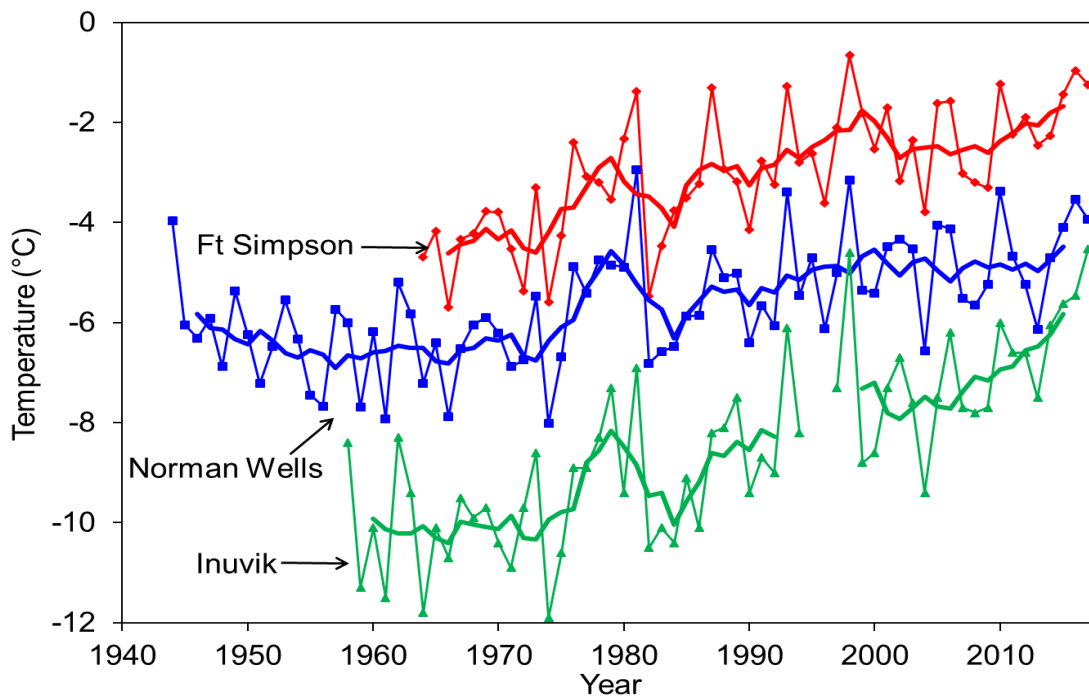


Figure 7. Mean annual air temperature for weather stations in the Mackenzie Valley (data from Environment Canada <http://climate.weather.gc.ca/>). The thick line represents the 5-year running mean.

Vegetation clearing also occurred in 2015 and 2016 at the edge of the winter road right-of-way to install a fibre optic cable. Complete removal of trees occurred at the base of the slope at Little Smith Creek (LS-01). MAGT at this site over the last two years has been higher than in 2014-15 and the warmer ground conditions may be the result of the site disturbance.

MAGT for selected non permafrost sites in the southern portion of the region are provided in figure 8. For most sites, MAGT was higher in 2016-17 compared to that at the start of the record. However, the measurement depth for most of these sites is shallower than the ZAA depth so there is still a significant amount of seasonal variation and there will be greater fluctuations in MAGT from year to year in response to fluctuations in air temperature (figure 8). There was a decrease in MAGT in 2014-15 at JMC-01 and the annual range in ground temperature appears to be smaller over that period. It is not clear if this is related to issues with the equipment or some other cause. This site is located in a poorly drained area and wetter conditions may have resulted in cooler summer ground conditions.

During the International Polar Year (IPY, 2007-09), a base line was established (Smith et al. 2010b). Overall MAGTs are currently higher than they were when most of the sites were established in 2007 and the IPY baseline (Figure 9). The difference between MAGT and the IPY baseline has generally been greater for colder permafrost sites or unfrozen sites. At some of the colder permafrost sites, the current MAGT is about 1°C higher than the IPY baseline. For warmer permafrost sites, especially where MAGT is close to 0°C and soils are ice rich, latent

heat effects associated with phase change result in very little change in ground temperature over the last decade (e.g. Bonnaventure et al., 2015; Smith et al., 2010b). At some very warm permafrost sites, permafrost has thawed at the measurement depth used for MAGT (Figure 9).

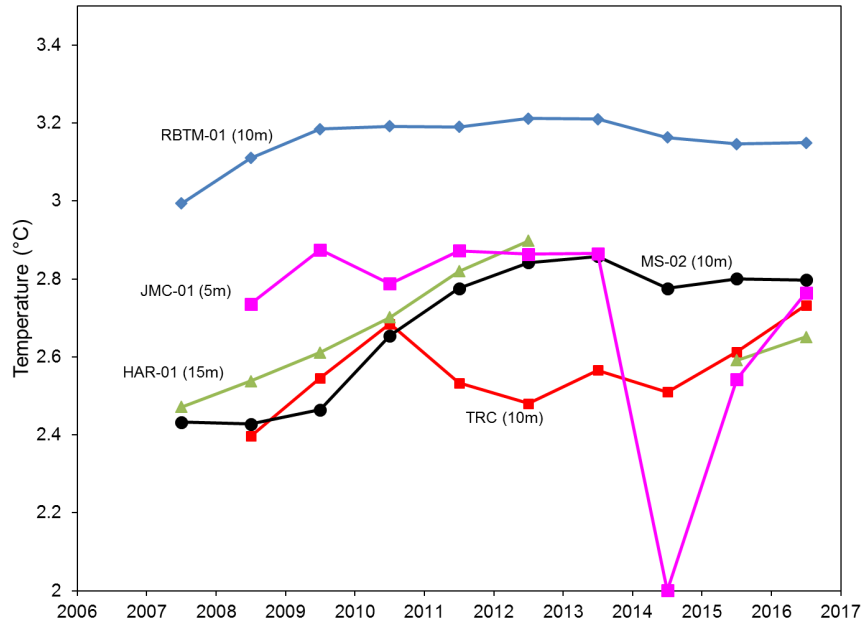


Figure 8. MAGT at the measurement depth closest to ZAA depth for selected non permafrost sites in the southern portion of the region.

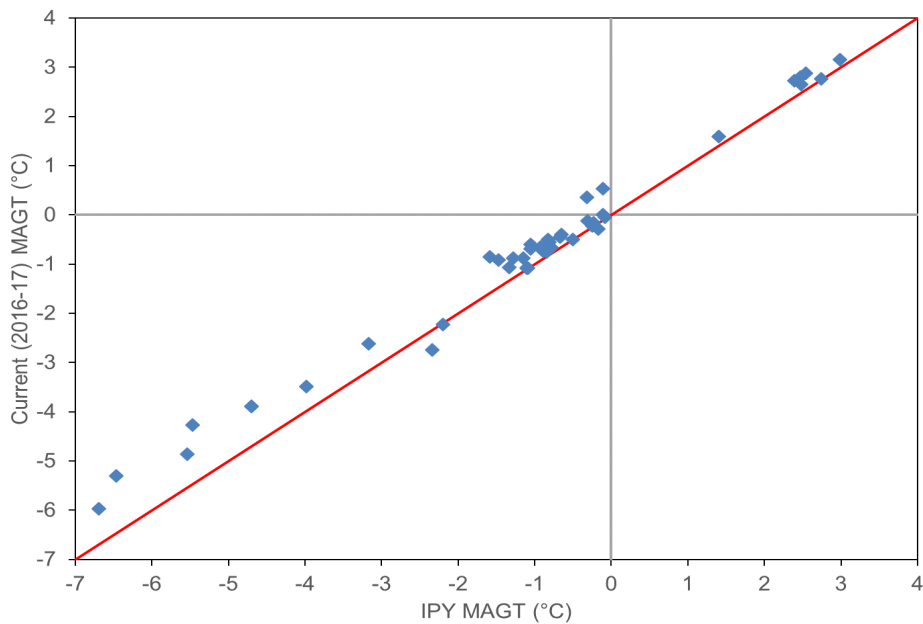


Figure 9. Comparison of current (2016-17) MAGT with IPY baseline for sites visited in 2017.

4.1 Changes in Active-layer Thickness

Active-layer thickness (ALT) exhibits much greater interannual variation than the deeper ground temperature measurements. The change in ALT, relative to the 10 year mean for 2003-12 is summarized for 25 sites in Figure 10. ALT has generally increased since 2008 and exceeded the long-term mean since 2009, reaching a peak in 2012, but still less than the maximum in 1998 which was one of the warmest years on record (Duchesne et al., 2015a). This recent increase in ALT is likely in response to warmer air temperatures over the last few years (Figure 7). ALT decreased slightly after 2012 and increased again after 2014. ALT in 2016 was generally greater than it was in both 2014 and 2015.

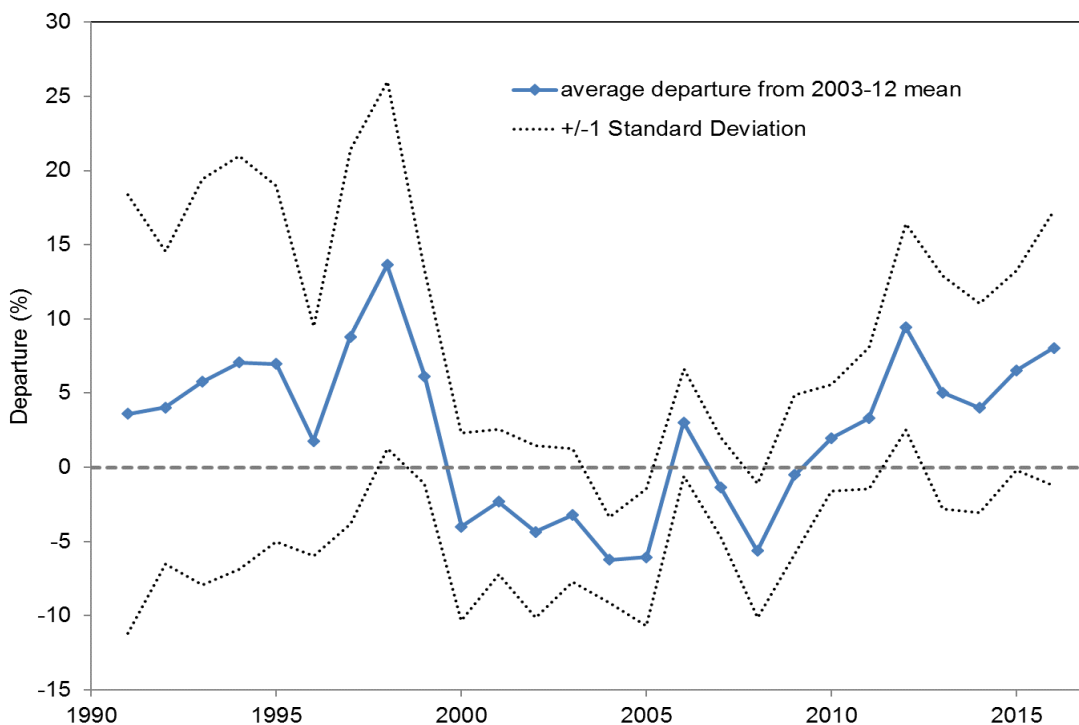


Figure 10. Mean ALT departures (%) from 2003-12 mean for 25 sites.

5. SUMMARY

This report provided a summary of field activities in the Mackenzie corridor during summer and fall 2017. A summary of the ground-thermal data collected at permafrost monitoring sites in August and September 2017 for the previous one-year period has been presented in graphical and tabular format. The 2016 active-layer thickness data for active-layer monitoring sites visited in 2017 were also provided. Existing time series were also provided and the results indicate that permafrost generally continues to warm at most sites in the corridor. 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.

6. ACKNOWLEDGEMENTS

Support for the 2017 field data collection was provided by Natural Resources Canada. Logistical support was provided by the Polar Continental Shelf Program and the Aurora Research Institute. We are also grateful for the continuing support for this project of the various community organizations and stakeholders in the region. We would like to thank Willie Modeste for his help with fieldwork.

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APPENDIX A

GRAPHICAL AND TABULAR PRESENTATION OF GROUND TEMPERATURE DATA FOR THE PERIOD 2016-17

The annual maximum (red line) and minimum (blue line) temperature profile, or ground temperature envelope, is provided for each site for which a continuous 2016-17 record of ground temperature is available. For sites that do not have a continuous record for 2016-17, the ground temperature profile based on a single manual measurement during the 2017 site visit (in July, August or September) is provided (green line). For sites not visited in 2015 or 2016 but visited in 2017, the ground temperature envelope for 2014-15, 2015-16 and 2016-17 is 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 2016-17 period (or 2014-17 period if site not visited in 2015 or 2016) is presented graphical and tables for each site where available.

North Head shore — 90TT13

Inuvialuit Settlement Region

Latitude: 69.719 N

Longitude: 134.462 W

Elevation: 3 m a.s.l.

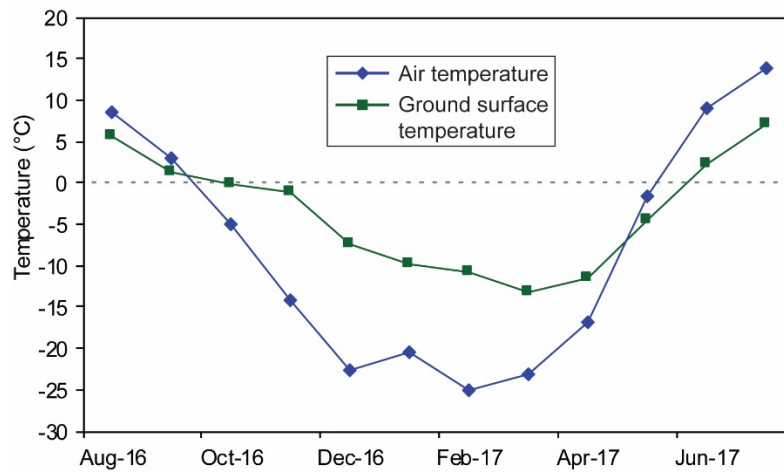
Landform: Thermokarst coastal plain

Vegetation cover: Tundra

Thaw Depth: 0.90 m (probed)

Site visit: July 18, 2017

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2016	8.45	5.54
Sept / 2016	3.04	1.21
Oct / 2016	-5.10	-0.27
Nov / 2016	-14.21	-1.21
Dec / 2016	-22.75	-7.45
Jan / 2017	-20.48	-9.72
Feb / 2017	-25.09	-10.70
Mar / 2017	-23.22	-13.24
Apr / 2017	-16.81	-11.41
May / 2017	-1.71	-4.62
Jun / 2017	9.06	2.34
Jul / 2017	13.91	7.12



Big Lake 2

Inuvialuit Settlement Region

Latitude: 69.389 N

Longitude: 134.965 W

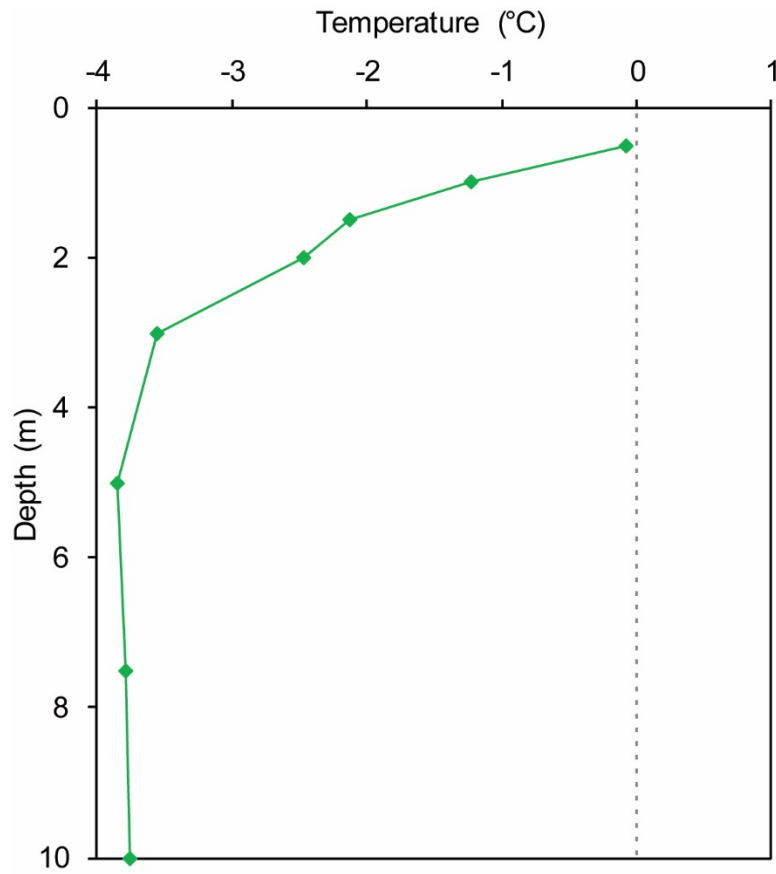
Elevation: n/a

Landform: Polygonal wetlands

Vegetation cover: Sedge

Thaw Depth: n/a

Site visit: July 18, 2017



Depth (m)	Temp (°C)
0.5	-0.08
1	-1.23
1.5	-2.12
2	-2.46
3	-3.56
5	-3.85
7.5	-3.79
10	-3.75

Taglu — TAG04 SWIL

Inuvialuit Settlement Region

Latitude: 69.371 N

Longitude: 134.982 W

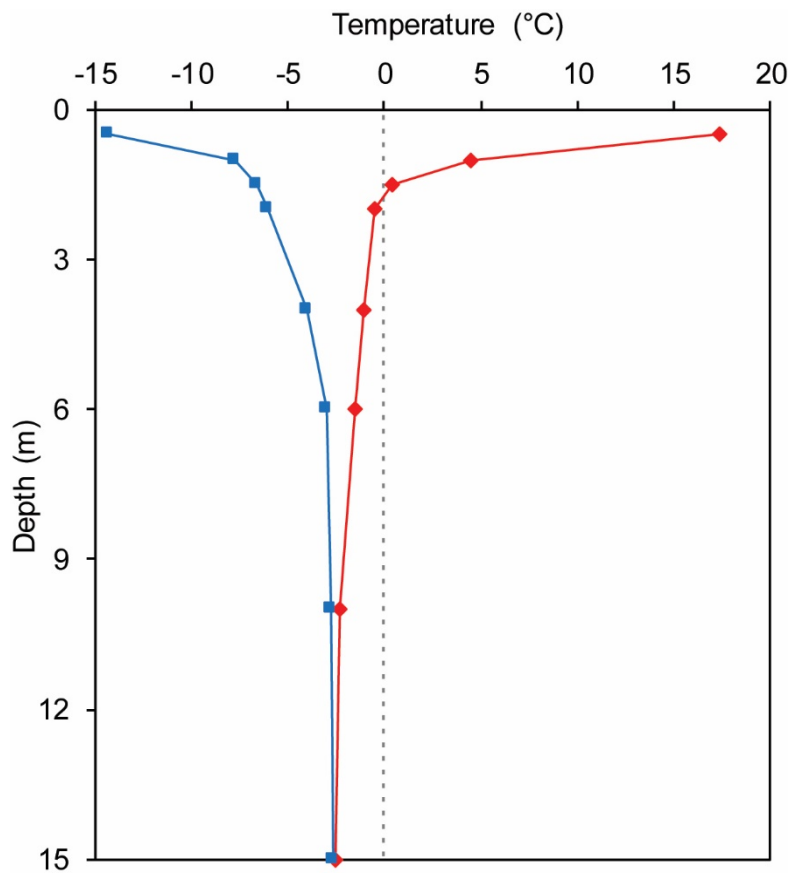
Elevation: n/a

Landform: Point Bar

Vegetation cover: Dwarf willow shrubs

Thaw Depth: 1.55 m

Site visit: July 18, 2017



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	17.34	-14.30
1	4.45	-7.77
1.5	0.41	-6.57
2	-0.46	-6.01
4	-1.06	-3.98
6	-1.55	-3.00
10	-2.28	-2.71
15	-2.54	-2.68

Taglu — 91TTC

Inuvialuit Settlement Region

Latitude: 69.368 N

Longitude: 134.958 W

Elevation: 15 m a.s.l.

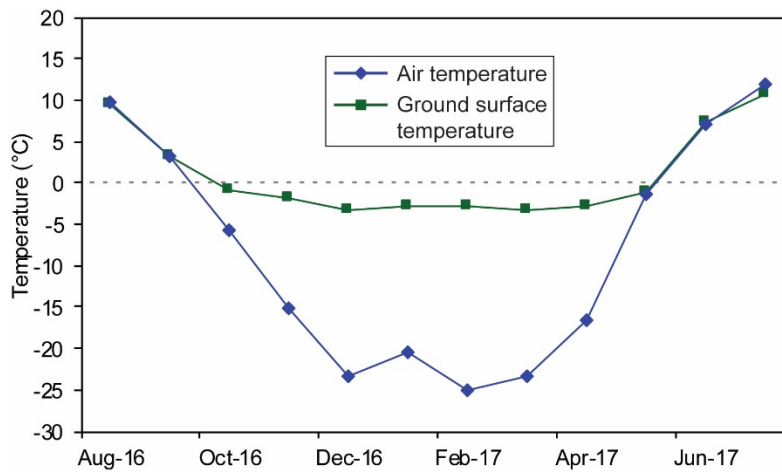
Landform: Surface of Holocene Mackenzie delta

Vegetation cover: Low shrub tundra

Thaw Depth: >1.30 m (probed)

Site visit: July 18, 2017

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2016	9.81	9.58
Sept / 2016	3.32	3.13
Oct / 2016	-5.68	-0.83
Nov / 2016	-15.11	-1.94
Dec / 2016	-23.46	-3.38
Jan / 2017	-20.45	-2.89
Feb / 2017	-24.96	-2.90
Mar / 2017	-23.46	-3.41
Apr / 2017	-16.62	-2.94
May / 2017	-1.43	-1.08
Jun / 2017	7.15	7.26
Jul / 2017	12.01	10.80



Kumak — KUM02 SWIL

Inuvialuit Settlement Region

Latitude: 69.322 N

Longitude: 135.211 W

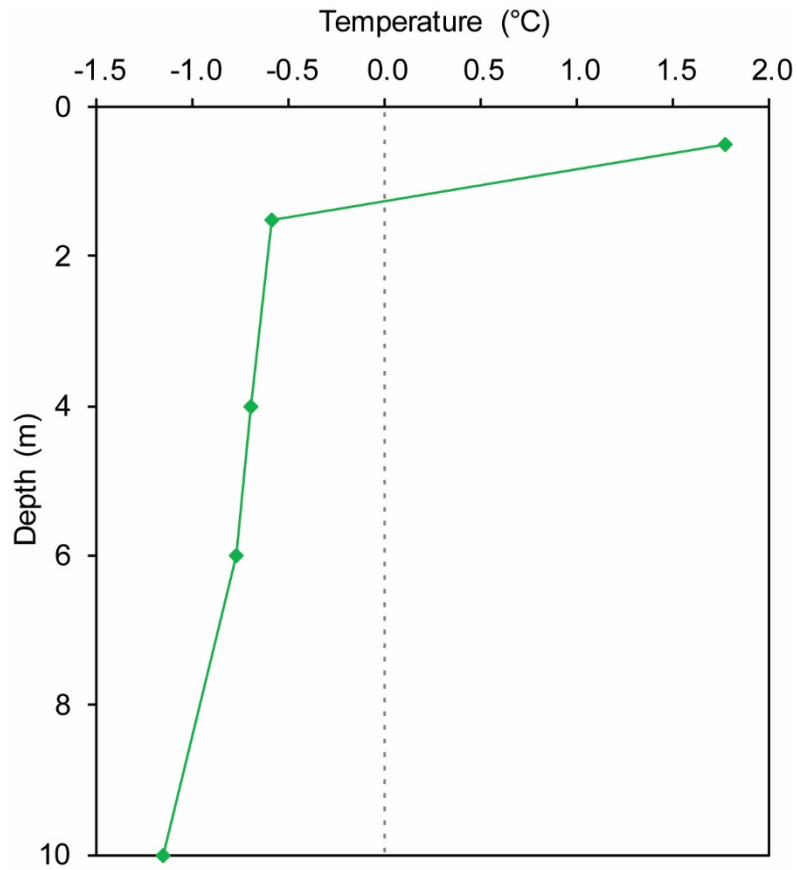
Elevation: n/a

Landform: Point bar

Vegetation cover: Dwarf willow shrubs

Thaw Depth: 1.25 m

Site visit: July 18, 2017



Depth (m)	Temp (°C)
0.5	1.77
1.5	-0.59
4	-0.7
6	-0.77
10	-1.16

Kumak — KUM02 TWIL

Inuvialuit Settlement Region

Latitude: 69.323 N

Longitude: 135.210 W

Elevation: n/a

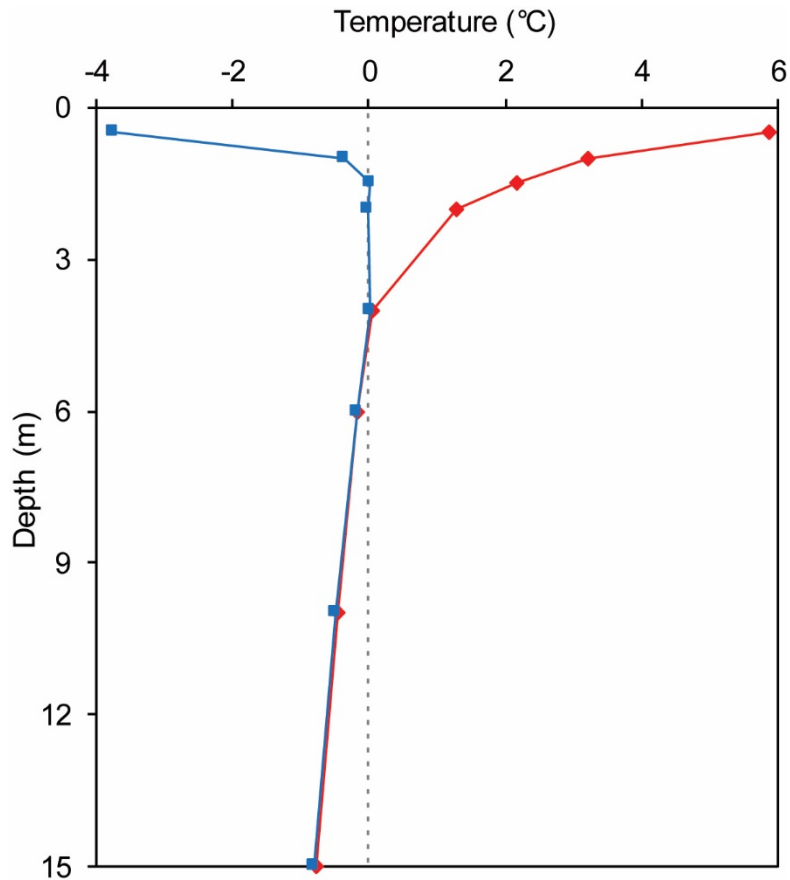
Landform: Point bar

Vegetation cover: Tall willow shrubs

Thaw Depth: 4.06 m

Site visit: July 18, 2017

Note: From 1.5 to 4.0 m minimum temperature likely $\sim 0^{\circ}\text{C}$ (within measurement error)



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	5.88	-3.74
1	3.21	-0.37
1.5	2.19	0.01
2	1.29	-0.03
4	0.04	0.03
6	-0.15	-0.17
10	-0.44	-0.50
15	-0.78	-0.79

KC-07

Inuvialuit Settlement Region

Latitude: 69.311 N

Longitude: 135.249 W

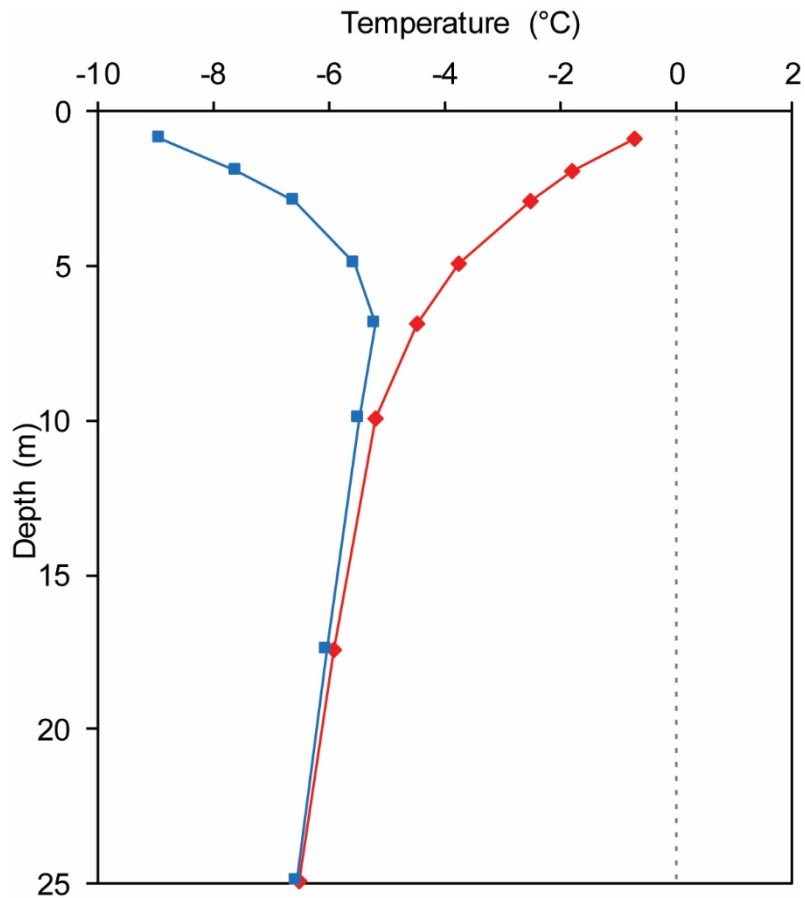
Elevation: n/a

Landform: Tundra upland

Vegetation cover: Grass and moss tundra

Thaw Depth: 0.38 m (probed)

Site visit: July 18, 2017



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.9	-0.74	-8.91
1.9	-1.81	-7.59
2.9	-2.53	-6.58
4.9	-3.76	-5.56
6.9	-4.45	-5.19
9.9	-5.18	-5.47
17.4	-5.92	-6.02
24.9	-6.52	-6.56

Dennis Lake — T7 Upland

Inuvialuit Settlement Region

Latitude: 69.308 N

Longitude: 134.538 W

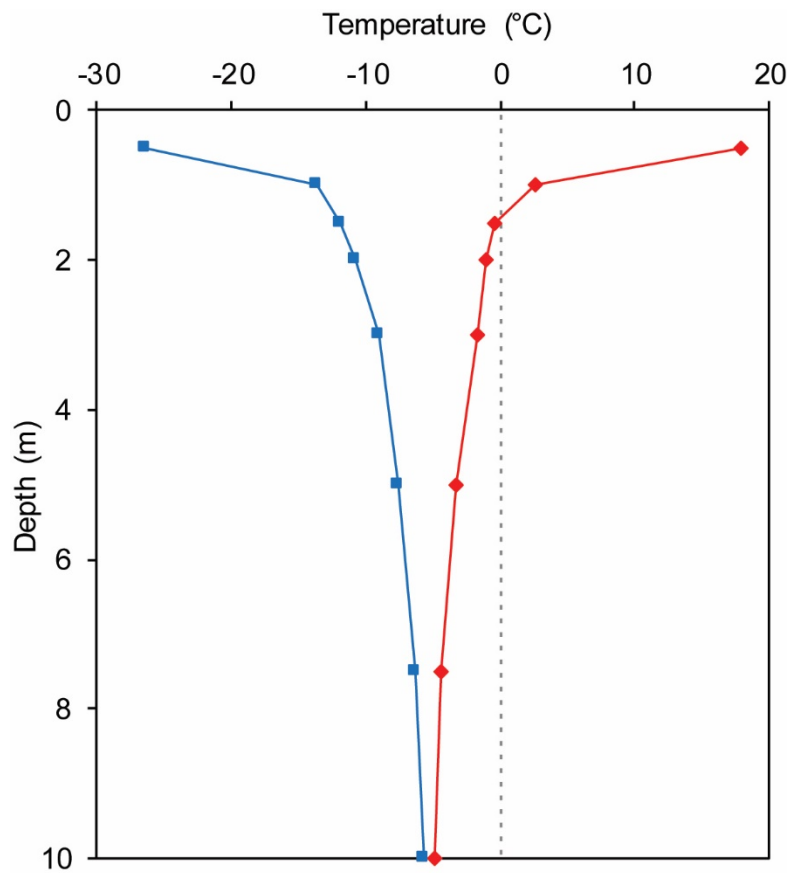
Elevation: n/a

Landform: Moraine uplands

Vegetation cover: Dwarf birch tundra with willow and alder shrubs

Thaw Depth: 1.09 m

Site visit: July 19, 2017



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	17.97	-26.37
1	2.69	-13.69
1.5	-0.48	-11.83
2	-1.01	-10.75
3	-1.76	-9.09
5	-3.36	-7.54
7.5	-4.38	-6.29
10	-4.89	-5.76

Lousy Point ridge — 90TT05

Inuvialuit Settlement Region

Latitude: 69.219 N

Longitude: 134.285 W

Elevation: 39 m a.s.l.

