Government of
Northwest Territories

NWT Water Monitoring Bulletin – May 12, 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:

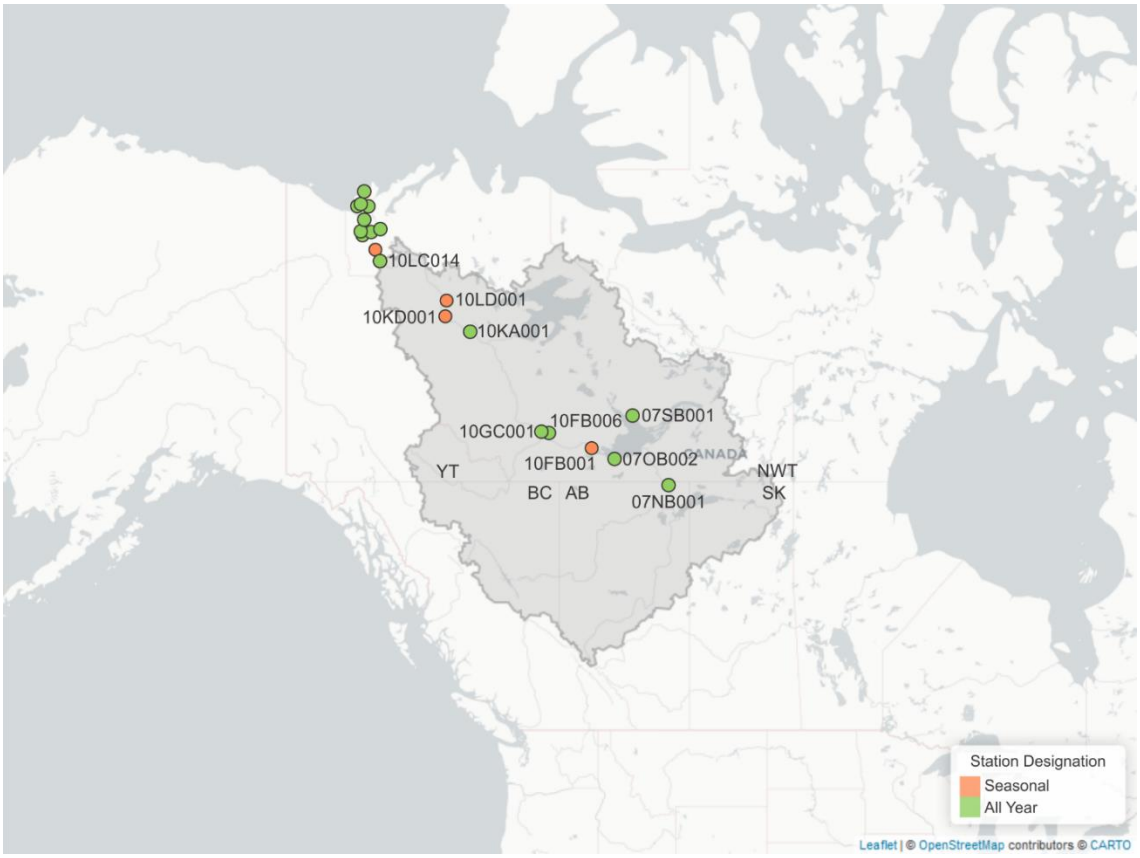
- Satellite imagery (from 11 May) and photographs (from morning of 12 May) indicate that break up has progressed down the Mackenzie River past Tulita and is expected to move through Norman Wells today/tomorrow;
    - Ice has started to shift locally at Fort Good Hope, but Mackenzie River ice has not yet pushed past the Ramparts;
- The water level on the Mackenzie River at Norman Wells has been climbing steadily since 01:30 this morning (12 May);
- Temperatures in the Sahtu are forecast to be warmer than normal and mostly sunny in the Sahtu through this weekend;
    - Night-time temperatures are forecast to remain above freezing;
    - Ice will continue to degrade and move down the Mackenzie River;
- Water levels on the Peel and Arctic Red rivers have continued to rise under ice;
    - Temperatures in these basins are expected to be seasonal with intermittent cloud over the next two days, but will rise to well above seasonal and sunny beginning on Sunday;
    - Water levels may rise suddenly as the ice breaks up and snowmelt water moves towards streams and rivers;
    - Current conditions indicate that water levels at break up could approach or exceed the highest level on record and land users should be aware of this;
        - Water levels will vary at different locations and times along the river and will be dependent on how and where ice jams build and release.

