

WQX User Call
April 25, 2019
12:00 – 1:00 PM EST
202-991-0477 ID: 4189172

Webinar: <http://epawebconferencing.acms.com/wqp/>

There were approximately 27 participants.

Next WQX User Meeting: Thursday, May 23, 2019

Agenda:

- 1) Freshwater Explorer Demo - Susan Cormier, OST
- 2) Domain Value Change Notification Alert FTP Site -
ftp://newftp.epa.gov/storet/wqx/domain_alerts/
 - Characteristic and Taxonomic names
 - deprecated, retired, and duplicate value resolution

1) Freshwater Explorer Demo – Susan Cormier, OST
PowerPoint Presentation is available at:
[ftp://newftp.epa.gov/storet/xfer/How/2019-04-25/
WQX_presentation_Freshwater_Explorer_20190422.pptx](ftp://newftp.epa.gov/storet/xfer/How/2019-04-25/WQX_presentation_Freshwater_Explorer_20190422.pptx)

The Freshwater Explorer is an interactive web-based tool that provides the status of salt and mineral content in freshwater resources for streams in the lower 48 states. The data is comprised of both WQX and NWIS data from WQP.

The tool was developed to make salt and mineral content information more accessible to users by providing information on the status of water resources for a network of streams and predicting and measuring freshness. Susan explained how the model was created and discussed the issues found with the data reported in WQP. When ORD started they tossed 50% of the data. Then they decided to flag data with issues.

Erroneous data such as salt contents with negative counts, data reported as $\mu\text{S}/\text{cm}$ but likely measured as mS/cm need to be addressed. Susan asked data stewards to review their data by reviewing the spreadsheet she referenced. Data is broken down by state and each organization is listed. The spreadsheet contains a worksheet to select the link to and query the questionable data in WQP.

The spreadsheet is located at: [ftp://newftp.epa.gov/storet/xfer/How/2019-04-25/
WQP_Data_Summarization.xlsx](ftp://newftp.epa.gov/storet/xfer/How/2019-04-25/WQP_Data_Summarization.xlsx)

The plan is for ORD to release the application. ORD would like feedback on the application and data stewards to help cleaning up the data flagged for issues. ORD would like pull the data

from the WQP again before publishing the Storybook. ORD also plans to make an explorer tools for other parameters such as nitrogen.

Susan opened the floor to questions:

- Dwane Young reminded data stewards that WQX business rule require the entire sample to be uploaded. Correction submissions for Individual results require the uploading the entire sample. If the entire sample is updated, it will overwrite all the information for that sample.
- Dwane confirmed that the $\mu\text{S}/\text{cm}$ to mS/cm units are input into WQX that way and are not translated by WQP. If it goes into WQX that way, then it comes out in WQP that way.

2) Domain Value Change Notification Alert – Kevin Christian

ftp://newftp.epa.gov/storet/wqx/domain_alerts/

- a. Characteristic and Taxonomic names – are impacted by our reference systems SRS Characteristics, Taxon – ITIS and Bio Data
- b. deprecated, retired, and duplicate value resolution

One of the challenges in stewarding WQX domain values is communicating domain changes to the user community.

Characteristics and Taxonomic names are updated on a daily basis. They are impacted by reference systems, SRS for Characteristics and ITIS and Biodata for Taxonomic names.

The WQX will leverage the ftp site to keep the user community informed on updates to Characteristics and Taxonomic domains. An update for Characteristic changes was recently sent out. Kevin is hoping to release an update for Taxonomic name changes and the impacts to organizations.

ITIS system is fully vetted. Diatoms are always changing and ITIS tracks this information. Kevin references ITIS for retired diatoms. He retires Latin names that are synonyms of valid taxon names. Kevin explained he has had to unretired names as they have been made valid after they were flagged to be retired.

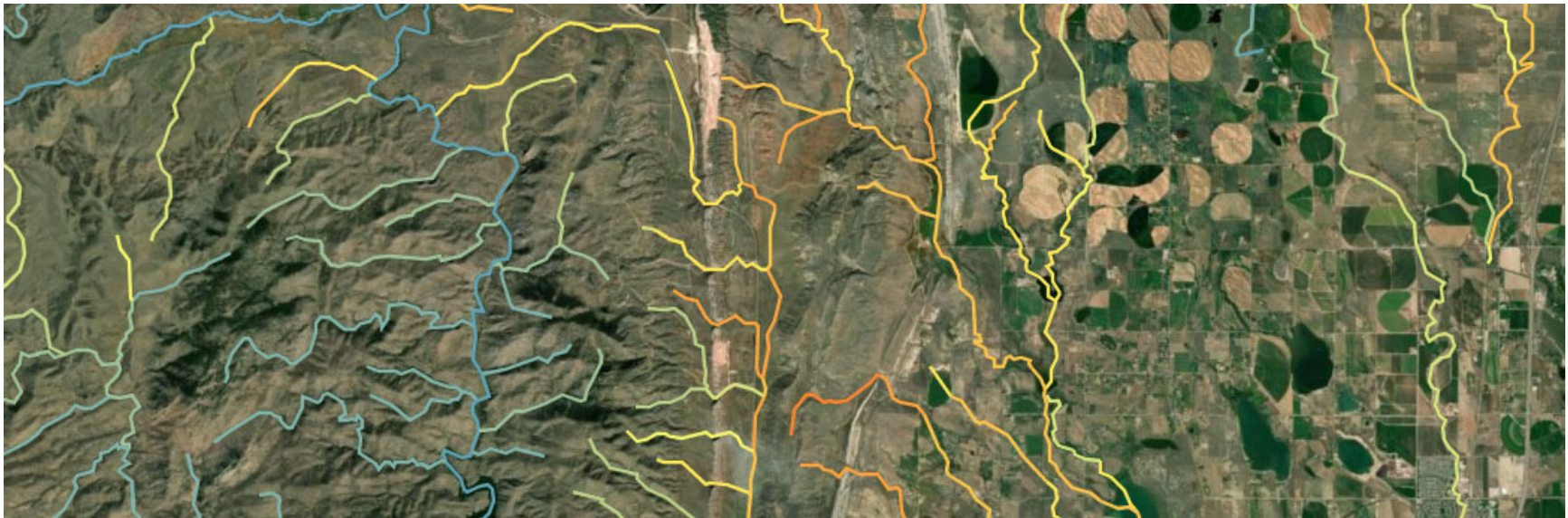
Kevin asked users to provide feedback on the Domain Value Change Notification process.

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Enclosed is the PowerPoint presentation for Freshwater Explorer Demo - Susan Cormier, OST

Freshwater Explorer

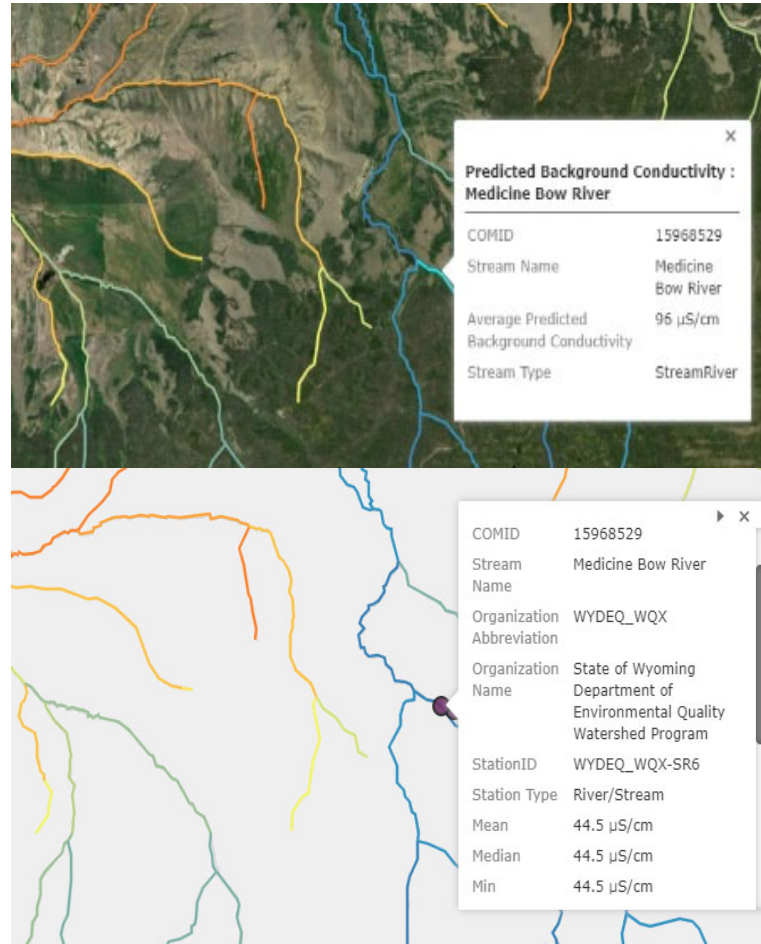
a database story map



Susan Cormier, NCEA
Chris Wharton and Isabelle Bertani, TetraTech, Inc.
John Olson, CSU Monterey Bay

What is the Freshwater Explorer?

