Government of
Northwest Territories

NWT Water Monitoring Bulletin – April 30, 2023 at 16:00

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 ENR 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:

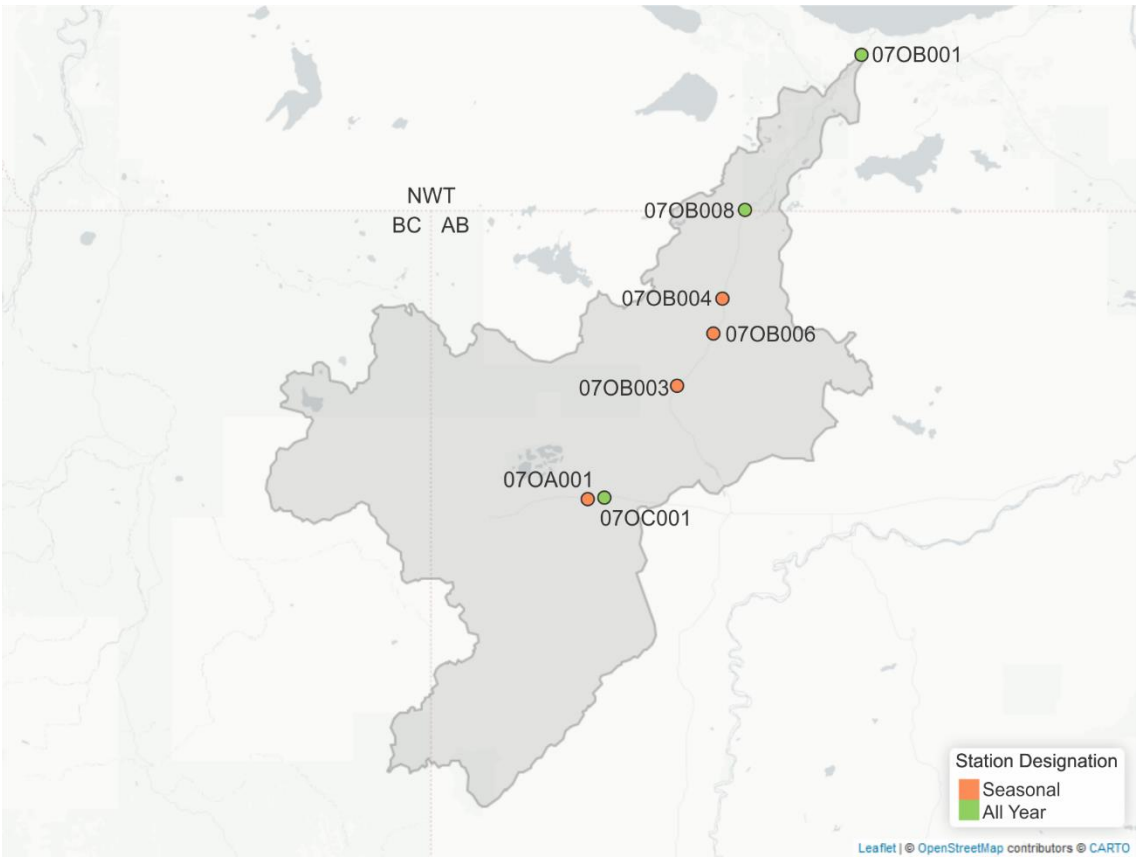
- Water levels remain low on the Hay River and most of the remaining river ice is between Alexandra Falls and the Town of Hay River
    - The Hay River at the AB-NT border gauge appears to have hit its ice-induced peak yesterday (Apr. 29)
- On the Liard River and on the Mackenzie River at Fort Simpson, water levels are rising under the ice, but the rates of increase are still small;
- Warmer than seasonal temperatures are forecast for the Hay River and lower Liard River basins over the next week.
    - Nearly all of the snowpack in the Hay River basin has already melted;
    - Snowmelt is well underway in the lowlands of the Liard River basin
    - Temperatures will approach 20°C in the southern parts of the basins and will rapidly melt residual snowpack and soften river ice.

Contents

Hay River:

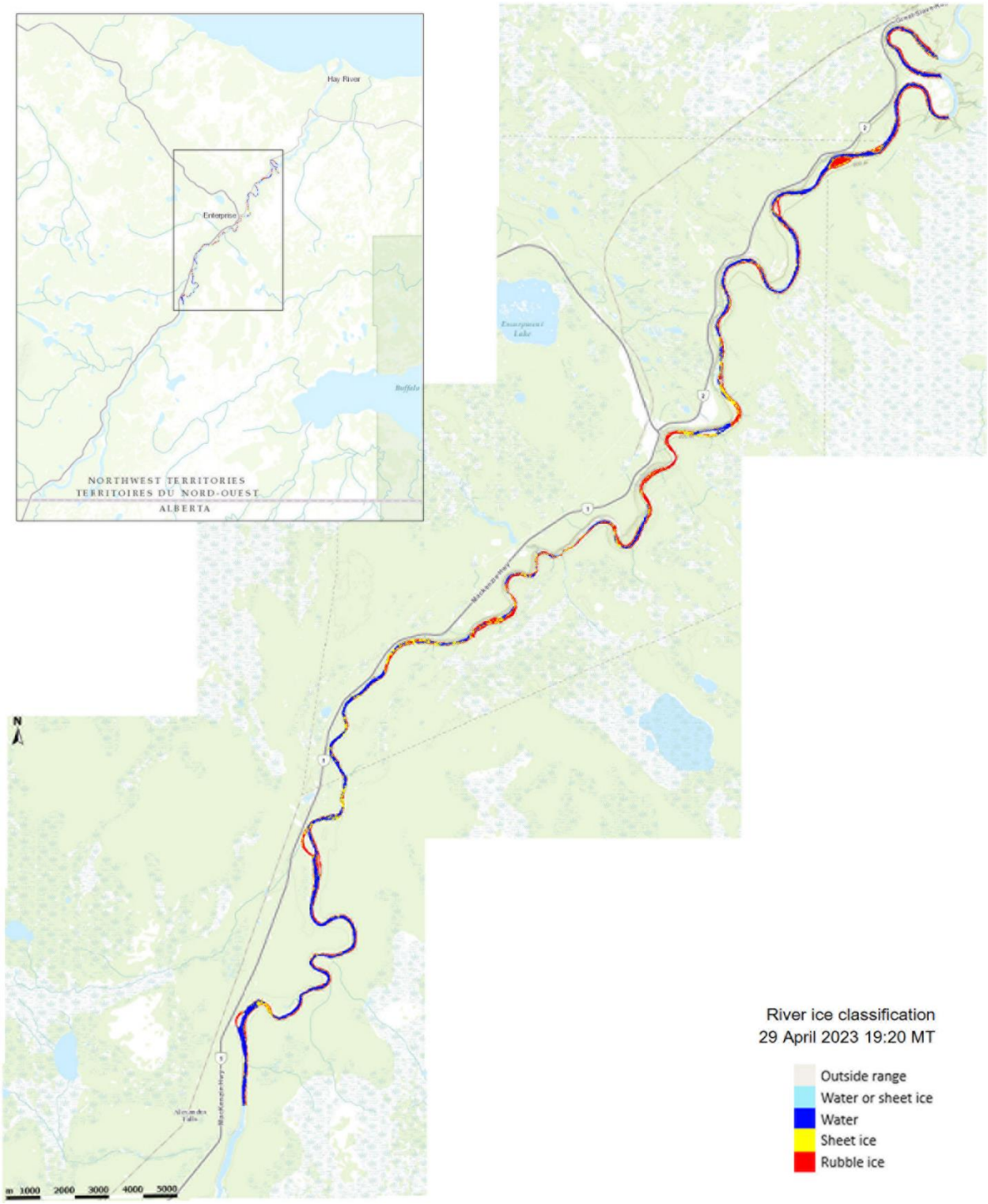
Current Status:

- Nearly all of the snowpack has melted from the Hay River basin
- Water levels at the Hay River near Hay River gauge reached a peak of 3.97 m around 09:00 this morning (Apr. 30) and have been receding since
- Ice continues to move between Alexandra Falls and the Town of Hay River
- Water levels at the AB-NT border appear to have hit their ice-induced peak yesterday (Apr. 29) around noon
- Satellite imagery shows large sections of open water upstream of Alexandra Falls
- Refer to the Town of Hay River website for the most up-to-date information, as well as webcam images of current conditions.