Contents

Mackenzie River

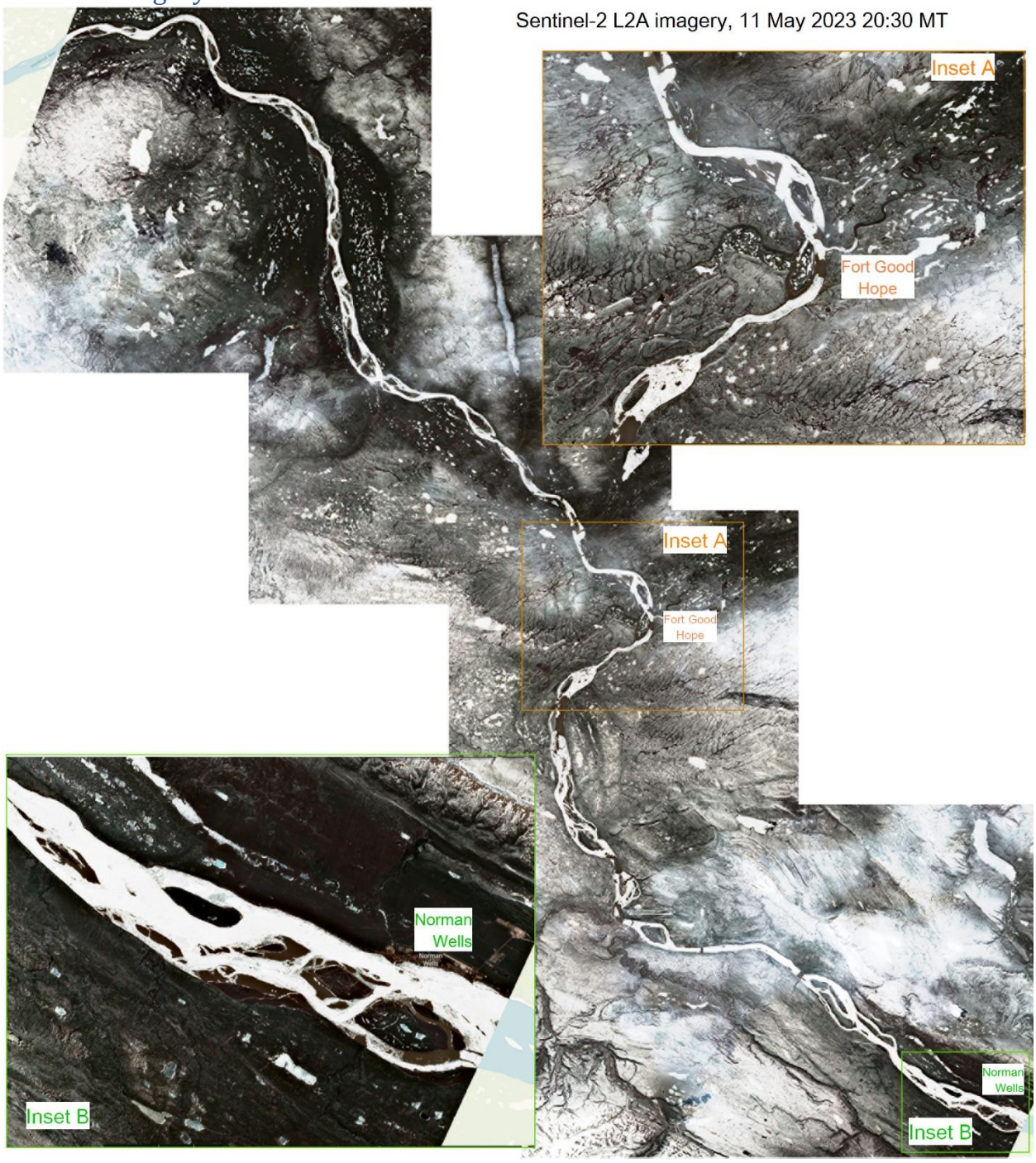
Current Status:

- Mackenzie River ice has moved past Tulita;
- The water level on the Mackenzie River at Norman Wells has been increasing steadily since 01:30 this morning;
    - This increase happens every year as the ice front moves through Norman Wells;
    - Water levels are within the range of normal during break up;
- Ice has shifted locally at Fort Good Hope but the ice front has not moved through the Ramparts as of 11:00 today.



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

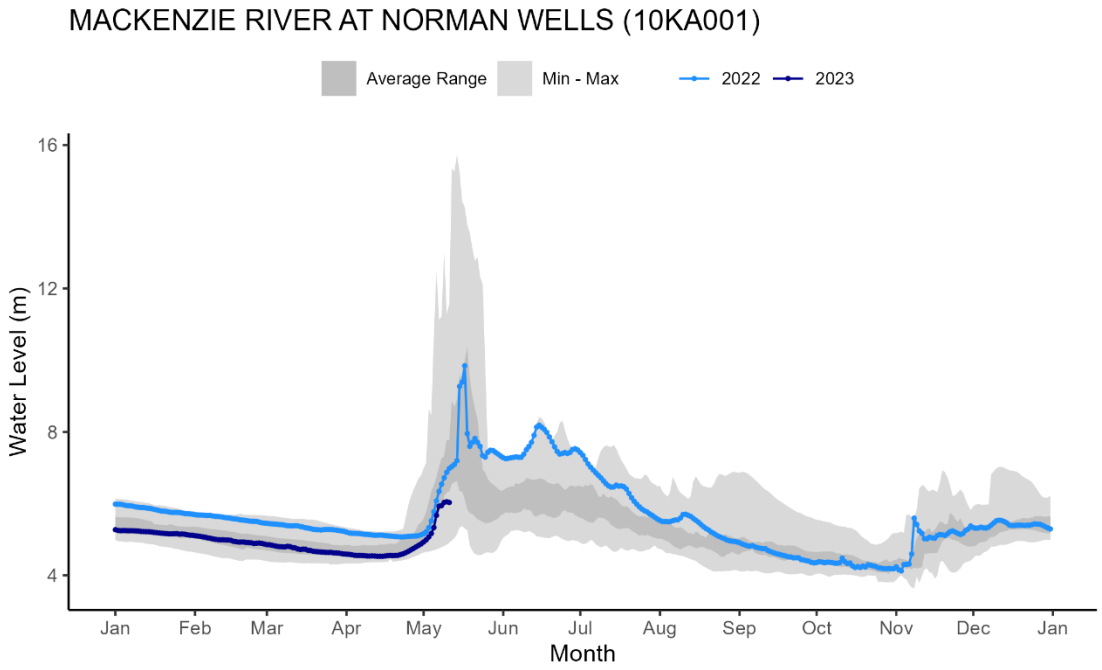
Satellite imagery:



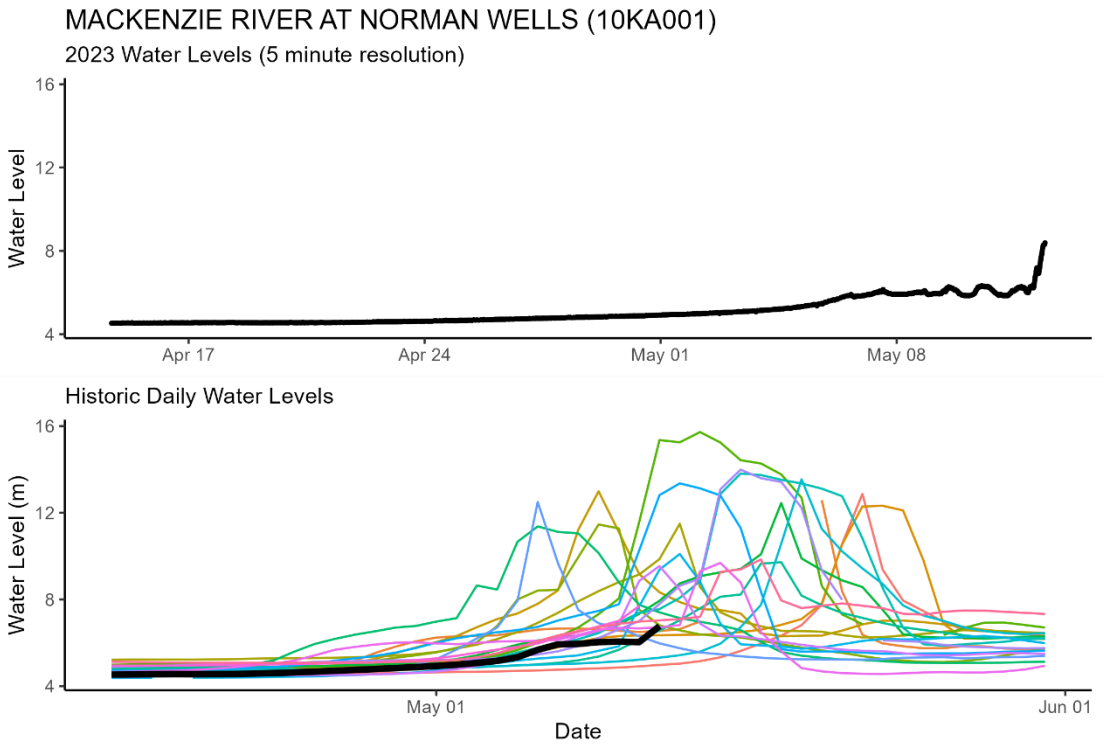
Above – Satellite imagery over the Sahtu Region showing Mackenzie River ice. As of the acquisition time of this image (11 May 20:30), ice was still generally intact between Norman Wells and Fort Good Hope, but sections of open water leads are starting to form, including an open water section at Fort 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 12 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

Above – Mackenzie River at Norman Wells from this morning (12 May). Photos courtesy of Cst. Chris Piton, RCMP Norman Wells detachment.

Above – Mackenzie River at Norman Wells from this morning (12 May). Photos courtesy of Cst. Chris Piton, RCMP Norman Wells detachment.

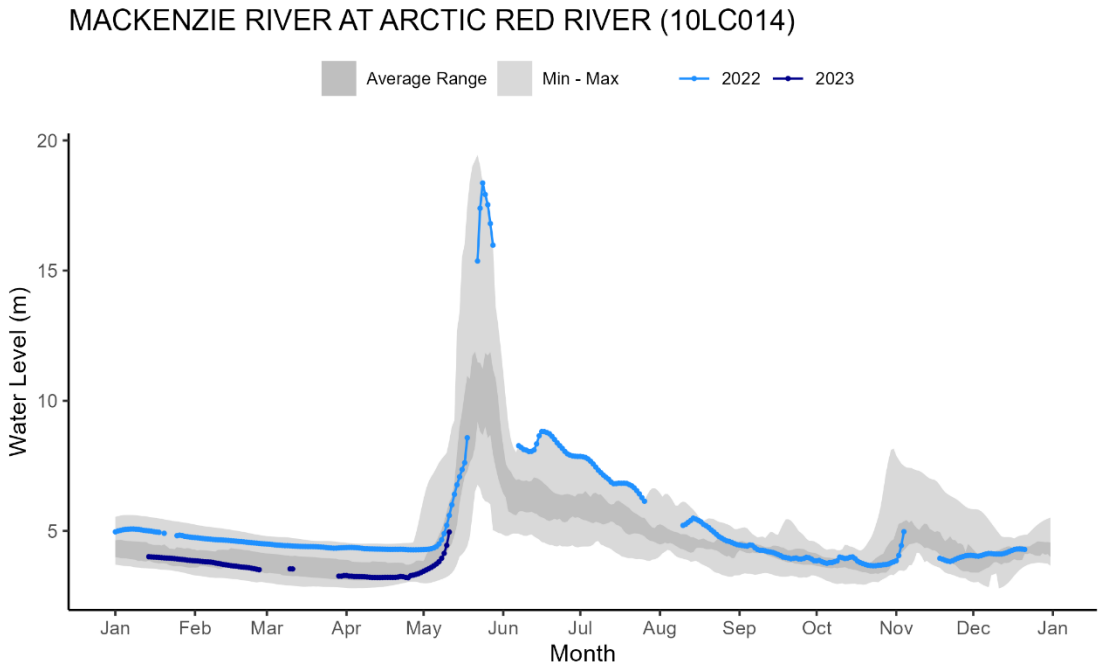
Mackenzie River at Fort Good Hope [10LD001]:

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

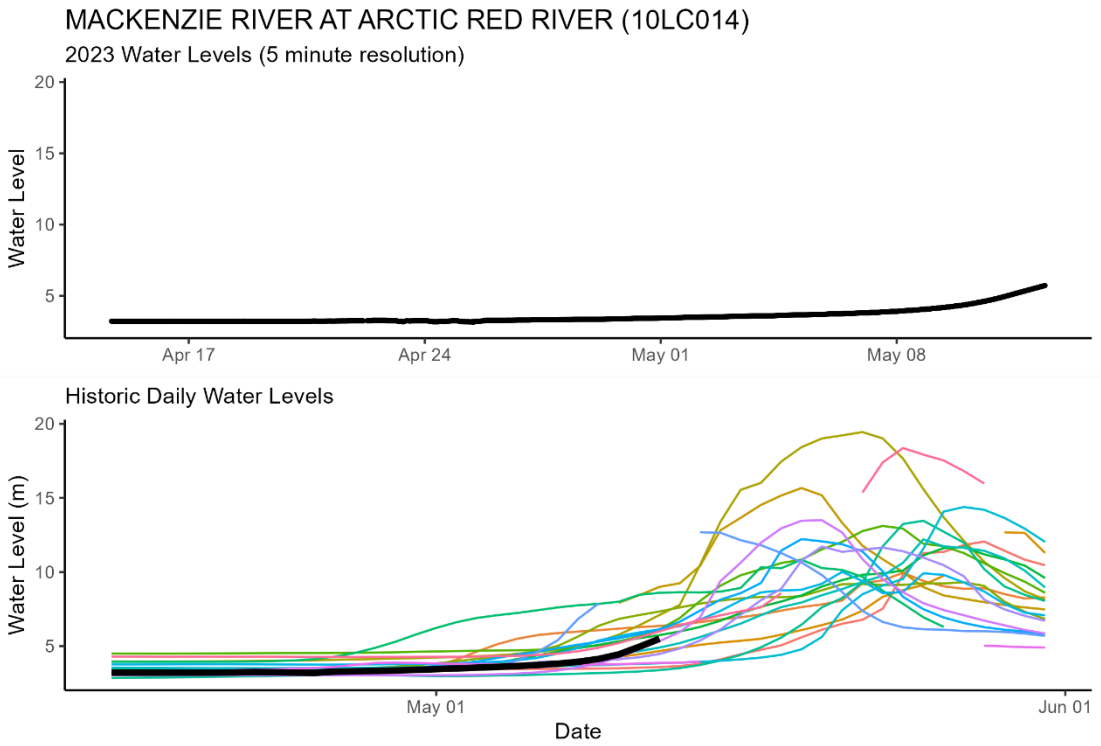
Above – Mackenzie River at Fort Good Hope from this morning (12 May). Photos courtesy of RCMP Sgt. Michel Mignon.

