

Rhode Island
OCEAN
samp

- Michael M. Tikoian, Chair
- Paul E. Lemont, Vice Chair
- David Abedon
- Robert Driscoll
- Donald Gomez
- Raymond Coia
- W. Michael Sullivan, RIDEM Director
- Bruce Dawson
- Grover Fugate, Executive Director

Special Area Management Plans

Federal CZMA Definition:

The term "special area management plan" means a comprehensive plan providing for natural resource protection and reasonable coastal-dependent economic growth containing a detailed and comprehensive statement of policies; standards and criteria to guide public and private uses of lands and waters; and mechanisms for timely implementation in specific geographic areas within the coastal zone.

SAMPs for Ecosystem Management...

- describe the dynamics of marine ecosystems
- characterize the salient issues
- set clear policies and standards for permitting and regulation by federal /state/municipal governments
- establish an integrated decision-making process
- build an informed constituency for long term stewardship





CRMC's legislative charge: "...to preserve, protect, develop, and where possible, restore the coastal resources of the state for this and succeeding generations..."

The CRMC developed and adopted the First Ocean Spatial Plan in 1983.



Climate Change

Three Choices:

Adapt, Mitigate, Suffer



Rhode Island Ocean Special Area Management Plan (SAMP)

71°50'W 71°40'W 71°30'W 71°20'W 71°10'W 71°0'W 70°50'W

Map Key

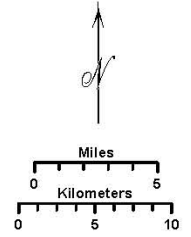
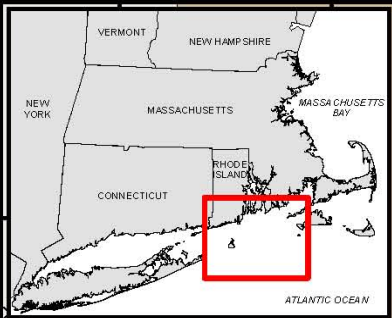
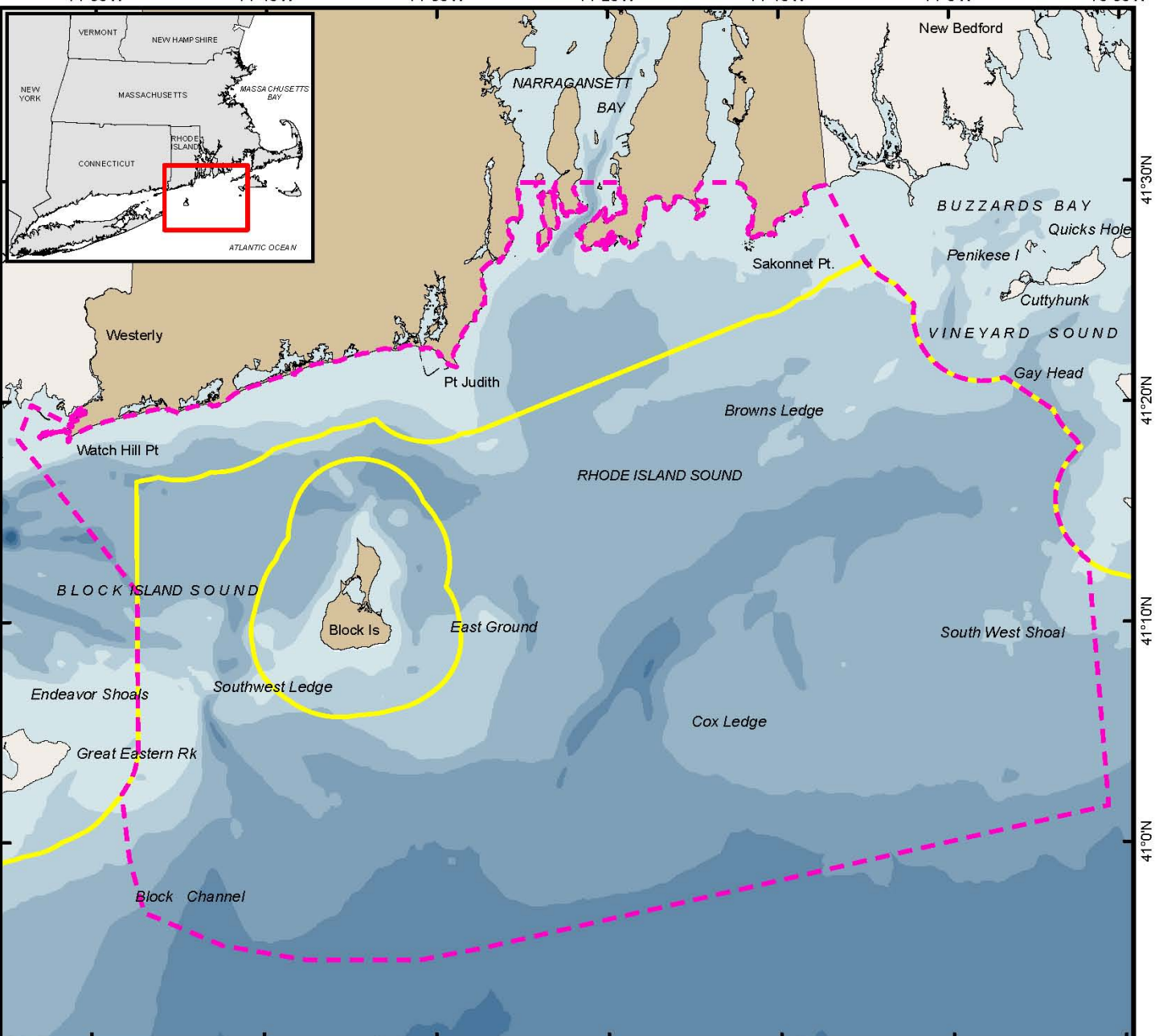
- Proposed Ocean Study Area
- State/Federal Waters Separation

Bathymetry (m)

- 20
- 30
- 40
- 50
- 60
- 70
- 80

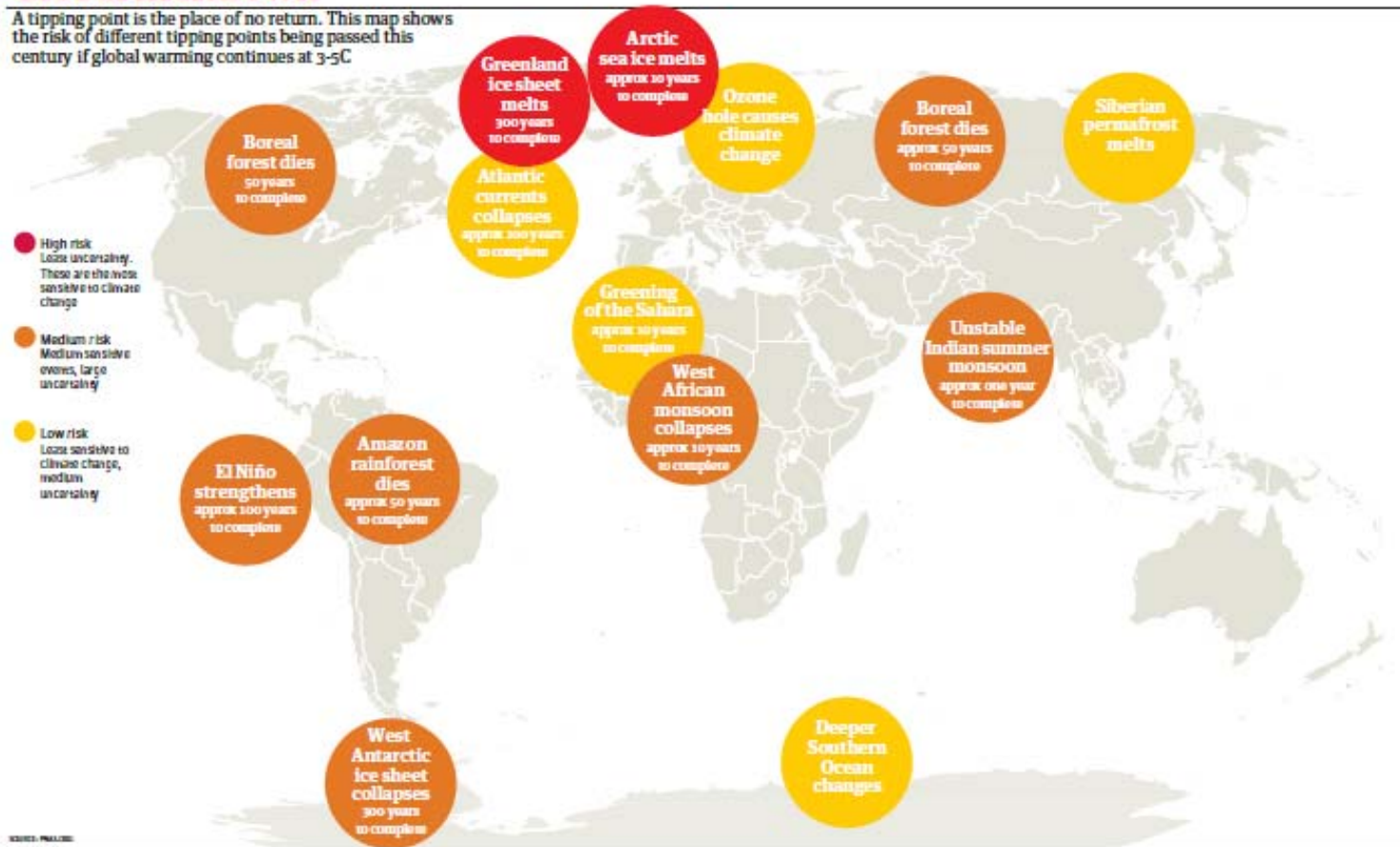
Coordinate System:
 Projection: R1 Stateplane
 Units: Feet
 FIPS Zone: 3800
 Datum: NAD83

For Project Map and Data Products:
http://www.narrbay.org/d_projects/oceansamp



Global meltdown

A tipping point is the place of no return. This map shows the risk of different tipping points being passed this century if global warming continues at 3-5C



Marine Renewable Power

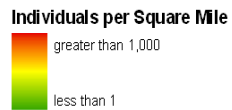
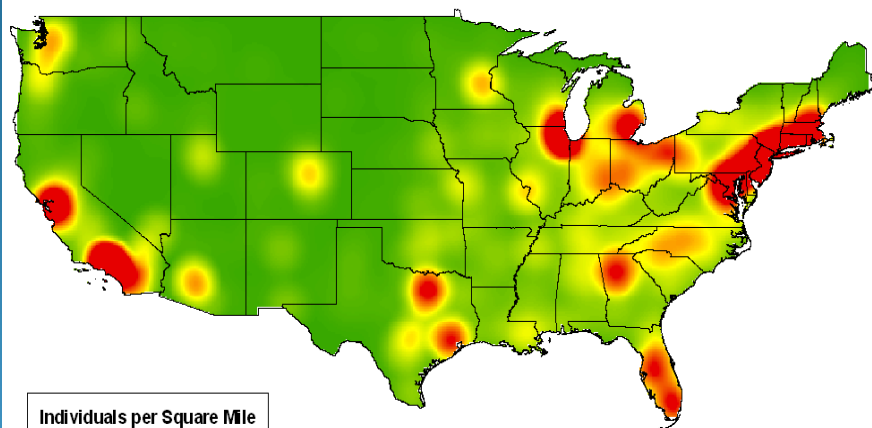
- Wave, devices in limited production
- Tidal flow, prototyping now
- Gulf Stream, not yet prototyped
- OTEC prototypes never perfected (on hold)
- Offshore wind commercial devices have 15 years' experience – VIABLE NOW

Why Offshore Wind?

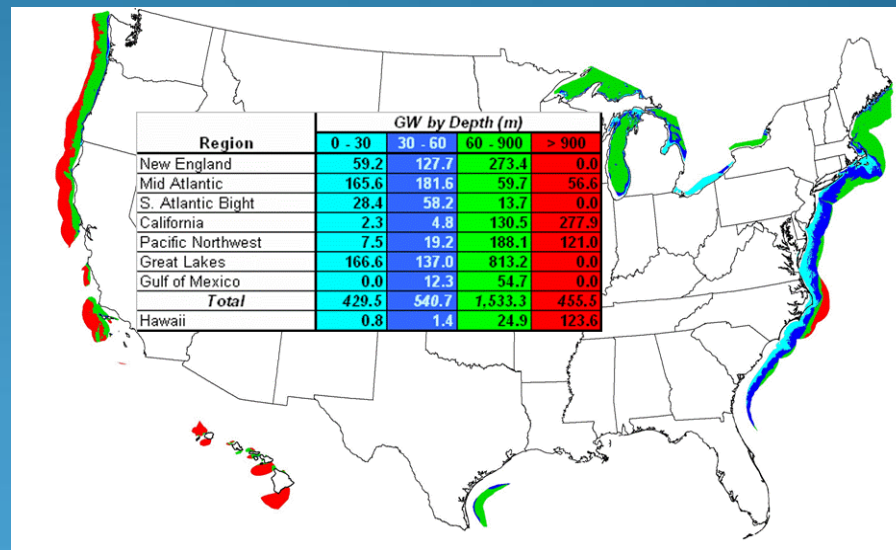
Coastal load centers are transmission-constrained and cannot be easily served by land-based wind.

