

# Study to be Discussed

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<b>41</b>	<b>MM</b>	<b>Chukchi Acoustic, Oceanography and Zooplankton Study: Hanna Shoal (Extension of CHAOZ)</b>	<b>2</b>
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AQ = Air Quality IM = Information Management PO = Physical Oceanography		FE = Fates & Effects SS = Social Systems HE = Habitat & Ecology	MM = Marine Mammals and Protected Species REN = Renewable Energy

\* Denotes project that remains contingent on collaboration with external groups.



## **BOEM Information Need:**

- Information from this study will document the physical and biological dynamics in the Hanna Shoal region, including the temporal and spatial distribution of marine mammals. Findings may be used for evaluating potential deferral areas and other potential limitations on offshore leasing, exploration, and development. This study will provide useful information to support NEPA analysis and documentation for Beaufort and Chukchi Sea Lease Sales, exploration plans, development and production plans, consultations under the ESA and MMPA, and monitoring protocols for adaptive management.



## Background:

### A) Relationship with Previous Work/Efforts

- This study will refocus the acoustic and biophysical monitoring begun under the study “COMIDA: Factors Affecting the Distribution and Relative Abundance of Endangered Whales” to the region of Hanna Shoal.



## **Background:**

### **B) Relationship with Concurrent/Future Efforts**

- This study will coordinate closely other research efforts in the northeastern Chukchi Sea, including the BOEM funded Hanna Shoal Ecosystem Study and Use of the Chukchi Sea by Endangered Baleen and Other Whales.



## **Study's Objectives:**

- Assess the spatial and temporal distribution of marine mammals near Hanna Shoal and implement a tonal detector/classifier for all marine mammal species of interest to BOEM in the Arctic.
- Describe patterns of current flow, hydrography, ice thickness, light penetration, and concentrations of nutrients, chlorophyll and large crustacean zooplankton.
- Evaluate the extent to which variability in environmental conditions such as sea ice, oceanic currents, water temperature and salinity, and prey abundance influence whale distribution and relative abundance.
- Develop a quantitative description of the Chukchi Sea's noise budget, as contributed by biotic and abiotic sound sources, and continuous, time-varying metrics of acoustic habitat loss for a suite of arctic marine mammal species.

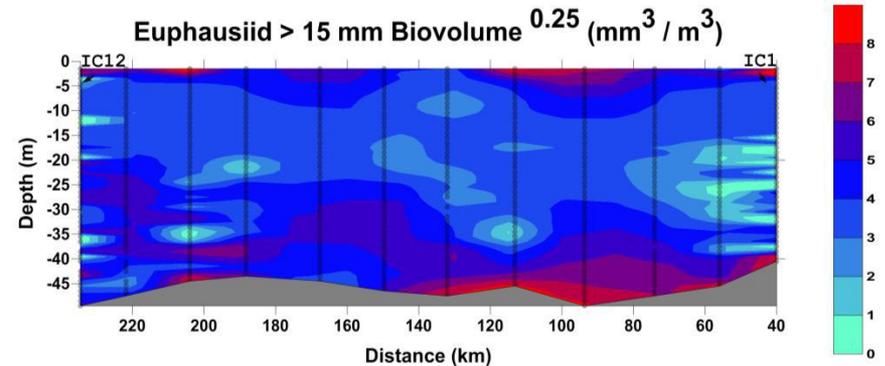
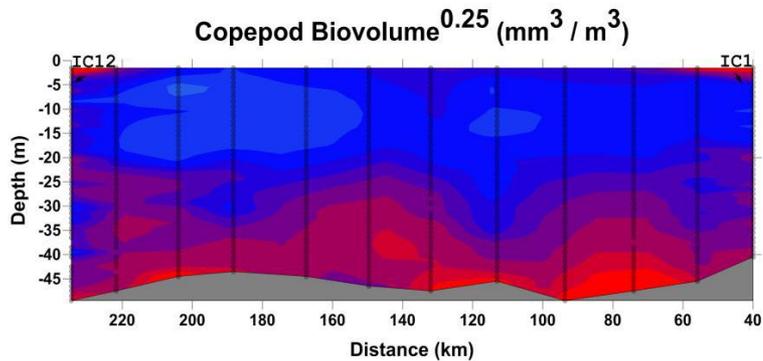
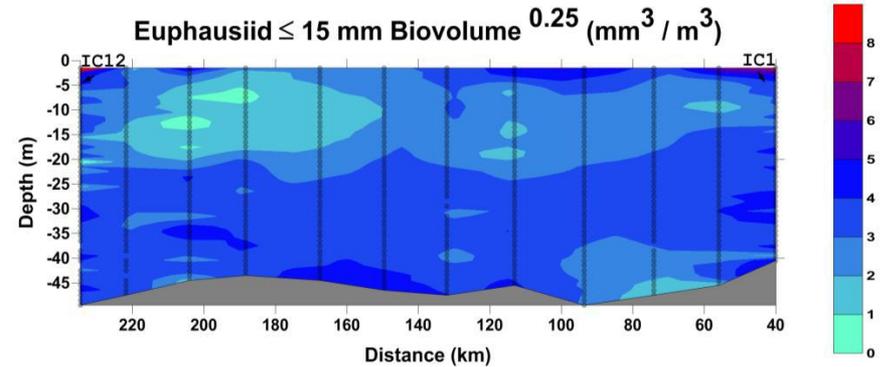
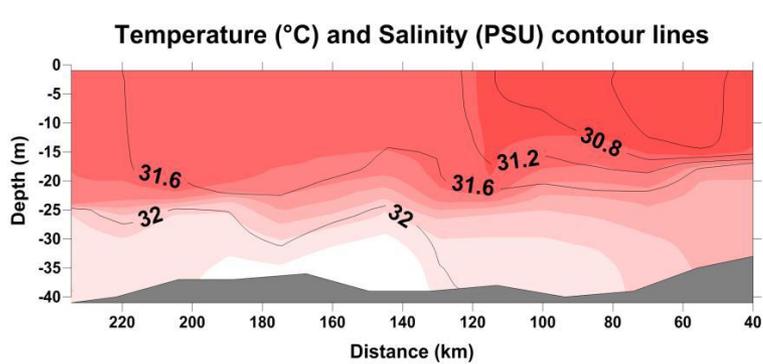


