The National Network for U.S. Coastal Waters and Their Tributaries

Progress report on
Delaware Basin Demonstration Area Project
Monitoring and Data Management Activities
NJWMCC Meeting Trenton, NJ
September 12, 2008

Outline of Presentation

- **Briefly explain USGS Network Activities**
  - **USGS NASQAN expansion—5 new sites ($400K total per year) including the Delaware River at Trenton**
  - **Demonstration Areas ($300K total each year for both FY08 & FY09)**
    - **Lake Michigan ($100K each year)**
    - **San Francisco Bay ($100K each year)**
    - **Delaware River Basin ($100K each year)**
  - **USGS/USEPA Data Exchange ($300K)**
- **Update on Delaware River Basin Monitoring FY08**
  - **USGS upgrades to real-time monitoring**
  - **USGS upgrades to discrete monitoring for nutrients and carbon**
  - **DRBC/DNREC Boat Run upgrades**

National Water Quality Monitoring Council Home Page - Windows Internet Explorer

http://acwi.gov/monitoring/

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NATIONAL WATER QUALITY MONITORING COUNCIL

Working Together for Clean Water

NWQMC

National Water Quality Monitoring Council

▶ ACWI ▶ NWQMC ▶ Members ▶ Work Groups ▶ What's New ▶ Meetings ▶ Contacts

Purpose: ***Provide a national forum for coordination of consistent and scientifically defensible methods and strategies to improve water quality monitoring, assessment and reporting. Promote partnerships to foster collaboration, advance the science, and improve management within all elements of the water quality monitoring community.***

HOW THE COUNCIL WORKS

- Advisory Committee on Water Information
- Work Groups || Organization Chart
- Terms of Reference
- History
- Meeting Minutes

PRODUCTS OF THE COUNCIL

- Council Brochure
- Activities and Products (July 2007)
- Meeting Presentations
- Publications
- The Framework for Monitoring
  - AWRA Water Resources IMPACT Magazine - Monitoring Framework Issue (September 2003 Issue)
- Related Links

NATIONAL MONITORING NETWORK

- About the Network
- Network Report
- Network Pilot Studies

New Pilot Study Reports now available!

The pilot pase of the National Water Quality Monitoring Network (Network) for U.S. Coastal Waters and their Tributaries is complete for three geographic areas: Delaware Bay, Lake Michigan, and San Francisco Bay. The pilot phase of the Network examines current monitoring and gaps in relation to the proposed Network design. Learn more about the pilots...

NATIONAL MONITORING CONFERENCES

National Conference Information and Results:

- 2006 Conference Results
- Conference Results (1998-2004)

The National Water Quality Monitoring Council (NWQMC) hosted its 6th conference, *Monitoring: Key to Understanding Our Waters*, in Atlantic City, New Jersey. The conference focused on seven themes that highlight the importance of monitoring in achieving the goal of clean water for all. More Information...

WHO'S WHO ON THE COUNCIL

- Membership List
- Member Agencies
- State and Regional Councils
  - Contacts
- Contact the Council

IN THE NEWS...

- What's New?
- Scheduled Council Meetings
- Other Meetings of Interest
- Success Stories

National Monitoring Network - Windows Internet Explorer

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NATIONAL WATER QUALITY MONITORING COUNCIL
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National Monitoring Network

Purpose

The goal of the Network is to provide information about the health of our oceans and coastal ecosystems and inland influences on coastal waters for improved resource management.

Of Current Interest...

New Pilot Study Reports now available! The pilot phase of the National Water Quality Monitoring Network (Network) for U.S. Coastal Waters and their Tributaries is complete for three geographic areas: Delaware Bay, Lake Michigan, and San Francisco Bay. The pilot phase of the Network examines current monitoring and gaps in relation to the proposed Network design. Learn more about the pilots...

BACKGROUND

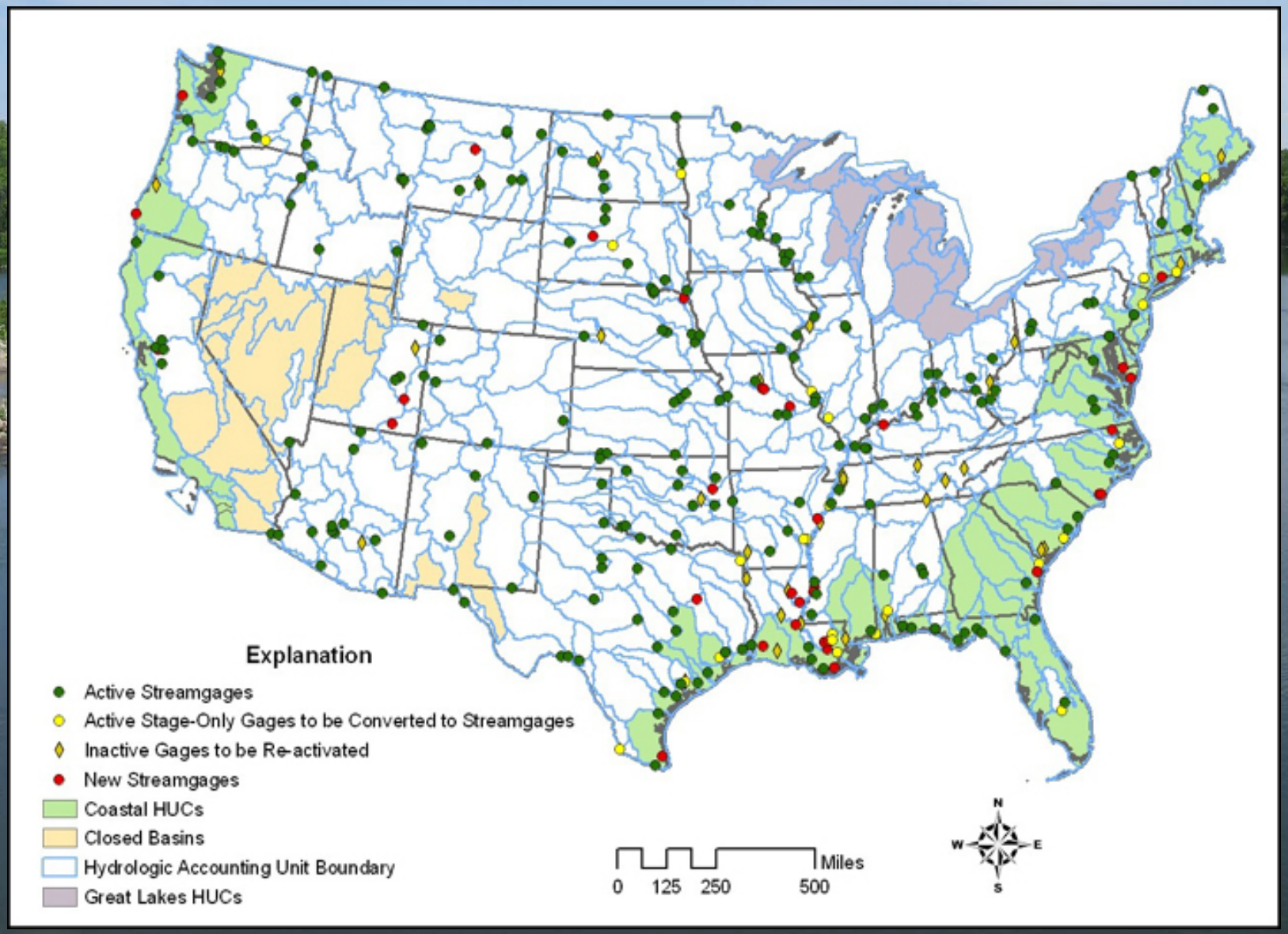
- Proposal for a National Monitoring Network (Network)
- Letter from CEQ to ACWI on Network - January 2007
- Council Resolution to ACWI on Network

PRODUCTS

- Network Design Report - *Revised*
- Network Refinement Summary Report - *February 2008* New
  - Nutrients
  - Contaminants
  - Wetlands
  - Biology
  - Atmospheric Deposition
  - Analytes
- Network Overview *(2.3 MB) - August 2007*
- Poster - *Note: These are large files (Pilot Studies Are Now Included)*
  - 4x3 feet (15 MB PDF) | 4x8 feet (15 MB PDF)
- Brochures - *Note: Some of these files are large (pdf)*
  - Network_front (2 MB .pdf) | Network_back (1.75 KB .pdf)
  - ACWI_front (353 KB .pdf) | ACWI_back (25 MB .pdf)
- Network Status
- Network Design Features

Figure 3-7. Map of the conterminous United States, showing Hydrologic Accounting Unit boundaries, closed basins, coastal basins, Great Lakes basins, and streamgages required to meet the design criteria for inland rivers.

http://acwi.gov/monitoring/network/design/Entire_Report_v18_060506.doc



National Monitoring Network Pilots - Windows Internet Explorer

http://acwi.gov/monitoring/network/pilots/index.html

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National Monitoring Network Pilot Studies

Of Current Interest...

New **Pilot Study Reports now available!** The pilot phase of the National Water Quality Monitoring Network (Network) for U.S. Coastal Waters and their Tributaries is complete for three geographic areas: Delaware Bay, Lake Michigan, and San Francisco Bay. The pilot phase of the Network examines current monitoring and gaps in relation to the proposed Network design. The new pilot reports are linked below.

