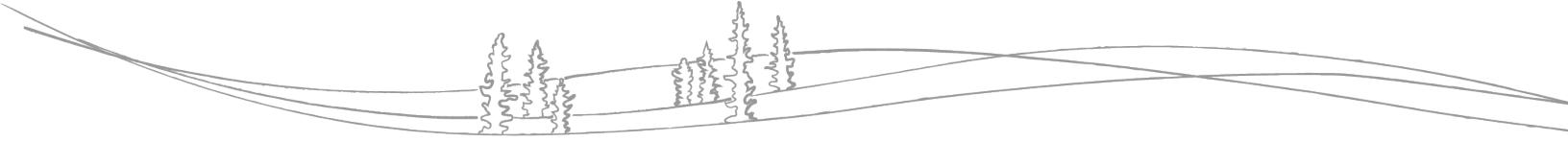




NWT Water Monitoring Bulletin

– May 07, 2022



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:

- Hay River issued an evacuation order for Vale Island, including the West Channel area;
- The potential for further flooding remains high as most of the river ice has yet to pass through the Town of Hay River. There is a significant amount of additional precipitation forecast to fall in the Hay River region;
 - Environment and Climate Change Canada have issued a rainfall warning;
 - It is rare for a precipitation event of this magnitude to coincide with break up;
- There was bank to bank ice running on the Liard River at Fort Liard this morning but as of 12:00, appeared to be stationary;
 - The Petitot River at Fort Liard broke yesterday afternoon;
- Small amounts of ice are running on the Dehcho (Mackenzie River) below Strong Point, but a jam has prevented this ice from reaching Fort Simpson;
- Neither the Dehcho (Mackenzie River) nor the Liard River have broken at Fort Simpson as of May 07 at 12:00;
 - Cool temperatures are forecast over the Dehcho region until Wednesday.

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Hay River:

Current Status:

- The Town of Hay River issued an evacuation notice for Vale Island this morning at 02:00;
- A flash flood alert was issued for K'atl'odeeche First Nation and Hay River at 23:00 on May 06;
- A significant low-pressure system continues to sit over the Hay River basin. Precipitation will likely be a mix of rain and snow this morning, transitioning to rain this afternoon and back to snow this evening;
 - A rainfall warning is currently in place for the Hay River region by Environment and Climate Change Canada;
- An ENR precipitation gauge near the town of Hay River recorded 27 mm of rain between 00:00 and 10:00 on May 07;
- Models are predicting an additional 50-70 mm of precipitation in the Hay River region through to Monday morning;
- Ice continues to run, jam, and release along sections of the Hay River. Ice jams upstream of gauge locations can result in temporary reductions of water levels;
- The water level response on the Hay River and its tributaries to precipitation is very rapid at this time of year due to low storage and frozen ground;
- Refer to the [Town of Hay River website](#) for the most up-to-date information, as well as webcam images of current conditions.

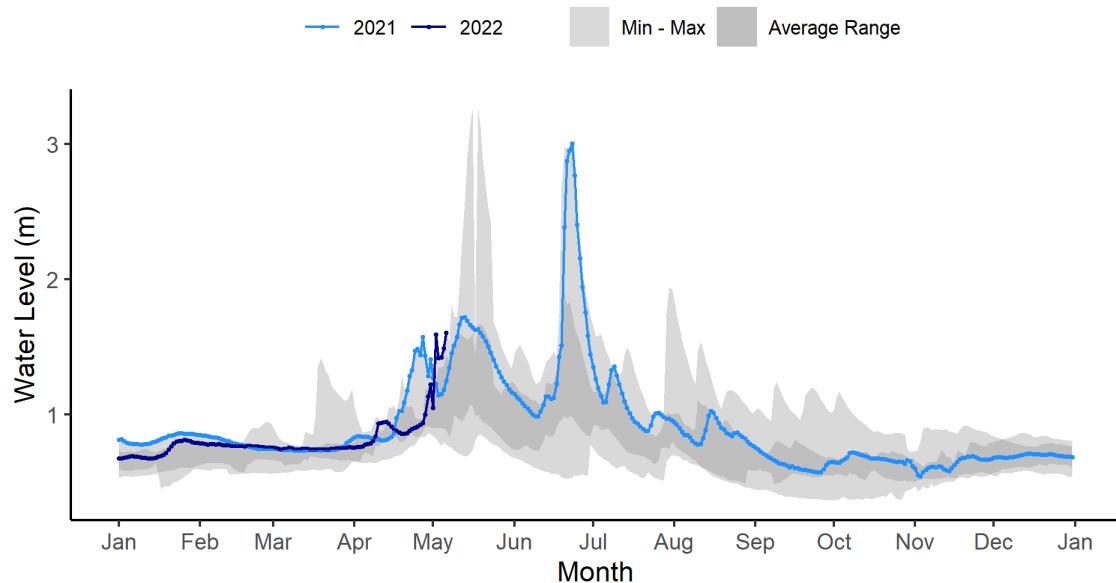


Above – Map of hydrometric stations in the Hay River basin. The station numbers are referenced in the water level plots below.

Hydrometric Data:

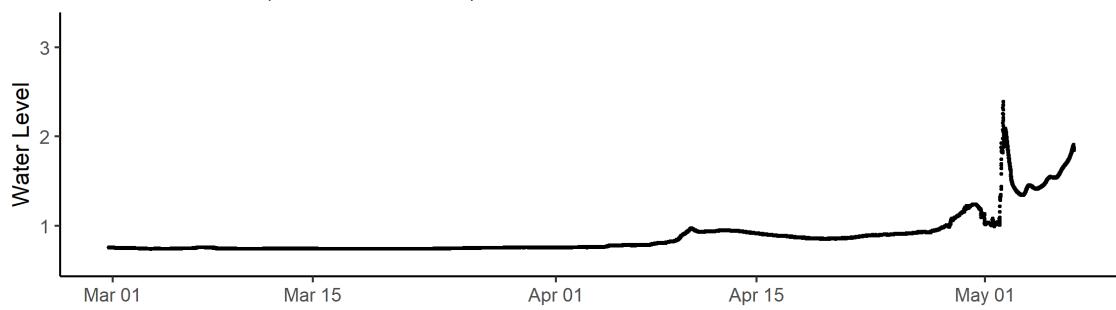
Chinchaga River near High Level (Alberta) [07OC001]:

CHINCHAGA RIVER NEAR HIGH LEVEL (07OC001)

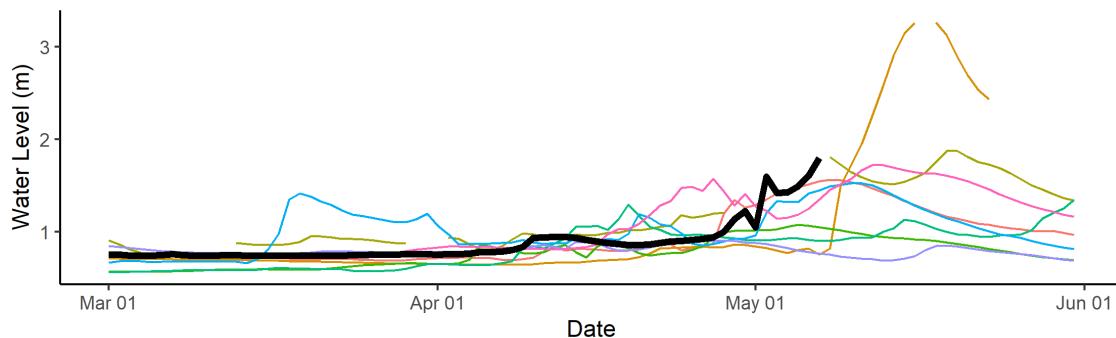


CHINCHAGA RIVER NEAR HIGH LEVEL (07OC001)

