Support Assessment and Reporting Tools

National Water Quality Monitoring Council Meeting

Reston, VA

December 11, 2008

Eric Vowinkel

USGS New Jersey Water Science Center

USGS Co-Chair Methods and Data Comparability Board

Issues (from Council Prioritized Issues 12/09/2008 as Framework for Work Group Discussions)

- Promote, share, and document statistical, modeling, and assessment tools
- Build capacity among Feds and States
- *Provide guidance for the National Monitoring Network for Coastal Waters and Their Tributaries (Demonstration Study Areas) on how to integrate and assess water-quality data*

National Water Quality Monitoring Council Home Page - Windows Internet Explorer

http://acwi.gov/monitoring/

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Page Tools

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

Users of Water Data

- Water quality managers
- Water supply managers
- Water security managers
- Public health officials
- Regulatory agencies
- Maritime traffic—PORTS
- Search and rescue operations
- Boaters--marina and yacht clubs
- Fishermen
- Academic

Thoughts

- The NWQMC designed a National Water Quality Monitoring Network for Coastal Waters and their Tributaries
- It is a designed as a Network of Networks
- Different compartments—atmosphere, rivers, estuaries, near coastal, ocean, wetlands, ground water
- Various types of data:
  - discrete (annually, quarterly to as many as 12-16 many times per year),
  - Probabilistic (once every five years at different sites)
  - fixed-point continuous monitors,
  - moving continuous (ferry, AUV)
  - Satellite (temperature, chlorophyll)
- Different groups of water characteristics and constituents
  - Field (DO, temp, conductance, pH, turbidity, ….
  - Major ions
  - Nutrients
  - Metals
  - Organic contaminants
- Want to determine (1) status, (2) trends, (3) loads, (4) other measures like probability of exceeding a threshold level

More thoughts

- **Suggest that the Council/Board provide guidance on appropriate statistical methods to integrate and interpret data from the National Networks (and other networks) to provide the users with comparable data?**
- **What is the Council expecting the Demonstration Project areas to do with all this data?**
- **Can we integrate these disparate data sets and if so, how do we suggest we integrate them to tell the story of water quality in that HUC6 basin?**
- **We are great a collecting the data but we need tools to assess the data**
- **Need funding to assess the data too!!!**

What does the Methods Board want to do relative to this issue?

- Develop a Statistics Work Group to provide expertise on water-quality/quantity issues at different scales
- Provide guidance on appropriate statistical (parametric/nonparametric), graphical, and mapping techniques for interpreting and presenting data
- Provide guidance on data mining techniques???
- Develop website to provide guidance and point to success stories from Federal, State, local, and volunteer reports
- Enter statistical methods into a National Environmental Methods Index (NEMI) type database

http://www.practicalstats.com/aes/aesbook/files/HelselHirsch.PDF - Windows Internet Explorer

http://www.practicalstats.com/aes/aesbook/files/HelselHirsch.PDF

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Bookmarks

STATISTICAL METHODS IN WATER RESOURCES

Table of Contents

Preface

Chapter 1. Summarizing Data

Chapter 2. Graphical Data Analysis

Chapter 3. Describing Uncertainty

Chapter 4. Hypothesis Tests

Chapter 5. Differences between Two Independent Groups

Chapter 6. Matched-Pair Tests

Chapter 7. Comparing

USGS
science for a changing world

Techniques of Water-Resources Investigations of the United States Geological Survey

Book 4, Hydrologic Analysis and Interpretation

Chapter A3

Statistical Methods in Water Resources

By D.R. Helsel and R.M. Hirsch

Downloaded (3.10 MB of 11.67 MB) : http://www.practicalstats.com/aes/aesbook/files/HelselHirsch.PDF

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Mid-Atlantic Coastal Ocean Observing Regional Association - Windows Internet Explorer

http://www.macoora.org/

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Mid-Atlantic Coastal Ocean Observi...

MACOORA

Mid-Atlantic Coastal Ocean Observing Regional Association

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About Us | Education & Outreach | Data, Products & Modeling | Get Involved | Latest News | Upcoming Events | Members

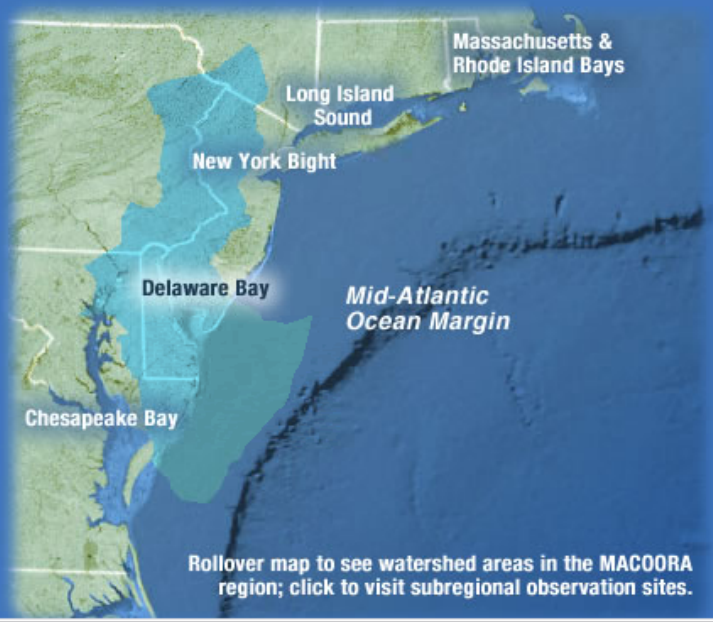
Upcoming Events

— Save the Date —

MARIBS/MACOORA Fisheries Information User's Workshop
November 19–20, 2008
University of Massachusetts Dartmouth's Advanced Technology & Manufacturing Center
Fall River, MA

Participation by invitation
Contact: Bella Costa

Workshop on High Density Distributed Coastal Ocean
November 24–25, 2008
SURA Headquarters
1201 New York Ave., NW



About MACOORA

MACOORA coordinates and facilitates observations of the ocean and estuaries between Cape Hatteras and Cape Cod as part of a national effort to improve scientific observations of our coastal oceans...more

About MARCOOS

(MARCOOS) is the regional observing system of MACOORA...more

Meeting Archives

Newsletter

http://www.macoora.org/de_bay_sub.html

Internet 100%

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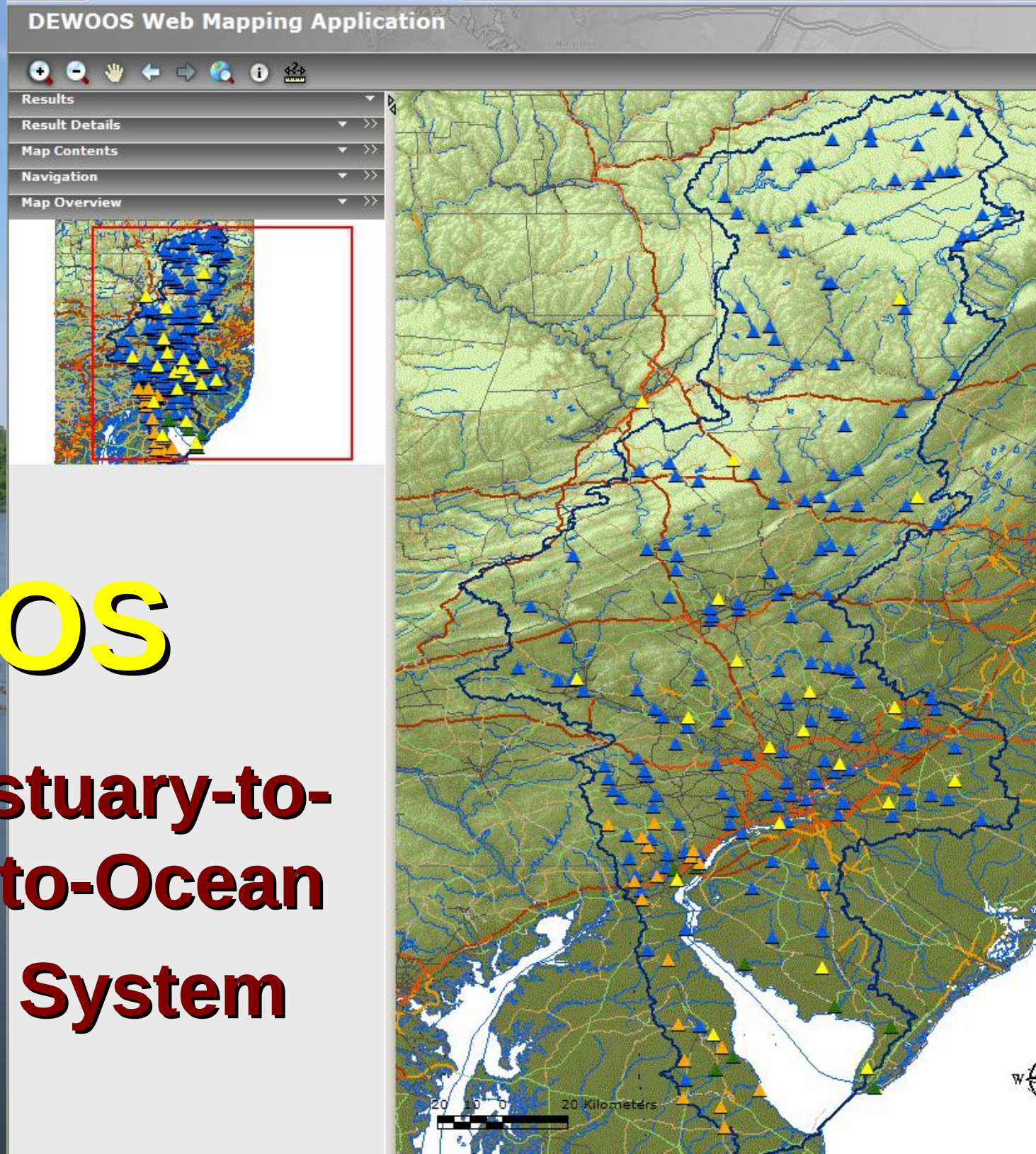
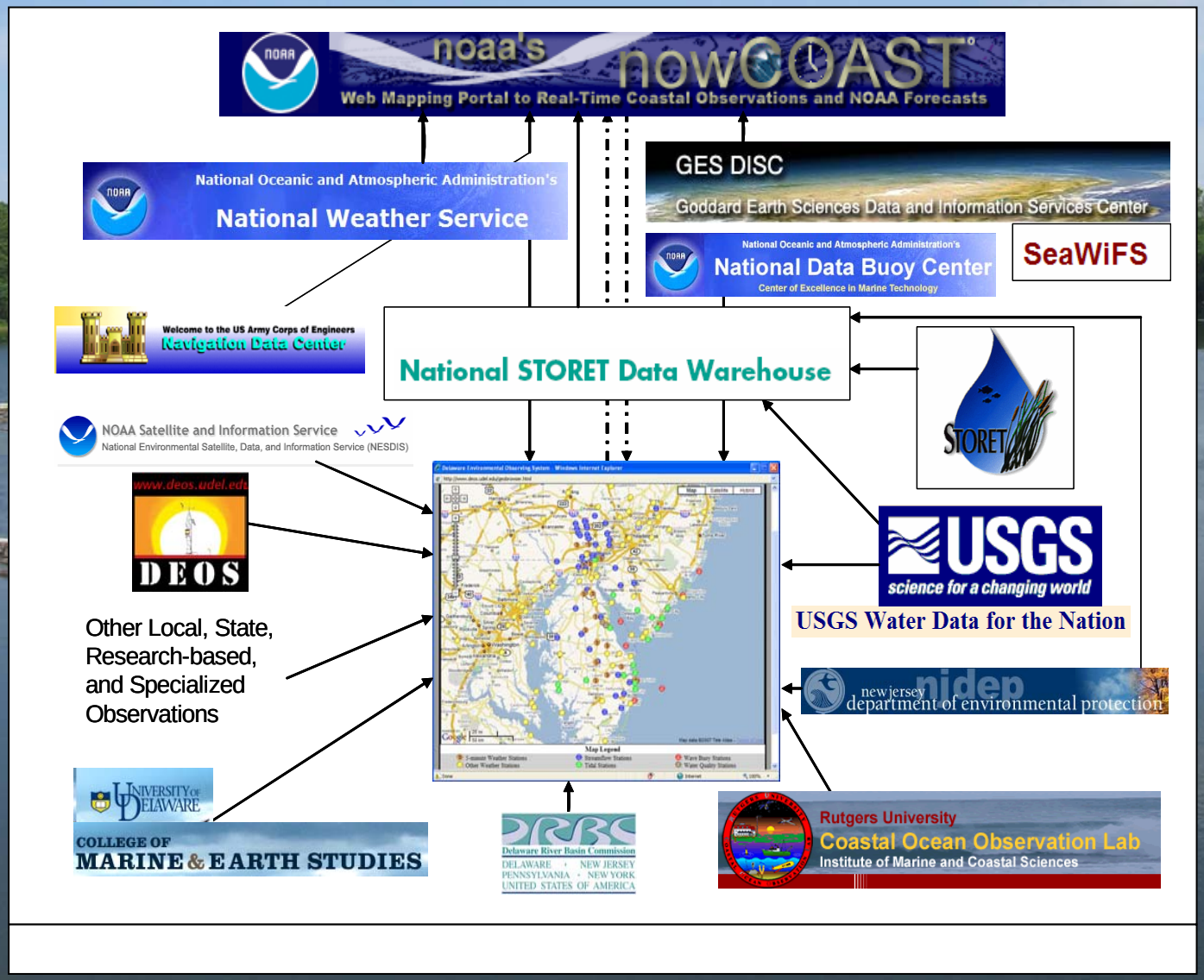
DEWOOS

