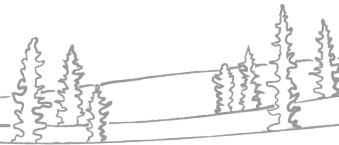




NWT Water Monitoring Bulletin

– May 05, 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:

- Break up is under way in the Hay River basin. Ice is moving in many sections of the Hay River and is very dynamic;
- There is a significant precipitation event (starting as rain, turning to snow) forecast over the Hay River basin beginning tonight and running through to Monday and will be accompanied by cooler than normal temperatures;
- Some ice movement on the Dehcho (Mackenzie River) was reported around Fort Providence and Strong Point (between Jean Marie River and Fort Simpson), but Liard and Mackenzie ice is still solid at Fort Simpson;
- Water levels continue to rise slowly on the Liard River at Fort Liard;
- Warmer than normal temperatures are forecast over the Dehcho for today and tomorrow;
- The initiation of spring break up has been delayed relative to average break up times due to cooler than normal spring temperatures;
 - For example, Fort Simpson experienced the third coldest April in the last 35 years

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 (07OB001) gauge has a current level of approximately 288 m. The Hay River near Hay River gauge has a current level of approximately 5.8 m. This **does not mean** that the water level at the Hay River at the border site is 282 m higher than the water level at the Hay River near Hay River site.

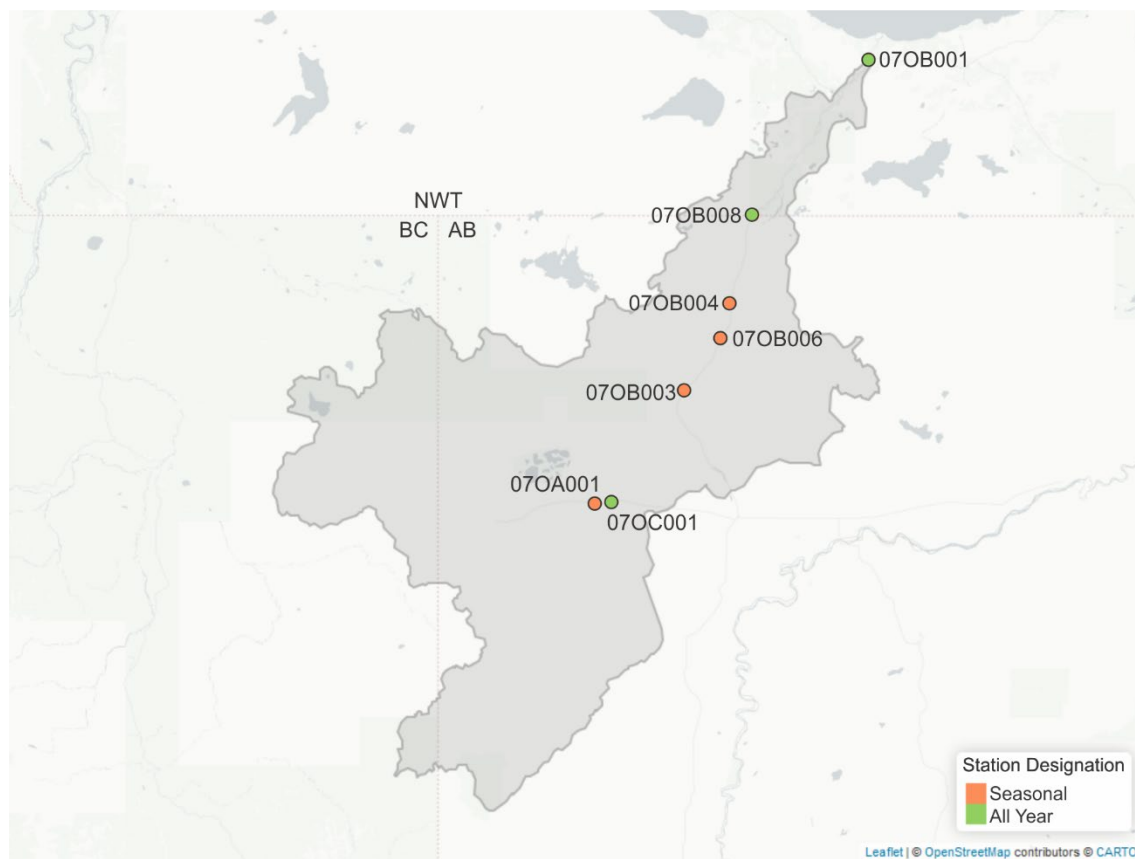
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Hay River:

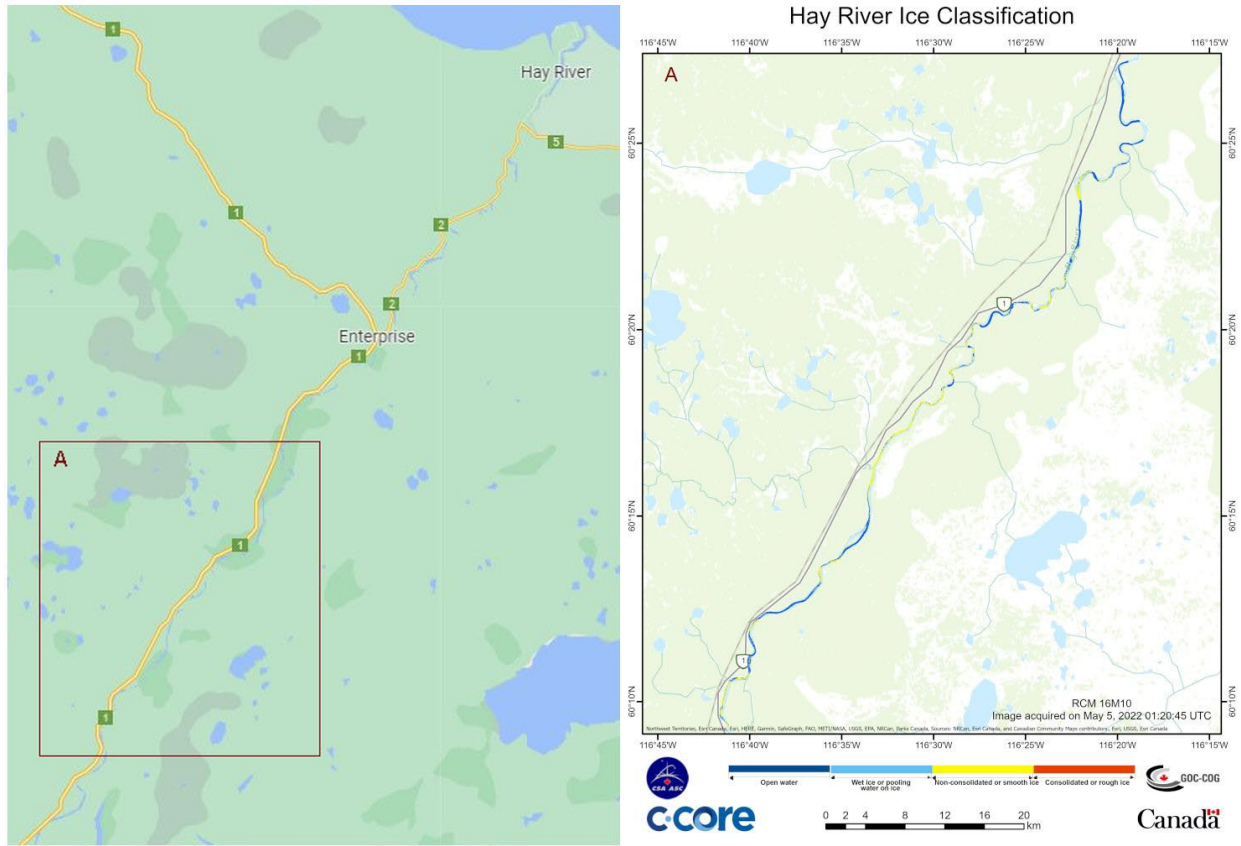
Current Status:

- Snowmelt is ongoing in the northern part of the basin and has concluded in the southern reaches;
- Weather forecast models are showing a system moving over the Hay River basin from Friday to Monday. This system will bring a significant amount of precipitation (about 30 to 80 mm, depending on which model is used), starting as rain and turning to snow. Rain brings additional energy to melt snow and ice and will bring large volumes of additional water. Weather will be cool and cloudy over the weekend which could limit further ice melt;
- Ice is moving along stretches of the Hay River. The system is very dynamic right now and local conditions are constantly changing;
- 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 Imagery:

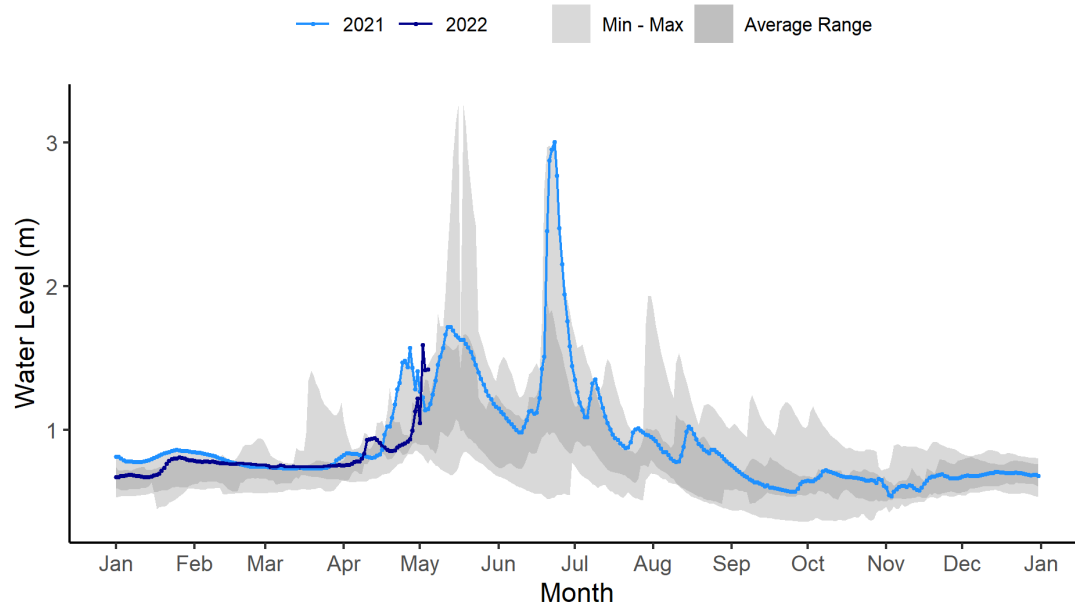


Above – Radar satellite imagery of Hay River showing classified river ice for the section identified on the map (on the left) by box (A).

