Eastern Long Island Sound Supplemental EIS (SEIS):

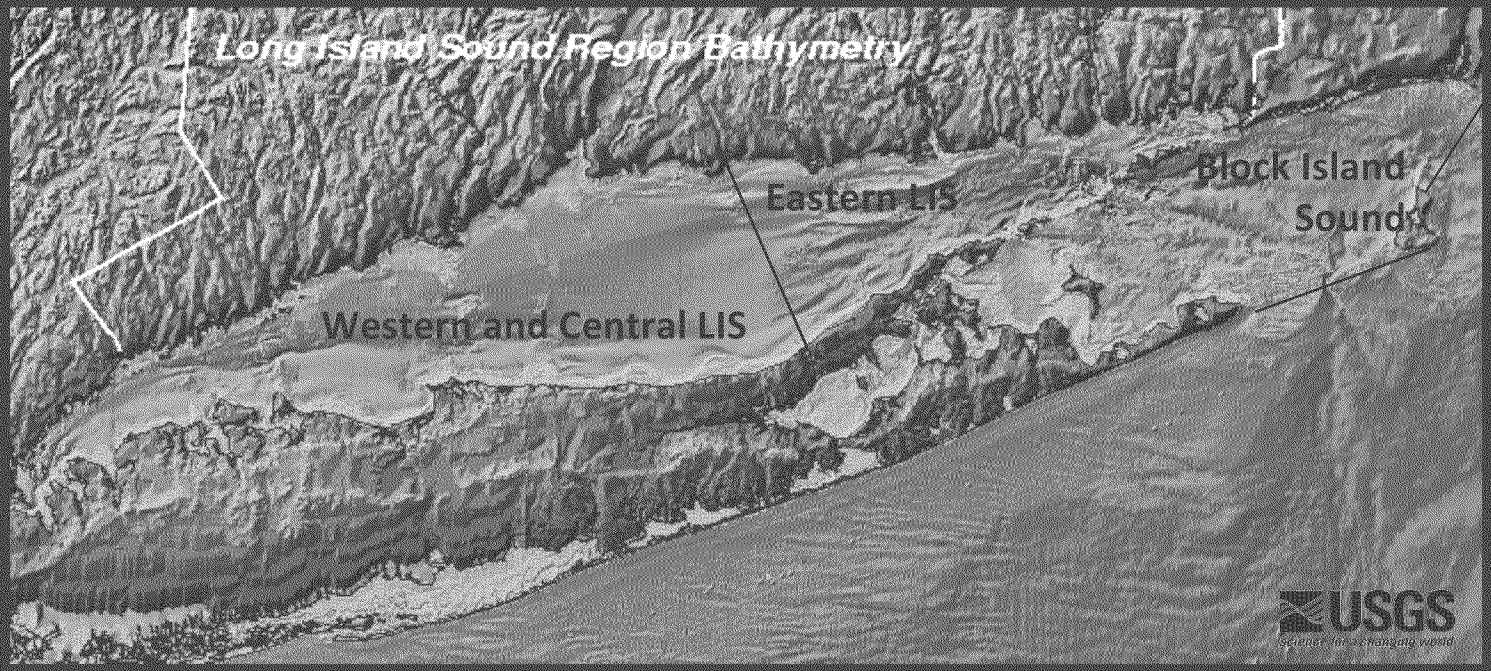
GIS Screening for Potential Alternative Dredged Material Disposal Sites

Cooperating Agency Meeting 2

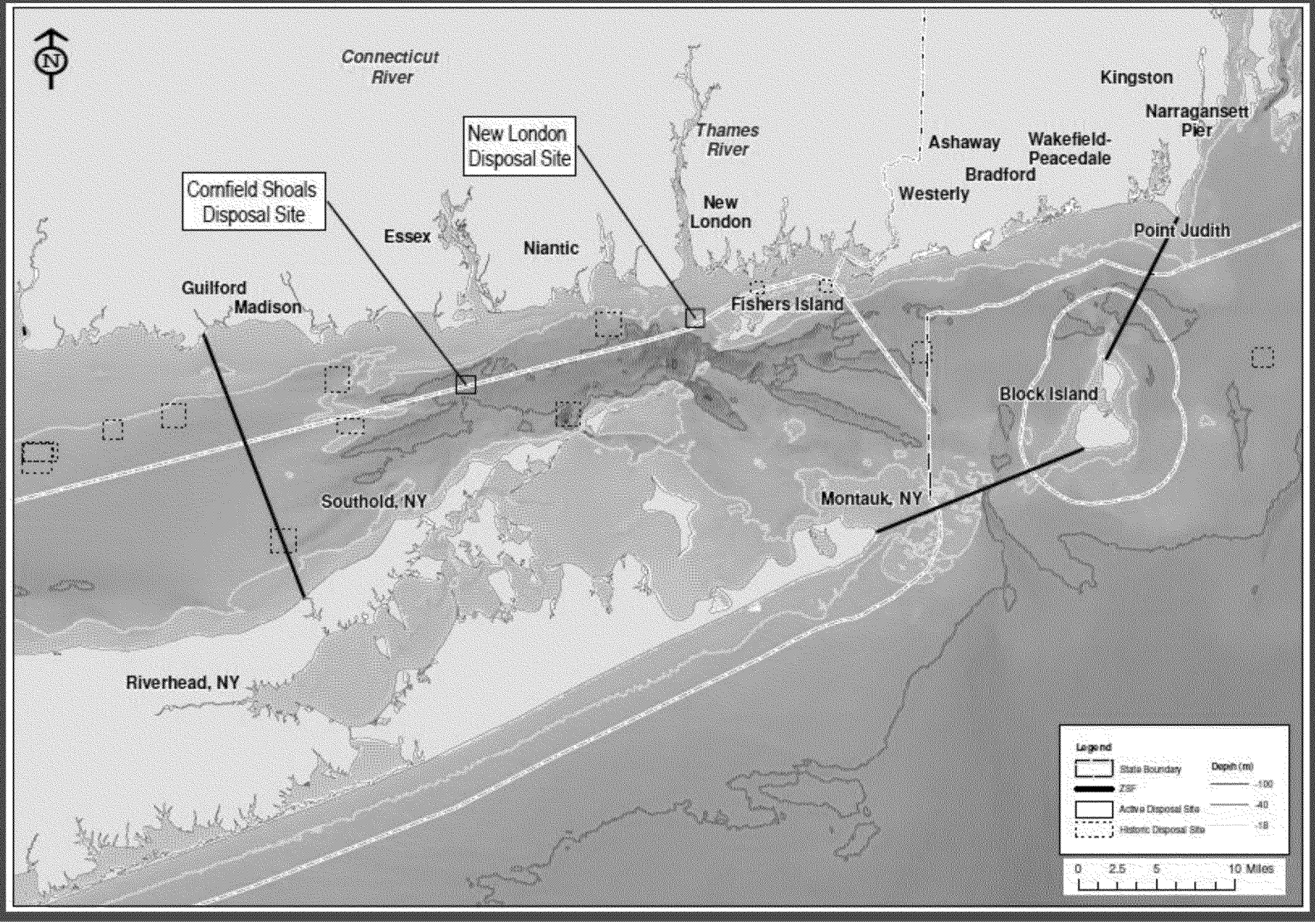
May 20, 2013

Zone of Siting Feasibility

- SEIS will address the eastern region of Long Island Sound, and Block Island Sound



Zone of Siting Feasibility



Screening Objective

Identify….

- Areas within the ZSF acceptable for locating an open water disposal site designated under the Ocean Dumping Regulations
- Specific alternative disposal site(s) within the acceptable area(s) for further evaluation in the SEIS

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General Approach to Screening

- Marine Protection, Research, and Sanctuaries Act (1972): Criteria or ocean dredged material site designation
  - 5 general criteria (40 CFR 228.5)
  - 11 specific criteria (40 CFR 228.6)

- Screening levels
  - Tier 1: Screen areas not acceptable for an open water disposal site
  - Tier 2: Evaluate general and specific criteria for potential alternatives

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Tier 1 Screening Criteria

- Sedimentary Environment
  - Bathymetry
  - Currents and Waves; Bottom Stress
  - Sediment Texture (resuspension potential; habitat proxy)
- Areas of Conflicting uses
  - Infrastructure (cables, pipelines)
  - Navigation (shipping lanes, anchoring areas)
  - Conservation Areas (sanctuaries, wildlife refuges, National Seashores, parks, artificial reefs)
- Biological Resources
  - Shellfish Beds
  - Benthic Community
  - Fish Habitat, Fish Concentrations, and Fishing Areas
  - Breeding, Spawning, Nursery, Feeding, and Passage Areas

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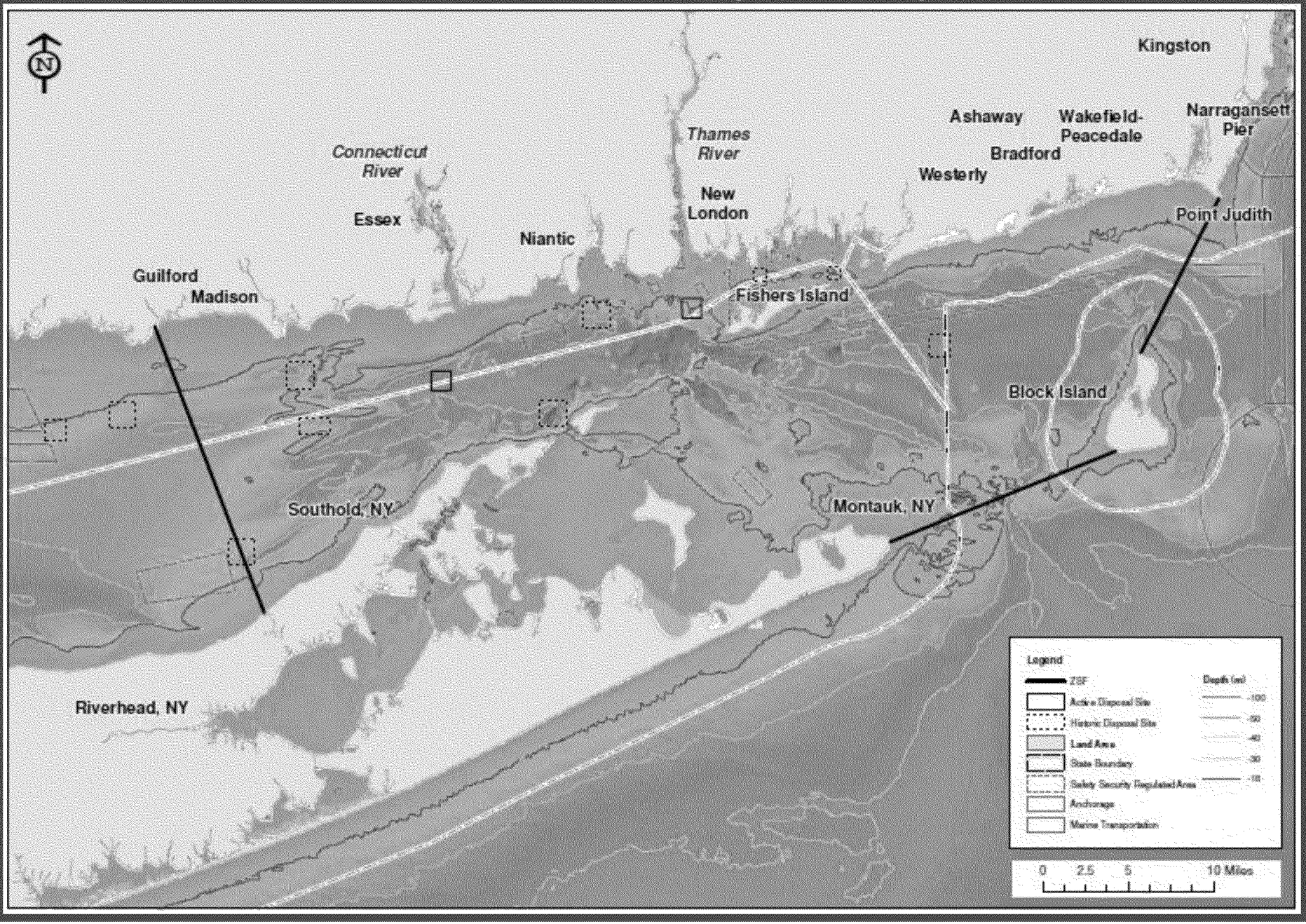
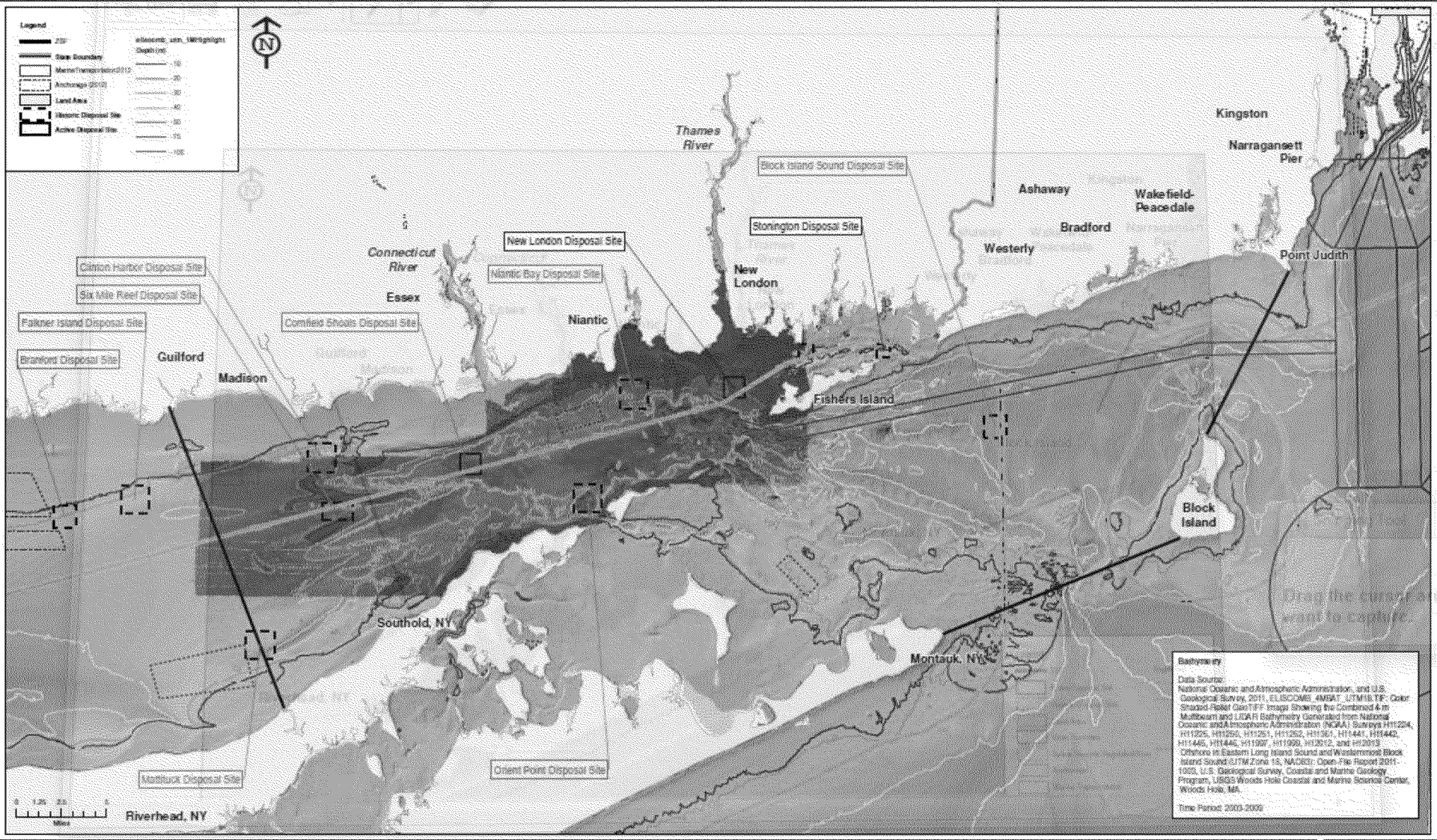
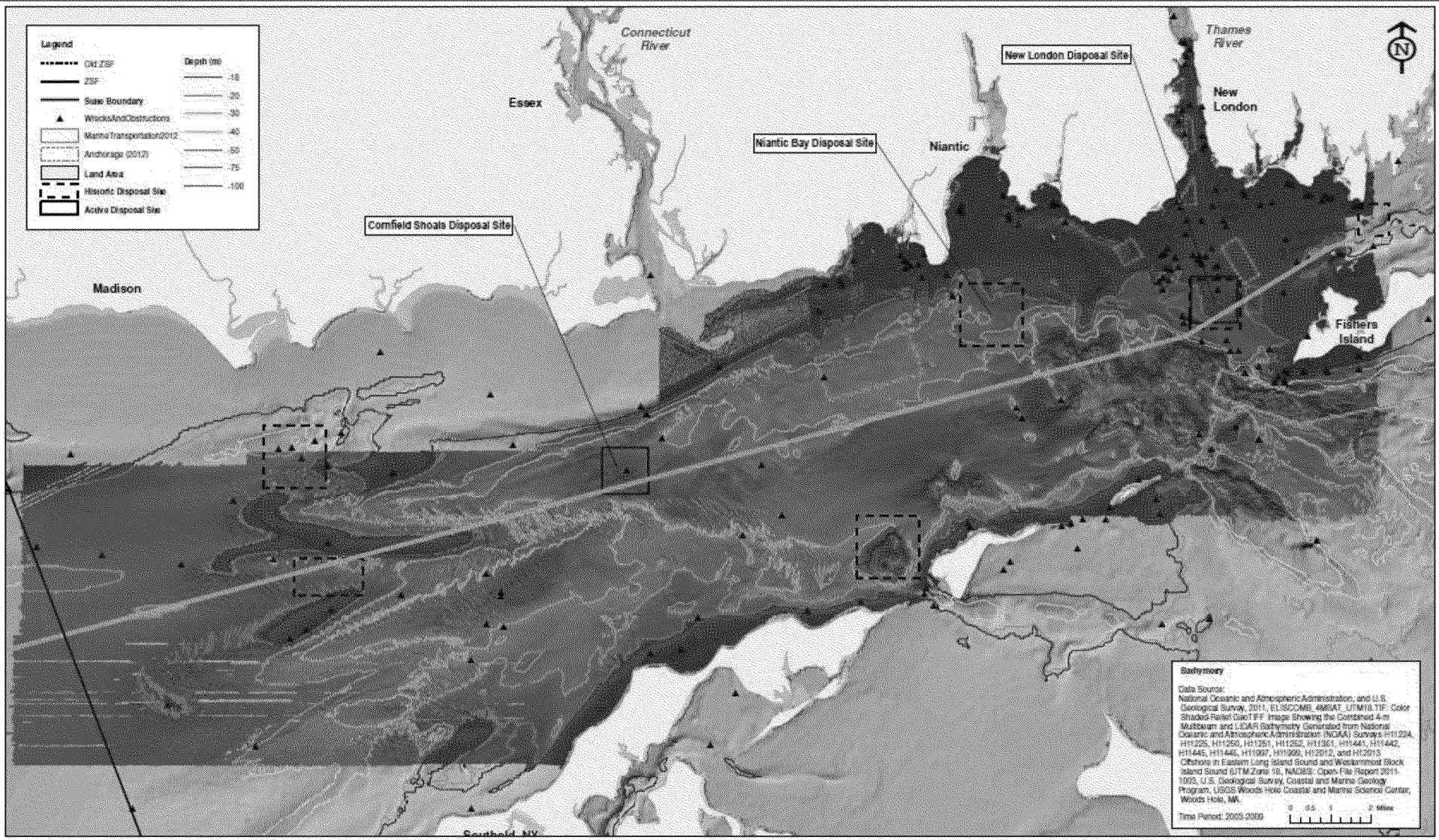
Tier 1: Bathymetry



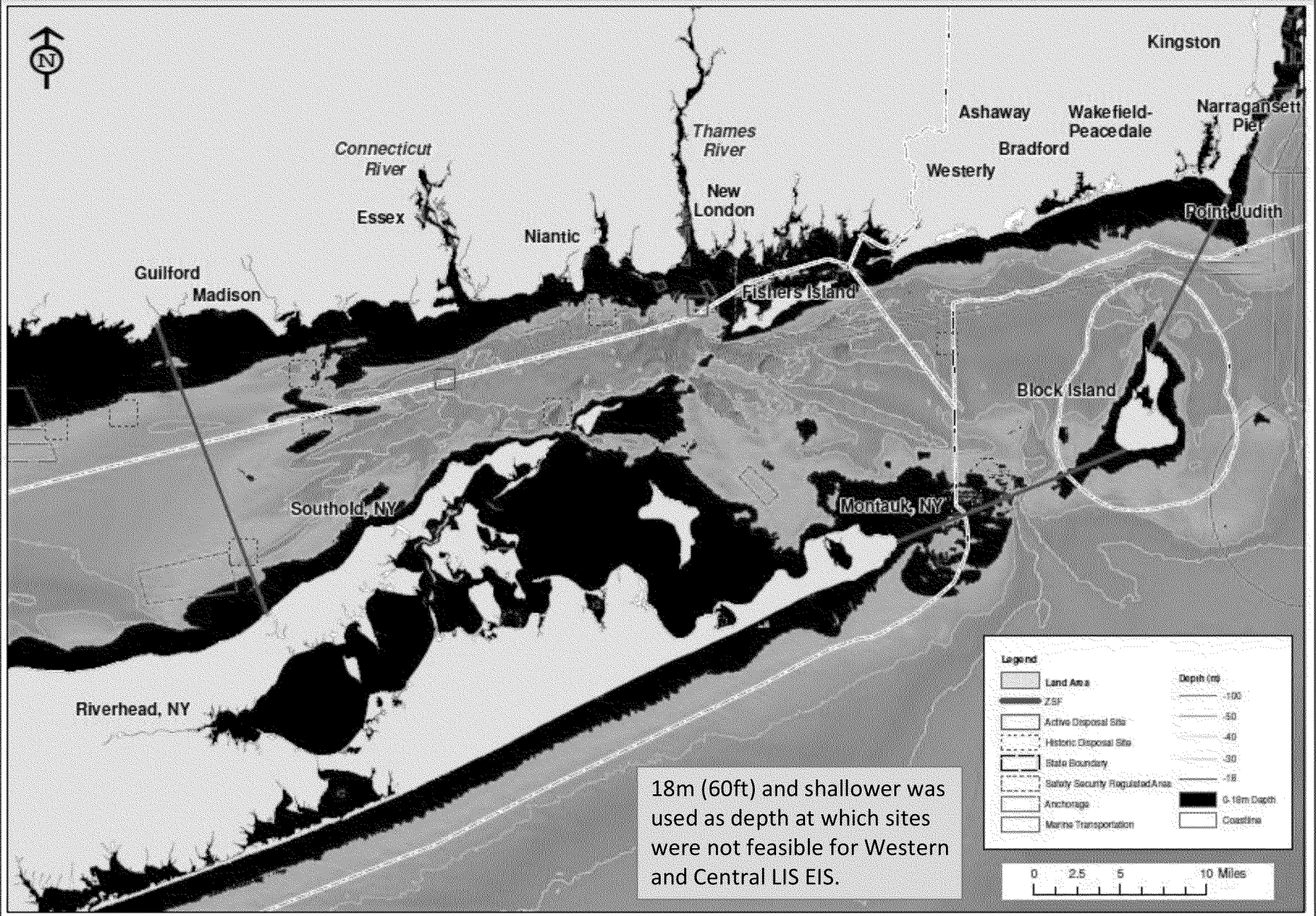
Tier 1: Bathymetry (ZSF)



Tier 1: Bathymetry (Eastern LIS)

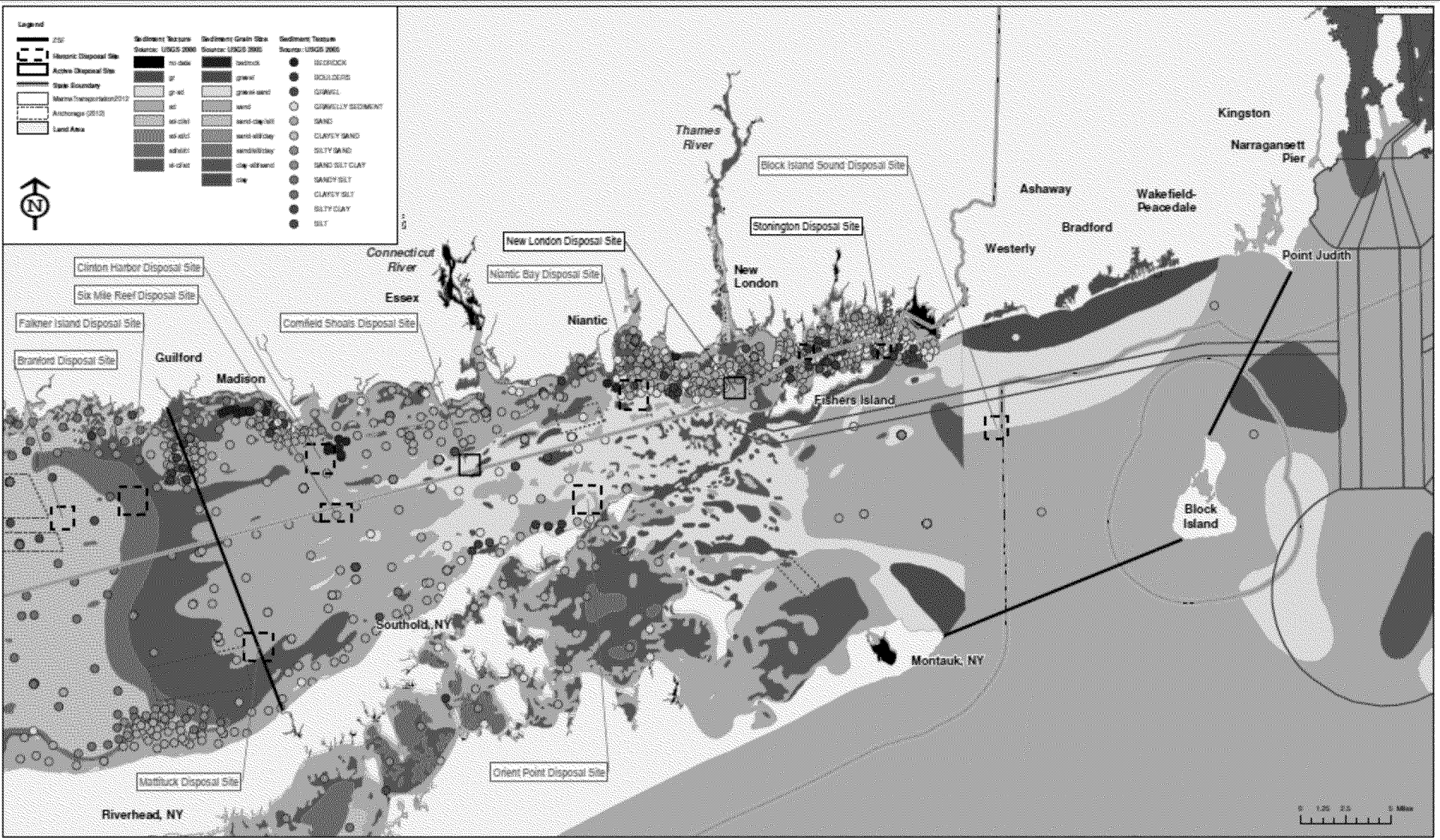


Tier 1: Bathymetry (>18 m)

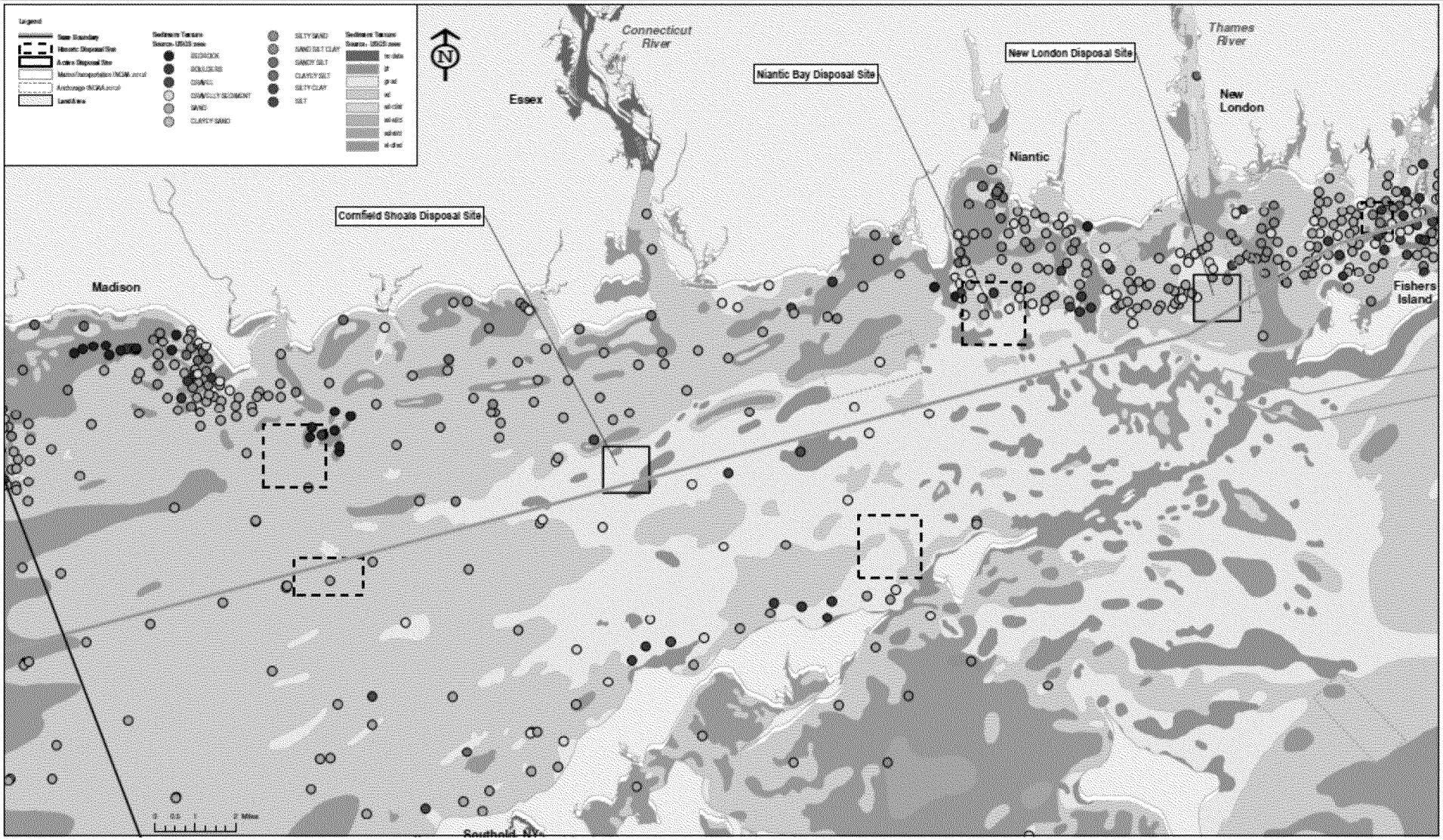


18m (60ft) and shallower was used as depth at which sites were not feasible for Western and Central LIS EIS.

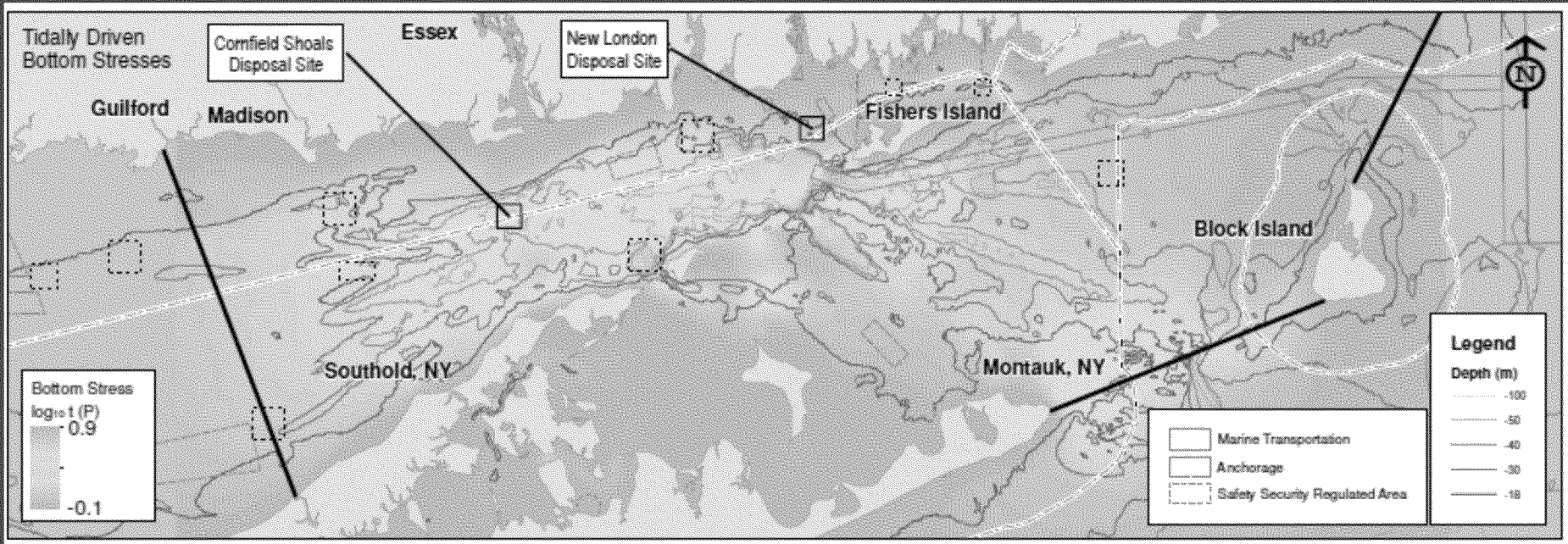
Tier 1: Sediment Characteristics (ZSF)

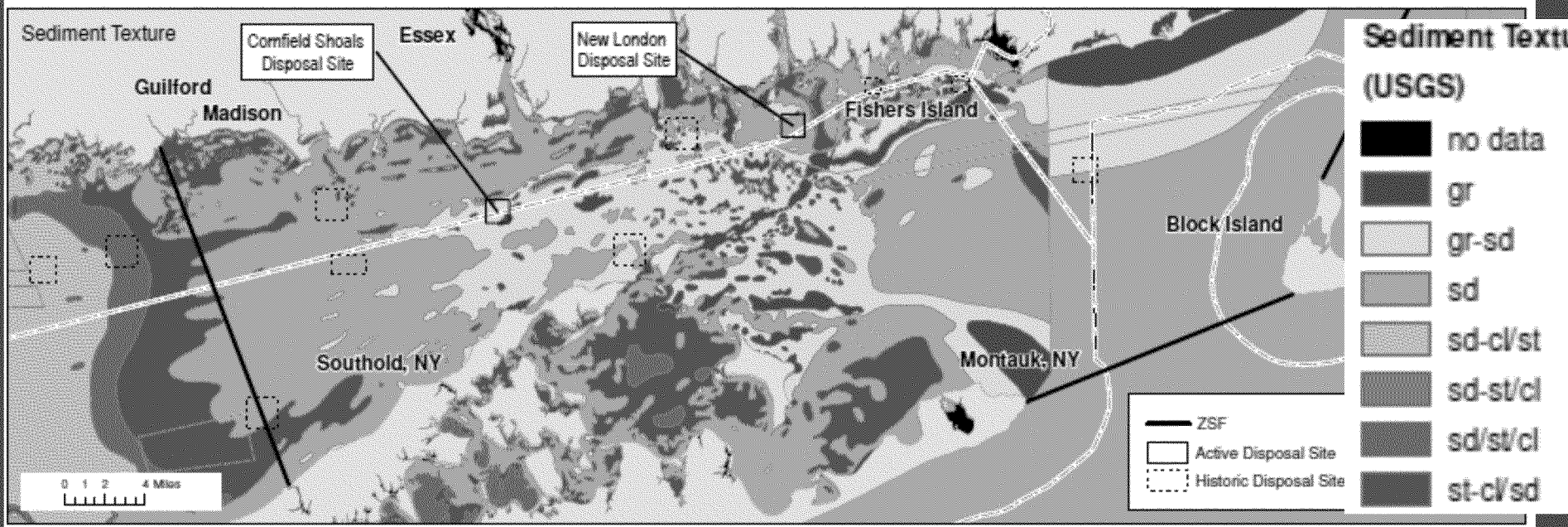


Tier 1: Sediment Characteristics (ELIS)



