

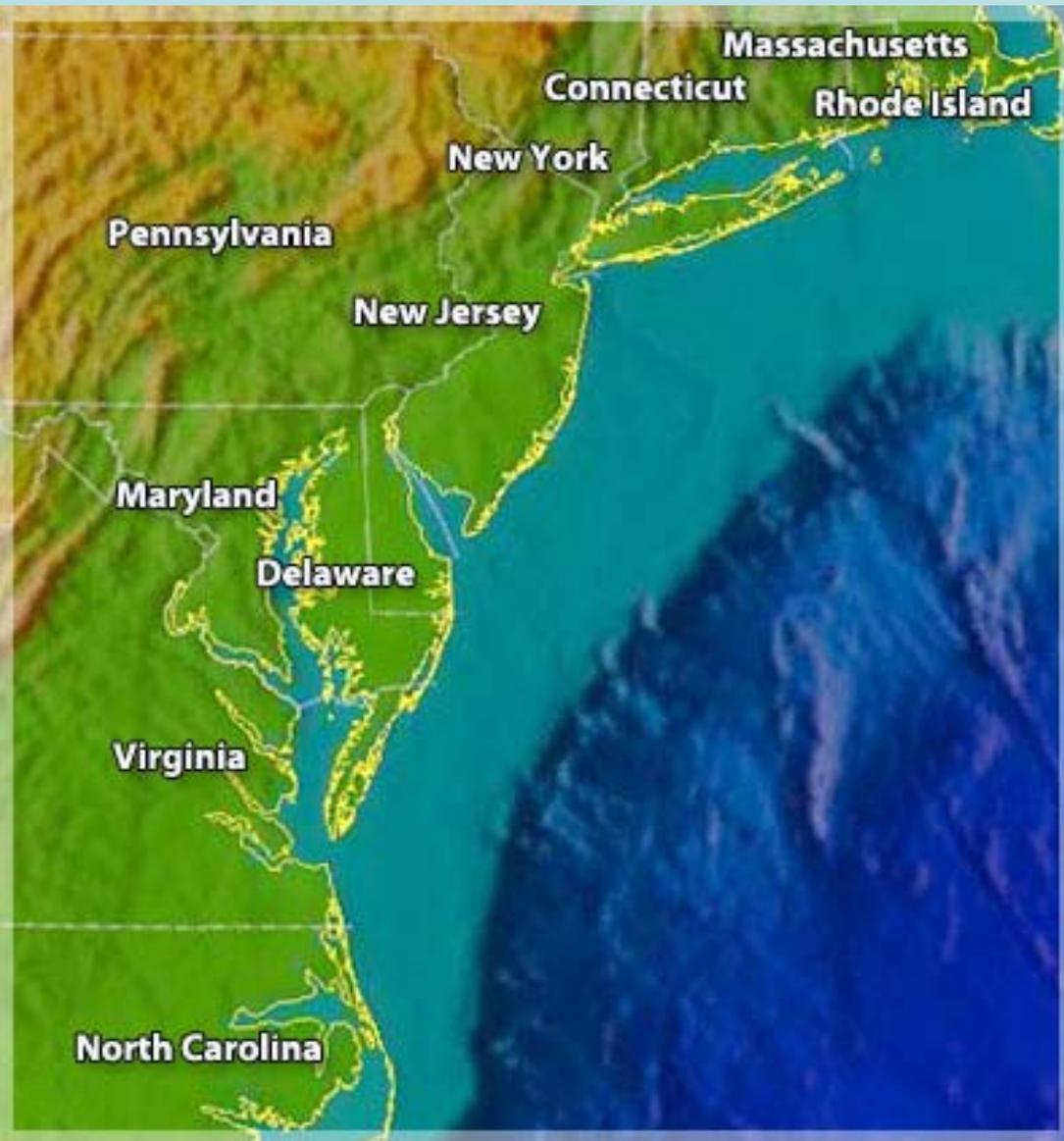


# **MACOORA: Where We Are And Where We Need To Go In Coastal Water Quality Management**

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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.

MARCOOS is the regional observing system of MACOORA

- Inundation
- Water Quality

# MACOORA Needs Assessment Workshop on Water Quality Monitoring for Managers

- Establish a regional, integrated ocean observing system driven by stakeholder input.
- Focus on key coastal resource management issues
  - existing and planned observing systems
  - research priorities
  - cooperation among MACOORA sub-entities
- Present and evaluate current management knowledge and data base for addressing coastal water quality resource and management issues
  - assign priority to the water quality-related coastal resources management issues
  - identify what is being done to improve the condition of MACOORA estuaries and coastal bays
  - describe resource-use conflicts and management challenges for resolving the issues

# Water Quality-Related Issues

- Coastal Pollution (toxics and nutrients - comparison with guidelines and source attribution)
- Shellfish Bed Closures
- Seafood Consumption Advisories
- Beach Closures and Swimming Advisories
- Harmful Algal Blooms
- Hypoxia
- Impact of Non-indigenous Species
- Habitat Loss and Freshwater Modifications
- Impacts of Extreme Natural Events on Water Quality.

