



# Developing Water Monitoring Consortium to Support NJ's Barnegat Bay Action Plan

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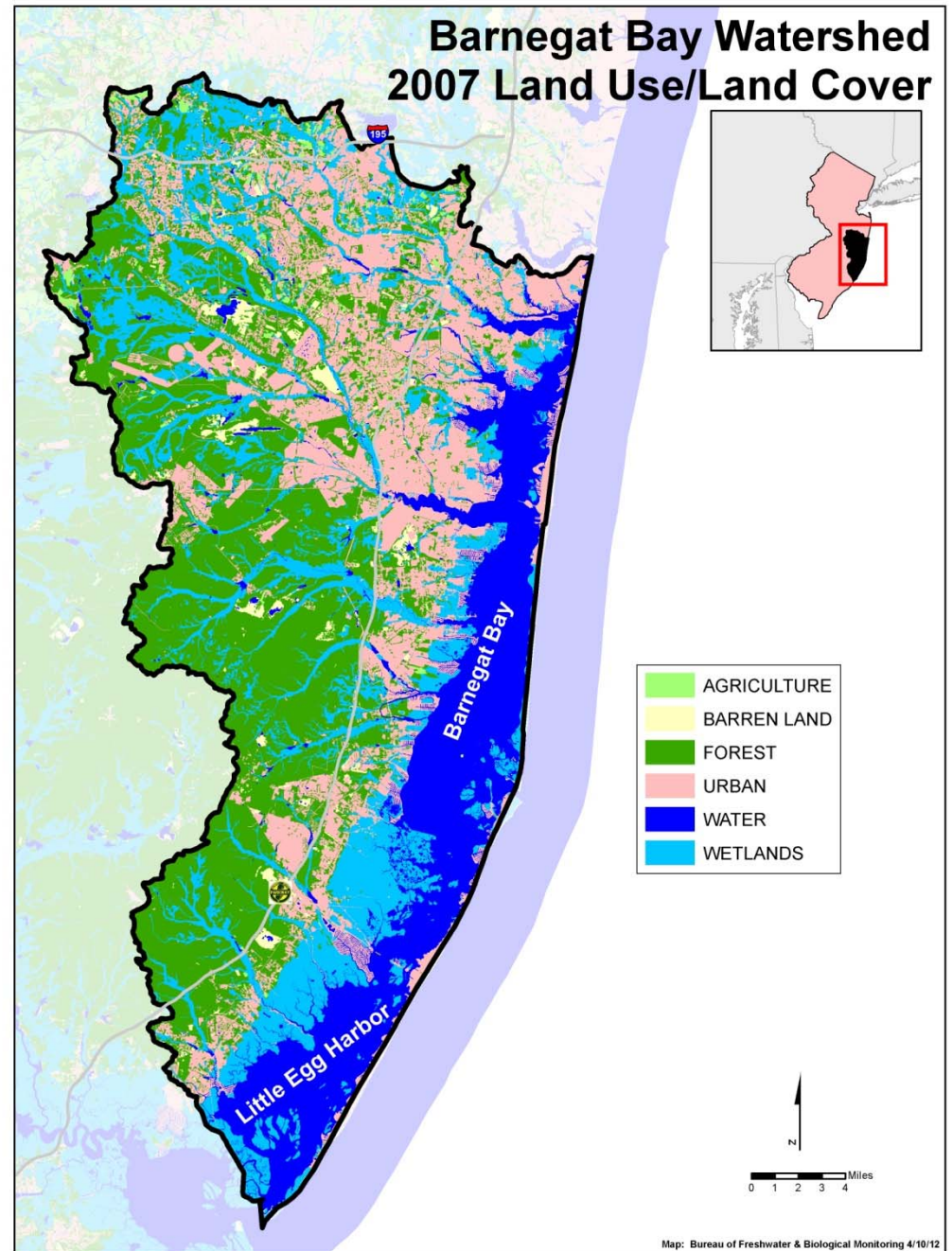
National Water Monitoring Conference  
Session O1 – Strengthening Monitoring Programs  
Through Non-Profit/Government Collaboration

May 4, 2012



# Overview

- Barnegat Bay Ecological Concerns
- Governor's Action Plan
- Monitoring Objectives & Design
- Partnership Development
- Preliminary Results



# Barnegat Bay Stressors and Ecological Concerns

Stressors include:

- Rapid population increase, LU/LC Changes, intensive boating uses, nuclear facility cooling water discharge, nutrient & other pollutant loadings

