

## Research

# Patterns in Deep-Sea Corals – expedition aboard NOAA ship *Bell M. Shimada*

## Project Overview

In March 2015, a team of NOAA-led researchers will explore the deep seafloor environment of the Channel Islands National Marine Sanctuary (CINMS). Data collected during this cruise will help supply ocean resource managers with the tools needed to preserve this amazing place. Timely data such as that collected during this cruise will shine a light on how these ecosystems are impacted by a variety of stresses facing them such as ocean acidification (OA). Using a remotely operated vehicle (ROV), a team of NOAA scientists will study the condition of deep-sea *Lophelia pertusa* corals in this area and monitor water chemistry in and around reefs to assess this ecosystem's vulnerability to OA. The team will also document previously unmapped areas of the Sanctuary's deep seafloor.

**Channel Islands National Marine Sanctuary (CINMS)**, located off the coast of Santa Barbara and Ventura counties in California, is one of 14

federally designated marine protected areas administered by NOAA. The sanctuary encompasses 1,470 square miles of water offshore of Santa Barbara, Anacapa, Santa Cruz, Santa Rosa, and San Miguel islands, and is a special place for sensitive habitats. Also, the high acidity and high inorganic carbon of the California Current ecosystem make this location a natural laboratory to study the effects of OA on deep-sea organisms. Insights gained from the cruise surveys and collections will provide new information about the extent of deep-sea coral in the region and a baseline for possible climate change impacts to coral both within CINMS and worldwide.

## Ocean Acidification

When the ocean absorbs carbon dioxide (CO<sub>2</sub>), chemical reactions occur that reduce seawater pH and the amounts of available calcium carbonate minerals – this is known as ocean acidification (OA). Calcium carbonate minerals are the building blocks for the skeletons and shells of many marine organisms, including deep-sea corals. 2014 survey results indicate that corals in CINMS



Photo: NOAA

NOAA ship *Bell M. Shimada*



Photo: NOAA National Centers for Coastal Ocean Science  
Lophelia II Reefs, Rigs, and Wrecks Expedition 2009

Deep-sea stony coral *Lophelia pertusa*

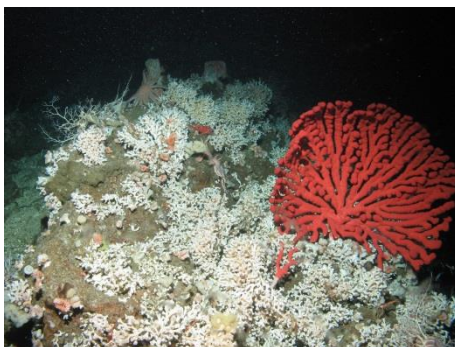


Photo: NOAA National Centers for Coastal Ocean Science

*Lophelia pertusa* and a 'bubblegum' coral in Channel Islands National Marine Sanctuary

## NOAA ship *Bell M. Shimada*

*Bell M. Shimada* is the fourth in the class of fisheries survey vessels built for NOAA by VT Halter Marine, Inc., in Moss Point, Mississippi. The vessel is a state-of-the-art research ship capable of conducting a wide variety of fisheries and oceanographic research. Foremost among these capabilities is acoustic quieting technology, which will enable NOAA scientists to monitor fish populations without altering their behavior. *Bell M. Shimada* supports NOAA's mission to protect, restore, and manage the use of living marine, coastal, and ocean resources. The research conducted aboard aids scientists in understanding the California Current Large Marine Ecosystem, a globally significant natural resource stretching from Baja California to British Columbia. *Bell M. Shimada* is uniquely dedicated to serve the entire U.S. West Coast.

