Field	Study Information
Title	Updating Lower Cook Inlet Seabird Colony Counts
Administered by	Alaska Regional Office
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Procurement Type(s)	Interagency Agreement
Performance Period	FY 2024–2027
Final Report Due	TBD
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Problem	Locations, species composition, and sizes of seabird colonies in Lower Cook Inlet (LCI) and associated regions are important to guide prudent development of energy resources. Large fluctuations in seabird breeding distribution and abundance are occurring at multiple seabird colonies. A comprehensive population survey of seabird colonies in LCI is necessary to update baseline data to assess the potential effects of current and future stressors.
Intervention	Information on seabird colony locations, species, and abundance will be collected for LCI. Census efforts will prioritize information about colony size and species of concern within the outflow of LCI, including Shelikof Strait, the Kodiak Archipelago, and the Kenai Peninsula.
Comparison	To compare and quantify numbers of breeding seabirds at colonies in the LCI region, the study will use traditional boat-based census counts, population estimates using emerging technology, photographic counts with machine learning software, and indices derived from marine-band radar. In addition to highlighting new colony locations, results will be evaluated with historic colony estimates to document differences in seabird abundance and breeding distribution.
Outcome	This study will produce defensible estimates of breeding bird populations in the Cook Inlet Planning Area.
Context	Lower Cook Inlet and Shelikof Strait.

BOEM Information Need(s): A better understanding of seabird population distributions, relative abundance and species compositions in LCI is needed to evaluate potential impacts from oil and gas activities. Colony surveys provide important data needed to assess and mitigate potential effects of oil and gas activities, vessel traffic, oil spills, disturbance, and Highly Pathogenic Avian Influenza (HPAI) on seabird populations. Updating population estimates of breeding seabirds and colony locations in LCI will help to inform the effects of climate change and improve the assessment of potential impacts from industry activities and potential oil spills. Advances in seabird colony survey methods using innovative technology can provide cost-efficient, precise, and accurate estimates of population abundance, and can be used to improve traditional boat-based seabird colony surveys. The information collected will inform environmental analyses for potential impacts from future lease sales and exploration plans, and development and production plans. The study will provide information about ongoing trends related to

cumulative impacts, including climate change effects on seabirds, help evaluate potential impacts from industry activities, and identify possible mitigation measures.

Background: Alaska supports North America's greatest concentration of seabirds with an estimated 40 to 50 million individuals breeding in Alaska, or roughly 75% of North America's seabirds (USFWS 2009; Stephensen and Irons 2003). An additional 40 to 45 million seabirds that breed outside Alaska spend the austral winter feeding in Alaska waters with Alaskan-breeding birds. Seabirds are long-lived, conspicuous, and feed near the top of marine food web making them ideal biological indicators of marine health. These characteristics, coupled with their tendency to nest in large colonies, allow seabirds to be counted and monitored relatively easily. By studying seabirds, scientists can detect variability in their prey abundance and diversity and environmental changes that affect seabirds. The LCI and outflow (Shelikof Strait, northern Kodiak Archipelago, Kenai Peninsula) support approximately 325 seabird colonies totaling over a half million breeding birds. Traditionally, breeding seabird populations are estimated from colony-based censuses, though seabirds from these colonies forage offshore (up to 200 km; Boersma and Wheelwright 1979) and diverse survey methods are needed to minimize undercounting these populations. Funding for surveys has been largely unavailable over the past three decades. Information currently archived in the North Pacific Seabird Colony Register (NPSCR) for the LCI, and associated regions is nearly 40 years old; the average year of the "Best Current Estimate" in the NPSCR, managed by the U.S. Fish and Wildlife Service, is 1982. In the 1970s and 1980s, the USFWS led marine bird surveys in the LCI as part of the Outer Continental Shelf Environmental Assessment Program (OCSEAP) to provide information needed for decisions regarding offshore oil and gas development. Following OCSEAP, survey efforts were reduced and assessing the damage to marine bird populations following the 1989 Exxon Valdez Oil Spill (EVOS) in Prince William Sound was difficult because of the lack of updated baseline information (Ford et al. 1996). After EVOS, the USFWS investigated marine bird populations in the spill-affected area, but survey efforts again tapered off due to lack of funding. Nearly 25 years later, an unprecedented multi-year marine heatwave occurred in the Gulf of Alaska, where massive seabird die-off events occurred and populations at many colonies experienced complete reproductive failure (Piatt et al. 2020). In 2022, the occurrence of HPAI in Alaska created another potential impact to seabirds; however, negative effects have been largely limited to scavengers (e.g., gulls, jaegers) and have not caused any known widespread mortalities at breeding colonies. However, HPAI strains are now evolving with unknown risks to migratory birds. Efforts to fully assess the impacts of these events are once again hampered by the lack of updated baseline information.

Objectives:

- Establish current estimates of distribution, species composition, and abundance of seabirds in approximately 325 known LCI colonies and identify any new colony locations to determine potential changes that have occurred over the past 40–50 years.
- Evaluate alternative survey methods and emerging technologies to estimate seabird abundance and develop a protocol that balances statistical confidence, repeatability, feasible methods, and reasonable costs.
- Provide information to BOEM on important marine bird areas based on number of individuals and species of conservation concern that will allow the Bureau to develop a more accurate Oil Spill Risk Assessment and inform an appropriate and feasible oil spill response strategy in the event of an oil spill.
- Update the North Pacific Seabird Colony Register used in the National Ocean and Atmospheric Administration's online Environmental Response Management Application tool (ERMA).

Methods: An array of field methods is required to accurately assess breeding numbers of different seabird species, depending on behavior (i.e., ledge vs. burrow/crevice nesting) and colony accessibility. Researchers at USFWS will collaborate with the U.S. Geological Survey (USGS) to develop and apply emerging technology protocols to estimate abundance of ledge nesting breeding seabirds (e.g., murres, kittiwakes). New and current technologies such as marine-band radar and photographic surveys from fixed-wing aircraft and helicopters will be used to collect relative abundance of species and densities of seabird colonies and to minimize potential undercounting. Working with partners at the Alaska Maritime National Wildlife Refuge and Alaska Biological Research, Inc., researchers will develop population indices of burrow nesting seabirds (e.g., tufted and horned puffins). Methods used to update census information at the 325 colonies will complement current work being conducted by USGS to expand understanding of all seabird species breeding in the LCI region.

Specific Research Question(s):

1. What are current population indices and the current population estimates, locations, and species composition of seabird colonies in LCI and adjacent coastlines?
2. How does seabird breeding distribution, composition and estimates of abundance differ from previous colony surveys in the 1970s and 1980s? What are the ranges of variability for colony population changes over the last 40–50 years?
3. Do new technologies for quantifying seabird distribution and abundance provide robust measures (i.e., repeatable and defensible during oil spill mitigation)?

Current Status: N/A

Publications Completed: N/A

Affiliated WWW Sites: N/A

References:

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