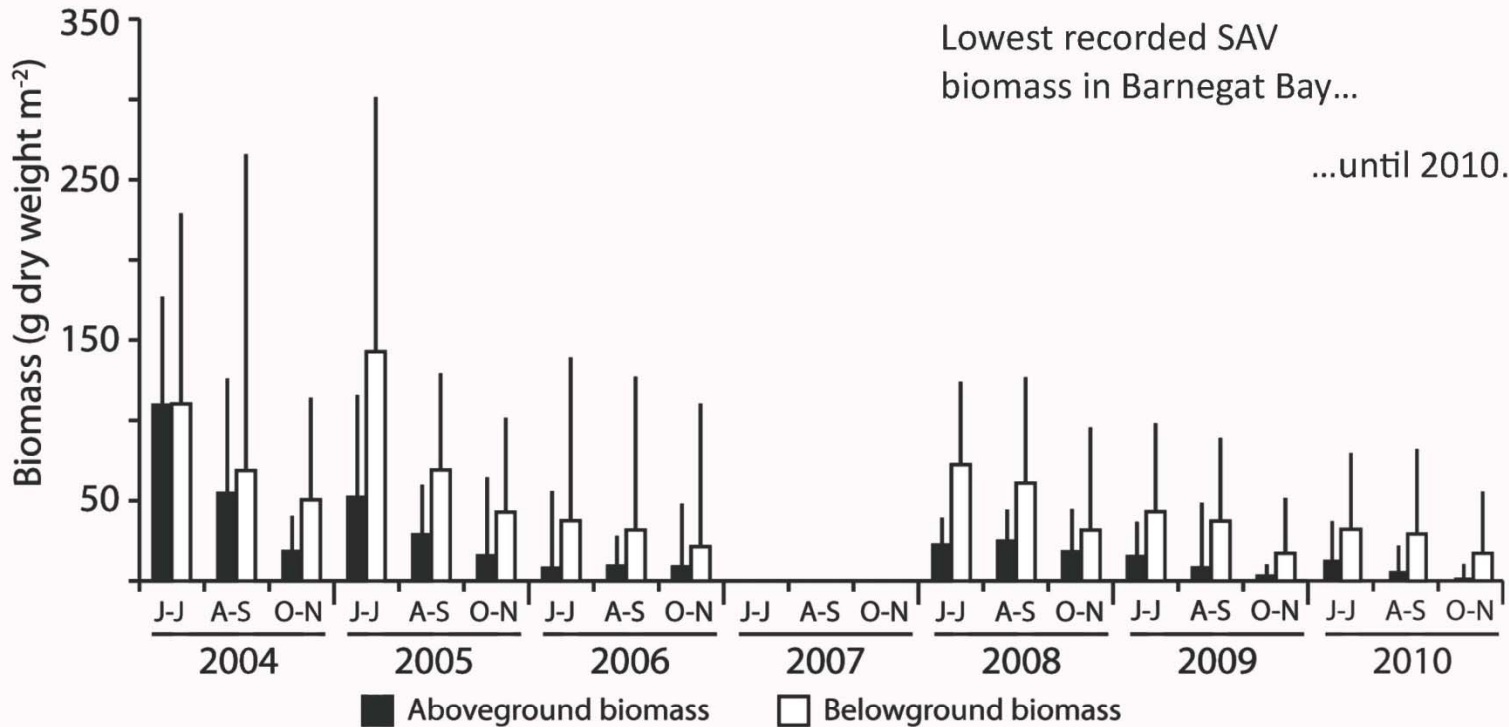
Ecological concerns include:

- Loss of SAV
- Occurrences of macroalgae & brown tide
- Declining hard clams
- Increasing stinging nettle populations
- Water quality concerns, including DO



## Submerged Aquatic Vegetation (SAV) Decline

### *BIOMASS DECLINED WITHIN AND ACROSS YEARS*



**R Institute of Marine & Coastal Sciences**

Kennish, Fertig & Sakowicz, 2011



NJDEP Water Monitoring and Standards

# Governor's Action Plan for Barnegat Bay - December 9, 2010 *(to address ecological health of bay)*

1. Close Oyster Creek Nuclear Facility Early
2. Fund Stormwater Mitigation Projects
3. Reduce Nutrient Pollution from Fertilizers
4. Require Post-Construction Soil Restoration
5. Acquire Land in the Watershed
6. Est. Special Area Management Plan
7. **Adopt More Rigorous Water Quality Standards**

## **Monitoring Consortium & Model Development**

8. Educate the Public
9. Fill Research Gaps – 10 projects developed  
e.g. benthic macroinvertebrates, hard clam pops
10. Reduce Water Craft Impacts



# Barnegat Bay Water Quality Monitoring Program: Objectives

- Determine type and extent of water quality **impairments**
- Develop **models** for use in directing water quality **restoration** or TMDL development
- Based on pollutant load responses, identify water quality or loading **targets for nutrients** or other pollutants



# Monitoring Design

## Phase 1 (6/11-3/12)

- 13 Trib stations & 14 Bay stations
- Grab water quality sampling (~ biweekly)
- Flow monitoring – trib (manual & gages) & bay
- Trib benthic macroinvert. monitoring

## Phase 2 Changes (3/12-2013)

- Increased sampling frequency (weekly)
- 2 intensive (4 day) sampling events
- Continuous monitoring - 1 trib & 7 bay stations
- Sediment quality
- Bathymetric bay survey



# WE NEED HELP!

- Monitoring & sample prep exceeds DEP capacity
- Simultaneous sampling - trib & bay sites
- First 6 months:
  - ~7500 field measurements
  - ~ 10,000 Bottles for 4 labs
  - > 100 Flow measurements

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## Field & Laboratory Parameters include:

Temp, DO, DO Sat, pH, Specific Conductance, Turbidity, Transmissionmetry, Salinity, Secchi Depth, TSS, Chlorophyll a, BOD5, CBOD5, CBOD20, Dissolved and Total Nutrients, Alkalinity, Silica, TOC, DOC





