Bathymetric and Backscatter Analyses of Fisheries Habitats Off the Southeast US Coast

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LOCATION OF STUDY SITE

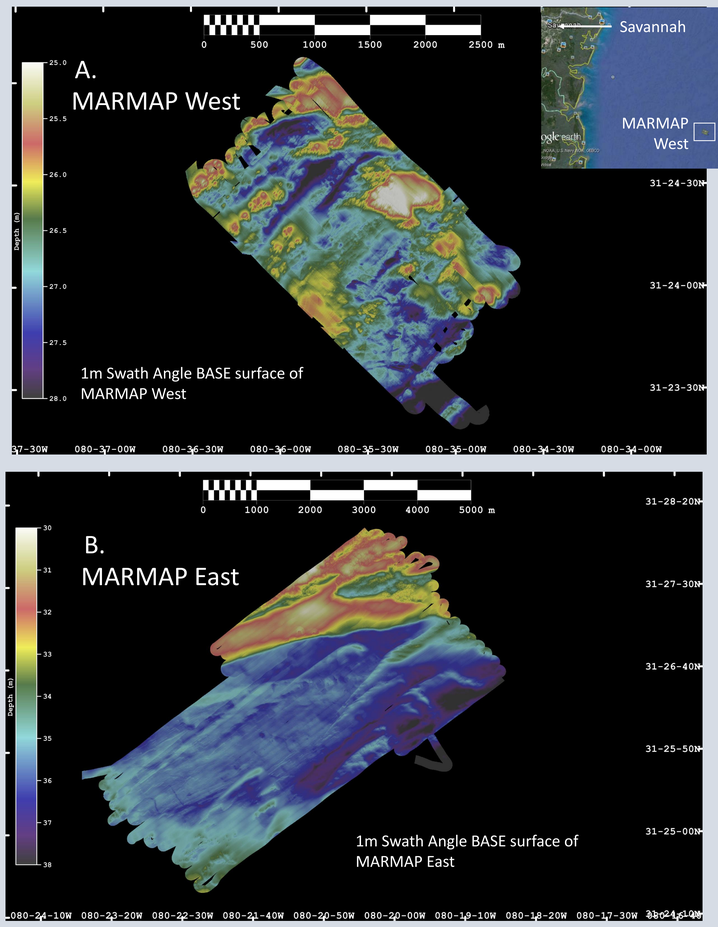


FIGURE 1. Bathymetric images of study sites, each with a 1m resolution Swath Angle BASE surface.
A) MARMAP West
B) MARMAP East
The inset above shows their location off the Georgia coast.

ABSTRACT

The Marine Resources Monitoring, Assessment, and Prediction (MARMAP) Program of the South Carolina Department of Natural Resources (SCDNR) assesses reef fish off the southeastern US coast. Our mapped region included habitat areas for economically significant reef fish species monitored by MARMAP. Bathymetric and backscatter intensity analyses were conducted on two study sites. The greatest biomass and diversity of fishes are found near rocky outcrops and settling invertebrates at depths of 19 to 55 m. Bathymetry and backscatter analyses allowed for the identification of "hard bottom" rocky outcrops and sand bodies. Profiles were generated to identify rocky versus sandy areas as well as areas of high relief. Hard bottom surfaces with complex morphology may serve as substrate for invertebrates, making them ideal sites for spawning reef fishes. Identifying suitable reef fish habitat areas within these mapped regions may aid in managing fisheries and identifying potential marine protected areas (MPAs).

METHODS

- Multibeam sonar data were collected off the coast of Savannah, GA by CofC BEAMS program aboard the *RV Savannah* using a Kongsberg EM2040 system.
- Data were post-processed using CARIS HIPS 9.0. Bathymetric surfaces and backscatter mosaics were generated.
- Grids were overlain on backscatter mosaics to characterize the percentage of soft, medium, and hard sediment.

BACKGROUND

The Marine Resources Monitoring, Assessment, and Prediction (MARMAP) Program of the South Carolina Department of Natural Resources (SCDNR) conducts assessments of reef fish off the southeastern US coast (DNR). The study sites are located off the coast of Savannah, GA from 25-38 m deep and are within the area monitored by MARMAP. There are rocky outcrops and hard bottom areas which could serve as ideal habitats for snapper and grouper (DNR). Hotspot fish habitats such as these are vulnerable to overexploitation (Wyanski et.al. 2000). This study will conduct sediment analysis of two focus sites to quantify and compare their suitability as fish habitats.

PURPOSE

Characterize and compare sites monitored by MARMAP using bathymetric maps, backscatter data, and profiles to identify potential areas of ideal reef fish habitat.

