

Environmental Studies Program: Completed Study

Title	Nearshore fish surveys in the Beaufort Sea (AK-17-x11)
Administered by	Alaska Regional Office
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Procurement Type(s)	USGS OCS Funds
Conducting Organizations(s)	USGS
Total BOEM Cost	\$778,728
Performance Period	FY 2018–2021
Final Report Due	September 2021
Date Revised	March 8, 2022
PICOC Summary	
<i><u>Problem</u></i>	More information is need about how the composition of nearshore fish communities have changed overtime in the Beaufort Sea and what habitat characteristics influence these changes. A better understanding of habitat associations and changes in community composition is needed to more fully assess how oil and gas development activities might impact these resources.
<i><u>Intervention</u></i>	Monitor the nearshore fish community composition at sites across the Beaufort Sea associated with oil and gas development.
<i><u>Comparison</u></i>	Results from this study will follow site selection and sampling protocol of a past study conducted by the USFWS. Species composition will be compared to determine potential temporal changes and possible changes due to a warming environment.
<i><u>Outcome</u></i>	This study will provide insight into the fish community assemblage of an Arctic kelp bed community that has been heavily studies as part of the ANIMDA project. It will strongly compliment previous efforts by providing contemporary nearshore information for comparison and improving our understanding of habitat use, and will facilitate a better understanding of the linkages between nearshore and shelf habitats.
<i><u>Context</u></i>	Beaufort Sea Planning Area

BOEM Information Need(s): Nearshore systems provide habitat to a unique community of marine and diadromous fish. Updated information on fish community and use of nearshore habitats will provide NEPA analysts with information for assessments and improve understanding of current susceptibility and risks. Continued production from the Northstar facility and anticipated offshore construction activities in Stefansson Sound (Liberty), Camden Bay, and Smith Bay all have the potential to impact nearshore habitats and fish communities along the Beaufort Sea.

Background: Nearshore lagoons and adjacent areas offer very different physical habitat with markedly warmer, lower salinity, protected waters as compared to the continental shelf. Nearshore lagoons area thought to be particularly important feeding, rearing, and migration habitat for diadromous fish species including Dolly Varden (*Salvelinus malma*) and Arctic cisco (*Coregonus autumnalis*), as well as key

marine species that serve as food resources for diadromous fish, marine mammals, and seabirds. These marine species include the ubiquitous Arctic cod (*Boreogadus saida*), which is known to move into lagoon habitats to feed in late summer and thought to spawn under ice during midwinter.

Arctic fish assemblages have been shifting with climate warming. Recent sampling in and outside Beaufort Sea lagoons near Kaktovik in August 2012 described a very different fish community compared to sampling in previous decades and suggests the possibility of major shifts in species distribution, abundance, and community composition. Complex dynamics in lagoons and differences among collection methods across studies make interpretations of any single snapshot difficult, but the pattern follows climate warming predictions and warrant further investigation.

This study will provide needed information and augment three recent efforts: (1) the Arctic Nearshore Impact Monitoring in Development Area (ANIMIDA), (2) US-Canada Transboundary Fish and Lower Trophic Communities study, and (3) the Kaktovik Summer Oceanography Program.

Objectives:

- Examine the composition of nearshore fish communities along spatial (central to eastern Beaufort Sea) and temporal (inter-annual) scales.
- Describe the distribution and abundance of marine and diadromous fish species in nearshore habitats in relation to known hydrographic (e.g., salinity, temperature) and biological (e.g., presence of kelp, epifaunal prey) drivers.
- Compare nearshore and continental shelf fish communities and individual attributes to investigate the role of nearshore habitats for marine fish.
- Engage local residents and students from Kaveolook School through the K-12 Oceanography Program (see <https://utmsi.utexas.edu/visit/summer-science/kaktovik-alaska/>).

Methods: Fyke nets and 1-m beam trawls will be used to sample fishes in lagoons and adjacent nearshore areas at depths < 20 m. Fyke nets have been consistently used to sample fish in the region and are most useful for documenting temporal changes in fish assemblages. Trawls provide access to habitat distant from the shoreline, are effective at sampling both within and outside of lagoons, and are the most comparable to collection methods used on the recent US-Canada Transboundary fish study. To ensure that data from small beam trawls will be comparable to beam trawls used during the Transboundary study, paired sampling using both gears types will be conducted at select sites. Individual fish attributes of interest will include length, weight, and trophic indicators (e.g., stable isotopes) for targeted fish and prey species.

Specific Research Question(s):

1. What is composition of nearshore fish communities in the central and eastern Beaufort Sea?
2. What is the distribution and abundance of marine and diadromous fish species in nearshore habitats in relation to physical and biological drivers?

Current Status: Completed Study

Publications Completed: None

Affiliated WWW Sites:

<http://www.boem.gov/akstudies/>

<https://marinecadastre.gov/epis/#/search/study/100273>