



**fRI** *Research*  
Informing Land & Resource Management

# A collaborative approach to modeling stream temperature along Alberta's Eastern Slopes

Claire Allore, Benjamin C. Kissinger, Ryan MacDonald, Devin Cairns, Sam Chevalier, Lisa Schaubel, Neil Mochnacz

September 18, 2024

Alberta Lake Management Society



**fRI** *Research*  
Informing Land & Resource Management

# Land Acknowledgment





# Acknowledgments

- Dr. Barry White
- Dan Teleki
- Various agencies for data submissions

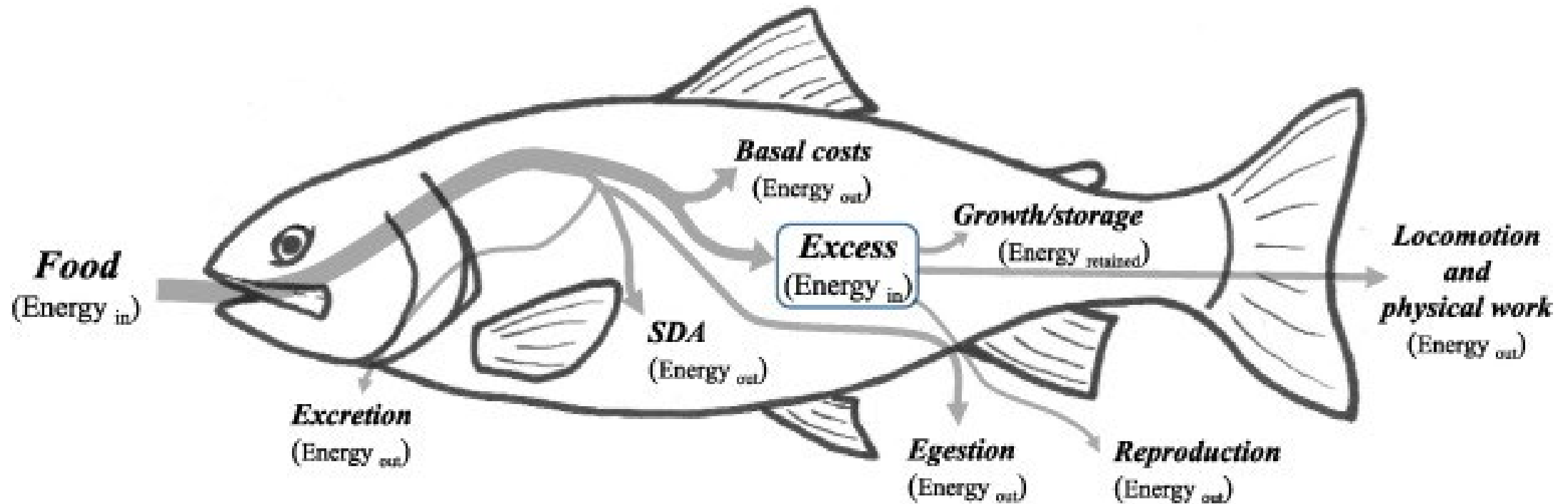
## Funding

- DFO HSP grant
- FRIAA (two grants sponsored by West Fraser, Canfor, and Weyerhaeuser)
- Nature Legacy through AEPA Native Trout Collaborative



