National Monitoring Network for Coastal Waters and Their Tributaries: the Delaware River Basin Demonstration Project

NOAA ORRAP Meeting

February 18, 2009

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Outline of Presentation

- Interactions with MACOORA
- National Monitoring Network Pilot Inventory and Demonstration Phase in Delaware Basin
- Proposed Data Management for the Delaware River Basin (DEWOOS)
- Methods Board Sensors Work Group
- Where are we going from here?

Mid-Atlantic Coastal Ocean Observing Regional Association (MACOORA)

http://www.macoora.org/

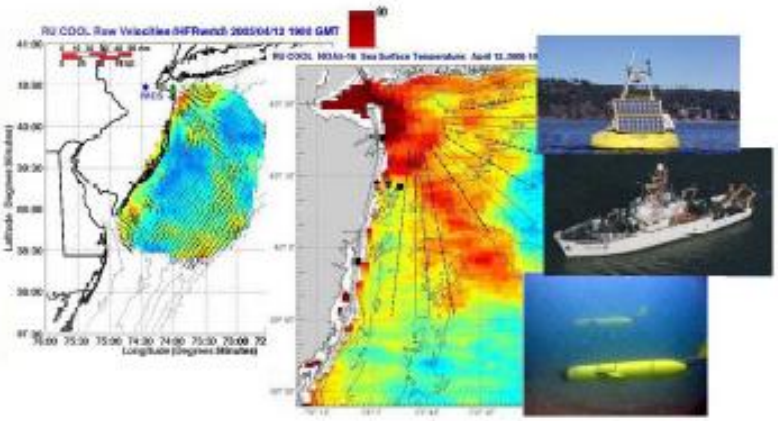
MACOORA formed to integrate observations from Cape Hatteras to Cape Cod

Water-quality workshop in March 11-12, 2008 in Philadelphia

Data Inventory and Pilot Study Reports with gap analysis

Linking Elements of the Integrated Ocean Observing System (IOOS) With the Planned National Water Quality Monitoring Network

Proceedings from the NOAA-Supported Workshop
19-21 September, 2005



Edited by: Peter M. Rowe, Ph.D.; M. Jawed Hameedi, Ph.D.; and Michael P. Weinstein, Ph.D.

NOAA Technical Memorandum NOS NCCOS 48

Delaware River Basin Commission
DELAWARE · NEW JERSEY
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DELAWARE RIVER BASIN
NATIONAL WATER QUALITY MONITORING NETWORK
PILOT STUDY
FINAL REPORT

REPORT COORDINATORS: Mr. Robert Tudor (Delaware River Basin Commission)
Dr. Eric F. Vowinkel (USGS, NJ Water Science Center)

RESOURCE COMPARTMENT WORKGROUP CHAIRS:

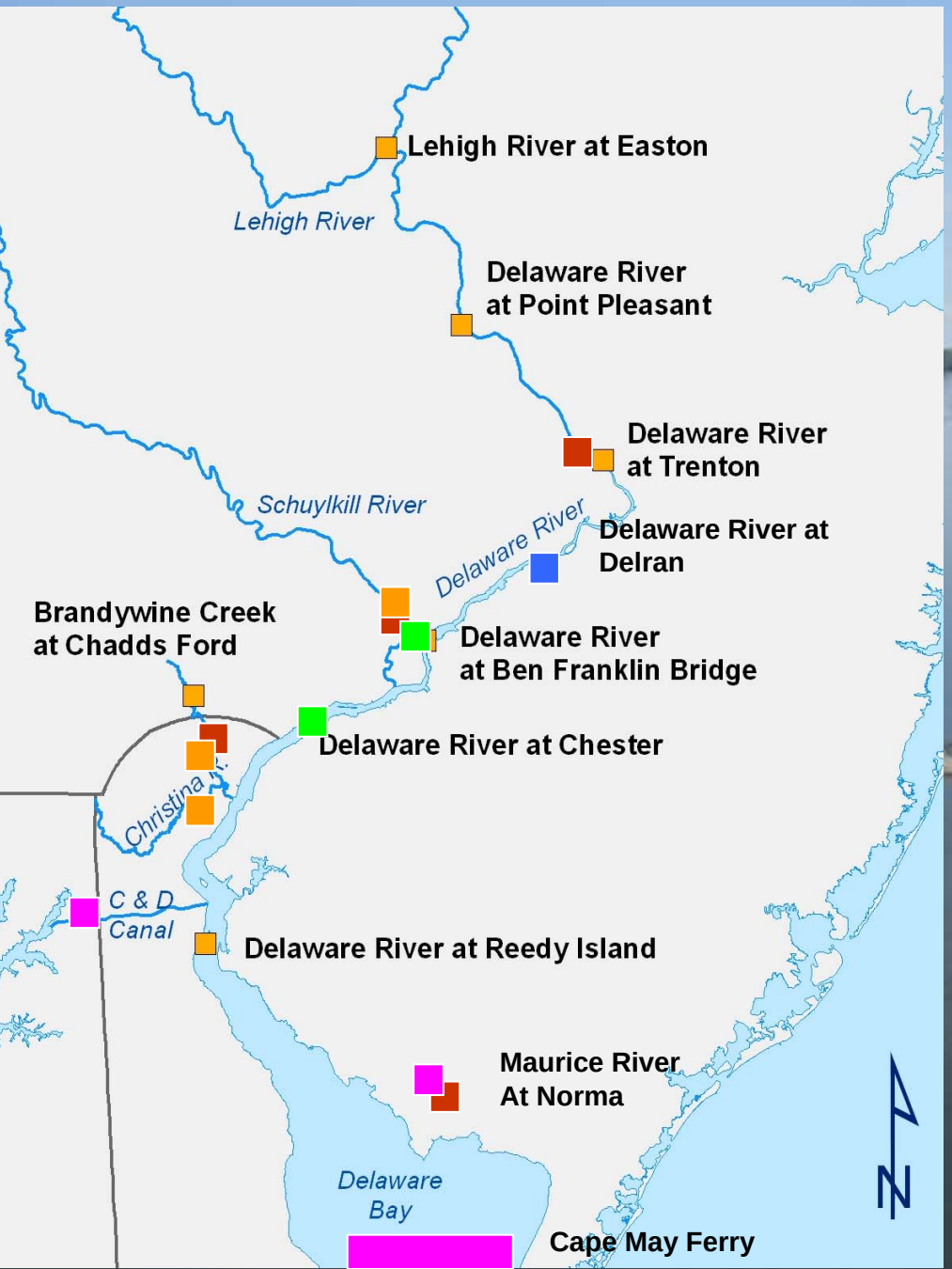
Estuaries Workgroup Chair:	Dr. Jonathan H. Sharp (College of Marine and Earth Studies, University of Delaware)
Near-shore Workgroup Chair:	Mr. Robert Connell (NJ Dept. of Environmental Protection)
Off-shore Workgroup Chair:	Dr. Scott Glenn, (Institute of Marine and Coastal Sciences, Rutgers Univ.)
	Dr. Josh Kohut (Institute of Marine and Coastal Sciences, Rutgers Univ.)
Rivers Workgroup Chair:	Dr. Eric F. Vowinkel (USGS, NJ Water Science Center)
Groundwater Workgroup Chair:	Dr. Eric F. Vowinkel
Wetlands Workgroup Chair:	Dr. Danielle Kreeger (Partnership for the Delaware Estuary)
Atmospheric Deposition Workgroup Chair:	Dr. Lisa A. Rodenburg (Dept. of Environmental Sciences, Rutgers Univ.)
Data Management Workgroup Chair:	Dr. David R. Legates (Dept. of Geography, University of Delaware)

