Government of
Northwest Territories

NWT Water Monitoring Bulletin – May 14, 2022: 13:00

NWT break up reports will be published routinely as break up unfolds. These reports will focus on regions with active snowmelt and ice break up. The geographic focus of the report will shift as conditions change. Additional information about basin conditions can be found in the ENR Snow Survey Bulletin and Spring Water Outlook, available here. If you have any photos or information about break up in your community, feel free to reach out to us: nwtwaters@gov.nt.ca.

Current Status:

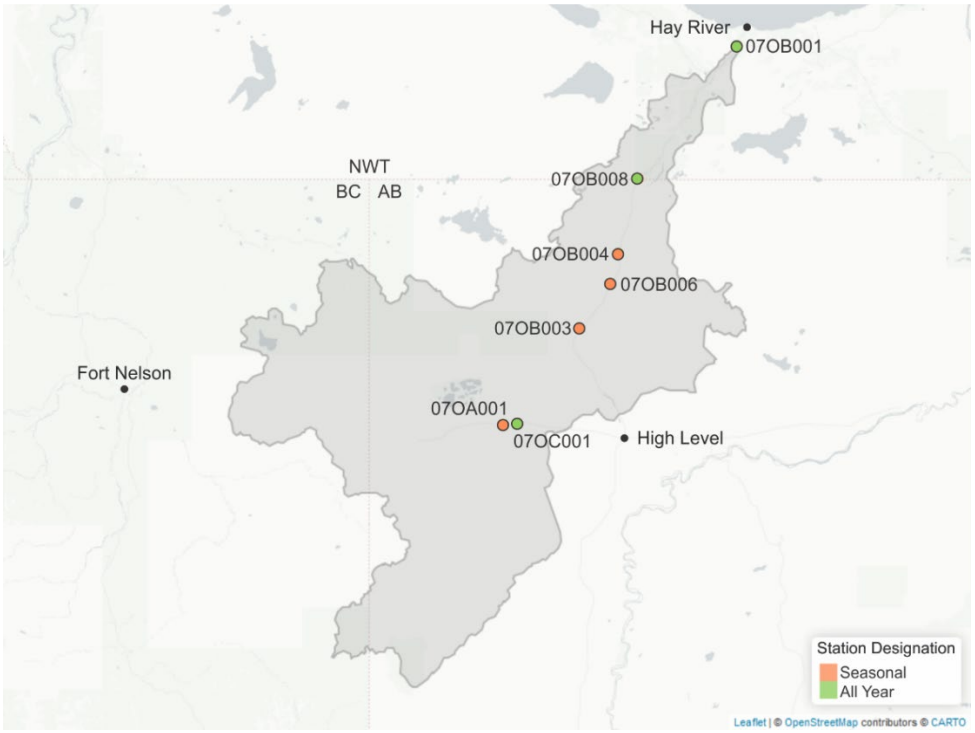
- Provisional water levels at the Hay River near Hay River hydrometric gauge have dropped 5 m since their peak on Thursday morning;
    - Water levels are now indicative of open water conditions;
    - It is expected that water levels at the gauge site will likely continue to slowly rise over the next few days, however the rate of rise is much lower with ice free conditions and will not approach the ice-induced water levels from earlier this week;
    - The provisional water level reading as of 12:00 (~7.9 m) is the highest open water level on record;
- Ice is moving well along the entirety of the NWT portion of the Liard River;
    - There is a significant precipitation event forecast over the South Nahanni River basin over the next five days;
        - It is uncertain at this time whether the precipitation will fall as rain or snow;
- Ice on the Mackenzie River is currently moving at Jean Marie River;
    - Mackenzie River ice has started to flow past Fort Simpson;
- Ice continues to move well on the Mackenzie River downstream of Fort Simpson;
- Mackenzie River ice is still stationary at Tulita as of yesterday at 13:00;
- Water levels under ice are increasing further downstream on the Mackenzie River, as is normal for this time of year.

Contents

Hay River:

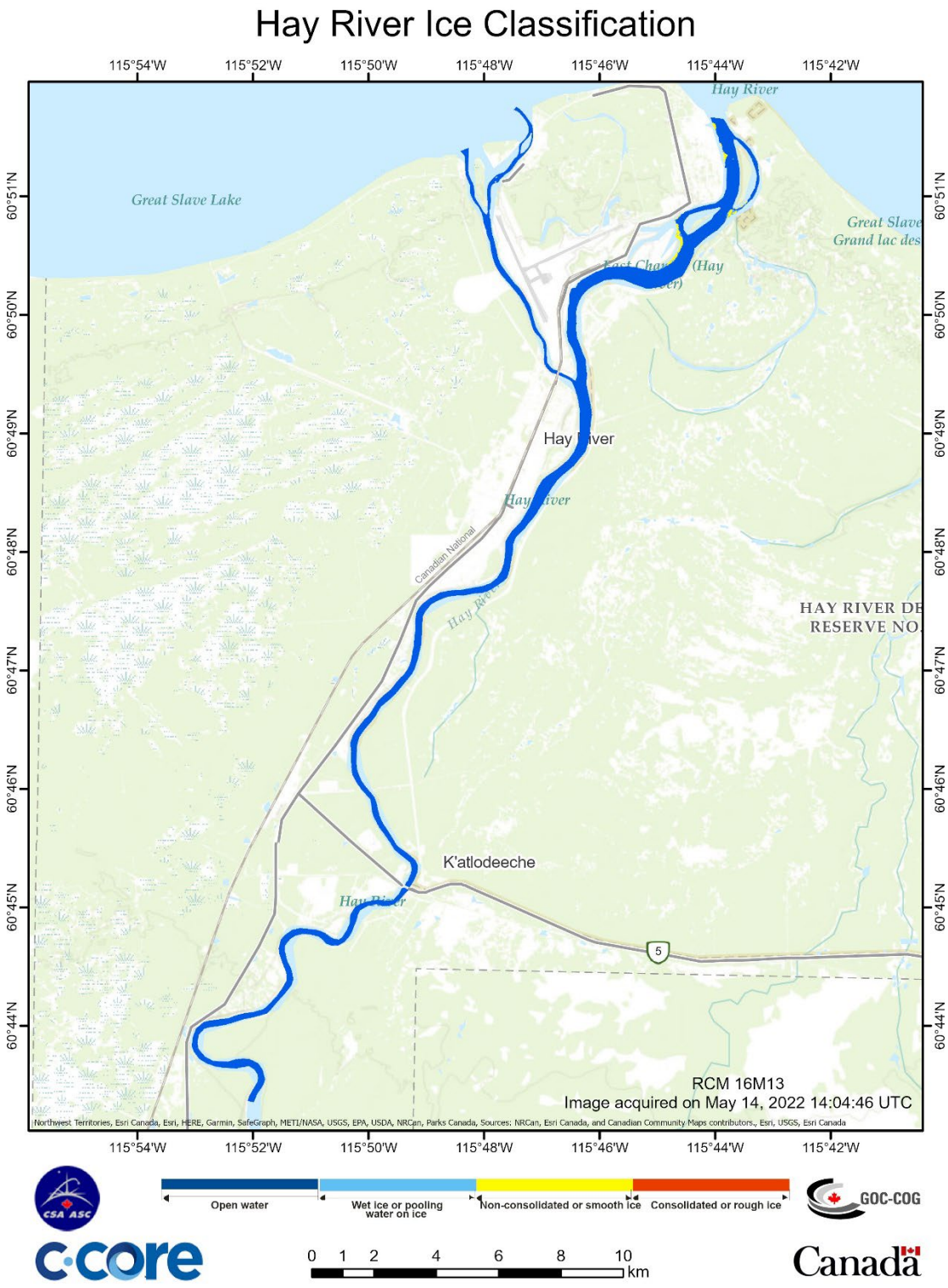
Current Status:

- Provisional water levels at the Hay River near Hay River gauge (just upstream of town) have now dropped by 5 m since the peak on the morning of May 12;
    - Satellite imagery from this morning indicates that there is no ice remaining in the East or West Channels;
    - Water levels are now indicative of open water conditions;
    - The provisional water level reading as of 12:00 (~7.9 m) is the highest open water level on record;
- Upstream gauges on the main stem of the Hay River continue to slowly increase as snowmelt water continues to move through the basin;
    - It is expected that water levels near the Town of Hay River and K'atl'odeeche First Nation will likely continue to slowly rise over the next few days, however the rate of rise is much lower with ice free conditions, and will not approach the ice-induced water levels from earlier this week;
- Moderate precipitation is expected in the Hay River basin over the weekend;
    - This precipitation event will likely maintain current high water levels;
- 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.

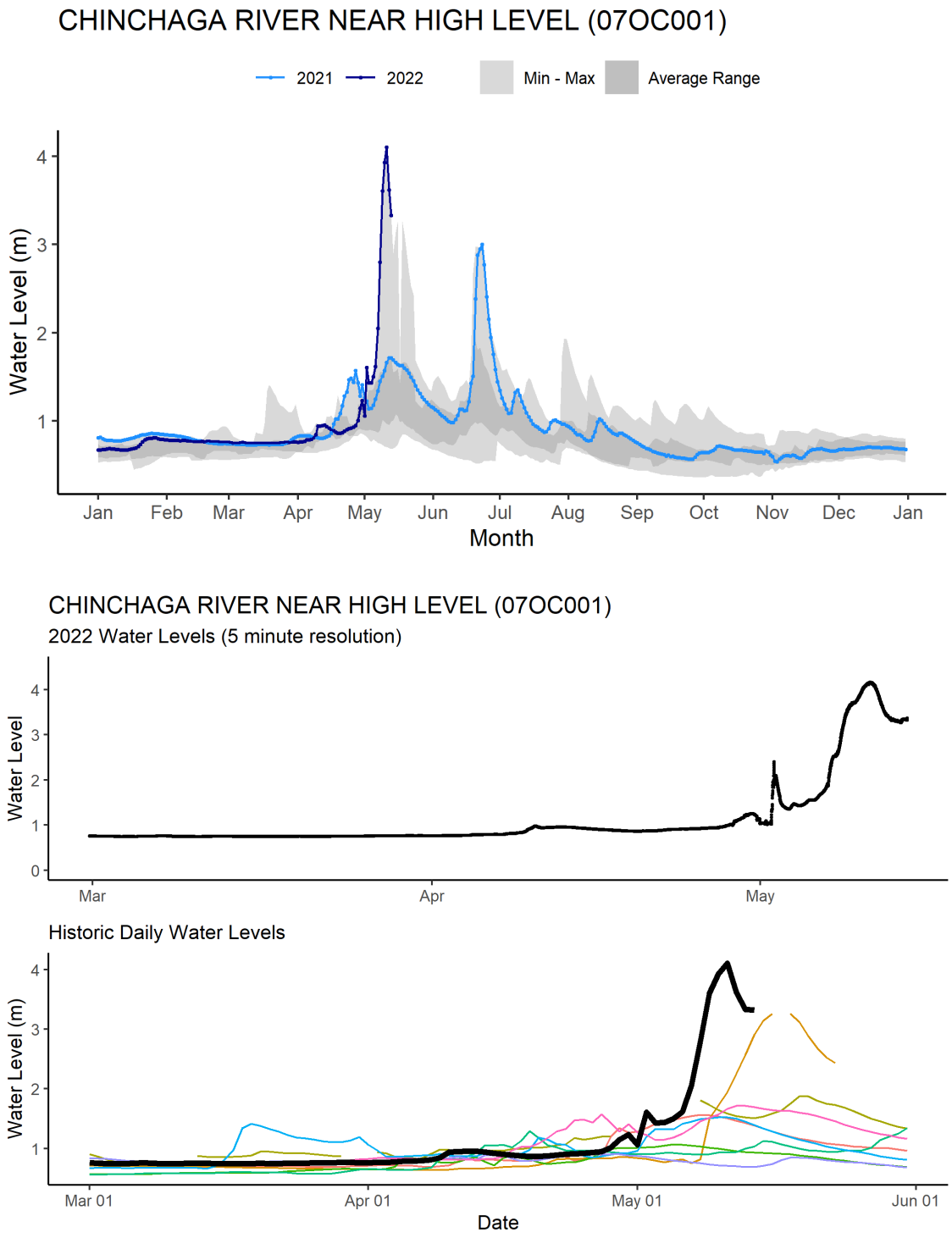
Imagery:



Above - Ice classification map based on radar imagery of a stretch of the Hay River, from Pine Point Bridge to the town of Hay River and K'atl'odeeche First Nation, taken on 14th May at 08:04 MDT.

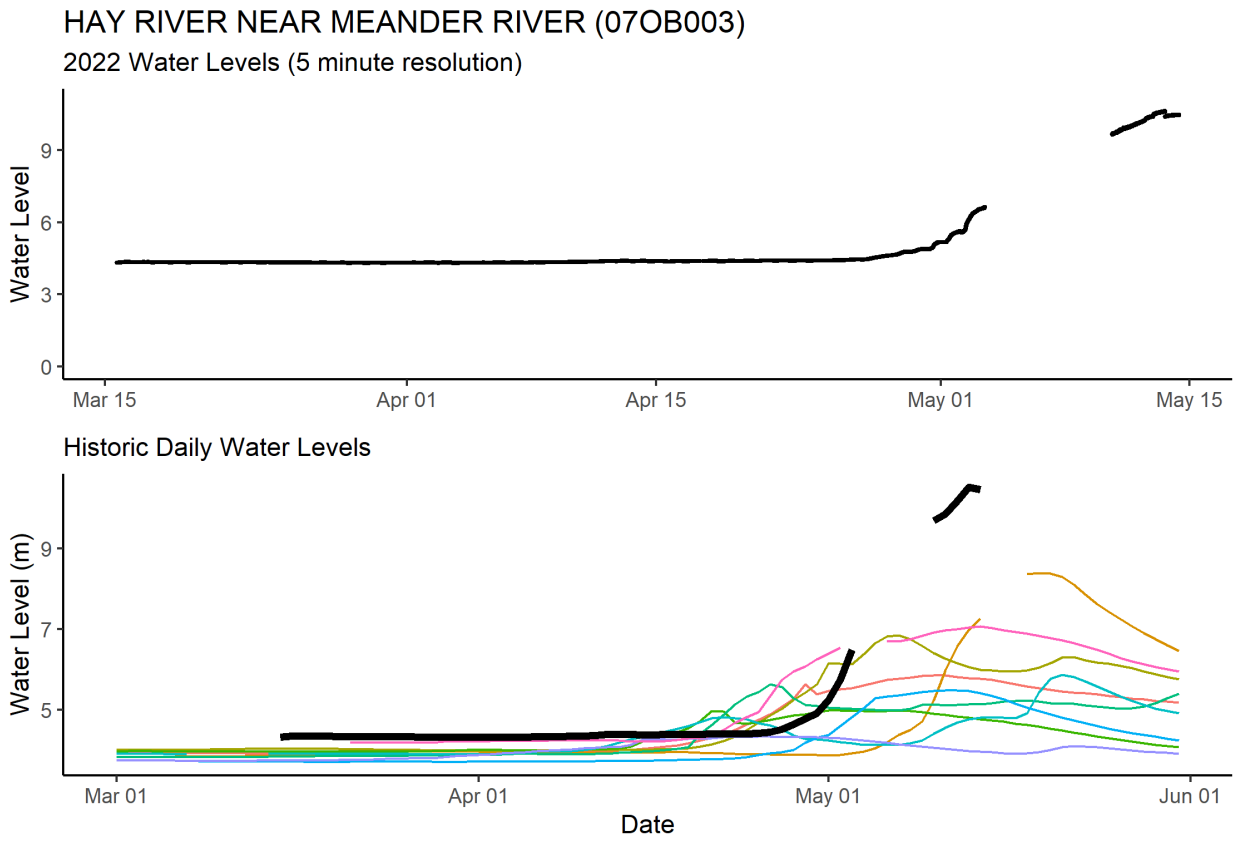
Hydrometric Data:

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



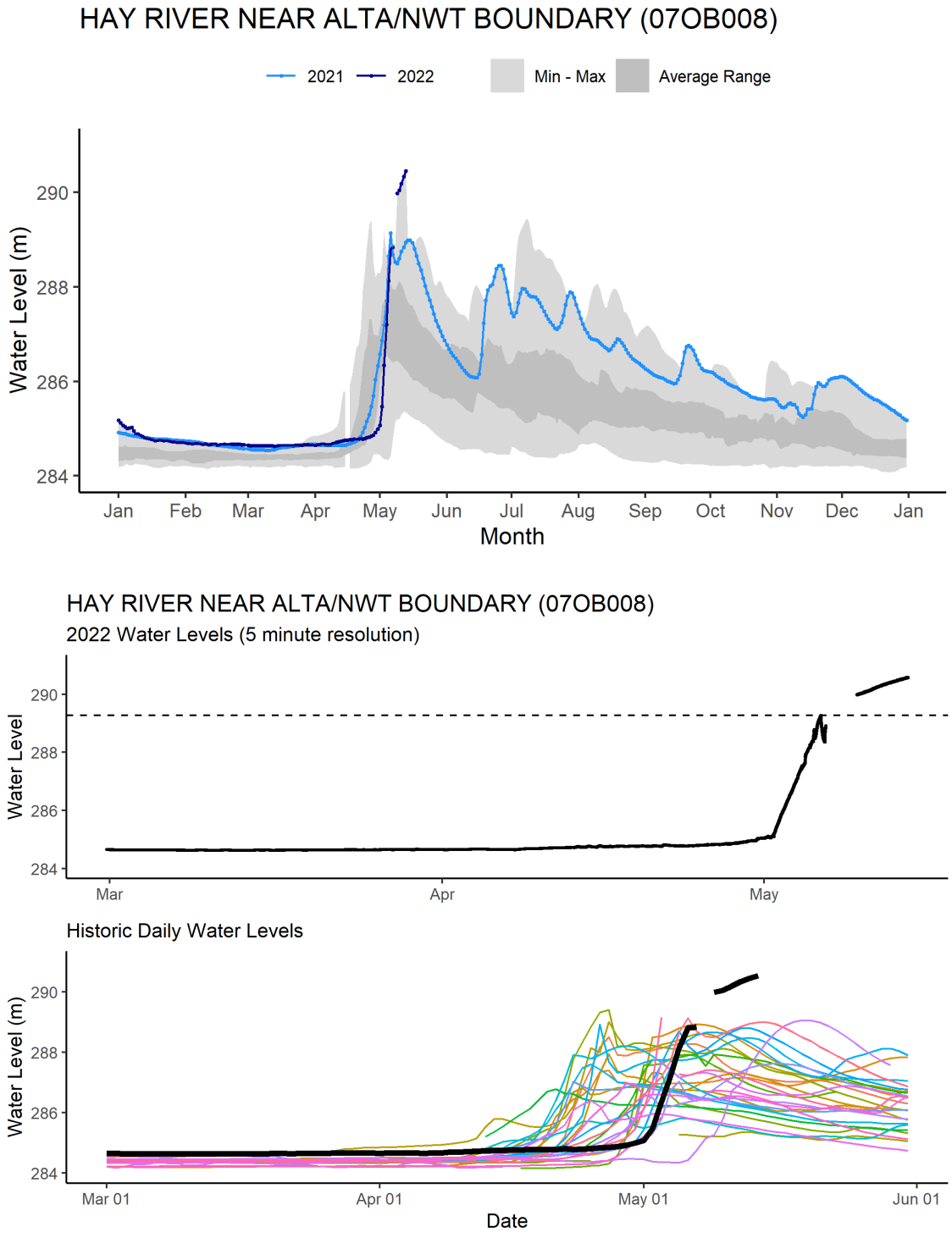
Above – Water level data at the Chinchaga River near High Level, AB. This plot shows high resolution (5 minute) water level data in the middle, and daily average data on the bottom. Water levels are now receding from their peak.

