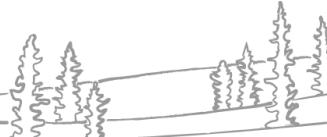




NWT Water Monitoring Bulletin

– May 11, 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 10 May) and photographs (from morning of 11 May) indicate that break up has progressed down the Mackenzie River past Tulita;
 - The tail end of the main portion of Mackenzie River ice appeared to be about 25 km upstream of Tulita, as of yesterday evening (11 May, 20:00);
- The water level on the Mackenzie River at Norman Wells levelled off over the past 24 hours, but looks to have resumed climbing underneath the ice;
- 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;
 - This will likely rapidly melt remaining snow in the region and deliver runoff to streams and rivers;
- Water levels on the Peel and Arctic Red rivers have continued to slowly rise under ice;
- 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](#).

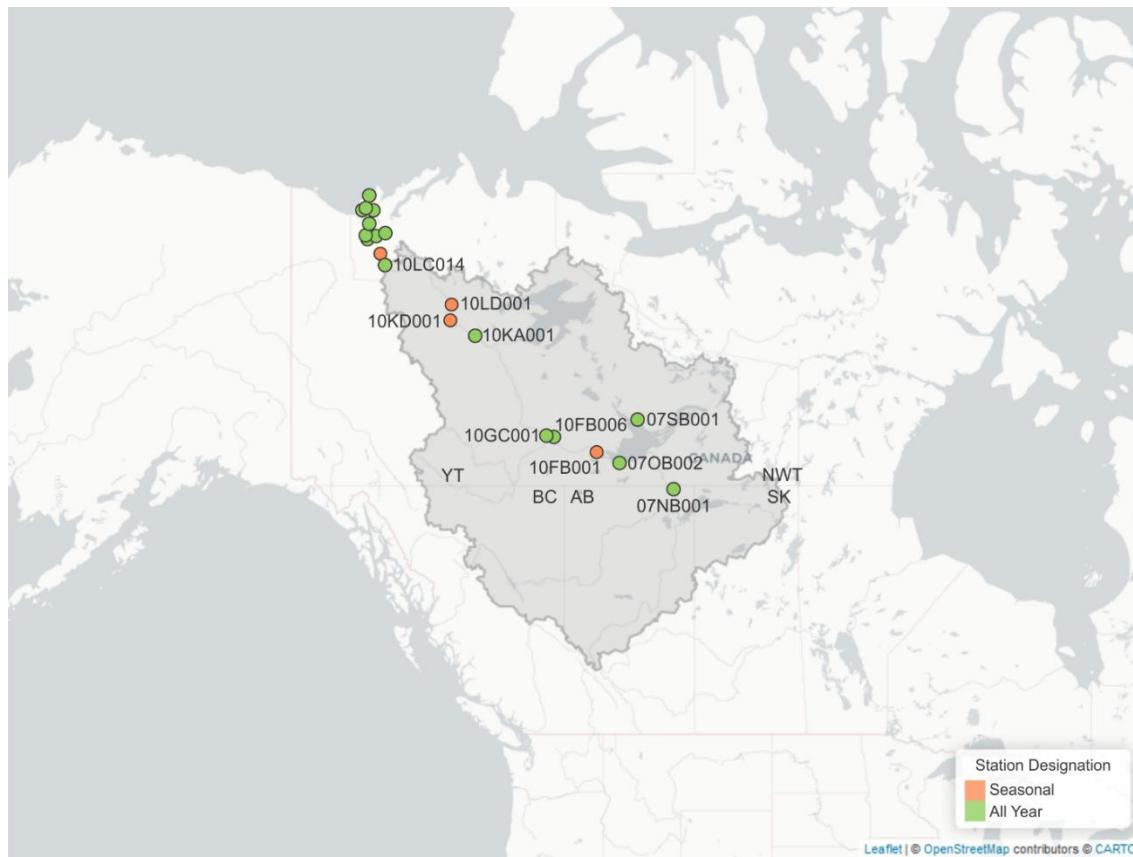
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Mackenzie River

Current Status:

- The water level on the Mackenzie River at Norman Wells levelled off over the past 24 hours, but looks to have resumed climbing underneath the ice as snowmelt and break up progress northward;
- According to local reports, ice has broken at Tulita with ice flowing steadily by this morning and lots of open water visible (11 May);
- Ice remains intact at Norman Wells and Fort Good Hope.

