Government of
Northwest Territories

NWT Water Monitoring Bulletin – May 15, 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:

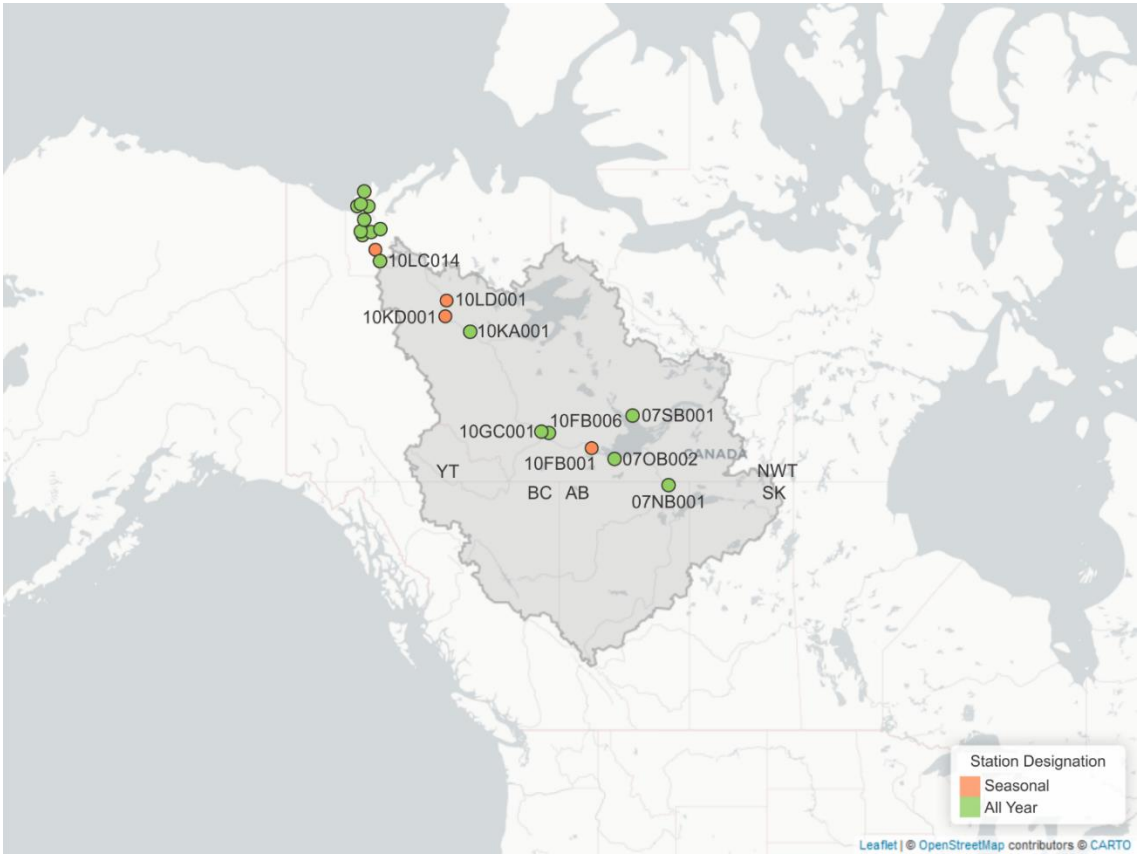
- Ice on the Mackenzie River is moving past Fort Good Hope;
    - The flood risk at Fort Good Hope is dependent on how well the ice clears downstream of the community;
    - As of 13:00, ice is moving well, and water levels are high but stable;
    - If the ice jams downstream, the water level at Fort Good Hope could rise rapidly;
    - Satellite imagery from yesterday at ~14:00 indicated the presence of ~100 km of open water downstream of Fort Good Hope followed by what appears to be an ice jam;
    - It is unknown if that existing ice jam is strong enough to hold the ice that has been moving past the community over the past few hours.
- The water level on the Peel River is rising rapidly;
    - Ice began moving on the Peel River yesterday;
    - The hydrometric gauge has been impacted by ice and is no longer producing data;
    - Photos from the hydrometric gauge show rapid increases in the water level and large chunks of ice moving down the river;
    - Cabin owners along the Peel River and residents of Fort McPherson should be aware of the potential for high water and flooding;
- Temperatures are forecast to remain high today but will cool off tomorrow which could serve to hold ice in place;
- The water level on the Mackenzie River at Tsiigehtchic and throughout the Mackenzie River Delta is rising underneath the ice.

