



Natural Resources  
Canada

Ressources naturelles  
Canada

**GEOLOGICAL SURVEY OF CANADA  
OPEN FILE 8707**

**Report on 2018 field activities and collection of  
ground-thermal and active-layer data in the  
Mackenzie corridor, Northwest Territories**

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

**2020**

**Canada**



## **GEOLOGICAL SURVEY OF CANADA OPEN FILE 8707**

# **Report on 2018 field activities and collection of ground-thermal and active-layer data in the Mackenzie corridor, Northwest Territories**

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

Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario K1A 0E8

**2020**

© Her Majesty the Queen in Right of Canada, as represented by the Minister of Natural Resources, 2020

Information contained in this publication or product may be reproduced, in part or in whole, and by any means, for personal or public non-commercial purposes, without charge or further permission, unless otherwise specified.

You are asked to:

- exercise due diligence in ensuring the accuracy of the materials reproduced;
- indicate the complete title of the materials reproduced, and the name of the author organization; and
- indicate that the reproduction is a copy of an official work that is published by Natural Resources Canada (NRCAN) and that the reproduction has not been produced in affiliation with, or with the endorsement of, NRCAN.

Commercial reproduction and distribution is prohibited except with written permission from NRCAN. For more information, contact NRCAN at [rncan.copyrightdroitdauteur.rncan@canada.ca](mailto:rncan.copyrightdroitdauteur.rncan@canada.ca).

Permanent link: <https://doi.org/10.4095/321921>

This publication is available for free download through GEOSCAN (<https://geoscan.nrcan.gc.ca/>).

### **Recommended citation**

Duchesne, C., Chartrand, J., and Smith, S.L., 2020. Report on 2018 field activities and collection of ground-thermal and active-layer data in the Mackenzie corridor, Northwest Territories; Geological Survey of Canada, Open File 8707, 84 p. <https://doi.org/10.4095/321921>

Publications in this series have not been edited; they are released as submitted by the author.

## **ABSTRACT**

This report presents a summary of field activities conducted in 2018 in the Mackenzie corridor, north of Wrigley, N.W.T. Air temperature, ground-thermal and active-layer data acquired from permafrost monitoring sites visited in 2018 are provided in graphical and tabular format. Ground temperature records for the 2007–2018 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 (2007–2009). 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 planning of northern infrastructure.

## TABLE OF CONTENTS

ABSTRACT.....	1
TABLE OF CONTENTS.....	iii
LIST OF TABLES.....	iv
LIST OF FIGURES.....	iv
SITE INDEX.....	v
1. INTRODUCTION.....	1
2. STUDY SITES AND INSTRUMENTATION.....	1
3. DATA COLLECTION AND PRESENTATION.....	13
4. CHANGES OVER TIME.....	15
4.1 Changes in Ground Temperatures 2007–2018.....	15
4.2 Changes in Active Layer Thickness.....	18
5. SUMMARY.....	19
6. ACKNOWLEDGEMENTS.....	19
7. REFERENCES.....	20
APPENDIX A: Graphical and tabular presentation of air and ground temperature data for the period 2017–2018.....	23

## LIST OF TABLES

Table 1. Ground thermal monitoring sites in the Inuvialuit, Gwich'in, Sahtu, and Deh Cho Settlement Regions. Presence of air and ground surface sensors is indicated. n/a = non-available. 3

Table 2. Summary of active layer, and air and ground surface temperature monitoring sites from north to south throughout the corridor. n/a = not available. .... 9

## LIST OF FIGURES

Figure 1. Permafrost and active layer monitoring sites north and south of Inuvik in the Inuvialuit and Gwich'in Settlement Regions, visited in 2018..... 11

Figure 2. Permafrost and active layer monitoring sites between Fort Good Hope and Wrigley in the Sahtu and Deh Cho Settlement Regions, visited in 2018. .... 12

Figure 3. Current (2017–2018) annual mean ground temperature (AMGT) for the Mackenzie corridor based on temperature at depth of zero annual amplitude (ZAA) or the deepest available measurement. .... 14

Figure 4. Annual mean ground temperature (AMGT) at measurement depth at or closest to depth of zero annual amplitude (ZAA) for selected sites in the continuous permafrost zone. Borehole name and depth of AMGT indicated. .... 15

Figure 5. Annual mean ground temperature (AMGT) at the measurement depth at or closest to depth of zero annual amplitude (ZAA) for selected permafrost sites in the discontinuous permafrost zone. Borehole name and depth of AMGT indicated. Some sites are represented with a manual measurement..... 16

Figure 6. Mean annual air temperature (MAAT) 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..... 17

Figure 7. Vegetation cover at site LS-01 following cable installation in 2007 (NRCan Photo 2019-759), and after tree clearing between 2015 and 2016 (NRCan Photo 2019-758). .... 17

Figure 8. Comparison of current (2017–2018) annual mean ground temperature (AMGT) with international polar year (IPY) (2007–2009) baseline for sites visited in 2018. A 1:1 line is shown for comparison. .... 18

Figure 9. Mean active-layer thickness (ALT) departures (%) from 2003–2012 mean for 25 sites. .... 19

## SITE INDEX

Big Lake 2.....	24	Little Smith Creek — LS-01.....	71
Campbell Lake — CaL-01.....	39	Little Smith Creek— LS-02.....	72
Campbell Lake — CaL-02.....	40	Lousy Point Low Terrace — 90TT06 .....	29
Campbell Lake — CaL-03.....	41	Lousy Point Ridge — 90TT05 .....	28
Canyon Creek North A — 84-2A-HT.....	63	Navy Channel — 03TC01 .....	34
Canyon Creek North A — 84-2A-T4 .....	64	Navy Road — 01TC01 .....	36
Canyon Creek North B — 84-2B-T4.....	65	Norman Wells - Water treatment plant.....	61
Chick Lake — CL-01.....	51	Norman Wells Fen — 99TC5.....	58
East Channel — T6 Upland.....	31	Norman Wells Pump Station — 84-1-T4.....	59
Elliot Creek — EC-01.....	54	Norman Wells Upper Air — 93AG10.....	60
Elliot Creek — EC-02.....	55	Norris Creek — NC-01.....	35
Fort Good Hope South — FGHS-01.....	48	North Caribou Lake — NCL-01.....	42
Fort Good Hope South — FGHS-02.....	49	North Caribou Lake — NCL-02.....	43
Gibson Lake — GL-01 .....	52	Ochre River Cabin — 92TT10 .....	80
Hanna River — HR-01 .....	53	Old Fort Point — OFP-01 .....	70
Hill Lake — HL-01.....	44	Oscar Creek — OC-01 .....	56
Hill Lake — HL-02.....	45	Police Island — PI-01.....	68
Inuvik Airport (bog) — 12TC01.....	38	Police Island — PI-02.....	69
Inuvik Airport (trees) — 01TC02 .....	37	Reindeer Depot (Williams Island) — 91TT13	33
Jackfish Creek — JF-02.....	47	Reindeer Station Plateau — 91TT12.....	32
KC-07.....	27	Rengleng River mouth — 91TT14.....	46
Kee Scarp HT.....	57	Saline River — SR-02 .....	73
KP182 — Crest of Slope.....	76	Snafu Creek — SC-01 .....	50
KP182 — Mid Slope HT192 .....	74	Steep Creek Top — Steep-02 .....	78
KP182 — Top of Slope.....	75	Table Mountain A — 85-7A-HA108 .....	79
KP182 — Unburnt.....	77	Taglu — TAG04 SWIL.....	25
KP313 T2.....	81	Van Everdingen — 30m.....	62
KP313 T4.....	82	Vermillion Creek — VC-01 .....	66
KP313 T5.....	83	Vermillion Creek — VC-02 .....	67
KP313 T6.....	84	Yaya Lake Low — 90TT04.....	30
Kumak — KUM02 TWIL .....	26		

## 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 2018 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 2007–2018 period. A summary of changes in active-layer thickness since 1991 is also provided.

The primary objective of this report is to update stakeholders in the region on our activities and to make the data collected available to them. This information is also of interest to those requiring regional permafrost and active layer information such as industry, engineers and the academic and modelling communities.

## 2. STUDY SITES AND INSTRUMENTATION

Ground thermal monitoring sites along the Mackenzie corridor in the Inuvialuit, Gwich'in, Sahtu, and Deh Cho (north of Wrigley) Settlement Regions were visited in August 2018. The location and brief description of each site are provided in Figures 1 and 2 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  $\pm 0.01$  °C and an accuracy of  $\pm 0.1$  °C. Further details on the site establishment, site characteristics and instrumentation can be found in Smith et al. (2007, 2008b, 2009a and 2010a). At other sites, ground temperatures are only measured manually during site visits. Many of the sites were established in 2006-2007 (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 36 active layer monitoring sites throughout the Mackenzie corridor, many of which have been in operation since the early 1990s. In early August, sites in the Gwich'in and Inuvialuit and Deh Cho regions were visited (Table 2, Figures 1 and 2). 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 2018 site visits therefore allows the determination of the active-layer thickness for 2017. 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 a radiation shield 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 four hours.



Table 1. Ground thermal monitoring sites in the Inuvialuit, Gwich'in, Sahtu, and Deh Cho Settlement Regions. Presence of air and ground surface sensors is indicated. n/a = non-available.

Settlement region	Site name	Borehole name	Elevation (m a.s.l.)	Latitude (°N)	Longitude (°W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited
Inuvialuit	North Head Shore	90TT13	3	69.72	134.46	Thermokarst coastal plain	Tundra	Air / Ground	Not visited
Inuvialuit	Big Lake	Big Lake 1	n/a	69.39	134.96	Polygonal wetlands	Sedge	None	Not visited
		Big Lake 2	n/a	69.39	134.97	Polygonal wetlands	Sedge	None	03/08/2018
Inuvialuit	Taglu	TAG04 Sedge	n/a	69.37	134.99	Point bar	Horsetail	None	03/08/2018
		TAG04 SWIL	n/a	69.37	134.98	Point bar	Dwarf willow shrubs	None	03/08/2018
		91TTC	15	69.37	134.95	Surface of Holocene Mackenzie delta	Low shrub tundra	Air / Ground	Not visited
Inuvialuit	Kumak	KUM02 SWIL	n/a	69.32	135.21	Point bar	Dwarf willow shrubs	None	Not visited
		KUM02 TWIL	n/a	69.32	135.21	Point bar	Tall willow shrubs	None	03/08/2018
Inuvialuit	KC-07	KC-07	n/a	69.31	135.25	Tundra upland	Grass and moss tundra	None	03/08/2018
Inuvialuit	Dennis Lake	T7 Upland	n/a	69.31	134.54	Moraine uplands	Dwarf birch tundra with willow and alder shrubs	None	Not visited
Inuvialuit	Lousy Point Ridge	90TT05	n/a	69.22	134.28	Glaciofluvial ridge	Low shrub tundra	Air / Ground	04/08/2018
Inuvialuit	Lousy Point Low Terrace	90TT06	n/a	69.22	134.28	Glaciofluvial ridge	Low shrub tundra	Air / Ground	04/08/2018
Inuvialuit	Yaya Lake Low	90TT04	10	69.14	134.70	Ice contact complex	Shrub tundra	Air / Ground	03/08/2018
Inuvialuit	East Channel	T6 Upland	n/a	69.12	134.19	Moraine uplands	Dwarf birch tundra with willow and alder shrubs	None	04/08/2018
Inuvialuit	H-01	H-01	n/a	69.17	136.01	Surface of Holocene Mackenzie delta	Grass and shrub tundra	None	Not visited
Inuvialuit	Parsons Lake T5	T5 Upland	n/a	68.96	133.84	Moraine uplands	Dwarf birch tundra with willow and alder shrubs	None	Not visited
		T5 Slump	n/a	68.96	133.84	Thaw slump	Willow and alder shrubs	None	Not visited
Inuvialuit	Reindeer Station plateau	91TT12	152	68.69	134.11	Plateau surface, till plain	Shrub tundra	Air / Ground	07/08/2018

Table 1. (Continued)

Settlement region	Site name	Borehole name	Elevation (m a.s.l.)	Latitude (°N)	Longitude (°W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited
Inuvialuit	Reindeer Depot (Williams Island)	91TT13	5	68.68	134.15	Surface of bar in Mackenzie Delta	Riparian willow and alder shrub	Air / Ground	07/08/2018
Inuvialuit	Jimmy Creek Valley	Bottom	n/a	68.63	133.63	Moraine uplands	Dwarf birch tundra with willow and alder shrubs	None	Not visited
Inuvialuit	Navy Channel	03TC01	5	68.42	133.79	Surface of Holocene Mackenzie delta adjacent to eastern edge rising 10s of meters to till plain	Riparian high willow shrub, open, incomplete ground cover of forbs and sedge (forest tundra)	Air / Ground	07/08/2018
Gwich'in	Norris Creek	NC-01	15	68.41	133.29	Thick organic material over moraine plain	Shrub tundra	None	03/08/2018
Gwich'in	Navy Road	01TC01	60	68.40	133.76	Fine grained colluvium sloping toward river, post glacial (~10Ka)	Taiga post fire succession, scattered birch and alder, open dwarf birch, heath ground cover	Ground	08/08/2018
Gwich'in	Inuvik Airport (trees)	01TC02	84	68.32	133.44	Fluted till plain, glacial (>10Ka)	Taiga open black spruce, heath ground cover	Ground	02/08/2018
Gwich'in	Inuvik Airport (bog)	12TC01	68	68.32	133.43	Bog between ridges on fluted till plain, glacial (>10Ka)	Taiga open bog, scattered shrub, heath ground cover (forest tundra)	Ground	02/08/2018
Gwich'in	Campbell Lake	CaL-01	115	68.24	133.10	Moraine plain	Peatland	None	03/08/2018
		CaL-02	118	68.24	133.09	Moraine plain	Cutline	None	03/08/2018
		CaL-03	118	68.24	133.10	Moraine plain	Black spruce forest	None	03/08/2018
Gwich'in	North Caribou Lake	NCL-01	209	68.15	132.93	Moraine plain	Peatland	None	03/08/2018
		NCL-02	217	68.15	132.93	Moraine plain	Stunted black spruce forest	None	03/08/2018
Gwich'in	Hill Lake	HL-01	229	67.99	132.49	Moraine plain	Tundra	None	03/08/2018
		HL-02	234	67.99	132.49	Moraine plain	Shrub tundra	None	03/08/2018
Gwich'in	Wood Bridge Lake	WBL-01	204	67.90	132.18	Alluvial plain	Black spruce forest	None	Not visited
Gwich'in	Rengleng River mouth	91TT14	8	67.80	134.13	Alluvial plain	Mixed spruce and hardwood forest	Air / Ground	06/08/2018

Table 1. (Continued)

Settlement region	Site name	Borehole name	Elevation (m a.s.l.)	Latitude (°N)	Longitude (°W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited
Sahtu	Jackfish Creek	JF-02	90	66.29	128.47	Eolian dune on moraine plain, well drained, elevated area	Black spruce forest and moss cover	None	11/08/2018
Sahtu	Fort Good Hope South	FGHS-01	134	66.21	128.50	Hummocky peatland	Dense shrub and open black spruce	Air	11/08/2018
		FGHS-02	134	66.21	128.50	Hummocky peatland	Peat plateau, lichen, open black spruce	None	11/08/2018
Sahtu	Snafu Creek	SC-01	100	66.00	128.35	Moraine plain	Peat bog, open black spruce forest, and lichen cover	None	11/08/2018
Sahtu	Chick Lake	CL-01	122	65.90	128.24	Moraine plain	Peat and organic soil with open black spruce forest and shrubs	None	11/08/2018
Sahtu	Gibson Lake	GL-01	228	65.75	127.89	Hummocky moraine plain	Recovering burnt area with peat and shrubs	Ground	11/08/2018
Sahtu	Hanna River	HR-01	104	65.67	127.83	Lacustrine plain	Boggy burnt area	None	11/08/2018
Sahtu	Elliot Creek	EC-01	54	65.52	127.62	Lacustrine undulating plain, well drained elevated area	Peat cover on edge of open, mature black spruce forest	None	11/08/2018
		EC-02	54	65.52	127.62	Lacustrine plain overlain by alluvial sediments	Peat cover on edge of dense, mature black spruce forest	None	11/08/2018
Sahtu	Oscar Creek	OC-01	64	65.44	127.44	Undulating glaciolacustrine terrain overlain by alluvial sediments	Peat cover with dense-forested birch and black spruce	None	11/08/2018
Sahtu	Billy Creek North	BCN-01	90	65.40	127.32	Alluvial and eolian sediments overlying low-lying lacustrine plain	Peat cover with dense-forested black spruce and mixed shrub	None	No visit
Sahtu	Kee Scarp	Kee Scarp-HT	270	65.30	126.72	Top of narrow ridge. Borehole is in shale (which is underlain by limestone) with 20 cm moss and organic cover at surface	Boreal forest, mixture aspen birch pine and spruce with ground cover of grasses and small shrub	None	10/08/2018

Table 1. (Continued)

Settlement region	Site name	Borehole name	Elevation (m a.s.l.)	Latitude (°N)	Longitude (°W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited
Sahtu	Norman Wells Fen	99TC5	n/a	65.30	126.86	Thermokarst surface of glaciolacustrine plain (near small fen)	Large white and black spruce with smaller birch closed canopy, moss with lichen ground cover	Ground	14/08/2018
Sahtu	Norman Wells Pump Station	84-1-T4	61	65.29	126.89	Ground moraine	Moss, lichen, ericaceous shrubs with black spruce and tamarack	Air / Ground	10/08/2018
Sahtu	Norman Wells Upper Air	93AG10	94	65.29	126.75	Till plain	Moss, lichen, herbaceous alder and willow shrub, open black spruce	Air / Ground	14/08/2018
Sahtu	Normal Wells Town	Water Treatment Plant	80	65.28	126.84	Ground Moraine	Disturbed area adjacent to parking lot	None	10/08/2018
Sahtu	Van Everdingen	30m	n/a	65.27	126.75	Lacustrine plain	Open forest, moss, shrub, spruce/tamarack	Air / Ground	10/08/2018
Sahtu	Canyon Creek North A	84-2A-HT	110	65.23	126.50	Ground moraine	Lichen, moss, ericaceous shrubs with black spruce and tamarack	None	11/08/2018
		84-2A-T4	110	65.23	126.50	Ground moraine	Lichen, moss, ericaceous shrubs with black spruce and tamarack	None	11/08/2018
Sahtu	Canyon Creek North B	84-2B-T4	110	65.23	126.52	Ground moraine	Moss with white spruce	Air / Ground	11/08/2018
Sahtu	Vermillion Creek	VC-01	92	65.10	126.14	Moraine plain (site at approach to water crossing)	NW side of creek, on top of ridge in black spruce forest	Air	13/08/2018
		VC-02	92	65.10	126.13	Moraine plain (site at approach to water crossing)	SE side of creek on plateau in area of burnt black spruce	None	13/08/2018
Sahtu	Police Island	PI-01	113	64.83	125.01	Lacustrine plain	Recovering burn (burnt black spruce forest)	None	13/08/2018
		PI-02	113	64.83	125.01	Lacustrine plain	Unburnt, black spruce forest with moss and lichen ground cover	None	13/08/2018

Table 1. (Continued)

Settlement region	Site name	Borehole name	Elevation (m a.s.l.)	Latitude (°N)	Longitude (°W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited
Sahtu	Old Fort Point	OFP-01	112	64.65	124.84	Lacustrine plain	Open mixed spruce, pine deciduous forest adjacent to open, low-lying fen	None	12/08/2018
Sahtu	Little Smith Creek	LS-01	80	64.43	124.74	Alluvial flood plain	Open mature black spruce forest	None	12/08/2018
		LS-02	112	64.43	124.73	Glaciofluvial outwash plain	Tamarack, birch, poplar, and pine forest transition to spruce	None	12/08/2018
Sahtu	Saline River	SR-02	140	64.29	124.49	Glaciofluvial veneer over lacustrine	Burnt black spruce forest	Air	12/08/2018
Sahtu	KP182	Mid Slope HT192	138	64.28	124.47	Lacustrine plain	Forested (recovering burn, burned 1994)- Aspen, willow, birch, tamarack	Ground	13/08/2018
		Top of Slope	144	64.28	124.47	Lacustrine plain	Forested (recovering burn, burned 1994)- Aspen, willow, birch, tamarack	Ground	13/08/2018
		Crest of Slope	139	64.28	124.47	Lacustrine plain	Forested (recovering burn, burned 1994)- Aspen, willow, birch, tamarack	Air / Ground	13/08/2018
		Unburnt	141	64.28	124.47	Lacustrine plain	Forested - white spruce, white birch with black spruce, moss and peat ground cover	Ground	13/08/2018
Sahtu	Steep Creek	Steep-02 (crest)	134	64.18	124.38	Alluvial and colluvial, north facing slope of stream valley (site at edge of cleared ROW)	Mixed, white spruce, jackpine, aspen, birch	None	12/08/2018
Deh Cho	Table Mountain A	85-7A-HA108	255	63.61	123.64	Ground moraine	Lichen, moss, ericaceous shrubs with black spruce and alder	Air / Ground	12/08/2018

Table 1. (Continued)

Settlement region	Site name	Borehole name	Elevation (m a.s.l.)	Latitude (°N)	Longitude (°W)	Landform	Vegetation Cover	Air / ground surface temperature	Date visited
Deh Cho	KP313	KP313 T2	250	63.26	123.43	Lacustrine plain, bottom of slope	Moss cover and peat, forested, mix of birch and spruce	Ground	12/08/2018
		KP313 T4	250	63.26	123.43	Lacustrine plain, mid slope, W side of ROW	Moss cover and peat, forested, mix of birch and spruce	None	12/08/2018
		KP313 T5	250	63.26	123.43	Lacustrine plain, mid slope, E side of ROW	Moss cover and peat, forested, mix of birch and spruce	None	12/08/2018
		KP313 T6	250	63.26	123.43	Lacustrine plain, top of slope	Thin moss and organic cover, forested, mix of birch and spruce	Air / Ground	12/08/2018

Table 2. Summary of active layer, and air and ground surface temperature monitoring sites from north to south throughout the corridor. n/a = not available.

Note: Active layer thickness for 2017 determined from thaw tubes at active layer monitoring sites is provided. Probed thaw depths (where indicated in table) are taken on day of visit and are for the 2018 thaw season. Probed active layer values at ground temperature sites are presented in Appendix A.

Site Name	Site ID	Latitude (°N)	Longitude (°W)	2017 Active Layer (m)	Air / ground surface temperature	Date visited
North Head shore	90TT13	69.72	134.46	n/a	Air / Ground	Not visited
North Point summit	90TT02	69.66	134.39	n/a	None	Not visited
North Point mid-slope	90TT11	69.66	134.38	n/a	None	Not visited
North Point shore	90TT12	69.66	134.36	n/a	None	Not visited
Mason Bay high	90TT08	69.53	134.02	n/a	None	Not visited
Mason Bay shore	90TT09	69.53	134.01	n/a	None	Not visited
Mason Bay inlet	90TT10	69.53	134.04	n/a	None	Not visited
Illasarvik	94TT01	69.49	134.55	n/a	None	Not visited
Harry Channel mouth	91TTA	69.48	134.83	n/a	None	Not visited
Involuted Hill top	92TT01	69.47	132.63	n/a	None	Not visited
Involuted Hill flat	92TT02	69.47	132.63	n/a	Air / Ground	Not visited
Kendall Island Meadow	91TTF	69.45	135.34	n/a	None	Not visited
Taglu	91TTC	69.37	134.95	n/a	Air / Ground	Not visited
Lousy Point hollow	91TT09	69.22	134.30	0.32	None	03/08/2018
Lousy Point ridge	90TT05	69.22	134.28	0.83	Air / Ground	03/08/2018
Lousy Point low terrace	90TT06	69.22	134.28	0.51	Air / Ground	04/08/2018
Lousy Point flood plain	90TT07	69.22	134.27	n/a	None	Not visited
YaYa Lake high	90TT03	69.15	134.71	1.11	None	03/08/2018
YaYa Lake low	90TT04	69.14	134.70	0.94	Air / Ground	03/08/2018
Swimming Point slope	91TT01	69.11	134.40	n/a	None	Not visited
Swimming Point shore	91TT02	69.11	134.38	thawed	None	Not visited
Swimming Point Holmes	91TT03	69.11	134.35	n/a	None	Not visited
Trail Valley Creek	91TT11	68.74	133.49	n/a	None	Not visited
Reindeer Station plateau	91TT12	68.69	134.11	0.76	Air / Ground	30/06/2018
Williams Island	91TT13	68.68	134.14	1.45	Air / Ground	07/08/2018
Navy Channel	90TT17	68.42	133.79	thawed	Air / Ground	07/08/2018
Inuvik Airport	01TT02	68.32	133.43	1.15	None	02/08/2018
Upper Air	90TT16	68.32	133.53	0.83	None	04/08/2018
Havikpak Creek	93TT02	68.32	133.52	0.73	None	04/08/2018

Table 2. (Continued)

Site Name	Site ID	Latitude (°N)	Longitude (°W)	2017 Active Layer (m)	Air / ground surface temperature	Date visited
Caribou Creek	93TT01	68.11	133.48	1.05	None	02/08/2018
Rengleng River mouth	91TT14	67.80	134.13	1.12	Air / Ground	06/08/2018
Arctic Red	92TT03	67.50	133.76	1.14	None	02/08/2018
Tsiigehtchic	91TT16	67.48	133.77	n/a	Air / Ground	Not visited
Sans-Sault rapid	91TT19	65.66	128.78	0.75 (probed)	None	11/08/2018
Ochre River	92TT09	63.46	123.70	0.46 (probed)	None	12/08/2018
Ochre River cabin	92TT10	63.47	123.69	0.80 (probed)	Air / Ground	12/08/2018



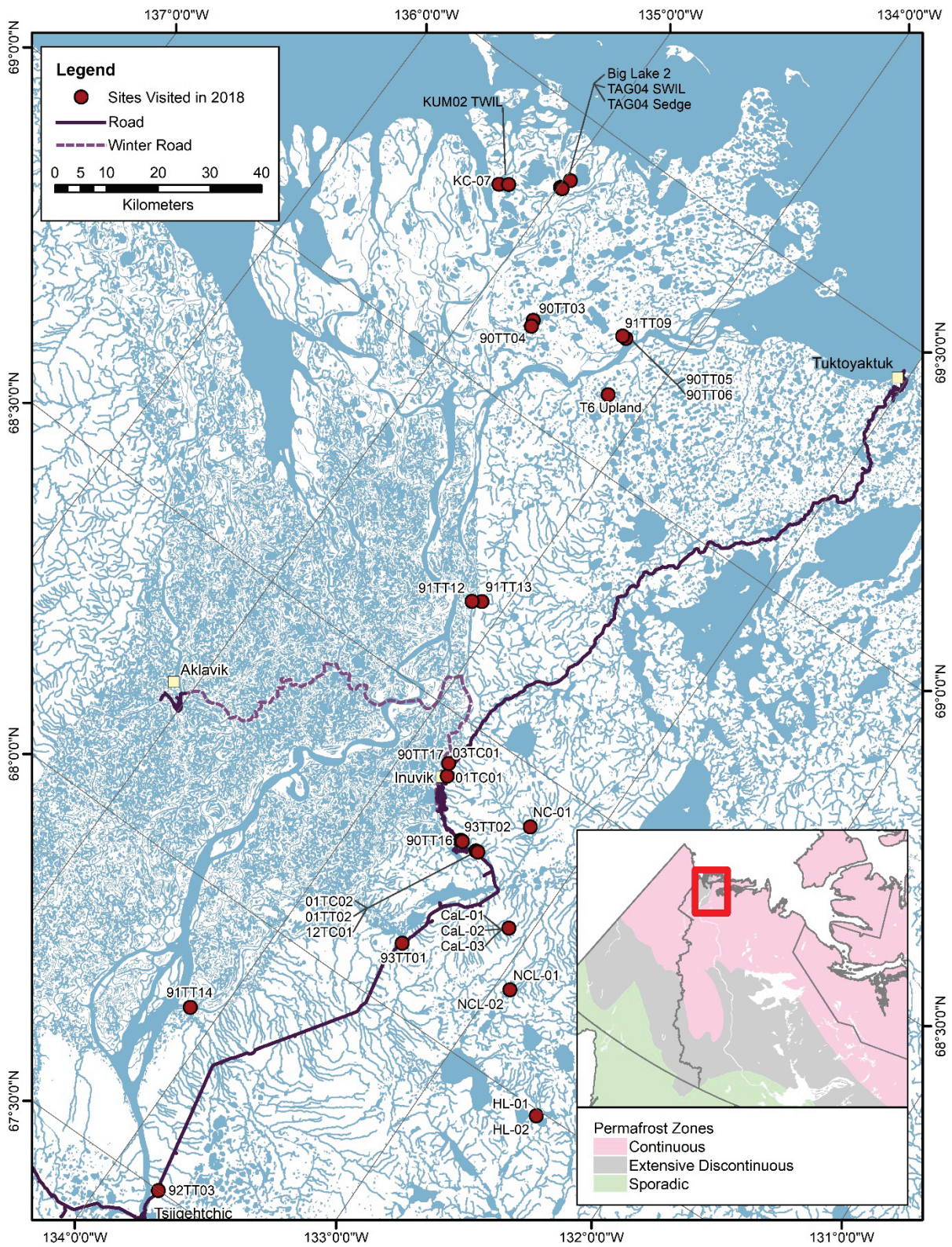


Figure 1. Permafrost and active layer monitoring sites north and south of Inuvik in the Inuvialuit and Gwich'in Settlement Regions, visited in 2018.

