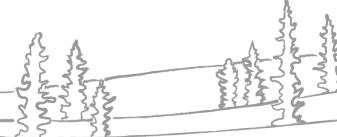




# NWT Water Monitoring Bulletin

## – April 24, 2023 at 14:00



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

### Current Status:

- Snowmelt, river ice melt, and small rises in water levels have begun in southern basins in the NWT.
- On the Hay River in the NWT, river ice is still largely intact and there is a small initial rise in water levels.
- The initiation of spring break up and water level rise in the Hay River is earlier than normal due to warm spring temperatures.
- On the Liard River and on the Mackenzie River at Fort Simpson, water levels are beginning to rise under the ice, but the rates of increase are still very small.

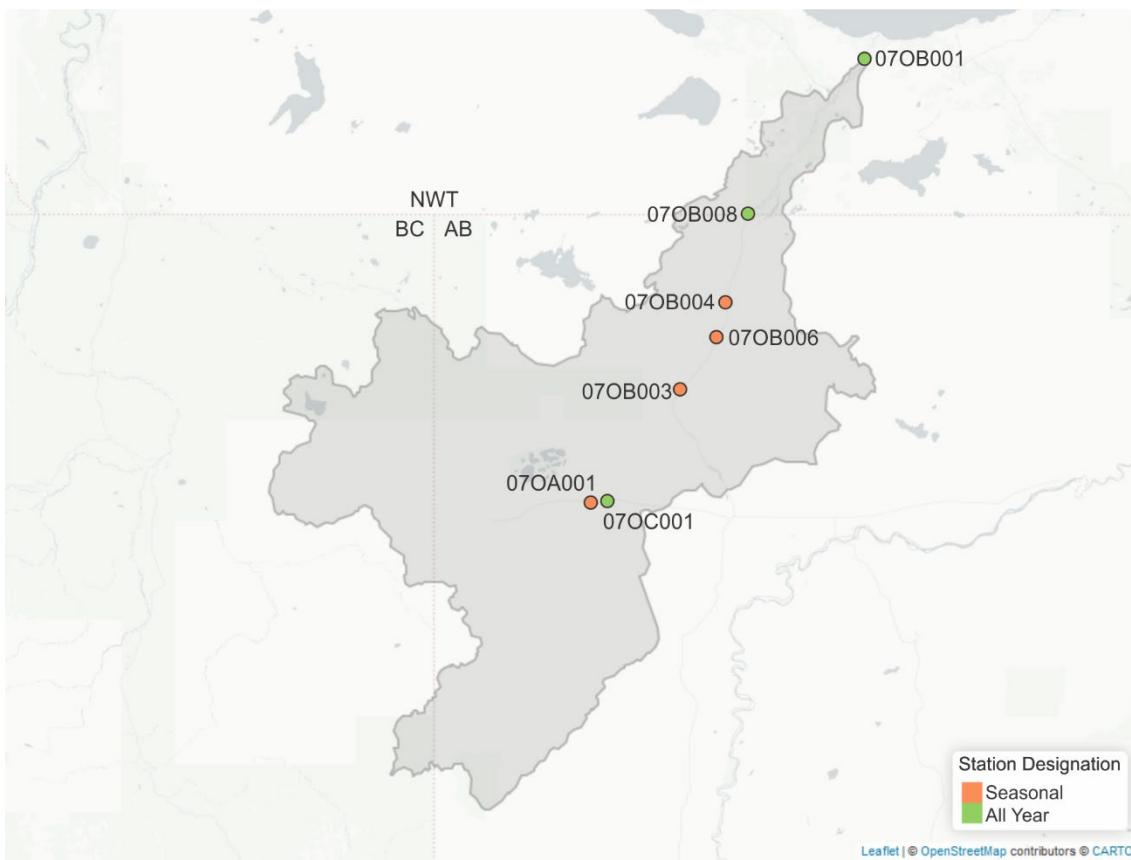
## Contents

|  |    |
|--|----|
| Current Status: .....                                      | 1  |
| Hay River:.....  | 3  |
| Current Status: .....                                      | 3  |
| Satellite Data:.....                                       | 4  |
| Hydrometric Data: .....                                    | 6  |
| Chinchaga River near High Level (Alberta) [07OC001]:.....  | 6  |
| Hay River near Meander River (Alberta) [07OB003]:.....     | 7  |
| Steen River near Steen River (Alberta) [07OB004]: .....    | 8  |
| Hay River near the border [07OB008]: .....                 | 9  |
| Hay River near Hay River [07OB001]: .....                  | 11 |
| Liard River:.....  | 13 |
| Current Status: .....                                      | 13 |
| Hydrometric Data: .....                                    | 14 |
| Liard River at Fort Liard [10ED001]:.....                  | 14 |
| Liard River near the mouth [10ED002]:.....                 | 16 |
| Slave River / Great Slave Lake / Mackenzie River .....     | 18 |
| Current Status: .....                                      | 18 |
| Hydrometric Data: .....                                    | 19 |
| Slave River at Fitzgerald (Alberta) [07NB001]:.....        | 19 |
| Great Slave Lake at Yellowknife Bay [07SB001]:.....        | 20 |
| Mackenzie River at Strong Point [10FB006]: .....           | 21 |
| Mackenzie River at Fort Simpson [10GC001]: .....           | 23 |
| Weather Data: .....  | 25 |
| Factors to Watch: .....                                    | 29 |
| Spring Break up on NWT Rivers: Mechanical vs Thermal ..... | 29 |
| Technical Note: .....                                      | 30 |

# Hay River:

## Current Status:

- Snow in the upper (southern) part of the basin has started to melt;
- Water levels are beginning 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 rainfall are forecasted in the upper Hay River basin over the next 48 hours, which would encourage continued melting of snow and river ice;
- Ice is beginning to degrade 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.

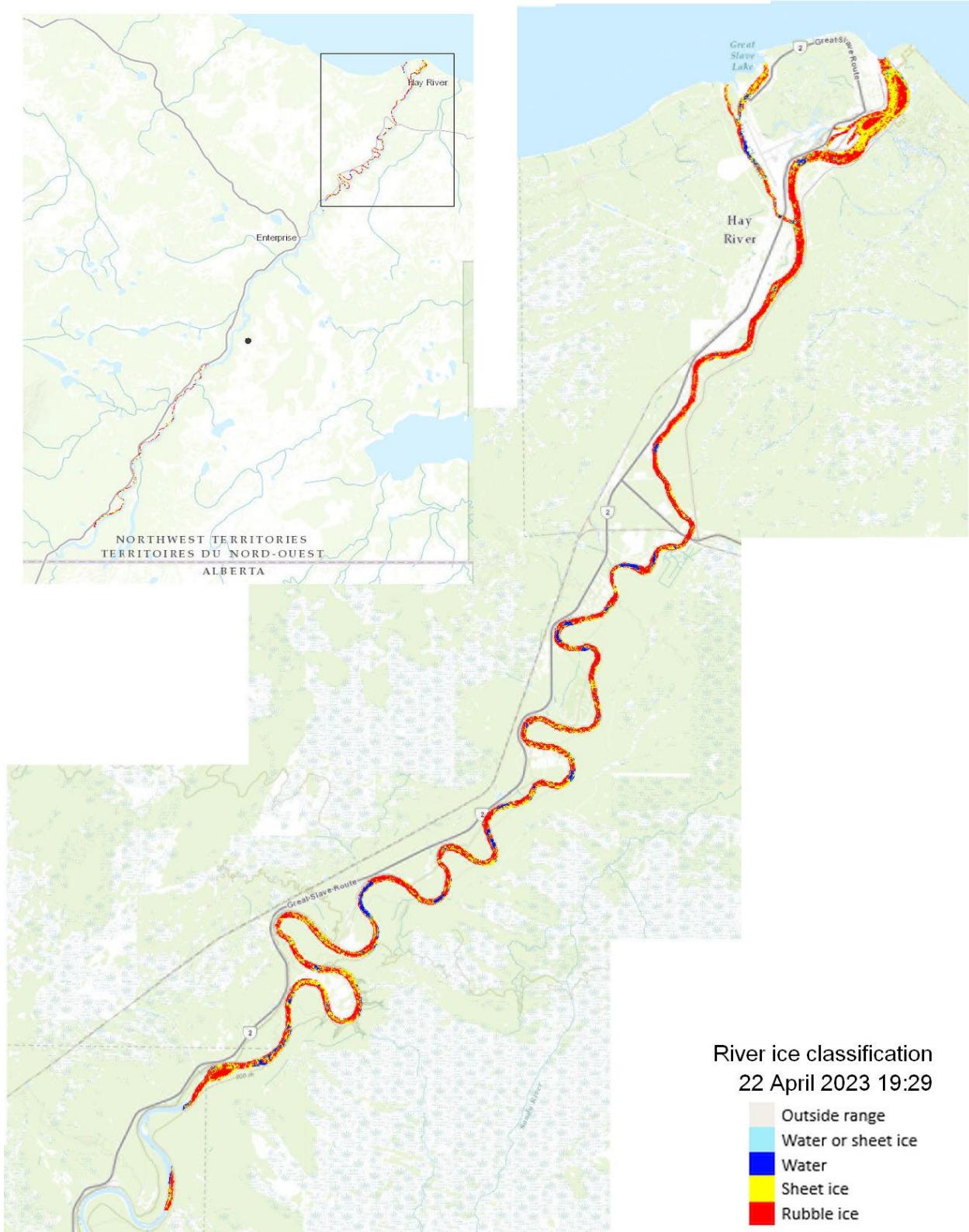


Above – Map of hydrometric stations in the Hay River basin. The station numbers are referenced in the water level plots below.

