

# Hydrology update from Omineca Ministry of Forests Research

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British Columbia

## B.C.'s spring snowpack is the lowest on record

Relatively dry conditions continued across most of the province through March, report says



Karin Larsen · CBC News · Posted: Apr 10, 2024 12:20 PM PDT | Last Updated: April 10



Extended drought has resulted in extremely low water levels at the confluence of the Fraser and Nechako Rivers near Prince George, B.C. (Andrew Kurjata/CBC)

British Columbia

## B.C. officials warn of early, 'challenging' wildfire season

Rainfall could avert worst-case scenarios but it's 'unlikely' enough will fall: BCWS

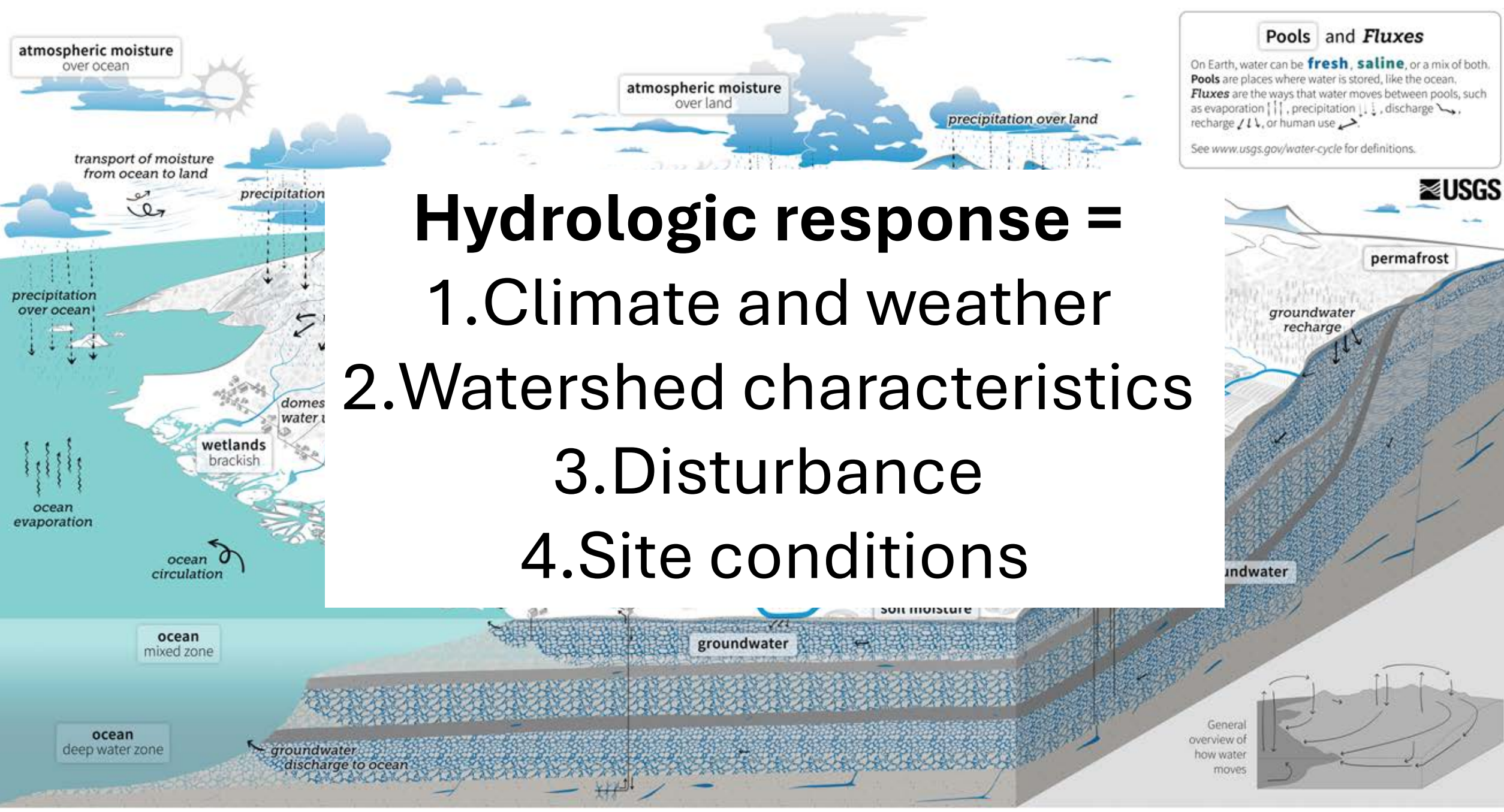


Moira Wyton · CBC News · Posted: Mar 18, 2024 4:24 PM PDT | Last Updated: March 18



A firefighter from an Alaskan unit uses a drip torch to set a planned ignition on a fire burning near a highway in northern British Columbia on July 11, 2023. B.C. officials say the province could see a 'very challenging' wildfire season in 2024 depending on how much rain falls in the coming months. (Jesse Winter)





**Pools and Fluxes**

On Earth, water can be **fresh, saline**, or a mix of both. **Pools** are places where water is stored, like the ocean. **Fluxes** are the ways that water moves between pools, such as evaporation ↓ ↓ ↓, precipitation ↓ ↓ ↓, discharge ↘ ↘ ↘, recharge ↙ ↙ ↙, or human use ↪ ↪ ↪.

See [www.usgs.gov/water-cycle](http://www.usgs.gov/water-cycle) for definitions.



**Hydrologic response =**

1. Climate and weather
2. Watershed characteristics
3. Disturbance
4. Site conditions

General overview of how water moves





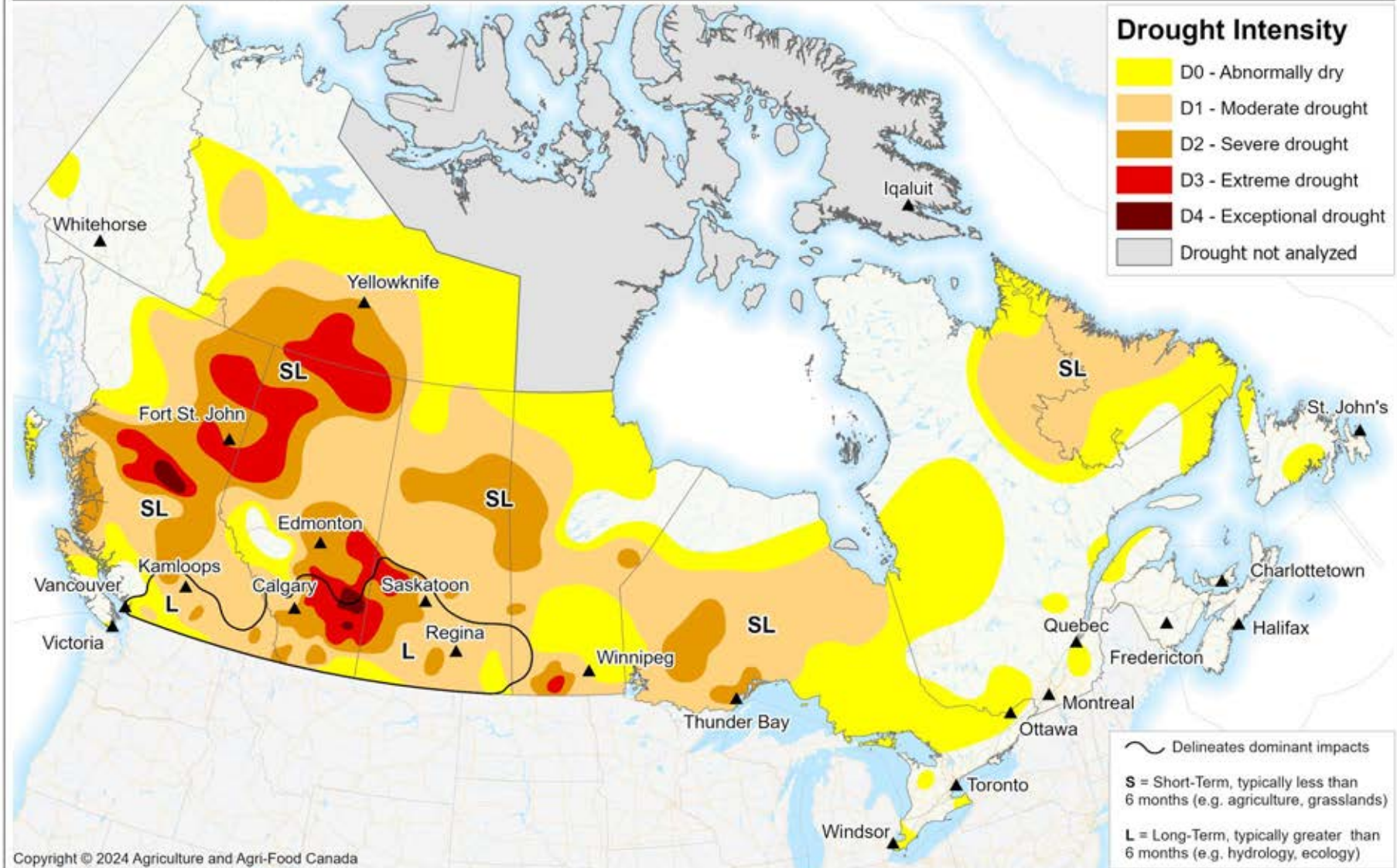
1985  
1995  
2005  
2015  
2020  
2022





# Canadian Drought Monitor

Conditions as of March 31, 2024



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Prepared by Agriculture and Agri-Food Canada's National Agroclimate Information Service. We also acknowledge various provincial, territorial and non-government organizations whose reports and assessments are consulted. The Drought Monitor focuses on broad-scale conditions. Regions in northern Canada may not be as accurate as other regions due to limited information.

