



NATIONAL WATER QUALITY MONITORING COUNCIL

*Working Together for Clean Water*

# **The National Water Quality Monitoring Network for U.S. Coastal Waters and Tributaries**

by

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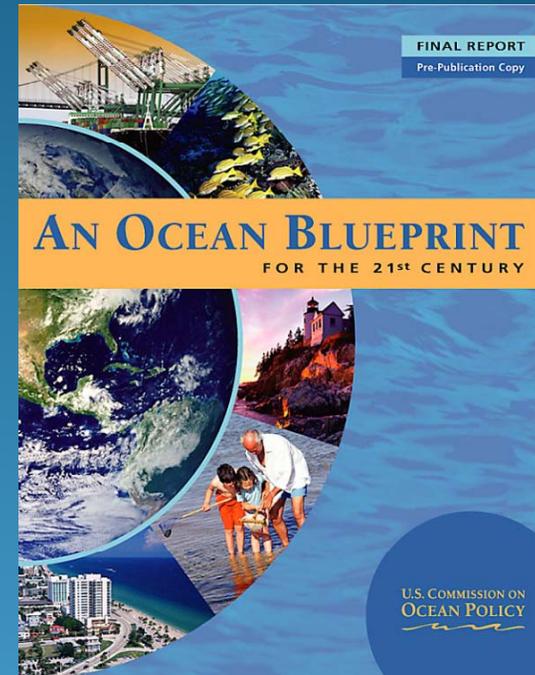
# Network Origins

## U.S. Commission on Ocean Policy

- Chapter 15, Creating a National Monitoring Network

## U.S. Ocean Action Plan

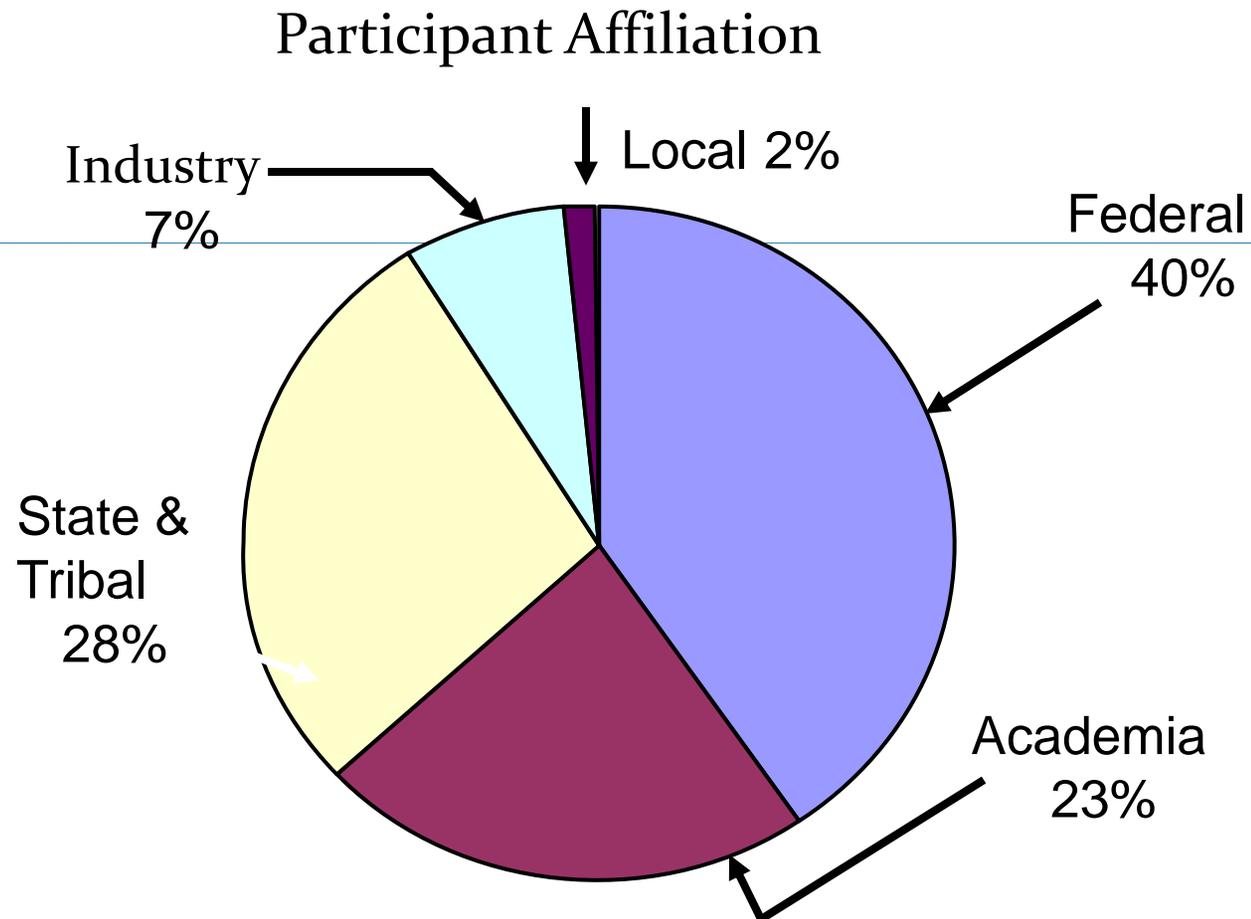
- Advancing our Understanding of the Oceans, Coasts, and Great Lakes
- Create a National Water Quality Monitoring Network