Delaware Bay

The Delaware River Basin encompasses 13,539 square miles (mi²) and contains one of the longest un-dammed rivers in the United States, extending 330 miles from the confluence of its East and West branches at Hancock, N.Y. to the mouth of Delaware Bay. Significant amounts of historical and current water-quality monitoring (physical, chemical, and biological) has been conducted in the watersheds, estuaries, near-shore, and off-shore parts of the basin by Federal, State, local, private, and academic entities. It is the intent of this effort to inventory, compare methods, and enhance data exchange in support of the National Monitoring Network. The watershed is home to more than 200 fish species, and provides habitat for federally protected endangered species such as dwarf wedgemussels, short-nose sturgeon, bald eagles, and bog turtles. Nearly 15 million people (about 5% of the nation's population) rely on the waters of the Basin for drinking water which includes about 7 million people in New York City and northern New Jersey who live outside the Basin.

- Pilot Study Report New
- Key Partners
- Proposal

National Monitoring Network Pilot Study – Delaware River Basin

Key Partners

The following study partners representing the Federal, State, and non-profit sectors study.

Federal

U.S. Environmental Protection Agency (U.S. EPA)
Jon Kushwara

National Oceanic and Atmospheric Administration (NOAA)
R. Scarborough

U.S. Geological Survey (USGS)
Rick Kropp, New Jersey Water Science Center
Jeff Fischer, National Water Quality Assessment Program (NAWQA)
Eric Vowinkel, NWQMC Methods and Data Comparability

State

Robert Tudor, Delaware River Basin Commission
Ed Santoro Delaware River Basin Commission
DE Dept. of Natural Resources and Env. Control
Paul Morton NJ Water Monitoring Coordination Council
Leslie McGeorge NJ Depart. of Environmental Protection

Academia

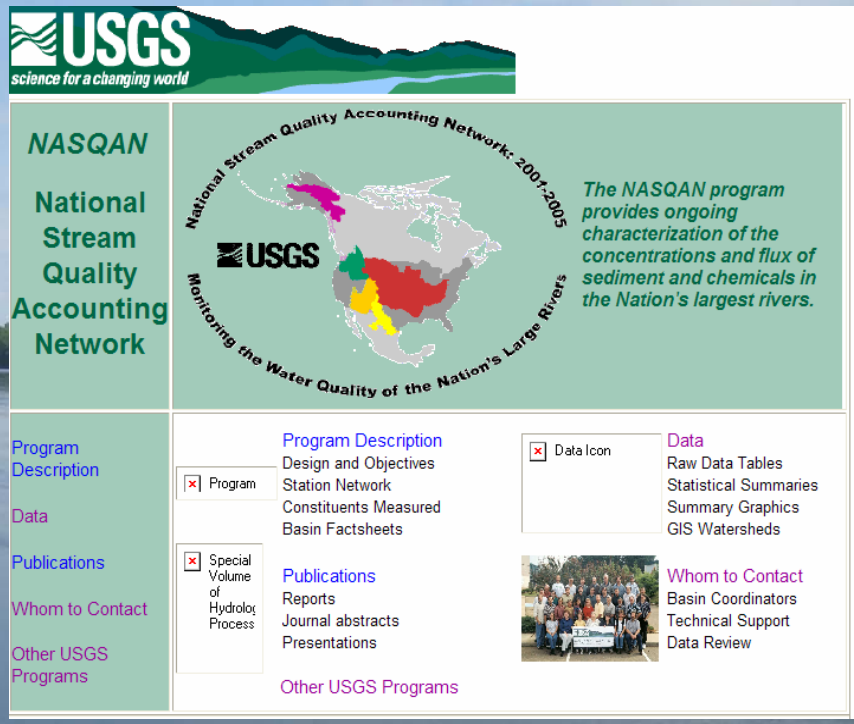
Jonathan Sharp, University of Delaware, College of Marine and Earth Studies
Scott Glenn, Rutgers University, Institute of Marine & Coastal Sciences
Lisa Totten, Rutgers University, Cook College

Non-profit Sector

Danielle Kreeger, Partnership for the Delaware Estuary

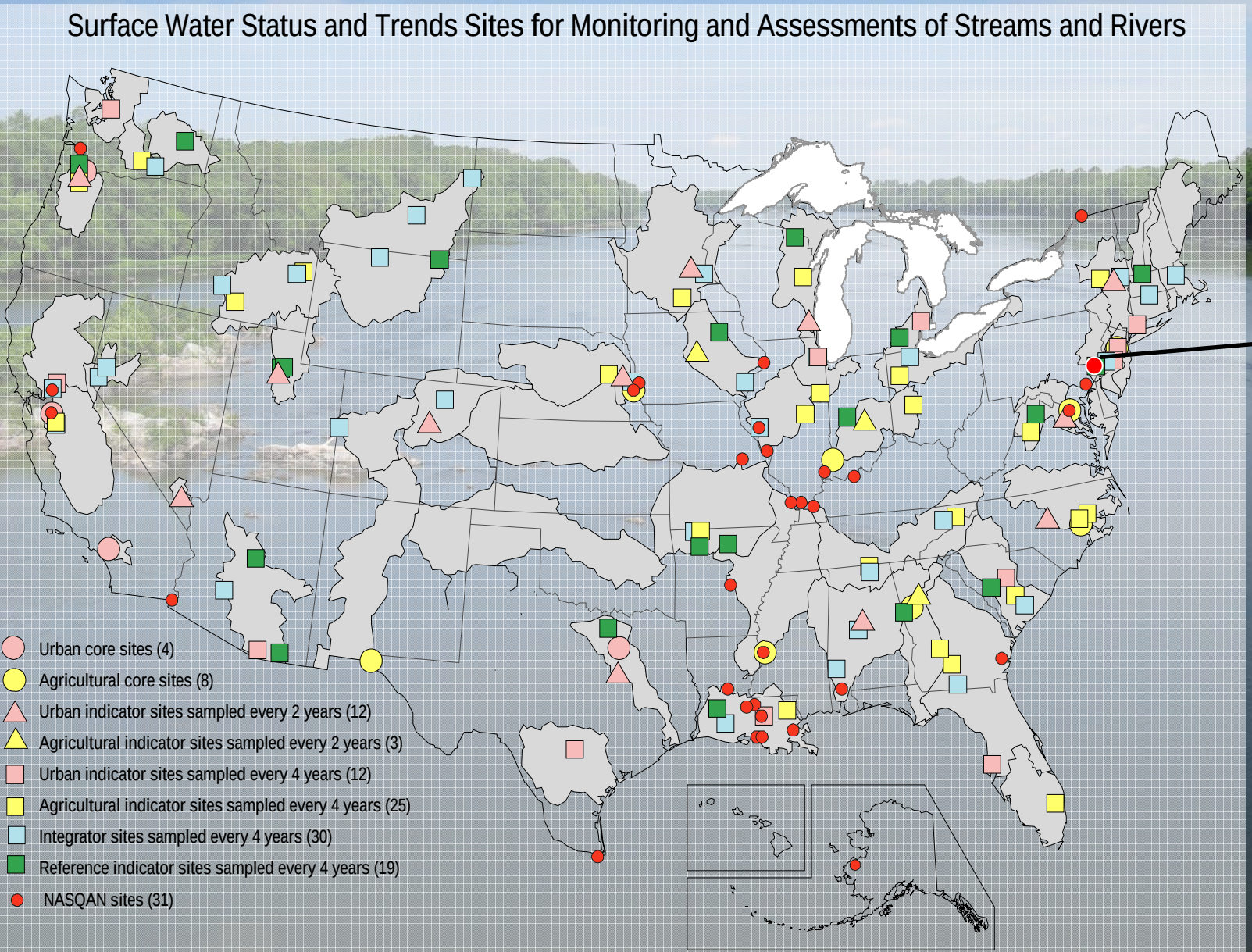
USGS NASQAN Expansion

http://water.usgs.gov/nasqan/



- **5 new sites**
  - **Delaware River at Trenton**
  - **Hudson River at Poughkepsie,**
  - **Mississippi River at Vicksburg, MS**
  - **Appalachicola River near Sumatra, FL**
  - **Brazos River, Texas**
- **Monitored 12 times per year every year**
  - **Major ions**
  - **Nutrients**
  - **Carbon**
  - **Suspended sediments**
  - **Pesticides (NAWQA pesticides & degradation products)**
  - **Metals**

USGS NAWQA and NASQAN Surface Water Monitoring Sites



Delaware River at Trenton

Demonstration Areas

- All 3 areas (Lake Michigan, SF Bay, and Delaware River Basin) decided to enhance nutrient monitoring at different levels
- Suspended sediments and phycotoxins in the San Francisco Bay area
- Toxicity indicator in Lake Michigan area
- Real time monitoring, carbon, and sediment enhancements in the Delaware Basin area

Improvements to Monitoring in the Delaware River Basin to Meet the Needs of the National Monitoring Network for U.S. Coastal Waters and Their Tributaries