Created: 2024-04-05  
[www.agr.gc.ca/drought](http://www.agr.gc.ca/drought)

# Hydrology and wildfires

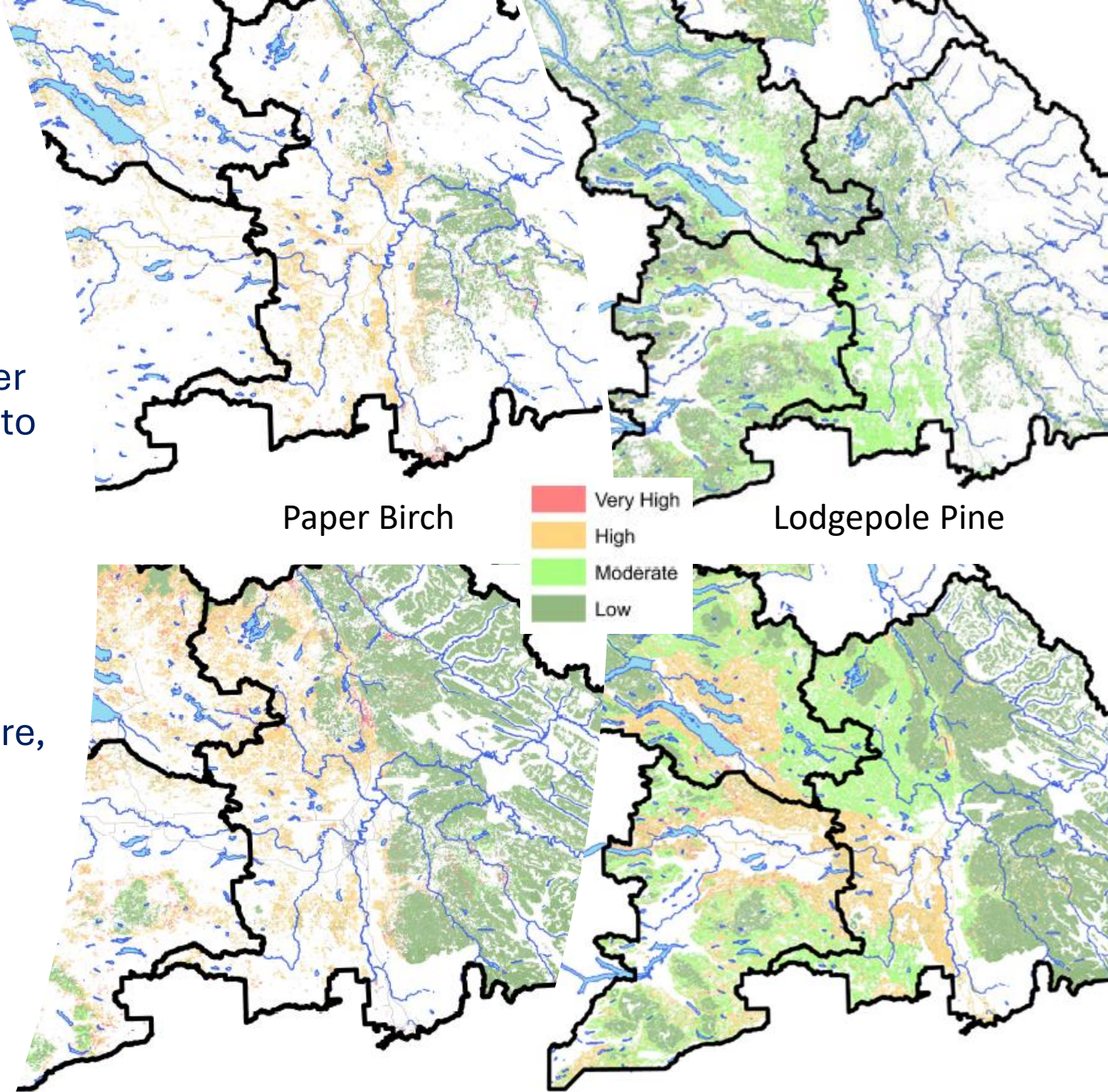
- Drought and Wildfire are related
  - **Meteorological:** below-average precipitation (rain/snow)
  - **Hydrological:** streamflow, lake, groundwater, and reservoir
  - **Ecological:** ecosystem is impaired due to a lack of water
- Wildfire impacts
  - Runoff, peak flow, and low flow
  - Stream temperature increase
  - Erosion, sediment transport, and debris flows
  - Water chemistry



# Modelled tree drought risk

(V. Foord)

- Climate change may cause drier site conditions that could lead to tree mortality
- 2041-2070 Projections: Prince George, Vanderhoof, Fort St James areas
- Drought stress can lead to secondary disturbances: wildfire, windthrow, pest outbreaks, hydrological change



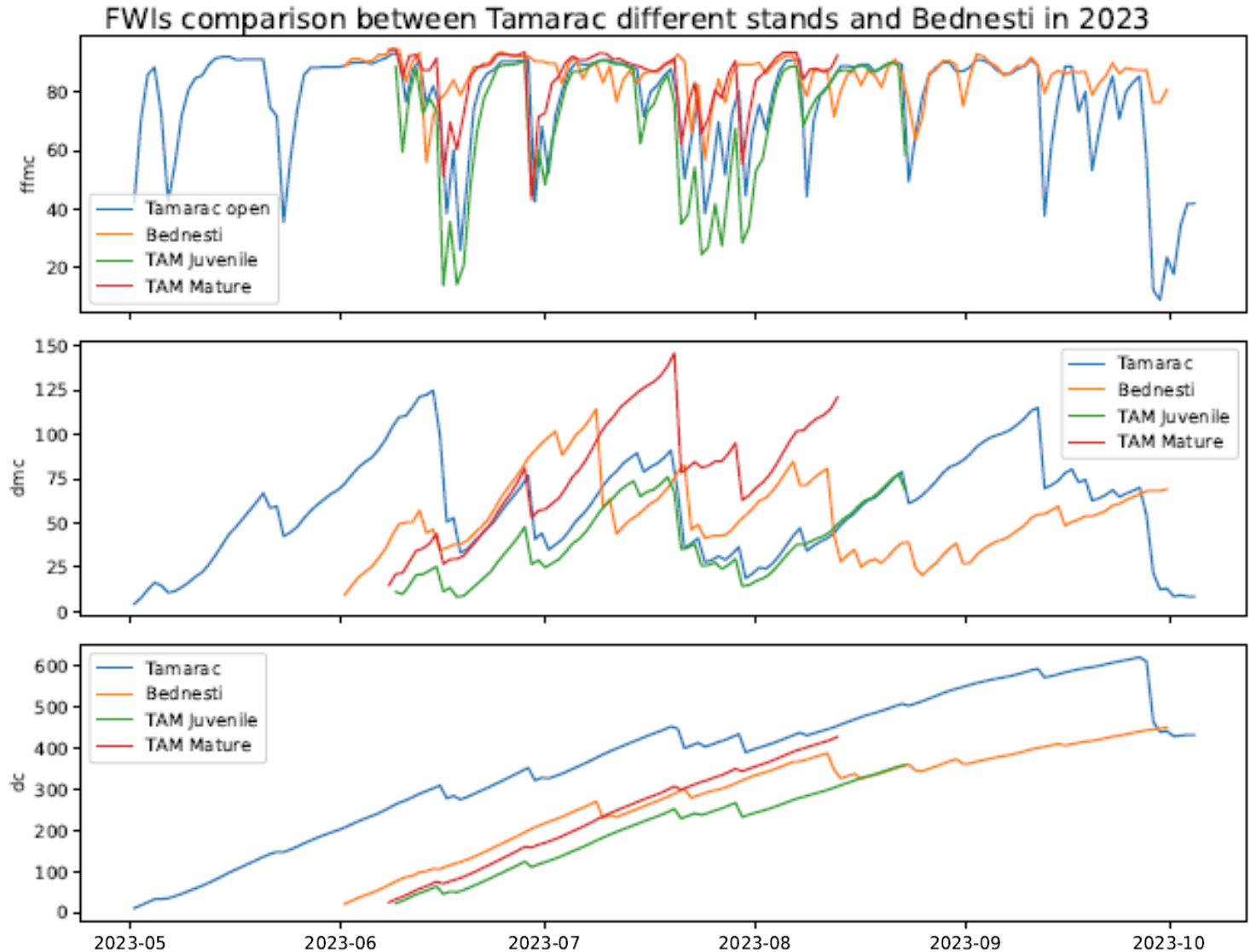


# Wildfire risk in different stand types (V. Foord)

- Clearcut
- Juvenile pine stands
- Mature forest



Wind speed, direction, air temp, surface temp, soil temp, relative humidity, vapour pressure deficit, soil moisture, rain





