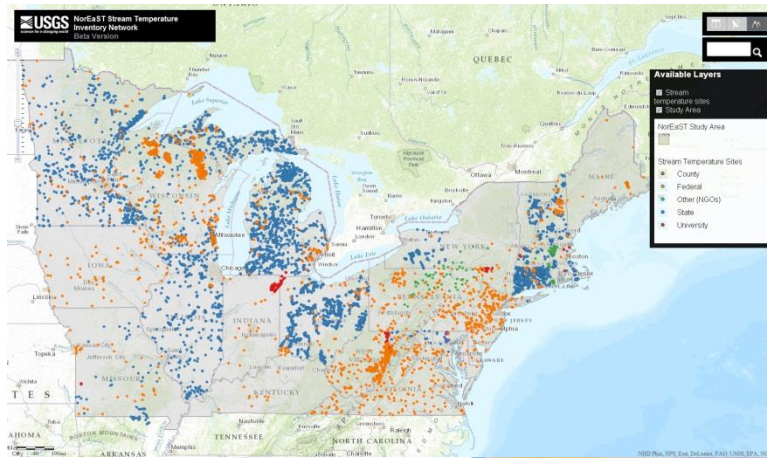
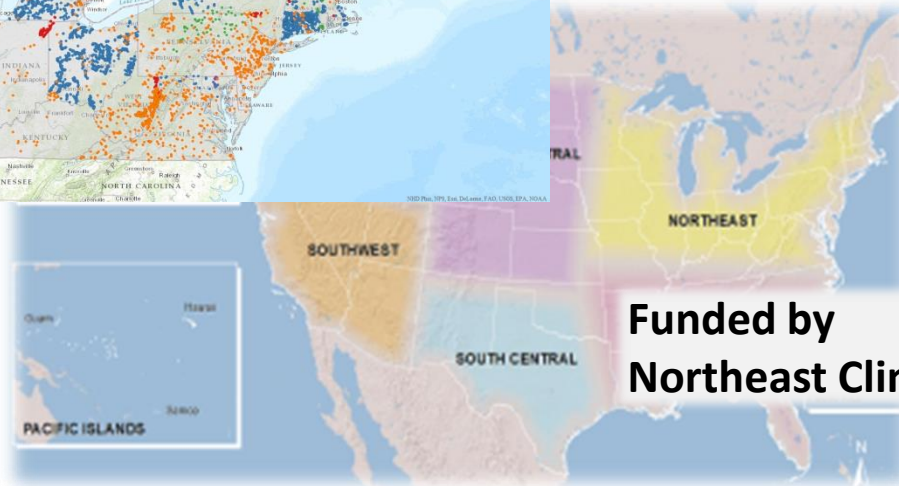


NorthEast Stream Temperature Inventory (NorEaST)

A Stream Temperature Inventory Network and Decision Support Metadata Mapper for North East U.S.



Jana Stewart
USGS Wisconsin Water Science Center



Funded by
Northeast Climate Science Center

WHAT ?

NorEaST - A stream temperature inventory mapper and data portal for evaluating climate effects on New England, Mid-Atlantic, and Great Lake state streams

Develop NorEaST Stream Temperature Web Portal

Community of interest

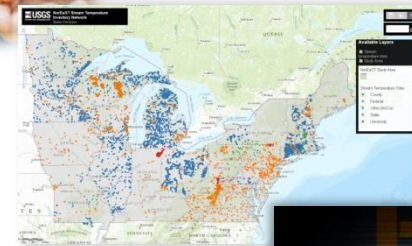
- Coordinate
- Connect
- Multi-state/agency

Mapper

- Locations and inventory
- Continuous records

Database

- Connect existing databases through web services
- Build/provide a template to store file-based data



WHO ?