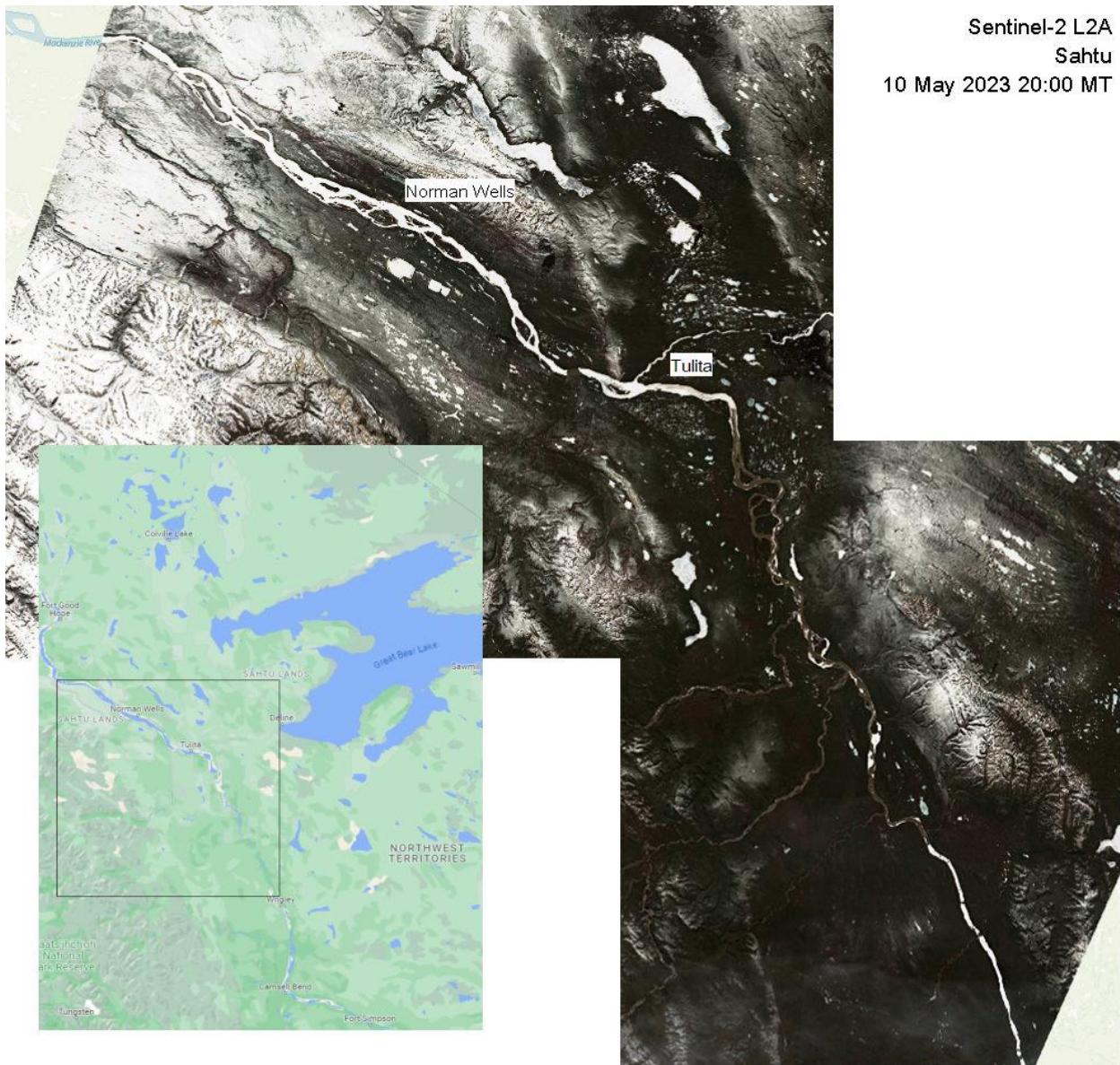


Above – Map of hydrometric stations in the Dehcho (Mackenzie River) basin. The station numbers are referenced in the water level plots below.



Above – Mackenzie River at Tulita from this morning (11 May). Photos courtesy of RCMP Cpl. Jon Rondeau.

Satellite imagery:

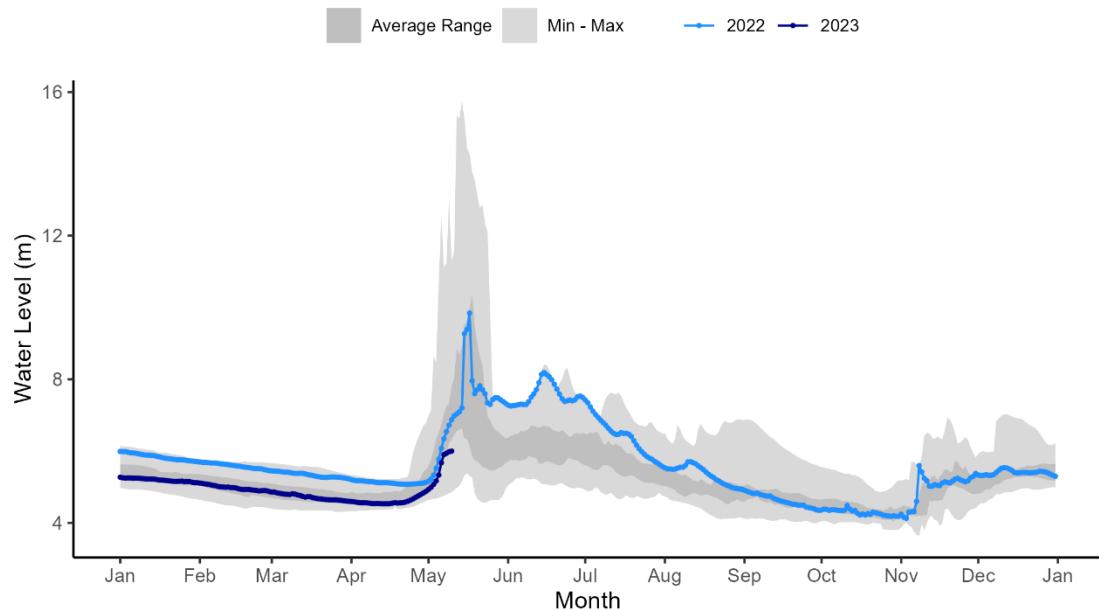


Above – Satellite imagery over the Sahtu Region showing Mackenzie River ice. As of the acquisition time of this image (10 May 20:00), the tail end of the main Mackenzie River ice was around 25km upstream Tulita, while there was still a section of ice along a stretch of the river north of Wrigley.

