



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Fisheries Science Center
166 Water Street
Woods Hole, MA 02543-1026

April 12, 2012

CRUISE RESULTS

UNOLS R/V *Hugh R. Sharp*
Cruise No. S1 11-01 (Parts I – III)
Sea Scallop Survey

CRUISE PERIOD AND AREA

The cruise period was 11 May - 30 June 2011 and was conducted in three parts: Part I was from 11 - 21 May, Part II was from 8 - 18 June, and Part III was from 20 - 30 June. The area surveyed was from the Middle Atlantic Bight to Georges Bank, including waters within Canada's Exclusive Economic Zone. Sampling depths ranged from 24 to 152 meters (13 to 83 fathoms). Approximate station locations are shown in Figures 1 and 2.

OBJECTIVES

The objectives of the survey were to: 1) determine the distribution and relative abundance of the sea scallop, *Placopecten magellanicus*; 2) collect biological samples; 3) conduct a prototype visual-based survey, using a towed vehicle (HabCam) equipped with a camera system, to compare those results with traditional dredge-based survey technology.

METHODS

Operations and gear for cruise S1 11-01 Parts I – III conformed with the Cruise Instructions for the Sea Scallop Survey, dated 19 April 2011; Addendum I, dated 26 April; Addendum II, dated 31 May; and Addendum III, dated 20 June.

Pre-selected, random stations were sampled using a modified 2.44 m (8 feet) wide New Bedford type scallop dredge rigged with 5.1 cm (2 inch) diameter rings and lined with at 3.8 cm (1½ inch) polyethylene stretched mesh liner. Tow duration was 15 minutes, tow speed was 3.8 knots, and the dredge was fished using a 3.5:1 wire out to depth scope. Tow distance was recorded using differential GPS, and a recording inclinometer was mounted on the dredge to collect bottom contact time data.

All catch and biological data were recorded using the shipboard automated data entry system, Fisheries Scientific Computing System (FSCS). This system uses digital scales, electronic measuring boards, and touch screen displays to record data on deck; FSCS also archives the data on the ship's computer network.

After each dredge tow of the scallop survey, the entire catch was sorted into biological and habitat components. Live whole and clapper shells of various scallop species, including sea and Icelandic, were weighed using the motion compensated digital scales. Representative length frequencies for all scallop species were collected to the nearest millimeter using electronic measuring boards (Limnoterra and Ictystick); selected fish species incidentally caught in the dredge were also measured to the nearest millimeter. Weights and total numbers were recorded for all other fish species at each station. Furthermore, the weights and total numbers of cancer crabs and starfish were recorded at every third station. Habitat portions were estimated by bushel volume, converted into number of liters (where 1 bushel = 32 liters), recorded into the FSCS system, and then finally discarded.

Surface temperatures were measured using the R/V *Hugh R. Sharp*'s hull-mounted temperature sensor and logged by the Scientific Computer System (SCS) at all stations. Temperature and conductivity profiles were made at approximately every third station using a conductivity, temperature, and depth instrument (CTD). A bottom salinity sample was obtained twice a day to calibrate the CTD. Water samples were also taken for fluorometer calibrations.

Additionally, cooperative work was conducted during Part III of the sea scallop survey to reoccupy dredge tows from Part II and for testing the feasibility of utilizing the HABitat mapping CAMera system (HabCam) as a surveying tool, or part of the suite of survey tools, for future NOAA scallop surveys. Developed by a group of researchers associated with Woods Hole Oceanographic Institute, as well as in conjunction with particular members of the commercial fishing industry, HabCam is a towed, seafloor-imaging camera system with the following capabilities: 1) acquisition of optical and acoustic imagery, which can be viewed in "real time", 2) the ability to count and measure scallops and groundfish, 3) measurement of biodiversity and community structure, 4) characterization of substrate, and 5) measurement of oceanic properties (salinity, temperature, nutrients).

The system is designed to operate over the range of the continental shelf, between depths of 20 to 250 meters, and is able to image a track of roughly 100 nautical miles each 24 hour day, while at sea. The current Northeast Fisheries Science Center's 8' wide dredge makes approximately 24, 15 minute tows at 3.8 knots per day, covering about 4,500 square meters (m²) per tow and 106,704 m² per day. Continuous operation with HabCam towing at five knots covers 259,200 m² per day. Thus, the spatial coverage of HabCam is nearly 2.5 times the area covered by the survey dredge.