Wind energy goals cannot be achieved without offshore contributions

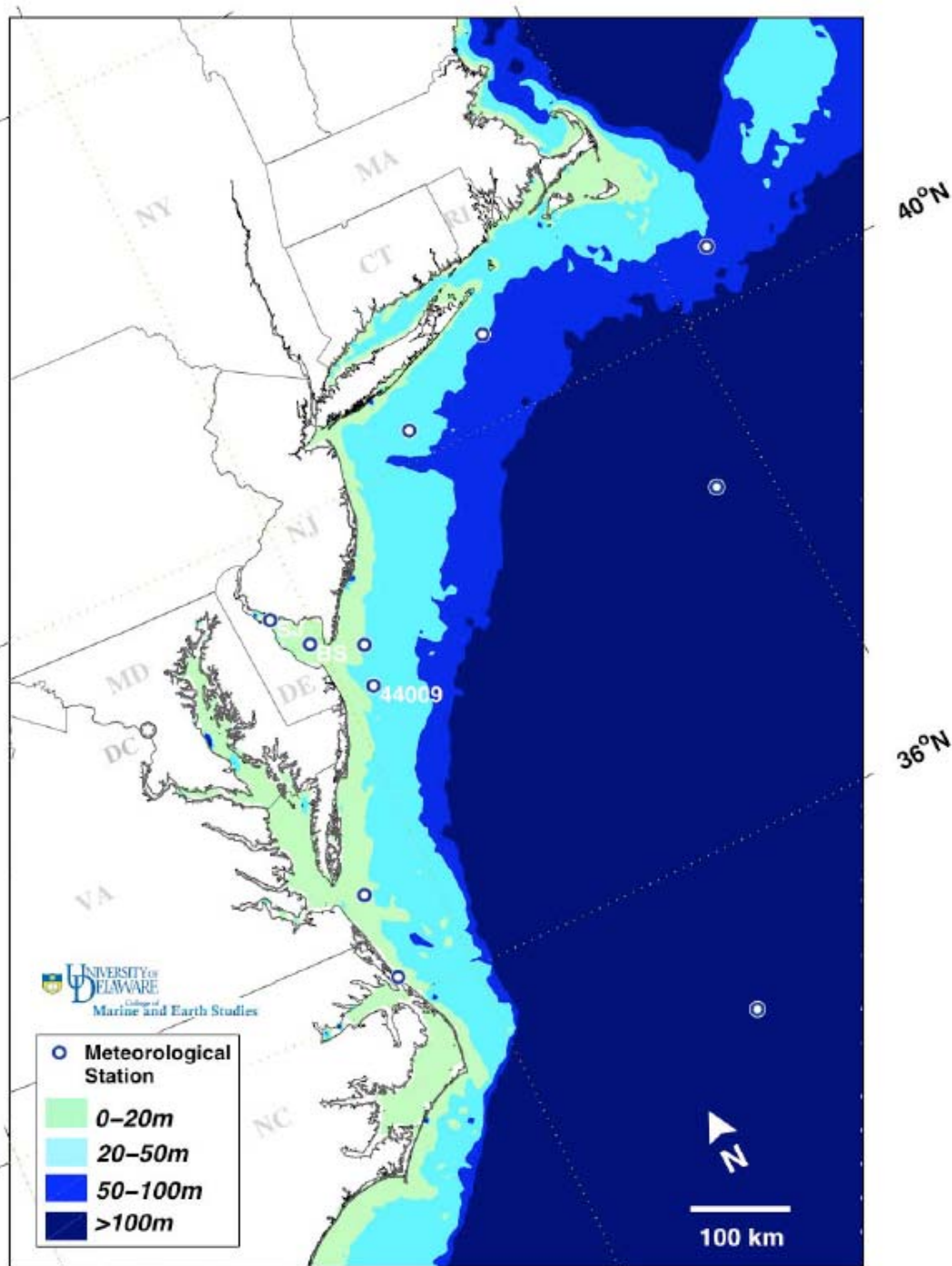
Population Density of the Conterminous United States



U.S. Wind Resource and Bathymetry



28 coastal states use 78% of the electricity in US



Wind Resources of US Mid-Atlantic

m	Excl	GW_a
0-20	0.46	60
20-50	0.40	117
50-100	0.10	153
Total		330

from: Kempton, Archer, Dhanju, Garvine and Jacobson, 2007, *Geophysical Research Letters*

Needs vs. Resource

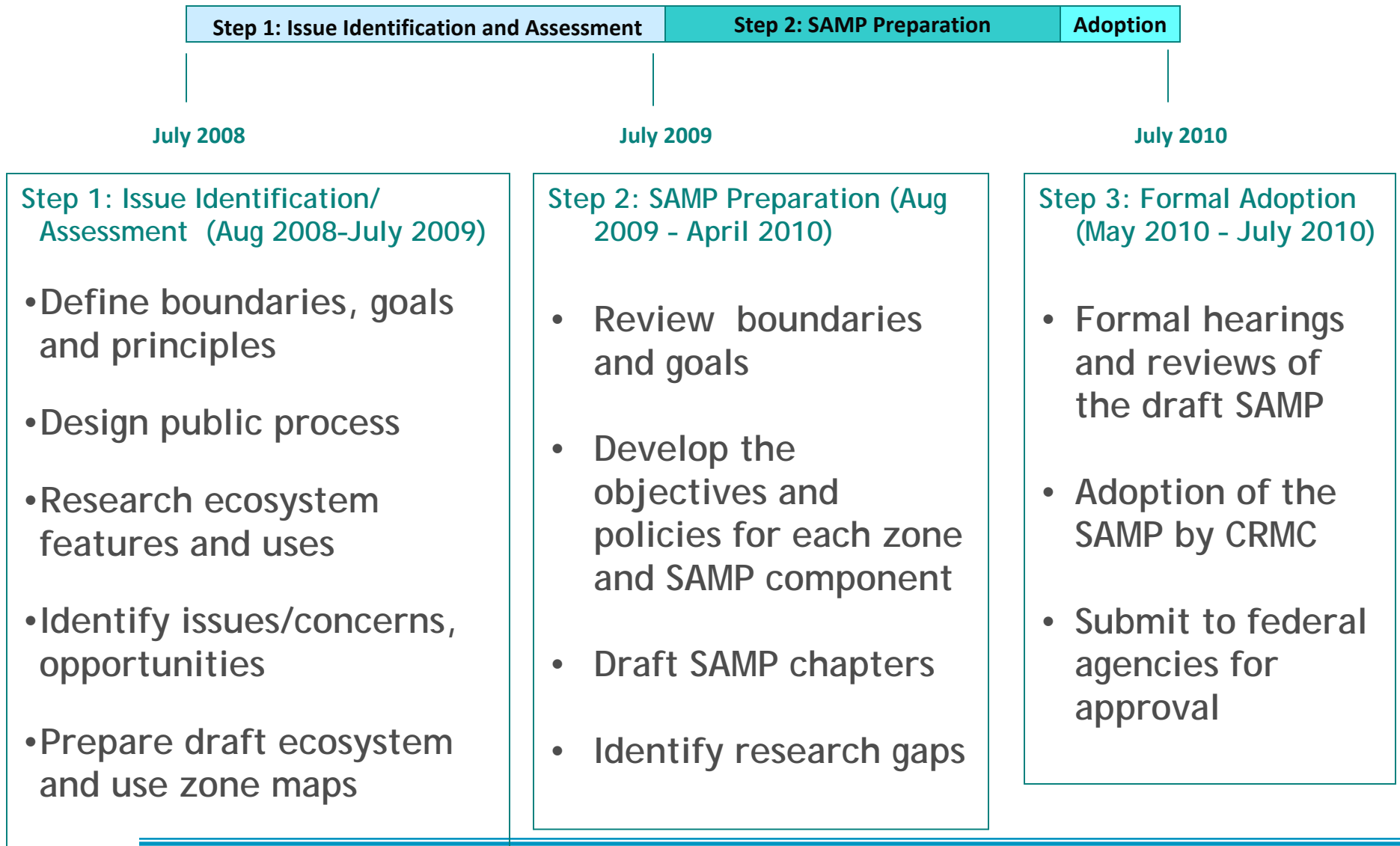
	GW_{avg}
Electricity	73
Cars	29
Heating	83
total	185

m	Excl	GW_a
0-20	0.46	60
20-50	0.40	117
50-100	0.10	153
Total		330

All of electricity, cars and heating uses 2/3 of the wind resource, dropping regional CO_2 by 68%.

Existing CRMC Ocean SAMP Process*

August 1, 2008 – July 31, 2010



* This timeline is based on current knowledge.

Ocean SAMP Document

The SAMP will include the following:

- Ecology of the Study Area
- Cultural and Historical Resources
- Fisheries Resources
- Recreation and Tourism
- Marine Transportation
- Infrastructure
- Renewable Energy
- Future Uses
- Federal Process and Federal Consistency



SAMP Research

Research Topics Include...

- Wind resources
- Marine mammals and birds
- Fisheries uses
- Physical oceanography
- Ecosystem interactions
- Sediment and benthic habitat
- Cultural resources
- Acoustics and electromagnetic effects
- Meteorology
- Engineering
- Marine transportation uses



Preliminary Spatial Analysis Used To Screen Candidate Areas For Focused Research And Data Acquisition For Renewable Energy Siting

Overview

Tier #1 Analysis (Hard Constraints) -

Energy Resource (wind, waves, tidal/mean currents, OTEC)

Exclusions

Technology Type

Extended (TDI, Visualization, Marine Transportation)

Tier #2 Analysis -

Use conflicts/collaboration and environmental impacts

Technology Based Assessment

Objective: Develop a metric based on technical challenge to power production potential to screen for sites.

$$\text{TDI} = \text{TCI}/\text{PPP}$$

where TDI – Technical Development Index

TCI- Technical Challenge Index

PPP- Power Production Potential

Presented in form of dimensionless values (Predicted TDI divided by lowest TDI possible in area of interest)

Tier #1 Screening (Hard Constraints)

Wind Resource

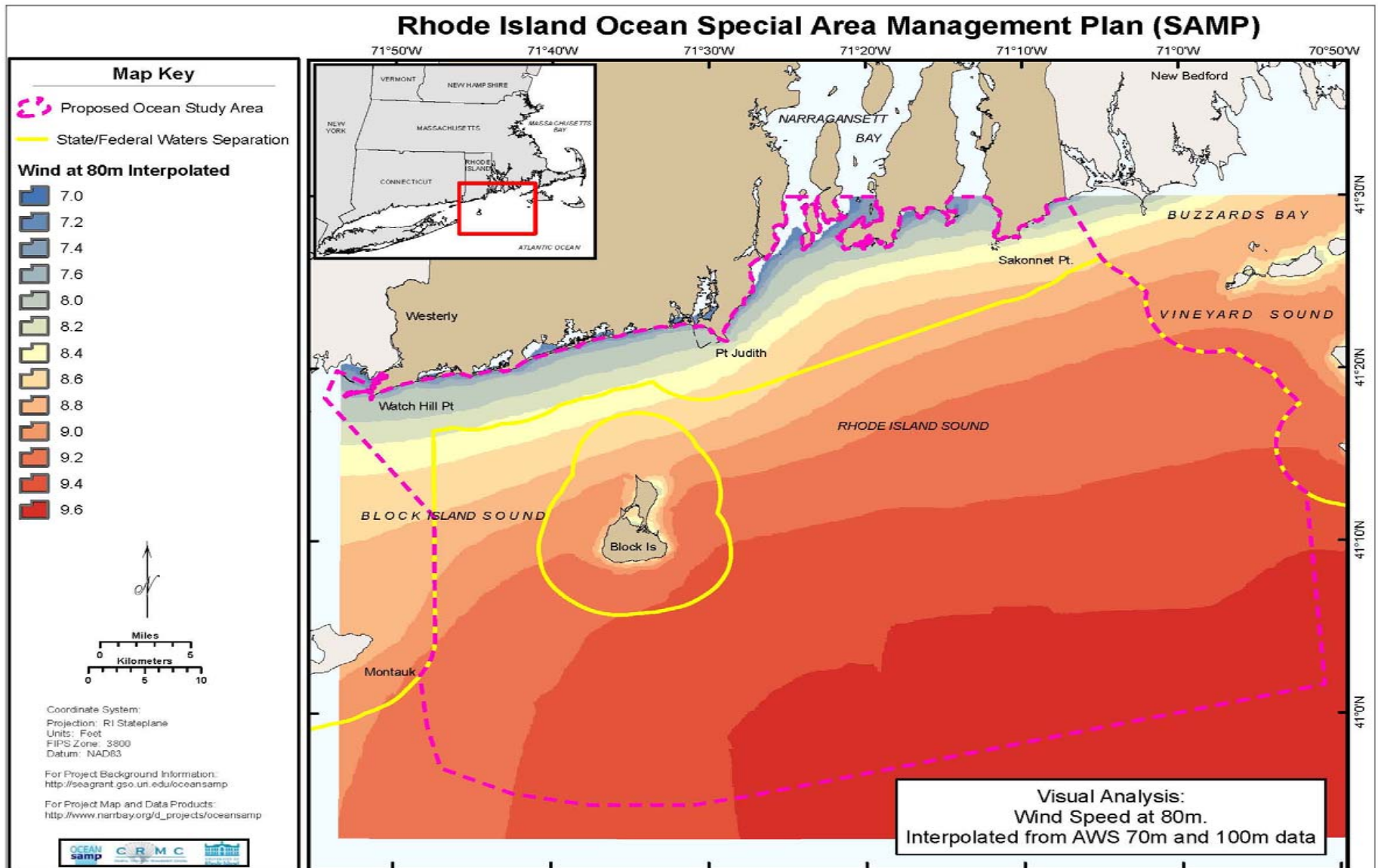
- Adequate Wind Resources (greater than 7 m/sec at 80 m, hub height)

Exclusions

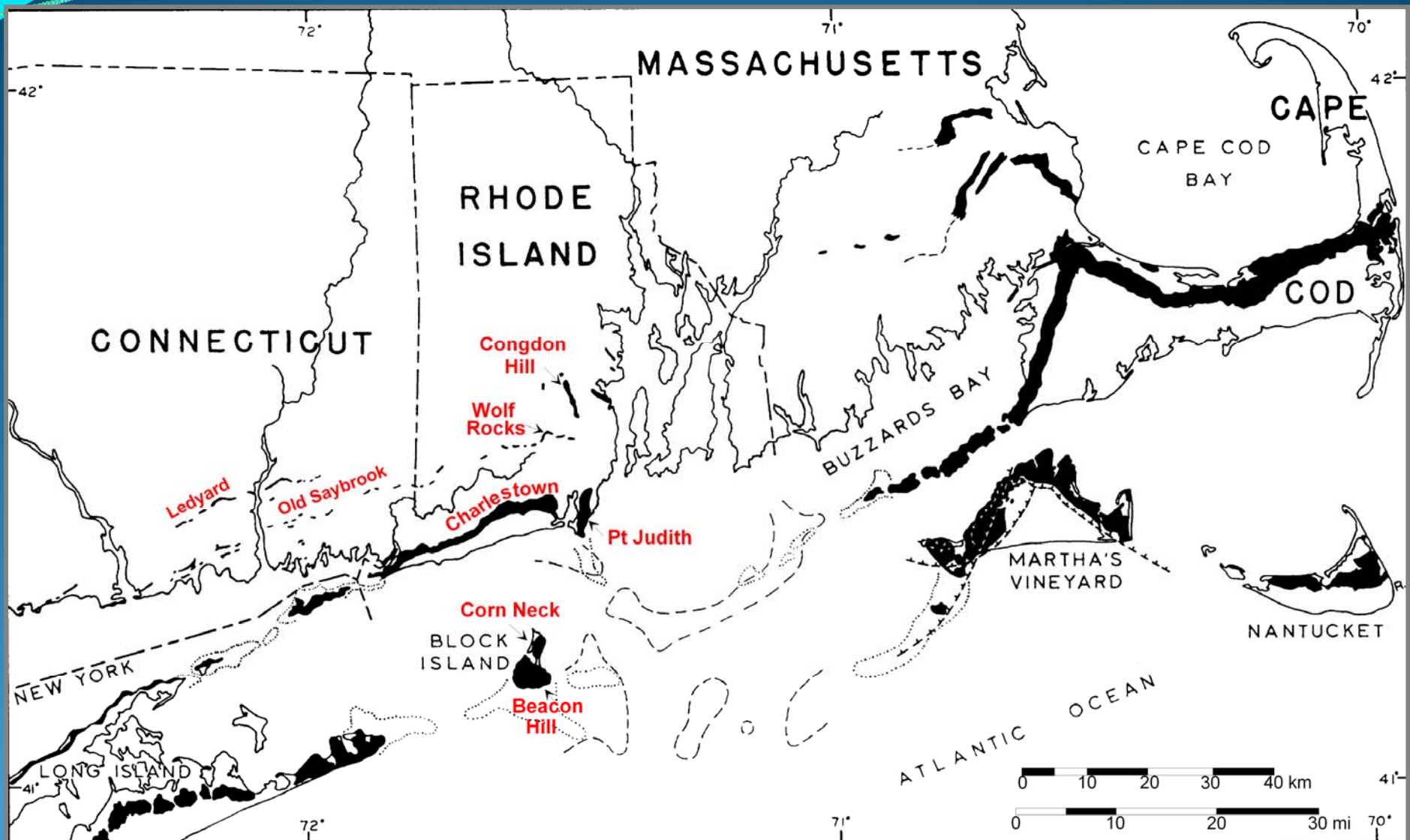
- Navigation Areas -Regulated (shipping lanes, precautionary areas, preferred routes)
- Vessel tracks (AIS data)
- Ferry Routes
- Regulated areas (disposal site, military areas, unexploded ordnance, marine protected areas)
- Airport buffer zones
- Coastal buffer zone (1 km)
- Cable Areas (?)

