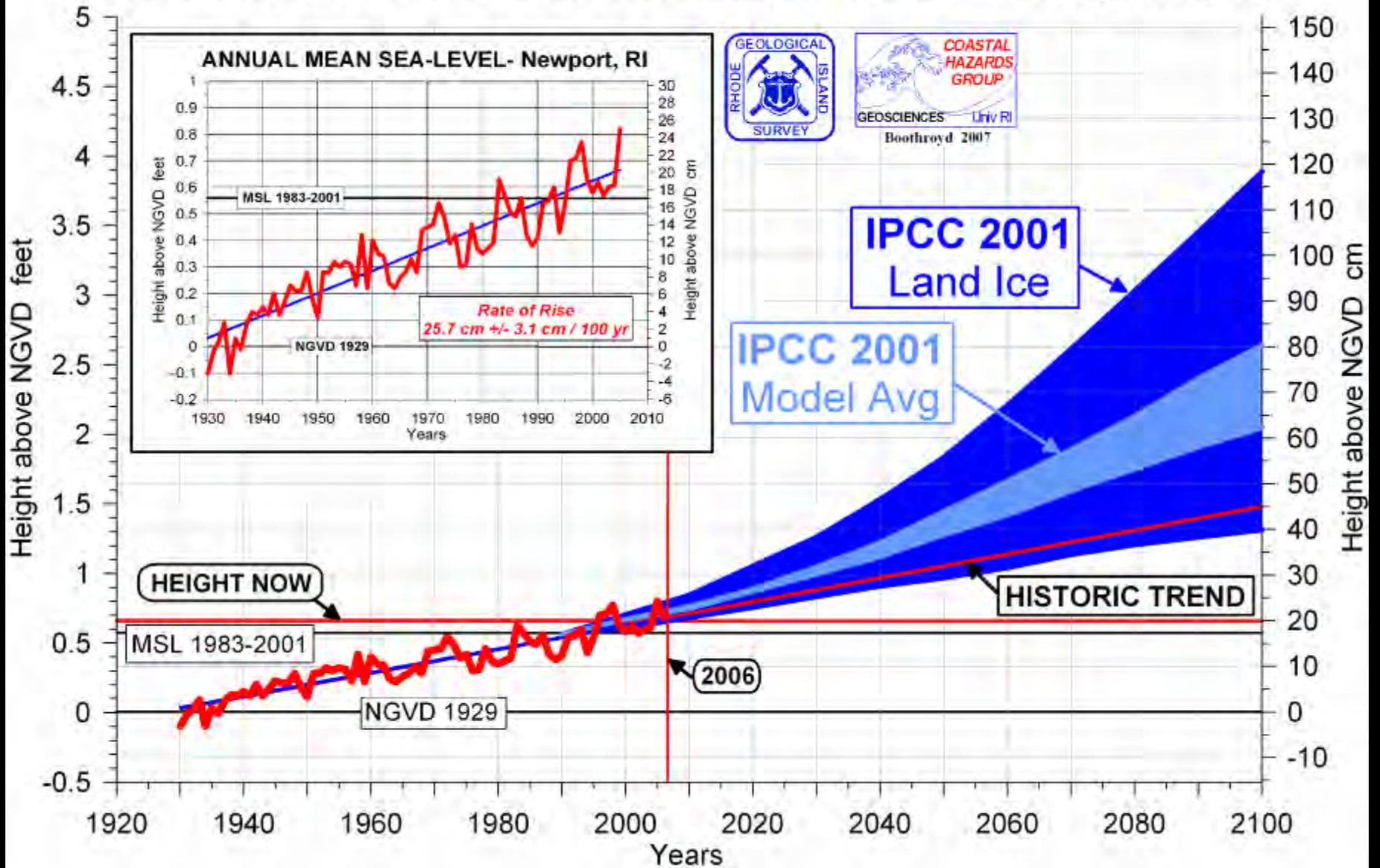


Rhode Island Efforts Towards Mitigation and Adaptation to Climate Change

**Northeast CZM Regional Meeting
November 18, 2009**

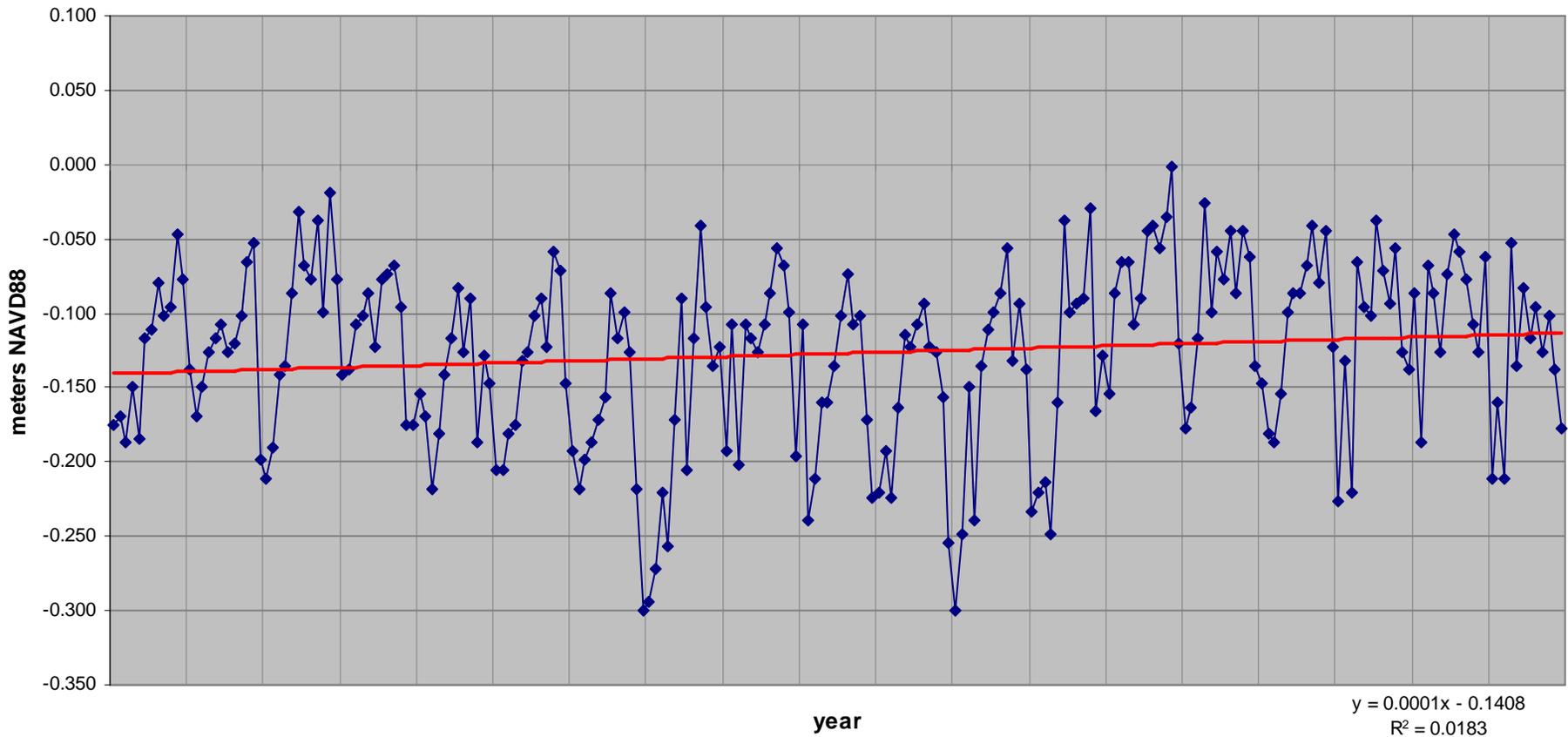


ACCELERATED SEA-LEVEL RISE - Newport, RI



Graphic courtesy of Jon Boothroyd URI

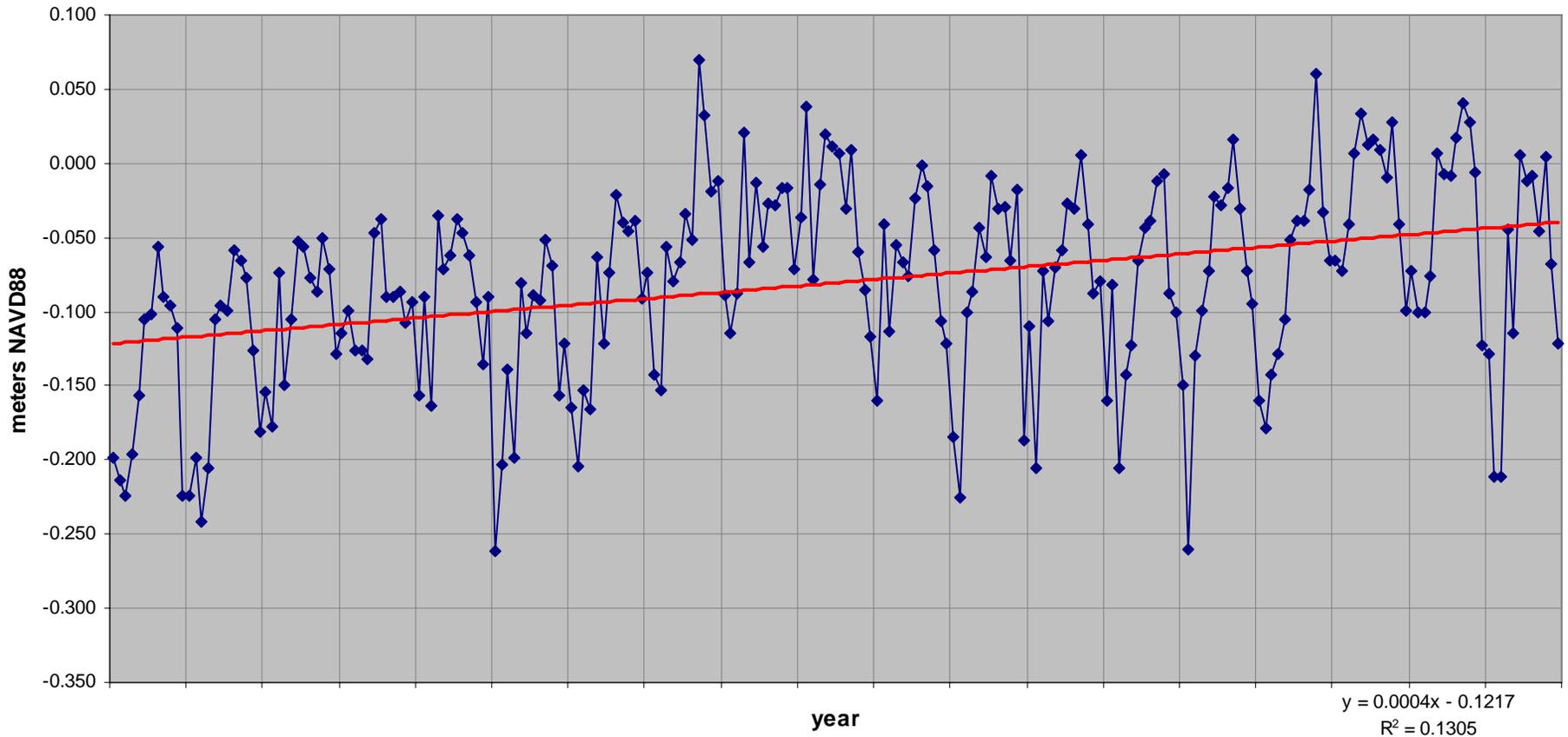
Newport MSL 1970-1988



Mean Relative Sea Level Change = 0.05 in/yr (1.27 mm/yr)

<http://tidesandcurrents.noaa.gov/nwlon.html>

Newport MSL 1989-2008



Mean Relative Sea Level Change = 0.16 in/yr (4.06 mm/yr)

<http://tidesandcurrents.noaa.gov/nwlon.html>

Inundation Scenario



Lands susceptible to **3 feet** of sea level rise - Quonochontaug Pond, Charlestown, RI.

Vinhateiro, 2008

Inundation Scenario



Lands susceptible to **5 feet** of sea level rise - Quonochontaug Pond, Charlestown, RI.

Vinhateiro, 2008



**Patriot's Day Nor'easter
April 2007
Tides 3 feet above normal**

An aerial photograph of a hurricane, showing a distinct eye in the center surrounded by dense, swirling cloud bands. The image is used as a background for the text.

Erosion happens during storms!

