



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 conservation areas south of St. Thomas and St. John.

NOAA Project NF-10-03

Project funded by NOAA's Coral Reef Conservation Program

More About...

The National Oceanic and Atmospheric Administration



An agency of the U.S. Commerce Department, NOAA is dedicated to enhancing economic security and national safety through the prediction and research of weather and climate-related events and providing environmental stewardship of the nation's coastal and marine resources. Through the emerging Global Earth Observation System of Systems (GEOSS), NOAA is working with its federal partners and nearly 60 countries to develop a global monitoring network that is as integrated as the planet it observes.

Our Partners



The Caribbean Fishery Management Council (CFMC) is one of eight regional fishery management councils established under the Magnuson-Stevens Act for the conservation and utilization of U.S. fishery resources. The University of the Virgin Islands (UVI) is committed to enhancing the lives of the people of the USVI and the wider Caribbean. The National Park Service manages a number of marine and terrestrial protected areas in the USVI, including the Virgin Islands Coral Reef National Monument. The USVI Department of Fish and Wildlife plays an important role in managing and sustaining marine resources for the people of the USVI. The University of North Carolina at Wilmington (UNCW) provides critical equipment and expertise in the ROV deployment.

The Nancy Foster

The NOAA research ship *Nancy Foster*, based in Charleston, S.C., is one of a fleet of research and survey vessels used by NOAA to improve understanding of the marine environment. The former Navy vessel was converted in 2002 to conduct a variety of coastal oceanographic research projects along the U.S. Atlantic and Gulf coasts. The ship has 17 permanent crewmembers and accommodations for up to 15 scientists. The *Nancy Foster* was commissioned on May 10, 2004.



The Biogeography Branch

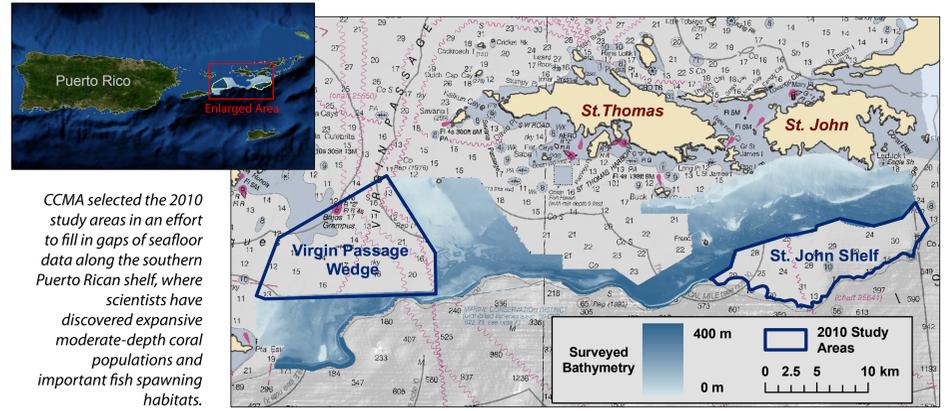
The Biogeography Branch is part of NOAA's National Centers for Coastal Ocean Science in the Center for Coastal Monitoring and Assessment (CCMA), located in Silver Spring, Maryland, USA. The goals of the Biogeography Branch are to develop knowledge and products relating to the distribution and ecology of living marine resources throughout the nation's estuarine, coastal and marine environments; and provide resource managers, scientists and the public with an improved ecosystem basis for making decisions.

For more information:

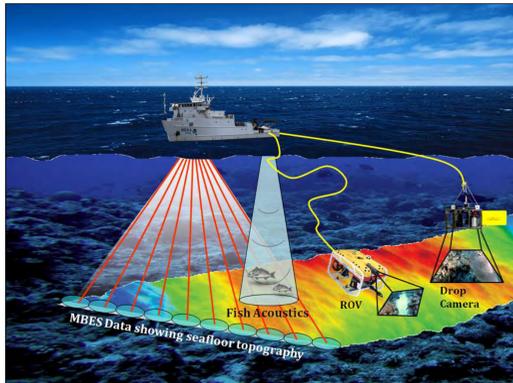
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Planning

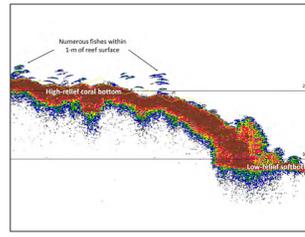
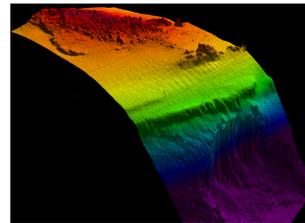
During the seventh annual scientific mission in the U.S. Caribbean, NOAA's Center for Coastal Monitoring and Assessment (CCMA) will map and explore seafloor habitats 10 to 30 km off the southern coasts of St. Thomas and St. John, USVI. These high-priority areas were chosen by CCMA, in collaboration with 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. Products from this effort will be used to support additional biological monitoring efforts.



CCMA selected the 2010 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.



From the bathymetry information gathered by sensors mounted on the hull of the *Nancy Foster*, scientists can derive 3D representations of important seafloor features (Above right: Bajo de Cico, Puerto Rico). They can also track and record fish densities (right) using other acoustic instruments.