Contents

Mackenzie River

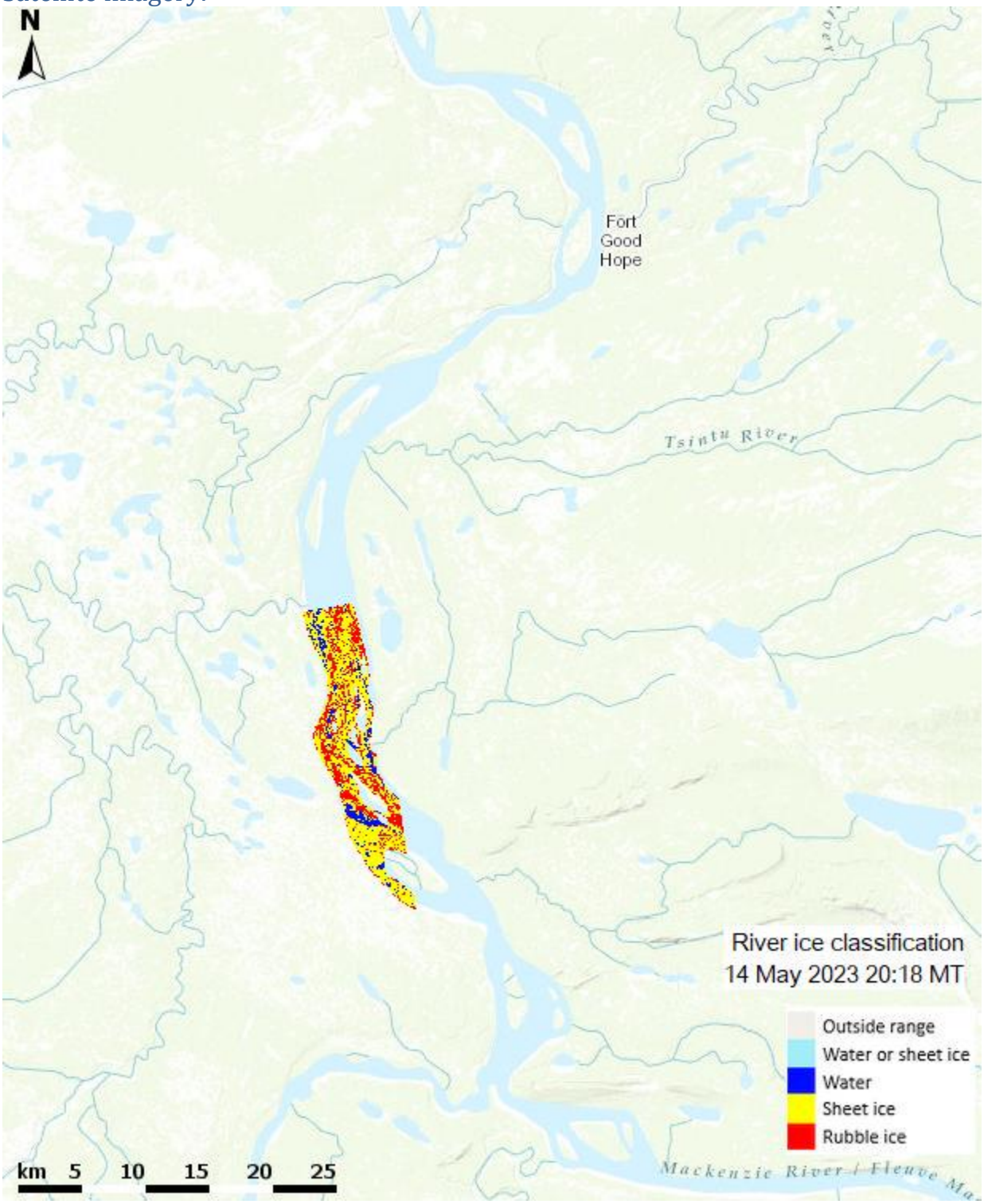
Current Status:

- Ice has cleared past Norman Wells and through the Ramparts;
    - Water levels at Norman Wells peaked at 9.9 m yesterday morning at 09:00 and have dropped by over 3.5 m since then;
- Ice is moving well through Fort Good Hope (as of 13:00);
- The current water level at Fort Good Hope is high but appears stable;
- Satellite imagery acquired yesterday at 14:00 indicates the presence of open water for approximately 100 km downstream of Fort Good Hope followed by what appears to be an ice jam;
    - It is not known if the ice moving down the Mackenzie River today has pushed through and cleared the ice jam or if ice and water are backing up;
    - If ice jams and holds, water levels in Fort Good Hope could rise rapidly.