Principal Investigator:

Jana Stewart, USGS **WI** Water Science Center (WSC)

Co-Investigators:

Marcus C. Waldron, USGS **MA** Water Science Center

David Armstrong, USGS **MA** Water Science Center

Jim McKenna, USGS Great Lakes Science Center, **NY**

Dana Infante, **MI** State University

Kevin Wehrly, Institute for Fisheries Research, MI DNR

***Post-Doctoral Associate:** Yin-Phan Tsang, MI State University*

Team Members:

Blake Draper, USGS WI Water Science Center

Nate Booth, USGS WI Water Science Center

Gary Latzke, USGS WI Water Science Center

*Jon Morrison, **CT** Water Science Center*

*Bill Davies, USGS **MD/DC** Water Science Center*

*Jen Krstolic, USGS **VA** Water Science Center*

Brian Hasty, USGS VA Water Science Center



Distributed/coordinated team
located across 10 States

Coordinate with modeling team (Polebitski and others)

Bringing people, data, and models together – addressing impacts of climate change on stream temperature

Project type

Stakeholder-Identified Research Project

Project leader:

Austin Polebitski, U Mass/ U. Wisconsin-Plattville

Co-PIs:

Ben H. Letcher, USGS-BRD, CAFRC

Yi-Chen E. Yang, Dept of C.E.Eng., UMass

Keith H. Nislow, USFS, Northern Research Station

Richard N. Palmer, Dept of C.E.Eng., UMass

Casey M. Brown, Dept of C.E.Eng., UMass

Project Partners



Wisconsin Water Science Center

Landscape Conservation Cooperatives (LCCs)

US Geological Survey (USGS) Science Centers

Team Members:

Kyle O'Neill, UMASS

Lynne Brennan, UMASS

Jodi Whittier, Univ of MO

This study will gather existing stream temperature data, identify data gaps, deploy temperature monitoring to these locations, and compare state-of-the-art stream temperature models across the Northeast domain.

Coordination with other efforts

- **USGS project (J. Deacon, NAWQA/NH WSC)**
A National Compilation and Inventory of Water-Quality Monitoring Data
- **J. Jacobs, UNH;** **N. Detenbeck, EPA;** **J. Morrison, USGS**

WHERE ?

NE U.S. a region with diverse characteristics and activities

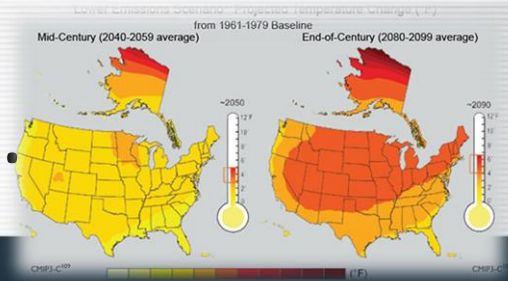


22 states, 10 of the 21 LCC regions,
over 130 million people and multiple ecoregions

- **Extreme range** in environments and threats
- **Complex climate predictions** of regional impacts
- **Complex history** of species extirpations, invasions, range extensions, and restorations
- **Limited federal lands**, pattern of ownership and management dominated by relatively small and privately owned parcels
- **Wide array** of stakeholders



Why are we doing this.....



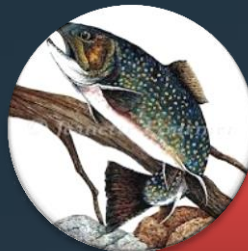
Stream data for the northeastern U.S. are needed to enable managers to understand baseline conditions, historic trends, and future projections of the impacts of climate change on stream temperature and flow, and in turn on aquatic species in freshwater ecosystems.



Climate change



Stream temperature

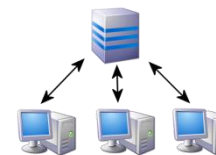
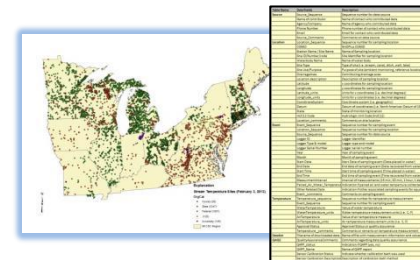
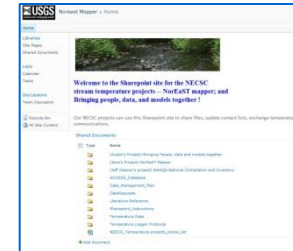


Fish



Approach

- **Coordination and Outreach**
- **Data Acquisition**
 - Sites
 - Data
- **Mapper**
- **Database**



Approach Coordination and Outreach

USGS Northeast Mapper - Home

Home
Libraries
Site Pages
Shared Documents
Lists
Calendar
Tasks
Discussions
Team Discussion