2022 Water Levels (5 minute resolution)

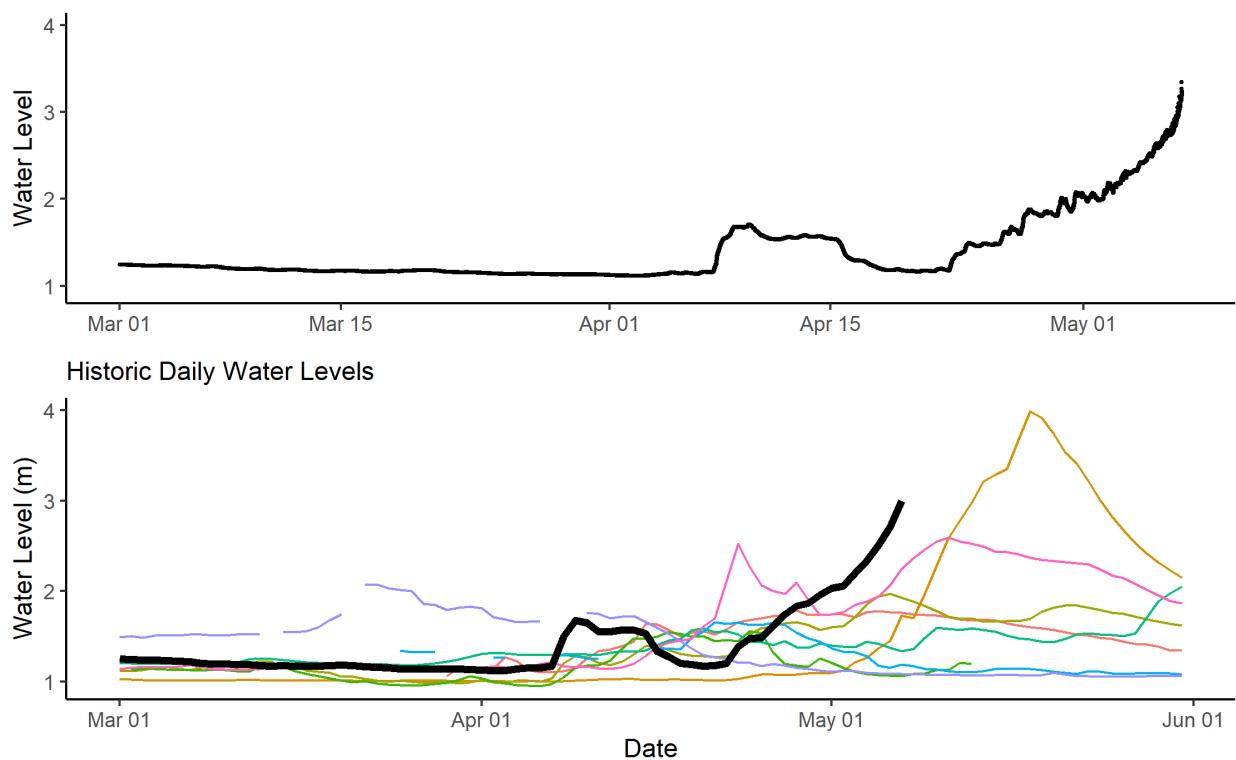


Historic Daily Water Levels



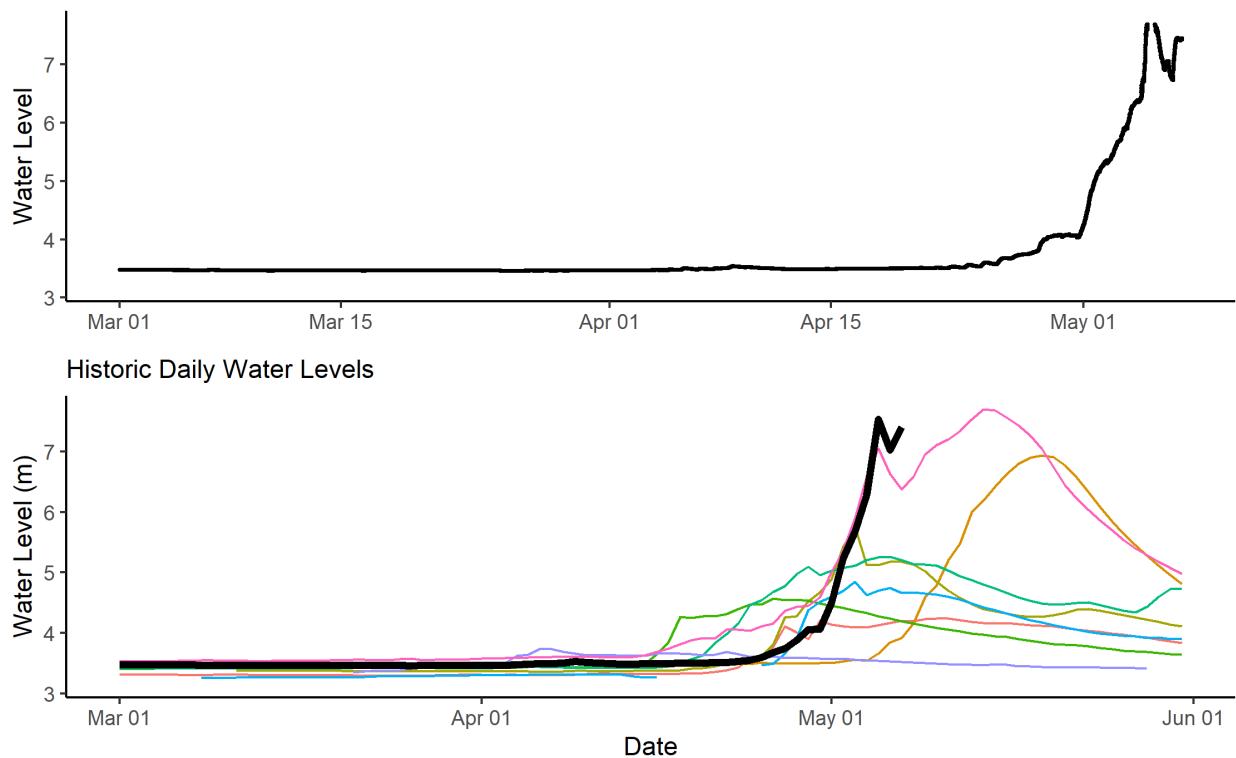
Above – Water level data at the Chinchaga River near High Level, AB. This plot shows high resolution (5 minute) water level data in the middle, and daily average data on the bottom. An ice jam and release can be observed on May 02.

Sousa Creek near High Level (Alberta) [070A001]:
SOUSA CREEK NEAR HIGH LEVEL (070A001)
2022 Water Levels (5 minute resolution)



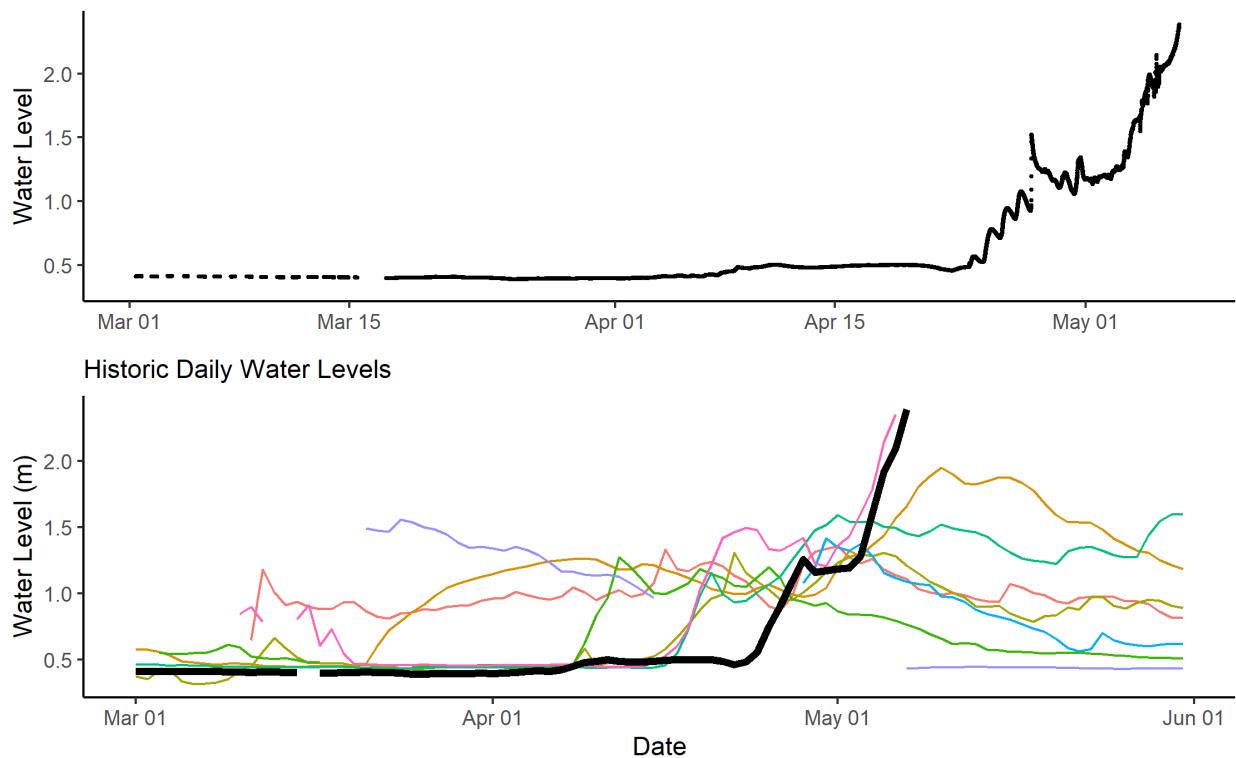
Above – Water level data on Sousa Creek near High Level, AB. The Sousa River is a small tributary to the Hay River. Water levels have been rising rapidly in response to ongoing rainfall.

Steen River near Steen River (Alberta) [07OB004]:
STEEN RIVER NEAR STEEN RIVER (07OB004)
2022 Water Levels (5 minute resolution)



Above – Water level data on the Steen River near Steen River, AB. The Steen River is a tributary to the Hay River. Water levels peaked in the morning of May 05 but have been rising again in response to rainfall.

Lutose Creek near Steen River (Alberta) [070B006]:
LUTOSE CREEK NEAR STEEN RIVER (070B006)
2022 Water Levels (5 minute resolution)

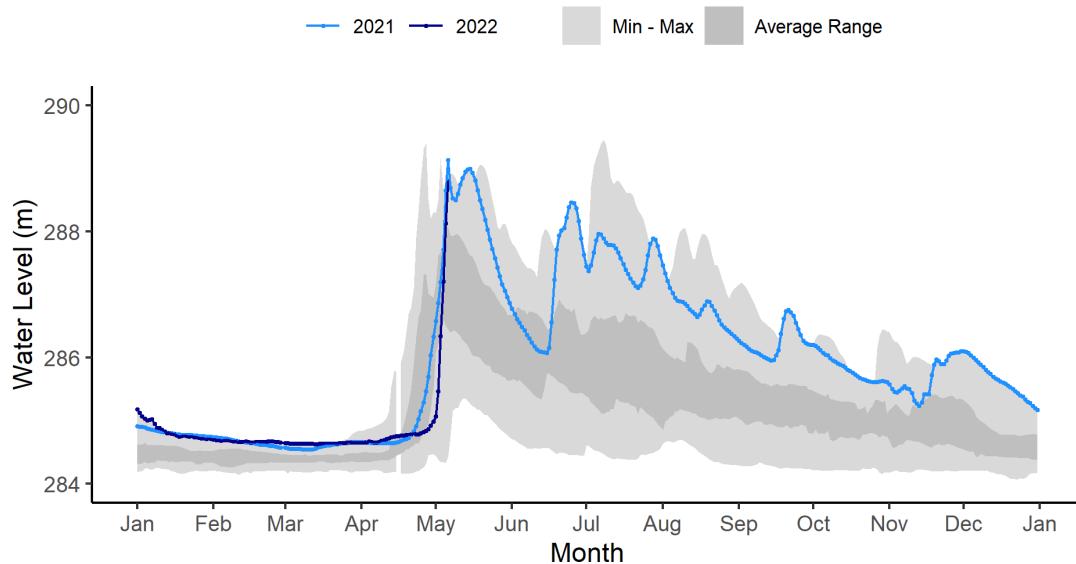


Above – Water level data on Lutose Creek near Steen River, AB. Lutose Creek is a small tributary to the Hay River. Water levels initially peaked on May 05 in response to ice movement, but have risen rapidly in response to ongoing rain events.

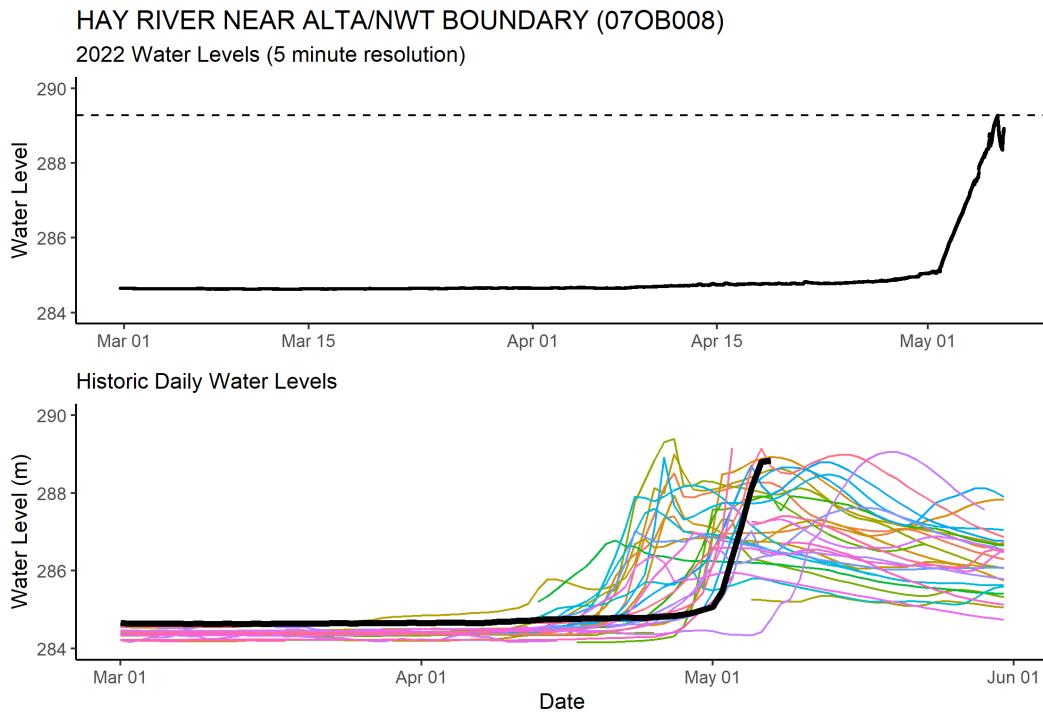
Hay River near the border [07OB008]:

Note: Ice has impacted the gauge and real time data are not available at this location. **The most recent data are from May 06 at 18:25**

HAY RIVER NEAR ALTA/NWT BOUNDARY (07OB008)



Above - hydrograph of daily average levels for the previous two years. Note that the most recent point on this graph shows the **daily average level from May 06** (yesterday).

