NJDEP Monitoring and Research in the Barnegat Estuary Human and Ecological Health

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Water Monitoring & Standards

New Jersey Department of Environmental Protection

Barnegat Bay Stakeholder Meeting

May 5, 2010

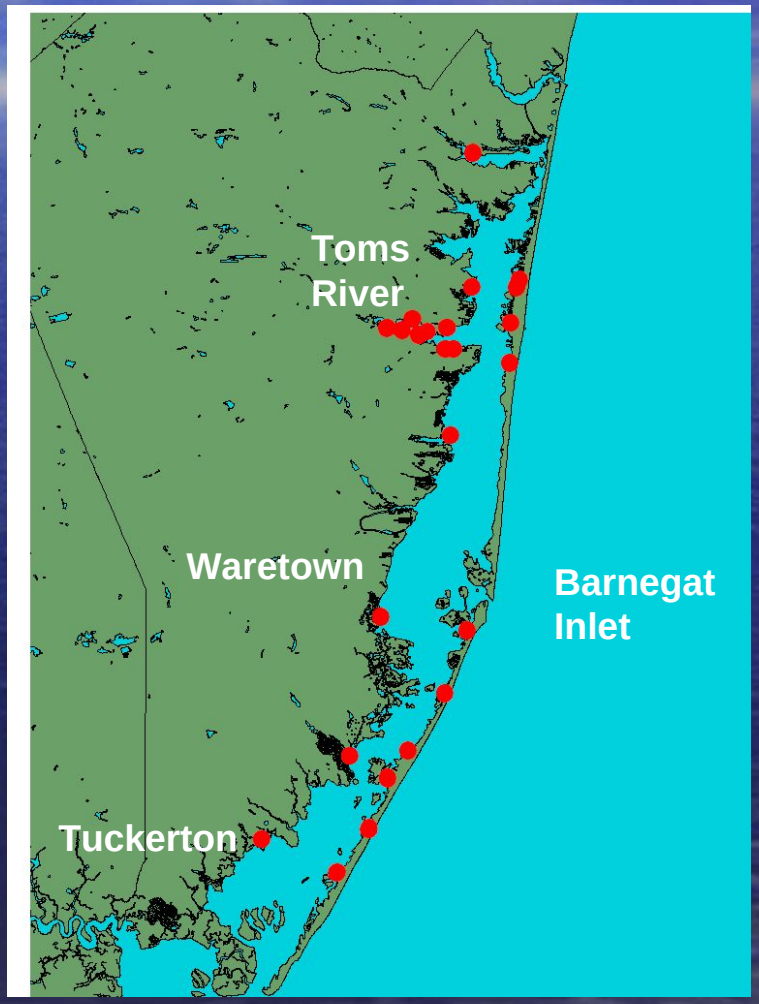
Collaborators on this Presentation

- Mike Celestino, NJDEP Division of Fish and Wildlife
- Thomas Belton, NJDEP Office of Science
- Jeffrey Hoffman, NJDEP – NJ Geological Survey
- Barbara Hirst, NJDEP – TMDL/319H programs
- Leslie McGeorge, Bob Schuster, Julie Nguyen, Tracy Fay, Helaine Liwacz – NJDEP Water Monitoring & Standards

Measuring the Sanitary Quality of the Estuary for Human Use - Recreation

- 24 Recreational Bathing Beaches
  - Monitoring for indicators of human waste
    - Fecal coliform
    - Enterococcus
  - Weekly summer testing
  - Cooperative program between NJDEP, county and local health officials

