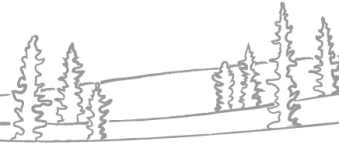




NWT Water Monitoring Bulletin

– May 19, 2023 at 11:00



NWT break up reports will be published routinely as break up unfolds. These reports will focus on regions with active snowmelt and ice break up. The geographic focus of the report will shift as conditions change. Additional information about basin conditions can be found in the ECC Snow Survey Bulletin and Spring Water Outlook, [available here](#). If you have any photos or information about break up in your community, feel free to reach out to us: nwtwaters@gov.nt.ca.

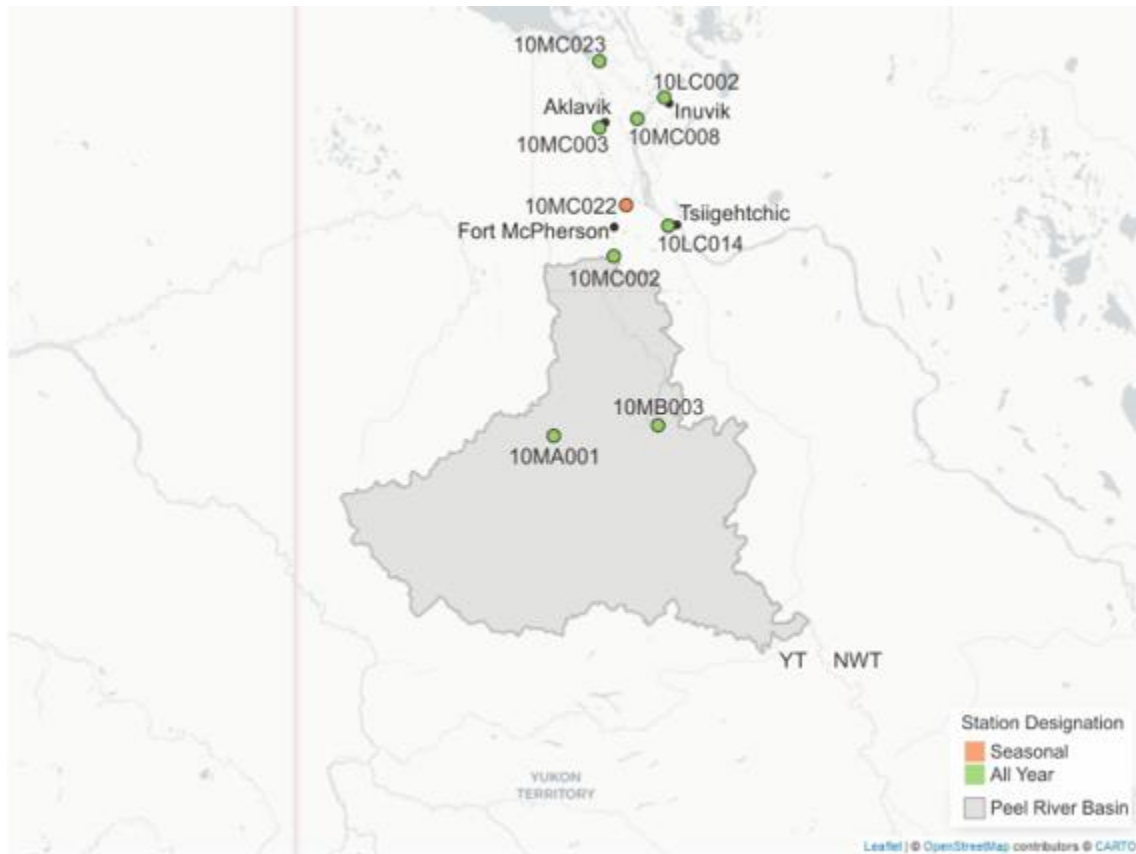
Current Status:

- Fort McPherson has declared a local state-of-emergency in response to high water levels and restricted access to fresh water and the airport;
 - Cabin owners along the Peel River and residents of Fort McPherson should be aware of continued potential for high water along the Peel River;
- The water level on the Peel River at Fort McPherson has been slowly receding over the past 48 hours after the large ice jam shifted downstream of the community;
 - Water levels have dropped by just over 1.0 m over the last two days;
- Water levels continue to rise on the Mackenzie River at Tsiigehtchic, but are well within their normal range;
 - Ice from the main stem of the Mackenzie River has packed into the Delta near Point Separation and at the confluence of the Peel River;
- Residents in Aklavik should prepare for the possibility of high water at break up;
 - Warm weather and clear skies in the Beaufort Delta over the next five days will expedite breakup and cause ice to start moving soon;
 - Mackenzie River ice is packed into the upper Mackenzie Delta near Point Separation and the mouth of the Peel River;
 - This ice is being held by solid sheet ice in the main channel
 - The water level underneath the ice at Aklavik has been rising quickly, but well within the normal range for breakup;
 - Peak water level will be dependent on how the ice and water move through the many channels of the Delta.