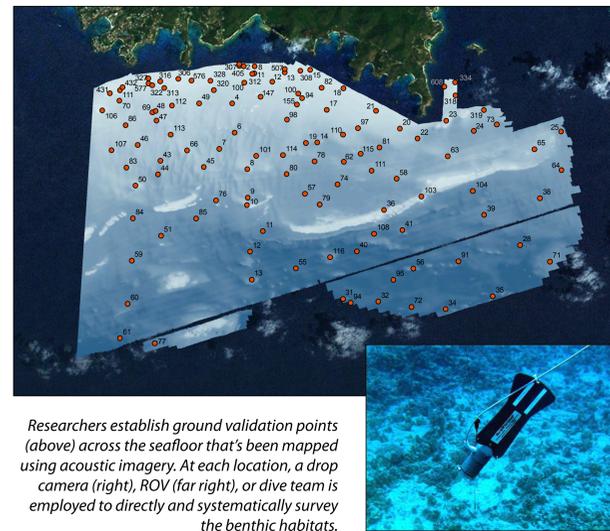


Acoustic Data Collection

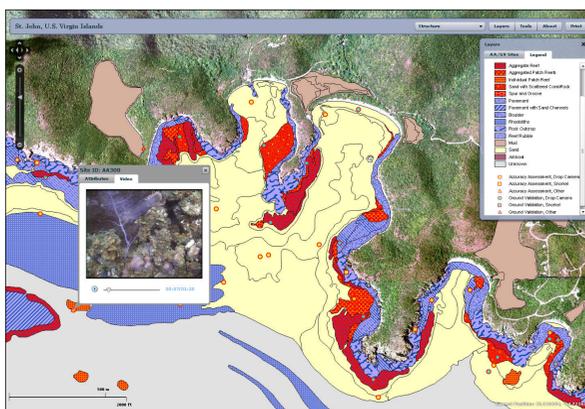
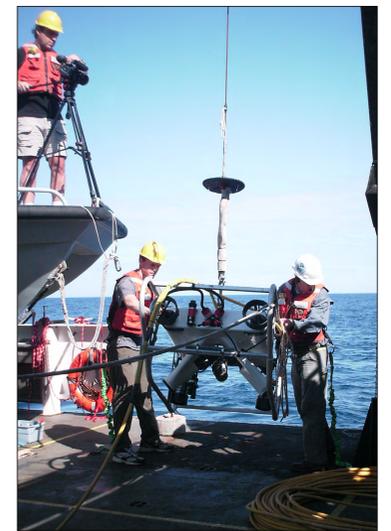
While onboard the NOAA ship *Nancy Foster* (see "More About..."), CCMA scientists will collect and process data from multibeam echosounders (MBES). These sensors use sound to collect information about the depth (i.e., bathymetry) and physical properties (i.e., backscatter) of the seafloor. These two 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.

Ground Validation Missions

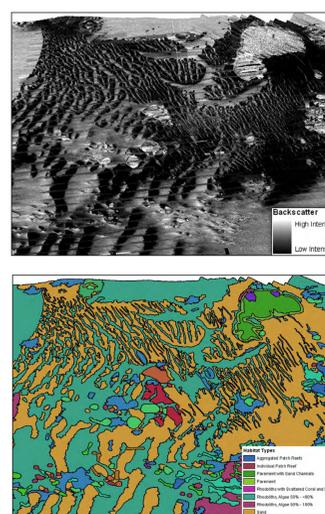
In order to explore the locations and habitats selected from the acoustic imagery analysis, scientists from CCMA and UNCW (University of North Carolina at Wilmington) use a remotely operated vehicle (ROV). This ROV is equipped with technology that allows scientists to determine the ROV's location, as well as with underwater video and high-resolution still cameras that are used to photograph habitats on the seafloor. These photographs are later linked to the ROV's location. 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 (above) across the seafloor that's been mapped using acoustic imagery. At each location, a drop camera (right), ROV (far right), or dive team is employed to directly and systematically survey the benthic habitats.



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



Products

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

Seafloor habitat mapping is one of the first steps toward building a science-based argument for the conservation of living marine resources. "The NOAA maps and seafloor imagery are what we use to get the first glimpses of an area," explains Graciela García-Moliner of the CFMC. This approach was valuable for Puerto Rico's Abrir la Sierra Bank (see map, right), where the spawning populations of Red Hind have been seasonally protected from commercial fishing since 1996. More recently, resource managers from the CFMC and local fishermen alike began to voice concern for the area's population of Queen Conch. To evaluate the threat of overfishing to this commercially valuable mollusk, the Biogeography Branch collected acoustic imagery, ROV video, and underwater still photos, and later conducted a characterization study of the queen conch population. In 2005, CFMC used these products and the subsequent characterization study to gather enough support to close the Queen Conch fishery in Puerto Rican waters. This year, the council hopes to use similar tools to evaluate the effectiveness of this closure.



In 2005 the Queen Conch (above) joined the Red Hind as a protected species in the Abrir la Sierra bank. The Biogeography Branch's mapping products (bathymetry and habitat delineation data shown at right) played a significant role in this conservation decision.