Hydrometric Data:

Mackenzie River at Norman Wells [10KA001]:

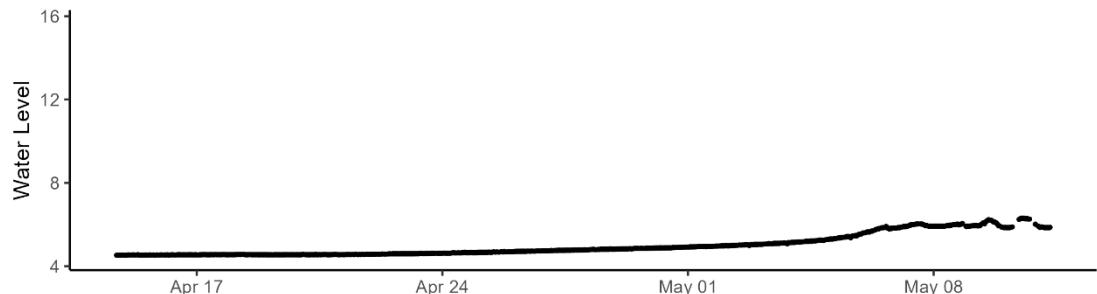
MACKENZIE RIVER AT NORMAN WELLS (10KA001)



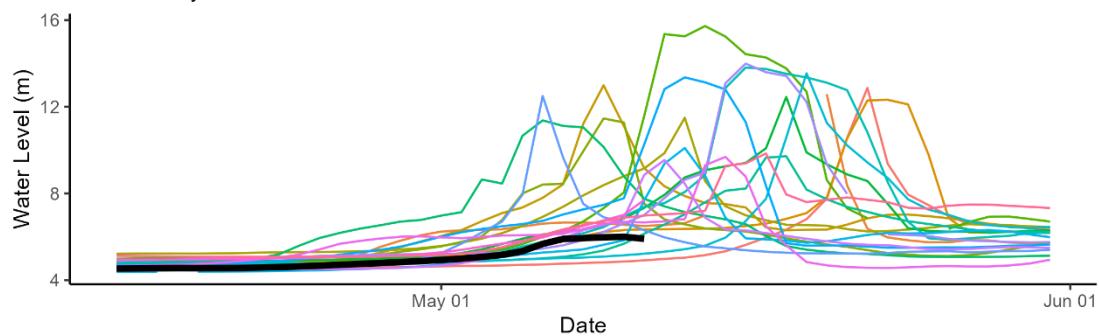
Above – Water level data for the Mackenzie River at Norman Wells. Daily average levels for the previous year are shown here.

MACKENZIE RIVER AT NORMAN WELLS (10KA001)

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.

10KA001 2023-05-11 19:04:17 UTC
65.27199, -126.85005 135V 17.5°C P



Above – Mackenzie River at Norman Wells hydrometric gauge photo from May 11 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

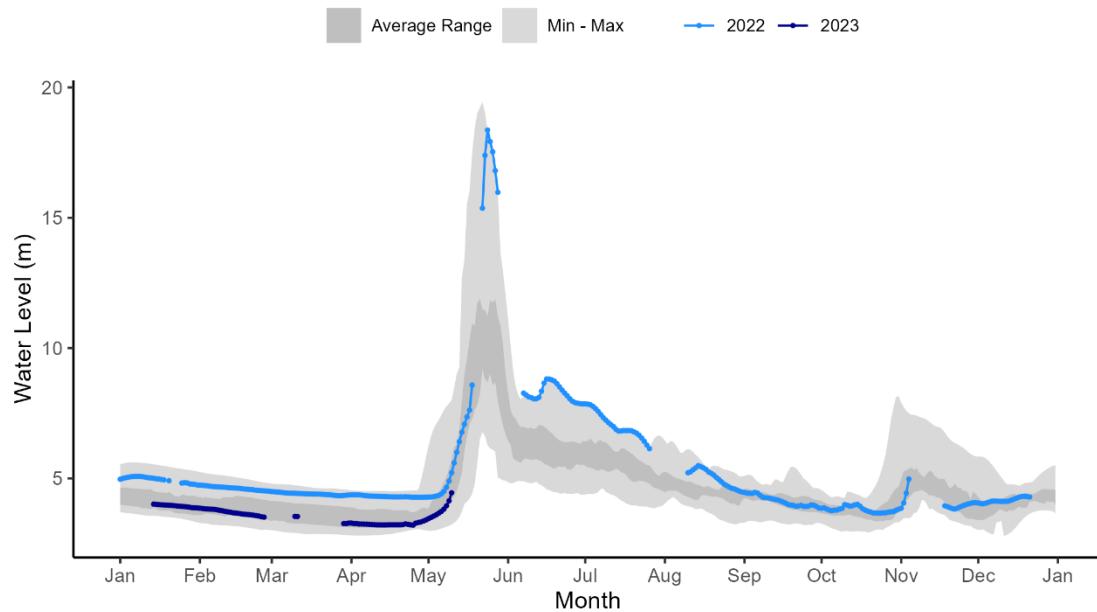
Mackenzie River at Fort Good Hope [10LD001]:

10LD001 2023-05-11 19:01:14 UTC
66.25151, -128.64580 12.0V 20.0°C P

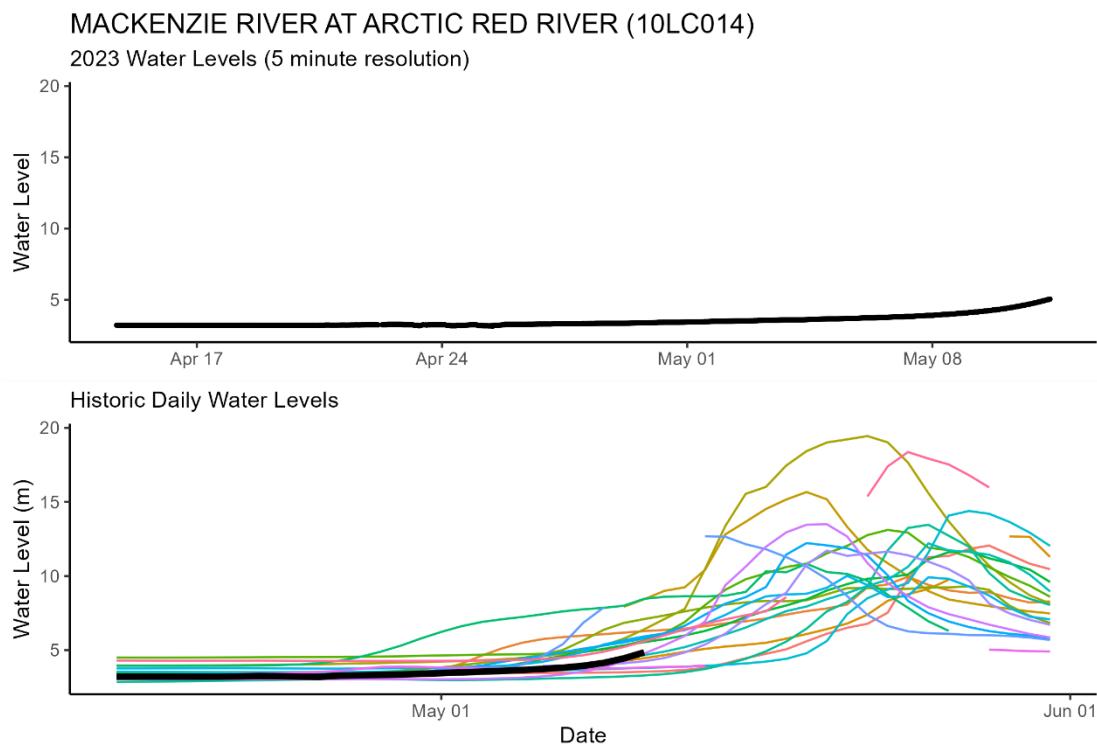


Above – Mackenzie River at Fort Good Hope hydrometric gauge photo from May 11 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

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 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.

10LC014 2023-05-11 190107 UTC
67.4598, -133.75328 14.4V 24.0°C P

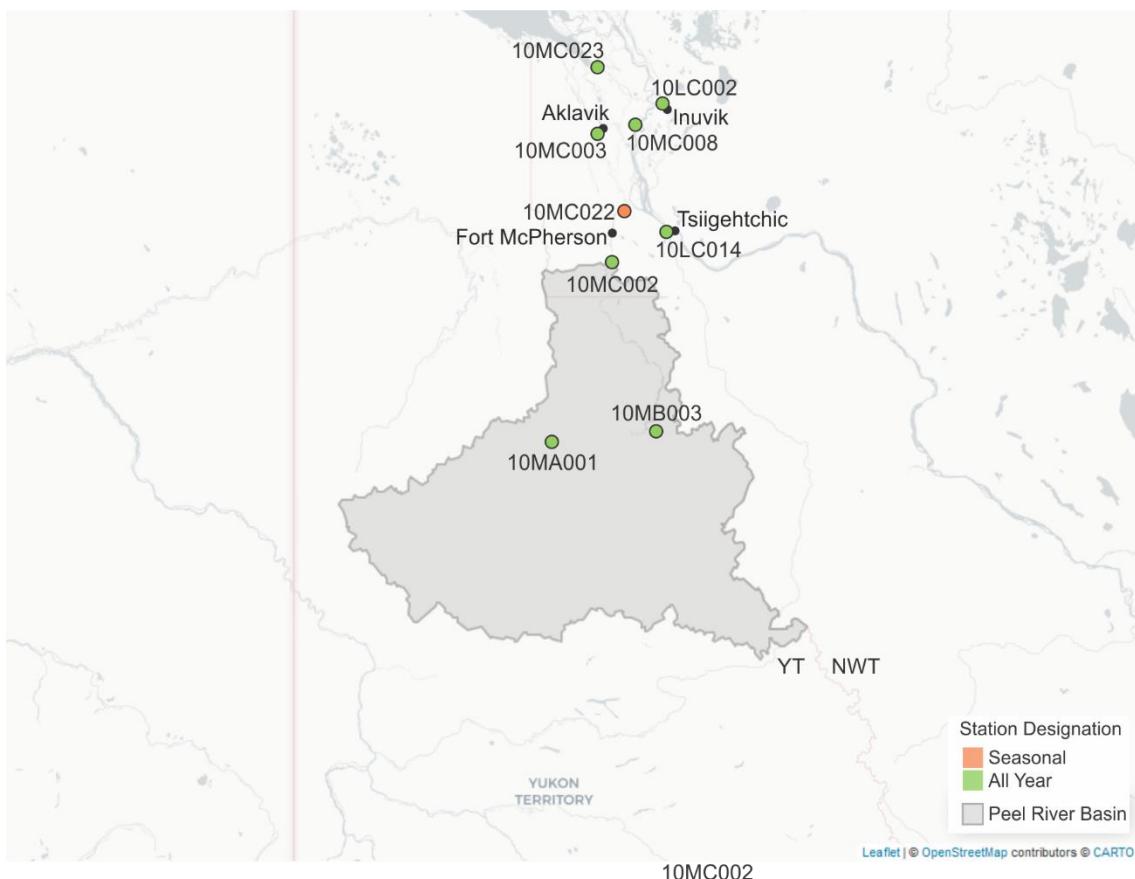


Above – Mackenzie River at Tsiiigehtchic hydrometric gauge photo from May 11 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

