Government of
Northwest Territories

NWT Water Monitoring Bulletin – April 24, 2024 at 11:00

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:

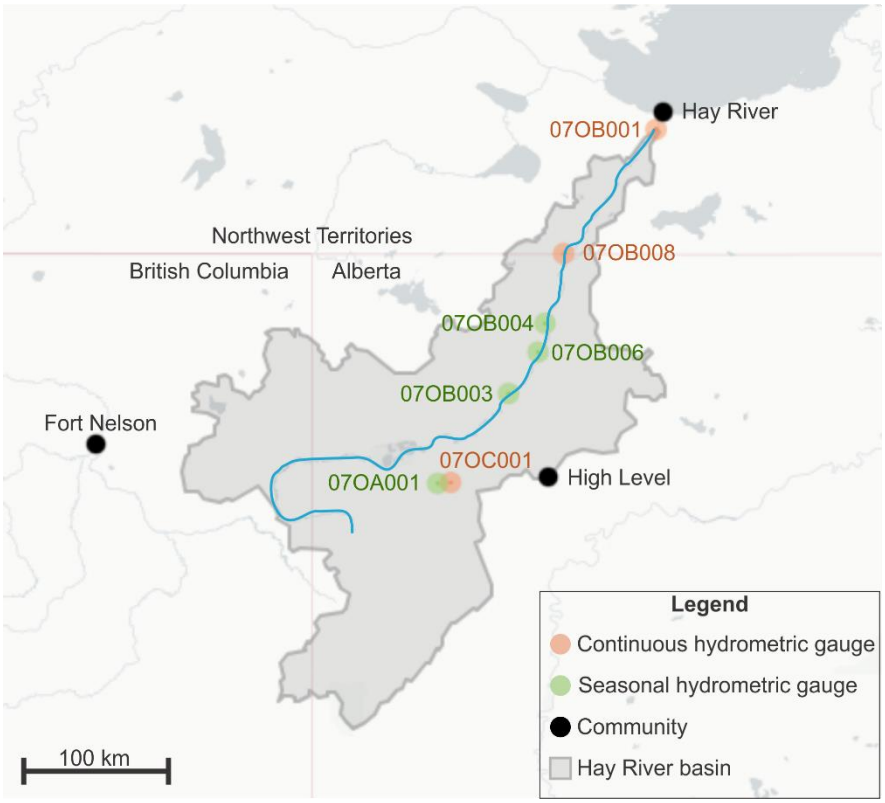
- Snowmelt is almost complete in the Hay River basin;
- Snowmelt in the lower part of the Liard River basin (i.e., the low elevation, non-mountainous part of the basin) is continuing;
    - Snowmelt is almost complete in the British Columbia part of the basin;
    - Snowmelt is ongoing in the NWT part of the basin.
- Break up along the Hay River appears to be thermal so far (ice is primarily melting in place);
    - There are some open water stretches along the river, but river ice has not yet started to move.
- River ice is still largely intact on the Liard River;
    - Some small open water sections are developing
- There are small stretches of open water on the Mackenzie River between Jean Marie River and Fort Simpson, but river ice is still largely intact.
- Water levels are slowly increasing on the Hay River but remain well below normal for this time of year.
- On the Liard River and on the Mackenzie River at Fort Simpson, water levels are slowly rising under the ice, but the rates of increase are small.

Contents

Hay River:

Current Status:

- The snowpack has almost entirely melted across the basin;
    - Exceptions include:
        - Areas near the Town of Hay River (northernmost part of the basin);
        - A small section of the Caribou Hills that drains to the Hay River.
- Ice appears to be degrading thermally along the Hay River:
    - Open water leads are developing throughout the river (see image below);
    - No ice jams or ice runs have been observed from satellite imagery;
    - The Chinchaga River (largest tributary to the Hay River) is now ice free.
- Water levels continue to rise slowly along the Hay River and its tributaries;
    - The rate of water level rise is low;
    - Water levels remain extremely low for this time of year .
- Spring temperatures throughout the basin have fluctuated between above normal and normal, which has resulted in a slow snowmelt.
- Temperatures in the Hay River basin are expected to be about average for the rest of the week and a small amount of rainfall (10-15 mm) is now forecast for the southern part of the basin today and tomorrow.
- Refer to the [Town of Hay River website] for the most up-to-date information, as well as webcam images of current conditions.



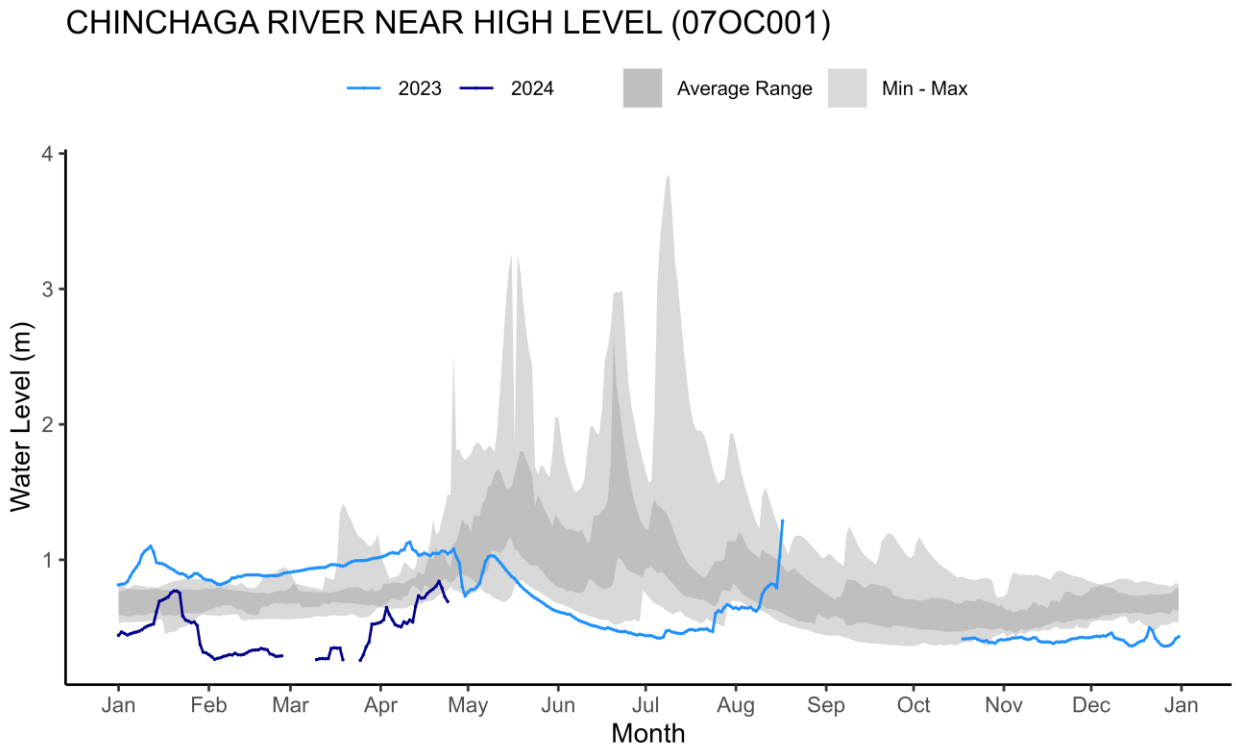
Above – Map of hydrometric stations in the Hay River basin. The station numbers are referenced in the water level plots below.

Satellite Data:

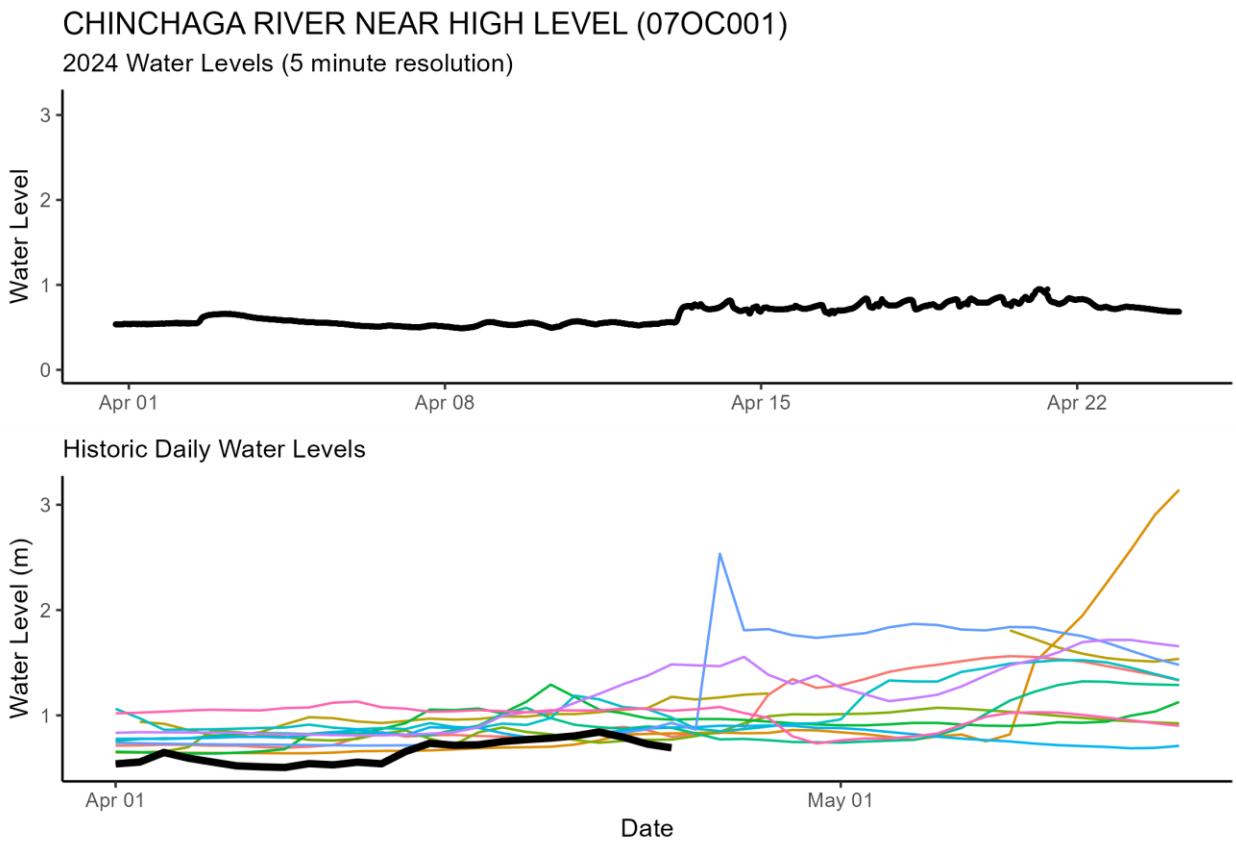
Above – Sentinel-2 satellite imagery of the Hay River near the Alberta/NWT border courtesy of Sentinel-Hub. The image was acquired on Apr 22 at 13:00 MDT. The image shows intermittent sections of open water and degrading river ice.

