

BOEM ENVIRONMENTAL STUDIES PROGRAM: Ongoing Studies

Region: Alaska

Planning Area(s): Beaufort Sea

Title: Wading Shorebird Habitats, Food Resources, Associated Infauna, Sediment Characteristics and Bioremediation Potential of Resident Microbiota of Deltaic Mudflats (AK-11-10b)

BOEM Information Need(s) to be Addressed: More information is needed about species composition, abundance, or distribution of the microfauna and meiofauna living within the interstitial spaces of the littoral zones along the Beaufort Sea coast. Shorebirds depend on meiofauna for food for pre-migratory fattening. Additionally, these organisms make important contributions to bioremediation of oil spills as well as the chemical factors that determine their distribution. The information obtained from this research will contribute to development of mitigation measures and strategies to reduce potential impacts from OCS exploration and development and production activities.

Total Cost: \$365,236

Period of Performance: FY 2011-2016

Conducting Organization: University of Alaska Fairbanks

BOEM Contact: [Rick Raymond](#)

Description:

Background: Nearshore shelf areas of the Beaufort Sea are defined by specific biological and physical gradients that have influence on the Arctic ecosystem including trophic structure, productivity, and the species that inhabit there. Massive freshwater discharges from the Mackenzie River along with numerous smaller rivers produce an environment that is estuarine in characteristic. The features of these estuarine ecosystems vary in trophic structure and productivity. The role of terrestrial carbon in these estuarine food webs is especially important in view of current warming trends in the Arctic and from post-lease exploration and development. Shorebirds depend on invertebrates for food for pre-migratory fattening along the delta mudflats that are at the river face. Smaller organisms that supply food sources for these organisms may also make important contributions to bioremediation of oil spills as well as the chemical factors that determine their distribution. More information is needed about species composition, abundance, or distribution of the microfauna and meiofauna living within the interstitial spaces of the littoral zones along the Beaufort Sea coast. Combined with the distribution of these microfauna and meiofauna a link can be generated with a collection of the chemical stimulation of this biota by describing sediment size and the amount and source of organic carbon.

The Beaufort Sea coast includes a variety of biologically productive habitats in lagoons, barrier islands, river deltas, and adjacent tundra areas. These habitats support diverse

biota and could be affected by oils spills or disturbance resulting from OCS oil exploration in the Beaufort Sea. These ecosystems are particularly vulnerable to climate-change effects, such as inundation and increased erosion caused by rising sea levels, glacial melt, and longer periods of open water. More information is needed about the species composition, abundance, or distribution of the aquatic invertebrates along the Beaufort Sea coast. This information need extends to the lower trophic levels forming the base of these complex food webs and the biochemistry that influences these relationships. Their contributions to shore bird foraging, migration, and reproductive biology as well as bioremediation of oil spills has been shown to be important factors in the recovery and cleanup of past oil spill events in Alaska and other regions.

Objectives: The specific objectives of this study are to:

- Quantify the spatial and temporal distribution of bacterial assemblages, meiofauna, and macrofauna at coastal lagoons and river deltas along the Beaufort Sea coast within the Arctic National Wildlife Refuge at three sites associated with the coastal lagoons and deltas of Jago, Hulahula/Okpilak, and Canning Rivers.
- Characterize the sediment pore water chemistry for salinity, ammonium, organic carbon, chlorophyll a, stable carbon isotopic signature, and sediment grain size at sample locations representative of each site.

Methods: This study builds on an existing study with USGS to assess shorebird abundance and macrofauna assemblages and tiers off a previous MMS/CMI shorebird study by Abby Powell across the Beaufort and Chukchi Sea coasts. This study focuses intensively on a few sites along the coast of the Arctic National Wildlife Refuge. The USGS/ UAF/ BOEM partnership would collect data on a few sites intensively within the Arctic National Wildlife Refuge, including three sites associated with the coastal lagoons at the Jago, Hulahula/Okpilak, and Canning Rivers. This project will provide additional sampling locations and core analysis to analyze population structures, chemical footprint, numbers of individuals, and diversity of populations from the interstitial spaces within the littoral zone. The project will continue to map the distribution of common functional groups of invertebrates using spatial analysis kriging techniques. Results will produce data reflecting measures of abundance of benthic invertebrates using mudflat core samples to determine availability of food resources for shorebirds.

Current Status: Ongoing

Final Report Due: May 2016

Publications Completed:

Churchwell, R. T., S. J. Kendall, A. L. Blanchard, K. H. Dunton, A.N. Powell. 2015. Natural Disturbance Shapes Benthic Intertidal Macroinvertebrate Communities of High Latitude River Deltas. *Estuaries and Coasts*. DOI 10.1007/s12237-015-0028-2

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

Revised Date: April 2016

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