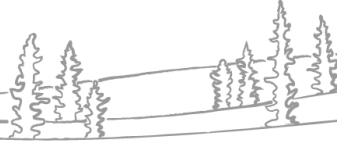




NWT Water Monitoring Bulletin

– May 21, 2023 at 14:00



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.

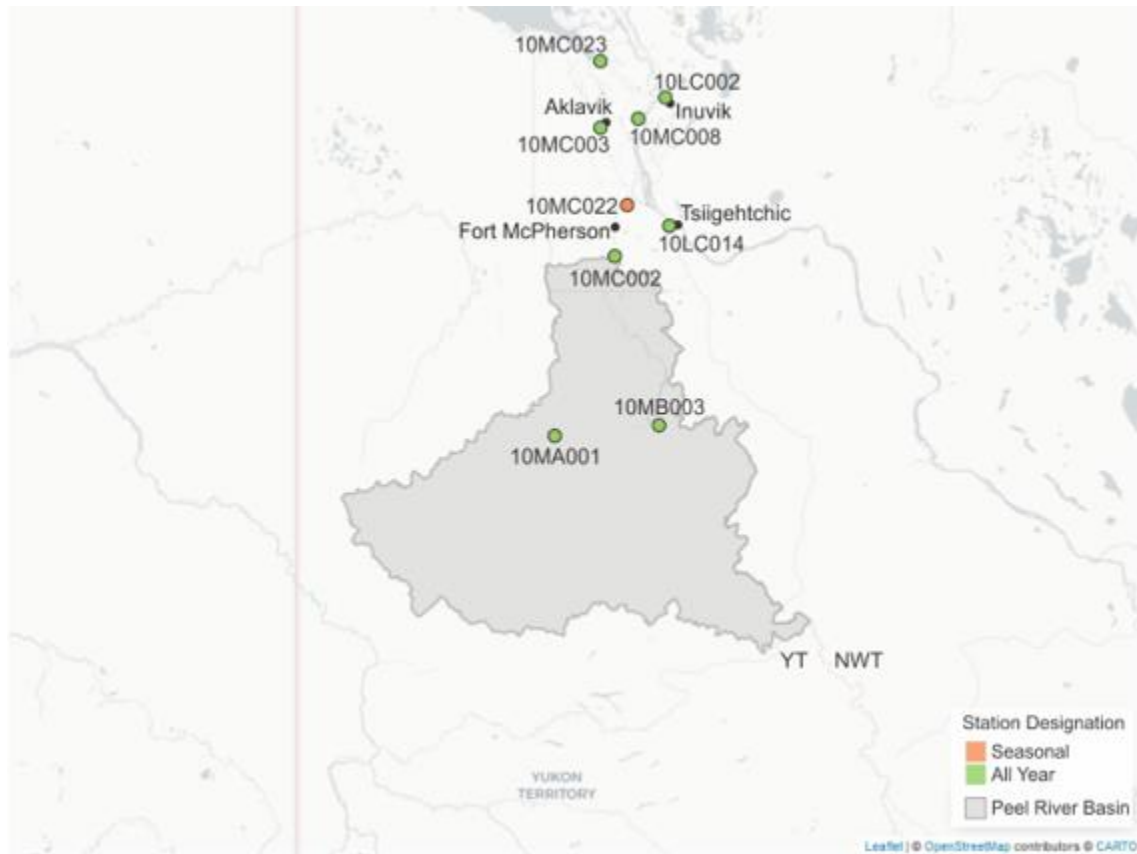
Current Status:

- The water level on the Peel River at Fort McPherson has likely continued to recede since reaching its peak on Thursday (18 May);
 - The temporary gauge location is likely no longer connected to the Peel River, suggesting that levels have dropped but this cannot be confirmed with the data;
- Water levels on the Mackenzie River at Tsiigehtchic remain stable as the build up of ice just downstream remains in place;
 - 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;
 - Solid sheet ice has begun to shift locally on the Middle Channel;
- Satellite imagery shows that solid sheet ice has started to shift at Aklavik;
 - Imagery was acquired at 20:35 MT yesterday (20 May) evening;
 - Residents of Aklavik should remain vigilant as water levels can change rapidly as ice moves through channels in the Delta;
 - Water levels in Aklavik continue to rise, but are within the normal range expected for this stage of break up;
 - The water level in Aklavik will be dependent on how ice and water clear through the Delta over the coming days;
 - Aklavik and Inuvik are forecast to receive extremely warm temperatures with clear skies tomorrow, which should continue to soften and move ice through the Delta.

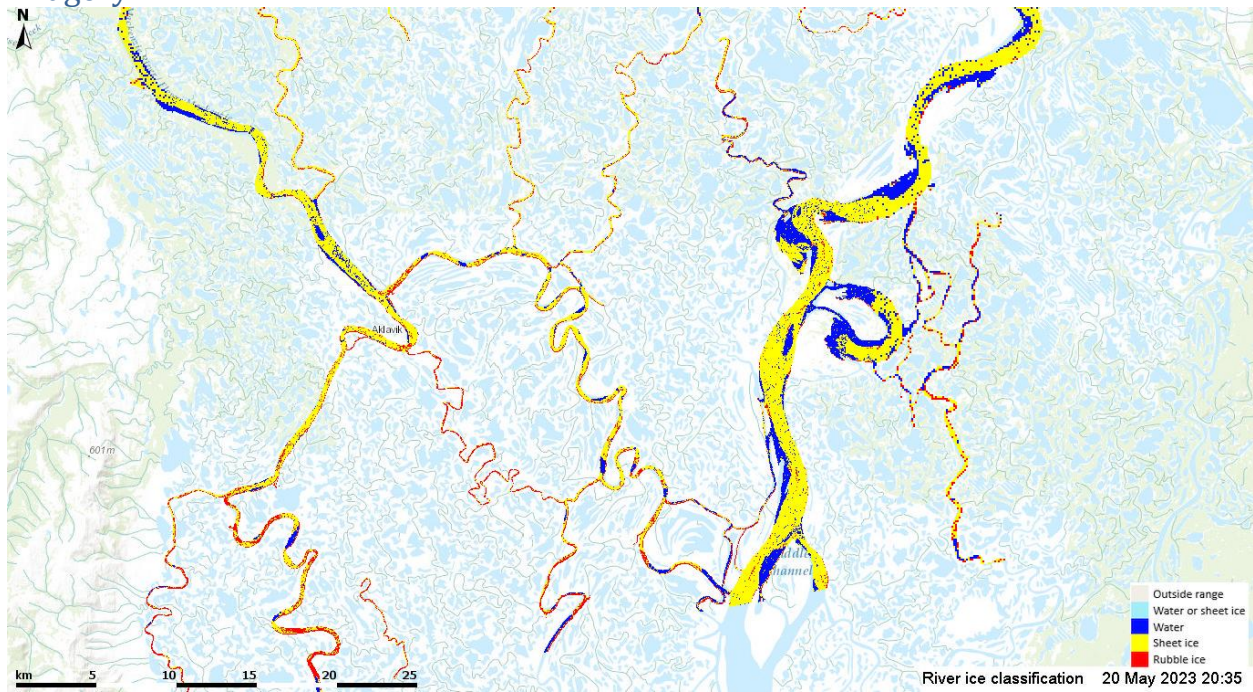
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Beaufort Delta and Peel River:



Imagery:



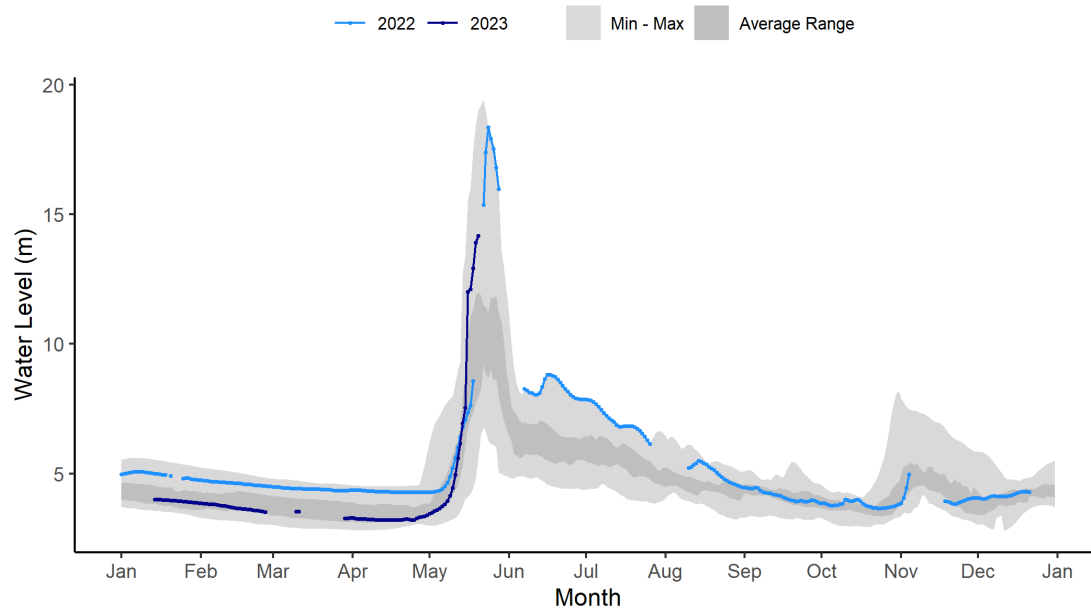
Above – Classified river ice image of the Peel and Mackenzie rivers and the Mackenzie River Delta. The image was acquired yesterday evening at 20:35 and is courtesy of the federal government’s Government Operations Centre. The river ice classification was completed using the IceBC algorithm.

The image shows that the solid sheet ice (yellow in figure) near Aklavik has started to shift locally. Ice jams are forming in the Peel Channel but the rubble ice (red) is still backed up behind sheet ice. Sheet ice has started to shift in the Middle Channel, but as of last night the main ice jam at the Turtle had not yet broken.

Hydrometric Data:

Mackenzie River at Arctic Red River [10LC014]:

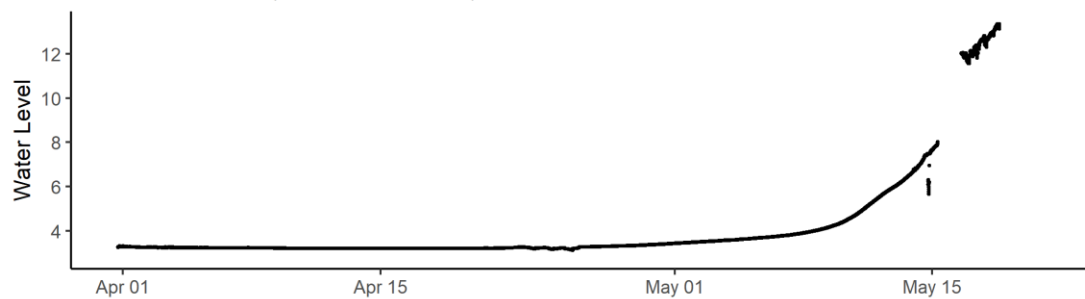
MACKENZIE RIVER AT ARCTIC RED RIVER (10LC014)



