

Environmental Studies Program: Ongoing Study

Title	Quantifying Sea Otter Abundance, Distribution, and Foraging Intake in Cook Inlet Alaska (AK-20-04)
Administered by	Alaska Regional Office
BOEM Contact(s)	Rick Raymond, richard.raymond@boem.gov
Conducting Organizations(s)	USGS
Total BOEM Cost	\$450,000
Performance Period	FY 2020–2023
Final Report Due	TBD
Date Revised	June 5, 2020
PICOC Summary	
<i><u>Problem</u></i>	In Lower Cook Inlet (LCI), sea otter occurrence overlaps much of the Outer Continental Shelf (OCS) lease area (Garlich-Miller <i>et al.</i> , 2018). Currently, information is limited on the effects of oil and gas development activities (<i>e.g.</i> , seismic surveys and drilling infrastructure) on sea otter distribution and behavior. Additionally, more information is needed on the level of connectivity between the eastern and western LCI sea otter stocks.
<i><u>Intervention</u></i>	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. Genetic samples from a representative number of sea otters will be obtained from stocks in both eastern and western LCI to determine the level of variation between eastern and western stocks.
<i><u>Comparison</u></i>	Researchers will use UAS-based 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 <i>et al.</i> , 2016) including additional USGS/U.S. Fish & Wildlife Service (USFWS) work in the LCI that will begin in Fiscal Year (FY) 2019.
<i><u>Outcome</u></i>	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.
<i><u>Context</u></i>	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, and level of genetic isolation between eastern and western stocks 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 would apply aerial 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. In addition, a collaborative project involving USFWS and USGS includes capturing and radio tagging sea otters in LCI in FY 2020, which will provide a sample of animals for targeted survey work along with additional logistic support for this project. These two projects will complement each other.

Objectives:

- Document sea otter distribution and habitat use patterns relative to oil and gas development activities at appropriate temporal and spatial scales.
- Develop a cost effective and statistically defensible methodology to using multi-replicate, seasonal abundance surveys in LCI documenting annual changes in sea otter distribution and habitat use.
- Assess offshore habitat quality and sea otter foraging behavior for comparison with nearshore land-based foraging data.
- Collect blood samples from a representative number of sea otters from both the eastern and western LCI stocks for genetic analysis.

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.

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?
4. How much genetic isolation exists between eastern and western stocks of LCI sea otters?

Current Status: Ongoing, fieldwork delayed due to COVID-19 response

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: https://www.fws.gov/alaska/fisheries/mmm/seaotters/pdf/2017_Cook_Inlet_Sea_Otter_Survey_Final_Report.pdf