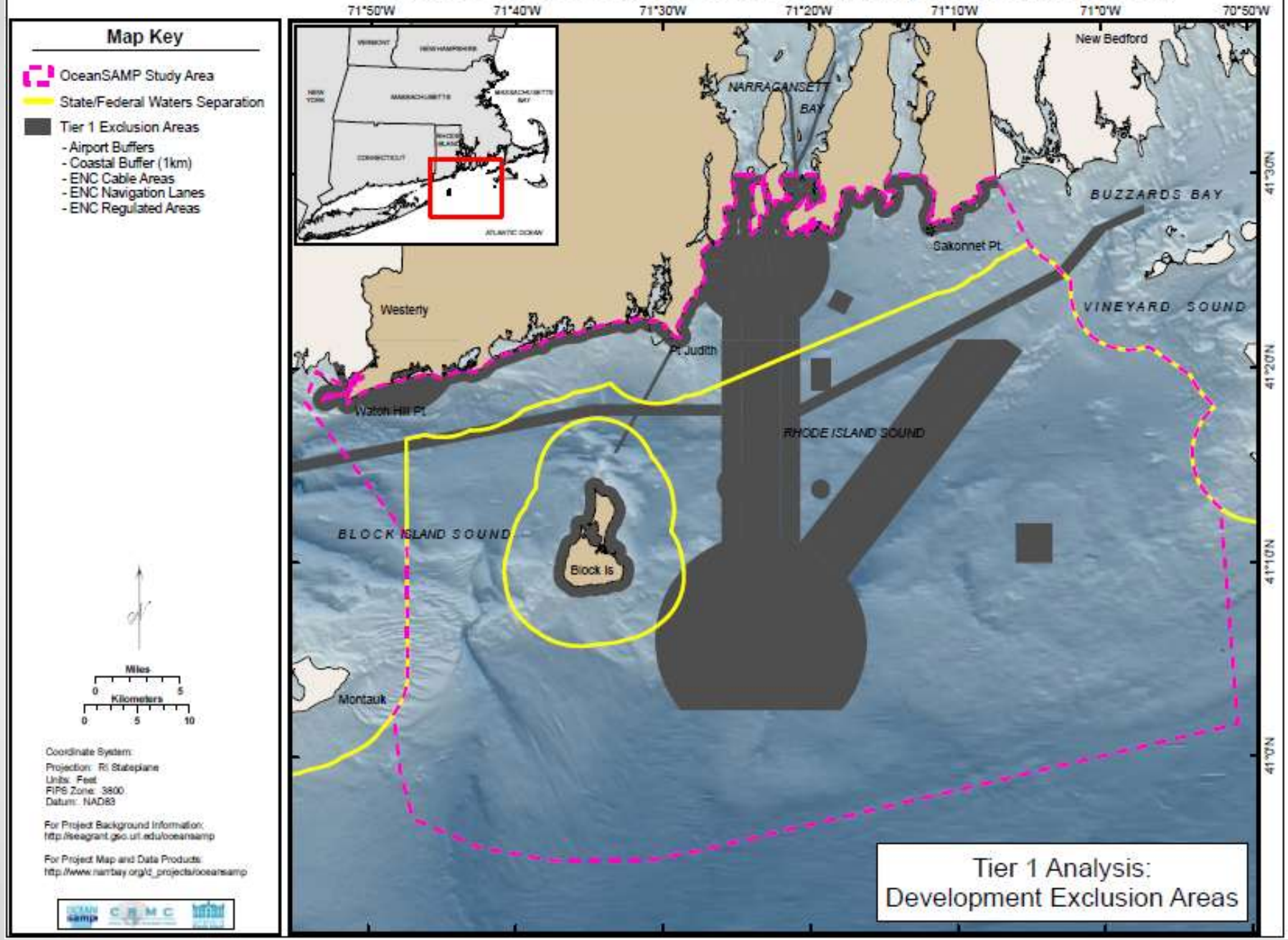
Coastal and Marine Spatial Planning: Oyster Aquaculture Siting Optimization

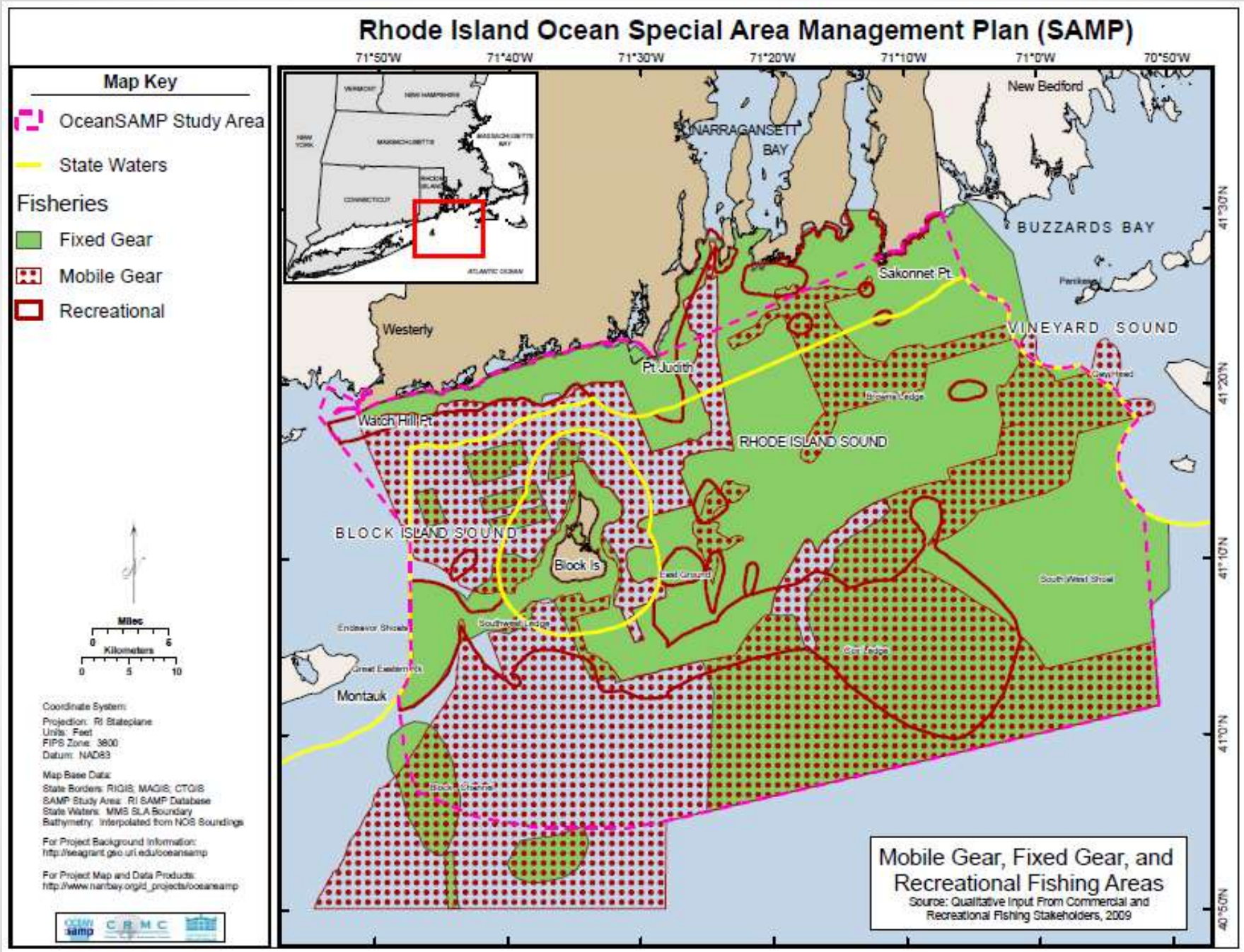
Oyster Aquaculture Tiger Team

What is Coastal and Marine Spatial Planning (CMSP)

- Comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean and coastal areas.
- Coastal and marine spatial planning identifies areas most suitable for various types or classes of activities in order to:
  - reduce conflicts among uses,
  - reduce environmental impacts,
  - facilitate compatible uses,
  - and preserve critical ecosystem services to meet economic, environmental, security, and social objectives.

