Government of
Northwest Territories

NWT Water Monitoring Bulletin – May 17, 2023 at 16:00

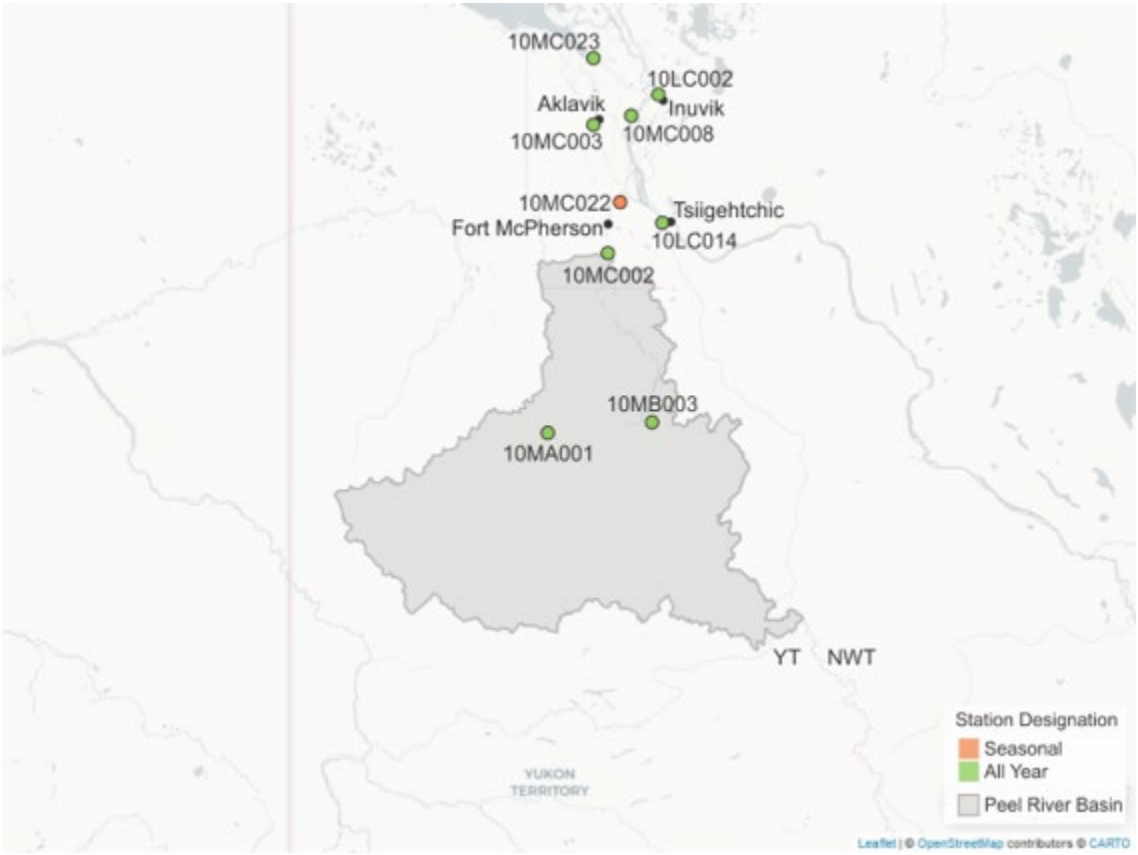
NWT break up reports will be published routinely as break up unfolds. These reports will focus on regions with active snowmelt and ice break up. The geographic focus of the report will shift as conditions change. Additional information about basin conditions can be found in the ECC Snow Survey Bulletin 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;
- As of 10:00 this morning, a 25 km long ice jam was present on the Peel River;
    - The ice jam was maintaining high water on the Peel River at Fort McPherson;
    - The ice jam was sitting about 15 km upstream of Fort McPherson and extended 10 km downstream of the community;
    - There was approximately 10 km of solid ice remaining below the toe (most downstream extent) of the ice jam.
- Reports have indicated that the ice jam started moving at 12:30 today, and is still moving as of 15:30, with water levels dropping since that time;
    - The water levels around Fort McPherson will depend on how ice continues to clear on the Peel River;
- Residents in Aklavik should prepare for high water at break up if a strong ice jam forms at the mouth of the Peel River and water backs up through the Peel Channel;
- Water Survey of Canada technicians are installing a temporary gauge on the Peel River this afternoon and provided the photographs in this report;
- Local ice on the Mackenzie River at Tsiigehtchic has moved;
    - As of yesterday at 14:00, satellite imagery indicates an ice jam approximately 40 km upstream of Tsiigehtchic (on the Mackenzie River) that has been holding back the majority of Mackenzie River ice;
    - Photographs from the gauge on the Mackenzie River at Tsiigehtchic show that the ice is starting to move into the Mackenzie Delta.

