Government of
Northwest Territories

NWT Water Monitoring Bulletin – May 06, 2023 at 10:00

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 Mackenzie River at Fort Simpson (Village sensor) peaked near 11.0 m at about 20:30 last night and have receded since then;
    - The current water level is 8.1 m (as of 10:00);
    - The water level at Fort Simpson rose by approximately 4.5 m yesterday as a long ice run moved down the Mackenzie River past Fort Simpson; the water level began to drop once the ice run passed;
- The risk of flooding in Fort Simpson in 2023 is now very low;
- Counter to the very warm spring in the southern NWT, the Sahtu and Beaufort Delta regions have experienced a colder-than-normal spring;
- Although break up is not yet imminent, early indicators show that there is an increased potential for flooding in the Peel and Arctic Red river basins;
    - This increased potential stems from highest on record over-winter water levels, high precipitation last summer/fall, high snowpack, and a colder-than-normal spring;
    - The maximum extent of spring break up water levels will be dependent on weather conditions over the coming weeks;
    - More information for land users in the basins is available here.

Contents

Liard River:

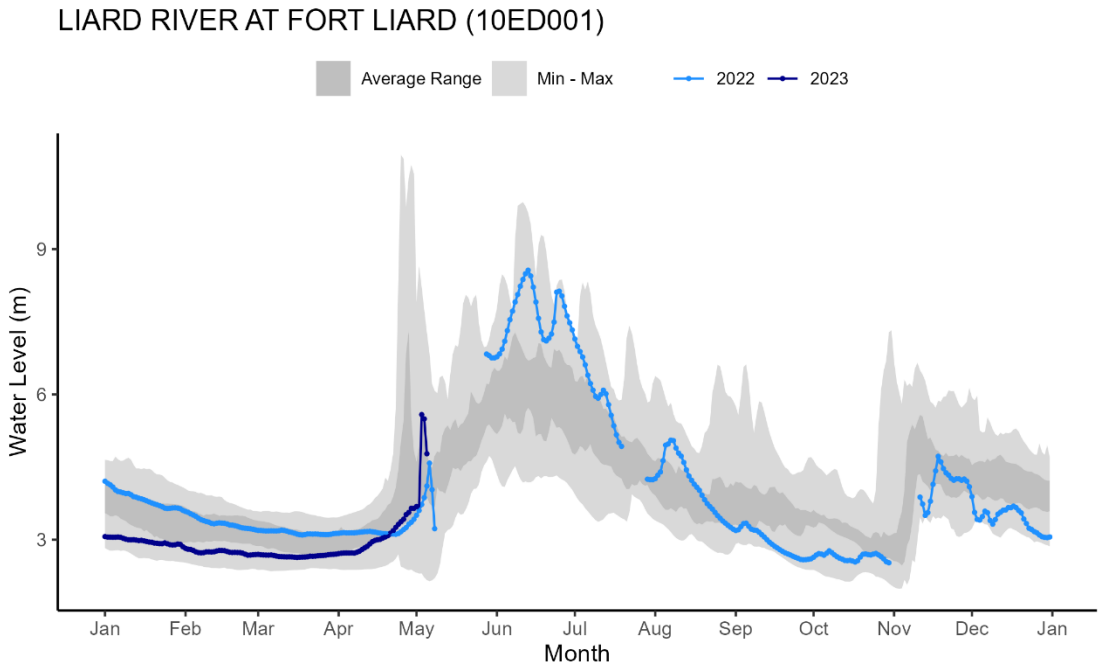
Current Status:

- Remaining ice on the Liard River is moving well;
- Water levels on the Liard River near the mouth increased rapidly yesterday as Mackenzie River ice moved through Fort Simpson, and impeded Liard River flow;
- According to gauge photos, the water levels have since receded (the water level gauge sensor was damaged yesterday evening).

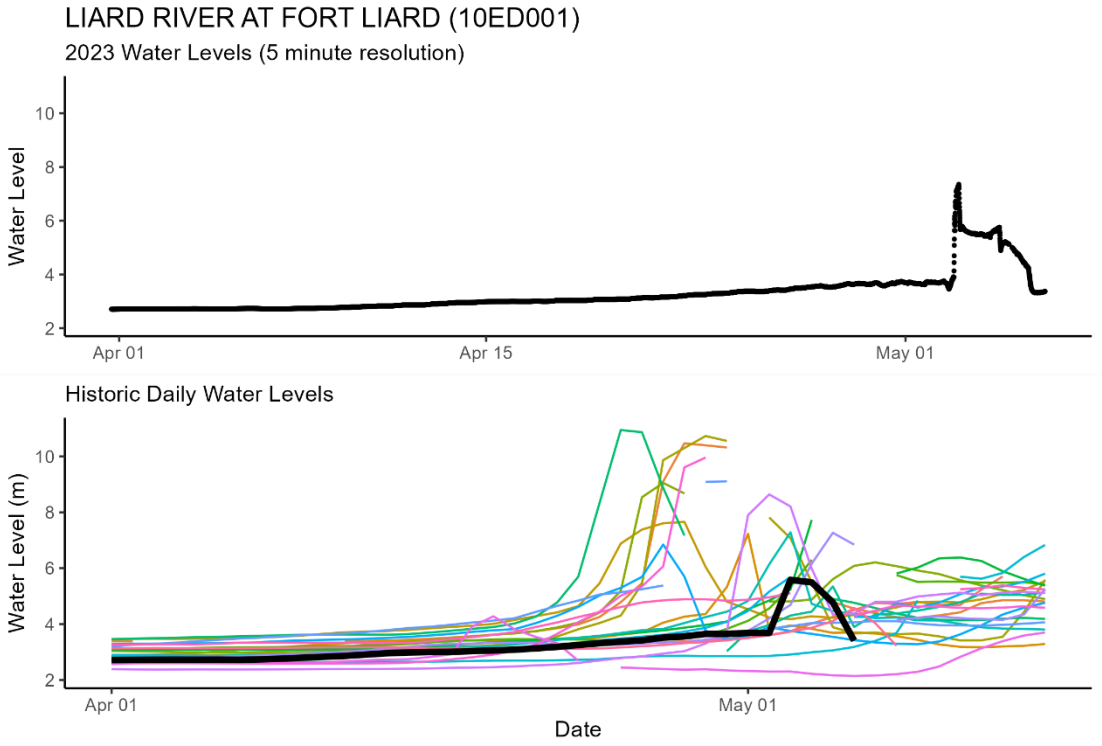
Above – Map of hydrometric stations in the Liard River basin. The station numbers are referenced in the water level plots below.