February 7, 2008

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

http://www.ccma.nos.noaa.gov/publications/IOOSTechMemo.pdf

NWQMN Delaware River Basin Demonstration Area Sensor and Discrete Monitoring Network



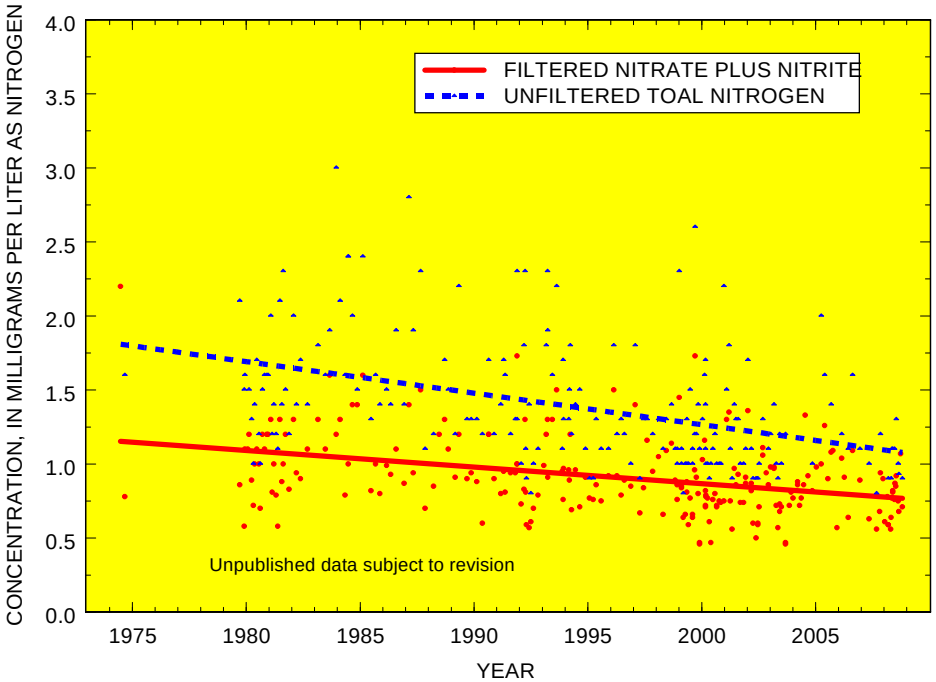
- Existing 4 or 5 parameter real-time sensors
- New 5 parameter real-time sensor
- Upgraded to 5-parameter real-time sensor with turbidity
- Possible real-time sensors
- DEL-NMN discrete monitoring sites for nutrients and carbon