For more information:
http://www.nj.gov/dep/bmw/bathingbeach/bbindex.html

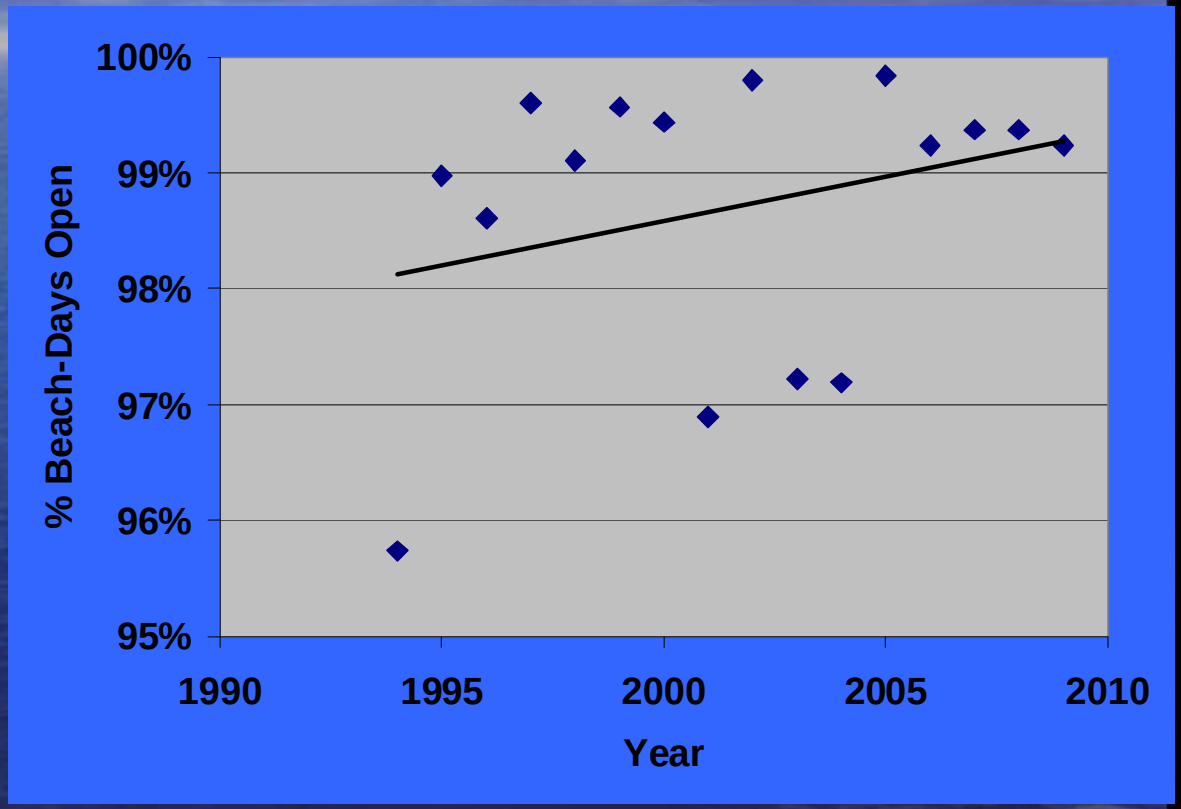


Recreational Bathing Beaches in the Barnegat Estuary

Measuring the Sanitary Quality of the Estuary for Human Use

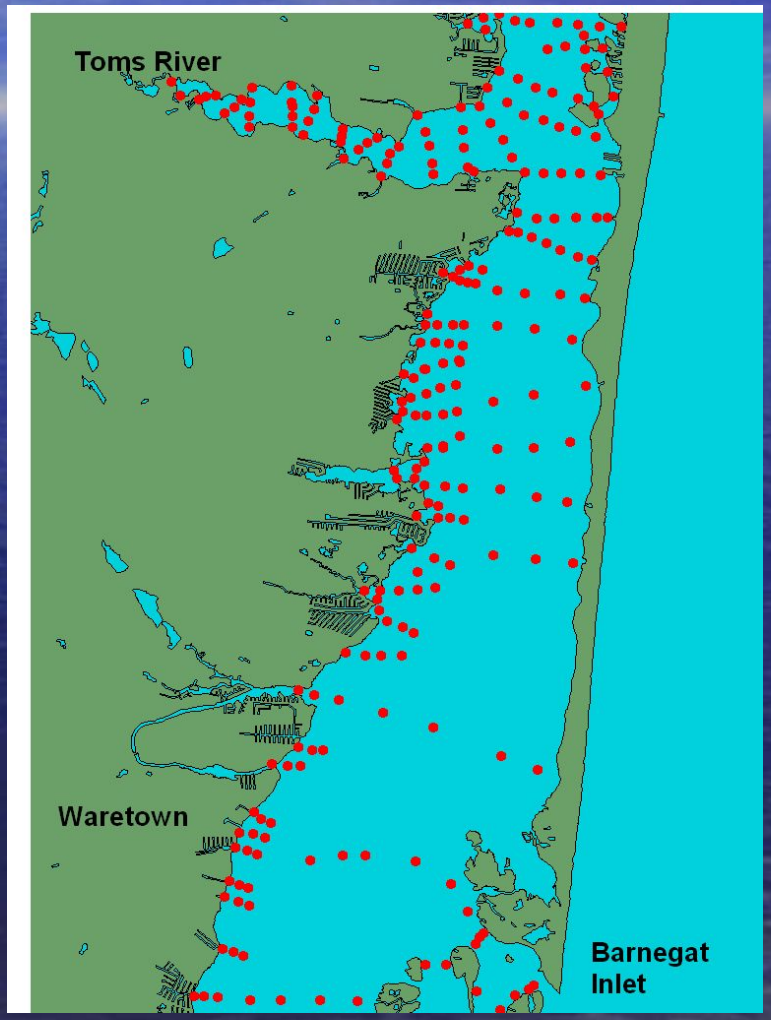
- Can we swim at beaches in the estuary?

  Yes. In 2009 monitored beaches in the Barnegat Estuary were open of 99.2% of the time. However, our goal is 100%. On average, this trend has been improving over the past 15 years.



Measuring the Sanitary Quality of the Estuary for Human Use – Shellfish Consumption

- Monitoring for indicators of human waste as per the NSSP*.
  - Total coliform
- 5-12x per year
- NJDEP, Water Monitoring & Standards



Shellfish Sanitation monitoring in a portion of the Barnegat Estuary

*NSSP = National Shellfish Sanitation Program

For further information:
http://www.nj.gov/dep/bmw/waterclass.htm

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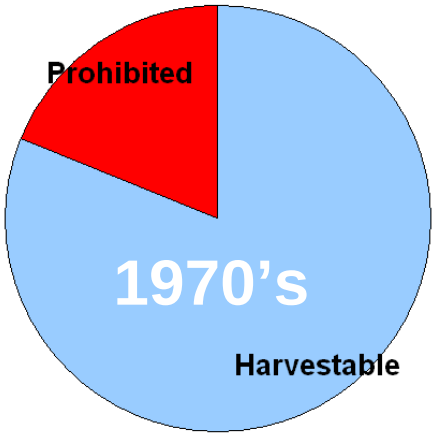
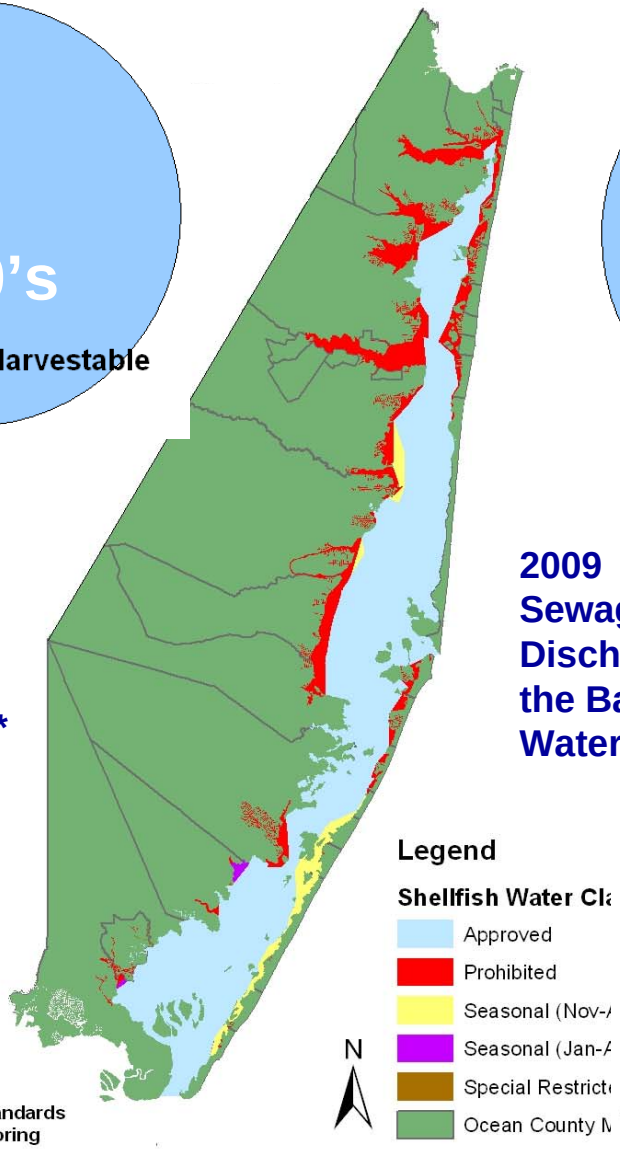
Measuring the Sanitary Quality of the Estuary for Human Use – Shellfish Consumption