The HabCam camera system was mounted in a 10-foot steel frame, and towed one to three meters off the ocean floor at a speed of approximately five knots. An operator controlled the system by means of the R/V *Hugh R. Sharp*'s winch-driven, fiber optic cable, which allowed for real-time data collection and provided power to the unit.

RESULTS

The survey sampled at 307 stations, with 155 and 152 dredge hauls made on Parts I and II, respectively. The dredge flipped 6 times; stations were re-towed in most cases. Bottom temperatures were collected at 86 stations using the CTD system, while bottom water samples for CTD calibration were taken at 25 stations.

A total of 2,543 samples were collected to support five internal and external investigations (Table 1).

During Part III of the scallop survey, the HabCam vehicle obtained 3,017,949 images over the course of a 949 nm cruise track, resulting in approximately 1.25×10^6 m² covered on Georges Bank.

DISPOSITION OF DATA

Catch data and hydrographic data will be analyzed at the NEFSC Laboratory in Woods Hole, Massachusetts. The various collections were forwarded to researchers listed in Table 1. Resulting data will be audited, edited, and archived in an Oracle database.

HabCam images will be further analyzed for biological data both at the Woods Hole Oceanographic Institute and at NOAA's NMFS Woods Hole Lab.

SCIENTIFIC PERSONNEL

National Marine Fisheries Service, NEFSC, Woods Hole, MA

Kevin McIntosh, Chief Scientist²

Victor Nordahl, Chief Scientist¹

David Chevrier³

William Duffy¹

Nathan Keith²

National Marine Fisheries Service, NEFSC, Sandy Hook, NJ

Richard Langton³

National Marine Fisheries Service, NERO, Gloucester, MA

Christopher Walker¹

National Marine Fisheries Service, NERO, Hampton, VA

Steven Ellis¹

National Marine Fisheries Service, NSL, Washington, D.C.

LaShaun Willis²

Connecticut College, New London, CT

Seana Siekman²

Justine Rooney²

State University of New York, Brewster, NY

Darcy Balcarce²

Teacher-at-Sea Program

Channa Comer¹

Bronx, NY

Kathleen Brown²

Windham, ME

University of Maine, Orono, ME

Sam Truesdell²

University of South Florida, St. Petersburg, FL

Aaron Burnham²

US Coast Guard Academy, New London, CT

Jonas Miller³

Christopher Shivock³

Woods Hole Oceanographic Institution, Woods Hole, MA

Karen Bolles³

Scott Gallager³

Richard Taylor³

Amber York³

Contractors, ITS, Woods Hole, MA

Geoff Shook^{1,3}, Chief Scientist³

Nicole Charriere^{1,3}

Farrell Davis²

Kara Gibbons²

Jakub Kircun^{1,2}

Adam Poquette¹

Sarah Simons¹

Volunteers

Brian Farless¹
Joseph Gattozi²
James Logie¹
Kevin Staples¹

Somerville, MA
Bridgton, ME
Silver Spring, MD
Mt. Desert, ME

¹ 11-21 May 2011

² 8-18 June 2011

³ 20-30 June 2011

Table 1. Special samples obtained for various investigators on UNOLS R/V *Hugh R. Sharp* Sea Scallop Survey, during 11 May – June 30 2011.

Investigator and Affiliation	Samples Saved	Approximate Number
Ceriani, Simona, Univ. of Central FL, Orlando, FL	various species	88 indiv.
Galbraith, John, NMFS, NEFSC, Woods Hole, MA	unidentified fish	37 indiv.
Hart, Dvora, NMFS, NEFSC, Woods Hole, MA	sea scallop shells	729 indiv.
	scallop meat weights	660 indiv.
	sea scallop, diseased	2 indiv.
	sea scallop, tagged	6 indiv.
	sea scallop clapper shells	3 indiv.
	sea stars	754 examined
O'Brien, Loretta, NMFS, NEFSC, Woods Hole, MA	Atlantic cod	2 examined
Shank, Burton, NMFS, NEFSC, Woods Hole, MA	various species	262 indiv.