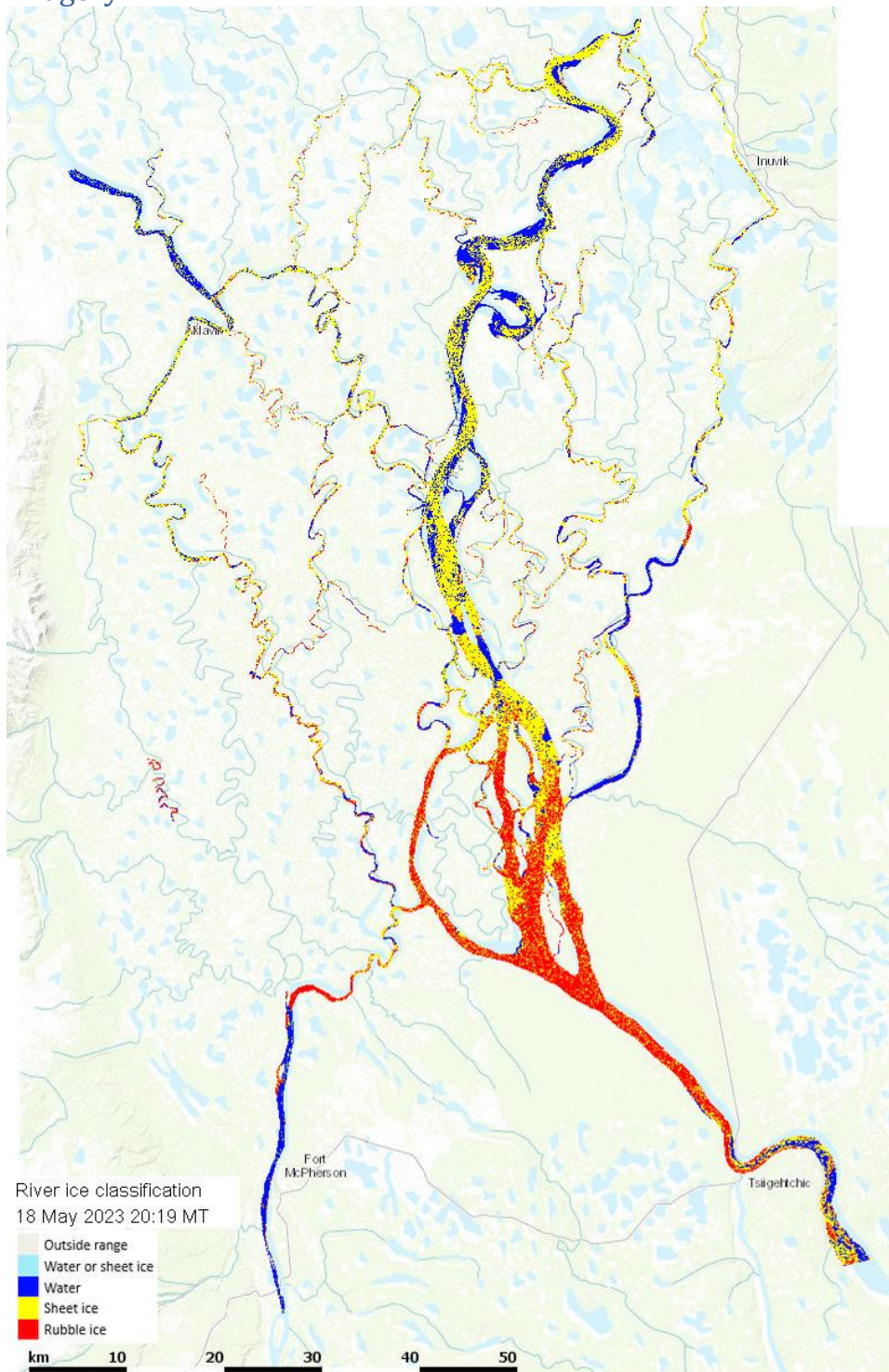
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Beaufort Delta and Peel River:



Imagery:

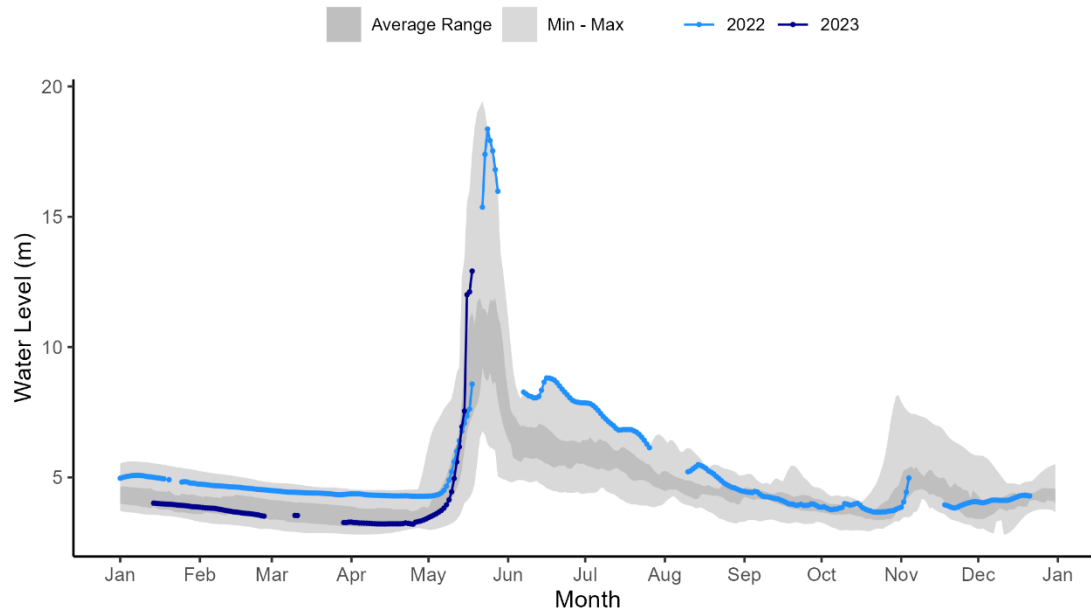


Above – Classified river ice image of the Peel and Mackenzie rivers. The image was acquired on 18 May at 20:19 MT and is courtesy of the federal government’s Government Operations Centre. The river ice classification was completed using the IceBC algorithm. The image shows an ice jam on the Peel River approximately 20 km downstream of Fort McPherson. Ice is packing into the Mackenzie Delta around Point Separation. Note that the blue sections at the north end of the image are likely misclassified as the algorithm is picking up snow or water on top of ice.

Hydrometric Data:

Mackenzie River at Arctic Red River [10LC014]:

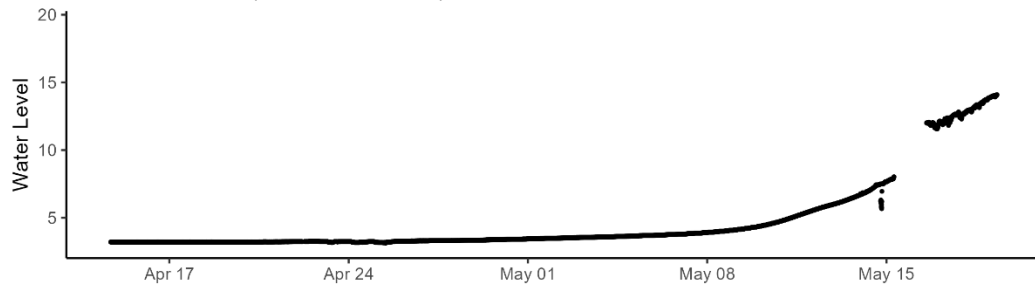
MACKENZIE RIVER AT ARCTIC RED RIVER (10LC014)



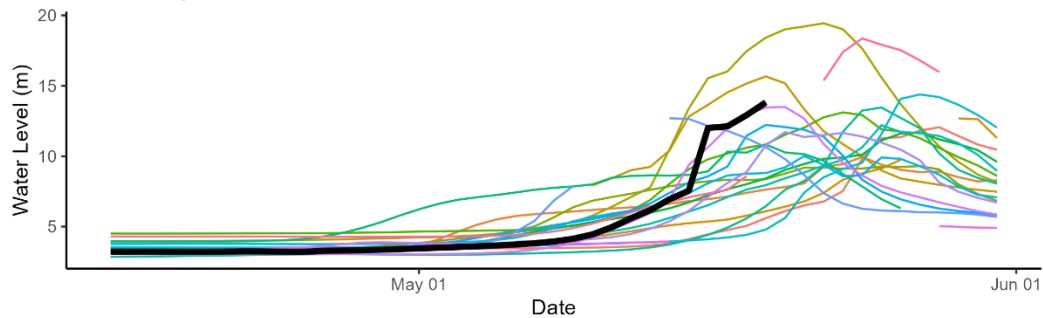
Above – Water level data for the Mackenzie River at Arctic Red River. Daily average levels for this year and the previous year are shown here.

MACKENZIE RIVER AT ARCTIC RED RIVER (10LC014)

2023 Water Levels (5 minute resolution)



Historic Daily Water Levels



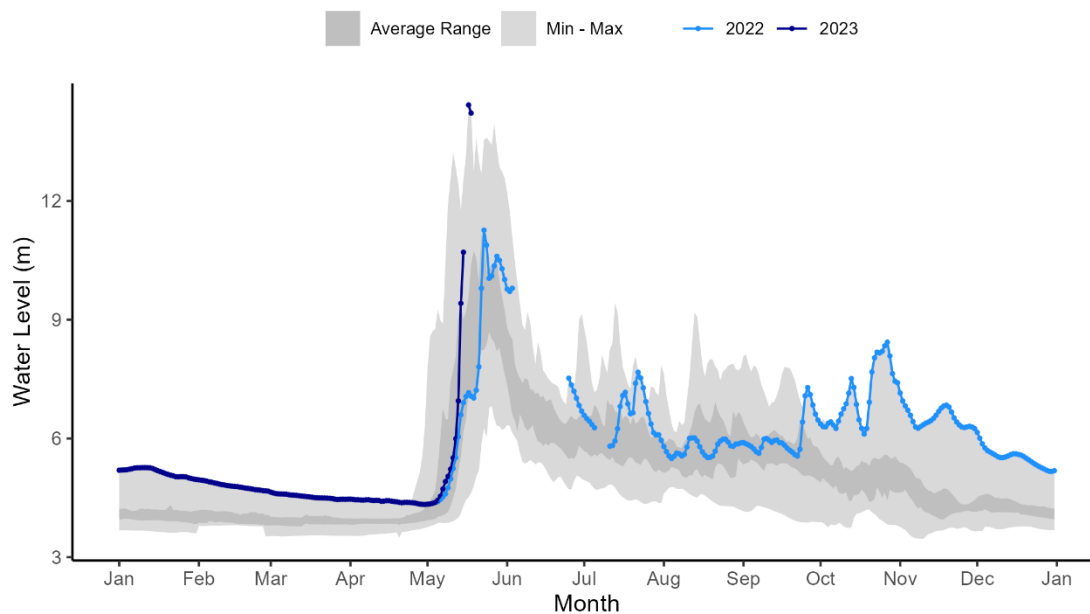
Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.



