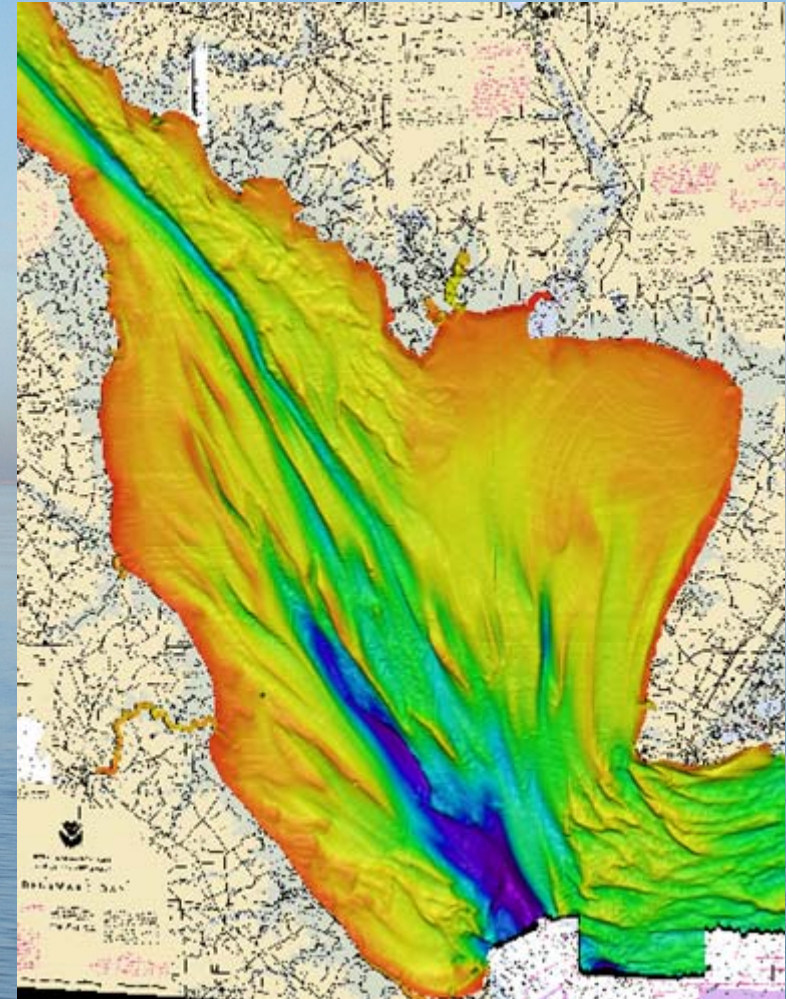
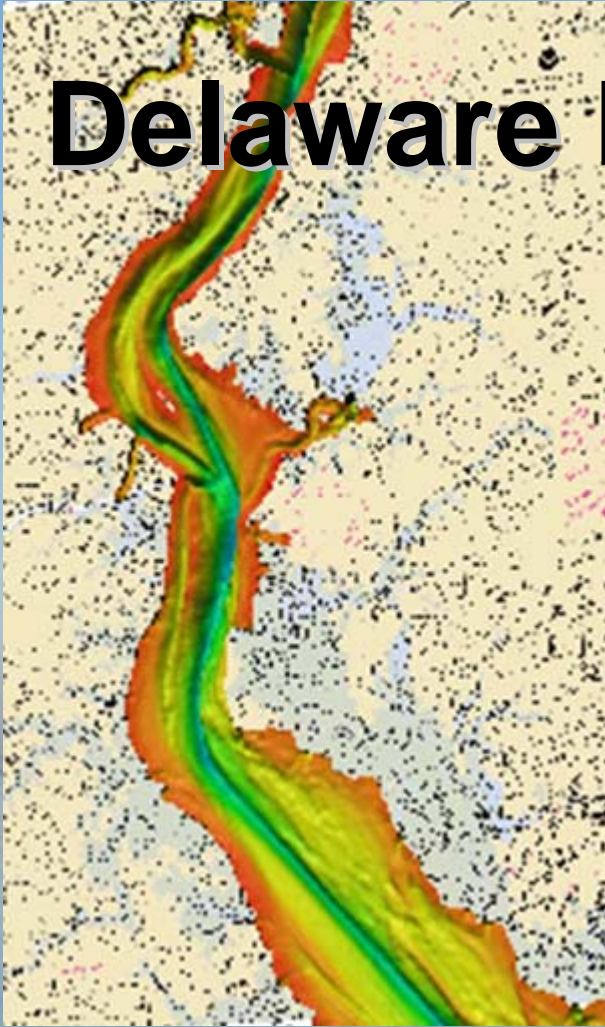


Delaware Bay Benthic Mapping



**Bartholomew D. Wilson
and David B. Carter**

DNREC, Delaware Coastal Programs

Delaware Benthic Habitats and their Living Resources

- Benthic Habitats comprise about 21 % of the State of Delaware
- These habitats support many of the fishery and other resources that we have become dependent upon for both consumptive and non-consumptive uses (commercial & recreational fishing, boating, etc.)
- We impact these habitats by our actions on a daily basis
- We cannot effectively avoid or minimize our impacts if we don't know what needs to be protected

Delaware Benthic Habitats and their Living Resources

- The current approach of using “best informed decisions” for management may be costing tax payers and businesses millions of dollars per year
- Over 2500 hours are spent annually on Bay issues by Delaware Coastal Management Program
- Untold hours by other Agencies including Fisheries, Sub-aqueous lands etc.
- Additional information is necessary to properly and effectively manage the Delaware Bay

Existing Needs for Benthic Data

- Identify Essential Fish Habitat
 - ID preferred sedimentary environments
 - Mapping Oyster Beds and habitat
 - Information for Horseshoe Crab Habitat Management
- Identify Important Locations for Marine Protection/Management Areas
- Benthic Habitat Damage
 - trawl, dredge, anchor scars



Existing Needs for Benthic Data

- Identification of Sand Resources for Beach Replenishment
- Monitor Dredge Sites
 - recovery rate, infilling material
- Emergency Response
- Artificial Reef Monitoring
- Sediment Dynamic of Delaware River and Bay
- Habitat Restoration Planning & Design
- Storm Assessment
 - pre/post event mapping

Project Goals

- Bay/River Wide Bottom Sediment Map
- Bay/River Wide Sub-bottom 2-D & 3-D Stratigraphy
- Bottom Imagery of Key Features/Areas
- Habitat Suitability Index Models
- Completely Integrated GIS Database

Delaware River & Bay

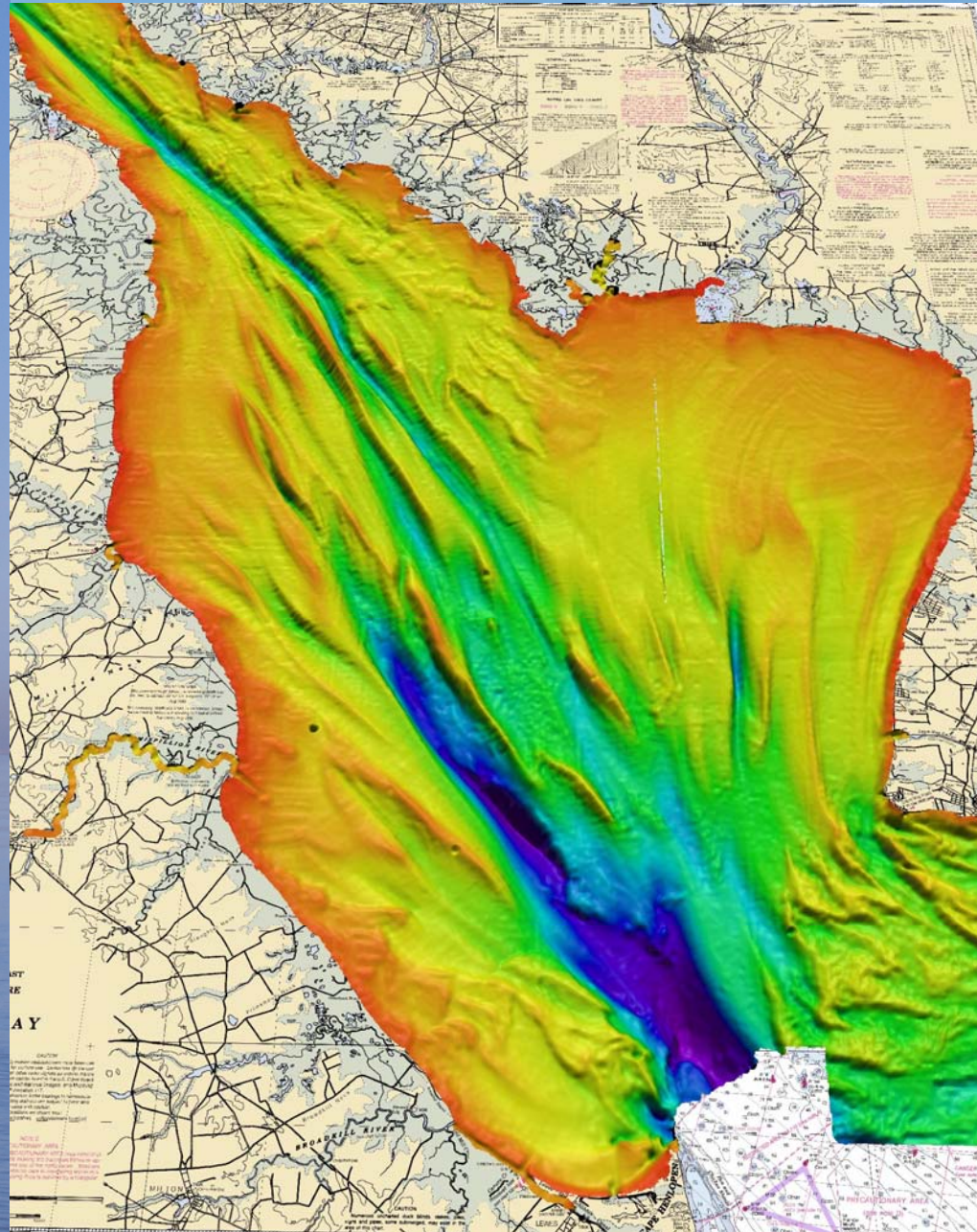
- 755.2 sq. miles
 - 380.6 (DE)
 - 374.6 (NJ)