Delaware Estuary-to-Watershed-to-Ocean Observing System



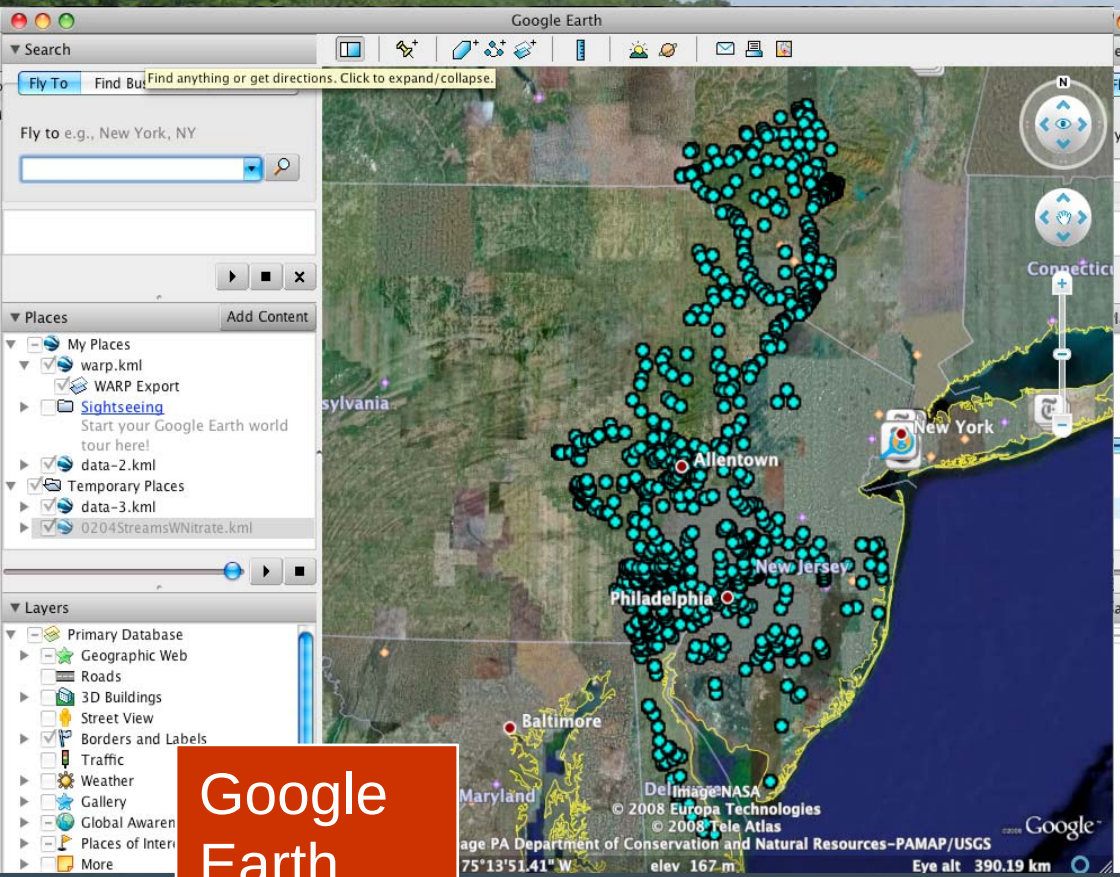
Data Soruces to DEWOOS



USGS/EPA Data Exchange

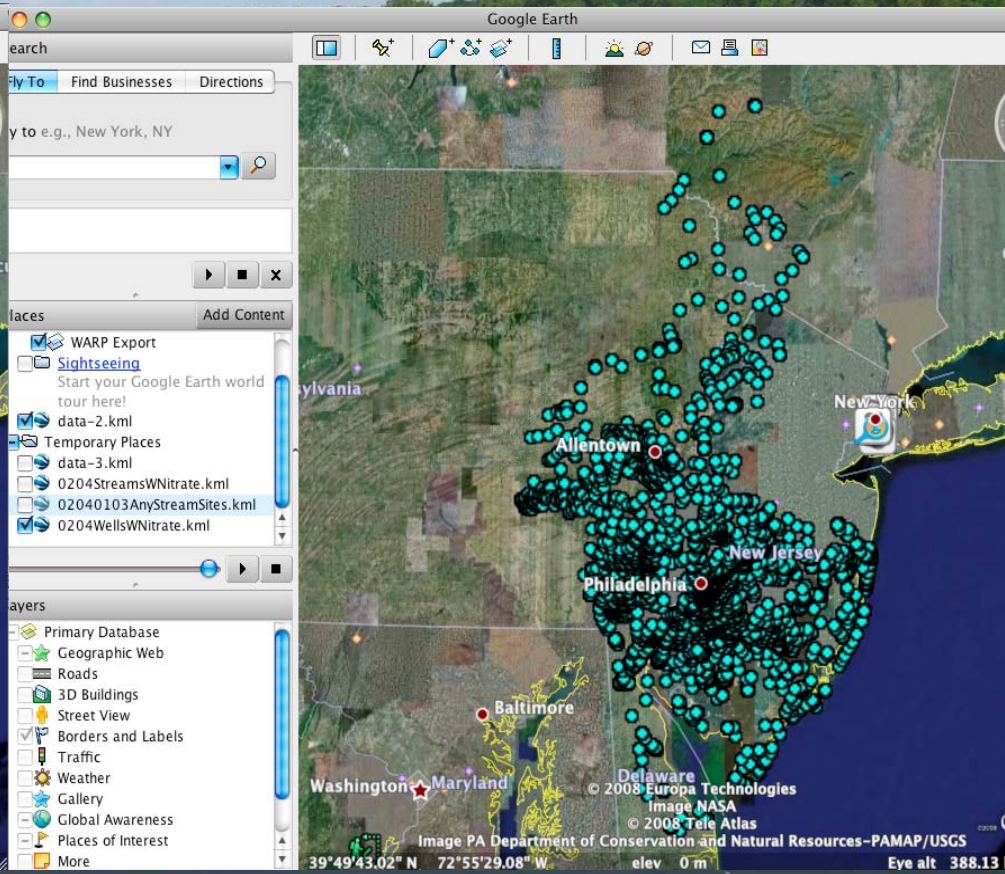
USGS: Jon Scott, Nate Booth, Dorrie Gellenbeck, I-Lin Kuo
USEPA: Dwane Young

Example: Water-quality sites with nitrate data in the Delaware River Basin (HUC0204) from NWIS & STORET



Google Earth

Surface water



Ground water

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

Real-Time Water Data Retrieval Map - Windows Internet Explorer

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

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Real-Time Water Data Retrieval Map

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science for a changing world

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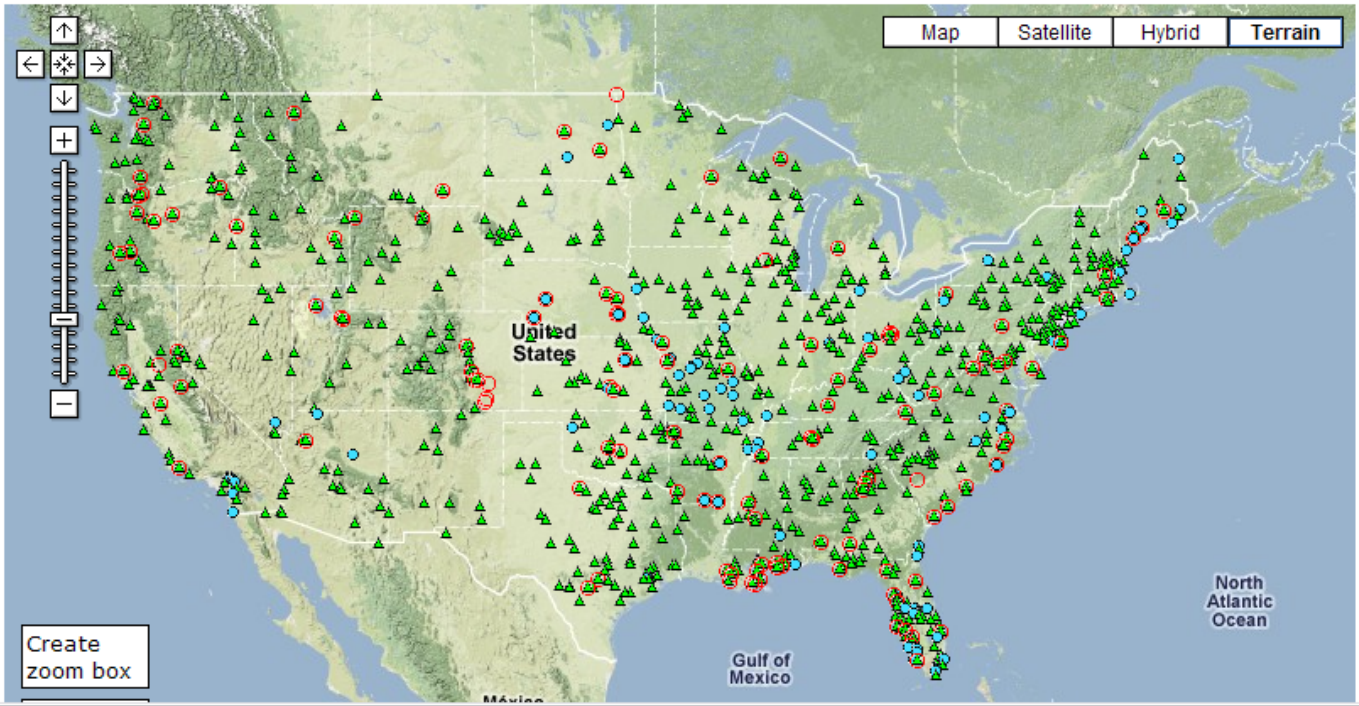
WaterWatch: Map Interface to All USGS Real-Time Water Data