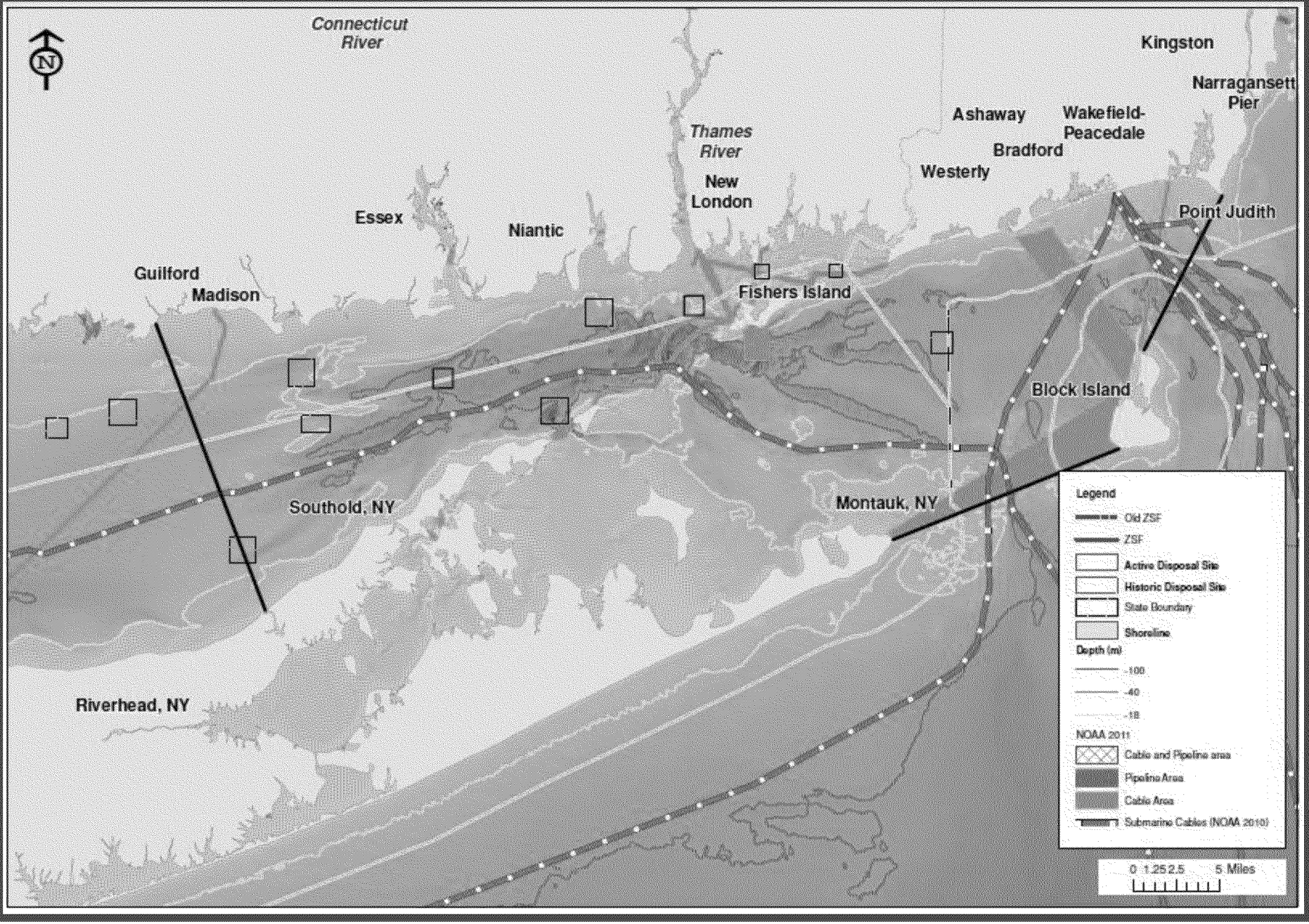
Tidally-Driven Bottom Stress and Sediment Texture



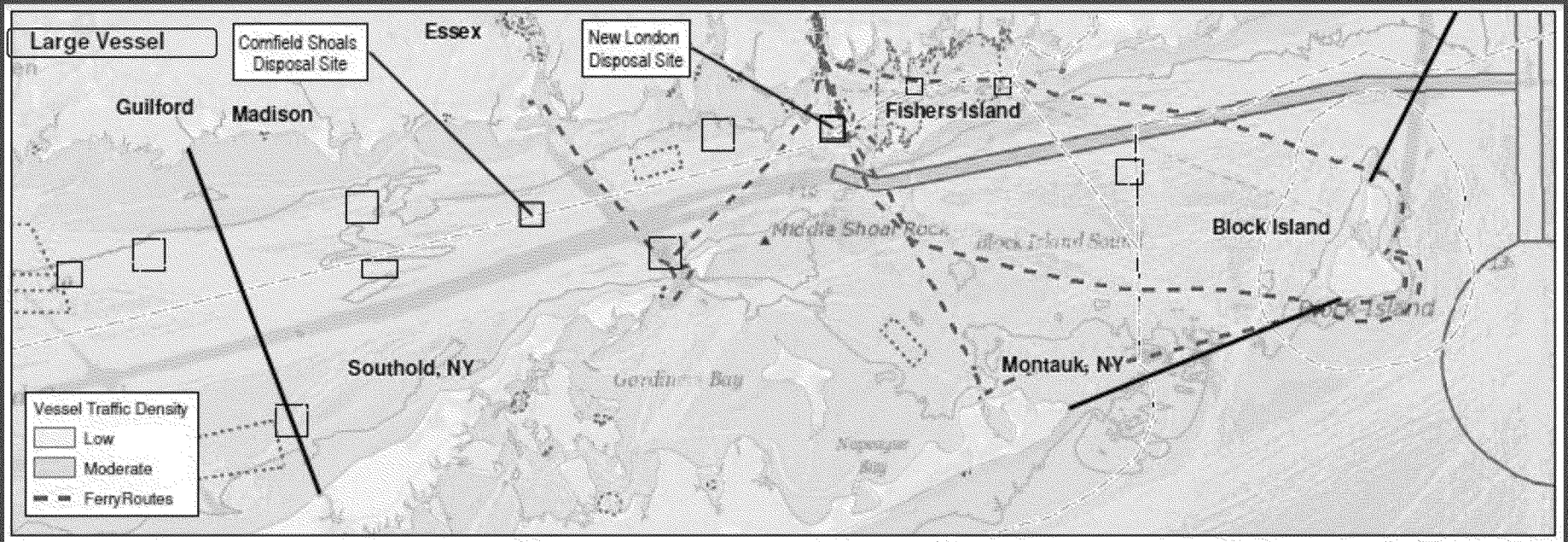


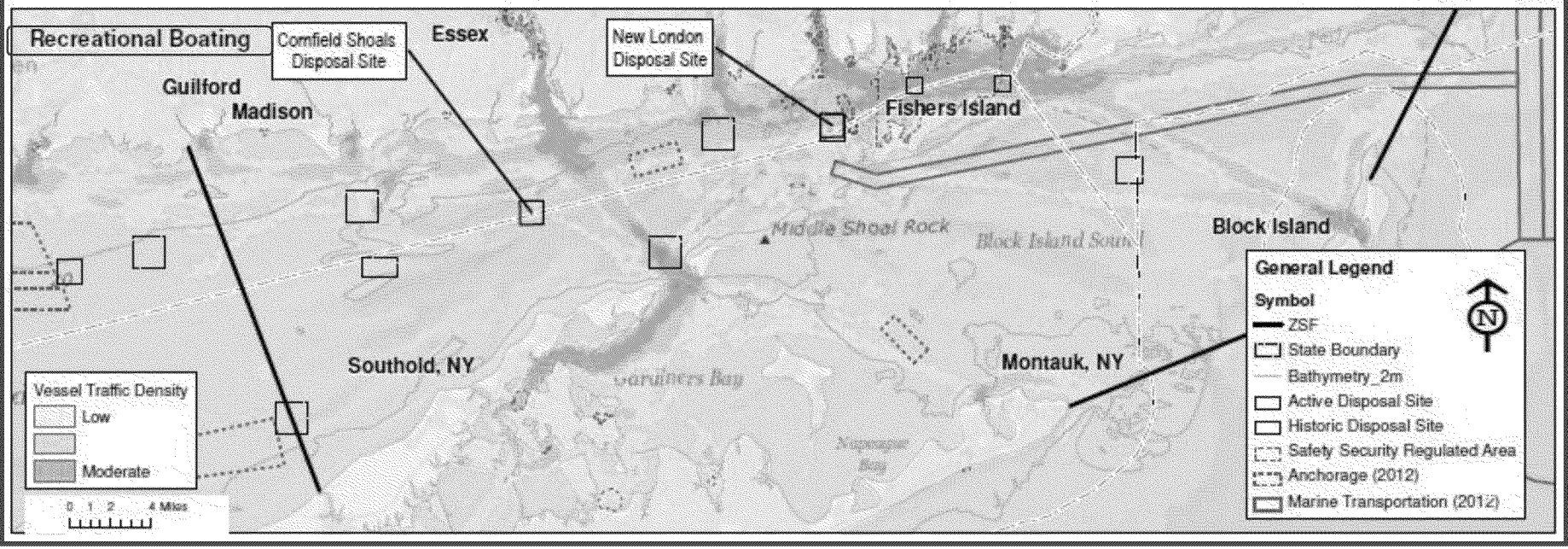
Flow Directions

Tier 1: Cables and Pipelines



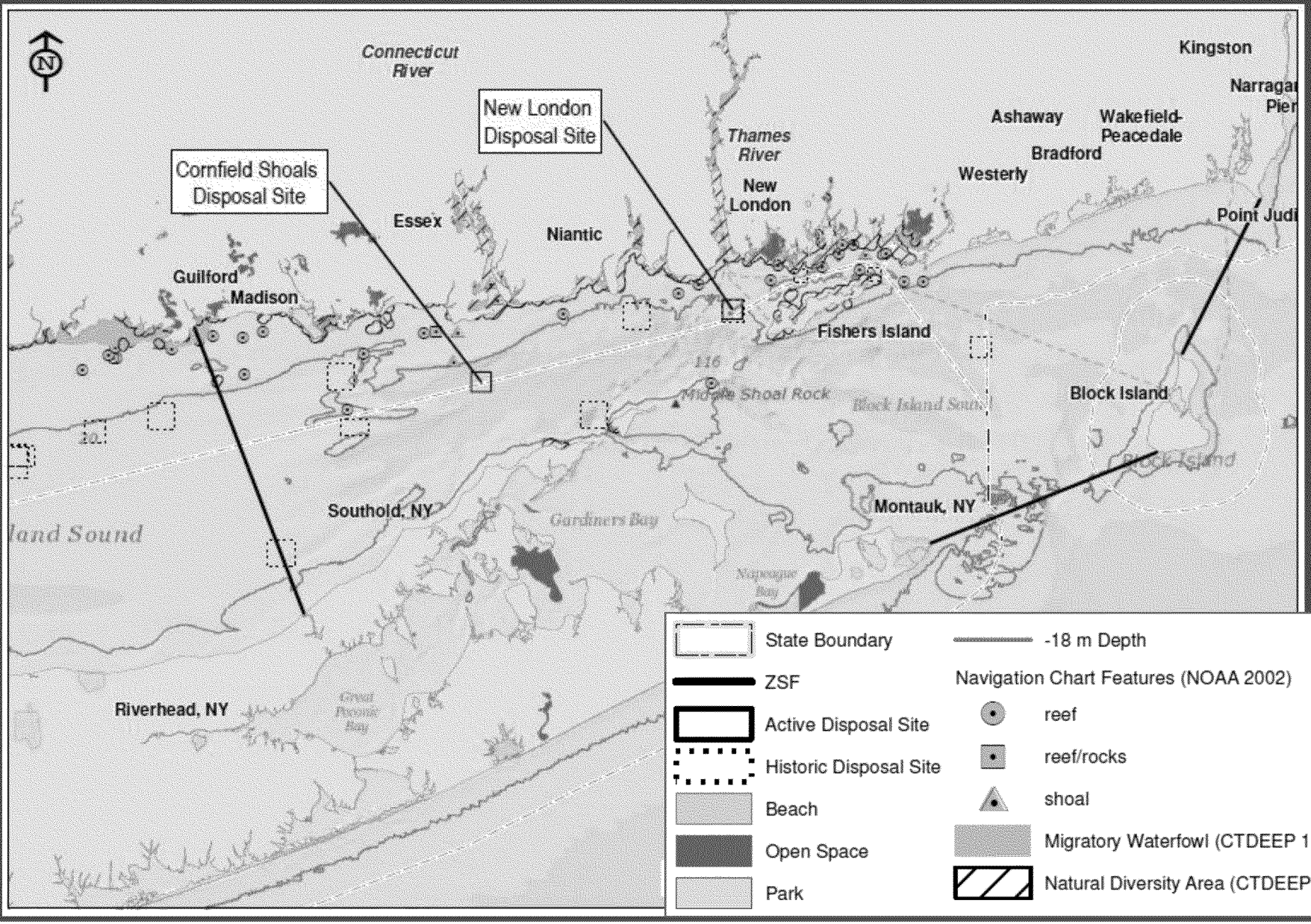
Tier 1: Vessel Traffic Density, Anchoring Areas



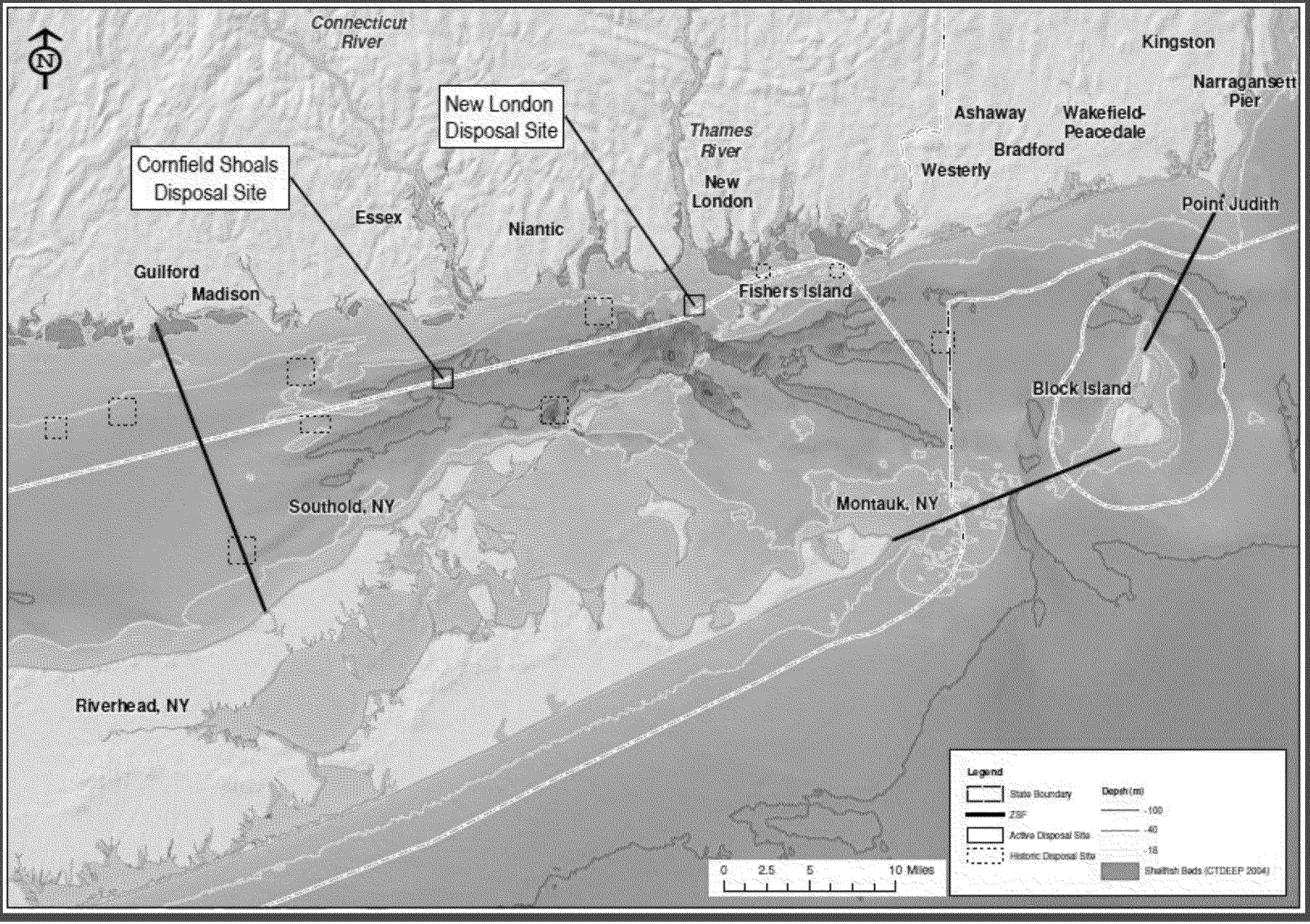


Conservation Areas (More data needed)

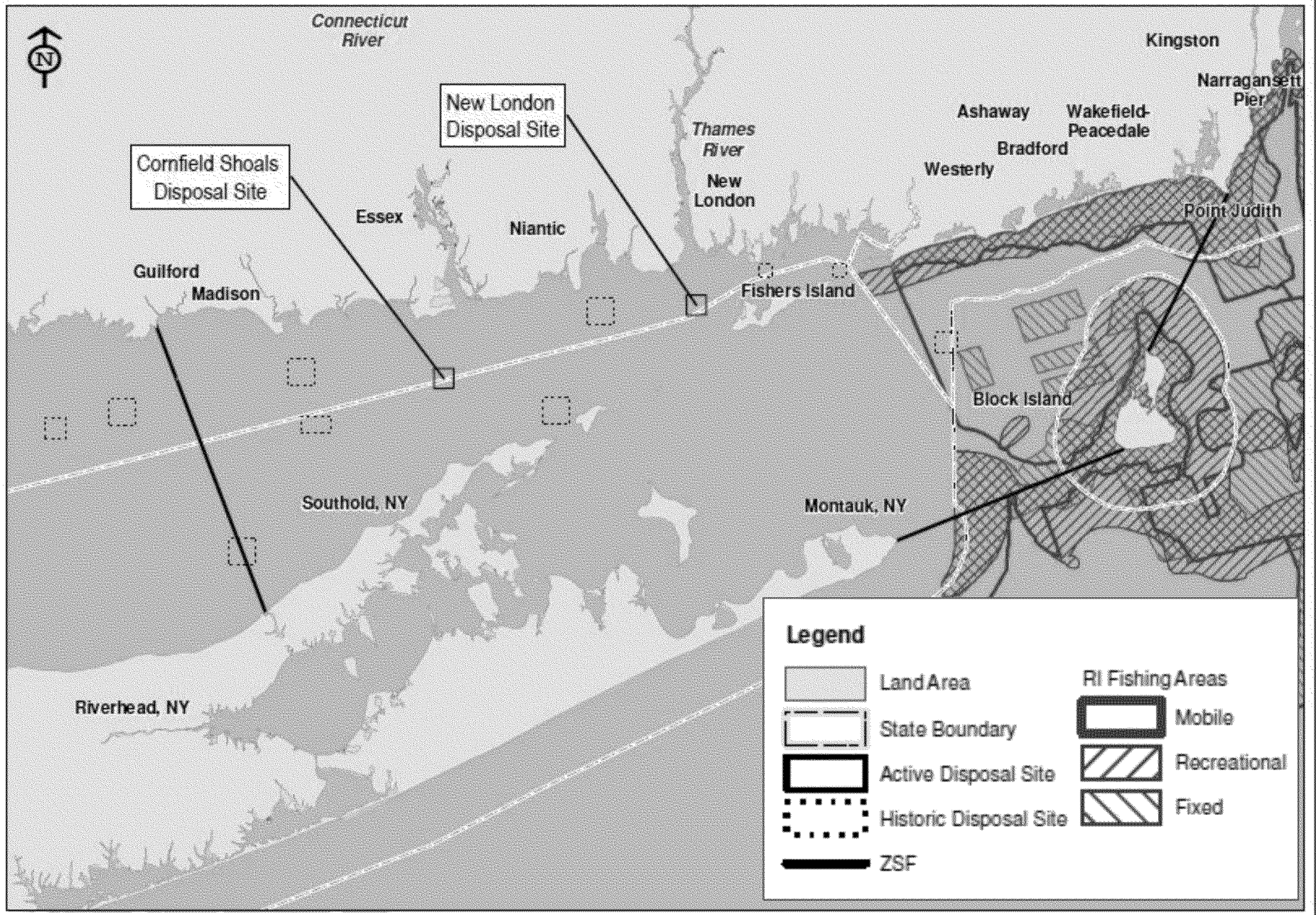
(sanctuaries, wildlife refuges, national seashores, parks, artificial reefs, etc.)



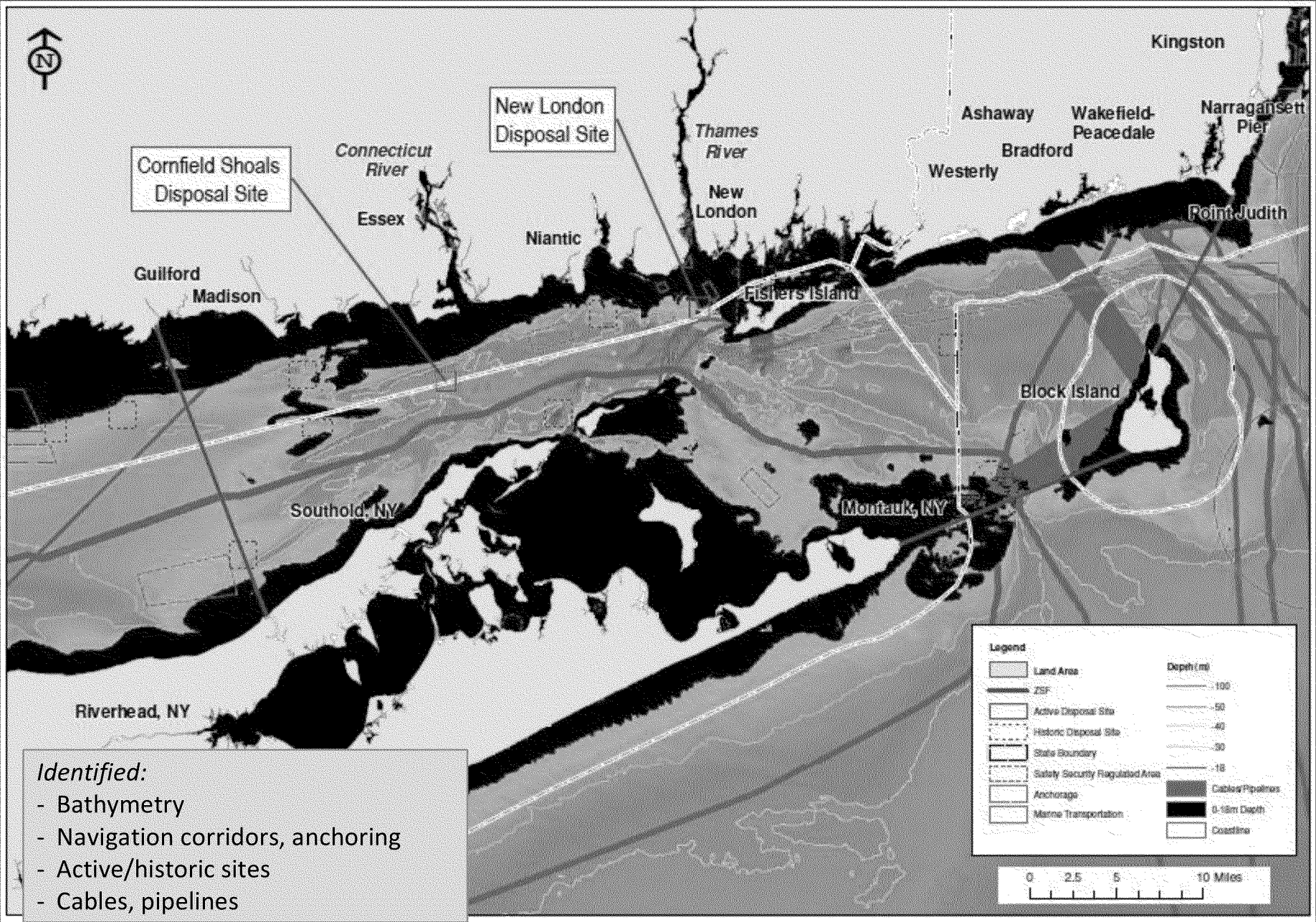
Tier 1: Shellfish Beds (NY+RI Data needed)



Tier 1: Fishing Areas (additional data needed)

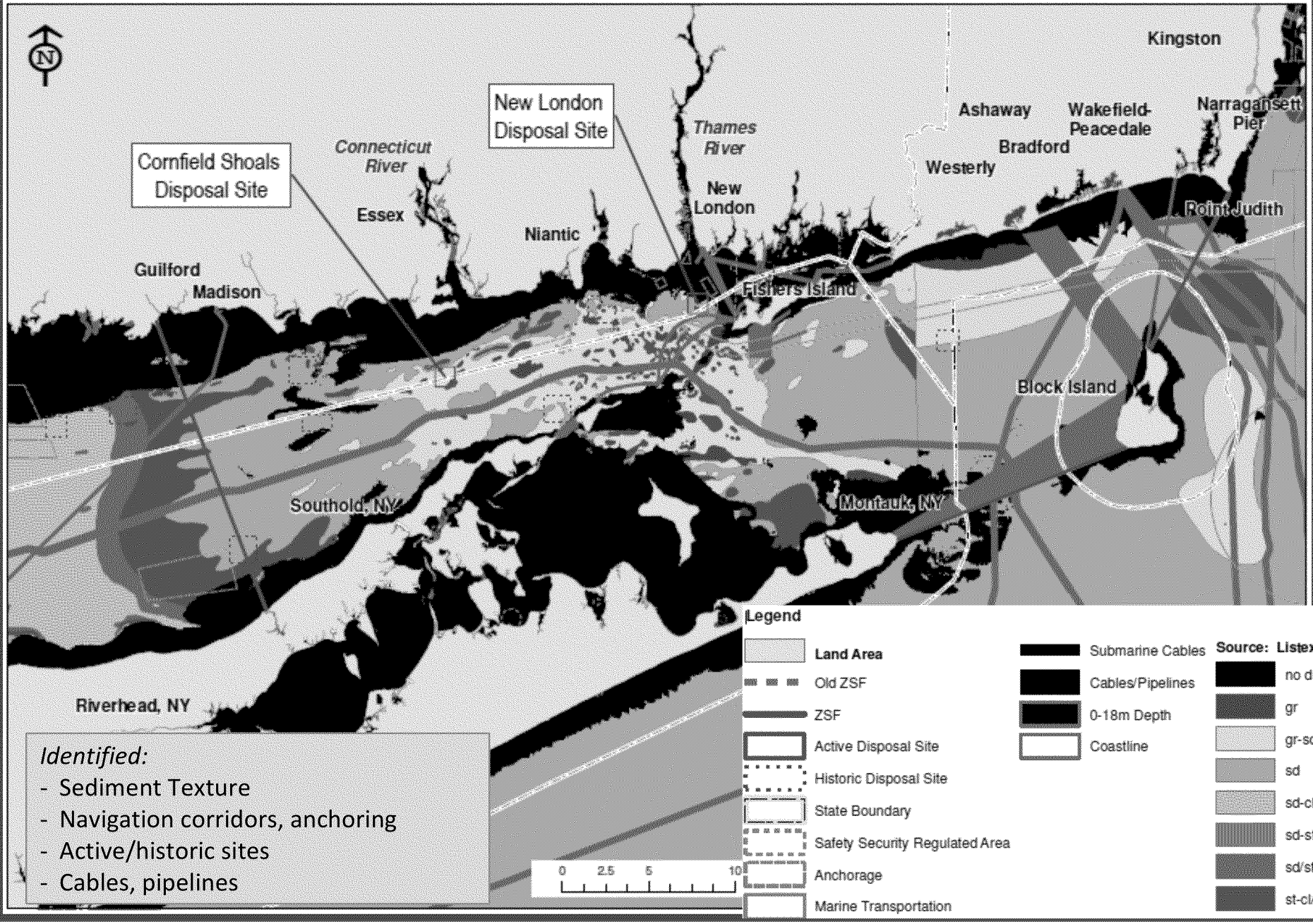


Tier 1 Overlay 1: Base - Bathymetry



Identified:
- Bathymetry
- Navigation corridors, anchoring
- Active/historic sites
- Cables, pipelines

Tier 1 Overlay 2: Base - Sediment Texture



Identified:
- Sediment Texture
- Navigation corridors, anchoring
- Active/historic sites
- Cables, pipelines

Tier 2: Key Screening Criteria

- Biological Resources
  - Eelgrass Beds
  - Shellfish Zoning
  - Essential Fish Habitat
- Active/Historic Disposal Site vs. New Sites
- Historic and Cultural Resources
- Recreation
  - Recreational Navigation
  - Proximity to Beaches
- Conflicting Uses

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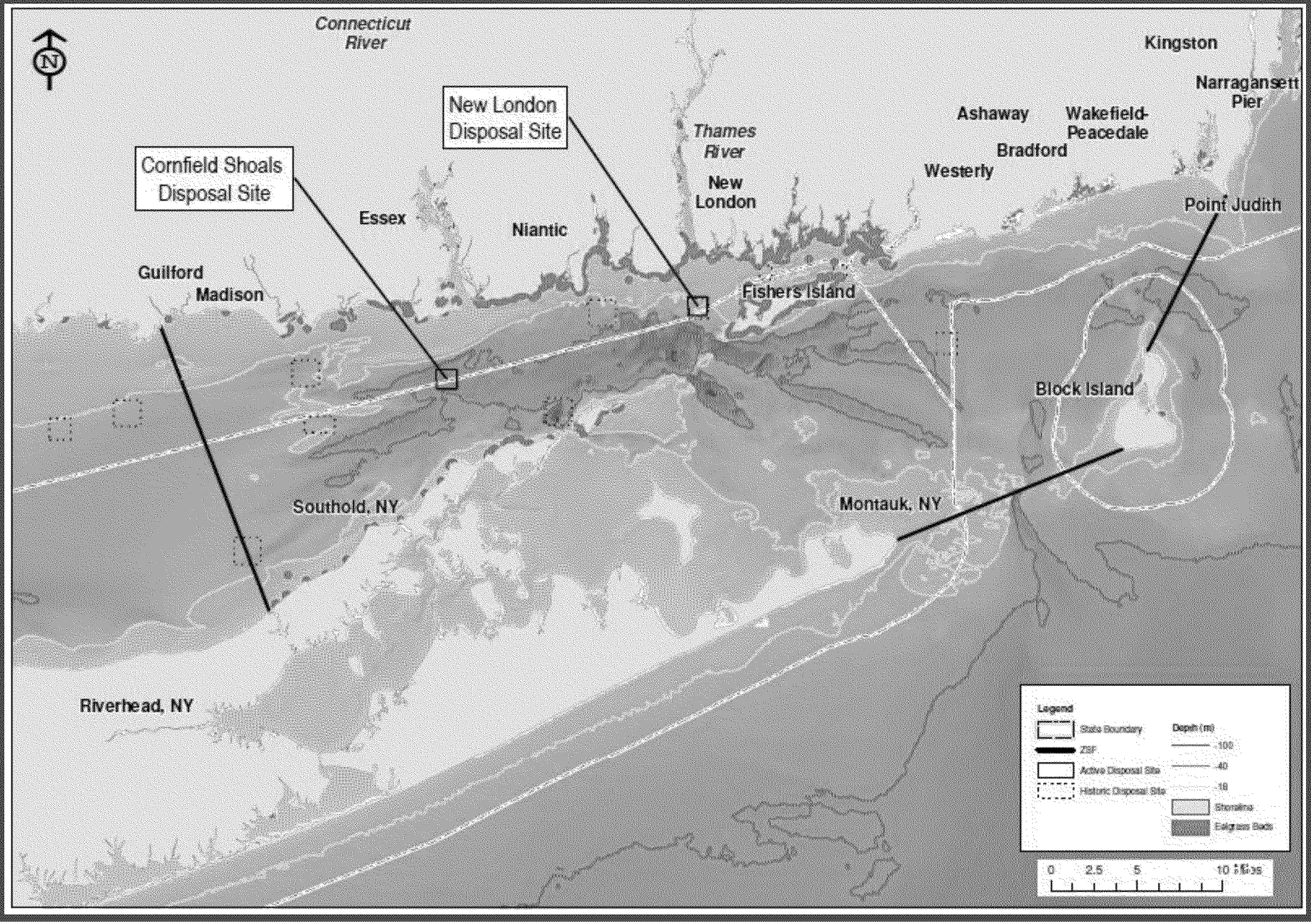
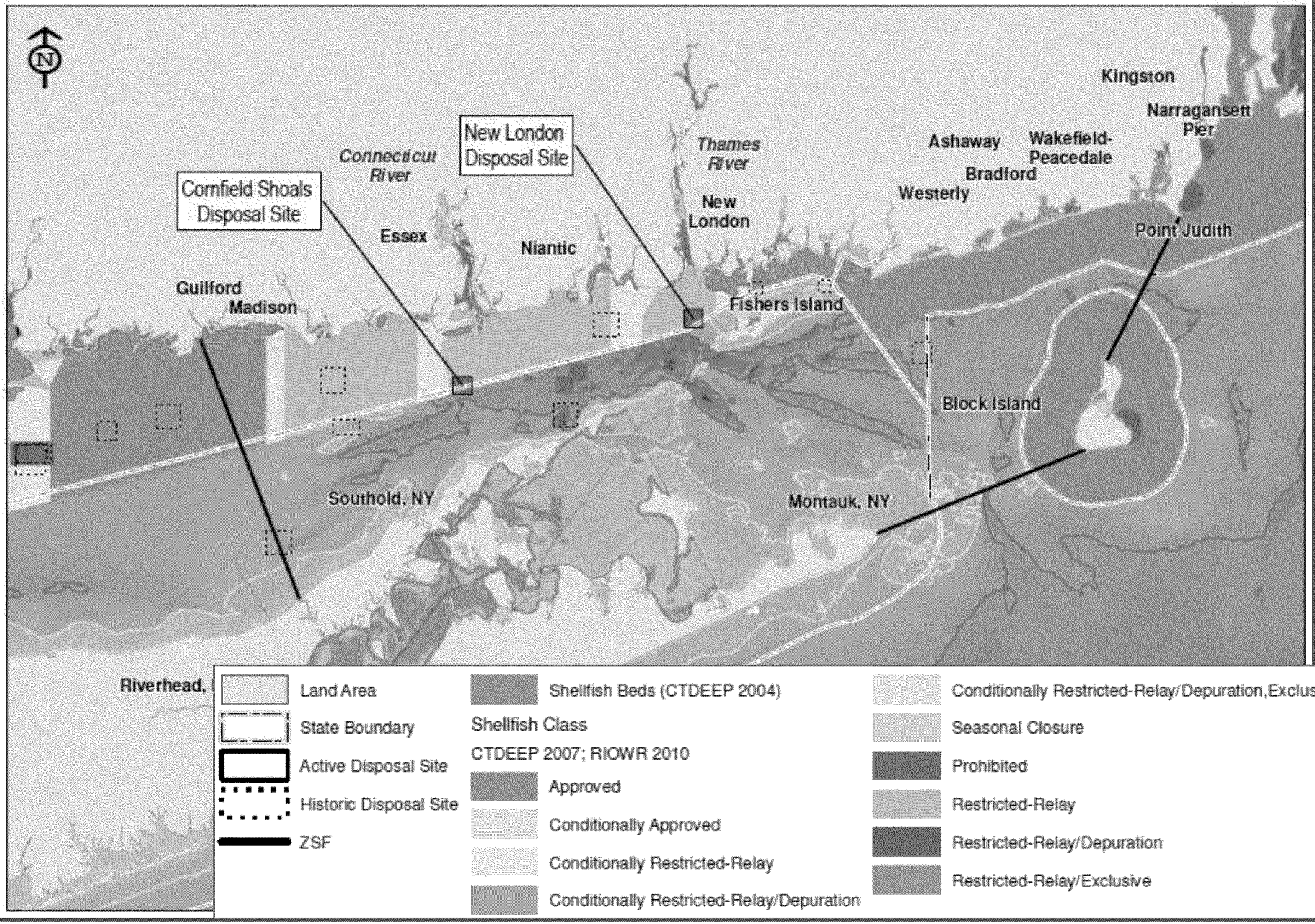
Tier 2: Eelgrass Beds