# How we measure rivers

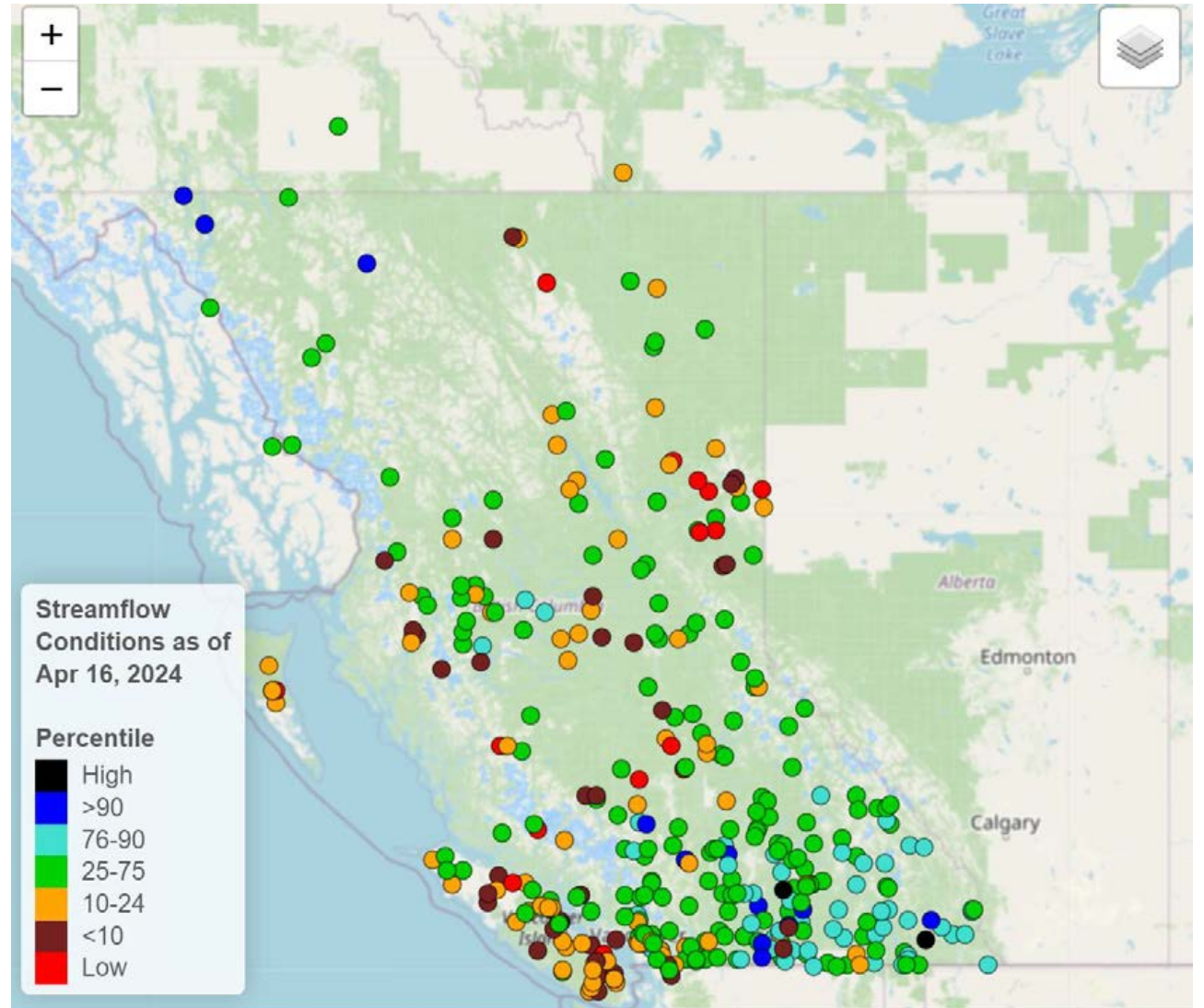
- Measure
  - Water level (pressure)
  - Streamflow (velocity/area)
  - Temperature
  - Quality (Turbidity, pH, DO..)





# Where do we measure rivers

- Water Survey of Canada
- Third party data
  - [Aquarius](#)
  - [MoF Research](#)





- Map
- List
- Location
- Data Set
- Chart
- Export
- Reports
- Dashboards

Select Parameter: Parameters... Select Value: Location Type Date: Latest Data

Filter



Map Options

- Display Values
- Show Values In Indicators

Select Legend:

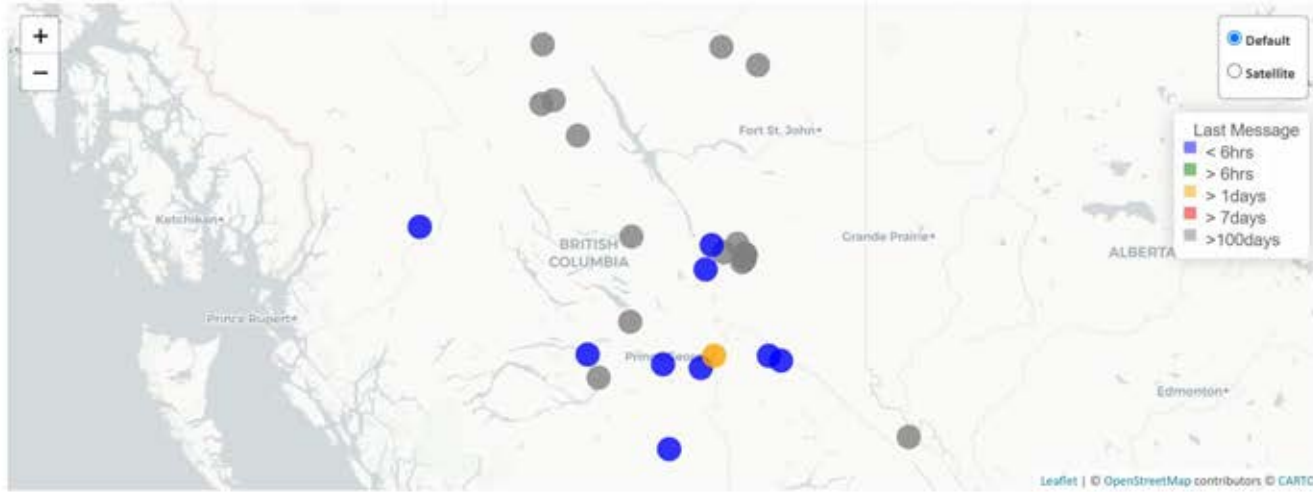
Location Type

Location Type 1836

|                                     |                                     |               |     |
|-------------------------------------|-------------------------------------|---------------|-----|
| <input type="checkbox"/>            | <input type="checkbox"/>            | Snow          | 541 |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Hydrometric   | 720 |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Water Quality | 203 |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Groundwater   | 367 |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Other         | 5   |



