

Yukon Permafrost Database

The Yukon Permafrost Database is a compilation of ground thermal and geotechnical data in Yukon, including related reports. Further background and details on the database structure and its contents will be available in January 2022 (Lipovsky *et al.*, 2022).

In referring to information included in this download please use the following citation: Yukon Geological Survey, current year. Yukon permafrost temperature data. *In*: Yukon Permafrost Database. Government of Yukon, <https://service.yukon.ca/permafrost>, accessed [month day, year].

Temperature data

Temperature data come from investigations performed by government agencies, geotechnical engineers and consultants, academics, and others. Investigations are done to obtain information on the air or ground temperature conditions at a particular location. Ground temperature investigations generally include the installation of temperature sensors at a variety of depths below ground, and data loggers which record the temperatures at regular time intervals (e.g., hourly or daily) for varying time periods ranging from one-time or occasional measurements to multi-year monitoring. They also often involve the installation or monitoring of above-ground weather stations. Where ground temperature data characterizes the ground thermal regime, weather data allows for an understanding of the relationship between the ground thermal regime and local weather.

Temperature data are stored in seven primary tables in the database. As each investigation has unique objectives, the level of data collection and type of data collected varies by project. To allow for all relevant permafrost data to be captured, the temperature data was created so any type of observation can be added to it, e.g., surface description, permafrost description, ground temperature, thaw depth, air humidity, air temperature, soil moisture, water level, wind speed, and wind direction. Four summary tables, derived from the temperature data are included in the download.

The temperature sub-database currently has 128 sites loaded (Fig. 1). The majority of the temperature data were provided by the Department of Highways and Public Works (HPW-TEB), the mineral industry, and Yukon Geological Survey (YGS). Highways and Public Works (HPW) has 73 temperature data sites across the territory, 8 of which are meteorological stations: 27 sites at Beaver Creek and the nearby Shakhwak/Beaver Creek test section (km 1865 Alaska Highway); 11 sites at the Dry Creek thermosiphon installation (km 1841 Alaska Highway); 9 sites along the Dempster Highway (km 0, 65, 124 and 421); 4 sites each at the Mayo airstrip, Takhini Valley (km 1457 Alaska Highway), and Burwash Creek; 3 sites near Watson Lake (km 976, 980 and 1002 Alaska Highway); and 1 site each in Haines Junction, Carcross, Braeburn, Carmacks, Stewart Crossing, Dawson City, Alaska Highway at North Klondike Highway junction, and Drury Creek. There are a total of 25 sites submitted from the private mineral industry and 11 sites were submitted by YG Assessment and Abandoned Mines from Clinton Creek Mine. The Yukon Geological Survey has a total of 19 sites, with 5 US Array sites in the remote Richardson and Ogilvie Mountains, 6 community permafrost monitoring network sites, and 7 sites in the greater Whitehorse area.

Table 1. Sources of temperature data.

Source	Number of sites
YG Transportation Engineering Branch (HPW-TEB)	73
Yukon Geological Survey (YGS)	19
Assessment and Abandoned Mines (YG-AAM)	11 (Clinton Creek)
Mineral Industry	25