Contents

Beaufort Delta and Peel River:



Imagery:

Above – An image of the Peel River as of 10:00 this morning. The red line is the ice jam and the yellow line is the solid ice below it. Note that the photos are the opposite orientation of the map (i.e. the photos are facing upstream). There are reports that the ice jam broke and began to move as of 12:30 this afternoon. Photos are courtesy of the Water Survey of Canada.

Above – An image of the Peel River as of 10:00 this morning. This is a photo of 8 Mile at the ferry crossing. The upstream end of the ice jam can be seen at the top right of the picture. Photo credit: Ryan Lennie, Water Survey of Canada.

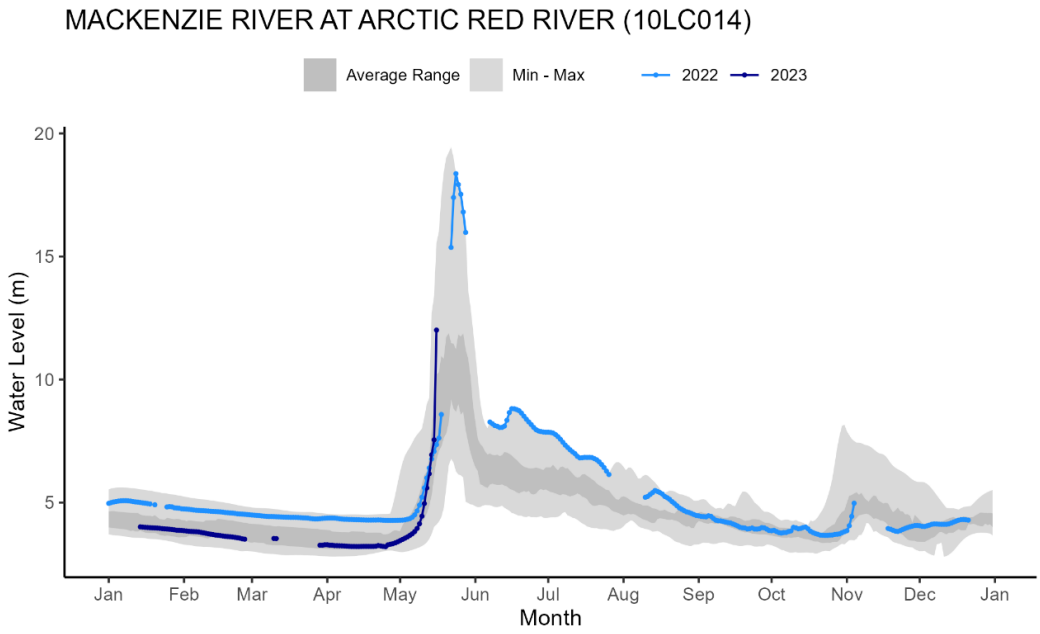
Above – An image of the Peel River as of 10:00 this morning. This is a photo of the ice jam at Fort McPherson. Photo credit: Ryan Lennie, Water Survey of Canada.

Above – An image of the Peel River as of 10:00 this morning. This is a photo of the ice jam downstream of Fort McPherson. Photo credit: Ryan Lennie, Water Survey of Canada.