Hydrometric Data:

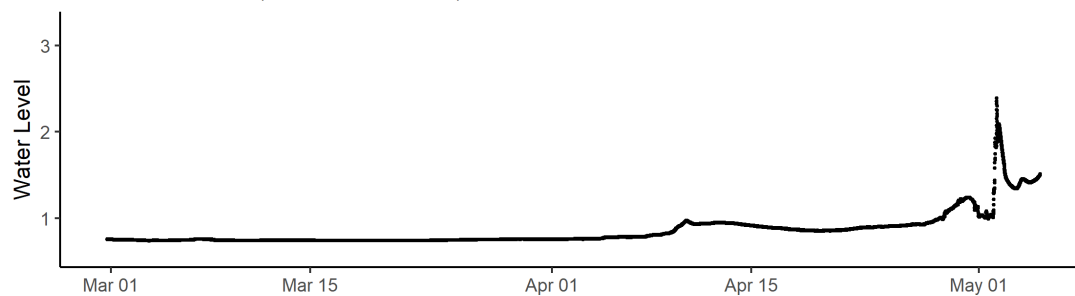
Chinchaga River near High Level (Alberta) [07OC001]:

CHINCHAGA RIVER NEAR HIGH LEVEL (07OC001)

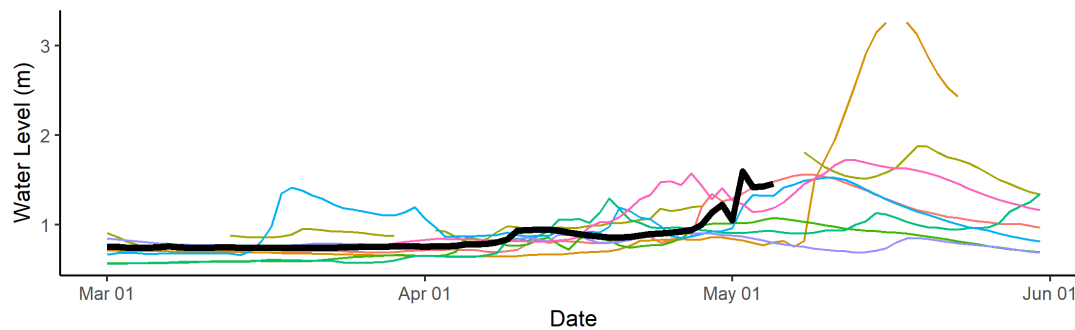


CHINCHAGA RIVER NEAR HIGH LEVEL (07OC001)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels

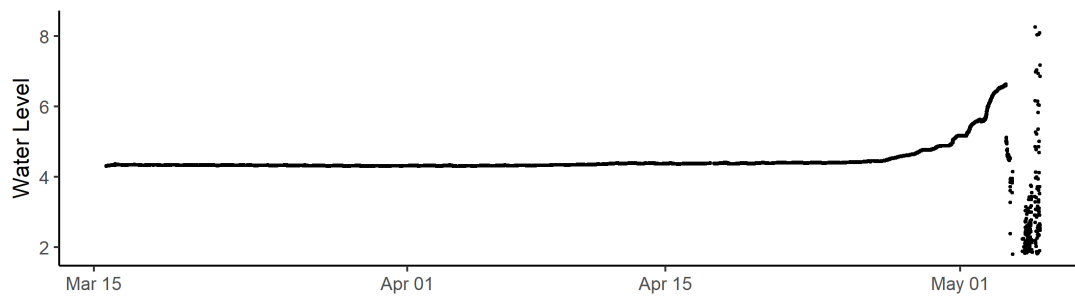


Above – Water level data at the Chinchaga River near High Level, AB. This plot shows high resolution (5 minute) water level data in the middle, and daily average data on the bottom. An ice jam and release can be observed on May 02.

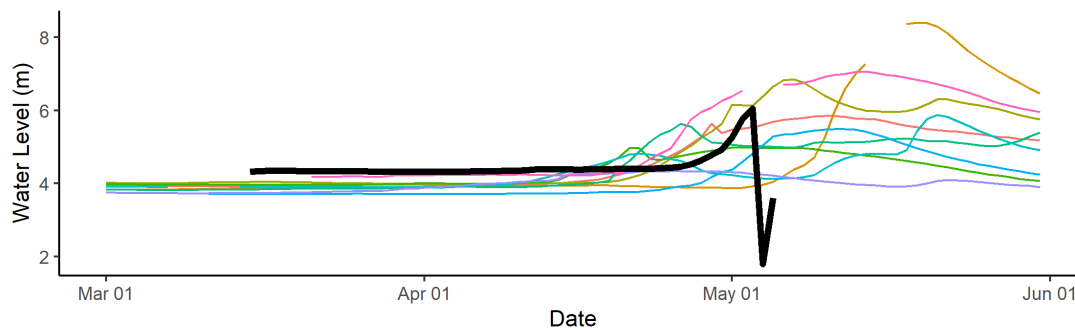
Hay River near Meander River (Alberta) [070B003]:

HAY RIVER NEAR MEANDER RIVER (070B003)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels

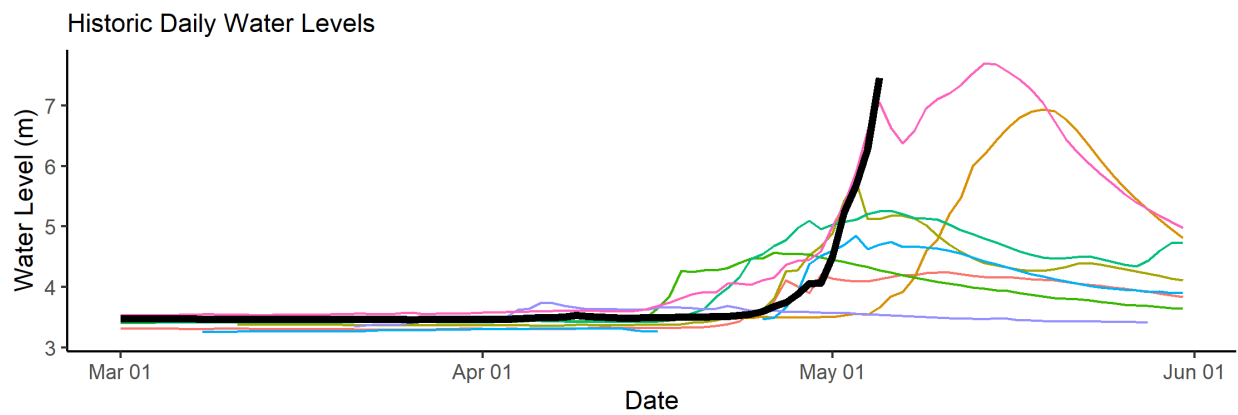
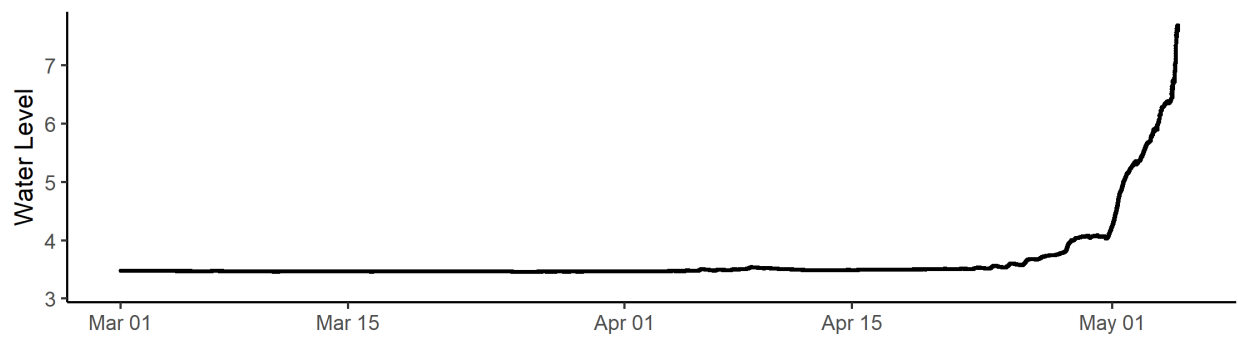


Above – Water level data on the Hay River near Meander River, AB. The hydrometric gauge appears to have been impacted by ice.



Above – Image of Hay River near Meander River bridge on May 04. Photo courtesy of Travis Wright, Hay River Director of Public Services

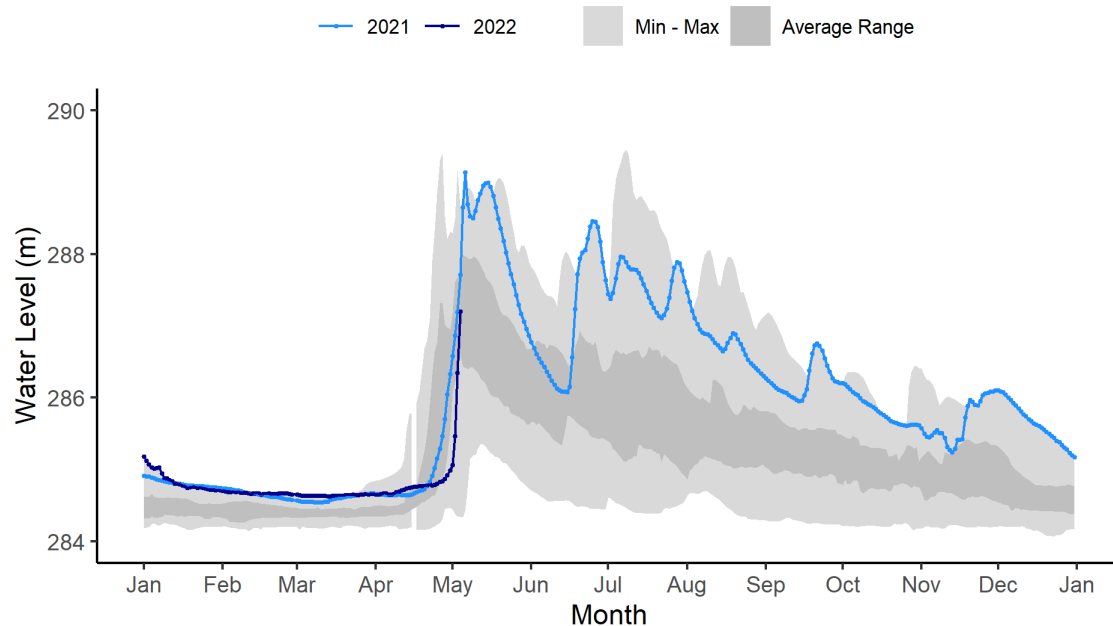
Steen River near Steen River (Alberta) [07OB004]:
STEEN RIVER NEAR STEEN RIVER (07OB004)
2022 Water Levels (5 minute resolution)



Above – Water level data on the Steen River near Steen River, AB. The Steen River is a small tributary to the Hay River. Water levels have been rapidly rising since May 01.

Hay River near the border [07OB008]:

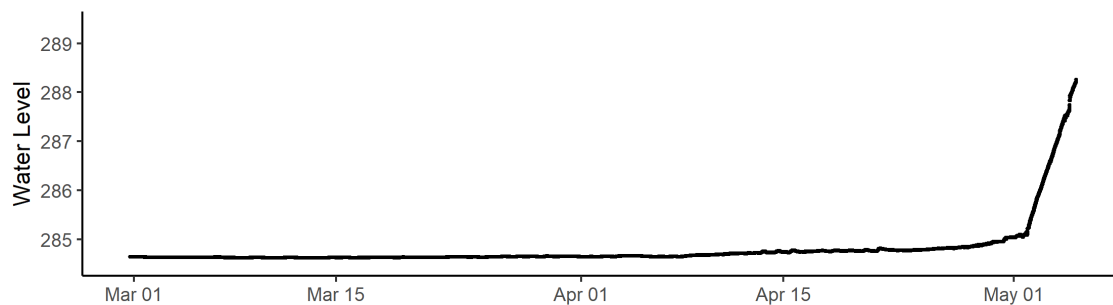
HAY RIVER NEAR ALTA/NWT BOUNDARY (07OB008)



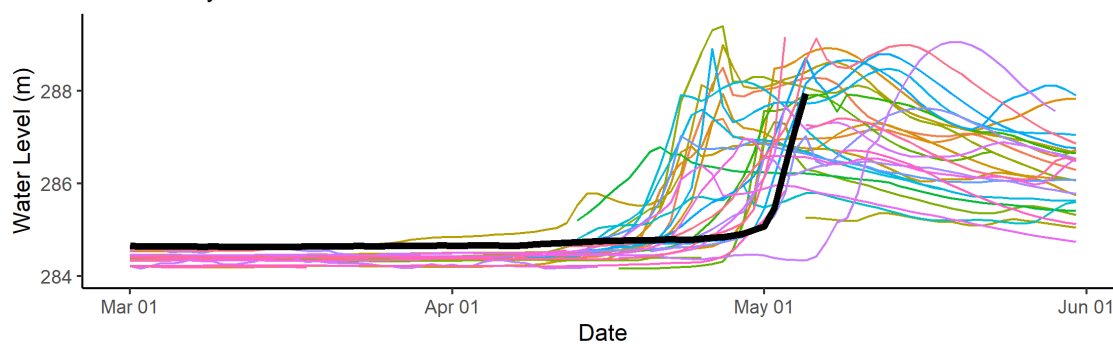
Above - hydrograph of daily average levels for the previous two years. Note that the most recent point on this graph shows the **daily average level from May 04** (yesterday).

