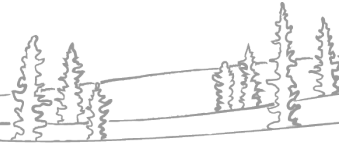




NWT Water Monitoring Bulletin

– May 16, 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;
 - It is expected that water levels at the gauge site will likely continue to slowly rise over the next couple days as residual snowmelt water moves through the basin, 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 May 12th 12:00 (8.12 m) is the highest open water level on record.
- Ice continues to move well on the Mackenzie River downstream of Jean Marie River, and downstream of Fort Simpson;
- Reports have indicated Mackenzie River water levels were rising in Tulita;
- Ice on the Mackenzie River has cleared in front of Norman Wells overnight;
 - Currently water levels (12:00) are rising slowly, but remain near average;
- Ice on the Mackenzie River at Fort Good Hope is started to shift; appears to be unchanged at the gauge location near Tsiigehtchic as of 10:00.
- Water levels under ice are increasing further downstream on the Mackenzie River and in the Mackenzie River Delta, as is normal for this time of year;
- Water levels on the Peel River near Fort McPherson are increasing at a normal rate, and river ice remains intact (as of 12:00).

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Hay River:

Current Status:

- Provisional water levels at the Hay River near Hay River gauge (just upstream of town) dropped by 5 m since the peak on the morning of May 12;
 - The provisional water level reading as of 12:00 (8.12 m) is the highest open water level on record;
- While the gauge on the main stem of the Hay River at the border continues to slowly increase as residual snowmelt water moves through the basin and to the river, the gauge further south on the Hay River near Meander River has levelled off;
- Refer to the [Town of Hay River website](#) for the most up-to-date information, as well as webcam images of current conditions.



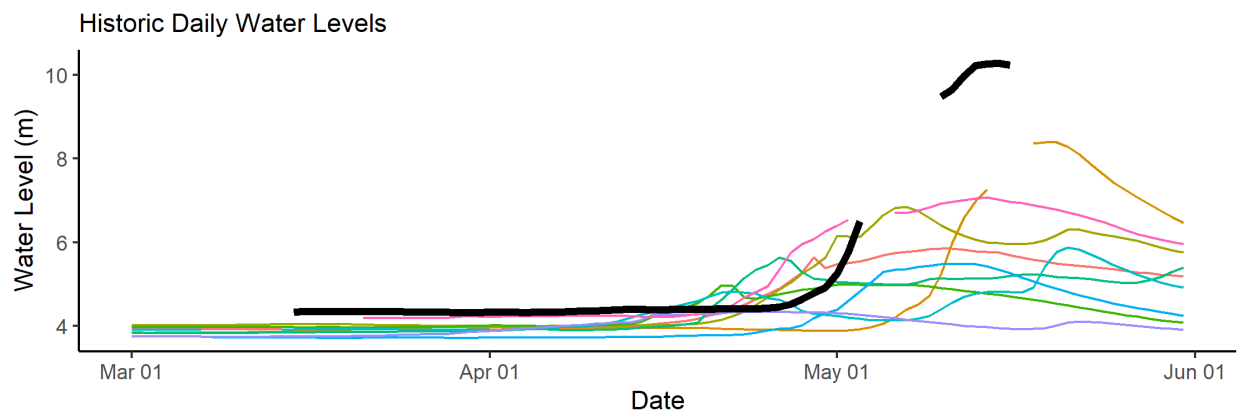
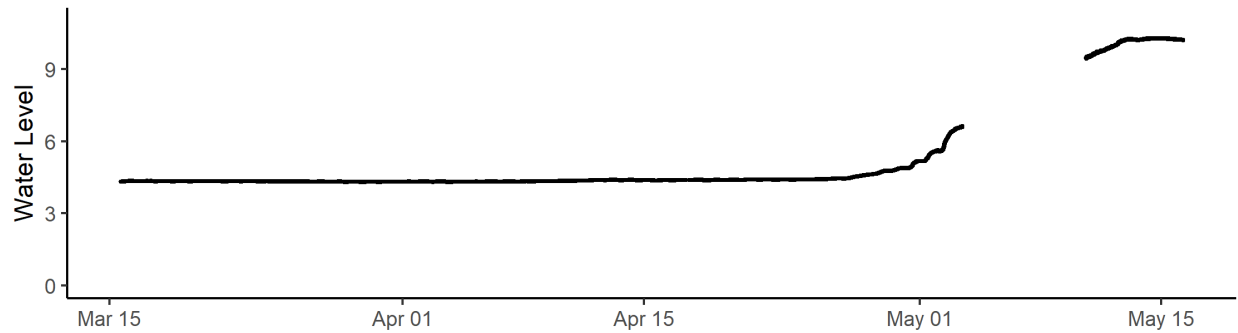
Above – Map of hydrometric stations in the Hay River basin. The station numbers are referenced in the water level plots below.

Hydrometric Data:

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

HAY RIVER NEAR MEANDER RIVER (070B003)

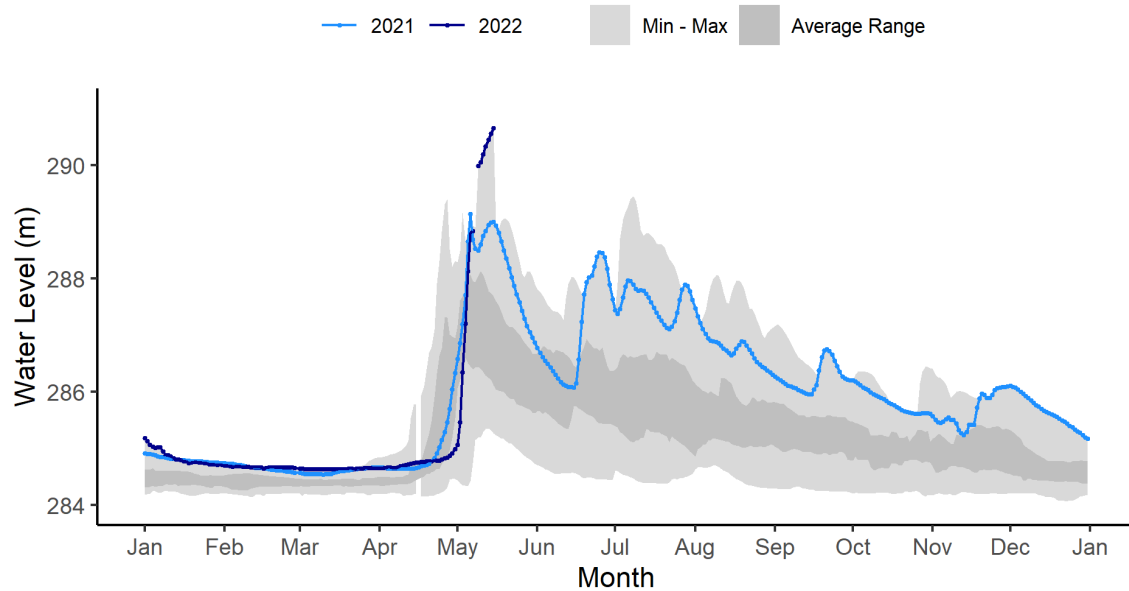
2022 Water Levels (5 minute resolution)



Above – Water level data on the Hay River near Meander River, AB. It appears that water levels are reaching their peak in response to the precipitation event from last week.