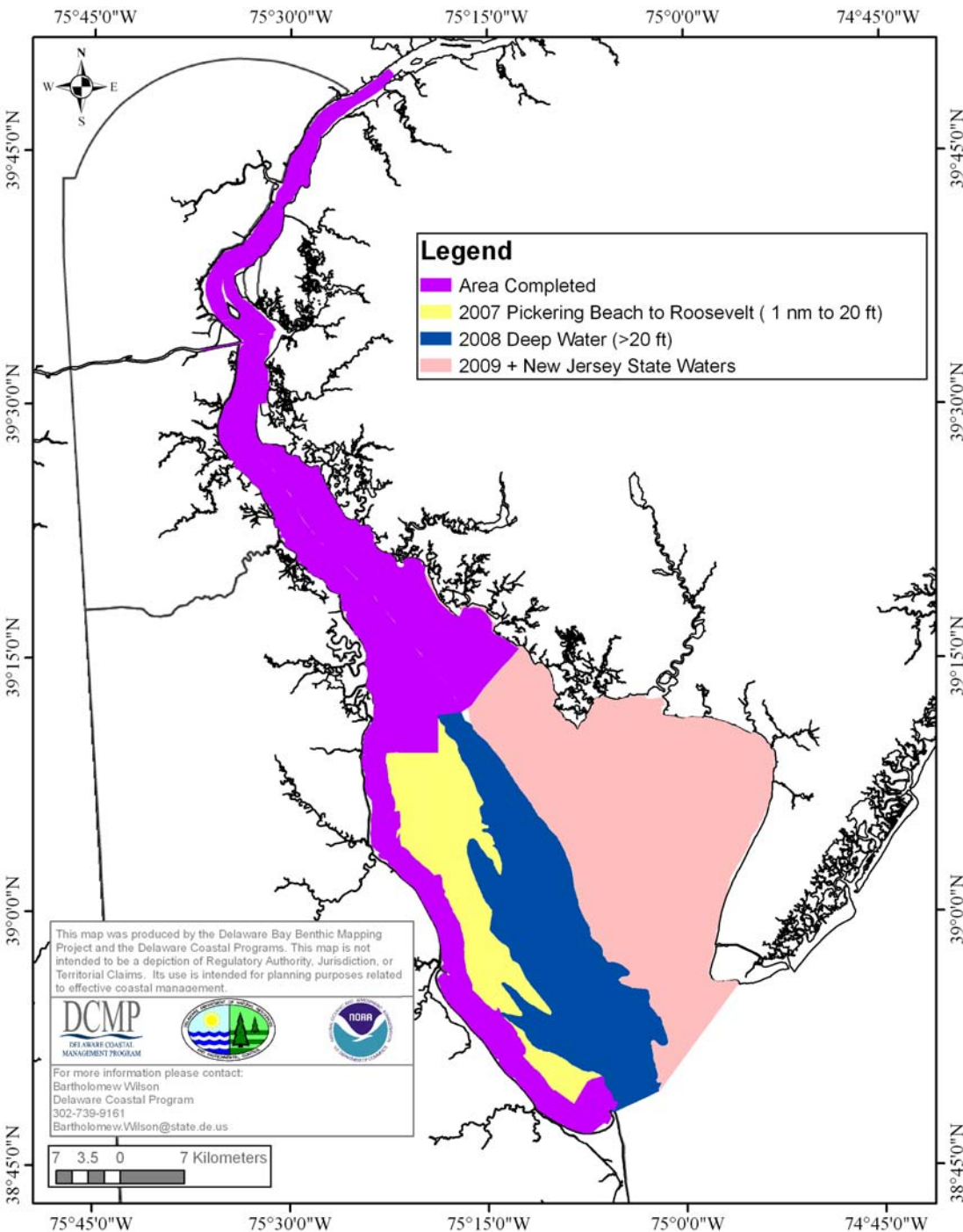
Area Mapped as of 2006

- 31 % Bay & River
 - 224 square miles
- 41 % DE
 - 149 square miles

Area Mapped by End of 2007 Field Season

- 72 % DE
 - March 2007: 173 square miles (49%; C&D Canal to De state line)
 - November 2007: 259 square miles
- 47 % Bay & River:
 - 332 square miles





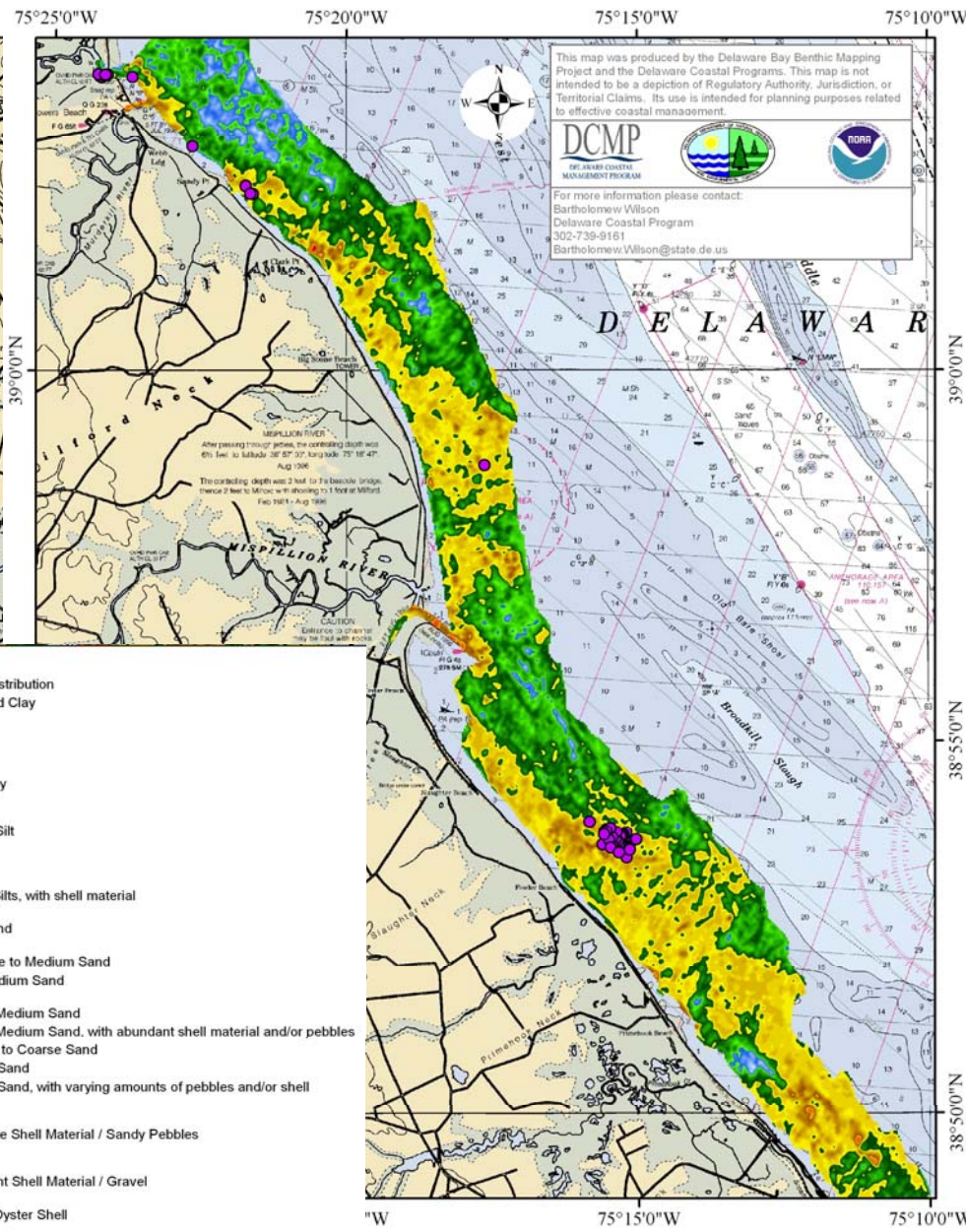
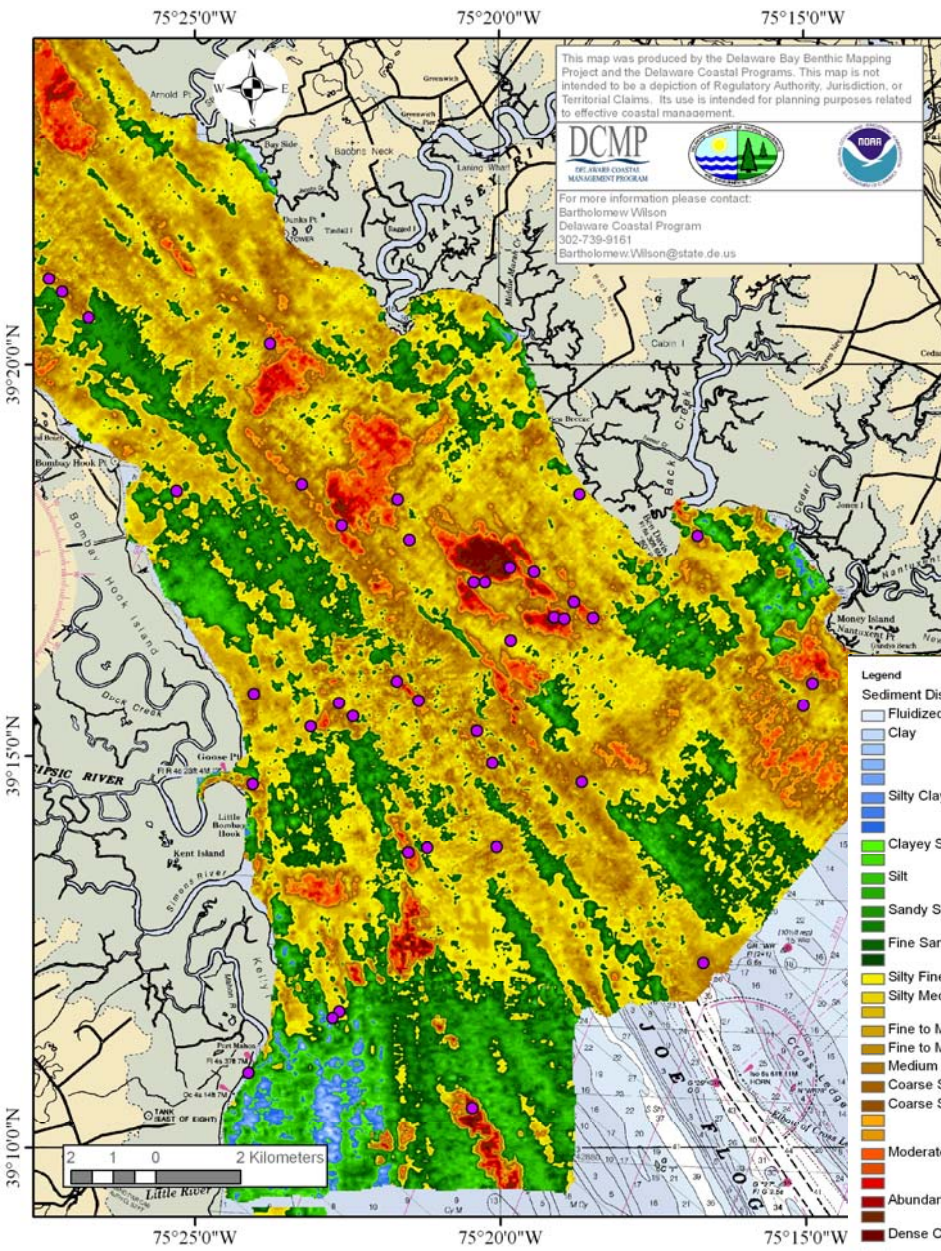
- 2004
 - 38 sq miles
 - 577 miles of trackline
 - 180 grab samples
- 2005
 - 101 sq. miles
 - 1,300 miles of trackline
 - 55 days
 - 255 grab samples
 - Multibeam
 - Blackbird Creek
 - Sections of St. Jones River
 - 2 artificial reefs
- 2006
 - 75 Sq. miles
 - 1,150 miles of trackline
 - 52 days
 - 103 + grab samples