HAY RIVER NEAR ALTA/NWT BOUNDARY (07OB008)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels



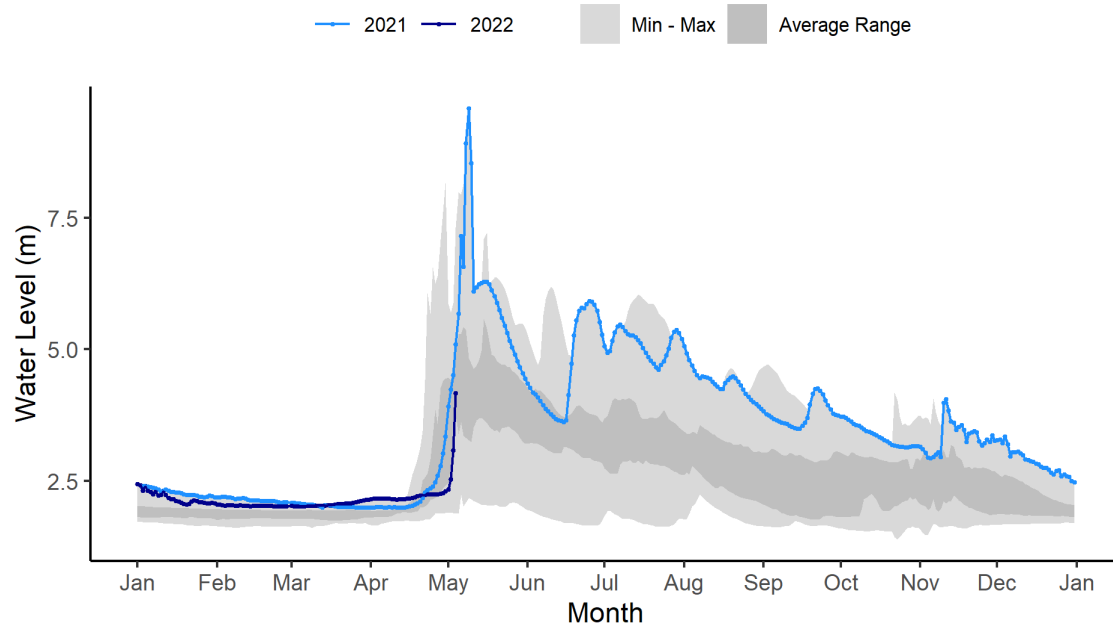
Above - The upper graph in the figure presents real time water level data at 5-minute resolution **until 09:00 on May 05** (288.3 m), while the lower graph shows daily average levels relative to the previous 20 years



Above – Hay River near the border hydrometric gauge photo on May 05 at 10:00. Photo courtesy of Water Survey of Canada and GNWT.

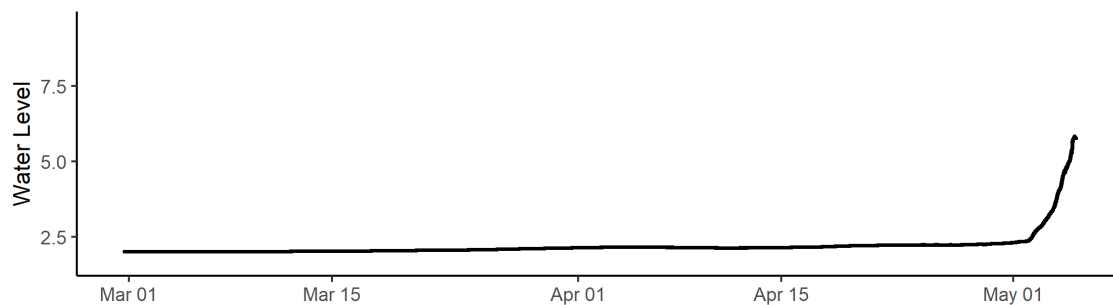
Water levels continue to rise steadily at the Hay River near the AB-NWT border site.

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

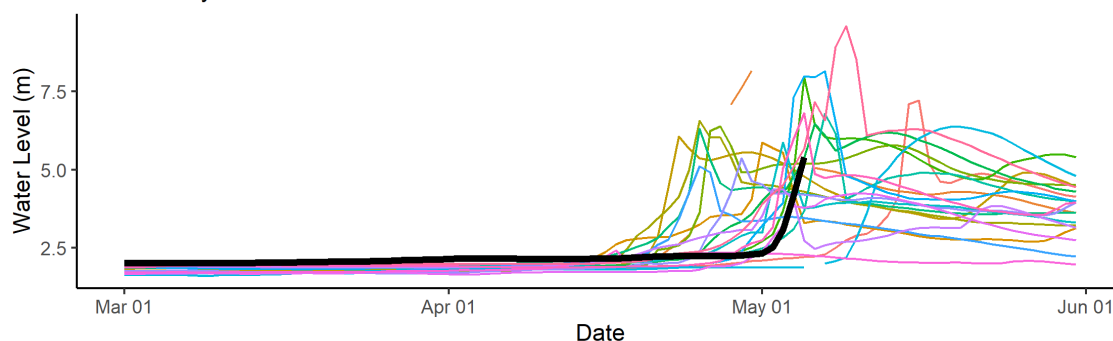


Above – hydrograph of daily average levels for the previous two years. Note that the most recent point on this graph shows the **daily average level from May 04** (yesterday).

HAY RIVER NEAR HAY RIVER (07OB001) 2022 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 **until 09:00 on May 05** (5.8 m), while 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 05 at 11:00. Photo courtesy of Water Survey of Canada and GNWT.

Liard River:

Current Status:

- Snowpack continues to melt across the basin;
- There have been reports of the Fort Nelson River (major tributary to the Liard River) breaking in Fort Nelson;
 - The Muskwa River (tributary to Fort Nelson River) gauge showed signs of ice breaking on May 03;
- Water levels are slowly beginning to rise underneath the ice at the Liard River at Fort Liard;
- Break up was reported to start in the Upper Liard (YT), and there was reported ice movement in the NT around the mouth of the Birch River;
- Warmer than normal temperatures and forecast for today and tomorrow.

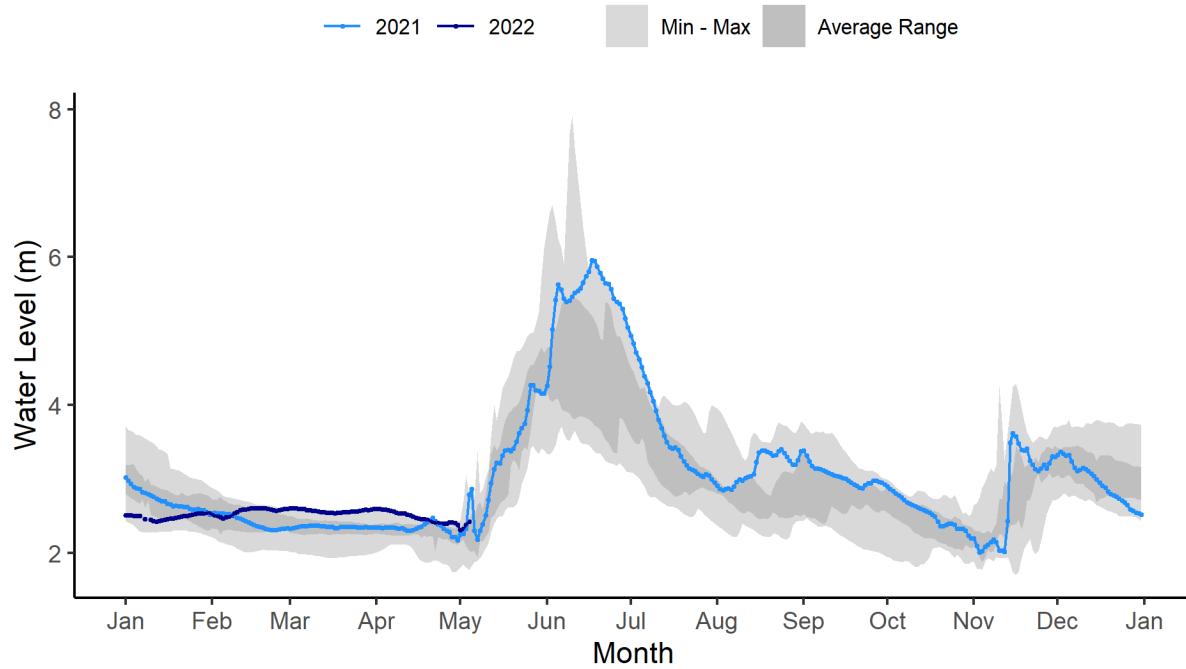


Above – Map of hydrometric stations in the Liard River basin. The station numbers are referenced in the water level plots below.

Hydrometric Data:

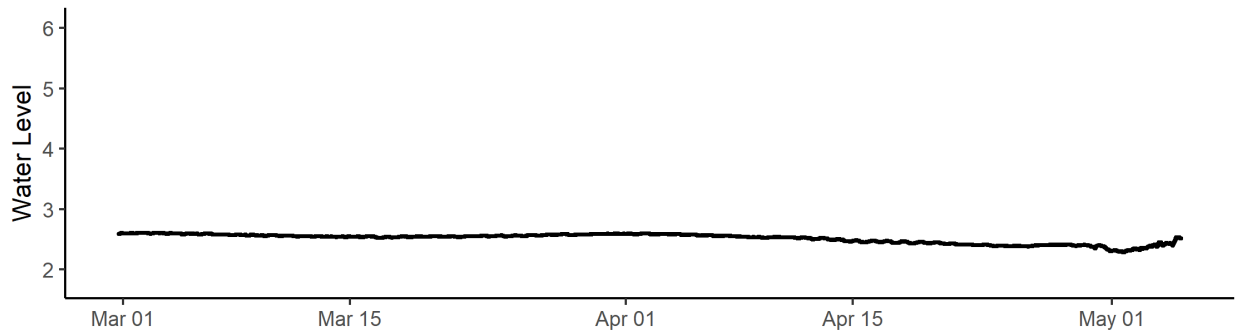
Liard River at Upper Crossing (Yukon) [10AA001]:

LIARD RIVER AT UPPER CROSSING (10AA001)