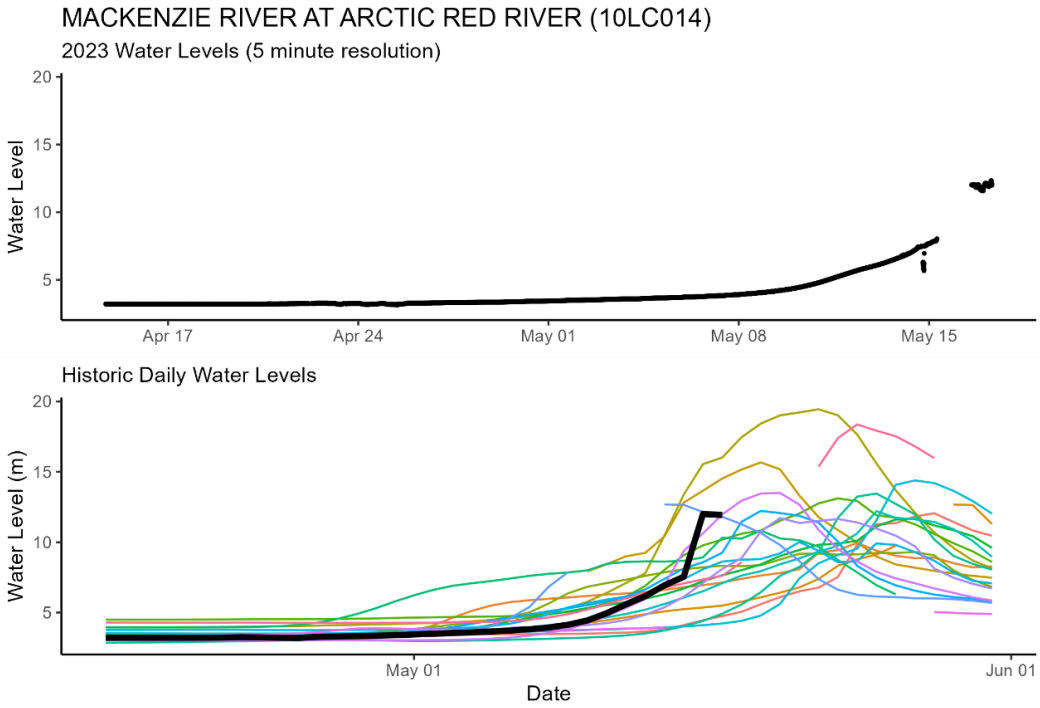
Above – An image of the Peel River as of 10:00 this morning. This is a photo of the lower part of the solid ice cover near the mouth of the Peel River where it empties into the Mackenzie Delta. The Peel Channel of the Mackenzie Delta can be faintly observed near the top of the photo. Photo credit: Ryan Lennie, Water Survey of Canada.

Hydrometric Data:

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.



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 17 at 15:00. Photo courtesy of Water Survey of Canada and GNWT.

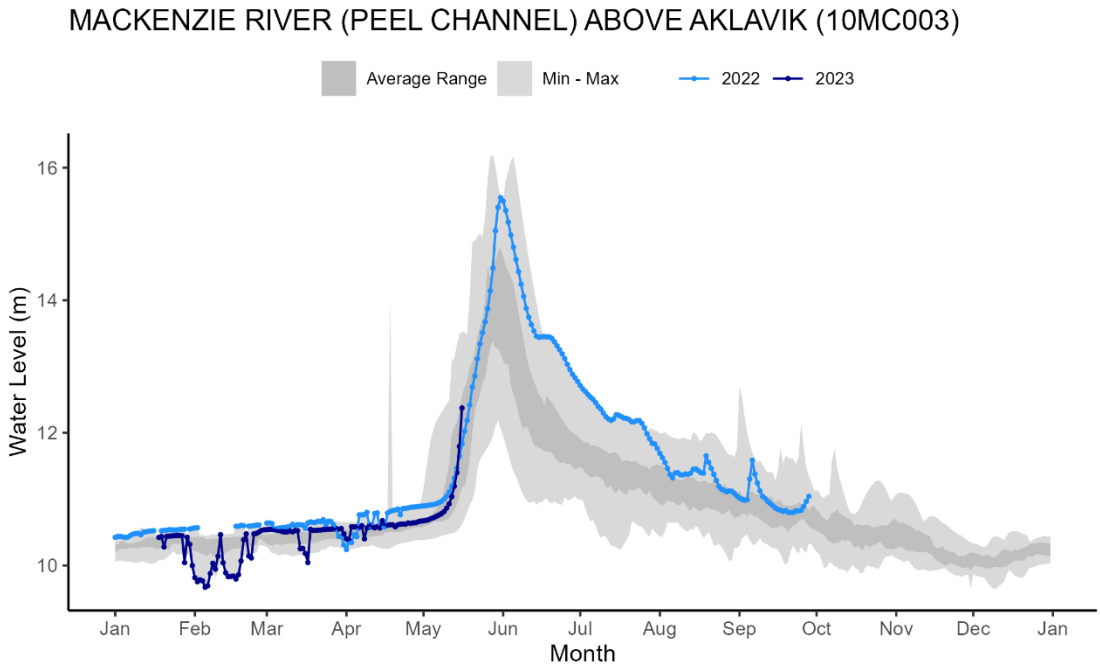
Peel River above Fort McPherson [10MC002]