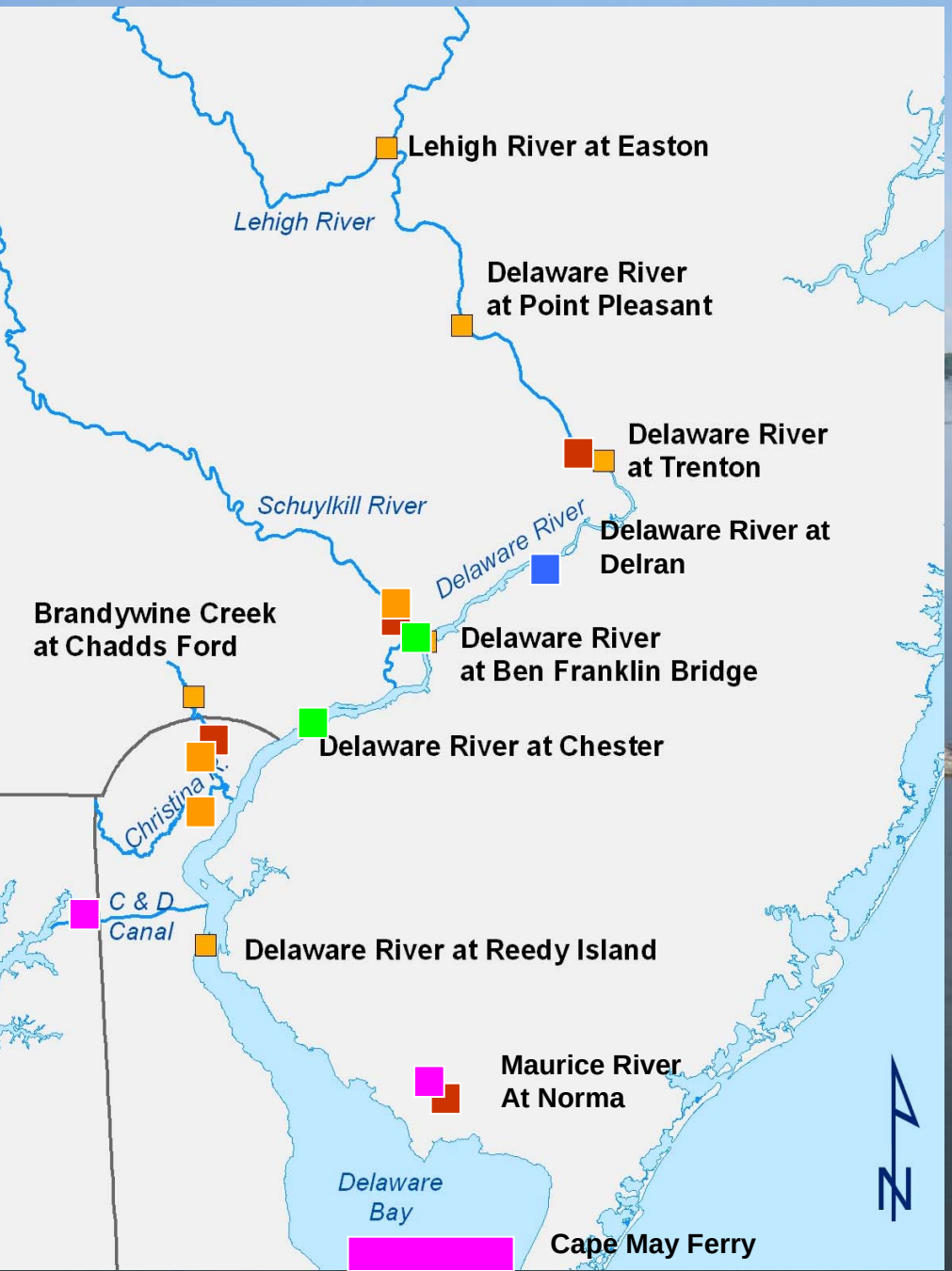
Objectives FY08-09

- **Improve nutrient and carbon analyses as per Nutrient Work Group recommendations**
  - **Major head of tide stations in the basin**
  - **Estuary Boat Run sites**
- **Improve real-time monitoring along river and estuary**
  - **New site at Delran T, SC, pH, DO and turbidity**
  - **upgrade other stations to include turbidity**
- **Delaware River at Trenton upgraded to a USGS NASQAN site. This supplements existing NAWQA site and DRBC and NJDEP monitoring.**

Delaware NMN Basin Monitoring Sites

- Nutrient and carbon sites
  - Delaware River at Trenton (16 times in FY08 for NAWQA/NASQAN)
  - Schuylkill River
  - Brandywine River
  - Maurice River
- Real-time sites on mainstem of Delaware River
  - Trenton
  - Delran (new)
  - Ben Franklin Bridge
  - Chester, PA
  - Reedy Island

Delaware River Basin Sensor and Discrete Monitoring Network



- Existing 5 parameter real-time sensors
- New 5 parameter real-time sensor
- Upgraded to 5-parameter real-time sensor with turbidity
- Possible real-time sensors
- DEL-NMN discrete monitoring sites for nutrients and carbon

Recommendations of Nutrient Work Group

http://acwi.gov/monitoring/network/

Analyte	Range	Detection limit
Dissolved ammonium	0.007–0.50 mg N L^{-1}	0.007 mg N L^{-1}
Dissolved nitrate plus nitrite	0.007–10.0 mg N L^{-1}	0.007 mg N L^{-1}
Dissolved ortho phosphate	0.001–5.0 mg P L^{-1}	0.001 mg P L^{-1}
Dissolved silica	0.003–4.0 mg Si L^{-1}	0.003 mg Si L^{-1}
Particulate nitrogen	0.01–100 %	0.01%
Particulate phosphorus	0.005–5.0 mg P L^{-1}	0.005 mg P L^{-1}
Total dissolved nitrogen	0.001–10.0 mg N L^{-1}	0.001 mg N L^{-1}
Total nitrogen	0.03–15.0 mg N L^{-1}	0.03 mg N L^{-1}
Total dissolved phosphorus	0.01–5.0 mg P L^{-1}	0.01 mg P L^{-1}
Total phosphorus	0.01–10.0 mg P L^{-1}	0.01 mg P L^{-1}
Chlorophyll *a*	0.01–150 µg L^{-1}	0.01 µg L^{-1}
Dissolved oxygen	0–15 mg L^{-1}	0.1 mg L^{-1}
Total suspended sediments	1–20,000 mg L^{-1}	10 mg L^{-1}
Conductivity/salinity	0–1,000 mS cm^{-1}	1 -100 µS cm^{-1}
Dissolved organic carbon	0.22–50 mg C L^{-1}	0.22 mg C L^{-1}
Dissolved inorganic carbon	3–24 mg C L^{-1}	3 mg C L^{-1}
pH	1–12 pH	0.01 pH
Particulate carbon	0.01–100 %	0.01%
Photosynthetically active radiation (400 -700 nm)	0.01–10,000 µmol m^{-2} s^{-1}	0.01 µmol m^{-2} s^{-1}

Tier 1--required

Tier 2—recommended

Response variable

Ancillary analysis

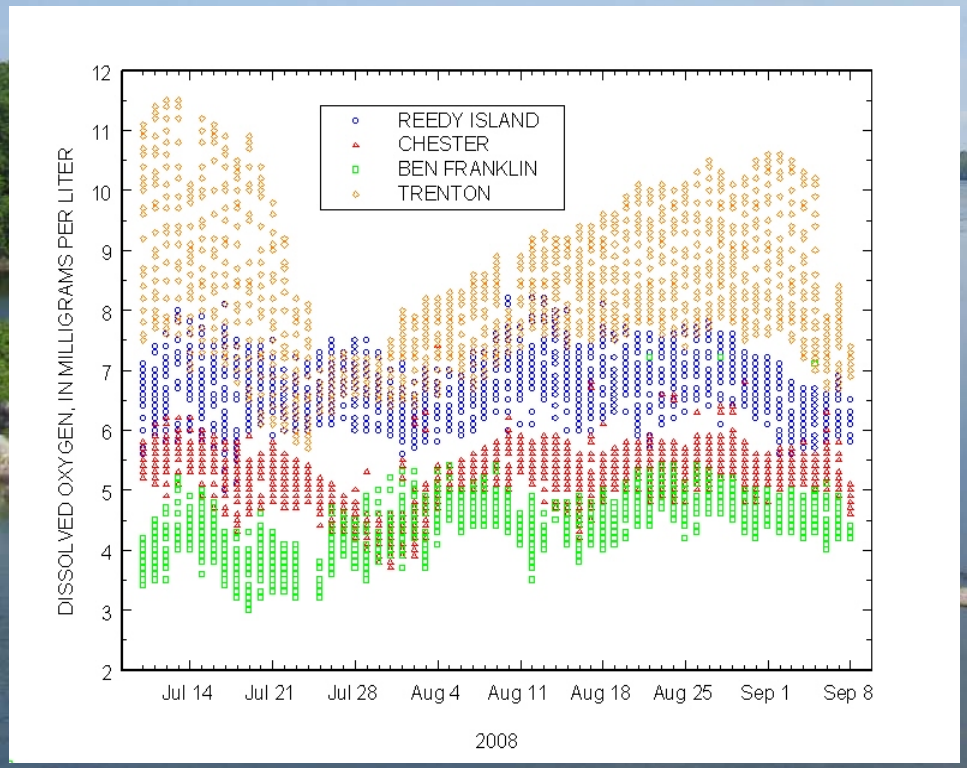
Dissolved inorganic nitrogen (DIN)
Dissolved organic nitrogen (DON)
Total nitrogen (TN)
Total dissolved nitrogen (TDN)
Particulate nitrogen (PN)
DIN = NO3NO2 + NH4
TDN = DIN + DON
TN = TDN + PN
DON = TDN - DIN

