



**GEOLOGICAL SURVEY OF CANADA
OPEN FILE 7416**

**Report on 2012 Field Activities and Collection of Ground
Thermal and Active Layer Data in the Mackenzie Corridor
Completed Under Northwest Territories Science Licence
#15053**

M. Ednie, J. Chartrand, S.L. Smith, C. Duchesne, and D.W. Riseborough

2013



Natural Resources
Canada

Ressources naturelles
Canada

Canada



**GEOLOGICAL SURVEY OF CANADA
OPEN FILE 7416**

**Report on 2012 Field Activities and Collection of Ground
Thermal and Active Layer Data in the Mackenzie Corridor
Completed Under Northwest Territories Science Licence
#15053**

M. Ednie, J. Chartrand, S.L. Smith, C. Duchesne, and D.W. Riseborough

2013

©Her Majesty the Queen in Right of Canada 2013

doi:10.4095/292864

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

Recommended citation

Ednie, M., Chartrand, J., Smith, S.L., Duchesne, C., and Riseborough, D.W. 2013. Report on 2012 Field Activities and Collection of Ground Thermal and Active Layer Data in the Mackenzie Corridor Completed Under Northwest Territories Science Licence #15053; Geological Survey of Canada, Open File 7416, 69 p. doi: 10.4095/292864

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 2012 in the Mackenzie Corridor under N.W.T. Science Licence #15053. Air temperature, ground thermal and active layer data acquired from permafrost monitoring sites visited in 2012 throughout the corridor are provided in graphical and tabular format. This report will be distributed to community organizations and stakeholders in the study region to provide an update on field activities. The ground thermal and active layer data presented provide essential baseline information that can be utilized by stakeholders and others for various purposes such as land management activities, regulatory processes and design of northern infrastructure.

TABLE OF CONTENTS

	Page
Abstract	i
Table of Contents	ii
List of Figures and Tables	iii
1. Introduction	1
2. Study Sites and Instrumentation	1
3. Data Collection and Presentation	2
4. Summary	3
5. Acknowledgements	3
6. References	3
Appendix A Graphical and Tabular Presentation of Air and Ground Temperature Data for the Period 2011-12	17

LIST OF FIGURES AND TABLES

Page

Tables

1. Thermal monitoring sites in the Deh Cho, Sahtu and Gwich'in Settlement Regions 5
2. Thermal monitoring sites in the Inuvialuit Settlement Region. 12
3. Active layer thickness in 2010 for active layer monitoring sites throughout the Mackenzie Corridor. 13

Figures

1. Permafrost and active layer monitoring sites north and south of Inuvik. 14
2. Permafrost monitoring sites between Fort Good Hope and Norman Wells in the Sahtu Settlement Region. 15
3. Permafrost monitoring sites south of Norman Wells in the Sahtu and Deh Cho Settlement Regions. 16

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 are utilized to improve the characterization of regional baseline ground thermal conditions and to support development decisions in the Mackenzie corridor.

The purpose of this report is to provide a summary of the 2012 field activities conducted under N.W.T. Science Licence #15053 in order to inform the various community organizations, regulatory boards and other stakeholders in the region of our activities. This report provides a summary of the ground temperature and active layer data collected during August and September 2012. Although the primary objective of this report is to update stakeholders in the region on our activities and to make the data collected available to them, this information is also of interest to those requiring regional permafrost and active layer information such as industry, engineers and the academic and modeling communities.

2. STUDY SITES AND INSTRUMENTATION

Ground thermal monitoring sites along the Mackenzie corridor in the Gwich'in, Sahtu, Deh Cho, and Inuvialuit Settlement Regions were visited in August and September 2012. The location and brief description of each site visited in 2012 is provided in Figures 1, 2 and 3 and in Tables 1 and 2. Ground temperatures are measured with multi-sensor temperature cables installed in boreholes up to 20 m in depth. Temperatures are recorded by data loggers connected to the cables. The measurement system allows for an accuracy of $\pm 0.1^{\circ}\text{C}$ and a resolution of $\pm 0.01^{\circ}\text{C}$. Data were automatically collected at eight hour intervals to provide a continuous record of ground temperature throughout the year. Further details on the site establishment, site characteristics and instrumentation can be found in Smith et al. (2007, 2008, 2009a and 2010a, b). It should be noted that it is not possible to visit all sites each year and some sites are only visited every two years. Accessibility, weather and other issues also resulted in some planned site visits not being conducted in 2012. Sites that were not visited in 2012 are included in the Tables 1 and 2 and Figures 1, 2 and 3 but not in the figures presented in appendix A.

The GSC also maintains about 40 active layer monitoring sites throughout the Mackenzie corridor many of which have been in operation since the early 1990s. Thaw tubes have been installed at these sites to determine the maximum thaw penetration and the ground surface position during the period of maximum thaw in the year prior to the site visit. Data obtained during 2012 site visits therefore allow the determination of the active layer thickness for 2011. Table 3 provides a list of sites from which data were obtained in August 2012. Further details on thaw tube establishment, instrumentation and site characteristics can be found in Nixon and Taylor (1994), Nixon et al. (1995) and Smith et al. (2009b).

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

3. DATA COLLECTION AND PRESENTATION

GSC permafrost monitoring sites were visited in August and September 2012 to collect ground temperature data from the data loggers, take manual temperature measurements and to service the instrumentation. The temperatures acquired from the data loggers were checked visually and any irregular data were removed from the data record.

The continuous annual data record for each site was analyzed to determine the minimum and maximum temperature at each depth and to define the annual ground temperature envelope for the 2011-2012 period. For sites that were not visited in 2011, the annual ground temperature envelope for both 2010-11 and 2011-12 are presented. These data are presented in graphical and tabular format for each site in Appendix A. The maximum thaw depth for each site was calculated by either interpolating between the maximum temperatures reached at the depths that bracket 0°C or by use of a frost probe. Maximum thaw depth is included with each temperature envelope in Appendix A.

At some sites the data logger malfunctioned or was damaged so that a continuous temperature record could not be acquired for the 2011-2012 period. For these sites the 2012 manual temperature measurements made during the site visit are presented in Appendix A. For sites, such as those in the Inuvialuit Settlement region, which do not have data loggers connected to the cables, a ground temperature profile for August 2012 is provided.

Previous data collected from the thermal monitoring sites have also been presented in Smith et al. (2008, 2009a, 2010a, 2010b) and Ednie et al. (2011, 2012). In addition, summary ground temperature data are disseminated through the internet at www.gtnp.org.

The 2011 active layer thickness data are presented in Table 3 for all active layer monitoring sites that were visited in August 2012. Data collected prior to 2011 have been published in Smith et al. (2009b, 2010b) and Ednie et al. (2011, 2012). For active layer monitoring sites not visited in 2011, the values represent the estimated maximum depth of thaw penetration of the previous two summers.

Air and ground surface temperature records were visually checked and any irregularities were removed from the data record. Monthly averages of air and ground surface temperatures are presented in Appendix A. Tables 1, 2 and 3 identify air and ground surface temperature records associated with or next to a permafrost monitoring site or an active layer monitoring site. In

Appendix A, the air and ground surface temperature records associated with a permafrost monitoring sites are presented on the same page.

4. SUMMARY

This report provided a summary of 2012 field activities in the Mackenzie corridor conducted under N.W.T. Science Licence #15053. A summary of the ground thermal data collected at permafrost monitoring sites in August and September 2012 for the previous one year period has been presented in graphical and tabular format. The 2011 active layer thickness for active layer monitoring sites visited in 2012 was also provided. This report will be distributed to the various community organizations and stakeholders within the region in order to provide them with an update of our activities. The data presented can be utilized for land management activities, regulatory processes and for engineering design. The addition of these data to existing records builds up the ground temperature time-series and also improves the quality of baseline permafrost information against which change may be measured.

5. ACKNOWLEDGEMENTS

Support for the 2012 field data collection was provided by Natural Resources Canada. The enhancement of the monitoring network and previous data collection has benefitted from support from the Northern Energy Development Initiative, the Program for Energy Research and Development, and the Federal International Polar Year Program. 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. Review comments provided by Peter Morse are much appreciated. We would like to acknowledge the enthusiastic participation of trainees from the Gwich'in Renewable Resources Board Youth Work Experience program. Finally, we would like to thank Jasmine Brewster, Janet Hurst, and Willie Modeste for their help with fieldwork.

6. REFERENCES

- Ednie, M., Chartrand, J., Smith, S L. 2011. Report on 2010 field activities and collection of ground thermal and active layer data in the Mackenzie Corridor completed under N.W.T. science licence #14686; Geological Survey of Canada, Open File 6932, 62 p. doi:10.4095/288924
- Ednie, M., Chartrand, J., Smith, S L., Duchesne, C, Riseborough, D.W. 2012. Report on 2011 field activities and collection of ground thermal and active layer data in the Mackenzie Corridor completed under N.W.T. science licence #14618; Geological Survey of Canada, Open File 7231, 85 p. doi:10.4095/291982

- 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.
- 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.
- Smith, S.L., Nguyen, T.-N., Riseborough, D.W., Ednie, M., Ye, S., and Chartrand, J. 2008. 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.
- 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.
- 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.
- 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.
- Smith, S.L., Throop, J., Ednie, M., Chartrand, J., Riseborough, D. and Nixon, F.M. 2010b. Report on 2009 field activities and ground thermal data collection in the Mackenzie Corridor completed under N.W.T. Science Licence #14582; Open File 6695, 79 p.
- 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.

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

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air/ ground surface temperature	Site visited 2012
Deh cho	Trout Road Crossing	TRC	420	60.83	120.48	Bog-dominated moraine plain	Dry peatland vegetation consisting of black spruce, tamarack, and feathermoss	None	21/09/2012
Deh cho	Trout River	Trout R	350	61.02	120.59	Organic terrain	Peatland with scattered spruce and sphagnum ground cover	None	21/09/2012
Deh cho	Jean-Marie Creek	JMC-01	198	61.44	120.95	Transition alluvial flood plain to organic (fen) over lacustrine plain	Poorly drained shrub fen	None	20/09/2012
		JMC-02	198	61.44	120.95	Transition alluvial flood plain to organic (fen) over lacustrine plain	Sandy ridge with spruce, pine forest	None	20/09/2012
Deh cho	Liard Spruce	97TC4	180	61.55	121.39	Surface of glaciolacustrine delta, late glacial (>10Ka)	Boreal, wetland shrub and sedge	Ground	Not visited
Deh cho	Manners Sources	MS-01 (Fen)	182	61.63	121.11	Eolian interdune	Thermokarst shrub fen	None	20/09/2012
		MS-02 (Crest)	182	61.63	121.10	Eolian dune crest	Pine forest	None	20/09/2012
Deh cho	Wrigley Highway (Open black spruce)	99TC3	183	61.66	121.34	Surface of glaciolacustrine delta, post glacial (>10Ka)	Small black spruce thicket with willow shrub, 100% cover of moss with lichen and boreal heath (coniferous)	Air / Ground	Not visited
Deh cho	Harris River	HAR-01	146	61.88	121.29	Moraine	Predominantly birch	None	Not visited
Deh cho	Wrigley Highway (Mature black spruce)	97TC2	165	61.92	121.71	Surface of glaciolacustrine delta, post glacial (>10Ka)	Boreal, black spruce (coniferous forest)	Air / Ground	Not visited

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air/ ground surface temperature record	Site visited 2012
Deh cho	Wrigley Highway (Aspen)	97TC1	165	61.95	121.76	Surface of glaciolacustrine delta, post glacial (>10Ka)	Boreal, aspen grove (deciduous forest)	Air / Ground	Not visited
Deh cho	Wrigley ferry transition	97TC5	165	61.98	121.88	Surface of glaciolacustrine delta, post glacial (>10Ka)	Boreal, open spruce (coniferous forest)	Air / Ground	Not visited
Deh cho	Wrigley Highway (Fort Simpson bog)	99TC1	165	61.98	121.88	Peat plateau on surface of glaciolacustrine delta, post glacial (>10Ka)	Boreal, open black spruce (coniferous forest)	Air / Ground	Not visited
		99TC2	165	61.98	121.88	Thermokarst depression in the surface of glaciolacustrine delta, post glacial (>10Ka)	Boreal, sedge and sphagnum in depression surrounded by black spruce on raised peat rim	None	Not visited
Deh cho	Trail River	TR-01	181	62.09	121.76	Lacustrine plain and eolian landforms	Black spruce and tamarack forest with sphagnum and feathermoss ground cover	None	20/09/2012
Deh cho	Wrigley Highway (Liard Spruce)	99TC4	n/a	62.28	122.60	Organic terrain on till plain, post glacial (>10Ka)	Boreal burn, scattered small spruce, pine and aspen, heath ground cover	Air / Ground	Not visited
Deh cho	Willow Lake River	WLR-01	122	62.71	123.08	Alluvial fan	Open mixed forest	None	Not visited
Deh cho	River Between Two Mountains	RBTM-01	120	62.95	123.21	Transition lacustrine to alluvial to moraine terrain	Dense black spruce forest	None	Not visited
Deh cho		RBTM-02	150	62.93	123.18	Transition lacustrine to alluvial to moraine terrain	Dense black spruce forest	None	Not visited

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air/ ground surface temperature record	Site visited 2012
Sahtu	Steep Creek	Steep-01	62	64.19	124.37	Alluvium and colluvium, north facing slope of stream valley (site at edge of right-of-way)	Mixed, white spruce, jackpine, aspen, birch	None	22/09/2012
		Steep-02	134	64.18	124.38	Alluvium and colluvium, north facing slope of stream valley (site at edge of cleared right-of-way)	Mixed, white spruce, jackpine, aspen, birch	None	22/09/2012
		Steep-03	N/A	64.19	124.38	Alluvium and colluvium, north facing slope of stream valley (site on edge of wood chip insulated right-of-way)	Mixed, white spruce, jackpine, aspen, birch	None	Cable removed
Sahtu	Saline River	SR-02	140	64.29	124.49	Glaciofluvial veneer over lacustrine	Burnt black spruce forest	None	22/09/2012
Sahtu	Little Smith Creek	LS-01	80	64.43	124.74	Alluvial flood plain	Open mature black spruce forest	None	22/09/2012
		LS-02	112	64.43	124.73	Glaciofluvial outwash plain	Tamarack, birch, poplar, and pine forest transition to spruce	None	22/09/2012
Sahtu	Old Fort Point	OFP-01	112	64.65	124.84	Lacustrine plain	Open mixed spruce, pine deciduous forest adjacent to open, low-lying fen	None	22/09/2012

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air/ ground surface temperature record	Site visited 2012
Sahtu	Police Island	PI-01	113	64.83	125.01	Lacustrine plain	Recovering burn (burnt black spruce forest)	None	22/09/2012
		PI-02	113	64.83	125.01	Lacustrine plain	Unburnt, black spruce forest with moss and lichen ground cover	None	22/09/2012
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	22/09/2012
		VC-02	92	65.10	126.13	Moraine plain (site at approach to water crossing)	SE side of creek on plateau in area of burnt black spruce	None	22/09/2012
Sahtu	NW Fen	99TC5	n/a	65.30	126.86	Thermokarst surface of glaciolacustrine plain (near small fen)	Large white and black spruce with smaller birch closed canopy, moss with lichen ground cover	Ground	Not visited
Sahtu	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	19/09/2012
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	19/09/2012

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air/ ground surface temperature record	Site visited 2012
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	19/09/2012
		EC-02	54	65.52	127.62	Lacustrine plain overlain by alluvial sediments	Peat cover on edge of dense, mature black spruce forest	None	19/09/2012
Sahtu	Hanna River	HR-01	104	65.67	127.83	Lacustrine plain	Boggy burnt area	None	19/09/2012
Sahtu	Gibson Lake	GL-01	228	65.75	127.89	Hummocky moraine plain	Recovering burnt area with peat and shrubs	Air	19/09/2012 Cable destroyed
Sahtu	Chick Lake	CL-01	122	65.90	128.24	Moraine plain	Peat and organic soil with open black spruce forest and shrubs	None	cable destroyed
Sahtu	Snafu Creek	SC-01	100	66.00	128.35	Moraine plain	Peat bog, open black spruce forest, and lichen cover	None	19/09/2012

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (N)	Longitude (W)	Landform	Vegetation Cover	Air/ ground surface temperature record	Site visited 2012
Sahtu	Fort Good Hope South	FGHS-01	134	66.21	128.50	Hummocky peatland	Dense shrub and open black spruce	Air	19/09/2012
		FGHS-02	134	66.21	128.50	Hummocky peatland	Peat plateau, lichen, open black spruce	None	19/09/2012
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	19/09/2012
Gwich'in	Wood Bridge Lake	WBL-01	204	67.90	132.18	Alluvial plain	Black spruce forest	None	07/08/2012
Gwich'in	Hill Lake	HL-01	229	67.99	132.49	Moraine plain	Tundra	None	07/08/2012
		HL-02	234	67.99	132.49	Moraine plain	Shrub tundra	None	07/08/2012
Gwich'in	North Caribou Lake	NCL-01	209	68.15	132.94	Moraine plain	Peatland	None	07/08/2012
		NCL-02	217	68.15	132.93	Moraine plain	Stunted black spruce forest	None	07/08/2012

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (°N)	Longitude (°W)	Landform	Vegetation Cover	Air/ ground surface temperature record	Site visited 2012
Gwich'in	Campbell Lake	CaL-01	115	68.24	133.10	Moraine plain	Peatland	None	07/08/2012
		CaL-02	118	68.24	133.09	Moraine plain	Cutline through black spruce forest	None	07/08/2012
		CaL-03	118	68.24	133.10	Moraine plain	Black spruce forest	None	07/08/2012
Gwich'in	Inuvik Airport	01TC2 (Trees)	84	68.32	133.44	Fluted till plain, glacial (>10Ka)	Taiga open black spruce, heath ground cover	Ground	10/08/2012 No data, data logger malfunction
		01TC3 (bog)	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	10/08/2012 No data, cable destroyed
Gwich'in	Norris Creek	NC-01	15	68.41	133.29	Thick organic material over moraine plain	Shrub tundra	None	07/08/2012
Gwich'in	Navy Channel	03TC1	5	68.42	133.79	Surface of Holocene Mackenzie delta adjacent to eastern edge rising 10s of meters to till plain	Riparian high willow shrub, open, incomplete ground cover of forbs and sedge (forest tundra)	Air / Ground	13/08/2012
Gwich'in	Navy Road	01TC1	60	68.40	133.76	Fine grained colluvium sloping toward river, post glacial (~10Ka)	Taiga post fire succession, scattered birch and alder, open dwarf birch, heath ground cover	Ground	13/08/2012

Table 2. Thermal monitoring sites in the Inuvialuit Settlement Region. Note there are no data loggers connected to the temperature cables.

Settlement region	Site name	Bore hole name	Elevation (m a.s.l.)	Latitude (°N)	Longitude (°W)	Landform	Vegetation Cover	Air/ ground surface temperature record	Site visited 2012
Inuvialuit	Taglu	C4	15	69.37	134.95	Surface of Holocene Mackenzie delta	Low willow shrub	None	06/08/2012 No data, cable destroyed
Inuvialuit	Lousy Point	1/91GSC6 (Wolf Lake)	115	69.24	134.44	Ice cored ice contact complex, may be late glacial (>10Ka) or much older (early Wisconsinan)	Tundra	None	Not visited
		2/91GSC13	118	69.22	134.29	Ice cored ice contact ridge, may be late glacial (>10Ka) or much older (early Wisconsinan)	Shrub tundra	None	Not visited
		216-86-SO5	118	69.22	134.29	Ice cored ice contact ridge, may be late glacial (>10Ka) or much older (early Wisconsinan)	Shrub tundra	None	Not visited
Inuvialuit	Involuted Hill	IH88-02	209	69.47	132.64	Ice cored collapsing hill, may be postglacial (10Ka) or much older (early Wisconsinan)	Shrub tundra	Air / Ground	Not visited
		IH88-03	n/a	69.47	132.64	Ice cored collapsing hill, may be postglacial (10Ka) or much older (early Wisconsinan)	Shrub tundra	None	Not visited
		IH88-04	217	69.47	132.64	Ice cored collapsing hill, may be postglacial (10Ka) or much older (early Wisconsinan)	Tundra	None	Not visited

Table 3. Active layer and air/ground surface temperature monitoring sites throughout the corridor. Active layer thickness in 2011 determined from thaw tubes at active layer monitoring sites is provided. Note: Site IDs that include “AG” are only air and ground surface temperature sites and do not have a thaw tube. Probed active layer depths are taken on day of visit and are for the 2012 thaw season. Probed active layer values at ground temperature sites are presented in appendixA.

