Government of
Northwest Territories

NWT Water Monitoring Bulletin – May 05, 2023 at 14:30

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 at Fort Simpson began moving this morning at about 08:30;
    - This ice was part of a large ice jam that was building on the Mackenzie River above the confluence with the Liard River;
- Ice on the Liard River at the ferry crossing has started to push in the centre of the channel as of 11:00;
- The water level on the Mackenzie River at the Village of Fort Simpson gauge is approximately 10.0 m (as of 14:30) and is rising;
    - Real time water level data are from the Village of Fort Simpson are available here
    - The water level on the Mackenzie River will be dependent on how the ice clears downstream of Fort Simpson and when ice from the Liard River moves in;
- Warmer than seasonal temperatures will continue for the southern Dehcho region (lower Liard and upper Mackenzie basins) through the weekend and into next week;
- 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

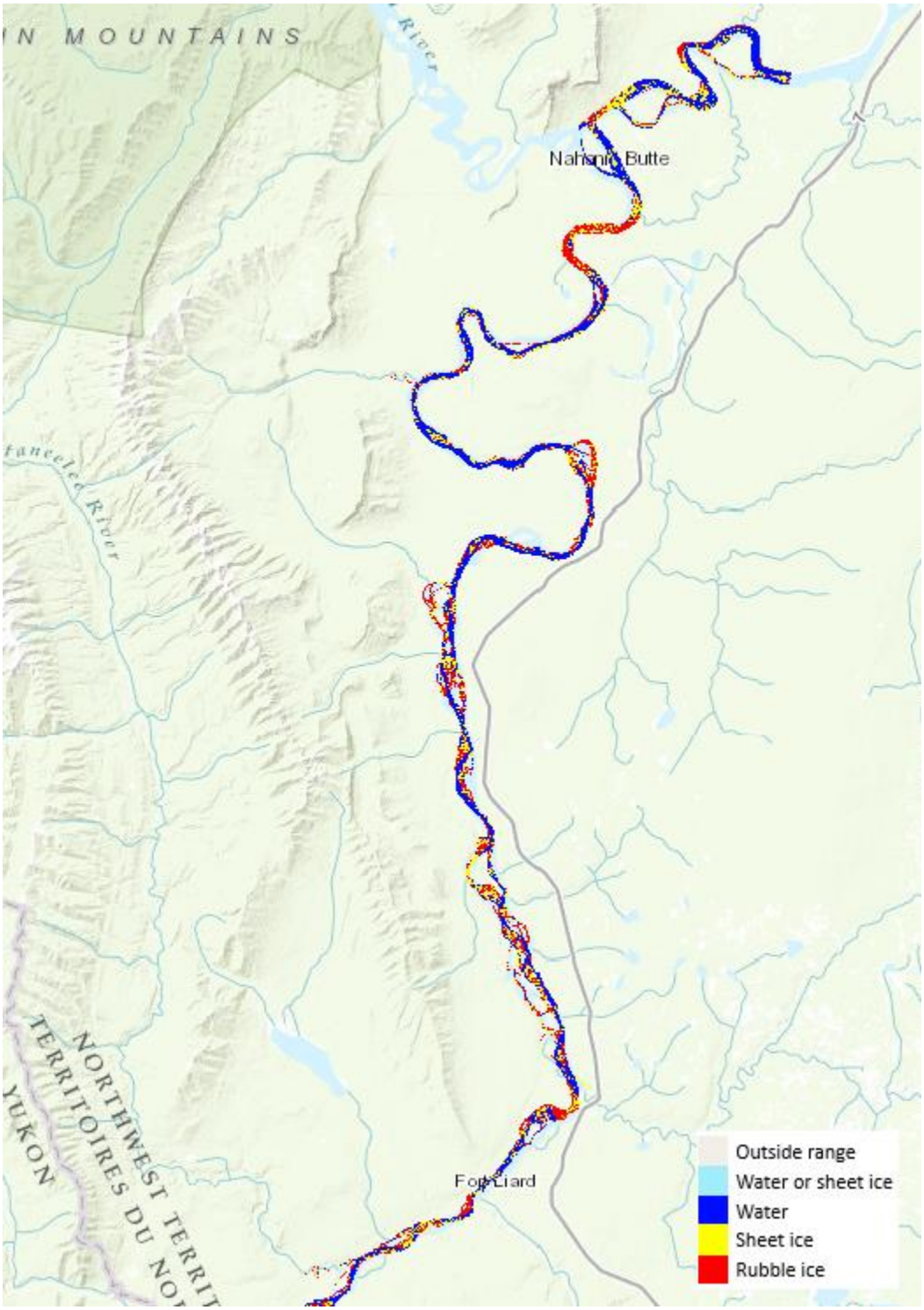
Liard River:

Current Status:

- Ice on the Liard River is moving well past Fort Liard;
- Ice has started to push in the middle of the channel on the Liard River at the Fort Simpson ferry crossing (as of 11:00);
- Ice on the Liard River near Fort Simpson has remained in place because the low inflows from tributaries were not sufficient to lift the ice and move it downstream;
- The southern Dehcho region will continue to receive unseasonably warm weather through the weekend and into next week.

