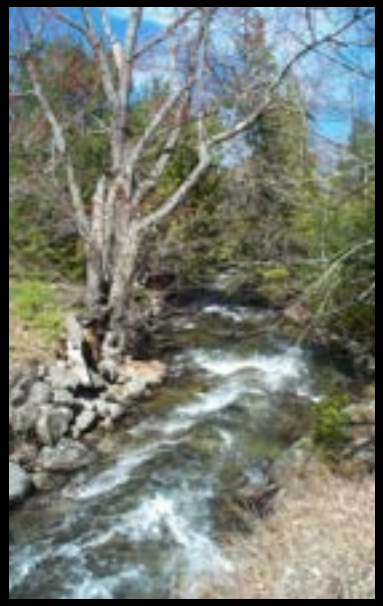
Water Temperature Monitoring and Modeling

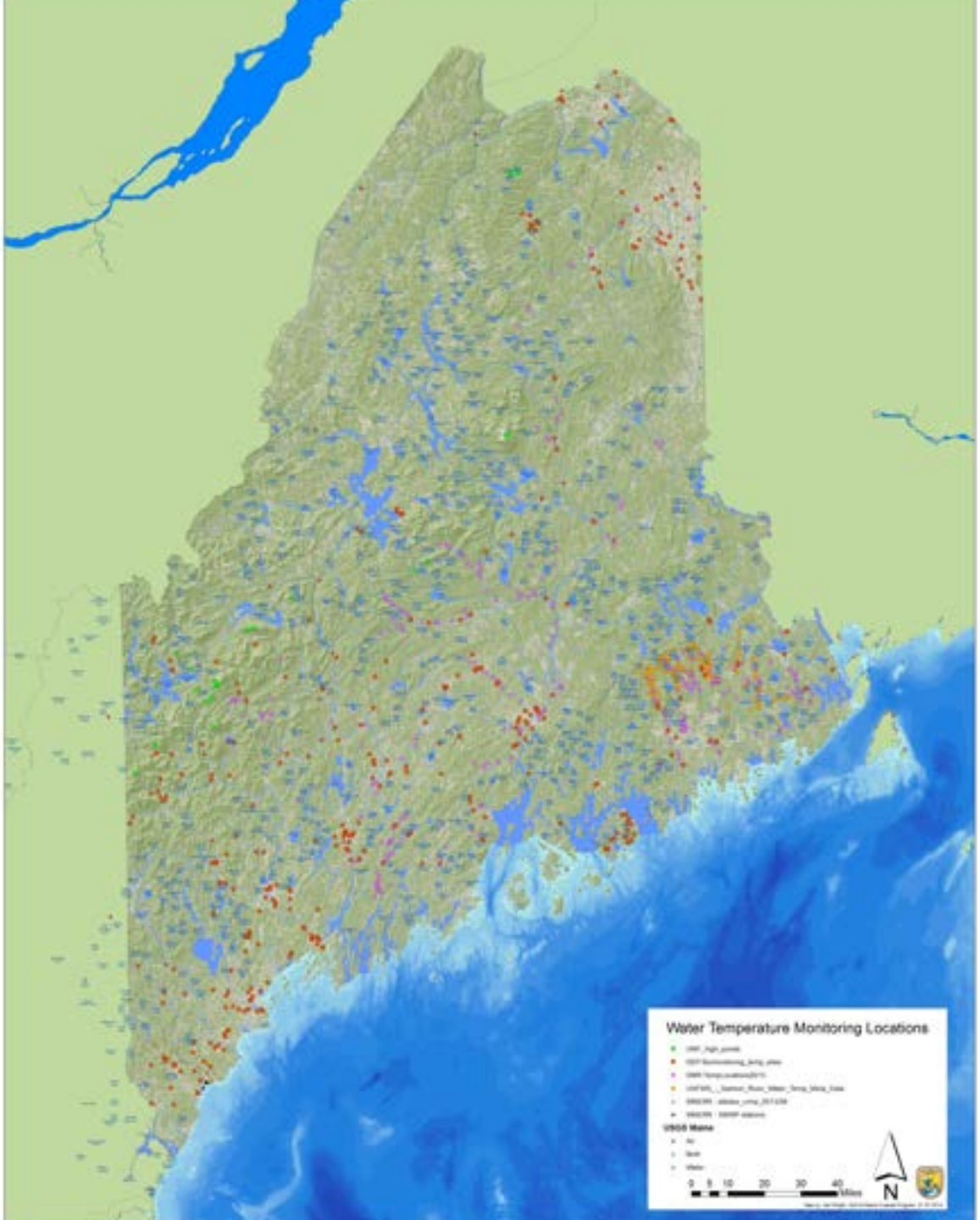