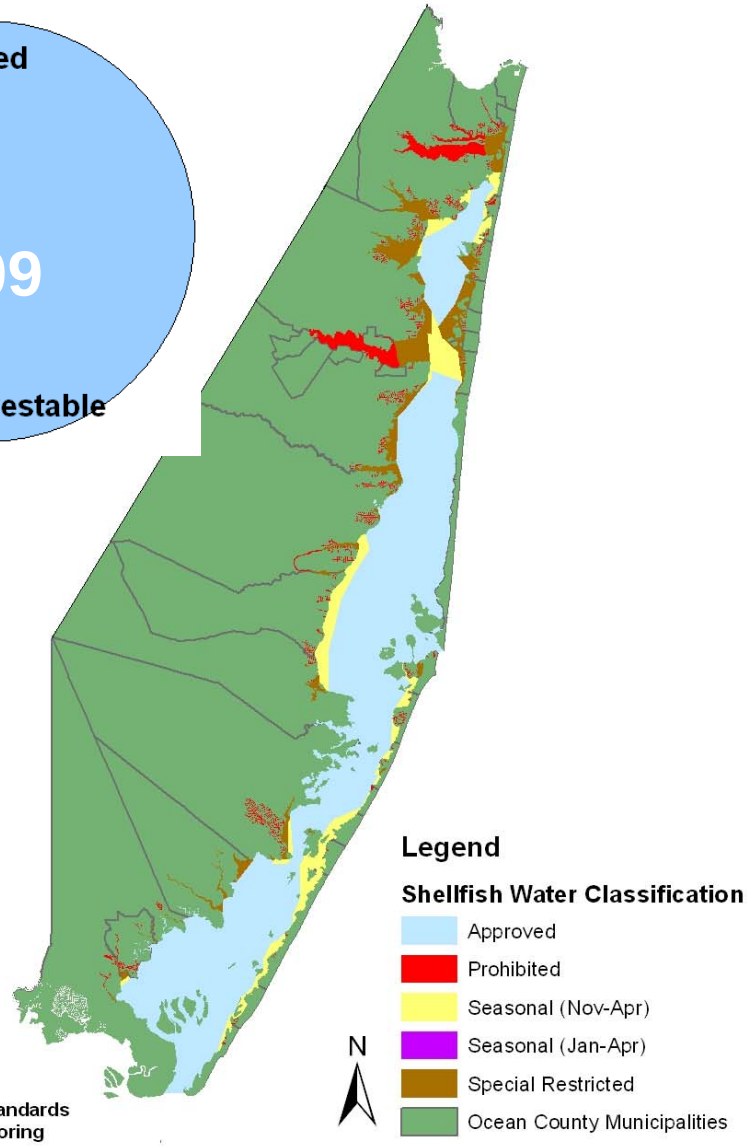


1970's Sewage Plant Discharges into the Barnegat Watershed = 45*

2009 Sewage Plant Discharges into the Barnegat Watershed = 0

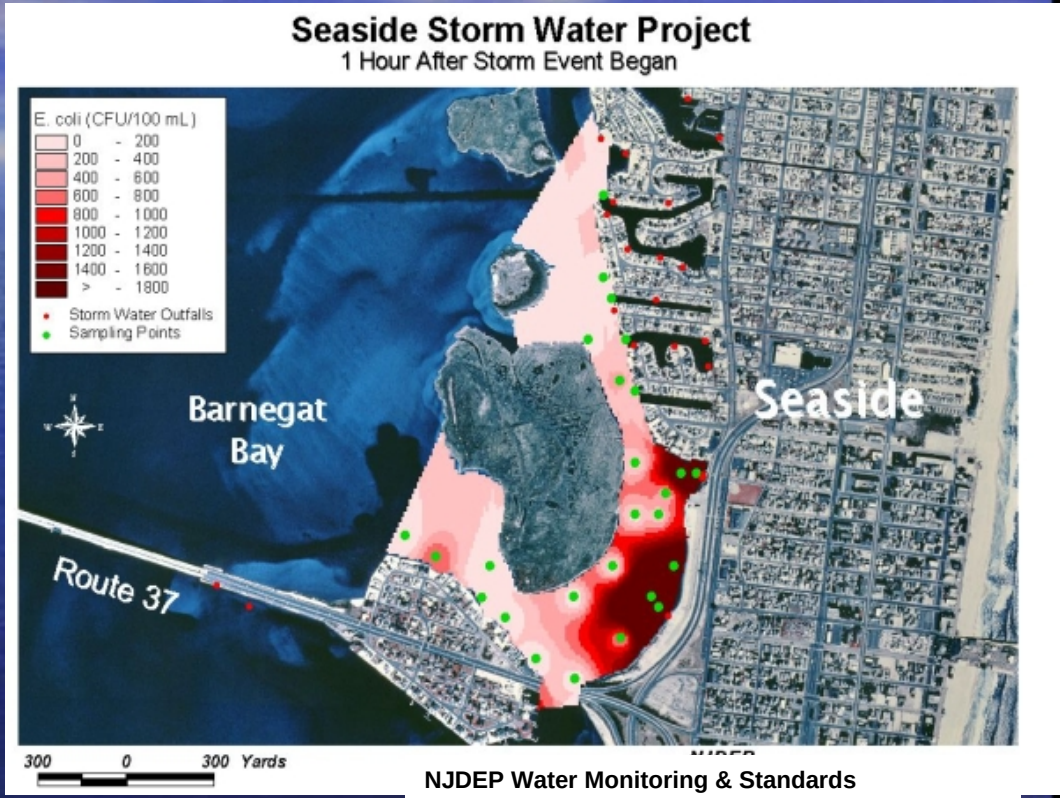
*Source: Ocean County Utilities Authority





Targeted Monitoring to Improve Human Health Protection

- Remaining impacts to the Barnegat Estuary are primarily related to stormwater
- DEP's Microbial Source Tracking includes:
  - Monitoring through storm events
  - Application of new, more specific indicators of human waste
    - F+ RNA coliphage
    - Antibiotic resistance
    - Optical brighteners



- Has successfully tracked down illicit wastewater handling (e.g. broken sewer lines)
- Limited municipal resources can be focused on the most significant problems.

For further information:
http://www.nj.gov/dep/bmw/info03.htm

Ecosystem Health – Sediment Quality

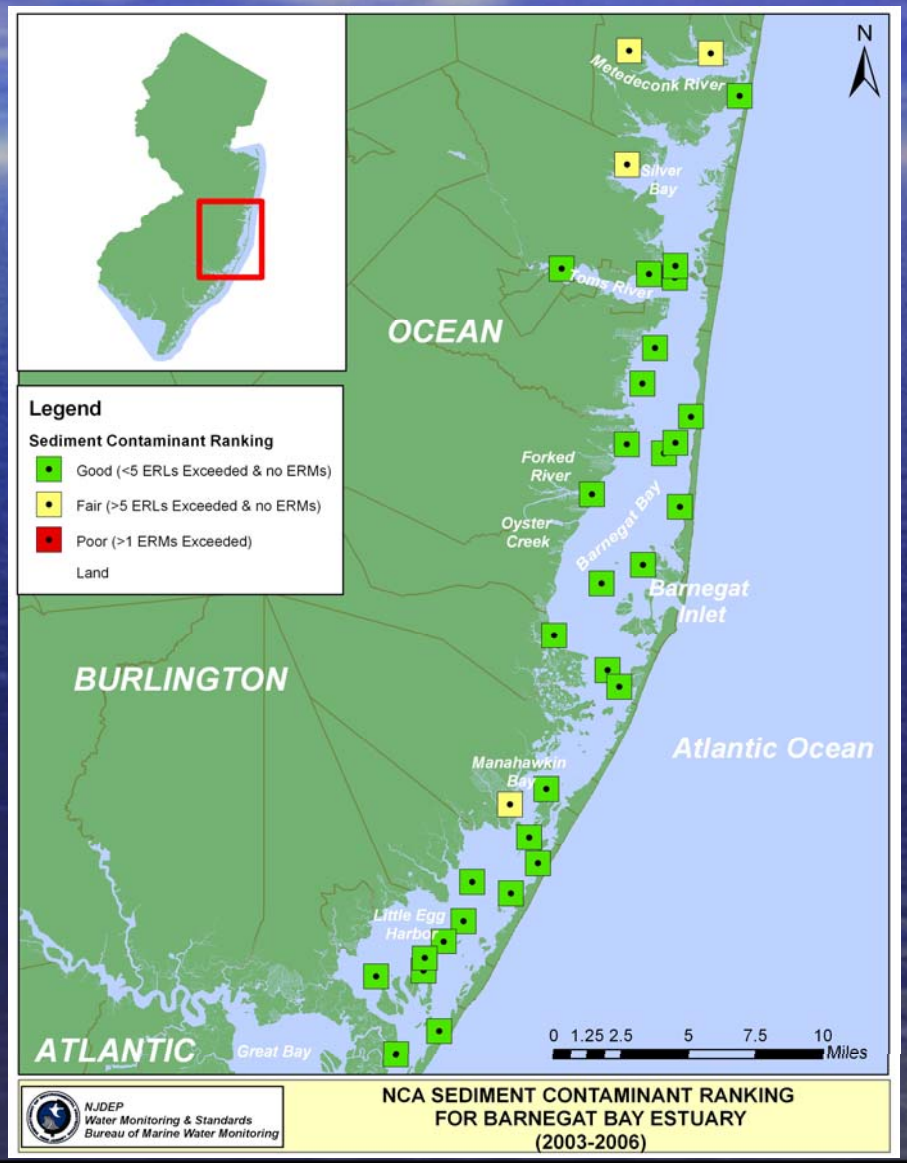
National Coastal Assessment Sediment Contaminants

National Coastal Assessment is a USEPA funded national aquatic survey to assess the health of the nation's estuaries

Sediment samples collected in the Barnegat Estuary by NJDEP as part of the National Coastal Assessment.

Results are assessed against NOAA's Effects Range Medium (ERM) and Effects Range Low (ERL) criteria.