Site Name	Site ID	Lat (°N)	Long (°W)	2011 Active Layer (m)	Air / Ground Temperature	Date Visited
North Head shore	90TT13	69.72	134.46	n/a	Air / Ground	08/08/2012
North Head ridge	90TT01	69.71	134.49	n/a	Abandoned	Not visited
North Point summit	90TT02	69.66	134.39	0.48	None	08/08/2012
North Point mid-slope	90TT11	69.66	134.38	0.61	None	08/08/2012
North Point shore	90TT12	69.65	134.39	0.50	None	08/08/2012
Mason Bay high	90TT08	69.52	134.02	0.78	None	08/08/2012
Mason Bay shore	90TT09	69.52	134.01	0.66	None	08/08/2012
Mason Bay inlet	90TT10	69.52	134.04	0.82	None	08/08/2012
Illasarvik	94TT01	69.48	134.57	0.61	None	08/08/2012
Harry Channel mouth	91TTA	69.47	134.82	0.69	None	06/08/2012
Involuted Hill top	92TT01	69.47	132.63	n/a	None	Not visited
Involuted Hill flat	92TT02	69.47	132.64	n/a	Air / Ground	Not visited
Kendall Island Meadow	91TTF	69.45	135.34	1.04	None	06/08/2012
Taglu	91TTC	69.37	134.95	1.71	Air / Ground	06/08/2012
Lousy Point hollow	91TT09	69.22	134.30	n/a	None	Not visited
Lousy Point ridge	90TT05	69.22	134.29	0.72	Air (failed) / Ground	07/08/2012
Lousy Point low terrace	90TT06	69.22	134.28	0.65	Air / Ground	08/08/2012
Lousy Point flood plain	90TT07	69.22	134.27	n/a	None	Not visited
YaYa Lake high	90TT03	69.14	134.72	1.00	None	06/08/2012
YaYa Lake low	90TT04	69.14	134.70	0.89	Air / Ground	06/08/2012
Swimming Point slope	91TT01	69.11	134.40	0.61	None	07/08/2012
Swimming Point shore	91TT02	69.11	134.39	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	0.75	Air / Ground	07/08/2012
Reindeer Depot (Williams Island)	91TT13	68.68	134.15	1.37 (probed)	Air / Ground	07/08/2012
Navy Channel (Rat Channel)	90TT17	68.42	133.79	thawed	None	13/08/2012
Inuvik Airport	01TT02	68.32	133.43	0.67	None	10/08/2012
Upper Air	90TT16	68.32	133.50	0.81	None	10/08/2012
Havikpak Creek	93TT02	68.32	133.51	0.79	None	10/08/2012
Caribou Creek	93TT01	68.11	133.48	0.69	None	12/08/2012
Rengleng River mouth	91TT14	67.80	134.13	>1.24 (probe)	Air / Ground	11/08/2012
Tsiigehtchic	91TT16	67.48	133.77	n/a	Air / Ground	Not visited
Ochre River cabin	92TT10	63.47	123.69	n/a	None	Not visited
Ochre River	92TT09	63.46	123.69	n/a	None	Not visited
River between two mountains	92TT08	62.95	123.20	n/a	Air / Ground	Not visited
Willow Lake River	92TT7	62.70	123.06	n/a	Air / Ground	Not visited
Willow Lake burn	93AG4	62.70	123.06	n/a	Air / Ground	Not visited
Wrigley Pines	94AG2	62.32	122.69	n/a	Air / Ground	Not visited
FS bog	93AG2	61.98	122.88	n/a	Air / Ground	Not visited
Spruce cutline	93AG3	61.97	121.82	n/a	Air / Ground	Not visited
FS aspen dune	94AG3	61.89	121.52	n/a	Air / Ground	Not visited
Martin River	92TT6	61.89	121.60	n/a	Air / Ground	Not visited
FS deep	94AG1	61.83	121.34	n/a	Air / Ground	Not visited

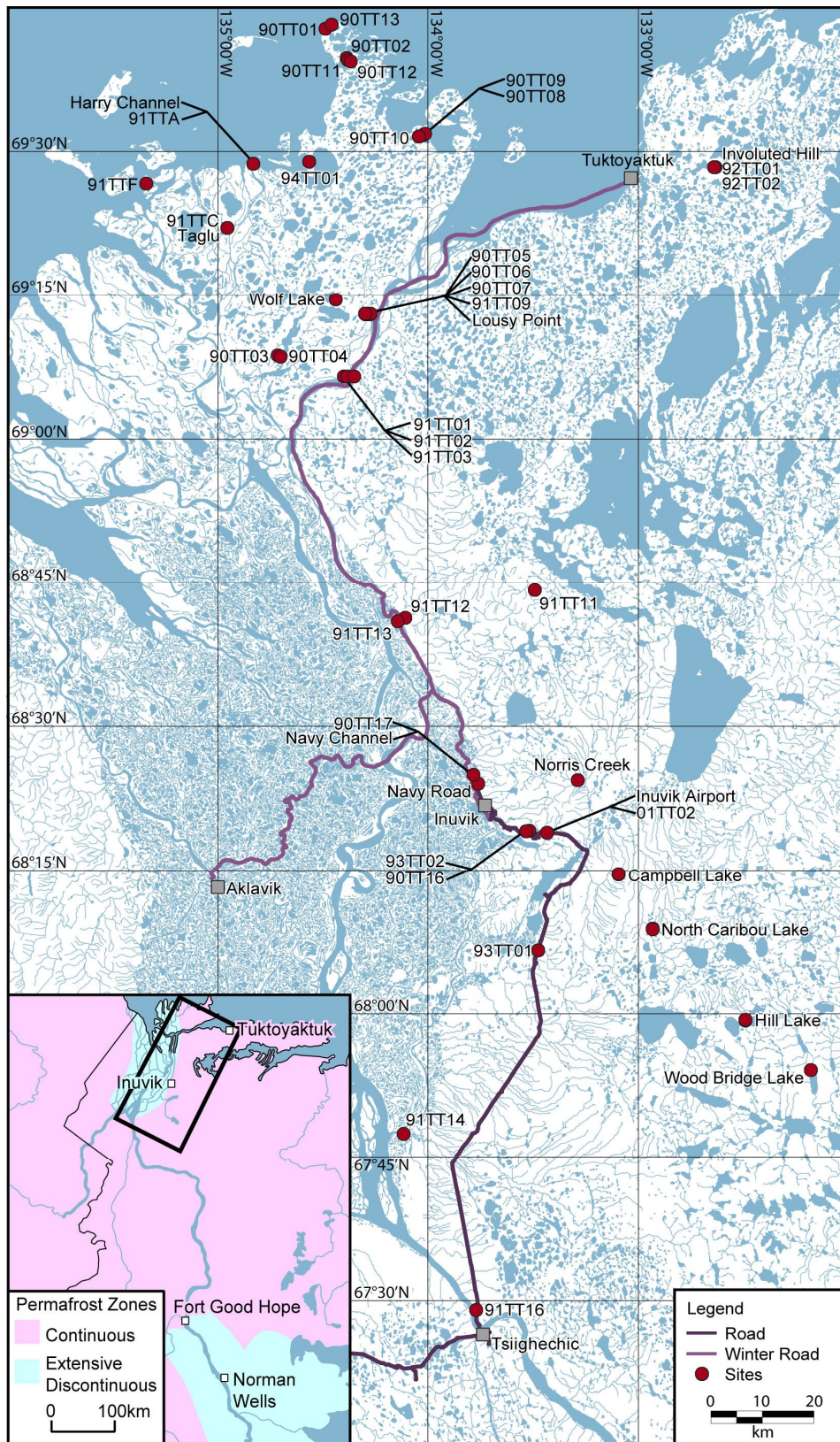


Figure 1. Permafrost and active layer monitoring sites north and south of Inuvik.

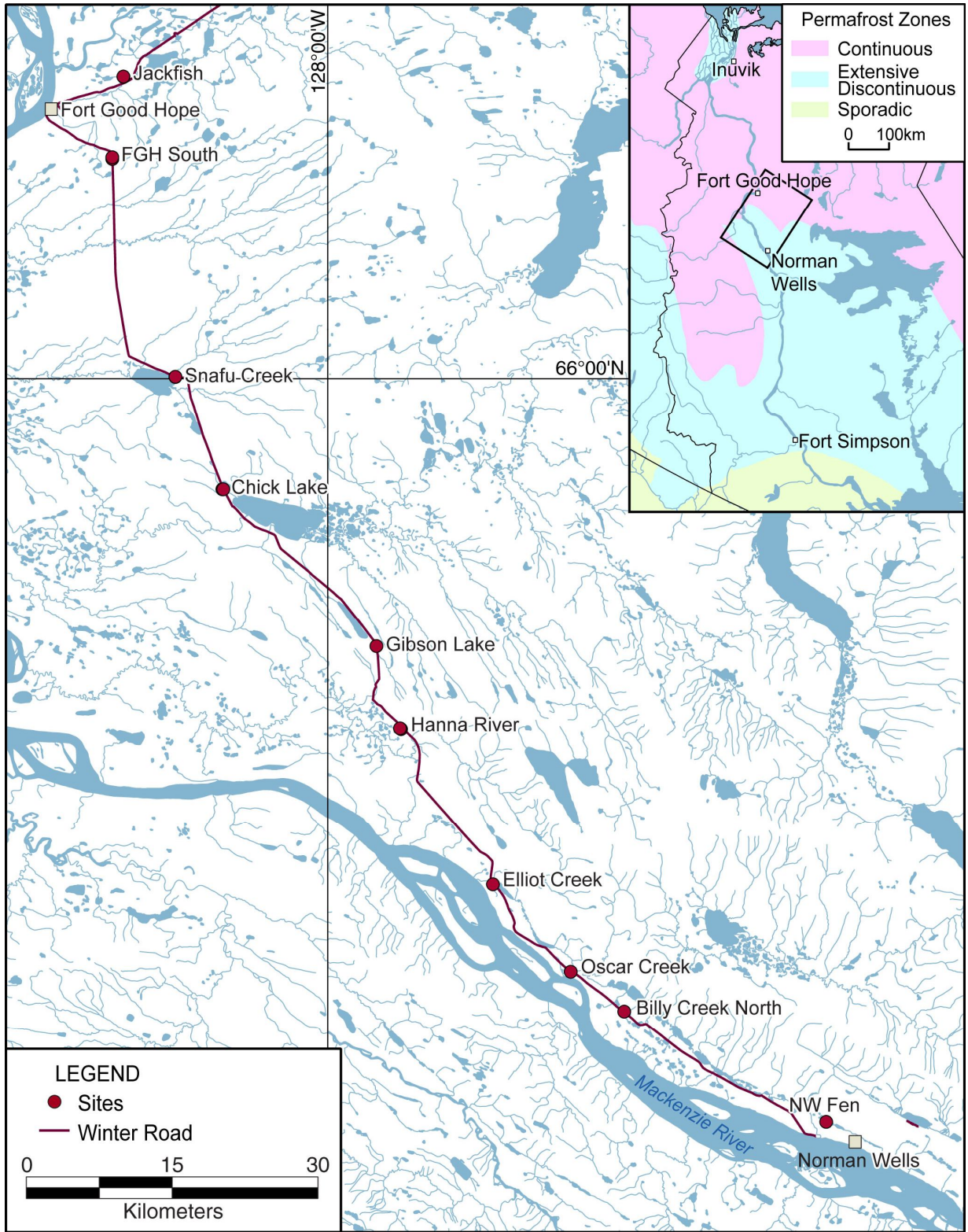


Figure 2. Permafrost monitoring sites between Fort Good Hope and Norman Wells in the Sahtu Settlement Region.

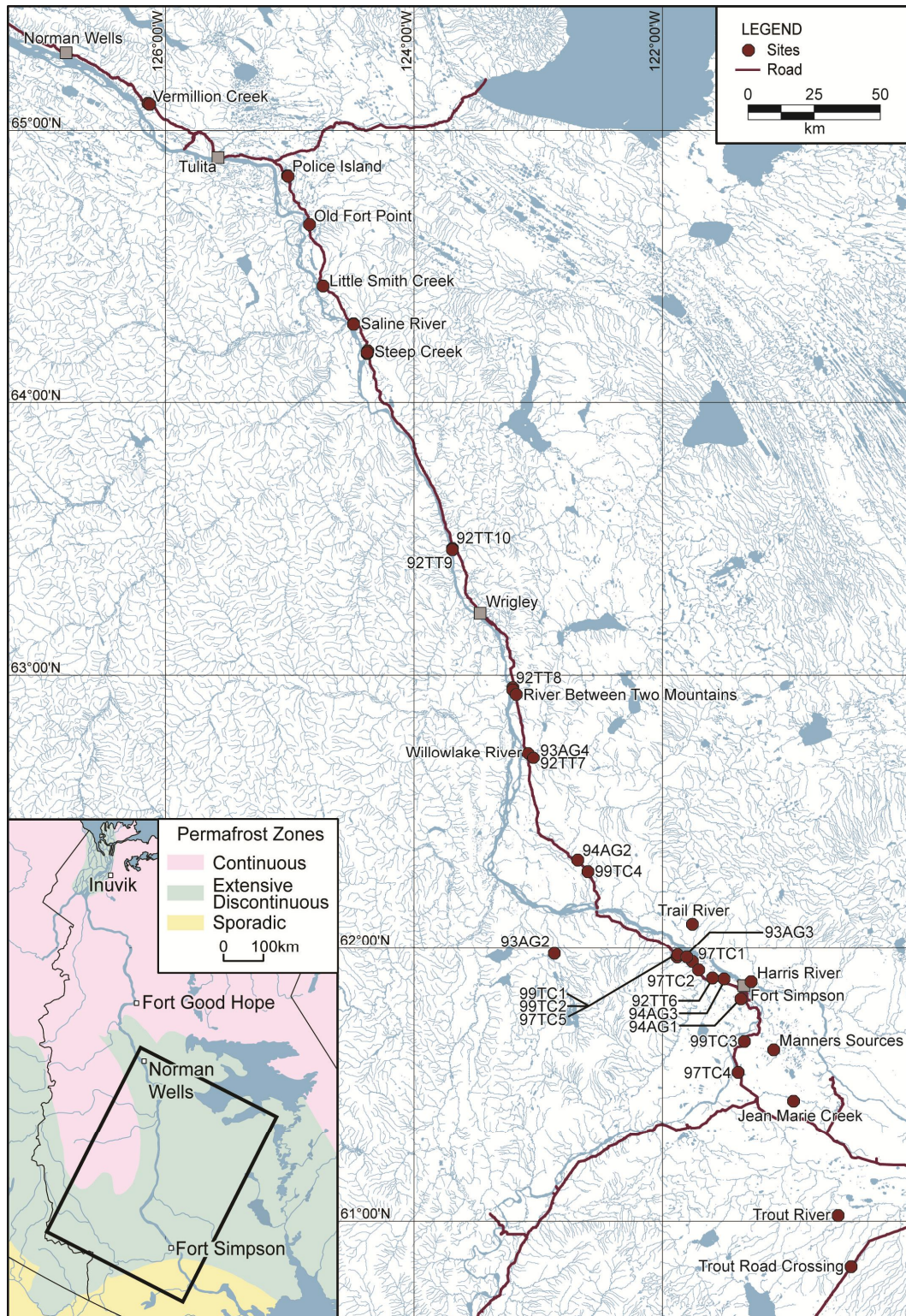


Figure 3. Permafrost and active layer monitoring sites south of Norman Wells in the Sahtu and Deh Cho Settlement Regions.

APPENDIX A

GRAPHICAL AND TABULAR PRESENTATION OF GROUND TEMPERATURE DATA COLLECTED IN AUGUST AND SEPTEMBER 2012

Graph styles used to summarize site data include:

Annual maximum/minimum (temperature envelope)

The maximum (red line) and minimum (blue line) annual temperature profile is provided for each site for which a continuous 2011-12 record of ground temperature is available.

Manual measurement during site visit

For sites that do not have a continuous record for 2012-12, the ground temperature profile based on a single manual measurement during the 2012 site visit (in August or September) is provided (green line).

Multi-year record for sites not visited in 2011

For sites not visited in fall 2011, a two year record was obtained from the data loggers and temperature envelopes are presented for both 2010-11 (gray) and 2011-12 (black) years.

Air and ground surface temperature

Mean monthly air (blue) and ground surface (green) temperature (5 cm depth) graphs and tables are either from August 2011 to July 2012 or from September 2011 to August 2012, depending on when the data were downloaded from the data logger.

Measured or estimated thaw depth is provided for each site, based on interpolation of temperature profiles unless otherwise noted. Where insufficient temperature data were available to determine the thaw depth, the measurement obtained through probing on the day of the site visit is provided.

Trout Road Crossing — TRC

Sahtu Settlement Region

Latitude: 60.83 N

Longitude: 120.48 W

Elevation: 420 m a.s.l.

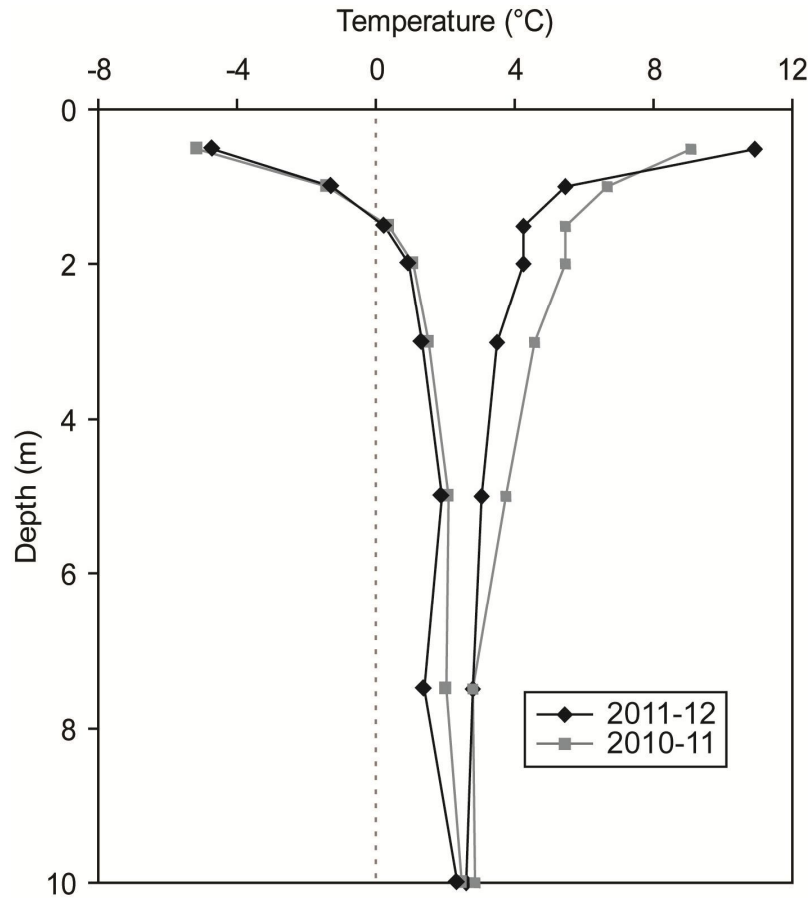
Landform: Bog-dominated moraine plain

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

Thaw Depth: Unfrozen

Site visit: September 21, 2012

Note: As this site was not visited in fall 2011, a two year record was obtained from the data loggers and temperature envelopes and tables are presented for both 2010-11 and 2011-12 years.



2011 - 2012	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	10.91	-4.72
1	5.46	-1.29
1.5	4.24	0.25
2	4.23	0.94
3	3.48	1.31
5	3.06	1.89
7.5	2.78	1.42
10	2.63	2.35

2010 - 2011	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	9.07	-5.12
1	6.65	-1.41
1.5	5.49	0.36
2	5.46	1.08
3	4.55	1.49
5	3.73	2.11
7.5	2.81	2.03
10	2.84	2.46

Trout River — Trout R

Sahtu Settlement Region

Latitude: 61.02 N

Longitude: 120.59 W

Elevation: 350 m a.s.l.

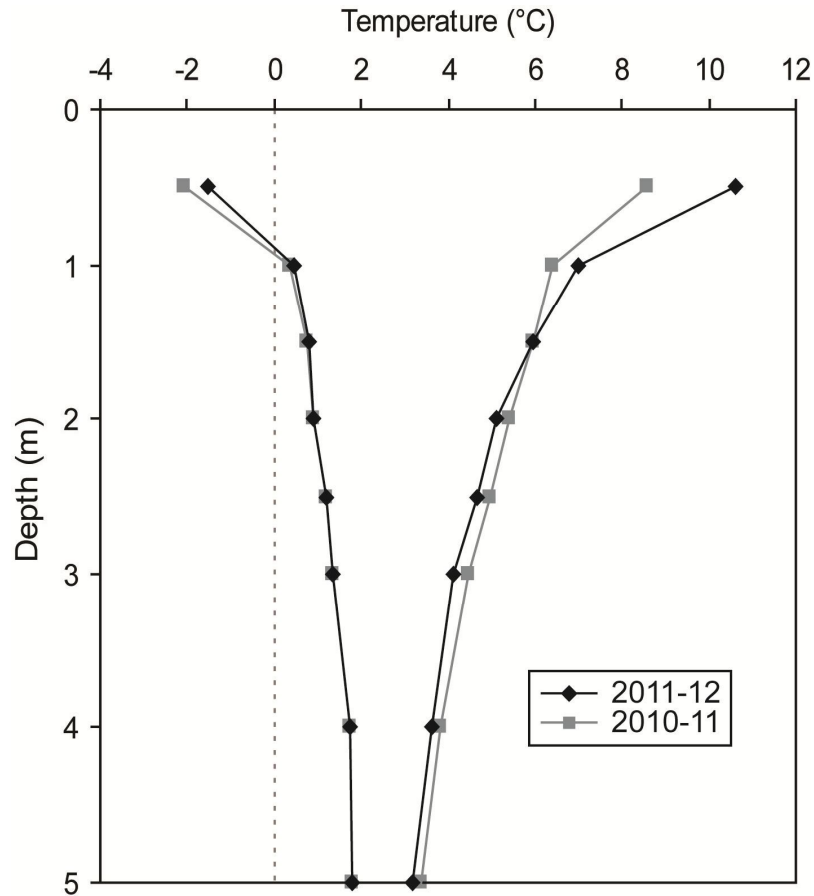
Landform: Organic terrain

Vegetation cover: Peatland with scattered spruce and sphagnum ground cover

Thaw Depth: Unfrozen

Site visit: September 21, 2012

Note: As this site was not visited in fall 2011, a two year record was obtained from the data loggers and temperature envelopes and tables are presented for both 2010-11 and 2011-12 years.



2011 - 2012	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	10.61	-1.50
1	6.99	0.46
1.5	5.94	0.82
2	5.11	0.93
2.5	4.65	1.22
3	4.13	1.36
4	3.61	1.75
5	3.18	1.81

2010 - 2011	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	8.60	-2.07
1	6.42	0.34
1.5	5.95	0.76
2	5.40	0.90
2.5	4.98	1.21
3	4.46	1.35
4	3.84	1.74
5	3.36	1.80

Jean-Marie Creek — JMC-01

Sahtu Settlement Region

Latitude: 61.44 N

Longitude: 120.95 W

Elevation: 198 m a.s.l.