Above – Mackenzie River at Fort Good Hope from this morning (12 May). Photos courtesy of RCMP Sgt. Michel Mignon.

Mackenzie River at Arctic Red River [10LC014]:



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

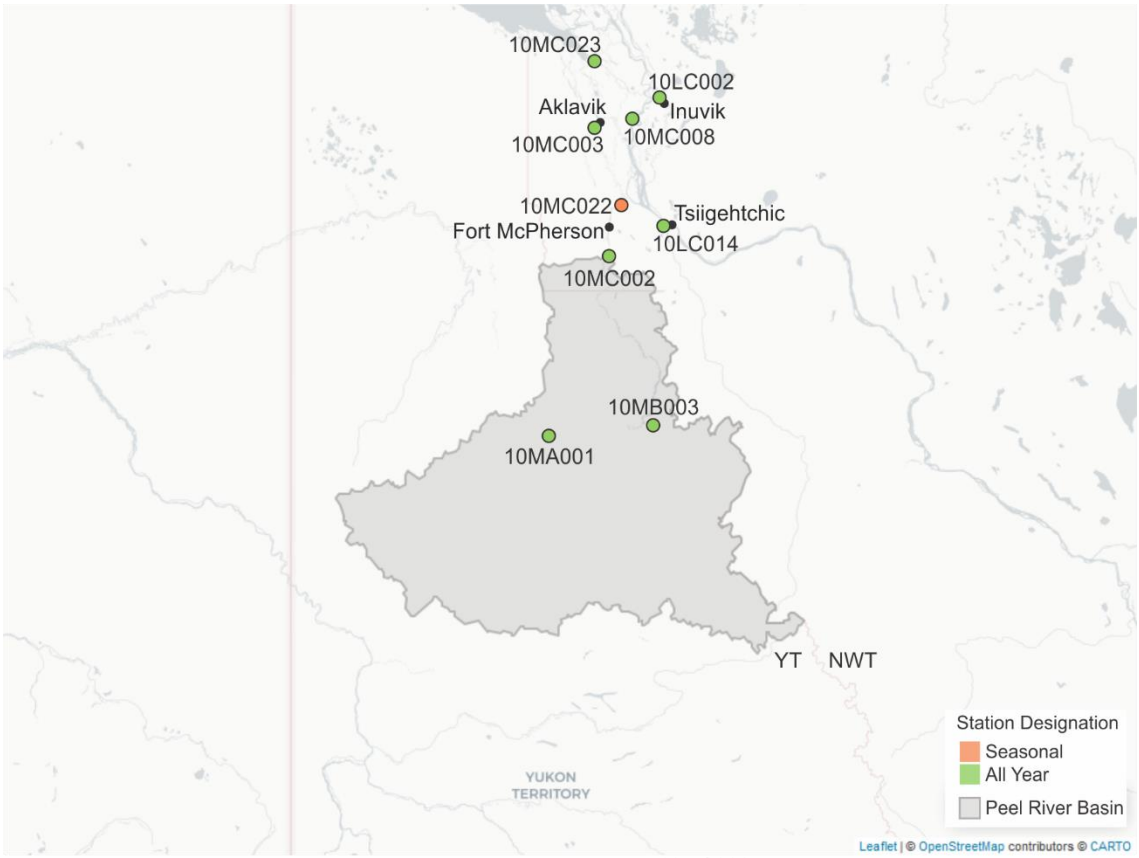


Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Peel River and Beaufort Delta:

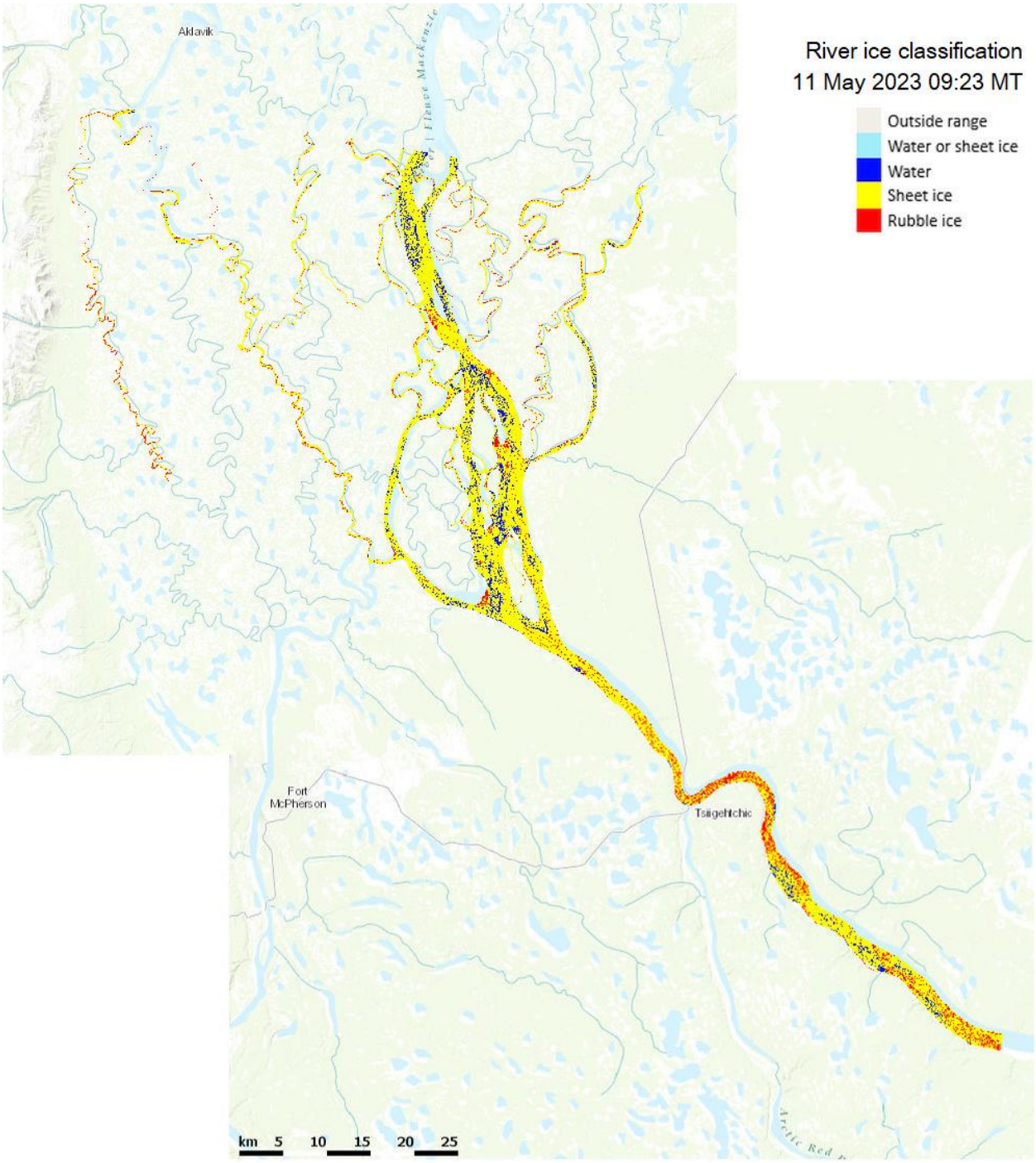
Current status:

- Water levels continue to rise under the ice on the Peel and Arctic Red rivers as snowmelt progresses;
- Temperatures in Fort McPherson and the Peel River basin are forecast to be seasonal with intermittent cloud cover today and tomorrow, followed by unseasonably warm weather and sun beginning Sunday;
    - This will cause rapid melt of the remaining snowpack;
    - Land users should be aware of the possibility of rapidly rising water levels, especially as ice moves down the Peel and Arctic Red rivers.



10MC002

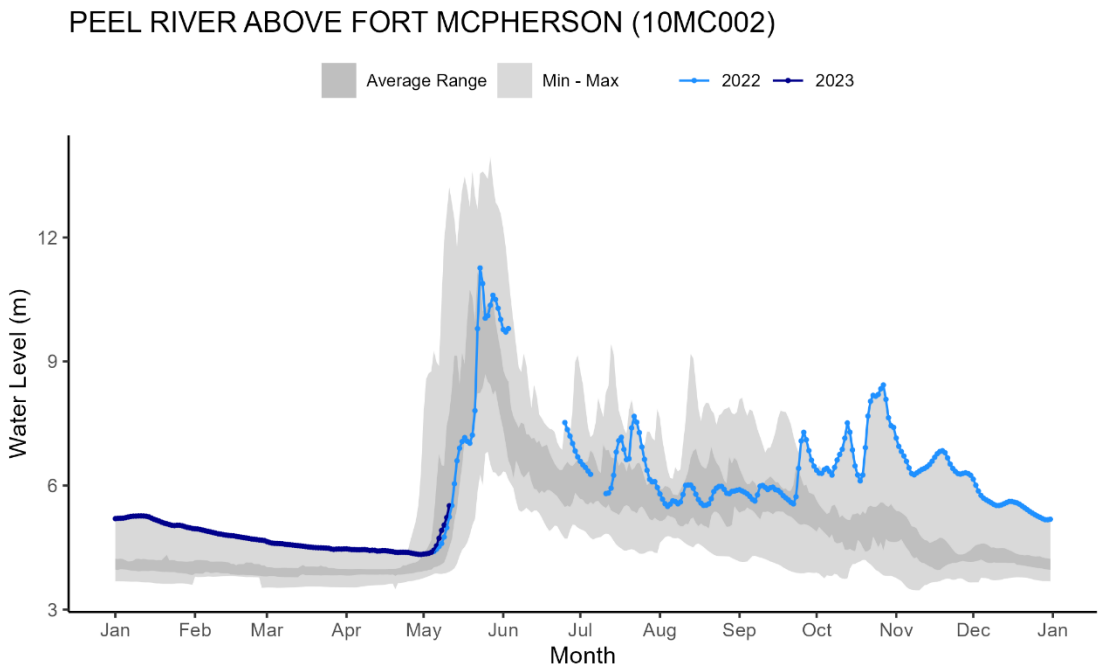
Satellite Data:



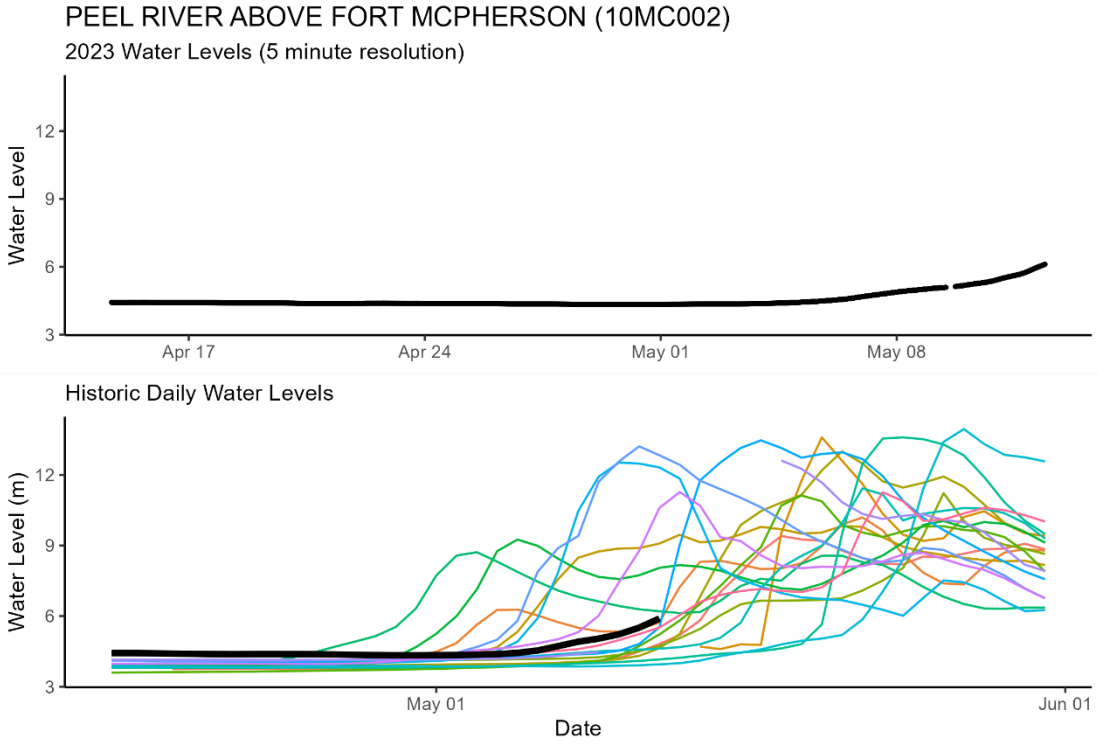
Above: Classified river ice imagery from the RADARSAT Constellation Mission, courtesy of the Government Operations Centre. The imagery was acquired yesterday morning (11 May at 09:23). The image shows that ice in the lower Mackenzie River and the Mackenzie Delta remains mostly intact.

