

Marine Habitat Use

BESIDES UNDERSTANDING WHAT MARINE MAMMALS EAT, WE ALSO NEED TO UNDERSTAND HOW THEIR DISTRIBUTION AND HABITAT USE OVERLAP WITH COMMERCIAL FISHERIES, SUBSISTENCE HUNTING, AND OTHER HUMAN ACTIVITIES.

To date, the Board has funded eight research projects for about \$920,000 to address marine mammal habitat use in the North Pacific Ocean. Marine mammal scientists rely on a variety of techniques for studying marine mammal habitat, including analyzing historical data, using acoustic equipment to detect their presence, tagging with satellite tags to track marine mammals, and conducting marine mammal surveys from ships and airplanes.

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Winter Habitats of Beluga Whales

Project 324

SUBSISTENCE HUNTERS IN ALASKA, NORTHERN CANADA AND Russia harvest beluga whales. Effective management of these harvests requires understanding the winter migrations of beluga whale populations that summer in the Bering, Beaufort and Chukchi seas and in the Arctic Ocean, where much of the subsistence hunting occurs.

Project 324 aimed to identify and define the winter habitat of beluga whales in the Bering Sea and determine which stocks of whales were migrating along the coast of the Chukotka Peninsula in the fall. Researchers intended to attach satellite transmitters to beluga whales in Lavrentia Bay, Russia, in late fall where beluga whales had regularly been seen. Unfortunately, during the first two field years, belugas did not enter the study area or other parts of the bay. During the summer of the third field year, work refocused to the Anadyr River, where researchers captured a beluga whale and attached one tag. Bad weather prevented further capture attempts before the end of the field season.

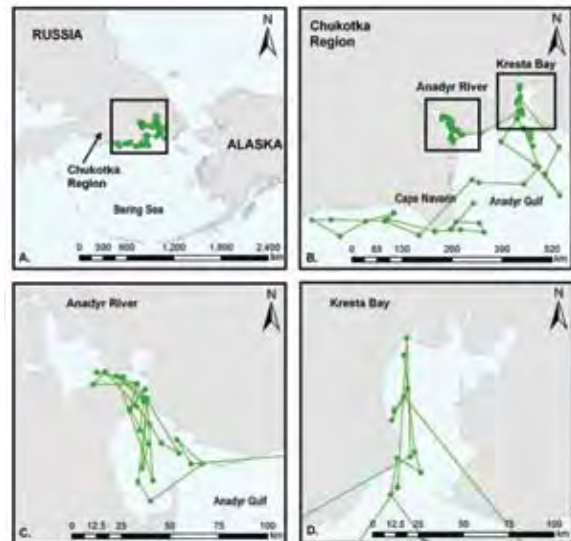
Movements of the one tagged whale indicated that this animal remained in the Gulf of Anadyr and on the continental shelf during the fall and early winter, before moving north along the coast to Kresta Bay in midwinter, where it stayed until the tag failed in early February. Due to the difficulties of capturing belugas, researchers also focused on developing a satellite tag that they could attach to the whales via harpoon, which could be tested and utilized in future movement studies.

To learn which stocks of beluga whales visited the study area, researchers collected genetic samples from ten individual beluga whales in the Anadyr River area using crossbow biopsy darts. Preliminary results indicate that this group is most closely related to the Beaufort Sea stock of beluga whales.



Rod Hobbs

Satellite transmitter attached by cables to three nylon pins. Note that cables are not pulled tight so that they don't pull on the pins as the whale flexes and extends its dorsal surface as it swims.



A,B) The range of the tagged whale included the Gulf of Anadyr and shelf waters south and east of Cape Navarin. **C)** The tagged whale remained in the Anadyr River and Estuary between mid August and the end of October. **B,D)** During November the tagged whale moved from the Anadyr Estuary to Kresta Bay. In mid November, the tagged whale moved out into the Gulf of Anadyr. It later returned to Kresta Bay then returned to the northern gulf. **B)** In mid-December the tagged whale moved to shelf waters south of Cape Navarin.

FEATURE PROJECT

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Listening for Large Whales

Projects 307, 519

SINCE LARGE WHALES ARE DIFFICULT TO DETECT BY SIGHT, AND TRAVEL over vast areas of the world's oceans, little is known about their distribution and seasonal occurrence. Ship surveys are costly and so scientists base most of what they know about the distribution and seasonality of large whales on the historical whaling data from the mid-20th century.

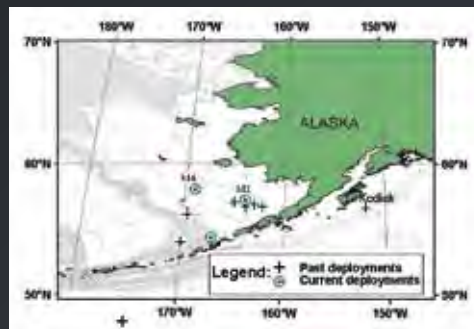
To learn more about which large whale species use specific areas of the North Pacific, researchers rely on acoustic technology to listen for the presence of large whales. Projects 307 and 519 used passive acoustic technology to study the seasonal presence of endangered North Pacific right whales and fin whales in the southeast Bering Sea and the western Gulf of Alaska. Commercial whaling in the 19th and 20th centuries severely depleted these two species throughout the North Pacific and Bering Sea, and decades after whaling ceased, we still do not know whether either species is recovering.