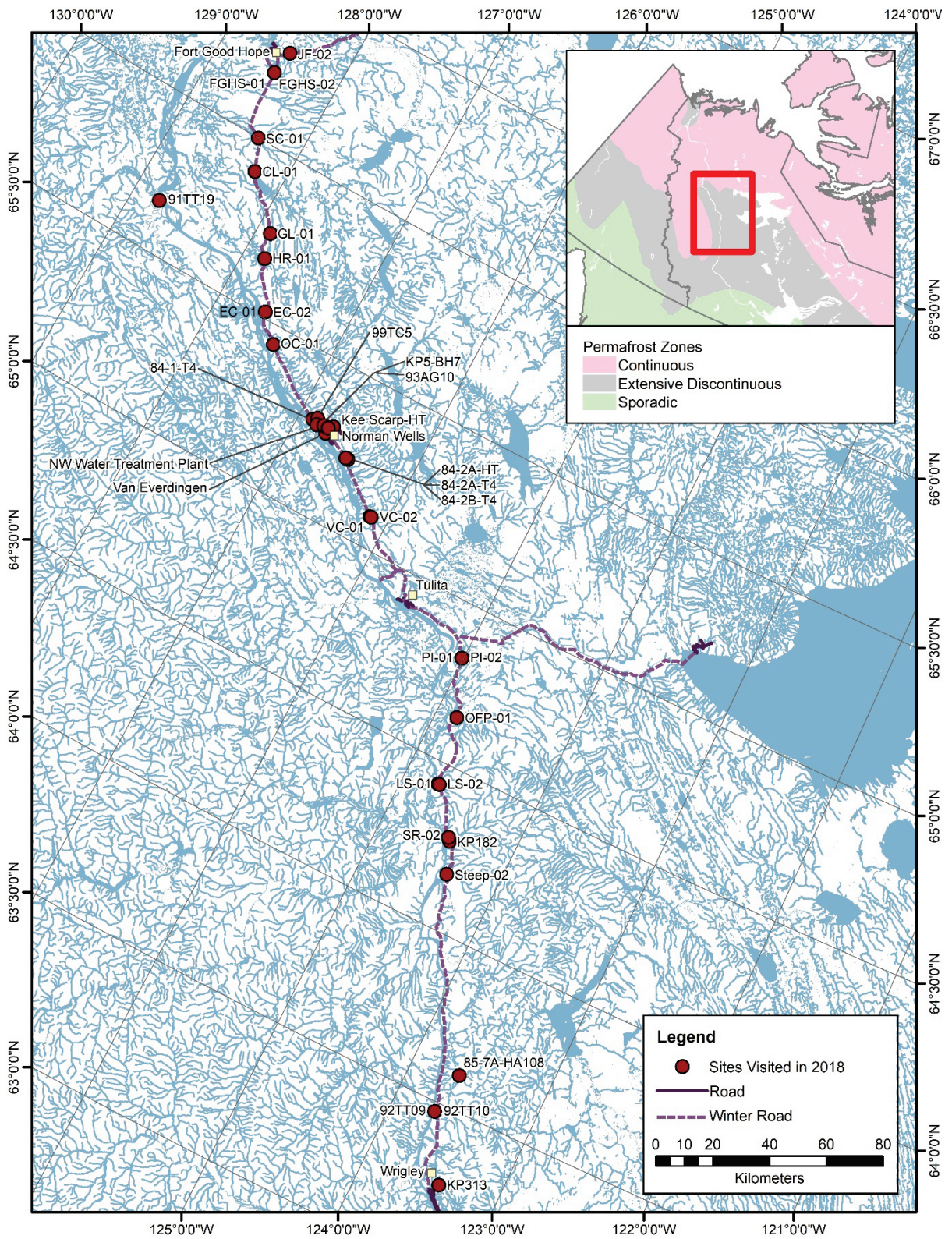


Figure 2. Permafrost and active layer monitoring sites between Fort Good Hope and Wrigley in the Sahtu and Deh Cho Settlement Regions, visited in 2018.

### 3. DATA COLLECTION AND PRESENTATION

Sites were visited in early August 2018 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, maximum and mean temperature at each depth and to define the annual ground temperature envelope for the 2017–2018 period. Temperature envelopes and mean annual temperature profiles are presented in graphical and tabular format for each site in Appendix A. The maximum thaw depth for each site was determined by either extrapolating down using the maximum temperature for two sensors located on the unfrozen side of the 0 °C isotherm (Riseborough, 2008), 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., 2018).

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.

The annual mean ground temperature (AMGT) 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 AMGT 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, AMGT was determined at the deepest measurement depth. The AMGT for the 2017–2018 period is summarized in Figure 3. Colder permafrost is found in the northern portion of the corridor with AMGT at the tundra upland site at Niglingtak (KC-07) below -5 °C. 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 AMGT generally above -2 °C, and some sites having AMGT very close to 0 °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 2018 are summarized in Duchesne et al. (2014) as well as previous annual reports (e.g. Smith et al., 2018).

The 2017 active layer-thickness data determined from thaw tubes are presented in Table 2 for all active layer monitoring sites that were visited in early August 2018. Previous data have been summarized elsewhere (e.g. Duchesne et al., 2015a, b; Smith et al., 2009b, 2018).

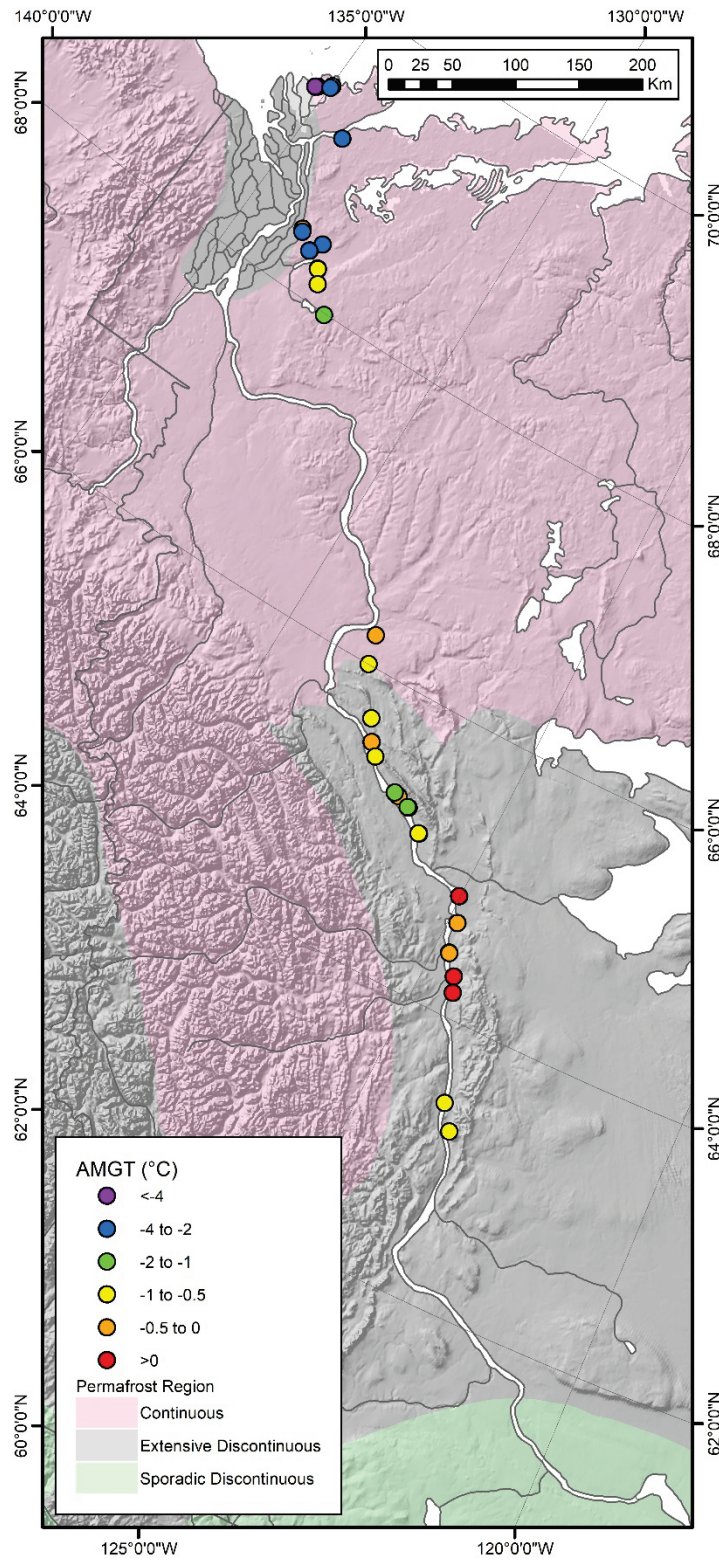


Figure 3. Current (2017–2018) annual mean ground temperature (AMGT) for the Mackenzie corridor based on temperature at depth of zero annual amplitude (ZAA) or the deepest available measurement.

## 4. CHANGES OVER TIME

### 4.1 Changes in Ground Temperatures 2007–2018

Many of the monitoring sites were established in 2007 and ground temperature records about a decade long are now available. Although the data records are not sufficient 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.

For each site, AMGT determined at the ZAA depth is tracked annually for the 2007–2018 period. Temperatures at the ZAA depth are desirable for following long-term trends whereas temperatures at shallower depths reflect shorter term fluctuations. For sites with data loggers, the annual period for AMGT 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 sites where only manual measurements are available the temperature recorded at the ZAA depth during the site visit is used as the AMGT. Time series for selected permafrost sites in the continuous and discontinuous permafrost regions (Figure 4 and 5) are discussed below.

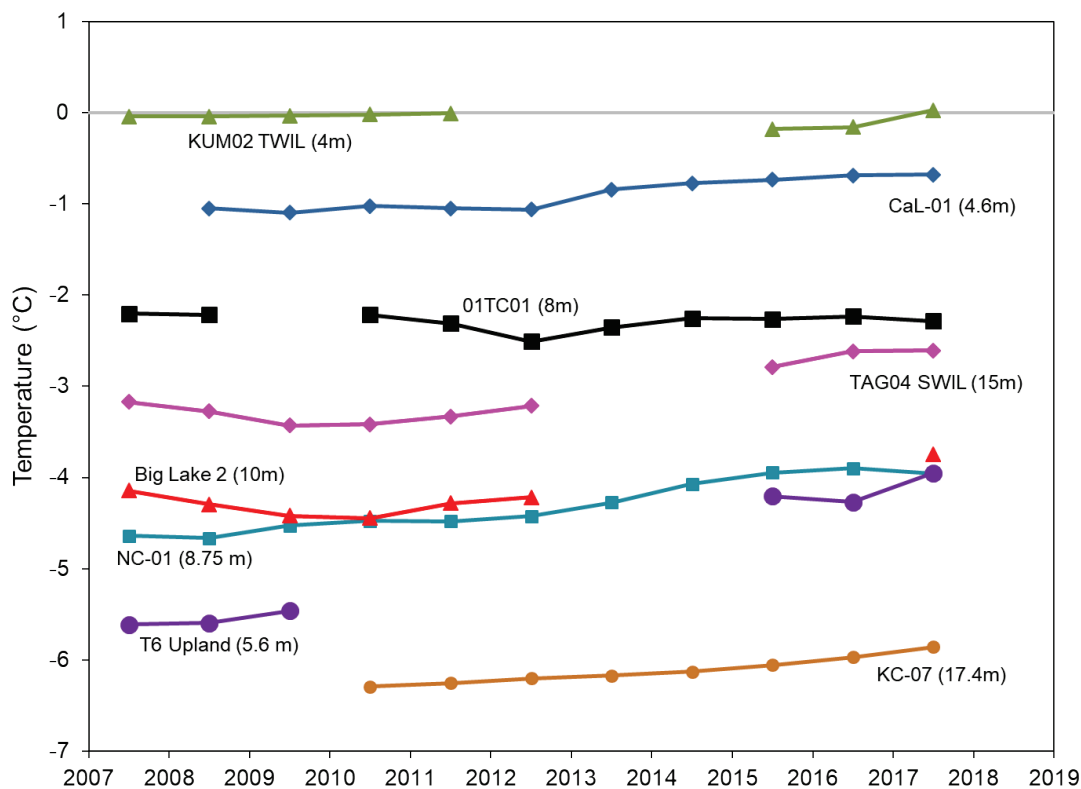


Figure 4. Annual mean ground temperature (AMGT) at measurement depth at or closest to depth of zero annual amplitude (ZAA) for selected sites in the continuous permafrost zone. Borehole name and depth of AMGT indicated.

Analysis of data collected in the continuous permafrost zone indicates that at most sites permafrost has been warming at rates greater than  $0.05\text{ }^{\circ}\text{C}\text{y}^{-1}$  (Figure 4). However, at some of the warmer permafrost sites (e.g. KUM02 TWIL, 01TC01), little warming or even slight cooling ( $0.005\text{ }^{\circ}\text{C}\text{y}^{-1}$ ) 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 6). At NC-01 and T6 Upland, greater increases in ground temperature ( $0.08$  and  $0.17\text{ }^{\circ}\text{C}\text{y}^{-1}$ , respectively) was observed over the same period. However, the measurement depths for these sites are shallower than that for many of the more northerly sites, and also above the ZAA depth, where temperatures exhibit more short-term fluctuation in response to air temperature changes.

The rate of change in AMGT in warmer permafrost of the discontinuous zone has generally been less than that for the colder permafrost sites. Over the last decade, the AMGT has increased by up to  $0.03\text{ }^{\circ}\text{C}\text{y}^{-1}$  at sites between Norman Wells and Fort Good Hope and by  $0.02\text{ }^{\circ}\text{C}\text{y}^{-1}$  or less at sites south of Norman Wells (Figure 3 and 5). These changes in AMGT are in agreement with those acquired from longer records for the central Mackenzie Valley (see Smith et al., 2019; Romanovsky et al., 2019) which indicate permafrost has been warming since the mid 1980s. Similarly to sites in continuous permafrost, the increase in AMGT since 2010 at some sites (Figure 5) may be the result of higher air temperatures in the last 9 years compared to those between 2007 and 2009 (Figure 6).

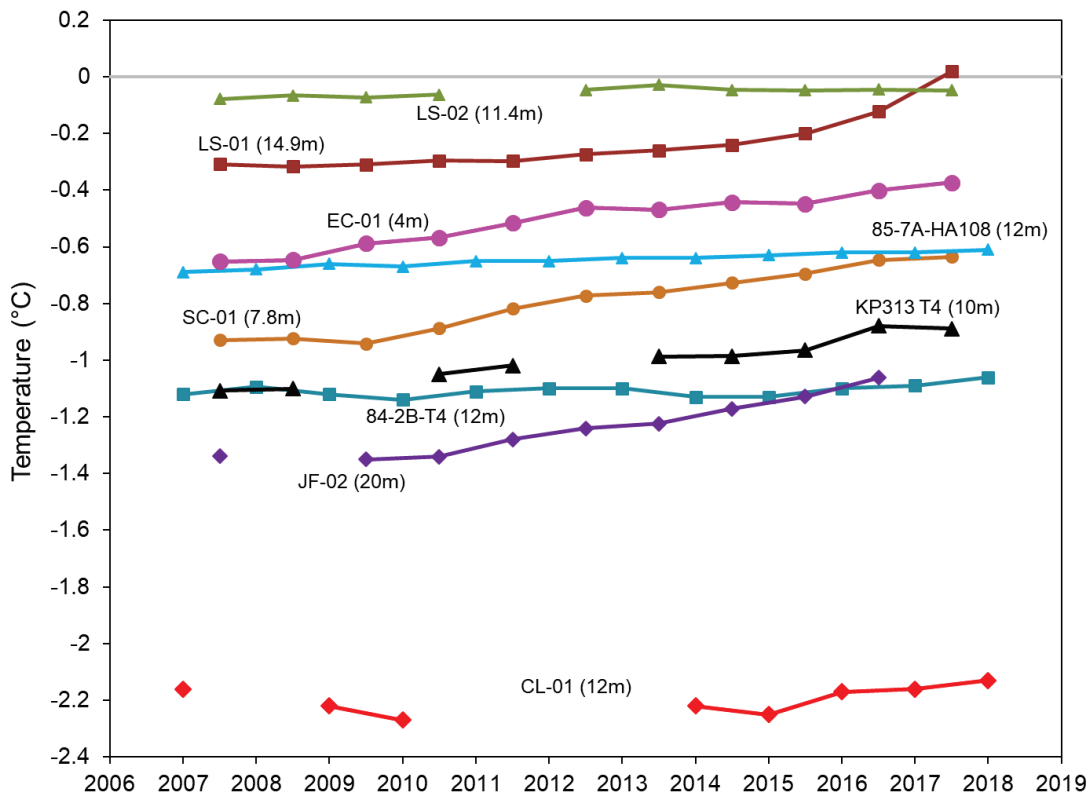


Figure 5. Annual mean ground temperature (AMGT) at the measurement depth at or closest to depth of zero annual amplitude (ZAA) for selected permafrost sites in the discontinuous permafrost zone. Borehole name and depth of AMGT indicated. Some sites are represented with a manual measurement.

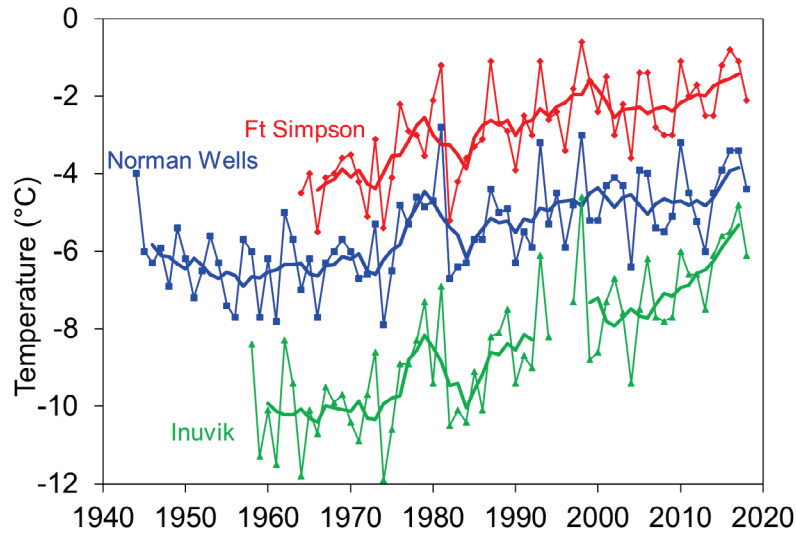


Figure 6. Mean annual air temperature (MAAT) for weather stations in the Mackenzie Valley (data from Environment Canada <http://climate.weather.gc.ca/>). The thick line represents the 5-year running mean.

Vegetation clearing occurred in 2015 and 2016 at the edge of the winter road (Figure 2) to install a fibre optic cable. Complete removal of trees occurred at the base of the slope at Little Smith Creek, at site LS-01 (Figure 7). The increasing rate of warming at this site over the last three years (Figure 5) is likely due to this loss of vegetation.



Figure 7. Vegetation cover at site LS-01 following cable installation in 2007 (NRCan Photo 2019-759), and after tree clearing between 2015 and 2016 (NRCan Photo 2019-758).

AMGTs for 2017–2018 for 34 sites have been compared to the baseline established during the International Polar Year (IPY, 2007–2009) (Smith et al., 2010b). Overall AMGTs are currently higher than the IPY baseline (Figure 8) with the difference generally being greater for colder permafrost sites. Similar results are found for other northern Canadian sites (Smith et al., 2019). At some of the colder permafrost sites, the current AMGT is about 1 °C higher than the IPY baseline. For warmer permafrost sites, especially where AMGT 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 AMGT (Figure 8).

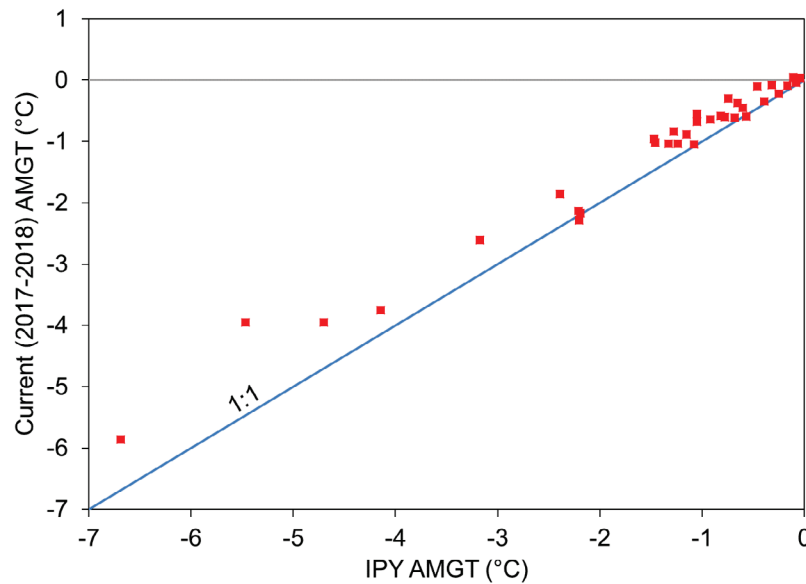


Figure 8. Comparison of current (2017–2018) annual mean ground temperature (AMGT) with international polar year (IPY) (2007–2009) baseline for sites visited in 2018. A 1:1 line is shown for comparison.

## 4.2 Changes in Active Layer Thickness

Active-layer thickness (ALT) exhibits greater interannual variation than the deeper ground temperature measurements. The change in ALT, relative to the 10-year mean for 2003–2012 is summarized for 25 sites in Figure 9. ALT has generally increased since 2008 and exceeded the long-term mean since 2009, reaching a peak in 2012, but was still less than the maximum attained 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 6). ALT decreased slightly after 2012 and increased again after 2014. ALT in 2017 was generally greater than it was between 2014 and 2016. Analysis of long-term changes in thaw penetration (measured from a fixed datum) and ground surface elevation for 17 sites in the Mackenzie Delta has also shown that significant subsidence as occurred at more than half of the sites due to melting of excess ground ice (O’Neill et al., 2019).



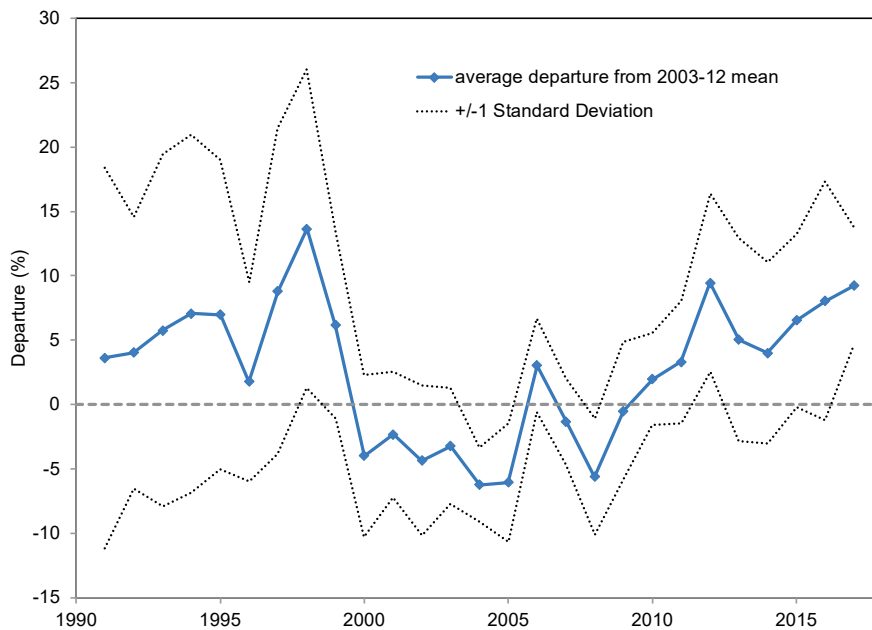


Figure 9. Mean active-layer thickness (ALT) departures (%) from 2003–2012 mean for 25 sites.

## 5. SUMMARY

This report summarizes field activities in the Mackenzie corridor during summer 2018. A summary of the ground thermal data collected at permafrost monitoring sites for the period between August 2017 and August 2018 are presented in graphical and tabular format. The 2017 active-layer thickness data for active layer monitoring sites visited in 2018 were also provided. Analysis of data collected over the last decade indicates 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 to provide an update of our activities. The data presented can be utilized for land management activities, regulatory processes and for planning 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 2018 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 and Andrew Branson for their help with fieldwork. We also thank Wendy Sladen for helpful comments and suggestions.

## 7. REFERENCES

- Bonnaventure, P.P., Smith, S.L., Riseborough, D.W., Duchesne, C., and Ednie, M., 2015. The ground thermal regime across the Mackenzie Valley Corridor, Northwest Territories Canada; *In* GEOQuébec 2015 (68th Canadian Geotechnical Conference and 7th Canadian Conference on Permafrost), Québec, GEOQuébec 2015 Organizing Committee, Paper 67.
- Burn, C.R., and Kokelj, S.V., 2009. The environment and permafrost of the Mackenzie Delta area; *Permafrost and Periglacial Processes*, v. 20, no. 2, p. 83105, doi:10.1002/ppp.653
- Duchesne, C., Riseborough, D., and Smith, S.L., 2014. Air and near surface ground temperatures, indices and summary statistics from 1994 to 2011 for the Mackenzie Valley corridor, N.W.T.; Geological Survey of Canada, Open File 7392, 85 p., doi:10.4095/292675
- Duchesne, C., Smith, S.L., Ednie, M., and Bonnaventure, P.P., 2015a. Active layer variability and change in the Mackenzie Valley, Northwest Territories; *In* GEOQuébec 2015 (68th Canadian Geotechnical Conference and 7th Canadian Conference on Permafrost), Québec, GEOQuébec 2015 Organizing Committee, Paper 117.
- Duchesne, C., Smith, S., Ednie, M., and Chartrand, J., 2015b. 20 years of active layer monitoring in the Mackenzie Valley, Northwest Territories; Geological Survey of Canada, Scientific Presentation SP31, doi:10.4095/296513
- Nixon, F.M., and Taylor, A.E., 1994. Active layer monitoring in natural environments, Mackenzie Valley, Northwest Territories; Geological Survey of Canada, Current Research, 1994-B, p. 27-34.
- Nixon, F.M., Taylor, A.E., Allen, V.S., and Wright, F., 1995. Active layer monitoring in natural environments, lower Mackenzie Valley, Northwest Territories; Geological Survey of Canada, Current Research, 1996-B, p. 27-34.
- O'Neill, H.B., Smith, S.L., Duchesne, C., 2019. Long-term permafrost degradation and thermokarst subsidence in the Mackenzie Delta area indicated by thaw tube measurements; *In* Cold Regions Engineering 2019 (Proceedings of the 18th International Conference on Cold Regions Engineering and the 8th Canadian Conference on Permafrost), (ed.) J.-P. Bilodeau, D.F. Nadeau, D. Fortier, and D. Conciatori, Quebec, Canada, August 18-22 2019, American Society of Civil Engineers, p. 643-651.
- Pilon, J.A., Burgess, M.M., Judge, A.S., Allen, V.S., MacInnes, K.L., Harry, D.G., Tarnocai, C., and Baker, H., 1989. Norman Wells to Zama pipeline permafrost and terrain research and monitoring program: site establishment report; Geological Survey of Canada, Open File 2044, 332 p.