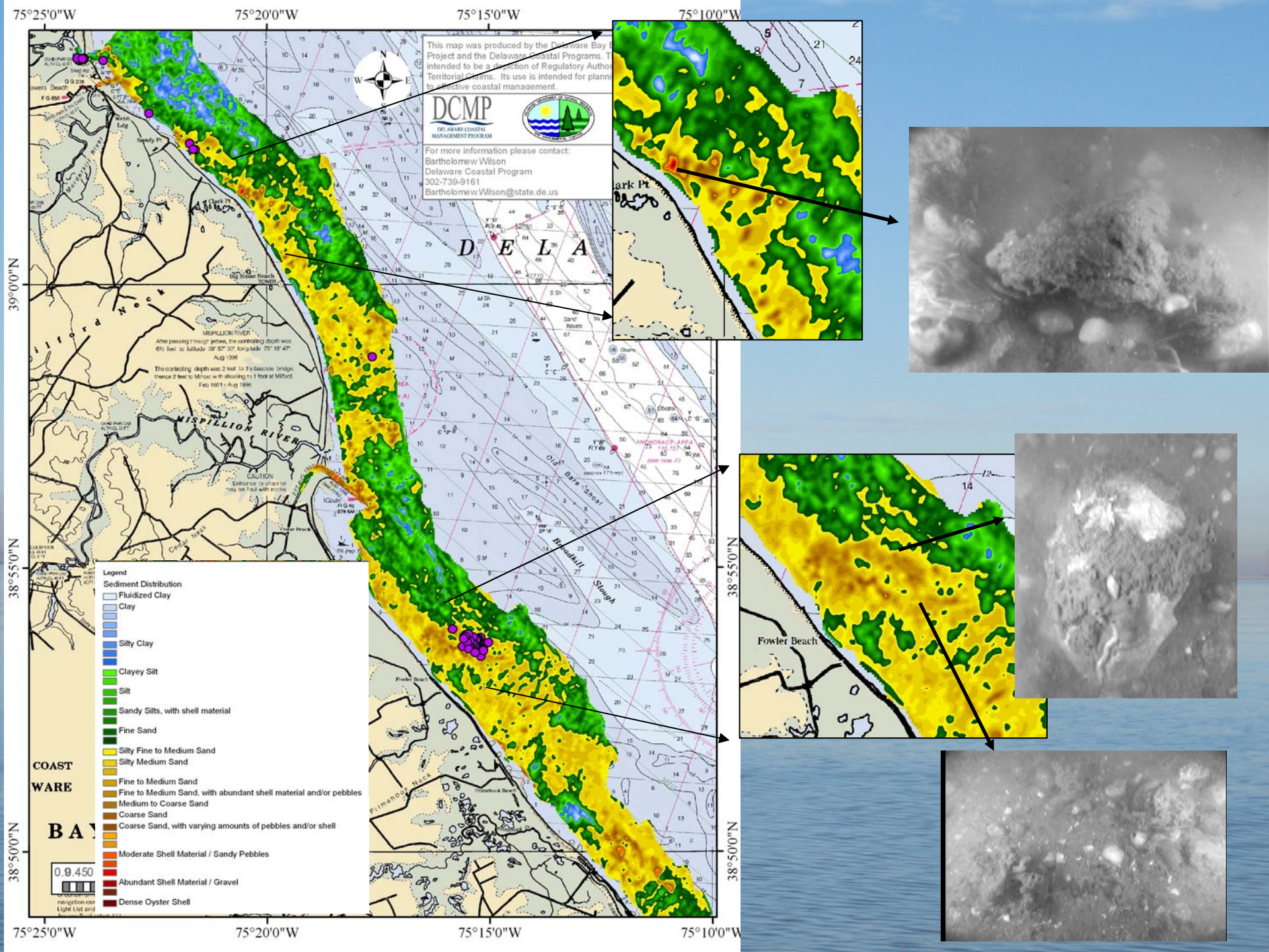
Technologies for Benthic Mapping

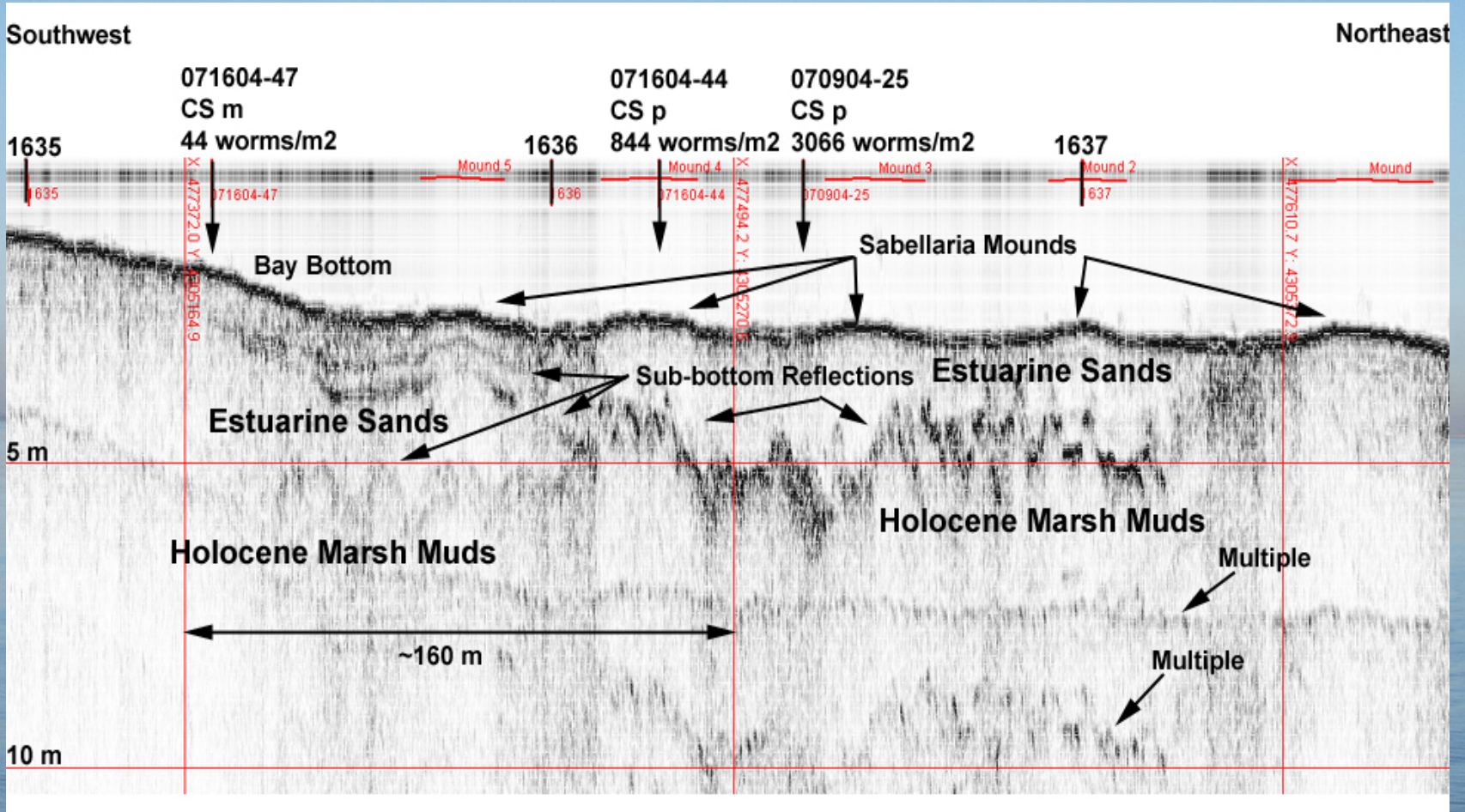
- RoxAnn Seabed Classification System
- Chirp Sub-bottom Profiler
- Multibeam bathymetry system
- Field Verification
 - Ponar Grabs
 - Vibra-coring
 - Push-coring
 - Video

