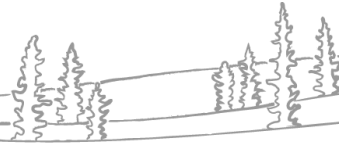




# NWT Water Monitoring Bulletin

## – May 01, 2023 at 12:00



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](mailto:nwtwaters@gov.nt.ca).

### Current Status:

- Water levels at the Hay River near Hay River hydrometric gauge reached their ice-induced peak around 09:00 yesterday morning;
  - Water levels at the Hay River at the AB-NWT border gauge reached their ice-induced peak on Apr 29 around noon.
- 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;
  - Most of the snowpack has melted in the lower Liard River basin;
  - Patches of open water have been identified on the Mackenzie River just upstream of Fort Simpson, near the Rabbitskin River.
- Warmer than seasonal temperatures are forecast for the Hay River and lower Liard River basins over the next week;
  - Temperatures will exceed 20°C in the southern parts of the basins and will rapidly melt any remaining snow and soften river ice.

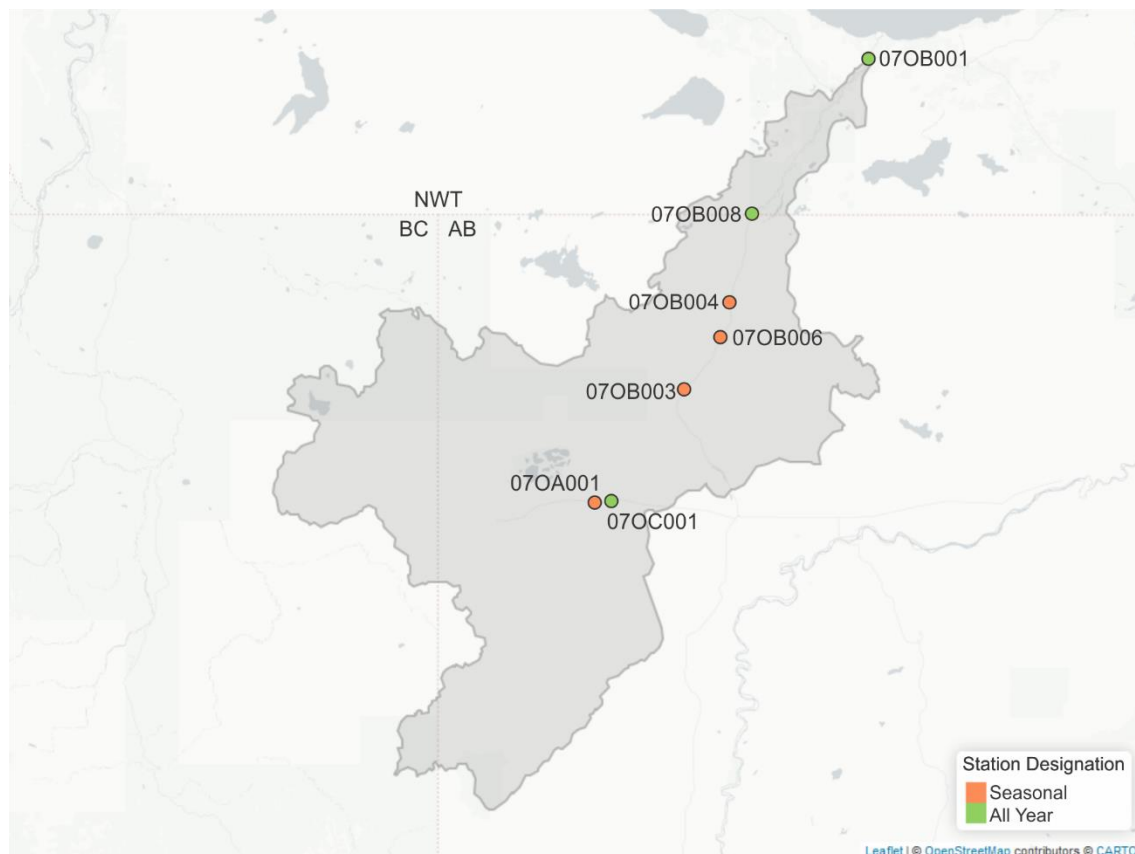
## Contents

Current Status: .....	1
Hay River: .....	3
Current Status: .....	3
Satellite Data: .....	4
Hydrometric Data: .....	6
Hay River near Meander River (Alberta) [07OB003]: .....	6
Hay River near the border [07OB008]: .....	7
Hay River near Hay River [07OB001]: .....	9
Liard River: .....	11
Current Status: .....	11
Satellite Data: .....	12
Hydrometric Data: .....	13
Liard River at Fort Liard [10ED001]: .....	13
Liard River near the mouth [10ED002]: .....	15
Great Slave Lake / Mackenzie River .....	17
Current Status: .....	17
Hydrometric Data: .....	18
Great Slave Lake at Yellowknife Bay [07SB001]: .....	18
Mackenzie River at Strong Point [10FB006]: .....	19
Mackenzie River at Fort Simpson [10GC001]: .....	20
Weather Data: .....	22
Current status and forecast: .....	22
Background information and context: .....	22
2023 spring temperatures to-date: .....	23
Hay River: .....	23
Fort Liard: .....	23
Fort Simpson: .....	23
Seven-day weather forecast: .....	24
Hay River: .....	24
Fort Liard: .....	24
Fort Simpson: .....	24
Factors to Watch: .....	25
Spring Break up on NWT Rivers: Mechanical vs Thermal .....	25