- Riseborough, D.W., 2008. Estimating active layer and talik thickness from temperature data: implications from modeling results; *In* Ninth International Conference on Permafrost, June 29-July 3, 2008, AK Fairbanks, DL Kane, KM Hinkel (eds)., Institute of Northern Engineering, University of Alaska Fairbanks, Fairbanks, Alaska, p. 1487-1492.
- Romanovsky, V.E., Smith, S.L., Isaksen, K., Shiklomanov, N.I., Streletskiy, D.A., Kholodov, A.L., Christiansen, H.H., Drozdov, D.S., Malkova, G.V., and Marchenko, S.S., 2019. [Arctic] Terrestrial Permafrost; *In* State of the Climate in 2018, Bulletin of the American Meteorological Society (supplement), v. 100, no. 9, p. S153-S156, doi: 10.1175/2019BAMSStateoftheClimate.1
- Smith, S.L., Ye, S., and Ednie, M., 2007. Enhancement of permafrost monitoring network and collection of baseline environmental data between Fort Good Hope and Norman Wells, Northwest Territories; Geological Survey of Canada, Current Research, 2007-B7, 10 p., doi:10.4095/224524
- Smith, S.L., Burgess, M.M., Riseborough, D., and Chartrand, J., 2008a. Permafrost and terrain research and monitoring sites of the Norman Wells to Zama pipeline – Thermal data collection and case histories, April 1985 to September 2001; Geological Survey of Canada, Open File 5331, doi:10.4095/224831
- Smith, S.L., Nguyen, T.-N., Riseborough, D.W., Ednie, M., Ye, S., and Chartrand, J., 2008b. Preliminary ground-thermal data for permafrost-monitoring sites established in 2007 between Fort Good Hope and Norman Wells, Northwest Territories; Geological Survey of Canada, Current Research 2008-20, 9 p., doi:10.4095/226049
- Smith, S.L., Chartrand, J., Nguyen, T.N., Riseborough, D.W., Ednie, M., and Ye, S., 2009a. Geotechnical database and descriptions of permafrost monitoring sites established 2006-07 in the central and southern Mackenzie corridor; Geological Survey of Canada, Open File 6041, 183 p., doi:10.4095/226435
- Smith, S.L., Riseborough, D.W., Nixon, F.M., Chartrand, J., Duchesne, C., and Ednie, M., 2009b. Data for Geological Survey of Canada active layer monitoring sites in the Mackenzie valley, N.W.T.; Geological Survey of Canada, Open File 6287, 100 p., doi:10.4095/248197
- Smith, S.L., Nguyen, T.N., Riseborough, D.W., Ednie, M., Ye, S., and Chartrand, J., 2010a. Baseline geotechnical and permafrost data from new field sites established in the Mackenzie corridor south of Norman Wells, Northwest Territories; Geological Survey of Canada, Current Research 2010-2, 18 p., doi:10.4095/261487
- Smith, S.L., Romanovsky, V.E., Lewkowicz, A.G., Burn, C.R., Allard, M., Clow, G.D., Yoshikawa, K., and Throop, J., 2010b. Thermal state of permafrost in North America - A contribution to the International Polar Year; *Permafrost and Periglacial Processes*, v. 21, no. 2, p. 117-135, doi:10.1002/ppp.690

- Smith, S.L., Chartrand, J., and Duchesne, C., 2018. Report on 2017 field activities and collection of ground thermal and active layer data in the Mackenzie Corridor, Northwest Territories; Geological Survey of Canada, Open File 8492, 109 p., doi: 10.4095/313036
- Smith, S.L., Duchesne, C., and Lewkowicz, A.G., 2019. Tracking changes in permafrost thermal state in Northern Canada; *In* Cold Regions Engineering 2019 (Proceedings of the 18th International Conference on Cold Regions Engineering and the 8th Canadian Conference on Permafrost), (ed.) J.-P. Bilodeau, D.F. Nadeau, D. Fortier, and D. Conciatori, Quebec, Canada, August 18-22 2019, American Society of Civil Engineers, p. 670-677.
- Taylor, A.E., 2000. Relationship of ground temperatures to air temperatures in forests; *In* The Physical Environment of the Mackenzie Valley, Northwest Territories: a Base Line for the Assessment of Environmental Change, (ed.) L.D. Dyke and G.R. Brooks, Geological Survey of Canada, Bulletin 547, p. 111-117.
- Wolfe, S.A., Smith, S.L., Chartrand, J., Kokelj, S.V., Palmer, M., and Stevens, C., 2010. Geotechnical database and descriptions of permafrost monitoring sites established 2006-10 in the northern Mackenzie Corridor; Geological Survey of Canada, Open File 6677, 76 p., doi:10.4095/287167

## **APPENDIX A**

### **GRAPHICAL AND TABULAR PRESENTATION OF AIR AND GROUND TEMPERATURE DATA FOR THE PERIOD 2017–2018**

The annual maximum (red line) and minimum (blue line) temperature profile, or ground temperature envelope, is provided along with the mean temperature profile (green line) for each site for which a continuous 2017–2018 record of ground temperature is available. For sites that do not have a continuous record for 2017–2018, the ground temperature profile, based on a single manual measurement during the August 2018 site visit, is provided (green line). For sites not visited in 2017 but visited in 2018, the ground temperature envelopes for both years are provided. The maximum thaw depth is provided for each site based on extrapolation or 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 if available. Mean monthly air and ground surface temperature (5 cm depth) data for the 2017–2018 period is presented graphical and tables for each site where available.

## Big Lake 2

Inuvialuit Settlement Region

Latitude: 69.39 N

Longitude: 134.97 W

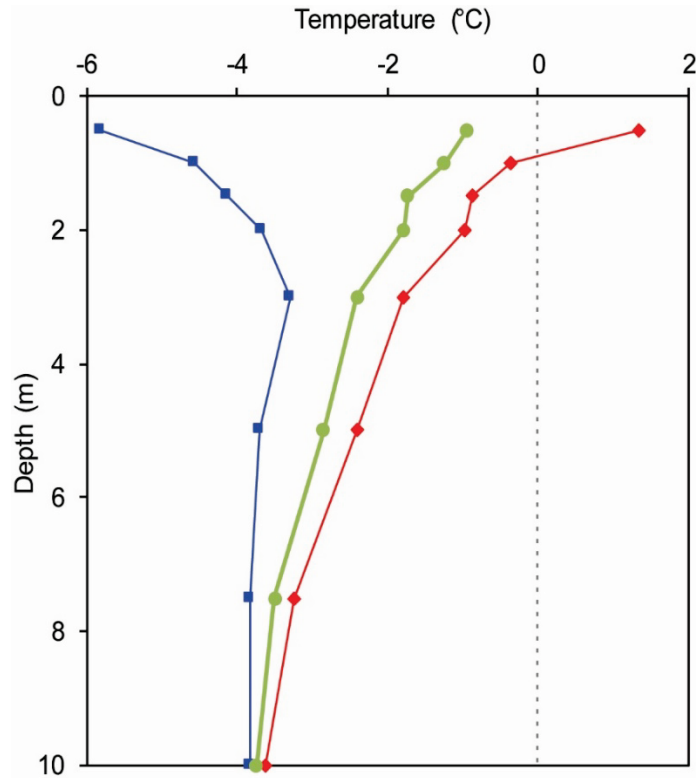
Elevation: n/a

Landform: Polygonal wetlands

Vegetation cover: Sedge

Thaw Depth: 0.89 m

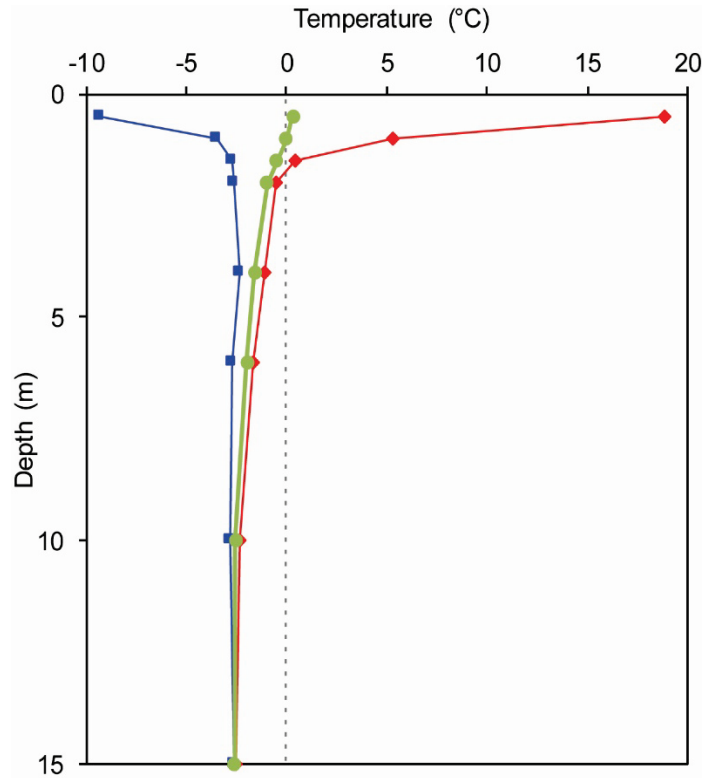
Site visit: Aug 3, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	1.34	-5.82	-0.95
1	-0.36	-4.57	-1.26
1.5	-0.88	-4.12	-1.73
2	-0.98	-3.68	-1.78
3	-1.79	-3.29	-2.41
5	-2.39	-3.70	-2.85
7.5	-3.24	-3.82	-3.50
10	-3.62	-3.83	-3.75

**Taglu — TAG04 SWIL**  
Inuvialuit Settlement Region

Latitude: 69.37 N                      Longitude: 134.98 W  
 Elevation: n/a  
 Landform: Point bar  
 Vegetation cover: Dwarf willow shrubs  
 Thaw Depth: 1.55 m  
 Site visit: Aug 3, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	18.87	-9.27	0.32
1	5.28	-3.45	0.01
1.5	0.46	-2.70	-0.50
2	-0.48	-2.64	-0.95
4	-1.11	-2.37	-1.59
6	-1.62	-2.71	-1.99
10	-2.34	-2.77	-2.53
15	-2.54	-2.65	-2.61

## **Kumak — KUM02 TWIL**

Inuvialuit Settlement Region

Latitude: 69.32 N

Longitude: 135.21 W

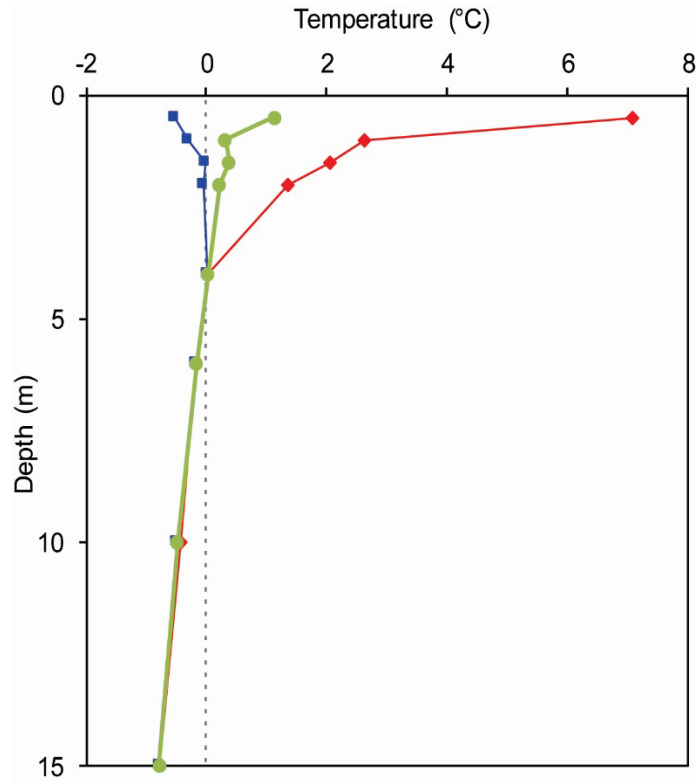
Elevation: n/a

Landform: Point bar

Vegetation cover: Tall willow shrubs

Thaw Depth: 4.05 m

Site visit: Aug 3, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	7.08	-0.51	1.12
1	2.62	-0.30	0.31
1.5	2.04	0.00	0.38
2	1.35	-0.04	0.22
4	0.03	0.03	0.03
6	-0.16	-0.17	-0.16
10	-0.43	-0.48	-0.48
15	-0.78	-0.79	-0.78



**KC-07**

Inuvialuit Settlement Region

Latitude: 69.31 N

Longitude: 135.25 W

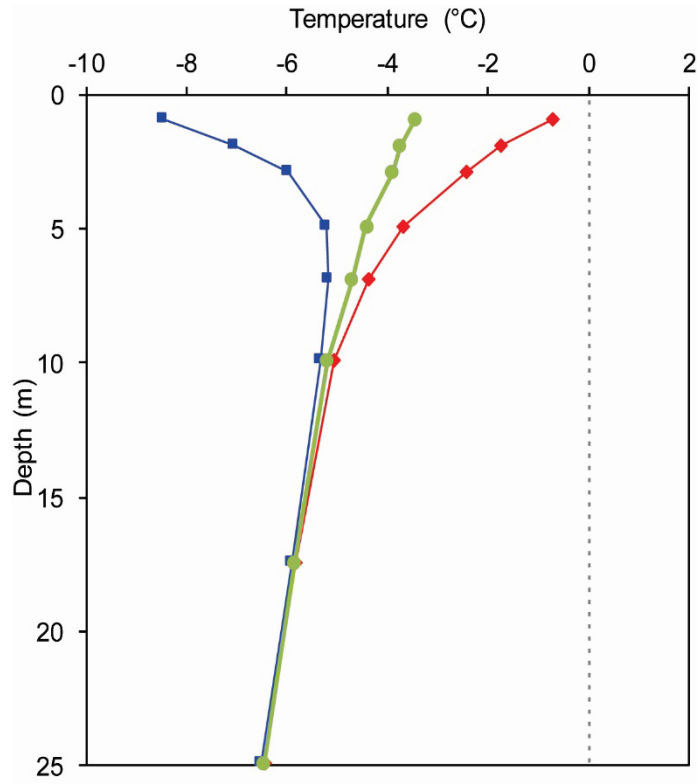
Elevation: n/a

Landform: Tundra upland

Vegetation cover: Grass and moss tundra

Thaw Depth: 0.22 m

Site visit: Aug 3, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.9	-0.70	-8.46	-3.45
1.9	-1.75	-7.03	-3.75
2.9	-2.45	-5.99	-3.91
4.9	-3.70	-5.22	-4.43
6.9	-4.36	-5.17	-4.71
9.9	-5.05	-5.35	-5.20
17.4	-5.82	-5.90	-5.86
24.9	-6.44	-6.49	-6.47

## **Lousy Point Ridge — 90TT05**

Inuvialuit Settlement Region

Latitude: 69.22 N

Longitude: 134.28 W

Elevation: 39 m a.s.l.

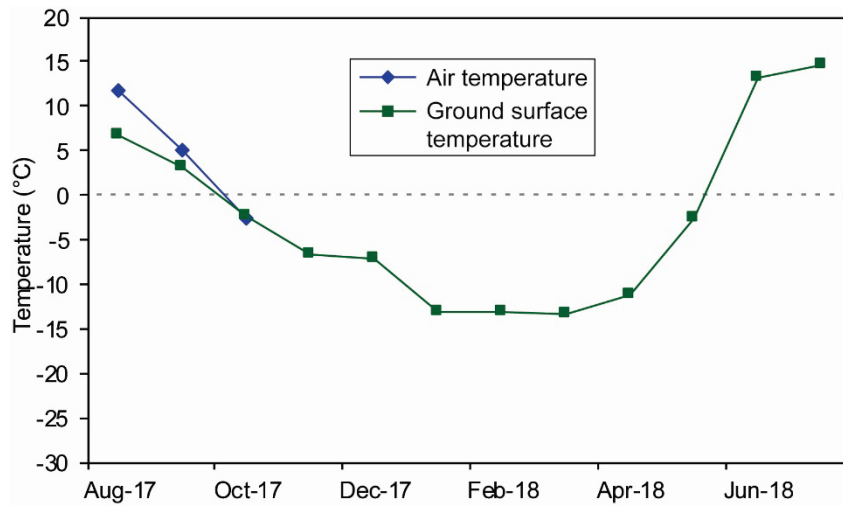
Landform: Glaciofluvial ridge

Vegetation cover: Low shrub tundra

Thaw depth: 0.66 m (probed)

Site visit: Aug 4, 2018

Month / Year	Temperature (°C)	
	Air	Surface
Aug-17	11.82	6.81
Sep-17	5.06	3.12
Oct-17	-2.52	-2.27
Nov-17	n/a	-6.58
Dec-17	n/a	-7.27
Jan-18	n/a	-13.08
Feb-18	n/a	-13.18
Mar-18	n/a	-13.30
Apr-18	n/a	-11.24
May-18	n/a	-2.59
Jun-18	n/a	13.13
Jul-18	n/a	14.71



## **Lousy Point Low Terrace — 90TT06**

Inuvialuit Settlement Region

Latitude: 69.22 N

Longitude: 134.28 W

Elevation: 9 m a.s.l.

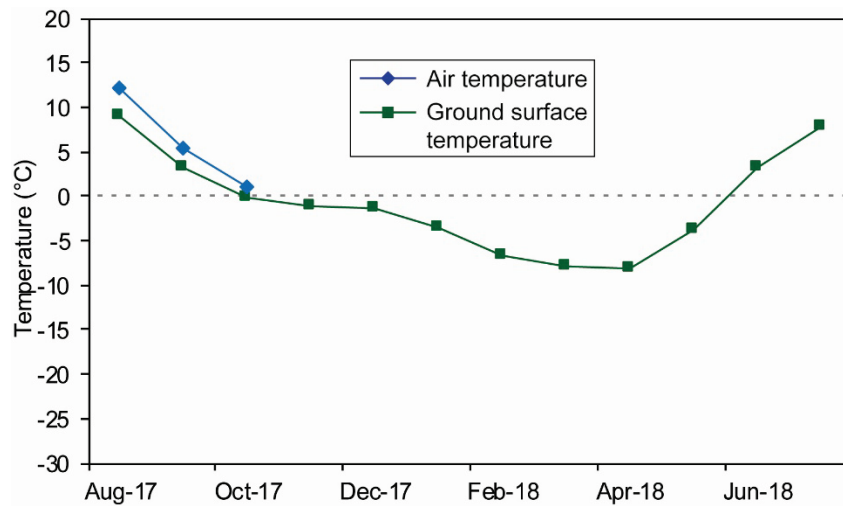
Landform: Glaciofluvial ridge

Vegetation cover: Low shrub tundra

Thaw depth: 0.44 m (probed)

Site visit: Aug 4, 2018

Month / Year	Temperature (°C)	
	Air	Surface
Aug-17	12.12	8.93
Sep-17	5.35	3.17
Oct-17	0.93	-0.24
Nov-17	n/a	-1.04
Dec-17	n/a	-1.29
Jan-18	n/a	-3.65
Feb-18	n/a	-6.71
Mar-18	n/a	-8.01
Apr-18	n/a	-8.09
May-18	n/a	-3.72
Jun-18	n/a	3.20
Jul-18	n/a	7.90



## Yaya Lake Low — 90TT04

Inuvialuit Settlement Region

Latitude: 69.14 N

Longitude: 134.70 W

Elevation: 10 m a.s.l.

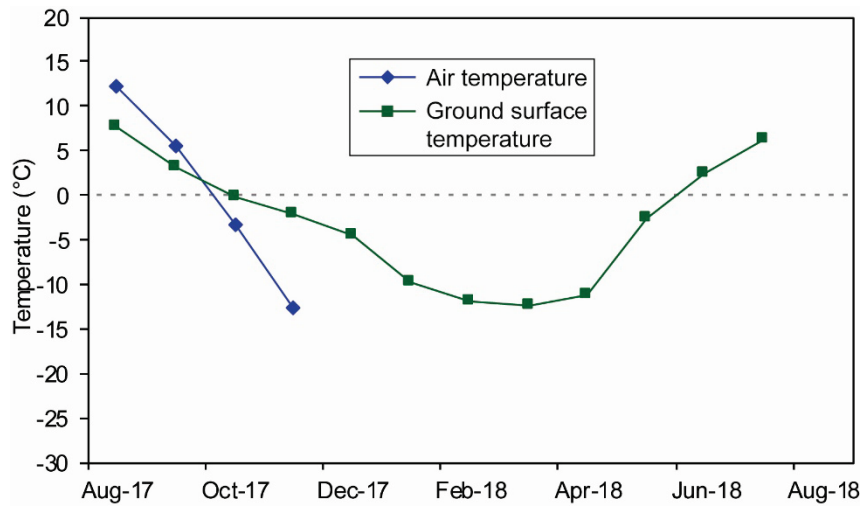
Landform: Ice contact complex

Vegetation cover: shrub tundra

Thaw Depth: 1.07 m (probed)

Site visit: Aug 3, 2018

Month / Year	Temperature (°C)	
	Air	Surface
Aug-17	12.18	7.76
Sep-17	5.45	3.15
Oct-17	-3.32	-0.19
Nov-17	-12.75	-2.22
Dec-17	n/a	-4.56
Jan-18	n/a	-9.82
Feb-18	n/a	-11.84
Mar-18	n/a	-12.33
Apr-18	n/a	-11.15
May-18	n/a	-2.49
Jun-18	n/a	2.50
Jul-18	n/a	6.34



## East Channel — T6 Upland

Inuvialuit Settlement Region

Latitude: 69.12 N

Longitude: 134.19 W

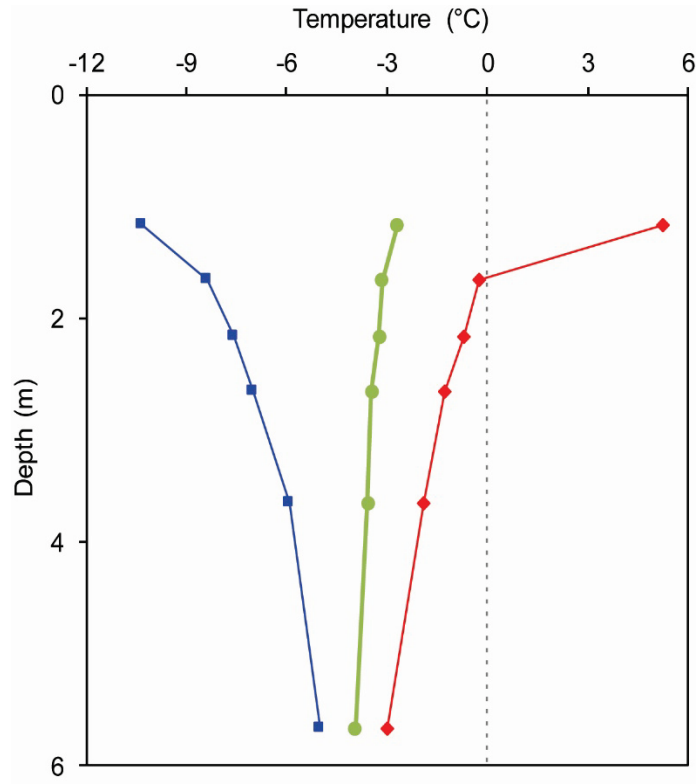
Elevation: n/a

Landform: Moraine uplands

Vegetation cover: Dwarf birch tundra with willow and alder shrubs

Thaw Depth: 1.64 m

Site visit: Aug 4, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
1.16	5.28	-10.32	-2.69
1.66	-0.22	-8.37	-3.15
2.16	-0.71	-7.56	-3.24
2.66	-1.26	-7.01	-3.46
3.66	-1.92	-5.91	-3.56
5.66	-3.01	-5.00	-3.95

## **Reindeer Station Plateau — 91TT12**

Inuvialuit Settlement Region

Latitude: 68.69 N

Longitude: 134.11 W

Elevation: 152 m a.s.l.

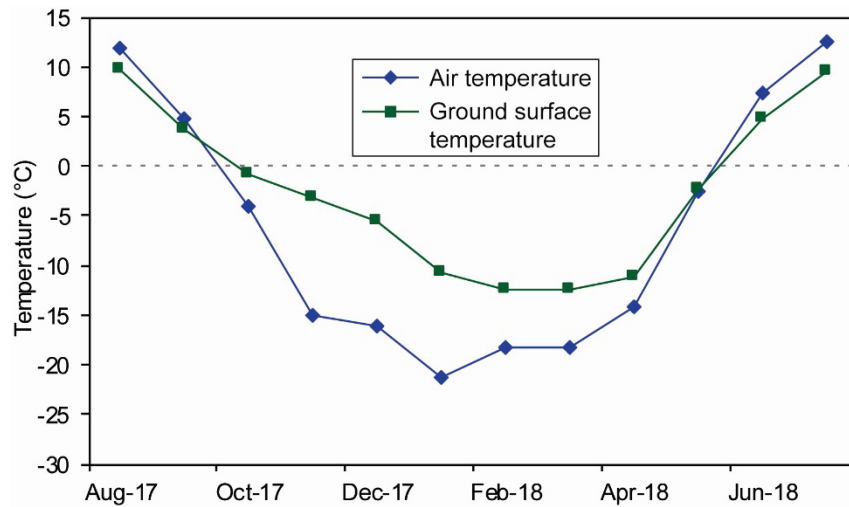
Landform: Plateau surface, till plain

Vegetation cover: Shrub tundra

Thaw Depth: 0.72 m (probed)

Site visit: Aug 7, 2018

Month / Year	Temperature (°C)	
	Air	Surface
Aug-17	11.93	9.78
Sep-17	4.80	3.75
Oct-17	-4.00	-0.75
Nov-17	-15.10	-3.19
Dec-17	-16.09	-5.64
Jan-18	-21.36	-10.80
Feb-18	-18.27	-12.35
Mar-18	-18.22	-12.35
Apr-18	-14.27	-11.10
May-18	-2.60	-2.32
Jun-18	7.29	4.84
Jul-18	12.45	9.44



## **Reindeer Depot (Williams Island) — 91TT13**

Inuvialuit Settlement Region

Latitude: 68.68 N

Longitude: 134.15 W

Elevation: 5 m a.s.l.