Hydrometric Data:

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

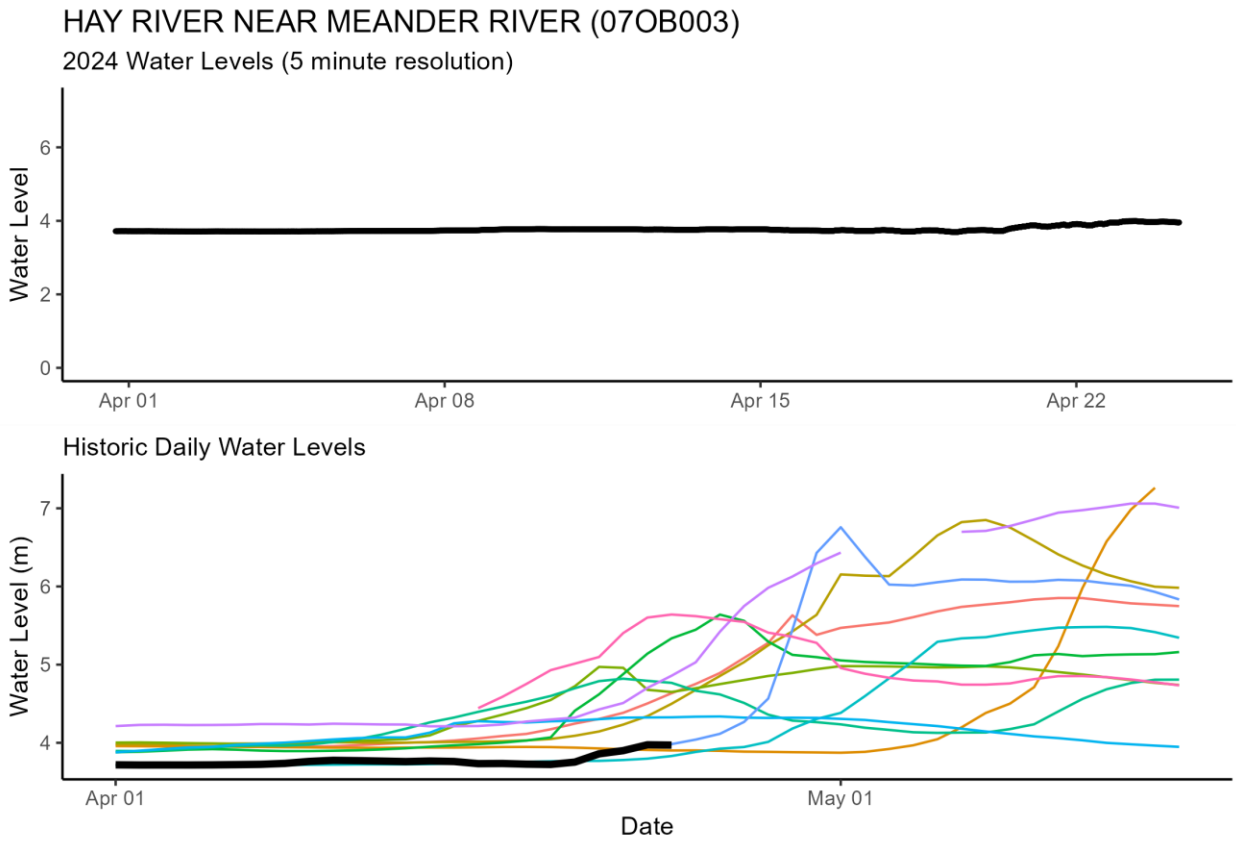


Above – Water level data for the Chinchaga River near High Level. Data for the previous year are also shown here.



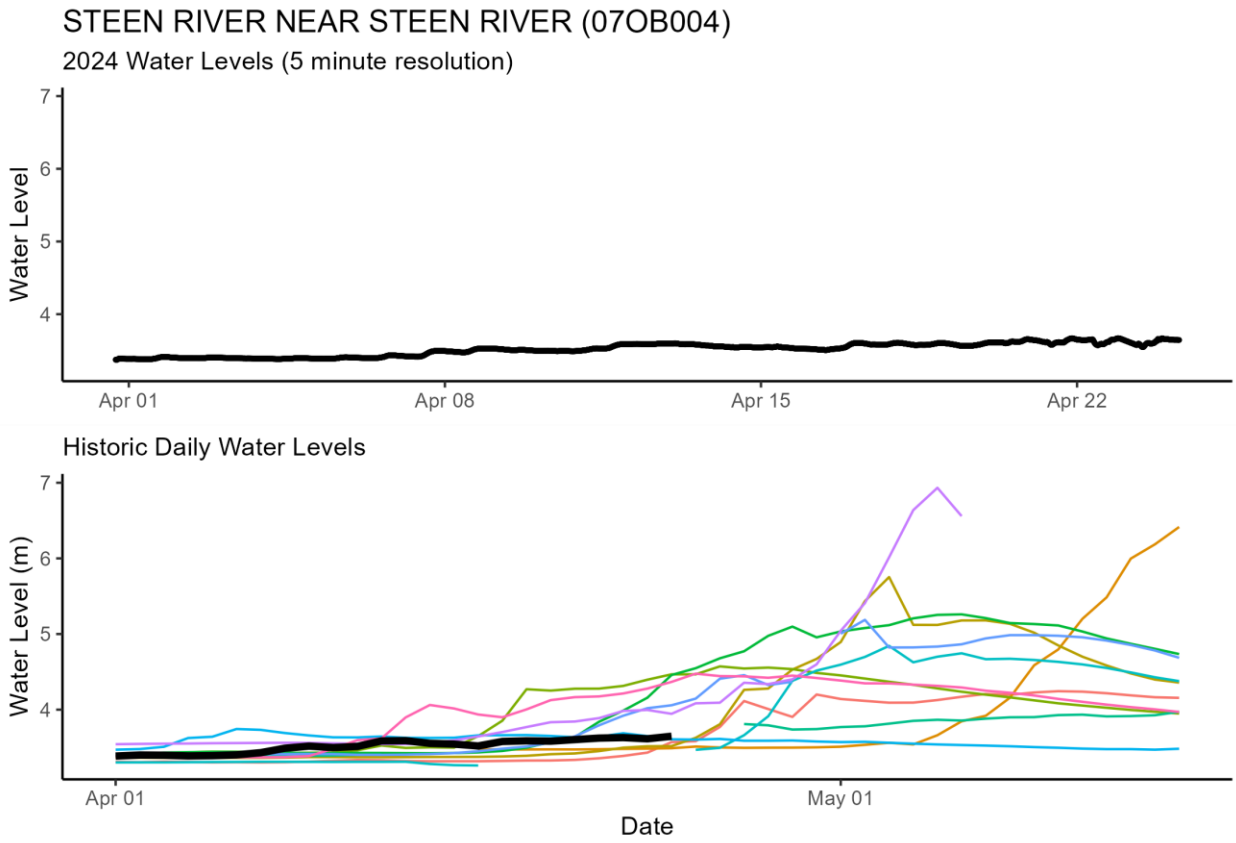
Above – Water level data at the Chinchaga River near High Level, AB. This plot shows high resolution (5 minute) water level data on the top, and daily average data on the bottom.