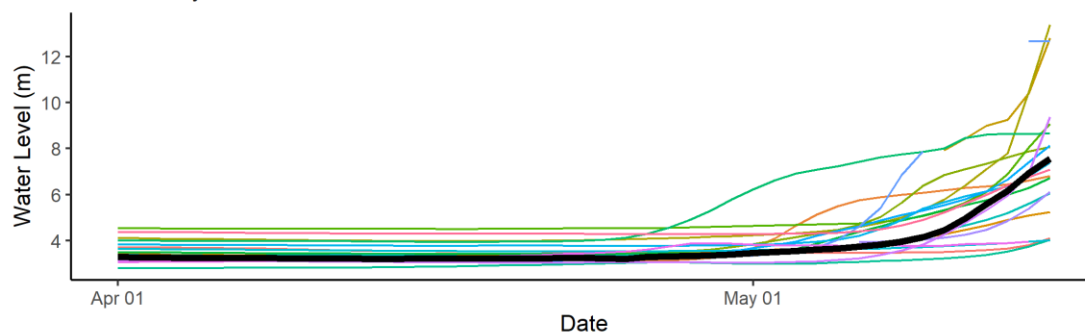
Above – Water level data for the Mackenzie River at Arctic Red River. Daily average levels for this year and the previous year are shown here.

MACKENZIE RIVER AT ARCTIC RED RIVER (10LC014)

2023 Water Levels (5 minute resolution)



Historic Daily Water Levels



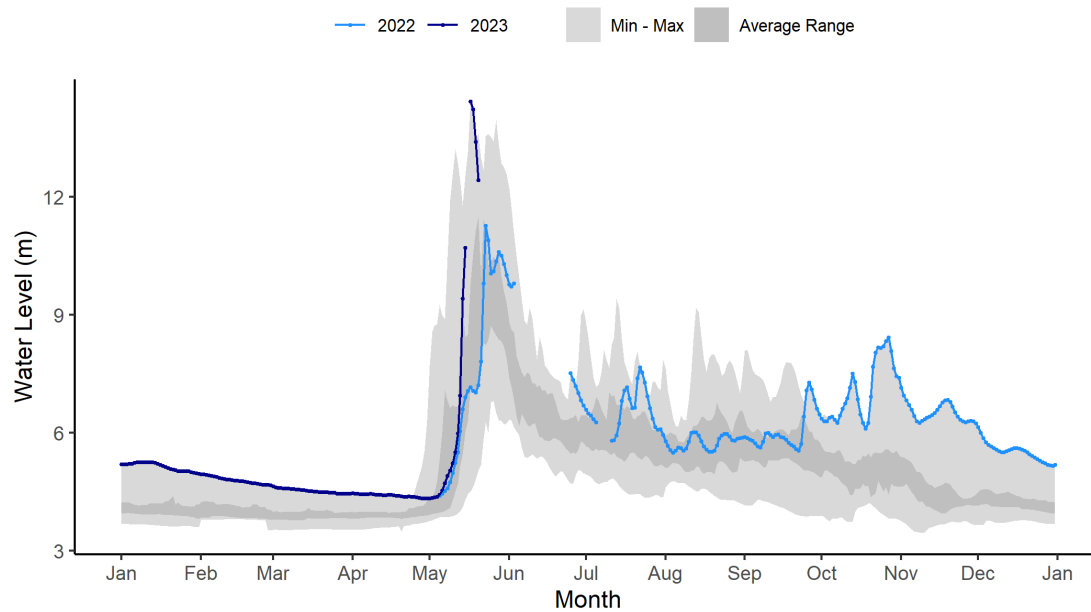
Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.



Above – Mackenzie River at Arctic Red River hydrometric gauge photo from May 21 at 09:00. Photo courtesy of Water Survey of Canada and GNWT.