Estimates of 80 m wind speeds

AWS TrueWinds data

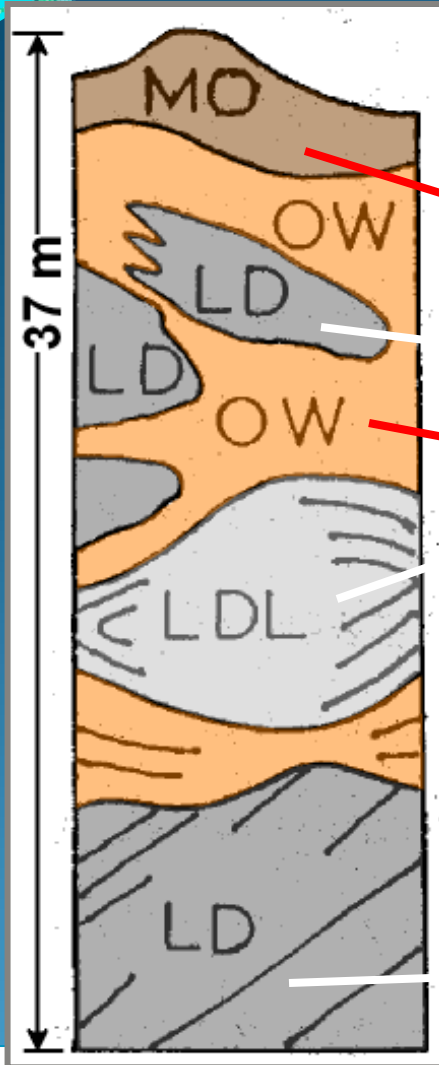


End Moraines of Southeastern New England



Schafer and Hartshorn, 1965; Sirkin, 1982



Mohegan Bluffs, BI – Complex Stratigraphy



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71°50'W 71°40'W 71°30'W 71°20'W 71°10'W 71°0'W 70°50'W

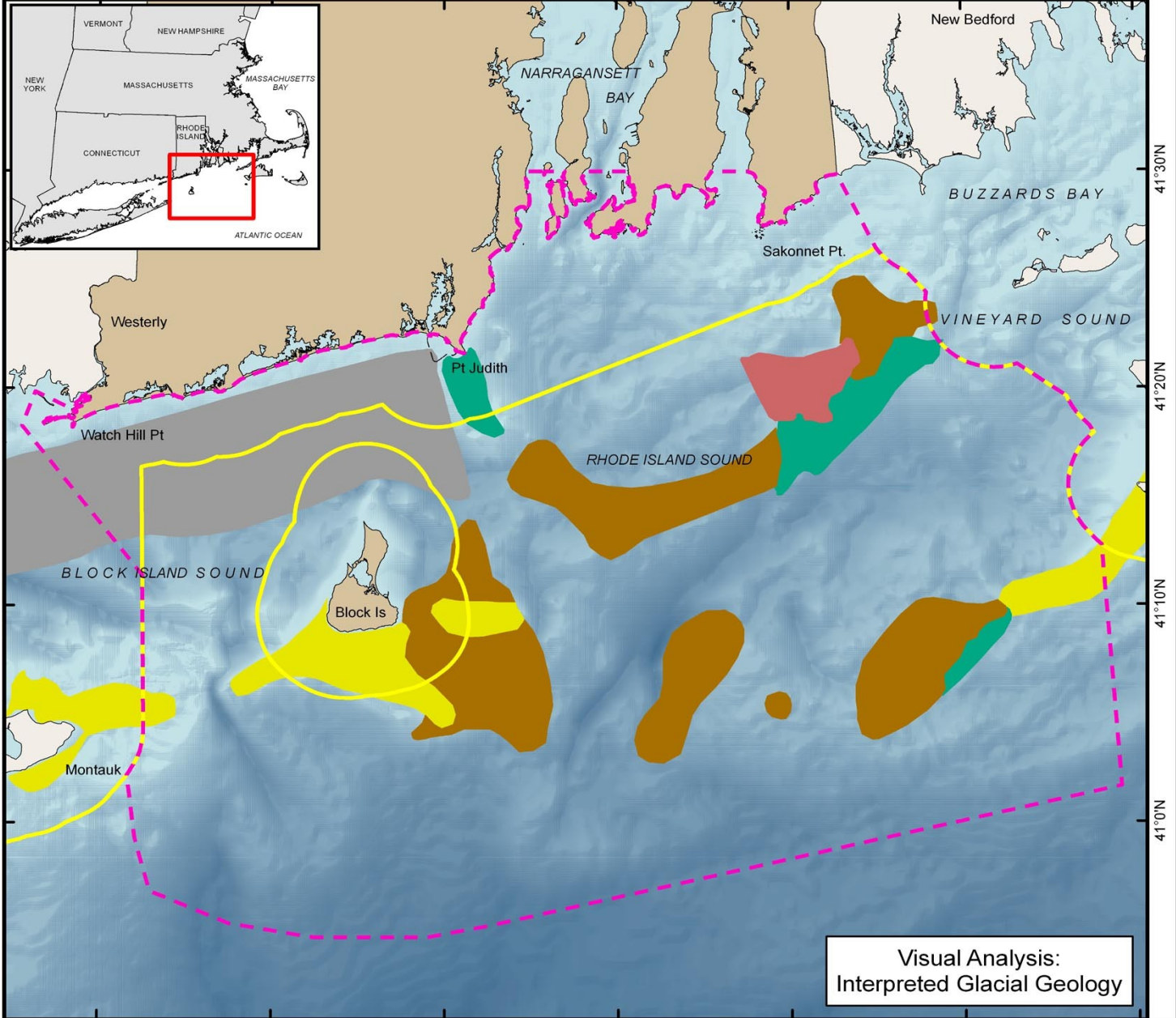
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-  State/Federal Waters Separation

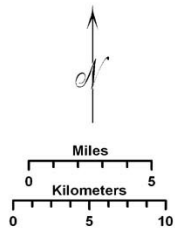
Glacial Geology

Stone-Borns 1986

-  Glacial Lakefloor
-  End Moraine - Blocky
-  End moraine - Boulder
-  End moraine - Bold., Cob., Sand
-  Tertiary Manetto Gravel



41°30'N
41°20'N
41°10'N
41°0'N



Coordinate System:
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Visual Analysis:
 Interpreted Glacial Geology





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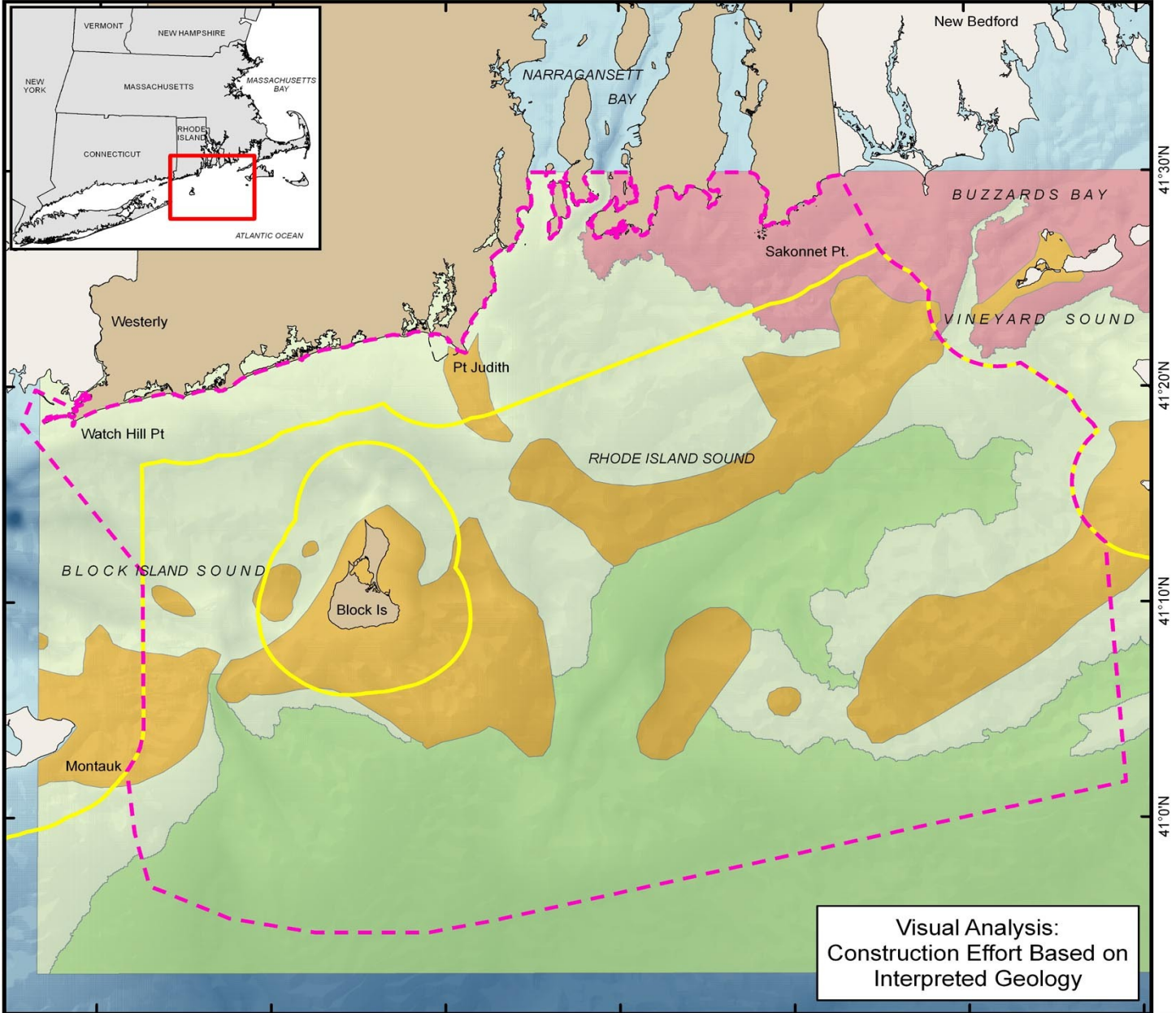
Construction Effort