Above – Mackenzie River at Arctic Red River hydrometric gauge photo from May 19 at 09:00. Photo courtesy of Water Survey of Canada and GNWT.

Peel River above Fort McPherson [10MC002]

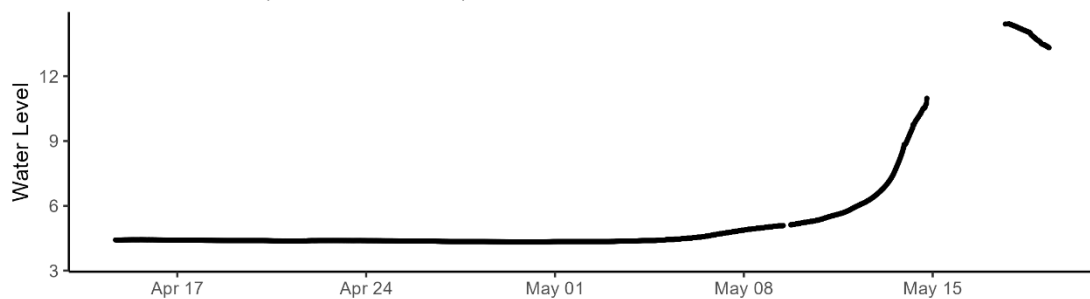
PEEL RIVER ABOVE FORT MCPHERSON (10MC002)



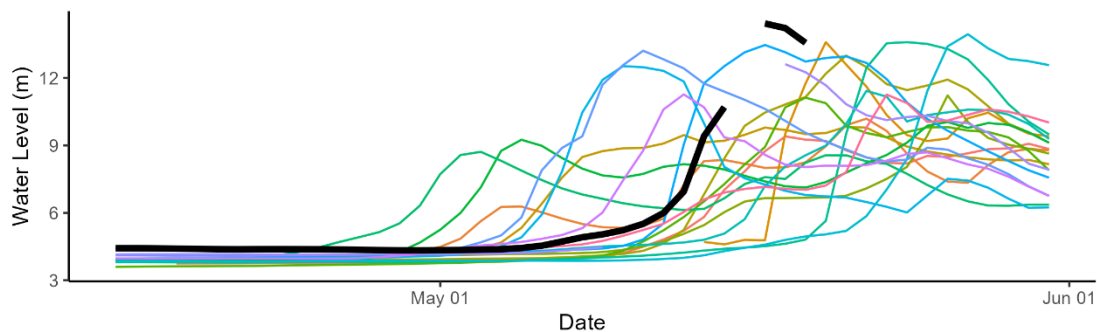
Above – Provisional water level data for the Peel River above Fort McPherson. Daily average levels for this year and the previous year are shown here.

PEEL RIVER ABOVE FORT MCPHERSON (10MC002)

