

ALASKA CORAL AND SPONGE INITIATIVE - PROJECT UPDATE
FEBRUARY 2013

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.

FY12 Research Activities

In FY12, three cruises were conducted in by AKCSI researchers in Alaska. In June 2012, a multibeam mapping cruise was conducted to collect bathymetry and backscatter information for three study sites in the southeast and one site in the central Gulf of Alaska. This mapping was conducted to support FY13-14 research activities that will explore the distribution and ecology of *Primnoa* thickets.

A second research cruise in early August was conducted aboard a chartered fishing vessel out of Kodiak to look at the ecology and production of commercial fishes from coral and non-coral habitats. Researchers collected underwater video at 18 transects inside and outside coral habitat. They also collected rockfish from coral and sponge habitat in four bottom trawl hauls. Oceanographic information and zooplankton samples were also collected. The research found that dusky rockfish (*Sebastes variabilis*) and northern rockfish (*Sebastes polypsinis*) were the most commonly identified species of commercial fish in the area.

The third research cruise was conducted in mid-August aboard a chartered fishing vessel to groundtruth a coral and sponge distribution model. This research cruise conducted underwater camera drops at 106 locations in the central and eastern Aleutian Islands from Unimak Pass to Petrel spur. In addition, a region north of the Aleutian chain, Bowers ridge and Bowers bank was also explored. Corals were observed at 53 of the 106 sites and sponges were observed at 69 of 106 sites.

In addition to these three cruises funded by AKCSI, there were also a number of field data collections carried out in partnership with other research activities in Alaska. In FY12, with partners in the AFSC RACE division (funded by the North Pacific Research Board) we purchased two sensors to collect O₂, salinity, turbidity and pH measurements on the headrope of bottom trawls used to conduct annual stock assessment surveys. A deployment mechanism was constructed and tested during the 2012 eastern Bering Sea slope bottom trawl survey. Oceanographic data were collected on 168 tows along the Bering Sea slope from Bering Canyon to the U.S.-Russia border at depths to 1100 m.

Oceanographic equipment to measure O₂, pH, salinity and temperature was also purchased to set up long-term monitoring stations in southeast Alaska and was deployed into Tracy Arm in January 2013.

In FY12 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 was deployed off a vessel of opportunity in July 2012. Although the test revealed the difficulty of designing a deployment platform for the camera (the pot that it was attached to fell over upon reaching the seafloor), the design is relatively sound and testing will continue on this project through the winter with hopes of deploying the instrument again in FY13.

Field activities also included the collection of 120 sponge specimens for morphological taxonomic study and coral and sponge tissue samples for genetic analysis through collaboration with the Aleutian Islands bottom trawl survey.

In anticipation of deploying settlement plates to serve as substrate for new *Primnoa* coral recruits, a number of naturally occurring rocks were collected in southeast Alaska. These rocks were cut into regular squares and attachment points were inserted. The plates will be “cured” by holding them in flowing seawater tanks at the Auke Bay Labs wet laboratory during the winter. The arrays will then be deployed in *Primnoa* thickets at two sites in summer FY13.

Laboratory studies were also conducted to support the AKCSI program in FY12. Work on genetic markers for *Primnoa* corals was performed in our partner laboratory at the U.S. Geological Survey (Leetown Science Center, West Virginia). This work will support the analysis of genetic population connectivity among Alaska and west coast populations of *Primnoa* scheduled for FY13 and FY14.

Additional work was conducted at the AFSC and U.S. Geological Survey to compile bathymetry and sediment maps for the Aleutian Islands and Gulf of Alaska in anticipation of completing a geologically interpreted substrate map for these regions in FY14. Some of the work on this project was funded through a small research grant from DSCRTP in FY11. Thus, the continuation of this work resulted in the completion of the Aleutian Islands region this year. Additionally, the data compilation in the Gulf of Alaska is proceeding at an accelerated pace thanks to collaboration with the NPRB-funded Gulf of Alaska-Integrated Ecosystem Research Program, which has similar needs for bathymetric data. A draft NOAA Technical Memorandum is currently undergoing review that describes the process and results for the Aleutian Islands.

Planned FY13 Activities

In FY13 three field programs will build on the 1st year's efforts to examine the distribution and abundance of coral and sponge ecosystems. First, the spatial distribution modeling project will focus its efforts on the eastern Aleutian Islands during another 15-day cruise.

Second, the FMP production project will also continue to collect fish and video data on the differences in production between sites with and without coral and sponge communities. This project will collect a second year of data at the same locations as in FY12. Additional funding to expand the sampling into winter and spring periods and to another site was obtained through successful proposals to NPRB and the AFSC-HEPR program.

Third, the main field effort in FY13 will use a remotely operated vehicle (ROV) to conduct sampling and surveys at the four newly multibeam locations in southeast Alaska. The bulk of the field effort will focus on the project to examine areas of high *Primnoa* abundance. Field sampling will be conducted to map the distribution and species composition of corals and sponges within each site. The field sampling will be carried out with a remotely operated vehicle (ROV) that is capable of collecting specimens *in situ* and collecting visual data on species identification, abundance and habitat from strip transects.

Another component of this ROV cruise will use stereo video to examine the size structure of *Primnoa* communities in a landscape ecology framework. Using the size and biomass of *Primnoa* corals under different conditions of fishing pressure, estimates of population level growth, recovery and recruitment will be inferred. In addition, settlement plates will be deployed in *Primnoa* thickets at the Fairweather Grounds and Cape Ommaney sites for collection in future years.

The final component of this cruise will use the ROV to collect tissue samples from up to 50 individual *Primnoa* colonies in order to examine the genetic connectivity of Alaska (and west coast) populations of *Primnoa*. The collections will be made at all four study sites in the eastern Gulf of Alaska.

Other activities will also be continued from FY12. The pilot project to deploy a camera system on commercial longline and pot gear will continue gear development. It is expected that another vessel of opportunity (either through AFSC research activities or collaboration with industry) will be available for field testing in the summer of FY13.

In FY13, oceanographic data will be collected from the bottom trawl survey scheduled for the Gulf of Alaska. The oceanographic instruments purchased and tested in FY12 will be deployed on the headrope of the AFSC research trawl during all three legs of the bottom trawl survey to collect O₂, pH, turbidity and salinity from the Islands of Four Mountains to Dixon Entrance at depths to 1000 m.

New partnerships will be developed and existing partnerships continued to collect specimens of corals and sponges for taxonomic resolution and special studies of paleoclimatology and medicinal purposes. These collections will occur during the ROV fieldwork as well as during the Gulf of Alaska trawl survey.

Finally, in FY13, 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, sediment data, and available seafloor imagery.