Recycle Bin
All Site Content

Shared Documents

Type	Name
Folder	(Austin's Project)-Bringing People, data and models together
Folder	(Dana's Project)-NorEaST Mapper
Folder	(Jeff Deacon's project) NAWQA National Compilation and Inventory
Folder	ACCESS_Database
Folder	Data_Management_Plan
Folder	DataRequests
Folder	Literature-Reference
Folder	Sharepoint_Introductions
Folder	Temperature Data
Folder	Temperature Logger Protocols
Folder	NECSCs_Temperature_projects_phone_list

Add document

North East Stream Temperature (NorEaST) Inventory
A Stream Temperature Inventory for the Northeast Climate Science Center

Introduction. The U.S. Geological Survey and University of Massachusetts stream temperature metadata across the Northeast Climate Science Center web-based decision support mapper and data portal to display and integrate monitoring locations and networks. Stream temperature is a key factor in aquatic organisms and affects nearly all aspects of stream ecology and was change is expected to alter stream temperature and flow regimes over the influence distributions of aquatic species in those freshwater ecosystems. If changes, there is a need to inventory, compile, and collect both short-and data.

Purpose. This project will compile information from multiple agencies and temperature data and monitoring locations and networks in New England a Stream temperature metadata will be combined into a common format in and map the information across agencies.

Data Inventory. Data stewards will be contacted and provided with a list associated with stream temperature data such as monitoring agency, site location of monitoring, etc. The data collection will target information for continuous temperature measurements that are reflective of average temperature conditions regarding additional measurements or sample collections such as paired air other aquatic biota will also be collected. The data retrieval, compilation, inventory, and continuous stream temperature data will be closely coordinated with similar data-compilation efforts conducted other Federal and State agencies, Universities, and private organizations.

Products. Data portal capabilities and a common framework will be developed for use by data to manage and upload stream temperature data, and a web-based decision support mapper will be developed to display, integrate, and share metadata.

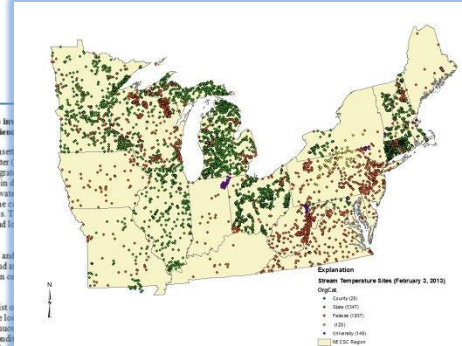
Benefits. The stream temperature inventory and project products will provide information needed wide variety of uses including identifying spatial and temporal gaps in existing data collection of planning future stream temperature monitoring locations, and evaluating historic and long term trends in addition to providing data useful for studying the effects of climate change on aquatic resources, project will also build a community of contacts and provide an opportunity for agencies collect temperature data for a variety of purposes - such as fisheries management, waterbody assessment planning - to coordinate and eliminate duplication of effort, and provide potential benefits of data.

Project Coordination. This effort is being coordinated across three related projects that include:

Project: A Stream Temperature Inventory and Decision Support Metadata Mapper - The Resource to Understand Climate Change Effects on Streams in New England and the Great States. Funded by the NE Climate Science Center
Primary Contact: Jana Stewart, jstewart@usgs.gov, 608-821-3855

Project: Bringing People, Data, and Models Together - Addressing Impacts of Climate Change Stream Temperature. Funded by the NE Climate Science Center
Primary Contact: Austin Polebinski, polebinski@ecf.umass.edu, 413-577-1275

Project: A National Compilation and Inventory of Water Quality Monitoring Data. Funded by the National Water Quality Assessment Program
Primary Contact: Jeff Deacon, jdeacon@usgs.gov, 603-236-7812