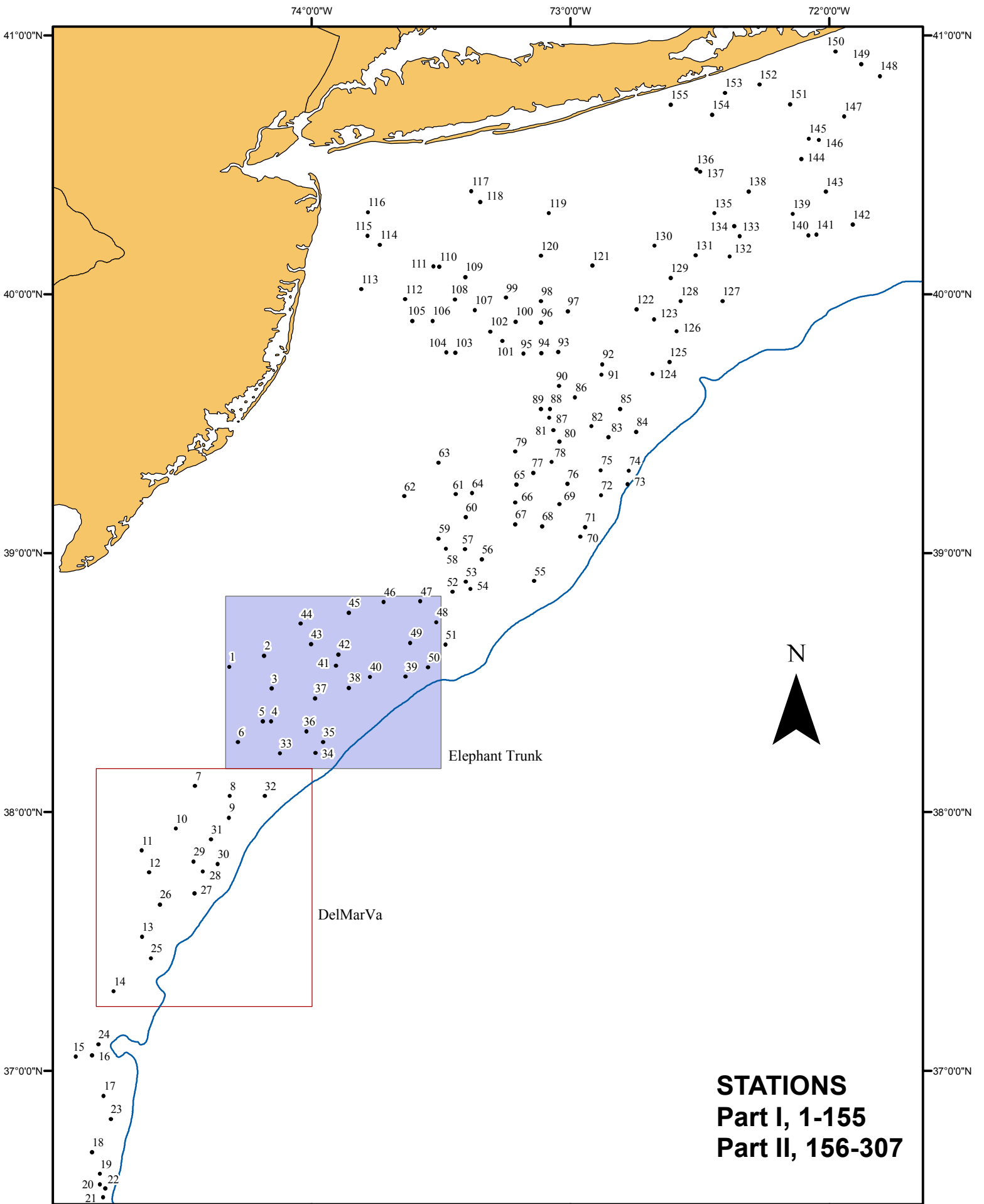


Figure 1. Dredge tows made from UNOLS R/V *Hugh R Sharp* (11-1), during NOAA Fisheries Service, Northeast Fisheries Science Center sea scallop survey, May 11 - June 30, 2011.

