An overview of current water levels in the NWT

Ryan Connon, Anna Coles, Shawne Kokelj
Hydrology Group

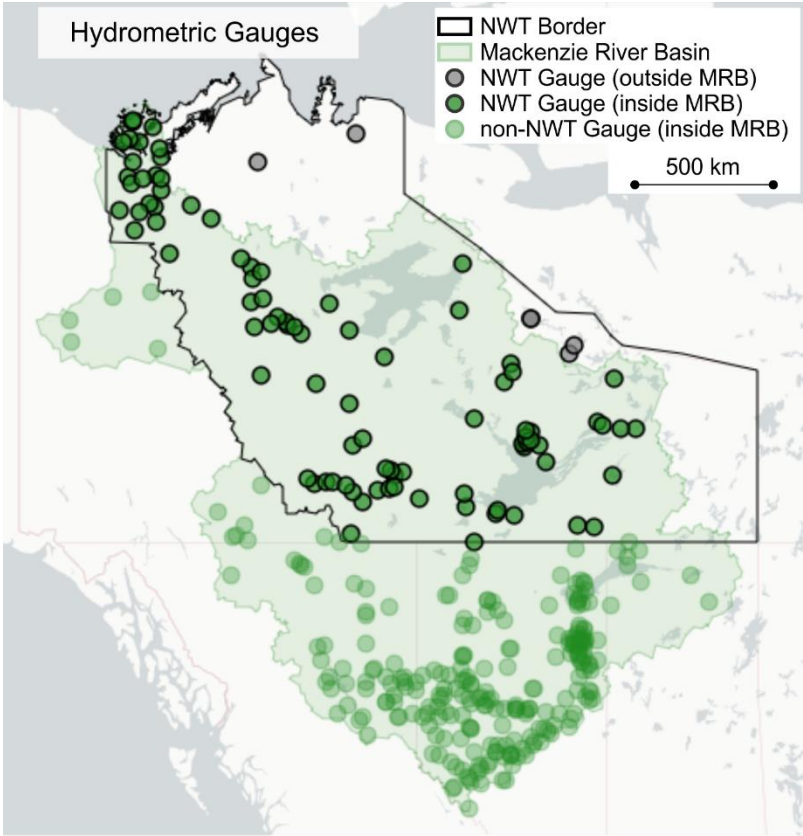
Water Stewardship and Monitoring Division
Department of Environment and Climate Change
Government of the Northwest Territories

Government of
Northwest Territories

Overview of NWT Hydrology

- Most of mainland NWT falls within the Mackenzie River Basin (nearly 2 million km^2)
  - Major tributaries:
    - Slave (Peace and Athabasca)
    - Liard
    - Great Bear
    - Peel

- GNWT are partners with Water Survey of Canada in the NWT Hydrometric Monitoring Network
  - 102 stations in the NWT
  - Sites consist of lakes, rivers, creeks
  - Sites measure water level and/or flow

