Government of
Northwest Territories

NWT Water Monitoring Bulletin – Hay River, April 25, 2023

NWT break up reports will be published routinely as break up unfolds. Today's report contains an update on conditions in the Hay River basin. 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:

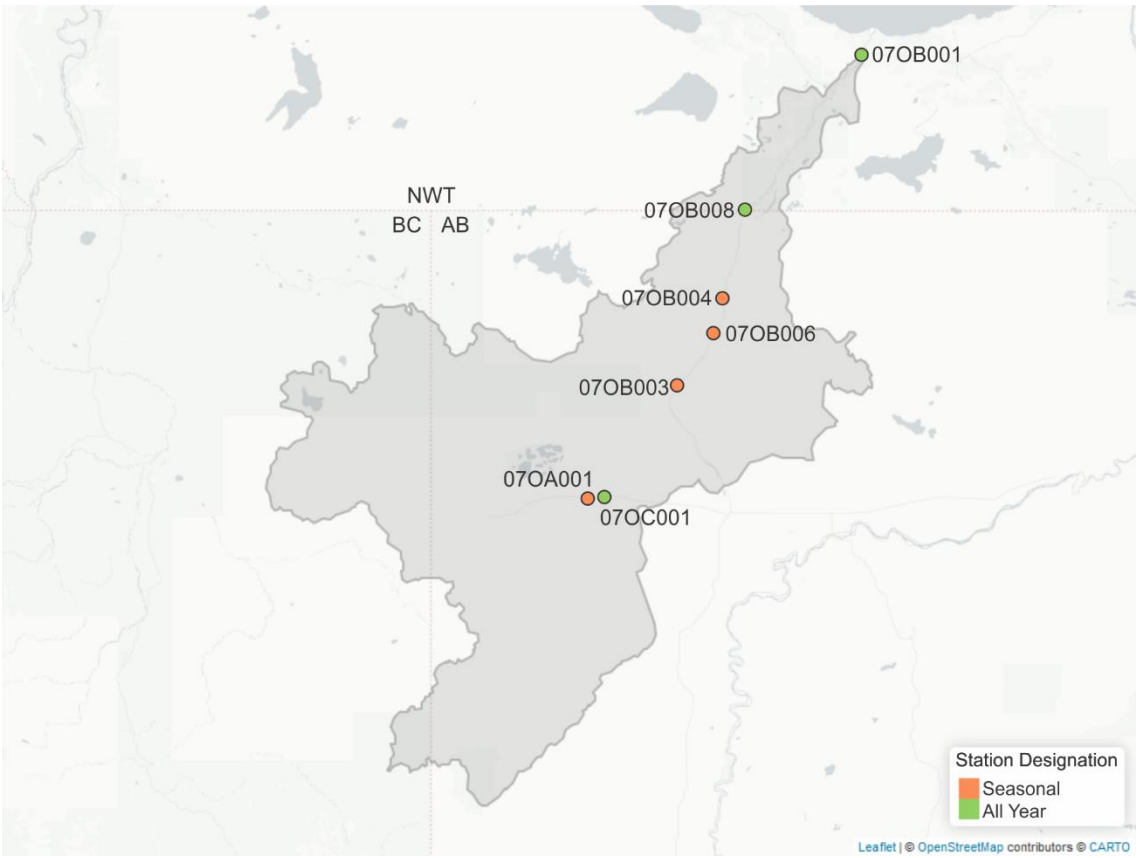
- Snowmelt, river ice melt, and small rises in water levels continue in southern basins in the NWT.
- On the Hay River in the NWT, river ice is beginning to shift but remains largely intact and water levels continue to rise slowly.
- The initiation of spring break up and water level rise in the Hay River is earlier than normal due to warm spring temperatures
- Small amounts of rain and snow are forecasted in the Hay River basin over the next 24 hours, which would encourage continued melting of snow and river ice.

