SHEDS

Project Status
Data Uploading Tutorial
Stream Temperature Model
ICE Updates

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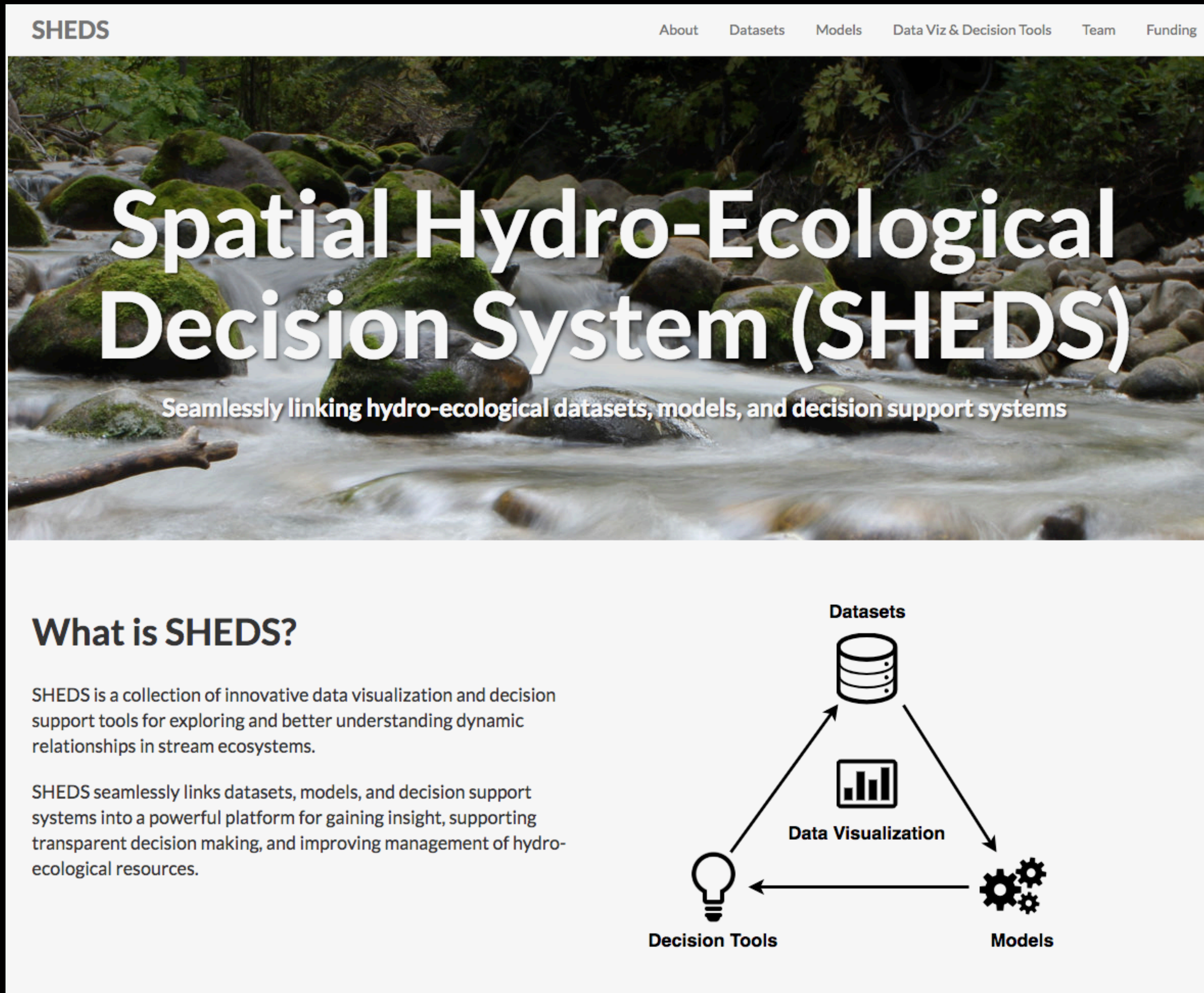
Walker Environmental Research, LLC

MEWTWG Meeting
April 29, 2019



http://ecosheds.org/

Project Status

- Bad News
  - Active funding coming to an end… 😢
- Good News
  - USGS is planning to adopt SHEDS! 🤩
  - Migrate to USGS cloud computing services
  - Funding support from USGS Conte Lab for ongoing maintenance and hosting costs
- What this will mean for you
  - SHEDS will live on in its current form with full database functionality, model updates, etc.
  - No further development of existing services without new funding

Project Updates

- Temperature and Brook Trout Occupancy Models
  - Code re-written for (mostly) automated updating
  - Re-calibrate every 6 months
  - New documentation and versioning system
- Interactive Catchment Explorer
  - Code re-written to increase flexibility and allow for larger datasets (more variables)
  - New tutorial and help sections
  - Improved download functionality

Data Upload Tutorial

http://db.ecosheds.org/

Stream Temperature Model

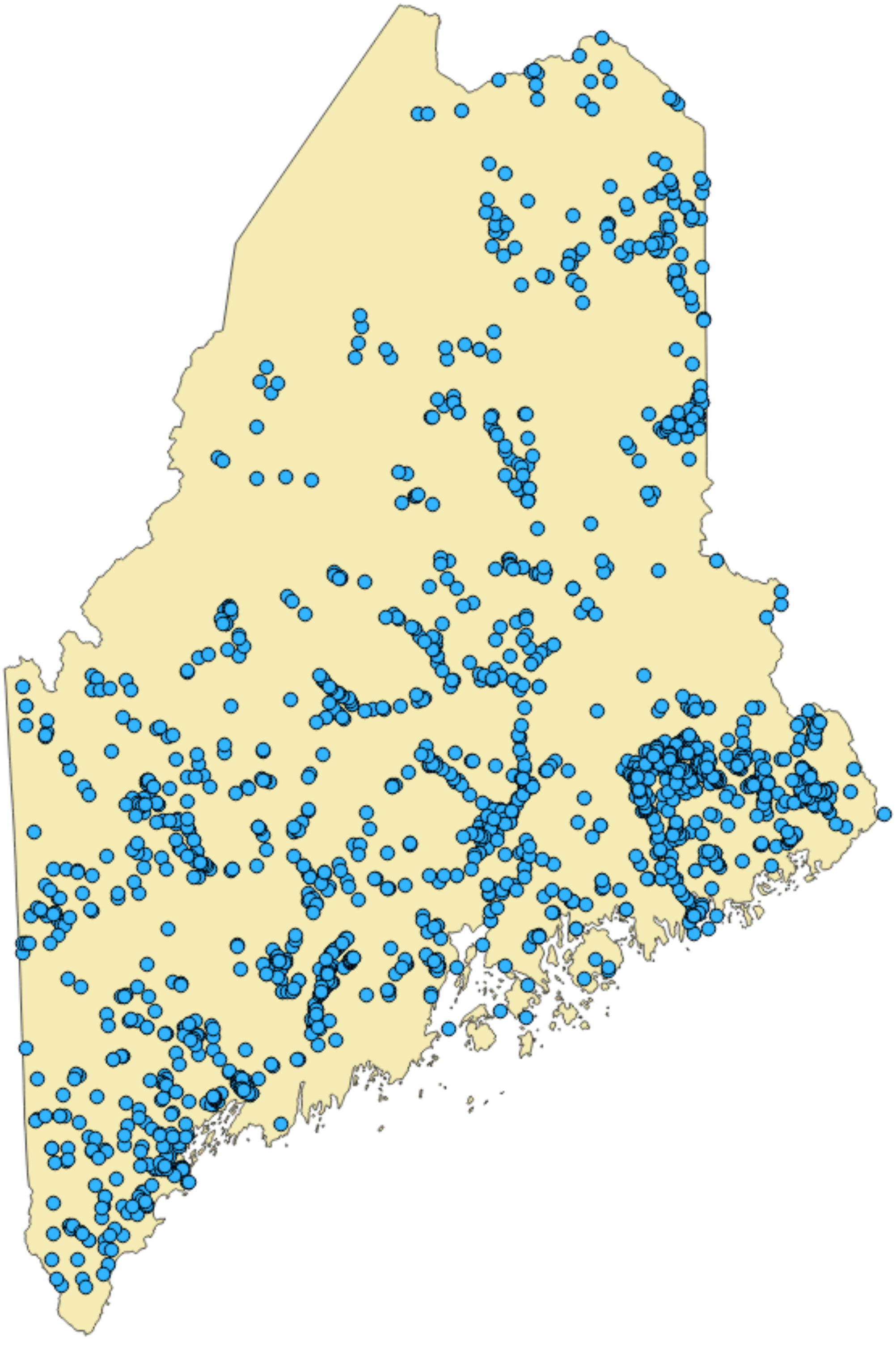
Q: Where should we put more loggers to improve model performance?

