movement might not be due to ambient temperature but in association with movement of their primary prey and ice formation.

Long-term survival of humpback whales radio-tagged in Alaska from 1976 through 1978

Mizroch, Sally A. [1]; Tillman, Michael F. [2]; Jurasz, Susan [3]; von Ziegesar, Olga [4]; Herman, Louis M. [5]; Pack, Adam A. [6]; Baker, Scott [7]; Darling, Jim [8]; Glockner-Ferrari, Debbie [9]; Ferrari, Mark [9]; Salden, Dan [10]; Clapham, Phillip J. [1]
(1) Nat. Marine Mammal Lab. NMFS, 7600 Sand Point Way NE, Seattle, WA, 98115, USA
(2) Scripps Institute of Oceanography, 9500 Gilman Dr, La Jolla, CA, 92093, USA
(3) SeaSearch, 146 Yamhill St, Sheridan, OR, 97378, USA
(4) Eye of the Whale, PO Box 15191, Fritz Creek, AK, 99603, USA
(5) The Dolphin Institute, 420 Ward Ave., Suite 212, Honolulu, HI, 96720, USA
(6) University of Hawaii at Hilo, 200 West Kawili St., Hilo, HI, 96720, USA
(7) Oregon State University Marine Mammal Institute, 2030 SE Marine Science Drive, Newport, OR, 97365, USA
(8) West Coast Whale Research Foundation, 1200-925 West Georgia Street, Vancouver, BC, V6C 3L2, Canada
(9) Center for Whale Studies, PO Box 1539, Lahaina, HI, 96767, USA
(10) Hawaii Whale Research Foundation, PO Box 1296, Lahaina, HI, 96767, USA
Corresponding author: sally.mizroch@noaa.gov

From 1976 to 1978, seven different humpback whales were tagged in Alaskan waters with large implantable radio tags developed by Watkins and others. All of these tagged whales were photographed again in subsequent years over periods ranging from at least 20 to 33 yr (mean = 28.1 yr). At least one of these whales, Tag No. 028, was a female who has produced calves at regular intervals and was seen with a calf in January 2009. These tagged whales have been photographed by a number of different research groups in Alaskan, Hawaiian, and Mexican waters and are among the most photographed whales in the National Marine Mammal Laboratory's FlukeFinder database. There is no evidence that these whales had any long-term reaction to either the chase or close approach from a 15-20 m vessel, nor to implantation of the tag itself. These whales did not avoid boats and most were re-approached many times by the tagging vessel in the days after they had been tagged.The tags used in this study were large by current standards. Current technology uses tags of about 375 g and a total tag length from tip to stopper less than or equal to 26 cm compared to 550 g and 29 cm used on these whales. These pioneering field projects in 1976, 1977 and 1978 validated the wisdom of using simple photographic techniques to back up trials of high-tech instrumentation. Being able to identify individual whales years and even decades later has provided invaluable insights into the long-term effects of these experimental technologies. In the specific case of the radio tag developed by Watkins and others and tested by the MMD and WHOI teams over 30 yr ago, extensive photographic re-sighting records demonstrate that the tagging operation was not a harmful experience for these humpback whales.

Results of aerial surveys conducted in conjunction with US navy training events off southern California Oct/Nov 2008

Mobley, Jr., Joseph R. [1]; Smultea, Mari A. [2]; Mazzuca, Lori [3]
(1) Marine Mammal Research Consultants, 1669 St Louis Dr, Honolulu, HI, 96816, USA
(2) Smultea Environmental Sciences, LLC., 29333 SE 64th St, Issaquah, WA, 98027, USA
(3) U.S. Navy, Naval Facilities Engineering Command Pacific, 258 Makalapa Dr, Ste 100, Pearl Harbor, HI, 96860-3134, USA
Corresponding author: jmobley@hawaii.edu