**Tropical Storms (Hurricanes)
Extra-tropical storms (Nor'easters)**

Hurricane Ike – NOAA photo



Quonochontaug Headland

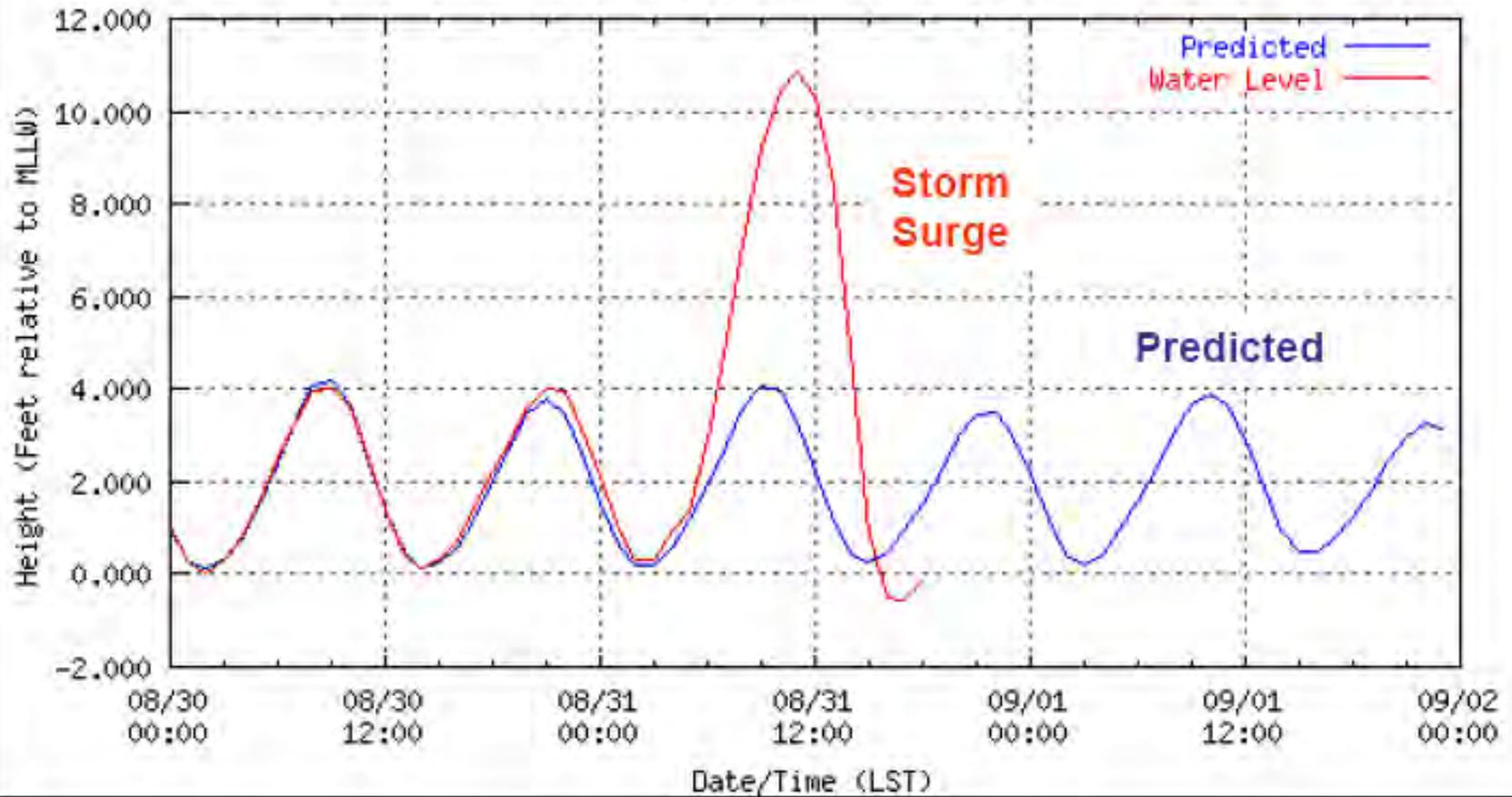
Quonochontaug Pond

Ninigret Pond

Block Island Sound

**East Beach Barrier
after Hurricane Carol in 1954**

NOAA/NOS/CO-OPS
Verified Hourly Height Water Level Plot
8452660 NEWPORT, NARRAGANSETT BAY, RI
from 08/30/1954 - 09/01/1954