## Northern BC Hydrology Research



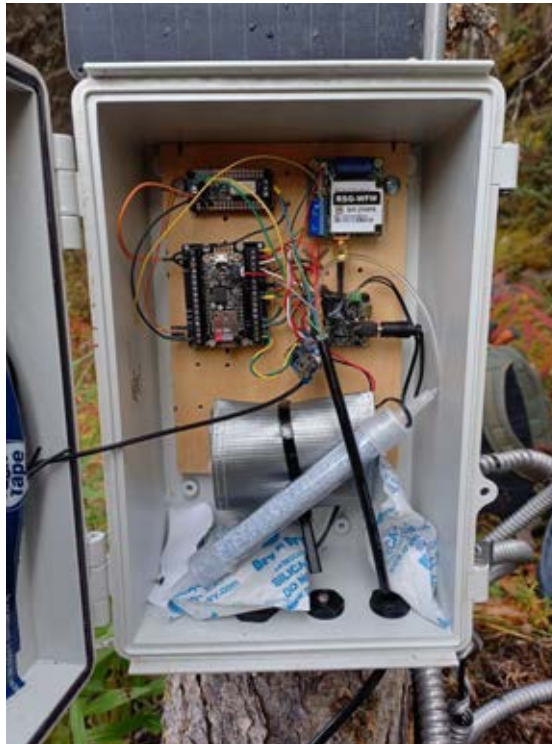
### Station Includes

### Number of days to display

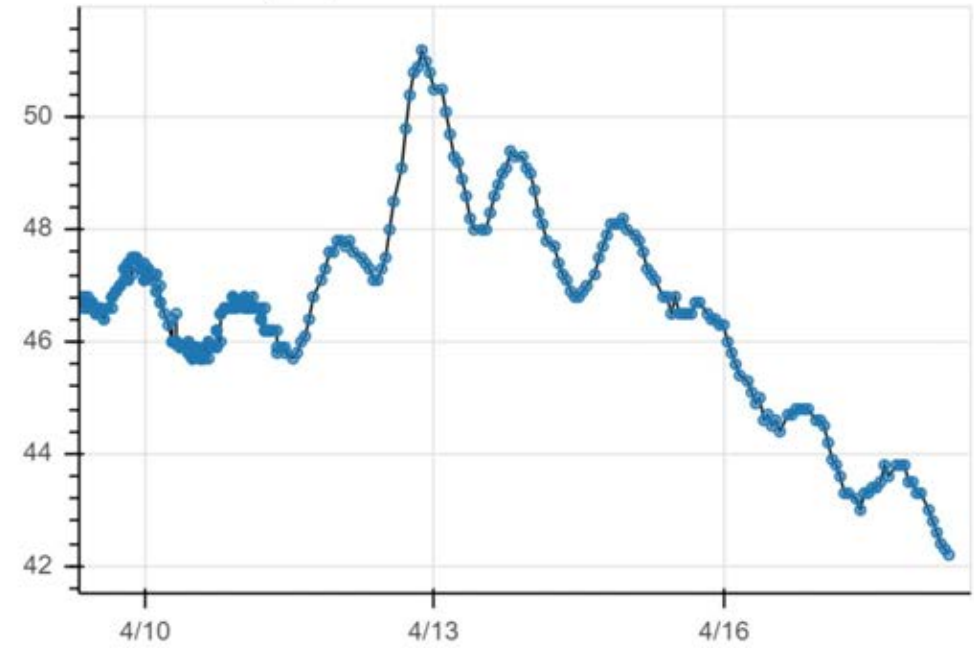


### Please note:

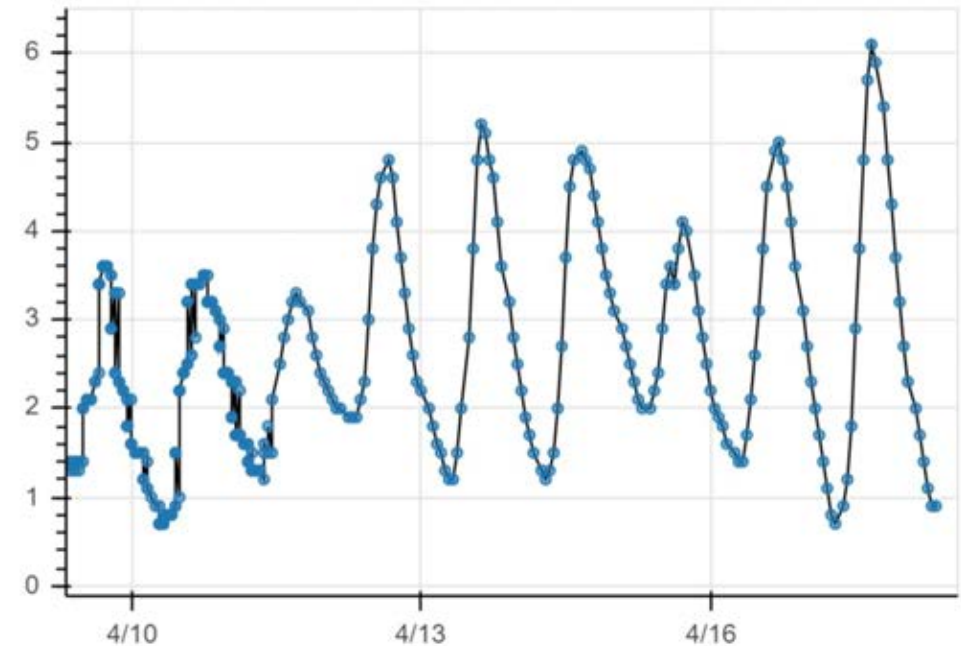
- This is an experimental research project, use caution.
- Gaps in the satellite network, cloud, rain and hardware failures can prevent the data transmission.
- Provisional data provided without any guarantees of quality or reliability.

[Download All Station Locations \(KML\)](#)[Download All Station Data \(CSV\)](#)

## Water Level (cm)



## Water Temperature (C)





# Watershed Indicators

## 118 Extension Note

JANUARY 2017

Equivalent Clearcut Area as an Indicator of Hydrologic Change in Snow-dominated Watersheds of Southern British Columbia

