



# **Barnegat Bay Research 2011 – 2012**

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# Governor's Comprehensive Action Plan for Barnegat Bay

A 10 point plan

<http://www.nj.gov/dep/barnegatbay/>

- Plan No. 9: Produce More Comprehensive Research
  - Support water quality improvement (nutrient criteria)
  - Establish the baseline conditions of the bay
  - Fill in critical data gaps
  - Advance habitat restoration on the Bay





STATE OF NEW JERSEY

DEPARTMENT OF ENVIRONMENTAL PROTECTION



## Office of Science

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# A Selected Bibliography of Ecological and Land Use Studies of Barnegat Bay

[Return to Office of Science - Barnegat Bay](#)

[Bibliography by year - please click here](#) | [Bibliography by category - please click here.](#)

**Alphabetical order by first author**

Blue text indicates a DEP link -

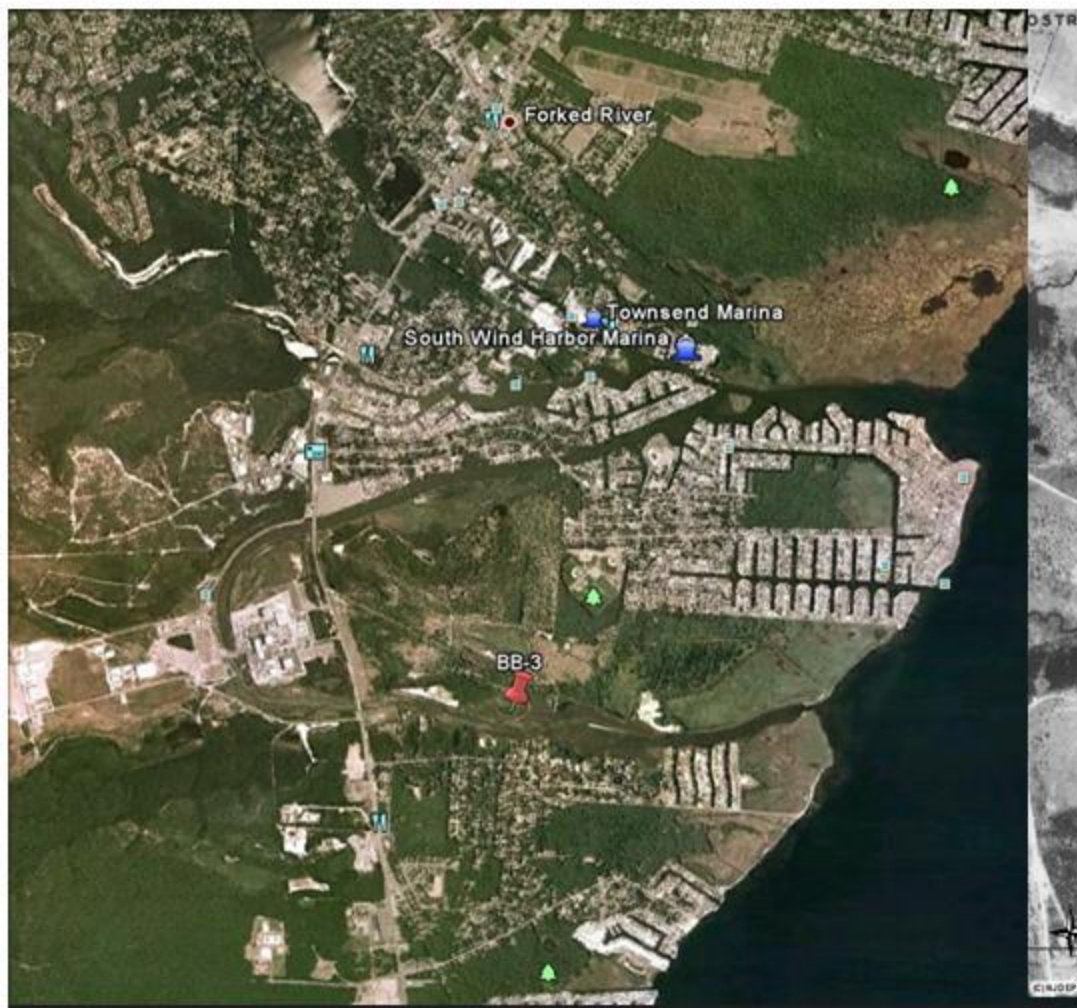
Green text indicates that this link will be leaving the DEP web site.

