

The Alaska Coral and Sponge Initiative (AKCSI): a NOAA Deep Sea Coral Research and Technology Program regional fieldwork initiative in Alaska

The U.S. EEZ in Alaska (3.3 million km²) contains more than 70% of the nation's continental shelf. The marine waters of Alaska support a diverse collection of abundant fishes and invertebrates. Many of these fish and invertebrates are harvested by commercial fishing and comprise some of the largest fisheries (by landed weight and economic value) in the U.S. In addition the marine waters of the continental shelf in Alaska contain significant deposits of oil and precious minerals that support a large resource extraction segment of the U.S. and Alaskan economy. These activities and resources require significant investments in research to support management. Concerns over global climate change and ocean acidification increase the need for adequate scientific research to answer questions regarding the response of marine resources to these impacts.

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 impacted by climate change and ocean acidification. Deep-sea coral and sponge ecosystems are also vulnerable to the effects of commercial fishing activities in Alaska. The challenges facing management of deep-sea coral and sponge in Alaska begin with the lack of knowledge of where these organisms occur in high abundance and diversity. Because of the size and scope of Alaska's continental shelf and slope, the vast majority of the area has not been surveyed for deep-sea coral and sponge abundance. Since the spatial distribution of these communities is not known in Alaska, it is difficult to predict the locations and types of 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) will be sponsoring 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 DSCRTP was established under the reauthorized Magnuson-Stevens Reauthorization Act (Public Law 109-479) to improve the understanding, conservation and management of deep-sea coral and sponge ecosystems. The DSCRTP funding intent is for three years and to rotate to other regions as funding levels allowed, beginning with the southeast U. S. in 2009, followed by the U.S. west coast in 2010, and focusing on the Alaska region beginning in 2012.

In anticipation of the upcoming fieldwork, a workshop was held Anchorage, Alaska in September 2010 to identify research priorities for the region. These priorities were largely derived from ongoing research needs and objectives identified by the DSCRTP, the North Pacific Fishery Management Council and Essential Fish Habitat-Environmental Impact Statement (EFH-EIS) process. The research priorities included:

- Determine the distribution, abundance and diversity of sponge and deep-sea coral in Alaska (and their distribution relative to fishing activity);
- Compile and interpret habitat and substrate maps for the Alaska region;
- Determine deep-sea coral and sponge associations with Fishery Management Plan species (especially juveniles) and the contribution of deep-sea coral and sponge ecosystems 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 in Alaska from disturbance or mortality; and,
- Establish a long-term monitoring program to determine the impacts of climate change and ocean acidification on deep-coral and sponge ecosystems.

Another outgrowth of this workshop was the formation of a planning team to guide the FY2012-2014 field research activities for the Alaska region. Through on-going planning team discussions culminating in an August 2011 meeting, a series of specific research objectives and corresponding research projects were identified. These projects were translated into field projects that will begin in the summer of 2012. The field research will be led by planning team from NMFS – Alaska Fisheries Science Center, NMFS – Alaska Regional Office, NOS – National Centers for Coastal Ocean Science, OAR – Office of Exploration and Research, and the University of Alaska, Fairbanks. The objectives for the projects are to:

- Identify and map areas of high abundance of *Primnoa* corals in the Gulf of Alaska using existing data, augmented by new multibeam mapping and ROV transects;
- Determine the distribution and areas of high abundance and diversity of deep-sea corals and sponges in the Gulf of Alaska and Aleutian Islands through modeling and through field sampling using underwater cameras;
- Estimate the recovery rates and sustainable impact rate for *Primnoa* corals in the Gulf of Alaska through a landscape ecology approach;
- Determine the productivity increases in terms of fish abundance and condition in areas with and without deep-sea coral and sponge presence by measuring density, growth and reproductive potential;
- Estimate the effects of commercial long-line and pot fishing on deep-sea coral and sponge communities in the Gulf of Alaska with an underwater camera system;
- Estimate the connectivity of populations of *Primnoa* in the Gulf of Alaska, British Columbia and the west coast of the U.S. through genetic studies;
- Initiate collection of long term data sets of oxygen and pH from summer bottom trawl surveys;
- Set up long-term monitoring of nearshore and unique populations of deep-sea coral and sponge in southeast Alaska fjords;
- Improve the taxonomy of deep-sea corals and sponges through special collections of unidentified specimens;
- Collect data and specimens for paleoclimatological studies; and,

- Compile a geologically based substrate map for the Gulf of Alaska and Aleutian Islands;

Most of these projects will be carried out in each of the three years of the DSCRTP funding and will result in completed research products and recommendations in early 2015. Throughout the Alaska Coral and Sponge Initiative we will attempt to communicate results to relevant management agencies in a timely manner, so that new information can be incorporated into management as it becomes available. In addition, preliminary research results will be timely and can be directly incorporated into the review and revisions of the EFH-EIS for commercial fisheries in Alaska. This EFH-EIS review is scheduled to begin in FY2014.

At the conclusion of this three-year field effort we plan to advance knowledge of deep-sea coral and sponge ecology in Alaska so that management of these resources can be based on the most up-to date scientific information on understanding human and climate impacts. Among other products, we expect to produce are distribution maps for select deep-sea coral and sponge producing regions of Alaska, detailed descriptions of growth patterns for select deep-sea coral species in the Gulf of Alaska, and descriptions of how deep-sea coral and sponge communities influence production of select fish and invertebrate species found in these habitats.