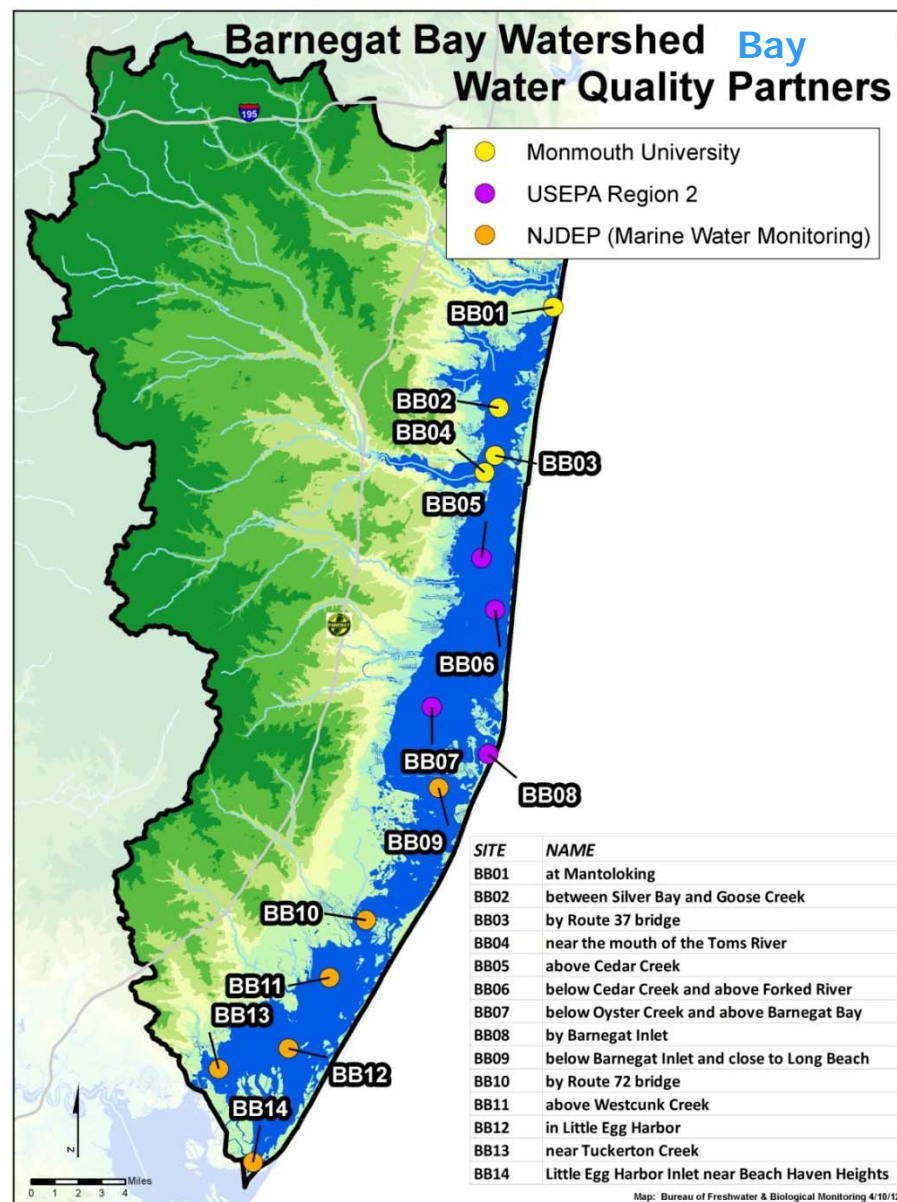
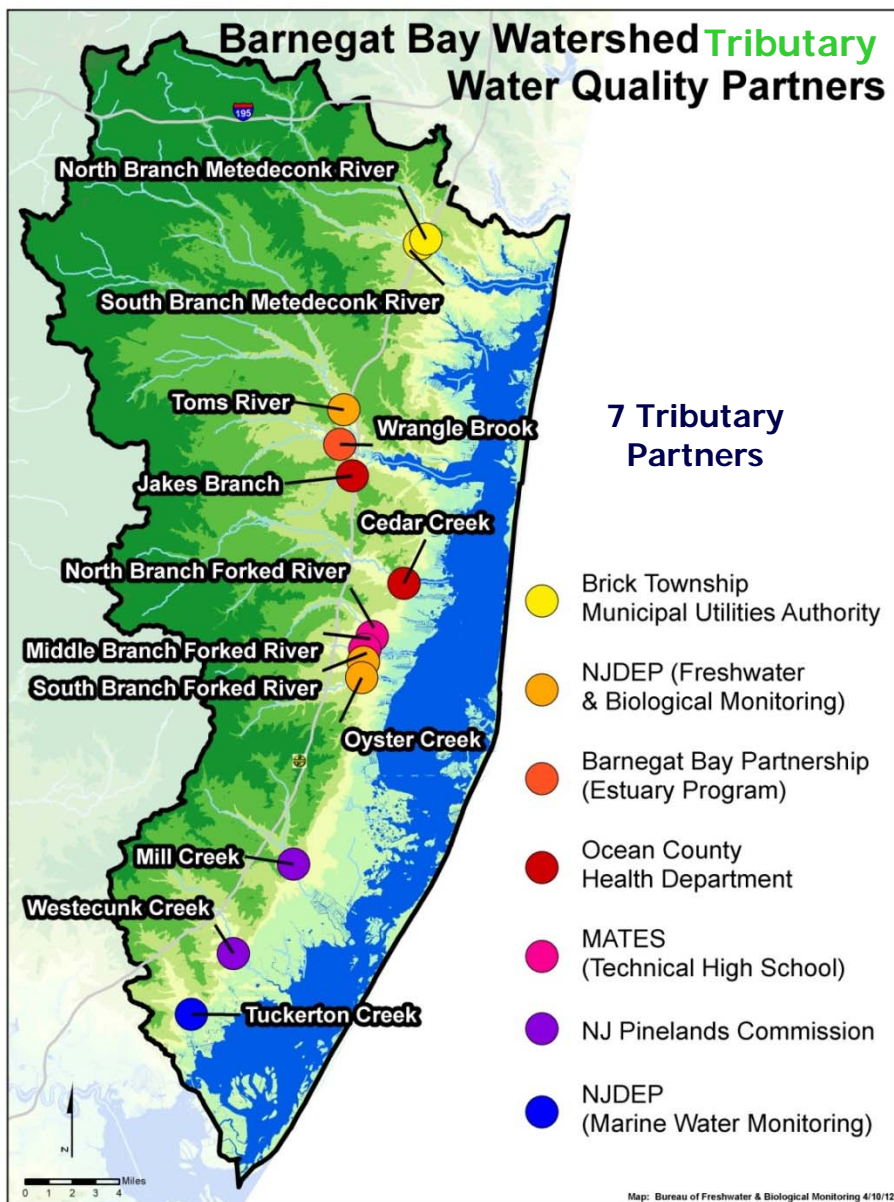
# Partnership Development



