Environmental Studies Program: Ongoing Study

Title	Early Detection Plan for Marine Non-native Species on the Arctic Outer Continental Shelf (OCS) (AK-20-07)
Administered by	Anchorage, Alaska Office
BOEM Contact(s)	TBD
Conducting Organizations(s)	TBD
Total BOEM Cost	TBD
Performance Period	FY 2020–2023
Final Report Due	TBD
Date Revised	October 16, 2019
PICOC Summary	
Problem	The threat of introductions of marine Non-Native Species (mNNS) in the Arctic is increasing with the uptick in Arctic shipping activity and infrastructure development. Coastal communities that are reliant on the services that marine ecosystems provide are particularly vulnerable. Early detection of mNNS is vital for potential control, eradication, and prevention of further spread.
Intervention	This project will create a baseline record of marine biodiversity, both by establishing monitoring plans and by collecting reference taxonomic and molecular samples of marine invertebrates, algae, and hard substrate community organisms in the Beaufort Sea and Chukchi Sea. The project will also capture the state of local traditional knowledge (LTK) on mNNS and establish long-term monitoring of the coastal ecosystem, offering a direct and cost-effective way to detect presence of mNNS.
Comparison	This monitoring complements ongoing measures by multiple organizations elsewhere in Alaska (*e.g.*, Prince William Sound, Cook Inlet, Boulder Patch & Kelp Communities) to establish a baseline record of plankton, algae and hard-substrate communities, including those currently associated with existing infrastructure in state waters. Repeat monitoring in the future will enable detection of introduced species against natural variability.
Outcome	This study will create a baseline data record that incorporates LTK and establish continued monitoring involving local residents at offshore infrastructure.
Context	Beaufort Sea and Chukchi Sea, focusing on areas with existing or potential future offshore infrastructure.

BOEM Information Need(s): BOEM is required under the National Environmental Policy Act (NEPA) to evaluate potential impacts that may be associated with Outer Continental Shelf (OCS) oil and gas exploration, development, and production activities. Potential introductions of mNNS to the U.S. Arctic are a recognized issue in relation to increases in ship traffic, including vessels related to offshore oil and gas activities. During the Liberty project approval process the need for mNNS monitoring was

emphasized during an Essential Fish Habitat Consultation with the National Oceanic & Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS). Results from this study will inform cumulative effects analyses under the National Environmental Policy Act (NEPA) for future lease sales and may facilitate development of potential mitigation measures.

Background: New infrastructure on the Alaska OCS would create new habitats that could be optimal for establishment of mNNS. Ship traffic to support installations and ocean warming further increase the potential for the introduction of mNNS. Because of the remoteness of the Arctic Ocean, monitoring for mNNS has not been a primary focus, but the risk of introductions is increasing.

The project will complement BOEM-supported efforts in Cook Inlet (*e.g.* NT-x10; Expanded Guide to Some Common Fouling Invertebrates of Alaska with Focus on Known and Potential Marine Invasive Species Kachemak Bay Marine National Estuarine Research Reserve), contribute to AK-15-01 (Arctic Marine Biodiversity Observing Network [AMBON]), and augment AK-11-14 (Arctic Nearshore Impact Monitoring in Development Area [ANIMIDA] III: Boulder Patch and other kelp communities in the development area). Additionally, it will capture LTK and make it accessible to a global audience (*e.g.*, through the Alaska Ocean Observing System [AOOS] and Local Environmental Observer [LEO] network). This study also could help to extend the reach of PlateWatch (platewatch.nisbase.org), a citizen science network operational in southeast Alaska, and parallel efforts by the Prince William Sound Regional Citizens' Advisory Council to monitor plankton communities.

Objectives: This project will:

- Establish a monitoring scheme for detection of attached and planktonic mNNS in the vicinity of offshore infrastructure in the Arctic.
- Record LTK for comparison and inclusion into biological assessments.
- Establish a continued monitoring scheme that includes citizen science with participation by local residents.

Methods: Biological surveys will include deployment of settlement devices (ceramic panels) to monitor the fouling community, and plankton tows and collection of open water environmental deoxyribonucleic acid (eDNA) samples to detect and quantify invertebrate assemblage composition. Taxonomic and genetic data will be verified by experts, compared with and submitted to public databases (*e.g.*, Ocean Biogeographic Information System [OBIS], GenBank) to establish identity and likelihood of mNNS. Species records will be published on the AOOS website, sequences will be accessible through GenBank. The data will also be linked with results from other relevant projects, such as the AMBON and the Arctic Shelf Growth, Advection, Respiration and Deposition Rate Experiments (ASGARD).

The status of LTK as it relates to marine invertebrates and introductions of non-native species will be captured via community and panel discussions (AK-15-05: *Traditional Knowledge Implementation: Accessing Arctic Community Panels of Subject Matter*

Experts) and digitization of physical records. Local citizens will be involved with the field surveys and plans to establish a long-term monitoring scheme.

Specific Research Question(s):

1. What do marine invertebrate communities look like near proposed installations in the OCS?
2. Are marine species being introduced to the region in association with oil and gas exploration activities?
3. How can LTK inform mNNS monitoring and management?

Current Status: Planned new start

Publications Completed: None

Affiliated WWW Sites: http://www.boem.gov/akstudies/