R. Winkler  
B.C. Ministry of Forests, Lands  
and Natural Resource Operations  
Kamloops, B.C.

S. Boon  
Crestside Communication  
Cobble Hill, B.C.

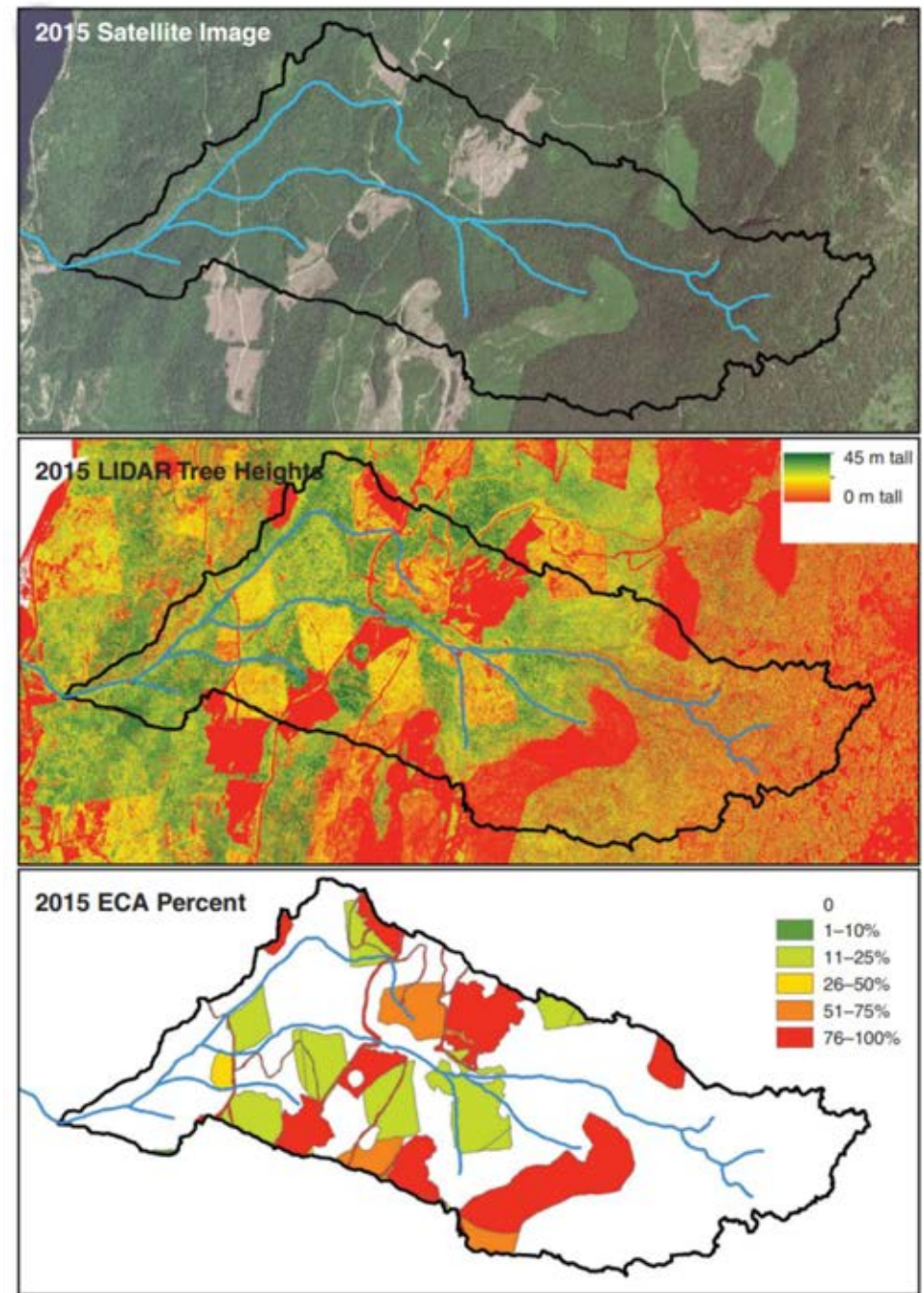
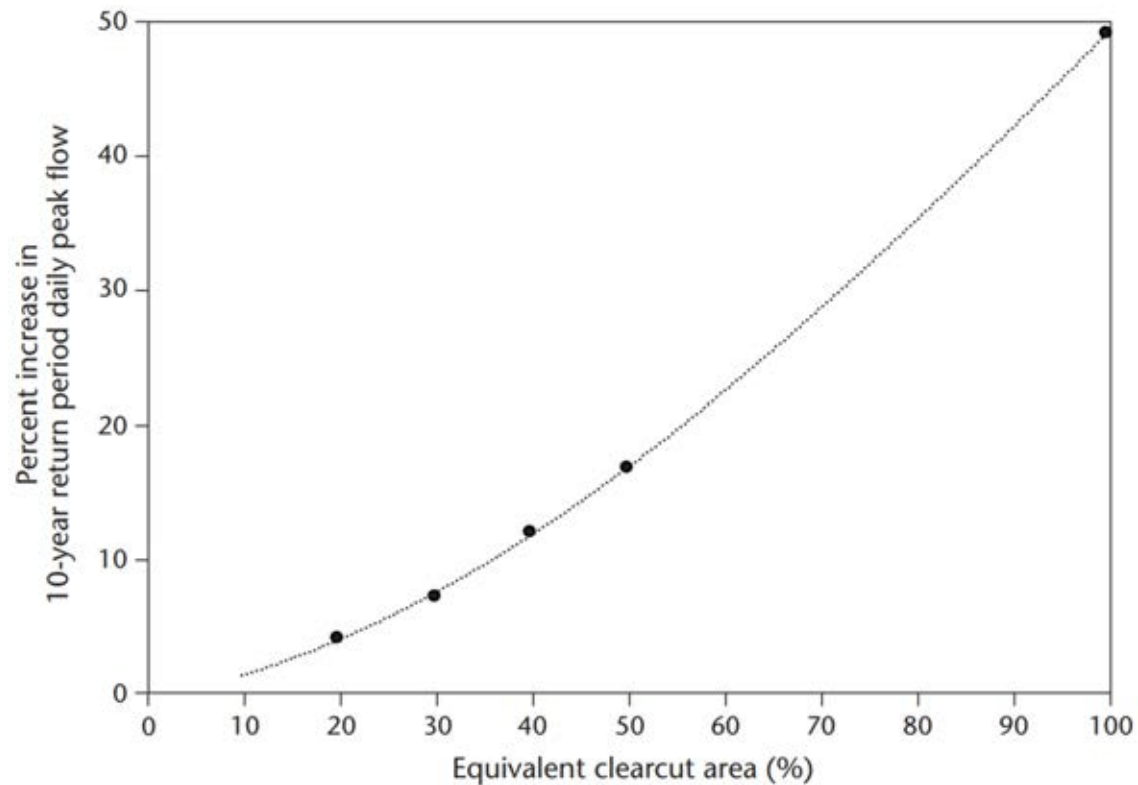
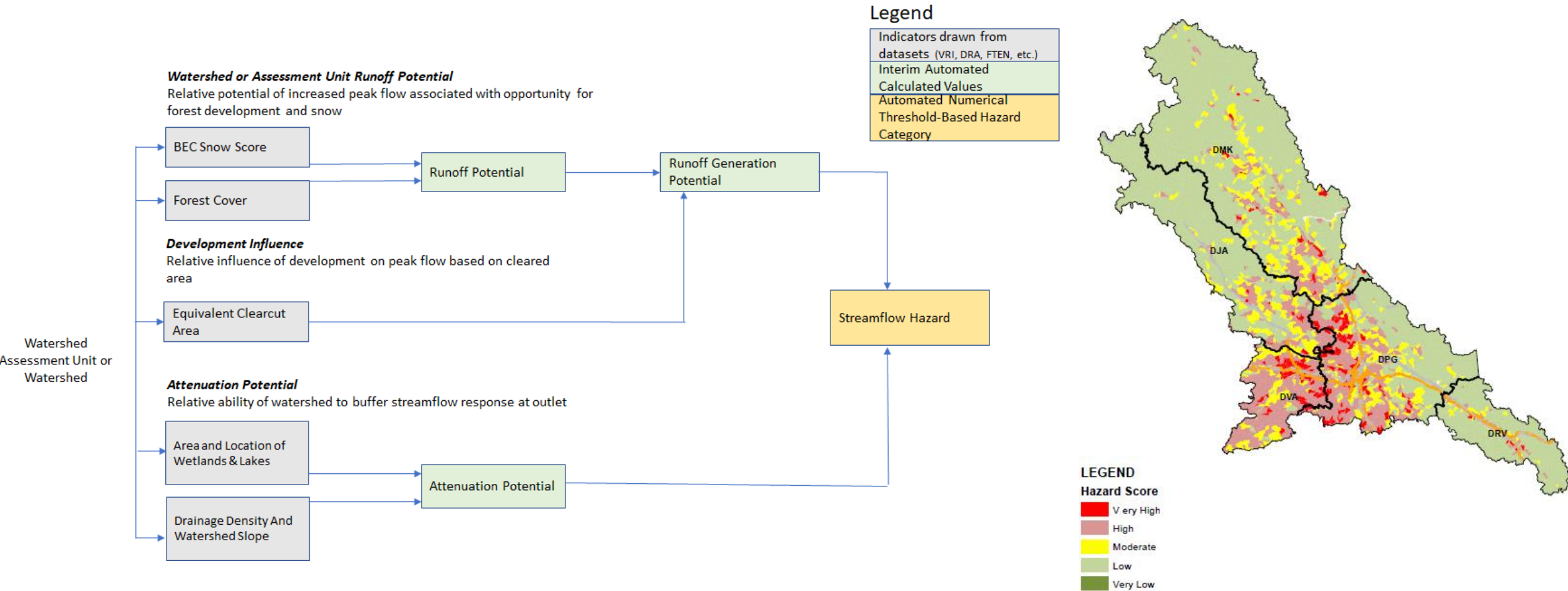


FIGURE 1 A typical southern interior watershed over which equivalent clearcut area has been determined for each cutblock and disturbance.



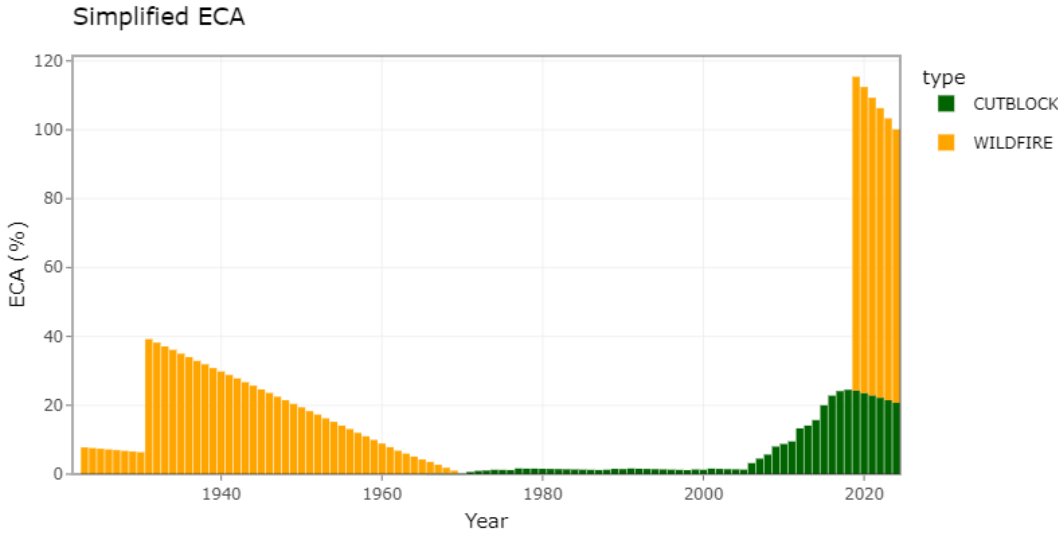
# Watershed Health Omineca Project

(John Rex)





# watershedBC





# Physical Watershed Modelling

## Hydrological Modelling as an Improvement on ECA-Based Methods for Informing Risk-Based Forest Management

Matthew Chernos, MacDonal Hydrology Consultants Ltd.

Kim Green, Selkirk College

Ryan MacDonald, MacDonal Hydrology Consultants Ltd.