To understand how fisheries and resource extraction may impact these species, we need to know where the whales are and when they use these waters. Researchers attached underwater acoustic recording packages to moorings in two study areas, which provided continuous, long-term data recordings that could detect the presence, distribution, and behavior of calling whales that were within a range of approximately 100 kilometers.

In the southeast Bering Sea study area, right whales called from May to December but rates were highest in August, September, and December. No right whales were detected at the Gulf of Alaska study site. Researchers compared the annual occurrences of right whale calls to the oceanographic conditions. They hypothesized that the springtime presence of right whales on the southeast Bering Sea shelf in years with late spring blooms is related to the production and growth rates of copepods during a warmer-water, oceanic phytoplankton bloom following winters with moderate ice cover.

The occurrence of right whales on the shelf in the summer and fall may be related to their ability to forage on copepods concentrated in the bottom cold water layer. Researchers heard fin whale calls year-round on the southeastern Bering Sea shelf, with the highest call rates in the fall. They also detected fin whales at the Gulf of Alaska site in the late summer.

Acoustic technology helps researchers detect the presence of elusive endangered North Pacific right whales.



Acoustic recording package deployment locations, 2000-2006.

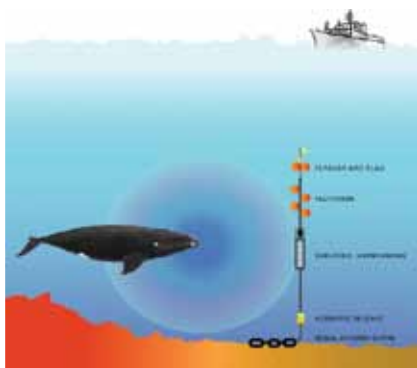


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More Ears in the Water

Projects 518, 719

TO CONTINUE PASSIVE ACOUSTIC RESEARCH ON THE distribution of large whales in the Bering Sea, the Board funded projects 518 and 719, which attached hydrophones to oceanographic moorings (M2, M4, and M5) along the Bering Sea shelf. These instruments continuously recorded acoustic events for one year, detecting vocalizations from right, fin, sperm, and humpback whales; bearded seals, and Pacific walrus. The marine mammals vocalized throughout the year and researchers are currently analyzing these acoustic events to determine differences between seasons and time of day for each species. By locating the recorders on oceanographic moorings, researchers can relate seasonal occurrences of each species with oceanographic conditions to better understand the physical processes affecting distribution, movement, and habitat.



A moored hydrophone instrument.

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Modeling Potential Habitat for Northern Right Whales

Project 633

MODELING STUDIES ARE ALSO UNDERWAY TO HELP determine which areas of the North Pacific could serve as critical or potential habitat for endangered right whales. In Project 633, scientists are identifying potential habitat at varying spatial and temporal scales. Researchers are combining historical whaling data on right whale distribution with contemporary data on current right whale sightings to characterize how previous habitat relates to known current habitat areas. This project also draws on the distribution and life histories of the main food of right whales (calanoid copepods), knowledge of Atlantic right whale foraging strategies, and oceanographic information to inform their multi-scale predictive habitat-use model.



Mikkel Jensen

A research vessel uses passive acoustic technology to detect right whales.

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North Pacific Right Whales

Project 720

SCIENTISTS PARTICIPATING IN PROJECT 720 SEEK to better describe the seasonal movements, migration paths, and behaviors of North Pacific right whales by attaching satellite transmitters to whales in the southeast Bering Sea. By characterizing the right whale's distribution and movements throughout their range, researchers will better understand right whale ecology and can better predict potential impacts from human activities.

During the first field year, researchers sighted 12 whales during ten different sighting events using aerial surveys, and 34 individuals during 22 different sighting events using ship-based survey methods. They tagged one right whale with a satellite transmitter, which monitored the movement of the animal for two months. Weather and unpredictable movements of individual whales hampered further satellite tagging attempts. In preparation for the 2009 field season, researchers are modifying how they attach satellite transmitters on whales to avoid the need for direct capture.

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Right Whale Calving Grounds

Project 718

ALTHOUGH RIGHT WHALES MIGRATE SEASONALLY TO warmer waters in lower latitudes to calve and mate, little is known about exactly where they go. This impacts our ability to manage threats in critical calving areas and hinders the recovery of these endangered species. Researchers working on Project 718 are using information gained from studies on North Atlantic right whale calving habitat to build a predictive model of right whale breeding habitat in the Pacific, using existing hydrographic and satellite remote sensing physical data. This model intends to identify, in time and space, the most advantageous and dependable areas for right whale calving.