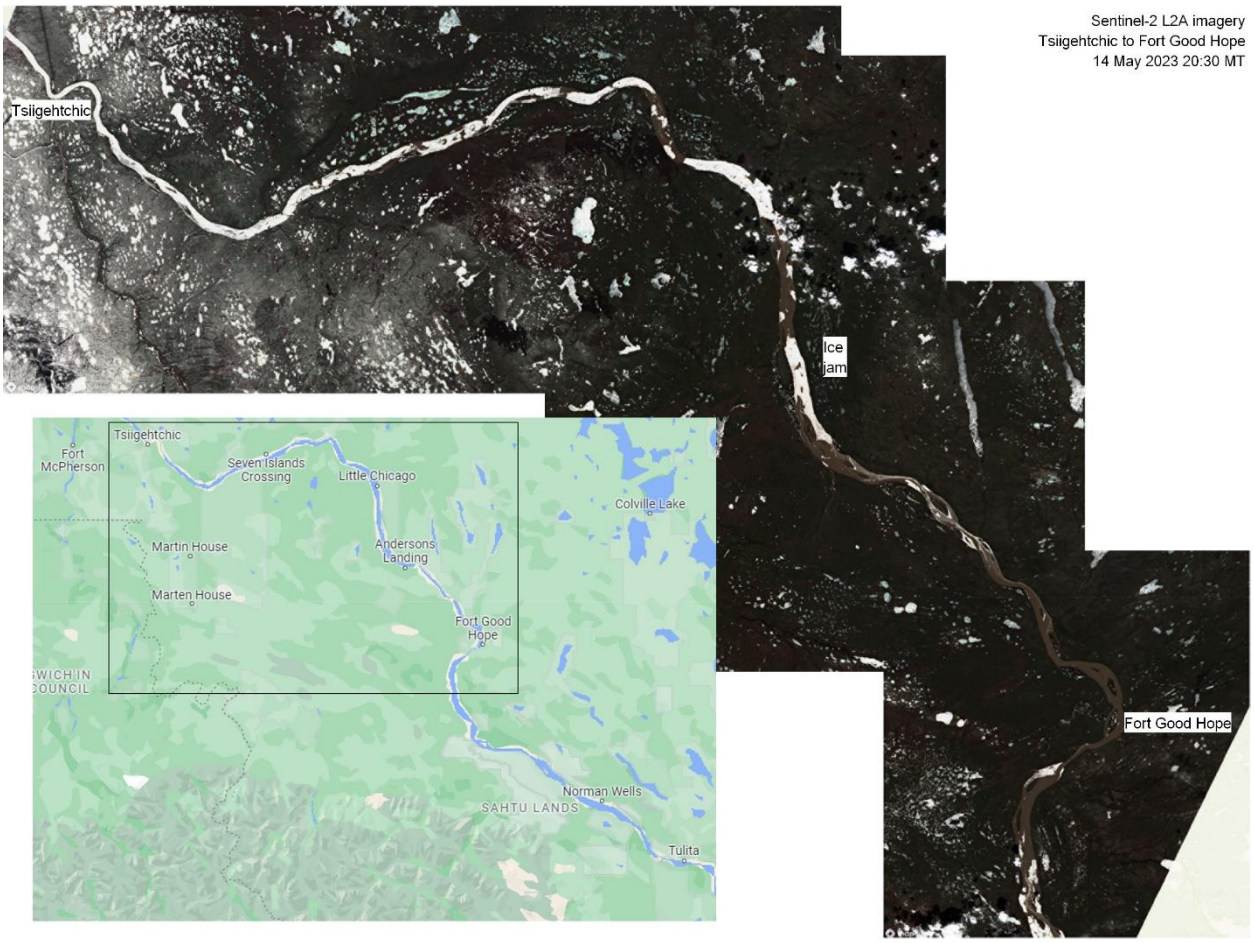


Above – Map of hydrometric stations Mackenzie River basin. The station numbers are referenced in the water level plots below.

