Protecting Water Quality and Habitats in Monmouth County

Monmouth County Board of Chosen Freeholders
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About the Urban Coast Institute (UCI)

- Mission: To serve the public interest as a forum for research, education and collaboration that fosters the application of the best science and policy to support healthy and productive coastal ecosystems and communities.

- Policy and Research Areas
  - *Sustainable Coastal Communities and Economies*
  - *Coastal and Ocean Law and Policy*
  - *Regional and Ecosystem-based Ocean Management*
  - *Coastal Watershed Management*

UCI Collaborating Agencies and Organizations

- National Oceanic and Atmospheric Administration
- Environmental Protection Agency
- NJ DEP
- Fairleigh S. Dickinson Jr. Foundation
- Barnegat Bay National Estuary Program
- Monmouth Coastal Watersheds Partnership
- Rutgers Cooperative Extension
- Monmouth Conservation Foundation
- Manasquan River Watershed Association
- American Littoral Society
- Local Communities

Sustainable Coastal Communities and Economies

- Program and Research Areas
  - *Coastal Policy* – Public Trust Doctrine Workshop and Public Access project underway(See UCI website)
  - *Coastal Sustainability and Resiliency* – Coastal No Adverse Impact Workshops with NJAFPM, Coastal Resilient Communities Initiative
  - *Coastal Communities and Economies* – Shore Protection Workshop 6/24 -25 ; Corps/FEMA/ State Workshop (upcoming)

Coastal and Ocean Law and Policy

- New Jersey Coastal Rules

- UCI partnered with American Littoral Society (ALS) and other stakeholder groups on a three-step process for the review the Coastal Rules
  - Pre-interview stakeholders, to identify problems associated with the existing Coastal Rules and permitting process and implementable alternatives
  - Prepare and disseminate "white papers" addressing mechanisms for achieving Coastal Zone Management goals
  - Develop an analysis of regulatory reform options and recommendations for consideration by stakeholders and DEP.

Regional and Ecosystem-based Ocean Management

- Monmouth, Rutgers, and Stevens MOU on advancing regional ocean observations systems, including UCI coastal monitoring stations
- Workshop with NJMSC on the Chronic Risks of Global Climate Change on Urban Communities and Economies at the Stevens Institute of Technology (November, 2007)
- NJ Workshop on Regional and Ecosystem-based Approaches to Ocean Management. (April 2008), and MidAtlantic Regional Ocean Forum (Dec 2009)

New Jersey's Beach Water Quality

- New Jersey's Cooperative Coastal Monitoring Program
  - New Jersey has 750 public coastal beaches along 127 miles of Atlantic
  - NJDEP's Cooperative Coastal Monitoring Program (CCMP) is conducted in cooperation with County Health Departments (mid-May to mid-September)
  - Local health agencies collect samples each week for *enterococci* bacteria concentrations at 188 ocean and 137 bay monitoring stations
  - DEP conducts aerial surveillance of near-shore coastal waters six days a week during the summer and monitors for algal blooms by assessing chlorophyll levels in coastal waters using remote sensors on aircraft
  - DEP also routinely inspects the 17 wastewater treatment facilities that discharge to the ocean
  - Daily results are posted on the CCMP website

NJ Beach Water Quality Standards

- NJ issues closings when bacteria levels exceed standards, as well as ***precautionary closings*** due to rain in some areas of the state

- Prior to 2004 the primary standard was 200 fecal coliforms per 100 mL; however EPA studies determined that *enterococci* bacteria have a greater correlation with swimming-associated gastrointestinal illness

- In 2004 the NJ Sanitary Code was amended to a ***standard of 104 enterococci per 100 mL/sample***

- Beach closing information, including the specific beaches closed and reasons can be found on the NJDEP web page (***www.njbeaches.org***).

NJ Beach Closings

- There were 97 beach closing in 2006 and 89 in 2009. The primary cause was stormwater runoff (See CCMP: Summary Report for 2006 and 2007, NJDEP, June 2008).

- The large number of beaches were closed for precautionary reasons after the implementation of a rainfall policy for beaches affected by the Wreck Pond outfall in Spring Lake and Sea Girt. L Street Beach also has preemptive rainfall standards.

- The precautionary plan requires that the two beaches north of the Wreck Pond outfall, Brown Avenue and York Avenue, close for a specified time period following a rain event.