USGS 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

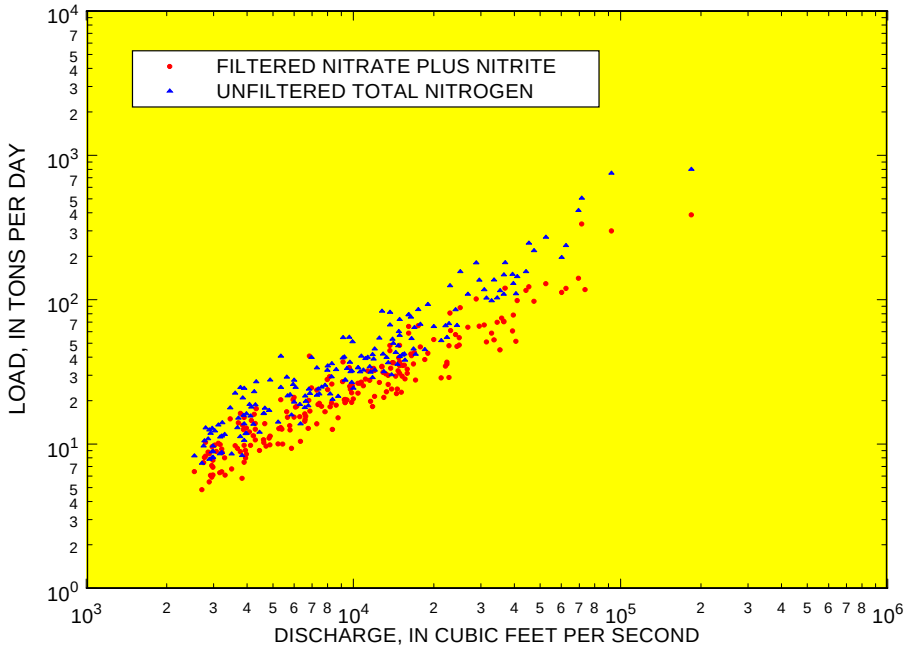
Objectives FY08-09

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

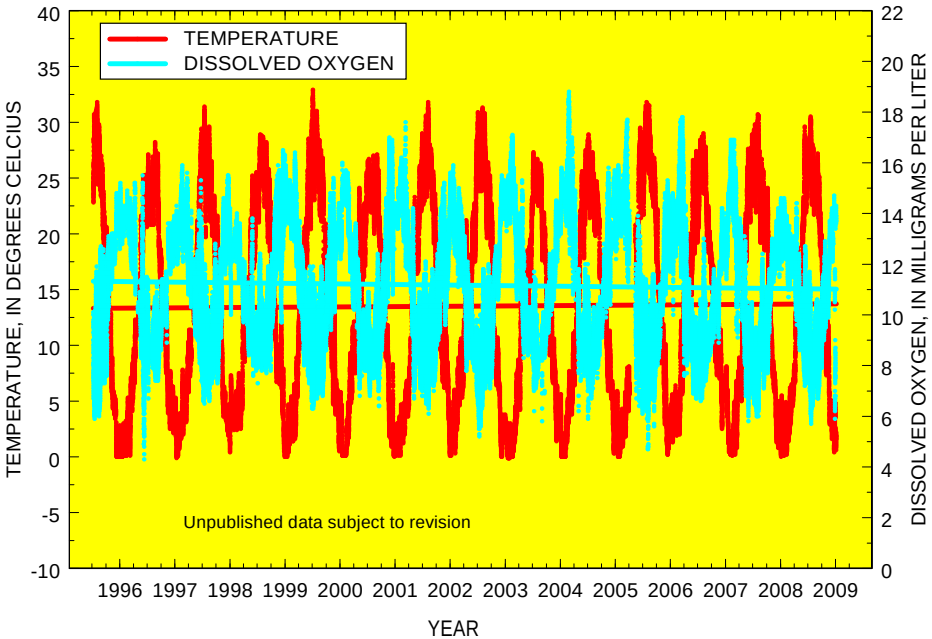
DELAWARE RIVER AT TRENTON--TRENDS IN CONCENTRATIONS FILTERED NITRATE PLUS NITRITE AND TOTAL NITROGEN



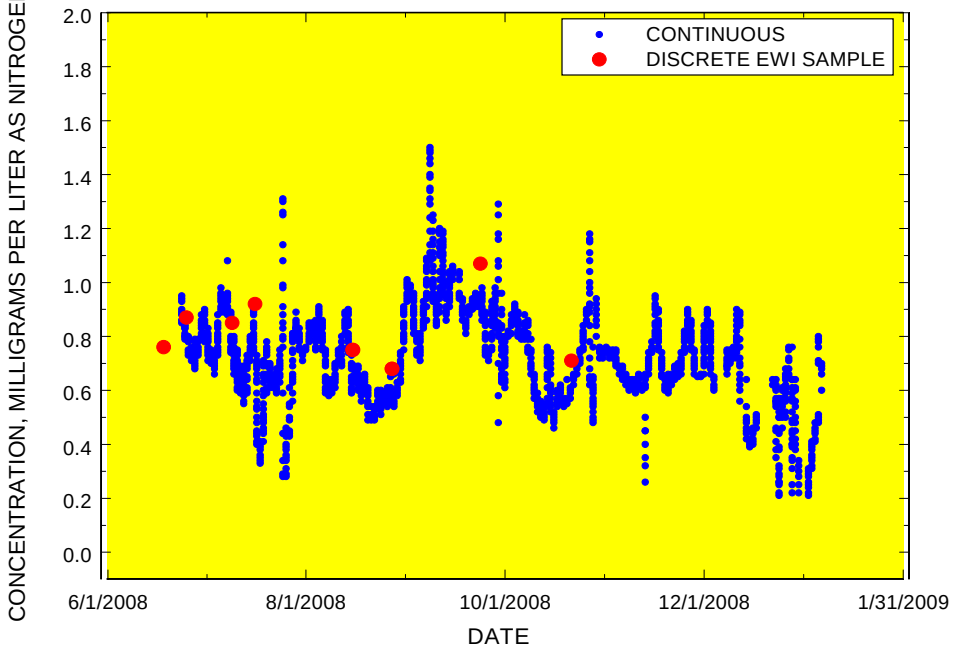
DELAWARE RIVER AT TRENTON--LOADS FILTERED NITRATE PLUS NITRITE AND TOTAL NITROGEN