# Multi-year Effort

- **Phase I - Network Design (FY 05 & 06)**
- **Phase II - Pilot Studies (FY 07 & 08)**
- **Phase III - Demonstration Projects (FY 08 & 09)**
- **Phase IV – Implementation; fill gaps and provide necessary enhancements to existing monitoring programs (FY 10 and beyond)**

# 80 Participants in the Phase 1 Design



# The Network is a continuum of observations in:

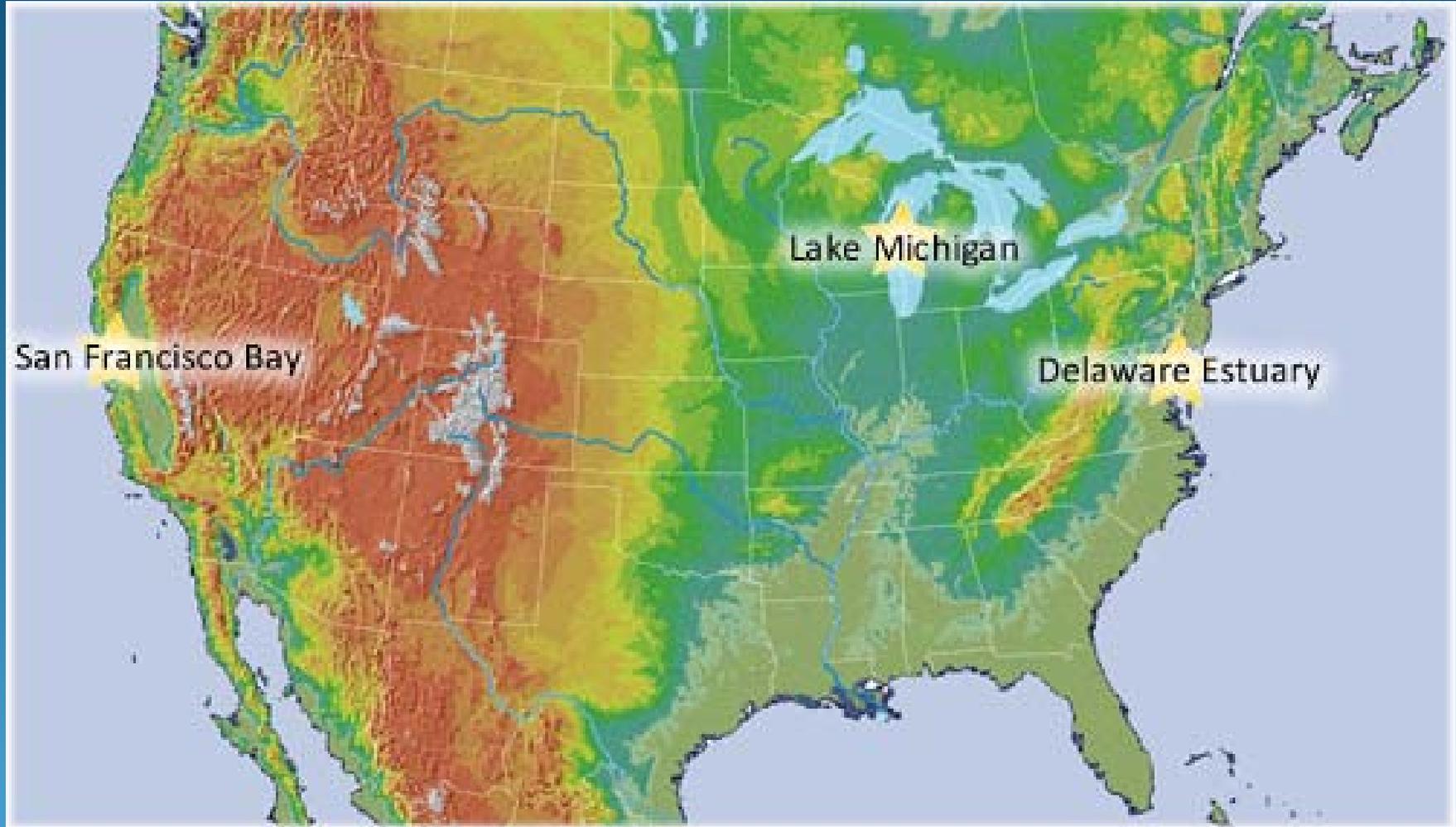
- Estuaries
- Near-shore waters
- Off-shore waters
- Great Lakes
- Coastal beaches
- Wetlands
- Flow and flux from
  - Streams
  - Ground water
  - Atmosphere