Hay River near Meander River (Alberta) [07OB003]:



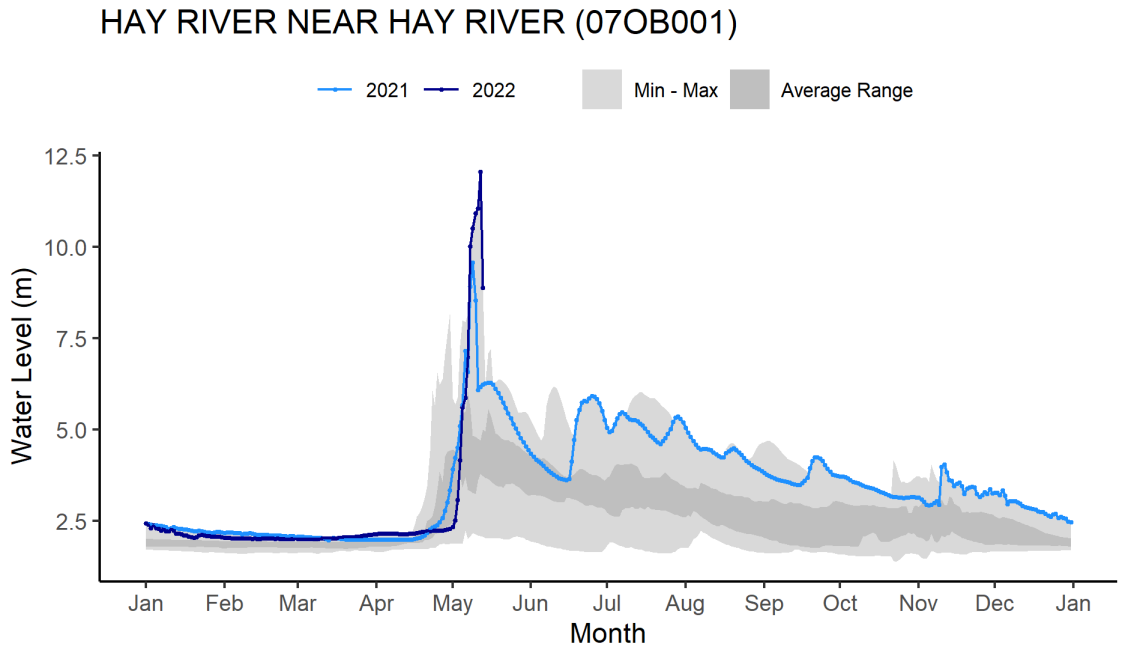
Above – Water level data on the Hay River near Meander River, AB. Water levels continue to slowly rise in response to snowmelt. **Note:** The provisional data indicate an instantaneous drop in level on May 13 at 15:30, but this is due to sensor error. Levels have been continuously rising since the station resumed data transmission.

Hay River near the border [07OB008]:

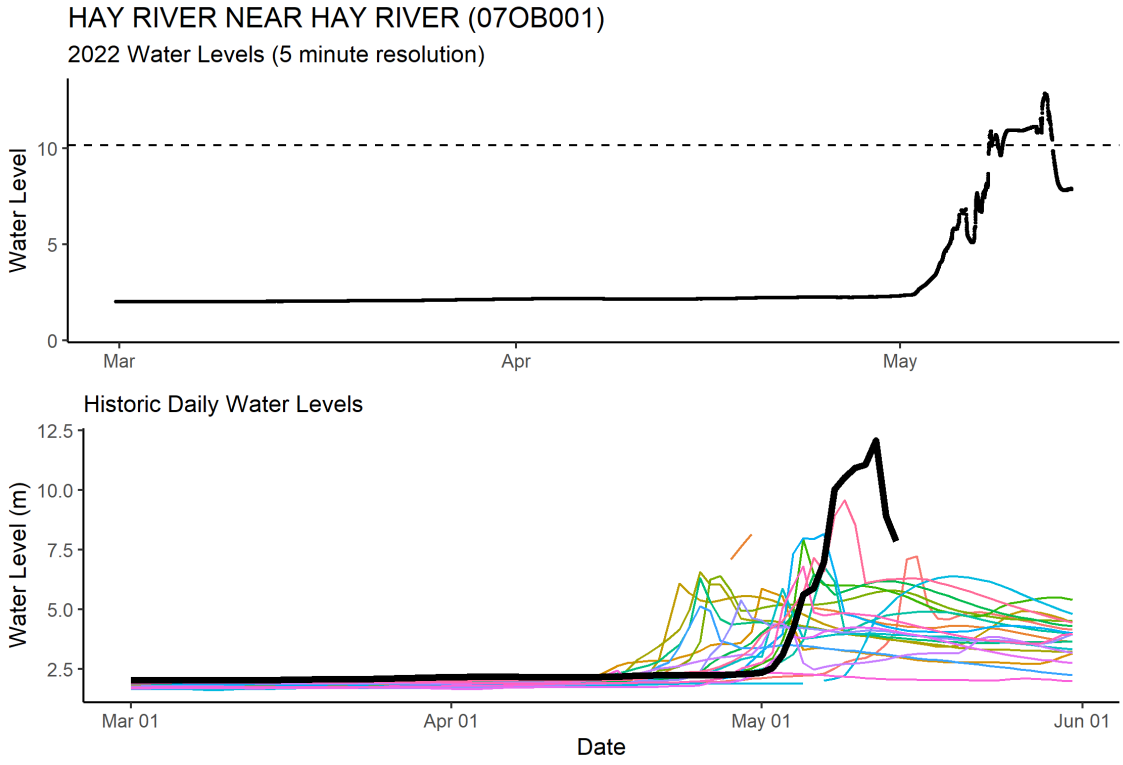


Above - The middle graph in this figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2021). The lower graph shows daily average levels relative to the previous 20 years. Water levels continue to slowly rise as snowmelt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

Hay River near Hay River [07OB001]:



Above – hydrograph of daily average levels for the previous two years.



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. The upper graph shows that provisional water levels have likely hit an open water equilibrium at ~7.8 m, which is the highest open water level on record.

Above – Hay River near the Town of Hay River hydrometric gauge photo on May 14 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

Liard River:

Current Status:

- There is now open water throughout the entire stretch of the Liard River in the NWT;
- Climate models are forecasting a severe precipitation event over the next five days;
    - Localized amounts of between 100-150 mm are forecast;
    - Most of the precipitation is forecast in the South Nahanni River basin where snowpack remains;
    - It is uncertain at this time if precipitation will fall as rain or snow;
    - If most of the precipitation falls as rain, it will speed up the melt of mountain snowpack and could result in rapidly rising water levels on the Liard and west bank tributaries.

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

Hydrometric Data:

Liard River at Fort Liard [10ED001]:

Note: The gauge is not currently producing data. The last available data were recorded on **May 08 at 04:25.**

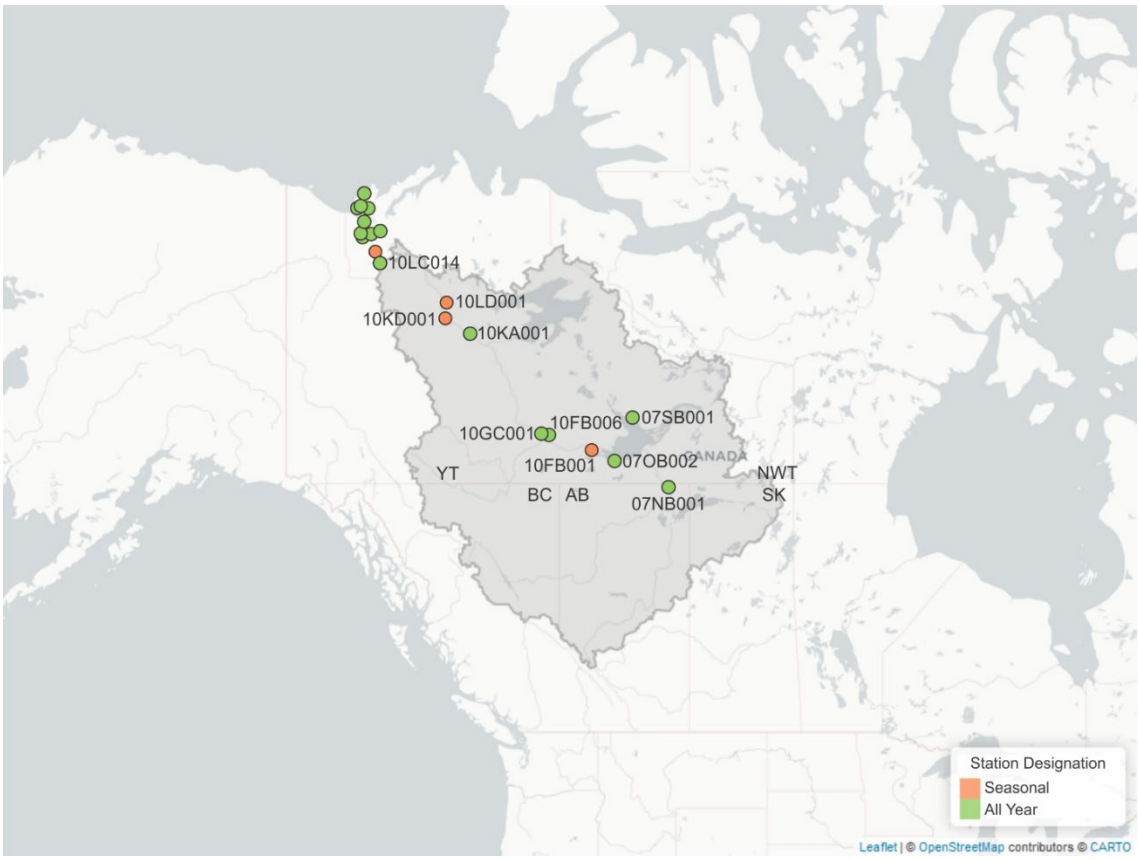
Liard River near the mouth [10ED002]:

Note: The gauge 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 and on May 09 at 10:15 and measured an instantaneous water level of 9.16 m.