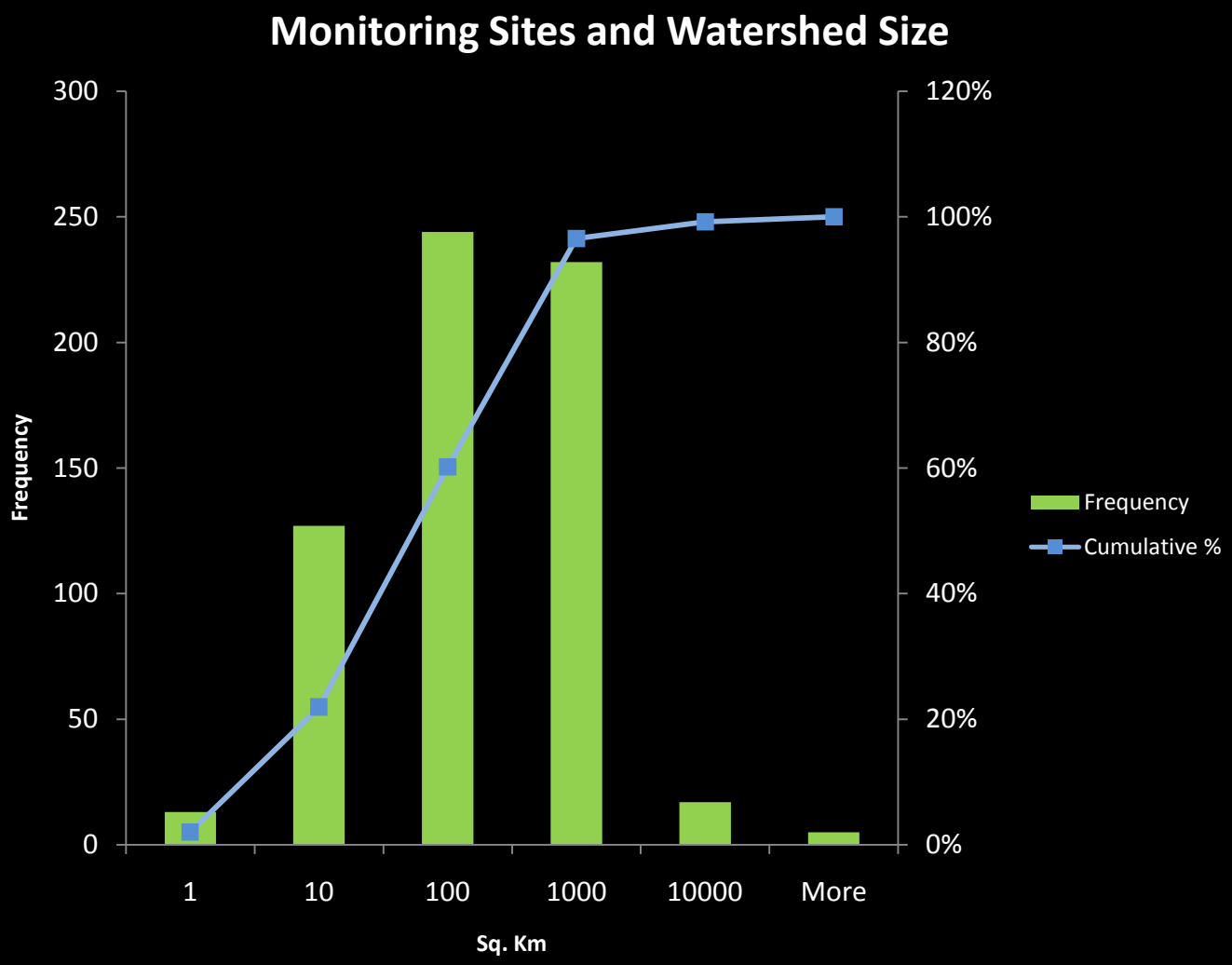
Fisheries Improvement Network

Jed Wright
Gulf of Maine Coastal Program
U.S. Fish and Wildlife Service
November 6, 2014