2023 Water Levels (5 minute resolution)

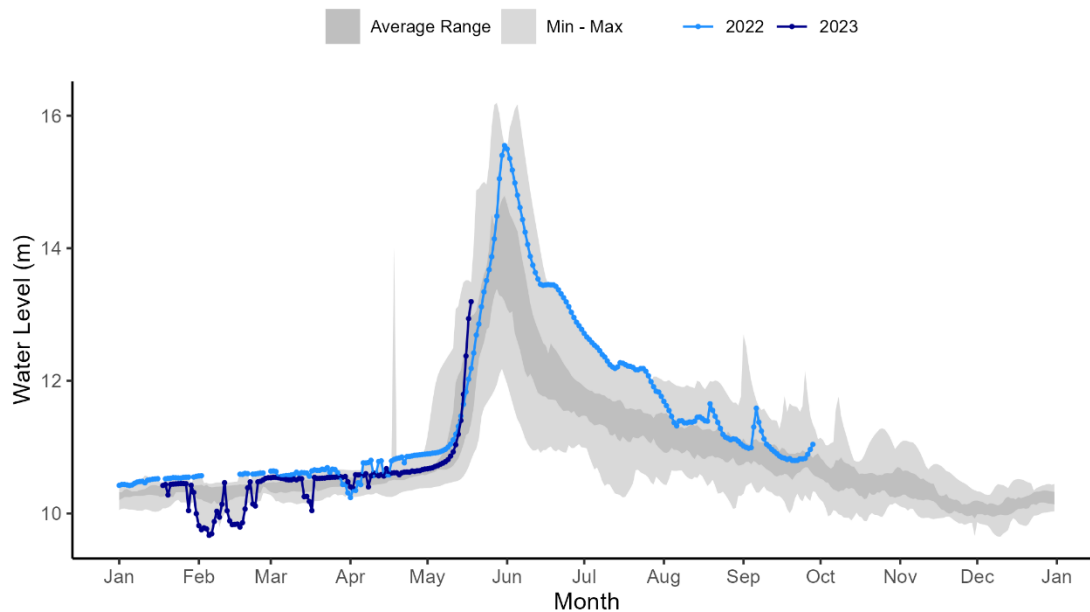


Historic Daily Water Levels



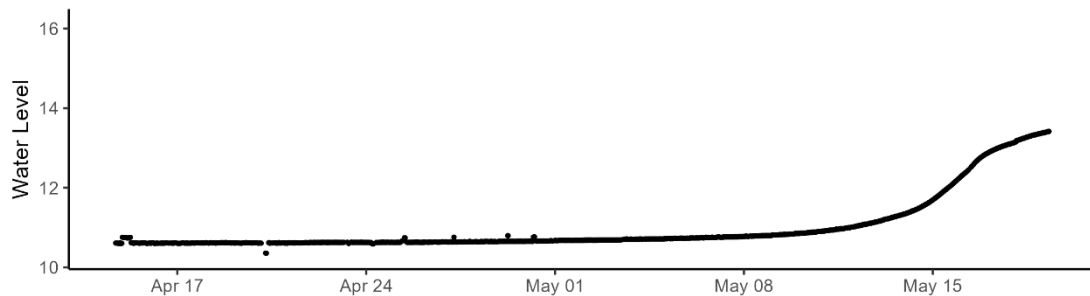
Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Mackenzie River (Peel Channel) above Aklavik [10MC003]:
MACKENZIE RIVER (PEEL CHANNEL) ABOVE AKLAVIK (10MC003)

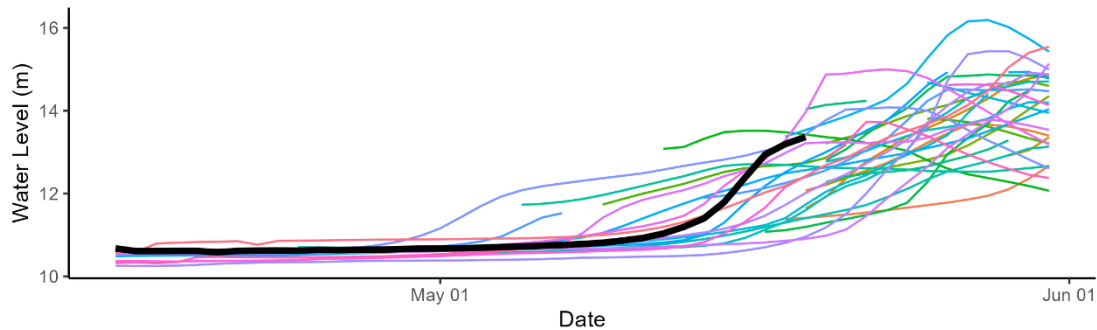


Above – Water level data for the Mackenzie River (Peel Channel) above Aklavik. Daily average levels for this year and the previous year are shown here.

MACKENZIE RIVER (PEEL CHANNEL) ABOVE AKLAVIK (10MC003)
2023 Water Levels (5 minute resolution)



Historic Daily Water Levels



Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

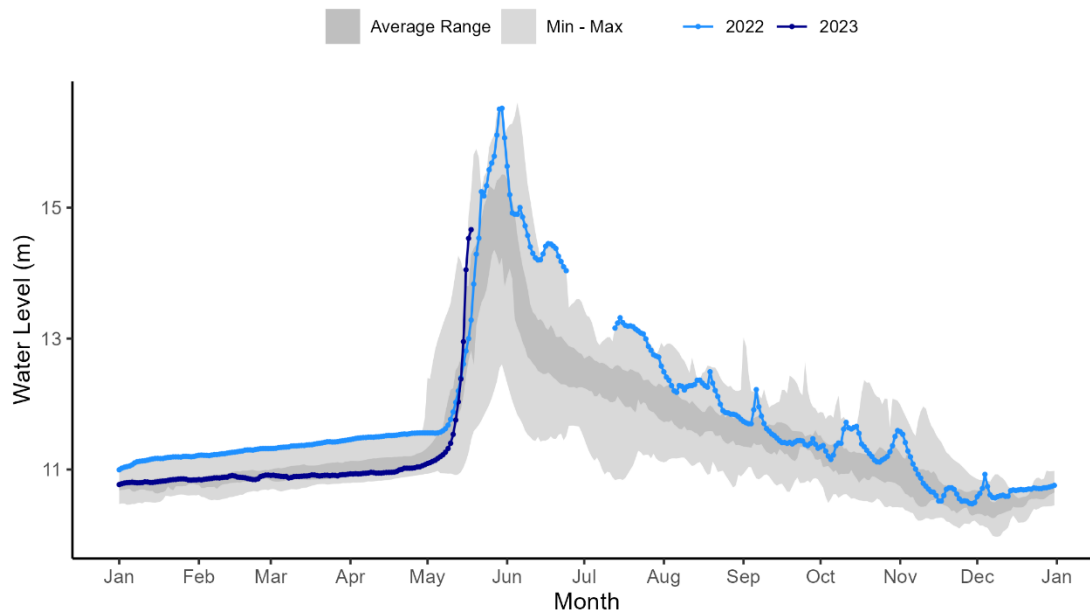


Above – Mackenzie River (Peel Channel) above Aklavik hydrometric gauge photo from May 18 at 19:00. Photo courtesy of Water Survey of Canada and GNWT.



