

ADF&G Report to ISC March 2024
ADF&G Arctic Marine Mammal Program
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BIOMONITORING

Seal samples are collected from the subsistence harvest to monitor diet, body condition, productivity, age at maturity, survival past weaning, disease, and other health-related measures.

Diet. As predicted, with warmer water, fewer ringed seals are eating Arctic cod, and more are eating saffron cod; however, no changes to health are evident.

We are working with NMFS to investigate the role of spotted seals as fish predators. Fish otoliths found in the stomachs of harvested spotted seals are used to determine the number, species and size of fish eaten. These diet data are integrated with fish energy content analysis and estimates of seal abundance, distribution, and seal age structure to assess total biomass of fish consumed annually.

Body condition, productivity, age at maturity, pup survival past weaning. These are good indicators of population health, and all are currently positive for ringed, bearded, and spotted seals. We summarized data for these by decade for all ice seal species for an essay titled, “Ice Seals in Alaska” in the 2024 Arctic Report Card.

Disease. We tested 14 bearded seals harvested in 2023 for avian influenza and phocine distemper, all were negative. Results are pending for 36 bearded seals harvested in 2024. Seals were tested for COVID in 2023 and 2024, but it was not detected.

Microplastics. We provided muscle, blubber, and liver from bearded seals and spotted seal stomachs, fetuses, placentas, and amniotic fluid to Dr. Lara Horstmann at UAF for microplastic analysis. Results for the bearded seal tissues and the spotted seal reproductive tissues will be presented in poster and oral form at the Alaska Marine Science Symposium in January 2025. A manuscript on microplastics found in the stomachs of spotted seals has been submitted to Marine Pollution Bulletin for publication.

Contaminants. We compared trace element and organochlorine concentrations in ice seal tissues (liver, kidney, muscle, blubber) in the 2000’s and 2010’s. Concentrations of both were within ranges that were similar to or below what has been measured for these species throughout their range in the Arctic and subarctic. The trace elements results were recently published in Science of the Total Environment (Olnes et al. 2025) and the organochlorine results are currently under review at Marine Pollution Bulletin.

Olnes, J., L. Quakenbush, A. Bryan, R. Stimmelmayer. 2025. Trace elements in Alaska’s ice seals in the 2000s and 2010s. Science of the Total Environment 958:178126. <https://doi.org/10.1016/j.scitotenv.2024.178126>

In 2025. We intend to receive tissues from Utqiagvik, Point Hope, Shishmaref, and Gambell.

GENETIC STUDIES

Bearded Seal Close-kin mark-recapture (CKMR). We used CKMR methods to estimate the abundance and demographics of bearded seals. A tooth and tissue sample are collected from harvested bearded seals. The tooth provides age for population dynamics modeling. The tissue sample provides DNA for kinship determination. The original estimate of abundance was 232,000, however the genetics showed that many of the adult males were not breeding. When these males were accounted for the preliminary abundance estimate increased to ~409,000. We also found that there are no full sibling pairs meaning that females do not often mate with the same male. These results were recently published in *Evolutionary Applications* (Taras et al. 2024).

Taras, B.D., P.B. Conn, M.V. Bravington, A. Kilian, A.R. Lang, A. Bryan, R. Stimmelmayr, and L. Quakenbush. 2024. Estimating demographic parameters for bearded seals, *Erignathus barbatus*, in Alaska using Close-kin mark-recapture methods. *Evolutionary Applications* 2024; 17:e70035 doi:10.1111/eva.70035

We intend to continue working with Alex Whiting and the Native Village of Kotzebue to collect bearded seal jaws for CKMR and hope to collect bearded seal jaws from as many communities and individuals as possible.

More samples from bearded seals (a lower jaw for a tooth and muscle) are needed for a more accurate abundance estimate. With more samples we can also learn about population trend, survival, and productivity using these samples and methods.

Bearded Seal Population Structure and Genetic Diversity. Ringed, bearded, spotted, and ribbon seal tissues were sent to the (University of Copenhagen, Denmark) for genetic studies of population structure and genetic diversity. A manuscript entitled “*Circumpolar population structure, diversity, and recent evolutionary history of the bearded seal in relation to past and present icescapes*” has been accepted by the *Journal of Molecular Ecology* in January 2025.