For more information:
http://www.nj.gov/dep/bmw/NCA/NCAmain.htm



Ecosystem Health Research – Benthic Index

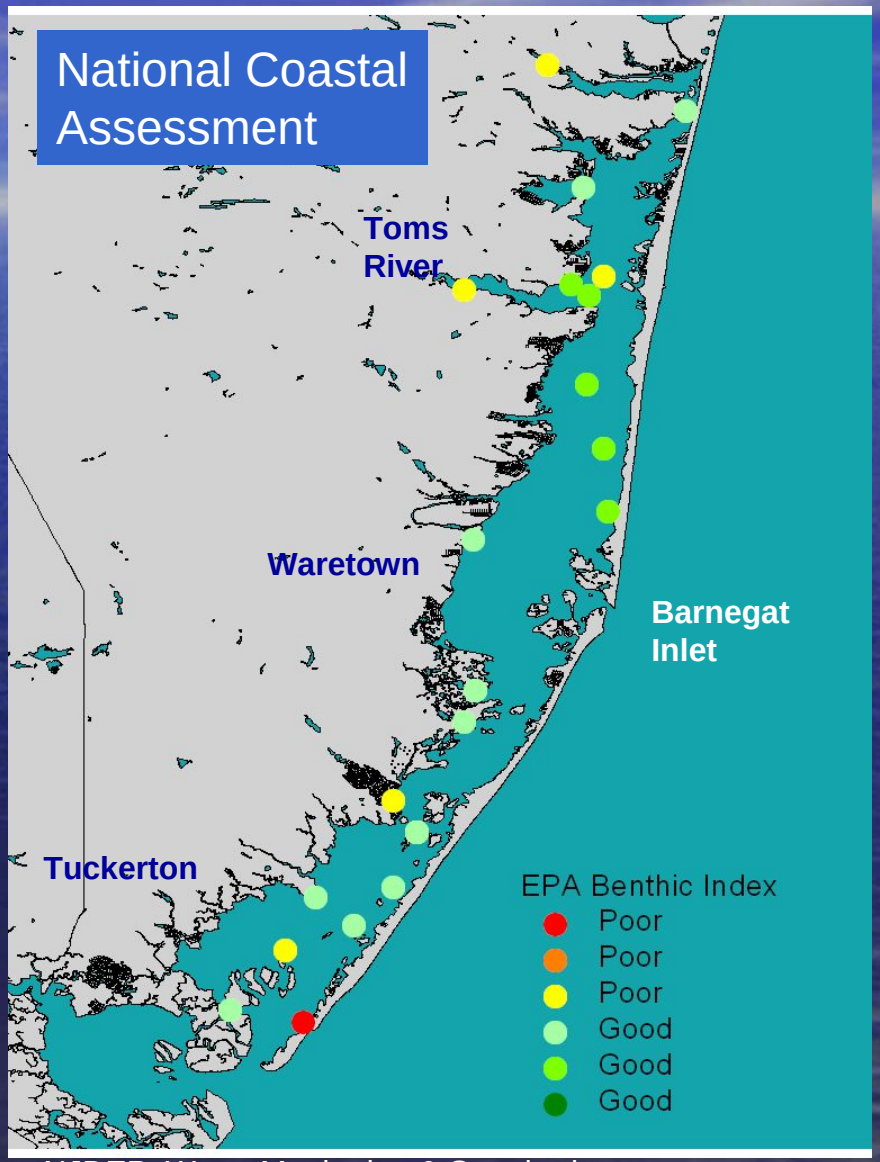
Regional Environmental Monitoring and Assessment Program (REMAP)

- **A benthic index looks at the diversity of organisms in the bottom of the bay. High diversity = good conditions; Low diversity = poor conditions.**

- **Benthic Index* shown to the right was developed for broad application nationally, but needs refinement before applying to management decisions locally.**

- **This USEPA funded research is a collaboration between USEPA ORD, USEPA Region 2, NJDEP Water Monitoring & Standards and Rutgers University.**

* Based on Paul, J. et al., 2001.



NJDEP, Water Monitoring & Standards

Ecosystem Health Research

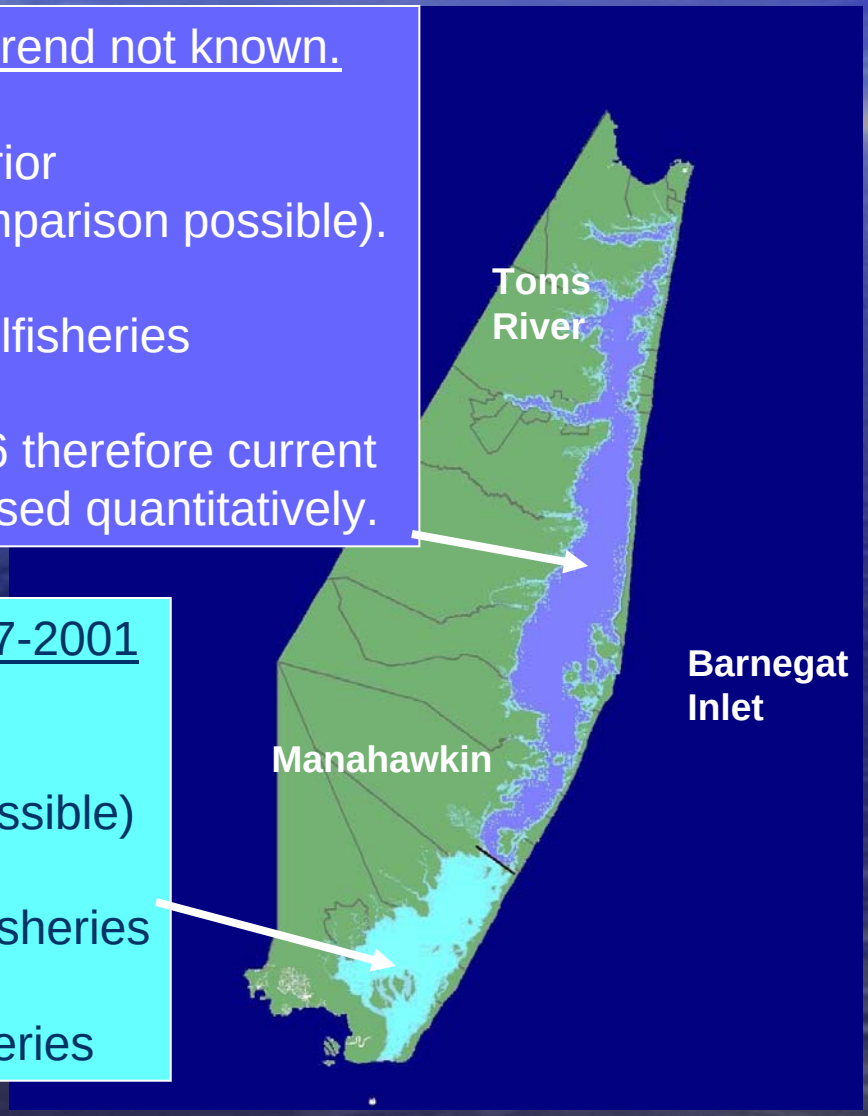
Hard Clam Population Surveys – NJDEP Division of Fish & Wildlife

Barnegat Bay: Current population trend not known.
Surveys:

- 1963: US Department of Interior
  (not repeated ∴ no comparison possible).
- 1985-86: NJDEP Bureau of Shellfisheries
- No funding for surveys since 1986 therefore current status and trend cannot be assessed quantitatively.