Rhode Island Ocean Special Area Management Plan (SAMP)




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
41°30'N
41°20'N
41°10'N
41°0'N
40°50'N
Map Key
OceanSAMP Study Area
State Waters
Fisheries
Fixed Gear
Mobile Gear
Recreational
Miles
0
6
Kilometers
0
5
10
Coordinate System:
Projection: RI Stateplane
Units: Feet
FIPS Zone: 3800
Datum: NAD83
Map Base Data:
State Borders: RIGIS; MAGIS; CTGIS
SAMP Study Area: RI SAMP Database
State Waters: MMS SLA Boundary
Bathymetry: Interpolated from NOS Soundings
For Project Background Information:
http://seagrant.gso.uri.edu/oceansamp
For Project Map and Data Products:
http://www.narbay.org/sl_projects/oceansamp
New Bedford
NARRAGANSETT BAY
BUZZARDS BAY
Sakonnet Pt
Westerly
Pt Judith
VINEYARD SOUND
Watch Hill Pt
RHODE ISLAND SOUND
BLOCK ISLAND SOUND
Block Is
Montauk
Mobile Gear, Fixed Gear, and Recreational Fishing Areas
Source: Qualitative Input From Commercial and Recreational Fishing Stakeholders, 2009

GIS Planning Goals

- Decrease user conflicts, improve planning and regulatory efficiencies and decrease costs and delays, and preserve critical ecosystem services
  - Reduce conflicting Interests
    - High Boat use regions and pathways would be primary conflicting use.
    - Conflicting uses would be exclusion areas for aquaculture.
    - Mixed or overlapping uses may be excluded or rated as a low interest area due to the type of uses and conflicts.
    - Optimally aquaculture lease areas would be located in areas with low conflicted interests or highly compatible uses.
- Places science-based information at the heart of decision-making.
- Emphasizes stakeholder and public participation.

Current Data

- Human-Use Considerations
  - Navigational Channels
  - Historic Channel dredging
  - Marinas, public and private boat ramps, high use boat slip regions
- Physical Data
  - Bathymetry
  - Bottom sediment data
    - DNREC Clam Abundance Surveys
    - Chrzastowski (1986)
- Ecological Data
  - Clam abundance and potential habitat
  - Seasonal important Bird Habitat

Human-Use Considerations

- Navigational Channels
- High-use boat locations
- Marinas
- Boat ramps
- High density boat slip locations

Navigational Channels

Legend

Navigational Channels

2.5 1.25 0 2.5 Miles

3 1.5 0 3 Kilometers

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Historic Navigational Dredging Reaches