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



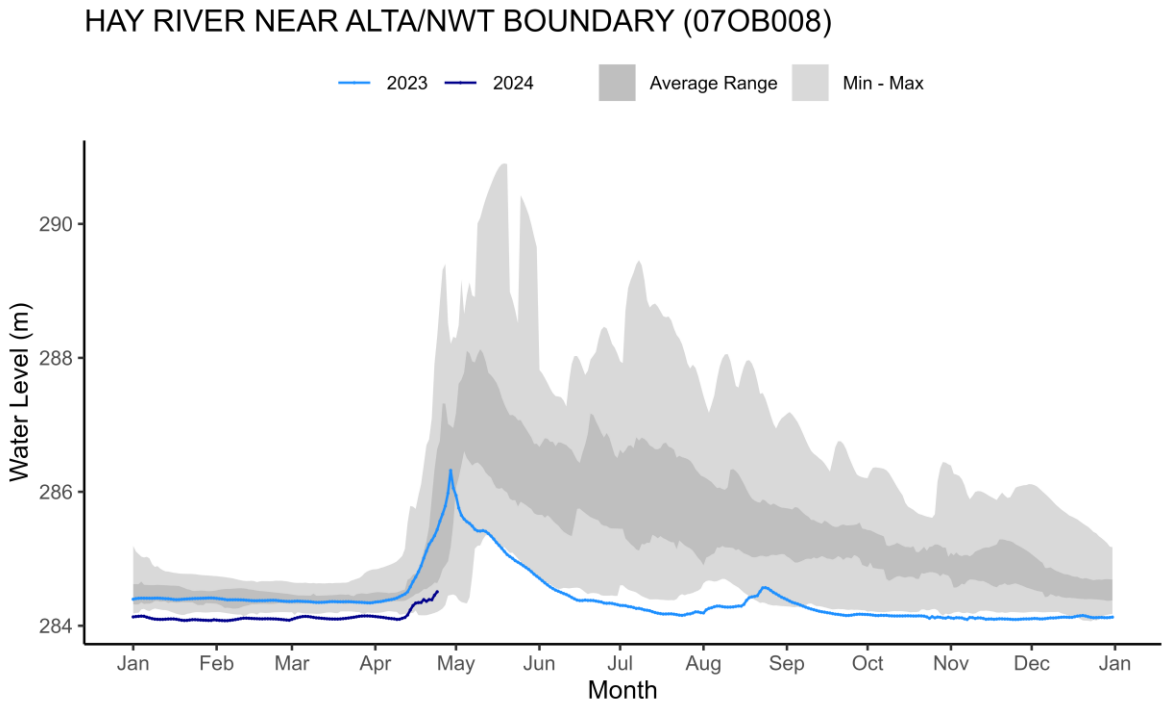
Above – Water level data on the Hay River near Meander River, AB.

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

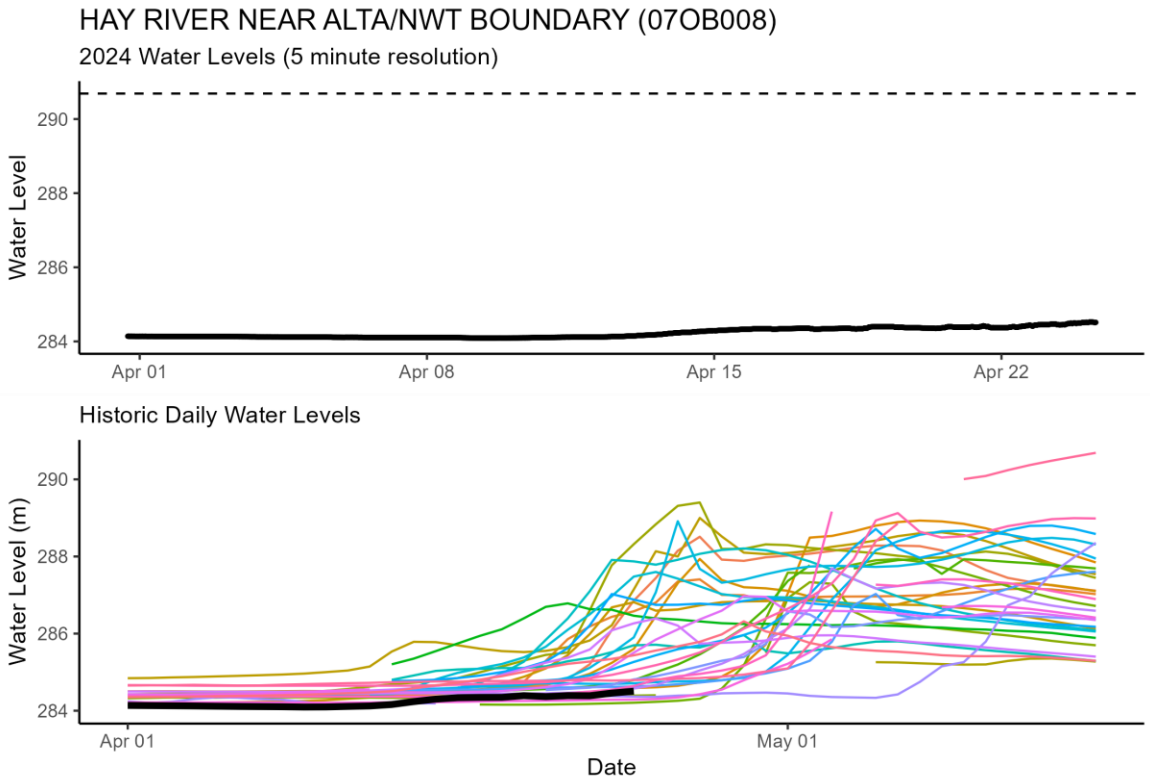


Above – Water level data on the Steen River near Steen River, AB. The Steen River is a small tributary to the Hay River.

Hay River near the border [07OB008]:



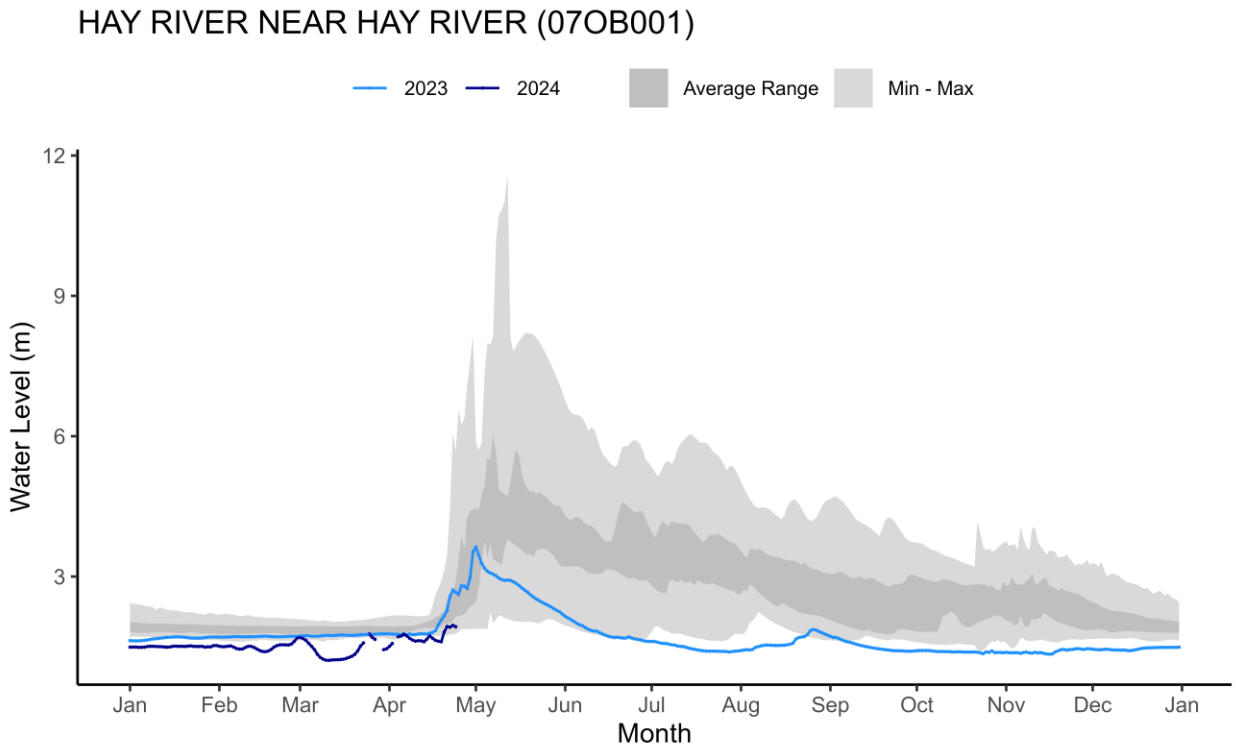
Above – Water level data for the Hay River near the Alberta- NWT border. Data for the previous year are also shown here.



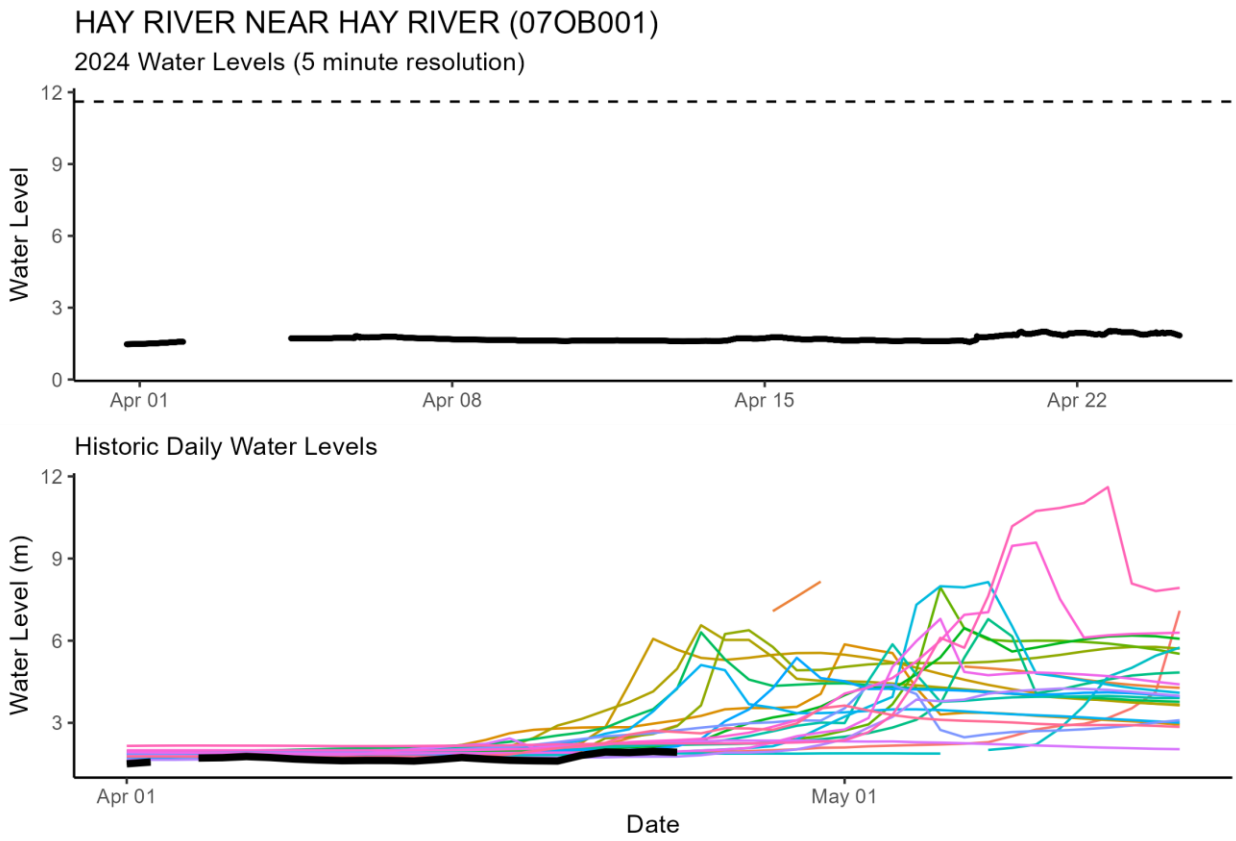
Above - The upper graph in the figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from 2022. The lower graph shows daily average levels relative to the previous 20 years.

