

ALASKA CORAL AND SPONGE INITIATIVE - PROJECT UPDATE
FEBRUARY 2014

Deep-sea coral and sponge ecosystems are widespread throughout most of Alaska's marine waters. In some places, such as the western Aleutian Islands, these may be the most diverse and abundant deep-sea coral and sponge communities in the world. Deep-sea coral and sponge communities are associated with many different species of fishes and invertebrates in Alaska. Because of their biology, these benthic invertebrates are potentially vulnerable to the effects of commercial fishing, climate change and ocean acidification. Since little is known of the biology and distribution of these communities, it is difficult to manage human activities and climate impacts that may affect deep-sea coral and sponge ecosystems.

Beginning in FY2012 the NOAA Deep Sea Coral Research and Technology Program (DSCRTP) initiated a field research program in the Alaska region for three years (FY2012-2014) to better understand the location, distribution, ecosystem role, and status of deep-sea coral and sponge habitats. The research priorities of this initiative include:

- Determine the distribution, abundance and diversity of sponge and deep-sea coral in Alaska;
- Compile and interpret habitat and substrate maps for the Alaska region;
- Determine deep-sea coral and sponge associations with FMP species and their contribution to fisheries production;
- Determine impacts of fishing by gear type and testing gear modifications to reduce any impacts;
- Determine recovery rates of deep-sea coral and sponge communities from disturbance; and,
- Establish a monitoring program for the impacts of climate change and ocean acidification on deep-coral and sponge ecosystems.

FY13 Research Activities

In FY13, the primary focus of AKCSI researchers was to conduct remote operated vehicle surveys and sample collections in Primnoa thickets in Southeastern Alaska. In August 2013, concurrent cruises aboard the chartered fishing vessel *Alaska Provider* and Alaska Department of Fish and Game research vessel *Medeia* were conducted at previously mapped (in FY12) locations; Dixon Entrance, Prince of Wales, Fairweather Grounds, and Cape Ommaney, on the continental shelf and slope in the southeastern Gulf of Alaska. These cruises were to survey suspected areas of high density Primnoa habitats (thickets), collect size information from the thickets and collect samples for genetic analysis. Survey transects were completed at 3 of the 4 sites with the ROV aboard the *Alaska Provider* and at two sites with a stereo drop camera aboard the *Medeia*. Size data and images to estimate density of Primnoa habitats were collected at all four sites. Additionally, 8 settlement plates were deployed at locations in Primnoa thickets using the stereo drop camera. Samples for genetic analysis were collected at two of the four study sites. Samples were also collected to provide specimens for natural products studies and geological substrate interpretation.

Two other directed research cruises were planned for FY13, but were not completed due to contracting difficulties and the government-wide shutdown. The first of these was a research cruise to examine the ecology and production of FMP species from coral and non-coral habitats. Samples of rockfish for reproductive potential and bioenergetics were collected for this project during the Gulf of Alaska

bottom trawl survey in July 2013. The final research cruise was to conduct underwater camera drops at 150 locations in the central and eastern Aleutian Islands from Unimak Pass to Petrel spur. Due to the government-wide shutdown, this research cruise has been postponed until April 2014.

In addition to these cruises funded by AKCSI, there were also a number of field data collections carried out in partnership with other research activities in Alaska. In FY13 the second phase of a pilot project was conducted to construct a camera system that could be attached to longline and pot fishing gear in Alaska to collect information on the impacts of these gears on benthic habitats. A prototype camera system was constructed by research partners in the RACE division and tested throughout the winter of 2013. It was successfully deployed in the Gulf of Alaska during the AFSC longline survey in July 2013. Cooperation with the longline survey allowed us to deploy the camera system on two longline sets during a two day gear experiment. The images collected during the deployment were suitable for measuring the distance the longline travelled over the seafloor during deployment, fishing and retrieval.

In FY13, with partners in the AFSC RACE division we collected O₂, salinity, turbidity and pH measurements on the headrope of bottom trawls used to conduct annual stock assessment surveys. Oceanographic data were collected on 218 tows from the Islands of Four Mountains in the eastern Aleutian Islands to Dixon Entrance in the eastern Gulf of Alaska.