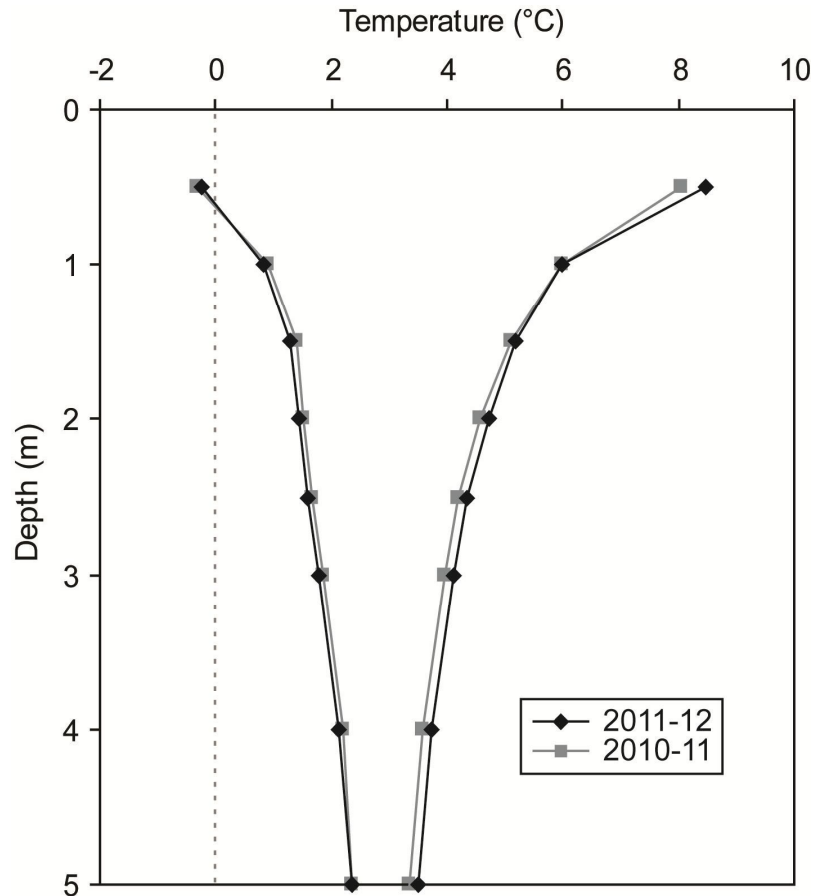
Landform: Transition alluvial flood plain to organic (fen) over lacustrine plain

Vegetation cover: Poorly drained shrub fen

Thaw Depth: Unfrozen

Site visit: September 20, 2012

Note: As this site was not visited in fall 2011, a two year record was obtained from the data loggers and temperature envelopes and tables are presented for both 2010-11 and 2011-12 years.



2011 - 2012	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	8.48	-0.25
1	6.00	0.81
1.5	5.18	1.30
2	4.71	1.43
2.5	4.33	1.58
3	4.10	1.79
4	3.74	2.13
5	3.48	2.34

2010 - 2011	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	8.07	-0.30
1	5.97	0.91
1.5	5.10	1.40
2	4.58	1.53
2.5	4.19	1.67
3	3.95	1.87
4	3.59	2.19
5	3.36	2.37

Jean-Marie Creek — JMC-02

Sahtu Settlement Region

Latitude: 64.44 N

Longitude: 120.95 W

Elevation: 198 m a.s.l.

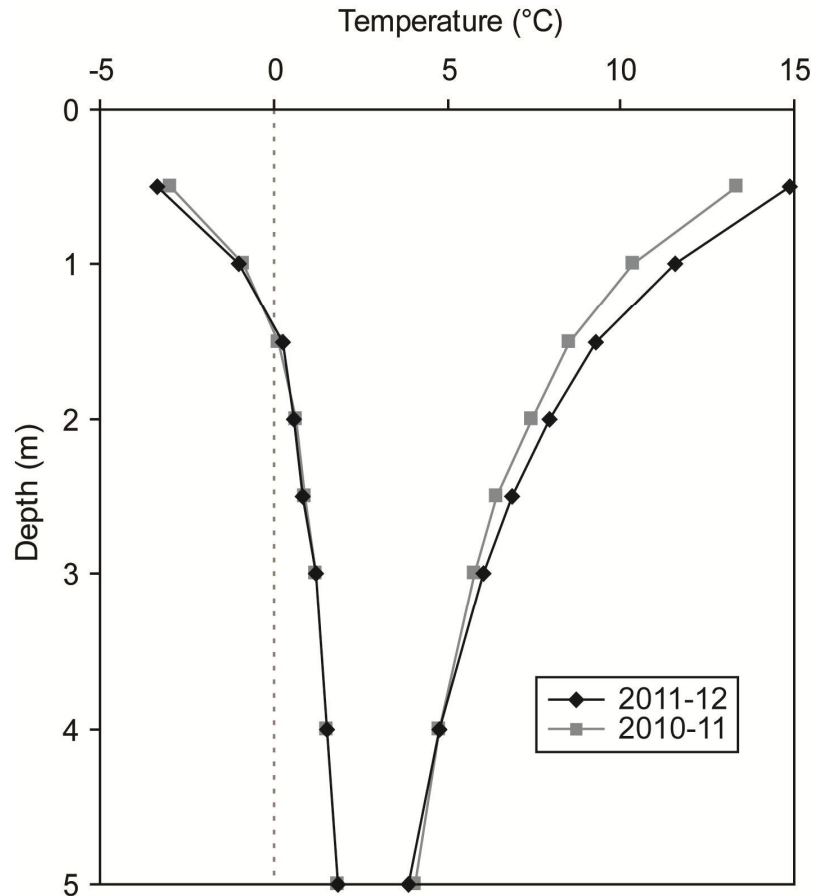
Landform: Transition alluvial flood plain to organic (fen) over lacustrine plain

Vegetation cover: Sandy ridge with spruce, pine forest

Thaw Depth: Unfrozen

Site visit: September 20, 2012

Note: As this site was not visited in fall 2011, a two year record was obtained from the data loggers and temperature envelopes and tables are presented for both 2010-11 and 2011-12 years.



2011 - 2012	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	14.85	-3.34
1	11.57	-1.03
1.5	9.28	0.26
2	7.98	0.61
2.5	6.85	0.87
3	6.06	1.22
4	4.79	1.54
5	3.88	1.83

2010 - 2011	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	13.34	-2.97
1	10.33	-0.85
1.5	8.53	0.17
2	7.43	0.62
2.5	6.46	0.88
3	5.78	1.24
4	4.77	1.56
5	4.09	1.86

Manners Sources — MS-01

Sahtu Settlement Region

Latitude: 61.63 N

Longitude: 121.11 W

Elevation: 182 m a.s.l.

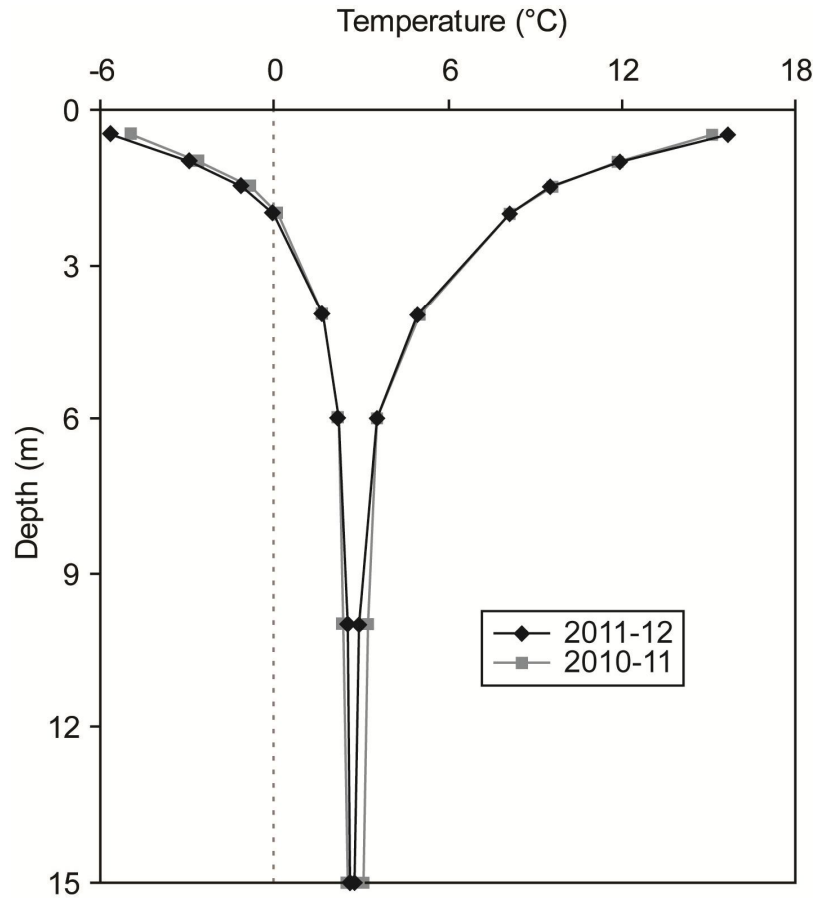
Landform: Eolian interdune

Vegetation cover: Thermokarst shrub fen

Thaw Depth: Unfrozen

Site visit: September 20, 2012

Note: As this site was not visited in fall 2011, a two year record was obtained from the data loggers and temperature envelopes and tables are presented for both 2010-11 and 2011-12 years.



2011 - 2012	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	15.63	-5.61
1	11.92	-2.92
1.5	9.52	-1.13
2	8.15	0.00
4	4.92	1.70
6	3.57	2.27
10	2.90	2.51
15	2.75	2.65

2010 - 2011	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	15.12	-4.94
1	11.87	-2.61
1.5	9.62	-0.81
2	8.15	0.10
4	5.05	1.72
6	3.55	2.22
10	3.26	2.39
15	3.09	2.52

Manners Sources — MS-02

Sahtu Settlement Region

Latitude: 61.63 N

Longitude: 121.10 W

Elevation: 182 m a.s.l.

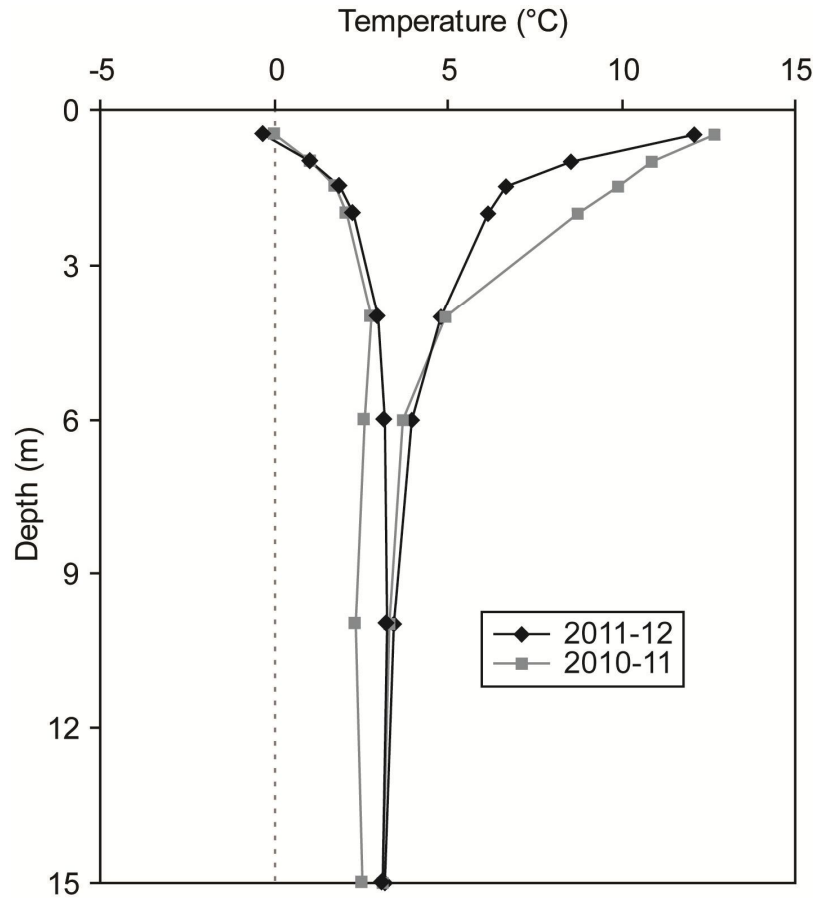
Landform: Eolian dune crest

Vegetation cover: Pine forest

Thaw Depth: Unfrozen

Site visit: September 20, 2012

Note: As this site was not visited in fall 2011, a two year record was obtained from the data loggers and temperature envelopes and tables are presented for both 2010-11 and 2011-12 years.



2011 - 2012	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	12.08	-0.26
1	8.55	1.07
1.5	6.67	1.93
2	6.14	2.29
4	4.79	3.00
6	3.97	3.20
10	3.43	3.23
15	3.21	3.14

2010 - 2011	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	12.71	0.01
1	10.86	1.05
1.5	9.93	1.75
2	8.72	2.10
4	4.91	2.78
6	3.71	2.60
10	3.31	2.38
15	3.15	2.53

Trail River — TR-01
Sahtu Settlement Region

Latitude: 62.09 N

Longitude: 121.76 W

Elevation: 181 m a.s.l.

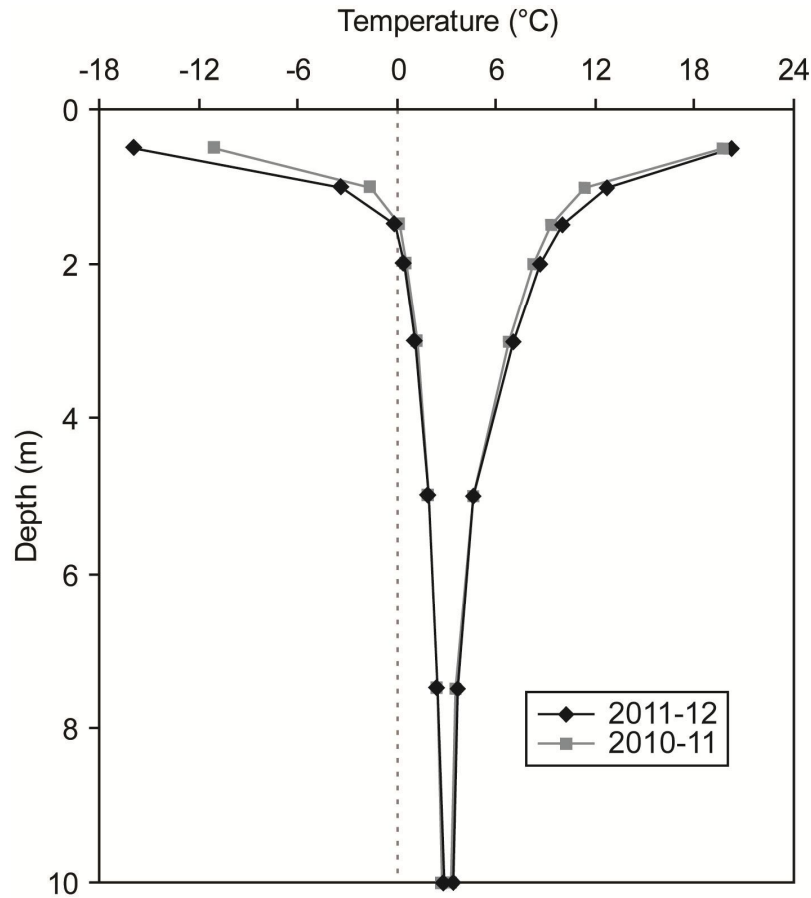
Landform: Lacustrine plain and eolian landforms

Vegetation cover: Black spruce and tamarack forest with sphagnum and feathermoss ground cover

Thaw Depth: Unfrozen

Site visit: September 20, 2012

Note: As this site was not visited in fall 2011, a two year record was obtained from the data loggers and temperature envelopes and tables are presented for both 2010-11 and 2011-12 years.



2011 - 2012	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	20.20	-15.85
1	12.65	-3.38
1.5	9.94	-0.03
2	8.71	0.40
3	7.08	1.10
5	4.67	1.86
7.5	3.62	2.40
10	3.38	2.81

2010 - 2011	Max temperature (°C)	Min temperature (°C)
Depth (m)		
0.5	19.65	-10.95
1	11.35	-1.58
1.5	9.30	0.17
2	8.27	0.53
3	6.71	1.20
5	4.58	1.92
7.5	3.53	2.40
10	3.31	2.75

Steep Creek Base — Steep-01

Sahtu Settlement Region

Latitude: 64.19 N

Longitude: 124.37 W

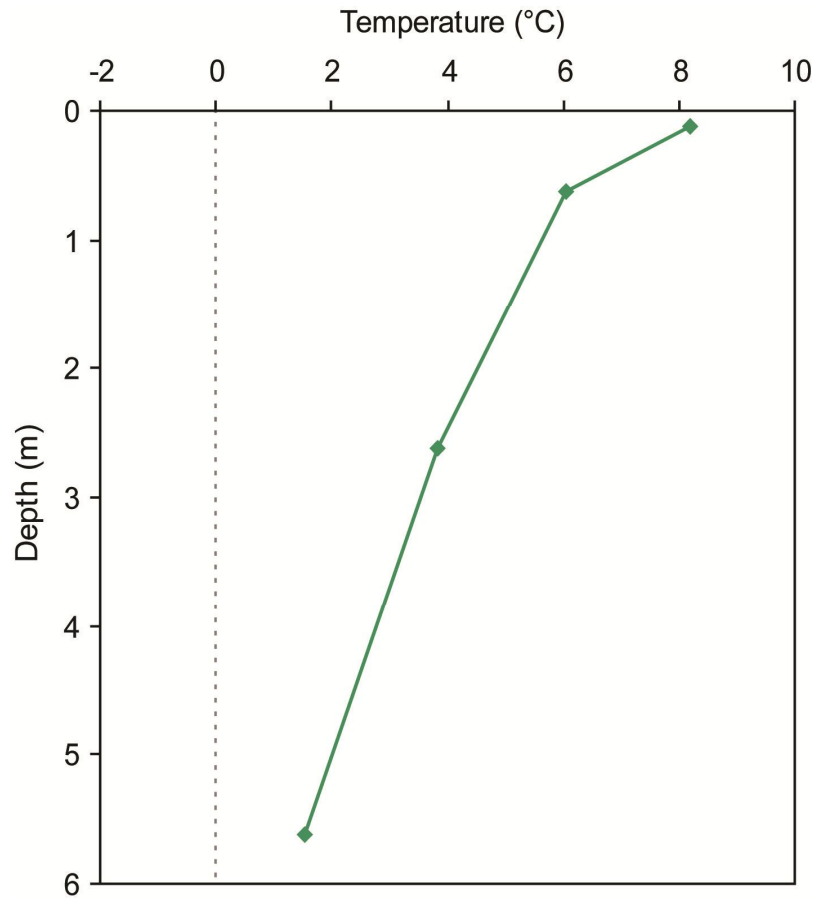
Elevation: 62 m a.s.l.

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

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

Thaw Depth: n/a

Site visit: September 22, 2012



Depth (m)	Temperature (°C)
0.12	8.18
0.62	6.04
2.62	3.82
5.62	1.54

Steep Creek Top — Steep-02

Sahtu Settlement Region

Latitude: 64.18 N

Longitude: 124.38 W

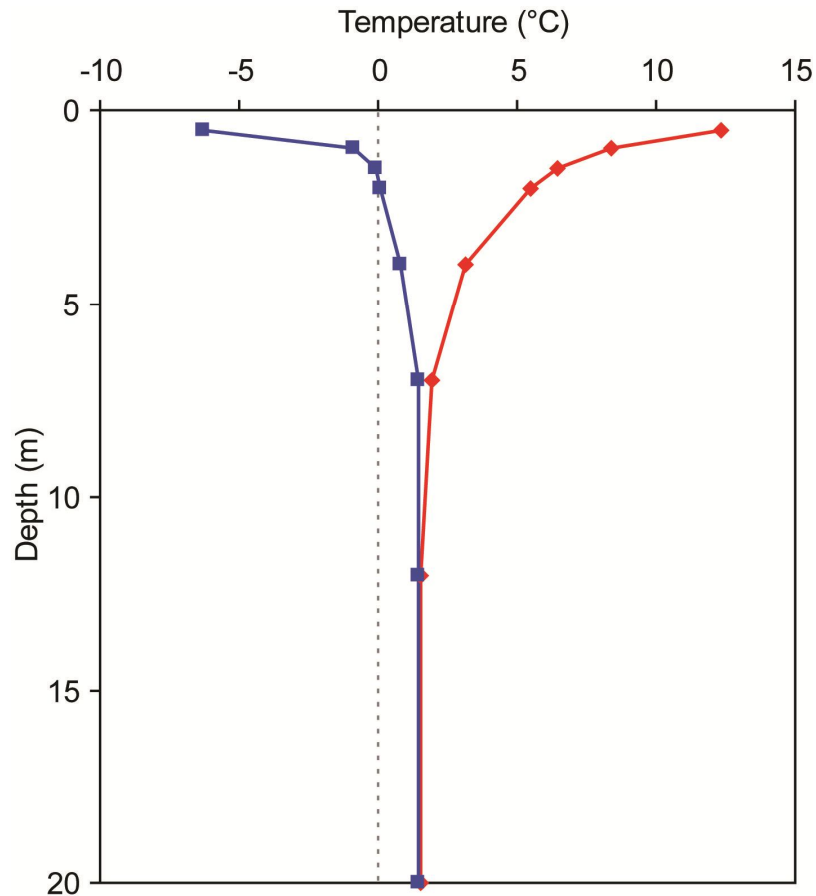
Elevation: 134 m a.s.l.