Above – Hay River near the border hydrometric gauge photo on April 24 at 09:00. 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 Alberta- NWT border. Daily average levels for the previous year are also 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 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 24 at 09:00. Photo courtesy of Water Survey of Canada and GNWT

Liard River:

Current Status:

- Snowmelt is well underway in the lower Liard River basin;
  - This is the low-lying (non-mountainous) area in northern BC and AB, and southwestern NWT;
  - Snowmelt is almost complete in the BC/AB part of the basin;
  - Snowmelt is ongoing in the NWT part of the basin but is well underway.
- Ice remains largely intact along the Liard River within the NWT;
  - Some open water leads at developing;
  - Small sections of open water have been observed along the banks.
- Water levels have started to slowly increase underneath the ice on the Liard River.
- Temperatures across the lower Liard River basin are expected to be about average over the next three days. A small amount of rainfall (10 mm) is forecast over parts of the region today and tomorrow.

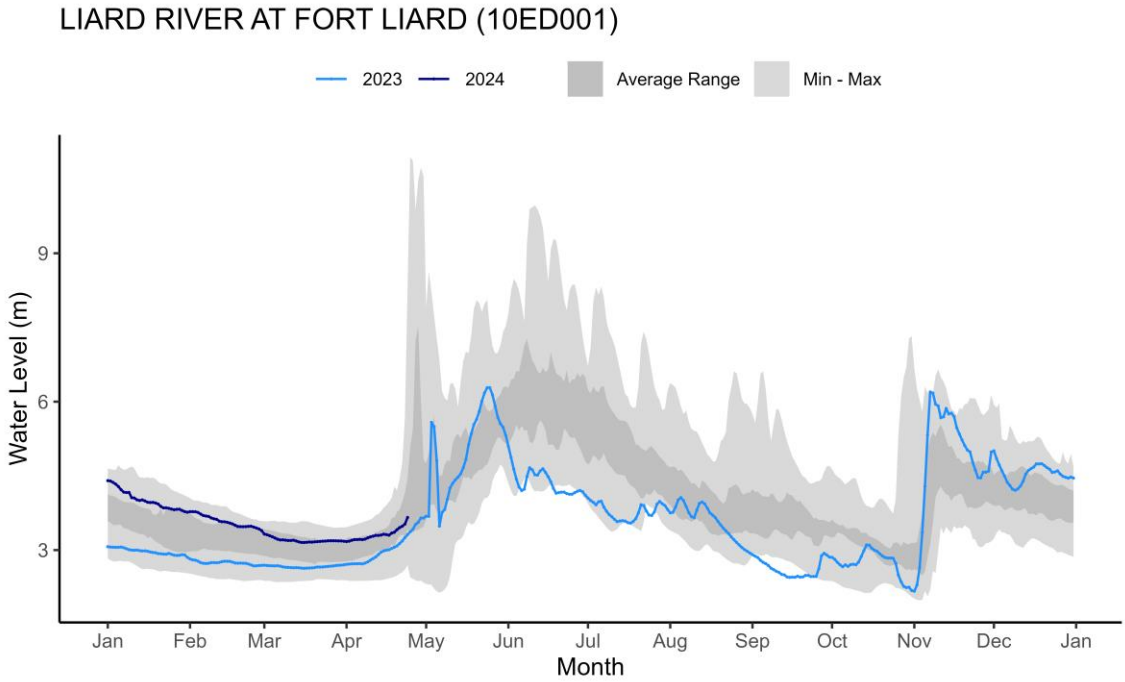
Above – Map of hydrometric stations in the Liard River basin. The station numbers are referenced in the water level plots below.

Optical Imagery:

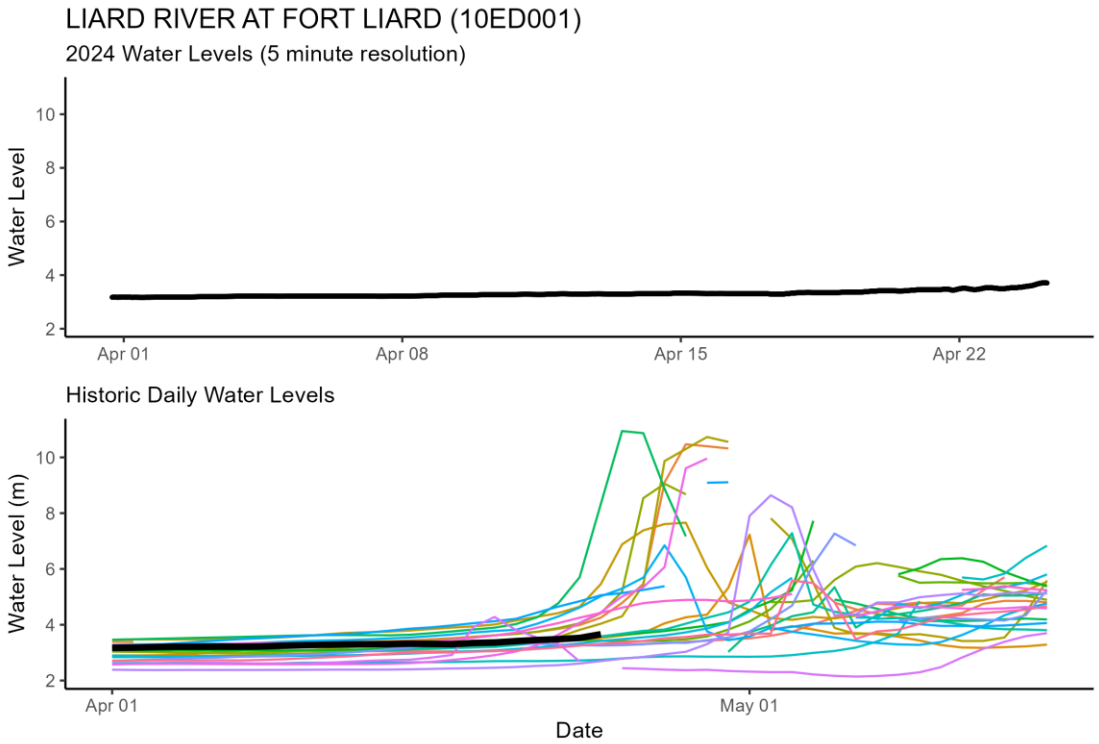
Above – Photograph of the Liard River looking downstream towards the Liard River crossing near the mouth. Photograph courtesy of Sergei Mjatelski and Goose Flying Service in Fort Simpson.

Hydrometric Data:

Liard River at Fort Liard [10ED001]:



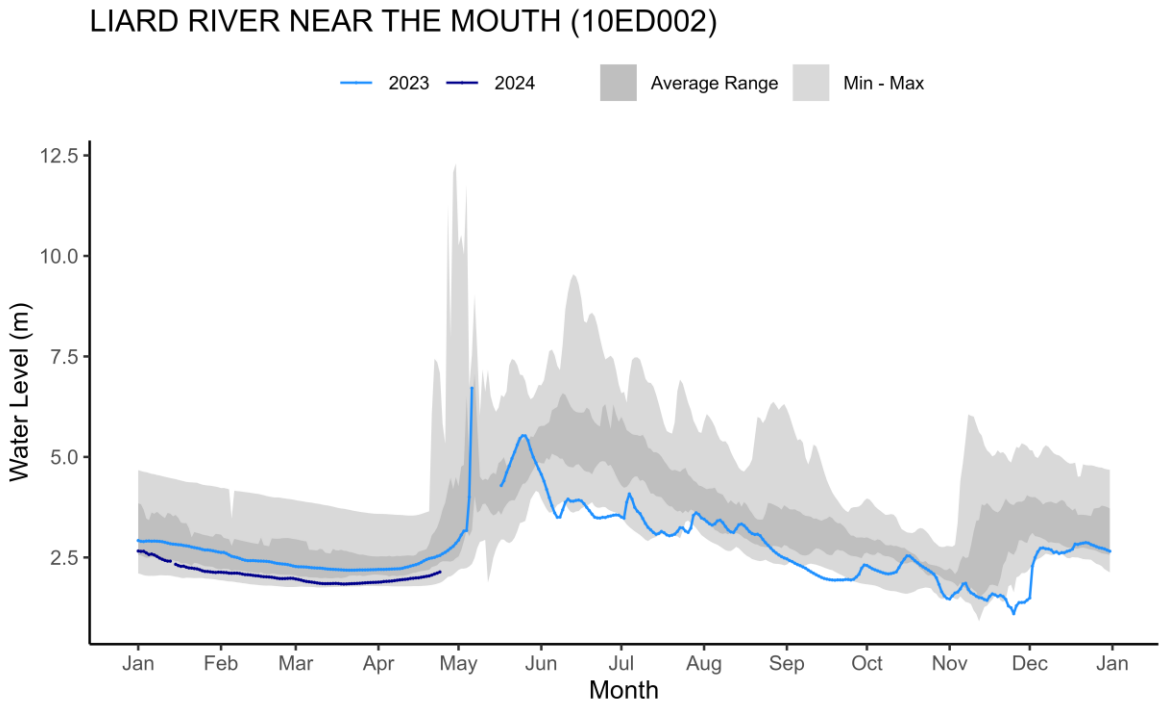
Above – Water level data for the Liard River at Fort Liard. Data for the previous year are also shown here.