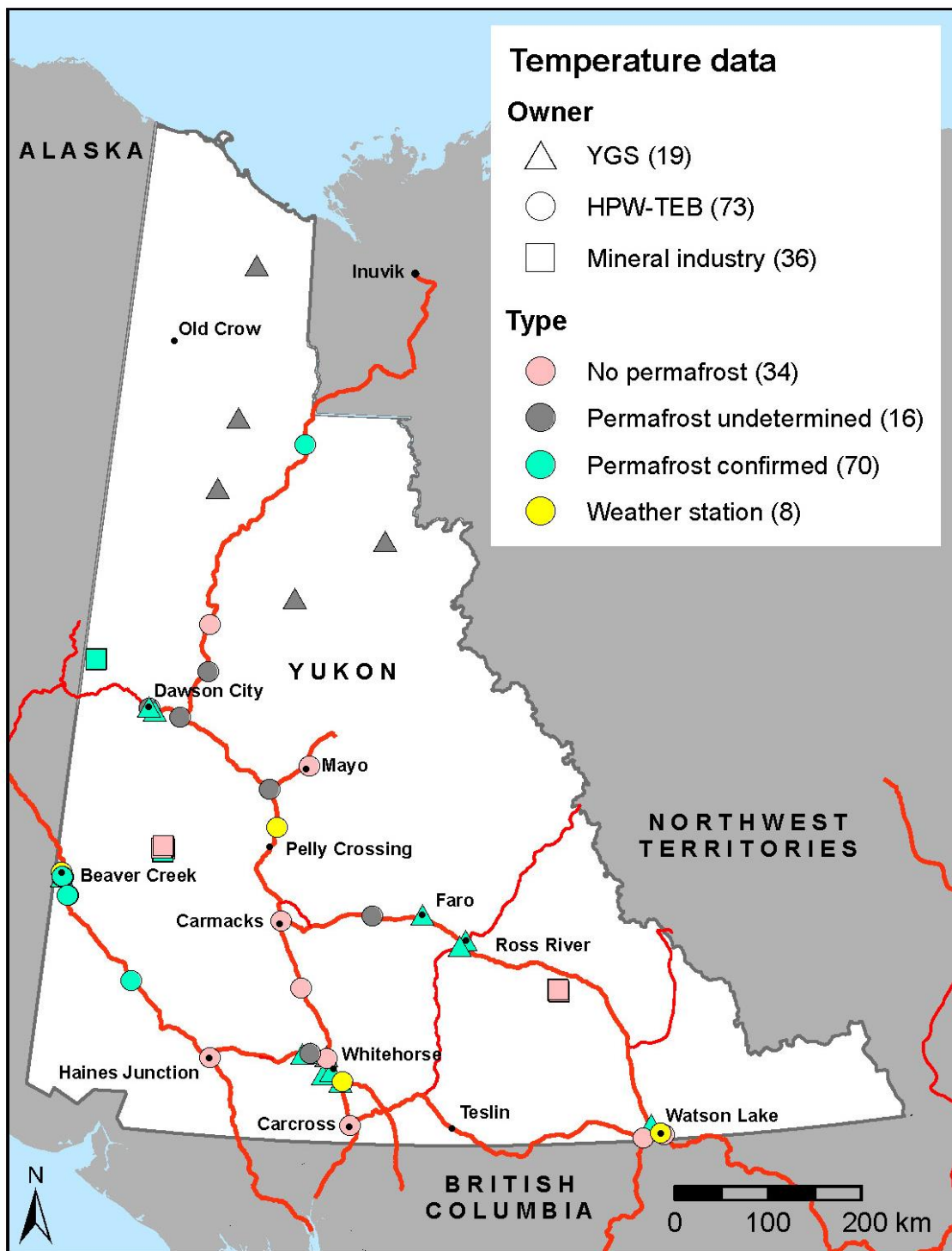


Figure 1. Location and primary sources of temperature data loaded into Yukon Permafrost Database.

Description of tables and fields

PFT_LOCATIONS

Contains basic metadata and information associated with site location.

FIELD (UNIT, IF APPLICABLE)	DESCRIPTION	DATA TYPE ¹	
ID	A unique identifier automatically assigned to each record in the table by the database during upload.	number	38,*
NAME	A distinctive name given to the site, <i>e.g.</i> , YGS Whitehorse.	varchar2	50
LATITUDE (DECIMAL DEGREES)	Latitude of the site reported in decimal degrees with a minimum of six decimal places, <i>e.g.</i> , 69.592925.	number	10,6
LONGITUDE (DECIMAL DEGREES)	Longitude of the site reported in decimal degrees with a minimum of six decimal places, <i>e.g.</i> , -139.086391.	number	10,6
ELEVATION (M)	Elevation of site in metres above sea level, with up to 2 decimal places <i>e.g.</i> , 712.00.	number	*,*
LOCATION ACCURACY (M)	Accuracy of location measurement in metres, as given by the device used. Depends on the method used to acquire coordinates; acquisition by Handheld GPS is normally set to 5 metres, <i>e.g.</i> , 10.	number	*,*
ELEVATION ACCURACY (M)	Accuracy of elevation measurement in metres, as given by the device used. Depends on the method used to acquire elevation; acquisition by Handheld GPS or Google Earth is normally set to 10 metres, <i>e.g.</i> , 10.	number	*,*
LOCAL RELIEF (M)	Difference in metres between the minimum and maximum elevations within a 10 metre radius of the site, <i>e.g.</i> , 1.	number	*,*
PERMAFROST	Permafrost confirmed at the site; select from: 'yes', 'no' or 'undetermined', <i>e.g.</i> , yes.	varchar2	20
COMMENTS	Information about the location of the site, proximity to road, how to get there, <i>etc.</i> , <i>e.g.</i> , Cowley Creek Subdivision. Physical descriptions of the site that would be expected to change over time should be reserved for observations in PFT OBSERVATIONS, <i>e.g.</i> , the site being flooded, presence of snow, <i>etc.</i>	varchar2	200

¹**DATA TYPE notes:**

varchar2 = variable length character string (with maximum number of characters specified)

number fields may be constrained using the optional parameters (p,s) where p = precision (maximum number of digits up to 38) and s = scale (number of decimal places).