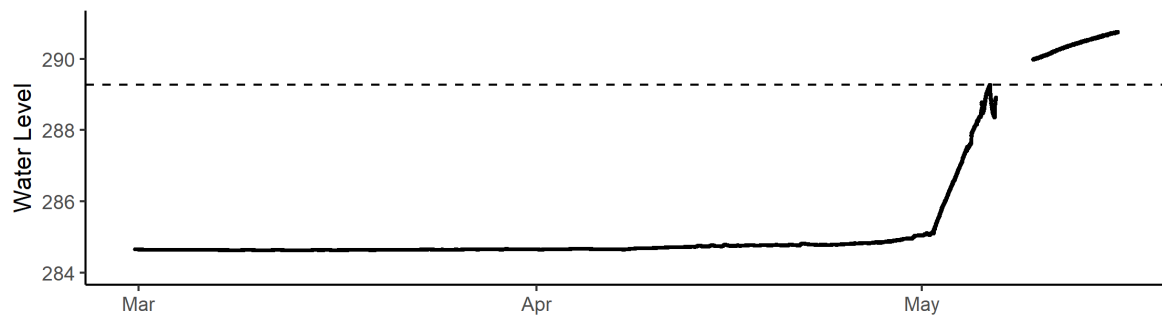
Hay River near the border [07OB008]:

HAY RIVER NEAR ALTA/NWT BOUNDARY (07OB008)

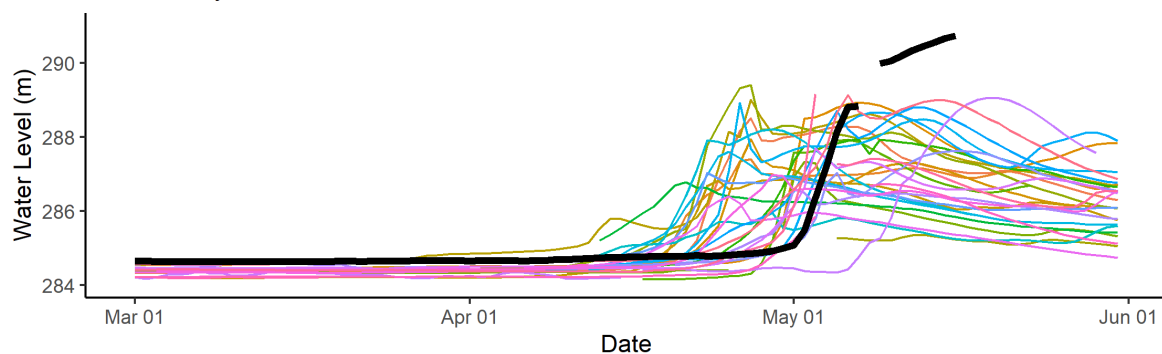


HAY RIVER NEAR ALTA/NWT BOUNDARY (07OB008)

2022 Water Levels (5 minute resolution)

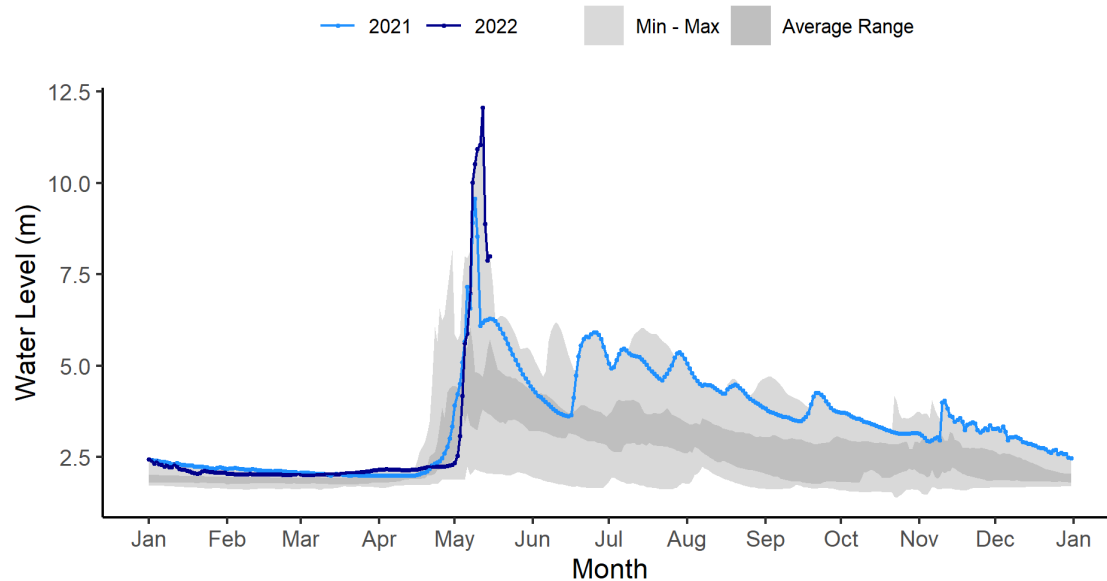


Historic Daily Water Levels

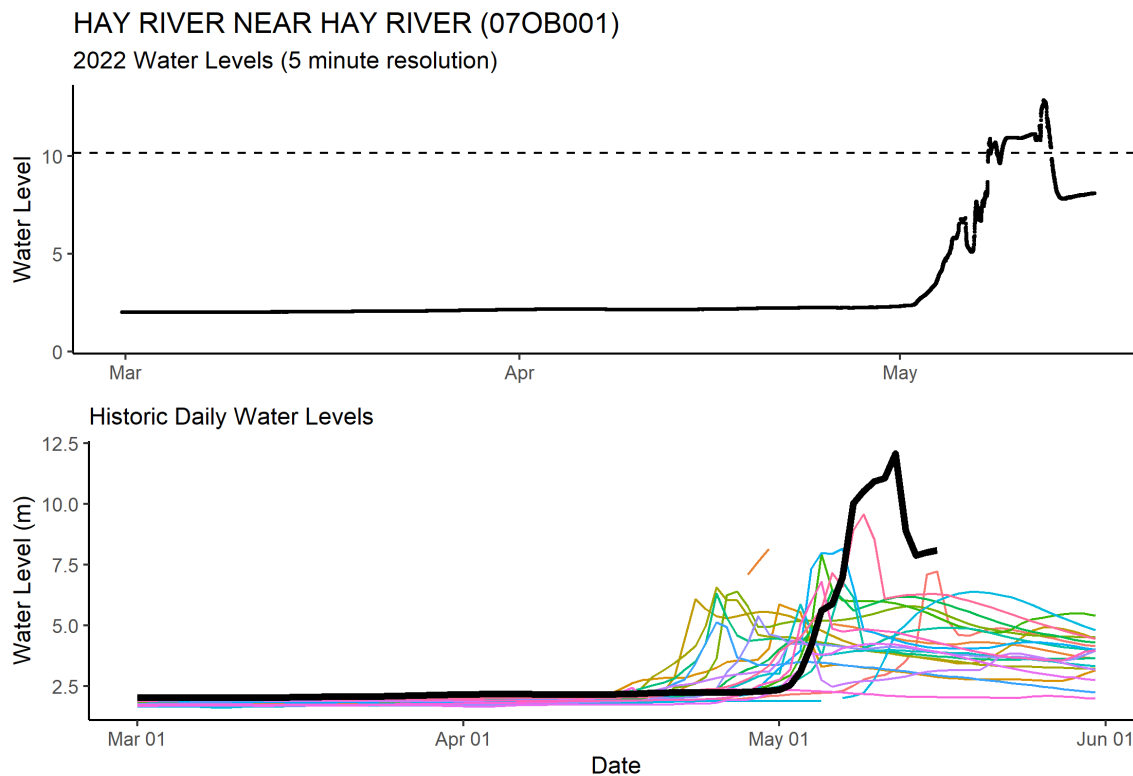


Above - The middle graph in this figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2021). The lower graph shows daily average levels relative to the previous 20 years. Water levels continue to slowly rise as snowmelt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

