

Environmental Studies Program: Ongoing Studies

Study Area(s): Beaufort Sea

Administered By: Alaska OCS Region

Title: Beaufort Sea Marine Fish Monitoring Survey in the Central Beaufort Sea (AK-10-06)

BOEM Information Need(s) to be Addressed: Fish resources are important to upper trophic levels in the Beaufort Sea ecosystem and to the coastal communities. NEPA analysts need additional species presence and abundance information for assessing potential impacts of OCS development activities. Study information will support NEPA analysis and documentation for Beaufort Sea EPs and DPPs.

Total BOEM Cost: \$1,764,252

Period of Performance: FY 2010-2018

Conducting Organization: University of Alaska Fairbanks

Principal Investigator(s): Dr. Brenda Norcross

BOEM Contact: [Catherine Coon](#)

Description:

Background: Enhanced marine fish information is needed for Beaufort Sea NEPA analyses. Existing data at the most basic level—e.g., fish species presence/absence and distribution data—are spotty and outdated. Fish assemblages and populations in other marine ecosystems off Alaska have undergone observable regime-shifts in diversity and abundance over the last 20-30 years. While the same is likely true of the Beaufort Sea, it is unconfirmed because the scant distribution and abundance data available are pre-regime-shift. Furthermore, important marine mating, spawning, rearing, feeding, and migration habitats (pre or post regime-shift) is yet to be delineated. A baseline of fish species, distribution, relative abundance, and the locations of critical or sensitive life history stage habitats in this central portion of the Beaufort Sea Planning Area remains a very high-priority information need for NEPA analyses.

An under-ice pilot survey is included because the Beaufort Sea Planning Area is under ice for half to three-fourths of the year. Thus, it is important that BOEM obtain a more complete data set that encompasses the under-ice season. The addition of the under-ice pilot survey study will provide a more complete methodology and a baseline data set that encompasses all seasons in the Beaufort Sea, including ice-covered seasons. Such a data set will support environmentally sound OCS oil and gas exploration and development decisions.

The addition of bird and marine mammal observers and zooplankton sampling will provide transect data in offshore areas where data for those species is as sparse as for fish species. The contemporaneous collection will also enable first-time correlations between fish, zooplankton, birds and marine mammal species in this area.

Objectives:

- Identify the fish species that occupy the central OCS Beaufort Sea Planning Area.
- Develop and recommend a methodology adapted to arctic conditions and specific BOEM information needs for use in future surveys.
- Identify the fish species that occupy the central Beaufort Sea Planning Area during the ice-covered season.
- Correlate observation of seabirds and marine mammals to fish and zooplankton for increased understanding of this arctic ecological system.

Methods: The survey will sample fish and zooplankton in the central Beaufort between 147° and 152° west longitude, the area of greatest interest. Due to logistical conflicts encountered in 2008, it will incorporate new strategies for timing surveys to avoid interference from industry seismic surveys. It will include methods adapted to sampling small sized and rare fish thought to inhabit the Beaufort Sea and also assess additional options to effectively sample bottom habitats. Addition of bird and marine mammal observers will provide transect data to those specialties and allow correlations between fish, zooplankton, birds, and marine mammals.

A pilot under-ice marine survey will implement a design outlined in the 2007 MMS “Under-Ice Sampling Workshop.” The survey will occur in three stages: 1) assemble local and traditional knowledge with Inupiat residents; 2) under-ice sampling by local residents and time lapse under-ice cameras, 3) test survey of three different and difficult-to-sample Arctic cod habitats at the ice-water interface with DIDSON sonar (dual frequency identification sonar), remotely operated vehicles (ROVs), and shallow-water scuba transects. The pilot study will provide statistical hypothesis testing between the open water, ROV and dive surveys, which will provide a baseline for subsequent surveys and provide sampling statistics, including variance estimators, for future time-series analyses.

The final products will include Geographic Information Systems (GIS) and report formats. Intermediate results will be provided for NEPA analyses.

Current Status: Completed

Final Report:

Norcross B, Holladay B, Apsens S, Edenfield L, Gray B, Walker K. 2017. Central Beaufort Sea marine fish monitoring, Final Report. Fairbanks, AK: US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2017-33. 191 p.