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

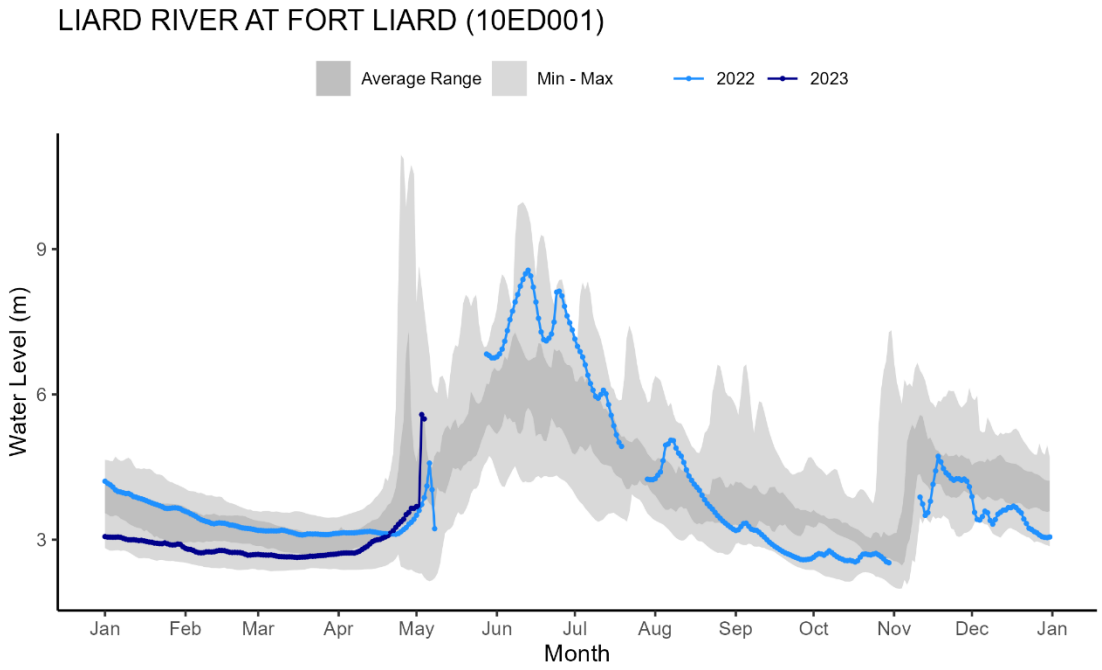
Satellite Data:



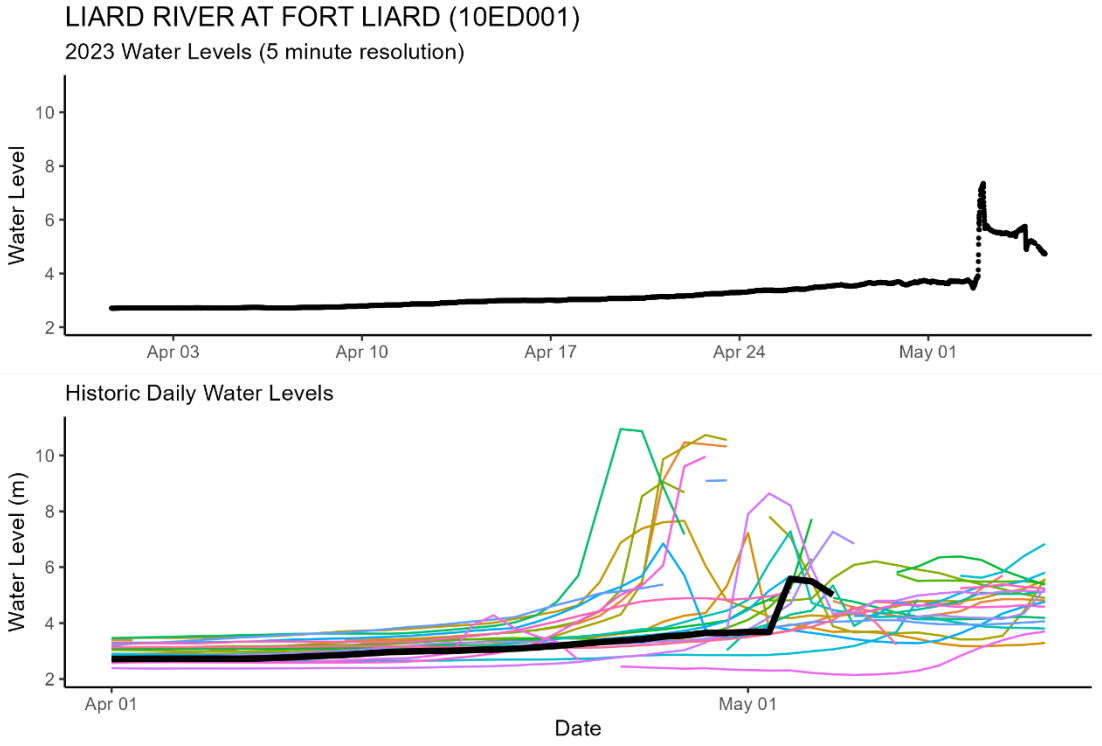
Above – Classified river ice imagery of the Liard River between Fort Liard and Nahanni Butte. The image was acquired on May 05 at 08:00 MT. This image shows large stretches of open water between Fort Liard and Nahanni Butte with a small ice jam (identified by red) just south of Nahanni Butte.