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

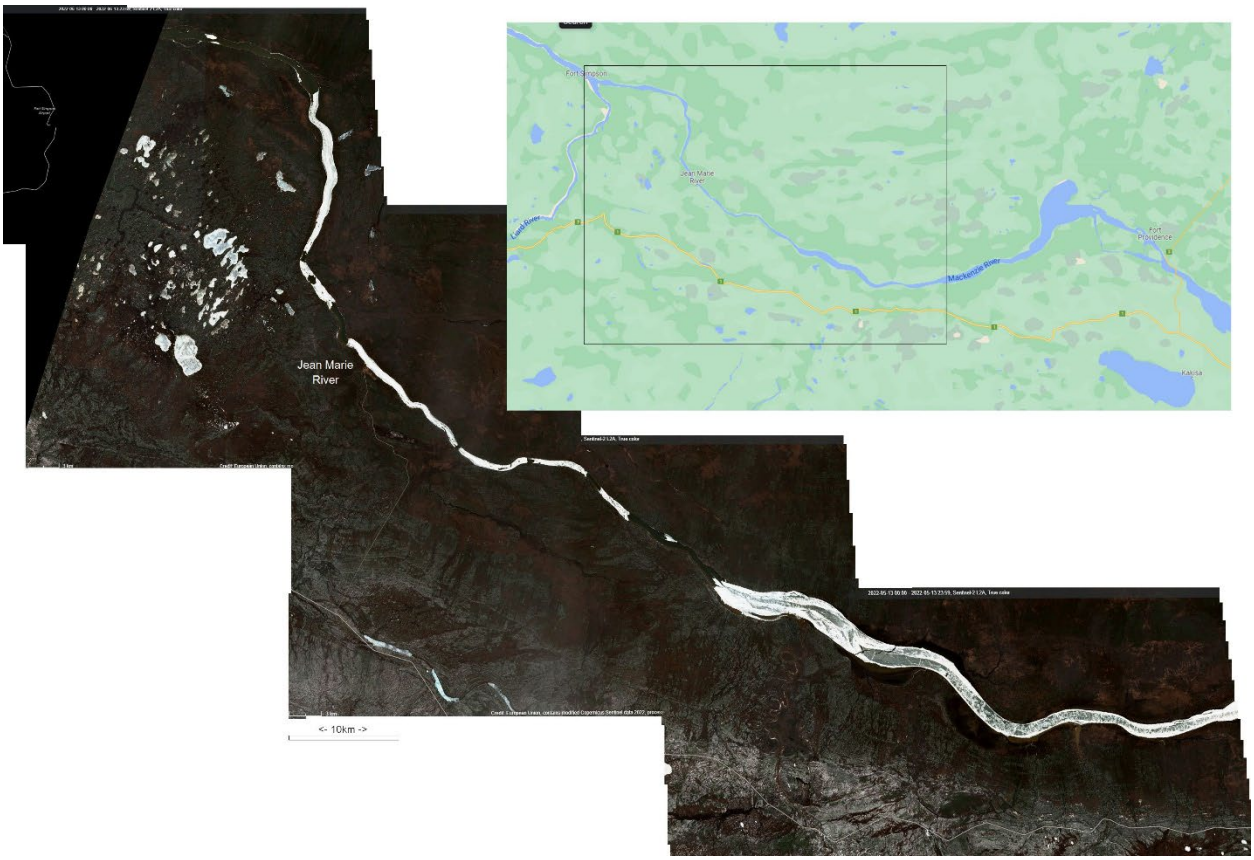
Current Status:

- Ice broke at Jean Marie River as of this morning;
    - Water levels rose initially but have since receded;
    - Ice from the Mackenzie River is breaking up and moving well at Fort Simpson with no threat for ice jam conditions;
- Mackenzie River ice is still stationary at Tulita as of yesterday at 13:00;
- Under ice water levels downstream on the Mackenzie River (Norman Wells and beyond) are starting to rise, as is normal for this time of year.

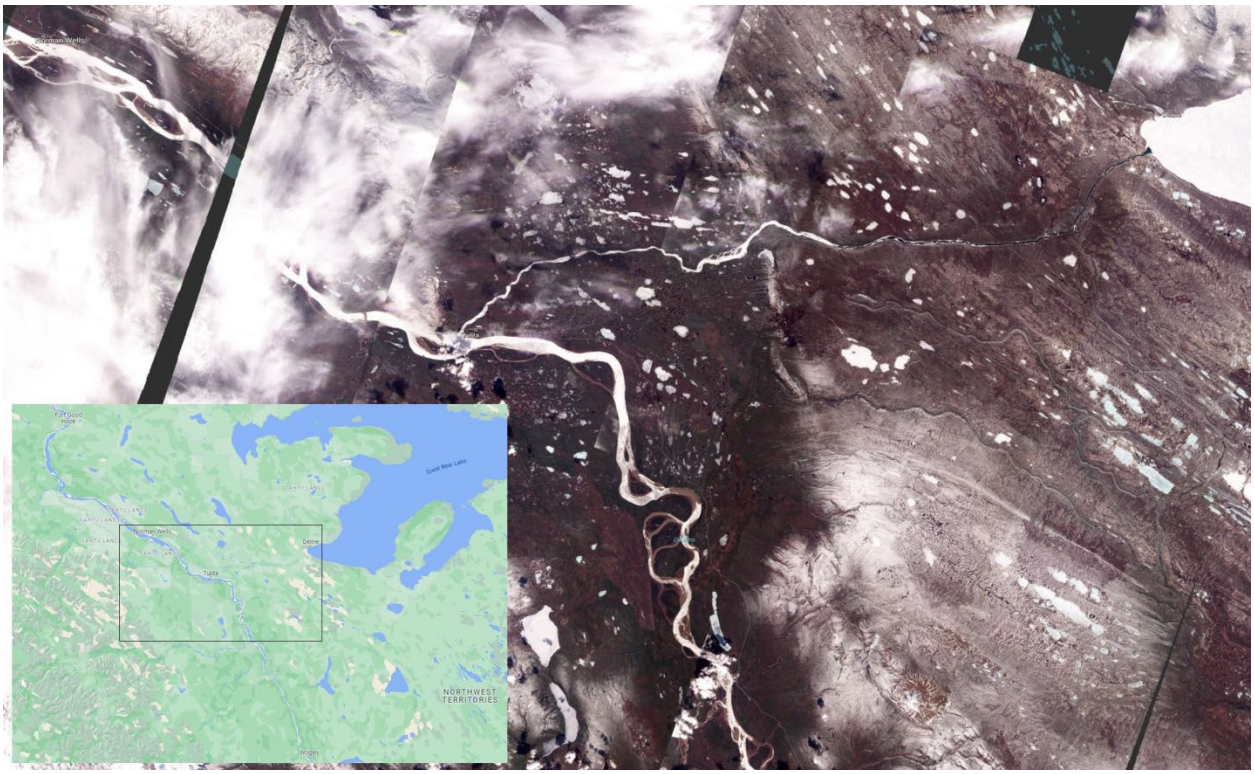


Above – Map of hydrometric stations in the Dehcho (Mackenzie River) basin. The station numbers are referenced in the water level plots below.

Imagery:



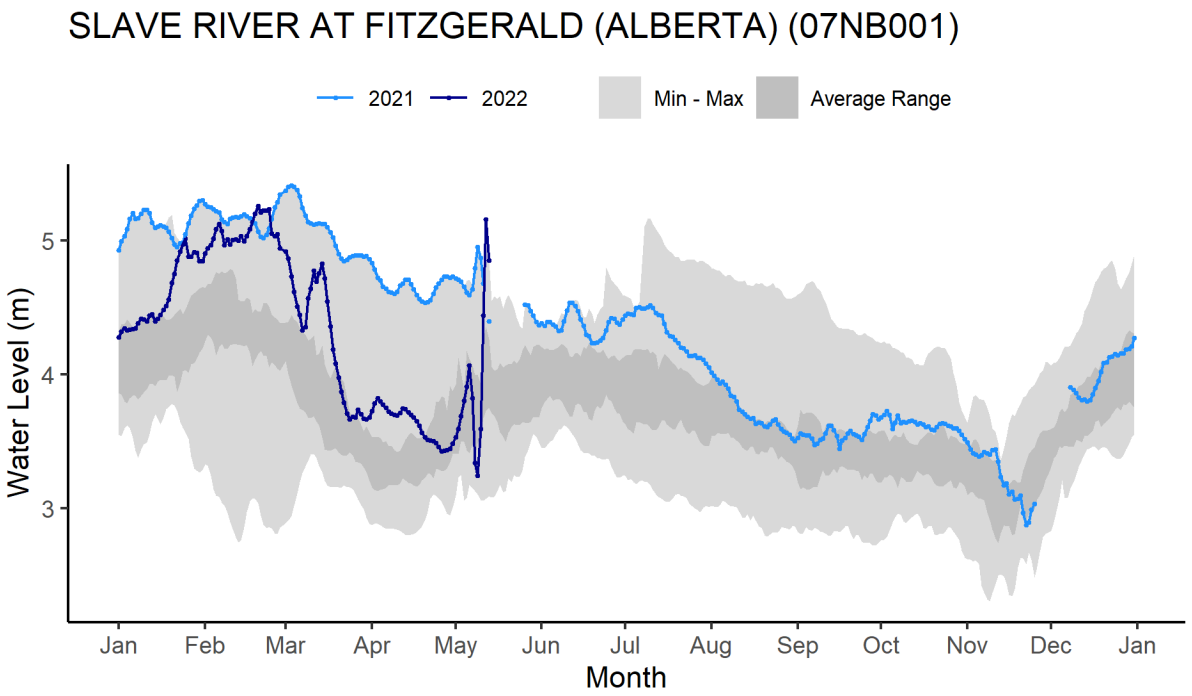
Above – Sentinel-2 satellite imagery taken on May 13th at ~1400 MDT over the Mackenzie River around Jean Marie River.

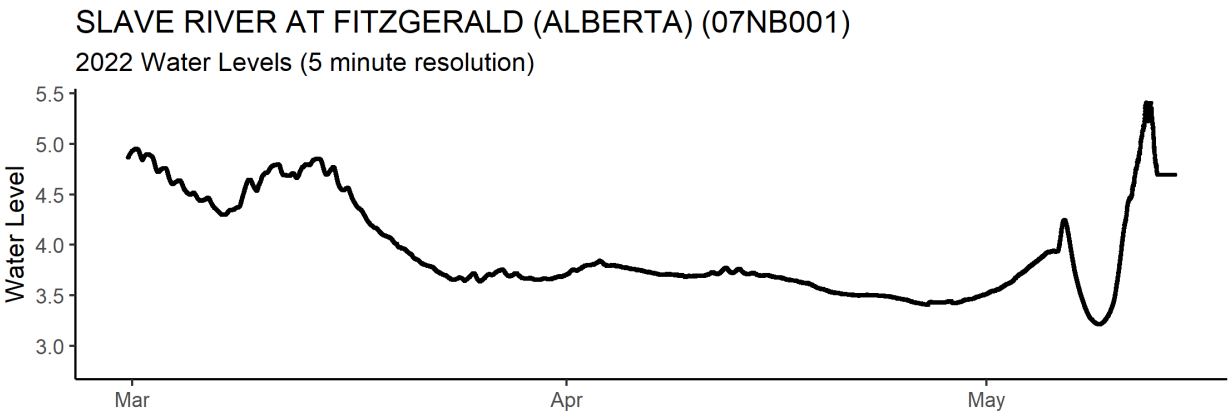


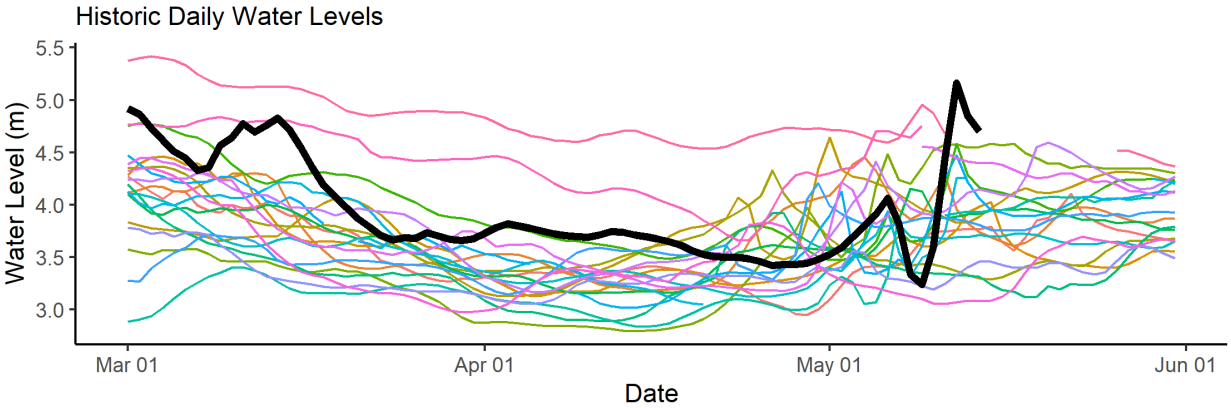
Above – Optical imagery taken between 12:50-13:40 MDT on May 13th of the Mackenzie River and Great Bear River. Obtained from Planet Explorer.