Legend

Historic Dredging Reaches

2.5 1.25 0 2.5 Miles

3 1.5 0 3 Kilometers

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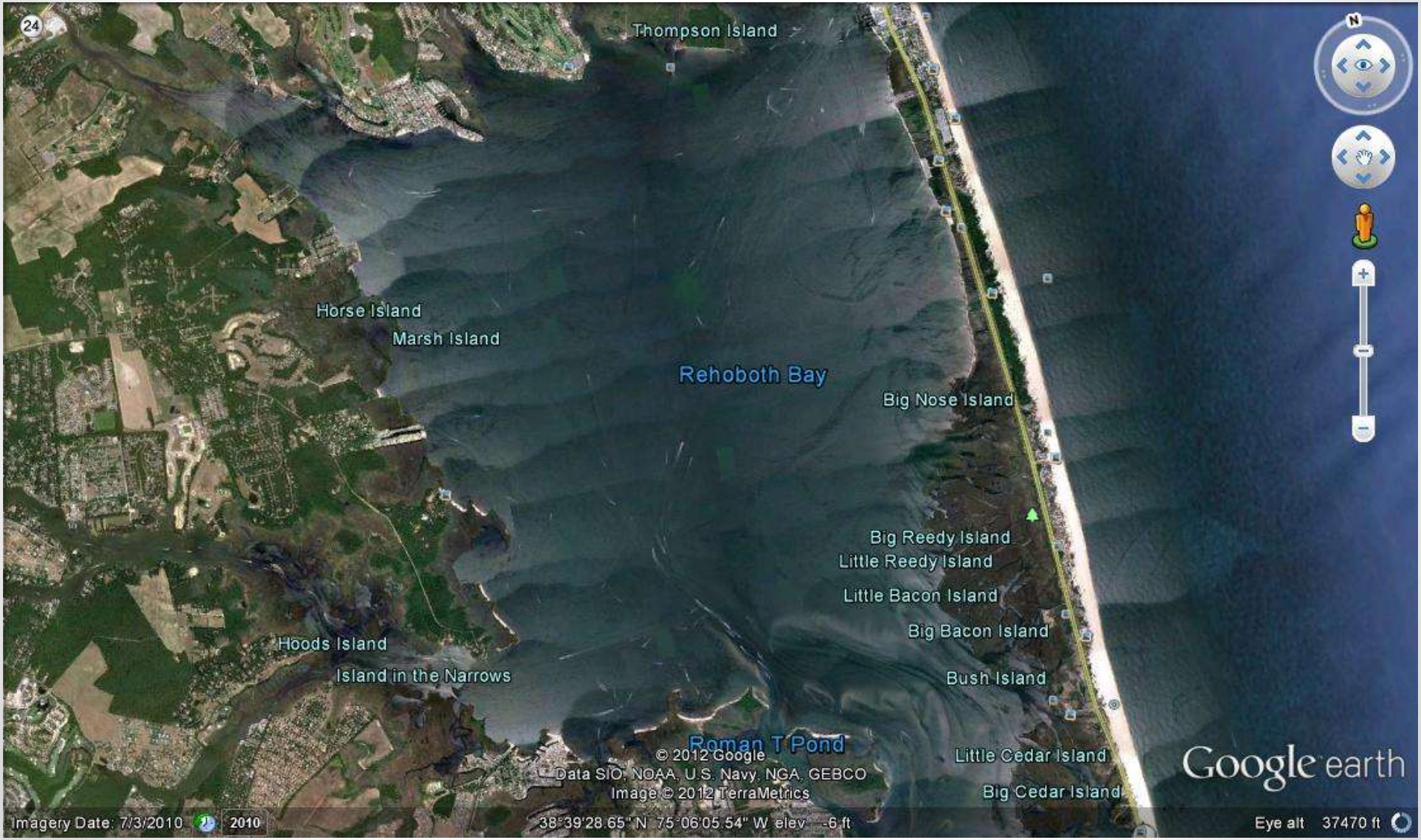
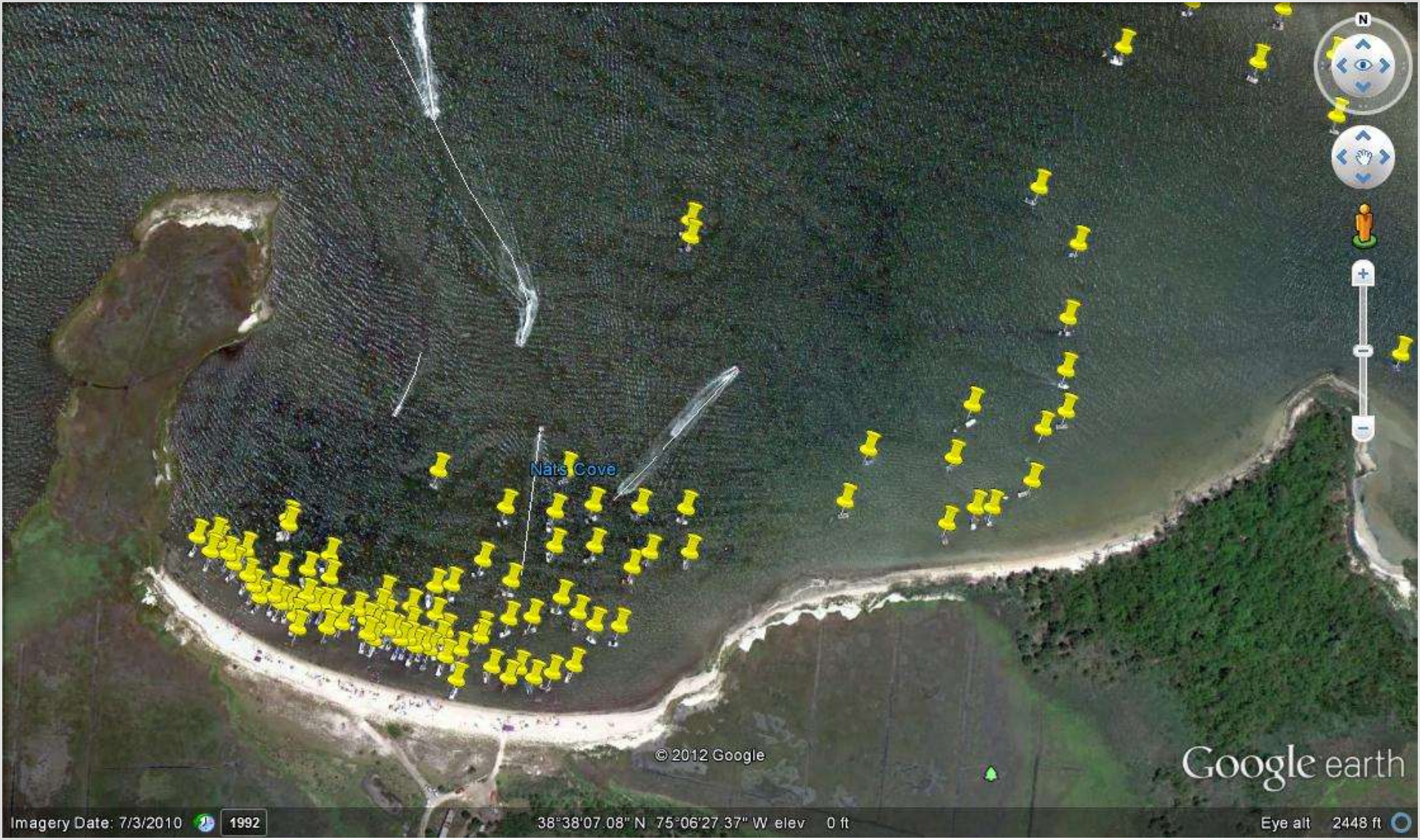
Boat Usage

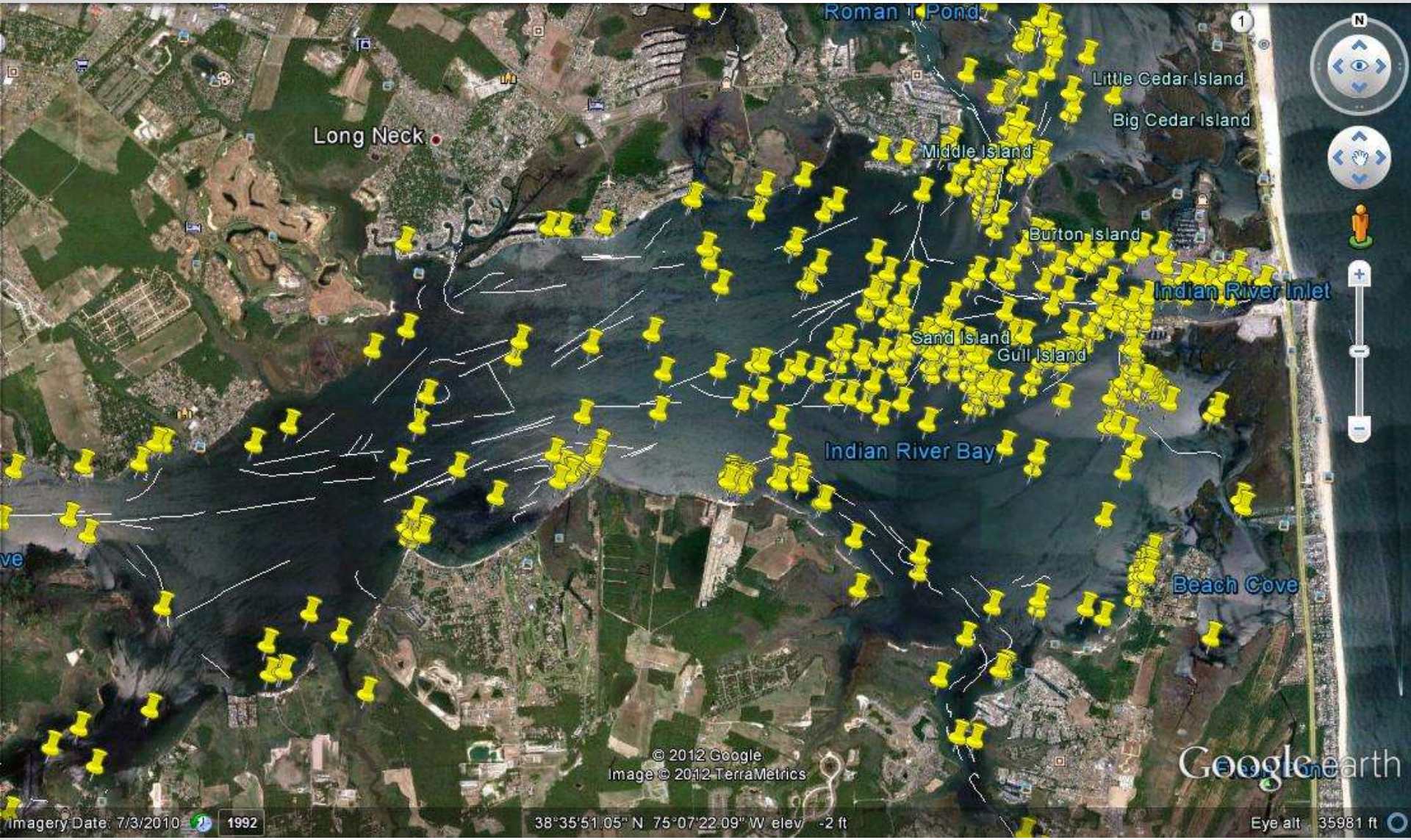

Thompson Island
Horse Island
Marsh Island
Rehoboth Bay
Big Nose Island
Big Reedy Island
Little Reedy Island
Little Bacon Island
Big Bacon Island
Hoods Island
Island in the Narrows
Bush Island
Roman T Pond
Little Cedar Island
Big Cedar Island
© 2012 Google
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2012 TerraMetrics
Imagery Date: 7/3/2010
2010
38°39'28.65" N 75°06'05.54" W elev -6 ft
Eye alt 37470 ft
Google earth

