

STUDY TITLE: Distribution and Relative Abundance of Marine Mammals in the Chukchi Sea and the Fall Migration of Bowhead Whales in the Beaufort Sea

REPORT TITLE: Distribution and Relative Abundance of Marine Mammals in the Northeastern Chukchi and Western Beaufort Seas, 2012

CONTRACT NUMBER: M11PG00033

SPONSORING OCS REGION: Alaska

APPLICABLE PLANNING AREA(S): Beaufort and Chukchi Sea Planning Areas

FISCAL YEAR(S) OF PROJECT FUNDING: 2011-2016

COMPLETION DATE OF REPORT: May 2013

COSTS: \$1,807,042

PROJECT MANAGER(S): Dr. Megan Ferguson, Dr. Phillip Clapham

AFFILIATION: National Marine Mammal Laboratory, Alaska Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration

ADDRESS: 7600 Sand Point Way NE, F/AKC3, Seattle, WA 98115-6349

PRINCIPAL INVESTIGATOR(S): Dr. Megan Ferguson, Janet Clarke

KEY WORDS: bowhead whale, *Balaena mysticetus*, gray whale, *Eschrichtius robustus*, humpback whale, *Megaptera novaeangliae*, minke whale, *Balaenoptera acutorostrata*, fin whale, *Balaenoptera physalus*, beluga, *Delphinapterus leucas*, killer whale, *Orcinus orca*, walrus, *Odobenus rosmarus*, polar bear, *Ursus maritimus*, aerial survey, relative abundance, habitat selection, Beaufort Sea, Chukchi Sea, line transect, distribution, behavior

BACKGROUND: The Aerial Surveys of Arctic Marine Mammals (ASAMM) project was initiated in 2011, via an Inter-Agency Agreement between the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE, now BOEM) and the Alaska Fisheries Science Center (AFSC), NOAA. These surveys are a continuation of aerial surveys that were conducted by MMS-sponsored contractors and MMS personnel from 1982-2007 and by AFSC from 2008-2010, and use similar methodology. Aerial surveys remain the only practical means of assessing marine mammal distribution, population density, and habitat use in large study areas. The goal of this study is to investigate the distribution and relative abundance of marine mammals in the western Beaufort and northeastern Chukchi seas during the open water (ice-free) months of June-October, when various species are undertaking seasonal migrations through the study area to and from seasonally occupied habitats both within and adjacent to the study area. The study area encompasses the northeastern Chukchi Sea from shore seaward, 68°N to 72°N from 157°W to 169°W, overlaying Lease Sale 193 (offered in February 2008), and the western Beaufort Sea from shore seaward, north to 72°N, from 140°W to 157°W. Species of interest include the bowhead whale (*Balaena mysticetus*), gray whale (*Eschrichtius robustus*), beluga (*Delphinapterus leucas*), polar bear (*Ursus maritimus*), walrus (*Odobenus rosmarus*), and ice seals. Other large cetaceans, including humpback whale (*Megaptera novaeangliae*), minke whale (*Balaenoptera acutorostrata*), fin whale (*Balaenoptera physalus*), and killer whale (*Orcinus orca*), are also observed in the Alaskan Arctic with increasing frequency. Improving the understanding of marine mammal distribution, abundance, behavior and migration timing in this region will assist in decision-making to minimize impacts from petroleum exploration, development and production activities and other anthropogenic impacts.

OBJECTIVES: (1) Describe the annual migration of bowhead whales across the Alaskan Arctic, significant inter-year differences, and long-term trends in the spatial distribution and timing (duration and start date) of the migration; (2) Document relative abundance, spatial and temporal distribution, and behavior (including calving/pupping, feeding, hauling out) of marine mammals (cetaceans, ice seals, walrus, and polar bears) in the Alaskan Arctic; (3) Provide near real-time data and maps to BOEM and NMFS on marine mammals in the Alaskan Arctic, with specific interest in endangered species, such as bowhead whales; (4) Provide an objective wide-area context for understanding marine mammal ecology in the Alaskan Arctic, to help inform management decisions and interpret results of other small-scale studies; (5) Provide, when requested by BOEM's Representative, limited integrative products such as graphics of summarized observations for use by BOEM analysts in NEPA and ESA analyses and documentation; (6) Provide timely information on environmental conditions, including ice conditions, to organizations (e.g., National Ice Center, Alaska Eskimo Whaling Commission, BOEM) as directed by BOEM's Representative.