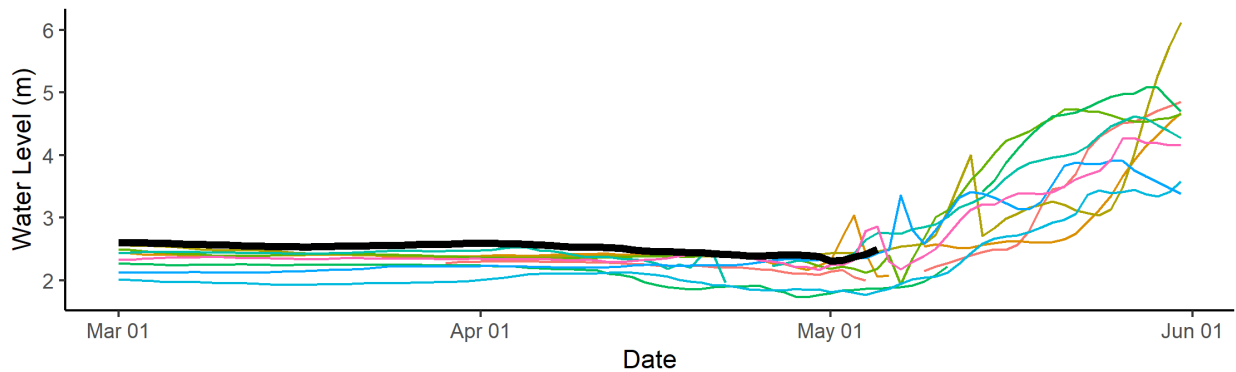


LIARD RIVER AT UPPER CROSSING (10AA001)

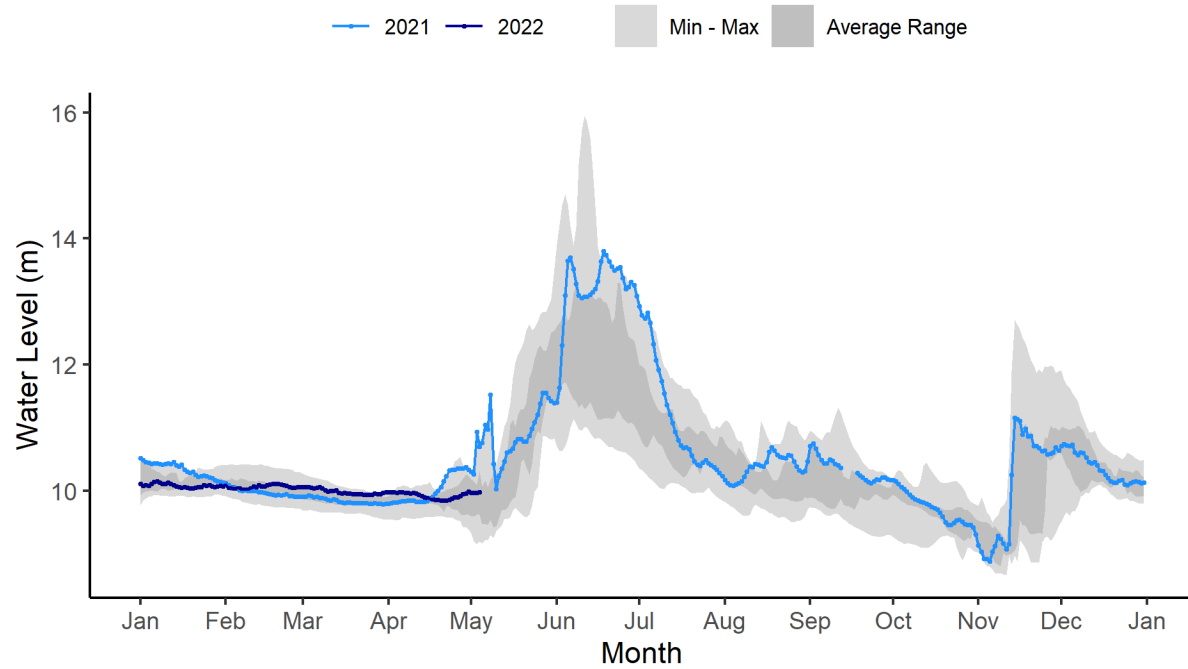
2022 Water Levels (5 minute resolution)



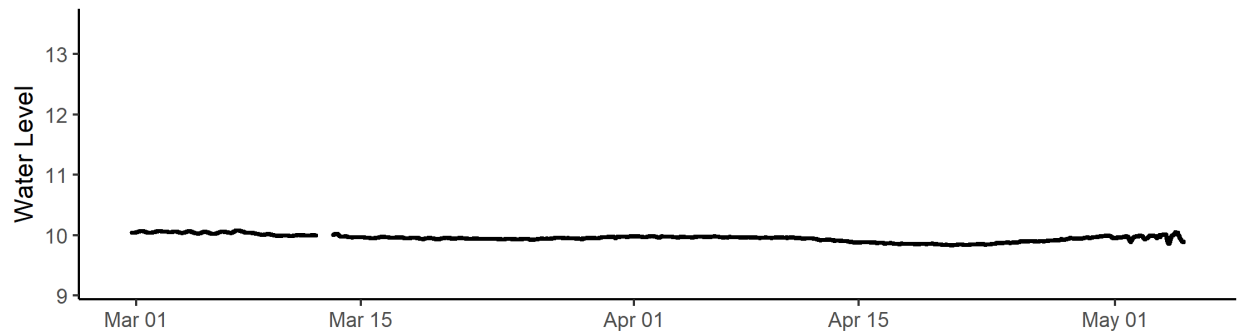
Historic Daily Water Levels



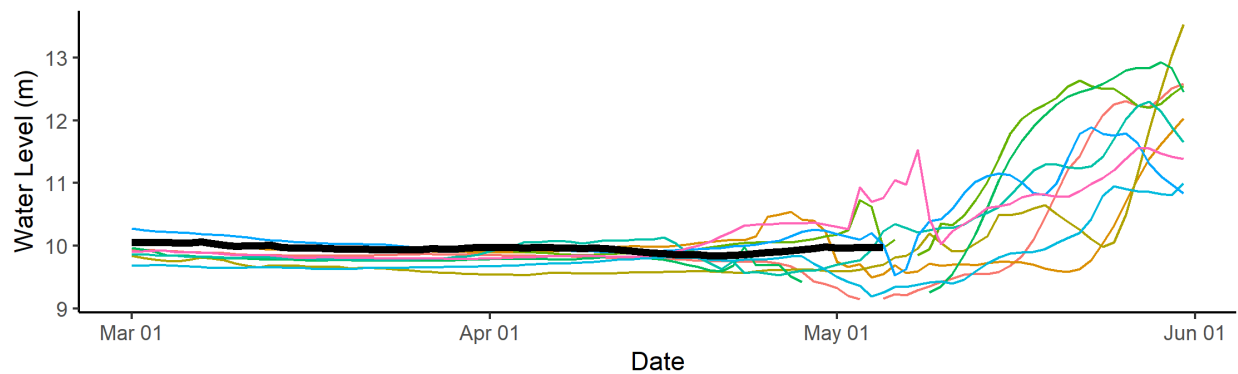
Liard River at Lower Crossing (British Columbia) [10BE001]:
 LIARD RIVER AT LOWER CROSSING (10BE001)



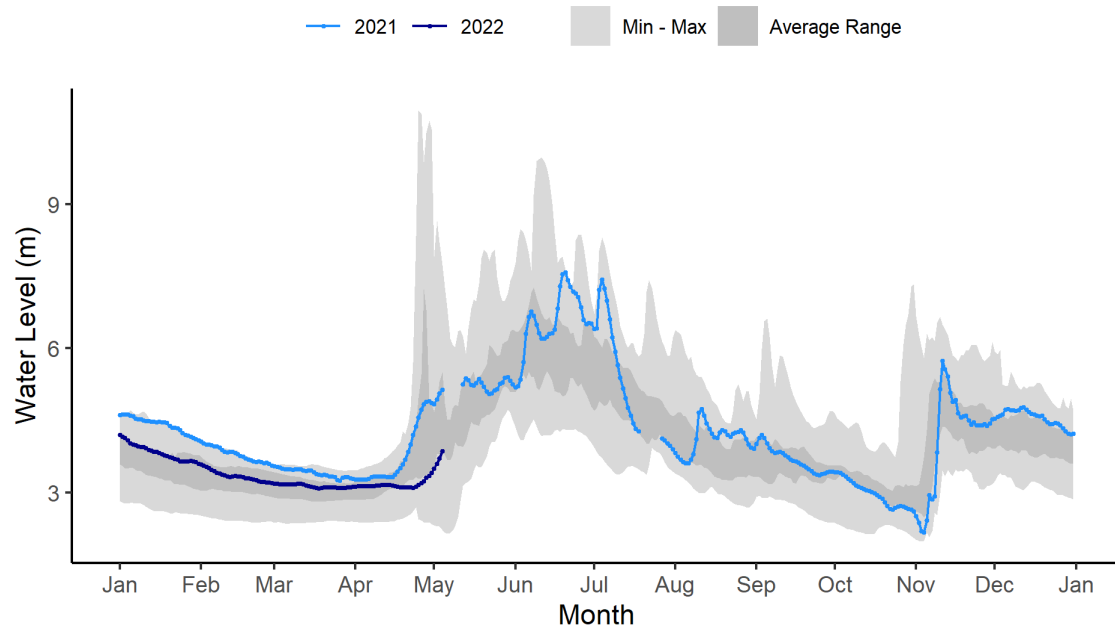
LIARD RIVER AT LOWER CROSSING (10BE001)
 2022 Water Levels (5 minute resolution)



Historic Daily Water Levels

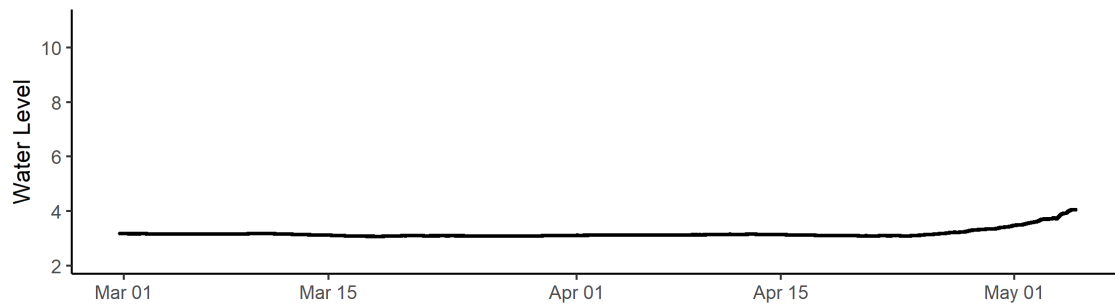


Liard River at Fort Liard [10ED001]:
LIARD RIVER AT FORT LIARD (10ED001)

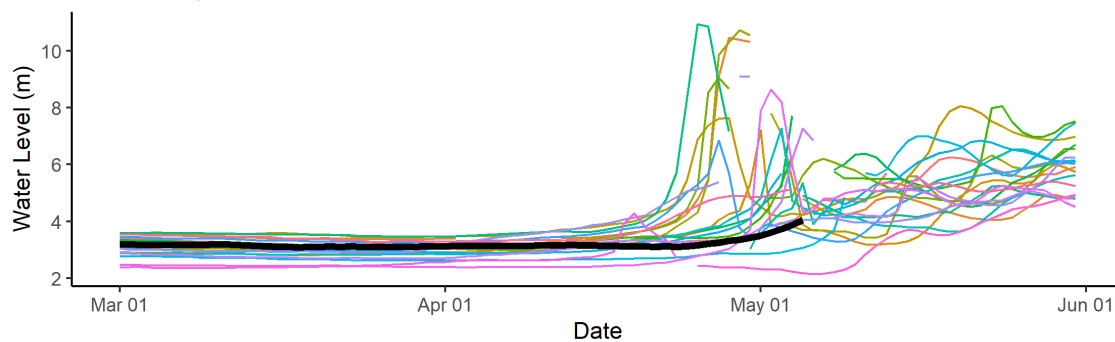


Above – hydrograph of daily average levels for the previous two years. The spring water level rise is delayed relative to previous years.

