

Advancing the implementation of a National Water Quality Monitoring Network (The Network) for U.S. Coastal Waters and their Tributaries

Dr. Bernice Smith, EPA Office of Wetlands, Oceans and Watersheds

Dr. Tony Olsen, EPA Office of Research and Development

Judy Beck, EPA Great Lakes Program

Dr. Gunnar Lauenstein, NOAA, National Centers for Coastal Ocean Science

Donna Myers, USGS Office of Water Quality

Dr. Whitney P. Broussard III, University of Louisiana at Lafayette

Dr. Jan Newton, UW & Northwest Association of Networked Ocean Observing Systems (NANOOS)

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Dr. Tony Olsen, EPA Office of Research and Development

NMN 2006 Report Overview

NARS: National Coastal Condition Assessment



Anthony R. Olsen
USEPA
Western Ecology Division
NWQMC May 2012

NMN 2006 Report

- Primary considerations and background
 - Build NMN on existing monitoring programs: fill gaps as necessary
 - Incorporate IOOS in NMN development
 - Spatially AND temporally intensive monitoring not possible everywhere
- General framework
 - Spatially extensive surveys every five years for coastal estuaries and nearshore & for Great Lakes
 - Flow and loads for 90% of freshwater outflow
 - Spatially and temporally intensive monitoring by coastal monitoring organizations (eg NEPs)
 - Coastal groundwater monitoring



NMN Spatially Extensive Surveys: National Coastal Condition Assessment

- Designed to satisfy NMN estuarine survey requirements
- Covers all estuarine and intra-coastal waterways in 49 states (Alaska and territories not fully included)
- Covers Great Lakes embayments and nearshore
- Organized by NMN estuarine groups, states and IOOS regions
- 1000 sites every five years (2010, 2015,...)
- Encourages integration of existing estuarine probability-based monitoring programs
 - South Carolina estuary monitoring program
 - San Francisco Bay monitoring program



NMN Spatially Extensive Component Needs

- Nearshore spatially extensive surveys
 - Not implemented nationally
 - Southern California Bight
 - Virginia nearshore study in 2010
- National GIS layer needed
 - Cover all marine waters and Great Lakes from shoreline to seaward edge of Exclusive Economic Zone
 - Requires agreement on definition for estuaries, nearshore, offshore, etc.
 - Must include geopolitical boundaries
 - Must include NMN network estuaries boundaries

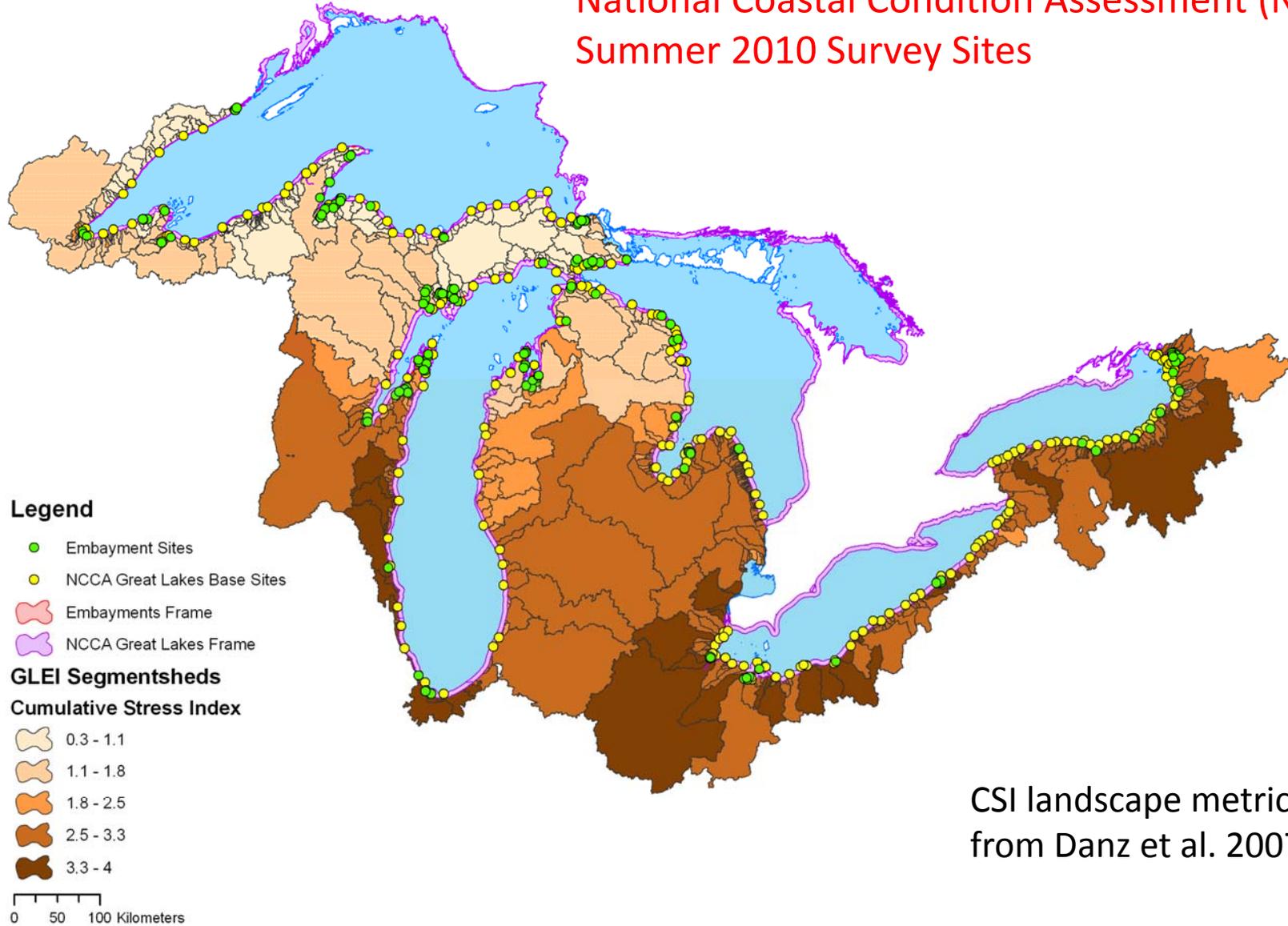


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Judy Beck, EPA Great Lakes Program

- 1987-Great Lakes Water Quality Agreement
- 1970s- fish, 1990-air dep, Annual open water
- 1994/95 -Lake Michigan Mass Balance Project
- 1999- Lk MI Monitoring Coordinating Council
- 2005- Resampled 5 trib mouths for PCBs, Hg
- 2007- LMMCC one of 3 NMD Pilots
- 2008-Develop Bi-national Coordinated Science and Monitoring Initiative (CSMI)
- 2010- Great Lakes Restoration Initiative (GLRI)
- 2010-NCCA, Lake Michigan CSMI, GLRI Grants

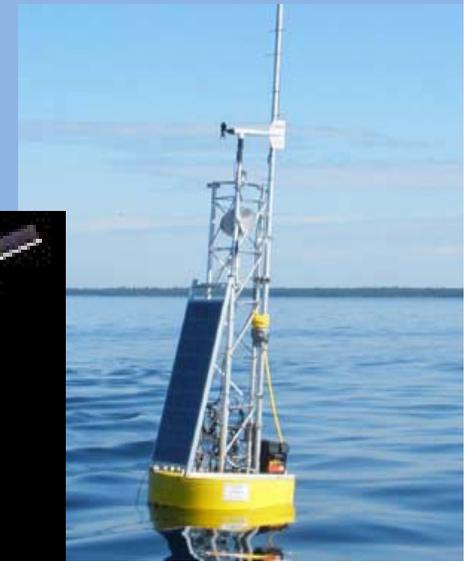
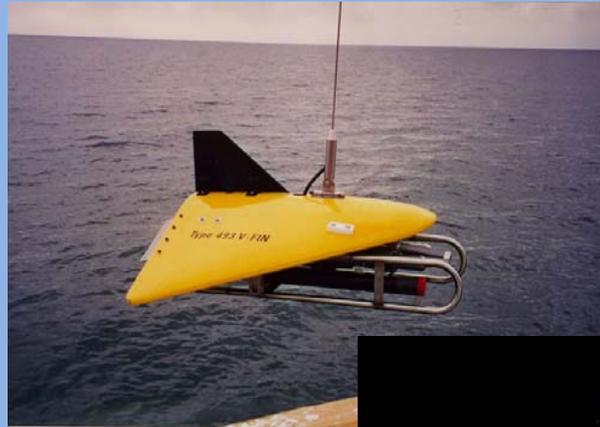
National Coastal Condition Assessment (NCCA) Summer 2010 Survey Sites



CSI landscape metric
from Danz et al. 2007

Volumes of Data are being Generated

- Towed Devices
- Buoys
- Remote Sensing
- Conventional
- Nearshore Monitoring



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Dr. Gunnar Lauenstein, NOAA, National Centers for Coastal Ocean Science



National Ocean Service National Monitoring Programs

NCCOS - Mussel Watch Program

NMS – System Wide Monitoring (SWiM)

NERRs - System-wide Monitoring Program (SWMP)

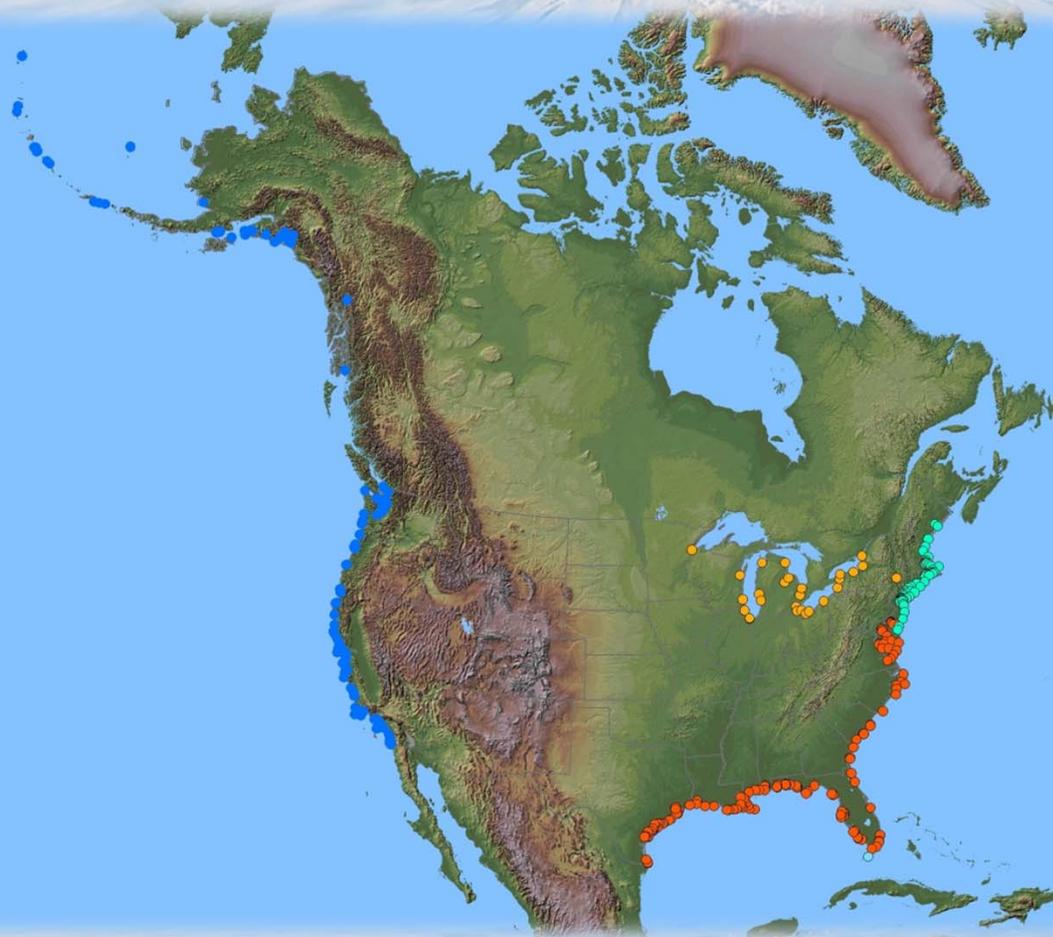
G. Lauenstein, S. Gittings, M. Bundy and D. Apeti