-  1 - 2
-  3
-  4 - 5
-  5

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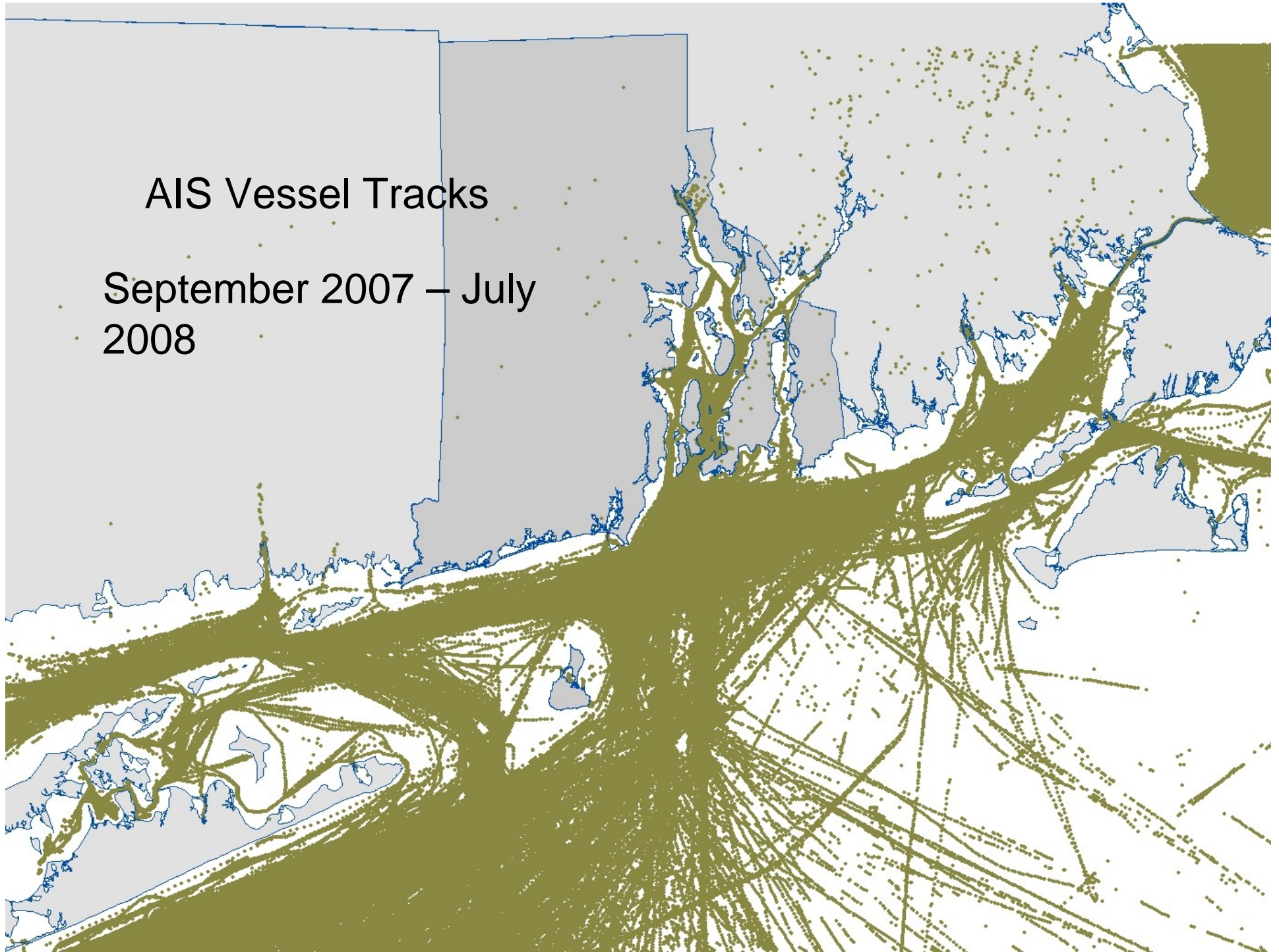
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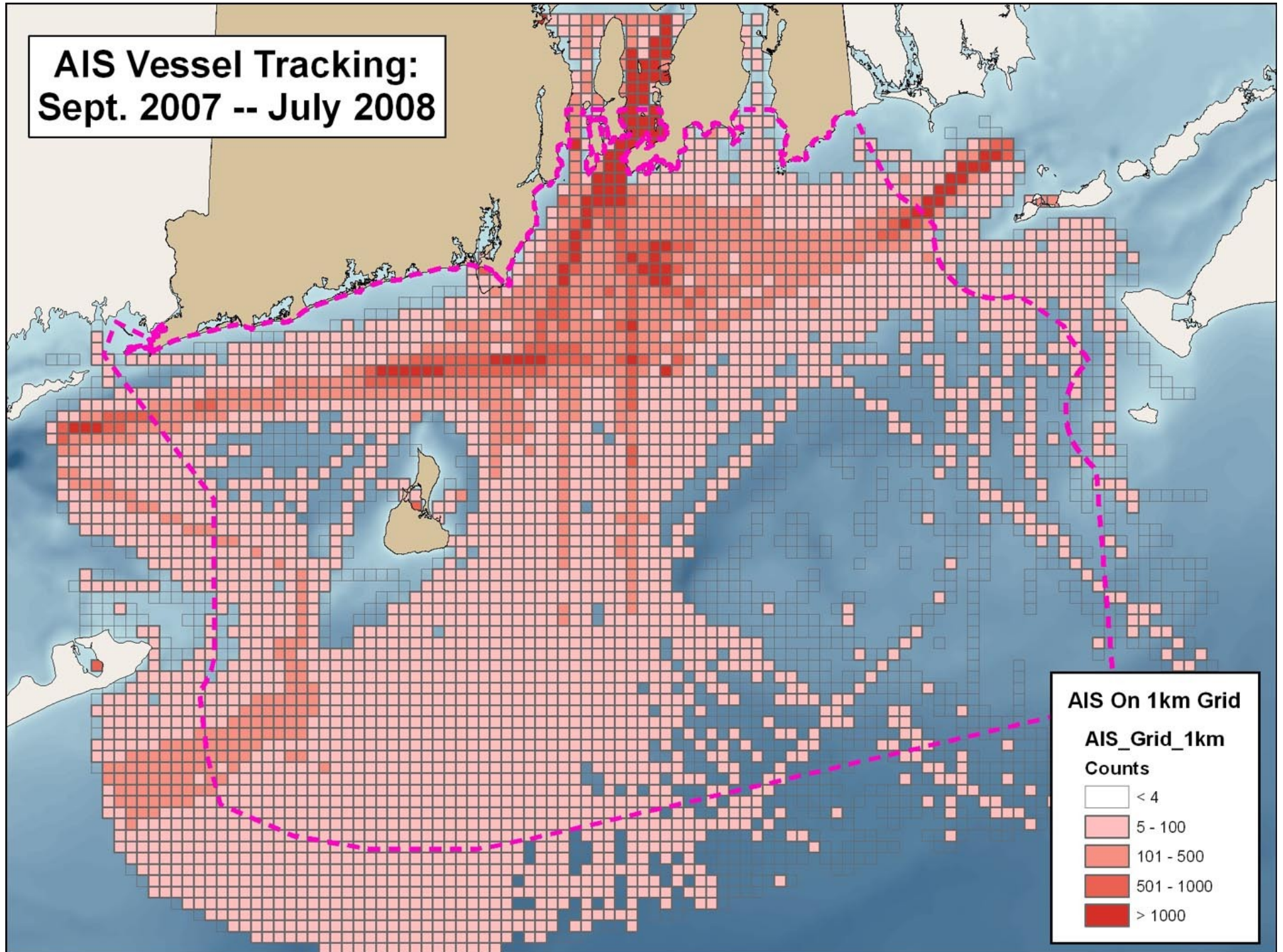
41°30'N
41°20'N
41°10'N
41°0'N

AIS Vessel Tracks

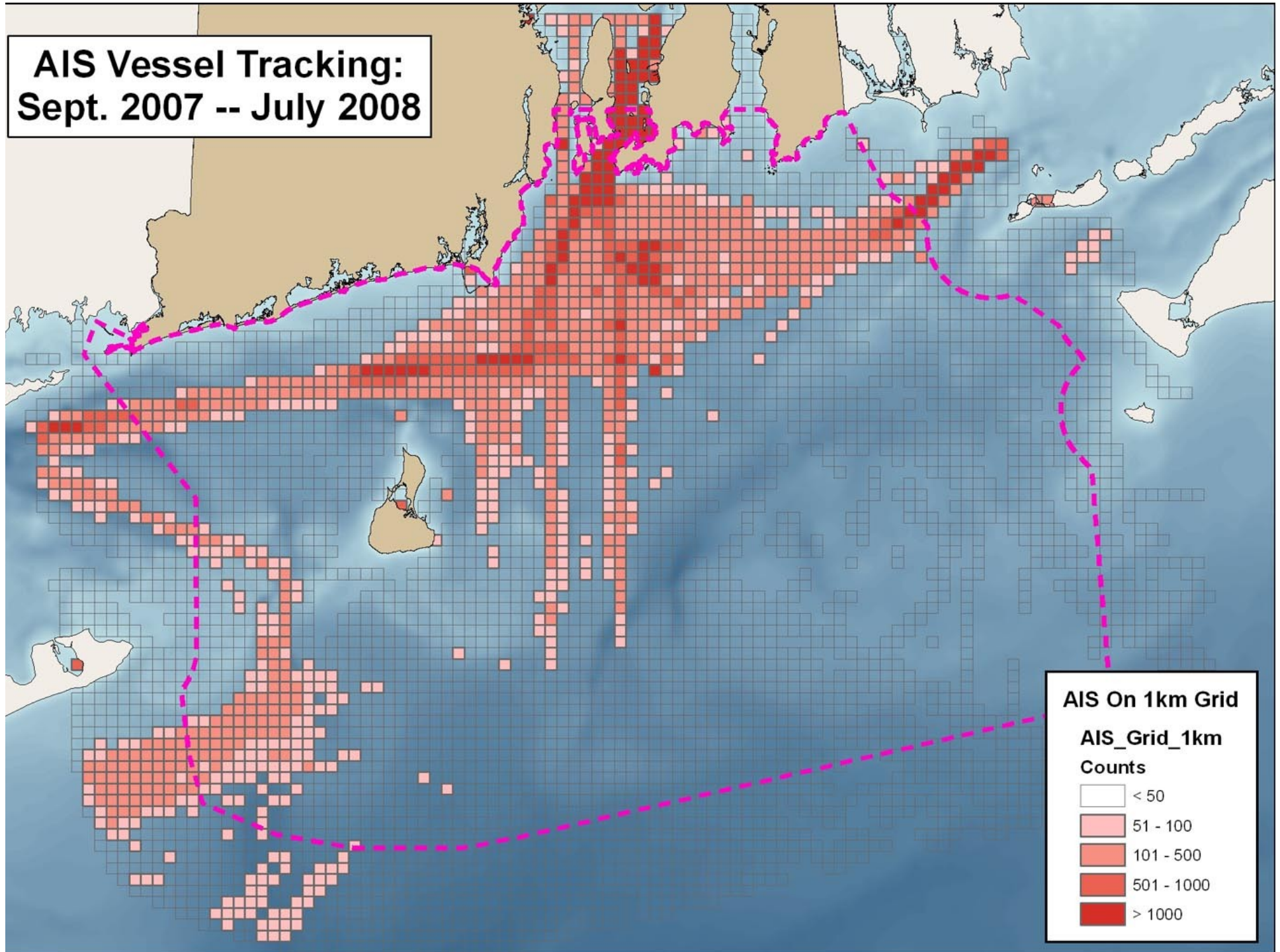
September 2007 – July
2008



AIS Vessel Tracking: Sept. 2007 -- July 2008











AIS Vessel Tracking: Sept. 2007 -- July 2008



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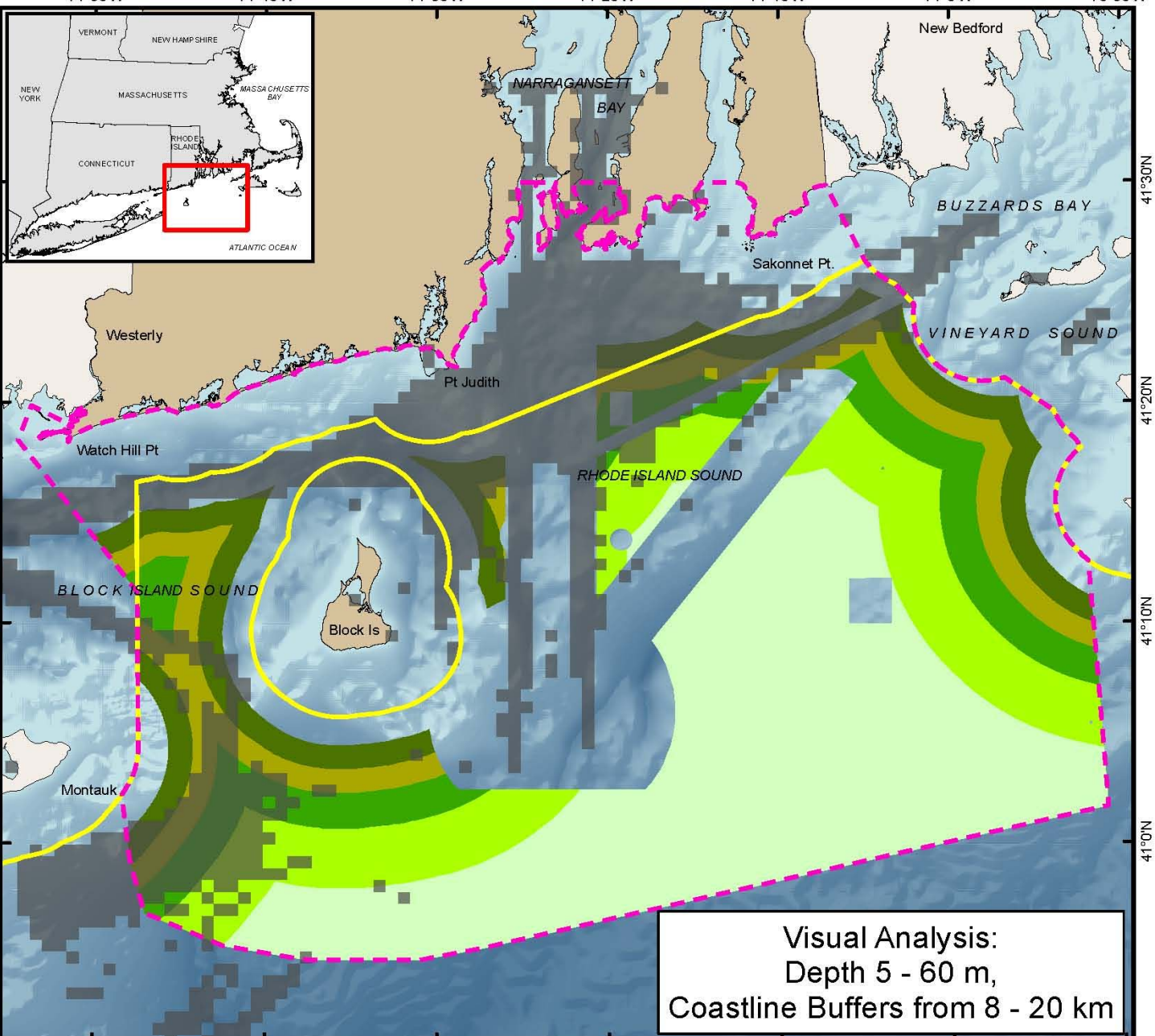
Map Key

-  Proposed Ocean Study Area
-  State/Federal Waters Separation
-  AIS Vessel Traffic
-  20 Kilometer Buffer
-  15 Kilometer Buffer
-  12 Kilometer Buffer
-  10 Kilometer Buffer
-  8 Kilometer Buffer

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Visual Analysis:
 Depth 5 - 60 m,
 Coastline Buffers from 8 - 20 km













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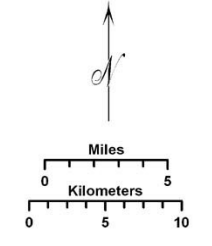

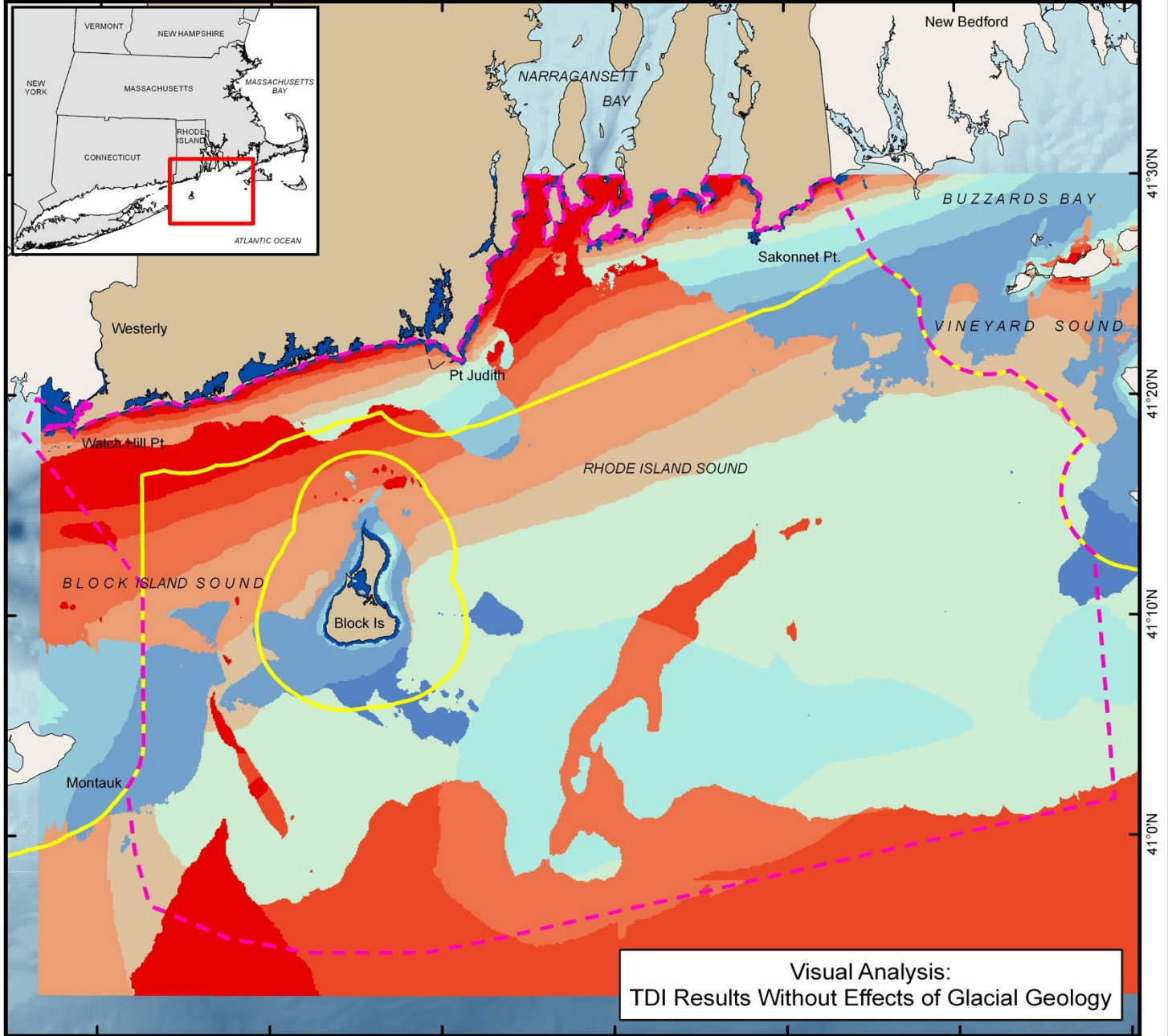
TDI - No Geology

-  1.0
-  1.1
-  1.2
-  1.3
-  1.4
-  1.5
-  1.6
-  1.7
-  1.8
-  1.9
-  2.0
-  2.1