DESCRIPTION: Aerial surveys were conducted in the ASAMM study area during summer and autumn 2012. This area comprises 22 survey blocks, which were established in the 1980s when broad-scale surveys were initially conducted. Surveys were conducted in Aero Commander 690A aircraft. Duration of flights depended on aircraft configuration, with maximum duration of 5.5 hours. During summer months, two flights per day were occasionally flown when weather conditions allowed, maximizing potential survey time. Survey altitude was between 310 m (1,000 ft) and 460 m (1,500 ft), although lower cloud ceilings occasionally required that surveys be conducted at or below 310 m (1,000 ft). Surveys near walrus haulouts on ice and spotted seal haulouts in Kasegaluk Lagoon were conducted at higher altitudes to avoid potential disturbances. Surveys were flown at a speed of 200 km/hr (110 kts). Surveys were flown with two primary observers, positioned at bubble windows on each side of the aircraft, and a data recorder who also functioned as a secondary observer. Data were recorded onto a laptop computer via customized, menu-driven, data-entry software, developed specifically for these surveys. Data collected included location, environmental conditions, and sighting information. Preliminary summary data were available immediately following each flight, and were posted as Daily Reports to a website maintained by the National Marine Mammal Laboratory (NMML, a division of AFSC). Marine mammal research activities were permitted under NMFS Permit No. 14245 for cetaceans and ice seals and under U.S. Fish and Wildlife Service (USFWS) Permit No. MA212570 for polar bears and walrus.

SIGNIFICANT CONCLUSIONS: The ASAMM aerial surveys met or exceeded all stated objectives in 2012. There were few prolonged periods of inclement weather in summer and autumn 2012. Bowhead whales were seen in all months of the study period, predominantly offshore in the western Beaufort Sea in July and August and nearshore in the western Beaufort Sea and northern Chukchi Sea in September and October. Gray whales were seen in all months of the study period in the northeastern Chukchi Sea, and were somewhat regularly observed in Barrow Canyon and very nearshore east of Barrow in the Beaufort Sea. Gray whale aggregations were observed within 40 km of shore between Point Barrow and Wainwright, with scattered sightings very nearshore (<5 km) between Cape Lisburne and Point Hope, and up to 100 km offshore between Point Franklin and Icy Cape. Similar to 2008-2011, few gray whales were seen on Hanna Shoal (~72°N, 162°W). Humpback and minke whales were seen nearshore between Barrow and Icy Cape and south and west of Point Hope. Fin whales were seen south of Point Hope. Large groups of belugas were seen during surveys conducted jointly for ASAMM and the Alaska Beluga Whale Committee in late June and early July nearshore from south of Point Lay to Icy Cape. Beluga sightings in the northeastern Chukchi Sea during August, September and October were few and fairly widespread. Beluga distribution in the Alaskan Beaufort Sea in summer and autumn was similar to that observed previously, primarily offshore on the continental slope. Killer whales were observed near Barrow and approximately 80 km west of Point Hope. Walrus were closely associated with sea ice when it was present. Walrus were seen very close to shore between Ledyard Bay and Icy Cape, but did not form large haulouts along the northwestern Alaskan coastline in 2012. Polar bears were present in the study area in summer and autumn, but their distribution and occurrence were not predictable except at Cross Island and Barter Island (both locations of bowhead whale bone piles resulting from subsistence whaling). Aerial surveys by manned aircraft remain the only current practical means of assessing marine mammal distribution and relative abundance in an area as large as the ASAMM study area.

STUDY RESULTS: Over 140,000 km were flown during ASAMM 2012, including over 56,000 km on transect. Over 20,000 marine mammals were sighted, including 433 sightings of 648 bowhead whales, 310 sightings of 558 gray whales, 20 sightings of 29 humpback whales, 3 sightings of 5 fin whales, 6 sightings of 7 minke whales, 506 sightings of 4,188 belugas, and 2 sightings of 18 killer whales. Other marine mammal sightings included unidentified cetaceans, polar bears, walruses, bearded seals, and unidentified pinnipeds.

STUDY PRODUCT(S): A Final Report was produced, which included a summary of all data collected in 2012 and analyses of 2012 data with historical data from 1982-2011. During the field season, Daily Reports for each flight were posted to a NMML-maintained website within 48 hours of each survey. Additional products included 2 oral presentations, 6 poster presentations, 1 published paper and 6 *in prep* papers presenting data collected during ASAMM aerial surveys.

* P.I.'s affiliation may be different than that listed for Project Manager(s).