Background

NOAA National Status & Trends Program

Mussel Watch Program



**300 Sites nationwide –
1/2 monitored annually**

**Stations 20 km apart in
estuaries, 70 km along
open coast**

**150 contaminants
routinely monitored in
indigenous bivalve
populations**

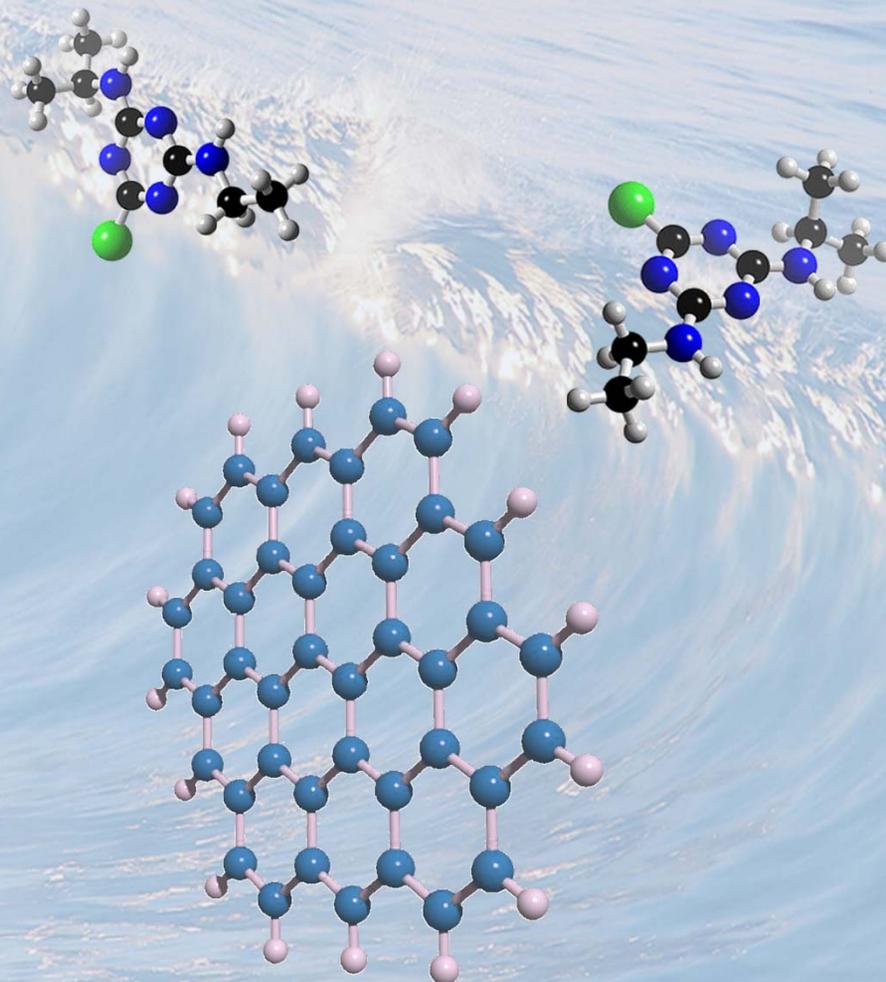
**Nations longest running
coastal contaminant
monitoring program
(25+ years)**

Background

NOAA National Status & Trends Program: Mussel Watch

Sample Collection – Analytes Measured

- Trace elements
- Pesticides
- PAHs
- Industrial chemicals (such as PCBs)
- PBDEs
- Butyltins
- Ancillary environmental data (e.g. grain size, *Clostridium perfringens*, lipid content)



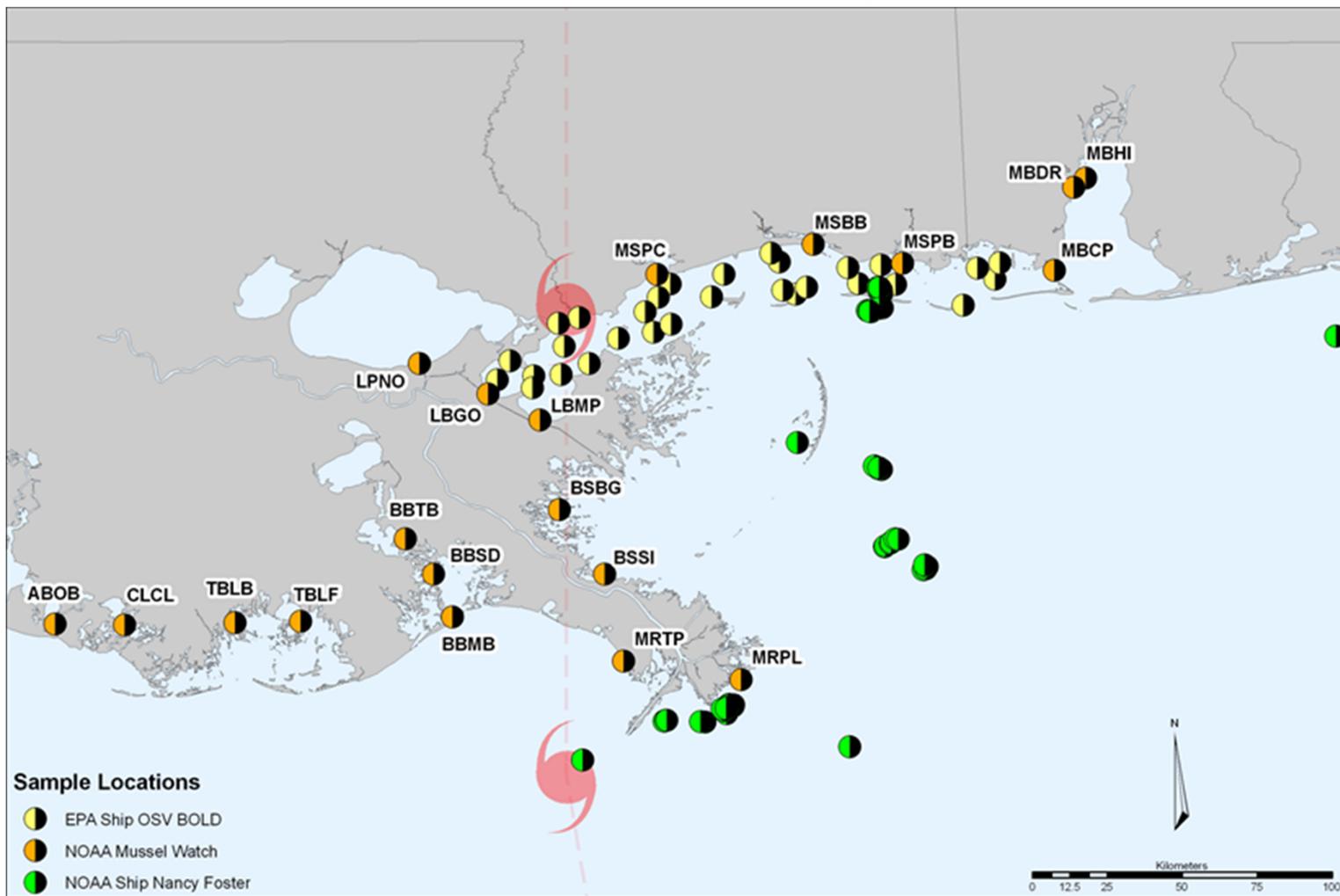
Extreme Events

NOAA 2005 Hurricane Katrina Impact



Background

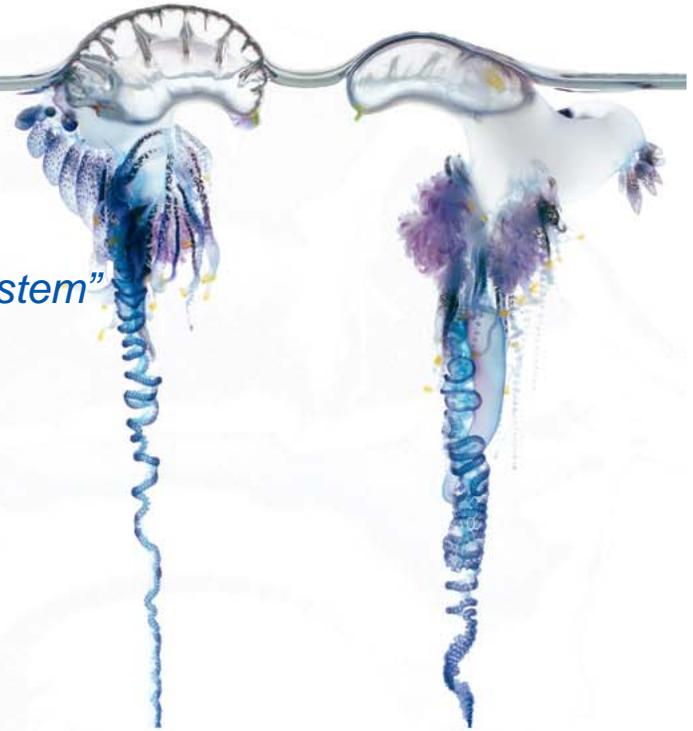
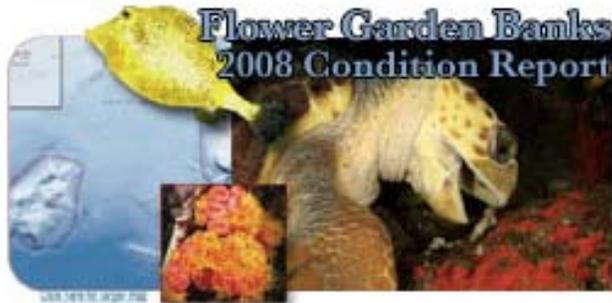
NOAA 2005 Hurricane Katrina Impact Assessment



Sample sites of the combined EPA/NOAA response to characterize coastal contamination throughout the impacted Region

System-Wide Monitoring (SWiM)

“A Monitoring Framework for the National Marine Sanctuary System”



- ***Consistent*** approach to design and reporting
- ***Tailored*** local monitoring to track resource and human use trends

Monitoring Tailored to Diverse Management Issues

Habitat alteration
Emergency response
Water quality
Noise
Boundary modification
Archaeological resources
Fishing and harvesting
Trawling impacts
Marine reserve effectiveness
Marine debris
Threatened & endangered species
Habitat restoration
Vessel traffic
Wildlife disturbance
User conflicts

Introduced species
Coastal development
Military activities
Oil and gas development
Personal watercraft
Desalination
Dredge disposal
Submerged cables



Condition Reports

Pressure-State-Response approach

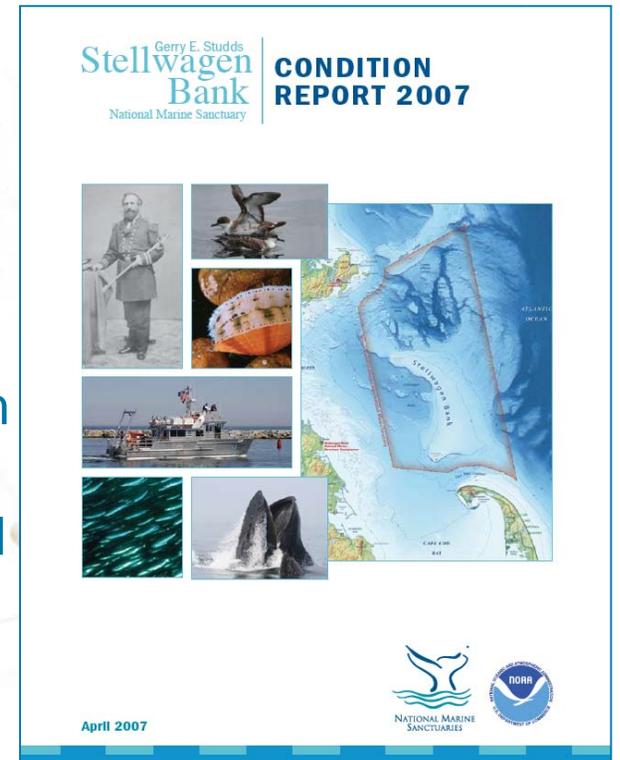
17 questions standard among all sanctuaries

Questions relate to:

- Water
- Habitat
- Living Resources
- Maritime Archaeological Resources

Goals:

- Assess the condition of the site and the system
- Determine if system is achieving its resource protection and improvement goals as reflected in program performance measures



Purpose of Condition Reports

- Inform community and regional partners
- Report to NOAA and Congress
- Educate stakeholders and interested members of the public



National Estuarine Research Reserve System

NERRS and System-wide Monitoring Program
(SWMP) – An Overview





NATIONAL
ESTUARINE
RESEARCH
RESERVE
SYSTEM

NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM



28 Reserves, protected for:

- Long-term research and monitoring
- Education
- Resource stewardship

Mission:

To practice and promote stewardship of coasts and estuaries through innovative research, education, and training using a place-based system of protected areas.

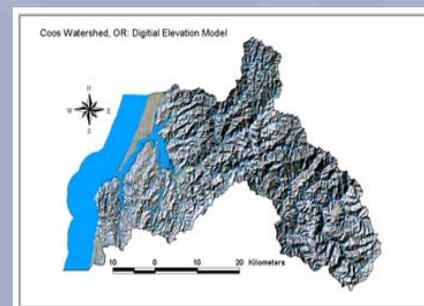


System-Wide Monitoring Program (Integrated Components)

