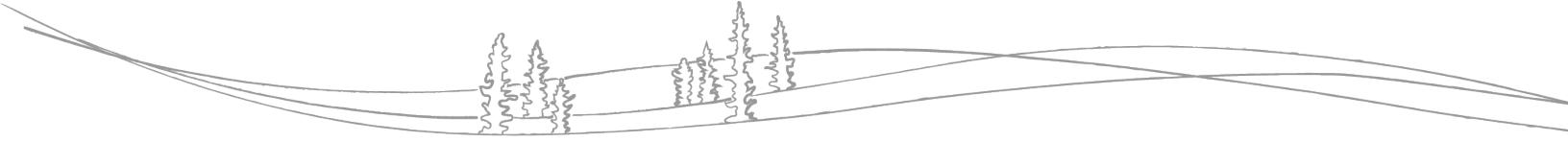




NWT Water Monitoring Bulletin

– May 06, 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 remains very dynamic;
 - Water levels at the Hay River near the border gauge have matched the peak levels from last year;
- There is a significant precipitation event forecast to bring a total of 50 to 100 mm (starting as rain, turning to snow) to the Hay River basin beginning this morning and running through to Monday and will be accompanied by cool 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 remains stationary at Fort Simpson;
- Water levels continue to rise slowly on the Liard River at Fort Liard;
- 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 289 m. The Hay River near Hay River gauge has a current level of approximately 5.3 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.

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Hay River:

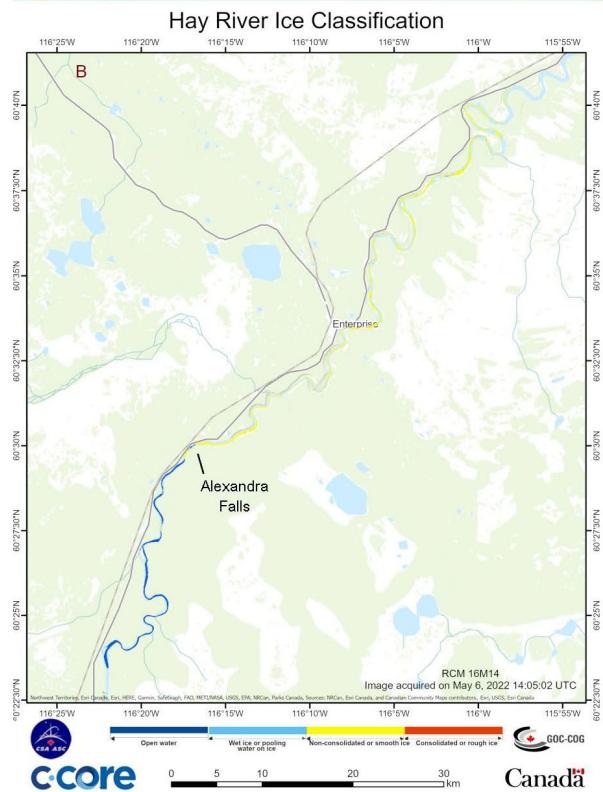
Current Status:

- Weather forecast models are showing a low-pressure system moving over the Hay River basin from Friday to Monday. This system will bring a significant amount of precipitation (between 50 and 100 mm total), starting as rain and turning to snow on Saturday morning. 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 continues to move, jam, and release along sections of the Hay River. Ice jams upstream of gauge locations can result in temporary reductions of water levels;
- Snowmelt has almost concluded in the north part of the basin. Rainfall on Friday should help to melt residual snowpack, but there is potential for new snowfall this weekend;
- 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:

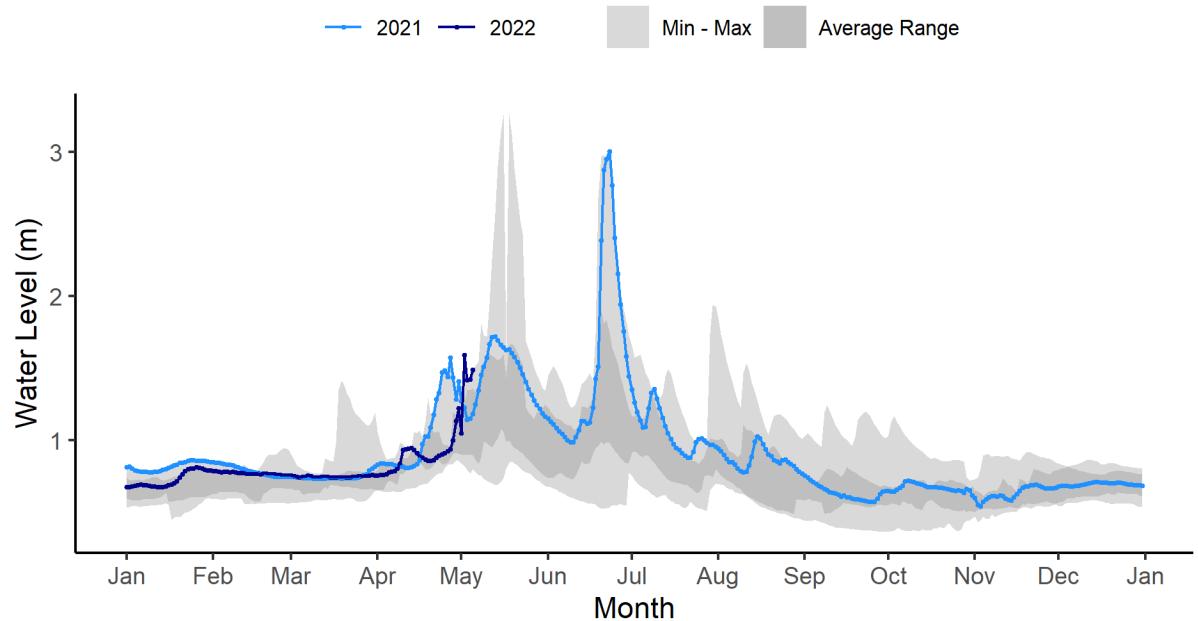


Above – Sentinel-2 optical satellite imagery of Hay River (top right), taken around 12 noon on 5 May 2022, showing the section identified above on the map by box (A). Radar satellite imagery (below) from 7 am MDT on 6 May 2022 of Hay River showing classified river ice for the section identified on the map by box (B). This shows predominantly open water upstream of Alexandra Falls, and non-consolidated ice downstream of Alexandra Falls.

Hydrometric Data:

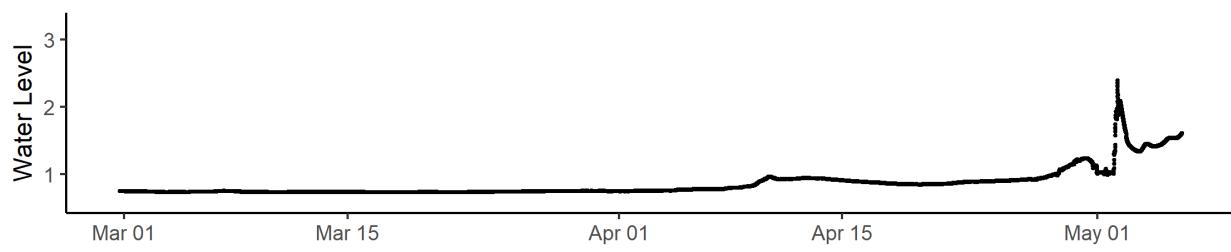
Chinchaga River near High Level (Alberta) [07OC001]:

CHINCHAGA RIVER NEAR HIGH LEVEL (07OC001)

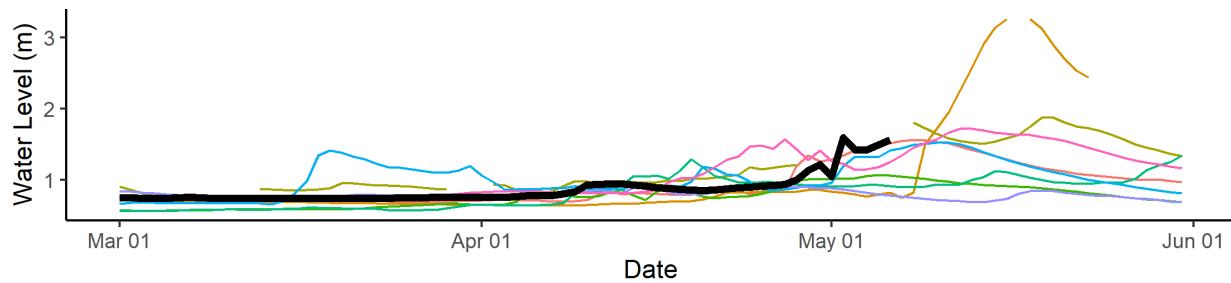


CHINCHAGA RIVER NEAR HIGH LEVEL (07OC001)

2022 Water Levels (5 minute resolution)

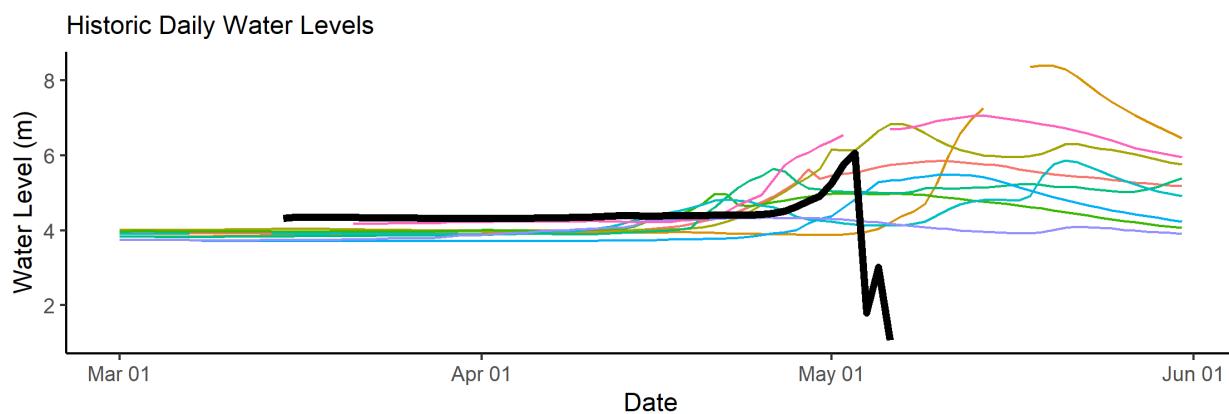
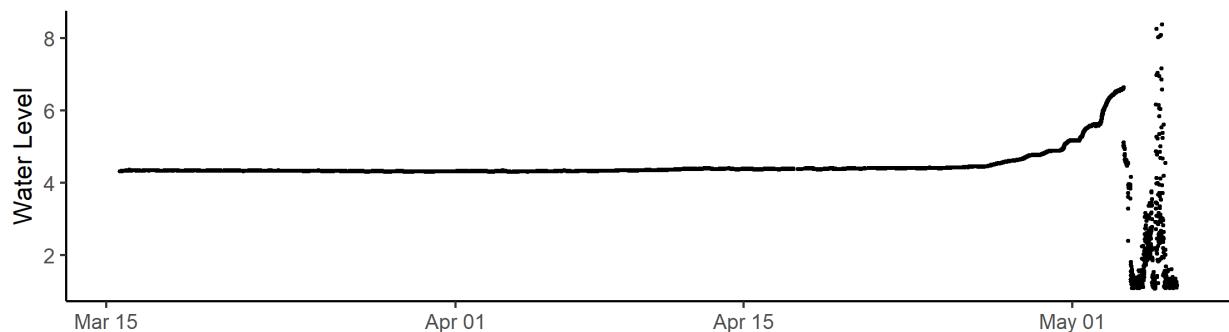