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



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



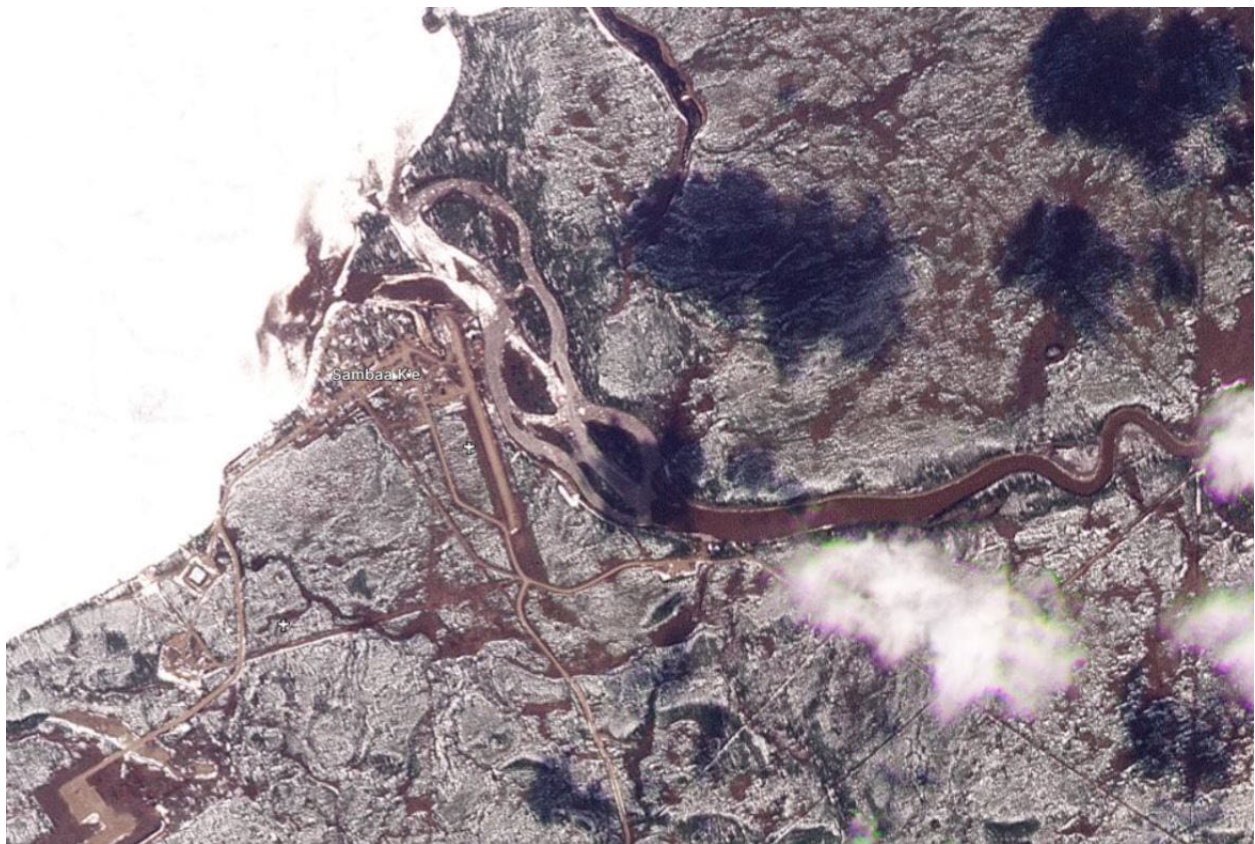
Above - The upper graph in this figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2021). The lower graph shows daily average levels relative to the previous 20 years. The upper graph shows that provisional water levels have hit an open water equilibrium at ~8 m, which is the highest open water level on record.

Dehcho Region

Current Status:

- Some flooding was reported in Sambaa K'e yesterday afternoon;
 - Optical imagery indicates that ice on the Island River likely impeded river flow to the lake, backing water up into the community, but further verification required.

Imagery:

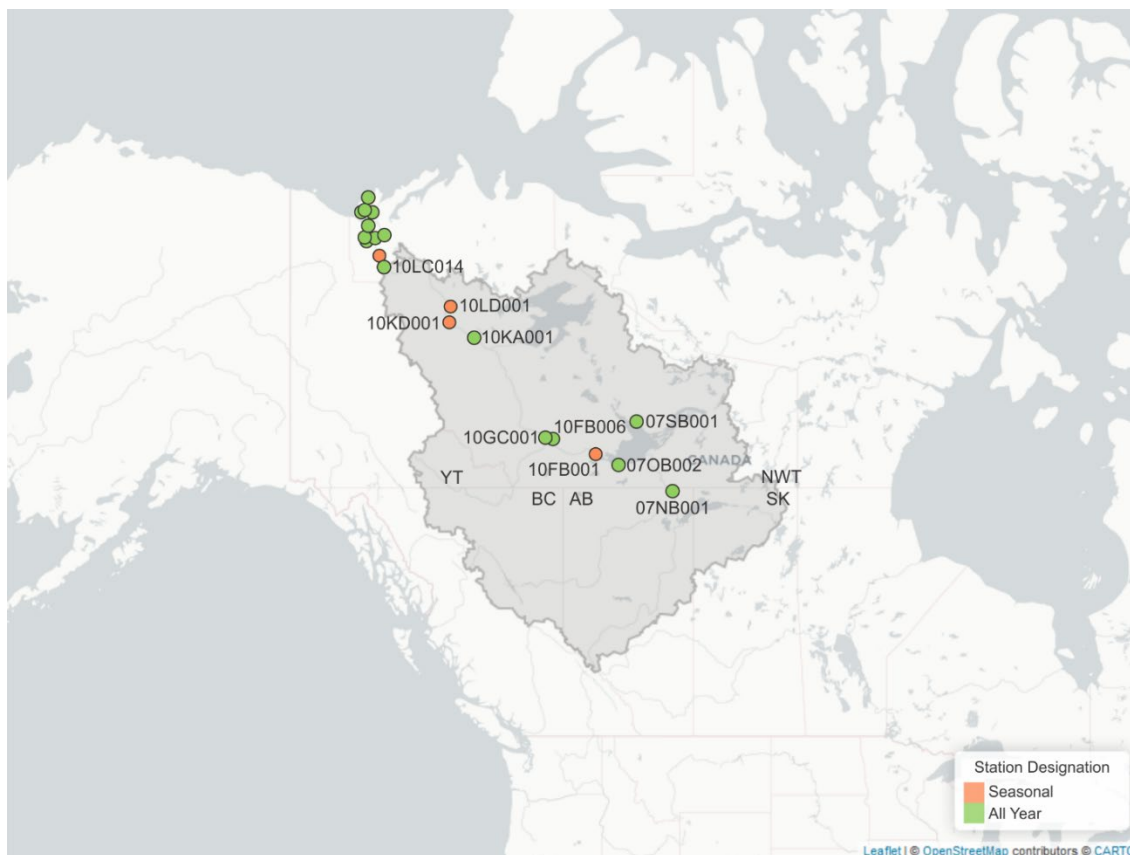


Above – Optical imagery taken at 13:01 MDT on May 15th over the community of Sambaa K'e. Obtained from Planet Explorer. The image shows open water (upstream) and ice (downstream) on the Island River.

Mackenzie River

Current Status:

- According to optical imagery from yesterday at ~13:00, the Mackenzie River near Jean Marie River was relatively clear of ice, with some ice moving downstream in the area;
 - Provisional water levels on the Mackenzie River at Strong Point (~30 km downstream of Jean Marie River) have remained steady since yesterday;
 - This peak was more than 5 m lower than the peak from the 2021 (last year) flooding event at Jean Marie River;
- Reports have indicated Mackenzie River water levels were rising in Tulita;
- Ice on the Mackenzie River has cleared in front of Norman Wells overnight;
 - Unsteady water levels on the Mackenzie River at Norman Wells are an indication of local ice movement on the river;
 - Currently water levels (12:00) are rising slowly, but remain near average;
- Ice on the Mackenzie River at Fort Good Hope is started to shift, appears to be unchanged at the gauge location near Tsiigehtchic as of 10:00.



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

Imagery:

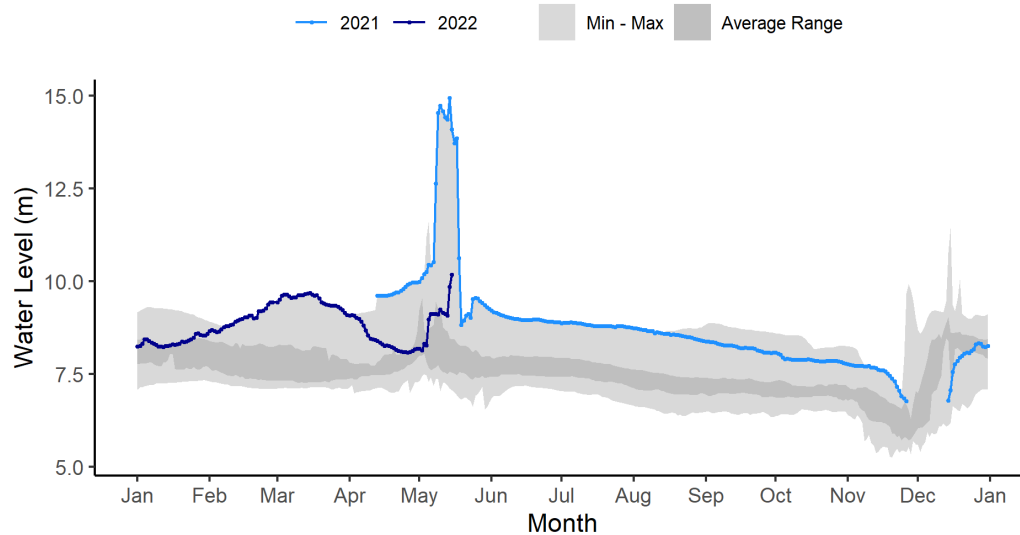


Above – Optical imagery taken between 13:01-13:06 MDT on May 15th of the Mackenzie River around Jean Marie River.