WaterWatch | Ground-Water Watch | Water Quality Watch

Real-Time Water Data Retrieval Map



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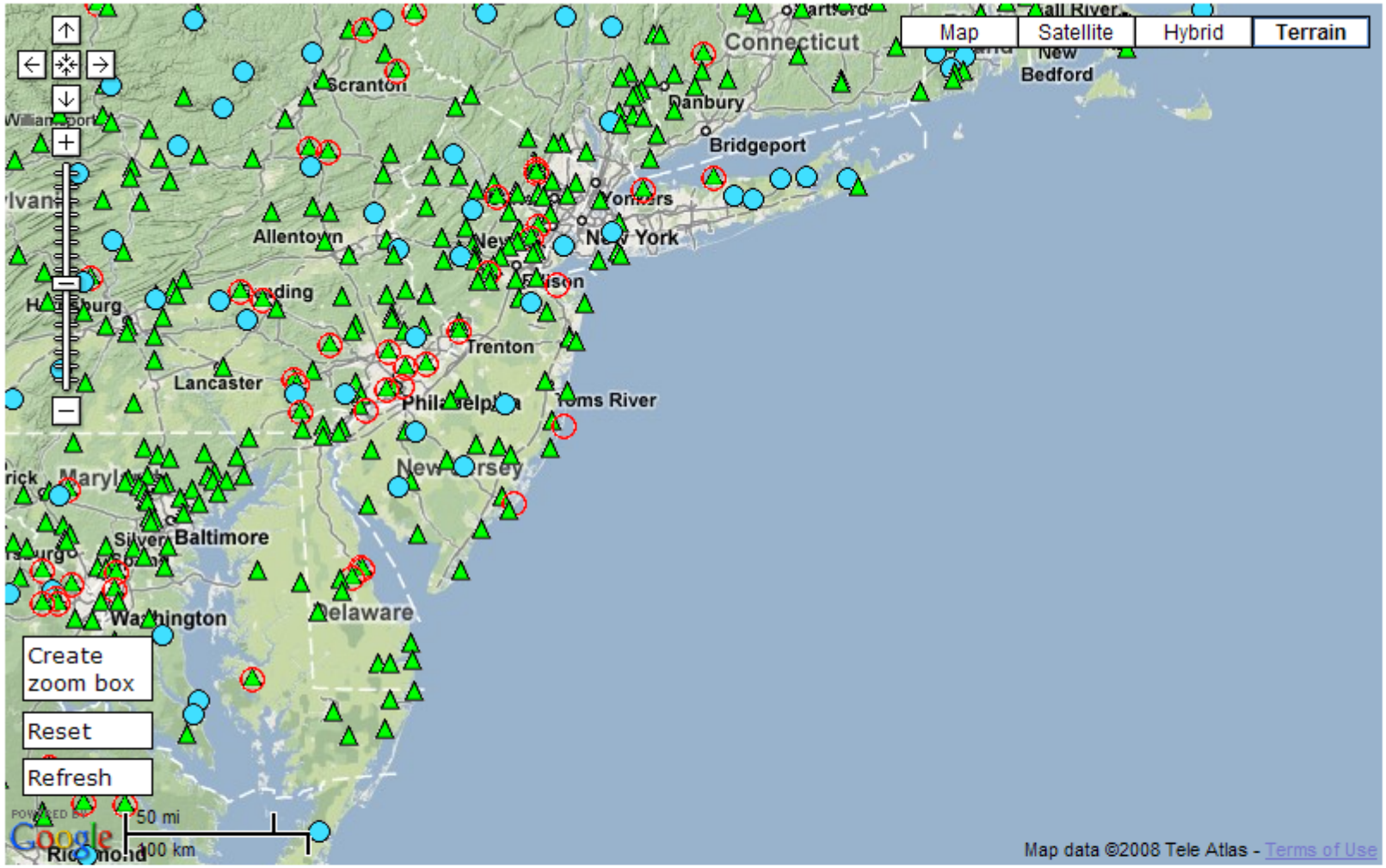
Real-Time Water Data Retrieval Map



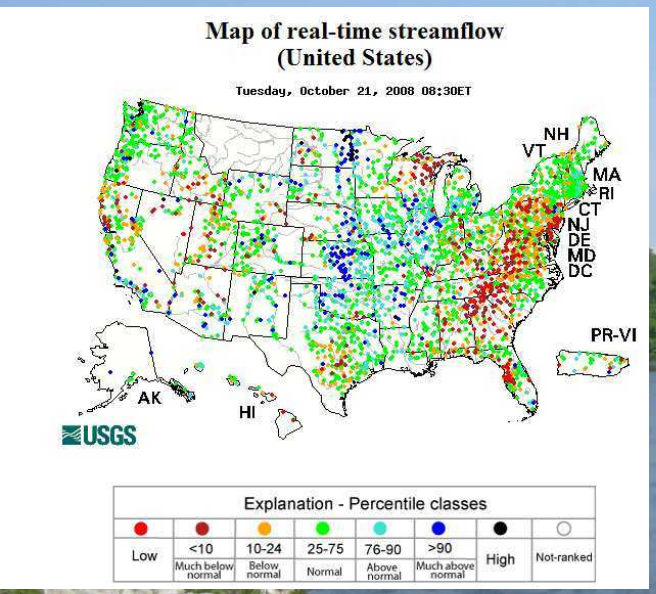
TO START: Click on the 'Create zoom box' button, and then click and drag a box across the area of interest.

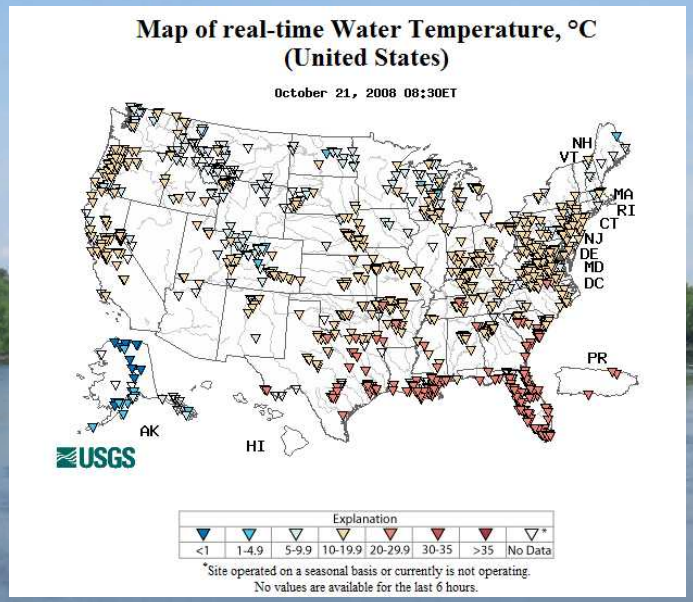
Explanation

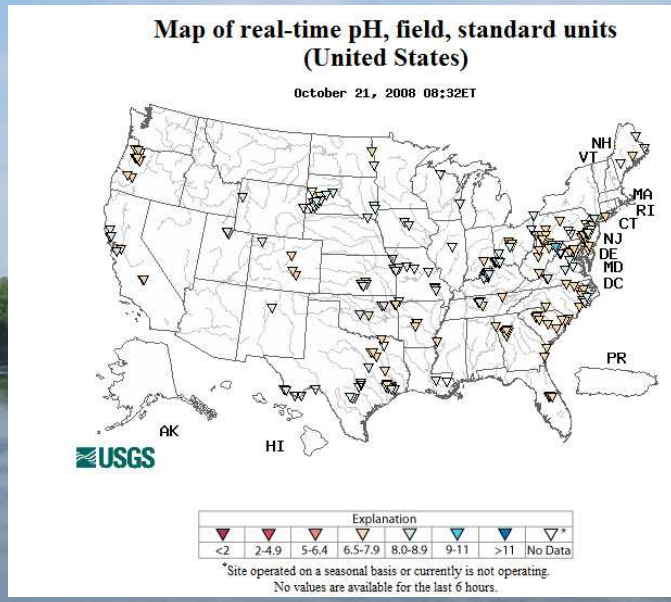
Station Type			
Storm Surge	Streamflow	Ground Water	Water Quality

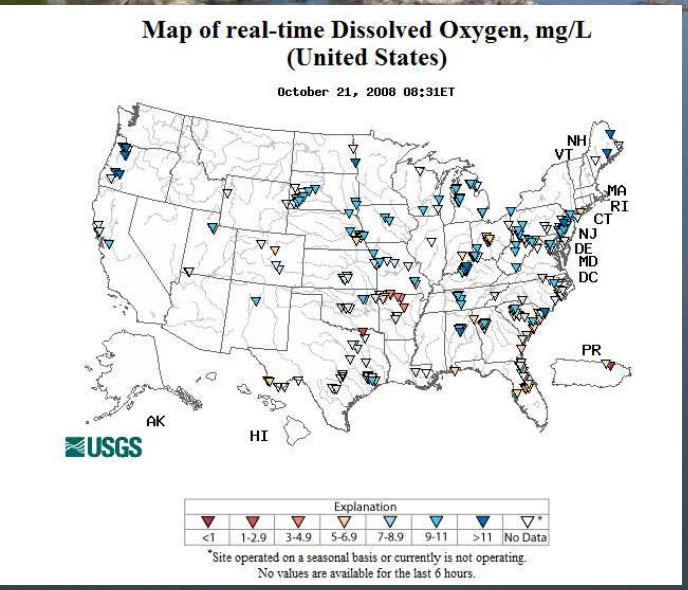
USGS WATERWATCH

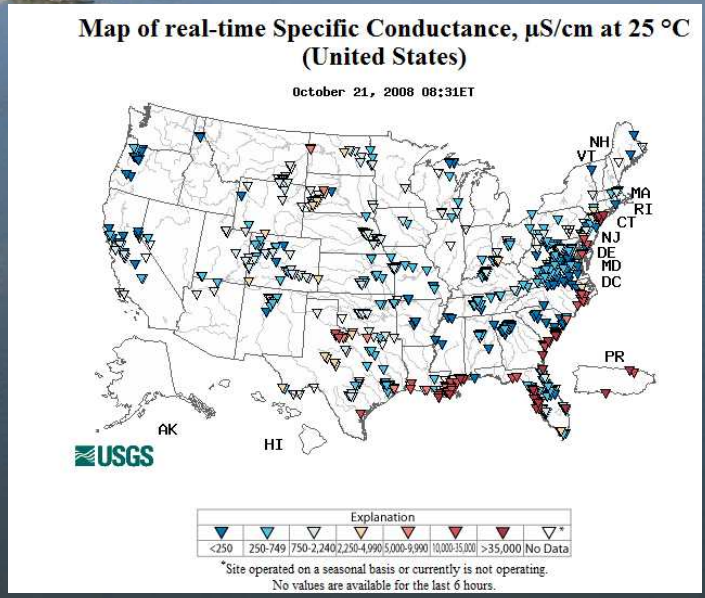
http://water.usgs.gov/waterwatch/wqwatch/