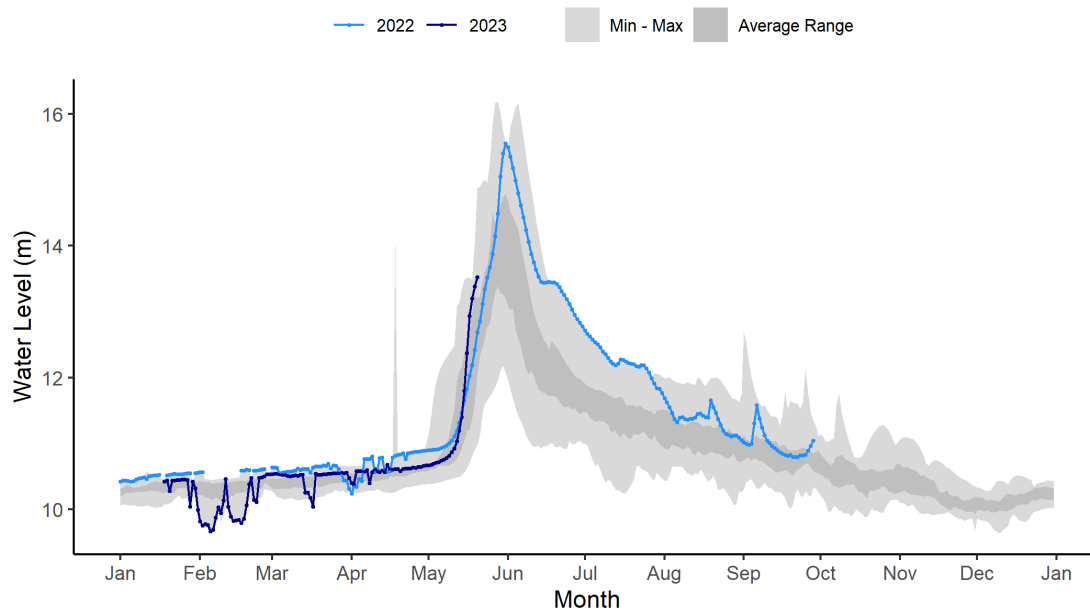
Peel River above Fort McPherson [10MC002]

PEEL RIVER ABOVE FORT MCPHERSON (10MC002)