Little Egg Harbor: 68% decline 1987-2001
Surveys:

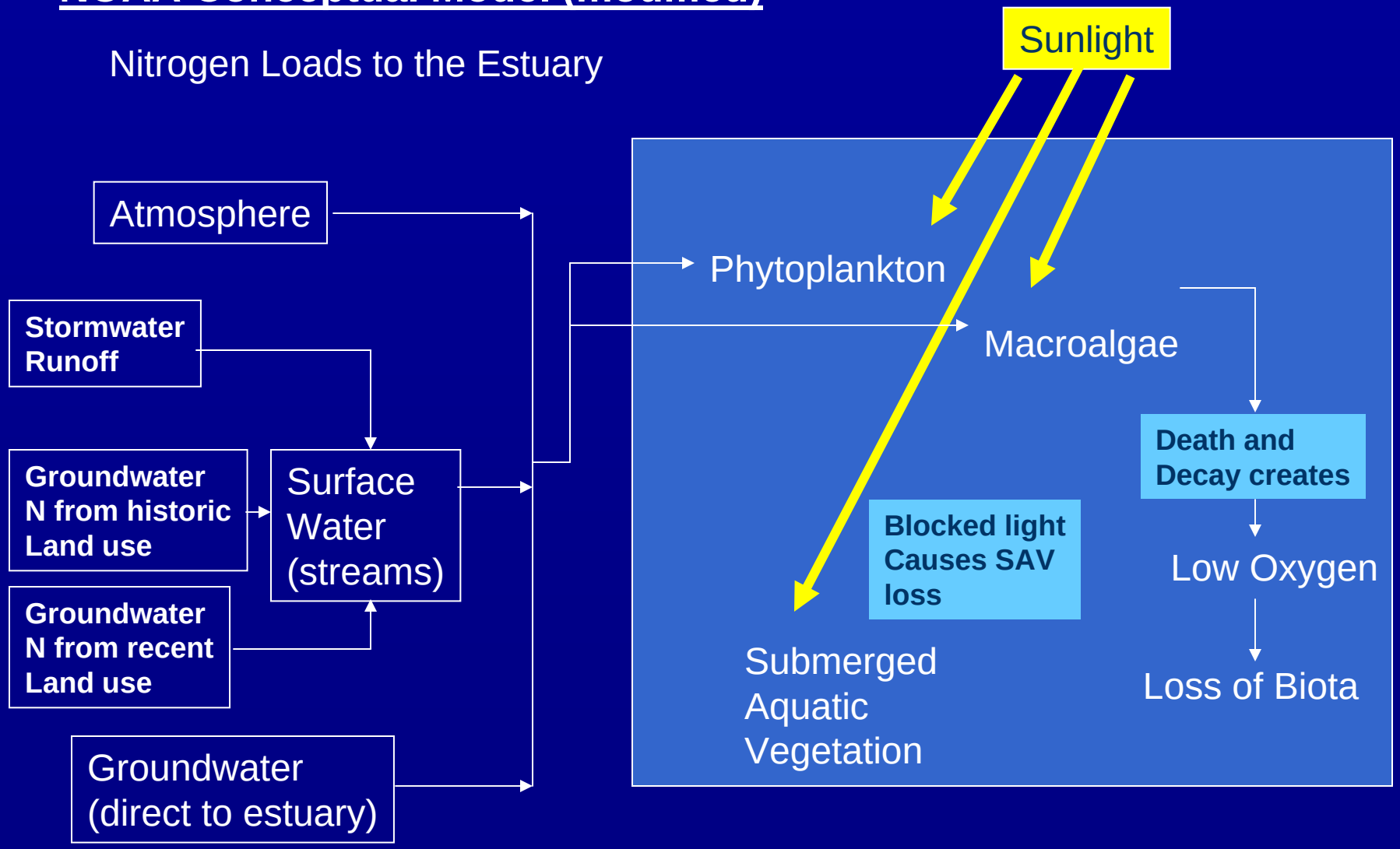
- 1963: US Department of Interior
  (not repeated ∴ no comparison possible)
- 1986-87: NJDEP Bureau of Shellfisheries
- 2001: NJDEP Bureau of Shellfisheries



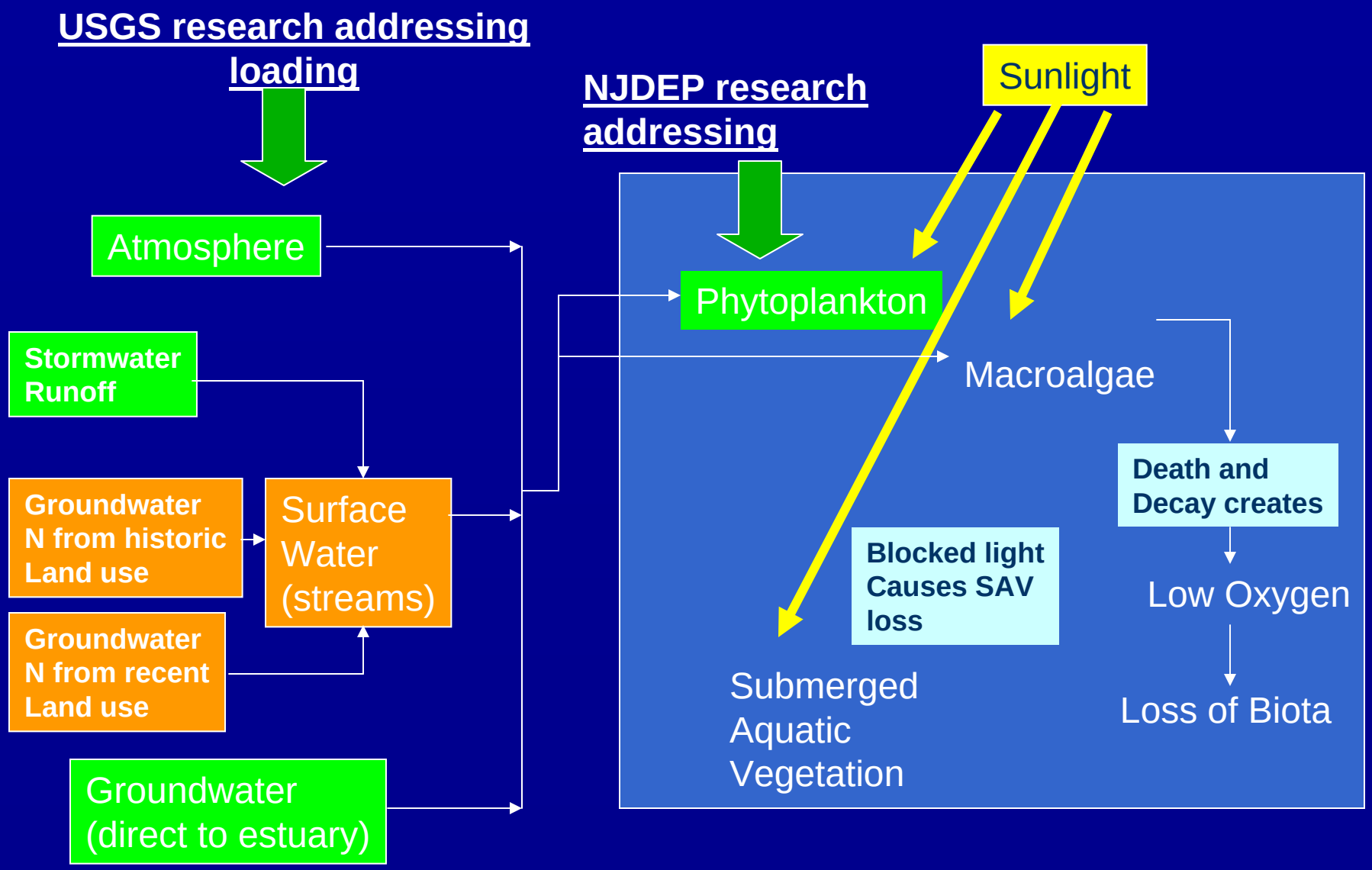
Eutrophication

NOAA Conceptual Model (modified)

Nitrogen Loads to the Estuary



Eutrophication – Barnegat Estuary



Eutrophication – Barnegat Estuary

Phytoplankton Levels

Chlorophyll measured quarterly by NJDEP Water Monitoring and Standards by traditional surface grab sampling since 1999.

Collaborative research by NJDEP, NOAA, NASA and Rutgers University lead to availability of near-daily remote sensing for chlorophyll during the summer months for bloom detection with much greater spatial coverage.