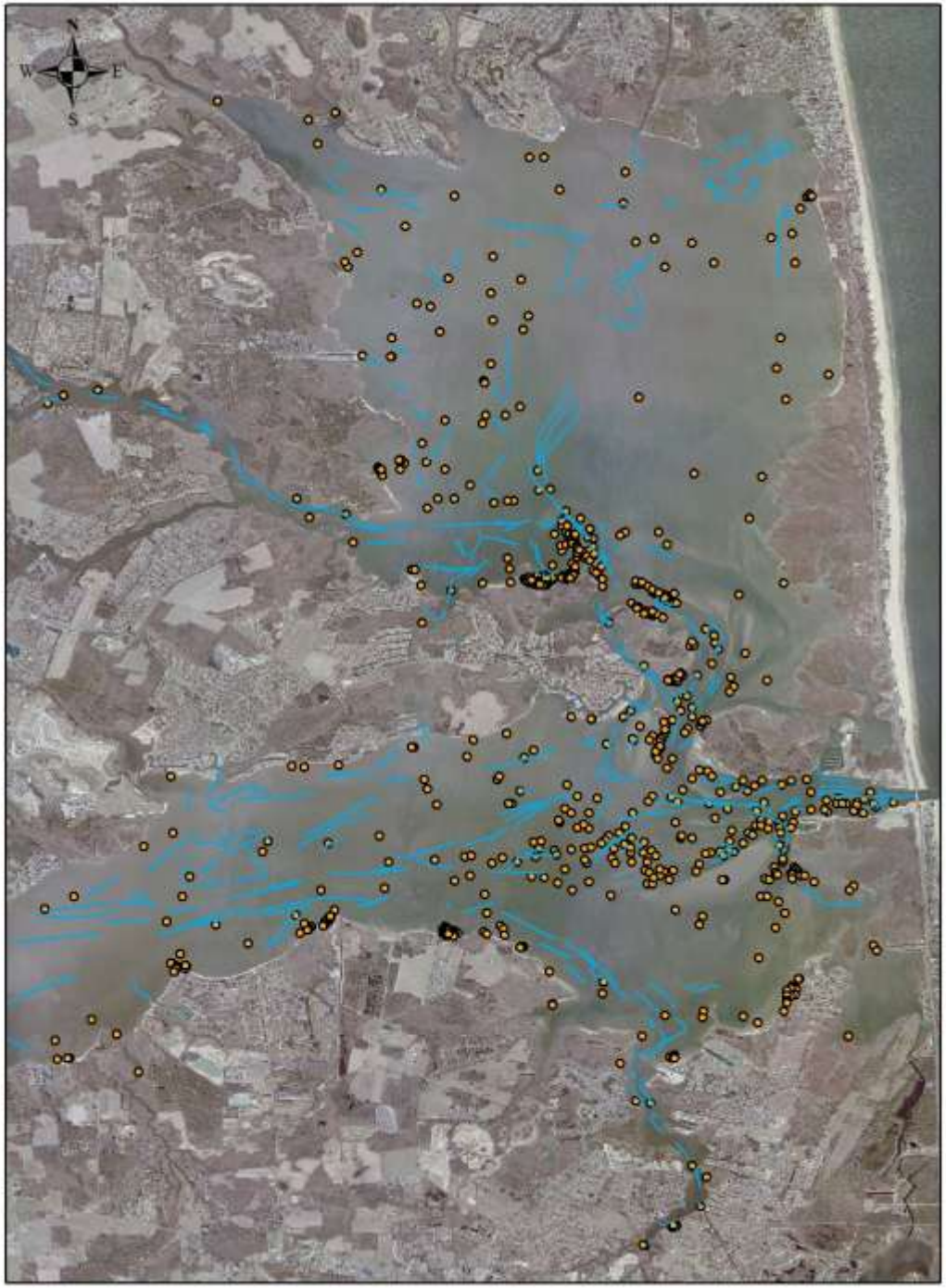

Nats Cove
Roman T Pond
Walker Rd
Raccoon Cove
© 2012 Google
Google earth
Imagery Date: 7/3/2010
1992
38°37'58.12" N 75°06'00.89" W elev 0 ft
Eye alt 6759 ft


Nats Cove
© 2012 Google
Google earth
Imagery Date: 7/3/2010
1992
38°38'05.81" N 75°06'29.40" W elev 0 ft
Eye alt 1831 ft


Nats Cove
© 2012 Google
Google earth
Imagery Date: 7/3/2010
1992
38°38'07.08" N 75°06'27.37" W elev 0 ft
Eye alt 2448 ft


Thompson Island
Horse Island
Marsh Island
Rehoboth Bay
Big Nose Island
Hoods Island
Island in the Narrows
Big Reedy Island
Little Reedy Island
Little Bacon Island
Big Bacon Island
Bush Island
© 2012 Google
Image © 2012 TerraMetrics
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Imagery Date: 7/3/2010
2010
38°39'33.31" N 75°06'37.58" W elev -6 ft
Eye alt 35981 ft
Google earth


Roman T. Pond
Little Cedar Island
Big Cedar Island
Long Neck
Middle Island
Burton Island
Indian River Inlet
Sand Island
Gull Island
Indian River Bay
Beach Cove
© 2012 Google
Image © 2012 TerraMetrics
Google earth
Imagery Date: 7/3/2010
1992
38°35'51.05" N 75°07'22.09" W elev -2 ft
Eye alt 35981 ft



Digitized Boat Usage (July 3, 2010)