A: 🤔

1. Which stations get used in the model?
2. How does each station contribute to the model calibration?

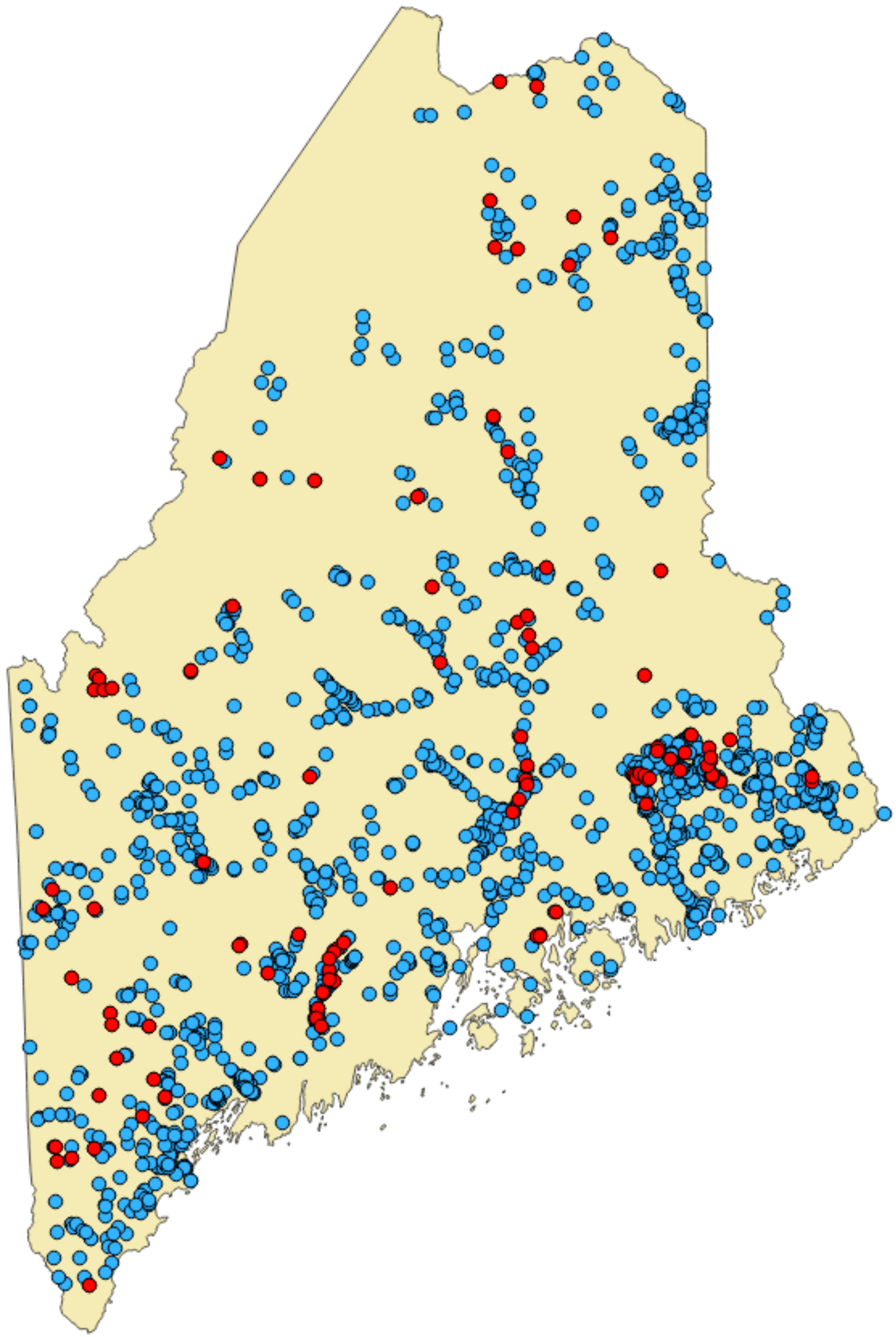
Part 1

Which stations get used in the model?



Station Screening

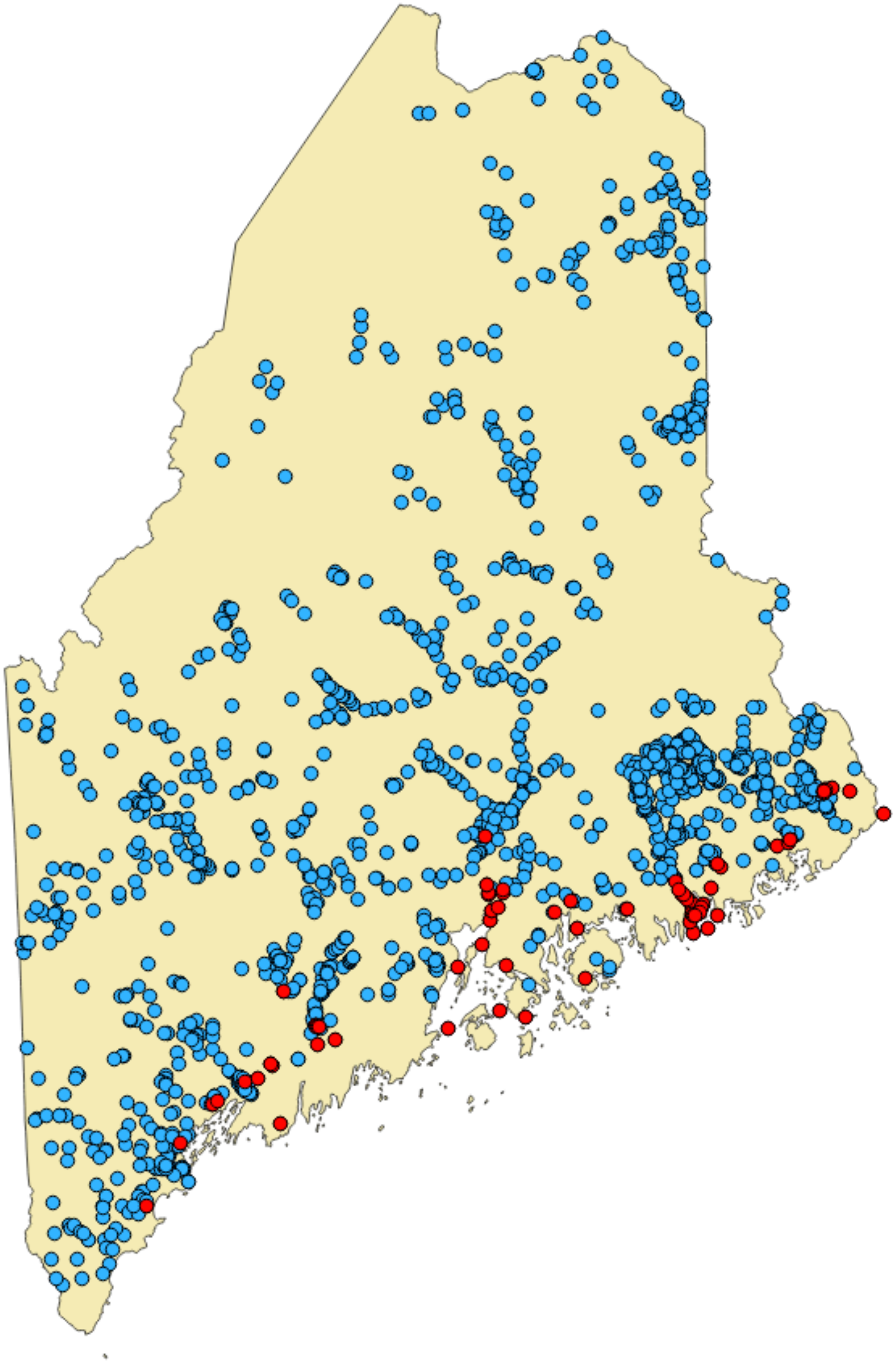
1,780 Total Stations (in ME)



Station Screening

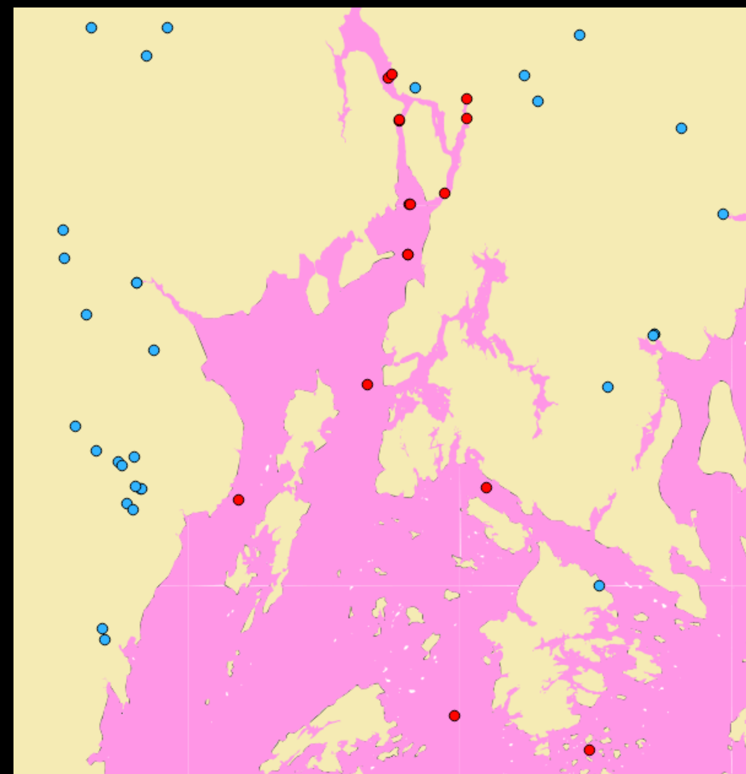
1,780 Total Stations (in ME)