LIARD RIVER AT FORT LIARD (10ED001)
2022 Water Levels (5 minute resolution)



Historic Daily Water Levels

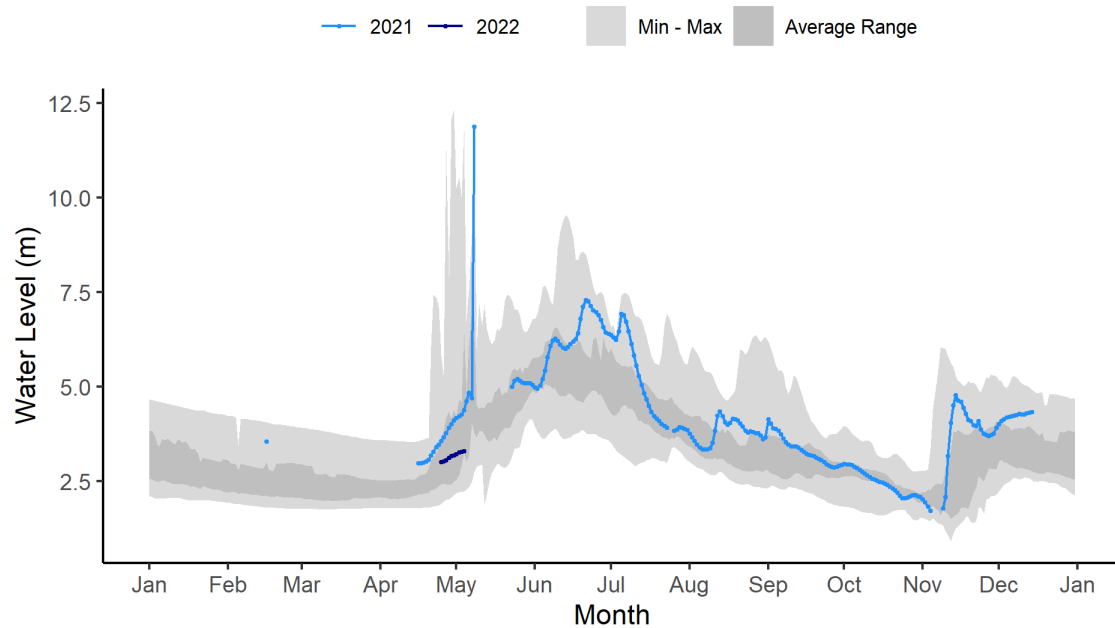




Above – Liard River at Fort Liard hydrometric gauge photo from May 05 at 07:00. Photo courtesy of Water Survey of Canada and GNWT.

Liard River near the mouth [10ED002]:

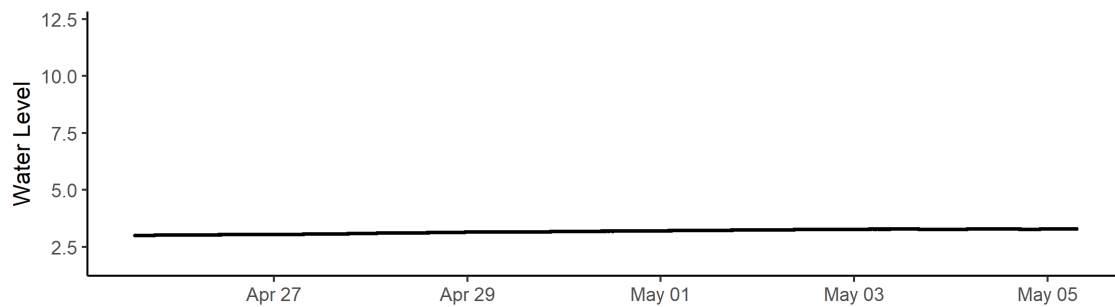
LIARD RIVER NEAR THE MOUTH (10ED002)



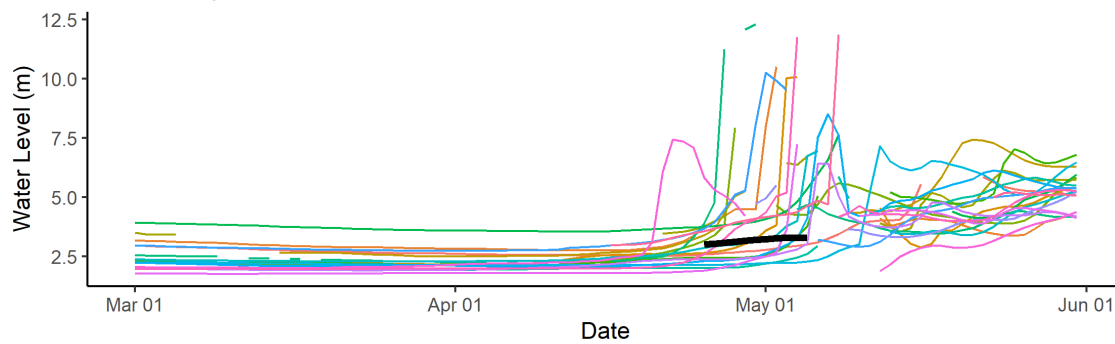
Above – hydrograph of daily average levels for the previous two years. The spring water level rise is delayed relative to previous years.

LIARD RIVER NEAR THE MOUTH (10ED002)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels



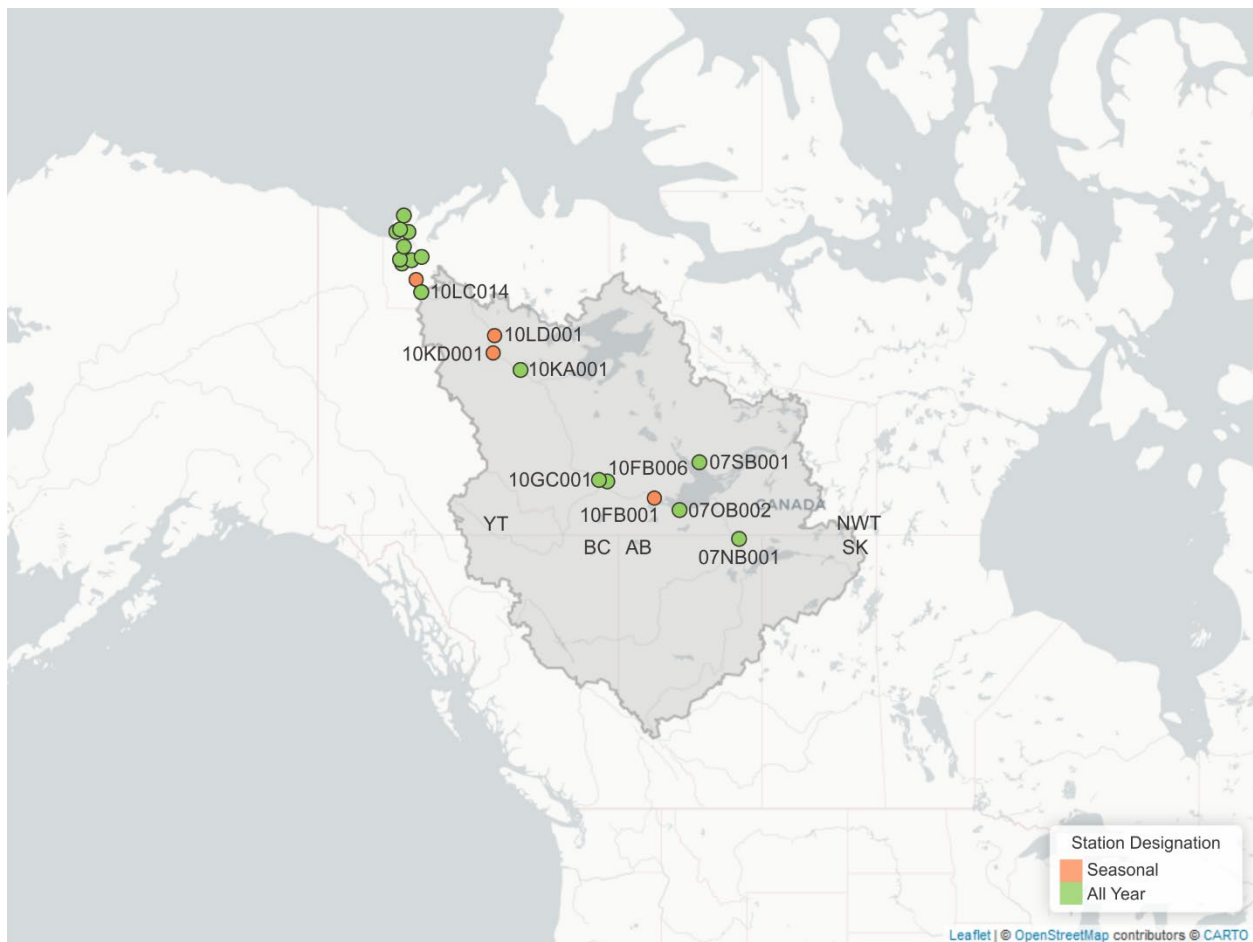


Above – Liard River near the mouth hydrometric gauge photo from May 05 at 7:00. Photo courtesy of Water Survey of Canada and GNWT.

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

Current Status:

- Break up has been delayed this year due to colder than normal temperatures;
 - April air temperatures in Fort Simpson were the third coldest over the past 35 years (the two colder years were 2002 and 2013);
- Break up is progressing along the Peace River (which drains into the Slave River);
- Ice is reported to have begun moving on the Dehcho (Mackenzie River) at Fort Providence, and around Strong Point (between Jean Marie River and Fort Simpson);
 - There was a small ice jam between Strong Point and Fort Simpson in the evening of May 04 which caused a small increase in level at the Strong Point gauge;
- Ice on the Liard and Mackenzie rivers near Fort Simpson is still solid;
- A snow cover remains on the ground in the Dehcho, which will continue to release water to local rivers and streams;
- Environment and Climate Change Canada has forecast above seasonal temperatures for today and tomorrow in the Dehcho region, with temperatures cooling off to below normal over the weekend.

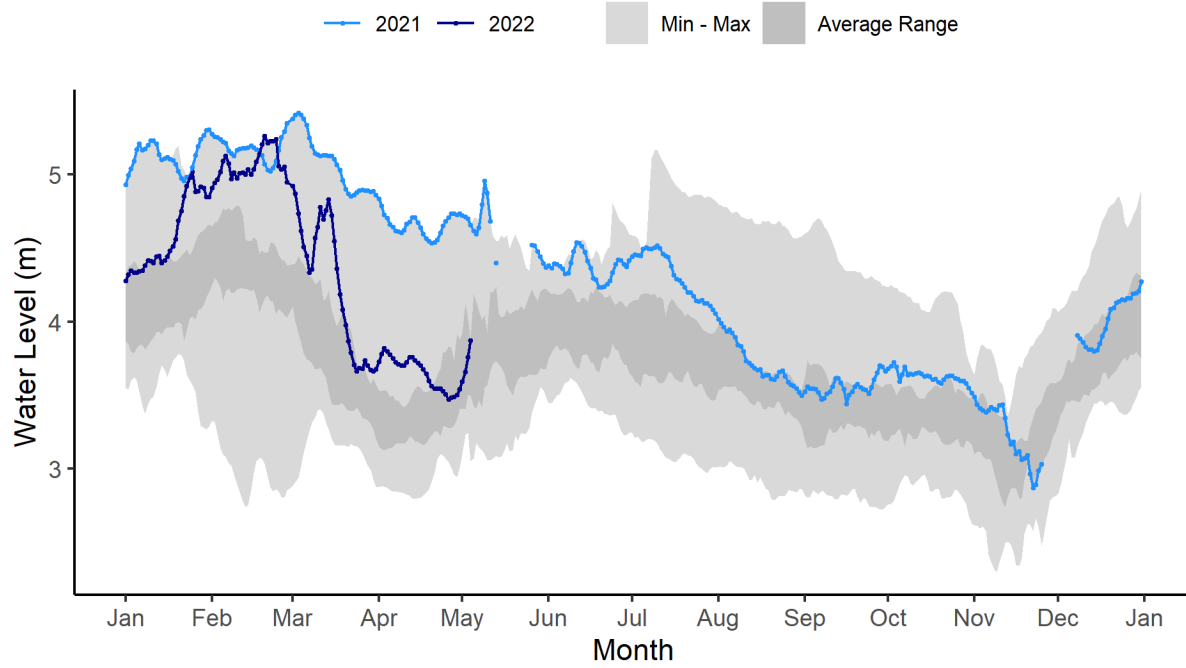


Above – Map of hydrometric stations in the Dehcho (Mackenzie River) basin. The station numbers are referenced in the water level plots below.