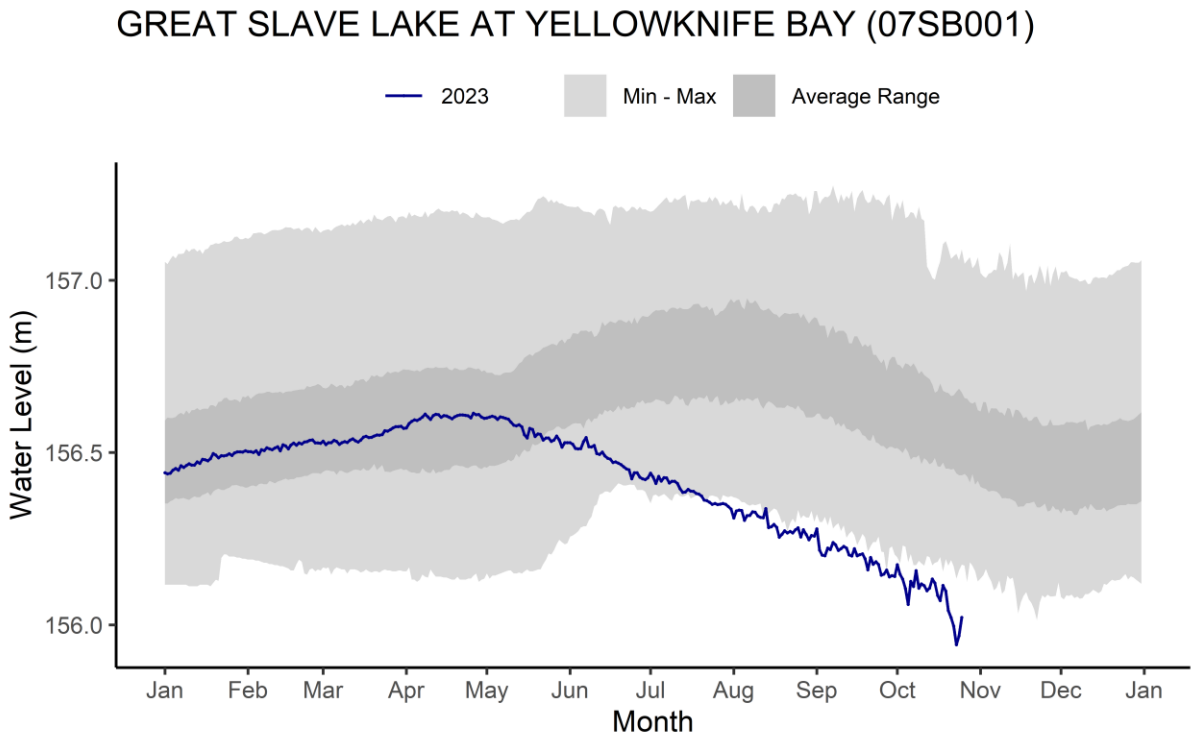


Record low water levels across NWT

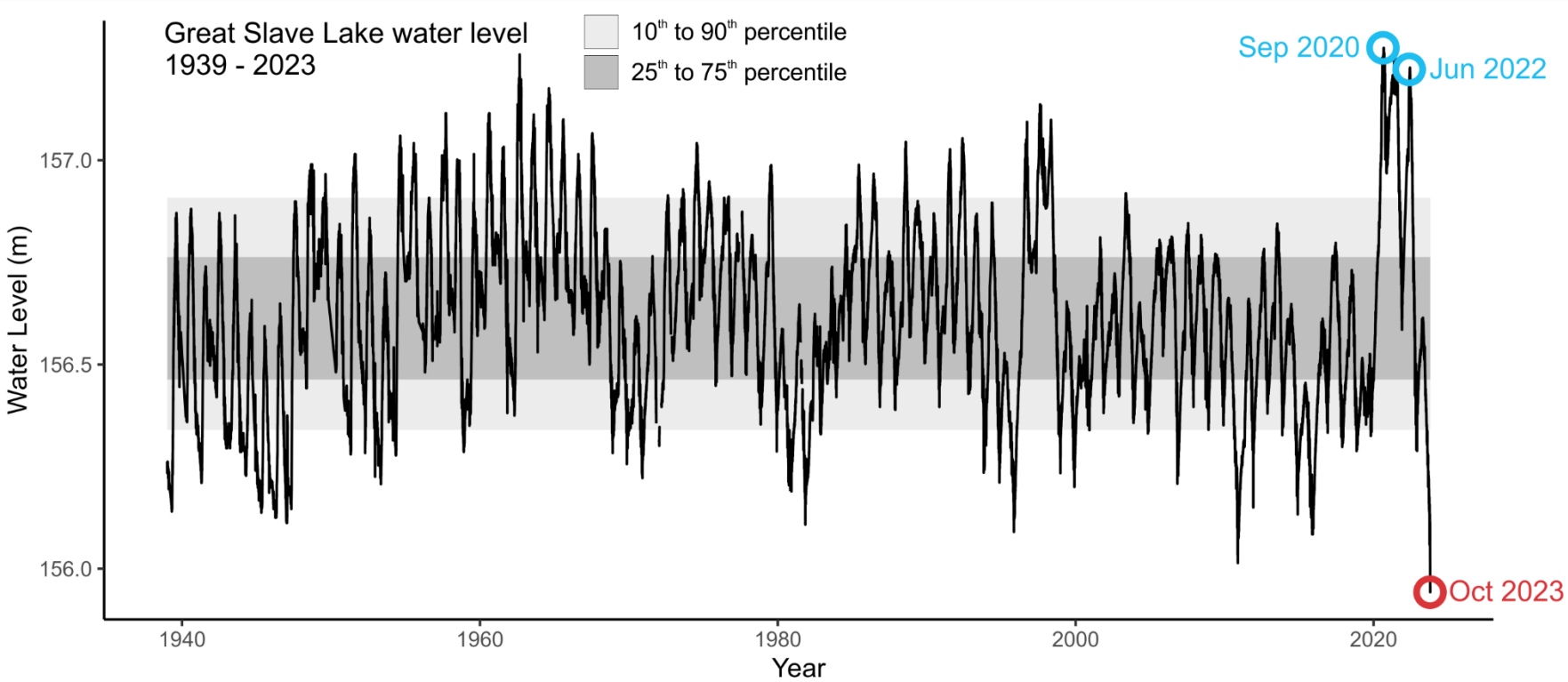
- Water levels have been extremely low across much of the NWT in 2023
- Most gauged rivers in the southern NWT reached their lowest levels on record during the summer of 2023
- Low water levels are a combination of abnormally warm temperatures and very little rain
  - High temperatures usually lead to more evaporation from lakes and transpiration from plants
  - These climate conditions are a combination of global-scale atmospheric phenomenon (e.g. El Niño) and climate change