➤ **Abiotic Monitoring**
Water Quality & Nutrients
Weather Parameters

➤ **Biological Monitoring**
Habitat Change
Biodiversity

➤ **Land Cover/Use and Habitat**
Change
Spatial Patterns
Human Impacts

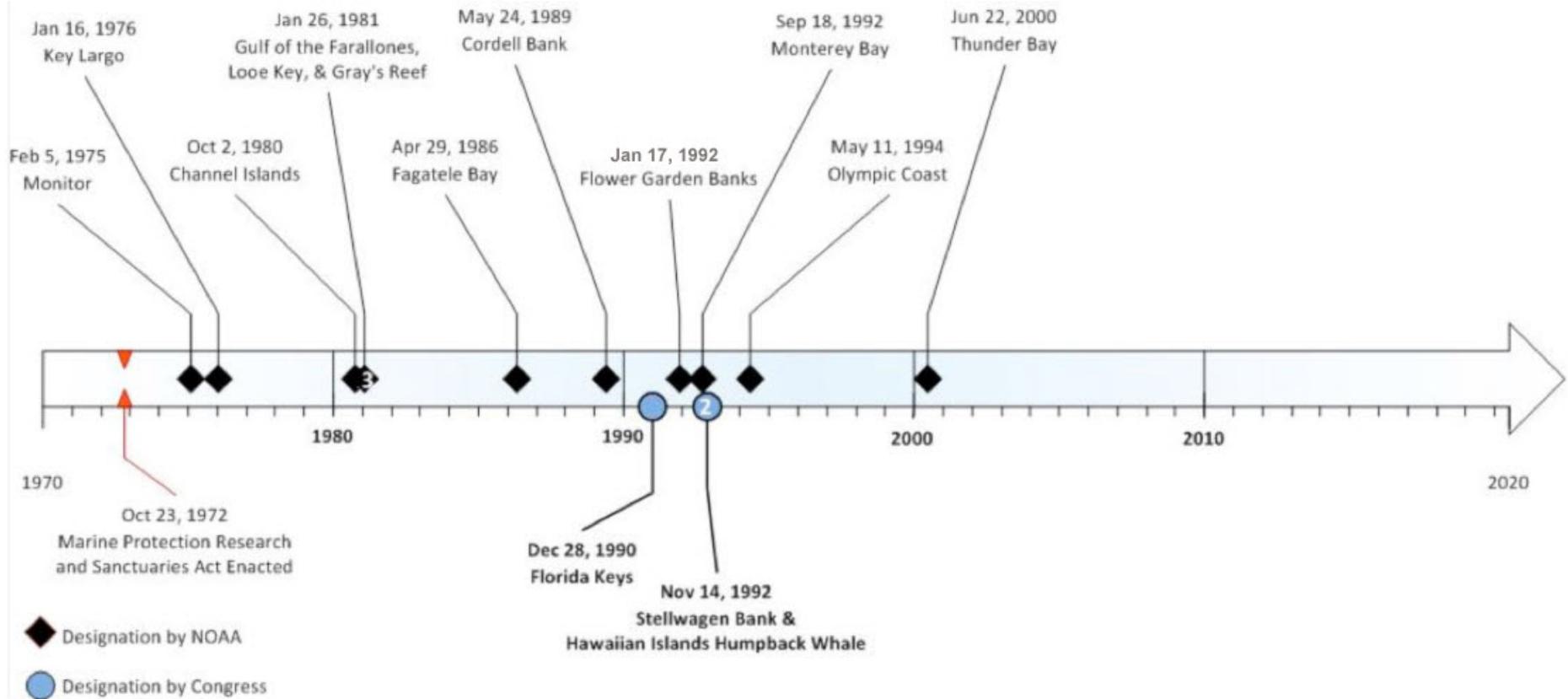


SWMP weather and water quality monitoring (cont.)

- Currently 111 SWMP WQ stations (nominally 4/Reserve)
- Of these, 39 are telemetered for near-real time data delivery
- There are also 28 Wx Stations (1/Reserve), all of which are telemetered for near-real time data delivery
- All non-telemetered data is archived and available in provisional form within 2 weeks of collection

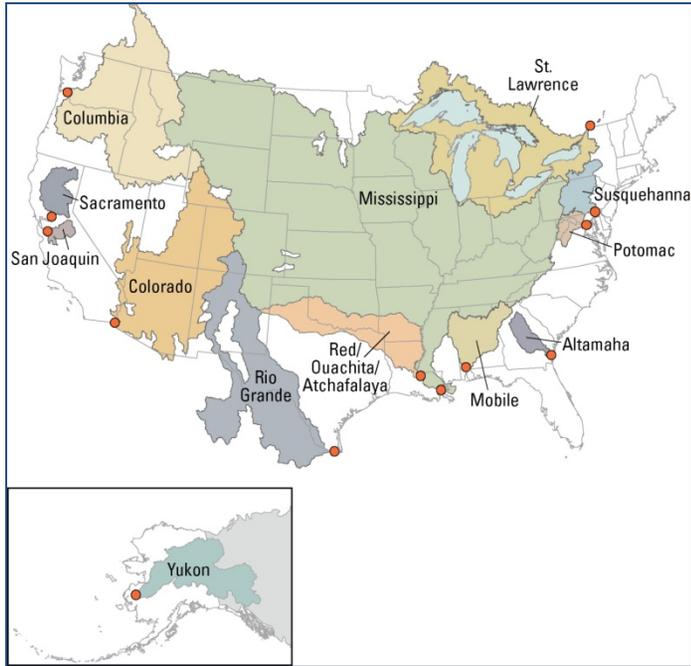


National Marine Sanctuaries Timeline

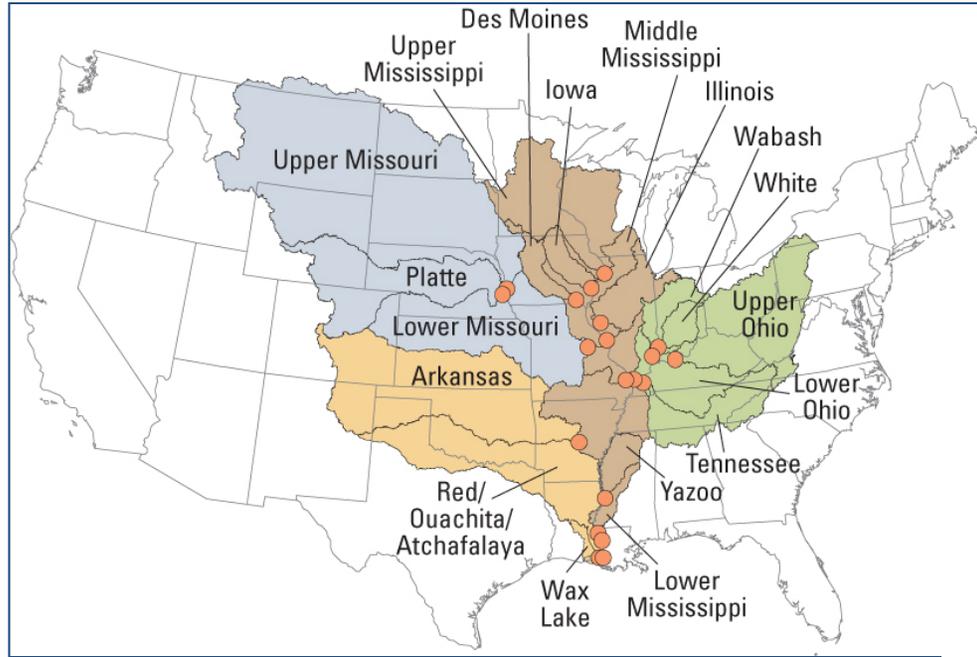


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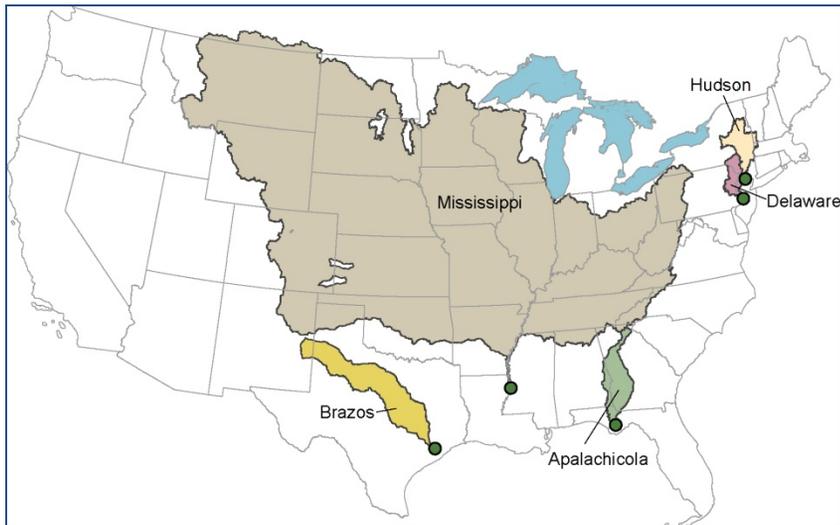
Donna Myers, USGS Office of Water Quality



A. USGS Coastal Rivers Network

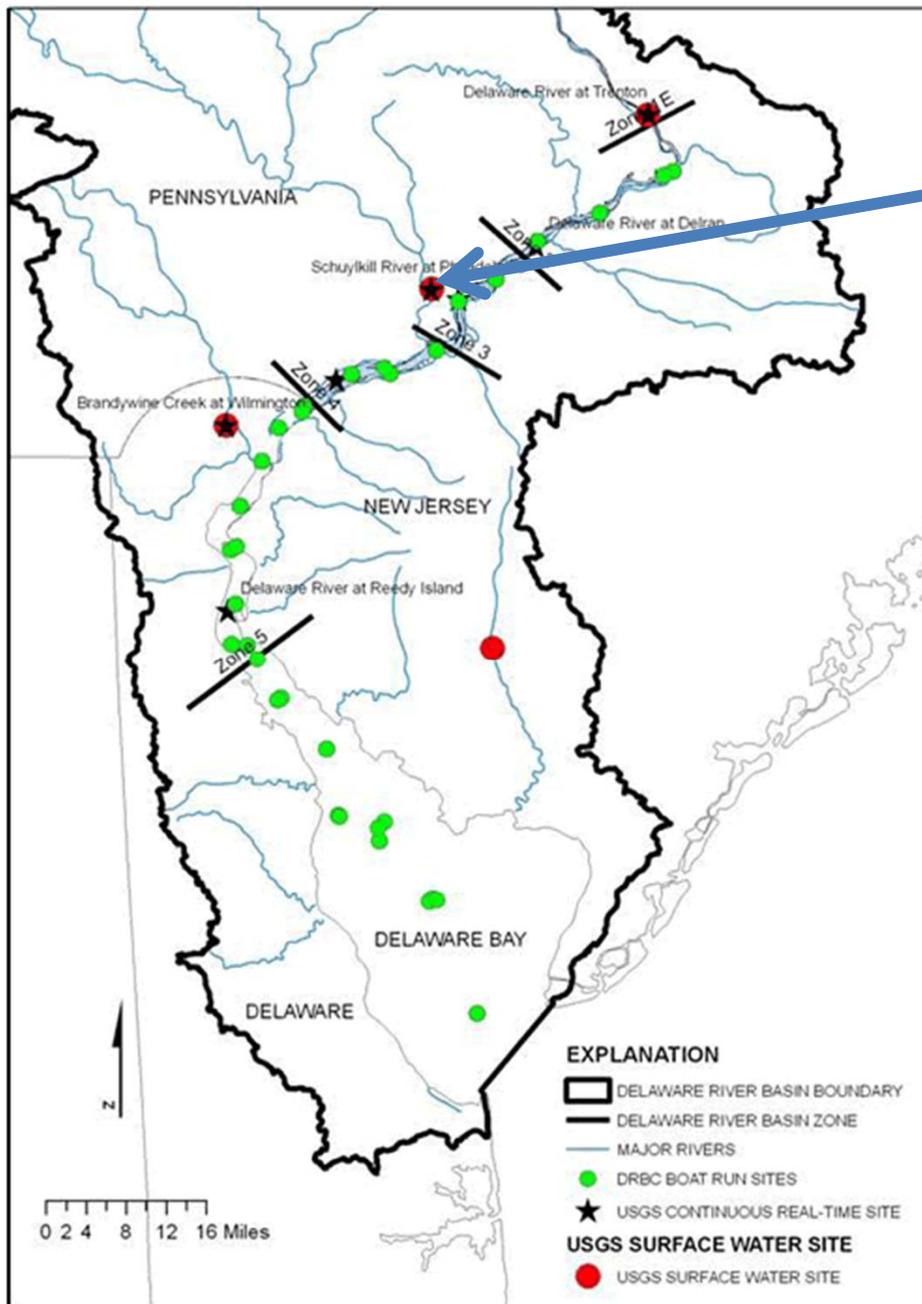


B. USGS Mississippi River Basin Sub-Network



C. Gaps filled by National Monitoring Network Additions

Delaware River Demonstration Project



USGS NMN site

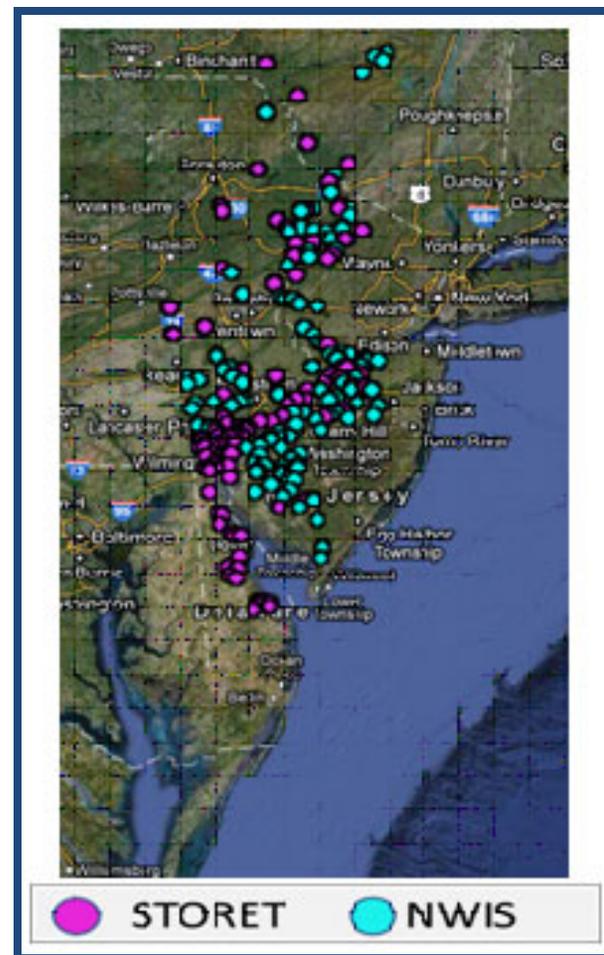
Nearshore sites operated by the Delaware River Basin Commission are green dots. These sites were identified in the Demonstration Study.

How can we recognize these sites and sites like these all across the Nation as part of the NMN in the next Phase?