Note: The hydrometric gauge and the camera have been impacted by ice and are not producing data at this location.

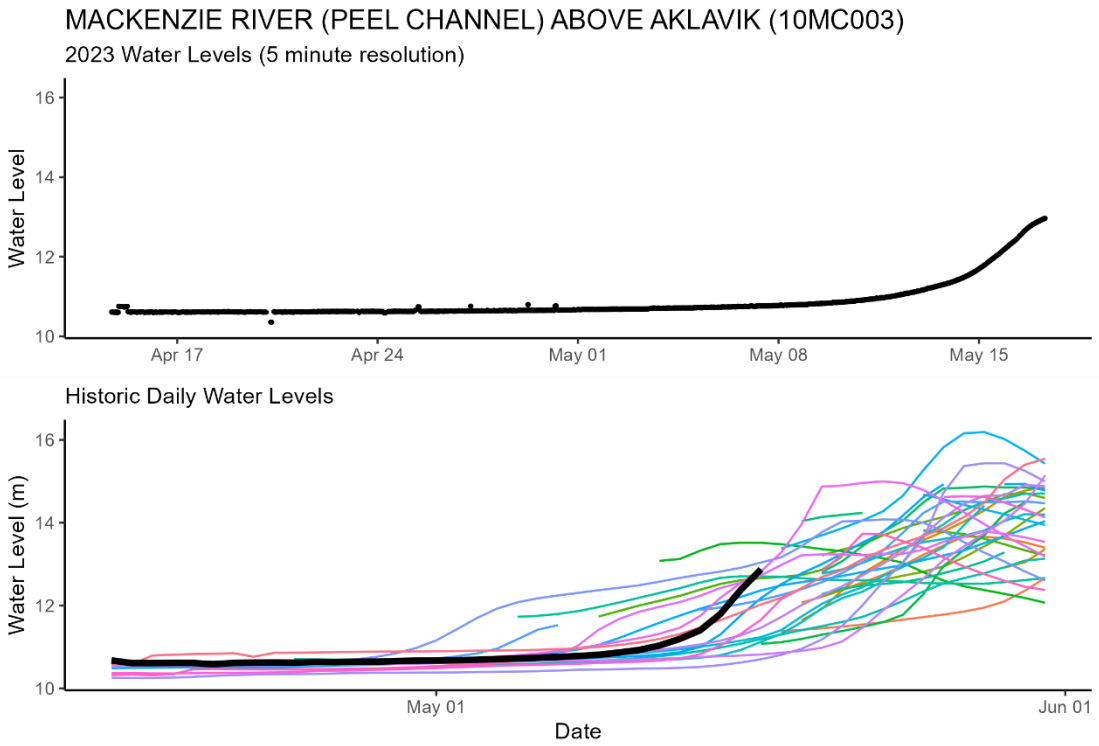
Arctic Red River near the mouth [10LA001]

Note: The hydrometric gauge has been impacted by ice and is not producing data at this location.

