

## **BOEM ENVIRONMENTAL STUDIES PROGRAM: Ongoing Studies**

**Study Area(s):** Beaufort Sea, Chukchi Sea

**Administered By:** Alaska OCS Region

**Title:** Distribution and Habitat Use of Fish in the Nearshore Ecosystem of the Beaufort and Chukchi Seas (AK-12-06)

**BOEM Information Need(s) to be Addressed:** Information is needed on nearshore habitats and fish abundance in the Beaufort and Chukchi Seas to refine areas designated as Essential Fish Habitat (EFH) as presented in the Arctic FMP, adopted by NOAA in 2009. Fish in the ecologically fragile nearshore environments are particularly vulnerable to oil spills. Information from this study will support better identification and description of EFH in NEPA analyses and a better understanding of how fish species respond to habitat variables to improve estimates of distributions under different climate conditions. This project will operate concurrently with other fish sampling efforts (AK-10-06 and AK-11-08) to provide a seamless baseline of forage fish data from the beach to the offshore environment.

**Total Cost:** \$164,000  
plus Joint Funding (~\$500,000)

**Period of Performance:** FY 2012-2017

**Conducting Organization:** NOAA

**BOEM Contact:** [Catherine Coon](#)

### **Description:**

**Background:** The Arctic is one of the most rapidly changing ecosystems in the world, yet information on EFH and what species and life stages use these habitats is very limited. Specific information is very sparse for fishes in the Arctic, especially in shallow, nearshore waters (shoreline out to 8 m depth). Nearshore habitats are some of the most productive habitats in Alaska and the most at risk to development and oil spills. Many species included in the Arctic Fisheries Management Plan for the Arctic, such as capelin and rainbow smelt, use nearshore habitats at some time in their life but estimates of their abundance and habitat use are poorly documented. Nearshore habitats differ from offshore (>30 m depth) habitats, as do fish assemblages in each area. Recent nearshore research in the Arctic has been limited to the Barrow area, which represents only a small fraction of the nearly 1,700 km of the U.S. Arctic coastline. As development and transportation activities begin to increase in the Arctic, more information is needed on fish distribution and habitat use, life history characteristics, food webs, and species at risk to make informed management decisions regarding potential effects from global climate change and human disturbance. In addition, warming conditions in the Arctic will likely result in a reorganization of community structure; new fish species are expected to migrate to the Arctic with unknown consequences to existing stocks and food webs.

Many Arctic fish species are important in the diet of higher-level predators and in Inupiat subsistence fisheries. For example, in the Bering, Beaufort, and Chukchi Seas, Arctic cod and saffron cod occur in the diets of 13 marine mammal species and 20 seabird species. Availability of prey is critical to some Arctic marine mammals such as ice seals, which themselves are important in the diet of polar bears. Larger predators are already under stress by reduced ice cover. The distribution, diversity, and habitat use of nearshore fishes is largely unknown in other areas of the Arctic, especially in the Chukchi Sea. The proposed study would expand fish distribution and habitat use information to the eastern Beaufort Sea and western Chukchi Sea.

#### Objectives:

- Inventory the distribution and diversity of nearshore fish, their habitat and prey along high priority sites in the Beaufort and Chukchi Seas
- Assess age and diet of fish important as prey species
- Describe oceanographic features of areas with nearshore fish
- Understand how habitat variables like temperature and salinity affect fish species distributions
- Develop a public outreach document entitled Arctic Coastal Impressions with photographs of the US Arctic Coastline.

Methods: Beach and small otter trawl sampling will occur in areas of high importance, defined as locations near oil and gas production, or close to foraging areas for birds or marine mammals, followed by areas with opportunities for research platforms for three sampling seasons. In the summer and fall 2013/2014 two primary areas will be at sites between Barrow and Peard Bay to establish a baseline of fish and habitat use and as reference sites to the Chukchi Lease area.

A random sample of key fish species (e.g., Arctic cod, saffron cod, and capelin) will be collected for age and diet analyses. A sample of select fish species will also be collected, frozen, and archived for later fatty acid and genetic analyses. Habitat will be measured at each sampling site. At seine sites each beach will be profiled according to ShoreZone protocols. Intertidal invertebrates and macroalgae will also be recorded. Additionally, a drop camera will be deployed, depending on water visibility, to search for and identify unusual habitat types and other fish species that may not be captured by seine or trawl. Models will be generated to assess habitat use by fishes according to habitat variables. Maps will be generated to describe species distribution relative to multiple habitat variables. Information that may lead to NOAA's EFH general distribution will be shared. Relational databases will be built that contain data on species presence and abundance that will expand the current BOEM fish database, be suitable for use in GIS, and complement ShoreZone mapping efforts.

This project collaborates with staff and funding with the Alaska Coastal Ecosystem Survey (ACES) with joint funding from NPRB. The public outreach document entitled Arctic Coastal Impressions shows photographs of the U.S. Arctic Coastline from the ShoreZone project along the North Slope and Western Alaska.

**Current Status:** Awaiting final report

**Final Report Due:** July 2017

**Publications Completed:** None

**Affiliated WWW Sites:** <http://www.boem.gov/akstudies/>  
<http://alaskafisheries.noaa.gov/habitat/fishatlas/>

**Revised Date:** June 29, 2017

**ESPIS: Environmental Studies Program Information System**

**All *completed* ESP studies can be found here:** <https://www.boem.gov/ESPIS/>