HARVEST MONITORING

A draft report of the 2023 harvest survey in Hooper Bay is complete and is waiting for community approval.

An updated ISC report on “*The Subsistence Harvest of Ice Seals in Alaska— a Compilation of Existing Information, 1960 – 2022*” is available on the ISC and ADF&G websites.

WINTER RINGED SEAL DENSITY

The purpose of this study is to determine the density of ringed seals within areas of oil and gas development near Prudhoe Bay. Seal breathing holes and lairs are usually under the snow and not visible, therefore we use dogs trained to find them. The density of seal structures and snow depth will be compared to a previous study conducted during 1982–1983. Field work was conducted in May of 2022 and 2023. We found more ringed seal structures in 2023 (0.83 structures/km²) than in 2022 (0.69 structures/km²). In 1983, a smaller area (42 km²) within our study area (88 km²) had 34 seal structures and a similar density (0.81 structures/km²; Kelly et al. 1986). In 2023, we mounted cameras at 10 breathing holes that had been opened for basking to record use; we recorded 70 haul-out bouts (basking) that averaged 9 hours and we saw two seals

hauled out at the same time on six occasions. In 2023, we also documented other species at seal structures including arctic foxes, polar bears, gulls, a red fox, and a ptarmigan. Results suggest that structure density varies annually, however, winter use of the Prudhoe Bay area has not decreased since the 1980s. We plan to survey this area again in May of 2025.

Kelly, B.P., L.T. Quakenbush, J.R. Rose. 1986. Ringed seal winter ecology and effects of noise disturbance. Final Report OCSEAP RU 232 61:447-536.

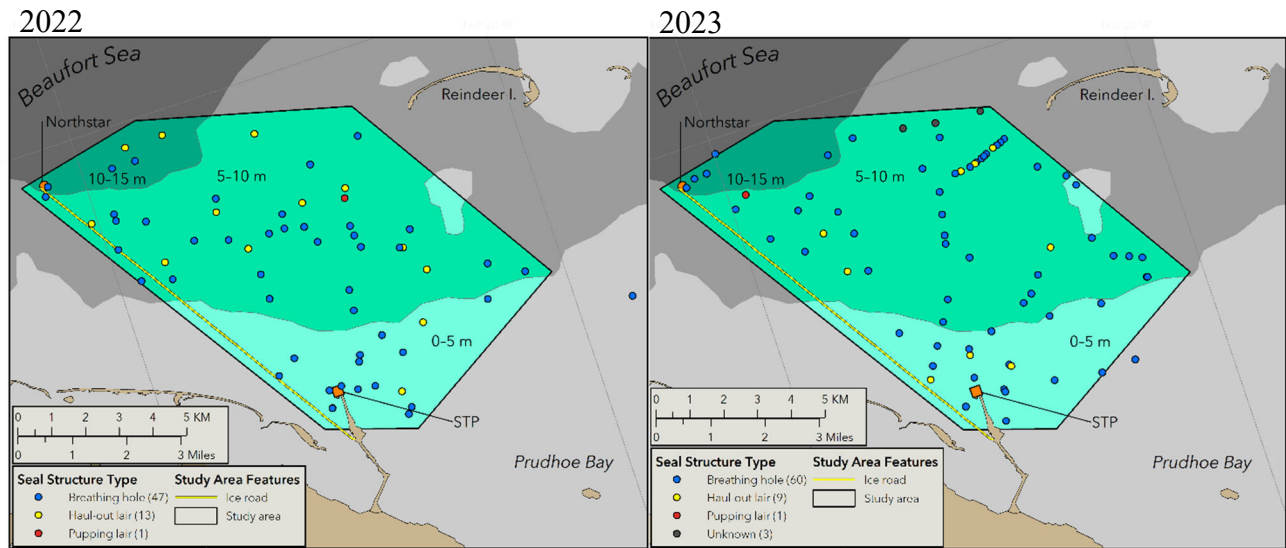


Figure 1. Distribution of ringed seal breathing holes and lairs found by wildlife detection dogs in Prudhoe Bay in May 2022 and 2023.