

## Environmental Studies Program: Ongoing Study

Field	Study Information
Title	Quantifying Sea Otter Abundance, Distribution, and Foraging Intake in Cook Inlet Alaska (AK-20-04)
Administered by	Alaska Regional Office
BOEM Contact(s)	Dr. Christina Bonsell ( <a href="mailto:christina.bonsell@boem.gov">christina.bonsell@boem.gov</a> )
Procurement Type(s)	Intra-agency Agreement
Conducting Organization(s)	USGS
Total BOEM Cost	\$450,000
Performance Period	FY 2020–2023
Final Report Due	May 15, 2024
Date Revised	February 16, 2023
Problem	In Lower Cook Inlet (LCI), sea otter occurrence overlaps much of the Outer Continental Shelf (OCS) lease area (Garlich-Miller et al., 2018). Currently, information is limited on the effects of oil and gas development activities (e.g., seismic surveys and drilling infrastructure) on sea otter distribution and behavior.
Intervention	This study will assess spatial and temporal patterns of use by females with pups and the status of the LCI sea otter population relative to the available food resources as indexed by foraging energy intake rates.
Comparison	Researchers will conduct sea otter surveys to compare sea otter distribution patterns and quality of different areas of offshore foraging habitats between. Further, data from offshore foraging habitats will be compared with nearshore sea otter foraging data collected under separate U.S. Geological Survey (USGS) studies (Coletti et al., 2016) including additional USGS/U.S. Fish & Wildlife Service (USFWS) work in the LCI.
Outcome	Information gained from this study will inform incidental take authorizations under the Marine Mammal Protection Act (MMPA) for USFWS management needs and inform BOEM’s National Environmental Policy Act (NEPA) analyses.
Context	Cook Inlet

**BOEM Information Need(s):** Sea otters are protected under the MMPA and one of the LCI stocks is listed under the Endangered Species Act (ESA). Scientists need to understand the effects of seismic activities and potential future oil and gas activities on sea otter behavior and habitat to minimize impacts. This study will provide data on sea otter (*Enhydra lutris*) distribution, abundance, habitat quality, feeding and resting habitats in LCI. This research will provide baselines for monitoring sea otter responses to oil and gas development activities and will inform incidental take authorizations under the MMPA. Study results will support BOEM analysts and decision-makers in relation to cumulative assessment for NEPA analyses for lease sales, exploration plans, and development and production plans.

**Background:** Traditional, manned aerial observer-based surveys are routinely used to estimate abundance (Bodkin and Udevitz 1999), and shore-based observations of foraging otters are a sensitive metric for population status and habitat quality (Dean et al., 2002; Coletti et al., 2016). This study plans aerial photo and boat surveys to identify important sea otter feeding and resting areas in LCI, as well as address questions regarding seasonal differences in sea otter distributions.

**Objectives:**

- Provide information on sea otter distribution, abundance, and habitat use within the LCI, including identifying the spatial and temporal patterns of use by females with pups.
- Assess food habitat quality and the status of the sea otter population over relatively small spatial scales as it relates to proposed and existing oil and gas development efforts

**Methods:** USGS researchers will work with the National Park Service (NPS) and USFWS partners to continue development of a photo-based survey plan for manned aircraft to compare with vessel-based observers and “ground-truth” results. Researchers will develop protocols to collect survey imagery and foraging observation data, select sensors (e.g., forward-looking infrared thermal camera and digital single-lens reflex camera, lens and red-green-blue filter combinations for surveys, and ultra-high definition 1080p+ video camera for foraging observations), optimize flight patterns, and develop statistical procedures to account for diving sea otters (i.e., availability bias) that will allow unbiased estimates of true abundance from photo-based surveys. Researchers will identify forage available to sea otters using remotely operated vehicle (ROV) surveys to classify preferred benthic habitat and how these habitat characteristics compare across the LCI. ROV data will be useful to build predictive models of sea otter density and distribution.

**Specific Research Question(s):**

1. What effect might oil and gas development activities have on seasonal sea otter abundance and distribution in LCI?
2. Where are sea otter resting and foraging habitats in LCI and which habitats are of highest quality based on use and prey quality?
3. Are UAS surveys a better alternative than manned aircraft surveys with respect to image quality and disturbance levels to sea otters?

**Current Status:** Ongoing, fieldwork completed

**Publications Completed:** None

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

**References:**

- Bodkin, J. L., and M. S. Udevitz. 1999. An aerial survey method to estimate sea otter abundance. *Marine Mammal Survey and Assessment Methods*:13-26.
- Coletti, H. A., J. L. Bodkin, D. H. Monson, B. E. Ballachey, and T. A. Dean. 2016. Detecting and inferring cause of change in an Alaska nearshore marine ecosystem. *Ecosphere* 7:e01489-n/a.

Dean, T. A., J. L. Bodkin, A. K. Fukuyama, S. C. Jewett, D. H. Monson, C. E. O'Clair, and G. R. VanBlaricom. 2002. Food limitation and the recovery of sea otters following the 'Exxon Valdez' oil spill. *Marine Ecology Progress Series* 241:255-270.

Garlich-Miller, J. L., G. G. Esslinger, and B. P. Weitzman. 2018. Aerial Surveys of Sea Otters (*Enhydra lutris*) in Lower Cook Inlet, Alaska, May, 2017. USFWS Marine Mammals Management Technical Report MMM 2018-01. Available at:  
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