Hay River at Alexandra Falls, Oct. 2023
Photo credit: R. Staples

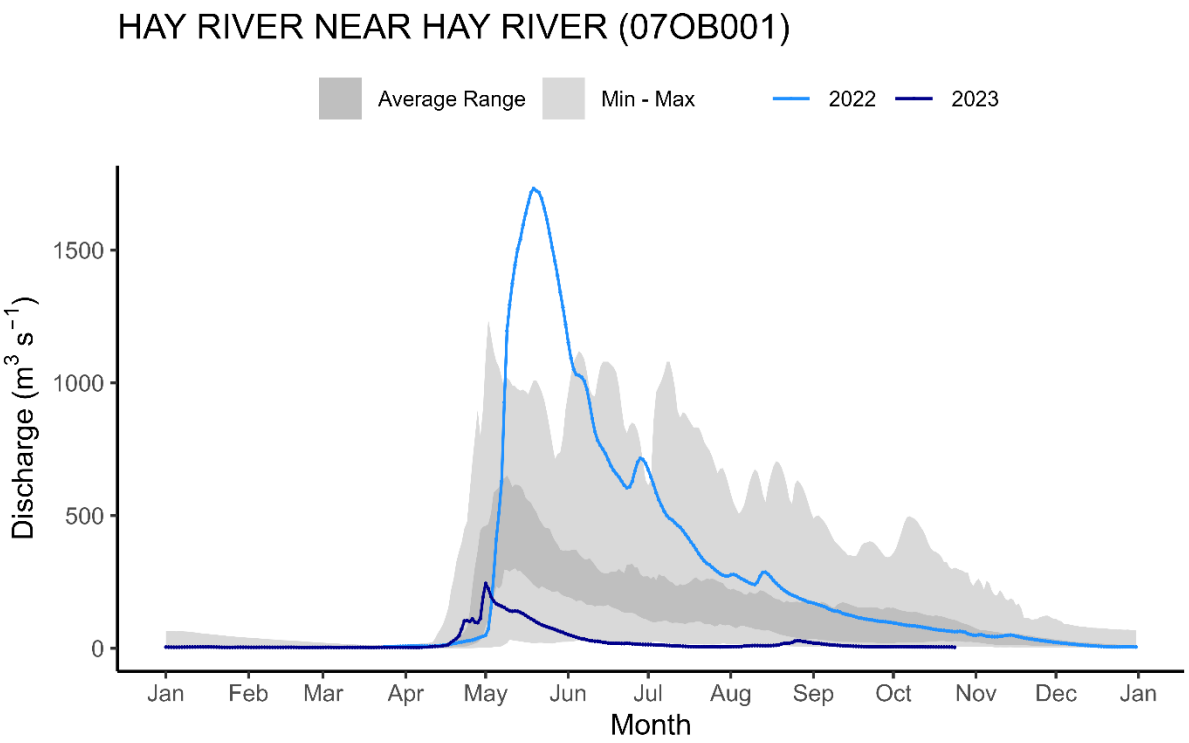
Great Slave Lake



Great Slave Lake

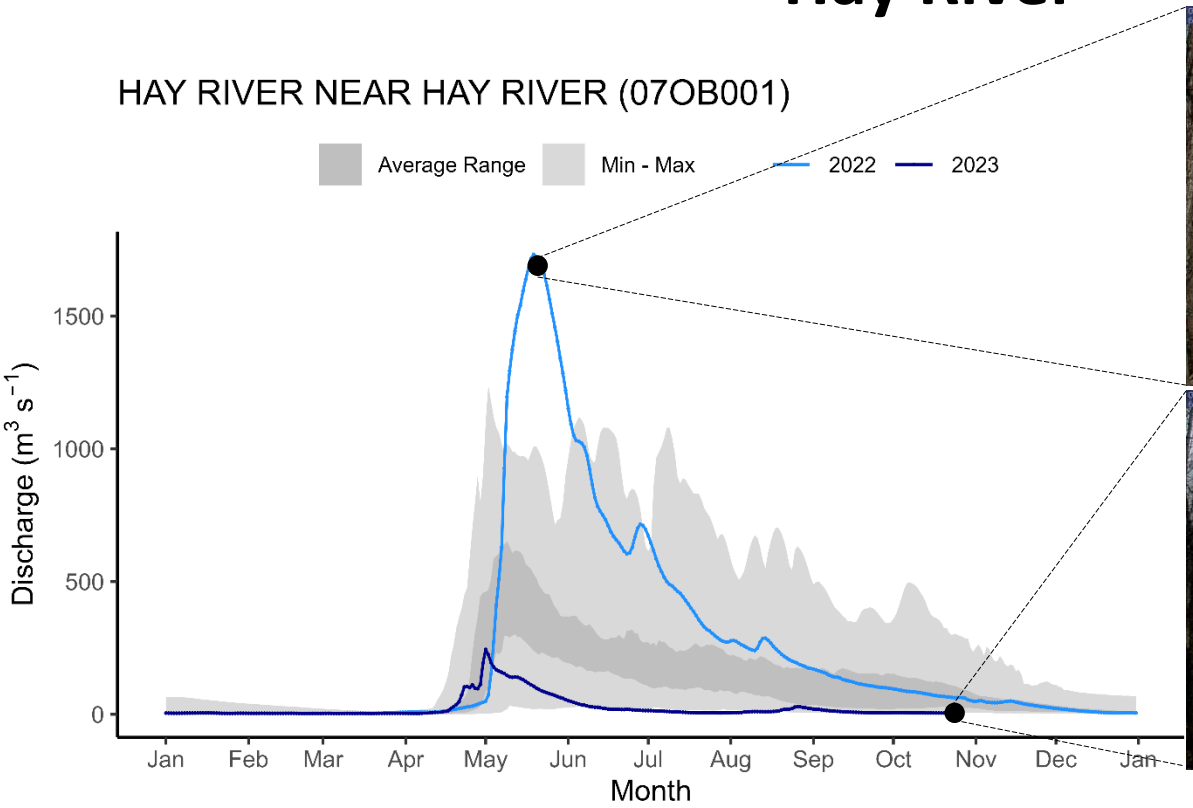


Hay River



- Hay River went from record high water levels in spring 2022 to record low water levels in fall 2023
- This was caused by extremely low rain from Jun to Oct 2022 and again from May to Oct 2023c