- How find interested & willing partners?
- Start w/ **NJ Water Monitoring Council**
  - USGS, EPA, Water Utility, Planning Commission, University, Estuary Program
- Meet w/ entities - ask what they can do?
- Add monitoring & lab partners
  - County Health Dept, Local Technical High School & Sewage Utility, University, & Health Dept
- Find partners in our own agency
  - QA Office, Forestry Center facility, AmeriCorps
- Retask existing partner work - e.g. USGS flow work
- **Now have 13 partners!**



# 7 Tributary and 3 Bay Monitoring Partners



# Our Dedicated Partners !!!



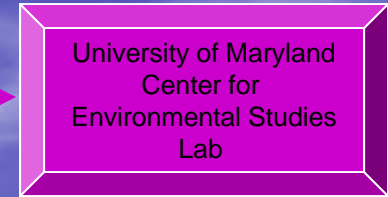
# Partnership Development

- **Monitoring Agreements** – written agreements with each entity specifying project commitments
- **Comprehensive Quality Assurance Plan**
  - Referred to in all Partner Agreements
  - Assure data of known quality & comparability of results
  - Includes:
    - Station locations/dates/ times
    - Sample preparation – preservation & filtering in 2 labs
    - Parameters, analytical & field methods
    - Data quality requirements/ review
    - Sample routing
    - Chain of custody forms

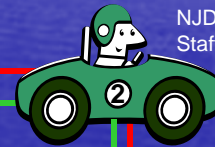
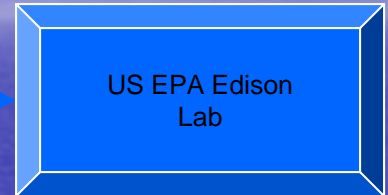


# Complex Sample Collection & Transport Logistics

NJDEP Trenton



- Partners:**
- NJDEP Bureau of Marine Water Monitoring
  - USEPA Region 2
  - Monmouth University



- Partners:**
- NJDEP Bureau of Freshwater & Biological Monitoring
  - NJ Pinelands Commission
  - OCVTS MATES
  - Ocean County Health Department
  - Brick Twp MUA
  - Barnegat Bay Partnership



- █ Saltwater Carbon
- █ Freshwater Carbon, Silica, Alkalinity
- █ BOD, CBOD
- █ Nutrients, TSS, Chlorophyll a
- █ Turbidity



# Partnership Development

- **Training & QA Approval**- Partner meetings on project design, sample collection, equipment calibration, and QA Office approval for field measurements ( DO, SC, T)
- **Partner Communication** – 1 point agency contact overall project, 1 field contact for tribes and 1 for bay, frequent emails
- **Data access** – Website w/ Interactive map



## Lessons Learned So Far

- Don't be afraid to ask for participation
- Importance of QAPP and QA approval for field measurements
- Communicate, communicate, communicate
- Anticipate data gaps
- Accommodate partners scheduling needs & have backup staff to fill in
- Recognize partner resource limitations, be flexible & have backup plans
- **Expect the unexpected ! →**