DELAWARE RIVER AT TRENTON--WATER TEMPERATURE vs. DISSOLVED OXYGEN

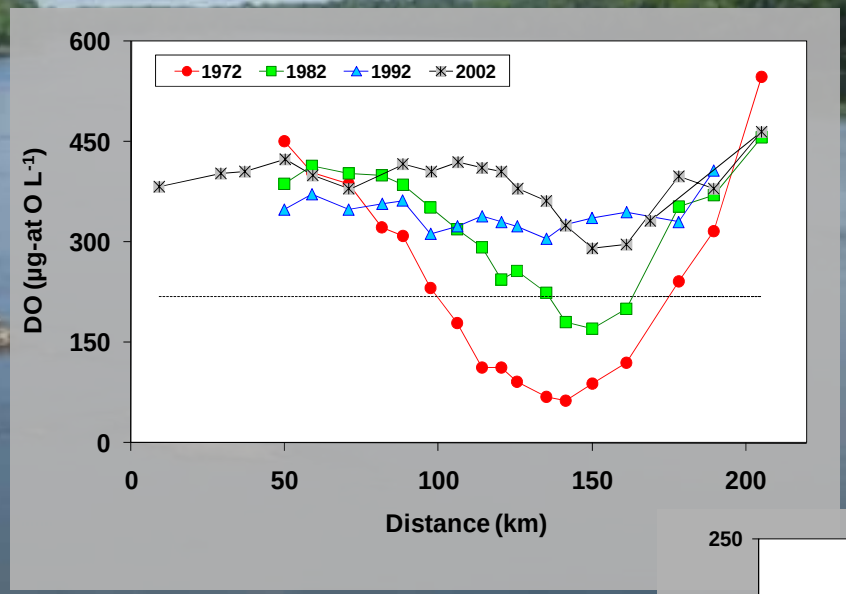


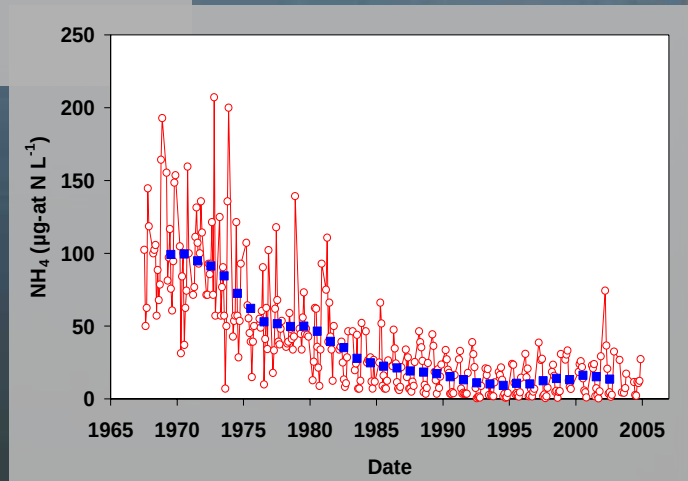
DELAWARE RIVER AT TRENTON--NITRATE PLUS NITRATE USING CONTINUOUS vs. DISCRETE EWI SAMPLES



Boat Run Network

- **Data collected since early 1970's**
- **22 sites along estuary spine sampled 16 times per year on same day**
  - **Nutrients Carbon Other**
  - **Bacteria VOCs**





NOAA Grant Proposal related to real-time monitoring in the Delaware Basin

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
Deputy Executive Director
Delaware River Basin Commission
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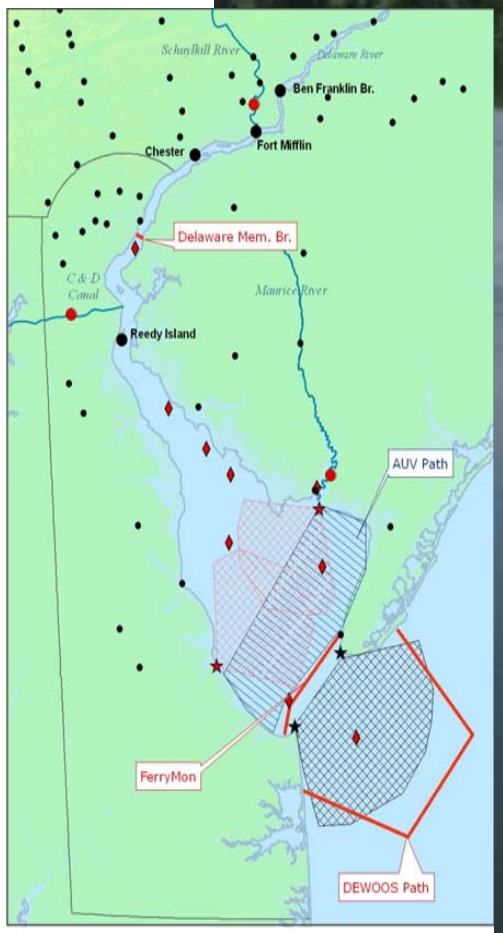
P.O. Box 7360
West Trenton, NJ 08628-0360
(609) 883-9500
(609) 883-9522 (FAX)
robert.tudor@drbc.state.nj.us