Historic Daily Water Levels



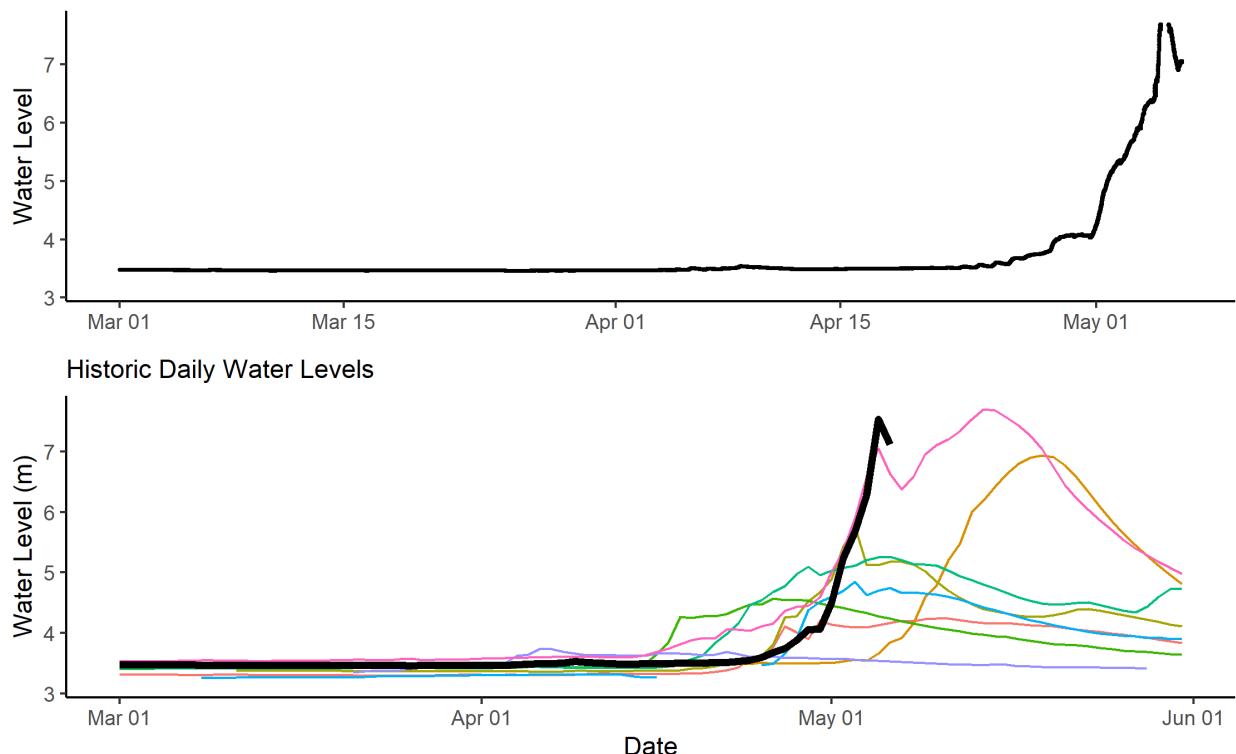
Above – Water level data at the Chinchaga River near High Level, AB. This plot shows high resolution (5 minute) water level data in the middle, and daily average data on the bottom. An ice jam and release can be observed on May 02.

Hay River near Meander River (Alberta) [070B003]:
HAY RIVER NEAR MEANDER RIVER (070B003)
2022 Water Levels (5 minute resolution)



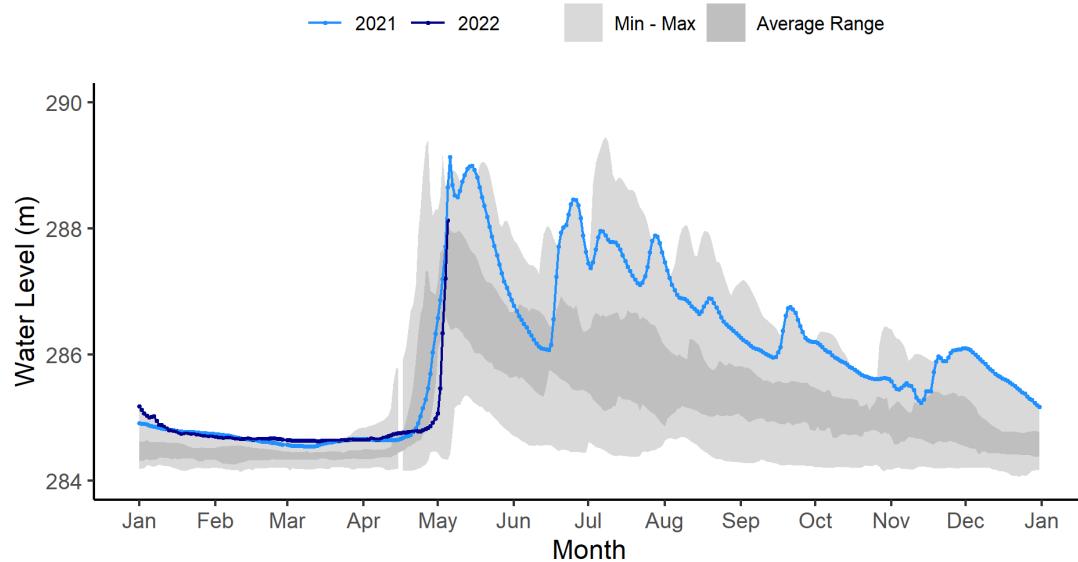
Above – Water level data on the Hay River near Meander River, AB. The hydrometric gauge has been impacted by ice – it will no longer be included in this report until after it is repaired by Water Survey of Canada (Alberta).

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

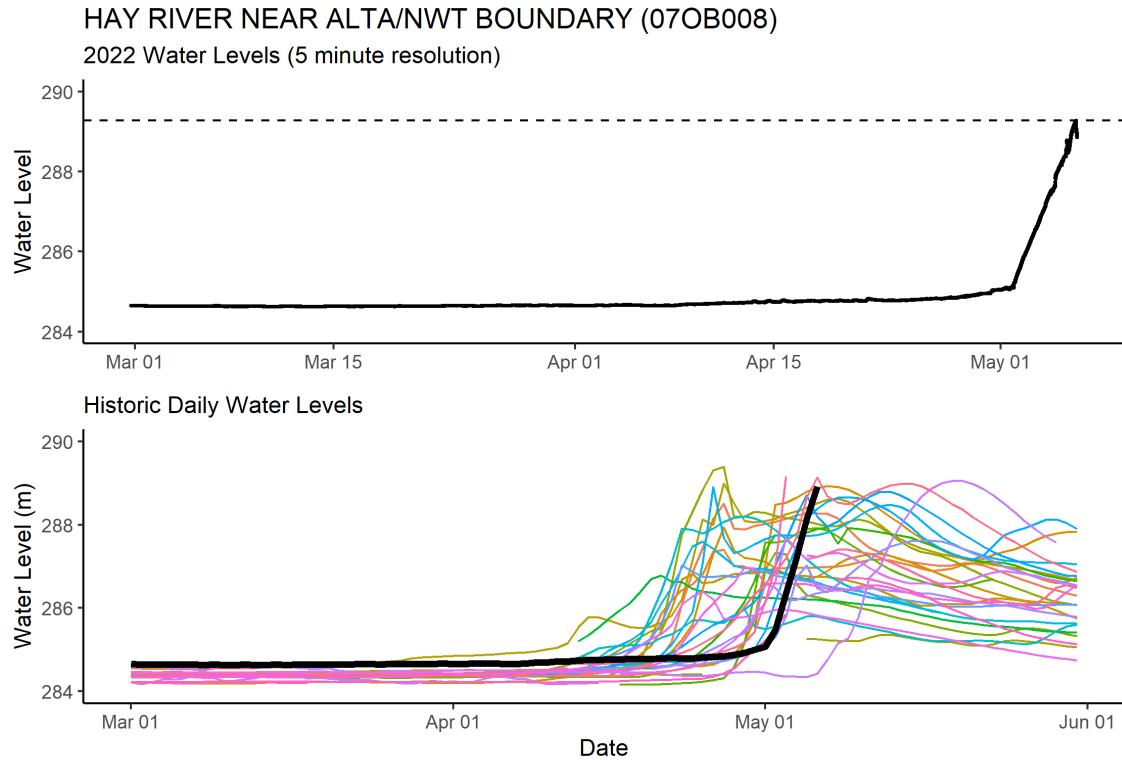


Above – Water level data on the Steen River near Steen River, AB. The Steen River is a small tributary to the Hay River. Water levels have been rapidly rising since May 01, but hit an initial peak in the morning of May 05.

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



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 05** (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. An ice jam upstream of the border has caused levels to temporarily decrease slightly since about 03:00 on May 06.