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: Unfrozen

Site visit: September 22, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.5	12.33	-6.27
1	8.37	-0.91
1.5	6.48	-0.10
2	5.49	0.09
4	3.14	0.79
7	1.95	1.41
12	1.56	1.42
20	1.50	1.45

Saline River — SR-02

Sahtu Settlement Region

Latitude: 64.29 N

Longitude: 124.49 W

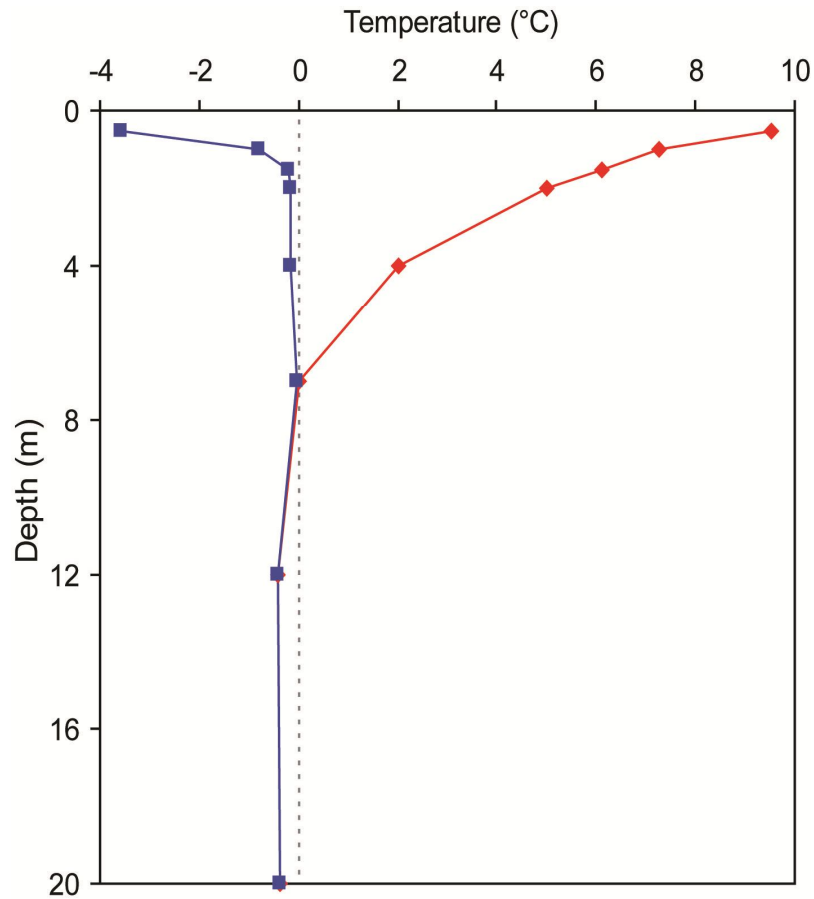
Elevation: 140 m a.s.l.

Landform: Glaciofluvial veneer over lacustrine

Vegetation cover: Burnt black spruce forest

Thaw Depth: 6.66 m

Site visit: September 22, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.5	9.53	-3.58
1	7.28	-0.78
1.5	6.13	-0.20
2	5.01	-0.16
4	2.02	-0.15
7	0.00	-0.02
12	-0.40	-0.41
20	-0.39	-0.39

Little Smith Creek — LS-01

Sahtu Settlement Region

Latitude: 64.43 N

Longitude: 124.74 W

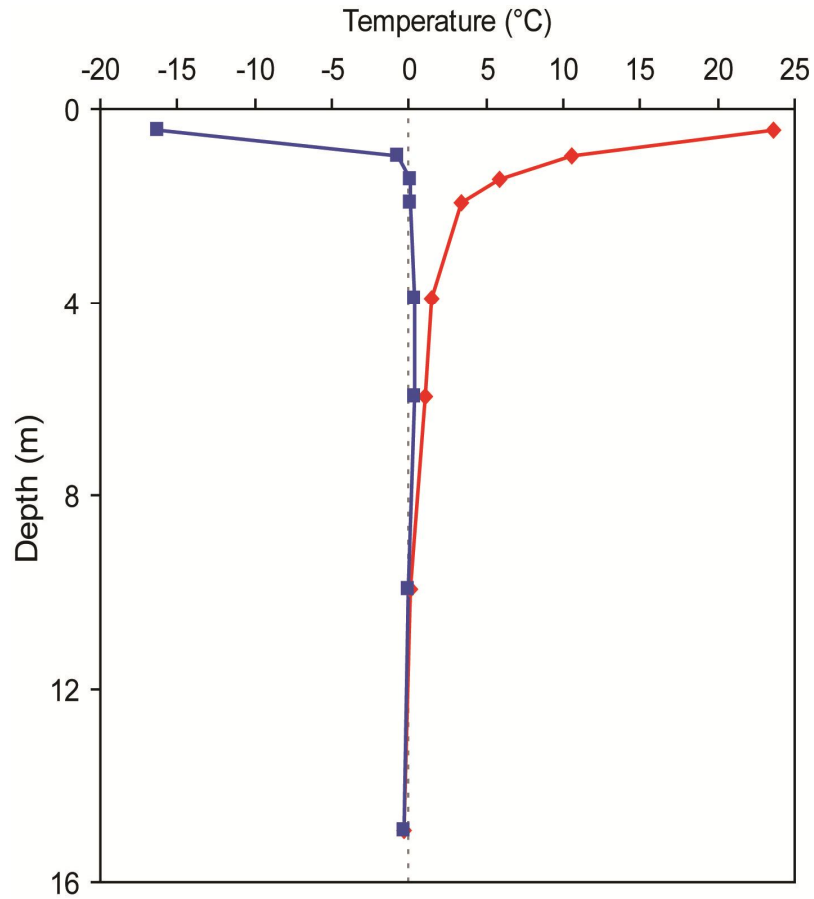
Elevation: 80 m a.s.l.

Landform: Alluvial flood plain

Vegetation cover: Open mature black spruce forest

Thaw Depth: 11.6 m

Site visit: September 22, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.45	23.65	-16.32
0.95	10.55	-0.70
1.45	5.84	0.10
1.95	3.37	0.15
3.95	1.51	0.35
5.95	1.05	0.39
9.95	0.14	-0.04
14.95	-0.28	-0.30

Little Smith Creek — LS-02

Sahtu Settlement Region

Latitude: 64.43 N

Longitude: 124.73 W

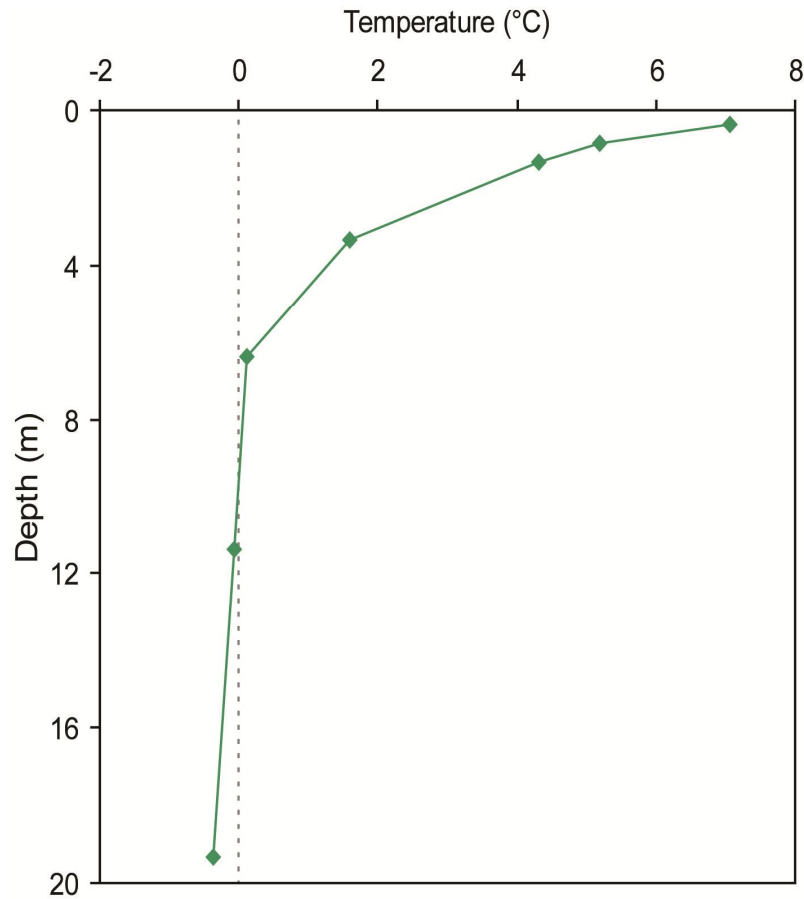
Elevation: 112 m a.s.l.

Landform: Glaciofluvial outwash plain

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

Thaw Depth: 9.4 m

Site visit: September 22, 2012



Depth (m)	Temperature (°C)
0.36	7.05
0.86	5.18
1.36	4.3
3.36	1.59
6.36	0.11
11.36	-0.07
19.36	-0.37
0.36	7.05

Old Fort Point — OFP-01

Sahtu Settlement Region

Latitude: 64.65 N

Longitude: 124.84 W

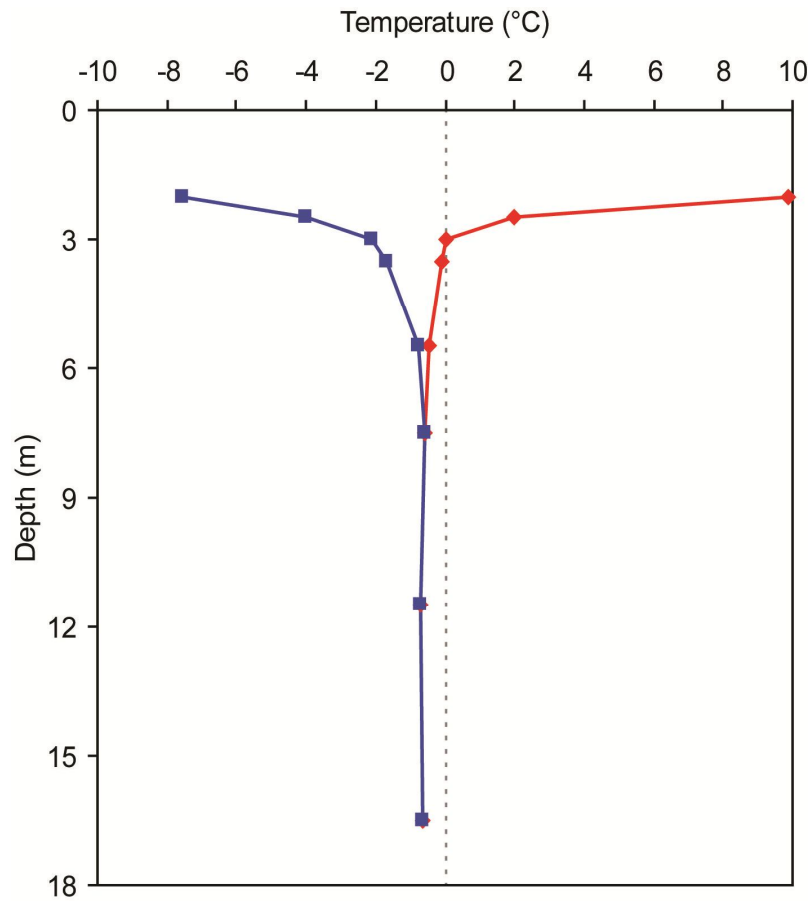
Elevation: 112 m a.s.l.

Landform: Lacustrine plain

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

Thaw Depth: 3.18 m

Site visit: September 22, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
2	9.88	-7.54
2.5	1.99	-4.00
3	0.05	-2.10
3.5	-0.09	-1.70
5.5	-0.48	-0.74
7.5	-0.56	-0.61
11.5	-0.70	-0.72
16.5	-0.62	-0.62

Police Island — PI-01

Sahtu Settlement Region

Latitude: 64.83 N

Longitude: 125.0 W

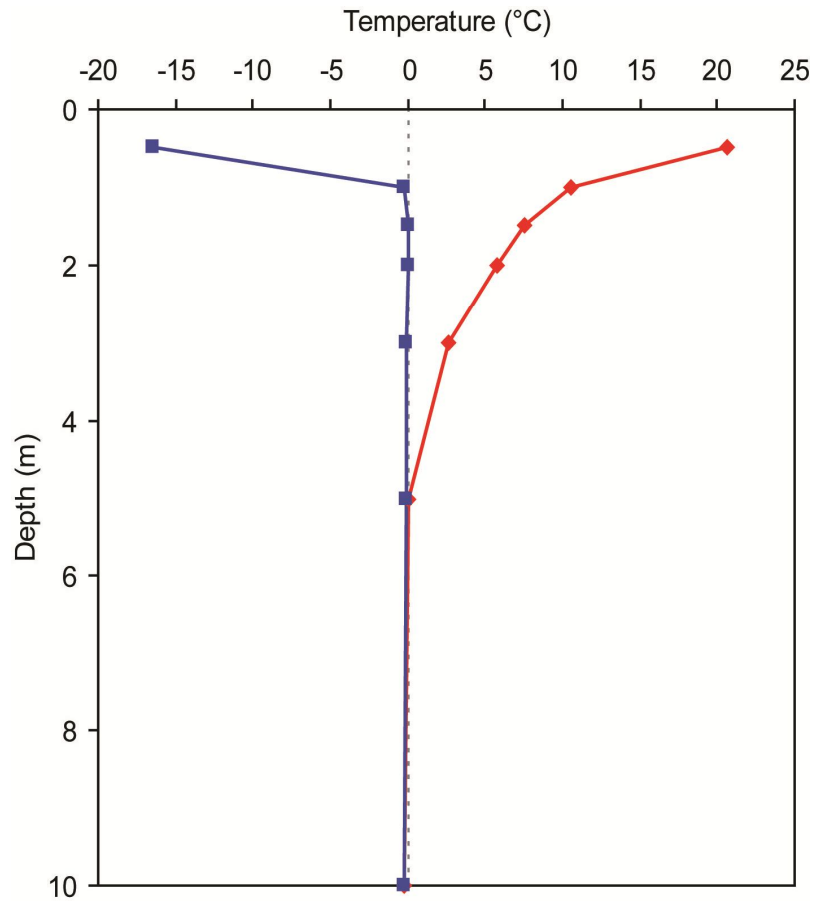
Elevation: 113 m a.s.l.

Landform: Lacustrine plain

Vegetation cover: Recovering burn (burnt black spruce forest)

Thaw Depth: 4.99 m

Site visit: September 22, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.5	20.68	-16.47
1	10.52	-0.22
1.5	7.50	0.04
2	5.73	0.04
3	2.58	-0.02
5	-0.01	-0.05
7.5	n/a	n/a
10	-0.16	-0.20

Police Island — PI-02

Sahtu Settlement Region

Latitude: 64.83 N

Longitude: 125.01 W

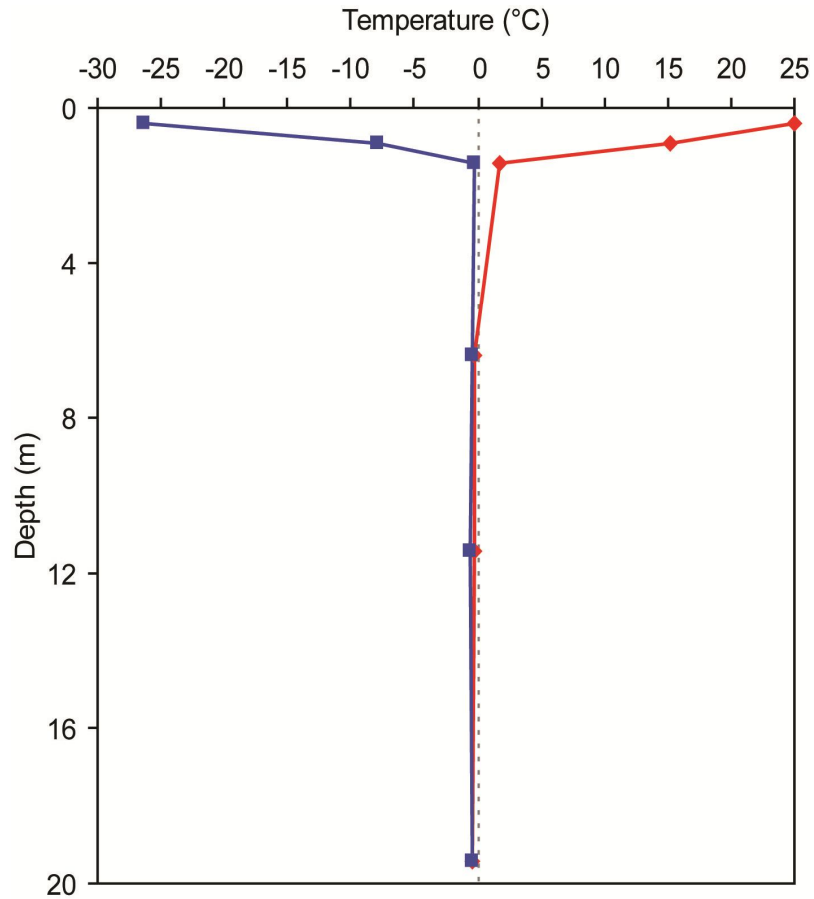
Elevation: 113 m a.s.l.

Landform: Lacustrine plain

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

Thaw Depth: 5.80 m

Site visit: September 22, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.4	25.05	-26.39
0.9	15.18	-7.97
1.4	1.71	-0.18
6.4	-0.23	-0.43
11.4	-0.29	-0.51
19.4	-0.35	-0.48

Vermillion Creek — VC-01

Sahtu Settlement Region

Latitude: 65.10 N

Longitude: 126.14 W

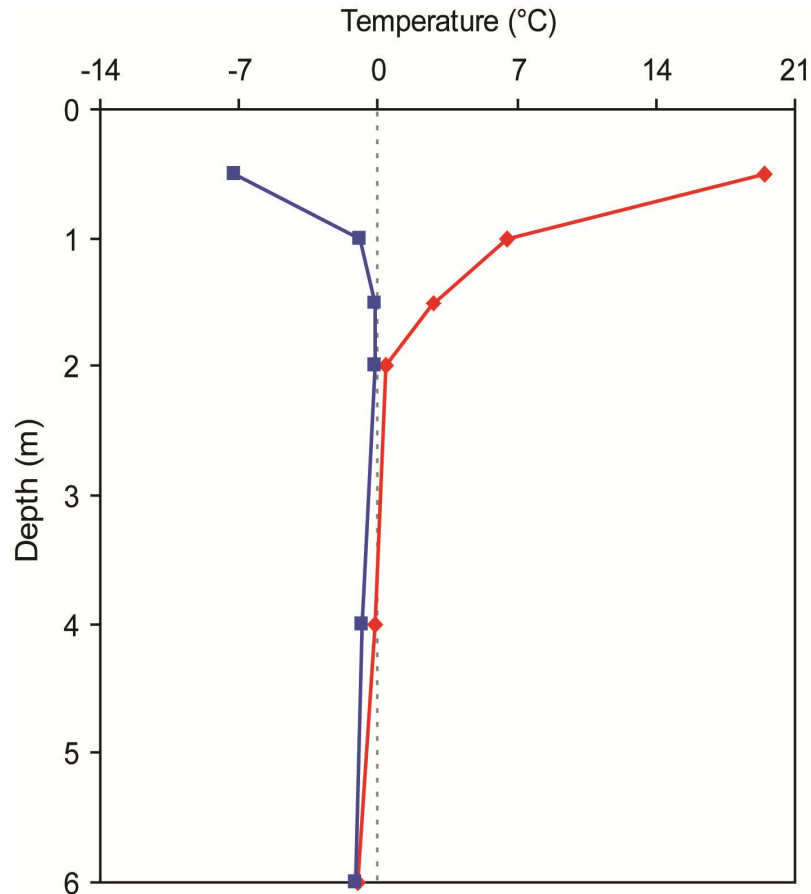
Elevation: 92 m a.s.l.