Hydrometric Data:

Liard River at Fort Liard [10ED001]:



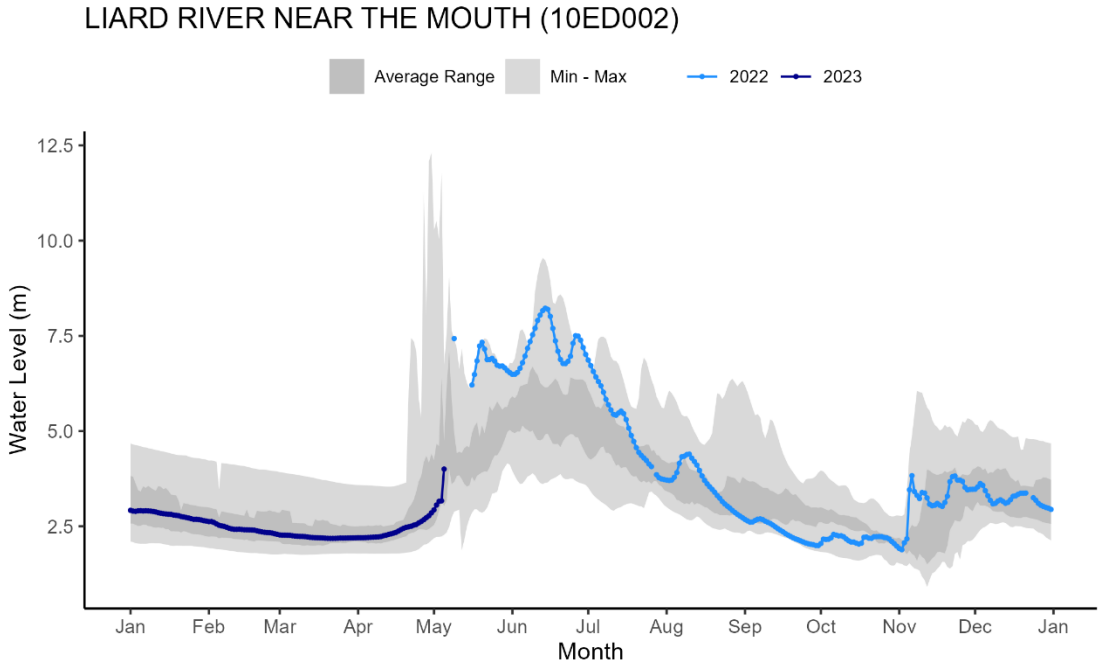
Above – Water level data for the Liard River at Fort Liard. Daily average levels for the previous year are shown here.



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 – Liard River at Fort Liard hydrometric gauge photo from May 06 at 09:00. Photo courtesy of Water Survey of Canada and GNWT.

Liard River near the mouth [10ED002]:



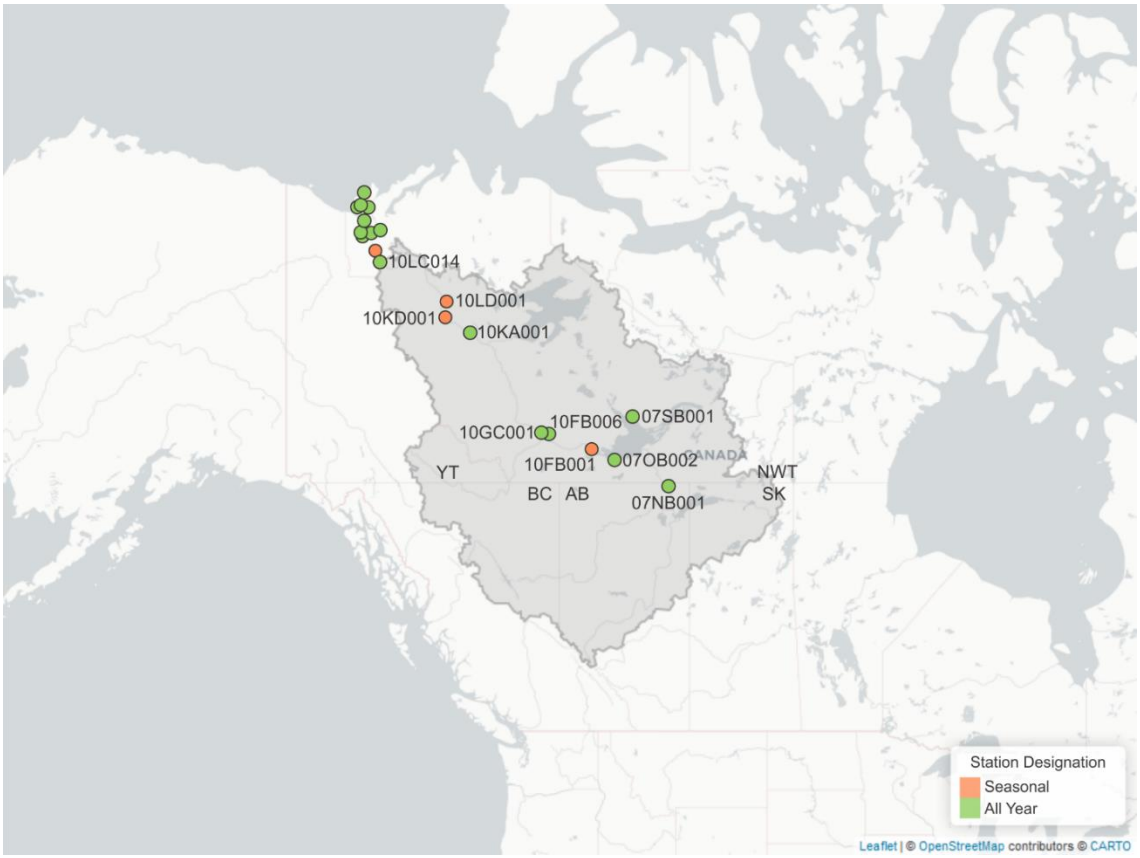
Above – Water level data for the Liard River near the mouth (at Fort Simpson). Daily average levels for the previous year are shown here.

Above – Liard River near the mouth hydrometric gauge photo from May 06 at 09:00. Photo courtesy of Water Survey of Canada and GNWT.

Mackenzie River

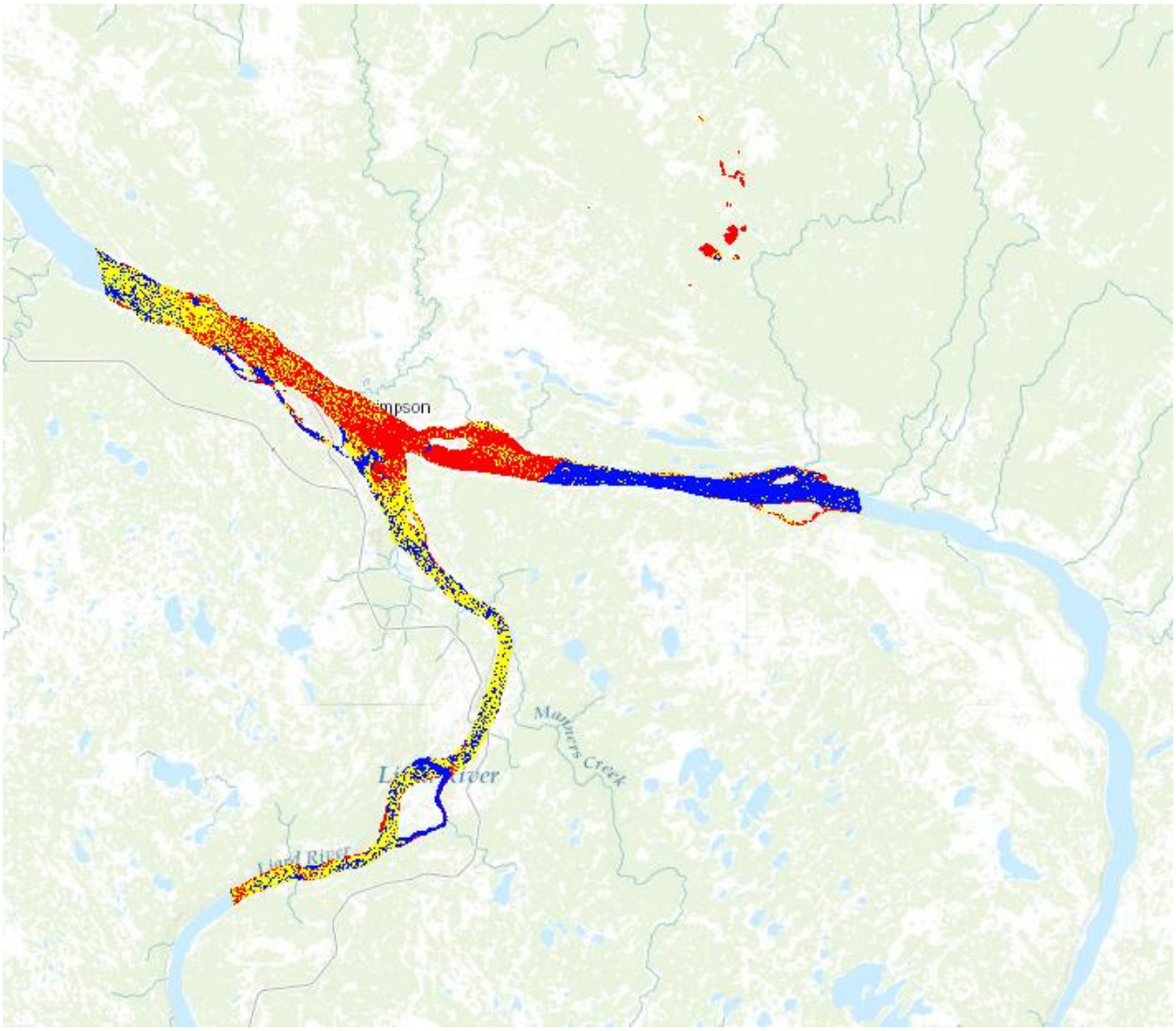
Current Status:

- Water levels on the Mackenzie River at Fort Simpson peaked close to 11.0 m last night (at the Village sensor) around 20:30 but have declined as the ice run has moved past Fort Simpson;
    - In most years, the Liard River will break before the Mackenzie River, but this year the Mackenzie River broke first;
        - This is likely because of low water on the Liard River, and low volumes of snowmelt runoff from tributaries that were not able to raise the ice off of the river banks;
    - The current water level on the Mackenzie River at Fort Simpson (Village gauge) is 8.1 m (as of 10:00);
- Risk of flooding in Fort Simpson is now very low.



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

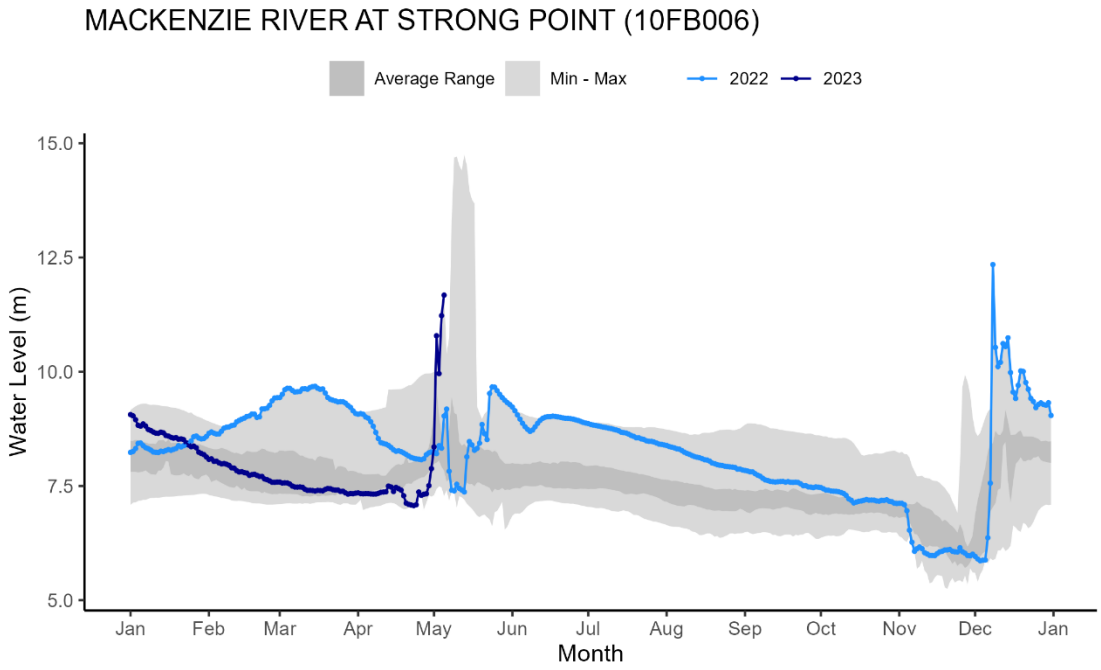
Satellite Data:



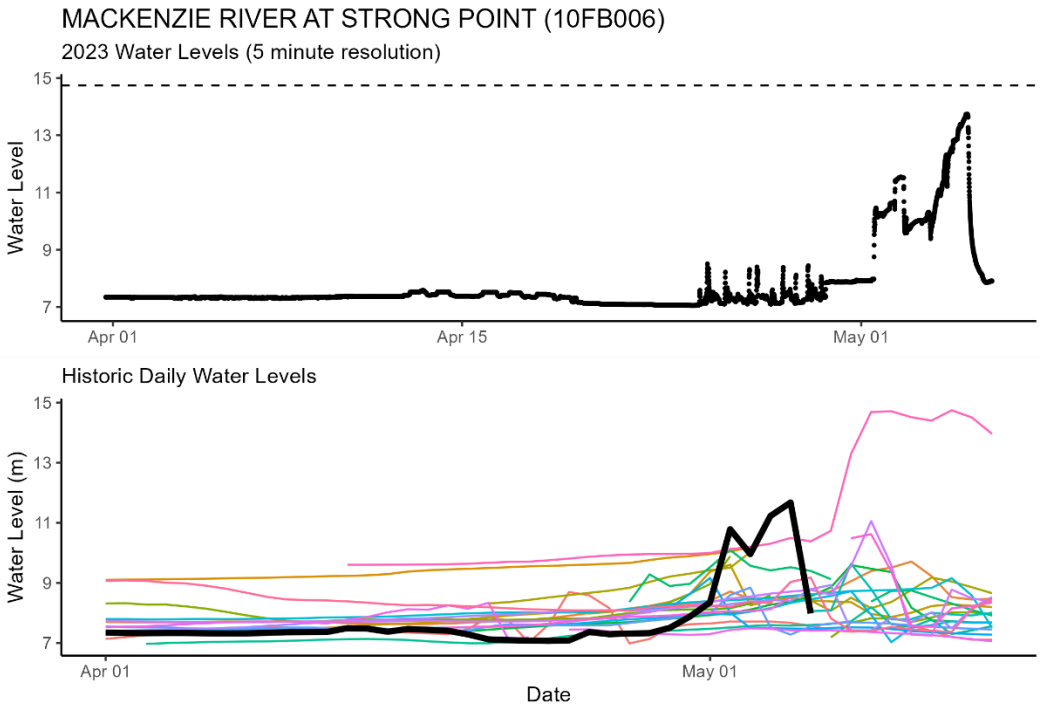
Above – Classified river ice imagery of the Mackenzie and Liard rivers above Fort Simpson. The image was acquired on May 05 at 19:30 MT. This image was acquired just before water levels on the Mackenzie River at Fort Simpson started to drop last night. The image shows the head of the ice jam on the Mackenzie River. The ice jam was approximately 60 km long yesterday and slowly moved down the Mackenzie River past Fort Simpson. The Mackenzie River ice has now cleared through Fort Simpson.