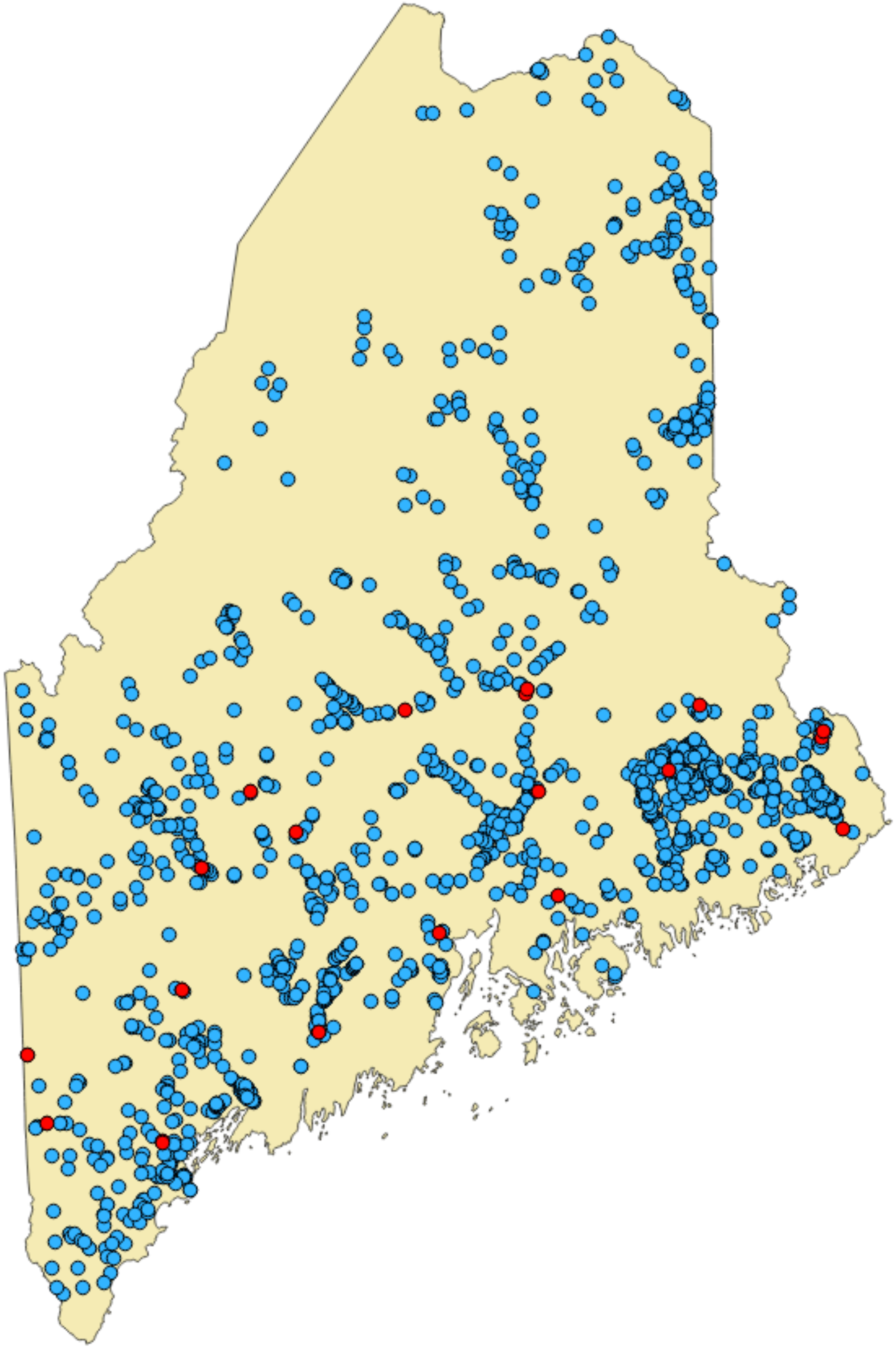
– 106 No Data



Station Screening

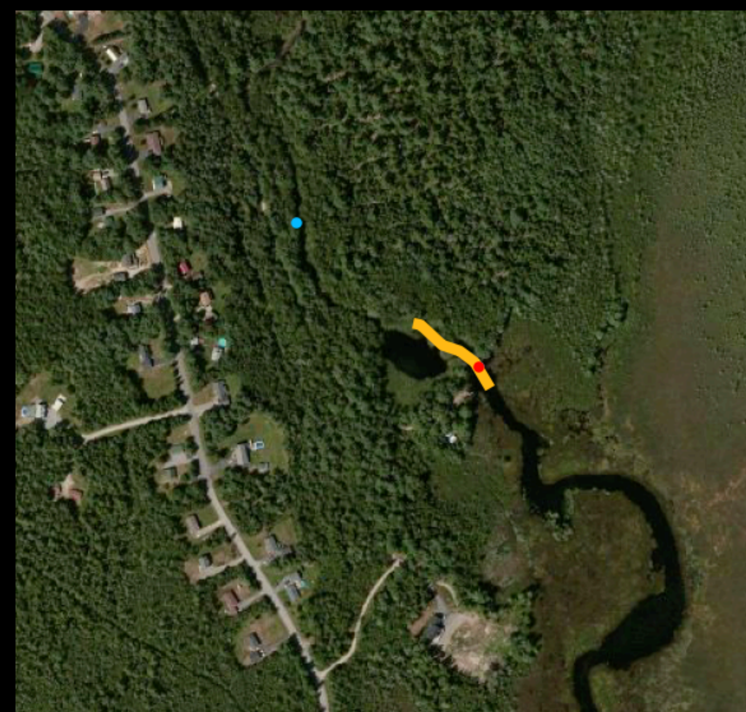
1,780 Total Stations (in ME)
– 106 No Data
– 90 Tidal