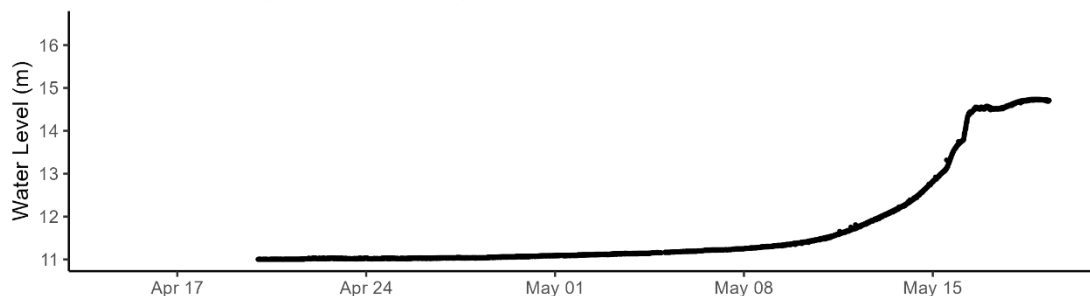
Above – Mackenzie River at Aklavik. May 18 at ~17:00. Photo credit: Cst. Jenna Simms, Aklavik RCMP.

Mackenzie River (Middle Channel) below Raymond Channel [10MC008]:
MACKENZIE RIVER BELOW RAYMOND CHANNEL (10MC008)

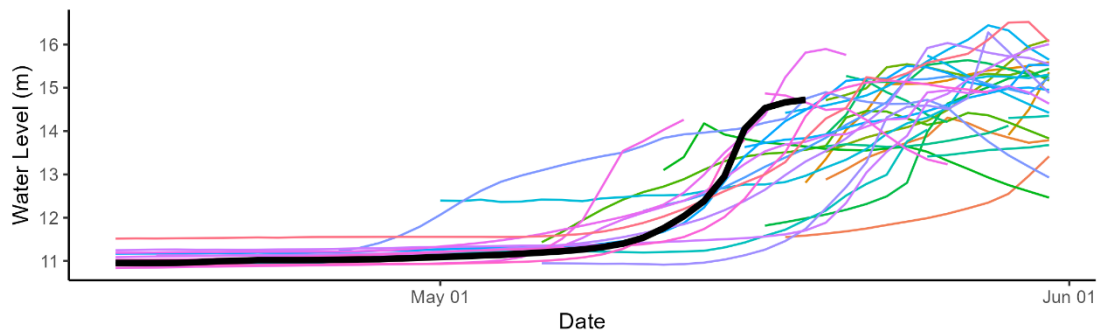


Above – Water level data for the Mackenzie River (Middle Channel) below Raymond Channel. Daily average levels for this year and the previous year are shown here.

MACKENZIE RIVER BELOW RAYMOND CHANNEL (10MC008)
2023 Water Levels (5 minute resolution)



Historic Daily Water Levels

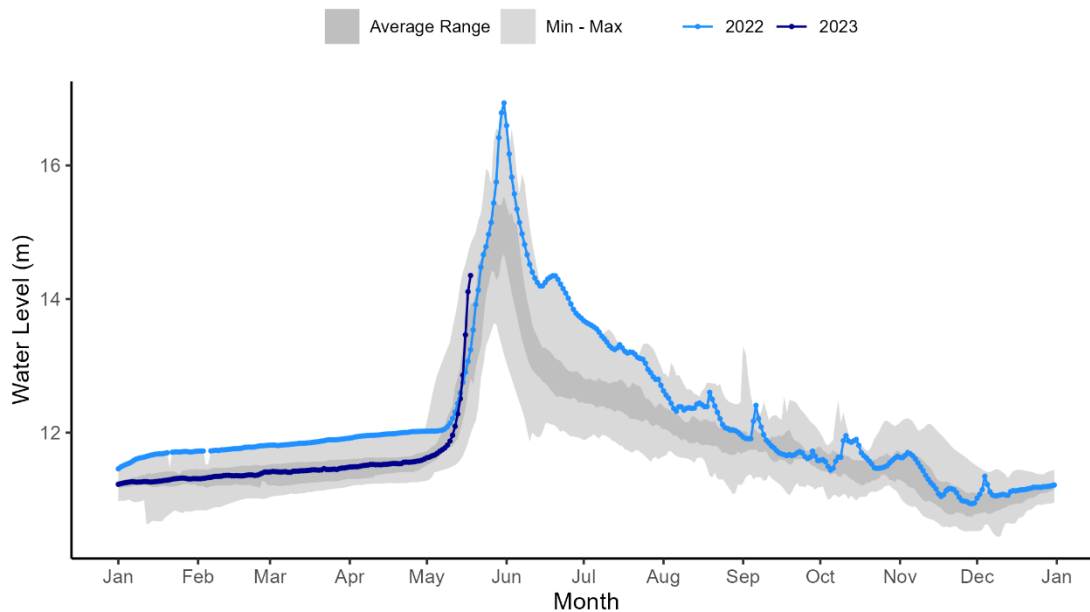


Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.



Above – Mackenzie River (Middle Channel) below Raymond Channel hydrometric gauge photo from May 19 at 09:00. Photo courtesy of Water Survey of Canada and GNWT.