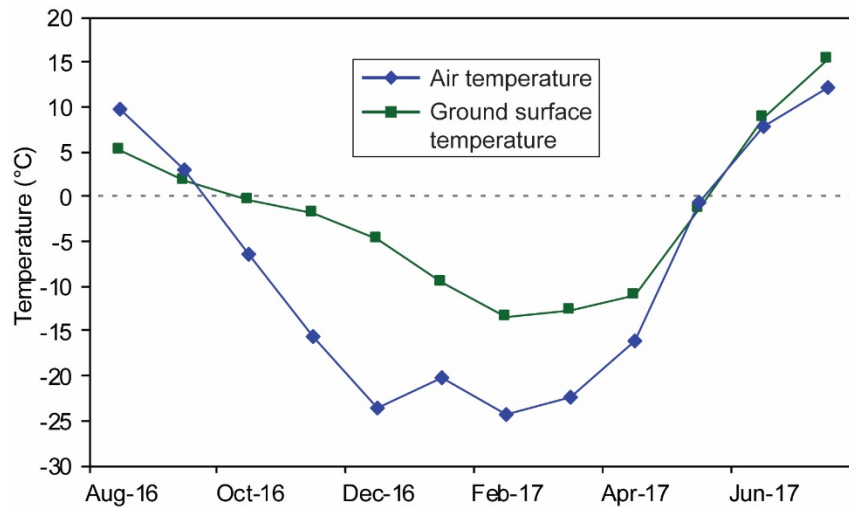
Landform: Glaciofluvial ridge

Vegetation cover: Low shrub tundra

Thaw depth: 0.58 m (probed)

Site visit: July 19, 2017

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2016	9.69	5.26
Sept / 2016	3.03	1.77
Oct / 2016	-6.41	-0.30
Nov / 2016	-15.66	-1.96
Dec / 2016	-23.52	-4.85
Jan / 2017	-20.32	-9.54
Feb / 2017	-24.34	-13.36
Mar / 2017	-22.40	-12.81
Apr / 2017	-16.04	-11.03
May / 2017	-0.56	-1.28
Jun / 2017	7.70	8.77
Jul / 2017	12.24	15.28



YaYa Lake low — 90TT04

Inuvialuit Settlement Region

Latitude: 69.143 N

Longitude: 134.704 W

Elevation: 10 m a.s.l.

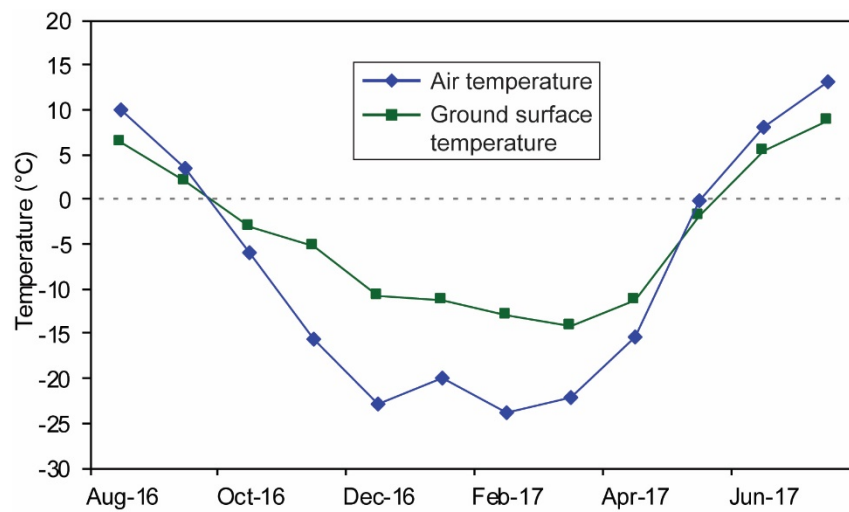
Landform: Ice contact complex

Vegetation cover: shrub tundra

Thaw Depth: 0.45 m (probed)

Site visit: July 18, 2017

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2016	9.92	6.30
Sept / 2016	3.57	1.89
Oct / 2016	-6.07	-3.09
Nov / 2016	-15.61	-5.19
Dec / 2016	-22.93	-10.69
Jan / 2017	-19.99	-11.28
Feb / 2017	-23.90	-12.97
Mar / 2017	-22.27	-14.12
Apr / 2017	-15.42	-11.39
May / 2017	-0.10	-1.87
Jun / 2017	7.93	5.45
Jul / 2017	13.16	8.70



East Channel — T6 Upland

Inuvialuit Settlement Region

Latitude: 69.119 N

Longitude: 134.185 W

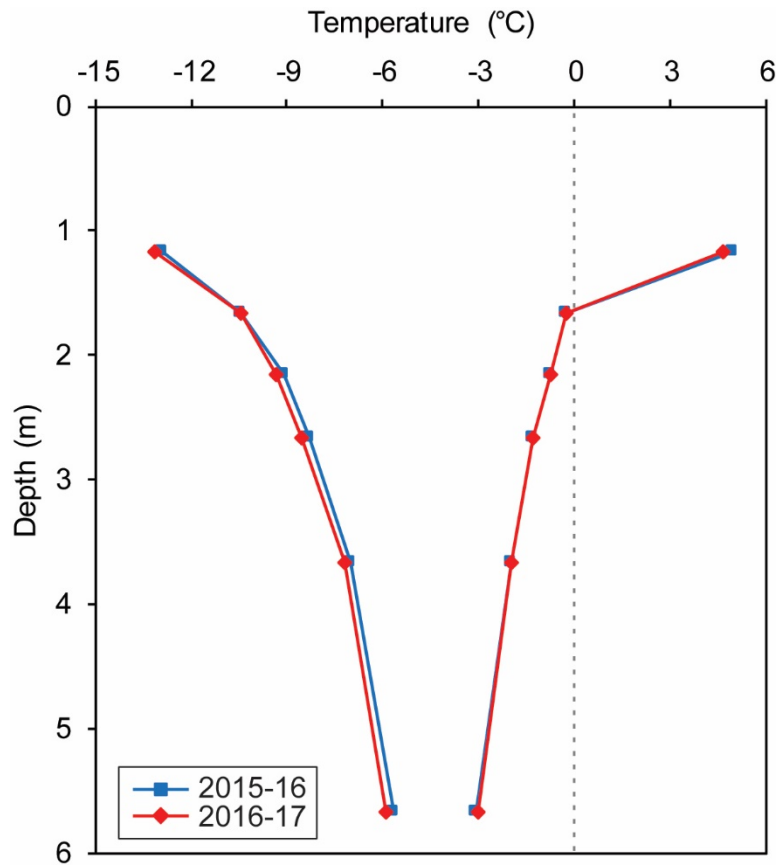
Elevation: n/a

Landform: Moraine uplands

Vegetation cover: Dwarf birch tundra with willow and alder shrubs

Thaw Depth: 1.64 m for 2015-16 and 1.63 m for 2016-17

Site visit: July 19, 2017



Aug 2015 – Jul 2016		
Depth (m)	Max (°C)	Min (°C)
1.16	4.95	-12.89
1.66	-0.26	-10.43
2.16	-0.75	-9.08
2.66	-1.30	-8.31
3.66	-1.97	-6.98
5.66	-3.08	-5.66

Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
1.16	4.64	-13.15
1.66	-0.27	-10.42
2.16	-0.73	-9.33
2.66	-1.29	-8.53
3.66	-1.95	-7.20
5.66	-3.03	-5.89

Parsons Lake — T5 Upland

Inuvialuit Settlement Region

Latitude: 68.958 N

Longitude: 133.838 W

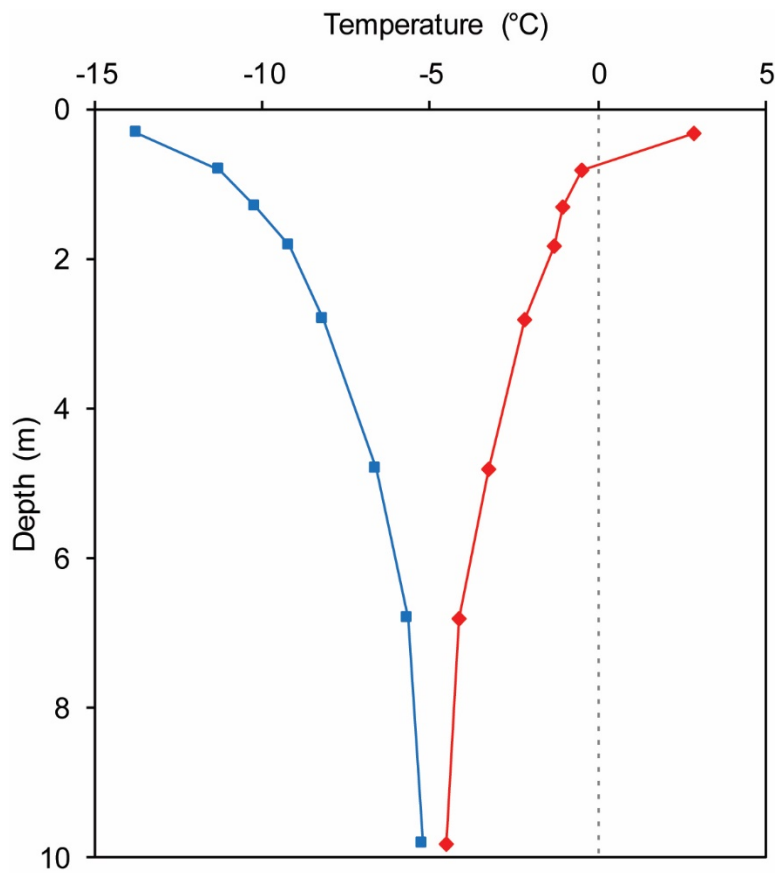
Elevation: n/a

Landform: Moraine uplands

Vegetation cover: Dwarf birch tundra with willow and alder shrubs

Thaw Depth: 0.75 m

Site visit: July 21, 2017



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.32	2.85	-13.73
0.82	-0.47	-11.30
1.32	-1.04	-10.19
1.82	-1.31	-9.17
2.82	-2.20	-8.17
4.82	-3.24	-6.60
6.82	-4.13	-5.65
9.82	-4.53	-5.24

Parsons Lake — T5 Slump

Inuvialuit Settlement Region

Latitude: 68.957 N

Longitude: 133.837 W

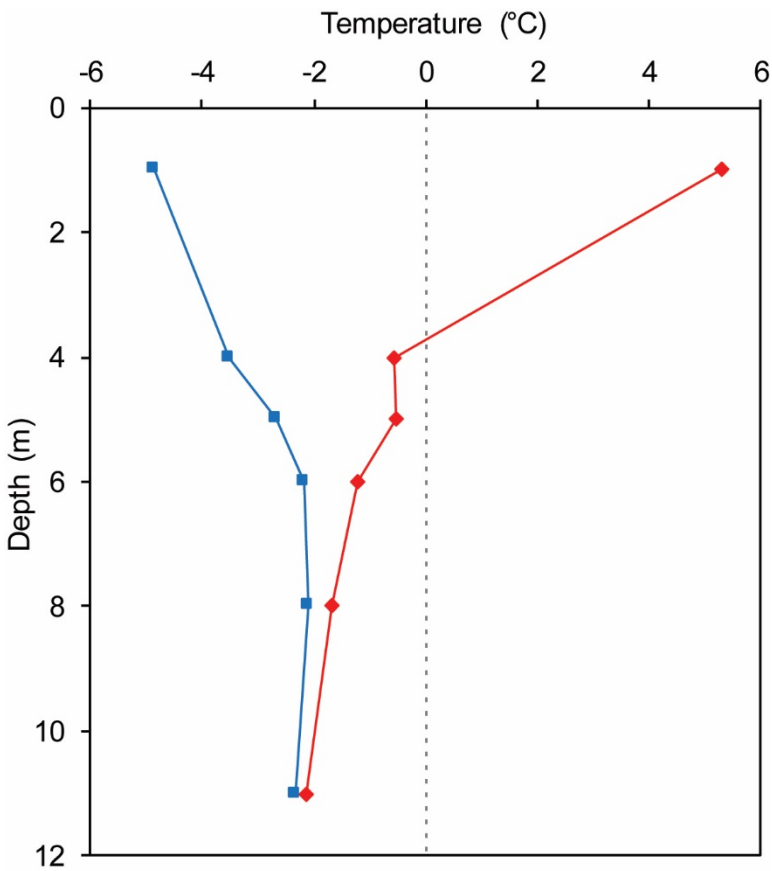
Elevation: n/a

Landform: Thaw slump

Vegetation cover: Willow and alder shrubs

Thaw Depth: 3.72 m

Site visit: July 21, 2017



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
1	5.32	-4.84
4	-0.55	-3.53
5	-0.53	-2.66
6	-1.22	-2.19
8	-1.69	-2.10
11	-2.14	-2.32

Reindeer Station plateau — 91TT12

Inuvialuit Settlement Region

Latitude: 68.689 N

Longitude: 134.111 W

Elevation: 152 m a.s.l.

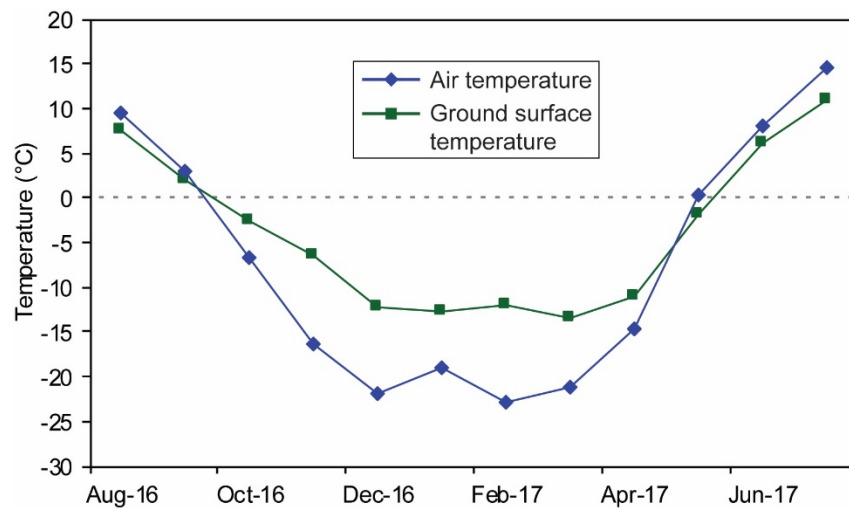
Landform: Plateau surface, till plain

Vegetation cover: Shrub tundra

Thaw Depth: n/a

Site visit: July 21, 2017

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2016	9.48	7.58
Sept / 2016	2.94	1.91
Oct / 2016	-6.62	-2.60
Nov / 2016	-16.30	-6.40
Dec / 2016	-21.89	-12.34
Jan / 2017	-18.92	-12.78
Feb / 2017	-22.84	-12.06
Mar / 2017	-21.09	-13.35
Apr / 2017	-14.77	-10.93
May / 2017	0.31	-1.90
Jun / 2017	8.06	6.18
Jul / 2017	14.46	10.85



Reindeer Depot (Williams Island) — 91TT13

Inuvialuit Settlement Region

Latitude: 68.683 N

Longitude: 134.145 W

Elevation: 5 m a.s.l.

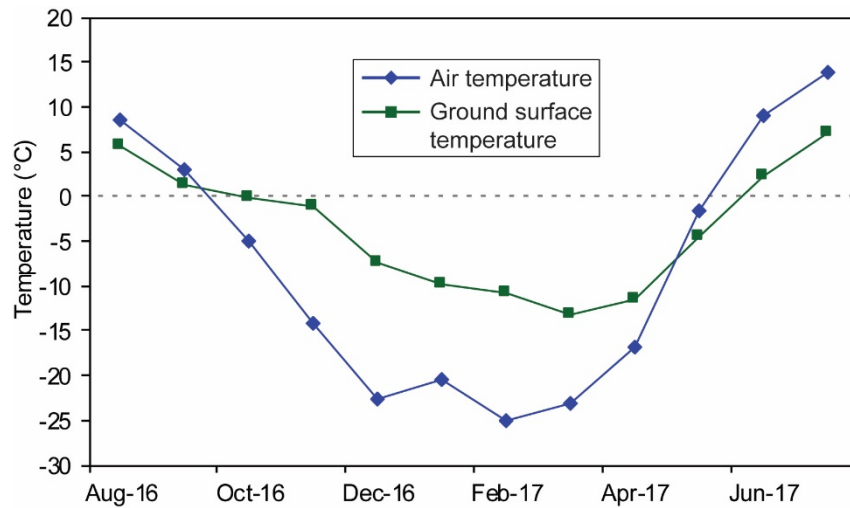
Landform: Surface of bar in Mackenzie Delta

Vegetation cover: Riparian willow and alder shrub

Thaw Depth: 0.99 m (Probed)

Site visit: July 23, 2017

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2016	8.45	5.54
Sept / 2016	3.04	1.21
Oct / 2016	-5.10	-0.27
Nov / 2016	-14.21	-1.21
Dec / 2016	-22.75	-7.45
Jan / 2017	-20.48	-9.72
Feb / 2017	-25.09	-10.70
Mar / 2017	-23.22	-13.24
Apr / 2017	-16.81	-11.41
May / 2017	-1.71	-4.62
Jun / 2017	9.06	2.34
Jul / 2017	13.91	7.12



Jimmy Creek Valley — JV-1 Bottom

Inuvialuit Settlement Region

Latitude: 68.626 N

Longitude: 133.632 W

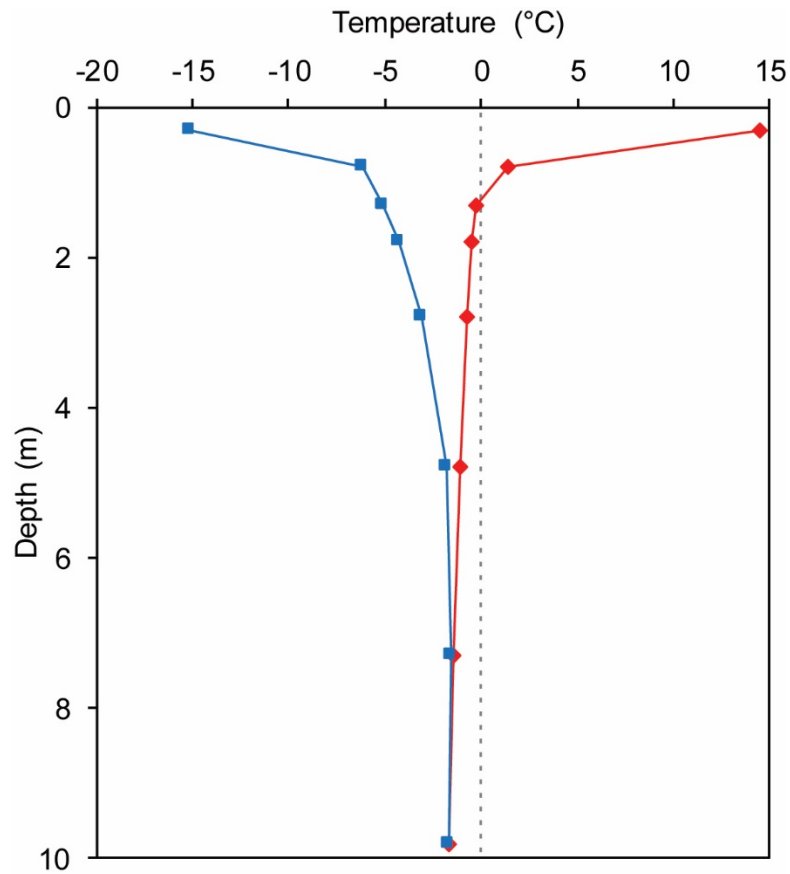
Elevation: n/a

Landform: Moraine uplands

Vegetation cover: Dwarf birch tundra with willow and alder shrubs

Thaw Depth: 0.85 m

Site visit: July 21, 2017



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.3	14.43	-15.13
0.8	1.38	-6.14
1.3	-0.30	-5.10
1.8	-0.46	-4.32
2.8	-0.76	-3.07
4.8	-1.09	-1.77
7.3	-1.39	-1.56
9.8	-1.63	-1.65

Navy Channel — 03TC01

Inuvialuit Settlement Region

Latitude: 68.415 N

Longitude: 133.794 W

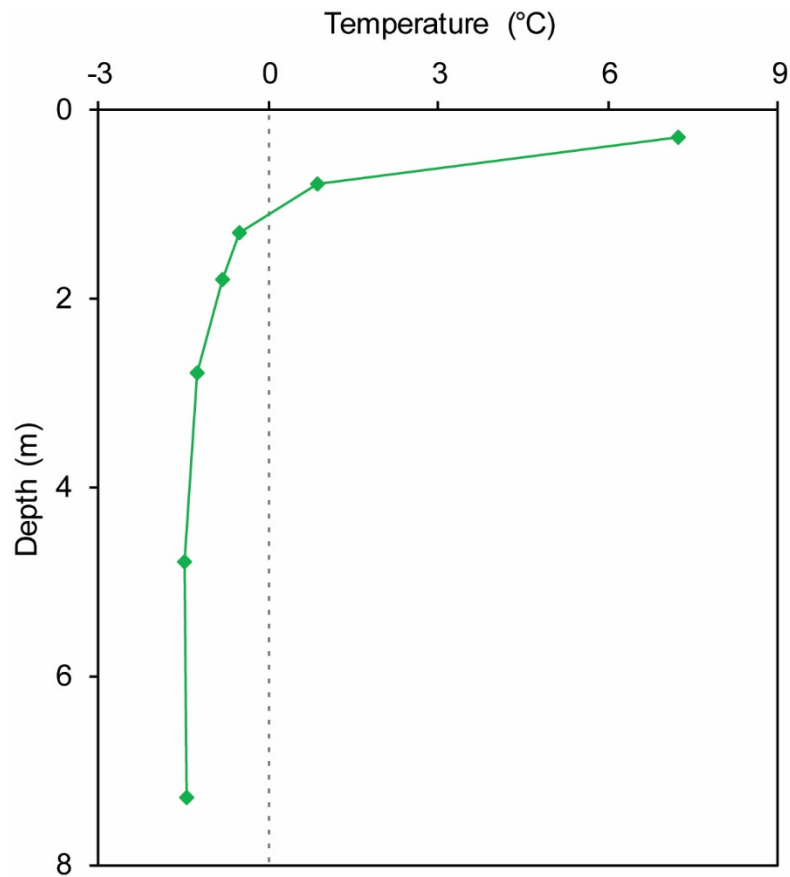
Elevation: 5 m a.s.l.

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: 1.56 m

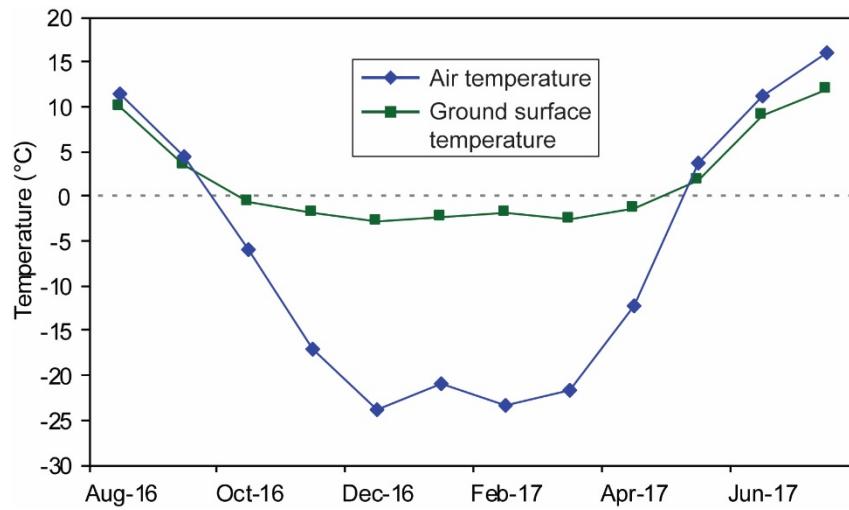
Site visit: July 23, 2017



Depth (m)	Temp (°C)
1	3.05
1.5	0.34
2	-0.29
3	-0.38
4	-0.43
6	-0.48
8	-0.4

Navy Channel — 03TC01 (continued)

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2016	11.40	9.87
Sept / 2016	4.37	3.44
Oct / 2016	-6.06	-0.62
Nov / 2016	-17.03	-1.87
Dec / 2016	-23.85	-2.84
Jan / 2017	-20.97	-2.44
Feb / 2017	-23.24	-1.91
Mar / 2017	-21.71	-2.47
Apr / 2017	-12.13	-1.47
May / 2017	3.65	1.85
Jun / 2017	11.07	9.04
Jul / 2017	16.07	11.94



Norris Creek — NC-01

Gwich'in Settlement Region

Latitude: 68.407 N

Longitude: 133.290 W

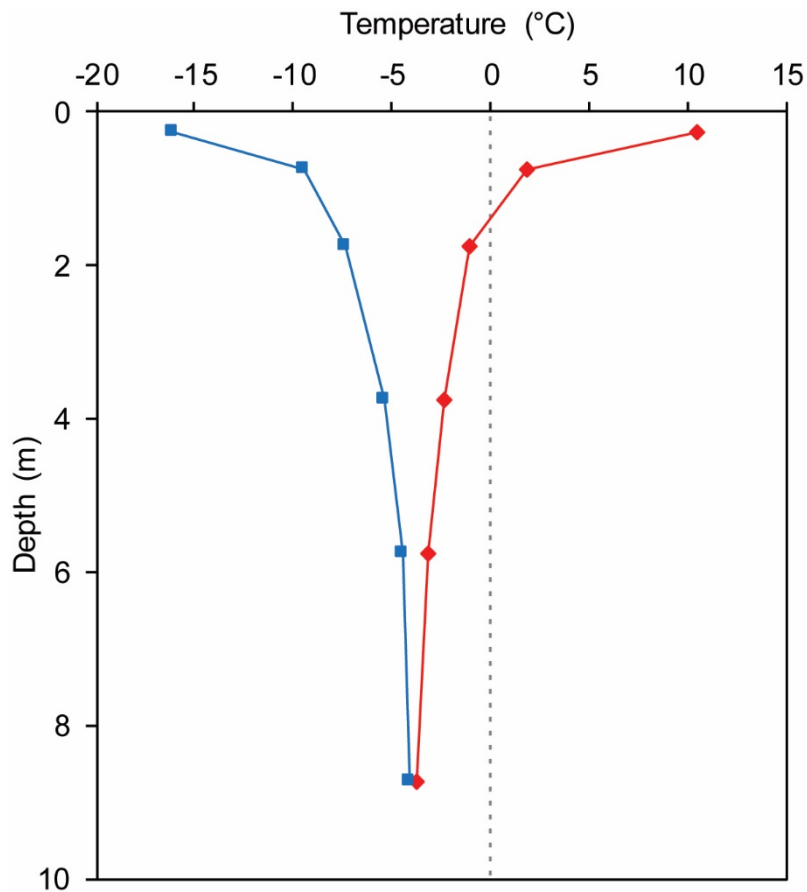
Elevation: 15 m a.s.l.

Landform: Thick organic material over moraine plain

Vegetation cover: Shrub Tundra

Thaw Depth: 0.85 m

Site visit: July 21, 2017



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.25	10.40	-16.08
0.75	1.80	-9.48
1.75	-1.05	-7.37
3.75	-2.36	-5.34
5.75	-3.22	-4.47
8.75	-3.74	-4.10

Navy Road — 01TC01

Gwich'in Settlement Region

Latitude: 68.401 N

Longitude: 133.762 W

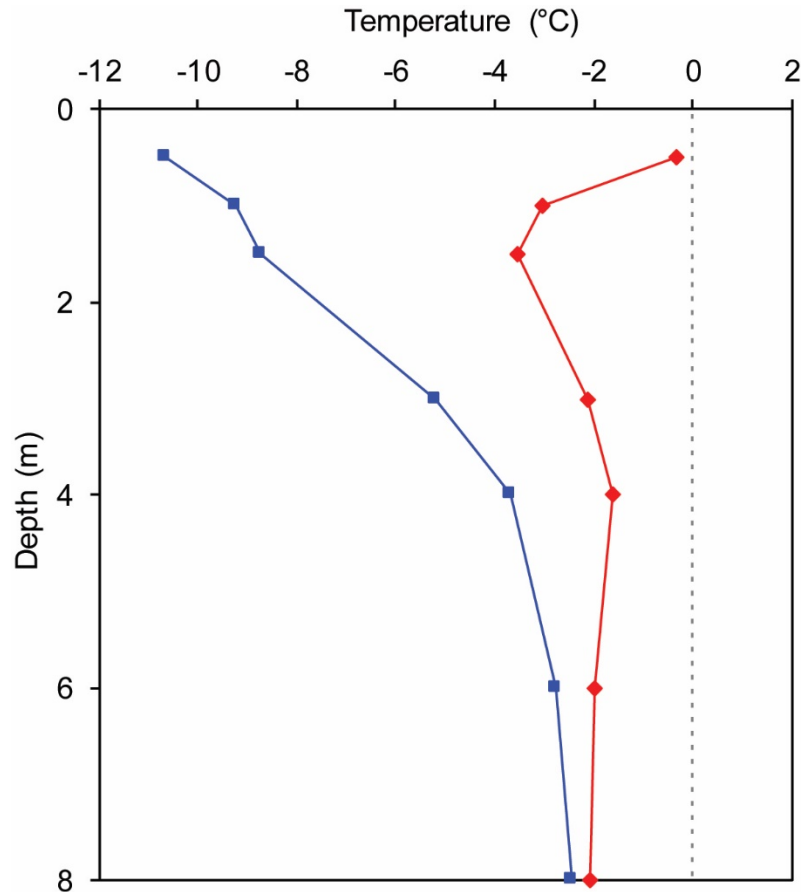
Elevation: 60 m a.s.l.

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

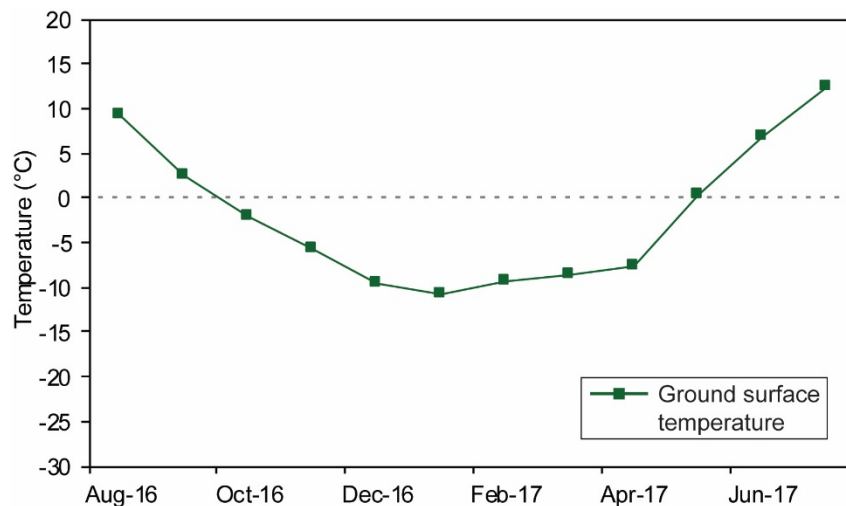
Thaw Depth: 0.51 m (Probed)

Site visit: July 21, 2017



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	-0.34	-10.67
1	-3.04	-9.22
1.5	-3.52	-8.74
3	-2.12	-5.21
4	-1.60	-3.67
6	-1.97	-2.75
8	-2.08	-2.42

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2016	n/a	9.18
Sept / 2016	n/a	2.42
Oct / 2016	n/a	-2.09
Nov / 2016	n/a	-5.74
Dec / 2016	n/a	-9.56
Jan / 2017	n/a	-10.85
Feb / 2017	n/a	-9.28
Mar / 2017	n/a	-8.68
Apr / 2017	n/a	-7.54
May / 2017	n/a	0.22
Jun / 2017	n/a	6.84
Jul / 2017	n/a	12.41



Inuvik Airport (trees) — 01TC02

Gwich'in Settlement Region

Latitude: 68.316 N

Longitude: 133.436 W

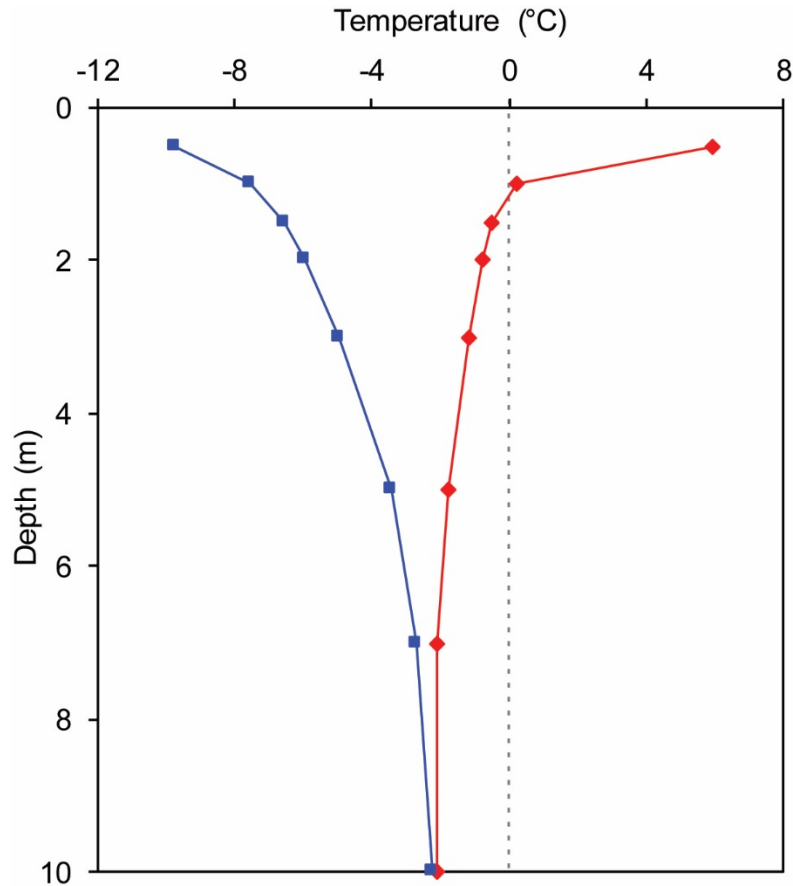
Elevation: 84 m a.s.l.