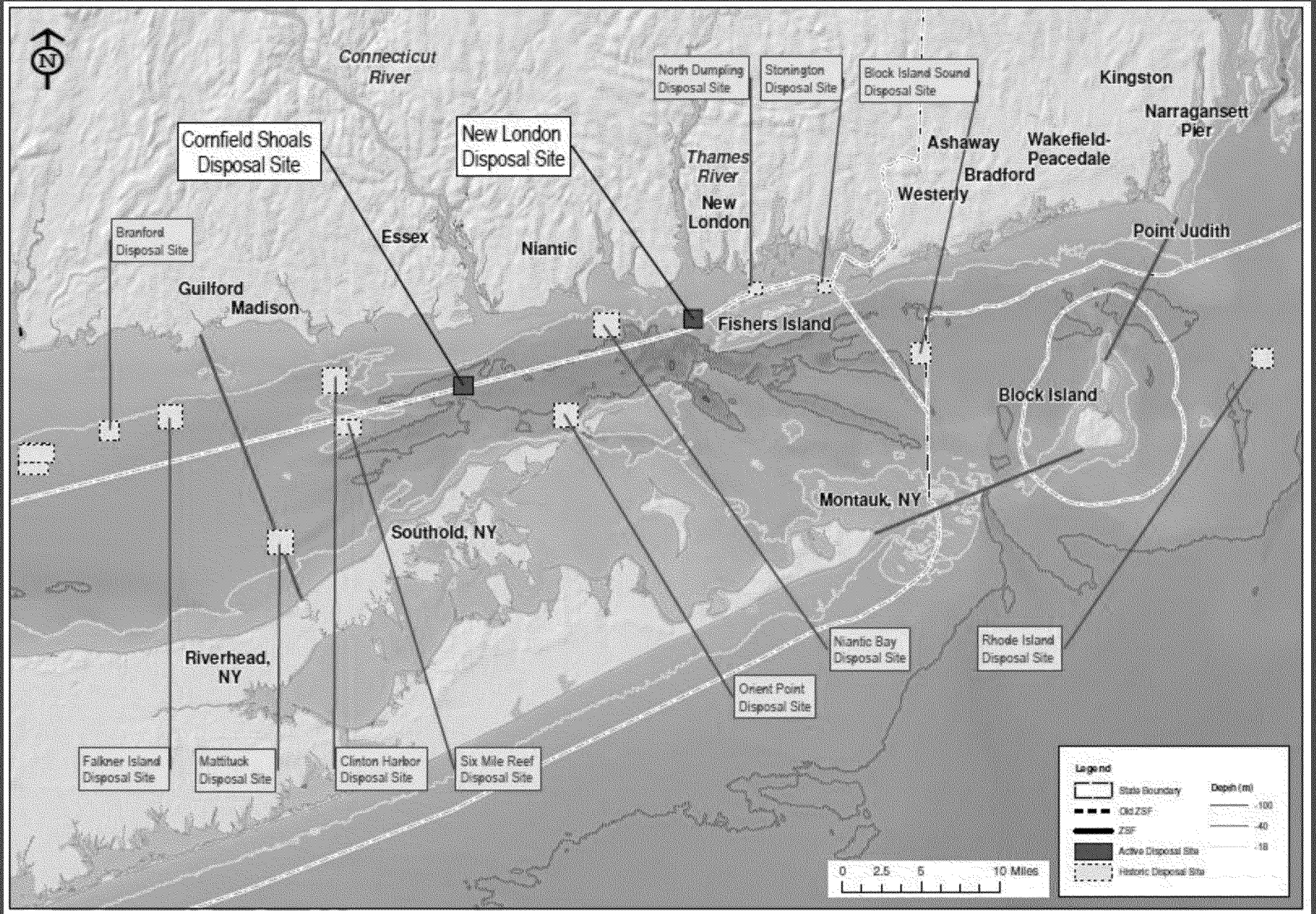


Tier 2: Approved/ Prohibited Shellfish Areas

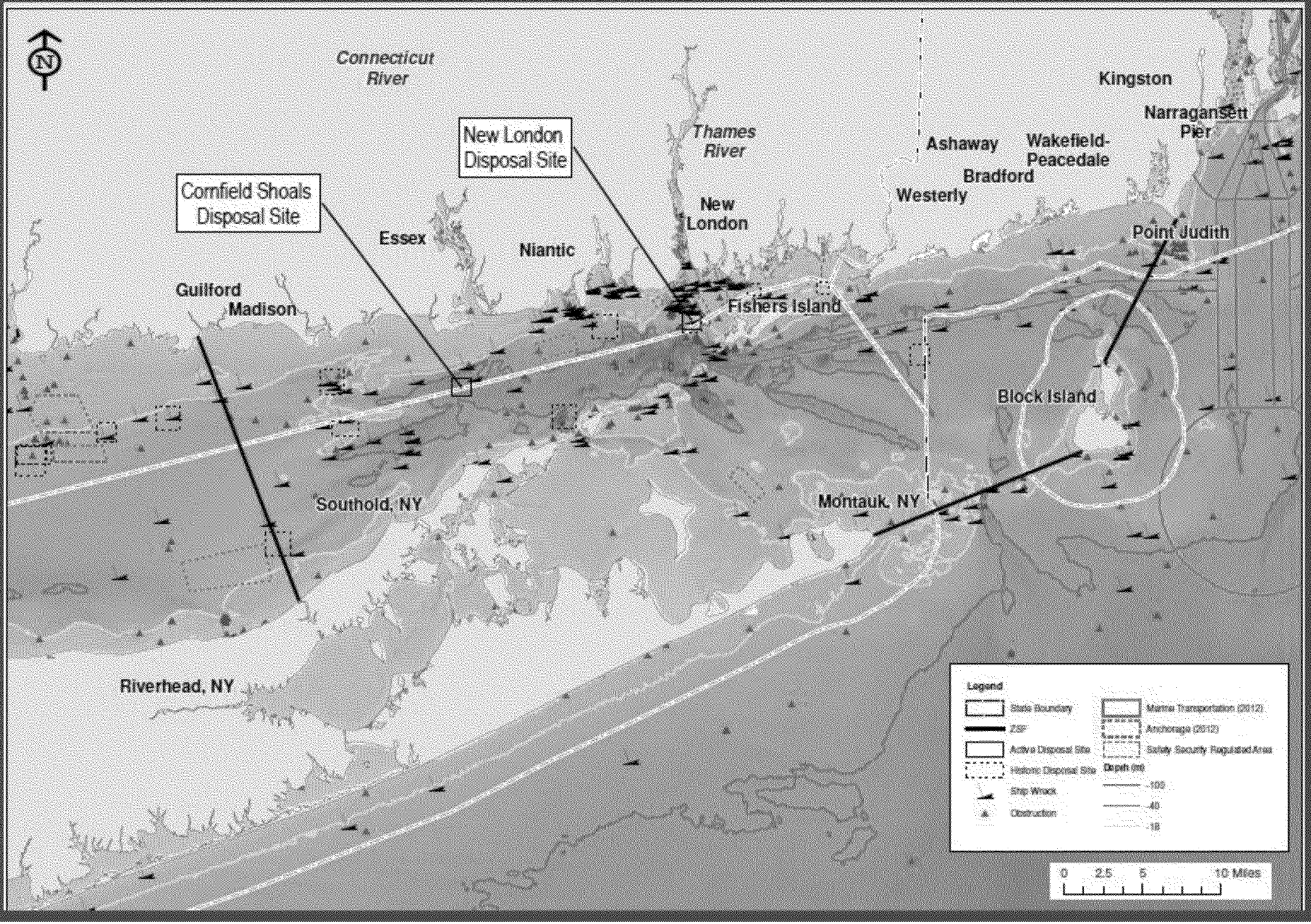
(additional NY data needed)



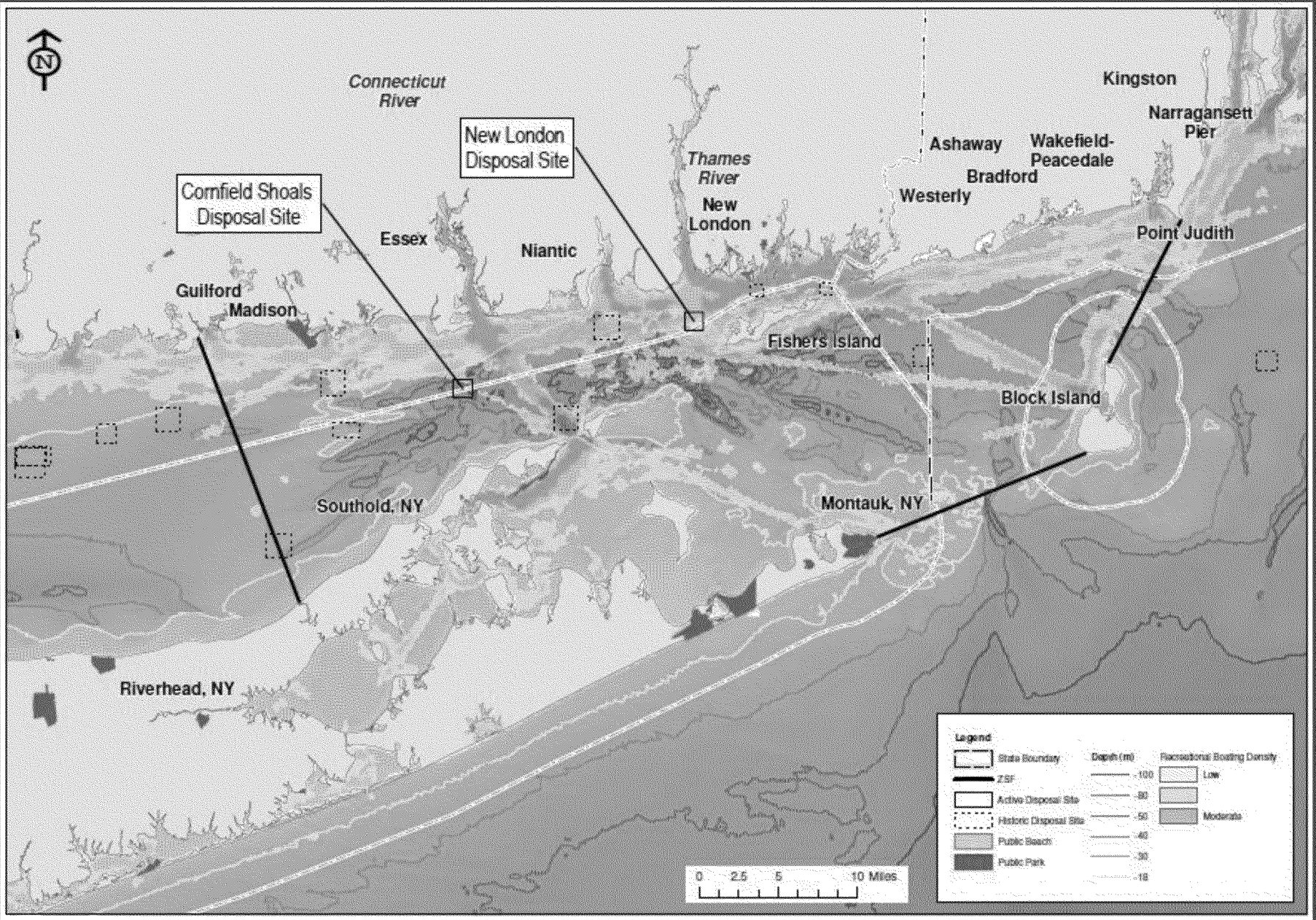
Tier 2: Active and Historic Disposal Sites



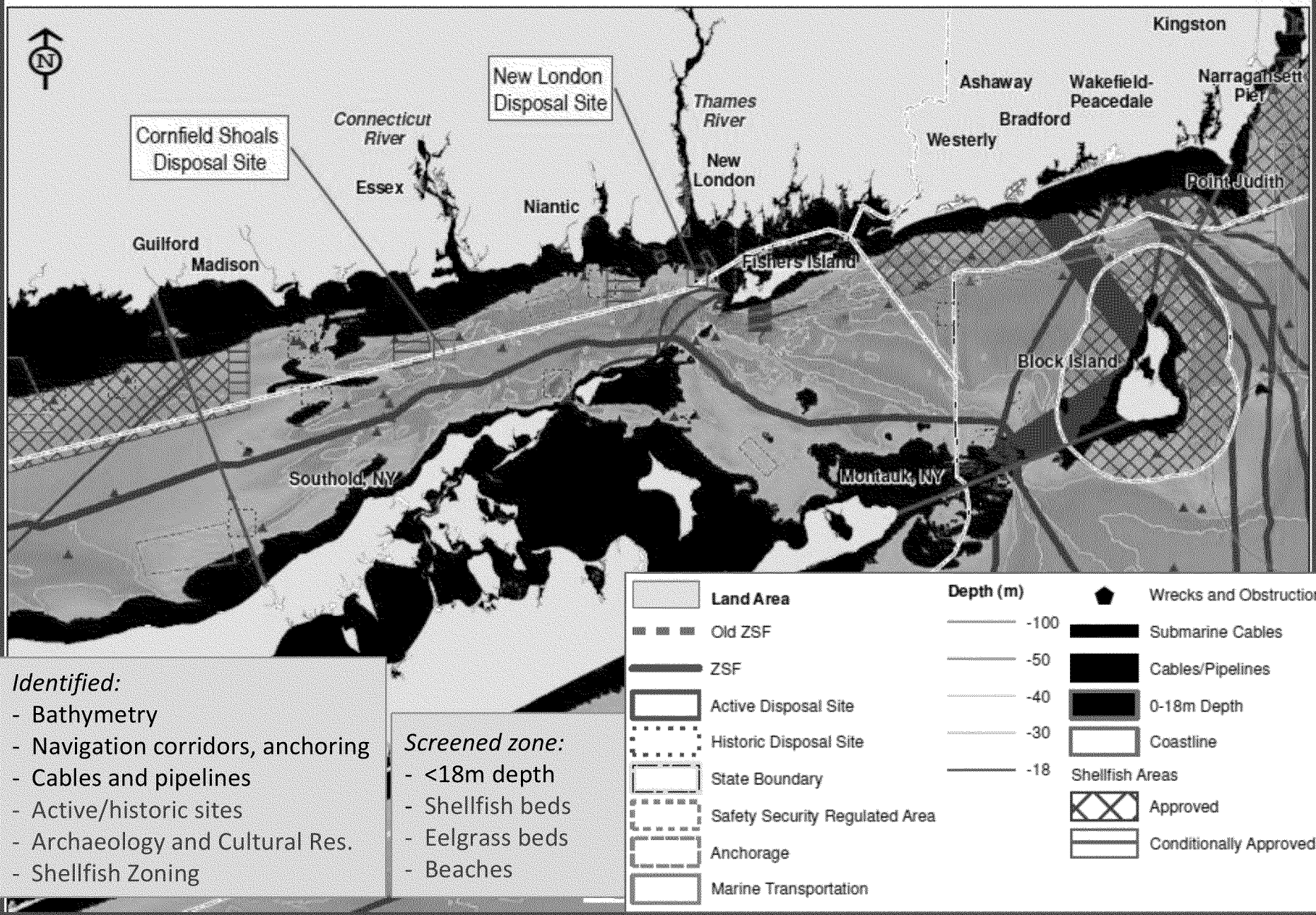
Tier 2: Archaeological and Cultural Resources



Tier 2: Recreational Areas and Navigation



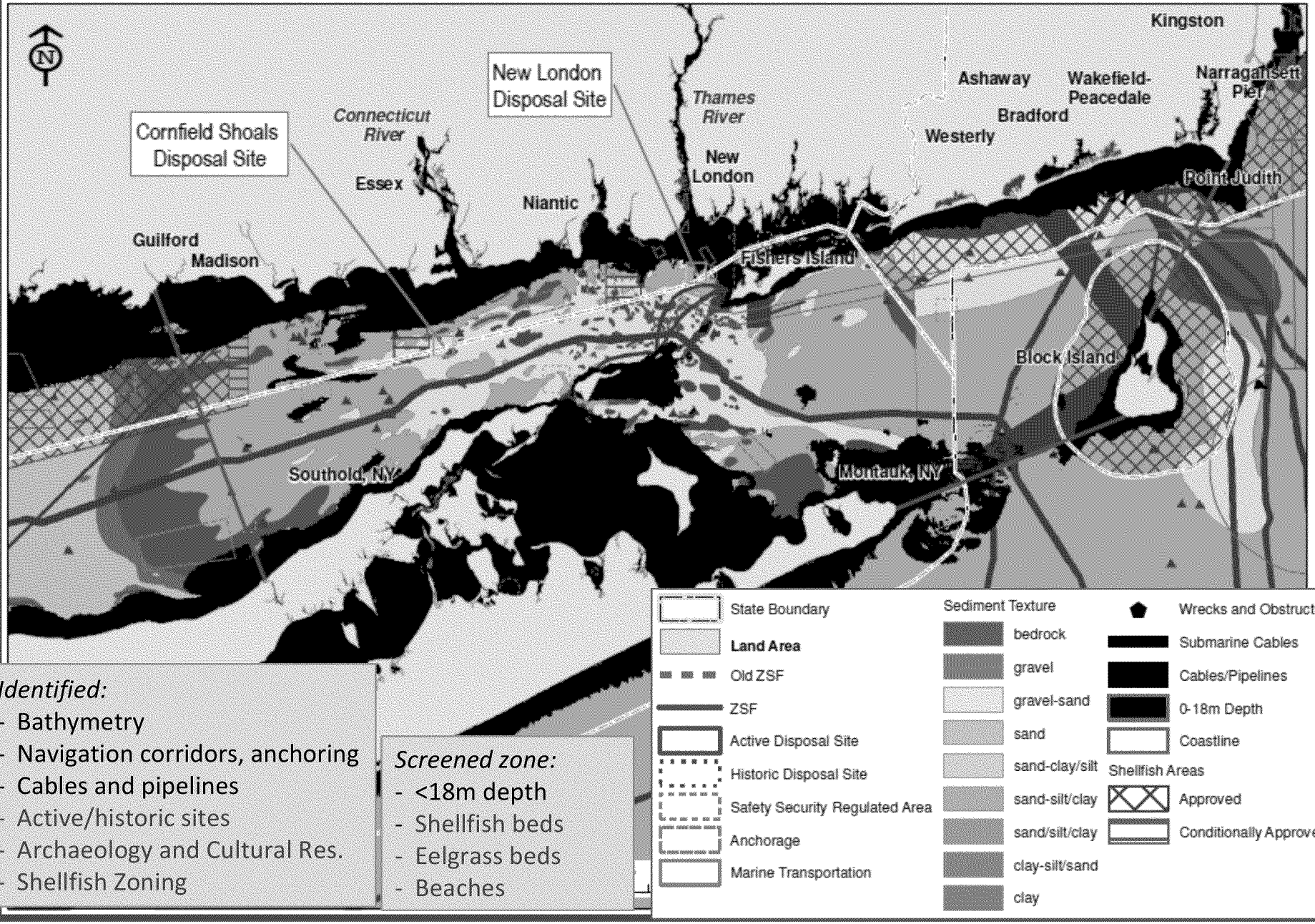
Tier 2 Overlay 1: Base - Bathymetry



Identified:
- Bathymetry
- Navigation corridors, anchoring
- Cables and pipelines
- Active/historic sites
- Archaeology and Cultural Res.
- Shellfish Zoning

Screened zone:
- <18m depth
- Shellfish beds
- Eelgrass beds
- Beaches

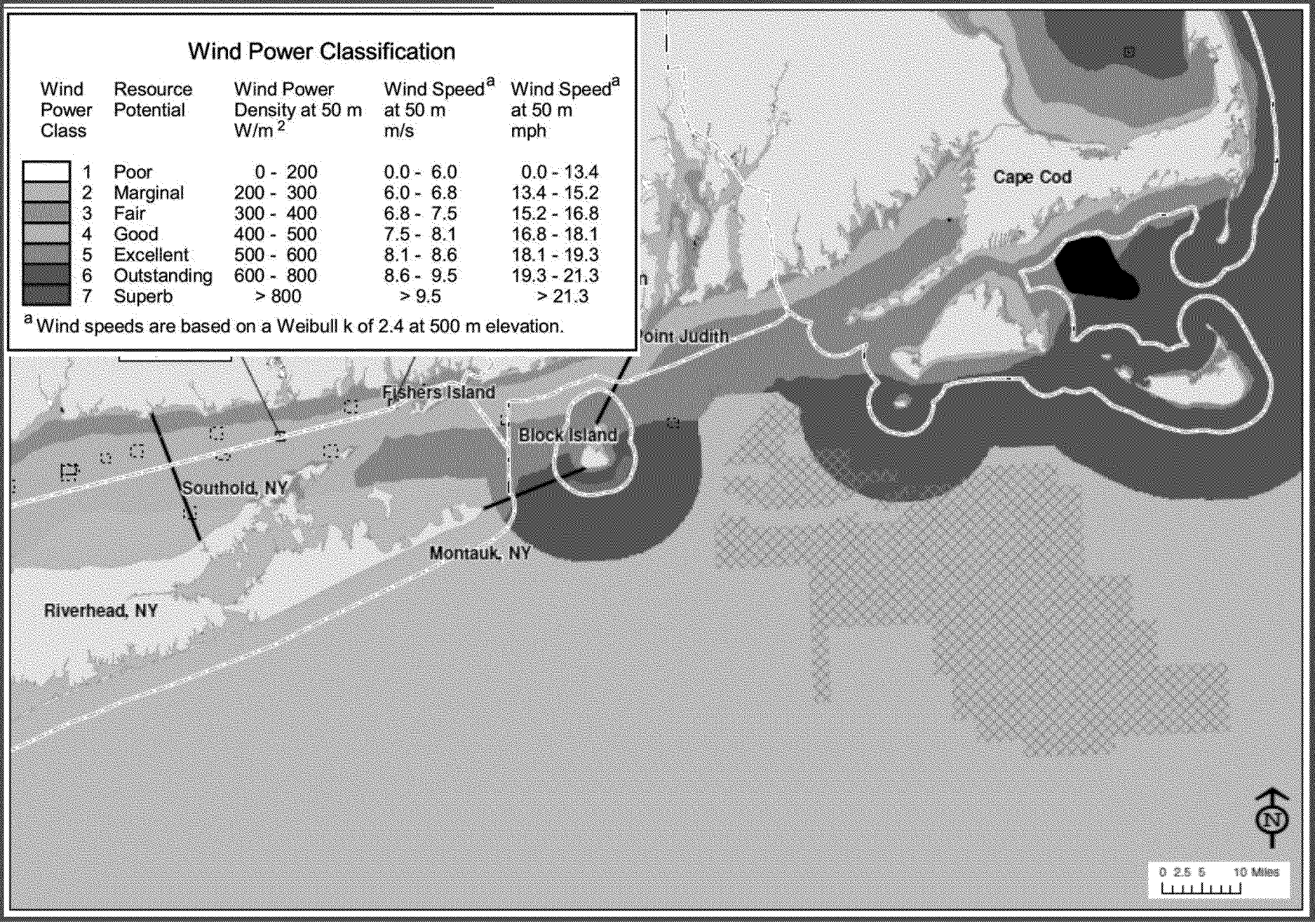
Tier 2 Overlay 2: Base - Sediment Texture



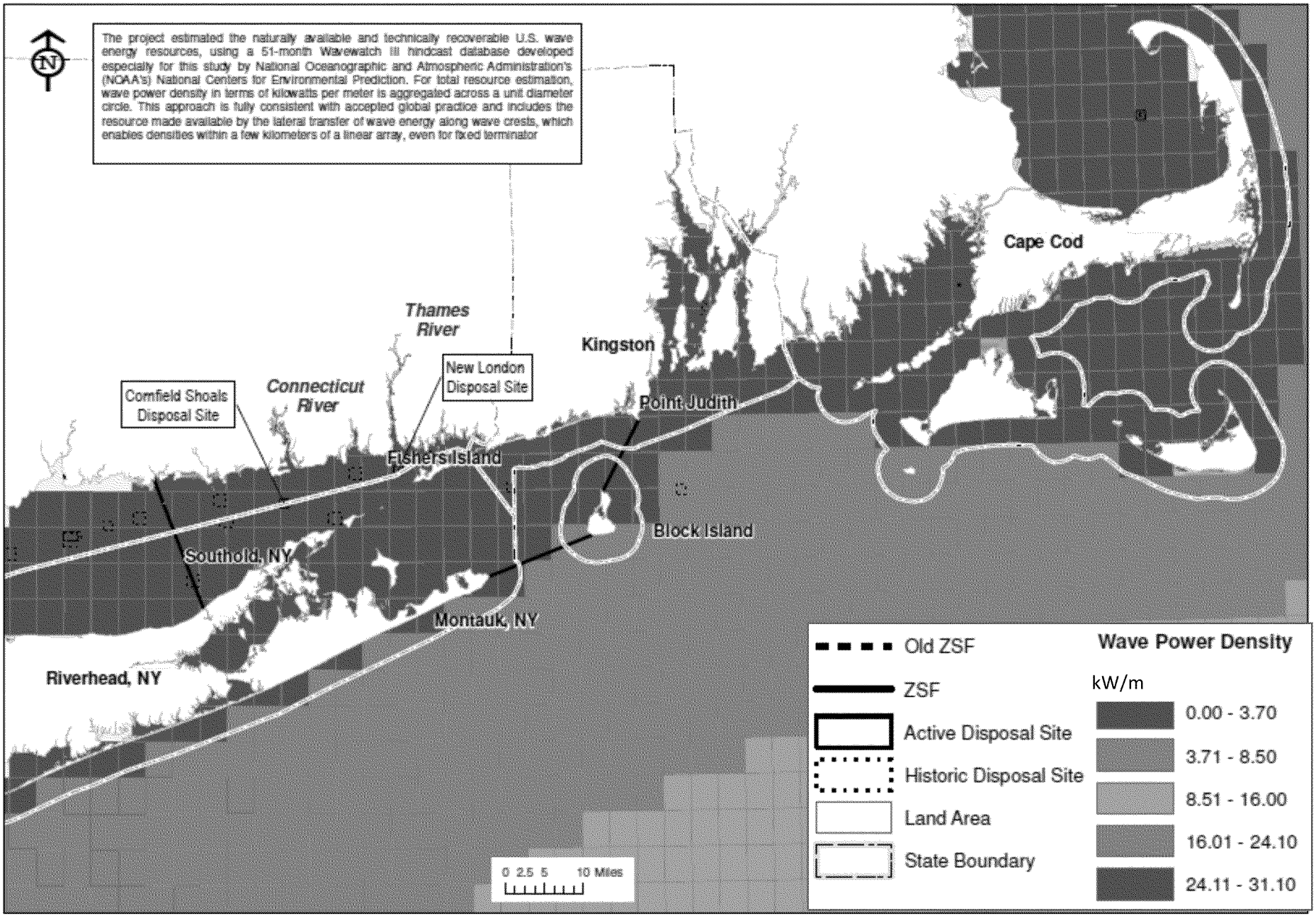
Identified:
- Bathymetry
- Navigation corridors, anchoring
- Cables and pipelines
- Active/historic sites
- Archaeology and Cultural Res.
- Shellfish Zoning

Screened zone:
- <18m depth
- Shellfish beds
- Eelgrass beds
- Beaches

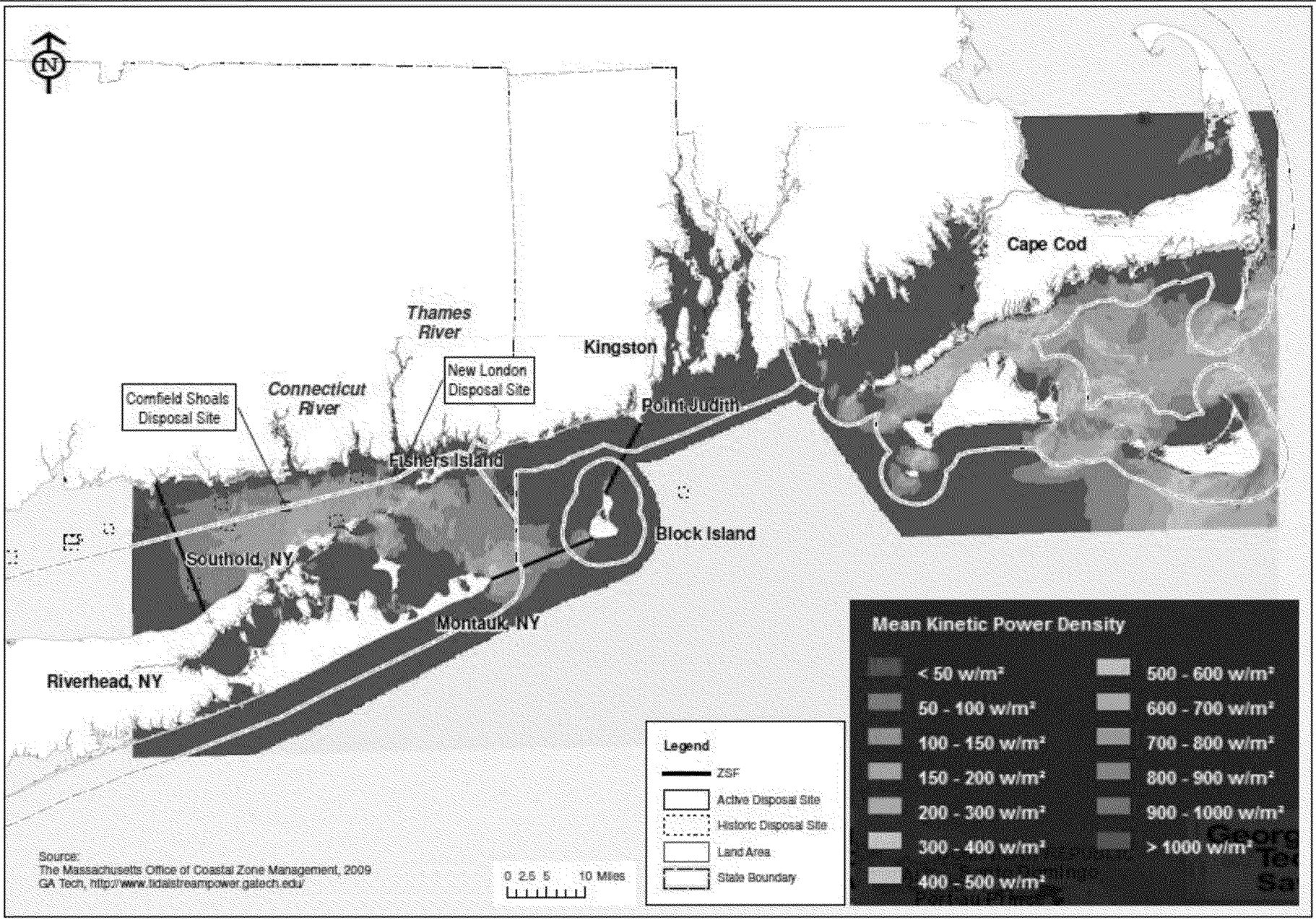
Alternative Energy – Wind



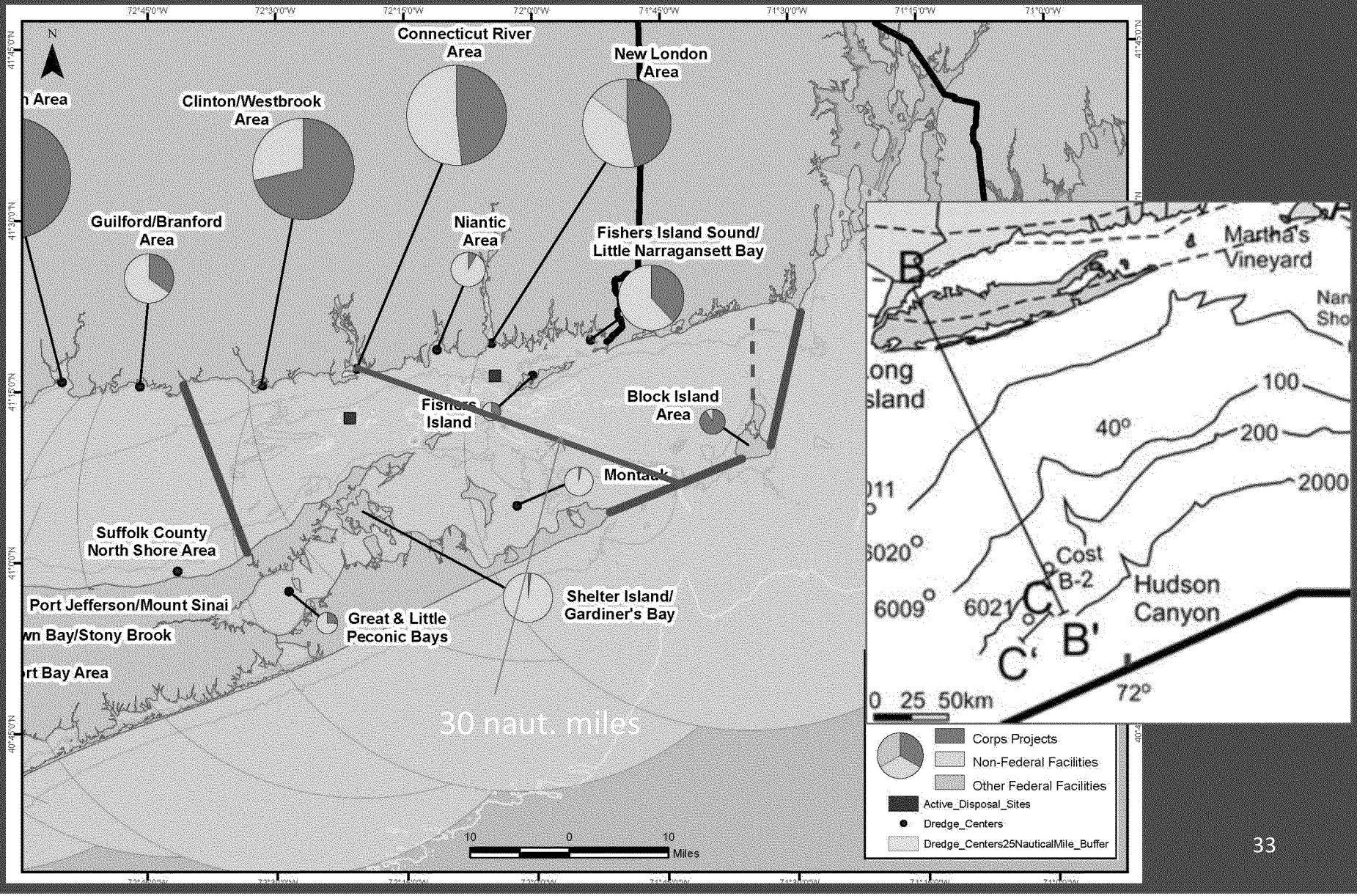
Alternative Energy – Wave



Alternative Energy – Tidal



Continental Shelf and Areas within 25 nm of Dredging Centers



Alternative Site Discussion

- Site characteristics (preferably containment)
  - *Containment* – All materials remain at the location where they are placed
  - *Dispersive* – Materials are allowed to be moved off of the placement location through currents, etc.
- Valuable marine habitats
  - Gravel and hardbottom areas were identified previously as important to maintain
- Conservation Areas
- Economy, Safety, and Environment
- Active/historic vs. new disposal area