Objectives

- Develop stream temperature monitoring network
- Collect standardized year-round stream temperature data
- Provide easy storage, access and analysis of stream temperature datasets
- Identify areas that are more resilient to temperature increases

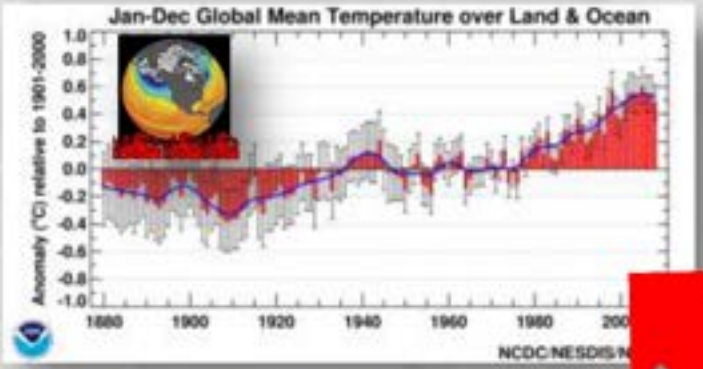

Water Temperature Monitoring Locations
USGS Maine
0 5 10 20 30 40
Miles
N

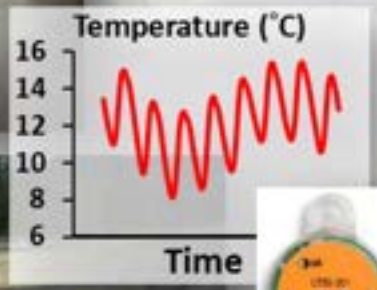

Monitoring Sites and Watershed Size
300
250
200
150
100
50
0
Frequency
120%
100%
80%
60%
40%
20%
0%
1
10
100
1000
10000
More
Sq. Km
Frequency
Cumulative %

Monitoring & Modeling Stream Temperatures: Lessons Learned in the Rocky Mountains with Utility for Maine?

Dan Isaak, US Forest Service

Rocky Mountain Research Station





More Longterm, Annual Monitoring Needed

Inexpensive, reliable "epoxy protocol"

Annual Flooding Concerns

Underwater epoxy cement

$130 = 5 years of data

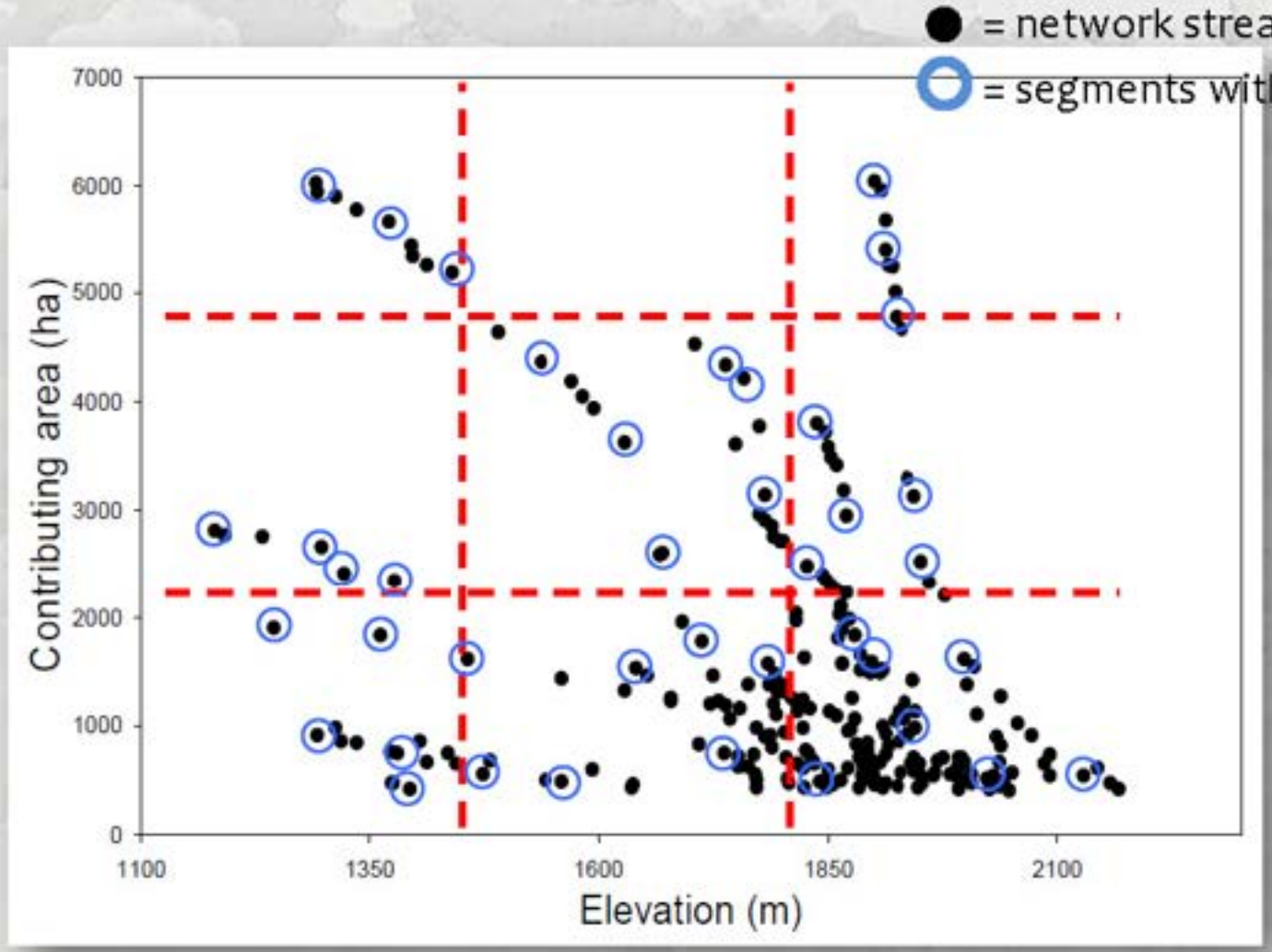
Sensors glued to large boulders & bridges