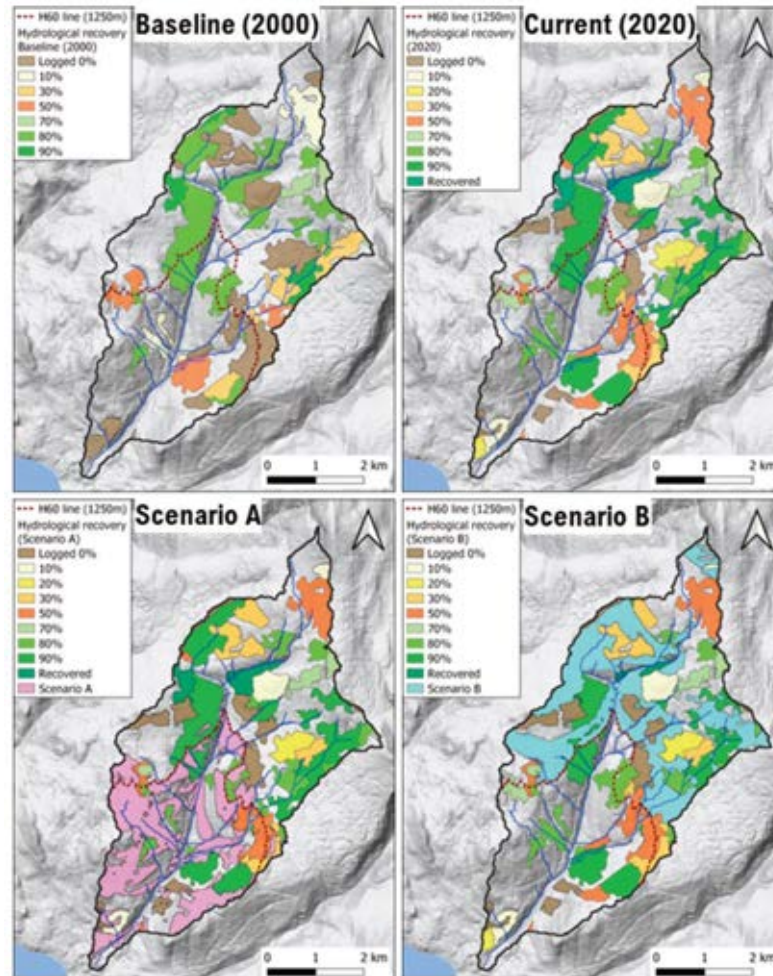


Figure 5. Graphical representation of hydrological recovery in Little Cayuse Creek for the land cover conditions investigated in this study.

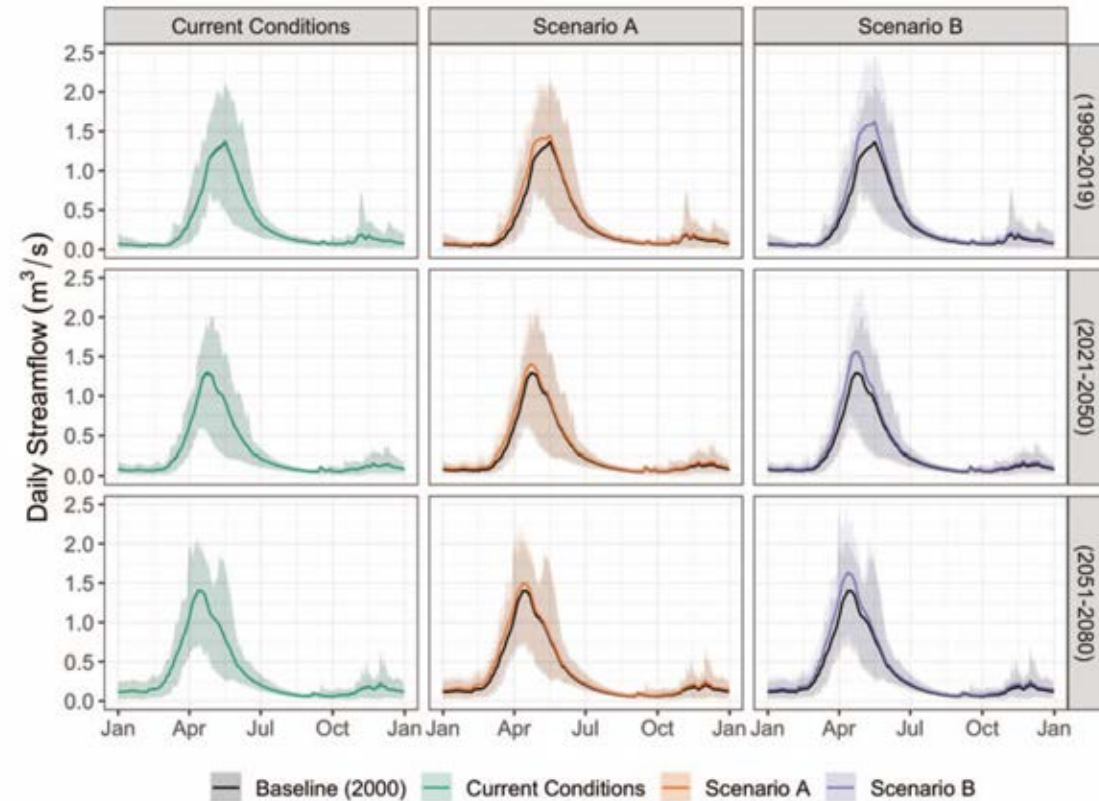
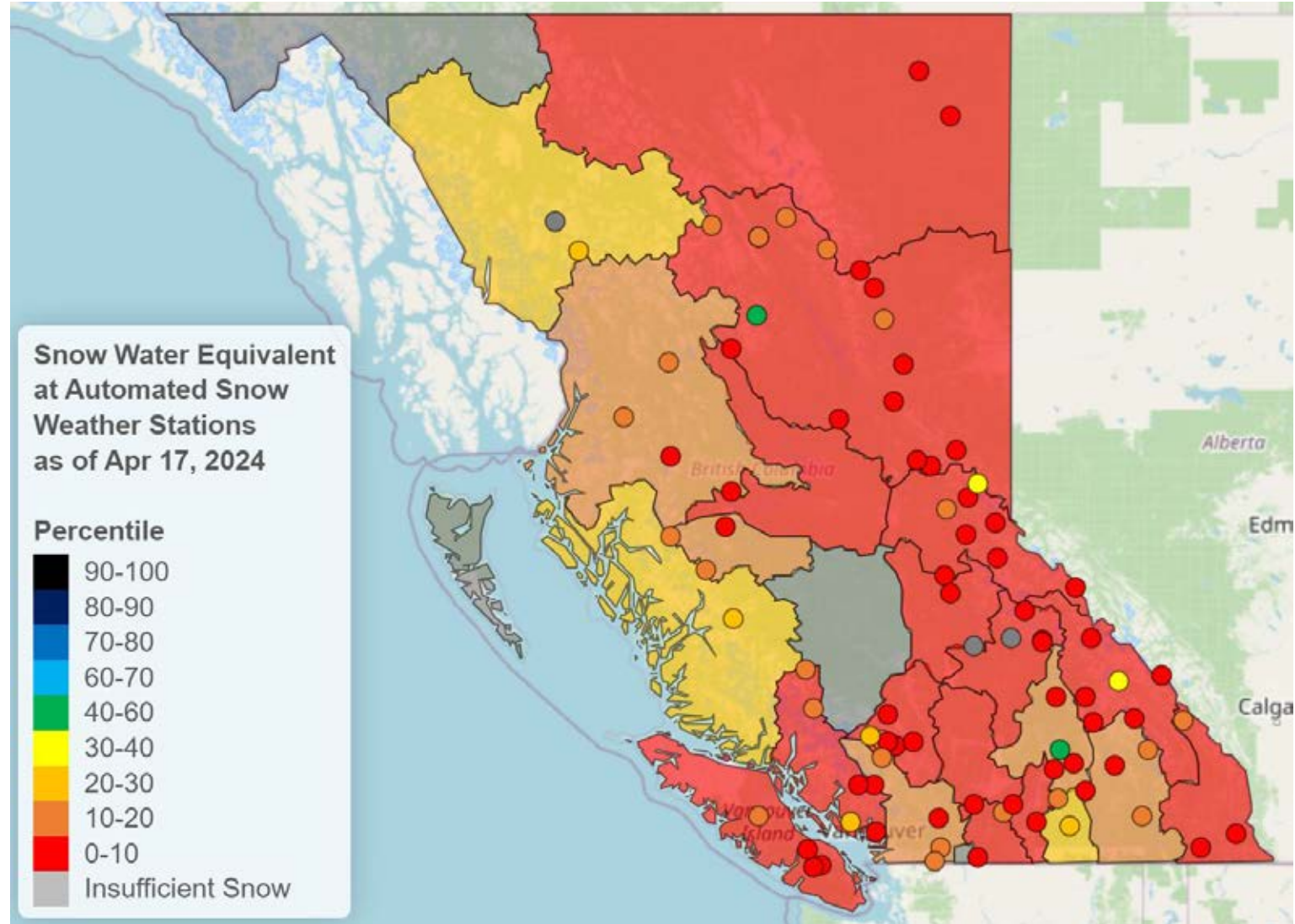


Figure 8. Mean daily streamflow in Little Cayuse Creek under all land cover scenarios and historical and future periods.