## Satellite Data:



Above – River ice classification information for the Hay River, using radar imagery taken on 22 April 2023. The images show sheet ice and rubble ice along the Hay River, with some patches of open water or water on ice.

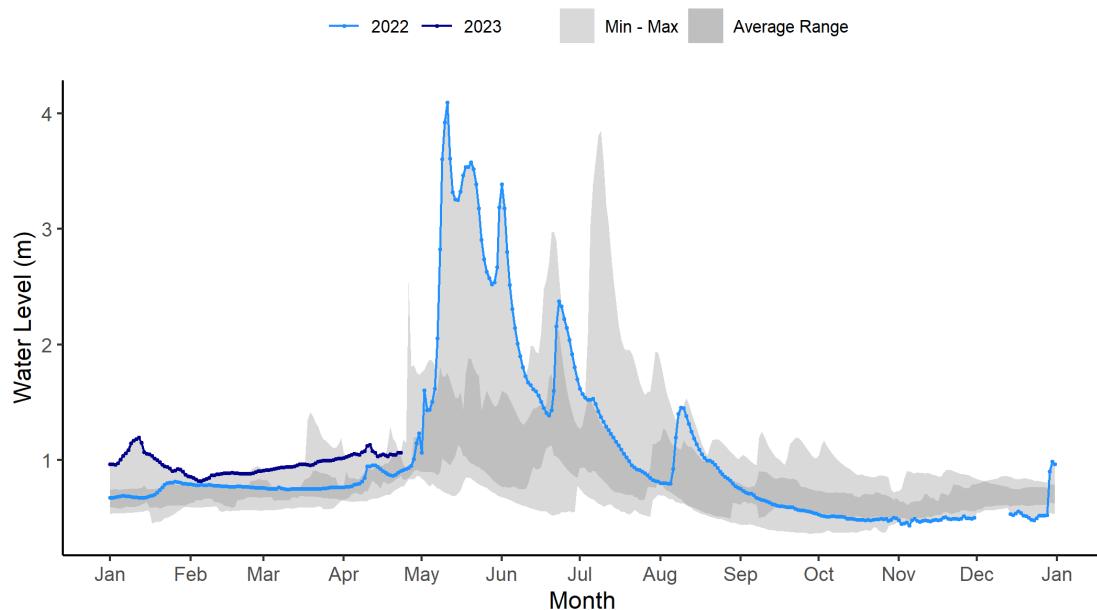


Above – River ice classification information for the Hay River, using radar imagery taken on 22 April 2023. The images show sheet ice and rubble ice along the Hay River, with some patches of open water or water on ice.

## Hydrometric Data:

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

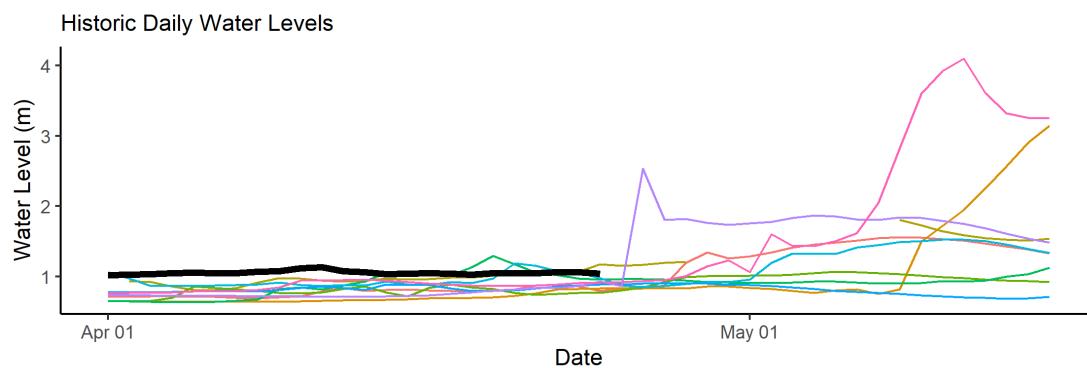
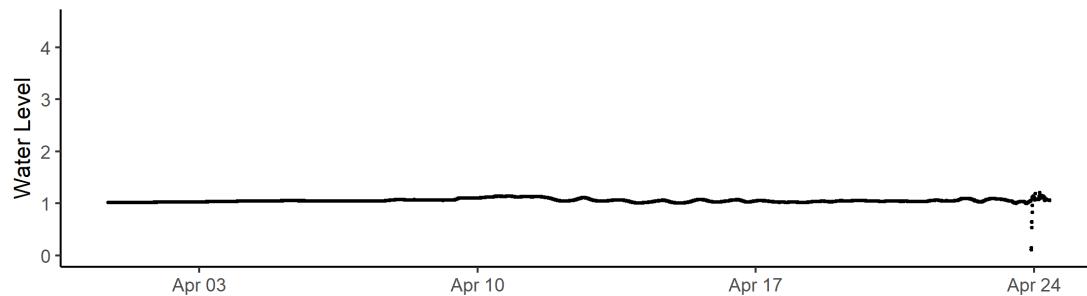
CHINCHAGA RIVER NEAR HIGH LEVEL (07OC001)



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

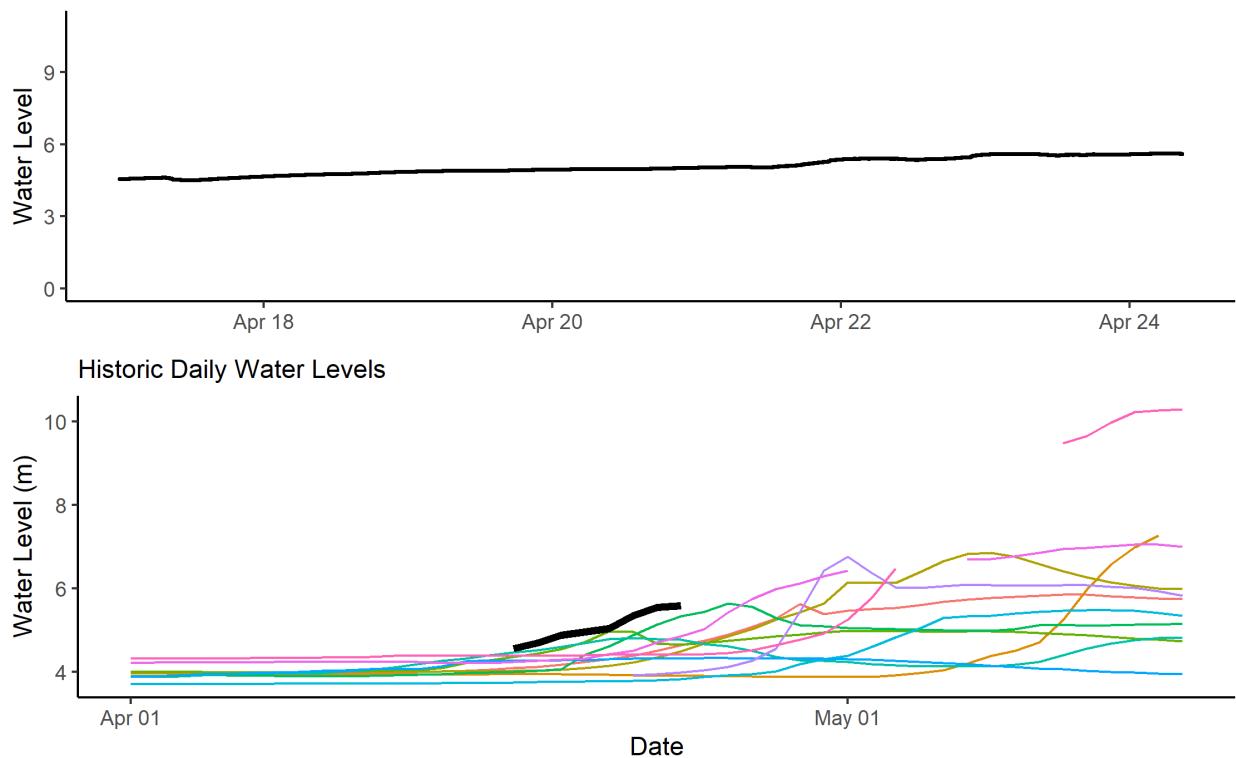
CHINCHAGA RIVER NEAR HIGH LEVEL (07OC001)