Satellite imagery:



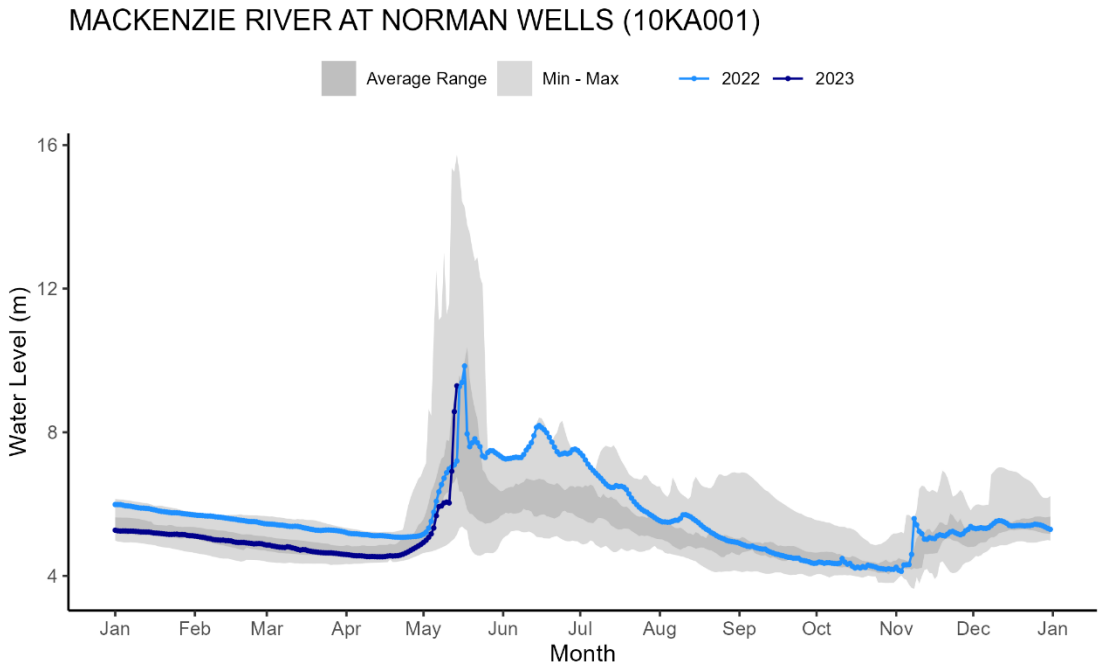
Above – Classified river ice imagery at Fort Good Hope as of 20:18 yesterday evening (14 May). The imagery was acquired by the RADARSAT Constellation Mission via the Government Operations Centre. The image shows consolidated ice which is assumed to be moving down the Mackenzie River towards Fort Good Hope.



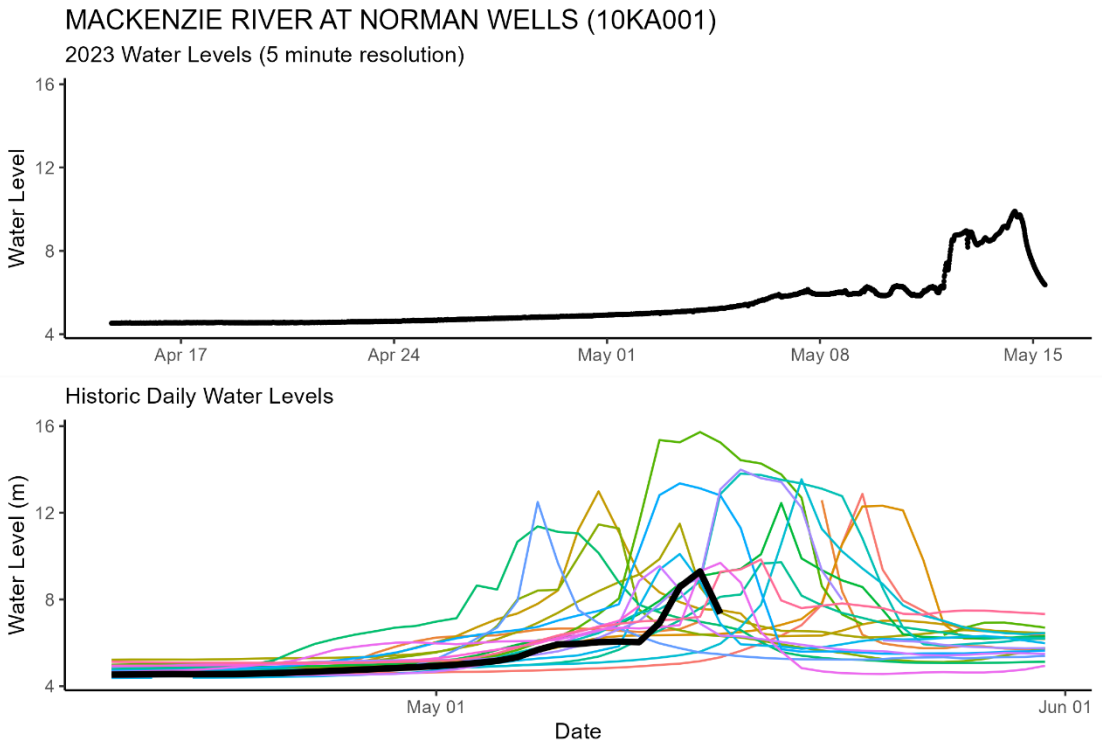
Above – Satellite imagery over the Sahtu Region showing Mackenzie River ice. As of the acquisition time of this image (14 May 14:30), an ice jam was observed ~100 km downstream from Fort Good Hope, but ice from upstream had not yet reached Fort Good Hope.