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41°30'N
41°20'N
41°10'N
41°0'N

Visual Analysis:
TDI Results Without Effects of Glacial Geology

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71°50'W 71°40'W 71°30'W 71°20'W 71°10'W 71°0'W 70°50'W

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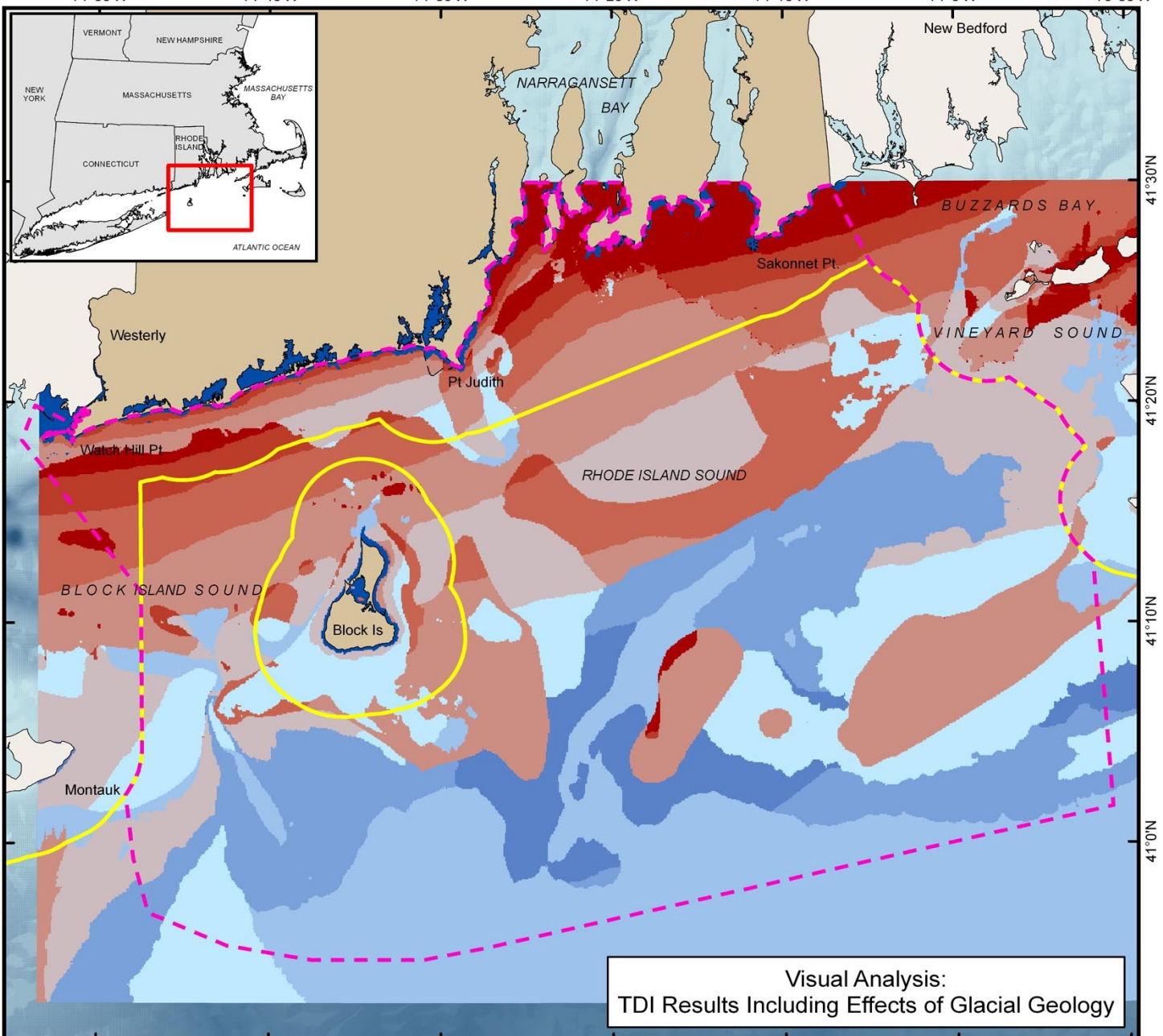
TDI - With Geology

- 1.00
- 1.25
- 1.50
- 1.75
- 2.00
- 2.25
- 2.50
- 2.75
- 3.00
- 3.25
- 3.50

Coordinate System:
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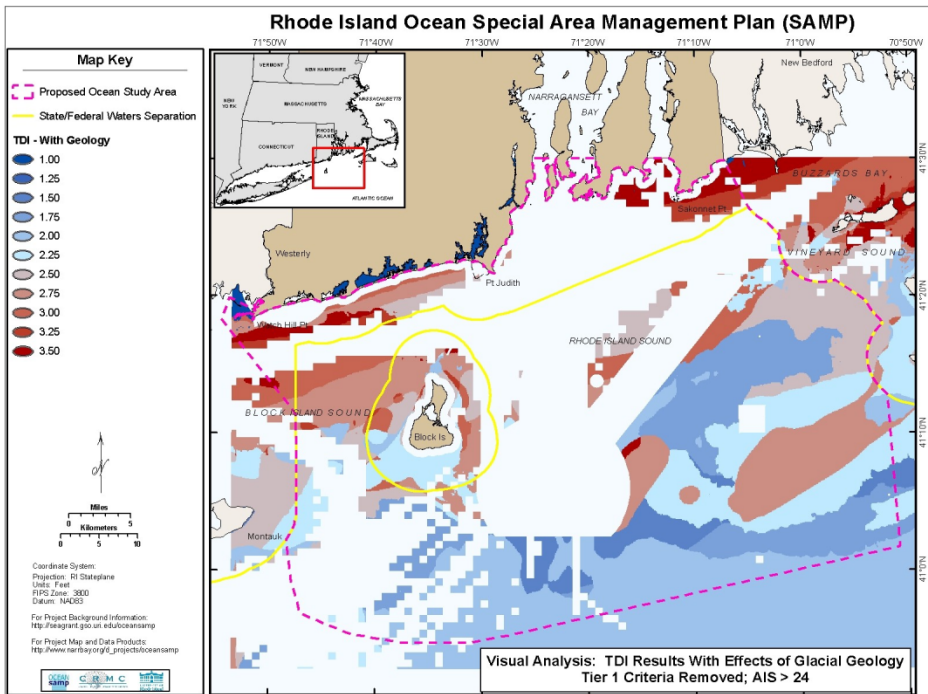
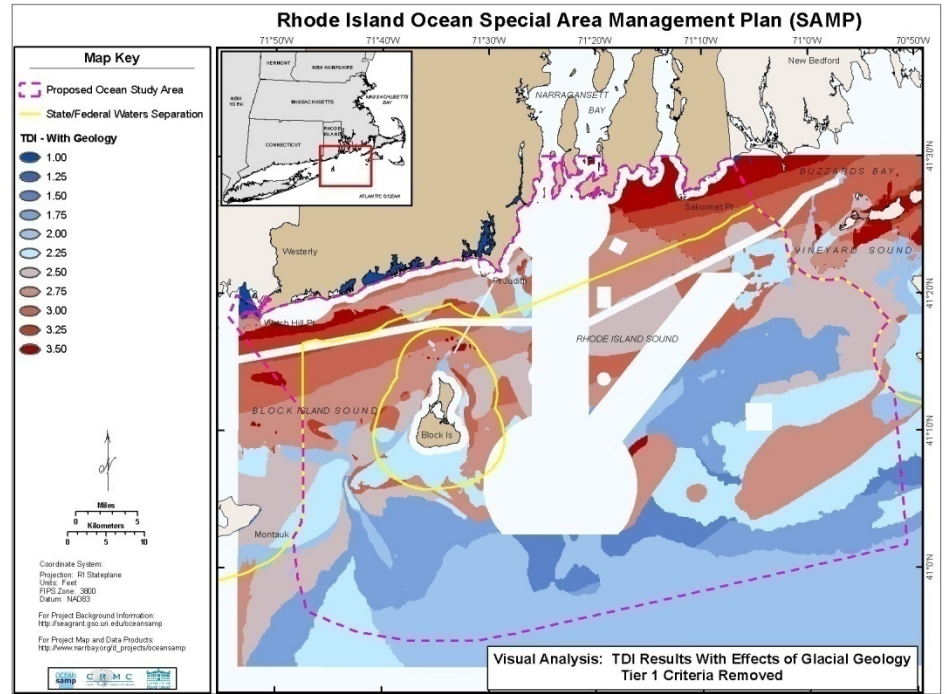
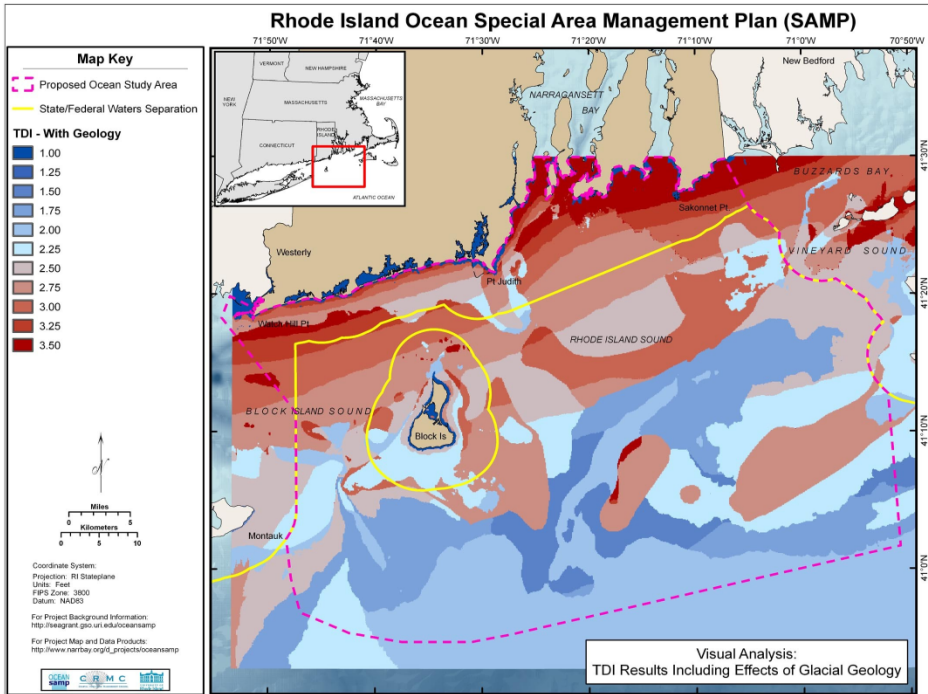
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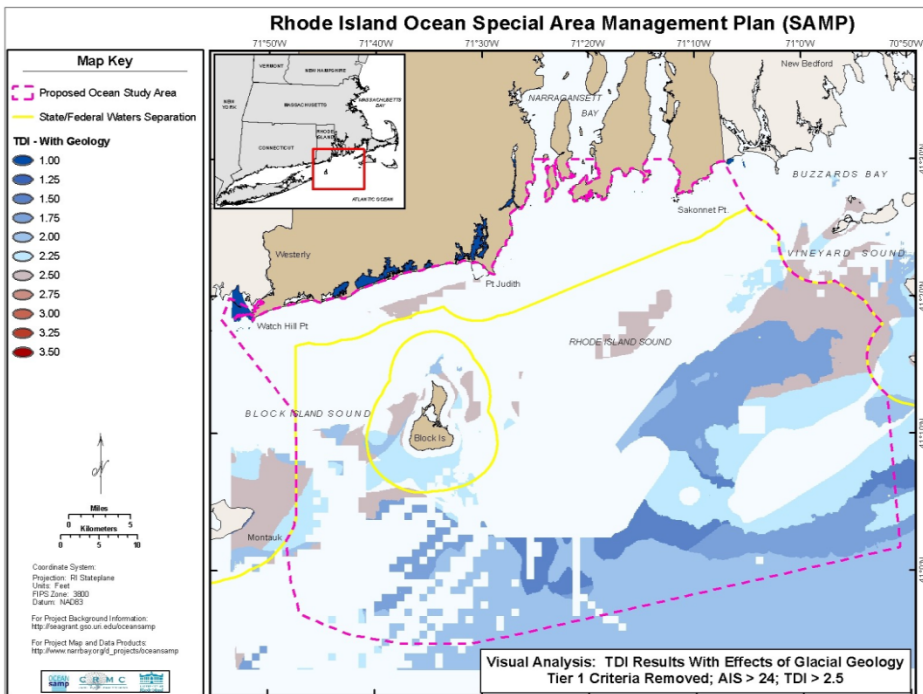
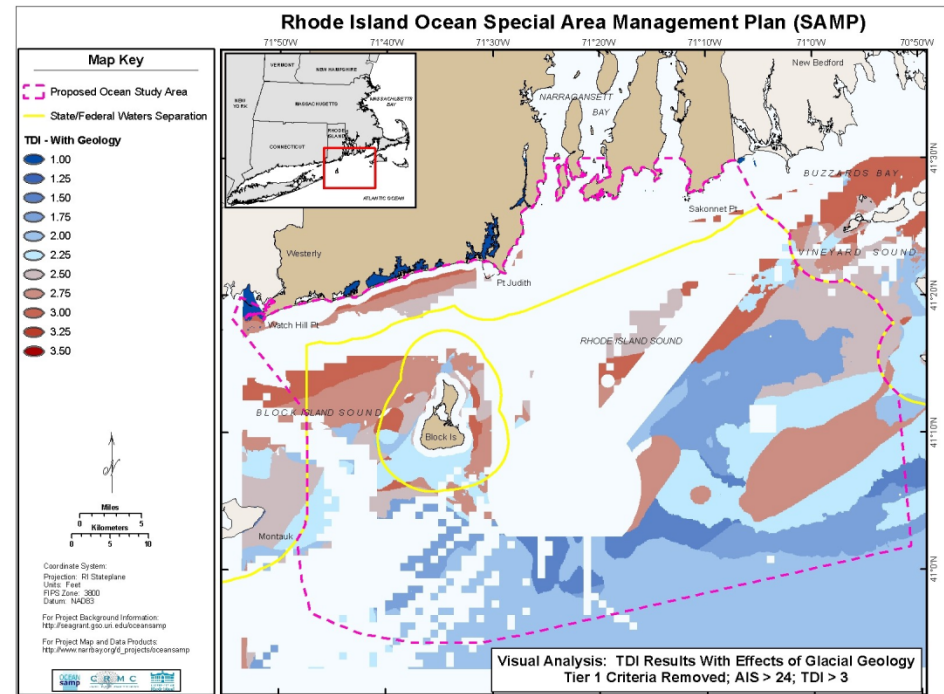
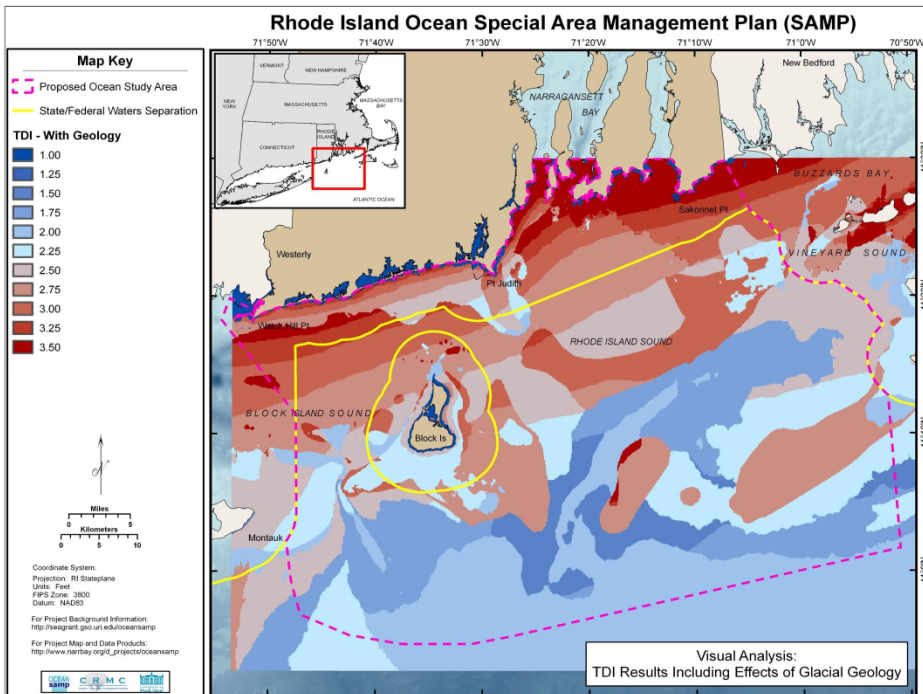