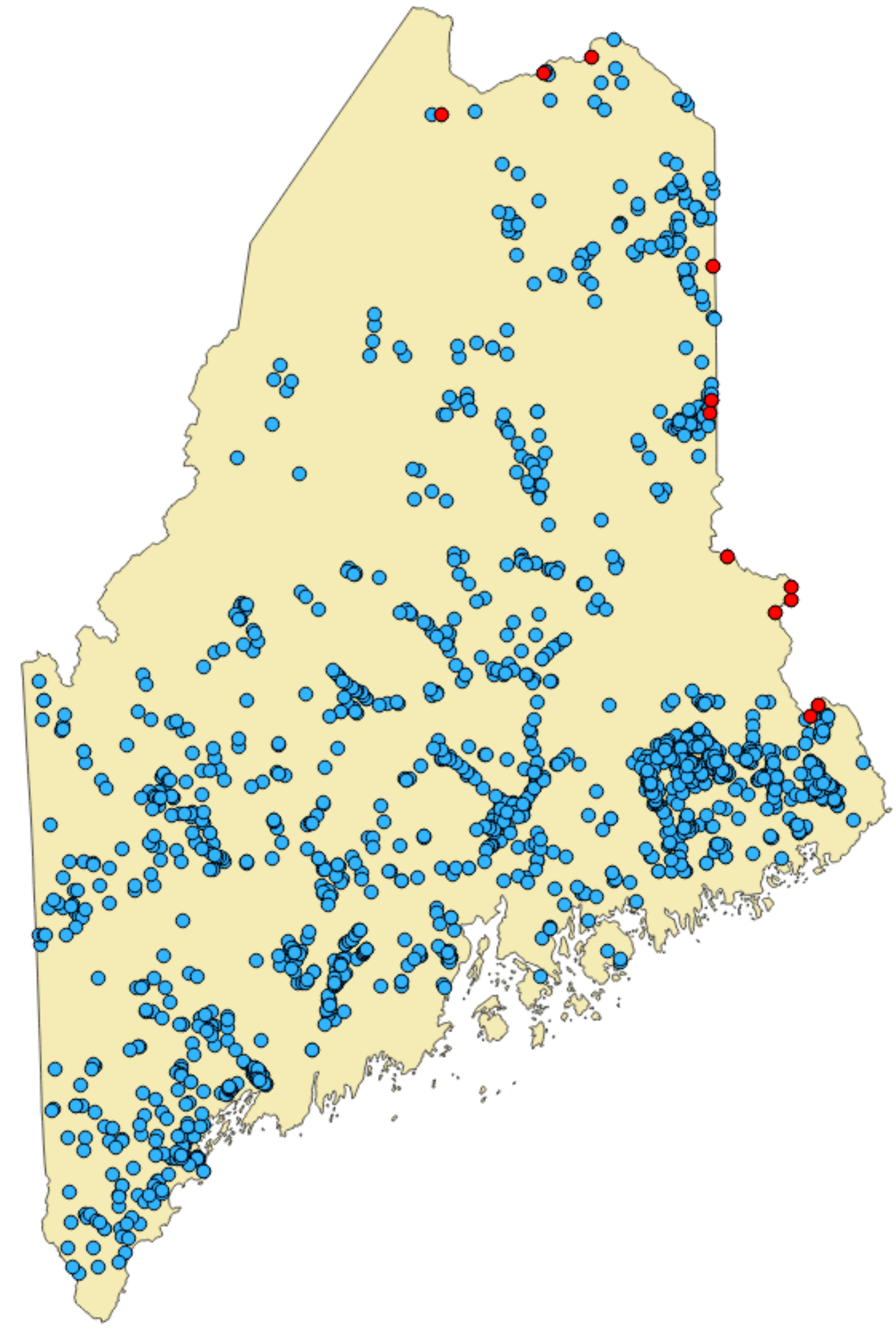




Station Screening

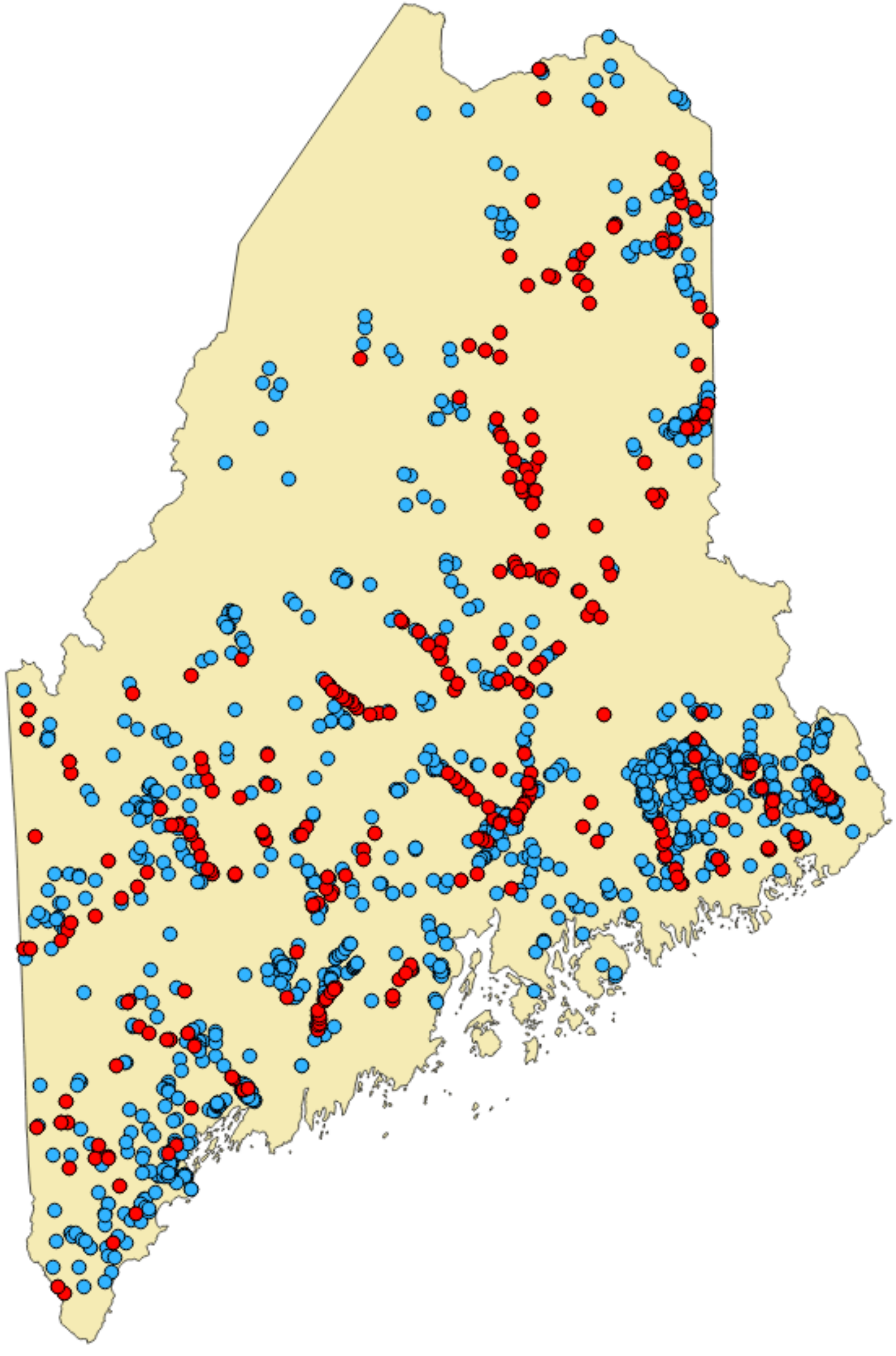
1,780 Total Stations (in ME)
– 106 No Data
– 90 Tidal
– **21 Near Impoundment**





Station Screening

1,780 Total Stations (in ME)
– 106 No Data
– 90 Tidal
– 21 Near Impoundment
– 13 Missing Covariates



Station Screening

1,780 Total Stations (in ME)
– 106 No Data
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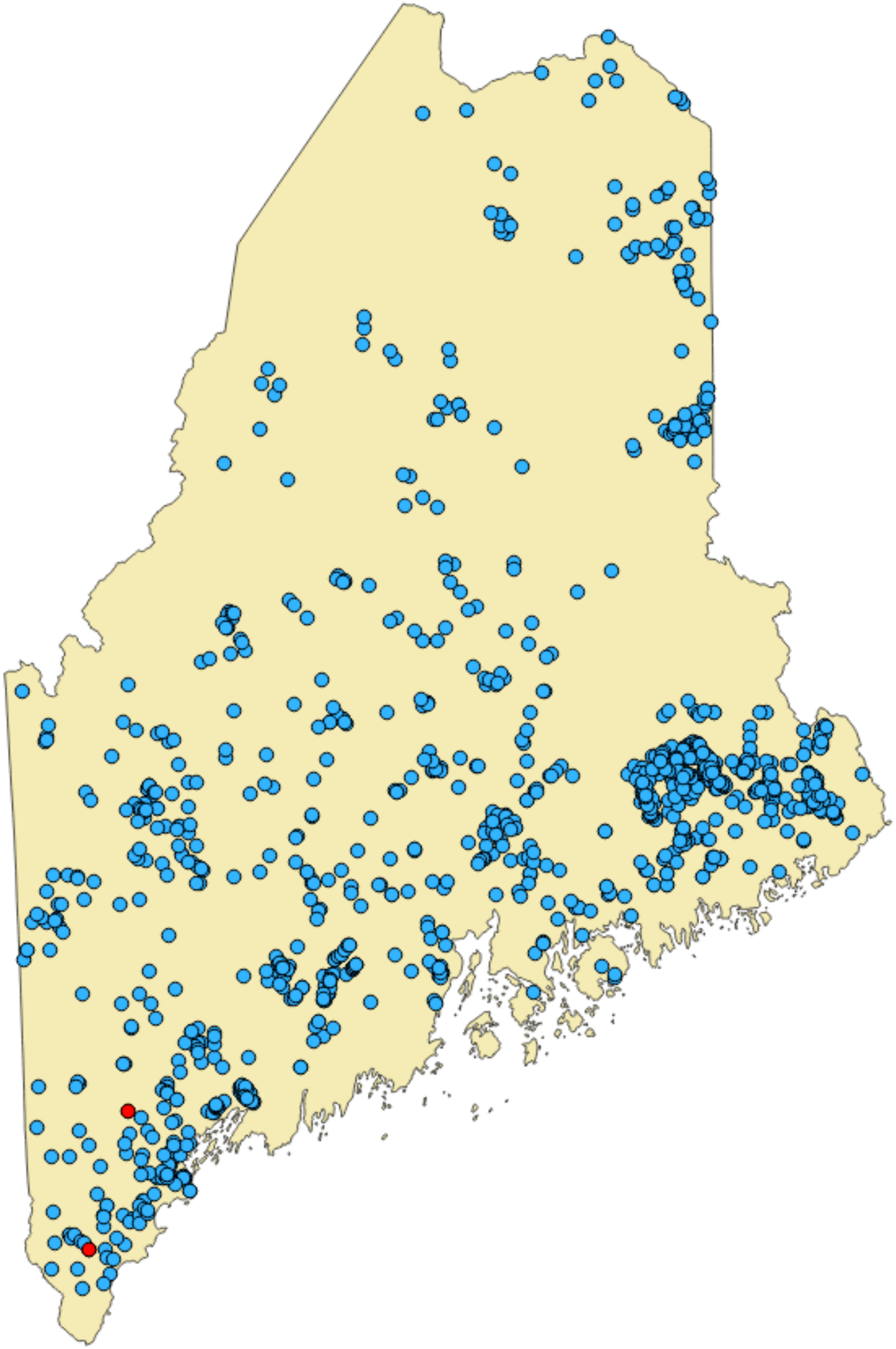
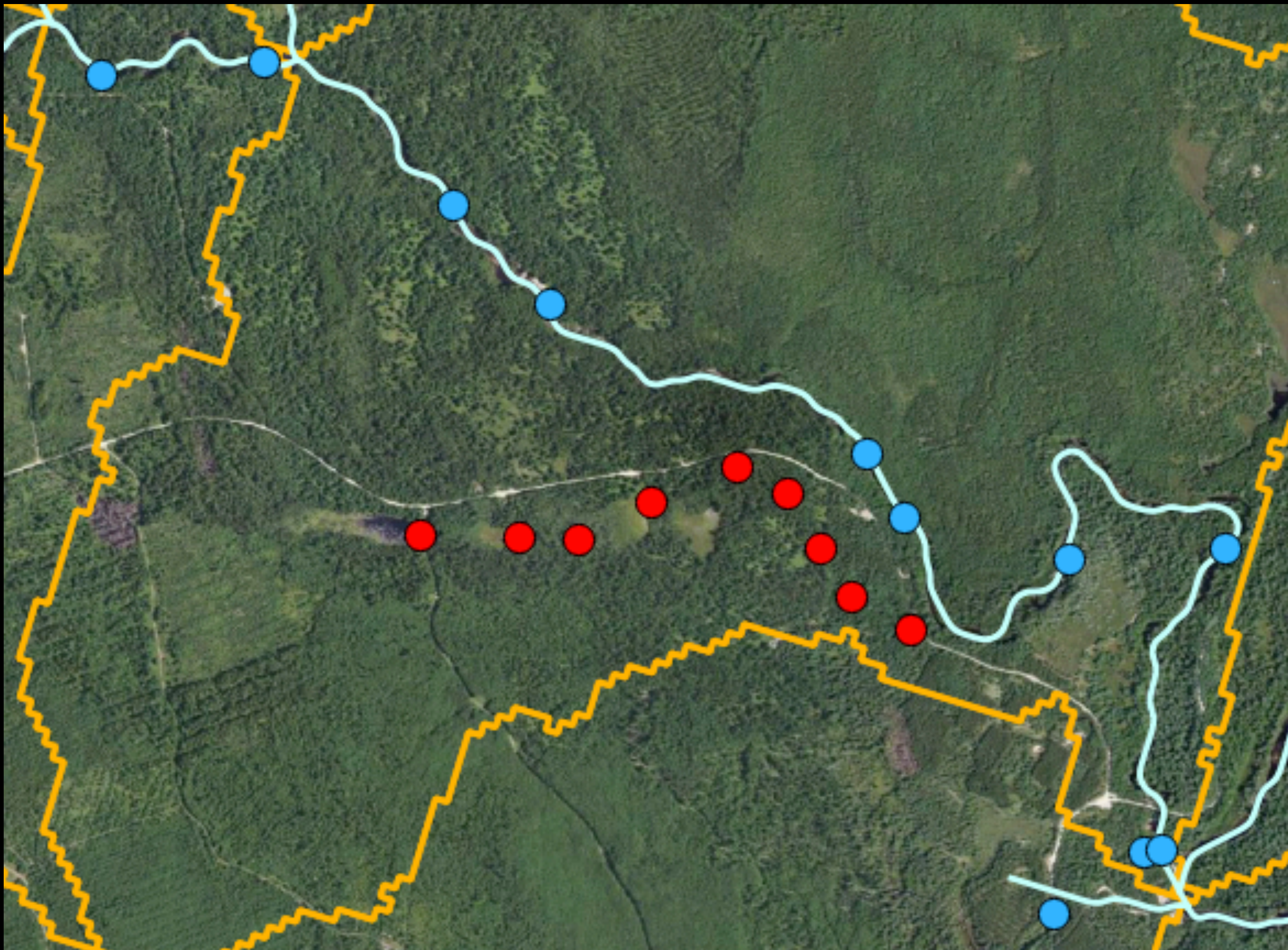
– 383 Drainage Area > 200 km^2