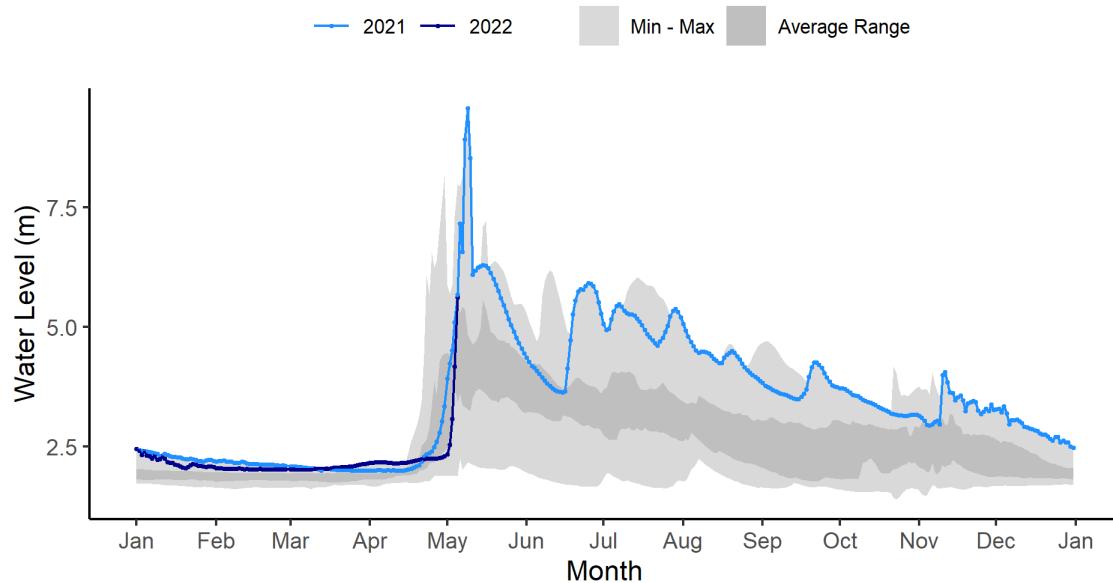


Above – Hay River near the border hydrometric gauge photo on May 06 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

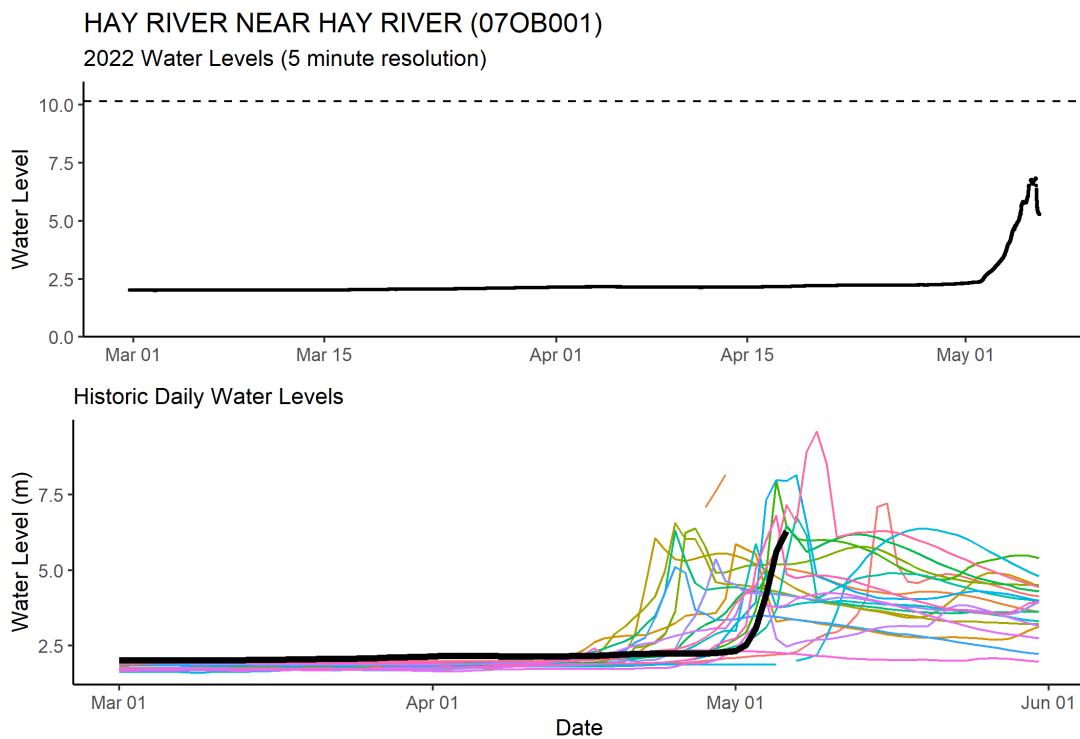


Above – Hay River below Alexandra Falls on May 05. Photo courtesy of Travis Wright, Hay River Director of Public Services.

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 05** (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. An ice jam upstream of the gauge has caused levels to temporarily decrease slightly since about 03:00 on May 06.



Above – Hay River near the Town of Hay River hydrometric gauge photo on May 06 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

Liard River:

Current Status:

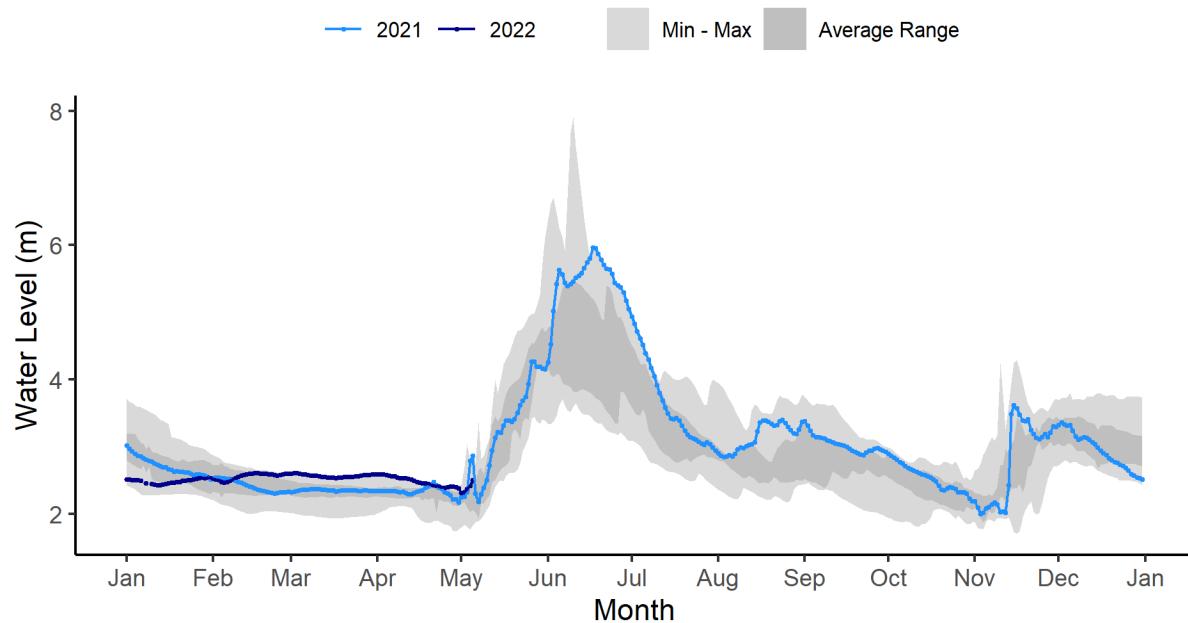
- Water levels continue to slowly rise underneath the ice at the Liard River at Fort Liard;
- Snowpack continues to melt across the basin;
- There have been reports of the Fort Nelson River (major tributary to the Liard River) breaking in Fort Nelson;
 - The Muskwa River (tributary to Fort Nelson River) gauge showed signs of ice breaking on May 03;
- 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 are forecast for today with cooler temperatures coming this weekend.



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

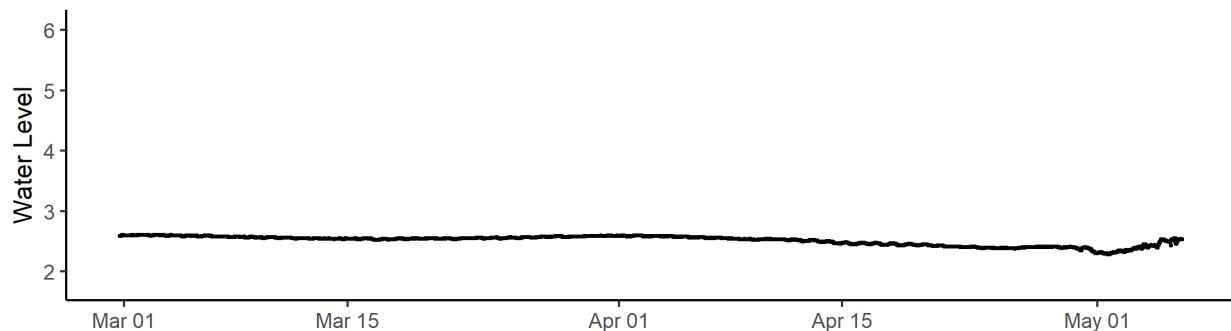
Hydrometric Data:
Liard River at Upper Crossing (Yukon) [10AA001]:

LIARD RIVER AT UPPER CROSSING (10AA001)

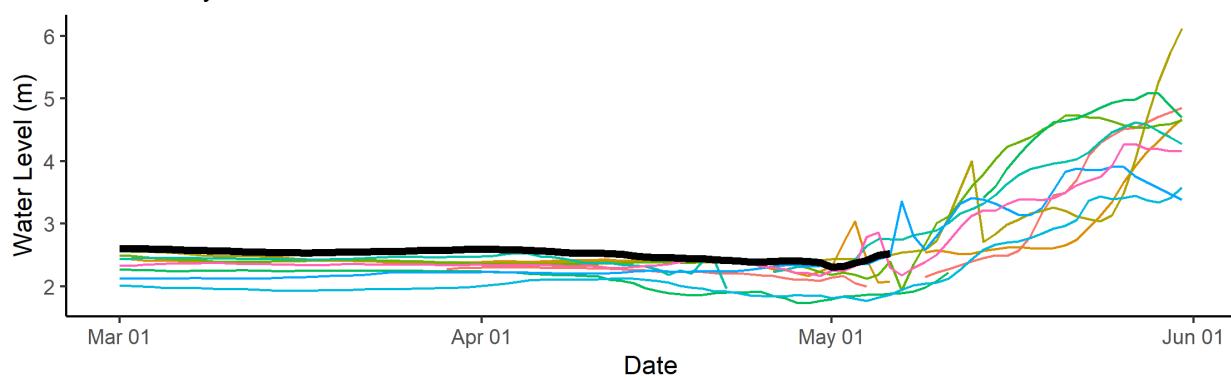


LIARD RIVER AT UPPER CROSSING (10AA001)