- NJDEP is currently working with stakeholders to address the elevated bacteria levels in the pond. In early 2006, NJDEP completed a 300 foot extension of the Wreck Pond outfall into the ocean.

Reasons for Beach Closings and Sources

According to a recent report by the Natural Resource Defense Council (NRDC):

- 72 percent (102) of closing days in 2007 were preemptive due to rain and stormwater runoff
- 26 percent (37) were due to monitoring that revealed high bacteria levels from unknown sources
- 1 percent (2) were preemptive closures for unspecified reasons
- 1 percent (1) were in response to a known sewage spill

NJ Floatables and Marine Debris

- To reduce the amount of marine debris from reaching NJ beaches, a multi-agency Floatables Action Plan utilizes helicopter surveillance to locate slicks, skimmer vessels fitted with nets that collect floating debris, floating booms that trap debris near sewer-system discharge points for later collection, and sewer-system improvements.

- Under NJDEP's Clean Shores Program, state inmates remove floatable debris from the shorelines of the Hudson, Raritan, and Delaware estuaries and barrier island bays.

(See US EPA. Floatables Action Plan www.epa.gov/region02/water/, May 2008.)

BEACHES Legislation and Funding

- New Jersey received a $279,870 federal BEACH Act grant in 2007 and was eligible for a $275,480 grant in 2008. NJ contributes an additional $200,000 to the CCMP through the sale of Shore Protection license plates.

- Sen. Lautenberg and Rep. Pallone have sponsored legislation to reauthorize and strengthen the *Beaches Environmental Assessment and Coastal Health Act* including the following:
  - Increased funding for states implementation, including use of funds to track sources of pollution (e.g. NJDEP has successfully applied microbial source tracking techniques, such as coliphage, multiple antibiotic resistance testing at several locations around the State).
  - Support development of more rapid testing to support same-day notification of poor water quality conditions at recreational bathing beaches (current tests take 24 hours).