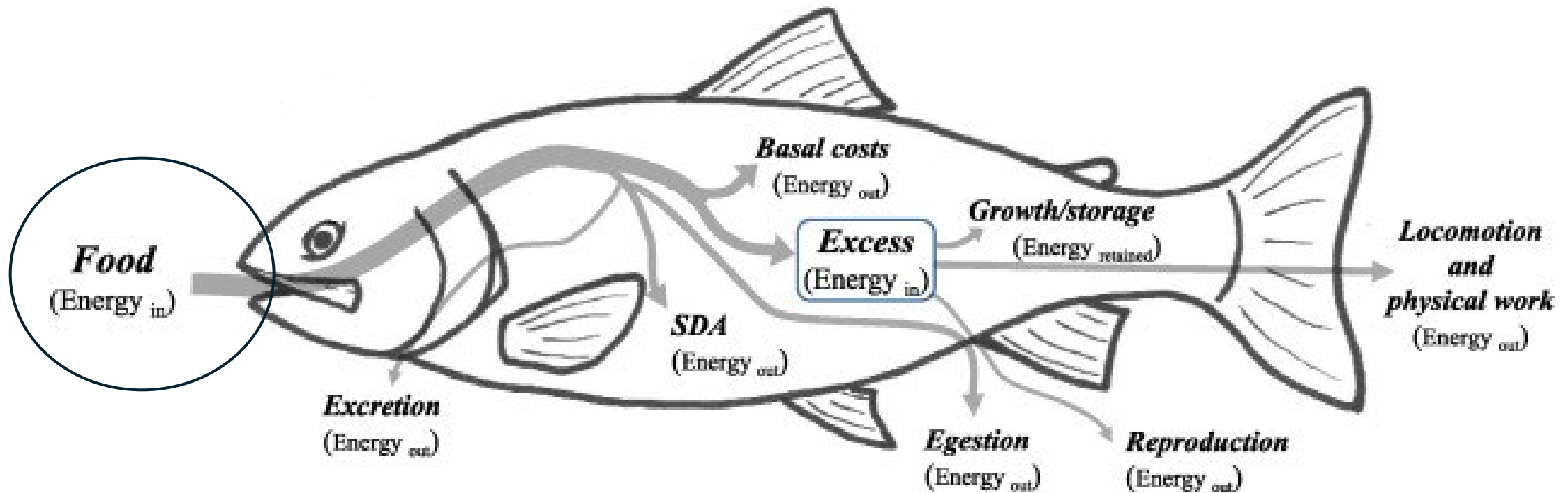
| **fRI** *Research*

# Why is water temperature important?



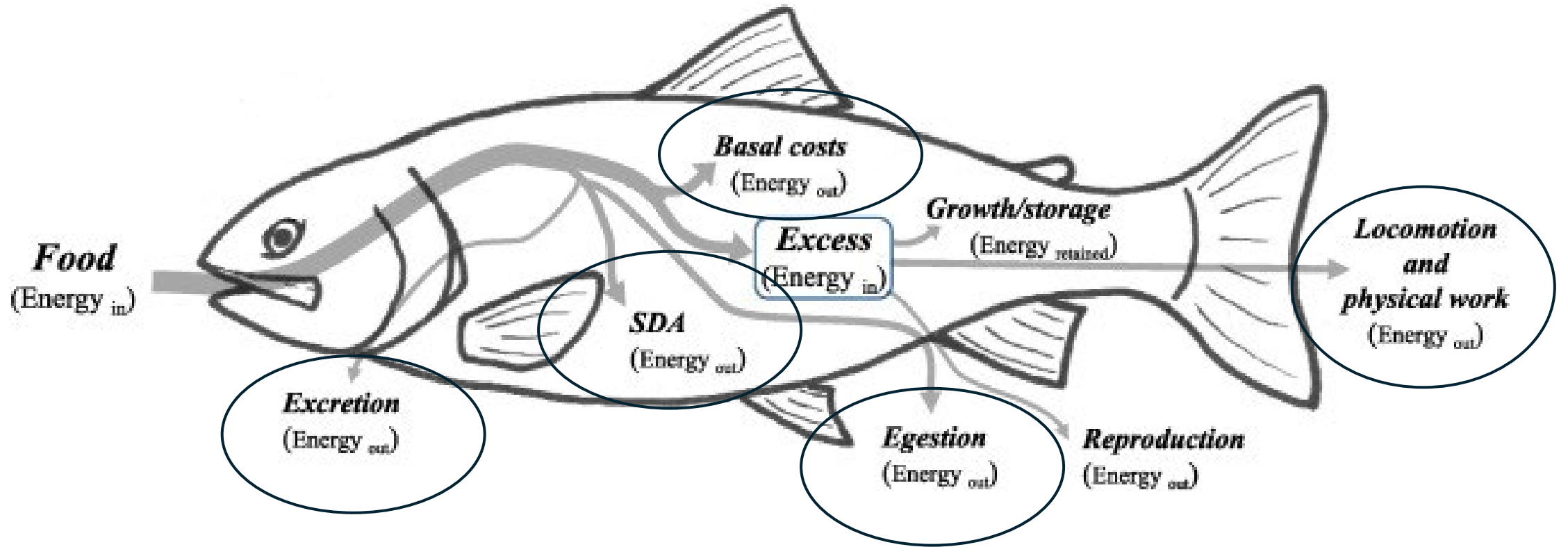
fRI Research

# Why is water temperature important?

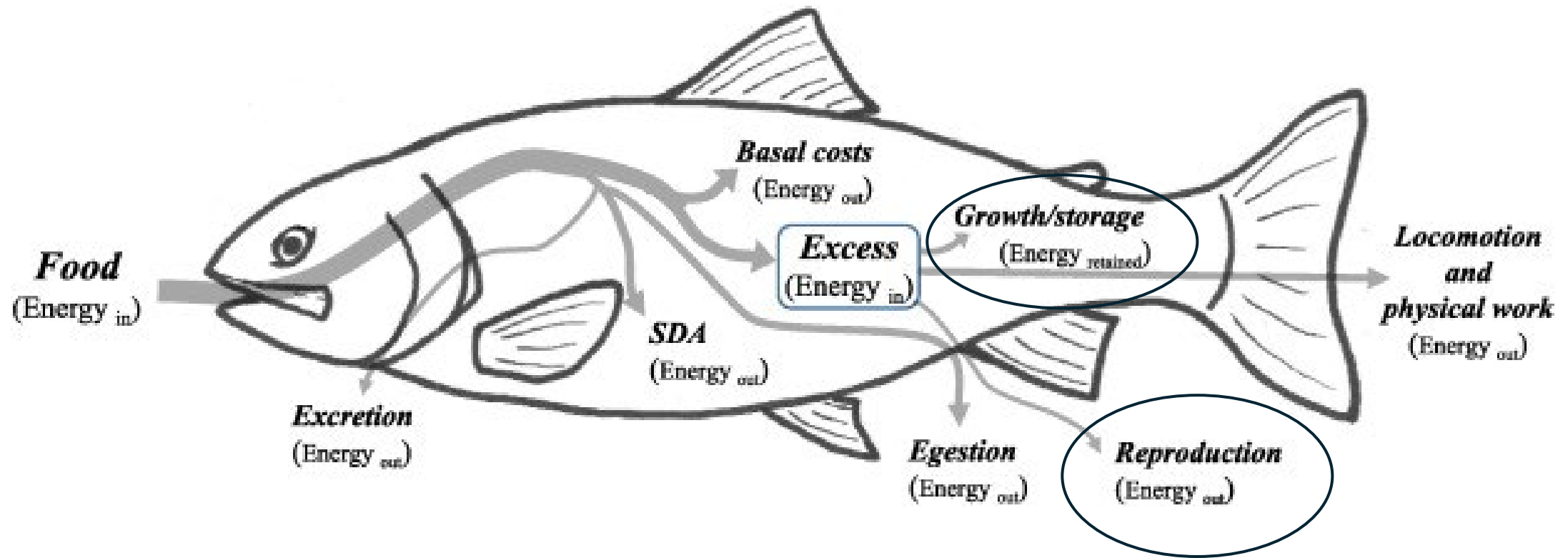


fRI Research

# Why is water temperature important?

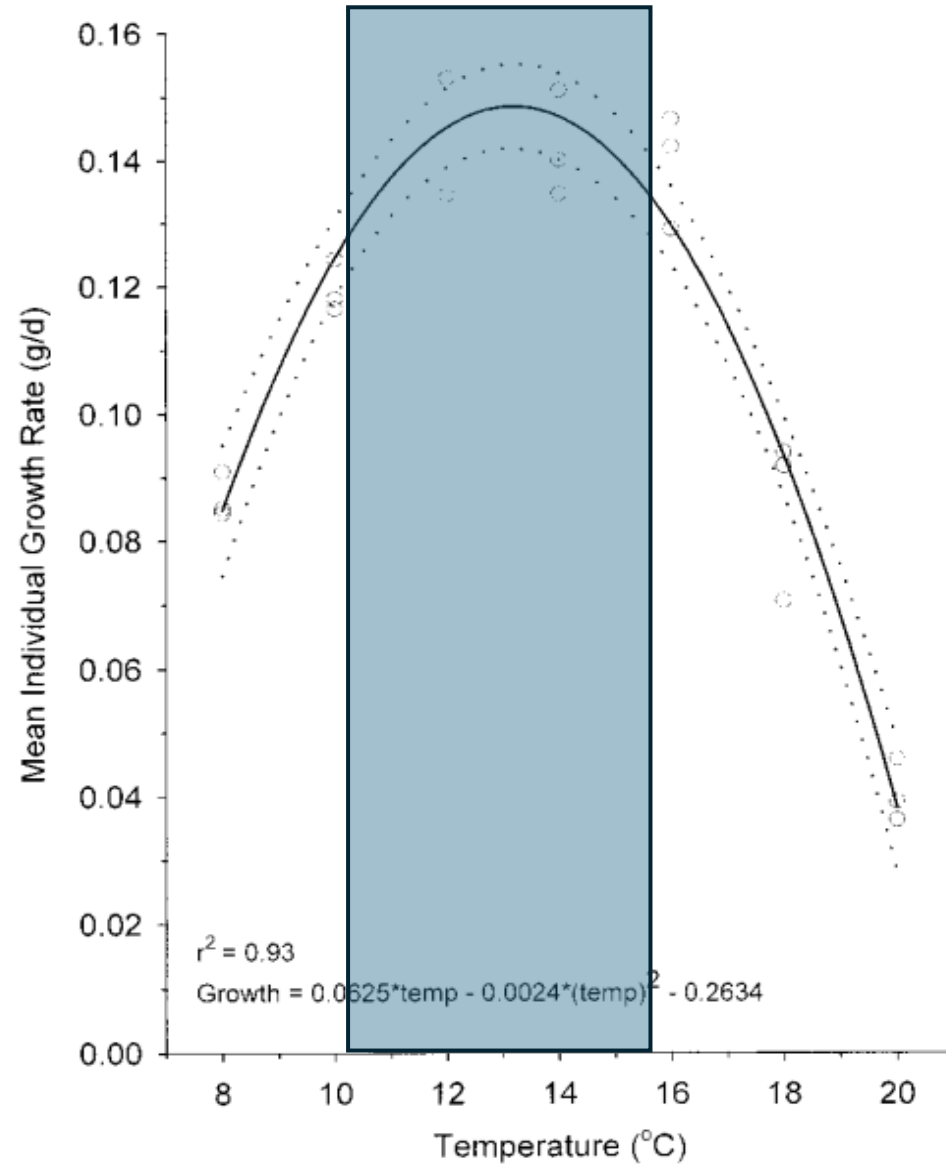


# Why is water temperature important?



fRI Research

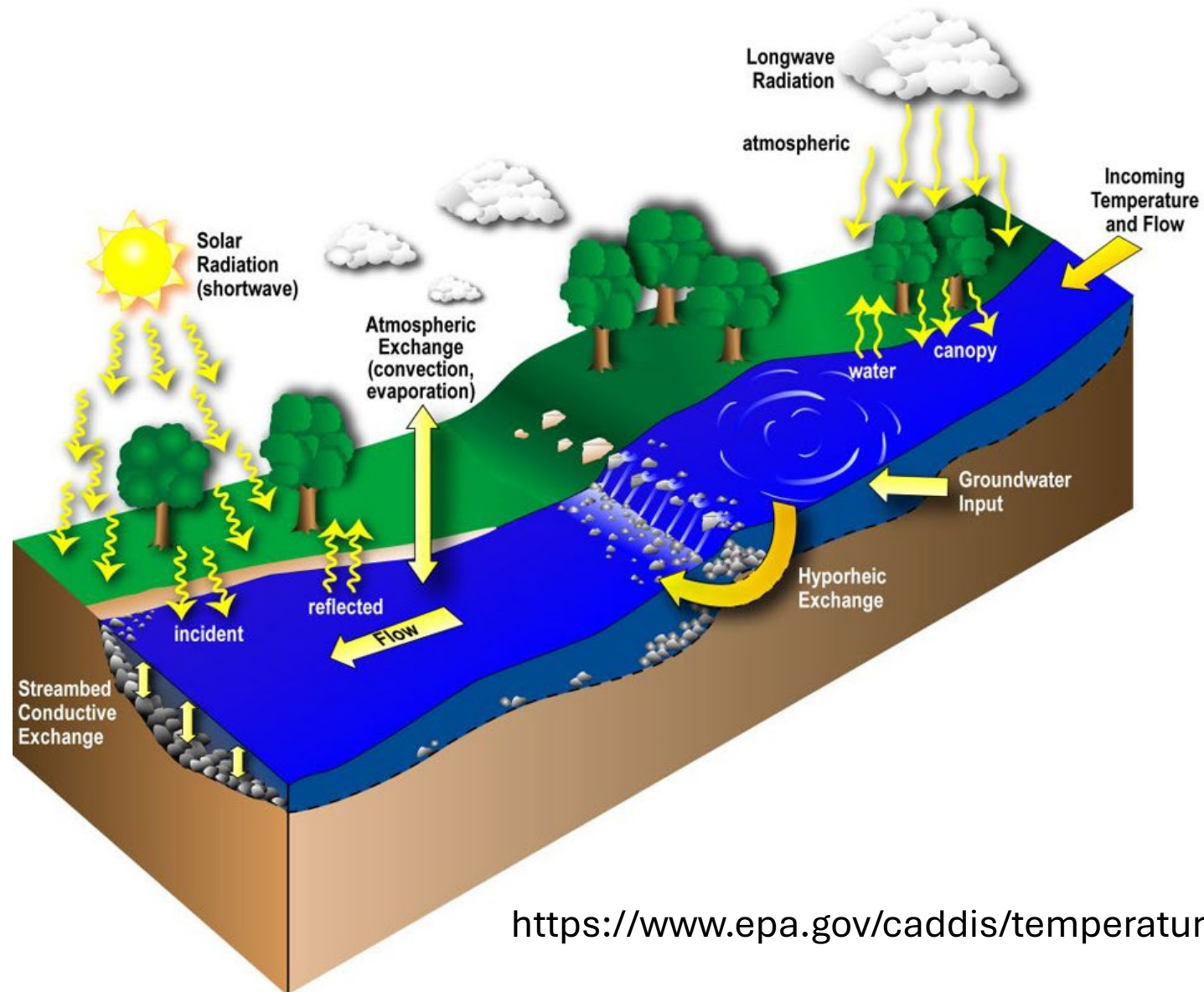
# Why is water temperature important?



fRI Research



# What influences water temperature?



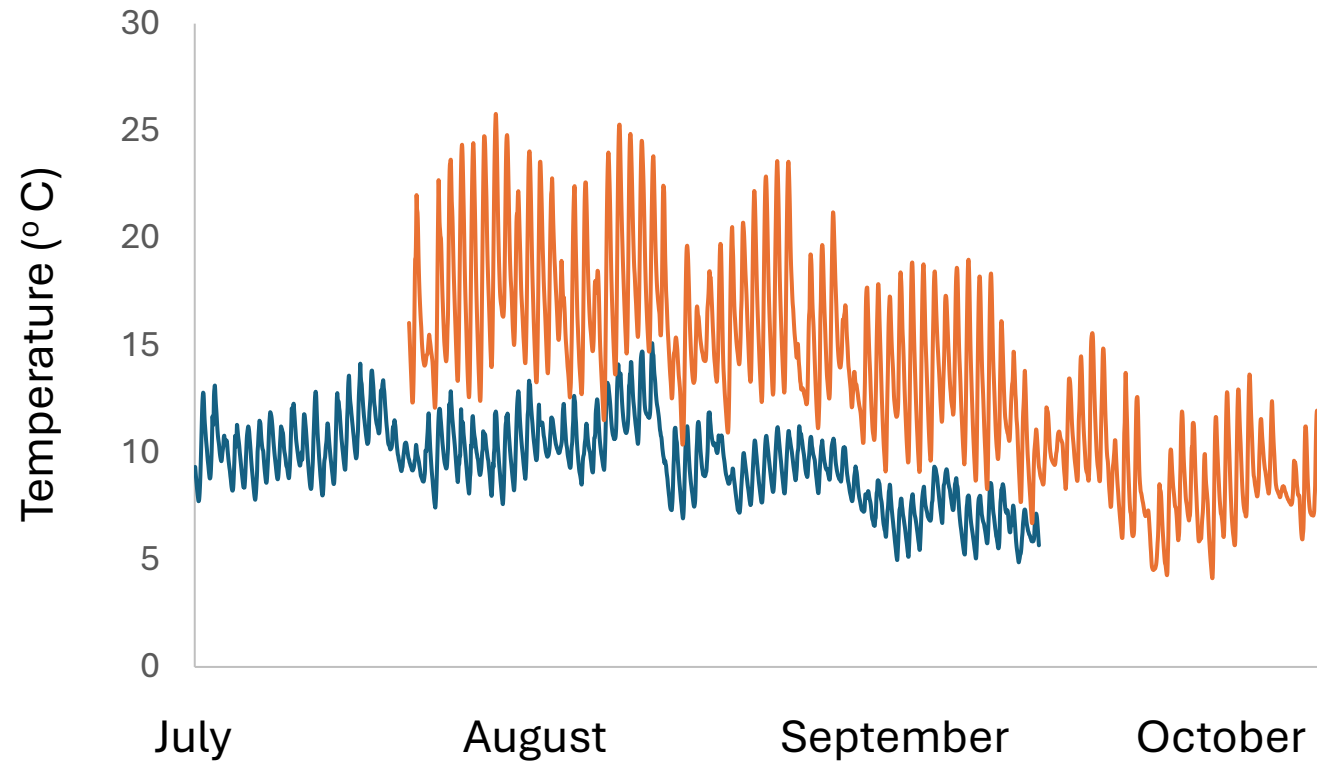
Athabasca glacier



fRI Research

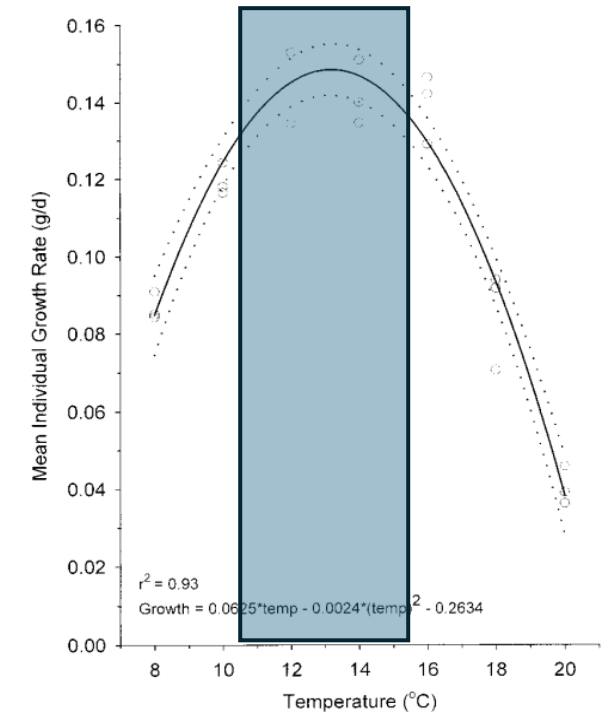
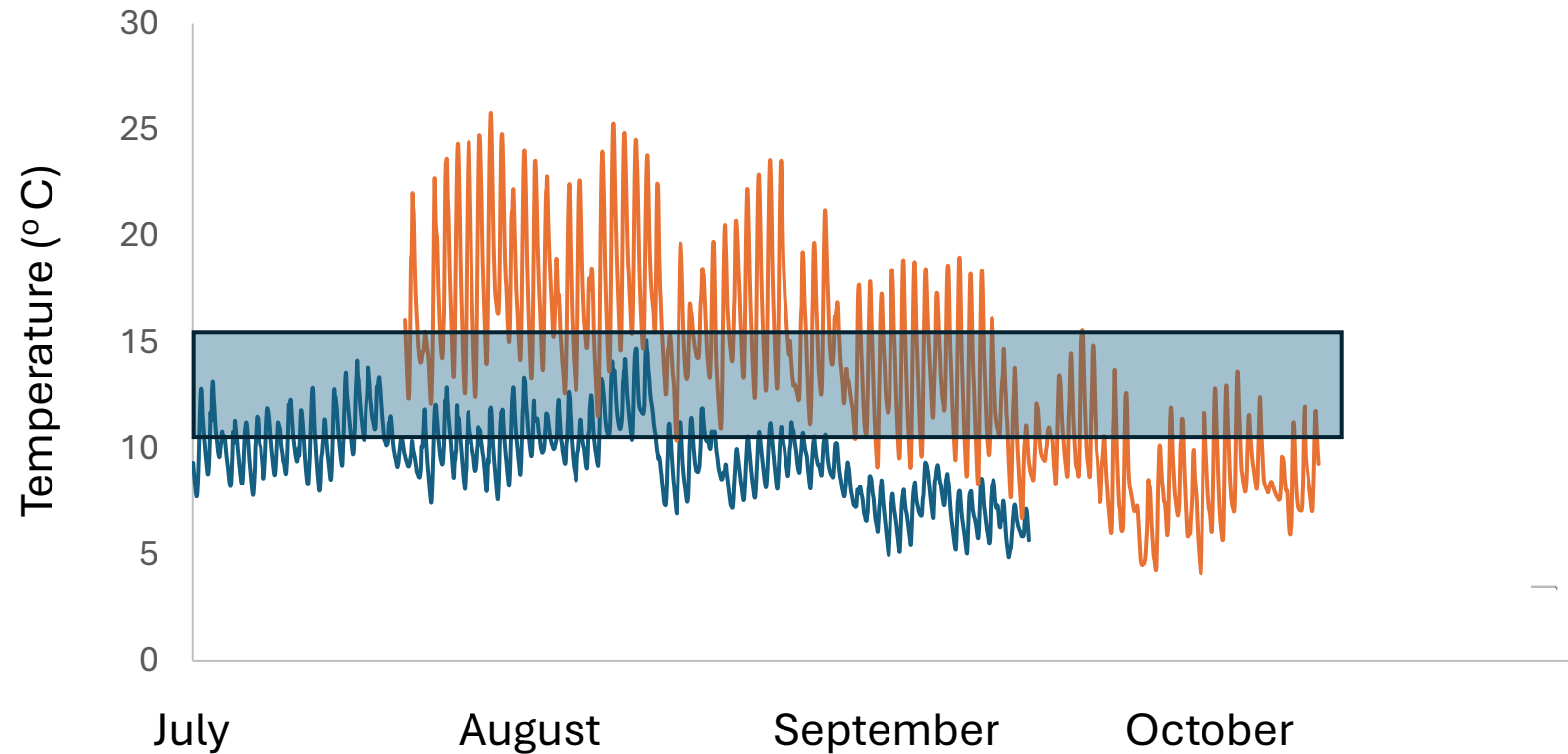
<https://www.epa.gov/caddis/temperature>