Peel River and Beaufort Delta:

Current status:

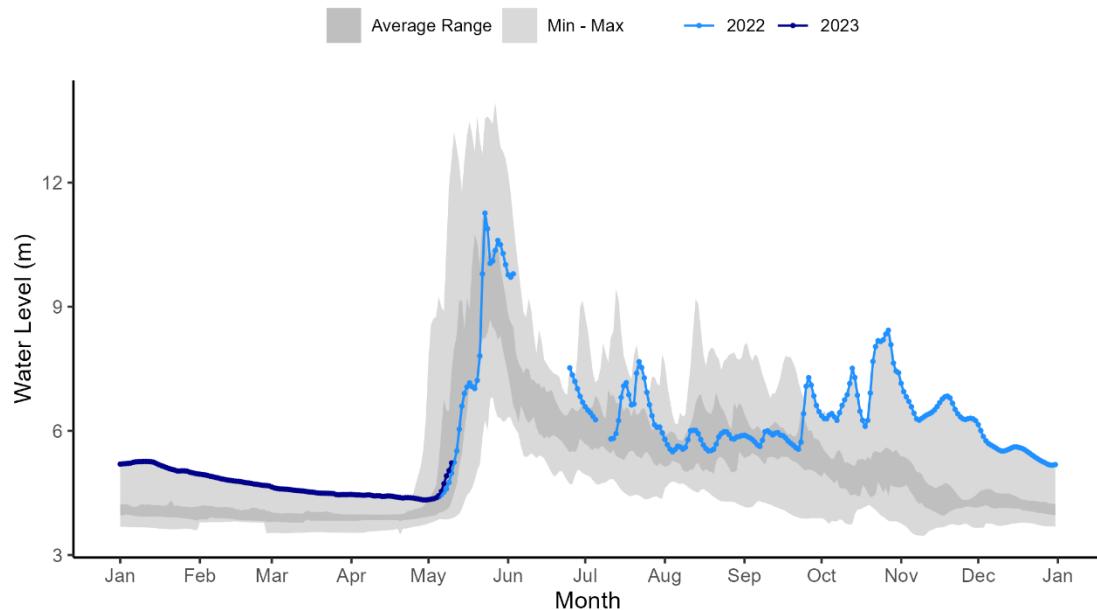
- Water levels continue to slowly rise under the ice on the Peel and Arctic Red rivers as snowmelt begins;
- Fort McPherson and the Peel River basin are forecast to be warmer than normal again today, with cooler temperatures for the next two days, followed by more warm temperatures and sunny conditions;
- 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 spring progresses and the snowpack melts.



Hydrometric Data:

Peel River above Fort McPherson [10MC002]:

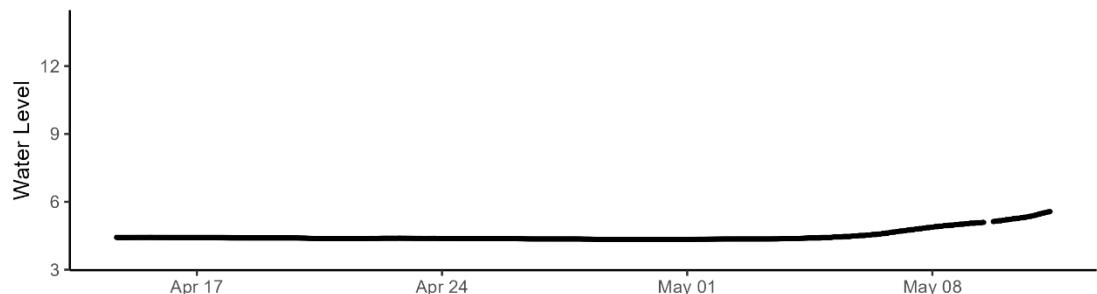
PEEL RIVER ABOVE FORT MCPHERSON (10MC002)



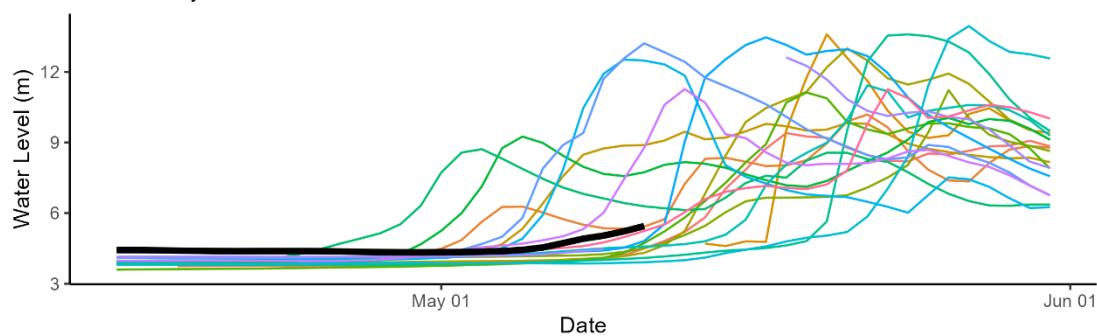
Above – Water level data for the Peel River above Fort McPherson. Daily average levels for the previous year are shown here.