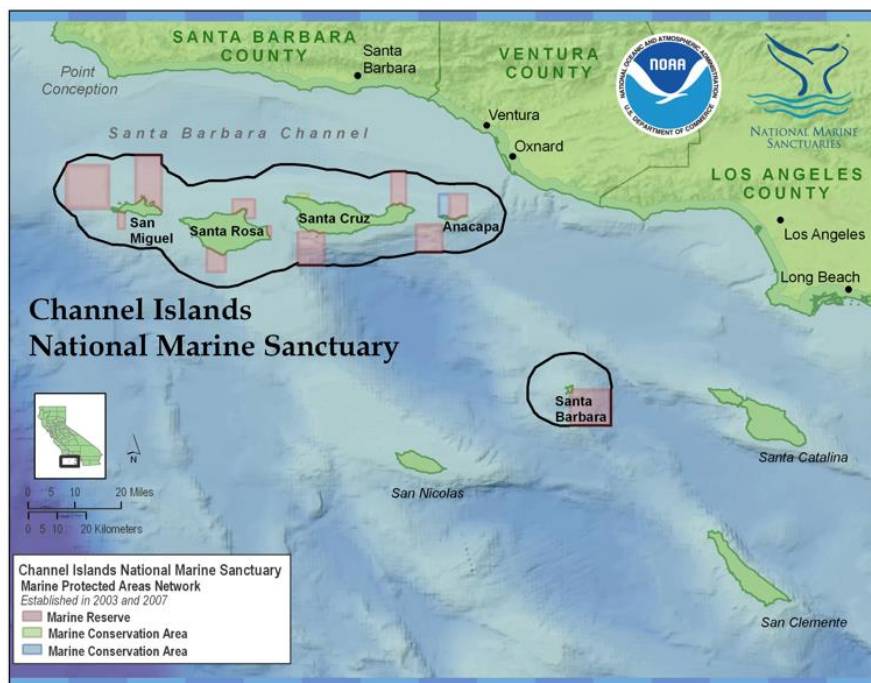
are already experiencing effects from OA, and waters in this area are projected to become even more acidic. These corals support extensive fish and invertebrate ecosystems, including commercially fished species, so it is important to monitor the potentially harmful effects OA has on this species. The OA team will collect samples of *Lophelia pertusa*, a stony reef-building deep-sea coral found in CINMS, as well as water samples using a CTD-niskin rosette, to help measure local effects of climate change.

## Technology

Cruise researchers will employ a couple of different advanced technologies to get their jobs done including both multibeam sonar and the use of the Beagle ROV from Marine Applied Research and Exploration. This ROV is equipped with a high-definition video camera and multifunction manipulator arm to deploy data loggers and collect live corals to a depth of 500 meters. The ROV surveys will allow the research team to characterize unexplored habitat, as well as to assess abundance and condition of corals.

## Seafloor Mapping

The project's seafloor mapping team will use sonar technology to explore areas of the Sanctuary that have not yet been mapped. Over 50% of the seafloor here has not been surveyed since the 1930s, when technology was much less sophisticated. These mapping efforts will extend NOAA's mapping capabilities on the west coast. The team will also map areas at night to help guide the following



day's ROV deployment. Sonars used for this mapping mission will describe the seafloor terrain in terms of coral and fish habitat, helping to guide research and marine resource management. The seafloor mapping team will also work to verify that the onboard ship systems are properly integrated with the sonars to improve data quality.

## Expedition team

Participating institutions for this project include NOAA's National Ocean Service (NOS) – Office of National Marine Sanctuaries, National Centers for Coastal Ocean Science, and Office of Coast Survey; National Marine Fisheries Service

(NMFS) Deep Sea Coral Research and Technology Program; OAR – Ocean Exploration and Research; Marine Applied Research and Education; Oxnard Unified School District; and Claremont College.

Team leads are Chris Caldwell, NOAA CINMS, expedition lead; Dr. Peter Etnoyer, deep-sea coral team lead; Dr. Laura Kracker, mapping team lead; Dr. Branwen Williams, Keck Science Department at Claremont College; and Sarah Raskin, Teacher at Sea. For more information on OA and deep-sea corals, please visit <http://oceanacidification.noaa.gov> and <http://coralreef.noaa.gov/deepseacorals>. To learn more about ocean exploration please visit <http://oceanexplorer.noaa.gov>.



Photo: NOAA National Centers for Coastal Ocean Science

A deep-sea vase-shaped "cloud sponge" *Aphrocallistes vastus* in Channel Islands National Marine Sanctuary



Photo: NOAA National Centers for Coastal Ocean Science

Research crew prepares the ROV for launch during a 2014 survey cruise



Photo: Marine Applied Research & Exploration (MARE)

Copper Rockfish (*Sebastes courinus*) with Red Gorgonian (*Leptogorgia chilensis*) sea fan