## Hay River:

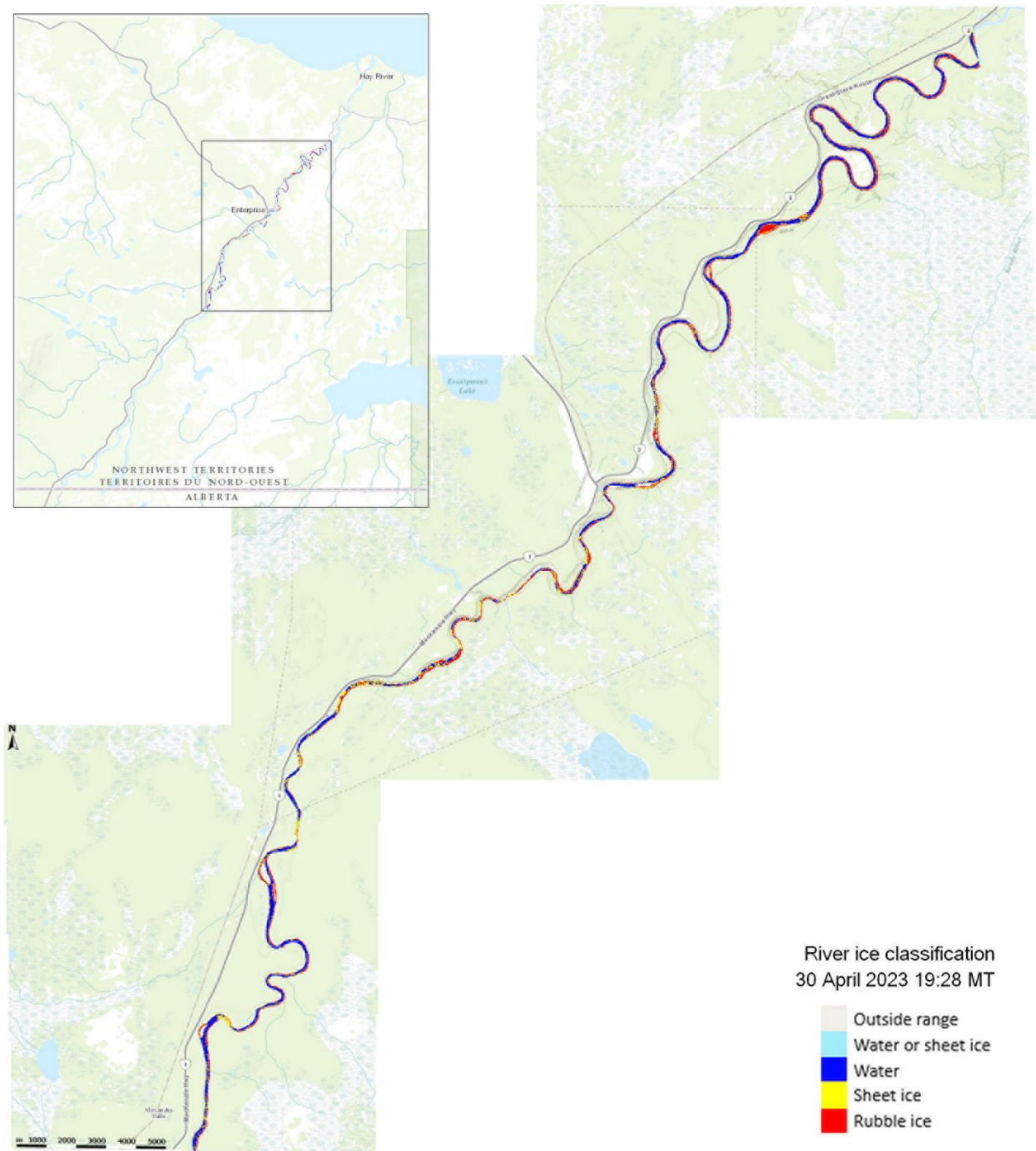
### Current Status:

- Provisional water level data at the Hay River near Hay River gauge indicates that water levels peaked yesterday morning at 3.97 m;
  - This peak is lower than the average peak during breakup and is 8.77 m lower than the peak from the last year;
- Some consolidated ice remains in the East Channel;
- Water levels at the AB-NWT border gauge reached their ice-induced peak Saturday on Apr. 29 around noon;
- According to imagery viewed, there is no more ice 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.



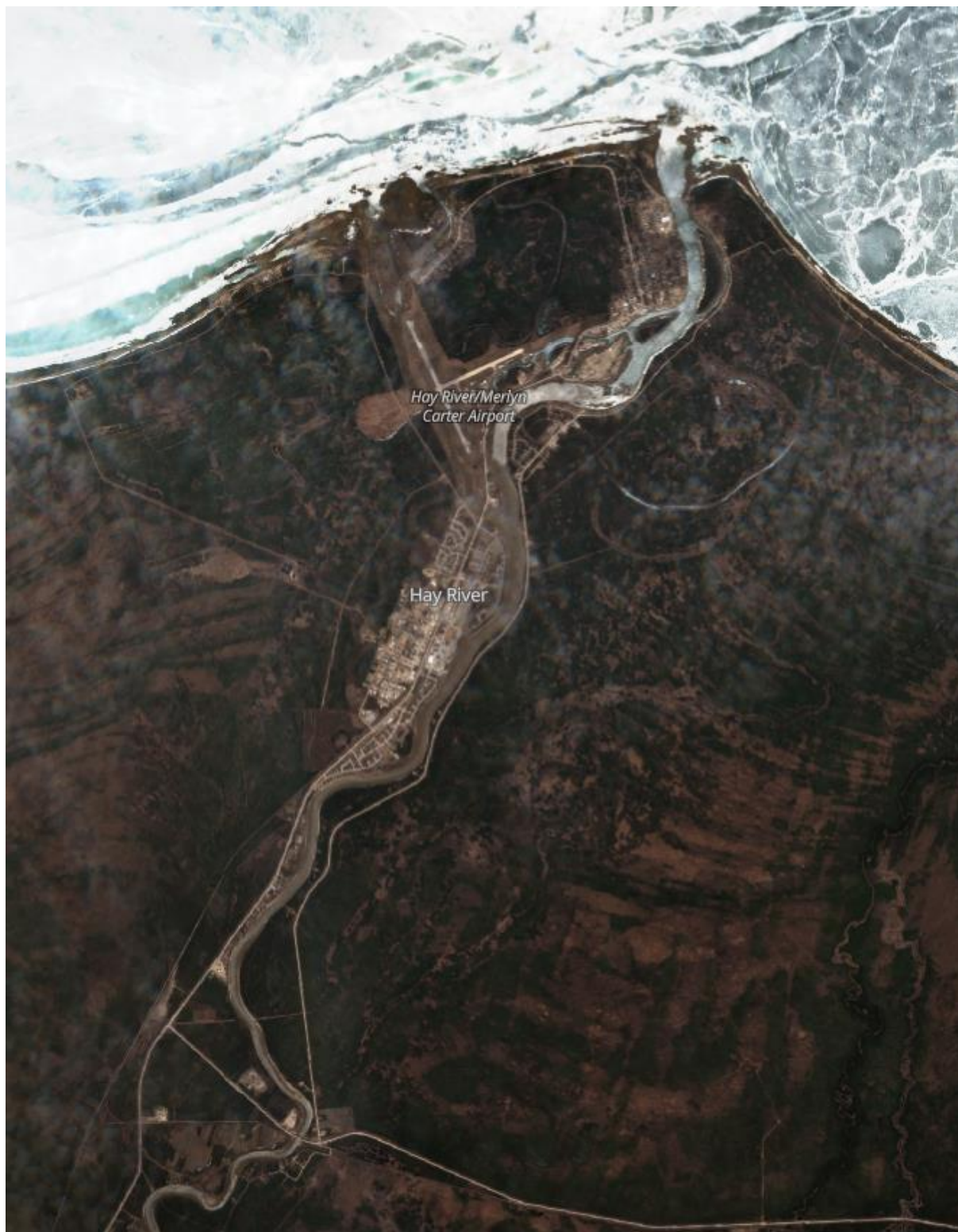
Above – Map of hydrometric stations in the Hay River basin. The station numbers are referenced in the water level plots below.

## Satellite Data:



*Above* – River ice classification information for the Hay River, using radar imagery taken on the evening of 30 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.