2023 Water Levels (5 minute resolution)



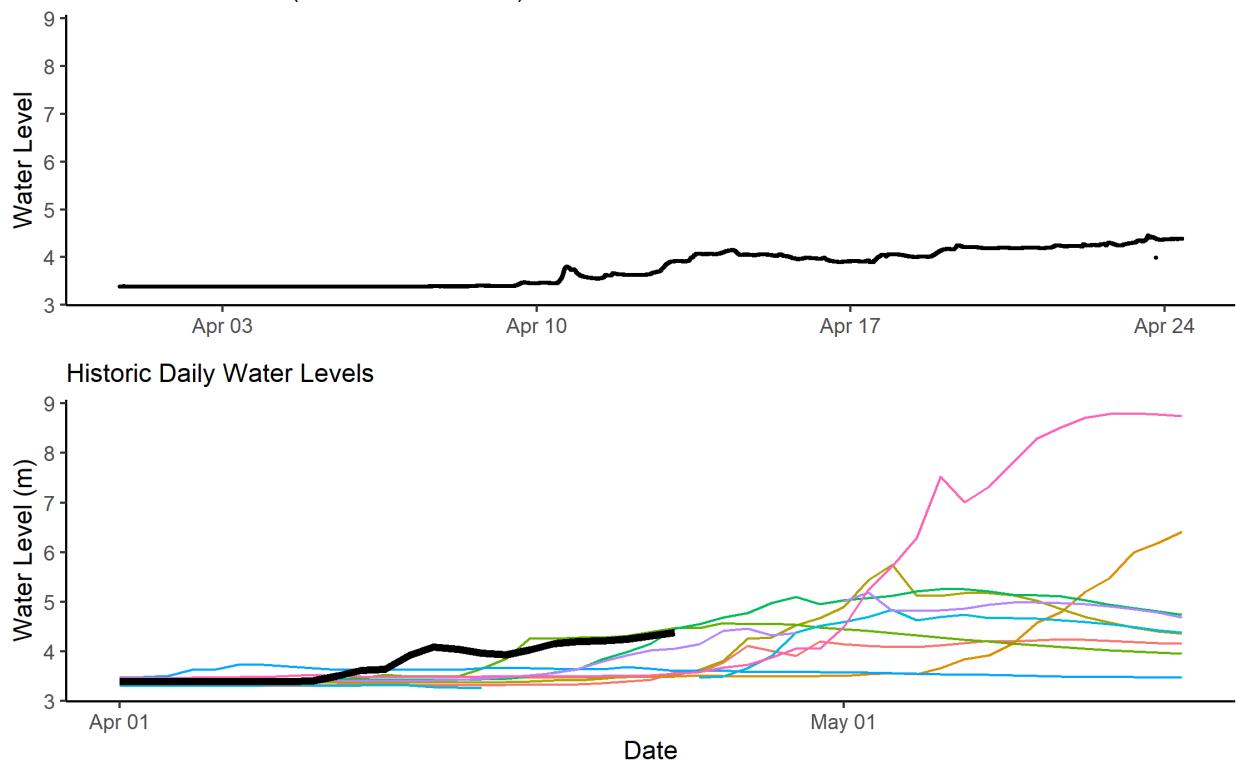
Above – Water level data at the Chinchaga River near High Level, AB. This plot shows high resolution (5 minute) water level data in the middle, and daily average data on the bottom.

Hay River near Meander River (Alberta) [07OB003]:  
HAY RIVER NEAR MEANDER RIVER (07OB003)  
2023 Water Levels (5 minute resolution)



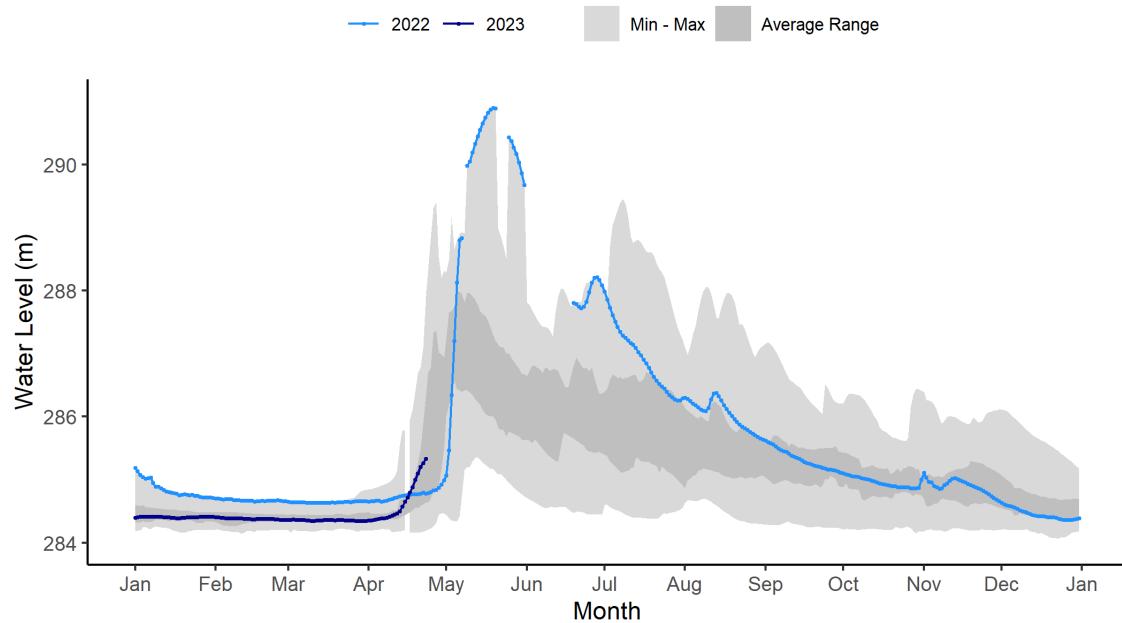
Above – Water level data on the Hay River near Meander River, AB. Water levels are slowly starting to rise.

Steen River near Steen River (Alberta) [07OB004]:  
STEEN RIVER NEAR STEEN RIVER (07OB004)  
2023 Water Levels (5 minute resolution)

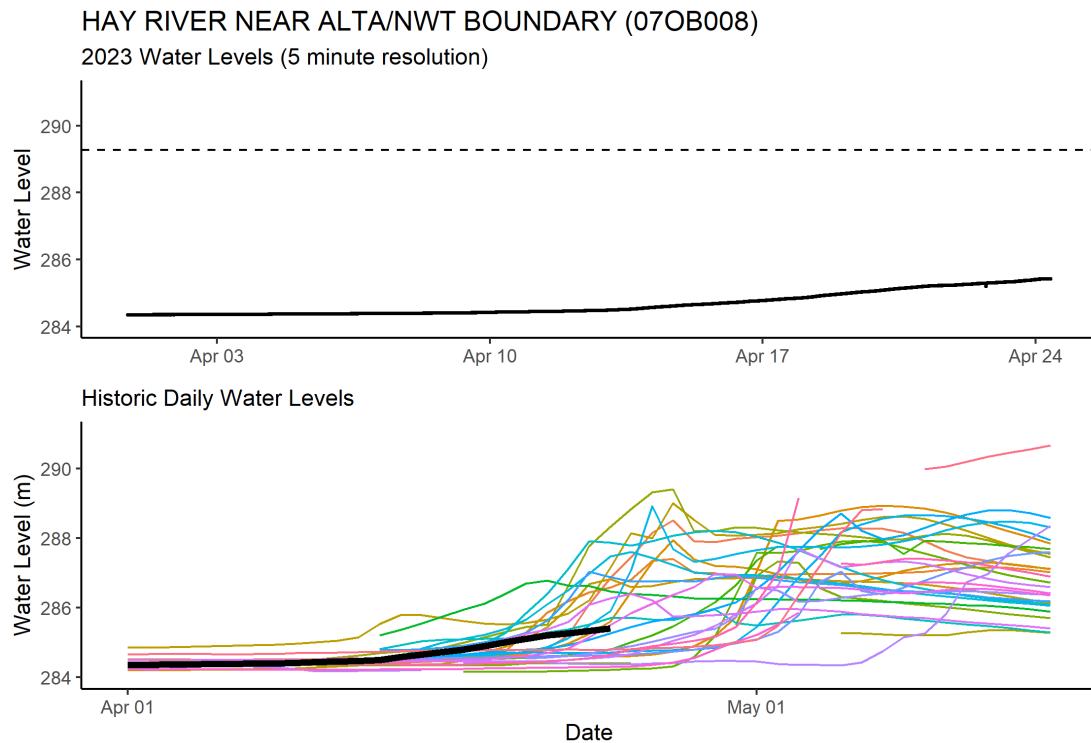


Above – Water level data on the Steen River near Steen River, AB. The Steen River is a small tributary to the Hay River. Water levels have slowly started to rise.

Hay River near the border [070B008]:  
**HAY RIVER NEAR ALTA/NWT BOUNDARY (070B008)**



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

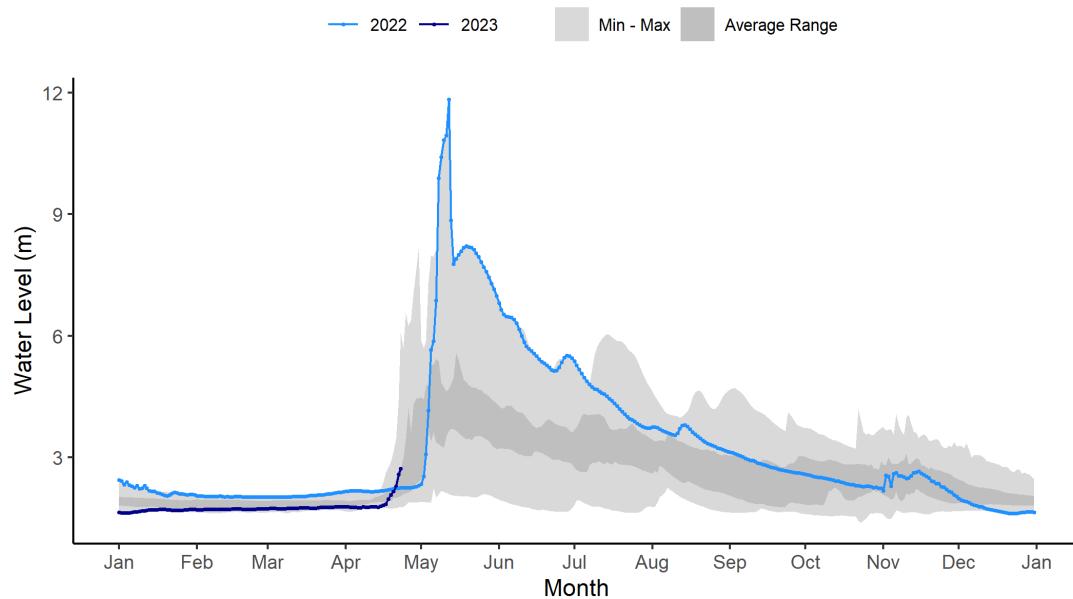


Above - The upper graph in the figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2022). The lower graph shows daily average levels relative to the previous 20 years.