Hydrometric Data:

Liard River at Fort Liard [10ED001]:



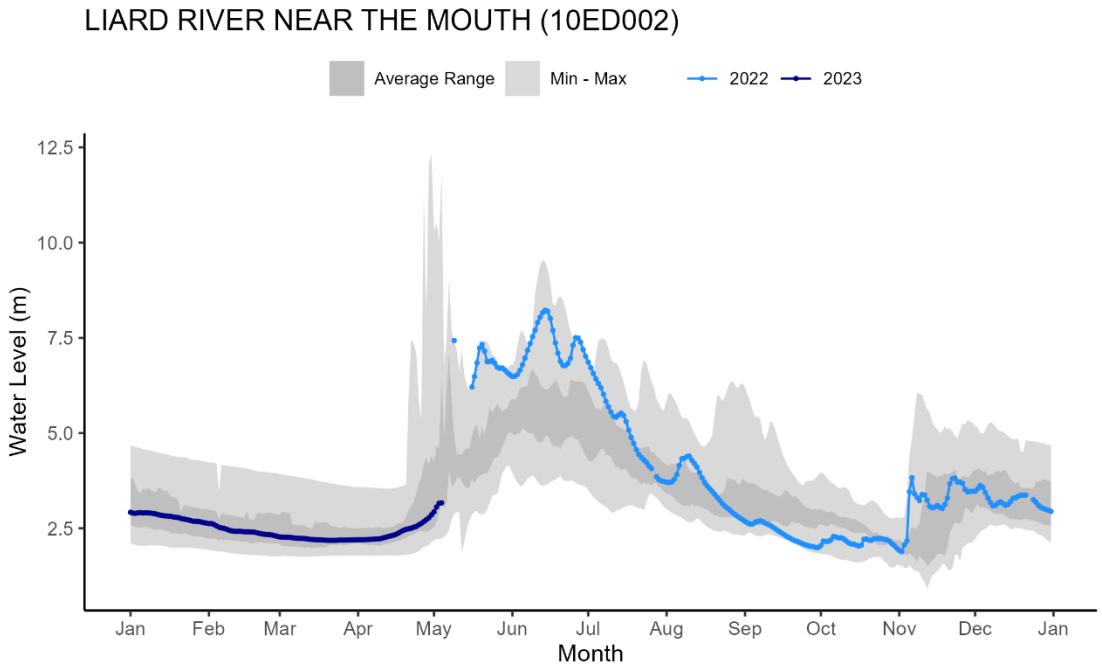
Above – Water level data for the Liard River at Fort Liard. Daily average levels for the previous year are shown here.



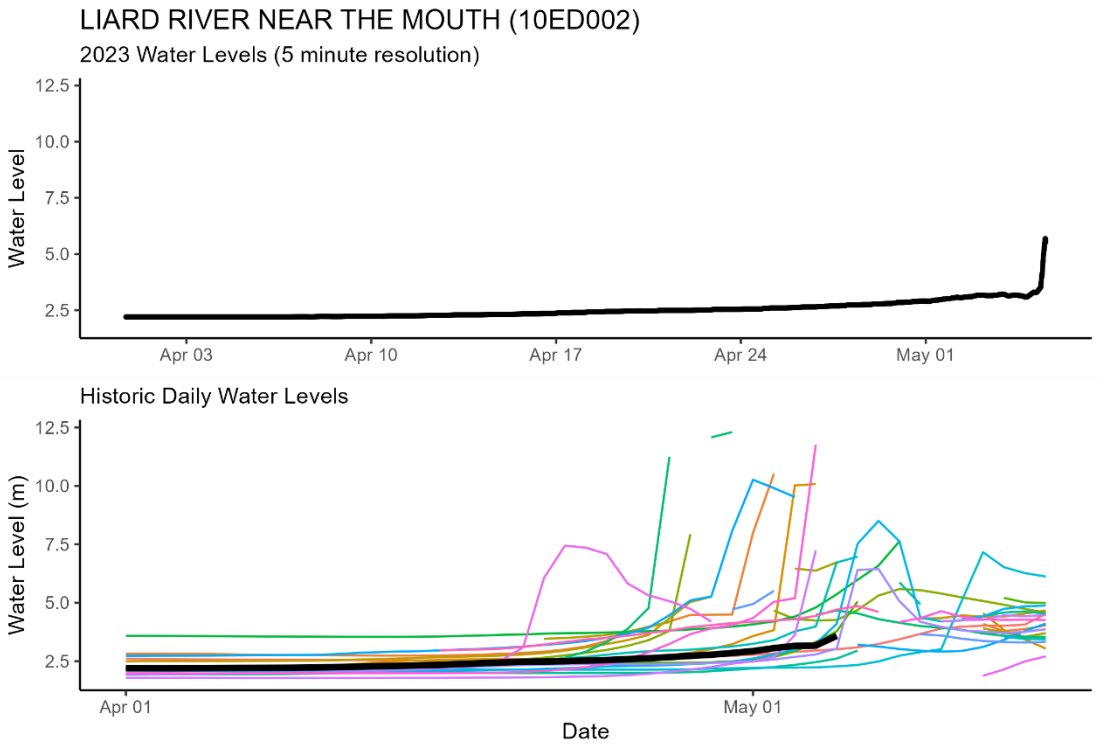
Above - The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Above – Liard River at Fort Liard hydrometric gauge photo from May 05 at 14:00. 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.