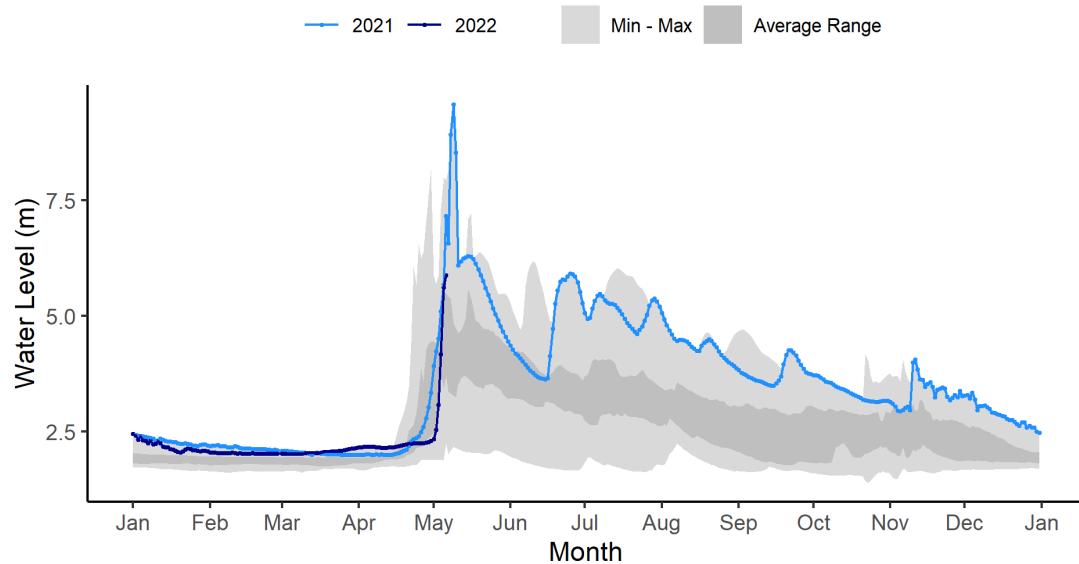


Above - The upper graph in this figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2021). **Real time data are currently unavailable.**

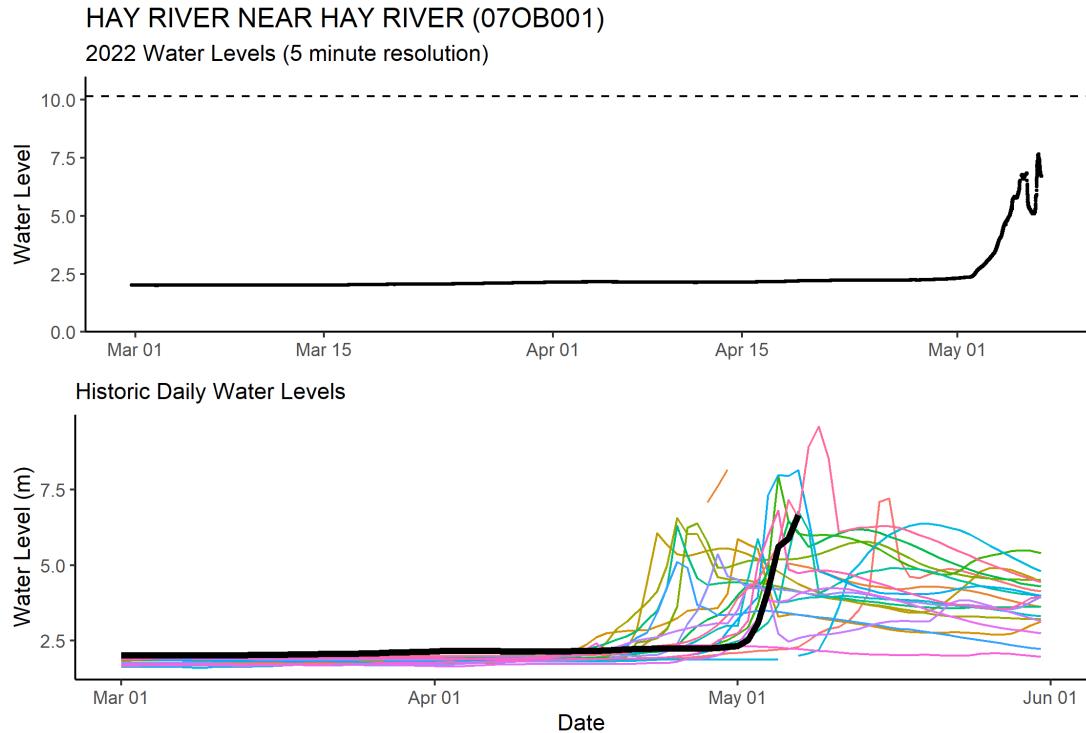


Above – Hay River near the border hydrometric gauge photo on May 07 at 11:00. Photo courtesy of Water Survey of Canada and GNWT.

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



Above – hydrograph of daily average levels for the previous two years. Note that the most recent point on this graph shows the **daily average level from May 06** (yesterday).



Above - The upper graph in this figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2021). The lower graph shows daily average levels relative to the previous 20 years. Water levels at the gauge are currently impacted by ice movement.

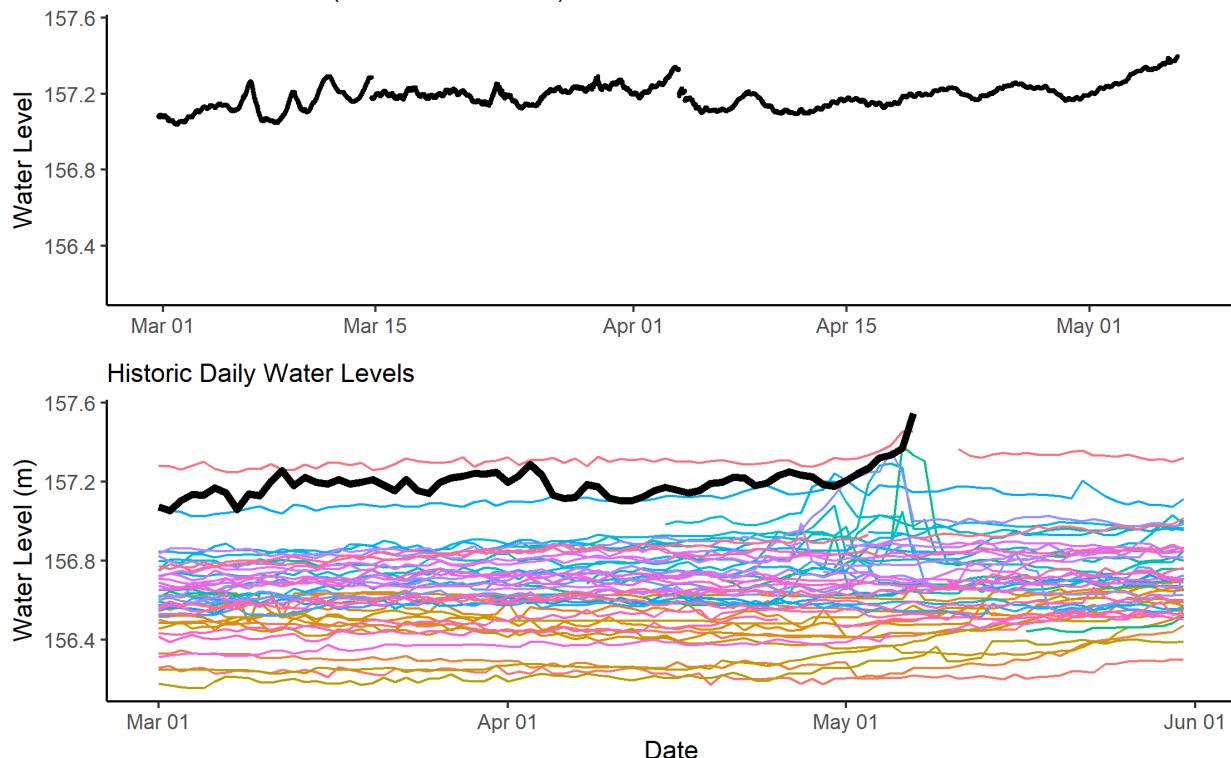


Above – Hay River near the Town of Hay River hydrometric gauge photo on May 07 at 11:00. Photo courtesy of Water Survey of Canada and GNWT.

Great Slave Lake at Hay River [070B002]:

GREAT SLAVE LAKE AT HAY RIVER (070B002)

2022 Water Levels (5 minute resolution)



Above – Water levels at the Great Slave Lake at Hay River gauge. The gauge is located at the mouth of the East Channel of the Hay River. The pink line at the top of the lower graph was the water level last year (2021). The peak level this year has now passed the peak level from last year. **Note:** these values are all **provisional** and may be subject to sensor drag from ice.

Liard River:

Current Status:

- There was bank to bank ice running on the Liard River at Fort Liard this morning, but as of 12:00, appeared to be stationary;
 - Ice on the Petitot River broke yesterday (May 06) around 13:00;
- Ice on the Liard River at Fort Simpson is still solid this morning (May 07) as of 12:00;
- Water levels are climbing on the Liard River at the NWT hydrometric gauges, but the increases remain typical for break up.

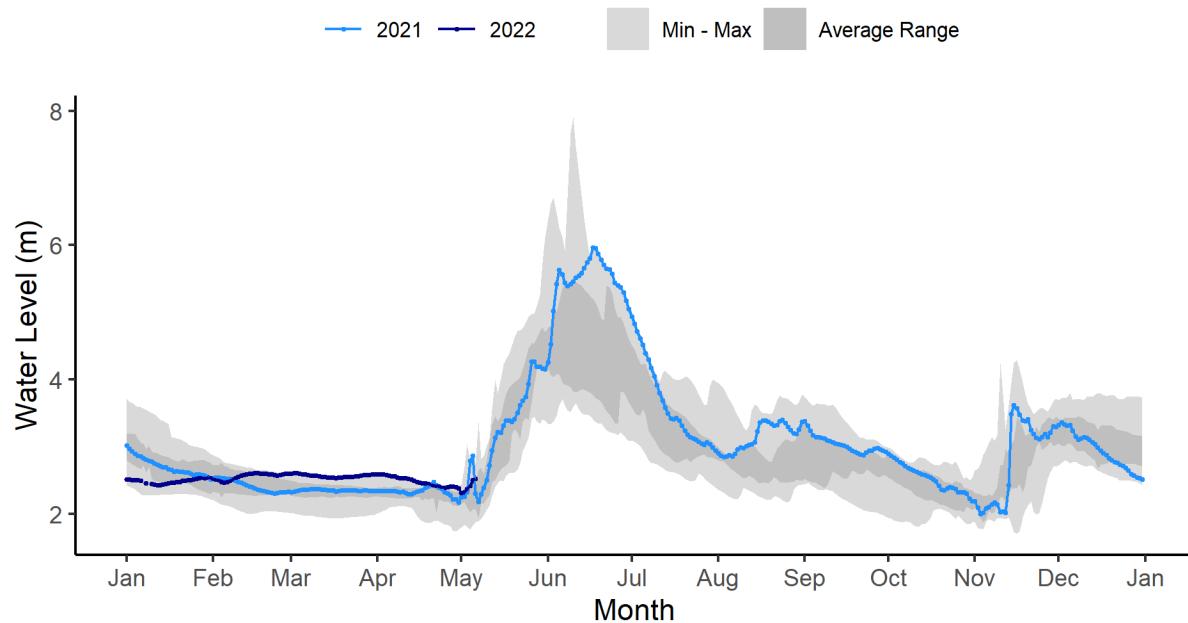


Above – Map of hydrometric stations in the Liard River basin. The station numbers are referenced in the water level plots below.