Hydrometric Data:

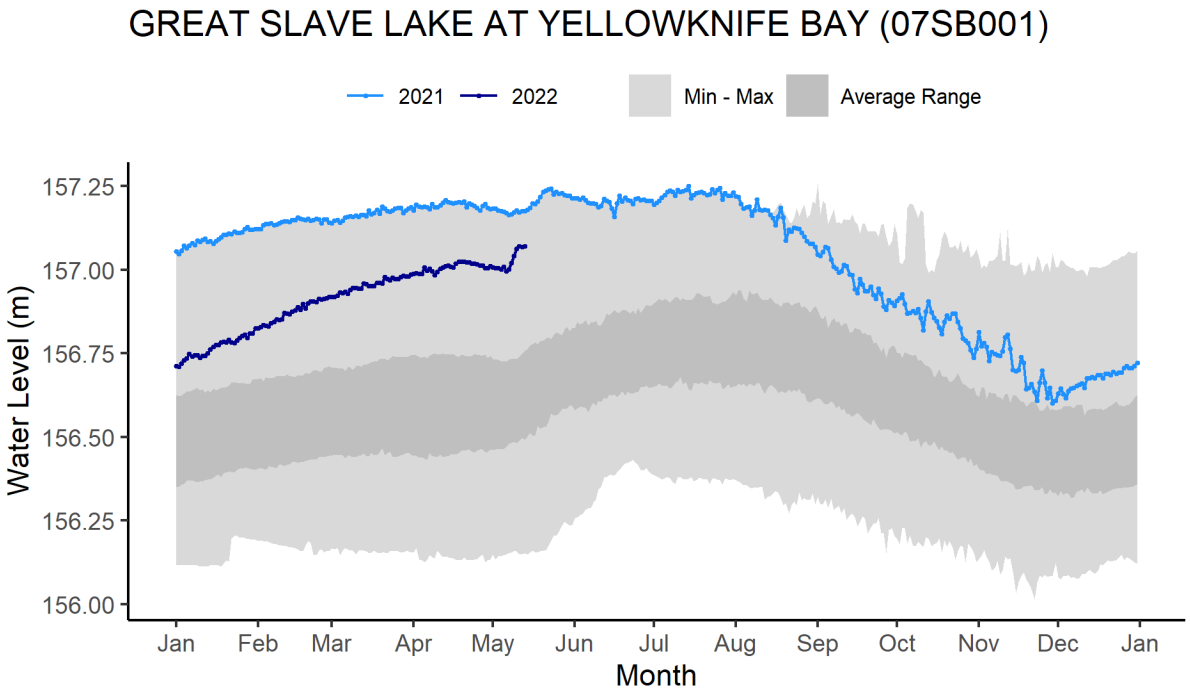
Slave River at Fitzgerald (Alberta) [07NB001]:





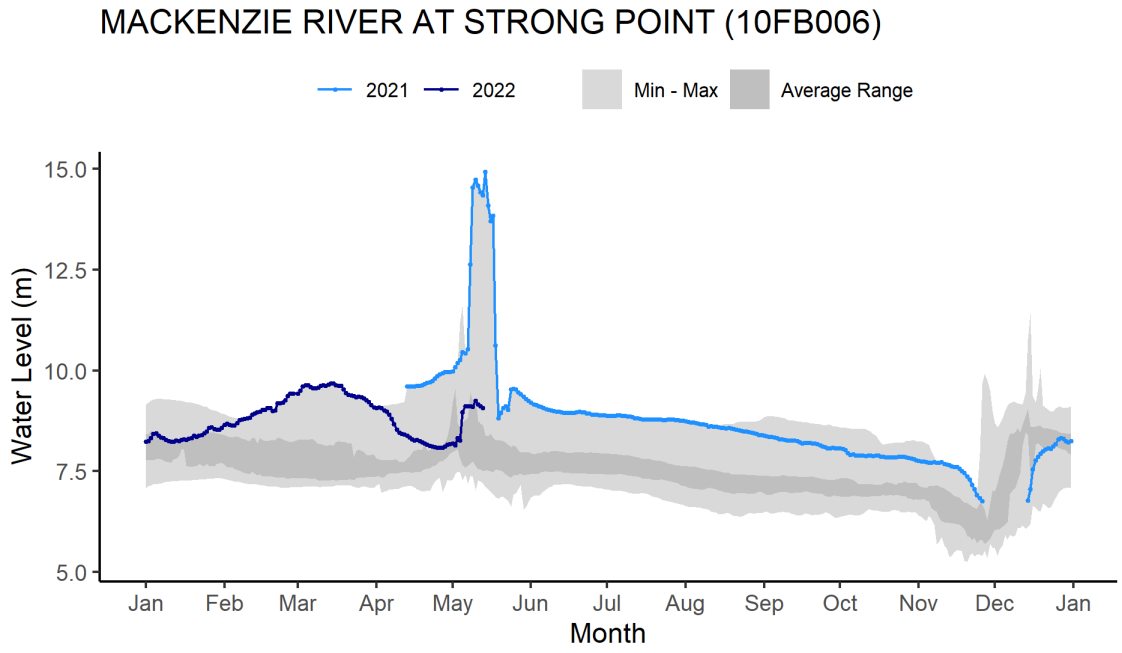


Great Slave Lake at Yellowknife Bay [07SB001]:

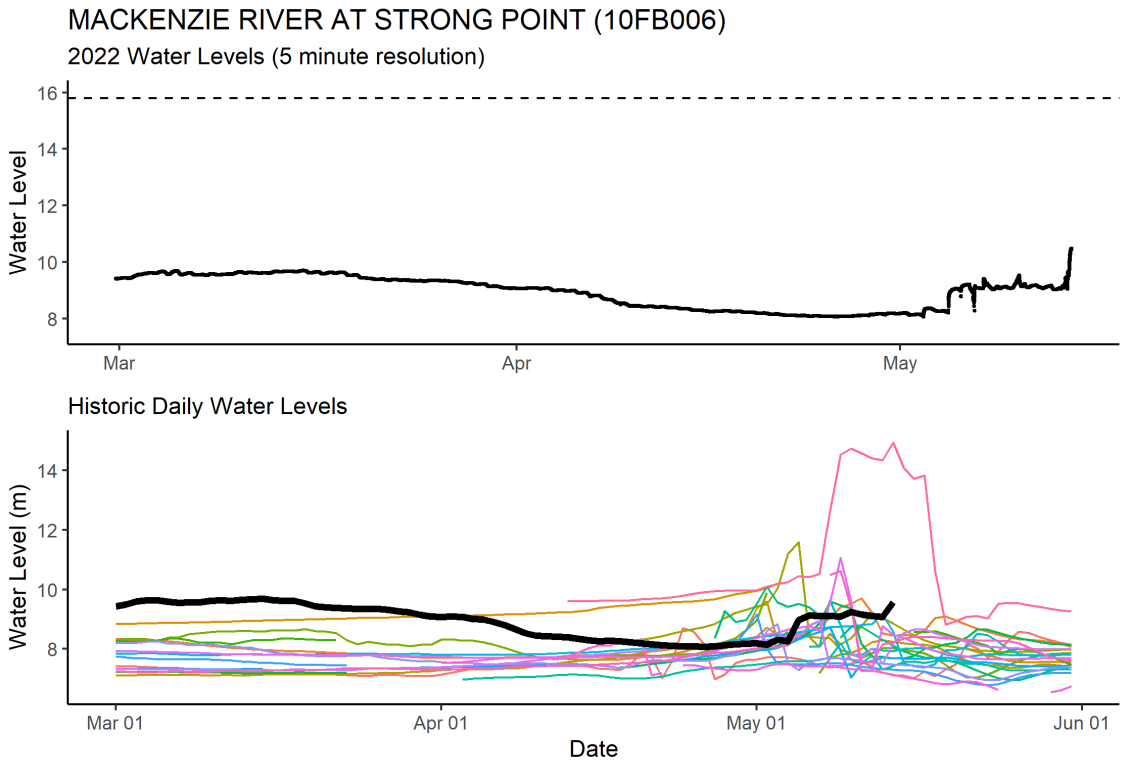


Above – Water levels on Great Slave Lake at Yellowknife Bay for the previous two years. Although water levels have receded since the highs of 2020 and 2021, levels remain much higher than normal.

Mackenzie River at Strong Point [10FB006]:



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 13** (yesterday).