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Able KW, Fahay MP. (2011). Ecology of Estuarine Fishes: Temperate Waters of the Western North Atlantic. Baltimore, MD: The Johns Hopkins University Press.

Able KW, Grothues TM. (2007). [Diversity of estuarine movements of striped bass \(\*Morone saxatilis\*\): a synoptic examination of an estuarine system in southern New Jersey.](#) [Fishery Bulletin](#);105(3):426-435.

## Change in Barnegat Bay Land Use at Forked River and Oyster Creek (1931 and 2011)



## OBJECTIVES OF BARNEGAT BAY COMPREHENSIVE RESEARCH

	Research Project	Nutrient Bio-Criteria	TMDL	Power Plant	Tourism & Recreation	Food Safety	Comprehensive/Baseline/Data Gaps
1	Benthic Invertebrate Community Monitoring and Indicator Development for Barnegat Bay.	X	X	X			X
2	Nutrient and Ecological Histories of Barnegat Bay	X	X				X
3	Assessment of Hard Clam Populations in Barnegat Bay			X	X		X
4	Assessment of Fishes and Crabs Responses to Human Alteration of Barnegat Bay.			X	X		X
5	Assessment of the Distribution and Abundance of Stinging Sea Nettles (Jellyfishes) in Barnegat Bay			X	X		X
6	Baseline Characterization of Phytoplankton Communities and Harmful Algal Blooms (HABs)	X	X		X	X	X
7	Baseline Characterization of Zooplankton Communities	X	X				X
8	Multi-Trophic Level Modeling of Barnegat Bay						X
9	Tidal Freshwater and Salt Marsh Wetland Studies of Changing Ecological Function and Adaptation Strategies						X
10	Ecological Evaluation of Sedge Island Marine Conservation Area in Barnegat Bay				X		X



# Research Schedule

**PMs Assigned**  
**Contracts Underway**  
**Research Coordination\***  
**QAPP – 1 month**  
**Qtrly Admin Reports**  
**Project Meetings**  
**Co-Project Meetings**  
**Tri-Qtrly Review/Meeting**  
**Annual Reports**  
**Year 2-3 Proposals**  
**Publications/Manuscripts**

\* Presentations from researchers coordination meeting 9/29/11  
<http://www.state.nj.us/dep/dsr/barnegat/research.htm>

# Governor's Comprehensive Action Plan for Barnegat Bay

- Plan No. 10: Reduce Water Craft Impacts
  - Boats and personal water craft can harm the Bay by damaging submerged aquatic vegetation and disrupting aquatic habitats. Designation of a Conservation Zone, similar to the one at Island Beach State Park, can reduce such impacts



# Sedge Island Marine Conservation Zone

On March 7th, 2001, the New Jersey Tidelands Resource Council approved the creation of a marine conservation zone for the southern management area of Island Beach State Park and the Sedge Islands.

The Sedge Island Marine Conservation Zone contains approximately 1,600 acres of highly productive tidal marshes, creeks, ponds, and open water. The purpose of the Conservation Zone is to protect and interpret the wildlife resources while reducing user conflicts and maintaining the traditional uses of the area.

Why the conservation designation?

“Conflicts with personal watercraft and other incompatible activities created safety risks, disturbed nesting wildlife, and negatively impacted the experience of the park visitors. Further, the "soundscape" of this entire area was impacted by heavy use by personal watercraft. Flyfishers, clammers, crabbers, and traditional users of the shallow waters of the Sedge Islands were put at risk by the existing boat traffic.”