Hydrometric Data:

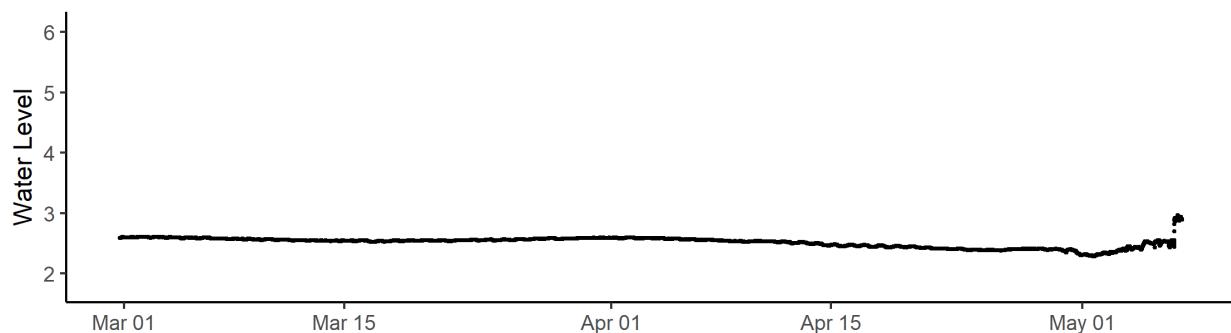
Liard River at Upper Crossing (Yukon) [10AA001]:

LIARD RIVER AT UPPER CROSSING (10AA001)

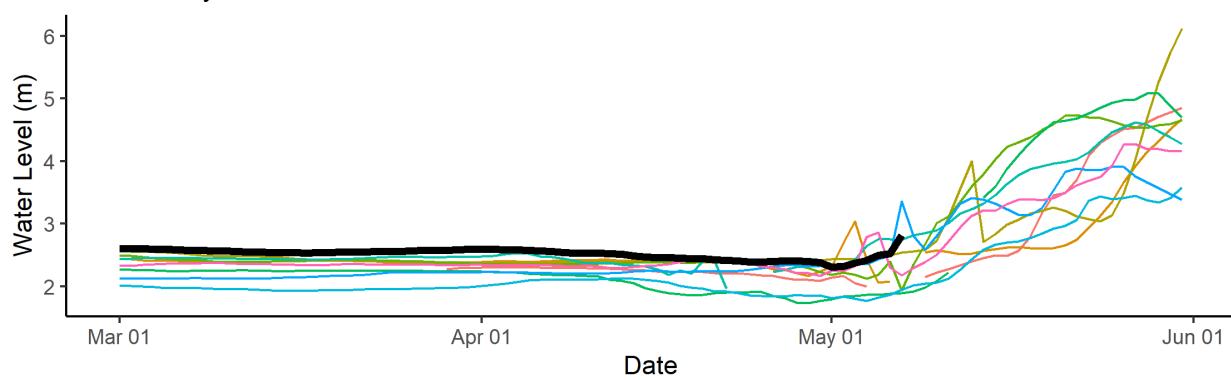


LIARD RIVER AT UPPER CROSSING (10AA001)

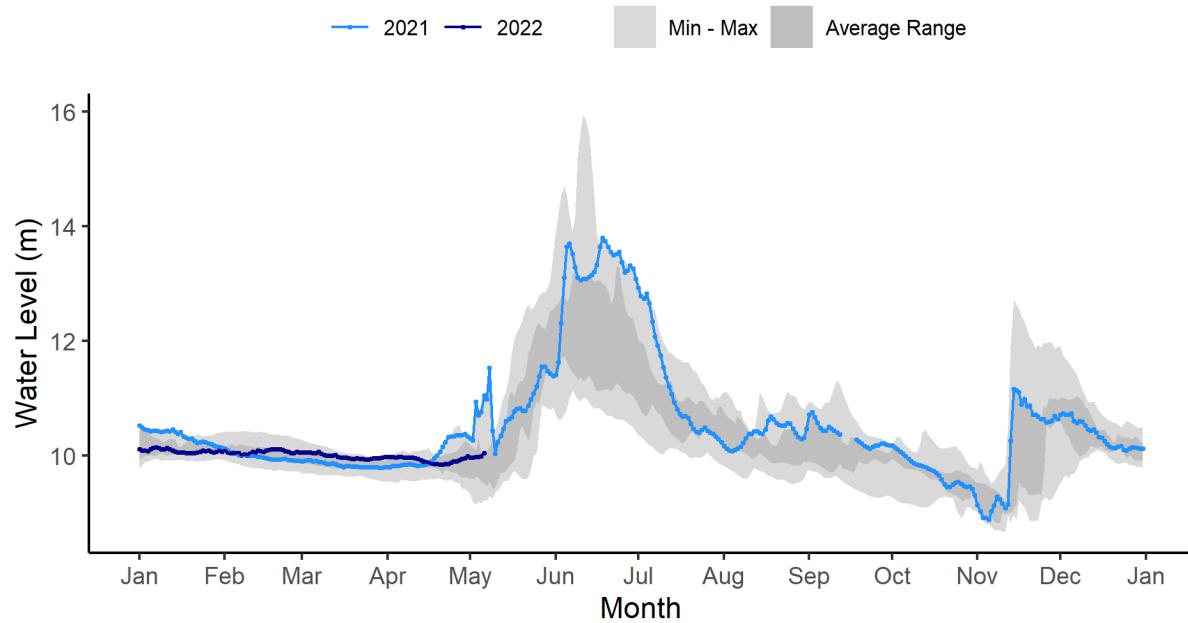
2022 Water Levels (5 minute resolution)



Historic Daily Water Levels

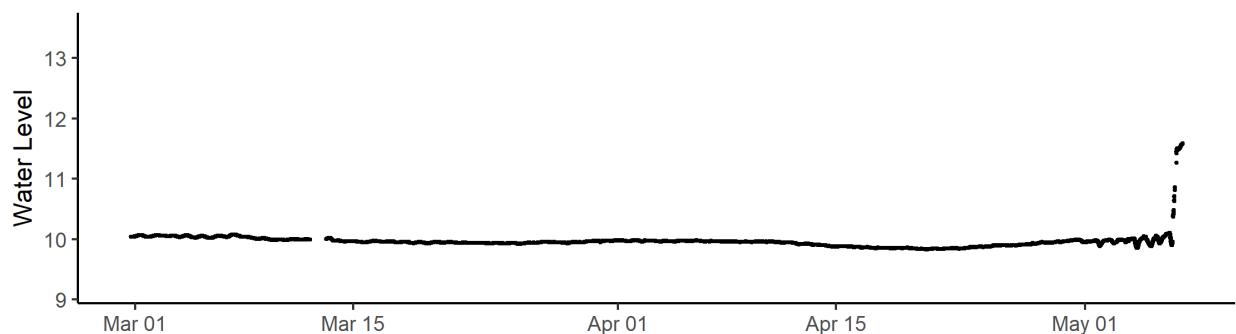


Liard River at Lower Crossing (British Columbia) [10BE001]:
LIARD RIVER AT LOWER CROSSING (10BE001)

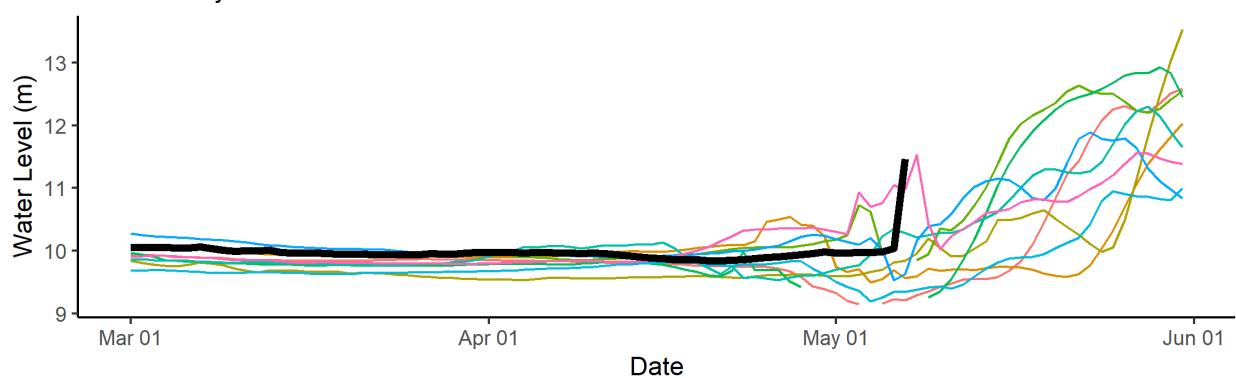


LIARD RIVER AT LOWER CROSSING (10BE001)

2022 Water Levels (5 minute resolution)



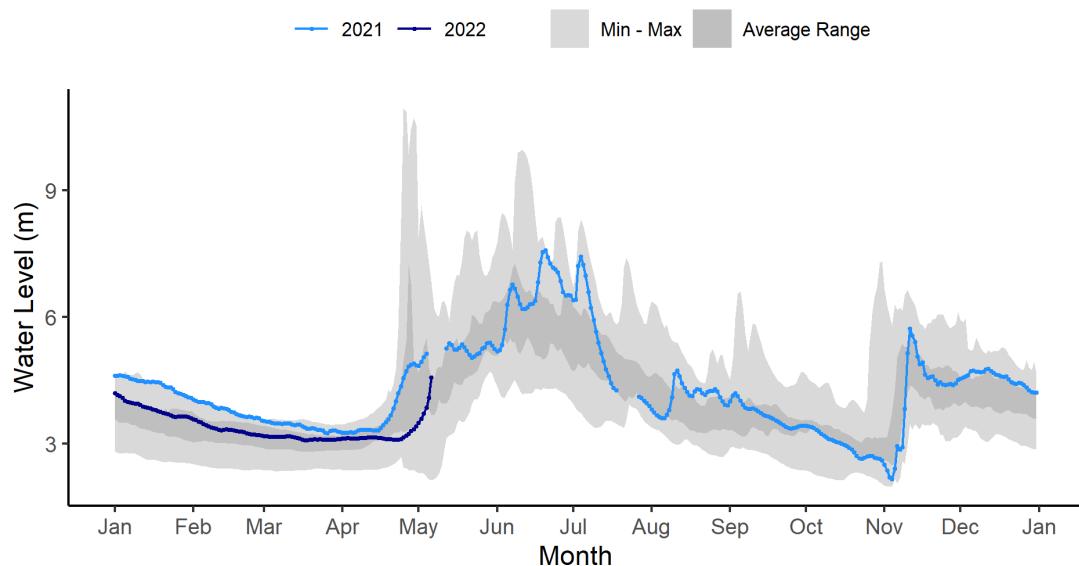
Historic Daily Water Levels



Liard River at Fort Liard [10ED001]:

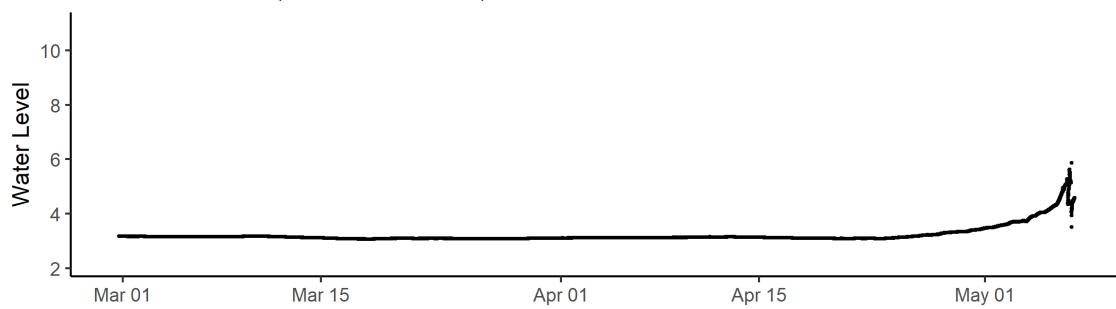
Note: Ice has impacted the site and dragged the water level sensor as of May 06 at 18:10. The provisional water level data that are currently being produced should not be considered reliable

LIARD RIVER AT FORT LIARD (10ED001)

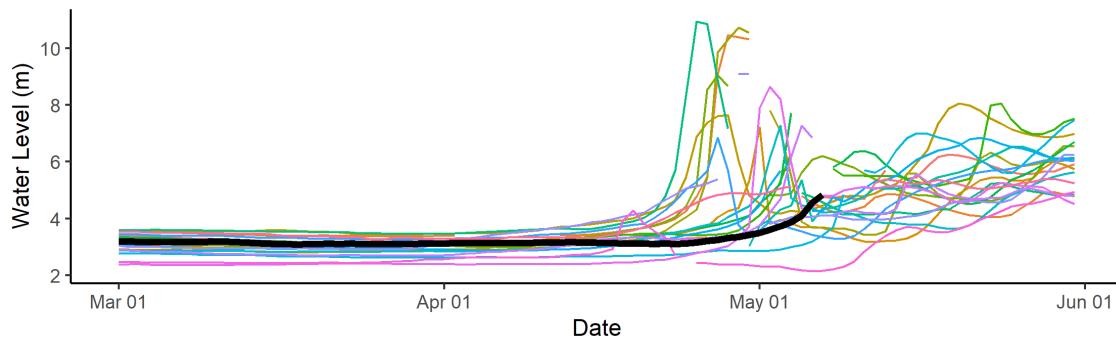


LIARD RIVER AT FORT LIARD (10ED001)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels



Above - The recent spikes and drops in the upper graph are the result of ice drag on the sensor.

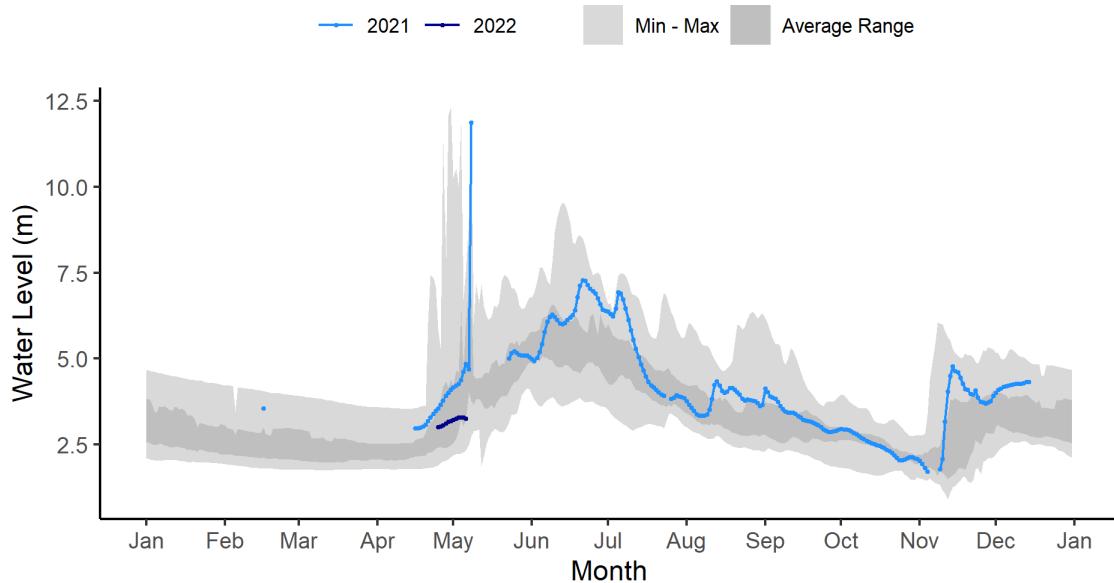


Above – Liard River at Fort Liard hydrometric gauge photo from May 07 at 11:00. Photo courtesy of Water Survey of Canada and GNWT. As of 12:00, the ice is stationary on the Liard River at Fort Liard.

Liard River near the mouth [10ED002]:

Note: Ice has impacted the site and sensor values are unreliable as of **May 06 at 22:00**

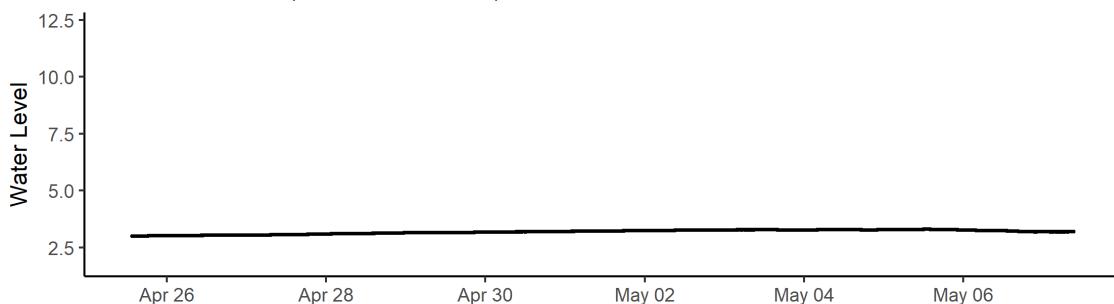
LIARD RIVER NEAR THE MOUTH (10ED002)



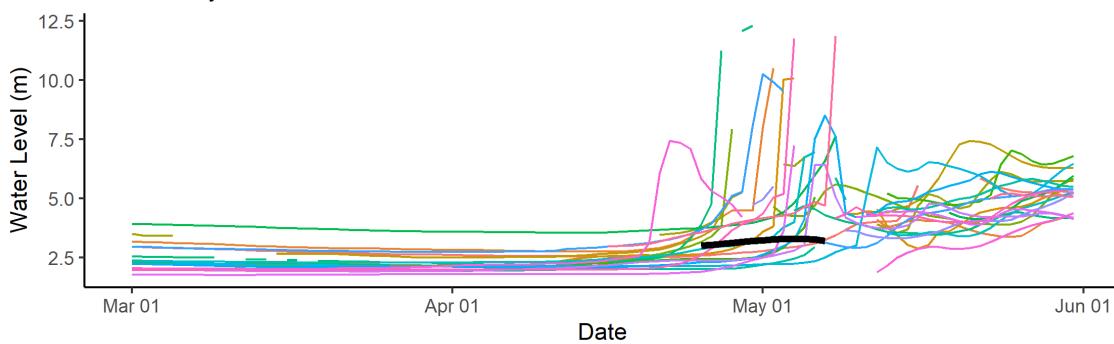
Above – hydrograph of daily average levels for the previous two years. The spring water level rise is delayed relative to previous years.

LIARD RIVER NEAR THE MOUTH (10ED002)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels



1060002_LiardMouth 2022-05-07 1601:15 UTC
61.74266, -121.22792 12.5V 45°C P

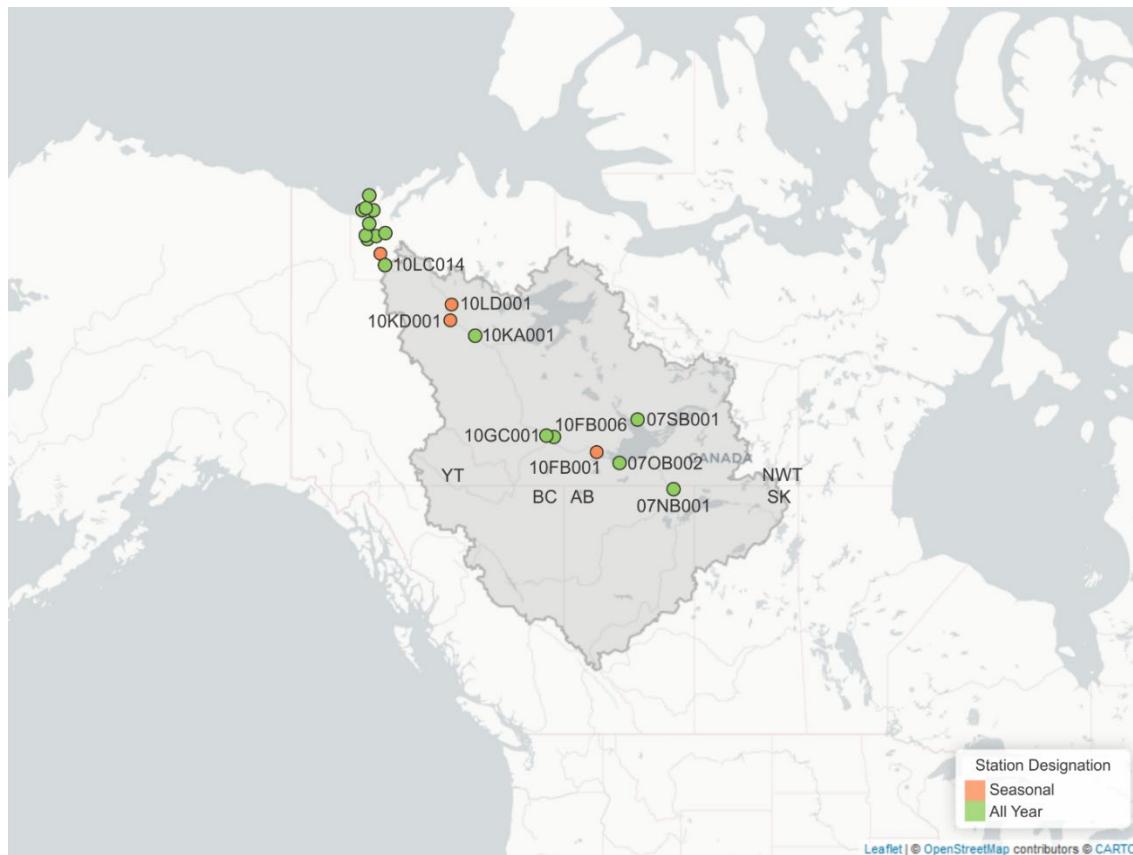


Above – Liard River near the mouth hydrometric gauge photo from May 07 at 10:00. Photo courtesy of Water Survey of Canada and GNWT.