* indicates parameters unspecified.

PFT_OBSERVATIONS

Primary table in the temperature database. Contains all observations (*i.e.*, individual measurements of ground temperature, meteorological data, or other permafrost characteristics, typically at one point in time, but sometimes over a specified time interval).

FIELD (UNIT, IF APPLICABLE)	DESCRIPTION	DATA TYPE	
ID	A unique identifier automatically assigned to each record in the table by the database during upload.	number	*, *
METHOD ID	An identifier that corresponds to a record (ID) in PFT METHOD, <i>e.g.</i> , 3.	number	*, *
WHO ID	An identifier that corresponds to a record (ID) in PFT WHO, <i>e.g.</i> , 2.	number	*, *
LOCATION ID	An identifier that corresponds to a record (ID) in PFT LOCATIONS, <i>e.g.</i> , 67.	number	*, *
DEPTH MIN (M)	The minimum (top) depth of the observation in metres. For most temperature observations, this will be the same as the <i>maximum depth</i> , <i>e.g.</i> , -4.00. Positive depth values represent depths above the ground surface, and negative depth values represent depths below the ground surface.	number	*, *
DEPTH MAX (M)	The maximum (bottom) depth of the observation in metres. For most temperature observations, this will be the same as the <i>minimum depth</i> , <i>e.g.</i> , -4.00.	number	*, *
TIME START	Timestamp when observation began, recorded in the format: YYYY-MM-DD HH:MI:SS AM. <i>Time Start</i> and <i>Time End</i> are the same for single temperature measurements, however they differ if the observation is an aggregate value such as a mean temperature, <i>e.g.</i> , 2007-05-04 12:00:00 PM.	date	
TIME END	Timestamp when the observation was completed, recorded in the format: YYYY-MM-DD HH:MI:SS AM. <i>Time Start</i> and <i>Time End</i> are the same for single temperature measurements, however they differ if the observation is an aggregate value such as a mean temperature, <i>e.g.</i> , 2007-05-04 12:00:00 PM.	date	
NUMERICAL VALUE	Where the observation itself is placed if a numerical value. If the observation is a number, this field is filled in and <i>Text Value</i> field is left blank, <i>e.g.</i> , -0.09.	number	*, *
TEXT VALUE	Where the observation itself is placed if a text value. If the observation is a text value, this field is filled in and <i>Numerical Value</i> field is left blank, <i>e.g.</i> <i>organics</i> .	varchar2	100
OBSERVATION TYPE	The type of measurement recorded, <i>e.g.</i> , ground temperature, selected from PFT OBSERVATION TYPE lookup table.	varchar2	50
COMMENTS	Any information about the observations not captured by other fields of this table.	varchar2	200

PFT_OBSERVATION_TYPE

Lookup table for types of potential observations (*i.e.*, measurements) that may be made at a site. Other types may also be added in the future as required.

TYPE
Air humidity
Air temperature
Ground temperature
Permafrost characterization
Soil moisture
Surface description
Surface temperature
Thaw depth
Water level
Wind direction
Wind speed

PFT_DISTURBANCE

Contains details on any disturbances that have occurred near a site.

Note: this table does not currently contain any records because these data were not available for the sites loaded to date; it is hoped, however, that the table will become populated as new data is loaded in the future.

FIELD (UNIT, IF APPLICABLE)	DESCRIPTION	DATA TYPE	
ID	A unique identifier automatically assigned to each record in the table by the database during upload.	number	*, *
LOCATION ID	An identifier that refers to the ID in PFT LOCATIONS, <i>e.g.</i> , 67.	number	*, *
TYPE ID	Code for the type of disturbance that occurred near the site, given in TYPE LOOKUP, <i>e.g.</i> , 2 (excavation). Disturbances within 20 m are recorded. No disturbances are indicated by code 13 (None).	varchar2	50
PROXIMITY (M)	Distance between disturbance and the site in metres (must be within 20 m). If a site is situated within the disturbance, such as a borehole on the road, then the distance is 0, <i>e.g.</i> , 10.	number	*, *
ESTIMATED DATE	Estimate of the date on which the disturbance occurred, recorded in the format: YYYY-MM-DD HH:MI:SS AM, <i>e.g.</i> , 2000-07-21 12:00:00 AM.	date	
COMMENTS	Any information about the disturbance not captured by other fields of this table.	varchar2	200

TYPE_LOOKUP

Contains codes for different types of disturbances.