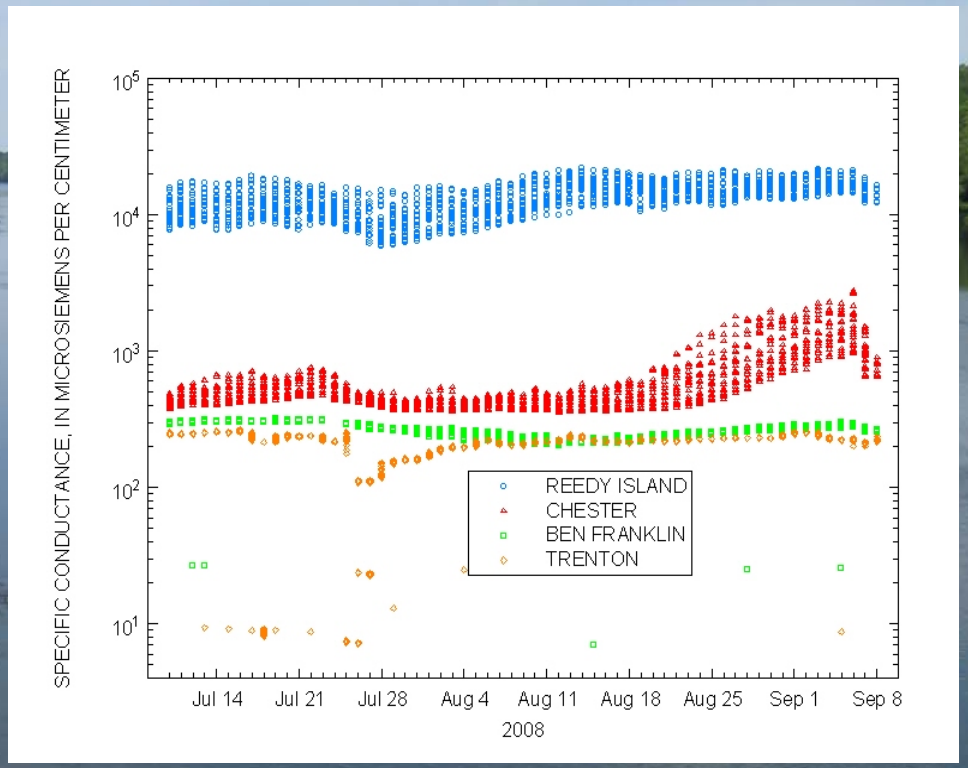
Total Phosphorus (TP)
Dissolved inorganic phosphate (DIP)
Ortho phosphate (oPO4)
Particulate phosphate (PP)
Total dissolved phosphorus (TDP)
DIP = oPO4
TP = TDP + PP
TDP = DOP + oP04
TP = oPO4 + DOP + PP

DELRAN CONTINUOUS WATER QUALITY MONITOR

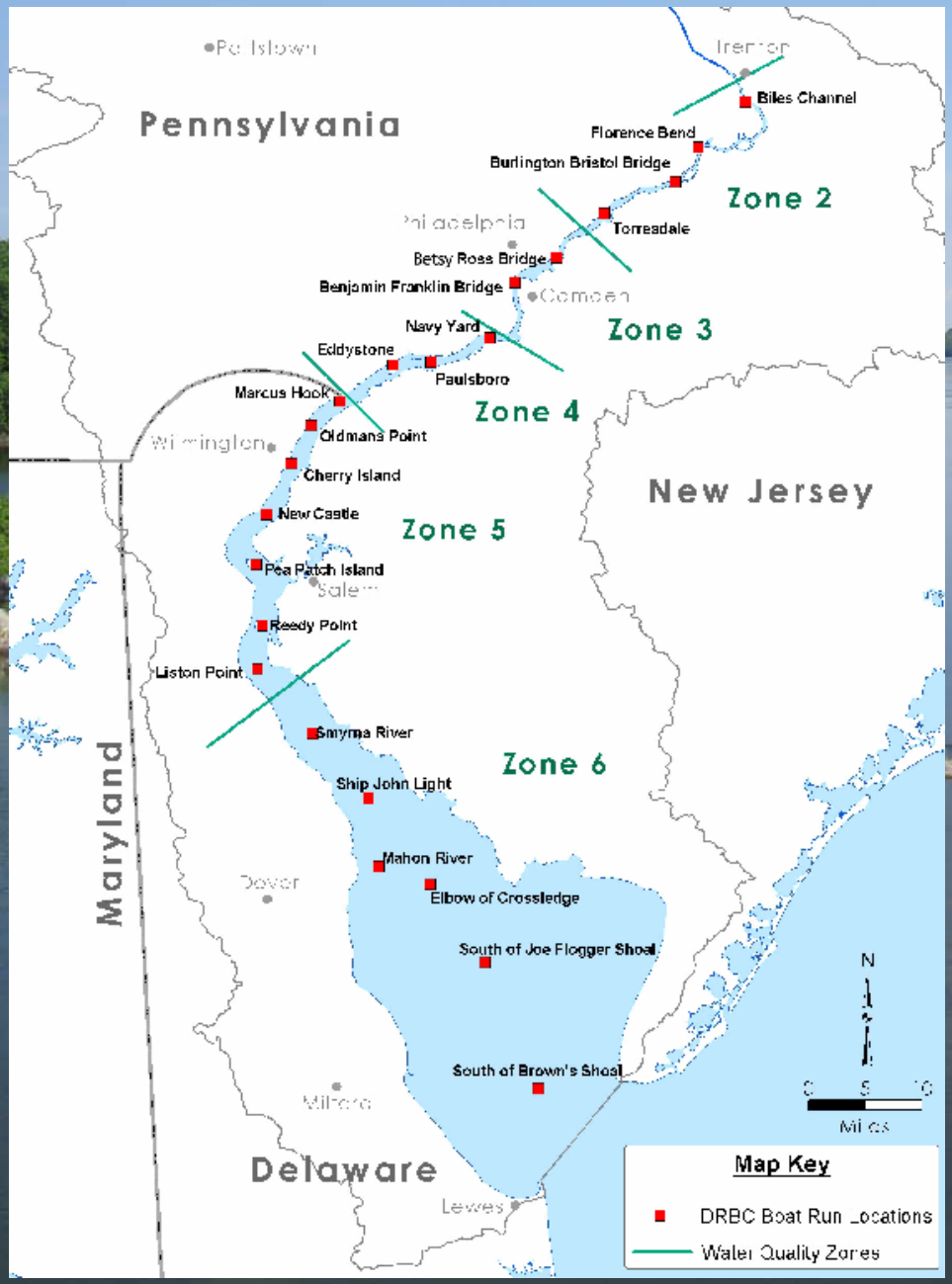
- Establishing a Zone 2 continuous monitor will allow a better understanding of the interaction of the non-tidal river and estuary and assess DO concentrations in a reach that already exhibits temperature violations