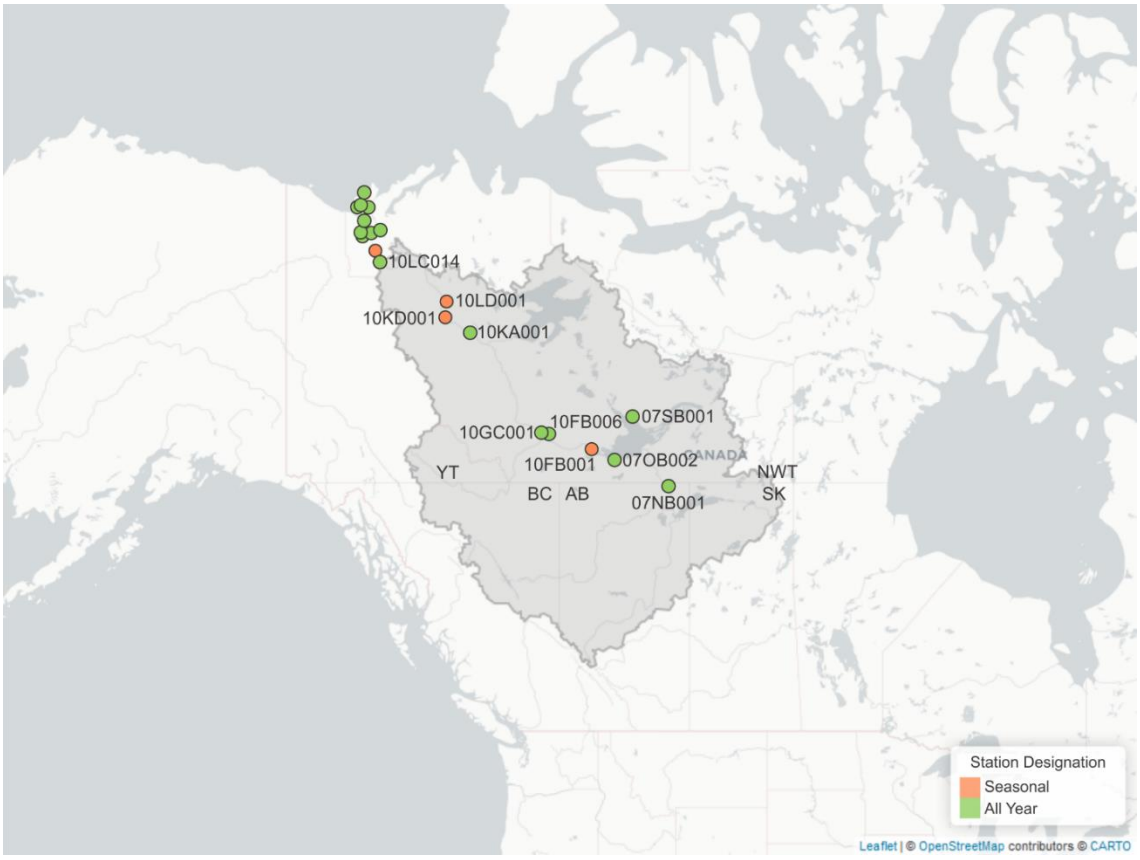
Above - The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Above – Liard River near the mouth hydrometric gauge photo from May 05 at 14:00. Photo courtesy of Water Survey of Canada and GNWT.