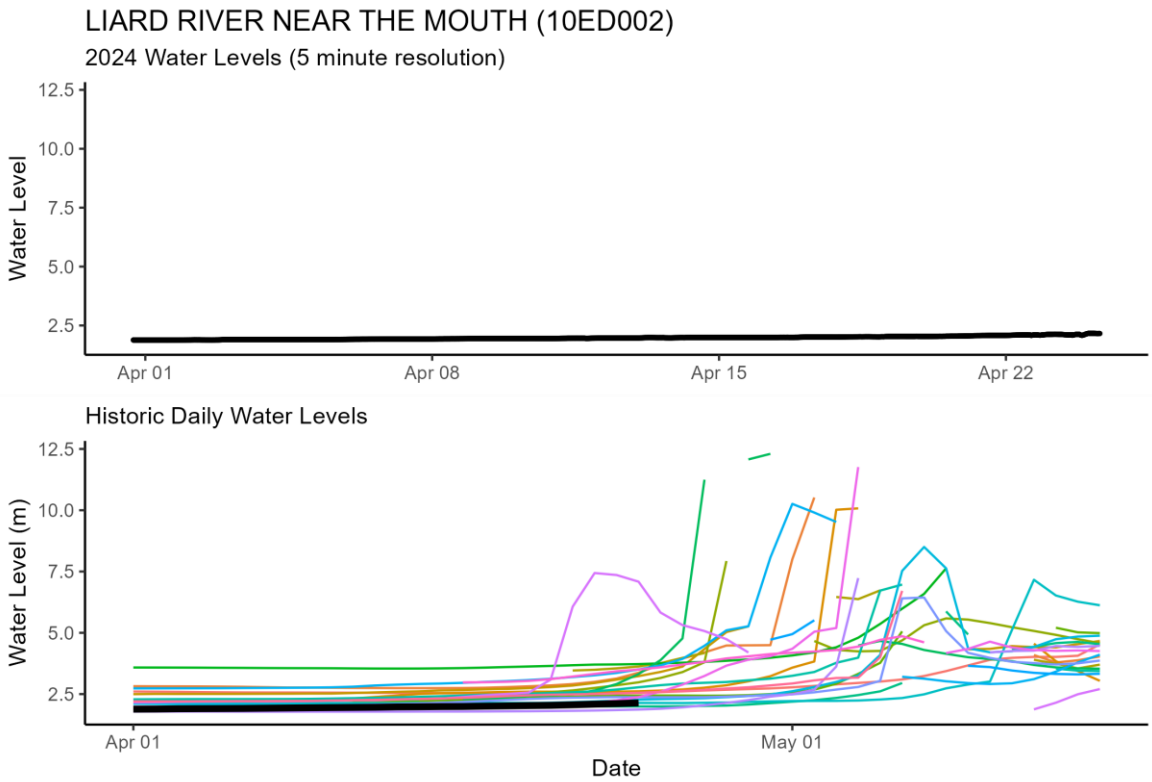
Above - The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Above – Liard River at Fort Liard hydrometric gauge photo from April 24 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). Data for the previous year are also shown here.



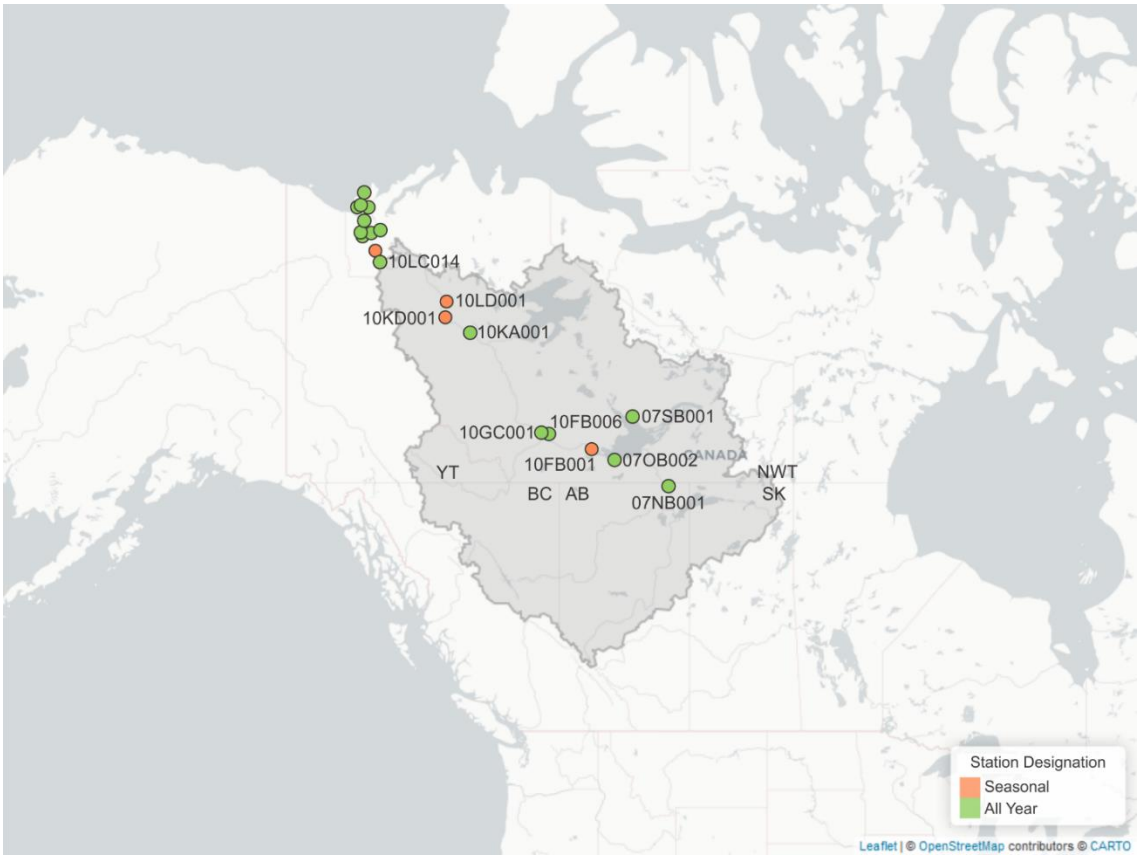
Above - The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Above – Liard River near the mouth hydrometric gauge photo from April 24 at 09:00. Photo courtesy of Water Survey of Canada and GNWT.

Slave River / Great Slave Lake / Mackenzie River

Current Status:

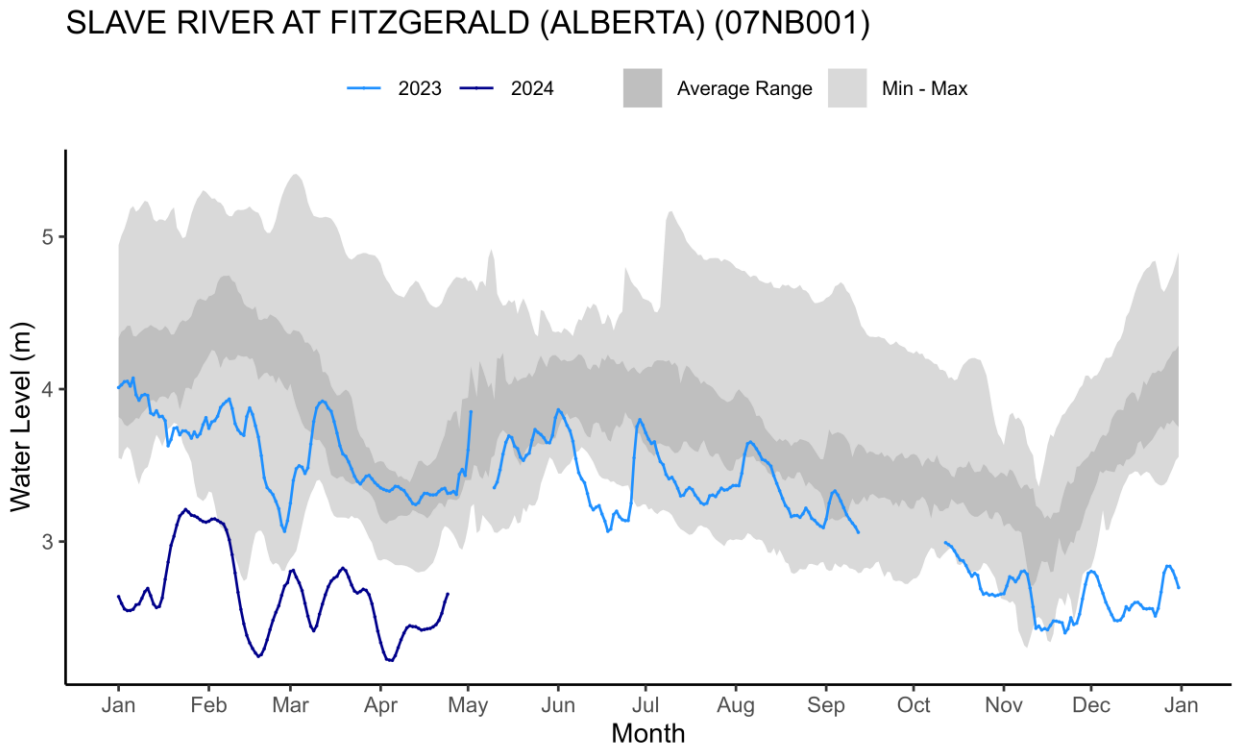
- Break up is underway in the Peace/Athabasca basins, which drain into the Slave River;
    - Break up has been mostly thermal on the Peace and Athabasca rivers.
- There are small stretches of open water on the Mackenzie River between Jean Marie River and Fort Simpson, but river ice is still largely intact.
- Water levels are slowly beginning to rise underneath the ice at the Mackenzie River at Fort Simpson, but the rate of increase is still very small.