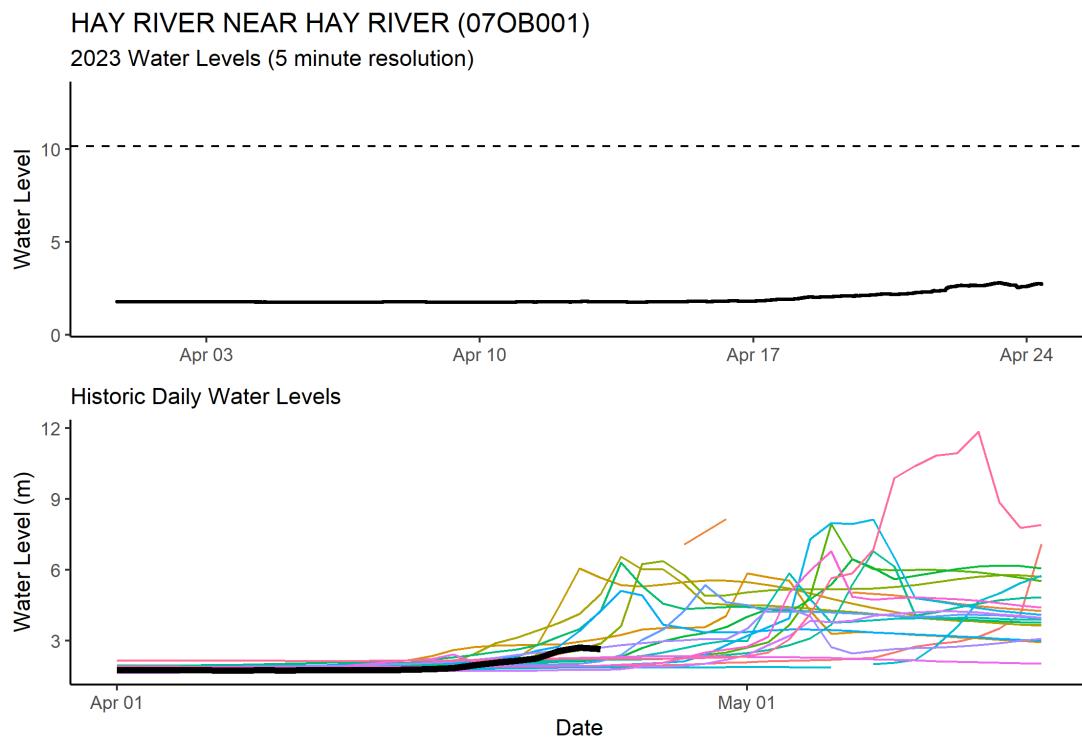


*Above* – Hay River near the border hydrometric gauge photo on April 24 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

Hay River near Hay River [07OB001]:  
**HAY RIVER NEAR HAY RIVER (07OB001)**



Above – Water level data for the Hay River near the Alberta- NWT border. Daily average levels for the previous year is 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 24 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

## Liard River:

### Current Status:

- Snowpack is beginning to melt across the basin;
- Ice remains intact along the Liard River within the NWT;
- Water levels are slowly increasing underneath the ice on the Liard River at Fort Liard.

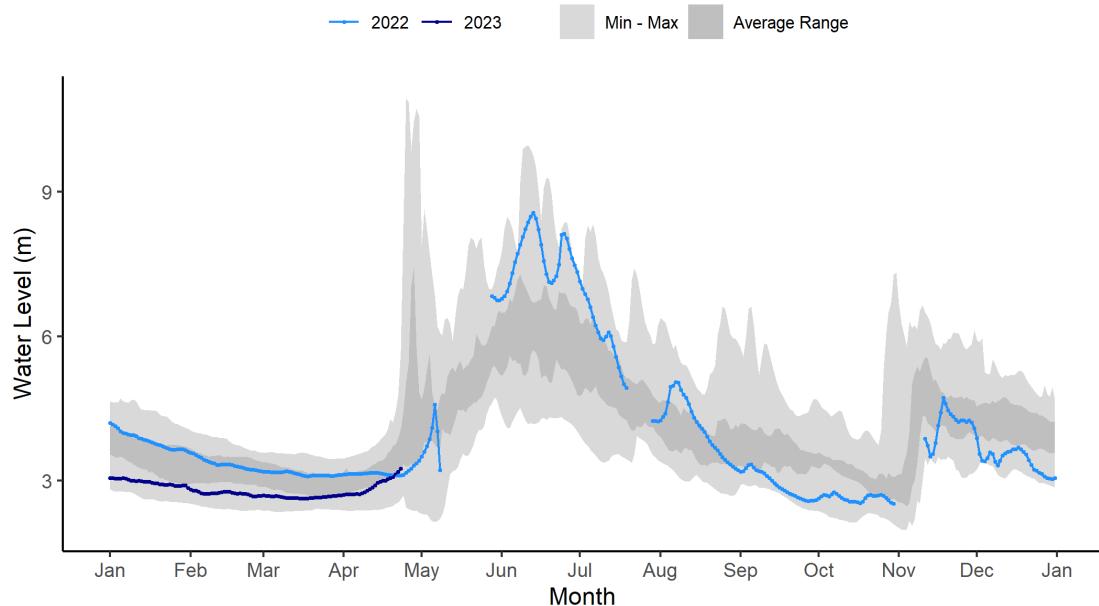


*Above* – Map of hydrometric stations in the Liard River basin. The station numbers are referenced in the water level plots below.

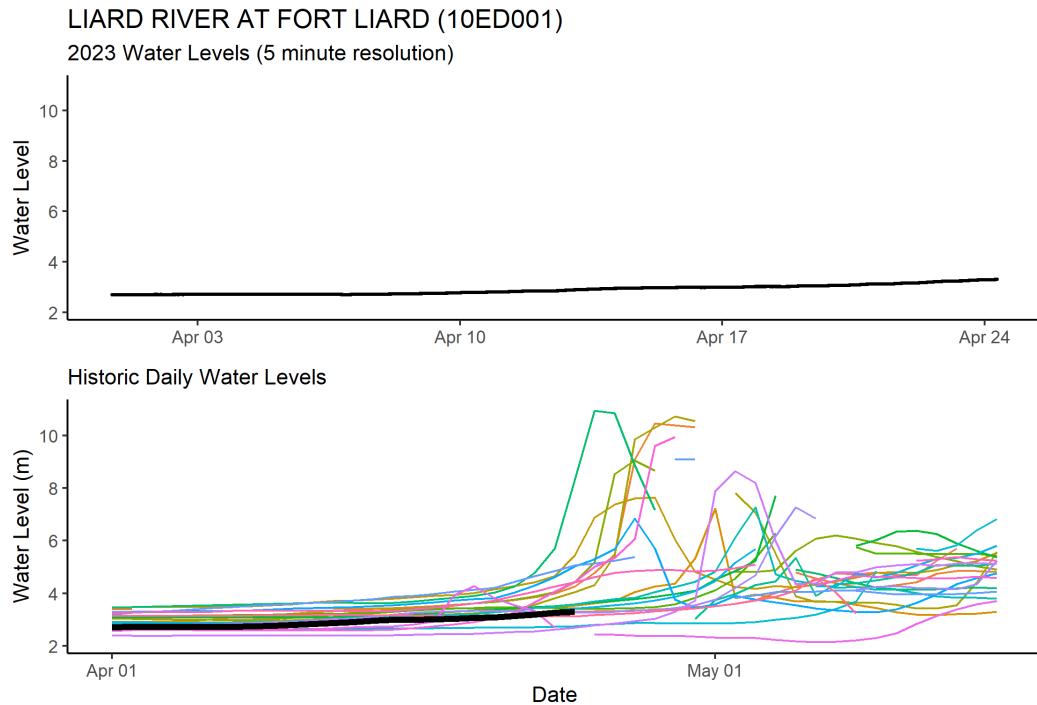
## Hydrometric Data:

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 is shown here.



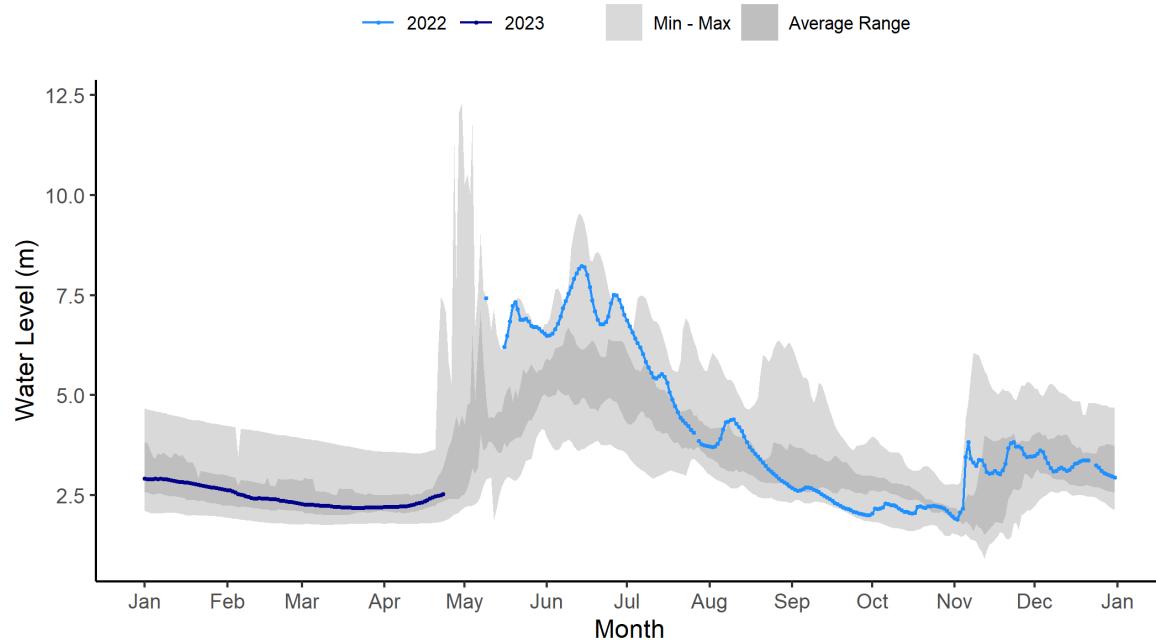
Above - The upper graph in the figure presents real time water level data at 5-minute resolution. The lower graph shows daily average levels relative to the previous 20 years.