Hydrometric Data:

Mackenzie River at Strong Point [10FB006]:

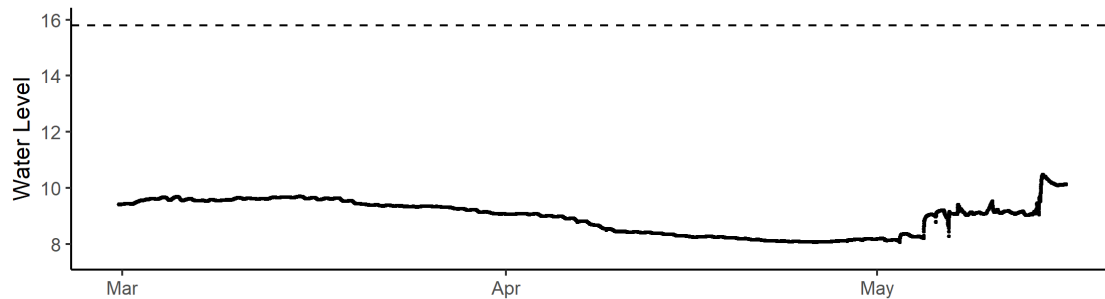
MACKENZIE RIVER AT STRONG POINT (10FB006)



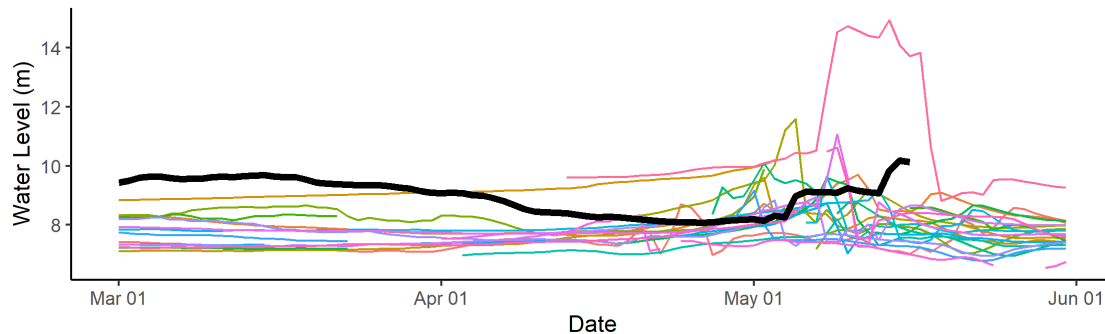
Above – hydrograph of daily average levels for the previous two years.

MACKENZIE RIVER AT STRONG POINT (10FB006)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels

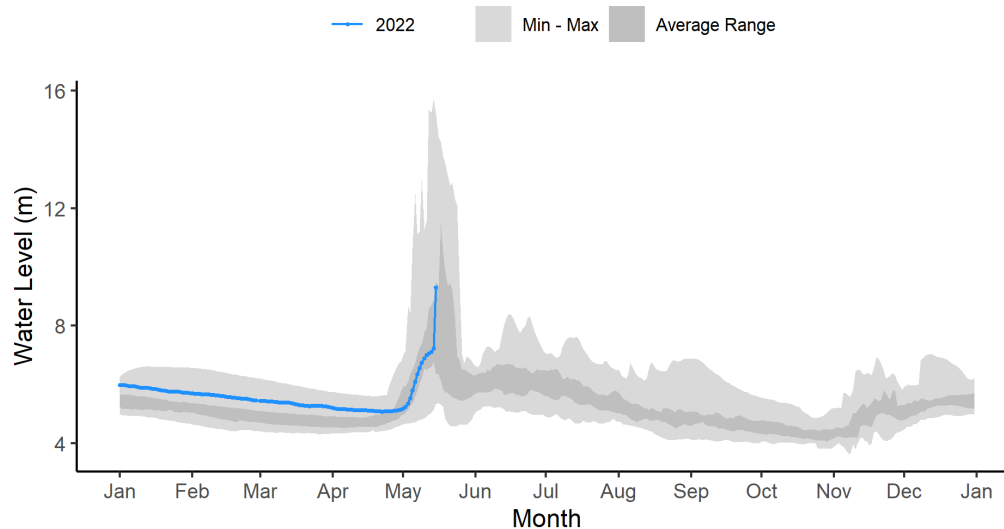


Above - The upper graph in the figure presents real time water level data at 5-minute resolution with the dashed line representing the peak water level from last year (2021). The lower graph shows daily average levels relative to the previous 20 years.



Above – Dehcho (Mackenzie River) at Strong Point hydrometric gauge photo from May 16 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

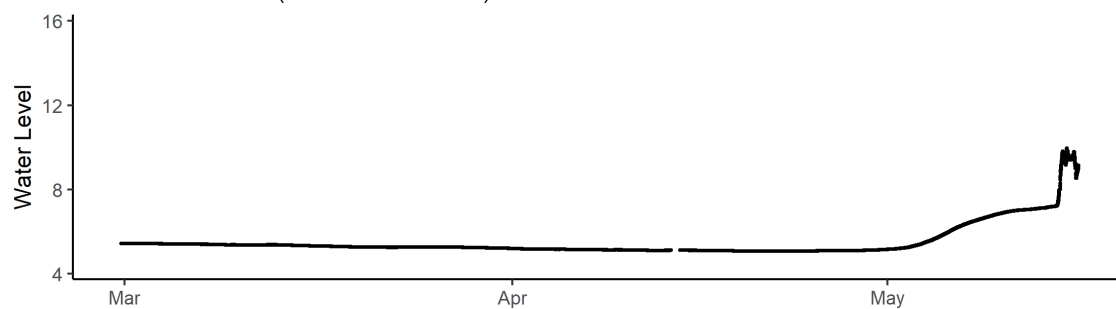
Mackenzie River at Norman Wells [10KA001]:
MACKENZIE RIVER AT NORMAN WELLS (10KA001)



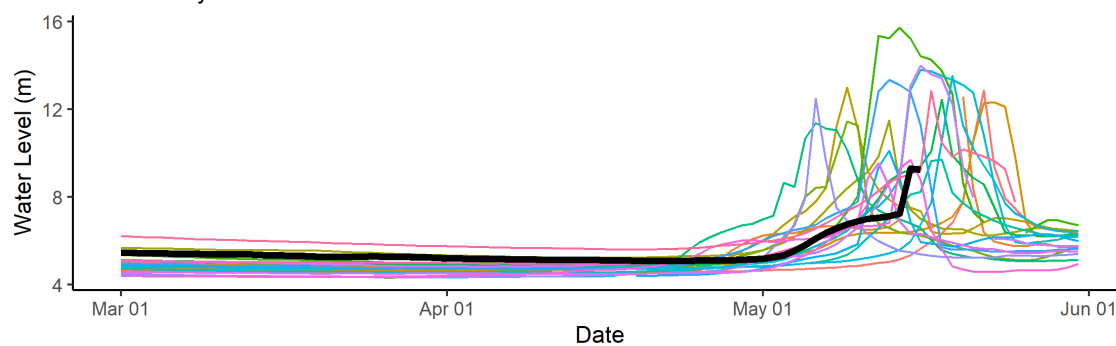
Above – hydrograph of daily average levels for the previous two years. Note: the most recent data point is the average daily value from yesterday (May 15).

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. Unsteady water levels are an indication of ice movement. Water levels remain within typical levels for break up.