- The Freshwater Explorer is an interactive-web based platform that provides the status of the salt and mineral content (i.e., freshness) for freshwater resources across a network of streams in the contiguous 48 states.
- Freshness, defined as conductivity, are presented as color-coded predicted stream reach values and point (site-specific) measured values.
- Juxtaposing background and measured conductivity over satellite imagery lets users see patterns and potential factors associated with fresh water conditions.



Why was the Freshwater Explorer developed?

- Currently, this type of data is stored in EPA's Water Quality Portal, but is not very accessible or intuitive in a spatial context.

How was it developed?

- To enable self-sufficiency and greater access, scientists at ORD developed national datasets that let users independently compare background and measured water freshness (i.e., conductivity).
- Methods and approaches were published in peer-reviewed journals.
- The national datasets were derived from conductivity data in OWOW's signature Water Quality Portal. Presently, more than 400 monitoring groups contribute data to the (WQP) resulting in a spatially and temporally robust dataset.
- The national datasets are presented as an interactive StoryMap.
- OST, OWOW, Regions 3, 5, 6, 9, and 10 were consulted during development or reviewed the Freshwater Explorer

Who are the primary audiences?

- The 400+ entities that contribute to the WQP
- Federal, state, local agencies, monitoring groups, NGO's, and industry with a need to access local water quality data.
- Audience requires some degree of technical knowledge.



The screenshot shows the homepage of the National Water Quality Monitoring Council (NWQMC) Water Quality Portal. The header features the NWQMC logo and the tagline "Working together for clean water". Below the header, the page title "Water Quality Portal" is displayed. A descriptive paragraph explains that the WQP is a cooperative service sponsored by the USGS, EPA, and NWQMC, serving data from over 400 state, federal, tribal, and local agencies. The main content area is divided into three columns: "DOWNLOAD DATA" (with a map background and text about downloading data in Excel, CSV, TSV, and KML formats), "HOW TO USE THE WQP" (with a book icon and links to User Guide, Web Services Guide, FAQs, and Upload Data), and "NATIONAL RESULTS COVERAGE" (with a map of the United States and text about water-quality data by state). A fourth section, "ABOUT THE WQP", is located at the bottom right, with a bar chart icon and links for "What is the WQP?", "Contributing organizations", "Other Water Quality Portals", and "Explore WQP Sites". The footer includes a "Contact us" link, the USGS logo, and the EPA logo.

National Water Quality Monitoring Council
Working together for clean water

Water Quality Portal

The Water Quality Portal (WQP) is a cooperative service sponsored by the United States Geological Survey (USGS), the Environmental Protection Agency (EPA), and the National Water Quality Monitoring Council (NWQMC). It serves data collected by over 400 state, federal, tribal, and local agencies.

DOWNLOAD DATA

Download water-quality data in Excel, CSV, TSV, and KML formats.

HOW TO USE THE WQP

User Guide
Web Services Guide
FAQs
Upload Data

NATIONAL RESULTS COVERAGE

Water-quality data in your state.

ABOUT THE WQP

What is the WQP?
Contributing organizations
Other Water Quality Portals
Explore WQP Sites

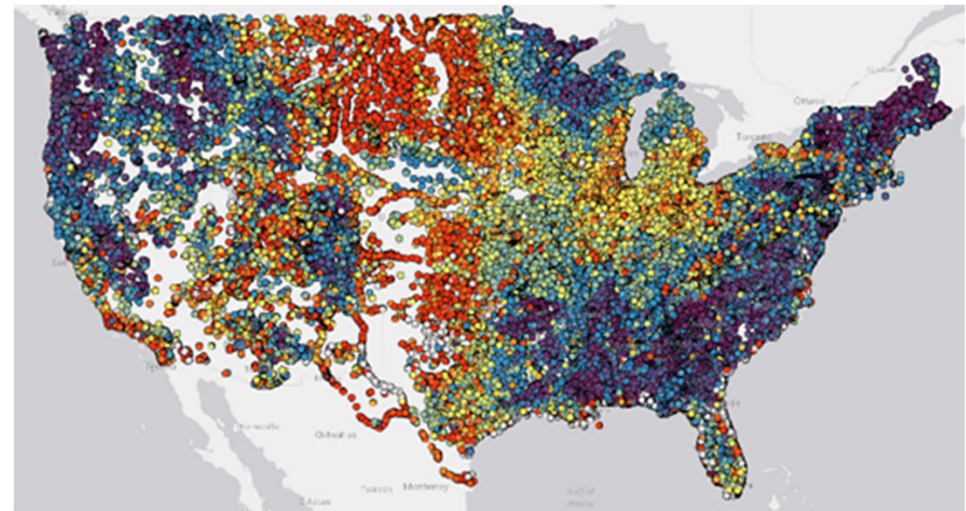
Contact us

USGS
science for a changing world

EPA
United States Environmental Protection Agency

What are the anticipated uses and benefits of the Freshwater Explorer?

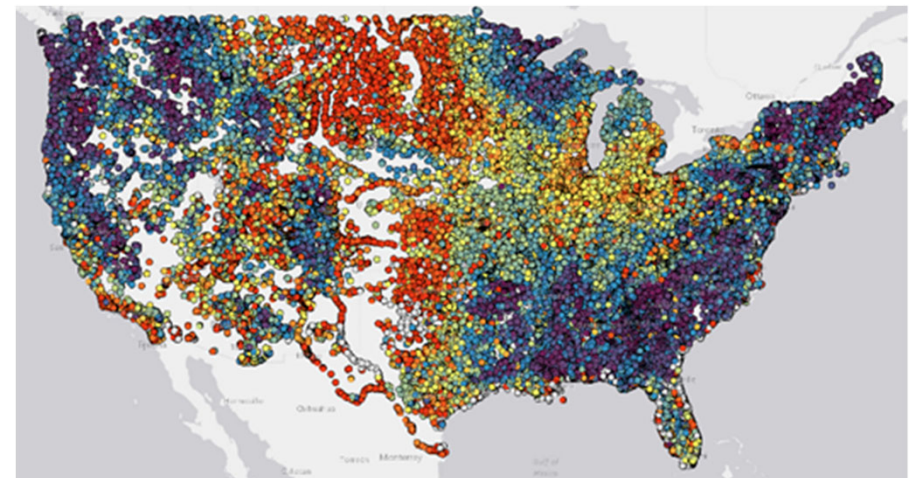
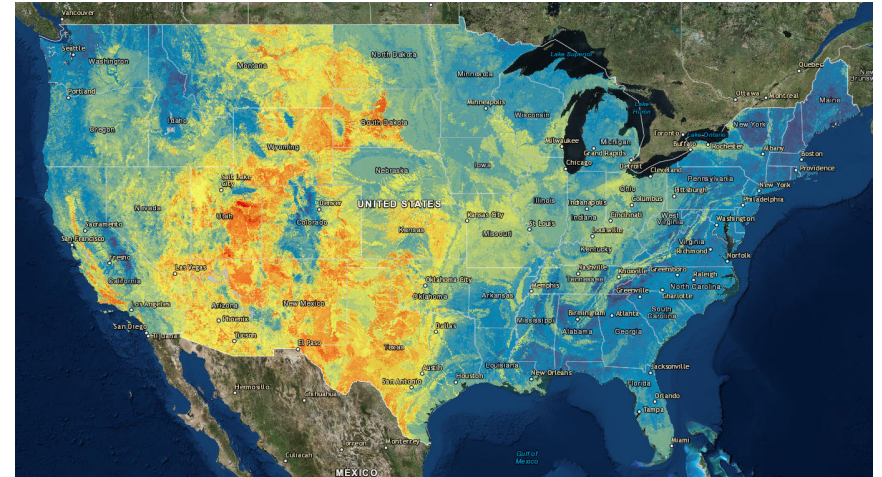
- It provides information on the status of water resources for a network of streams in the contiguous 48 states color-coded for predicted and measured freshness, i.e., low salt and mineral content.



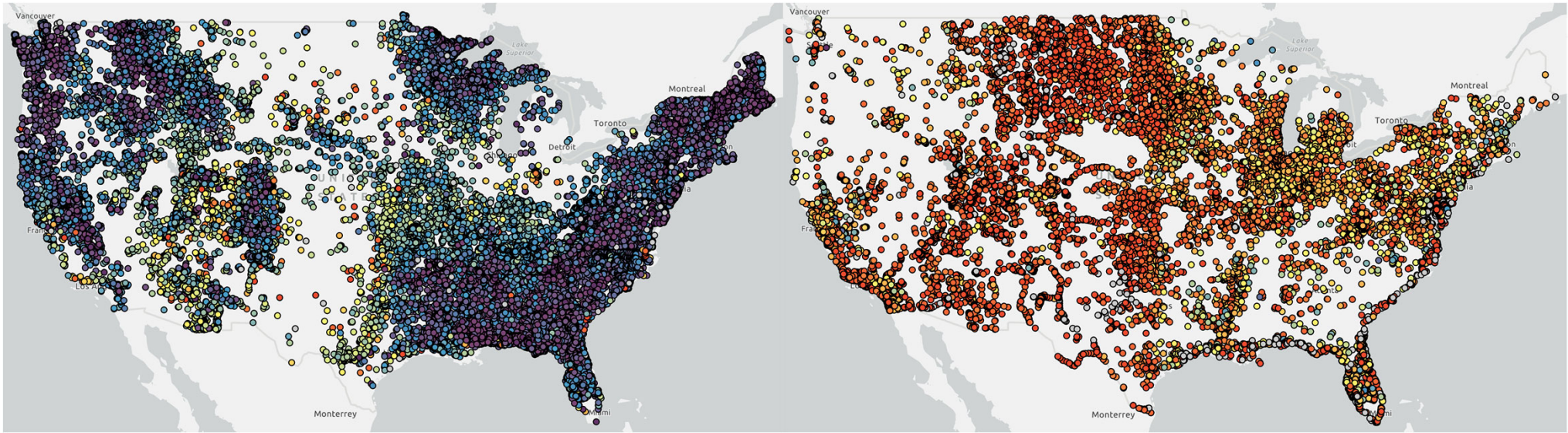
- Currently, only measured conductivity data is provided, a measurement of fresh water and water quality that is stored in EPA's Water Quality Portal.
- The web-based story map allows users to quickly access information about estimated background and measured conductivity.