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

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

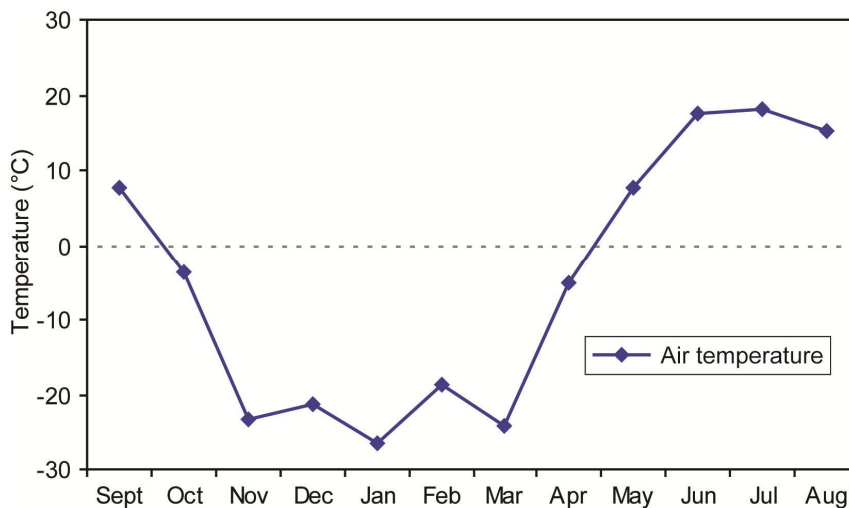
Thaw Depth: 3.30 m

Site visit: September 22, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.5	19.46	-7.25
1	6.54	-0.93
1.5	2.80	-0.18
2	0.38	-0.16
4	-0.20	-0.82
6	-1.08	-1.16

Month / Year	Temperature (°C)	
	Air	Surface
Sept / 2011	7.7	n/a
Oct / 2011	-3.5	n/a
Nov / 2011	-23.4	n/a
Dec / 2011	-21.3	n/a
Jan / 2012	-26.5	n/a
Feb / 2012	-18.6	n/a
Mar / 2012	-24.1	n/a
Apr / 2012	-5.0	n/a
May / 2012	7.7	n/a
Jun / 2012	17.6	n/a
Jul / 2012	18.1	n/a
Aug / 2012	15.2	n/a



Vermillion Creek — VC-02

Sahtu Settlement Region

Latitude: 65.10 N

Longitude: 126.13 W

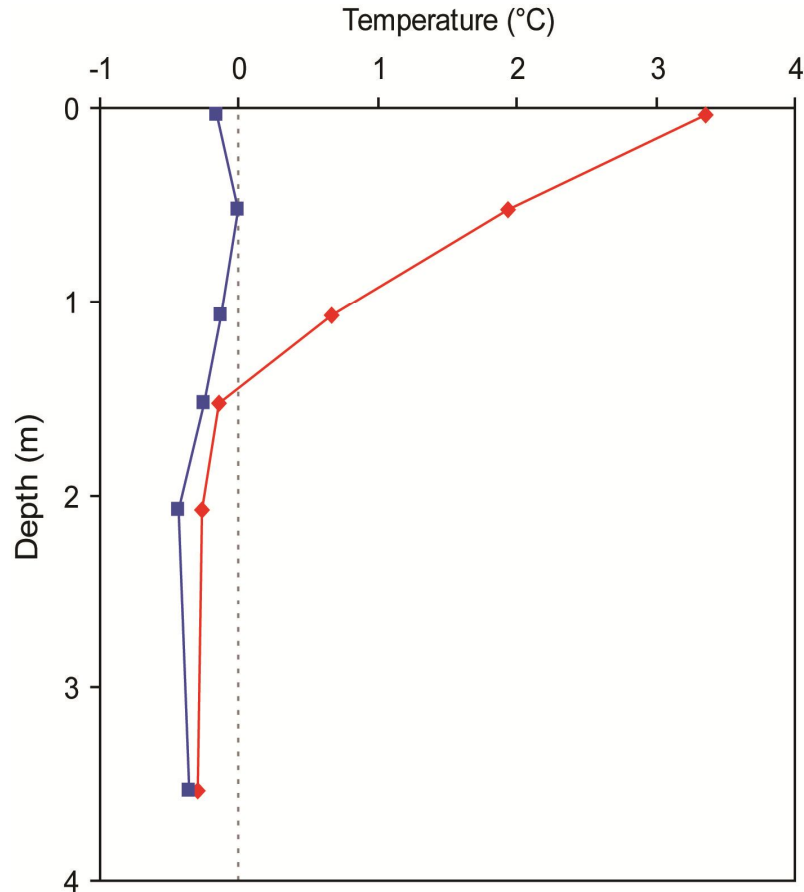
Elevation: 92 m a.s.l.

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: 1.45 m

Site visit: September 22, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.03	3.37	-0.15
0.53	1.93	0.00
1.08	0.66	-0.12
1.53	-0.14	-0.24
2.08	-0.27	-0.43
3.53	-0.30	-0.35

Billy Creek North — BCN-01

Sahtu Settlement Region

Latitude: 65.40 N

Longitude: 127.32 W

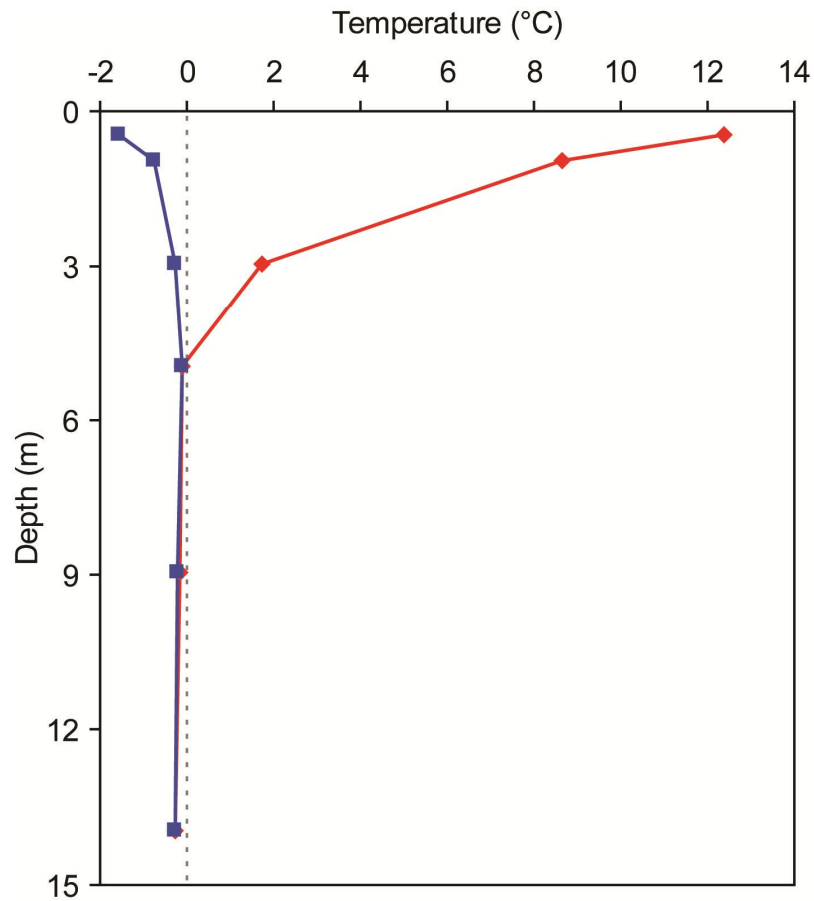
Elevation: 90 m a.s.l.

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

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

Thaw Depth: 4.87 m

Site visit: September 19, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.47	12.40	-1.58
0.97	8.66	-0.75
2.97	1.71	-0.25
4.97	-0.09	-0.11
8.97	-0.17	-0.22
13.97	-0.25	-0.26

Oscar Creek — OC-01

Sahtu Settlement Region

Latitude: 65.44 N

Longitude: 127.44 W

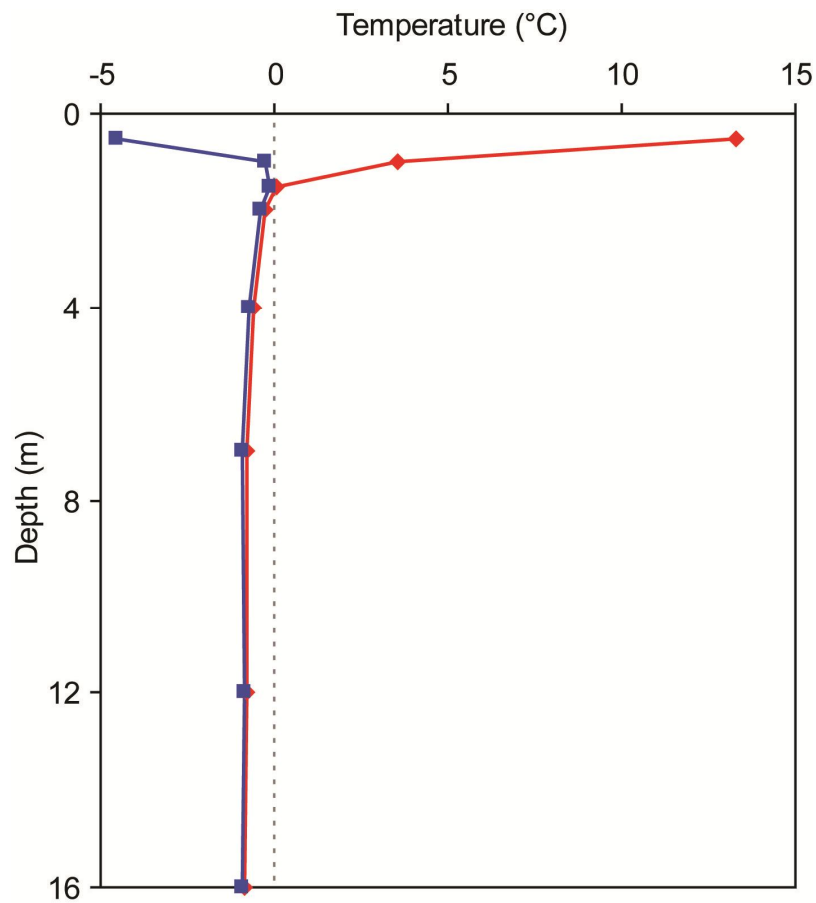
Elevation: 64 m a.s.l.

Landform: Undulating glaciolacustrine terrain overlain by alluvial sediments

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

Thaw Depth: 1.63 m

Site visit: September 19, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.5	13.32	-4.52
1	3.56	-0.26
1.5	0.09	-0.15
2	-0.26	-0.37
4	-0.59	-0.72
7	-0.81	-0.94
12	-0.79	-0.89
16	-0.84	-0.91

Elliot Creek — EC-01

Sahtu Settlement Region

Latitude: 65.52 N

Longitude: 127.62 W

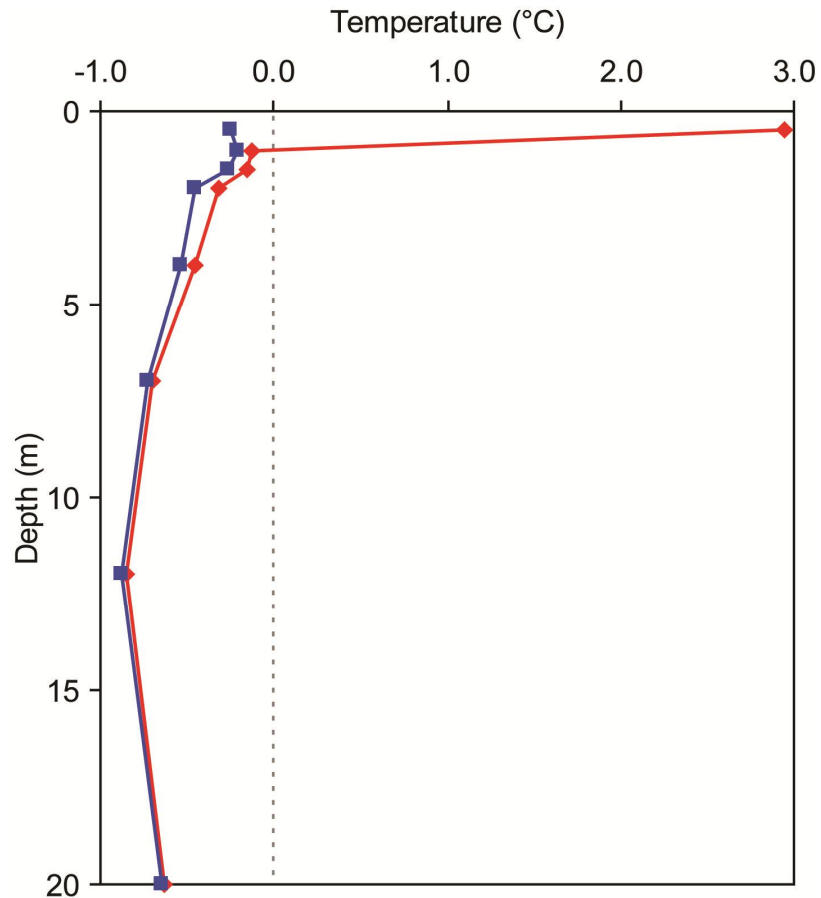
Elevation: 54 m a.s.l.

Landform: Lacustrine undulating plain, well-drained elevated area

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

Thaw Depth: 0.98 m

Site visit: September 19, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.5	2.94	-0.25
1	-0.12	-0.21
1.5	-0.15	-0.27
2	-0.32	-0.45
4	-0.46	-0.53
7	-0.70	-0.73
12	-0.85	-0.87
20	-0.64	-0.65

Elliot Creek — EC-02

Sahtu Settlement Region

Latitude: 65.52 N

Longitude: 127.62 W

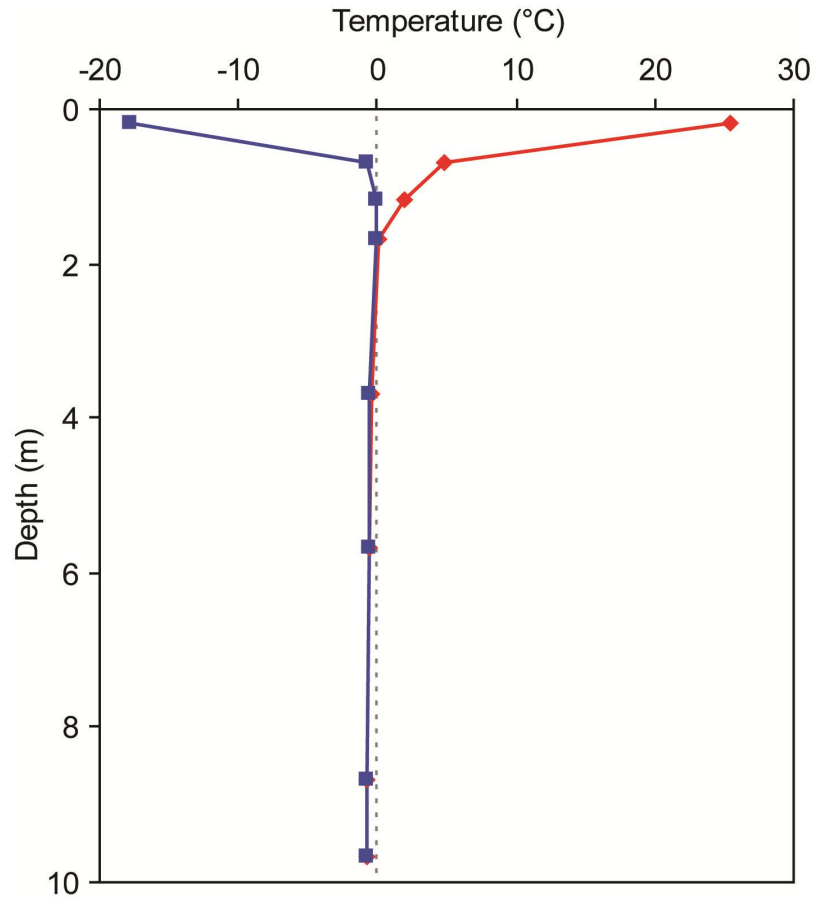
Elevation: 54 m a.s.l.

Landform: Lacustrine plain overlain by alluvial sediments

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

Thaw Depth: 1.85 m

Site visit: September 19, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.18	25.43	-17.76
0.68	4.90	-0.70
1.18	1.94	-0.04
1.68	0.04	-0.13
3.68	-0.47	-0.53
5.68	-0.57	-0.63
8.68	-0.70	-0.75
9.68	-0.70	-0.75

Hanna River — HR-01

Sahtu Settlement Region

Latitude: 65.67 N

Longitude: 127.83 W

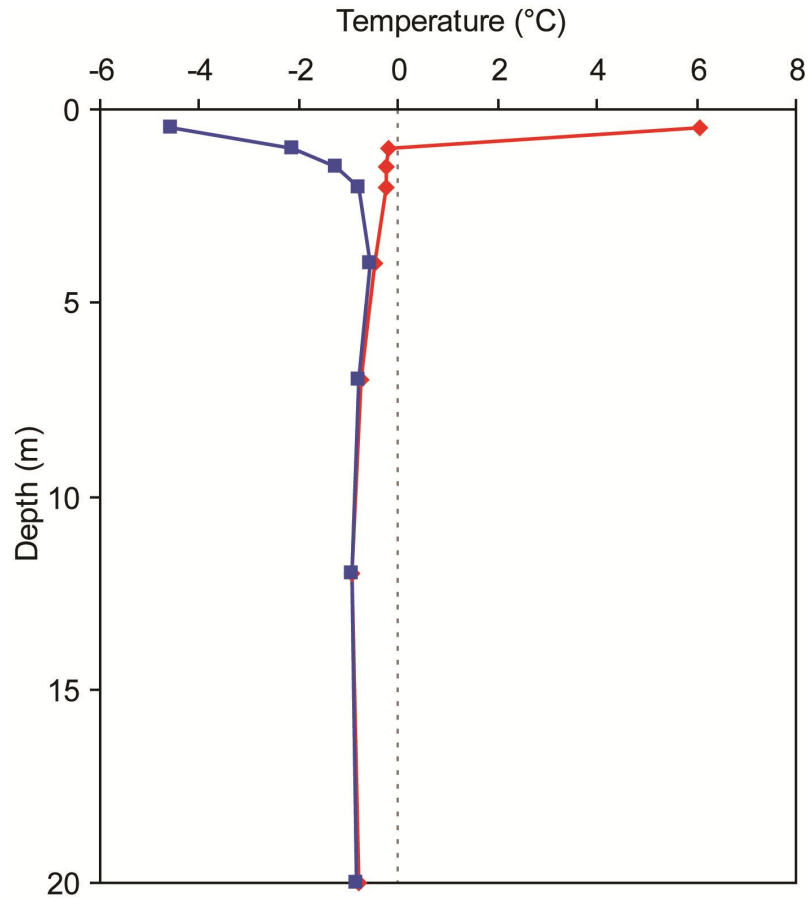
Elevation: 104 m a.s.l.

Landform: Lacustrine plain

Vegetation cover: Boggy burnt area

Thaw Depth: 0.98 m

Site visit: September 19, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.5	6.07	-4.58
1	-0.19	-2.14
1.5	-0.25	-1.23
2	-0.26	-0.81
4	-0.49	-0.55
7	-0.75	-0.80
12	-0.93	-0.94
20	-0.82	-0.82

Gibson Lake — GL-01

Sahtu Settlement Region

Latitude: 65.75 N

Longitude: 127.89 W

Elevation: 228 m a.s.l.

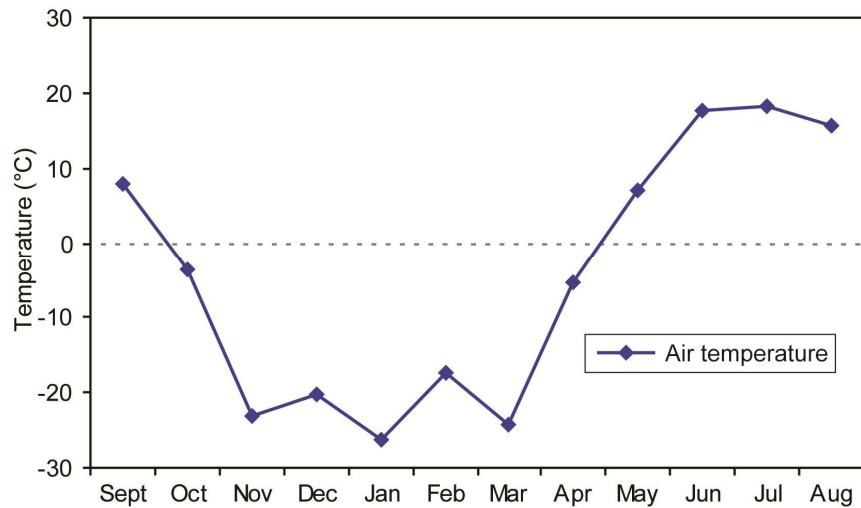
Landform: Hummocky moraine plain

Vegetation cover: Recovering burnt area with peat and shrubs

Thaw Depth: n/a

Site visit: September 19, 2012

Month / Year	Temperature (°C)	
	Air	Surface
Sept / 2011	7.94	n/a
Oct / 2011	-3.69	n/a
Nov / 2011	-23.06	n/a
Dec / 2011	-20.32	n/a
Jan / 2012	-26.22	n/a
Feb / 2012	-17.46	n/a
Mar / 2012	-24.39	n/a
Apr / 2012	-5.26	n/a
May / 2012	6.99	n/a
Jun / 2012	17.53	n/a
Jul / 2012	18.11	n/a
Aug / 2012	15.55	n/a



Snafu Creek — SC-01

Sahtu Settlement Region

Latitude: 66.00 N

Longitude: 128.35 W

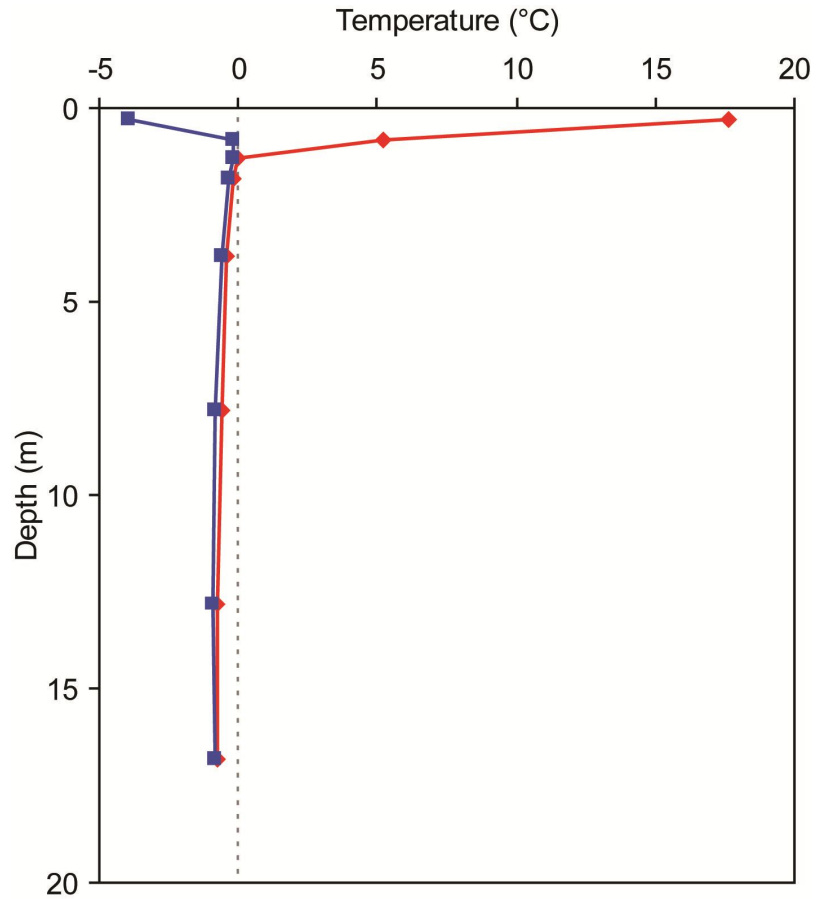
Elevation: 100 m a.s.l.