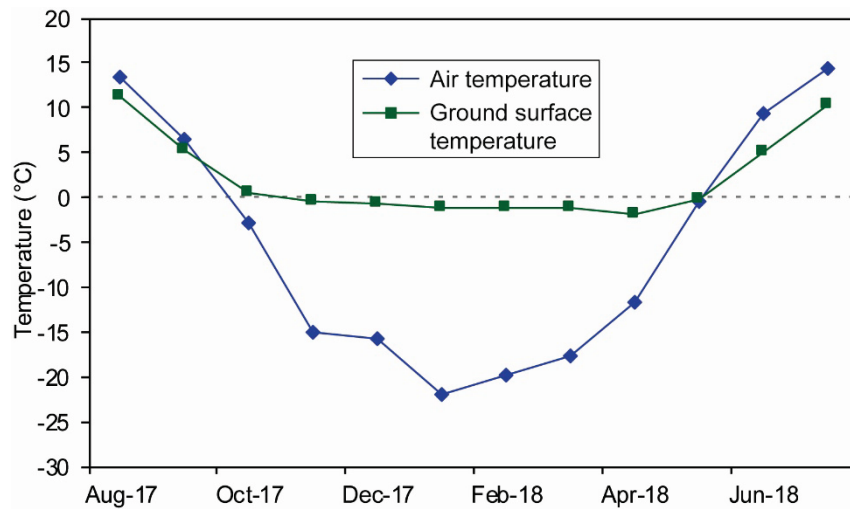
Landform: Surface of bar in Mackenzie Delta

Vegetation cover: Riparian willow and alder shrub

Thaw Depth: >1.32 m (probed)

Site visit: Aug 7, 2018

Month / Year	Temperature (°C)	
	Air	Surface
Aug-17	13.48	11.32
Sep-17	6.39	5.19
Oct-17	-2.89	0.59
Nov-17	-14.94	-0.37
Dec-17	-15.67	-0.76
Jan-18	-22.08	-1.28
Feb-18	-19.77	-1.09
Mar-18	-17.62	-1.24
Apr-18	-11.74	-1.92
May-18	-0.38	-0.32
Jun-18	9.32	4.98
Jul-18	14.38	10.28



## Navy Channel — 03TC01

Inuvialuit Settlement Region

Latitude: 68.42 N

Longitude: 133.79 W

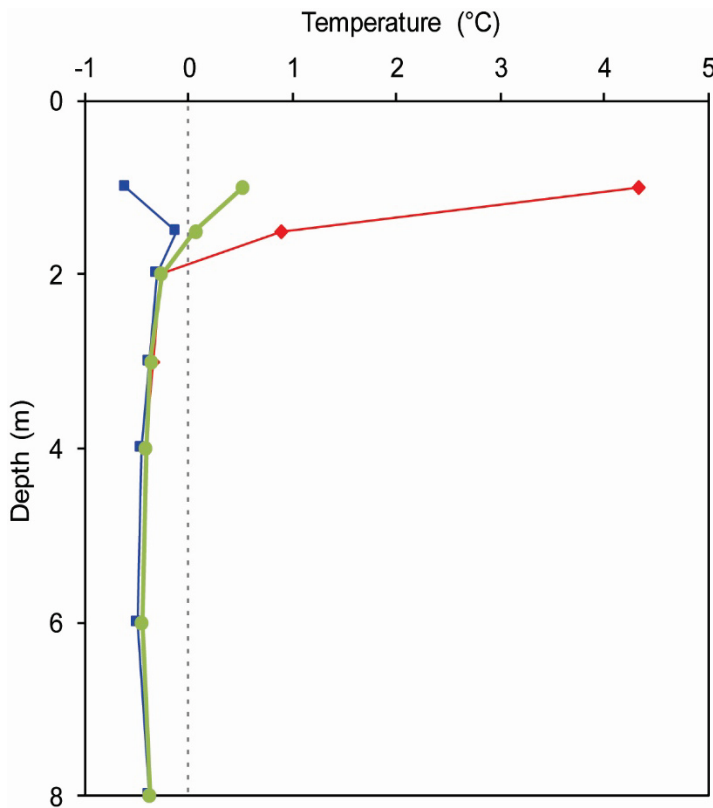
Elevation: 5 m a.s.l.

Landform: Surface of Holocene Mackenzie delta adjacent to eastern edge rising 10s of meters to till plain

Vegetation cover: Riparian high willow shrub, open, incomplete ground cover of forbs and sedge (forest tundra)

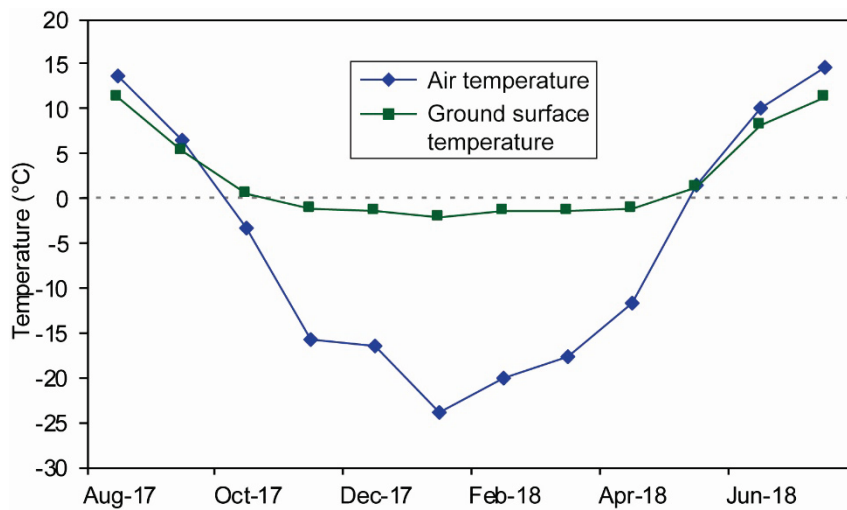
Thaw Depth: 1.63 m

Site visit: Aug 7, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
1	4.33	-0.60	0.51
1.5	0.89	-0.11	0.06
2	-0.26	-0.30	-0.27
3	-0.34	-0.37	-0.36
4	-0.41	-0.45	-0.42
6	-0.45	-0.49	-0.45
8	-0.37	-0.37	-0.37

Month / Year	Temperature (°C)	
	Air	Surface
Aug-17	13.59	11.23
Sep-17	6.40	5.31
Oct-17	-3.39	0.42
Nov-17	-15.71	-1.10
Dec-17	-16.56	-1.33
Jan-18	-23.83	-2.10
Feb-18	-20.17	-1.47
Mar-18	-17.72	-1.46
Apr-18	-11.80	-1.23
May-18	1.38	1.32
Jun-18	9.95	8.19
Jul-18	14.67	11.18





## Norris Creek — NC-01

Gwich'in Settlement Region

Latitude: 68.41 N

Longitude: 133.29 W

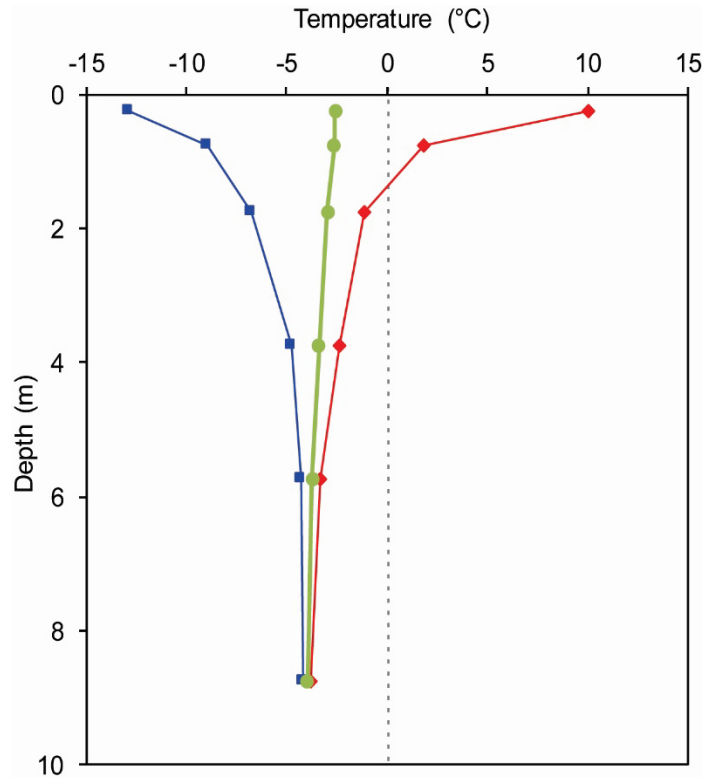
Elevation: 15 m a.s.l.

Landform: Thick organic material over moraine plain

Vegetation cover: Shrub tundra

Thaw Depth: 0.87 m

Site visit: Aug 3, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.25	10.03	-12.87	-2.60
0.75	1.88	-8.91	-2.61
1.75	-1.13	-6.71	-2.99
3.75	-2.40	-4.72	-3.39
5.75	-3.28	-4.30	-3.75
8.75	-3.77	-4.15	-3.95

**Navy Road — 01TC01**  
Gwich'in Settlement Region

Latitude: 68.40 N

Longitude: 133.76 W

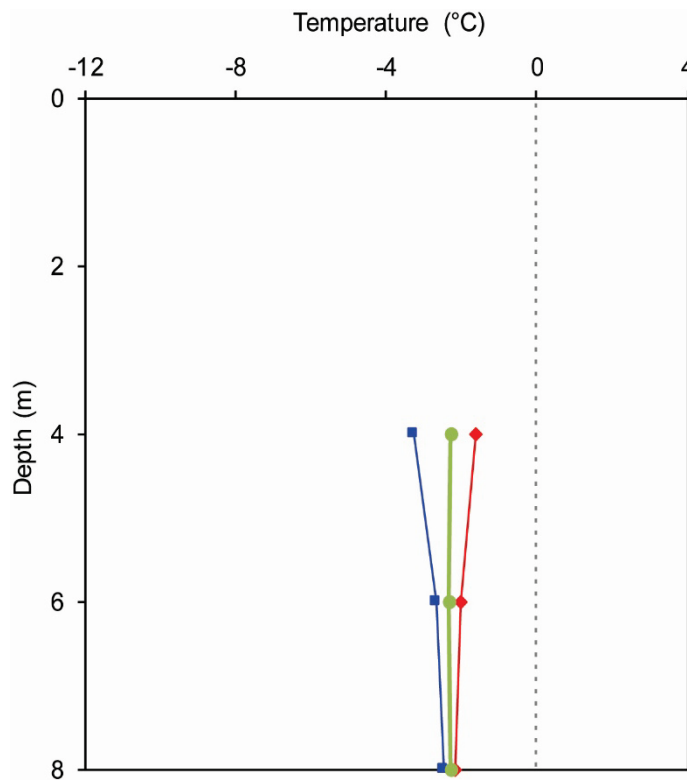
Elevation: 60 m a.s.l.

Landform: Fine grained colluvium sloping toward river, post glacial (~10Ka)

Vegetation cover: Taiga post fire succession, scattered birch and alder, open dwarf birch, heath ground cover

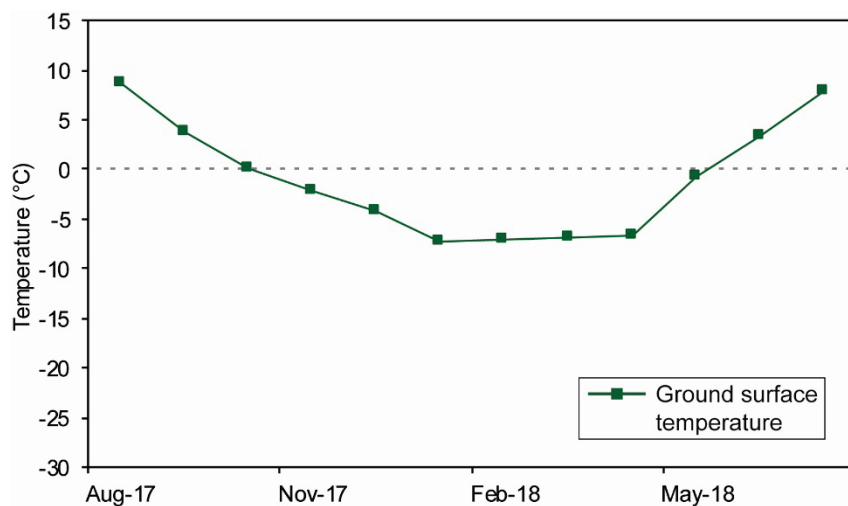
Thaw Depth: 0.64 m (probed)

Site visit: Aug 8, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
4	-1.60	-3.26	-2.28
6	-2.01	-2.68	-2.32
8	-2.16	-2.45	-2.28

Month / Year	Temperature (°C)	
	Air	Surface
Aug-17	n/a	8.65
Sep-17	n/a	3.83
Oct-17	n/a	0.00
Nov-17	n/a	-2.24
Dec-17	n/a	-4.13
Jan-18	n/a	-7.28
Feb-18	n/a	-7.06
Mar-18	n/a	-6.92
Apr-18	n/a	-6.59
May-18	n/a	-0.63
Jun-18	n/a	3.32
Jul-18	n/a	7.79



## Inuvik Airport (trees) — 01TC02

Gwich'in Settlement Region

Latitude: 68.32 N

Longitude: 133.44 W

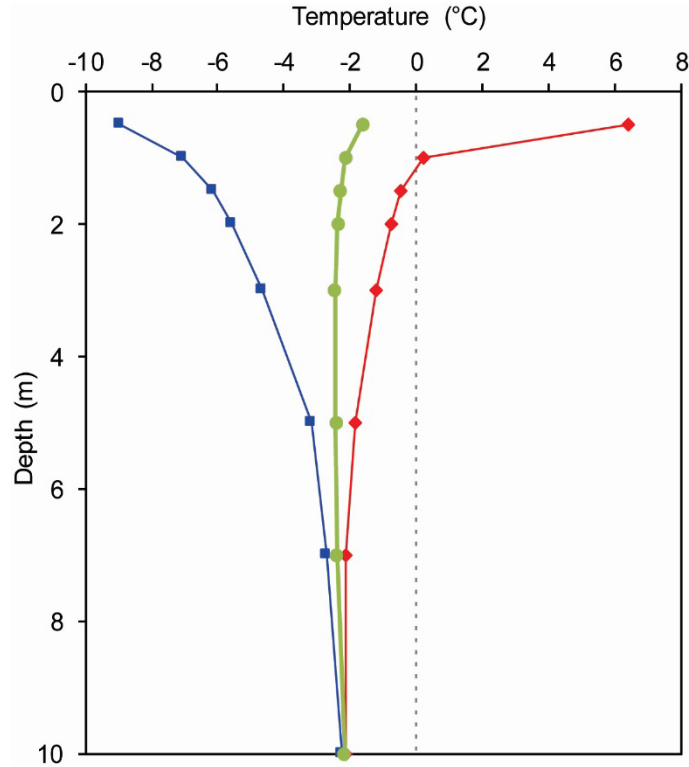
Elevation: 84 m a.s.l.

Landform: Fluted till plain, glacial (>10Ka)

Vegetation cover: Taiga open black spruce, health ground cover

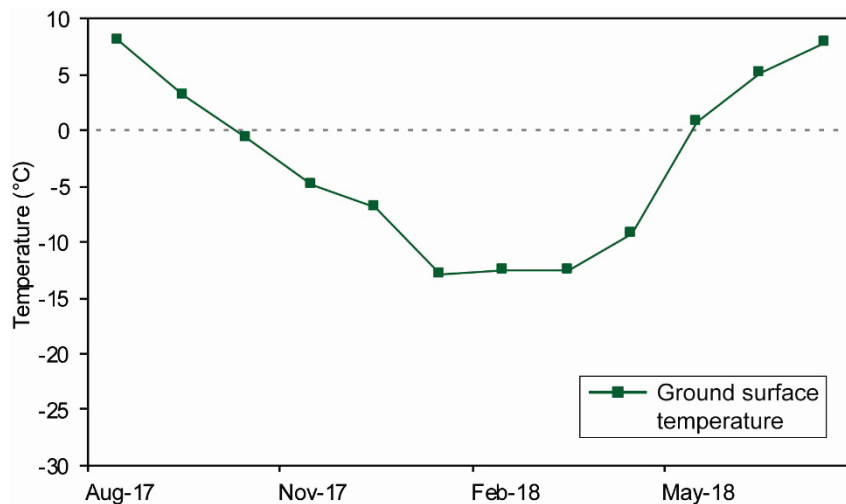
Thaw Depth: 1.02 m

Site visit: Aug 2, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	6.39	-8.95	-1.62
1	0.20	-7.05	-2.16
1.5	-0.47	-6.12	-2.28
2	-0.76	-5.57	-2.37
3	-1.22	-4.63	-2.45
5	-1.83	-3.14	-2.42
7	-2.15	-2.69	-2.40
10	-2.12	-2.23	-2.18

Month / Year	Temperature (°C)	
	Air	Surface
Aug-17	n/a	7.95
Sep-17	n/a	3.20
Oct-17	n/a	-0.74
Nov-17	n/a	-4.95
Dec-17	n/a	-6.98
Jan-18	n/a	-12.88
Feb-18	n/a	-12.62
Mar-18	n/a	-12.60
Apr-18	n/a	-9.28
May-18	n/a	0.69
Jun-18	n/a	5.20
Jul-18	n/a	7.88



## Inuvik Airport (bog) — 12TC01

Gwich'in Settlement Region

Latitude: 68.32 N

Longitude: 133.43 W

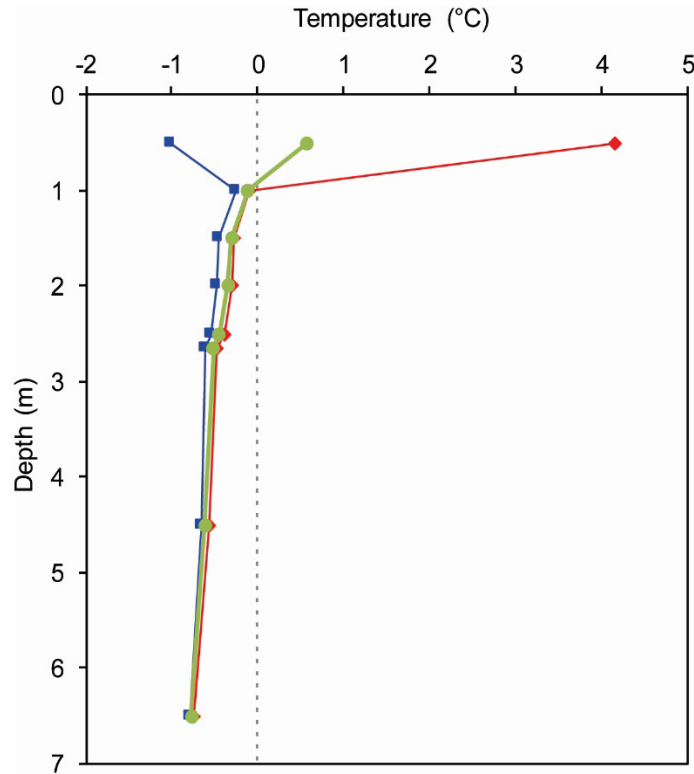
Elevation: 68 m a.s.l.

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

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

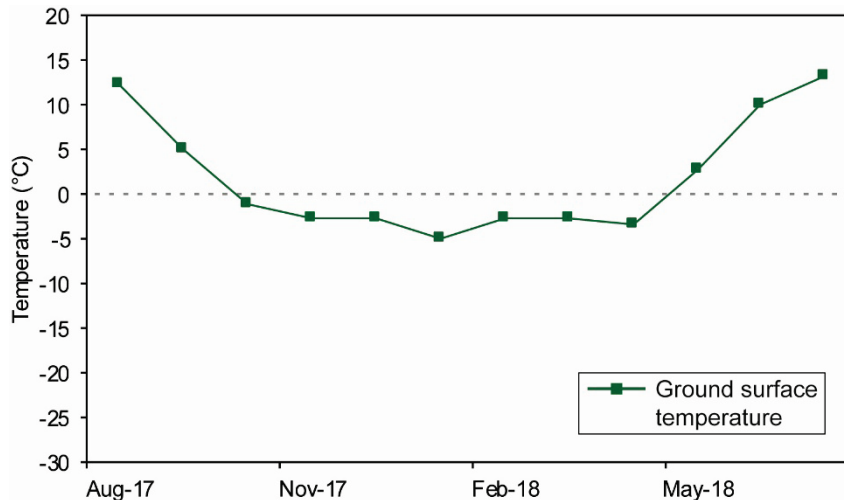
Thaw Depth: 0.99 m

Site visit: Aug 2, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	4.15	-1.01	0.58
1	-0.09	-0.25	-0.11
1.5	-0.27	-0.45	-0.30
2	-0.31	-0.47	-0.35
2.5	-0.40	-0.54	-0.44
2.65	-0.47	-0.61	-0.51
4.5	-0.58	-0.65	-0.61
6.5	-0.75	-0.78	-0.77

Month / Year	Temperature (°C)	
	Air	Surface
Aug-17	n/a	12.34
Sep-17	n/a	4.98
Oct-17	n/a	-1.05
Nov-17	n/a	-2.69
Dec-17	n/a	-2.74
Jan-18	n/a	-5.02
Feb-18	n/a	-2.69
Mar-18	n/a	-2.73
Apr-18	n/a	-3.32
May-18	n/a	2.65
Jun-18	n/a	10.07
Jul-18	n/a	13.20



## Campbell Lake — CaL-01

Gwich'in Settlement Region

Latitude: 68.24 N

Longitude: 133.10 W

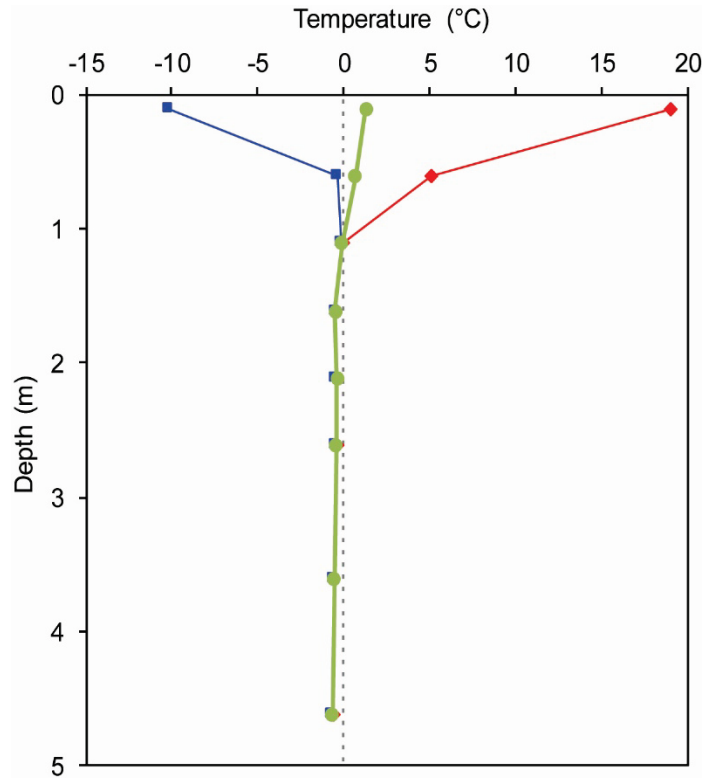
Elevation: 115 m a.s.l.

Landform: Moraine plain

Vegetation cover: Peatland

Thaw Depth: 0.79 m

Site visit: Aug 3, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.11	19.02	-10.17	1.26
0.61	5.05	-0.37	0.66
1.11	-0.05	-0.17	-0.14
1.61	-0.45	-0.53	-0.50
2.11	-0.37	-0.44	-0.40
2.61	-0.41	-0.49	-0.44
3.61	-0.56	-0.63	-0.59
4.61	-0.65	-0.70	-0.68

## Campbell Lake — CaL-02

Gwich'in Settlement Region

Latitude: 68.24 N

Longitude: 133.09 W

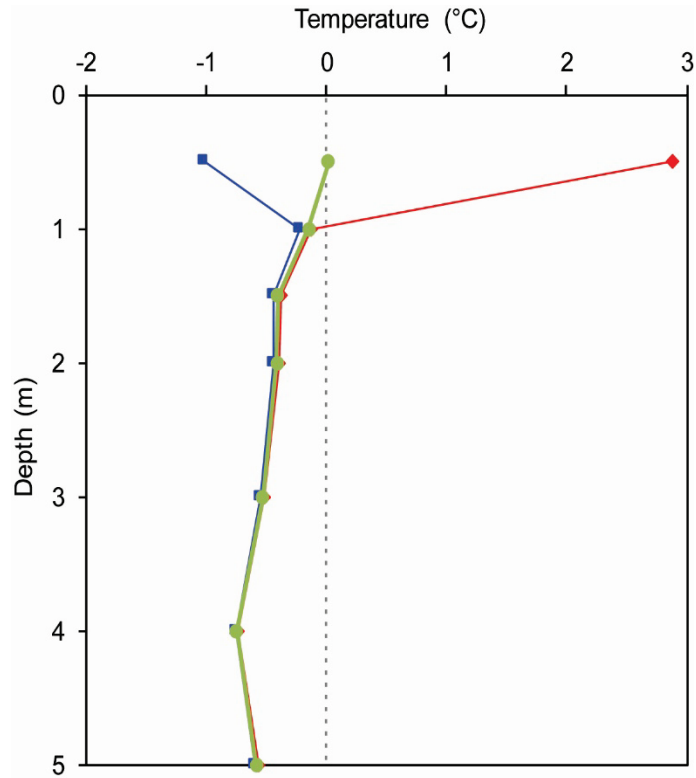
Elevation: 118 m a.s.l.

Landform: Moraine plain

Vegetation cover: Cutline through Black spruce forest

Thaw Depth: 0.98 m

Site visit: Aug 3, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	2.89	-1.02	0.02
1	-0.13	-0.22	-0.15
1.5	-0.38	-0.44	-0.41
2	-0.39	-0.44	-0.41
3	-0.51	-0.54	-0.53
4	-0.74	-0.76	-0.75
5	-0.57	-0.59	-0.58

## Campbell Lake — CaL-03

Gwich'in Settlement Region

Latitude: 68.24 N

Longitude: 133.10 W

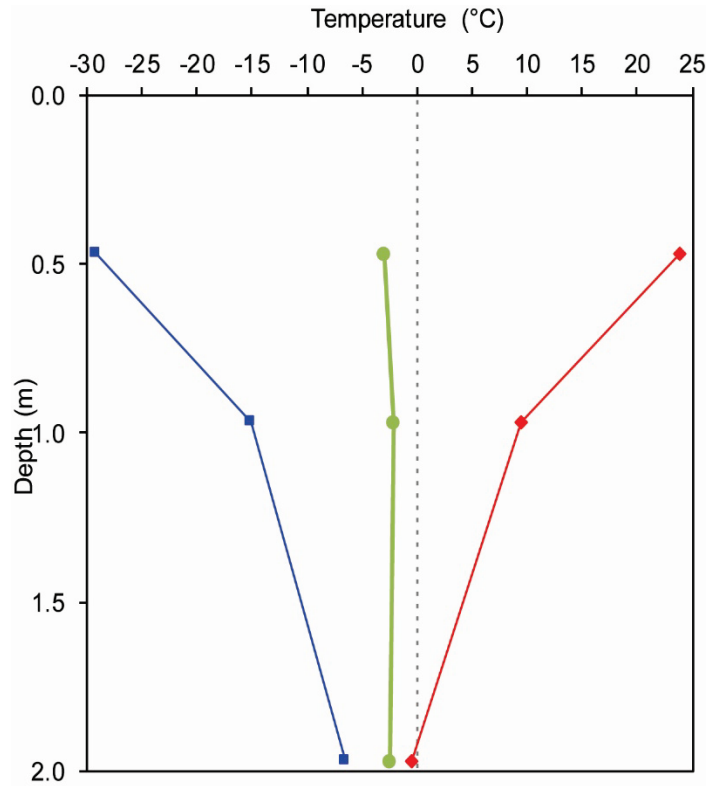
Elevation: 118 m a.s.l.