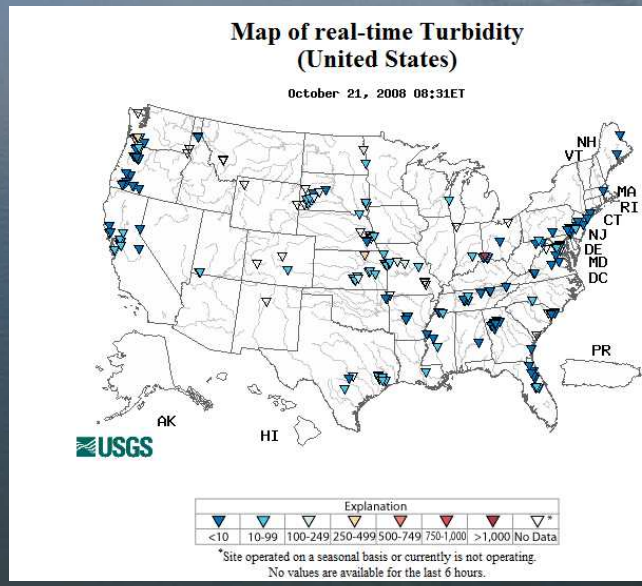




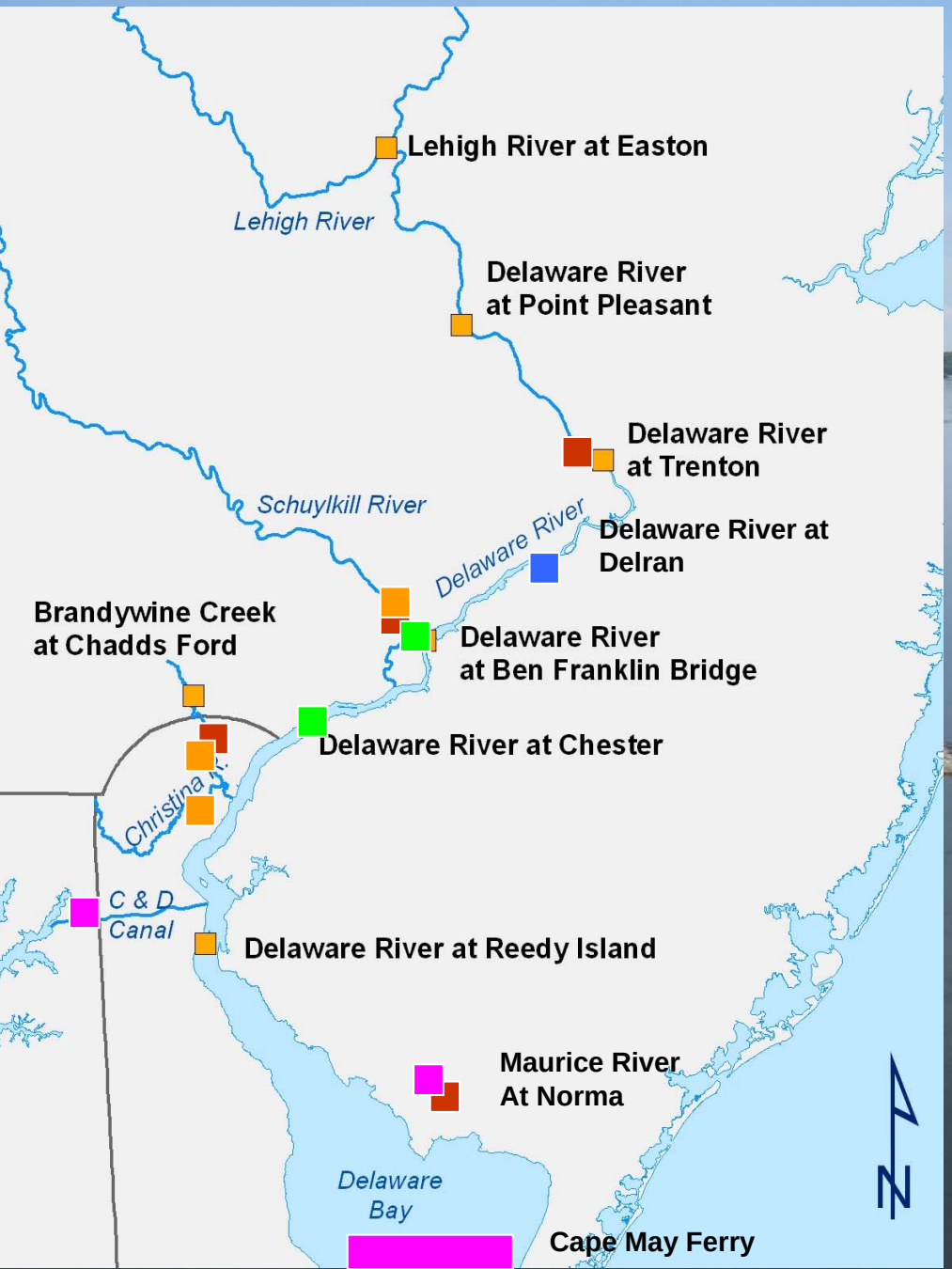




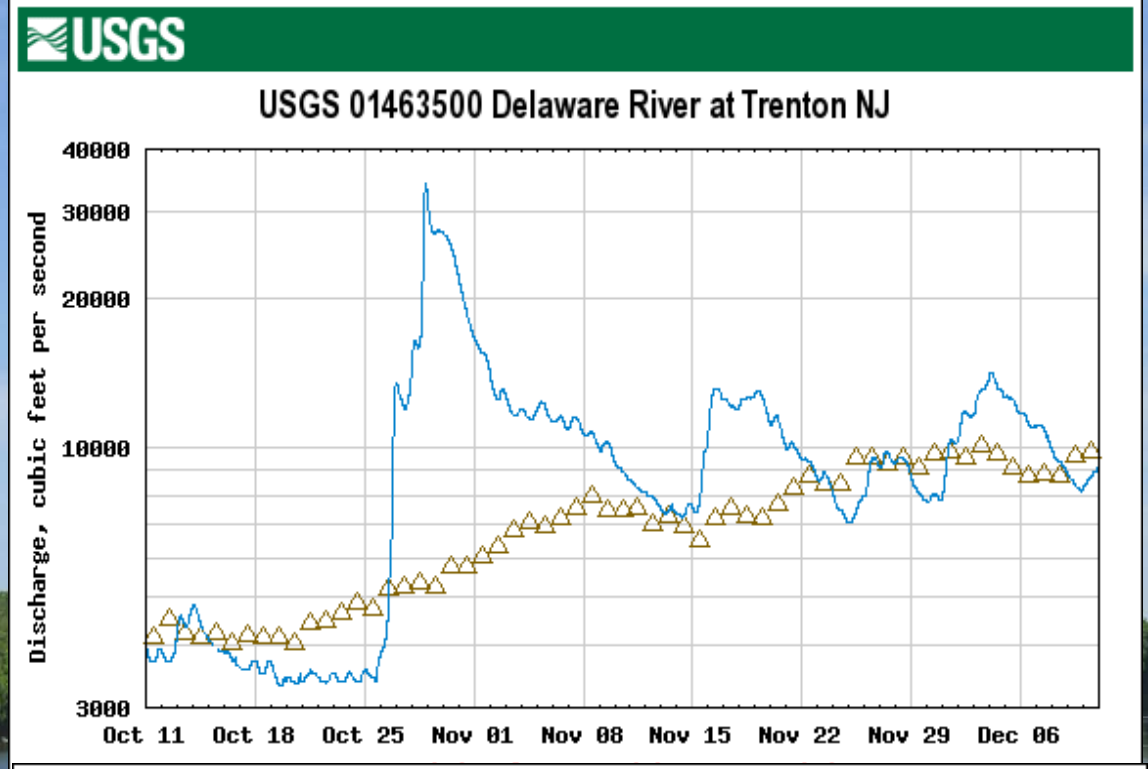


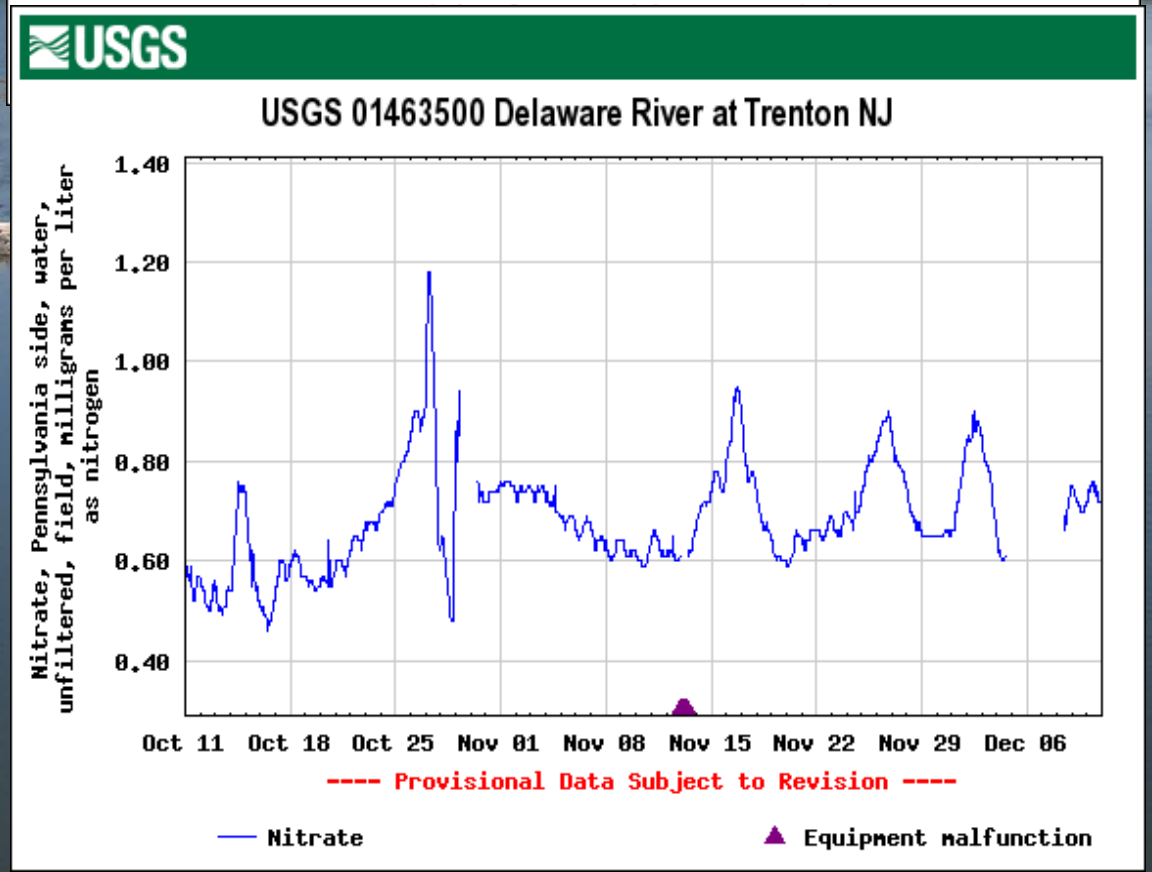


NWQMN Delaware River Basin Demonstration Area Sensor and Discrete Monitoring Network