Landform: Moraine plain

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

Thaw Depth: 1.32 m

Site visit: September 19, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.32	17.63	-3.97
0.82	5.22	-0.19
1.32	-0.05	-0.19
1.82	-0.20	-0.37
3.82	-0.41	-0.60
7.82	-0.60	-0.85
12.82	-0.78	-0.90
16.82	-0.78	-0.83

Fort Good Hope South — FGHS-01

Sahtu Settlement Region

Latitude: 66.21 N

Longitude: 128.50 W

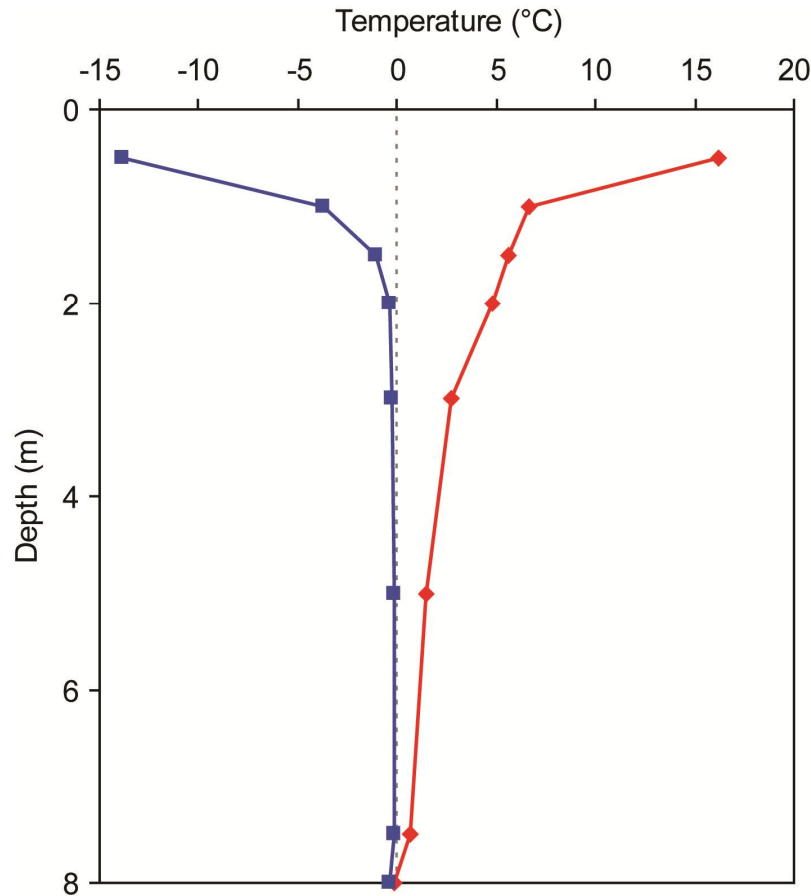
Elevation: 134 m a.s.l.

Landform: Hummocky peatland

Vegetation cover: Dense shrub and open black spruce

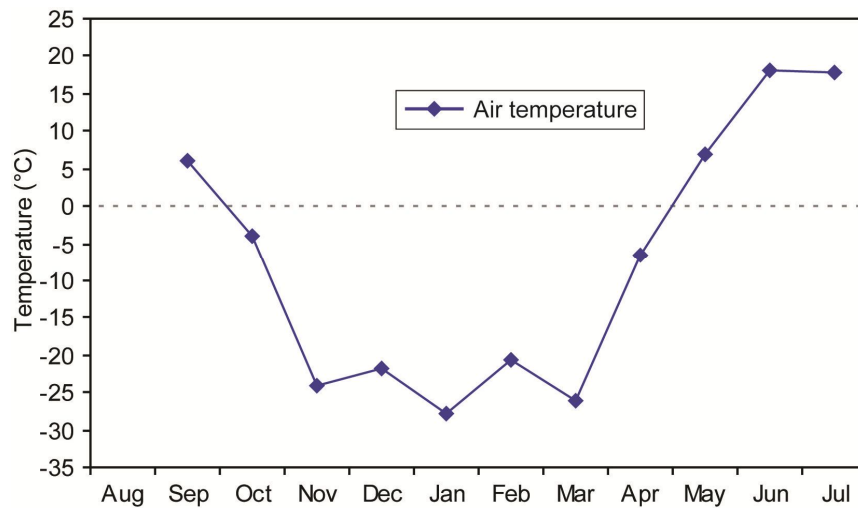
Thaw Depth: 7.94 m

Site visit: September 19, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.5	16.19	-13.84
1	6.63	-3.76
1.5	5.64	-1.09
2	4.78	-0.34
3	2.75	-0.21
5	1.50	-0.16
7.5	0.63	-0.15
8	-0.09	-0.34

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	n/a	n/a
Sept / 2011	5.98	n/a
Oct / 2011	-4.07	n/a
Nov / 2011	-24.08	n/a
Dec / 2011	-21.78	n/a
Jan / 2012	-27.86	n/a
Feb / 2012	-20.60	n/a
Mar / 2012	-26.02	n/a
Apr / 2012	-6.68	n/a
May / 2012	6.95	n/a
Jun / 2012	18.05	n/a
Jul / 2012	17.93	n/a



Fort Good Hope South — FGHS-02

Sahtu Settlement Region

Latitude: 66.21 N

Longitude: 128.50 W

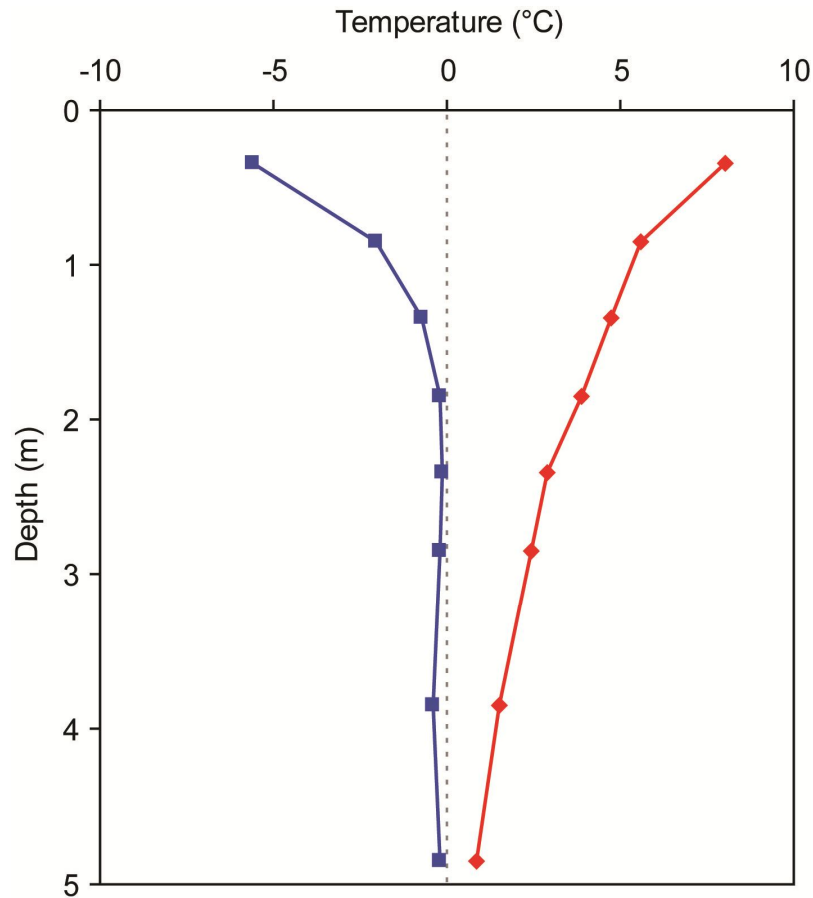
Elevation: 134 m a.s.l.

Landform: Hummocky peatland

Vegetation cover: Peat plateau, lichen, open black spruce

Thaw Depth: 6.11 m (thaw depth was extrapolated from bottom two temperature measurements)

Site visit: September 19, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.35	8.05	-5.61
0.85	5.60	-2.05
1.35	4.73	-0.70
1.85	3.90	-0.20
2.35	2.87	-0.13
2.85	2.45	-0.18
3.85	1.49	-0.36
4.85	0.83	-0.20

Jackfish Creek — JF-02

Sahtu Settlement Region

Latitude: 66.29 N

Longitude: 128.47 W

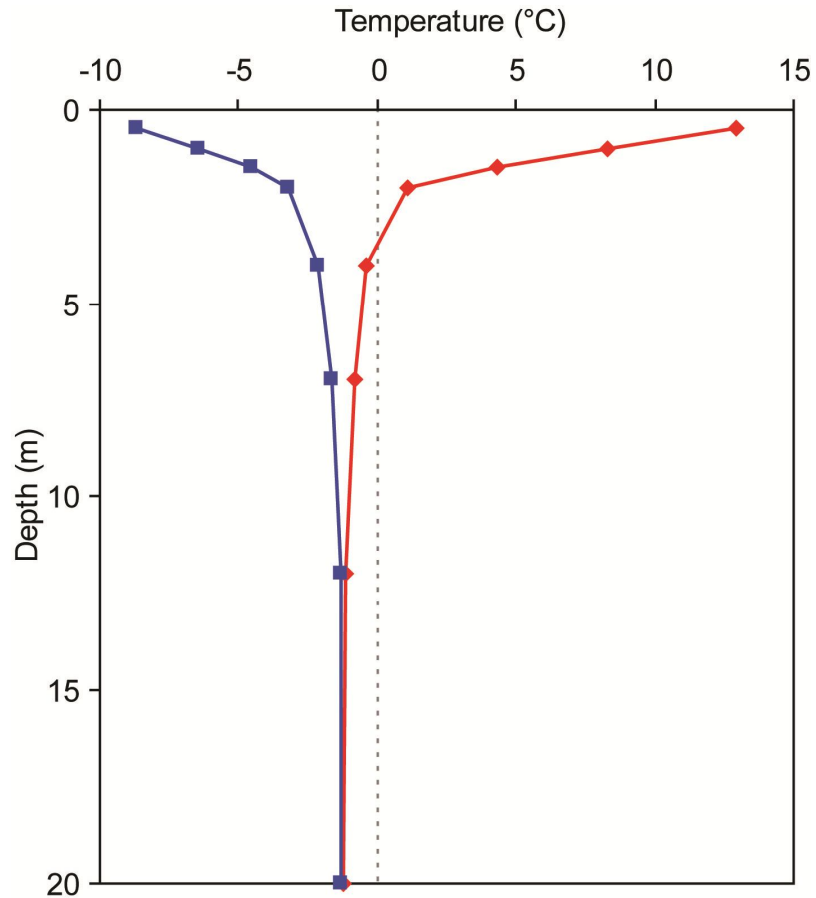
Elevation: 90 m a.s.l.

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

Vegetation cover: Black spruce forest and moss cover

Thaw Depth: 3.47 m

Site visit: September 19, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.5	12.97	-8.64
1	8.30	-6.44
1.5	4.31	-4.53
2	1.09	-3.20
4	-0.39	-2.13
7	-0.83	-1.61
12	-1.11	-1.35
20	-1.25	-1.30

Wood Bridge Lake — WBL-01

Gwich'in Settlement Region

Latitude: 67.90 N

Longitude: 132.18 W

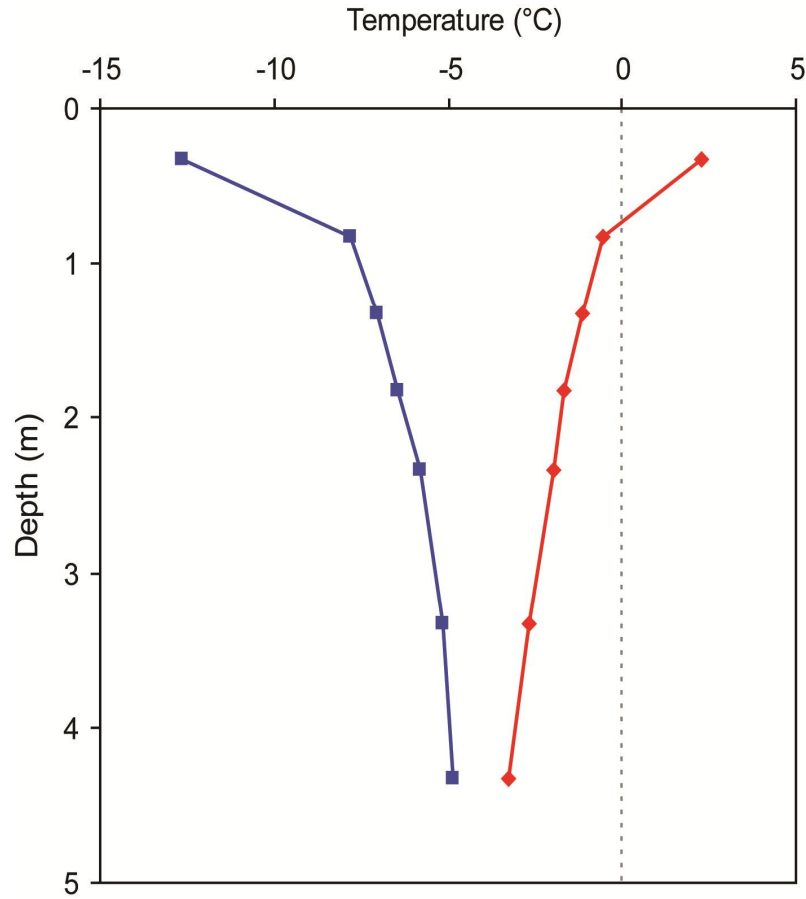
Elevation: 204 m a.s.l.

Landform: Alluvial plain

Vegetation: Black spruce forest

Thaw Depth: 0.74 m

Site visit: August 7, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.33	2.27	-12.67
0.83	-0.53	-7.80
1.33	-1.12	-7.06
1.83	-1.64	-6.43
2.33	-1.94	-5.79
3.33	-2.70	-5.13
4.33	-3.25	-4.85

Rengleng River mouth — 91TT14

Gwich'in Settlement Region

Latitude: 67.80 N

Longitude: 134.13 W

Elevation: 8 m a.s.l.

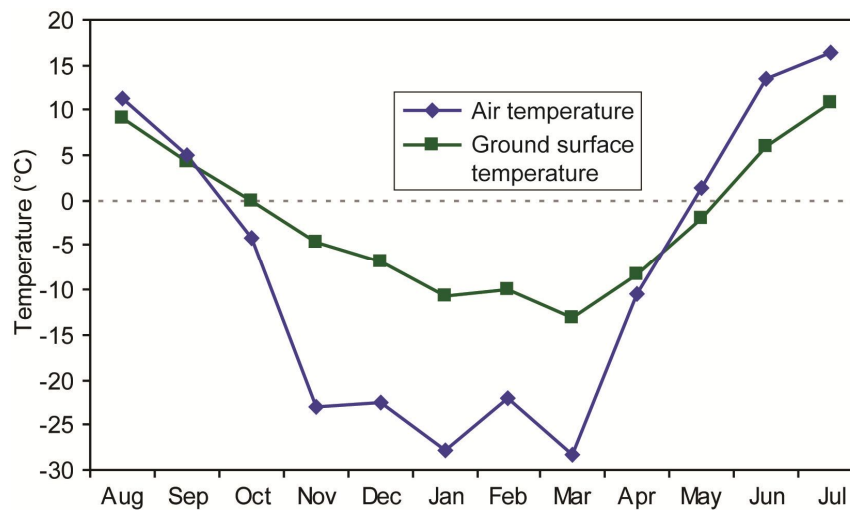
Landform: Alluvial plain

Vegetation cover: Mixed spruce and hardwood forest

Thaw Depth : >1.24 m (probed)

Site visit: August 11, 2012

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	11.32	9.17
Sept / 2011	5.13	4.24
Oct / 2011	-4.26	-0.03
Nov / 2011	-22.88	-4.54
Dec / 2011	-22.40	-6.77
Jan / 2012	-27.92	-10.62
Feb / 2012	-22.02	-9.87
Mar / 2012	-28.30	-13.13
Apr / 2012	-10.53	-8.22
May / 2012	1.34	-2.06
Jun / 2012	13.46	6.01
Jul / 2012	16.28	10.90



Hill Lake — HL-01

Gwich'in Settlement Region

Latitude: 67.99 N

Longitude: 132.49 W

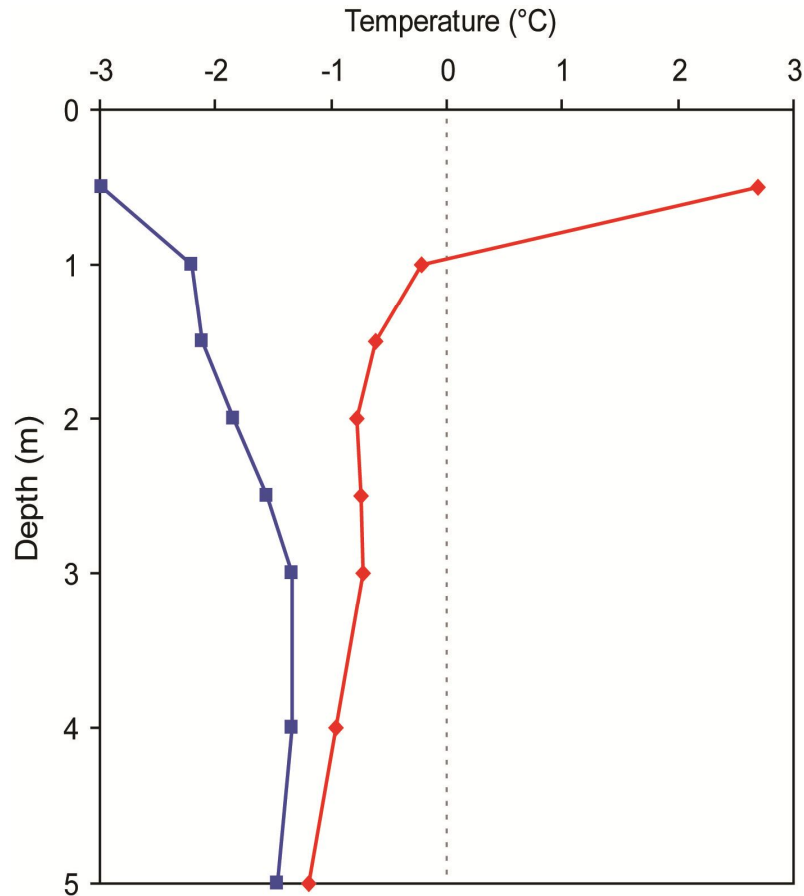
Elevation: 229 m a.s.l.

Landform: Moraine plain

Vegetation cover: Tundra

Thaw Depth : 0.96 m

Site visit: August 7, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.5	2.68	-2.98
1	-0.21	-2.21
1.5	-0.62	-2.11
2	-0.77	-1.84
2.5	-0.75	-1.55
3	-0.72	-1.34
4	-0.95	-1.34
5	-1.20	-1.46

Hill Lake — HL-02

Gwich'in Settlement Region

Latitude: 67.99 N

Longitude: 132.49 W

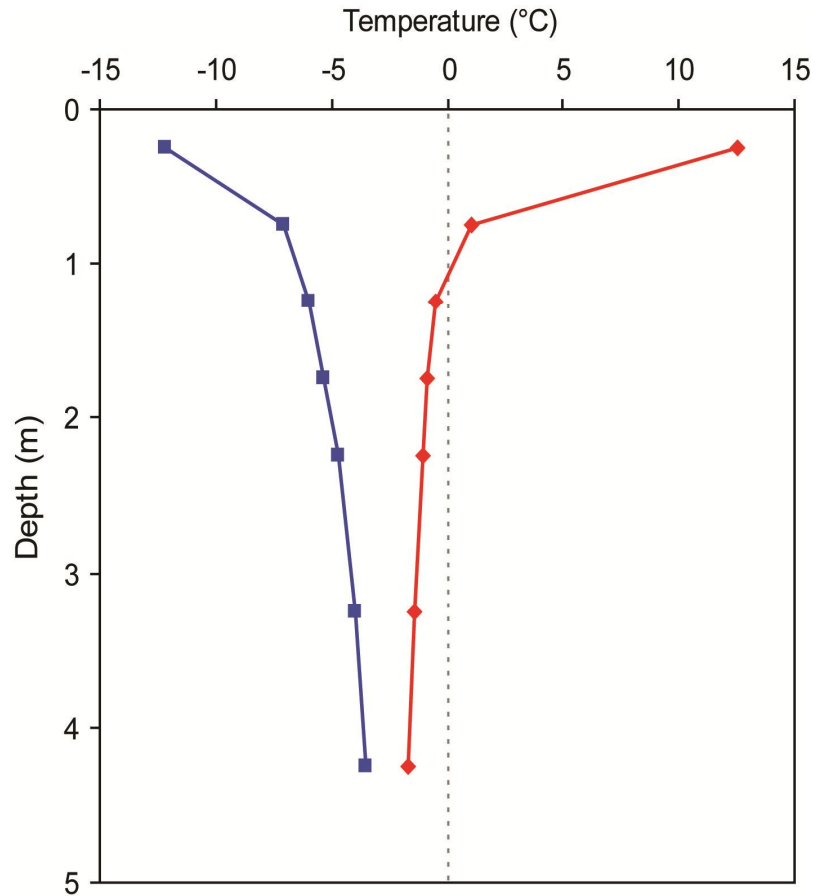
Elevation: 234 m a.s.l.