Problems Facing Coastal Watersheds

Stormwater and Runoff

Problems Facing Coastal Watersheds

Degraded Shoreline Conditions

Problems Facing Coastal Watersheds

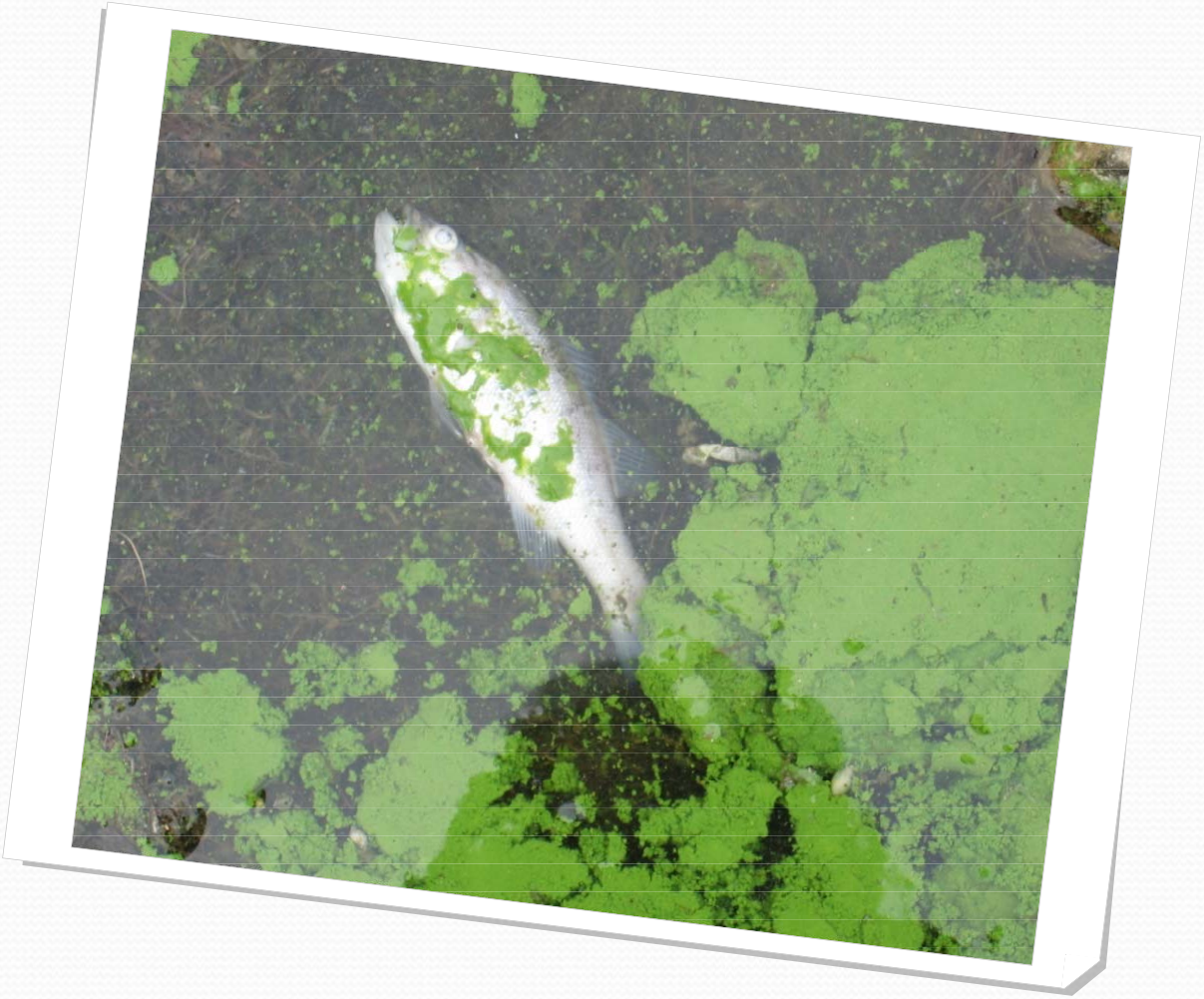
Litter, Floatables and Debris

Problems Facing Coastal Watersheds

Nutrient Enrichment and Algae Blooms

Problems Facing Coastal Watersheds

Degraded Fish Habitat



Problems Facing Coastal Watersheds

Nuisance and Invasive Aquatic Weeds

Problems Facing Coastal Watersheds

Stream Bank Erosion

Problems Facing Coastal Watersheds

Sediment, Shoaling and Dredging

Problems Facing Coastal Watersheds

Pathogen Contamination

Coastal Watersheds and Habitats

- **Urban Coast Institute Initiatives**
  - **Bioassessments of Local Subwatersheds**
  - **Coastal Lakes Initiative**
  - **Microbial Source Tracking Studies**
  - **Coastal and Marine Conservation and Restoration**
  - **Real Time Water Quality Monitoring**

Bioassessments of Local Subwatershed

- Assess existing stream and pond conditions in subwatersheds to develop recommended management measures for local communities that will limit further degradation and result in improved habitat and water quality conditions.
- Identify vulnerable wetland and riparian areas and assist local communities with development of programs to protect and restore these areas.
  - Shippee's Pond Subwatershed
  - Whale Pond Brook Subwatershed
  - Shark River and Jumping Brook Subwatersheds

Coastal Lakes Initiative

- Provide municipal officials, representatives of civic groups, community organizations, and local coastal and watershed management groups with information and tools necessary to develop cost-effective strategies to restore, protect and maintain coastal lake and pond ecosystems.
  - Stream Restoration Tools and Techniques Workshop (2007)
  - Streamside Living Workshop (2007)
  - Future of Coastal Lakes of Monmouth and Ocean Counties Workshop (2008)
  - Formation of Wreck Pond Watershed Commission (2008-09)

Microbial Source Tracking Studies

- Assist regional stormwater management efforts by characterizing potential sources of bacterial contaminants contributed to local watersheds using Microbial Source Tracking (MST) methodologies.
- Provide data necessary for the selection of applicable stormwater management measures that result in controlling sources of pathogens that adversely affect beneficial uses.
  - Manasquan River Estuary
  - Shark River Estuary
  - Wreck Pond
  - Colts Neck