- 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

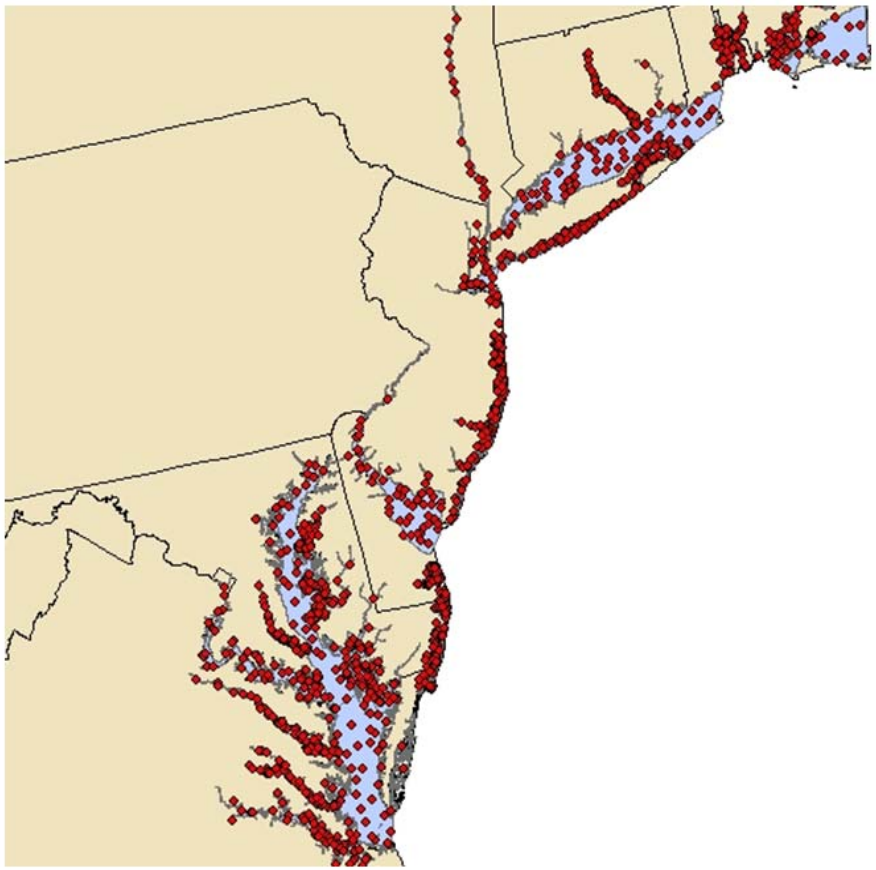




Methods to estimate loads of contaminants from continuous sensors

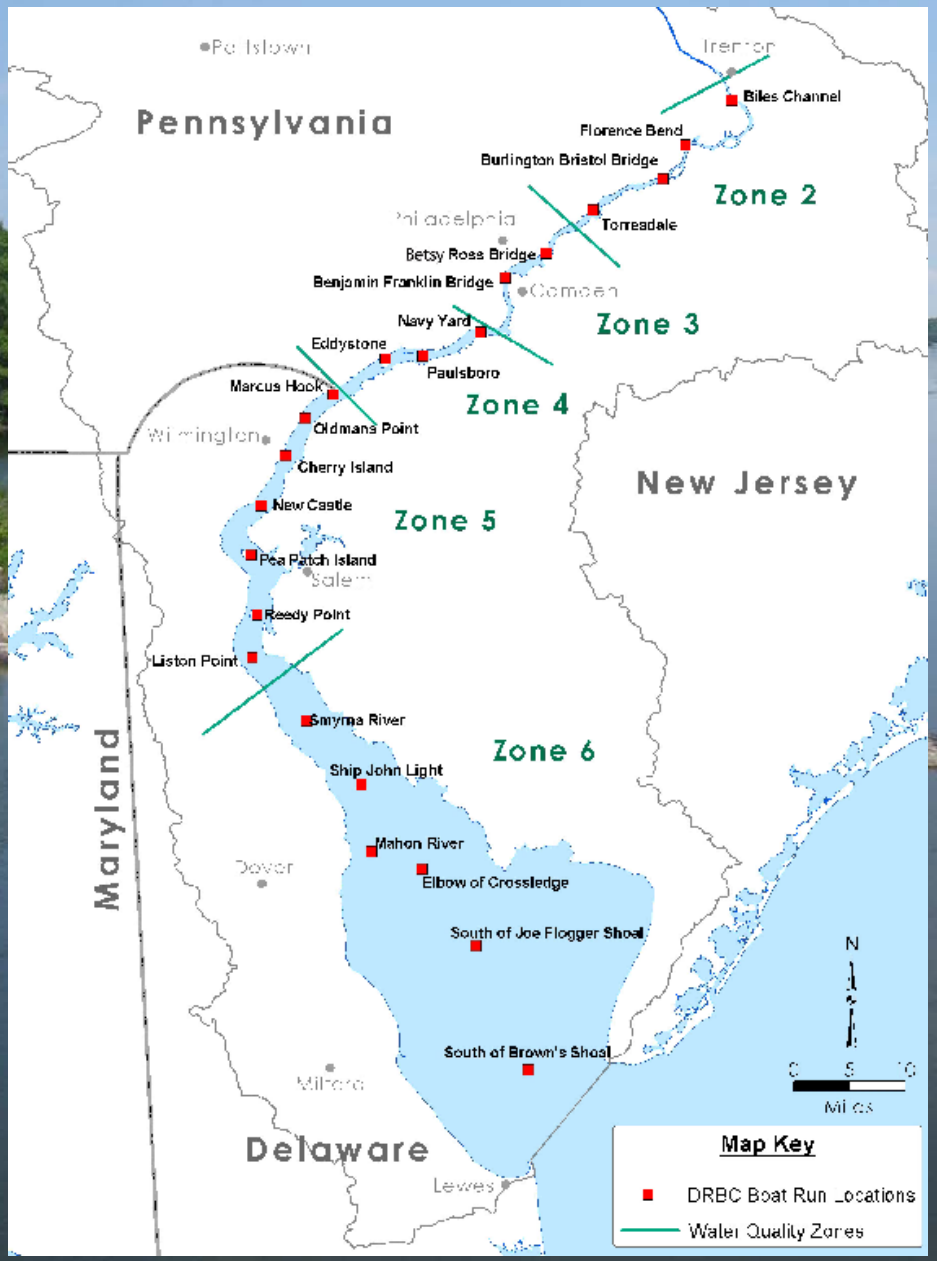
Probabilistic Estuarine Monitoring in the Mid-Atlantic IOOS Region from Network

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



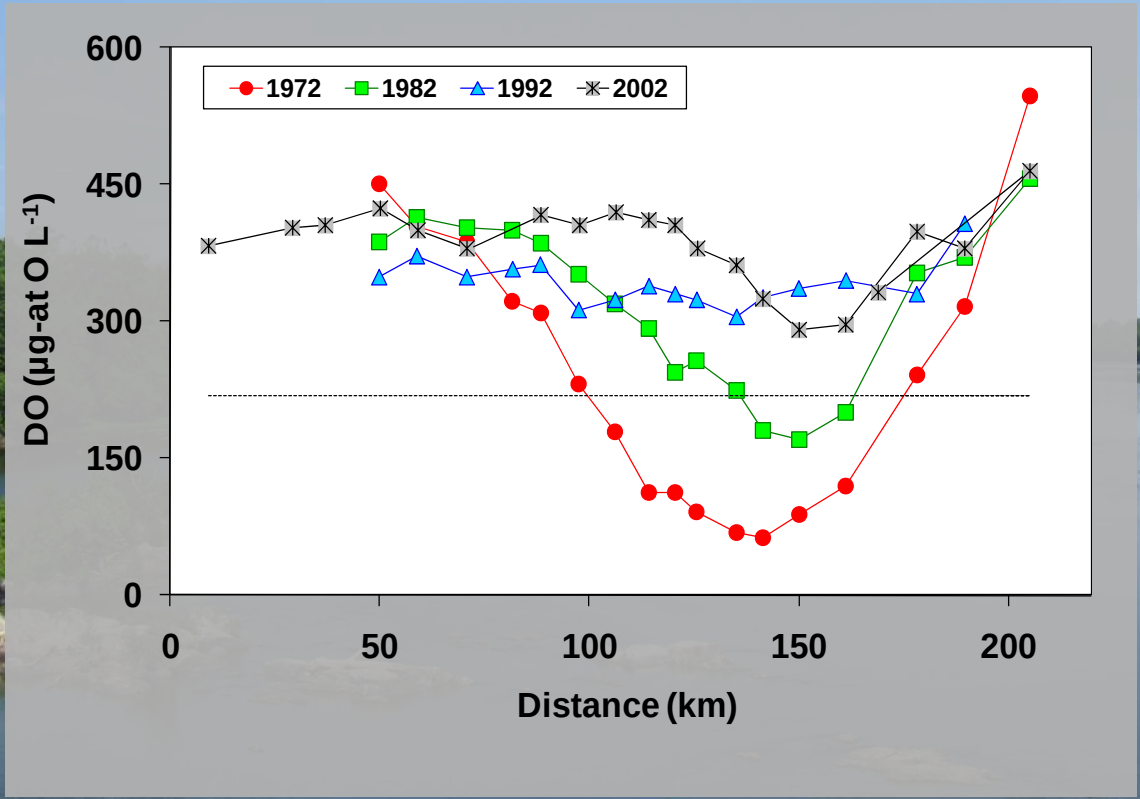
- Designed by USEPA ORD
- Need to coordinate with EPA probabilistic estuary monitoring in 2010

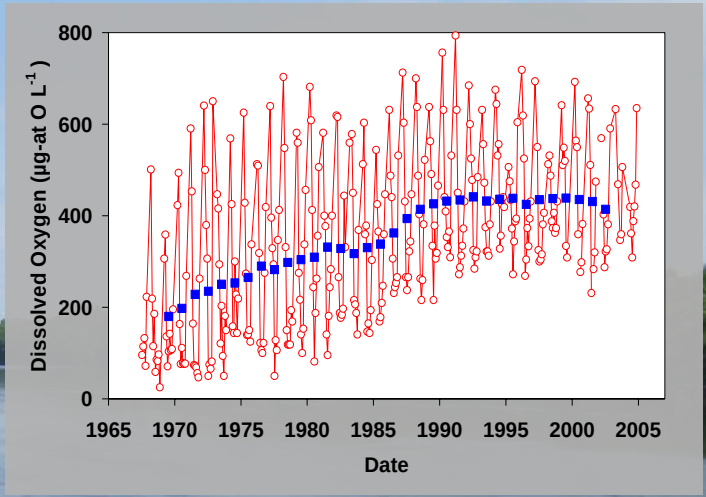
Delaware Estuary Boat Run Sites

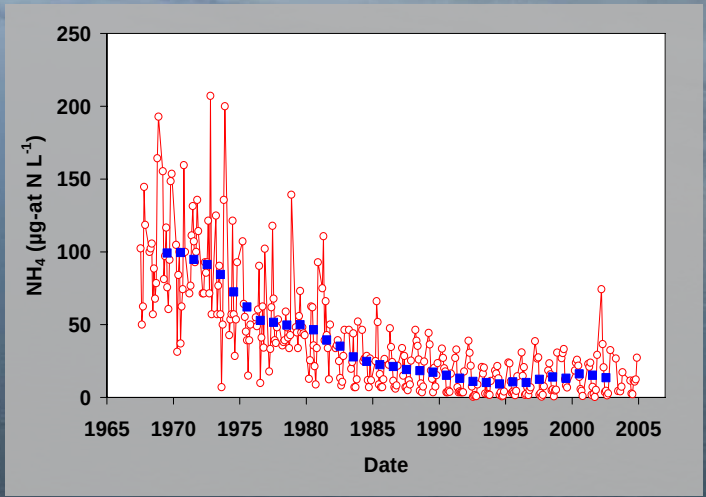


- Data collected since early 1970's
- 22 sites along estuary spine sampled 16 times per year on same day
  - Nutrients
  - Carbon
  - Bacteria
  - VOCs
  - Other
- Upgrading nutrient and carbon analyses to meet Network needs
- Compliments previous and planned National Coastal Assessment monitoring (2008)

