Field	Study Information
Title	Passive Acoustic Monitoring for Cetaceans in Lower Cook Inlet, Alaska (AK-25-03
Administered by	Alaska Regional Office
BOEM Contact(s)	Christina Bonsell (christina.bonsell@boem.gov)
Procurement Type(s)	Interagency Agreement
Conducting Organization(s)	NOAA
Total BOEM Cost	$929,500 ($1,002,000 in-kind support)
Performance Period	FY 2025–2028
Final Report Due	TBD
Date Revised	26 August 2024
Problem	Information is needed on the seasonal occurrence of cetaceans in Lower Cook Inlet. Contemporary data on the presence and/or absence and seasonal occurrence of these species are needed to: (i) determine movement into, and seasonal use of Lower Cook Inlet; and (ii) identify and evaluate potential effects from Outer Continental Shelf (OCS) renewable energy activities.
Intervention	Year-round passive acoustic monitoring will provide information on the seasonal presence of cetaceans at the entrance of Cook Inlet and their occurrence in specific areas known to have the highest potential for wind and hydrokinetic renewable energy potential.
Comparison	The results of this study will inform the design and implementation of appropriate mitigation measures and be used for Endangered Species Act (ESA) Section 7 consultation, National Environmental Policy Act (NEPA) analysis, and Marine Mammal Protection Act (MMPA) incidental harassment authorization requests.
Outcome	Seasonal occurrence of cetaceans in Lower Cook Inlet, including information required to assess potential impacts at sites with the highest potential for wind and hydrokinetic renewable energy.
Context	Lower Cook Inlet

BOEM Information Need(s): Data on the seasonal occurrence of cetaceans in Lower Cook Inlet (LCI) are required to assess potential effects of conventional and renewable energy development, including potential impacts of underwater noise. Results will address regulatory requirements under the ESA, MMPA, and NEPA.

Background: Federal agencies need reliable information on the abundance and distribution of the cetacean species occurring in Cook Inlet and adjacent coastal areas to accurately evaluate potential impacts to these stocks. Cook Inlet and adjacent coastal areas are frequented by up to three different populations of humpback whales, two stocks of which are currently listed under the Endangered Species

Act (ESA). ESA-listed fin whales are also common seasonal visitors to LCI and forage in adjacent areas year-round. Other endangered species that use waters in and around the lower Cook Inlet, include routine, infrequent use by Cook Inlet belugas (CIB), and North Pacific right whales (NPRW) (e.g., Stevenson Entrance mooring data; NOAA, unpublished data). Other non-endangered cetacean species are also present in LCI, but data on their seasonality, stock structure, and/or abundance are sparse or do not exist (e.g., killer, minke, and gray whales, harbor and Dall's porpoise).

Cook Inlet has recently been surveyed and determined to be capable of annually producing 18 gigawatts of energy from tidal power, in addition to 95 gigawatts of potential power from wind (Meadows et al. 2023). Information about baleen whale presence in and around Cook Inlet is needed if BOEM is to comply with NEPA, the MMPA, and ESA and pursue renewable energy efforts in and near LCI (Young et al. 2023).

NOAA has successfully used passive acoustic monitoring equipment to record the occurrence and foraging behavior of CIB in Cook Inlet (Castellote et al. 2023; Kumar et al. 2024) and presence of NPRW in the Gulf of Alaska (NOAA, unpublished data). The focus has been on these species due to their very low population numbers (331 for belugas; 31 for NPRW). Contemporary information on the occurrence, of NPRW, sei, sperm, blue, fin, and gray whales is lacking or dated for LCI. Presence of these large, migratory cetacean species in LCI is likely tied to oceanography at the inlet entrance, namely strong inflow events (NOAA, unpublished data). These events impact nutrient supply, ventilation, and productivity to the extent that periods with enhanced flow may lead to higher food availability for marine mammals.

Use of passive acoustic monitoring and oceanographic moorings will allow BOEM to (i) characterize the seasonal occurrence of beluga, humpback, NPRW, sei, blue, fin, and gray whales at the entrance of Cook Inlet, and evaluate potential environmental drivers; (ii) evaluate their occurrence near sites with the highest potential for wind and hydrokinetic energy development; and (iii) characterize anthropogenic sound sources in the monitored area. A BOEM-funded study (Meadows, et al. 2023) identified two wind energy locations and one hydrokinetic energy location in the LCI OCS that have high potential in providing ocean-based renewable power. This study would gather information on cetaceans, the soundscape, and oceanography for use in future BOEM planning, environmental analyses, and consultation documents.

Objectives:

1. Determine occurrence of humpback, fin, minke, NPRW, sei, sperm, blue, fin, and gray whales in at the entrance of Cook Inlet, near the areas with the greatest potential for wind and hydrokinetic energy development.
2. Evaluate inflow events at the entrance of Cook Inlet, and their connection to cetacean occurrence.
3. Characterize anthropogenic sound sources in the monitored area.

Methods: Passive acoustic moorings, both including wideband sound recorders and echolocation loggers, will be deployed the three entrances to LCI (e.g., at historical oceanographic mooring sites in Stevenson and Kennedy Entrances and in northeast Shelikof Strait) and will include oceanographic instrumentation. The three moorings will record currents throughout the water column and subsurface water properties hourly, allowing for tidal and lower frequency flow estimates. Relationships of inflow to available wind measurements will be quantified, and changes in inflow will be analyzed in the context

of marine mammal occurrence. The Stevenson Entrance mooring has been collecting data since 2022, and will be available to turn-around in year 1.

Specific Research Question(s):

1. What are the seasonal movements of humpback, fin, minke, NPRW, sei, blue, fin, and gray whales into Cook Inlet and do these species occur near sites with the greatest potential for wind and hydrokinetic energy development?
2. What oceanographic conditions are correlated with the presence of each cetacean species detected?

Current Status: N/A

Publications Completed: N/A

Affiliated WWW Sites: N/A

References:

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