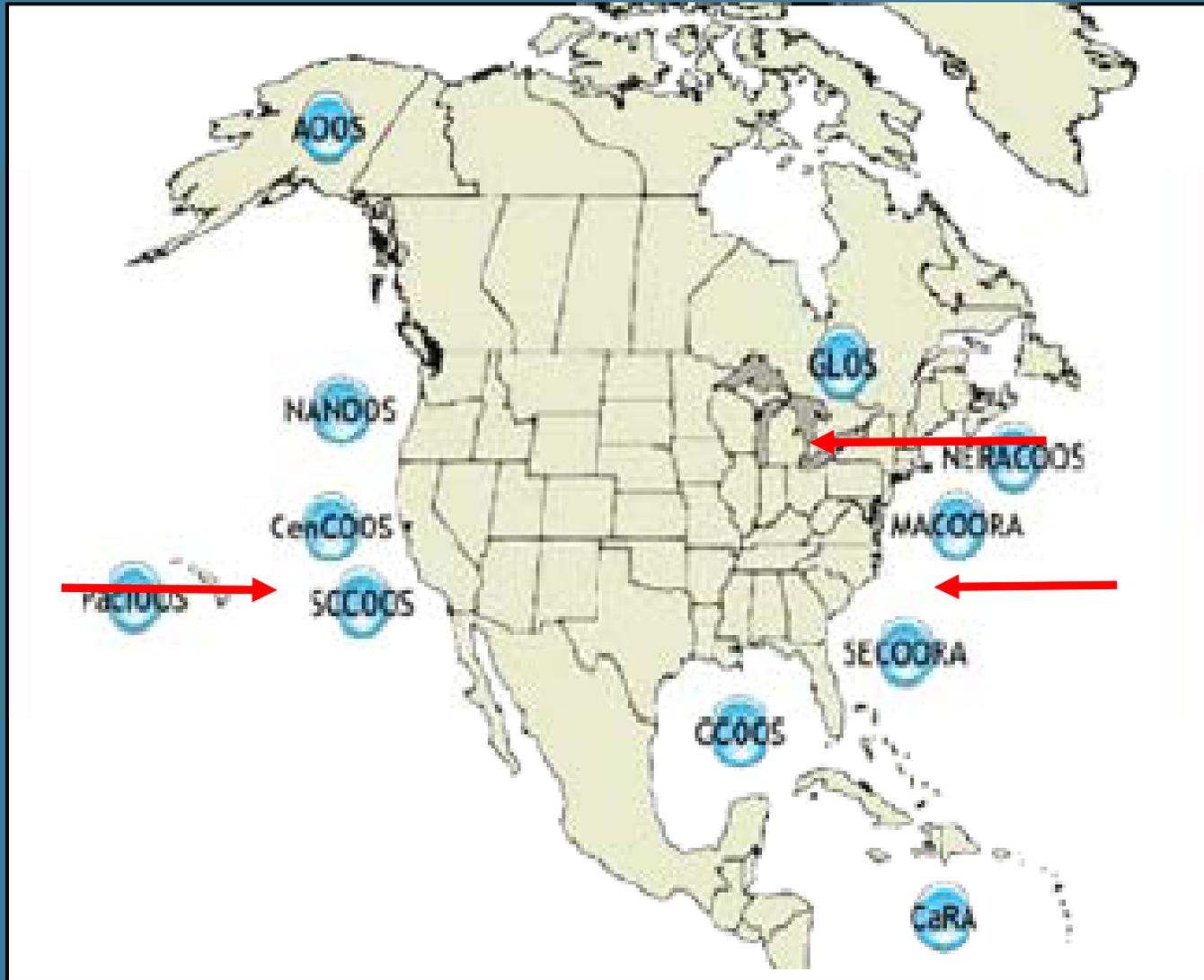
# Selected Design Features

- Clear linkages with management issues—such as related to nutrient enrichment, oxygen depletion, toxic contaminants, and beaches
- Involvement of IOOS and regional associations for monitoring offshore compartments and coastal management.
- A linked data network
- Inclusion of monitoring to meet diverse objectives (including fixed and probabilistic designs)
- Provisions for data comparability, management, and access.

## Phase 2 – Implementation of Pilots (January 2007)



# Regional Associations for Coastal and Ocean Observing



# Selected Results of Pilot Findings

- Need for enhanced data management and integration across organizations to optimize the use of available monitoring data.
- Inadequate monitoring sites, frequency of monitoring, and constituent coverage.
- Common management issues relating to nutrient enrichment, hypoxia, sediment, toxic contaminants, and harmful algal species.
- Local and regional expertise is paramount in the implementation of any Network design and its relevance to addressing management of water resources.



## Phase 3 — Demonstration Projects

- **Delaware Bay**: Nutrient and carbon monitoring and assessment added to current USGS tidal stations and estuary boat run sites; real-time monitoring (T, SC, pH, DO, and turbidity) added to selected river and estuary sites.
- **Lake Michigan**: 3 new monitoring sites added; nutrient monitoring was enhanced at 17 existing USGS sites; toxicity testing conducted at selected stations using semi-permeable membrane devices.
- **San Francisco Bay**: Real-time monitoring for suspended-sediment; nutrient and toxic algae monitoring enhanced at selected sites.