Mackenzie River (Peel Channel) above Aklavik [10MC003]:



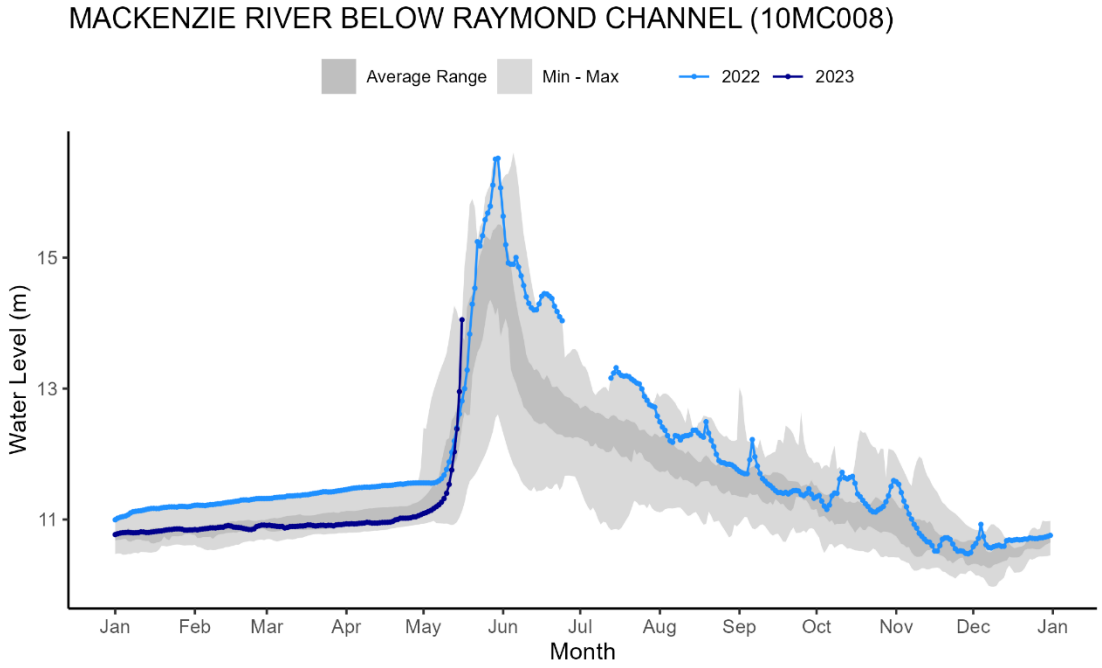
Above – Water level data for the Mackenzie River (Peel Channel) above Aklavik. Daily average levels for this year and the previous year are shown here.



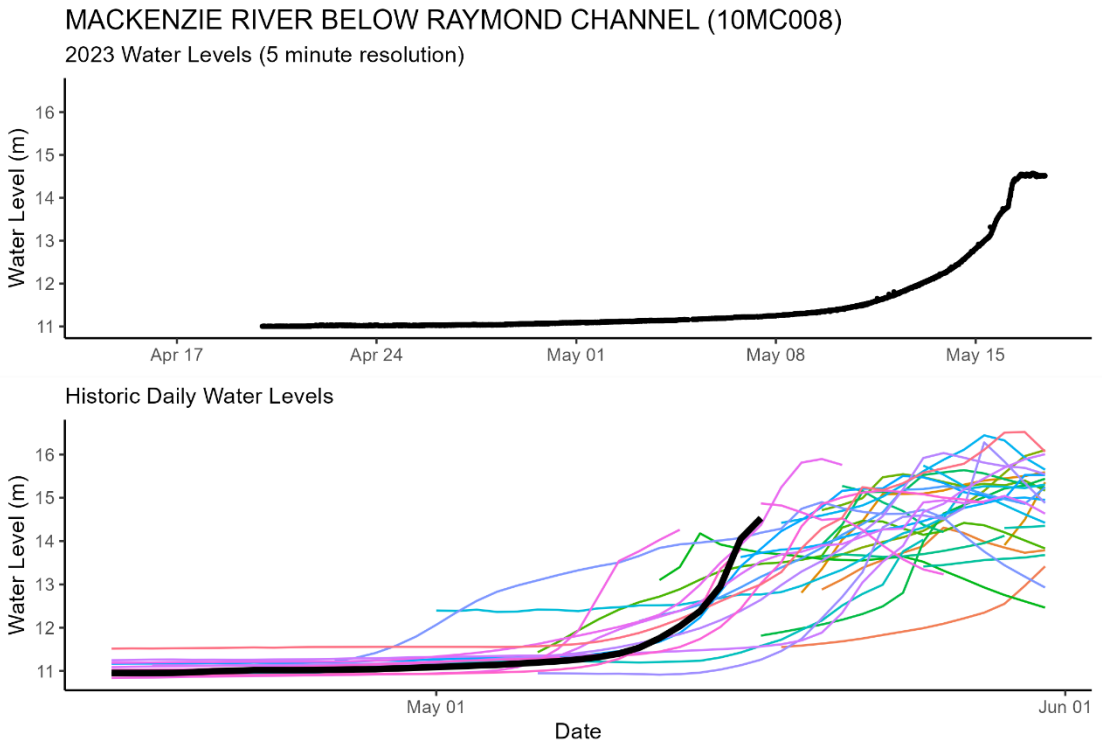
Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Above – Mackenzie River (Peel Channel) above Aklavik hydrometric gauge photo from May 17 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