# Partners in Action





# Example Phase 1 Results: June – December 2011

## Tributaries

- Ecological Health
- Flow
- Concentrations
- Loadings

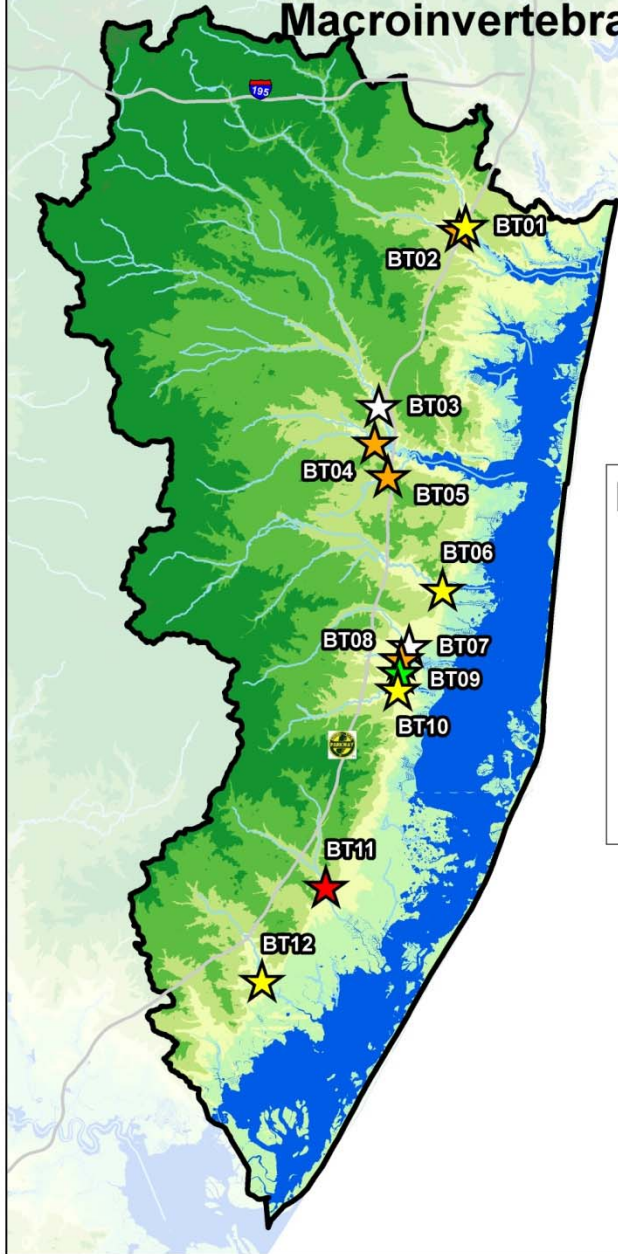


## Bay

- Concentrations
- Ecological Responses



# Barnegat Bay Watershed Tributary Macroinvertebrate Index Results



## Index Impairment

- ☆ No data
- ★ Excellent
- ★ Good
- ★ Fair
- ★ Poor

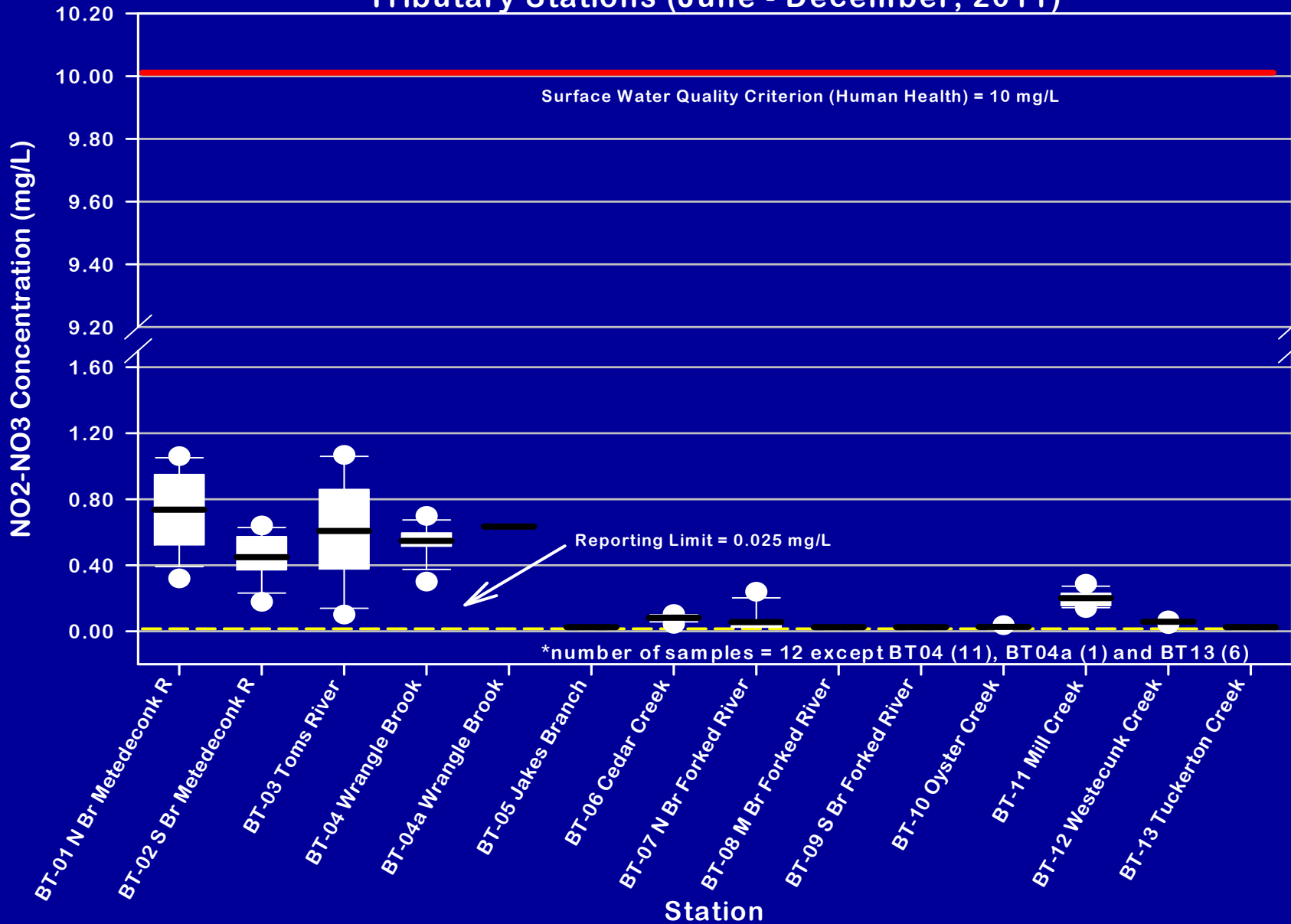
Trib Site	Stream Name	Impairment Rating
BT01	NB Metedeconk River	Good
BT02	SB Metedeconk River	Fair
BT03	Toms River	Not sampled, nonwadeable. Will try to re-sample.
BT04	Wrangle Brook	Fair
BT05	Jakes Branch	Fair
BT06	Cedar Creek	Good
BT07	NB Forked River	Will not sample. Site does not meet protocol.
BT08	Middle Br.	Fair
BT09	South Br.	Excellent
BT10	Oyster Creek	Good
BT11	Mill Creek	Poor
BT12	Westecunk Ck.	Good
BT13	Tuckerton Ck.	Will not sample. Site does not meet protocol.