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

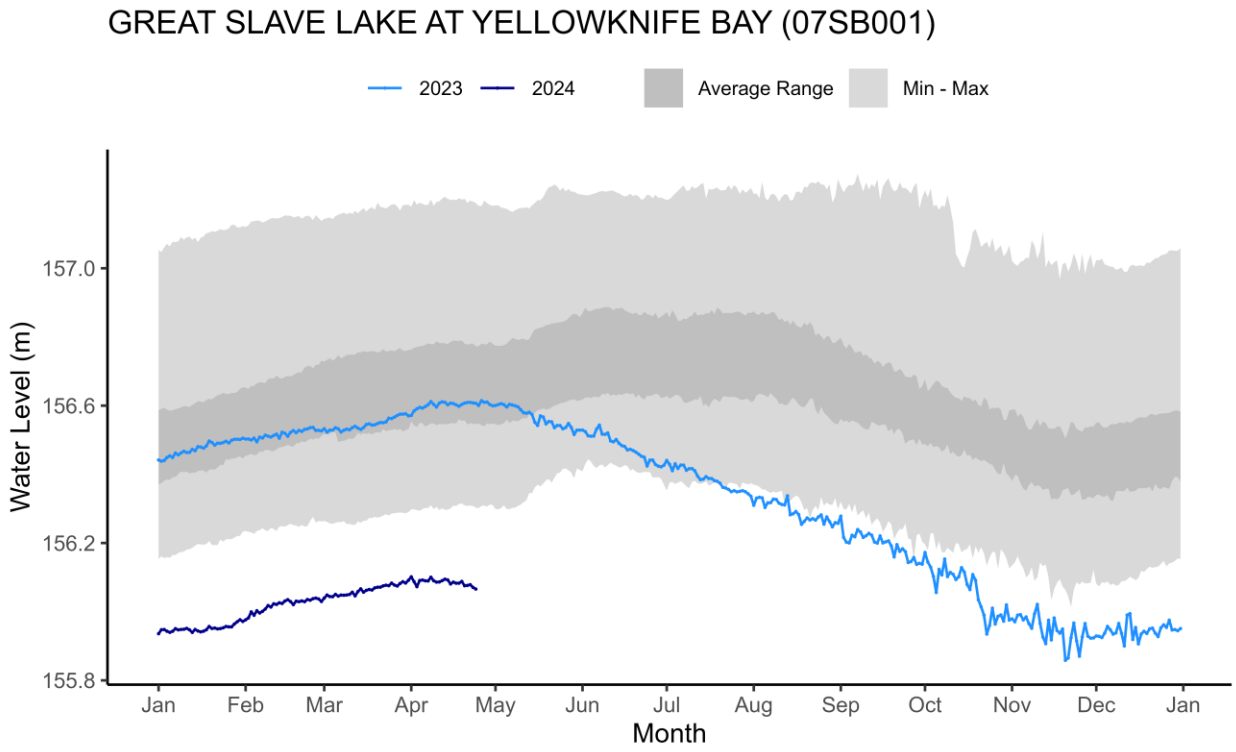
Hydrometric Data:

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



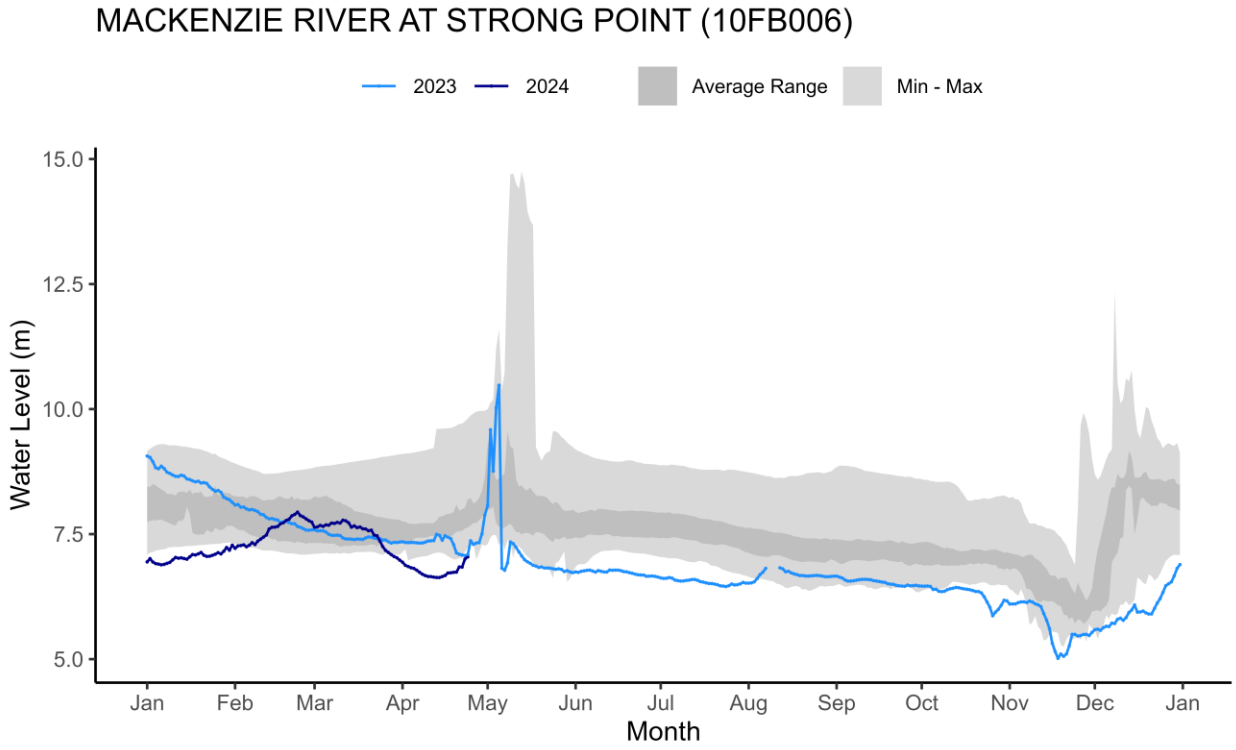
Above – Water level data for the Slave River at Fitzgerald. Data for the previous year are also shown here.

Great Slave Lake at Yellowknife Bay [07SB001]:

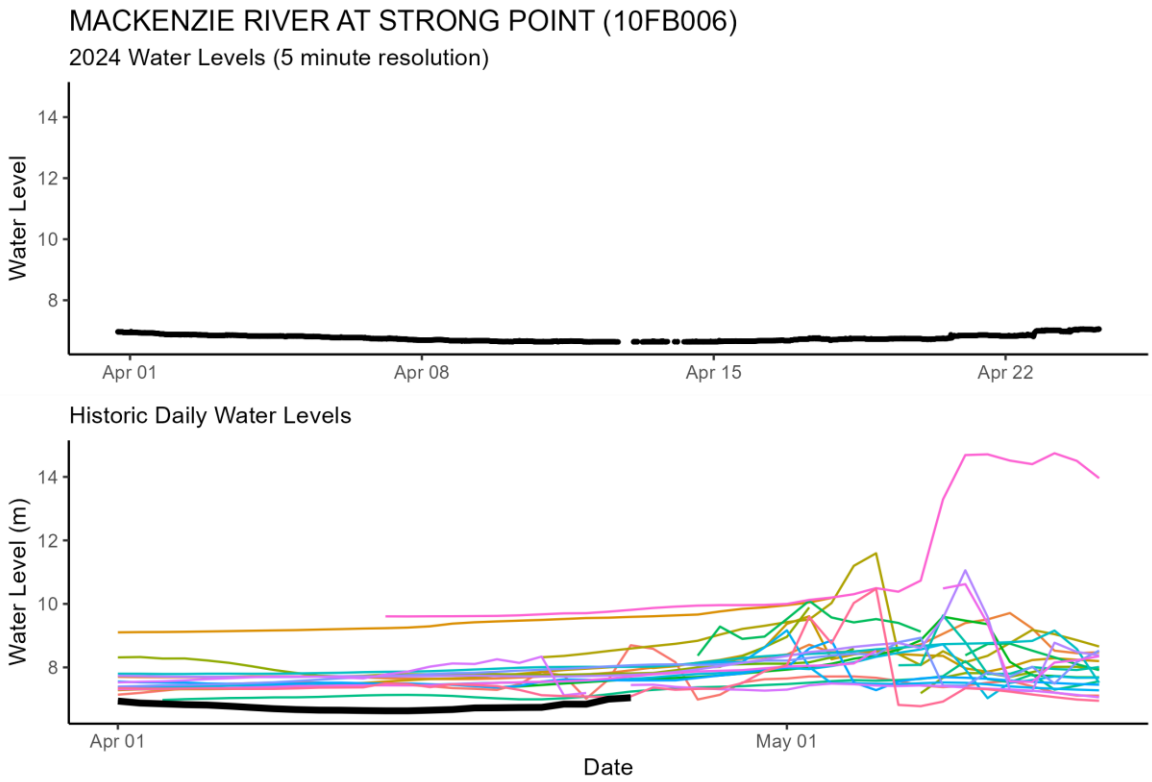


Above – Water level data for Great Slave Lake at Yellowknife Bay. Data for the previous year are also shown here.