Location	Agency/Company	Name of agency who contributed data
Phone Number	Phone number of contact who contributed data	
Email	Email for contact who contributed data	
Source_Comments	Comments on data source	
Location_Sequence	Sequence number for sampling location	
COMID	NHDPLUS COMID	
Station Name / Site Name	Name of sampling location	
Site ID/Number/Code	Site identifier for sampling location	
Waterbody Name	Name of water body	
Site Type	Type of site (i.e. stream, canal, ditch, well, lake)	
Site Use/Purpose	Purpose of site (ambient monitoring, reference location, etc.)	
DrainageArea	Contributing drainage area	
Location Description	Description of sampling location	
Latitude	N coordinate for sampling location	
Longitude	W coordinate for sampling location	
Latitude_units	Units for a coordinate (i.e. decimal degrees)	
Longitude_units	Units for a coordinate (i.e. decimal degrees)	
CoordinateSystem	Coordinate system (i.e. geographic)	
Datum	Datum of coordinates (i.e. North American Datum of 1983)	
State	State of monitoring location	
HUC12 Code	Hydrologic Unit Code (HUC12)	
Location_comments	Comments on site location	
Event	Comments on site location	
Event_Sequence	Sequence number for sampling events	
Source_Sequence	Sequence number for data source	
Logger ID	Logger identifier	
Logger Type & Model	Logger type and model	
Logger Serial Number	Logger serial number	
Year	Year of sampling event	
Month	Month of sampling event	
Start Date	Start Date of sampling event (Date placed in water)	
End Date	End date of sampling event (Date recovered from water)	
Start Time	Start time of sampling event (Time placed in water)	
End Time	End time of sampling event (Time recovered from water)	
MeasurementInterval	Interval of measurements (15 min, 30 min, 1 hour, 1 day, etc.)	
Paired_Air_Water_Temperature	Indication if paired air and water temperature collected (yes, no)	
Other Related Data	Indication if other associated sampling events for aquatic biota	
Event_Comments	Comments on sampling event	
Temperature_Sequence	Sequence number for temperature measurement	
Event_Sequence	Sequence number for sampling event	
Water Temperature	Value of water temperature	
Water Temperature_units	Water temperature measurement units (i.e. C, F)	
Air Temperature	Value of air temperature measure	
Air Temperature_units	Air temperature measurement units (i.e. C, F)	
Approval Status	Approval status or quality assurance	
Temperature_comments	Comments or remarks on temperature measurement	
DataSet	Comments regarding data quality assurance	
QA/QC	Name of file with measurement information and values	
Quality Assurance/Comments	Comments regarding data quality assurance	
QA/QC Status	Indication if QA/QC (yes, no)	
QA/QC Name	Name of QA/QC report	
Sensor Calibration Status	Indicate whether calibration bath was used	
Sensor Calibration Description	Description of calibration bath method	

PHONE LOG

Location/State: _____
 Agency Source: _____
 Contact Name: _____
 Position: _____
 Email: _____
 Phone: _____
 Database/Data format: _____
 Web site: _____
 Monitoring data type (frequency/interval): _____

of sites: _____
 Time period: _____
 Data description: _____

QA/P for Data Collection: _____
 Post download QA/QC: _____
 Additional info: _____

Date of phone call: _____
 Project contact person: _____
 Data received Status: _____
 Data file received: _____
 Data file name(s): _____
 Data file location: _____
 Data Sharing Restrictio: _____

1) CONTACTS
 Identify contacts in your State who collect or store stream temperature data.
 Add contact information to your NorEaST Master Contact spreadsheet on the sharepoint site: <https://xcolaboration.usgs.gov/noremap/2/iePages/Home.aspx>
 Verify whether or not the NAWQA Compilation and Inventory group (Jeff Deacon's) contacted them. OK if they have, but good to know.

3) PRIOR TO PHONE CALL
 Keep brief notes to summarize call in a MS Word doc (use Blank_Phone_Log on Sharepoint)
 Fill out known information prior to call.
 Have the one page summary describing the project and the list of metadata elements available in front of you to describe the information needed and ready to email
 Have this Checklist and Talking Points in front of you

4) MAKE THE CALL
 Describe our project and needs
 Send them a one page summary of our project and a list of desired metadata elements
 Ask about their stream temperature data, data collection efforts, databases; also determine interest in a data portal
 Request their data if it fits our needs
 Discuss possible follow-up conversation or email
 Ask them if they know of other stream temperature data collection efforts

5) AFTER THE CALL
 Summarize the conversation in an MS Word document
 Update the NorEaST Master contact list with information from your call
 Finish your phone call summary notes

6) FOLLOW UP
 Follow up with your contact via email - thanking them for their time and send them the one page summary and list of metadata elements
 Follow up as needed to acquire data

- Distributed team
- Sharepoint
- Weekly conference calls/webinars
- Outreach materials
- project description
- data elements
- phone checklist/talking points
- phone logs
- Existing efforts

Data Acquisition

1. Compile contacts and outreach materials
2. Contact potential contributors
3. Acquire site locations and metadata
4. Acquire temperature data (modeling)
5. Link to NHDPlus
6. Build mapper / Deploy sites on the map
7. Central data storage