Observations

- Nationally, wetter and higher elevation portions of the country have naturally fresher water, particularly in the Northwest, East and Southeast.
 - Measured conductivity in these areas are often near predicted background conductivity.
- In the arid West and agricultural Mid-West, predicted conductivity is greater.
 - Measured conductivity often is greater than predicted natural conditions owing to various sources of mineral loadings
- Locally, there are a variety of apparent causes of increased conductivity including road deicing, marine intrusion, agricultural, urban and industrial releases and run-off



Changes in Freshness compared to Background

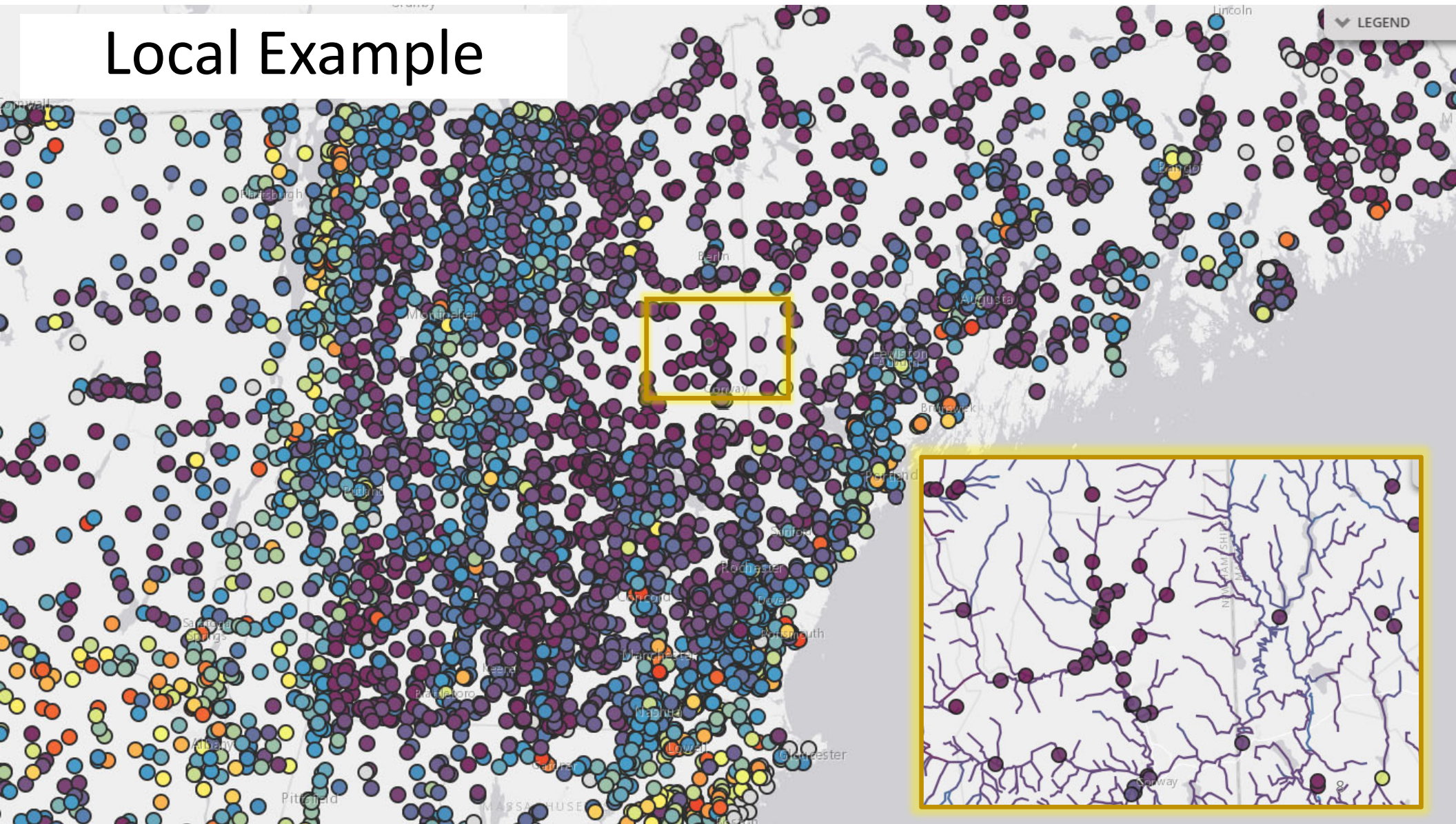


Measured less than or no more than
100 microS/cm > predicted Background

Measured 500 microS/cm greater
than predicted Background

Causes may include: sea water intrusion, drought, loadings, etc.

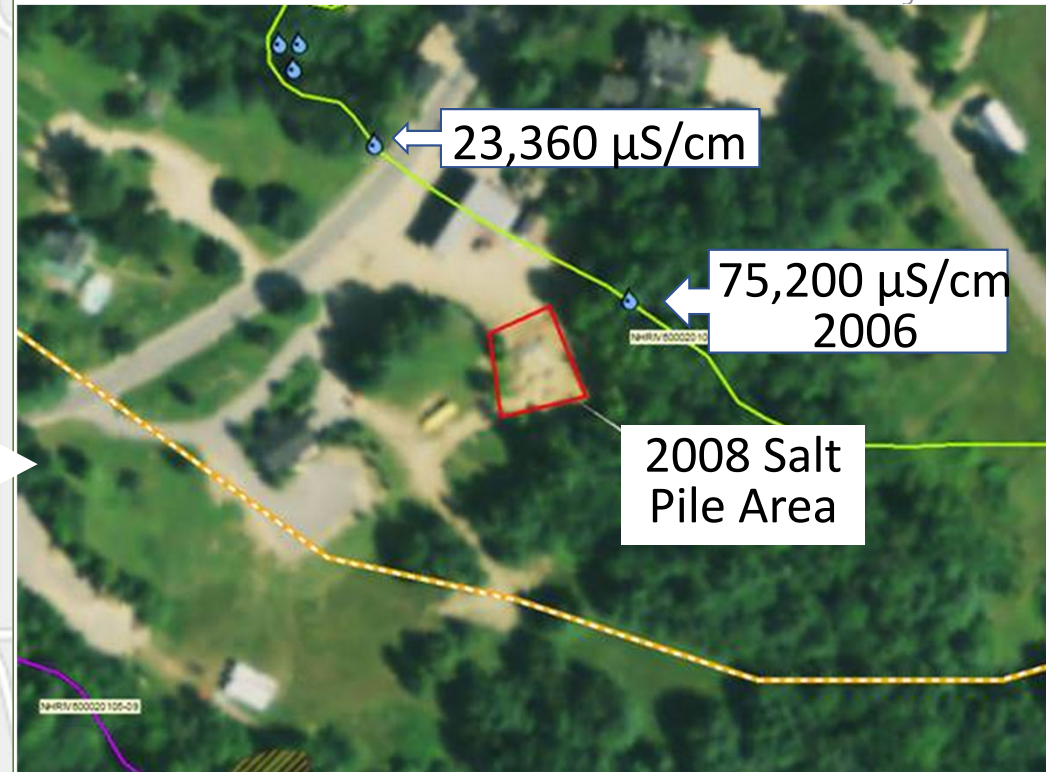
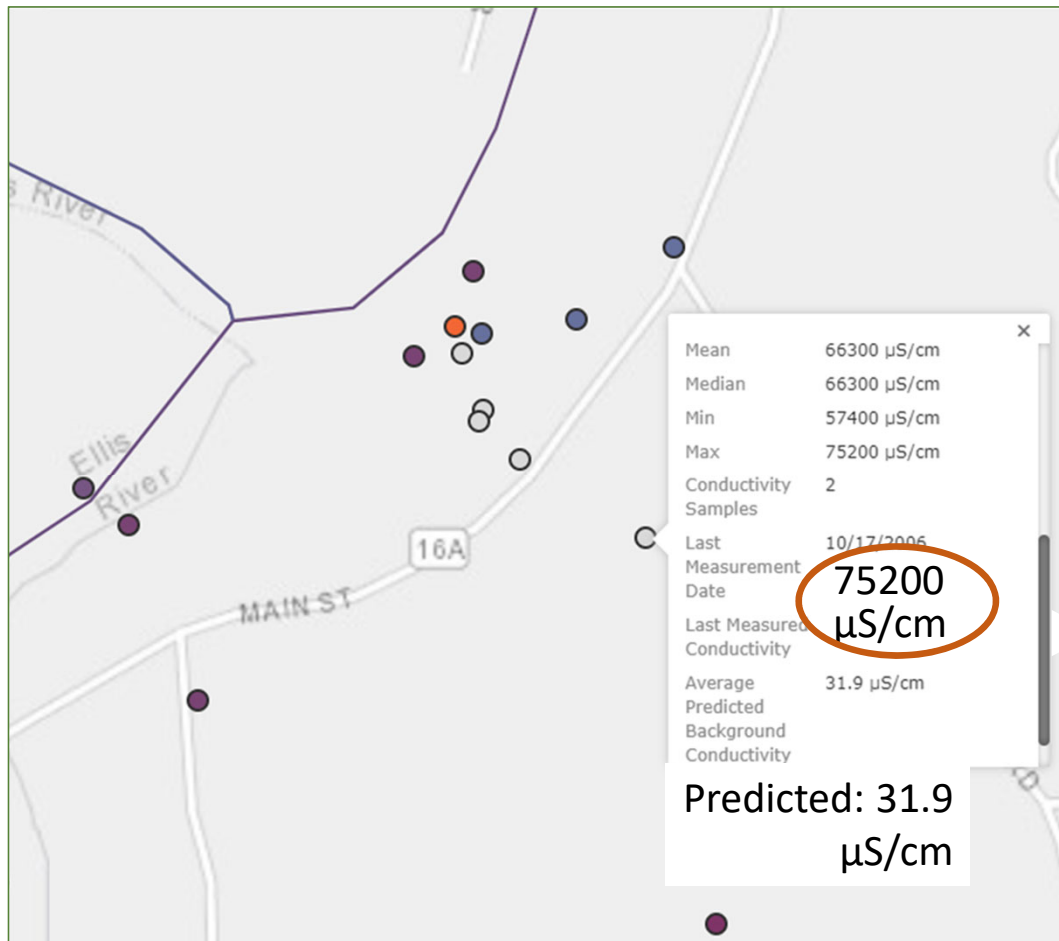
Local Example