# What influences water temperature?



fRI Research

# What influences water temperature?

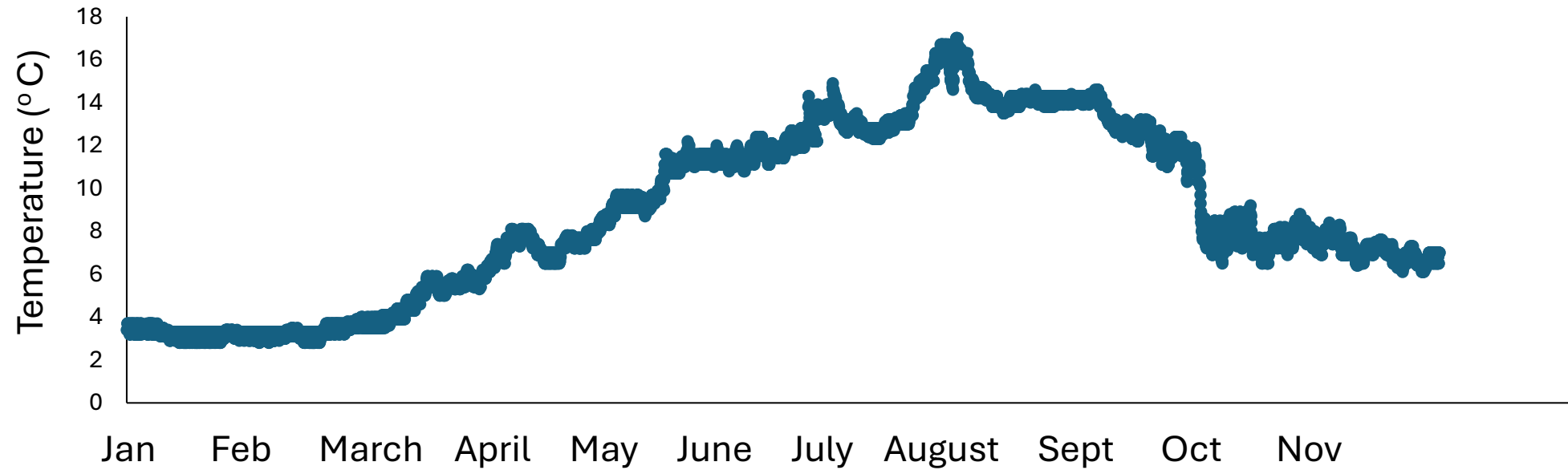


Selong et al. 2001

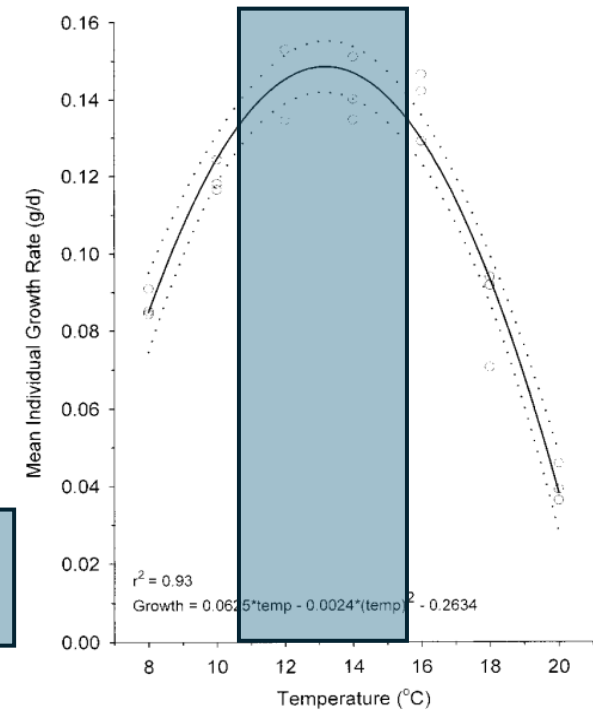
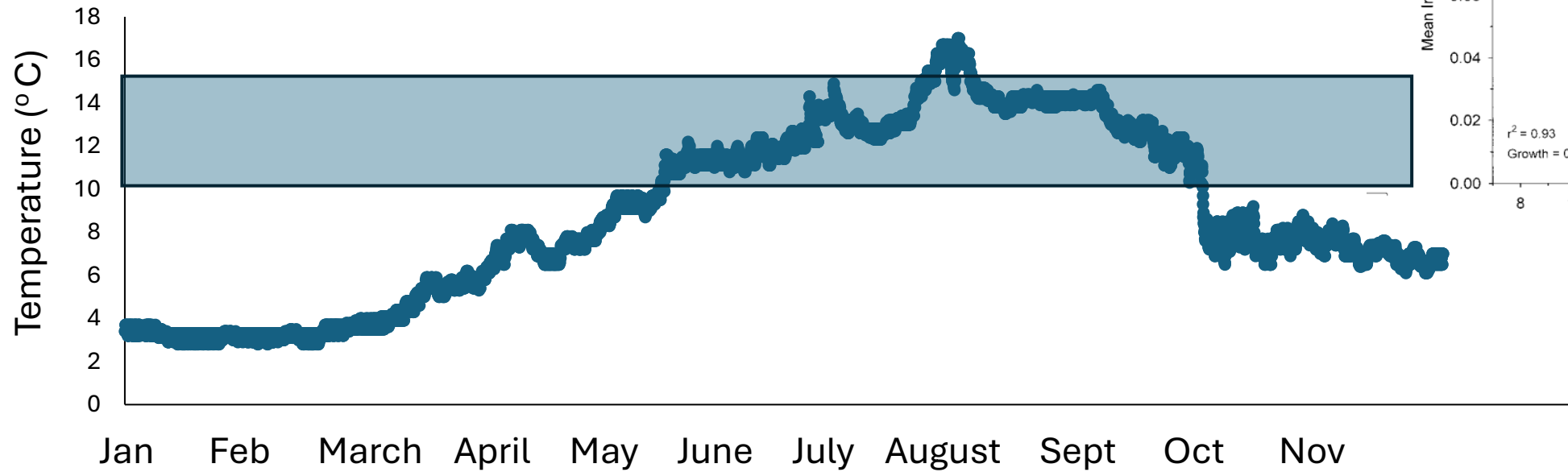