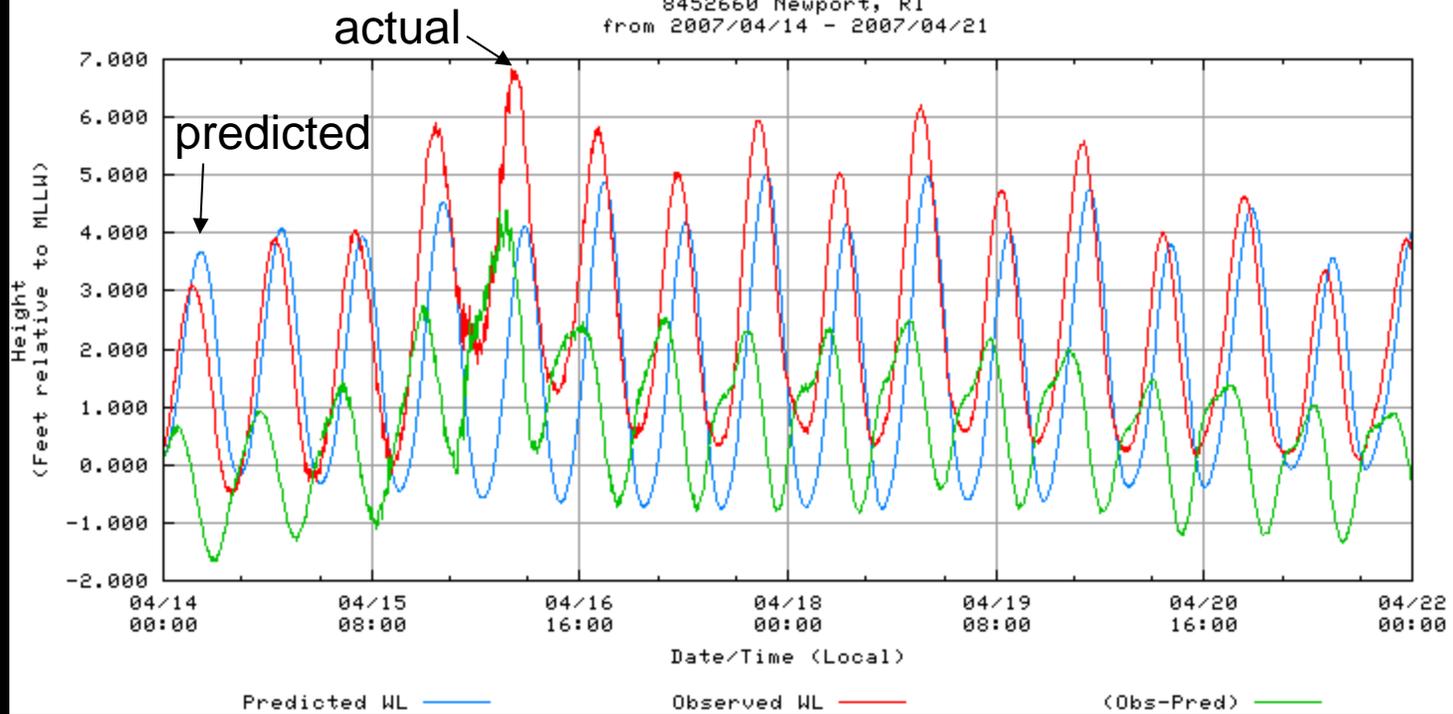


Browning Three Cottages – Patriots Day 2007



RE Hehre

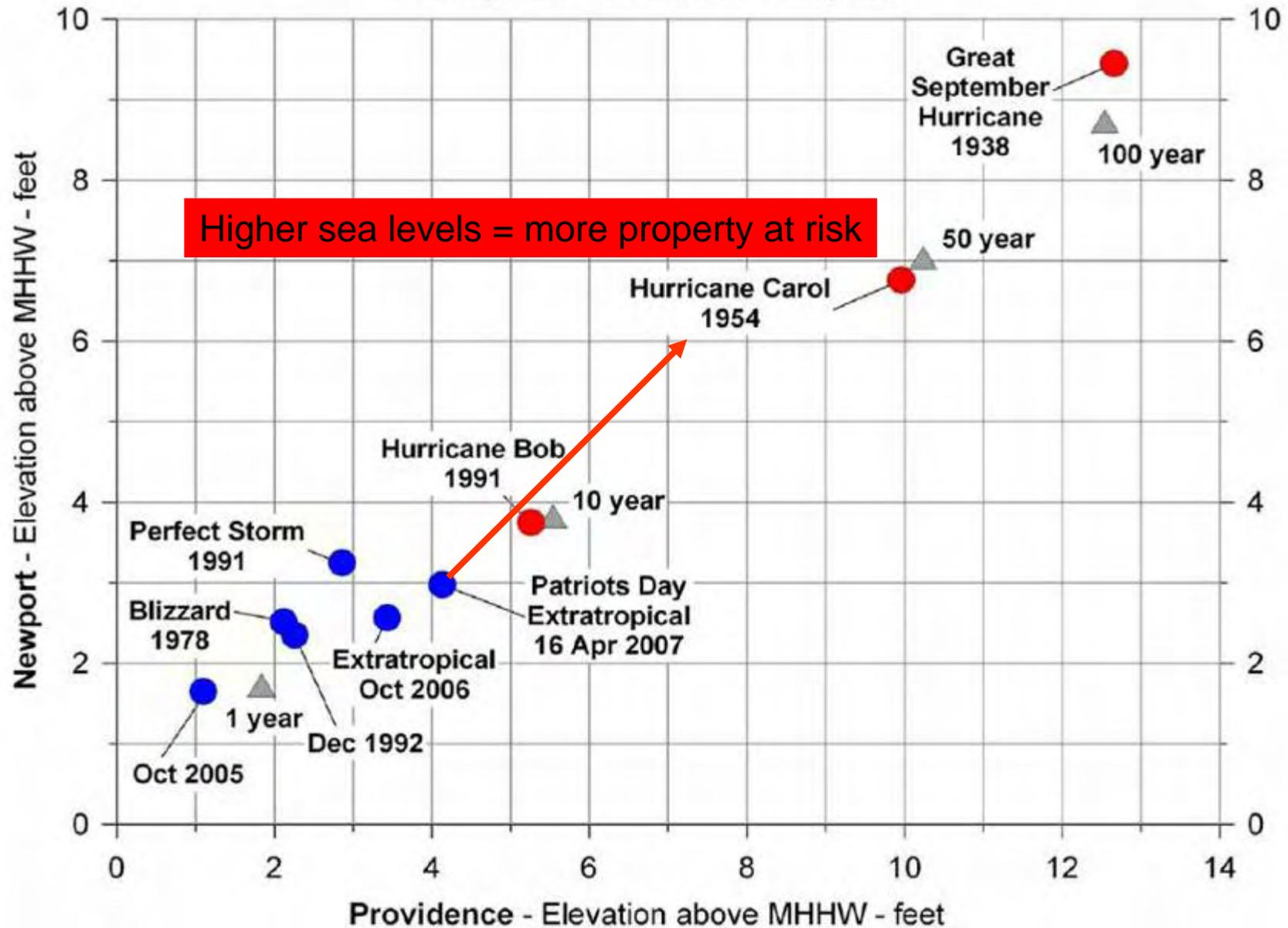
NOAA/NOS/CO-OPS
Preliminary Water Level (A1) vs. Predicted Plot
8452660 Newport, RI
from 2007/04/14 - 2007/04/21



Coastal Erosion



STORM-SURGE ELEVATION Newport - Providence, RI



Graphic courtesy of Jon Boothroyd URI

Impacts of Climate Change

CRMC Policy (RIGL § 46-23-1)

Preserve, protect, develop, and where possible, restore the coastal resources of the State of Rhode Island for this and succeeding generations through comprehensive and coordinated long range planning and management designed to produce maximum benefit for society from such coastal resources

Coastal Resources Management Plan

Section 145 Climate Change & Sea Level Rise

(Adopted January 2008)

Policy:

- Proactively plan for climate change and sea level rise
- Expect a base rate of 3 to 5 feet of sea level rise by 2100
- Revisit the science to assess SLR rates

Standards: (built environment and natural resources)

- Meetings with stakeholders, agencies (SBC, RIEMA, RIDOT) for structural design considerations
- State coastal habitat protection initiatives (CELCP)
- Living shoreline policy (partners STB & TNC)
 - Shoreline characterizations (25% hardened)
 - Pilot projects to assess effectiveness

