

Ice Seal Committee Annual Meeting – Feb 28 - Mar 1, 2023

NOAA Fisheries, Marine Mammal Laboratory

The Polar Ecosystems Program: 1) monitors and studies bearded, ringed, spotted, ribbon, and harbor seals in Alaska to support management and co-management, 2) conducts aerial surveys, vessel-based and village-based tracking and sampling studies, and 3) develops new methods for surveying and determining population numbers and trends.

Updates on past and upcoming research

Vessel-based research - Michael Cameron

In April 2022, the Polar Ecosystems Program (PEP) at NOAA's Alaska Fisheries Science Center conducted a research cruise aboard the NOAA ship *Oscar Dyson* to the marginal zone of the Bering Sea pack ice west of St. Matthew Island. There, we studied the habitat requirements and ecological relationships with sea ice of ribbon and spotted seals. The three expedition goals were: 1) to capture ribbon and spotted seals and instrument them with satellite-linked tags to examine seasonal movements, habitat use, foraging behavior, and the timing of haul-out; 2) to collect measurements and tissue samples to assess seal health and condition, diet, and population structure, and 3) to use uncrewed aerial systems (UAS) to collect images of seals to assess methods for estimating seal body condition. A focus of the work in 2022 was on health and condition of pups and their mothers, and potential impacts of diminishing sea ice. Austin Ahmasuk, a subsistence hunter from the Bering Strait region, joined our team as an ISC partner through Kawerak Inc. We hope to continue partnering with other regions in future expeditions.

The expedition in 2022 was shorter than any of our previous efforts (11 days in the marginal ice zone compared to the usual 21 days). In addition to pandemic-related delays, we also encountered unusually poor weather with heavy fog, snow, and high winds and swell for most of the trip. In spite of these challenges, the team was able to capture five seals and collect morphometric measurements and biological samples (blood, skin samples, nasal and rectal swabs, whisker, hair, blubber thickness measurements). One adult male spotted and one adult female ribbon seal were instrumented with satellite tags.

We plan to repeat this work in April 2024, as always, without impacting subsistence hunting:

- The Oscar Dyson will never operate within 30 nautical miles of whaling or sealing communities or within 12 nautical miles of the coast.
- Researchers will watch for, and will avoid disturbing, whales and walrus.
- Researchers will communicate daily with local coastal communities to identify where we plan to work and to avoid conflict with hunters.

Aerial surveys for ice-associated seals - Erin Moreland

Instrument-based aerial surveys have proved to be an efficient approach to estimating broadly distributed populations of ice-associated seals in the Arctic by increasing the aircraft altitude, survey range, decreasing disturbance of animals, and reducing error relative to surveys with human observers. We have successfully used long wavelength infra-red (IR, thermal) images to detect warm-bodied animals against the cold background of sea ice, and paired high-resolution color imagery to identify the species of detected animals. This method produces millions of images and requires automation to reduce the delay of abundance and distribution analyses. Automating data collection and image processing increases efficiency of the survey and post processing of collected imagery. We have successfully used this approach to survey the Bering Sea in 2012 and 2013, the Chukchi Sea in 2016, and the Beaufort Sea in 2021.

Our most recent Beaufort Sea survey took place during the pandemic (April 17 – June 11, 2021) which required us to modify our plans in order to reduce the impact to local communities. These reductions included not operating out of Inuvik, Canada, isolating for two weeks before and after traveling to the North Slope, and minimizing our interactions with the community of Utqiagvik. We also eliminated our plan to survey the northern Chukchi to avoid any chance of interference with the subsistence whaling activities. We collected over 900,000 sets of images and processed them using new detection and species classification models. A map of animal detections was presented along with population estimates and distribution maps from previous survey efforts. These results can be found in the printed presentation materials provided at the meeting. The results of the 2021 survey effort will be shared with the Ice Seal Committee after the abundance estimation is complete.

Aerial surveys of Bering Sea are scheduled to be funded for 2024 and will take place in April and May. We are working to further improve our approach to reduce the overall time and cost required to complete the survey. We have planned a workshop to help us broaden the discussion with the Ice Seal Committee and coastal communities as we look at ways to continue to improve our survey approach.