Financial Rep: Richard Gore

Delaware River Basin Commission

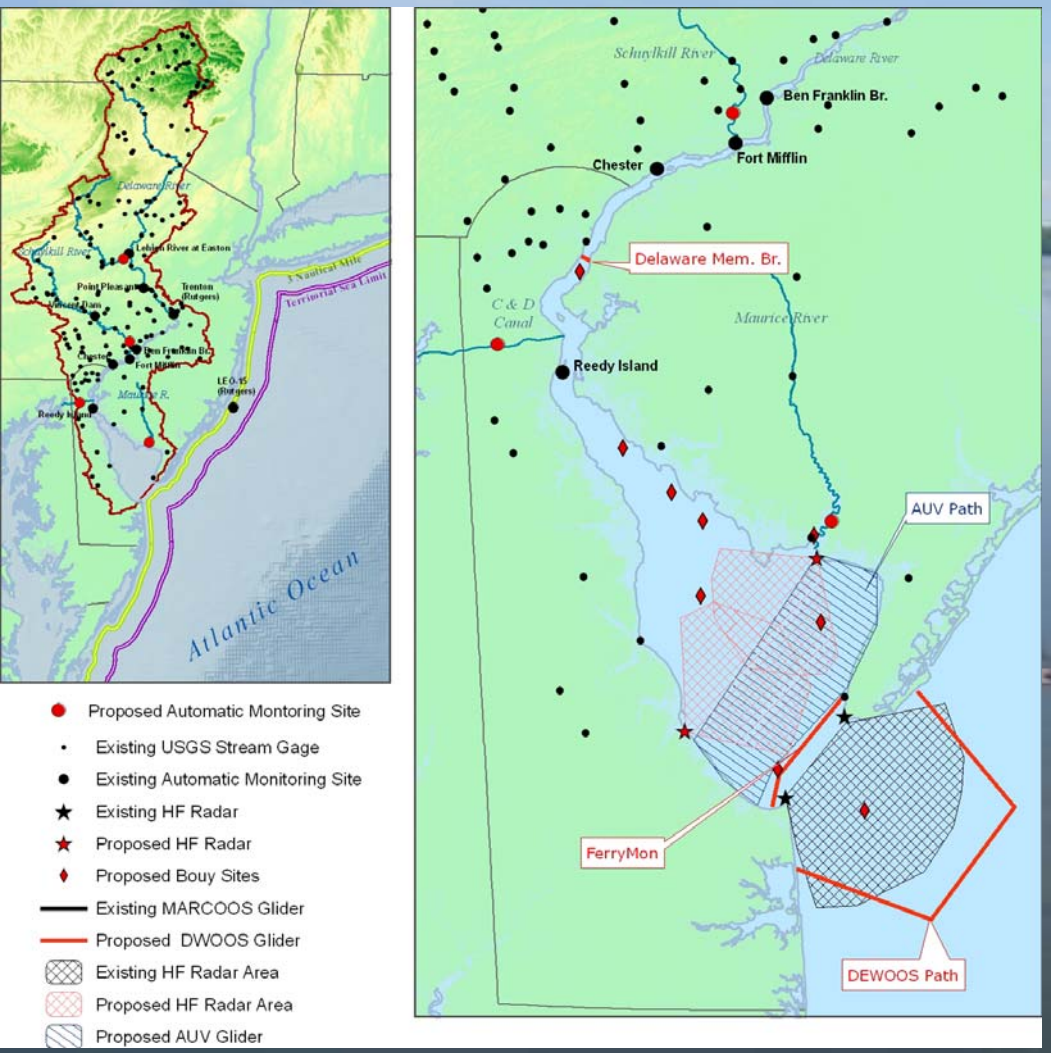
Duration of Project: 2 years plus 1 optional

Funding type: Grant



- Proposed Automatic Montoring Site
- Existing USGS Stream Gage
- Existing Automatic Monitoring Site
- Existing HF Radar
- Proposed HF Radar
- Proposed Bouy Sites
- Existing MARCOOS Glider
- Proposed DWOOS Glider
- Existing HF Radar Area
- Proposed HF Radar Area
- Proposed AUV Glider

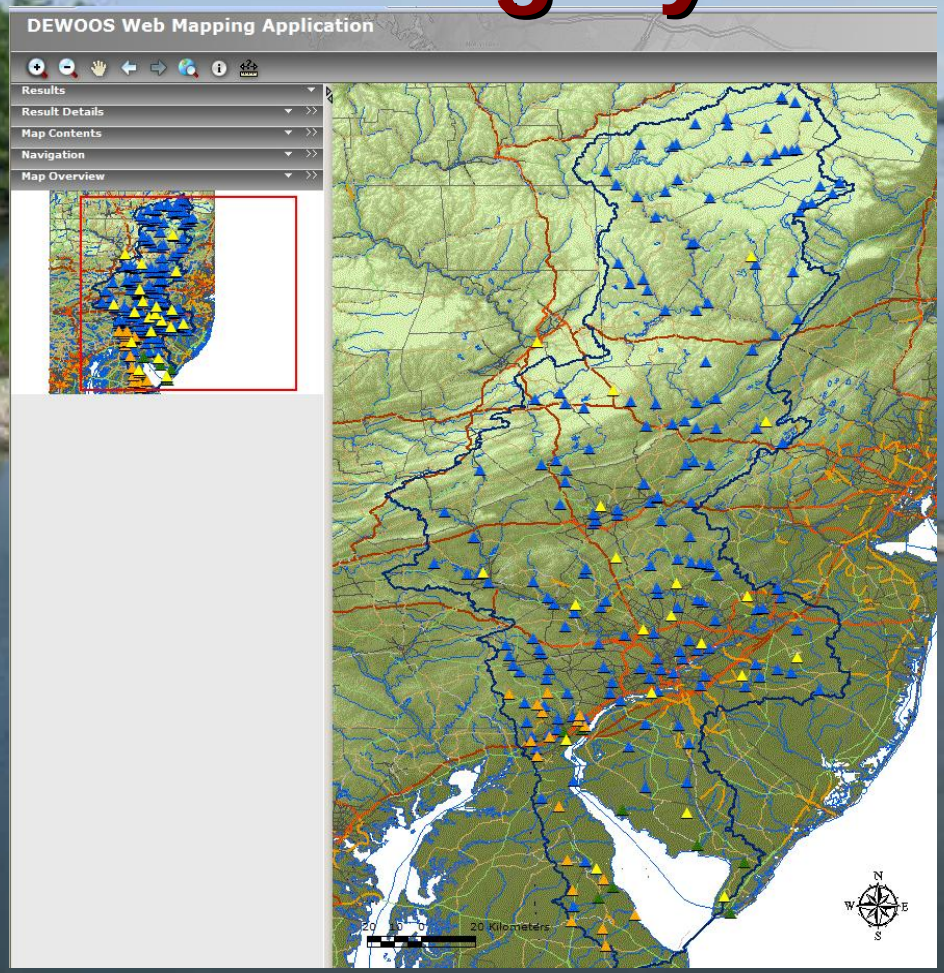
DEWOOS NOAA Grant
Proposed Real-Time Monitoring