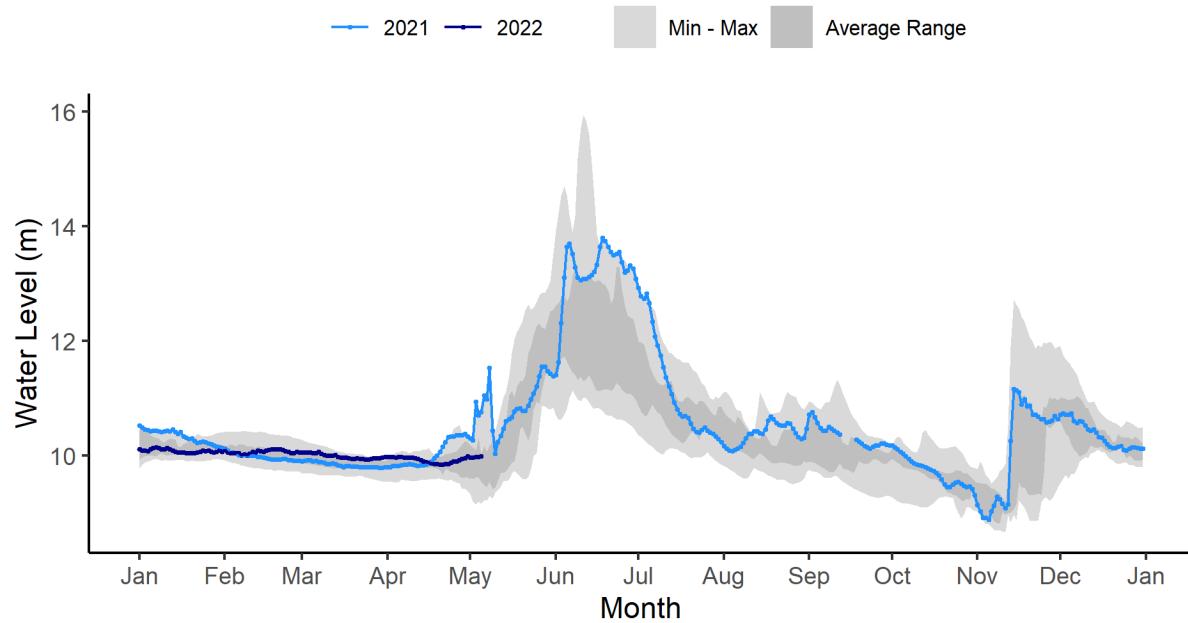
2022 Water Levels (5 minute resolution)



Historic Daily Water Levels

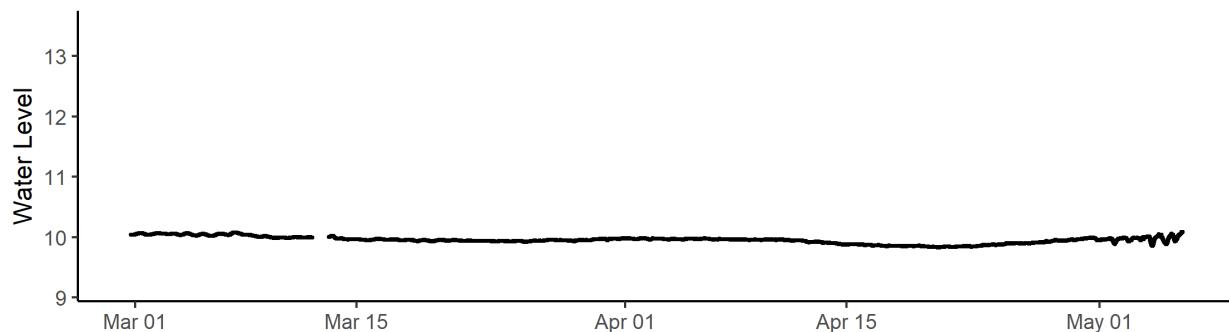


Liard River at Lower Crossing (British Columbia) [10BE001]:
LIARD RIVER AT LOWER CROSSING (10BE001)

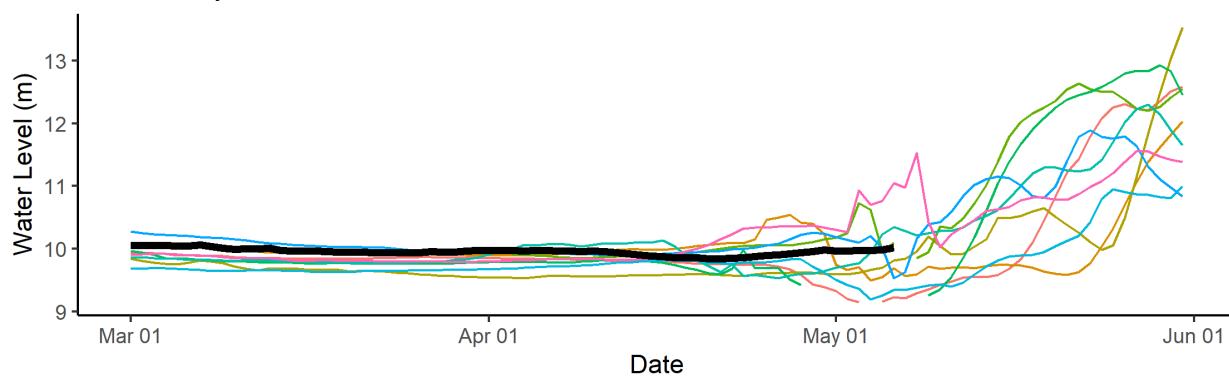


LIARD RIVER AT LOWER CROSSING (10BE001)

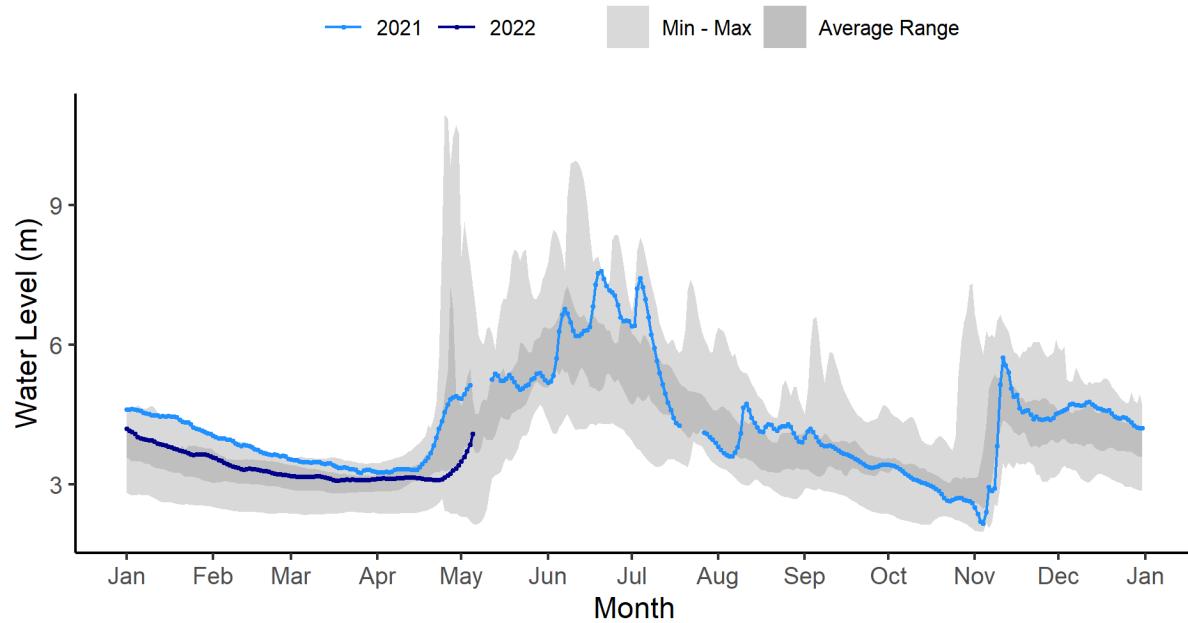
2022 Water Levels (5 minute resolution)



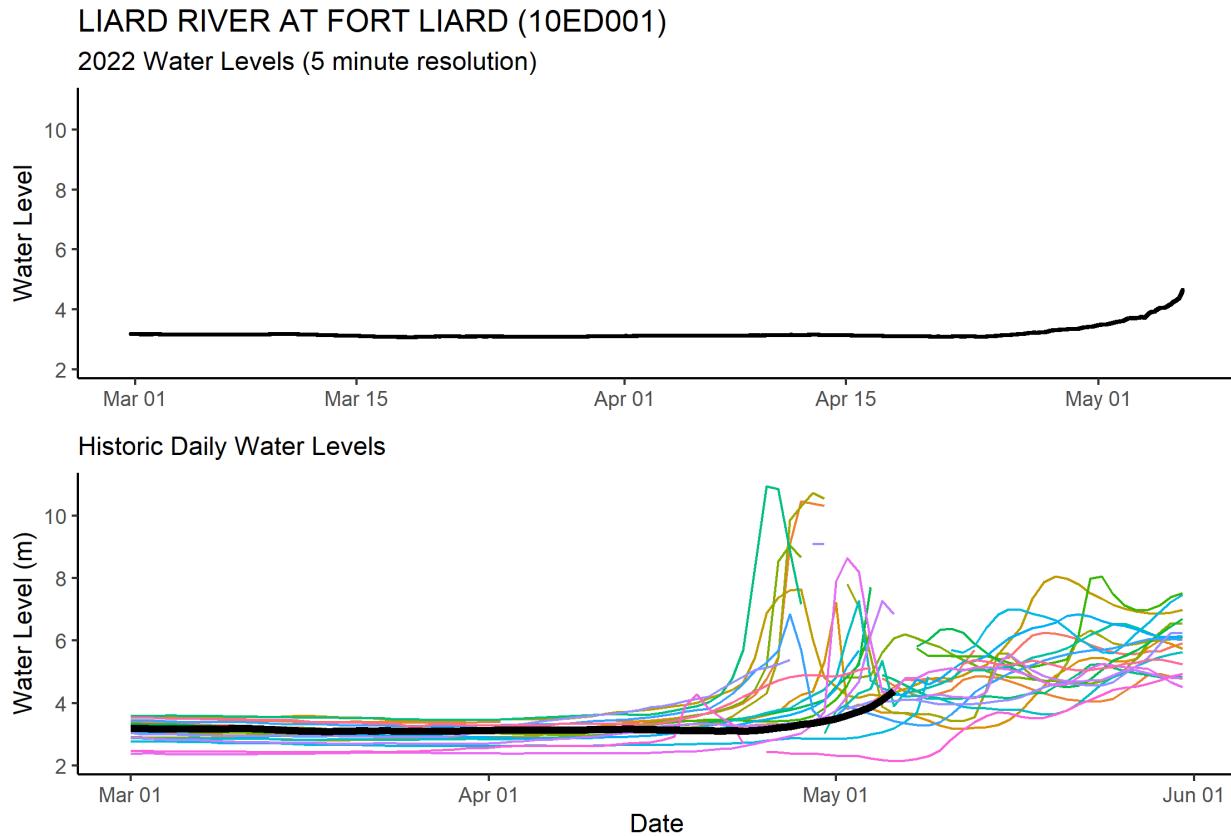
Historic Daily Water Levels



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.