Legend

- Stationary Boats
- Boats in Motion

2 1 0 2 Miles

3 1.5 0 3 Kilometers

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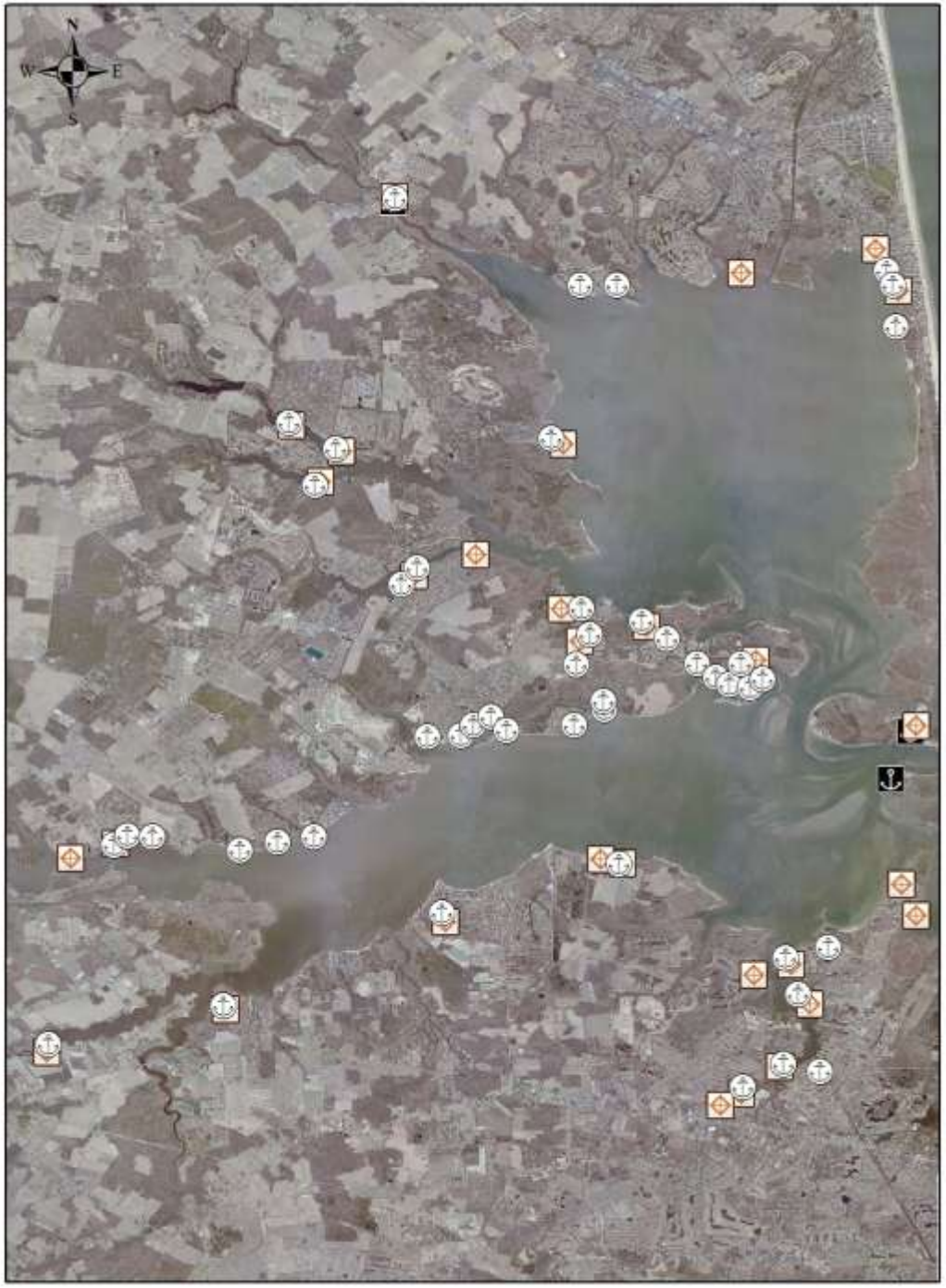

Public and Private Boat Ramps, High Density Boat Slips, and Marinas

Legend

- High Density Boat Slips
- Public/Private Boat Ramps
- Marinas

3 1.5 0 3 Miles

4 2 0 4 Kilometers

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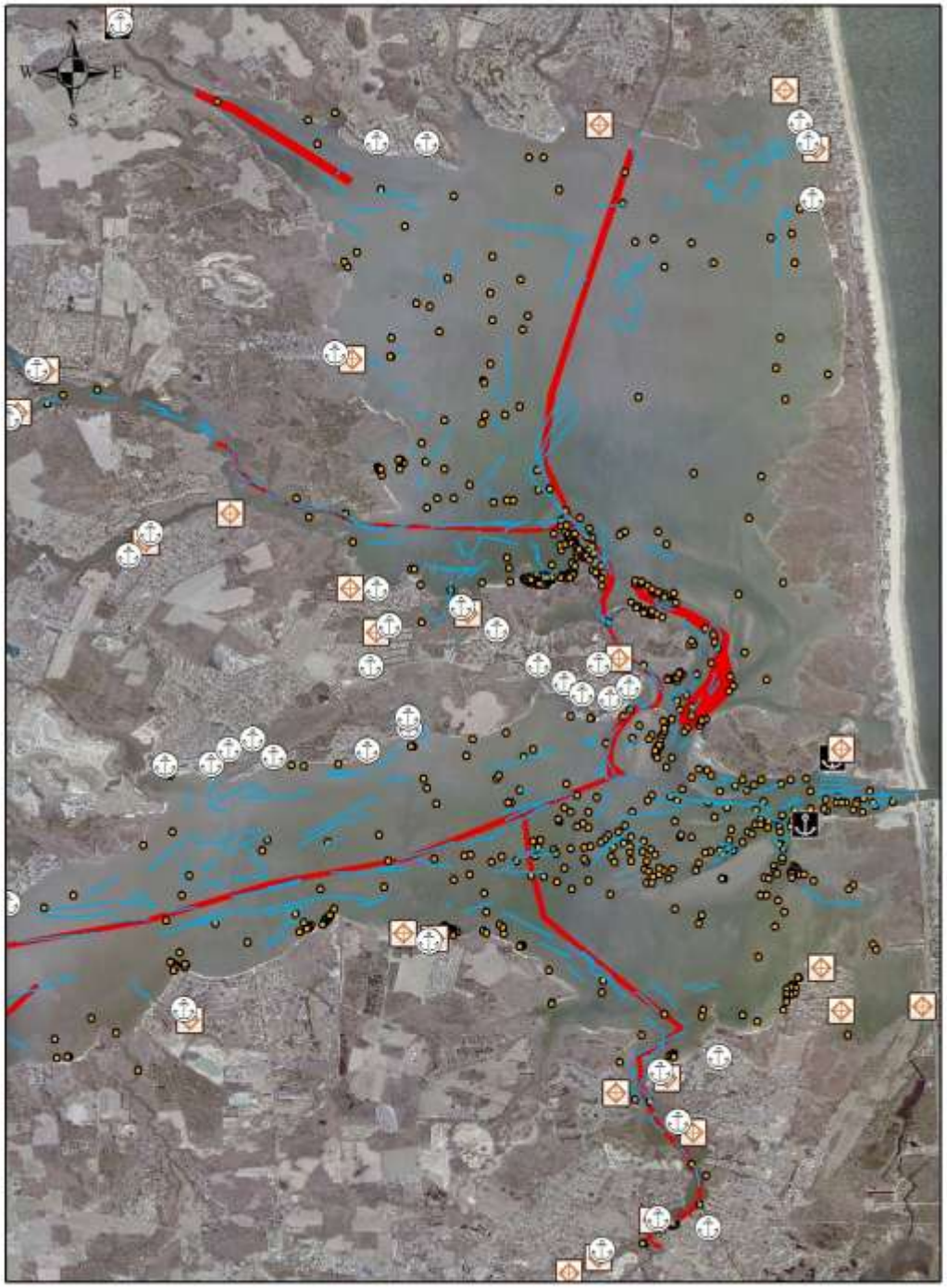