Contents

Hay River:

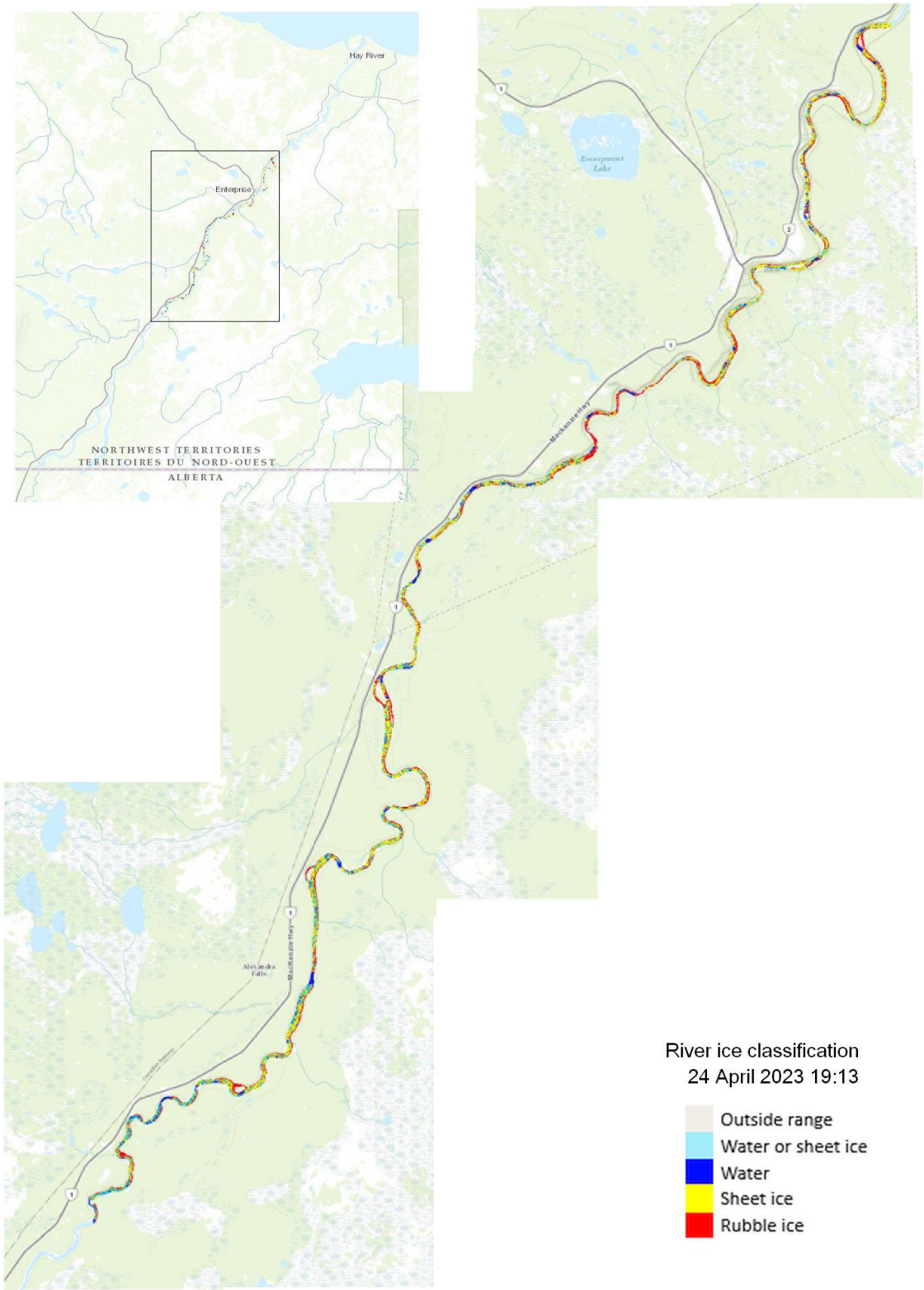
Current Status:

- Snow in the upper (southern) part of the basin continues to melt;
- Water levels have begun to rise at the downstream (northern) gauges, but the rate of increase is still small and normal for the onset of freshet;
- The onset of water level rise is occurring earlier than normal and much earlier than last year;
- Small amounts of rain and snow are forecasted in the Hay River basin over the next 24 hours, which would encourage continued melting of snow and river ice;
- Ice is degrading along the Hay River within the NWT, with some open patches of water beginning to appear;
- 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.