FRI Research

# What influences water temperature?



# What influences water temperature?

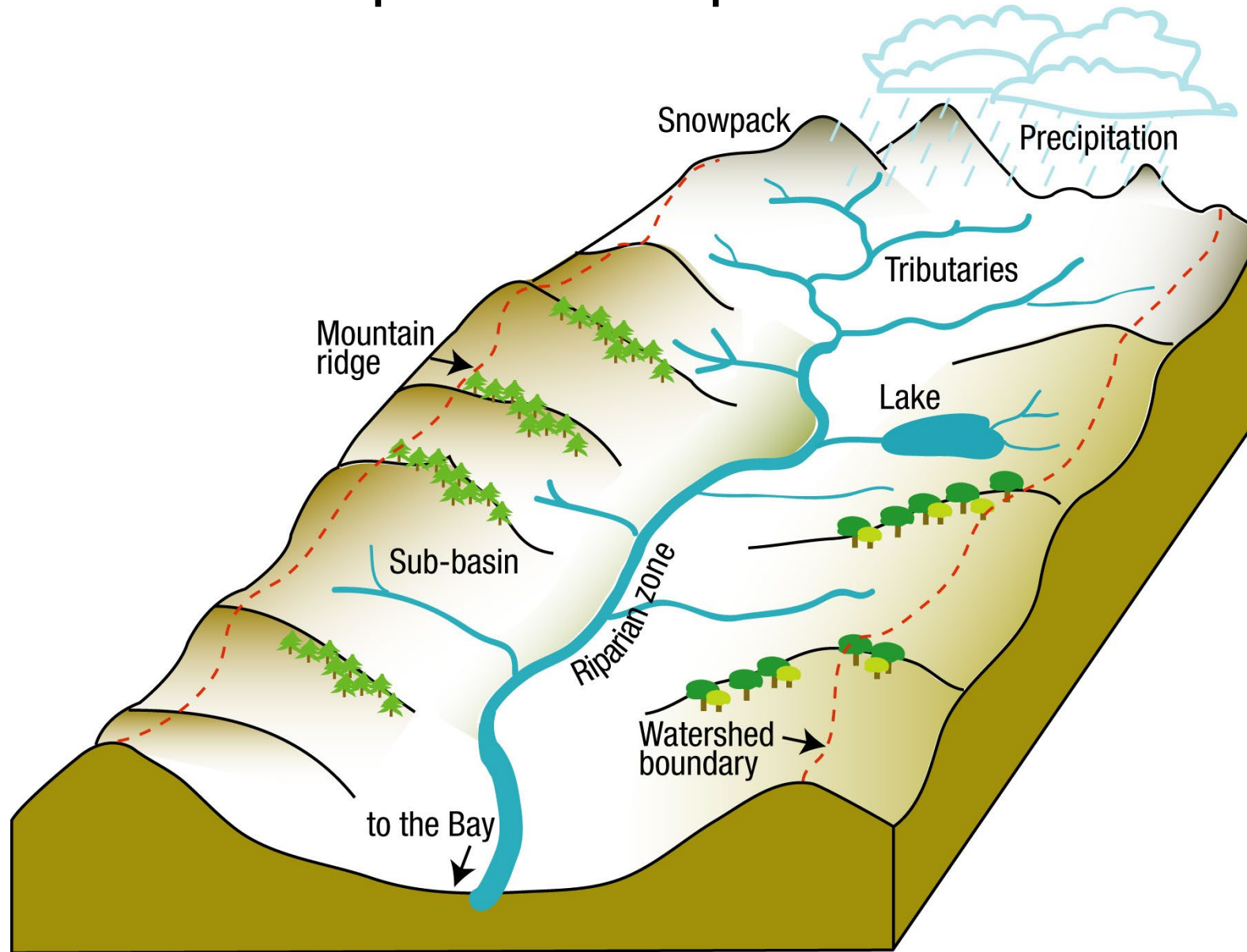


Selong et al. 2001

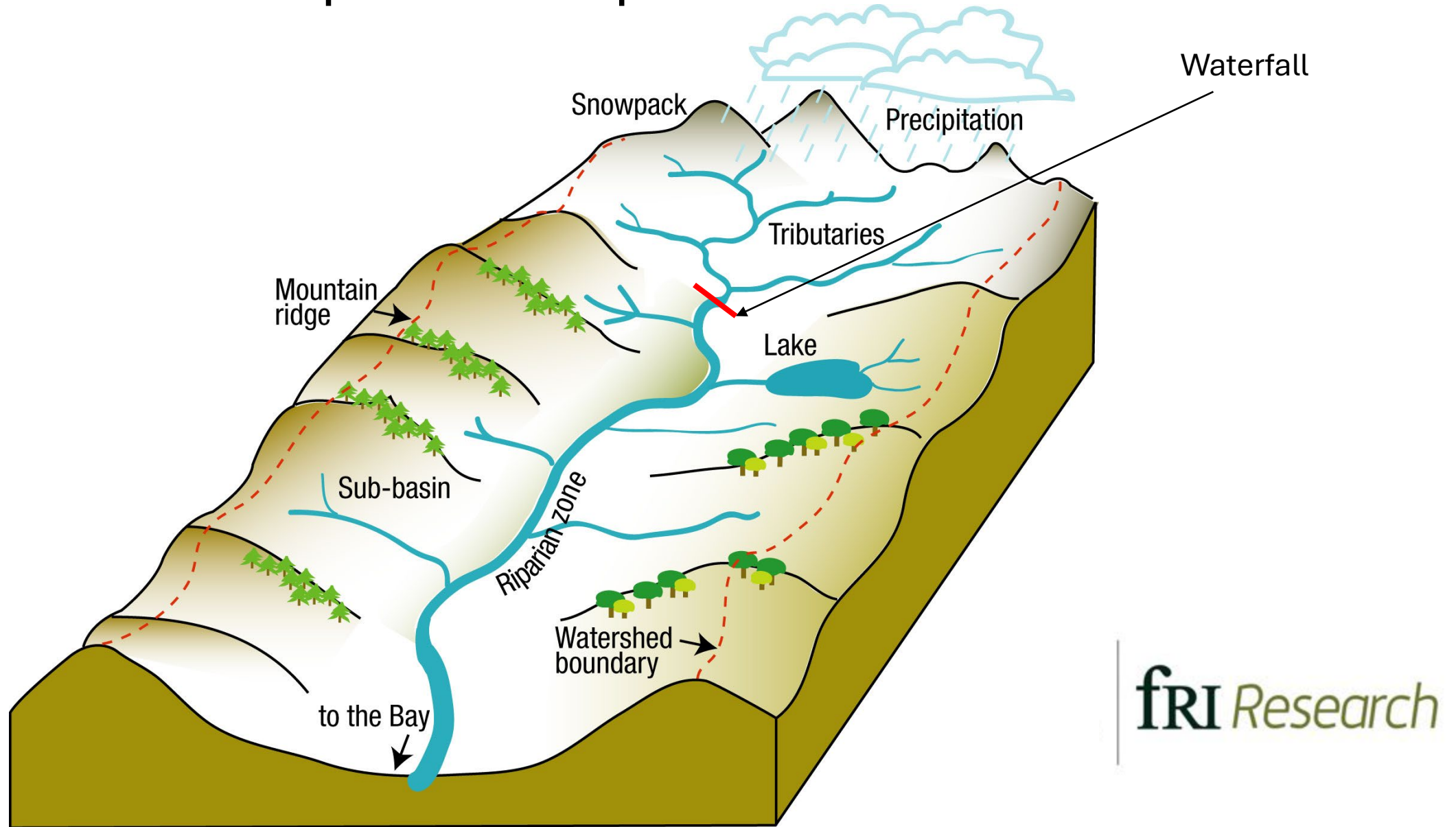


fRI Research

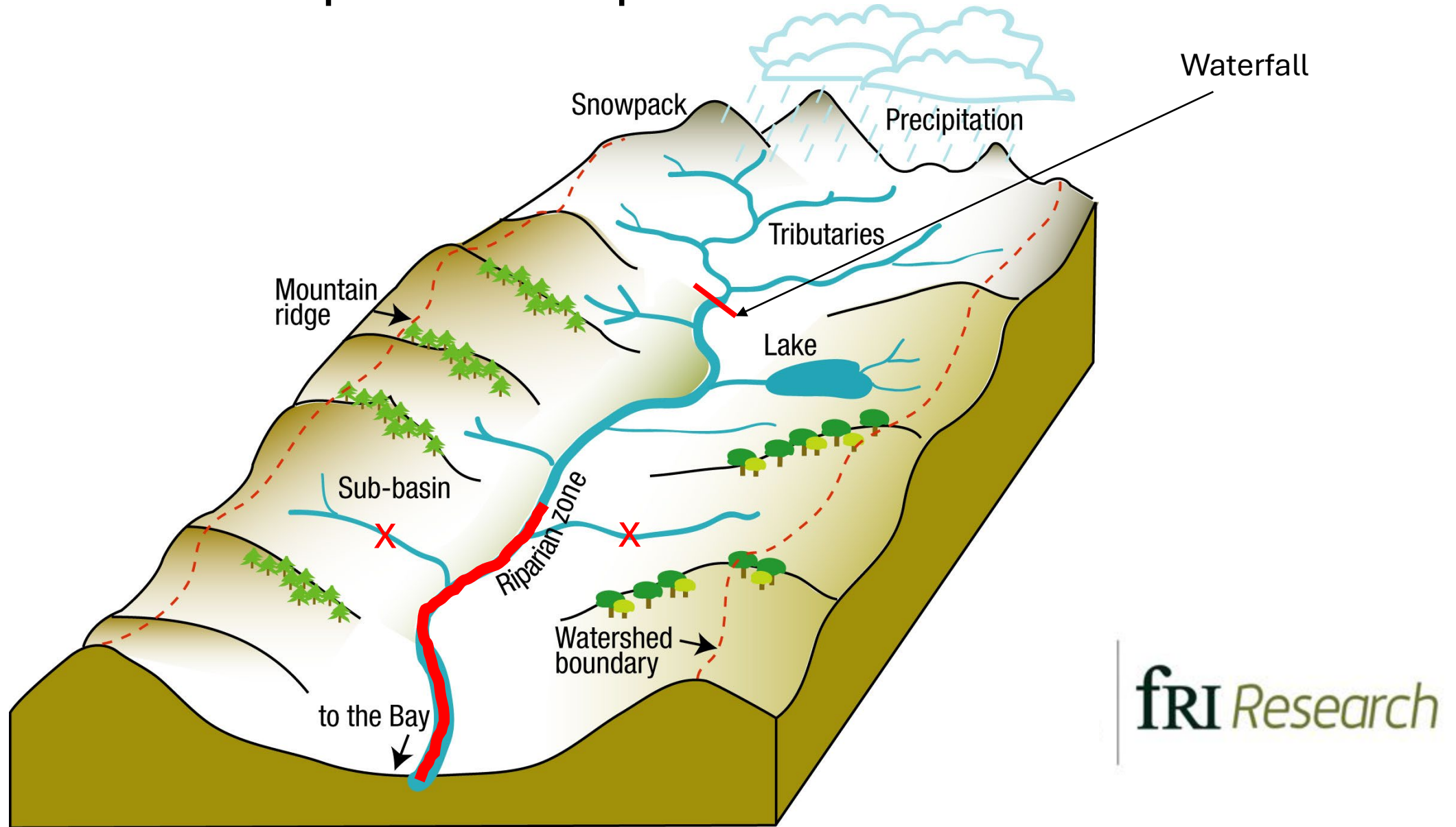
# Why is water temperature important?



# Why is water temperature important?



# Why is water temperature important?





# Why is water temperature important?

## Fisheries Manager questions

- Where is optimal habitat for cold water species (Athabasca rainbow trout, westslope cutthroat trout, bull trout)?
- Which watersheds have the most optimal habitat?
- Where is optimal habitat most likely to be lost?



| **fri** *Research*



# Rocky Mountain Research Station

## Water and Watersheds Research Program

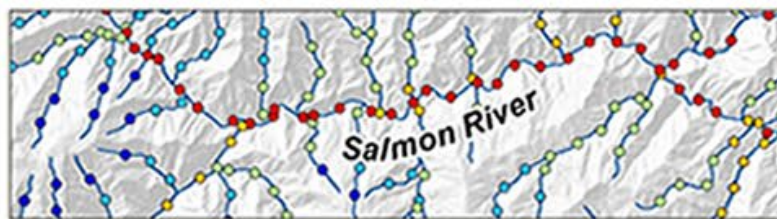
[ABOUT W&W](#)[RESEARCH](#) ▾[PROJECTS, TOOLS, & DATA](#) ▾[PUBLICATIONS](#) ▾[CONTACT US](#) ▾

GO

 search only W&W

# NorWeST

## Stream Temp



## Regional Database and Modeled Stream Temperatures

[HOME](#) ▶ [PROJECTS](#) ▶ [NORWEST](#)

The NorWeST webpage hosts stream temperature data and climate scenarios in a variety of user-friendly digital formats for streams and rivers across the western U.S. The temperature database was compiled from hundreds of biologists and hydrologists working for >100 resource agencies and contains >200,000,000 hourly temperature recordings at >20,000 unique stream sites. Those temperature data were used with [spatial statistical network models](#) to develop 36 historical and future climate scenarios at 1-kilometer resolution for >1,000,000 kilometers of stream.



Temperature data and model outputs, registered to [NHDPlus](#) stream lines, are posted to the website after QA/QC procedures and development of the final temperature model within a river basin (example [interactive temperature map](#)). It is hoped that open access to the data and the availability of accurate stream temperature scenarios will foster new research and collaborative relationships that enhance management and conservation of aquatic resources.

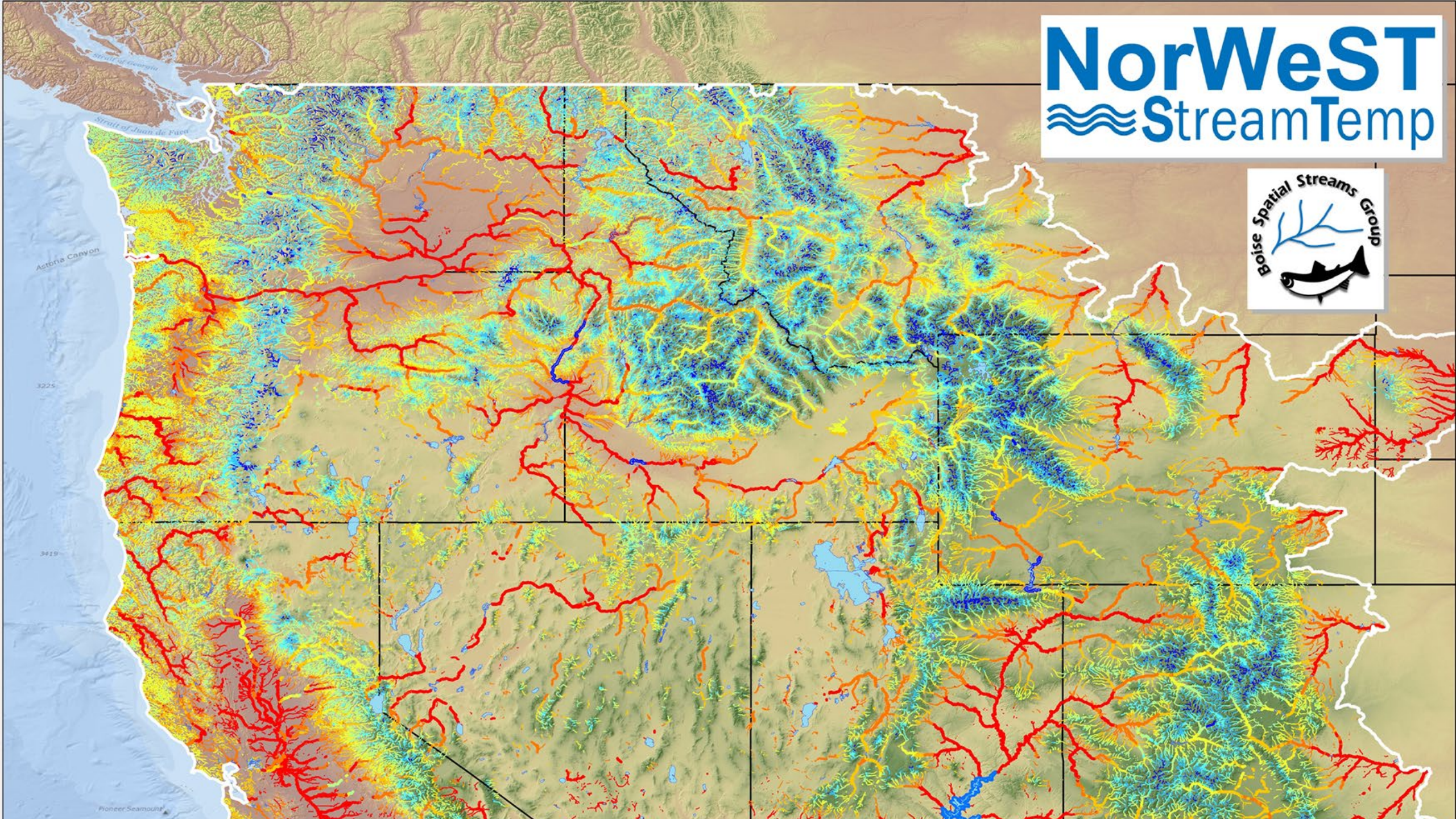
Funding for the project was provided by the [GNLCC](#) and [NPLCC](#) with additional funds and in-kind support from the USFS, USGS, USFWS, NFWF, California Fish Passage Forum, and NASA. [Original grant proposal](#).

These datasets can be viewed in ArcGIS Online ([line data](#); [point data](#)) or in the [interactive NorWeST viewer](#); they are also available from the [FSGeodata Clearinghouse](#), or for individual processing units [here](#).

Isaak, D., S. Wenger, E. Peterson, J. Ver Hoef, D. Nagel, C. Luce, S. Hostetler, J. Dunham, B. Roper, S. Wollrab, G.

# NorWeST

StreamTemp



# WE NEED TO COLLABORATE



Regional Database and Modeled Stream Temperatures



111 collaborators  
in the NorWeST  
program

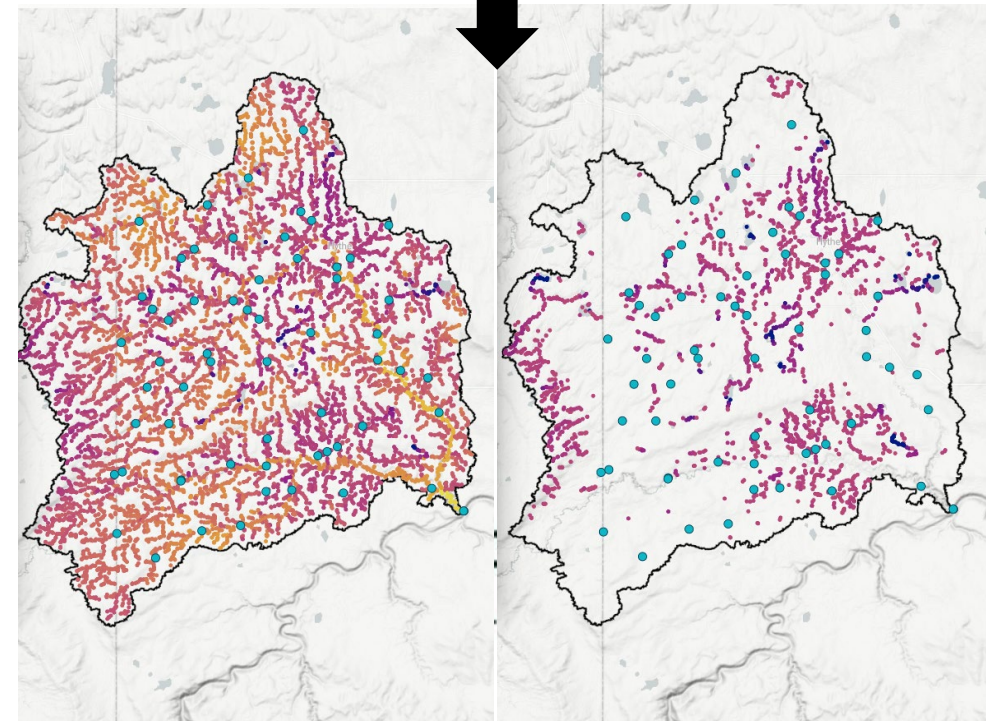
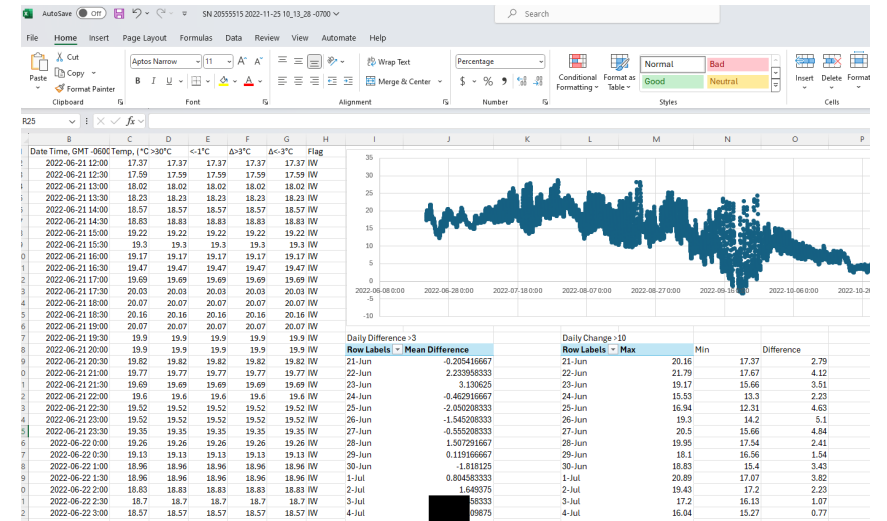