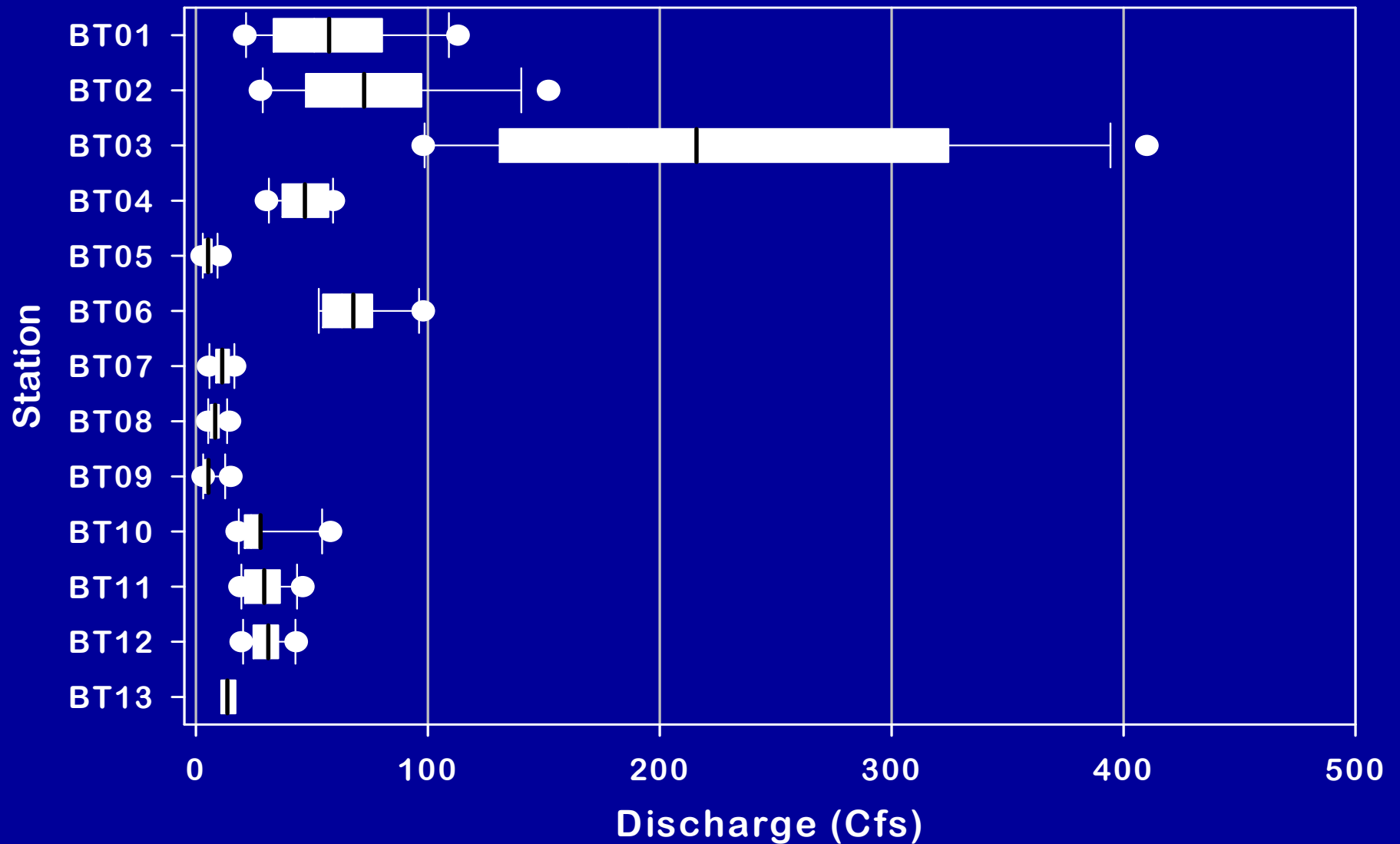
Map: Bureau of Freshwater & Biological Monitoring 4/10/12