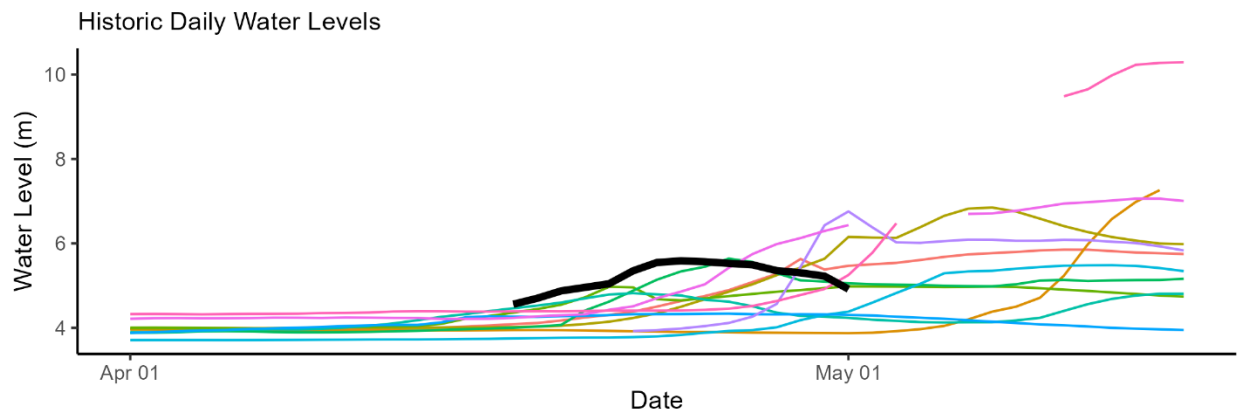
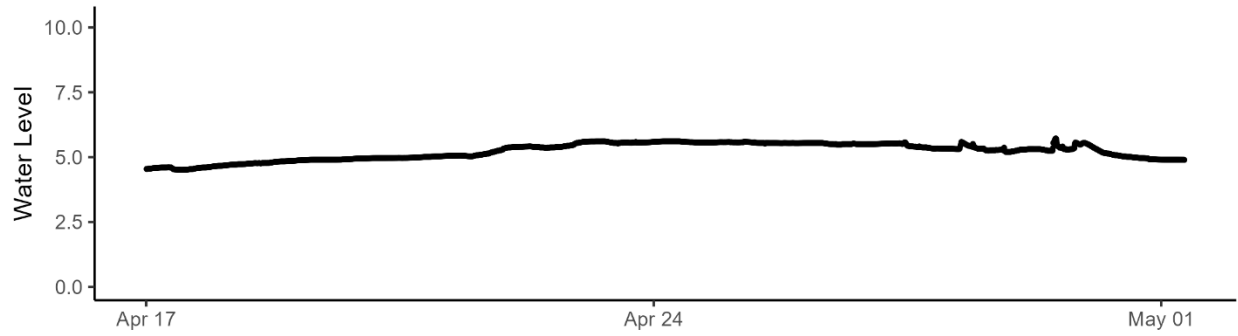
*Above* – Sentinel-2 satellite imagery of the Hay River courtesy of Sentinel-Hub acquired on Apr 30 at 13:00 MDT. The image shows consolidated ice in the East Channel and some residual ice upstream of the Forks. The West Channel is ice-free and is moving well into Great Slave Lake.

## Hydrometric Data:

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

HAY RIVER NEAR MEANDER RIVER (07OB003)

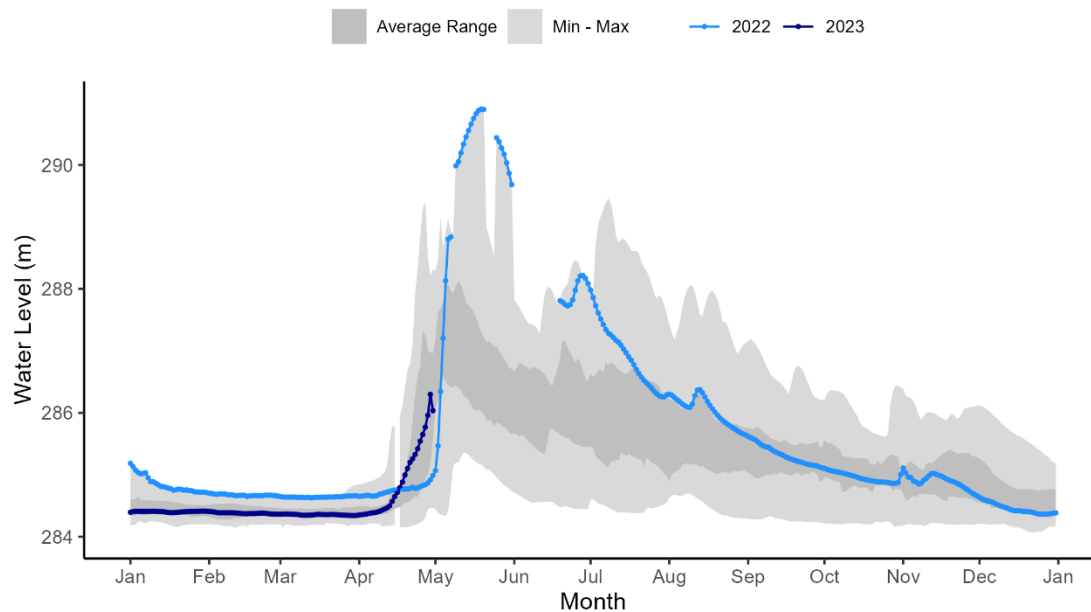
2023 Water Levels (5 minute resolution)



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

## Hay River near the border [07OB008]:

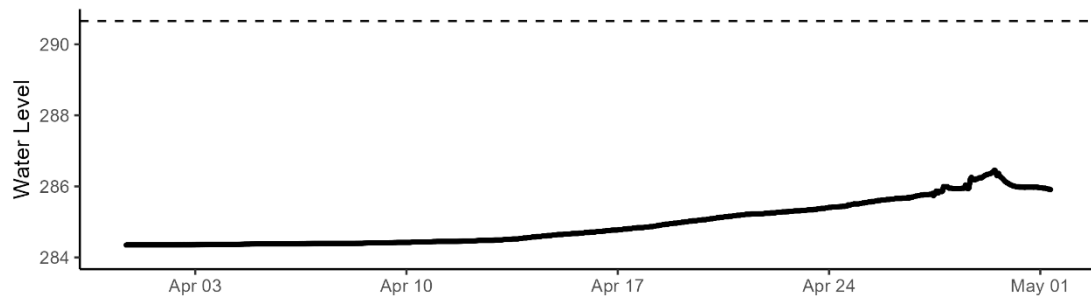
### HAY RIVER NEAR ALTA/NWT BOUNDARY (07OB008)



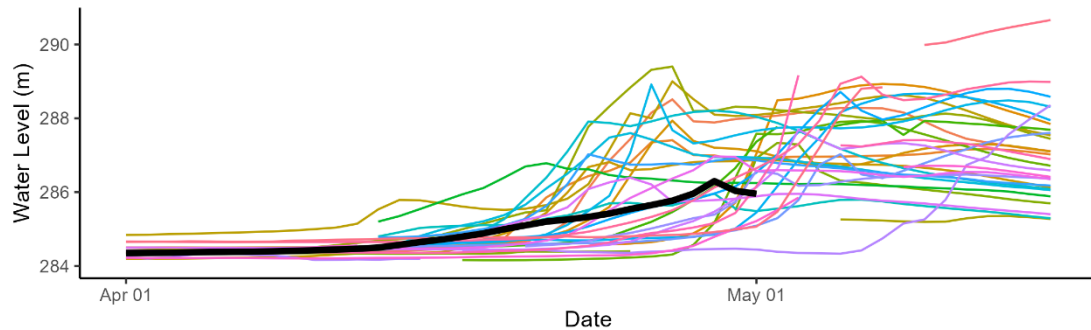
Above – Water level data for the Hay River near the Alberta-NWT border. Daily average levels for the previous year are shown here.