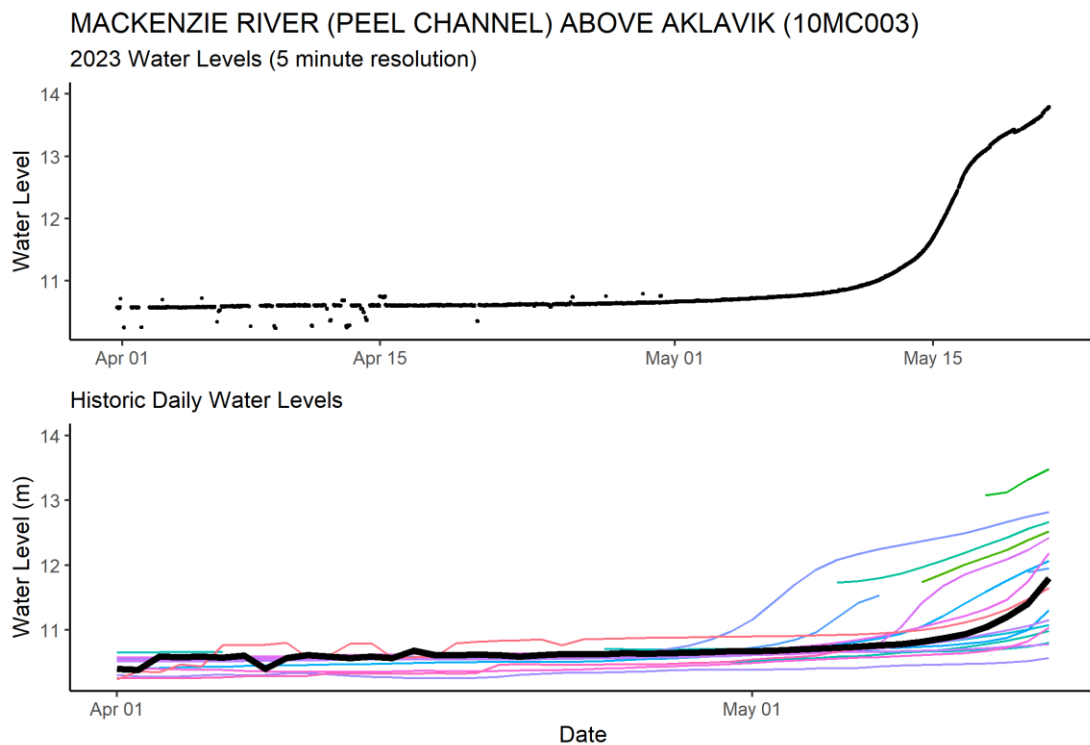


Above – Provisional water level data for the Peel River above Fort McPherson. Daily average levels for this year and the previous year are shown here.

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

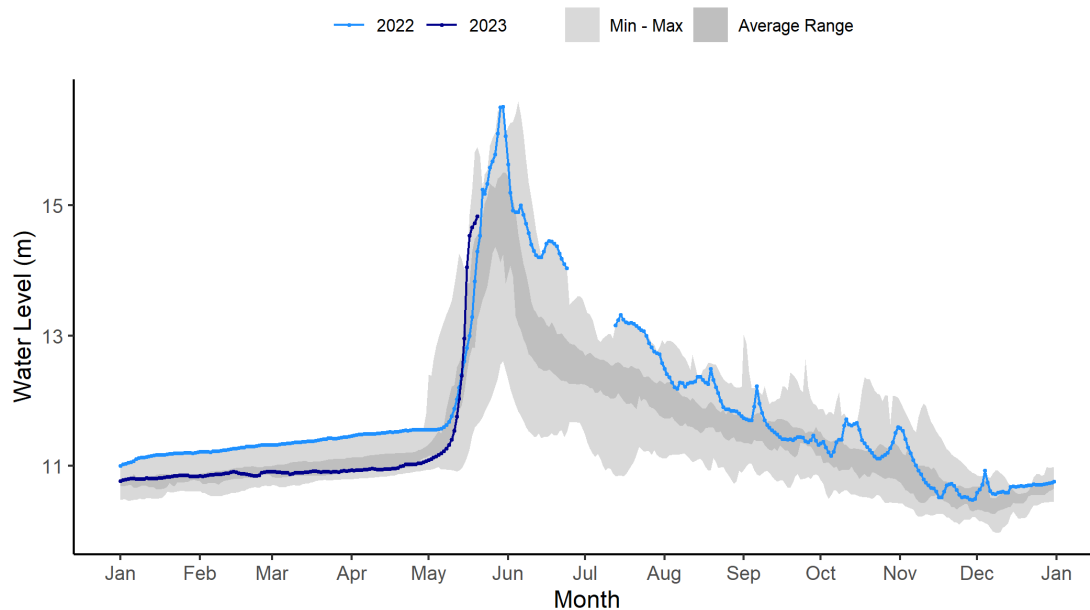


Above – Water level data for the Mackenzie River (Peel Channel) above Aklavik. Daily average levels for this year and the previous year are shown here.



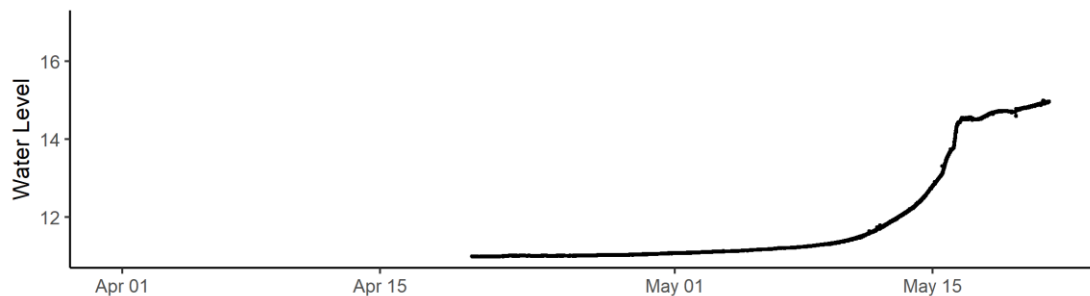
Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