Sabellaria vulgaris Habitat and Distribution



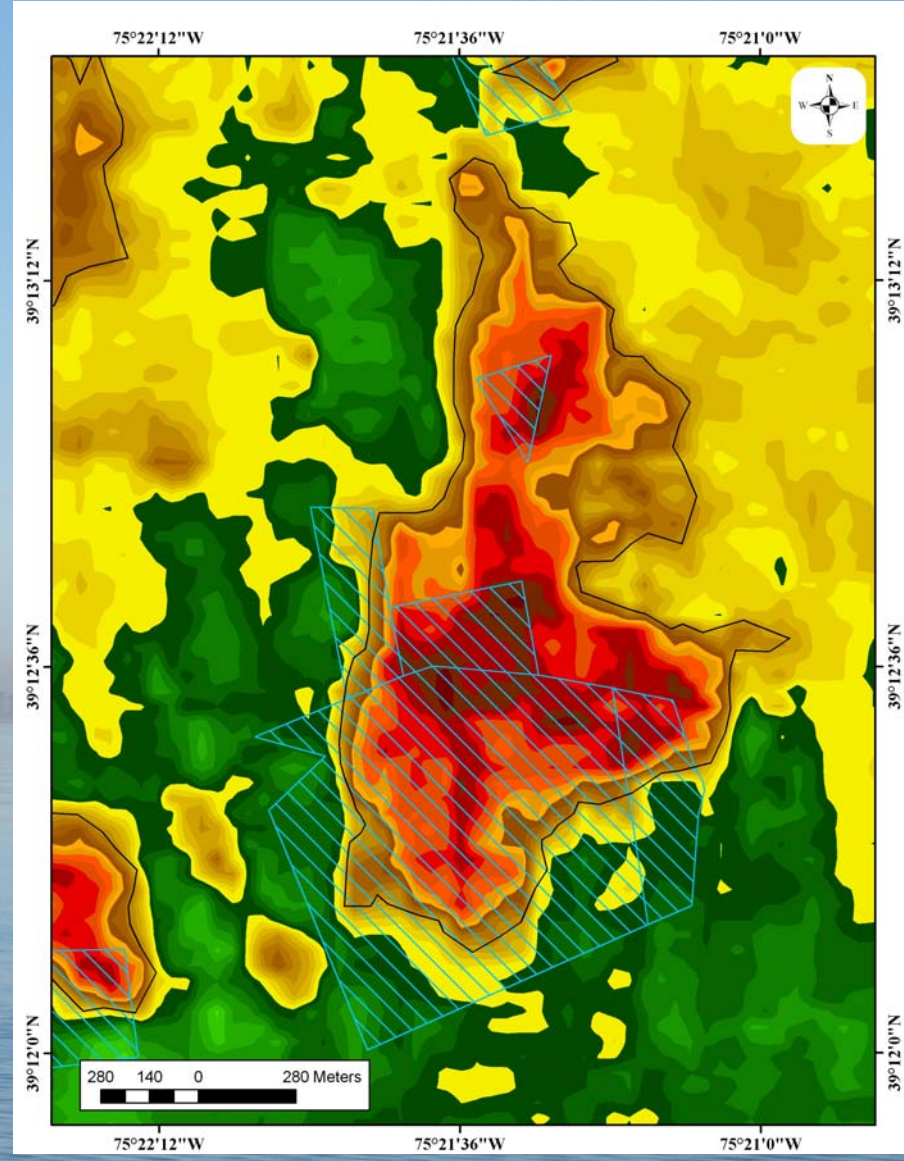
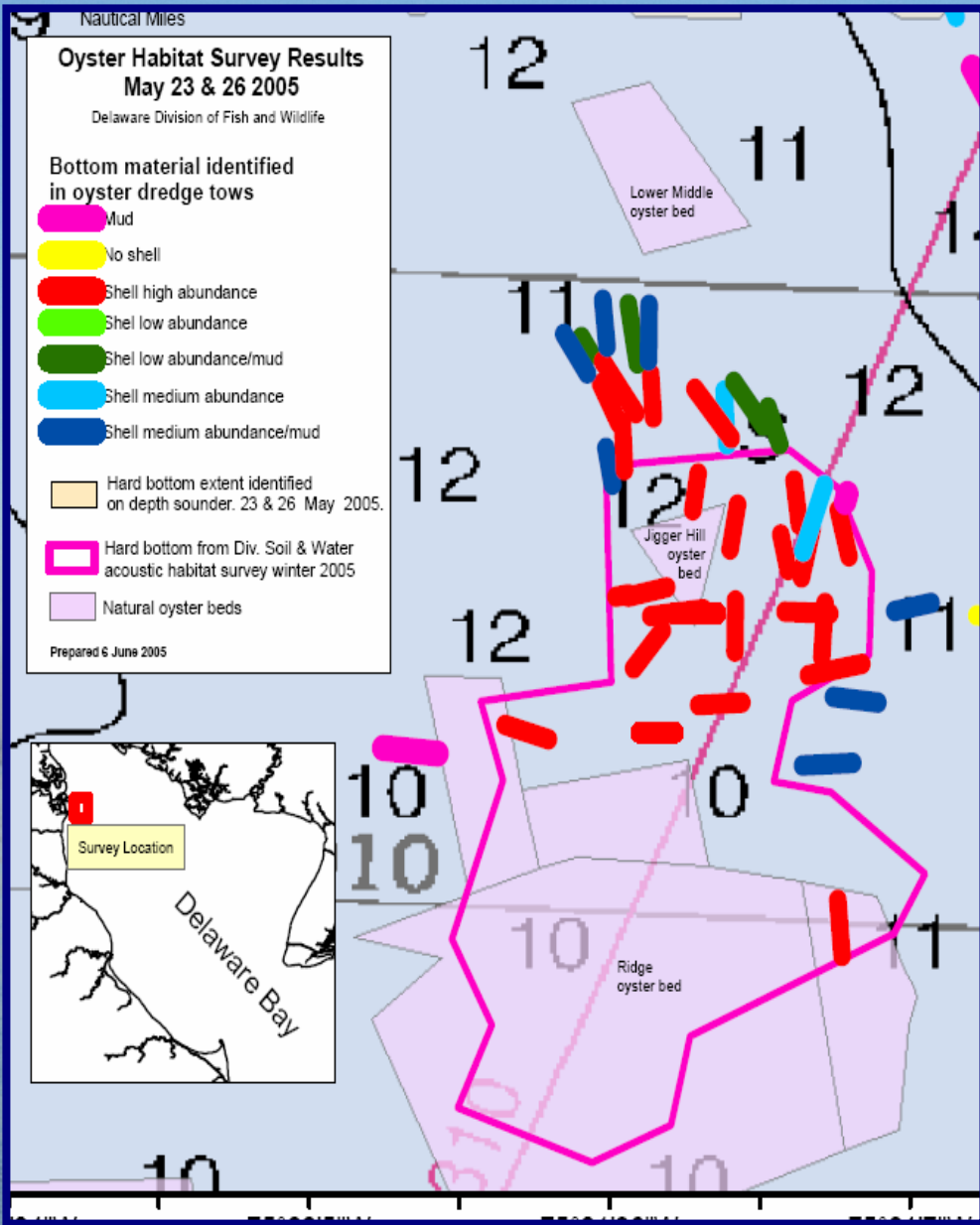






The background of the slide is a photograph of a large body of water, likely a bay or estuary, under a clear blue sky. In the distance, a power plant is visible, with a prominent cooling tower on the left side that is emitting a plume of white steam. The water in the foreground is calm with gentle ripples. The title text is overlaid on the upper half of the image.

Central Delaware Bay Oyster Bed Distribution and Habitat



Nautical Miles

Oyster Habitat Survey Results May 23 & 26 2005

Delaware Division of Fish and Wildlife

Bottom material identified
in oyster dredge tows

- Mud
- No shell

12

1

Lower Middle
oyster bed

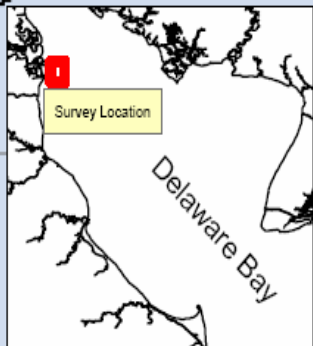
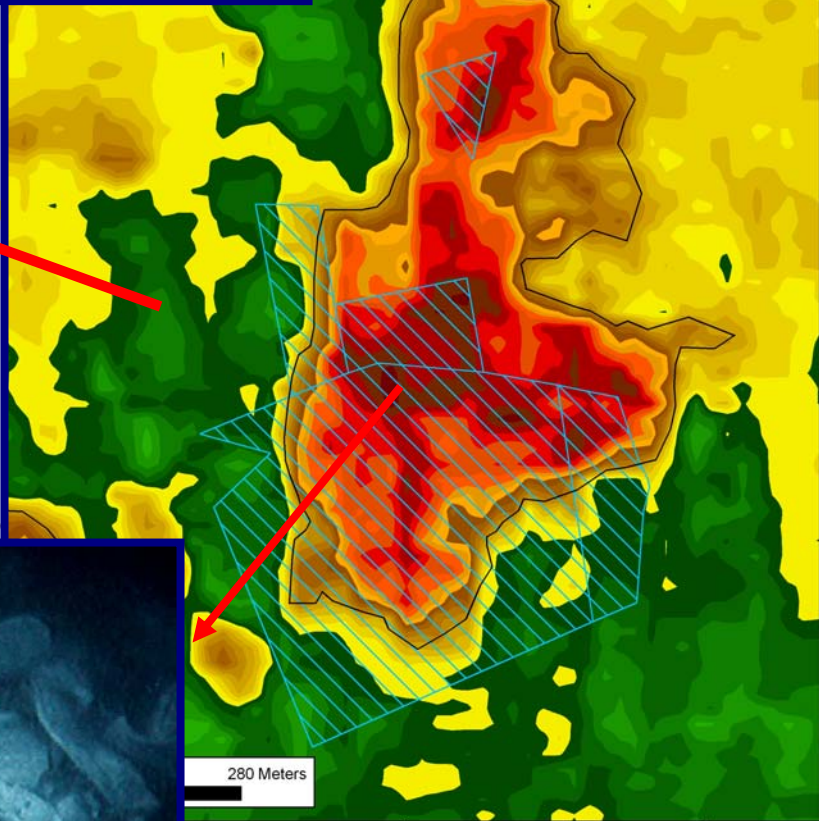
39°13'26"N