Other RI Coastal Program Initiatives to Address Climate Change & Sea Level Rise

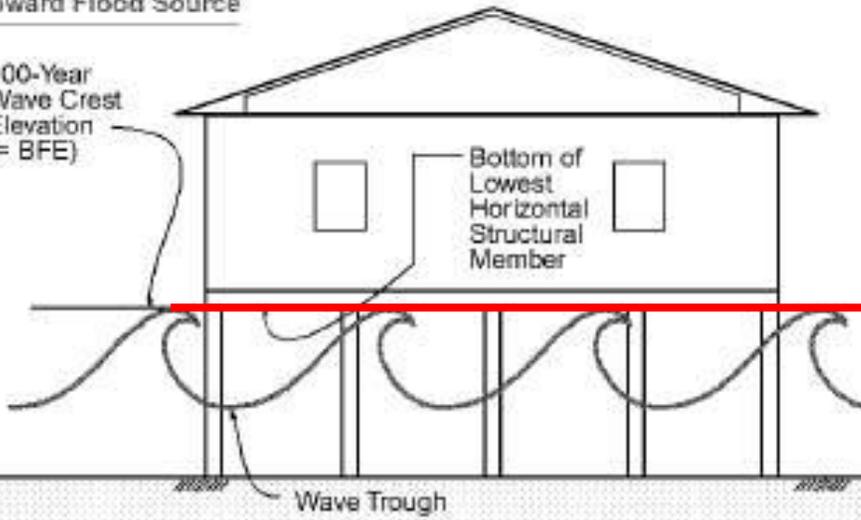
- Working with RI Flood Awareness Climate Change Taskforce (CRMC, SBC, RIEMA, RISG) – developed freeboard recommendations for structures – developing a fact sheet for to help determine Coastal A zone locations – rebuilding after a storm property owner guidance fact sheet
- New England Governors Conference – regional strategy for coastal habitat conservation and land acquisition expanding on federal CELCP, as well as Coastal Hazards Resilience Committee
- RISBC now incorporates 1-foot freeboard requirement above BFE and Coastal A zone designation – Washington and Newport county Risk MAP restudy will delineate Coastal A zones in those counties

a. Minimum NFIP Elevation Requirement in Coastal A Zones and V Zones

Toward Flood Source

100-Year Wave Crest Elevation (= BFE)

Bottom of Lowest Horizontal Structural Member



Wave Trough

Base Flood Elevation (BFE)

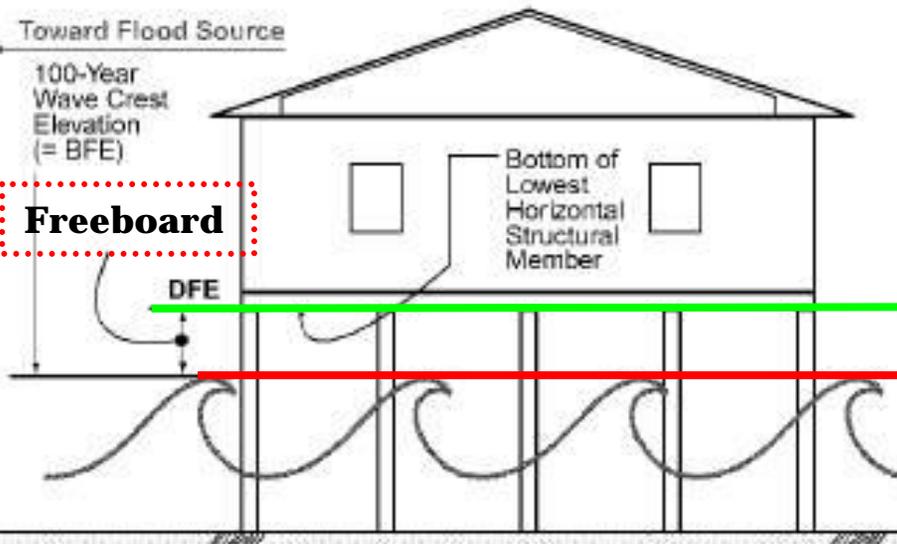
Toward Flood Source

100-Year Wave Crest Elevation (= BFE)

Bottom of Lowest Horizontal Structural Member

Freeboard

DFE



Design Flood Elevation (DFE)

Base Flood Elevation (BFE)

b. Exceeding NFIP Elevation Requirement in Coastal A Zones and V Zones

FEDERAL EMERGENCY MANAGEMENT AGENCY

Source: FEMA Coastal Construction Manual 2000

Rhode Island Coastal Program Amendments

- Section 145 to incorporate most recent science on SLR/climate change and expand Findings section
- Section 300.3 – Residential, Commercial, Industrial, and Recreational Structures – Append subsection G. Guidelines for Construction in Flood Hazard Areas