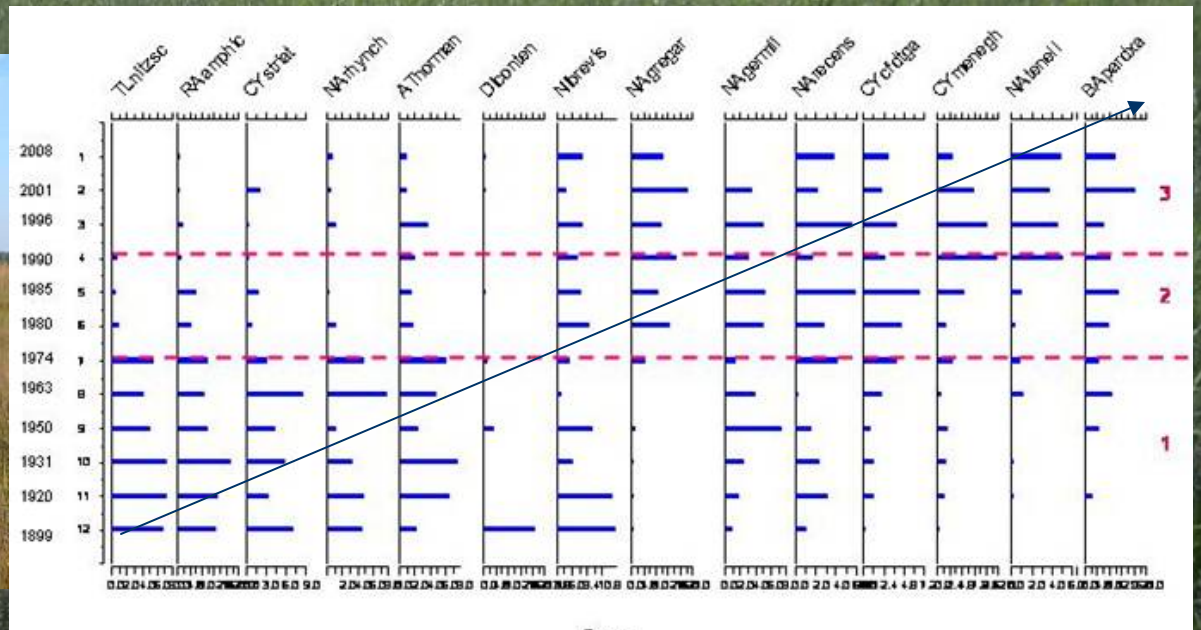
Location	# observations (Summer months 2008 & 2009)	Classification Scheme		
		EPA National Coastal Assessment	NOAA ASSETS	Maryland Inland Bays
Barnegat Bay	29,330	Low	Moderate	Low
Manahawkin Bay	2,794	Low	Low	Low
Little Egg Harbor	13,296	Low	Low	Low

For further information:
http://www.nj.gov/dep/bmw/remotesensing.htm
http://www.nj.gov/dep/bmw/phytoplankton.htm

Barnegat Bay Tidal Marsh Studies

How can environmental changes in Barnegat Bay be monitored over time and results used to manage the system? Needs tools to look back in time AND predict future responses! Salt Marshes, the perfect answer!

2009-2010 Marsh coring study of historical nutrient loads and algal responses (Patrick Center at ANS)



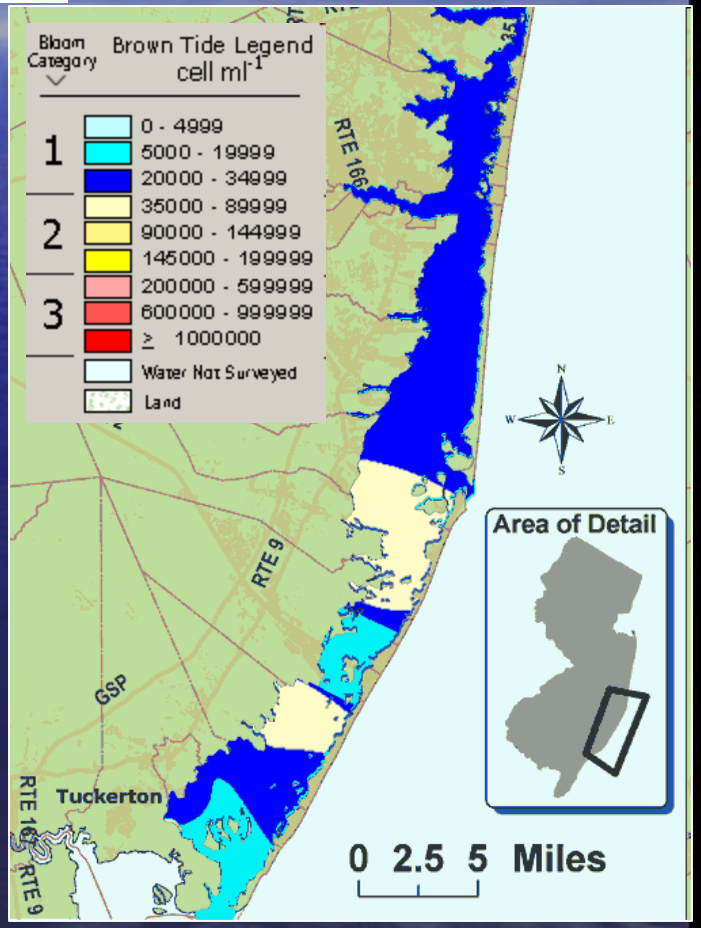
Eutrophication

Harmful Algal Blooms:
Brown Tide Assessment Project

- NJDEP Office of Science and Rutgers University
- Evaluated brown tide occurrence and influencing factors, 2000 – 2004.
- Found that the brown tide was favored by dry weather conditions.
- Significant brown tides did not occur in any month where the Toms River flow exceeded 200 ft^3 sec^{-1} .

Table 1. Annual mean and monthly maximum abundance (cells ml^{-1}) of *Aureococcus anophagefferens*, 2000-2004.

Year	Overall Mean (cells ml^{-1})	Monthly Maximum (cells ml^{-1}) [June of each year]
2000	190,500	2,155,000
2001	246,500	1,883,000
2002	281,900	1,561,000
2003	8,900	54,000
2004	15,700	49,000



For further information: http://www.state.nj.us/dep/dsr/browntide/bt.htm
http://www.crssa.rutgers.edu/projects/btide/index.html

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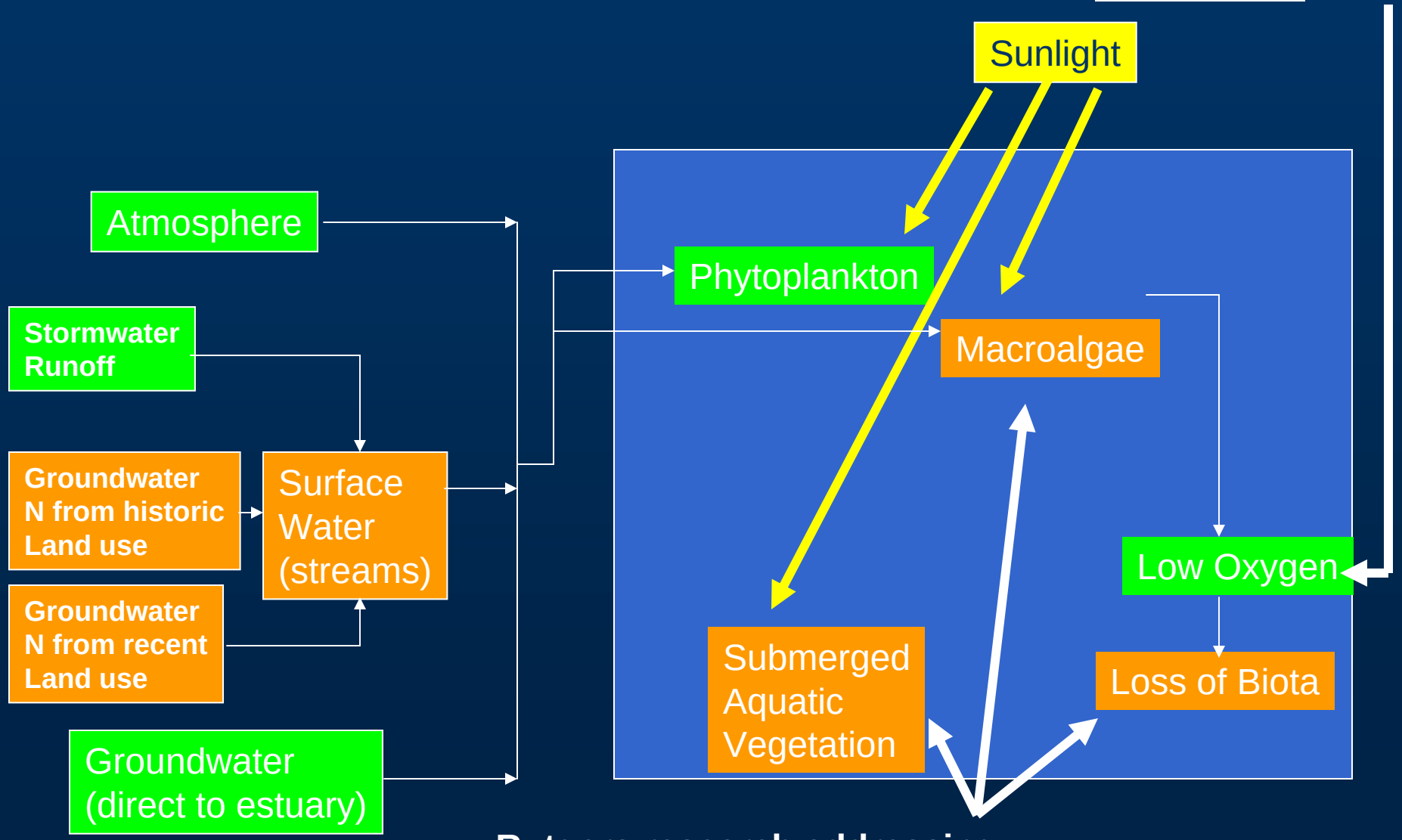
Eutrophication