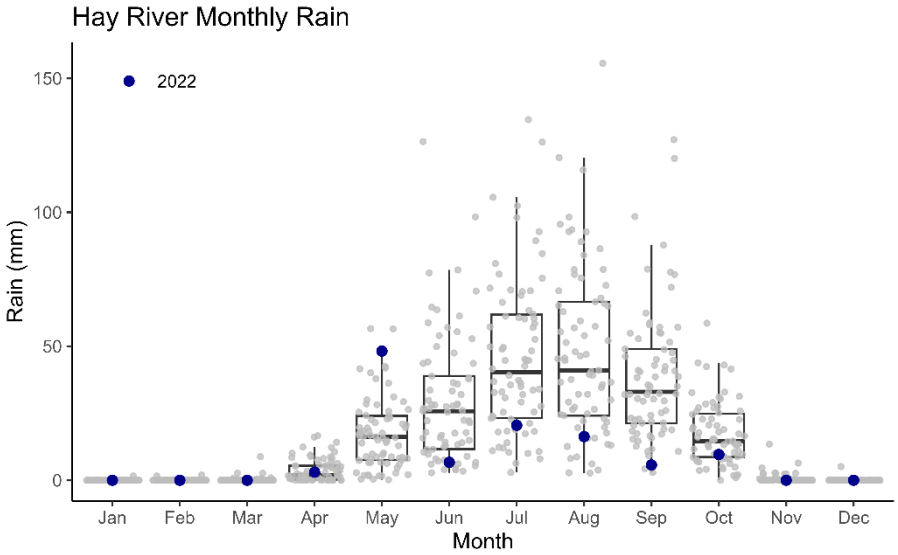
Hay River

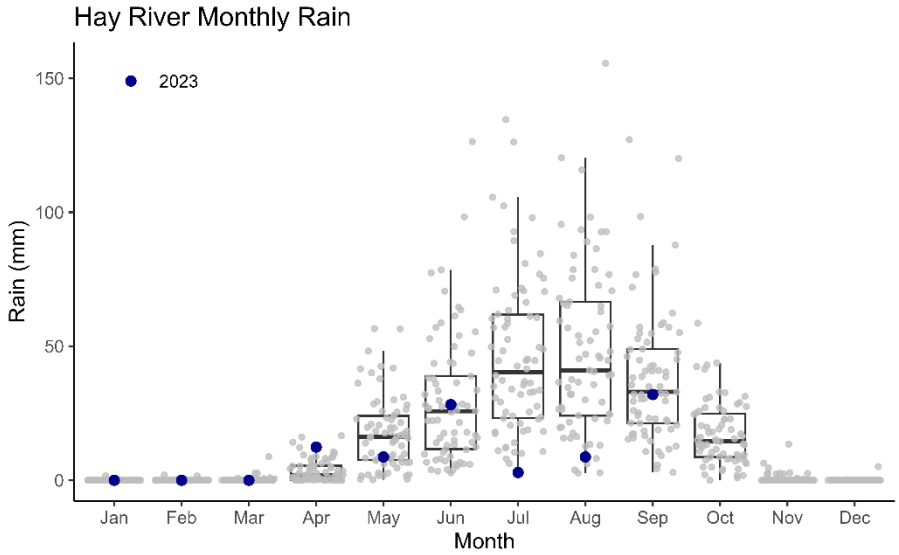


Government of
Northwest Territories

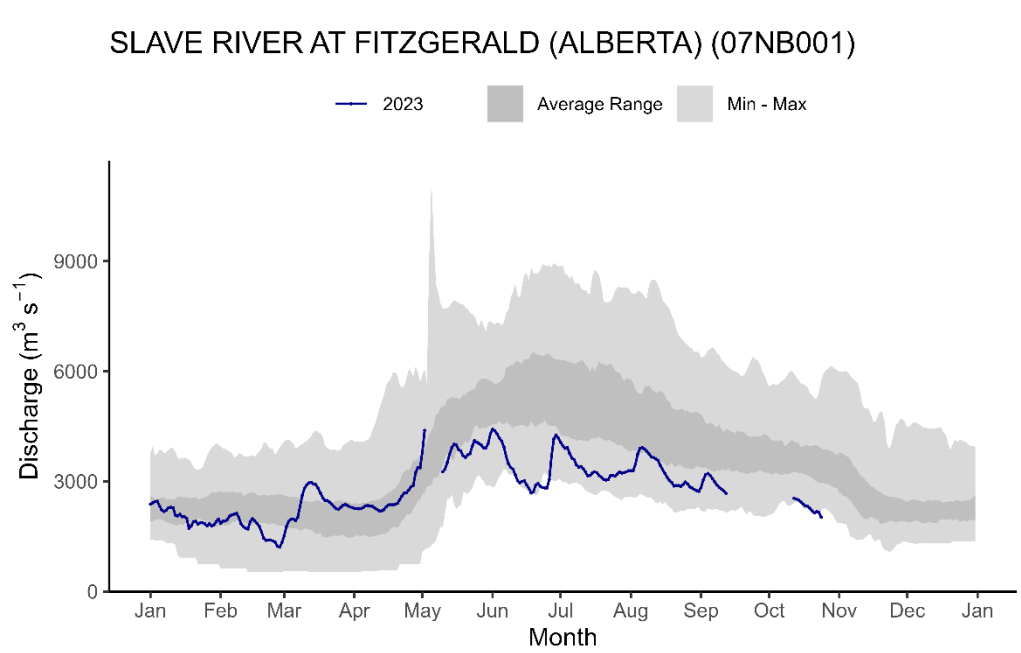
Hay River

- Hay River was very dry in late summer of 2022, and entire summer of 2023





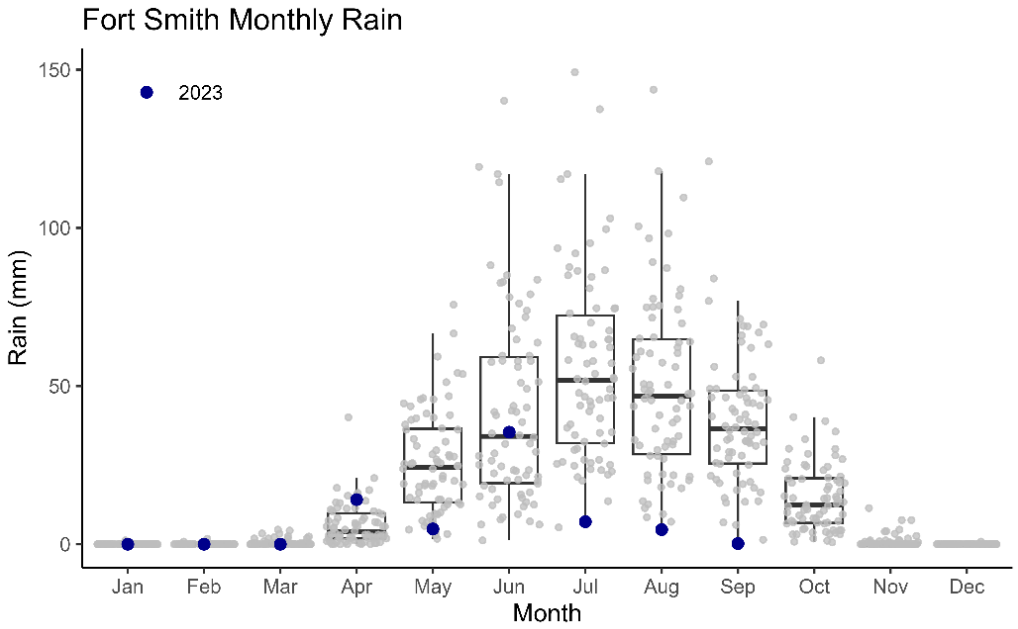
Slave River



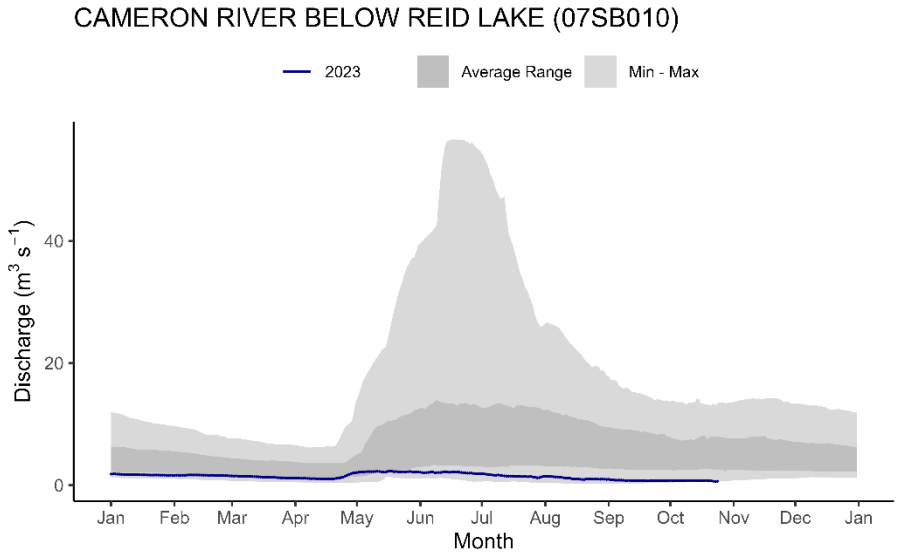
Slave River at Murdoch Creek, Oct. 2023
Photo credit: R. Staples