# Significance of the present

Interagency mechanisms are in place for collaboration and integration across monitoring programs and observing systems (e.g., ICOSRMI)

A system for key national environmental indicators is a high priority national need

*US Comptroller General – Environmental Reporting and Environmental Accounting (June 2007; September 2007)*

IOOS Regional Associations are getting established; they will be a vital link to coastal managers and stakeholders to assure that IOOS has a strong customer focus and relevance.

New observational technologies need wider applications to become both cost-effective and profitable



# Pilot Study Tasks

- Identify Management Issues
- Inventory Current Monitoring
- Identify Gaps
- Investigate Data Comparability and Data Sharing Issues
- Estimate Costs of Current and Needed Monitoring
- Prepare Report

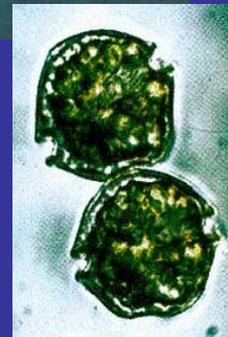
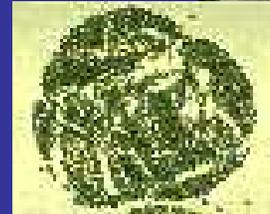
# Management Issues

- Habitat Degradation
- **Contaminants**
- **Sediment Management**
- **Nutrient Enrichment**
- Non-indigenous Species
- Oxygen Depletion
- Harmful Algal Blooms
- Pathogens
- **Habitat Restoration**
- Loss of Native Species
- **Wetland loss, alteration, status**



# CBOS: Future Possibilities

- *In water* microarrays & toxins: ESP2 (Scholin & Doucette)
- *In water* pigments, e.g., breve-buster (Kirkpatrick & Schofield) or sensors (Adolf et al.)
- *In water* cell sorting & imaging (Olson & Sosik)



Connecticut Department of Environmental Protection

Long Island Sound Water Quality Monitoring Program



Lyman

# Working Groups Session #1: User Needs and Requirements

- *What water quality issues are of most concern?*
- *What are the water quality threats?*
- Breakout Groups
  - Public Health
  - Hypoxia/Algal Blooms
  - Habitat Loss and Freshwater Requirements

# Session #1 Questions

- *What decisions regarding water quality do you currently make or influence? ( i.e., do you provide information to local communities on human health? On contamination? On aquatic habitats? Other?)*
- *Do you support local comprehensive planning? (e.g., Project water supply needs?)*
- *What data do managers currently use?*
- *Where do managers get the data? How easy is it to get data?*
- *On what time scale do you need? Do you need real-time data? Do you need trend data?*
- *What is the geographic scale of the data that managers need?*
- *What data format is required?*
- *What is the reliability of existing data?*
- You may include in your discussion the impacts of extreme natural events (floods, hurricanes, and drought).

# Public Health

MACOORA should:

- Enhance forecasting and modeling capabilities
- With partners enhance development of sensors and sensor specificity
- Integrate consistent data format into central portal – reduce search and decision time
- Communicate to managers proper interpretation of data
- Provide better (understandable) public outreach (public literacy and communication)
- Work to get newer technologies (e.g., site specific sensors for algae (HAB), etc.) accepted by EPA so that states can use them

# Hypoxia/Algal Blooms

MACOORA should:

- Provide better synthesis of understanding in order to develop an observing system that informs management decisions
- Identify and analysis gaps in existing observing assets
- Provide scientific “brain trust” as a resource to managers in addressing an event such as a large algal bloom or hypoxia (resource for shellfishery events)
- Provide information/understanding for states/municipalities to come to a common consensus on criteria (e.g., state response to proposed DO criteria).
- Help develop and evaluate criteria.