Freshwater Explorer Example

Courtesy of: Matt Wood, Assessment Coordinator
NH Department of Environmental Services

9



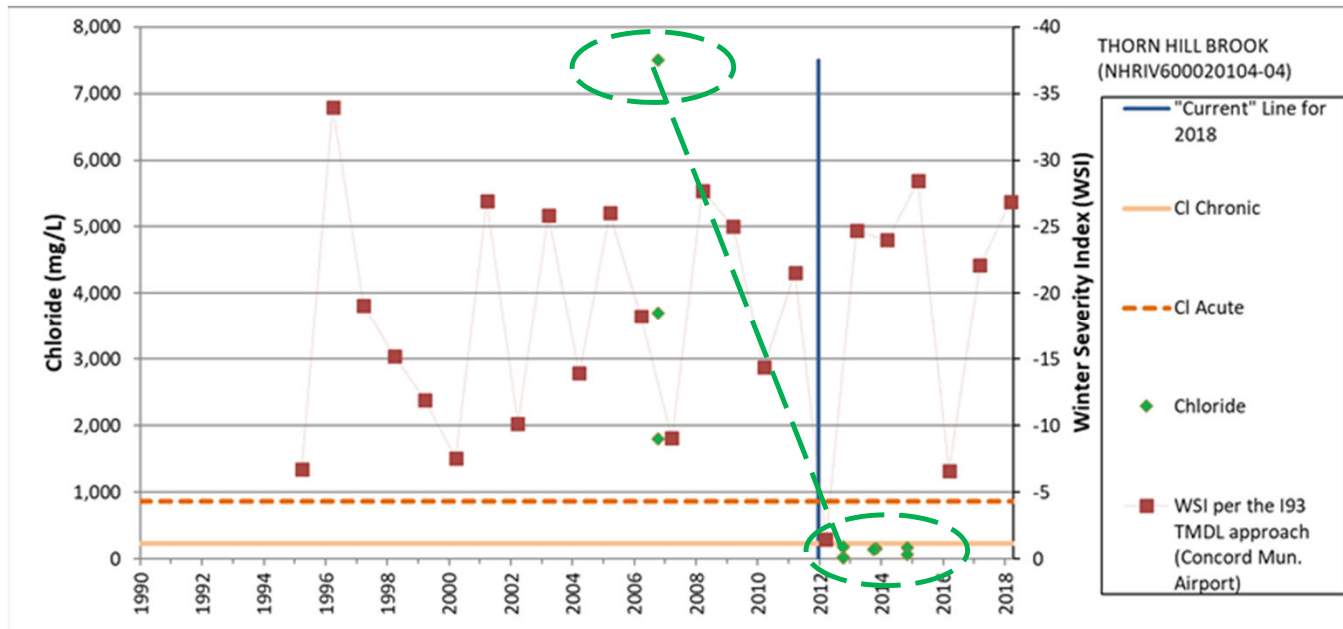
Salt pile was removed
and covered salt
storage was built

75,200 $\mu\text{S}/\text{cm}$
2006

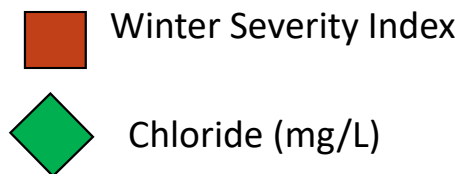
Salt Pile Area
2006

New Storage
Area 2018

Plans are to delist from 303d after a bit more monitoring



Chloride level decreased dramatically after moving pile away from stream and covering some of it



Courtesy of: Matt Wood, Assessment Coordinator
NH Department of Environmental Services

Freshwater Explorer has 3 Data sets

1. Results of a model that predicts natural background conductivity from empirical data (Natural Background Stream Conductivity (NBSC) Model).
2. Measured data (National Conductivity Dataset) from the EPA Water Quality Portal (WQP), the nation's largest source for water quality monitoring data.
3. Measured data (Measured Conductivity - NWIS) from the National Water Information System (NWIS) collected by USGS.

Brief Explanation of the Empirical Background Conductivity Model

estimated based on geology, climate, soil, vegetation, topography, and other factors

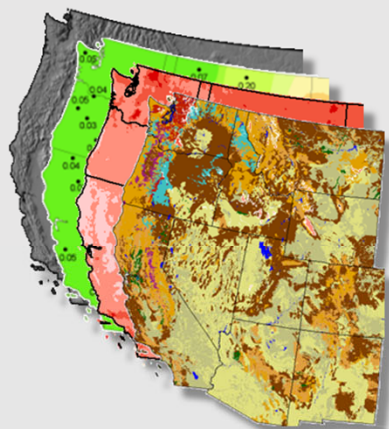
ENVIRONMENTAL
Science & Technology

Article

pubs.acs.org/est

Modeling Spatial and Temporal Variation in Natural Background Specific Conductivity

John R. Olson^{*,†} and Susan M. Cormier[‡]



Landscape Data

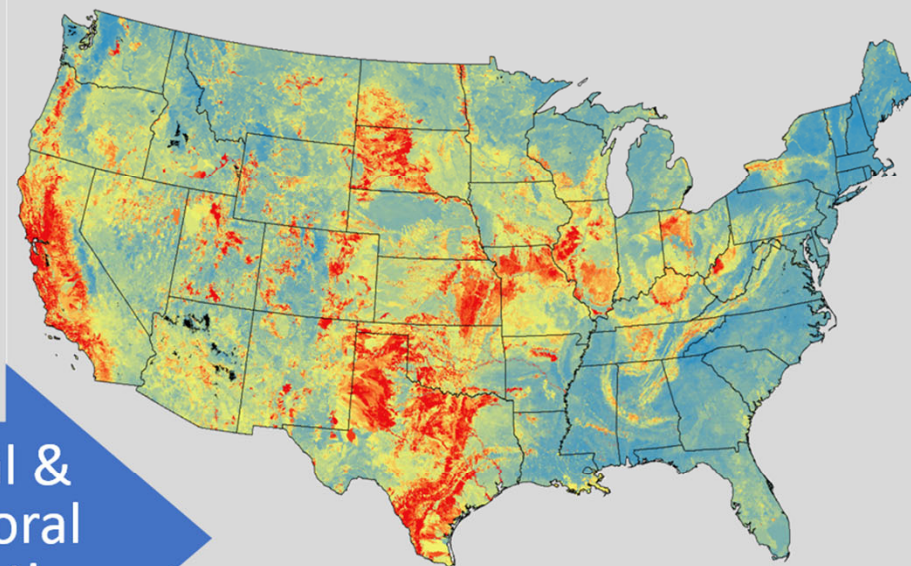
Monthly Climate Data 2000-2015

Regression Tree Analysis

19 Selected Model Predictors

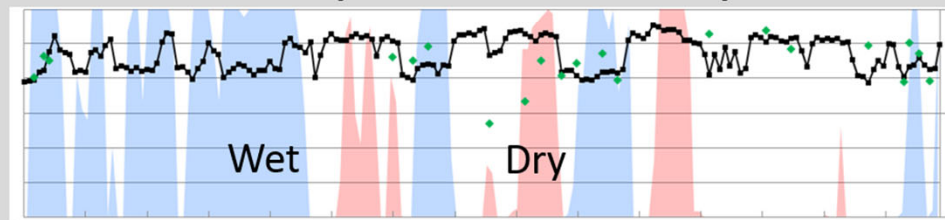
Rock %CaO	Rock %S	Atm Ca Dep	Water Table Depth	% Grass	Soil K Factor	Rock Strength
% Clay	% Shrub	% Conifer	% Mixed Forest	Soil Permeability	6 Mo Avg Precip	2 Mo Prior Max T
	12 Mo Avg ET	Max T	% Herb Wetland	3 Mo Avg Precip	1 Mo Prior Precip	