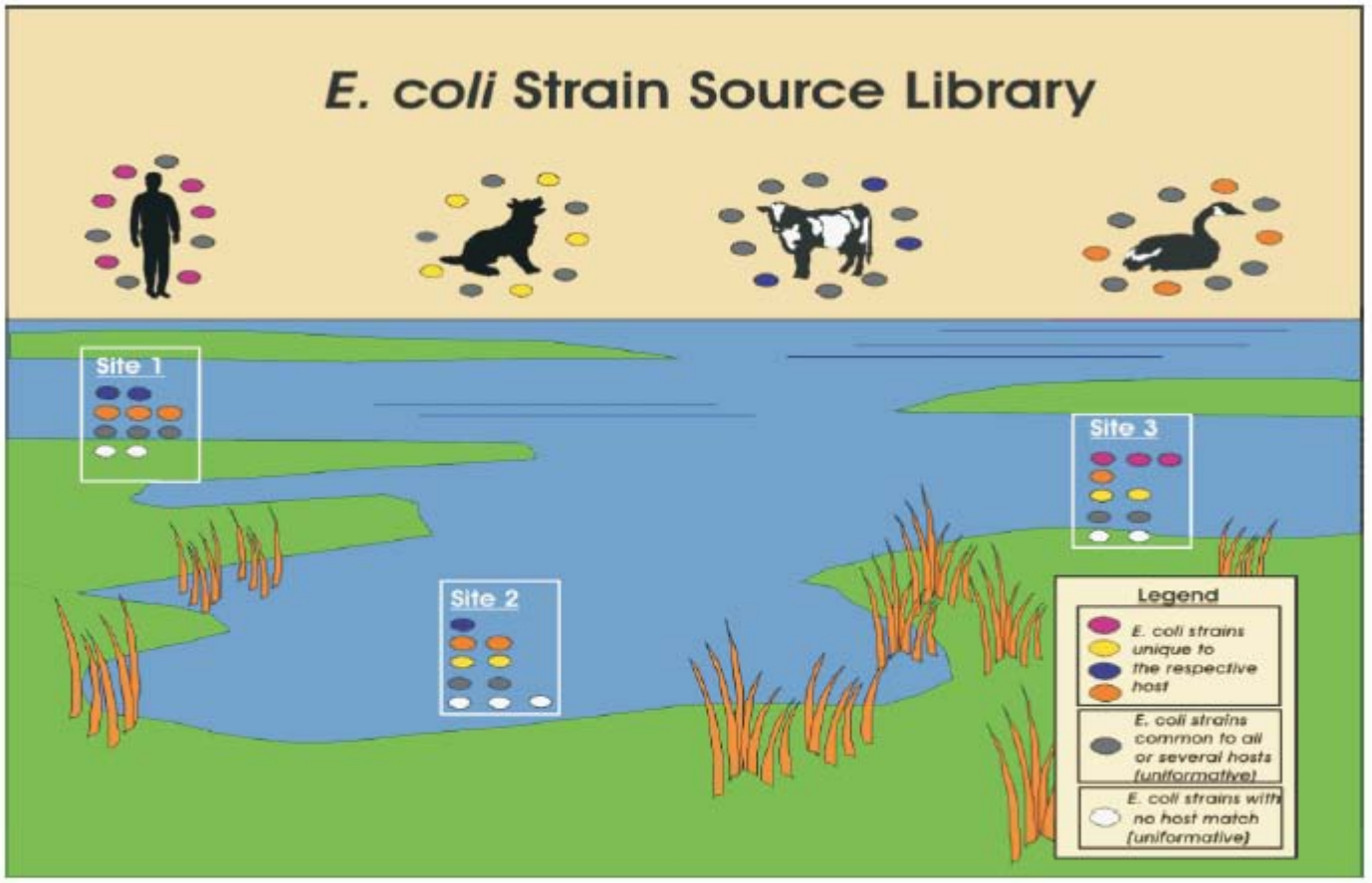
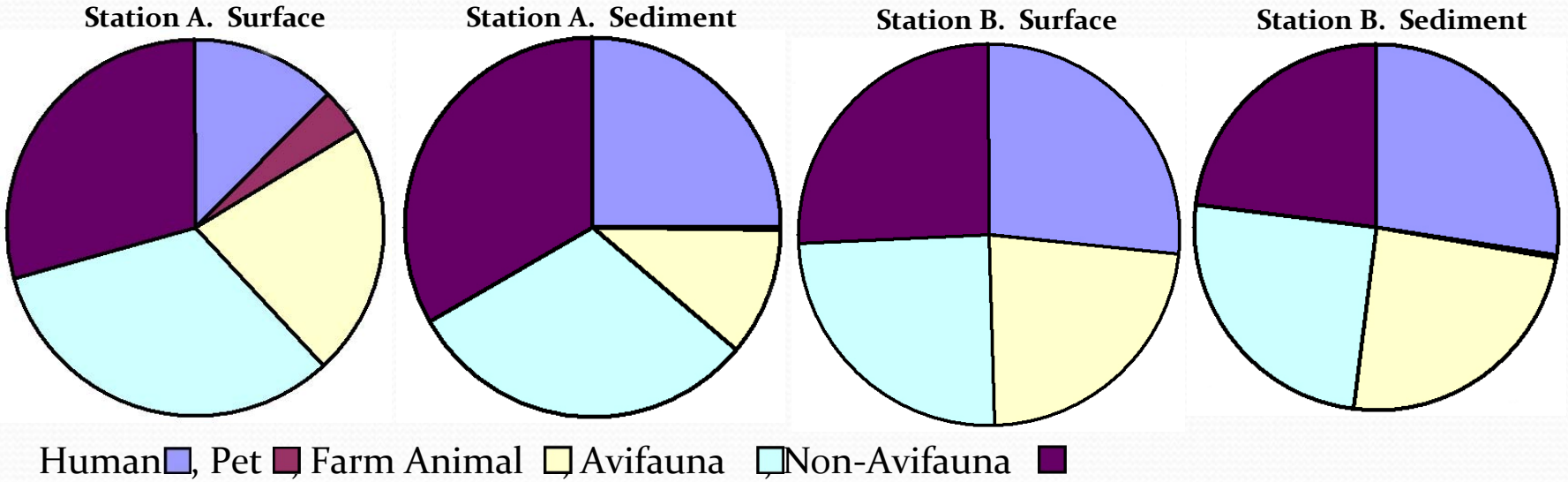