PEEL RIVER ABOVE FORT MCPHERSON (10MC002)

2023 Water Levels (5 minute resolution)



Historic Daily Water Levels

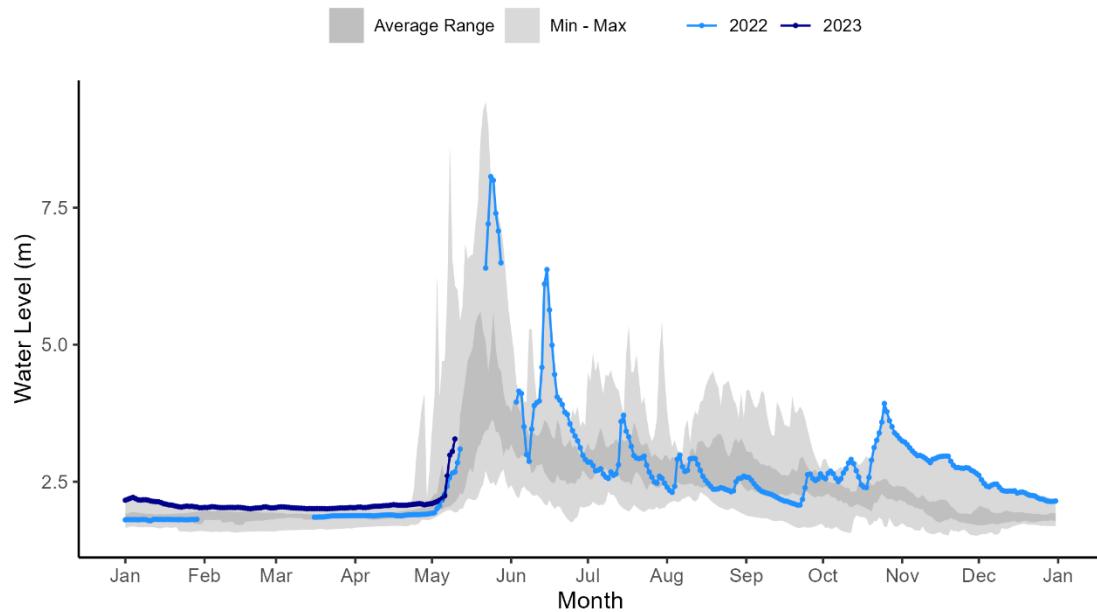


Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

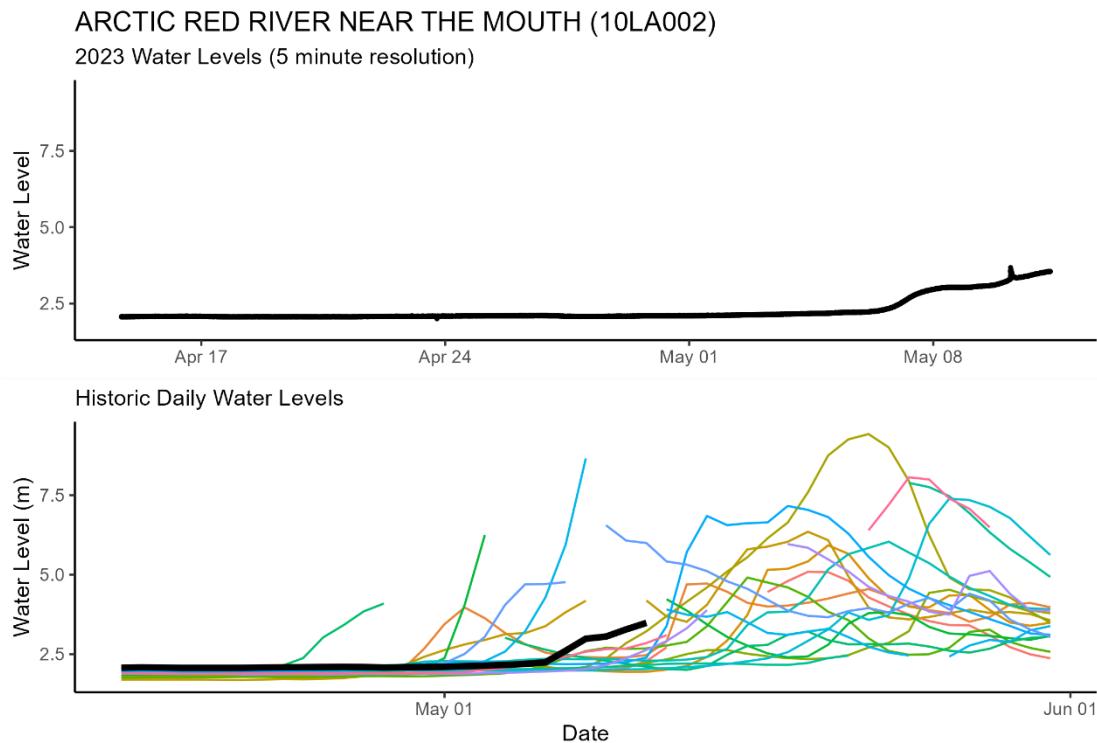


Above – Peel River above Fort McPherson hydrometric gauge photo from May 11 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

Arctic Red River near the mouth [10LA002]:
 ARCTIC RED RIVER NEAR THE MOUTH (10LA002)