Hydrometric Data:

Mackenzie River at Norman Wells [10KA001]:



Above – Water level data for the Mackenzie River at Norman Wells. Daily average levels for 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 Norman Wells hydrometric gauge photo from May 15 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

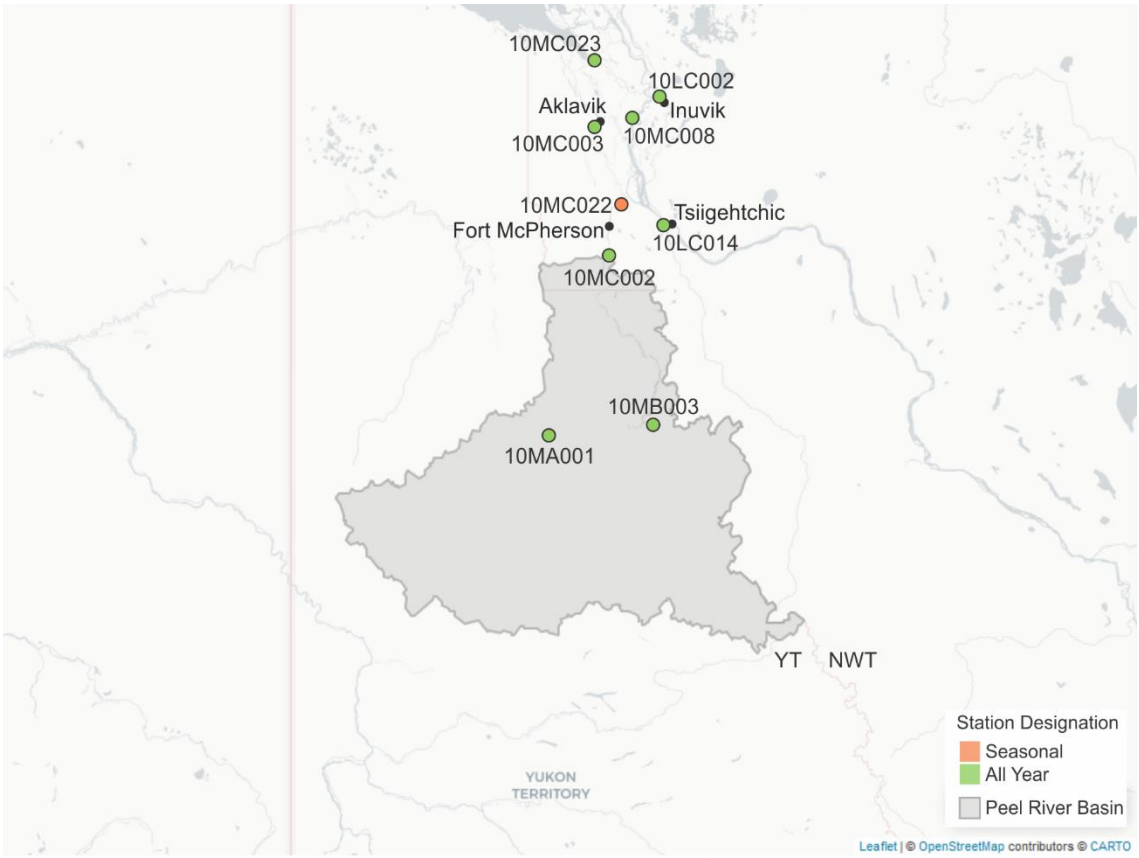
Mackenzie River at Fort Good Hope [10LD001]:

Above – Mackenzie River at Fort Good Hope hydrometric gauge photo from May 15 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

Peel River and Beaufort Delta:

Current status:

- Water levels on the Peel River have risen rapidly over the past two days;
- Ice on the Peel River began moving yesterday;
- The hydrometric gauge on the Peel River above Fort McPherson was impacted by ice and is no longer producing data;
    - Photos from the gauge are transmitting hourly and show rapid water level rise and considerable ice movement;
- Cabin owners along the Peel River and residents of Fort McPherson should be aware that water levels are rising rapidly and that low elevation areas may experience flooding;
- Temperatures will remain well above seasonal today, but are forecast to cool off tomorrow before returning to above seasonal on Wednesday;
    - Warm temperatures today will continue to bring snowmelt water to the river and raise water levels;
- Water levels on the Mackenzie River near Tsiigehtchic and throughout the Delta are rising underneath the ice;
- The hydrometric gauge on the Mackenzie River near Tsiigehtchic has been impacted by ice and is not producing data.



10MC002

River and that much of the basin still has a snow cover.

Hydrometric Data:
Peel River above Fort McPherson [10MC002]

Note: The hydrometric gauge has been impacted by ice and is not producing data. Below are a series of photographs from the camera mounted to the hydrometric gauge that depict changing conditions over the past 48 hours. Photos are courtesy of Water Survey of Canada and the GNWT.

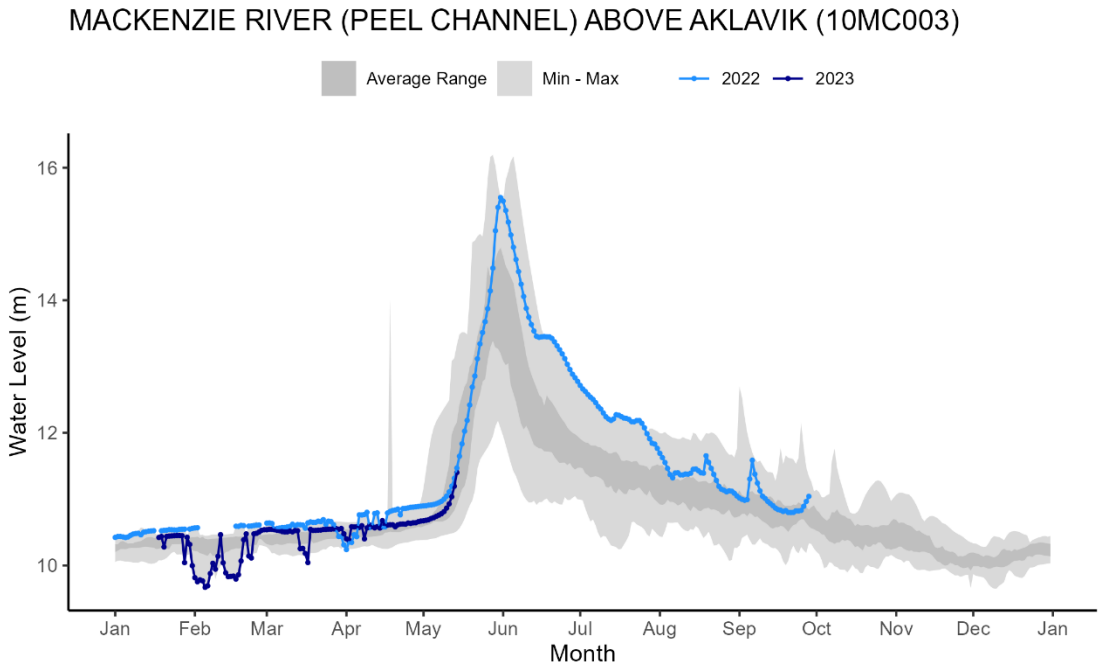
Two days ago (Saturday, May 13 at 12:00 MT):

Yesterday (Sunday, May 14 at 12:00 MT):