Landform: Fluted till plain glacial (>10Ka)

Vegetation cover: Taiga open black spruce, health ground cover

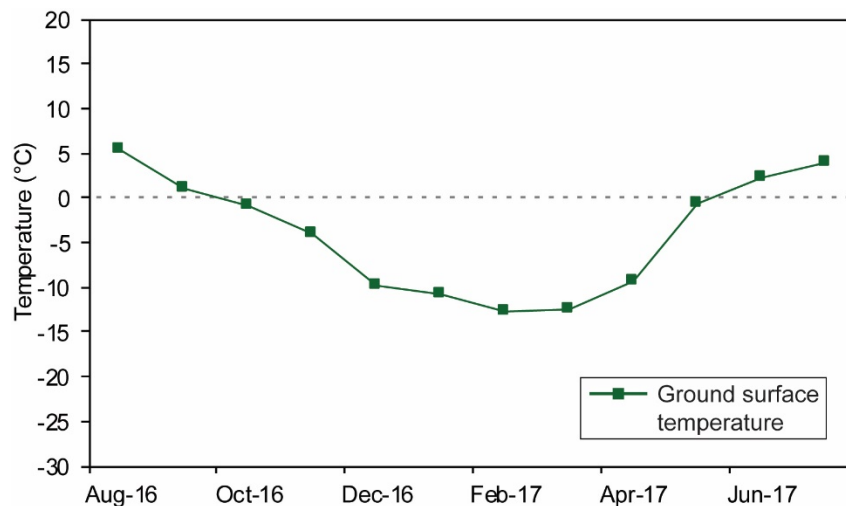
Thaw Depth: 1.02 m

Site visit: July 21, 2017



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	5.94	-9.74
1	0.26	-7.52
1.5	-0.49	-6.57
2	-0.76	-5.94
3	-1.19	-4.95
5	-1.79	-3.41
7	-2.12	-2.69
10	-2.08	-2.20

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2016	n/a	5.48
Sept / 2016	n/a	1.13
Oct / 2016	n/a	-0.84
Nov / 2016	n/a	-4.10
Dec / 2016	n/a	-9.86
Jan / 2017	n/a	-10.85
Feb / 2017	n/a	-12.73
Mar / 2017	n/a	-12.48
Apr / 2017	n/a	-9.27
May / 2017	n/a	-0.62
Jun / 2017	n/a	2.21
Jul / 2017	n/a	3.91



Inuvik Airport (bog) — 12TC01

Gwich'in Settlement Region

Latitude: 68.316 N

Longitude: 133.432 W

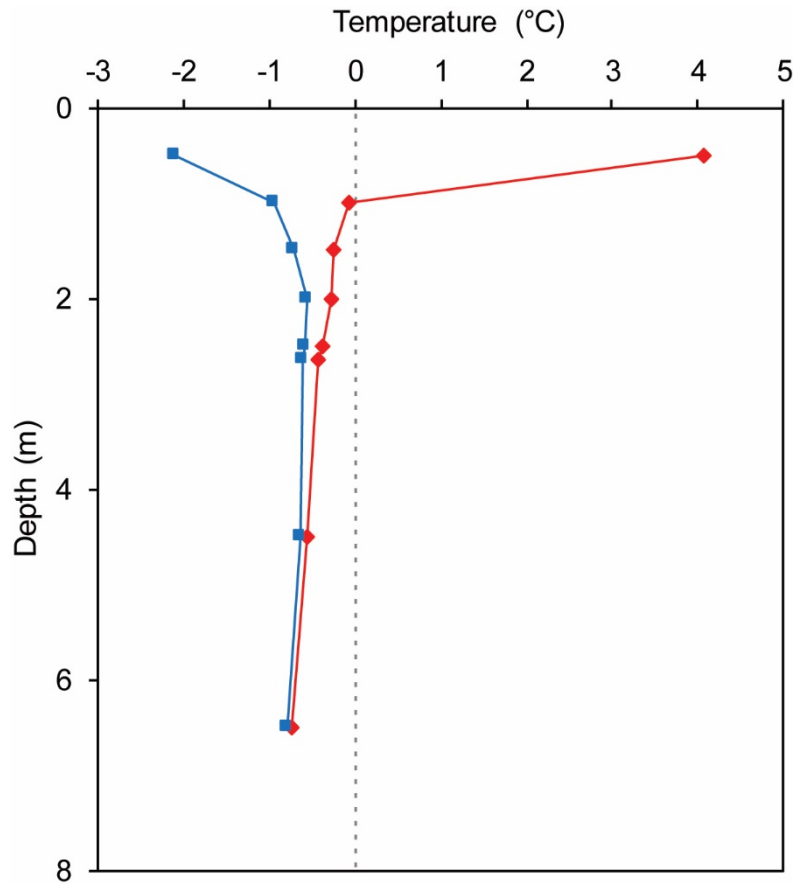
Elevation: 68 m a.s.l.

Landform: Bog between ridges on fluted till plain, glacial (>10Ka)

Vegetation cover: Taiga open bog, scattered shrub, heath ground cover (forest tundra)

Thaw Depth: 0.99 m

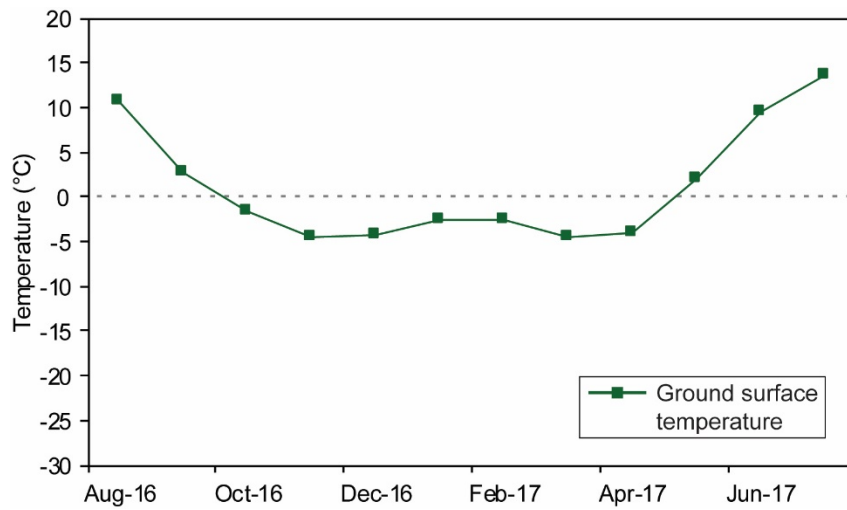
Site visit: July 21, 2017



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	4.06	-2.11
1.0	-0.06	-0.95
1.5	-0.25	-0.72
2.0	-0.28	-0.57
2.5	-0.38	-0.58
2.65	-0.44	-0.62
4.5	-0.57	-0.64
6.5	-0.75	-0.78

Inuvik Airport (bog) — 12TC01 (continued)

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2016	n/a	10.79
Sept / 2016	n/a	2.72
Oct / 2016	n/a	-1.73
Nov / 2016	n/a	-4.40
Dec / 2016	n/a	-4.35
Jan / 2017	n/a	-2.56
Feb / 2017	n/a	-2.57
Mar / 2017	n/a	-4.56
Apr / 2017	n/a	-3.92
May / 2017	n/a	2.09
Jun / 2017	n/a	9.49
Jul / 2017	n/a	13.52



Campbell Lake — CaL-01

Gwich'in Settlement Region

Latitude: 68.243 N

Longitude: 133.094 W

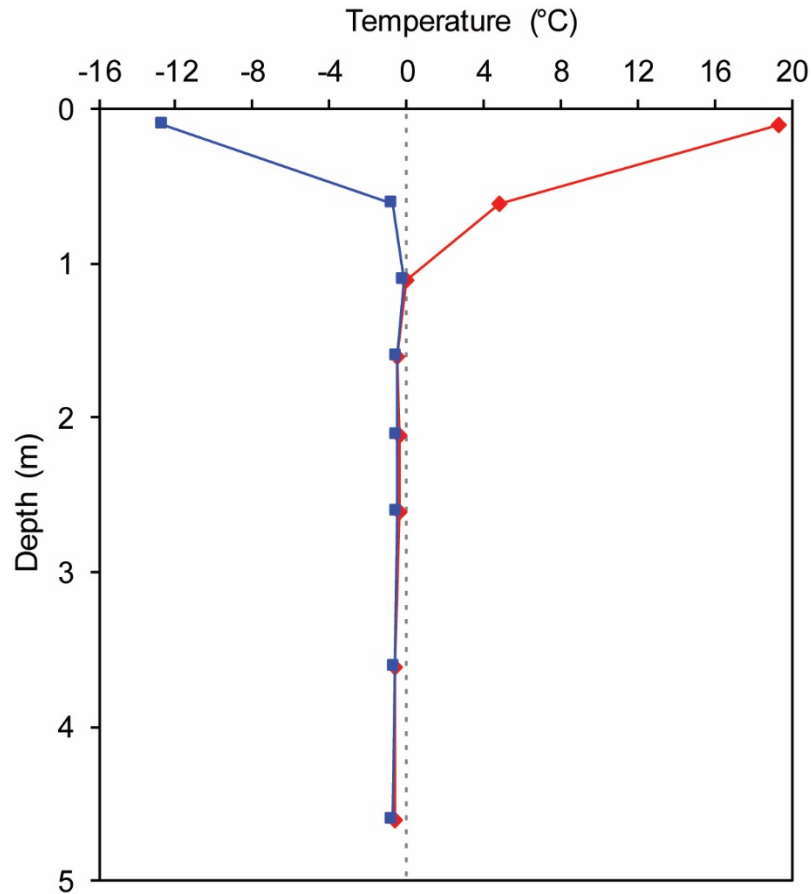
Elevation: 115 m a.s.l.

Landform: Moraine plain

Vegetation cover: Peatland

Thaw Depth: 0.77 m

Site visit: July 21, 2017



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.11	19.34	-12.67
0.61	4.78	-0.75
1.11	-0.07	-0.18
1.61	-0.47	-0.53
2.11	-0.37	-0.44
2.61	-0.43	-0.50
3.61	-0.58	-0.63
4.61	-0.67	-0.70

Campbell Lake — CaL-02

Gwich'in Settlement Region

Latitude: 68.243 N

Longitude: 133.096 W

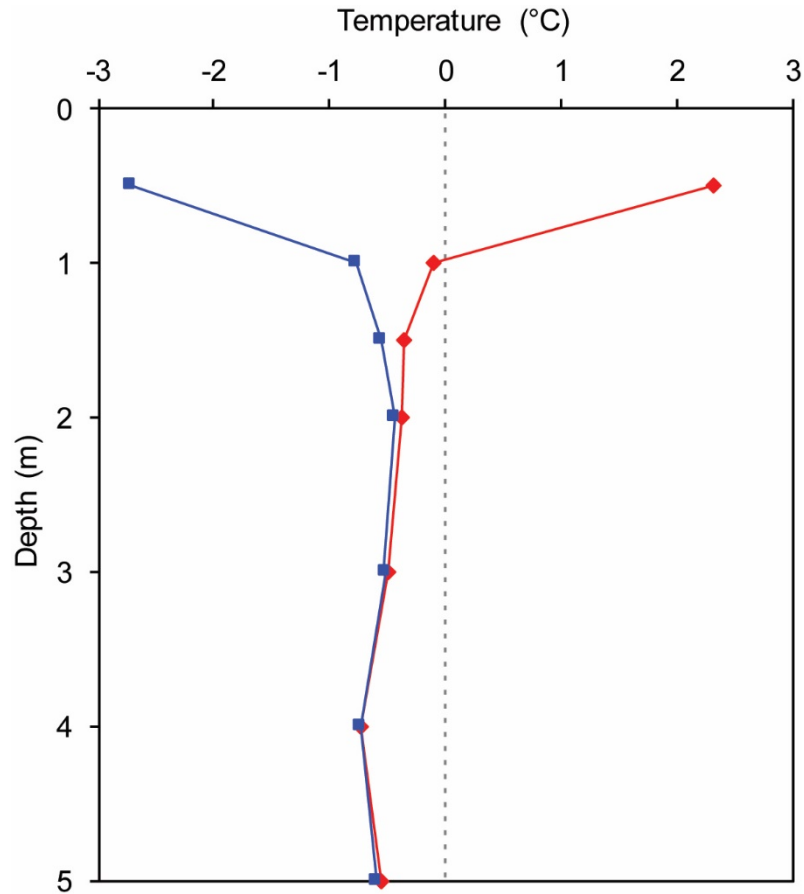
Elevation: 118 m a.s.l.

Landform: Moraine plain

Vegetation cover: Cutline through Black spruce forest

Thaw Depth: 0.98 m

Site visit: July 21, 2017



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	2.31	-2.71
1	-0.09	-0.77
1.5	-0.35	-0.56
2	-0.38	-0.44
3	-0.49	-0.52
4	-0.72	-0.74
5	-0.56	-0.59

Campbell Lake — CaL-03

Gwich'in Settlement Region

Latitude: 68.244 N

Longitude: 133.096 W

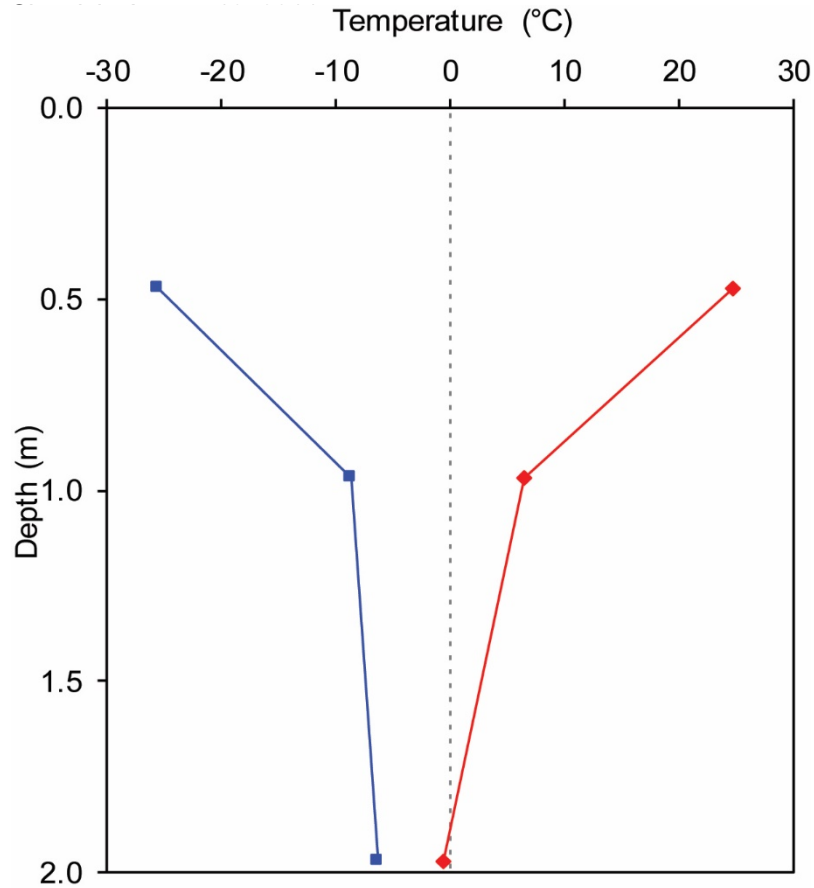
Elevation: 118 m a.s.l.

Landform: Moraine plain

Vegetation cover: Black spruce forest

Thaw Depth: 1.15 m

Site visit: July 21, 2017



Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.47	24.70	-25.35
0.97	6.56	-8.57
1.97	-0.54	-6.18

North Caribou Lake — NCL-01

Gwich'in Settlement Region

Latitude: 68.148 N

Longitude: 132.933 W

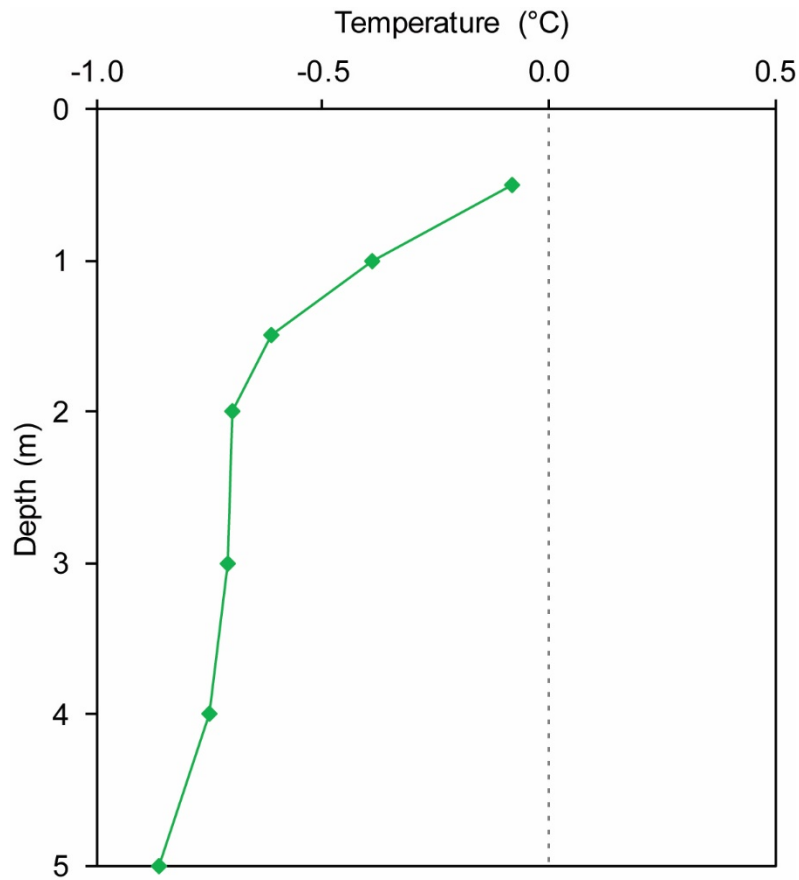
Elevation: 209 m a.s.l.

Landform: Moraine plain

Vegetation cover: Peatland

Thaw Depth: 0.72 m

Site visit: July 21, 2017



Depth (m)	Temp (°C)
0.5	-0.08
1	-0.39
1.5	-0.61
2	-0.7
3	-0.71
4	-0.75
5	-0.86

North Caribou Lake — NCL-02

Gwich'in Settlement Region

Latitude: 68.147 N

Longitude: 132.932 W

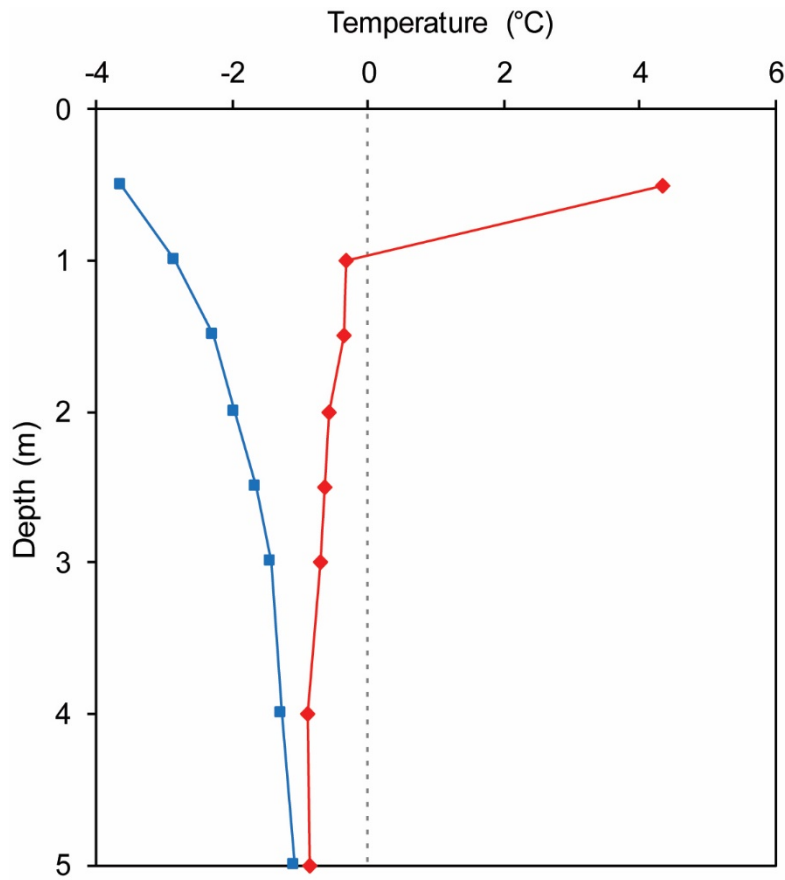
Elevation: 217 m a.s.l.

Landform: Moraine plain

Vegetation cover: Stunted black spruce forest

Thaw Depth: 0.97 m

Site visit: July 21, 2017



Aug 2016 – July 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	4.32	-3.63
1	-0.31	-2.84
1.5	-0.36	-2.26
2	-0.56	-1.97
2.5	-0.62	-1.66
3	-0.69	-1.44
4	-0.89	-1.28
5	-0.84	-1.08

Hill Lake — HL-01

Gwich'in Settlement Region

Latitude: 67.989 N

Longitude: 132.491 W

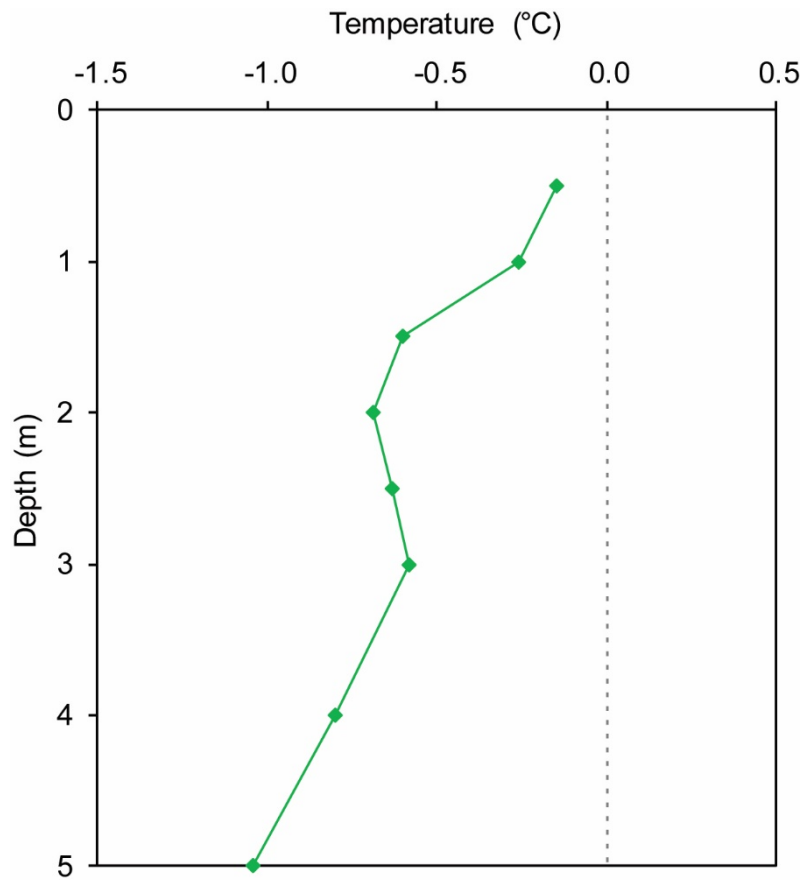
Elevation: 229 m a.s.l.

Landform: Moraine plain

Vegetation cover: Tundra

Thaw Depth: n/a

Site visit: July 21, 2017



Depth (m)	Temp (°C)
0.5	-0.15
1	-0.26
1.5	-0.6
2	-0.69
2.5	-0.63
3	-0.58
4	-0.8
5	-1.04

Hill Lake — HL-02

Gwich'in Settlement Region

Latitude: 67.989 N

Longitude: 132.490 W

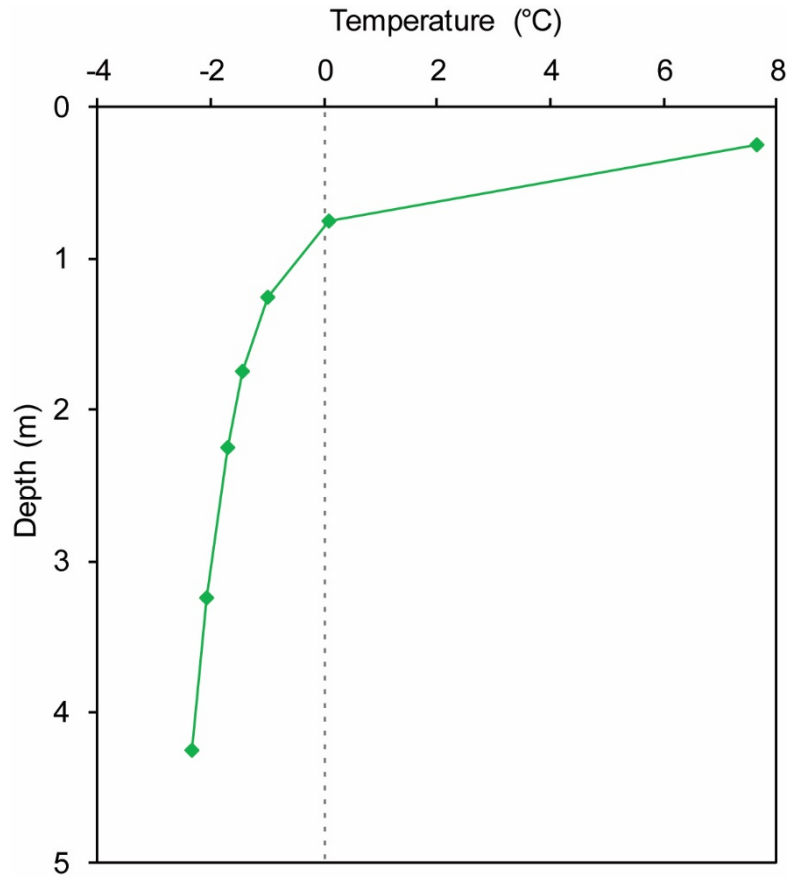
Elevation: 234 m a.s.l.

Landform: Moraine plain

Vegetation cover: Shrub Tundra

Thaw Depth: 0.76 m

Site visit: July 21, 2017



Depth (m)	Temp (°C)
0.25	7.66
0.75	0.08
1.25	-1
1.75	-1.45
2.25	-1.71
3.25	-2.09
4.25	-2.32

Wood Bridge Lake — WBL-01

Gwich'in Settlement Region

Latitude: 67.902 N

Longitude: 132.178 W

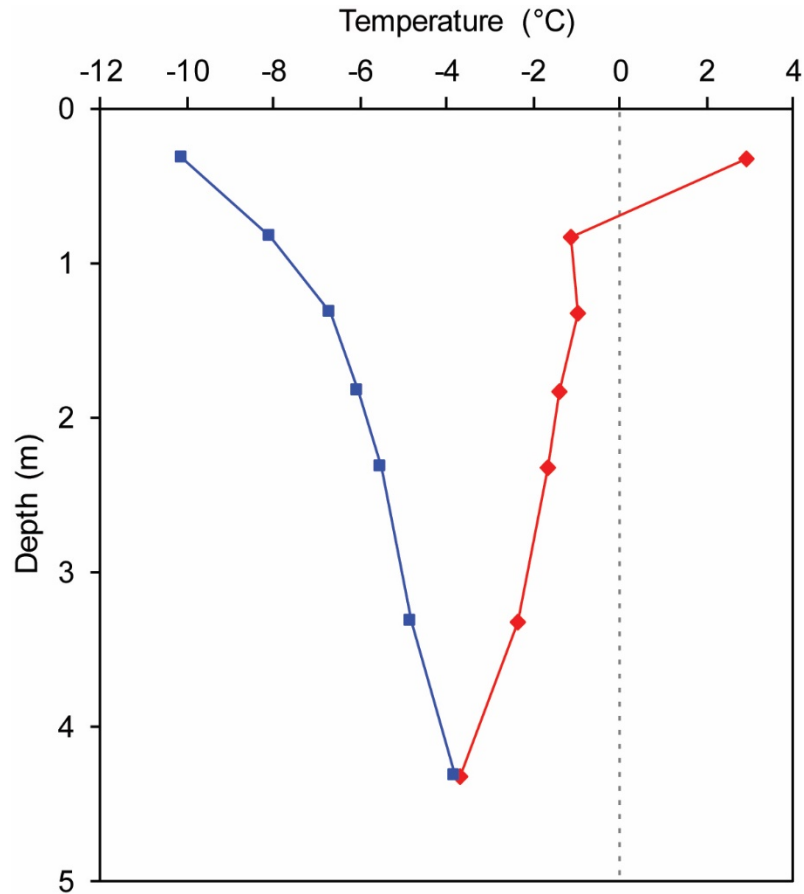
Elevation: 204 m a.s.l.

Landform: Alluvial plain

Vegetation: Black spruce forest

Thaw Depth: 0.69 m

Site visit: July 21, 2017



Aug 2016 – July 2017		
Depth (m)	Max (°C)	Min (°C)
0.33	2.91	-10.08
0.83	-1.14	-8.05
1.33	-0.97	-6.69
1.83	-1.40	-6.07
2.33	-1.67	-5.51
3.33	-2.36	-4.83
4.33	-3.69	-3.79

Rengleng River mouth — 91TT14

Gwich'in Settlement Region

Latitude: 67.795 N

Longitude: 134.126 W

Elevation: 8 m a.s.l.