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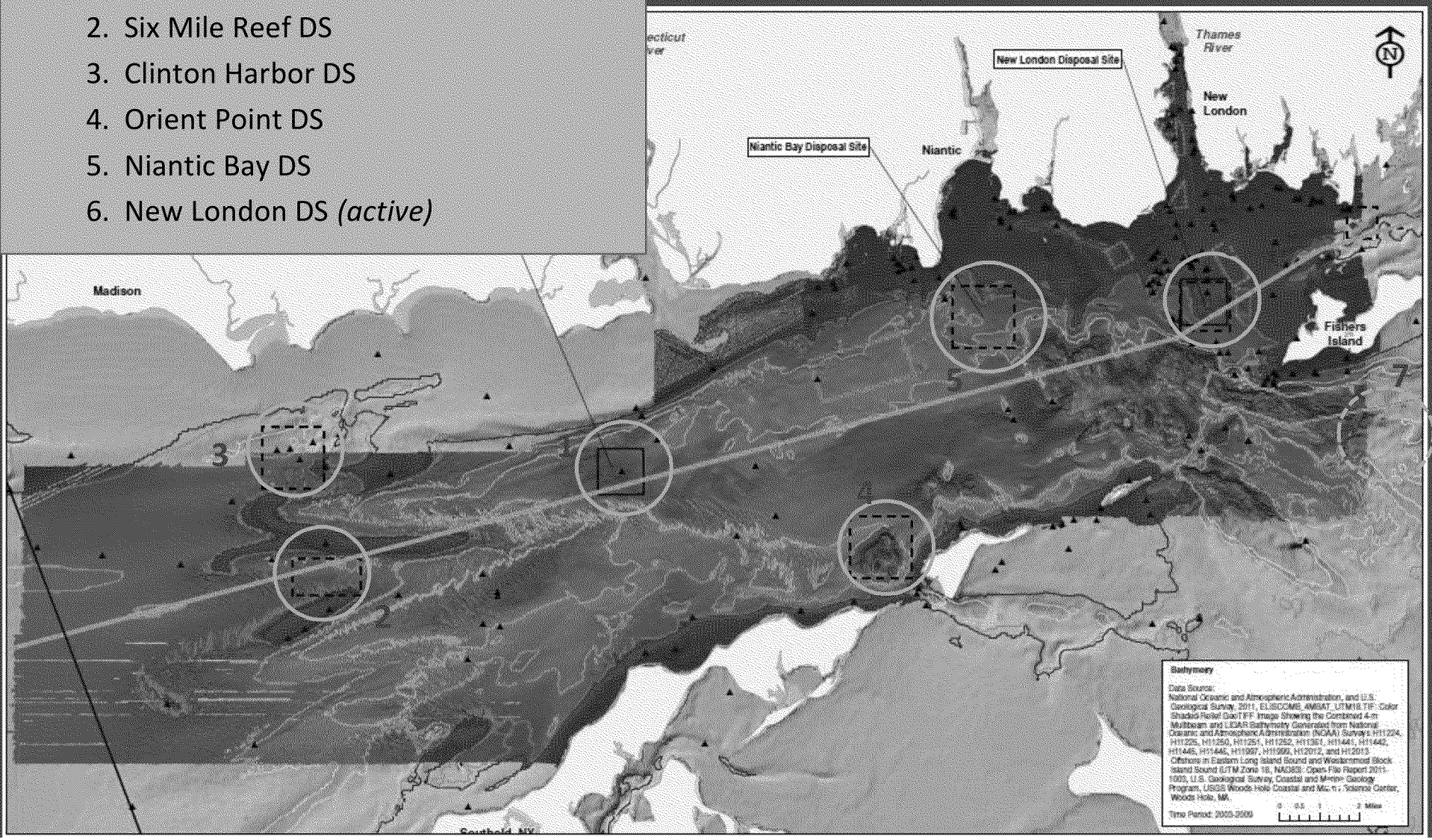
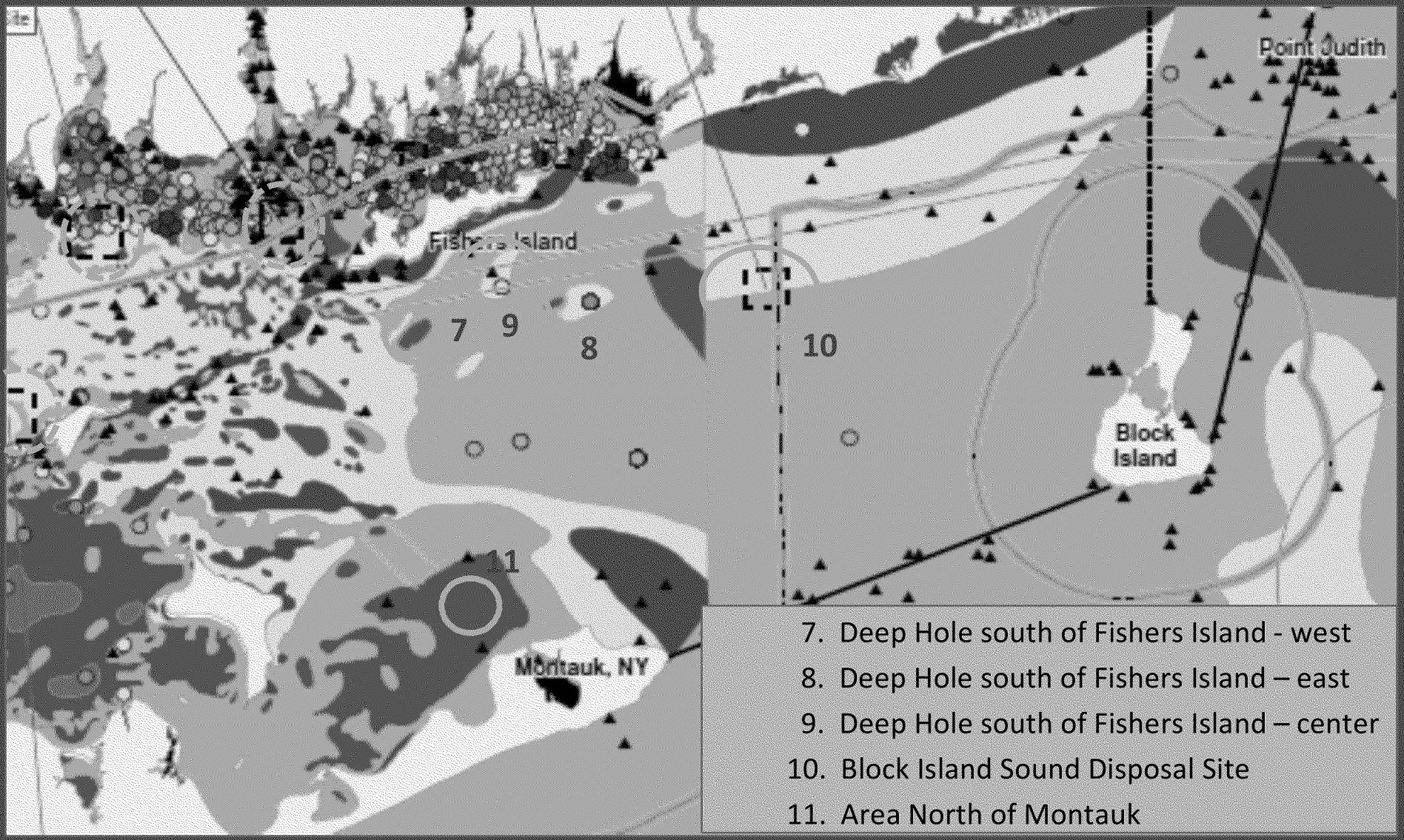
Alternative Site Discussion: Eastern Long Island Sound

1. Cornfield Shoals DS (*active)*
2. Six Mile Reef DS
3. Clinton Harbor DS
4. Orient Point DS
5. Niantic Bay DS
6. New London DS *(active)*



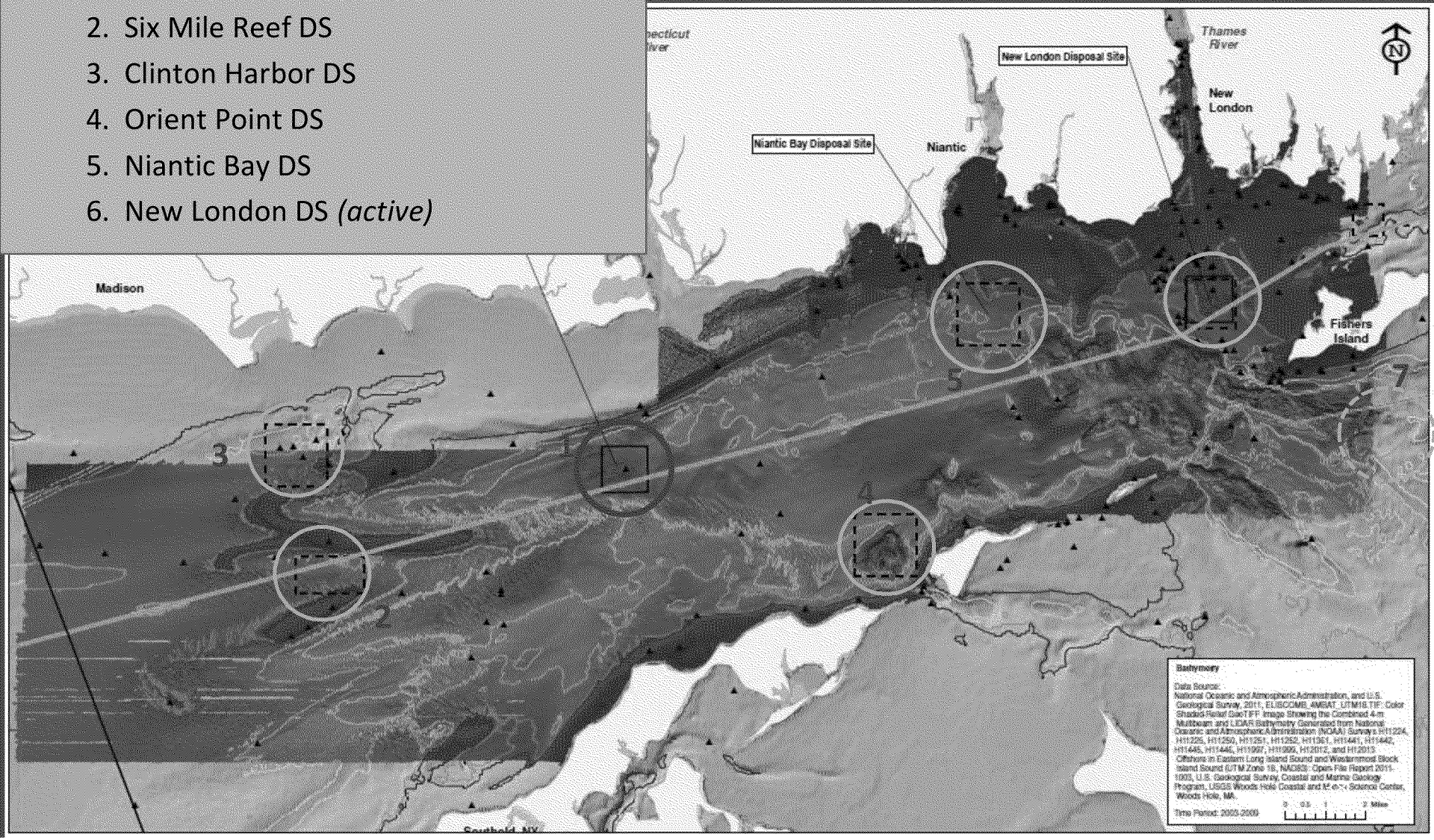
Alternative Site Discussion: Block Island Sound



7. Deep Hole south of Fishers Island - west
8. Deep Hole south of Fishers Island – east
9. Deep Hole south of Fishers Island – center
10. Block Island Sound Disposal Site
11. Area North of Montauk

Alternative Site Discussion: Eastern Long Island Sound *(cont.)*

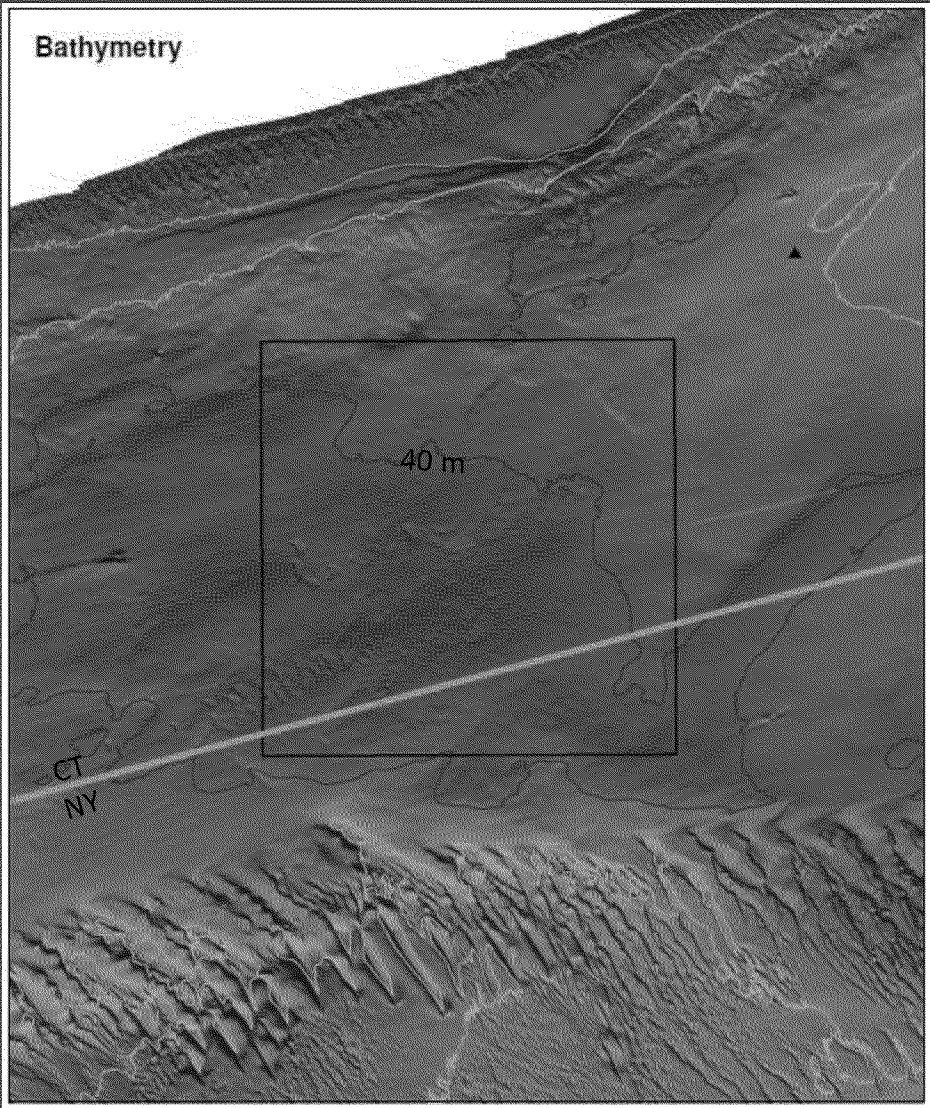
1. **Cornfield Shoals DS (*active*)**
2. Six Mile Reef DS
3. Clinton Harbor DS
4. Orient Point DS
5. Niantic Bay DS
6. New London DS *(active)*

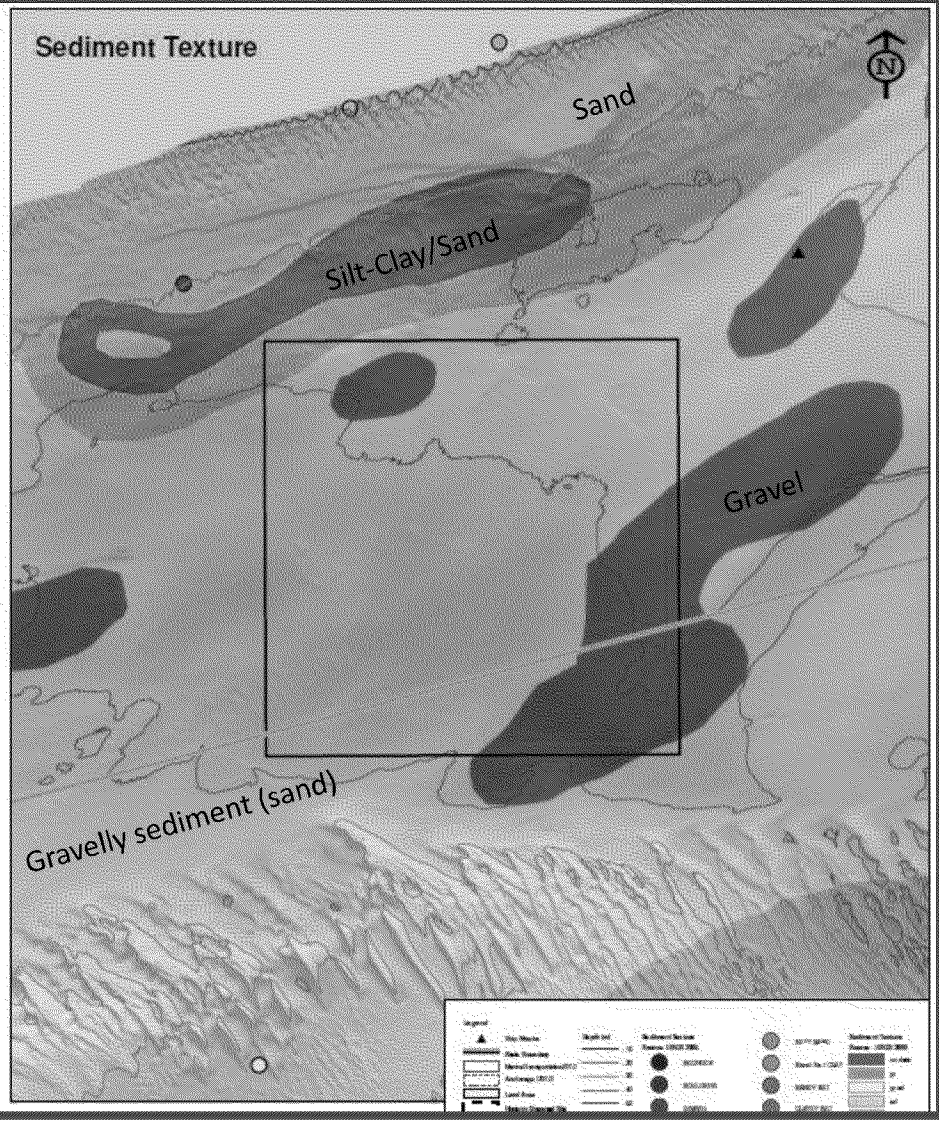


1. Cornfield Shoals Disposal Site

+ Deep area (150 ft)
+ Long Sand Shoal to north
+ Near dredging centers
+ Active site

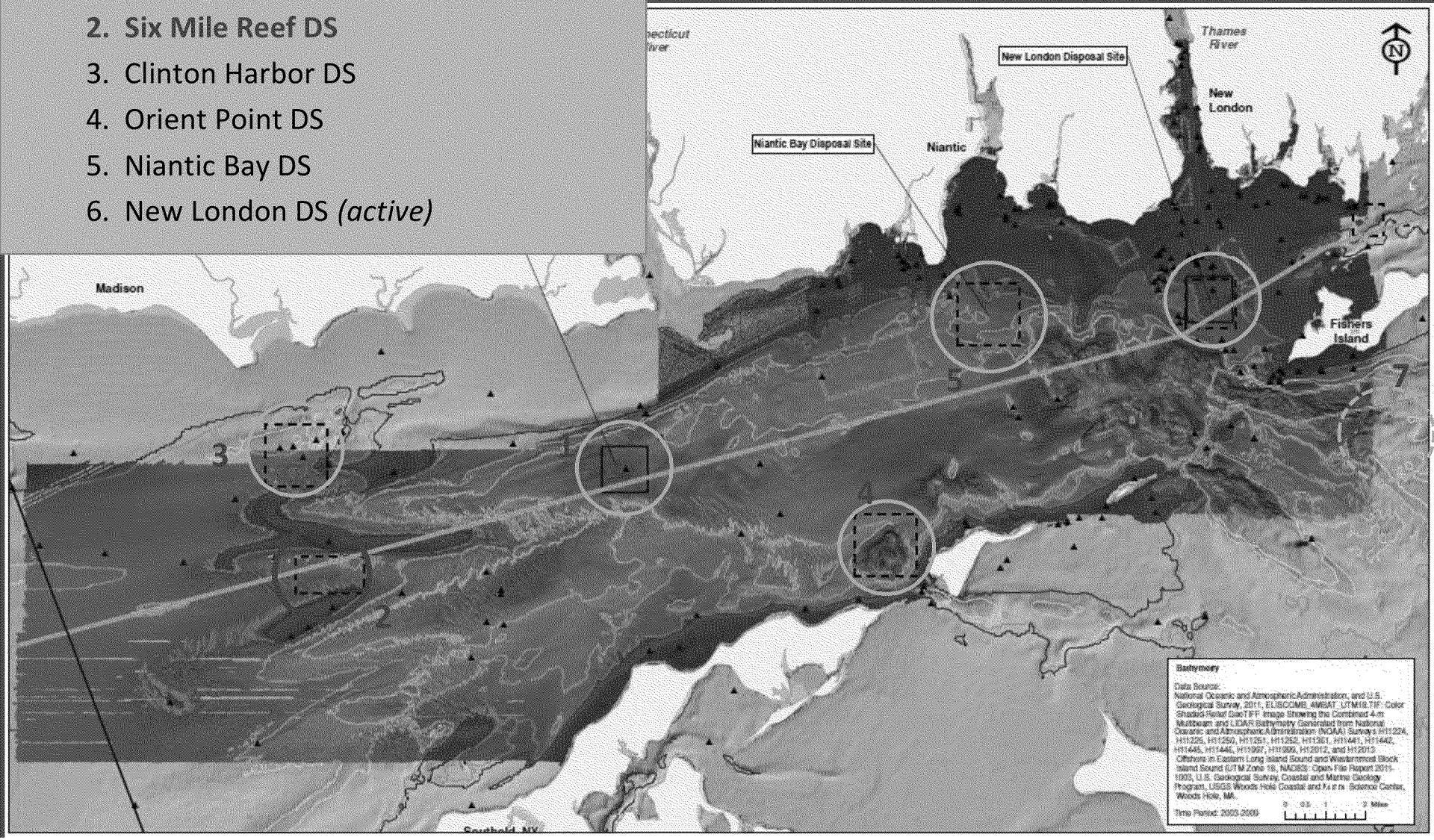
o Zoned for restricted shellfishing (CT)
- Gravelly sand
o Transport direction WSW-ENE





Alternative Site Discussion: Eastern Long Island Sound *(cont.)*

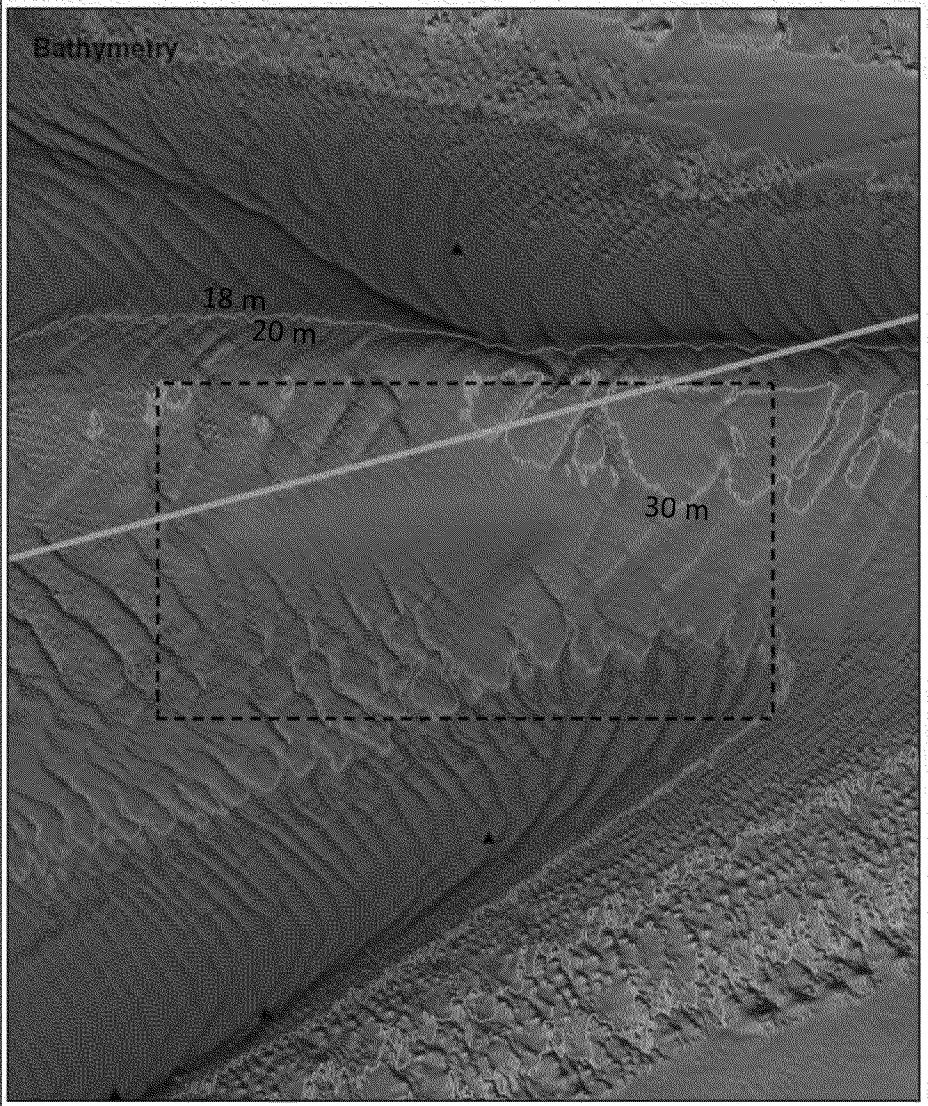
1. Cornfield Shoals DS (*active)*
2. **Six Mile Reef DS**
3. Clinton Harbor DS
4. Orient Point DS
5. Niantic Bay DS
6. New London DS *(active)*

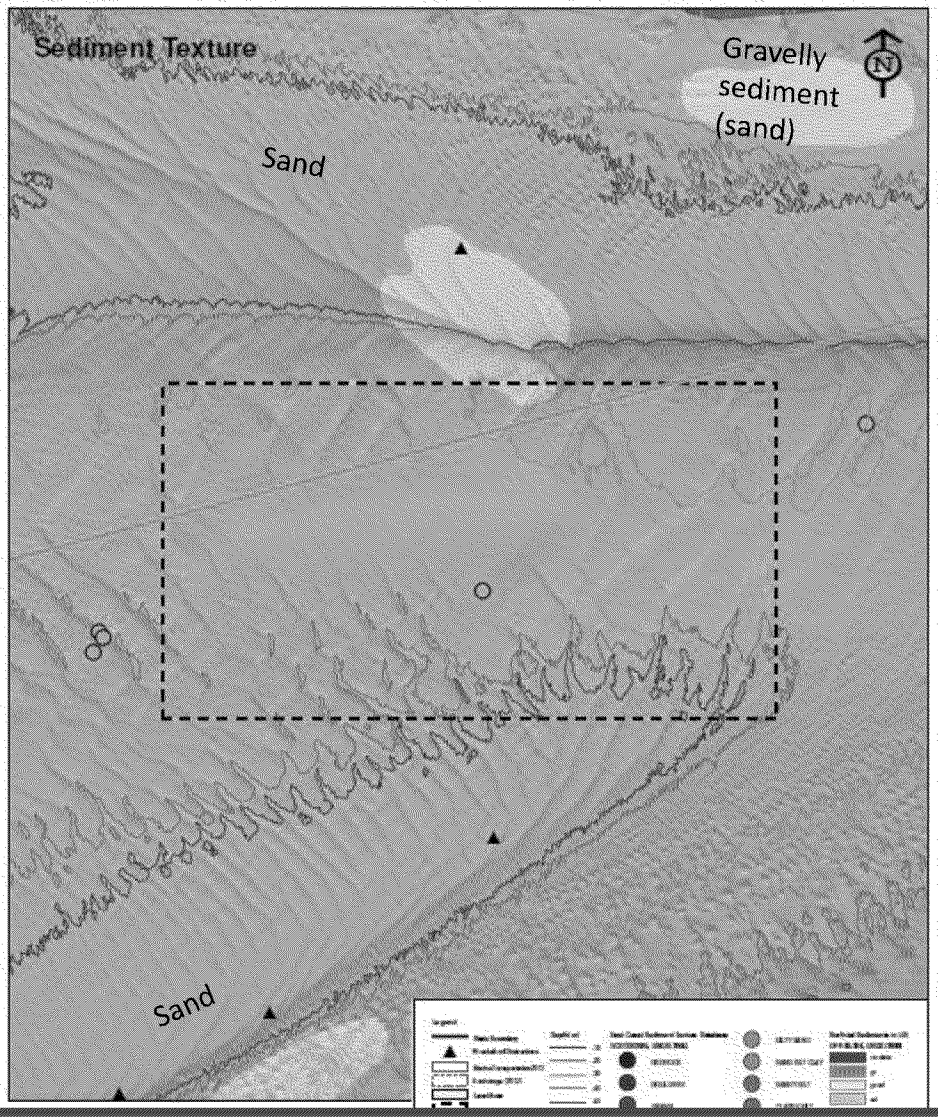


2. Six Mile Reef Disposal Site

- o Shallow (62-110 ft; 19-35 m)
- \- Sand waves
- \+ Near dredging centers (Clinton: 6 nm)

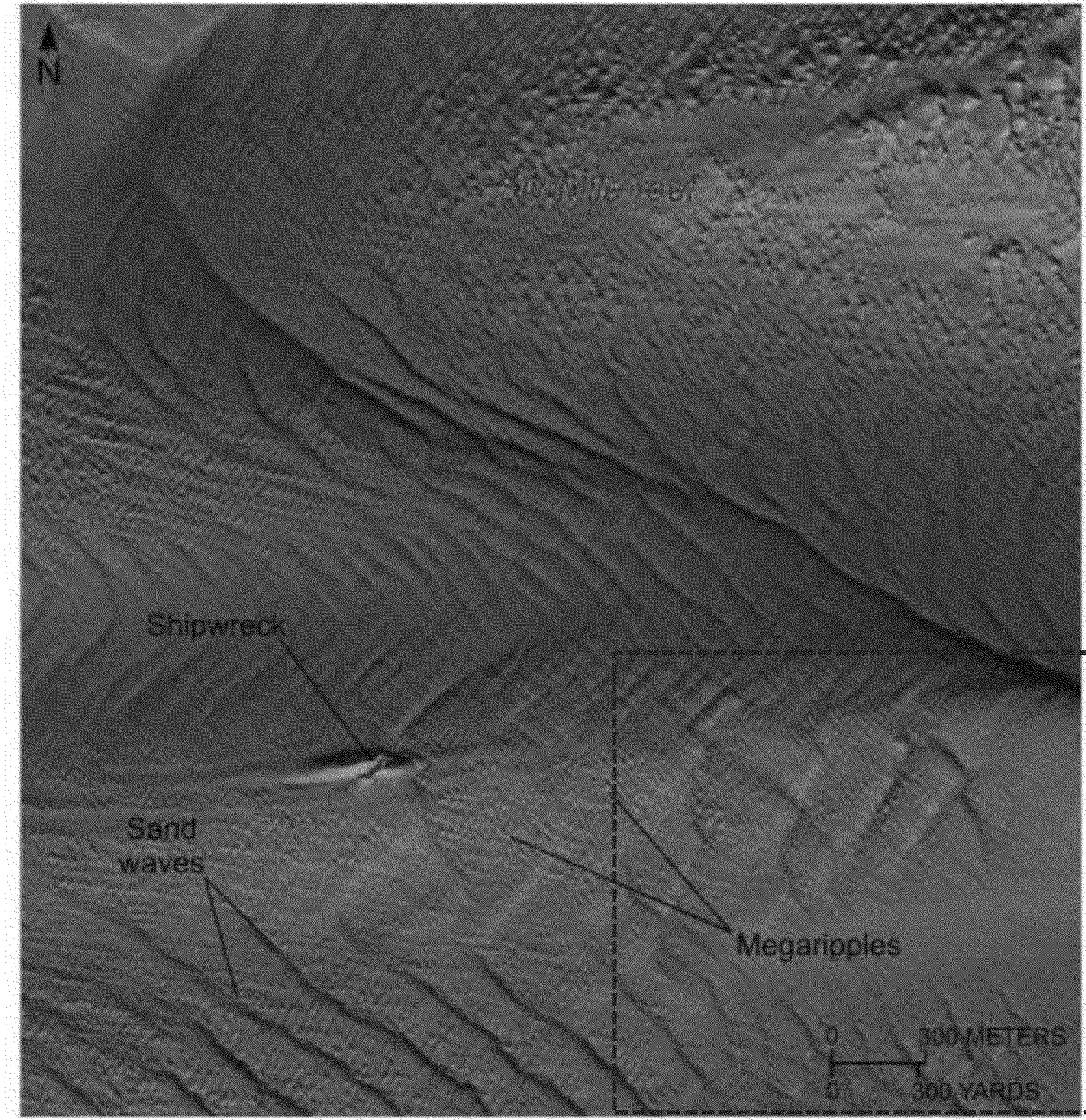
- o Historic site
- o 3.5 mi east of approved shellfishing zone (CT)
- \- Currents move in W-E direction





Six Mile Reef

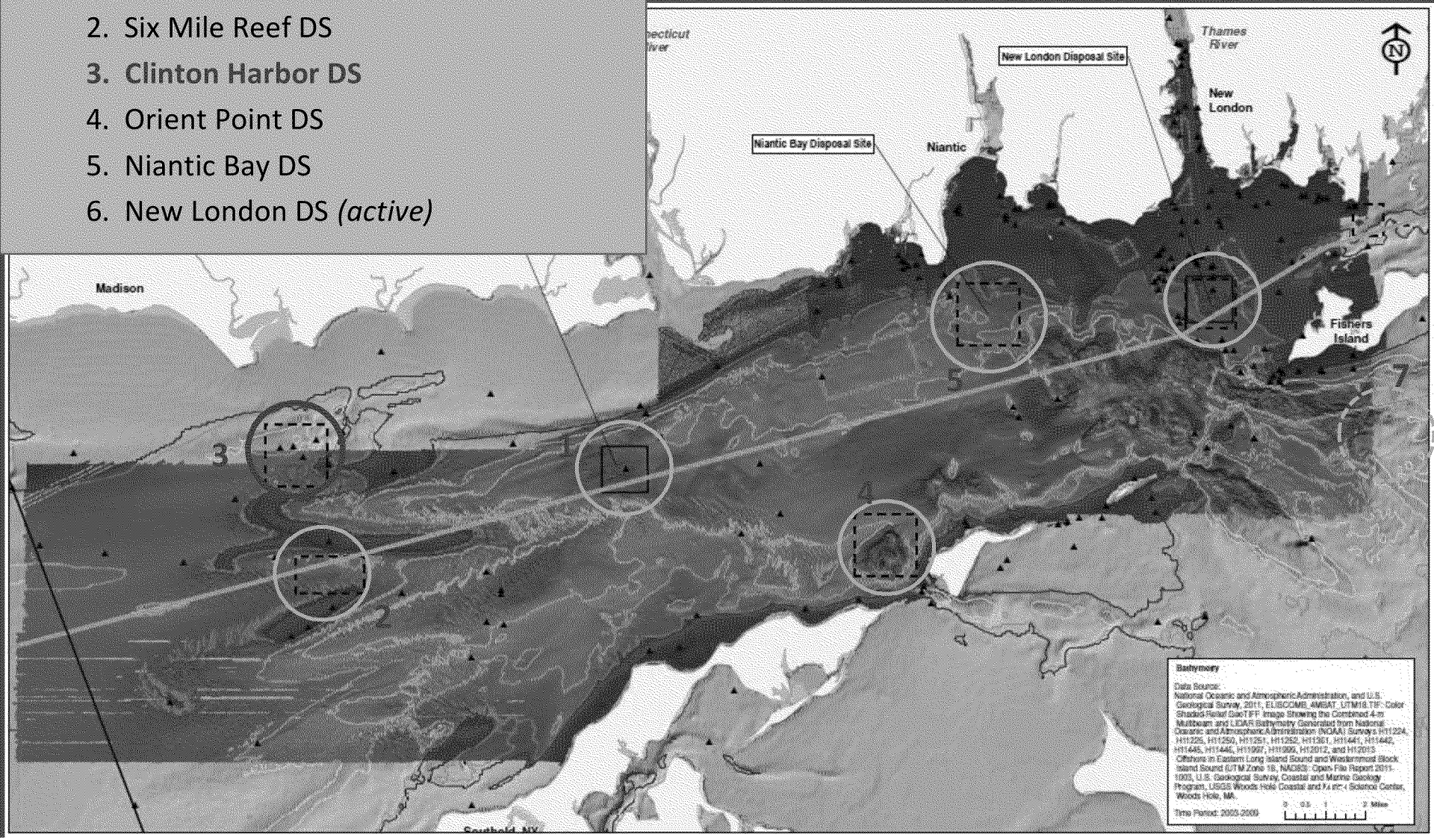
(Close-up)



http://pubs.usgs.gov/of/2011/1003/html/figures.html

Alternative Site Discussion: Eastern Long Island Sound *(cont.)*

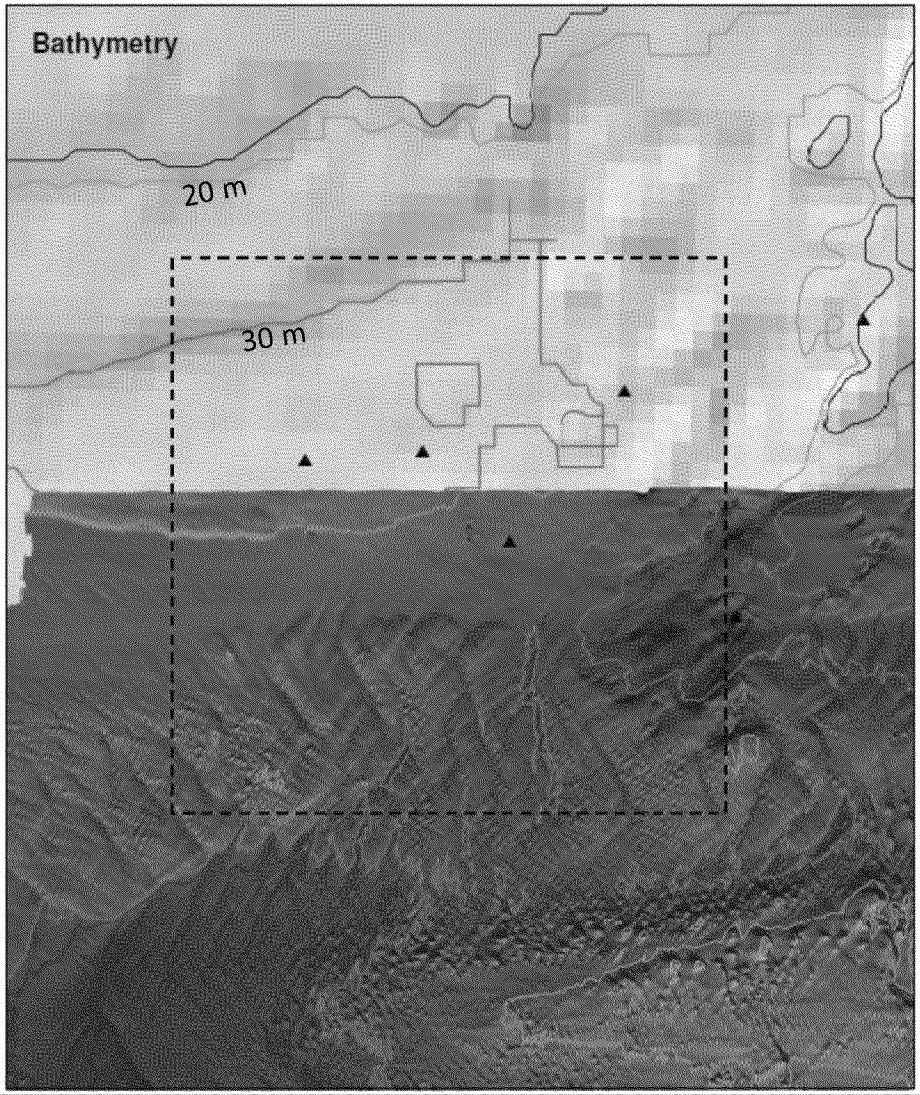
1. Cornfield Shoals DS (*active)*
2. Six Mile Reef DS
3. **Clinton Harbor DS**
4. Orient Point DS
5. Niantic Bay DS
6. New London DS *(active)*