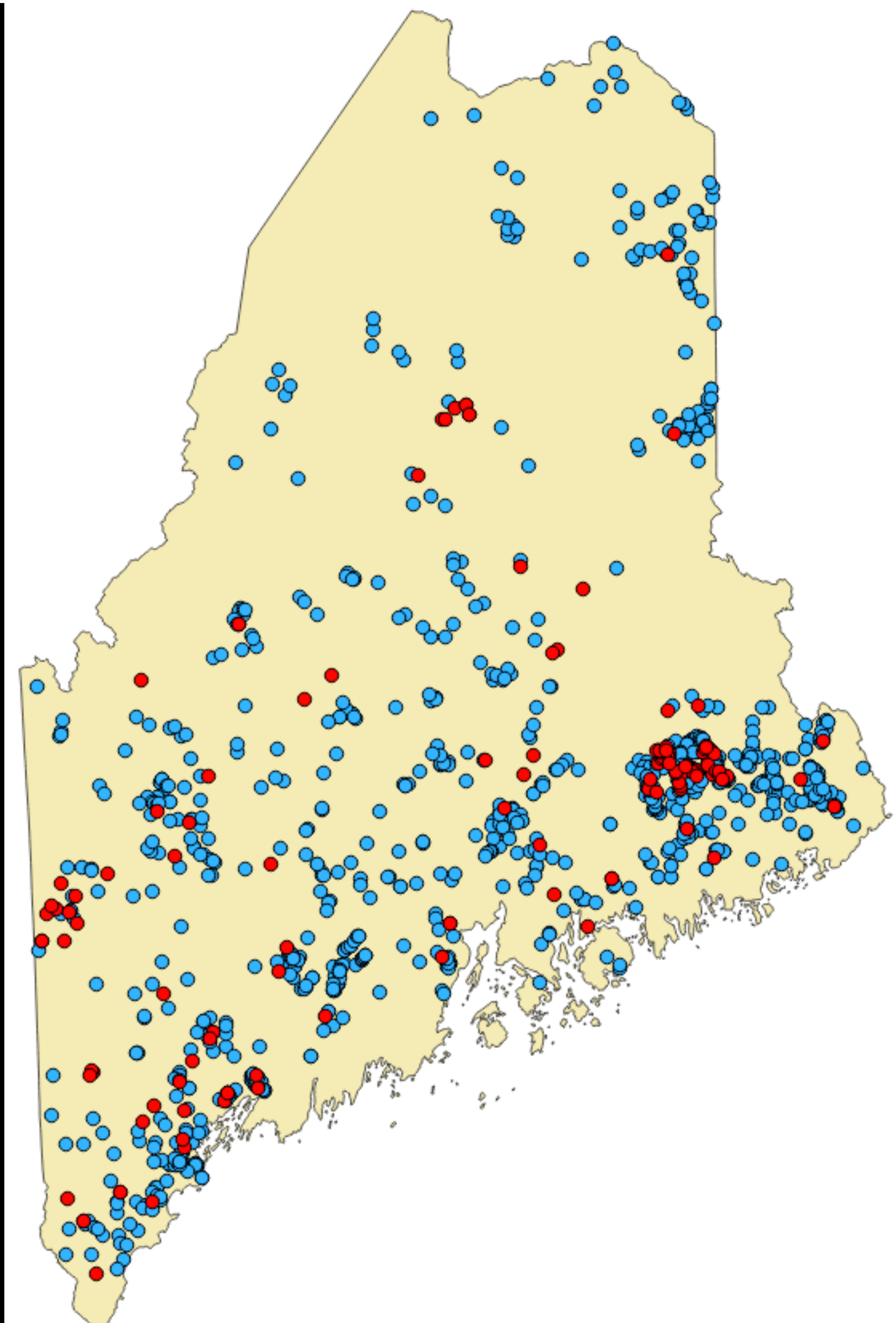


Station Screening

1,780 Total Stations (in ME)
– 106 No Data
– 90 Tidal
– 21 Near Impoundment
– 13 Missing Covariates
– 383 Drainage Area > 200 km^2
– 2 Open Water LU > 50%