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

Satellite Data:



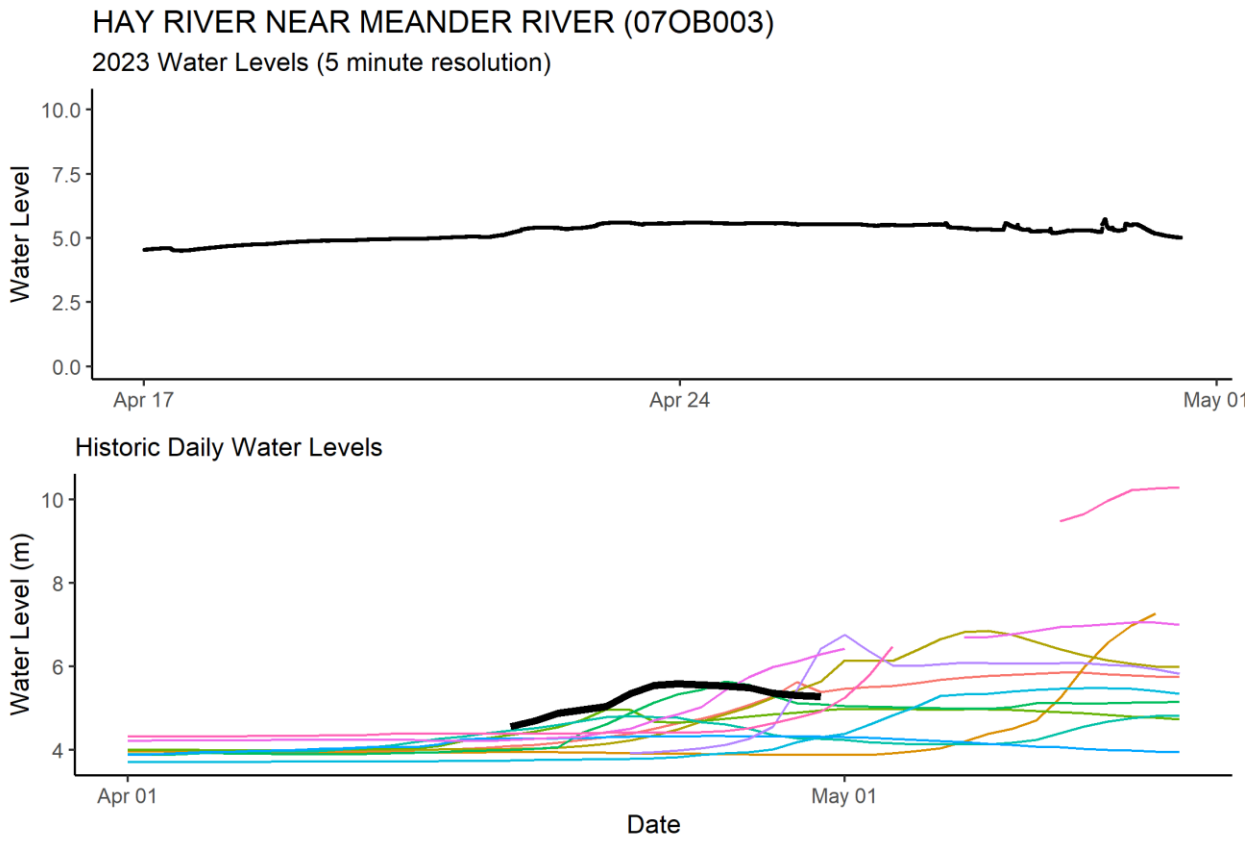
Above – River ice classification information for the Hay River, using radar imagery taken on the evening of 29 April 2023. The image shows large stretches of open water above Alexandra Falls with residual rubble ice between Alexandra Falls and the Town of Hay River.

Hydrometric Data:

Chinchaga River near High Level (Alberta) [07OC001]:

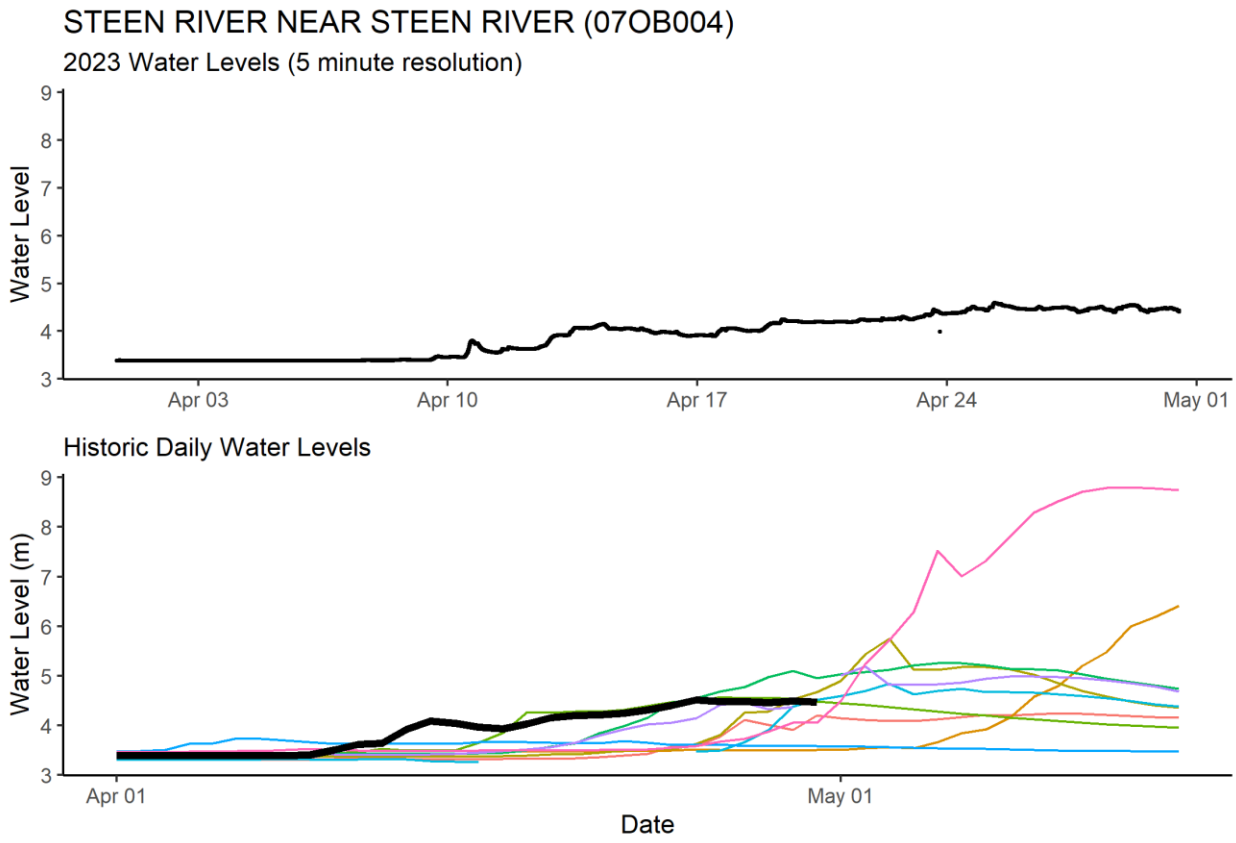
Note – The water level sensor at the Chinchaga River gauge appears to have been dragged by ice and is not producing reasonable values.