Mean Predicted Natural Conductivity



Spatial & Temporal Predictions

Predicted and Observed Conductivity in Wet and Dry Periods



2001

14

2015

Clean-up process for Measured Data

Remove SC values ≤ 0 .	SC values are positive and cannot be negative
Remove SC values reported with units different from Siemens or mho	Considered ambiguous. E.g., SC reported as NTU, or °C
Convert remaining SC values to $\mu\text{S}/\text{cm}$ (e.g., values as mS/cm were multiplied by 1000).	Allowed direct comparison among samples
Flag sites with SC values $< 10 \mu\text{S}/\text{cm}$ as uncertain (gray circles)	Identified data reported as $\mu\text{S}/\text{cm}$ but likely measured as mS/cm
Flag SC values $> 5000 \mu\text{S}/\text{cm}$ (grey circles).	Data reported as mS/cm but likely measured as $\mu\text{S}/\text{cm}$, brine, or marine.

Flag SC values > 5000 $\mu\text{S}/\text{cm}$
(grey circles)

Station Type	Lake
Mean	32000 $\mu\text{S}/\text{cm}$
Median	32000 $\mu\text{S}/\text{cm}$
Min	32000 $\mu\text{S}/\text{cm}$
Max	32000 $\mu\text{S}/\text{cm}$
Conductivity Samples	5
Last Measurement Date	9/19/2007
Last Measurement Conductivity	32000 $\mu\text{S}/\text{cm}$
Average Predicted Background	77.7 $\mu\text{S}/\text{cm}$

Station Type	River/Stream
Mean	34.5 $\mu\text{S}/\text{cm}$
Median	34 $\mu\text{S}/\text{cm}$
Min	31 $\mu\text{S}/\text{cm}$
Max	37 $\mu\text{S}/\text{cm}$
Conductivity Samples	11
Last Measurement Date	12/7/2010
Last Measurement Conductivity	31 $\mu\text{S}/\text{cm}$
Average Predicted Background	77.3 $\mu\text{S}/\text{cm}$

Data reported as mS/cm
but likely measured as $\mu\text{S}/\text{cm}$,
or is brine or marine.

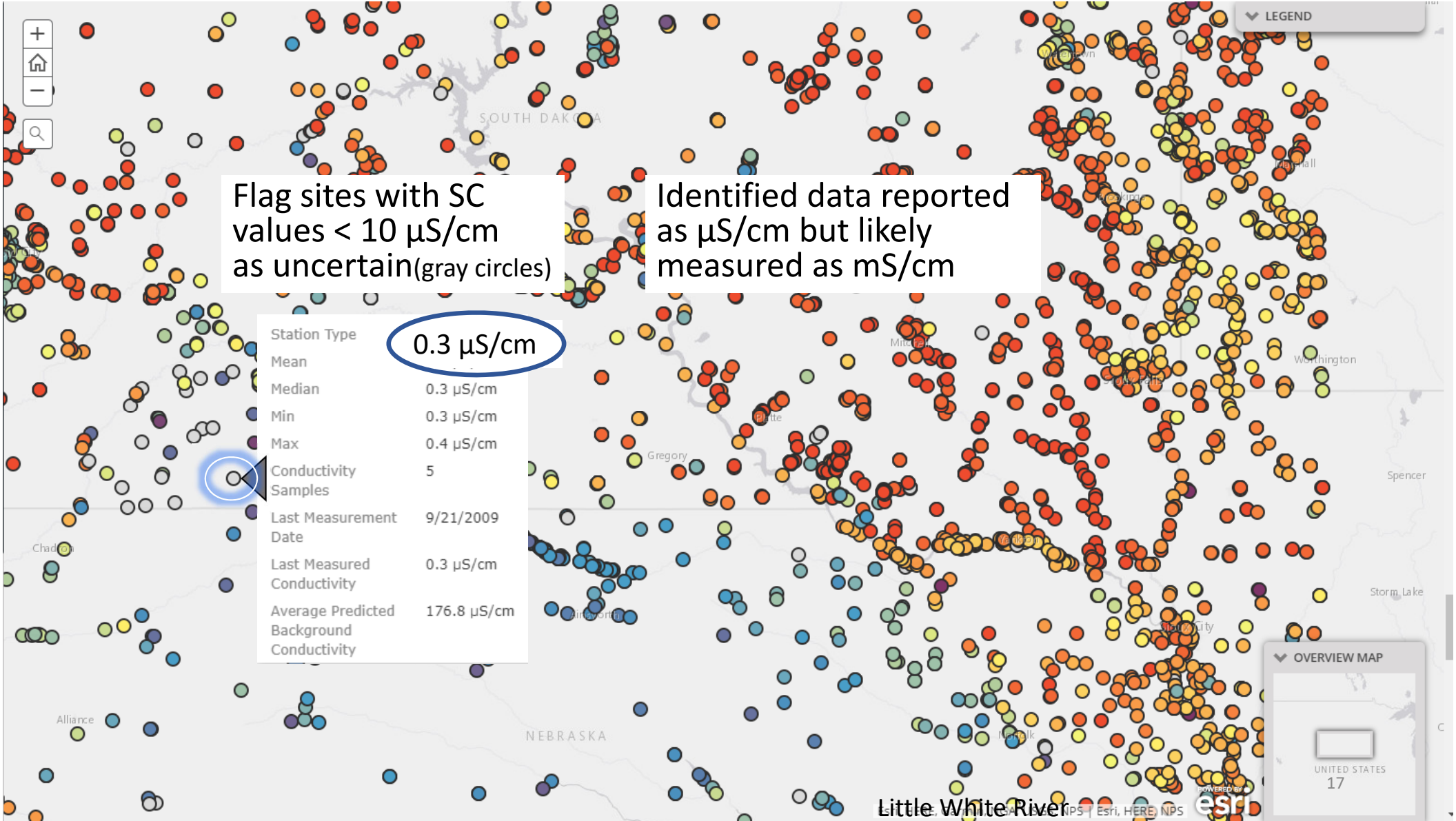
Mossy Cr. Perry GA

Flag sites with SC values < 10 $\mu\text{S}/\text{cm}$ as uncertain (gray circles)

Identified data reported as $\mu\text{S}/\text{cm}$ but likely measured as mS/cm

Station Type	
Mean	0.3 $\mu\text{S}/\text{cm}$
Median	0.3 $\mu\text{S}/\text{cm}$
Min	0.3 $\mu\text{S}/\text{cm}$
Max	0.4 $\mu\text{S}/\text{cm}$
Conductivity Samples	5
Last Measurement Date	9/21/2009
Last Measured Conductivity	0.3 $\mu\text{S}/\text{cm}$
Average Predicted Background Conductivity	176.8 $\mu\text{S}/\text{cm}$