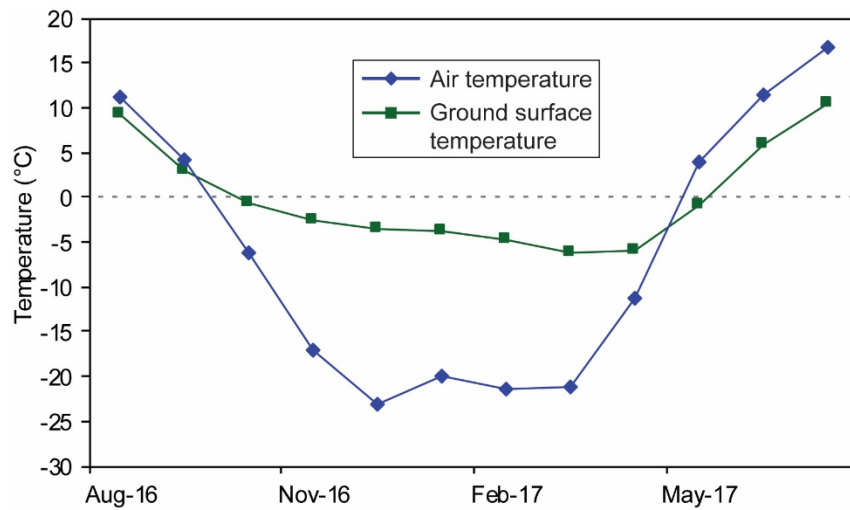
Landform: Alluvial plain

Vegetation cover: Mixed spruce and hardwood forest

Thaw Depth : n/a

Site visit: July 22, 2017

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2016	11.22	9.26
Sept / 2016	4.09	3.07
Oct / 2016	-6.14	-0.77
Nov / 2016	-17.12	-2.63
Dec / 2016	-23.01	-3.61
Jan / 2017	-20.07	-3.83
Feb / 2017	-21.51	-4.73
Mar / 2017	-21.13	-6.27
Apr / 2017	-11.19	-6.04
May / 2017	3.88	-0.98
Jun / 2017	11.34	5.82
Jul / 2017	16.63	10.48



Jackfish Creek — JF-02

Sahtu Settlement Region

Latitude: 66.285 N

Longitude: 128.469 W

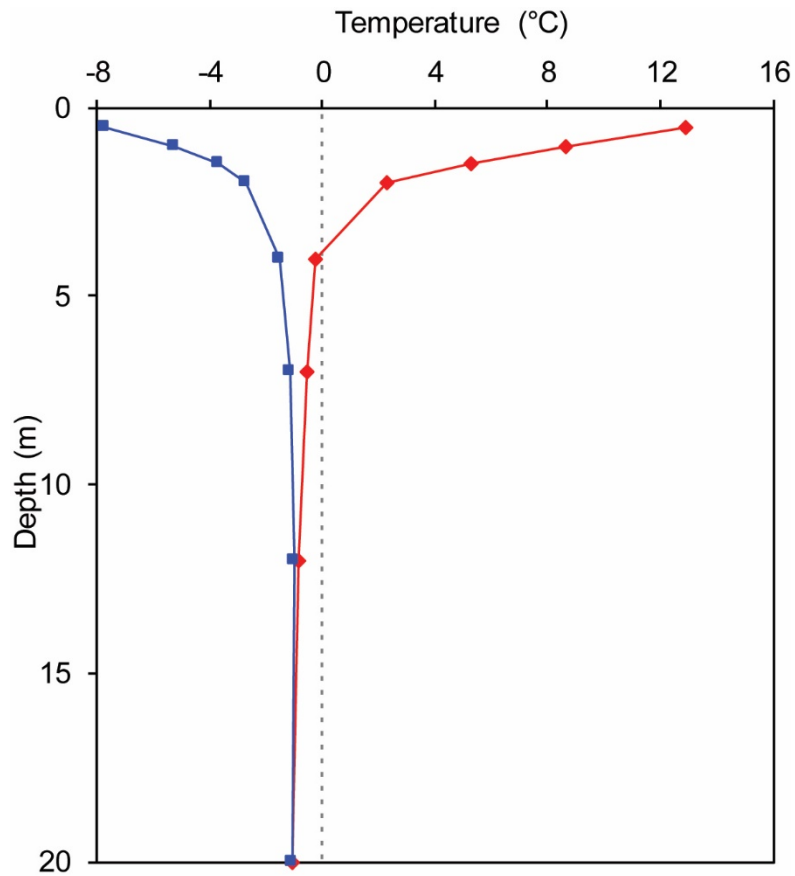
Elevation: 90 m a.s.l.

Landform: Eolian dune on moraine plain, well drained, elevated area

Vegetation cover: Black spruce forest and moss cover

Thaw Depth: 2.40 m

Site visit: September 21, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	12.87	-7.73
1	8.63	-5.24
1.5	5.27	-3.68
2	2.33	-2.70
4	-0.24	-1.51
7	-0.58	-1.16
12	-0.82	-0.99
20	-1.03	-1.09

Fort Good Hope South — FGHS-01

Sahtu Settlement Region

Latitude: 66.202 N

Longitude: 128.486 W

Elevation: 134 m a.s.l.

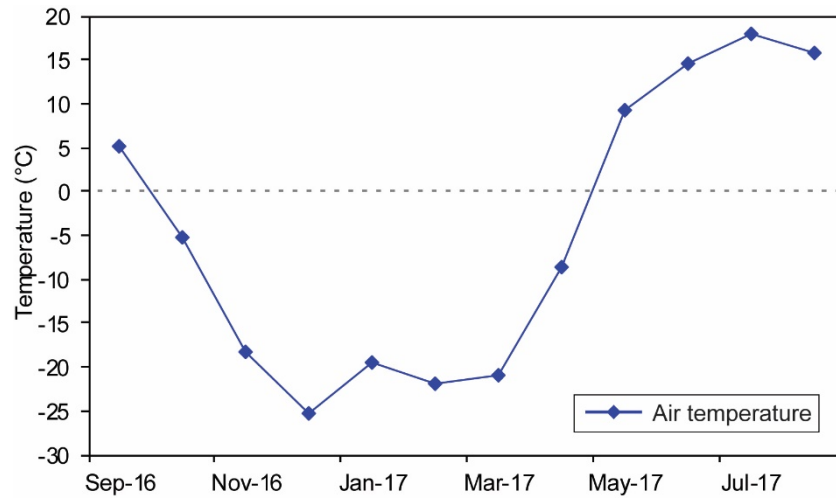
Landform: Hummocky peatland

Vegetation cover: Dense shrub and open black spruce

Thaw Depth: n/a

Site visit: September 21, 2017

Month / Year	Temperature (°C)	
	Air	Surface
Sep / 2016	5.05	n/a
Oct / 2016	-5.23	n/a
Nov / 2016	-18.31	n/a
Dec / 2016	-25.27	n/a
Jan / 2017	-19.37	n/a
Feb / 2017	-21.86	n/a
Mar / 2017	-20.90	n/a
Apr / 2017	-8.67	n/a
May / 2017	9.21	n/a
Jun / 2017	14.58	n/a
Jul / 2017	17.92	n/a
Aug / 2017	15.73	n/a



Fort Good Hope South — FGHS-02

Sahtu Settlement Region

Latitude: 66.209 N

Longitude: 128.496 W

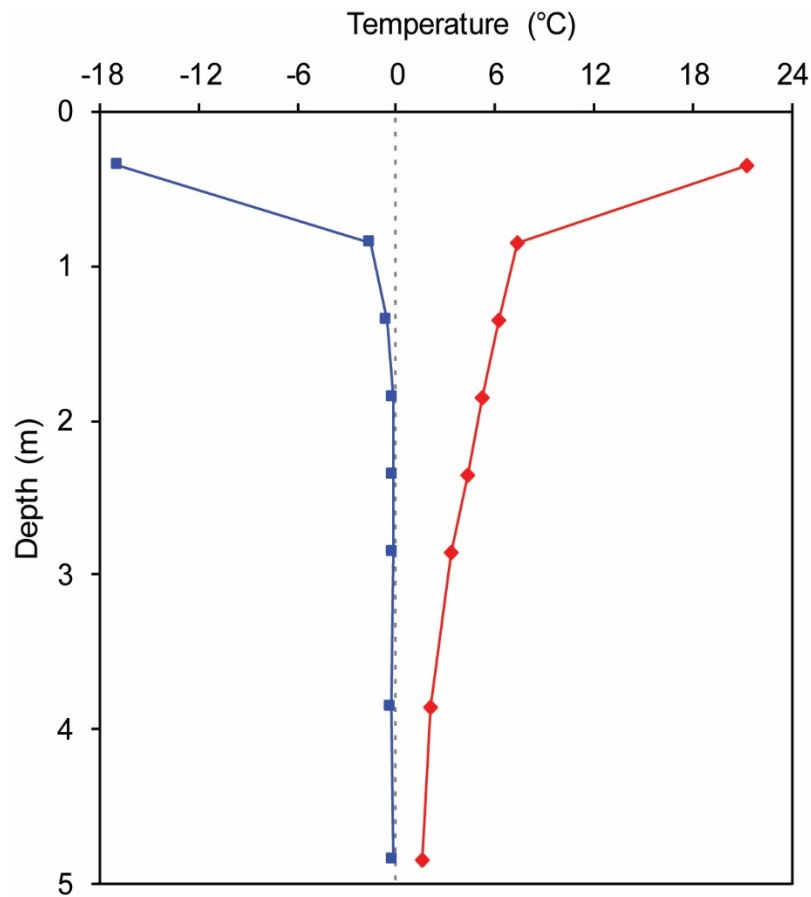
Elevation: 134 m a.s.l.

Landform: Hummocky peatland

Vegetation cover: Peat plateau, lichen, open black spruce

Thaw Depth: 7.57 m (thaw depth was extrapolated from bottom two temperature measurements)

Site visit: September 21, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.35	21.31	-16.85
0.85	7.39	-1.56
1.35	6.29	-0.52
1.85	5.23	-0.19
2.35	4.29	-0.11
2.85	3.36	-0.14
3.85	2.12	-0.35
4.85	1.55	-0.19

Snafu Creek — SC-01

Sahtu Settlement Region

Latitude: 66.002 N

Longitude: 128.351 W

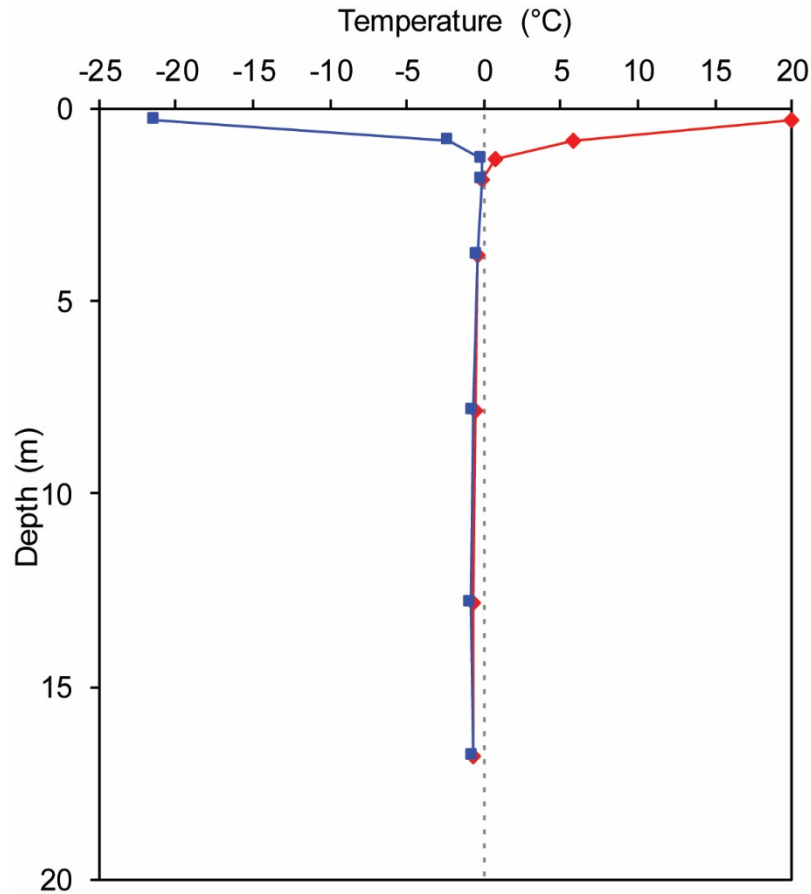
Elevation: 100 m a.s.l.

Landform: Moraine plain

Vegetation cover: Peat bog, open black spruce forest, and lichen cover

Thaw Depth: 1.40 m

Site visit: September 21, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.32	19.94	-21.39
0.82	5.79	-2.24
1.32	0.75	-0.12
1.82	-0.16	-0.20
3.82	-0.40	-0.43
7.82	-0.63	-0.68
12.82	-0.77	-0.81
16.82	-0.74	-0.77

Chick Lake — CL-01

Sahtu Settlement Region

Latitude: 65.896 N

Longitude: 128.240 W

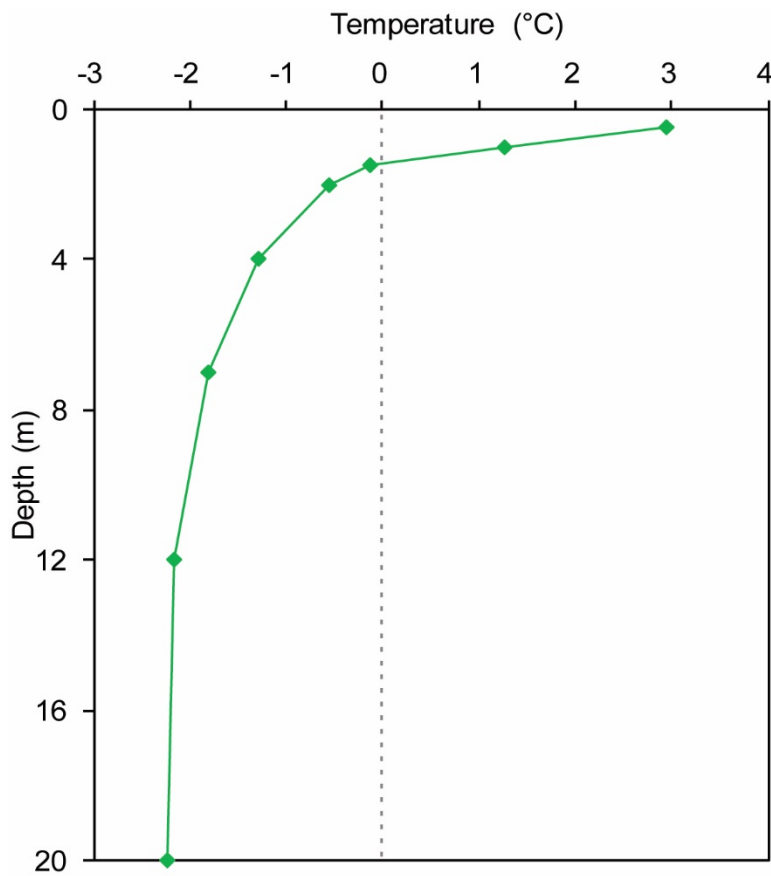
Elevation: 122 m a.s.l.

Landform: Moraine plain

Vegetation cover: Peat and organic soil with open black spruce forest and shrubs

Thaw Depth: 1.38 m

Site visit: September 21, 2017



Depth (m)	Temp (°C)
0.5	2.95
1	1.27
1.5	-0.13
2	-0.56
4	-1.28
7	-1.8
12	-2.16
20	-2.23

Gibson Lake — GL-01

Sahtu Settlement Region

Latitude: 65.747 N

Longitude: 127.888 W

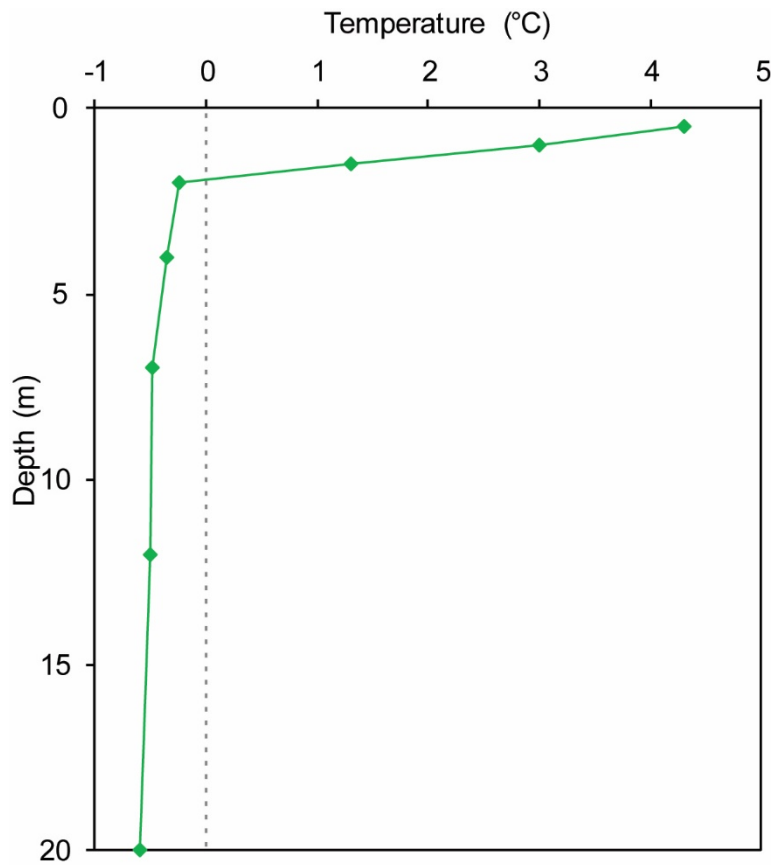
Elevation: 228 m a.s.l.

Landform: Hummocky moraine plain

Vegetation cover: Recovering burnt area with peat and shrubs

Thaw Depth: 1.88 m

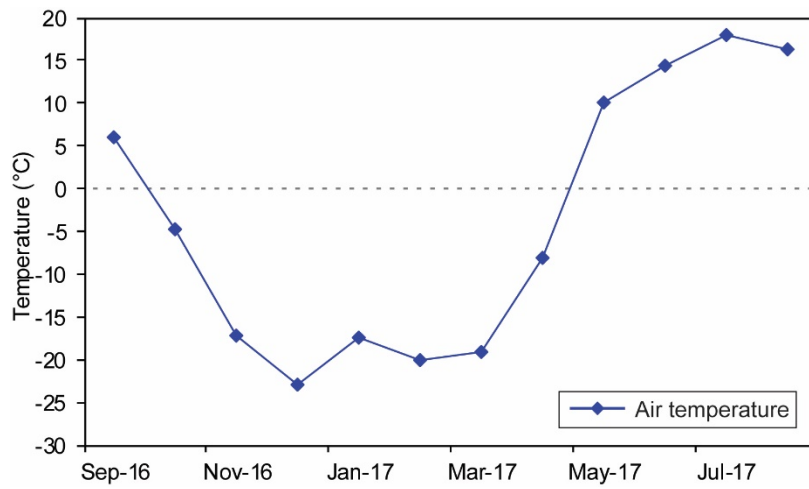
Site visit: September 21, 2017



Depth (m)	Temp (°C)
0.5	4.31
1	2.99
1.5	1.31
2	-0.24
4	-0.35
7	-0.49
12	-0.5
20	-0.6

Gibson Lake — GL-01 (continued)

Month / Year	Temperature (°C)	
	Air	Surface
Sep / 2016	5.90	n/a
Oct / 2016	-4.78	n/a
Nov / 2016	-17.27	n/a
Dec / 2016	-23.01	n/a
Jan / 2017	-17.35	n/a
Feb / 2017	-20.01	n/a
Mar / 2017	-19.07	n/a
Apr / 2017	-8.09	n/a
May / 2017	10.04	n/a
Jun / 2017	14.28	n/a
Jul / 2017	18.08	n/a
Aug / 2017	16.21	n/a



Hanna River — HR-01

Sahtu Settlement Region

Latitude: 65.670 N

Longitude: 127.834 W

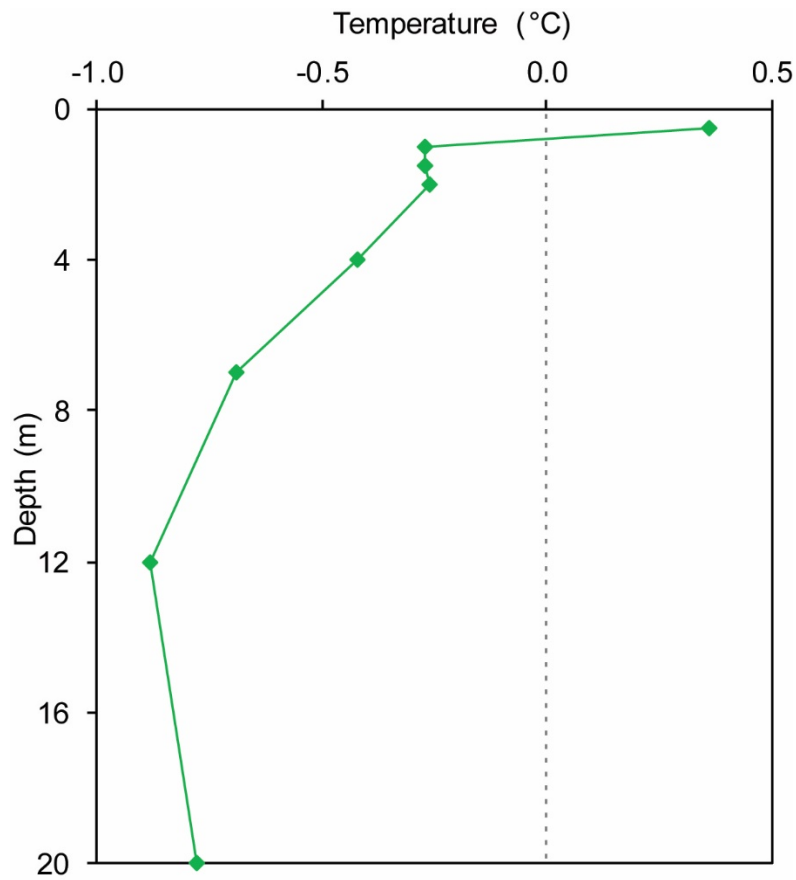
Elevation: 104 m a.s.l.

Landform: Lacustrine plain

Vegetation cover: Boggy burnt area

Thaw Depth: 0.79 m

Site visit: September 21, 2017



Depth (m)	Temp (°C)
0.5	0.36
1	-0.27
1.5	-0.27
2	-0.26
4	-0.42
7	-0.69
12	-0.88
20	-0.78

Elliot Creek — EC-01

Sahtu Settlement Region

Latitude: 65.520 N

Longitude: 127.621 W

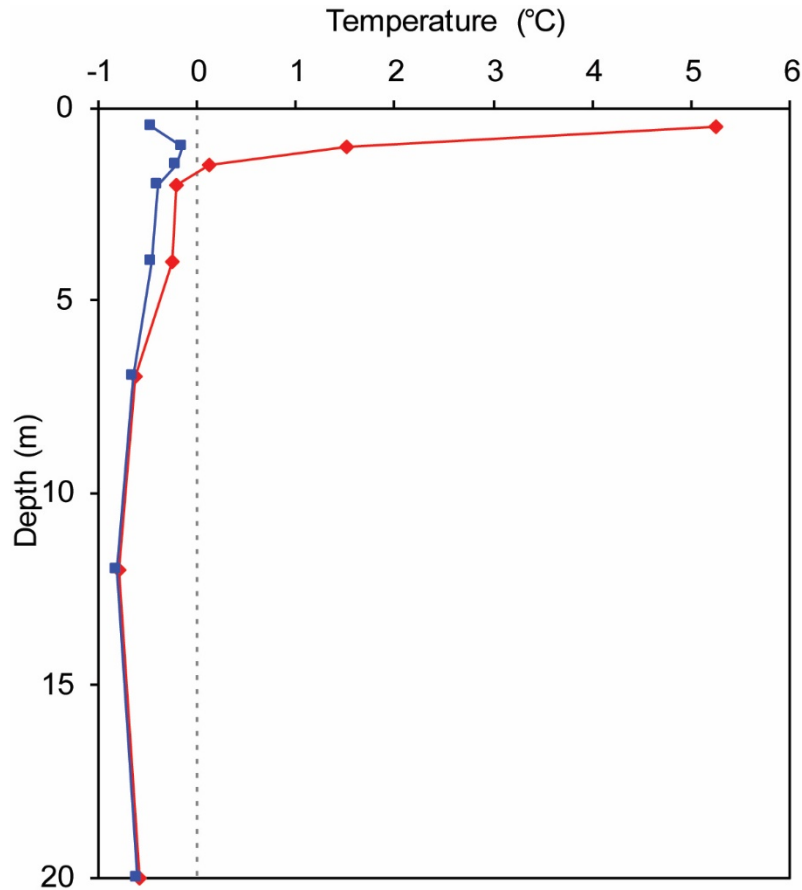
Elevation: 54 m a.s.l.

Landform: Lacustrine undulating plain, well-drained elevated area

Vegetation cover: Peat cover on edge of open, mature black spruce forest

Thaw Depth: 1.54 m

Site visit: September 21, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	5.25	-0.45
1	1.51	-0.15
1.5	0.12	-0.21
2	-0.21	-0.39
4	-0.25	-0.46
7	-0.61	-0.64
12	-0.79	-0.81
20	-0.58	-0.61

Elliot Creek — EC-02

Sahtu Settlement Region

Latitude: 65.523 N

Longitude: 127.622 W

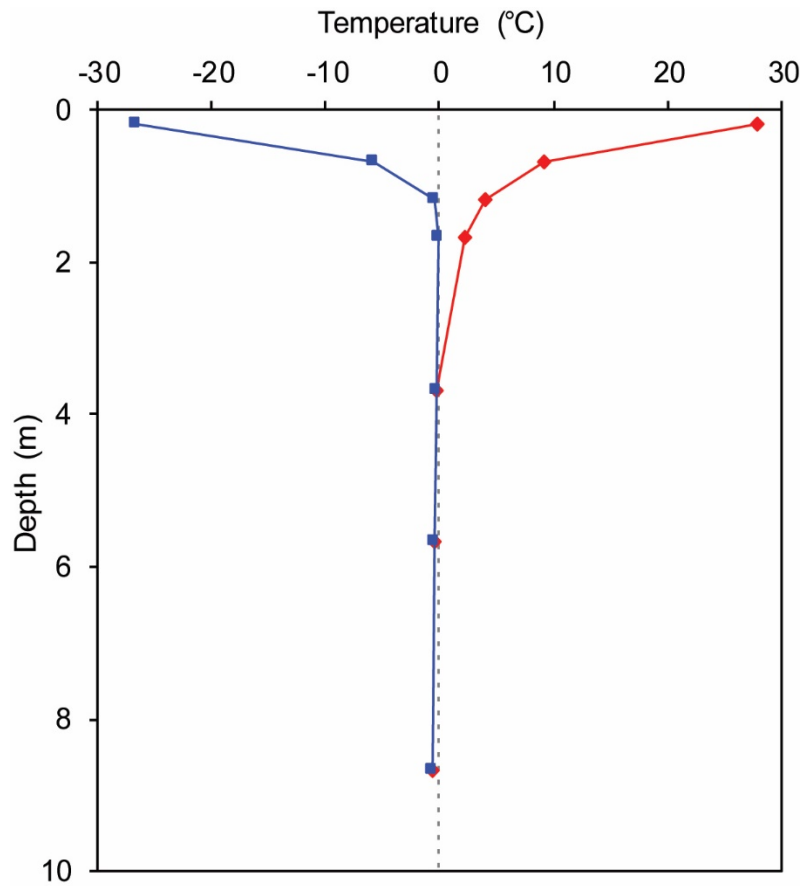
Elevation: 54 m a.s.l.

Landform: Lacustrine plain overlain by alluvial sediments

Vegetation cover: Peat cover on edge of dense, mature black spruce forest

Thaw Depth: 2.29 m

Site visit: September 21, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.183	27.75	-26.50
0.683	9.24	-5.84
1.183	4.03	-0.39
1.683	2.21	-0.06
3.683	-0.29	-0.33
5.683	-0.40	-0.44
8.683	-0.53	-0.57

Oscar Creek — OC-01

Sahtu Settlement Region

Latitude: 65.437 N

Longitude: 127.438 W

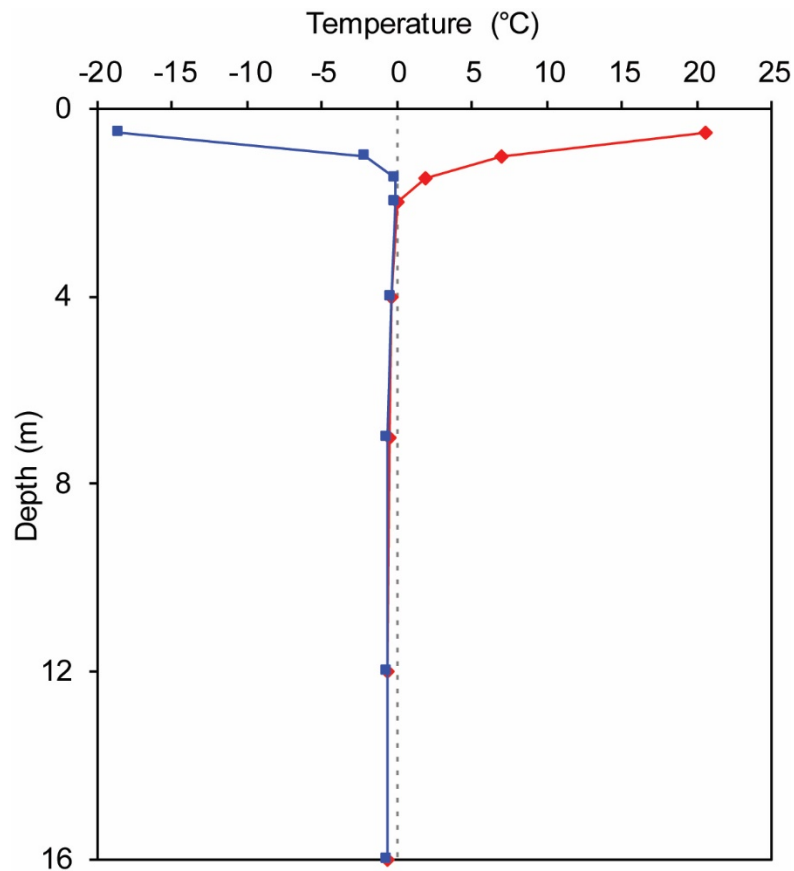
Elevation: 64 m a.s.l.

Landform: Undulating glaciolacustrine terrain overlain by alluvial sediments

Vegetation cover: Peat cover with dense-forested birch and black spruce

Thaw Depth: 2.01 m

Site visit: September 21, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	20.56	-18.46
1	6.97	-2.05
1.5	1.94	-0.08
2	0.02	-0.14
4	-0.33	-0.38
7	-0.54	-0.58
12	-0.57	-0.62
16	-0.64	-0.68

Billy Creek North — BCN-01

Sahtu Settlement Region

Latitude: 65.403 N

Longitude: 127.318 W

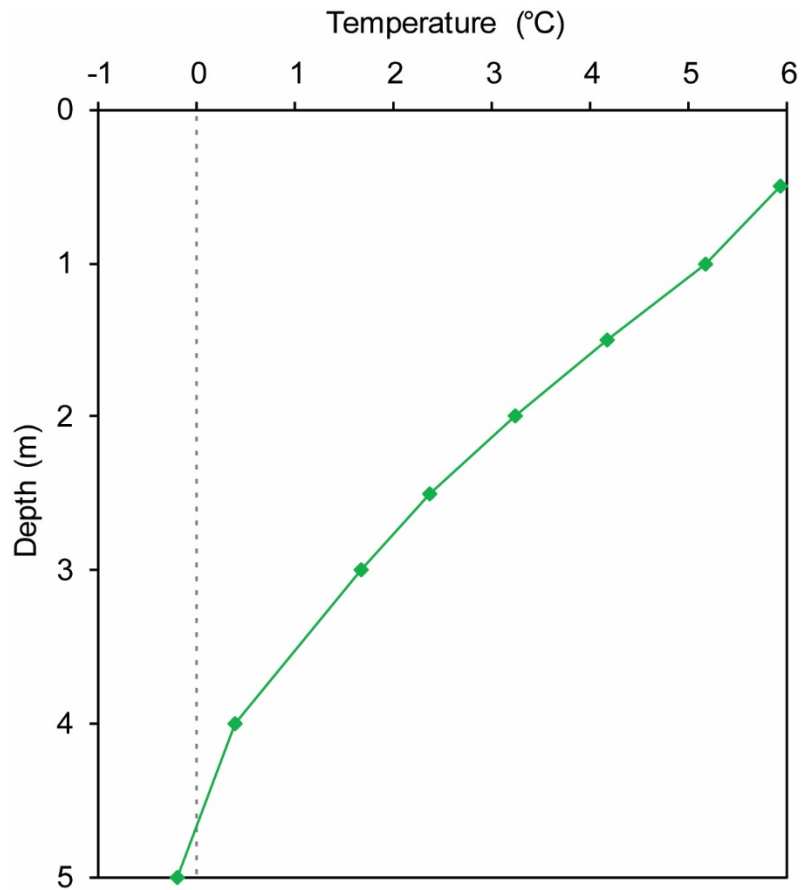
Elevation: 90 m a.s.l.