Historical Boat Run Data

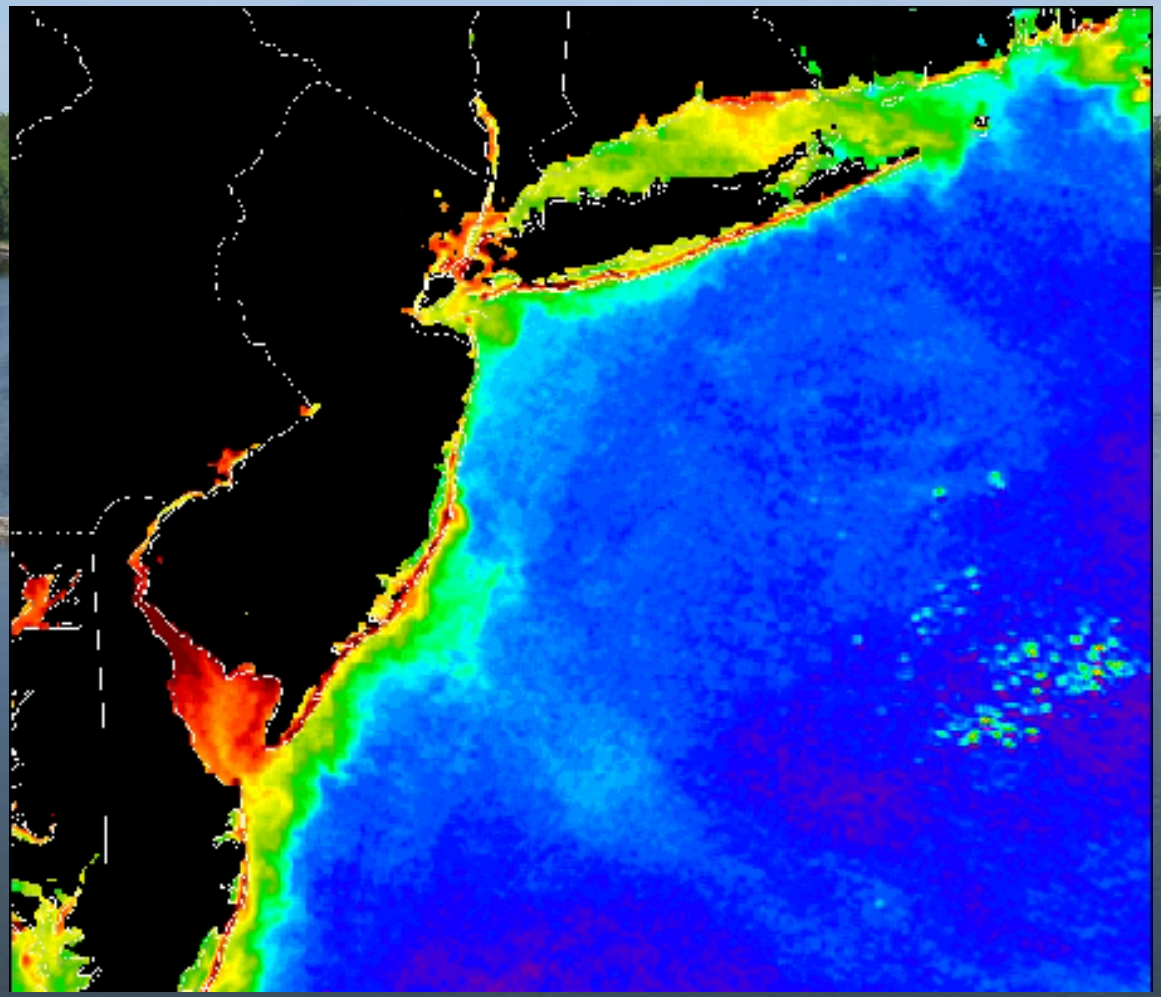






- WQ data back to the early 1970's
- DO sag below Philadelphia decreasing as wastewater treatment plant improvements
- Need to improve data storage and retrieval
- Need to integrate with real-time data

Satellite Chlorophyll



More Precise Assessment of Benthic Conditions in Delaware Bay

DCMP
DELAWARE COASTAL MANAGEMENT PROGRAM

PARTNERSHIP FOR THE DELAWARE ESTUARY INC.