Results of real-time monitoring on the mainstem of the Delaware River



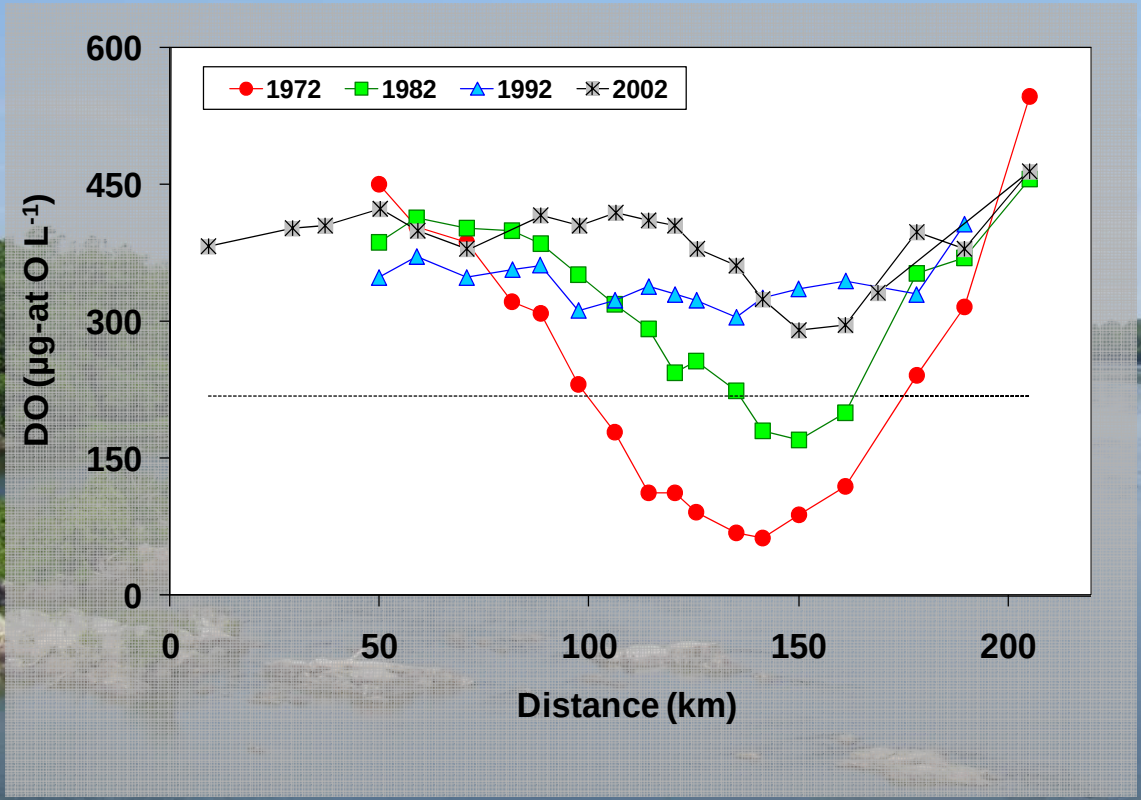


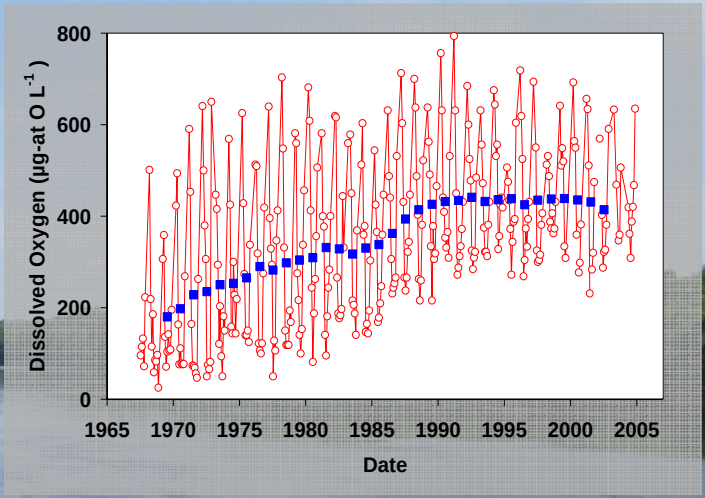
Delaware Estuary Boat Run Sites

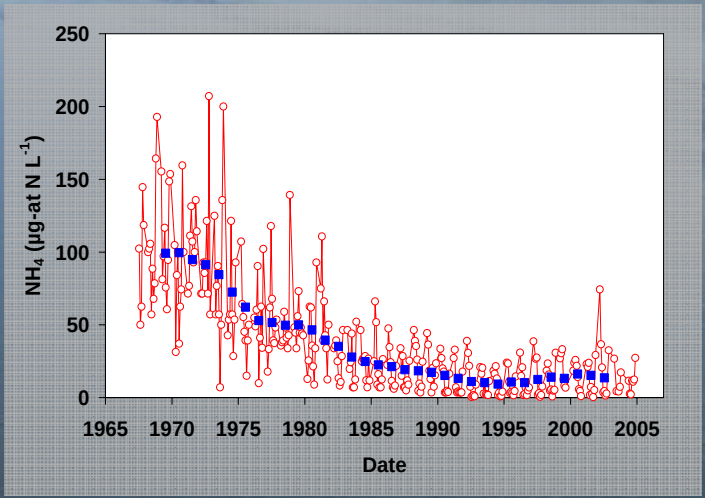


- Data collected since early 1970's
- 22 sites along estuary spine sampled 16 times per year on same day
  - Nutrients
  - Carbon
  - Bacteria
  - VOCs
  - Other
- Upgrading nutrient and carbon analyses to meet Network needs
- Compliments previous and planned National Coastal Assessment monitoring (2008)

Historical Boat Run Data



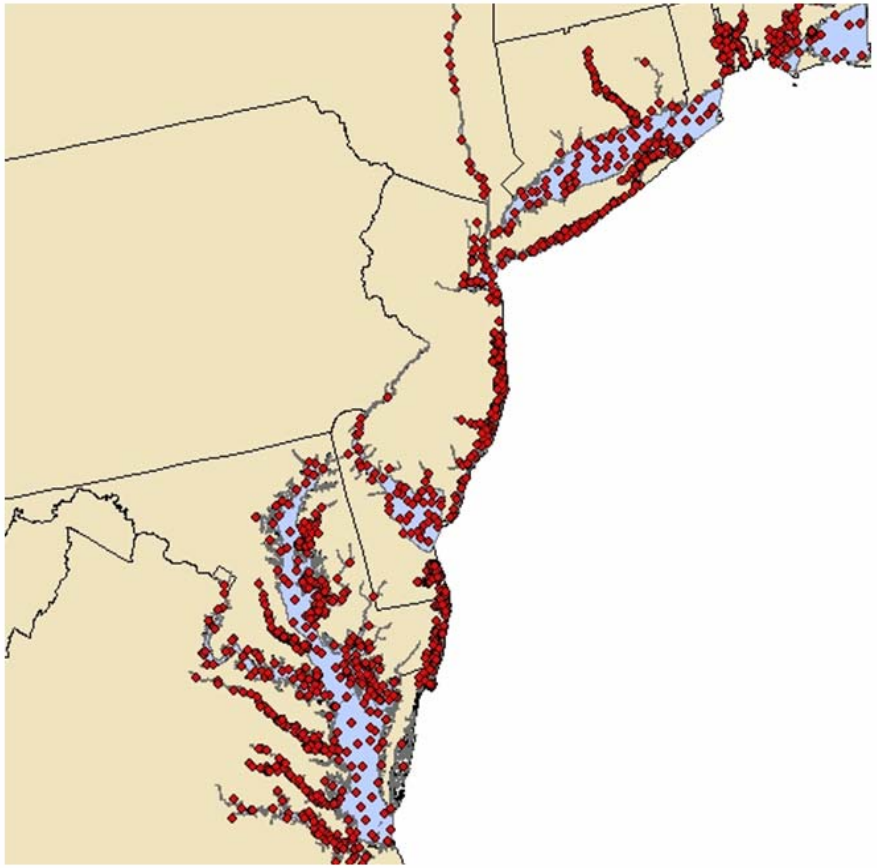




- WQ data back to the early 1970's
- DO sag below Philadelphia decreasing as wastewater treatment plant improvements
- Need to improve data storage and retrieval
- Need to integrate with real-time data

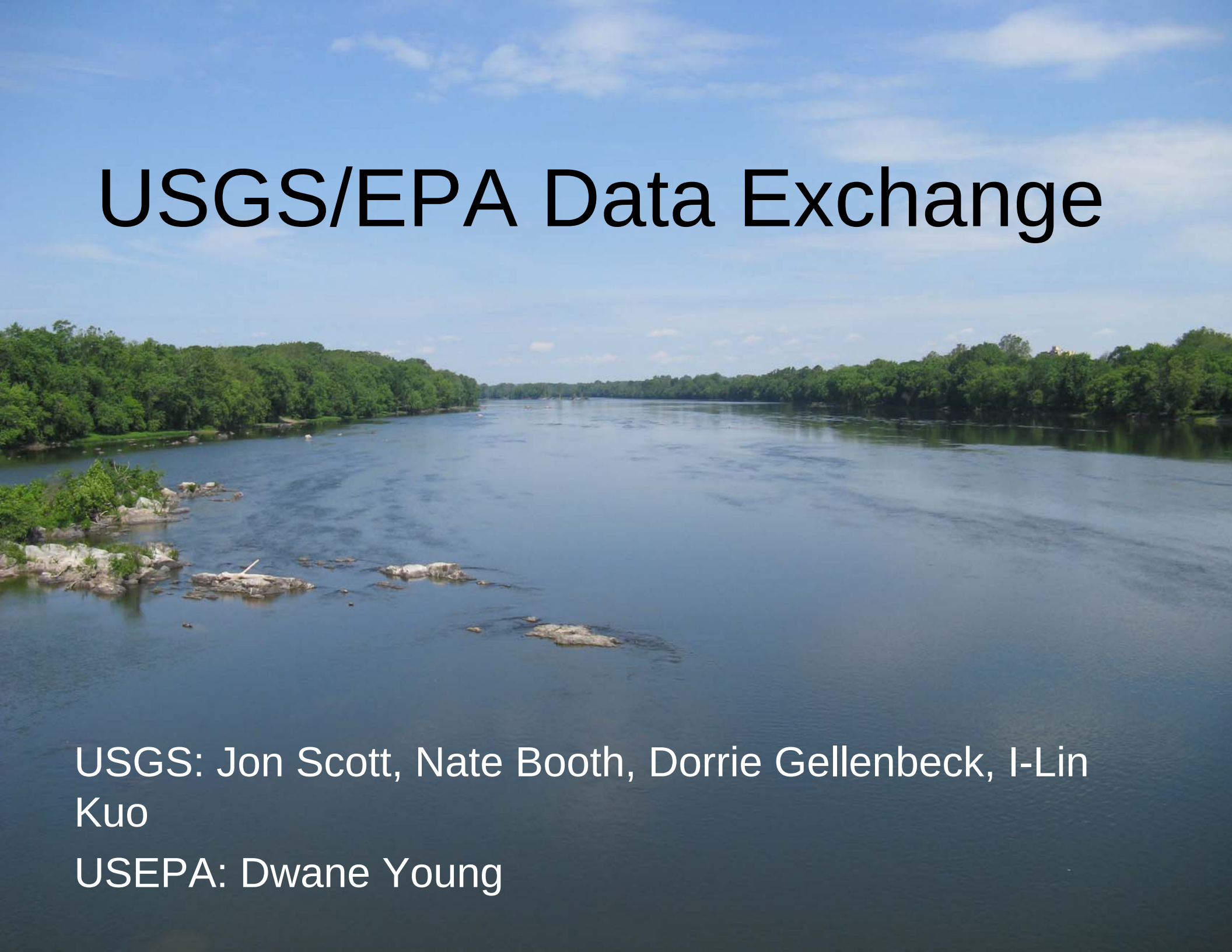
Probabilistic Estuarine Monitoring in the Mid-Atlantic IOOS Region from Network