### HAY RIVER NEAR ALTA/NWT BOUNDARY (07OB008)

2023 Water Levels (5 minute resolution)



### Historic Daily Water Levels



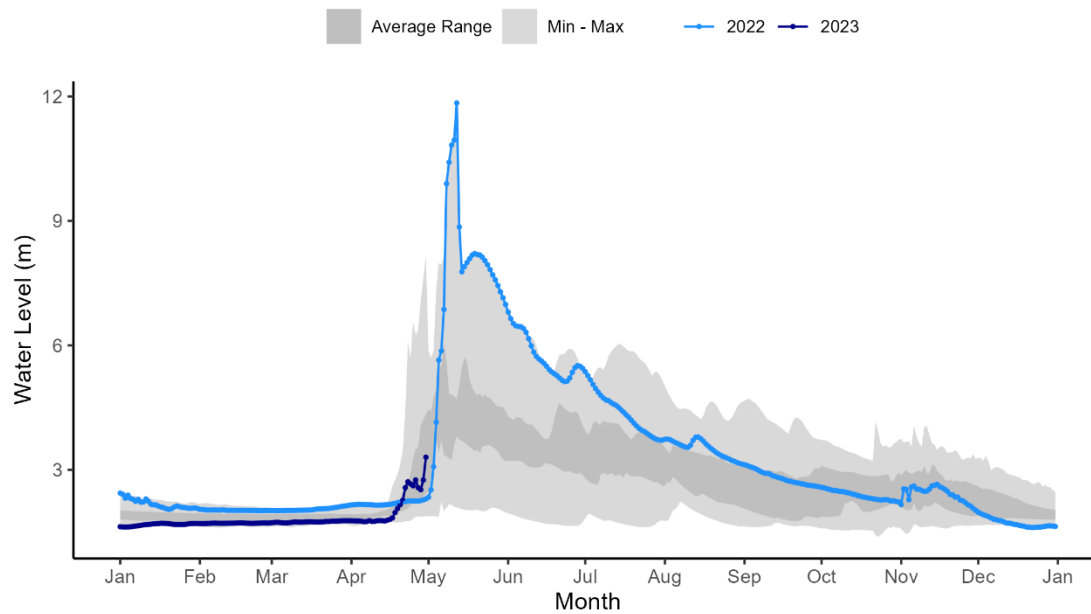
Above - The upper graph in the figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2022). The lower graph shows daily average levels relative to the previous 20 years.



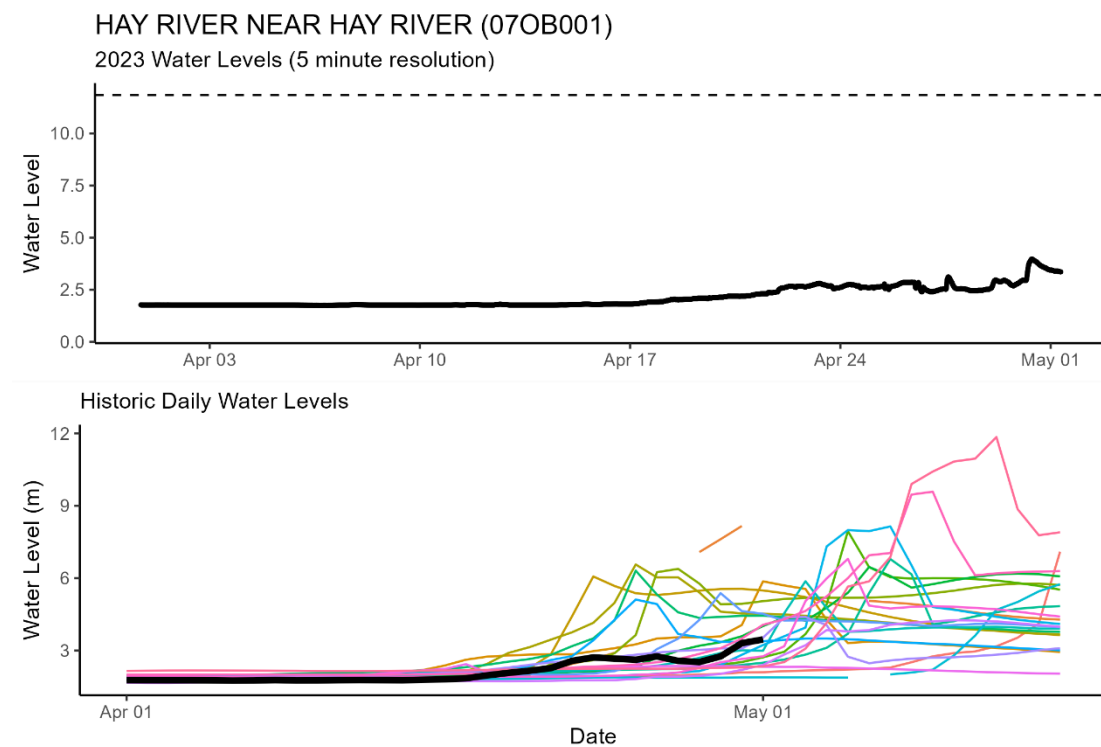
*Above* – Hay River near the border hydrometric gauge photo on May 01 at 10:00. Photo courtesy of Water Survey of Canada and GNWT.



# Hay River near Hay River [07OB001]: 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 May 01 at 10:00. Photo courtesy of Water Survey of Canada and GNWT.

## Liard River:

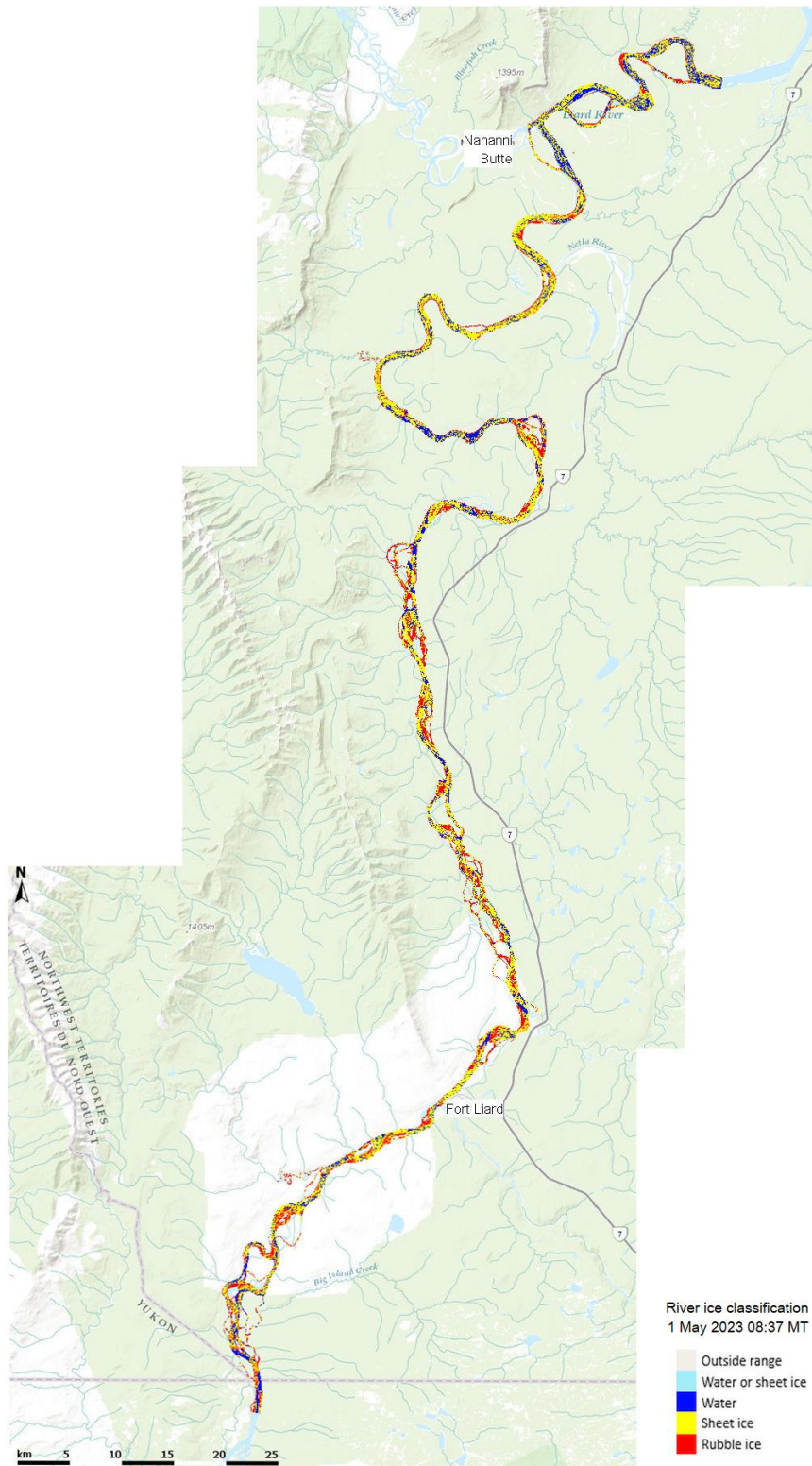
### Current Status:

- Most of the lower Liard River basin is snow-free;
- Ice on the Liard River is softening in response to warm temperatures;
- Water levels are increasing underneath the ice on the Liard River at Fort Liard;
  - The rate of water level rise is normal for this stage of break up;
- The southern Dehcho region is forecast to receive warmer than normal temperatures throughout this week.



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

## Satellite Data:

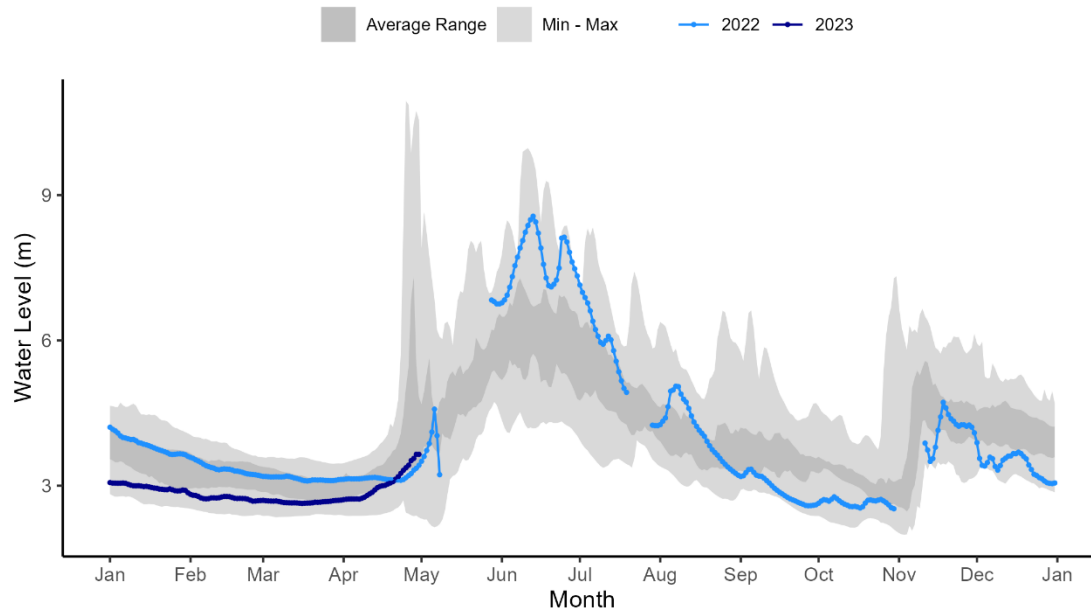


Above – River ice classification information for the Liard River, using radar imagery taken on the morning of May 01, 2023. The images show mainly sheet and rubble ice along the Liard River, with some small patches of water.

## Hydrometric Data:

Liard River at Fort Liard [10ED001]:

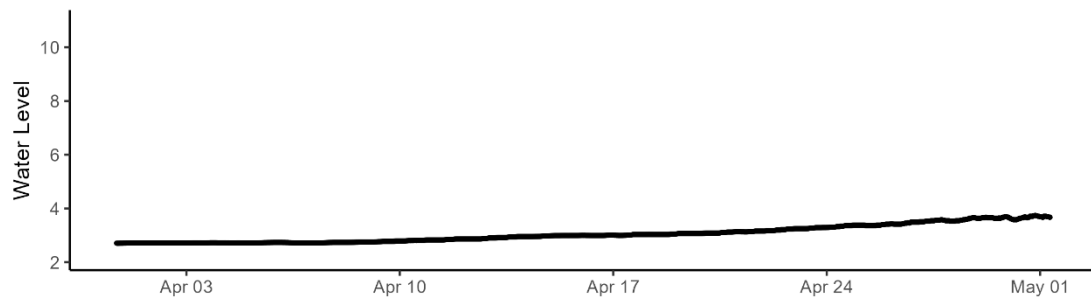
LIARD RIVER AT FORT LIARD (10ED001)



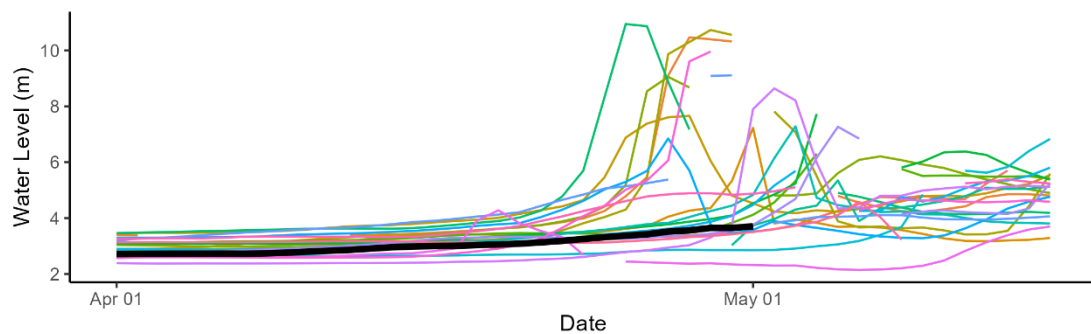
Above – Water level data for the Liard River at Fort Liard. Daily average levels for the previous year are shown here.