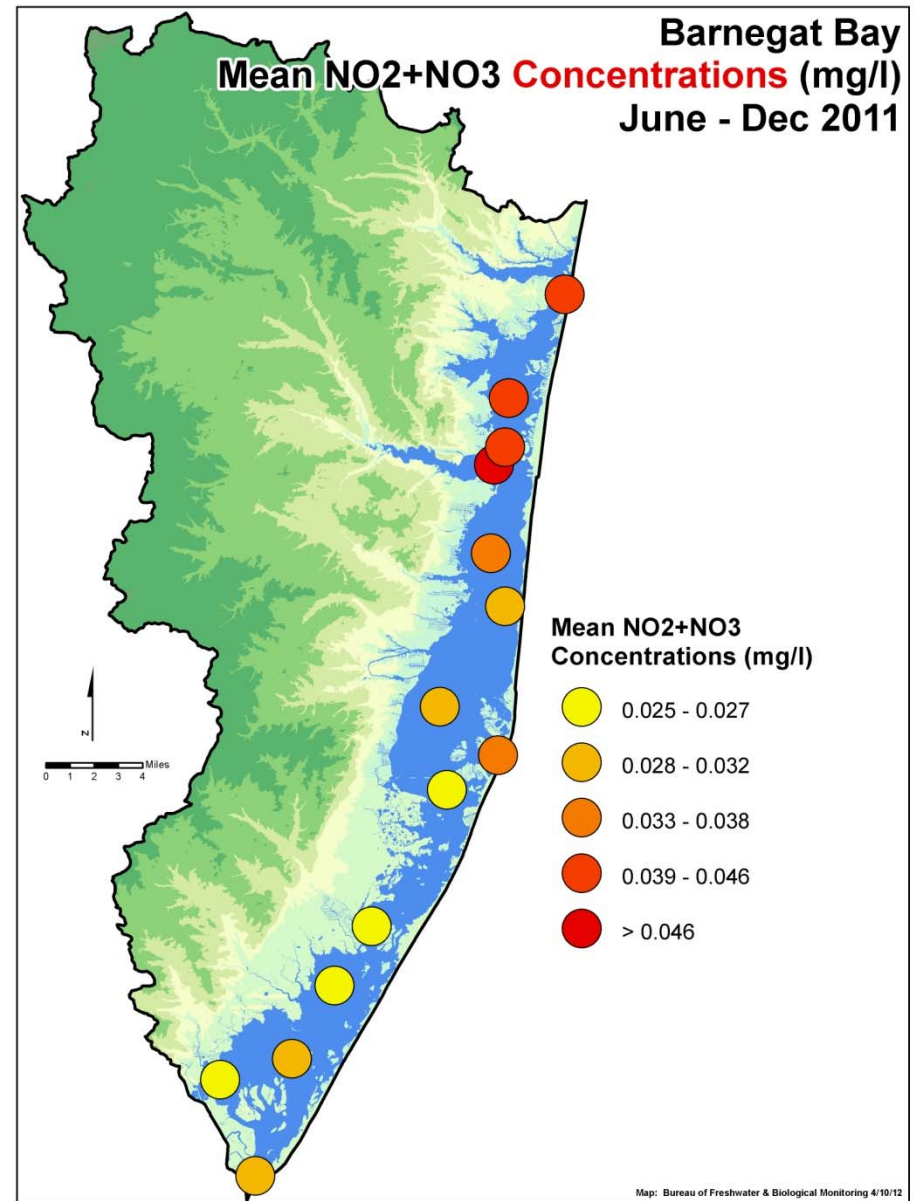
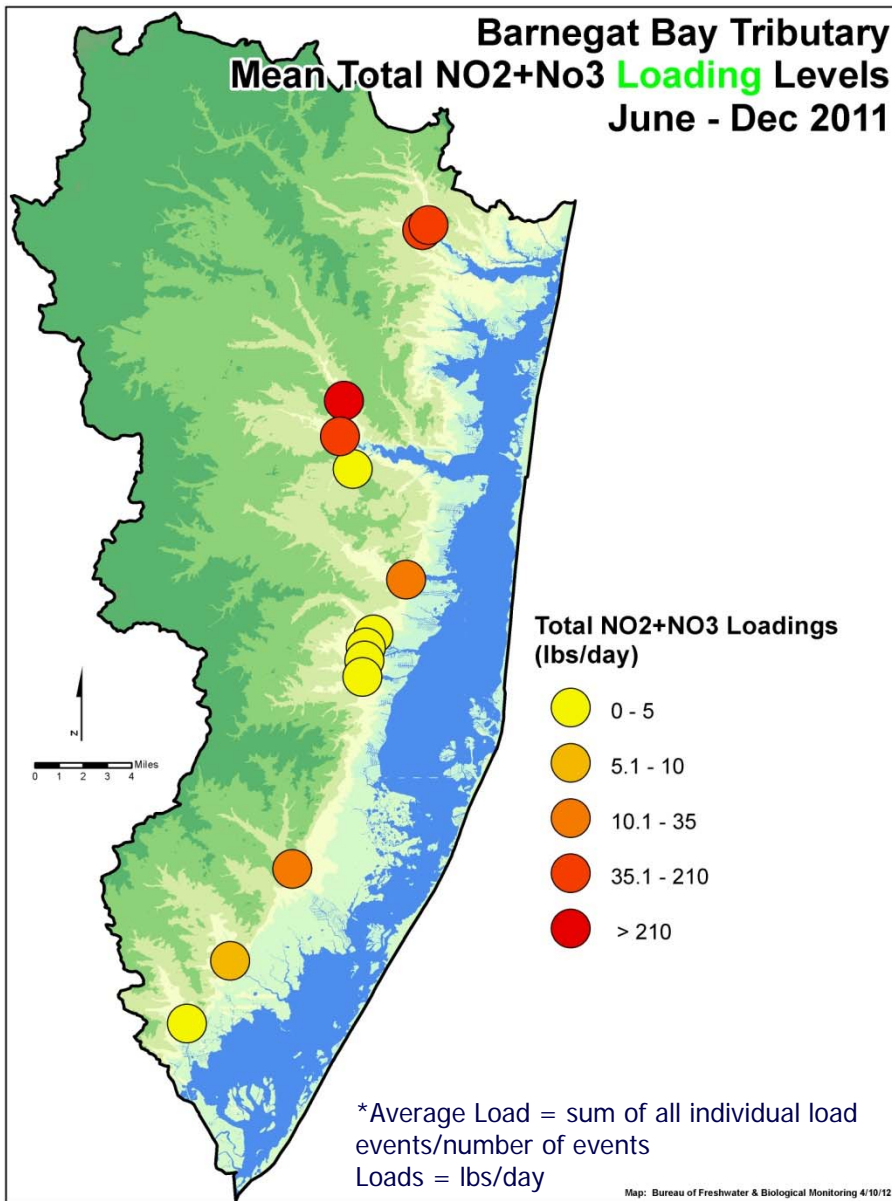
## Nitrate - Nitrite Concentrations (mg/L) at Barnegat Bay Tributary Stations (June - December, 2011)