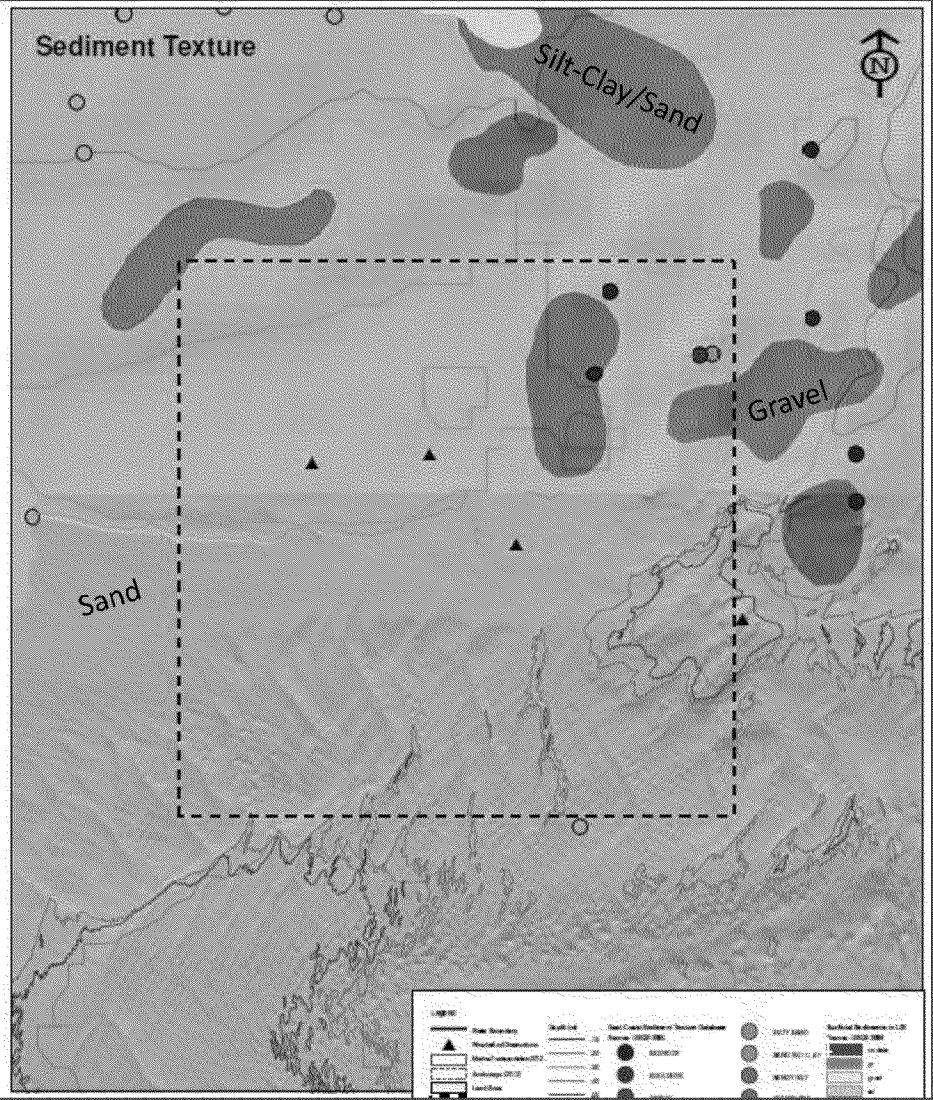


3. Clinton Harbor Disposal Site

- o Shallow depth: (up to 110 ft; 35 m)
- \- Sand
- \+ Near dredging centers (Clinton: 3 nm)
- o Historic site

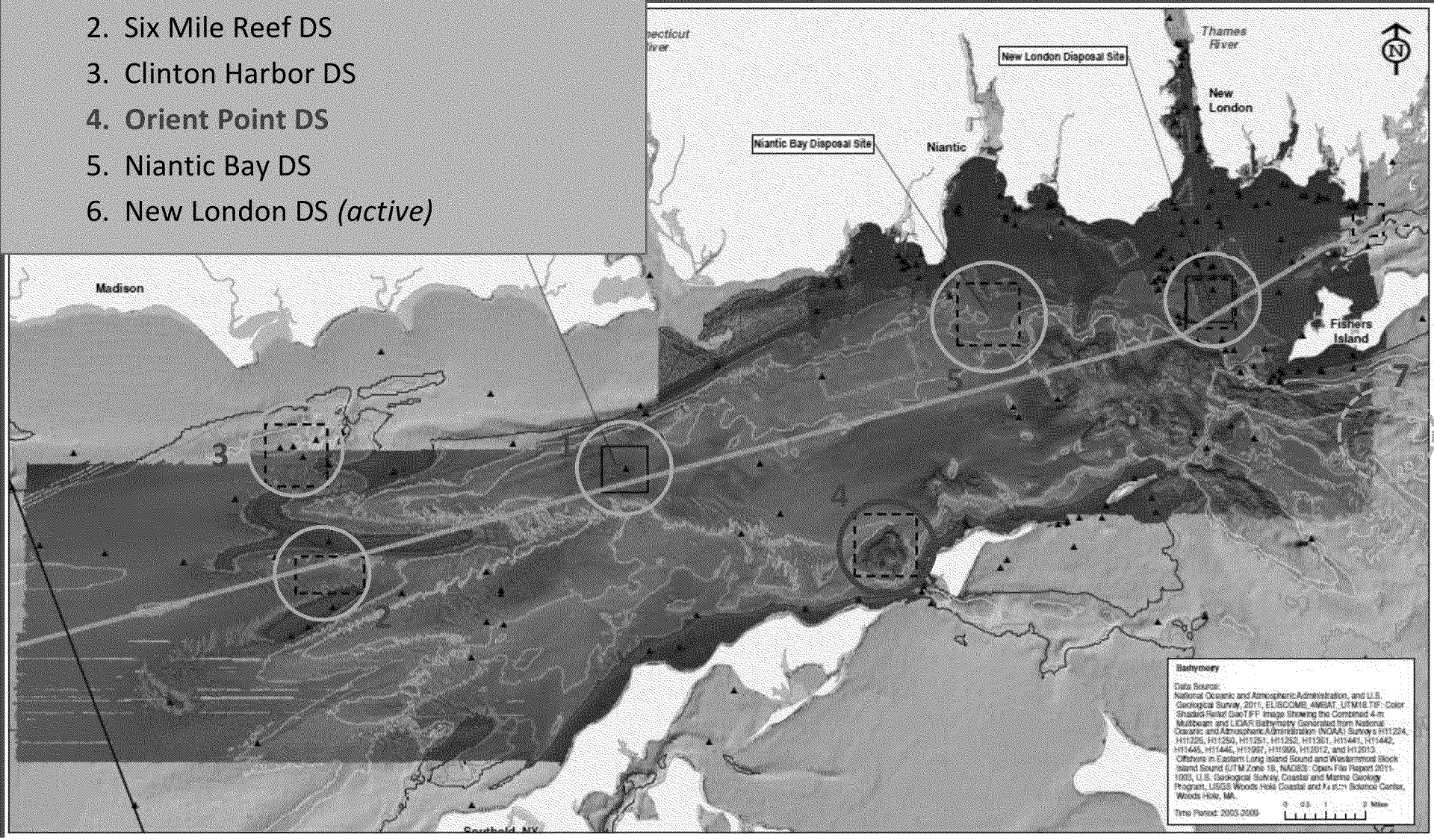
- \- Close to shore (1.5 nm)
- o 3 mi east of approved shellfishing zone (CT)
- ? Biological resources (gravel and rocky areas in NE)
- ? Archaeological resources (4 wrecks)





Alternative Site Discussion: Eastern Long Island Sound *(cont.)*

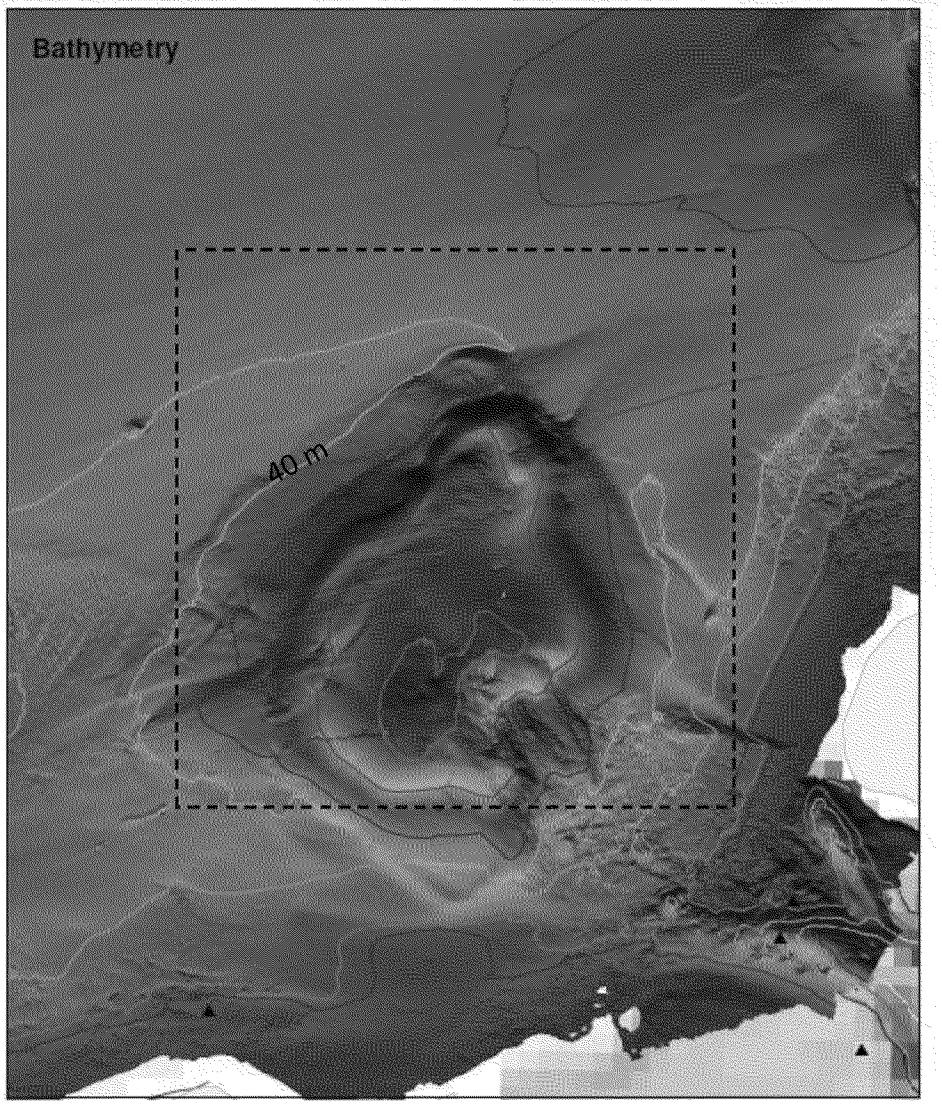
1. Cornfield Shoals DS (*active)*
2. Six Mile Reef DS
3. Clinton Harbor DS
4. **Orient Point DS**
5. Niantic Bay DS
6. New London DS *(active)*

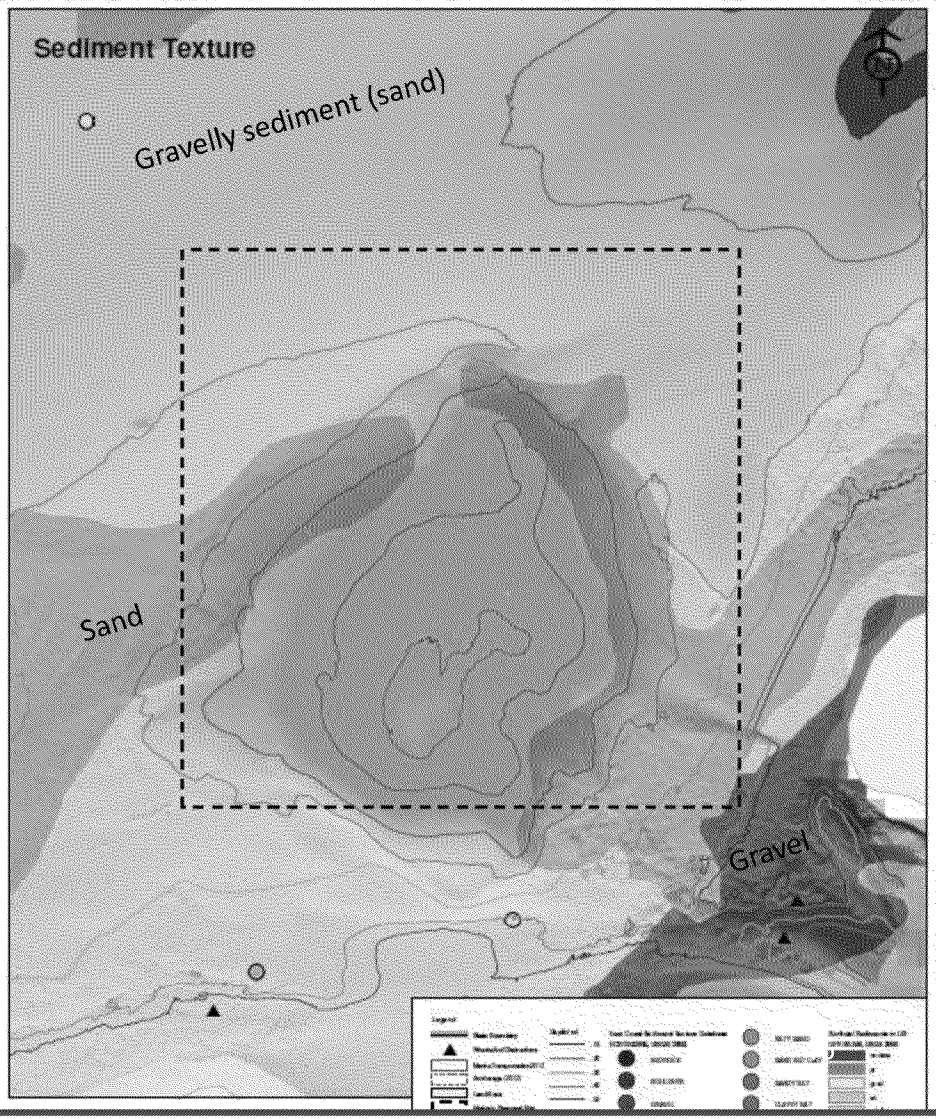


4. Orient Point Disposal Site

+ Deep depression (300 ft; 100m)
o Medium distance to dredging centers
  (CT River: 8 mi; NL: 15 mi)
o Historic site

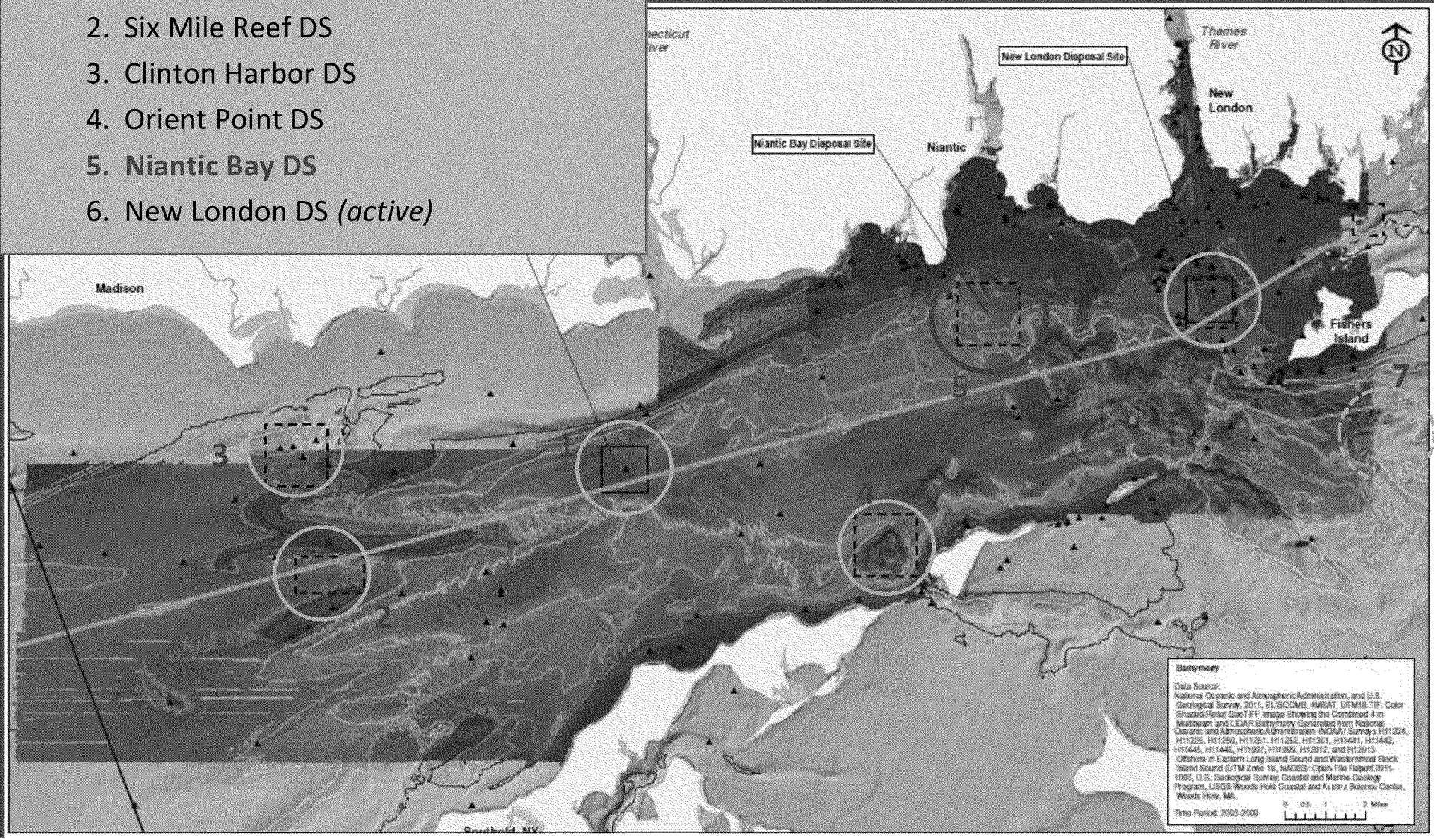
? Shellfish resources
- Gravelly sand
? Transport into Gardiners Bay (outgoingtide?)
- Navigation (Ferry traffic to Orient Point)





Alternative Site Discussion: Eastern Long Island Sound *(cont.)*

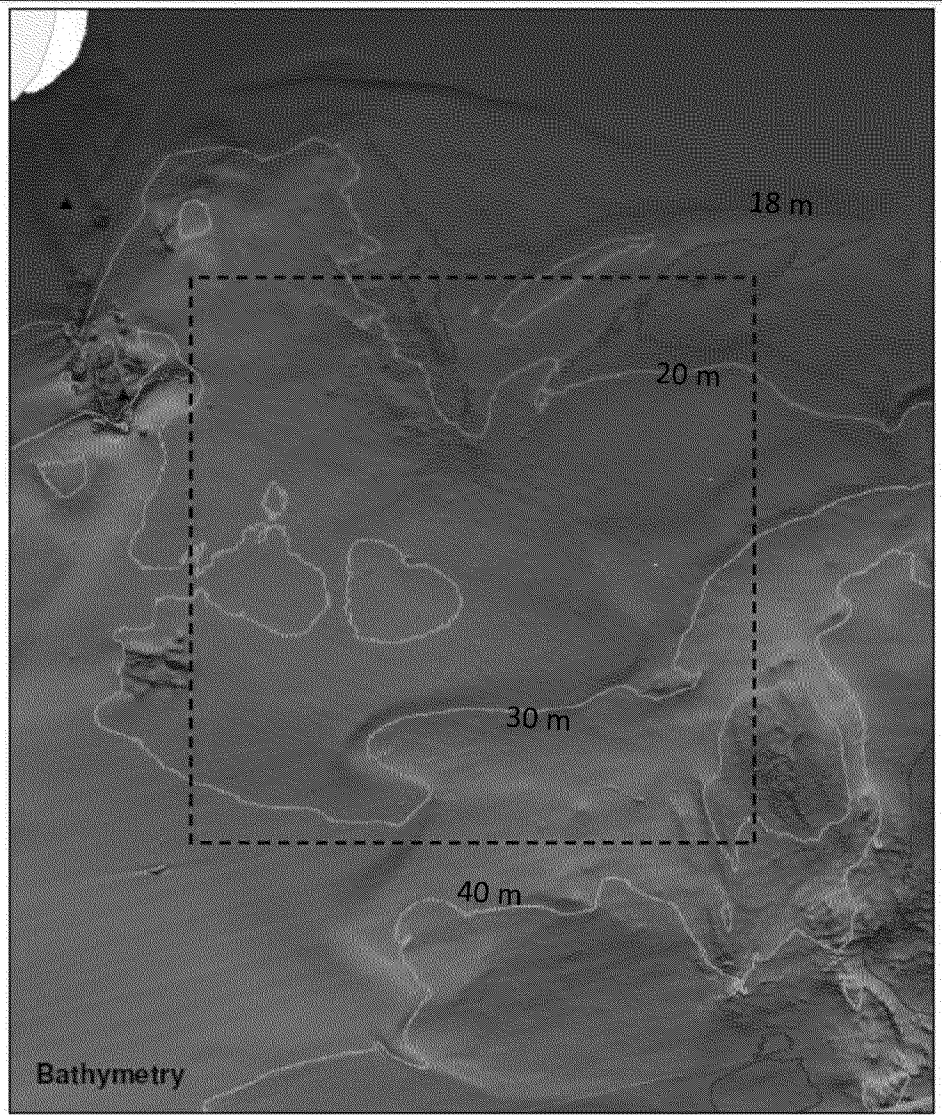
1. Cornfield Shoals DS (*active)*
2. Six Mile Reef DS
3. Clinton Harbor DS
4. Orient Point DS
5. **Niantic Bay DS**
6. New London DS *(active)*

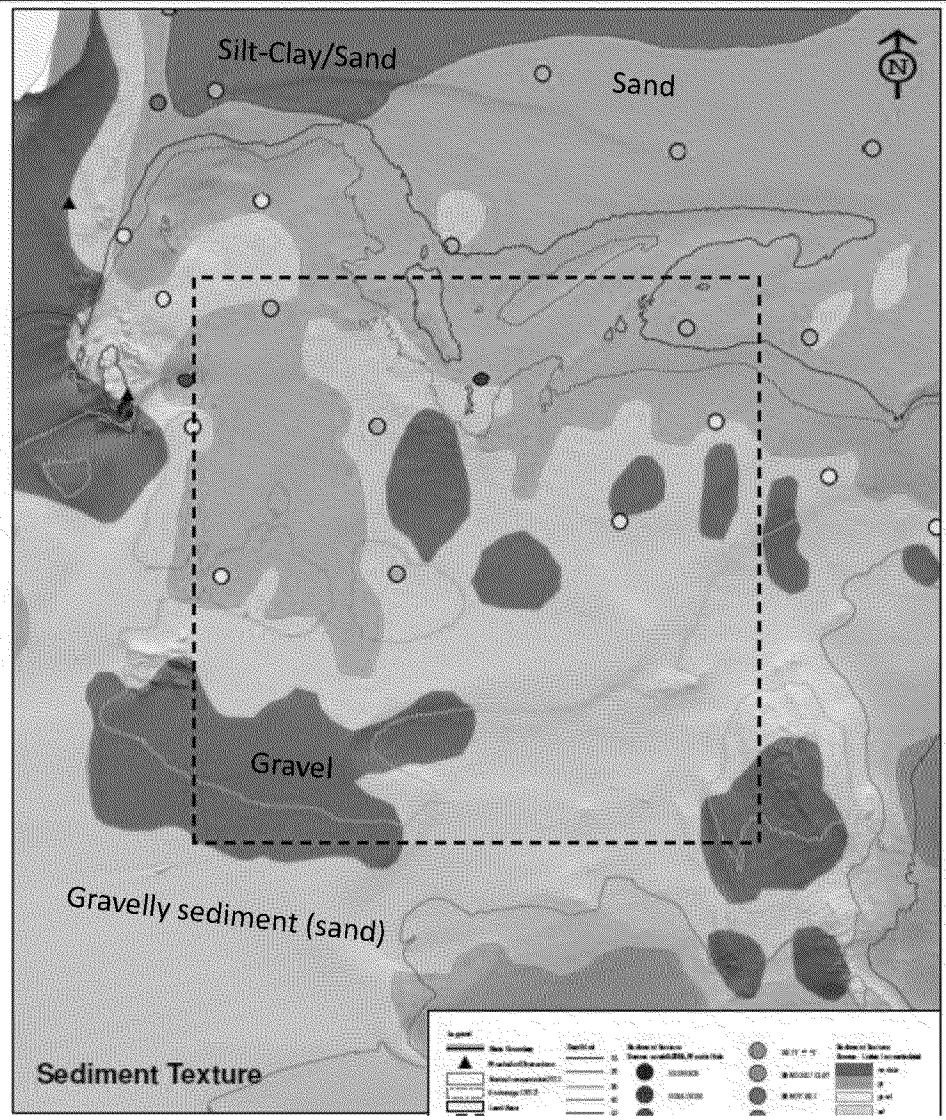


5. Niantic Bay Disposal Site

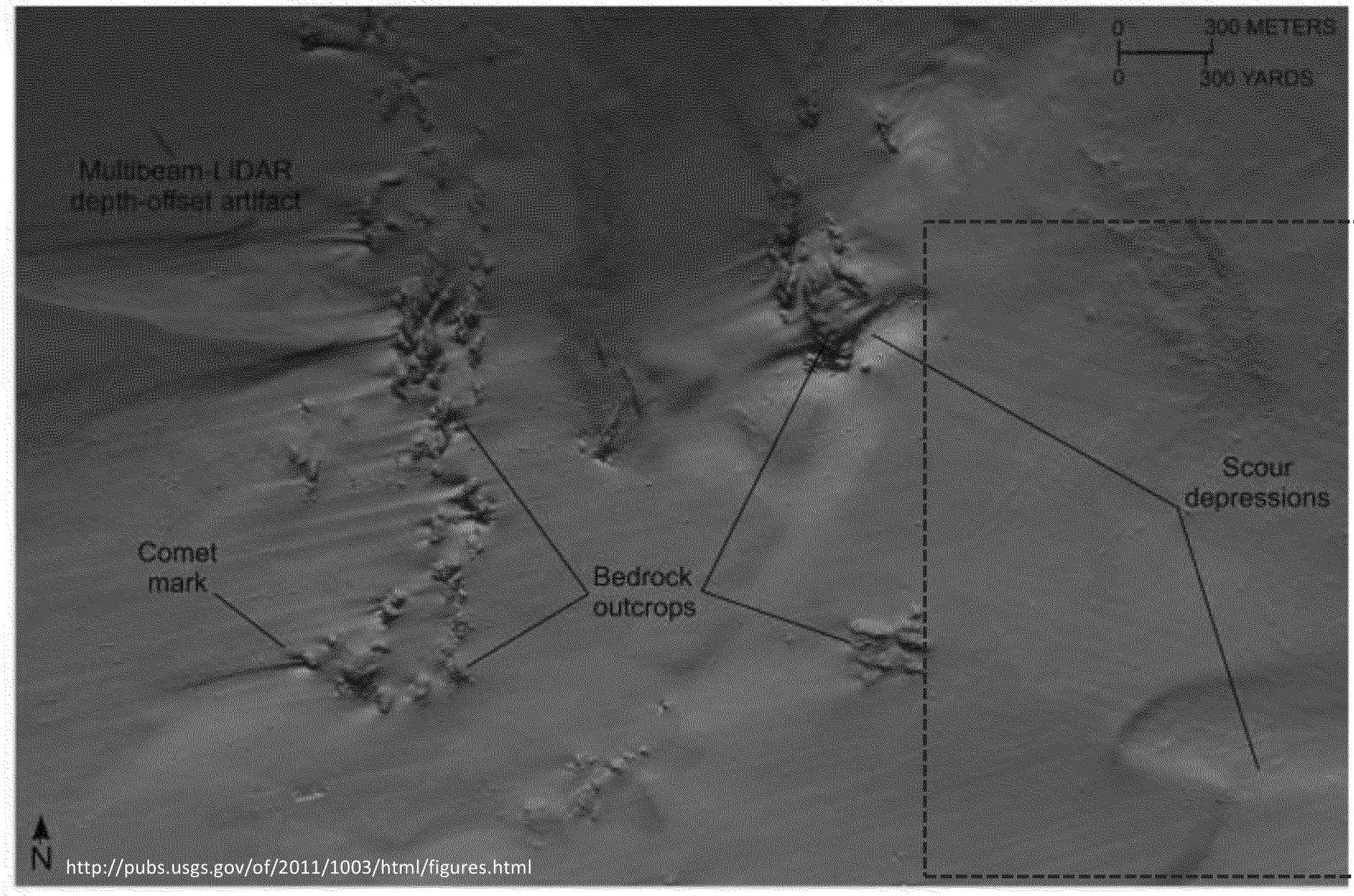
+ Deep area (up to 130 ft; 40m)
+ Near dredging centers
o Outside rocky areas
o Historic site

o Zoned for restricted shellfishing/cond. approved (CT)
-/? Sand; gravelly sand
o Transport direction WSW-ENE





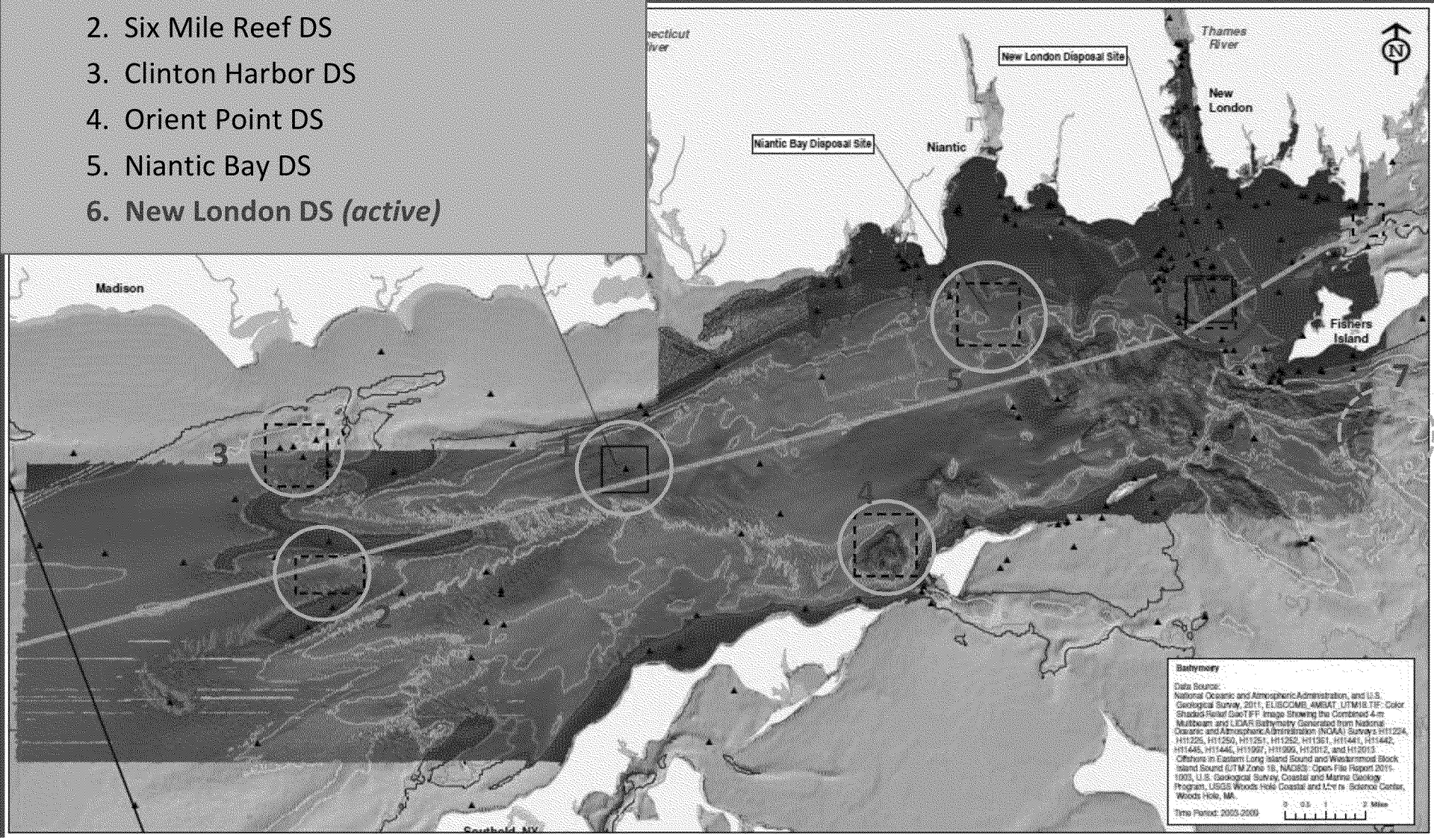
Area around Niantic Bay Disposal Site (Close-up)



http://pubs.usgs.gov/of/2011/1003/html/figures.html

Alternative Site Discussion: Eastern Long Island Sound *(cont.)*

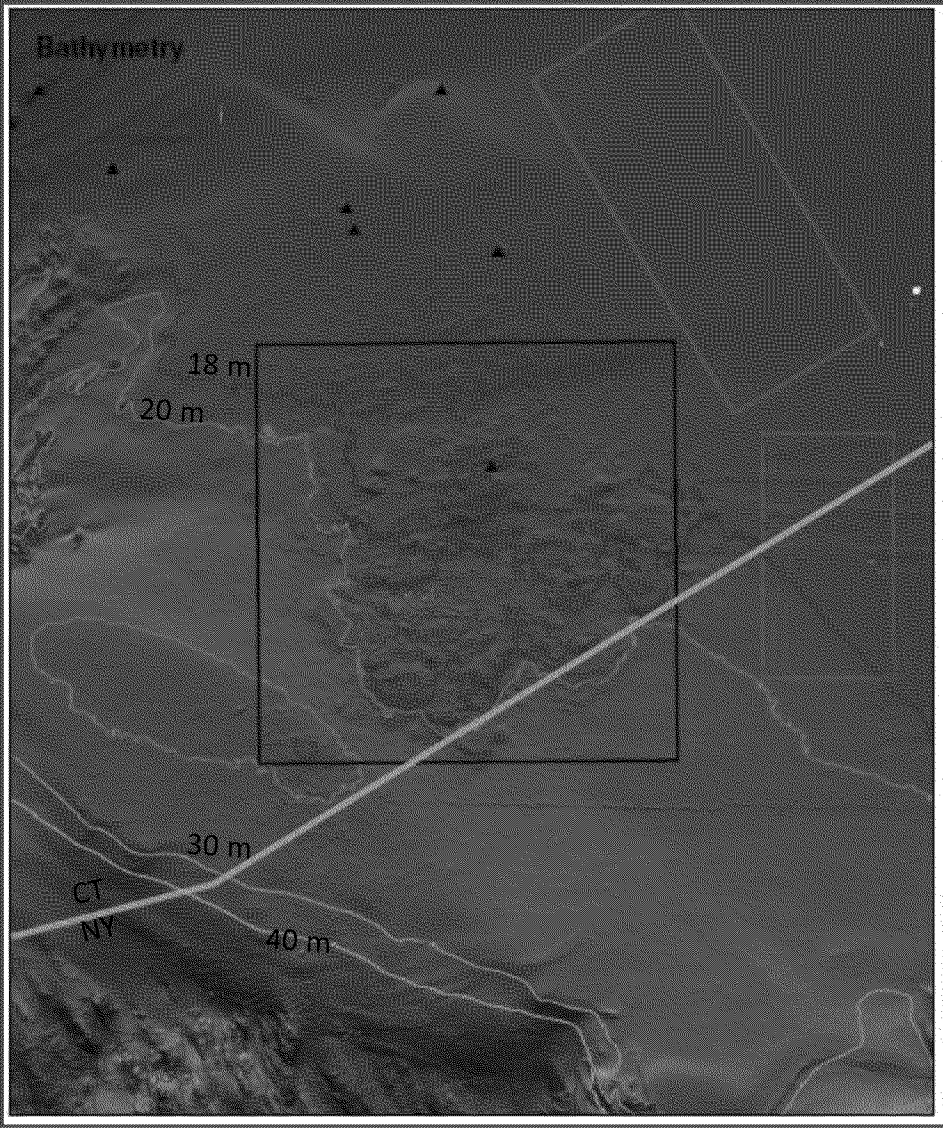
1. Cornfield Shoals DS (*active)*
2. Six Mile Reef DS
3. Clinton Harbor DS
4. Orient Point DS
5. Niantic Bay DS
6. **New London DS *(active)***

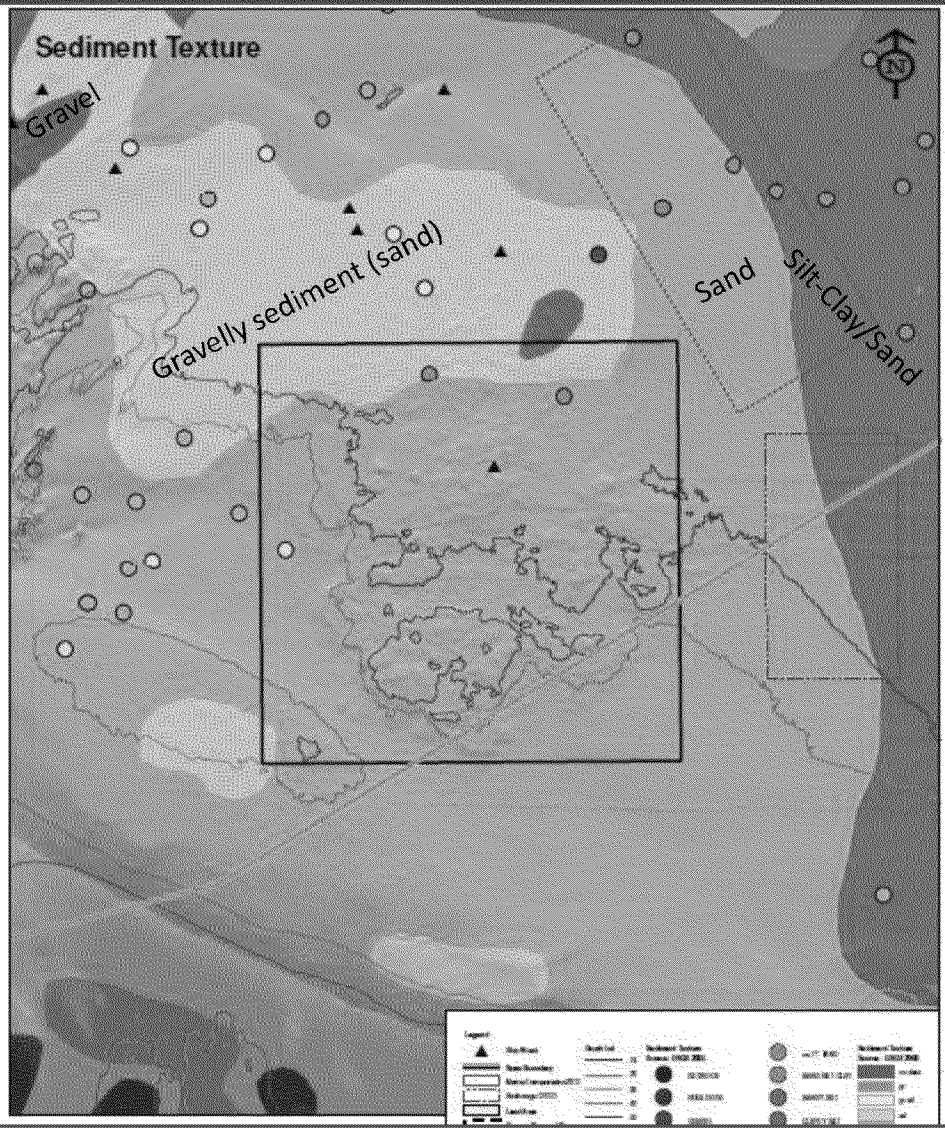


6. New London Disposal Site

-/o Shallow (up to 50-70 ft; 15-21 m)
+ Near dredging centers (NL: 5 nm)
+ Located away from rocky areas
+ Active site

o Zoned for restricted shellfishing (CT)
+ Fine grained sediment
- Navigation zone
? Cable corridor (active cable?)