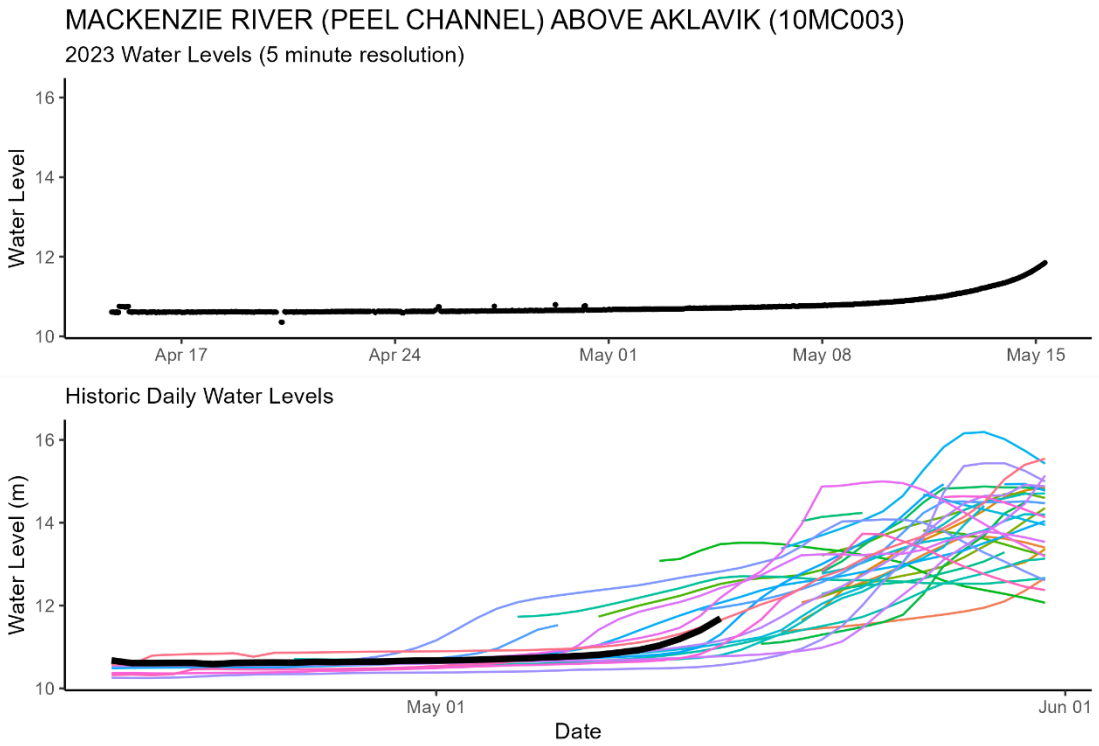
Today (Monday, May 15 at 10:00 MT):

Today (Monday, May 15 at 12:00 MT):

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



Above – Water level data for the Mackenzie River above Aklavik. Daily average levels for 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 above Aklavik hydrometric gauge photo from May 15 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

Weather Data:

Current status and forecast:

Temperatures in the Sahtu and Beaufort Delta have been well above seasonal for the past week and are forecast to stay the same today. Temperatures in the Sahtu will remain high with sun until Thursday. Temperatures in the Beaufort Delta region will begin to cool tomorrow but should stay higher than average into the weekend.

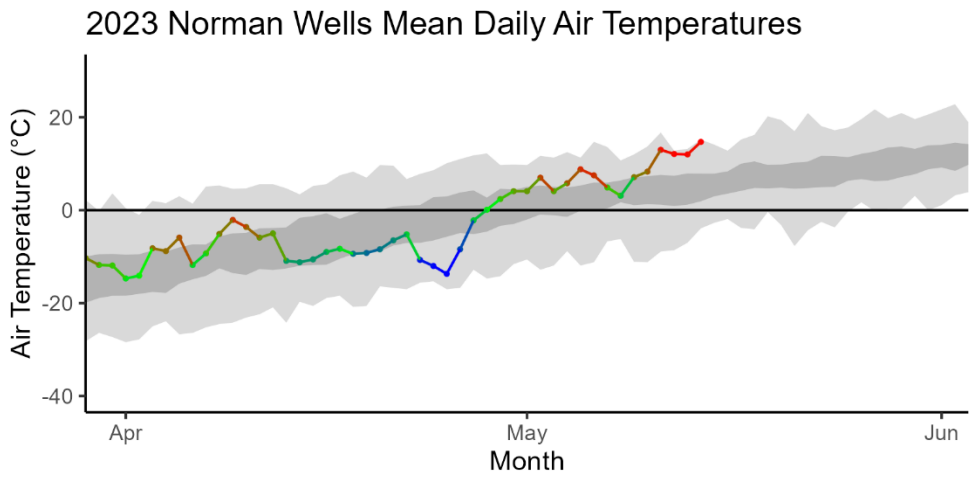
Background information and context:

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.