Mackenzie River (Middle Channel) below Raymond Channel [10MC008]:



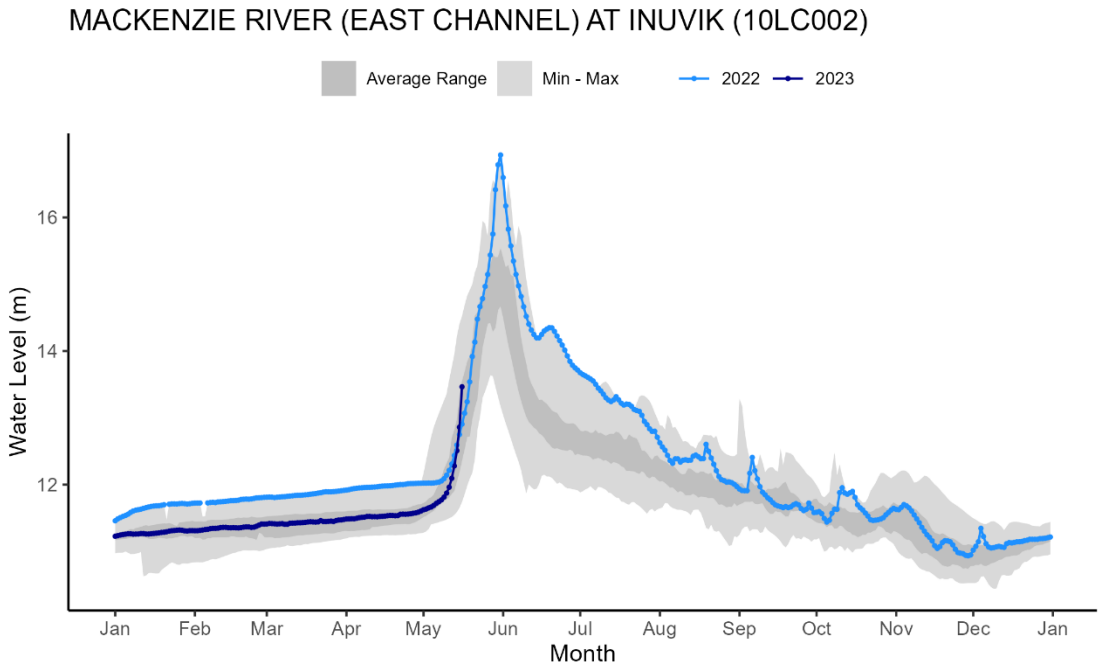
Above – Water level data for the Mackenzie River (Middle Channel) below Raymond Channel. Daily average levels for this year and the previous year are shown here.