10ED001FortLiard 2023-04-24 19:01:15 UTC  
60.24143, -123.47551 14.0V -45°C P

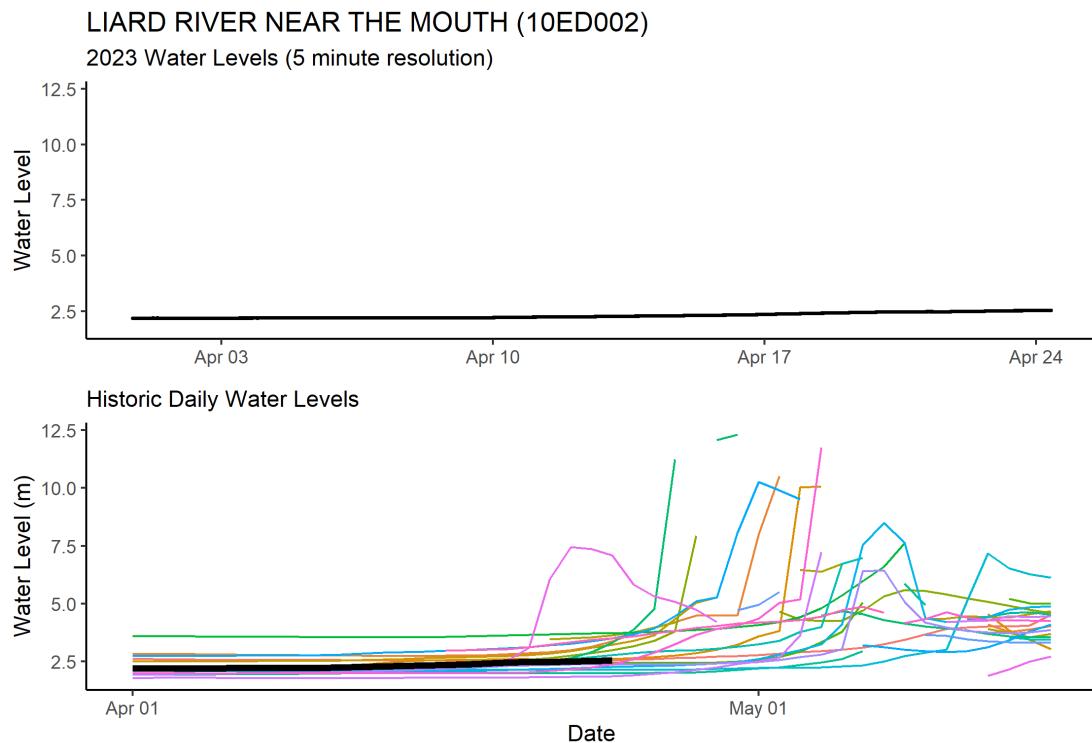


*Above* – Liard River at Fort Liard hydrometric gauge photo from April 24 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

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 is 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.

10ED002, LiardMouth 2023-04-24 1901:16 UTC  
61.74267, -121.22787 12.1V 10°C P

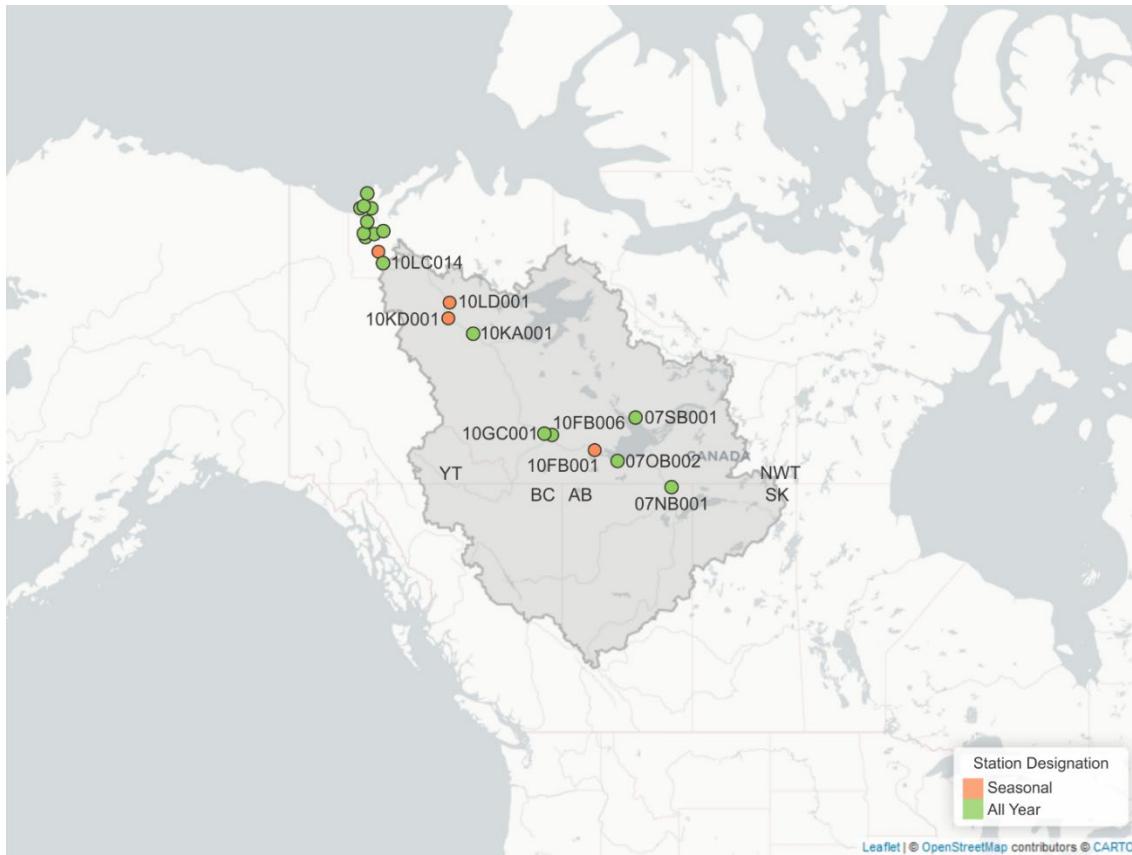


*Above* – Liard River near the mouth hydrometric gauge photo from April 24 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

## 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;
- Break up has not yet commenced on the Mackenzie River;
- 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.

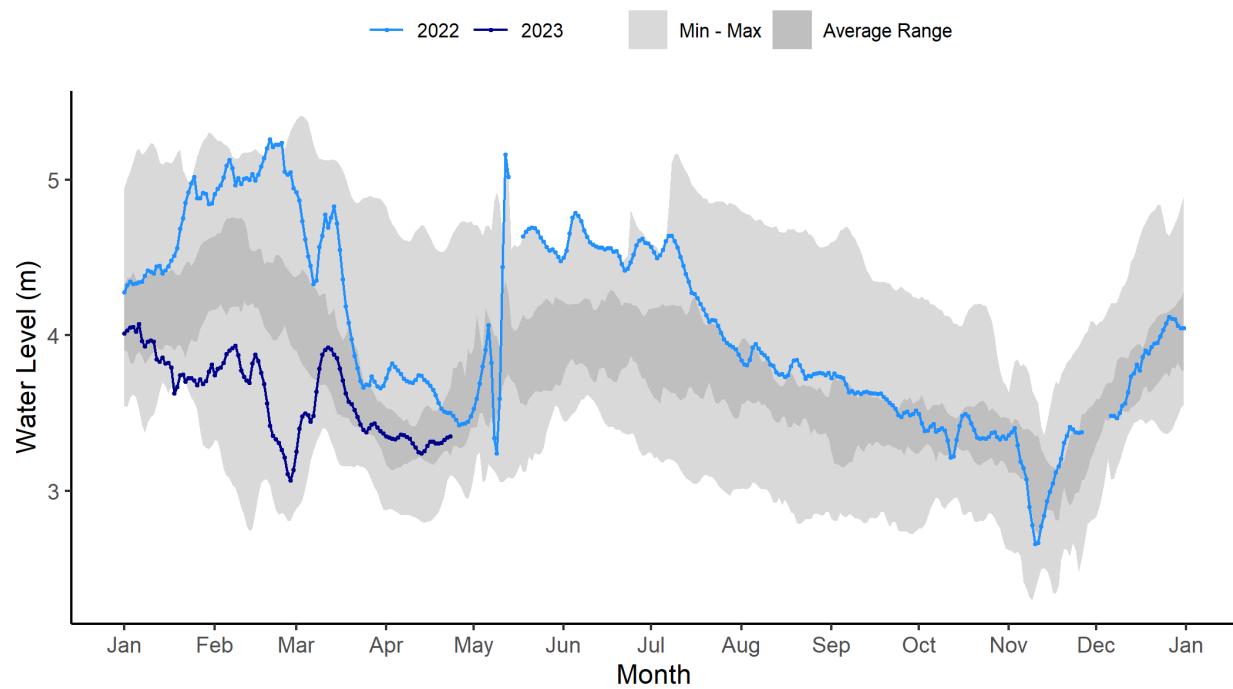


*Above – Map of hydrometric stations in the Dehcho (Mackenzie River) basin. The station numbers are referenced in the water level plots below.*