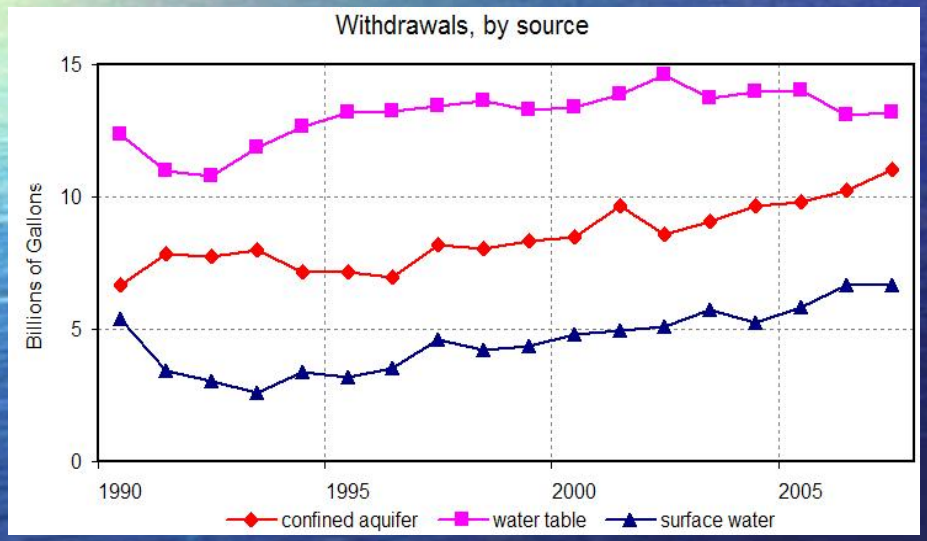
NJDEP, Monmouth Univ., BBEP

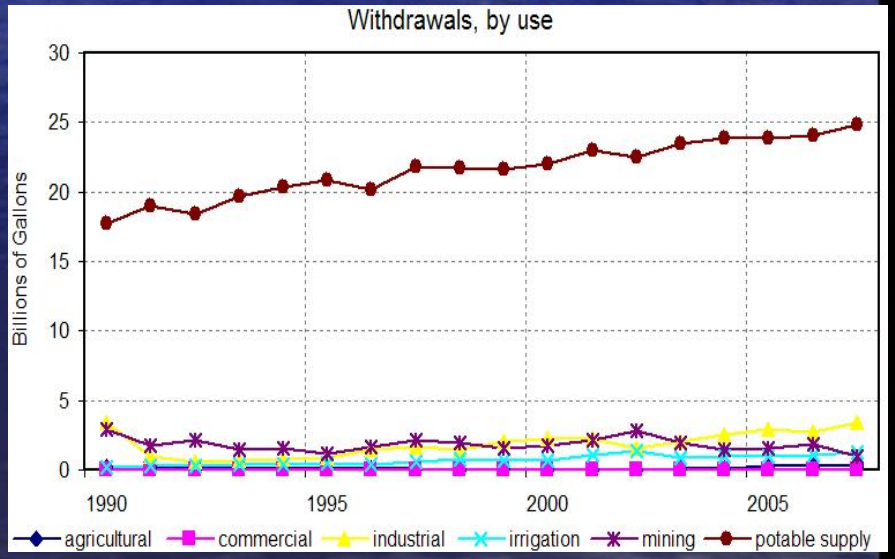


Rutgers research addressing

Water Supply & Geological Survey

- update of Water Supply Plan
- water withdrawals, use, and transfers

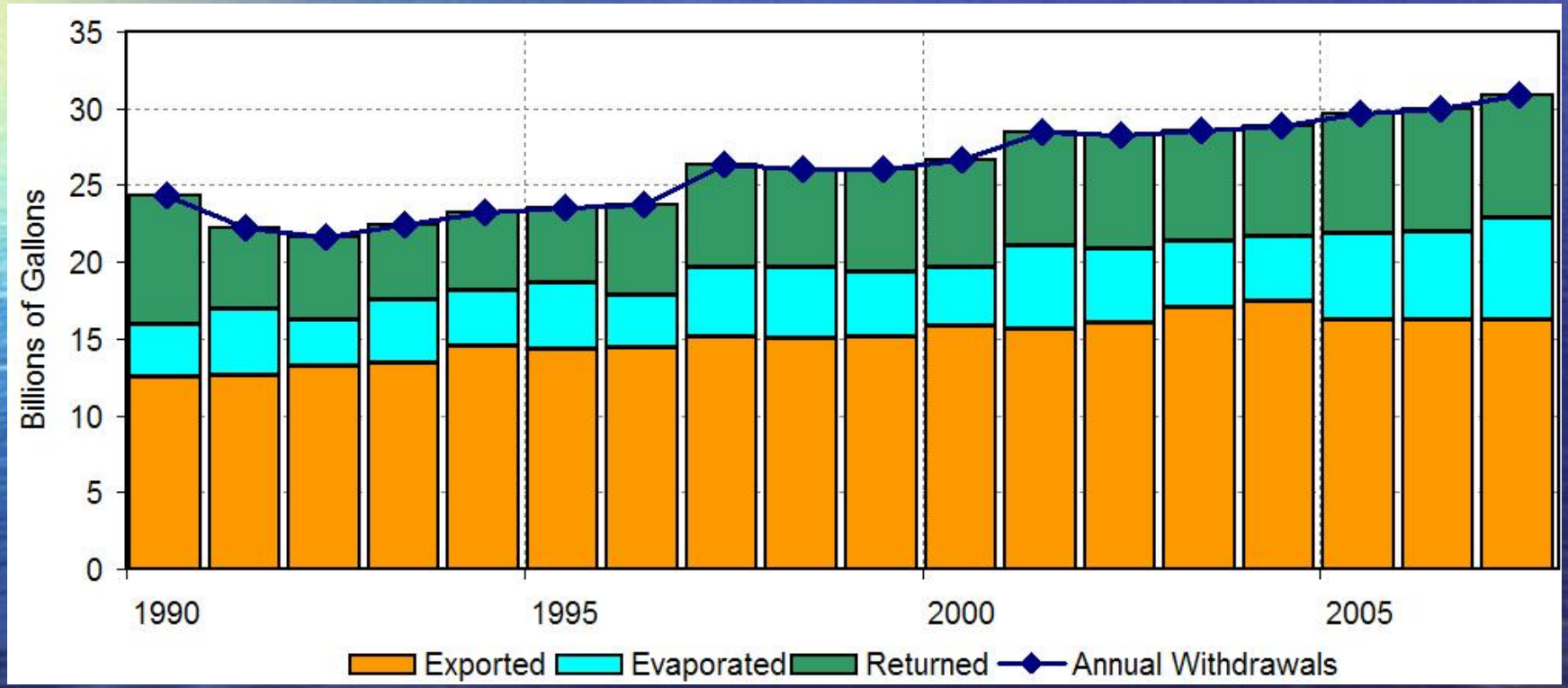




Where does the withdrawn water go after use?