LIARD RIVER AT FORT LIARD (10ED001)

2023 Water Levels (5 minute resolution)



Historic Daily Water Levels



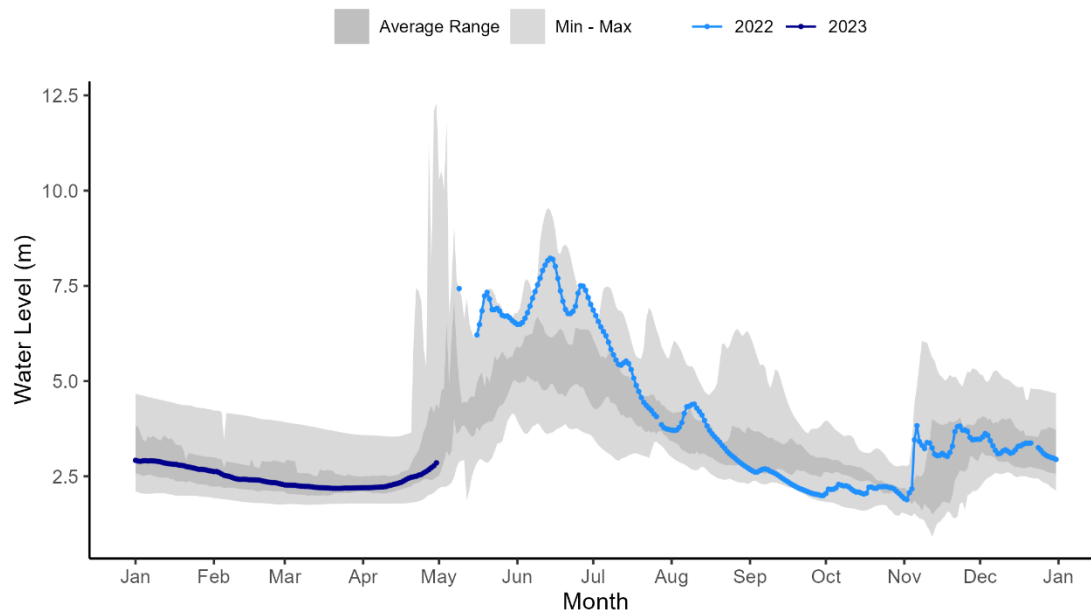
Above - The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.





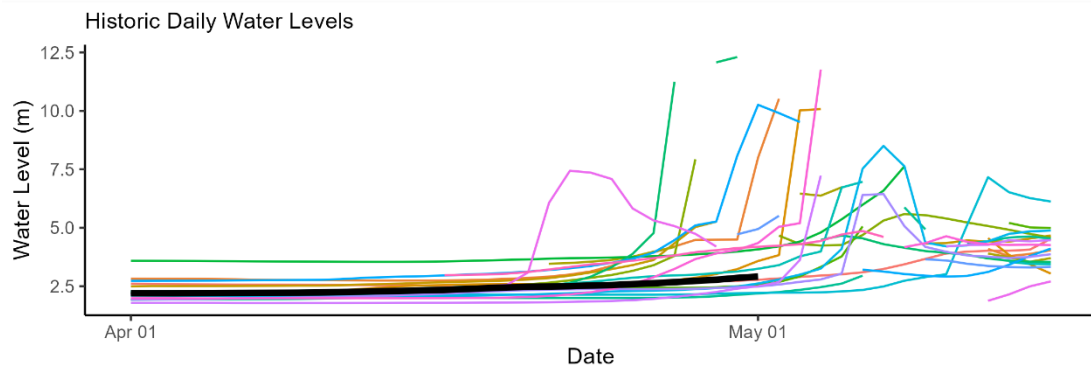
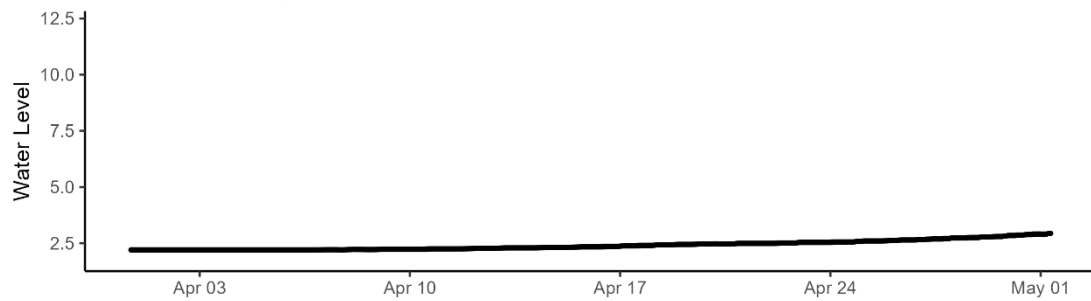
*Above* – Liard River at Fort Liard hydrometric gauge photo from May 01 at 10:00. Photo courtesy of Water Survey of Canada and GNWT.

Liard River near the mouth [10ED002]:  
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.

LIARD RIVER NEAR THE MOUTH (10ED002)  
2023 Water Levels (5 minute resolution)



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.

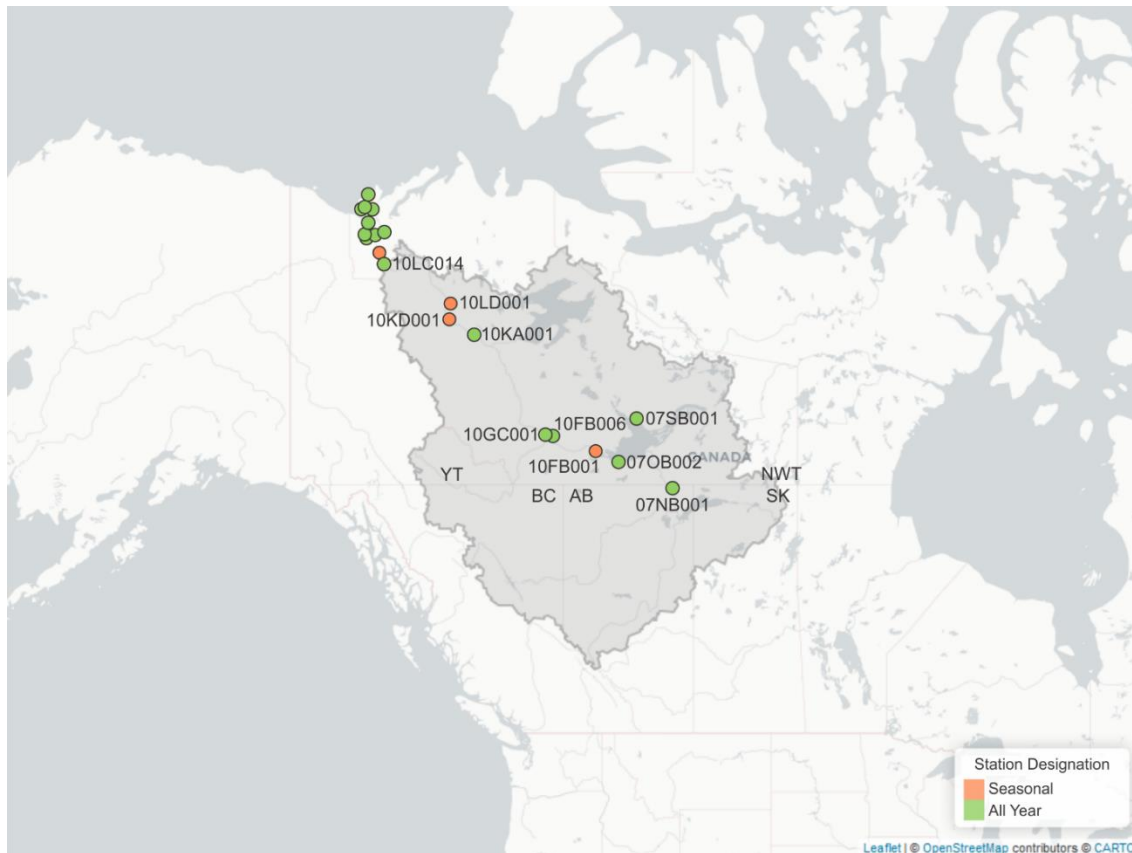


*Above* – Liard River near the mouth hydrometric gauge photo from May 01 at 10:00. Photo courtesy of Water Survey of Canada and GNWT.