Landform: Alluvial and eolian sediments overlying low-lying lacustrine plain

Vegetation cover: Peat cover with dense-forested black spruce and mixed shrub

Thaw Depth: 4.29 m

Site visit: September 21, 2017



Depth (m)	Temp (°C)
0.5	5.92
1	5.16
1.5	4.17
2	3.23
2.5	2.36
3	1.67
4	0.38
5	-0.2

Kee Scarp - HT

Sahtu Settlement Region

Latitude: 65.308 N

Longitude: 126.720 W

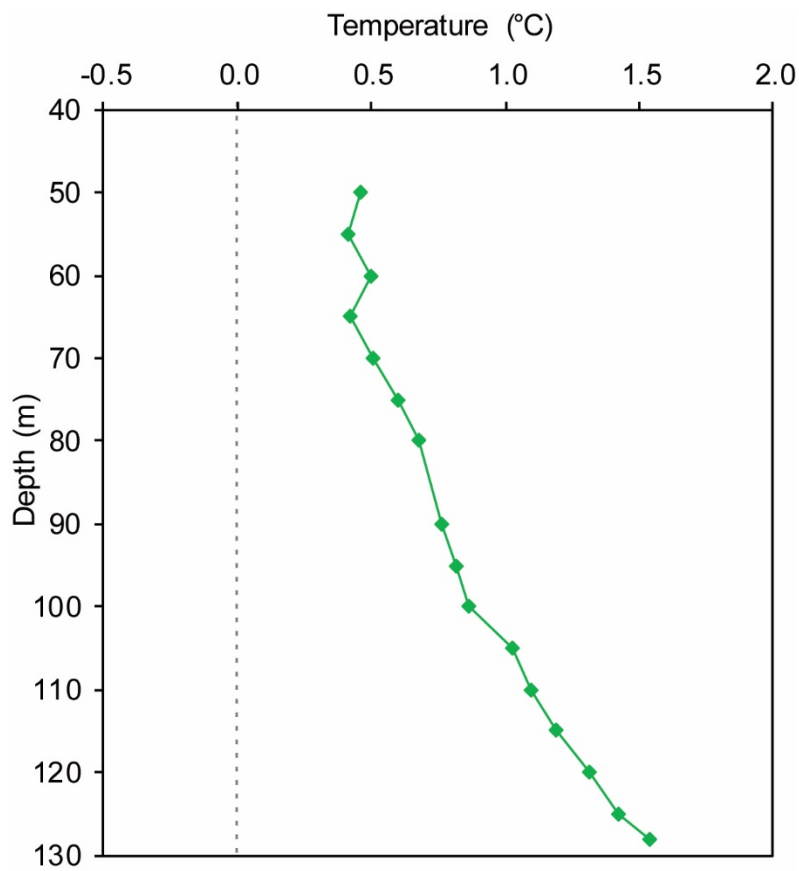
Elevation: 270 m a.s.l.

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 23, 2017



Depth (m)	Temp (°C)
50	0.46
55	0.41
60	0.5
65	0.42
70	0.51
75	0.6
80	0.68
90	0.76
95	0.82
100	0.86
105	1.03
110	1.1
115	1.19
120	1.31
125	1.42
128	1.54

Norman Wells pump station — 84-1-T4

Sahtu Settlement Region

Latitude: 65.290 N

Longitude: 126.885 W

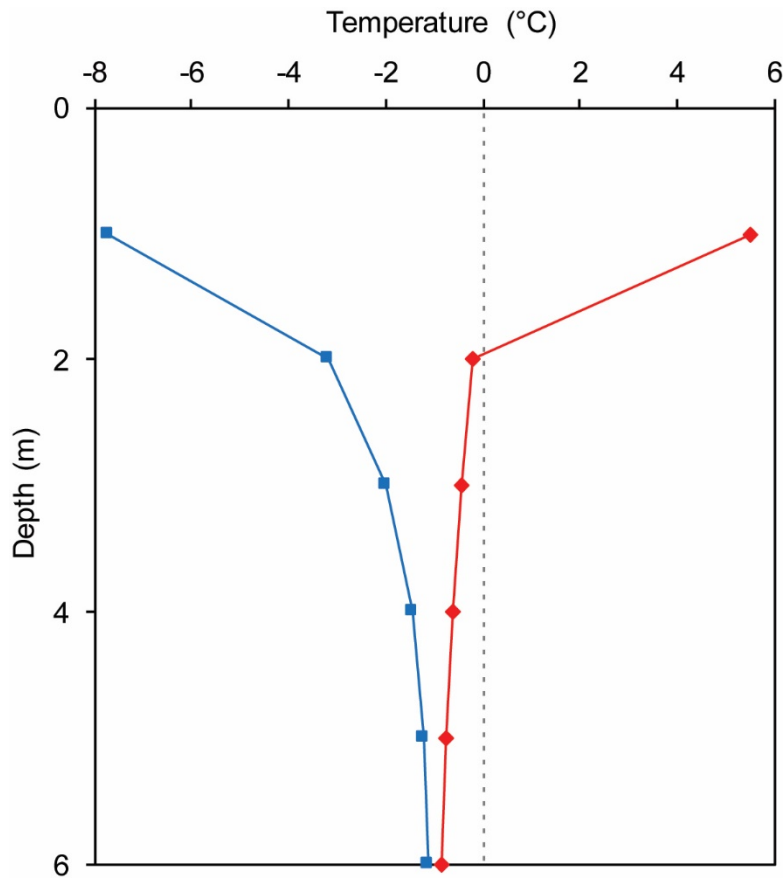
Elevation: 61 m a.s.l.

Landform: Ground moraine

Vegetation cover: Moss, lichen, ericaceous shrubs with black spruce and tamarack

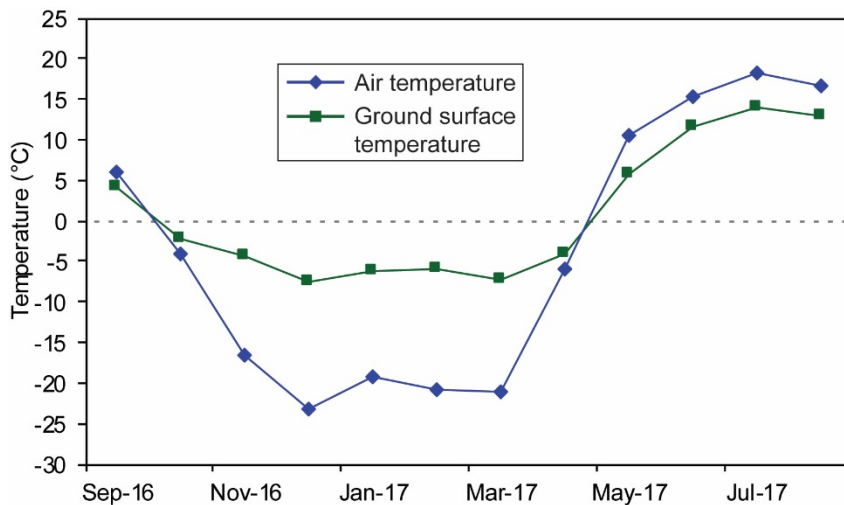
Thaw Depth: 1.96 m

Site visit: September 23, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
1	5.50	-7.72
2	-0.23	-3.19
3	-0.45	-2.01
4	-0.60	-1.45
5	-0.75	-1.19
6	-0.87	-1.12

Month / Year	Temperature (°C)	
	Air	Surface
Sep / 2016	5.92	4.07
Oct / 2016	-4.16	-2.31
Nov / 2016	-16.57	-4.48
Dec / 2016	-23.34	-7.58
Jan / 2017	-19.11	-6.30
Feb / 2017	-20.77	-5.93
Mar / 2017	-21.15	-7.37
Apr / 2017	-6.03	-4.19
May / 2017	10.63	5.81
Jun / 2017	15.17	11.60
Jul / 2017	18.17	13.88
Aug / 2017	16.62	12.95



Norman Wells Arena

Sahtu Settlement Region

Latitude: 65.281 N

Longitude: 126.837 W

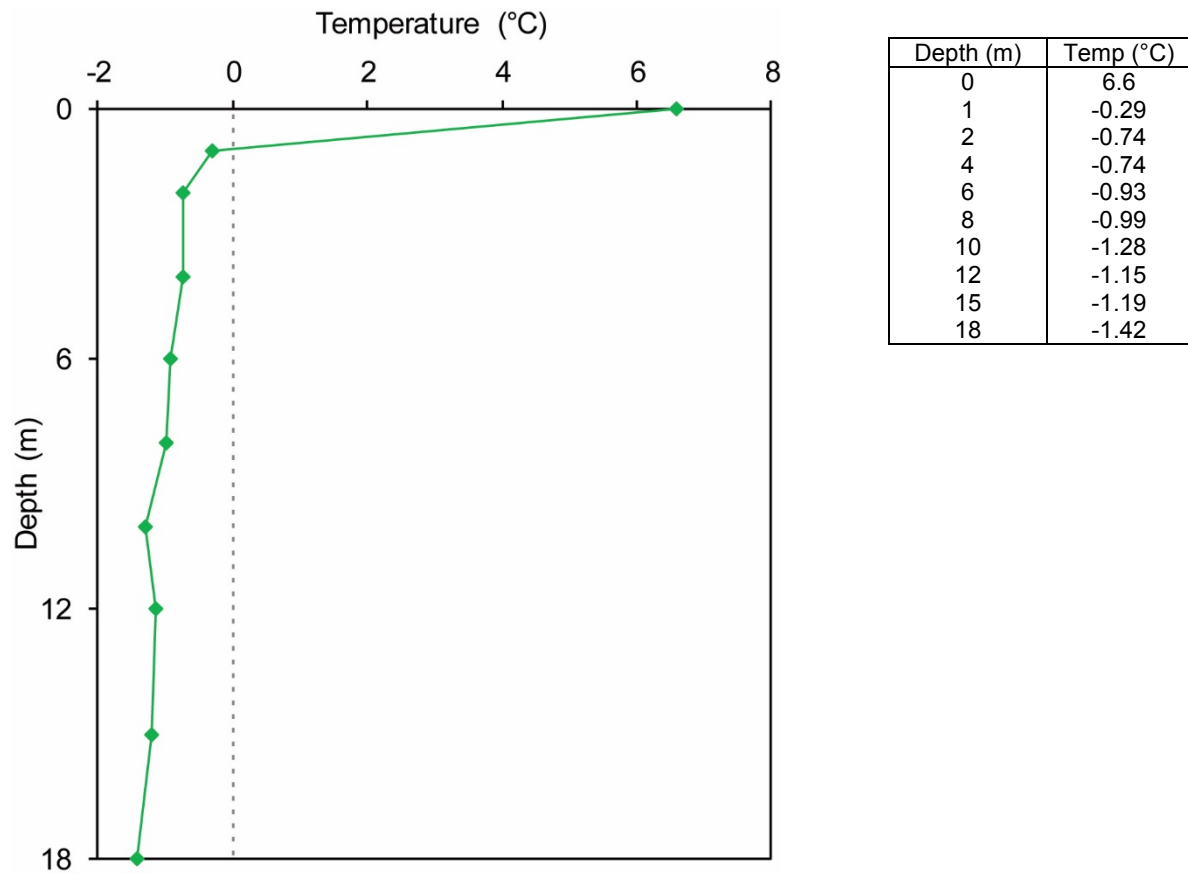
Elevation: 80 m a.s.l.

Landform: Ground moraine

Vegetation cover: Disturbed area adjacent to parking lot

Thaw Depth: 0.96 m

Site visit: September 21, 2017



Norman Wells water treatment plant

Sahtu Settlement Region

Latitude: 65.282 N

Longitude: 126.833 W

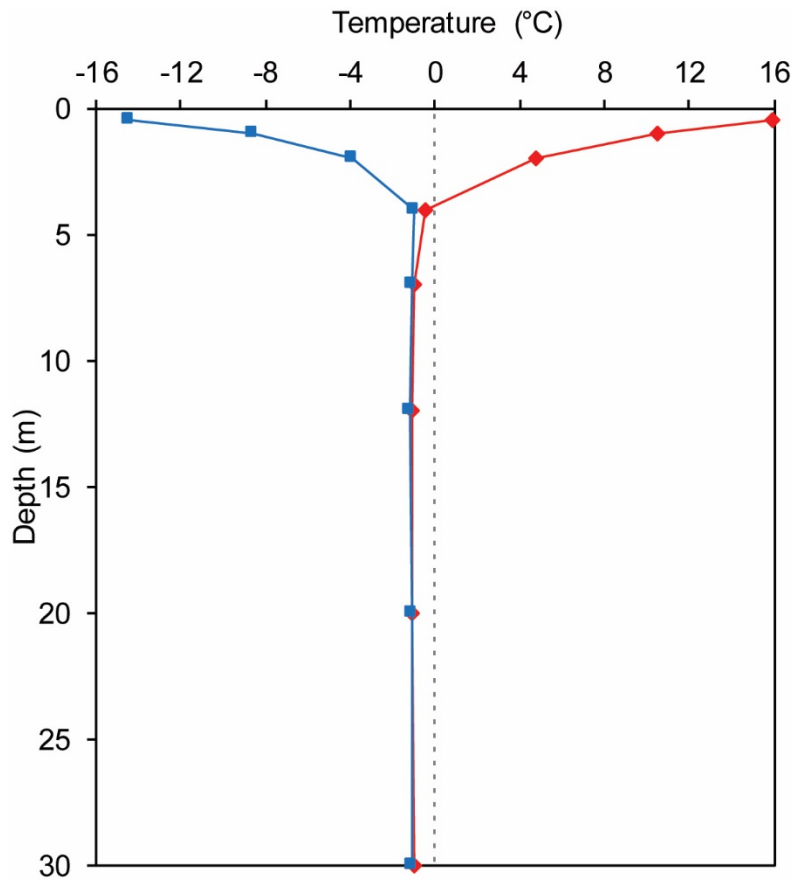
Elevation: 80 m a.s.l.

Landform: Ground moraine

Vegetation cover: Disturbed area adjacent to parking lot

Thaw Depth: 2.85 m

Site visit: September 21, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	15.88	-14.37
1	10.46	-8.53
2	4.81	-3.93
4	-0.49	-0.93
7	-0.93	-1.07
12	-1.11	-1.16
20	-1.07	-1.11
30	-1.01	-1.02

Van Everdingen 30m

Sahtu Settlement Region

Latitude: 65.273 N

Longitude: 126.754 W

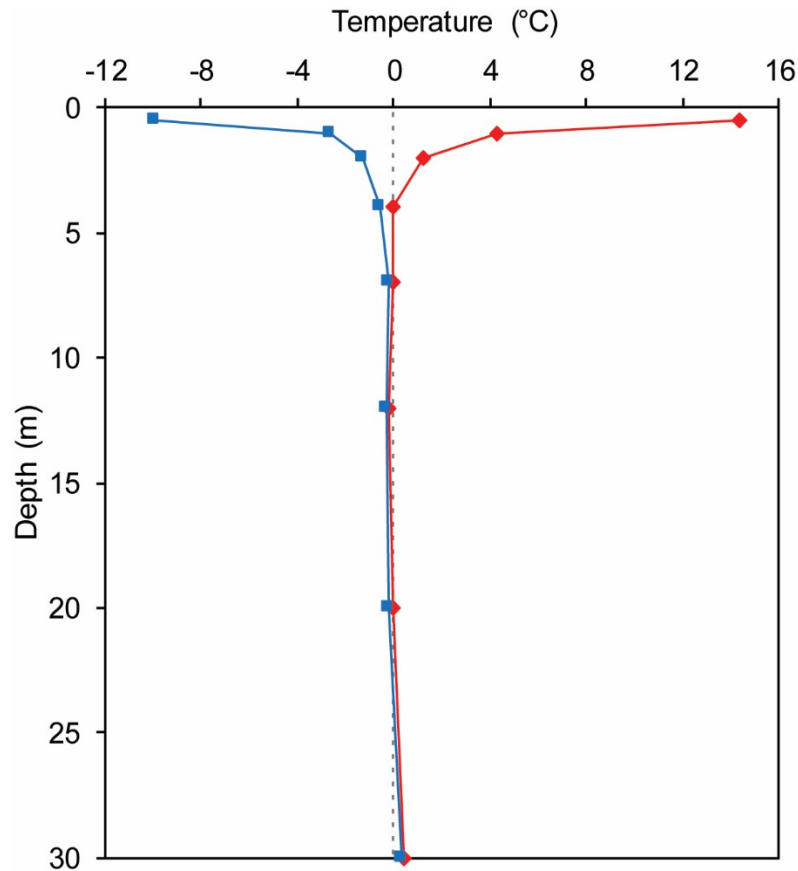
Elevation: n/a

Landform: Lacustrine plain

Vegetation cover: Open forest, moss, shrub, spruce/tamarack

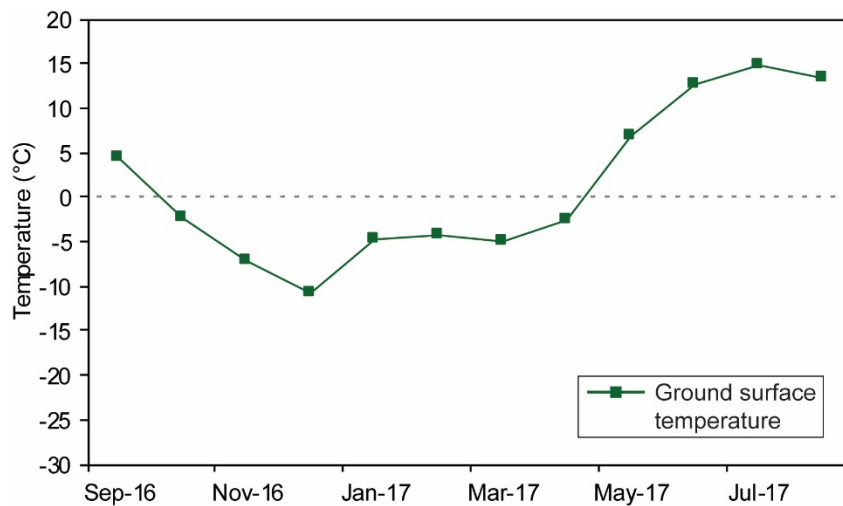
Thaw Depth: 2.39 m

Site visit: September 23, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	14.32	-9.95
1.0	4.29	-2.65
2.0	1.21	-1.26
4.0	-0.01	-0.57
7.0	0.01	-0.24
12.0	-0.23	-0.32
20.0	-0.03	-0.19
30.0	0.39	0.34

Month / Year	Temperature (°C)	
	Air	Surface
Sep / 2016	n/a	4.42
Oct / 2016	n/a	-2.29
Nov / 2016	n/a	-7.26
Dec / 2016	n/a	-10.89
Jan / 2017	n/a	-4.65
Feb / 2017	n/a	-4.26
Mar / 2017	n/a	-5.05
Apr / 2017	n/a	-2.57
May / 2017	n/a	6.88
Jun / 2017	n/a	12.53
Jul / 2017	n/a	14.87
Aug / 2017	n/a	13.41



Canyon Creek North A — 84-2A-T4

Sahtu Settlement Region

Latitude: 65.234 N

Longitude: 126.526 W

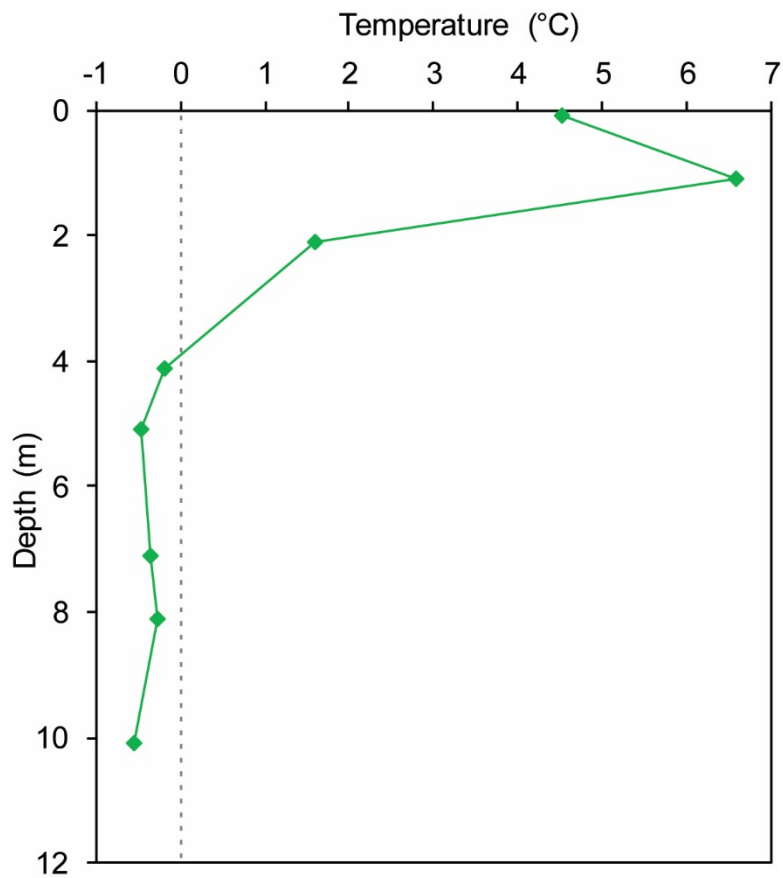
Elevation: 110 m a.s.l.

Landform: Ground moraine

Vegetation cover: Lichen, moss, ericaceous shrubs with black spruce and tamarack

Thaw Depth: 2.42 m

Site visit: September 21, 2017



Depth (m)	Temp (°C)
0.1	4.51
1.1	6.58
2.1	1.61
4.1	-0.18
5.1	-0.46
7.1	-0.35
8.1	-0.26
10.1	-0.54

Canyon Creek North A — 84-2A-HT

Sahtu Settlement Region

Latitude: 65.234 N

Longitude: 126.526 W

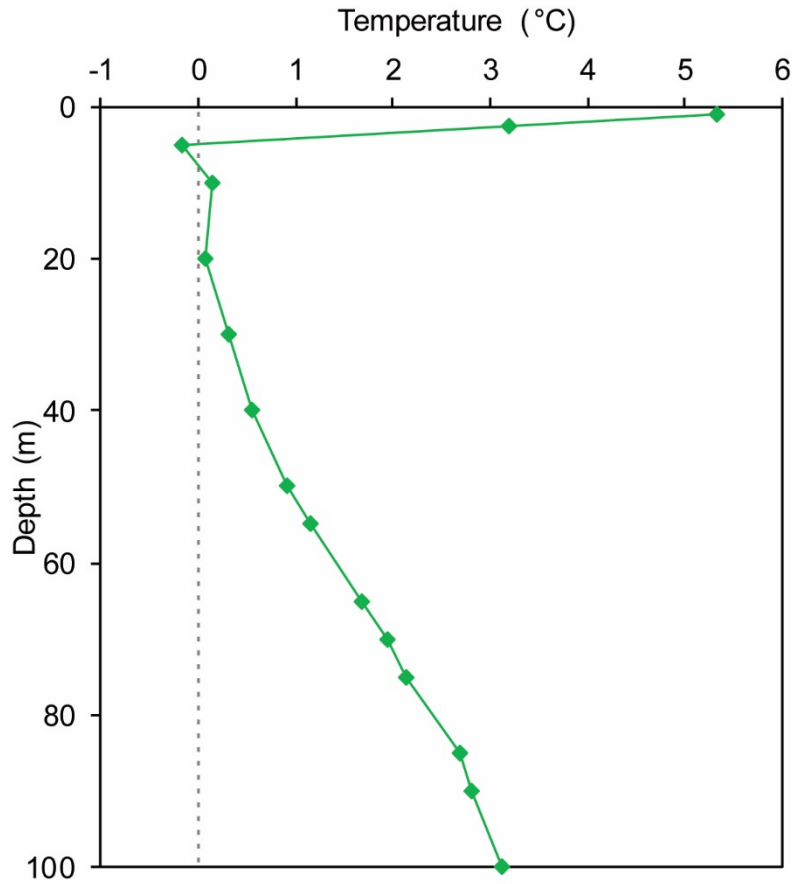
Elevation: 110 m a.s.l.

Landform: Ground moraine

Vegetation cover: Lichen, moss, ericaceous shrubs with black spruce and tamarack

Thaw Depth: 4.75 m

Site visit: September 21, 2017



Depth (m)	Temp (°C)
1	5.33
2.5	3.2
5	-0.18
10	0.15
20	0.07
30	0.3
40	0.54
50	0.92
55	1.16
65	1.67
70	1.94
75	2.14
85	2.68
90	2.82
100	3.11

Canyon Creek North B — 84-2B-T4

Sahtu Settlement Region

Latitude: 65.232 N

Longitude: 126.520 W

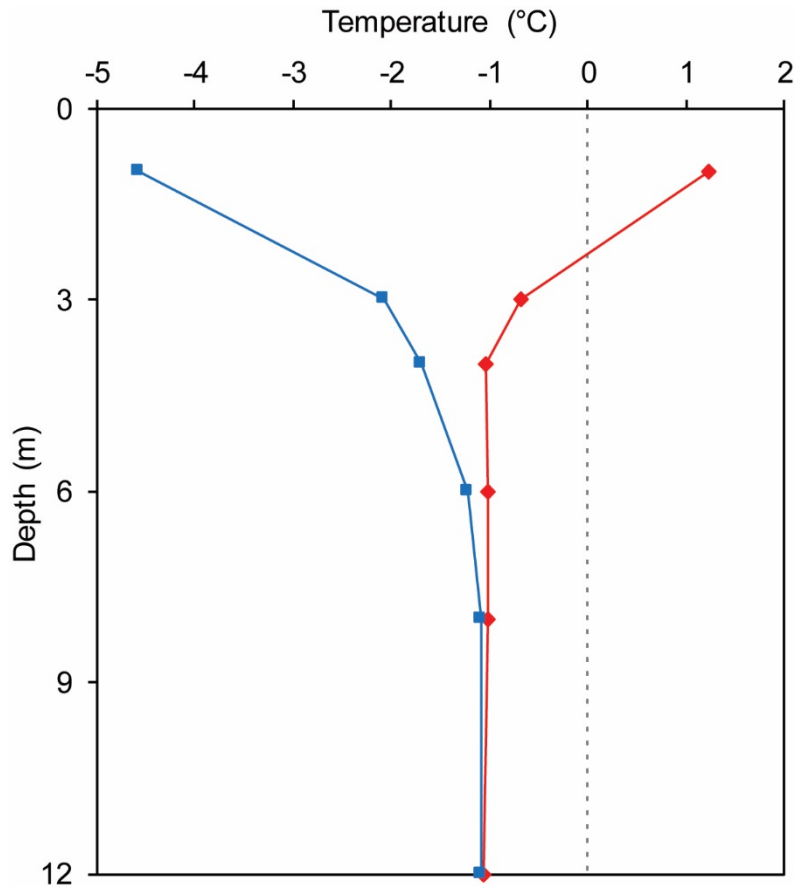
Elevation: 110 m a.s.l.

Landform: Ground moraine

Vegetation cover: Moss with white spruce

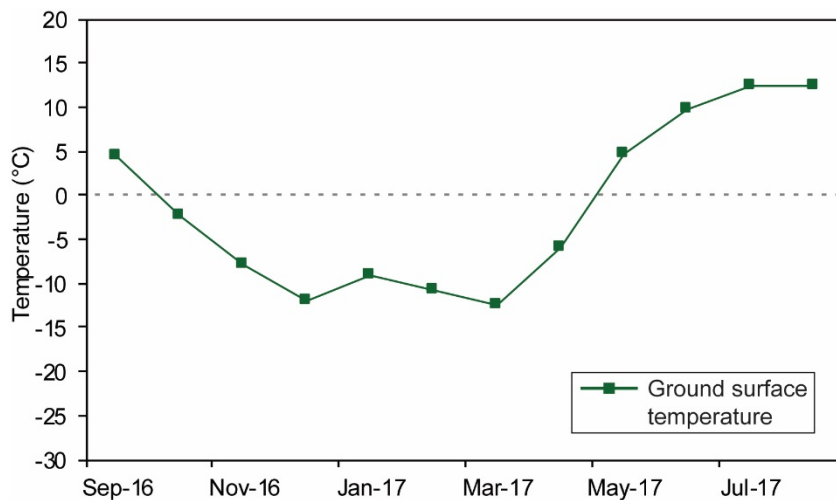
Thaw Depth: 2.29 m

Site visit: September 21, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
1	1.24	-4.57
3	-0.68	-2.07
4	-1.03	-1.70
6	-1.02	-1.23
8	-1.01	-1.08
12	-1.06	-1.09
18	-0.75	-0.77

Month / Year	Temperature (°C)	
	Air	Surface
Sept / 2016	n/a	4.47
Oct / 2016	n/a	-2.46
Nov / 2016	n/a	-7.93
Dec / 2016	n/a	-11.92
Jan / 2017	n/a	-9.13
Feb / 2017	n/a	-10.76
Mar / 2017	n/a	-12.55
Apr / 2017	n/a	-5.95
May / 2017	n/a	4.71
Jun / 2017	n/a	9.64
Jul / 2017	n/a	12.42
Aug / 2017	n/a	12.47



Vermillion Creek — VC-01

Sahtu Settlement Region

Latitude: 65.098 N

Longitude: 126.137 W

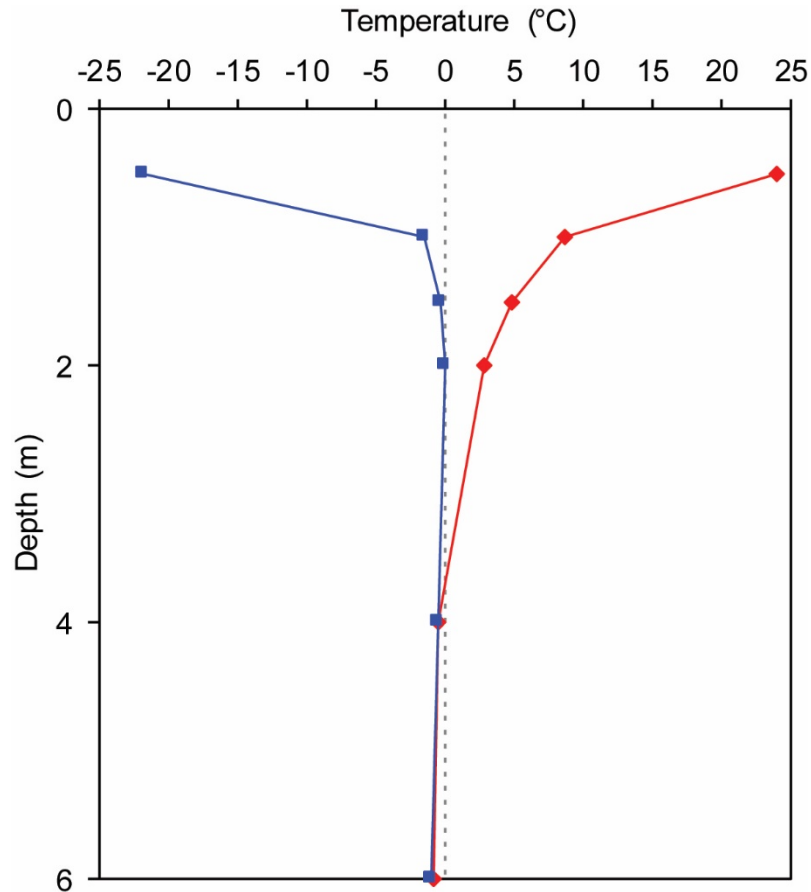
Elevation: 92 m a.s.l.

Landform: Moraine plain (site at approach to water crossing)

Vegetation cover: NW side of creek, on top of ridge in black spruce forest

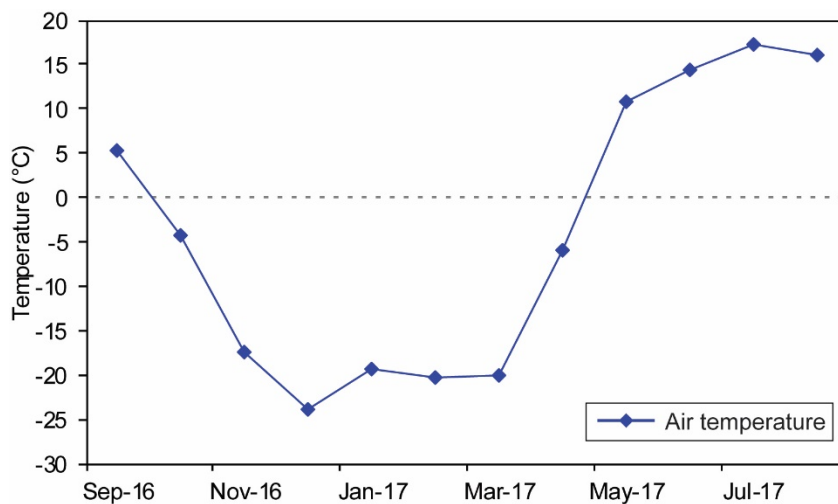
Thaw Depth: 2.75 m

Site visit: September 22, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	23.97	-21.83
1	8.62	-1.47
1.5	4.87	-0.31
2	2.93	-0.02
4	-0.43	-0.49
6	-0.85	-0.90

Month / Year	Temperature (°C)	
	Air	Surface
Sept / 2016	5.21	n/a
Oct / 2016	-4.36	n/a
Nov / 2016	-17.32	n/a
Dec / 2016	-23.93	n/a
Jan / 2017	-19.30	n/a
Feb / 2017	-20.34	n/a
Mar / 2017	-19.95	n/a
Apr / 2017	-6.07	n/a
May / 2017	10.76	n/a
Jun / 2017	14.49	n/a
Jul / 2017	17.34	n/a
Aug / 2017	16.09	n/a



Vermillion Creek — VC-02

Sahtu Settlement Region

Latitude: 65.095 N

Longitude: 126.127 W

Elevation: 92 m a.s.l.