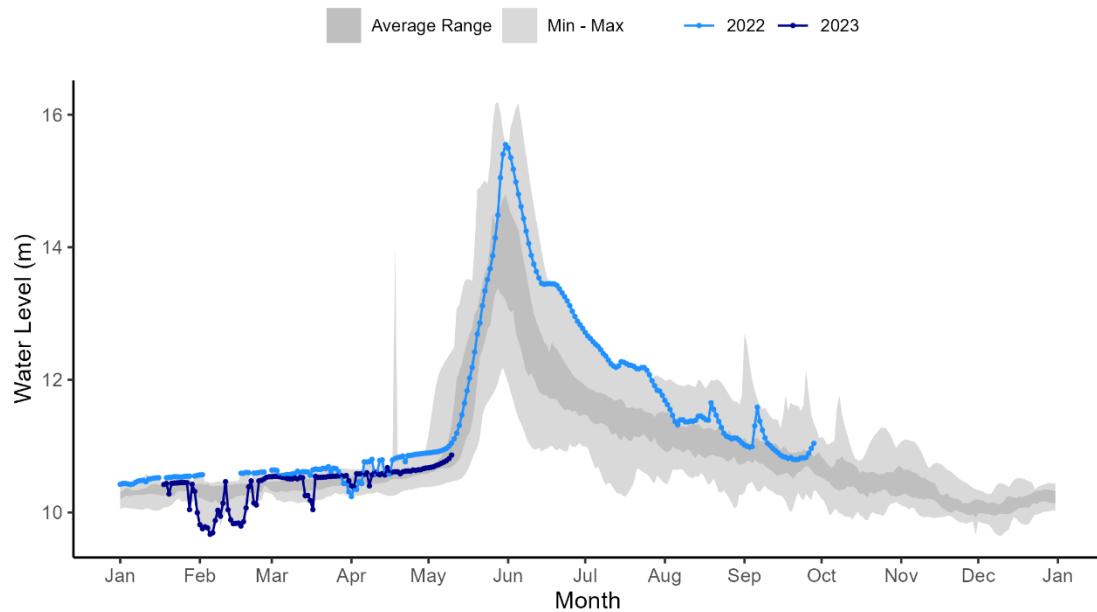


Above – Water level data for the Arctic Red River near the mouth. Daily average levels for the previous year are shown here.

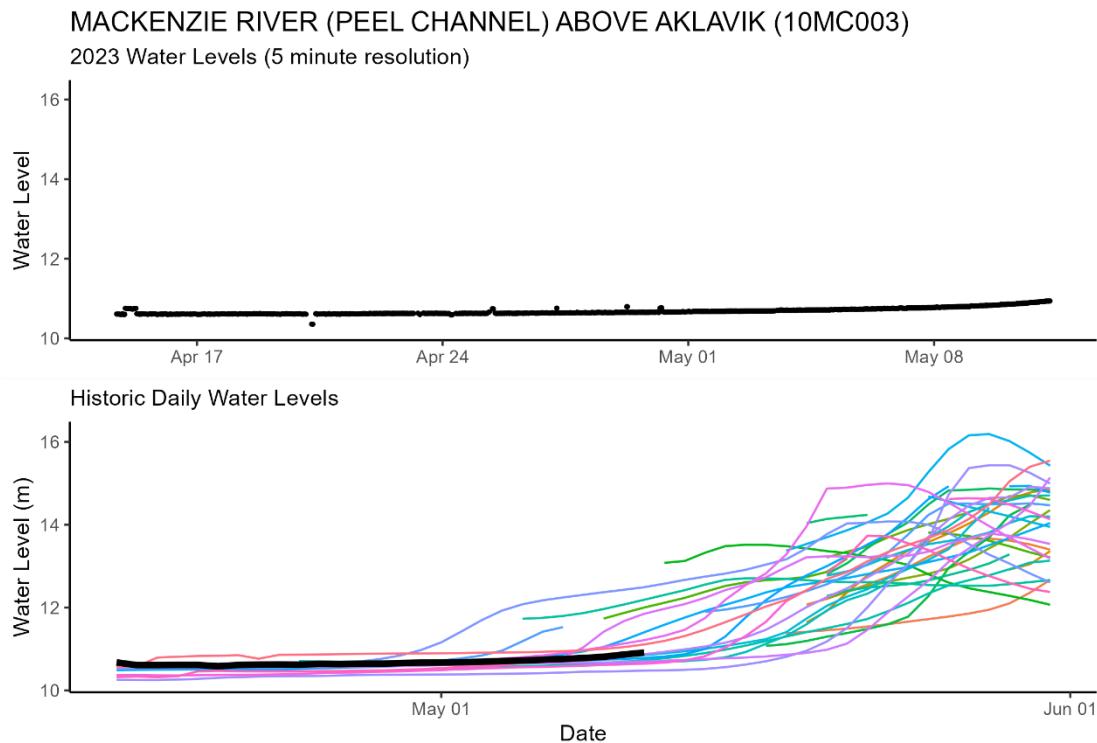


Above: The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Mackenzie River (Peel Channel) above Aklavik [10MC003]:
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 11 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 into this weekend. The timing of break up is projected to be about average in the Sahtu region. Temperatures in the Beaufort Delta have been below seasonal so far this spring and but are forecast to be slightly more seasonal or warmer for the next five days. The timing of snowmelt and break up is projected to be slightly delayed relative to normal in the Peel River basin and the Beaufort Delta region.

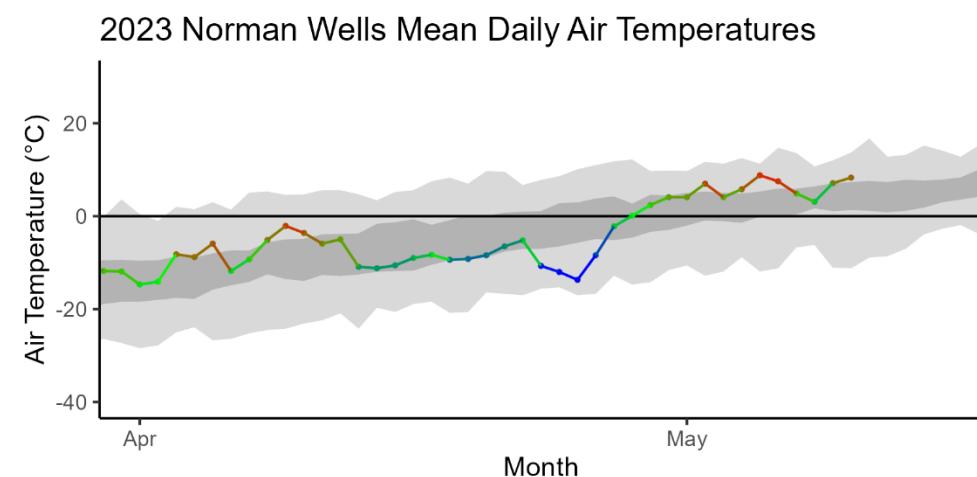
Background information and context:

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.