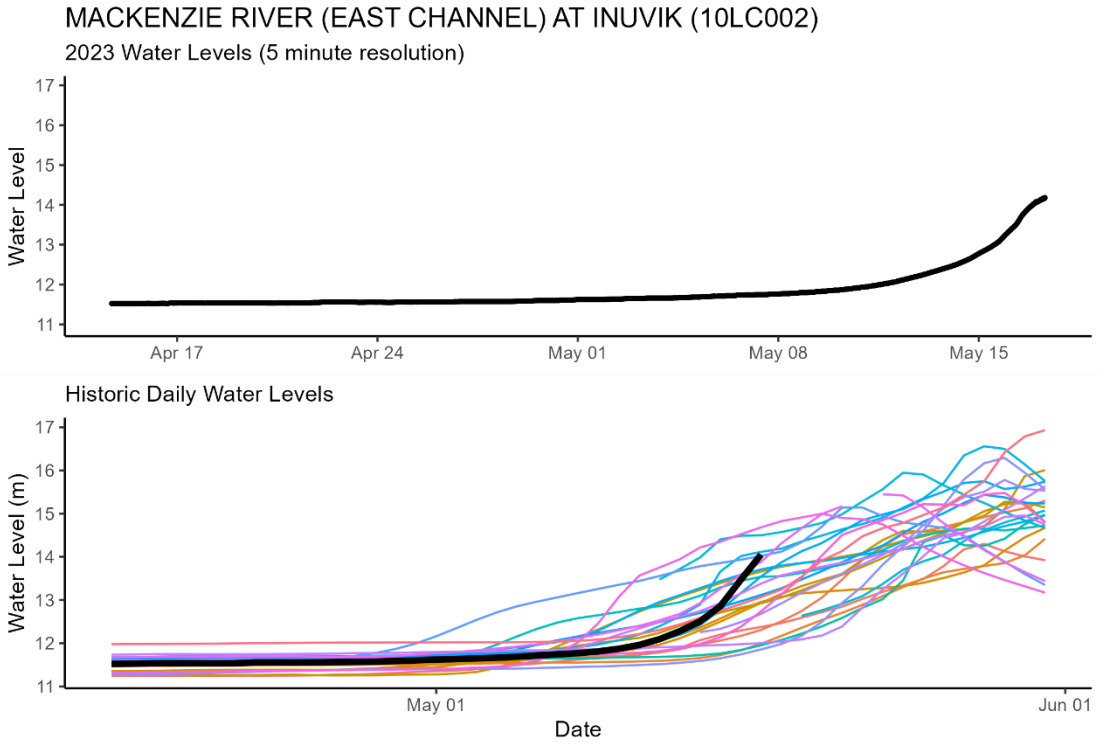
Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Above – Mackenzie River (Middle Channel) below Raymond Channel hydrometric gauge photo from May 17 at 15:00. Photo courtesy of Water Survey of Canada and GNWT.

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.



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:

Variable conditions are expected over the next 3-5 days. Warm temperatures near Fort McPherson (up to around 15C in the daytime and above freezing at night) might help to thaw Peel River ice. Precipitation is no longer forecast for the Peel River basin tomorrow. Temperatures are cooler in the Delta (daytime highs up to 10C and still below freezing at night), which might slow the progression of break-up through the Delta. Some precipitation (5-15mm) is forecast for the Peel River basin on Saturday and Sunday, which will encourage more snowmelt in the basin.

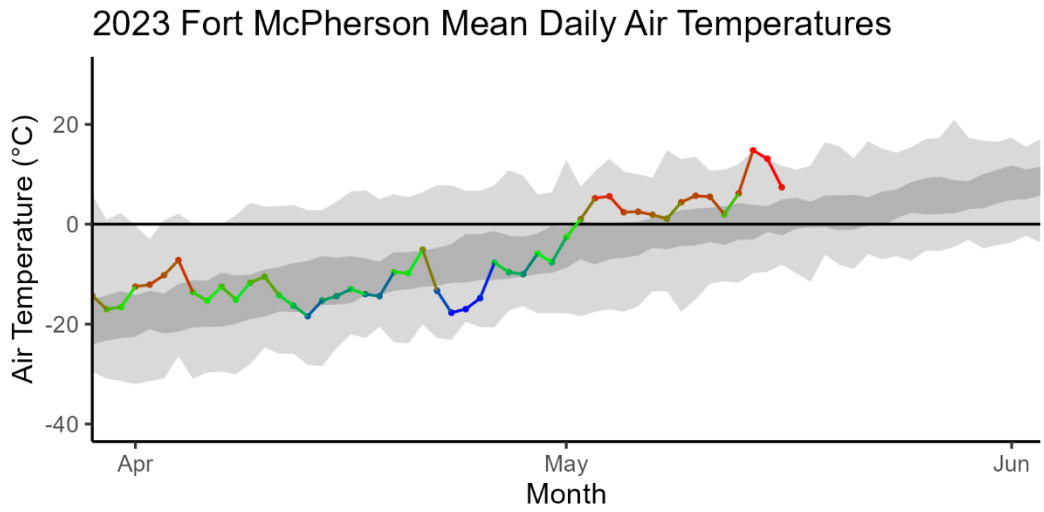
Background information and context:

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.