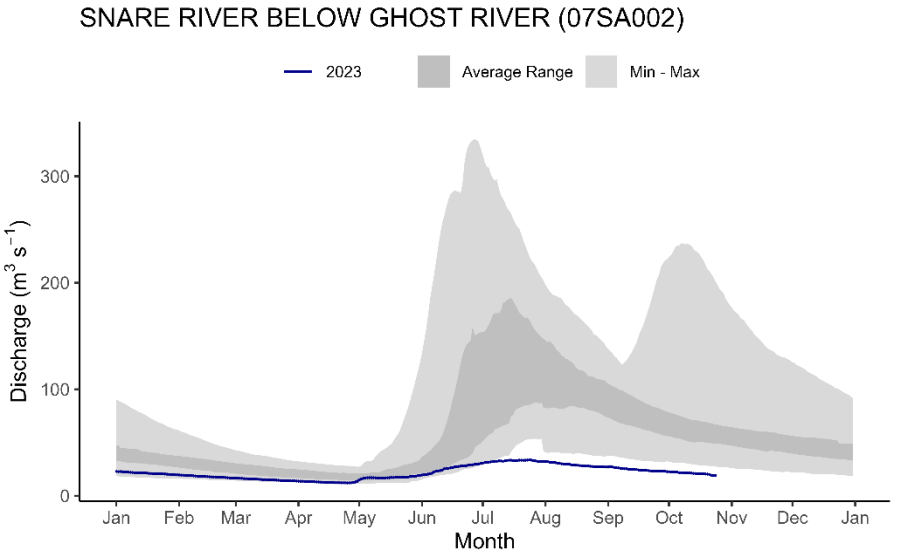
Fort Smith

- Fort Smith was extremely dry during the summer of 2023



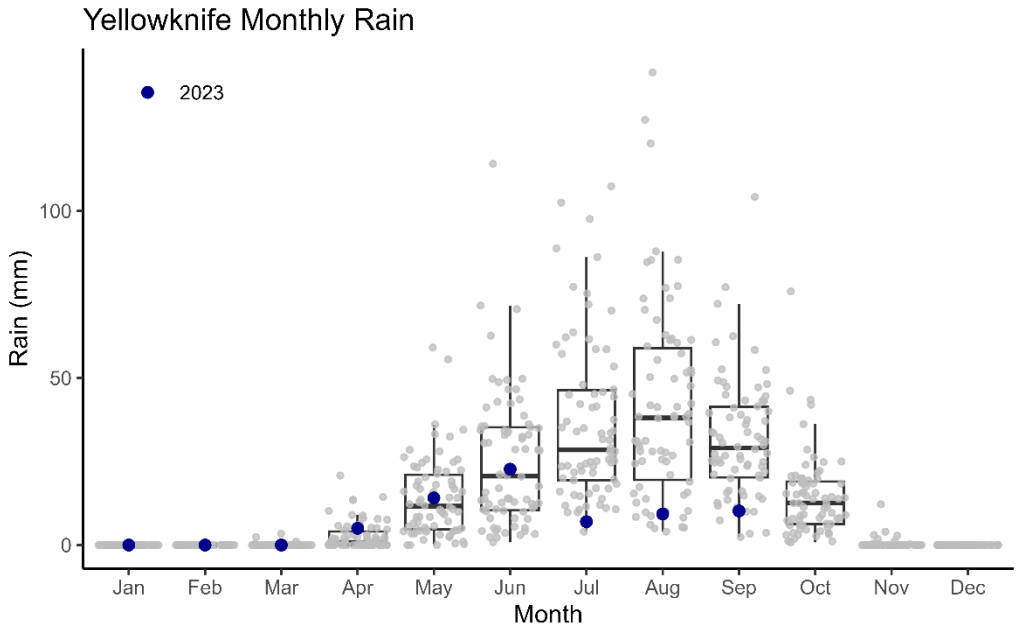
North Slave Rivers





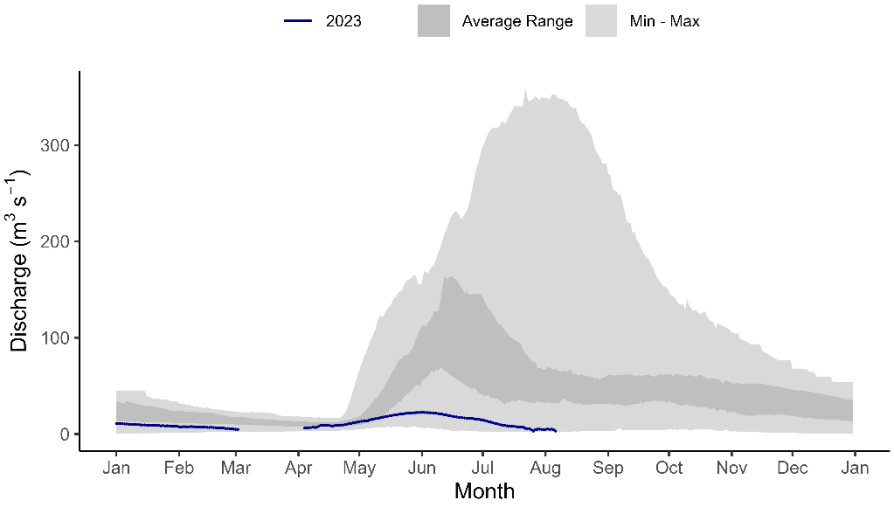
Yellowknife

- Yellowknife was also extremely dry during the summer of 2023

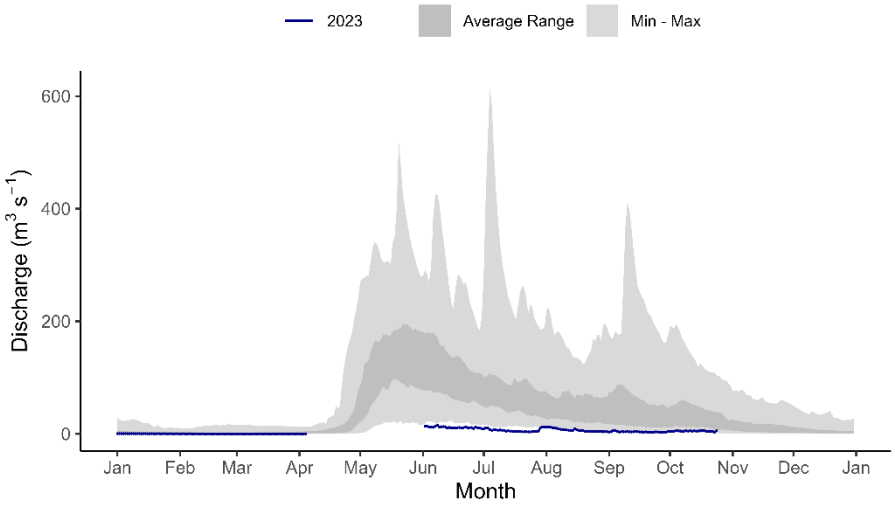


Mackenzie River Tributaries

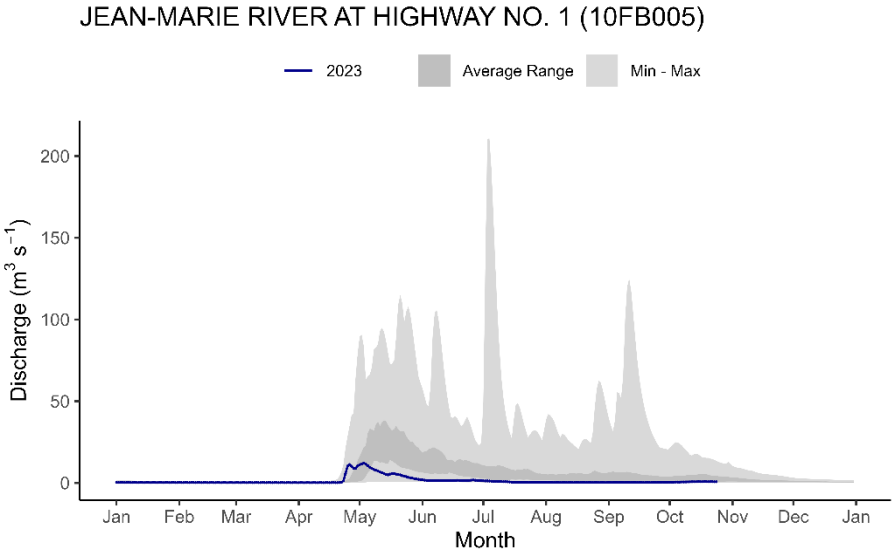
KAKISA RIVER AT OUTLET OF KAKISA LAKE (07UC001)

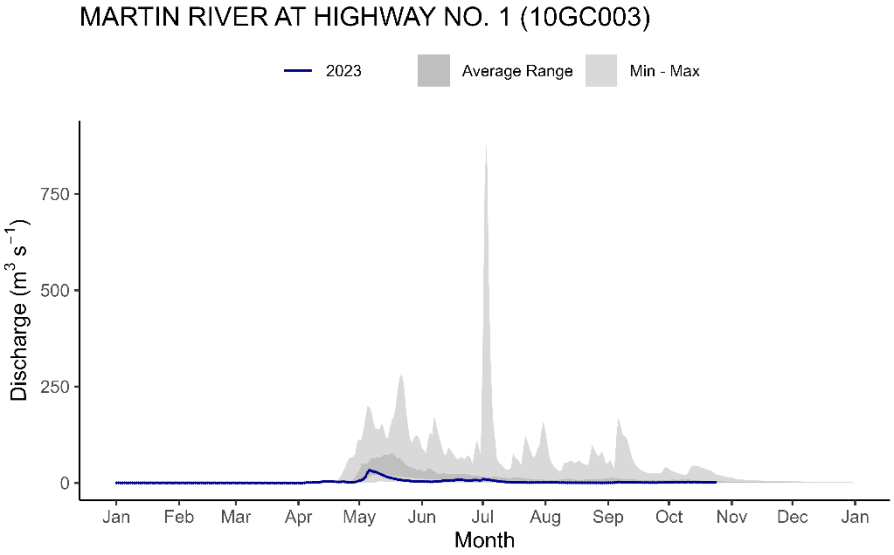


TROUT RIVER AT HIGHWAY NO. 1 (10FA002)