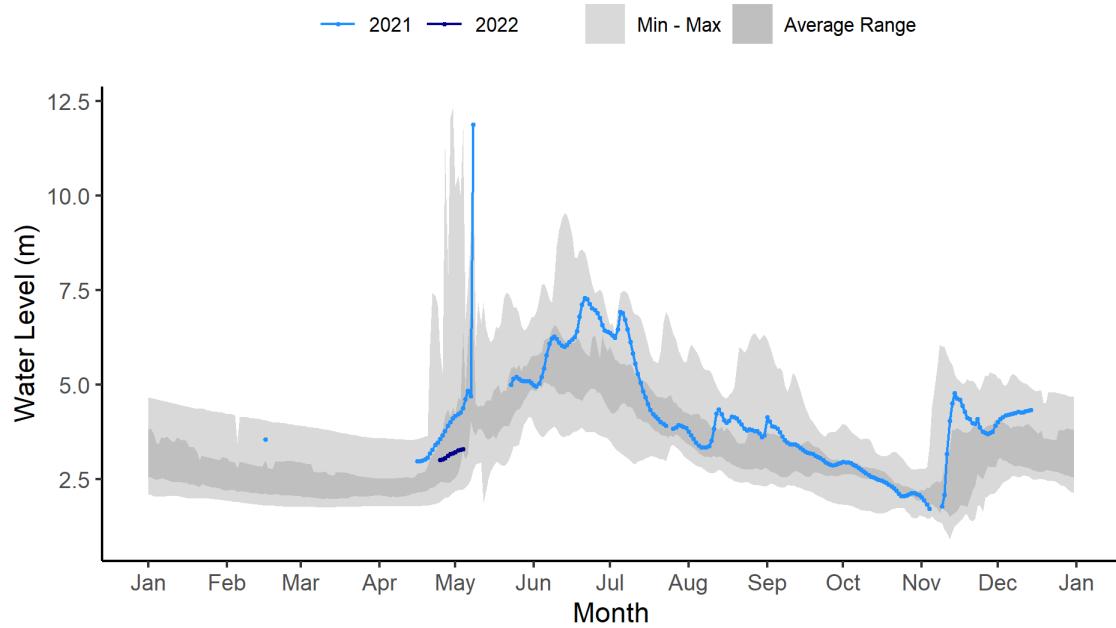




Above – Liard River at Fort Liard hydrometric gauge photo from May 06 at 07:00. Photo courtesy of Water Survey of Canada and GNWT.

Liard River near the mouth [10ED002]:

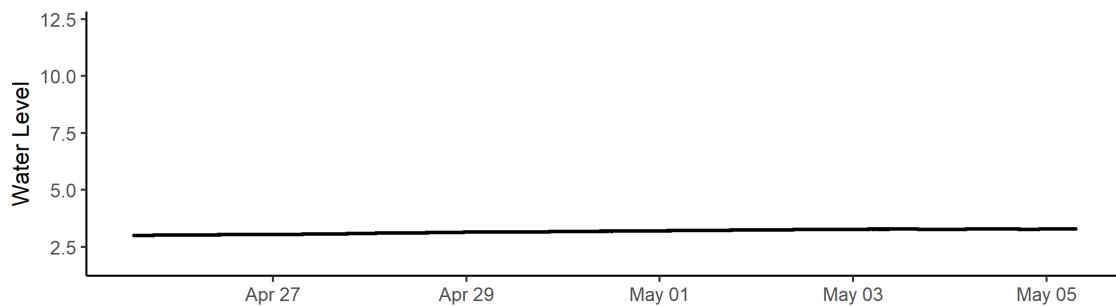
LIARD RIVER NEAR THE MOUTH (10ED002)



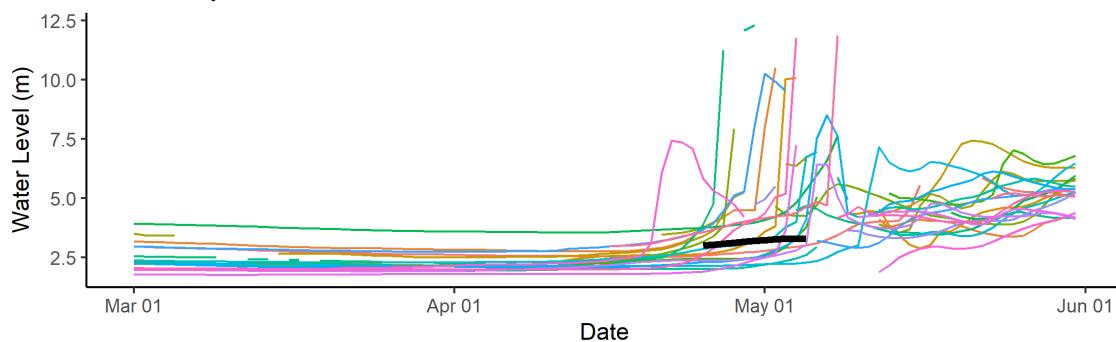
Above – hydrograph of daily average levels for the previous two years. The spring water level rise is delayed relative to previous years.

LIARD RIVER NEAR THE MOUTH (10ED002)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels



10ED002_LiardMouth 2022-05-06 130114 UTC
61.74270, -121.22787 124V -20°C P

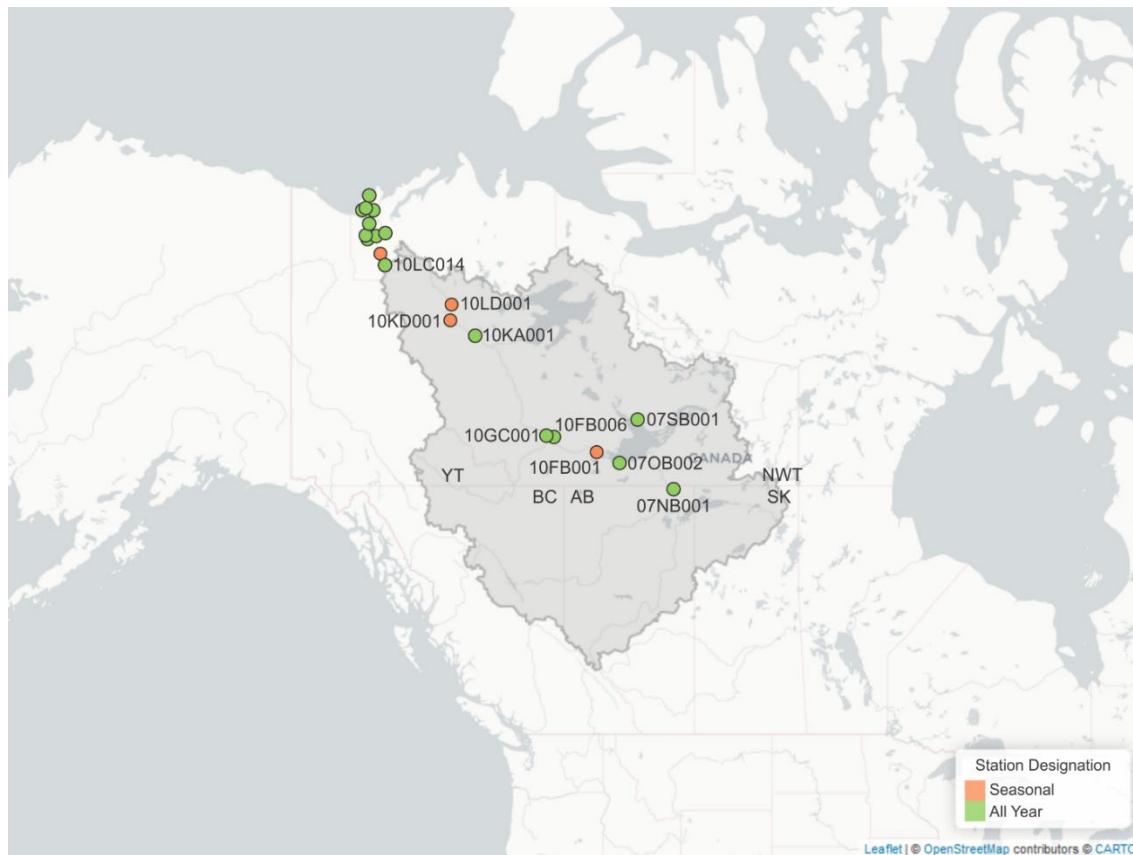


Above – Liard River near the mouth hydrometric gauge photo from May 06 at 7:00. Photo courtesy of Water Survey of Canada and GNWT.

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

Current Status:

- Break up is progressing along the Peace River (which drains into the Slave River);
 - There are reports that ice has opened up at Peace Point and that ice is flowing into Lake Athabasca;
- 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 stationary;
- A small snow cover remains on the ground in the Dehcho, which will continue to release water to local rivers and streams;
- 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);
- Environment and Climate Change Canada has forecast above seasonal temperatures for today in the Dehcho region, with temperatures cooling off to below normal over the weekend.

