Survey of Hard Bottom Areas on the Continental Shelf

In May, SERTC staff participated in a research cruise on board the NOAA ship *R/V Nancy Foster* in collaboration with Dr. Paul Gayes of Coastal Carolina University. Our goal was to collect invertebrate fauna from hard bottom habitats and adjacent sandy veneer substrates at inner, middle and outer shelf depths. The southeastern continental shelf has numerous hard bottom outcroppings interspersed with sand bottom (Figure 1). These rocky outcroppings provide a unique habitat for a very diverse community of invertebrate and vertebrate species. Also known as "live" bottom, the hard bottom habitats off the southeastern coast are usually of low relief. The most inshore areas called "black fish banks" are interspersed throughout shallow nearshore depths out to 20 m. Further offshore, in waters of 28-45 m, the "snapper banks" and other reefs occur. The deepest hard bottom habitats on the shelf are found at its edge, in depths of 55-100 m.

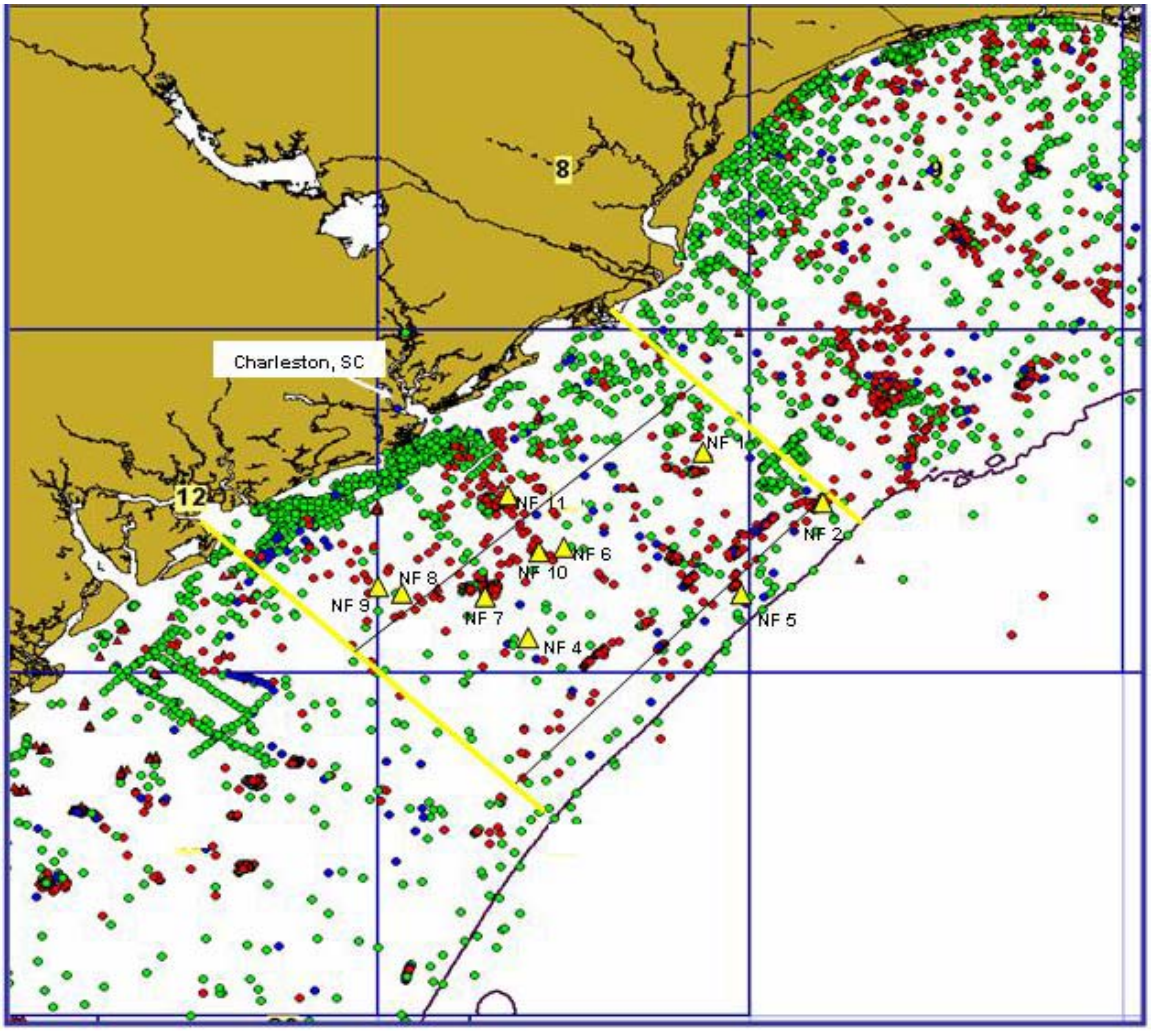


Figure 1. Location of known (red points) and suspected (green points) hard bottom habitats on the shelf off South Carolina. Station locations (triangles) for biological sampling are noted. Isobath indicates shelf edge.

Most of the hard bottom habitats encountered on the inner shelf are small, isolated areas consisting of rock outcroppings that are heavily encrusted with sessile invertebrates such as bryozoans, sponges, octocorals and sea fans. There are numerous areas, however, that consist of sand bottom underlain by hard substrate that are dominated by sponges, hydroids, bryozoans, ascidians, and anthozoans. The hard bottom areas inshore are subject to cooler temperatures and have generally lower diversity than those further offshore. It is likely that the low relief areas of the inner shelf are subjected to periodic covering by a layer of sand due to the effects of storms and strong tidal and wind-driven currents.

