Government of
Northwest Territories

NWT Water Monitoring Bulletin – May 09, 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:

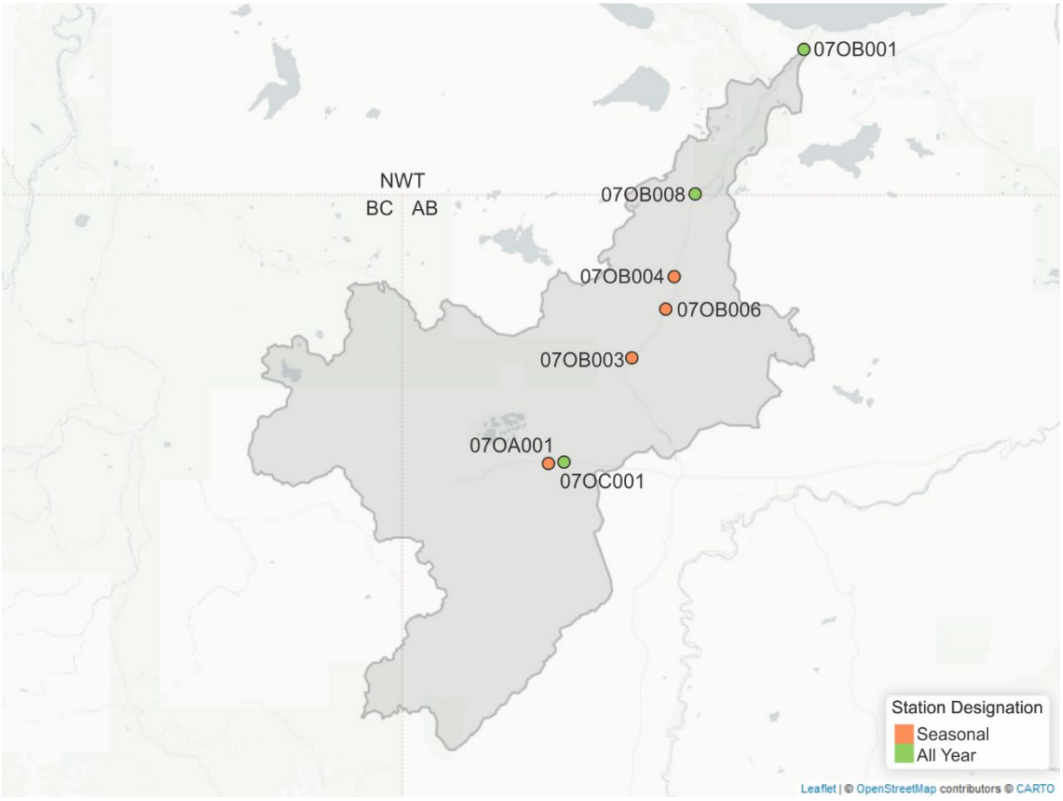
- The Town of Hay River and K'atl'odeeche First Nation have issued Evacuation Orders and Alerts for certain areas;
- Provisional water levels recorded at the Hay River near Hay River gauge are higher than the peak from last year;
    - All tributaries to the Hay River are recording water levels higher than the ice-induced peak from last week;
- Snowfall warnings have been issued for Hay River again today with snowfall expected to slow down by mid-afternoon;
- The potential for further/continued flooding remains high as ice remains present on the river;
    - Additional water will move down the Hay River and its tributaries when this recent snowfall begins to melt;
- Ice on the Liard River is moving in sections of the Liard River, and moved at the Fort Simpson ferry crossing as of this morning;
- The Dehcho (Mackenzie River) shifted about 50-100 m at Fort Simpson last night but is stationary as of 12:00 today.

Contents

Hay River:

Current Status:

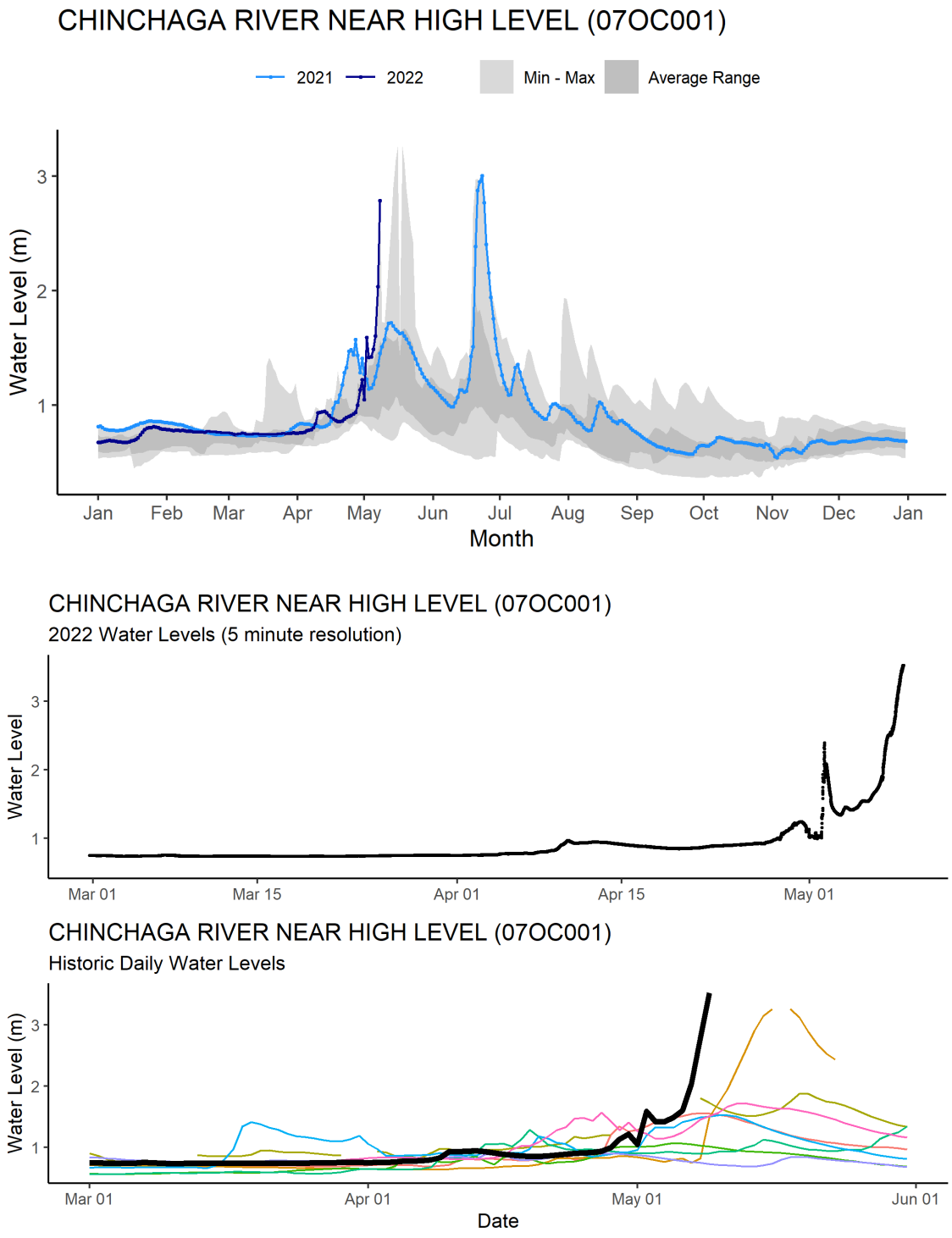
- According to the camera located at the border with Alberta, there has not been additional ice seen coming from Alberta for 36 hours;
- The storm system appears to be tapering off. There will be approximately 2-5 cm of additional snow this afternoon, but it should recede by this afternoon;
    - A snowfall warning remains in effect for the Hay River region on Monday.
- Hay River tributaries have shown rapid rises over the past 48 hours. In some cases, these rises have subsided, but there will most likely be another pulse of water as recent snowfall over the basin melts;
- The water level response on the Hay River and its tributaries to precipitation is very rapid at this time of year due to low basin 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.

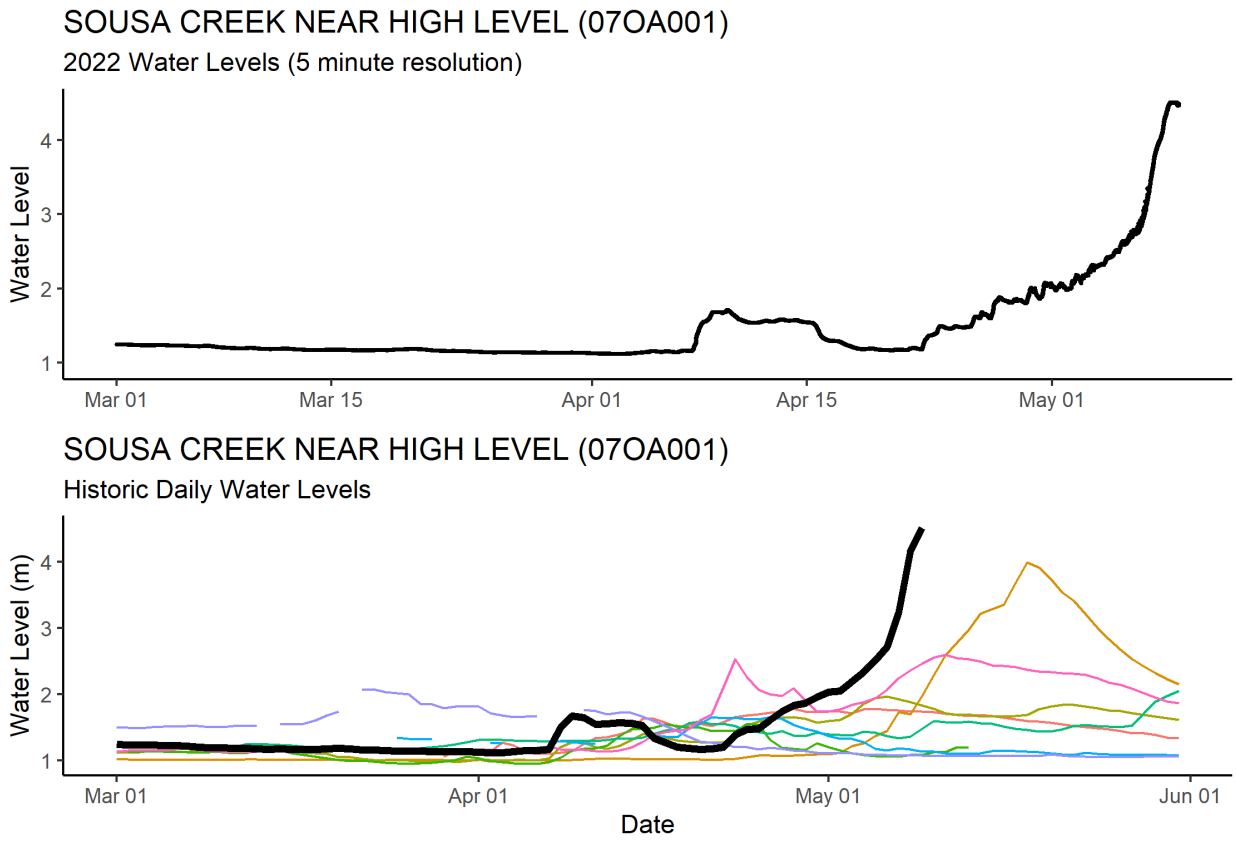
Hydrometric Data:

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



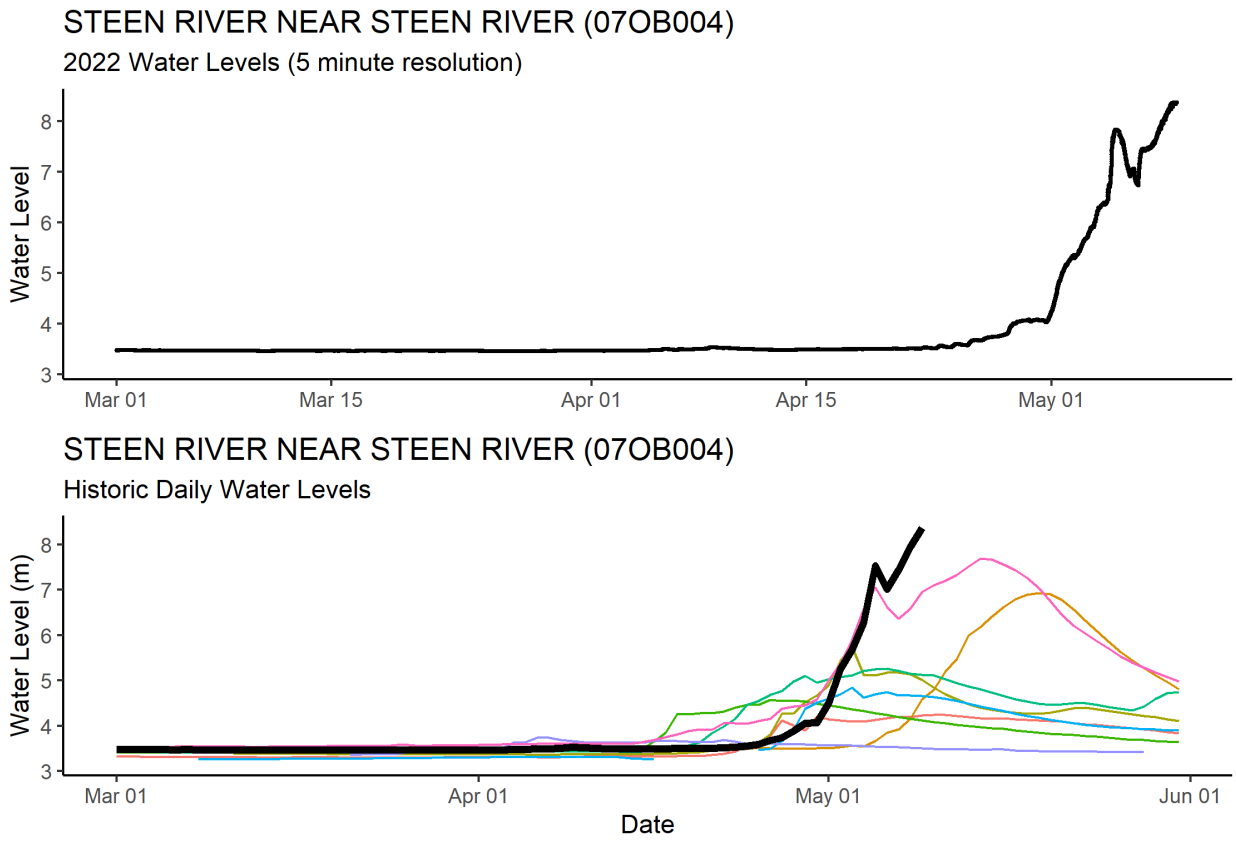
Above – Water level data at the Chinchaga River near High Level, AB. This plot shows high resolution (5 minute) water level data in the middle, and daily average data on the bottom. Water levels have risen 1.8 m over the course of the recent storm.

Sousa Creek near High Level (Alberta) [07OA001]:



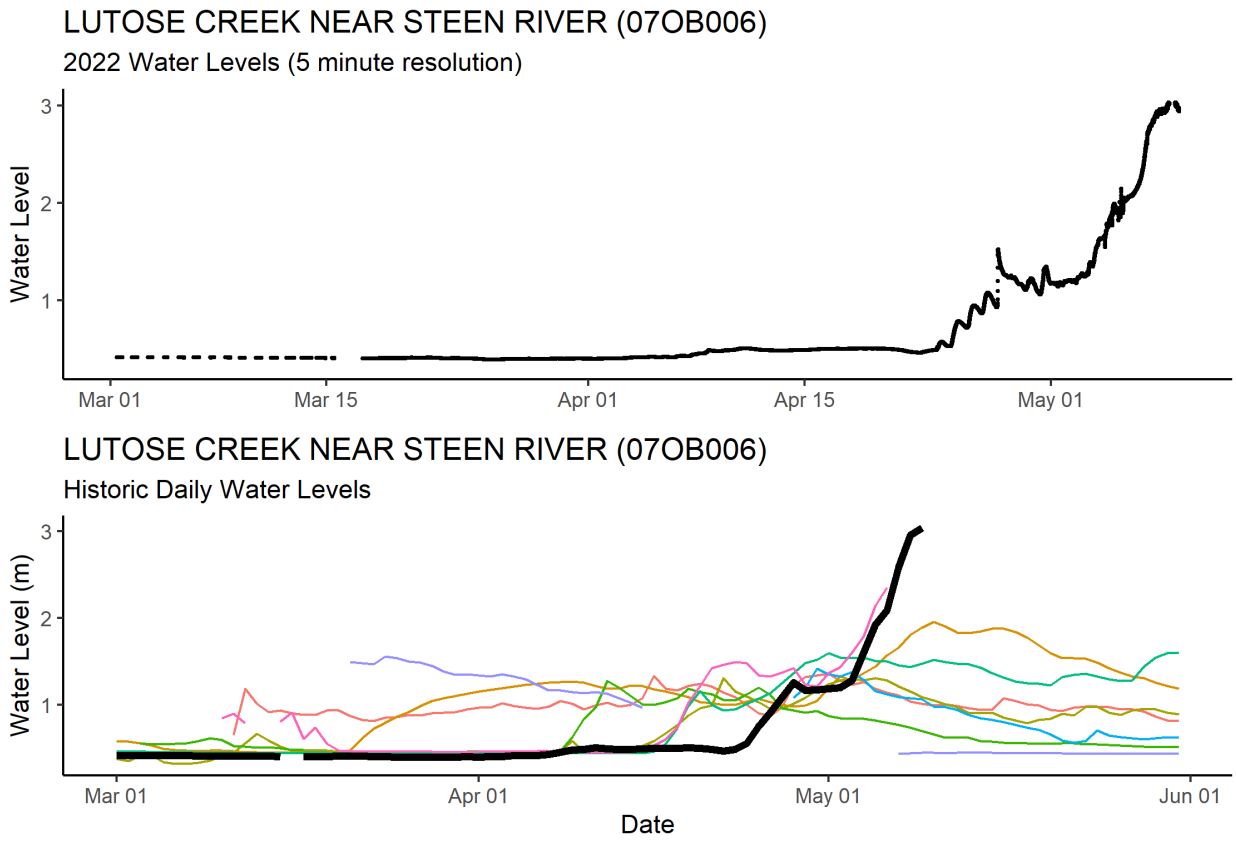
Above – Water level data on Sousa Creek near High Level, AB. The Sousa River is a small tributary to the Hay River. Water levels have risen 1.8 m over the course of the recent storm.

Steen River near Steen River (Alberta) [07OB004]:



Above – Water level data on the Steen River near Steen River, AB. The Steen River is a tributary to the Hay River. Water levels have risen 1.7 m over the course of the storm.

Lutose Creek near Steen River (Alberta) [07OB006]:



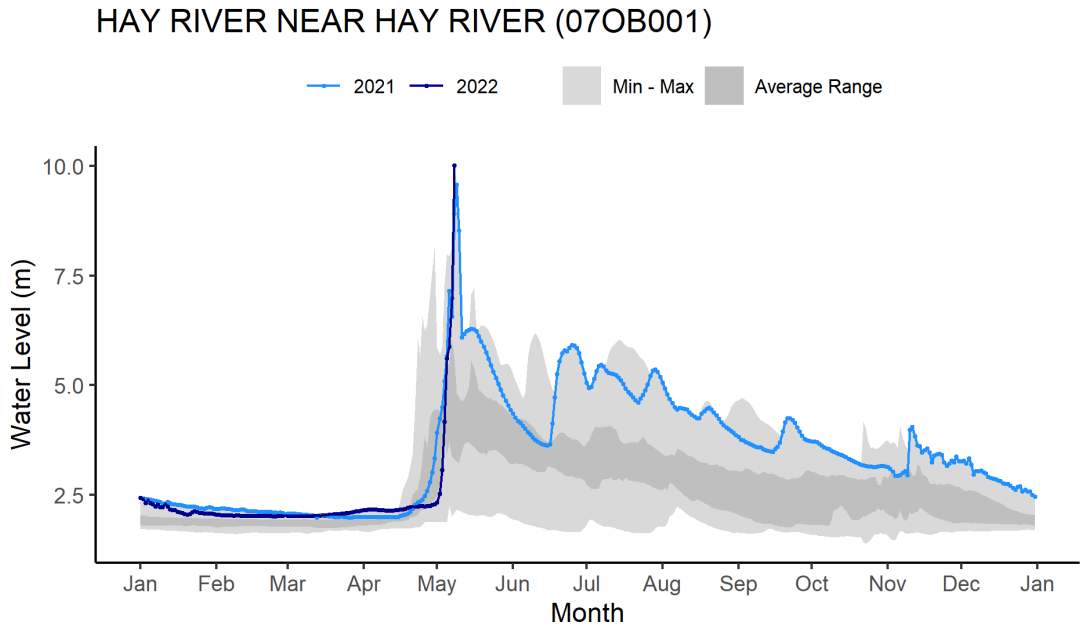
Above – Water level data on Lutose Creek near Steen River, AB. Lutose Creek is a small tributary to the Hay River. Water levels have risen 0.9 m over the course of the storm.