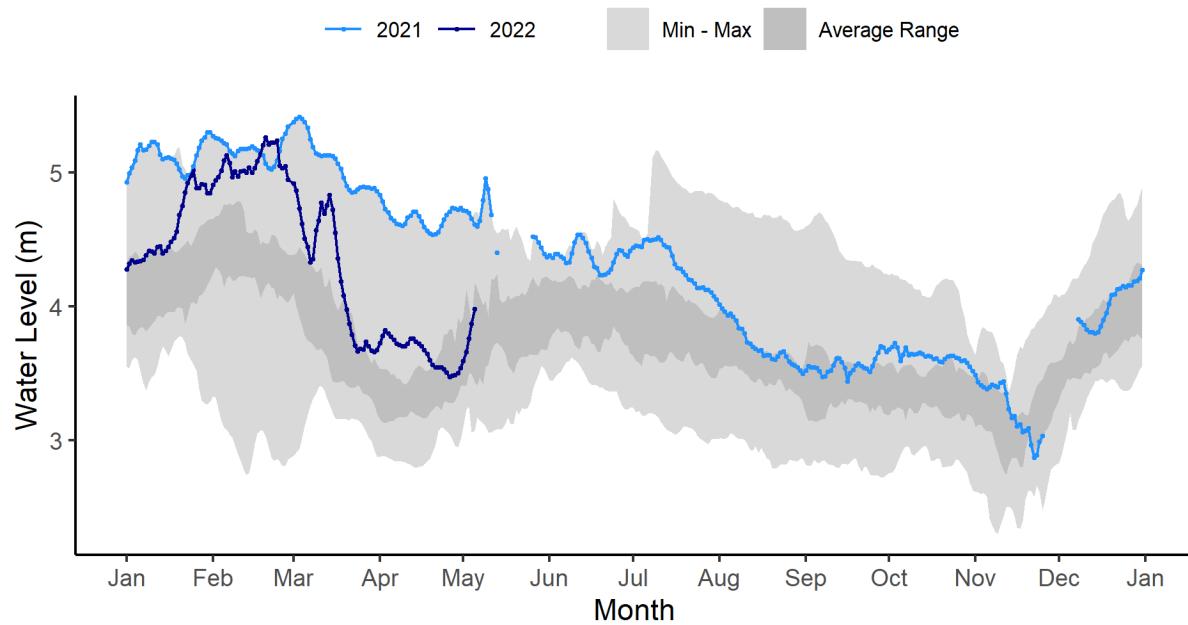


Above – Map of hydrometric stations in the Dehcho (Mackenzie River) basin. The station numbers are referenced in the water level plots below.

Hydrometric Data:

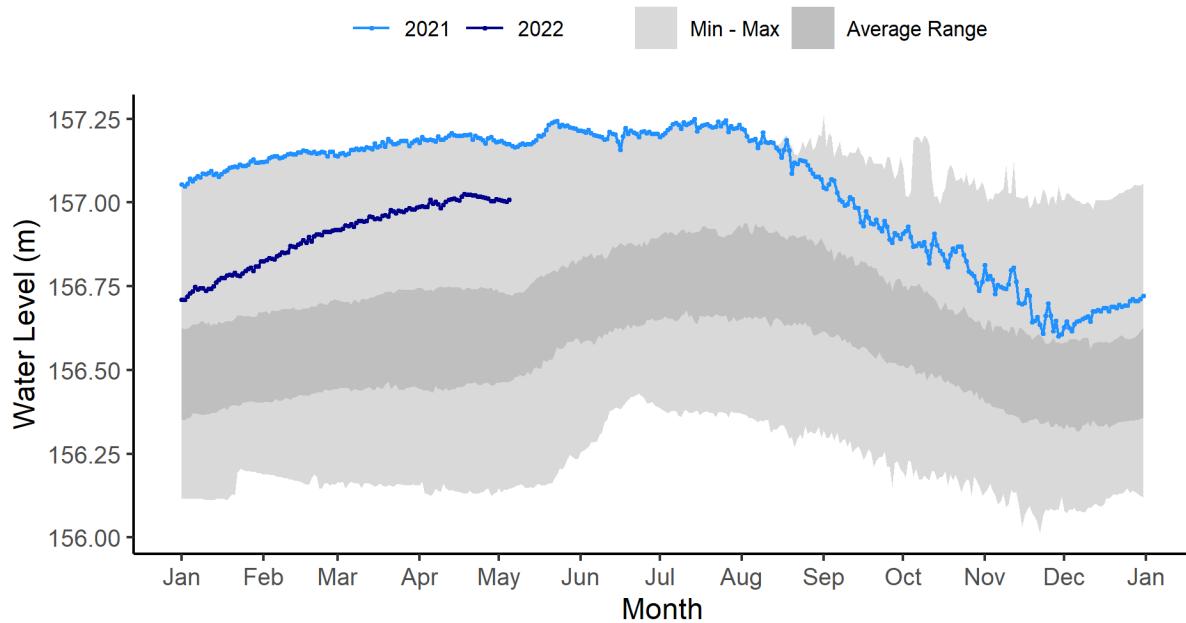
Slave River at Fitzgerald (Alberta) [07NB001]:

SLAVE RIVER AT FITZGERALD (ALBERTA) (07NB001)



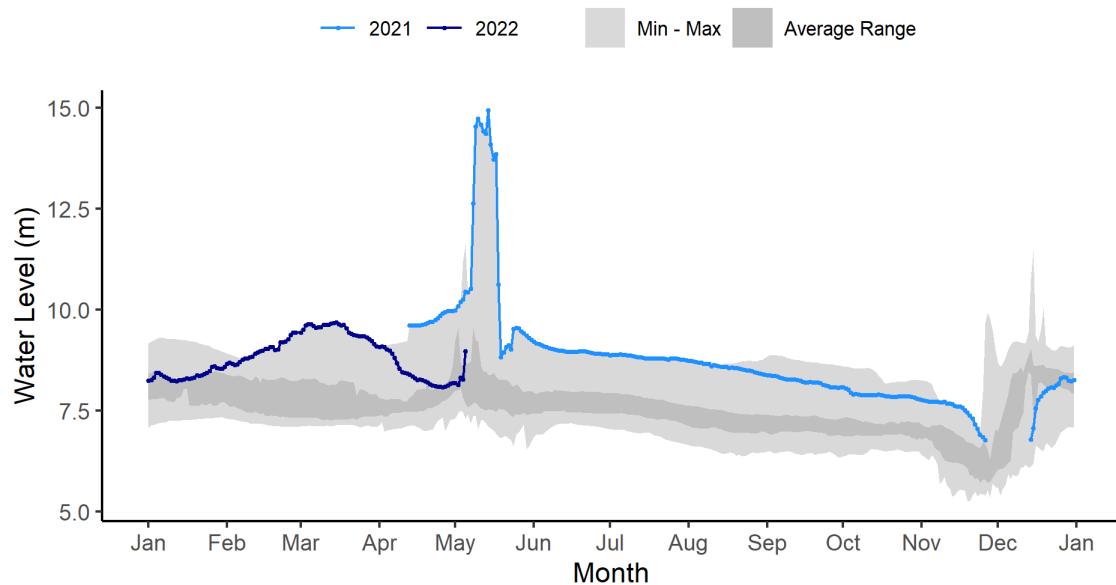
Great Slave Lake at Yellowknife Bay [07SB001]:

GREAT SLAVE LAKE AT YELLOWKNIFE BAY (07SB001)

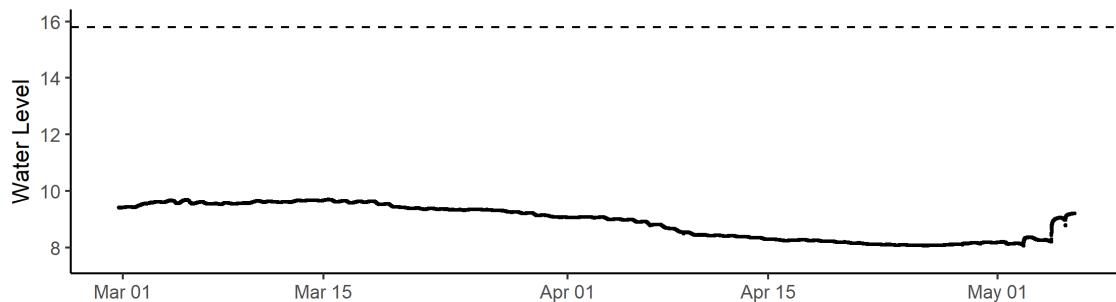


Above – Water levels on Great Slave Lake at Yellowknife Bay for the previous two years. Although water levels have receded since the highs of 2020 and 2021, levels remain much higher than normal.

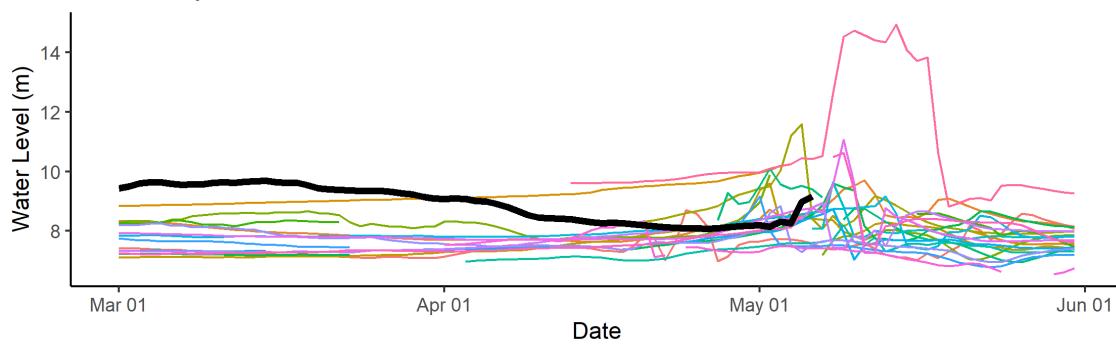
Mackenzie River at Strong Point [10FB006]:
MACKENZIE RIVER AT STRONG POINT (10FB006)



MACKENZIE RIVER AT STRONG POINT (10FB006)
2022 Water Levels (5 minute resolution)