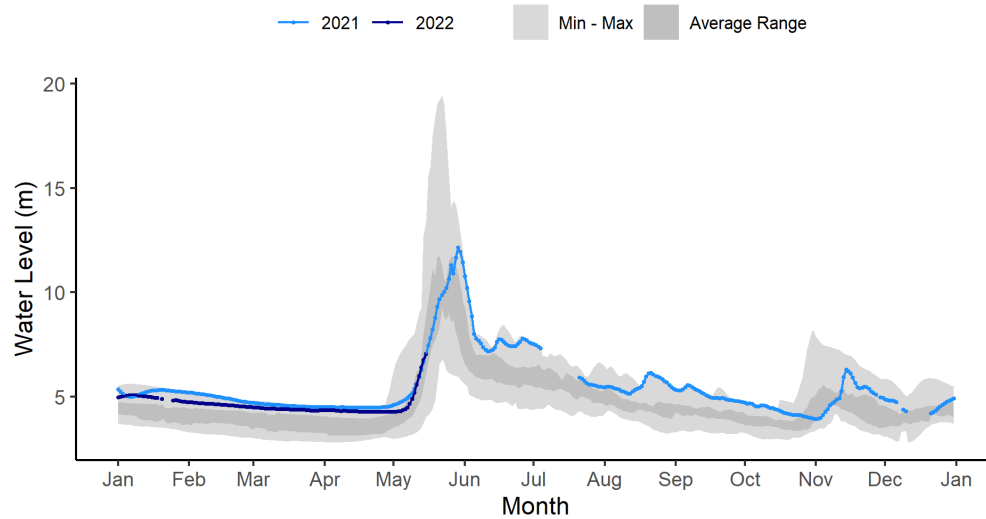
Above – Mackenzie River at Norman Wells hydrometric gauge photo from May 16 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

Mackenzie River at Fort Good Hope [10LD001]:



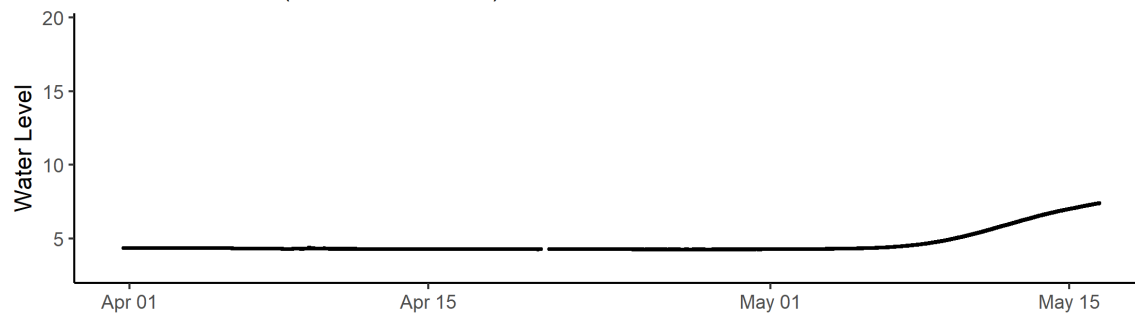
Above – Mackenzie River at Fort Good Hope hydrometric gauge photo from May 16 at 12:00. Photo courtesy of Water Survey of Canada and GNWT.

Mackenzie River at Arctic Red River [10LC014]:
MACKENZIE RIVER AT ARCTIC RED RIVER (10LC014)

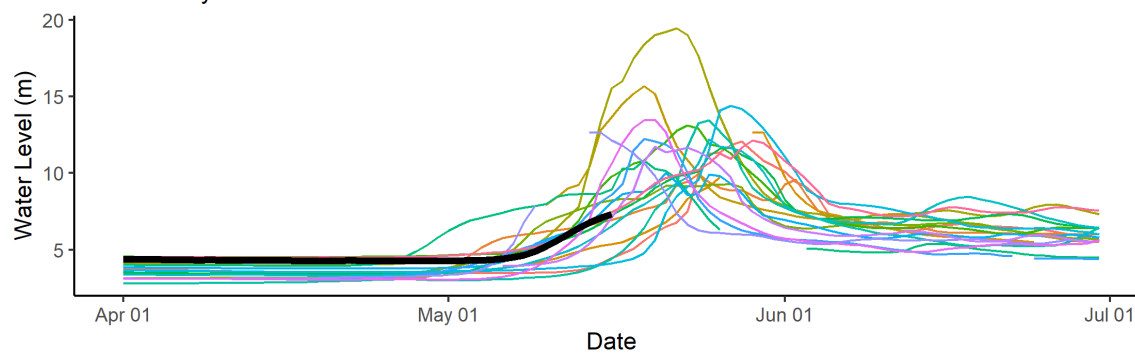


MACKENZIE RIVER AT ARCTIC RED RIVER (10LC014)

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 Arctic Red River have slowly begun to rise, with the timing being approximately average to previous years.

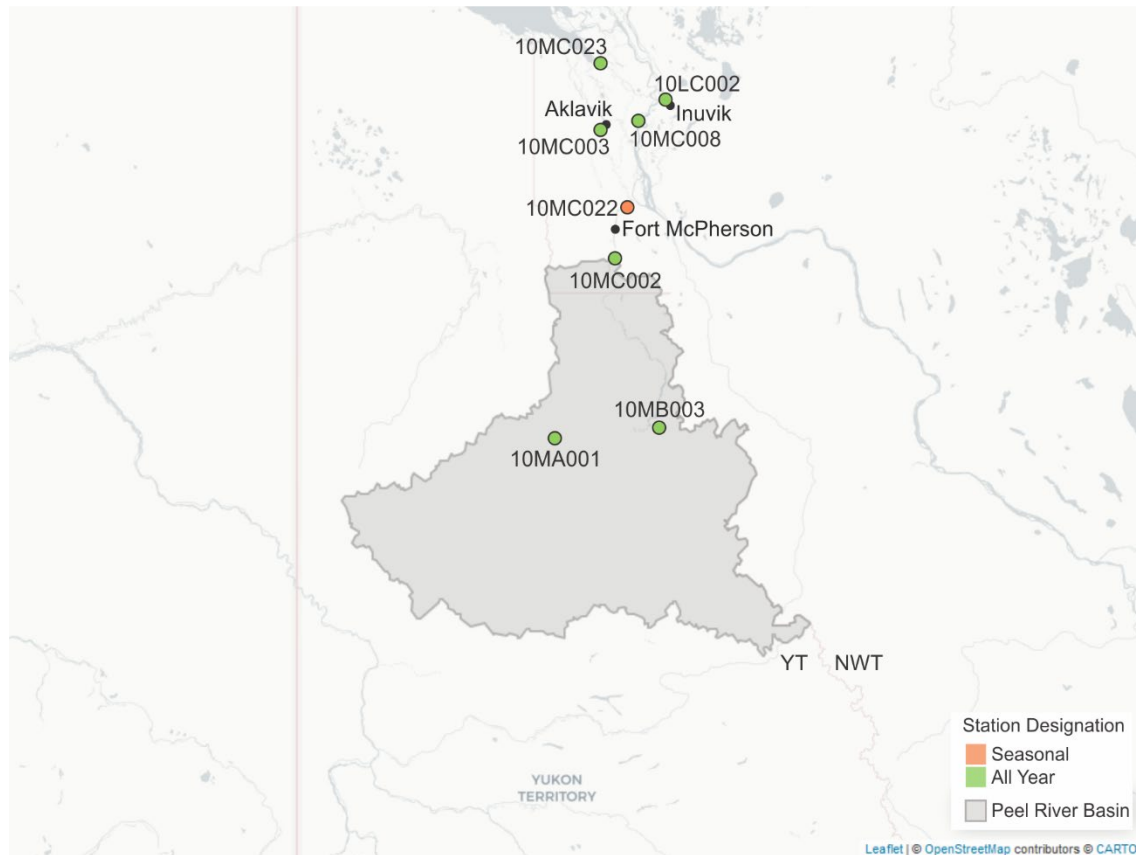


Above – Mackenzie River at Arctic Red River hydrometric gauge photo from May 16 at 10:00. Photo courtesy of Water Survey of Canada and GNWT.

Peel River and Beaufort Delta

Current Status:

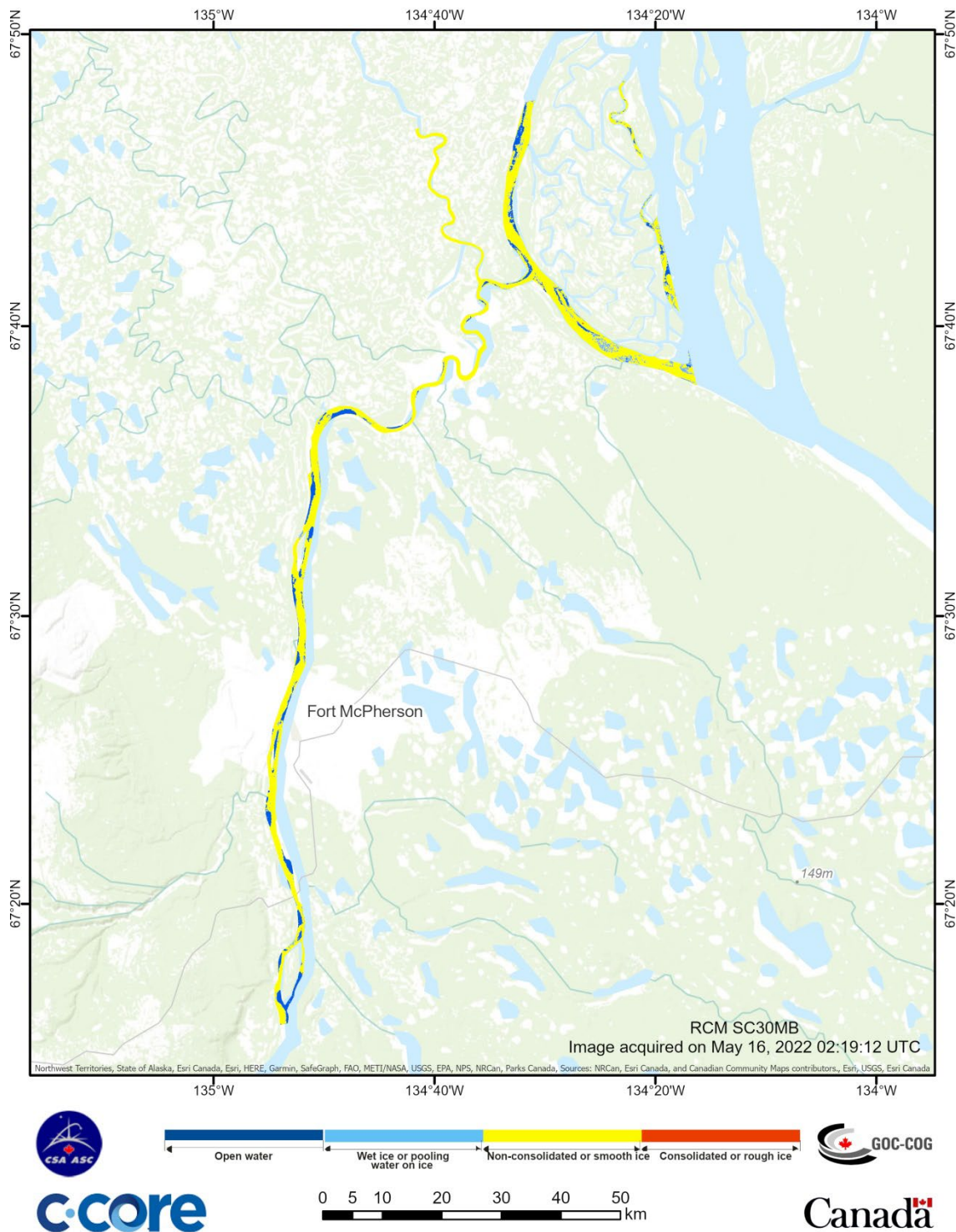
- Water levels are beginning to increase on the Peel River, as is usual for this time of year;
- Water levels in the Mackenzie Delta continue to rise;
 - Water levels were much higher than average over winter, but lower than last year.
- Radar imagery of the Peel River indicates predominantly intact ice with some areas of open water forming.



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.

Imagery:

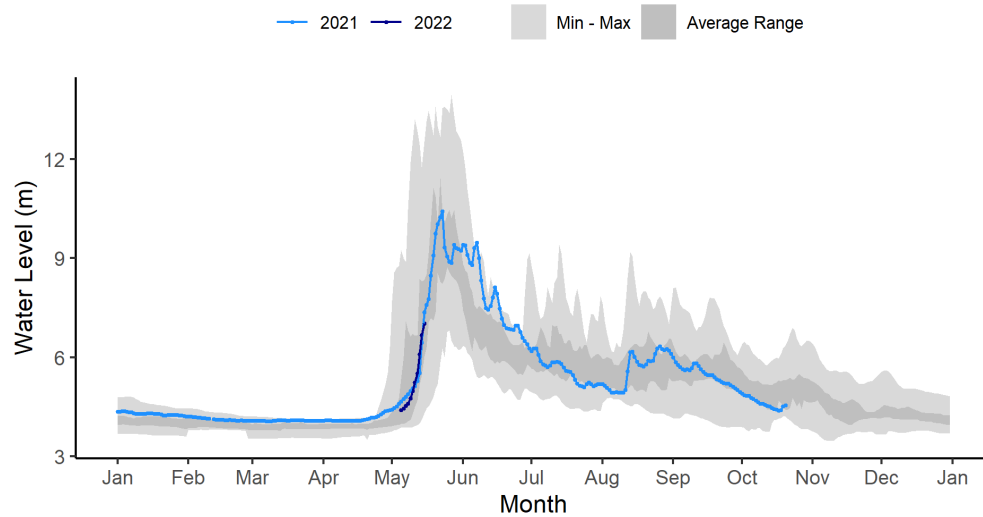
Peel River Ice Classification



Above – Ice classification map based on radar imagery of a stretch of the Peel River, around Fort McPherson and downstream to the Peel Channel and Mackenzie River. Taken on 15th May at 20:19 MDT.

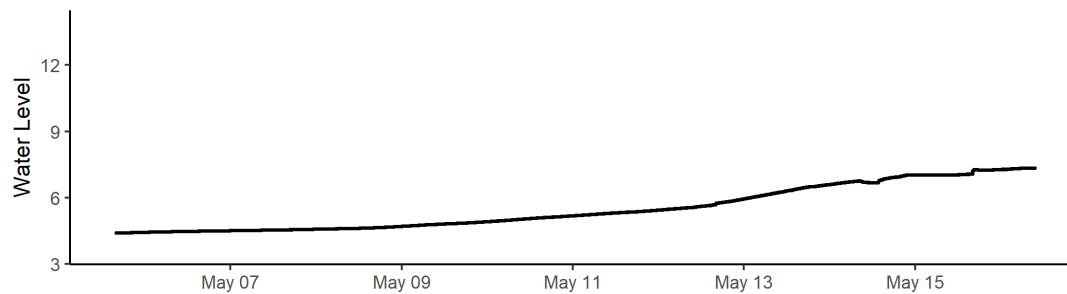
Peel River at Fort McPherson [10MC002]:

PEEL RIVER ABOVE FORT MCPHERSON (10MC002)

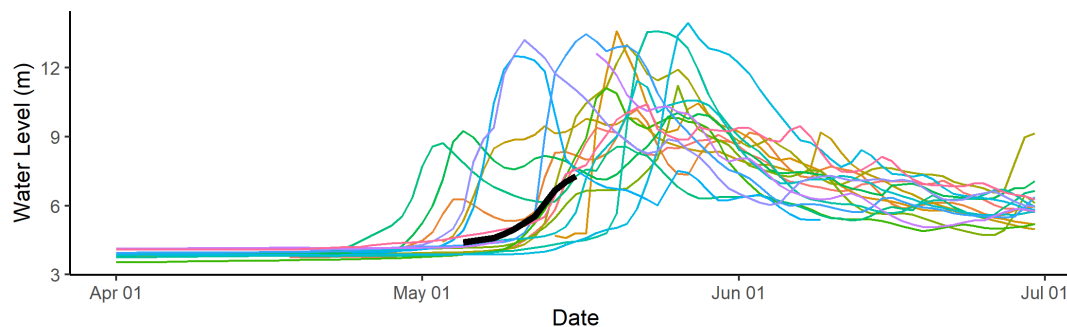


PEEL RIVER ABOVE FORT MCPHERSON (10MC002)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels



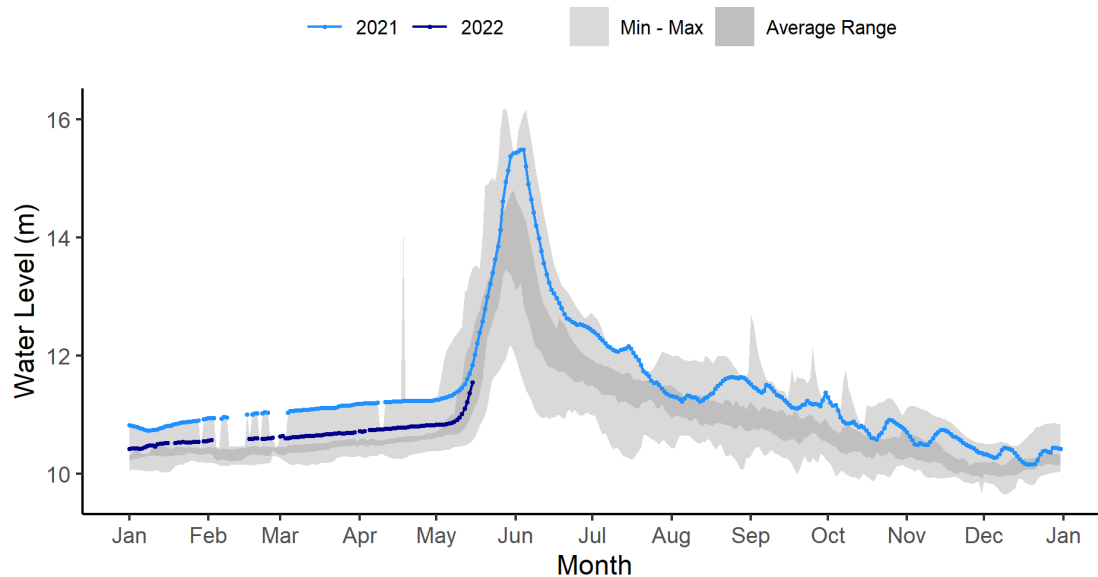
Above – The middle graph in the figure presents real time water level data at 5-minute resolution while the lower graph shows daily average levels relative to the previous 20 years. Water levels on the Peel River at Fort McPherson have slowly begun to rise, with the timing being approximately average to previous years. There were reports of ice movement on the Peel River near Fort McPherson as of this morning.