Mackenzie River at Strong Point [10FB006]:



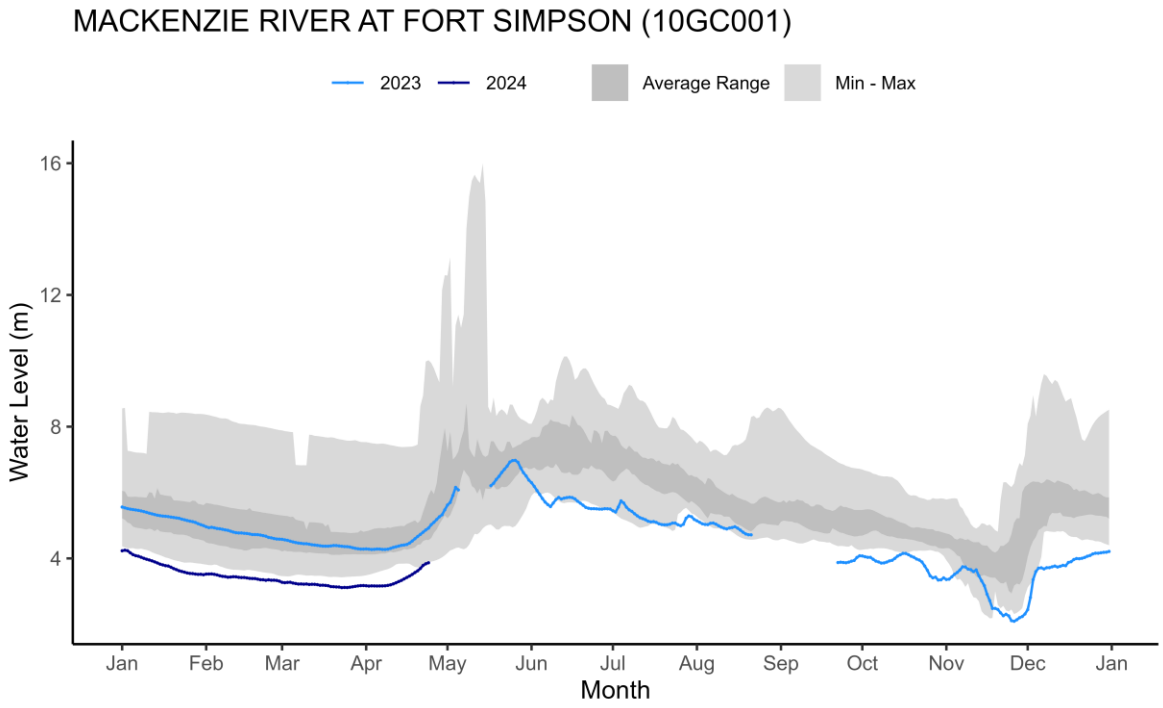
Above – Water level data for the Mackenzie River at Strong Point. Data for the previous year are also shown here.



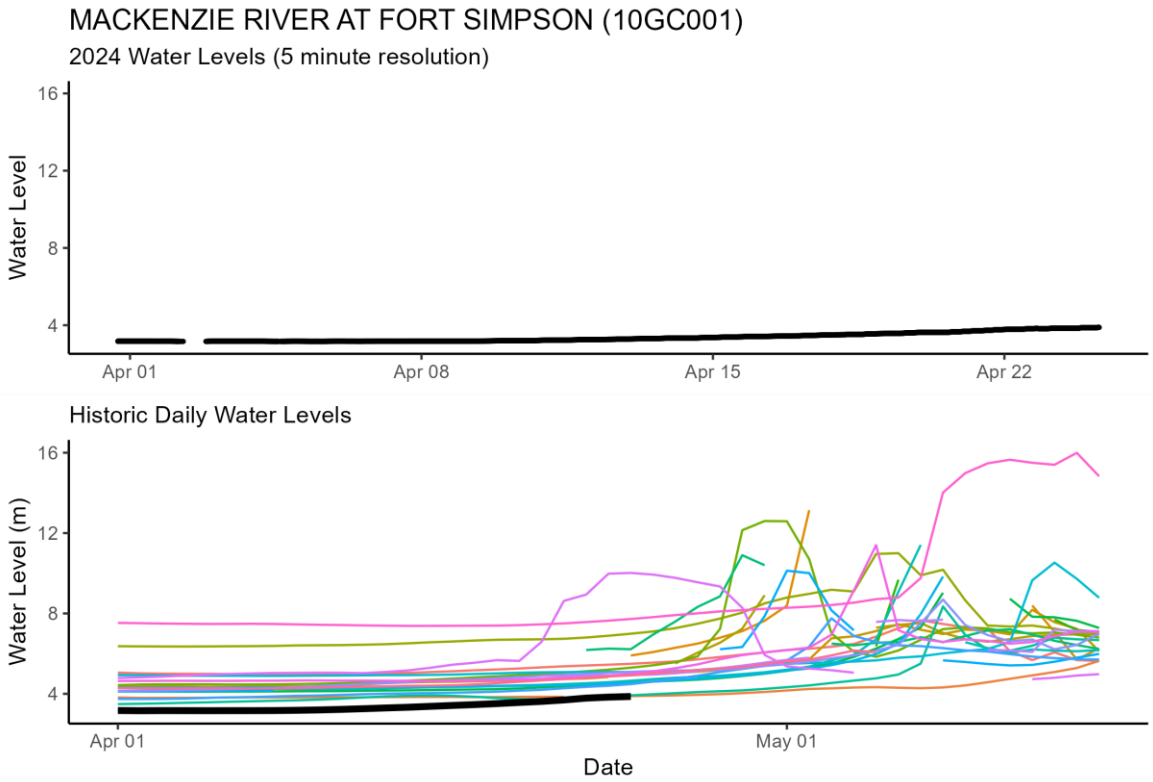
Above – The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

Above – Mackenzie River at Strong Point hydrometric gauge photo from April 24 at 09:00. 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. Data for the previous year are also shown here.



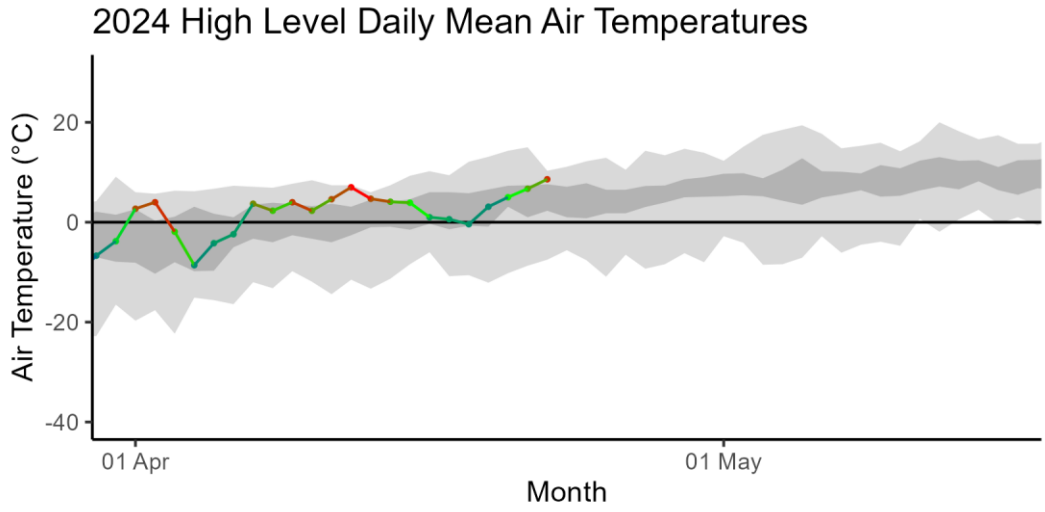
Above - The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

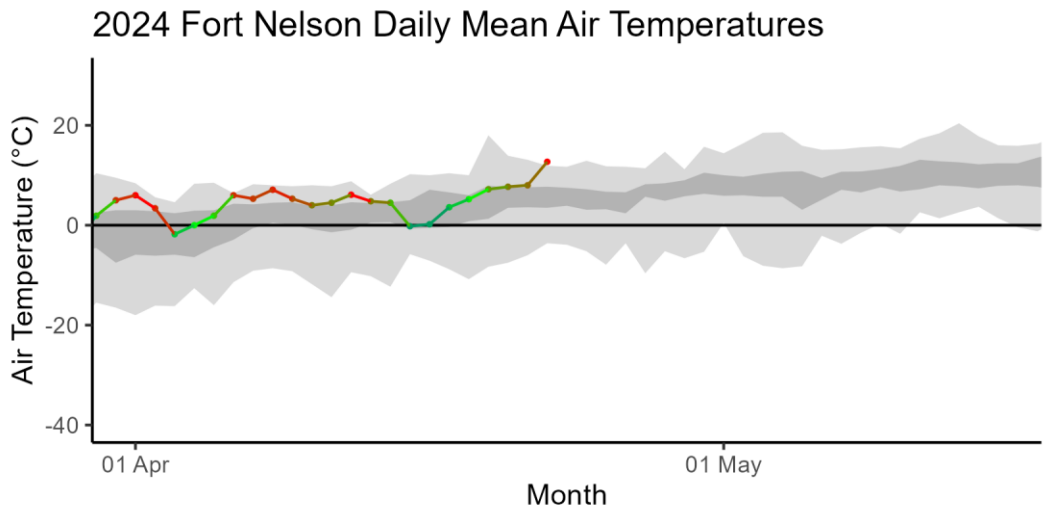
Above – Mackenzie River at Fort Simpson hydrometric gauge photo from April 24 at 9:00. Photo courtesy of Water Survey of Canada and GNWT.