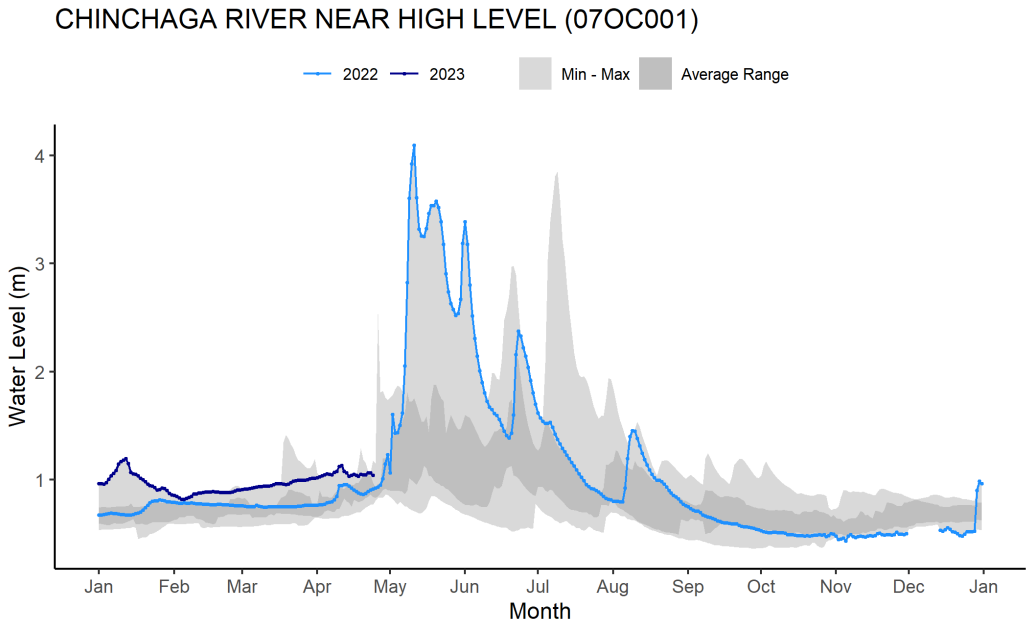
Satellite Data:



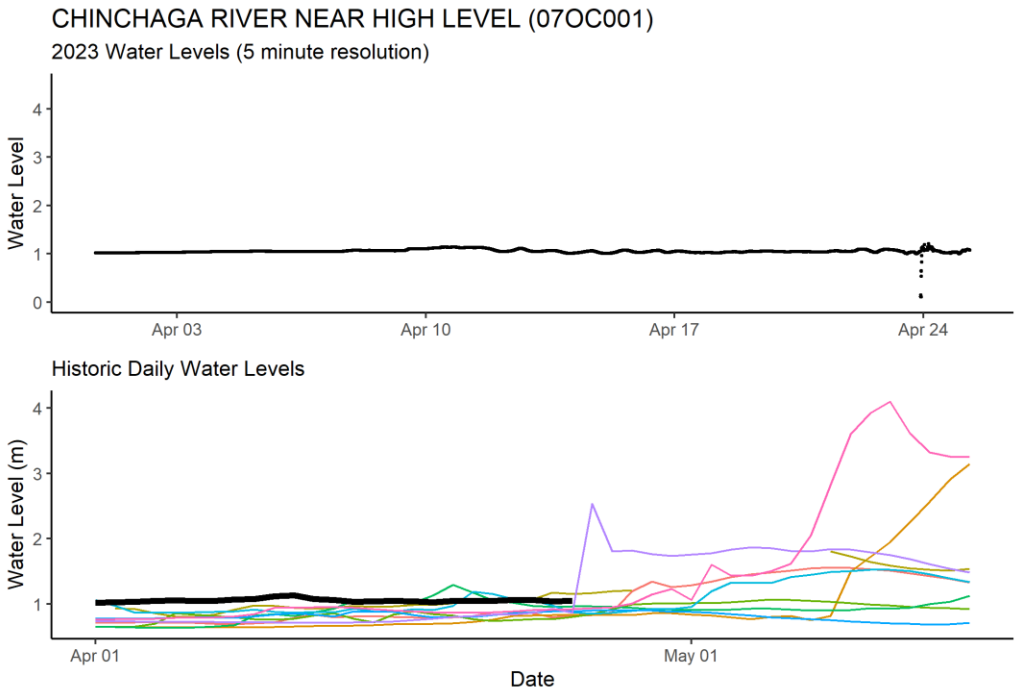
Above – River ice classification information for the Hay River, using radar imagery taken on 24 April 2023, 19:13 MDT. The images show sheet ice and rubble ice along the Hay River, with some patches of open water or water on ice.

