

## **BOEM ENVIRONMENTAL STUDIES PROGRAM: Ongoing Studies**

**Region:** Alaska

**Planning Area(s):** Beaufort Sea, Chukchi Sea

**Title:** Sensitivity to Hydrocarbons and Baselines of Exposure in Marine Birds on the Chukchi and Beaufort Seas (AK-13-03-02)

**BOEM Information Need(s) to be Addressed:** Baselines of exposure levels on avian species in the U.S. Arctic would provide invaluable reference information for monitoring population status and restoration efforts. Identification of sensitive species and populations will assist in assessments of new development activities, and development of long term monitoring strategies. BOEM analysts and decision-makers will use this information in NEPA analysis and documentation for Lease Sales, EPs and DPPs.

**Total Cost:** \$247,908  
plus Joint Funding (\$248,595)

**Period of Performance:** FY 2013-2016

**Conducting Organization:** CMI, UAF

**BOEM Contact:** [Rick Raymond](#)

### **Description:**

**Background:** With the potential of increasing development of oil and gas resources in the Chukchi and Beaufort Seas, establishment of baselines and assessment of sensitivity of arctic biota to hydrocarbon exposure would provide vital information needs for management and conservation of natural resources potentially impacted by development. Evaluating baselines of hydrocarbon exposure in selected avian species of subsistence importance [king eider (*Somateria spectabilis*), common eider (*Somateria mollissima*), and greater white-fronted goose (*Anser albifrons*)] in the Chukchi and Beaufort Seas will provide measurements of liver cytochrome P450 (CYP1A) enzyme activity. Study results will provide a first assessment of baselines for hydrocarbon exposure by forming a basis for further development of field programs for monitoring of exposure levels in marine birds in the Chukchi and Beaufort Sea region. In addition, results will provide information for assessment of current and future safety of subsistence caught food.

Bird sensitivity to hydrocarbons will be evaluated in a broader suite of marine bird species using species-specific cell culture methods. This longer list of species includes spectacled eider, Steller's eider (*Polysticta stelleri*), king eider, common eider, long-tailed duck (*Clangula hyemali*), greater white-fronted goose, black brant (*Branta bernicla*), and three species of alcids. These species represent a broader spectrum of candidate bioindicators of exposure and additional species of conservation and subsistence importance. Results from this study will provide guidance on further selection of suitable bioindicator species, based on their responses and sensitivity to

hydrocarbon exposure will provide information for assessment of relative risks of hydrocarbon exposure to the arctic biota.

Objectives:

- Measure baselines of hydrocarbon exposure in selected species of marine bird indicator species (species of subsistence importance) liver cytochrome (p450) activity.
- Assess and measure comparative sensitivity to hydrocarbon exposure in selected marine bird indicator species (larger suite of marine birds).
- Coordinate and collaborate field work with the North Slope Borough, Department of Wildlife.
- Coordinate with North Slope subsistence hunters to gather cell samples (spring, summer and fall).
- Conduct cell culture assays in laboratory.
- Share study findings to local communities through public outreach programs, produce poster and flyer and present at scientific conferences.

Methods: This study will utilize multiple criteria to select and identify suitable avian species as candidates for ecological monitoring programs. Measurement of liver 7-ethoxyresorufin-O-deethylase (EROD) activity in liver cultures allows for species specific assessment of magnitude and duration of cytochrome P450 (CYP1A) induction. EROD is widely used as an indicator of CYP1A induction and EROD results can be combined with other measurements to determine cellular or genetic effects, allowing evaluation of potential cellular or genetic pathology associated with hydrocarbon exposure. Liver samples to measure hydrocarbon-inducible CYP1A activity will be collected in collaboration with the North Slope Borough, Department of Wildlife Management and local hunters. Ultimately, this study will help in the development of guidelines and field sampling protocols by refining techniques for sample collection.

**Current Status:** Ongoing

**Final Report Due:** October 2016

**Publications Completed:** None

**Affiliated WWW Sites:** <http://www.boem.gov/akstudies/>  
<http://www.sfos.uaf.edu/cmi/>

**Revised Date:** July 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](http://www.data.boem.gov/homepg/data_center/other/espis/espisfront.asp)