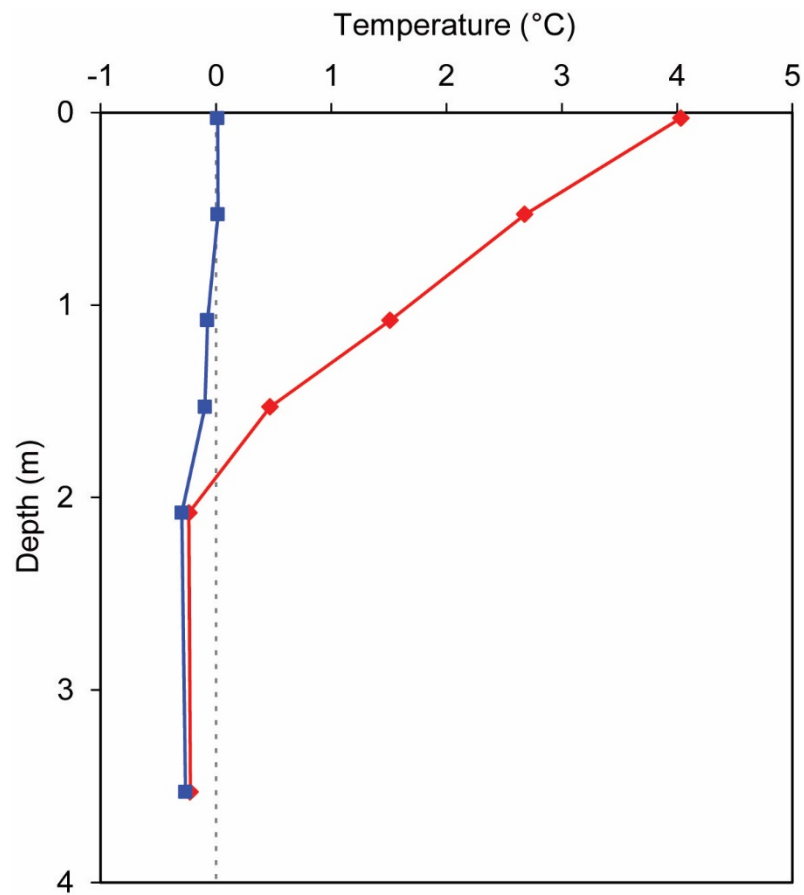
Landform: Moraine plain (site at approach to water crossing)

Vegetation cover: SE side of creek on plateau in area of burnt black spruce

Thaw Depth: 1.73 m

Site visit: September 22, 2017

Note: 0.03 to 0.53 m temperatures may be $\sim 0^{\circ}\text{C}$ (within measurement error)



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.03	3.48	-0.03
0.53	2.36	0.00
1.08	0.51	-0.11
1.53	-0.21	-0.23
2.08	-0.22	-0.26
3.53	1.39	-0.10

Police Island — PI-01

Sahtu Settlement Region

Latitude: 64.836 N

Longitude: 125.015 W

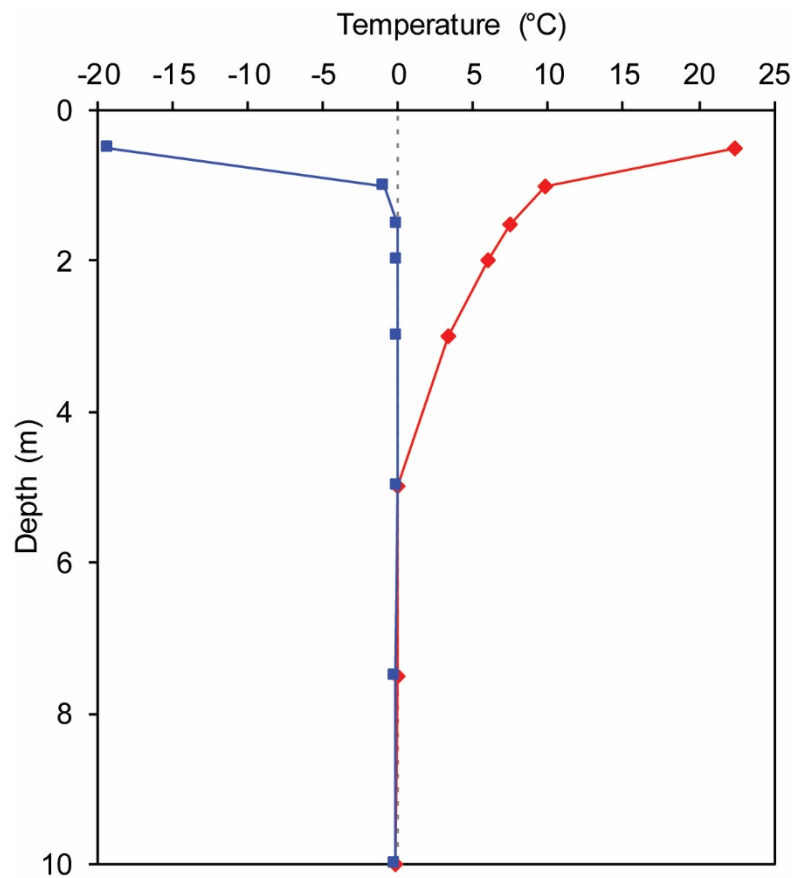
Elevation: 113 m a.s.l.

Landform: Lacustrine plain

Vegetation cover: Recovering burn (burnt black spruce forest)

Thaw Depth: 5.02 m

Site visit: September 22, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	22.34	-19.20
1	9.79	-0.96
1.5	7.45	0.02
2	5.97	0.00
3	3.28	-0.06
5	0.04	-0.01
7.5	-0.07	-0.11
10	-0.15	-0.18

Police Island — PI-02

Sahtu Settlement Region

Latitude: 64.835 N

Longitude: 125.014 W

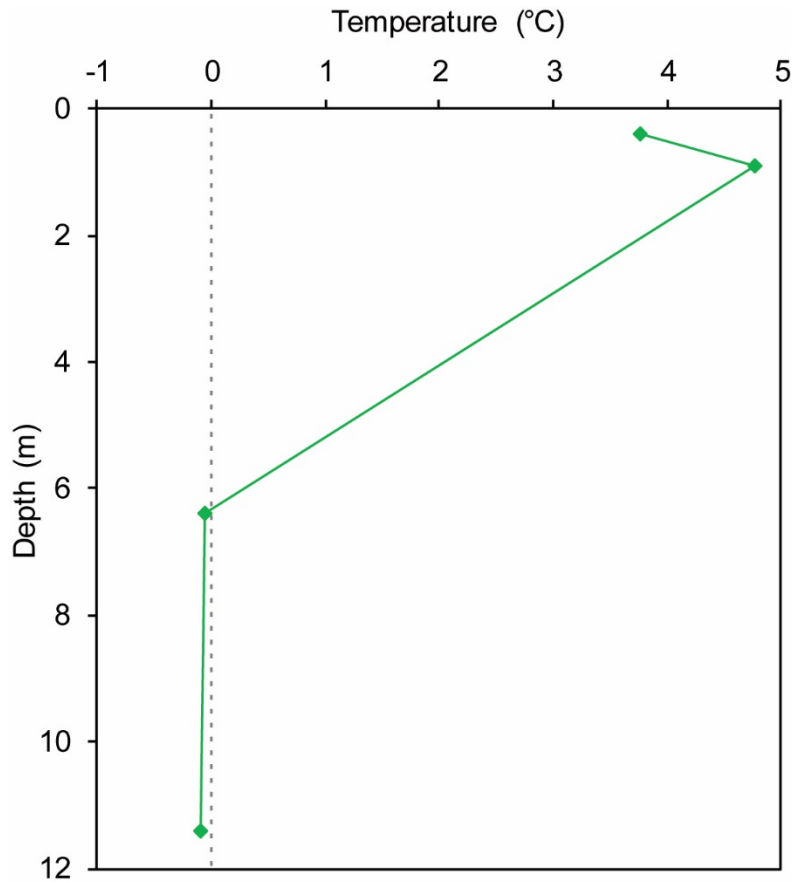
Elevation: 113 m a.s.l.

Landform: Lacustrine plain

Vegetation cover: Unburnt, black spruce forest with moss and lichen ground cover

Thaw Depth: 6.33 m

Site visit: September 22, 2017



Depth (m)	Temp (°C)
0.4	3.77
0.9	4.77
6.4	-0.06
11.4	-0.09

Old Fort Point — OFP-01

Sahtu Settlement Region

Latitude: 64.654 N

Longitude: 124.848 W

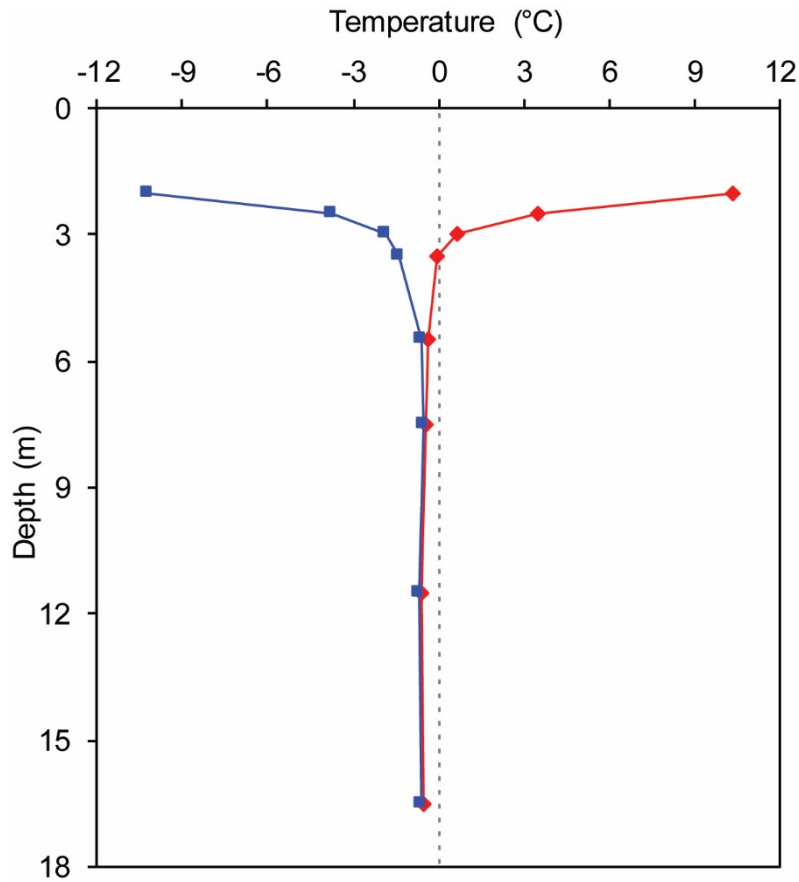
Elevation: 112 m a.s.l.

Landform: Lacustrine plain

Vegetation cover: Open mixed spruce, pine deciduous forest adjacent to open, low-lying fen

Thaw Depth: 3.11 m

Site visit: September 22, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
2	10.39	-10.24
2.5	3.50	-3.76
3	0.65	-1.89
3.5	-0.04	-1.35
5.5	-0.38	-0.57
7.5	-0.45	-0.50
11.5	-0.61	-0.65
16.5	-0.55	-0.59

Little Smith Creek — LS-01

Sahtu Settlement Region

Latitude: 64.433 N

Longitude: 124.740 W

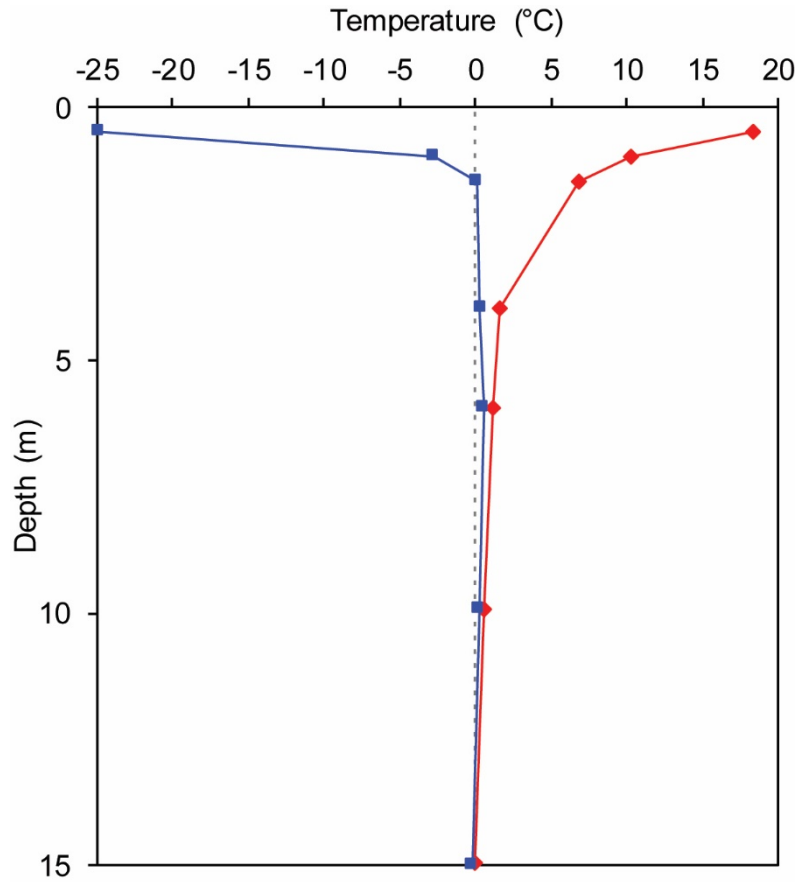
Elevation: 80 m a.s.l.

Landform: Alluvial flood plain

Vegetation cover: Open mature black spruce forest

Thaw Depth: 13.20 m

Site visit: September 22, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.45	18.35	-24.76
0.95	10.22	-2.75
1.45	6.79	0.13
3.95	1.65	0.49
5.95	1.24	0.59
9.95	0.56	0.33
14.95	-0.06	-0.18

Little Smith Creek— LS-02

Sahtu Settlement Region

Latitude: 64.429 N

Longitude: 124.733 W

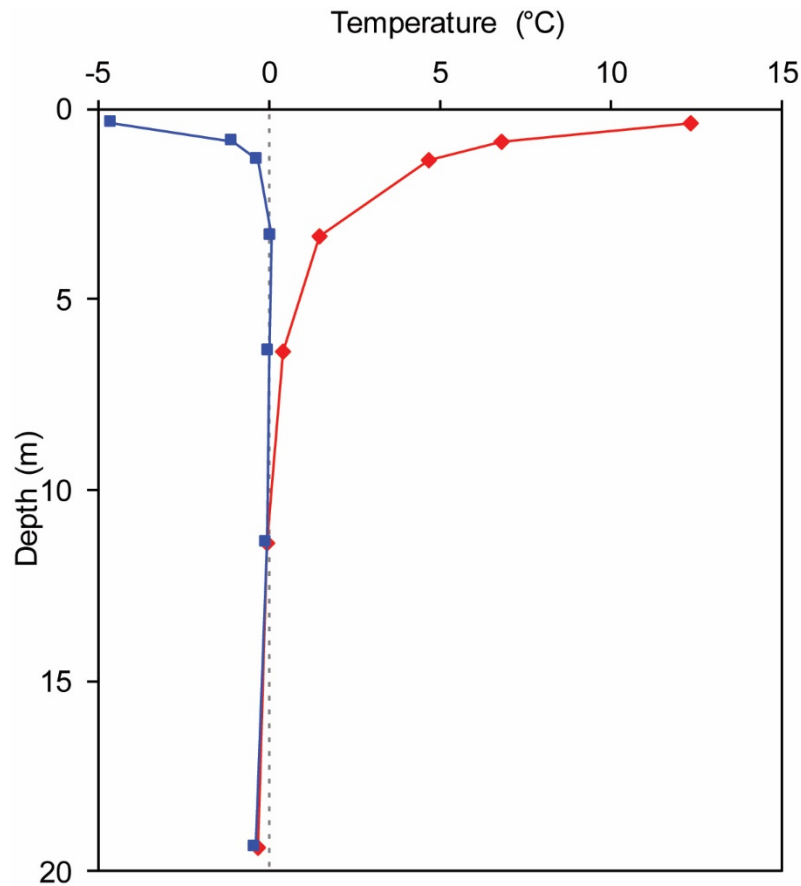
Elevation: 112 m a.s.l.

Landform: Glaciofluvial outwash plain

Vegetation cover: Tamarack birch poplar, and pine forest transition to spruce

Thaw Depth: 7.53 m

Site visit: September 22, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.36	12.30	-4.56
0.86	6.81	-1.07
1.36	4.68	-0.34
3.36	1.46	0.11
6.36	0.41	0.02
11.36	-0.04	-0.05
19.36	-0.34	-0.34

Saline River — SR-02

Sahtu Settlement Region

Latitude: 64.290 N

Longitude: 124.485 W

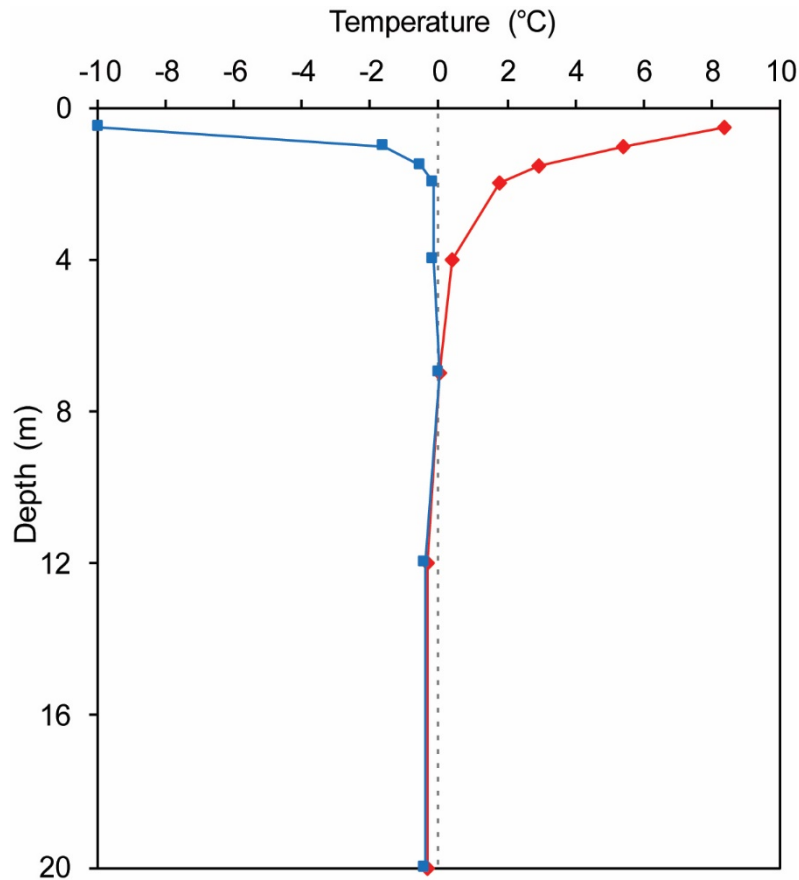
Elevation: 140 m a.s.l.

Landform: Glaciofluvial veneer over lacustrine

Vegetation cover: Burnt black spruce forest

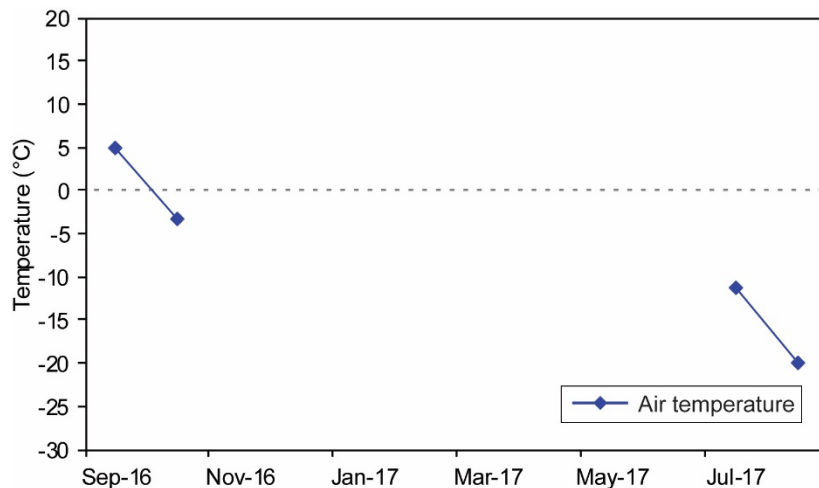
Thaw Depth: 7.19 m

Site visit: September 22, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	8.36	-9.94
1	5.44	-1.58
1.5	2.92	-0.51
2	1.81	-0.17
4	0.38	-0.15
7	0.02	0.01
12	-0.35	-0.38
20	-0.36	-0.37

Month / Year	Temperature (°C)	
	Air	Surface
Sep / 2016	4.97	n/a
Oct / 2016	-3.38	n/a
Nov / 2016	n/a	n/a
Dec / 2016	n/a	n/a
Jan / 2017	n/a	n/a
Feb / 2017	n/a	n/a
Mar / 2017	n/a	n/a
Apr / 2017	n/a	n/a
May / 2017	n/a	n/a
Jun / 2017	n/a	n/a
Jul / 2017	-11.33	n/a
Aug / 2017	-20.05	n/a



Steep Creek — Steep-02 (crest)

Sahtu Settlement Region

Latitude: 64.185 N

Longitude: 124.370 W

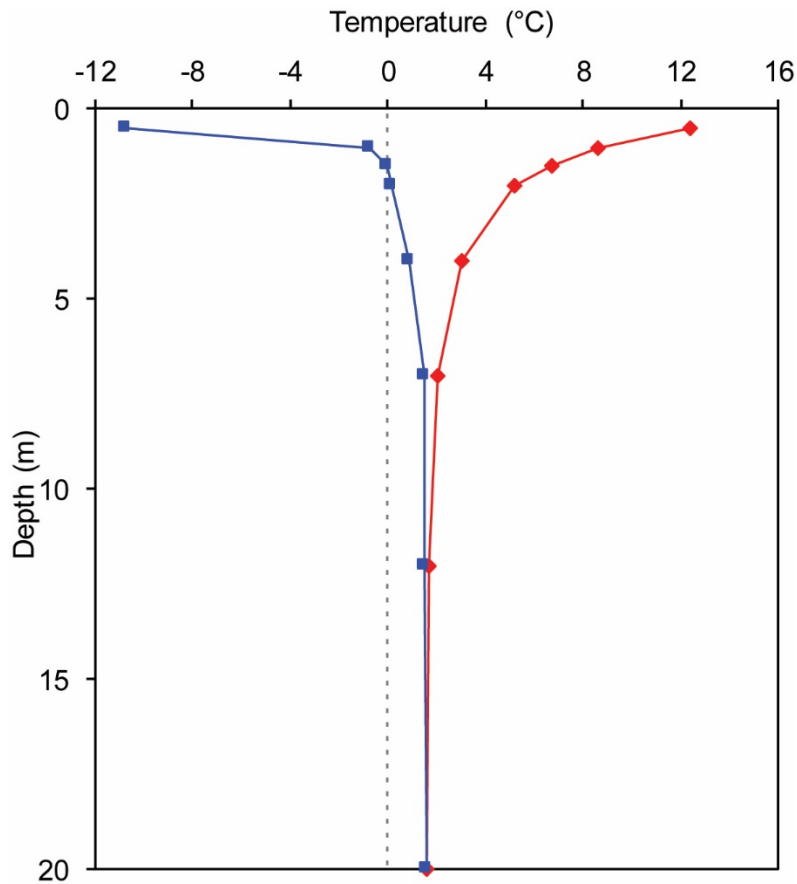
Elevation: 134 m a.s.l.

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, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	12.38	-10.71
1	8.62	-0.77
1.5	6.72	-0.05
2	5.22	0.16
4	3.05	0.86
7	2.01	1.50
12	1.66	1.54
20	1.61	1.55

Table Mountain A — 85-7A-HA108

Deh cho Settlement Region

Latitude: 63.613 N

Longitude: 123.645 W

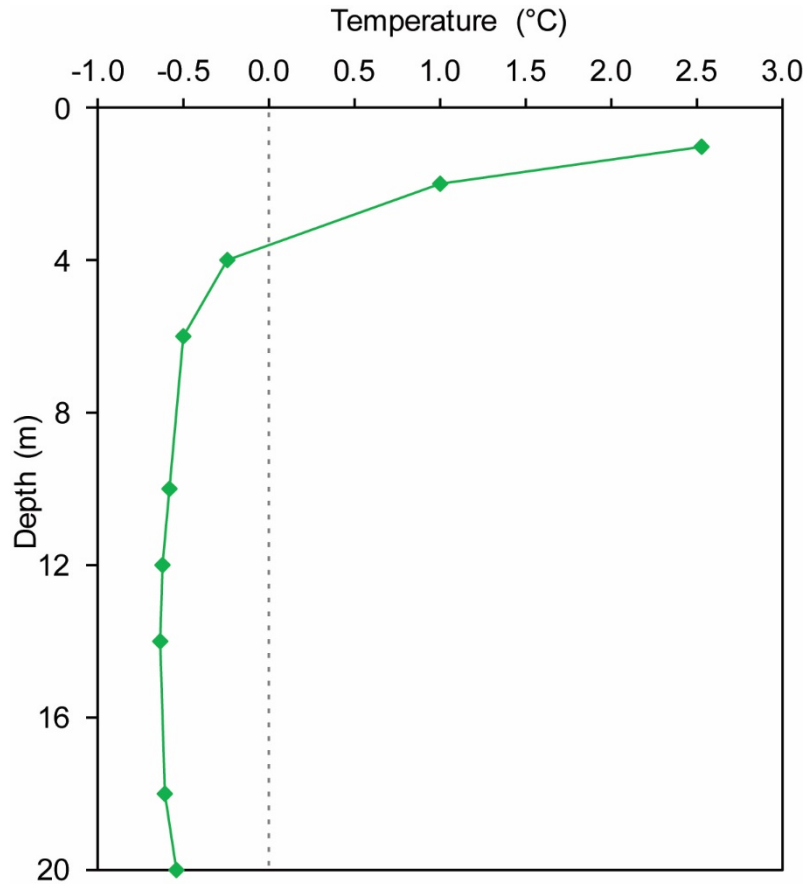
Elevation: 255 m a.s.l.

Landform: Ground moraine

Vegetation cover: Lichen, moss, ericaceous shrubs with black spruce and alder

Thaw Depth: 2.66 m

Site visit: September 22, 2017



Depth (m)	Temp (°C)
1	2.53
2	1.01
4	-0.23
6	-0.49
10	-0.57
12	-0.62
14	-0.63
18	-0.6
20	-0.53

KP313 T2

Deh cho Settlement Region

Latitude: 63.262 N

Longitude: 123.425 W

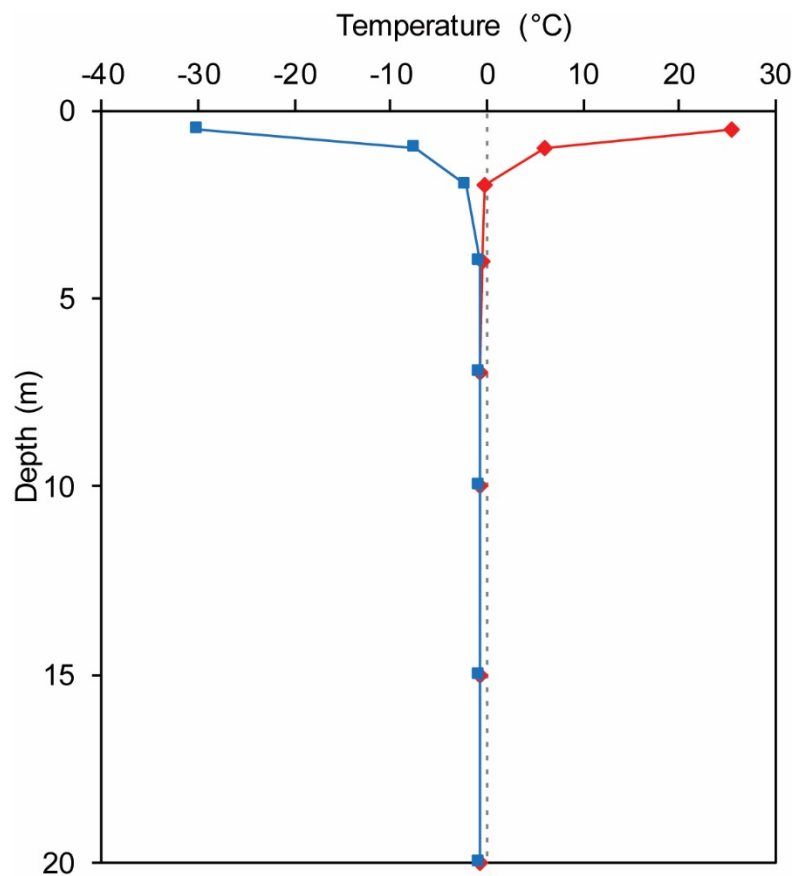
Elevation: 250 m a.s.l.

Landform: Lacustrine plain, bottom of slope

Vegetation cover: Moss cover and peat, forested, mix of birch and spruce

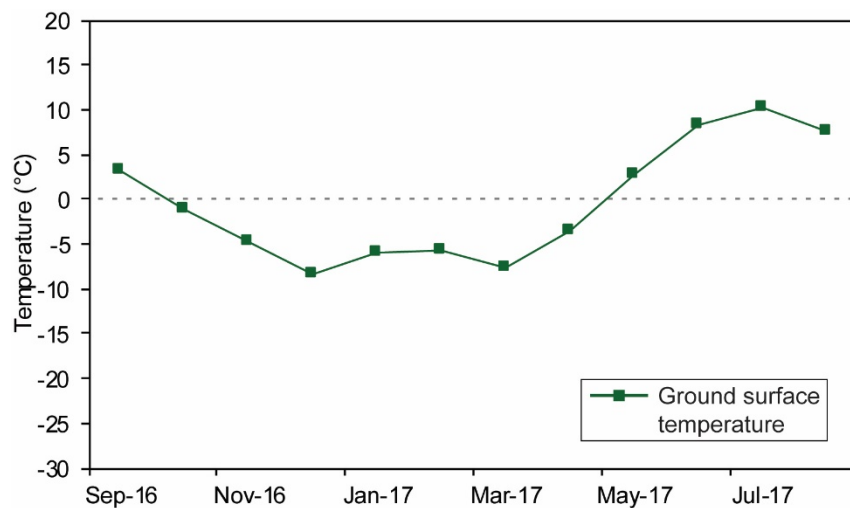
Thaw Depth: 1.15 m

Site visit: September 22, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	25.42	-30.07
1	5.93	-7.37
2	-0.23	-2.05
4	-0.59	-0.83
7	-0.65	-0.69
10	-0.68	-0.72
15	-0.74	-0.76
20	-0.81	-0.82

Month / Year	Temperature (°C)	
	Air	Surface
Sept / 2016	n/a	3.24
Oct / 2016	n/a	-1.20
Nov / 2016	n/a	-4.87
Dec / 2016	n/a	-8.41
Jan / 2017	n/a	-6.06
Feb / 2017	n/a	-5.80
Mar / 2017	n/a	-7.63
Apr / 2017	n/a	-3.45
May / 2017	n/a	2.67
Jun / 2017	n/a	8.37
Jul / 2017	n/a	10.14
Aug / 2017	n/a	7.64



KP313 T4

Deh cho Settlement Region

Latitude: 63.262 N

Longitude: 123.425 W

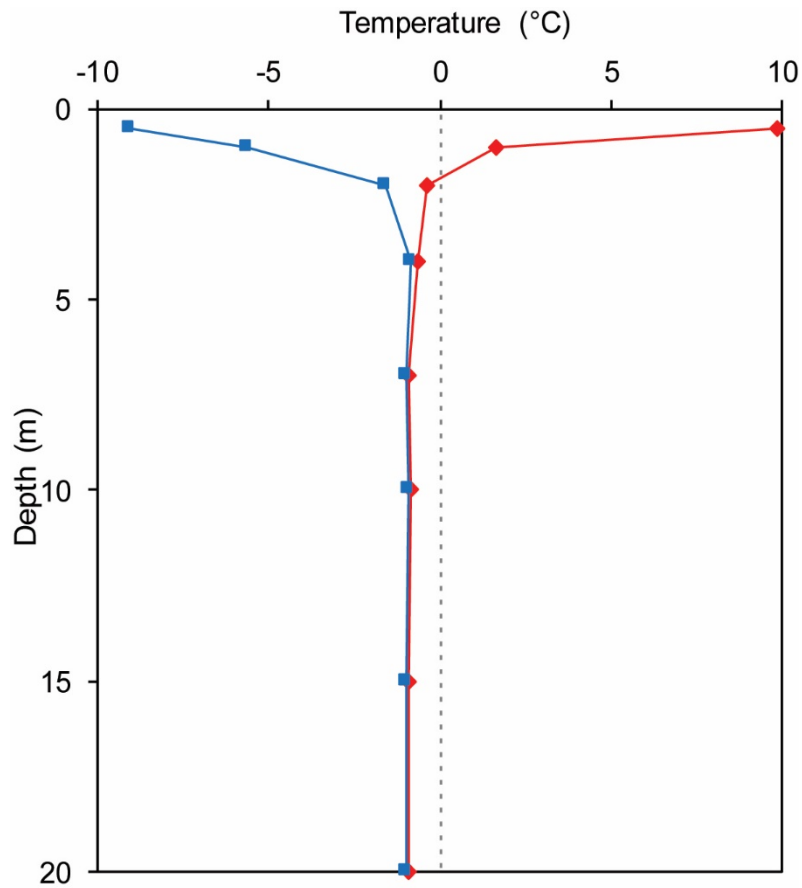
Elevation: 250 m a.s.l.