http://acwi.gov/monitoring/network/design/Entire_Report_v18_060506.doc



- Designed by USEPA ORD
- Need to coordinate with EPA probabilistic estuary monitoring in 2010

USGS/EPA Data Exchange



USGS: Jon Scott, Nate Booth, Dorrie Gellenbeck, I-Lin Kuo

USEPA: Dwane Young

Example: Stream sites with Nitrate in the Delaware River Basin (HUC0204)

Provide these search parameters in a URL:

Site Type = Stream
HUC = 0204*
Characteristic = Nitrate

NWIS WQX Web Service

XML

Excel

Google Earth

Example: Stream sites with Nitrate in the Delaware River Basin (HUC0204)

Excel

data-1.xls.xlt

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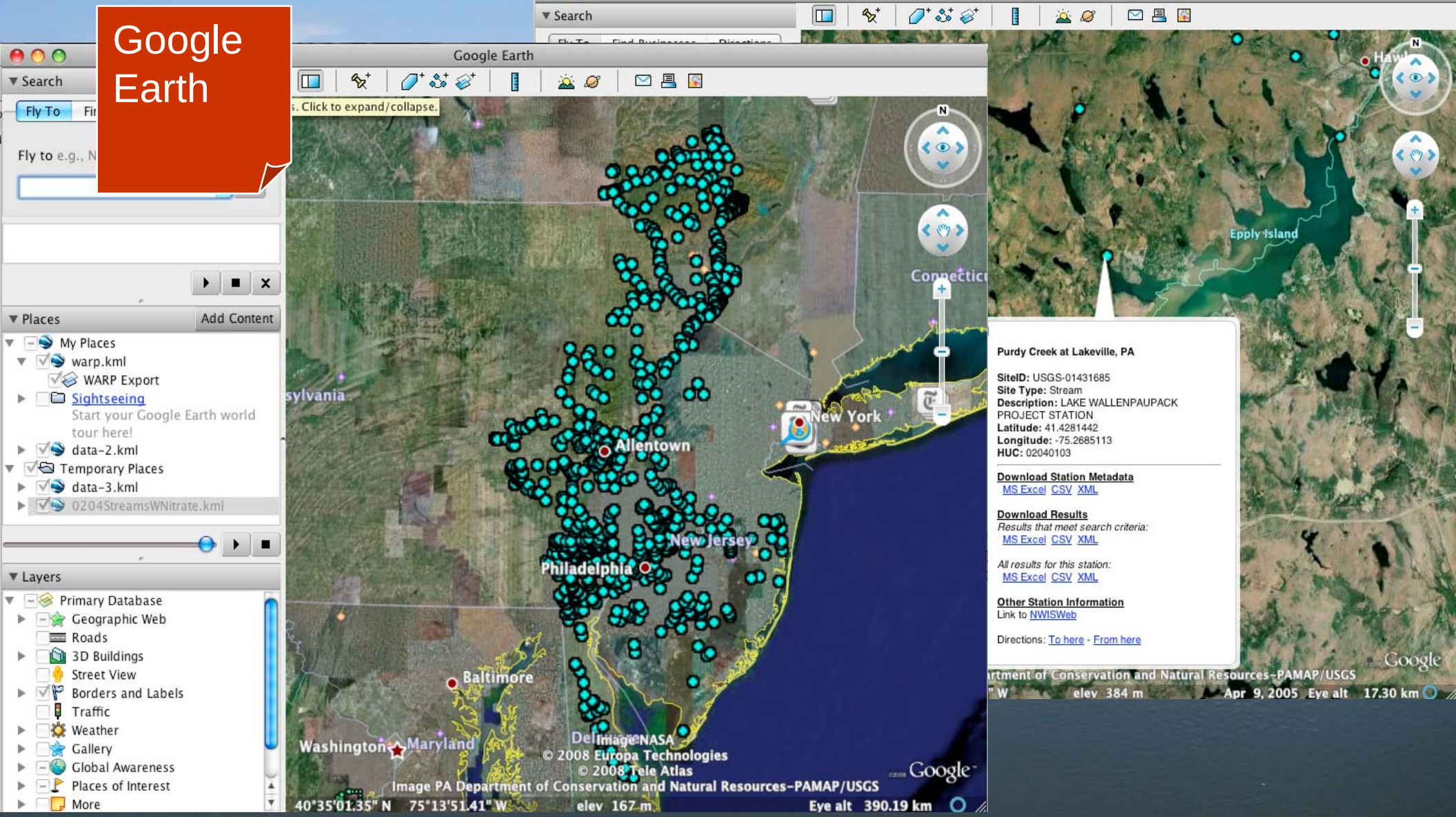
Sheets Charts SmartArt Graphics WordArt