# Habitat Loss and Freshwater Requirements

MACOORA should:

- Previous slide applies!
- Monitor how variables (channel deepening, climate change (sea level rise)) affect Fresh Water Inflow and the impact on biota/habitat along the gradient and within tributaries of estuaries.
- Improve sensors and monitoring that are linked to the proper biological/ecological questions
- Identify, monitor and link wetland health to freshwater inflow and water quality.
- Improve observing system to include lateral sampling in estuaries.
- Inventory available biological data for analysis and modeling (e.g. oysters, eel grass) for finer tuned wetland analysis

# Working Groups Session #2: Needs vs Current Capabilities (Gap Analysis)

- *How sufficient are the current observation and monitoring programs for meeting these needs?*
- *What gaps are there in observations/data?*
- *What are the impediments for overcoming the gaps?*
- *Breakout Groups*
  - *MACOORA Sub-regions (MA-RI Bays, Long Island Sound, New York Bight, Delaware Bay, Chesapeake Bay)*

# Session #2 Questions

- *How sufficient are the current observation and monitoring programs for meeting these needs?*
- *How sufficient are current models in meeting these needs? (Are coastal water quality managers aware of them and interested in them? Are they operational and do they have the capabilities to provide data at scales appropriate for subregional use?) (e.g., circulation and hydrodynamic models, hypoxic events, HAB, ecosystem change, and impervious land cover)*
- *What gaps are there in observations/data?*
- *Are there impediments in access to the data (including formatting issues)?*
- *What barriers are there in data application and interpretation?*
- *What are the impediments for overcoming the gaps?*
- *You may include in your discussion the impacts of extreme natural events (floods, hurricanes, and drought).*

# Needs versus Current Capabilities (Gap Analysis)

- Frequency and duration of impaired waters (DE Bay)
- Real-time sensors improve response to impairment criteria (DE Bay)
- Agencies require tech support (MACOORA) in addressing real-time streams of data sharing and standards problem (DE Bay)
- *Make data access easier and with common data format (MACOORA act as a web portal) (LIS and Ches Bay)*
- Improvement in wave sensing and analysis (Ches Bay)
- Need system response monitoring for groundwater, nutrients, non-point source contamination (LIS)

# Needs versus Current Capabilities (Gap Analysis)

- Formatting issues of different datasets; improved QA/QC (NYB)
- MACOORA needed as switchboard for data needs and accessibility (user-friendly) for emergency response (NYB)
- Improve LIDAR coverage (elevations) in estuaries to assess habitat loss (NYB)
- Lack of sampling (biological, physical, chemical) at scales useful for within-estuary issues (MA-RI Bays)

# Working Groups Session #3:

## Filling the Gaps: Identifying opportunities and solutions

- *What kind of data and information products would be of use in fulfilling your job?*
- *Breakout Groups*
  - *Short-term Water Quality Issues*
  - *Long-term Water Quality Issues*
    - *What kind of data and information products would be of use in fulfilling your job?*
    - *Data and products can include desktop decision making tools (models), access to detailed information, real-time data, format of data, and maps.*

# Filling the Gaps: Identifying Opportunities and Solutions

## Short Term

- Future DMAC compliance (make sure MARCOOS proposals are critiqued against national standards where available)
- Action team (brain trust) of scientists (SWAT Team) to provide guidance to managers
- Identify and/or create canned information software applications as template – available to academic teams and are multi-jurisdictional (GIS type spatial dataset)