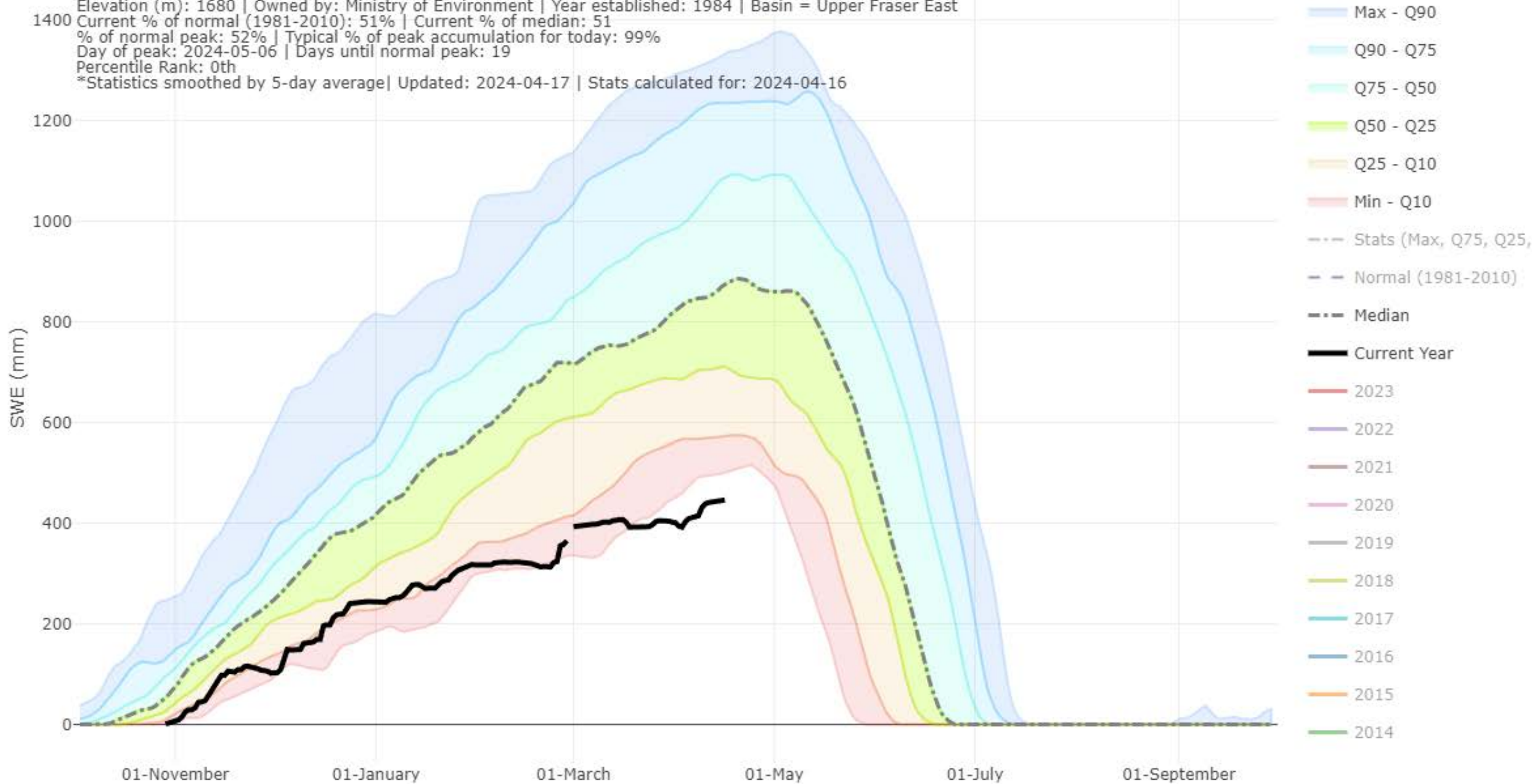
# Current Conditions





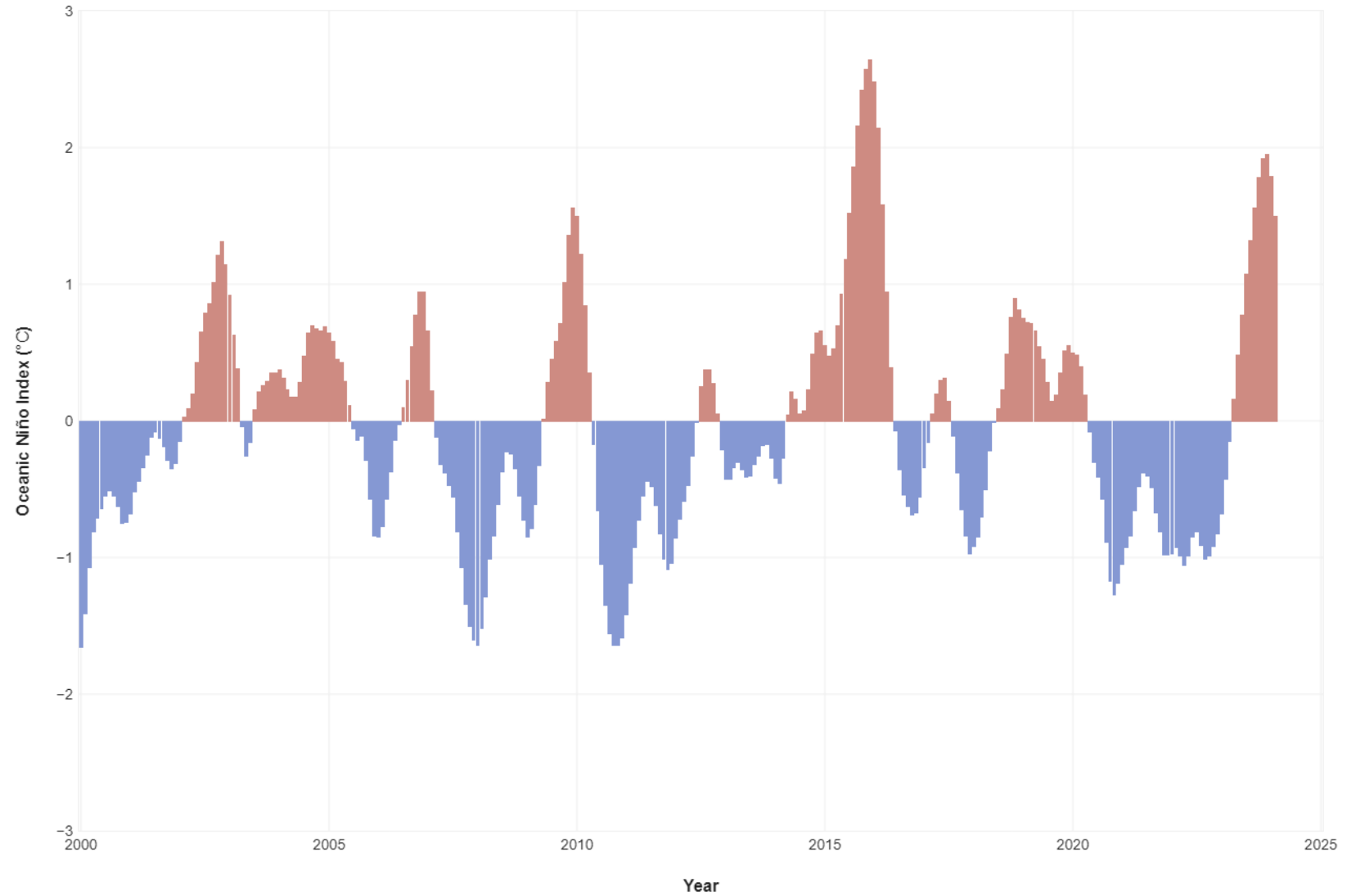
# SWE (mm) for Revolution Creek, 1A17P

Elevation (m): 1680 | Owned by: Ministry of Environment | Year established: 1984 | Basin = Upper Fraser East  
 Current % of normal (1981-2010): 51% | Current % of median: 51  
 % of normal peak: 52% | Typical % of peak accumulation for today: 99%  
 Day of peak: 2024-05-06 | Days until normal peak: 19  
 Percentile Rank: 0th  
 \*Statistics smoothed by 5-day average | Updated: 2024-04-17 | Stats calculated for: 2024-04-16