39°12'58"N

39°12'29"N

75°21'36"W

75°21'0"W



10
10

10



280 Meters

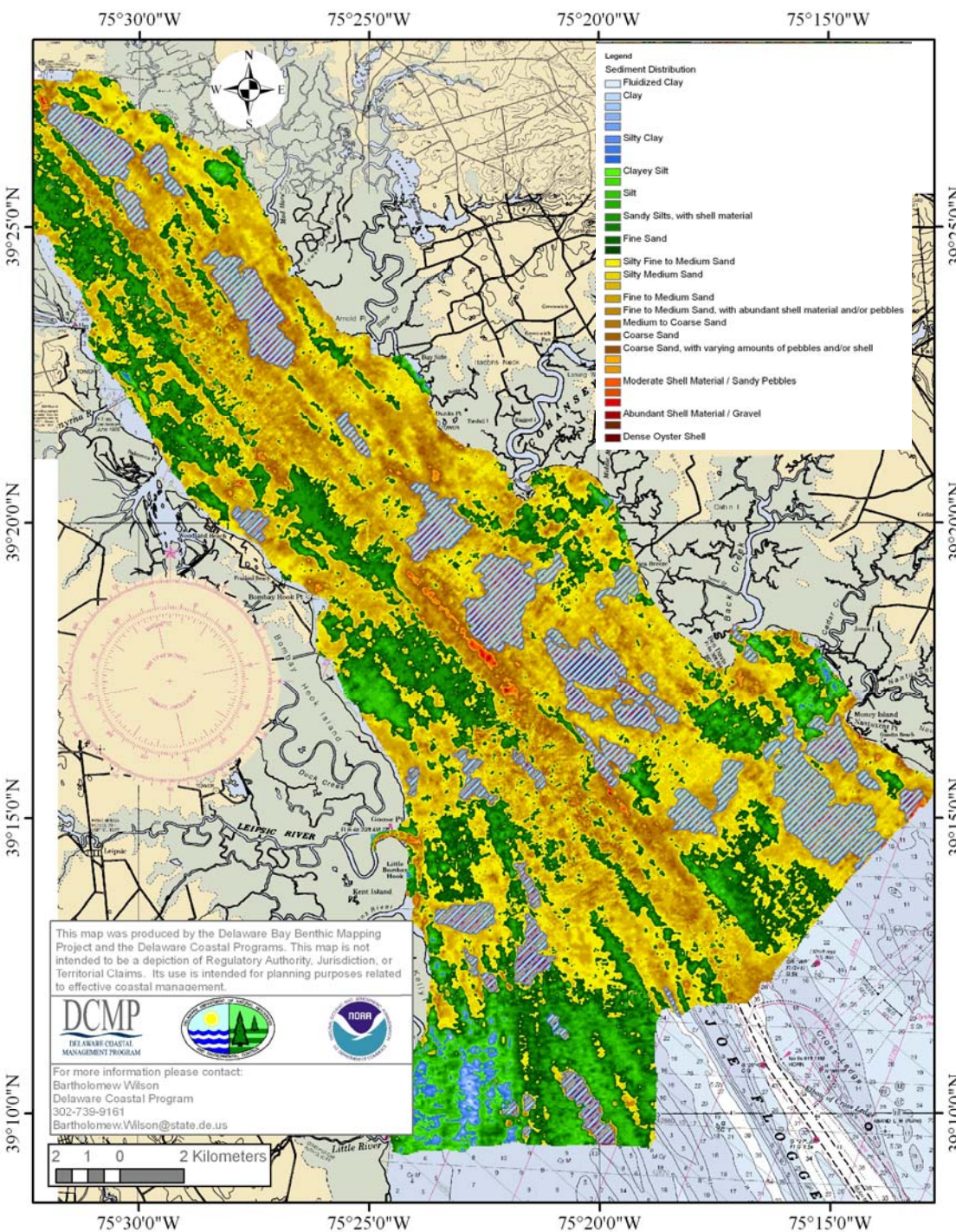
75°21'36"W

75°21'0"W

39°13'12"N

39°12'36"N

39°12'0"N



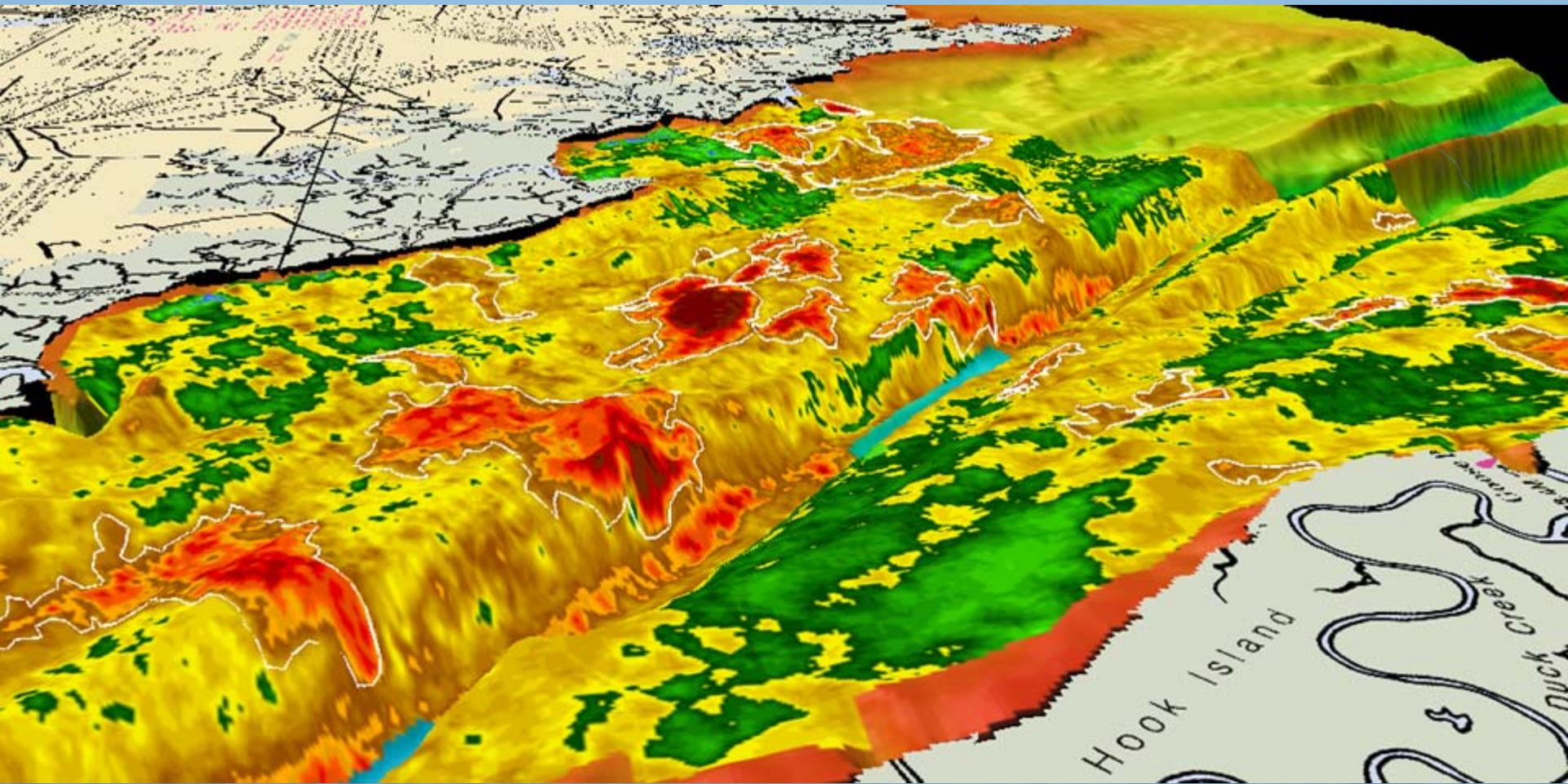
- New Jersey

- 25 Beds Located
- Total Area of Shell:
 - 13.4 Square miles
 - 8,601 Acres

- Delaware

- 15 Beds Located
- Total Area of Shell:
 - 2.9 Square miles
 - 1,835 Acres

Middle, Ship John, Shell Rock, and Bennies



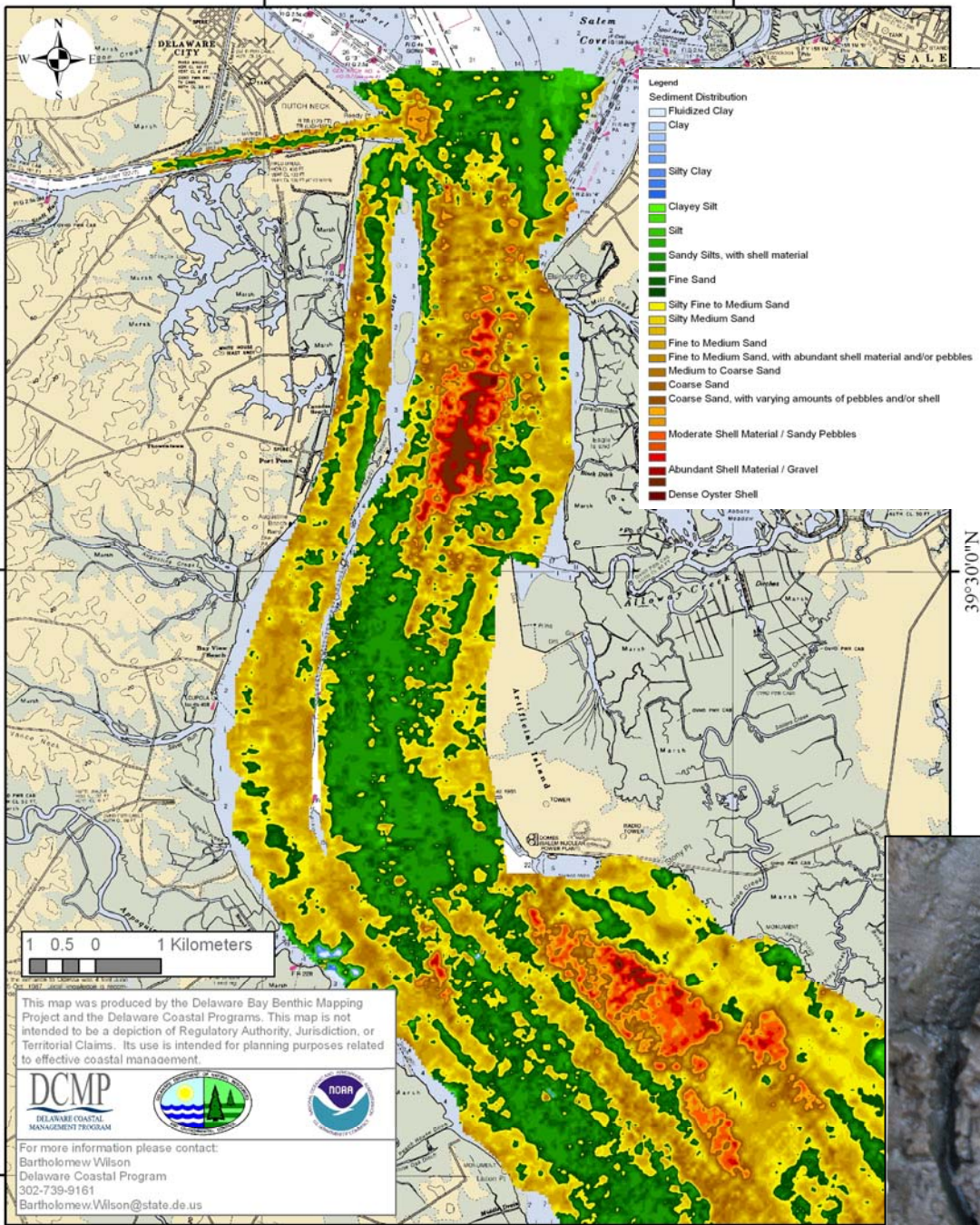
A wide, calm river flows under a clear blue sky. In the distance, a cooling tower is visible on the left side, emitting a plume of white steam. The water's surface is slightly rippled, and the overall scene is serene.