Hay River near the border [07OB008]:

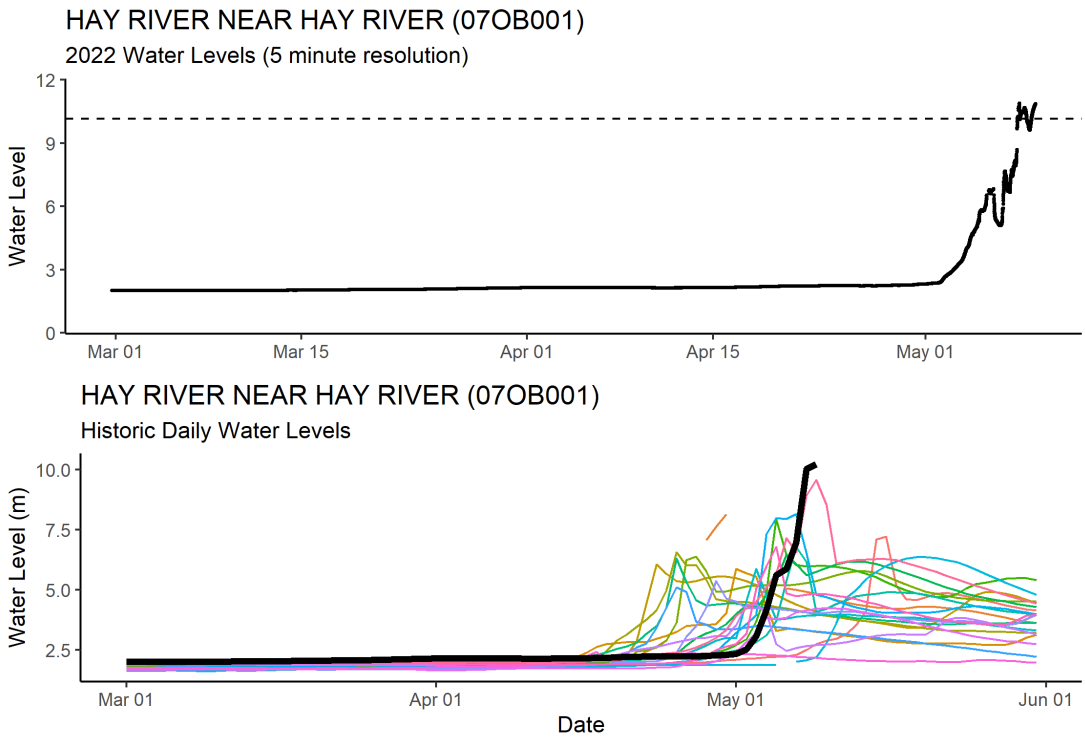
Note: Ice has impacted the gauge and real time data are not available at this location. **The most recent data are from May 06 at 18:25.** Water Survey of Canada staff are hoping to have this issue rectified by this afternoon if conditions are safe.

Above – Hay River near the border hydrometric gauge photo on May 09 at 11:00. Photo courtesy of Water Survey of Canada and GNWT.

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 08** (yesterday).

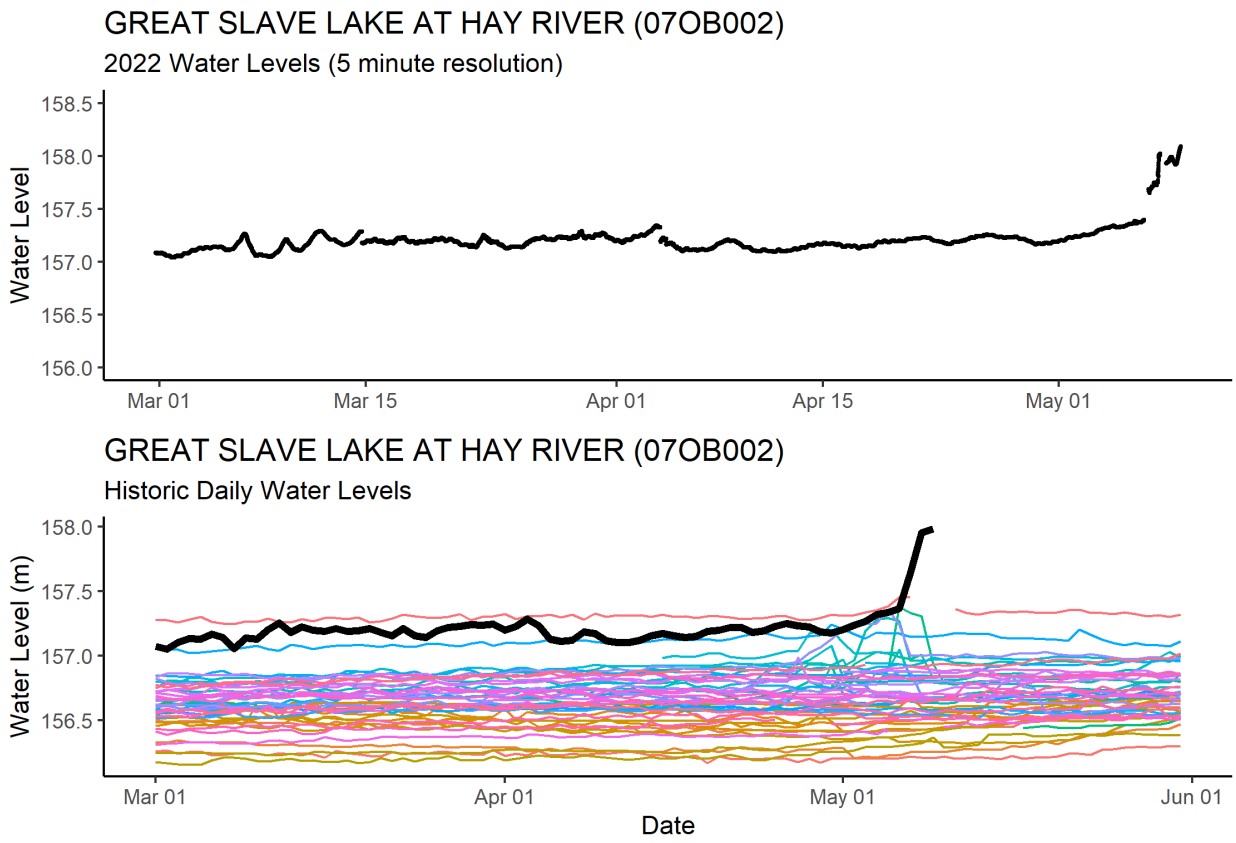


Above - The upper graph in this figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2021). The lower graph shows daily average levels relative to the previous 20 years. Provisional data indicate that water levels at the gauge have passed the instantaneous peak from last year and continue to be affected by ice.

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 [07OB002]:

Note: This gauge is at the mouth of the East Channel of the Hay River and is therefore sensitive to rising river levels. During ice break up, this gauge provides an indication of water levels on the East Channel of the Hay River and <u>not</u> water levels on Great Slave Lake.



Above – Water levels at the Great Slave Lake at Hay River gauge. 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:

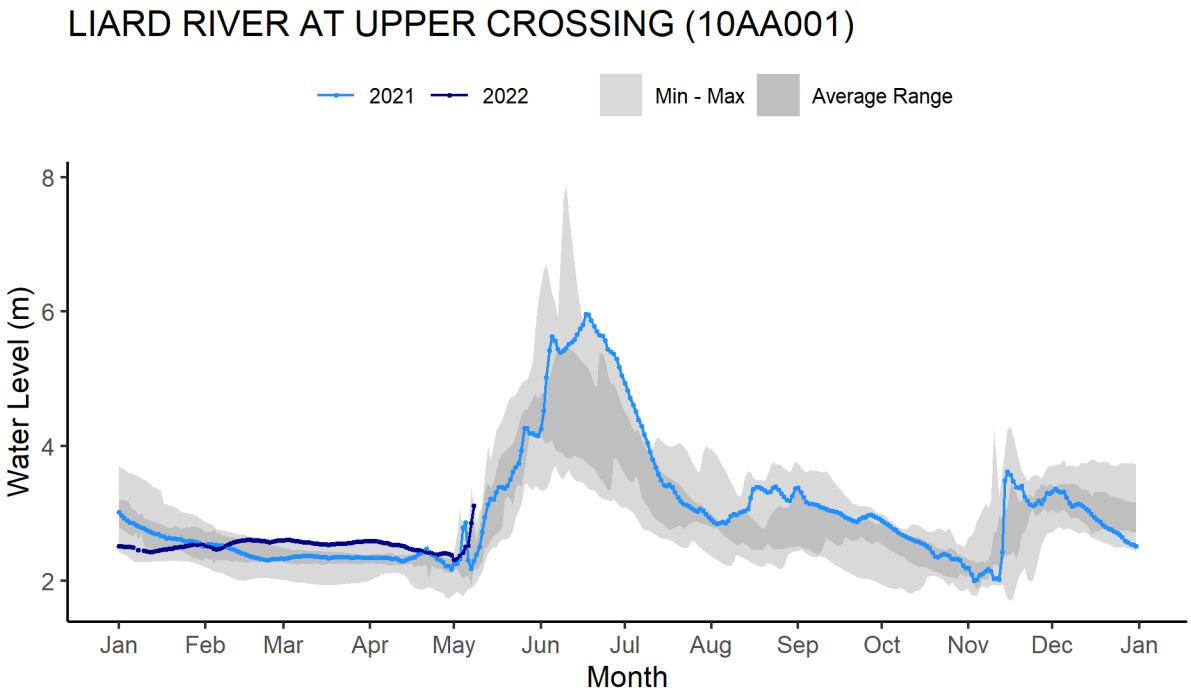
Current Status:

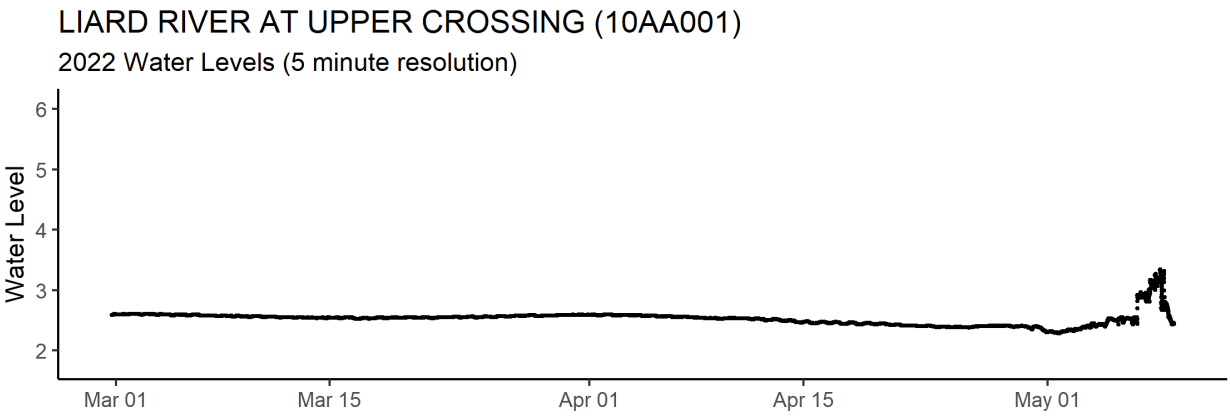
- Ice moved at the Liard River near the mouth (Fort Simpson ferry crossing) as of 09:00 this morning;
- There have been reports of ice moving near Fort Liard and Nahanni Butte.

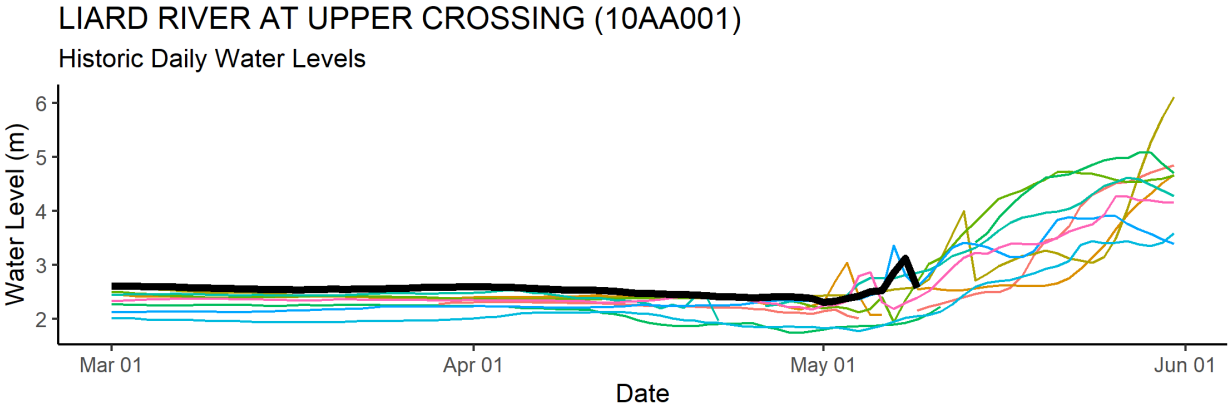
Above – Map of hydrometric stations in the Liard River basin. The station numbers are referenced in the water level plots below.

Hydrometric Data:

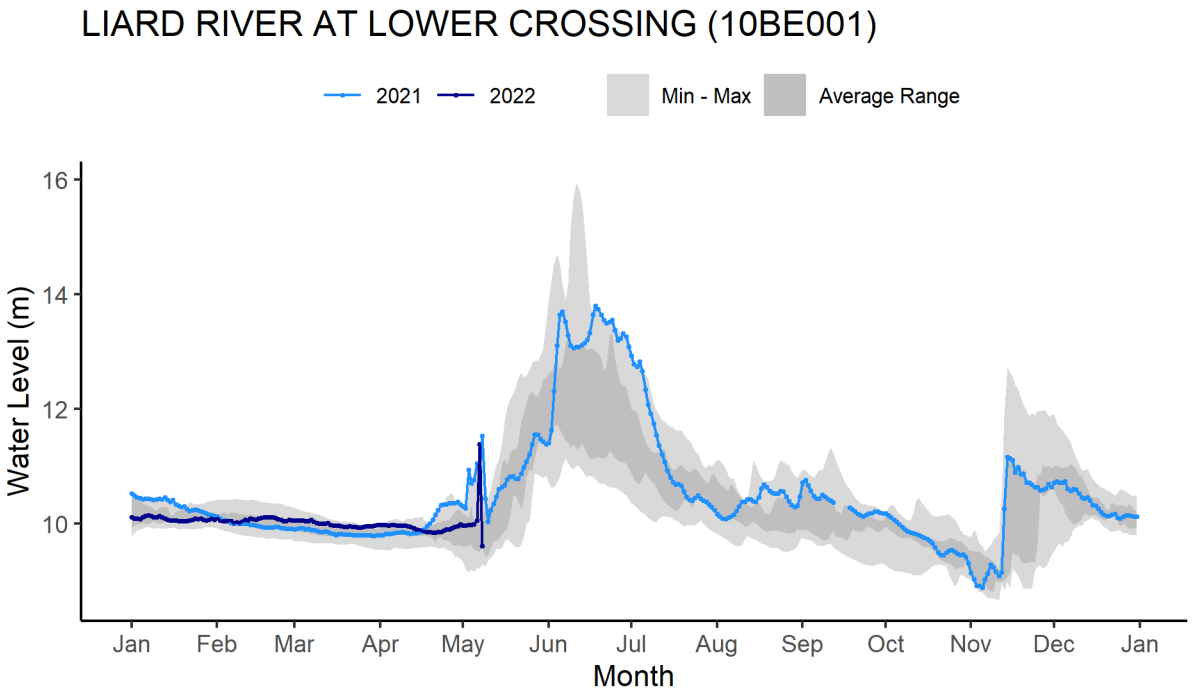
Liard River at Upper Crossing (Yukon) [10AA001]:

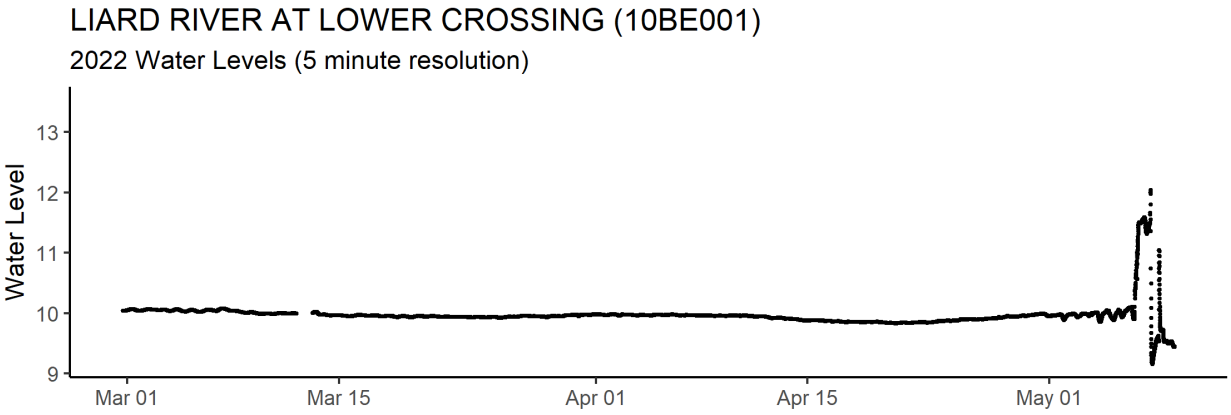


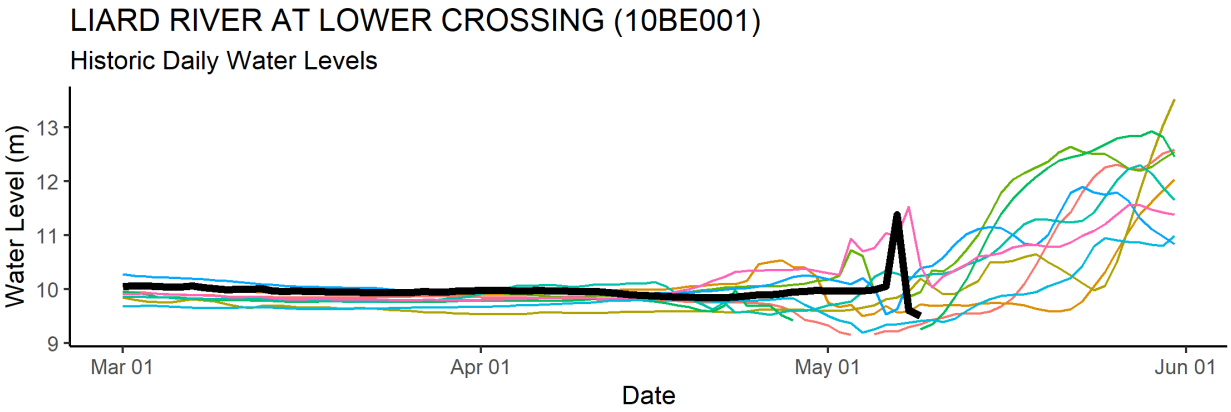




Liard River at Lower Crossing (British Columbia) [10BE001]:







The gauge appears to be affected by ice at this time.

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 are not considered reliable.**

Above – Liard River at Fort Liard hydrometric gauge photo from May 08 at 11:00. Photo courtesy of Water Survey of Canada and GNWT.