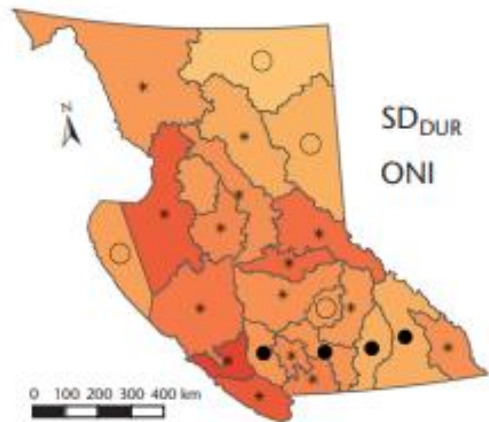




## OCEANIC NIÑO INDEX (ONI)

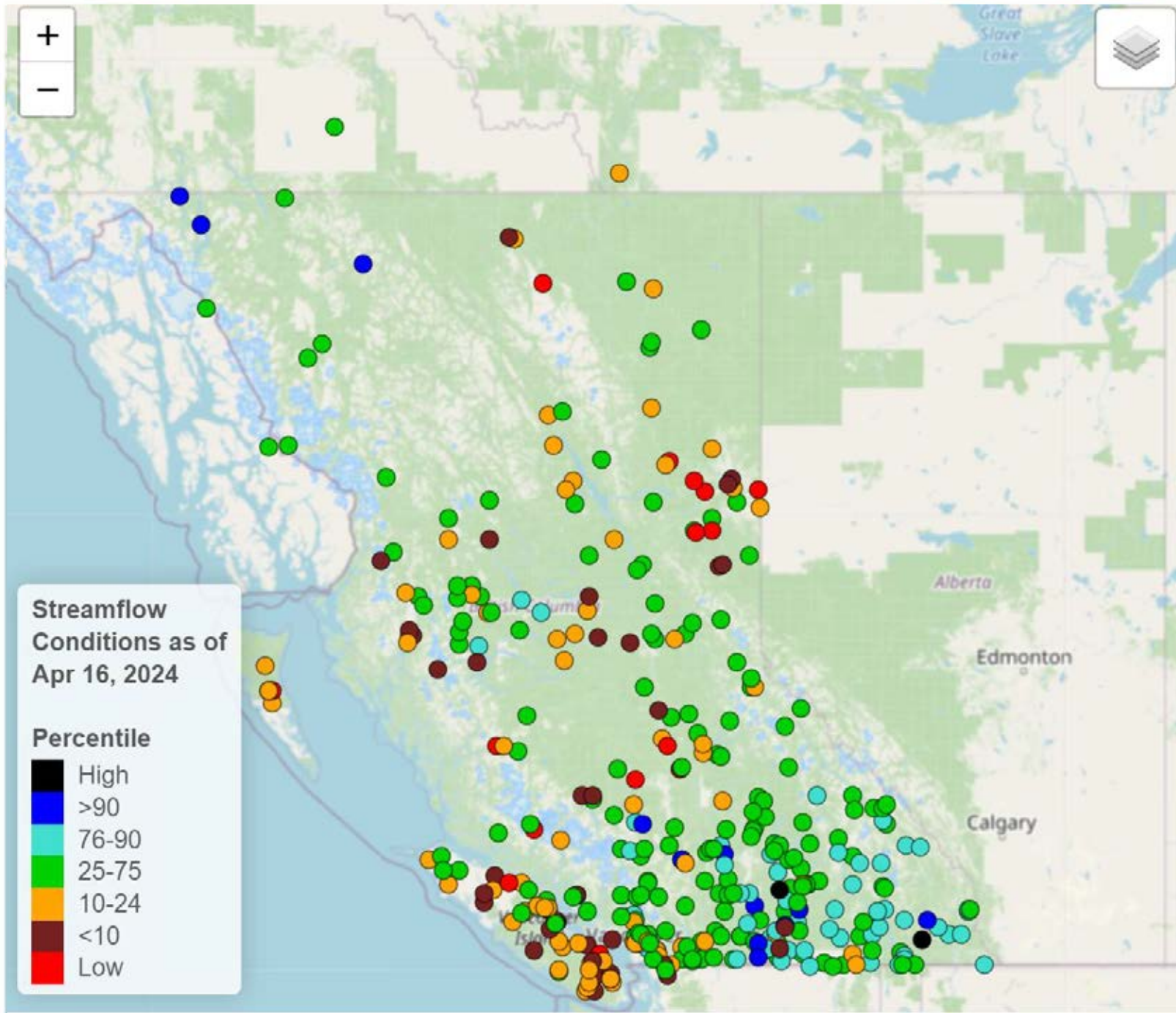


<https://www.climate.gov/news-features/understanding-climate/climate-variability-oceanic-nino-index>



BC Technical Report 129 (2020) Snow Cover Timing from Satellite Imagery Opportunities for Near-real-time Mapping and Seasonal Forecasting

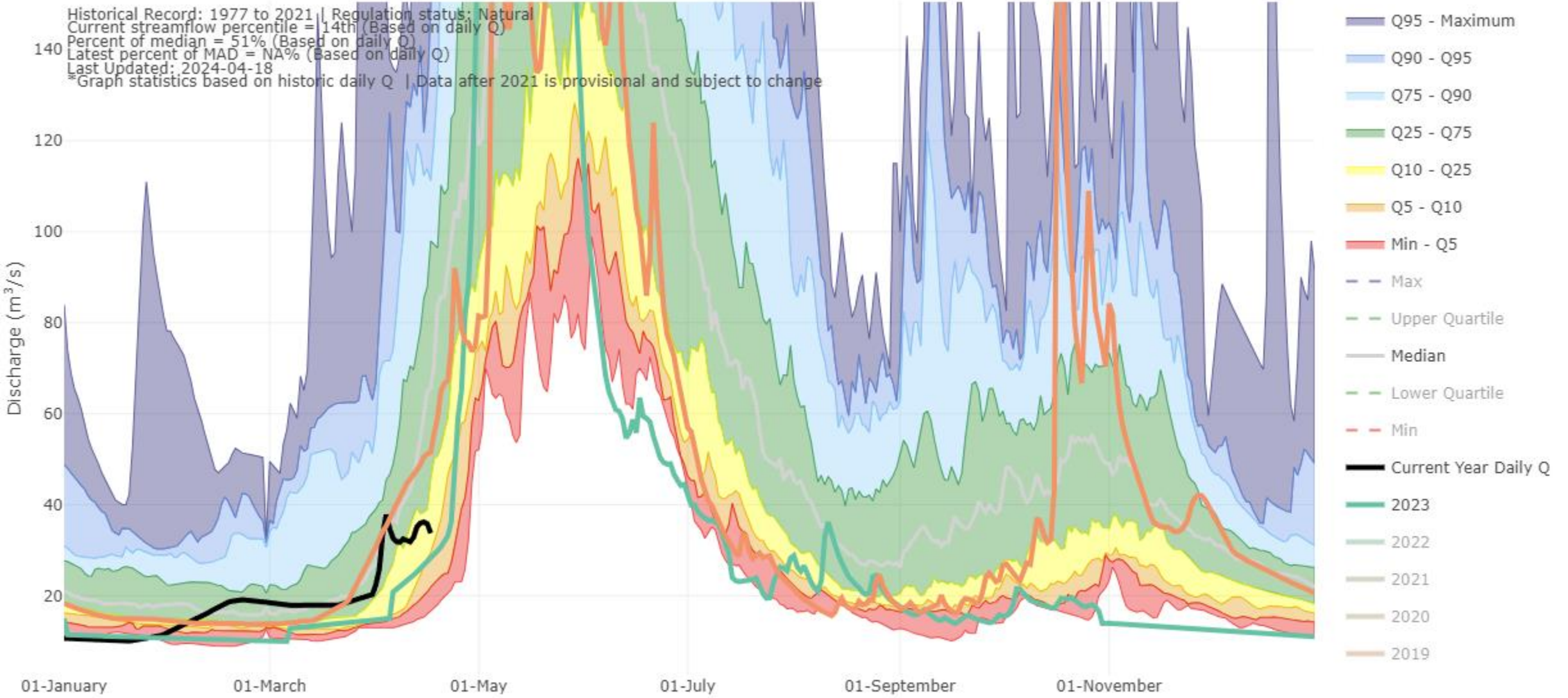






# Daily Streamflow for 08KD007 BOWRON RIVER BELOW BOX CANYON

Historical Record: 1977 to 2021 | Regulation status: Natural  
 Current streamflow percentile = 14th (Based on daily Q)  
 Percent of median = 51% (Based on daily Q)  
 Latest percent of MAD = NA% (Based on daily Q)  
 Last Updated: 2024-04-18  
 Graph statistics based on historic daily Q | Data after 2021 is provisional and subject to change



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# Closing remarks

- Hard to monitor pre/post wildfire conditions. Often need to compare between sites and over time.
- Simple watershed indicators are very helpful for general watershed conditions.
- Physical modelling is needed to better estimate future conditions (climate and land cover change, etc.)
- Real-time tools becoming much more powerful, and useful.