0.3 $\mu\text{S}/\text{cm}$



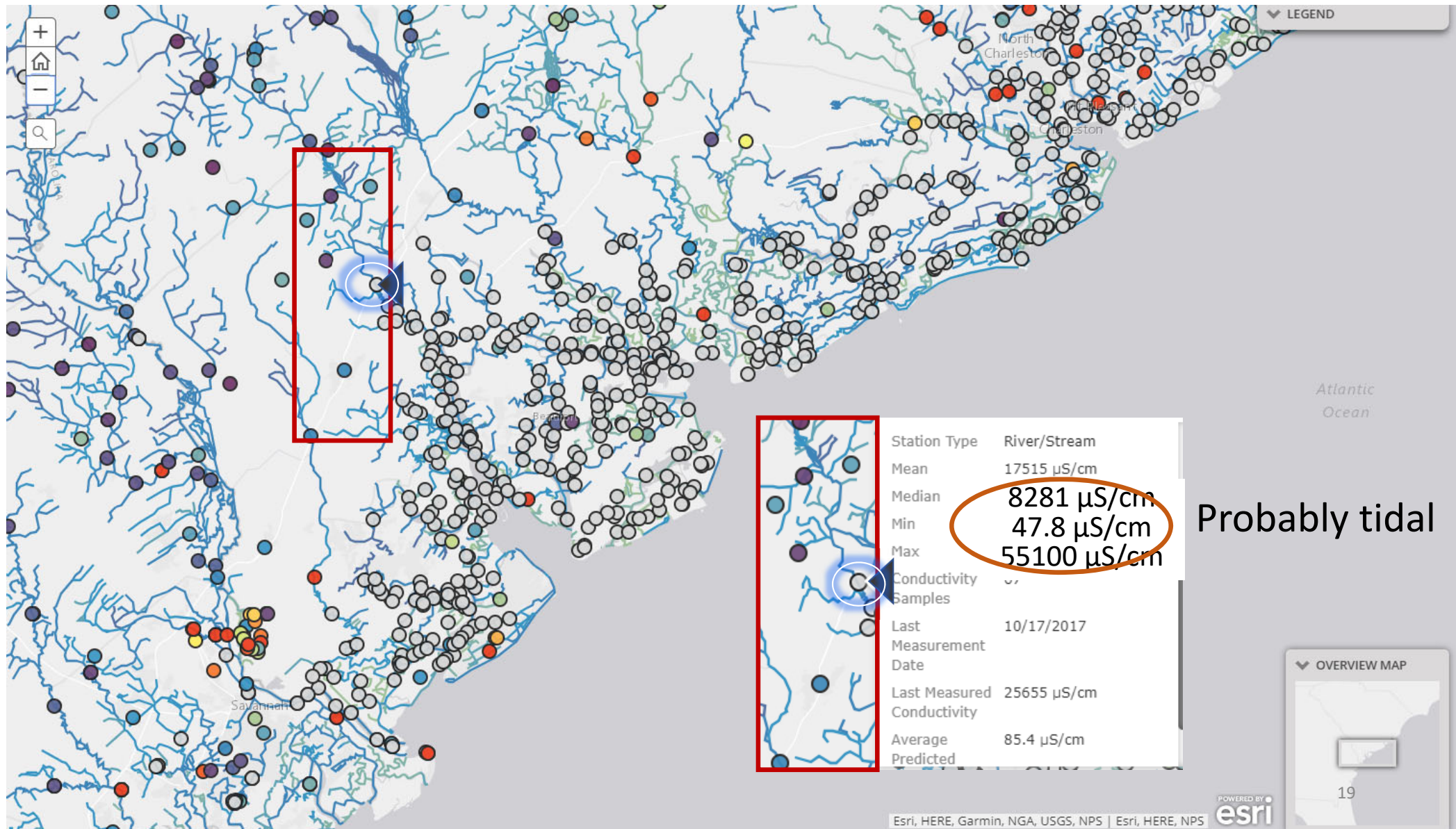
But, some may still be there, especially near the 10 $\mu\text{S}/\text{cm}$ threshold.

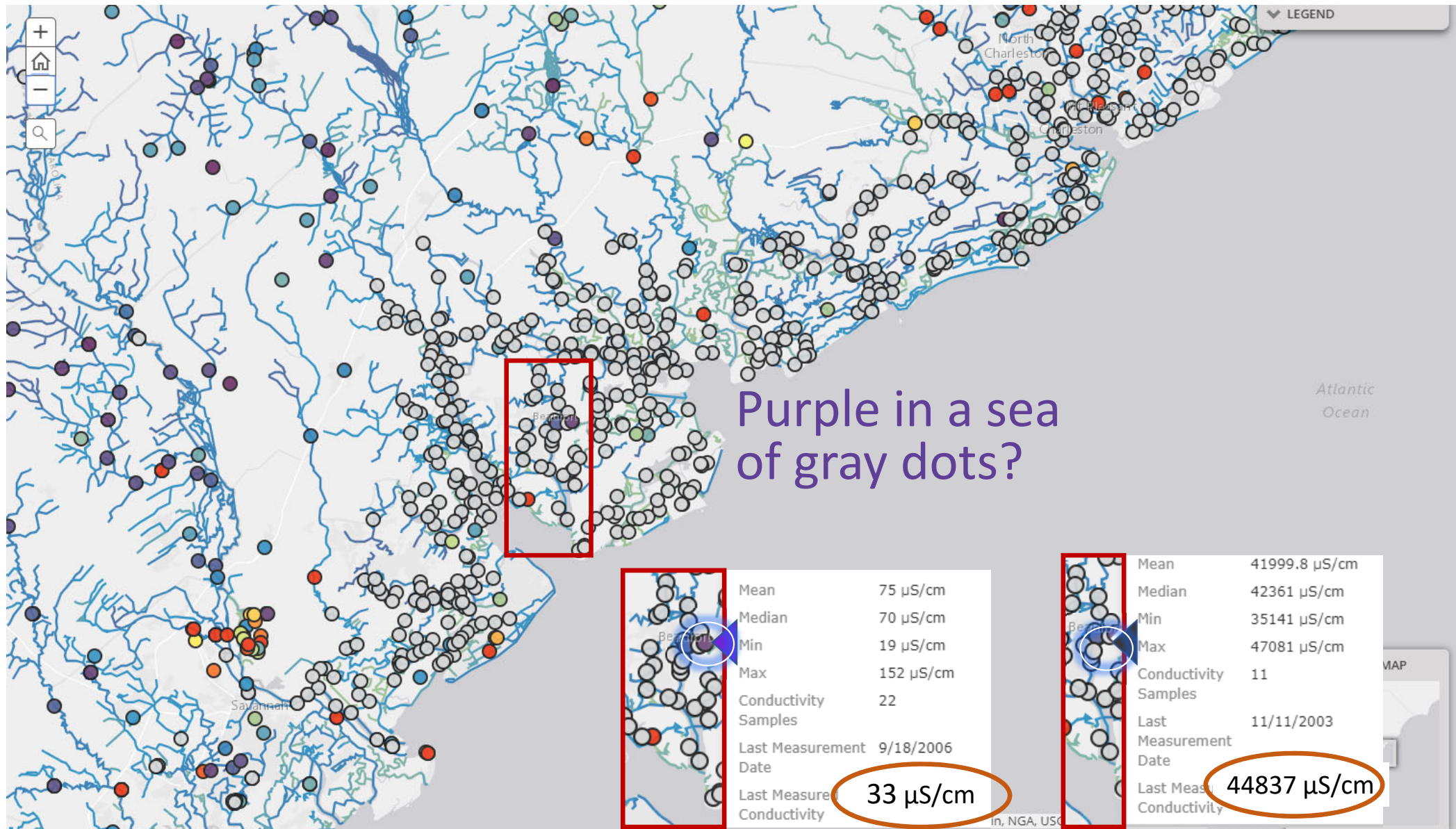
Station Type	River/Stream
Mean	38.6 $\mu\text{S}/\text{cm}$
Median	
Min	0.3 $\mu\text{S}/\text{cm}$
Max	387.6 $\mu\text{S}/\text{cm}$
Conductivity Samples	70
Last Measurement Date	9/23/2014
Last Measured Conductivity	352.6 $\mu\text{S}/\text{cm}$
Average Predicted Background	393.6 $\mu\text{S}/\text{cm}$