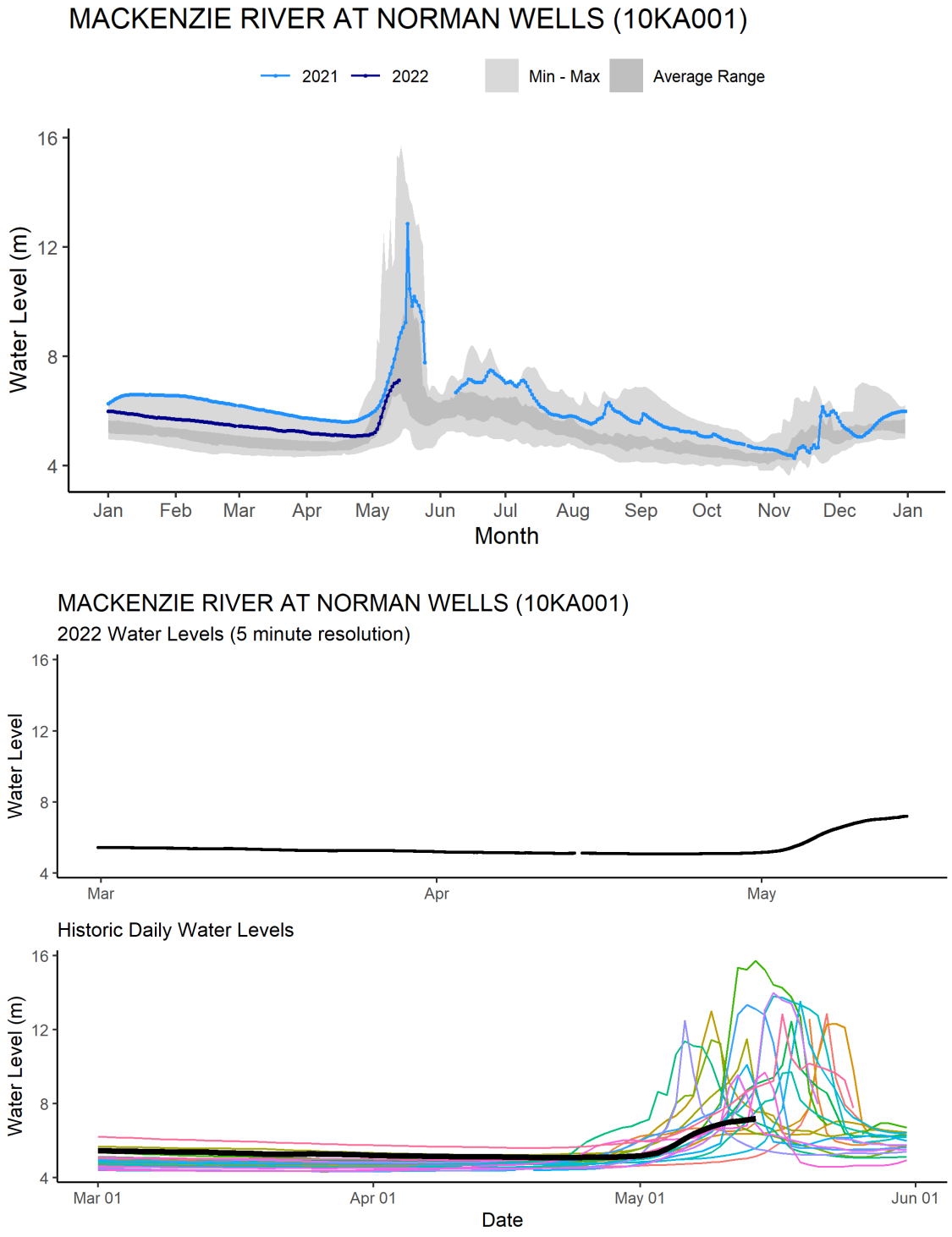
Above - The upper graph in the figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2021). The lower graph shows daily average levels relative to the previous 20 years.

Above – Dehcho (Mackenzie River) at Strong Point hydrometric gauge photo from May 14 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

Mackenzie River at Fort Simpson [10GC001]:

Note: The sensor is not currently producing data. The river is open at Fort Simpson and small amounts of ice are moving well.

Mackenzie River at Norman Wells [10KA001]:



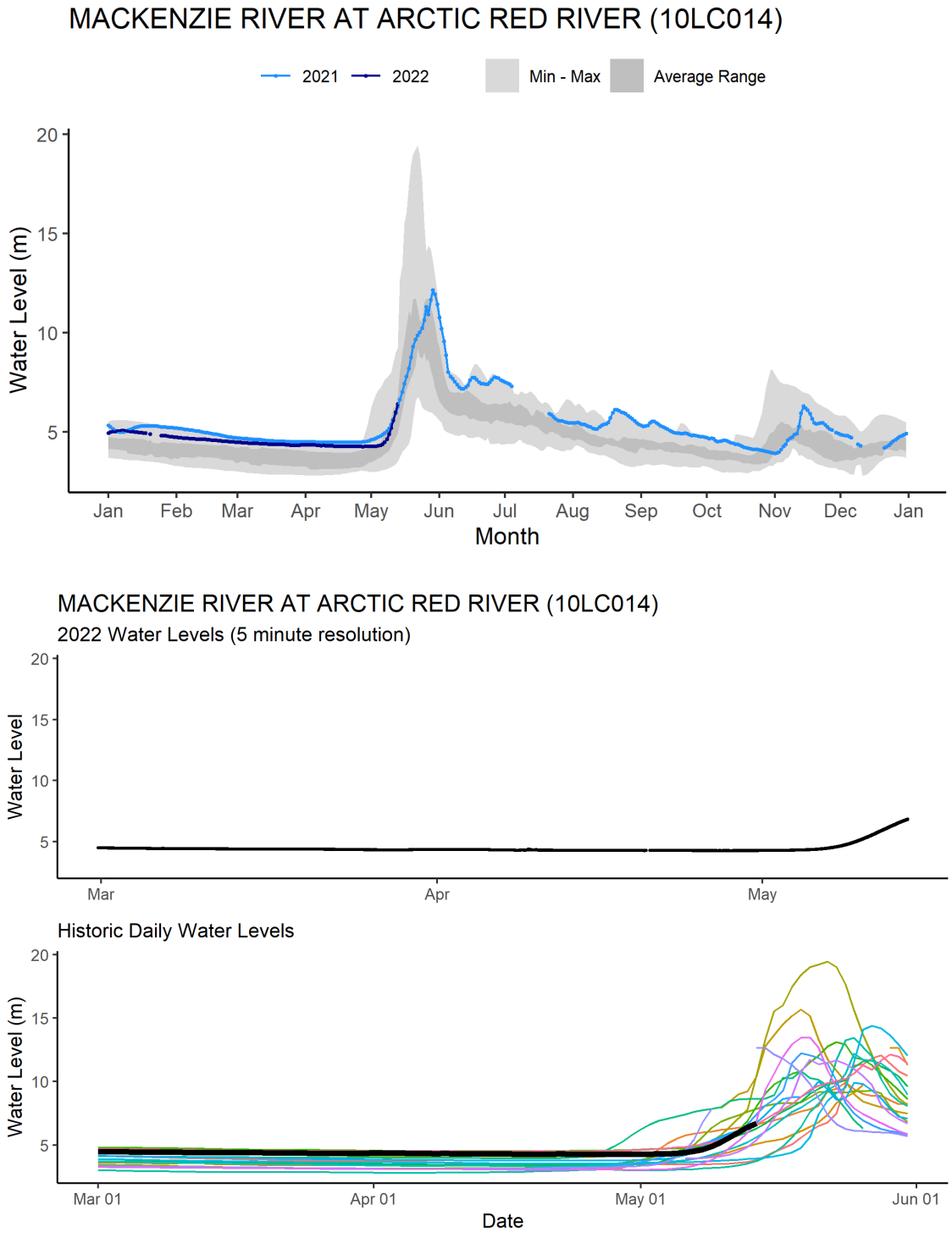
Above – The middle graph in the figure presents real time water level data at 5-minute resolution while the lower graph shows daily average levels relative to the previous 20 years. Water levels on the Mackenzie River at Norman Wells have begun to rise, with the timing being approximately average to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

Above – Mackenzie River at Norman Wells hydrometric gauge photo from May 14 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

Mackenzie River at Fort Good Hope [10LD001]:

Above – Mackenzie River at Fort Good Hope hydrometric gauge photo from May 14 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

Mackenzie River at Arctic Red River [10LC014]:

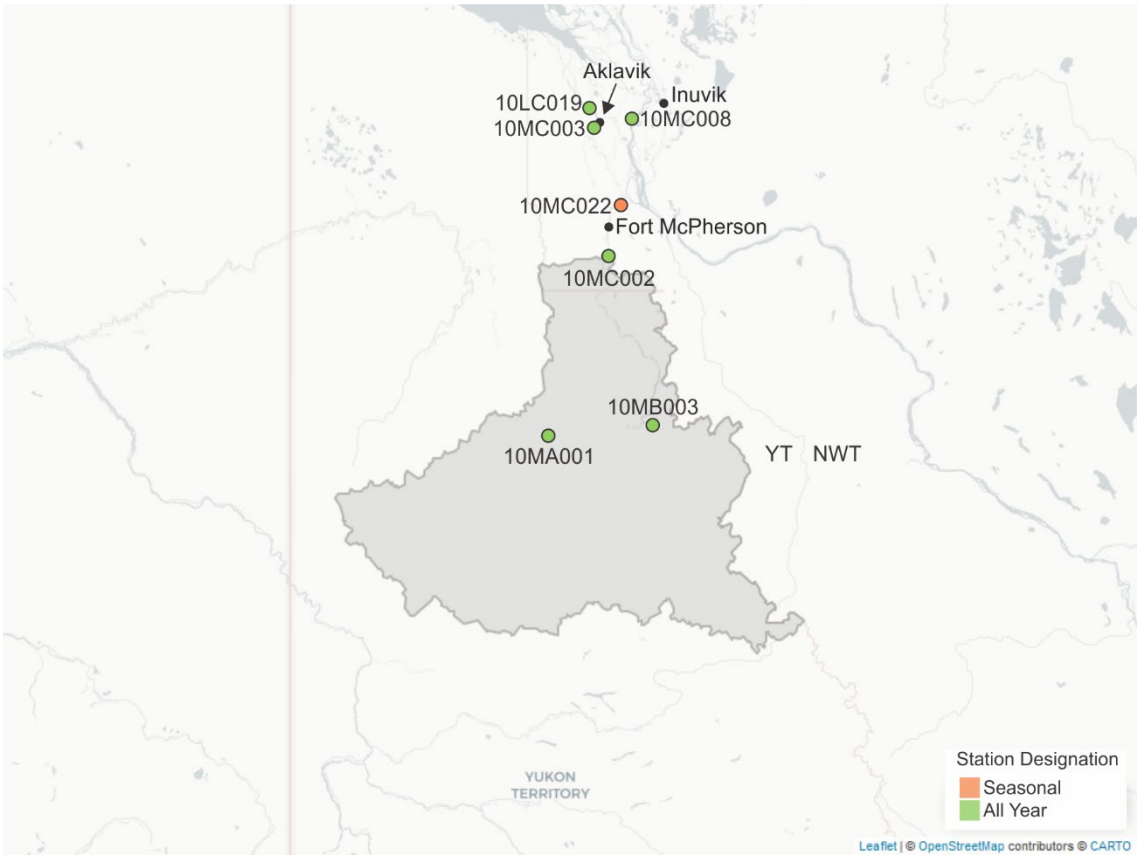


Above – The middle graph in the figure presents real time water level data at 5-minute resolution while the lower graph shows daily average levels relative to the previous 20 years. Water levels on the Mackenzie River at Arctic Red River have slowly begun to rise, with the timing being approximately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