Slave River / Great Slave Lake / Dehcho (Mackenzie River)

Current Status:

- Break up is progressing along the Peace River and has started on the Slave River;
 - There have been reports of an ice jam on the Slave River at km 10 as of May 06;
- Ice has started to move on the Dehcho (Mackenzie River) at Fort Providence, and around Strong Point (between Jean Marie River and Fort Simpson);
 - The running ice from Strong Point has jammed upstream of the confluence with the Liard River;
 - There appears to be solid ice upstream of Strong Point which has resulted in a water level drop at the gauge site as the ice from Strong Point pushed downstream;
- Ice on the Dehcho and Liard rivers near Fort Simpson is still stationary as of May 07 at 12:00;
- Break up has been initiated on the Liard River at Fort Liard;
- Environment and Climate Change Canada has forecast below seasonal temperatures for the weekend in the Dehcho region.

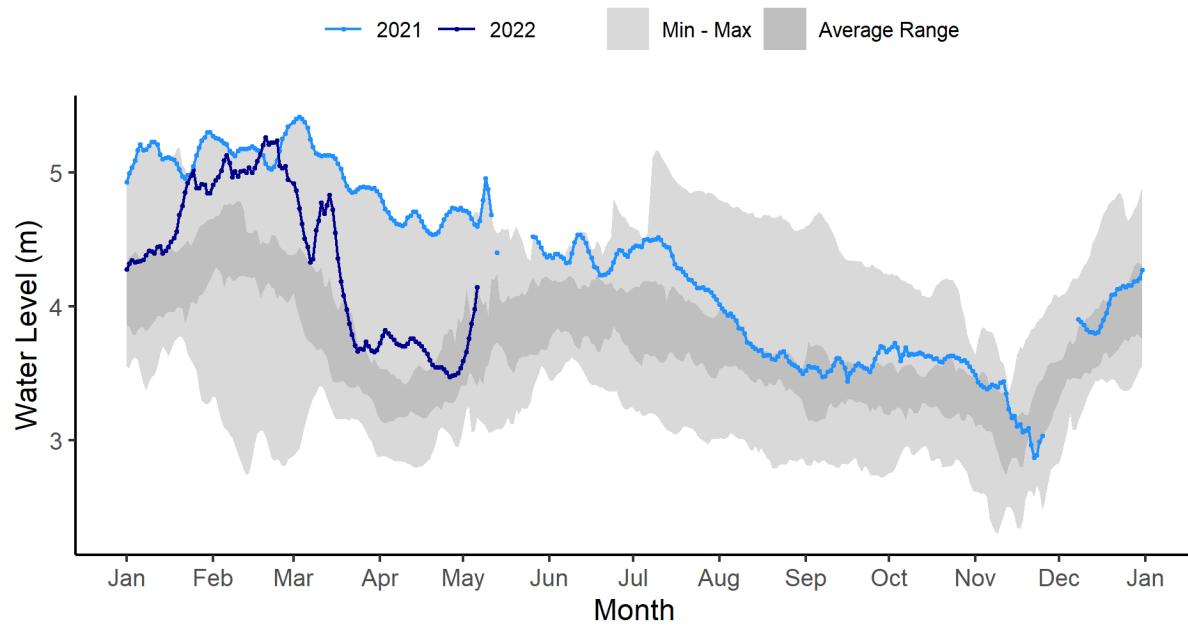


Above – Map of hydrometric stations in the Dehcho (Mackenzie River) basin. The station numbers are referenced in the water level plots below.

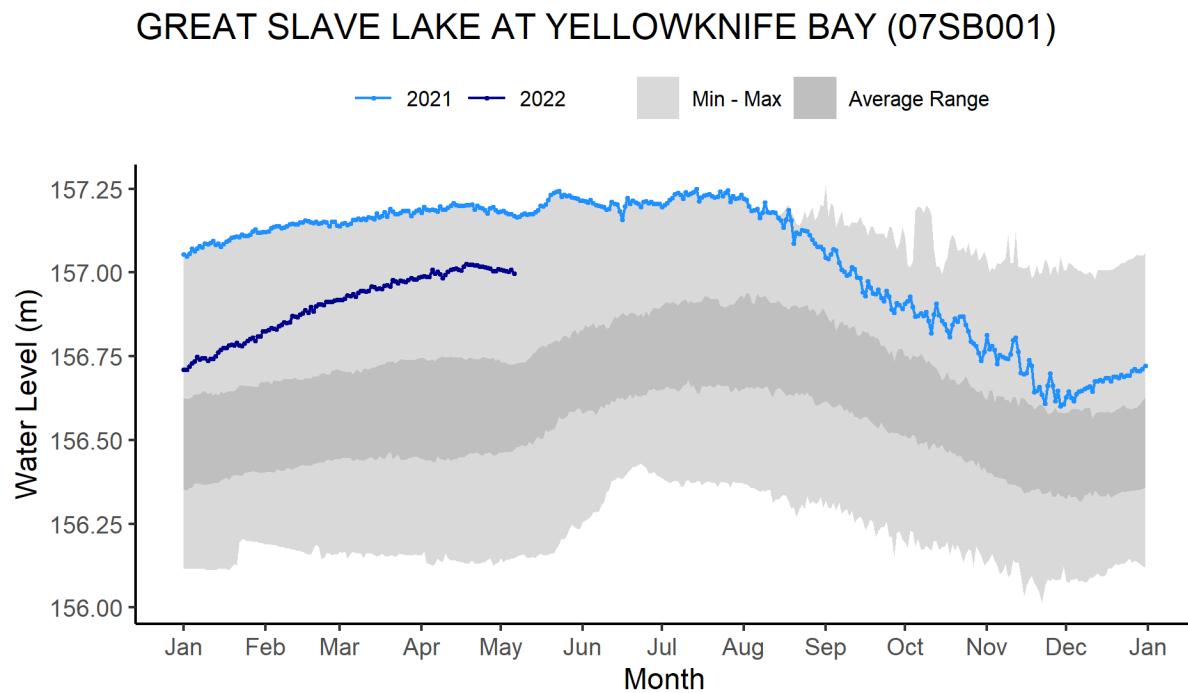
Hydrometric Data:

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

SLAVE RIVER AT FITZGERALD (ALBERTA) (07NB001)

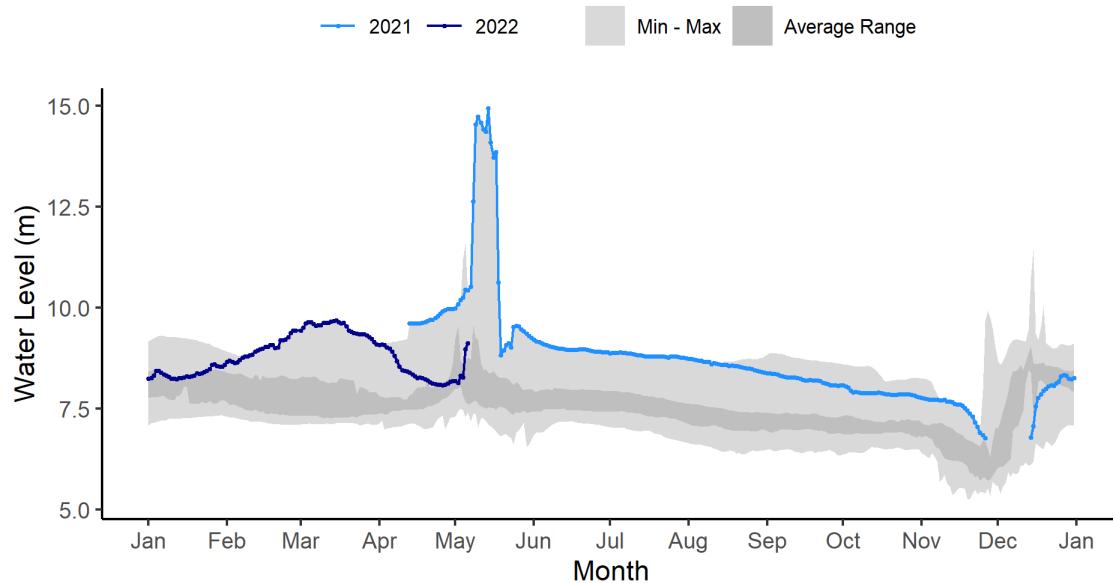


Great Slave Lake at Yellowknife Bay [07SB001]:

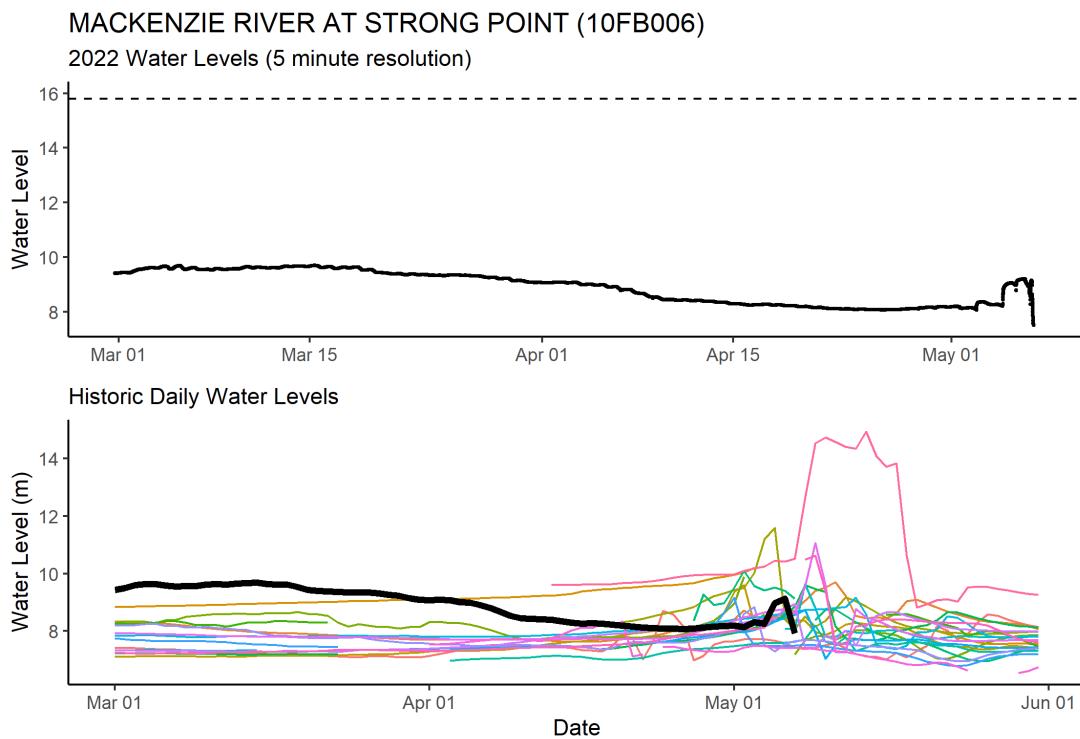


Above – Water levels on Great Slave Lake at Yellowknife Bay for the previous two years. Although water levels have receded since the highs of 2020 and 2021, levels remain much higher than normal.

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



Above – hydrograph of daily average levels for the previous two years. Note that the most recent point on this graph shows the **daily average level from May 06** (yesterday).

