



NOAA Conducts Seafloor Habitat Mapping Mission in the U.S. Virgin Islands



In partnership with the Caribbean Fisheries Management Council, the University of the Virgin Islands, the U.S. Virgin Islands Department of Fish and Wildlife, and the National Park Service, NOAA collects SoNAR and video data in high priority areas south of St. Thomas and St. John.

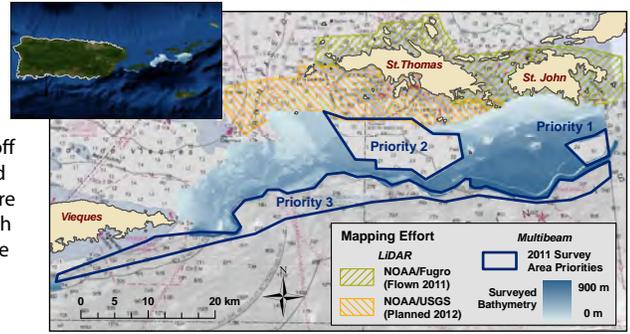


NOAA Project NF-11-01

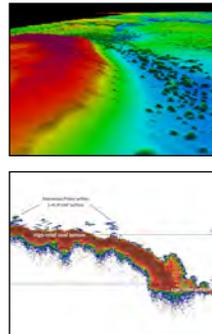
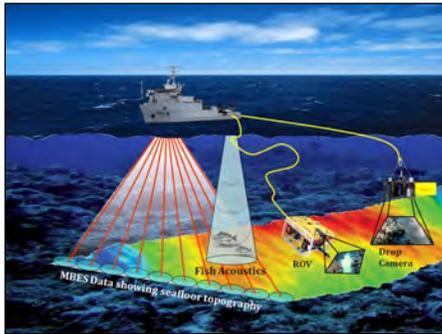
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Planning

During the eighth annual scientific mission in the U.S. Caribbean, NOAA's Center for Coastal Monitoring and Assessment (CCMA) will map and explore seafloor habitats 3 to 30 km off the southern coasts of St. Thomas and St. John. These high-priority areas were chosen by CCMA, in collaboration with the University of the Virgin Islands, the Caribbean Fisheries Management Council (CFMC) and NOAA's Office of Coast Survey because of their ecological significance to commercially important fisheries and the need for updated nautical charts.



CCMA selected the 2011 study areas in an effort to fill in gaps of seafloor data along the southern Puerto Rican shelf, where scientists have discovered expansive moderate-depth coral populations and important fish spawning habitats.



Acoustic Data Collection

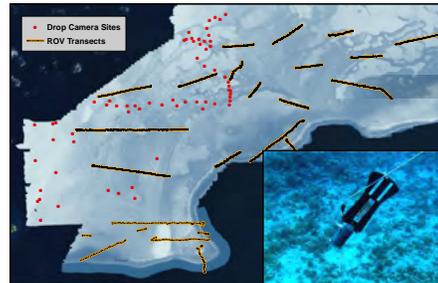
While onboard the NOAA ship Nancy Foster, CCMA scientists will collect and process data from multibeam echosounders (MBES). These sensors use sound to collect information about the depth (i.e., bathymetry) and physical properties (i.e., backscatter) of the seafloor. These two surfaces are then analyzed by scientists at the end of each day, and used to inform which geographic locations and seafloor habitats they would like to explore the following morning. Using other acoustic imaging technologies, researchers will also study fish populations. Based on the return strength of the sound waves, scientists can quantify fish density, size distributions, and day-night abundance and distribution differences at known spawning aggregation locations.

From the bathymetry information gathered by the Nancy Foster's multibeam, scientists can derive 3D representations of important seafloor features (Top right: an area of the Virgin Passage). They can also track and record fish densities (bottom right) using other acoustic instruments.

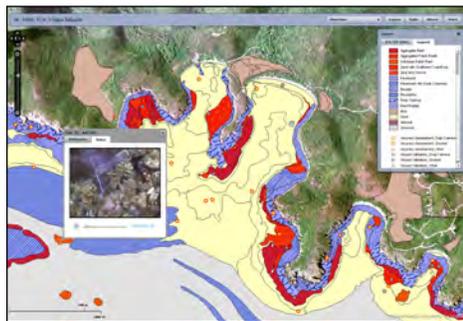
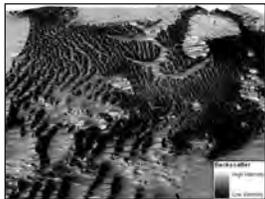
Ground Validation

In order to explore the locations and habitats selected from the acoustic imagery analysis, scientists from CCMA and UNCW (University of North Carolina at Wilmington) use a remotely operated vehicle (ROV) and a drop camera. This ROV is equipped with technology that allows scientists to determine the ROV's location, as well as with underwater video and high-resolution still cameras that are used to photograph habitats on the seafloor. By viewing both of these datasets at the same time, scientists gain an understanding of how the two datasets are related and can begin to develop a habitat map of the seafloor.

Researchers establish ground validation points (right) across the seafloor that's been mapped using acoustic imagery. At each location, a drop camera (right) or ROV (far right) is employed to directly and systematically survey the benthic habitats.



Products



BIOMapper (above) is the user-friendly internet mapping tool through which habitat characterization data and underwater video can be accessed. A backscatter surface (above left) and habitat map (below left) of the same area south of St. John, USVI are examples of other products that will be derived from data gathered on this mission.

Several products are generated from the research conducted onboard the Nancy Foster. In particular, these products include: (1) underwater video and photographs with associated geographic locations; (2) processed depth imagery; (3) processed backscatter imagery; and (4) a habitat map describing the geographic location, physical structure, biological cover and live coral cover on the seafloor. All of this data and information is disseminated online using CCMA's BIOMapper (Biogeography Integrated Online Mapper). This scalable web application allows users to interact with all of these datasets dynamically, so that they can tailor the information that they receive to suit their research and management needs.

Management Outcomes

High resolution bathymetry and seafloor habitat maps have greatly enhanced efforts to locate derelict fish traps and other marine debris in the waters off St. Thomas and St. John. Managers in the region are concerned about the abundance and locations of marine debris, as well as the possibility for their removal. The National Centers for Coastal Ocean Science (NCCOS) partnered with the US Navy, the St. Thomas Fishermen's Association and others to test the efficacy of autonomous underwater vehicles, or AUVs, in the role of discovering lost traps. Researchers consulted benthic habitat maps developed from Nancy Foster acoustic data alongside results from a survey of local fishermen (see map below) in determining ideal study areas. "Because fish traps are more easily found in less rugged habitats, we were able to use the bathymetry to focus our sampling strategy accordingly and use our time wisely," NCCOS researcher Randy Clark said. The bathymetric products and habitat maps also helped the scientists and fishermen take steps to navigate around more complex areas and prevent damage to the AUV.

The Nancy Foster's multibeam bathymetry provided context for the AUV's (below) deployment in select study areas (right, in purple).