Flowline Distance > 60 m





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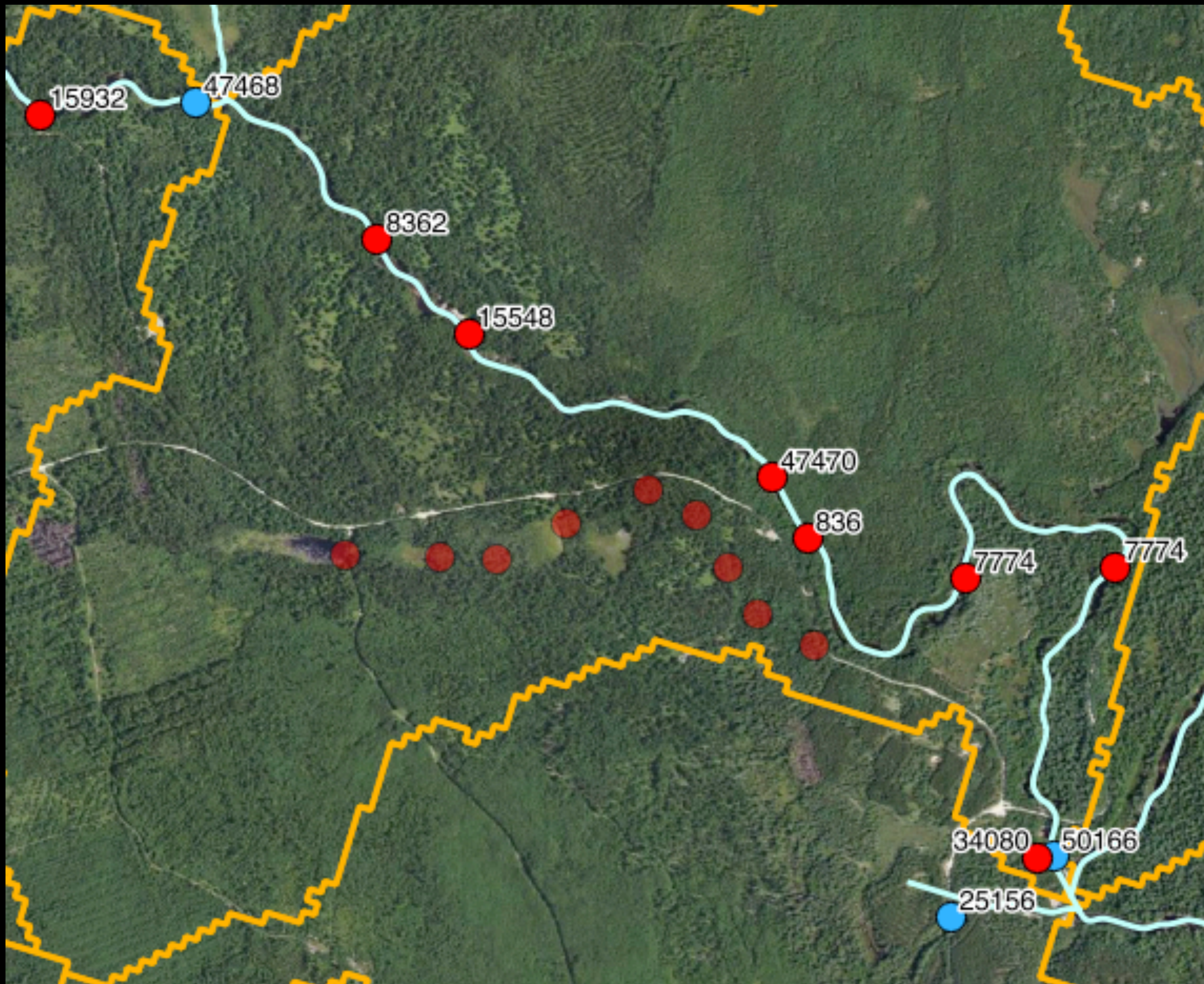
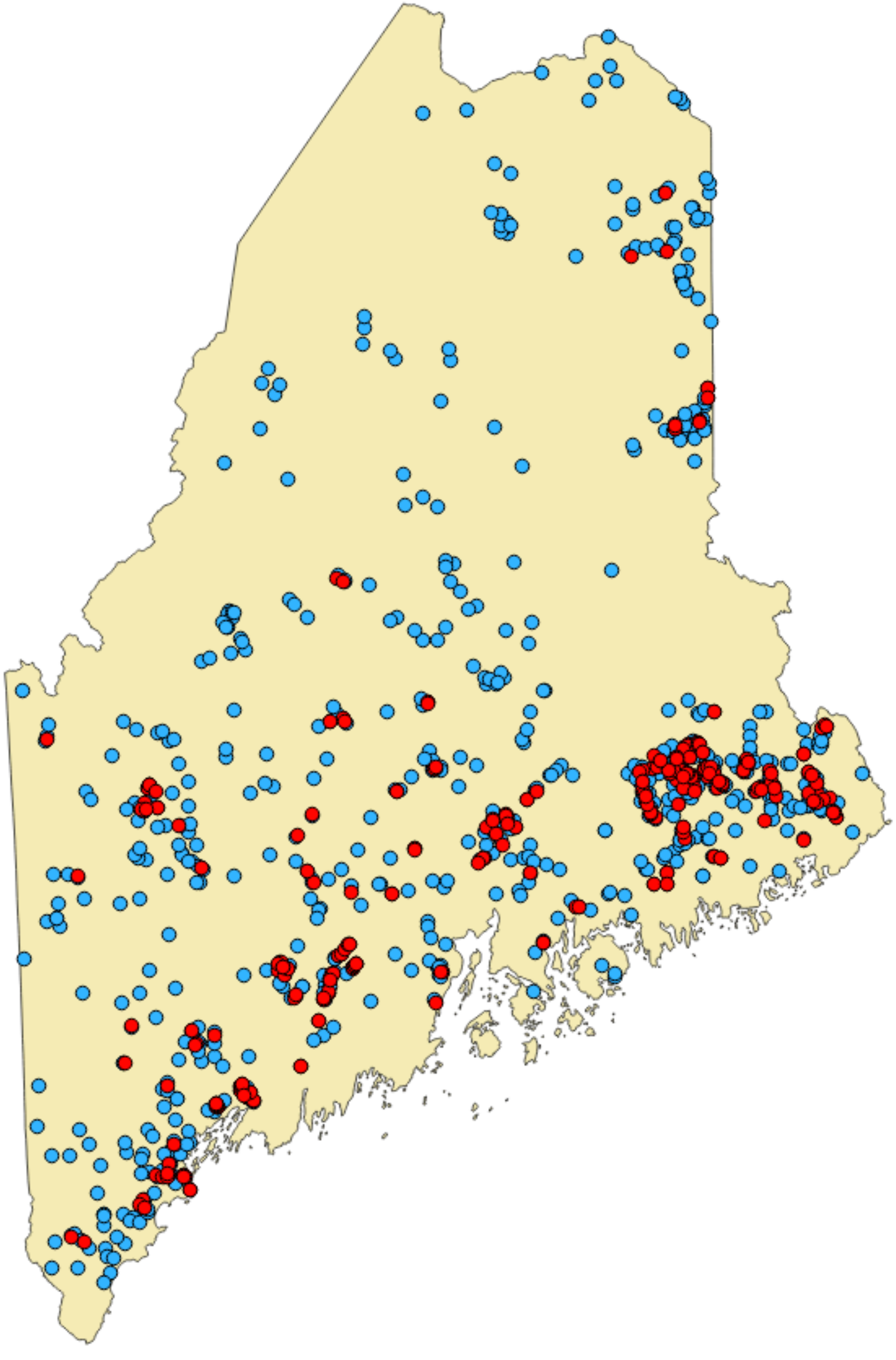
– 2 Open Water LU > 50%
– **138 Flowline Distance > 60 m**

Secondary Stations within Catchment





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– 106 No Data
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– 21 Near Impoundment
– 13 Missing Covariates
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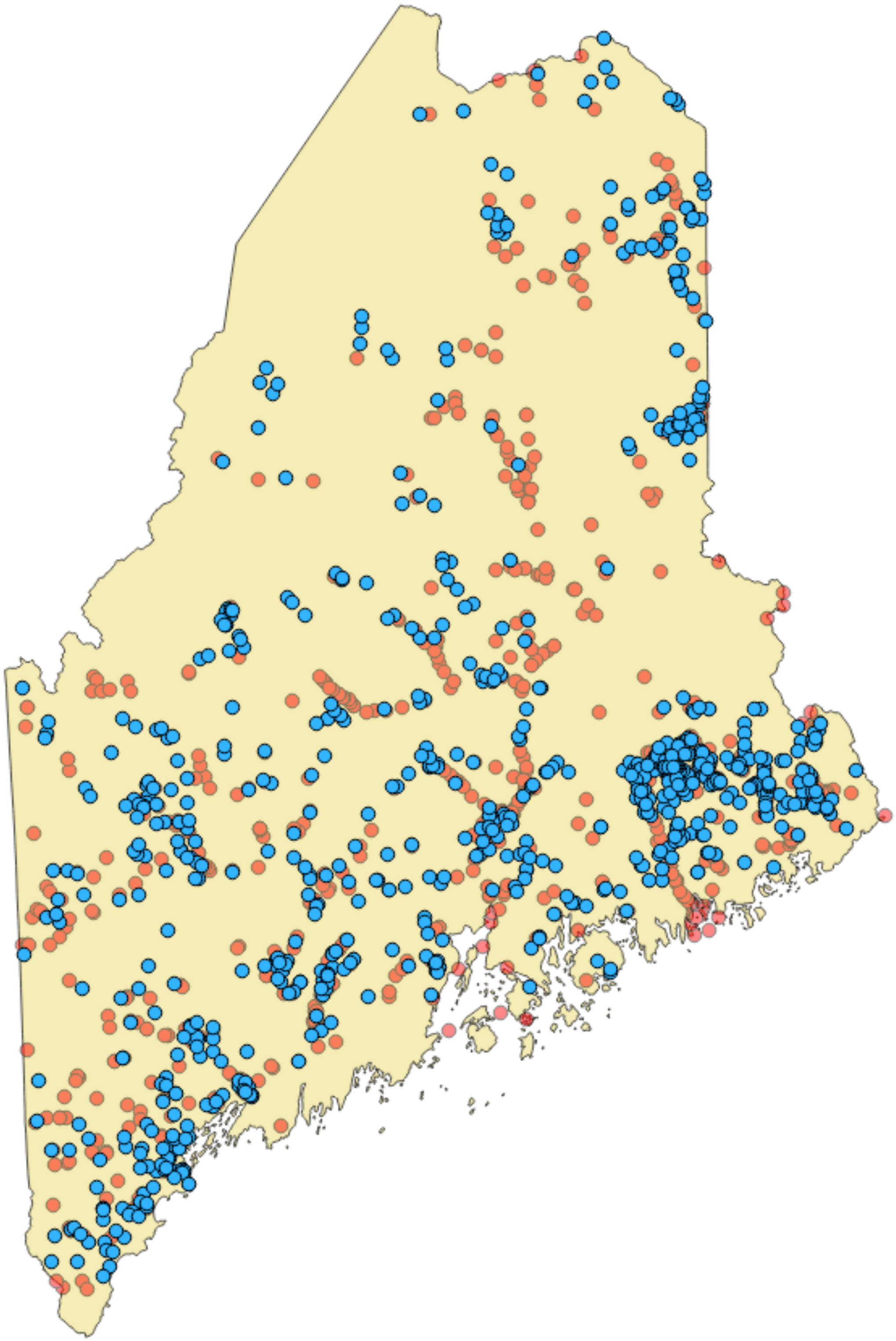
– 2 Open Water LU > 50%
– 138 Flowline Distance > 60 m
– 295 Secondary in Catchment