Hydrometric Data:

Peel River above Fort McPherson [10MC002]:



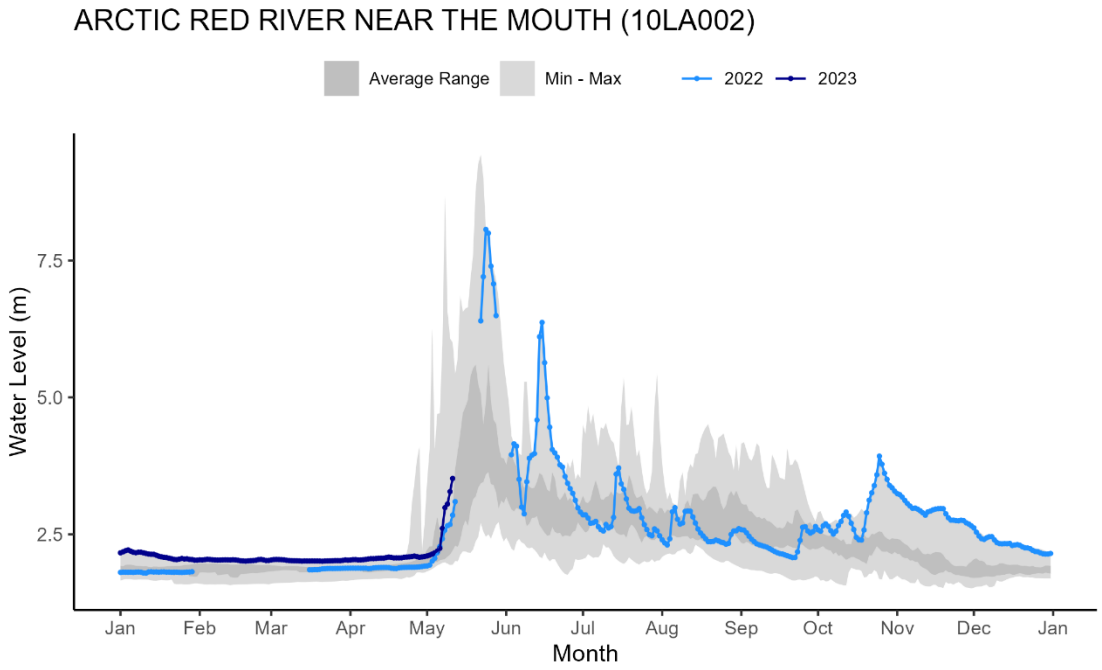
Above – Water level data for the Peel River above Fort McPherson. Daily average levels for the previous year are shown here.



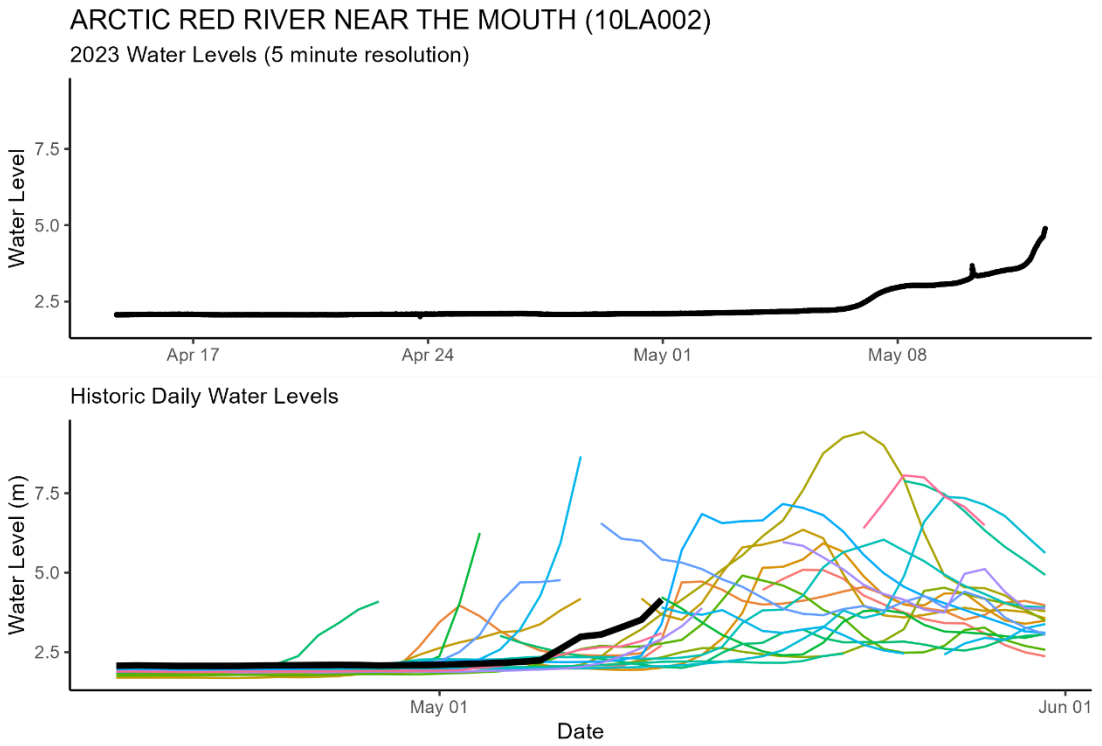
Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Above – Peel River above Fort McPherson hydrometric gauge photo from May 12 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

