

Listening for bearded seals (*maklak/ugruk*) near Togiak Island and Utqiagvik, Alaska

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-in collaboration with-

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Take Home Message: Hydrophones have been deployed in Utqiagvik, AK (September 2023) and will be deployed in Bristol Bay, AK (February 2024) to listen for bearded seals.

Overview: Bearded seals are a critical component of Alaskan Native subsistence culture along the Bering, Chukchi, and Beaufort seas^{1,9}. Seals are a source of food; skins are used for clothes, boats, and crafts, and the activities surrounding seal hunting, processing, and use, are culturally important. The role of declining sea ice and shifting habitat characteristics on ice seals during the breeding season have been widely identified as a subsistence priority^{2,17}. Over the past three years, during annual meeting of the ISC, representatives from indigenous communities from Togiak Island in Bristol Bay and from Utqiagvik in the North Slope Borough (NSB), expressed concern that there may be changes in the arrival, departure, and residency time of bearded seals associated with sea ice loss, and possible negative implications associated with manmade noise and habitat changes during the breeding season.

As recently as the 1970's both regions were known to host breeding populations of bearded seals. The contemporary experience of bearded seals in these two regions, however, is contrasting between the North Slope and Bristol Bay. In Bristol Bay, the more southern of the two locations, sea ice that was previously common in spring is no longer present. According to local people from Togiak Island, bearded seals began to decline between 1970 and 1990 and have become rare. Currently, the arrival and departure of bearded seals appears to have de-coupled from traditional ecological knowledge, resulting in communities that are unsure if bearded seals are present and undetected, or if they have abandoned the area as a breeding ground. In Utqiagvik, contemporary bearded seal populations are robust, but initial analysis of long-term data indicates that breeding phenology is growing unpredictable in response to changing ice conditions.

We propose to use historic and contemporary acoustic datasets alongside remotely sensed ice cover data to investigate if and how ice seals alter their breeding timing and duration, and reproductive performance (calling behavior) in response to sea ice loss and anthropogenic noise, as well as to determine if bearded seals have been extirpated from Bristol Bay. This project was developed in collaboration with the Bristol Bay Native Association (BBNA) and the North Slope Borough (NSB) to address concerns about bearded seal population health in light of climate change. This work is critical for protecting access to this subsistence species and is significant for developing industrial management plans prior to the total loss of summer sea ice in the Arctic.

Contemporary Data Collection: In September of 2023, a five-element hydrophone array was deployed in Utqiagvik to monitor bearded seals as part of a NPR-A grant. This array will record

until summer of 2024. Similarly, two hydrophones will be deployed in Bristol Bay in Spring (February) of 2024 to listen for bearded seals, as well as any other relevant marine mammal species in the region (potentially walrus and/or whales). work, funded by the University of New Hampshire, will also include monitoring for vessel presence, and temporal overlap between anthropogenic activities and subsistence species. At both locations, instruments are bottom mounted, and do not contain a surface expression. This minimizes the possibility of entanglements, lowers flow noise, and may reduce the likelihood of interactions with fisheries (see schematic below).

Students from Togiak High School will join researchers from the University of New Hampshire on the water to deploy the instruments in spring 2024 and will have an opportunity to listen to bearded seal recordings and learn about the ecology of bearded seals.

Hydrophones from both locations will be recovered in the summer of 2024 and will be analyzed by researchers at the University of New Hampshire.

Primary Project Objectives:

- 1- Identify shifts in timing and duration of bearded seals associated with sea ice conditions spanning in the Alaskan Arctic and sub-Arctic
- 2- Identify if Bristol Bay has been abandoned as a bearded seal breeding ground, or if bearded seals continue to use the region at unknown times

Secondary Objectives:

- 1- Identify temporal overlap between anthropogenic activities and subsistence species
- 2- Identify if/how bearded seals adjust their breeding call source levels (loudness) or frequency (pitch) to compensate for elevated anthropogenic noise
- 3- Identify if bearded seals respond similarly to anthropogenic noise sources and natural noise sources (i.e., determine if anti-masking strategies transferable)