Three destinations:

1) Exported from the watershed for treatment and discharge.
2) Evaporated during use.
3) Returned to the watershed after use.



Net water loss is sum of evaporated and exported.

2010-2011 USEPA Grants (pending) to Barnegat Bay Partnership and NJDEP to establish tidal wetlands reference network in New Jersey

What are the ecological values of tidal wetlands? (Need methods)
Structural: habitat for fish and wildlife; nursery for fish and wildlife.
Functional: base of food web; water quality filter; flood protection.

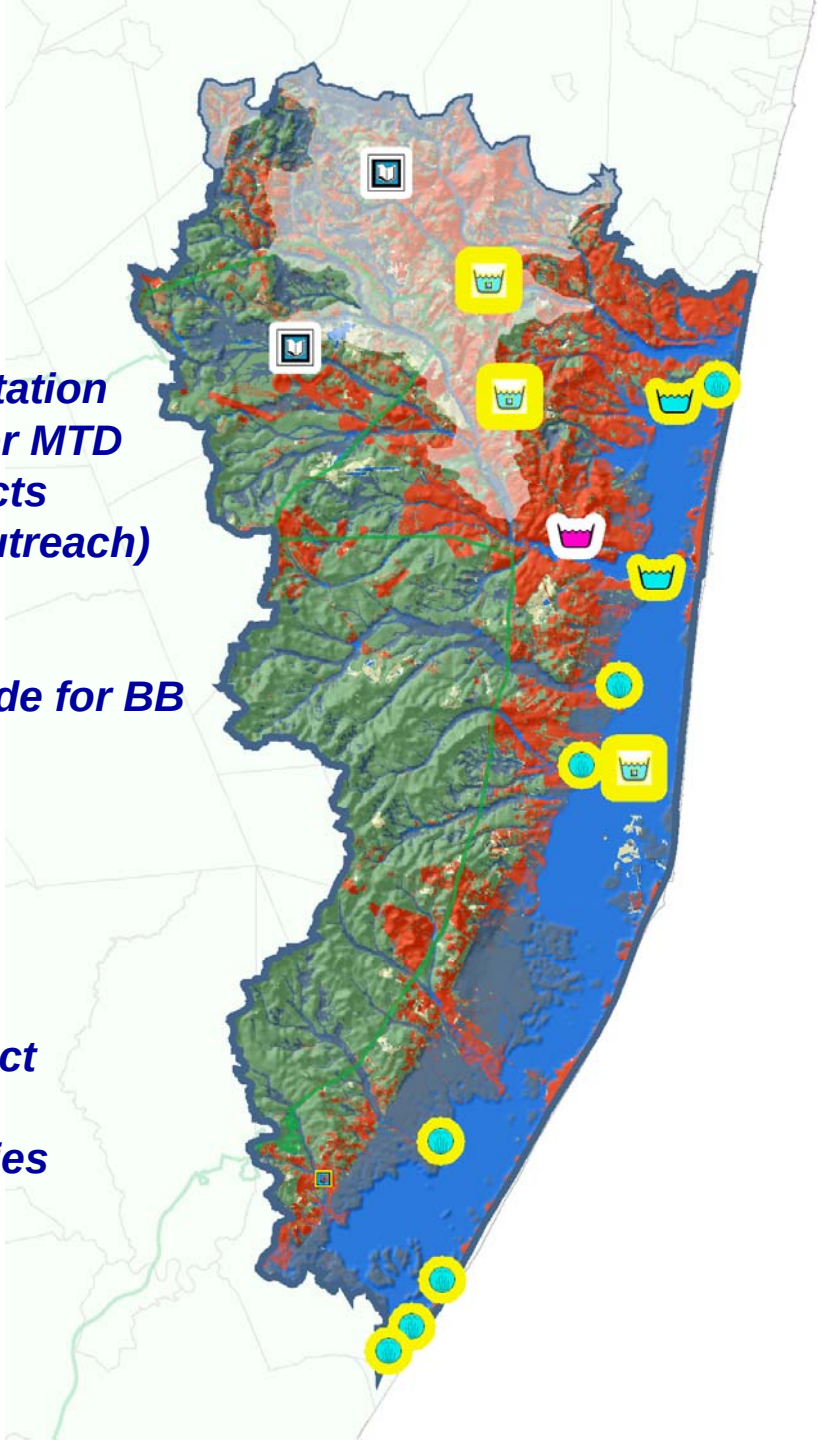
Project Tasks:

- Establish a network of monitoring stations over a range of marsh types, conditions and stressors in both Barnegat and Delaware Bays
- Conduct intensive geomorphology, biota and water quality monitoring as a baseline for future planning and management
- Provide protocols for routine monitoring/assessment by NJDEP
- Provide important information for marsh preservation/restoration and climate adaptation (sea level rise and carbon sequestration)

Contact: Thomas Belton, NJDEP Office of Science (thomas.belton@dep.state.nj.us)

General Location of Restoration Activities

Montclair State Univ. Submerged Aquatic Vegetation
Ocean County Planning Department Stormwater MTD
OCSCD Shoreline/Roadside Stabilization Projects
OCSCD Specific Activity Guide (Educational Outreach)
Lake Carasaljo Feasibility Study
OCSCD Stewardship of Soil Health
RU/OCSCD Low Maintenance Landscaping Guide for BB
Baywood Marina Stormwater BMP's
OCSCD District Shoreline Stabilization
OCPD Stormwater Basin Retrofits
Lake Pohatcong Feasibility Study
Long Swamp Creek(LSC) Restoration Plan
OCSCD LSC Subwatershed Action Project
Bey Lea Golf Course BMP Demonstration Project
OCVTS Wetland Enhancement Project
NJ Clean Vessel Act Program Pump Out Facilities



Additional Planning, Implementation and Research Projects Funded in Response to the NJDEP Action Plan

When	Who	What	Funding	
			Amount	Source
6/2009	*Metedeconk WRPP and Implementation Project with Brick MUA*	*Address TMDLs, identify, prioritize and implement highest priority stormwater BMP's projects throughout the entire watershed*	*$666,000 $475K for implementation*	*CBT*
9/2009	*Ocean County Planning Department*	*Stormwater BMP's & Retrofit Projects focused in the upper portions of the estuary*	*$371,482*	*319(h)*
9/2009	*Ocean County Soil Conservation District*	*Completed two additional Stormwater Basin Retrofits in the Fall of 2009 Under the Long Swamp Creek Subwatershed Action Projects grant*	*$256,150*	*CBT*
11/2009	*Ocean County Planning*	*5th Pump Out Boat to service central portions of Barnegat Bay and Enhance No Discharge Area - Anticipated Operation Summer 2010*	*$65,000*	*NJ Clean Vessel Act*
6/2010	*Ocean County College*	*Assess the condition of coastal wetlands where wetlands may play a critical role in maintaining water quality by functioning as non-point source capture and potential treatment zones (coordinated with tidal marsh coring and wetlands assessment projects.*	*$150,000*	*319(h)*

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