fRI Research



# Components

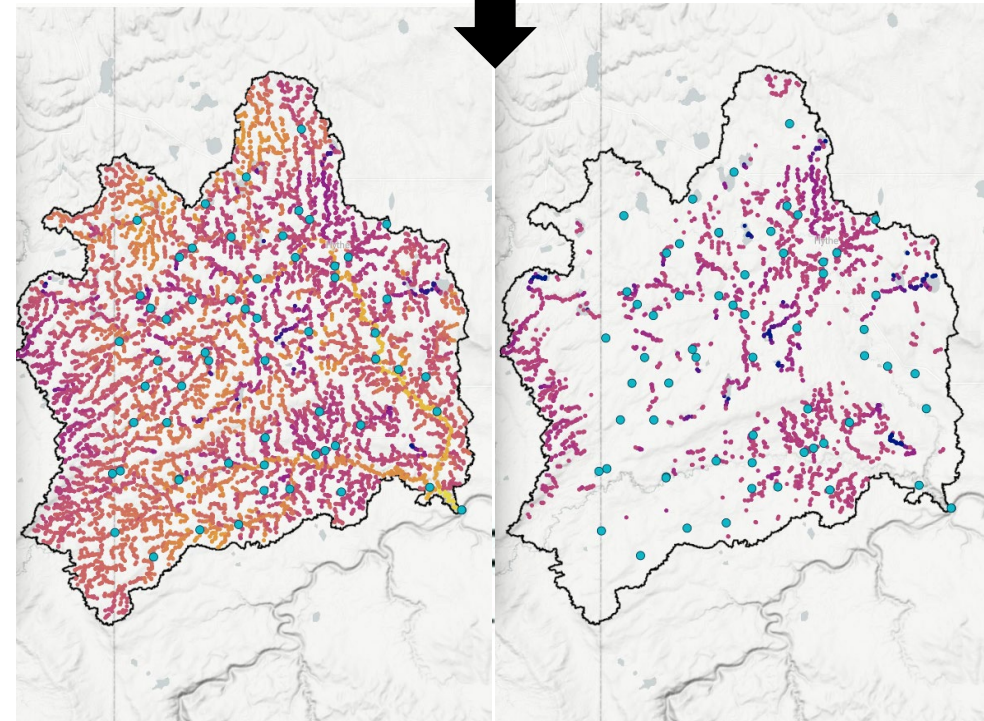
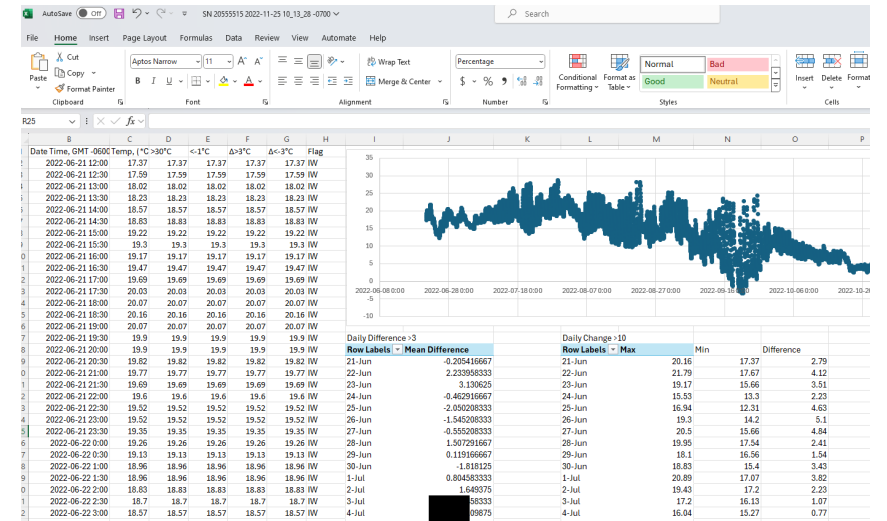
1. Data
2. Model





# Components

1. Data  
fRI Research
2. Model  
MacHydro

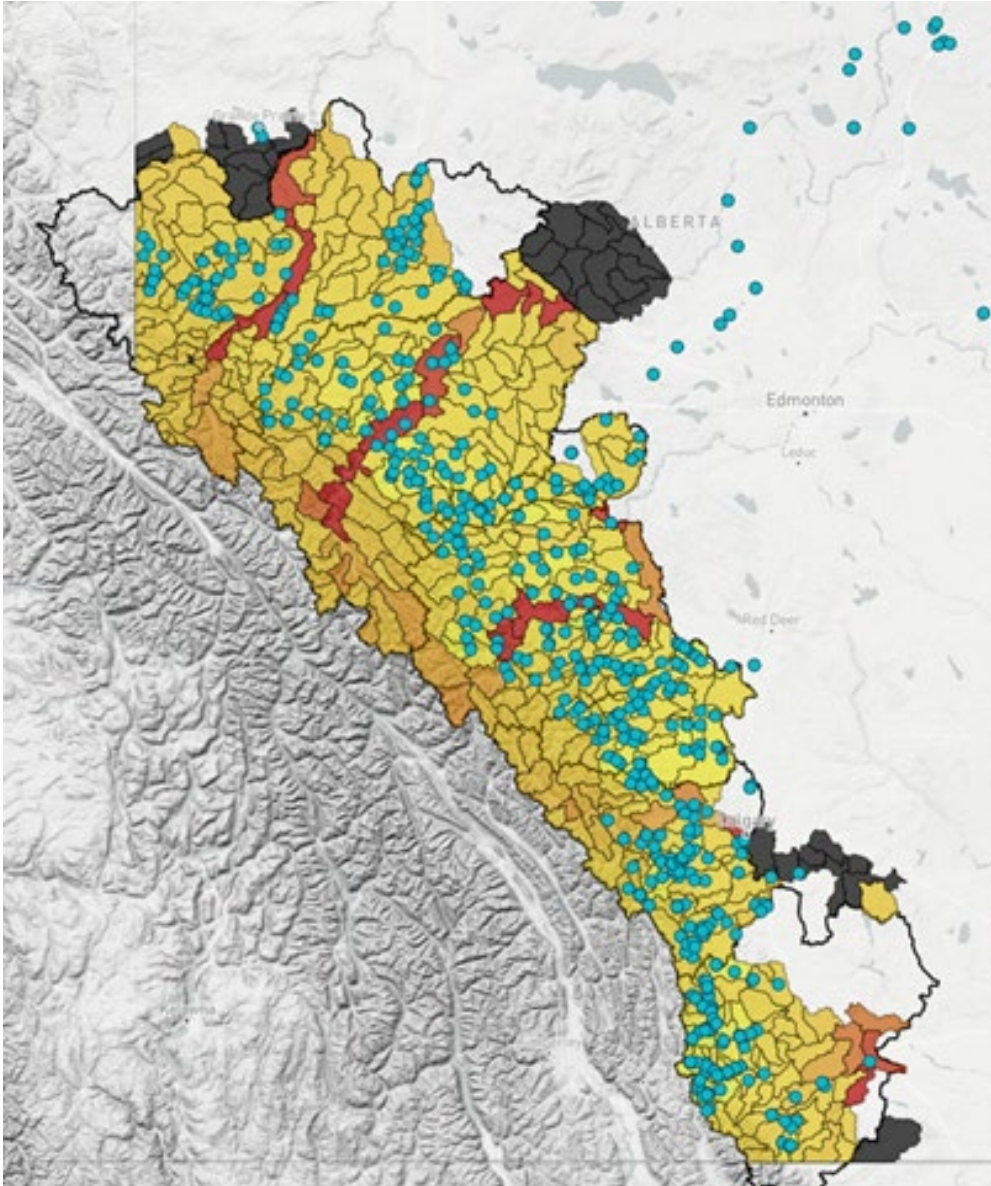


# SSN model completion plan for Alberta

1. Assess gaps in current logger data
2. Reach out to stakeholders to see if data are missing
3. Prioritize filling data gaps
4. Fill data gaps
5. QA/QC data
6. Assess SSN model fit



# 1. Assess gaps in current logger data

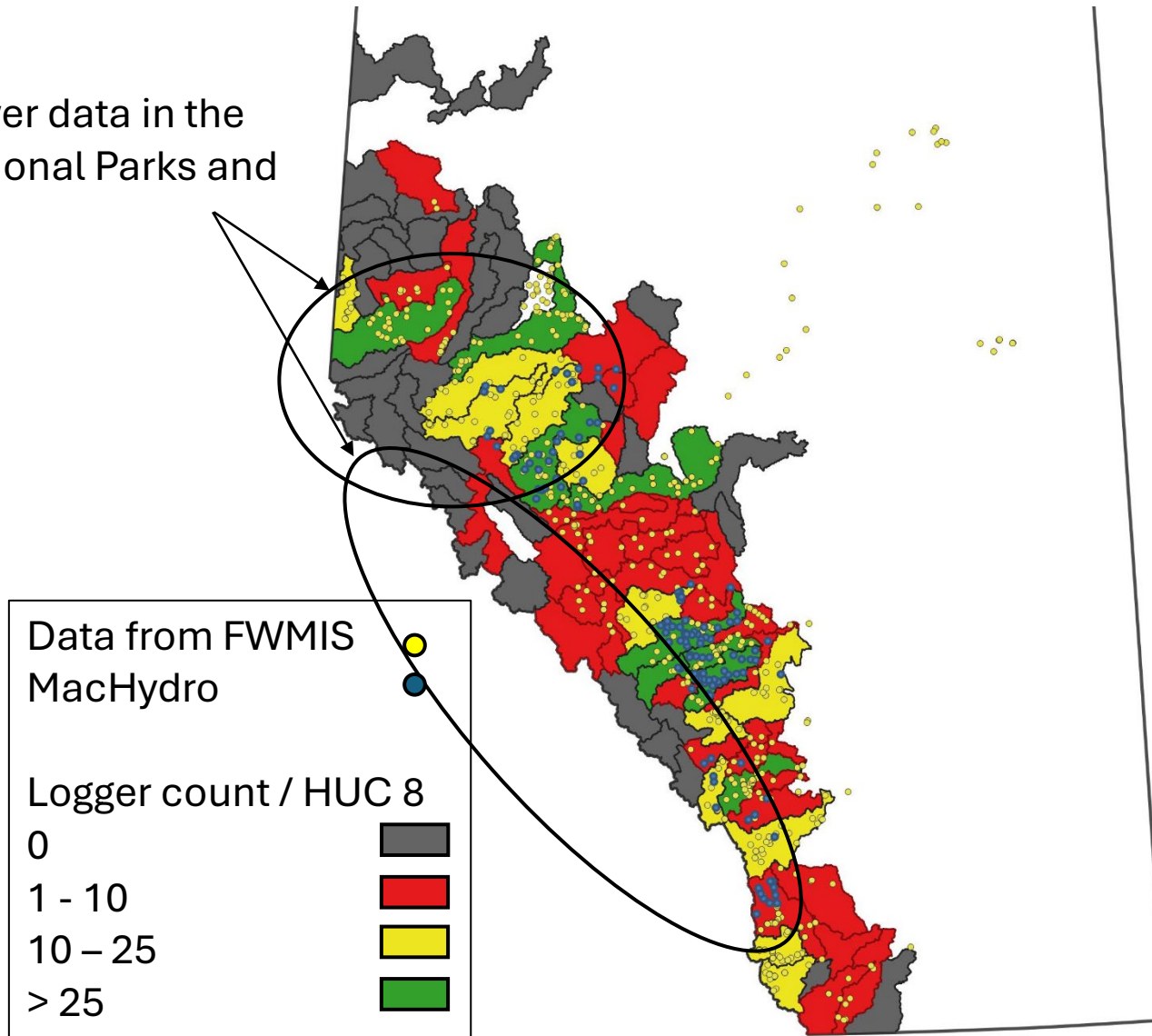


- 986 loggers locations (some with more than one year of data)
- 673 would be considered unique locations