Above – Peel River at Fort McPherson hydrometric gauge photo from May 16 at 09:00. Photo courtesy of Water Survey of Canada and GNWT.

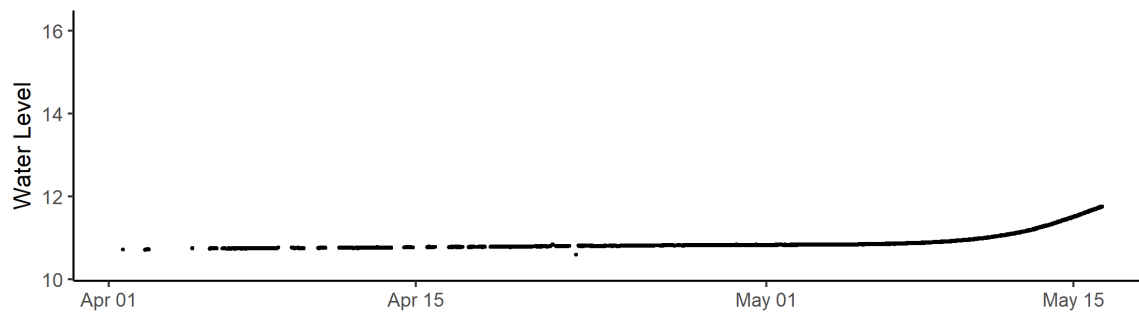
Mackenzie River (Peel Channel) at Aklavik [10MC003]:

MACKENZIE RIVER (PEEL CHANNEL) ABOVE AKLAVIK (10MC003)

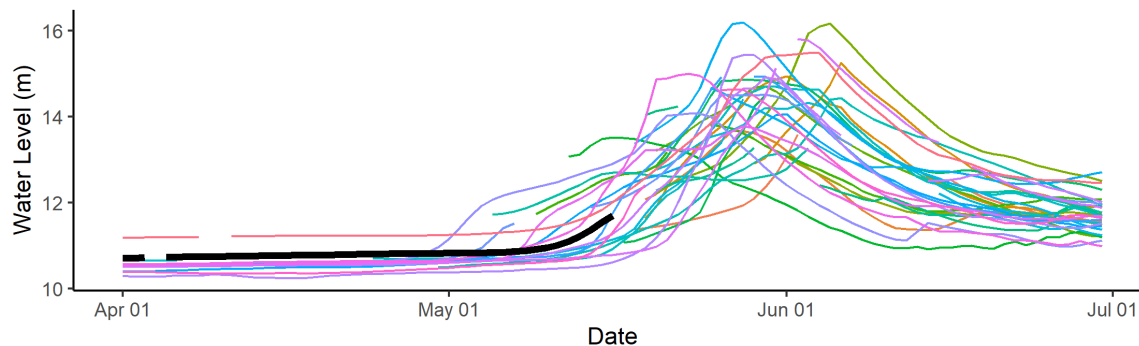


MACKENZIE RIVER (PEEL CHANNEL) ABOVE AKLAVIK (10MC003)

2022 Water Levels (5 minute resolution)

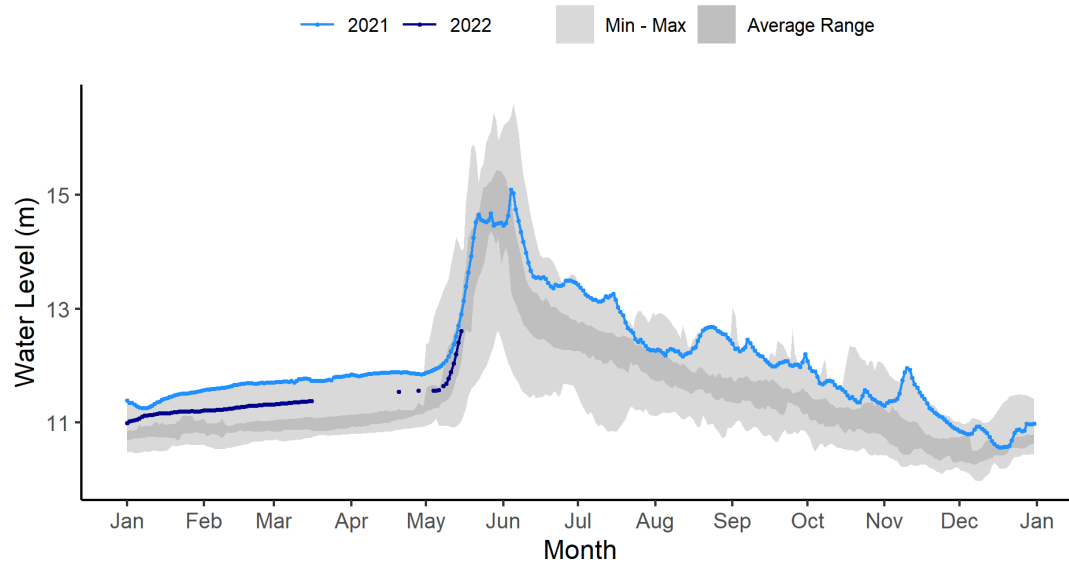


Historic Daily Water Levels

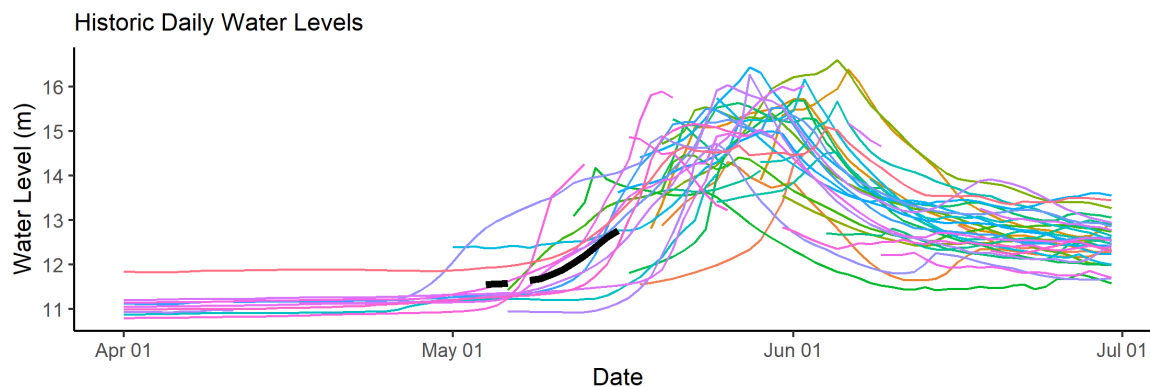
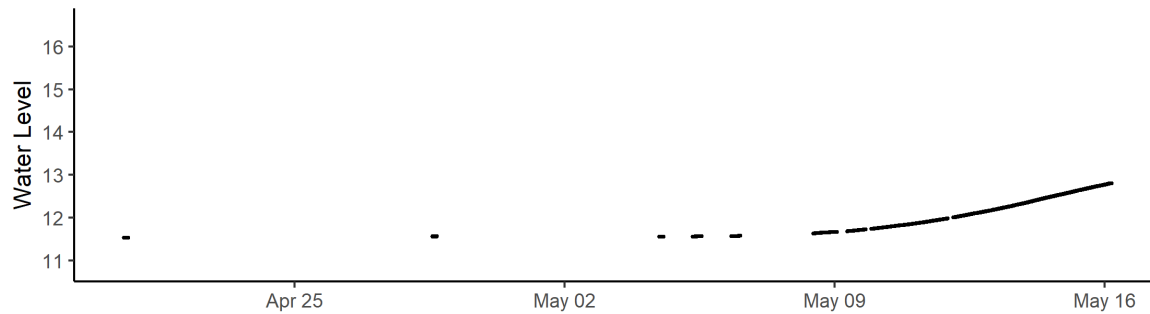