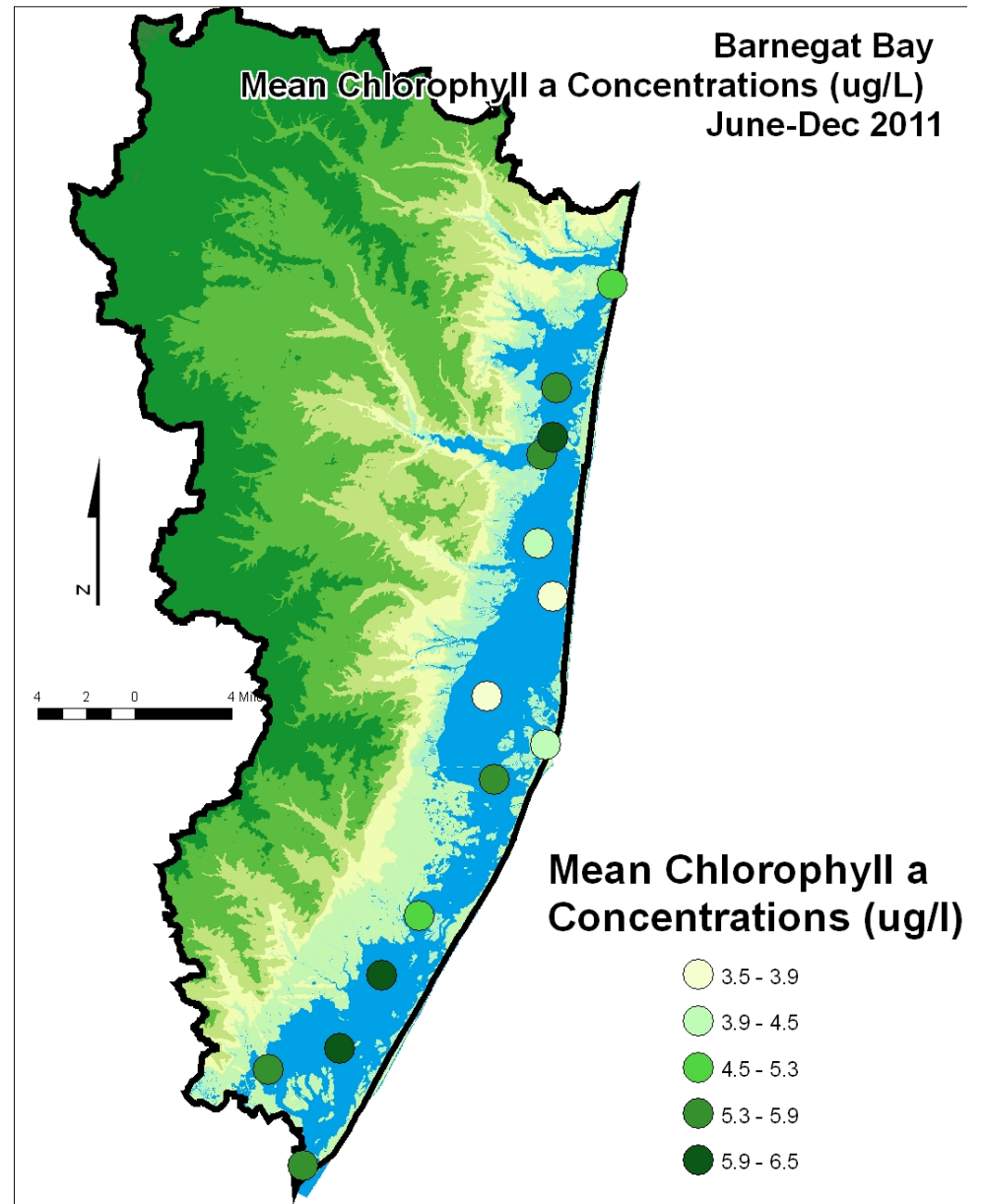
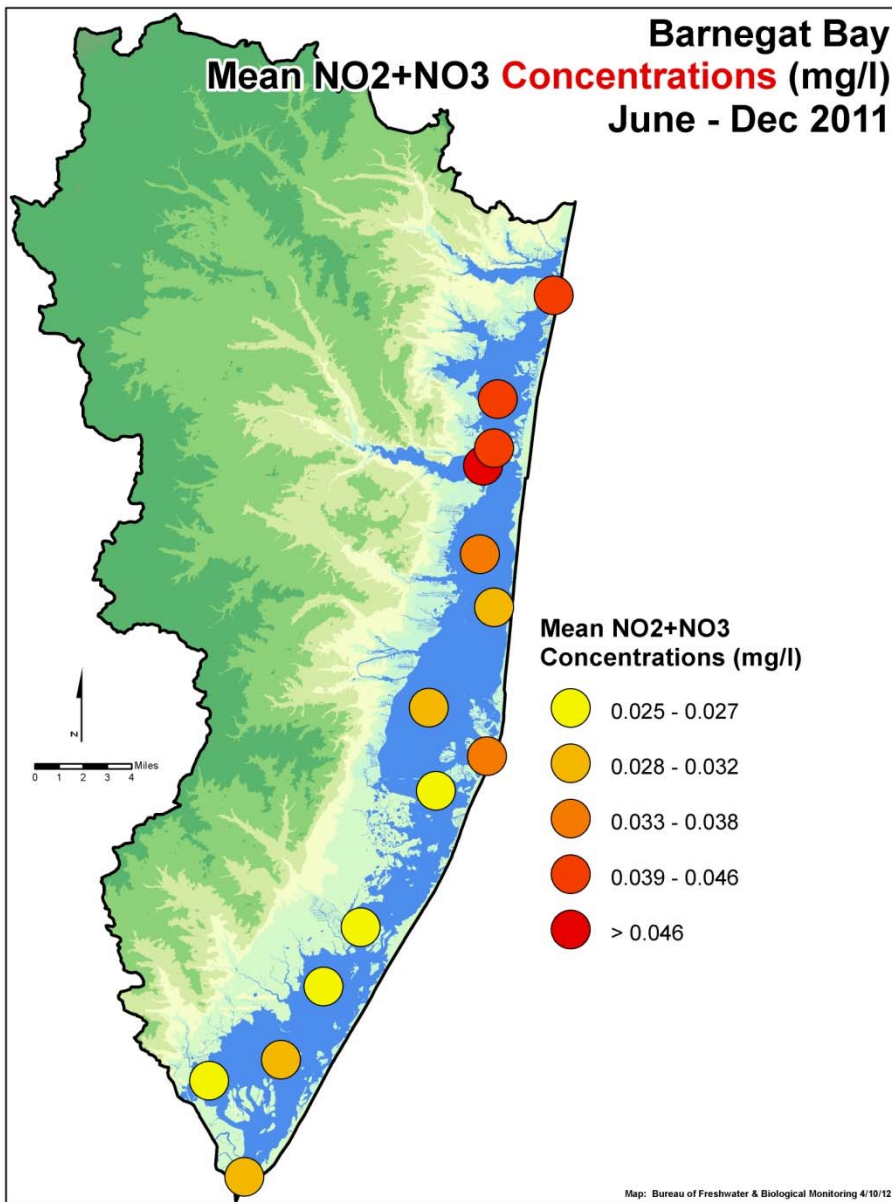
# Discharge(flow) (cubic feet per second) at Barnegat Bay Tributary Stations (June - December, 2011)



# Mean Nitrite-Nitrate Loadings & Concentrations (12 Sampling Events)



# Mean Nitrite-Nitrate Loadings & Chlorophyll Concentrations (12 Sampling Events)



**Barnegat Bay Website:**  
[www.state.nj.us/dep/barnegatbay/](http://www.state.nj.us/dep/barnegatbay/)  
*(including Interactive Map for monitoring data)*

Additional contributors: Chris Kunz, Leigh Lager and Helen Pang, DEP