Coastal Management Program

DNREC Online

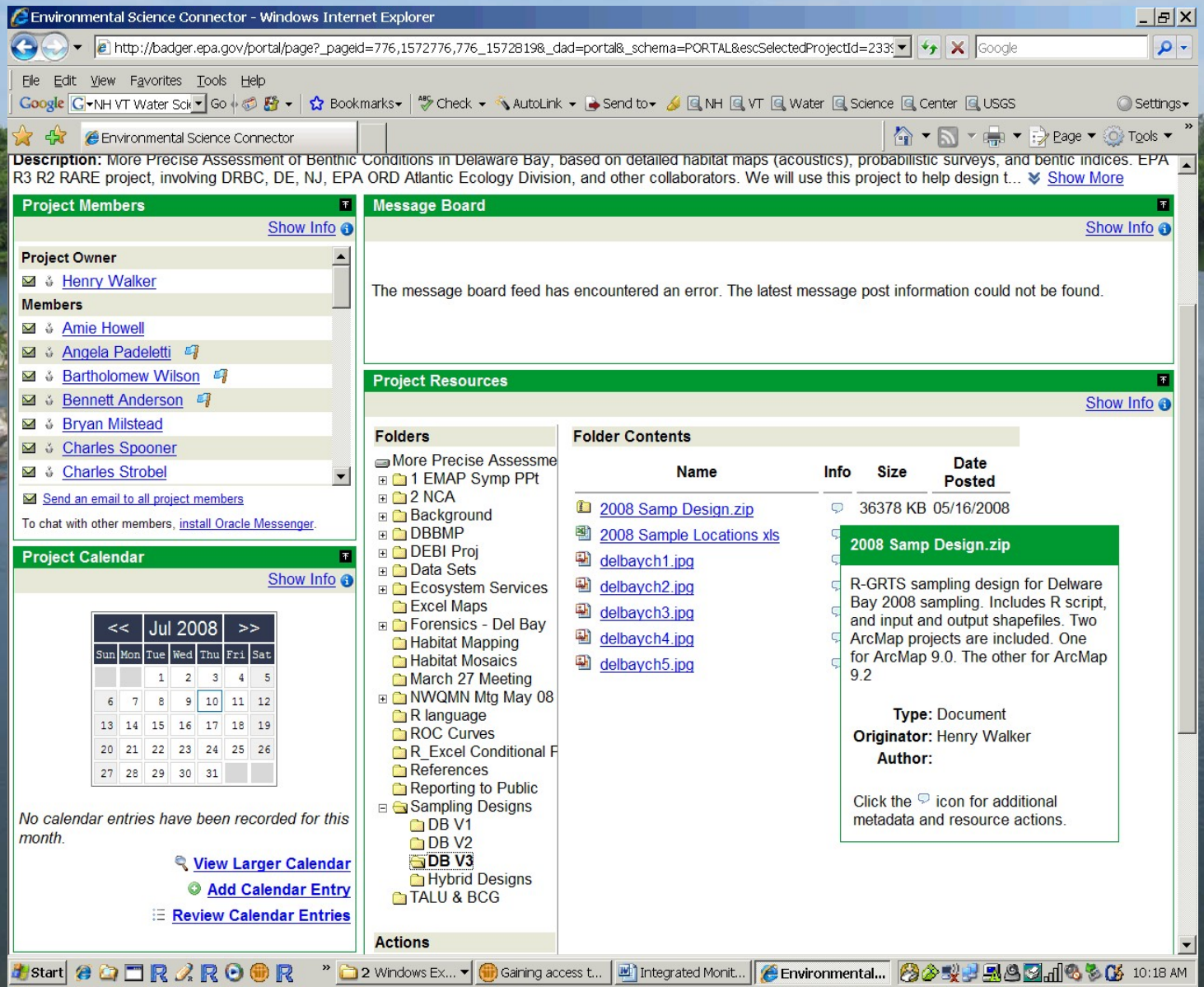
Delaware River Basin Commission

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

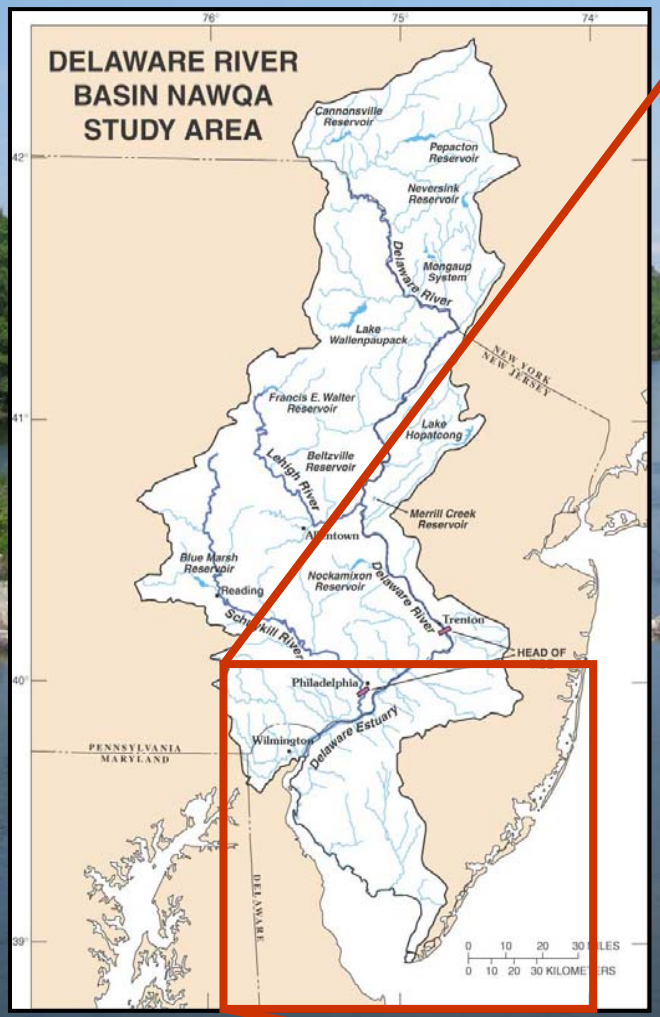
UNIVERSITY OF DELAWARE

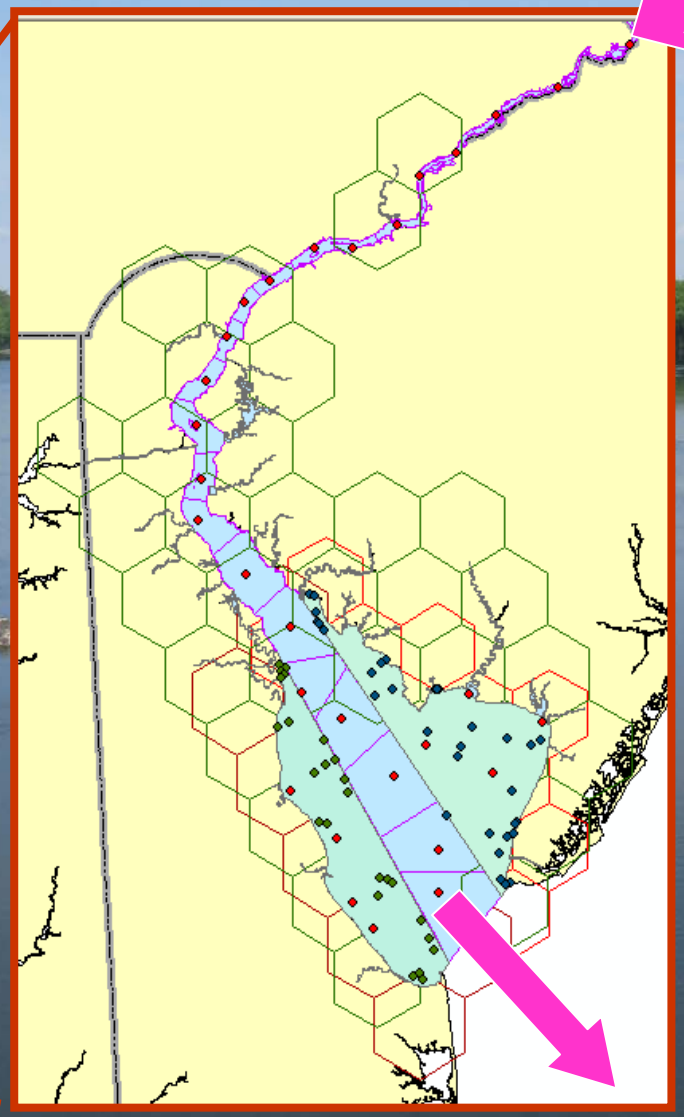
newjersey department of environmental protection nidep

Delaware Bay Benthic Study
EPA Web Portal
need web site here!!!



Some of the basics related to the probability survey design.





Boat Run Stations

Sampling design for 2000-2001 includes:

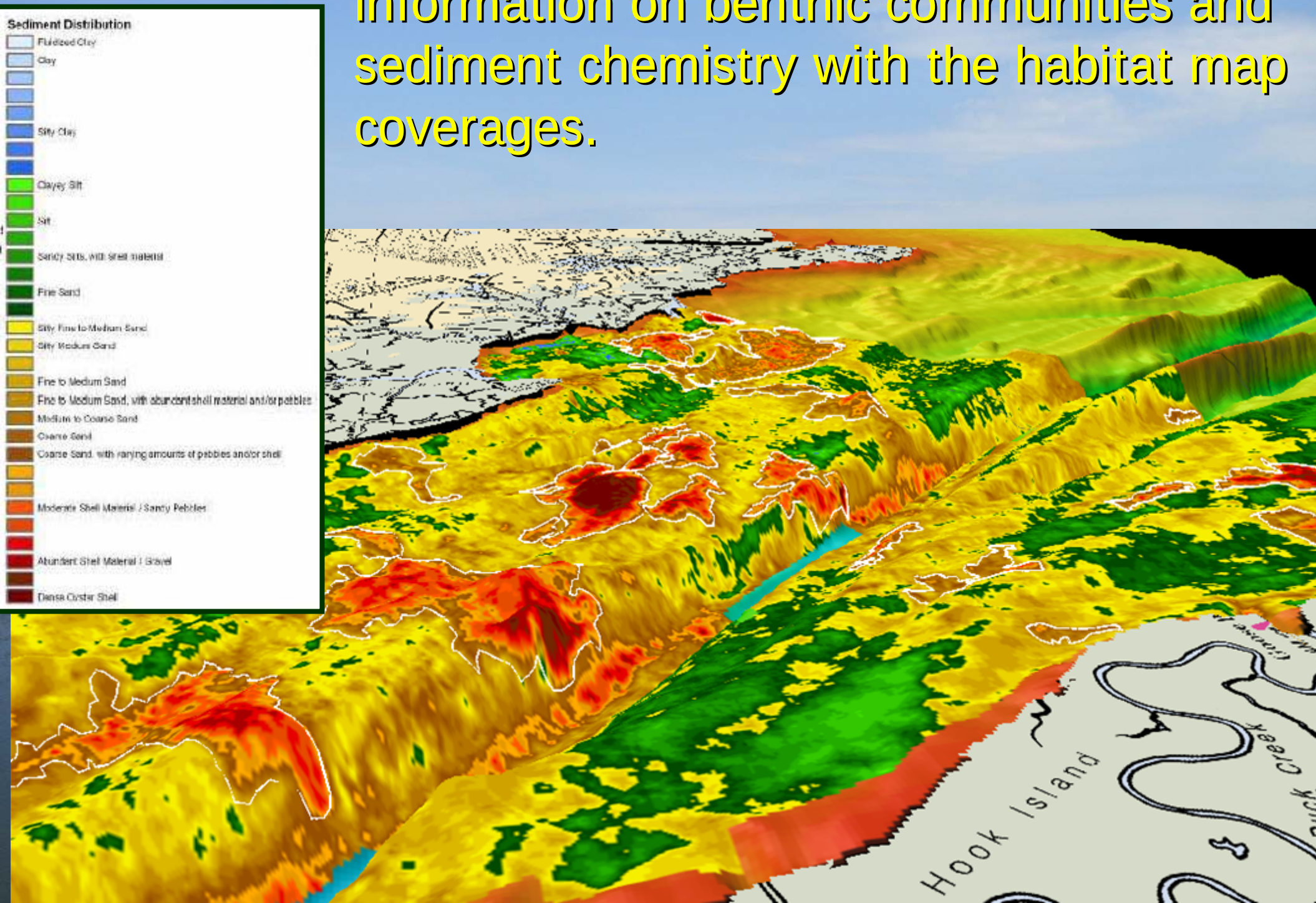
(1) Boat Run stations,

(2) Delaware Bay, and

(3) Minor tributaries

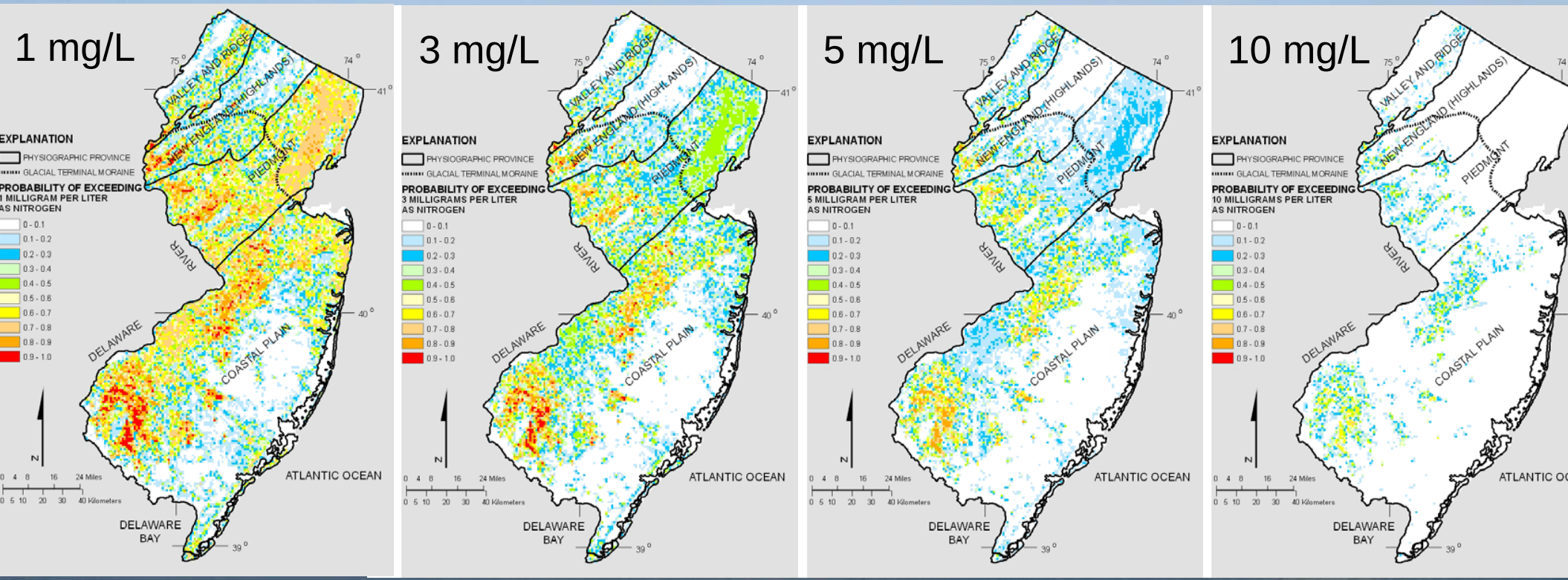
Additional Info from earlier EMAP Virginia Province, MAIA, and subsequent NCA surveys thru 2006.

In the year ahead, we will be combining information on benthic communities and sediment chemistry with the habitat map coverages.



Academic Uses of Water-Quality Data

Probability of nitrate as nitrogen exceeding selected concentrations in ground water less than or equal to 100 feet deep



Models based

- percent agricultural land use
- percent urban land use
- septic system density

National Water Quality Monitoring Network for Coastal Waters and Their Tributaries

- Network of Networks integrating watersheds, estuaries, near coastal, and ocean observations
- Integration of discrete point, continuous point, probabilistic, and satellite monitoring by Federal, State and local agencies
- 3 Pilot and Demonstration study areas
  - Delaware River Basin
  - Lake Michigan
  - San Francisco Bay