Mackenzie River

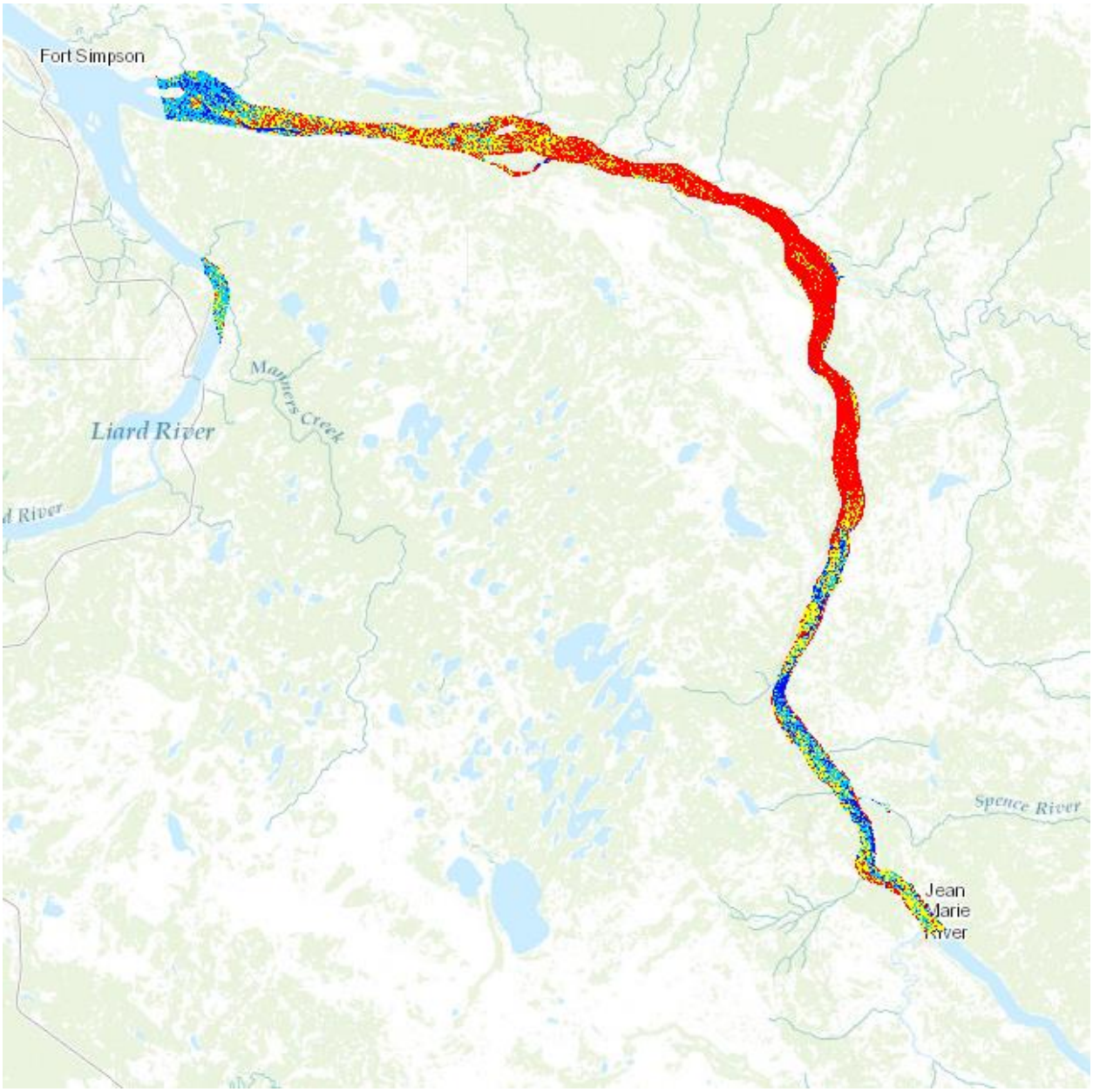
Current Status:

- Ice began moving on the Mackenzie River at Fort Simpson at about 08:30 this morning;
    - This ice was from a large ice jam that developed on the Mackenzie River above Fort Simpson;
        - The jam extended approximately 60 km upstream from the confluence of the Mackenzie and Liard rivers;
    - In most years, ice from the Liard River breaks before ice from the Mackenzie River;
- The water level on the Mackenzie River at the Village of Fort Simpson gauge is approximately 10.0 m (as of 14:30) and is rising;
    - According to the Village of Fort Simpson, flood watch commences at 12.5 m;
- Water levels in Fort Simpson during break up will be dependent on how the ice clears downstream of Fort Simpson, and when ice on the Liard River breaks;
- Warm temperatures in the region will soften river ice and expedite break up.



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

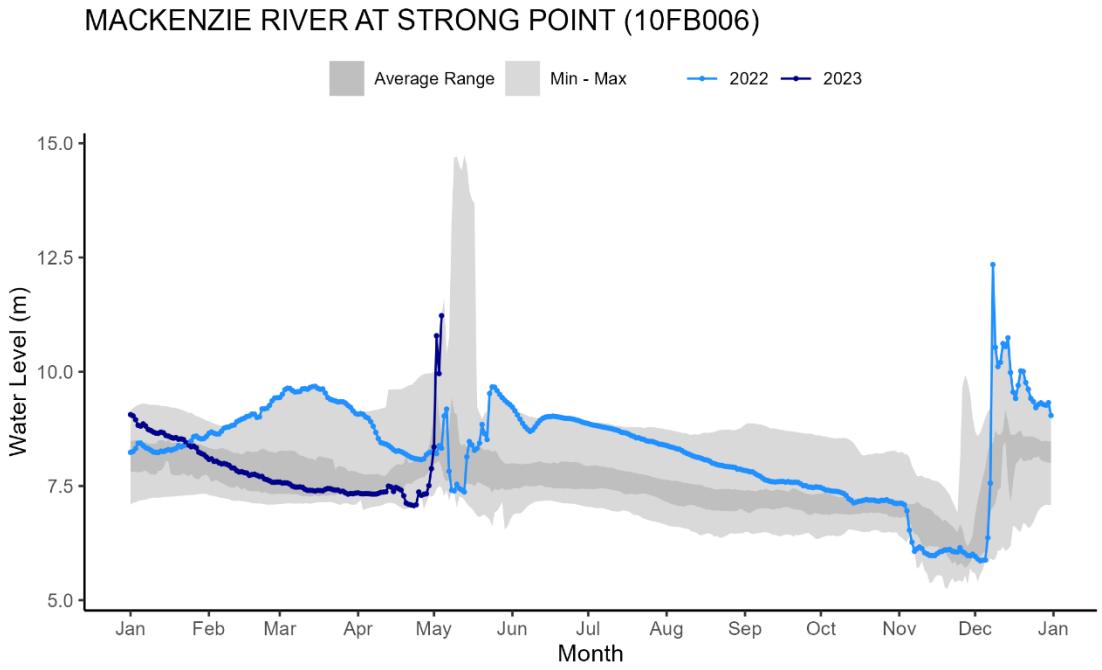
Satellite Data:



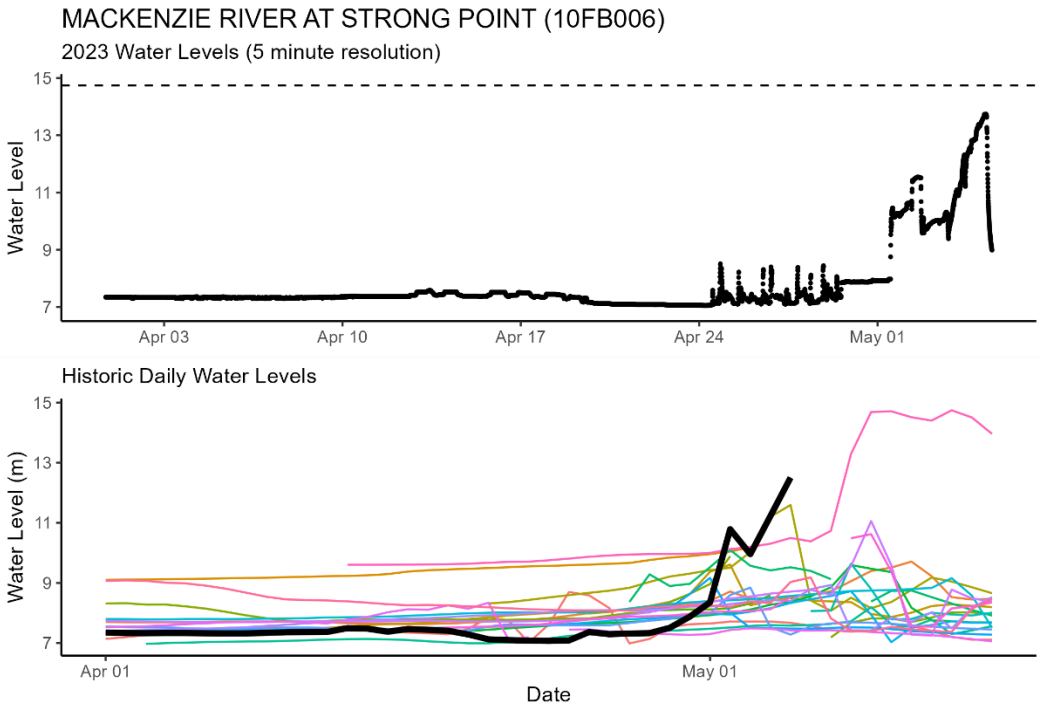
Above – Classified river ice imagery of the Mackenzie and Liard rivers above Fort Simpson. The image was acquired on May 4 at 19:30 MT. This image shows the long ice jam that was building between Jean Marie River and Fort Simpson. The red in the image denotes the ice jam. The ice jam broke this morning around 08:30 and Mackenzie ice is now moving past 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]:

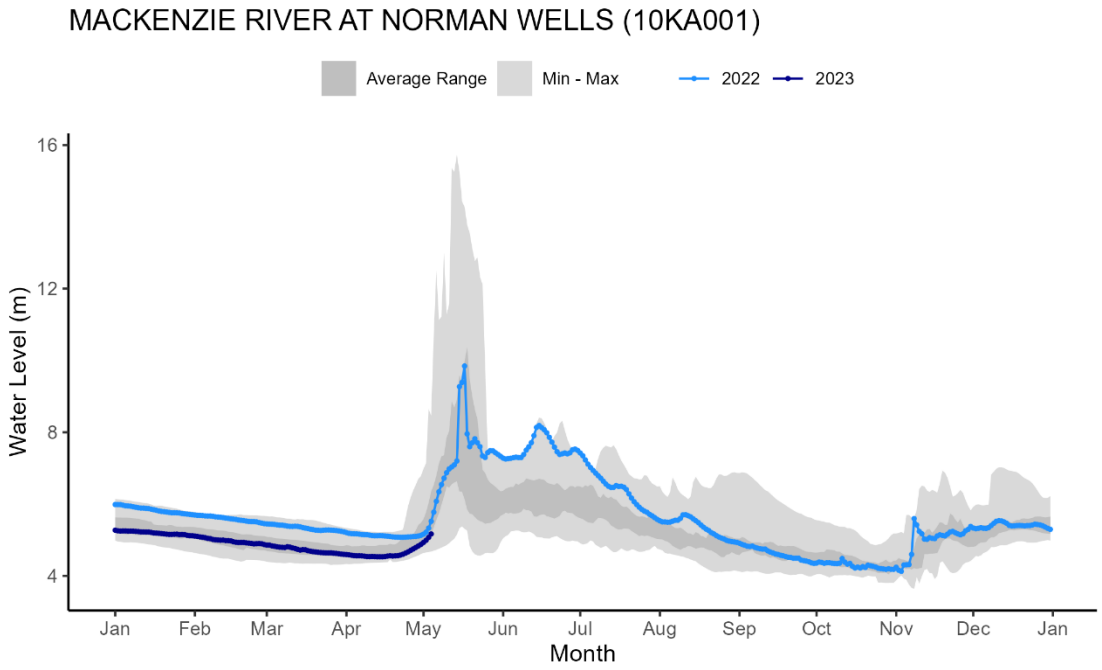
Note: The Water Survey of Canada sensor has been dragged by ice and is not producing reasonable values