Landform: Moraine plain

Vegetation cover: Black spruce forest

Thaw Depth: 1.30 m

Site visit: Aug 3, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.47	23.91	-29.21	-2.98
0.97	9.49	-15.06	-2.18
1.97	-0.53	-6.45	-2.51

# North Caribou Lake — NCL-01

Gwich'in Settlement Region

Latitude: 68.15 N

Longitude: 132.93 W

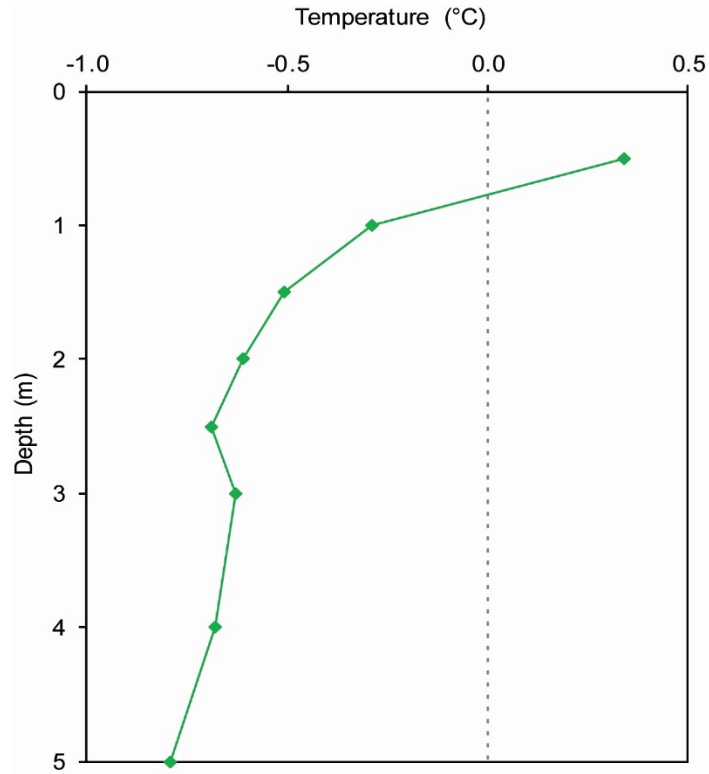
Elevation: 209 m a.s.l.

Landform: Moraine plain

Vegetation cover: Peatland

Thaw Depth: 0.73 m

Site visit: Aug 3, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	0.22	-0.12	0.06
1	-0.26	-0.38	-0.35
1.5	-0.57	-0.62	-0.58
2	-0.65	-0.69	-0.68
3	-0.68	-0.70	-0.69
4	-0.73	-0.77	-0.75
5	-0.78	-0.87	-0.83



## North Caribou Lake — NCL-02

Gwich'in Settlement Region

Latitude: 68.15 N

Longitude: 132.93 W

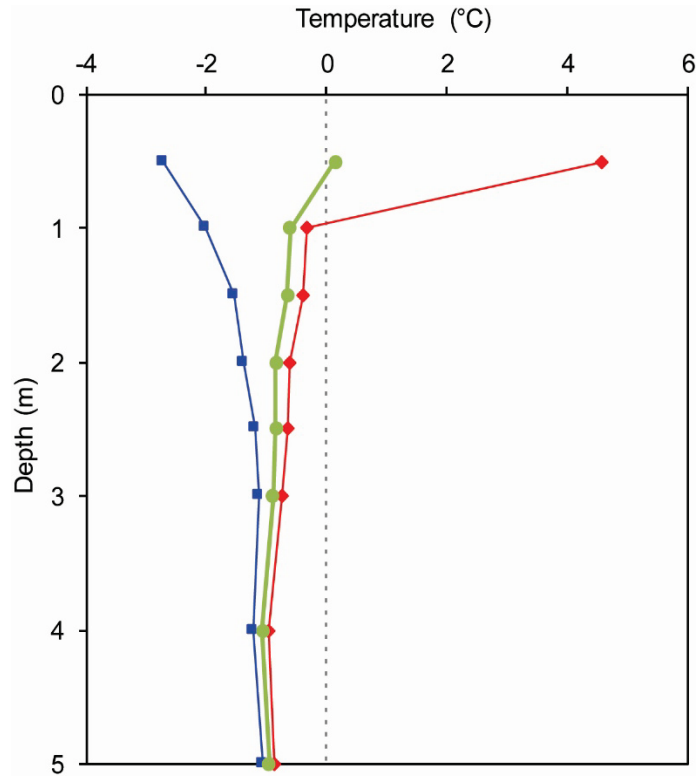
Elevation: 217 m a.s.l.

Landform: Moraine plain

Vegetation cover: Stunted black spruce forest

Thaw Depth: 0.97 m

Site visit: Aug 3, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	4.58	-2.70	0.14
1	-0.32	-2.01	-0.61
1.5	-0.39	-1.52	-0.65
2	-0.61	-1.37	-0.84
2.5	-0.65	-1.19	-0.85
3	-0.73	-1.12	-0.90
4	-0.95	-1.21	-1.06
5	-0.88	-1.06	-0.96

## Hill Lake — HL-01

Gwich'in Settlement Region

Latitude: 67.99 N

Longitude: 132.49 W

Elevation: 229 m a.s.l.

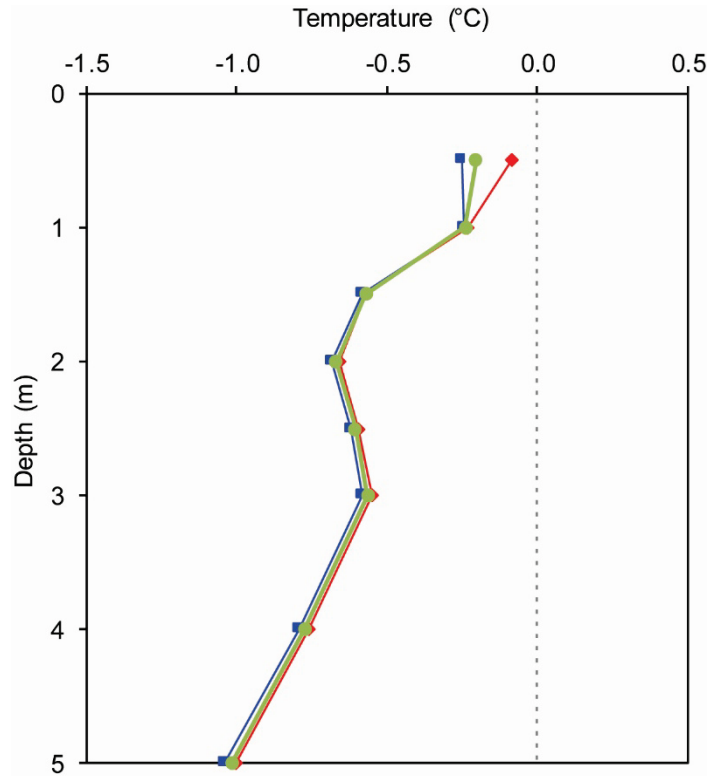
Landform: Moraine plain

Vegetation cover: Tundra

Thaw Depth: n/a

Site visit: Aug 3, 2018

Note: Water at surface



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	-0.08	-0.25	-0.21
1.0	-0.23	-0.25	-0.24
1.5	-0.57	-0.58	-0.57
2	-0.66	-0.68	-0.67
2.5	-0.59	-0.62	-0.61
3	-0.55	-0.58	-0.56
4	-0.76	-0.79	-0.77
5	-1.00	-1.04	-1.02

## Hill Lake — HL-02

Gwich'in Settlement Region

Latitude: 67.99 N

Longitude: 132.49 W

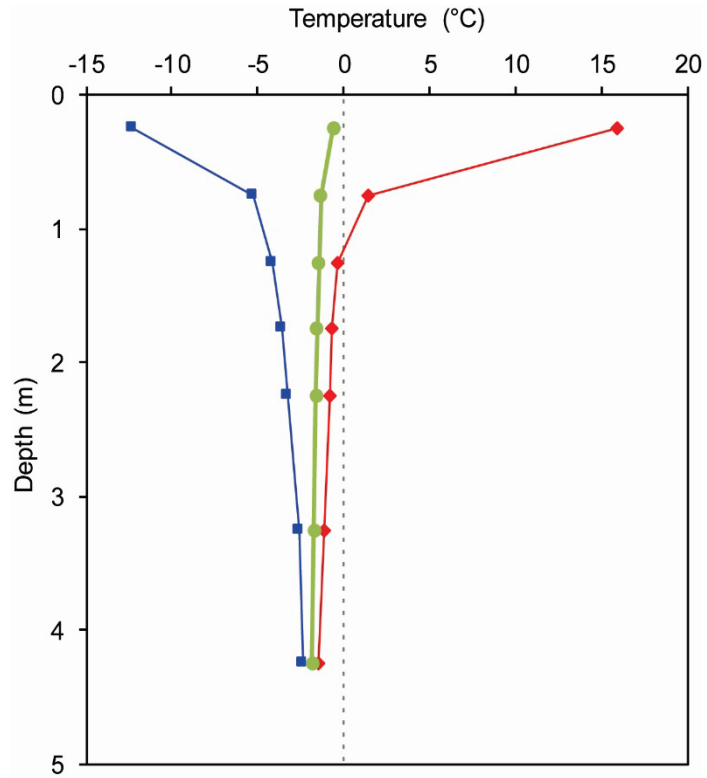
Elevation: 234 m a.s.l.

Landform: Moraine plain

Vegetation cover: Shrub Tundra

Thaw Depth: 0.80 m

Site visit: Aug 3, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.25	15.83	-12.23	-0.60
0.75	1.38	-5.30	-1.36
1.25	-0.41	-4.10	-1.48
1.75	-0.69	-3.64	-1.59
2.25	-0.85	-3.22	-1.63
3.25	-1.15	-2.65	-1.72
4.25	-1.44	-2.38	-1.86

## **Rengleng River mouth — 91TT14**

Gwich'in Settlement Region

Latitude: 67.80 N

Longitude: 134.13 W

Elevation: 8 m a.s.l.

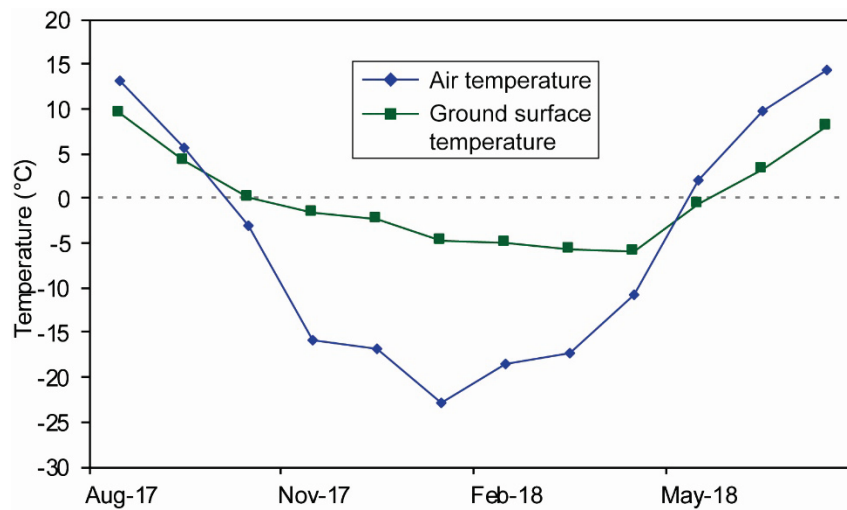
Landform: Alluvial plain

Vegetation cover: Mixed spruce and hardwood forest

Thaw Depth : n/a

Site visit: Aug 6, 2018

Month / Year	Temperature (°C)	
	Air	Surface
Aug-17	13.06	9.46
Sep-17	5.69	4.22
Oct-17	-3.09	0.06
Nov-17	-15.77	-1.57
Dec-17	-16.72	-2.46
Jan-18	-22.76	-4.65
Feb-18	-18.48	-5.08
Mar-18	-17.38	-5.73
Apr-18	-10.86	-5.92
May-18	2.06	-0.64
Jun-18	9.84	3.14
Jul-18	14.37	8.11



## Jackfish Creek — JF-02

Sahtu Settlement Region

Latitude: 66.29 N

Longitude: 128.47 W

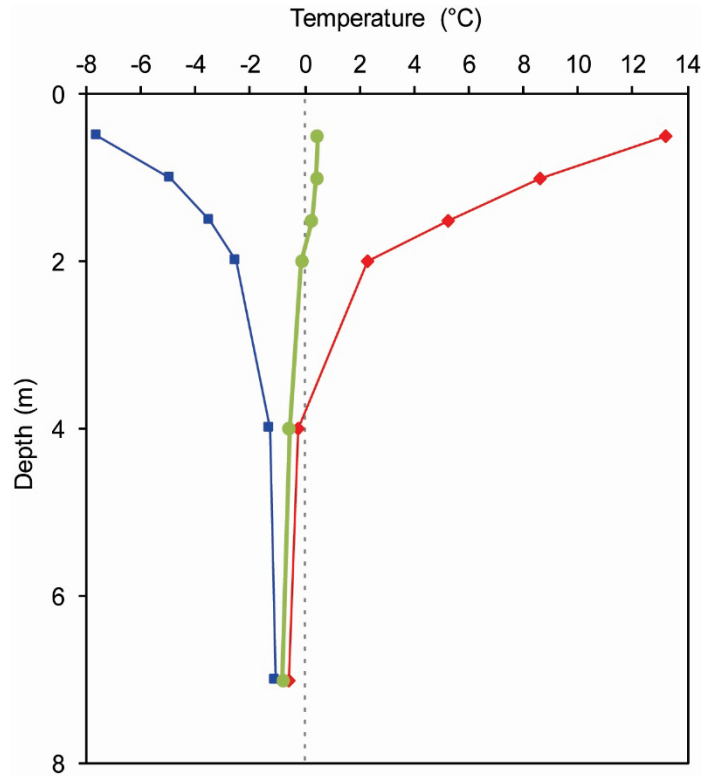
Elevation: 90 m a.s.l.

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

Vegetation cover: Black spruce forest and moss cover

Thaw Depth: 2.40 m

Site visit: Aug 11, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	13.22	-7.60	0.47
1	8.64	-4.88	0.42
1.5	5.27	-3.43	0.25
2	2.33	-2.51	-0.11
4	-0.26	-1.27	-0.57
7	-0.61	-1.08	-0.81

## Fort Good Hope South — FGHS-01

Sahtu Settlement Region

Latitude: 66.21 N

Longitude: 128.50 W

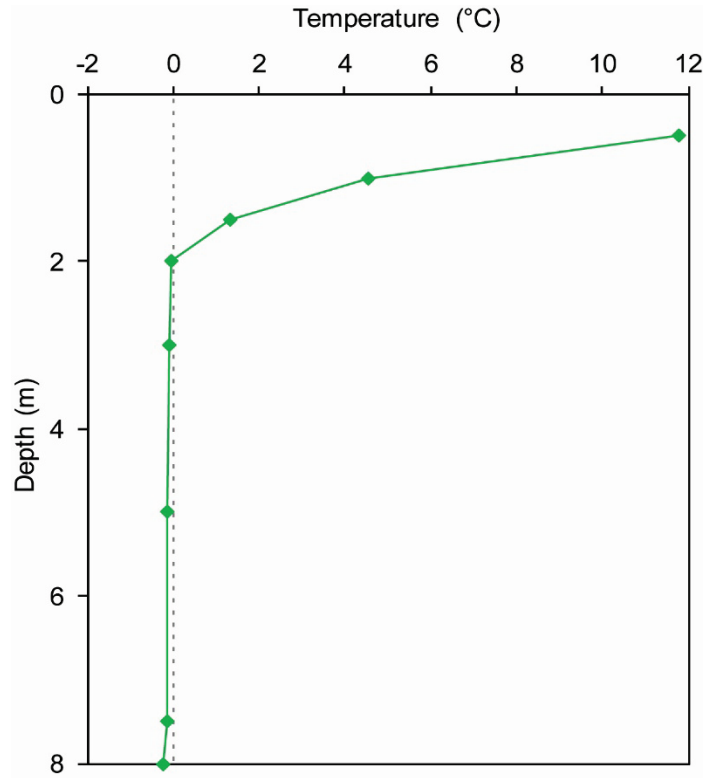
Elevation: 134 m a.s.l.

Landform: Hummocky peatland

Vegetation cover: Dense shrub and open black spruce

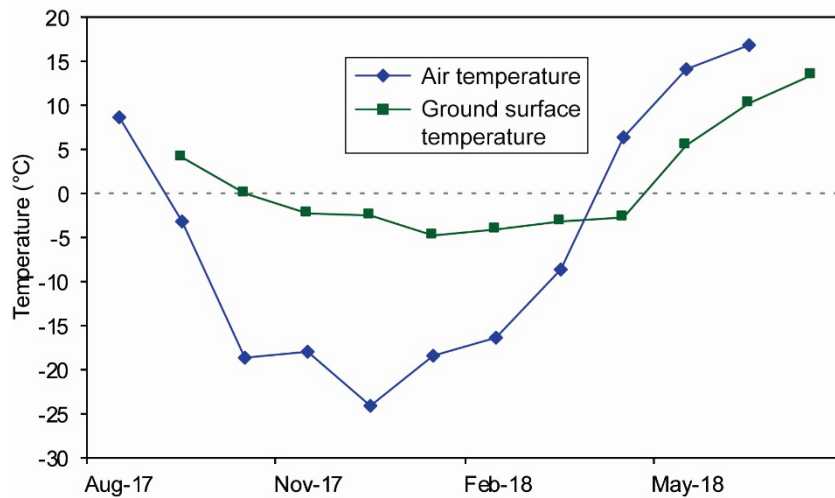
Thaw Depth: n/a

Site visit: Aug 11, 2018



Depth (m)	Temp (°C)
0.5	11.81
1	4.54
1.5	1.34
2	-0.03
3	-0.08
5	-0.15
7.5	-0.15
8	-0.25

Month / Year	Temperature (°C)	
	Air	Surface
Aug-17	15.73	n/a
Sep-17	8.60	4.11
Oct-17	-3.17	-0.09
Nov-17	-18.65	-2.27
Dec-17	-17.97	-2.58
Jan-18	-24.12	-4.76
Feb-18	-18.50	-4.11
Mar-18	-16.47	-3.17
Apr-18	-8.55	-2.60
May-18	6.47	5.39
Jun-18	14.06	10.28
Jul-18	16.78	13.33



## Fort Good Hope South — FGHS-02

Sahtu Settlement Region

Latitude: 66.21 N

Longitude: 128.50 W

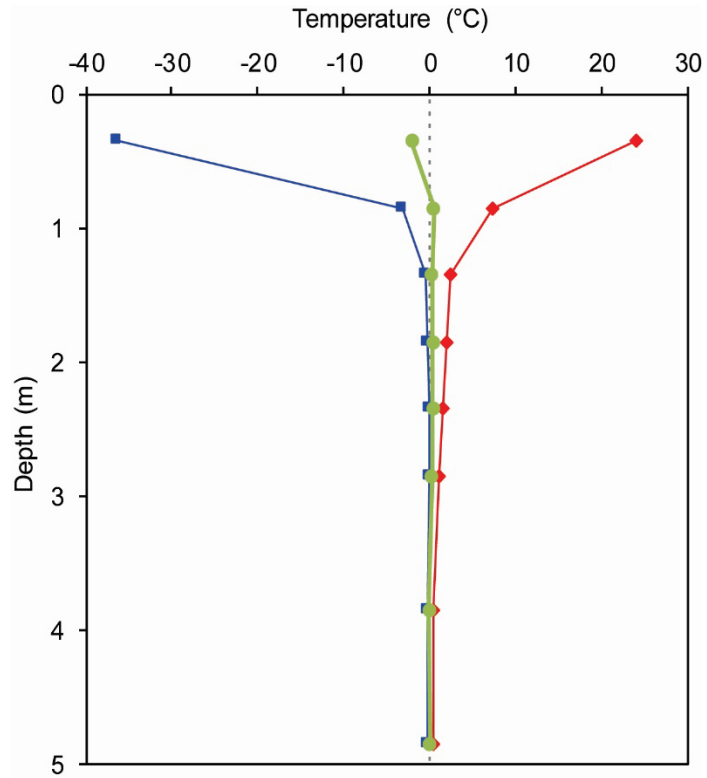
Elevation: 134 m a.s.l.

Landform: Hummocky peatland

Vegetation cover: Peat plateau, lichen, open black spruce

Thaw Depth: n/a

Site visit: Aug 11, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.35	23.89	-36.36	-2.08
0.85	7.37	-3.22	0.44
1.35	2.40	-0.48	0.26
1.85	1.94	-0.19	0.27
2.35	1.59	-0.11	0.28
2.85	1.14	-0.15	0.19
3.85	0.49	-0.35	-0.08
4.85	0.35	-0.20	0.01

## Snafu Creek — SC-01

Sahtu Settlement Region

Latitude: 66.00 N

Longitude: 128.35 W

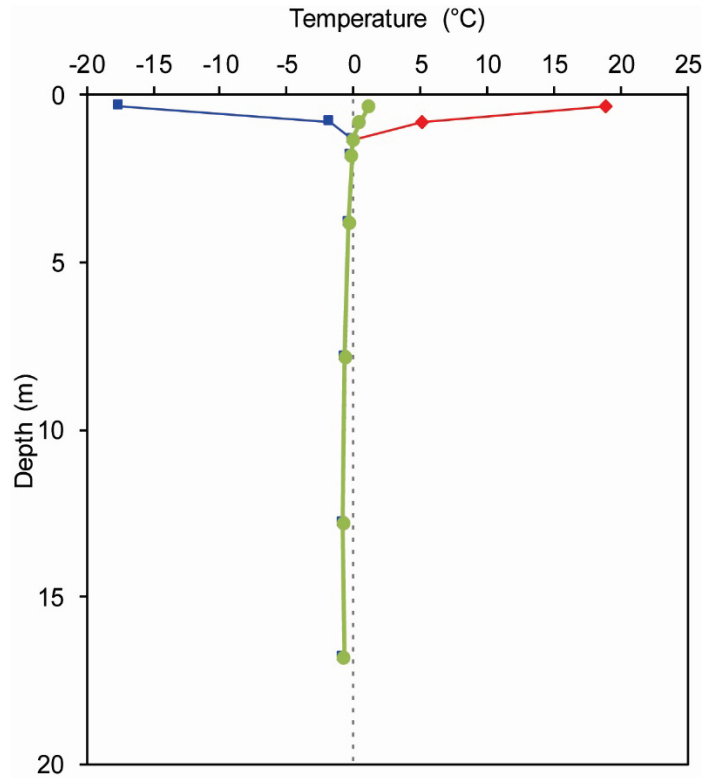
Elevation: 100 m a.s.l.

Landform: Moraine plain

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

Thaw Depth: 0.99 m

Site visit: Aug 11, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.32	18.78	-17.53	1.16
0.82	5.04	-1.73	0.41
1.32	0.00	-0.11	-0.07
1.82	-0.17	-0.18	-0.18
3.82	-0.38	-0.40	-0.39
7.82	-0.63	-0.65	-0.64
12.82	-0.76	-0.78	-0.77
16.82	-0.73	-0.75	-0.74



**Chick Lake — CL-01**  
Sahtu Settlement Region

Latitude: 65.90 N

Longitude: 128.24 W

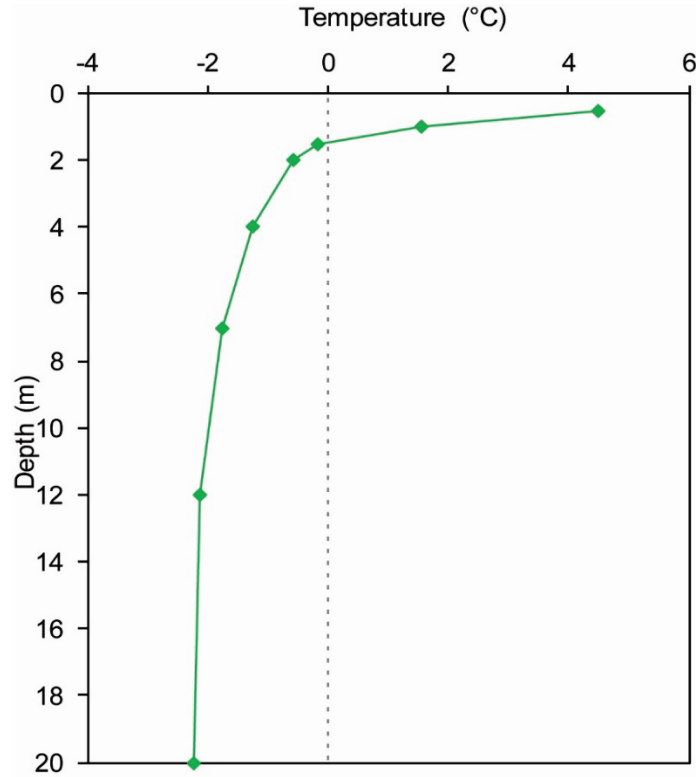
Elevation: 122 m a.s.l.

Landform: Moraine plain

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

Thaw Depth: 1.27 m

Site visit: Aug 11, 2018



Depth (m)	Temp (°C)
0.5	4.48
1	1.57
1.5	-0.16
2	-0.57
4	-1.24
7	-1.76
12	-2.13
20	-2.21

## Gibson Lake — GL-01

Sahtu Settlement Region

Latitude: 65.75 N

Longitude: 127.89 W

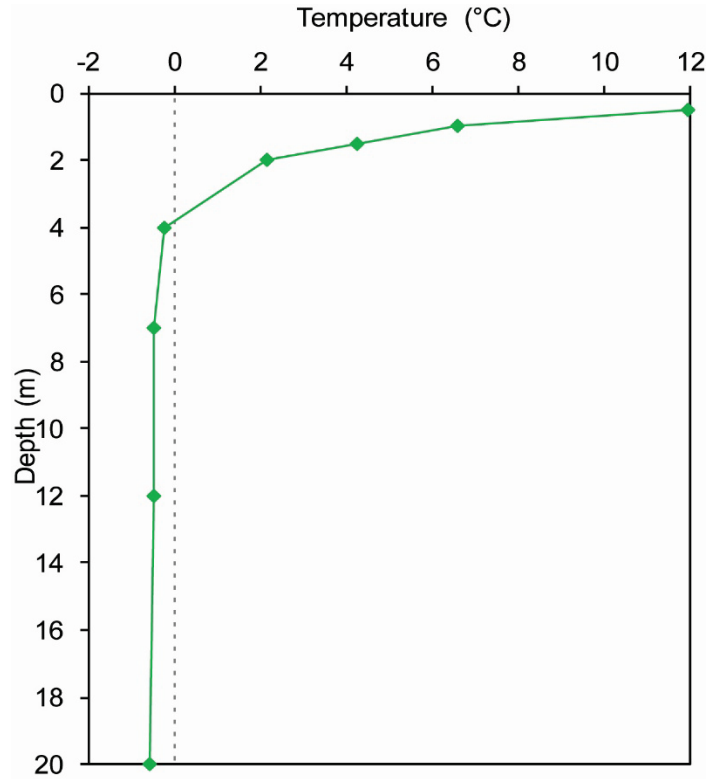
Elevation: 228 m a.s.l.