## 2. Reach out to stakeholders to see if data are missing

Fewer data in the  
National Parks and  
NW



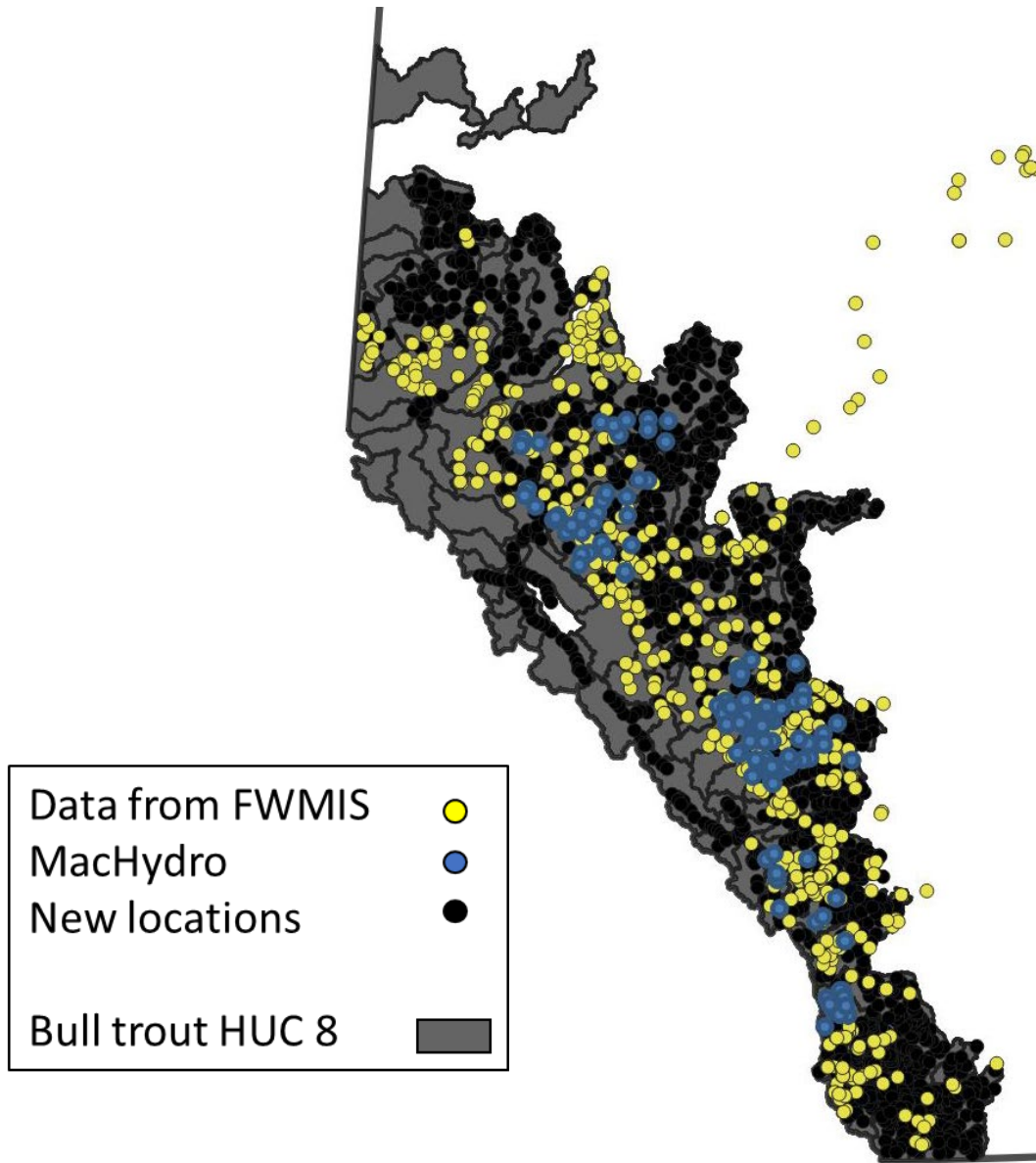
### Questions

1. Do you have data?
2. Do you have data loggers?
3. Would you be willing to fill data gaps?



fRI Research

### 3. Prioritize filling data gaps



## 4. Fill data gaps- What it looks like



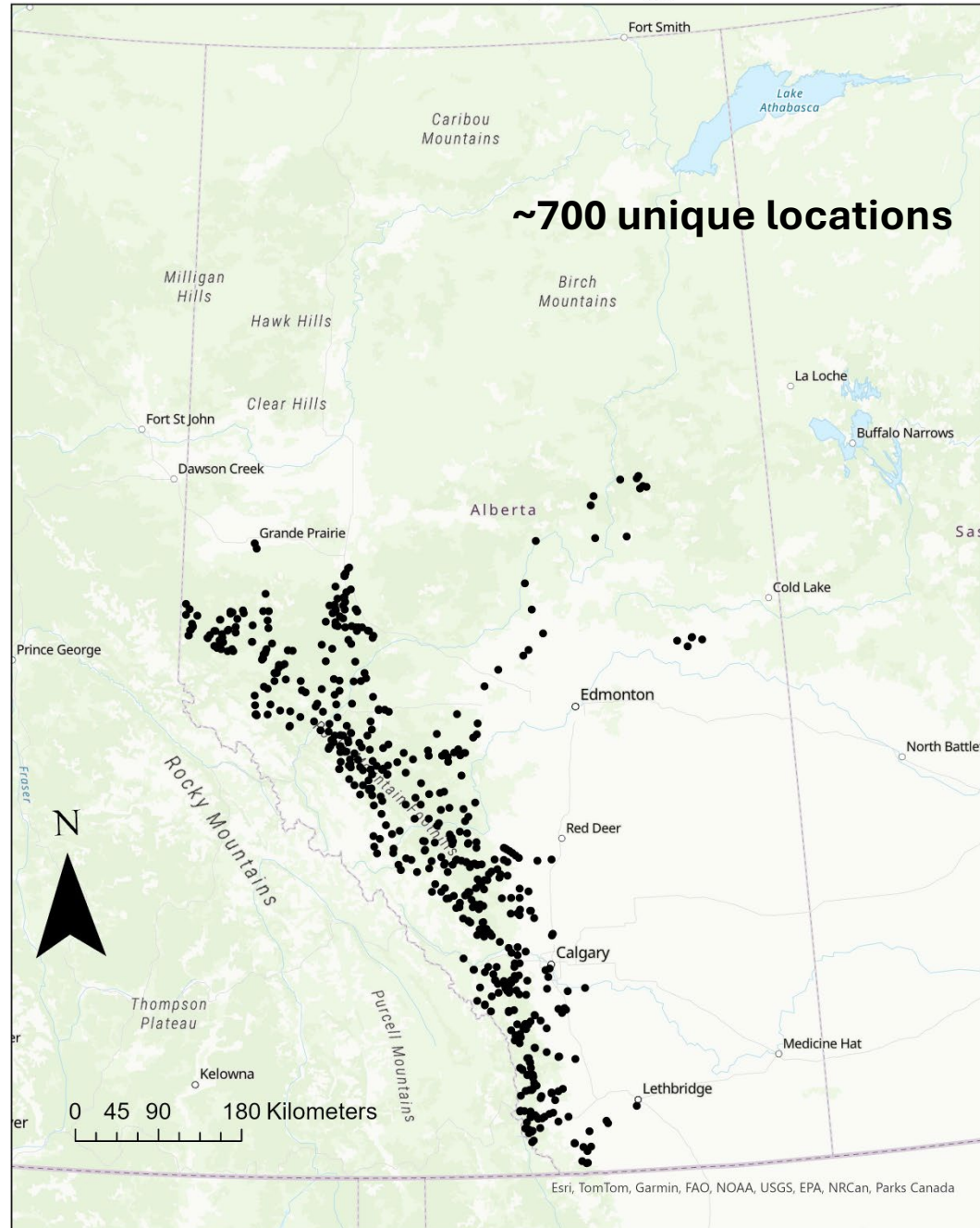
fRI Research

# 4. Fill data gaps- What it looks like



# Model data spring 2023

## 4. Fill data gaps Our progress so far



# fRI Research contracts 2023

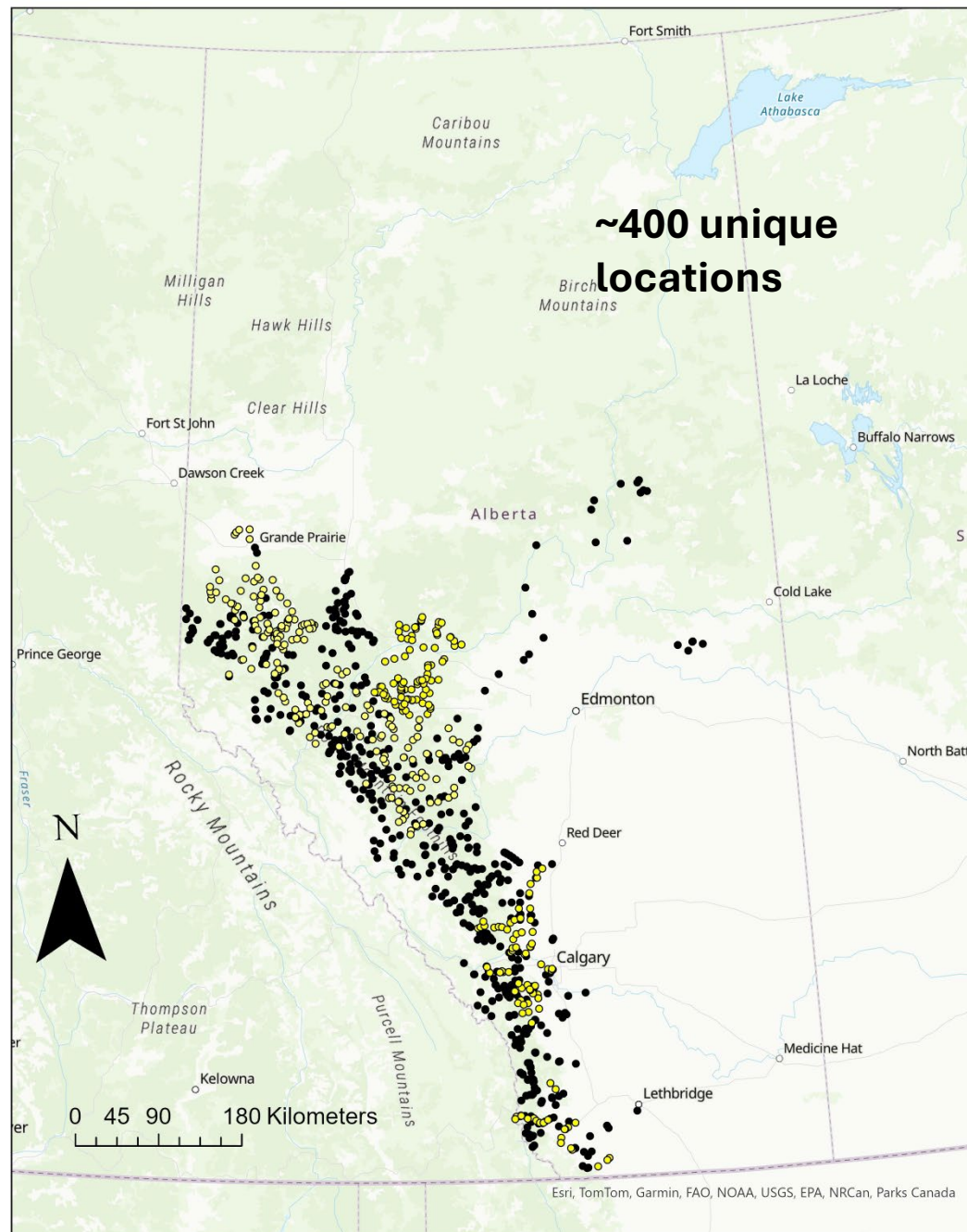
## 4. Fill data gaps



Trout Unlimited  