Hay River near Meander River (Alberta) [07OB003]:



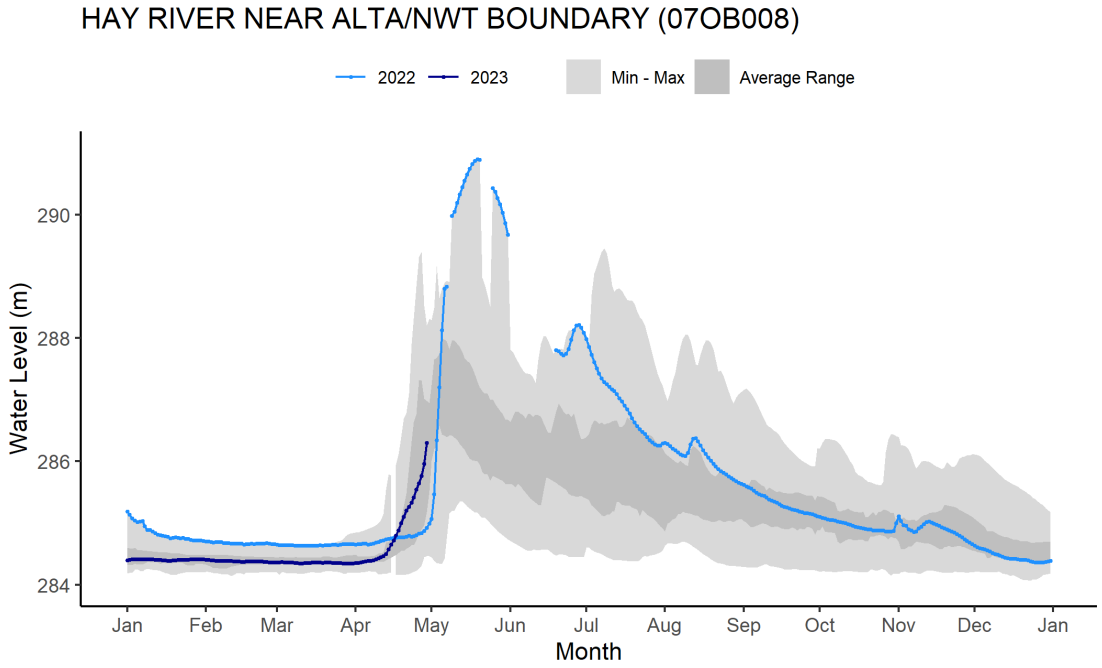
Above – Water level data on the Hay River near Meander River, AB.

Steen River near Steen River (Alberta) [07OB004]:

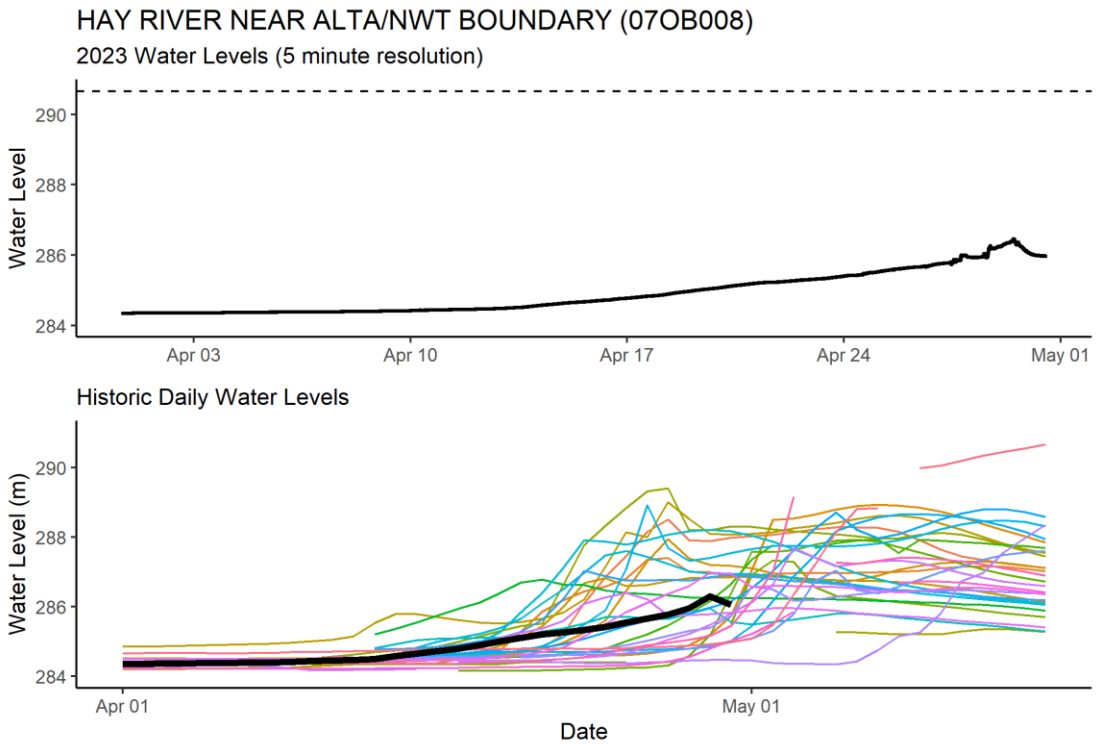


Above – Water level data on the Steen River near Steen River, AB. The Steen River is a small tributary to the Hay River. Water levels are slowly rising.

Hay River near the border [07OB008]:



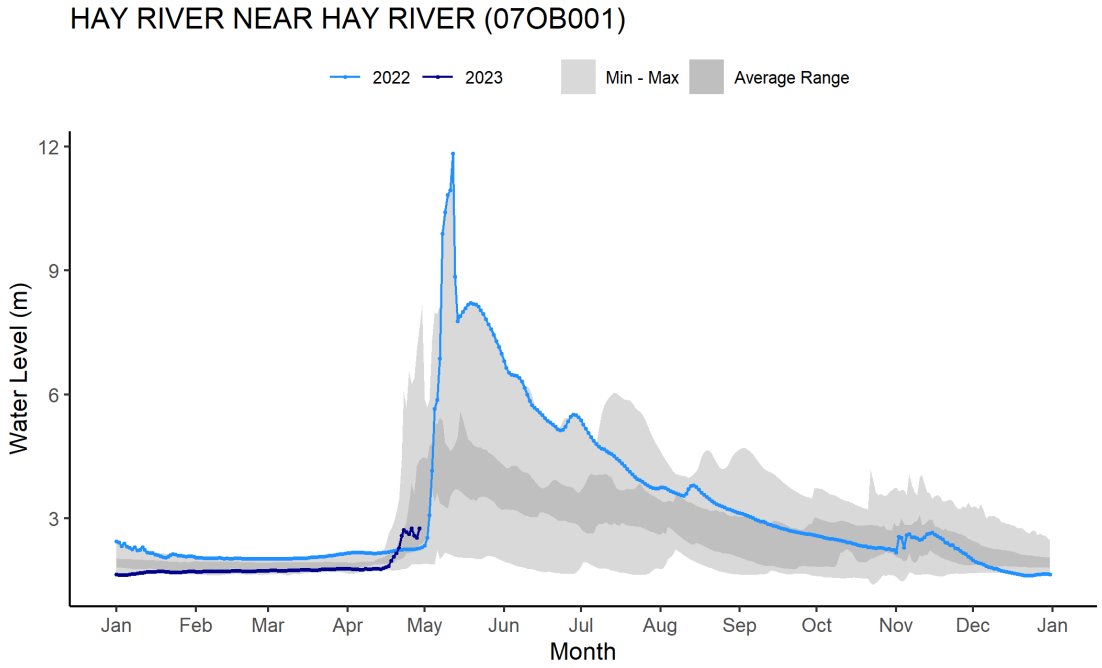
Above – Water level data for the Hay River near the Alberta- NWT border. Daily average levels for the previous year are shown here.