Figure 1. Cartoon illustrating the bacterial source tracking method. Antibiotic resistance (AR) profiles of E. coli (ovals) isolated from environmental sites (#1, #2, and #3) were compared to the AR profiles of E. coli isolated from the feces of targeted animals to determine their likely host of origin. Some AR profiles are unique to certain hosts (colors) while others (grey) are common to multiple hosts (assigned to more than one host group). Some E. coli from the environment have profiles (white) that do not match any in the "fecal source library" (their host origin is unknown).

Application of MST Results

Wreck Pond Pathogen Source Identification



- Source identification
- Best Management Practice recommendations

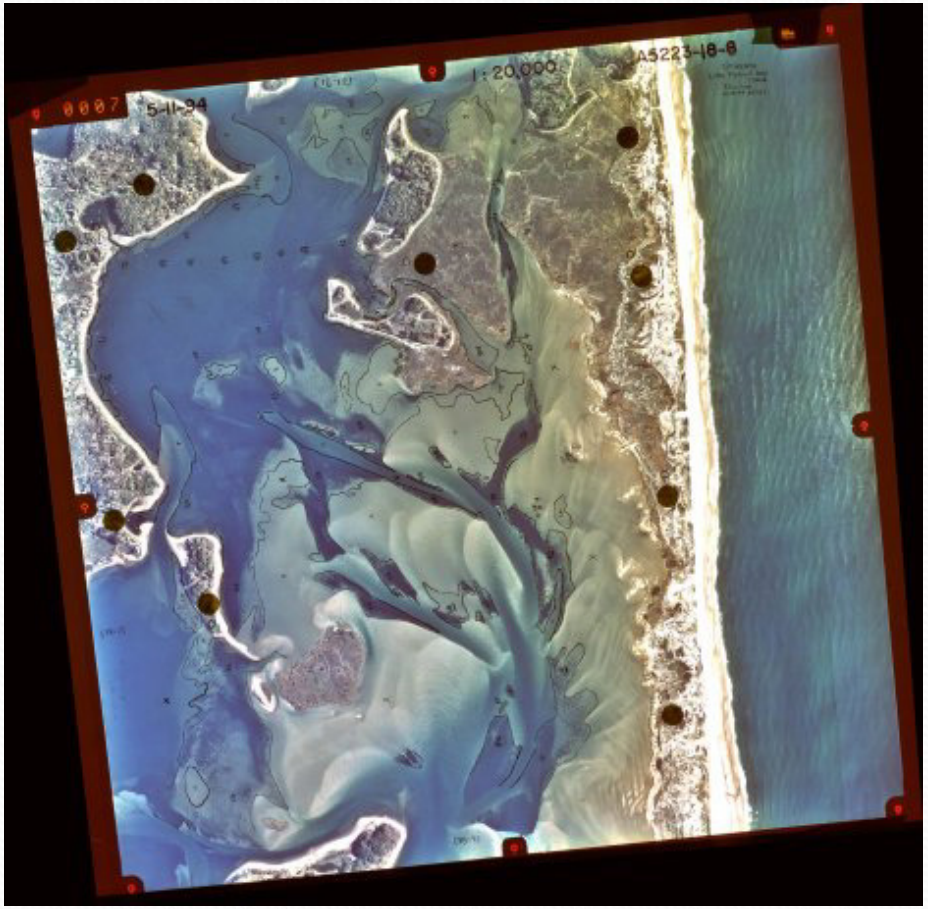
Coastal and Marine Conservation and Restoration: Watershed and Benthic Assessments