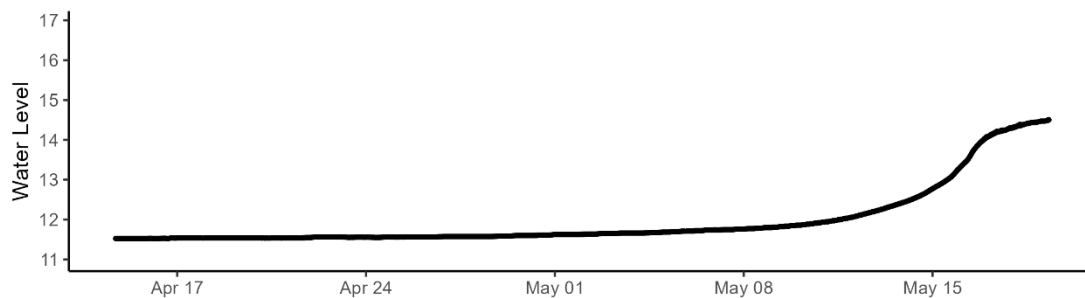
Mackenzie River (East Channel) at Inuvik [10LC002]:
MACKENZIE RIVER (EAST CHANNEL) AT INUVIK (10LC002)



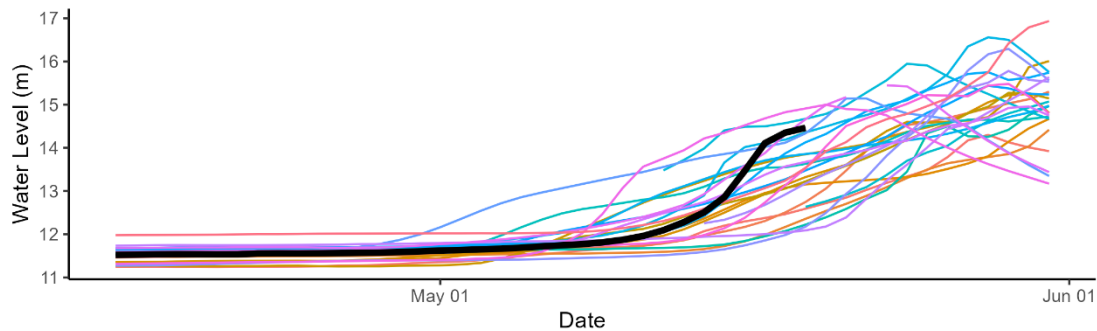
Above – Water level data for the Mackenzie River (East Channel) at Inuvik. Daily average levels for this year and the previous year are shown here.

MACKENZIE RIVER (EAST CHANNEL) AT INUVIK (10LC002)

2023 Water Levels (5 minute resolution)



Historic Daily Water Levels



Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Weather Data:

Current status and forecast:

Weather in the Beaufort Delta is expected to be much warmer than seasonal for the next five days, along with clear skies and sun. This weather should continue to soften river ice and cause ice in the Delta to start moving soon.

Background information and context:

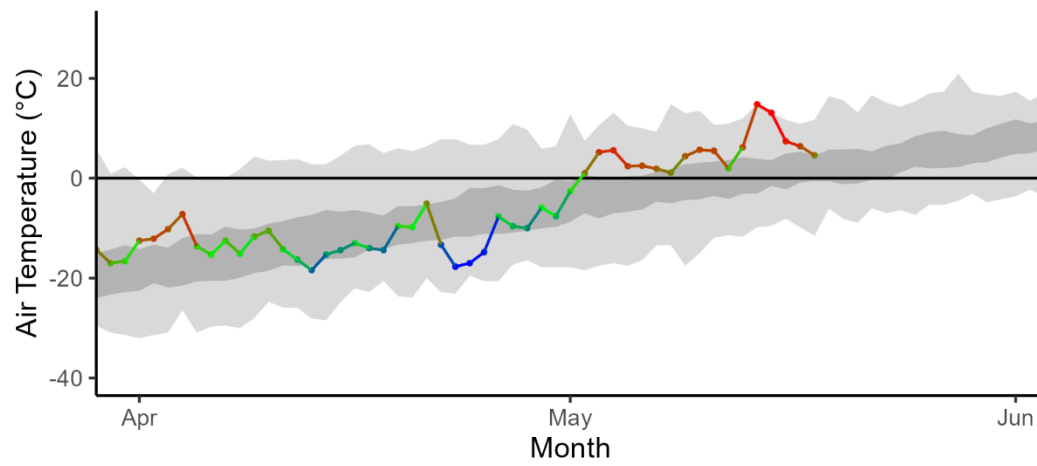
Weather information informs how snow and ice will melt and provides information about how this spring is unfolding relative to previous springs. Warmer than normal conditions early in the spring allow for additional energy to melt the snowpack and soften river ice. Rain-on-snow events can cause rapid melt of snowpacks and facilitate quick delivery of snowmelt water to rivers. Locations included here cover basin areas that feed into NWT rivers that are currently undergoing break up.

There are two sets of figures below. The first set of figures shows daily temperatures relative to normal for select locations in the NWT. The dark grey bands represent the average range of temperatures, while the light grey bands represent historic minimum and maximum daily mean temperatures. The second set of figures present a seven-day weather forecast, provided by Environment and Climate Change Canada.

2023 spring temperatures to-date:

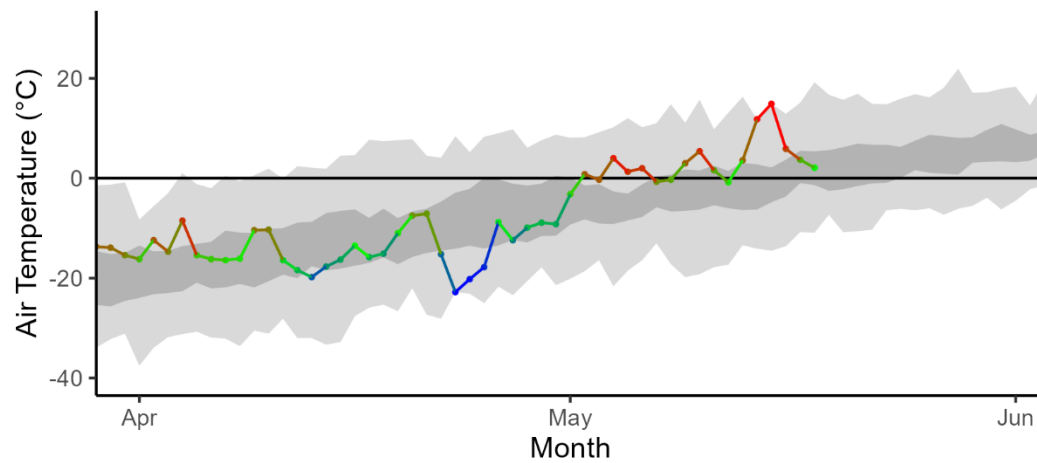
Fort McPherson:

2023 Fort McPherson Mean Daily Air Temperatures
















Inuvik:

2023 Inuvik Mean Daily Air Temperatures
















Seven-day weather forecast:














Fort McPherson:

Fri 19 May	Sat 20 May	Sun 21 May	Mon 22 May	Tue 23 May	Wed 24 May	Thu 25 May
 12°C Mainly sunny	 15°C Mainly sunny	 14°C A mix of sun and cloud	 20°C Sunny	 21°C Sunny	 9°C Cloudy	 9°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 3°C Clear	 3°C Cloudy	 9°C Clear	 7°C Clear	 4°C Cloudy	 1°C Cloudy	

Inuvik:

Fri 19 May	Sat 20 May	Sun 21 May	Mon 22 May	Tue 23 May	Wed 24 May	Thu 25 May
 13°C Mainly sunny	 12°C Mainly sunny	 11°C Sunny	 14°C Sunny	 19°C Sunny	 13°C Cloudy	 12°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 6°C Clear	 0°C Cloudy	 6°C Clear	 5°C Clear	 4°C Cloudy	 -1°C Cloudy	

Aklavik:

Fri 19 May	Sat 20 May	Sun 21 May	Mon 22 May	Tue 23 May	Wed 24 May	Thu 25 May
 13°C Mainly sunny	 9°C Sunny	 11°C Sunny	 13°C Sunny	 20°C A mix of sun and cloud	 7°C Cloudy	 7°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 4°C Clear	 1°C Cloudy periods	 6°C Clear	 5°C Clear	 2°C Cloudy	 -1°C Cloudy	

Factors to Watch:

It is important to note that much of the water contributing to flooding of NWT communities originates from outside of the NWT, which is why we also rely on information from the Yukon, British Columbia, Alberta and Saskatchewan.

The potential and severity of flooding will depend in large part on the weather over the upcoming weeks and how this interacts with existing ice conditions, water levels and snow pack amounts.

The primary factors that influence water levels in the spring are:

- Ice jams (can result in out-of-bank flows, even if there are below normal flows)
- Rate of melt of ice and snow:
 - Gradual vs quick melt
 - Rain on snow or ice events (rain brings a lot of energy to help melt happen more quickly)
- Current water levels
- How wet the ground was in the fall
- Snowpack

Spring Break up on NWT Rivers: Mechanical vs Thermal

In any given year, spring flooding can occur in a number of NWT communities, including Hay River, Jean Marie River, Fort Simpson, Fort Liard, Nahanni Butte, Tulita, Fort Good Hope, Fort McPherson and Aklavik. Spring flooding is caused by ice jam-induced flooding and can occur irrespective of existing water levels. However, if existing water levels are high, the impact of an ice jam flood can be much worse.

Ice jams typically form when on north-flowing rivers, where warm weather and snowmelt cause ice to break up on the southern reaches of a river. As this ice flows north (downstream), it meets a more solid ice cover. When this happens, the pieces of floating ice jam on the solid ice and can form a dam, which causes water levels to rise rapidly. This is called a **mechanical break up**, whereby the ice downstream is broken up by the force of ice moving into it.

If there is warm and sunny weather throughout early spring, the ice will thermally erode and weaken. This provides less of a resisting force for ice and water moving down the river and will have less of a chance of causing water levels to rise. This is called a **thermal break up**.

The causes of mechanical and thermal break ups are usually dependent on the weather during early spring. Warm weather, sunshine, and rain on snow events are usually a good way to bring extra energy into the system to help melt the ice. Warm temperatures in the upstream part of a basin could also cause a rapid snowmelt and move water to the river very quickly. This could lead to ice-jam conditions downstream if the ice has not yet received enough energy to degrade. Another important factor is the thickness of the ice. Thicker ice takes longer to melt and can increase the chances of ice jams. If an ice jam occurs, the location of the ice jam is also very

important. Each river reach has different locations that are prone to ice jams. The location of the ice jam can be an important factor as to whether or not a community floods. Furthermore, ice will jam and then move again at multiple locations along a river as break up progresses downstream. The timing and location of each jam can also influence if a community will flood.

Technical Note:

- The figures in this report plot water levels. The values on the y-axis are (in most cases) relative to an arbitrary datum. This means that the values on each gauge can be compared to different years but should not be used to compare water levels from one location to the next.

For example, the Hay River near the border gauge (07OB008) records a level of about 288 m. The Hay River near Hay River gauge (07OB001) usually records a level of about 4 m. This **does not mean** that the water level at the Hay River at the border site is 284 m higher than the water level at the Hay River near Hay River site.