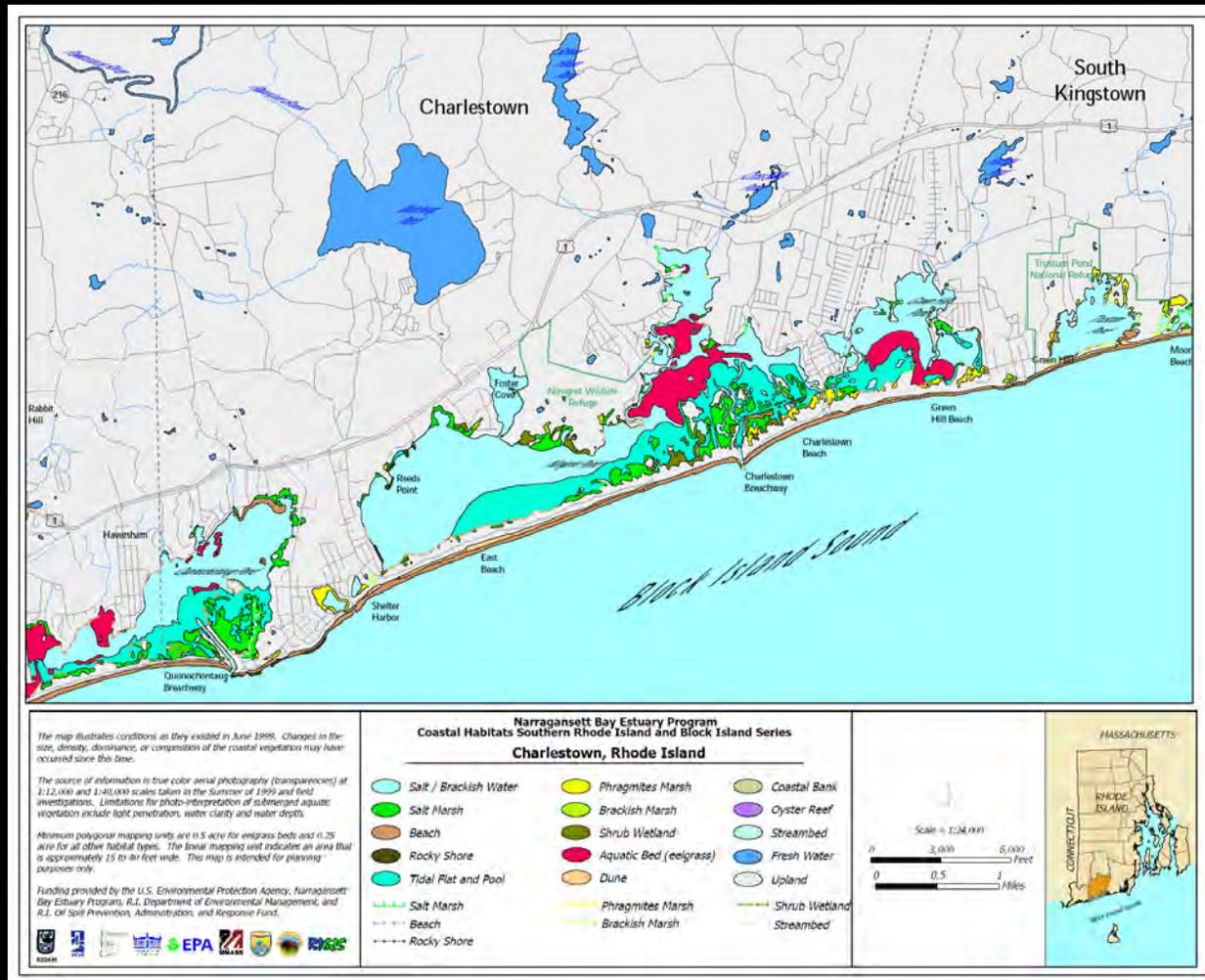
Table 1. Freeboard design recommendations for buildings and public infrastructure

Structure Classification ¹	Freeboard Height (feet)	Design Flood Elevation
Category 1 – Accessory structures	1	BFE + 1 foot
Category II – all residential	3	BFE + 3 feet
Category III – high occupancy buildings	4	BFE + 4 feet
Category IV – essential facilities (e.g., hospitals, fire, rescue, police, etc.)	4	BFE + 4 feet
Public Infrastructure – bridges, roadways, utilities, levees, etc.	5	BFE + 5 feet

DRAFT

¹ - Category I, II, III, and IV structures are defined in Rhode Island SBC-1 and SBC-2 and Table 1-1 in “Flood Resistant Design and Construction” American Society of Civil Engineers (ASCE/SEI 24-05, 2006)

Evaluate coastal habitats for susceptibility to SLR impacts



December 15 conference of coastal scientists in collaboration with URI, TNC, RISG & CRMC to discuss coastal habitat conservation in the face of global climate change and most recent SLR estimates for region

Assess effectiveness of living shorelines as alternative to conventional structural shoreline protection techniques