RESULTS: Backscatter Intensity

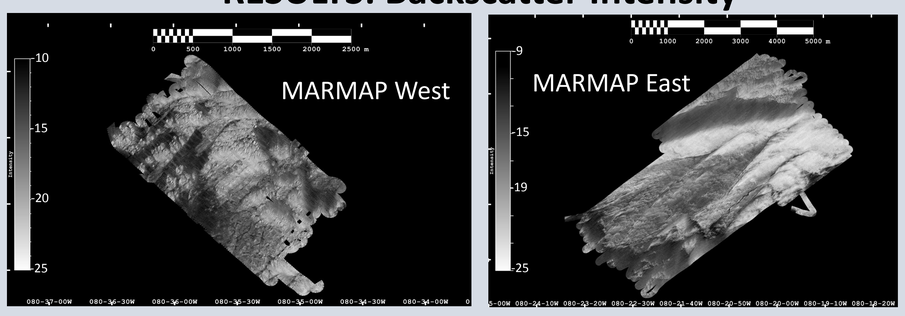
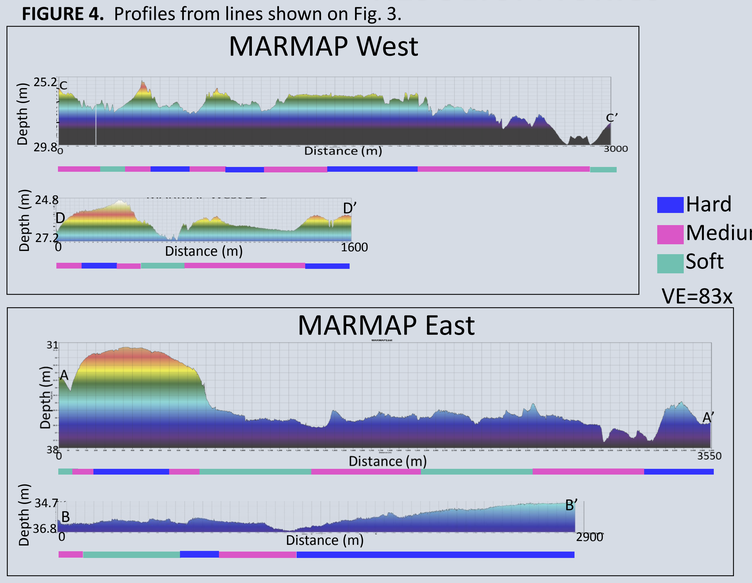


FIGURE 2. Backscatter intensity maps for A) MARMAP West and B) MARMAP East.

RESULTS: Profiles

FIGURE 4. Profiles from lines shown on Fig. 3.



MARMAP West

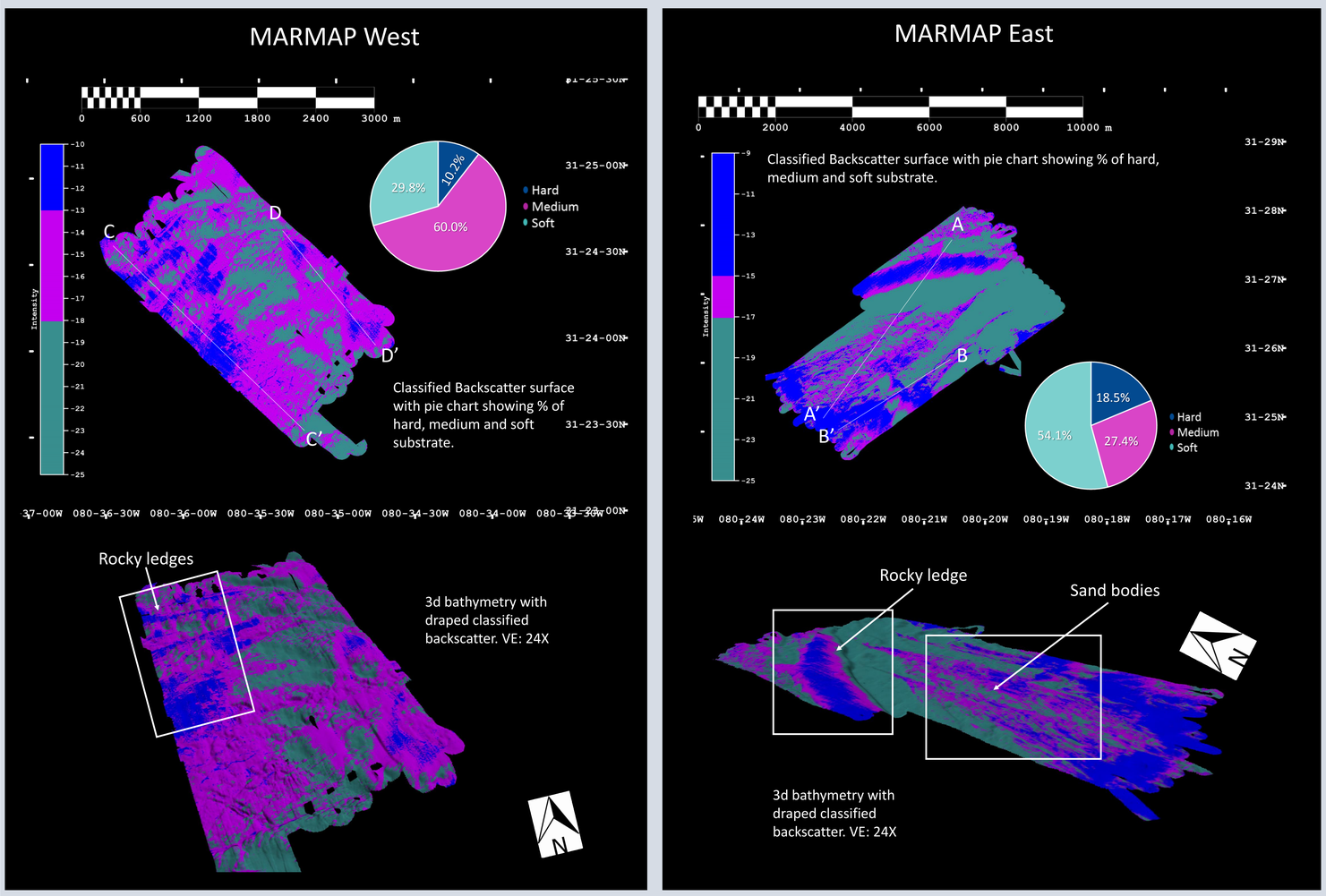
- Profile C-C': rocky ledge and sand waves with possible rocky outcrops
- Profile D-D': sand waves and rocky outcrops