Hydrometric Data:

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

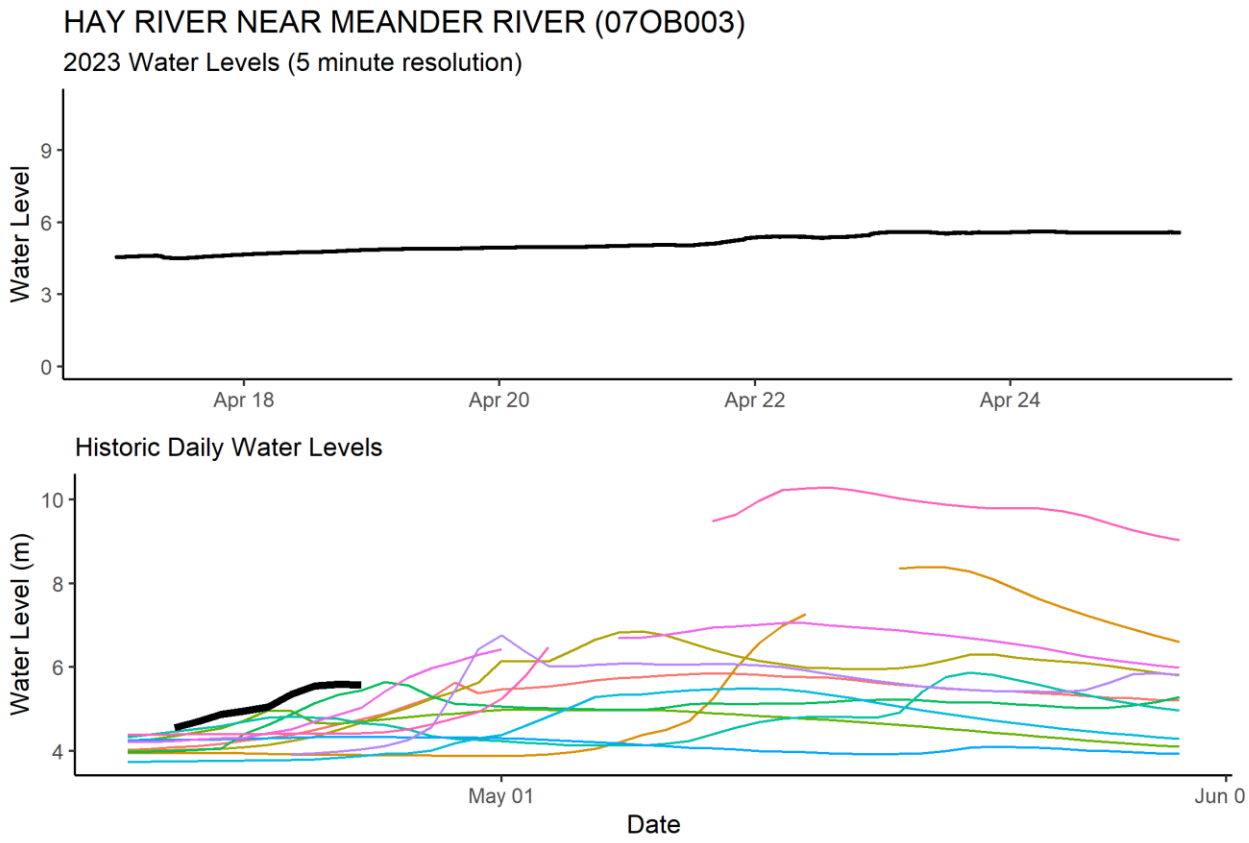


Above – Water level data for the Chinchaga River near High Level. Daily average levels for the previous year are shown here.