Station Screening

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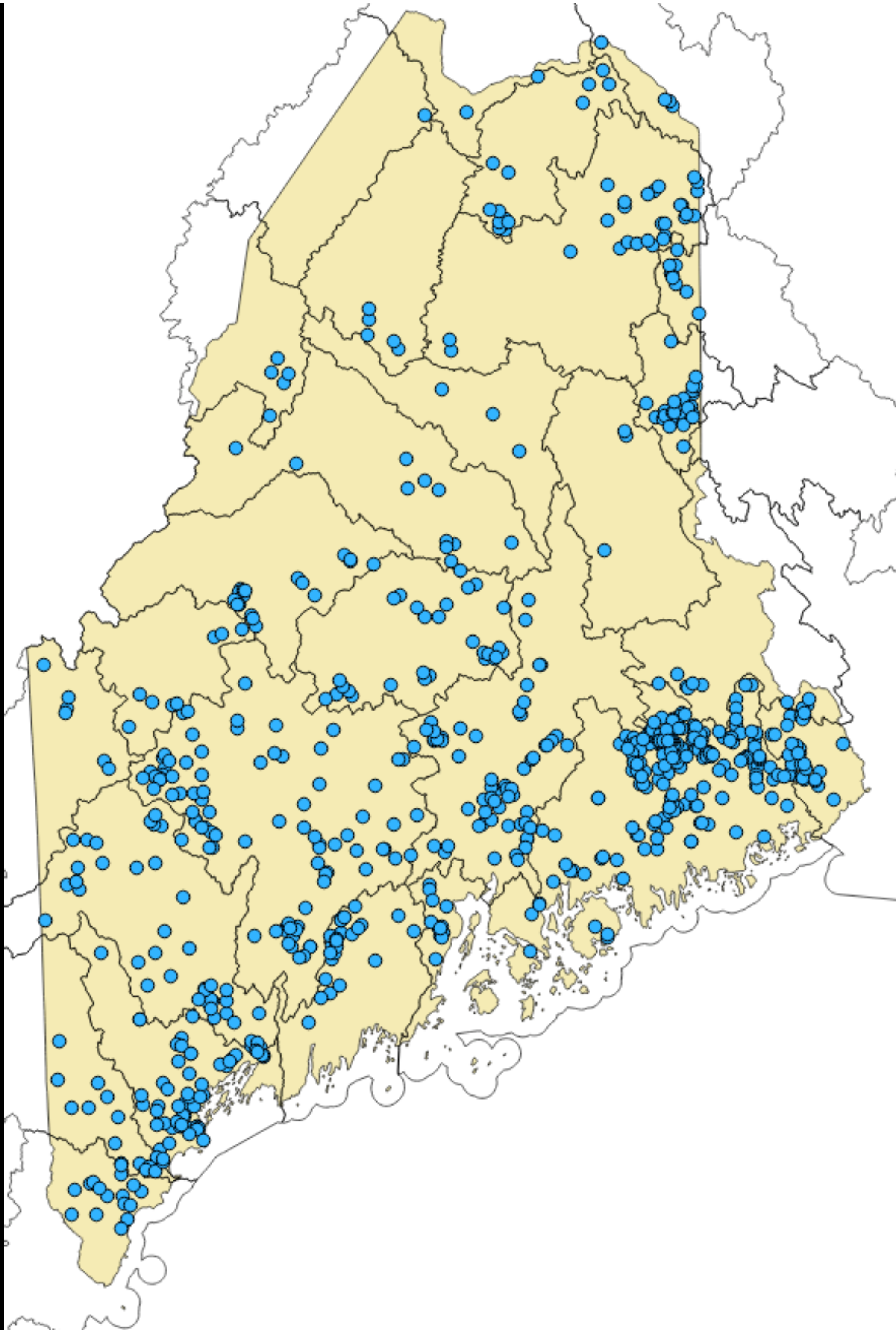
– 295 Secondary in Catchment

= 732 Selected Stations (40% of Total)



Process Data

Raw Data:
732 Stations
1,399 Time Series
13,844,458 Measurements

Temperature QAQC &
Daily Aggregation

Model Input Dataset:
530 Catchments
25 HUC8s
1,099 Time Series
105,298 Daily Mean Values

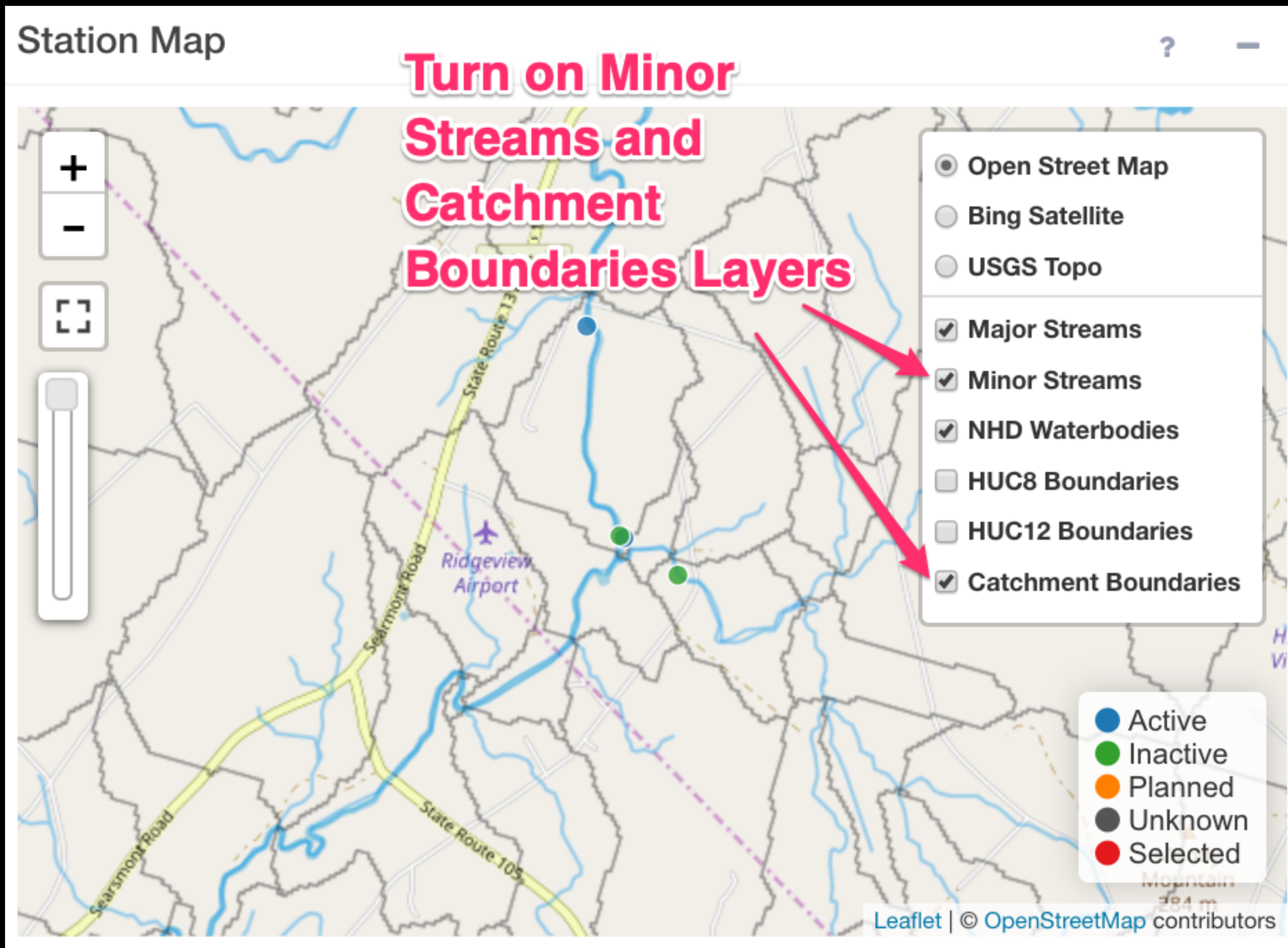
Stream Temperature Model

Q: Where should we put more loggers to improve model performance?

A1: Any location that will meet the model selection criteria

1. Places to avoid
   - Tidal Zones
   - Impoundments
   - Large Drainage Areas (> 200 km^2)
   - Catchments with existing stations
2. Places to target
   - On the main flowline
   - Near the pour point of the catchment

How do I find the main flowline and pour point of a catchment?



Part 2

How does each station contribute to the model calibration?