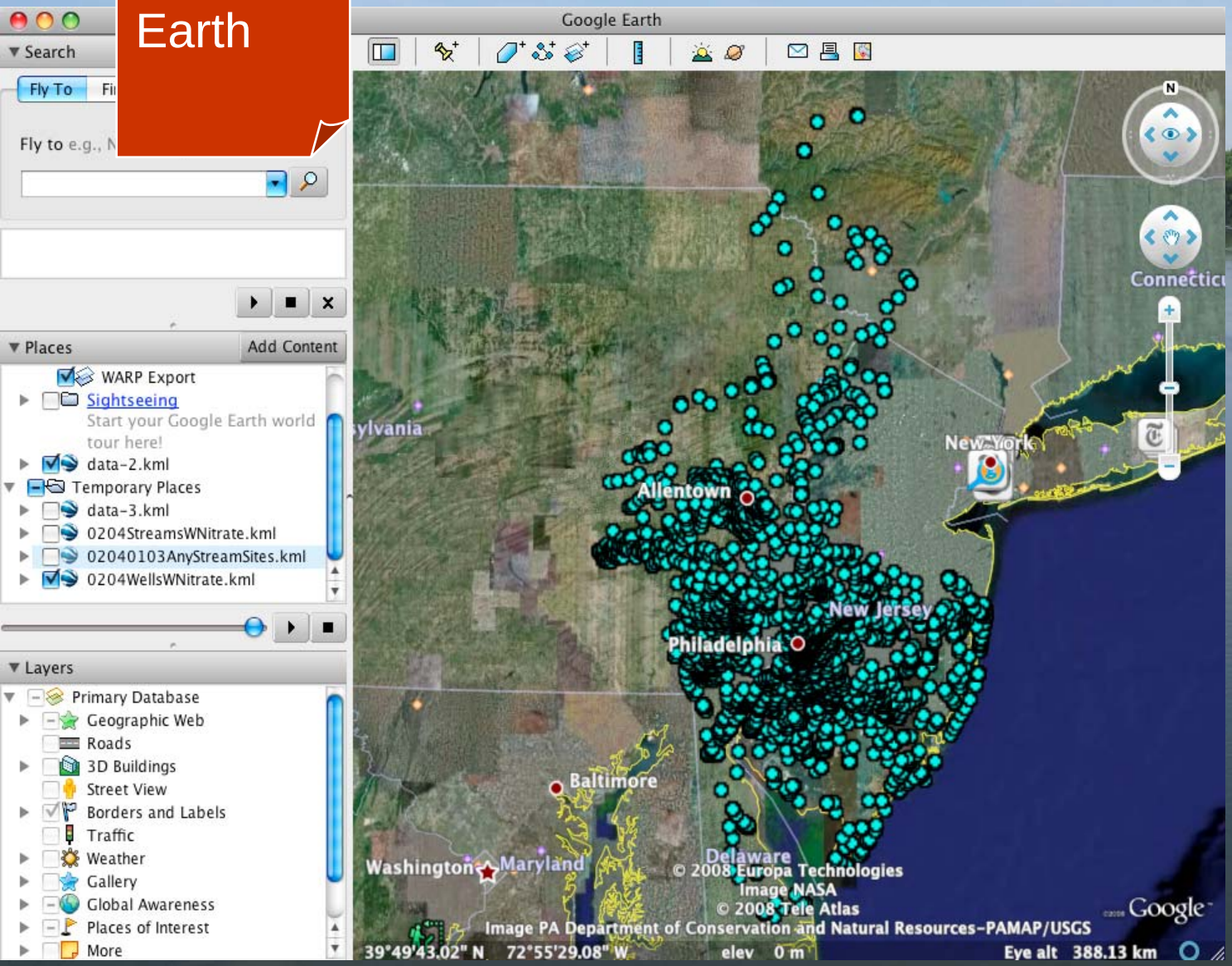
	A		F	G	H	I	J	K	L	M	N	O	P	Q
1	Organiz		ActivityMediaS	ActivityStartDa	ActivityStartTir	ActivityStartTir	ResultDetectio	CharacteristicName	ResultSampleF	ResultMeasure	ResultMeasure	ResultStatusId	StatisticalBase	ResultValueTyp
2	USGS-P	ience Center	Surface Water	1992-04-15	16:30:00	EDT		Ammonia and ammonium	Dissolved	0.03	mg/l NH4	Historical		Calculated
3	USGS-P	Science Center	Surface Water	1992-04-15	16:30:00	EDT		Nitrogen, Kjeldahl	Total	0.20	mg/l as N	Historical		Actual
4	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Ammonia and ammonium	Total	0.03	mg/l NH4	Historical		Calculated
5	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Ammonia and ammonium	Total	0.02	mg/l as N	Historical		Actual
6	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Nitrate-nitrite	Dissolved	0.210	mg/l as N	Historical		Actual
7	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Nitrate-nitrite	Total	0.21	mg/l as N	Historical		Actual
8	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT	Not Detected	Nitrite	Dissolved			Historical		Actual
9	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT	Not Detected	Nitrite	Total			Historical		Actual
10	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Nitrogen compounds, organic	Total	0.18	mg/l	Historical		Calculated
11	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Nitrogen, mixed forms (NH3), (NH4), o	Total	0.41	mg/l	Historical		Calculated
12	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Nitrogen, mixed forms (NH3), (NH4), o	Total	1.8	mg/l NO3	Historical		Calculated
13	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Phosphate	Dissolved	0.031	mg/l	Historical		Calculated
14	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Phosphate	Dissolved	0.010	mg/l as P	Historical		Actual
15	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Phosphate	Total	0.01	mg/l as P	Historical		Actual
16	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Phosphate-phosphorus	Total	0.031	mg/l	Historical		Calculated
17	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Phosphorus	Total	0.01	mg/l	Historical		Actual
18	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Hydrogen ion	Total	0.00014	mg/l	Historical		Calculated
19	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Stream flow, instantaneous		12	cfs	Historical		Actual
20	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		pH	Total	6.9	std units	Historical		Actual
21	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Specific conductance	Total	75	uS/cm @25C	Historical		Actual
22	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Temperature, water		10.5	deg C	Historical		Actual
23	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-04-15	16:30:00	EDT		Ammonia and ammonium	Dissolved	0.020	mg/l as N	Historical		Actual
24	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	10:45:00	EDT		Sediment	Suspended	2	mg/l	Historical		Actual
25	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Stream flow, instantaneous		9.0	cfs	Historical		Actual
26	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		pH	Total	6.9	std units	Historical		Actual
27	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Specific conductance	Total	75	uS/cm @25C	Historical		Actual
28	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Temperature, water		17.5	deg C	Historical		Actual
29	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT	Not Detected	Nitrogen, Kjeldahl	Total			Historical		Actual
30	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Ammonia and ammonium	Dissolved	0.04	mg/l NH4	Historical		Calculated
31	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Ammonia and ammonium	Dissolved	0.030	mg/l as N	Historical		Actual
32	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Ammonia and ammonium	Total	0.04	mg/l NH4	Historical		Calculated
33	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Ammonia and ammonium	Total	0.03	mg/l as N	Historical		Actual
34	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Nitrate-nitrite	Dissolved	0.097	mg/l as N	Historical		Actual
35	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Nitrate-nitrite	Total	0.10	mg/l as N	Historical		Actual
36	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT	Not Detected	Nitrite	Dissolved			Historical		Actual
37	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT	Not Detected	Nitrite	Total			Historical		Actual
38	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Phosphate	Dissolved	0.031	mg/l	Historical		Calculated
39	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Phosphate	Dissolved	0.010	mg/l as P	Historical		Actual
40	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Phosphate	Total	0.01	mg/l as P	Historical		Actual
41	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Phosphate-phosphorus	Total	0.031	mg/l	Historical		Calculated
42	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT	Not Detected	Phosphorus	Total			Historical		Actual
43	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Hydrogen ion	Total	0.00012	mg/l	Historical		Calculated
44	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Gage height		0.360	m	Historical		Calculated
45	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-13	11:00:00	EDT		Height, gage		1.18	ft	Historical		Actual
46	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-31	09:00:00	EDT		Nitrite	Dissolved	0.010	mg/l as N	Historical		Actual
47	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-31	09:00:00	EDT		Nitrite	Total	0.01	mg/l as N	Historical		Actual
48	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-31	09:00:00	EDT		Nitrogen compounds, organic	Total	0.35	mg/l	Historical		Calculated
49	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-31	09:00:00	EDT		Nitrogen, mixed forms (NH3), (NH4), o	Total	0.70	mg/l	Historical		Calculated
50	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-31	09:00:00	EDT		Nitrogen, mixed forms (NH3), (NH4), o	Total	3.1	mg/l NO3	Historical		Calculated
51	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-31	09:00:00	EDT		Phosphate	Dissolved	0.092	mg/l	Historical		Calculated
52	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-31	09:00:00	EDT		Phosphate	Dissolved	0.030	mg/l as P	Historical		Actual
53	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-31	09:00:00	EDT		Phosphate	Total	0.03	mg/l as P	Historical		Actual
54	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-31	09:00:00	EDT		Phosphate-phosphorus	Total	0.092	mg/l	Historical		Calculated
55	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-31	09:00:00	EDT		Phosphorus	Total	0.06	mg/l	Historical		Actual
56	USGS-PA	USGS Pennsylvania Water Science Center	Surface Water	1992-05-31	09:00:00	EDT		Stream flow, instantaneous		20	cfs	Historical		Actual

Example: Stream sites with Nitrate in the Delaware River Basin (HUC0204)



Example: Wells with Nitrate in the Delaware River Basin (HUC0204)

Google Earth



Future

- Station and Result web services planned for release FY08
- Define a common spatial framework vis-à-vis SRS for chemical nomenclature: NHDPlus
- Software libraries for other applications to leverage the web services
- Portal and analytical applications

http://QWWebServices.usgs.gov

PROPOSAL COVER SHEET

Development of a Delaware Basin Watershed to Ocean Water-Quality-Data Exchange Portal and Upgrades to Real-Time Observation Systems as Part of the National Monitoring Network for Coastal Waters and Their Tributaries

December 3, 2007

Principal Investigator: Robert Tudor
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Financial Rep: Richard Gore

Delaware River Basin Commission

Duration of Project: 2 years plus 1 optional

Funding type: Grant

Funding request by year:

Year 1: $3,220,000

Year 2: $2,872,000

Year 3: $2,254,000

USGS WATERWATCH

http://water.usgs.gov/waterwatch/

WaterQualityWatch — *Continuous Real-Time Water Quality of Surface Water in the United States*