Liard River near the mouth [10ED002]:

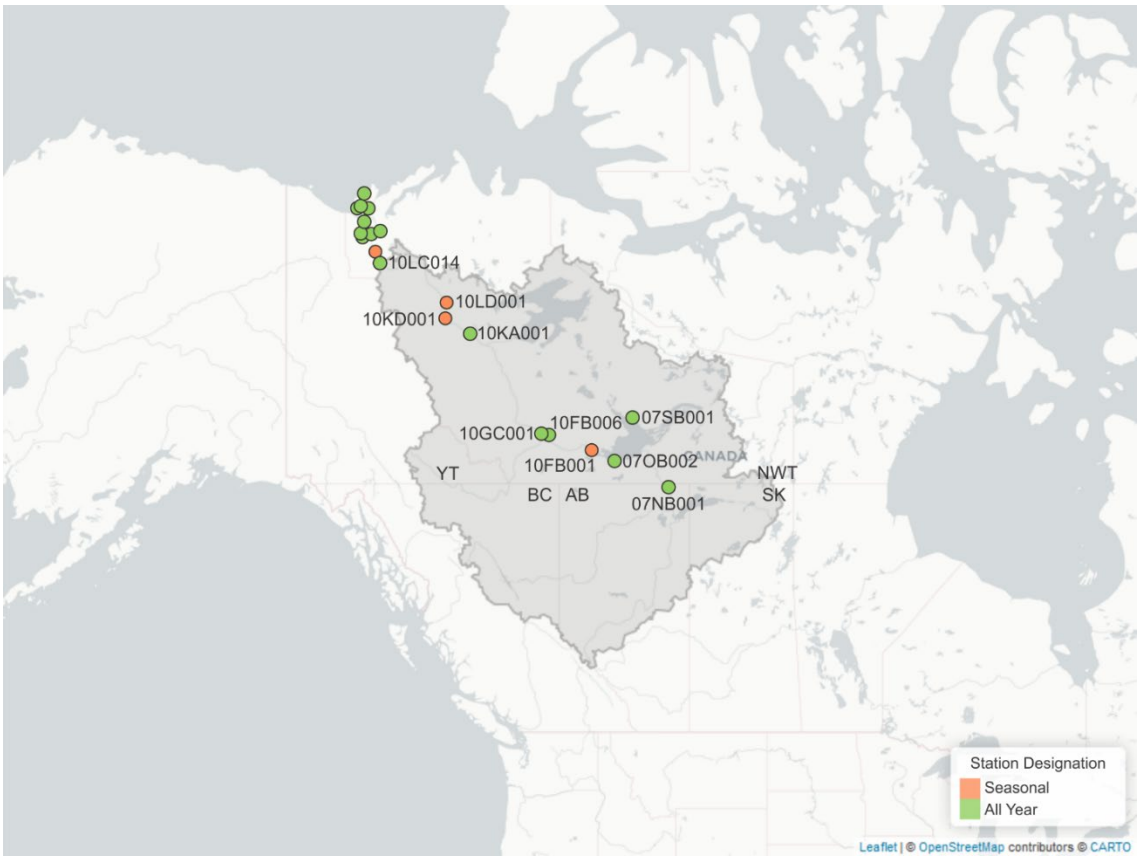
Note: The sensor is not currently producing data. Water Survey of Canada of Canada staff visited the gauge on May 07 at 10:20 and measured an instantaneous water level of 4.55 m.

Above – Liard River near the mouth hydrometric gauge photo from May 09 at 10:00. Photo courtesy of Water Survey of Canada and GNWT.

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

Current Status:

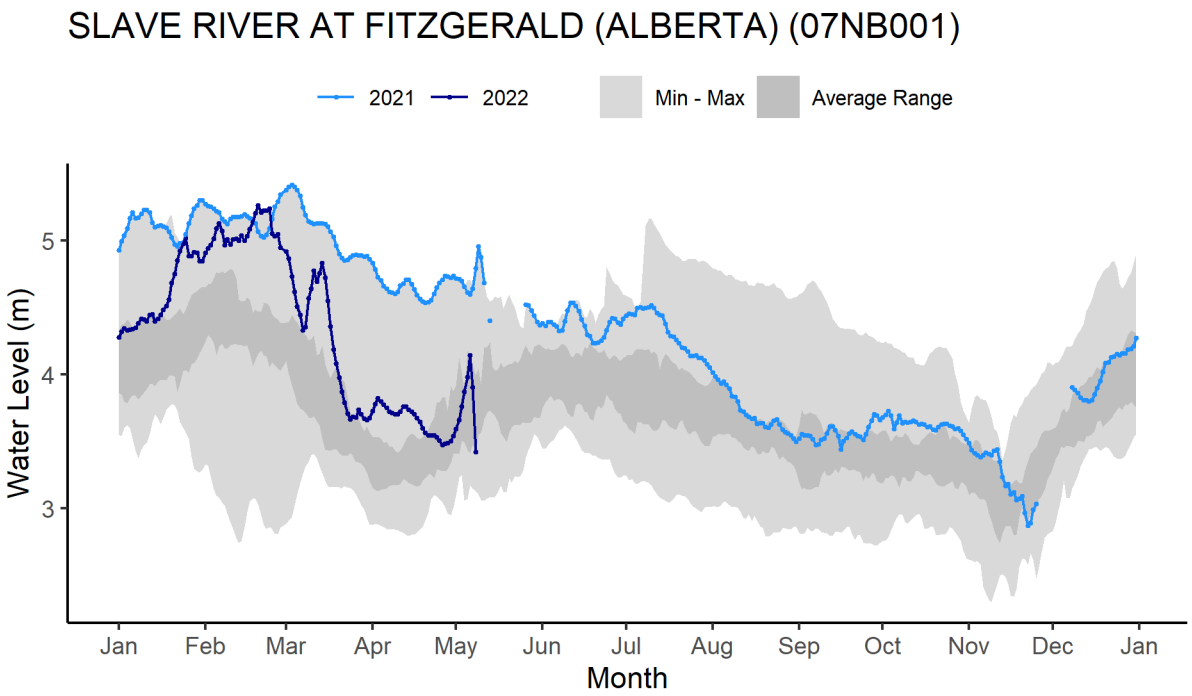
- Break up is progressing along the Peace River and the Slave River;
    - There have been reports of an ice jam on the Slave River at km 10 as of May 06;
- Ice moved locally on the Dehcho (Mackenzie River) at Fort Providence, and on the Mackenzie River (between Jean Marie River and Fort Simpson);
- Ice on the Dehcho near Fort Simpson moved approximately 50-100 m last night but is stationary as of today at 12:00;
- Environment and Climate Change Canada has forecast cloudy conditions with below normal temperatures until Wednesday in the Dehcho.



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

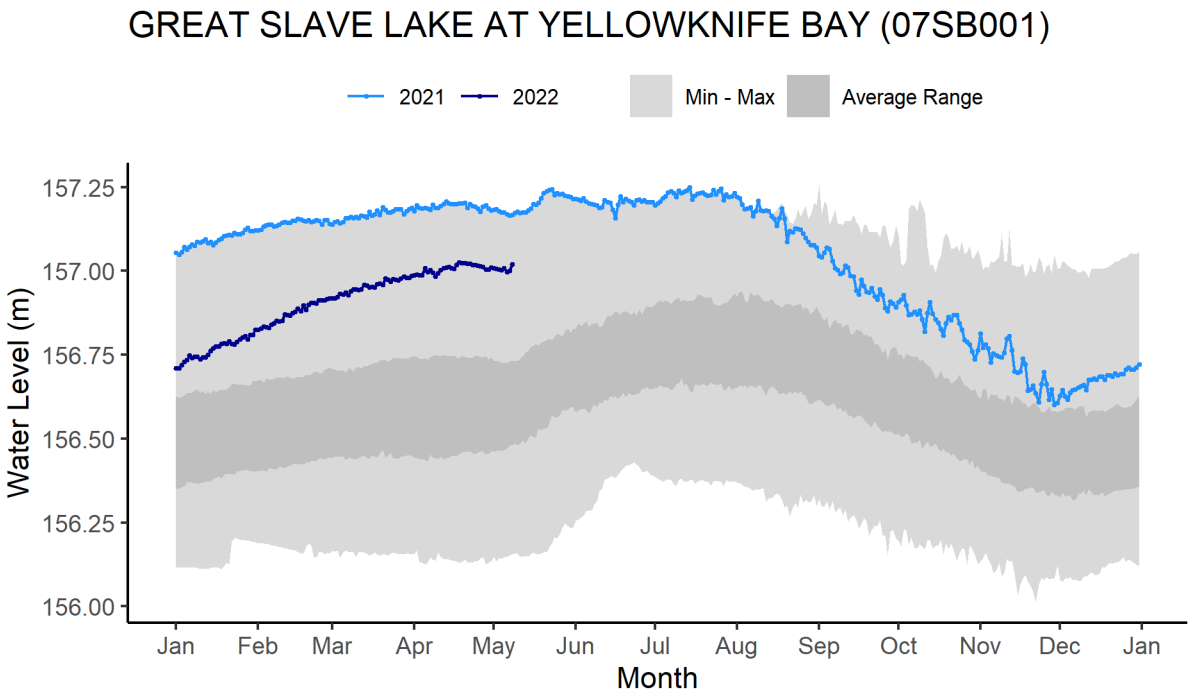
Hydrometric Data:

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



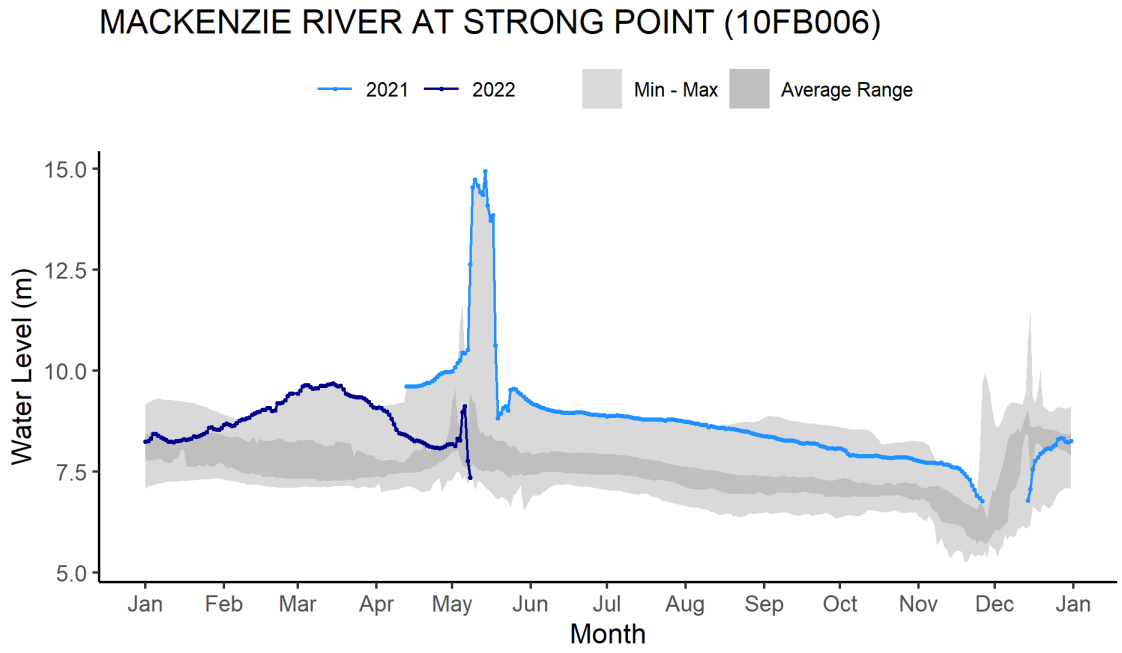
Above – The gauge appears to be affected by ice at this time.