Oceanographic equipment to measure O₂, pH, salinity and temperature were installed at a long-term study site in Tracy Arm (southeastern Alaska) and has been collecting oceanographic data since January 2013 on 6-hour intervals.

Field activities also included the collection of sponge and coral specimens for morphological taxonomic study and coral tissue samples for genetic analysis through collaboration with the Gulf of Alaska bottom trawl survey.

Additional work was conducted at the AFSC and U.S. Geological Survey to compile bathymetry and sediment maps from NOAA smooth sheets for the Aleutian Islands and Gulf of Alaska in anticipation of completing a geologically interpreted substrate map for these regions in FY14. The compiled sediment and bathymetry map for the Aleutian Islands region was released as a NOAA Technical Memorandum. The data compilation in the Gulf of Alaska has been completed for the majority of this region as well, thanks to collaboration with the NPRB-funded Gulf of Alaska-Integrated Ecosystem Research Program, which has similar needs for bathymetric data.

Planned FY14 Activities

In FY14 there will be three major field programs that will build on the activities from the FY12-13. First, the spatial distribution modeling project will focus its efforts on the western Aleutian Islands during another 15-day cruise. During this cruise, images will be collected at an additional 150 randomly selected sites. Once the fieldwork is complete and the images analyzed, the models will be re-evaluated with respect to their accuracy in predicting coral and sponge distribution, abundance and diversity.

Second, the FMP production project will collect fish and video data on the differences in production between sites with and without coral and sponge communities in the summer (August) of 2014. This

project will collect a second year of data at the same locations as in FY12. Additional funding (from NPRB) to expand the sampling into winter and spring periods will be used to fund two additional cruises in April 2014 and January 2015. Samples and video collected in the field to date will be analyzed leading to data analysis scheduled for the summer of FY15.

Third, the main field effort in FY14 will again focus on projects at the Dixon Entrance, Prince of Wales, Fairweather Grounds, and Cape Ommaney sites. We will again use a remotely operated vehicle (ROV) to conduct transect surveys at two of the study sites in southeastern Alaska that were not completed in FY13 (Fairweather Grounds and Dixon Entrance). The stereo drop camera will again be used to measure size structure of *Primnoa* at these sites, plus some additional transects at the Prince of Wales site. Samples for genetics analysis will also be collected at two sites (Dixon Entrance and Fairweather Grounds) to complete the collections for that project. In addition, two of the settlement plates deployed in FY13 will be recovered in FY14 and any newly settled recruits collected. Then the plates will be redeployed for collection at a later date.

Other activities will also be continued in FY13. The project to deploy a camera system on commercial longline gear will go into production mode and data will be collected during an entire leg of the longline survey. Data and images resulting from this project should be available for analysis by late summer FY14.

In FY14, oceanographic data will be collected from the bottom trawl surveys scheduled for the Aleutian Islands and the eastern Bering Sea slope. The oceanographic instruments purchased and tested in FY12 will be deployed on the headrope of AFSC research trawls during all three legs of both bottom trawl surveys to collect O₂, pH, turbidity and salinity from the Islands of Four Mountains to Stalemate Bank in the Aleutian Islands at depths to 500 m and from Bering Canyon to the U.S.-Russian border along the eastern Bering Sea slope at depths to 1000 m.

The instrument package at the long-term monitoring site at a shallow population of *Primnoa* (30 m depth) in Tracy Arm will be recovered. Since there are no funds available to routinely collect and deploy this instrumentation after FY14, we are attempting to develop a partnership with the USGS to deploy the instrument package at a similar site in Glacier Bay where it can be routinely serviced at little cost.

New partnerships will be developed and existing partnerships continued to collect specimens of corals and sponges for taxonomic resolution and for special studies of paleoclimatology and medicinal purposes. These collections will occur both during the ROV fieldwork as well as during the 2014 Aleutian Islands and eastern Bering Sea slope bottom trawl surveys.

Finally, in FY14, researchers at the University of Alaska Fairbanks and the Tombolo Institute will continue to collaborate with NOAA and USGS researchers to compile an interpreted (from geology) substrate and sediment map for Alaskan waters based on existing multibeam bathymetry, sidescan images, the new bathymetric and sediment database compiled from NOAA smooth sheets, other sediment and bedrock data, and available seafloor imagery.