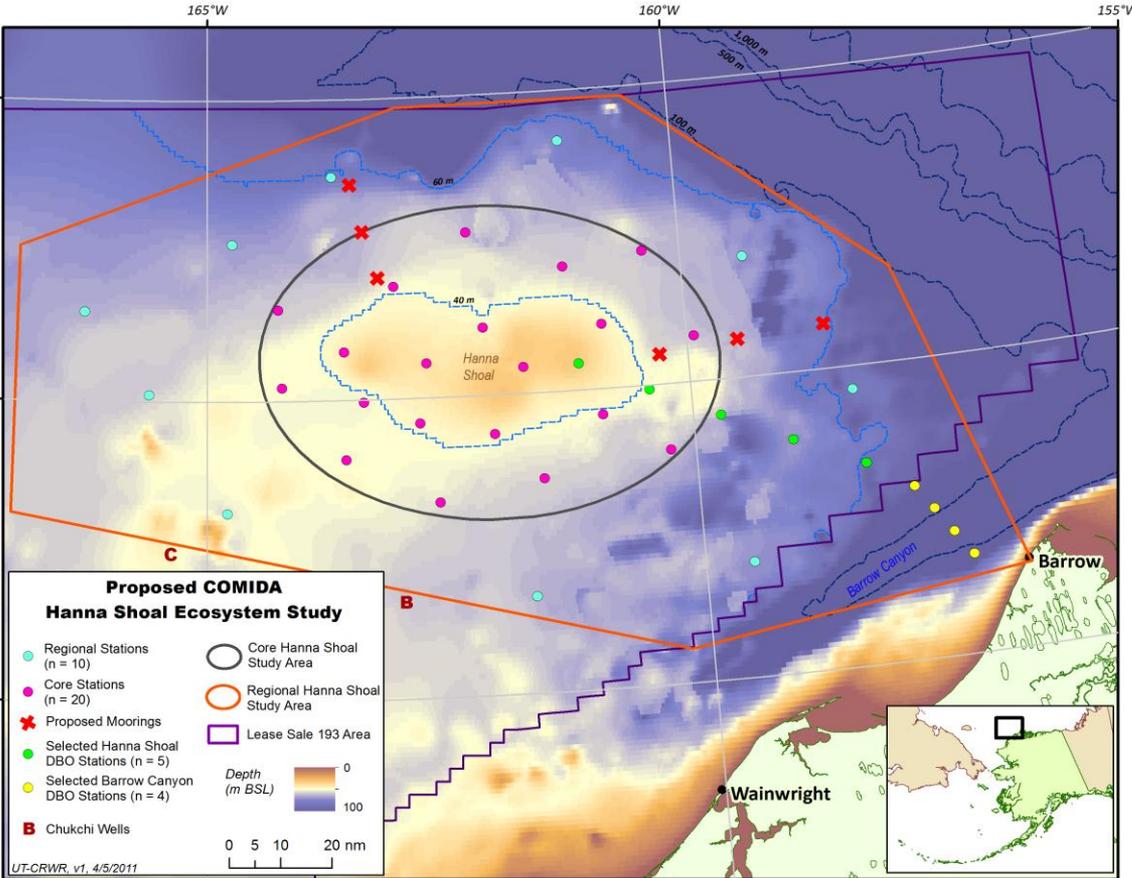
## **Methods:**

- The study will use long-term passive acoustic recorder moorings and opportunistically deployed sonobuoys to monitor vocalizing marine mammals. Data will be analyzed for whale calls to estimate: seasonal and inter-annual variability in occurrence by species, variation in occurrence due to changes in ice extent, and types and strengths of anthropogenic noise in the study area.
- Biophysical moorings and active acoustic moorings for zooplankton will collect information on currents, hydrography, ice, nutrient and chlorophyll concentrations, etc.
- Autonomous and real-time passive acoustic recording systems will be used to monitor the Chukchi acoustic ecosystem and quantify changes in its acoustic habitat as a function of natural and man-made noise contributors. These data will populate models of the acoustic environment that are currently under development.



# Results from Zooplankton Sensors





This proposed study would coordinate with the Hanna Shoal study. Mooring locations would be chosen to complement those from the Hanna Shoal Study.