## Hydrometric Data:

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

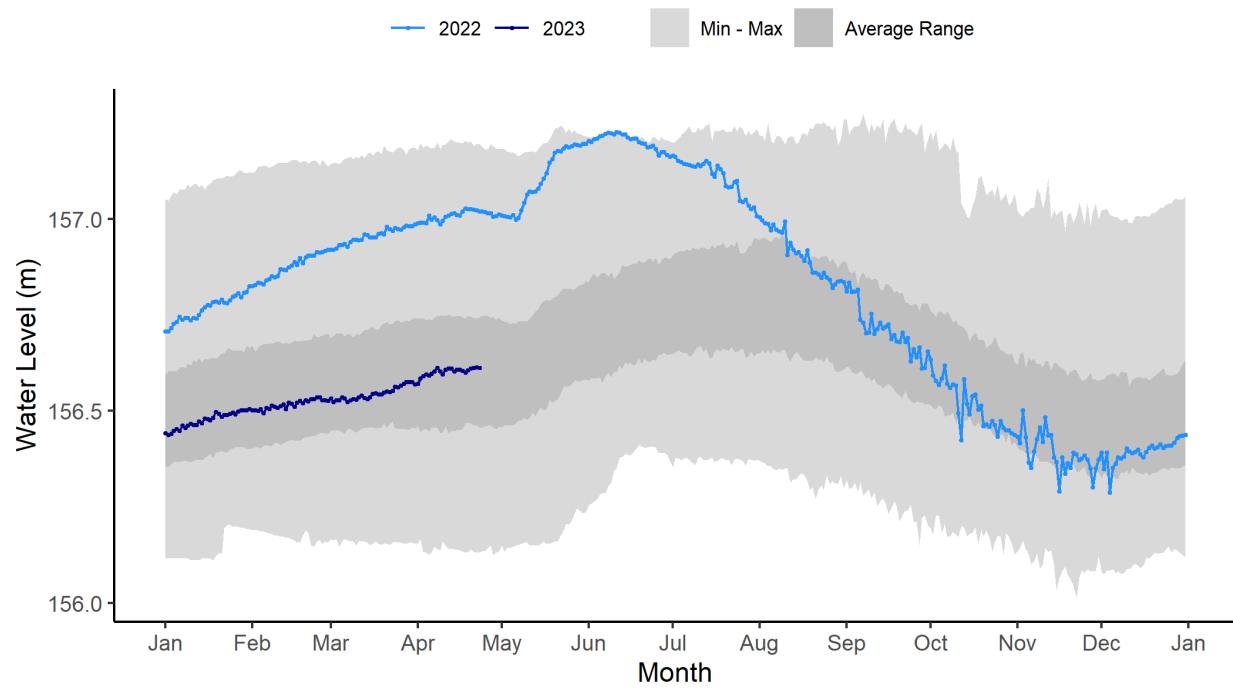
### SLAVE RIVER AT FITZGERALD (ALBERTA) (07NB001)



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

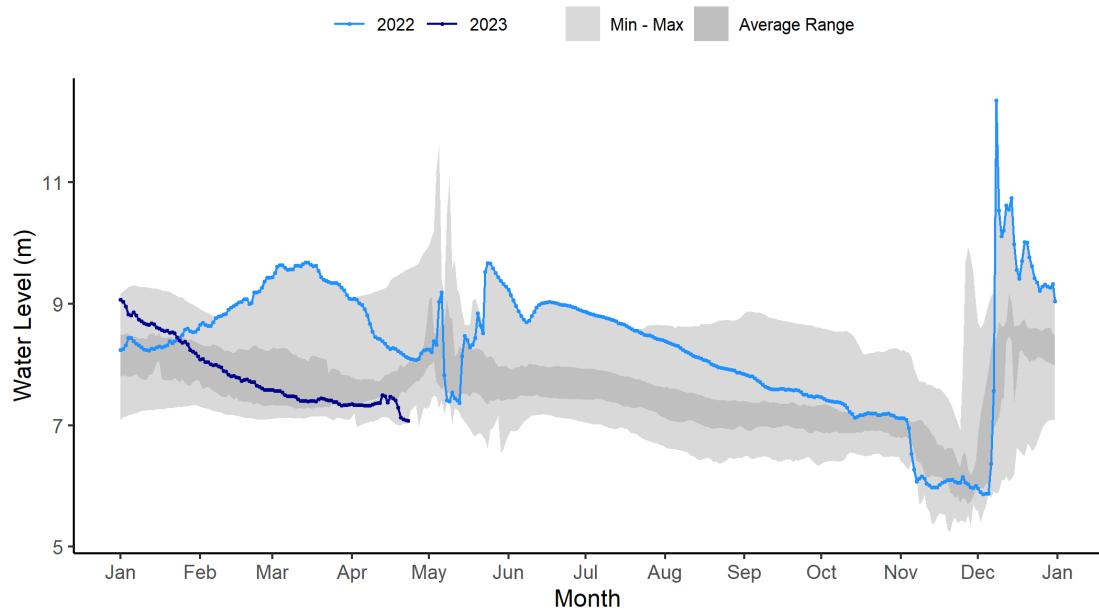
Great Slave Lake at Yellowknife Bay [07SB001]:

**GREAT SLAVE LAKE AT YELLOWKNIFE BAY (07SB001)**

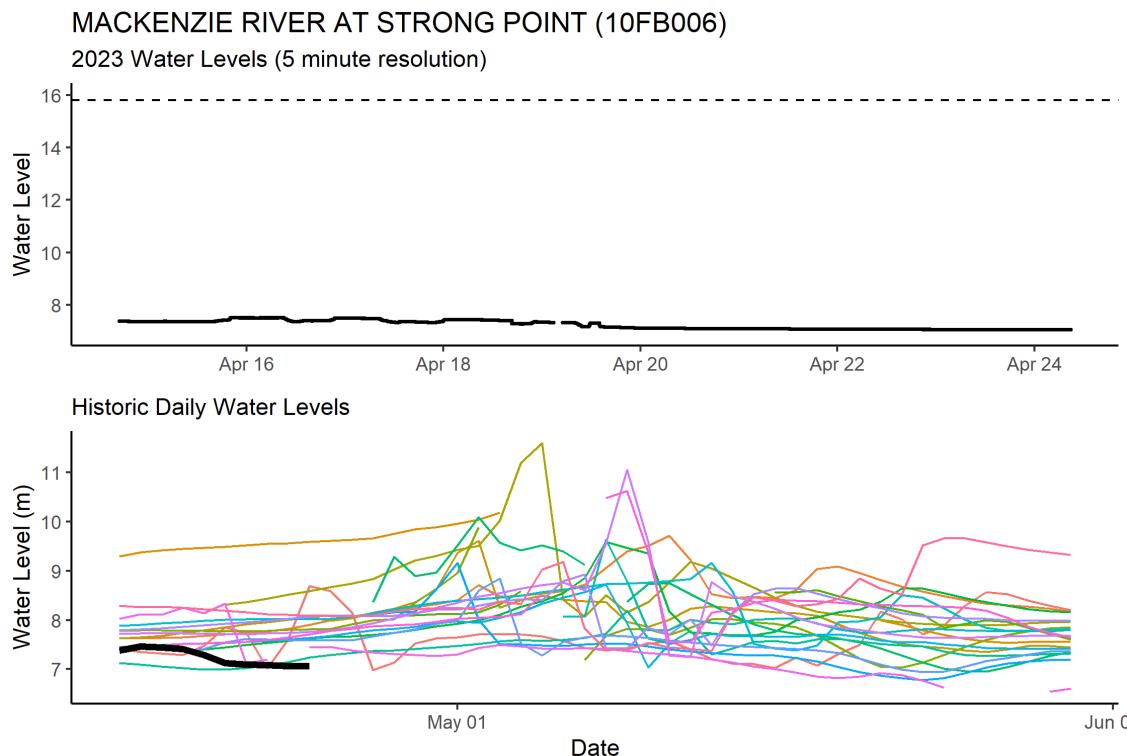


*Above – Water level data for Great Slave Lake at Yellowknife Bay. Daily average levels for the previous year is shown here.*

Mackenzie River at Strong Point [10FB006]:  
**MACKENZIE RIVER AT STRONG POINT (10FB006)**



Above – Water level data for the Mackenzie River at Strong Point. Daily average levels for the previous year is shown here.