Human-Use Data

Legend

- High Density Boat Slips
- Public/Private Boat Ramps
- Marinas
- Navigational Channels
- Stationary Boats
- Boats in Motion

2 1 0 2 Miles

3 1.5 0 3 Kilometers

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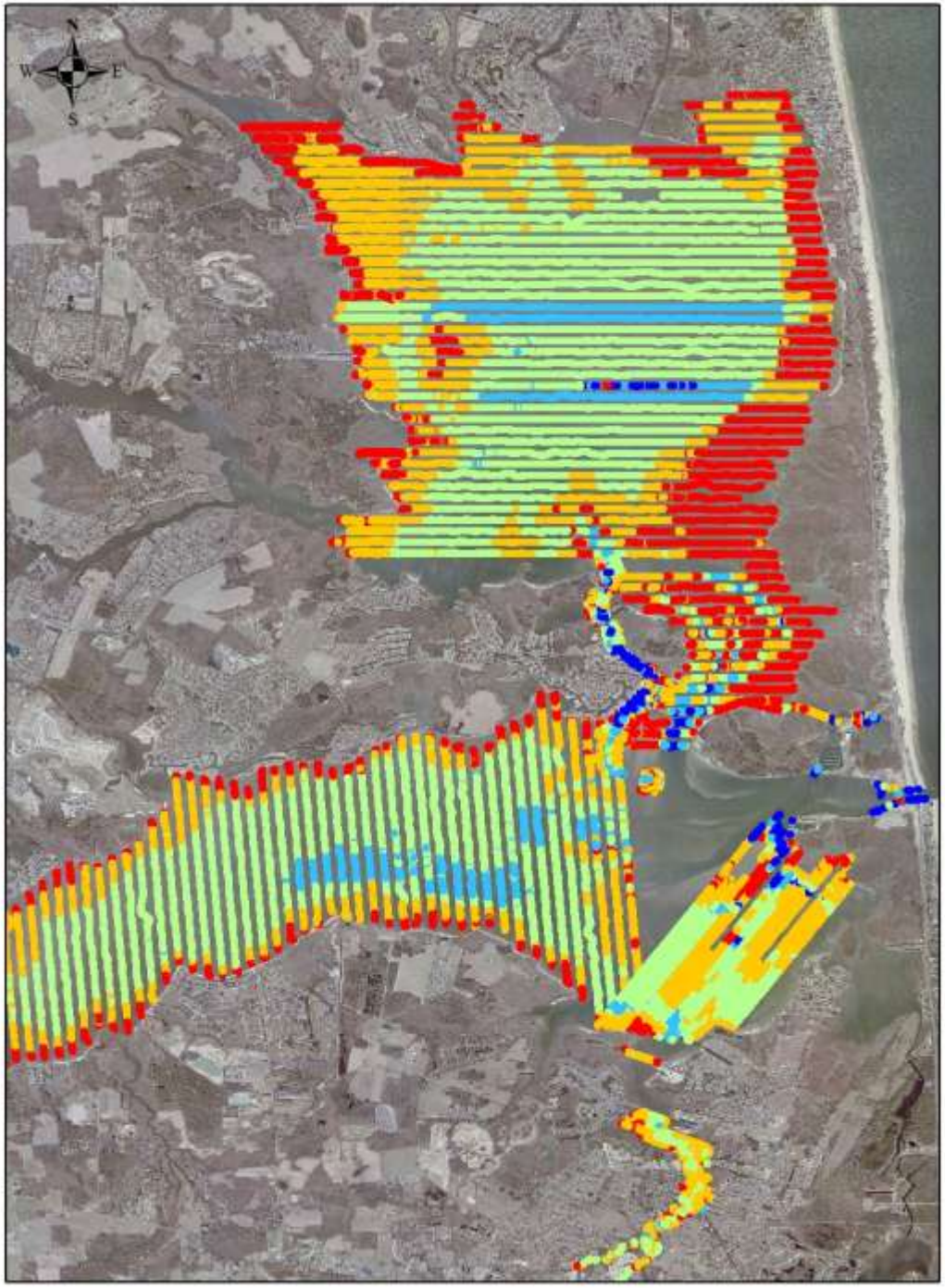
Physical Data

- Bathymetry
  - DNREC 2004 Bay wide Surveys (NAVD 88, ft)

Table 2-2. Bathymetric Data Sources

Date	Coverage	Source
2004	IR Inlet and Surrounding areas	USACE
2004	Inland Bays	DNREC
1863,1970,1977, 1984	Offshore	NGDC (GEODAS)
2004	Love Creek	DNREC
2004	Herring Creek	DNREC
1998	Guinea Creek	DNREC
2000	Bald Eagle Creek	DNREC
2005	Roosevelt Inlet (Lewes Rehoboth Canal)	USACE

- Bottom sediment data
  - DNREC Clam Abundance Surveys
  - Chrzastowski (1986)
- Salinity



Inland Bay Bathymetry

Legend

DNREC Bathymetry (2004)