Hydrometric Data:

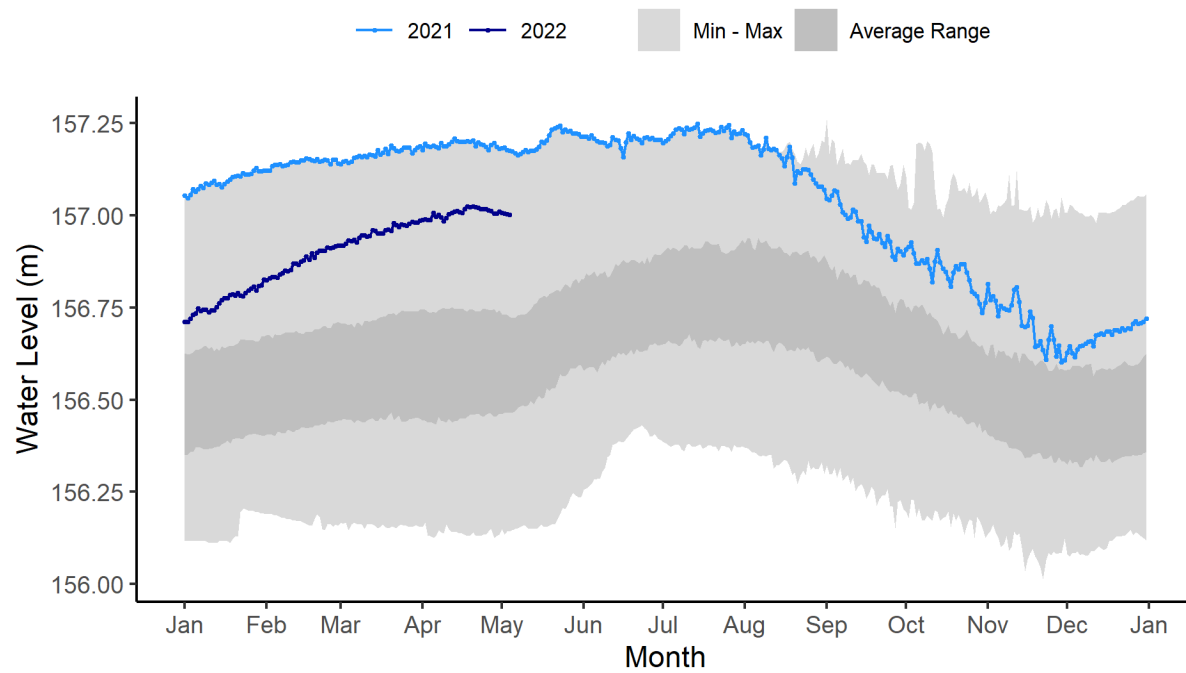
Slave River at Fitzgerald (Alberta) [07NB001]:

SLAVE RIVER AT FITZGERALD (ALBERTA) (07NB001)



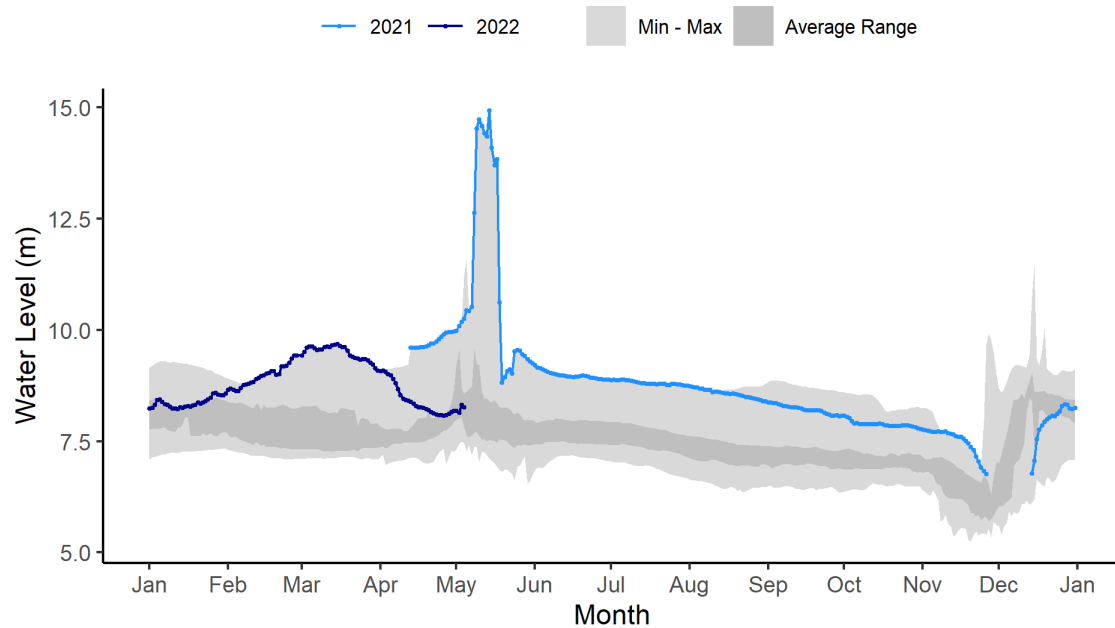
Great Slave Lake at Yellowknife Bay [07SB001]:

GREAT SLAVE LAKE AT YELLOWKNIFE BAY (07SB001)



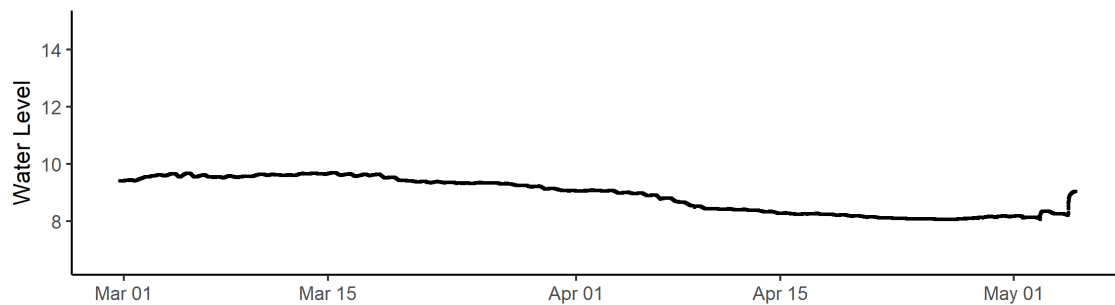
Above – Water levels on Great Slave Lake at Yellowknife Bay for the previous two years. Although water levels have receded since the highs of 2020 and 2021, levels remain much higher than normal.

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

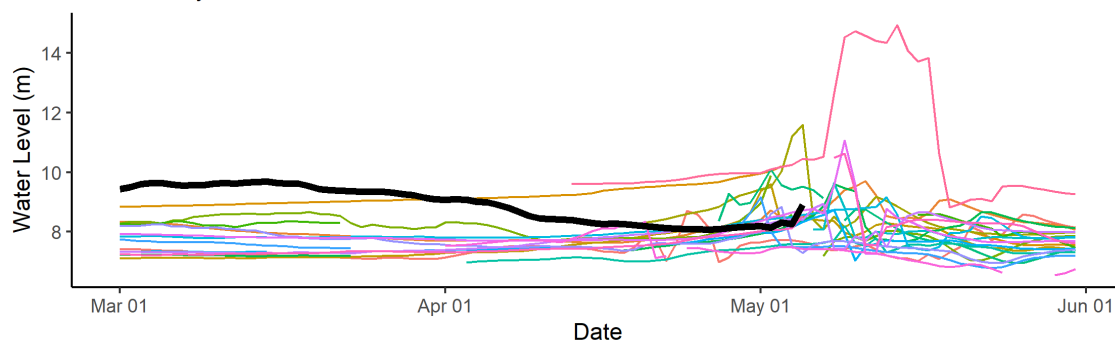


MACKENZIE RIVER AT STRONG POINT (10FB006)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels



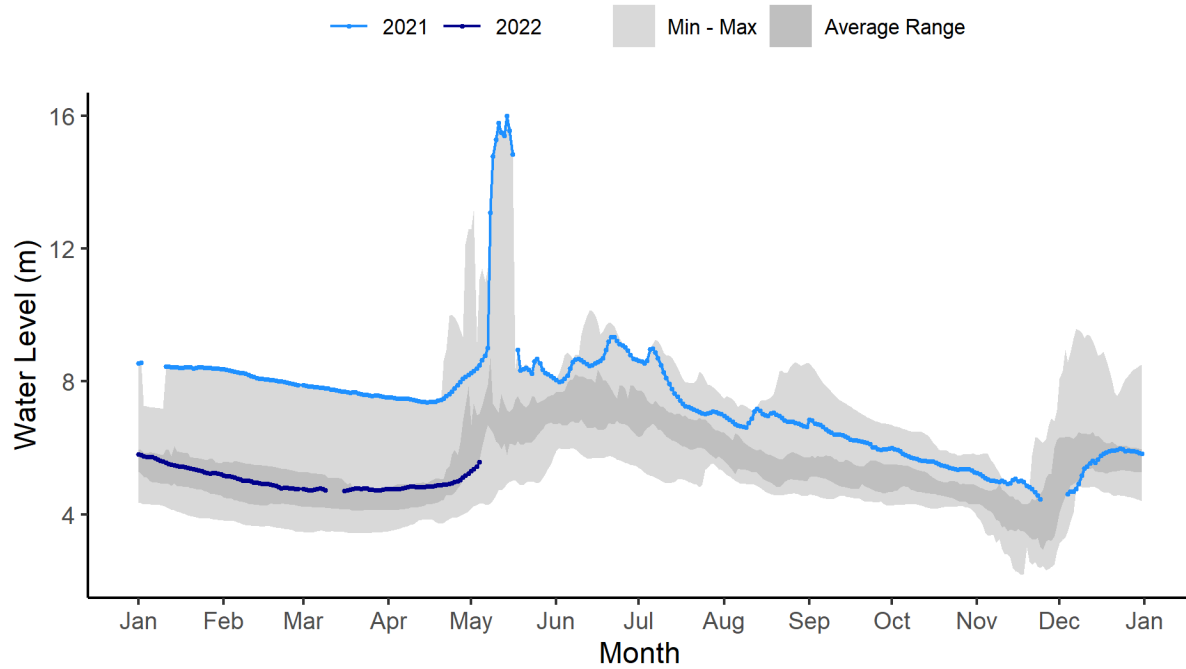
Above – The middle graph in the figure presents real time water level data at 5-minute resolution **until 09:00 on May 05** (9.06 m), while the lower graph shows daily average levels relative to the previous 20 years.