Hydrometric Data:

Mackenzie River at Strong Point [10FB006]:



Above – Water level data for the Mackenzie River at Strong Point. 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 dashed horizontal line represents the highest levels on record (from 2021). The lower graph shows daily average levels relative to the previous 20 years.

Above – Mackenzie River at Strong Point hydrometric gauge photo from May 05 at 14:00. Photo courtesy of Water Survey of Canada and GNWT.

Mackenzie River at Fort Simpson [10GC001]:

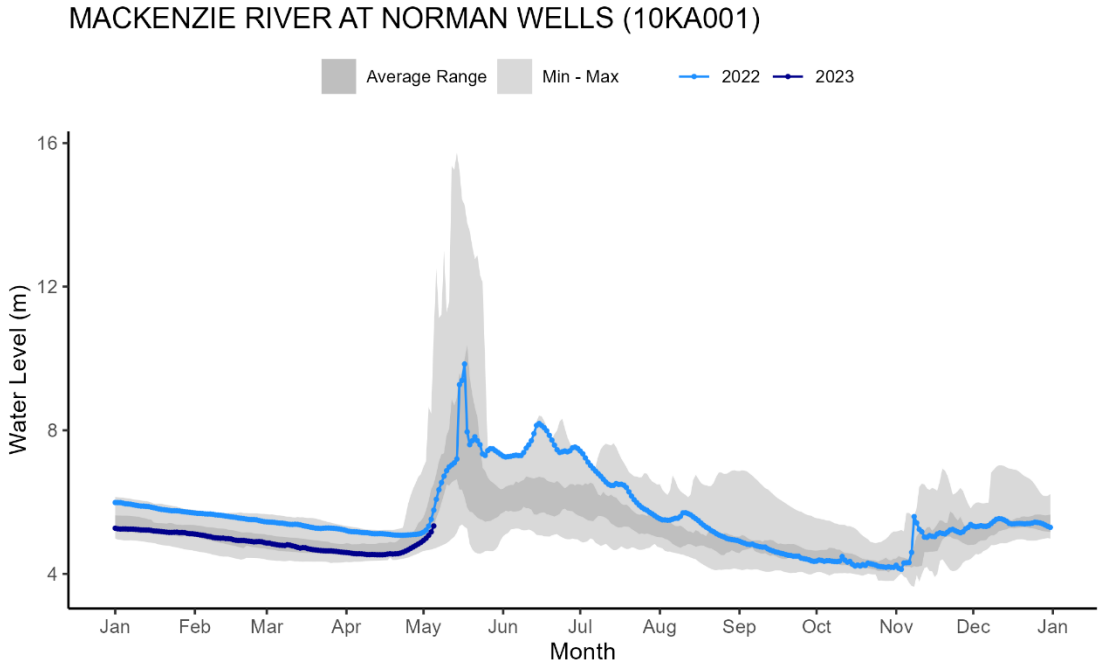
Note: The Water Survey of Canada sensor has been dragged by ice and is not producing reasonable values

The Village of Fort Simpson sensor is working and can be found here: https://fortsimpson.com/current-water-level/

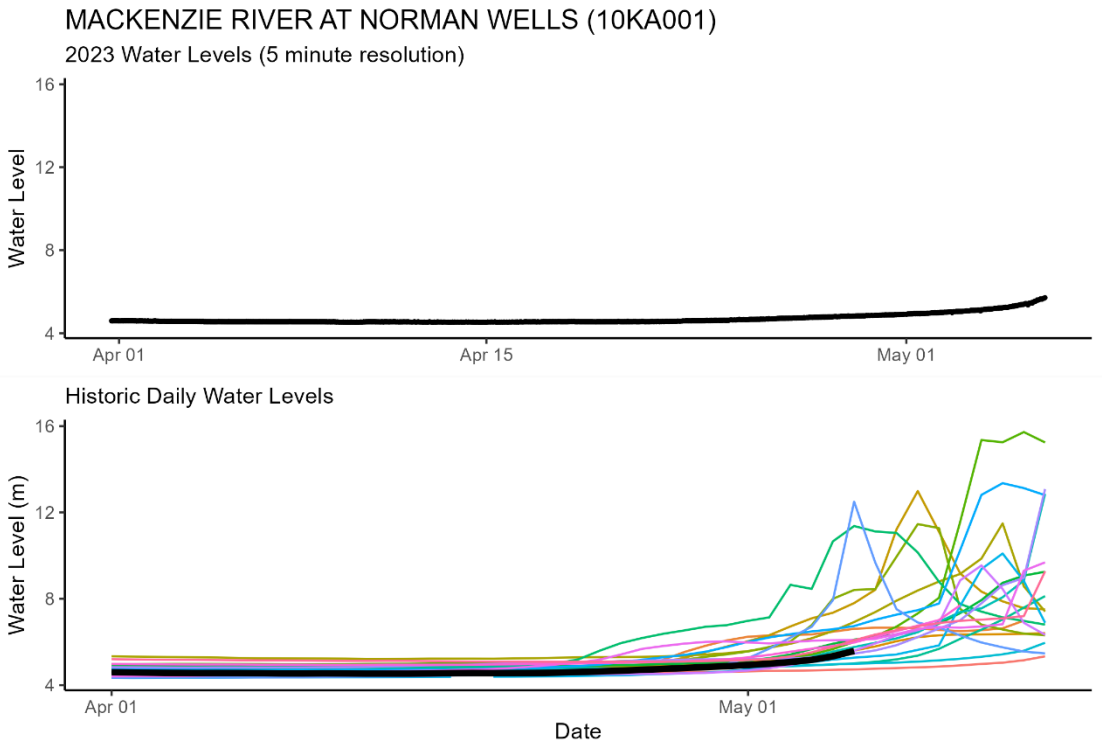
As of 10:00 the water level on the Mackenzie River at Fort Simpson is 8.1 m.