About USGS WaterQualityWatch

Current RTWQ Maps — Redisplay

State: United States

Measurement: Discharge

RTWQ Sites

Google Map of all USGS Real-Time Water Data

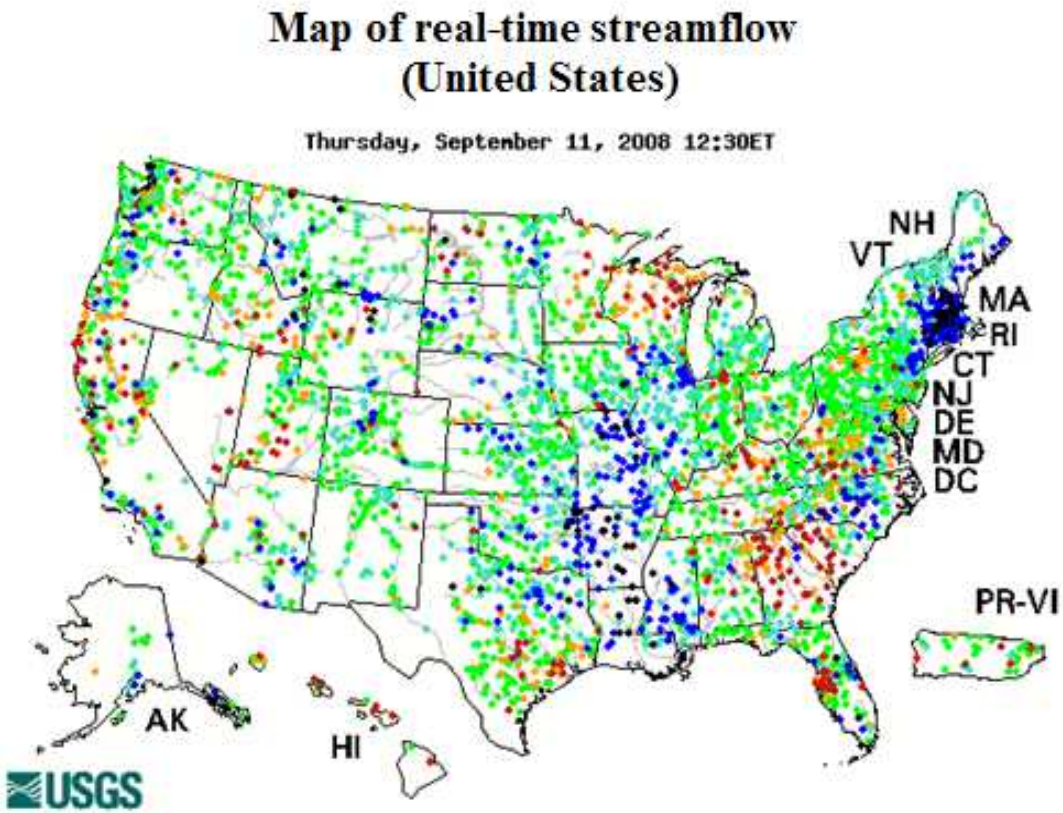
RTWQ FAQ — Redisplay

- What is the USGS?
- What is continuous RTWQ?
- How are sites selected?
- Why continuous and real time?
- How are these data used?
- What are these measurements?
- How are monitors operated and maintained?
- What is a surrogate?

Example of Sites Displaying Surrogates

- California
- Colorado
- Georgia
- Kansas
- Maryland
- Montana
- North Dakota
- Ohio
- South Dakota
- Wyoming

Examples of Surrogate Methods and Reports — Redisplay



Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	Not ranked
	Much below normal	Below normal	Normal	Above normal	Much above normal		

USGS WATERWATCH

http://water.usgs.gov/waterwatch/wqwatch/

WaterQualityWatch — *Continuous Real-Time Water Quality of Surface Water in the United States*

About USGS WaterQualityWatch

Current RTWQ Maps — Redisplay

State: United States

Measurement: Water temperature

RTWQ Sites

Google Map of all USGS Real-Time Water Data

RTWQ FAQ — Redisplay

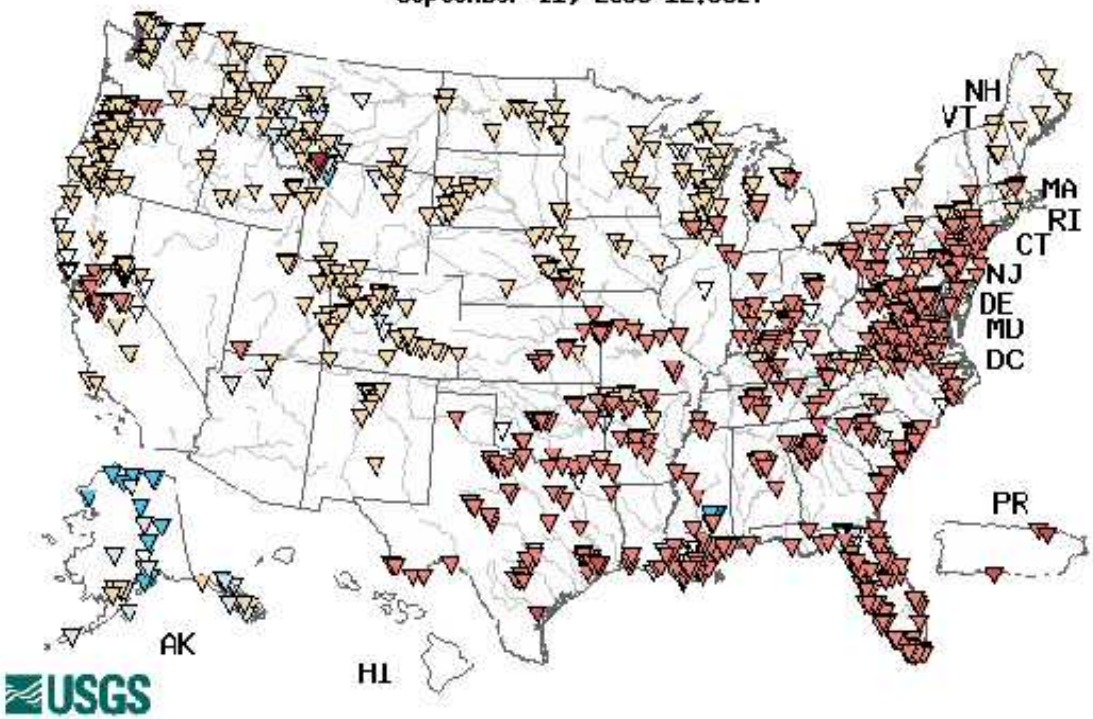
- What is the USGS?
- What is continuous RTWQ?
- How are sites selected?
- Why continuous and real time?
- How are these data used?
- What are these measurements?
- How are monitors operated and maintained?
- What is a surrogate?

Example of Sites Displaying Surrogates

- California ()
- Colorado ()
- Georgia ()
- Kansas ()
- Maryland ()
- Montana ()
- North Dakota ()
- Ohio ()
- South Dakota ()
- Wyoming ()

Map of real-time Water Temperature, °C (United States)

September 11, 2008 12:30ET



Explanation							
<1	1-4.9	5-9.9	10-19.9	20-29.9	30-35	>35	No Data

USGS WATERWATCH

http://water.usgs.gov/waterwatch/wqwatch/

USGS WATERWATCH

http://water.usgs.gov/waterwatch/wqwatch/

WaterQualityWatch -- *Continuous Real-Time Water Quality of Surface Water in the United States*

About USGS WaterQualityWatch

Current RTWQ Maps Redisplay

State: United States

Measurement: Specific conductance

RTWQ Sites

Google Map of all USGS Real-Time Water Data

RTWQ FAQ Redisplay

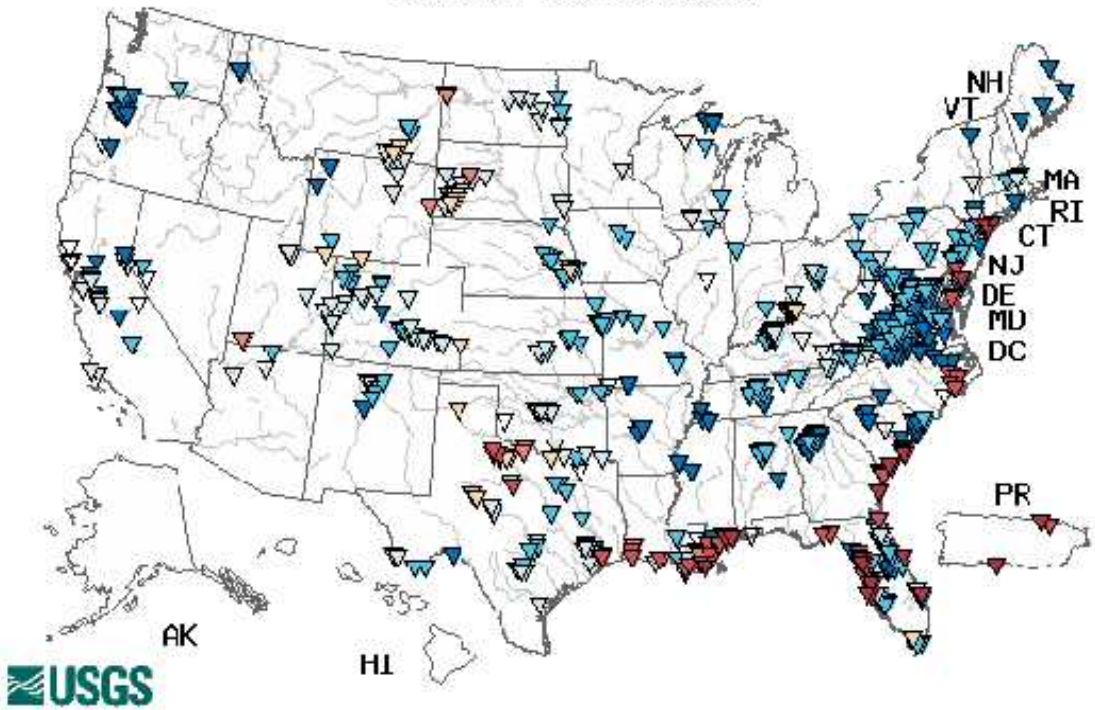
- What is the USGS?
- What is continuous RTWQ?
- How are sites selected?
- Why continuous and real time?
- How are these data used?
- What are these measurements?
- How are monitors operated and maintained?
- What is a surrogate?

Example of Sites Displaying Surrogates

- California ()
- Colorado ()
- Georgia ()
- Kansas ()
- Maryland ()
- Montana ()
- North Dakota ()
- Ohio ()
- South Dakota ()
- Wyoming ()

Map of real-time Specific Conductance, µS/cm at 25 °C (United States)

September 11, 2008 12:31ET



Explanation							
<250	250-749	750-2,240	2,250-4,990	5,000-9,990	10,000-35,000	>35,000	No Data