41°30'N
41°20'N
41°10'N
41°0'N

Visual Analysis:
TDI Results Including Effects of Glacial Geology



AIS SERIES



TDI Series

TDI > 3, TDI > 2.5

Next Steps

- Perform Tier #2 analysis

Use conflicts:

Commercial and recreational fishing

Recreational boating

Existing licenses (leases)

Aggregate extraction

Conservation

Aquaculture

Next Steps...(cont'd)

Tier # 2 Screening

Environmental Impact:

Birds

Fish and fish habitat

Marine mammals and turtles

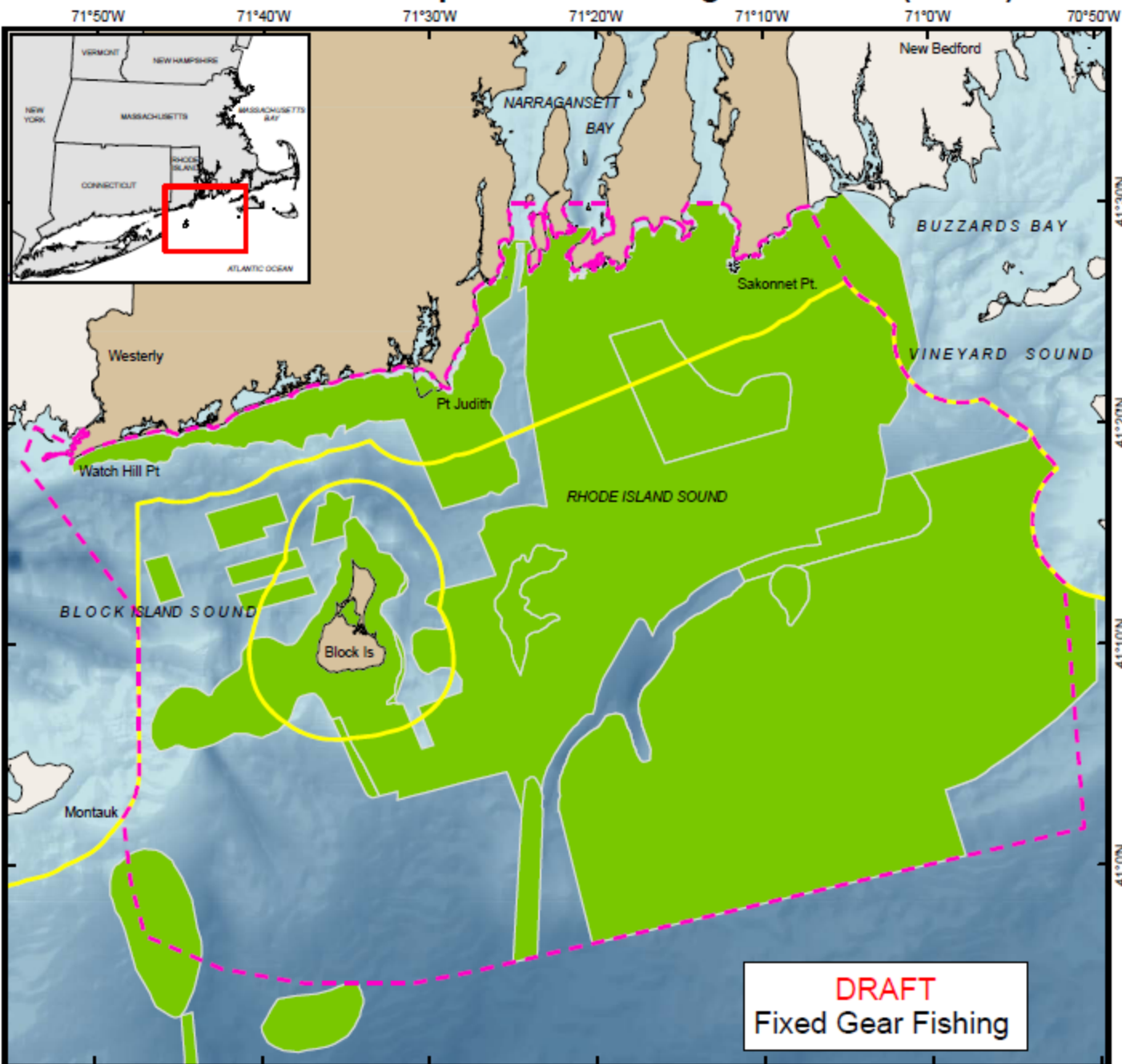
Water and air quality

Historical and cultural resources

Rhode Island Ocean Special Area Management Plan (SAMP)

Map Key

- Proposed Ocean Study Area
- State/Federal Waters Separation
- Fixed Gear Fishing



Coordinate System:
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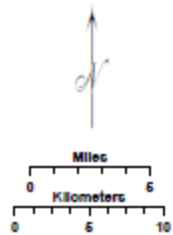


DRAFT
Fixed Gear Fishing

Rhode Island Ocean Special Area Management Plan (SAMP)

Map Key

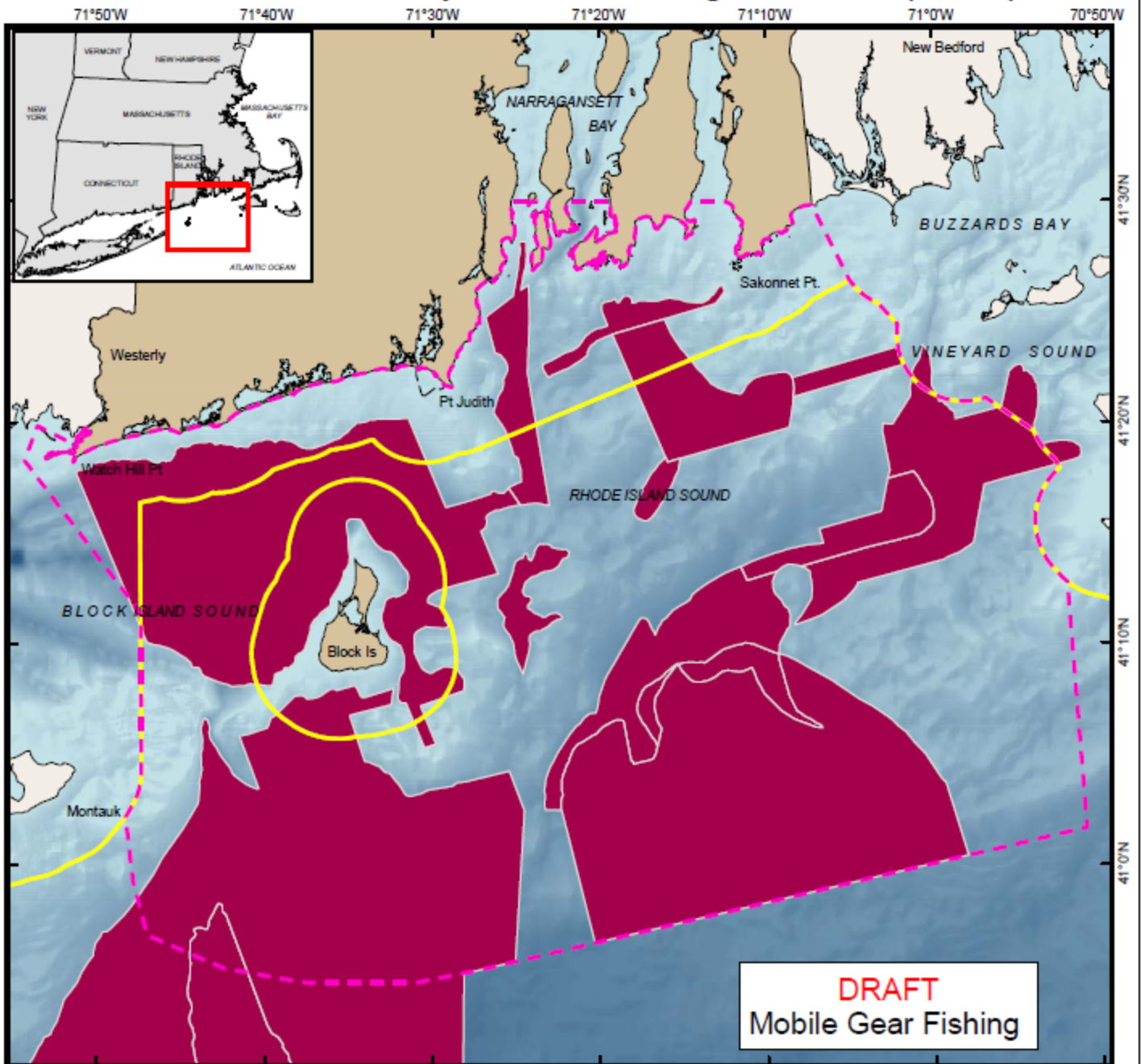
-  Proposed Ocean Study Area
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-  Mobile Gear Fishing



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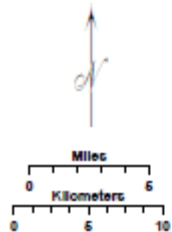
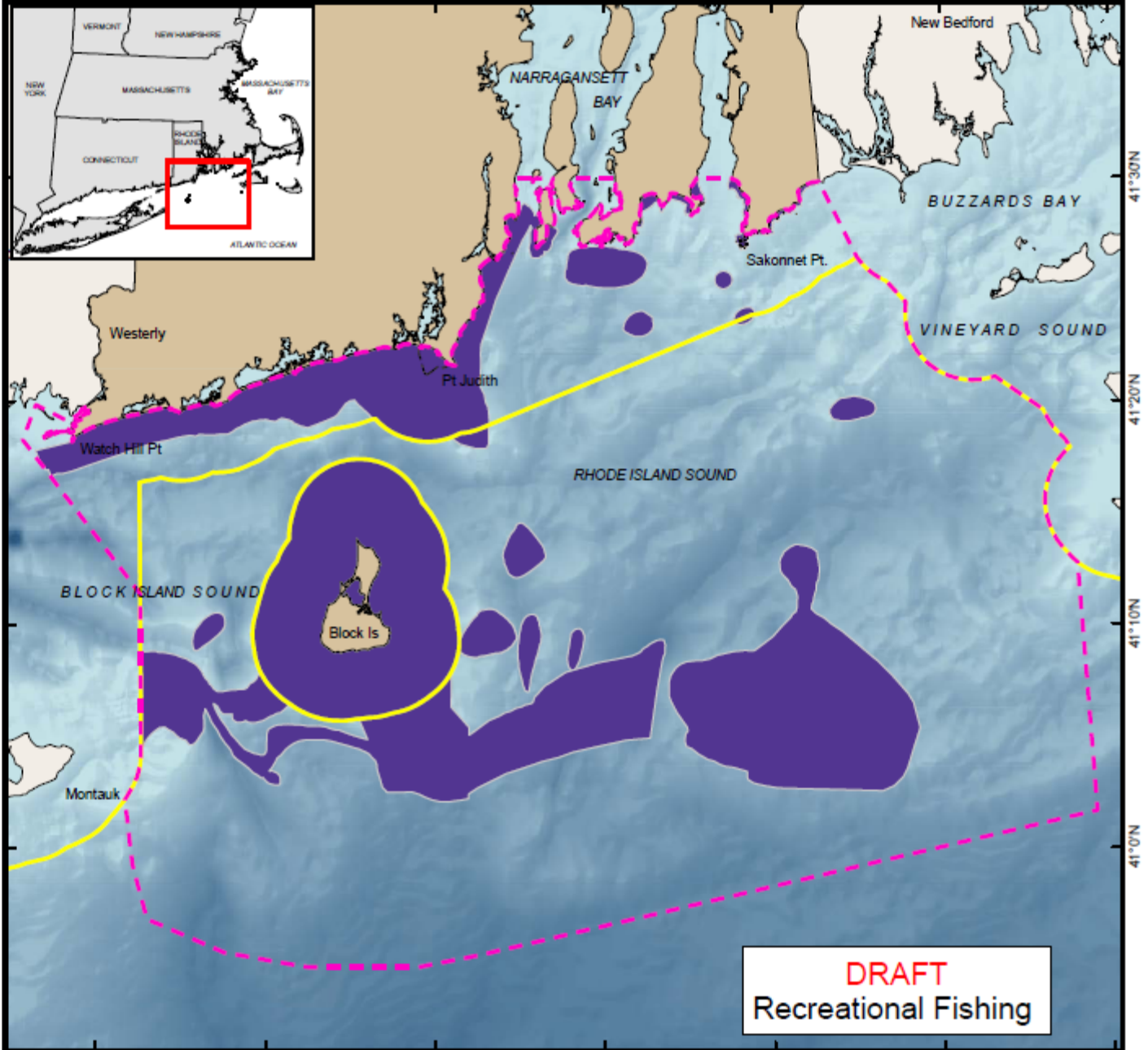
DRAFT
Mobile Gear Fishing