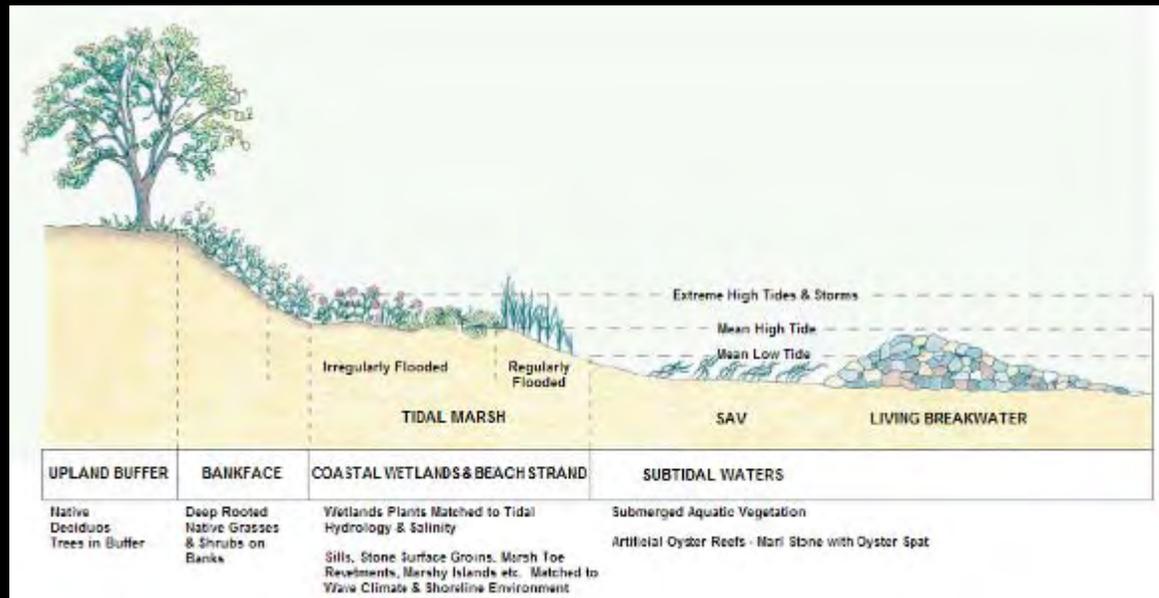
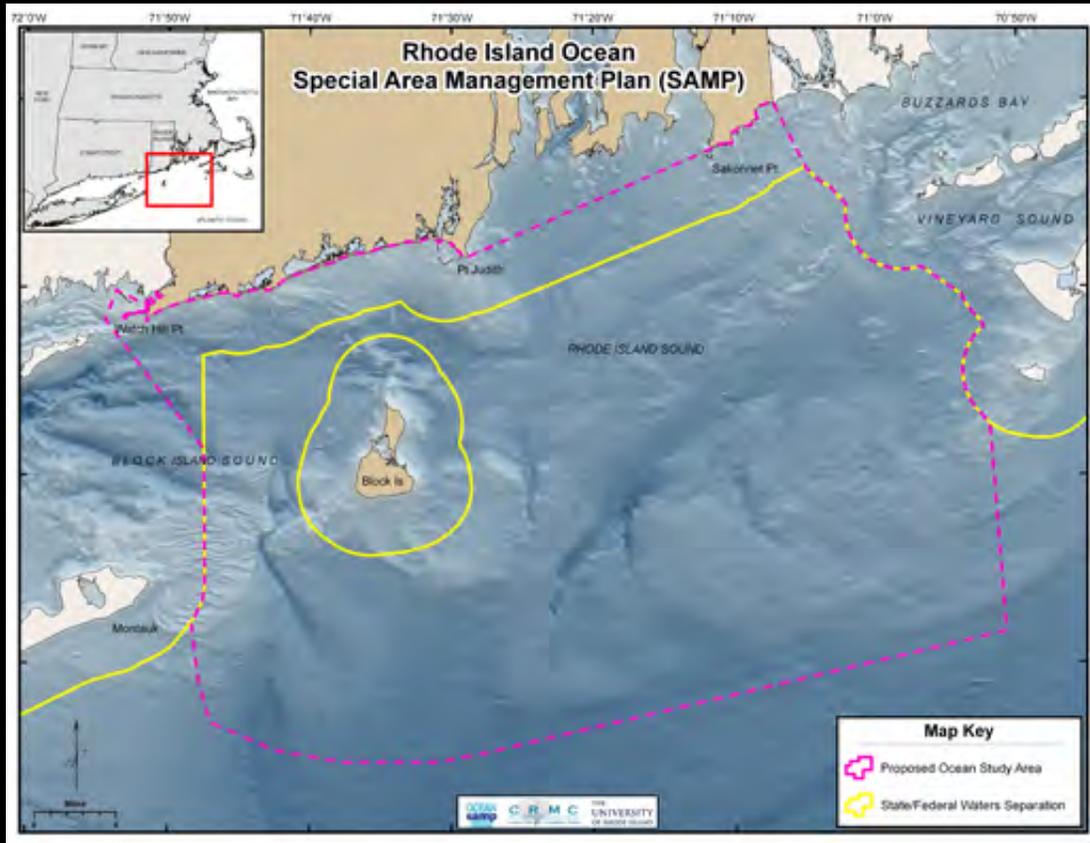


Photo: Chesapeake Bay NERR-Virginia



Photo: Mississippi-Alabama Sea Grant

RI mitigation efforts to offset fossil fuel consumption



Plan through Ocean SAMP process for utility-scale offshore wind turbines to generate at least 15% of RI's electricity needs