CANADA



Truite Illimitee  
CANADA



fRI Research

# Collaborators data input 2024

## 4. Fill data gaps

Trout Unlimited  
CANADA



Truite Illimitée  
CANADA



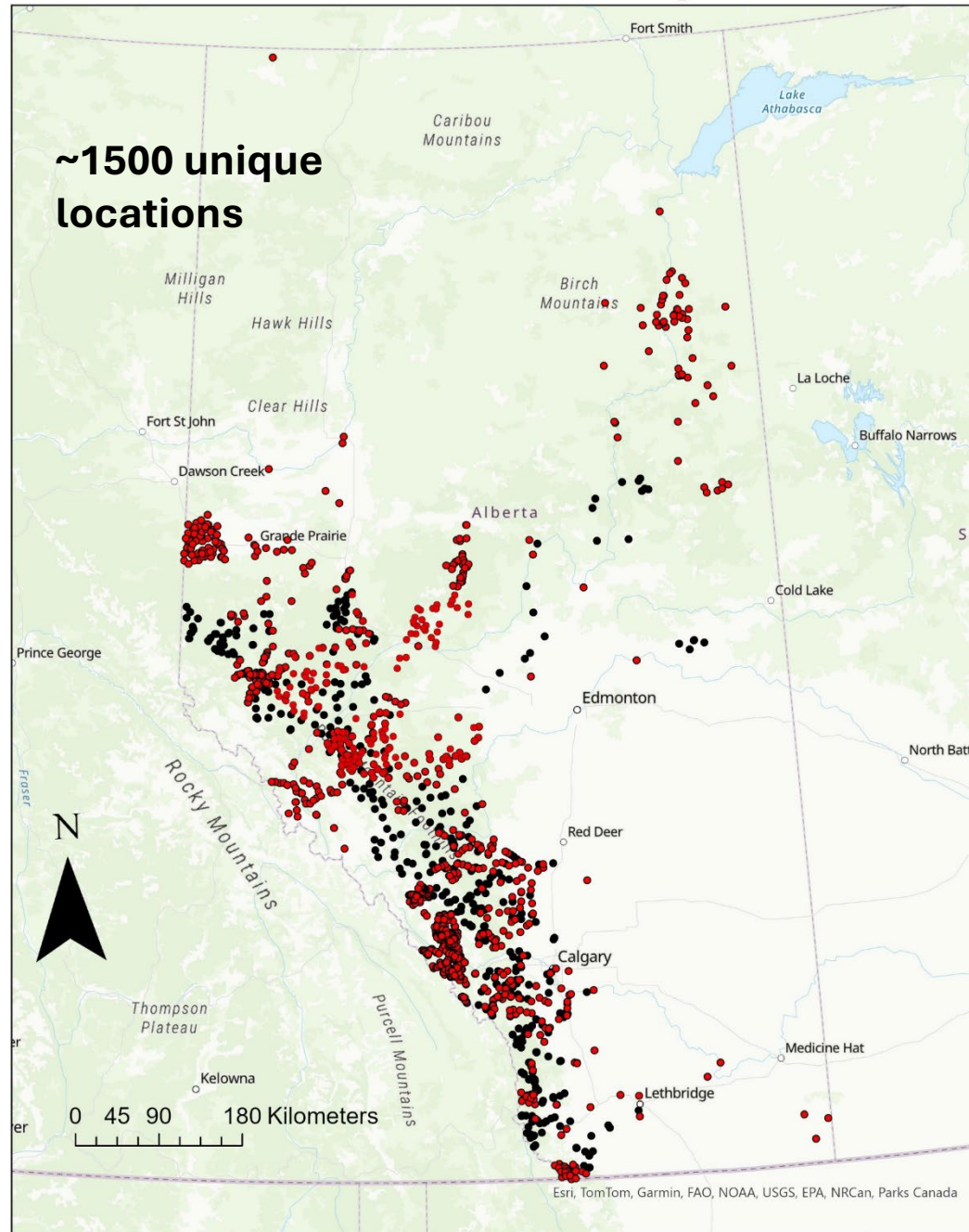
SWAN RIVER  
FIRST NATION



ASENIWUCHE  
WINEWAK NATION  
OF CANADA



Mighty Peace  
Watershed Alliance



West Fraser



Canada

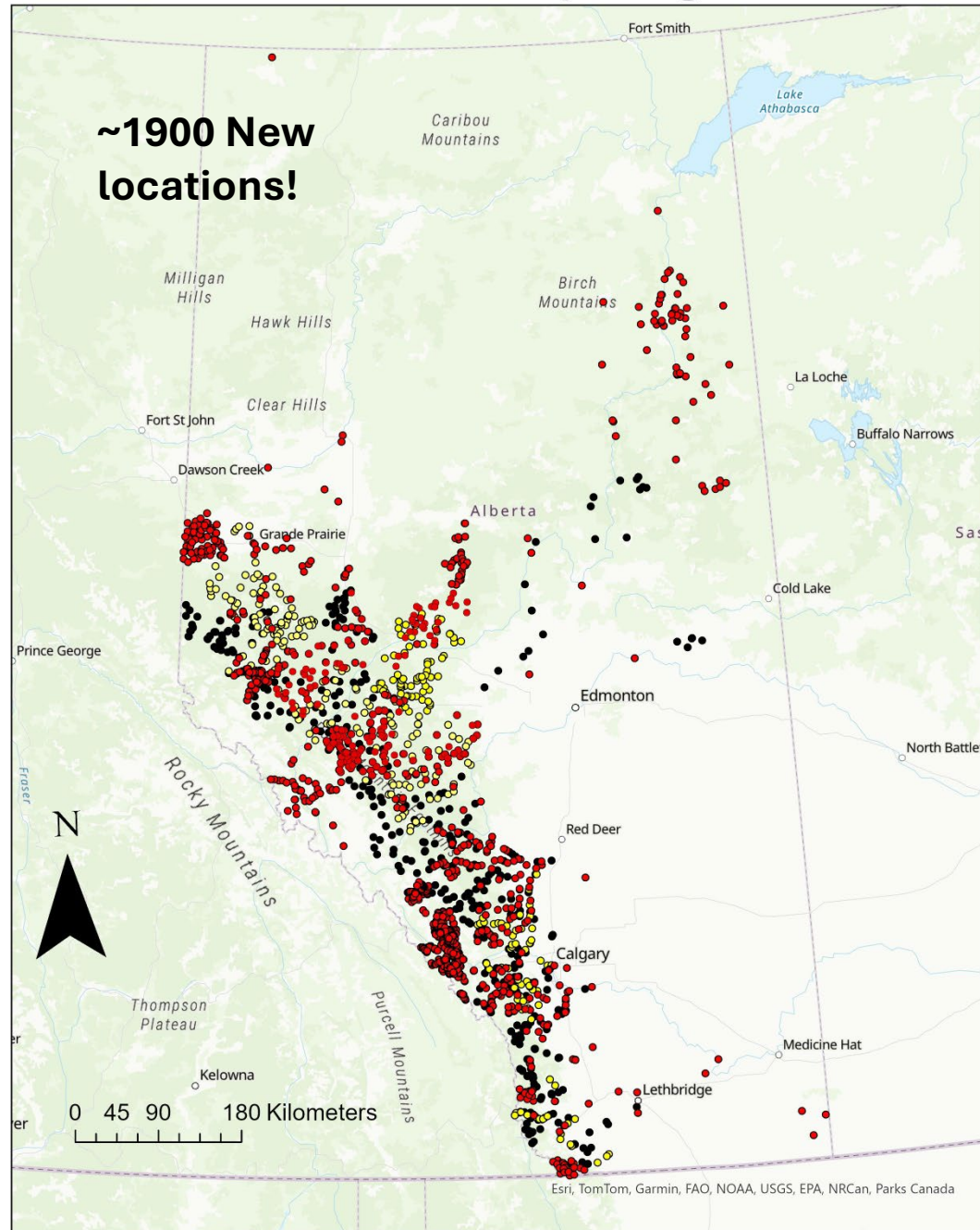


Ghost  
Watershed Alliance Society

fRI Research

# All data as of spring 2024

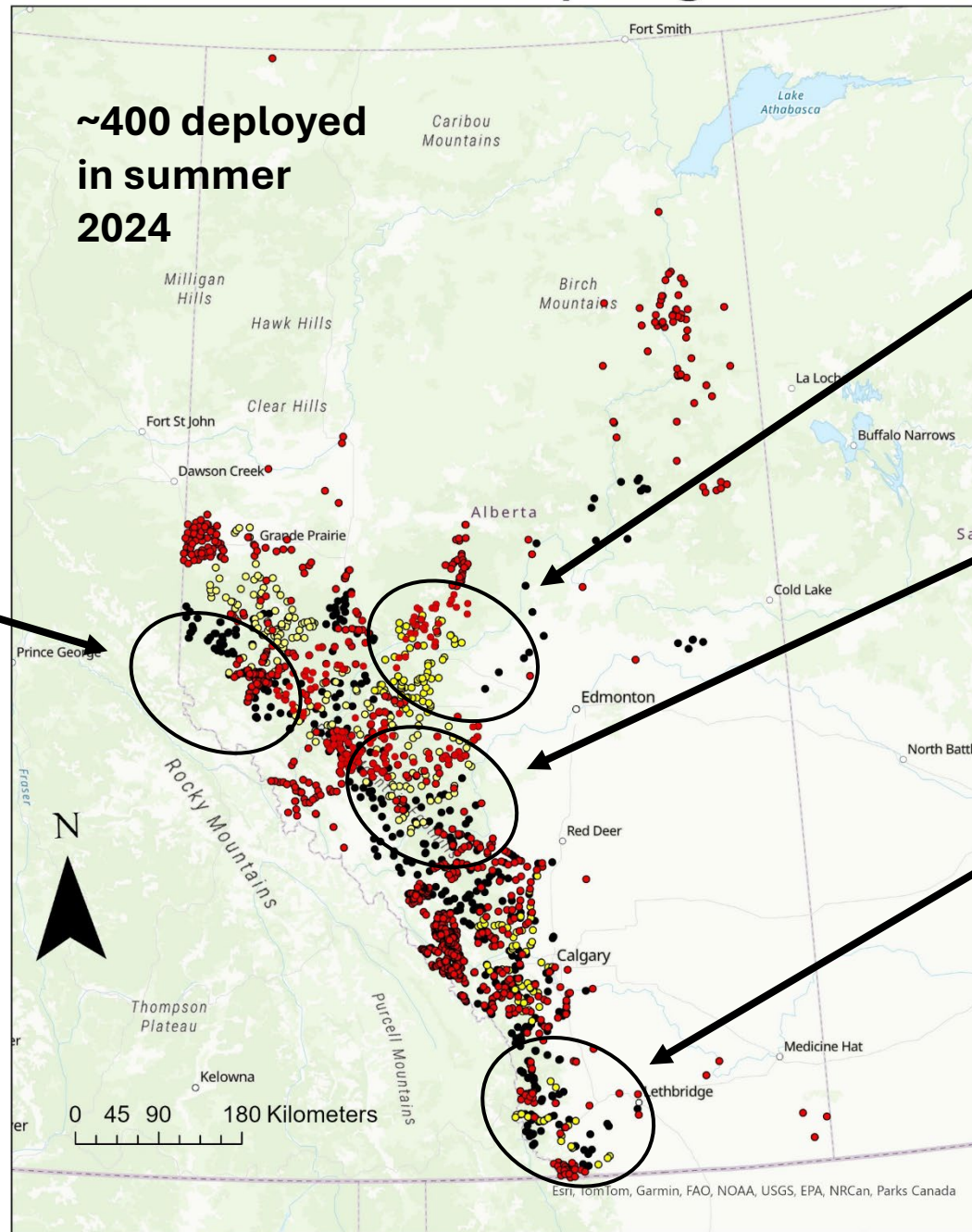
## 4. Fill data gaps





# All data as of spring 2024

## 4. Fill data gaps



Trout Unlimited  
CANADA



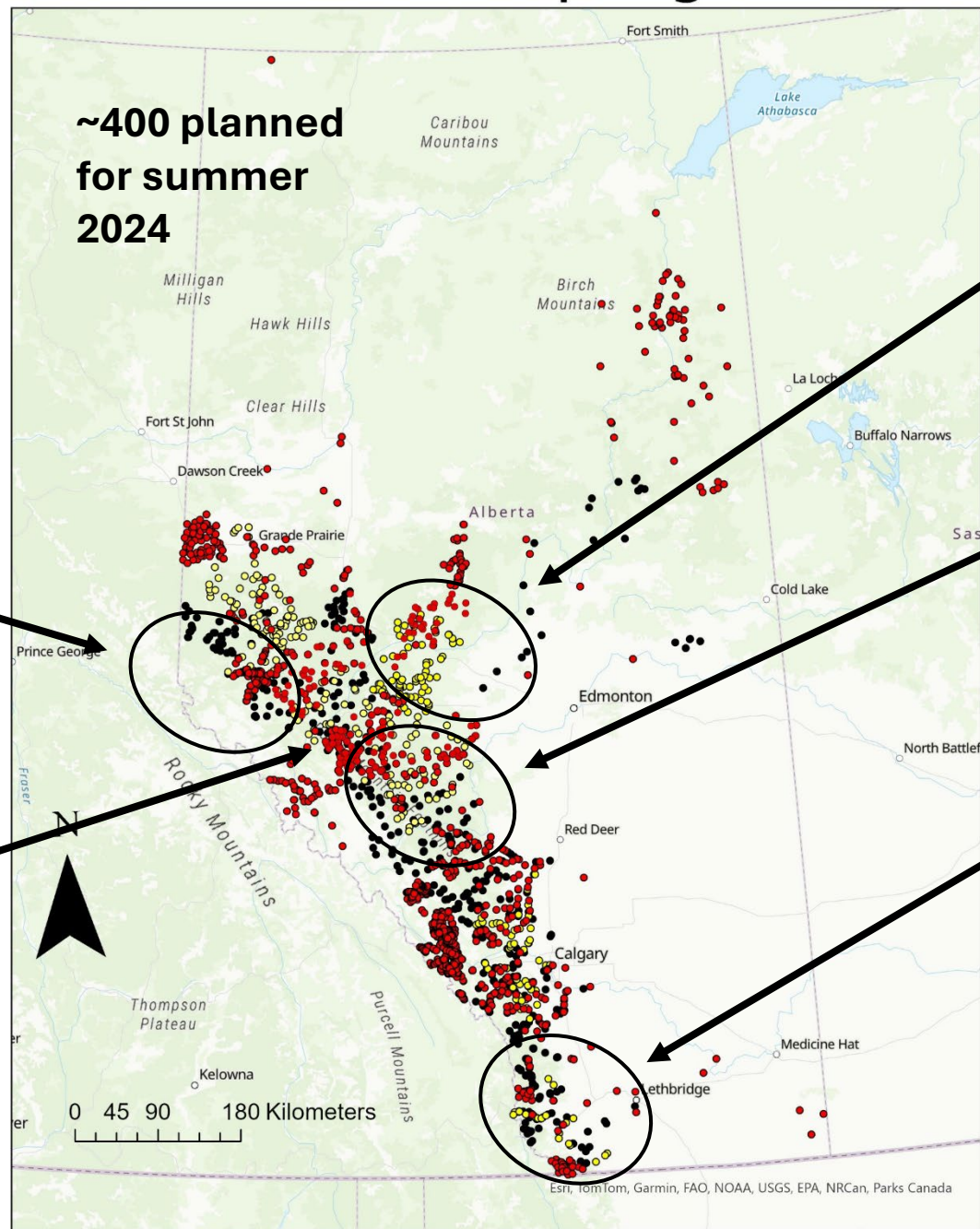