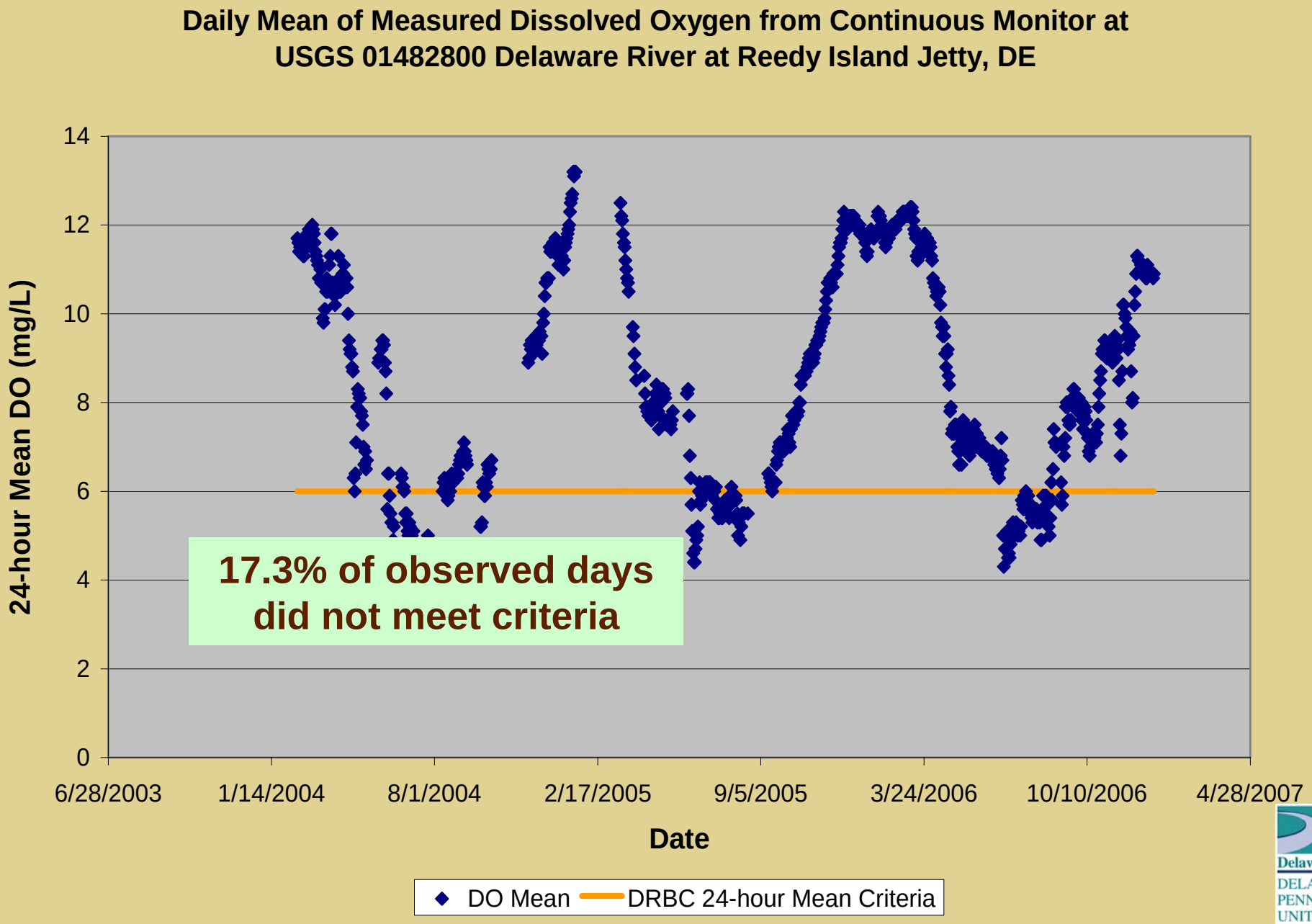
DEWOOS

- Proposed integrated watershed and coastal environmental system that can be applied to a variety of watersheds across the nation.
- MACOORA provided seed money to start project
- Demonstrate how a cooperative regional monitoring system can be linked to and enhance the National Water Quality Monitoring Network (NWQMN).
- One-stop shopping web site for water data in the Delaware River Basin

DEWOOS Data Type Platforms

- Standard ‘station-based’ data where an observing platform remains in a fixed position and records data on a regular basis.
- Research-specific measurements taken for a short time period.
- Lagrangian observations from observing platforms that move
- Gridded data acquired by remote sensing technology and spatial interpolation methodologies.

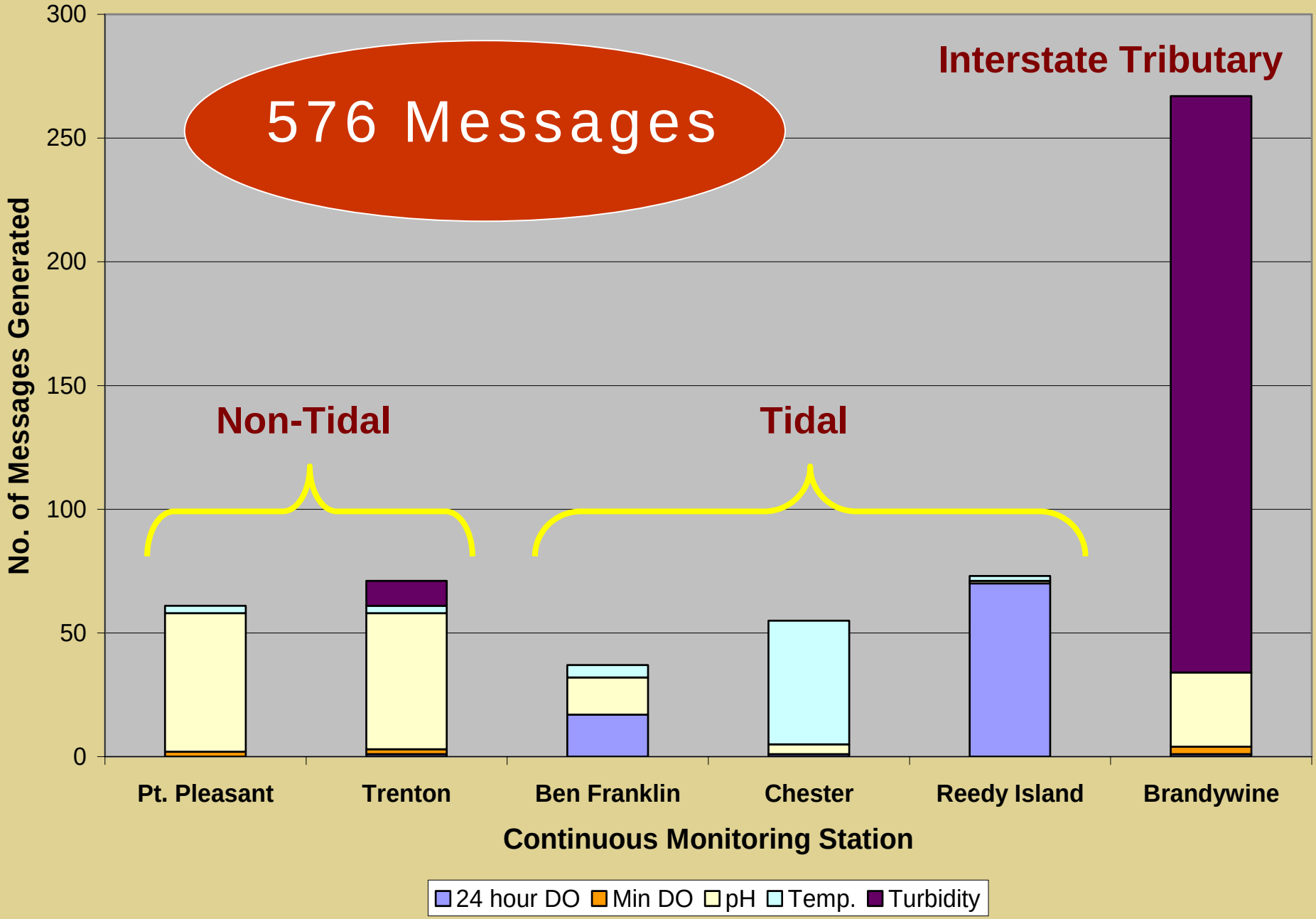
DRBC Regulatory Uses of Real Time Data



Delaware River Basin Commission
DELAWARE · NEW JERSEY
PENNSYLVANIA · NEW YORK
UNITED STATES OF AMERICA

Messages Generated

August 29, 2006 to May 14, 2008



Water Security Applications from Delaware River Early Warning System

http://www.delawarevalleyews.org/EWS/Default.aspx

Needs

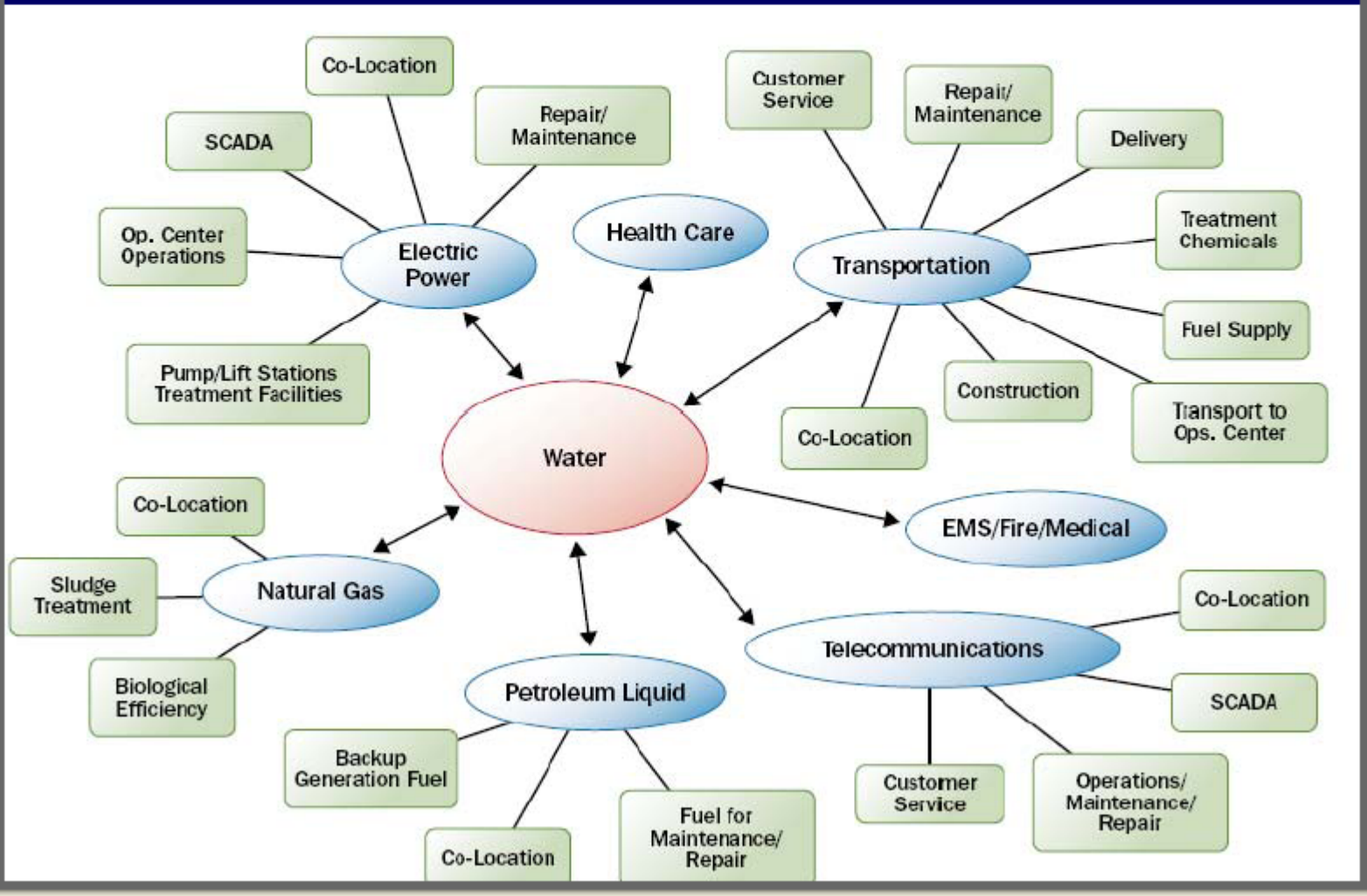
- Water quality website on MACOORA web page
- Funding for development of DEWOOS
- Develop methods to integrate point, probabilistic, satellite, water data
- Methods to integrate atmospheric, river, ground water, wetlands, estuary, near coastal, and ocean observations

ftp://ftp.cdm.com/Overview of Water Security Regulations - Alan Roberson.pdf - Windows Internet Explorer

ftp://ftp.cdm.com/Overview%20of%20Water%20Security%20Regulations%20-%20Alan%20Roberson.pdf

Water Sector Interdependencies

From Water Sector-Specific Plan, Pg. 51



Source: Alan Roberson, AWWA at Northeast Water Security Seminar, 10/07/08