NAVD 88, ft

- -13.6 - -8.1
- -8.0 - -6.0
- -5.9 - -3.9
- -3.8 - -1.8
- -1.7 - 4.5

2 1 0 2 Miles

3 1.5 0 3 Kilometers

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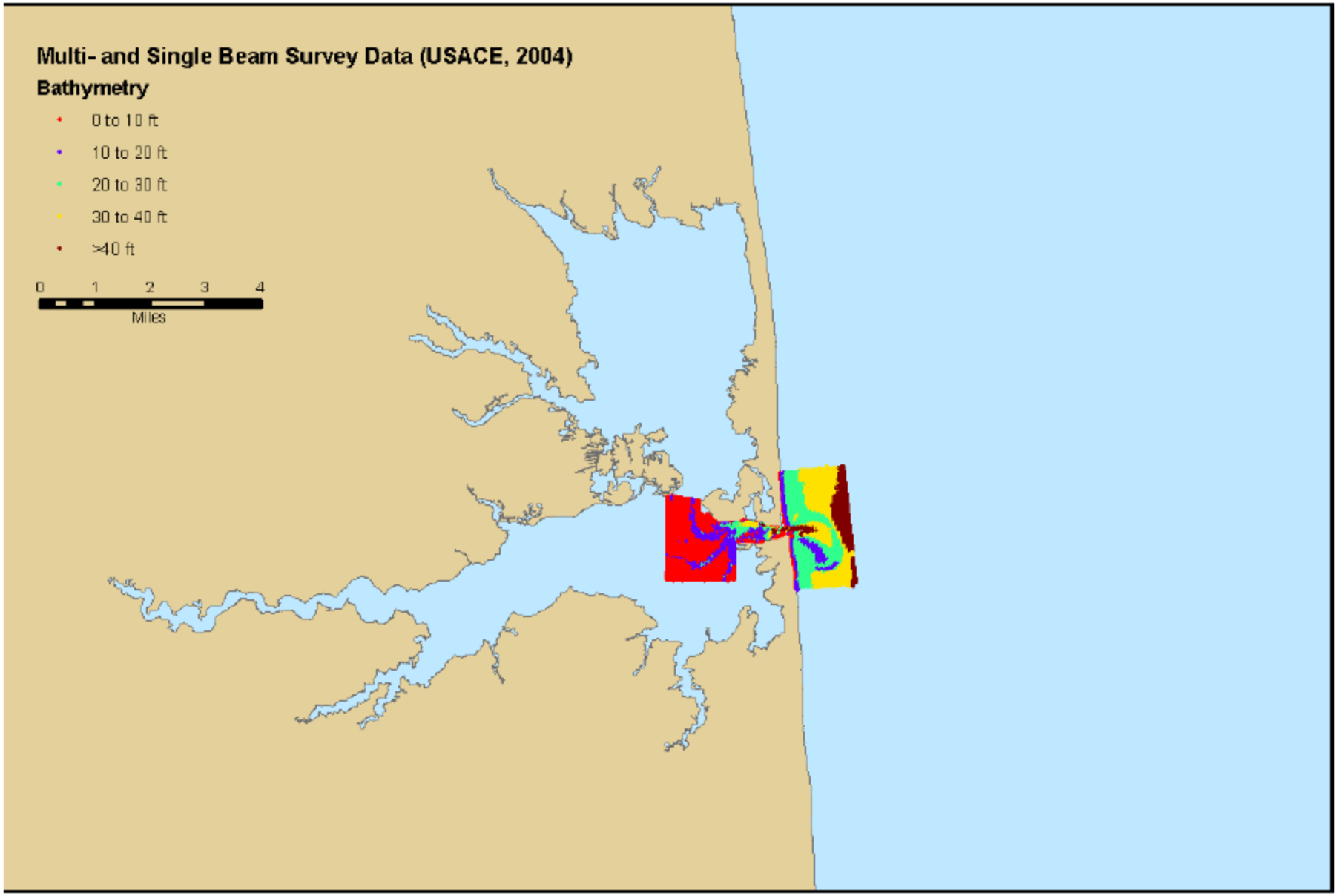
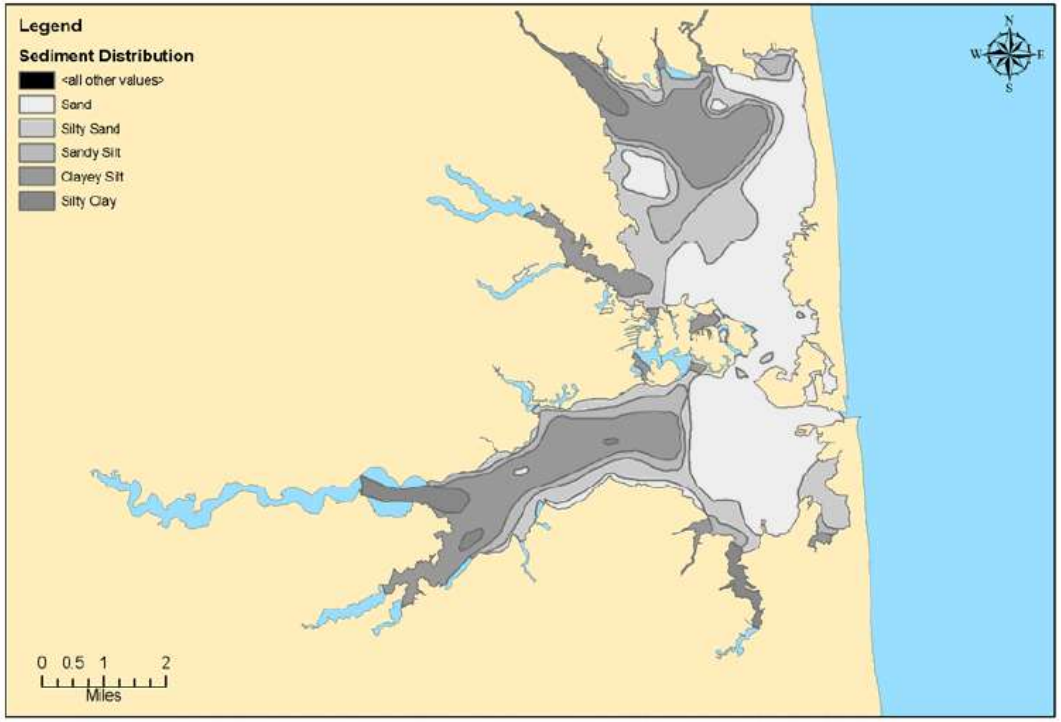
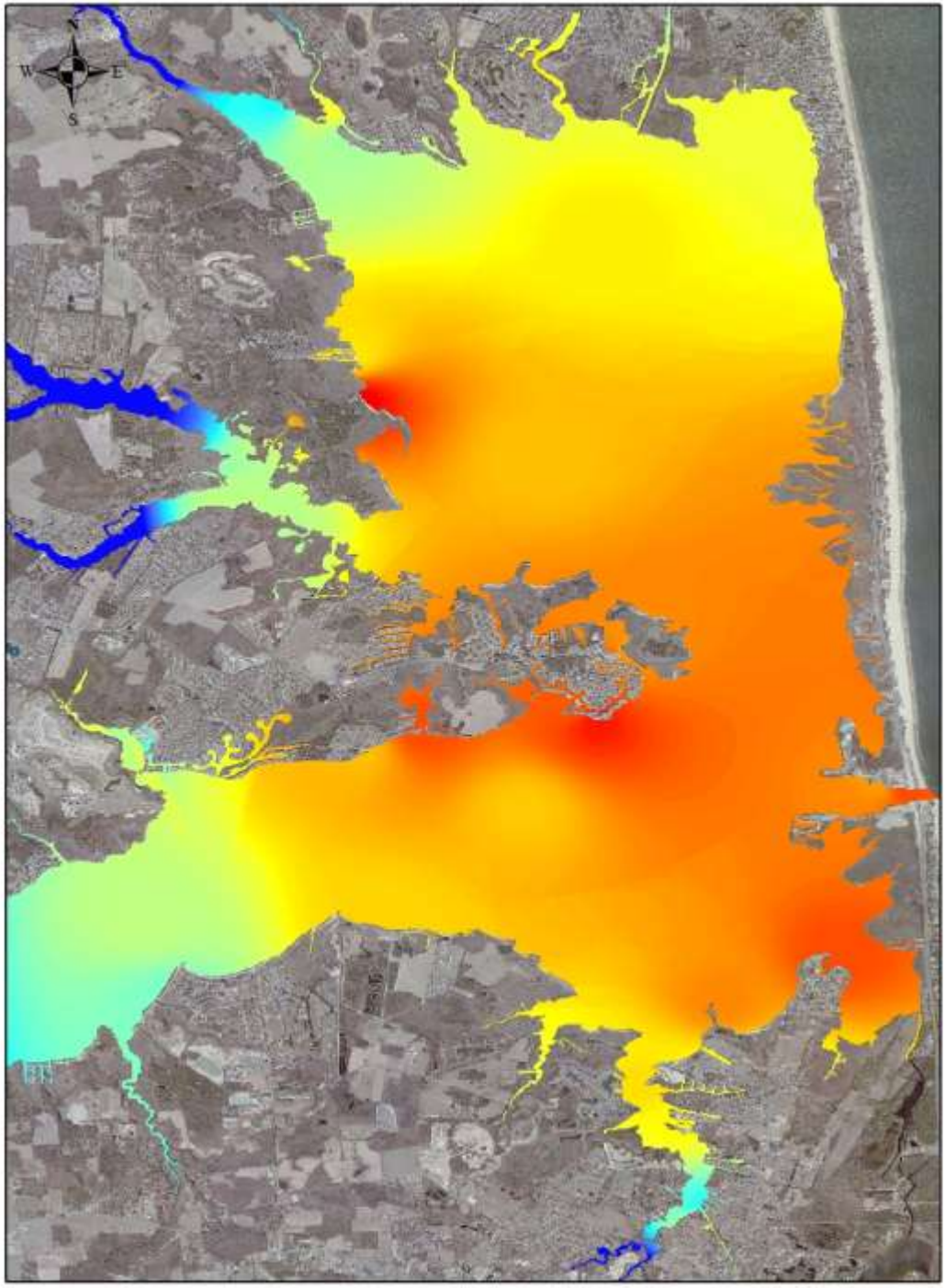