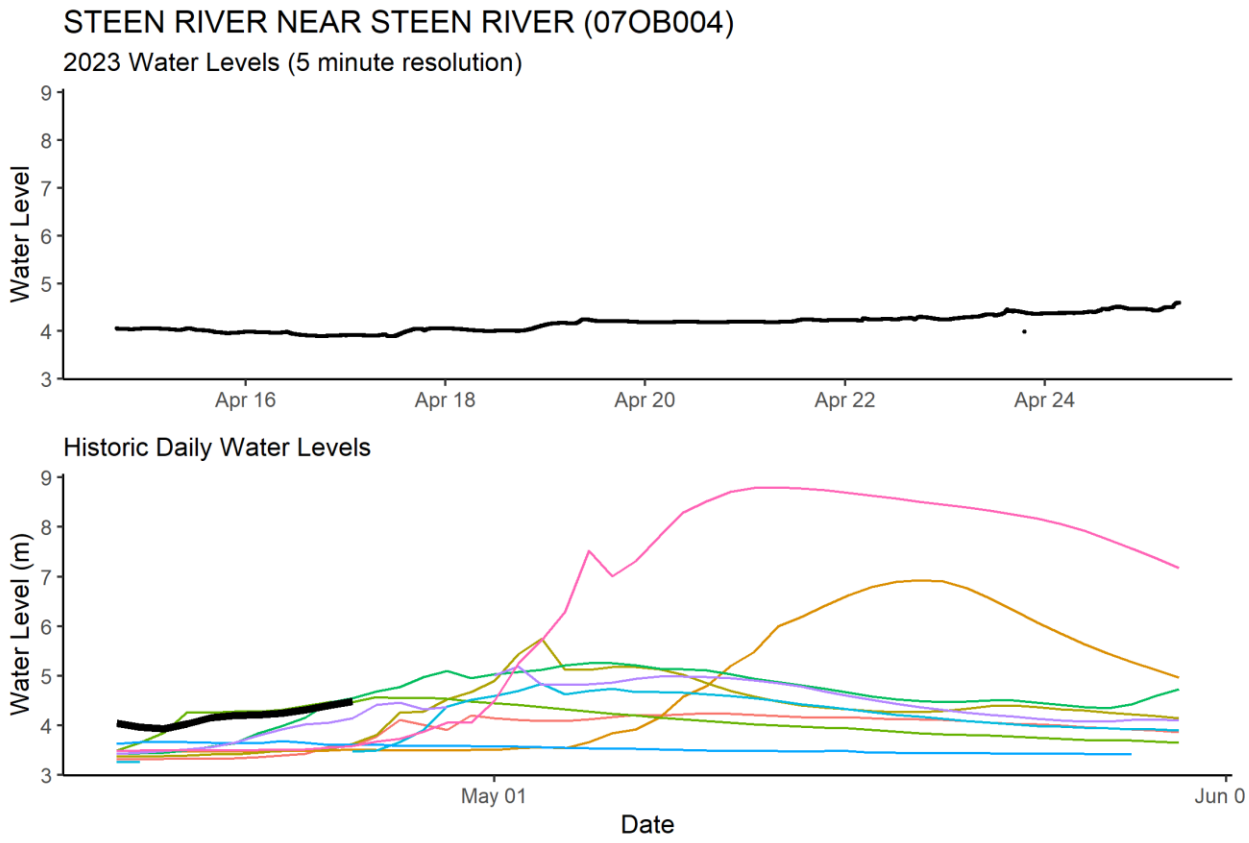
Above – Water level data at the Chinchaga River near High Level, AB. This plot shows high resolution (5 minute) water level data in the middle, and daily average data on the bottom.

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



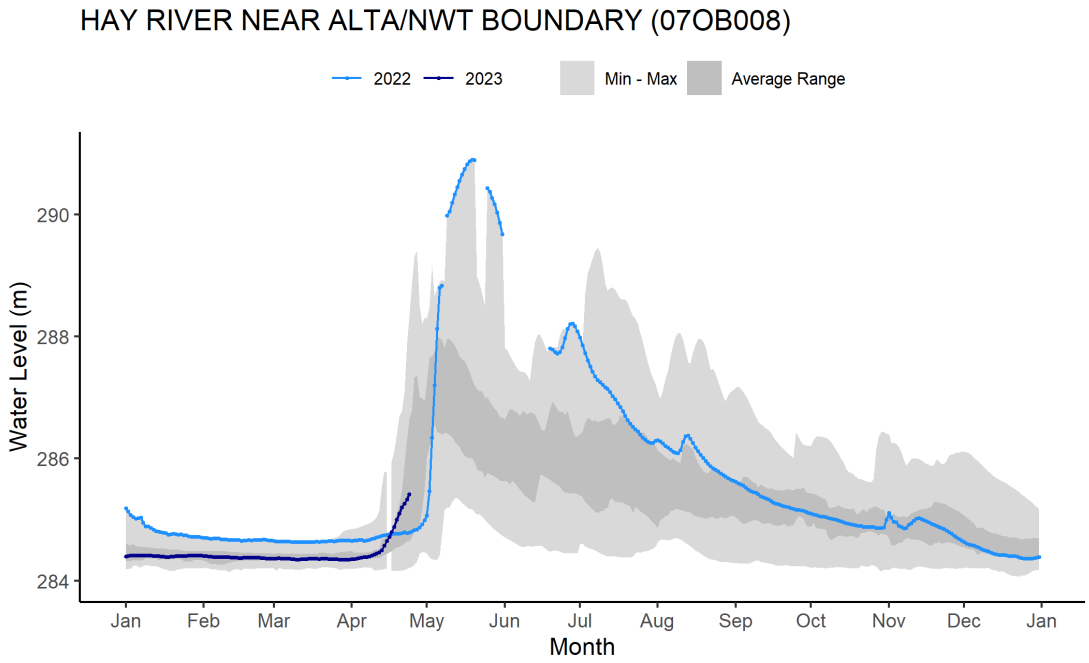
Above – Water level data on the Hay River near Meander River, AB. Water levels are slowly starting to rise.