Landform: Hummocky moraine plain

Vegetation cover: Recovering burnt area with peat and shrubs

Thaw Depth: 2.52 m

Site visit: Aug 11, 2018



Depth (m)	Temp (°C)
0.5	11.94
1	6.61
1.5	4.23
2	2.16
4	-0.22
7	-0.49
12	-0.49
20	-0.59

## Hanna River — HR-01

Sahtu Settlement Region

Latitude: 65.67 N

Longitude: 127.83 W

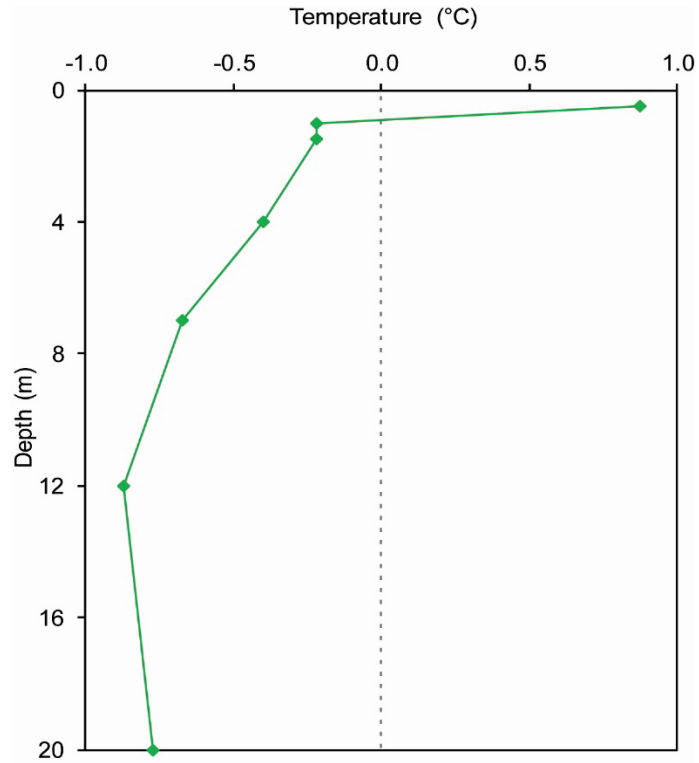
Elevation: 104 m a.s.l.

Landform: Lacustrine plain

Vegetation cover: Boggy burnt area

Thaw Depth: 0.9 m

Site visit: Aug 11, 2018



Depth (m)	Temp (°C)
0.5	0.87
1	-0.22
1.5	-0.22
4	-0.4
7	-0.67
12	-0.87
20	-0.77

## Elliot Creek — EC-01

Sahtu Settlement Region

Latitude: 65.52 N

Longitude: 127.62 W

Elevation: 54 m a.s.l.

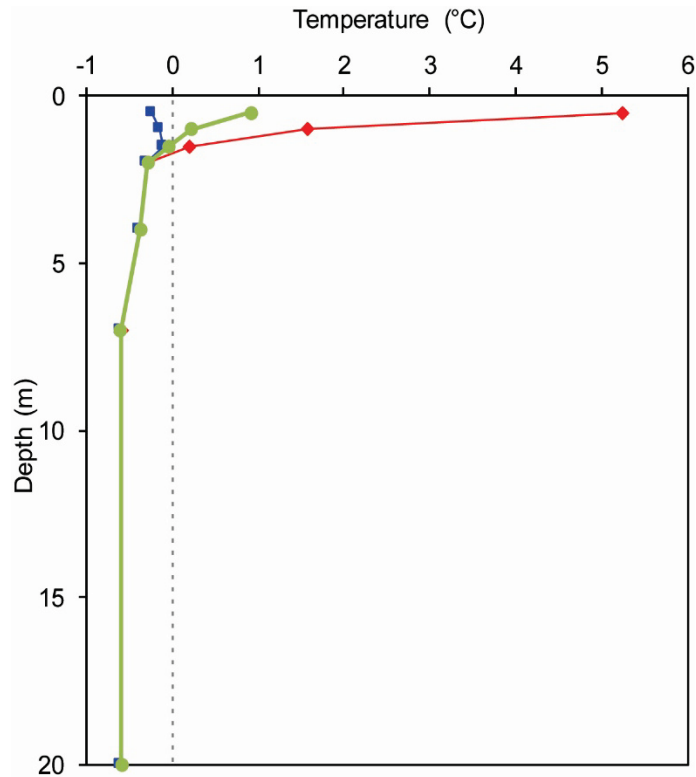
Landform: Lacustrine undulating plain, well-drained elevated area

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

Thaw Depth: 1.58 m

Site visit: Aug 11, 2018

Note: Clearing adjacent to site (along right-of-way) due to fibre optic cable installation.



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	5.25	-0.24	0.92
1	1.57	-0.15	0.22
1.5	0.21	-0.11	-0.04
2	-0.27	-0.29	-0.28
4	-0.36	-0.39	-0.37
7	-0.59	-0.61	-0.60
20	-0.58	-0.60	-0.58

**Elliot Creek — EC-02**  
Sahtu Settlement Region

Latitude: 65.52 N

Longitude: 127.62 W

Elevation: 54 m a.s.l.

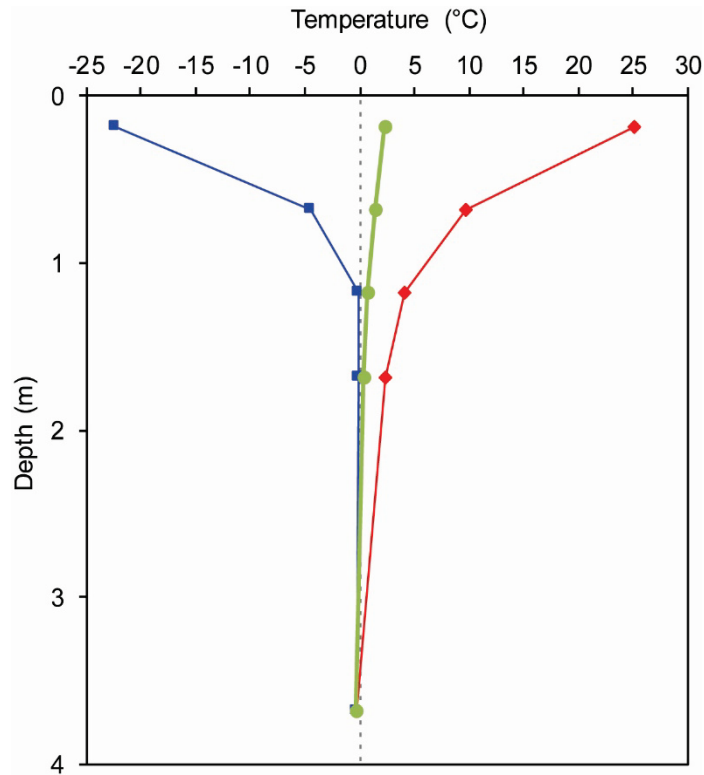
Landform: Lacustrine plain overlain by alluvial sediments

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

Thaw Depth: 2.40 m

Site visit: Aug 11, 2018

Note: Site burned in 2014



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.183	25.05	-22.29	2.32
0.683	9.65	-4.42	1.48
1.183	4.03	-0.05	0.77
1.683	2.37	-0.06	0.40
3.683	-0.29	-0.32	-0.30

## Oscar Creek — OC-01

Sahtu Settlement Region

Latitude: 65.44 N

Longitude: 127.44 W

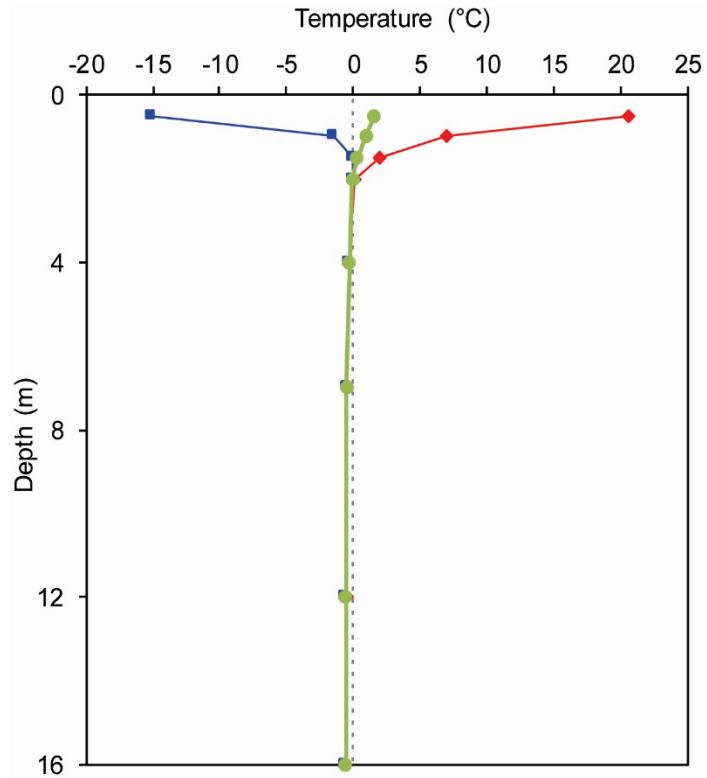
Elevation: 64 m a.s.l.

Landform: Undulating glaciolacustrine terrain overlain by alluvial sediments

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

Thaw Depth: 2.01 m

Site visit: Aug 11, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	20.56	-15.05	1.59
1	6.97	-1.54	0.93
1.5	1.94	-0.06	0.30
2	0.03	-0.10	-0.06
4	-0.31	-0.34	-0.33
7	-0.49	-0.54	-0.51
12	-0.53	-0.58	-0.55
16	-0.57	-0.65	-0.62

## **Kee Scarp HT**

Sahtu Settlement Region

Latitude: 65.30 N

Longitude: 126.72 W

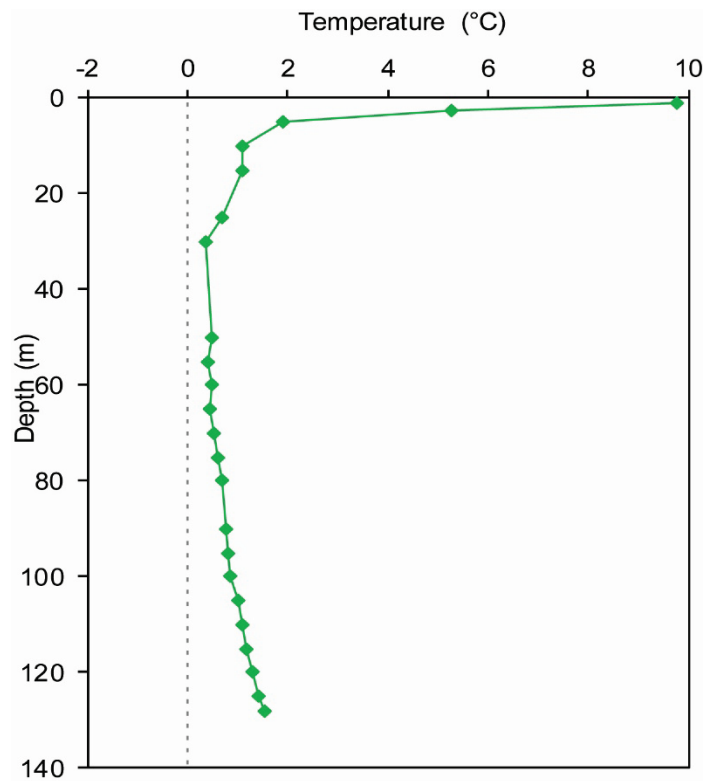
Elevation: 270 m a.s.l.

Landform: Top of narrow ridge. Borehole is in shale (which is underlain by limestone) with 20 cm moss and organic cover at surface

Vegetation cover: Boreal forest, mixture aspen birch pine and spruce with ground cover of grasses and small shrub

Thaw Depth: n/a

Site visit: Aug 10, 2018



Depth (m)	Temp (°C)
1	9.77
2.5	5.27
5	1.93
10	1.09
15	1.09
25	0.68
30	0.38
50	0.48
55	0.43
60	0.51
65	0.44
70	0.52
75	0.62
80	0.68
90	0.78
95	0.83
100	0.87
105	1.04
110	1.1
115	1.19
120	1.31
125	1.41
128	1.55

## Norman Wells Fen — 99TC5

Sahtu Settlement Region

Latitude: 65.30 N

Longitude: 126.86 W

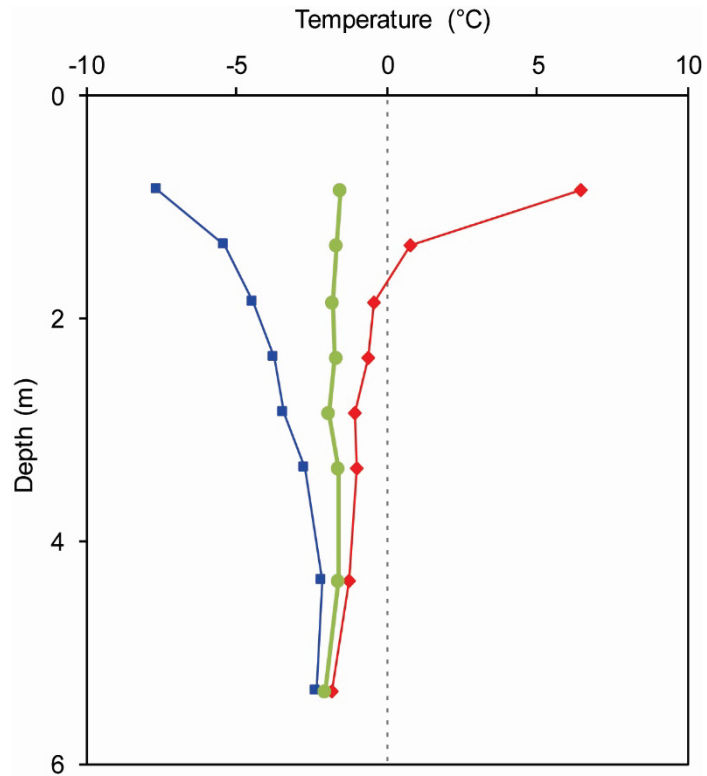
Elevation: n/a.

Landform: Thermokarst surface of glaciolacustrine plain (near small fen)

Vegetation cover: Large white and black spruce with smaller birch closed canopy, moss with lichen ground cover

Thaw Depth: 1.42 m

Site visit: Aug 14, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.85	6.45	-7.62	-1.56
1.35	0.77	-5.38	-1.70
1.85	-0.45	-4.43	-1.81
2.35	-0.65	-3.77	-1.73
2.85	-1.09	-3.44	-1.94
3.35	-0.98	-2.74	-1.63
4.35	-1.24	-2.16	-1.63
5.35	-1.83	-2.34	-2.06



## Norman Wells Pump Station — 84-1-T4

Sahtu Settlement Region

Latitude: 65.29 N

Longitude: 126.89 W

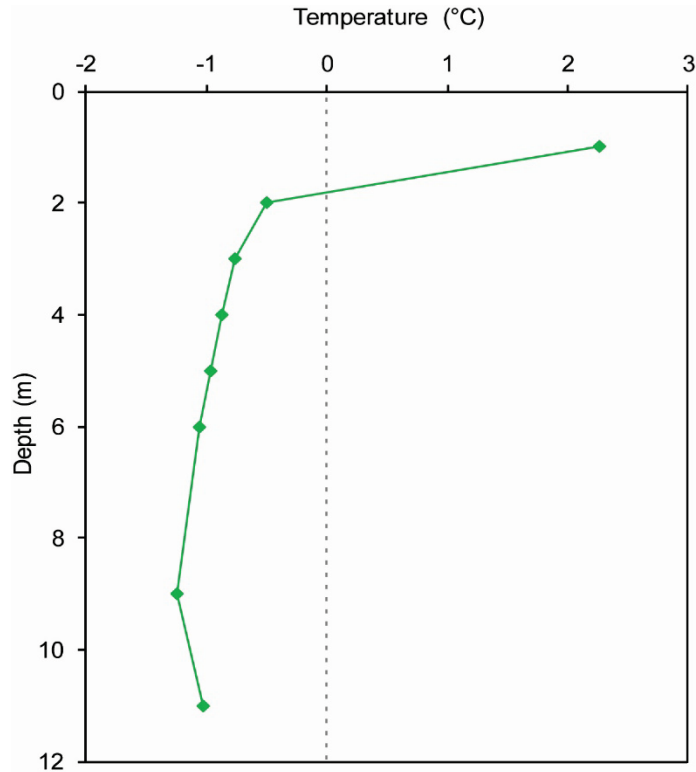
Elevation: 61 m a.s.l.

Landform: Ground moraine

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

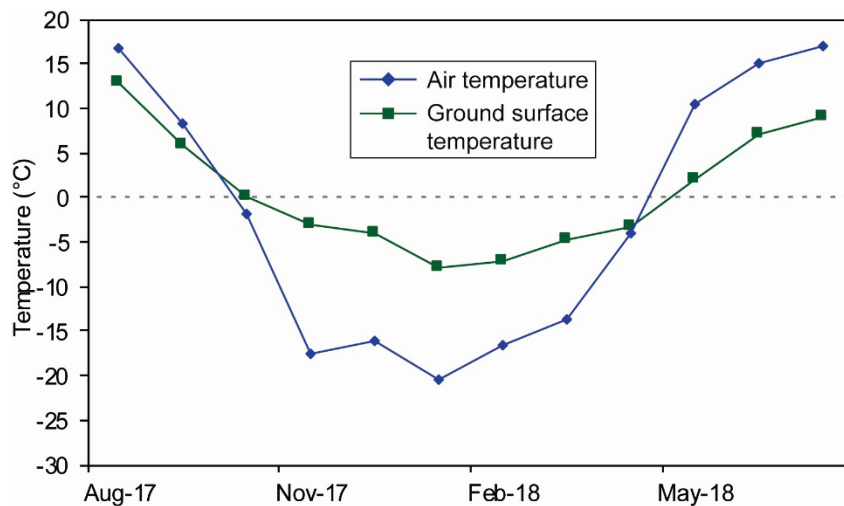
Thaw Depth: 1.82 m

Site visit: Aug 10, 2018



Depth (m)	Temp (°C)
1	2.27
2	-0.5
3	-0.76
4	-0.87
5	-0.97
6	-1.05
9	-1.24
11	-1.02

Month / Year	Temperature (°C)	
	Air	Surface
Aug-17	16.62	12.95
Sep-17	8.33	5.81
Oct-17	-1.95	0.08
Nov-17	-17.67	-3.09
Dec-17	-16.05	-4.13
Jan-18	-20.37	-7.89
Feb-18	-16.50	-7.06
Mar-18	-13.79	-4.72
Apr-18	-3.98	-3.43
May-18	10.40	1.90
Jun-18	14.98	7.04
Jul-18	17.00	8.93



## Norman Wells Upper Air — 93AG10

Sahtu Settlement Region

Latitude: 65.29 N

Longitude: 126.75 W

Elevation: 94 m a.s.l.

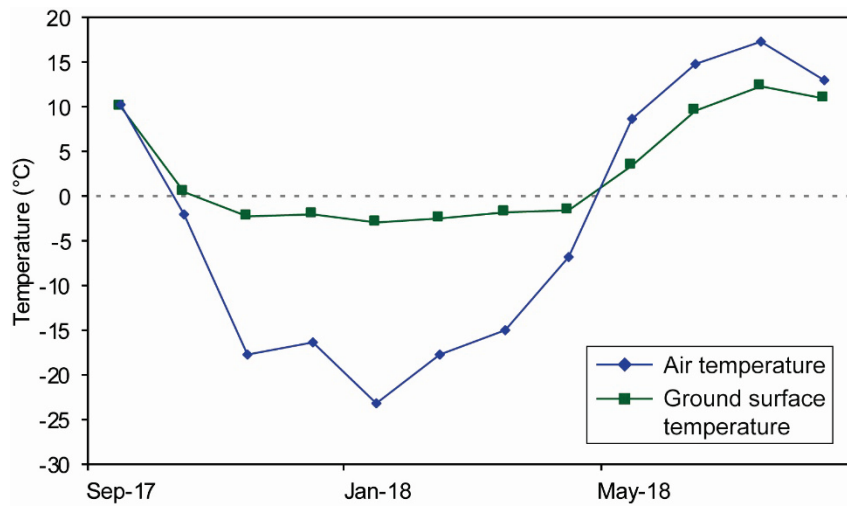
Landform: Till plain

Vegetation cover: Moss, lichen, herbaceous, alder and willow shrub, open black spruce

Thaw Depth: n/a

Site visit: Aug 14, 2018

Month / Year	Temperature (°C)	
	Air	Surface
Sep-17	10.32	9.95
Oct-17	-1.92	0.45
Nov-17	-17.73	-2.27
Dec-17	-16.41	-2.03
Jan-18	-23.09	-2.91
Feb-18	-17.76	-2.49
Mar-18	-15.06	-1.76
Apr-18	-6.79	-1.48
May-18	8.76	3.35
Jun-18	14.86	9.63
Jul-18	17.26	12.20
Aug-18	12.89	10.95



## Norman Wells - Water treatment plant

Sahtu Settlement Region

Latitude: 65.28 N

Longitude: 126.84 W

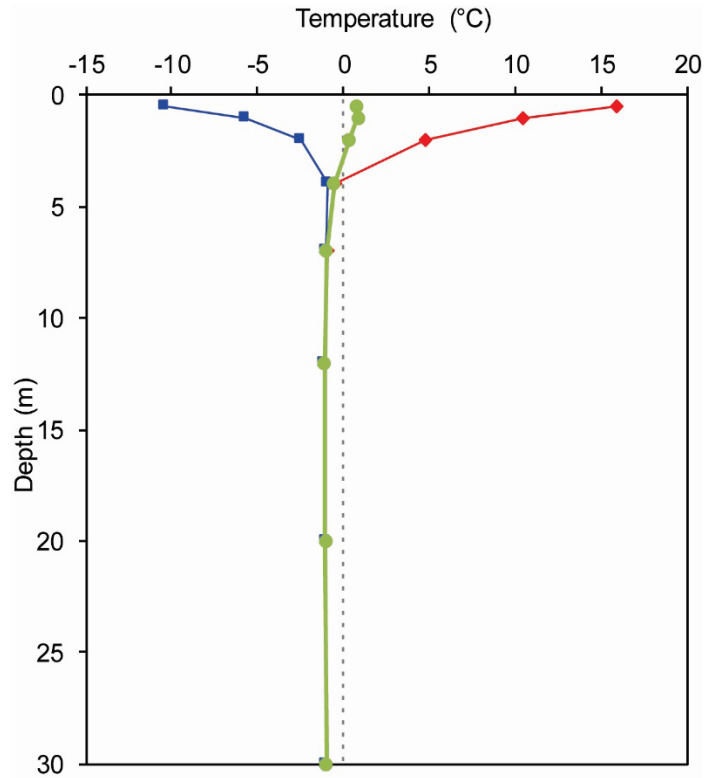
Elevation: 80 m a.s.l.

Landform: Ground moraine

Vegetation cover: Disturbed area adjacent to parking lot

Thaw Depth: 3.11 m

Site visit: Aug 10, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	15.88	-10.40	0.79
1	10.46	-5.67	0.84
2	4.75	-2.52	0.31
4	-0.47	-0.90	-0.59
7	-0.92	-1.07	-1.00
12	-1.10	-1.13	-1.12
20	-1.08	-1.09	-1.09
30	-1.01	-1.02	-1.02

## Van Everdingen — 30m

Sahtu Settlement Region

Latitude: 65.27 N

Longitude: 126.75 W

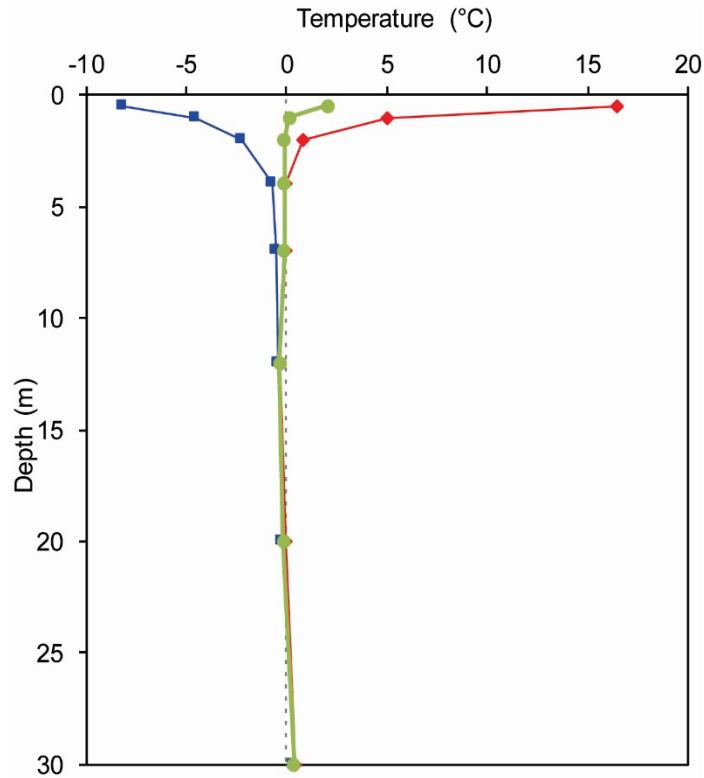
Elevation: n/a

Landform: Lacustrine plain

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

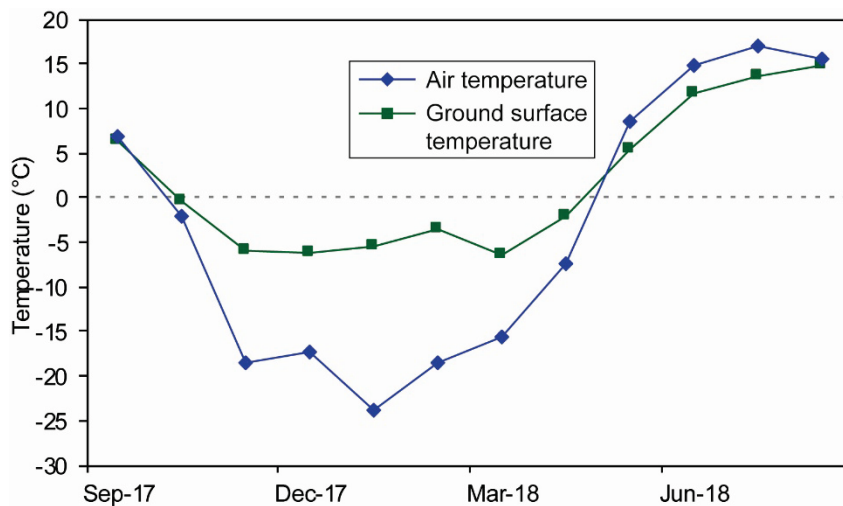
Thaw Depth: 2.21 m

Site visit: Aug 10, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	15.88	-10.40	0.79
1	10.46	-5.67	0.84
2	4.75	-2.52	0.31
4	-0.47	-0.90	-0.59
7	-0.92	-1.07	-1.00
12	-1.10	-1.13	-1.12
20	-1.08	-1.09	-1.09
30	-1.01	-1.02	-1.02

Month / Year	Temperature (°C)	
	Air	Surface
Sep-17	6.89	6.40
Oct-17	-2.10	-0.51
Nov-17	-18.44	-5.93
Dec-17	-17.21	-6.25
Jan-18	-23.94	-5.55
Feb-18	-18.52	-3.61
Mar-18	-15.59	-6.56
Apr-18	-7.37	-2.21
May-18	8.47	5.29
Jun-18	14.78	11.63
Jul-18	17.05	13.61
Aug-18	15.48	14.81



## Canyon Creek North A — 84-2A-HT

Sahtu Settlement Region

Latitude: 65.23 N

Longitude: 126.50 W

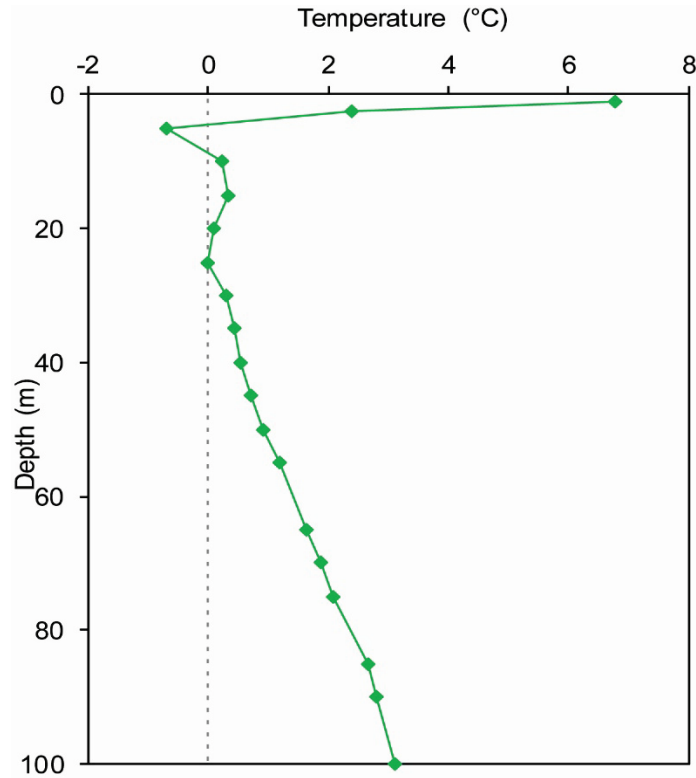
Elevation: 110 m a.s.l.