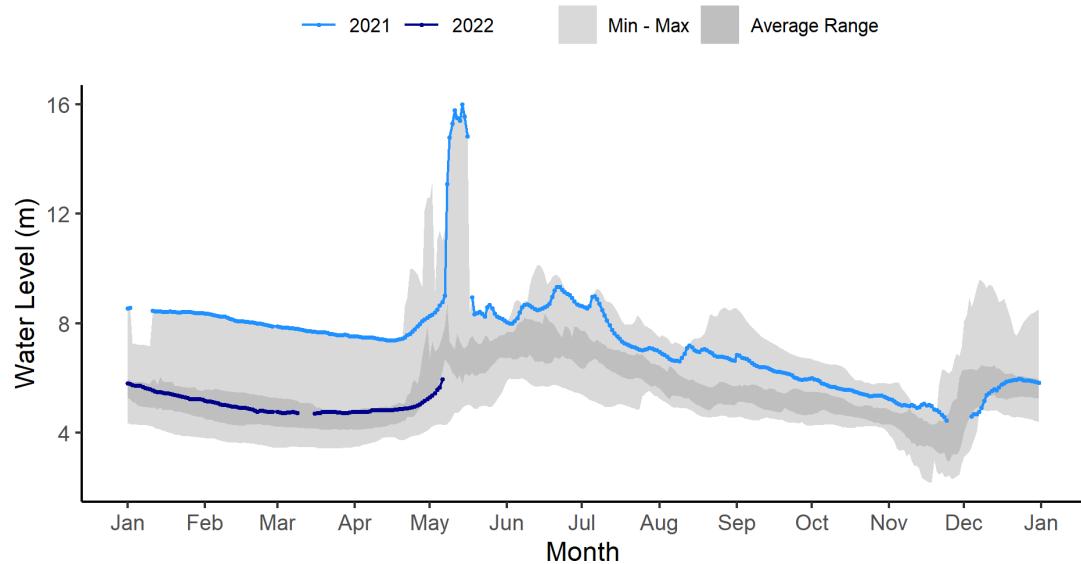


Above - The upper graph in the figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2021). The lower graph shows daily average levels relative to the previous 20 years. There has been ice movement over the last two days and likely solid ice upstream of the gauge which has caused a temporary drop in level.

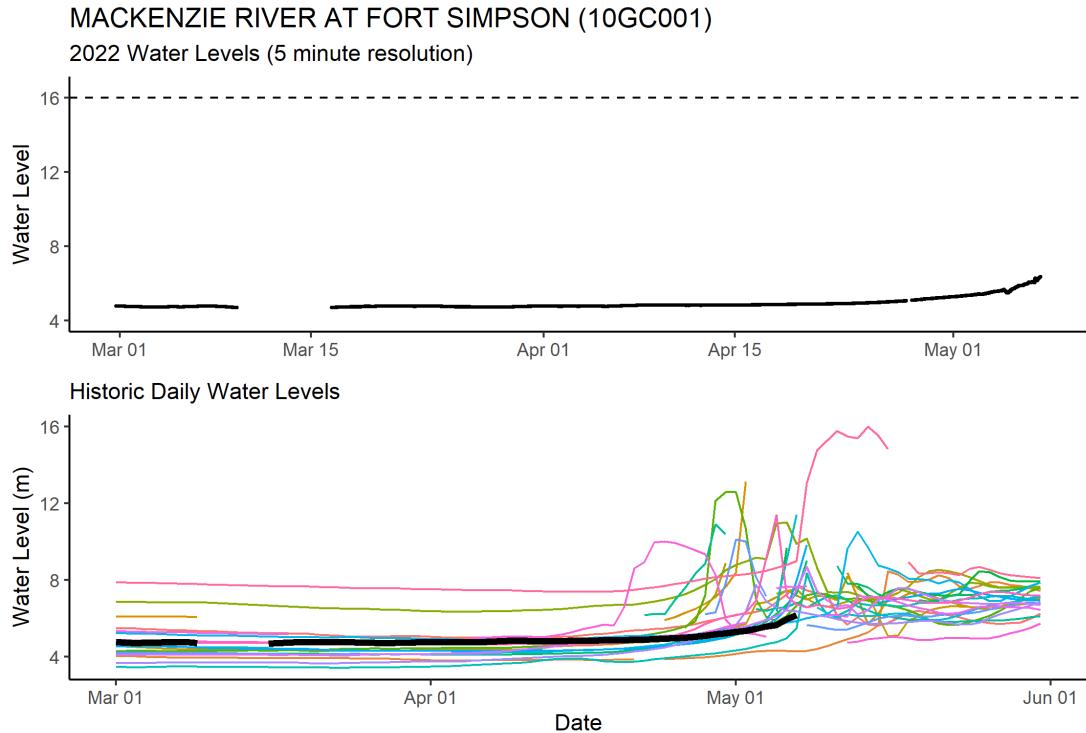


Above – Dehcho (Mackenzie River) at Strong Point hydrometric gauge photo from May 07 at 11:00. Photo courtesy of Water Survey of Canada and GNWT.

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



Above – hydrograph of daily average levels for the previous two years. Note that the most recent point on this graph shows the **daily average level from May 06** (yesterday).



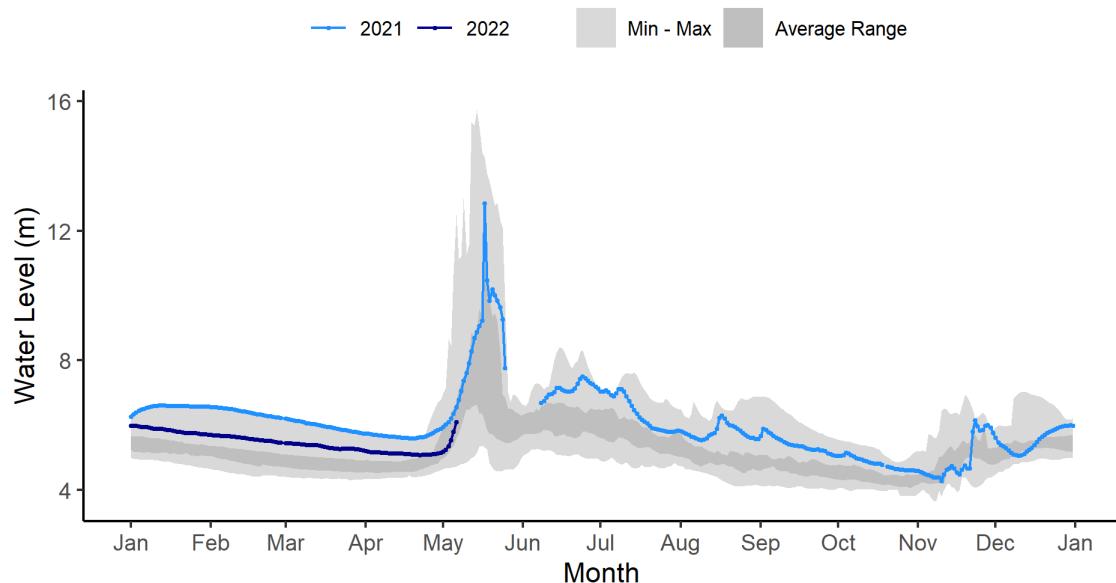
Above - The upper graph in the figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2021). The lower graph shows daily average levels relative to the previous 20 years. Water levels continue to slowly rise, as is normal for this time of year.



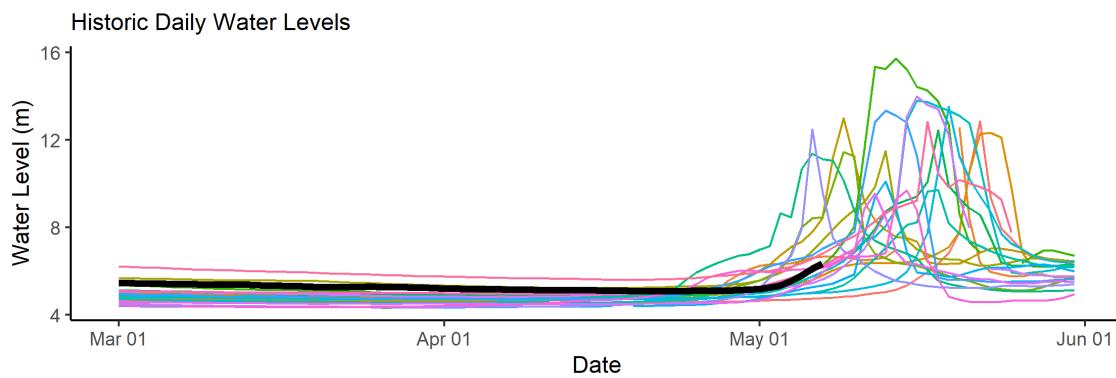
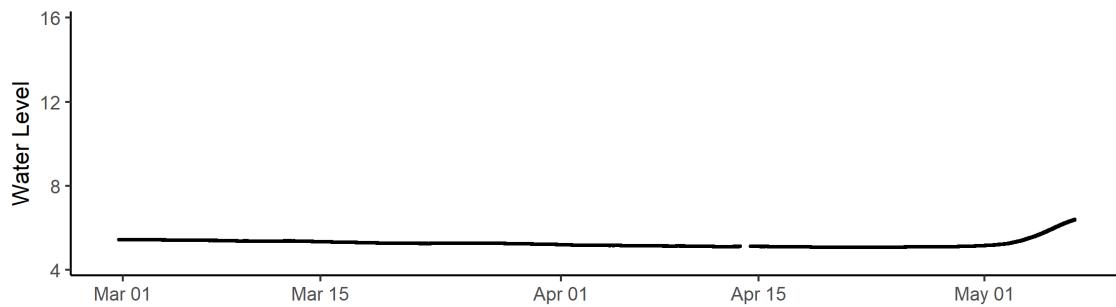
Above – Dehcho (Mackenzie River) at Fort Simpson hydrometric gauge photo from May 07 at 11:00. Photo courtesy of Water Survey of Canada and GNWT.

Water levels on the Dehcho (Mackenzie River) near Fort Simpson are slowly rising and snowmelt is ongoing, but river ice remains stationary at Fort Simpson.