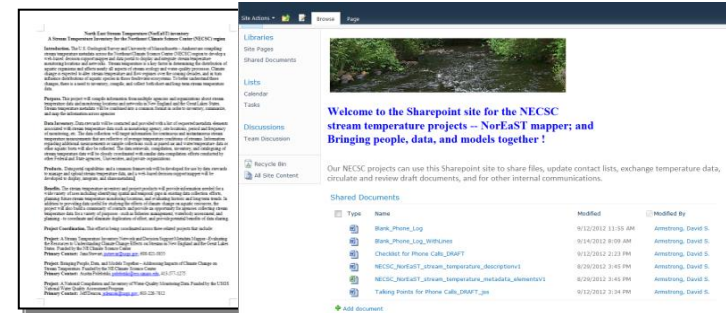
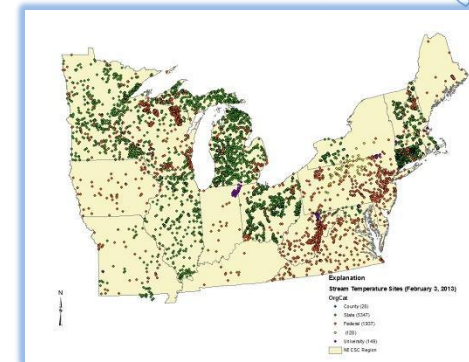


Table Name	Data Fields	Description
Source	Source_Sequence	Sequence number for data source
	Name of contributor	Name of contact who contributed data
	Agency/Company	Name of agency who contributed data
	Phone Number	Phone number of contact who contributed data
	Email	Email for contact who contributed data
	Source_Comments	Comments on data source
Location	Location_Sequence	Sequence number for sampling location
	COMID	NHDPlus COMID
	Station Name / Site Name	Name of Sampling location
	Site ID/Number/code	Site identifier for sampling location
	Waterbody Name	Name of water body
	Site Type	Type of site (i.e. stream, canal, ditch, well, lake)
	Site Use/Purpose	Purpose of site (ambient monitor location, etc.)
	DrainageArea	Contributing drainage area
	Location description	Description of sampling location
	Latitude	x coordinates for sampling locat
	Longitude	y coordinates for sampling locat



WHY ? Meeting contributors needs.....

" There have been several times that we have needed temperature data but didn't know whom to ask or where to look. "

C. Lipsky, NOAA

"We would love to be able to use (the NorEaST Mapper) to deploy our loggers in places where they might best capture useful data (and avoid duplicating another group's dataset). "

H. Elkinton, Merrimack River Watershed Council

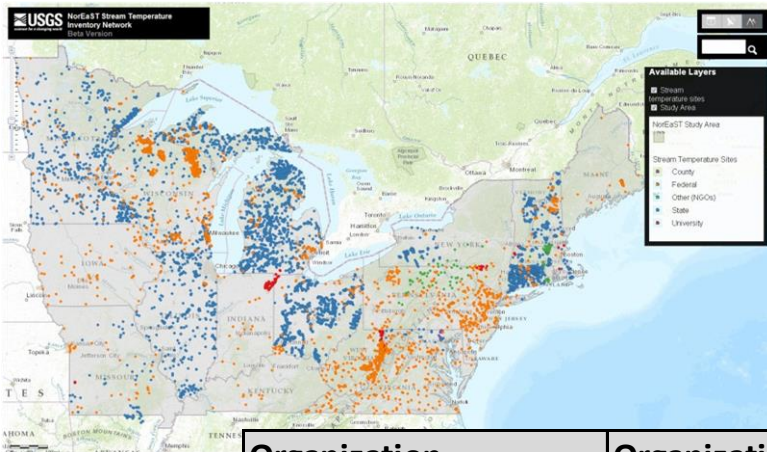
"I'd appreciate any insight you could give on improving the way our (temperature) data is stored. Since it looks like you are looking at many methods, I'd be interested in your thoughts."