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

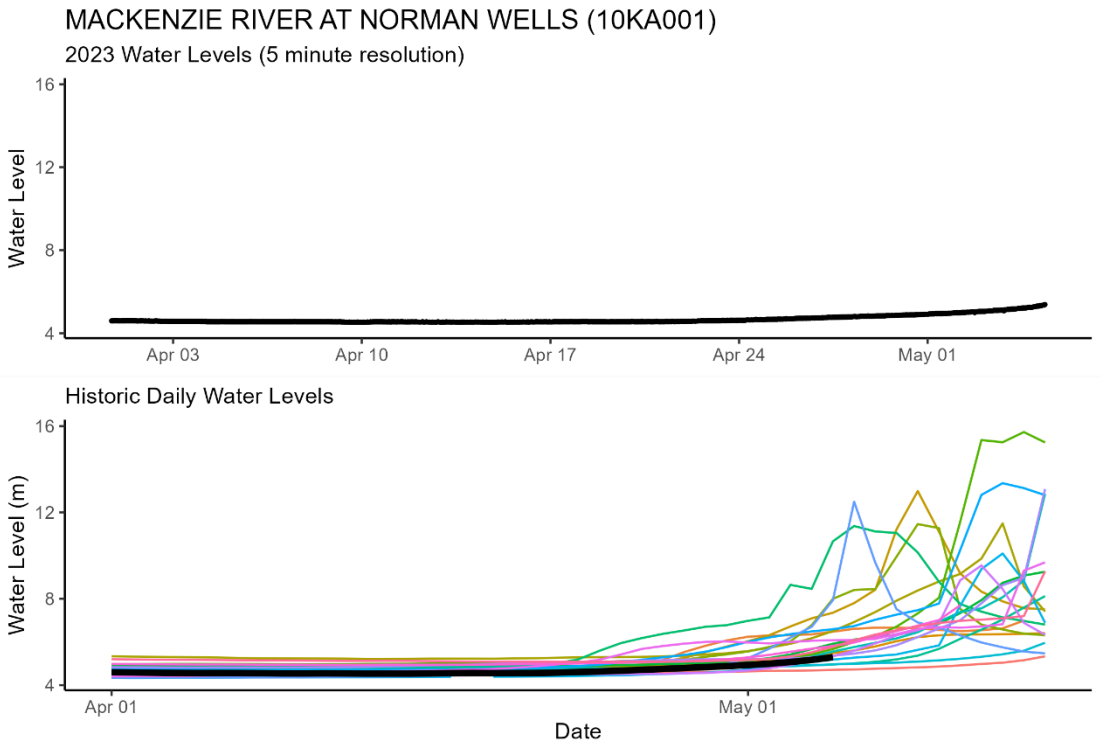
As of 14:30 the water level on the Mackenzie River at Fort Simpson is 10.06 m.

Above – Mackenzie River at Fort Simpson hydrometric gauge photo from May 05 at 14:00. 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.

Weather Data:

Current status and forecast:

The southern Dehcho region is forecast to receive well above seasonal temperatures for the next week. Daytime high temperatures are forecast in the low 20s today and are set to reach record high temperatures nearing 30°C tomorrow. High temperatures will continue to soften river ice on the Liard and Mackenzie rivers. Temperatures downstream on the Mackenzie River in the Sahtu region are forecast to be seasonal over the next five days. The timing of breakup is projected to be about average in the Sahtu region.

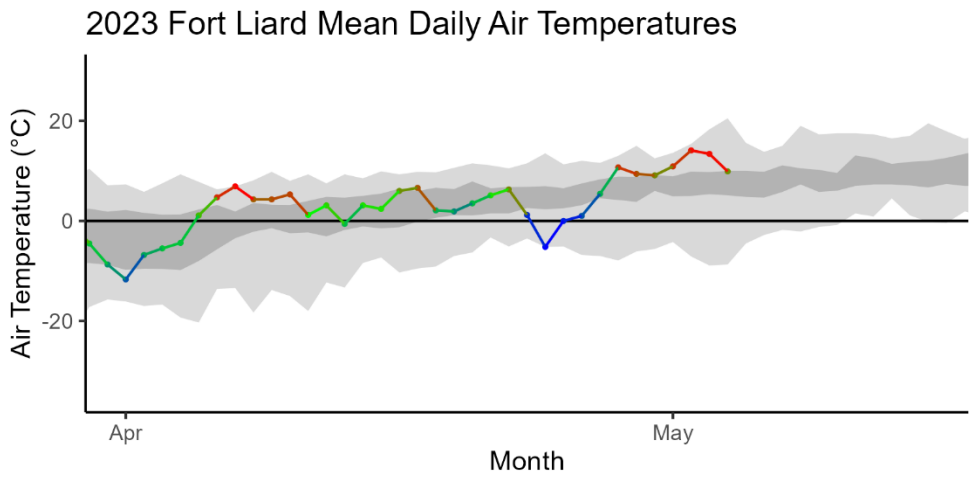
Background information and context:

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.