Landform: Moraine plain

Vegetation cover: Shrub Tundra

Thaw Depth: 1.09 m

Site visit: August 7, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.25	12.51	-12.13
0.75	1.07	-7.10
1.25	-0.50	-6.01
1.75	-0.84	-5.34
2.25	-1.02	-4.73
3.25	-1.37	-3.93
4.25	-1.70	-3.48

North Caribou Lake — NCL-01

Gwich'in Settlement Region

Latitude: 68.15 N Longitude: 132.94 W

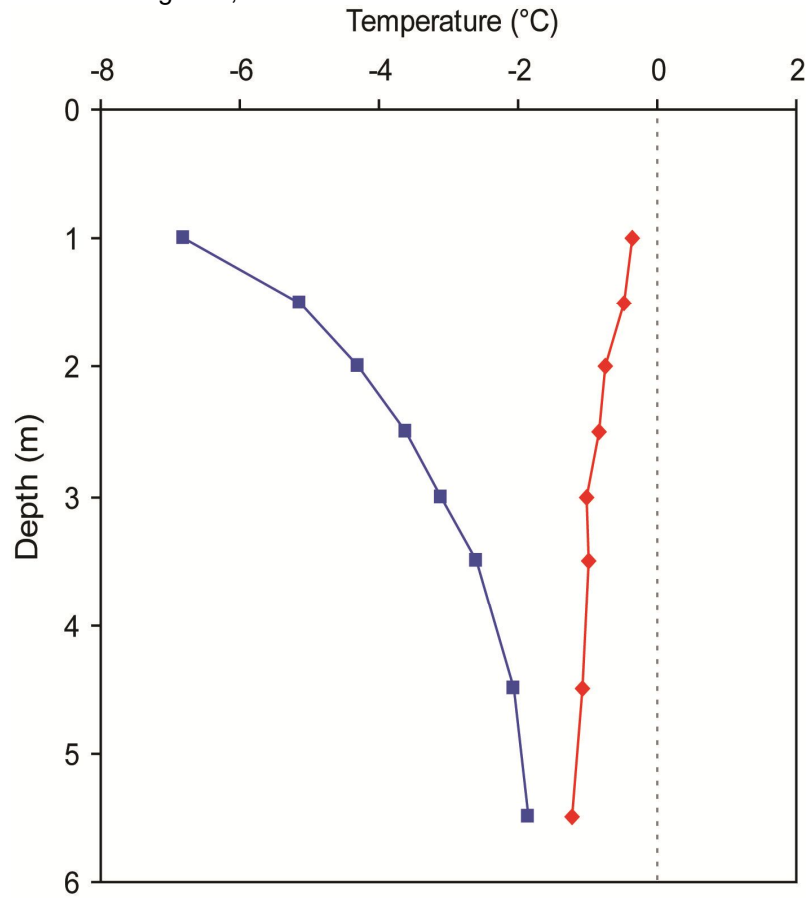
Elevation: 209 m a.s.l.

Landform: Moraine plain

Vegetation cover: Peatland

Thaw Depth: 0.62 m (probed)

Site visit: August 7, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
1.0	-0.35	-6.80
1.5	-0.48	-5.14
2.0	-0.75	-4.30
2.5	-0.83	-3.61
3.0	-1.00	-3.12
3.5	-0.97	-2.61
4.5	-1.07	-2.07
5.5	-1.21	-1.84

North Caribou Lake — NCL-02

Gwich'in Settlement Region

Latitude: 68.15 N

Longitude: 132.93 W

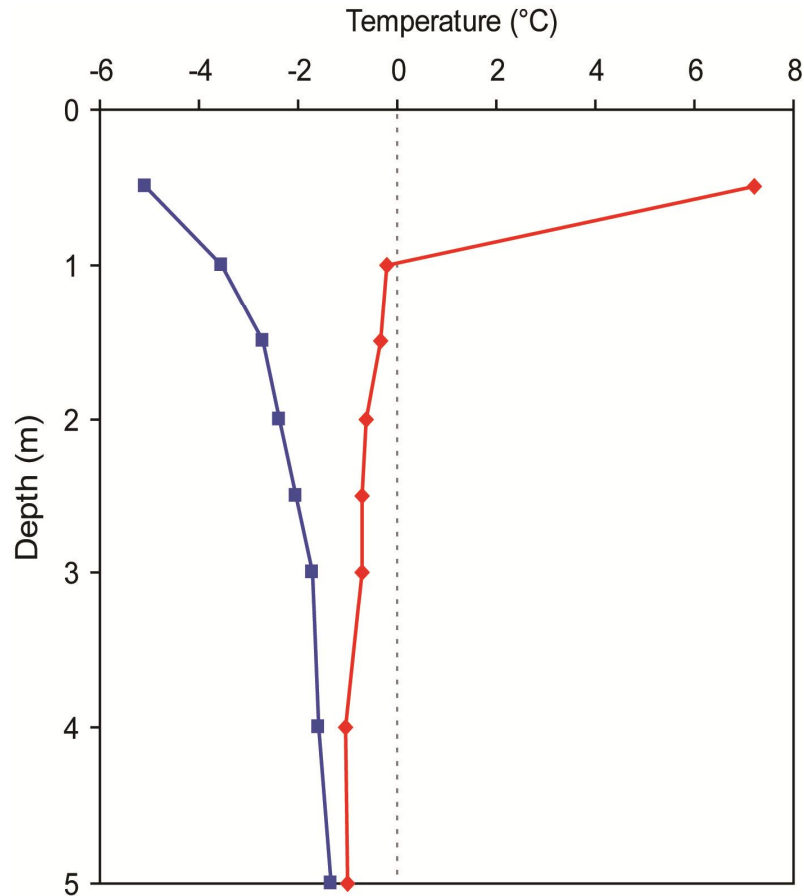
Elevation: 217 m a.s.l.

Landform: Moraine plain

Vegetation cover: Stunted black spruce forest

Thaw Depth: 0.99 m

Site visit: August 7, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.5	7.23	-5.06
1	-0.19	-3.53
1.5	-0.35	-2.71
2	-0.61	-2.38
2.5	-0.69	-2.05
3	-0.70	-1.71
4	-1.03	-1.58
5	-1.00	-1.32

Campbell Lake — CaL-01

Gwich'in Settlement Region

Latitude: 68.24 N

Longitude: 133.10 W

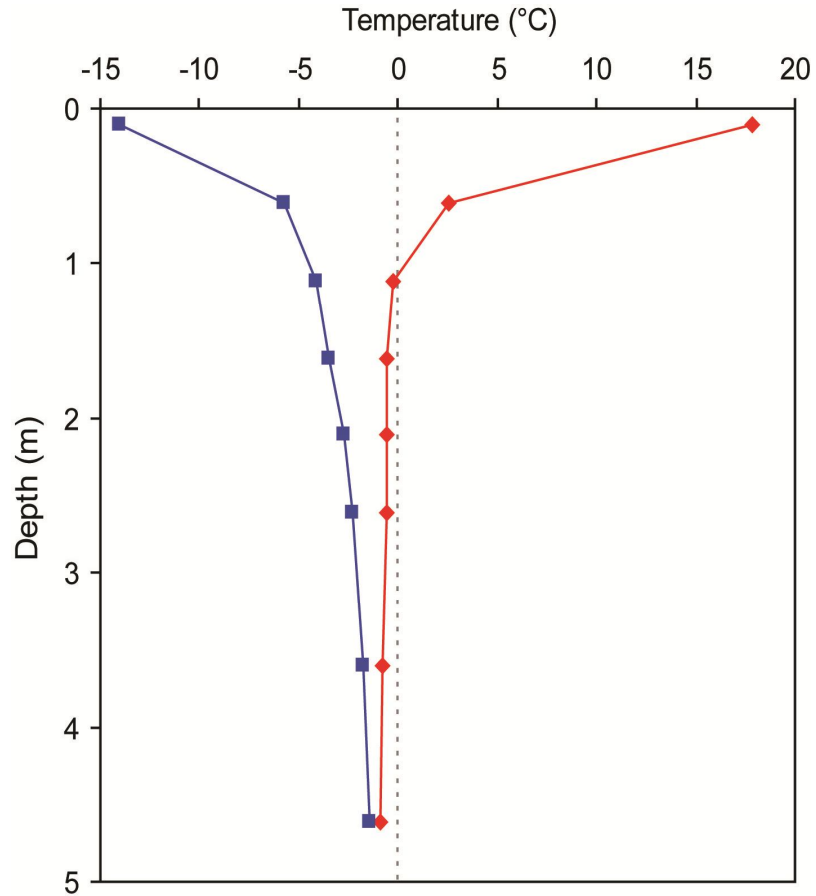
Elevation: 115 m a.s.l.

Landform: Moraine plain

Vegetation cover: Peatland

Thaw Depth: 1.06 m

Site visit: August 7, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.11	17.81	-14.04
0.61	2.50	-5.79
1.11	-0.29	-4.08
1.61	-0.61	-3.45
2.11	-0.53	-2.71
2.61	-0.60	-2.27
3.61	-0.78	-1.72
4.61	-0.88	-1.43

Campbell Lake — CaL-02

Gwich'in Settlement Region

Latitude: 68.24 N

Longitude: 133.09 W

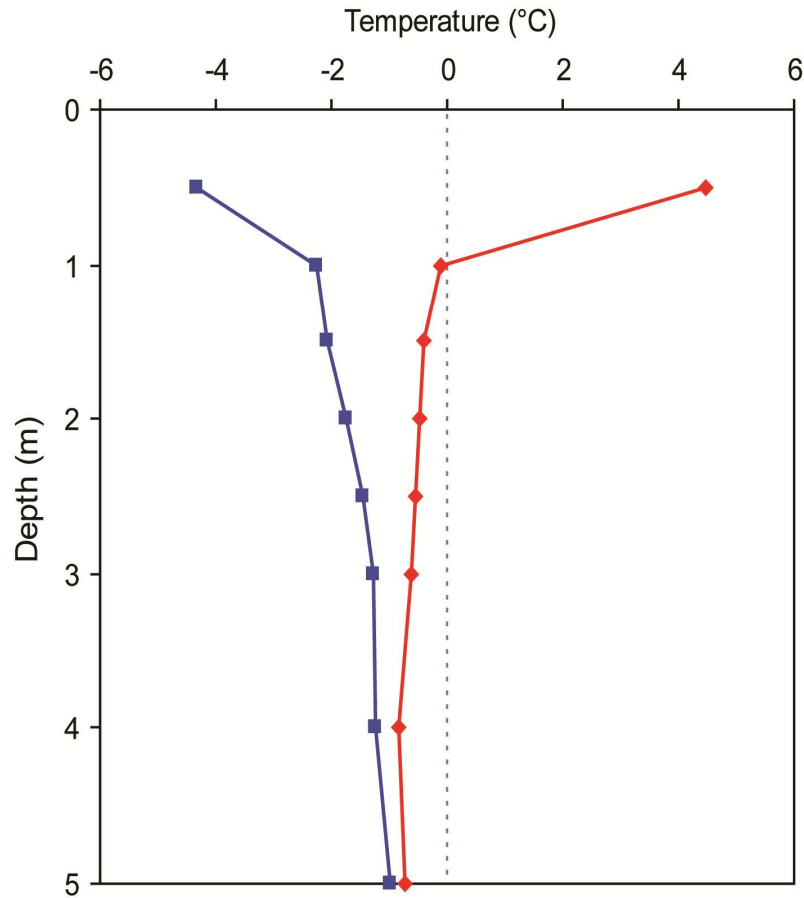
Elevation: 118 m a.s.l.

Landform: Moraine plain

Vegetation cover: Cutline through Black spruce forest

Thaw Depth: 0.99 m

Site visit: August 7, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.5	4.46	-4.33
1	-0.12	-2.26
1.5	-0.41	-2.09
2	-0.47	-1.74
2.5	-0.56	-1.47
3	-0.61	-1.28
4	-0.84	-1.23
5	-0.71	-0.98

Campbell Lake — CaL-03

Gwich'in Settlement Region

Latitude: 68.24 N

Longitude: 133.10 W

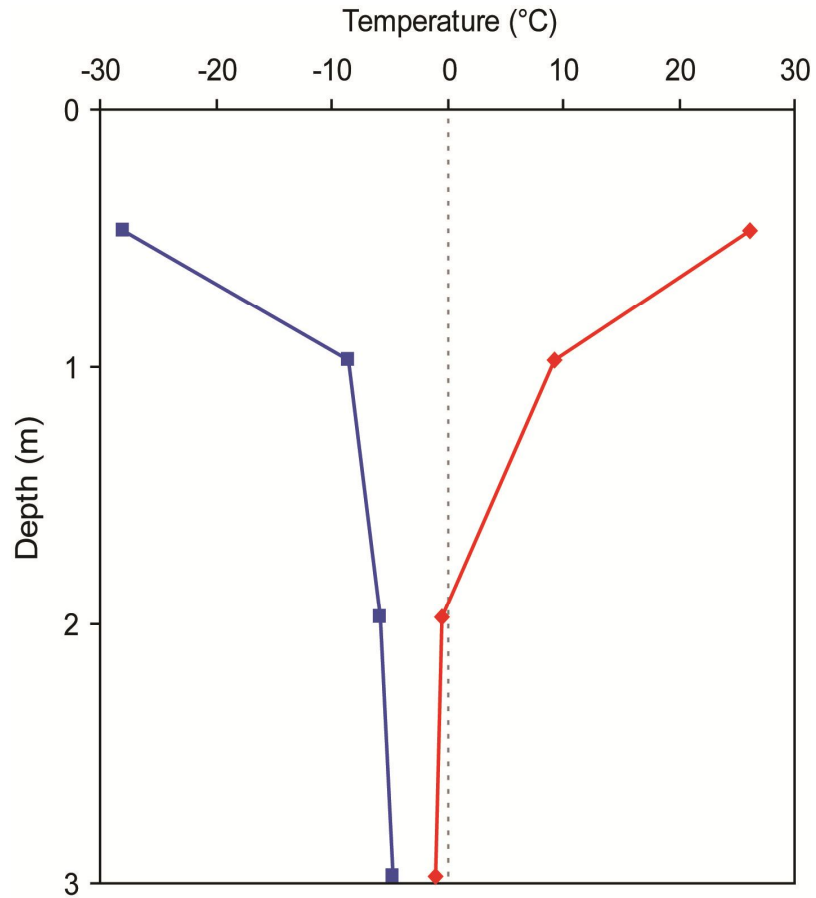
Elevation: 118 m a.s.l.

Landform: Moraine plain

Vegetation cover: Black spruce forest

Thaw Depth: 1.91 m

Site visit: August 7, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.47	26.13	-27.99
0.97	9.26	-8.52
1.97	-0.54	-5.85
2.97	-1.04	-4.65

Inuvik Airport (trees) — 01TC2

Gwich'in Settlement Area

Latitude: 68.32 N

Longitude: 133.44 W

Elevation: 84 m a.s.l.

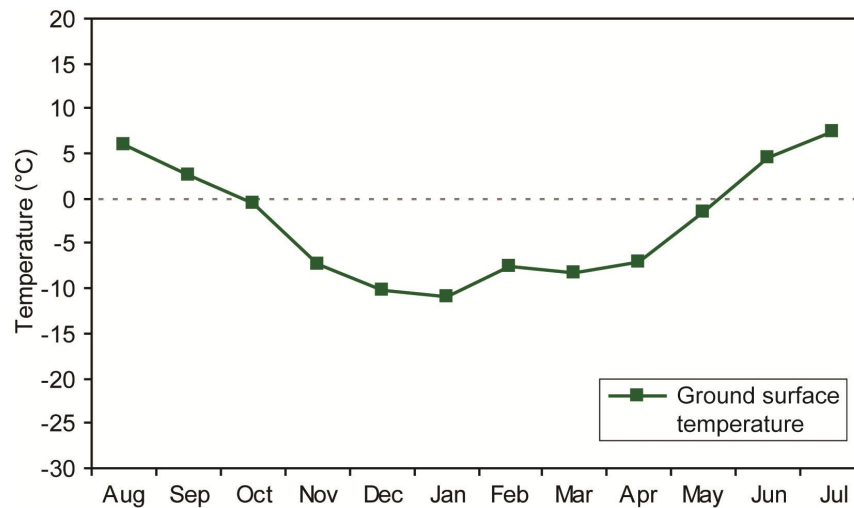
Landform: Fluted till plain, glacial (>10Ka)

Vegetation cover: Taiga open black spruce, heath ground cover

Thaw Depth: 0.64 m (probed)

Site visit: August 10, 2012

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	n/a	5.91
Sept / 2011	n/a	2.56
Oct / 2011	n/a	-0.48
Nov / 2011	n/a	-7.23
Dec / 2011	n/a	-10.13
Jan / 2012	n/a	-10.98
Feb / 2012	n/a	-7.43
Mar / 2012	n/a	-8.17
Apr / 2012	n/a	-7.08
May / 2012	n/a	-1.56
Jun / 2012	n/a	4.50
Jul / 2012	n/a	7.39



Inuvik Airport (bog) — 01TC3

Gwich'in Settlement Area

Latitude: 68.32 N

Longitude: 133.43 W

Elevation: 68 m a.s.l.

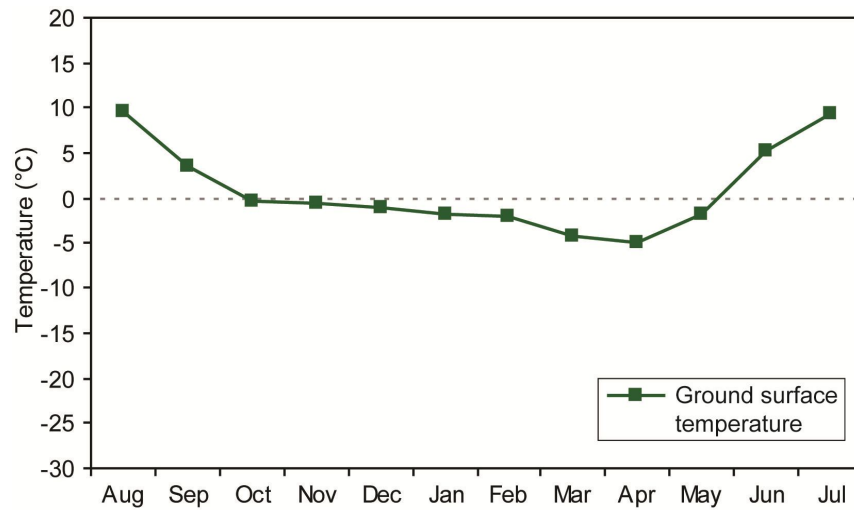
Landform: Bog between ridges on fluted till plain, glacial (>10Ka)

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

Thaw Depth: 0.62 m (probed)

Site visit: August 10, 2012

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2010	n/a	9.54
Sept / 2010	n/a	3.50
Oct / 2010	n/a	-0.27
Nov / 2010	n/a	-0.57
Dec / 2010	n/a	-1.12
Jan / 2011	n/a	-1.73
Feb / 2011	n/a	-2.02
Mar / 2011	n/a	-4.08
Apr / 2011	n/a	-4.83
May / 2011	n/a	-1.67
Jun / 2011	n/a	5.29
Jul / 2011	n/a	9.38



Norris Creek — NC-01

Gwich'in Settlement Region

Latitude: 68.41 N

Longitude: 133.29 W

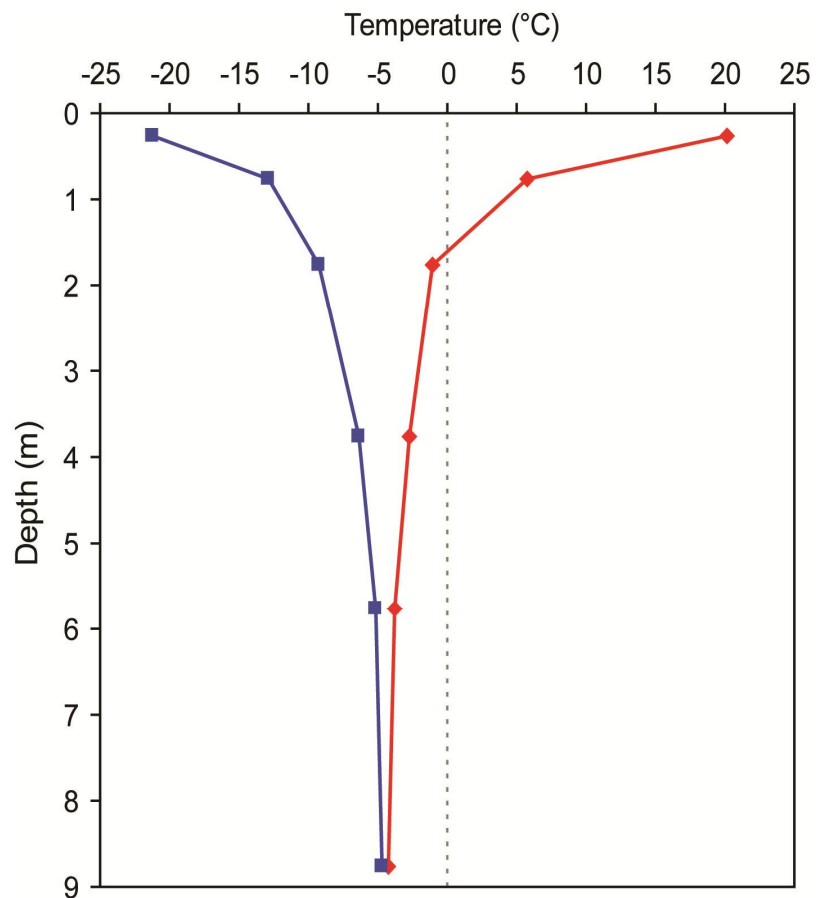
Elevation: 15 m a.s.l.

