

BOEM ENVIRONMENTAL STUDIES PROGRAM: Ongoing Studies

Region: Alaska

Planning Area(s): Beaufort Sea, Chukchi Sea

Title: Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (AK-12-07)

BOEM Information Need(s) to be Addressed: Whale species listed as threatened and/or endangered are known to, or potentially could, occur in areas that may be affected by oil and gas activities within the Chukchi Sea Planning Area. These include, but are not limited to the humpback (*Megaptera novaeangliae*), the fin (*Balaenoptera physalus*), and the bowhead (*Balaena mysticetus*), all of which are listed as endangered. Recent sightings of both humpback and fin whales in the Chukchi and/or Beaufort Seas, indicate a range expansion by one or both species. Gray (*Eschrichtius robustus*) and beluga (*Delphinapterus leucas*) whales also use these waters in large numbers. Under NEPA and the ESA, BOEM will be required to evaluate if and how Federal actions associated with oil and gas development may affect these whales. The occurrence, distribution and habitat use of these species in the areas concerned may play an important role in determining which areas are to be offered for lease, and the timing of potential exploration and development activities in certain areas.

Total Cost: \$4,502,000
plus Joint Funding (~\$4,024,000)

Period of Performance: FY 2012-2017

Conducting Organization: NOAA-NMML

BOEM Contact: [Carol Fairfield](#)

Description:

Background: Research underway on the Bowhead Whale Feeding Ecology Study (BOWFEST) indicates that large concentrations of bowhead whales feeding in the Barrow arch (Wainwright to Smith Bay) are attracted by prey and nutrients transported from the Bering Sea through Barrow Canyon and upwelled onto the Beaufort shelf near Barrow. Other large concentrations of whales, pinnipeds and water birds are found in the area and may be attracted by elements of the same mechanism. However, it is not clear exactly how this transport mechanism operates as these resources could be transported through the Chukchi Sea on the Alaska Coastal Current or by other sources of Bering Sea waters. This study will undertake to determine relationships between dominant currents passing through the Chukchi Sea and resources delivered to the Barrow Arch area and will provide information about the dynamic nature of those relationships relative to whale distribution and habitat utilization in the eastern-Chukchi and extreme western-Beaufort Seas.

The relationships between Chukchi Sea currents and the transport of nutrients and prey may be more dynamic than formerly appreciated and may be changing as a result of the

warming of the surface waters and increasing retreat of summer sea ice in the Chukchi. Recent observations of humpback and fin whales in the Chukchi Sea are likely a climate change-related range expansion that will continue in future years. Even as the range of these cetaceans appears to be expanding, with the exception of the bowhead whale, little is known about the population identities of any of the whales observed there. In the case of the humpback whales, it is possible that they are part of the relatively small western North Pacific stock. Information about the extent to which the region is important for humpback or fin whales is extremely limited. Gray whales make extensive use of the Chukchi for feeding and at least some gray whales have been documented in the area during every calendar month. Gray whales potentially could belong to stocks associated with either North America or Asia; the latter is considered to be critically endangered, with fewer than 150 animals remaining. Although gray whales have been documented in the Chukchi Sea by surveys over the past three decades, the ecology of the species has not been studied in the area. Over 10% of the Eastern Pacific Stock may use the Chukchi Sea for summer feeding. They are known to make extensive summer use of waters near the leased area and Peard Bay, areas of significant interest for industrial development. Beluga whales are frequent visitors to lagoons and coastal waters along the eastern Chukchi Sea coast. They are prized as a traditional species taken for subsistence and ceremonial purposes by Alaska Natives resident along that coastline. Beluga stock associations are not well known but belugas in the region are probably from a mixture of several stocks inhabiting the Chukchi Sea and Arctic Ocean.

Since all five species winter in, or south of, the Bering Sea, large numbers must pass through the Bering Strait during seasonal migrations to feeding grounds further north. Beginning at the Bering Strait, this research will investigate the currents and nutrient/prey transport process using methods and equipment developed for physical and biological oceanography. Additional work on the distribution, stock identity, and ecological relationships is needed for all five whale species and this all will be accomplished in a cooperative, highly-integrated study involving scientists supported by BOEM, the NSB DWM, and the NSF.

Objectives:

- Assess spatial and temporal patterns of use of the Chukchi Sea by endangered bowhead, fin and humpback whales, and beluga and gray whales.
- Assess population structure and origin of animals.
- Evaluate ecological relationships for the species, including physical and biological oceanography.
- Extend existing studies of bowhead whale foraging ecology into the Chukchi Sea to further understand the sources, transport and advection of krill from the Bering Strait.

Methods: This study requires technologies including satellite tracking, passive acoustic monitoring, genetic analyses, and oceanographic and biological methodologies and technologies.

Northern Bering Sea: Satellite tags will be attached to humpback and fin whales, and their movements through the Chukchi Sea will be monitored through the Argos system. No fin whales have been satellite tagged in this region. Up to 20 tags per species would be deployed in each of 4 years. Population structure and origin will be assessed by genetic analysis of biopsy samples. Areas where aggregations of whales occur will be targeted to increase the probability of successful tagging. For example, an aggregation of humpback whales tends to occur in the northern Bering Seas southwest of St. Lawrence Island (around the M8 oceanographic mooring). Sonobuoys will be used to target fin whales which use a triplet call that occurs in both the Bering and Chukchi Seas. An array of listening devices will be deployed through the Bering Sea to monitor occurrence and movement of large whales transiting through the area to facilitate tagging efforts and target whales that move into the Chukchi Sea.

Chukchi Sea/Bering Strait: In the Chukchi Sea, arrays of listening devices will be deployed in the Bering Strait and near Wainwright, Alaska, with the intention of monitoring the occurrence and movements of large whales transiting through the area. This study will also permit a full visual and acoustic survey to be conducted between Dutch Harbor and the Bering Strait/Wainwright. In addition, photo-id, biopsy sampling and satellite tagging will be attempted if humpback, fin and gray whales are found en route. Humpback, fin, and gray whales will be tagged in the region as practical. Cruises will be organized to extend similar research activities to those areas during years 3-4 of the study. Oceanographic surveys, including prey sampling, will be conducted in association with cruises, and will include studies of foraging ecology of bowheads using similar methods to those employed in the Beaufort Sea. Instrumented moorings may be deployed for year-around monitoring of oceanography and sound. The study will be integrated with other ongoing studies in the region including aerial surveys, passive acoustic monitoring and oceanography. Analysis of acoustic data from new and existing recording packages will investigate the occurrence of gray, humpback, fin and bowhead whales on a year-round basis.

Current Status: Ongoing

Final Report Due: July 2017

Publications Completed: None

Affiliated WWW Sites: <http://www.boem.gov/akstudies/>

Revised Date: August 2016

ESPIS: Environmental Studies Program Information System

All *completed* ESP studies can be found

here: http://www.data.boem.gov/homepg/data_center/other/espis/espisfront.asp