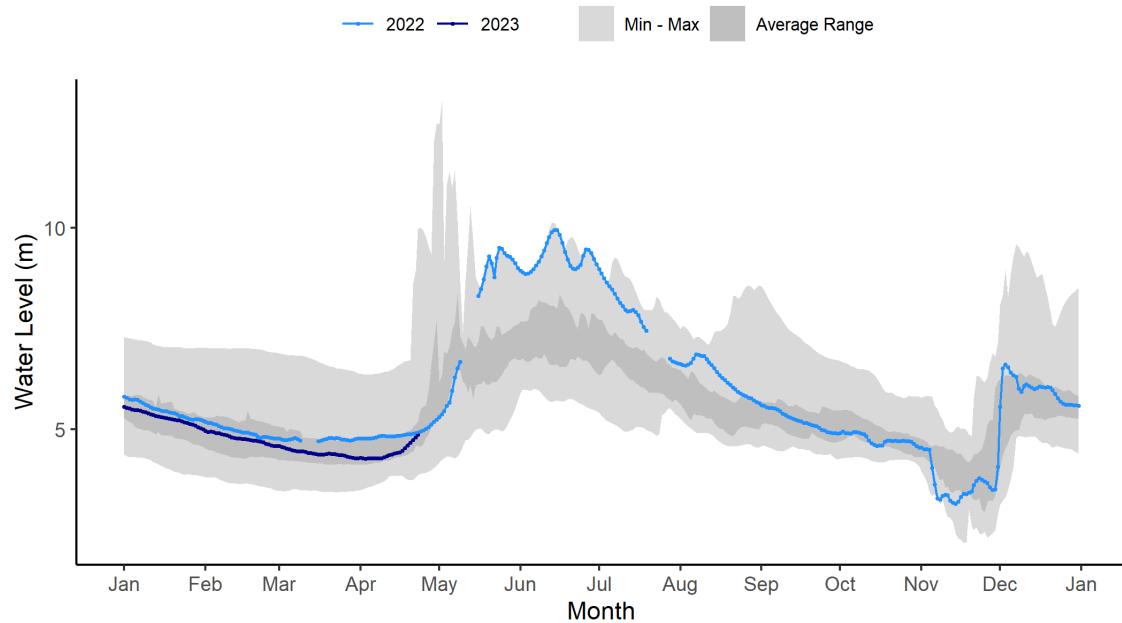
Above – The upper graph in the figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from 2021. The lower graph shows daily average levels relative to the previous 20 years.

10FB006\_MackStrongPoint 2023-04-24 19:01:14 UTC  
61.81646, -120.79187 14.6V 20°C P

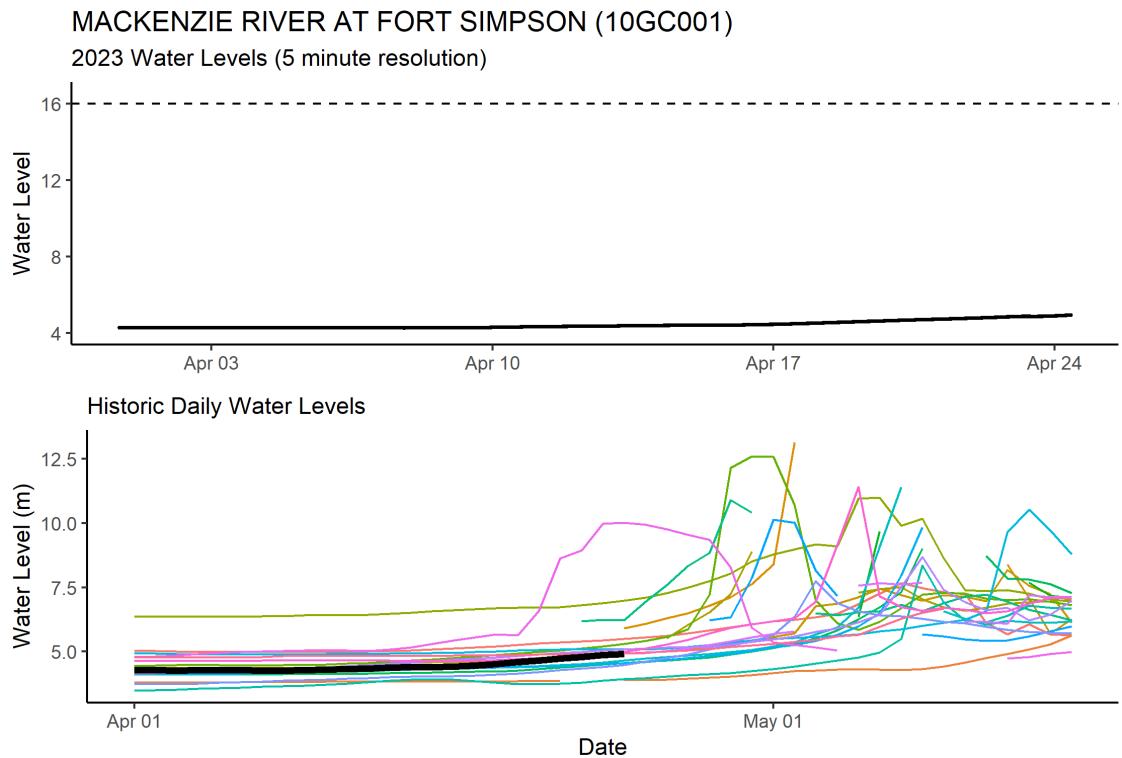


*Above* – Mackenzie River at Strong Point hydrometric gauge photo from April 24 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

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 is shown here.



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.

10GC001\_MackSimpson 2023-04-24 1901:14 UTC  
61.86801, -121.35844 145V 14.5°C P

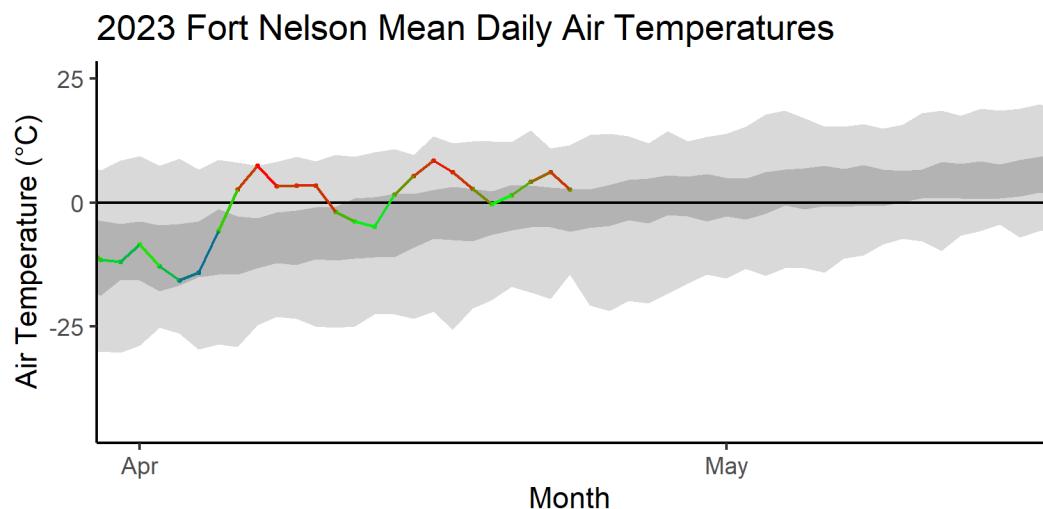
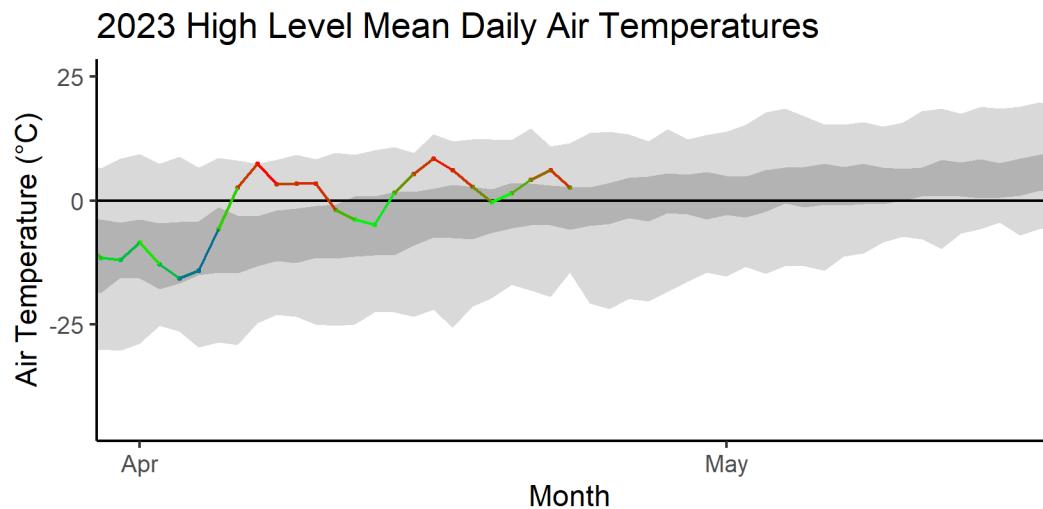


*Above* – Mackenzie River at Fort Simpson hydrometric gauge photo from April 24 at 13:00. Photo courtesy of Water Survey of Canada and GNWT.