Figure 2-15. Bathymetry (NAVD88) obtained from USACE (2004)

Bottom Sediment Data

- Mike Bott, DNREC (2010) Shellfish surveys of the Inland Bays
  - 278 quantitative sediment sampling locations
- Chrzastowski, M.J. 1986. "Stratigraphy and Geologic History of a Holocene Lagoon: Rehoboth Bay and Indian River Bay, Delaware". Ph.D. Dissertation. University of Delaware.





Mean Inland Bay Salinity

Legend

Mean Salinity (1998 - 2008)

Value (ppt)

High : 31.5423

Low : 7.24303

2 1 0 2 Miles

3 1.5 0 3 Kilometers

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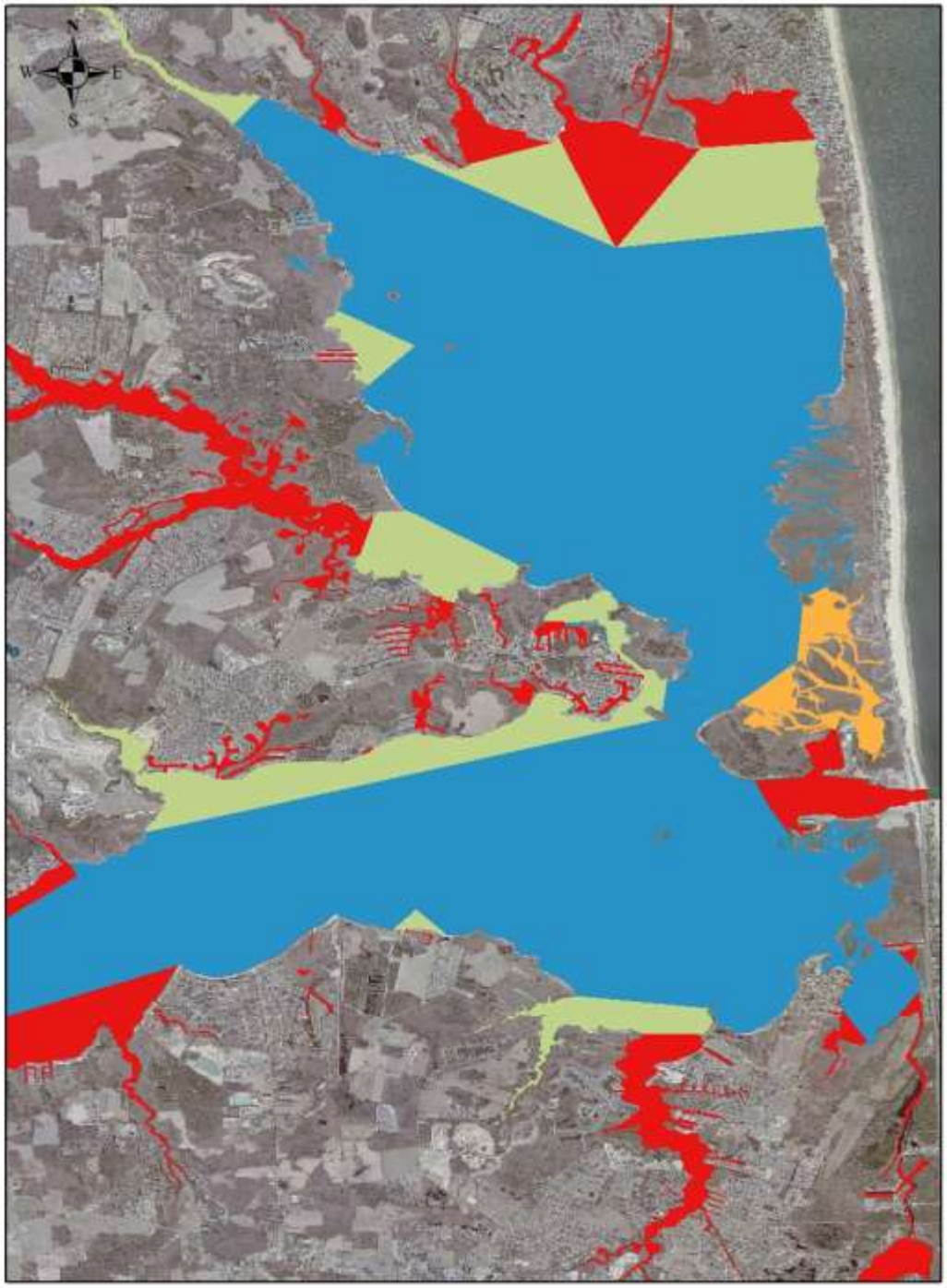
Biological/Ecological Data

- Shellfish
  - Clam abundance and potential habitat
    - Mike Bott, DNREC (2010) Shellfish surveys of the Inland Bays
      - 278 quantitative sampling locations
      - Clam abundance and sediment type

- Intertidal and Supratidal Habitat
  - Seasonal important Animal habitat
    - DNREC Heritage Program
      - Birds



DNREC Clam Harvest Closures

Legend

Working 2010 Shellfish Harvesting Areas

STATUS

- Prohibited
- Prohibited (Hatchery)
- Seasonal Closures
- Open

2 1 0 2 Miles

3 1.5 0 3 Kilometers

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Legend

Heritage IB Animial

Common Name

- AMERICAN OYSTERCATCHER
- BLACK SKIMMER
- CATTLE EGRET
- COMMON TERN
- ELFIN SKIMMER
- FORSTER'S TERN
- GREAT BLACK-BACKED GULL
- GREAT EGRET
- LEAST TERN
- NORTHERN HARRIER
- PIPING PLOVER
- SEDGE WREN
- TRICOLORED HERON

2 1 0 2 Miles

3 1.5 0 3 Kilometers

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Data Needs

- Bottom Sediment Data
  - NRCS data for subaqueous soils in bays
- Bathymetry
  - DNREC
  - USACE
- DNREC Heritage Program:
  - Species Distribution Update
- Potential Development areas (Long-term)
  - Marinas
  - Private ramps
  - Coastal development

Data (GIS) collection and synthesizing subcommittee

- Determine what data has been collected and what data is still needed to form a Commercial oyster aquaculture suitability map (GIS layer).
  - Report to team at June 5th meeting
- Synthesize data into a GIS layer showing optimal oyster aquaculture areas.
  - Draft product presented to team at July 3rd meeting