The Water Quality Portal is part of the solution.

Importance of the Water Quality Portal

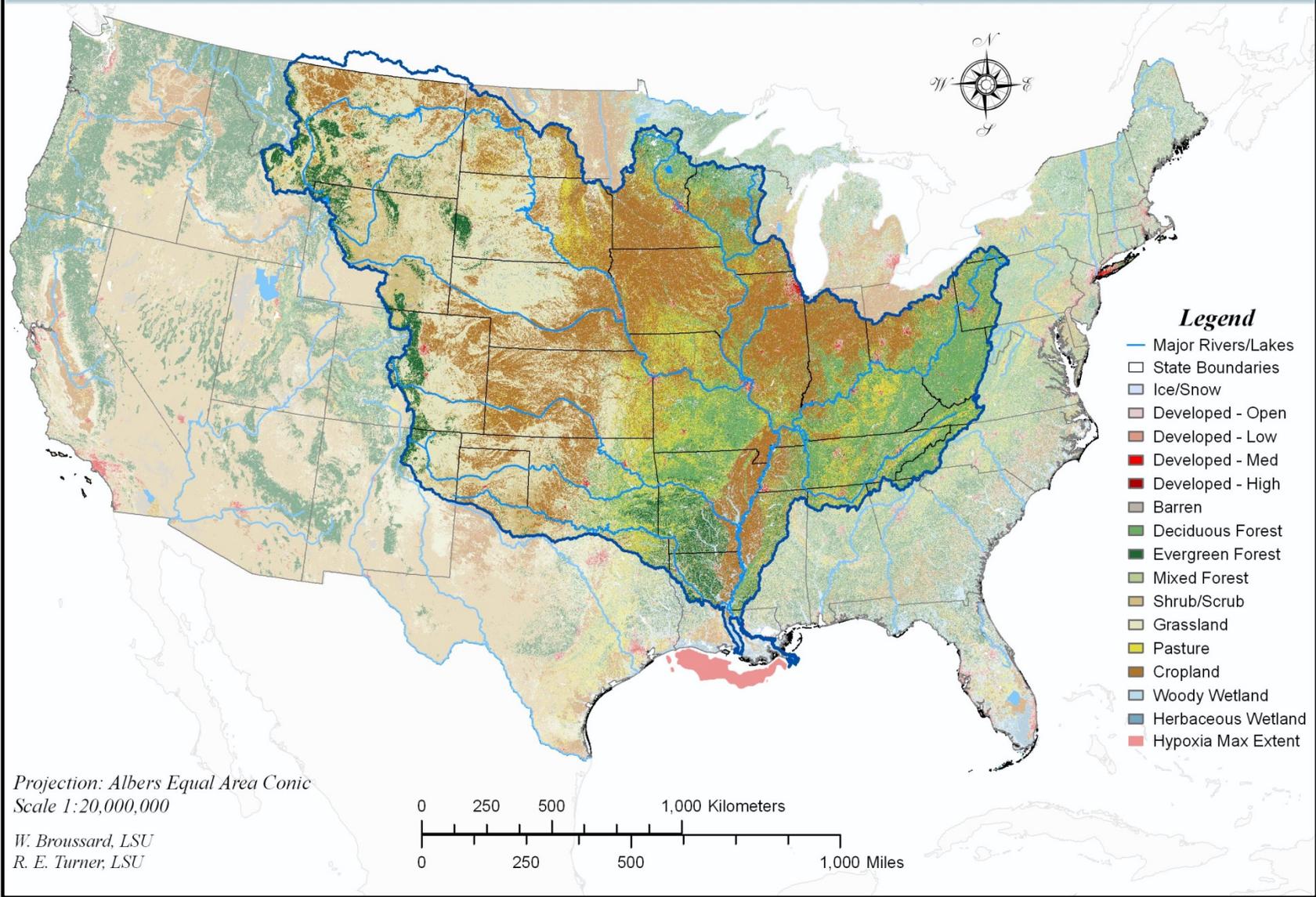
- Provides access to over 150 million water-quality records in USGS NWISWeb and USEPA Modern STORET data bases.
- Data sources are missing from Portal “community” that could be used to support the NMN
- <http://www.waterqualitydata.us/>



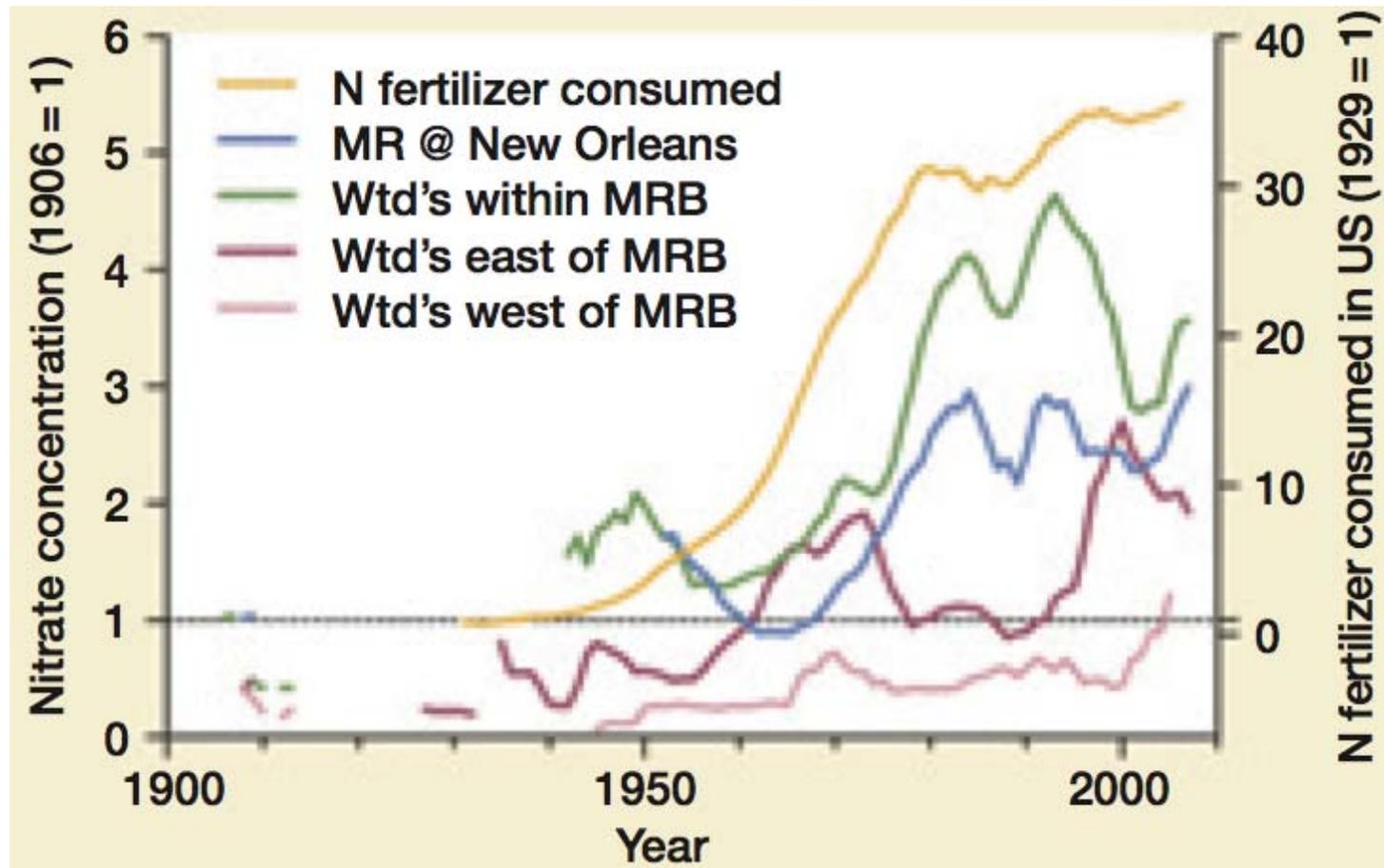
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Dr. Whitney P. Broussard III, University of Louisiana at Lafayette

Mississippi River Basin

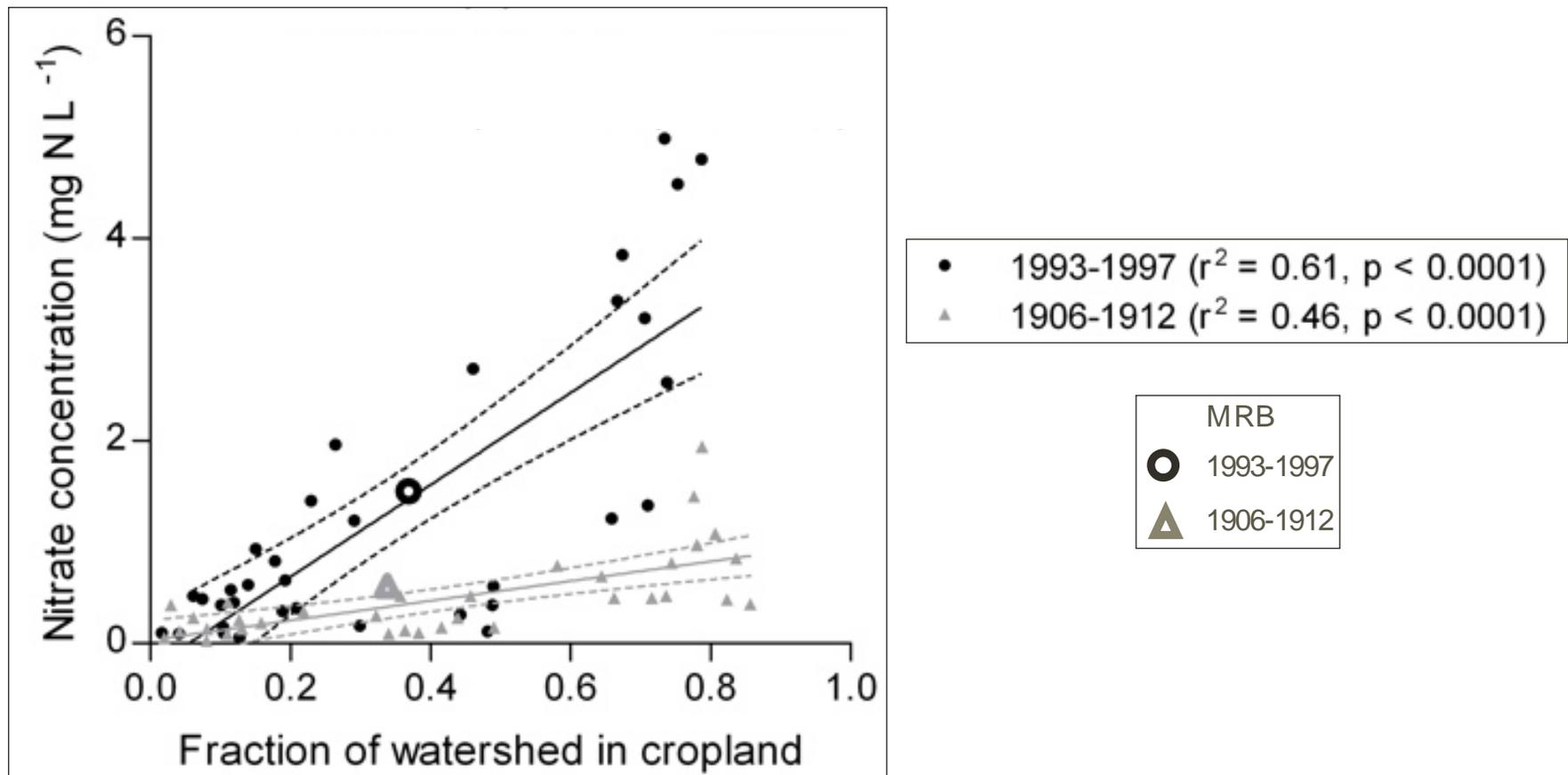


Data Sources: MRB Extent - National Hydrography Dataset, Major Rivers and Lakes - USGS, Landcover - USGS National Landcover Dataset, Hypoxia Extent - N. N. Rabalais