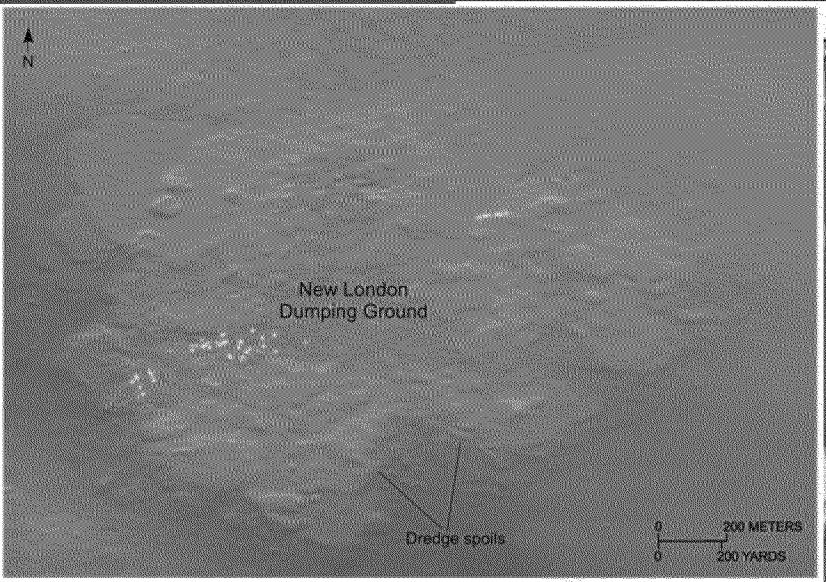


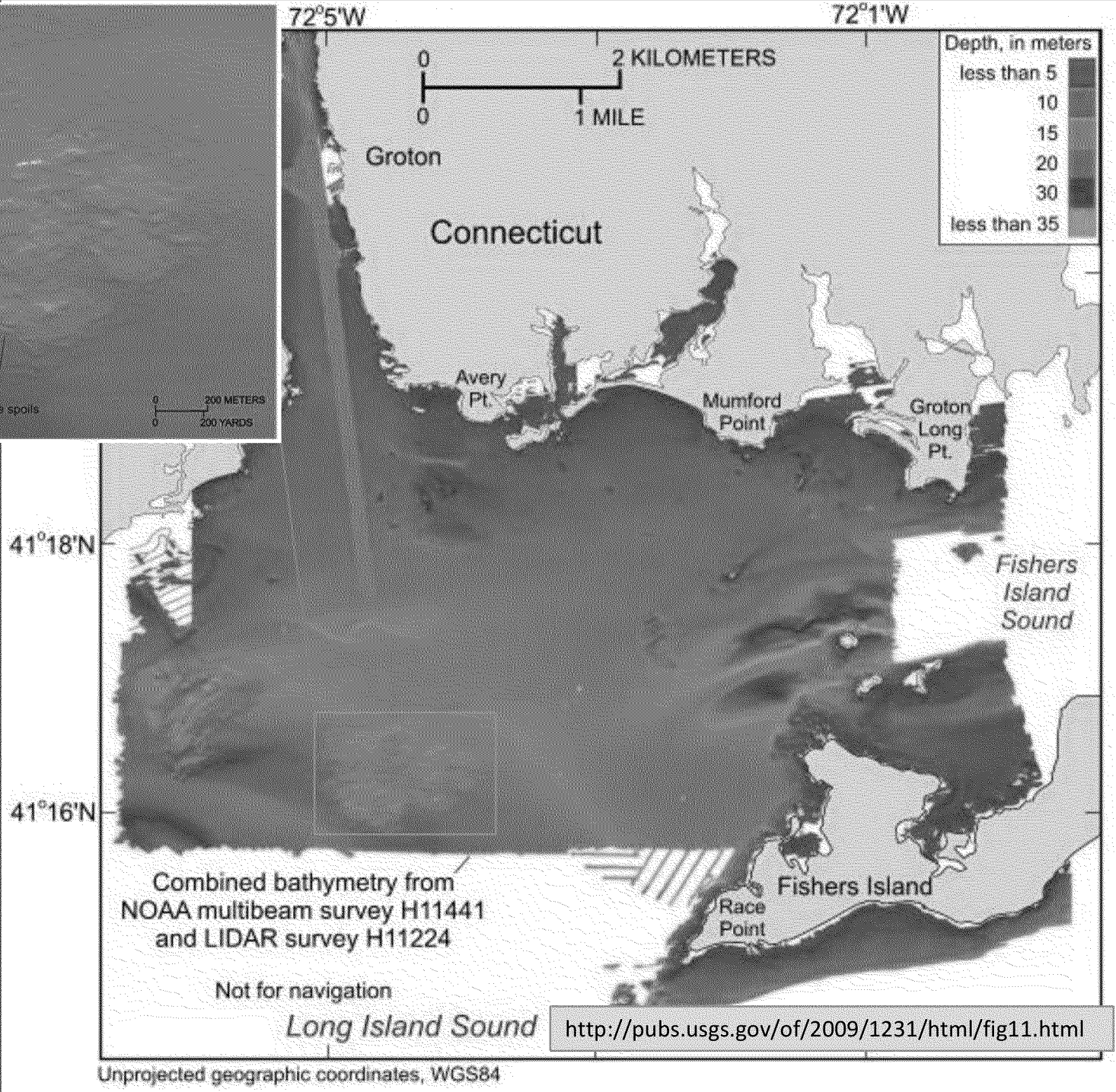


New London Disposal Site

Bathymetry

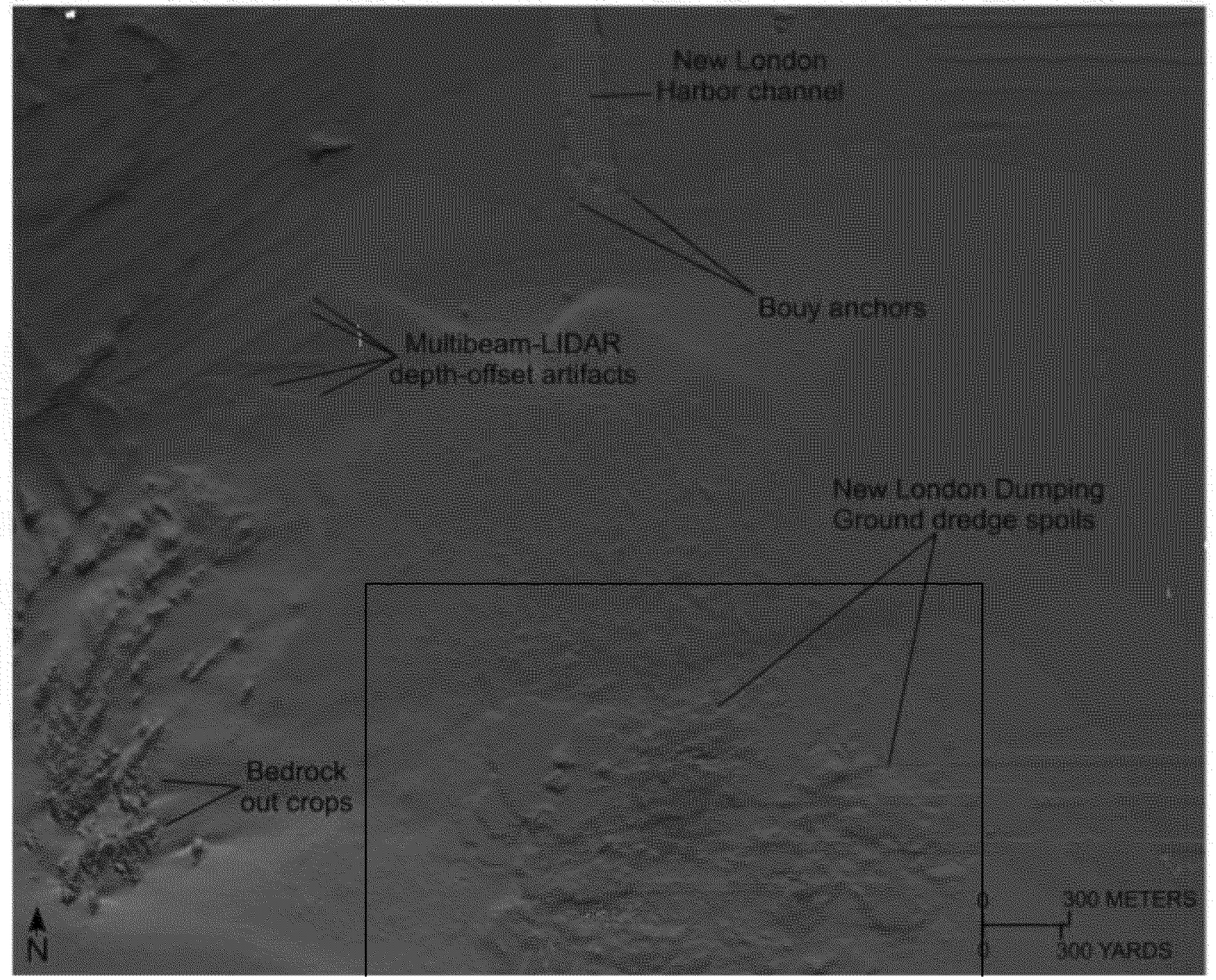
NOAA Multibeam and LIDAR survey)





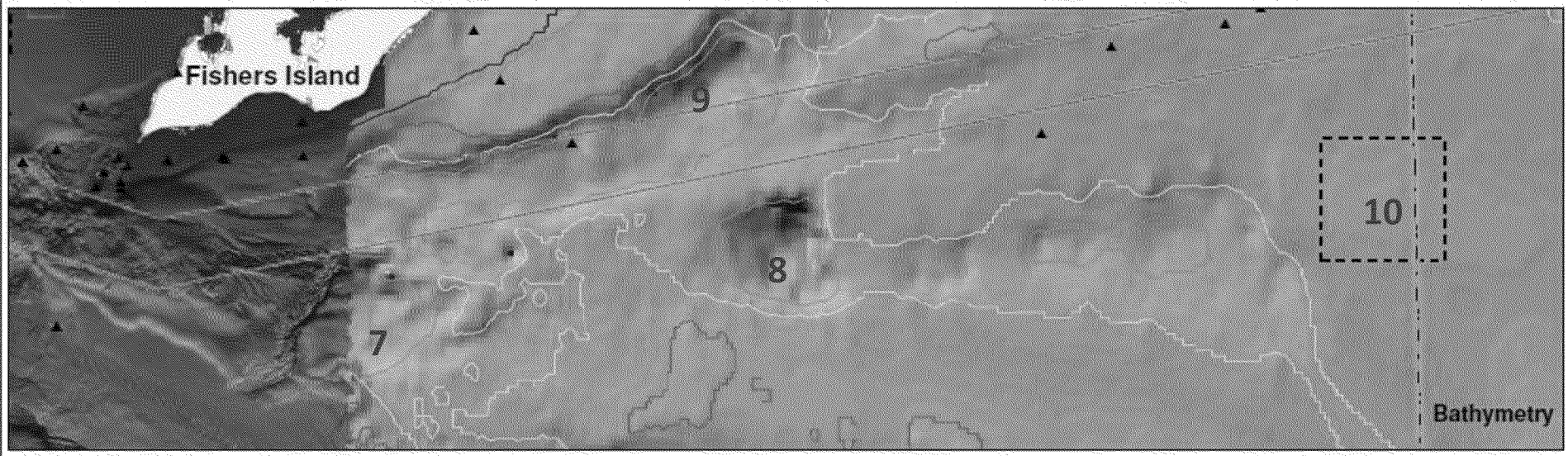
http://pubs.usgs.gov/of/2009/1231/html/fig11.html

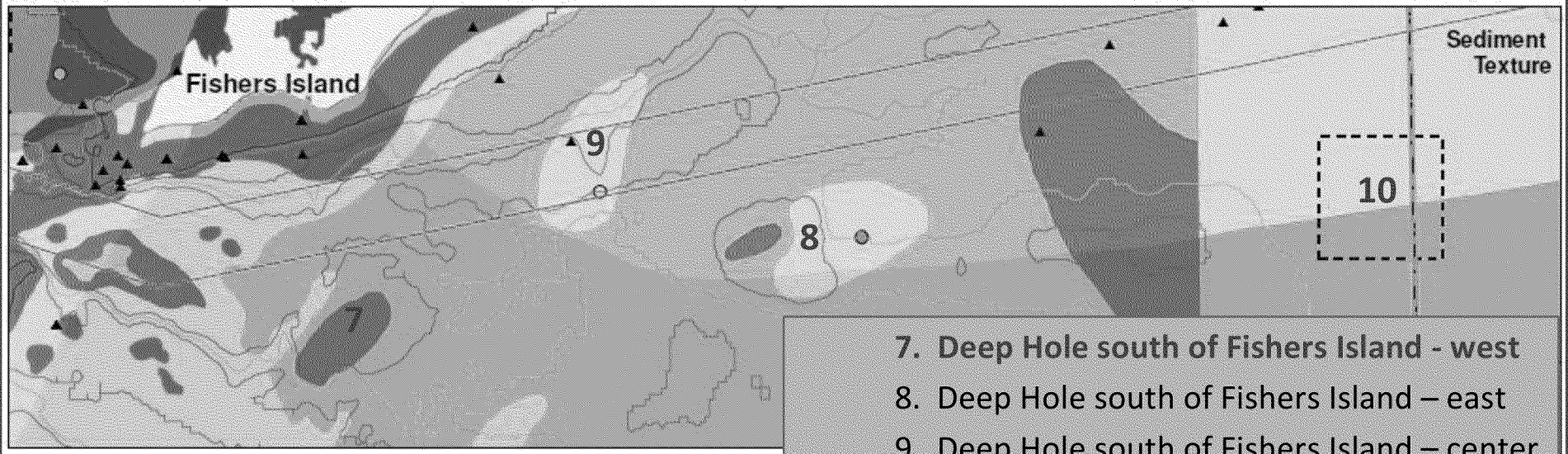
Area around New London DS (close-up)



http://pubs.usgs.gov/of/2011/1003/html/figures.html

7-10. Block Island Sound



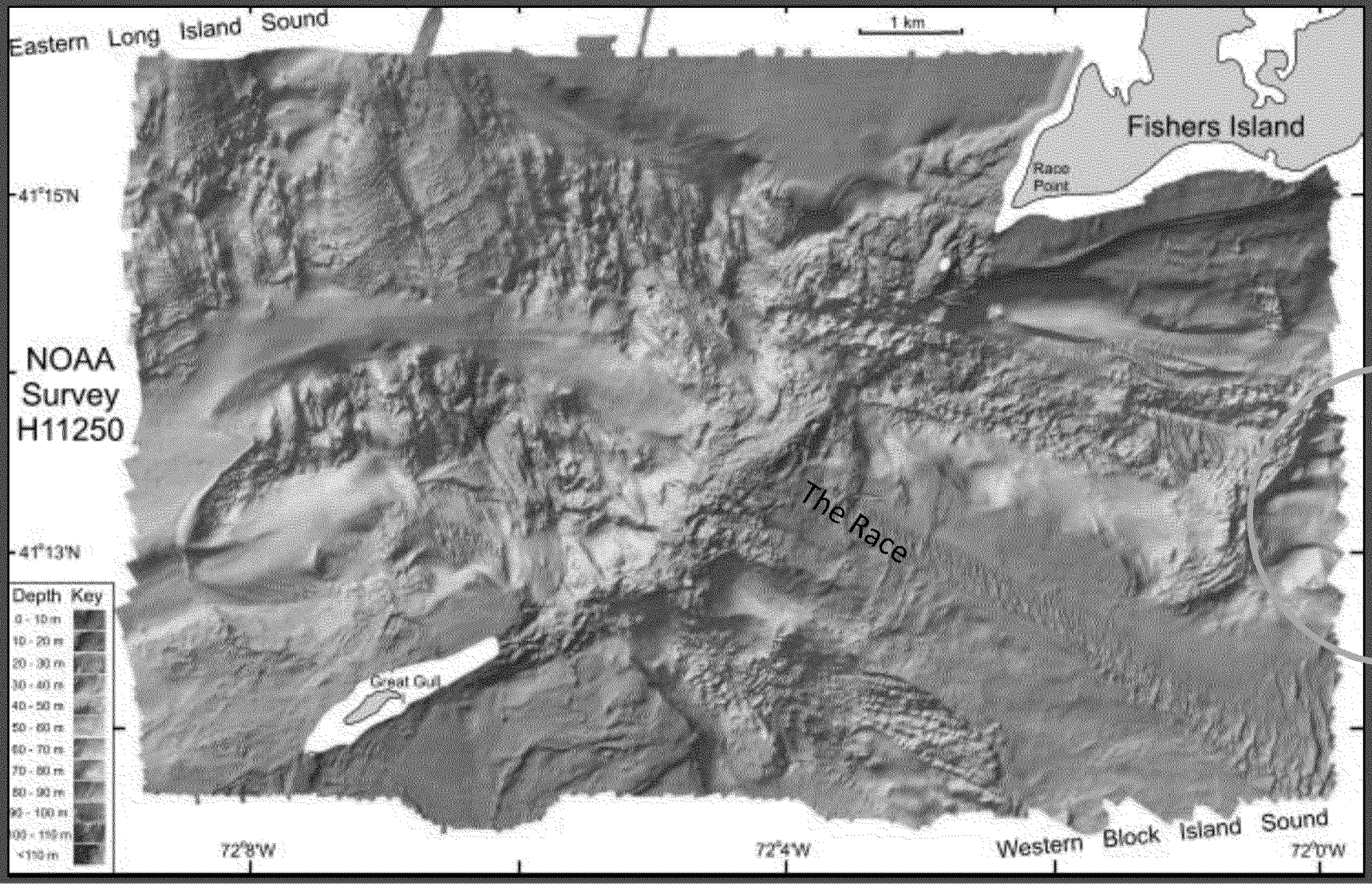


7. **Deep Hole south of Fishers Island - west**
8. Deep Hole south of Fishers Island – east
9. Deep Hole south of Fishers Island – center
10. Block Island Sound Disposal Site

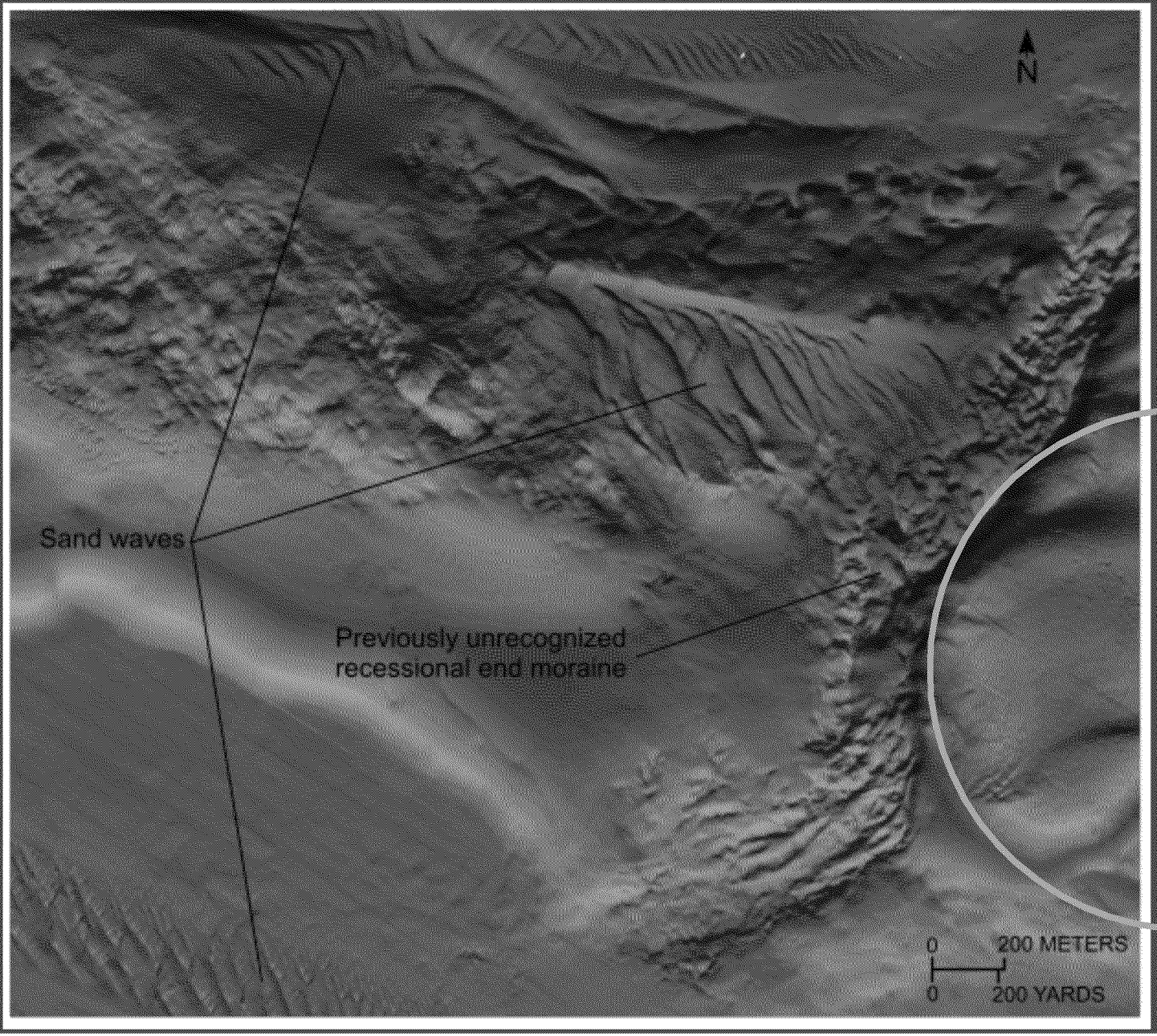
7. Deep Hole south of Fishers Island - west

+ Deep depression (270 ft; 90m)
o Medium distance to dredging centers (NL: 9 nm)
- New site
o Navigation area

-/? Dispersive (Silt/clay: likely Pleistocene deposits)
? Biological resources
? Tidal energy potential



Deep Hole south of Fishers Island – west (close-up)

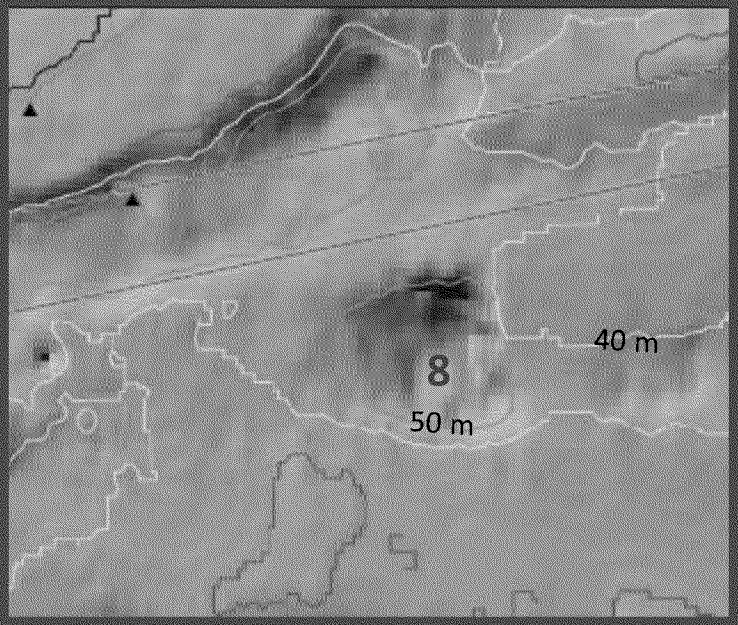


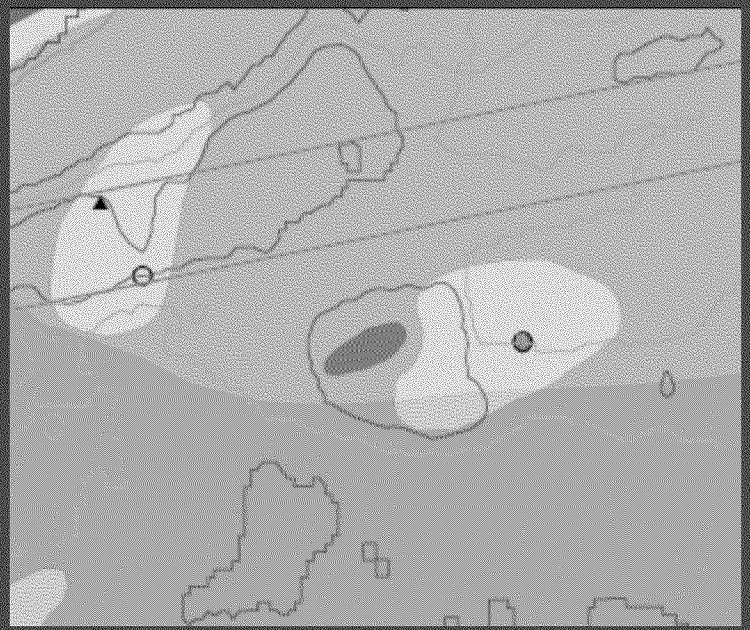
http://pubs.usgs.gov/of/2011/1003/html/figures.html

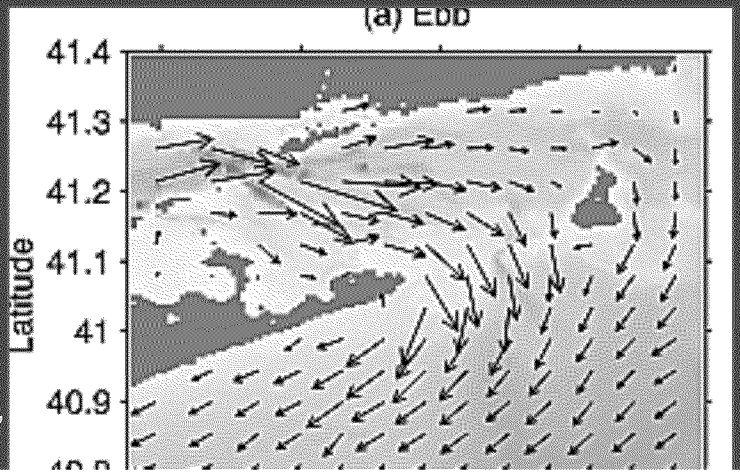
8. Deep Hole south of Fishers Island - east

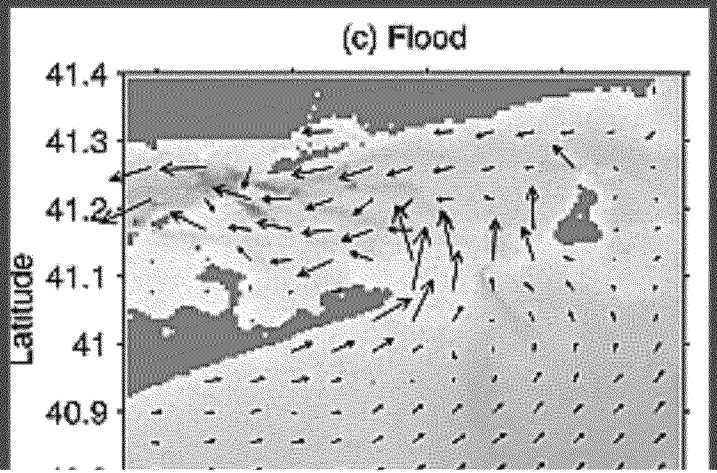
+ Deep depression (325ft; 100m)
-/o Long distance to dredging centers
(NL: 12 mi; CT River: 19 mi)
- New site

-/? Gravelly sand (silt/clay: Pleistocene deposits?)
? Biological resources
- Higher waves in Block Isl. Sound (barge transport)
- Dredge material management (depth/slope)







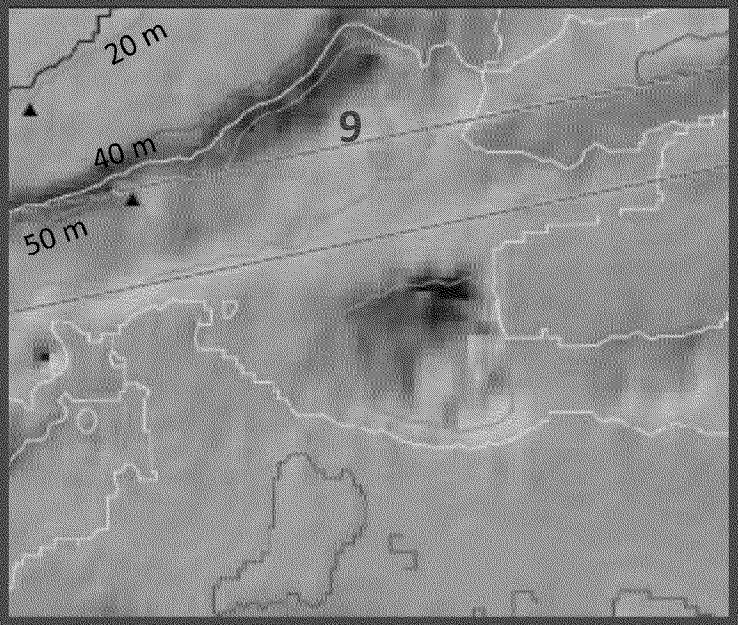


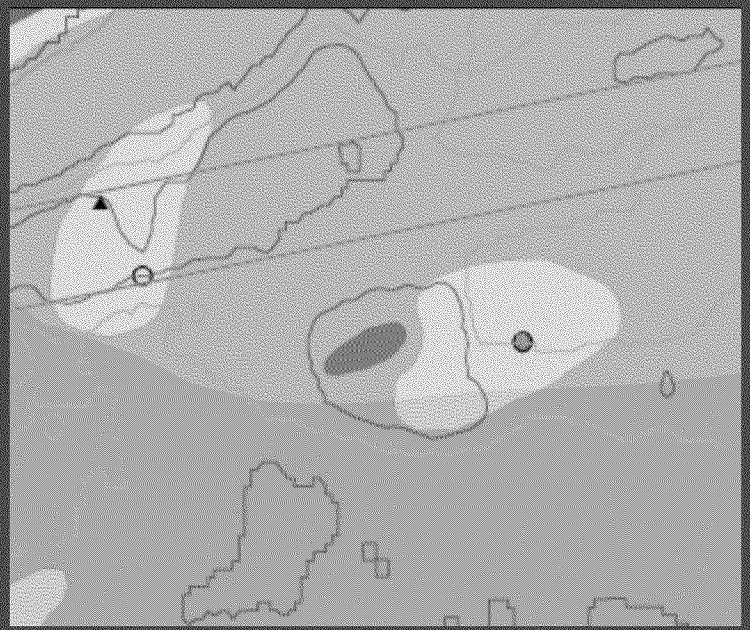
J. Geophys. Res.: Oceans, v. 109, 2004

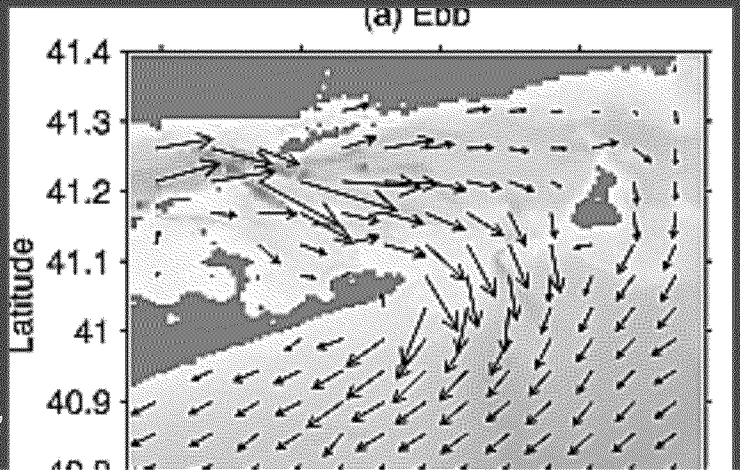
9. Deep Hole south of Fishers Island - center