# Phase 4 —Continued Implementation

- New technologies, such as real-time monitoring with sensors and autonomous underwater vehicles (AUVs), with more traditional monitoring.
- Improved data infrastructure and reporting through web services.
- Continued monitoring and tracking of nutrients, sediment, dissolved oxygen, phytoplankton abundance, beach health, and other parameters.



## Phase 4 — Assessment Highlights

- Improved understanding of oceanic and land-based inputs of sediment, nutrients, and contaminants to U.S. coastal waters and estuaries and enhanced assessments on the sources, amounts, timing, and severity of natural and anthropogenic stressors on coastal ecosystems.
- Comparisons across the Nation - findings suggest different responses among estuarine and coastal waters to contaminants and other natural and anthropogenic factors, including in magnitude, timing, and source.
- The information informs key management issues—such as related to nutrient enrichment, oxygen depletion, sediment, toxic contaminants, and beaches—in these and other U.S. waters.



Hydrologists collect water samples for analysis of long-term trends in nutrients, dissolved oxygen, chlorophyll a and other constituents in San Francisco Bay.



Semi-Permeable Membrane Devices (SPMDs) have been deployed to assess potential toxicity from hydrophobic organic contaminants, such as DDT and other organochlorine pesticides and polychlorinated biphenyls (PCBs).



Automated underwater vehicles (AUVs) are used in the bay of Green Bay and the Milwaukee harbor environments, and produce continuous high-resolution data for chlorophyll a, temperature, conductivity, dissolved oxygen, pH, turbidity, and blue-green algae.