Arctic Red River near the mouth [10LA002]:

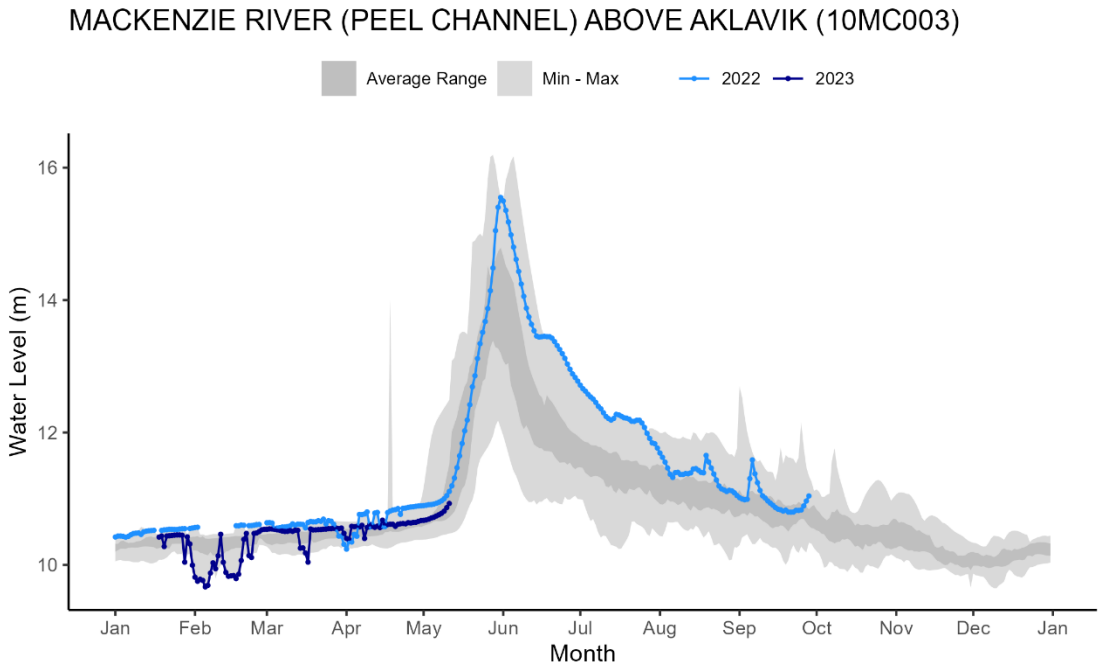


Above – Water level data for the Arctic Red River near the mouth. Daily average levels for the previous year are shown here.

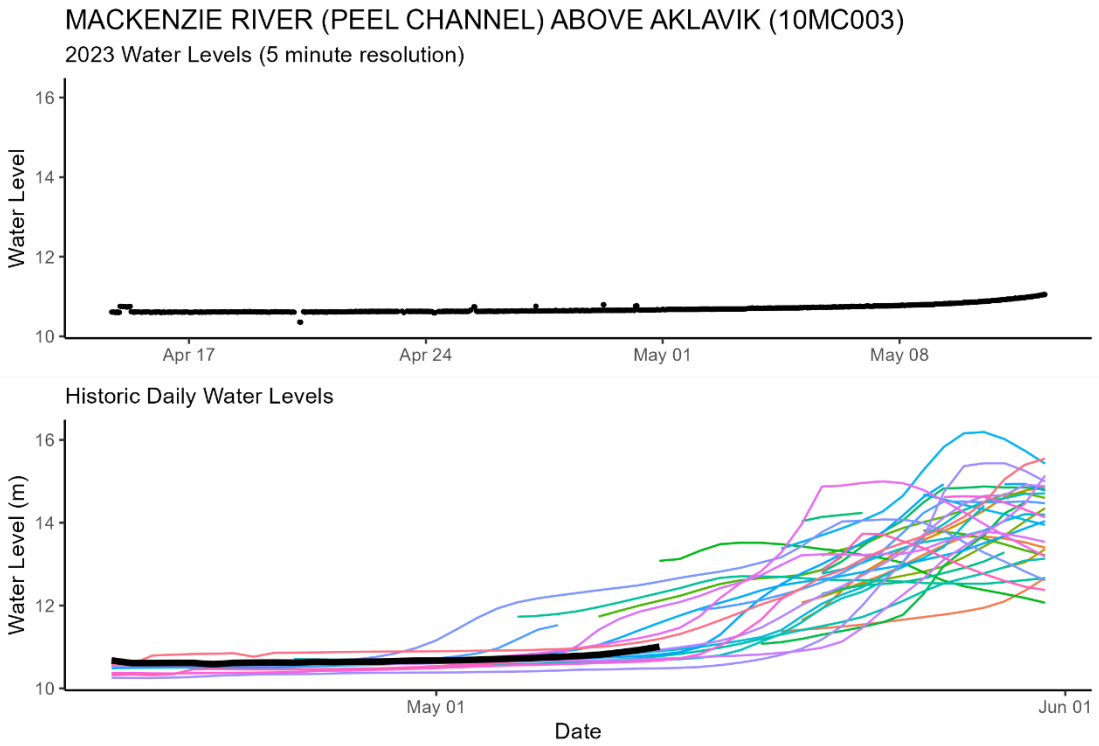


Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

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 12 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

Weather Data:

Current status and forecast:

Temperatures in the Sahtu region are forecast to be well above seasonal through this weekend. The timing of break up is projected to be about average in the Sahtu region. Temperatures in the Beaufort Delta will be slightly cooler this weekend but are forecast to be well above seasonal beginning Monday. The sun and high temperatures will expedite breakup and cause water levels to rise on the Peel and Arctic Red rivers throughout the next week.