Above – Mackenzie River at Fort Simpson hydrometric gauge photo from May 06 at 10:00. Photo courtesy of Water Survey of Canada and GNWT.

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.



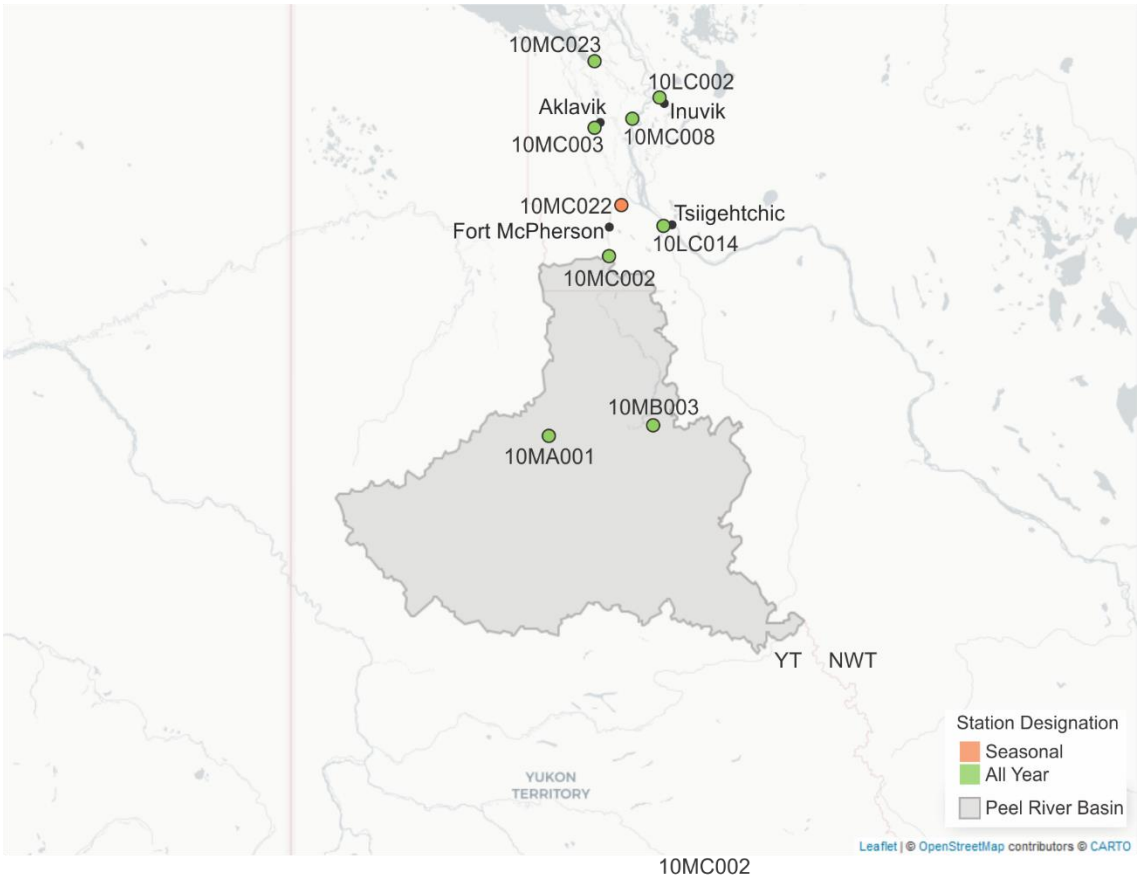
Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Above – Mackenzie River at Norman Wells hydrometric gauge photo from May 05 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

Peel River and Beaufort Delta:

Current status:

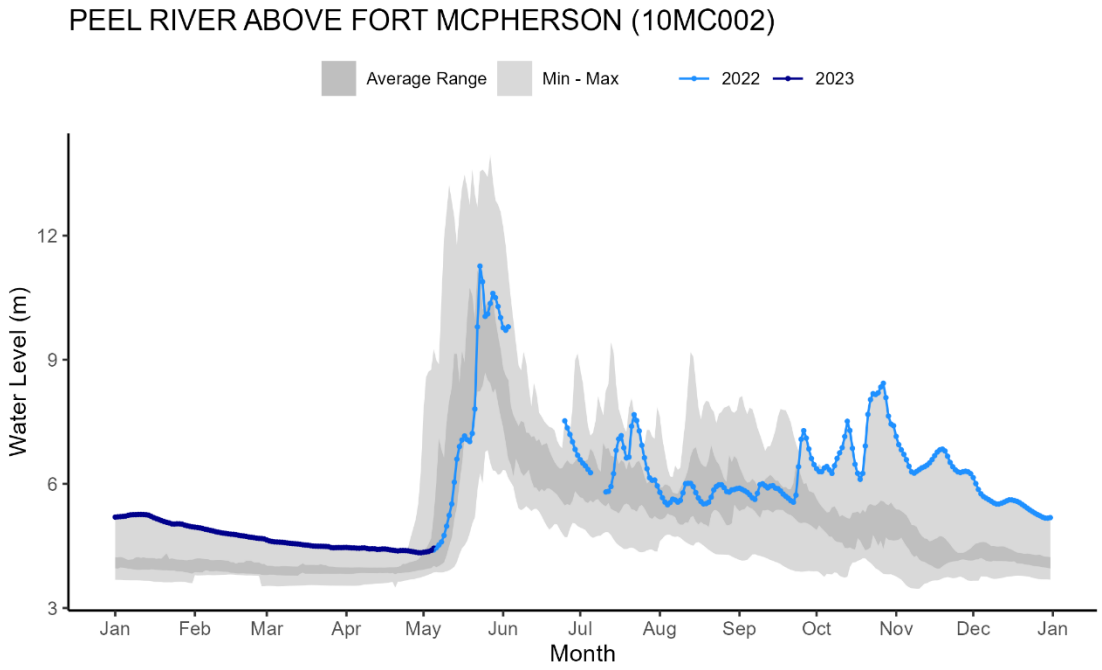
- Break up has yet to commence in the Peel River and Beaufort Delta;
- Early indicators show the potential for high water and out-of-bank flows on the Peel River and Arctic Red rivers at break up;
- More information will be available as the snowpack melts.



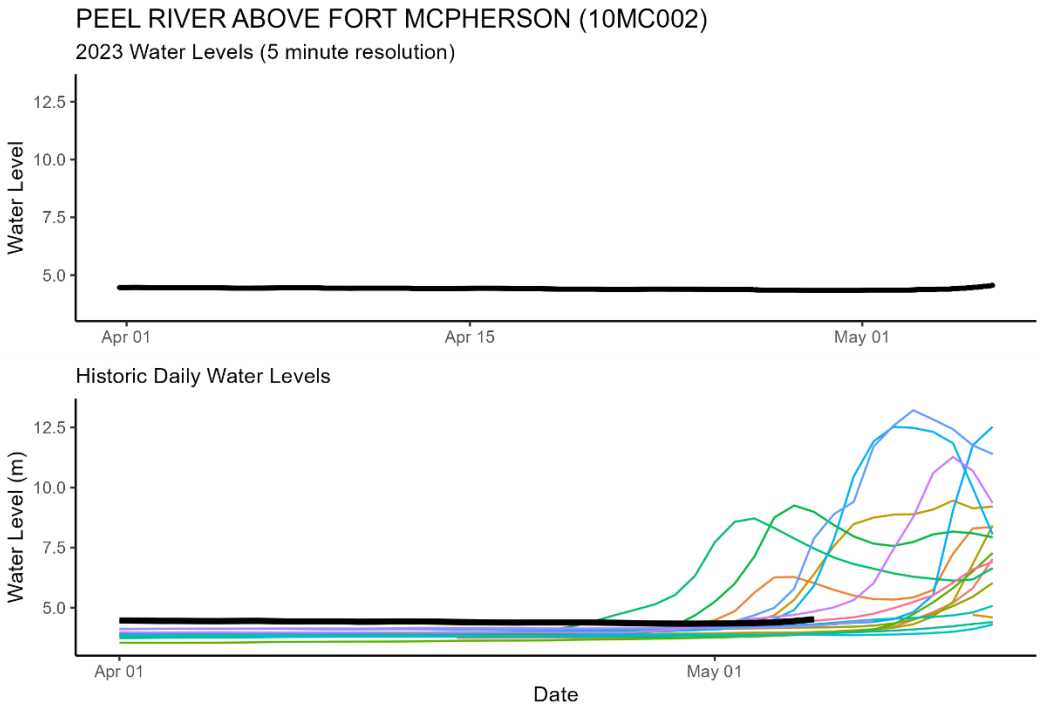
10MC002

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.

Weather Data:

Current status and forecast:

Higher than normal temperatures will persist through the southern NWT for the next week. Temperatures downstream on the Mackenzie River in the Sahtu region are forecast to be seasonal over the next three days and higher than normal by about mid-week. The timing of breakup is projected to be about average in the Sahtu region.

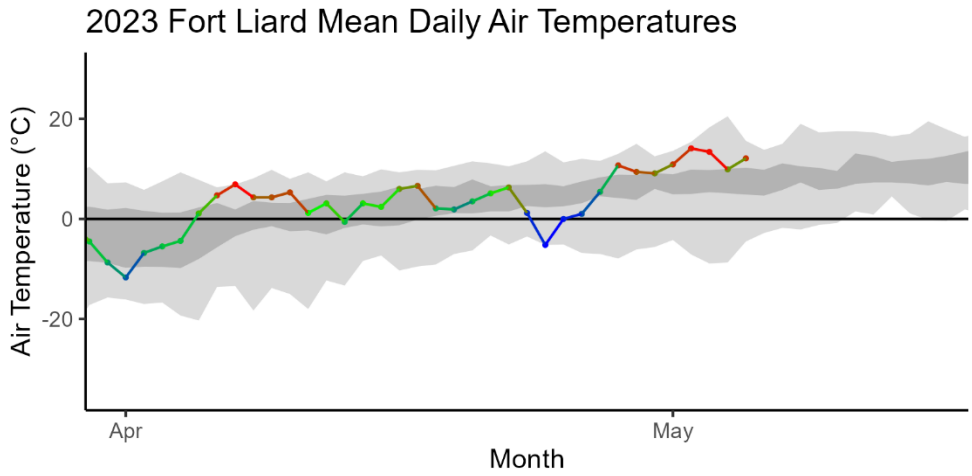
Background information and context:

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.