## Great Slave Lake / Mackenzie River

### Current Status:

- Open water sections have been reported on the Mackenzie River near the Rabbitskin River;
- Water levels are rising underneath the ice at the Mackenzie River at Fort Simpson, but water levels remain average for this stage of break up;
- Warm temperatures in the region should start moving ice in the next few days.

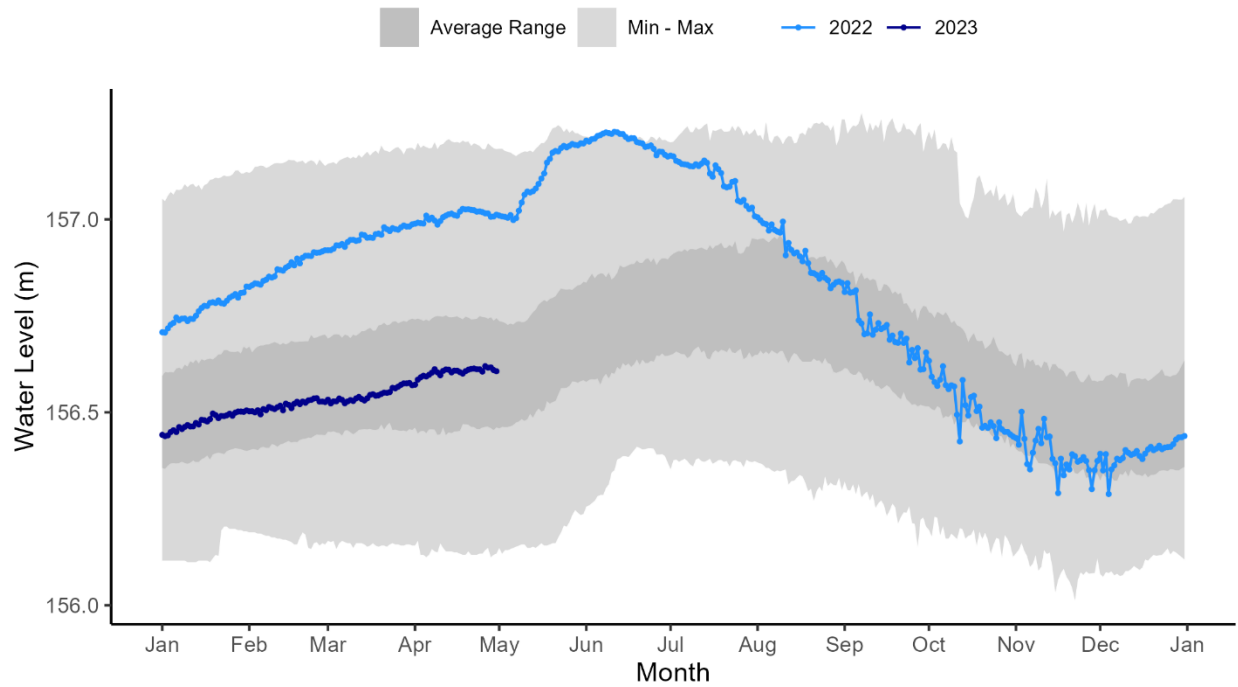


*Above* – Map of hydrometric stations in the Dehcho (Mackenzie River) basin. The station numbers are referenced in the water level plots below.

## Hydrometric Data:

Great Slave Lake at Yellowknife Bay [07SB001]:

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.



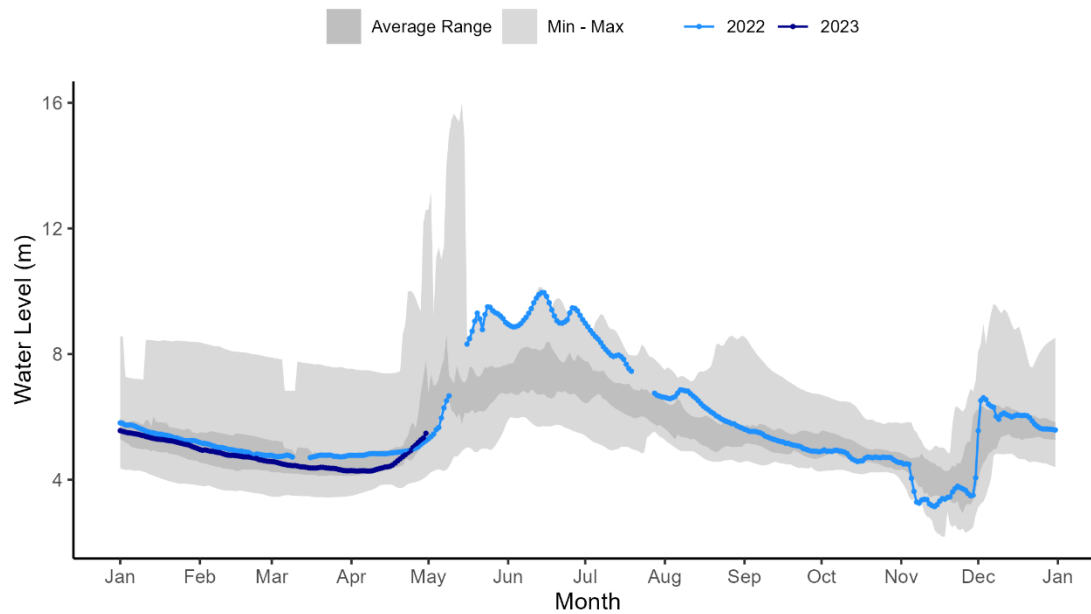
## Mackenzie River at Strong Point [10FB006]:

*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 May 01 at 10:00. Photo courtesy of Water Survey of Canada and GNWT.

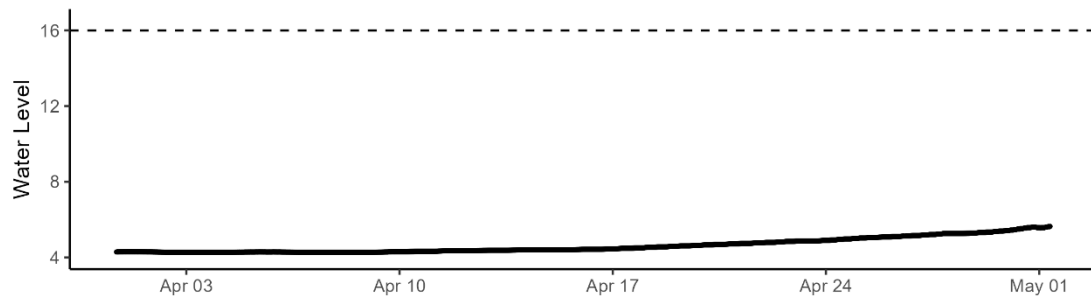
# Mackenzie River at Fort Simpson [10GC001]: MACKENZIE RIVER AT FORT SIMPSON (10GC001)



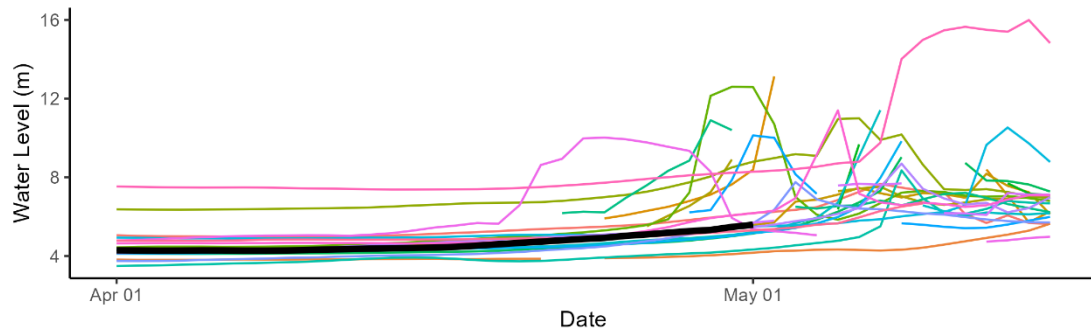
Above – Water level data for the Mackenzie River at Fort Simpson. Daily average levels for the previous year are shown here.