- Upgrades to USGS water-quality sites
- Delaware Memorial Bridge (UDel)
- Buoys for oyster beds (NJDEP)
- Cape May Ferry UDel
- AUV for shallow estuary (UDel)
- Moorings lower estuary (UDel)
- AUV for offshore (RU/UDel)
- CODAR for Delaware Estuary (UDel/RU)
- Atmospheric (RU)
- Wetlands (PDE)
- DEWOOS Data Management

DEWOOS

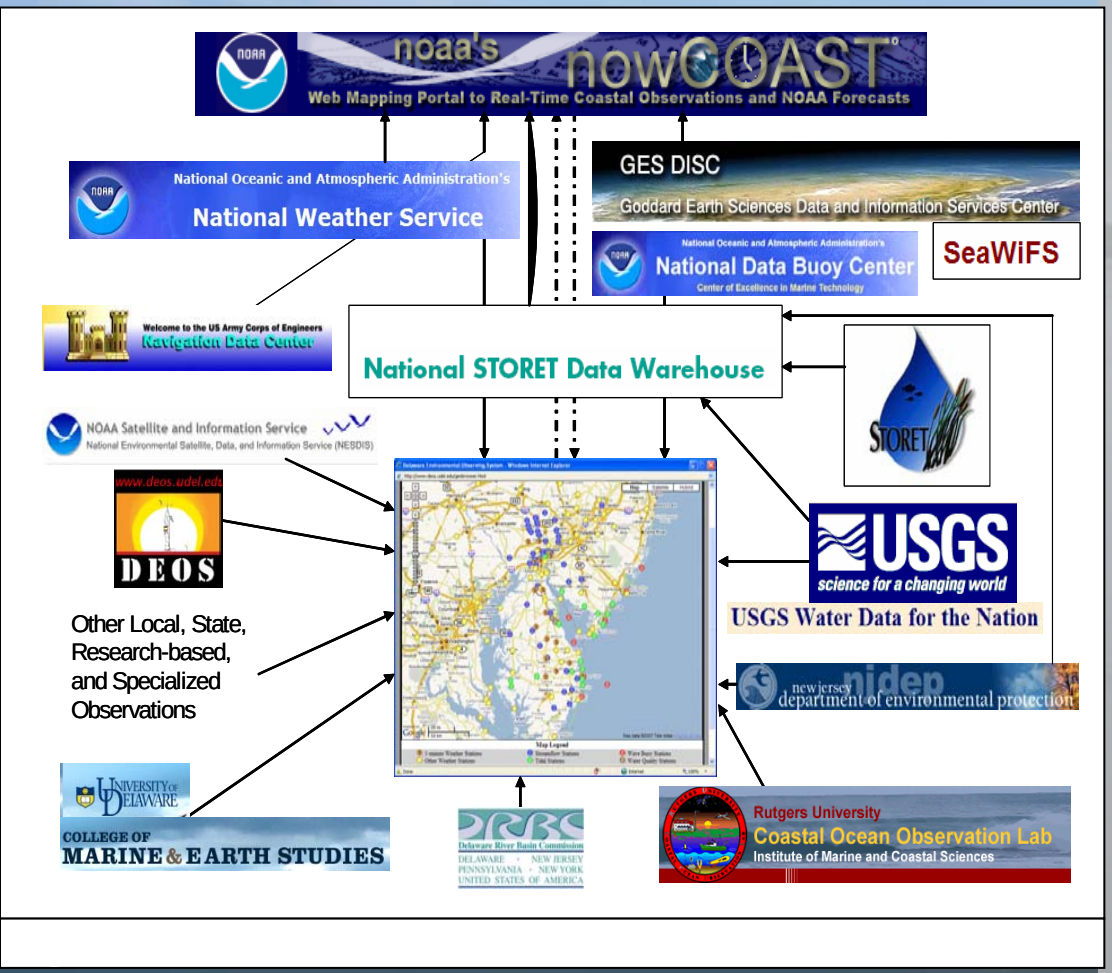
Delaware Estuary-to-Watershed-to-Ocean Observing System



http://www.dewoos.udel.edu/

- Proposed **integrated watershed and coastal environmental data-management system** that can be applied to a variety of watersheds across the nation—"**use the data we already have**".
- Initially based on DEOS concept
- MACOORA provided seed money to start project to David Legates at UDEL
- Demonstrate how a cooperative regional monitoring system can be linked to and enhance the National Water Quality Monitoring Network
- One-stop shopping web site for data in the DRB

DEWOOS Data Sources and Type Platforms



management systems.

- **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.

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

Real-Time Water Data Retrieval Map

USGS
science for a changing world

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

WaterWatch | Ground-Water Watch

Real-Time Water Data Retrieval Map

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- Reedy Point Air Gap
- Reedy Point
- Ship John Shoal Light
- Tacony/Palmyra Bridge

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Delaware River and Bay PORTS®