Lower Delaware River:

Sturgeon Habitat

75°35'0"W

75°30'0"W



39°30'0"N

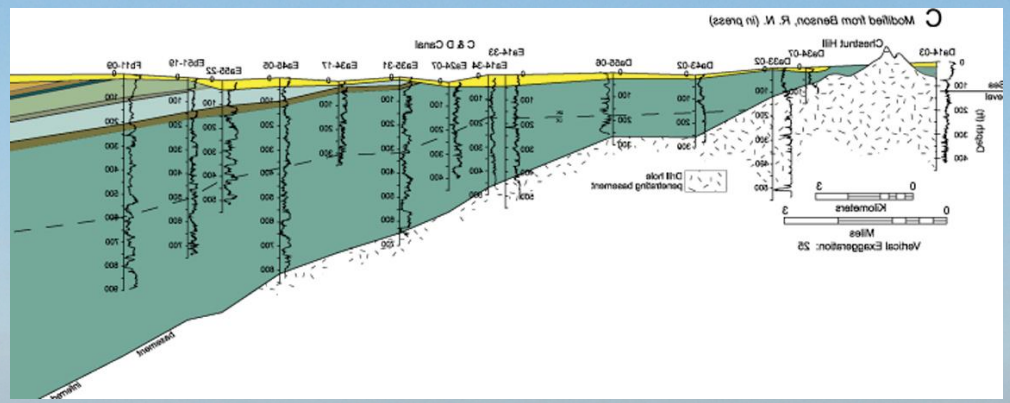
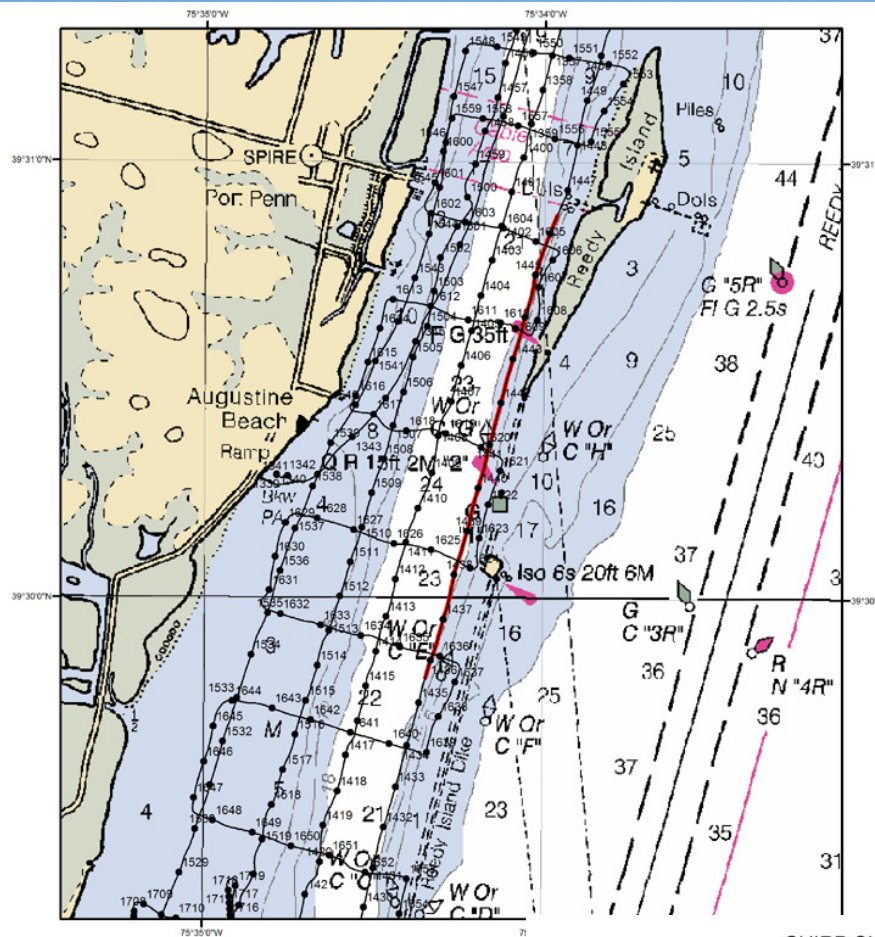
39°30'0"N