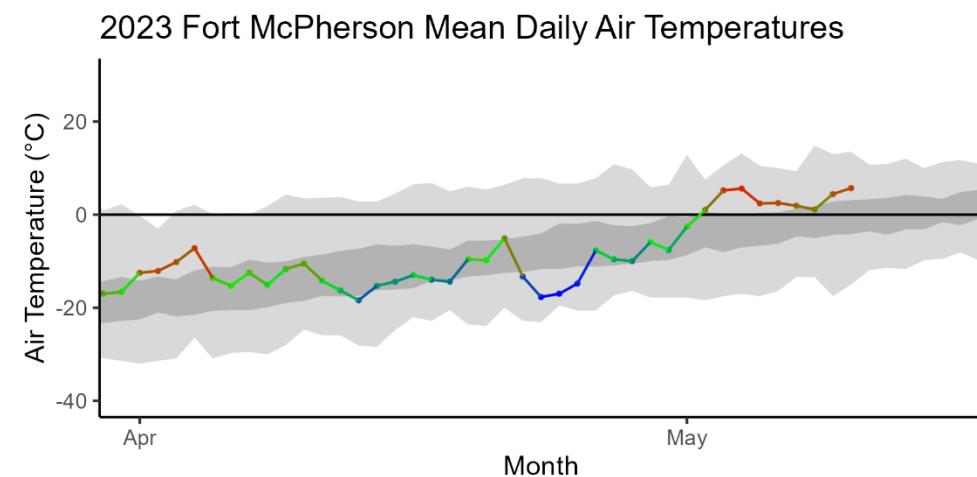
There are two sets of figures below. The first set of figures shows daily temperatures relative to normal for select locations in the NWT. The dark grey bands represent the average range of temperatures, while the light grey bands represent historic minimum and maximum daily mean temperatures. The second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

2023 spring temperatures to-date:

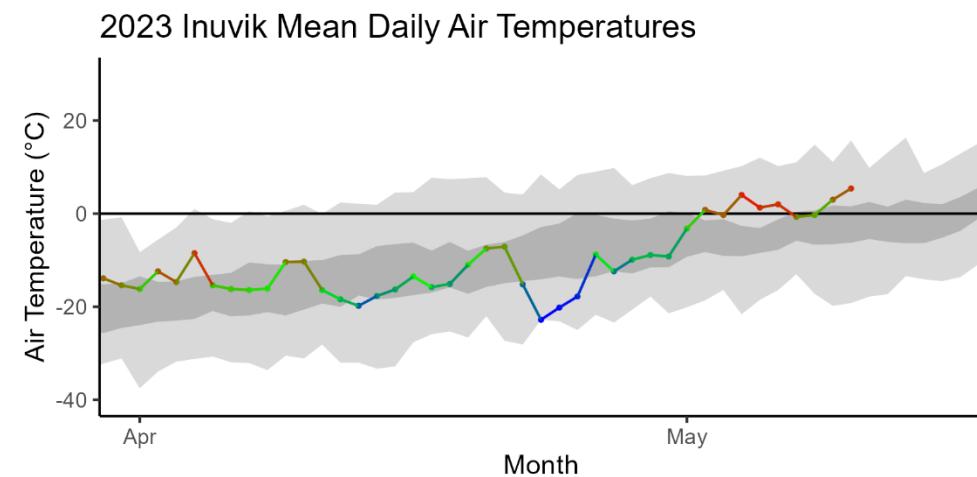
Norman Wells:



Fort McPherson:



Inuvik:



Seven-day weather forecast:

Norman Wells:

Thu 11 May	Fri 12 May	Sat 13 May	Sun 14 May	Mon 15 May	Tue 16 May	Wed 17 May
 25°C Mainly sunny	 20°C Mainly sunny	 20°C 40% Chance of showers	 18°C A mix of sun and cloud	 21°C Sunny	 20°C A mix of sun and cloud	 18°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 5°C Clear	 6°C 30% Chance of showers	 6°C Clear	 6°C Clear	 7°C Cloudy periods	 5°C Cloudy periods	

Fort McPherson:

Thu 11 May	Fri 12 May	Sat 13 May	Sun 14 May	Mon 15 May	Tue 16 May	Wed 17 May
 11°C Mainly sunny	 1°C Mainly cloudy	 8°C A mix of sun and cloud	 19°C Sunny	 19°C Sunny	 10°C A mix of sun and cloud	 9°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 -1°C Partly cloudy	 -4°C Cloudy periods	 2°C Cloudy periods	 7°C Clear	 2°C Cloudy periods	 1°C Cloudy periods	

Inuvik:

Thu 11 May	Fri 12 May	Sat 13 May	Sun 14 May	Mon 15 May	Tue 16 May	Wed 17 May
 11°C Mainly sunny	 0°C Mainly cloudy	 7°C Sunny	 10°C Sunny	 9°C Sunny	 14°C A mix of sun and cloud	 12°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 -1°C A few clouds	 -1°C Cloudy periods	 3°C Clear	 5°C Clear	 3°C Cloudy periods	 1°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.