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71°50'W 71°40'W 71°30'W 71°20'W 71°10'W 71°0'W 70°50'W

Map Key

-  Proposed Ocean Study Area
-  State/Federal Waters Separation
-  Recreational Fishing



Coordinate System:

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Units: Feet

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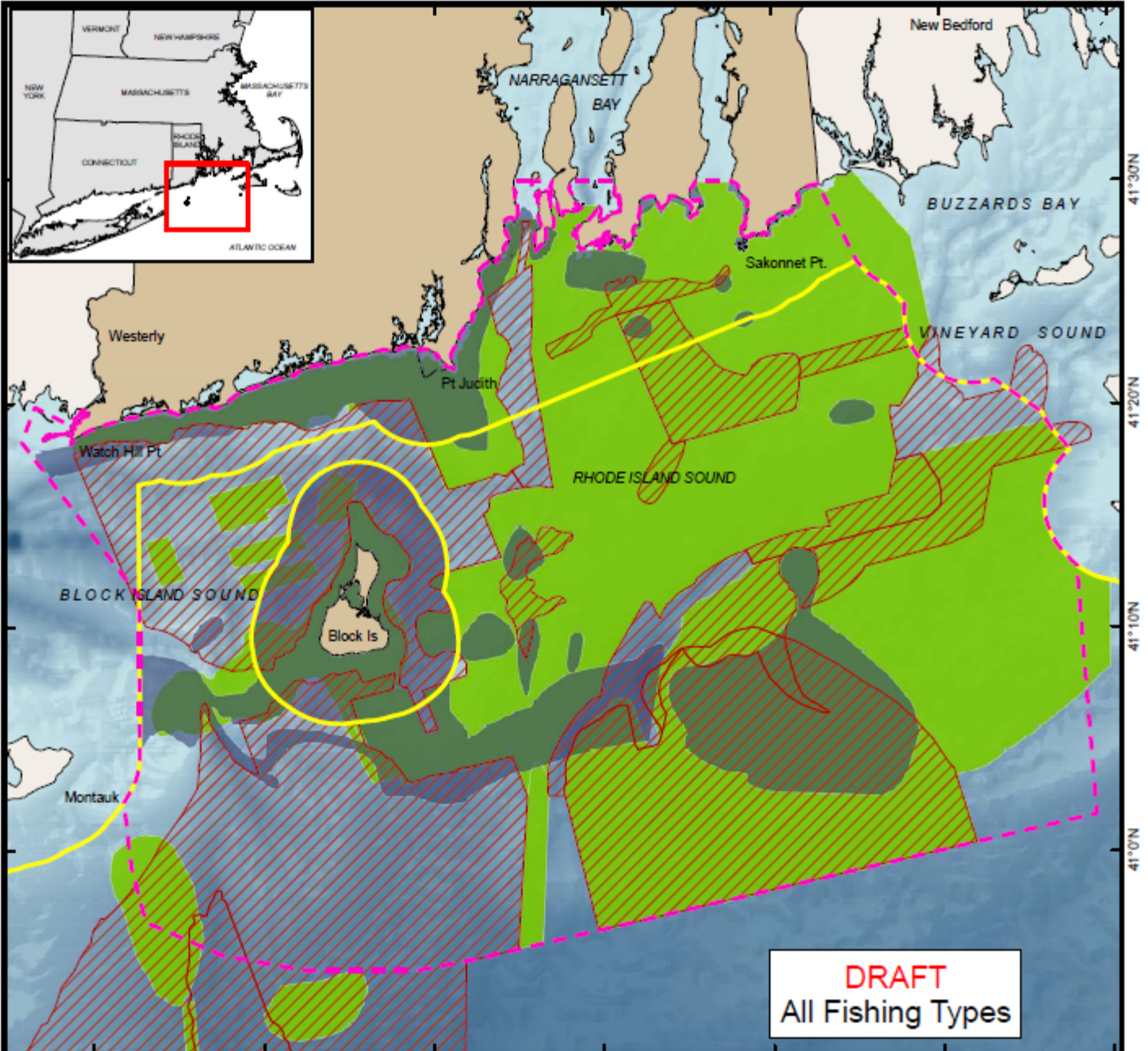
DRAFT
Recreational Fishing

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Map Key

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- Mobile Gear Fishing
- Recreational Fishing
- Fixed Gear Fishing



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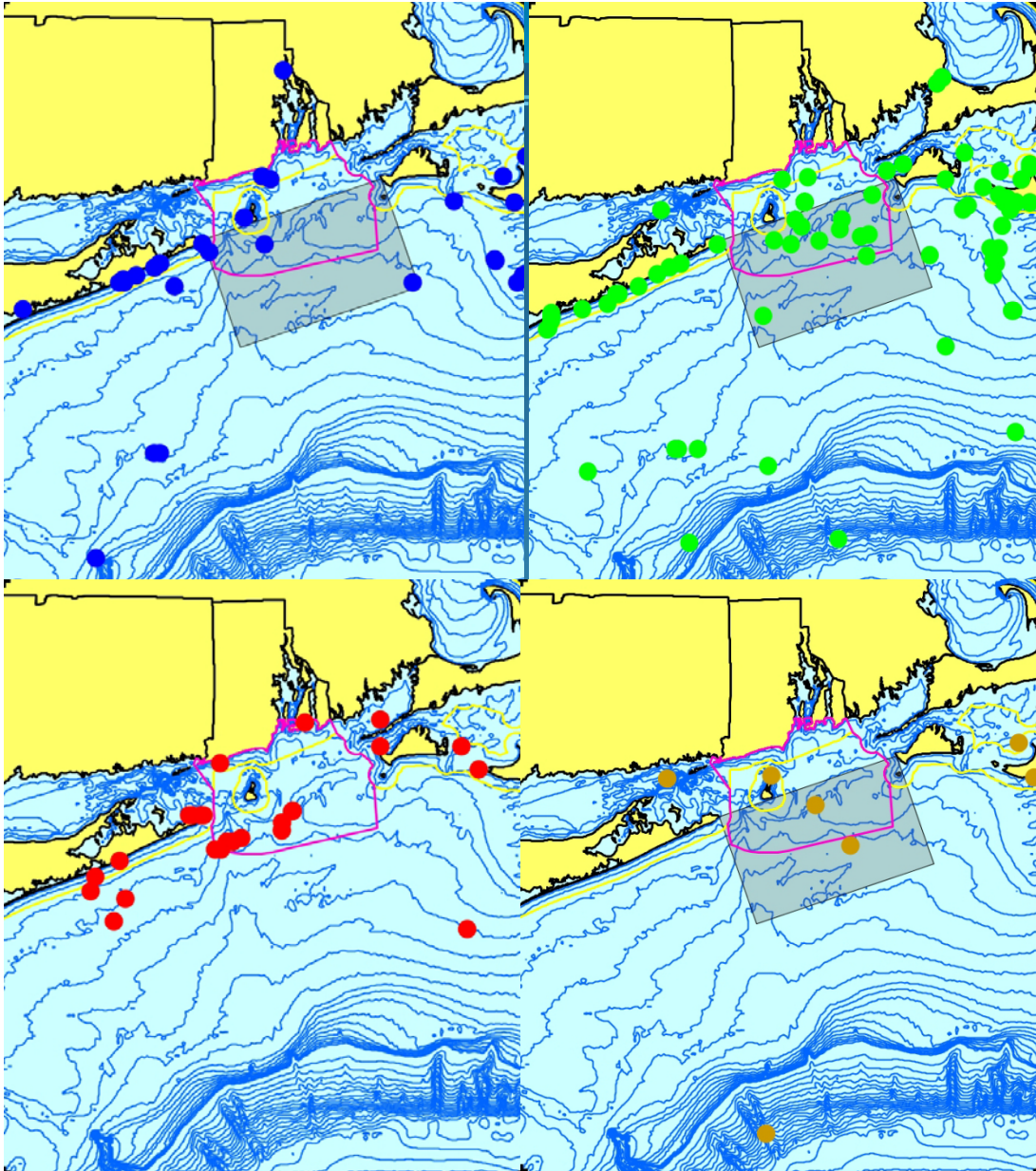
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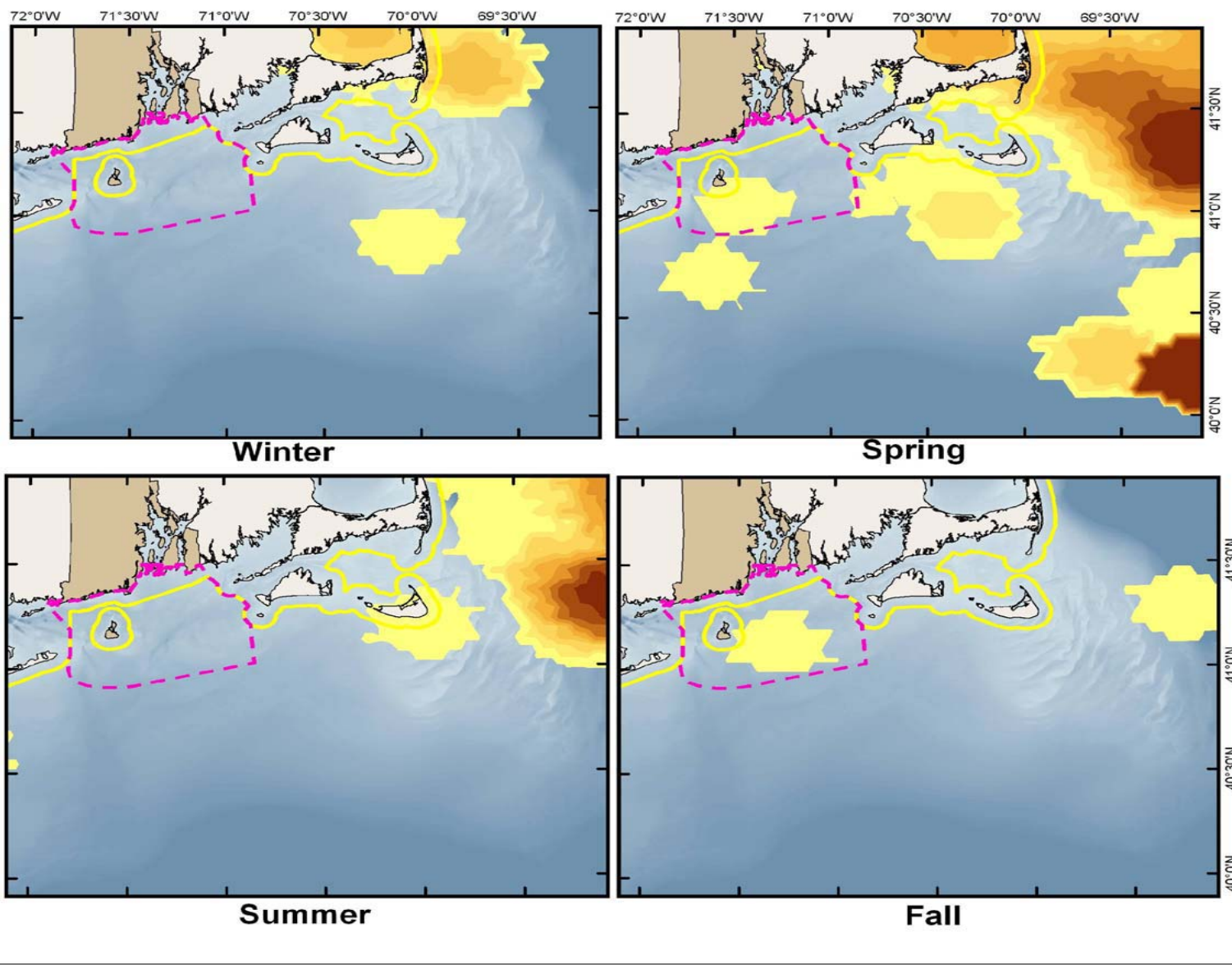