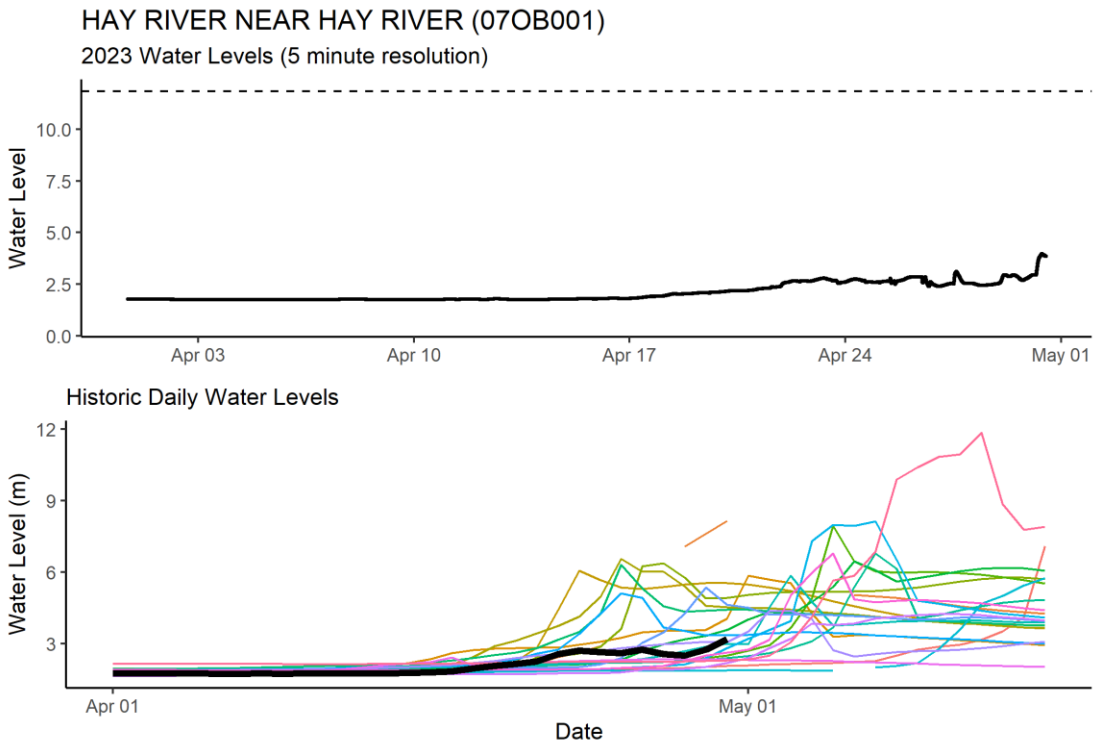
Above - The upper graph in the figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2022). The lower graph shows daily average levels relative to the previous 20 years.

Above – Hay River near the border hydrometric gauge photo on April 30 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

Hay River near Hay River [07OB001]:



Above – Water level data for the Hay River near the Town of Hay 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 with the dashed line representing the peak water level from last year (2022). The lower graph shows daily average levels relative to the previous 20 years.

Above – Hay River near the Town of Hay River hydrometric gauge photo on April 30 at 14:00. Photo courtesy of Water Survey of Canada and GNWT.

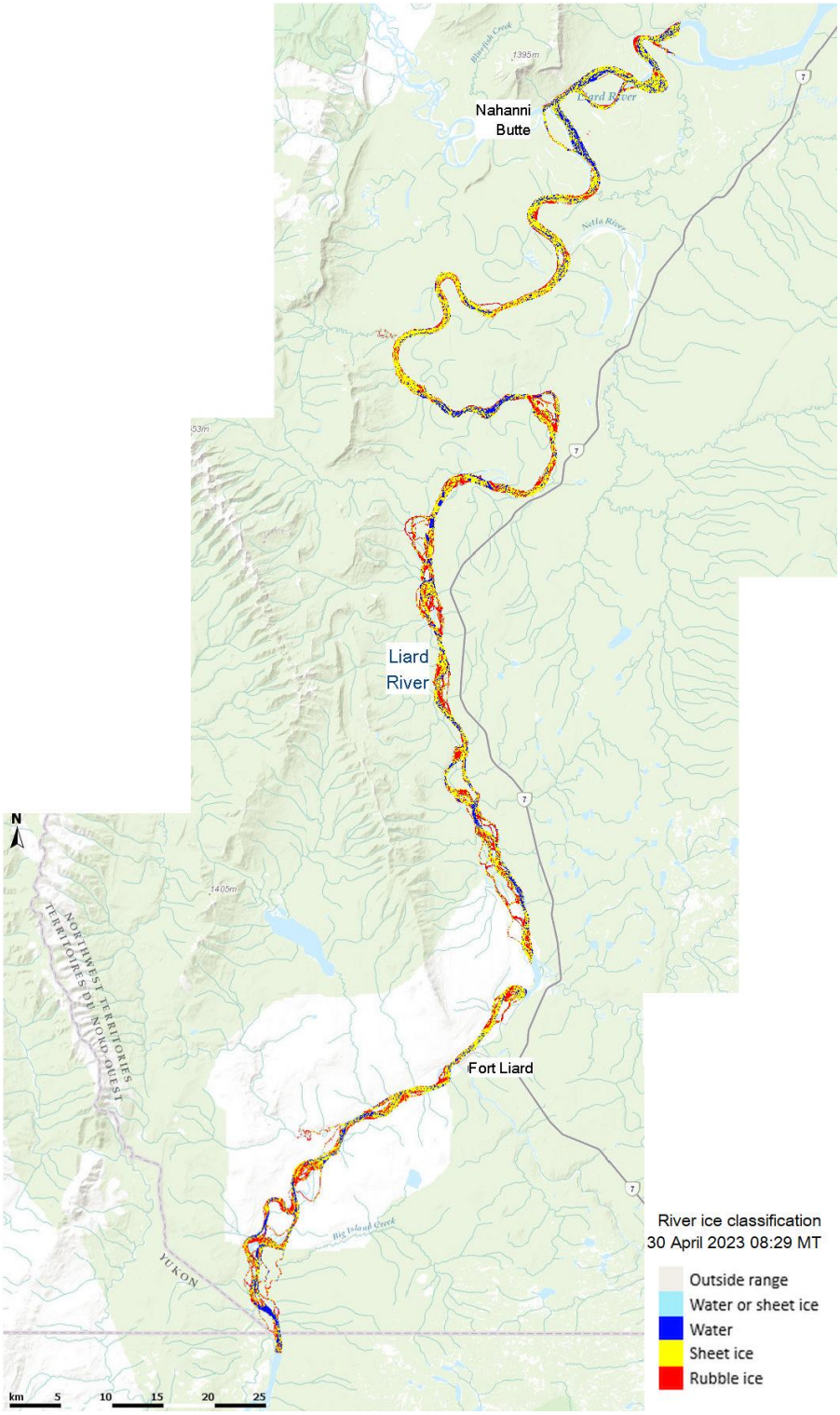
Liard River:

Current Status:

- Snowpack continues to melt with warm temperatures
- Ice remains mostly intact along the Liard River within the NWT but is beginning to soften;
- Water levels are increasing underneath the ice on the Liard River at Fort Liard
    - The low rate of water level rise is normal for this time of year;
- The southern Dehcho region is forecast to receive warmer than normal temperatures that will persist into next week.

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

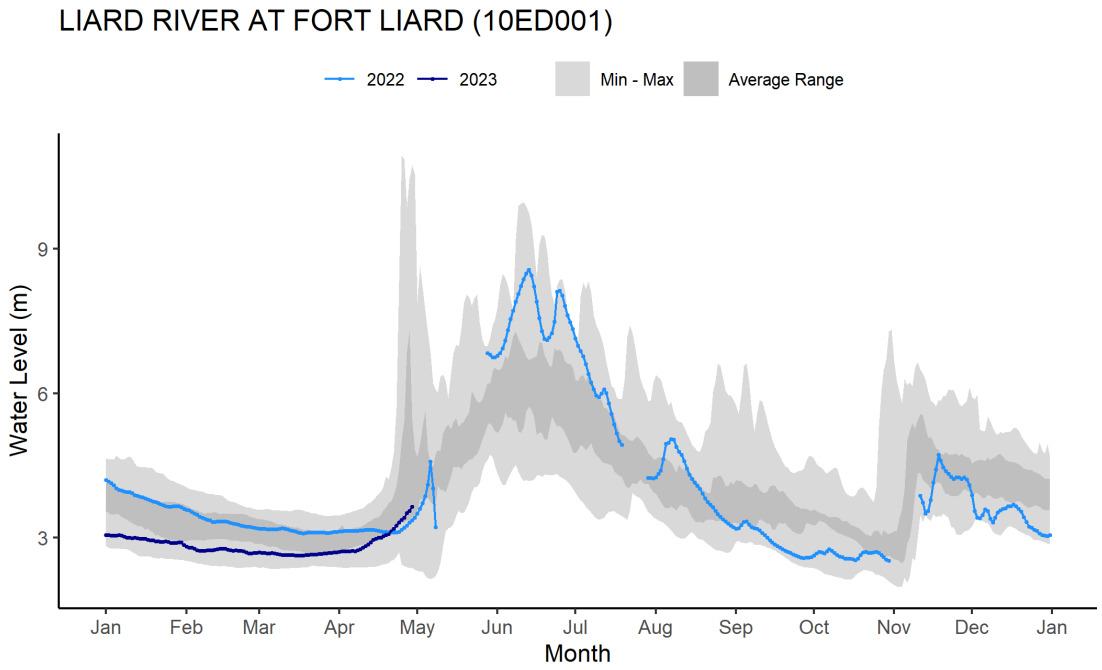
Satellite Data:



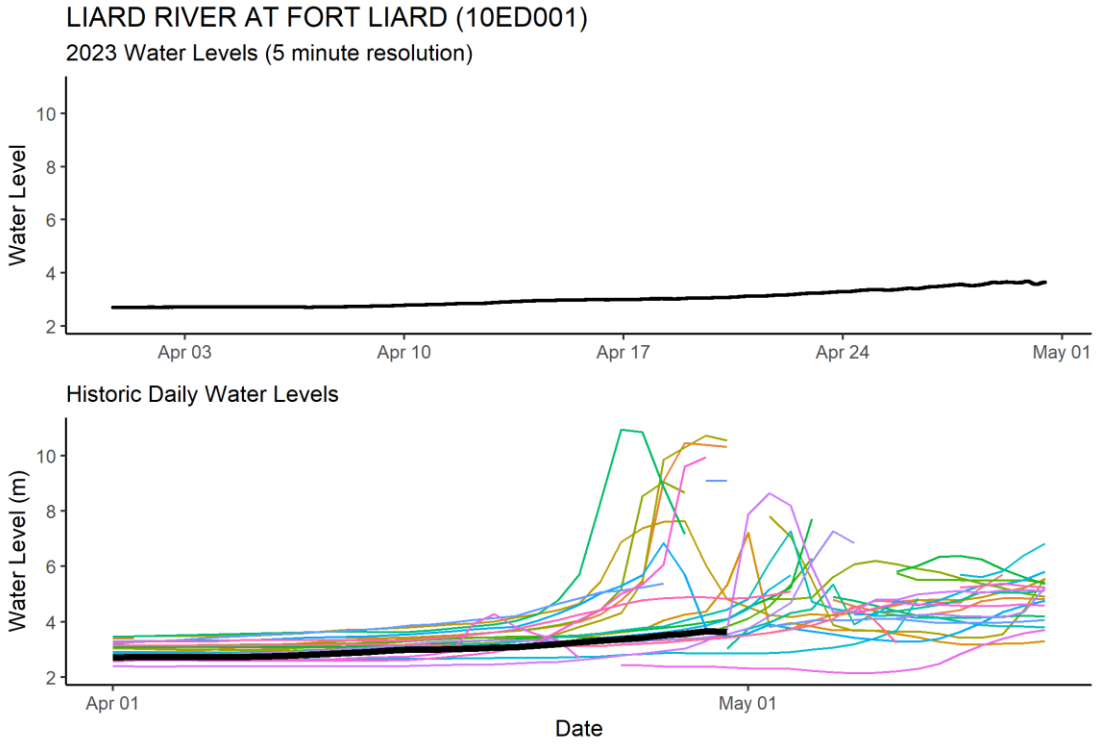
Above – River ice classification information for the Liard River, using radar imagery taken on the morning of April 30, 2023. The images show mainly sheet and rubble ice along the Liard River, with some small patches of water.

Hydrometric Data:

Liard River at Fort Liard [10ED001]:



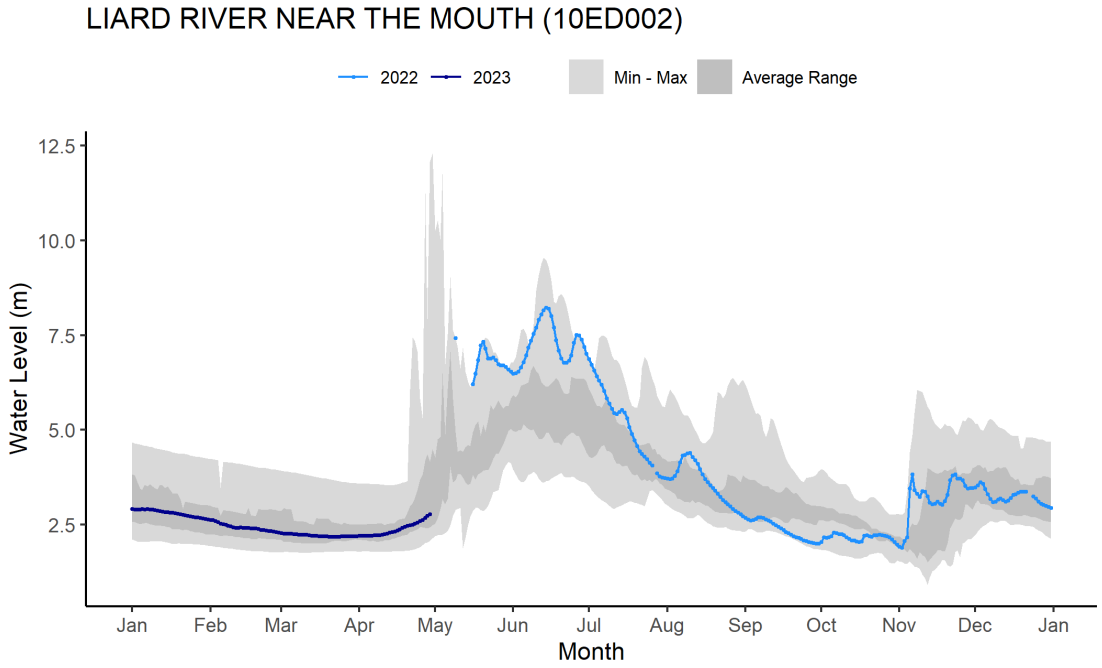
Above – Water level data for the Liard River at Fort Liard. Daily average levels for the previous year are shown here.



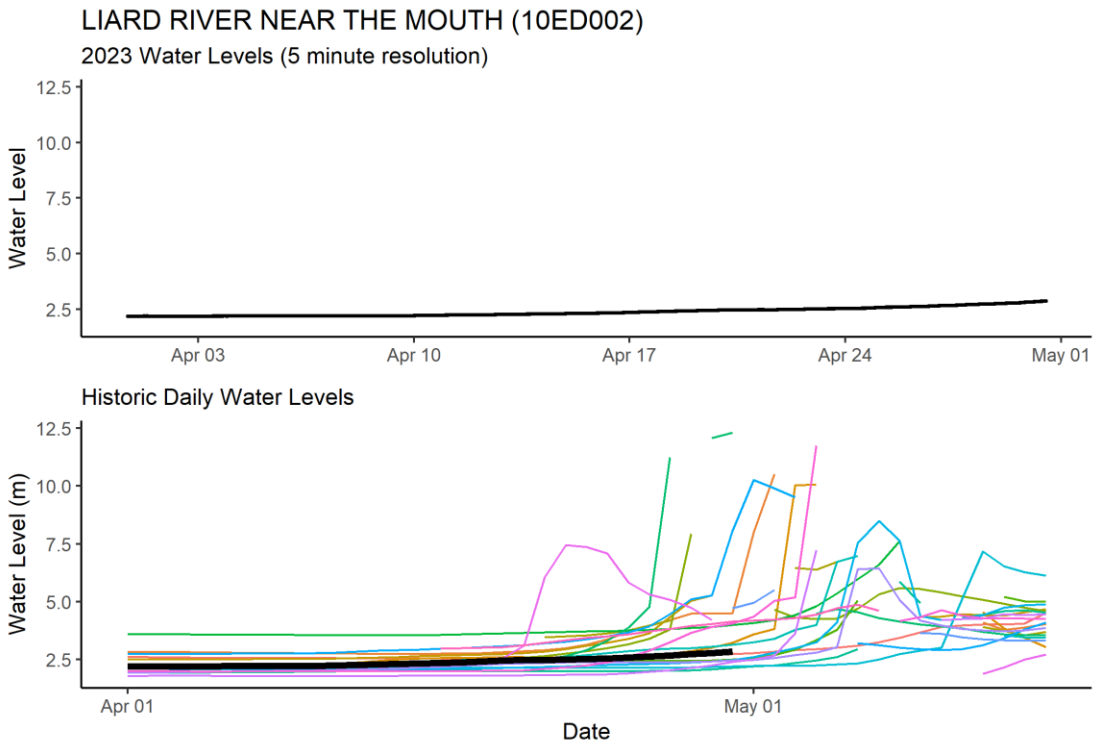
Above - The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Above – Liard River at Fort Liard hydrometric gauge photo from April 30 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.