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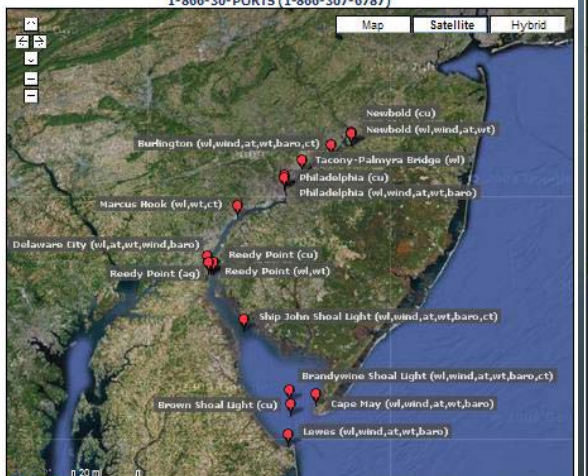
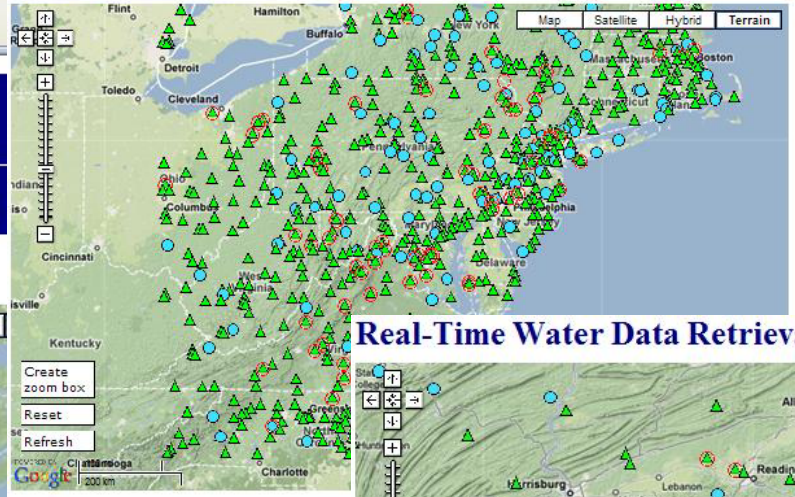
Voice data response system:
1-866-30-PORTS (1-866-307-6787)