Historic Daily Water Levels

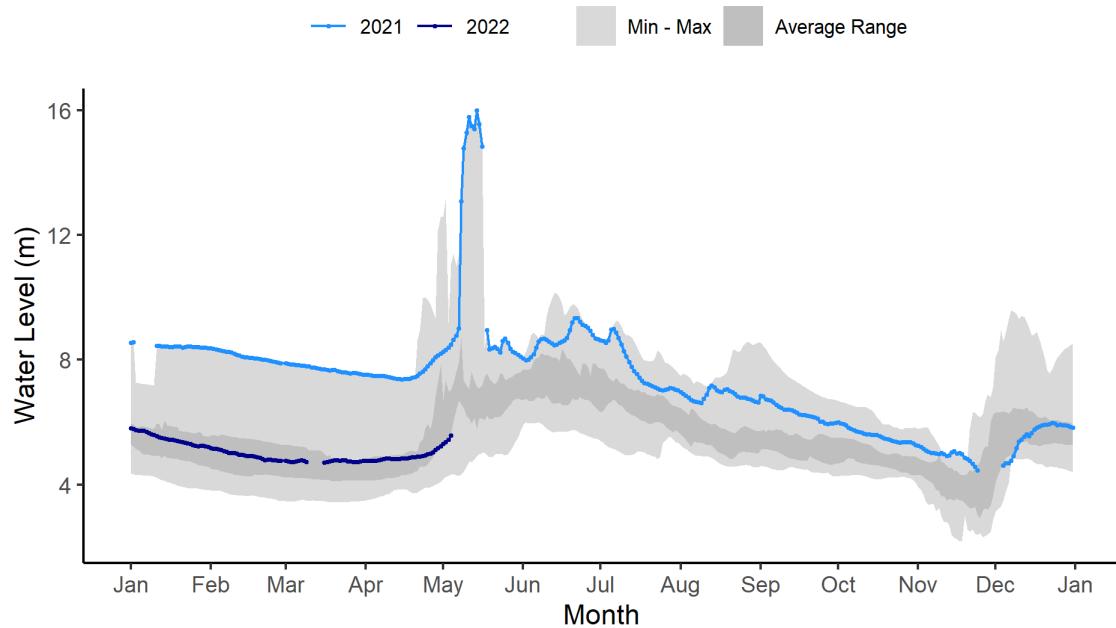


Above - The middle graph in the figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2021). The lower graph shows daily average levels relative to the previous 20 years. There has been minor ice movement over the last few days, but this has not resulted in substantial changes to water levels.



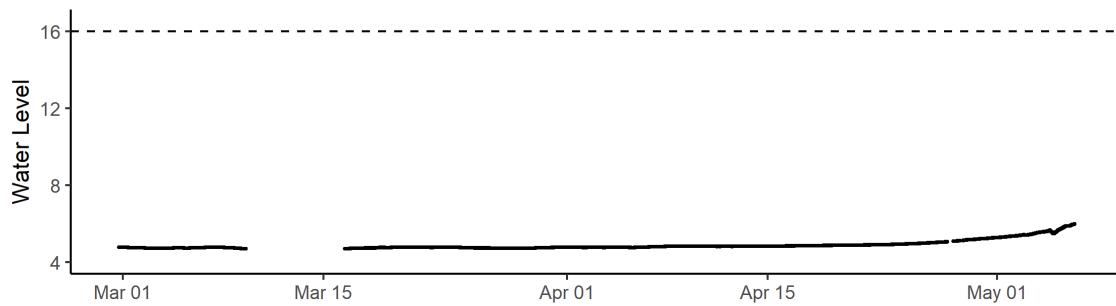
Above – Mackenzie River at Strong Point hydrometric gauge photo from May 06 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

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

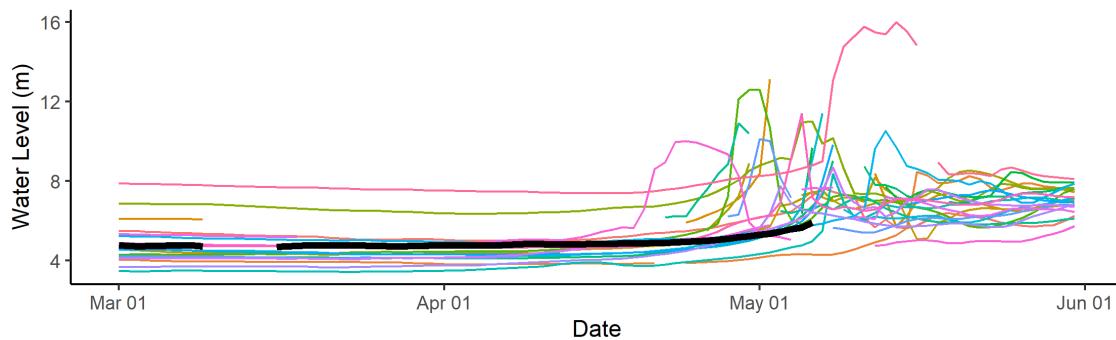


MACKENZIE RIVER AT FORT SIMPSON (10GC001)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels



Above - The middle 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, but no ice movement has been observed at Fort Simpson yet.

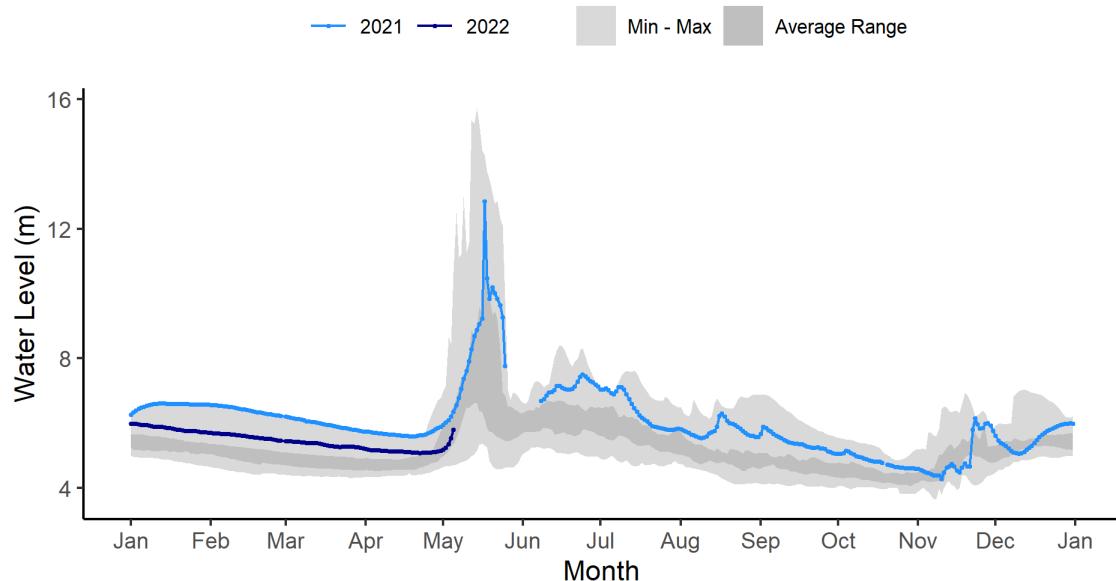
10G001_MackSimpson 2022-05-06 13:01:17 UTC
61.86802, -121.35823 12.8V 55°C P



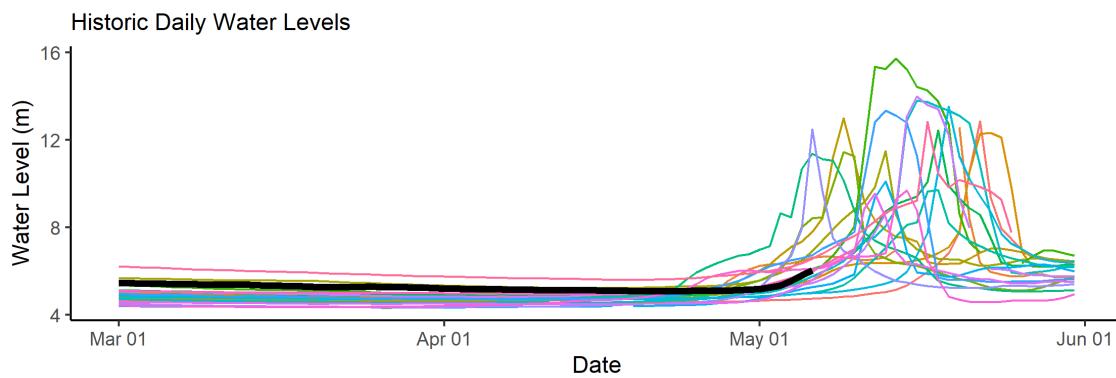
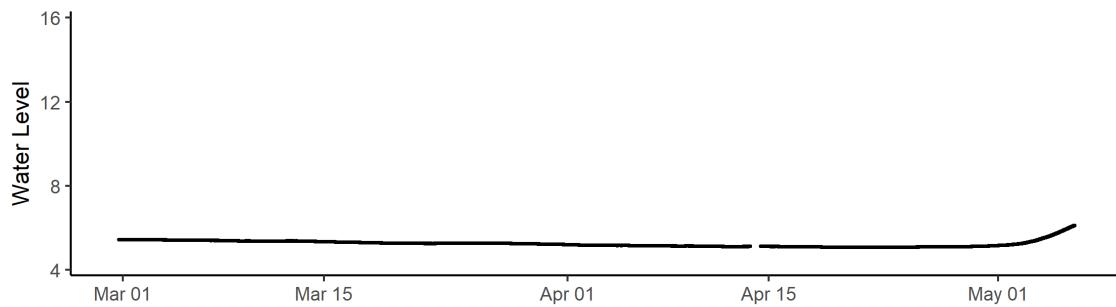
Above – Mackenzie River at Fort Simpson hydrometric gauge photo from May 06 at 07:00. Photo courtesy of Water Survey of Canada and GNWT.