Great Slave Lake at Yellowknife Bay [07SB001]:

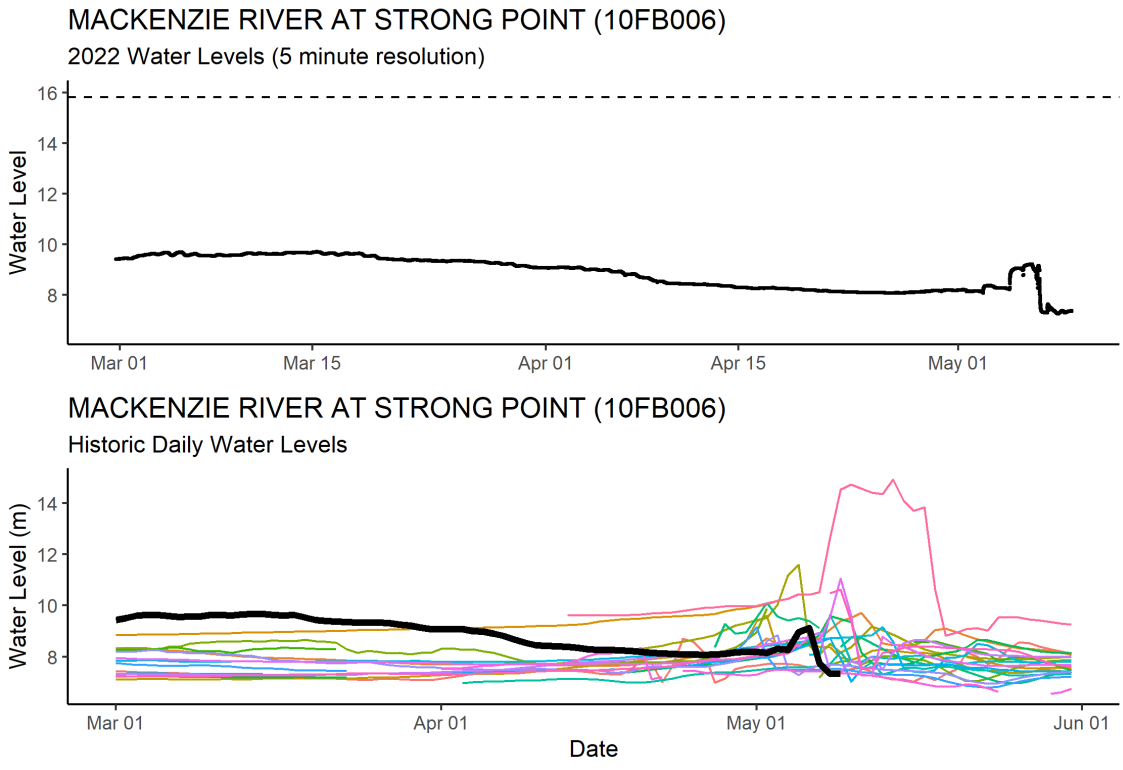


Above – Water levels on Great Slave Lake at Yellowknife Bay for the previous two years. Although water levels have receded since the highs of 2020 and 2021, levels remain much higher than normal.

Mackenzie River at Strong Point [10FB006]:



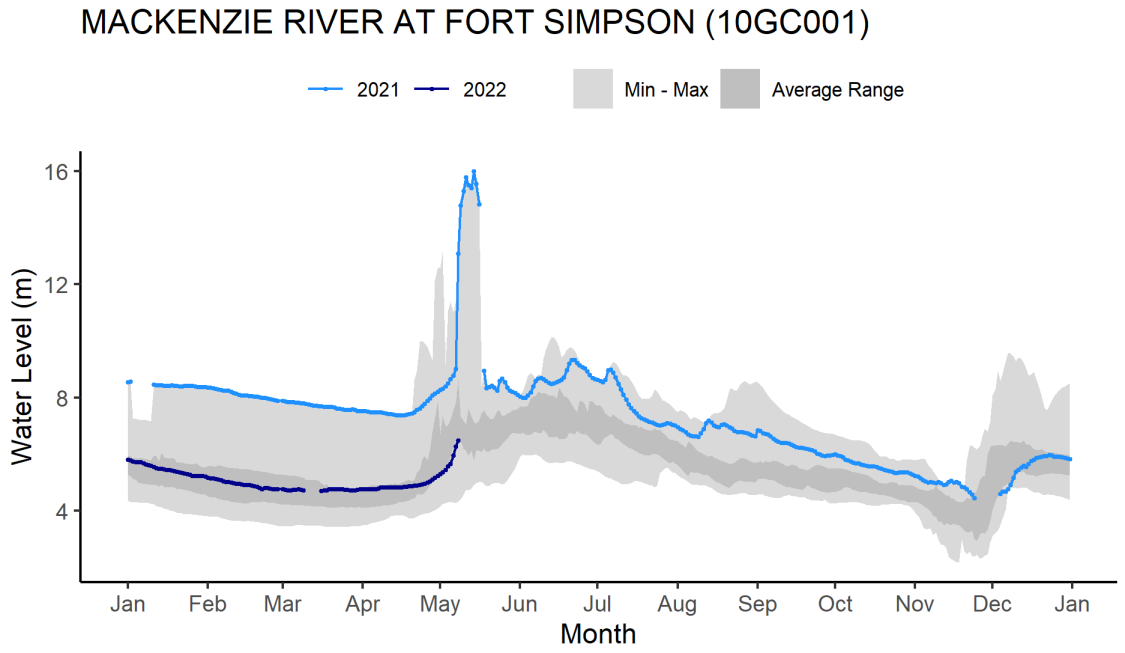
Above – hydrograph of daily average levels for the previous two years. Note that the most recent point on this graph shows the **daily average level from May 08** (yesterday).



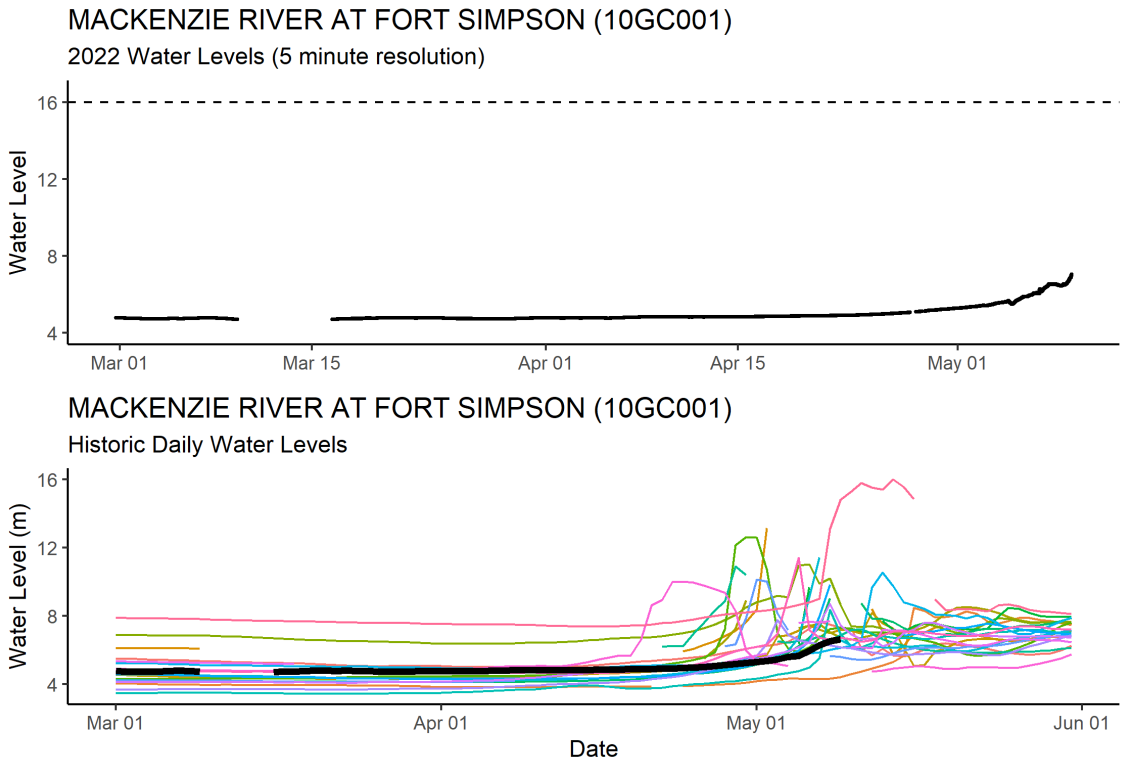
Above - The upper graph in the figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2021). The lower graph shows daily average levels relative to the previous 20 years. Ice movement has led to abrupt changes in level over the past few days.

Above – Dehcho (Mackenzie River) at Strong Point hydrometric gauge photo from May 09 at 11:00. Photo courtesy of Water Survey of Canada and GNWT.