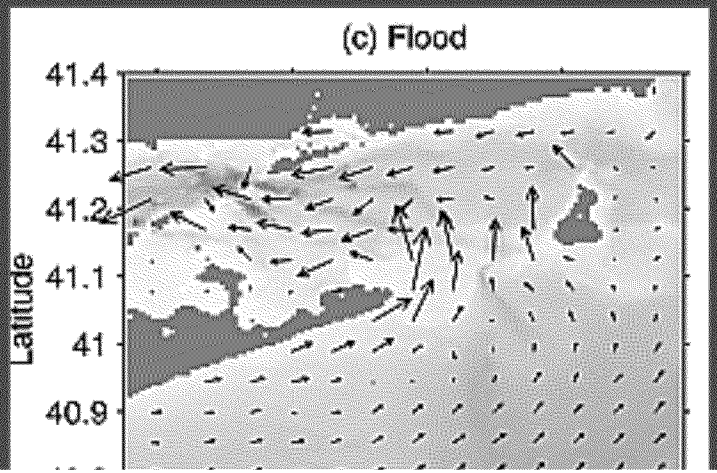
+ Deep depression (up to 241ft; 80m)
-/o Long distance to dredging centers
(NL: 12 mi; CT River: 19 mi)
- New site

- Sand /gravelly sand
? Biological resources
- Higher waves in Block Isl. Sound (barge transport)
- Within recommended navigation zone



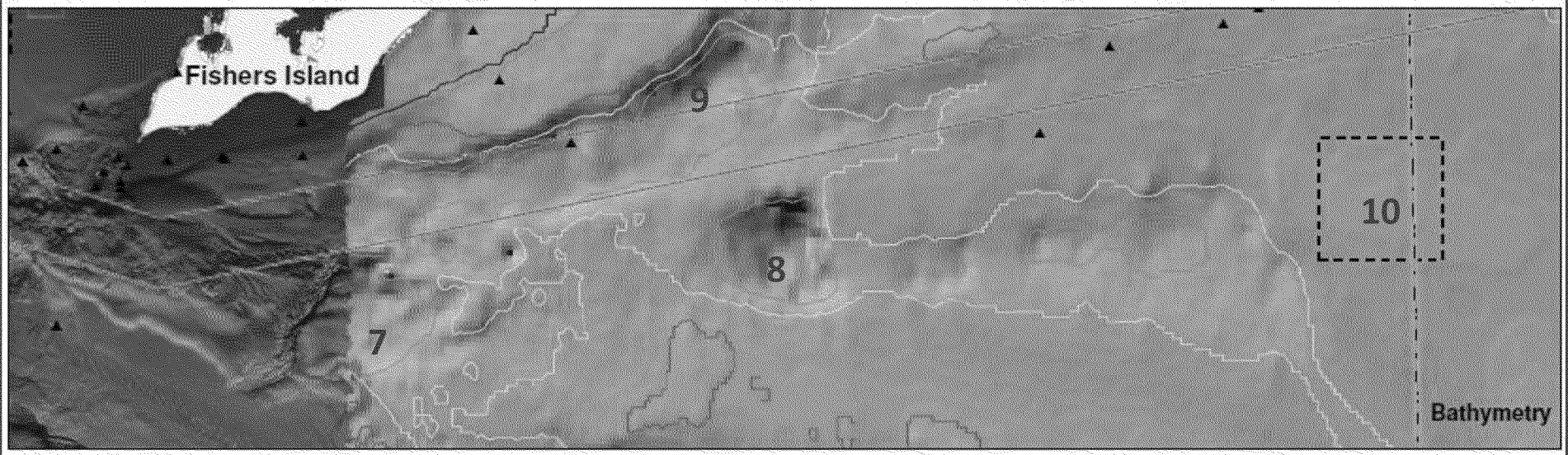


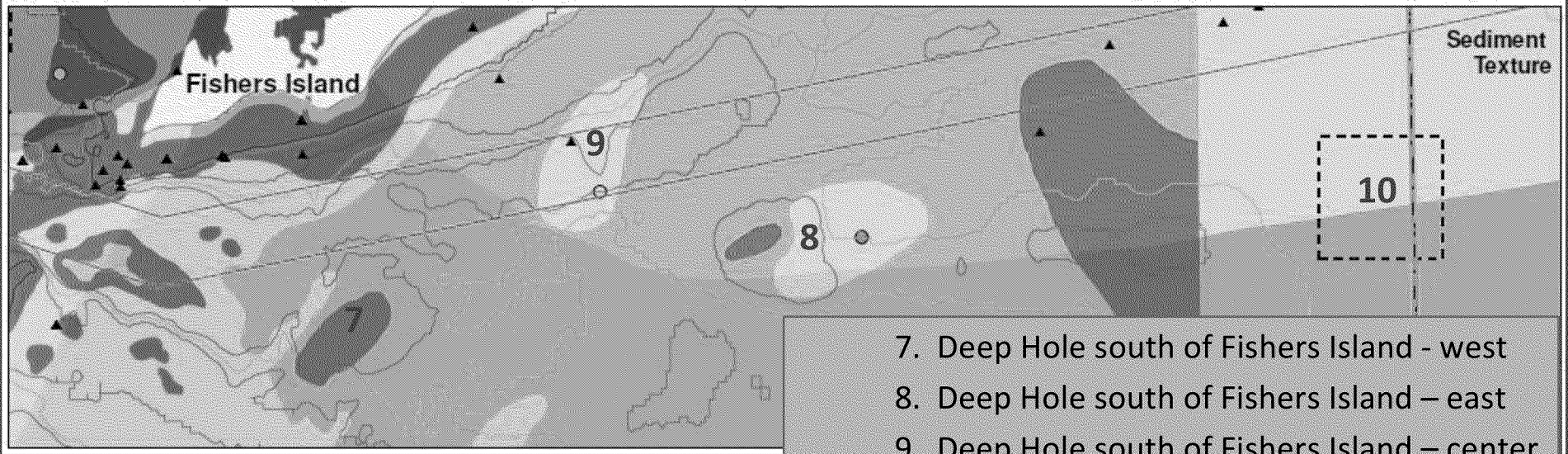




J. Geophys. Res.: Oceans, v. 109, 2004

7-10. Block Island Sound (cont.)



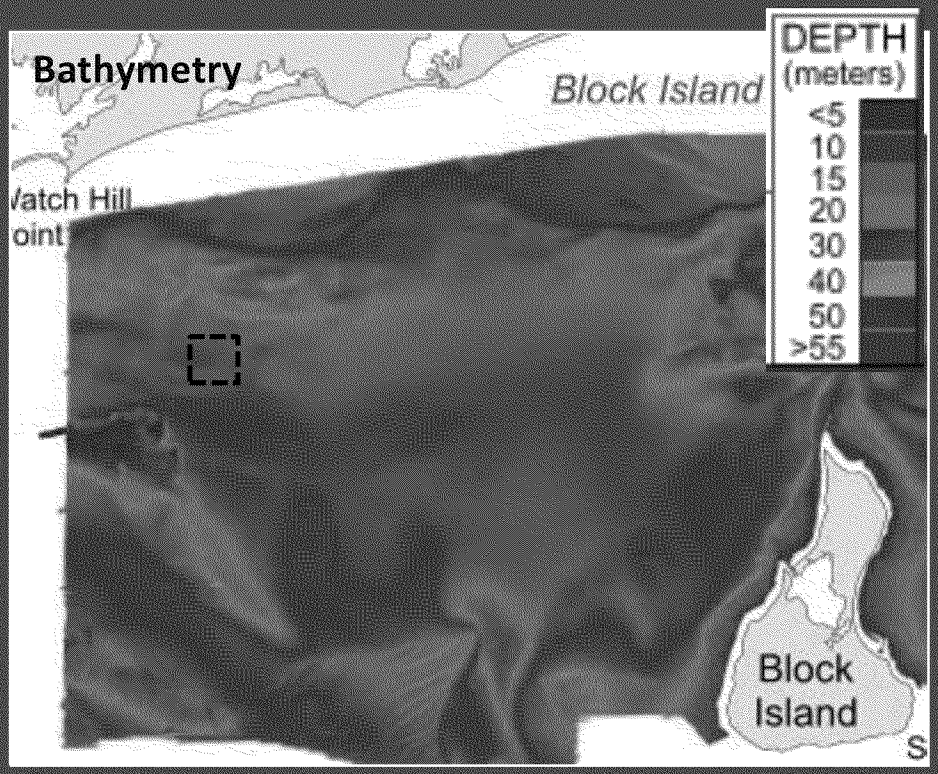


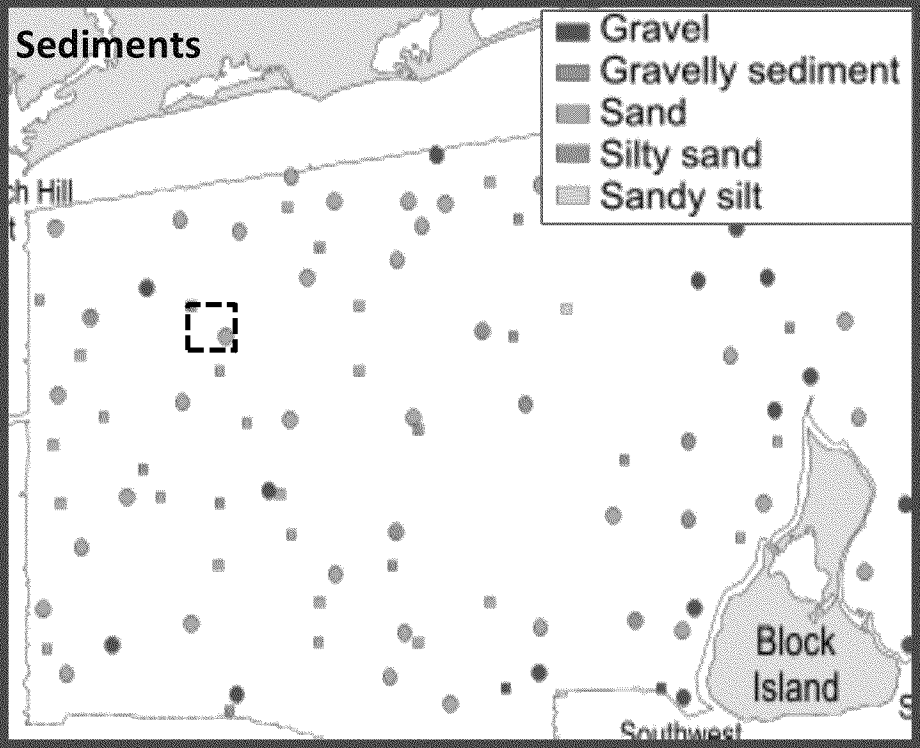
7. Deep Hole south of Fishers Island - west
8. Deep Hole south of Fishers Island – east
9. Deep Hole south of Fishers Island – center
10. **Block Island Sound Disposal Site**

10. Block Island Sound Disposal Site

+ Deep (110 ft; 35 m)
- Long distance to dredging centers
  (NL: 18nm; CT River: 25 nm)
- Historic site

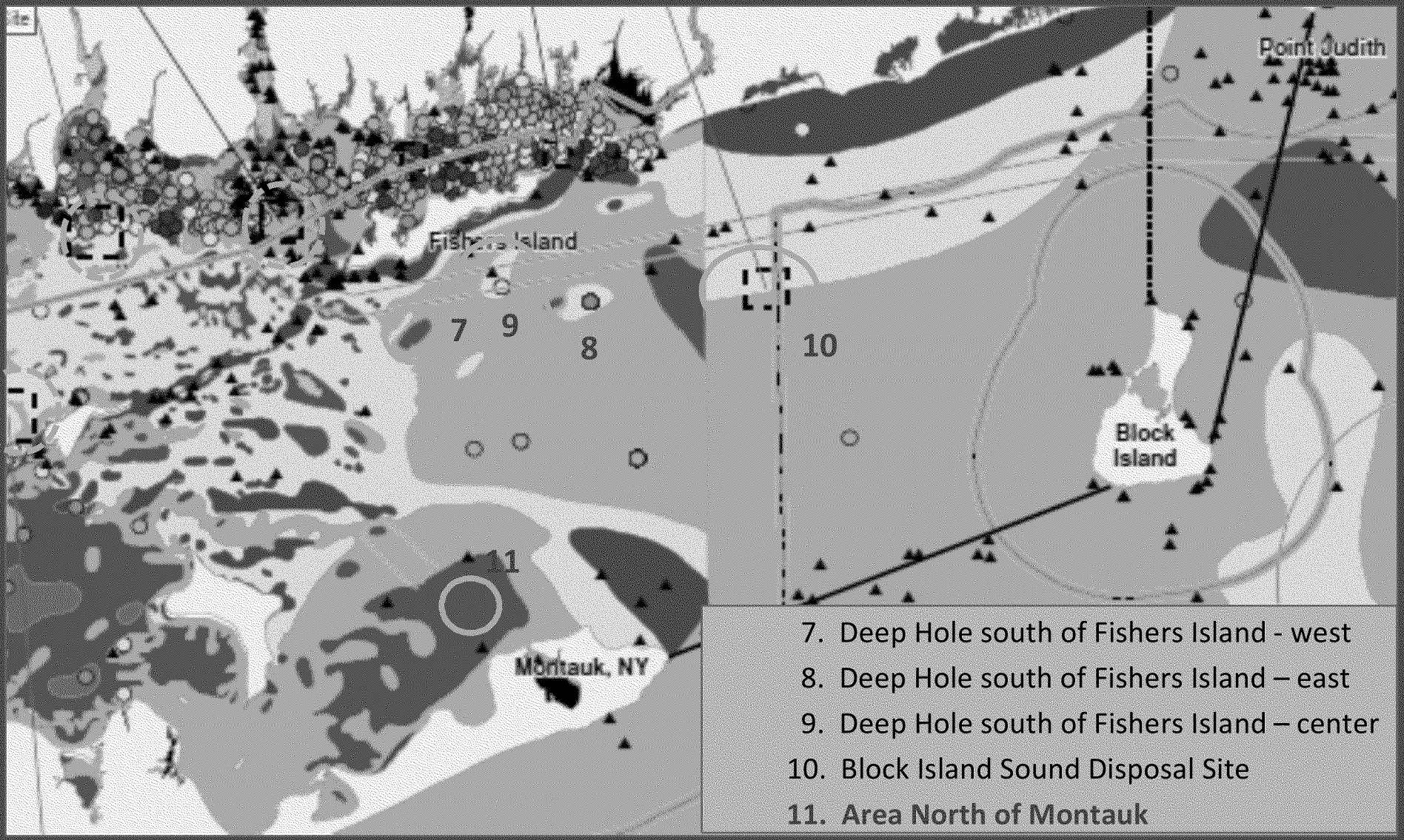
-/? Sand
? Biological resources





http://pubs.usgs.gov/of/2012/1005/html/fig14.html

Alternative Site Discussion: Block Island Sound

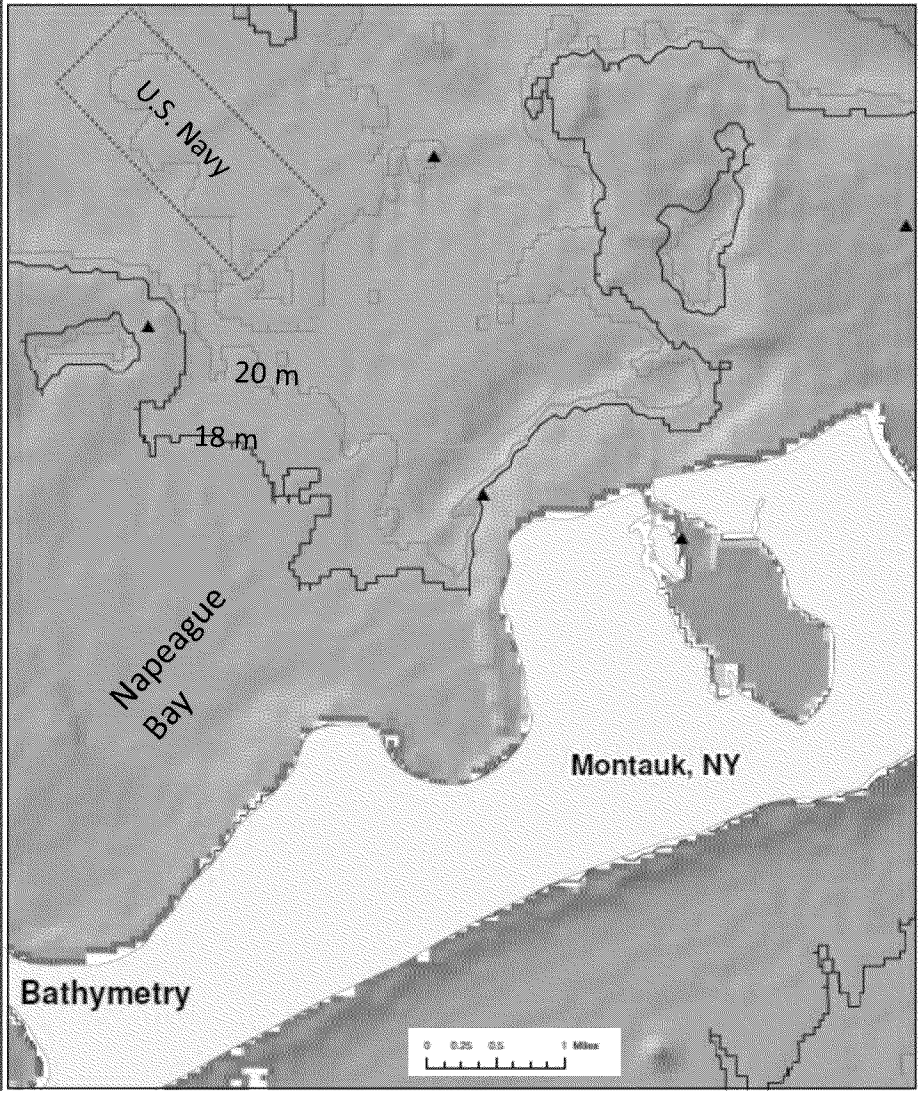


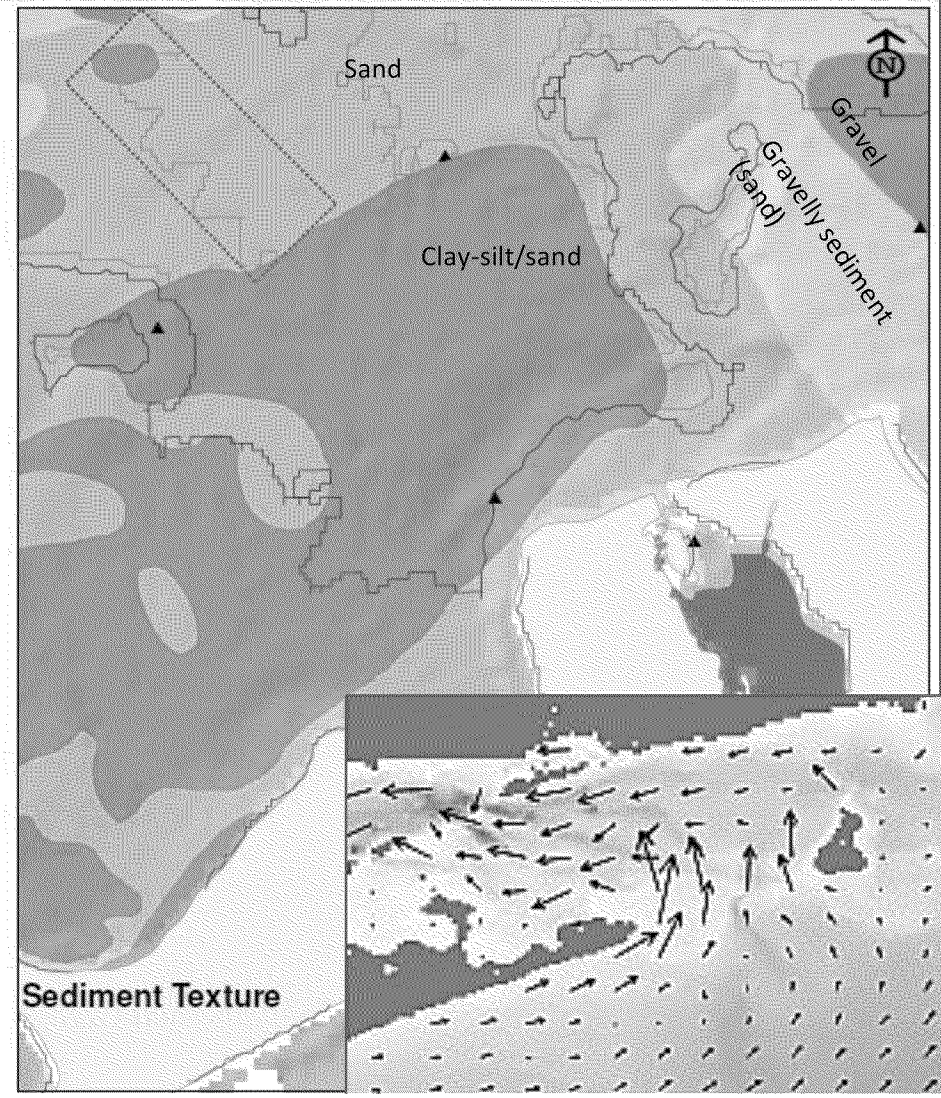
7. Deep Hole south of Fishers Island - west
8. Deep Hole south of Fishers Island – east
9. Deep Hole south of Fishers Island – center
10. Block Island Sound Disposal Site
11. **Area North of Montauk**

11. Area north of Montauk

- o Shallow (60-80 ft; 18-24 m)
- \- Long distance to dredging centers
  (NL: 16 nm; CT River: 21 nm)
- \- New site

- o Restricted U.S. Navy submarine anchorage
- +/? Containment (silt-clay/sand)
- ? Biological resources
- \- Close to shore (beaches; houses)





Alternative Site Discussion – Summary

Sites	Eastern Long Island Sound						Block Island Sound				
	1	2	3	4	5	6	7	8	9	10	11
	Cornfield Shoals Disposal Site	Six Mile Reef Disposal Site	Clinton Harbor Disposal Site	Niantic Bay Disposal Site	Orient Point Disposal Site	New London Disposal Site	Deep Hole south of Fishers Island - west	Deep Hole south of Fishers Island - east	Deep Hole south of Fishers Island - center	Block Island Sound Disposal Site	Area north of Montauk
Site Characteristics - Depth	+	-	o	+	+	-	+	+	+	o	-
Site Characteristics - Bottom Topography/Sediment Type	-	-	-	-/?	-	+	-	-/?	-/?	-/?	+/?
Distance to Dredging Centers	+	o	+	+	o	+	o	-	-	-	-
Active/Historic/New Disposal Site	+	o	o	o	o	+	-	-	-	-	-
Distance to Beaches areas	o	o	o	o	o	o	-	-	-	o	-
Distance to Commercial and Recreational Fisheries	o	o *1*	o *1*	o	o	o	o	o	o	o	?
Habitat /Biological Resources	o	o/?	?	o	?	+	?	?	?	?	?
Distance to Shellfish Beds	o	o *1*	o *1*	o	o	o	o	o	o	o	?
Distance to existing Habitat /Biological Resources	o	o/?	?	o	?	+	?	?	?	?	?
Disposal Site Managem. (mound stability, capacity, sed. type)	o	o	o	o	o	o	o	o	o	o	o
Historic and Cultural Resources			wrecks								
Navigation Considerations (anchorage, shipping lanes)						*2*			*2*		*2*
Distance to Conservation Area (Marine Sanctuary, preserve)					?					?	?
Other Use Conflicts (cables, pipelines)						cable?					
Other		morphology					barge transport - larger waves				

1 Approx. 3 miles east of *Approved* shellfishing zone.
2 Anchorage or vessel lane areas nearby

+ Relative Advantage
- Relative Disadvantage

o Neutral
? Need more data for screening

Next Steps

- Select and Assess Alternative Sites in more detail
  - Integrate additional available information
  - Identify and fill remaining data gaps
  - Review existing and newly collected data
- Collect Additional Information Needed for SEIS
- Public Meeting
- Cooperating Agency Meeting

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Questions and Discussion

Alternative Site Discussion – Summary

(for real-time editing)

	Eastern Long Island Sound						Block Island Sound				
	1	2	3	4	5	6	7	8	9	10	11
Sites	**Cornfield Shoals Disposal Site**	**Six Mile Reef Disposal Site**	**Clinton Harbor Disposal Site**	**Niantic Bay Disposal Site**	**Orient Point Disposal Site**	**New London Disposal Site**	**Deep Hole south of Fishers Island - west**	**Deep Hole south of Fishers Island - east**	**Deep Hole south of Fishers Island - center**	**Block Island Sound Disposal Site**	**Area north of Montauk**
Site Characteristics - Depth	+	-	o	+	+	-	+	+	+	o	-
Site Characteristics - Bottom Topography/Sediment Type	-	-	-	-/?	-	+	-	-/?	-/?	-/?	+/?
Distance to Dredging Centers	+	o	+	+	o	+	o	-	-	-	-
Active/Historic/New Disposal Site	+	o	o	o	o	+	-	-	-	-	-
Distance to Beaches areas	o	o	o	o	o	o	-	-	-	o	-
Distance to Commercial and Recreational Fisheries	o	o 1	o 1	o	o	o	o	o	o	o	?
Habitat /Biological Resources	o	o/?	?	o	?	+	?	?	?	?	?
Distance to Shellfish Beds	o	o 1	o 1	o	o	o	o	o	o	o	?
Distance to existing Habitat /Biological Resources	o	o/?	?	o	?	+	?	?	?	?	?
Disposal Site Managem. (mound stability, capacity, sed. type)	o	o	o	o	o	o	o	o	o	o	o
Historic and Cultural Resources			wrecks								
Navigation Considerations (anchorage, shipping lanes)						2			2		2
Distance to Conservation Area (Marine Sanctuary, preserve)					?					?	?
Other Use Conflicts (cables, pipelines)						cable?					
Other			morphology					barge transport - larger waves			

1 Approx. 3 miles east of Approved shellfishing zone.

2 Anchorage or vessel lane areas nearby

+ Relative Advantage

- Relative Disadvantage

o Neutral

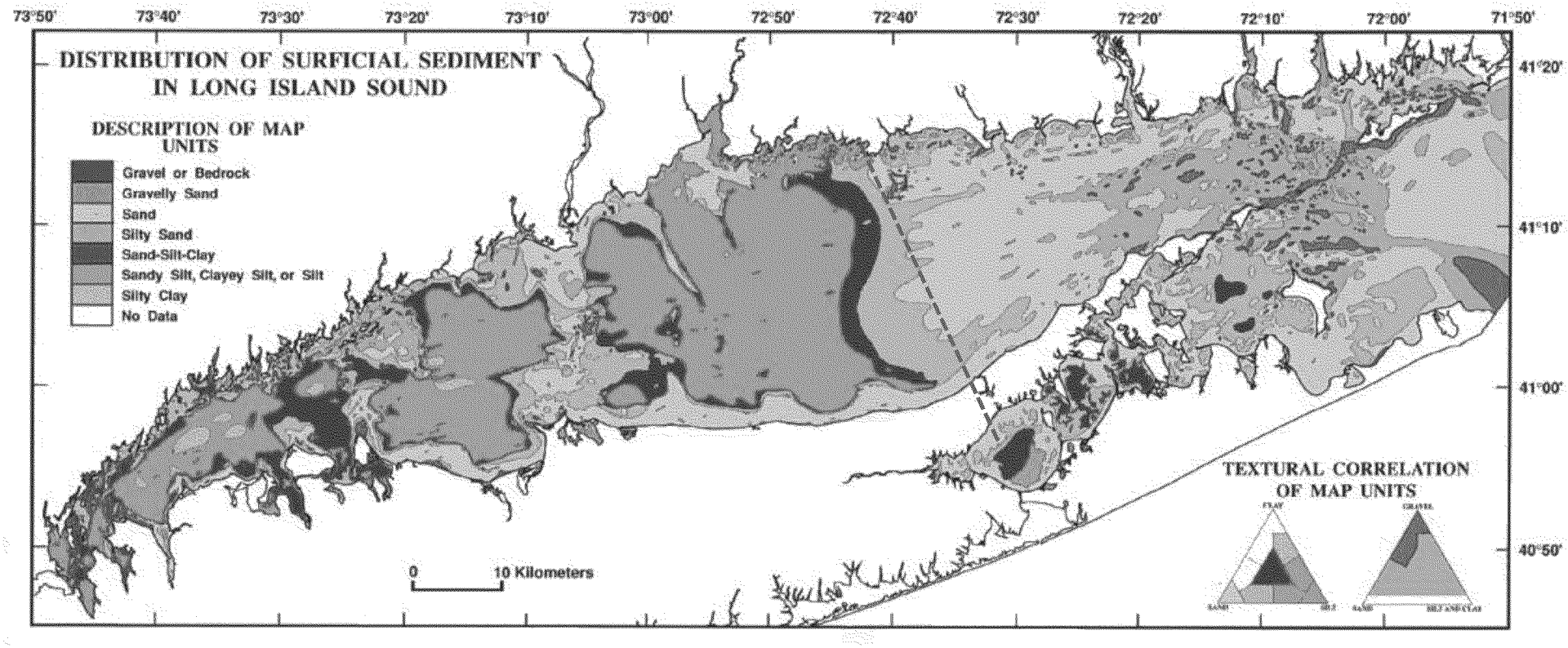
? Need more data for screening

Following are

FIGURES FOR POTENTIAL DISCUSSION, AS NEEDED

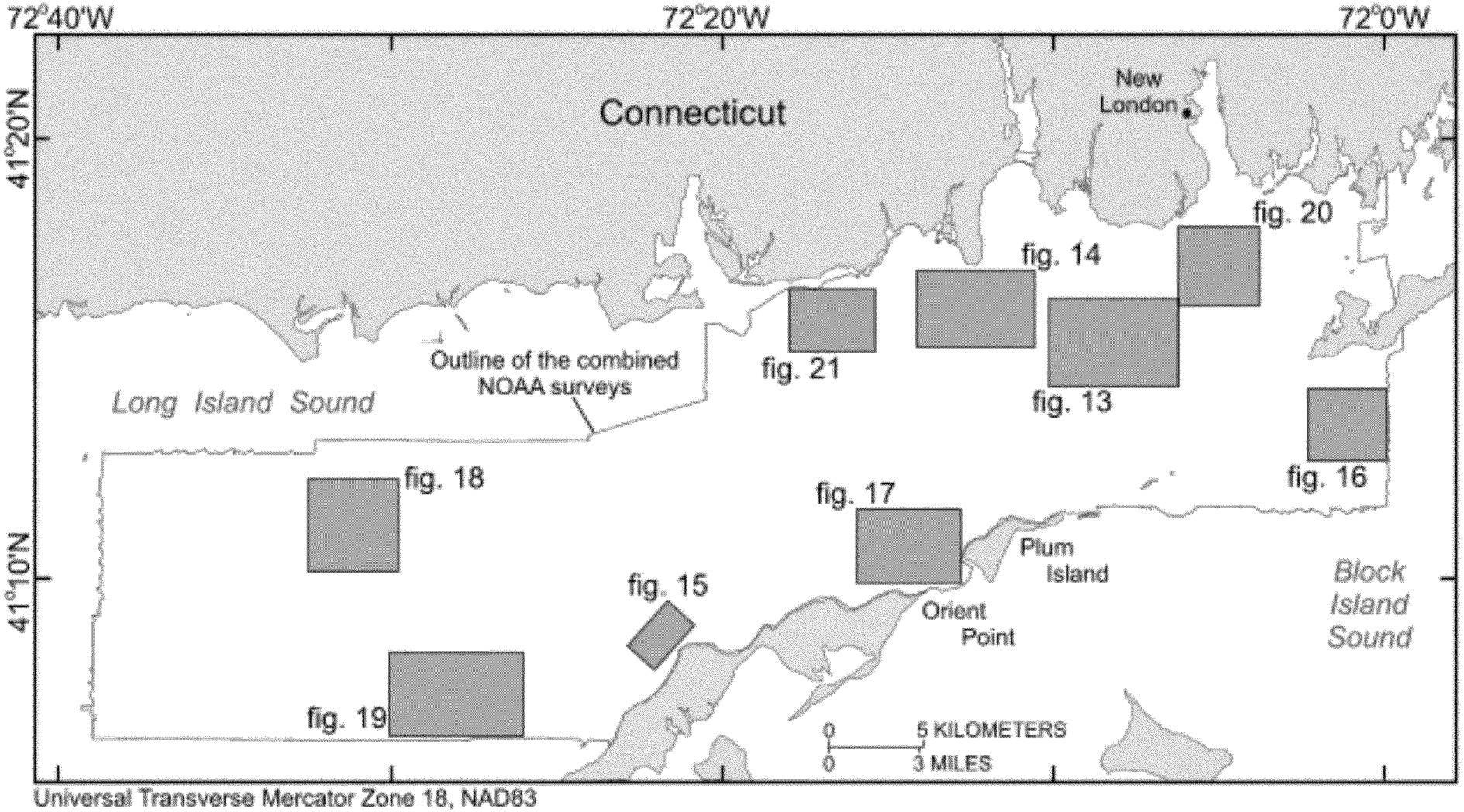
Sediment Texture – LIS

(USGS, 2000)



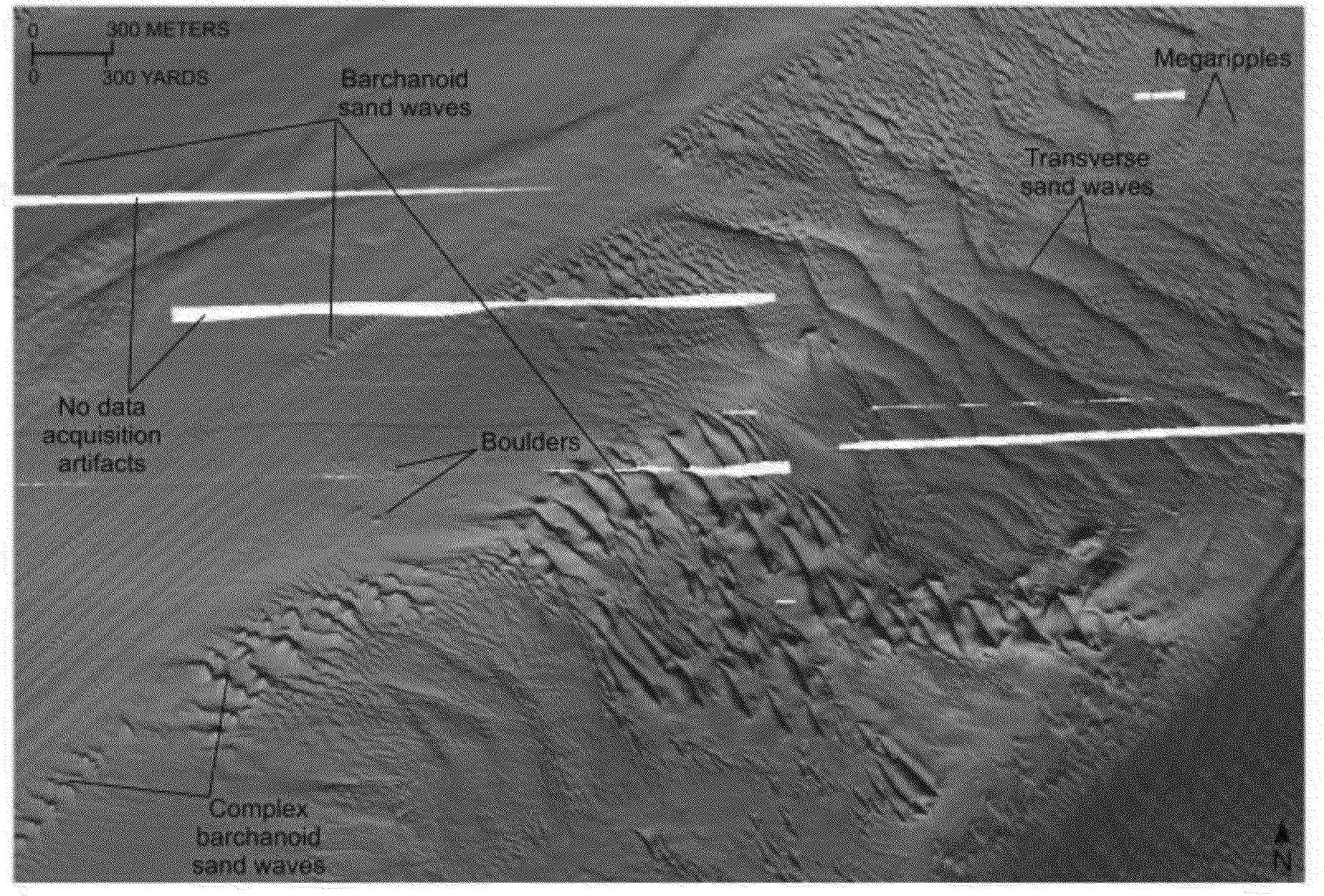
http://pubs.usgs.gov/of/2000/of00-304/htmldocs/chap04/images/mch4fig3.jpg

Multispectral Bathymetry Survey - USGS



http://pubs.usgs.gov/of/2011/1003/html/figures.html

Area 19 – ELIS (west)



http://pubs.usgs.gov/of/2011/1003/html/figures.html

Rhode Island Ocean Special Area Management Plan (SAMP)

Map Key

Interpreted Geologic Units

Stone & Borns, 1986

Adapted from Stone and Borns, 1986. Modified by Boothroyd, 2009.