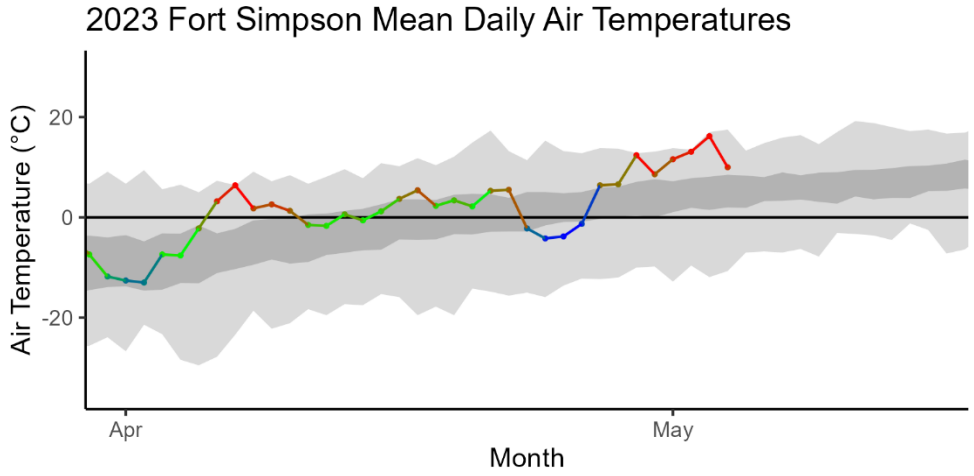
There are two sets of figures below. The first set of figures shows daily temperatures relative to normal for select locations in AB, BC, and the NWT. Weather information for High Level, AB and Fort Nelson, BC provide an idea of conditions in the upper (i.e., southern) part of the Hay River basin. The 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:

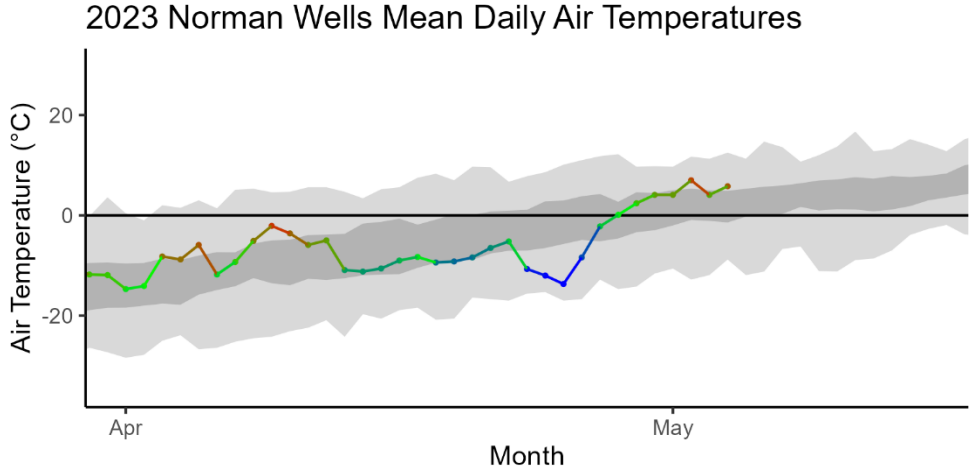
Fort Liard:



Fort Simpson:



Norman Wells:



Seven-day weather forecast:

Fort Liard:

Fri 5 May	Sat 6 May	Sun 7 May	Mon 8 May	Tue 9 May	Wed 10 May	Thu 11 May
21°C 30% Chance of showers	29°C Sunny	27°C Sunny	22°C A mix of sun and cloud	20°C Sunny	21°C A mix of sun and cloud	23°C A mix of sun and cloud
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
12°C Clear	10°C Clear	12°C Cloudy periods	8°C Clear	3°C Cloudy periods	6°C Cloudy periods	

Fort Simpson:

Fri 5 May	Sat 6 May	Sun 7 May	Mon 8 May	Tue 9 May	Wed 10 May	Thu 11 May
22°C 30% Chance of showers	29°C Sunny	27°C Sunny	24°C Sunny	19°C Sunny	24°C Sunny	27°C Sunny
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
7°C Clear	12°C Clear	10°C Clear	9°C Clear	5°C Clear	7°C Clear	

Norman Wells:

Fri 5 May	Sat 6 May	Sun 7 May	Mon 8 May	Tue 9 May	Wed 10 May	Thu 11 May
11°C A mix of sun and cloud	10°C Mainly sunny	12°C A mix of sun and cloud	6°C Cloudy	10°C Periods of snow	17°C A mix of sun and cloud	20°C A mix of sun and cloud
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
-2°C Partly cloudy	-3°C Clear	1°C Cloudy	-1°C Rain or snow	2°C Cloudy periods	4°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.