

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

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-in collaboration with-

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Key Findings: (1) In 2023-2024, bearded seals, as well as several other ice seal species (ringed and ribbon seals) were acoustically detected. Bearded seal breeding season began acutely on March 21st, 2024. Additional historic datasets have been identified to look at multi-decadal calling trends and timing of breeding. (2) Hydrophones from Togiak should be recording and will be recovered in summer. (3) Statistical analyses indicate that peak reproductive calling periods occur ~5 days following ice break up, and low ice years have higher bearded seal calling which may impact acoustic ecology of other species.

Background: Bearded seals are an essential part of Alaskan Native subsistence culture across the Bering, Chukchi, and Beaufort seas. Declining sea ice and changing habitats during the breeding season have raised concerns, prompting interest in acoustic studies to track seal residency, timing, and breeding behavior.

Historically, both Togiak and Utqiagvik hosted breeding populations of bearded seals. However, their presence has diminished in Bristol Bay, where spring sea ice has disappeared, and seals are now rarely seen. Local observations suggest a significant decline in bearded seals between 1970 and 1990, leaving communities uncertain if seals remain undetected or have abandoned the area. In contrast, Utqiagvik's seal populations are robust, but their breeding patterns are becoming less predictable due to changing ice conditions.

This project uses acoustic data and satellite ice cover analysis to study how seals adjust their breeding behavior in response to environmental changes and human noise. It also examines whether Bristol Bay has been abandoned as a breeding site. The research was developed in partnership with the Bristol Bay Native Association and the North Slope Borough, reflecting community priorities shared during ISC meetings.

Data Collection:

Utqiagvik: In September of 2023, a five-element hydrophone array was deployed in Utqiagvik to monitor bearded seals as part of an NPR-A grant. This five-element hydrophone array recorded until March 2024, with the intention of collecting calling onset. Dr. Fournet and MS Student Rachel Lewis joined Andy Von Duyke in Utqiagvik in July 2024 to recover the array. An additional hydrophone array was deployed in the fall to support the 2025 bowhead whale census. These data will also be repurposed in support of ice seal research upon recovery.

Bristol Bay: Working with Sam Gosuk and a local Togiak hunter, two hydrophones were deployed in Bristol Bay in September of 2024, and scheduled to begin recording in November 2024. Hydrophones

will be recovered in summer of 2025 and redeployed for a second year. These recordings will be analyzed for bearded seals, as well as any other relevant marine mammal species in the region (potentially walrus and/or whales).

Ongoing Data Analysis:

Historic: Using data collected in 2010 and 2011 from Utqiagvik (collected in support of the bowhead whale census) we asked the question: What is the relationship between peak calling (indicating peak breeding season) and ice conditions. By comparing ice conditions and calling behavior we determined that peak calling occurs on average 5 days later than the peak spring ice break up. This trend continues, with increases in reproductive signaling following periods of thin or patchy spring ice.

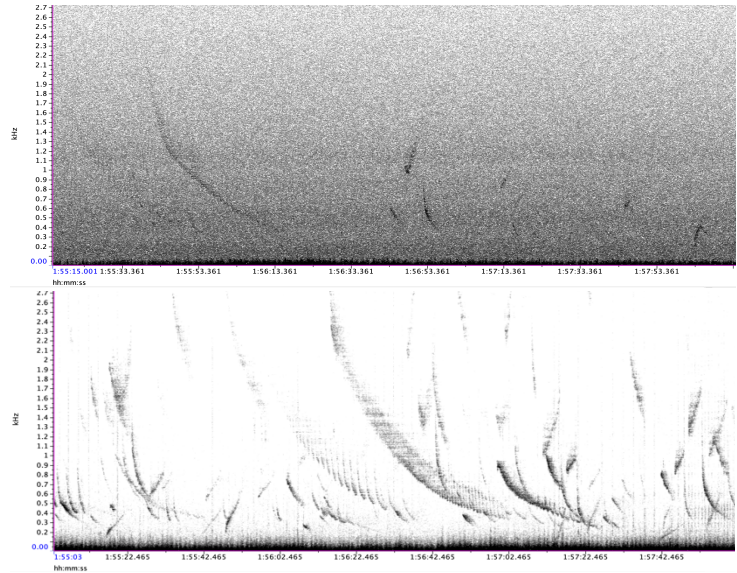


Figure 1- Top: Bearded seal calling activity on March 20, 2024. Bottom: Bearded seal chorusing approximately 24 hours later on March 21, 2025.

Contemporary: A pilot analysis of fall-spring (2023-2024) data from Utqiagvik indicates that the onset of bearded seal reproductive signaling (likely the start of the spring breeding season) began quite acutely on March 21st, 2023. Prior to that date only sporadic bearded seal calls were detected; chorusing began on

that date (Figure 1). Consistent with historic research in the vicinity of the hydrophone a large sheet of ice was dislodged from the shore approximately 5 days prior to calling onset (early morning March 17, 2024; Figure 2).

Future Data Analyses:

Utqiagvik: A longterm dataset was collected in Utqiagvik in support of the bowhead whale census. From this dataset 1985, 1992, and 2011 have been selected for a comparative soundscape and calling behavior analysis. This will allow us to identify changes in calling behavior over time and in association with ice.

Togiak: Several publicly available acoustic datasets (NOAA) have been identified from Bristol Bay, or nearby to complement contemporary data collection. We are in the process of seeking access to these datasets to do a comparison of bearded seal calling behavior, and presence absence in the region over time, particularly in reference to local knowledge about bearded seal decline from the 1970's-1990's.

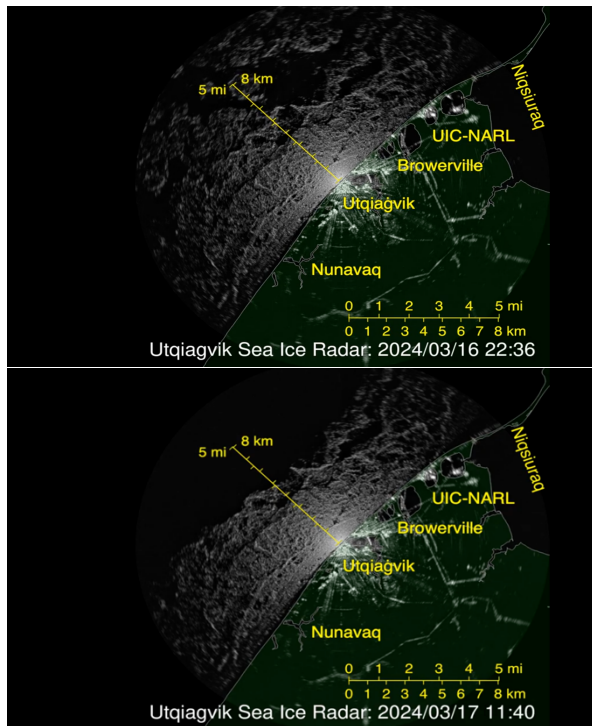


Figure 1: Image from Utqiagvik Sea Ice Radar taken on the evening of 3/16/2024 and again midday 3/17/2024.