**Ecological Evaluation of Sedge  
Island Marine Conservation Area  
in Barnegat Bay**

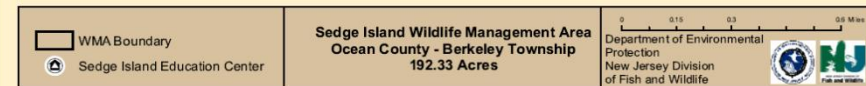
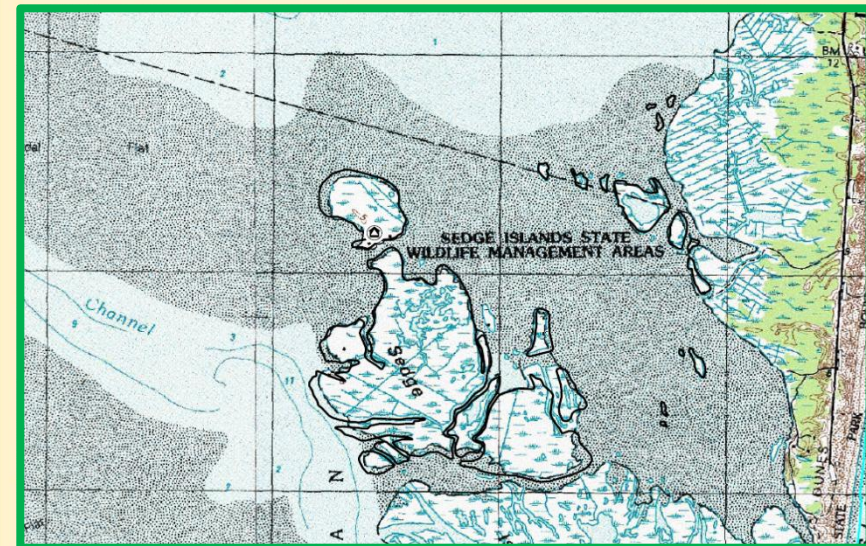
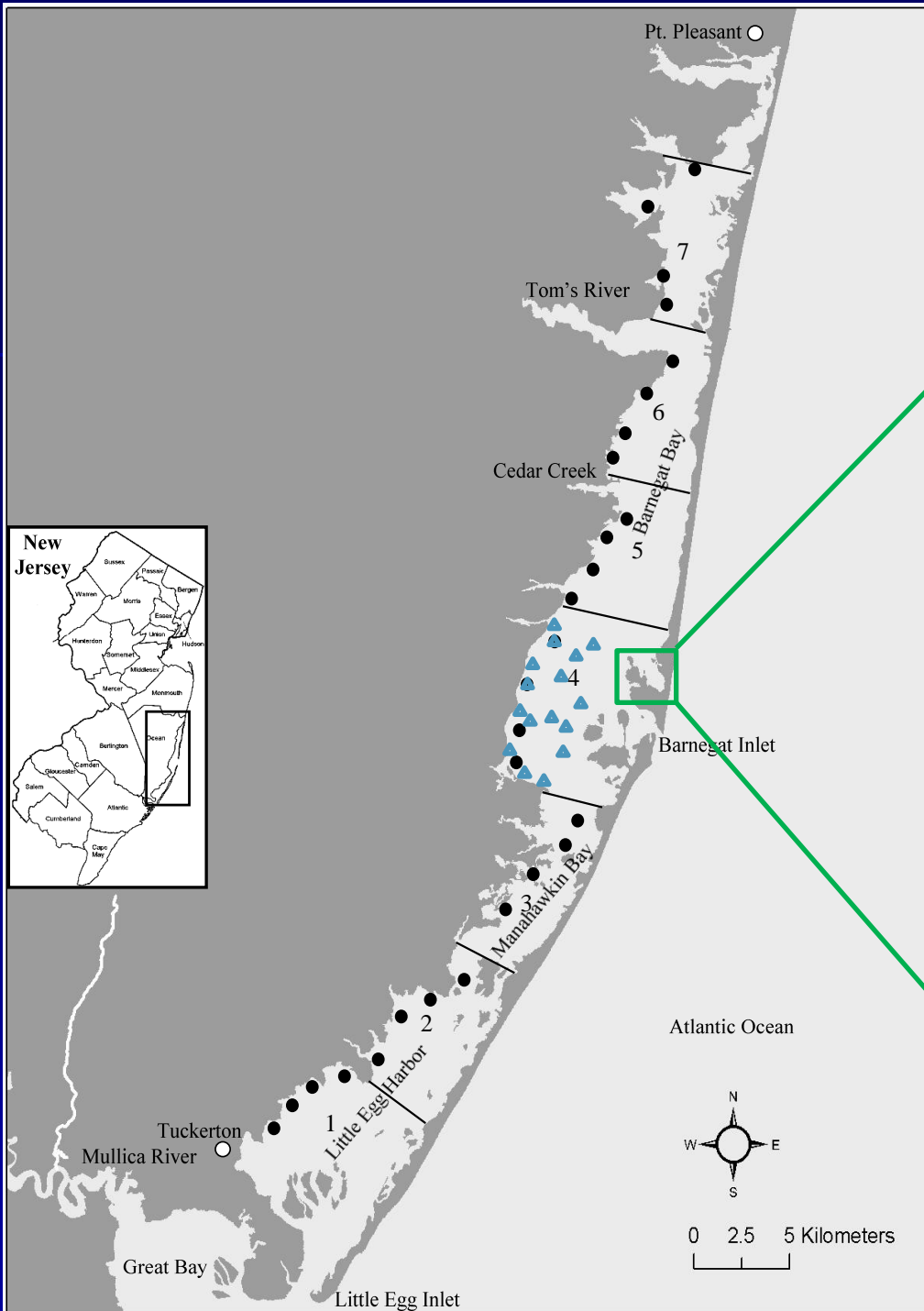
**Paul Jivoff**