Our cruise plan consisted of: (1) locating areas of hard bottom and vertical relief across the continental shelf and in proximity to the shelf/slope edge; (2) determining geological significance of hard bottom habitats; (3) collecting samples of bottom-dwelling invertebrates for taxonomic study and educational purposes; and (4) deploying gear to collect plankton at and near bottom above hard bottom habitats.

Samples of benthic fauna were collected using a combination of trawl, dredge, and grab sampling, depending on habitat type. Trawl tows yielded particularly diverse collections of organisms over nearshore low-relief hard bottom areas (Figure 2). Sponges, ascidians, gorgonian corals, echinoderms, and mollusks made up most of the catch.

Figure 2. Recovery of otter trawl (left); sample of catch from otter trawl (right)

If bottom topography was too rough to deploy the trawl net with confidence of an intact retrieval, we deployed a Cape Town dredge instead (Figure 3). Dredge tows were useful for documenting not only the presence of colonial encrusting organisms, but smaller organisms that may inhabit interstices of rock rubble and other complex structure, as well as larger mobile macroinvertebrates. Both gear types provided qualitative samples of macroinvertebrates at each station (Figure 4).

Animals living buried in the sediment were collected from sandy substrates on or near hard bottom areas using a Smith-McIntyre grab (Figure 5). Polychaete worms, amphipods, and isopods dominated these grab collections (Figure 6).

We also took plankton and neuston samples at each station, using bongo nets to sample at mid- to lower-water depths. The neuston net was used to sample surface waters for planktonic organisms (Figure 7).

Figure 3. The Cape Town dredge yields a sample.

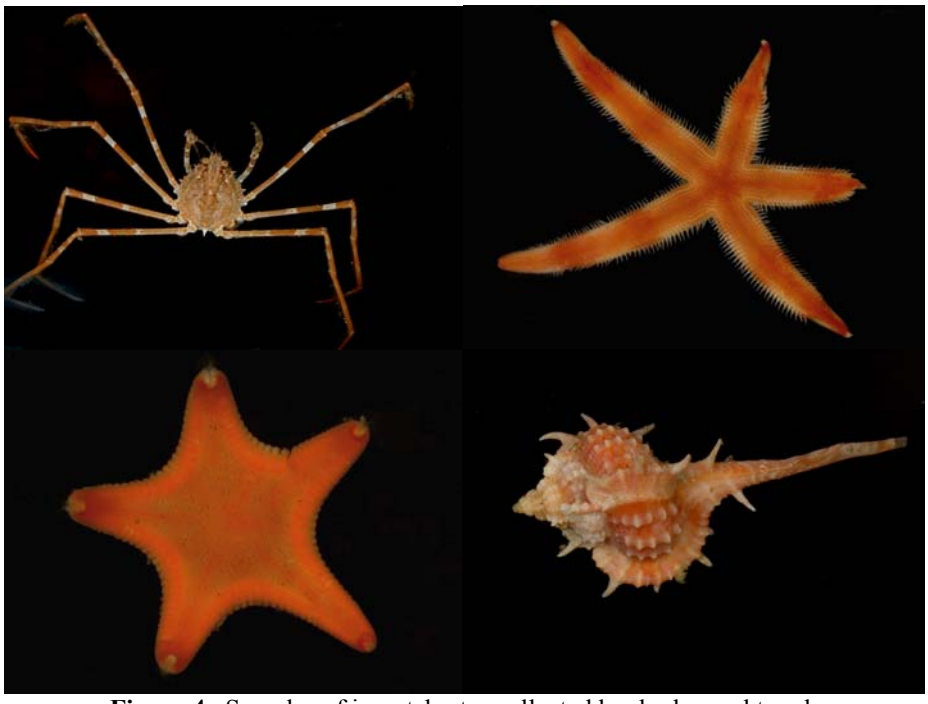
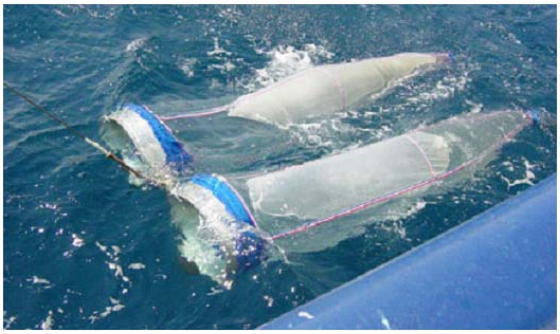


Figure 4. Samples of invertebrates collected by dredge and trawl.

Figure 5. Bringing the Smith-McIntyre grab on board (a) and washing down sediment sample collected by the grab (b).

Figure 6. Sample of invertebrates collected by the Smith-McIntyre grab.

Figure 7. A neuston net (left) was used to sample surface waters and paired bongo nets (right) were used to sample through the water column from surface to near bottom. (photos courtesy Project Oceanica/Leslie Sautter)



In addition to biological sampling, side scan sonar, CHIRP sub bottom profiling and precision fathometer surveys were collected on each sampled station. This technology provides continuous side scan coverage and geophysical information about the sampled areas, using acoustic signals that can penetrate sediment layers to provide both topographic information and images of sub-surface sediment layers. Other instruments (CTD probes) were used at each station sampled to obtain measurements of water depth, salinity, and temperature.

Workup of specimens from the cruise will continue throughout the coming year, along with syntheses of water quality and geophysical data.

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