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

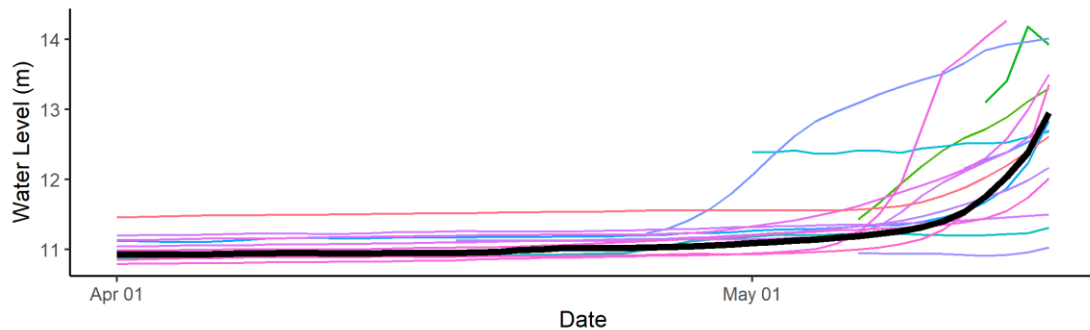


Above – Water level data for the Mackenzie River (Middle Channel) below Raymond Channel. Daily average levels for this year and the previous year are shown here.

MACKENZIE RIVER (MIDDLE CHANNEL) 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 21 at 09:00. Photo courtesy of Water Survey of Canada and GNWT.

Mackenzie River (East Channel) at Inuvik [10LC002]:

Note: The gauge has been impacted by ice and is not transmitting reliable data.

Weather Data:

Current status and forecast:














Weather in the Beaufort Delta is expected to be above seasonal today and well above seasonal tomorrow with clear skies. Forecast high temperatures tomorrow in Aklavik and Inuvik are projected to be the highest on record. The high temperatures and sun will help to degrade ice and move it downstream through the Delta.

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.

Seven-day weather forecast:














Fort McPherson:

Sun 21 May	Mon 22 May	Tue 23 May	Wed 24 May	Thu 25 May	Fri 26 May	Sat 27 May
 13°C Mainly sunny	 22°C Sunny	 20°C Cloudy	 14°C Sunny	 13°C 30% Chance of showers	 7°C A mix of sun and cloud	 8°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 6°C Clear	 7°C Clear	 5°C Clear	 4°C Cloudy periods	 0°C Cloudy periods	 0°C Cloudy periods	

Inuvik:

Sun 21 May	Mon 22 May	Tue 23 May	Wed 24 May	Thu 25 May	Fri 26 May	Sat 27 May
 10°C Mainly cloudy	 21°C Sunny	 17°C A mix of sun and cloud	 10°C A mix of sun and cloud	 11°C 40% Chance of showers	 9°C A mix of sun and cloud	 11°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 4°C Clear	 6°C Clear	 7°C A mix of sun and cloud	 5°C Cloudy	 -4°C 30% Chance of showers	 -3°C A mix of sun and cloud	

Aklavik:

Sun 21 May	Mon 22 May	Tue 23 May	Wed 24 May	Thu 25 May	Fri 26 May	Sat 27 May
 9°C Mainly cloudy	 21°C Sunny	 12°C A mix of sun and cloud	 8°C A mix of sun and cloud	 7°C Periods of rain	 5°C A mix of sun and cloud	 6°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 6°C Clear	 6°C Clear	 4°C A mix of sun and cloud	 3°C Periods of rain	 -2°C A mix of sun and cloud	 -1°C A mix of sun and cloud	

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.