Publications Completed:

Gray BG (2015) Comparisons of Arctic Cod (*Boreogadus saida*), Arctic Staghorn Sculpin (*Gymnocanthus tricuspis*), and Shorthorn Sculpin (*Myoxocephalus scorpius*) diets across the northeastern Chukchi and western Beaufort Seas. MS Thesis, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks

- Gray, BP, Norcross BL, Beaudreau AH, Seitz AC (2016) Food habits of Arctic staghorn sculpin (*Gymnocanthus tricuspis*) and shorthorn sculpin (*Myoxocephalus scorpius*) in the northeastern Chukchi and western Beaufort Seas. *Deep Sea Research* 135:111–123. DOI: 10.1016/j.dsr2.2016.05.013
- Gray, BP, Norcross BL, Blanchard AL, Beaudreau AH, Seitz AC (2016) Variability in the summer diets of juvenile polar cod (*Boreogadus saida*) in the northeastern Chukchi and western Beaufort Seas. *Polar Biology* 39:1069–1080. DOI 10.1007/s00300-015-1796-7

POSTERS AND ORAL PRESENTATIONS

2015

Norcross BL, Holladay BA Demersal fish communities on the shelf of the US Beaufort Sea. Alaska Marine Science Symposium, Anchorage, AK, January 2015 (oral presentation)

2014

- Edenfield LE, Norcross BL. Beaufort Sea marine fish surveys in the U.S.–Canada transboundary area 2010–2013. Ocean Sciences Meeting, Honolulu, HI, February 2014 (poster)
- Edenfield LE, Norcross BL. Beaufort Sea marine fish surveys in the U.S.–Canada transboundary area 2010–2013. Alaska Marine Science Symposium, Anchorage, AK, January 2014 (poster)
- Gray BP. Comparisons of Arctic Cod, Arctic Staghorn Sculpin, and Shorthorn Sculpin diets across the northeastern Chukchi and western Beaufort seas. MS thesis defense presentation, Fairbanks, Alaska, October 2014
- Gray BP, Norcross BL. A comparison of fish diets between regions of the northeastern Chukchi and western Beaufort Seas. American Fisheries Society – Alaska subunit meeting. October 2014, Juneau, AK (poster)
- Gray BP, Norcross BL. Comparing similar fish species' diets across the Chukchi and Beaufort seas. Ocean Sciences Meeting, Honolulu, HI, February 2014 (poster)
- Gray BP, Norcross BL. Fish diets across the Chukchi and Beaufort seas. Alaska Marine Science Symposium, Anchorage, AK, January 2014 (oral)
- Norcross BL, Holladay BA, Edenfield LE. Fish distribution across 200 miles of the Alaskan Beaufort Sea shelf. Alaska Marine Science Symposium, Anchorage, AK, January 2014 (poster)
- Walker KL, Norcross BL. The use of otoliths to compare three species from the Zoarcid family. 5th International Otolith Symposium 2014 (IOS2014) – ICES, Mallorca, Spain, October 2014 (poster)
- Walker KL, Norcross BL, Edenfield LE, Holladay BA. Length-Weight-Age Relationships of Demersal Fishes in the Beaufort Sea. Alaska Marine Science Symposium, Anchorage, AK, January 2014 (poster)

2013

- Gray BP, Norcross BL. Characterizing the diets of three abundant fishes in the Beaufort and Chukchi seas. Alaska Marine Science Symposium, Anchorage, AK, January 2013 (poster)
- Gray BP, Norcross BL. Comparing the diets of three abundant fish species across the Chukchi and Beaufort Seas. 28th Lowell Wakefield Fisheries Symposium: Responses of Arctic Marine Ecosystems to Climate Change, Anchorage, AK, March 2013 (poster)
- Gray BP, Norcross BL. Fish diets across the Chukchi and Beaufort Seas. Alaska Chapter, American Fisheries Society, Fairbanks, AK, October 2013 (oral)
- Norcross BL, Edenfield L. Beaufort Sea marine fish surveys. 28th Lowell Wakefield Fisheries Symposium: Responses of Arctic Marine Ecosystems to Climate Change. Anchorage, AK, March 2013 (oral)
- Norcross BL, Holladay BA, Edenfield L. Chukchi Sea Demersal Fish Data; Beaufort Sea Demersal Fish Surveys. SOAR – Fishes Workshop, Seattle, WA, May 2013 (oral)
- Norcross BL. Beaufort Sea marine fish surveys: Transboundary. Alaska Eskimo Whaling Commission, Fairbanks, AK, July 2013 (oral)
- Walker KL, Norcross BL, Edenfield LE, Holladay BA. Length-weight-age relationships of demersal fishes in the Beaufort Sea. Alaska Chapter, American Fisheries Society, Fairbanks, AK, October 2013 (poster)
- 2012
- Norcross BL, Edenfield LE. US Beaufort Sea fish communities. US–Canada Northern Oil and Gas Research Forum, Anchorage, AK, November 2012 (oral)
- Norcross BL. Arctic fisheries research. UAF Oil-Spill Research Meeting, Fairbanks, AK, August 2011 (oral)
- Norcross BL. UAF Beaufort Sea surveys. Alaska Eskimo Whaling Commission, Barrow, AK, February 2012 (oral)

Affiliated WWW Sites: <http://www.boem.gov/akstudies/>
<https://marinecadastre.gov/espis/#/search/study/26824>

Revised Date: February 6, 2019