39°25'0"N

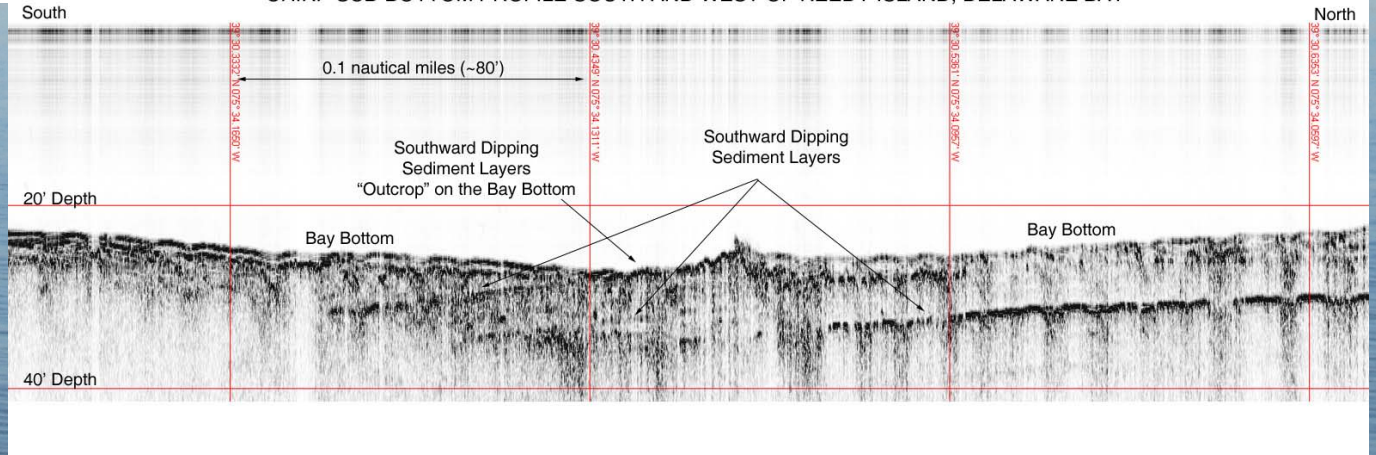
75°35'0"W

75°30'0"W



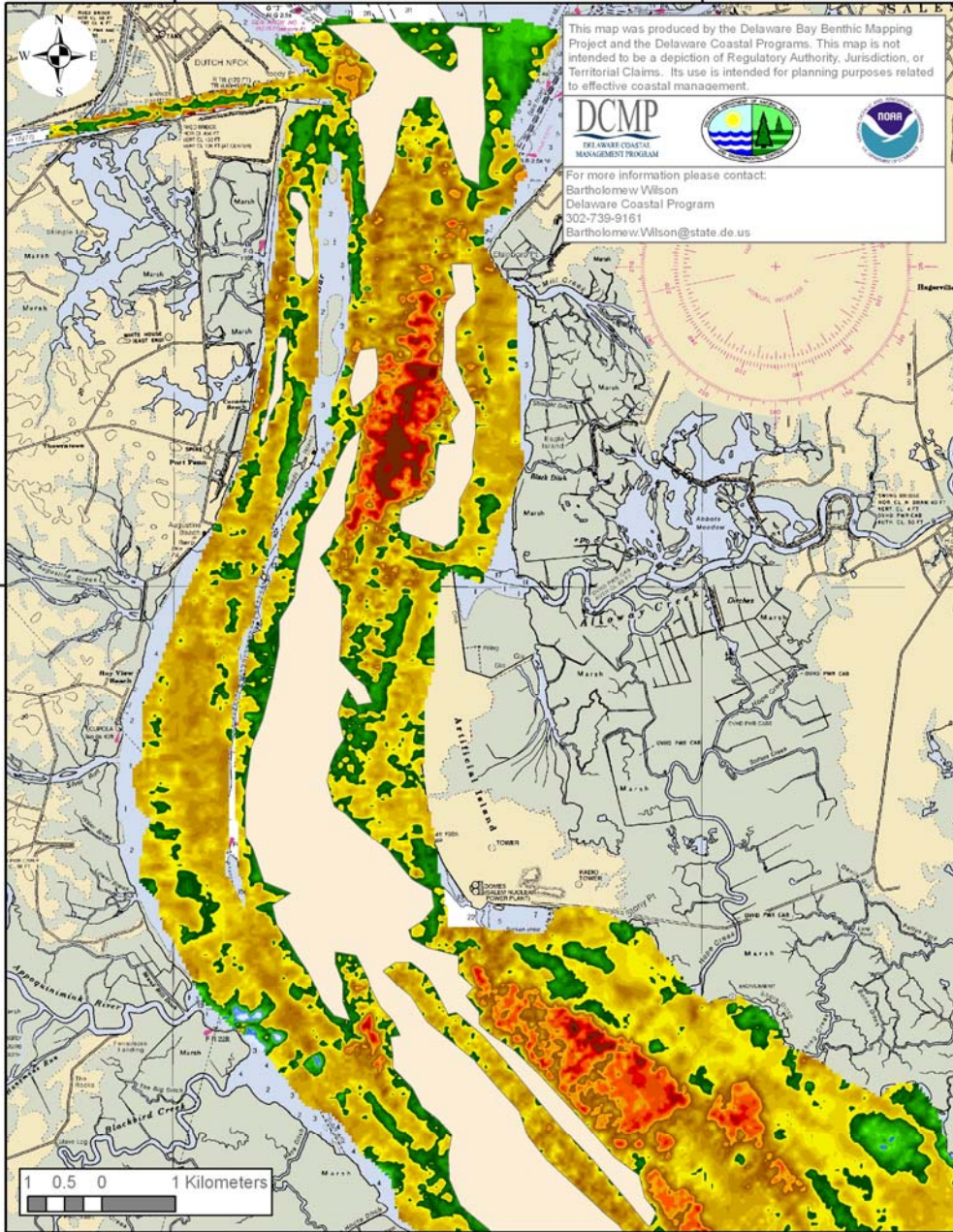


CHIRP SUB-BOTTOM PROFILE SOUTH AND WEST OF REEDY ISLAND, DELAWARE BAY



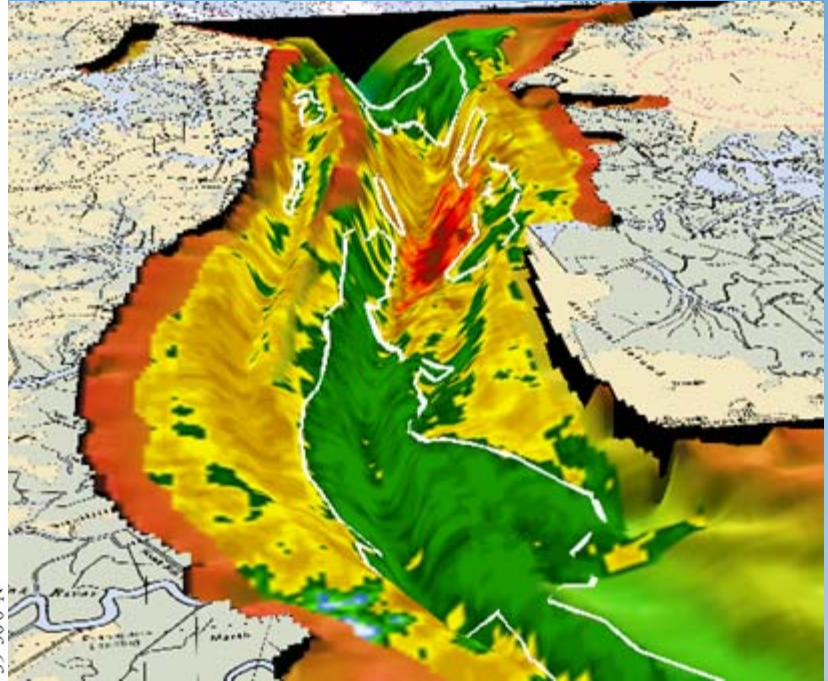
75°35'0"W

75°30'0"W

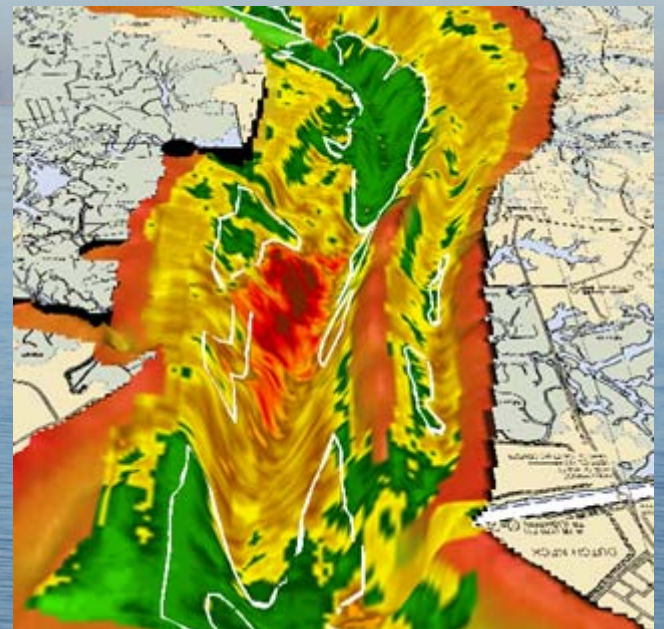


75°35'0"W

75°30'0"W



39°30'0"N

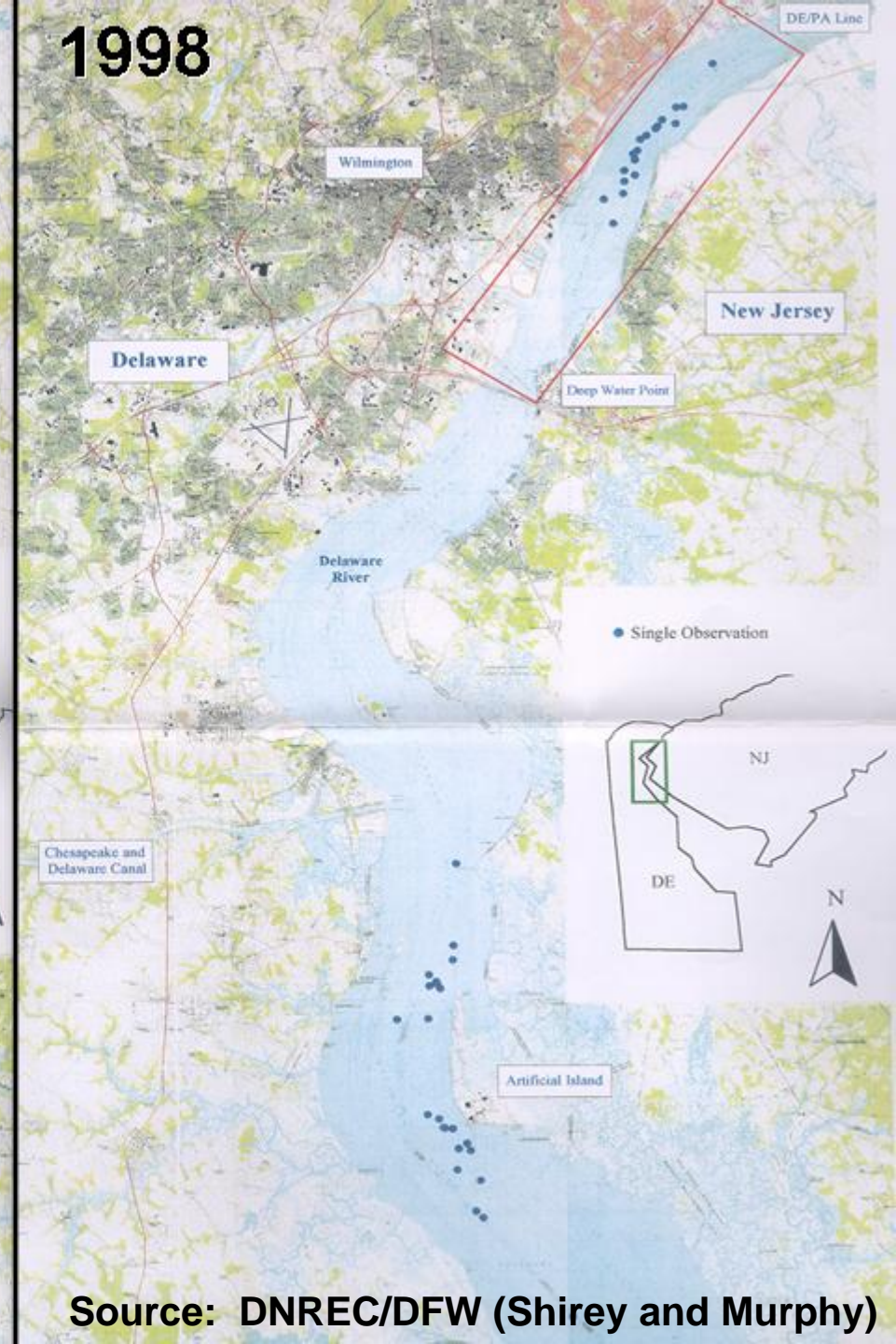


39°30'0"N

1997

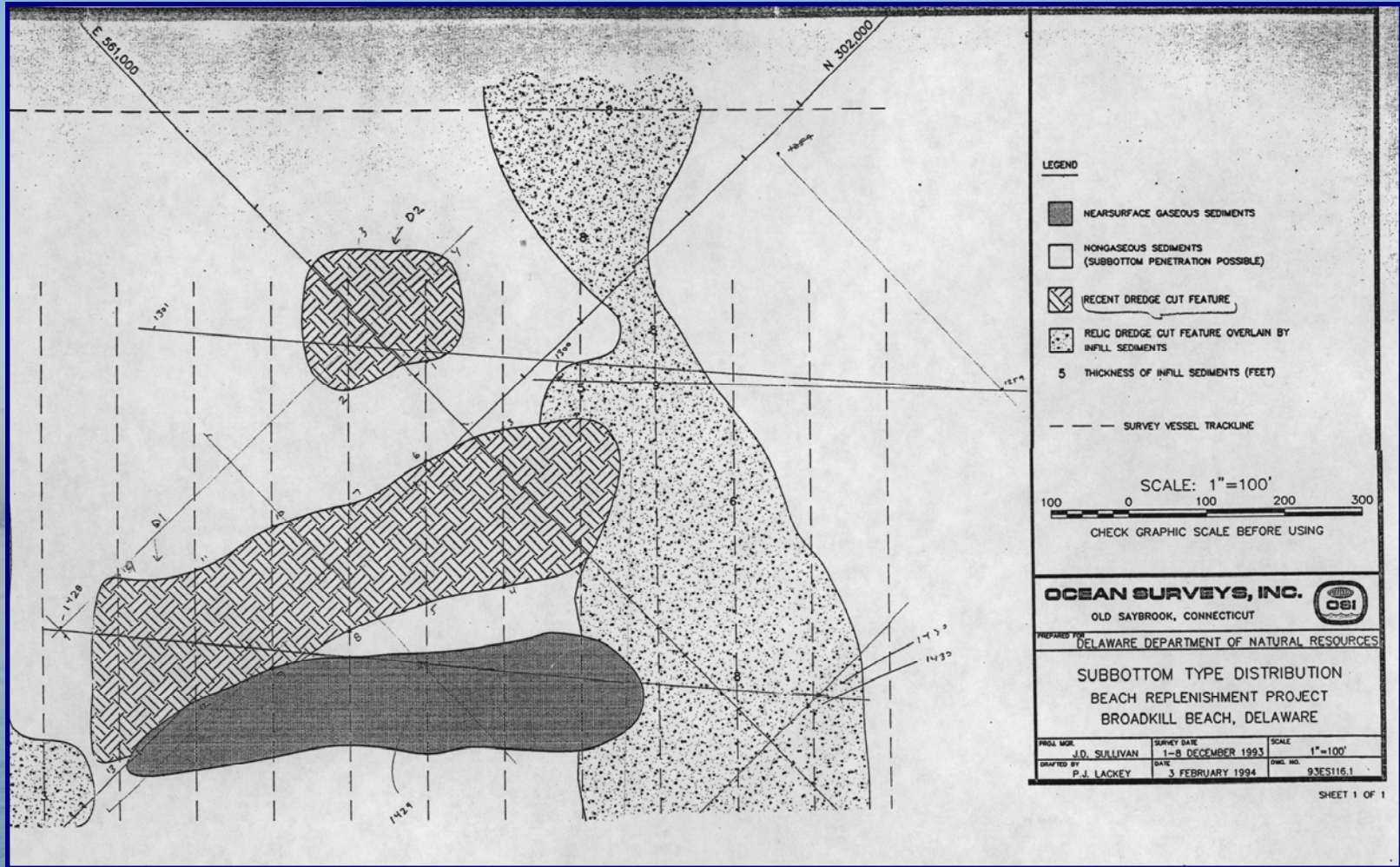


1998



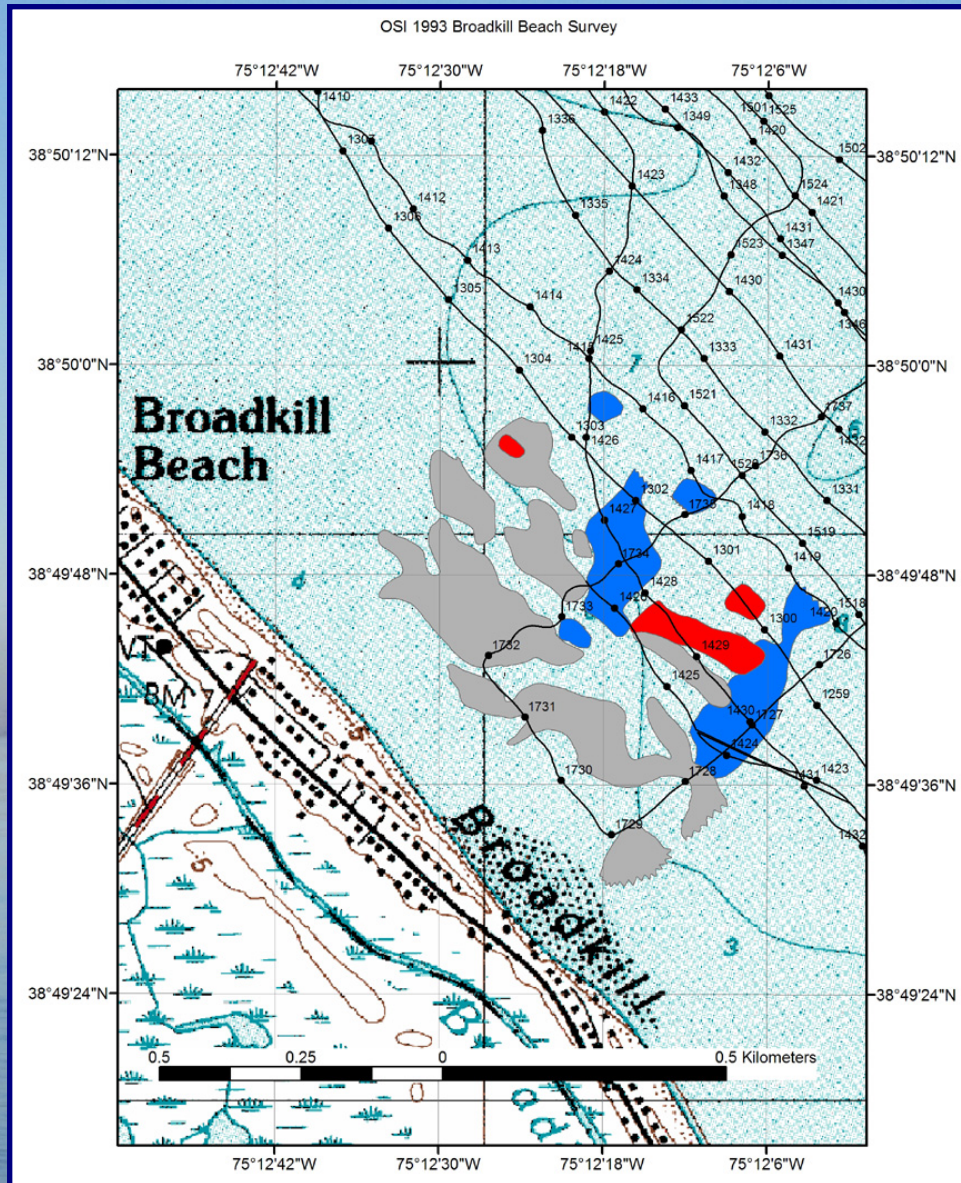
Source: DNREC/DFW (Shirey and Murphy)

Comparison with 1993 Ocean Surveys, Inc. Seismic Mapping

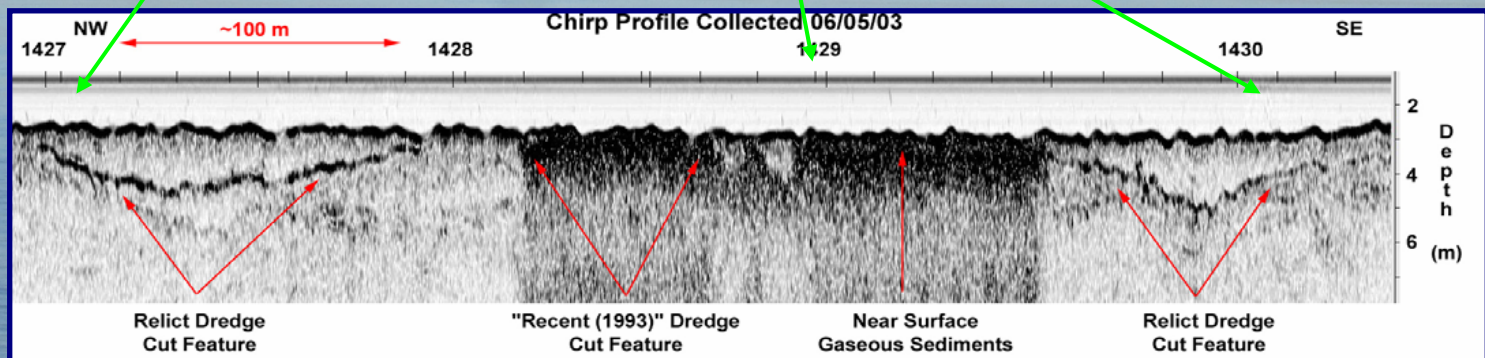
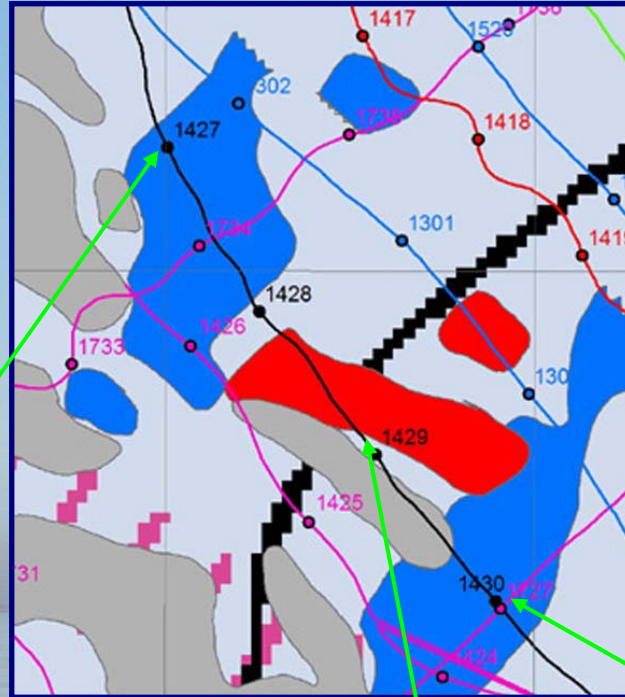


1993 OSI Data & 2003 Survey Lines

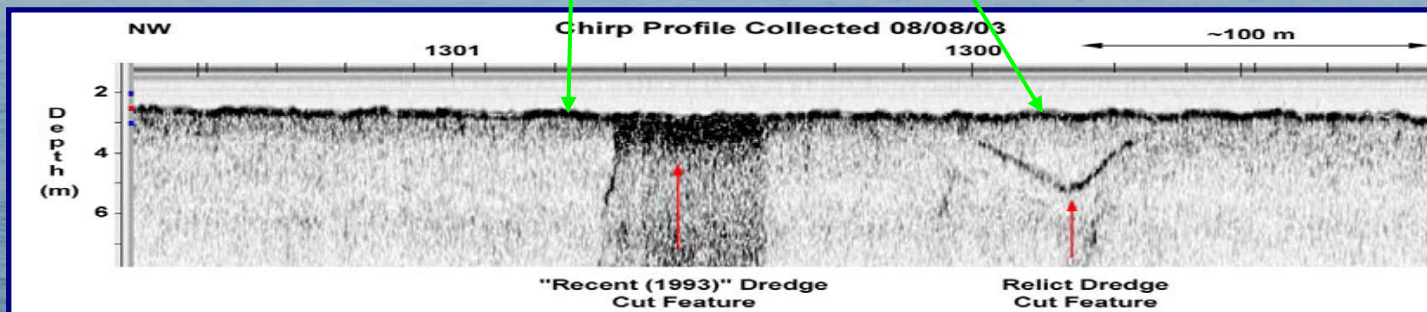
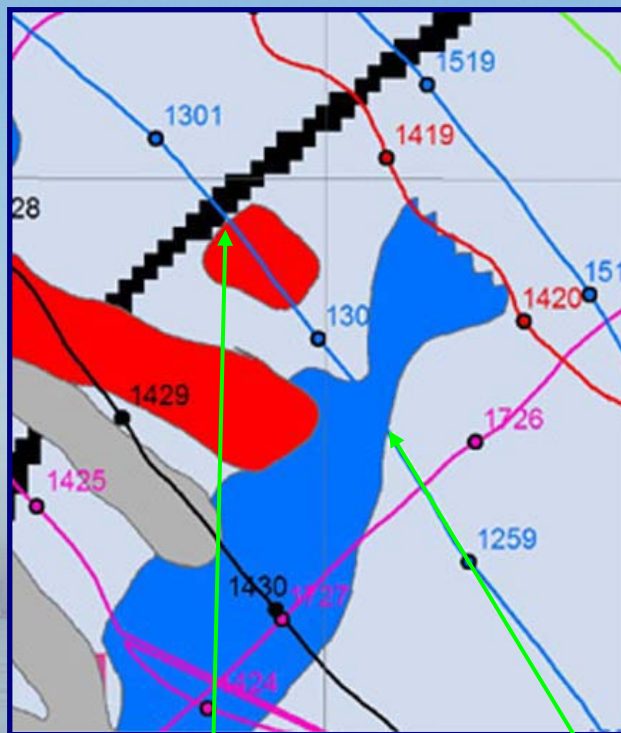
Gray = gaseous sediments.
Blue = relic dredge cut
feature
Red = recent (1993)
dredge cut feature



Comparison with 1993 Ocean Surveys, Inc. Seismic Mapping



Comparison with 1993 Ocean Surveys, Inc. Seismic Mapping



Partners in Mapping The Delaware Bay and River

- University of Delaware
 - Geology Department
- Delaware Fisheries
 - David Bruce and Rick Cole
- Delaware Shoreline and Waterway Section
 - Bay beach replenishment site selection
- Delaware State University
 - Dewayne Fox (Aquatic Sciences Department)
- Partnership for the Delaware Estuary
- New Jersey Department of Environmental Protection
 - Coastal Management Office

Next Steps

- Coming this Fall and Winter:
 - Asian Clam (*corbicula*) distribution maps for the Delaware River
 - Continues bottom sediment maps for the Upper Delaware Bay and River (from Port Mahon and Money Island to the Commodore Barry Bridge), a total of 205 square miles.
 - Integrated Atlantic and Short-nose Sturgeon habitat affinity maps for the Delaware River.
 - Oyster Distribution map for the upper Delaware Bay/Lower Delaware River
- Continue to Identify Potential Partners
 - Financial support
 - Staff support
 - Technical support
 - Political support
- Identify other uses and needs of the data
- Develop macro-invertebrate sampling plan
 - Partnering with EPA, USGS, NOAA and UD
 - Statistical design
 - Sample analysis

Questions and Comments