LEGEND

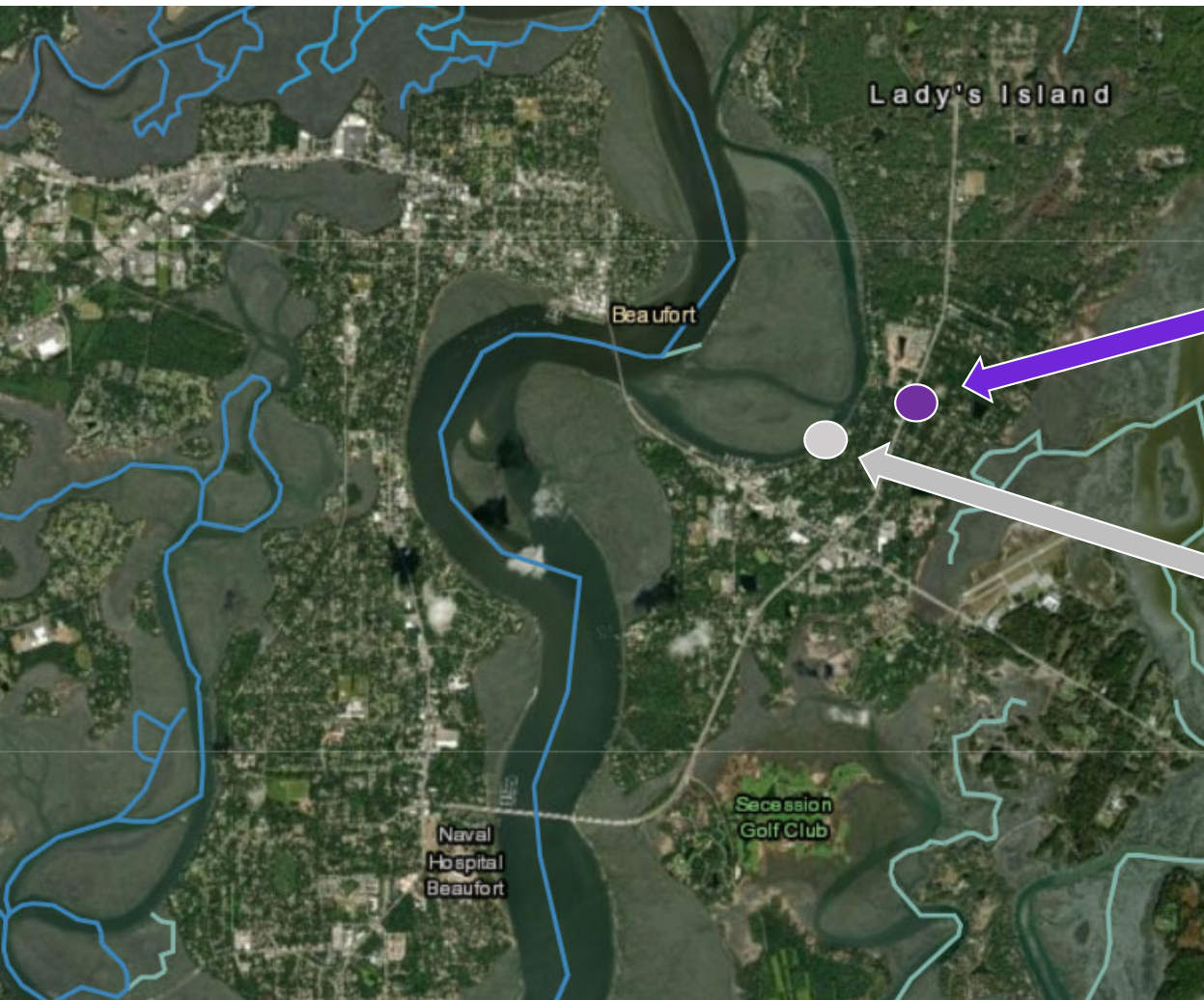
OVERVIEW MAP







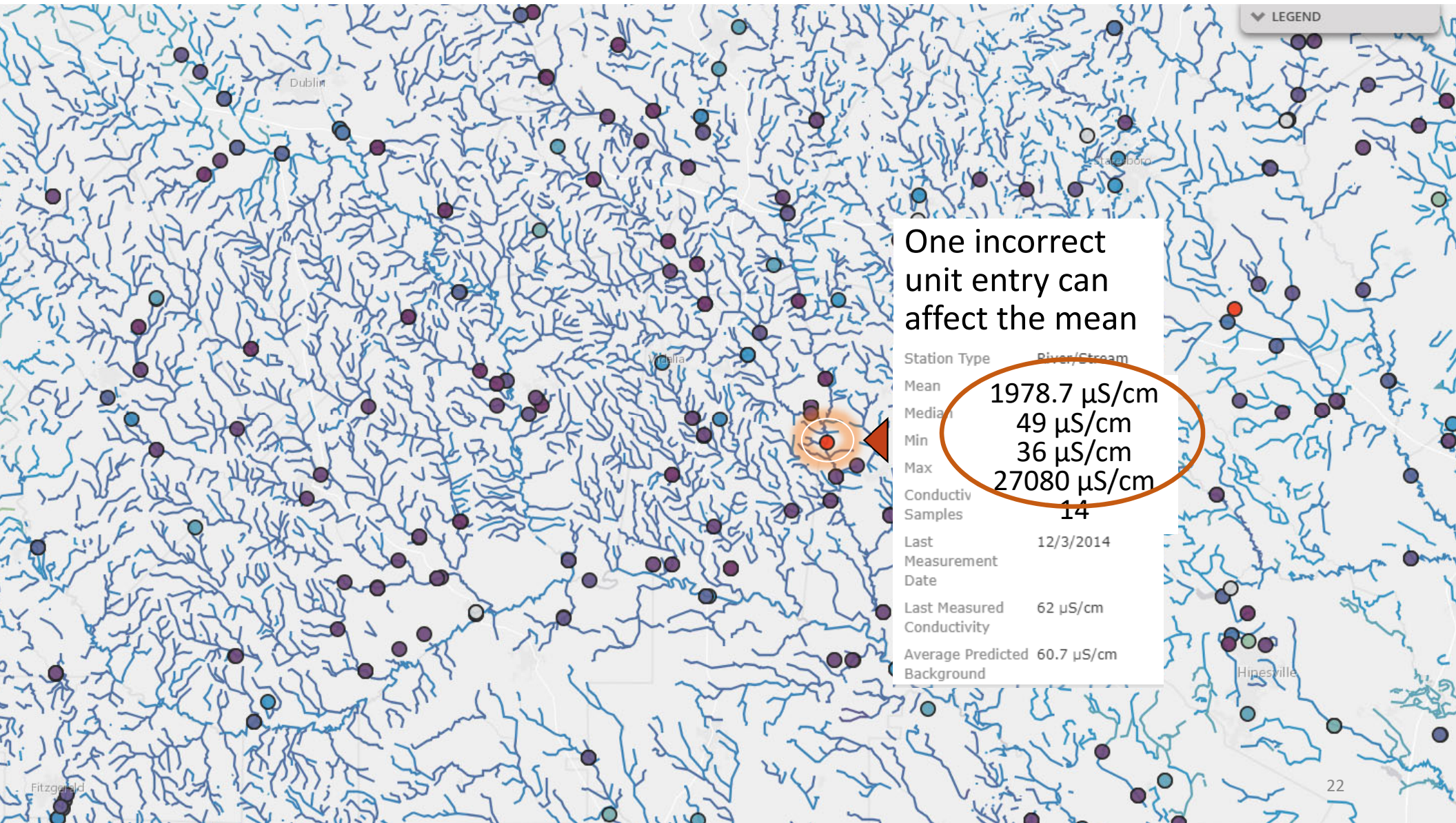
Check water body type



Station Type	Stream
Mean	75 $\mu\text{S}/\text{cm}$
Median	70 $\mu\text{S}/\text{cm}$
Min	19 $\mu\text{S}/\text{cm}$
Max	152 $\mu\text{S}/\text{cm}$
Conductivity Samples	22
Last Measurement Date	9/18/2006
Last Measured Conductivity	33 $\mu\text{S}/\text{cm}$



Station Type	Estuary
Mean	53557.6 $\mu\text{S}/\text{cm}$
Median	51112 $\mu\text{S}/\text{cm}$
Min	45426 $\mu\text{S}/\text{cm}$
Max	69255 $\mu\text{S}/\text{cm}$
Conductivity Samples	13
Last	12/4/2007



One incorrect unit entry can affect the mean

Station Type	River/Stream
Mean	1978.7 $\mu\text{S}/\text{cm}$
Median	49 $\mu\text{S}/\text{cm}$
Min	36 $\mu\text{S}/\text{cm}$
Max	27080 $\mu\text{S}/\text{cm}$
Conductivity Samples	14
Last Measurement Date	12/3/2014
Last Measured Conductivity	62 $\mu\text{S}/\text{cm}$
Average Predicted Background	60.7 $\mu\text{S}/\text{cm}$

QUESTIONS ABOUT DATA ENTRY

	Organization Formal Name	Samples	Sta.	Min. Cond.	Max. Cond.	Mean Cond.	Cond. In Other Units	Cond. Samples < 10	Cond. Samples > 5000	Potentially Excluded for Units	Potentially Excluded for Value	
FL	Biological Research Associates (Florida)	6	1	0	0	0.00	0	6	0	0%	100%	No data or zero conductivity?
FL	Broward Co Dept of Natural Resource Protection (Florida)	1848	49	271	58600	16481	0	0	858	0%	46%	Mix of fresh and estuarine?
FL	Broward County Environmental Protection Department	1347	52	235	58800	16425	0	0	618	0%	46%	Duplicate entry?
FL	Charlotte Harbor National Estuaries Program (Florida)	4068	1719	5	59590	31612	0	5	3475	0%	86%	Min of 5 entered as μ S but is mS?
FL	City of Cape Coral	18819	40	0	56	9.21	0	12439	0	0%	66%	Measured as mS recorded as μ S?
FL	City of Deltona	86	3	1	568	335	1	3	0	1%	3%	Incorrect units
FL	City of Lakeland, Lakeland Florida	489	21	45	273	172	0	0	0	0%	0%	Fresh, looks correct
FL	CITY OF MARCO ISLAND	44	6	48356	53220	51453	0	0	44	0%	100%	marine