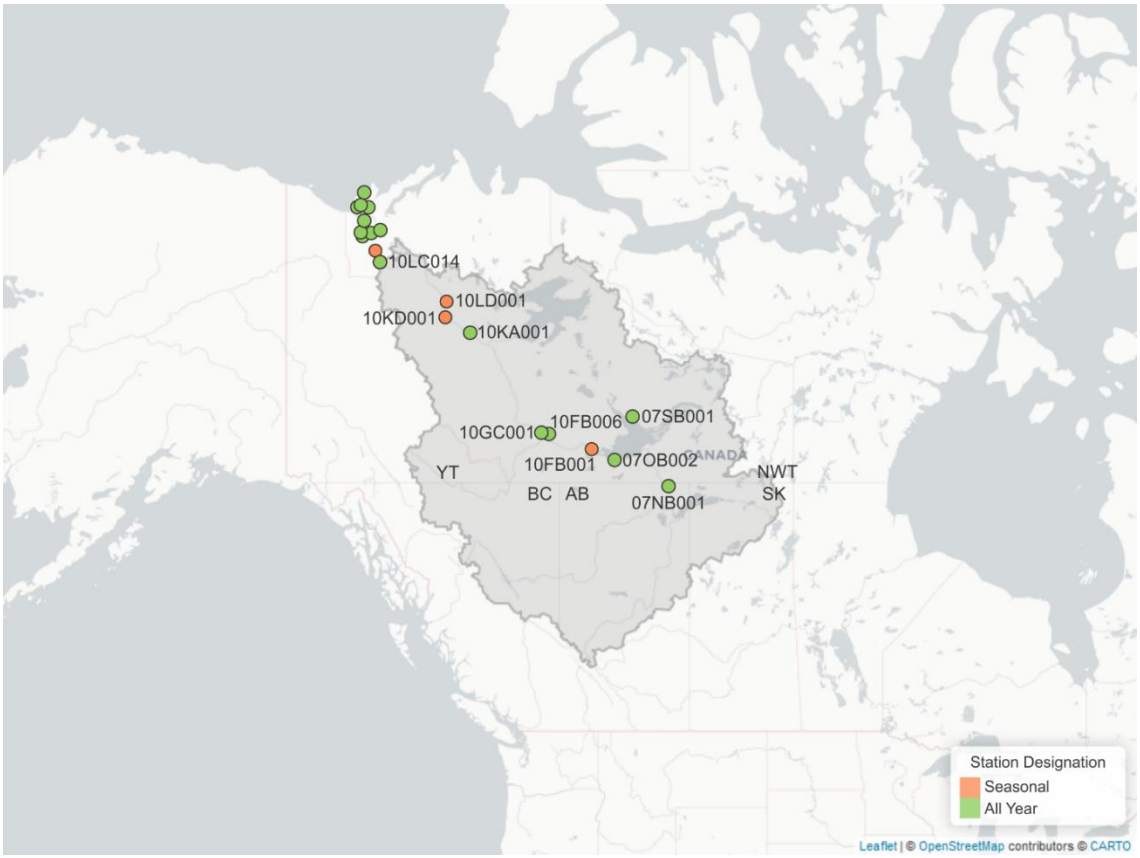
Above - The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Above – Liard River near the mouth hydrometric gauge photo from April 30 at 14:00. Photo courtesy of Water Survey of Canada and GNWT.

Slave River / Great Slave Lake / Mackenzie River

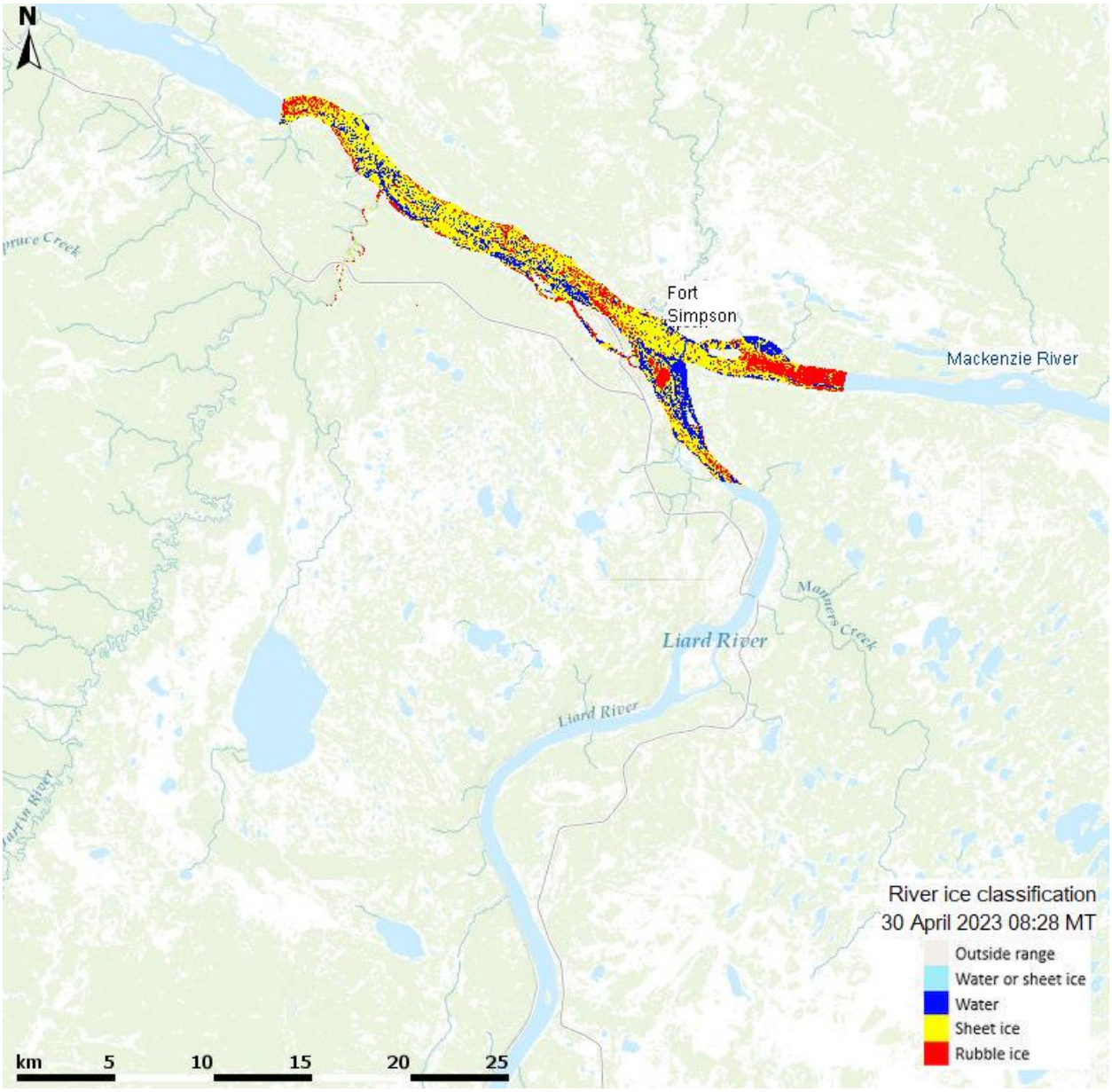
Current Status:

- Satellite imagery shows small open water sections on the Mackenzie River upstream of Jean Marie River, but river ice remains largely intact;
- Water levels are rising underneath the ice on the Mackenzie River at Fort Simpson, but the rate of increase is still small and is normal for this time of year;
- The southern Dehcho region is forecast to receive warmer than normal temperatures that will persist well into next week and will help to soften river ice.