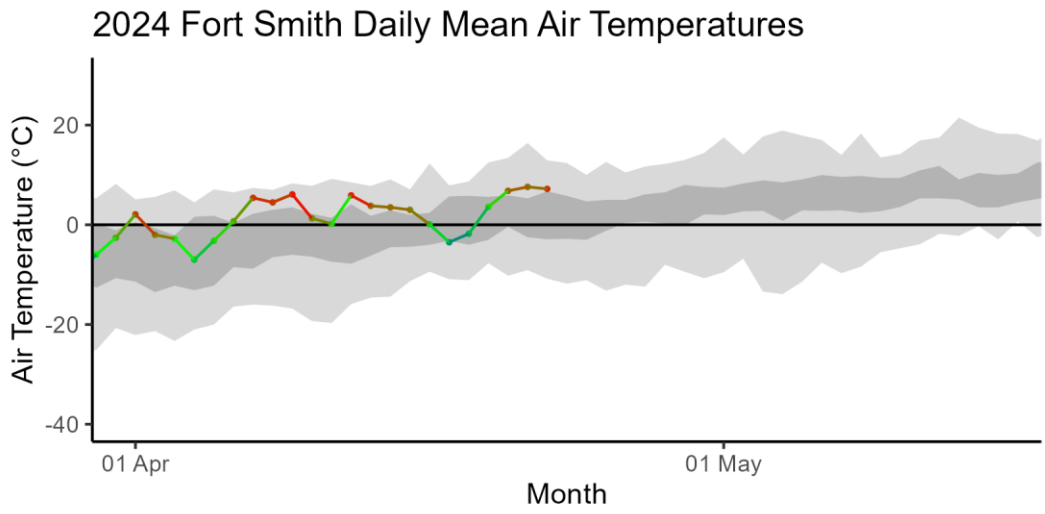
Weather Data:

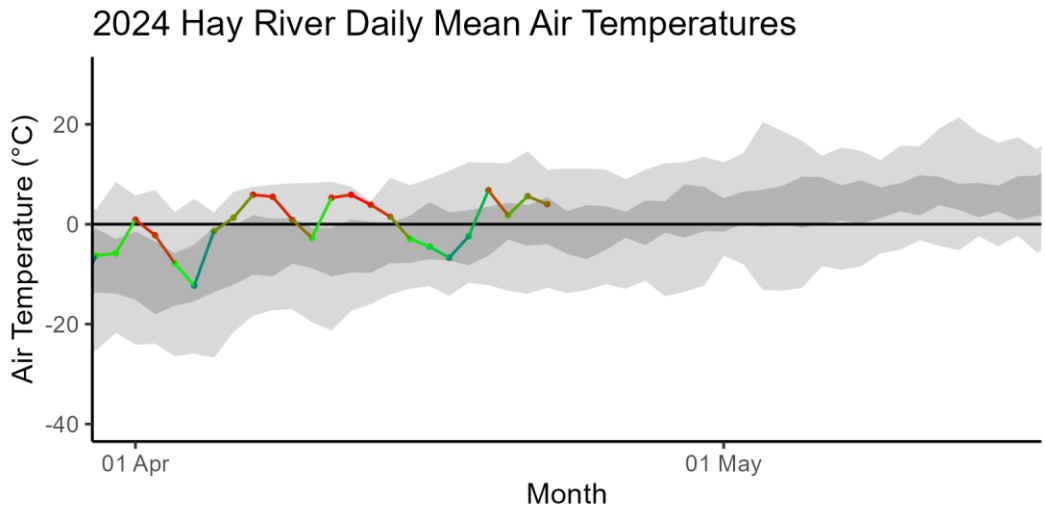
Weather information informs how snow and ice will melt and provides information about how this spring is unfolding relative to previous springs. Warmer than normal conditions early in the spring allow for additional energy to melt the snowpack and soften river ice. Rain-on-snow events can cause rapid 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. The first set of figures show how temperatures have been relative to average (dark grey band) this spring, while the second set is Environment and Climate Change Canada (ECCC) weather forecast data for the next seven days.

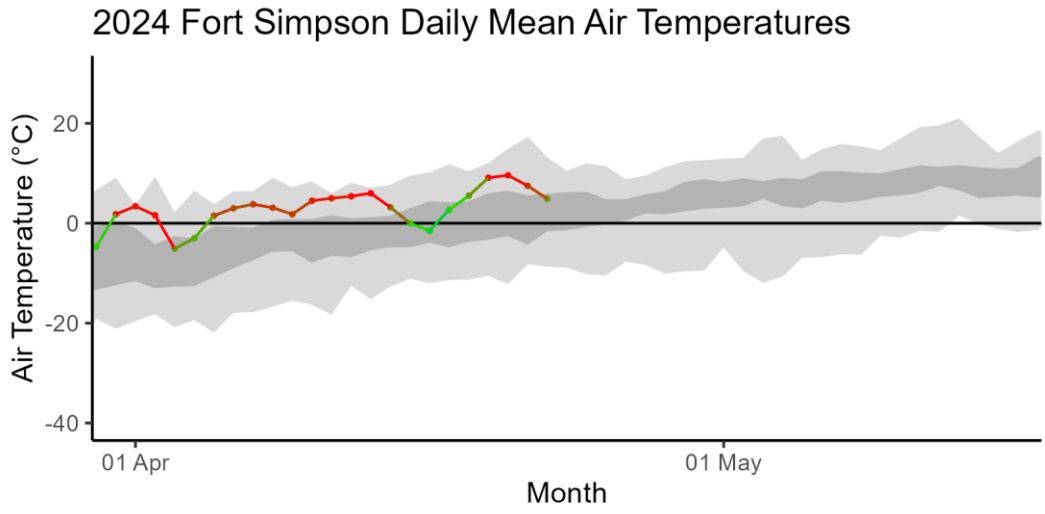
The Hay River basin and the southern Dehcho region are forecast to see average temperatures for the rest of the week. A small amount of rain (10-15 mm) is forecast for the region today and tomorrow.






2024 Fort Smith Daily Mean Air Temperatures
Air Temperature (°C)
20
0
-20
-40
01 Apr
01 May
Month


2024 Hay River Daily Mean Air Temperatures
Air Temperature (°C)
20
0
-20
-40
01 Apr
01 May
Month


2024 Fort Simpson Daily Mean Air Temperatures
Air Temperature (°C)
20
0
-20
-40
01 Apr
01 May
Month

High Level seven-day weather forecast:

Wed 24 Apr	Thu 25 Apr	Fri 26 Apr	Sat 27 Apr	Sun 28 Apr	Mon 29 Apr	Tue 30 Apr
13°C Mainly cloudy	6°C A few rain showers or flurries	10°C A mix of sun and cloud	16°C Sunny	19°C Sunny	13°C 30% Chance of flurries or rain showers	12°C A mix of sun and cloud
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
3°C A few rain showers or flurries	-4°C Clear	3°C Cloudy periods	0°C Clear	0°C Cloudy periods	-2°C Cloudy periods	

Fort Nelson seven-day weather forecast:

Wed 24 Apr	Thu 25 Apr	Fri 26 Apr	Sat 27 Apr	Sun 28 Apr	Mon 29 Apr	Tue 30 Apr
13°C 60% Chance of showers	9°C Rain showers or flurries	15°C Sunny	18°C Sunny	13°C Cloudy	8°C 40% Chance of rain showers or flurries	9°C 60% Chance of flurries or rain showers
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
2°C Rain showers or flurries	0°C Clear	3°C Clear	3°C Clear	0°C Cloudy	-1°C 60% Chance of showers	

Fort Smith seven-day weather forecast:

Wed 24 Apr	Thu 25 Apr	Fri 26 Apr	Sat 27 Apr	Sun 28 Apr	Mon 29 Apr	Tue 30 Apr
12°C Mainly sunny	6°C 60% Chance of showers	3°C Sunny	12°C Sunny	17°C Sunny	13°C A mix of sun and cloud	11°C A mix of sun and cloud
Tonight	**Night**	**Night**	**Night**	**Night**	**Night**	
4°C 60% Chance of showers	-7°C Cloudy periods	-4°C Cloudy periods	-2°C Clear	-1°C Cloudy periods	-2°C Cloudy periods	

Hay River seven-day weather forecast:

Wed 24 Apr	Thu 25 Apr	Fri 26 Apr	Sat 27 Apr	Sun 28 Apr	Mon 29 Apr	Tue 30 Apr
 8°C A mix of sun and cloud	 4°C Snow	 -2°C A mix of sun and cloud	 9°C Sunny	 3°C Sunny	 2°C A mix of sun and cloud	 2°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 -3°C Rain or snow	 -8°C Cloudy periods	 -6°C Cloudy periods	 -3°C Clear	 -5°C Cloudy periods	 -4°C Cloudy periods	

Fort Simpson seven-day weather forecast:

Wed 24 Apr	Thu 25 Apr	Fri 26 Apr	Sat 27 Apr	Sun 28 Apr	Mon 29 Apr	Tue 30 Apr
 12°C 30% Chance of showers	 6°C Mainly sunny	 5°C Cloudy	 11°C A mix of sun and cloud	 4°C Snow or rain	 6°C A mix of sun and cloud	 5°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 -1°C 30% Chance of showers	 -2°C Cloudy	 -2°C Clear	 0°C 40% Chance of rain showers or flurries	 -3°C Cloudy periods	 -3°C Cloudy periods	

Factors to Watch:

It is important to note that much of the water contributing to NWT rivers 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 snowpack 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, 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 occur 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, hits the ground, or gets stuck in a river bend. When this happens, the pieces of floating ice jam 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 may 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 behind an ice jam. 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.