S. Collenburg, NJDEP Freshwater Fisheries

So far

Partners contributing to

NorEaST



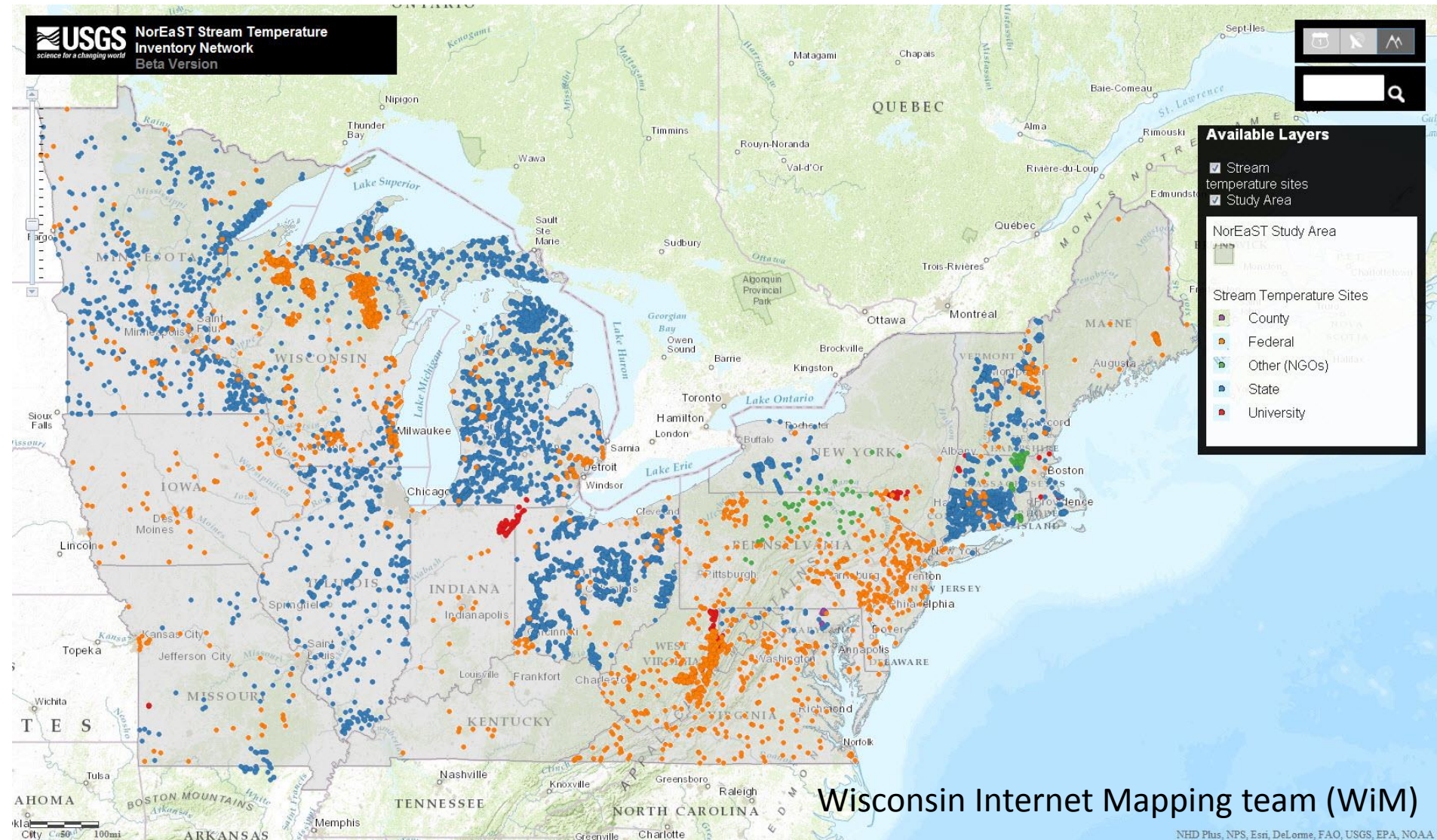
Organization Type	Organization Count	Site Count
Federal	3	2825
State	22	4668
County	1	28
Regional Commissions & NGOs	7	152
University	8	236
Total	41	7909