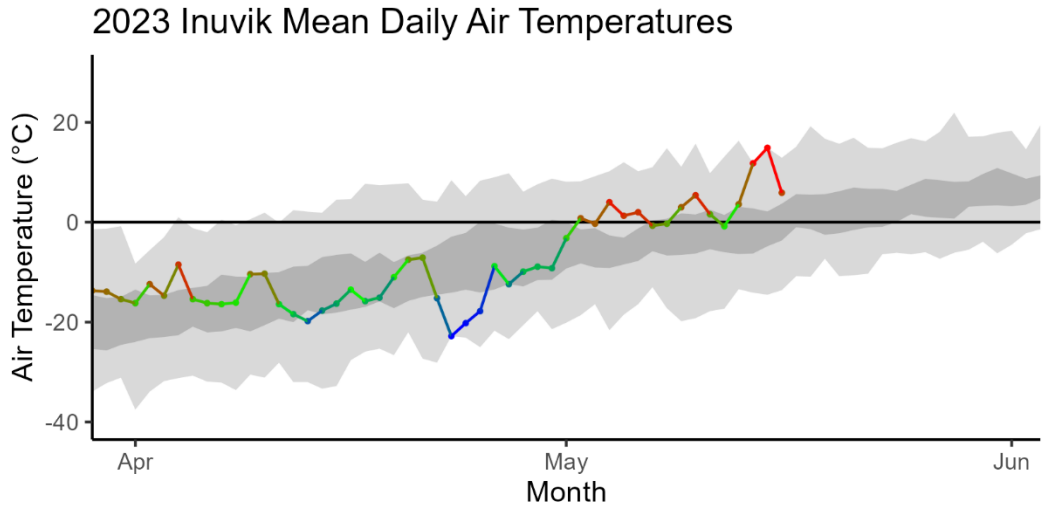
There are two sets of figures below. The first set of figures shows daily temperatures relative to normal for select locations in the NWT. The dark grey bands represent the average range of temperatures, while the light grey bands represent historic minimum and maximum daily mean temperatures. The second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

2023 spring temperatures to-date:

Fort McPherson:



Inuvik:



Seven-day weather forecast:

Fort McPherson:

Wed 17 May	Thu 18 May	Fri 19 May	Sat 20 May	Sun 21 May	Mon 22 May	Tue 23 May
13°C	6°C	12°C	16°C	12°C	9°C	10°C
Mainly sunny	A mix of sun and cloud	Sunny	A mix of sun and cloud	Sunny	A mix of sun and cloud	A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
0°C	-3°C	5°C	4°C	1°C	1°C	
A few clouds	Clear	Clear	Cloudy	Cloudy periods	Cloudy periods	

Inuvik:

Wed 17 May	Thu 18 May	Fri 19 May	Sat 20 May	Sun 21 May	Mon 22 May	Tue 23 May
8°C 30% Chance of flurries	3°C 60% Chance of flurries	10°C Sunny	13°C A mix of sun and cloud	11°C A mix of sun and cloud	14°C A mix of sun and cloud	14°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
-1°C	-3°C	4°C	1°C	0°C	0°C	
Increasing cloudiness	Cloudy periods	Clear	Cloudy periods	Cloudy periods	Cloudy periods	

Aklavik:

Wed 17 May	Thu 18 May	Fri 19 May	Sat 20 May	Sun 21 May	Mon 22 May	Tue 23 May
4°C	3°C 30% Chance of flurries	10°C Sunny	9°C Cloudy	8°C A mix of sun and cloud	8°C A mix of sun and cloud	9°C A mix of sun and cloud
A mix of sun and cloud						
Tonight	Night	Night	Night	Night	Night	
0°C	-1°C	4°C	2°C	0°C	0°C	
A few clouds	Clear	Clear	Cloudy periods	Cloudy periods	Cloudy periods	

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.