Landform: Lacustrine plain, mid slope, W side of ROW

Vegetation cover: Moss cover and peat, forested, mix of birch and spruce

Thaw Depth: 1.10 m

Site visit: September 22, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	9.82	-9.06
1	1.64	-5.59
2	-0.37	-1.57
4	-0.66	-0.86
7	-0.90	-1.00
10	-0.86	-0.94
15	-0.92	-0.96
20	-0.90	-0.97

KP313 T5

Deh cho Settlement Region

Latitude: 63.262 N

Longitude: 123.425 W

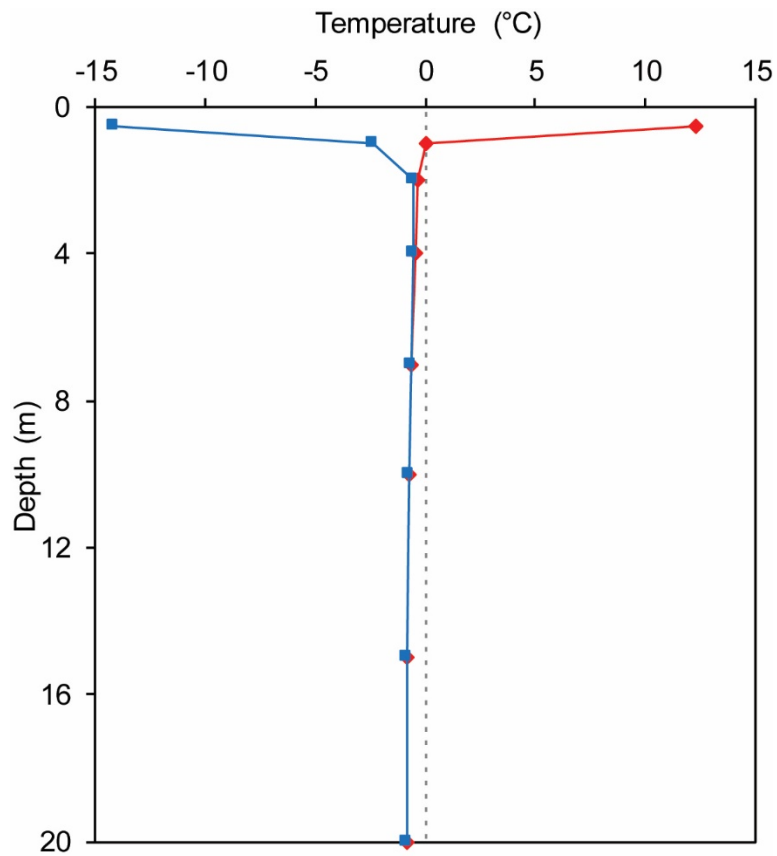
Elevation: 250 m a.s.l.

Landform: Lacustrine plain, mid slope, E side of ROW

Vegetation cover: Moss cover and peat, forested, mix of birch and spruce

Thaw Depth: 1.00 m

Site visit: September 22, 2017



Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	12.26	-14.15
1.0	0.02	-2.35
2.0	-0.39	-0.50
4.0	-0.47	-0.52
7.0	-0.59	-0.64
10.0	-0.73	-0.76
15.0	-0.83	-0.86
20.0	-0.81	-0.83

KP313 T6

Deh cho Settlement Region

Latitude: 63.262 N

Longitude: 123.425 W

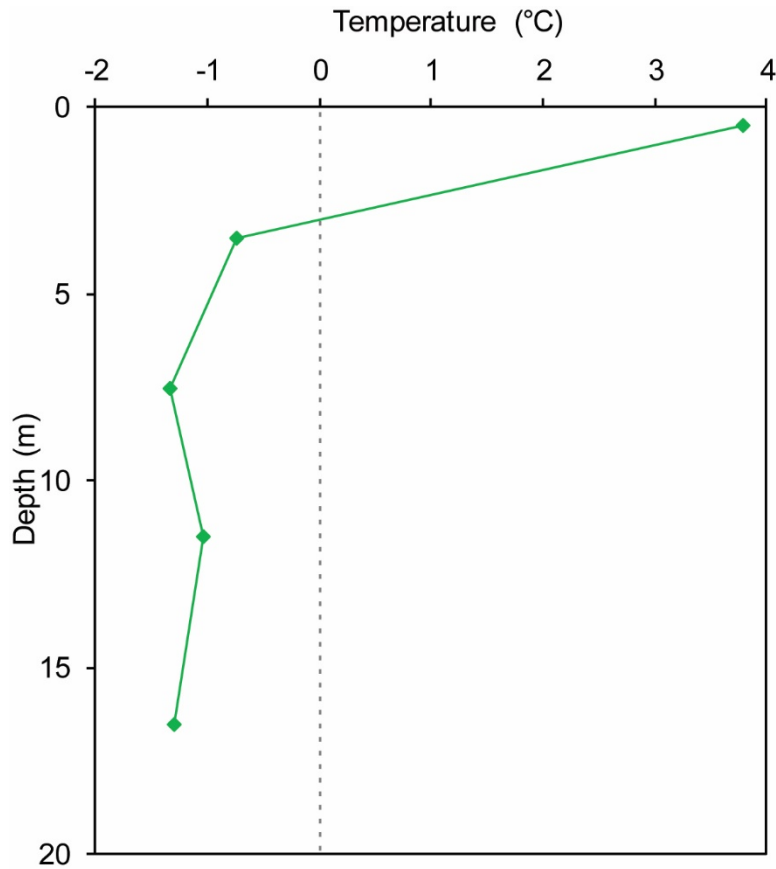
Elevation: 250 m a.s.l.

Landform: Lacustrine plain, top of slope

Vegetation cover: Thin moss and organic cover, forested, mix of birch and spruce

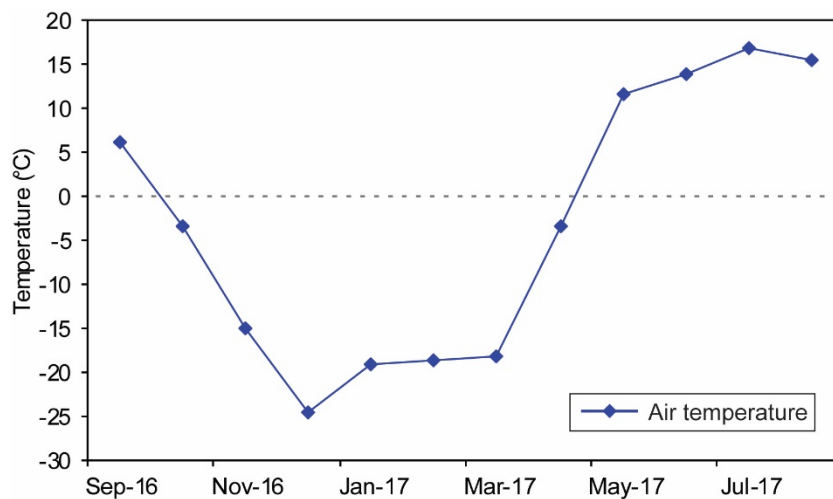
Thaw Depth: 3.01 m

Site visit: September 22, 2017



Depth (m)	Temp (°C)
0.5	3.78
3.5	-0.74
7.5	-1.34
11.5	-1.03
16.5	-1.3

Month / Year	Temperature (°C)	
	Air	Surface
Sept / 2016	6.26	n/a
Oct / 2016	-3.46	n/a
Nov / 2016	-15.05	n/a
Dec / 2016	-24.47	n/a
Jan / 2017	-19.04	n/a
Feb / 2017	-18.58	n/a
Mar / 2017	-18.19	n/a
Apr / 2017	-3.34	n/a
May / 2017	11.55	n/a
Jun / 2017	13.87	n/a
Jul / 2017	16.74	n/a
Aug / 2017	15.57	n/a



River Between Two Mountains — RBTM-01

Deh cho Settlement Region

Latitude: 62.949 N

Longitude: 123.205 W

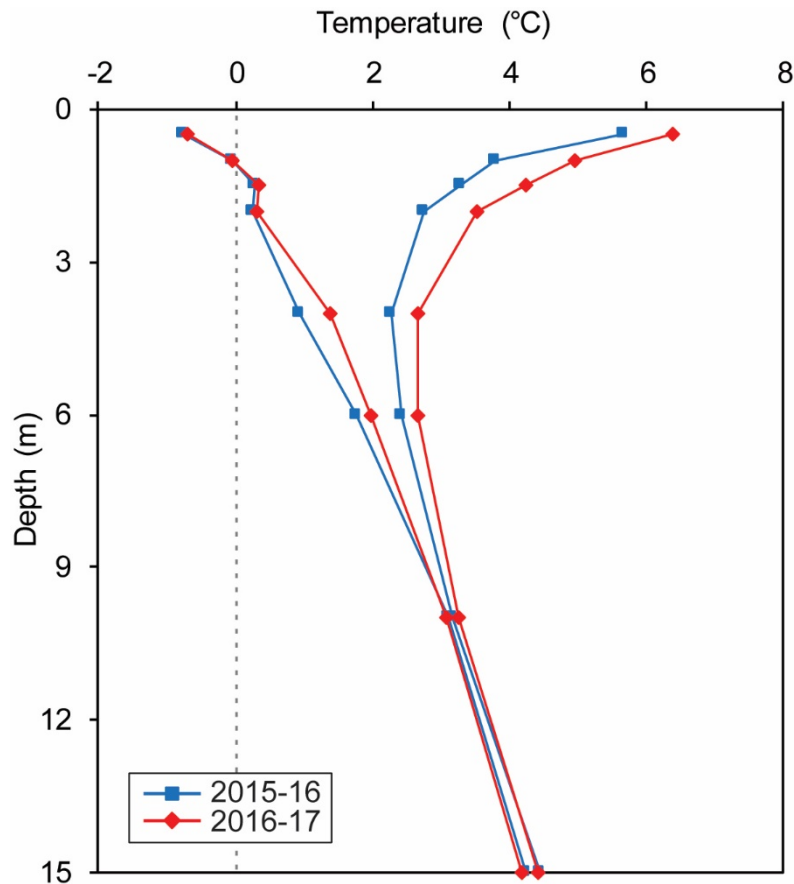
Elevation: 120 m a.s.l.

Landform: Transition lacustrine to alluvial to moraine terrain

Vegetation cover: Dense black spruce forest

Thaw Depth: n/a

Site visit: July 30, 2017



Aug 2015 – Jul 2016		
Depth (m)	Max (°C)	Min (°C)
0.5	5.66	-0.75
1	3.78	-0.04
1.5	3.30	0.28
2	2.75	0.26
4	2.28	0.92
6	2.43	1.78
10	3.18	3.12
15	4.46	4.23

Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	6.39	-0.71
1	4.95	-0.04
1.5	4.25	0.33
2	3.53	0.31
4	2.66	1.39
6	2.66	1.97
10	3.25	3.08
15	4.41	4.18

River Between Two Mountains — RBTM-02

Deh cho Settlement Region

Latitude: 62.933 N

Longitude: 123.180 W

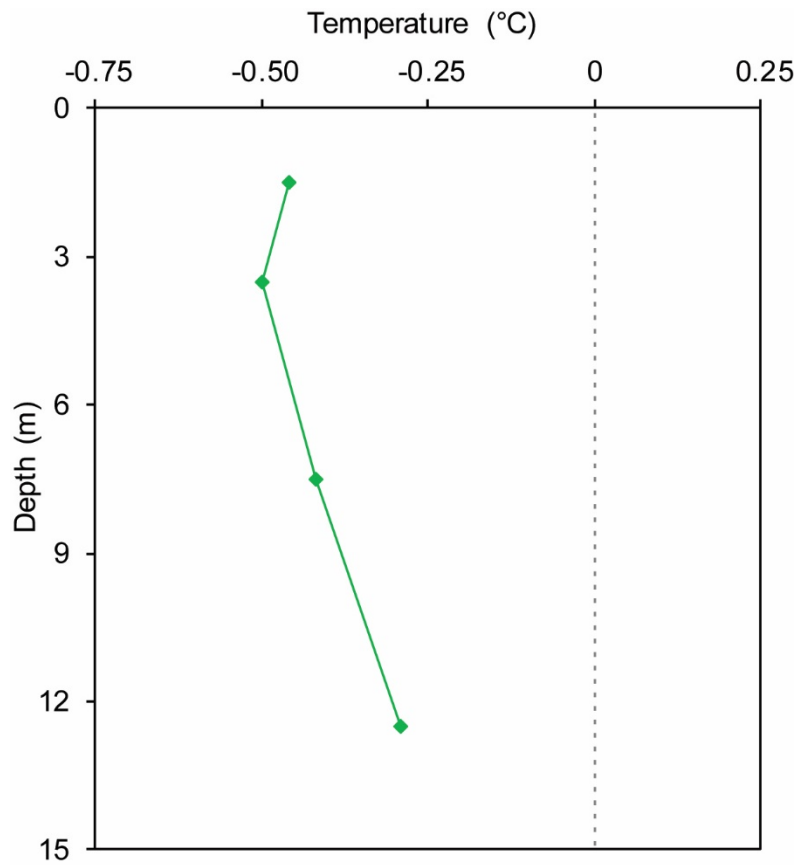
Elevation: 150 m a.s.l.

Landform: Transition lacustrine to alluvial to moraine terrain

Vegetation cover: Dense black spruce forest

Thaw Depth: n/a

Site visit: July 30, 2017



Depth (m)	Max (°C)
1.5	-0.46
3.5	-0.5
7.5	-0.42
12.5	-0.29

Willowlake River — WLR-01

Deh cho Settlement Region

Latitude: 62.715 N

Longitude: 123.084 W

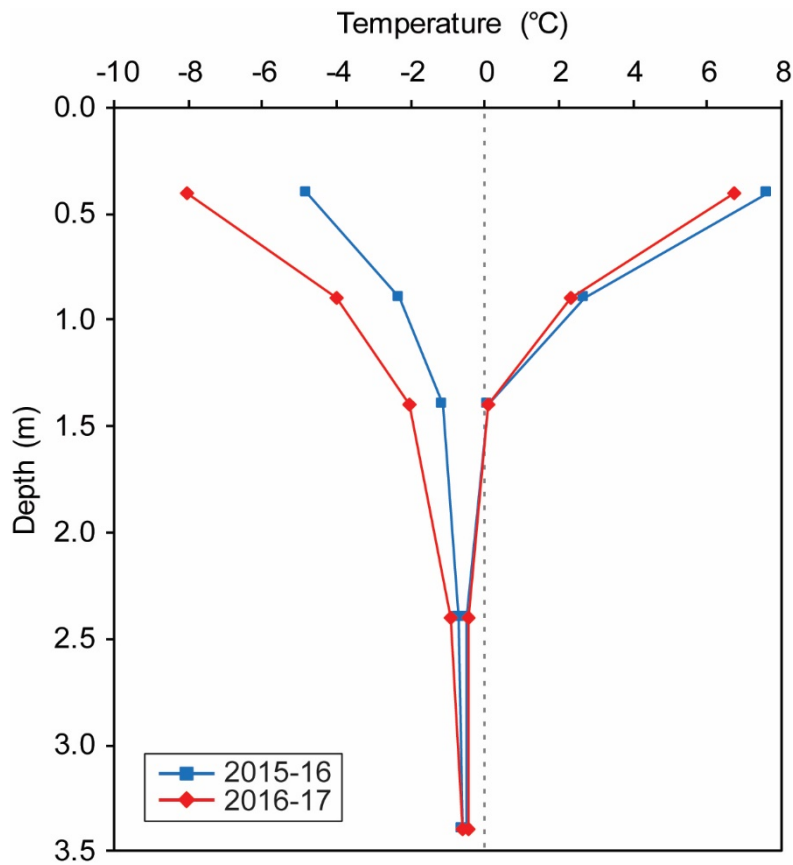
Elevation: 122 m a.s.l.

Landform: Alluvial fan

Vegetation cover: Open mixed forest

Thaw Depth: 1.42 m for 2016, 1.42 m for 2017

Site visit: July 30, 2017



Aug 2015 – Jul 2016		
Depth (m)	Max (°C)	Min (°C)
0.4	7.62	-4.77
0.9	2.66	-2.29
1.4	0.08	-1.15
2.4	-0.47	-0.73
3.4	-0.48	-0.62

Aug 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.4	6.71	-8.03
0.9	2.32	-3.99
1.4	0.10	-2.01
2.4	-0.45	-0.92
3.4	-0.45	-0.58

Wrigley Peatland — 99TC04

Deh cho Settlement Region

Latitude: 62.275 N

Longitude: 122.603 W

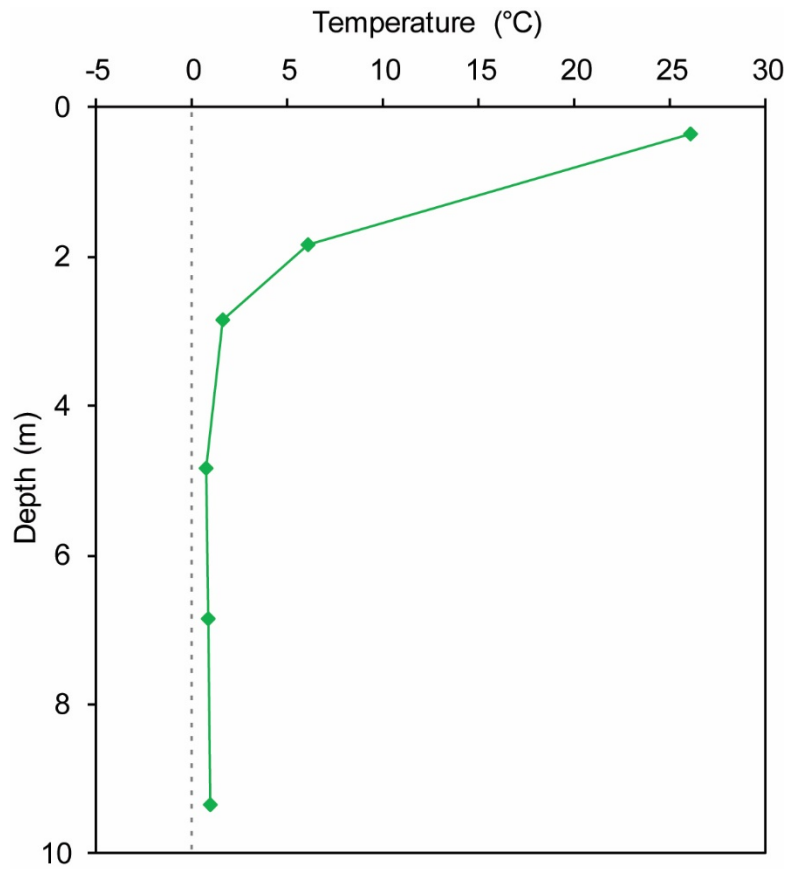
Elevation: n/a

Landform: Organic terrain on till plain, post glacial (>10Ka)

Vegetation cover: Boreal burn, scattered small spruce, pine and aspen, health ground cover

Thaw Depth: n/a

Site visit: July 30, 2017



Depth (m)	Temp (°C)
0.35	26.07
1.85	6.06
2.85	1.57
4.85	0.74
6.85	0.86
9.35	1

Fort Simpson bog low — 99TC02

Deh cho Settlement Region

Latitude: 61.976 N

Longitude: 121.878 W

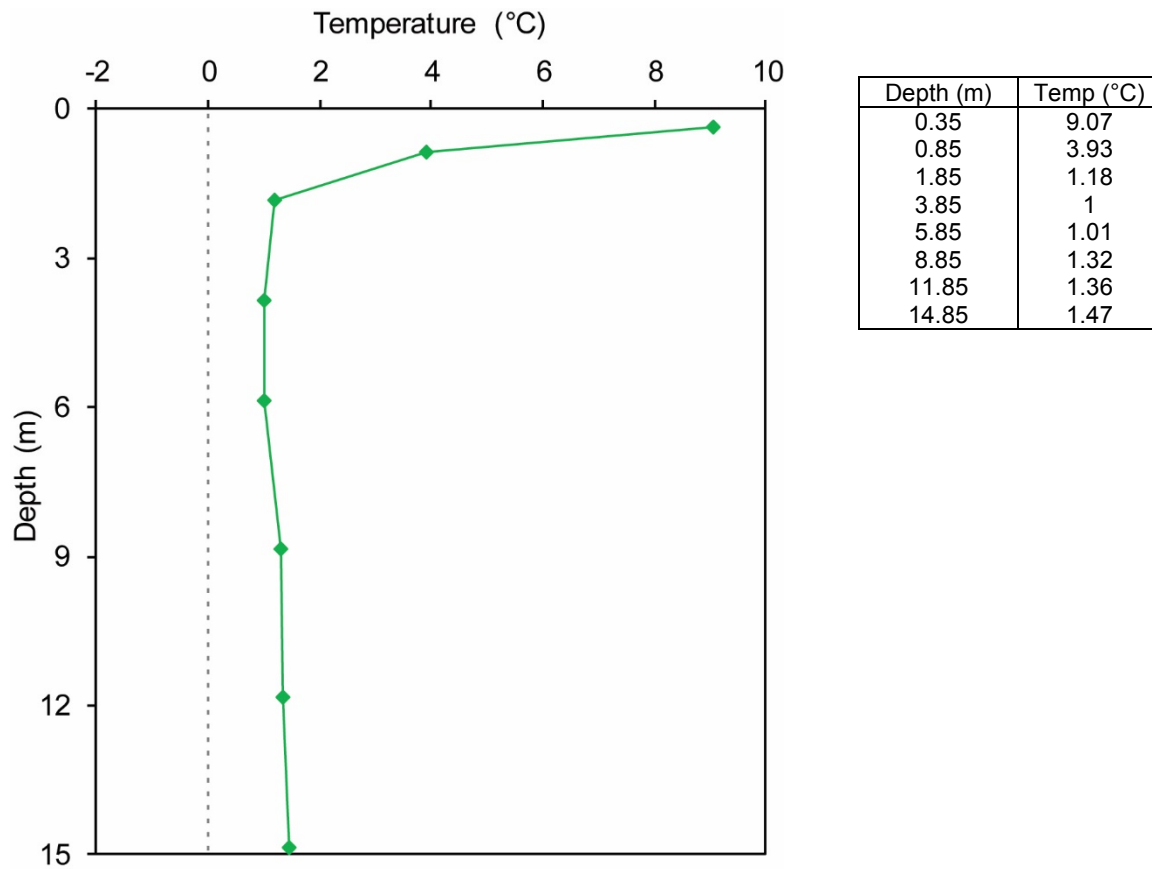
Elevation: 165 m a.s.l.

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: July 29, 2017



Aspen (Wrigley Highway) — 97TC01

Deh cho Settlement Region

Latitude: 61.953 N

Longitude: 121.761 W

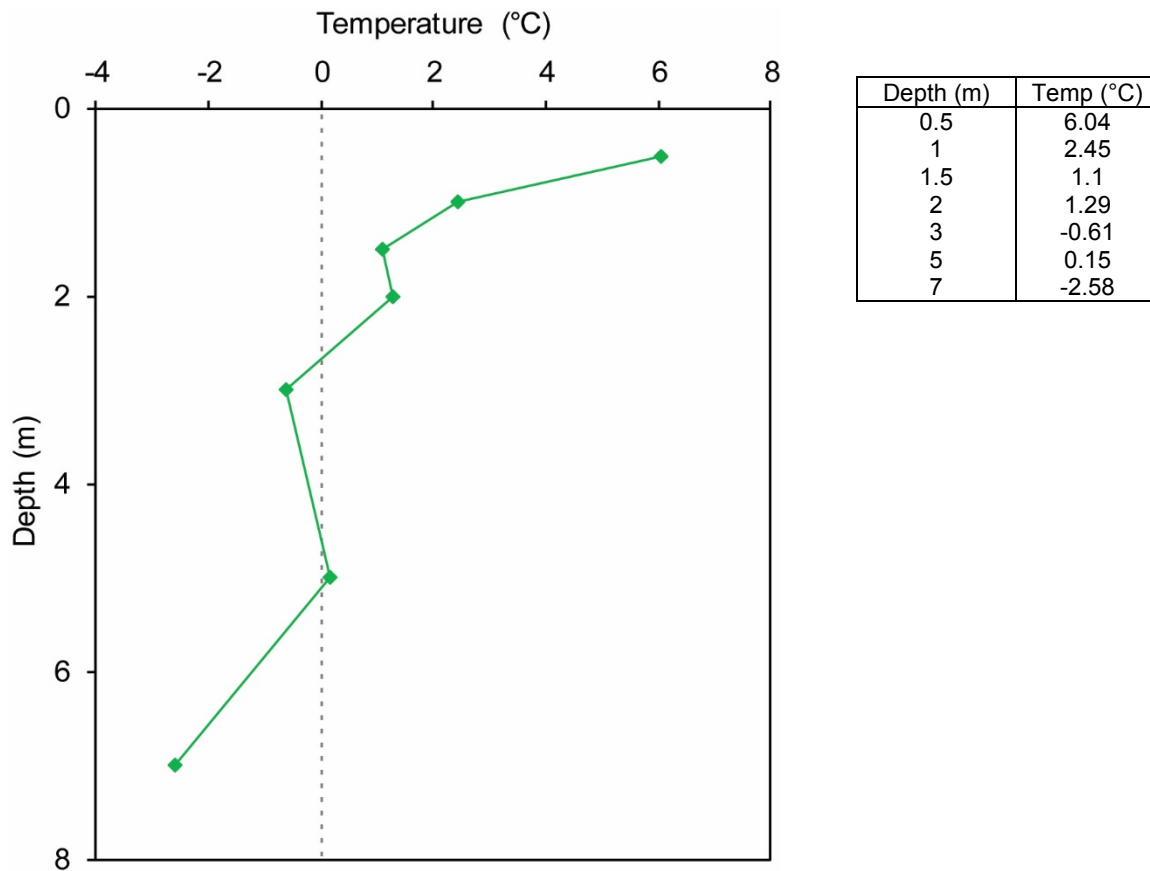
Elevation: 165 m a.s.l.

Landform: Surface of glaciolacustrine delta, post glacial (>10Ka)

Vegetation cover: Boreal, aspen grove (deciduous forest)

Thaw Depth: 2.68 m

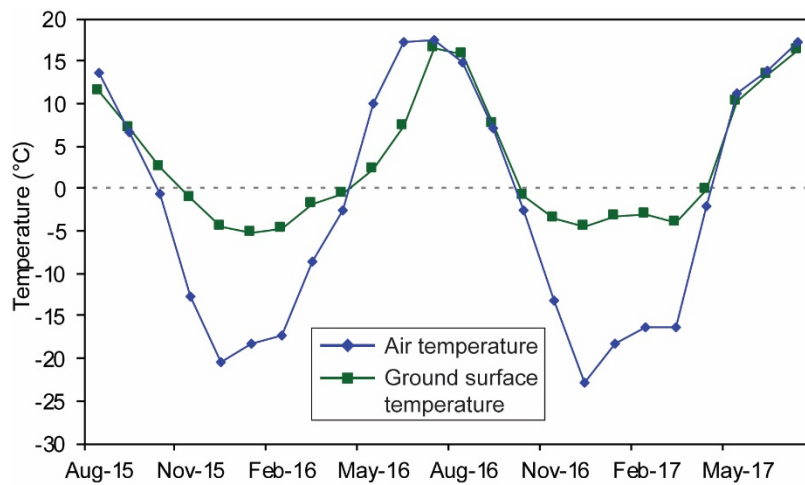
Site visit: July 29, 2017



Aspen (Wrigley Highway) — 97TC01 (continued)

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2015	13.53	11.50
Sept / 2015	6.68	6.96
Oct / 2015	-0.54	2.44
Nov / 2015	-12.70	-1.03
Dec / 2015	-20.37	-4.44
Jan / 2016	-18.39	-5.14
Feb / 2016	-17.33	-4.71
Mar / 2016	-8.52	-1.82
Apr / 2016	-2.48	-0.64
May / 2016	9.91	2.20
Jun / 2016	17.15	7.27
Jul / 2016	17.51	16.59

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2016	14.83	15.85
Sept / 2016	7.02	7.55
Oct / 2016	-2.59	-0.84
Nov / 2016	-13.21	-3.64
Dec / 2016	-22.78	-4.56
Jan / 2017	-18.35	-3.40
Feb / 2017	-16.45	-3.06
Mar / 2017	-16.40	-3.97
Apr / 2017	-2.13	-0.25
May / 2017	11.23	10.27
Jun / 2017	13.76	13.29
Jul / 2017	17.33	16.22



Mature Black Spruce (Wrigley Highway) — 97TC02

Deh cho Settlement Region

Latitude: 61.916 N

Longitude: 121.712 W

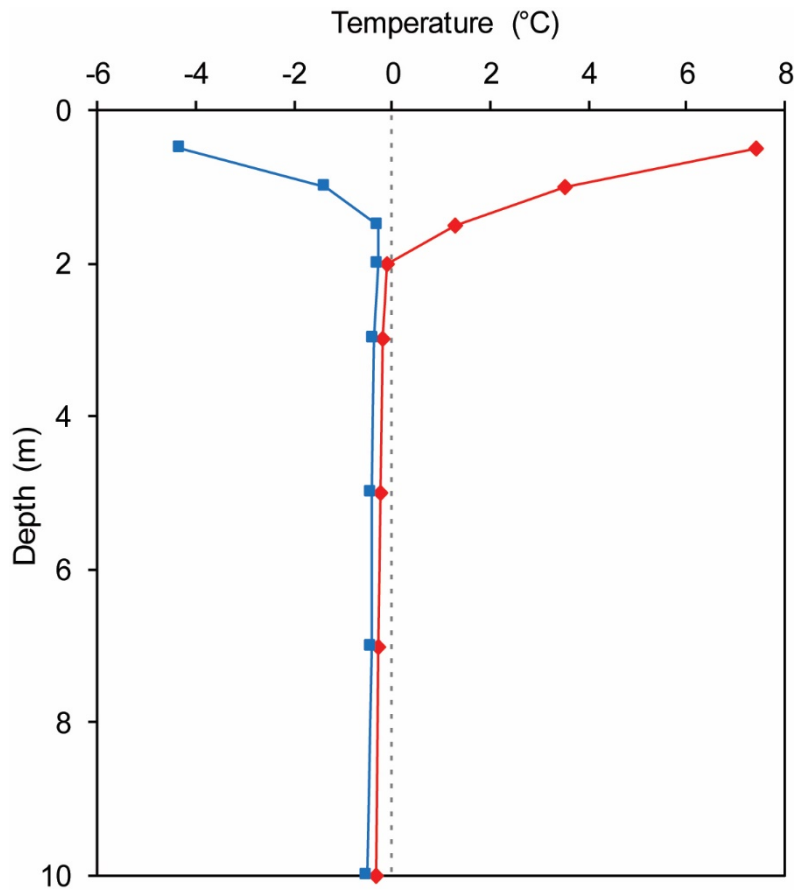
Elevation: 165 m a.s.l.