TYPE ID	TYPE
1	Highway
2	Excavation
3	Urban
4	Building
5	Fire
6	Deforestation
7	Trail
8	Road
9	Thermokarst
10	Stream
11	River
12	Lake
13	None

PFT_WHO

Contains information on data ownership and affiliation.

FIELD (UNIT, IF APPLICABLE)	DESCRIPTION	DATA TYPE	
ID	A unique identifier automatically assigned to each record in the table by the database during upload.	number	*, *
NAME	Name of the person who owns the data, or the contact at the institution that owns the data, <i>e.g.</i> , John Doe.	varchar2	30
INSTITUTION	Name of the institution to which NAME is affiliated, or the name of the institution that owns the data, <i>e.g.</i> , Yukon Geological Survey.	varchar2	100

PFT_METHOD

Contains information on the instrumentation installed at a site.

FIELD (UNIT, IF APPLICABLE)	DESCRIPTION	DATA TYPE	
ID	A unique identifier automatically assigned to each record in the table by the database during upload.	number	*,*
PRECISION	Precision of the measurement, as determined from the sensor and logger used, <i>e.g.</i> 0.03. Units of precision measurement recorded in units field.	number	*,*
ACCURACY	Accuracy of the measurement, as determined from the sensor and logger used, <i>e.g.</i> , 0.25.	number	*,*
METHOD ID	Code for the type of sampling method used, given in METHOD LOOKUP, <i>e.g.</i> , 3 (temperature probe).	number	*,*
SENSOR MANUFACTURER	Name of sensor manufacturer, <i>e.g.</i> , Onset.	varchar2	50
SENSOR MANUFACTURER MODEL	Name of sensor model, <i>e.g.</i> , TMC6-HD.	varchar2	50
LOGGER MANUFACTURER	Name of logger manufacturer, <i>e.g.</i> , Onset HOBO.	varchar2	50
LOGGER MANUFACTURER MODEL	Name of logger model, <i>e.g.</i> , U12-006.	varchar2	50
UNITS	Units of the measurement taken by the device, <i>e.g.</i> , °C.	varchar2	10
RADIATION SHIELD	Manufacturer and model of the radiation shield or a description if handmade.	varchar2	50

METHOD_LOOKUP

Contains codes for different sampling methods.

METHOD ID	METHOD
1	Wind monitor vane
2	Wind monitor propeller
3	Temperature probe
4	Air humidity sensor

PFT_DOIS

Contains DOI and metadata for documents associated with a site.

Note: this table does not currently contain any records because these data were not available for the sites loaded to date; it is hoped, however, that the table will become populated as new data is loaded in the future.

FIELD (UNIT, IF APPLICABLE)	DESCRIPTION	DATA TYPE	
ID	A unique identifier automatically assigned to each record in the table by the database during upload.	number	** ,
DOI	DOI (Digital Object Identifier) of document associated with the observation. A DOI is a string of numbers, letters and symbols used to permanently identify an article or document and link it on the web, e.g., 10.1016/r685957(3)fhjfh-2f.	number	** ,
NOTES	Any notes specific to the DOI. Notes about this DOI such as document type, e.g., academic paper.	varchar2	200

PFT_OBSERVATION_DOI

Intermediate table used to link records between the PFT_OBSERVATIONS and PFT_DOIS tables, to avoid many-to-many relationship.

Note: this table does not currently contain any records because these data were not available for the sites loaded to date; it is hoped, however, that the table will become populated as new data is loaded in the future.

FIELD (UNIT, IF APPLICABLE)	DESCRIPTION	DATA TYPE	
ID	A unique identifier automatically assigned to each record in the table by the database during upload.	number	** ,
DOI ID	An identifier that refers to a record (ID) in PFT DOIS, e.g., 1.	number	** ,
OBSERVATION ID	An identifier that refers to a record (ID) in PFT OBSERVATIONS, e.g., 18564981.	number	** ,

References

Lipovsky, P.S., Humphries, J.K., Stewart-Jones, E.T and Cronmiller, D.C., 2022 (in press). Yukon Permafrost Database: a new baseline data resource. *In: Yukon Exploration and Geology 2021*, K.E. MacFarlane (ed.), Yukon Geological Survey.