Mackenzie River at Fort Simpson [10GC001]:



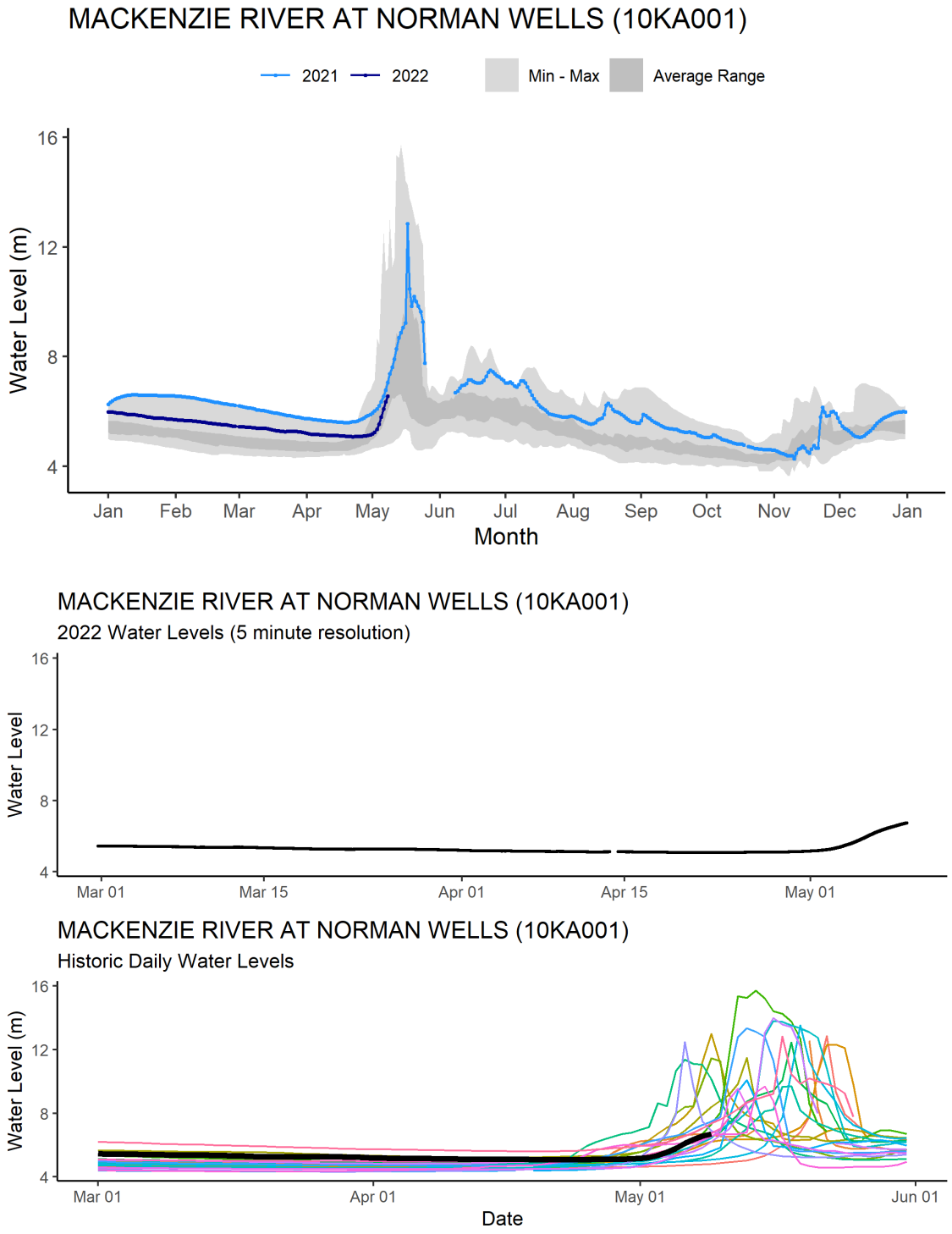
Above – hydrograph of daily average levels for the previous two years. Note that the most recent point on this graph shows the **daily average level from May 08** (yesterday).



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 rise as is normal for this time of year.

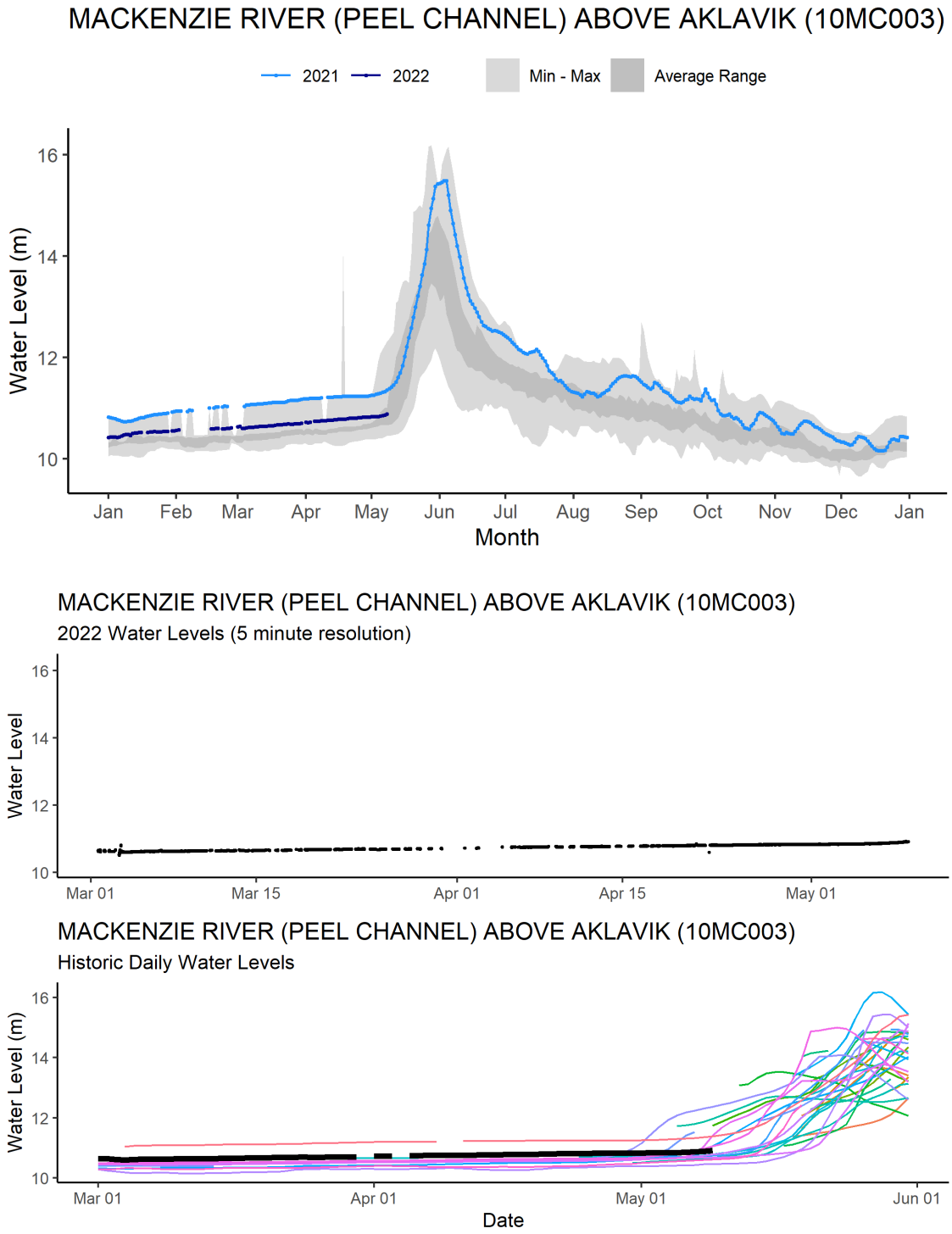
Above – Dehcho (Mackenzie River) at Fort Simpson hydrometric gauge photo from May 09 at 11:00. Photo courtesy of Water Survey of Canada and GNWT.

Mackenzie River at Norman Wells [10KA001]:



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 rise, with the timing being approximately average to previous years.

Mackenzie River (Peel Channel) at Aklavik [10MC003]:

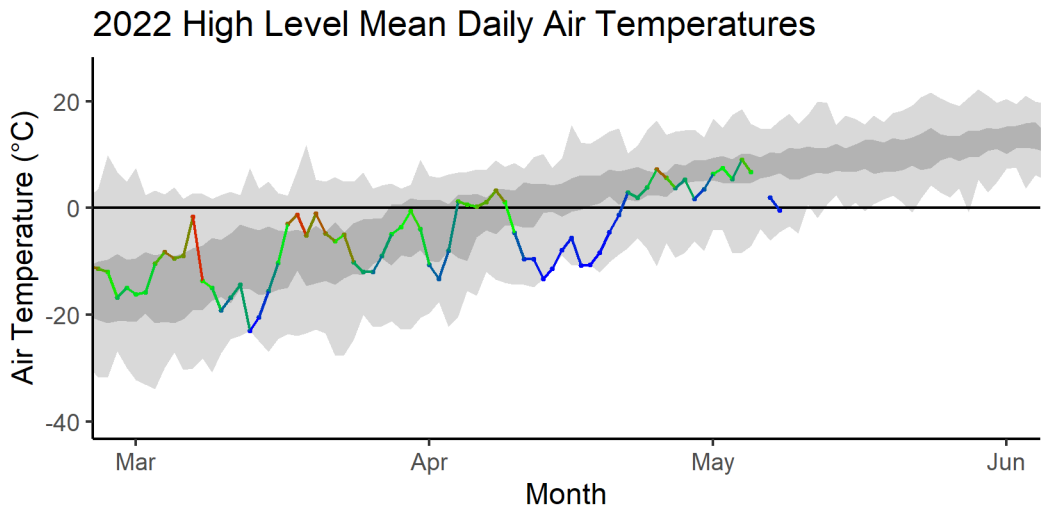


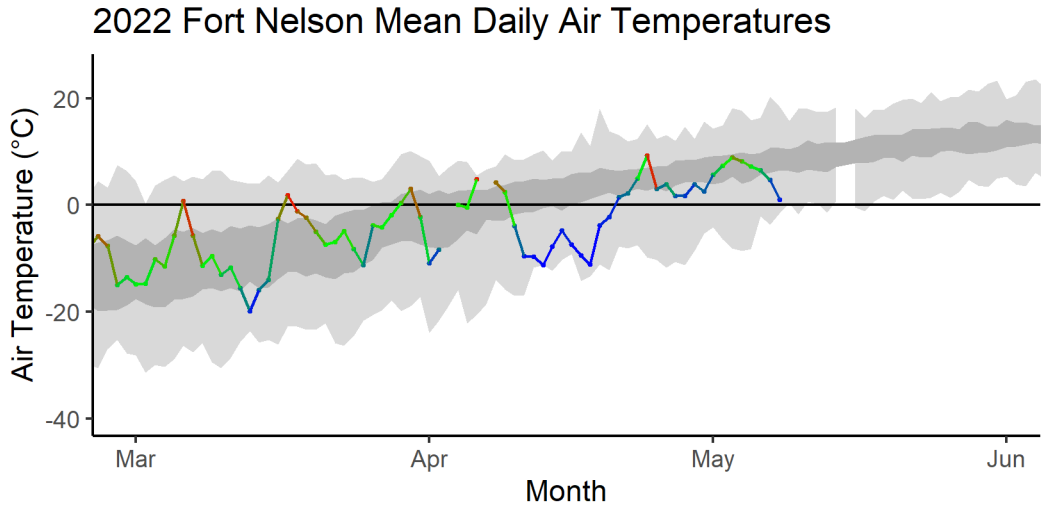
Above – The middle graph in the figure presents real time water level data at 5-minute resolution while the lower graph shows daily average levels relative to the previous 20 years. Water levels in the Delta have not yet started to rise. Water levels are lower than last year but have been higher than average throughout the winter.