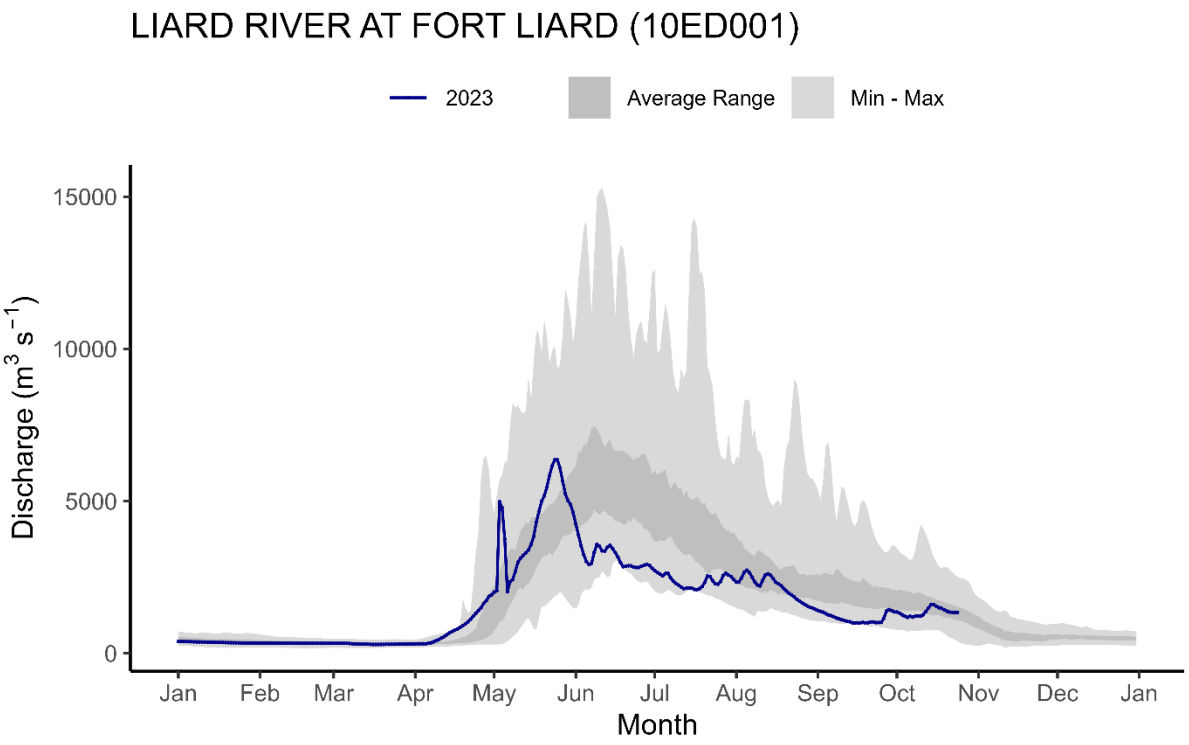


Mackenzie River Tributaries



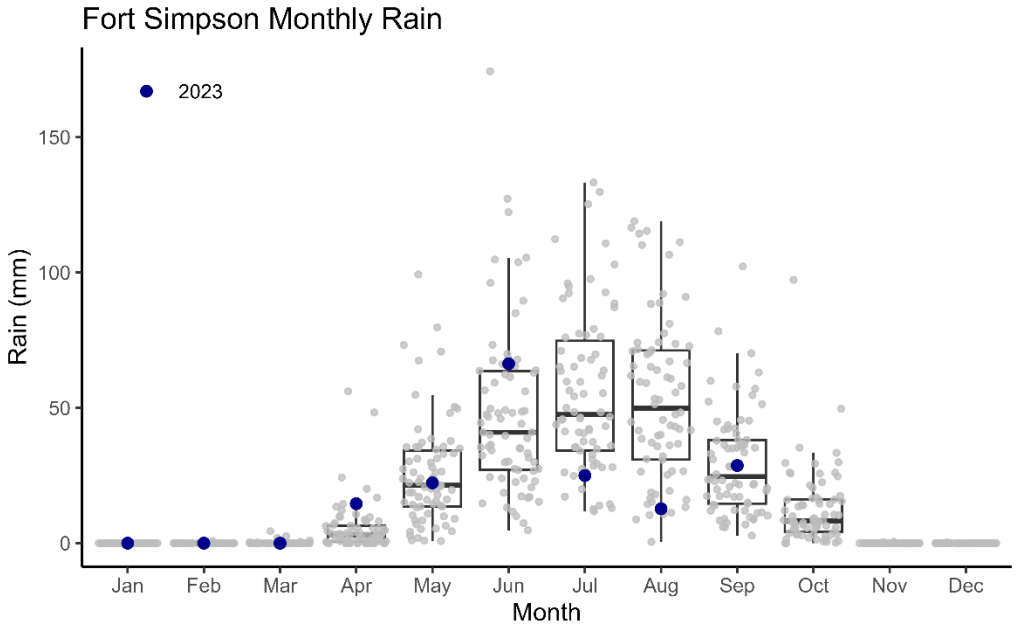


Liard River

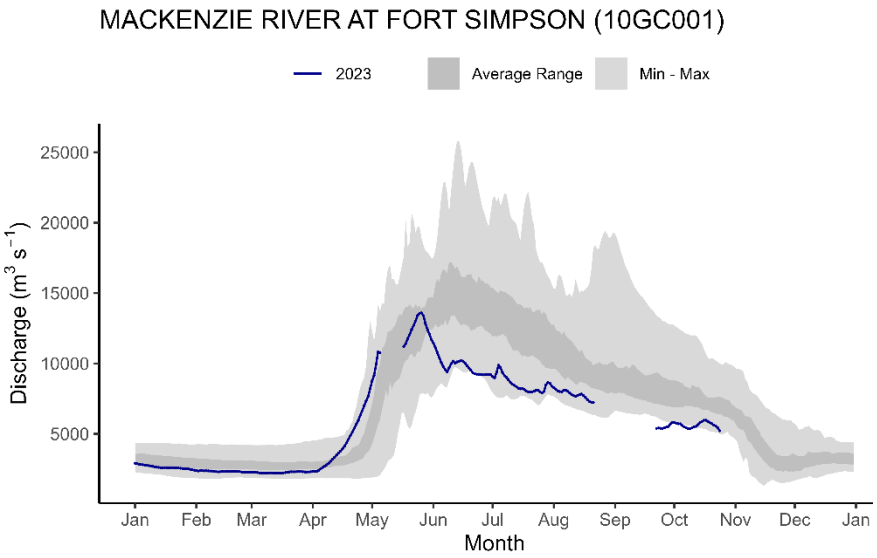

LIARD RIVER AT FORT LIARD (10ED001)
2023
Average Range
Min - Max
15000
10000
5000
0
Discharge ($m^3 s^{-1}$)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Month

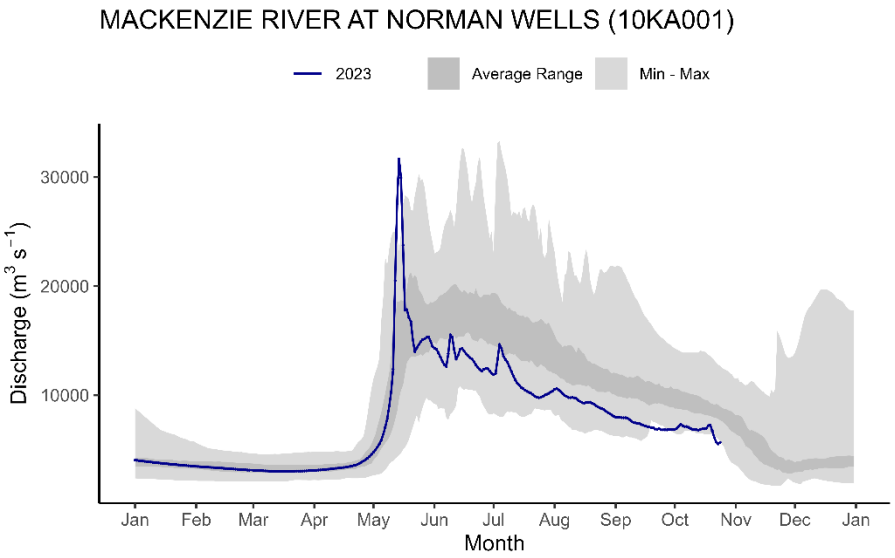
Fort Simpson

- Fort Simpson received more rainfall than other communities, but still much less than average in 2023