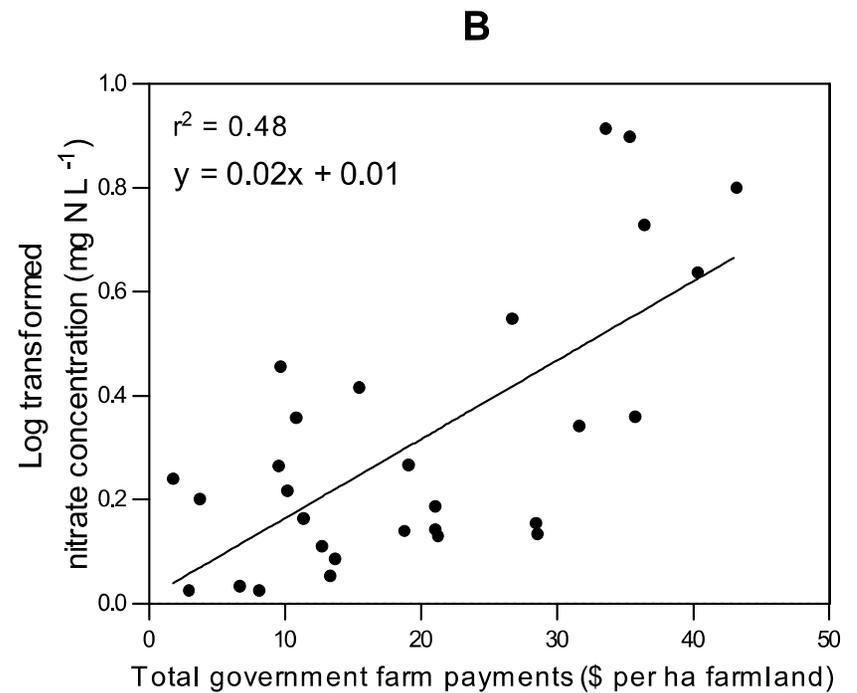
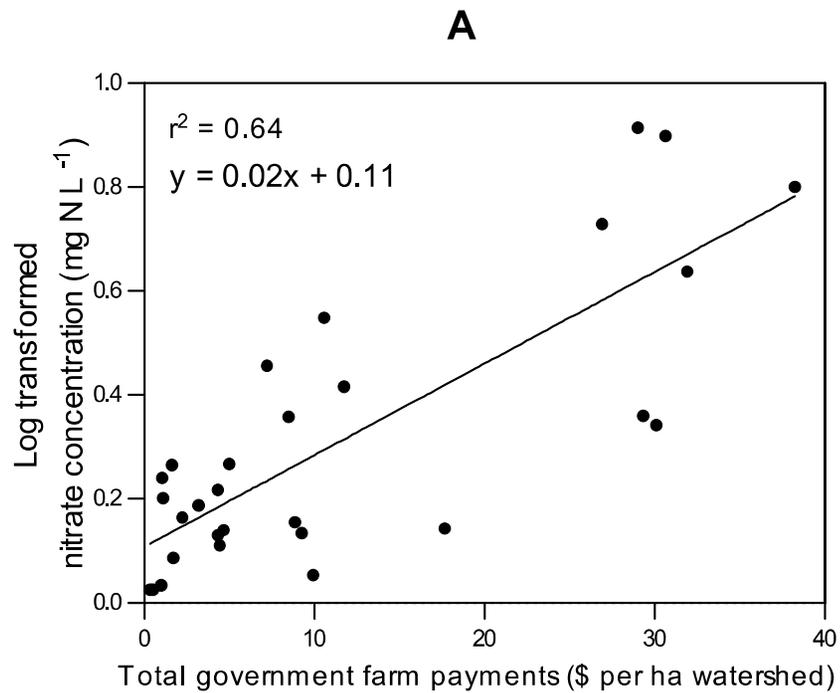
Broussard and Turner. 2009. *Frontiers, Ecology & the Environment*

Agricultural Cropland → NO_3^-



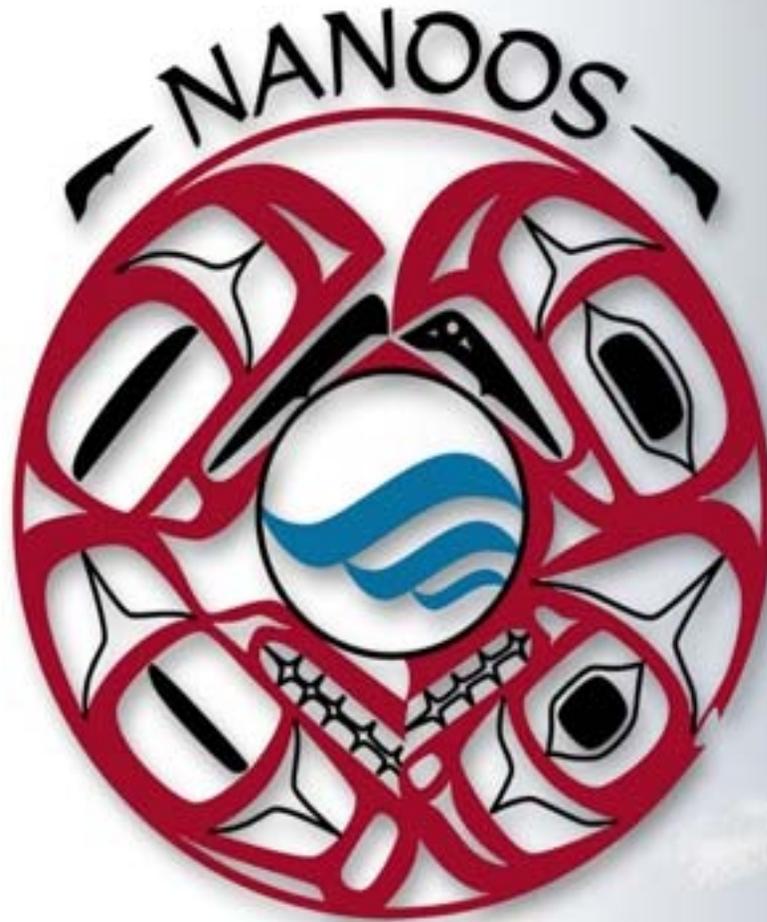
Broussard and Turner. 2009. *Frontiers, Ecology & the Environment*

Policy Implications ?



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Dr. Jan Newton, UW & Northwest Association of Networked Ocean Observing Systems (NANOOS)



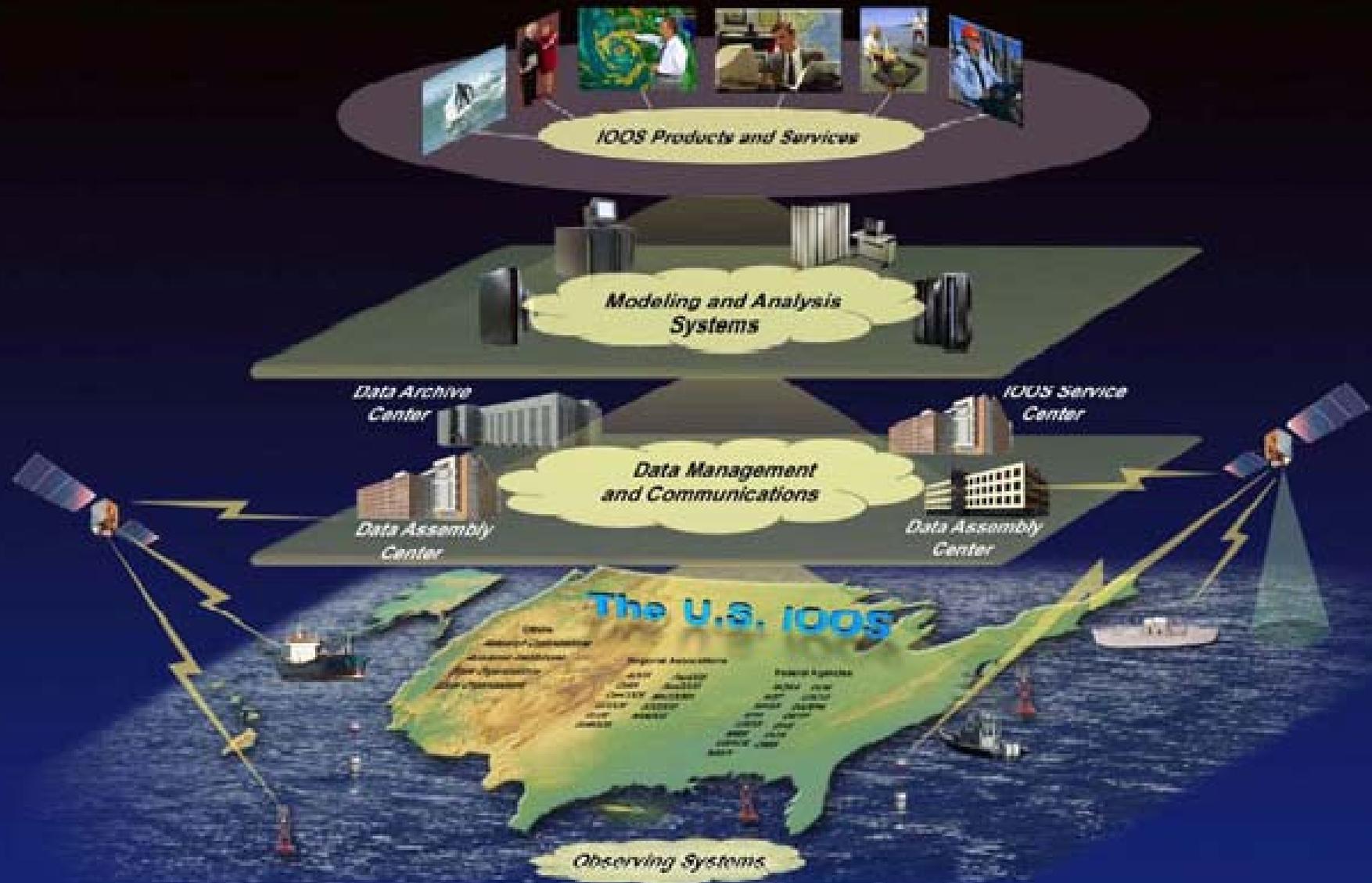
Northwest Association of Networked Ocean Observing Systems
The Integrated Ocean Observing System (IOOS®)
Regional Association for the Pacific NW



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IOOS[®]

INTEGRATED OCEAN OBSERVING SYSTEM



Integrated Coastal & Ocean Observation System Act of 2009

Created IOOS, with NOAA as lead Federal agency

“The purposes of this subtitle are to--

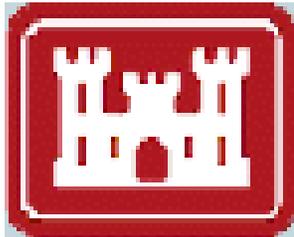
- (1) establish a **national integrated System** of ocean, coastal, and Great Lakes observing systems, comprised of **Federal and non-Federal** components coordinated at the national level by the National Ocean Research Leadership Council and at the regional level by a network of regional information coordination entities, and that includes in situ, remote, and other **coastal and ocean observation, technologies, and data management and communication systems**, and is **designed to address regional and national needs** for ocean information, to gather specific data on key coastal, ocean, and Great Lakes variables, and to ensure timely and sustained dissemination and availability of these data...”



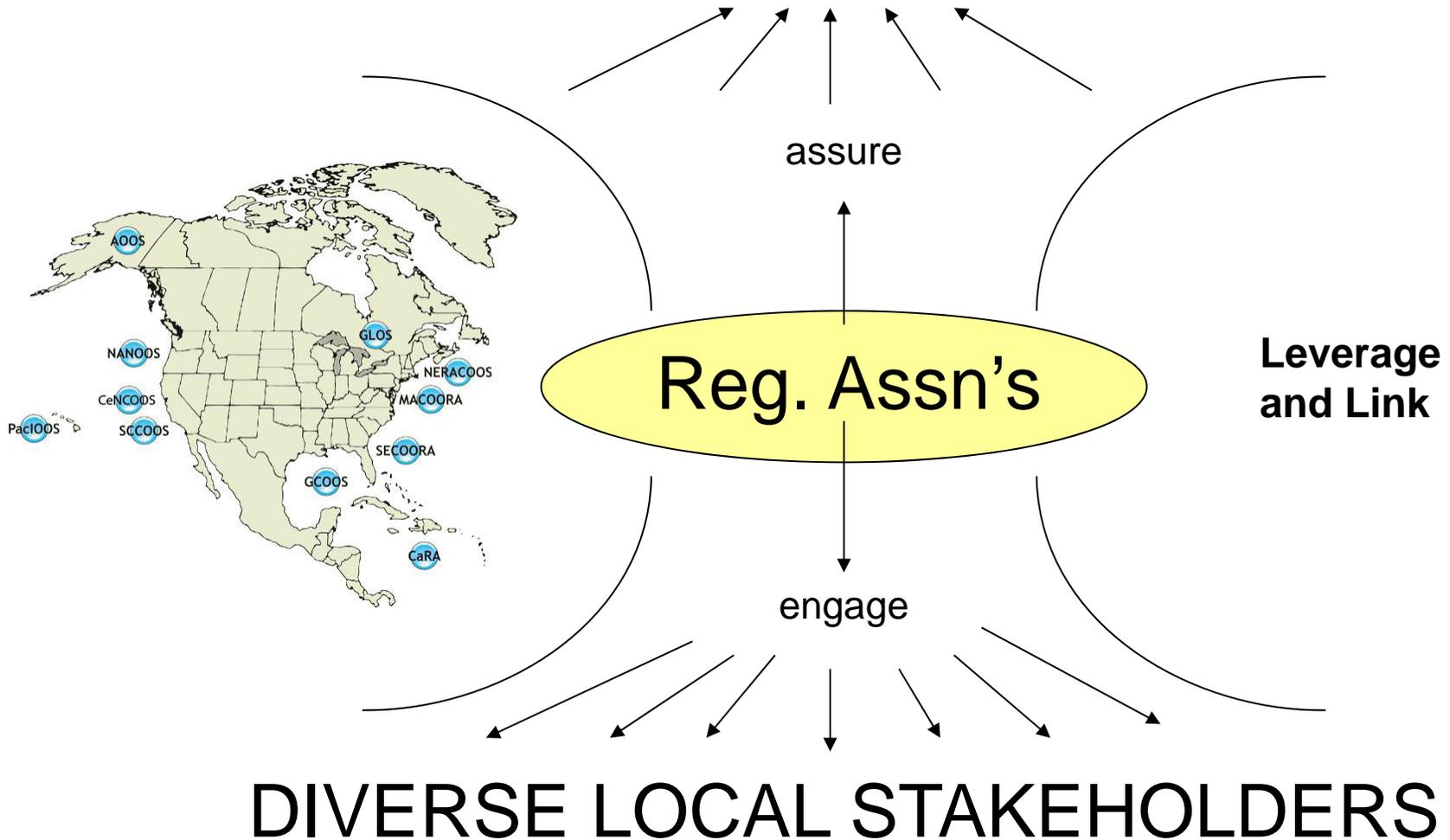
IOOS[®]