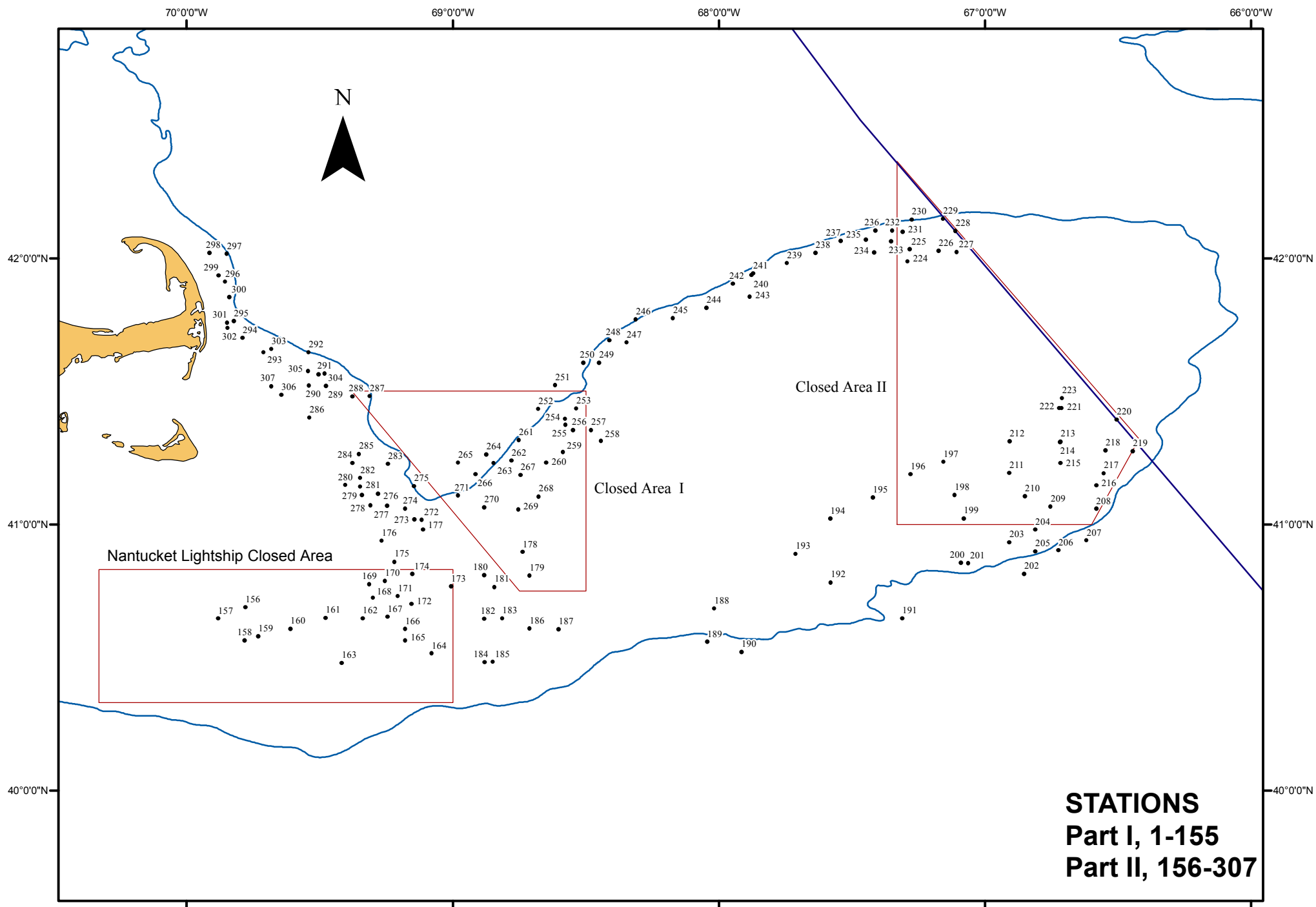


Figure 2. Dredge tows made from UNOLS R/V *Hugh R Sharp* (11-1), during NOAA Fisheries Service, Northeast Fisheries Science Center sea scallop survey, May 11 - June 30, 2011.