Landform: Surface of glaciolacustrine delta, post glacial (>10Ka)

Vegetation cover: Boreal, black spruce (coniferous forest)

Thaw Depth: 1.79 m for 2016

Site visit: July 29, 2017

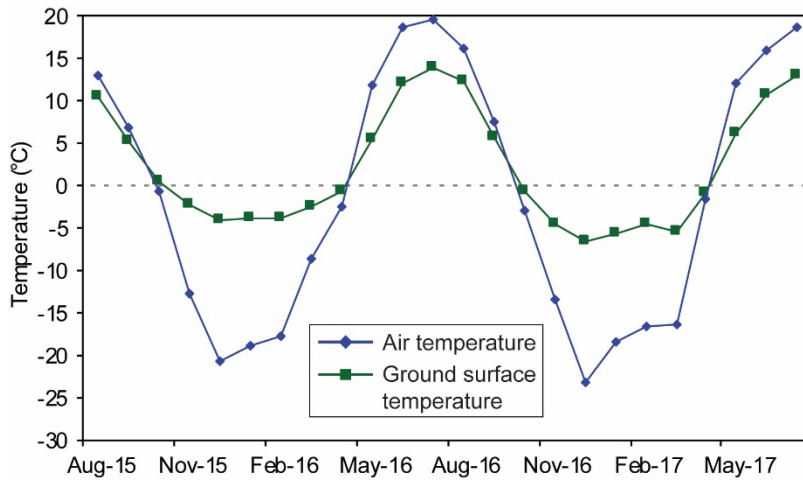


Sept 2015 – Aug 2016		
Depth (m)	Max (°C)	Min (°C)
0.5	7.42	-4.29
1	3.52	-1.34
1.5	1.28	-0.26
2	-0.12	-0.30
3	-0.19	-0.36
5	-0.25	-0.40
7	-0.29	-0.44
10	-0.34	-0.49

Mature Black Spruce (Wrigley Highway) — 97TC02 (continued)

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2015	12.90	10.51
Sept / 2015	6.79	5.21
Oct / 2015	-0.59	0.41
Nov / 2015	-12.74	-2.17
Dec / 2015	-20.71	-3.97
Jan / 2016	-18.78	-3.94
Feb / 2016	-17.67	-3.85
Mar / 2016	-8.67	-2.42
Apr / 2016	-2.52	-0.56
May / 2016	11.89	5.50
Jun / 2016	18.62	12.13
Jul / 2016	19.64	13.81

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2016	16.23	12.20
Sept / 2016	7.44	5.76
Oct / 2016	-2.88	-0.55
Nov / 2016	-13.37	-4.45
Dec / 2016	-23.19	-6.50
Jan / 2017	-18.37	-5.77
Feb / 2017	-16.52	-4.49
Mar / 2017	-16.35	-5.43
Apr / 2017	-1.64	-0.95
May / 2017	11.98	6.15
Jun / 2017	16.01	10.75
Jul / 2017	18.62	12.92



Harris River — HAR-01

Deh cho Settlement Region

Latitude: 61.877 N

Longitude: 121.290 W

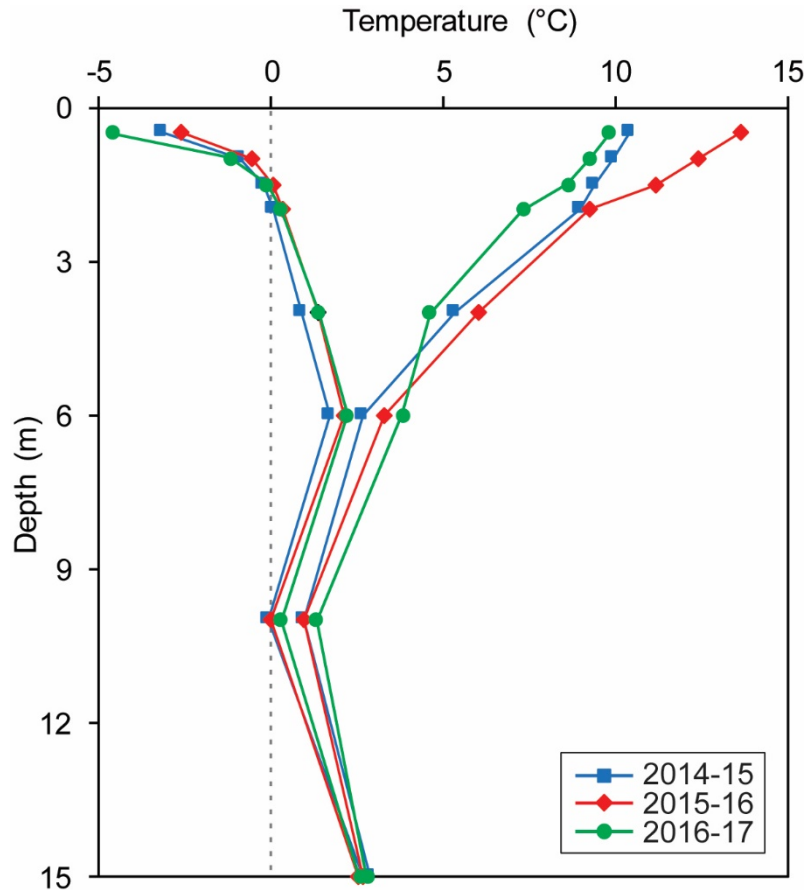
Elevation: 146 m a.s.l.

Landform: Moraine

Vegetation cover: Predominantly birch

Thaw Depth: n/a for 2015, n/a for 2016, n/a for 2017

Site visit: July 28, 2017



Sep 2014 – Aug 2015		
Depth (m)	Max (°C)	Min (°C)
0.5	10.39	-3.21
1	9.91	-0.94
1.5	9.35	-0.25
2	8.98	0.04
4	5.37	0.86
6	2.69	1.67
10	0.93	-0.07
15	2.85	2.64

Sep 2015 – Aug 2016		
Depth (m)	Max (°C)	Min (°C)
0.5	13.65	-2.64
1	12.43	-0.57
1.5	11.14	0.05
2	9.22	0.33
4	6.05	1.35
6	3.24	2.11
10	0.95	0.01
15	2.64	2.54

Sep 2016 – Jul 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	9.82	-4.65
1	9.27	-1.20
1.5	8.59	-0.15
2	7.32	0.25
4	4.60	1.36
6	3.80	2.20
10	1.30	0.26
15	2.76	2.58

Manners Sources — MS-02 (Crest)

Deh cho Settlement Region

Latitude: 61.625 N

Longitude: 121.104 W

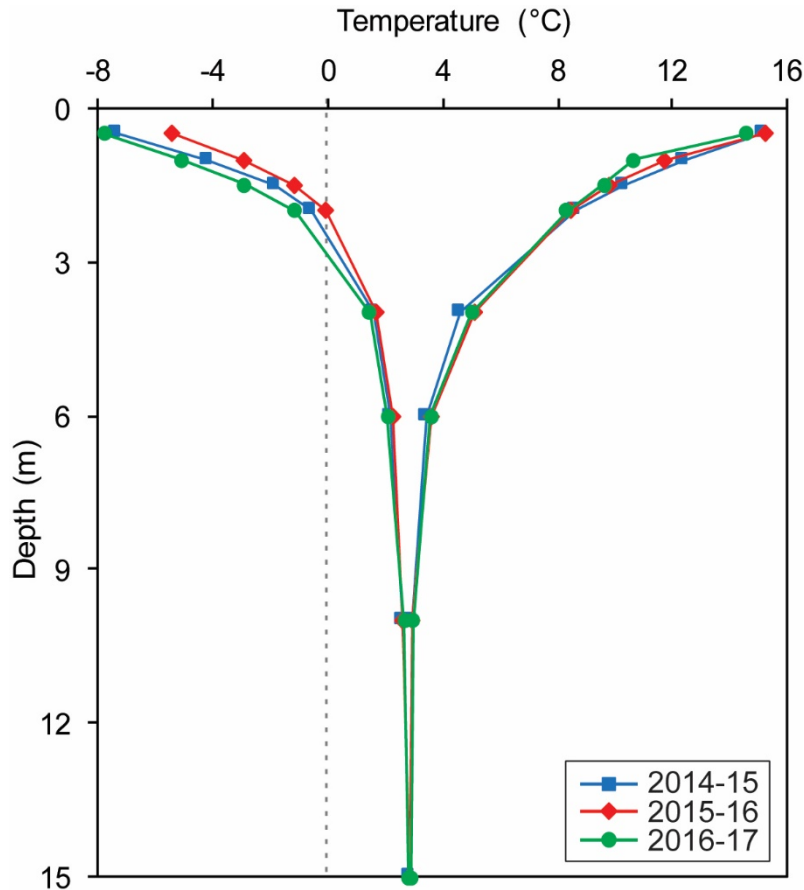
Elevation: 182 m a.s.l.

Landform: Eolian dune crest

Vegetation cover: Pine forest

Thaw Depth: n/a for 2015, n/a for 2016, n/a for 2017

Site visit: July 28, 2017



Sep 2014 – Aug 2015		
Depth (m)	Max (°C)	Min (°C)
0.5	15.15	-7.35
1	12.40	-4.17
1.5	10.28	-1.88
2	8.60	-0.56
4	4.63	1.56
6	3.41	2.19
10	2.89	2.62
15	2.88	2.84

Sep 2015 – Aug 2016		
Depth (m)	Max (°C)	Min (°C)
0.5	15.21	-5.40
1	11.73	-2.92
1.5	9.80	-1.18
2	8.47	-0.10
4	5.10	1.64
6	3.63	2.24
10	2.94	2.62
15	2.87	2.82

Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	14.54	-7.78
1	10.64	-5.12
1.5	9.60	-2.92
2	8.30	-1.15
4	4.99	1.42
6	3.58	2.08
10	2.93	2.65
15	2.88	2.84

Jean-Marie Creek — JMC-01

Deh cho Settlement Region

Latitude: 61.440 N

Longitude: 120.948 W

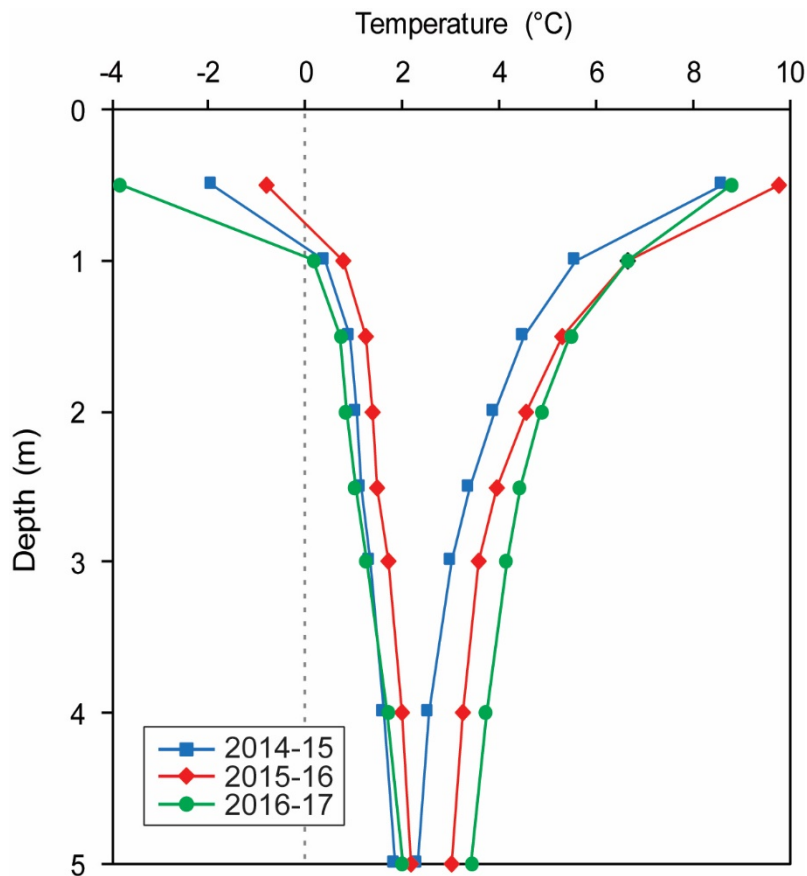
Elevation: 198 m a.s.l.

Landform: Transition alluvial flood plain to organic (fen) over lacustrine plain

Vegetation cover: Poorly drained shrub fen

Thaw Depth: n/a for 2015, n/a for 2016, n/a for 2017

Site visit: July 28, 2017



Sep 2014 – Aug 2015		
Depth (m)	Max (°C)	Min (°C)
0.5	8.58	-1.92
1	5.58	0.41
1.5	4.51	0.93
2	3.88	1.05
2.5	3.36	1.16
3	3.02	1.34
4	2.54	1.63
5	2.29	1.83

Sep 2015 – Aug 2016		
Depth (m)	Max (°C)	Min (°C)
0.5	9.75	-0.83
1	6.64	0.75
1.5	5.27	1.26
2	4.54	1.37
2.5	3.95	1.49
3	3.56	1.69
4	3.22	2.00
5	3.00	2.18

Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	8.80	-3.84
1	6.64	0.15
1.5	5.46	0.71
2	4.87	0.84
2.5	4.42	1.01
3	4.15	1.25
4	3.72	1.69
5	3.43	1.99

Jean-Marie Creek — JMC-02

Deh cho Settlement Region

Latitude: 61.439 N

Longitude: 120.948 W

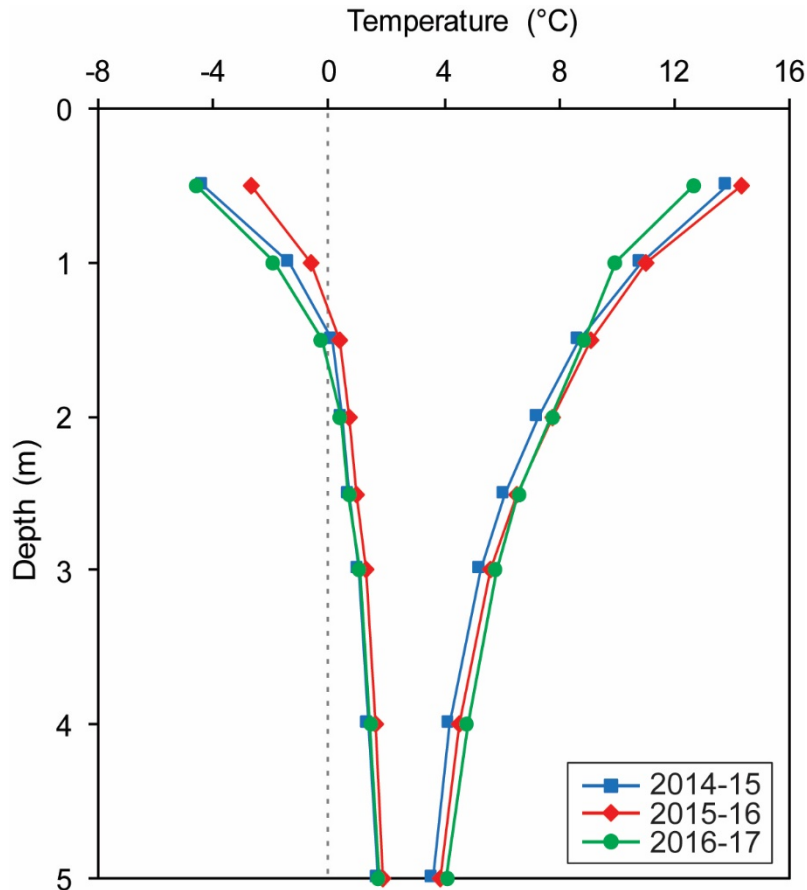
Elevation: 198 m a.s.l.

Landform: Transition alluvial flood plain to organic (fen) over lacustrine plain

Vegetation cover: Sandy ridge with spruce, pine forest

Thaw Depth: n/a for 2015, n/a for 2016, n/a for 2017

Site visit: July 28, 2017



Sep 2014 – Aug 2015		
Depth (m)	Max (°C)	Min (°C)
0.5	13.81	-4.38
1	10.84	-1.40
1.5	8.69	0.17
2	7.24	0.47
2.5	6.13	0.71
3	5.27	1.08
4	4.22	1.42
5	3.65	1.72

Sep 2015 – Aug 2016		
Depth (m)	Max (°C)	Min (°C)
0.5	14.4	-2.7
1	11.0	-0.6
1.5	9.1	0.4
2	7.8	0.7
2.5	6.6	0.9
3	5.6	1.3
4	4.5	1.6
5	3.9	1.9

Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	12.71	-4.61
1	9.95	-1.92
1.5	8.89	-0.27
2	7.76	0.41
2.5	6.61	0.68
3	5.82	1.07
4	4.79	1.43
5	4.09	1.75

Pump Station 3 — 85-9-T4

Deh cho Settlement Region

Latitude: 61.397 N

Longitude: 120.904 W

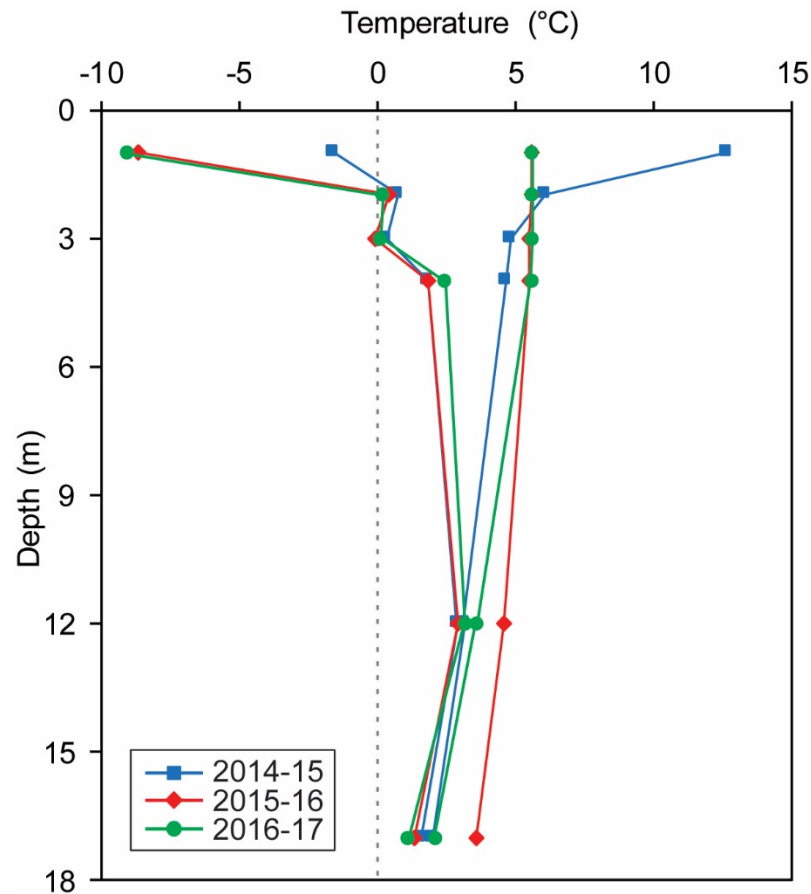
Elevation: 223 m a.s.l.

Landform: Lacustrine veneer over ground moraine (unfrozen granular)

Vegetation cover: Open black spruce, ericaceous shrubs, moss-lichen woodland

Thaw Depth: n/a for 2015, n/a for 2016, n/a for 2017

Site visit: July 28, 2017



Sep 2014 – Aug 2015		
Depth (m)	Max (°C)	Min (°C)
1	12.66	-1.59
2	6.11	0.74
3	4.88	0.39
4	4.71	1.83
12	3.21	2.96
17	2.04	1.60

Sep 2015 – Aug 2016		
Depth (m)	Max (°C)	Min (°C)
1	5.60	-8.66
2	5.60	0.44
3	5.49	-0.05
4	5.54	1.84
12	4.60	2.97
17	3.58	1.34

Sep 2016 – Mar 2017		
Depth (m)	Max (°C)	Min (°C)
1	5.60	-9.07
2	5.60	0.22
3	5.60	0.12
4	5.58	2.45
12	3.58	3.18
17	2.09	1.13

Jean Marie Creek A — 85-12A-T4

Deh cho Settlement Region

Latitude: 61.193 N

Longitude: 120.708 W

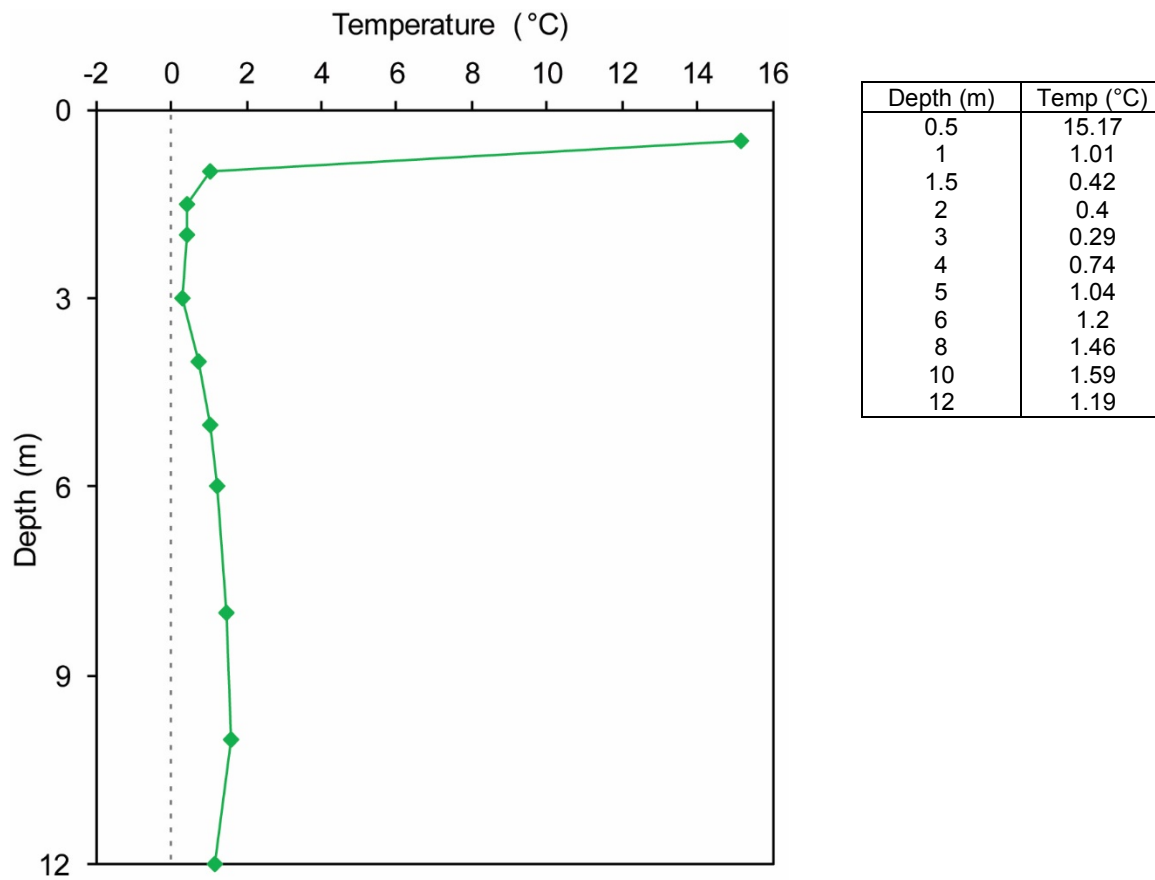
Elevation: 300 m a.s.l.

Landform: Ground moraine

Vegetation cover: Open black spruce, ericaceous shrubs, moss-lichen woodland (peat plateau)

Thaw Depth: n/a

Site visit: July 28, 2017



Trout River — Trout R

Deh cho Settlement Region

Latitude: 61.018 N

Longitude: 120.588 W

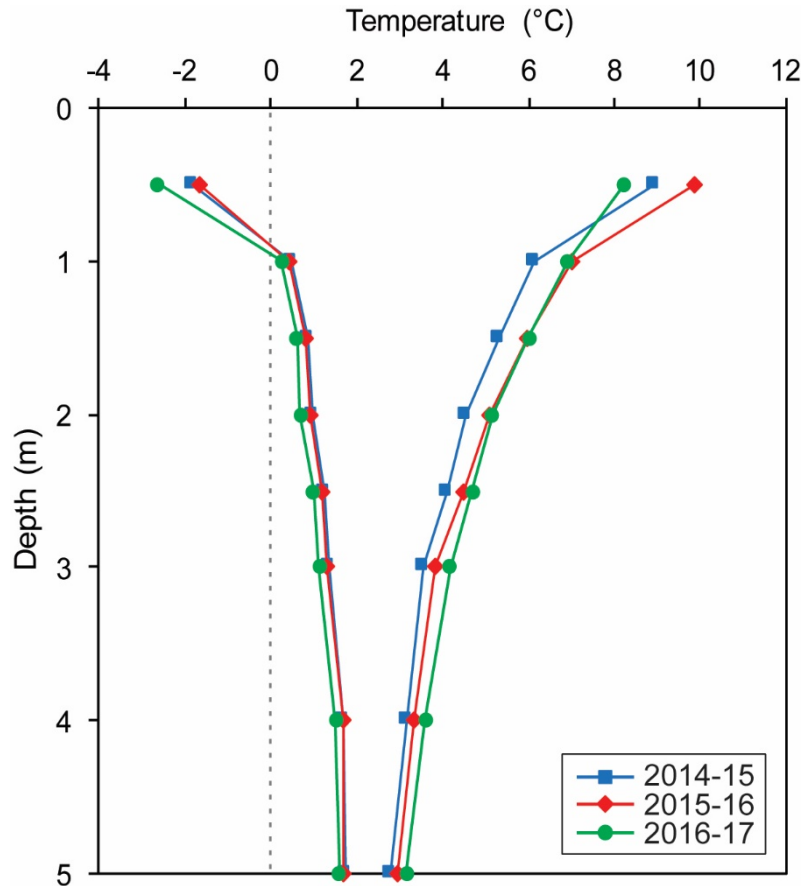
Elevation: 350 m a.s.l.

Landform: Organic terrain

Vegetation cover: Peatland with scattered spruce and sphagnum ground cover

Thaw Depth: n/a for 2015, n/a for 2016, n/a for 2017

Site visit: July 28, 2017



Sep 2014 – Aug 2015		
Depth (m)	Max (°C)	Min (°C)
0.5	8.92	-1.86
1	6.12	0.50
1.5	5.30	0.86
2	4.55	0.96
2.5	4.07	1.25
3	3.55	1.36
4	3.15	1.71
5	2.79	1.74

Sep 2015 – Aug 2016		
Depth (m)	Max (°C)	Min (°C)
0.5	9.88	-1.69
1	7.03	0.42
1.5	5.99	0.80
2	5.08	0.90
2.5	4.48	1.19
3	3.82	1.31
4	3.33	1.67
5	2.93	1.71

Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	8.23	-2.65
1	6.91	0.23
1.5	6.00	0.59
2	5.16	0.68
2.5	4.68	0.99
3	4.16	1.11
4	3.60	1.51
5	3.15	1.58

Trout Road Crossing — TRC-01

Deh cho Settlement Region

Latitude: 60.834 N

Longitude: 120.485 W

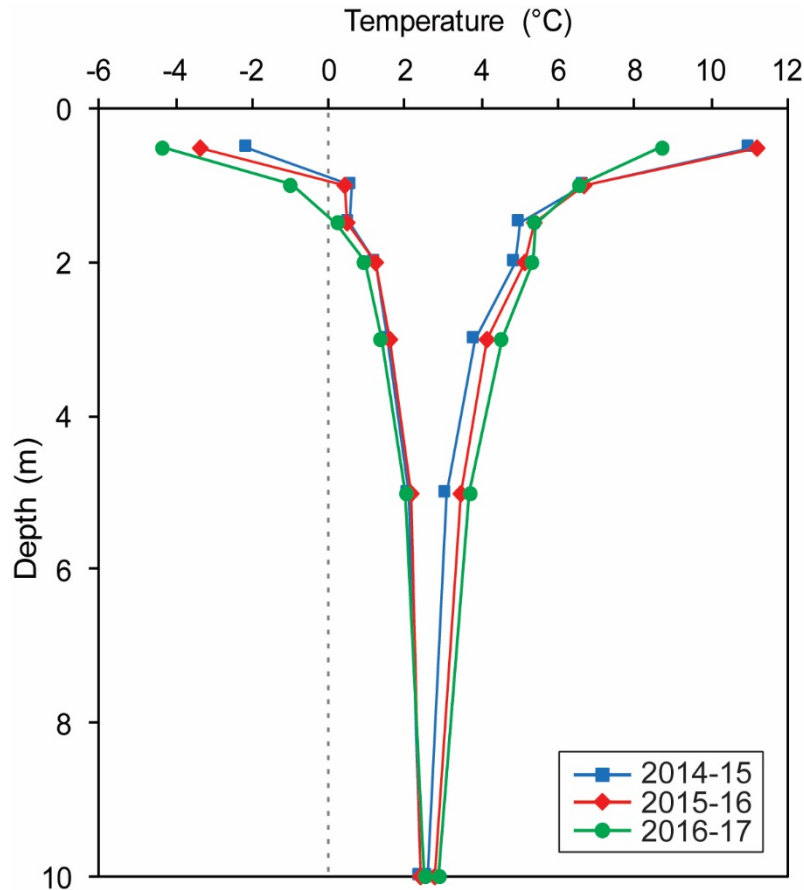
Elevation: 420 m a.s.l.

Landform: Bog-dominated moraine plain

Vegetation cover: Dry peatland vegetation consisting of black spruce, tamarack, and feathermoss

Thaw Depth: n/a for 2015, n/a for 2016, n/a for 2017

Site visit: July 28, 2017



Sep 2014 – Aug 2015		
Depth (m)	Max (°C)	Min (°C)
0.5	10.99	-2.14
1	6.68	0.59
1.5	5.03	0.53
2	4.90	1.20
3	3.86	1.56
5	3.06	2.09
10	2.60	2.40

Sep 2015 – Aug 2016		
Depth (m)	Max (°C)	Min (°C)
0.5	11.20	-3.33
1	6.65	0.41
1.5	5.36	0.51
2	5.16	1.21
3	4.16	1.60
5	3.44	2.16
10	2.75	2.43

Sep 2016 – Aug 2017		
Depth (m)	Max (°C)	Min (°C)
0.5	8.70	-4.37
1	6.58	-0.99
1.5	5.39	0.22
2	5.32	0.94
3	4.51	1.37
5	3.70	2.02
10	2.89	2.52

Petitot River North B — 84-5B-T4

Deh cho Settlement Region

Latitude: 59.757 N

Longitude: 119.514 W

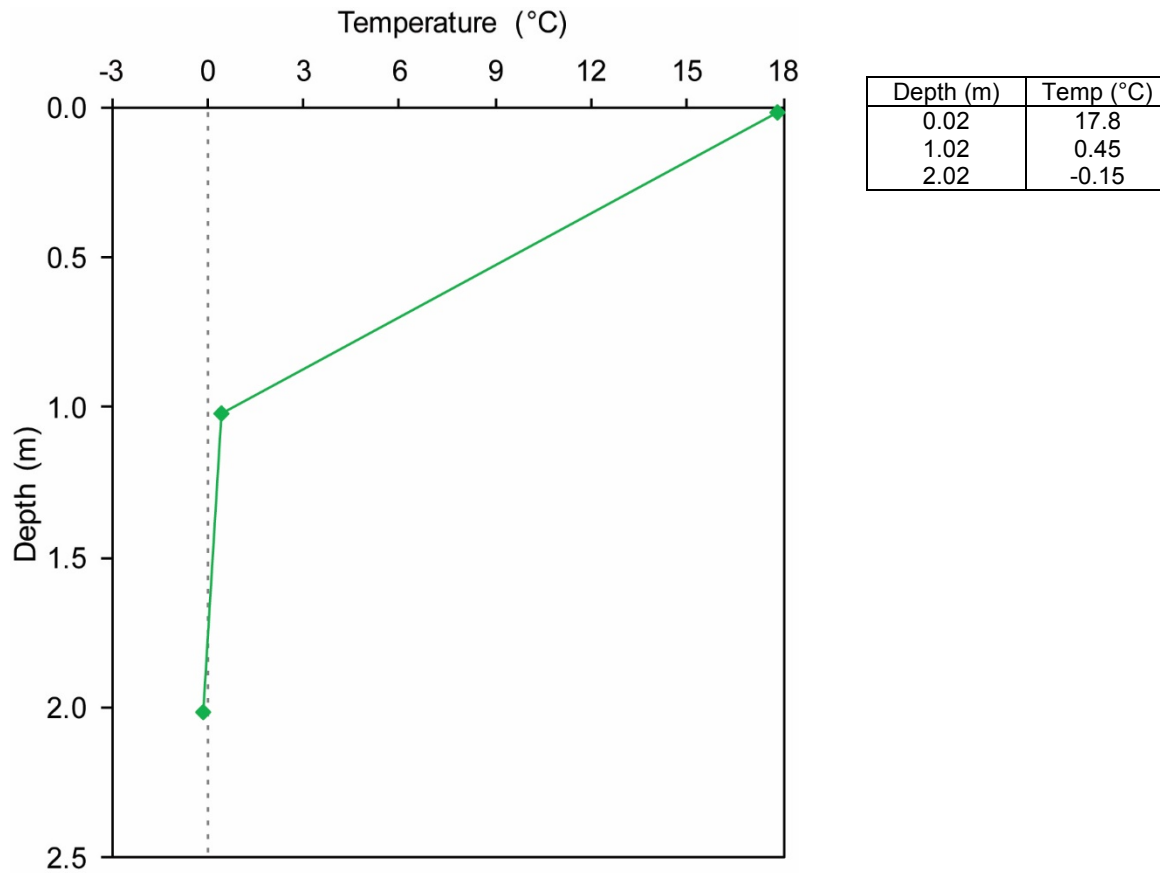
Elevation: 552 m a.s.l.

Landform: Ground moraine

Vegetation cover: Recovering burn (burned 2004), originally stunted black spruce, ericaceous shrubs, moss woodland (peat plateau)

Thaw Depth: 1.05 m

Site visit: July 28, 2017



Petitot River North A — 84-5A-T4

Deh cho Settlement Region

Latitude: 59.75 N

Longitude: 119.50 W

Elevation: 552 m a.s.l.

Landform: Ground moraine

Vegetation cover: Recovering burn (burned 2004), originally stunted black spruce, ericaceous shrubs, moss woodland (peat plateau)

Thaw Depth: 3.29 m

Site visit: July 28, 2017