INTEGRATED OCEAN OBSERVING SYSTEM

IOOS FEDERAL PARTNERS:



CONSISTENT NATIONAL CAPABILITY



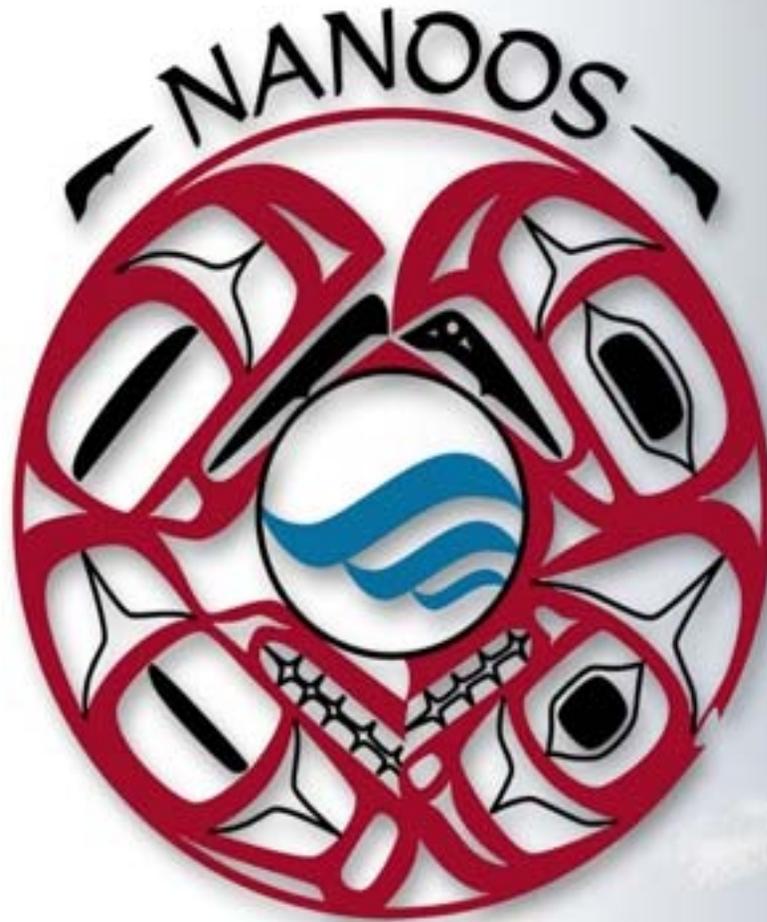
Integrated Coastal & Ocean Observation System Act of 2009

“In order to fulfill the purposes of this subtitle, the System shall be national in scope and consist of--

- (A) Federal assets to fulfill national and international observation missions and priorities;
- (B) non-Federal assets, including a network of regional information coordination entities identified under subsection (c)(4), to fulfill regional observation missions and priorities;
- (C) **data management, communication, and modeling systems for the timely integration and dissemination of data and information products from the System;**”

The Regional Associations of IOOS

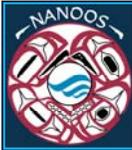




Northwest Association of Networked Ocean Observing Systems
The Integrated Ocean Observing System (IOOS®)
Regional Association for the Pacific NW



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NANOOS

NORTHWEST ASSOCIATION OF NETWORKED OCEAN OBSERVING SYSTEMS

WASHINGTON - OREGON - NORTHERN CALIFORNIA

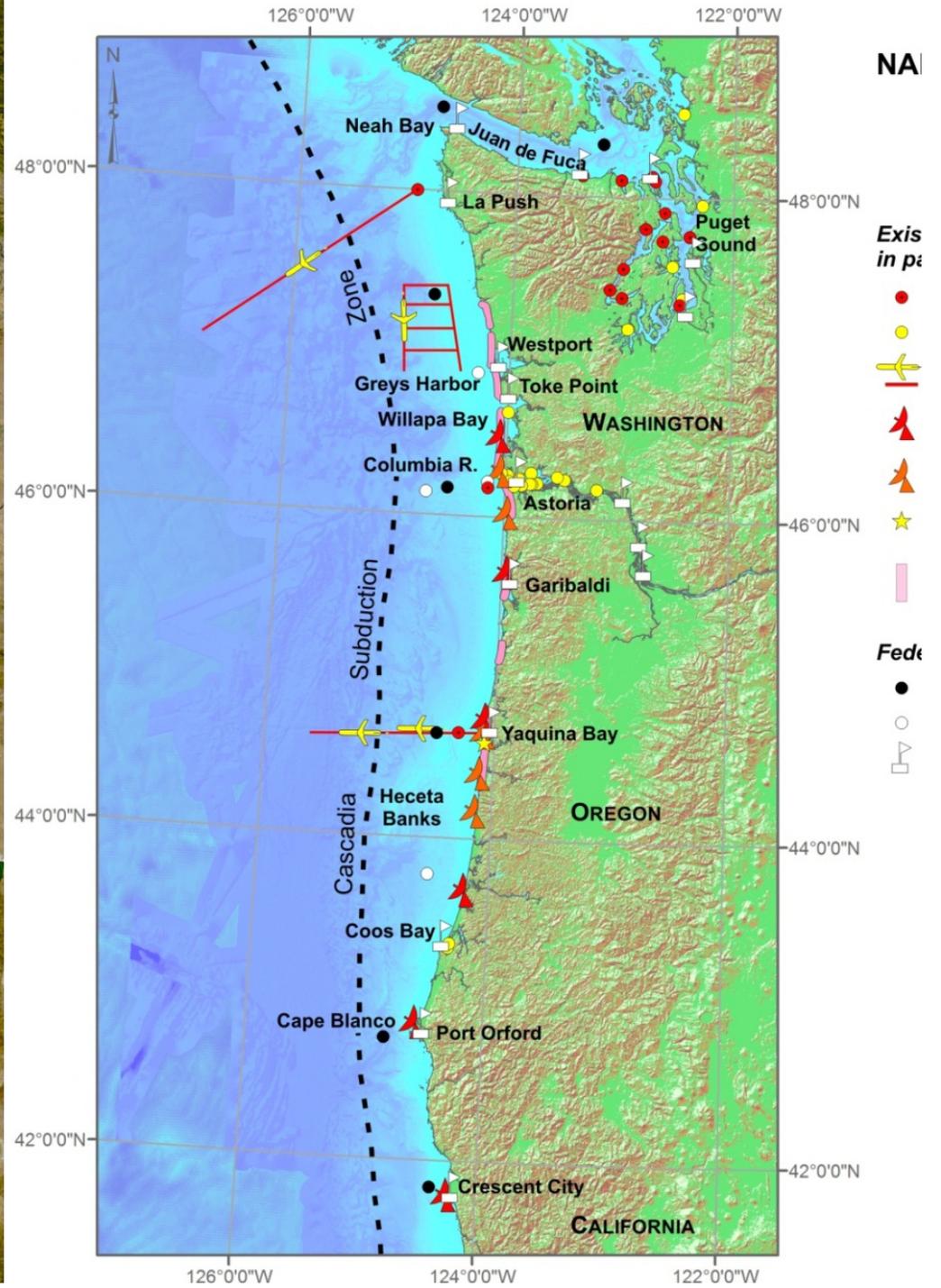


Strategy to develop a PNW Observing System

1. Integrate what we have (assets, people, technologies)

= federal, state agency, academic, local, tribal, and industry

2. Be strategic regarding what we need, based on priorities

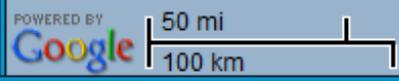


- myNANOOS
- Map
- Regions
- Filters
- Assets
- Overlays
- Places
- Settings
- Legend

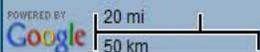


NANOOS funds:
 UW, WA State Dept.
 Ecology, OHSU,
 OSU, OR Dept State
 Lands assets, 
~19 in total

NANOOS displays:
 Federal, Tribal,
 State, University,
 Private assets,
167 in total



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- Map
- List
- Help

- Observations
- Forecasts
- Comparator
- Details
- Credits

Profiling Buoys at Twanoh - Hood Canal [Website](#)

Location: Puget Sound, Washington Lat: 47.375 Lon: -123.0083

Provider: ORCA-UW Data Source: NANOOS-APL

● Data Updated: 1 May 2012 12:19 PDT

ORCA Twanoh - Chlorophyll - 24 Hours
1 May 2012 13:57 PDT

Chlorophyll µg/L

— -10ft
— -66ft
— -92ft

15:00 18:00 21:00 00:00 03:00 06:00 09:00 12:00

Air Temperature (7ft):	50.5 °F
Barometric Pressure (7ft):	29.6 in Hg
Chlorophyll	
● -10ft:	9.8 µg/L
● -66ft:	2.6 µg/L
● -92ft:	0.9 µg/L
● CO2 (0ft):	266.1 ppm
● CO2 Air (7ft):	402.2 ppm
Oxygen Concentration	
● -10ft:	8.3 mg/L
● -66ft:	4.8 mg/L
● -92ft:	3.6 mg/L
Oxygen Percent Sat.	
● -10ft:	87.8 %
● -66ft:	49.9 %

24 Hours
7 Days
30 Days

↓
↓
↓

[Link](#)



Map
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Assets

- PSI Nahcotta
- PSI Bay Center
- WADOE Manchester
- WADOE Mukilteo
- WADOE Squaxin
- WADOE Willapa
- Land Station
 - NDBC CAR03
 - NDBC DESW1
 - NDBC NWPO3
 - NDBC SISW1
 - NDBC TTIW1
 - NDBC WPOW1
 - NERRS PDBFMET
 - NERRS SOSMMET
- River Gage
 - CMOP Saturn06
 - USGS Alesia
 - USGS Chehalis
 - USGS Chetco
 - USGS Columbia BAT
 - USGS Columbia BD
 - USGS Elwha
 - USGS Elwha Source
 - USGS Green
 - USGS Hoh
 - USGS Klamath
 - USGS Nehalem
 - USGS Nestucca
 - USGS NF Stillaguamish
 - USGS Nisqually
 - USGS Nooksack
 - USGS Puyallup
 - USGS Queets
 - USGS Quinault
 - USGS Rogue
 - USGS SF Coquille

Overlays

Show Overlay Icons on Map **On**

Observations (4)

Expand All Collapse All

Radar

- HF Radar
- OSU X-Band Radar

Satellite (Composite)

- AVHRR
- Water Temperature
- MODIS
- Chlorophyll a

Forecasts (6)

Expand All Collapse All

Model

- CMOP Columbia
 - Salinity
 - Water Temperature
- N. Amer. Mesoscale (NAM)
 - Air Temperature
 - Barometric Pressure
 - Relative Humidity
 - Wind Speed
- WAVEWATCH III
 - Dom. Wave Period (North Pacific)
 - Waves (North Pacific)
 - Winds (North Pacific)
 - Dom. Wave Period (N.E. Pacific)
 - Waves (N.E. Pacific)
 - Winds (N.E. Pacific)
- NOS/CO-OPS Tides
- OSU ROMS
 - Water Temp. & Currents
 - Water Temp. & Currents - Tuna
- OSU Wave Forecasts

Lat 49.4824, Lon: -129.6167
Terrain

AVHRR

Composite 1 Month 5 / 5

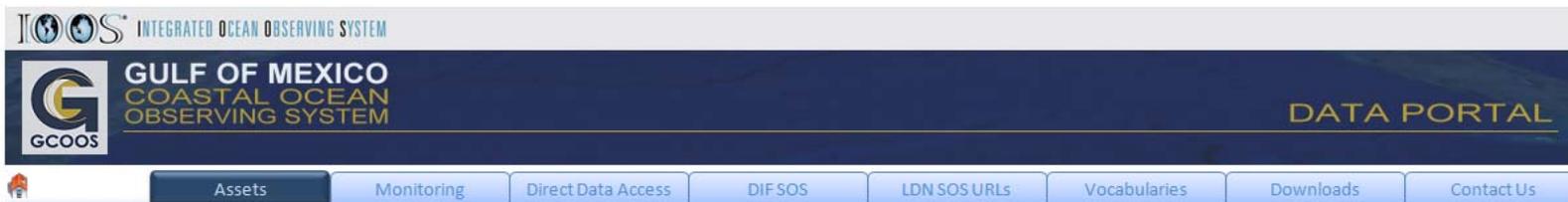
Date: 15 Nov 2011 16:00 PST

1/2 Sec

0 4 8 12 16 20 24 28 32

Sea Surface Water Temperature (°C)

“Gulf of Mexico Data Portal”



IOOS INTEGRATED OCEAN OBSERVING SYSTEM

GULF OF MEXICO
COASTAL OCEAN
OBSERVING SYSTEM

DATA PORTAL

Assets Monitoring Direct Data Access DIF SOS LDN SOS URLs Vocabularies Downloads Contact Us

Welcome to GCOOS Data Portal

This **Data Portal** provides timely information about the environment of the United States portion of the Gulf of Mexico and its estuaries for use by decision-makers, including researchers, government managers, industry, the military, educators, emergency responders, and the general public. Observing stations in the region are monitored constantly. Please visit the GCOOS main web site at <http://www.gcoos.org/> for more information on this regional association.

Region's Current Condition

The following is an interactive map to display resources and status of coastal and ocean observing stations. **Green** markers represent stations in full operation, **orange** markers are those with defective sensors and **red**-marked stations are those that are currently not transmitting data. Click on the station to view station details. Not all stations may be visible at the current scale. Zoom-in on an area to reveal all the stations. The HF Radar overlay uses Coastal Observing Research and Development Center (CORDC) published [HF RADAR API](#). [Click here](#) to toggle back to 2D mapping from 3D display.