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

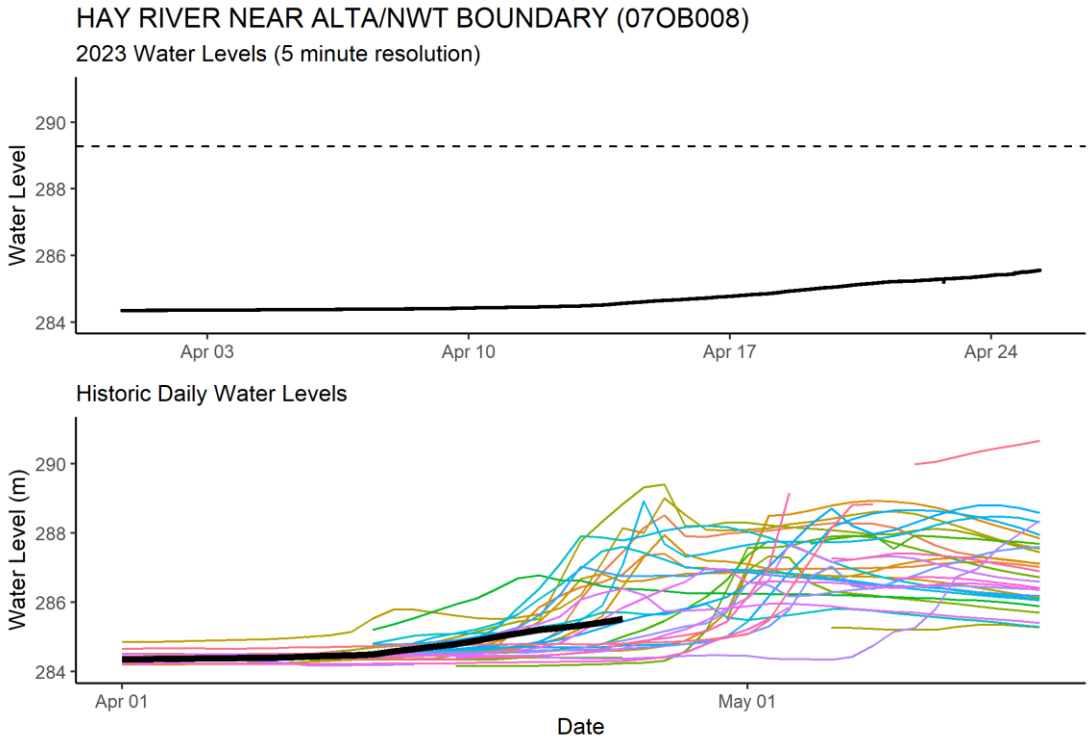


Above – Water level data on the Steen River near Steen River, AB. The Steen River is a small tributary to the Hay River. Water levels continue to slowly rise.

Hay River near the border [07OB008]:



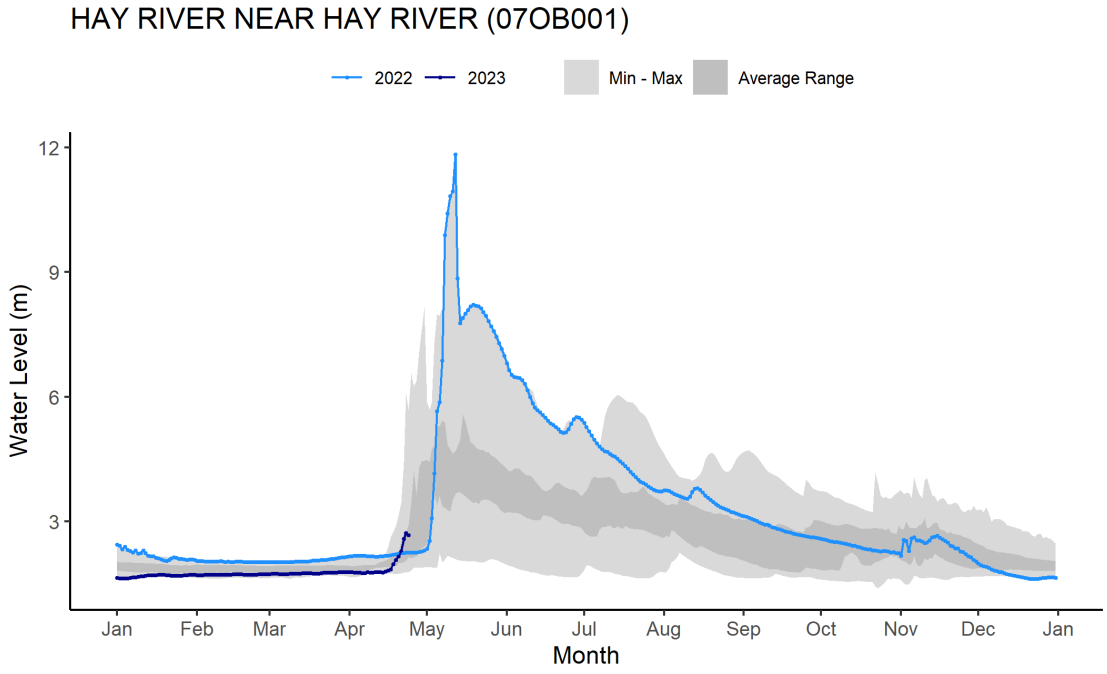
Above – Water level data for the Hay River near the Alberta- NWT border. Daily average levels for the previous year are shown here.