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

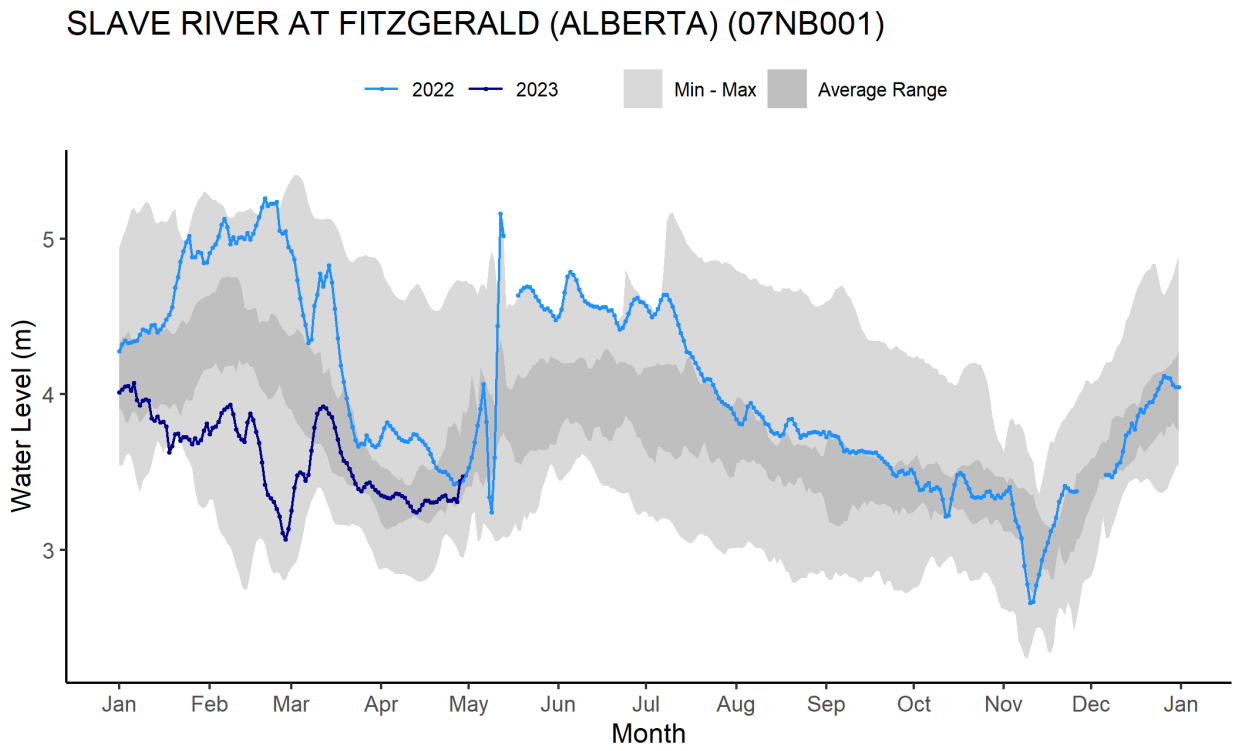
Satellite Data:



Above – River ice classification information for the Liard River and Mackenzie Rivers, using radar imagery taken on the morning of 30 April 2023. The images show mainly sheet ice with some small patches of rubble ice, indicating that the ice is softening.

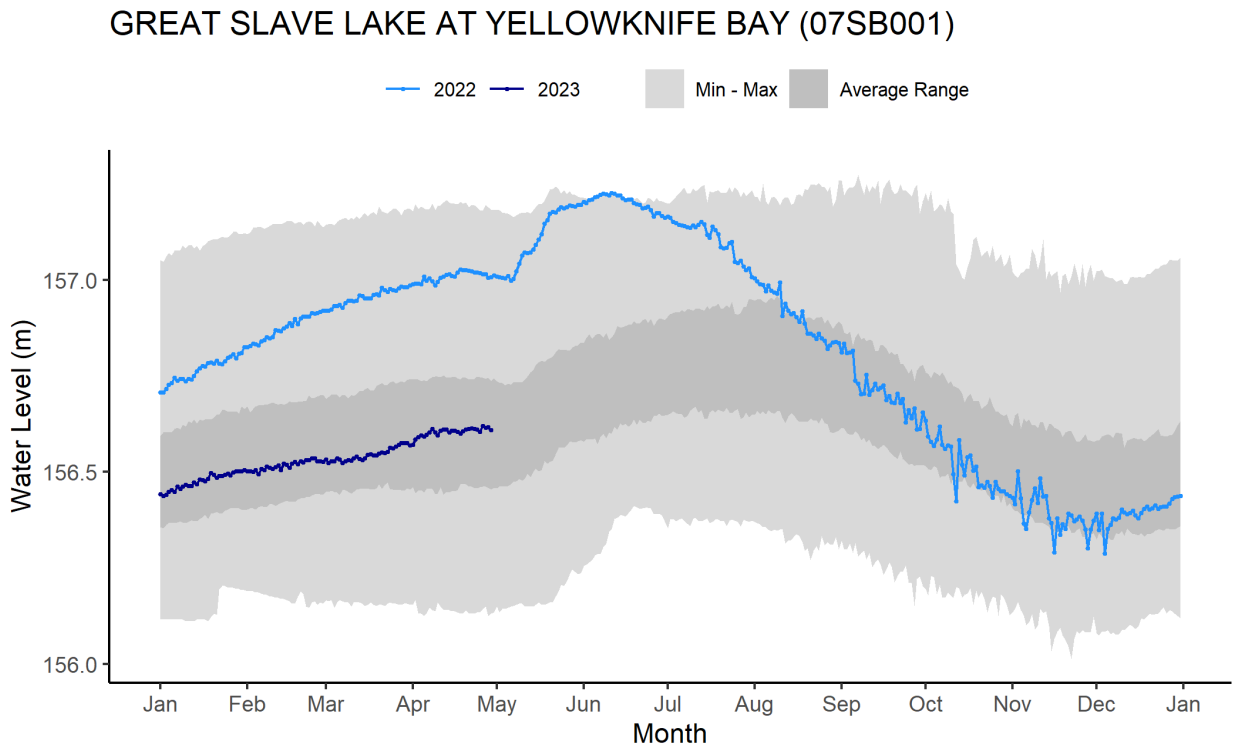
Hydrometric Data:

Slave River at Fitzgerald (Alberta) [07NB001]:



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

Great Slave Lake at Yellowknife Bay [07SB001]:



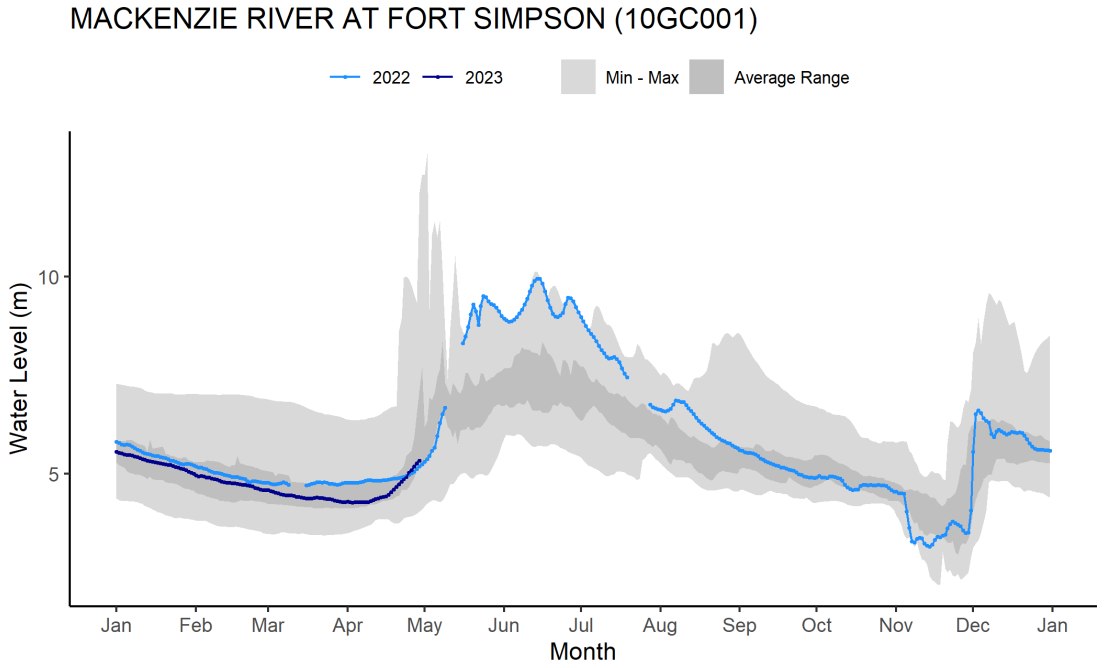
Above – Water level data for Great Slave Lake at Yellowknife Bay. Daily average levels for the previous year are shown here.

Mackenzie River at Strong Point [10FB006]:

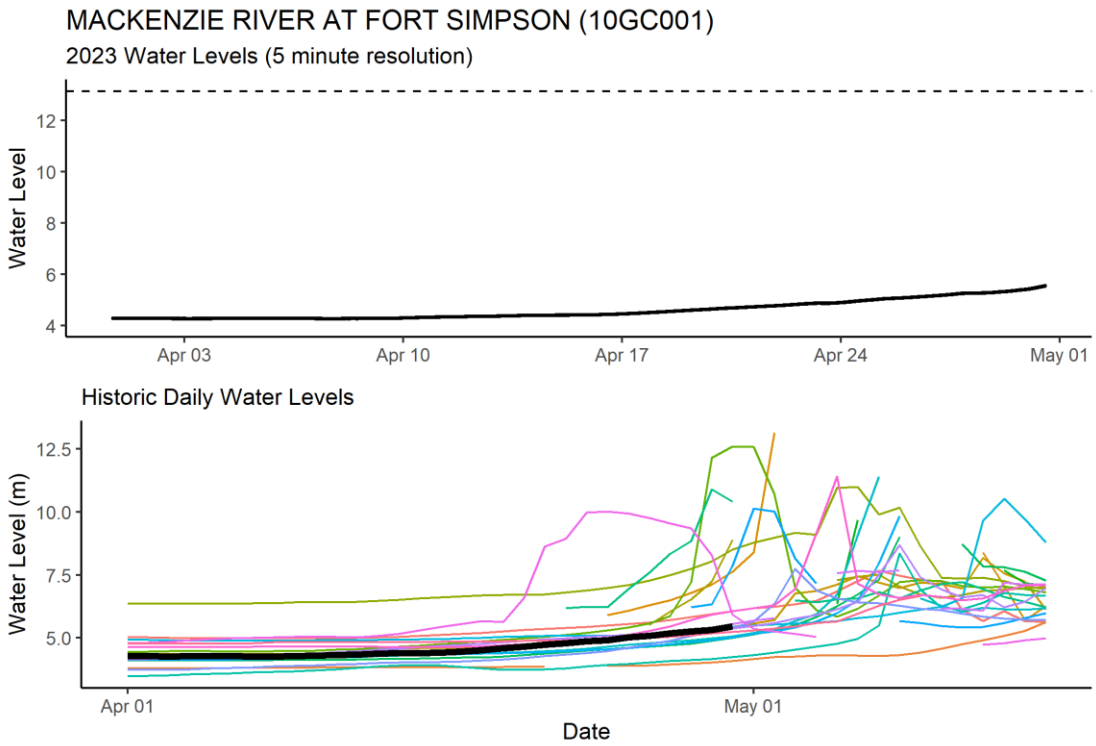
Note – The water level sensor at the Mackenzie River at Strong Point gauge appears to have been impacted by ice and is not producing reasonable values.

Above – Mackenzie River at Strong Point hydrometric gauge photo from April 30 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

Mackenzie River at Fort Simpson [10GC001]:



Above – Water level data for the Mackenzie River 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 – Mackenzie River at Fort Simpson hydrometric gauge photo from April 30 at 14:00. Photo courtesy of Water Survey of Canada and GNWT.

Weather Data:

Current status and forecast:

The Hay River basin and the southern Dehcho region are forecast to receive above seasonal temperatures that will last well into next week. Daytime high temperatures are forecast in the mid to high teens, with some areas near the mid to high 20s by the middle of the week between Fort Nelson, High Level, and Hay River. Satellite imagery indicates that the snowpack has melted in the almost all the Hay River basin and that snowmelt runoff delivery has likely ceased. Snowmelt is ongoing in the lower Liard River basin. The warm temperatures should melt the remaining snowpack and soften river ice.

The spring has been warmer than normal throughout the southern NWT and northern AB and BC. This has allowed snowpacks to gradual melt in advance of the warm weather that has been forecast for 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 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.

Seven-day weather forecast:

High Level:

Sun 30 Apr	Mon 1 May	Tue 2 May	Wed 3 May	Thu 4 May	Fri 5 May	Sat 6 May
 22°C A mix of sun and cloud	 22°C Mainly cloudy	 24°C Sunny	 27°C Sunny	 27°C Sunny	 29°C A mix of sun and cloud	 25°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 7°C Partly cloudy	 7°C Clear	 8°C Clear	 12°C Clear	 6°C Cloudy periods	 7°C Cloudy periods	

Fort Nelson:

Sun 30 Apr	Mon 1 May	Tue 2 May	Wed 3 May	Thu 4 May	Fri 5 May	Sat 6 May
 19°C A mix of sun and cloud	 20°C Sunny	 24°C Sunny	 26°C Sunny	 19°C A mix of sun and cloud	 19°C A mix of sun and cloud	 20°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 8°C Clearing	 6°C Clear	 8°C Clear	 10°C Cloudy periods	 6°C Cloudy periods	 6°C 30% Chance of showers	

Hay River:

Sun 30 Apr	Mon 1 May	Tue 2 May	Wed 3 May	Thu 4 May	Fri 5 May	Sat 6 May
 21°C A mix of sun and cloud	 20°C Mainly sunny	 15°C Sunny	 25°C Sunny	 16°C Sunny	 20°C A mix of sun and cloud	 17°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 9°C Partly cloudy	 2°C Clear	 8°C Clear	 9°C Clear	 9°C Cloudy periods	 9°C Cloudy periods	

Fort Liard:

Sun 30 Apr	Mon 1 May	Tue 2 May	Wed 3 May	Thu 4 May	Fri 5 May	Sat 6 May
 17°C A mix of sun and cloud	 18°C Sunny	 25°C Sunny	 24°C Sunny	 18°C A mix of sun and cloud	 17°C A mix of sun and cloud	 18°C A mix of sun and cloud
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
 6°C Clearing	 6°C Clear	 8°C Clear	 9°C Cloudy periods	 5°C Cloudy periods	 5°C 30% Chance of showers	

Fort Simpson:

Sun 30 Apr	Mon 1 May	Tue 2 May	Wed 3 May	Thu 4 May	Fri 5 May	Sat 6 May
 16°C A mix of sun and cloud	 19°C Mainly sunny	 23°C Sunny	 26°C Sunny	 17°C Cloudy	 19°C A mix of sun and cloud	 18°C A mix of sun and cloud
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
 5°C Clearing	 2°C Clear	 12°C Clear	 7°C Cloudy periods	 7°C Cloudy periods	 8°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.