Data retrieved from underwater

Isaak et al. 2013. USFS Report;

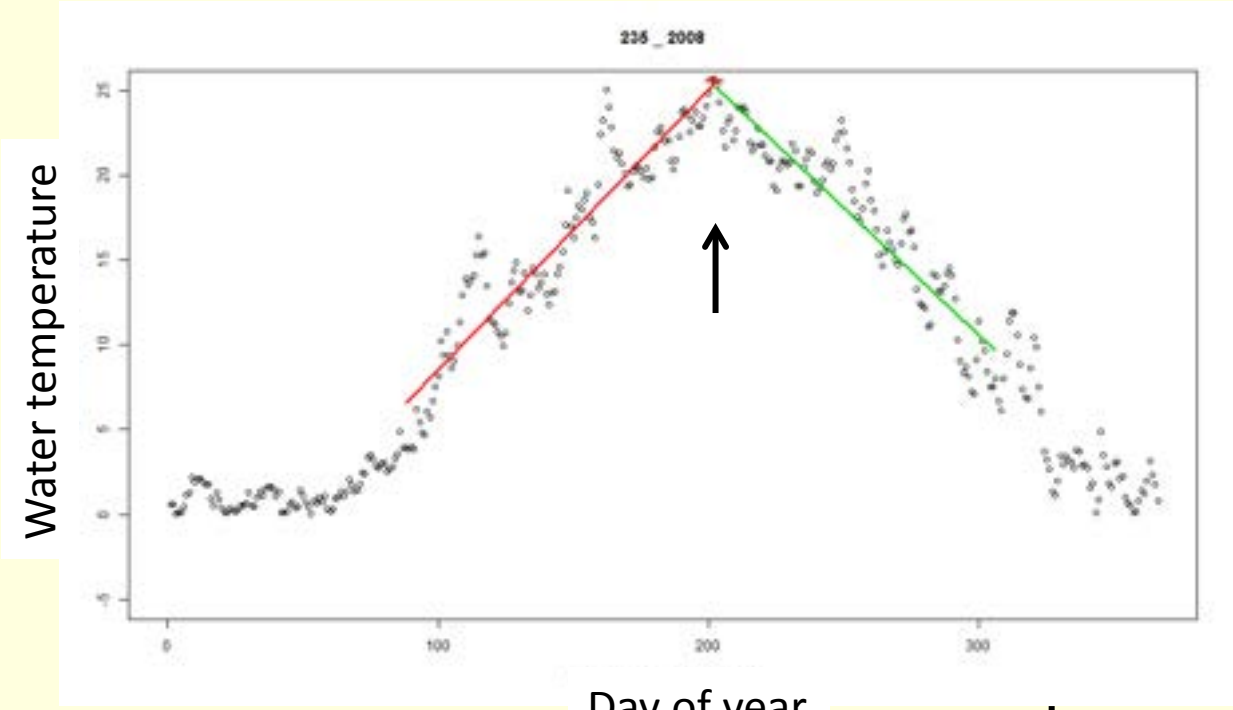
Isaak & Horan 2011. ***NAJFM*** 31:134-137