Above – Mackenzie River at Strong Point hydrometric gauge photo from May 05 at 11:00. Photo courtesy of Water Survey of Canada and GNWT.

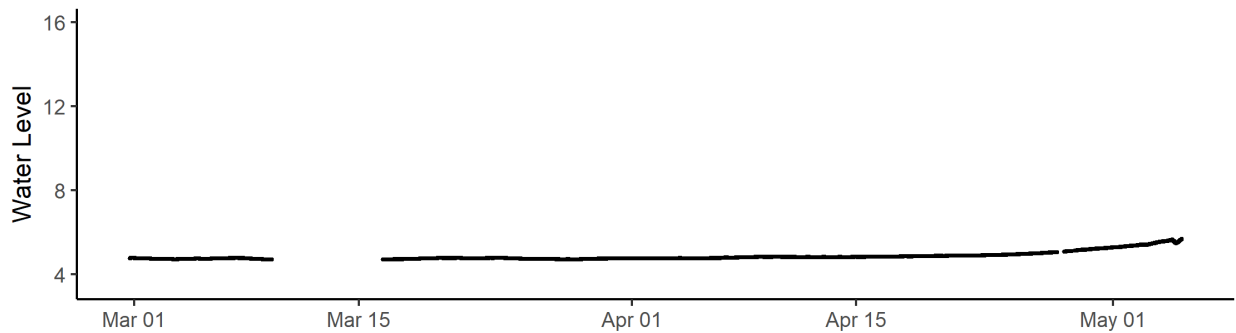
Mackenzie River at Fort Simpson [10GC001]:

MACKENZIE RIVER AT FORT SIMPSON (10GC001)

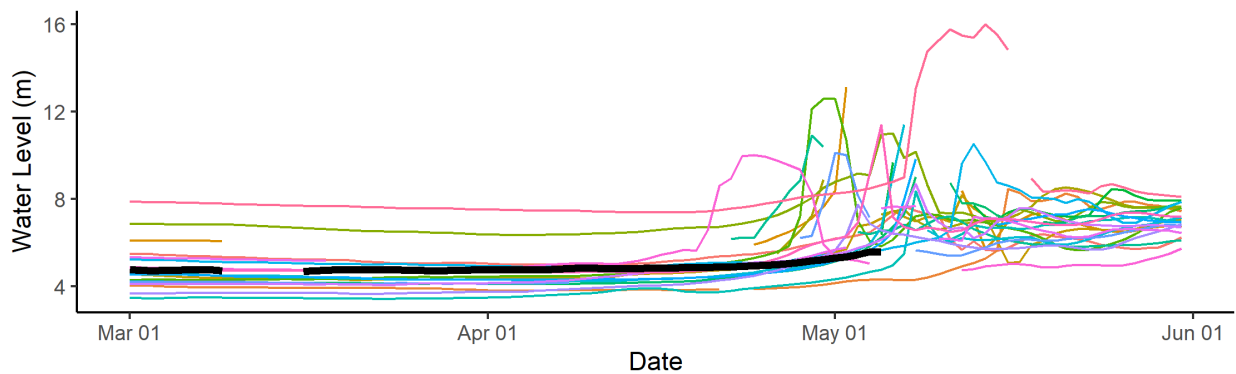


MACKENZIE RIVER AT FORT SIMPSON (10GC001)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels



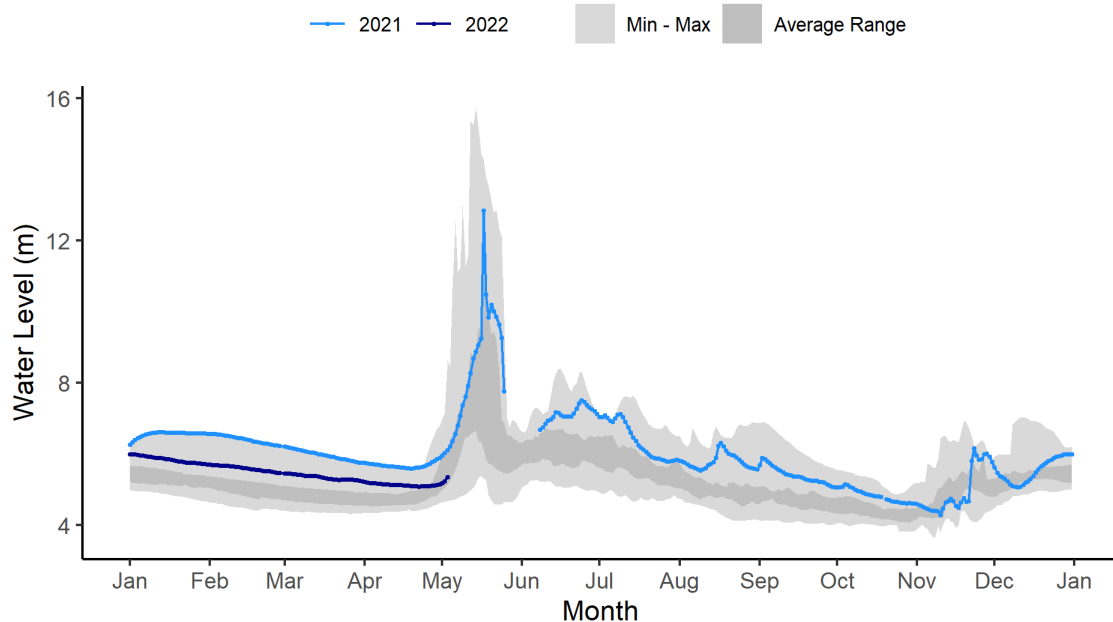


Above – Mackenzie River at Fort Simpson hydrometric gauge photo from May 05 at 07:00. Photo courtesy of Water Survey of Canada and GNWT.

Water levels on the Dehcho (Mackenzie River) near Fort Simpson are beginning to rise and snowmelt is ongoing, but river ice remains solid.

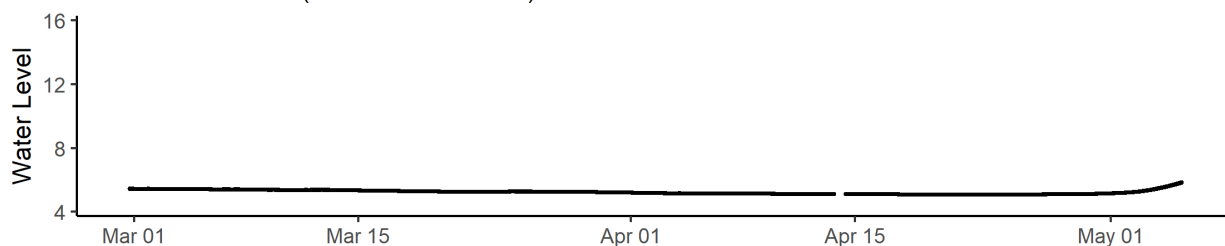
Mackenzie River at Norman Wells [10KA001]:

MACKENZIE RIVER AT NORMAN WELLS (10KA001)

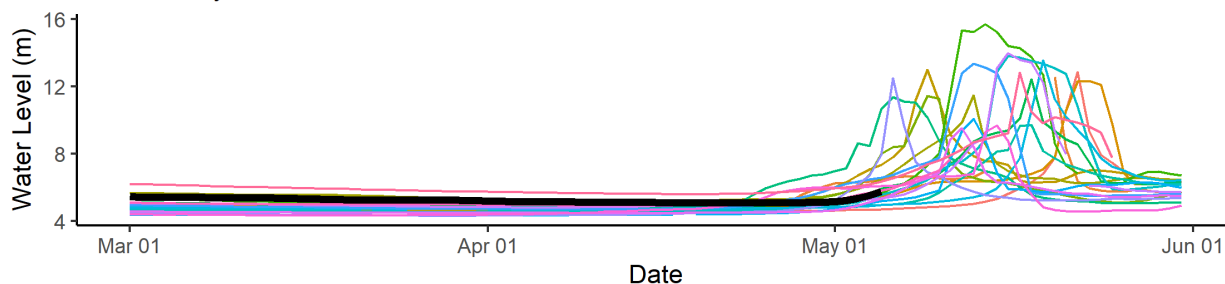


MACKENZIE RIVER AT NORMAN WELLS (10KA001)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels



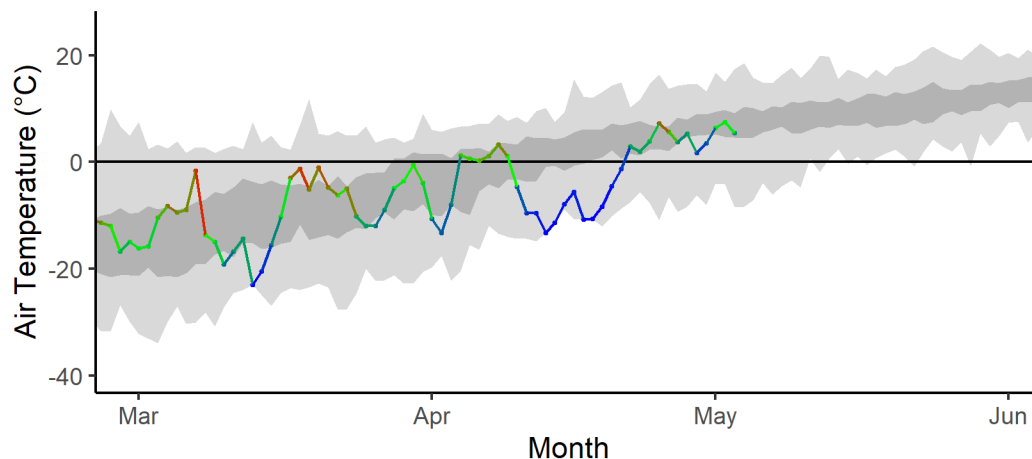
Above – The middle graph in the figure presents real time water level data at 5-minute resolution while the lower graph shows daily average levels relative to the previous 20 years. Water levels on the Mackenzie River at Norman Wells have begun to slowly rise, with the timing being approximately average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

Weather Data:

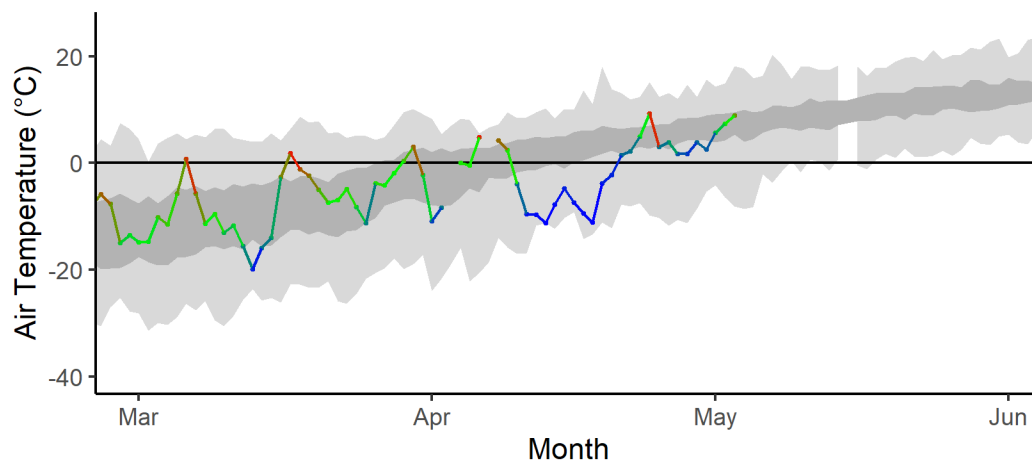
Weather information informs how snow and ice will melt and provides information about how this spring is unfolding relative to previous springs. Locations included here cover basin areas that feed into NWT rivers that are currently undergoing break up. The first set of plots show how temperatures have been relative to average (dark grey band) this spring, while the second set is Environment and Climate Change Canada weather forecast data for the next seven days.