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 25 at 9:00. Photo courtesy of Water Survey of Canada and GNWT.

Hay River near Hay River [07OB001]:



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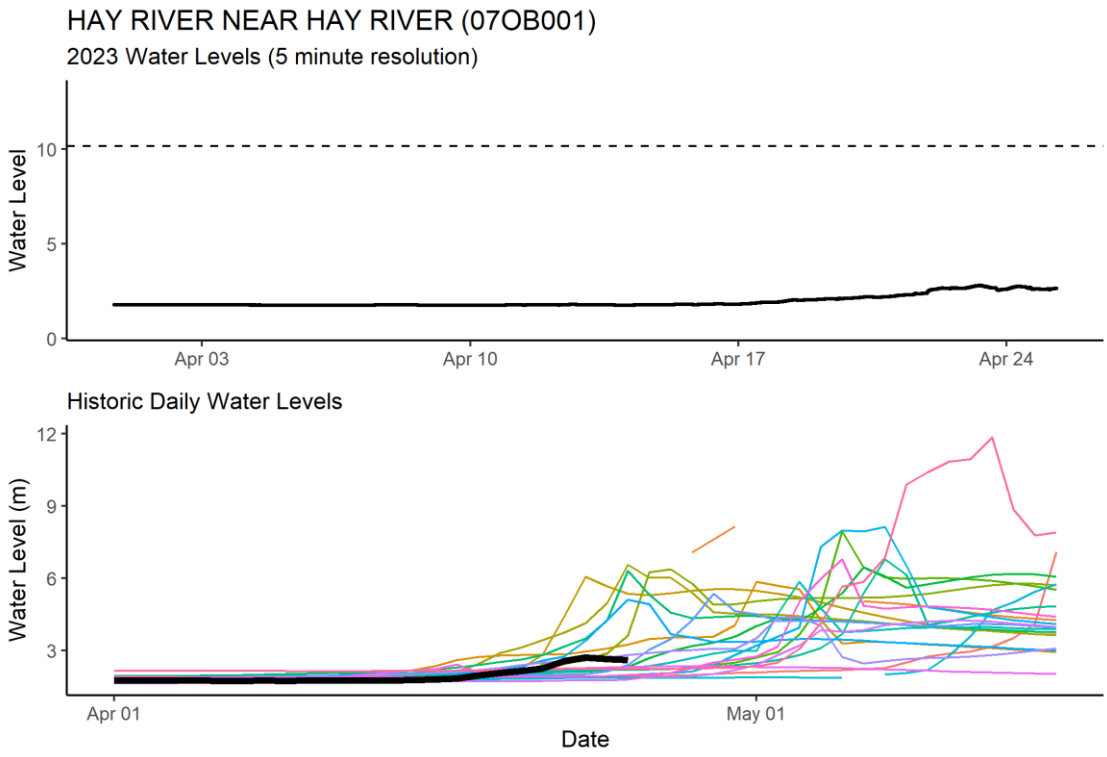