MARMAP East

- Profile A-A': two rocky ledges indicated by the dark blue areas underneath the profiles
- Profile B-B': rocky ledge and a rocky outcrop area

RESULTS: Classified Backscatter

FIGURE 3. Classified backscatter surfaces of study sites with percentages of hard, medium and soft substrate for each site. 3d bathymetric surfaces of both sites overlaid with classified backscatter surfaces.



- MARMAP East profile A-A' (Fig. 5A) depicts a rocky ledge, ideal for fish habitat
- Profiles B-B', C-C', and D-D' (Fig. 5A and 5B) show scattered, smaller rocky areas and sand bodies
- MARMAP East has a higher percentage of hard bottom substrate when compared to MARMAP West

DISCUSSION

- Ideal spawning habitat is often characterized by hard substrate, including rocky ledges or cliffs (Wyanski et al., 2000).
- MARMAP East has a higher percentage of hard bottom substrate when compared to MARMAP West
- Both sites have areas with rocky ledges which could serve as ideal fish habitat.
- The highest relief rocky ledge on Profile A-A' is especially ideal: high relief areas aid in spawning by limiting egg predation (Lindeman et al., 2000).
- Boxes indicate the most suitable potential habitat areas: these areas should be targeted for ROV dives to identify species present and to more clearly describe substrate types.
- Spawning aggregations are sources of high and predictable biomass distributions, so they are often targeted for fishing (Koenig et al., 2000).
- MPAs containing spawning areas could be especially effective at restoring populations of fished species (Koenig et al. 2000); so these ideal habitat areas may be suitable for MPA establishment.

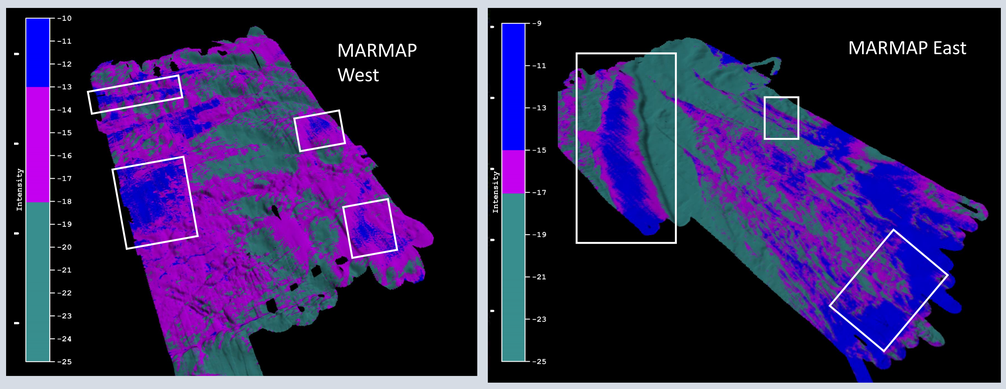


FIGURE 5. Ideal habitat areas indicated for MARMAP West and East, based on bathymetry and classified backscatter data.

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