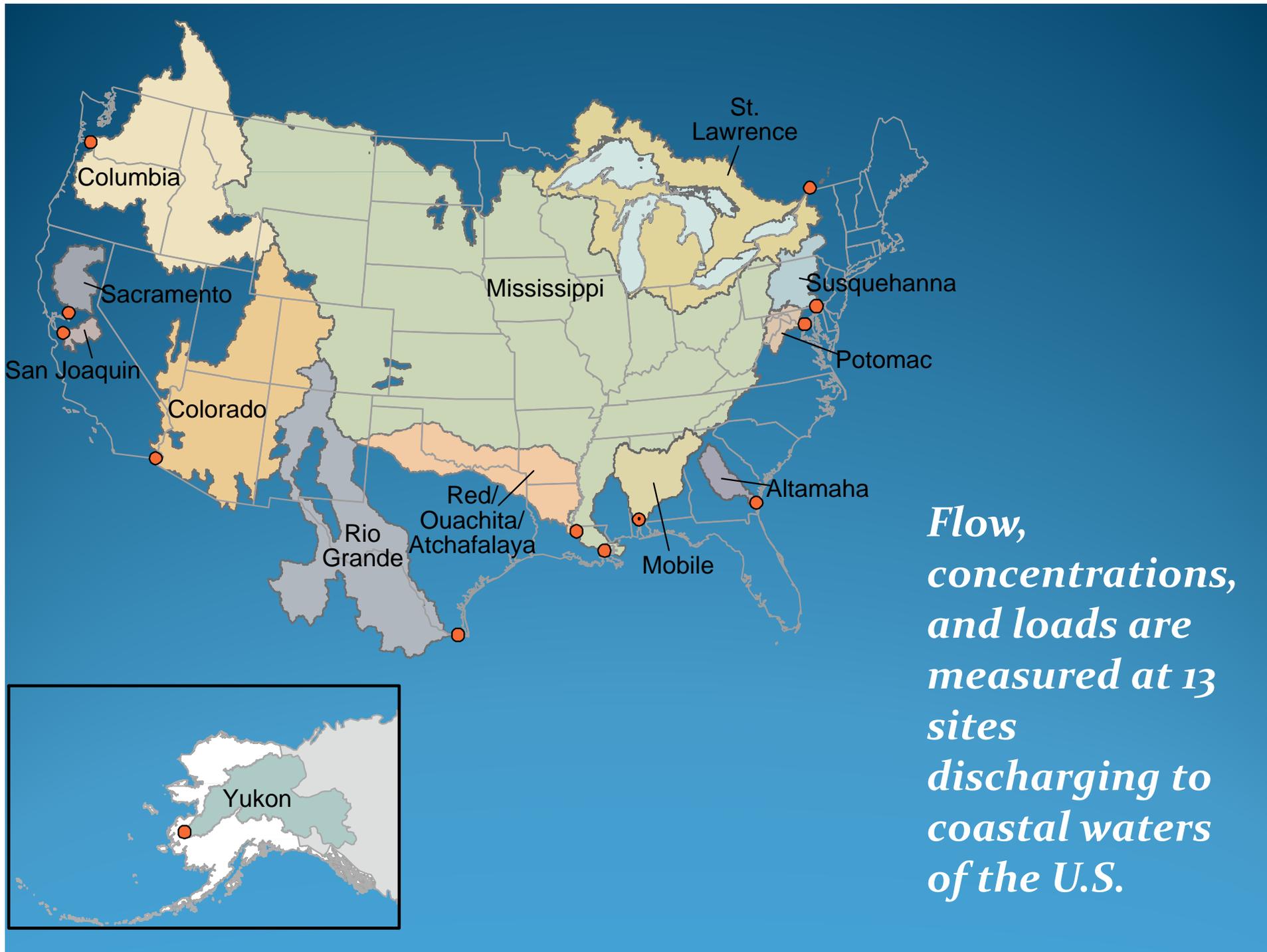
Hydrologists deploy real-time continuous monitors for turbidity, dissolved oxygen, specific conductance, and other parameters, which help to measure vertical profiles and monitor daily and seasonal variations and trends.