Peel River and Beaufort Delta

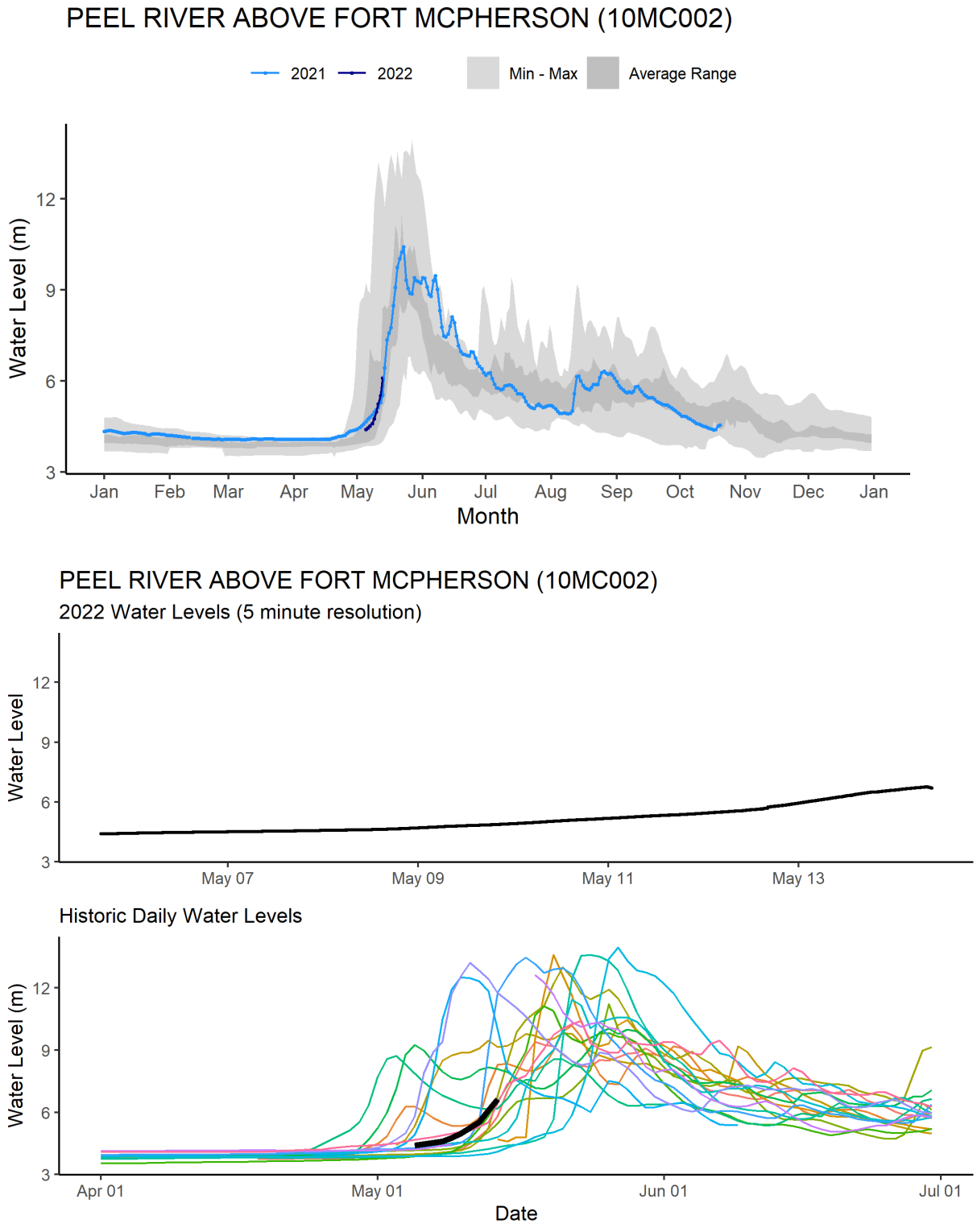
Current Status:

- Water levels are beginning to increase on the Peel River, as is usual for this time of year;
- Water levels in the Mackenzie Delta have slowly started to increase;
    - Water levels were much higher than average over winter, but lower than last year.



Above – Map of select hydrometric stations in the Peel River basin and the Beaufort Delta. The station numbers are referenced in the water level plots below.

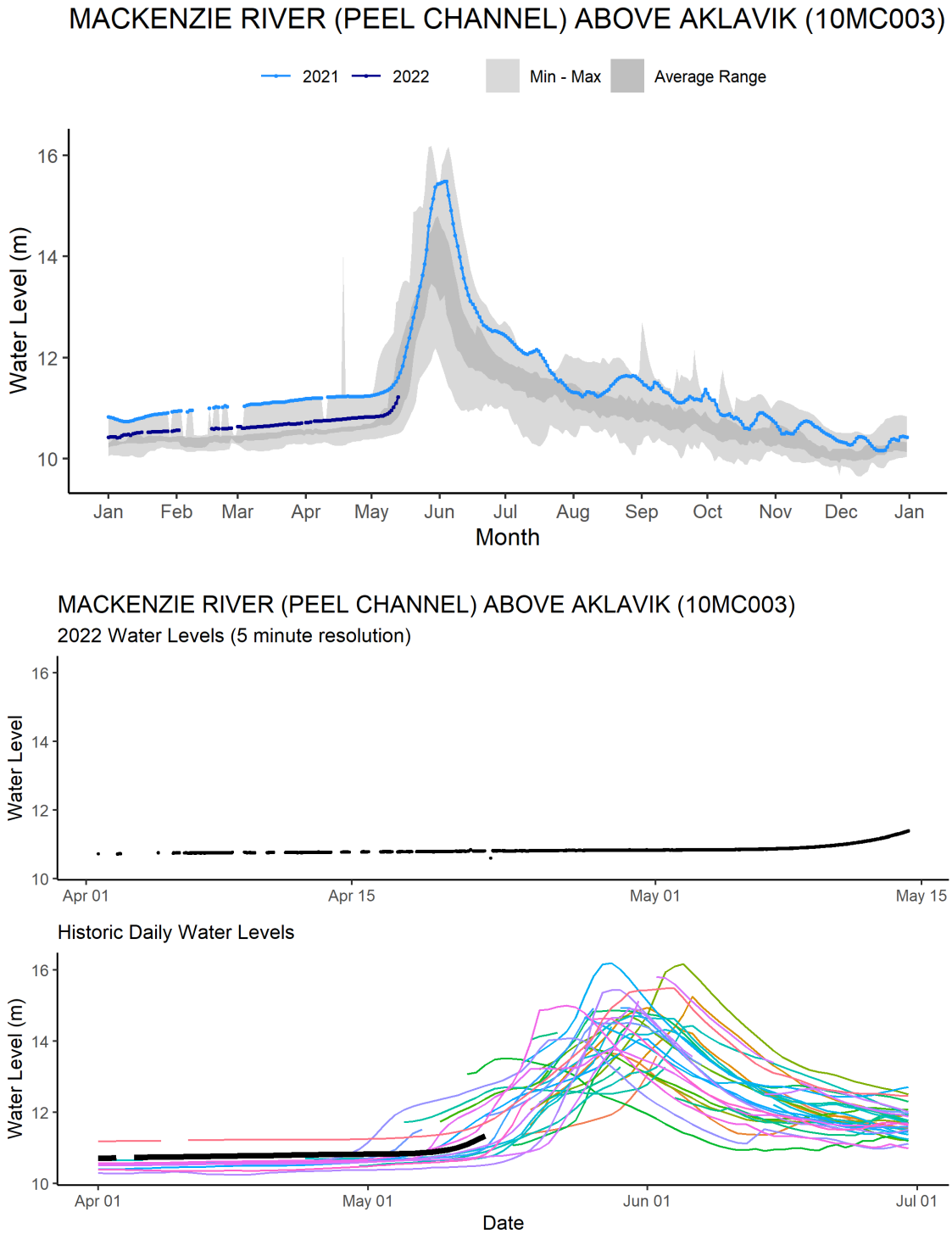
Peel River at Fort McPherson [10MC002]:



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 Peel River at Fort McPherson have slowly begun to rise, with the timing being approximately average to previous years.

Above – Peel River at Fort McPherson hydrometric gauge photo from May 13 at 14:00. Photo courtesy of Water Survey of Canada and GNWT.

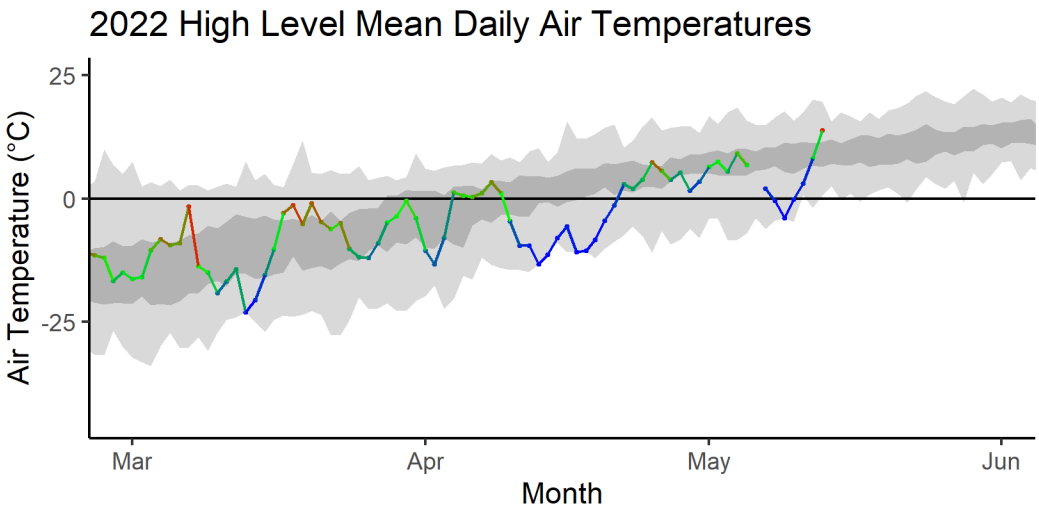
Mackenzie River (Peel Channel) at Aklavik [10MC003]:

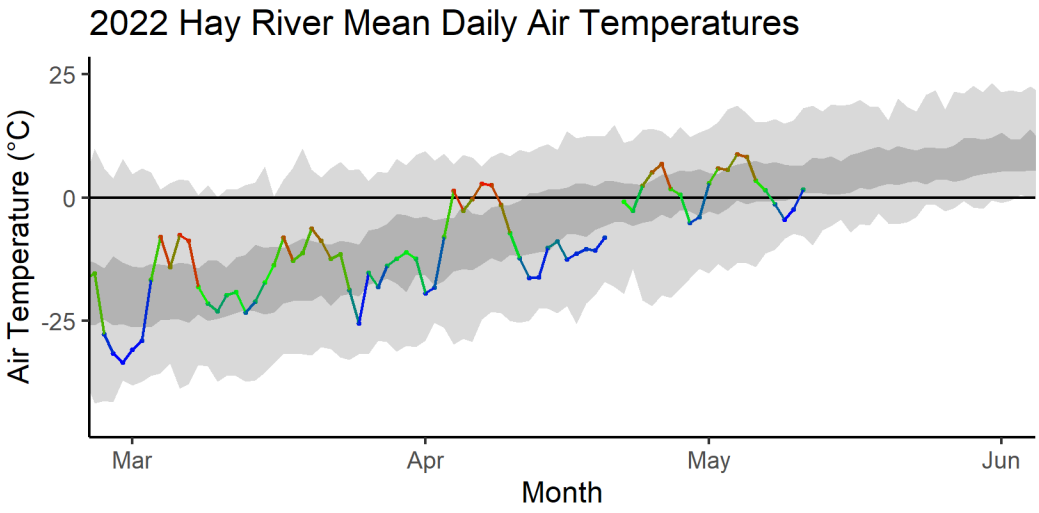


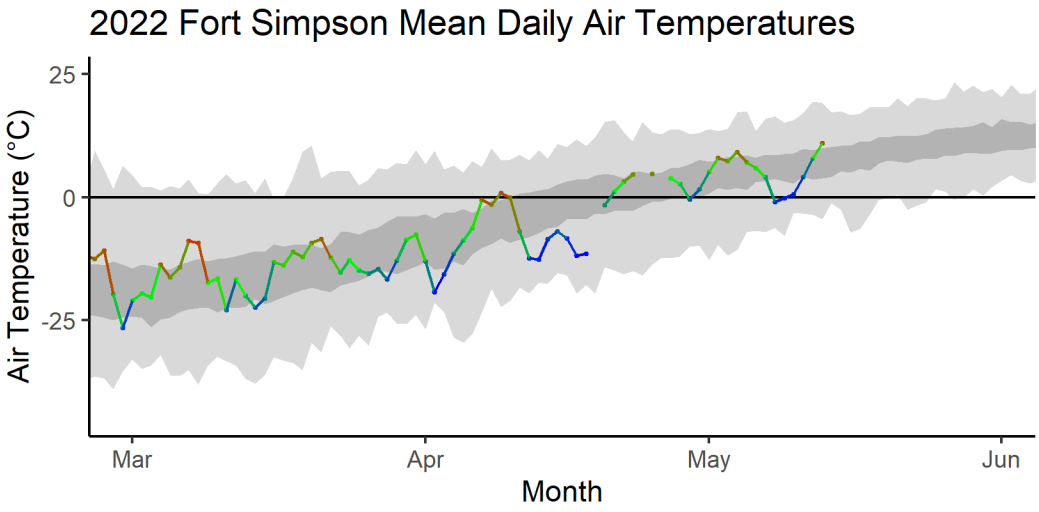
Above – The middle graph in the figure presents real time water level data at 5-minute resolution while the lower graph shows daily average levels relative to the previous 20 years. Water levels in the Mackenzie Delta are slowly beginning to rise. Water levels are lower than last year but have been higher than average throughout the winter.

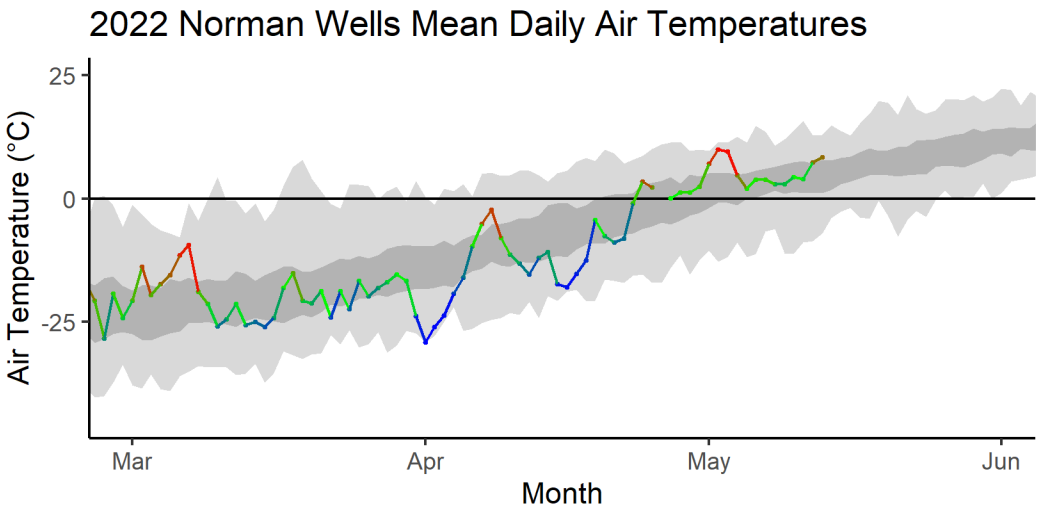
Weather Data:

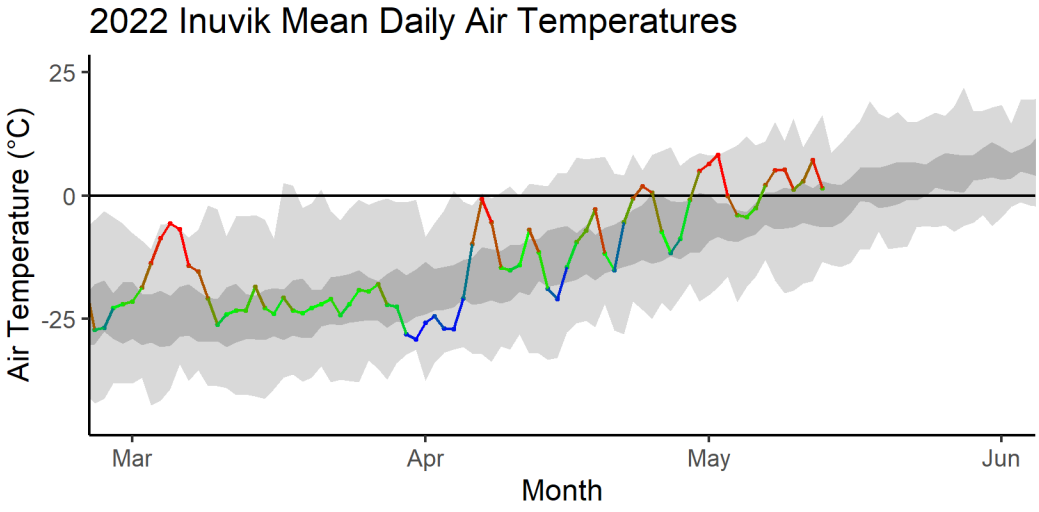
Weather information informs how snow and ice will melt and provides information about how this spring is unfolding relative to previous springs. Locations included here cover basin areas that feed into NWT rivers that are currently undergoing break up. The first set of plots show how temperatures have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






2022 Fort Simpson Mean Daily Air Temperatures
Air Temperature (°C)
25
0
-25
Mar
Apr
May
Jun
Month


2022 Norman Wells Mean Daily Air Temperatures
Air Temperature (°C)
25
0
-25
Mar
Apr
May
Jun
Month


2022 Inuvik Mean Daily Air Temperatures
Air Temperature (°C)
25
0
-25
Mar
Apr
May
Jun
Month

High Level seven-day weather forecast:

Sat 14 May	Sun 15 May	Mon 16 May	Tue 17 May	Wed 18 May	Thu 19 May	Fri 20 May
12°C A few showers	17°C 30% Chance of showers	12°C Cloudy	16°C 60% Chance of showers	11°C Cloudy	12°C A mix of sun and cloud	14°C Sunny
Tonight	Night	Night	Night	Night	Night	
4°C 60% Chance of showers	6°C Cloudy periods	7°C 60% Chance of showers	6°C Cloudy	3°C Cloudy periods	0°C Cloudy periods	

Hay River seven-day weather forecast:

Sat 14 May	Sun 15 May	Mon 16 May	Tue 17 May	Wed 18 May	Thu 19 May	Fri 20 May
14°C 30% Chance of showers	13°C 60% Chance of showers	14°C A mix of sun and cloud	13°C Cloudy	9°C Cloudy	7°C A mix of sun and cloud	9°C Sunny
Tonight	Night	Night	Night	Night	Night	
5°C 30% Chance of showers	5°C Clear	6°C Cloudy	3°C Cloudy	0°C Cloudy periods	-1°C Clear	

Fort Simpson seven-day weather forecast:

▾ Forecast Hourly Forecast | Alerts | Jet Stream

Sat 14 May	Sun 15 May	Mon 16 May	Tue 17 May	Wed 18 May	Thu 19 May	Fri 20 May
18°C 30% Chance of showers	16°C 60% Chance of showers	17°C A mix of sun and cloud	13°C 60% Chance of showers	11°C Periods of rain	14°C A mix of sun and cloud	15°C A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
6°C Periods of rain	7°C Clear	8°C Cloudy periods	7°C 60% Chance of showers	2°C Cloudy periods	1°C Cloudy periods	

Norman Wells seven-day weather forecast:

Sat 14 May	Sun 15 May	Mon 16 May	Tue 17 May	Wed 18 May	Thu 19 May	Fri 20 May
10°C	12°C	18°C	15°C	12°C	11°C	14°C
Mainly cloudy	A mix of sun and cloud	Sunny	A mix of sun and cloud	A mix of sun and cloud	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	1°C	2°C	
30% Chance of showers	Clear	Cloudy periods	Cloudy periods	Cloudy periods	Cloudy periods	

Inuvik seven-day weather forecast:

Sat 14 May	Sun 15 May	Mon 16 May	Tue 17 May	Wed 18 May	Thu 19 May	Fri 20 May
-1°C	7°C	3°C	0°C	2°C	6°C	9°C
60% Chance of flurries	Periods of light snow	Cloudy	Cloudy	Cloudy	A mix of sun and cloud	A mix of sun and cloud
Tonight	Night	Night	Night	Night	Night	
-3°C	2°C	-2°C	-3°C	-7°C	-4°C	
30% Chance of flurries	60% Chance of showers	Cloudy	Cloudy	Cloudy periods	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.