- Contributors**
- US Forest Service
 - US Geological Survey
 - US Fish and Wildlife Service
 - CT Department of Environmental Protection
 - IA Department of Natural Resources
 - IL Department of Natural Resources
 - IL Environmental Protection Agency
 - IN Department of Environmental Management
 - MA Department of Fish and Wildlife
 - MA Department of Environmental Protection
 - MA Division of Ecological Restoration
 - MD Department of Natural Resources
 - ME Department of Environmental Protection
 - MI Department of Natural Resources (IFR)
 - MN Department of Natural Resources
 - MN Pollution Control Agency
 - MO Department of Conservation
 - NH Department of Environmental Services
 - NH Department of Fish and Game
 - NJ Department of Environmental Protection
 - NY Department of Environmental Conservation
 - OH Environmental Protection Agency
 - PA Fish and Boat Commission
 - Vermont Fish and Wildlife Department
 - WI Department of Natural Resources
 - Baltimore County Department of Environmental Protection
 - Hoosic River Watershed Association
 - French River Connection
 - Nashua River Watershed Association
 - Wood-Pawcatuck Watershed Association
 - Rushing Rivers Institute
 - Susquehanna River Basin Commission
 - Chesapeake Bay Program
 - George Mason University
 - IN Purdue University Fort Wayne
 - Southern IL University
 - University of Virginia
 - University of Massachusetts – Boston
 - Virginia Institute of Marine Science
 - Virginia Commonwealth University
 - West Virginia University

and growing.....

NorthEast Stream Temperature Inventory (NorEaST)

A Stream Temperature Inventory for the Northeast Climate Science Center (NECSC) Region



<http://wim.usgs.gov/NorEaST>

Mapping

Northeast Stream Temperature Inventory (NorEaST) (In progress)



Current Mapper functionality includes:

Basemaps: Change basemaps (streets, imagery, topo maps)

Available Layers: Turn on and off layers

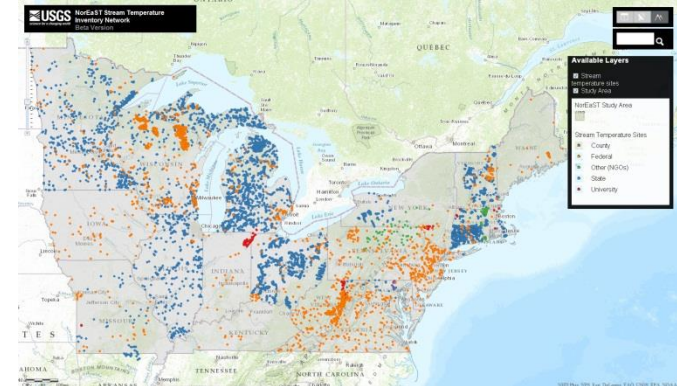
Navigation: Zoom – pan

Pop-Ups: Click on point - get information about location (s)

Zoom to location from Pop-up

Link to USGS NWIS system for USGS sites

Search : type place name; searches basemap



Future Mapper functionality planned:

Add/upload new sites

Queries

Webservice link to database

Other?????



Database and Framework (In progress)



- USGS CIDA



- Will provide direct link to some agencies database

- does not duplicate data
- compliant with agencies' data sharing policy



- Will allows agencies to store temperature data on the data portal

- Instead of building their own databases, agencies have the option to use data storing framework to store, update, and edit data

- Standard Data Schema

- Webservices

- WaterML2 standards



Data storage formats (Excel, Access, Hobo, Csv.....

and measurement sensors

come on many shapes and sizes



WaterLog



Onset Tidbit



Onset WaterTemp Pro



Onset Water Level



Campbell Scientific

Data Loggers

Sondes

Alcohol thermometers

Meters



In-Situ Troll



Hydrolab

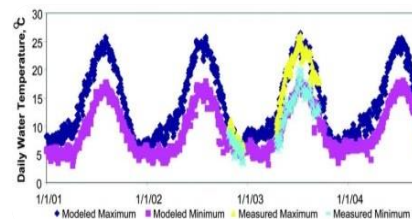
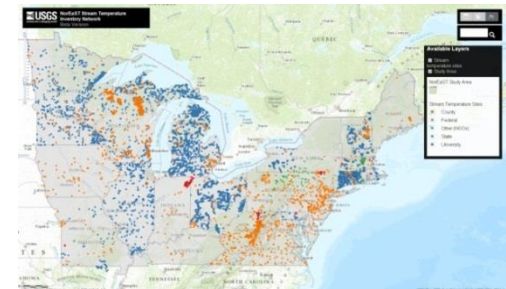


iButtons



Benefits to contributors

- build a **community** of contacts
- Identify **monitoring gaps** (spatial and temporal)
- encourage **leveraging in future monitoring** efforts across agencies
- monitoring **locations linked with NHDPlus**, and indices can return back to agencies
- **mapper to view, upload...**, and interrogate site information
- **data storage framework** to store, update, and edit data
- **temperature models** for some states/regions will be built
- Provide data framework for **comparison, regional analysis, and applications**