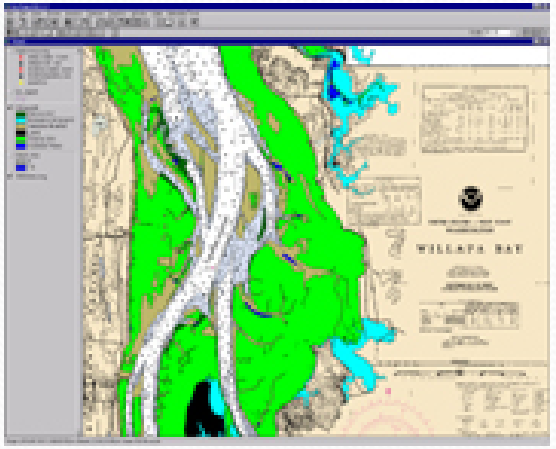
- Goals and Objectives: Provide federal, state and local agencies and organizations with information and tools necessary to identify priorities and develop and implement cost effective strategies to protect and restore critical areas in coastal watersheds
- Watersheds included:
  - Manasquan River Estuary
  - Shark River Estuary
  - Shrewsbury and Navesink River

Coastal and Marine Conservation and Restoration: Watershed and Benthic Assessments

- Benthic Assessments
  - Multibeam bathymetry
  - Sidescan sonar
  - Geolocated video grabs of substrate and biotic communities
  - Sediment grabs
  - Ambient and Real time water quality data

Coastal and Marine Conservation and Restoration: Watershed and Benthic Assessments





Coastal and Marine Conservation and Restoration: Watershed and Benthic Assessments

- Application of Results
  - Development of targeted restoration goals and objectives including benthic habitat restoration, submerged aquatic vegetation restoration, restoration of shoreline sites including living shorelines
  - Development of an inventory of sites suitable for conservation
  - Implementation of demonstration projects:
    - Shallow water benthic site
    - Shoreline site

Real Time Water Quality Monitoring in New Jersey Estuaries Using Data Loggers

- Currently operating a network of seven long-term, near real-time water quality monitoring stations in the northern estuaries of New Jersey (Funded by EPA and Fairleigh Dickinson, Jr. Foundation)
  - Navesink River, Oceanic Bridge
  - Shrewsbury River, Pleasure Bay Bridge
  - Shark River, Belmar Basin Marina
  - Manasquan River, Daymark 13 (East of Rt 70 Bridge)
  - Barnegat Bay, Mantoloking Yacht Club
  - Barnegat Bay, Seaside Park Yacht Club
  - To Be Added: Keyport Harbor and Long Beach Island, Rt 72
- Conducted in collaboration with the NJDEP Bureau of Marine Water Monitoring, Barnegat Bay Estuarine Program, Monmouth County Board of Health, local and regional watershed management groups and other partners
- Readings every 15 min.; data transmitted once per hour to Monmouth, NJDEP and retransmitted to Stevens Institute

Water Quality Monitoring in New Jersey Estuaries Using Data Loggers

Parameters to be Measured in Near-Real Time

PARAMETER	UNITS	PRECISION	ACCURACY
Dissolved Oxygen	% Saturation	0.1%	± 2%
Dissolved Oxygen	mg/L	0.01mg/L	0.2mg/L
Salinity	ppt	0.01ppt	0.1ppt
Temperature	ºC	0.01ºC	±0.15ºC
pH	unit	0.01units	±0.2units
Turbidity	NTU	0.1NTU	2 NTU
Chlorophyll	µg/L Chl	0.1µg/L Chl	-

Water Quality Monitoring in New Jersey Estuaries Using Data Loggers