Environmental Studies Program: Ongoing Study

Field	Study Information
Title	Arctic Marine Biodiversity and Ecosystem Structure Data Analysis and Synthesis (AK-19-02-09)
Administered by	Alaska Regional Office
BOEM Contact(s)	Dr. Christina Bonsell (christina.bonsell@boem.gov)
Procurement Type(s)	Cooperative Agreement
Conducting Organization(s)	University of Alaska Coastal Marine Institute
Total BOEM Cost	$54,189, plus Joint Funding ($54,189)
Performance Period	FY 2020–2023
Final Report Due	July 2023
Date Revised	February 16, 2023
Problem	Changing environmental conditions and shifting ecological boundaries and functions in the Chukchi Sea require new lines of investigation to address rapidly arising research and management needs.
Intervention	A data synthesis and collaborative writing project will combine data and insights from the Arctic Marine Biodiversity Observing Network (AMBON) and the Chukchi Ecosystem Observatory (CEO).
Comparison	The synthesis will be compared to other observational networks and long-term monitoring efforts across the nation, the pan-Arctic, and the globe relative to functional changes in marine ecosystems.
Outcome	Advanced understanding of the Chukchi Sea ecosystem and new conceptual models for the rapidly evolving ecology of the Chukchi shelf relating to biodiversity.
Context	Western Arctic marine ecosystem and the Northeast Chukchi Sea

BOEM Information Need(s): The Arctic Marine Biodiversity Observing Network (AMBON) and the Chukchi Ecosystem Observatory (CEO) were initiated in the Northeast Chukchi Sea to provide comprehensive baseline data to inform responsible exploration and development of nonrenewable resources. With information from these efforts, resource managers are better able to balance potential impacts of proposed industrial activities with potentially affected populations and marine habitats. Although oil exploration activity in the Chukchi Sea has been temporarily discontinued, the changing Arctic environment (Danielson et al., 2020) and potential offshore industrial activity in the Beaufort Sea may increase vessel traffic and other industrial and commercial activities. Increased activity will demand attention from operators, resource managers, first responders, and residents of the region who depend on the sea.

Background: The goal of the AMBON project is to build a marine, biodiversity observation network for the United States Chukchi Sea continental shelf and to contribute to the network being developed nationally. The program employs a spatially extensive, transect-based survey to cover regions of inflow

and outflow of the Chukchi Sea and different water masses from coastal to mid-shelf. The AMBON and CEO programs are efforts to build multi-disciplinary time series observations within the Distributed Biological Observatory of the Chukchi shelf to better understand changes through time. The two efforts are operationally and scientifically complementary, with AMBON focused on larger-scale vessel-based sampling of the water column and seafloor, and CEO focused on year-round subsurface moorings.

Objectives: The purpose of this project is to synthesize data to improve our collective understanding of ecosystem functioning in the context of a changing ocean. The objectives are:

- Advance understanding of the Chukchi Sea ecosystem through a combined analysis of summer season, station-based measurement and year-round mooring-based observations.
- Review and update existing conceptual models and/or develop new conceptual models to describe the evolving ecological functioning of the Chukchi shelf.
- Identify information needs for future research.

Methods: The project will use informal discussions at a multi-day meeting. The meeting participants collaboratively developed new lines of investigation, brainstormed concepts, and co-developed new analyses, journal manuscripts, and outreach materials. Participants began by sharing new ideas and results in a rapid-talk format. Following was a mix of time dedicated to whole-group discussions and small group break-outs with daily reports back to the entire group, and discussion of updates to existing conceptual models.

Specific Research Question(s):

1. How can we better communicate and synthesize among the numerous research programs and researchers operating in the United States Arctic and sub-arctic?
2. How can we best extrapolate existing data to other places and times where data are sparse or lacking?
3. How can we better inform our understanding of ecosystem changes through time?
4. Where are the information needs that, if filled, would enhance our understanding?
5. What policy and management recommendations can be made based on an improved understanding of the ecosystem?

Current Status: Ongoing

Publications Completed: None

Affiliated WWW Sites:

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

https://www.uaf.edu/cfos/research/cmi/

References:

Danielson, S. L., O. Ahkinga, C. Ashjian, E. Basyuk, L.W. Cooper, L. Eisner, E. Farley, K.B. Iken, J.M. Grebmeier, L. Juranek, G. Khen, S. Jayne, T. Kikuchi, C. Ladd, K. Lu, R. McCabe, G.W.K. Moore, S. Nishino, S.R. Okkonen, F. Ozenna, R.S. Pickart, I. Polyakov, P.J. Stabeno, Wood, W.J. Williams, R.A. Woodgate, T.J. Weingartner. 2020, *in press*. Manifestation and consequences of warming and altered heat fluxes over the Bering and Chukchi Sea continental shelves. *Deep Sea Research Part II: Topical Studies in Oceanography.*