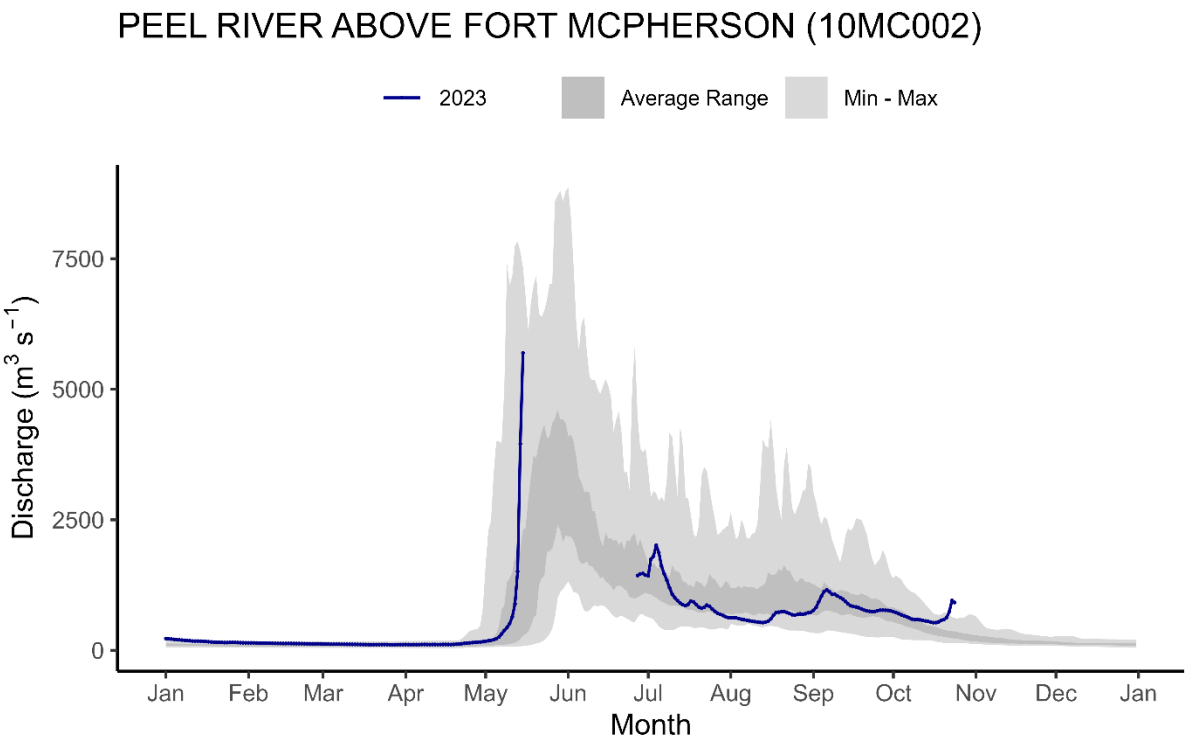


Mackenzie River

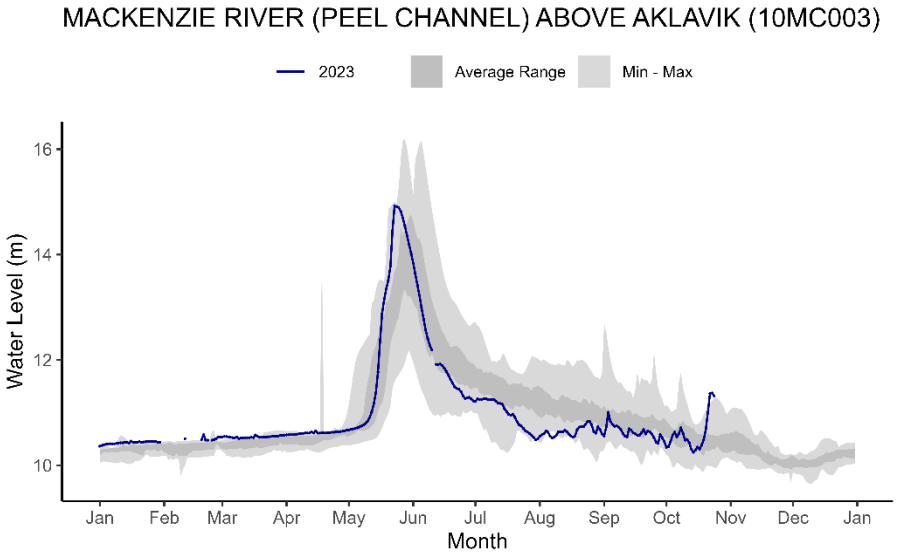


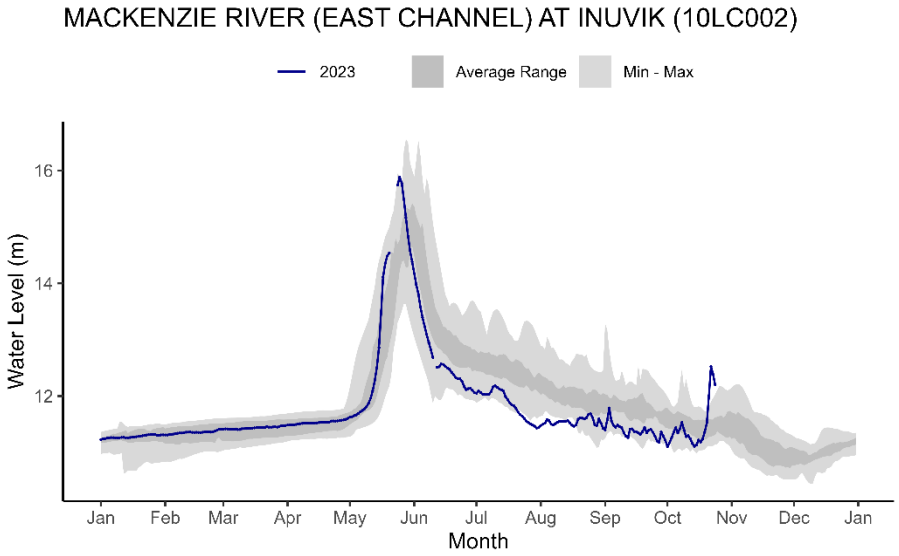


Peel River


PEEL RIVER ABOVE FORT MCPHERSON (10MC002)
2023
Average Range
Min - Max
Discharge (m^3 s^{-1})
7500
5000
2500
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Month