Late Pleistocene

- End Moraine - Blocky
- End Moraine - Boulder
- End Moraine - Boulder, Cobble, Sand
- Glacial Lakefloor

Early Pleistocene

- Manetto Gravel

Stone & Sirkin, 1996

- End Moraine - Undifferentiated

Additional map information from:
Needell and Lewis, 1984
Needell, O'Hara and Knebel, 1983
Schafer and Hartshorn, 1965
Sirkin, 1982

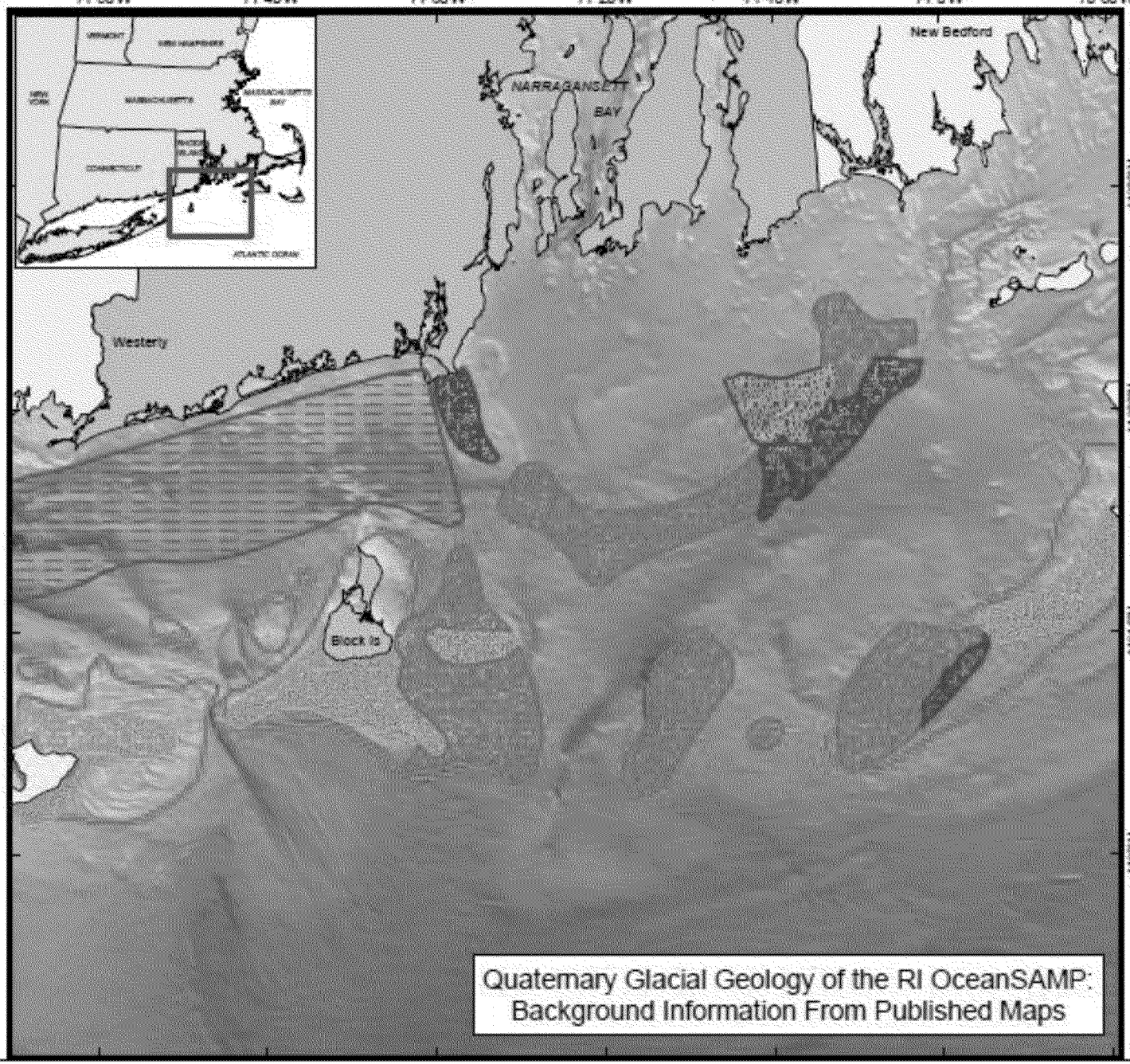
Miles
0 5
Kilometers
0 5 10

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 OLA Boundary
Bathymetry: Interpolated from NOS Soundings

For Project Background Information:
http://seagrant.gso.uri.edu/oceansamp

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



Quaternary Glacial Geology of the RI OceanSAMP: Background Information From Published Maps

Rhode Island Ocean Special Area Management Plan (SAMP)

Benthic Surface Roughness

Map Key

- OceanSAMP Study Area
- State/Federal Waters Separation

Surface Roughness

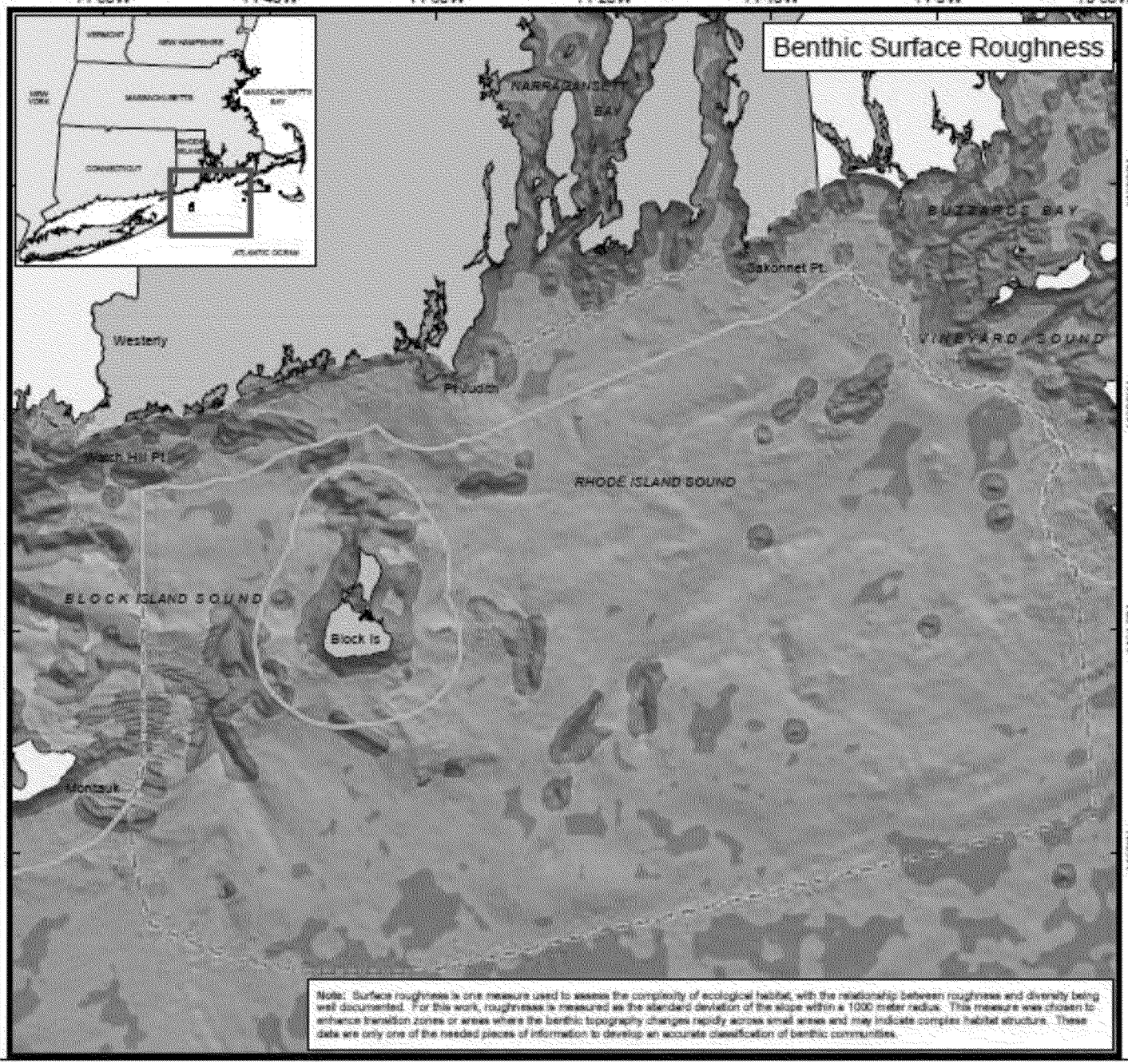
- Lowest Quartile
- Highest Quartile

Miles: 0 – 5
Kilometers: 0 – 5 – 10

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

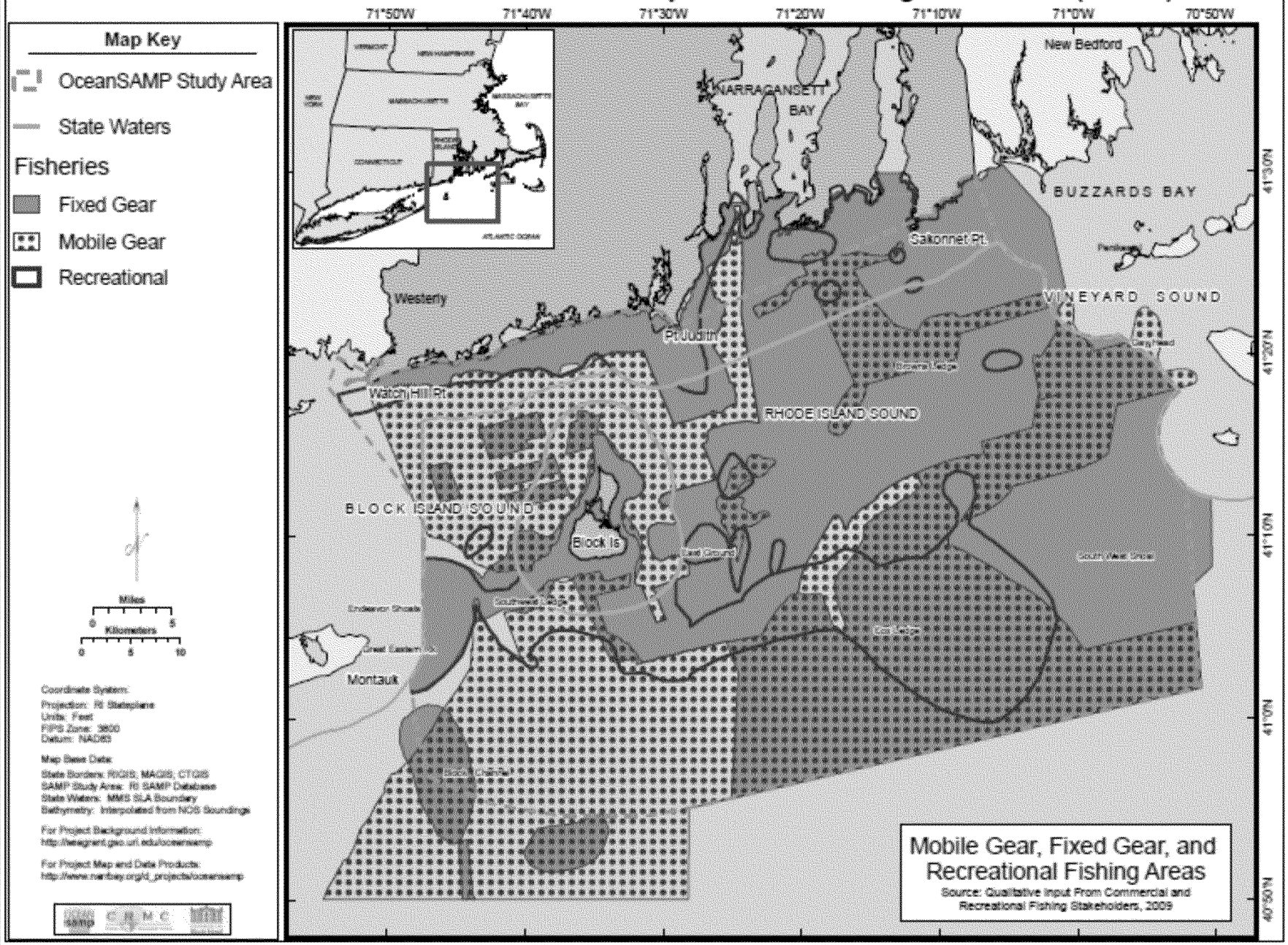
For Project Background Information:
http://seagrant.gso.uri.edu/oceansamp

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

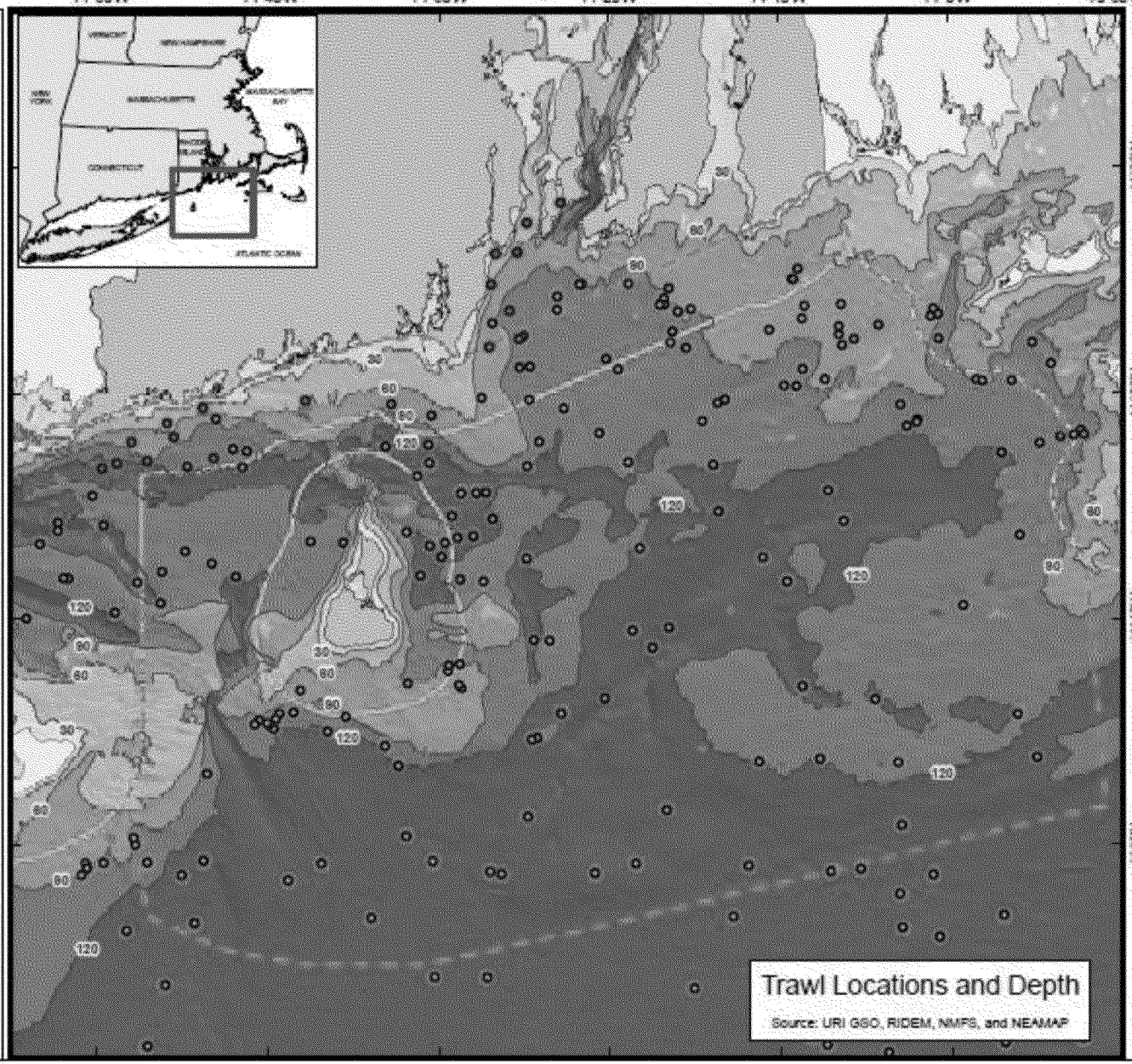


Note: Surface roughness is one measure used to assess the complexity of ecological habitat, with the relationship between roughness and diversity being well documented. For this work, roughness is measured as the standard deviation of the slope within a 1000 meter radius. This measure was chosen to enhance transition zones or areas where the benthic topography changes rapidly across small areas and may indicate complex habitat structure. These data are only one of the needed pieces of information to develop an accurate classification of benthic communities.

Rhode Island Ocean Special Area Management Plan (SAMP)



Rhode Island Ocean Special Area Management Plan (SAMP)



Map Key

- OceanSAMP Study Area
- State Waters

Trawl Sample Locations

- DEM
- GSO
- NEAMAP
- NMFS

- Depth Contours (feet)

Water Depth in Feet

- 0 - 30
- 30 - 60
- 60 - 90
- 90 - 120
- > 120

Miles
0 5
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:
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For Project Map and Data Products:
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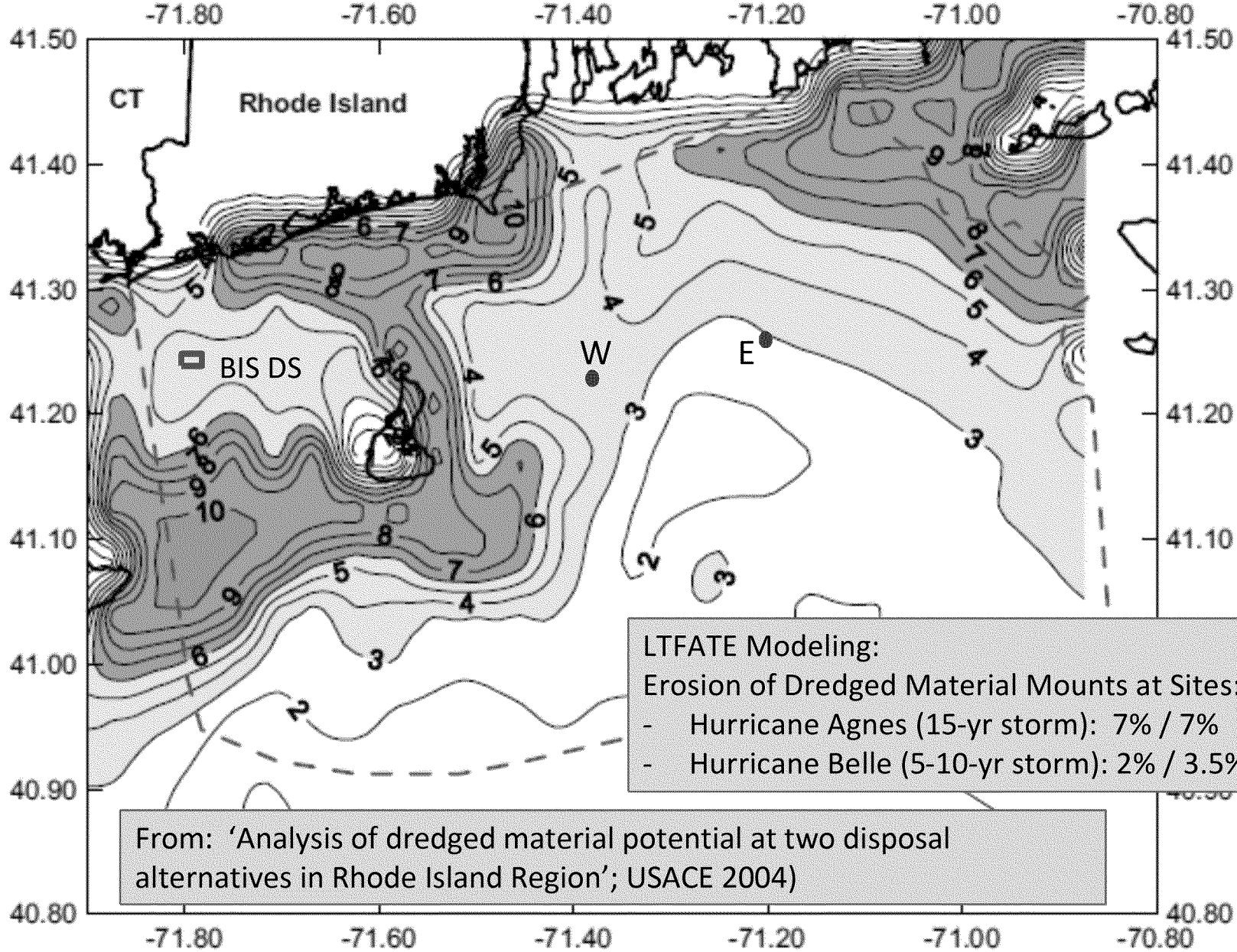
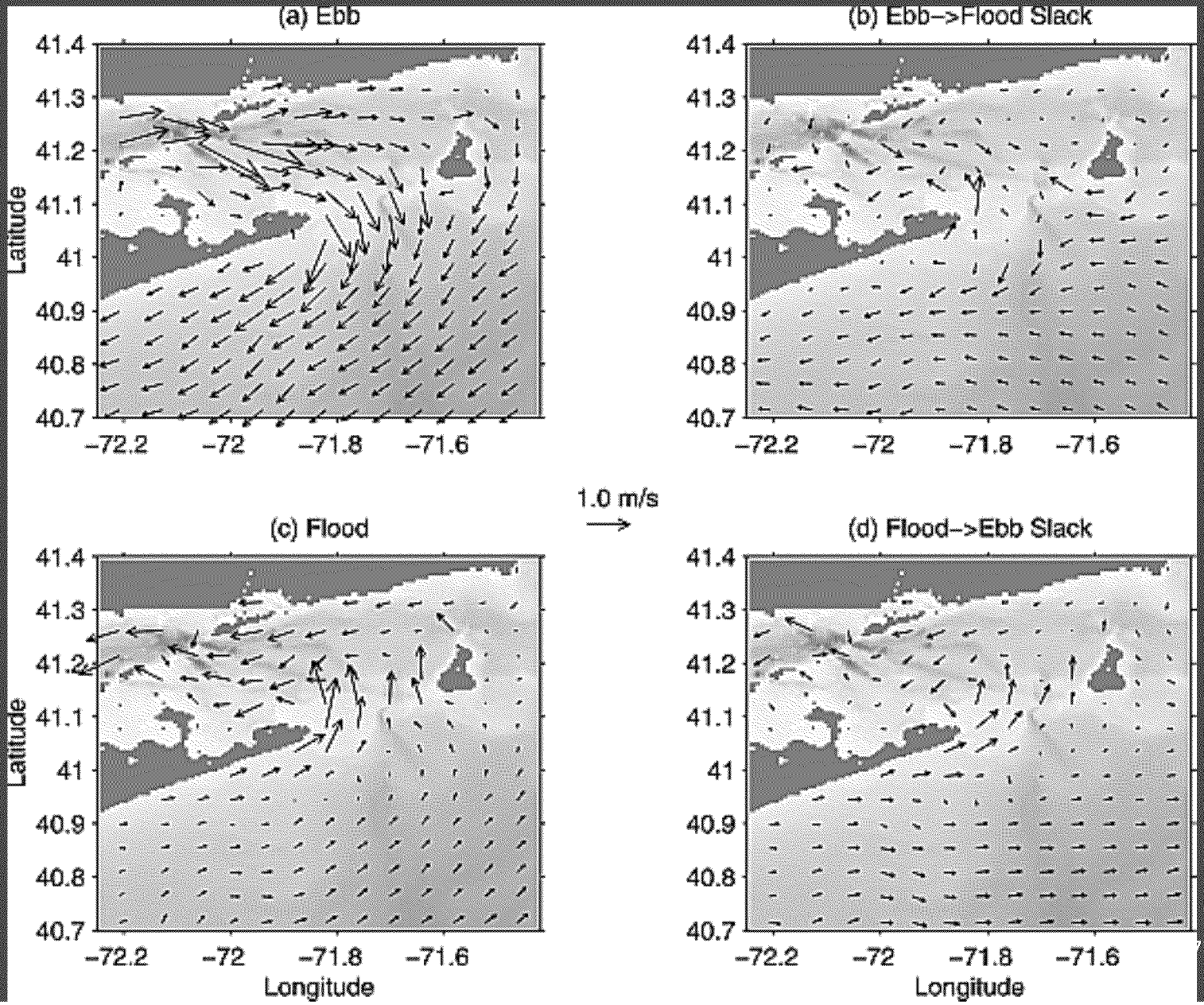


Figure 13. Predicted Sediment Erodability Parameter for 0.5-mm Grain Size for Typical Peak Tide and 1 Percent Frequency of Occurrence Wave Conditions.

Spring-summer frontogenesis at the mouth of Block Island Sound: 1. Numerical investigation into tidal and buoyancy-forced motion



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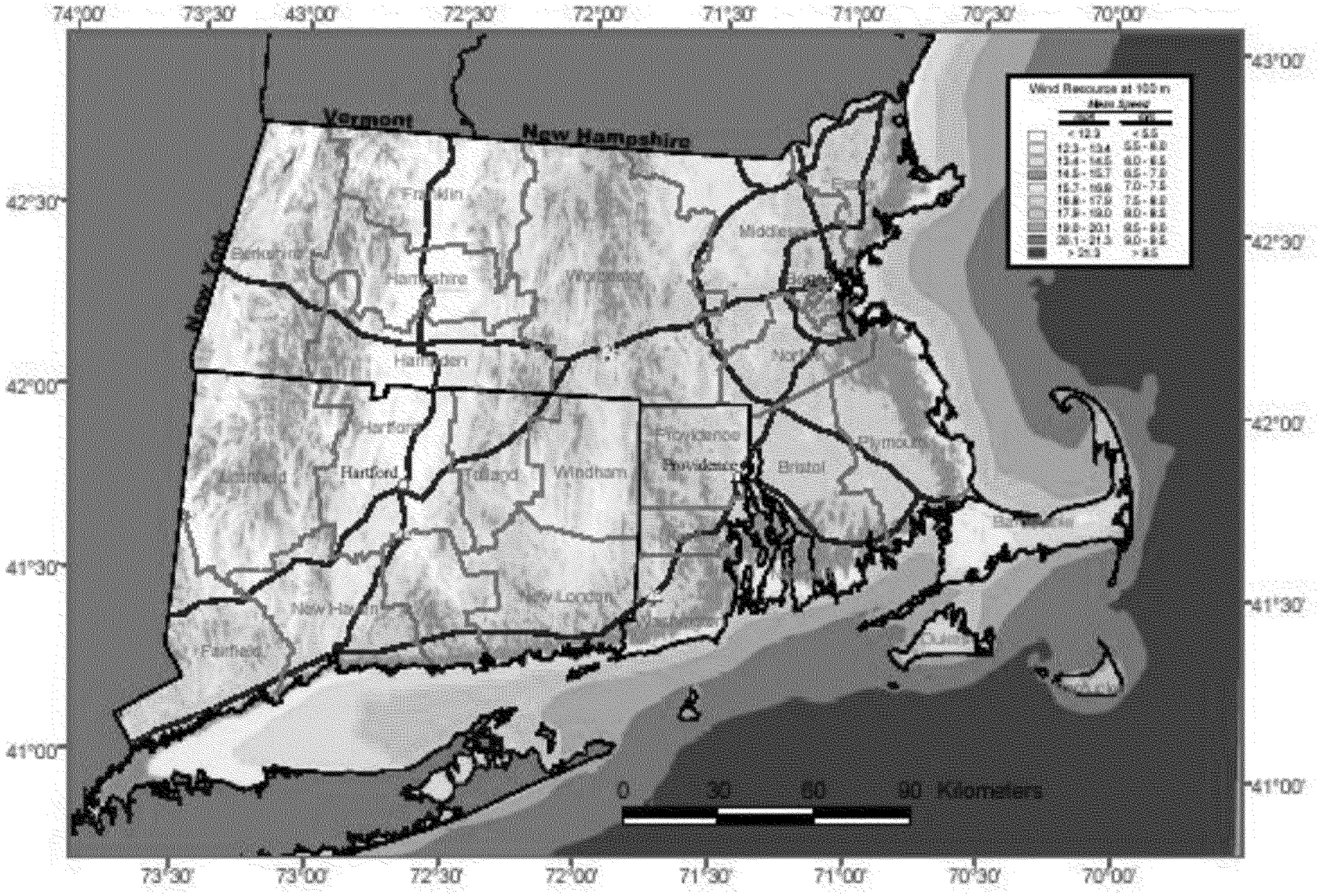
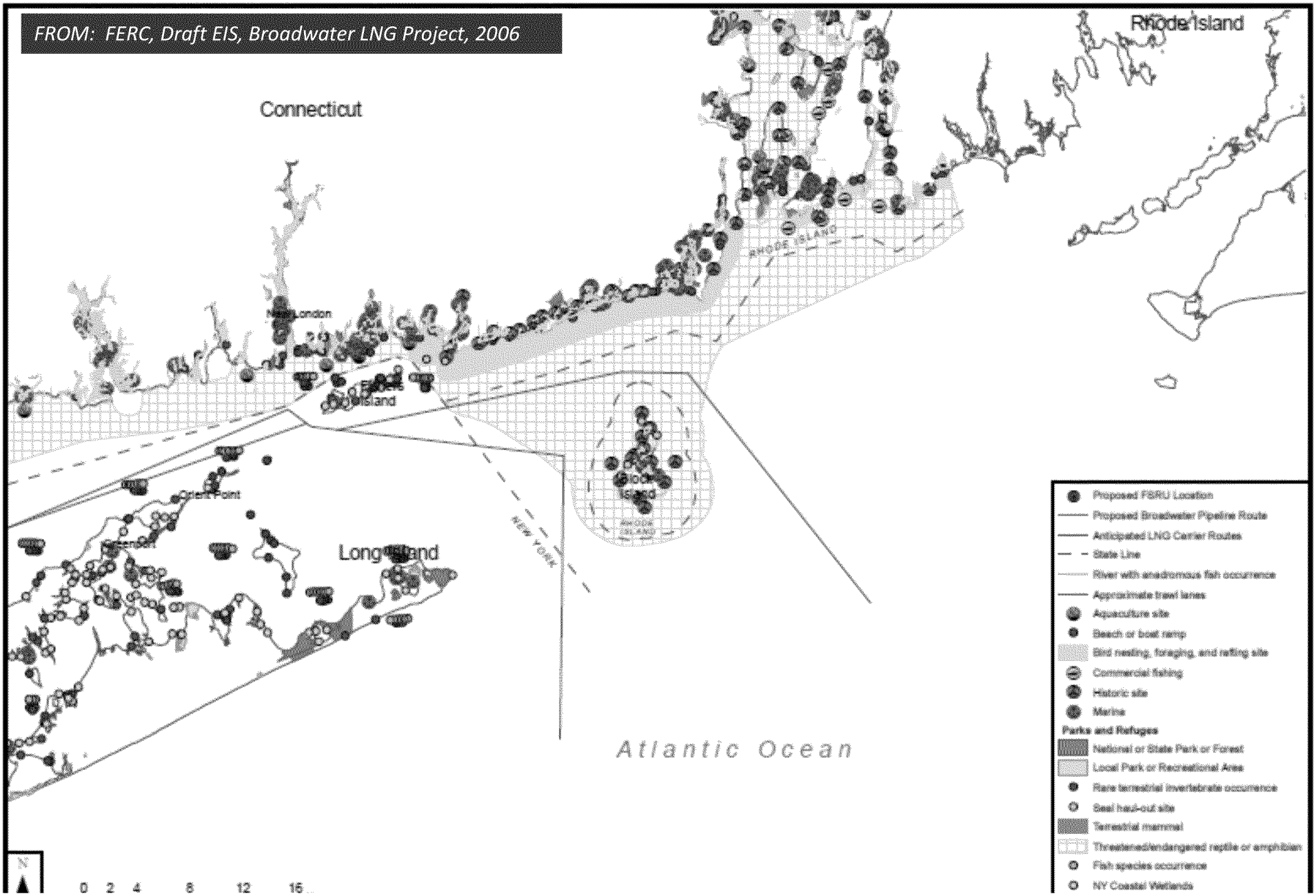
Tier 2: Alternative Energy – Wind

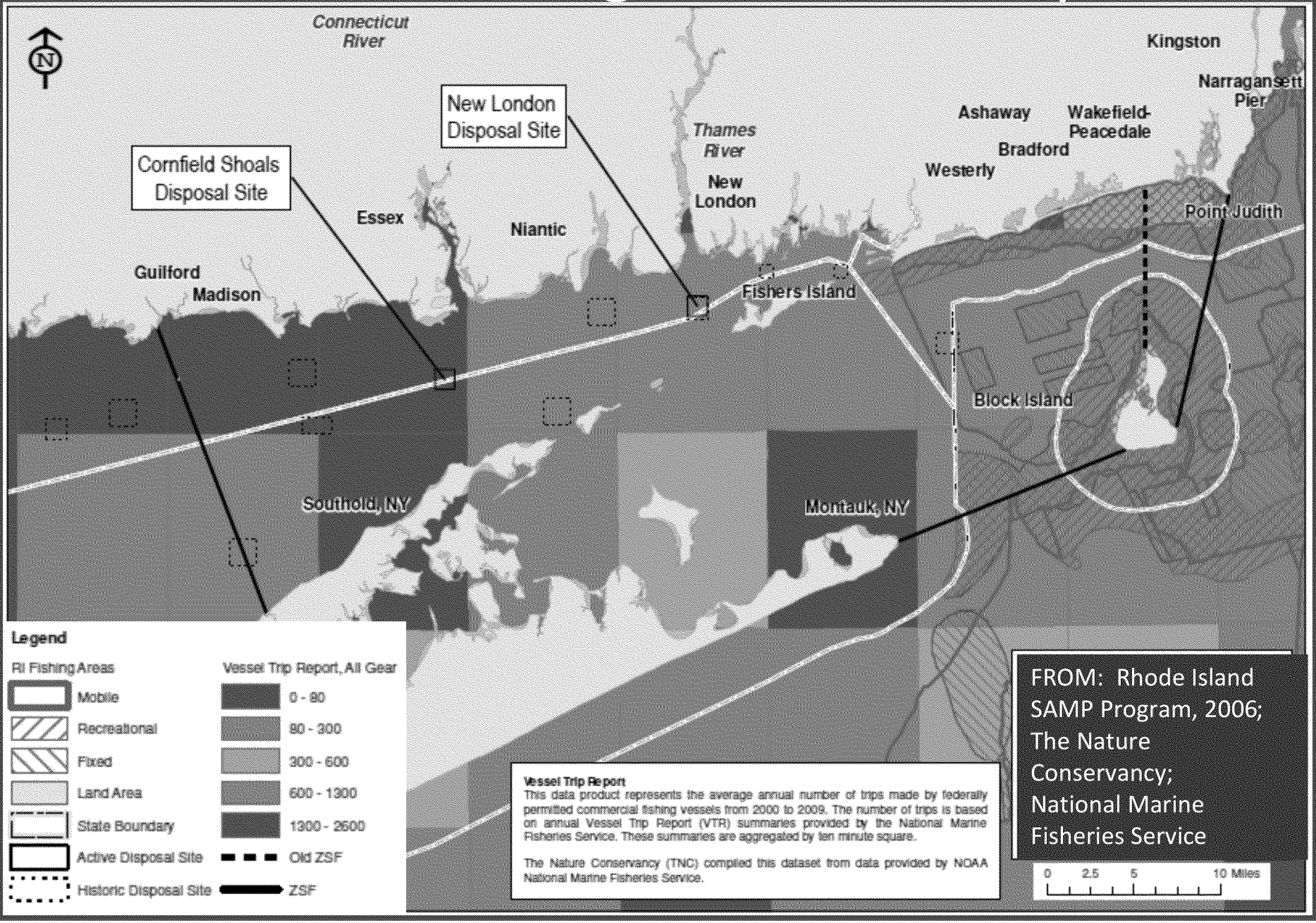
(Wind Speed at 100 m)



Sensitive Shoreline Resources



Tier 1: Fishing Areas and Trips



FROM: Rhode Island SAMP Program, 2006; The Nature Conservancy; National Marine Fisheries Service