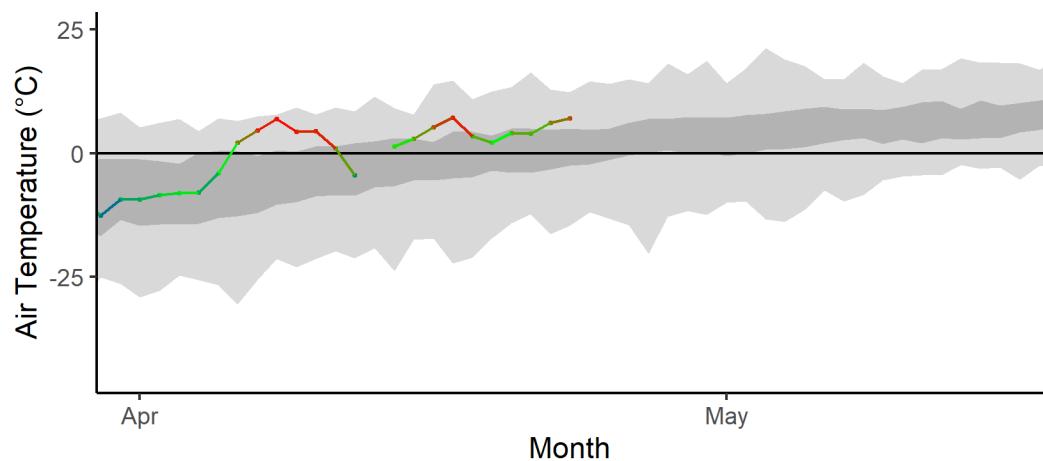
## Weather Data:

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 plots 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.

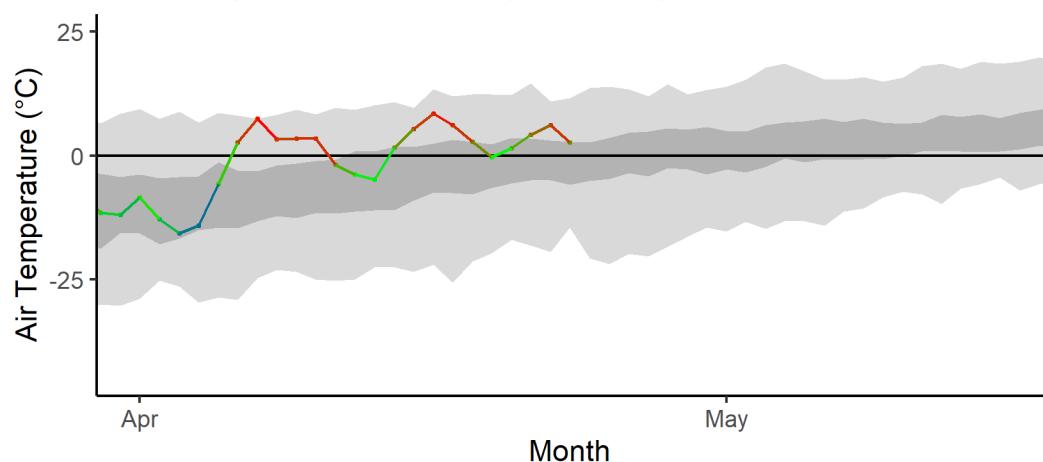
The Hay River basin and the southern Dehcho region are forecast to receive a small amount of mixed precipitation (5-20 mm) over the next 48 hours. The region is also expected to see warm temperatures arriving late this week and through the weekend which will continue to melt remaining snow and ice.



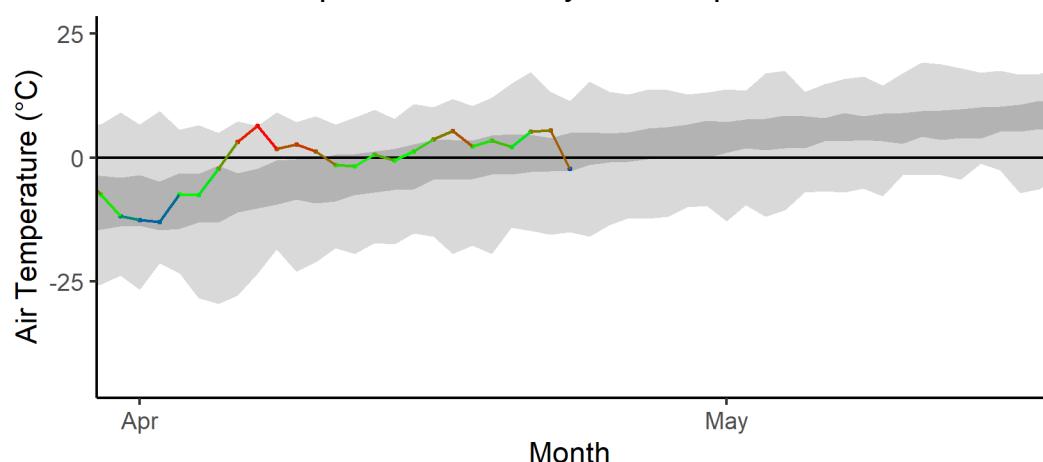
2023 Fort Smith Mean Daily Air Temperatures



2023 Hay River Mean Daily Air Temperatures



2023 Fort Simpson Mean Daily Air Temperatures



## High Level seven-day weather forecast:

| Mon<br>24 Apr   | Tue<br>25 Apr   | Wed<br>26 Apr   | Thu<br>27 Apr  | Fri<br>28 Apr   | Sat<br>29 Apr  | Sun<br>30 Apr   |
|---|---|---|--|---|--|---|
| <br>11°C<br>30%<br>Chance of showers | <br>8°C<br>Periods of rain | <br>10°C<br>A mix of sun and cloud | <br>13°C<br>Sunny | <br>15°C<br>Sunny | <br>20°C<br>Sunny         | <br>21°C<br>A mix of sun and cloud |
| <b>Tonight</b>  | <b>Night</b>  | <b>Night</b>  | <b>Night</b>   | <b>Night</b>  | <b>Night</b>   |   |
| <br>4°C<br>Showers                   | <br>-4°C<br>Cloudy         | <br>0°C<br>Periods of rain         | <br>3°C<br>Clear  | <br>-1°C<br>Clear | <br>2°C<br>Cloudy periods |   |
|   |   |   |  |   |  |   |

## Fort Nelson seven-day weather forecast:

| Mon<br>24 Apr   | Tue<br>25 Apr   | Wed<br>26 Apr  | Thu<br>27 Apr  | Fri<br>28 Apr  | Sat<br>29 Apr   | Sun<br>30 Apr   |
|---|---|--|--|--|---|---|
| <br>4°C<br>Periods of rain or snow   | <br>9°C<br>Periods of snow | <br>7°C<br>40%<br>Chance of showers | <br>14°C<br>Sunny | <br>16°C<br>Sunny          | <br>19°C<br>A mix of sun and cloud | <br>18°C<br>A mix of sun and cloud |
| <b>Tonight</b>  | <b>Night</b>  | <b>Night</b>   | <b>Night</b>   | <b>Night</b>   | <b>Night</b>  |   |
| <br>-3°C<br>Periods of rain or snow | <br>-5°C<br>Clear         | <br>0°C<br>Clear                   | <br>0°C<br>Clear | <br>2°C<br>Cloudy periods | <br>4°C<br>Cloudy periods         |   |
|   |   |  |  |  |   |   |

## Fort Smith seven-day weather forecast:

| Mon<br>24 Apr   | Tue<br>25 Apr  | Wed<br>26 Apr  | Thu<br>27 Apr   | Fri<br>28 Apr   | Sat<br>29 Apr  | Sun<br>30 Apr  |
|---|--|--|---|---|--|--|
| <br>12°C<br>A mix of sun and cloud | <br>9°C<br>60%<br>Chance of showers | <br>9°C<br>Cloudy | <br>11°C<br>A mix of sun and cloud | <br>13°C<br>Sunny | <br>14°C<br>Sunny | <br>16°C<br>Sunny |
| <b>Tonight</b>  | <b>Night</b>   | <b>Night</b>   | <b>Night</b>  | <b>Night</b>  | <b>Night</b>   |  |
| <br>2°C<br>A few clouds            | <br>2°C<br>60%<br>Chance of showers | <br>1°C<br>Cloudy | <br>1°C<br>Clear                   | <br>-2°C<br>Clear | <br>-1°C<br>Clear |  |
|   |  |  |   |   |  |  |

## Hay River seven-day weather forecast:

| Mon<br>24 Apr   | Tue<br>25 Apr  | Wed<br>26 Apr  | Thu<br>27 Apr  | Fri<br>28 Apr  | Sat<br>29 Apr   | Sun<br>30 Apr   |
|---|--|--|--|--|---|---|
|  5°C<br>A mix of sun and cloud |  5°C<br>Rain          |  5°C<br>Cloudy  |  12°C<br>A mix of sun and cloud |  12°C<br>Sunny |  11°C<br>Sunny |  12°C<br>Sunny |
| <b>Tonight</b>  | <b>Night</b>   | <b>Night</b>   | <b>Night</b>   | <b>Night</b>   | <b>Night</b>  |   |
|  -1°C<br>Increasing cloudiness |  -3°C<br>Rain or snow |  -2°C<br>Cloudy |  0°C<br>Clear                   |  -4°C<br>Clear |  0°C<br>Clear  |   |
|   |  |  |  |  |   |   |

## Fort Simpson seven-day weather forecast:

| Mon<br>24 Apr   | Tue<br>25 Apr  | Wed<br>26 Apr   | Thu<br>27 Apr  | Fri<br>28 Apr  | Sat<br>29 Apr  | Sun<br>30 Apr  |
|---|--|---|--|--|--|--|
|  -2°C<br>30%<br>Chance of flurries |  -5°C<br>Snow             |  4°C<br>A mix of sun and cloud |  12°C<br>Sunny  |  14°C<br>Sunny |  15°C<br>A mix of sun and cloud |  15°C<br>A mix of sun and cloud |
| <b>Tonight</b>  | <b>Night</b>   | <b>Night</b>  | <b>Night</b>   | <b>Night</b>   | <b>Night</b>   |  |
|  -8°C<br>Snow                     |  -9°C<br>Periods of snow |  -4°C<br>Cloudy               |  -4°C<br>Clear |  3°C<br>Clear |  5°C<br>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.