Landform: Ground moraine

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

Thaw Depth: 3.32 m

Site visit: Aug 11, 2018



Depth (m)	Temp (°C)
1	6.76
2.5	2.39
5	-0.69
10	0.23
15	0.35
20	0.11
25	0.01
30	0.32
35	0.45
40	0.53
45	0.7
50	0.91
55	1.19
65	1.63
70	1.87
75	2.1
85	2.65
90	2.81
100	3.1

## **Canyon Creek North A — 84-2A-T4**

Sahtu Settlement Region

Latitude: 65.23 N

Longitude: 126.50 W

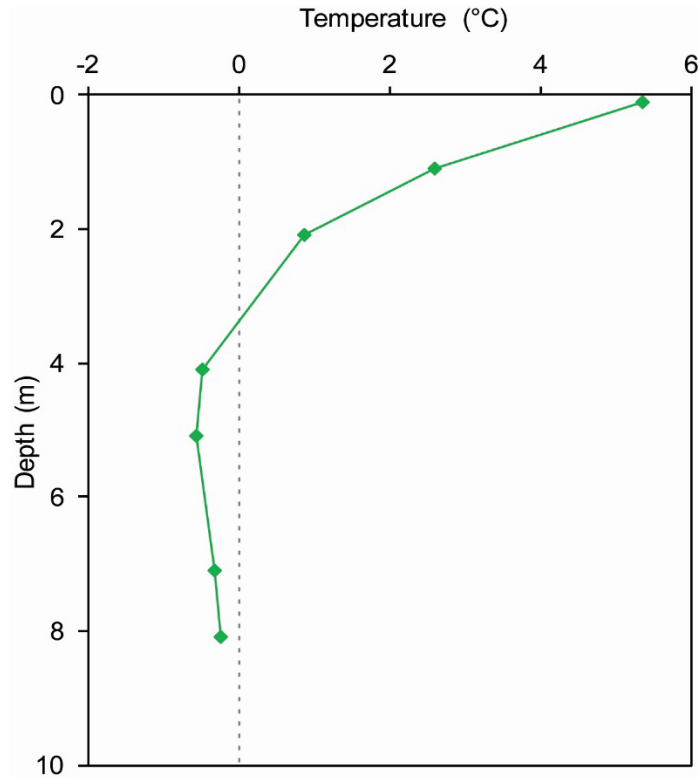
Elevation: 110 m a.s.l.

Landform: Ground moraine

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

Thaw Depth: 3.39 m

Site visit: Aug 11, 2018



Depth (m)	Temp (°C)
0.1	5.37
1.1	2.61
2.1	0.87
4.1	-0.48
5.1	-0.56
7.1	-0.32
8.1	-0.22

## Canyon Creek North B — 84-2B-T4

Sahtu Settlement Region

Latitude: 65.23N

Longitude: 126.52 W

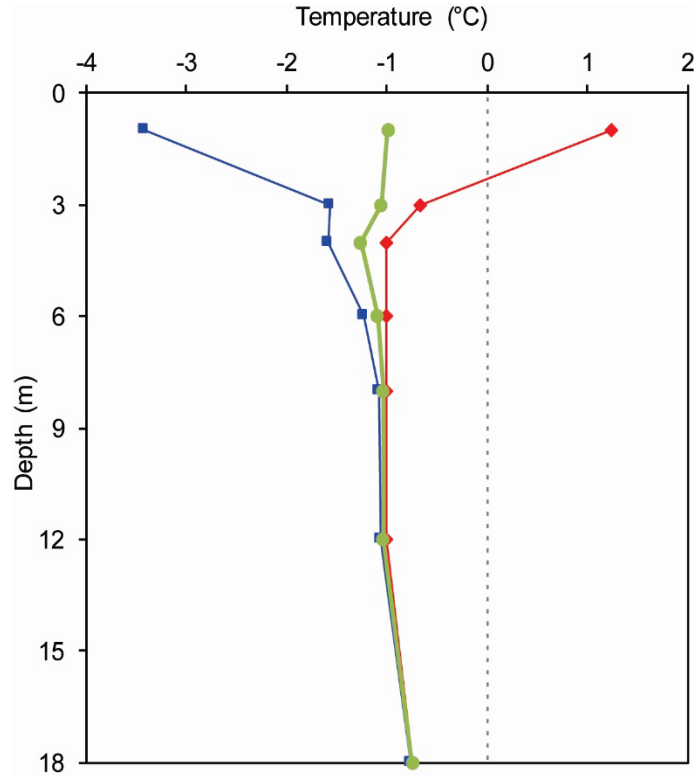
Elevation: 110 m a.s.l.

Landform: Ground moraine

Vegetation cover: Moss with white spruce

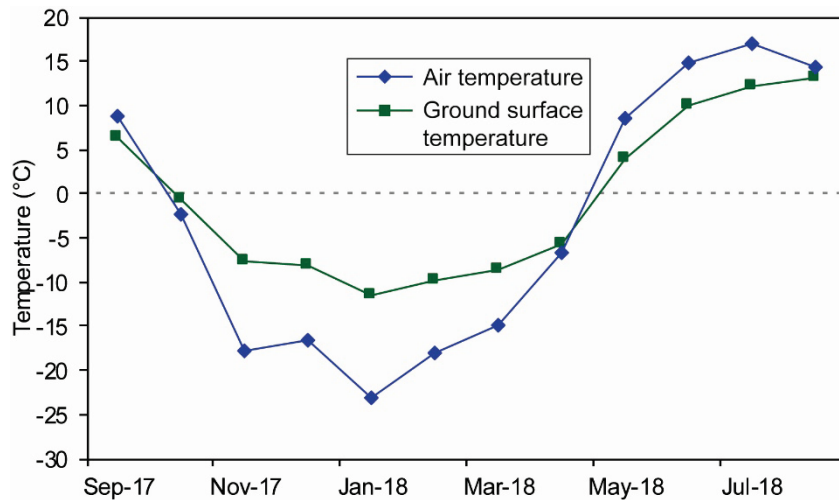
Thaw Depth: 1.47 m

Site visit: Aug 11, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
1	1.24	-3.42	-0.99
3	-0.66	-1.57	-1.06
4	-1.01	-1.58	-1.26
6	-1.01	-1.23	-1.09
8	-1.00	-1.08	-1.03
12	-1.01	-1.06	-1.04
18	-0.75	-0.76	-0.75

Month / Year	Temperature (°C)	
	Air	Surface
Sep-17	8.66	6.43
Oct-17	-2.23	-0.65
Nov-17	-17.77	-7.75
Dec-17	-16.66	-8.12
Jan-18	-23.10	-11.64
Feb-18	-18.01	-9.89
Mar-18	-14.98	-8.73
Apr-18	-6.73	-5.68
May-18	8.51	3.85
Jun-18	14.69	9.90
Jul-18	17.05	12.10
Aug-18	14.37	13.05



## Vermillion Creek — VC-01

Sahtu Settlement Region

Latitude: 65.10 N

Longitude: 126.14 W

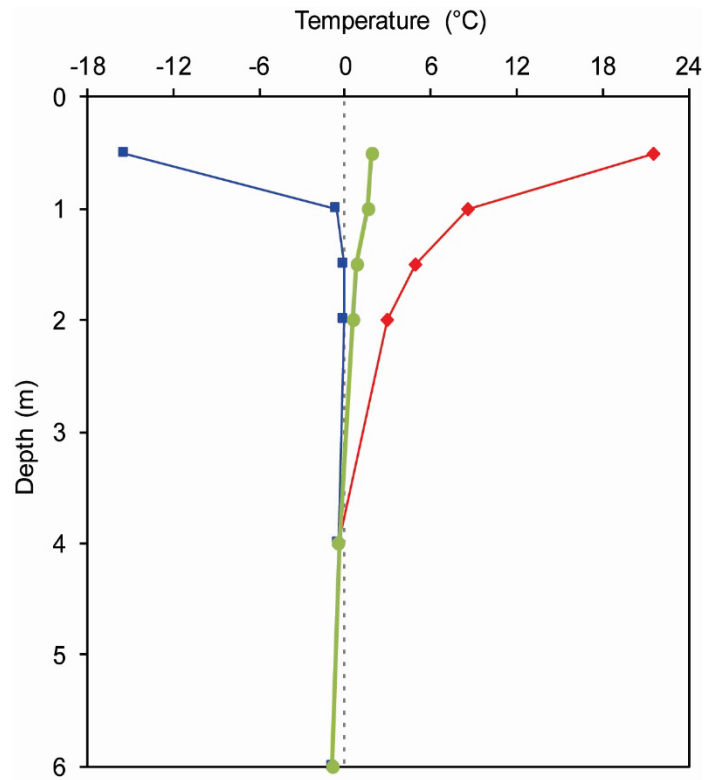
Elevation: 92 m a.s.l.

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

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

Thaw Depth: 2.75 m

Site visit: Aug 13, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	21.56	-15.33	1.87
1	8.62	-0.54	1.62
1.5	4.87	-0.10	0.86
2	2.93	-0.01	0.55
4	-0.40	-0.44	-0.41
6	-0.82	-0.85	-0.84



## Vermillion Creek — VC-02

Sahtu Settlement Region

Latitude: 65.10 N

Longitude: 126.13 W

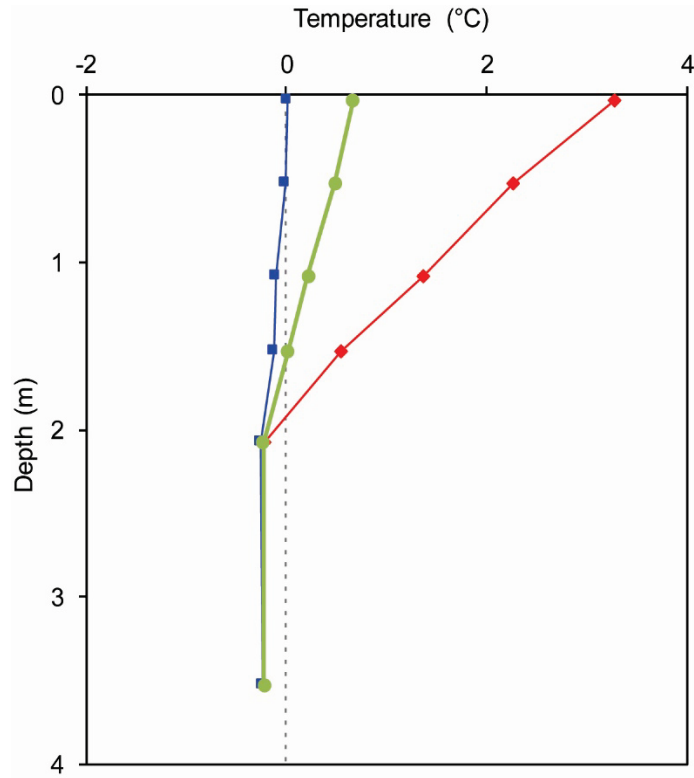
Elevation: 92 m a.s.l.

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

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

Thaw Depth: 1.73 m

Site visit: Aug 13, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.03	3.28	0.00	0.66
0.53	2.27	0.00	0.48
1.08	1.36	-0.10	0.22
1.53	0.55	-0.11	0.02
2.08	-0.21	-0.26	-0.24
3.53	-0.21	-0.23	-0.22

## Police Island — PI-01

Sahtu Settlement Region

Latitude: 64.83 N

Longitude: 125.01 W

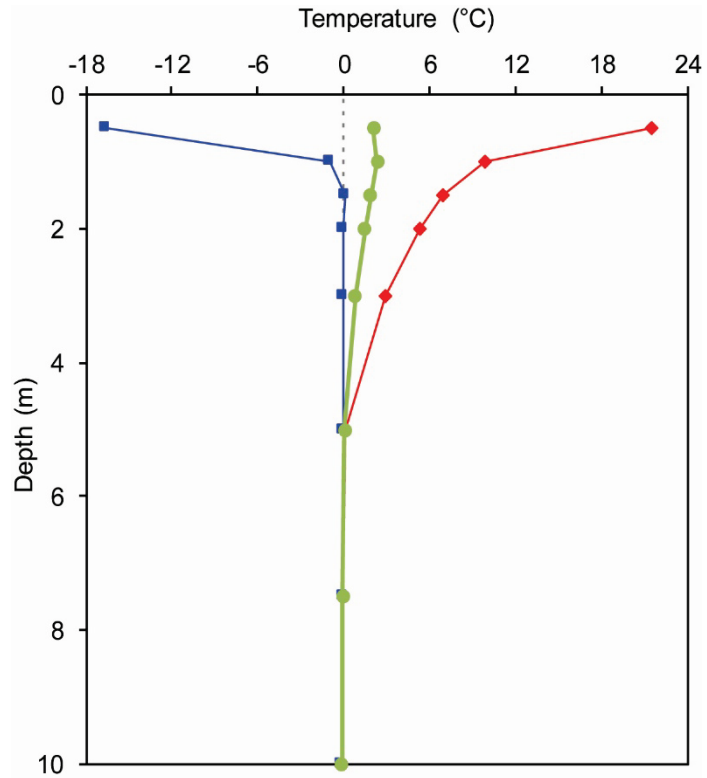
Elevation: 113 m a.s.l.

Landform: Lacustrine plain

Vegetation cover: Recovering burn (burnt black spruce forest)

Thaw Depth: 5.11 m

Site visit: Aug 13, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	21.48	-16.62	2.08
1	9.79	-0.95	2.33
1.5	6.89	0.03	1.84
2	5.31	0.01	1.45
3	2.84	-0.04	0.79
5	0.14	0.00	0.04
7.5	-0.08	-0.10	-0.08
10	-0.15	-0.17	-0.16

## **Police Island — PI-02**

Sahtu Settlement Region

Latitude: 64.83 N

Longitude: 125.01 W

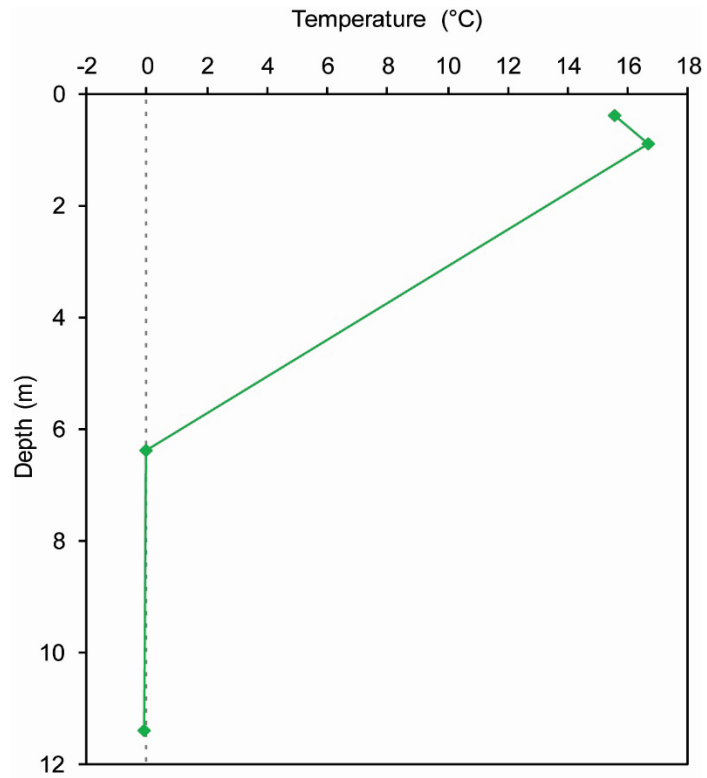
Elevation: 113 m a.s.l.

Landform: Lacustrine plain

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

Thaw Depth: n/a

Site visit: Aug 13, 2018



Depth (m)	Temp (°C)
0.4	15.55
0.9	16.65
6.4	-0.05
11.4	-0.11

## Old Fort Point — OFP-01

Sahtu Settlement Region

Latitude: 64.65 N

Longitude: 124.84 W

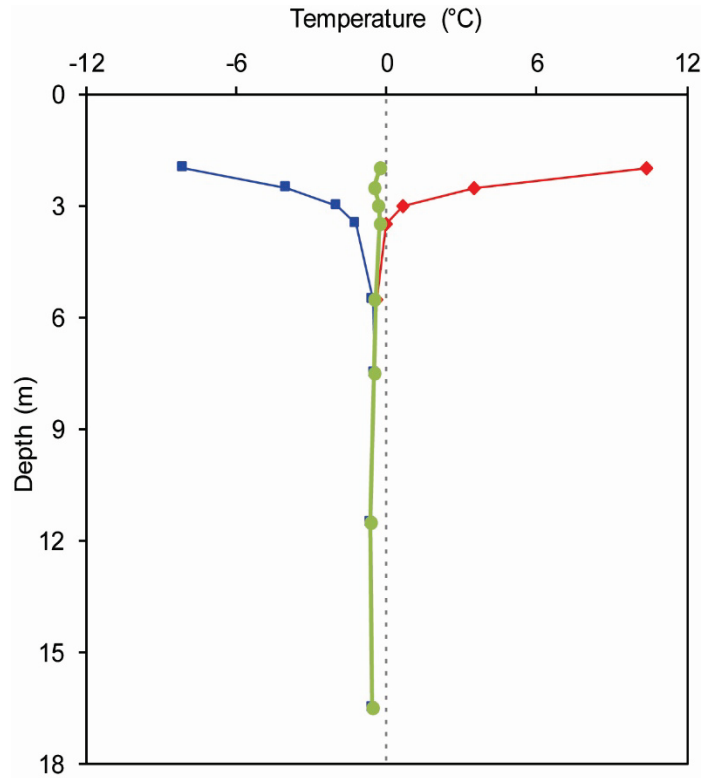
Elevation: 112 m a.s.l.

Landform: Lacustrine plain

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

Thaw Depth: 3.12 m

Site visit: Aug 12, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
2	10.39	-8.10	-0.26
2.5	3.50	-3.95	-0.49
3	0.66	-1.95	-0.31
3.5	-0.04	-1.21	-0.28
5.5	-0.40	-0.52	-0.45
7.5	-0.46	-0.49	-0.47
11.5	-0.61	-0.63	-0.62
16.5	-0.55	-0.57	-0.57

## Little Smith Creek — LS-01

Sahtu Settlement Region

Latitude: 64.43 N

Longitude: 124.74 W

Elevation: 80 m a.s.l.

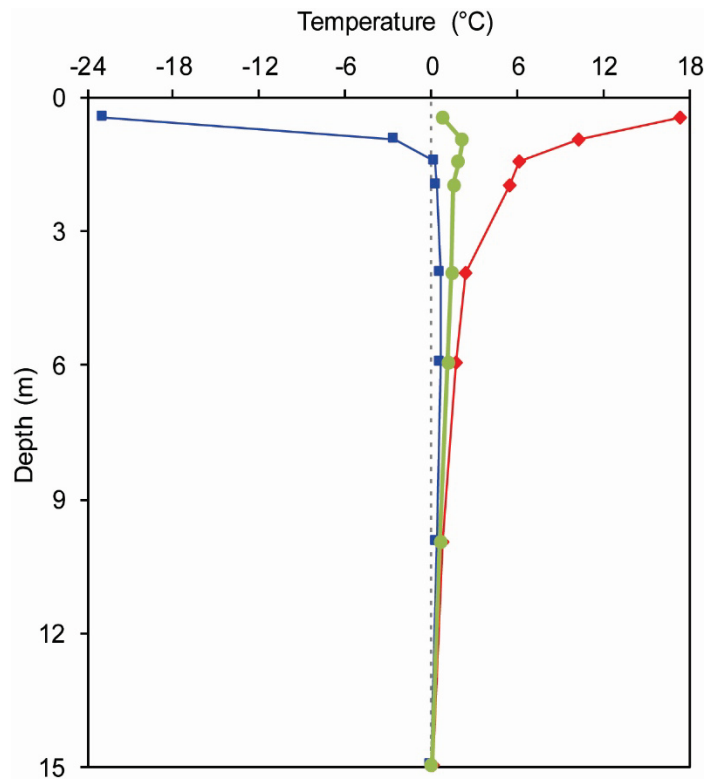
Landform: Alluvial flood plain

Vegetation cover: Open mature black spruce forest – cleared between 2015 and 2016.

Thaw Depth: n/a

Site visit: Aug 12, 2018

Note: Site cleared winter 2016



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.45	17.29	-22.84	0.72
0.95	10.22	-2.61	2.12
1.45	6.07	0.20	1.90
1.95	5.43	0.32	1.55
3.95	2.37	0.59	1.37
5.95	1.67	0.60	1.16
9.95	0.77	0.40	0.62
14.95	0.12	-0.06	0.02

## Little Smith Creek— LS-02

Sahtu Settlement Region

Latitude: 64.43 N

Longitude: 124.73 W

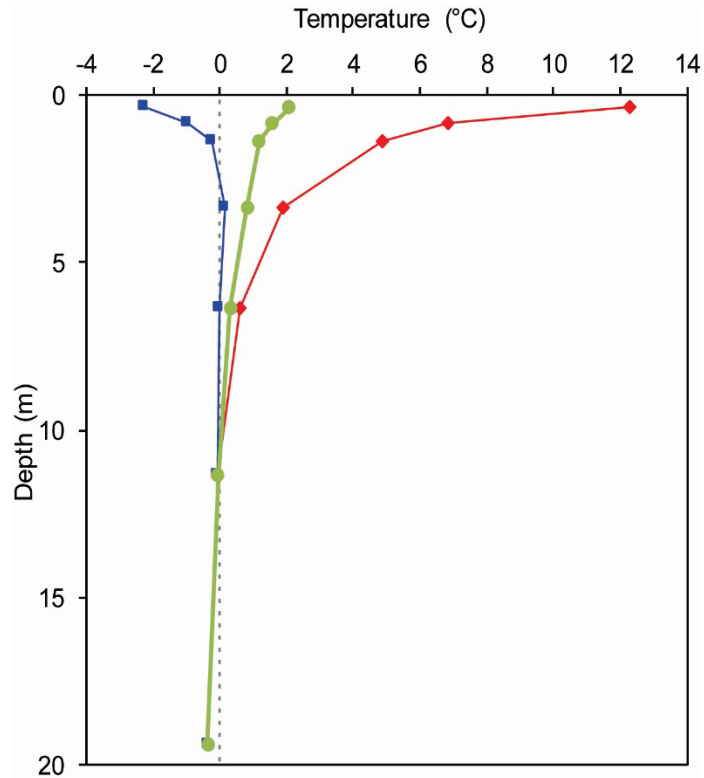
Elevation: 112 m a.s.l.

Landform: Glaciofluvial outwash plain

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

Thaw Depth: 7.68 m

Site visit: Aug 12, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.36	12.30	-2.28	2.09
0.86	6.81	-0.99	1.58
1.36	4.88	-0.25	1.19
3.36	1.92	0.14	0.81
6.36	0.58	0.02	0.31
11.36	-0.04	-0.05	-0.05
19.36	-0.34	-0.35	-0.35

## Saline River — SR-02

Sahtu Settlement Region

Latitude: 64.29 N

Longitude: 124.49 W

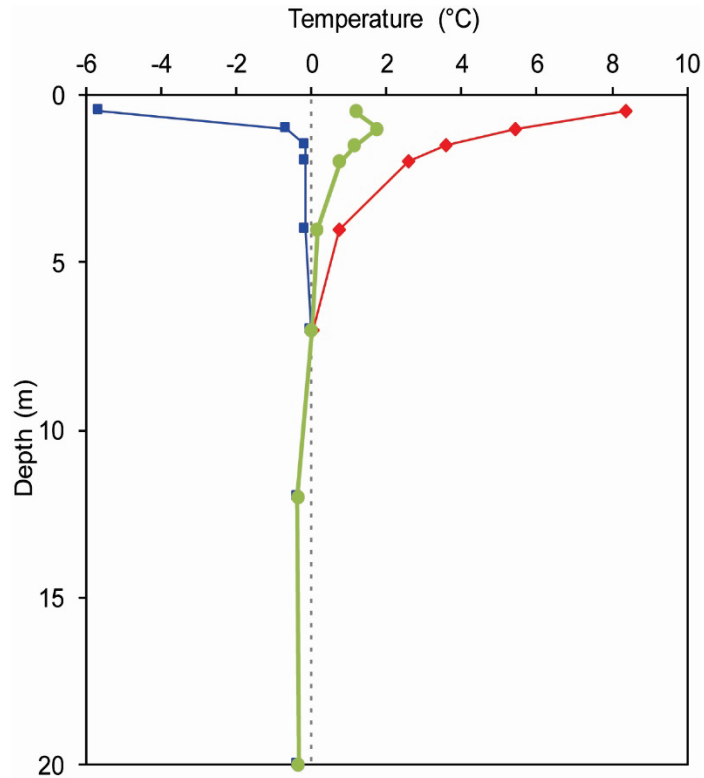
Elevation: 140 m a.s.l.

Landform: Glaciofluvial veneer over lacustrine

Vegetation cover: Burnt black spruce forest

Thaw Depth: 7.09 m

Site visit: Aug 12, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	8.36	-5.65	1.19
1	5.44	-0.65	1.76
1.5	3.56	-0.14	1.16
2	2.59	-0.16	0.76
4	0.73	-0.15	0.15
7	0.02	0.01	0.01
12	-0.35	-0.37	-0.36
20	-0.35	-0.36	-0.35

**KP182 — Mid Slope HT192**

Sahtu Settlement Region

Latitude: 64.28 N

Longitude: 124.47 W

Elevation: 138 m a.s.l.

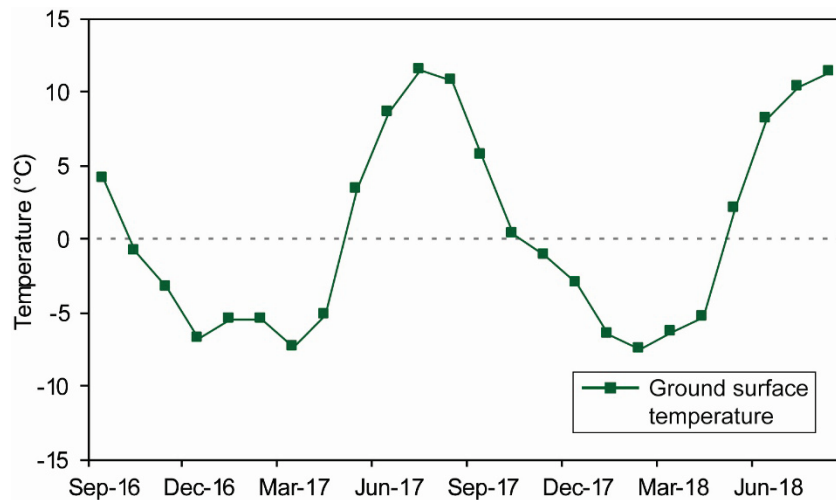
Landform: Lacustrine plain

Vegetation cover: Forested (recovering burn, burned 1994) - Aspen, willow, birch, tamarack

Thaw Depth: n/a

Site visit: Aug 13, 2018

Month / Year	Temperature (°C)	
	Air	Surface
Sep-16	n/a	4.01
Oct-16	n/a	-0.88
Nov-16	n/a	-3.32
Dec-16	n/a	-6.85
Jan-17	n/a	-5.51
Feb-17	n/a	-5.44
Mar-17	n/a	-7.35
Apr-17	n/a	-5.15
May-17	n/a	3.31
Jun-17	n/a	8.60
Jul-17	n/a	11.52
Aug-17	n/a	10.71
Sep-17	n/a	5.71
Oct-17	n/a	0.23
Nov-17	n/a	-1.19
Dec-17	n/a	-2.99
Jan-18	n/a	-6.58
Feb-18	n/a	-7.60
Mar-18	n/a	-6.43
Apr-18	n/a	-5.36
May-18	n/a	1.97
Jun-18	n/a	8.11
Jul-18	n/a	10.25
Aug-18	n/a	11.29





## KP182 — Top of Slope

Sahtu Settlement Region

Latitude: 64.28 N

Longitude: 124.47 W

Elevation: 144 m a.s.l.