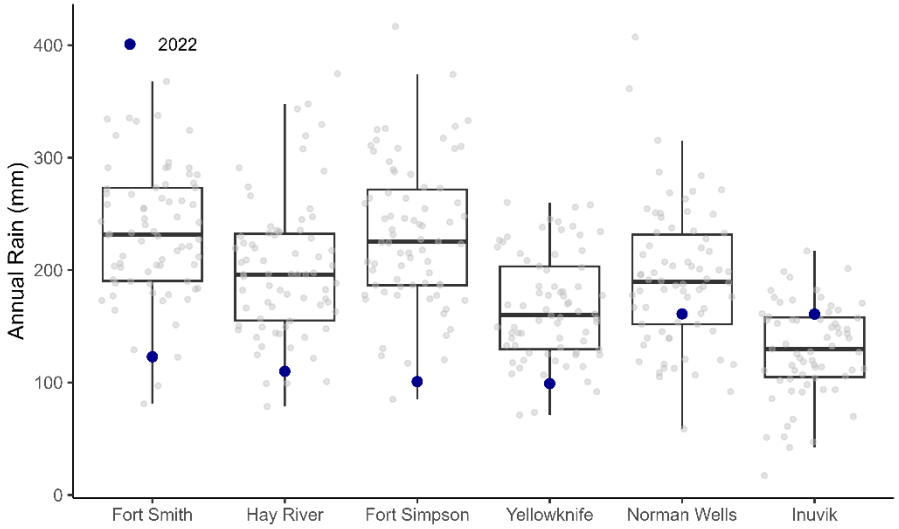
Mackenzie Delta

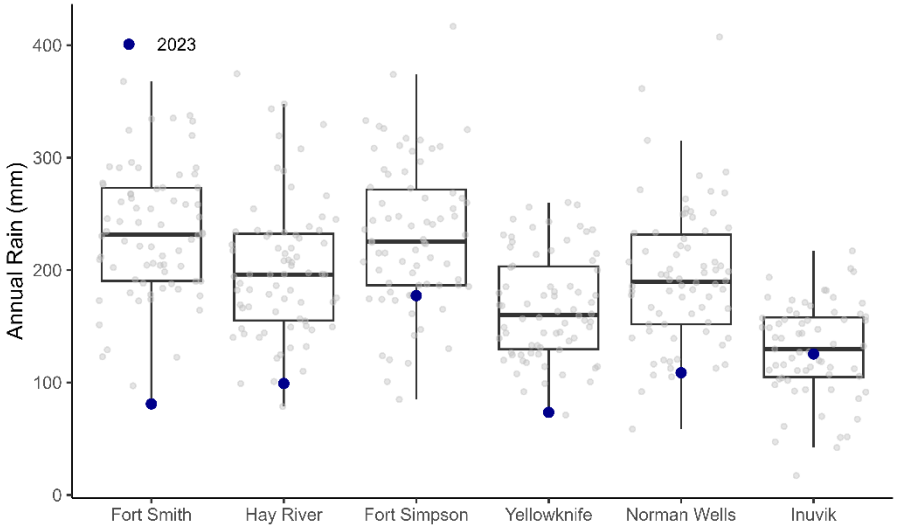




Water level drivers: NWT Rain 2023

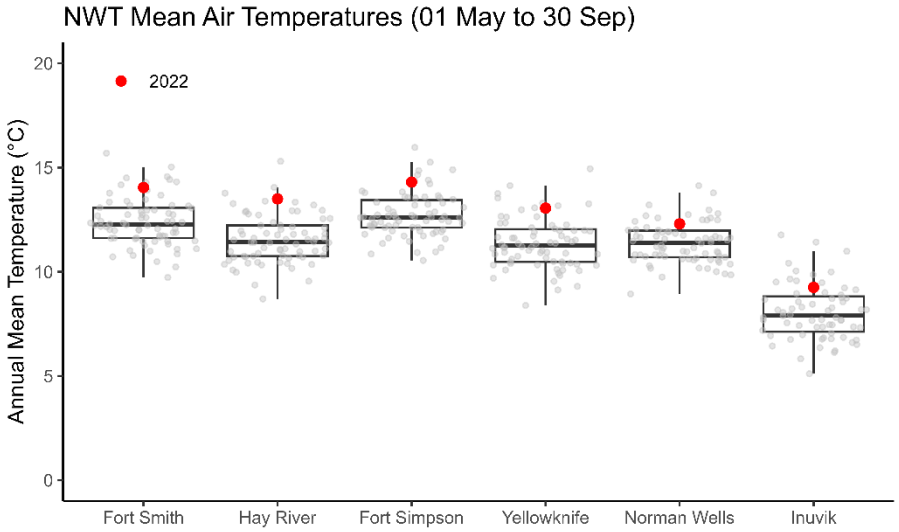
- Back-to-back summers of extremely low rainfall across the southern NWT

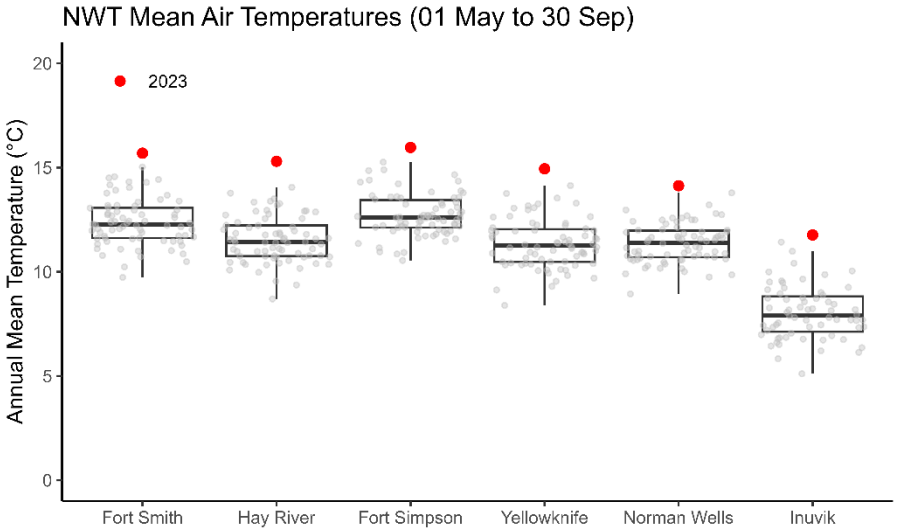




Water level drivers: NWT temperatures 2023

- Back-to-back summers of extremely high temperatures across the NWT





Other influences on water levels: Site C?

- BC Hydro has stated that they may start filling the Site C reservoir this fall
  - BC Hydro will be in communication with the GNWT when they start filling the reservoir

- The volume of the reservoir divided by the area of Great Slave Lake equals approximately **8.5 cm** of water on Great Slave Lake

- This means that after the reservoir is filled, Great Slave Lake would be a maximum of 8.5 cm lower than it would be if the reservoir was not filled
  - The actual difference in water level will depend on the difference between inflows (Slave River) and outflows (Mackenzie River)
  - The 8.5 cm would be restored as more water naturally flows through the system

Mahsi

The GNWT publishes monthly ‘Water Monitoring Bulletins’ to provide an update on current water levels across the NWT

Subscribe by emailing:

nwtwaters@gov.nt.ca