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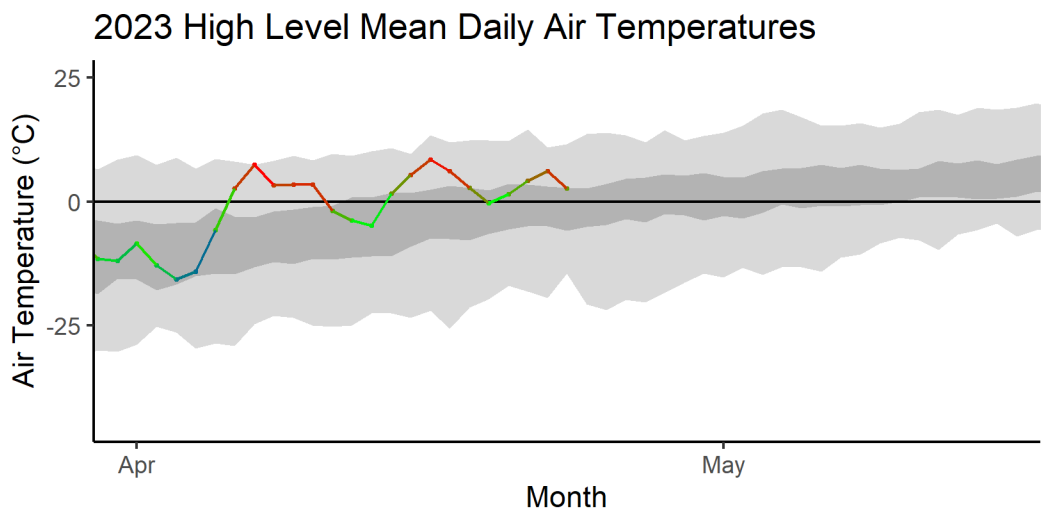
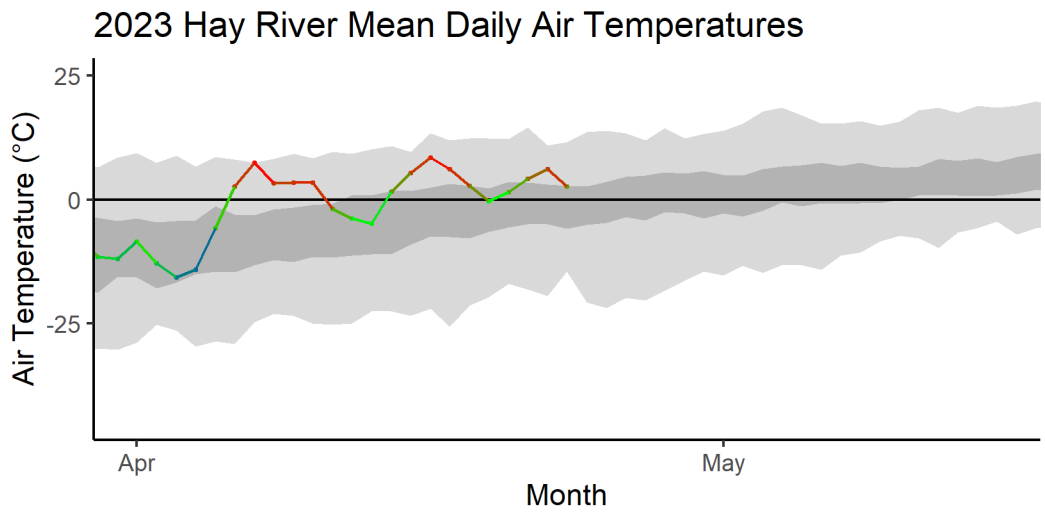
Above – Hay River near the Town of Hay River hydrometric gauge photo on April 25 at 9:00. Photo courtesy of Water Survey of Canada and GNWT.

Weather Data:

Spring temperatures to date:





Seven day weather forecasts:

High Level seven-day weather forecast:

Tue 25 Apr	Wed 26 Apr	Thu 27 Apr	Fri 28 Apr	Sat 29 Apr	Sun 30 Apr	Mon 1 May
 10°C Periods of rain	 9°C Rain	 14°C Sunny	 15°C Sunny	 17°C Sunny	 21°C A mix of sun and cloud	 19°C A mix of sun and cloud
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
 -5°C 60% Chance of flurries or rain showers	 2°C Periods of rain	 2°C Clear	 0°C Clear	 1°C Clear	 3°C Cloudy periods	

Hay River seven-day weather forecast:

Tue 25 Apr	Wed 26 Apr	Thu 27 Apr	Fri 28 Apr	Sat 29 Apr	Sun 30 Apr	Mon 1 May
 4°C Periods of rain	 5°C 30% Chance of flurries	 12°C Sunny	 12°C Sunny	 10°C Sunny	 14°C Sunny	 14°C A mix of sun and cloud
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
 -3°C Periods of rain or snow	 -5°C Cloudy periods	 2°C Cloudy periods	 -4°C Clear	 0°C Clear	 3°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.