Truite Illimitée  
CANADA

fri Research

Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NRCan, Parks Canada

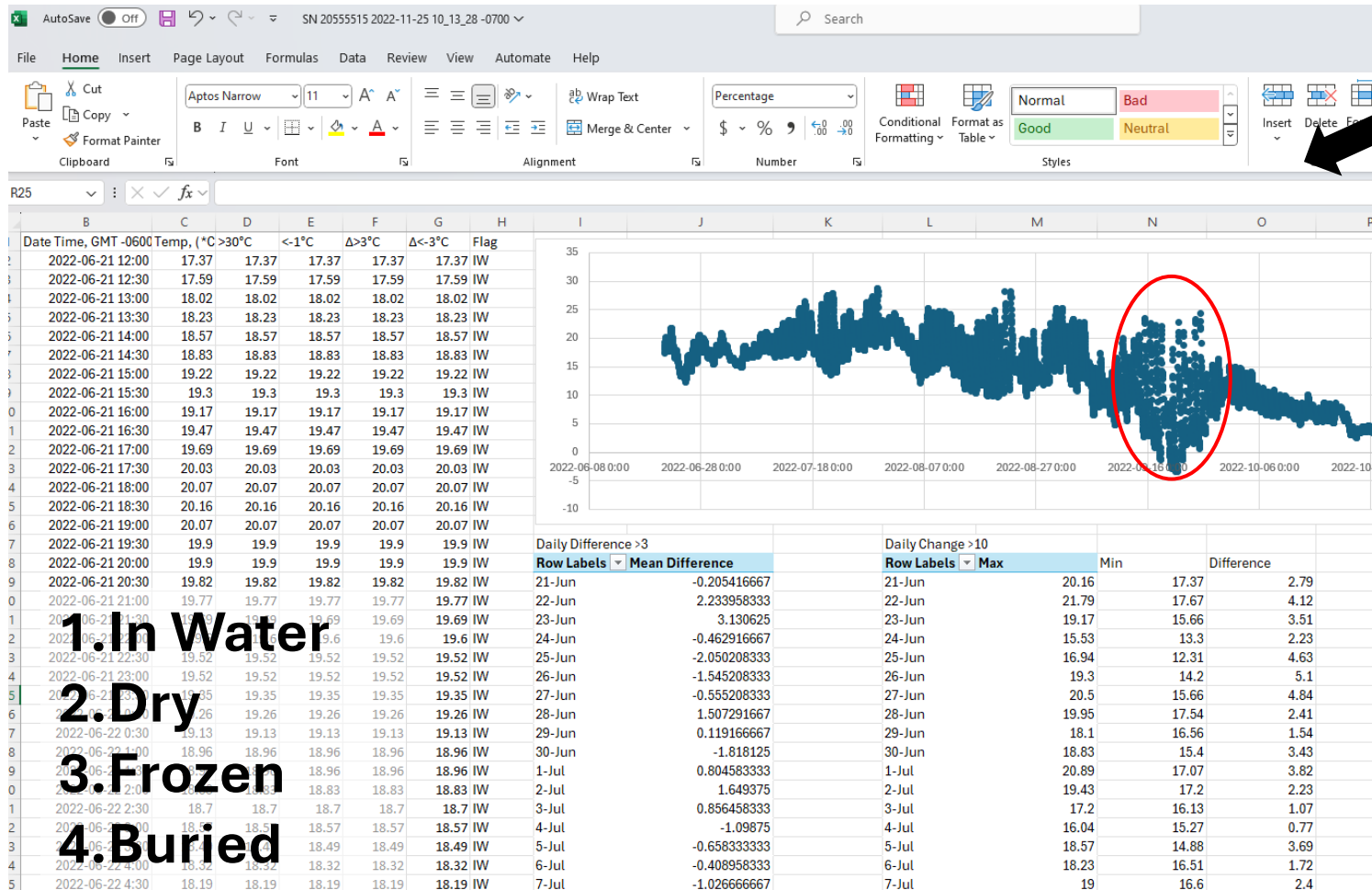
# All data as of spring 2024

## 4. Fill data gaps



A guy named Don from Edmonton

# 5. QA/QC data.



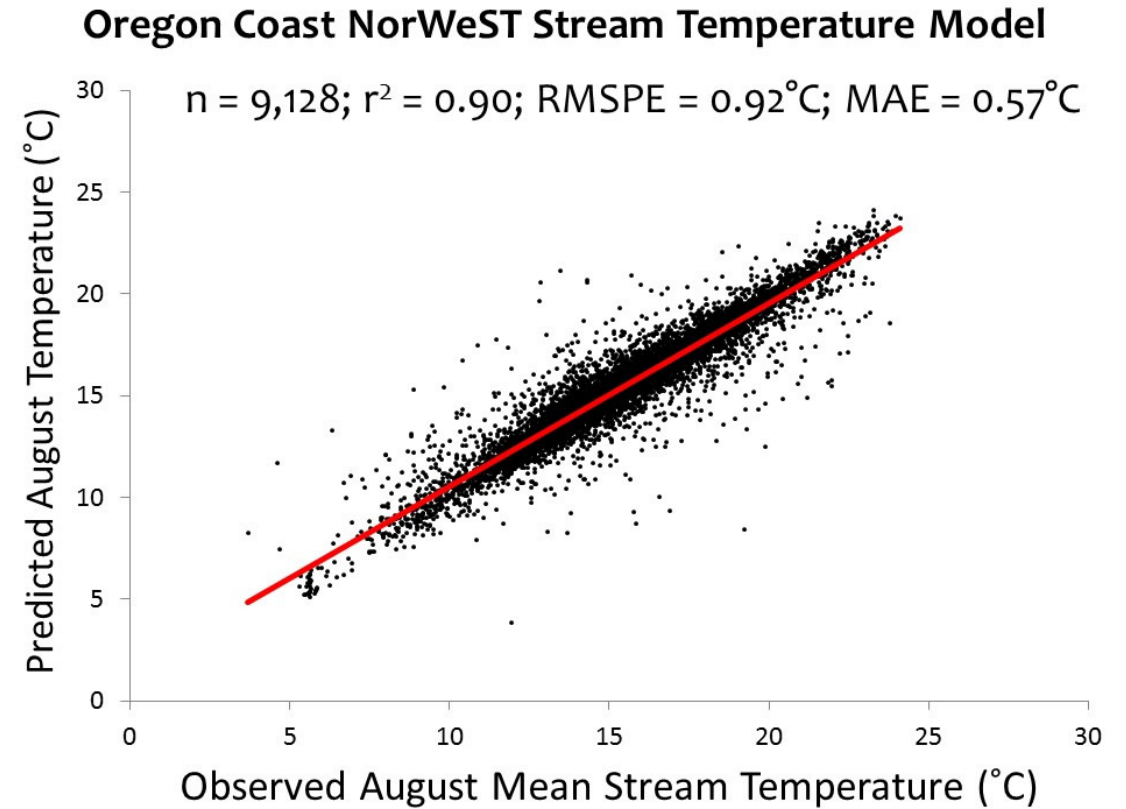
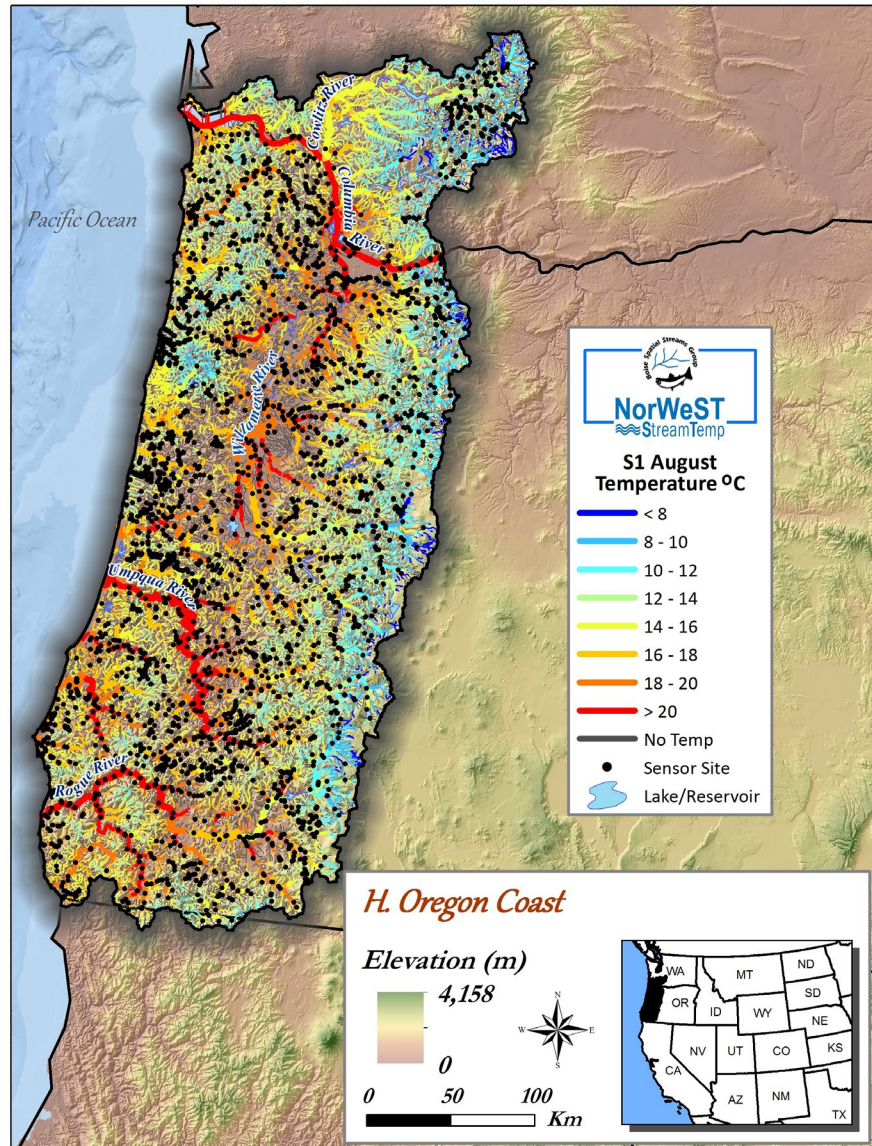
1. In Water

2. Dry

3. Frozen

4. Buried

# 6. Assess model fit



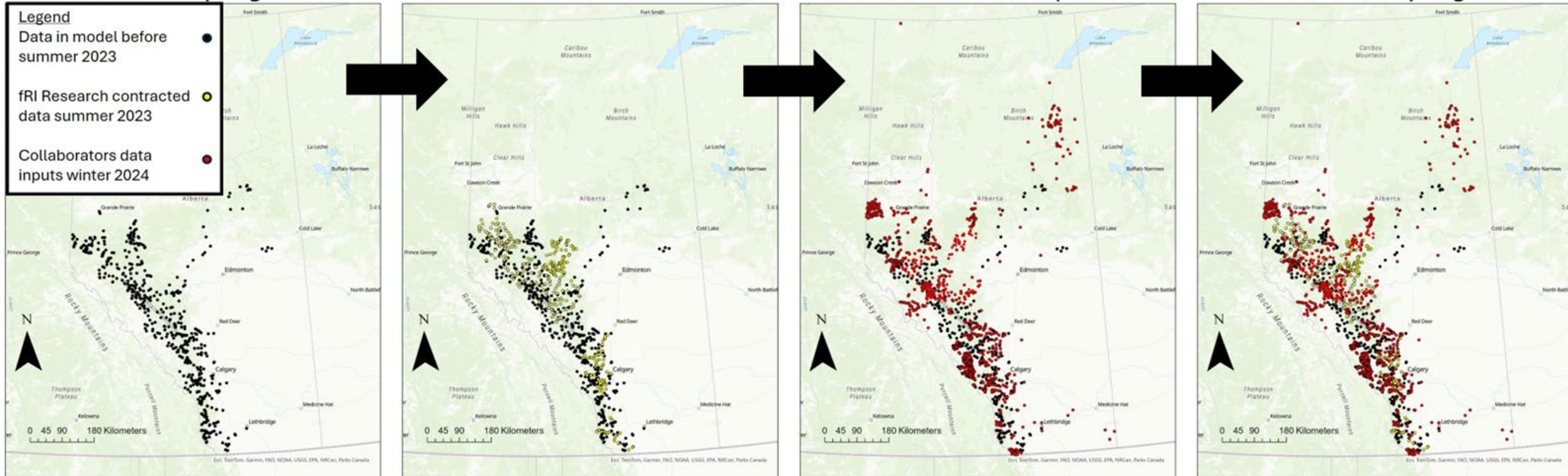
# Questions????

Model data spring 2023

fRI Research contracts 2023

Collaborators data input 2024

All data as of spring 2024



fRI Research

# Species status and distribution