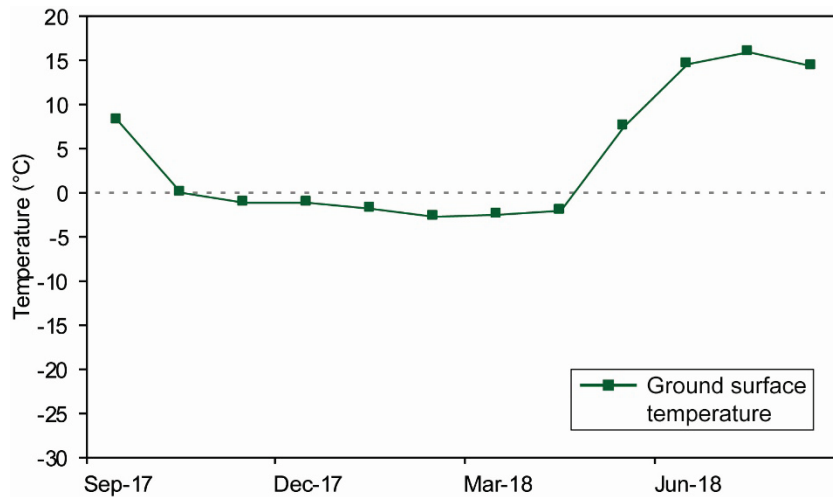
Landform: Lacustrine plain

Vegetation cover: Forested (recovering burn, burned 1994)- Aspen, willow, birch, tamarack

Thaw Depth: n/a

Site visit: Aug 13, 2018

Month / Year	Temperature (°C)	
	Air	Surface
Sep-17	n/a	8.11
Oct-17	n/a	-0.09
Nov-17	n/a	-1.08
Dec-17	n/a	-1.21
Jan-18	n/a	-1.77
Feb-18	n/a	-2.77
Mar-18	n/a	-2.39
Apr-18	n/a	-1.94
May-18	n/a	7.61
Jun-18	n/a	14.54
Jul-18	n/a	15.92
Aug-18	n/a	14.25



## KP182 — Crest of Slope

Sahtu Settlement Region

Latitude: 64.28 N

Longitude: 124.47 W

Elevation: 139 m a.s.l.

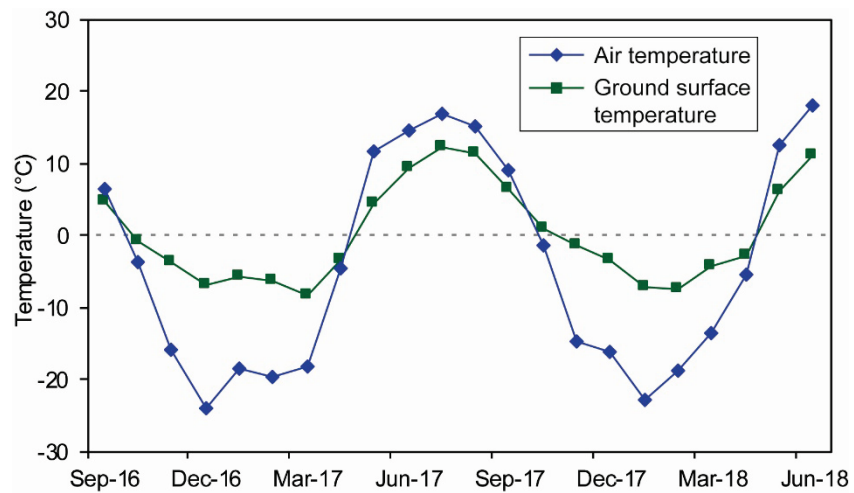
Landform: Lacustrine plain

Vegetation cover: Forested (recovering burn, burned 1994)— Aspen, willow, birch, tamarack

Thaw Depth: n/a

Site visit: Aug 13, 2018

Month / Year	Temperature (°C)	
	Air	Surface
Sep-16	6.31	4.63
Oct-16	-3.91	-0.92
Nov-16	-15.83	-3.73
Dec-16	-23.93	-6.95
Jan-17	-18.67	-5.89
Feb-17	-19.79	-6.26
Mar-17	-18.12	-8.36
Apr-17	-4.52	-3.41
May-17	11.46	4.48
Jun-17	14.60	9.41
Jul-17	16.81	12.03
Aug-17	15.04	11.36
Sep-17	8.92	6.49
Oct-17	-1.37	0.80
Nov-17	-14.85	-1.31
Dec-17	-16.10	-3.58
Jan-18	-22.99	-7.10
Feb-18	-18.92	-7.45
Mar-18	-13.71	-4.36
Apr-18	-5.39	-3.03
May-18	12.42	6.13
Jun-18	18.09	11.00



## KP182 — Unburnt

Sahtu Settlement Region

Latitude: 64.28 N

Longitude: 124.47 W

Elevation: 141 m a.s.l.

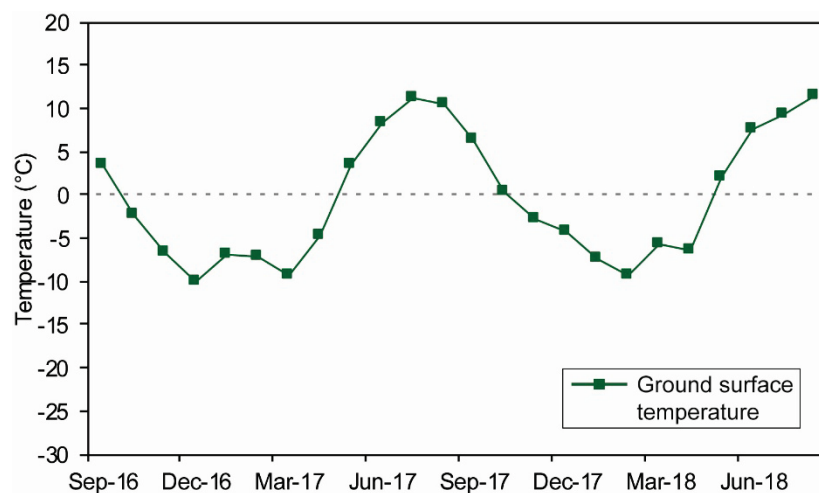
Landform: Lacustrine plain

Vegetation cover: Forested - white spruce, white birch with black spruce, moss and peat ground cover

Thaw Depth: n/a

Site visit: Aug 13, 2018

Month / Year	Temperature (°C)	
	Air	Surface
Sep-16	n/a	3.45
Oct-16	n/a	-2.27
Nov-16	n/a	-6.63
Dec-16	n/a	-10.18
Jan-17	n/a	-7.03
Feb-17	n/a	-7.13
Mar-17	n/a	-9.43
Apr-17	n/a	-4.73
May-17	n/a	3.51
Jun-17	n/a	8.34
Jul-17	n/a	11.24
Aug-17	n/a	10.44
Sep-17	n/a	6.27
Oct-17	n/a	0.21
Nov-17	n/a	-2.83
Dec-17	n/a	-4.16
Jan-18	n/a	-7.34
Feb-18	n/a	-9.25
Mar-18	n/a	-5.83
Apr-18	n/a	-6.49
May-18	n/a	1.91
Jun-18	n/a	7.57
Jul-18	n/a	9.29
Aug-18	n/a	11.42



## Steep Creek Top — Steep-02

Sahtu Settlement Region

Latitude: 64.18 N

Longitude: 124.38 W

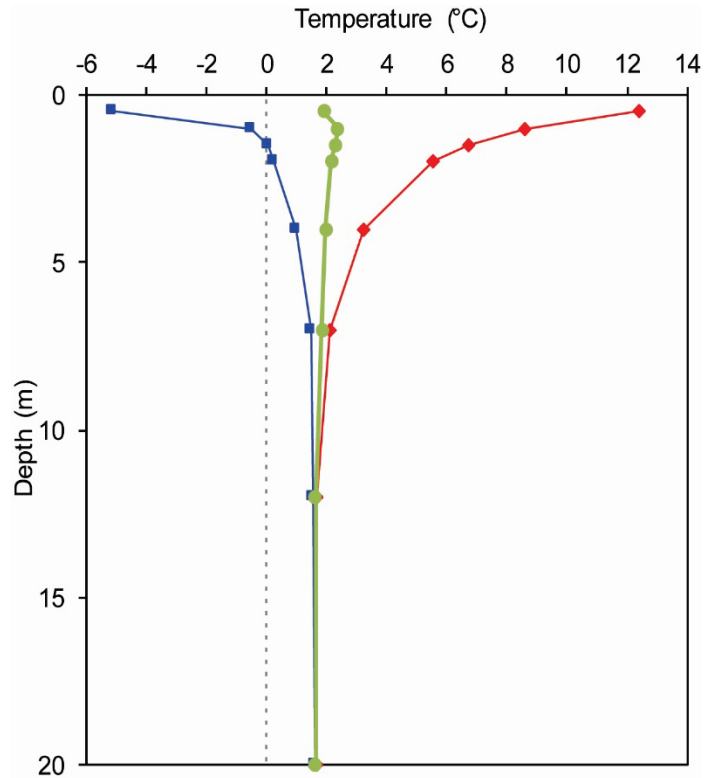
Elevation: 134 m a.s.l.

Landform: Alluvial and colluvial, north facing slope of stream valley (site at edge of cleared right-of-way)

Vegetation cover: Mixed, white spruce, jackpine, aspen, birch

Thaw Depth: n/a

Site visit: Aug 12, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	12.38	-5.13	1.91
1	8.62	-0.50	2.38
1.5	6.75	0.07	2.30
2	5.54	0.25	2.16
4	3.23	0.98	1.98
7	2.10	1.50	1.84
12	1.70	1.58	1.64
20	1.66	1.61	1.63

## Table Mountain A — 85-7A-HA108

Deh Cho Settlement Region

Latitude: 63.61 N

Longitude: 123.64 W

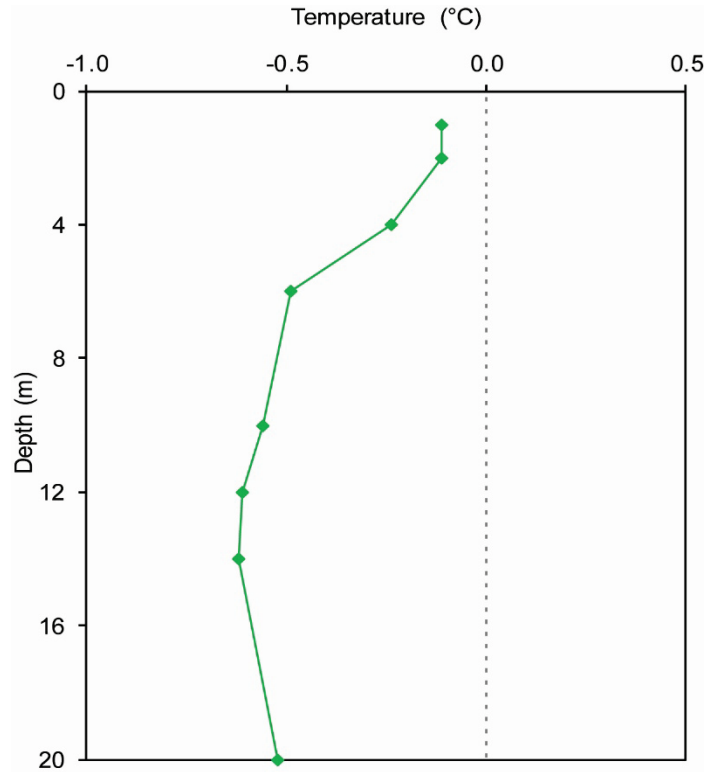
Elevation: 255 m a.s.l.

Landform: Ground moraine

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

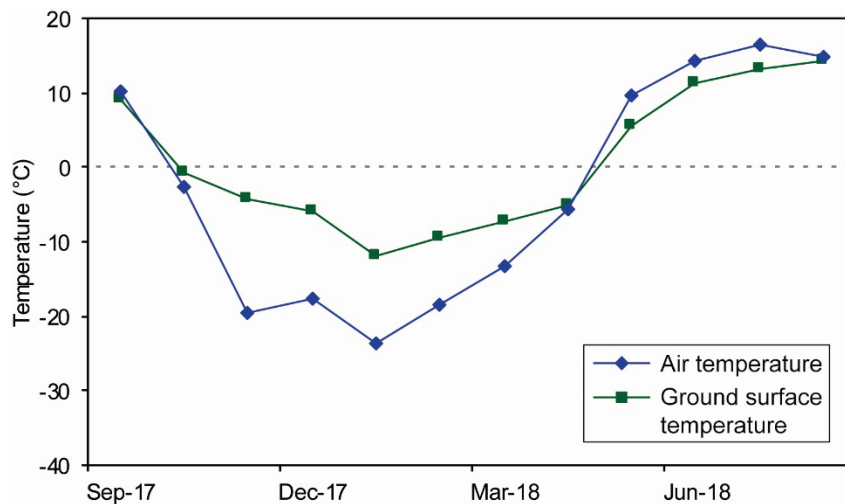
Thaw Depth: n/a

Site visit: Aug 12, 2018



Depth (m)	Temp (°C)
1	-0.11
2	-0.11
4	-0.24
6	-0.49
10	-0.56
12	-0.61
14	-0.62
20	-0.52

Month / Year	Temperature (°C)	
	Air	Surface
Sep-17	10.16	9.13
Oct-17	-2.69	-0.59
Nov-17	-19.41	-4.15
Dec-17	-17.72	-5.88
Jan-18	-23.52	-11.90
Feb-18	-18.53	-9.46
Mar-18	-13.20	-7.22
Apr-18	-5.55	-4.97
May-18	9.71	5.62
Jun-18	14.23	11.21
Jul-18	16.63	13.34
Aug-18	14.95	14.24



## Ochre River Cabin — 92TT10

Deh Cho Settlement Region

Latitude: 63.47 N

Longitude: 123.69 W

Elevation: 97 m a.s.l.

Landform: Low fluvial terrace cut into glacio-lacustrine plain

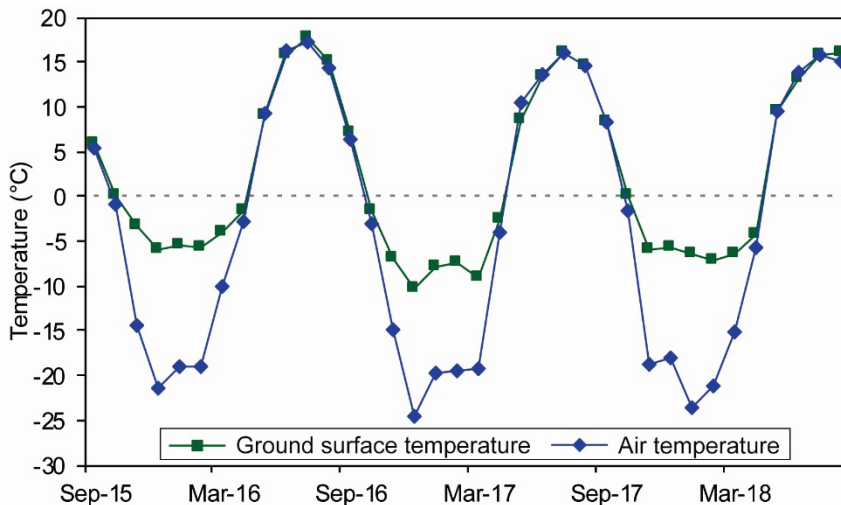
Vegetation cover: Complete ground cover of moss and typical boreal vascular plants, 3 types suggesting high moisture content, under mixed black spruce, moderate canopy density

Thaw Depth: 0.78 m (probed)

Site visit: Aug 12, 2018

Month / Year	Temperature (°C)	
	Air	Surface
Sep-15	5.31	5.76
Oct-15	-0.90	0.17
Nov-15	-14.48	-3.22
Dec-15	-21.47	-5.95
Jan-16	-19.04	-5.44
Feb-16	-19.01	-5.62
Mar-16	-9.99	-3.99
Apr-16	-2.79	-1.63
May-16	9.34	9.02
Jun-16	16.27	15.71
Jul-16	17.12	17.67
Aug-16	14.39	15.09
Sep-16	6.46	7.09
Oct-16	-3.02	-1.57
Nov-16	-14.85	-7.04
Dec-16	-24.60	-10.42
Jan-17	-19.69	-7.96
Feb-17	-19.45	-7.50

Month / Year	Temperature (°C)	
	Air	Surface
Mar-17	-19.31	-9.18
Apr-17	-4.07	-2.48
May-17	10.51	8.63
Jun-17	13.69	13.34
Jul-17	15.91	15.97
Aug-17	14.48	14.68
Sep-17	8.33	8.32
Oct-17	-1.73	0.09
Nov-17	-18.78	-5.89
Dec-17	-17.98	-5.81
Jan-18	-23.72	-6.44
Feb-18	-21.09	-7.24
Mar-18	-15.12	-6.41
Apr-18	-5.80	-4.21
May-18	9.50	9.38
Jun-18	13.92	13.21
Jul-18	15.87	15.66
Aug-18	15.14	16.05



## KP313 T2

Deh Cho Settlement Region

Latitude: 63.26 N

Longitude: 123.43 W

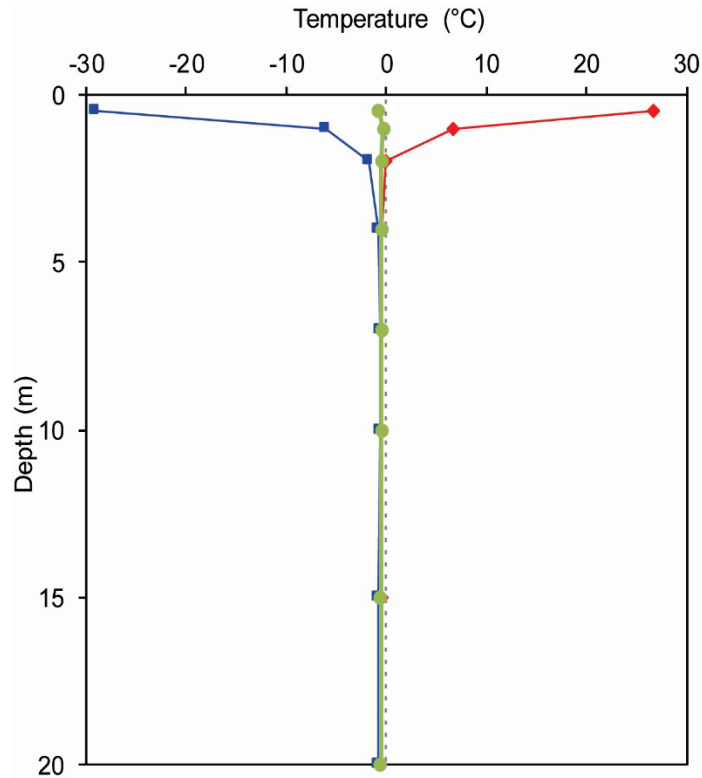
Elevation: 250 m a.s.l.

Landform: Lacustrine plain, bottom of slope

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

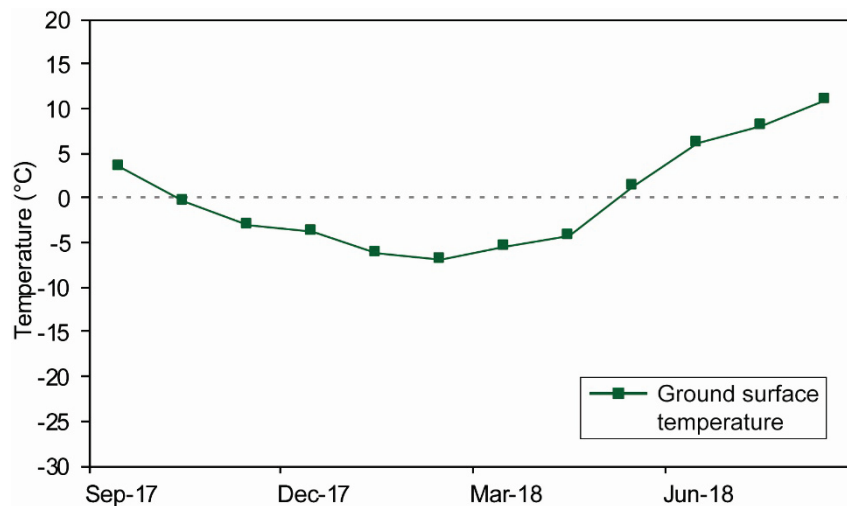
Thaw Depth: 2.0 m

Site visit: Aug 12, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	26.76	-28.98	-0.74
1	6.65	-6.11	-0.24
2	0.02	-1.72	-0.46
4	-0.35	-0.74	-0.48
7	-0.38	-0.67	-0.43
10	-0.42	-0.69	-0.47
15	-0.49	-0.75	-0.53
20	-0.56	-0.81	-0.60

Month / Year	Temperature (°C)	
	Air	Surface
Sep-17	n/a	3.48
Oct-17	n/a	-0.32
Nov-17	n/a	-3.09
Dec-17	n/a	-3.88
Jan-18	n/a	-6.15
Feb-18	n/a	-6.88
Mar-18	n/a	-5.46
Apr-18	n/a	-4.18
May-18	n/a	1.19
Jun-18	n/a	6.20
Jul-18	n/a	7.95
Aug-18	n/a	10.91



## KP313 T4

Deh Cho Settlement Region

Latitude: 63.26 N

Longitude: 123.43 W

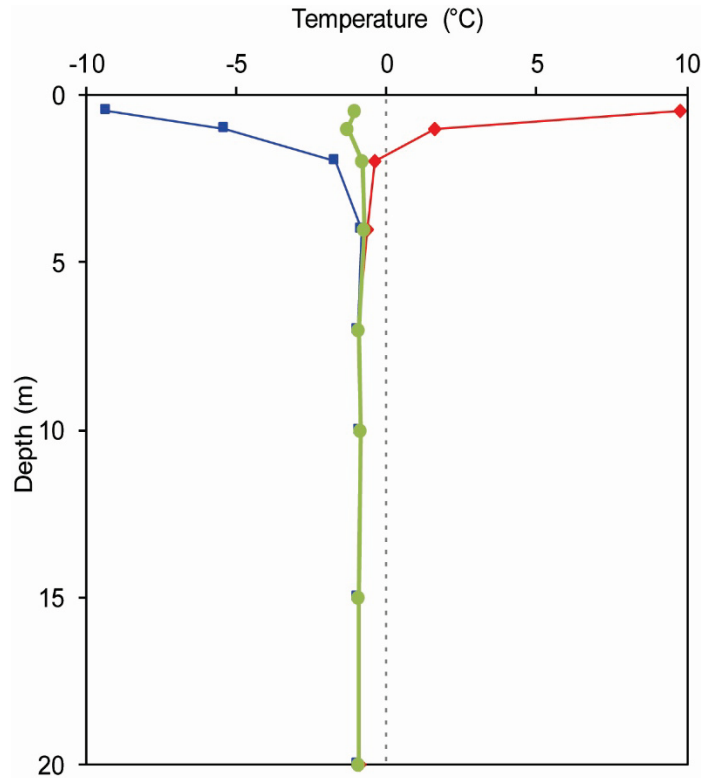
Elevation: 250 m a.s.l.

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

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

Thaw Depth: 1.10 m

Site visit: Aug 12, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	9.81	-9.32	-1.05
1	1.64	-5.35	-1.30
2	-0.42	-1.67	-0.81
4	-0.66	-0.85	-0.75
7	-0.93	-0.98	-0.95
10	-0.86	-0.90	-0.89
15	-0.92	-0.94	-0.94
20	-0.90	-0.96	-0.95



## KP313 T5

Deh Cho Settlement Region

Latitude: 63.26 N

Longitude: 123.43 W

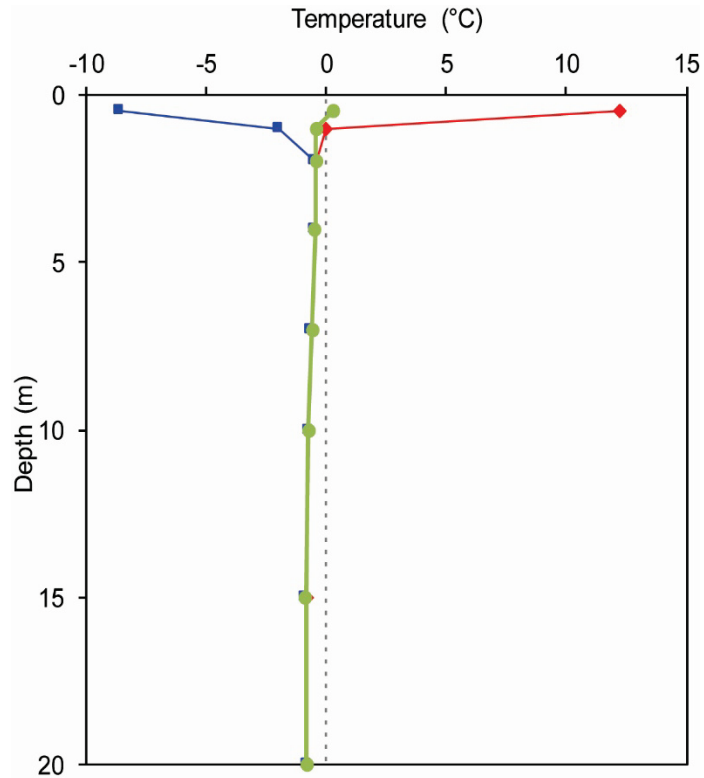
Elevation: 250 m a.s.l.

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

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

Thaw Depth: 1.00 m

Site visit: Aug 12, 2018



Aug 2017 – Jul 2018			
Depth (m)	Max (°C)	Min (°C)	Mean (°C)
0.5	12.26	-8.55	0.30
1.0	0.02	-1.95	-0.41
2.0	-0.38	-0.49	-0.43
4.0	-0.46	-0.49	-0.48
7.0	-0.58	-0.60	-0.59
10.0	-0.72	-0.74	-0.73
15.0	-0.83	-0.84	-0.84
20.0	-0.81	-0.83	-0.82

## KP313 T6

Deh Cho Settlement Region

Latitude: 63.26 N

Longitude: 123.43 W

Elevation: 250 m a.s.l.

Landform: Lacustrine plain, top of slope

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

Thaw Depth: 3.62 m

Site visit: Aug 12, 2018

Month / Year	Temperature (°C)	
	Air	Surface
Sep-17	8.18	6.57
Oct-17	-2.41	-0.45
Nov-17	-19.74	-5.56
Dec-17	-17.75	-4.87
Jan-18	-23.23	-5.85
Feb-18	-19.23	-5.97
Mar-18	-12.73	-4.46
Apr-18	-4.82	-2.75
May-18	10.12	5.54
Jun-18	14.36	11.30
Jul-18	16.68	12.93
Aug-18	15.28	14.16