Northeast Stream Temperature Inventory (NorEaST) (In progress)



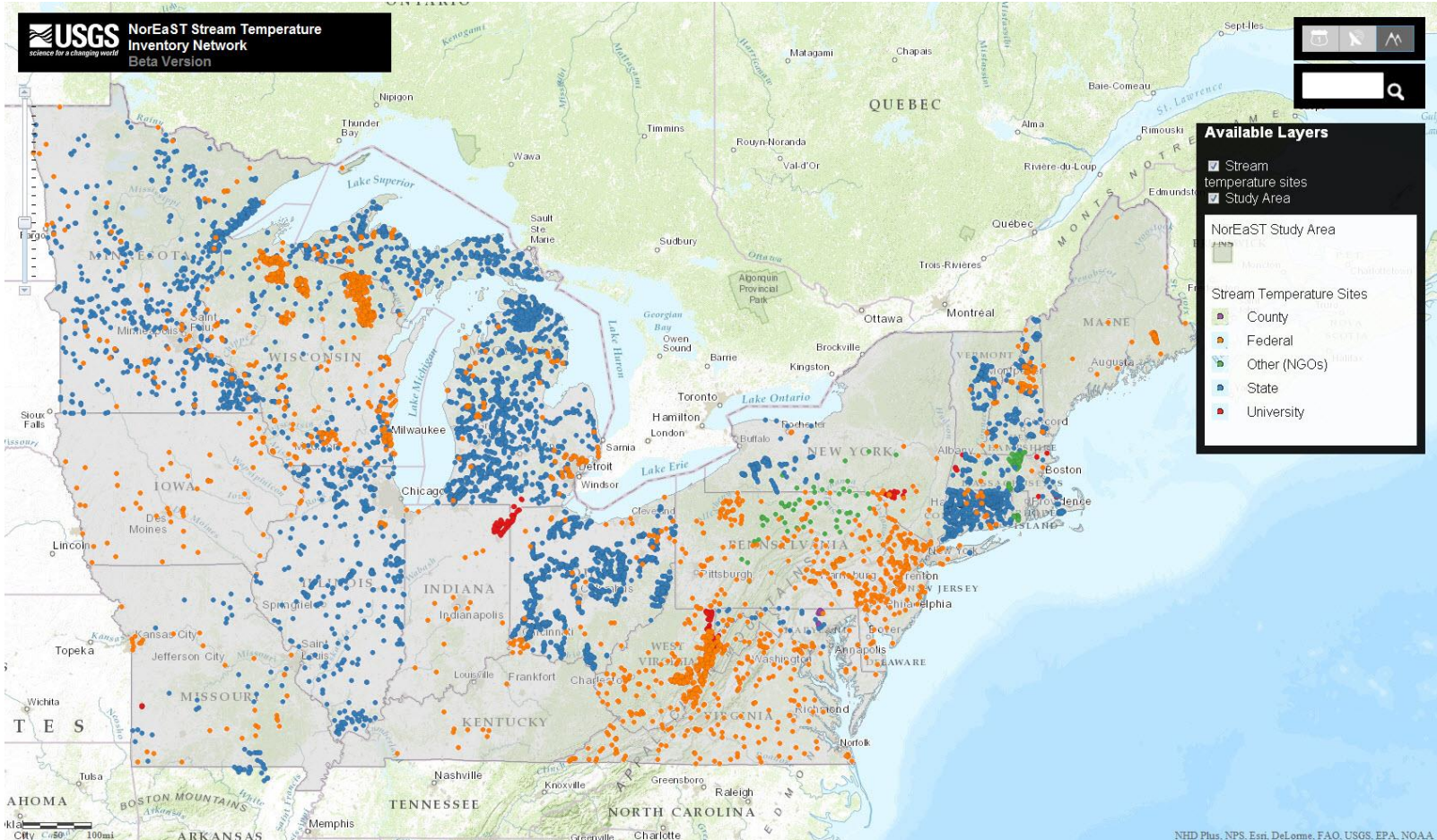
Future work...

“NorEaST stream temperature web portal demonstration and application”

Objectives

- Data cleanup
- Stakeholders Workshop
- Applications
 - Summary Stats
 - Fish Thermal Relations
 - Modeling

QuestionsDemo



<http://wim.usgs.gov/NorEaST>