WHAT'S NEW!

- (2011-11-22) A new plot module that can be embedded on any site is now available. Check the [Download](#) page for more on this.
- (2011-11-04) GCOOS data portal is now harvesting data from NERRS stations using their new



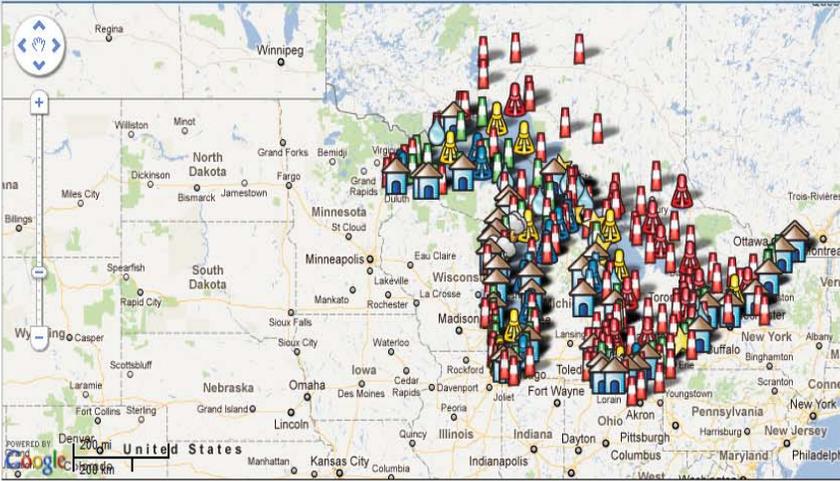


“GLOS Great Lakes Observations Explorer”

GREAT LAKES OBSERVING SYSTEM
OBSERVATIONS EXPLORER

Text View

Station Type Station Info Available Data Record of The Day Search Station Ship Report



Pick a parameter from the Available Data tag to get a quick view on the latest data (up to 7 days)

Station Type	Count	Check
C-Man Stations	53	<input checked="" type="checkbox"/>
Weather Station	5	<input checked="" type="checkbox"/>
Water Level Station	27	<input checked="" type="checkbox"/>
GLOS Buoy	15	<input checked="" type="checkbox"/>
USGS Water Gauge	41	<input checked="" type="checkbox"/>
GLOS Weather Station	3	<input checked="" type="checkbox"/>
3-meter Discus Buoy	14	<input checked="" type="checkbox"/>
Canadian Buoy	14	<input checked="" type="checkbox"/>
NERRS Weather Station	1	<input checked="" type="checkbox"/>
ASOS Station	138	<input checked="" type="checkbox"/>
Other Marine Reports	9	<input checked="" type="checkbox"/>

[Uncheck all](#)

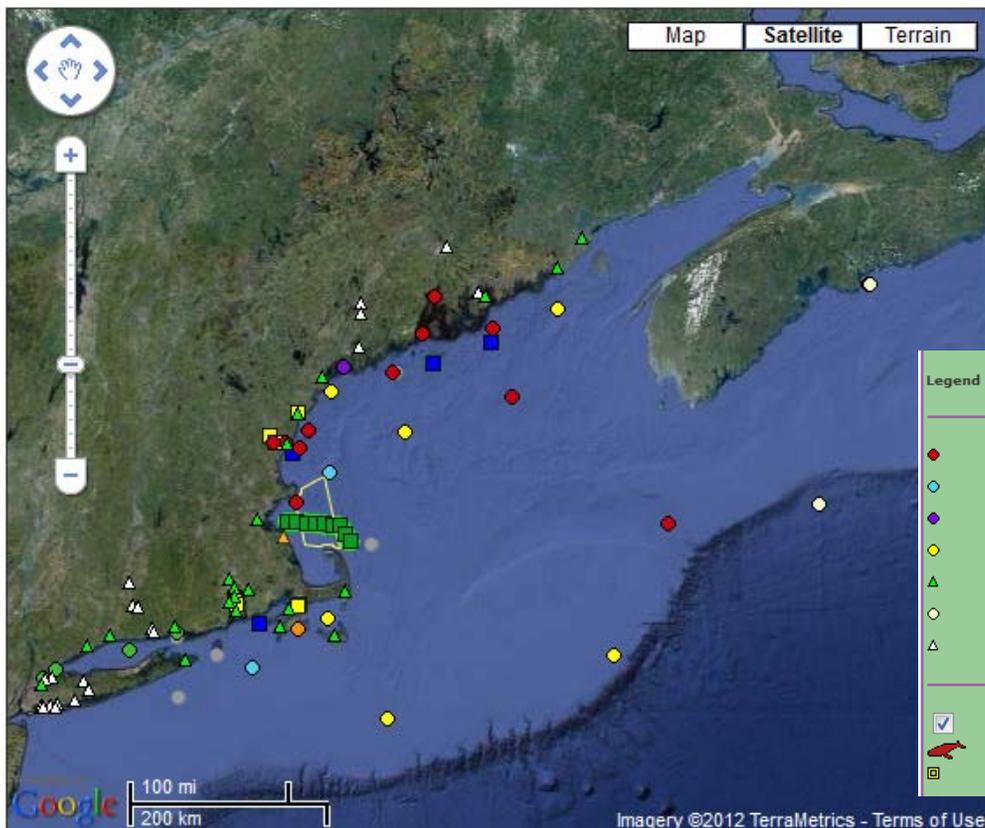
Disclaimer: All products published on this website are prototype products and are not intended to be used for navigational or operational purposes. Due to atmospheric or other conditions, latest data may not always be available. [View full disclaimer.](#)



© Great Lakes Observing System
229 Nickels Arcade | Ann Arbor, MI 48104
comments@glos.us

Home > Data & Tools >

Real-Time Data Portal



Zoom to location:

NERACOOS Region

NERACOOS Gulf of Maine M - Jordan Basin

Lat: 43.49 Lon: -67.87

Latest Observation: 05/01 4:00 PM EDT

Variable	Value
Wind speed	17 knots (20 mph, 32 kph)

Legend Deselect all

- Gulf of Maine Buoys
- CDIP Buoys
- Bowdoin Buoy
- NOAA Buoys
- NOS Stations
- Environment Canada Buoys
- USGS Stations
- Long Island Sound Buoys
- MVCO Sea Node
- NERRS Stations
- NOAA CMAN
- Scituate Tides
- SmartBay Buoys
- Inactive Buoys

Cornell Whale Array

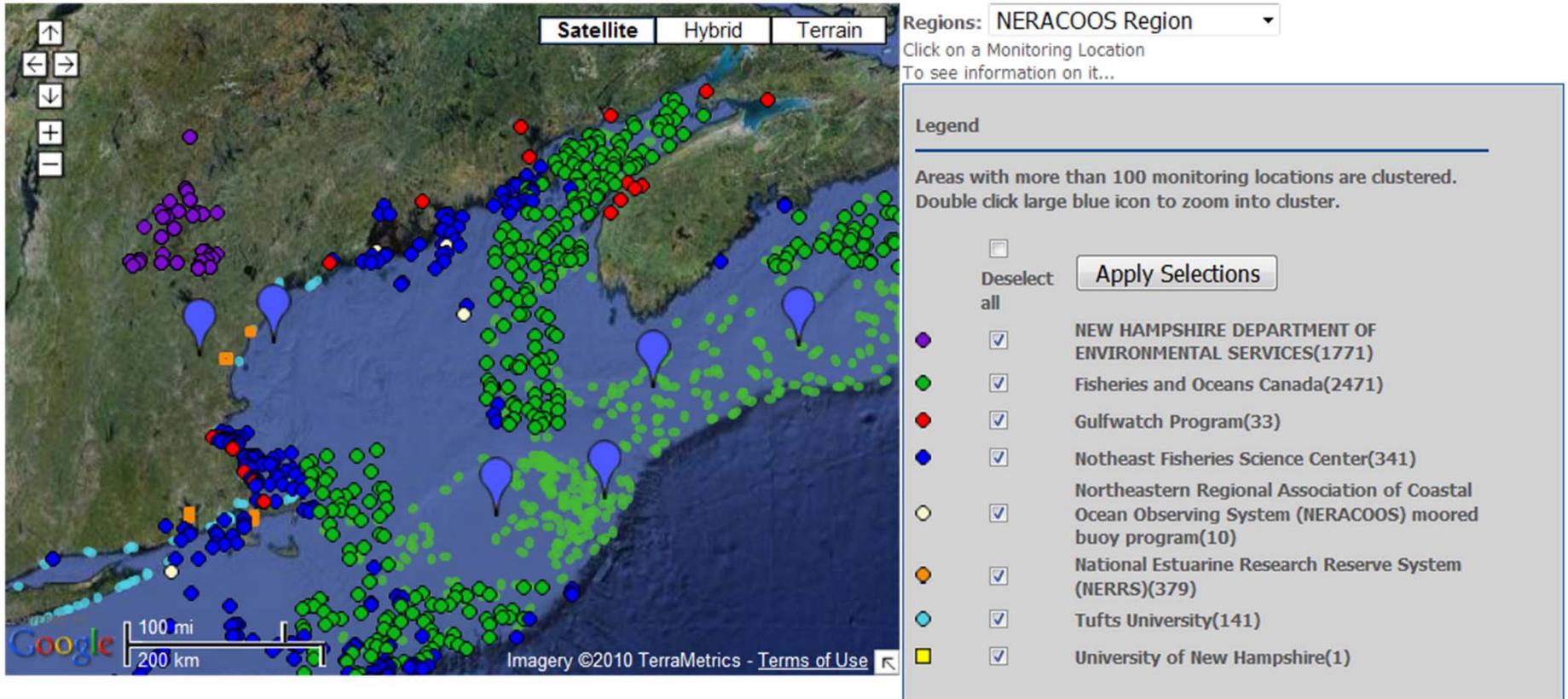
Recent detections ■ No recent detections

Stellwagen Bank National Marine Sanctuary

Imagery ©2012 TerraMetrics - Terms of Use

“Northeast Data Management and Portal”

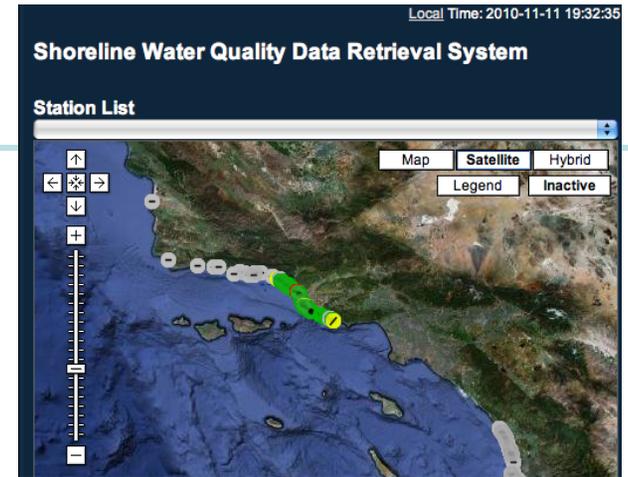
(<http://odpdx.neracoos.org>)



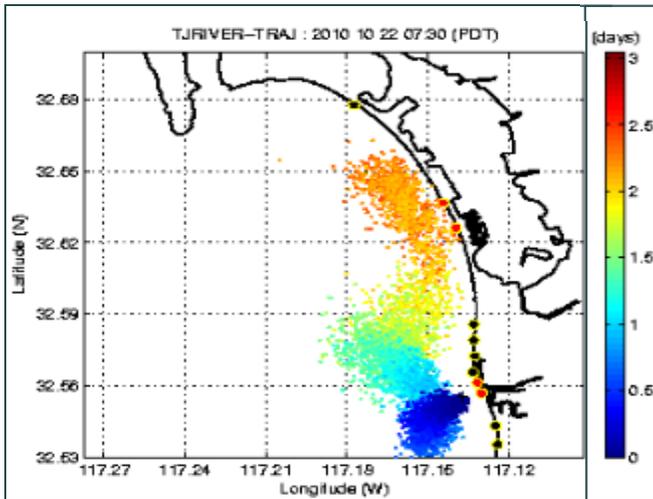


Observations, including support for partners

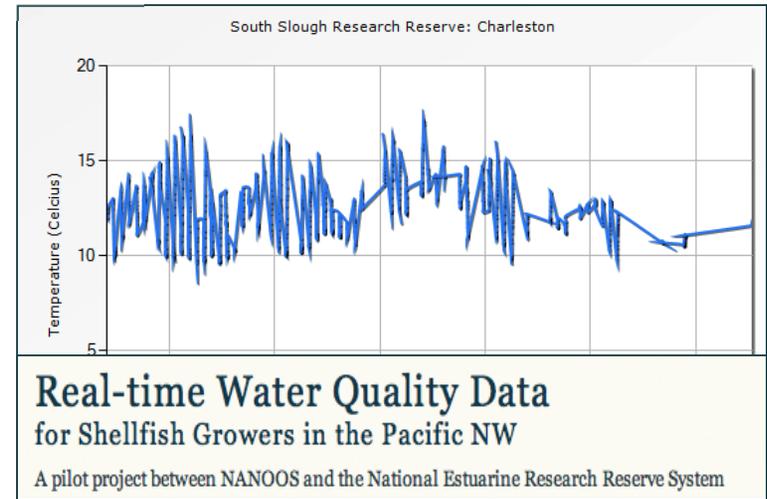
IOOS RA's Involvement in Water Quality



Data Services: Simplifying access to data



Plume Tracking



Real-time Water Quality Data for Shellfish Growers in the Pacific NW

A pilot project between NANOOS and the National Estuarine Research Reserve System