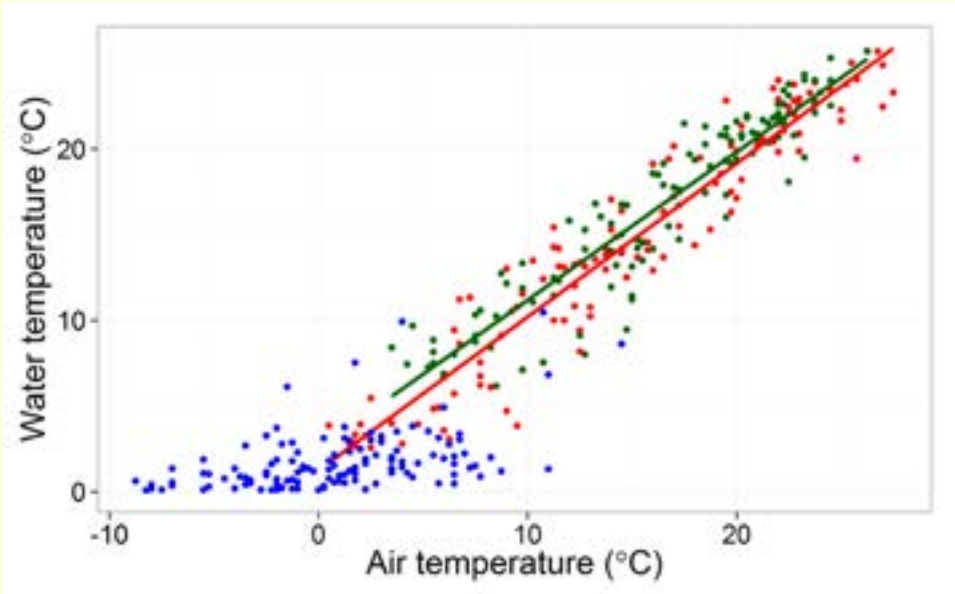
Sample Sites Representative of Full Network Gradients

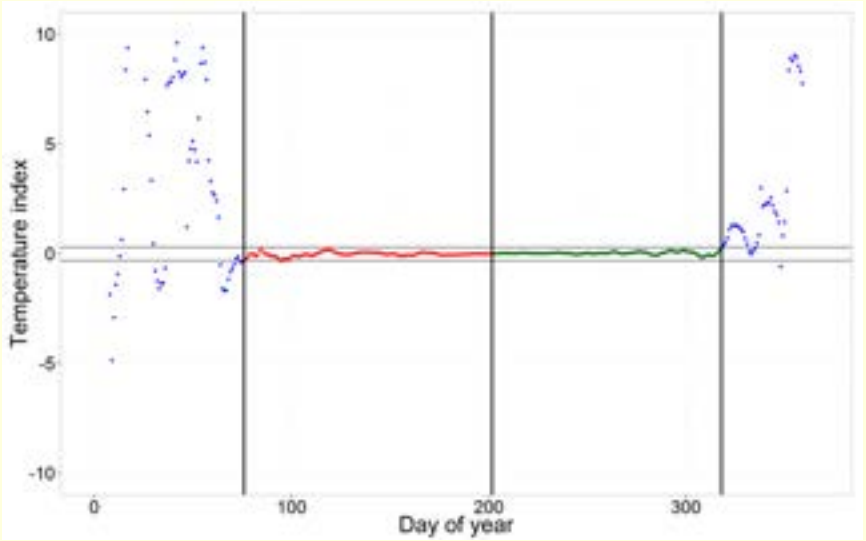


Plots easily developed from reach descriptors already linked to NHDPlus hydrography layer

When are stream and air temperature synchronized?