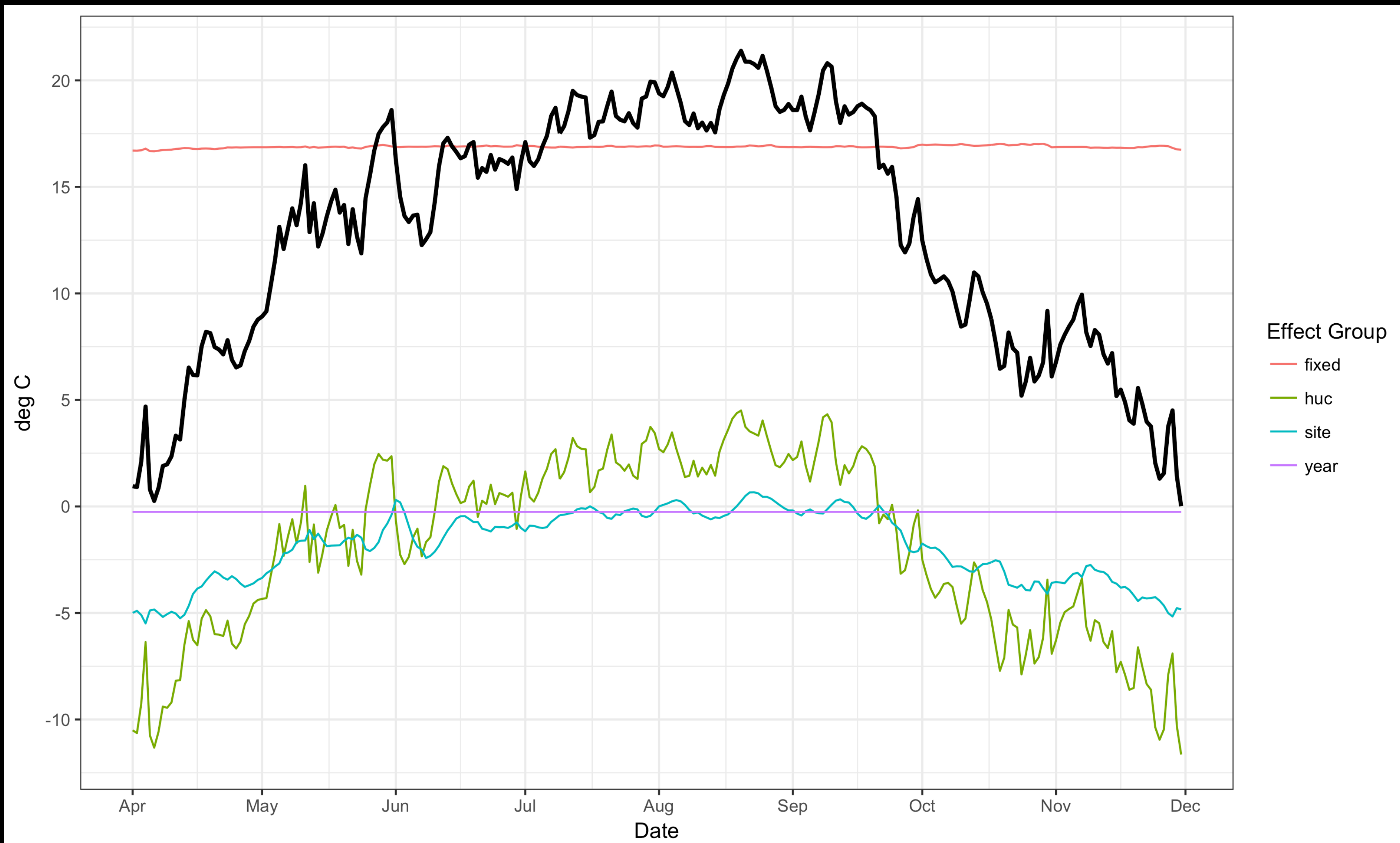
Model Equation

$\beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \cdots$

$$Temp_{huc,catchment,year,day} = X_{fixed}B_{fixed} + X_{huc}B_{huc} + X_{catchment}B_{catchment} + X_{year}B_{year}$$

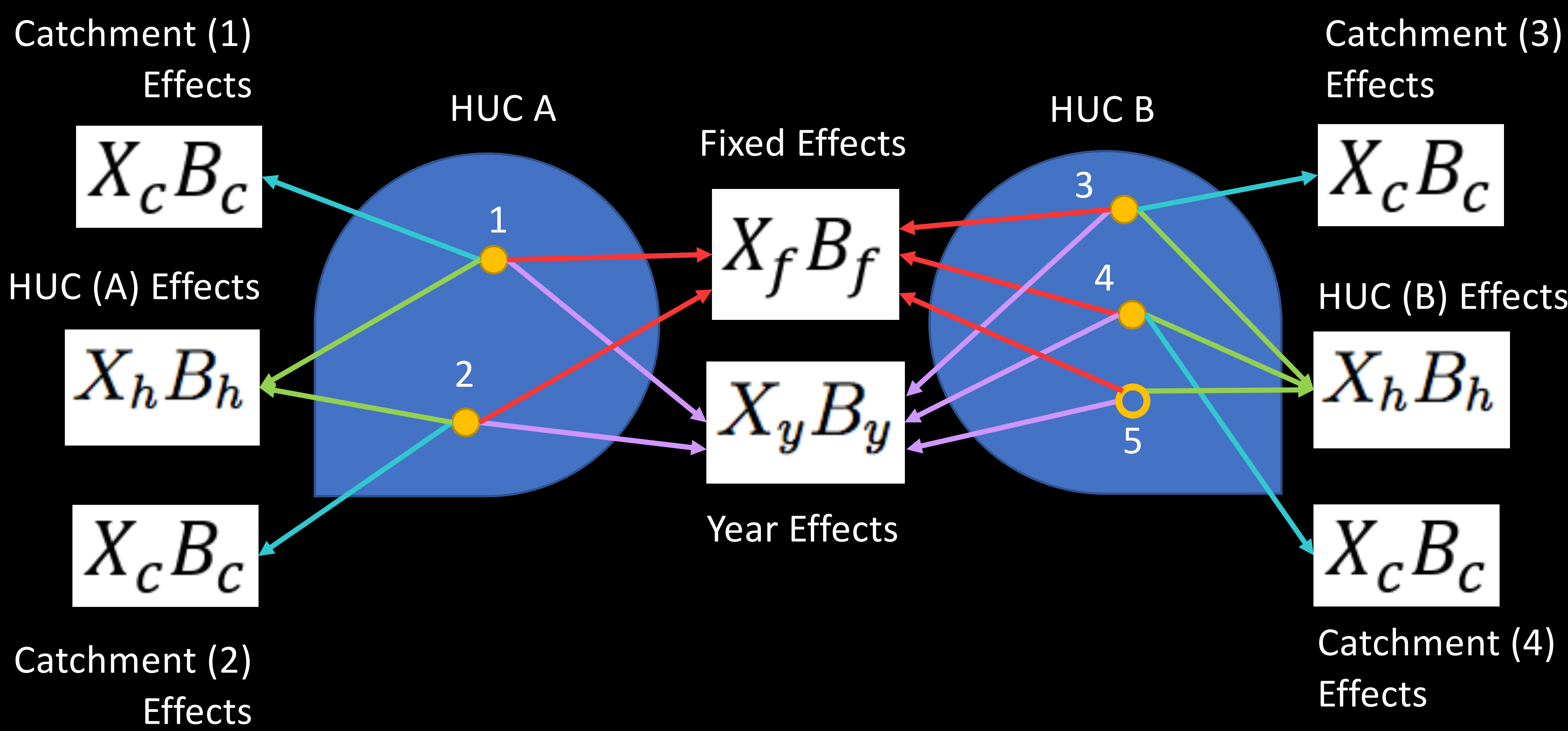
$$T_{h,c,y,d} = X_f B_f + X_h B_h + X_c B_c + X_y B_y$$

Example Calculation



$$T_{h,c,y,d} = X_f B_f + X_h B_h + X_c B_c + X_y B_y$$

Hierarchical Nesting



$$T_{h,c,y,d} = X_fB_f + X_hB_h + X_cB_c + X_yB_y$$

Stream Temperature Model

Q: Where should we put more loggers to improve model performance?

A2: Any catchment where you want more accurate model predictions,

or any HUC that doesn't have many stations

Stream Temperature Model

- New model versioning
- New model documentation
- New model downloads

http://ecosheds.org/models/stream-temperature/latest/

ICE Updates

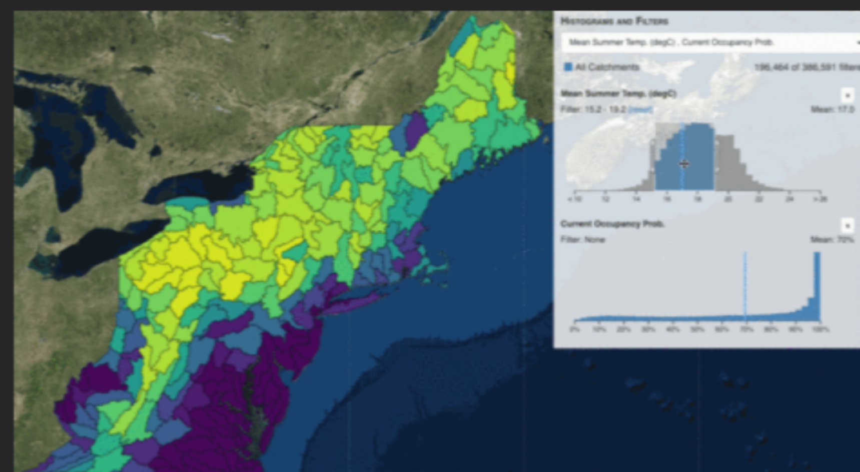
Interactive Catchment Explorer part of the Spatial Hydro-Ecological Decision System

What is ICE?

The Interactive Catchment Explorer (ICE) is a dynamic visualization interface for exploring catchment characteristics and environmental model predictions.

ICE was created for resource managers and researchers to explore complex, multivariate environmental datasets and model results, to identify spatial patterns related to ecological conditions, and to prioritize locations for restoration or further study.

ICE is part of the Spatial Hydro-Ecological Decision System (SHEDS).



Launch ICE ›

http://ice.ecosheds.org

Questions?