## MACKENZIE RIVER AT FORT SIMPSON (10GC001)

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* – Mackenzie River at Fort Simpson hydrometric gauge photo from May 01 at 09:00. 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 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:

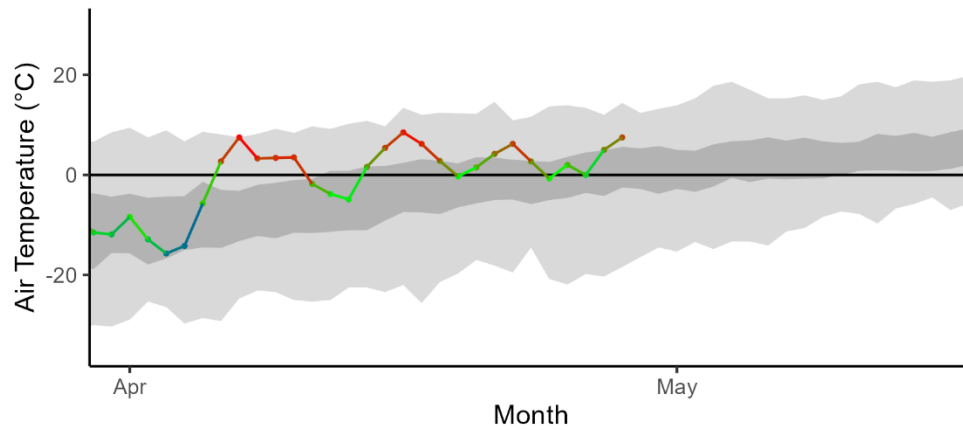
Weather information informs how snow and ice will melt and provides information about how this spring is unfolding relative to previous springs. Warmer than normal conditions early in the spring allow for additional energy to melt the snowpack and soften river ice. Rain-on-snow events can cause rapid 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.

## 2023 spring temperatures to-date:

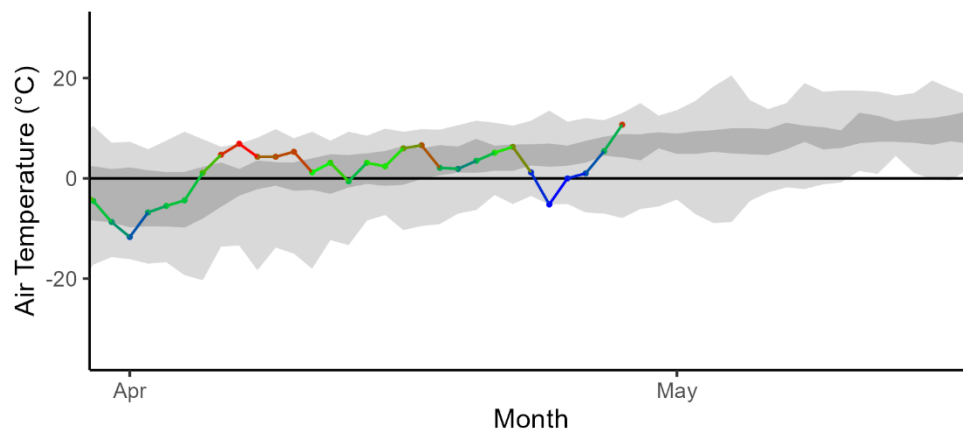
Hay River:

2023 Hay River Mean Daily Air Temperatures



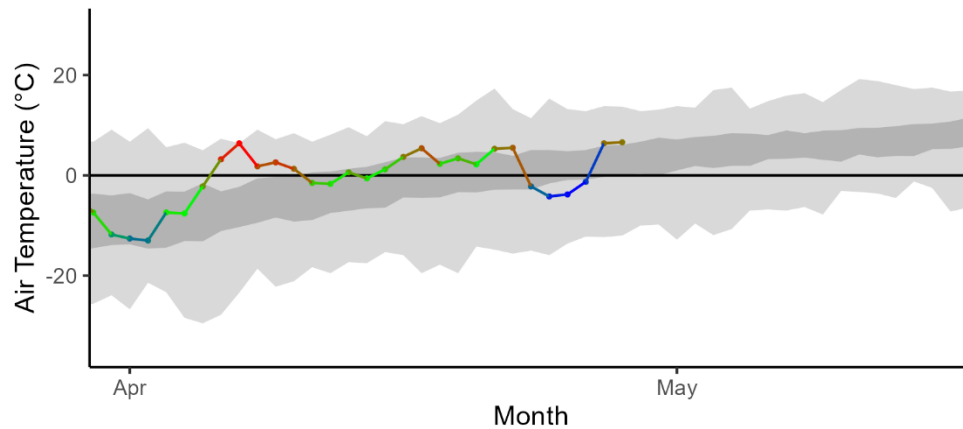
Fort Liard:

2023 Fort Liard Mean Daily Air Temperatures



Fort Simpson:














2023 Fort Simpson Mean Daily Air Temperatures


















## Seven-day weather forecast:














### Hay River:

Mon 1 May	Tue 2 May	Wed 3 May	Thu 4 May	Fri 5 May	Sat 6 May	Sun 7 May
 19°C A mix of sun and cloud	 17°C Sunny	 25°C Sunny	 12°C Sunny	 24°C Sunny	 19°C A mix of sun and cloud	 15°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 2°C A few clouds	 9°C Clear	 5°C Clear	 6°C Clear	 8°C Cloudy periods	 5°C Cloudy periods	

### Fort Liard:

Mon 1 May	Tue 2 May	Wed 3 May	Thu 4 May	Fri 5 May	Sat 6 May	Sun 7 May
 19°C Mainly sunny	 25°C Sunny	 24°C Sunny	 18°C Sunny	 18°C 60% Chance of showers	 19°C A mix of sun and cloud	 17°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 7°C Clear	 9°C Clear	 10°C Clear	 8°C Periods of rain	 6°C 60% Chance of showers	 5°C Cloudy periods	

### Fort Simpson:

Mon 1 May	Tue 2 May	Wed 3 May	Thu 4 May	Fri 5 May	Sat 6 May	Sun 7 May
 20°C A mix of sun and cloud	 24°C Sunny	 27°C Sunny	 18°C A mix of sun and cloud	 22°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	 14°C Cloudy periods	 7°C Clear	 7°C Clear	 7°C Cloudy periods	 5°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.