**Department of Biology**



# Rationale

- NJ's First Marine Conservation Zone....  
for preserving diversity of essential habitats
- Little work to assess habitats present or  
evaluate effectiveness for organisms



# Objectives

- Use blue crab as a model organism for  
evaluating relative effectiveness of SIMCZ
- Increase understanding of factors influencing  
blue crab fecundity

# Blue Crab Life History

Spawn in high salinity areas...  
mouth of estuary  
or inlet  
# of times...?



female with eggs



embryos

3 to 6 million eggs  
attached to female

~ 2 weeks



zoea

Planktonic  
8 zoea stages

~1-1.5 months



megalops

~ 3 weeks



1st crab

Settlement...  
Benthic  
seagrass,  
marsh  
protective habitats...  
seagrass, marsh

juvenile



shallow habitats...  
seagrass, marsh, beach

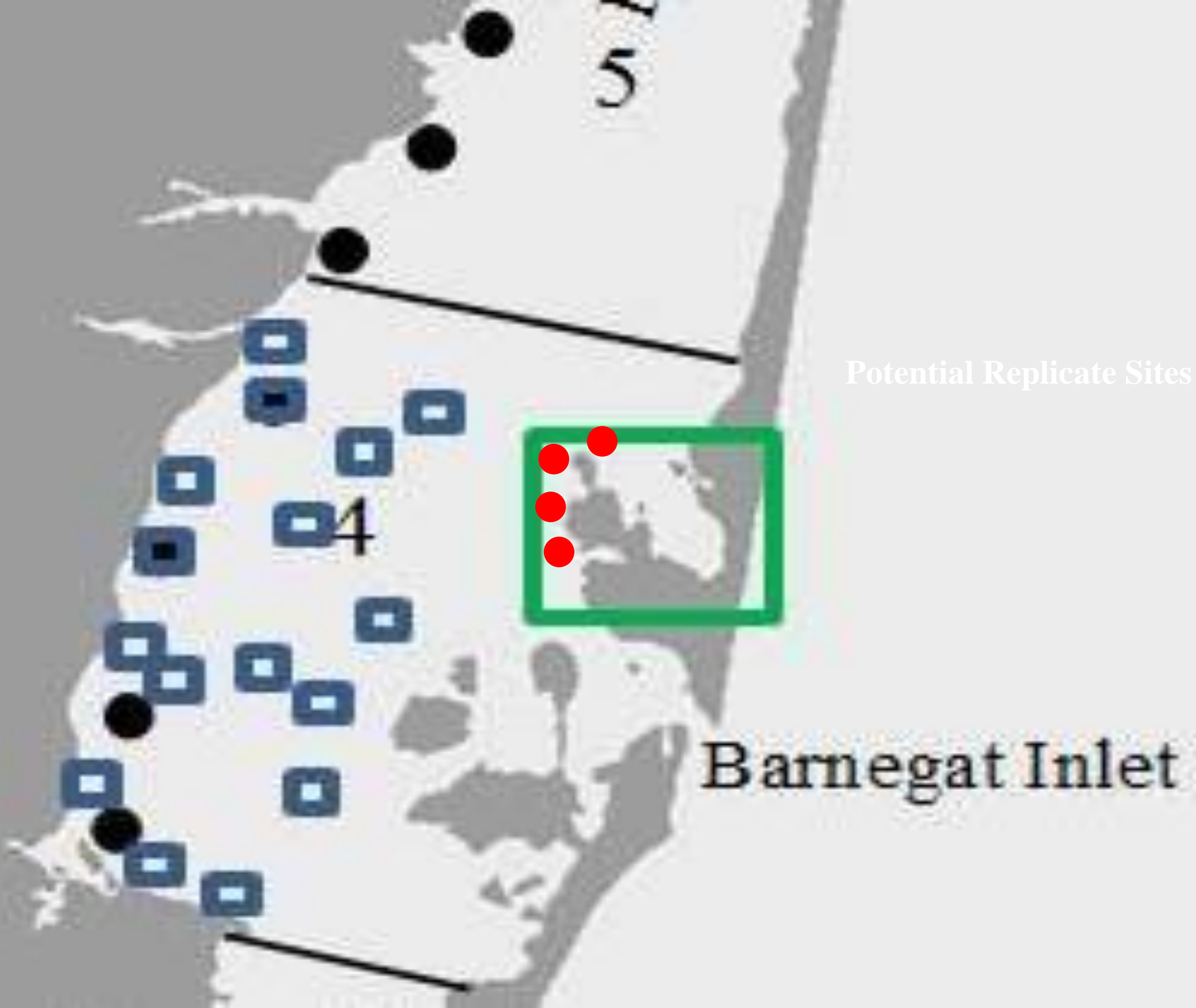


mating pair  
~1-1.5 years

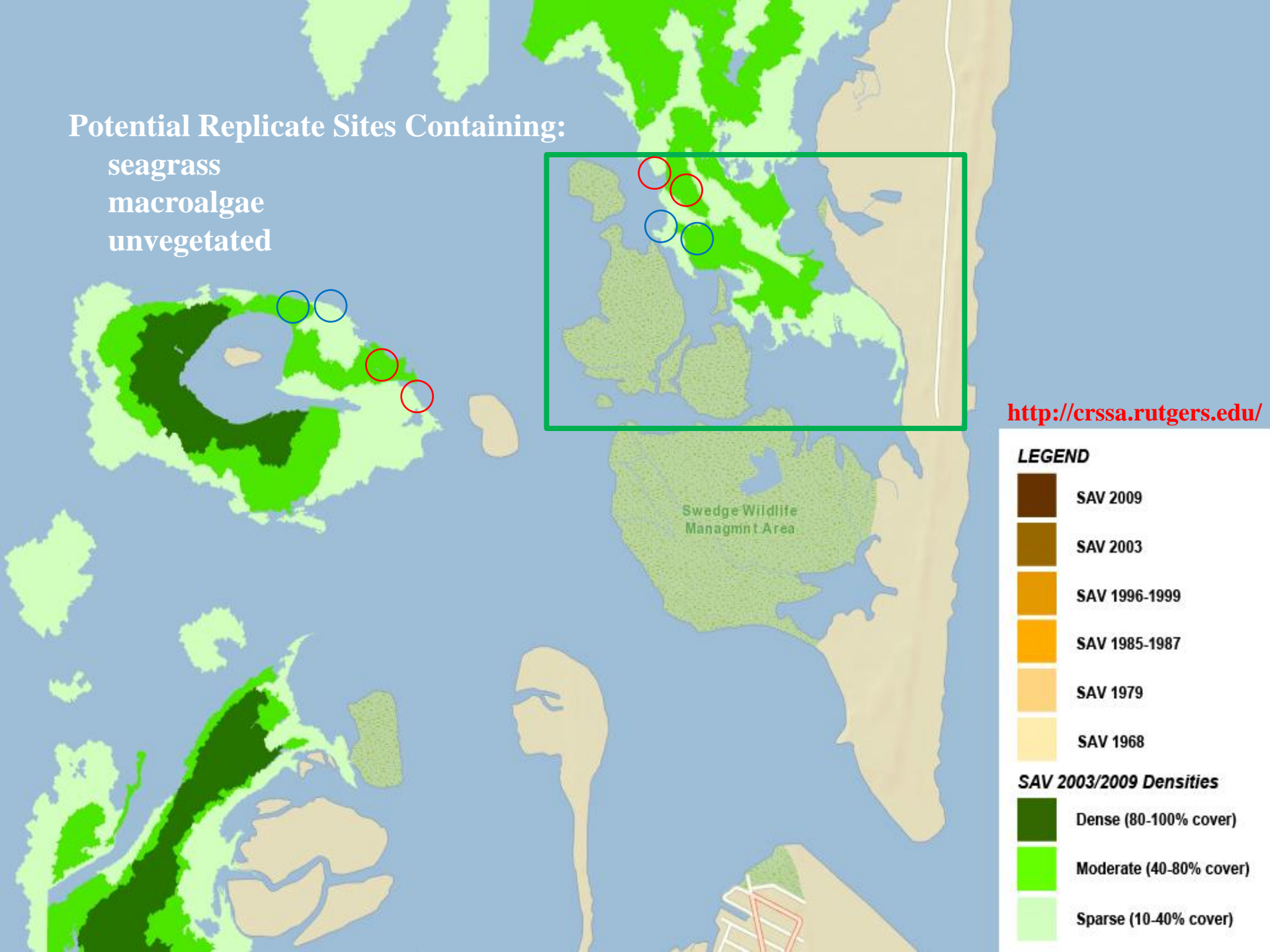