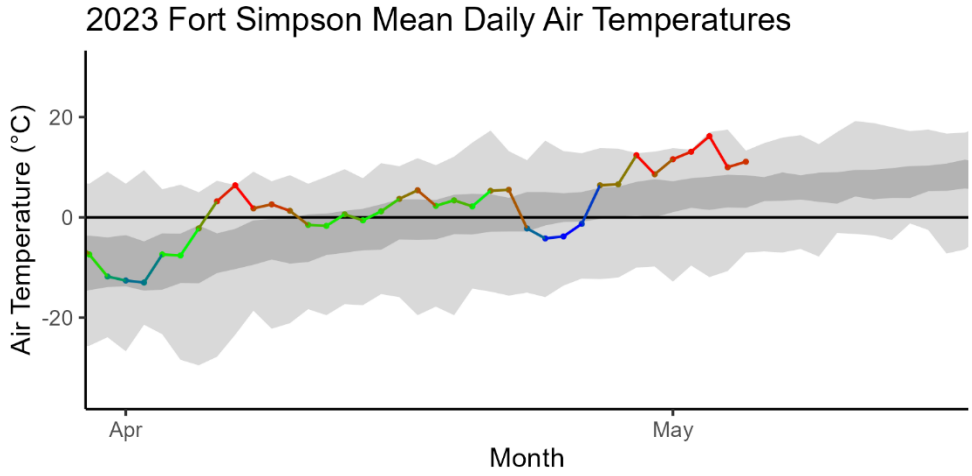
There are two sets of figures below. The first set of figures shows daily temperatures relative to normal for select locations in the NWT. The dark grey bands represent the average range of temperatures, while the light grey bands represent historic minimum and maximum daily mean temperatures. The second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

2023 spring temperatures to-date:

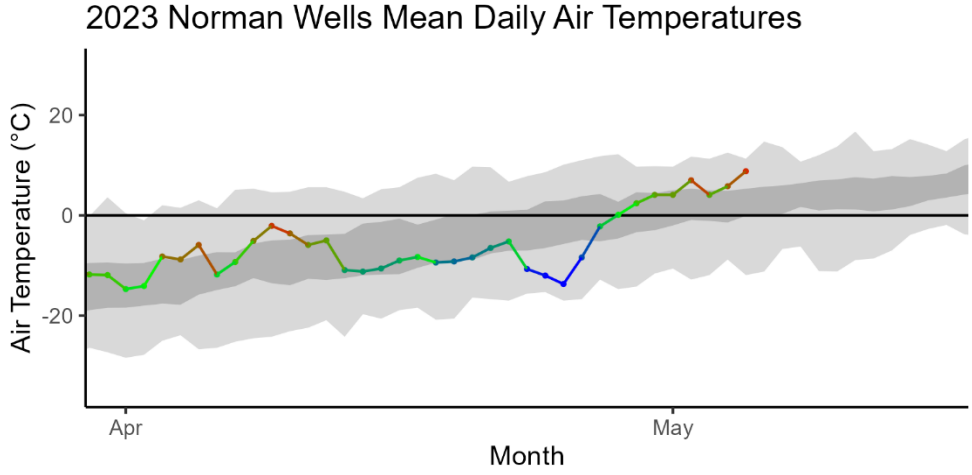
Fort Liard:



Fort Simpson:



Norman Wells:



Seven-day weather forecast:

Fort Liard:

Sat 6 May	Sun 7 May	Mon 8 May	Tue 9 May	Wed 10 May	Thu 11 May	Fri 12 May
26°C	26°C	23°C	24°C	25°C	23°C	23°C
Sunny	30% Chance of showers	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**	
11°C	11°C	9°C	8°C	6°C	7°C	
Clear	Cloudy periods	Clear	Clear	Cloudy periods	Cloudy periods	

Fort Simpson:

Sat 6 May	Sun 7 May	Mon 8 May	Tue 9 May	Wed 10 May	Thu 11 May	Fri 12 May
26°C	26°C	19°C	23°C	26°C	27°C	25°C
Sunny	Mainly sunny	Sunny	Sunny	Sunny	Sunny	Sunny
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
13°C	10°C	7°C	10°C	7°C	8°C	
Clear	Cloudy periods	Clear	Clear	Clear	Clear	

Norman Wells:

Sat 6 May	Sun 7 May	Mon 8 May	Tue 9 May	Wed 10 May	Thu 11 May	Fri 12 May
14°C	8°C	9°C	17°C	18°C	21°C	20°C
A mix of sun and cloud	Mainly cloudy	Cloudy	Sunny	Sunny	A mix of sun and cloud	A mix of sun and cloud
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
-2°C	-1°C	0°C	2°C	5°C	5°C	
A few clouds	Cloudy	Cloudy periods	Clear	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.