Landform: Thick organic material over moraine plain

Vegetation cover: Shrub Tundra

Thaw Depth: 1.60 m

Site visit: August 7, 2012



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

Navy Channel — 03TC1

Inuvialuit Settlement Region

Latitude: 68.42 N

Longitude: 133.79 W

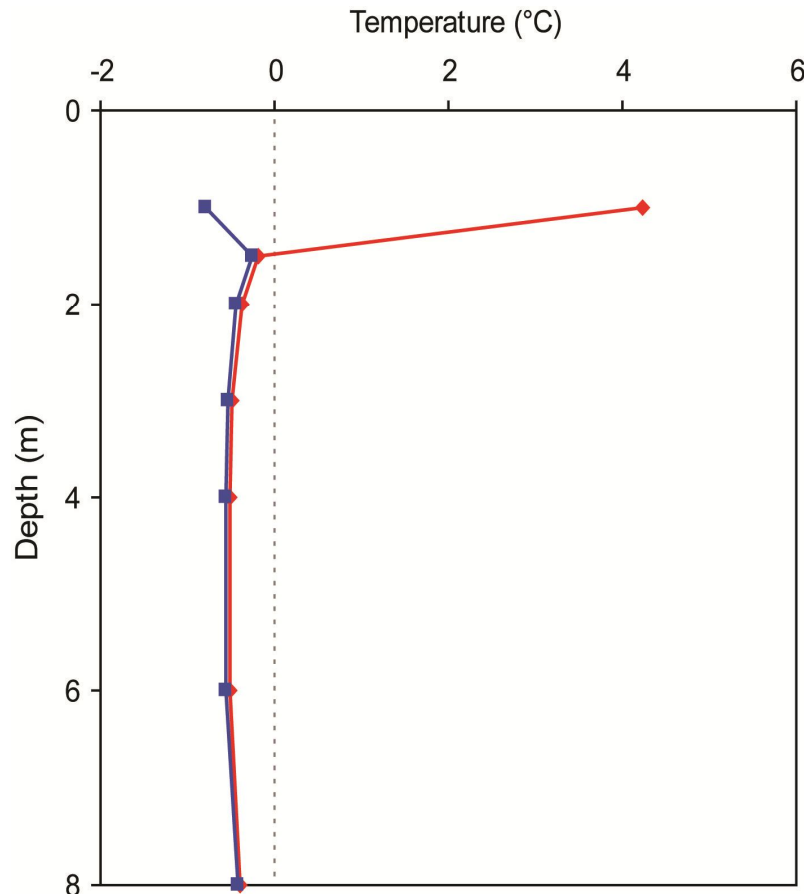
Elevation: 5 m a.s.l.

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

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

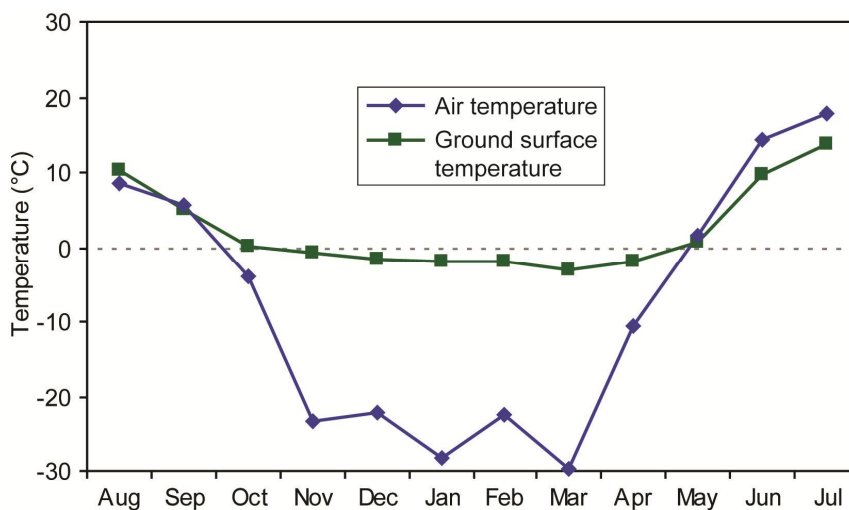
Thaw Depth: 1.48 m

Site visit: August 13, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
1	4.22	-0.79
1.5	-0.19	-0.25
2	-0.37	-0.45
3	-0.49	-0.54
4	-0.51	-0.56
6	-0.51	-0.56
8	-0.40	-0.42

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	8.48	10.32
Sept / 2011	5.52	5.10
Oct / 2011	-3.87	0.26
Nov / 2011	-23.32	-0.74
Dec / 2011	-22.31	-1.56
Jan / 2012	-28.39	-1.88
Feb / 2012	-22.52	-1.89
Mar / 2012	-29.69	-3.07
Apr / 2012	-10.49	-1.78
May / 2012	1.64	0.73
Jun / 2012	14.28	9.65
Jul / 2012	17.78	13.69



Navy Road — 01TC1
Inuvialuit Settlement Region

Latitude: 68.40 N

Longitude: 133.76 W

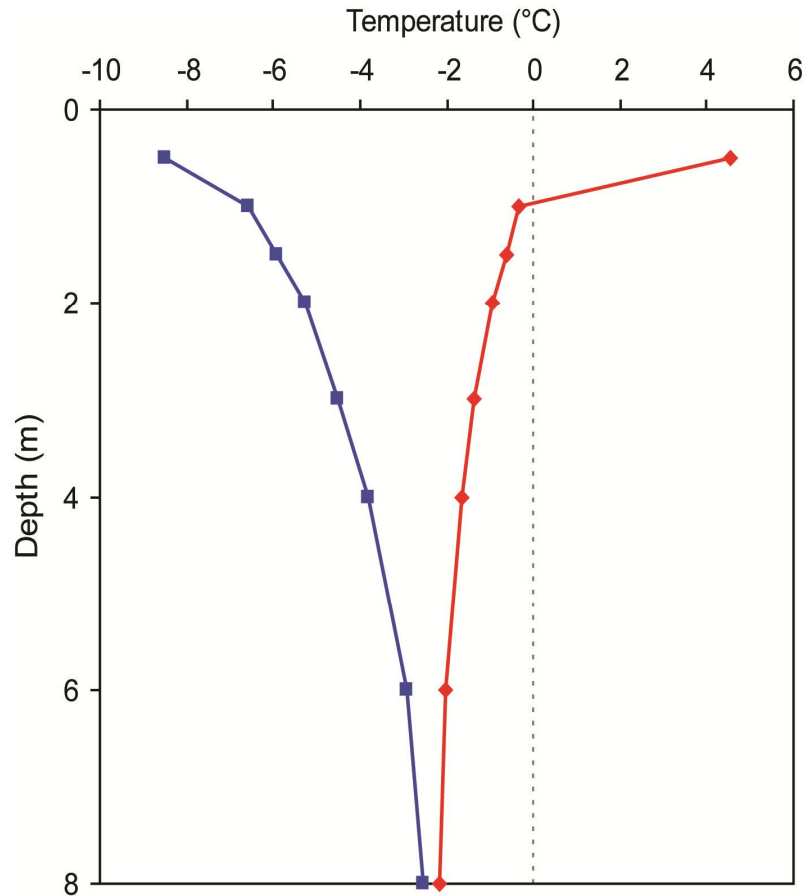
Elevation: 60 m a.s.l.

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

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

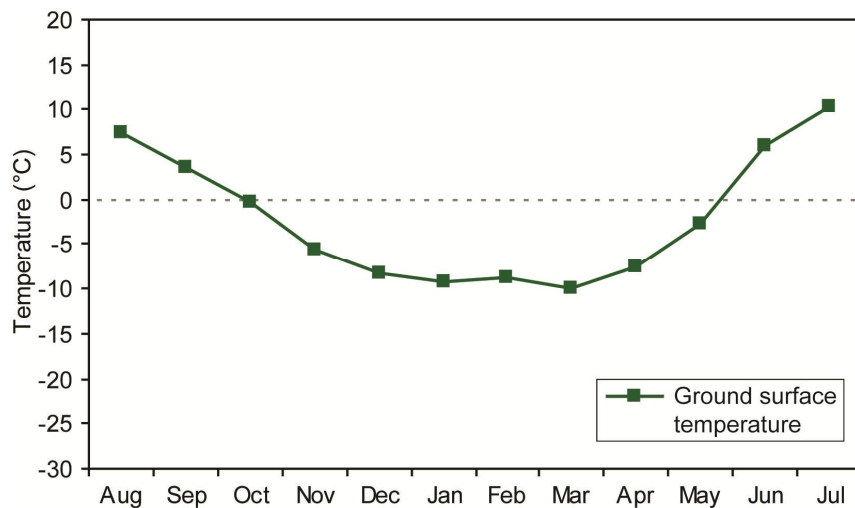
Thaw Depth: 0.97 m

Site visit: August 13, 2012



Depth (m)	Max temperature (°C)	Min temperature (°C)
0.5	4.55	-8.48
1	-0.34	-6.57
1.5	-0.64	-5.91
2	-0.93	-5.28
3	-1.38	-4.51
4	-1.64	-3.82
6	-2.01	-2.90
8	-2.16	-2.53

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	n/a	7.53
Sept / 2011	n/a	3.56
Oct / 2011	n/a	-0.36
Nov / 2011	n/a	-5.49
Dec / 2011	n/a	-8.20
Jan / 2012	n/a	-9.19
Feb / 2012	n/a	-8.69
Mar / 2012	n/a	-10.06
Apr / 2012	n/a	-7.63
May / 2012	n/a	-2.59
Jun / 2012	n/a	5.98
Jul / 2012	n/a	10.42



Reindeer Depot (Williams Island) — 91TT13

Inuvialuit Settlement Region

Latitude: 68.68 N

Longitude: 134.15 W

Elevation: 5 m a.s.l.

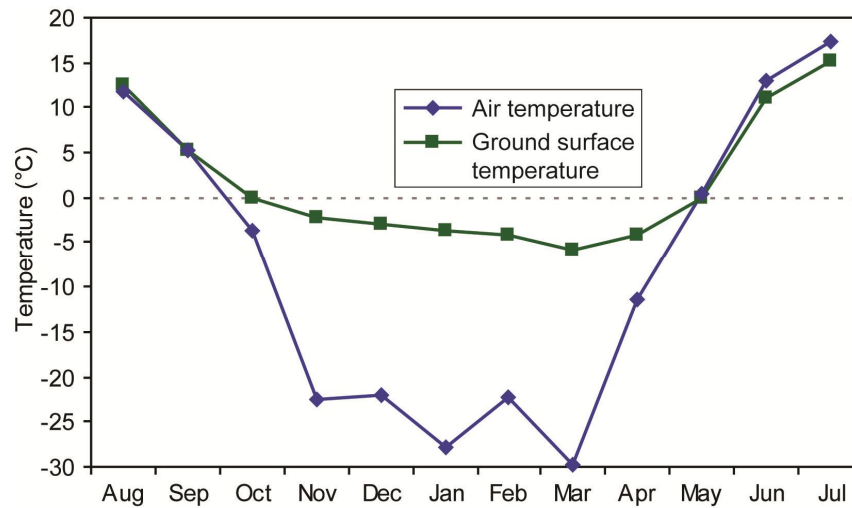
Landform: Surface of bar in Mackenzie Delta

Vegetation cover: Riparian willow and alder shrub

Thaw Depth: 1.37 m (probed)

Site visit: August 7, 2012

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	11.81	12.50
Sept / 2011	5.23	5.38
Oct / 2011	-3.72	0.01
Nov / 2011	-22.53	-2.27
Dec / 2011	-22.06	-2.90
Jan / 2012	-27.80	-3.61
Feb / 2012	-22.16	-4.04
Mar / 2012	-29.75	-5.77
Apr / 2012	-11.43	-4.16
May / 2012	0.44	-0.07
Jun / 2012	12.93	11.08
Jul / 2012	17.27	15.16



Reindeer Station plateau — 91TT12

Inuvialuit Settlement Region

Latitude: 68.69 N

Longitude: 134.11 W

Elevation: 152 m a.s.l.

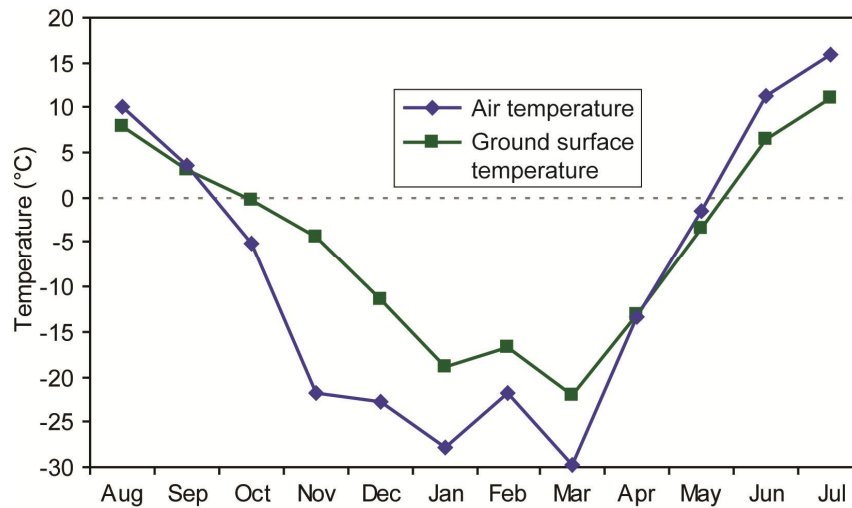
Landform: Plateau surface, till plain

Vegetation cover: Shrub tundra

Thaw Depth: 0.75 m

Site visit: August 7, 2012

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	10.05	7.94
Sept / 2011	3.59	3.19
Oct / 2011	-5.20	-0.37
Nov / 2011	-21.71	-4.45
Dec / 2011	-22.72	-11.41
Jan / 2012	-27.72	-18.77
Feb / 2012	-21.87	-16.80
Mar / 2012	-29.73	-22.06
Apr / 2012	-13.41	-12.97
May / 2012	-1.46	-3.48
Jun / 2012	11.37	6.45
Jul / 2012	15.81	11.01



YaYa Lake low — 90TT04

Inuvialuit Settlement Region

Latitude: 69.14 N

Longitude: 134.70 W

Elevation: 10 m a.s.l.

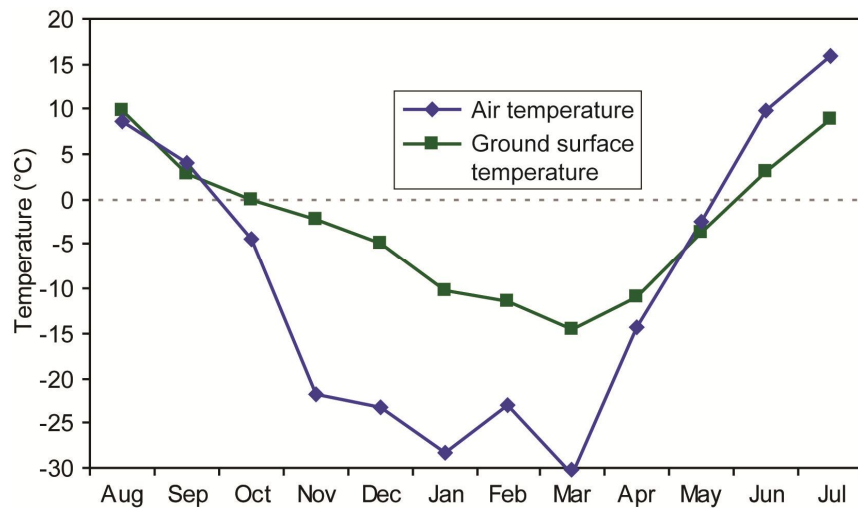
Landform: Ice contact complex

Vegetation cover: shrub tundra

Thaw Depth: 0.89

Site visit: August 6, 2012

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	8.59	9.78
Sept / 2011	4.13	2.79
Oct / 2011	-4.32	-0.07
Nov / 2011	-21.69	-2.12
Dec / 2011	-23.21	-4.84
Jan / 2012	-28.20	-10.19
Feb / 2012	-22.96	-11.47
Mar / 2012	-30.74	-14.48
Apr / 2012	-14.41	-10.86
May / 2012	-2.35	-3.60
Jun / 2012	9.82	2.99
Jul / 2012	15.79	8.86



Lousy Point ridge — 90TT05

Inuvialuit Settlement Region

Latitude: 69.22 N

Longitude: 134.29 W

Elevation: 39 m a.s.l.

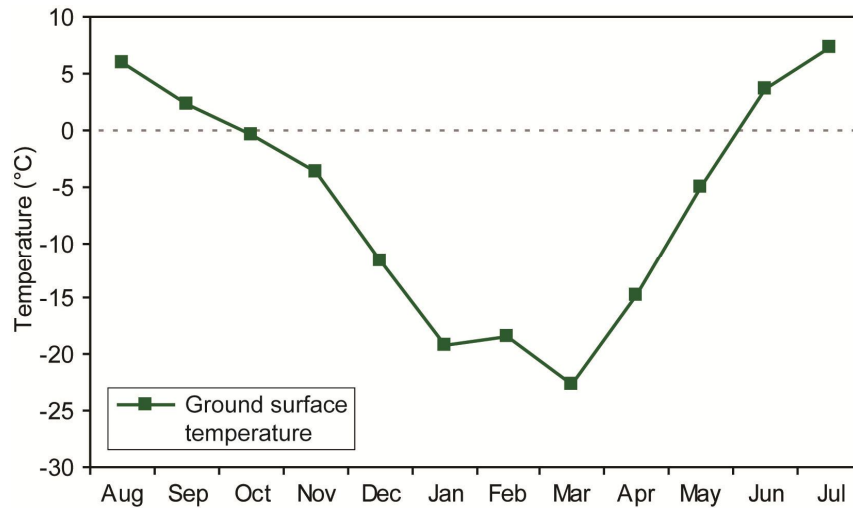
Landform: Glaciofluvial ridge

Vegetation cover: Low shrub tundra

Thaw depth: 0.72

Site visit: August 7, 2012

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	n/a	5.92
Sept / 2011	n/a	2.25
Oct / 2011	n/a	-0.35
Nov / 2011	n/a	-3.74
Dec / 2011	n/a	-11.57
Jan / 2012	n/a	-19.11
Feb / 2012	n/a	-18.46
Mar / 2012	n/a	-22.63
Apr / 2012	n/a	-14.80
May / 2012	n/a	-5.08
Jun / 2012	n/a	3.54
Jul / 2012	n/a	7.27



Taglu — 91TTC

Inuvialuit Settlement Region

Latitude: 69.37 N

Longitude: 134.95 W

Elevation: 15 m a.s.l.

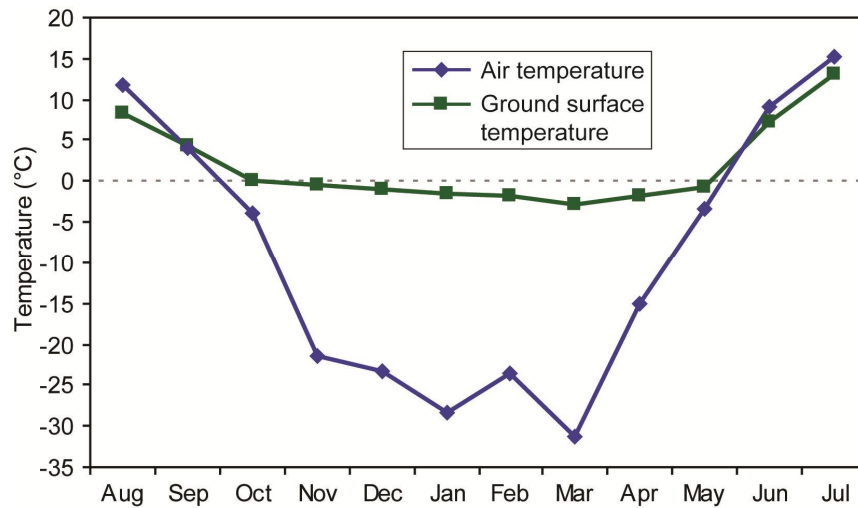
Landform: Surface of Holocene Mackenzie delta

Vegetation cover: Low shrub tundra

Thaw depth: 1.71

Site visit: August 6, 2012

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	11.65	8.35
Sept / 2011	3.96	4.44
Oct / 2011	-4.04	0.03
Nov / 2011	-21.52	-0.58
Dec / 2011	-23.42	-1.09
Jan / 2012	-28.29	-1.60
Feb / 2012	-23.58	-1.87
Mar / 2012	-31.15	-2.74
Apr / 2012	-15.06	-1.82
May / 2012	-3.44	-0.74
Jun / 2012	9.03	7.25
Jul / 2012	15.29	13.09



North Head shore — 90TT13

Inuvialuit Settlement Region

Latitude: 69.72 N

Longitude: 134.46 W

Elevation: 3 m a.s.l.

Landform: Thermokarst coastal plain

Vegetation: Tundra

Thaw depth: n/a

Site visit: August 8, 2012

Month / Year	Temperature (°C)	
	Air	Surface
Aug / 2011	6.20	6.01
Sept / 2011	3.19	2.74
Oct / 2011	-3.28	-0.27
Nov / 2011	-14.58	-4.03
Dec / 2011	-19.26	-12.19
Jan / 2012	-22.03	-16.39
Feb / 2012	-19.03	-16.79
Mar / 2012	-24.75	-19.87
Apr / 2012	-13.71	-14.50
May / 2012	-2.69	-6.19
Jun / 2012	8.50	4.07
Jul / 2012	15.28	10.12