# Methodology

## Blue Crab Characteristics: Inside vs. Outside the SIMCZ

- (1) population structure of adult crabs: abundance, size, sex ratio
  - a. Field data: SIMCZ vs. central bay vs. western shore using traps
    - monthly May-August
    - 2010 data
    - 2008-2009 data
    - 2010 data
    - 2011-fish & crabs
- (2) female reproductive success
  - a. Field data: brood size, egg viability, spatial variation, duration of season
  - b. Field experiment: brood size, timing & number, egg viability  
location, female size, food level
- (3) abundance of juvenile crabs: seagrass, macroalgae, and unvegetated areas
  - a. Field data: SIMCZ vs. outside using cylinder (throw-trap) sampling  
monthly May-August








Potential Replicate Sites Containing:  
seagrass  
macroalgae  
unvegetated






<http://crssa.rutgers.edu/>

**LEGEND**

-  SAV 2009
-  SAV 2003
-  SAV 1996-1999
-  SAV 1985-1987
-  SAV 1979
-  SAV 1968

**SAV 2003/2009 Densities**

-  Dense (80-100% cover)
-  Moderate (40-80% cover)
-  Sparse (10-40% cover)

## Research Objectives

The field experiment will provide estimates of reproductive capacity of blue crabs from the conservation zone in comparison with a less protected area and will provide estimates of seasonal reproductive output, which will help NJDEP to ascertain the relative protections offered by the marine conservation area in an otherwise degraded coastal embayment.

The area outside the SIMCZ, while physically similar to the SIMCZ, may be subject to greater boat and personal watercraft traffic and thus offers the opportunity to examine the effect of this type of disruption on habitat use.

Future field investigations may include other organisms and trophic levels for a more comprehensive assessment (e.g., finfish, shellfish, plankton, etc.).

QUESTIONS?