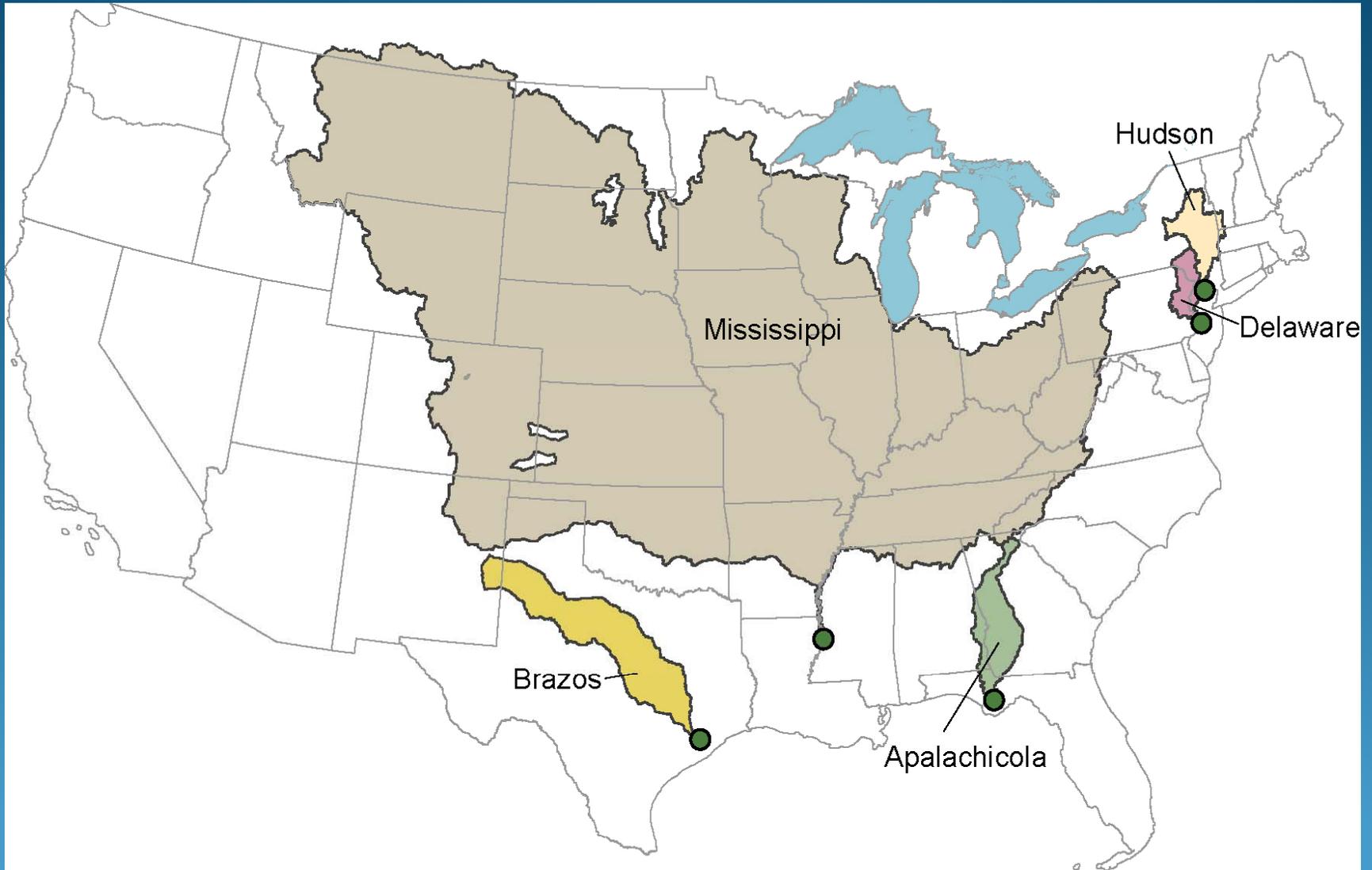
## Multi-Region Water Quality Workshop MACOORA - NERACOOS -SECOORA IOOS, USGS, EPA, National Water Quality Network

