

*POTENTIAL CMI STUDIES, MMS ALASKA ENVIRONMENTAL STUDIES PROGRAM*

**Region:** Alaska

**Planning Areas:** Beaufort Sea

**Type:** CMI or Competitive, multiagency support

**Title:** Arctic cod distributions and habitats in the Beaufort Sea and their implications for upper trophic levels and endangered species

**Period of Performance:** Three to four years

**Description:**

Background

According to a recent Beaufort Sea Lease Sale EIS, arctic cod are thought to be the most significant consumer of primary production in the Beaufort Sea and to influence the distribution and movements of marine mammals and seabirds. Yet knowledge of Arctic cod spatial and seasonal distribution is extremely limited. Without a better understanding of Arctic cod only a fragmented and incomplete evaluation of the entire food chain is possible in Beaufort Sea EIS's and EA's. As oil exploration and development extends beyond the near shore brackish water zone, understanding of Arctic cod's role in the food chain is of increasing significance.

Beluga whales, ringed seals, bearded seal spotted seal, eiders, other marine birds and four-horn sculpin all feed on arctic cod. Polar bears and possibly walrus in turn feed on ringed seals, spotted seals and some bearded seals. These Arctic cod predators are known to occur throughout the Beaufort Sea from, from nearshore to at least 70 kilometers offshore, from shallow to the 200 meter isobath waters, associated with openwater, polynas, shorefast ice, floating ice and moving ice, and in both estuarine and marine waters.

In the Beaufort Sea, Arctic cod of all ages have been documented from inshore to 175 km offshore. in a few to 400 meters depths. Yet temperature and salinity preferences are unsubstantiated (They have been documented in 5-32 ppt salinity waters). Spawning locations are largely unknown. Spawning is thought to occur between November and February but catch of a few young larvae has led scientists to speculate that spawning could be as late as July in the Beaufort Sea. They are found singly and in large schools but there is no coherent idea of when or where.

To date MMS fisheries studies in the Beaufort Sea have focused primarily on the lagoons and bays (primarily Simpson Lagoon and a few in Camden Bay) and near shore brackish waters within 10 kilometers of the coast. Only one MMS study has evaluate Arctic cod (or any other Beaufort Sea fish distribution) further offshore and it occurred only late in the summer season of a year of maximum mixing of the nearshore zone .

### Objectives

- 1: Compilation of existing knowledge, and development of working hypotheses.
2. Workup of existing biological samples and unanalyzed data in the Beaufort Sea
3. Collection of new pertinent information.
4. Summary of Arctic cod distribution and life history patterns in the Beaufort Sea and synthesis of its role in the trophic structure.

### Phase I Methods

1. Summarize published and grey literature and collect local knowledge
2. Organize workshop to develop working hypotheses and to identify existence of unanalyzed data and biological samples.
3. Identify cooperative agency funding.

### Phase II Methods

4. Compile existing data and workup biological samples,
5. Perform a detailed comparative and statistical analysis
6. Refine working hypotheses and develop recommendations for synoptic geographic and seasonal sampling in the Beaufort Sea.

### Phase III Methods

7. Coordinate with other offshore research conducted in the region to gather new data in an efficient manner.
8. Summarize Arctic cod distributions and habitats in the Beaufort Sea and their implications for other trophic levels and endangered species

Importance to MMS The potential social costs of major coastal oil spills are a public concern associated with OCS development in the U.S. Insofar as the, comprehensive understanding of the event and its various effects are of importance to MMS Alaska OCS Region. This study will generate analysis of utility for EA and EIS documentation, and an empirically-based framework for predicting and managing social effects potentially resulting from major oil spills and resulting oil spill litigation.

**Date Information Required:** Interim information is due annually for NEPA documentation for proposed Beaufort Sea Lease Sales and for review of exploration, development and production plans. Draft Final report and data due six months before the end of the project.