How to check and make corrections

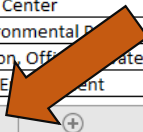
Geographic State	Organization Formal Name	Samples	Stations	Min. Conductivity	Max. Conductivity	Mean Conductivity	Conductivity In Other Units	Conductivity Samples < 10	Conductivity Samples > 5000	Potentially Excluded for Units	Potentially Excluded for Value
AK	Alaska Department of Environmental Conservation (BEACH)	213	12	8	39396	10722.46	0	1	86	0%	41%
AK	Alaska Dept of Environmental Conservation - Water Quality	115712	141	0	816	97.82	4	1630	0	0%	1%
AK	Alaska Monitoring and Assessment Program	7268	281	0	3417	22.15	480	6283	0	7%	86%
AK	Alaska Soil and Water Conservation District	88	51	0	270	82.64	0	2	0	0%	2%
AK	Chickaloon Native Village	66	16	0	1	0.14	0	66	0	0%	100%
AK	Craig Tribal Association	264	6	0	120	2.80	0	252	0	0%	95%
AK	Environmental Monitoring and Assessment Program	2134	16	2	4	3.01	2134	2134	0	100%	100%
AK	EPA National Aquatic Resources Survey (NARS)	2363	18	-99	4	18.71	2363	2363	0	100%	100%
AK	Georgetown Tribal Council	149	25	4	413	160.10	0	4	0	0%	3%
AK	Kenai National Wildlife Refuge	4356	33	0	536	77.11	0	288	0	0%	7%
AK	Kenai Watershed Forum	569	22	18	29398	343.63	0	0	11	0%	2%
AK	Levelock Village	68	3	31	67	46.93	0	0	0	0%	0%
AK	Seldovia Village Tribe	75791	44	0	173	47.38	488	912	0	1%	1%
AK	State of Alaska, Department of Environmental Conservation	554	67	0	8778	170.75	0	200	2	0%	36%
AK	USGS Alaska Water Science Center	7102	280	0	26000	281.28	0	5	10	0%	0%

WQP Data Query Access

803	WV	USGS West Virginia Water Science Center	2838	684	22	5380	409.40	0	0	2	0%	0%
804	WV	West Virginia Department of Environmental Protection Region Watershed Improvement	1332	13	2	2630	339.80	0	3	0	0%	0%
805	WV	WV Div of Environmental Protection, Office of Water Resource	4079	2171	2	9138	402.45	0	14	5	0%	0%
806	WY	Colorado Dept. of Public Health & Environment	21	2	27	330	85.29	0	0	0	0%	0%

WQP Data QC

WQP Data Query Access





National Water Quality Monitoring Council

Working together for clean water



Water Quality Data

[WQP Home](#) [Download Data](#) [How to use the WQP](#) [National Results Coverage](#) [About the WQP](#)

Reset form

LOCATION

Place:

Country: ?
State: * ?
County: ?

Point Location: ?

Bounding Box: ?

Within North:
miles of South:
Lat: East:
Long: West:

Use my location

Scroll
down
the
page

SITE PARAMETERS

Site Type: ?
Organization ID: ?
Site ID: ?
HUC: ?
Minimum sampling activities per site: ?


SAMPLING PARAMETERS

Sample Media: * ?
Characteristic Group: ?
Characteristics: * ?
 ?
Project ID: ?
Parameter Code: (NWIS ONLY) ?

RETA 2

Check how many samples

Search Upstream and Downstream (BETA) ?



Minimum results per site: ?

Date range - from: to:

Biological sampling parameters: ?

Assemblage: ?

Taxonomic Name: ?

DATA SOURCE

Select database:

Style sites:

Select data to download:

- Organization Data
- Site data only
- Project data
- Project Monitoring Location Weighting data
- Sample results (physical/chemical metadata)
- Sample results (biological metadata)
- Sample results (narrow)
- Sampling Activity
- Sampling Activity Metrics
- Result Detection Quantitation Limit Data
- Biological Habit

File format:

- Comma-separated
- Tab-separated
- MS Excel 2007+
- KML (Keyhole Markup Language - for Sites only)

Sort data

DATA SOURCE

Select database:

Show sites on map

Select data to download:

- Organization Data
- Site data only
- Project data
- Project Monitoring Location Weighting data
- Sample results (physical/chemical metadata)
- Sample results (biological metadata)
- Sample results (narrow)
- Sampling Activity
- Sampling Activity Metrics
- Result Detection Quantitation Limit Data
- Biological Habitat Metrics

DOWNLOAD

Copy to clipboard

<https://www.waterqualitydata.us/portal/#statecode=US%3A09&sampleMedia=Water&characteristicName=Conductivity&characteristicName=Specific%20conductance&characteristicName=Specific%20conductivity&startDateLo=01-01-2000&startDateHi=12-31-2015&mimeType=>

Show Web Service Calls

Show ArcGIS Online Parameters


Download Status

Your query will return **282** sites:
From BIODATA: 0 sites
From NWIS: 257 sites
From STEWARDS: 0 sites
From STORET: 25 sites
Click Continue to download the data

Cancel Continue

Reports how many samples, can download locational data or you can choose to get all data

Search Upstream and Downstream (BETA) ?



Leaflet | Powered by Esri | HERE, DeLorme, MapmyIndia, © OpenStreetM...

Minimum results per site: ?

Date range - from: to:

Biological sampling parameters: ?

Assemblage: ?

Taxonomic Name: ?

DATA SOURCE

Select database:

Style sites:

Select data to download:

- Organization Data
- Site data only
- Project data
- Project Monitoring Location Weighting data
- Sample results (physical/chemical metadata)
- Sample results (biological metadata)
- Sample results (narrow)
- Sampling Activity
- Sampling Activity Metrics
- Result Detection Quantitation Limit Data
- Biological Habitat Metrics

File format:

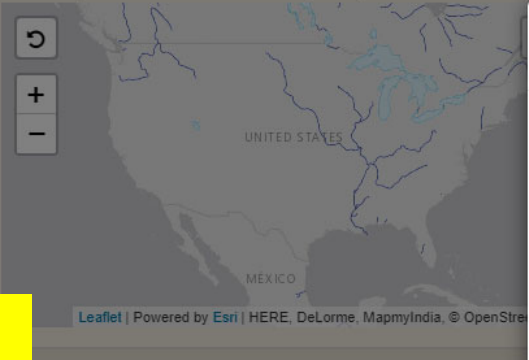
- Comma-separated
- Tab-separated
- MS Excel 2007+
- KML (Keyhole Markup Language - for Sites only)

Sort data

Choose sample results and download



Search Upstream and Downstream (BETA) ?



Leaflet | Powered by Esri | HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, © Imagery © Mapbox

DATA SOURCE

Select database:

to: 12-31-2015

Style sites: By source

Show sites on map

Select data to download:

- Organization Data
- Site data only
- Project data
- Project Monitoring Location Weighting data
- Sample results (physical/chemical metadata)
- Sample results (biological metadata)
- Sample results (narrow)
- Sampling Activity
- Sampling Activity Metrics
- Result Detection Quantitation Limit Data
- Biological Habitat

File format:

- Comma-separated
- Tab-separated
- MS Excel 2007+
- KML (Keyhole Markup Language - for Sites only)

Sort data

DOWNLOAD

Download Status

Your query will return **12,708** sample results from **282** sites:

- From BIODATA: 0 sample results from 0 sites
- From NWIS: 12,231 sample results from 257 sites
- From STEWARDS: 0 sample results from 0 sites
- From STORET: 477 sample results from 25 sites

Click Continue to download the data

Cancel Continue

Chose continue or download



An Example Output: Geophysical data download which we then screened for use in Freshwater Explorer

result.csv [Read-Only] - Excel

Home Insert Page Layout Formulas Data Review View Help Tell me what you want to do

Clipboard Font Alignment Number Styles

Normal Bad Good Neutral Calculation
Check Cell Explanatory ... Input Linked Cell Note

S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ
Activity	Project	Activity	Monitor	Activity	Sample	Hydrologi	Hydrologi	SampleCo	SampleCo	SampleCo	SampleCo	ResultDet	Character	ResultSan	ResultMe	ResultMe	MeasureC	ResultStat	Statistical	ResultVal	ResultWe	ResultTim	ResultTen	Result
		U.S. Geol	USGS-0111500			Stable, lo	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	78	uS/cm @25C		Historical		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, lo	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	75	uS/cm @25C		Historical		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, lo	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	75	uS/cm @25C		Historical		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, lo	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	124	uS/cm @25C		Historical		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, lo	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	121	uS/cm @25C		Historical		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	121	uS/cm @25C		Historical		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	126	uS/cm @25C		Historical		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	126	uS/cm @25C		Historical		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	126	uS/cm @25C		Historical		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	111	uS/cm @25C		Accepted		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	114	uS/cm @25C		Accepted		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	111	uS/cm @25C		Accepted		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	126	uS/cm @25C		Accepted		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, hi	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	66	uS/cm @25C		Accepted		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, hi	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	65	uS/cm @25C		Accepted		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	40 USGS para	Multiple v	US DH-81 with	Teflon bot		Specific c	Total	129	uS/cm @25C		Accepted		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	40 USGS para	Multiple v	US DH-81 with	Teflon bot		Specific c	Total	131	uS/cm @25C		Accepted		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	70 USGS para	Grab sam	Grab sample			Specific c	Total	144	uS/cm @25C		Accepted		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	70 USGS para	Grab sam	Grab sample			Specific c	Total	142	uS/cm @25C		Accepted		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	138	uS/cm @25C		Accepted		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	134	uS/cm @25C		Accepted		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	USGS	USGS	USGS	Unknown		Specific c	Total	152	uS/cm @25C		Accepted		Actual			25 deg C	
		U.S. Geol	USGS-0111500			Stable, no	Routine s	10 USGS para	Equal wid	US DH-95 Teflon bot			Specific c	Total	135	uS/cm @25C		Accepted		Actual			25 deg C	

Comments or Questions?