Temperatures in regions where break up is ongoing have been between average and above average for the previous three days. Temperatures are forecast to remain high for the next two days, followed by lower-than-normal temperatures over the weekend. The Hay River basin is expected to see significant precipitation (starting as rain, turning to snow) over the weekend.

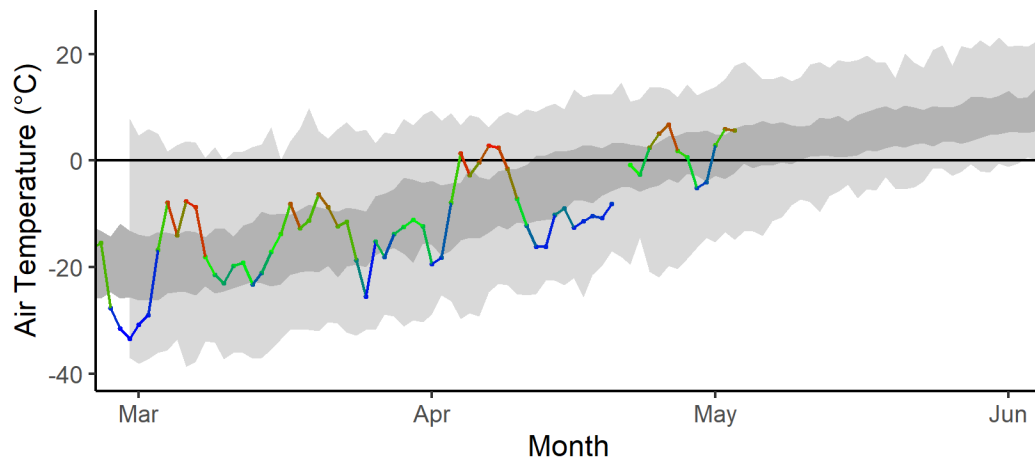
2022 High Level Mean Daily Air Temperatures



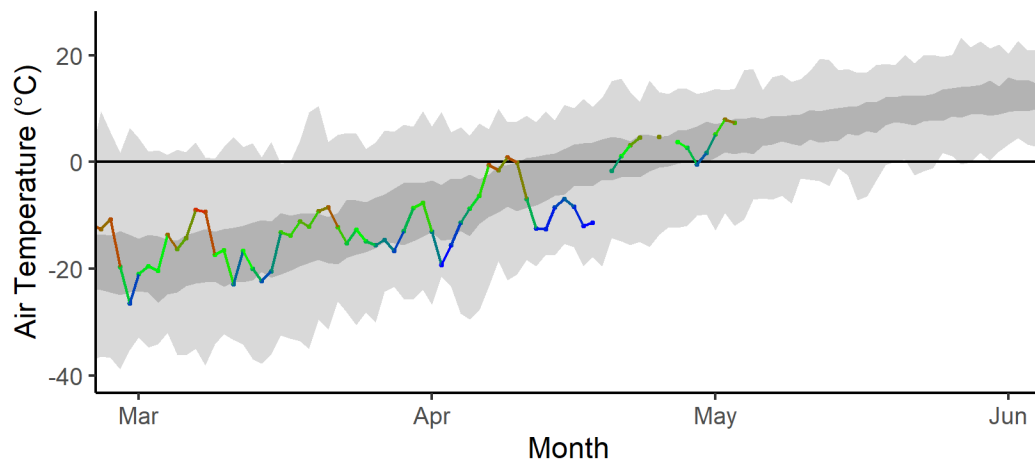
2022 Fort Nelson Mean Daily Air Temperatures



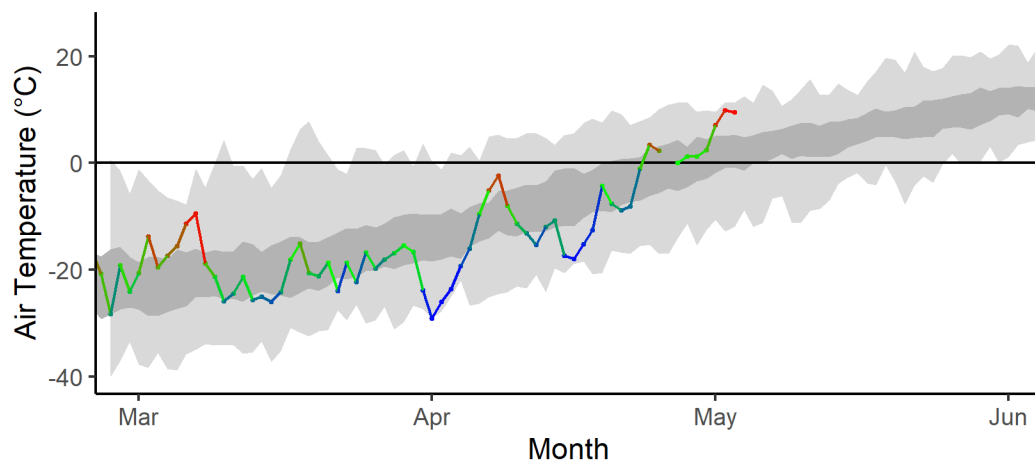
2022 Hay River Mean Daily Air Temperatures
















2022 Fort Simpson Mean Daily Air Temperatures
















2022 Norman Wells Mean Daily Air Temperatures
















High Level seven-day weather forecast:

<u>Thu</u> 5 May	Fri 6 May	Sat 7 May	Sun 8 May	Mon 9 May	Tue 10 May	Wed 11 May
 15°C 30% Chance of showers	 10°C Rain	 3°C Rain or snow	 5°C Snow or rain	 5°C Periods of snow	 10°C A mix of sun and cloud	 12°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 6°C 30% Chance of showers	 1°C Rain	 -1°C Rain or snow	 -4°C Periods of snow	 -3°C Cloudy periods	 -1°C Cloudy periods	














Fort Nelson seven-day weather forecast:

▼ Forecast							Hourly Forecast	Alerts	Jet Stream
<u>Thu</u> 5 May	Fri 6 May	Sat 7 May	Sun 8 May	Mon 9 May	Tue 10 May	Wed 11 May			
 14°C A mix of sun and cloud	 12°C 60% Chance of showers	 6°C 60% Chance of showers	 1°C Snow	 11°C Snow	 13°C A mix of sun and cloud	 13°C A mix of sun and cloud			
Tonight	Night	Night	Night	Night	Night				
 3°C 60% Chance of showers	 1°C 60% Chance of showers	 -1°C Rain or snow	 -3°C Periods of snow	 0°C Cloudy periods	 0°C Cloudy periods				














Hay River seven-day weather forecast:

▼ Forecast							Hourly Forecast	Alerts	Jet Stream
<u>Thu</u> 5 May	Fri 6 May	Sat 7 May	Sun 8 May	Mon 9 May	Tue 10 May	Wed 11 May			
 15°C A mix of sun and cloud	 5°C 30% Chance of showers	 1°C Rain or snow	 0°C Snow	 -1°C Snow	 4°C A mix of sun and cloud	 6°C A mix of sun and cloud			
Tonight	Night	Night	Night	Night	Night				
 3°C 30% Chance of showers	 1°C Rain	 -1°C Snow	 -5°C Snow and blowing snow	 -5°C 60% Chance of flurries	 -3°C Cloudy periods				

Fort Simpson seven-day weather forecast:

▼ Forecast						Hourly Forecast	Alerts	Jet Stream
Thu 5 May	Fri 6 May	Sat 7 May	Sun 8 May	Mon 9 May	Tue 10 May	Wed 11 May		
 15°C A mix of sun and cloud	 14°C 30% Chance of showers	 7°C Cloudy	 1°C Snow	 4°C Periods of snow	 8°C A mix of sun and cloud	 10°C A mix of sun and cloud		
Tonight	Night	Night	Night	Night	Night			
 -1°C Partly cloudy	 2°C Cloudy periods	 -1°C Cloudy	 -2°C 70% Chance of flurries	 -3°C Cloudy periods	 -2°C Cloudy periods			

Norman Wells seven-day weather forecast:

Thu 5 May	Fri 6 May	Sat 7 May	Sun 8 May	Mon 9 May	Tue 10 May	Wed 11 May		
 5°C 60% Chance of rain showers or flurries	 8°C 30% Chance of flurries	 10°C Cloudy	 7°C A mix of sun and cloud	 6°C A mix of sun and cloud	 6°C A mix of sun and cloud	 8°C A mix of sun and cloud		
Tonight	Night	Night	Night	Night	Night			
 -3°C 30% Chance of flurries or rain showers	 -4°C Cloudy	 -1°C Cloudy periods	 -2°C Clear	 -4°C Cloudy periods	 -3°C Cloudy periods			

Factors to Watch:

It is important to note that much of the water contributing to flooding of NWT communities originates from outside of the NWT, which is why we also rely on information from the Yukon, British Columbia, Alberta and Saskatchewan.

The potential and severity of flooding will depend in large part on the weather over the upcoming weeks and how this interacts with existing ice conditions, water levels and snow pack amounts.

The primary factors that influence water levels in the spring are:

- Ice jams (can result in out-of-bank flows, even if there are below normal flows)
- Rate of melt of ice and snow:
 - Gradual vs quick melt
 - Rain on snow or ice events (rain brings a lot of energy to help melt happen more quickly)
- Current water levels
- How wet the ground was in the fall
- Snowpack

Spring Break up on NWT Rivers: Mechanical vs Thermal

In any given year, spring flooding can occur in a number of NWT communities, including Hay River, Jean Marie River, Fort Simpson, Fort Liard, Nahanni Butte, Tulita, Fort Good Hope, Fort McPherson and Aklavik. Spring flooding is caused by ice jam-induced flooding and can occur irrespective of existing water levels. However, if existing water levels are high, the impact of an ice jam flood can be much worse.

Ice jams typically form when on north-flowing rivers, where warm weather and snowmelt cause ice to break up on the southern reaches of a river. As this ice flows north (downstream), it meets a more solid ice cover. When this happens, the pieces of floating ice jam on the solid ice and can form a dam, which causes water levels to rise rapidly. This is called a **mechanical break up**, whereby the ice downstream is broken up by the force of ice moving into it.

If there is warm and sunny weather throughout early spring, the ice will thermally erode and weaken. This provides less of a resisting force for ice and water moving down the river and will have less of a chance of causing water levels to rise. This is called a **thermal break up**.

The causes of mechanical and thermal break ups are usually dependent on the weather during early spring. Warm weather, sunshine, and rain on snow events are usually a good way to bring extra energy into the system to help melt the ice. Warm temperatures in the upstream part of a basin could also cause a rapid snowmelt and move water to the river very quickly. This could lead to ice-jam conditions downstream if the ice has not yet received enough energy to degrade. Another important factor is the thickness of the ice. Thicker ice takes longer to melt and can increase the chances of ice jams. If an ice jam occurs, the location of the ice jam is also very

important. Each river reach has different locations that are prone to ice jams. The location of the ice jam can be an important factor as to whether or not a community floods. Furthermore, ice will jam and then move again at multiple locations along a river as break up progresses downstream. The timing and location of each jam can also influence if a community will flood.