Aerial surveys were conducted to monitor marine mammals/sea turtles during and immediately after a major US Navy 2008 training event involving mid-frequency active sonar (MFAS) in offshore waters of Southern California in Oct and Nov 2008. The survey purpose was to monitor potential effects, if any, from Navy training events on marine mammals by conducting line-transect and focal behavioral sampling and shoreline stranding surveys. Survey locations varied in Oct vs. Nov due to air-safety concerns. Surveys were conducted by 3 biologists and 1 pilot in a fixed-wing Partenavia Observer (P68-C). Data were collected using newly developed hardware/software. Photographs/video were used to verify species/document behavior. Focal follows involved circling animals at ~1200-1500 ft altitude/radius ~0.5-1 km. A total of 8201 km (~50 hr) of observation effort occurred: 4563 km in Oct and 3638 km in Nov. Effort consisted of 38% systematic line-transect, 38% random transect and 24% circling (focal follow/photography/species verification). Beaufort 0-2 predominated (62%). A total of 289 marine mammal sightings of ~16,325 individuals were recorded. Three pinniped, 5 dolphin and 4 whale species were identified, including a rare Bryde's whale. Most sightings were California sea lions (N=86) followed by common dolphins (N=62) and Risso's dolphins (N=18). Risso's dolphins were seen more in Oct (n=17) vs. Nov (N=1). Pacific white-sided dolphins (N=11) and humpback whales (N=3) were seen only in Nov. No beaked whales were confirmed. A dead California sea lion and a dead subadult male blue whale with fishing line around its peduncle were seen in Nov. Focal follows occurred with 8 cetacean species and included extended video of blue, fin and humpback whale as well as Risso's dolphin behavior at and below the water surface. Samples sizes stratified by species were too small for statistical comparison but contribute to a growing pooled database for this region.

Evidence of feeding by bowhead whales from aerial photography

Mocklin, Julie A. [1, 2]; Rugh, David J. [1]; Moore, Sue E. [3]
(1) National Marine Mammal Laboratory, Alaska Fisheries Science Center, NOAA, 7600 Sand Point Way NE, building 4, Seattle, WA, 98115, USA
(2) University of Washington, Wildlife Science Group, Seattle, WA, 98115, USA
(3) NOAA, Science and Technology, PMEL, 7600 Sand Point Way NE, building 3, Seattle, WA, 98115, USA
Corresponding author: julie.mocklin@noaa.gov

Aerial photographs of the Bering-Chukchi-Beaufort population of bowhead whales (*Balaena mysticetus*) were analyzed to investigate their feeding habits, particularly epibenthic feeding near Barrow, Alaska. The analysis was based on mud visible on the dorsal surface of whales, resulting from feeding near the sea floor. A new photographic scoring system was developed and tested by bowhead experts, including subsistence whalers, to ensure an acceptable level of agreement on the analytical method. The tests resulted in >94% agreement when whales were scored as muddy, and 100% when clean. Over 3600 photographs were analyzed from 1985, 1986, 2003-2007, including photos from surveys in spring and late summer and in both the Western and Eastern Beaufort Sea. Of all the photographs analyzed, 60% were scored as definitively muddy. In spring, ratios ranged from a low of 27% in 2003 to a high of 76% in 2004. In May of 1986 and when all four May sample sets off Barrow were combined, there was a significant difference (t-test, p <.004) between the proportion of muddy juveniles to the proportion of muddy adults, with muddy adults being more common. Tests in a flow tank demonstrated that mud can persist on bowhead whale skin for up to half a day, making it difficult to pinpoint where feeding occurred. Plots of whale sightings show that the Barrow area was a commonly used feeding ground during migrations in both the spring (55% of the sample were muddy) and fall (97% of the sample). Epibenthic feeding in areas where petroleum extraction is underway with the risk of oil spills could have severe ramifications for bowheads.

Estimated polybrominated diphenyl ether (PBDE) accumulation in the Southern Resident killer whale (*Orcinus orca*): Sex and age no longer matter

Mongillo, Teresa [1]; Holmes, Elizabeth Eli [2]; Noren, Dawn P. [2]; VanBlaricom, Glenn R. [1, 3]; Punt, André [1]; Hanson, M. Bradley [2]
(1) University of Washington, 1122 NE Boat St., Seattle, Washington, 98195-5020, USA
(2) Northwest Fisheries Science Center, NOAA Fisheries, 2725 Montlake Blvd. E., Seattle, WA, 98112, USA
(3) Washington Coop. Fish and Wildlife Research Unit, 1122 N.E. Boat St., Seattle, WA, 98195, USA
Corresponding author: tmo@u.washington.edu

Polybrominated diphenyl ethers (PBDEs) are flame retardants used in many products including electronics, textiles, and plastics and have a ubiquitous distribution with increasing levels found in the air, sediment, and wildlife. Consequently, many marine species have recently experienced a nearly exponential increase in contamination. Due to the similar molecular structure and persistence to the polychlorinated biphenyls (PCBs), some of the PBDE congeners have the potential to cause cancer, neurotoxicity, and disrupt thyroid hormone balance. We used an individual-based model to