Above – The middle graph in the figure presents real time water level data at 5-minute resolution while the lower graph shows daily average levels relative to the previous 20 years. Water levels in the Mackenzie Delta are slowly beginning to rise. Water levels are lower than last year but have been higher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

Mackenzie River (Middle Channel) below Raymond Channel [10MC008]:
MACKENZIE RIVER (MIDDLE CHANNEL) BELOW RAYMOND CHANNEL

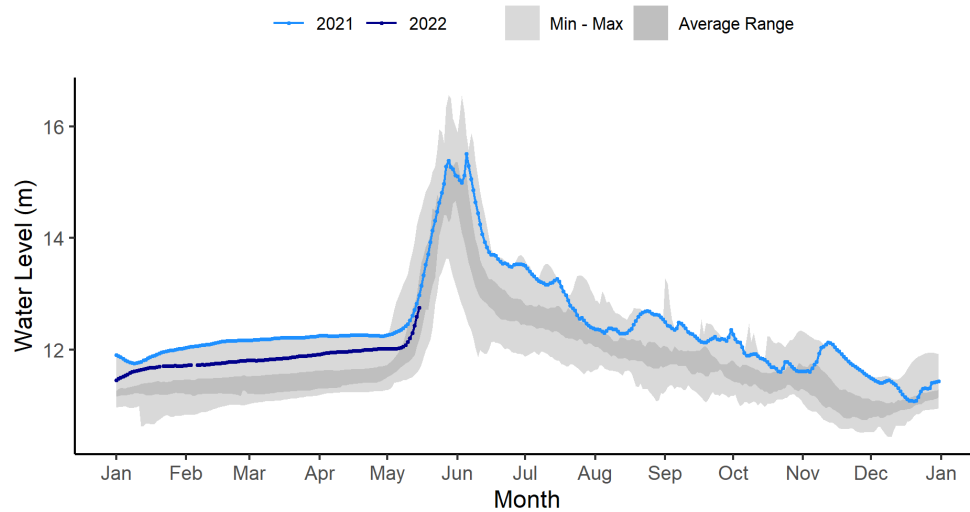


MACKENZIE RIVER (MIDDLE CHANNEL) BELOW RAYMOND CHANNEL (10MC008)
2022 Water Levels (5 minute resolution)



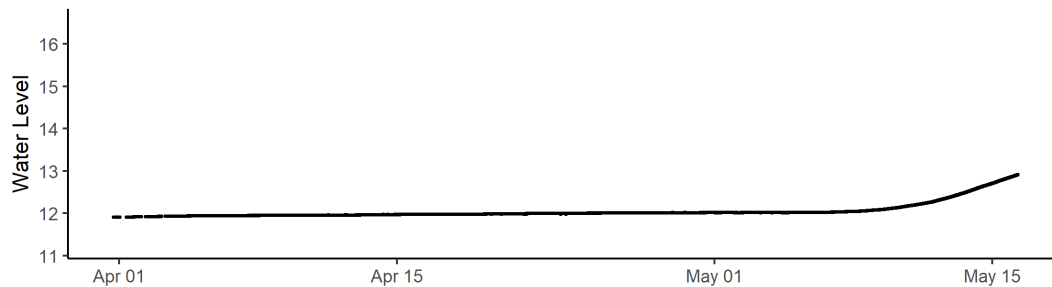
Above – The middle graph in the figure presents real time water level data at 5-minute resolution while the lower graph shows daily average levels relative to the previous 20 years. Water levels in the Mackenzie Delta are continuing to rise. Water levels are lower than last year but have been higher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

Mackenzie River (East Channel) at Inuvik [10LC002]:
MACKENZIE RIVER (EAST CHANNEL) AT INUVIK (10LC002)

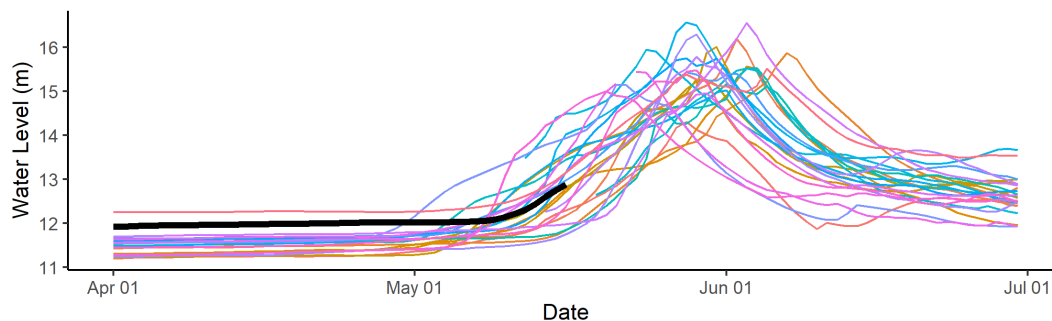


MACKENZIE RIVER (EAST CHANNEL) AT INUVIK (10LC002)

2022 Water Levels (5 minute resolution)



Historic Daily Water Levels

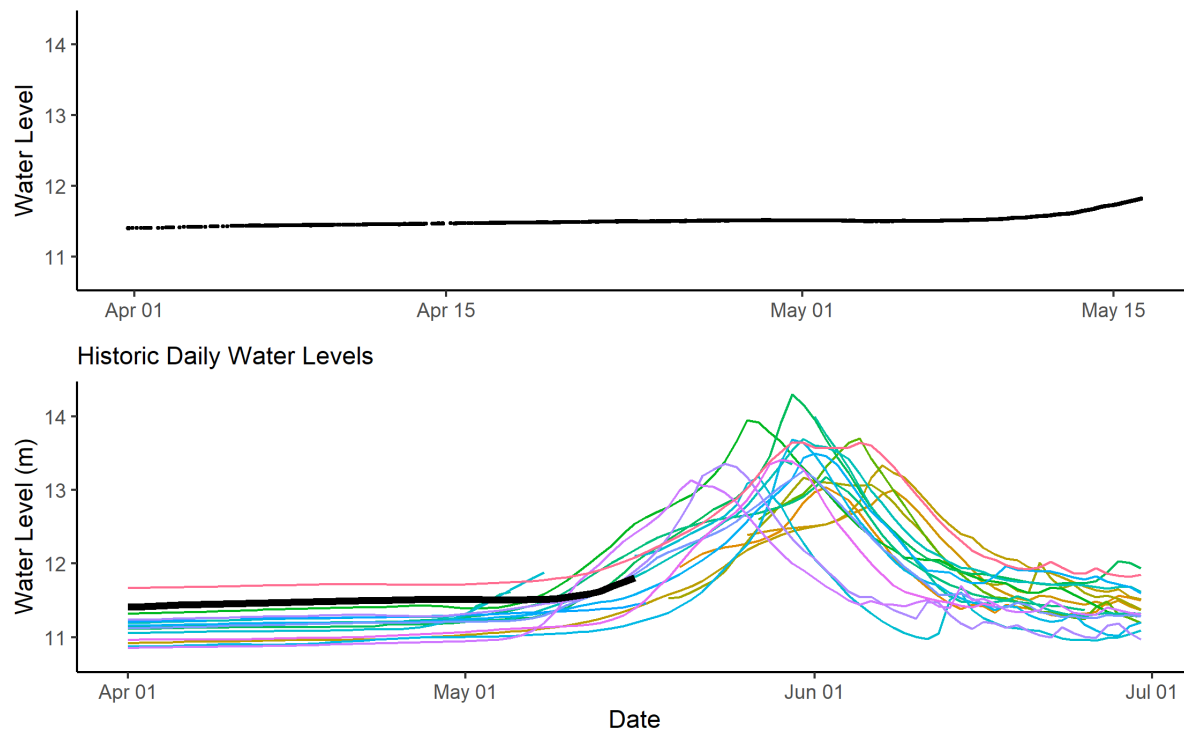


Above – The middle graph in the figure presents real time water level data at 5-minute resolution while the lower graph shows daily average levels relative to the previous 20 years. Water levels in the Mackenzie Delta are continuing to rise. Water levels are lower than last year but have been higher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

Mackenzie River (Napoia Channel) above Shallow Bay [10MC023]:

MACKENZIE RIVER (NAPOIAK CHANNEL) ABOVE SHALLOW BAY (10MC023)

2022 Water Levels (5 minute resolution)



Above – The top 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 continuing to rise. Water levels are lower than last year but have been higher than average throughout the winter.

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.