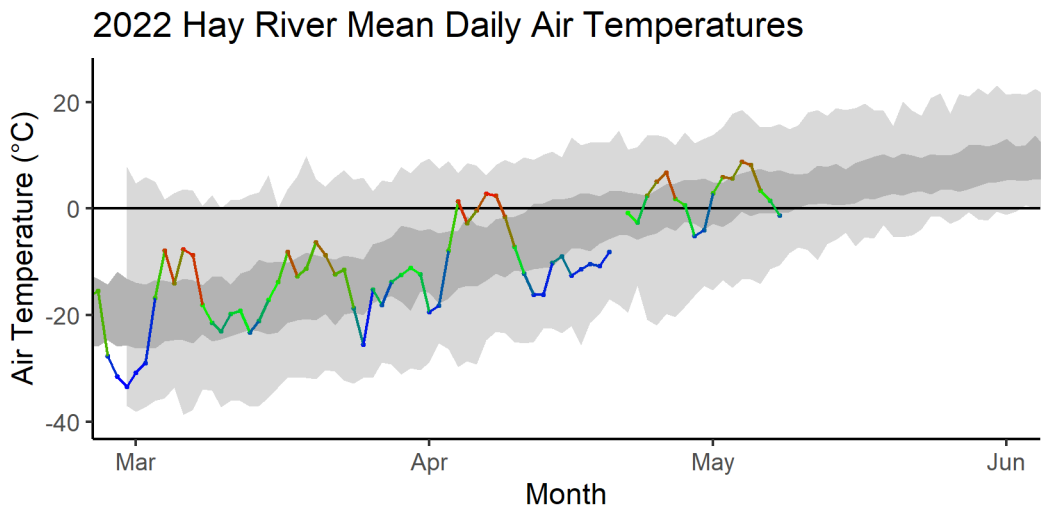
Weather Data:

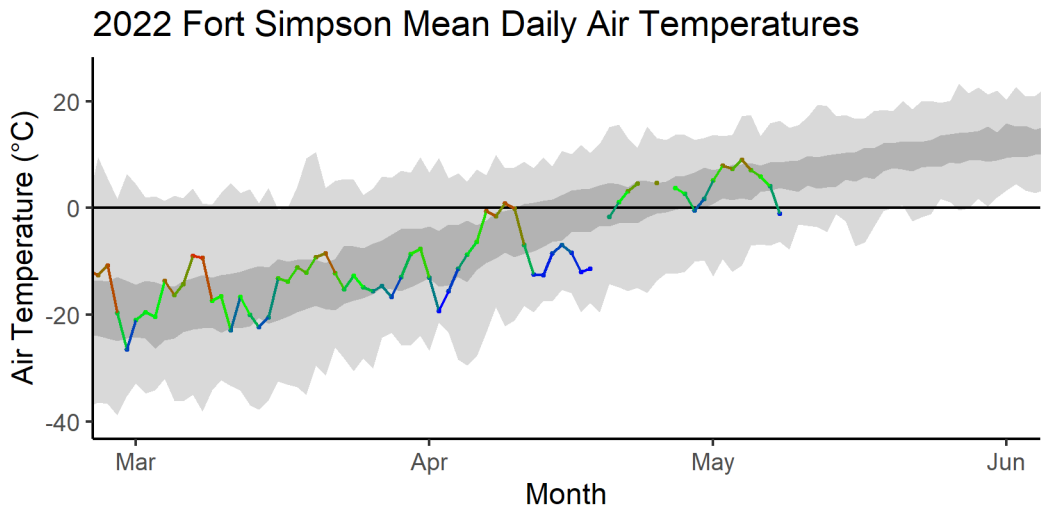
Weather information informs how snow and ice will melt and provides information about how this spring is unfolding relative to previous springs. Locations included here cover basin areas that feed into NWT rivers that are currently undergoing break up. The first set of plots show how temperatures have 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.

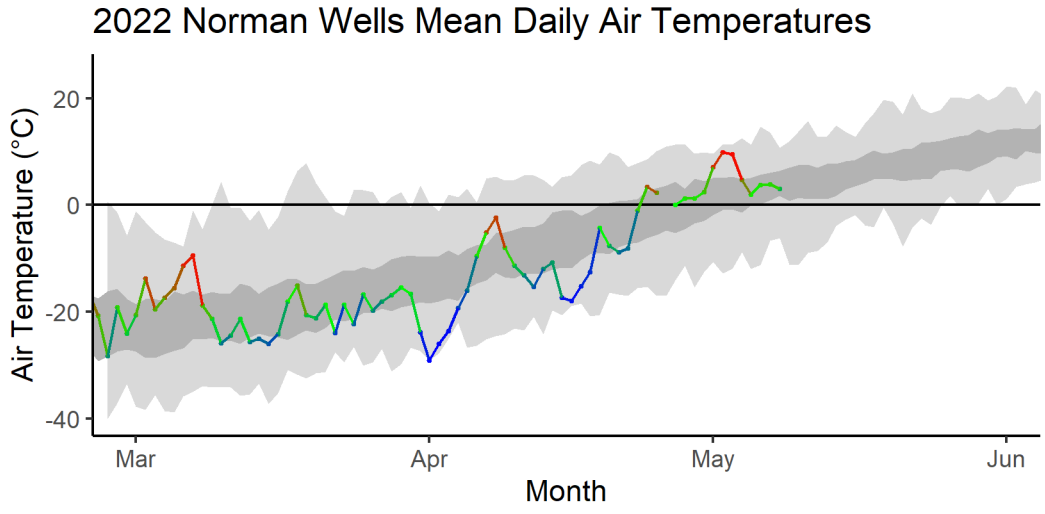
The low-pressure system over the Hay River basin should start to dissipate as of this afternoon. More snowfall is expected this morning and early afternoon for Hay River and Fort Providence.






2022 Hay River Mean Daily Air Temperatures
Air Temperature (°C)
20
0
-20
-40
Mar
Apr
May
Jun
Month


2022 Fort Simpson Mean Daily Air Temperatures
Air Temperature (°C)
20
0
-20
-40
Mar
Apr
May
Jun
Month


2022 Norman Wells Mean Daily Air Temperatures
Air Temperature (°C)
20
0
-20
-40
Mar
Apr
May
Jun
Month

High Level seven-day weather forecast:

Mon 9 May	Tue 10 May	Wed 11 May	Thu 12 May	Fri 13 May	Sat 14 May	Sun 15 May
 -1°C Periods of snow	 6°C Clearing	 13°C Sunny	 15°C Sunny	 18°C Sunny	 15°C A mix of sun and cloud	 15°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 -5°C Periods of snow	 -4°C Cloudy	 -1°C Clear	 2°C Clear	 3°C Cloudy periods	 2°C Cloudy periods	

Fort Nelson seven-day weather forecast:

Mon 9 May	Tue 10 May	Wed 11 May	Thu 12 May	Fri 13 May	Sat 14 May	Sun 15 May
 4°C Snow at times heavy	 10°C Mainly cloudy	 11°C 30% Chance of flurries or rain showers	 15°C A mix of sun and cloud	 18°C Sunny	 16°C A mix of sun and cloud	 14°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 -6°C 40% Chance of flurries	 -1°C Cloudy periods	 2°C Cloudy periods	 3°C Clear	 3°C Cloudy periods	 3°C Cloudy periods	

Hay River seven-day weather forecast:

Mon 9 May	Tue 10 May	Wed 11 May	Thu 12 May	Fri 13 May	Sat 14 May	Sun 15 May
 -3°C Periods of snow	 1°C 30% Chance of flurries	 5°C Sunny	 5°C Sunny	 11°C Sunny	 11°C A mix of sun and cloud	 10°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
 -6°C Periods of light snow	 -9°C Clear	 -7°C Clear	 -3°C Clear	 4°C Clear	 3°C Cloudy periods	

Fort Simpson seven-day weather forecast:

Mon 9 May	Tue 10 May	Wed 11 May	Thu 12 May	Fri 13 May	Sat 14 May	Sun 15 May
3°C 30% Chance of flurries	9°C A mix of sun and cloud	11°C Sunny	16°C Sunny	18°C Sunny	15°C A mix of sun and cloud	12°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
-8°C Partly cloudy	-3°C Clear	0°C Clear	4°C Clear	4°C Clear	2°C Cloudy periods	

Norman Wells seven-day weather forecast:

Mon 9 May	Tue 10 May	Wed 11 May	Thu 12 May	Fri 13 May	Sat 14 May	Sun 15 May
7°C Mainly sunny	8°C A mix of sun and cloud	10°C A mix of sun and cloud	16°C Sunny	16°C A mix of sun and cloud	11°C A mix of sun and cloud	10°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
-3°C Partly cloudy	-1°C Cloudy	1°C Clear	3°C Clear	2°C Cloudy periods	0°C Cloudy periods	

Factors to Watch:

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

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

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

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

Spring Break up on NWT Rivers: Mechanical vs Thermal

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

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

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

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

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

Technical Note:

- The figures in this report plot water levels. The values on the y-axis are (in most cases) relative to an arbitrary datum. This means that the values on each gauge can be compared to different years but should not be used to compare water levels from one location to the next.

For example, the Hay River near the border gauge (07OB008) records a level of about 288 m. The Hay River near Hay River gauge (07OB001) usually records a level of about 4 m. This **does not mean** that the water level at the Hay River at the border site is 284 m higher than the water level at the Hay River near Hay River site.