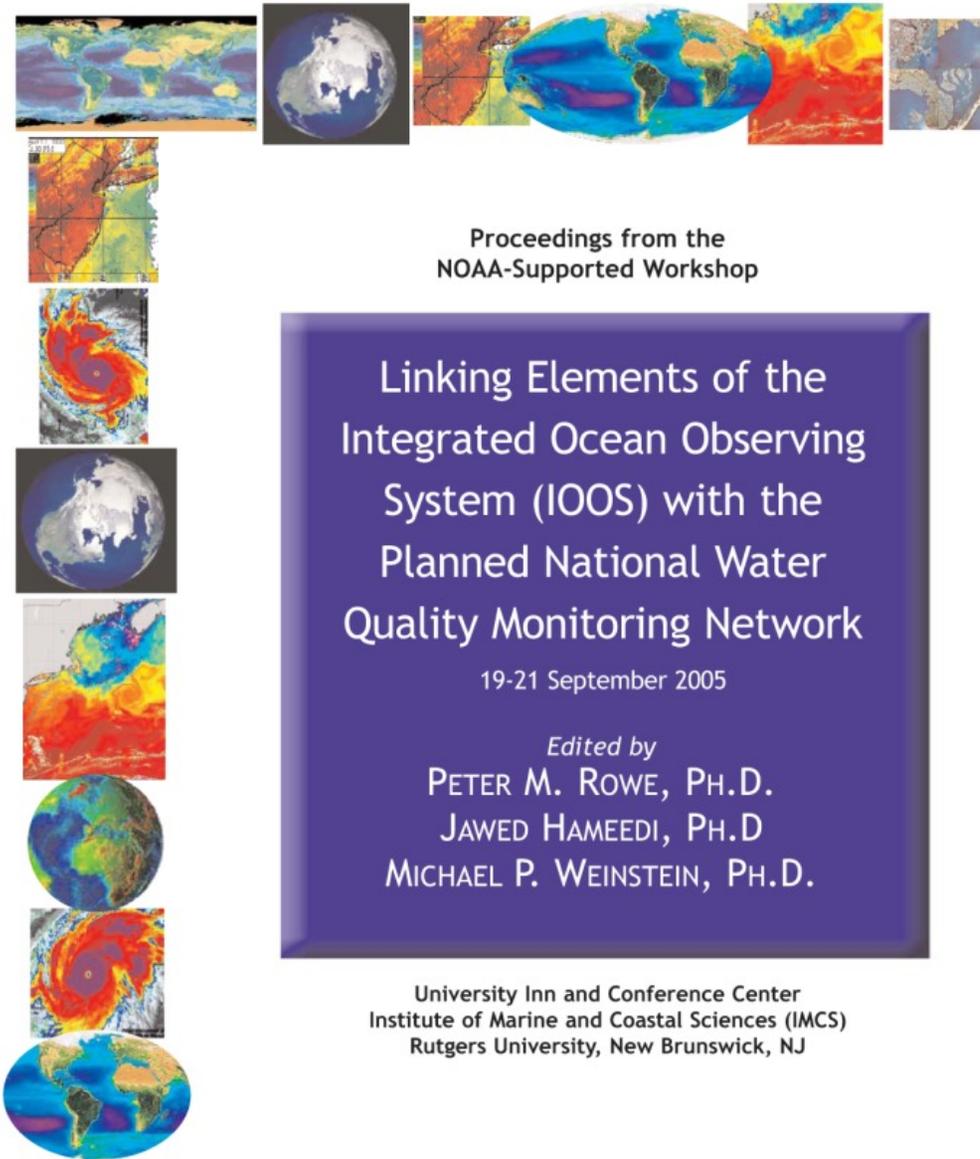
# Filling the Gaps: Identifying Opportunities and Solutions

## Long Term

- Identify and prioritize core observations and locales for monitoring
- Monitoring vegetative tidal wetland area trends/changes are critical to our understanding them (LIDAR).
- Need a baseline of ecosystem structure in light of frequent changes.
- Need a range of models (evolvable and revisable) for long term trends to inform management issues

# Panel Discussion

- MACOORA needs to be Proactive
  - Municipal
  - County
  - State
  - Regional
  - Federal



Proceedings from the  
NOAA-Supported Workshop

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

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# Linking IOOS-NWQMN Recommendations

- The Delaware Bay Ecosystem region would be ideally suited for attempts to link the IOOS with planned components of NWQMN through (a) **integration of existing discrete sampling sites and monitoring networks**, (b) addition of **supplemental monitoring** from ferries and/or autonomous underwater vehicles, (c) incorporation of existing air deposition sites and networks, and (d) **enhancement of existing arrays** of shore-based, aircraft or space-borne sensors. Current assets should be utilized to develop a cost-effective and comprehensive monitoring program that links system components of the DBE to serve regional needs, and contribute to broad societal goals that have been identified for the U.S. Integrated Ocean Observing System.
- Because contaminant inputs to the DBE can be hemispheric, regional or local, **broad geographical coverage, comparable data and an integrative approach to water quality monitoring are essential**; any future IOOS-NWQMN should be tailored to **meet specific resource management goals**.
- **Probabilistic and systematic** (“targeted”) **sampling** approaches are both necessary for water quality monitoring and data generation, and should be **developed on a complementary basis**.

# Linking IOOS-NWQMN Recommendations

- The temporal and spatial **scale of monitoring should be enhanced by application of new sensors and observation technologies** (e.g., autonomous underwater vehicles, fluorometry, acoustics, and biomarkers).
- The determination of ***what to monitor* should be strongly linked to current or future management and ecological issues** (an example of the latter might include the loss of wetlands due to sea level rise), and be **consistent with requirements for natural resource models in the region** (e.g., models describing oyster recruitment and incidence of disease); monitoring data should be appropriate for forecasting conditions in unmonitored areas or time frames.
- A **data clearinghouse** should be developed that links real-time and archived data while assuring **timely delivery of quality assured data in easily accessible formats**, preferably through a web-based portal.
- The Delaware Bay Ecosystem should be used as a pilot or proof of concept model for a linked IOOS-NWQMN, in particular by utilizing IOOS observational assets and data management protocols.