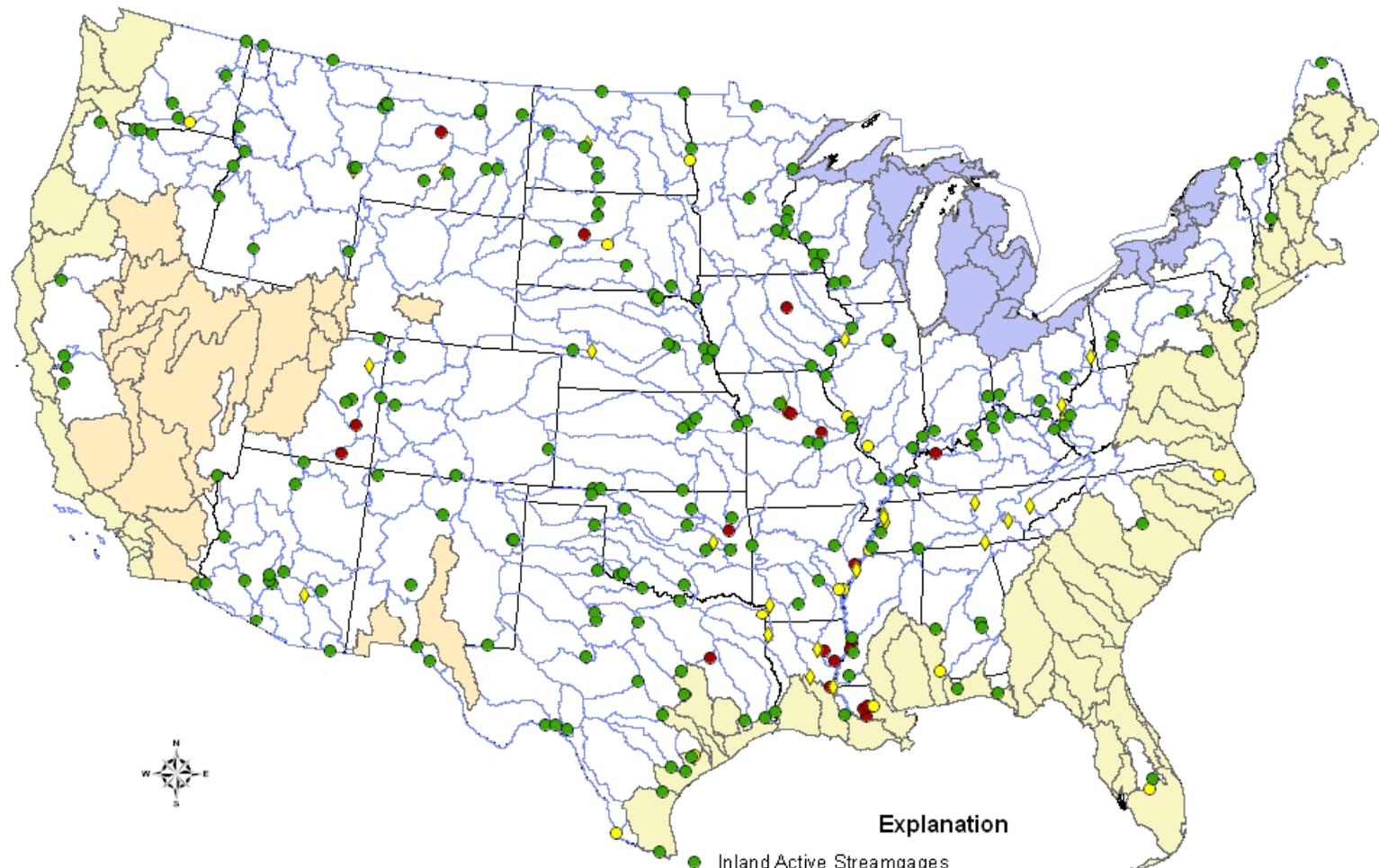
### KEY ISSUES:

- Dissolved oxygen depletion (hypoxia) and nutrient enrichment
- Beach health
- Harmful algal blooms



*Flow, concentrations, and loads are measured at 13 sites discharging to coastal waters of the U.S.*