Mackenzie River at Norman Wells [10KA001]:
MACKENZIE RIVER AT NORMAN WELLS (10KA001)



MACKENZIE RIVER AT NORMAN WELLS (10KA001)
2022 Water Levels (5 minute resolution)

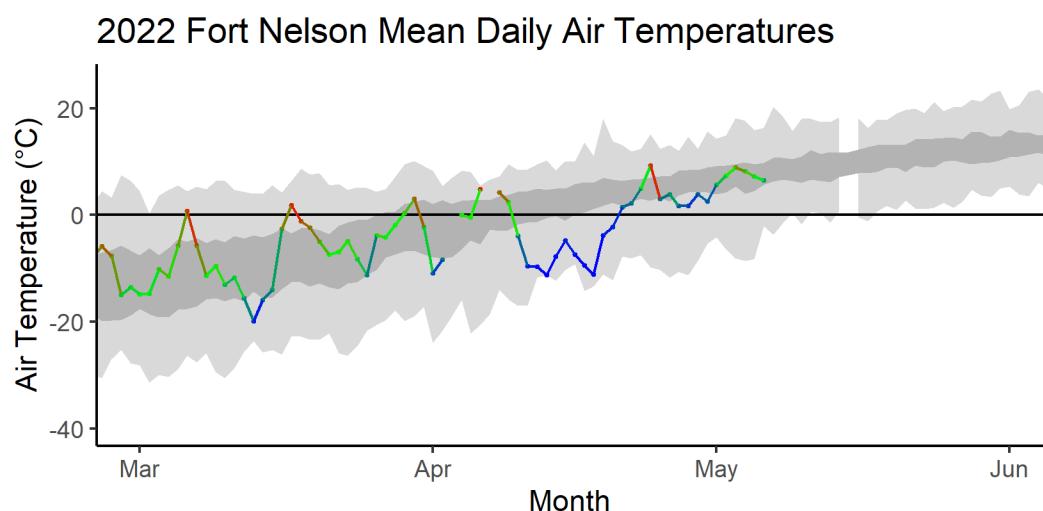
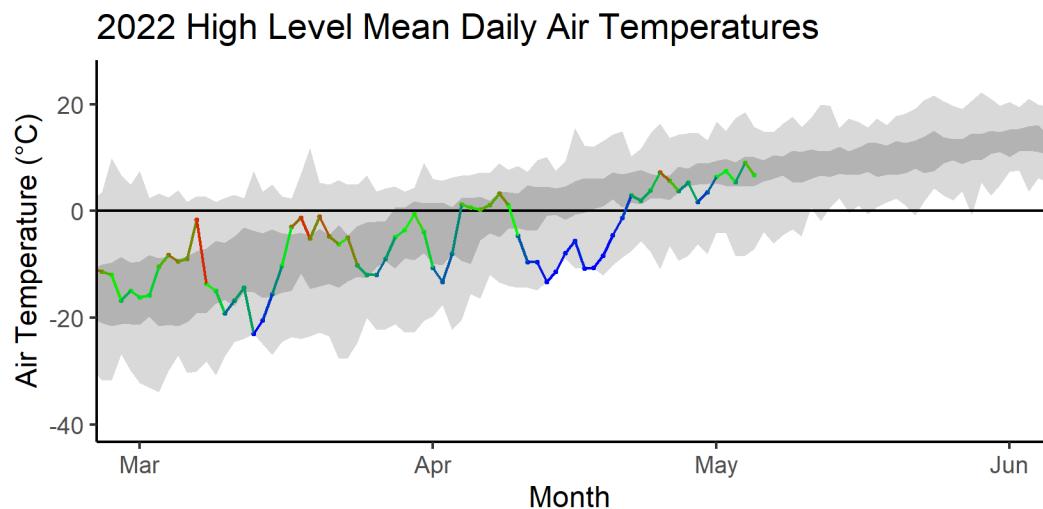


Above – The middle graph in the figure presents real time water level data at 5-minute resolution while the lower graph shows daily average levels relative to the previous 20 years. Water levels on the Mackenzie River at Norman Wells have begun to slowly rise, with the timing being approximately average to previous years.

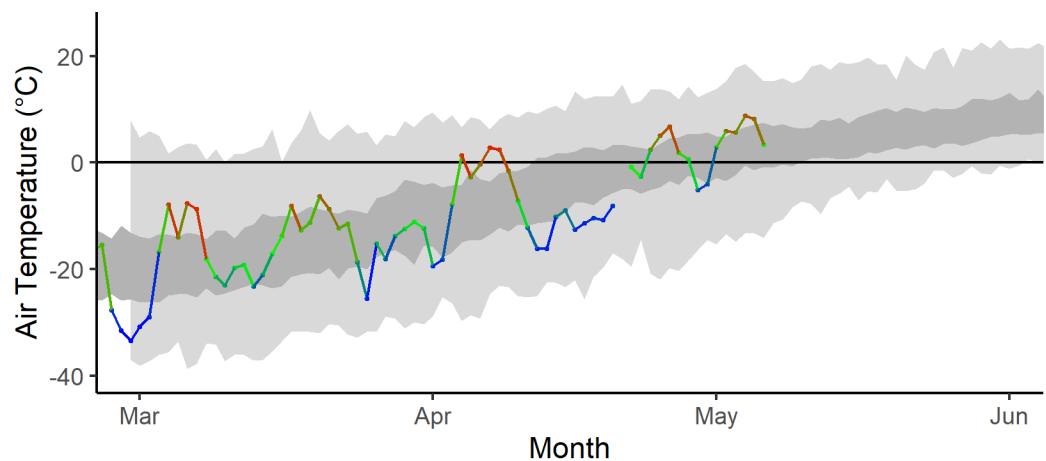
Weather Data:

Weather information informs how snow and ice will melt and provides information about how this spring is unfolding relative to previous springs. 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.

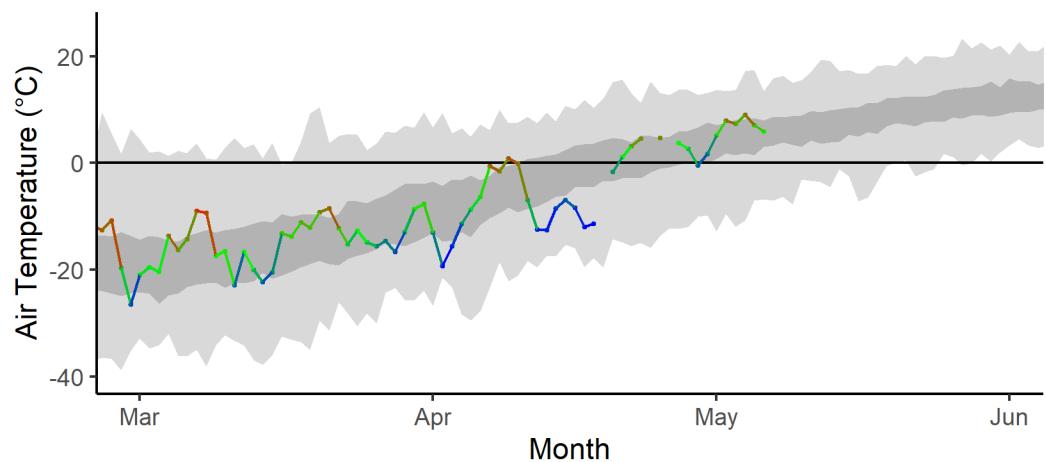
A low-pressure system has developed over the Hay River basin which is bringing significant precipitation (falling as a mix of rain and snow) and cool temperatures. Approximately 25 mm of rain has fallen so far, and models are predicting an additional 50 to 75 mm of precipitation through to Sunday, with localized amounts of up to 100 mm. ECCC has issued a rainfall warning for the Hay River region.



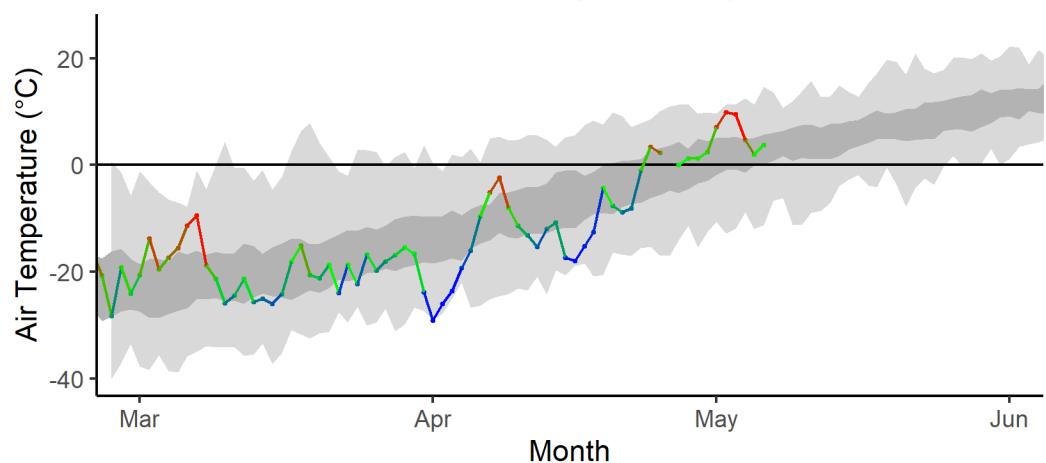
2022 Hay River Mean Daily Air Temperatures



2022 Fort Simpson Mean Daily Air Temperatures



2022 Norman Wells Mean Daily Air Temperatures



High Level seven-day weather forecast:

Sat 7 May	Sun 8 May	Mon 9 May	Tue 10 May	Wed 11 May	Thu 12 May	Fri 13 May
 4°C	 2°C	 1°C	 4°C	 9°C	 15°C	 15°C
Rain	Periods of snow or rain	Periods of snow	Cloudy	Cloudy	A mix of sun and cloud	A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 0°C	 -3°C	 -5°C	 -3°C	 0°C	 2°C	
Snow or rain	Rain or snow	Cloudy	Cloudy	Cloudy periods	Cloudy periods	

Fort Nelson seven-day weather forecast:

▼ Forecast							Hourly Forecast	Alerts	Jet Stream
Sat 7 May	Sun 8 May	Mon 9 May	Tue 10 May	Wed 11 May	Thu 12 May	Fri 13 May			
 5°C	 2°C	 1°C	 8°C	 11°C	 15°C	 16°C			
Periods of rain	Periods of snow mixed with rain	Snow	Periods of snow	Cloudy	A mix of sun and cloud	A mix of sun and cloud			
Tonight	Night	Night	Night	Night	Night	Night			
 -1°C	 -3°C	 -5°C	 -1°C	 2°C	 3°C				
Periods of rain or snow	Periods of snow or rain	Snow	Cloudy	Cloudy periods	Cloudy periods				

Hay River seven-day weather forecast:

Sat 7 May	Sun 8 May	Mon 9 May	Tue 10 May	Wed 11 May	Thu 12 May	Fri 13 May
 2°C	 1°C	 -1°C	 1°C	 6°C	 8°C	 9°C
Rain at times heavy mixed with snow	Snow	Snow	Cloudy	Cloudy	A mix of sun and cloud	A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	Night
 -1°C	 -4°C	 -4°C	 -5°C	 -1°C	 1°C	
Snow or rain	Snow	Periods of snow	Cloudy	Cloudy periods	Cloudy periods	

Fort Simpson seven-day weather forecast:

Forecast							Hourly Forecast	Alerts	Jet Stream
<u>Sat</u> <u>7 May</u>	<u>Sun</u> <u>8 May</u>	<u>Mon</u> <u>9 May</u>	<u>Tue</u> <u>10 May</u>	<u>Wed</u> <u>11 May</u>	<u>Thu</u> <u>12 May</u>	<u>Fri</u> <u>13 May</u>			
 3°C Periods of rain	 1°C Snow	 0°C Snow	 2°C Cloudy	 8°C A mix of sun and cloud	 13°C A mix of sun and cloud	 14°C A mix of sun and cloud			
Tonight  -2°C Snow	Night  -4°C Snow	Night  -4°C Cloudy	Night  -3°C Cloudy	Night  0°C Cloudy periods	Night  2°C Cloudy periods	Night			

Norman Wells seven-day weather forecast:

<u>Sat</u> <u>7 May</u>	<u>Sun</u> <u>8 May</u>	<u>Mon</u> <u>9 May</u>	<u>Tue</u> <u>10 May</u>	<u>Wed</u> <u>11 May</u>	<u>Thu</u> <u>12 May</u>	<u>Fri</u> <u>13 May</u>			
 5°C Mainly cloudy	 3°C Mainly cloudy	 6°C Sunny	 8°C A mix of sun and cloud	 7°C Cloudy	 12°C A mix of sun and cloud	 12°C A mix of sun and cloud			
Tonight  -2°C Mainly cloudy	Night  -8°C Clear	Night  -2°C Clear	Night  -2°C Cloudy	Night  -1°C Cloudy periods	Night  1°C Cloudy periods	Night			

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.