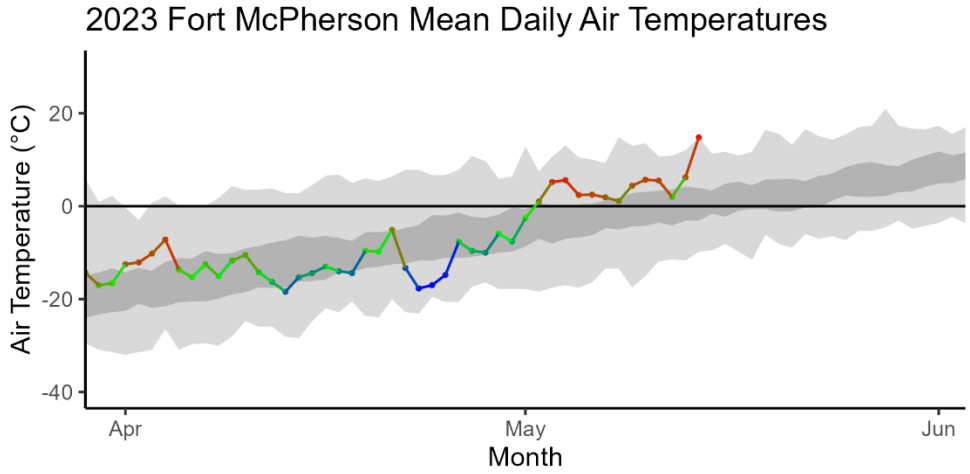
There are two sets of figures below. The first set of figures shows daily temperatures relative to normal for select locations in the NWT. The dark grey bands represent the average range of temperatures, while the light grey bands represent historic minimum and maximum daily mean temperatures. The second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

2023 spring temperatures to-date:

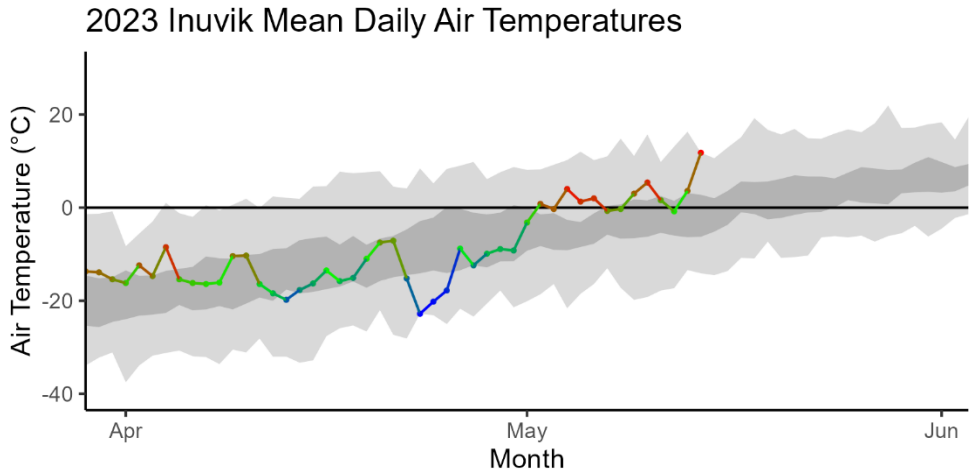
Norman Wells:



Fort McPherson:



Inuvik:



Seven-day weather forecast:

Norman Wells:

Mon 15 May	Tue 16 May	Wed 17 May	Thu 18 May	Fri 19 May	Sat 20 May	Sun 21 May
21°C 30% Chance of showers	23°C Mainly sunny	21°C Sunny	23°C Sunny	7°C Periods of rain	20°C A mix of sun and cloud	18°C A mix of sun and cloud
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
4°C 30% Chance of showers	6°C Clear	9°C Clear	5°C Cloudy periods	7°C Cloudy periods	6°C Cloudy periods	

Fort McPherson:

Mon 15 May	Tue 16 May	Wed 17 May	Thu 18 May	Fri 19 May	Sat 20 May	Sun 21 May
21°C Mainly sunny	6°C A mix of sun and cloud	14°C Sunny	9°C 30% Chance of showers	10°C A mix of sun and cloud	11°C A mix of sun and cloud	10°C A mix of sun and cloud
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
4°C A few clouds	0°C Cloudy	1°C Clear	-2°C Cloudy	2°C Clear	2°C Cloudy periods	

Inuvik:

Mon 15 May	Tue 16 May	Wed 17 May	Thu 18 May	Fri 19 May	Sat 20 May	Sun 21 May
18°C Mainly sunny	6°C 30% Chance of showers	9°C Sunny	5°C 60% Chance of showers	10°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**	
4°C A few clouds	4°C Cloudy	2°C Clear	-4°C Cloudy	0°C Clear	0°C 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.