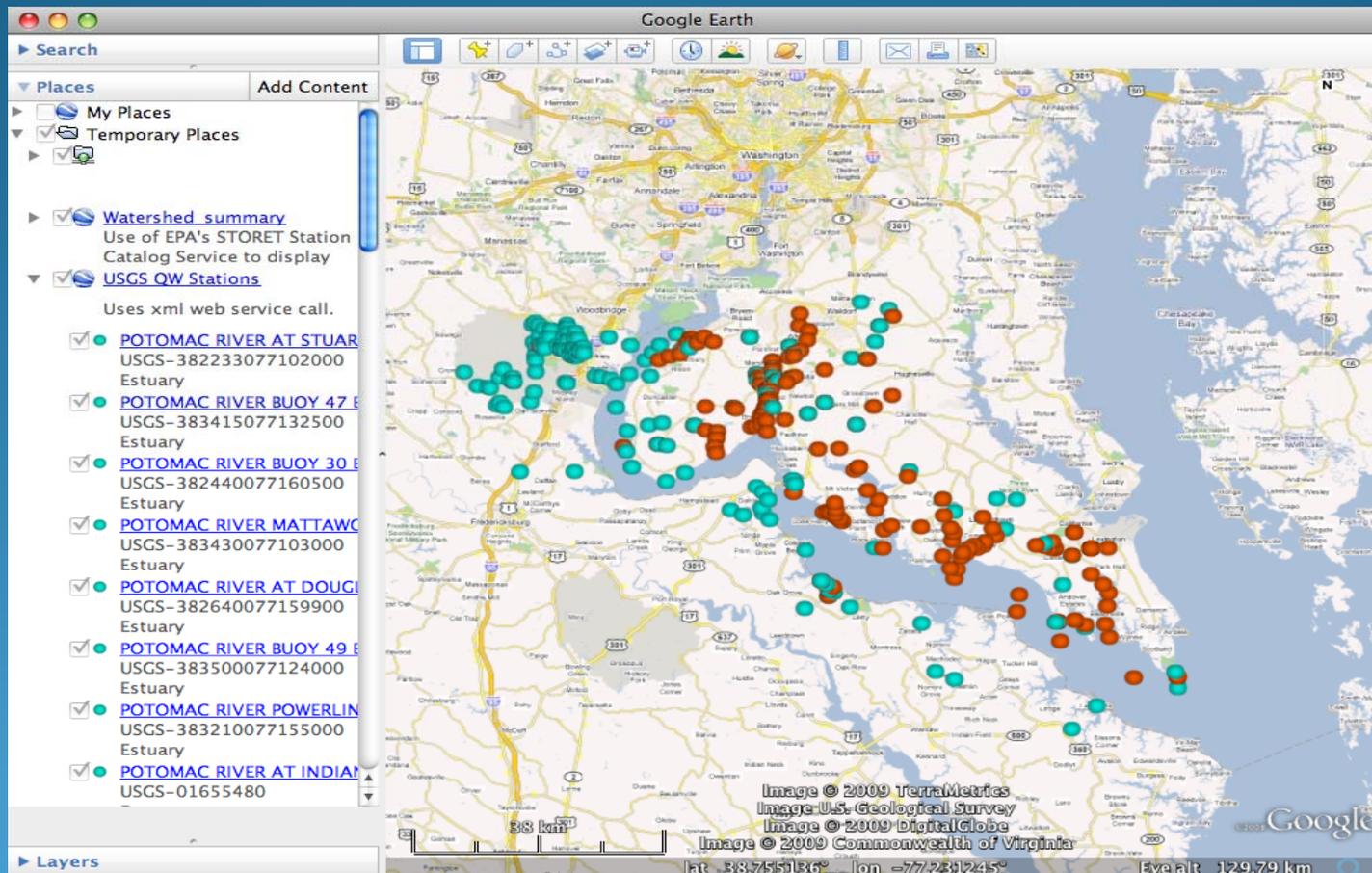
**Explanation**

- Inland Active Streamgages
- Inland Stage-Only Sites to be Converted to Streamgages
- ◆ Inland Inactive Streamgages to be Re-activated
- New Inland Streamgages
- HUC-6 basin boundary
- ClosedBasins
- CoastalHUCs
- GreatLakesHUCs

0 220,000 440,000 880,000 Meters



# Application of the Water Quality Exchange along the lower Potomac River yields a merged dataset that includes 161 USGS and 169 EPA stream sites



USGS       EPA

**For additional information:  
<http://acwi.gov/monitoring/network/>**