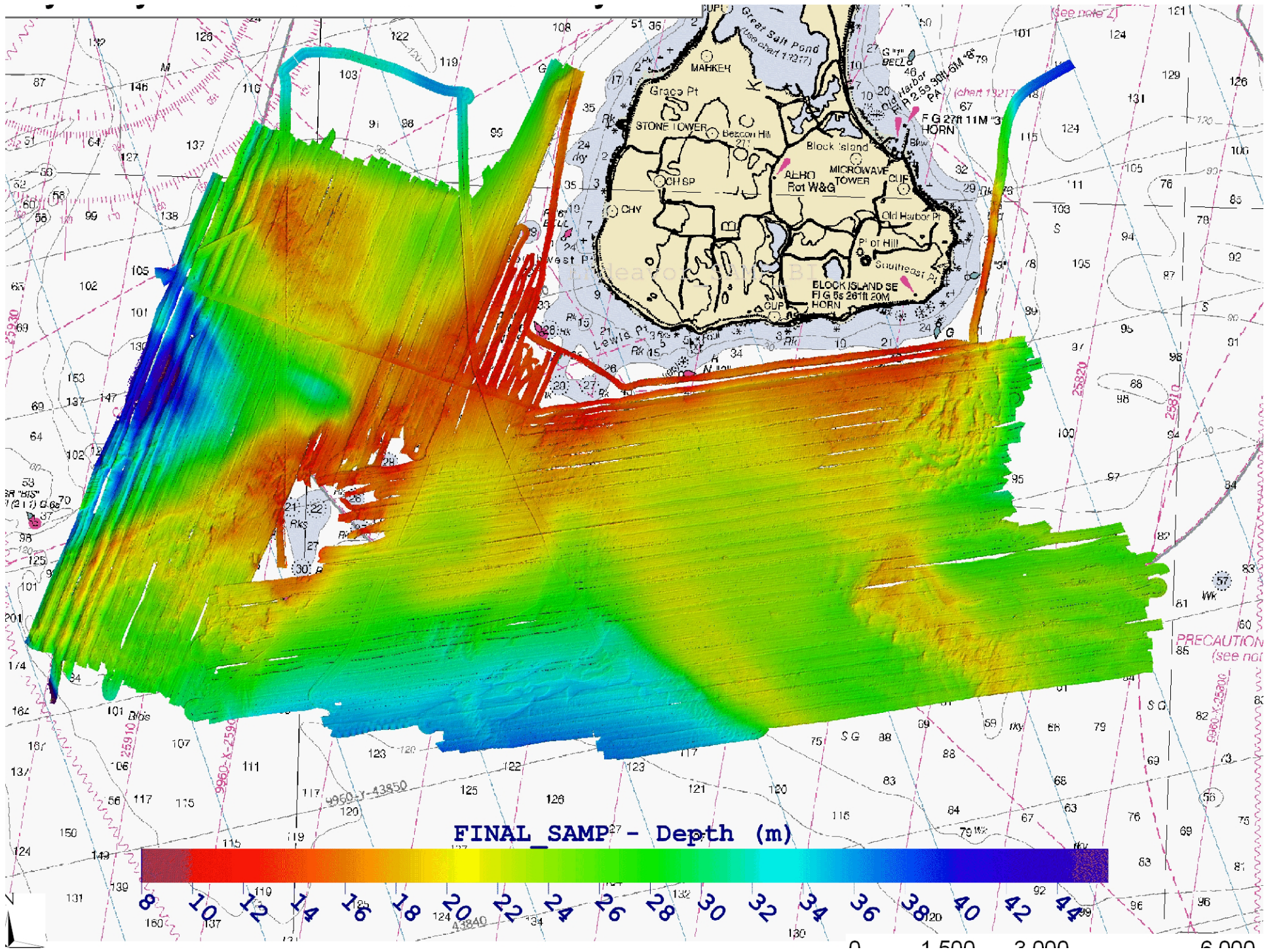
DRAFT
All Fishing Types

North Atlantic Right Whale, 1828-2007

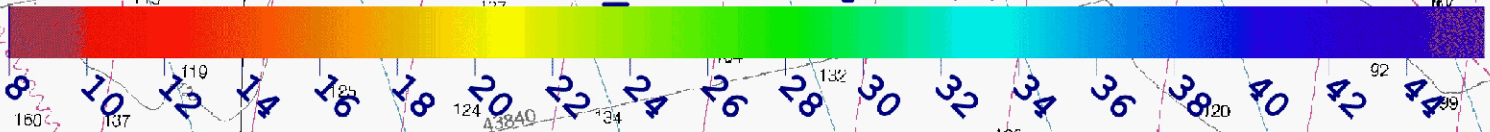


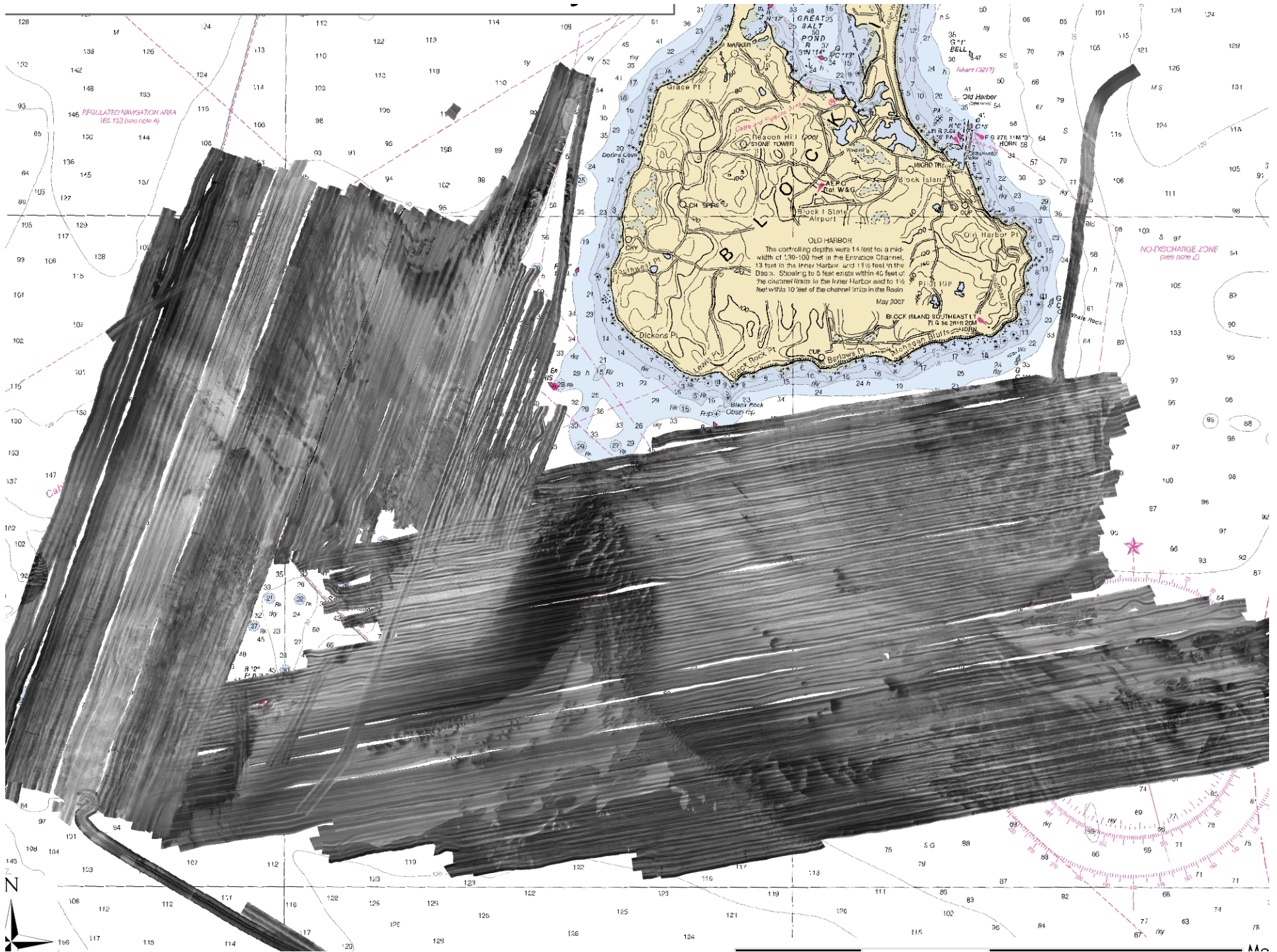
Research conducted by Dr. Robert Kenney, URI



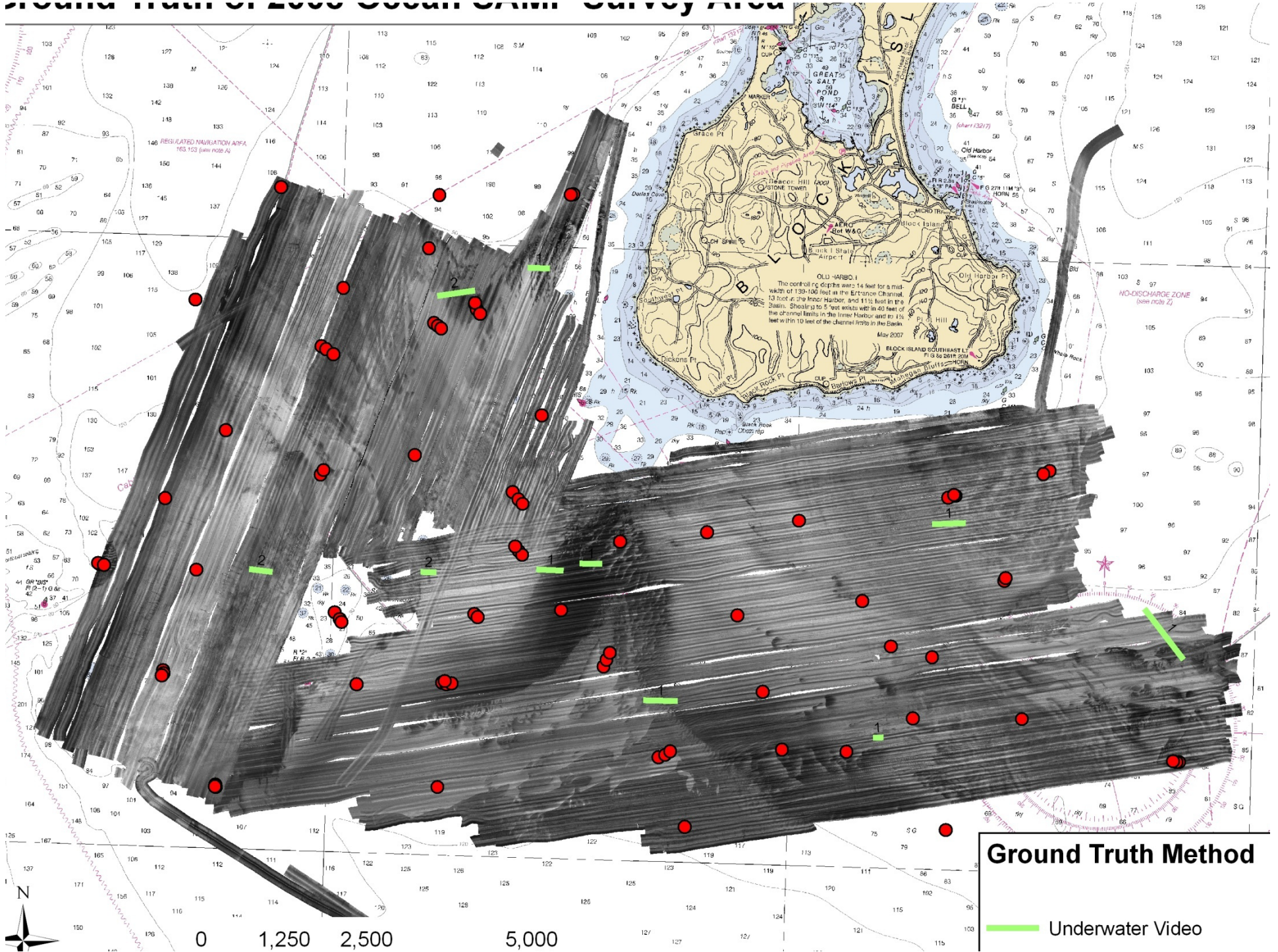


FINAL_SAMP²⁷ - Depth (m)

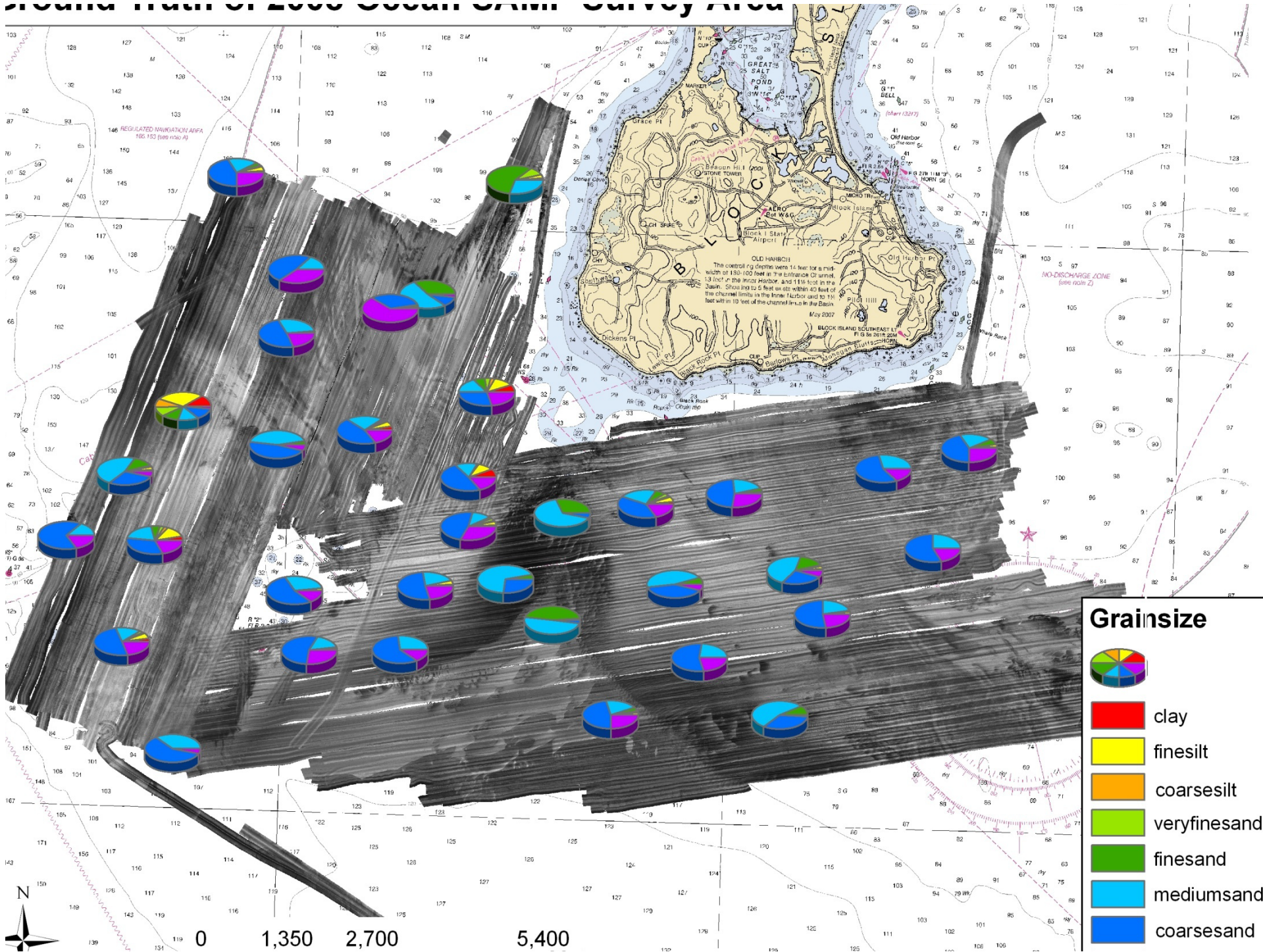




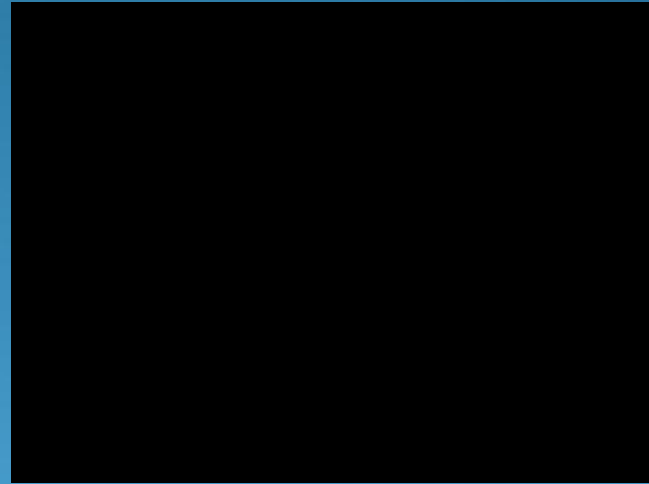
Ground Truth of 2000 Ocean Exam Survey Area



Ground Truth of 2000 Ocean Drift Survey Area



Dynamic Environments



BLOB CHART
A NON-SCHEMATIC REPRESENTATION OF THE CORPS OF ENGINEERS PERMIT PROCESS



Individual Permit Process