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

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



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

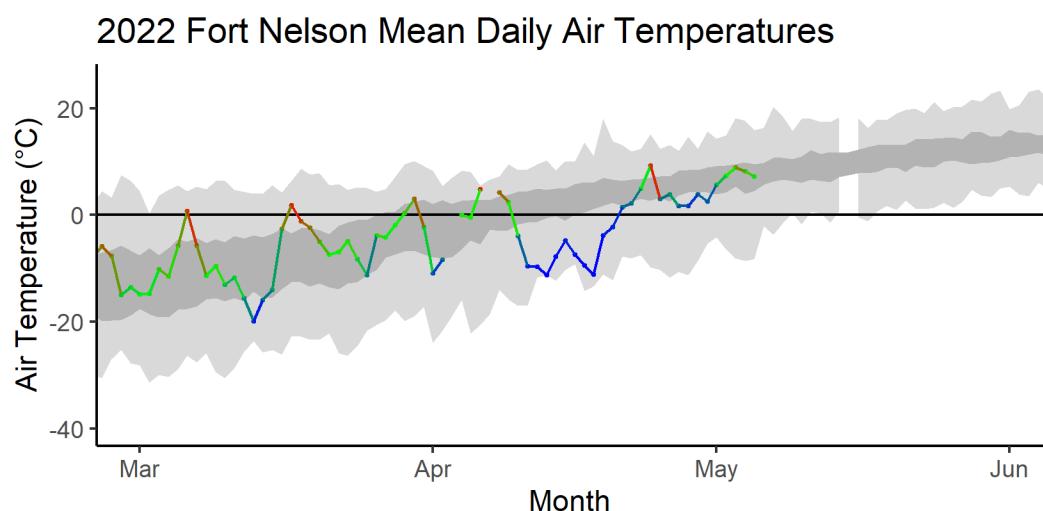
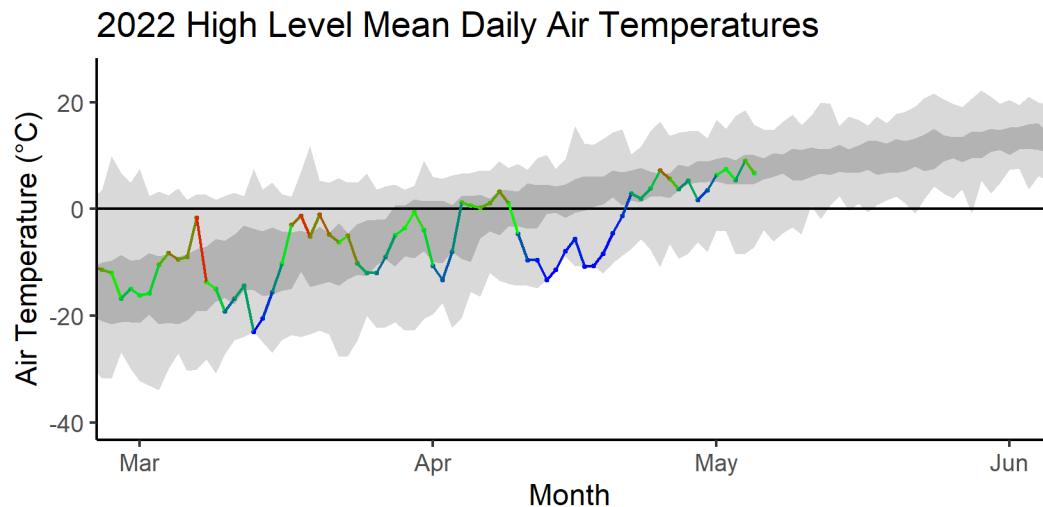


Above – The middle graph in the figure presents real time water level data at 5-minute resolution while the lower graph shows daily average levels relative to the previous 20 years. Water levels on the Mackenzie River at Norman Wells have begun to slowly rise, with the timing being approximately average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

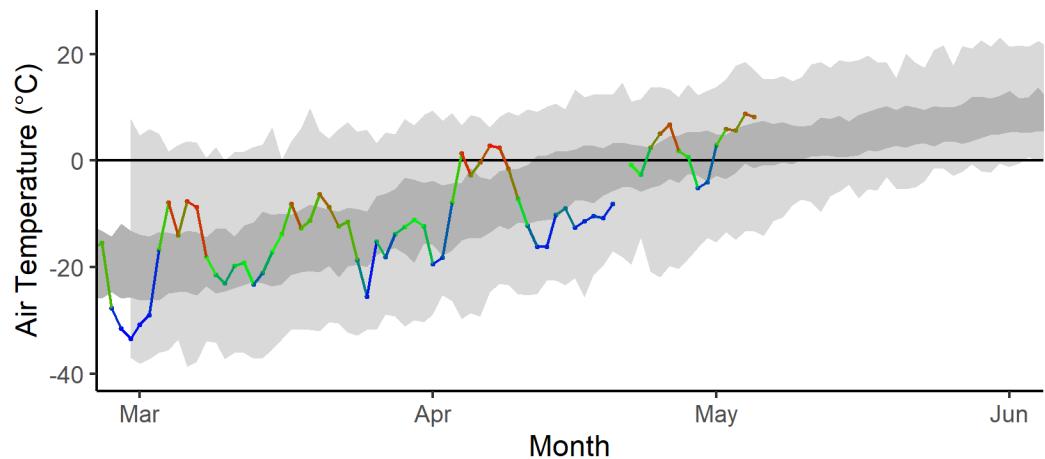
Weather Data:

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.

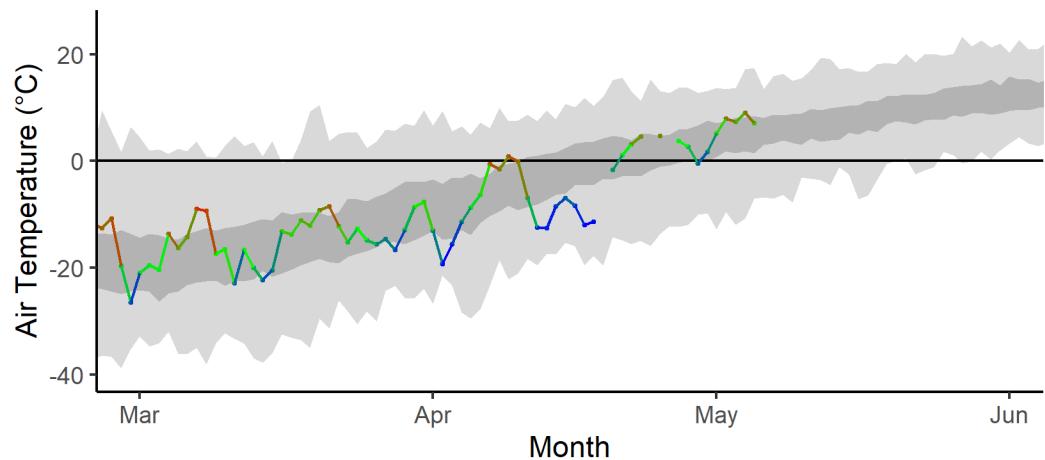
A low-pressure system is developing over the Hay River basin which is expected to bring significant precipitation (falling as rain then transitioning to snow) and cool temperatures. Models are predicting between 50 and 100 mm of precipitation through to Sunday, with localized amounts of up to 120 mm. ECCC has issued a rainfall warning for High Level, predicting 30-50 mm of rain over the next 24 hours.



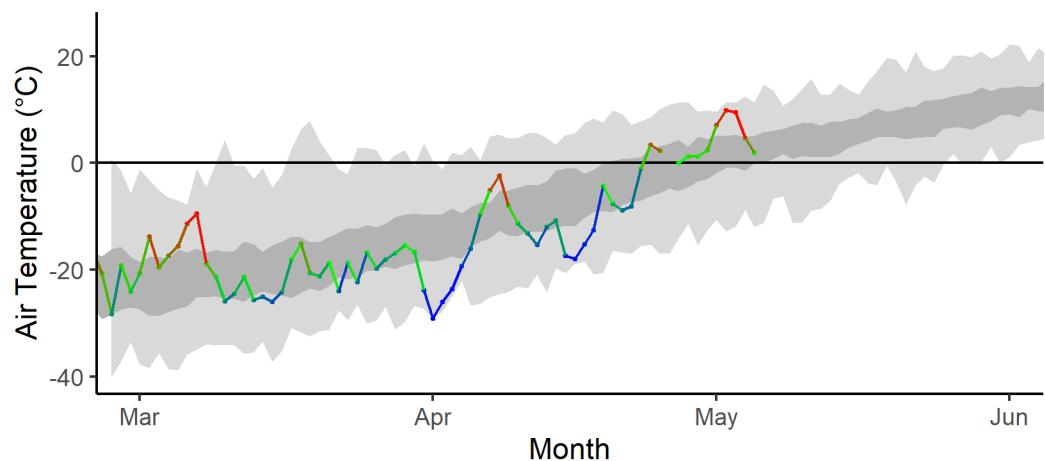
2022 Hay River Mean Daily Air Temperatures



2022 Fort Simpson Mean Daily Air Temperatures



2022 Norman Wells Mean Daily Air Temperatures



High Level seven-day weather forecast:

Fri 6 May	Sat 7 May	Sun 8 May	Mon 9 May	Tue 10 May	Wed 11 May	Thu 12 May
 9°C Periods of rain	 3°C Rain mixed with snow	 3°C Snow or rain	 1°C Periods of snow	 10°C Sunny	 13°C A mix of sun and cloud	 14°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 1°C Rain mixed with snow	 -1°C Rain or snow	 -3°C Rain or snow	 -5°C Cloudy	 0°C Cloudy periods	 1°C Cloudy periods	

Fort Nelson seven-day weather forecast:

Fri 6 May	Sat 7 May	Sun 8 May	Mon 9 May	Tue 10 May	Wed 11 May	Thu 12 May
 10°C Mainly cloudy	 5°C Periods of rain	 2°C Snow or rain	 5°C 60% Chance of flurries	 13°C Sunny	 12°C A mix of sun and cloud	 13°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 1°C Rain	 -1°C Periods of rain or snow	 -3°C Rain or snow	 -5°C Clear	 1°C Cloudy periods	 1°C Cloudy periods	

Hay River seven-day weather forecast:

Fri 6 May	Sat 7 May	Sun 8 May	Mon 9 May	Tue 10 May	Wed 11 May	Thu 12 May
 6°C Rain	 1°C Snow	 1°C Rain or snow	 1°C Periods of snow	 6°C Cloudy	 6°C A mix of sun and cloud	 7°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 -1°C Rain or snow	 0°C Rain or snow	 -4°C Snow	 -2°C Cloudy	 -2°C Cloudy periods	 0°C Cloudy periods	

Fort Simpson seven-day weather forecast:

<u>Fri</u> <u>6 May</u>	<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>
 13°C 30% Chance of showers	 3°C Snow mixed with rain	 1°C Periods of snow	 4°C Cloudy	 11°C Sunny	 10°C A mix of sun and cloud	 12°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 2°C 30% Chance of rain showers or flurries	 -2°C Rain or snow	 -4°C Snow	 -5°C Cloudy periods	 -1°C Cloudy periods	 0°C Cloudy periods	

Norman Wells seven-day weather forecast:

<u>Fri</u> <u>6 May</u>	<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>
 7°C 30% Chance of rain showers or flurries	 6°C 30% Chance of flurries	 6°C Cloudy	 9°C Sunny	 11°C A mix of sun and cloud	 8°C A mix of sun and cloud	 11°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 -1°C 30% Chance of flurries or rain showers	 -2°C Cloudy	 -5°C Cloudy periods	 -1°C Clear	 -2°C Cloudy periods	 -1°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.