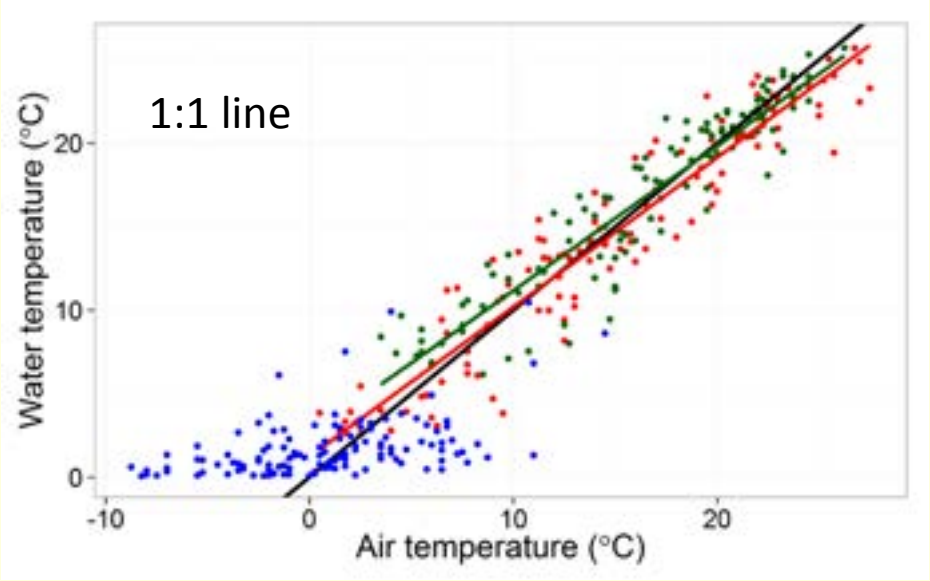




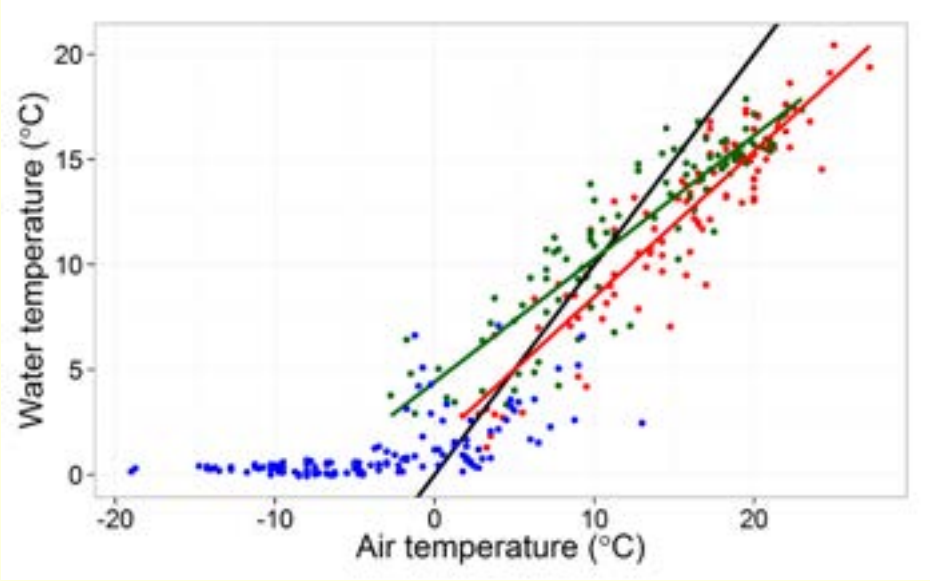


Metrics

Less resilient



More resilient



Slopes ~ resilience to air temperature change

NALCC/NECSC
Basin Characteristics
Stream Environment
Fish
Layer Control
Summer Max Temp
Opacity
100%
Previously Viewed
Show Flowlines
Outline: Huc 4 Grey
Basemap: OpenStreetMaps
Legend
Saint John
Eastport
Legend
Summer Max Temperature
NA
less than 0
0 - 10
10 - 15
15 - 20
20 - 25
greater than 25
Latitude:
Longitude:
Username
Password
Log In
Register

- Conduct a comprehensive inventory of existing water temperature monitoring data.
- Identify a network of 'reference sites', intended to be maintained in "perpetuity".
- Develop minimum standards for data collection methods for a project to meet so that its water temperature observations can be usable in a regional network analysis.
- Develop databases and distribution network for Maine water temperature data.