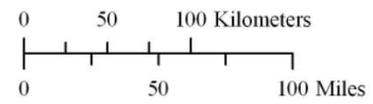
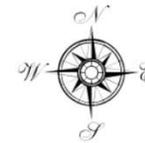
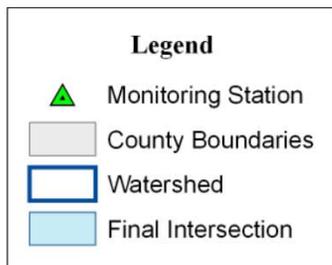
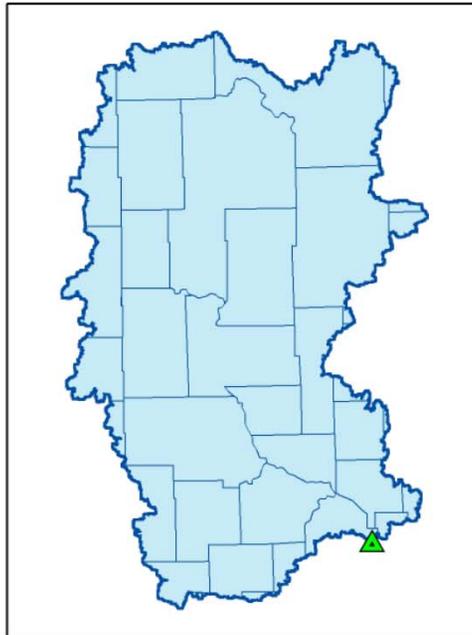
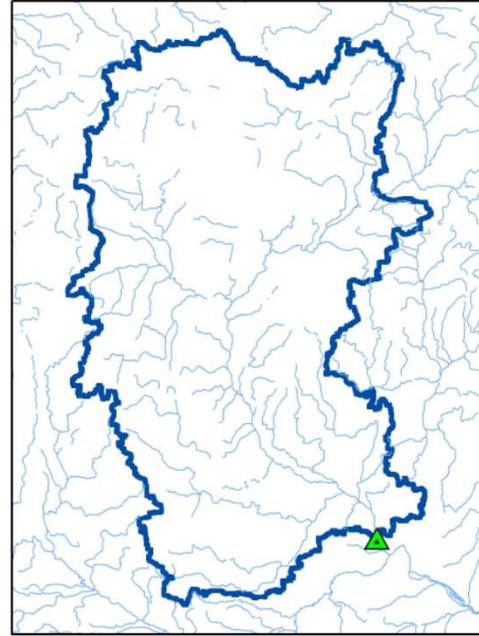
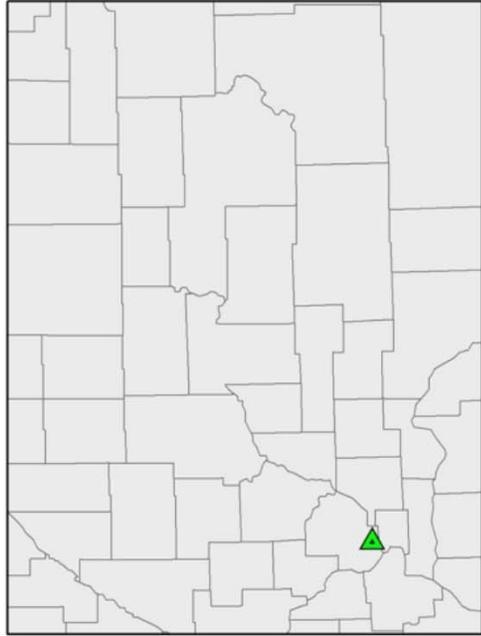
Customized Products

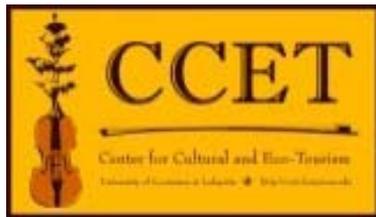
Take home messages

- IOOS has a federal mandate to integrate coastal ocean observations and data from federal and non-federal sources.
- IOOS and its RAs are critical building blocks of the National Water Quality Monitoring Network.
- IOOS RAs have integrated data access to federal, tribal, state, local, academic, NGO, and private sector monitoring assets and have designed their observing systems based on regional stakeholder input.
- Essential to optimize interoperability.

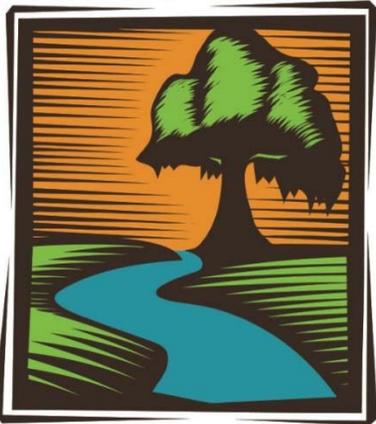
Advancing the implementation of a National Water Quality Monitoring Network (The Network) for U.S. Coastal Waters and their Tributaries

Dr. Whitney P. Broussard III, University of Louisiana at Lafayette

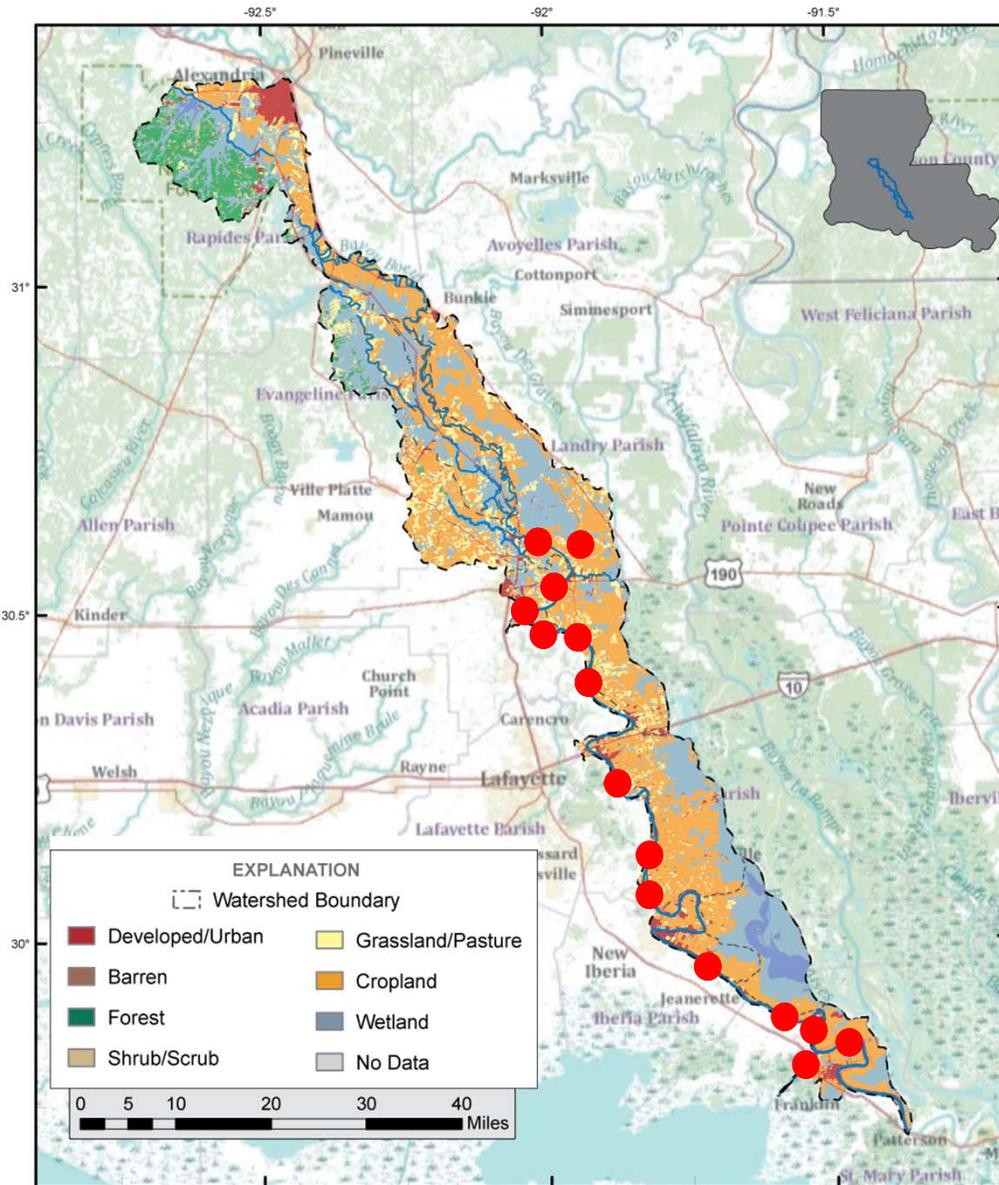




CAJUNS FOR BAYOU TECHE



THE TEICHE PROJECT



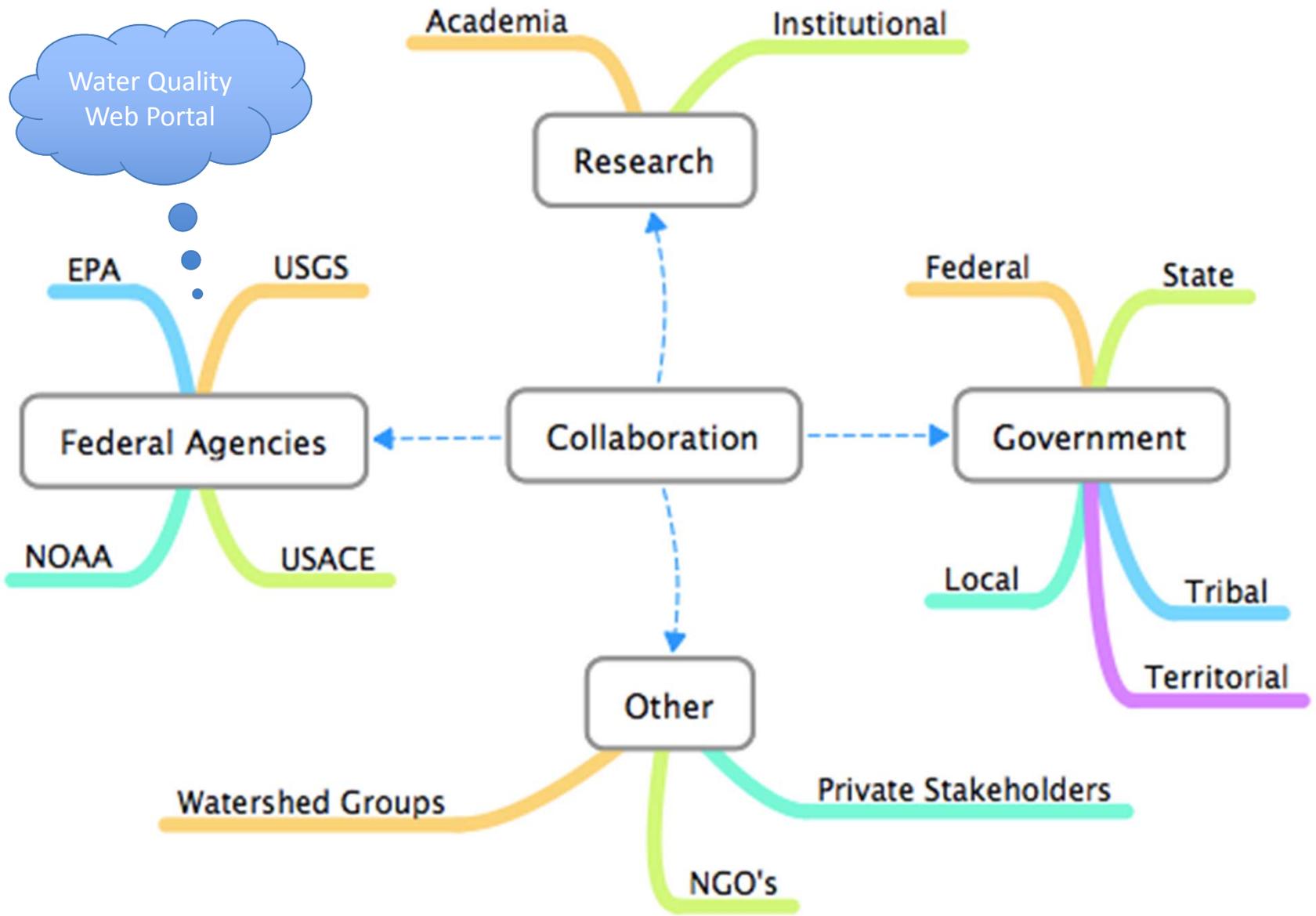
Base map: US National Park Service and ESRI. Landcover: USGS NLCD 2006. Watershed boundary and flowlines: USEPA & USGS NHDPlus 2005. UTM15N projection, NAD83.



W. Broussard, 2011. UL Lafayette, Institute for Coastal Ecology and Engineering.

Parish (County)
Presidents

Bayou Town Mayors



Advancing the implementation of a National Water Quality Monitoring Network (The Network) for U.S. Coastal Waters and their Tributaries

Dr. Bernice Smith, EPA Office of Wetlands, Oceans and Watersheds

Dr. Tony Olsen, EPA Office of Research and Development

Judy Beck, EPA Great Lakes Program

Dr. Gunnar Lauenstein, NOAA, National Centers for Coastal Ocean Science

Donna Myers, USGS Office of Water Quality

Dr. Jan Newton, UW & Northwest Association of Networked Ocean Observing Systems (NANOOS)

Dr. Whitney P. Broussard III, University of Louisiana at Lafayette