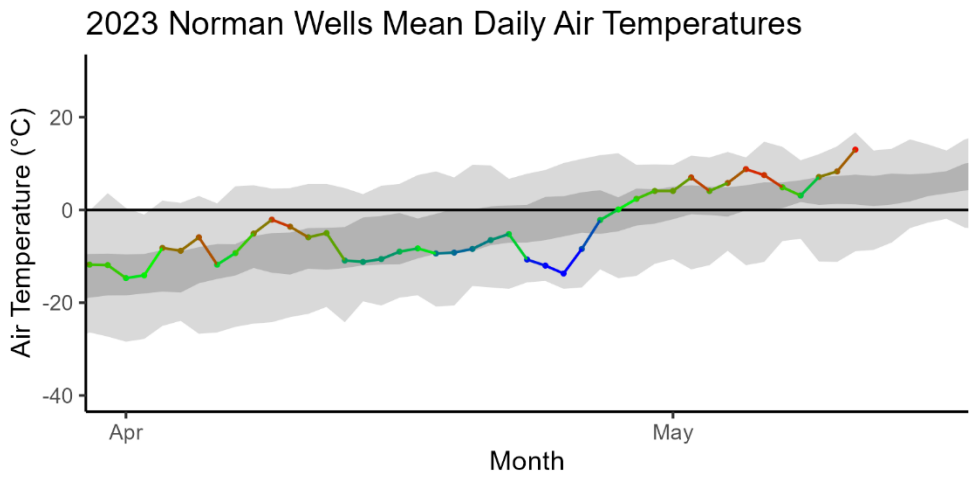
Background information and context:

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.

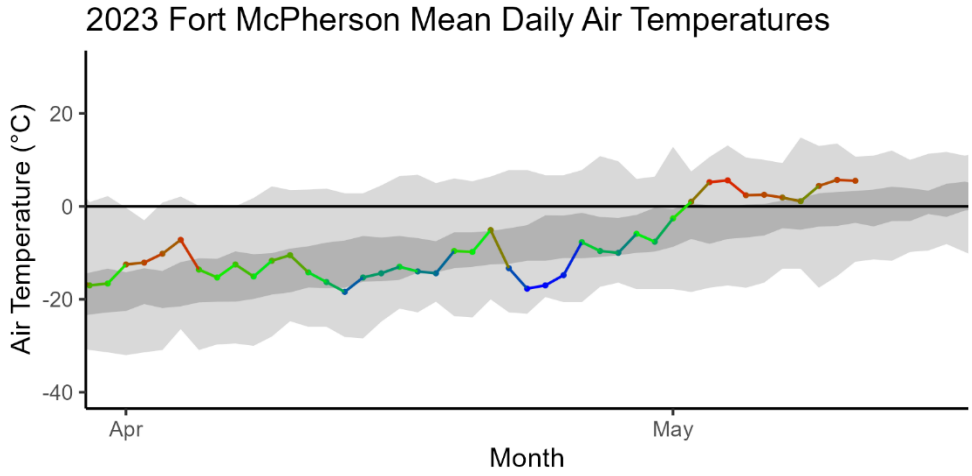
There are two sets of figures below. The first set of figures shows daily temperatures relative to normal for select locations in the NWT. The dark grey bands represent the average range of temperatures, while the light grey bands represent historic minimum and maximum daily mean temperatures. The second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

2023 spring temperatures to-date:

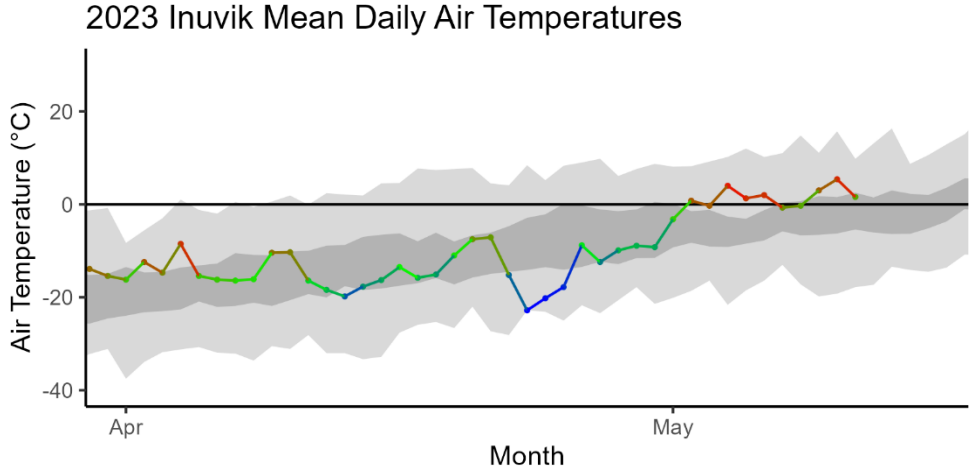
Norman Wells:



Fort McPherson:



Inuvik:



Seven-day weather forecast:

Norman Wells:

Fri 12 May	Sat 13 May	Sun 14 May	Mon 15 May	Tue 16 May	Wed 17 May	Thu 18 May
22°C	20°C	21°C	20°C	18°C	23°C	19°C
A mix of sun and cloud	Sunny	Sunny	Sunny	A mix of sun and cloud	A mix of sun and cloud	A mix of sun and cloud
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
5°C	7°C	7°C	7°C	6°C	8°C	
Partly cloudy	Clear	Clear	Clear	Cloudy periods	Cloudy periods	

Fort McPherson:

Fri 12 May	Sat 13 May	Sun 14 May	Mon 15 May	Tue 16 May	Wed 17 May	Thu 18 May
1°C	6°C	19°C	19°C	15°C	9°C	8°C
Mainly cloudy	Mainly sunny	Sunny	Sunny	Sunny	A mix of sun and cloud	A mix of sun and cloud
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
-3°C	4°C	5°C	9°C	0°C	0°C	
Mainly cloudy	Clear	Clear	Cloudy periods	Cloudy periods	Cloudy periods	

Inuvik:

Fri 12 May	Sat 13 May	Sun 14 May	Mon 15 May	Tue 16 May	Wed 17 May	Thu 18 May
2°C 30% Chance of flurries	6°C A mix of sun and cloud	11°C Sunny	13°C Sunny	12°C Cloudy	12°C Cloudy	9°C 30% Chance of flurries
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
0°C	2°C	5°C	9°C	0°C	-1°C	
Partly cloudy	Clear	Clear	Clear	Cloudy	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.