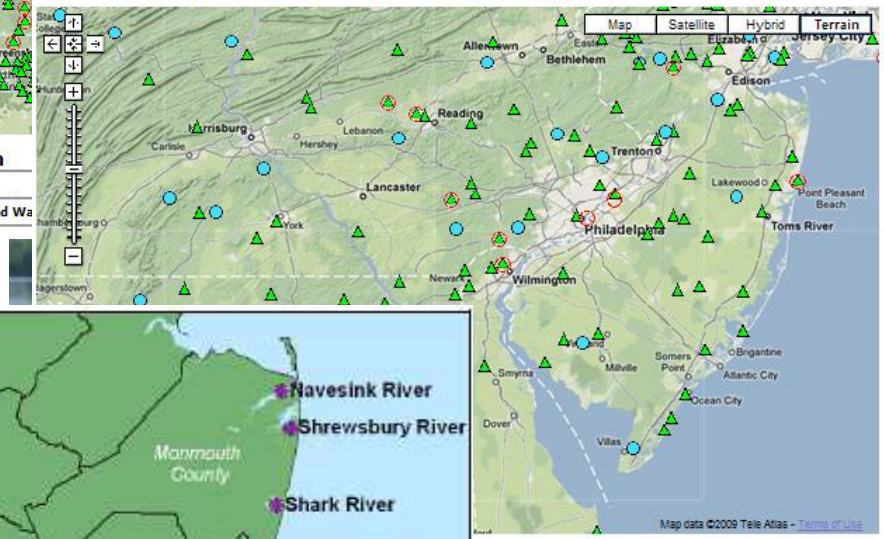
Real-Time Water Data Retrieval Map



Explanation

Station Type		
Storm Surge	Streamflow	Ground Wa

Real-Time Water Data Retrieval Map

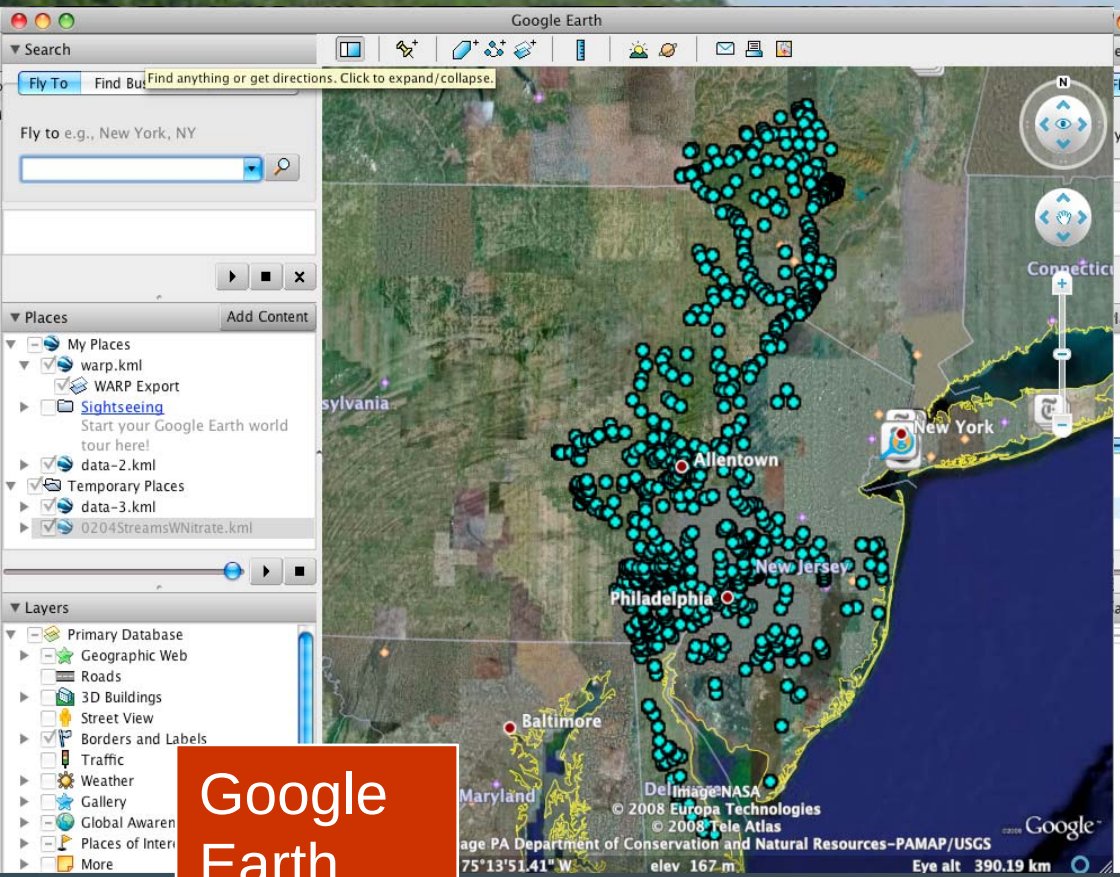


Water Quality

USGS/EPA Data Exchange

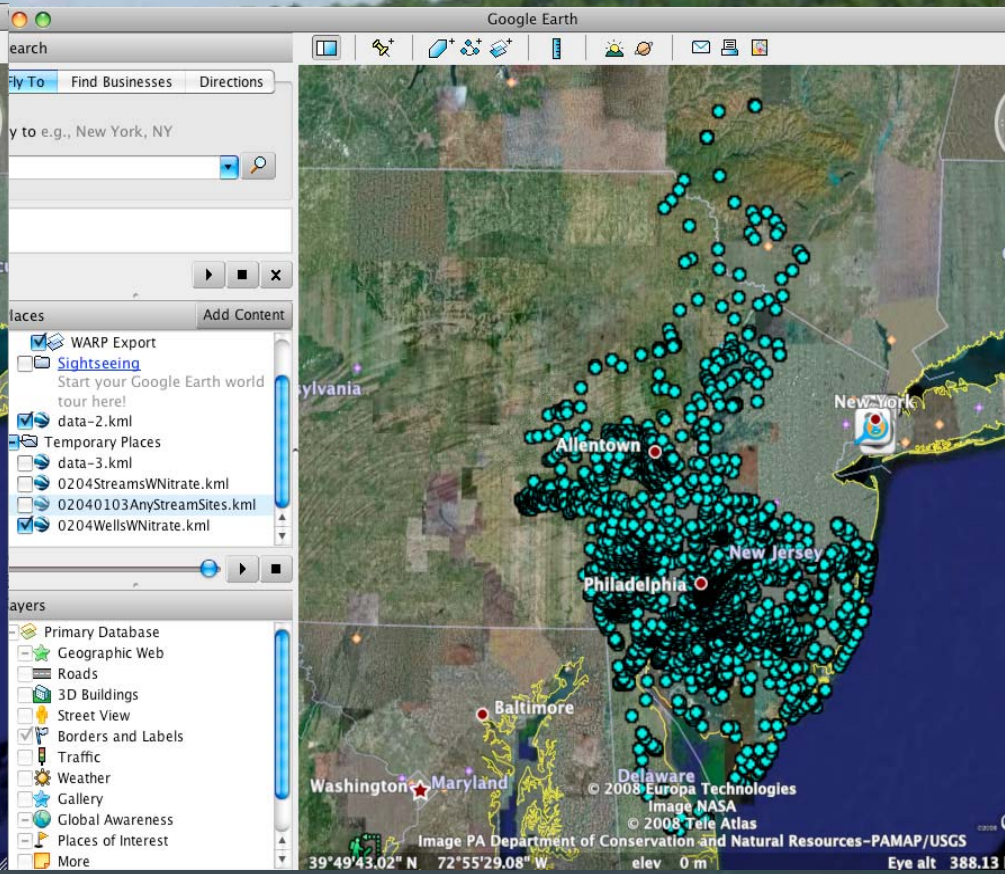
USGS: Jon Scott, Nate Booth, Dorrie Gellenbeck, I-Lin Kuo
USEPA: Dwane Young

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



Google Earth

Surface water



Ground water

Methods Board internal - Windows Internet Explorer

http://wi.water.usgs.gov/methodsboard/workgroups/sensors/index.htm

Methods Board internal

Methods and Data Comparability Board

Workgroup - Sensors

Challenge: Environmental sensor technology for field applications is rapidly evolving. The development of standard operating procedures (SOPs) for many of these technologies and applications has not kept pace and gaps have emerged that hinder the inter-comparability of data and collaboration. The result is degraded data quality and reduced productivity in the field. There is also no central repository available for users to access SOPs for field measurements compare sensing technologies, performance specifications, deployment guidelines, and greenness profiles.

Objectives: To convene a workgroup of experts on sensors to consider efforts to address these challenges in one or more of the following ways:

- Develop SOPs for the calibration, quality assurance and quality control, maintenance, and the deployment of field based environmental sensors
- Make recommendations for the creation of a data base to store relevant information on sensors to allow potential users to make informed decisions on the use of sensors for their projects
- Recommend types of sensors that are appropriate for the National Monitoring Network in freshwater, estuarine and coastal environments

The purpose of these pages will be to assist the workgroup in organizing its work, to share documents and ideas, and to begin the process of building a Web site for eventual public consumption.

NEW -- Field Monitoring Quality Assurance Initiative

NEW -- "Who's doing what in the Sensors world" database

Minutes of past meetings

- Oct. 13 QA/QC conf. call
- Nov. 3, 2008 conference call
- Oct. 2, 2008 QA/QC subgroup conf call

http://wi.water.usgs.gov/methodsboard/workgroups/sensors/index.htm

Where do we go from here?

- **Communicate, cooperate, collaborate**
- **Continued development of DEWOOS**
- **Develop methods to integrate**
  - analysis of discrete point, continuous, probabilistic, satellite, water-quality data
  - atmospheric, river, ground water, wetlands, estuary, near coastal, and ocean observations to tell the story of water quality in the Delaware River Basin
- Water-quality website on MACOORA homepage
- Sensors Work Group—manufacturer independent field QA/QC and field siting to improve data comparability