

ARCTIC WHALE ECOLOGY STUDY
(ARCWEST):
USE OF THE CHUKCHI SEA BY
ENDANGERED BALEEN AND
OTHER WHALES
(WESTWARD EXTENSION OF THE BOWFEST)

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Executive Summary

Through an Inter-Agency agreement (IA) between the National Marine Mammal Laboratory (NMML) and the Bureau of Ocean Energy Management (BOEM), NMML is conducting a dedicated multi-year study to determine relationships between dominant currents passing from the Bering Sea into and through the Chukchi Sea and prey resources delivered to the Barrow Arch area (an area of high bowhead whale and prey concentrations between Wainwright and Smith Bay), and to provide information about the dynamic nature of those relationships relative to whale distribution and habitat utilization in the eastern Chukchi and extreme western Beaufort Seas. This study will also provide important baseline data on the occurrence, distribution and habitat use of large whales in an area that is subject to rapid change in climate and human industrial development. This quarterly report covers the period of this study between January and March 2013.

The major activity during this period consisted of planning for the 2013 vessel survey.

Introduction and objectives

The western Arctic physical climate is rapidly changing. The 2012 Arctic summer minimum ice extent (3.4 million km²) was the lowest ice extent recorded, 18% below the previous minimum in 2007 and 49% below the 1979 to 2000 average. The speed of this ice loss was unexpected, as the consensus of the climate research community was that this level of ice reduction would not be seen for another thirty years. As sea temperature, oceanographic currents, and prey availability are altered by climate change, parallel changes in baleen whale species composition, abundance and distribution are expected (and evidenced already by local knowledge and opportunistic sightings). In addition, the observed northward retreat of the minimum extent of summer sea ice has the potential to create opportunities for the expansion of oil and gas-related exploration and development into previously closed seasons and localities in the Alaskan Arctic. It will also open maritime transportation lanes across the Arctic adding (to a potentially dramatic degree) to the ambient noise in the environment. This combination of increasing anthropogenic impacts, coupled with the steadily increasing abundance and related seasonal range expansion by bowhead (*Balaena mysticetus*), gray (*Eschrichtius robustus*), humpback (*Megaptera novaeangliae*) and fin whales (*Balaenoptera physalus*), mandates that more complete information on the year-round presence of large whales is needed in the Chukchi Sea planning area. Timing and location of whale migrations may play an important role in assessing where, when or how exploration or access to petroleum reserves may be conducted, to mitigate or minimize the impact on protected species.

The ARCWEST study has five component projects: visual observation, satellite tagging, passive acoustics, lower trophic level sampling, and physical oceanographic sampling. Each component project is a technical discipline and is coordinated by a Project Leader with extensive experience in that discipline. Visual surveys, along with sonobuoy deployments, will provide distributional data on baleen whales and other marine mammals. Satellite tagging will provide valuable information on both large- and fine-scale movements and habitat use of baleen whales. Passive acoustic moorings will provide year-round assessments of the seasonal occurrence of baleen whales. Concurrently deployed bio-physical moorings offer the potential of correlating whale distribution with biological and physical oceanographic conditions and indices of potential prey density. Satellite-tracked drifters will examine potential pathways to the areas of high biological importance. Our goal is to use these tools to understand the

mechanisms responsible for the high biological activity so that we can predict, in a qualitative way, the effects of climate change on these preferred habitats.

The overall goal of this multi-year IA is to use passive acoustic recorder deployments, visual and passive acoustic surveys, and satellite tagging to explore the distribution and movements of baleen whales in the Bering and Chukchi Seas, particularly the Chukchi Sea planning areas. In addition, oceanographic and lower trophic level sampling and moorings will be used to explore the relationships between currents passing through the Bering Strait and resources delivered to the Barrow Arch area (an area of high bowhead whale and prey concentrations between Wainwright and Smith Bay), and the dynamic nature of those relationships relative to whale distribution and habitat utilization in the eastern Chukchi and extreme western Beaufort Seas.

The specific objectives are:

1. Assess patterns of spatial and temporal use of the Chukchi Sea by endangered bowhead, fin and humpback whales, and beluga and gray whales.
2. Assess the population structure and origin of whales in the region.
3. Evaluate ecological relationships for the species, including physical and biological oceanography that affect critical habitat for these species.
4. Conduct physical and biological oceanographic sampling to further understand the transport and advection of krill and nutrients from the northern Bering Sea through the Bering Strait and to the Barrow Arch area.

Cruise activities and summary

Planning for the 2013 vessel survey has begun. Sampling and mooring locations and survey plans continue to evolve as plans are fine-tuned. The paperwork necessary to charter a vessel is being processed by the Western Acquisition Division and AFSC staff has been replying to questions as needed. Paperwork has been submitted to the Western Acquisition Division to hire survey personnel. Field equipment and supplies are being purchased.

Post-cruise data analysis results and planning

Visual Observations Component:

Paperwork has been submitted to the Western Acquisition Division to hire visual observers for the 2013 vessel survey. Field equipment and supplies are being purchased.

Satellite Tagging Component:

Field equipment and supplies are being purchased for the 2013 vessel survey. New satellite transmitter designs have been developed to make tags more robust to body contact among whales. Changes relative to former designs include a new configuration of the antenna, conductivity switch, and the stopper at the posterior end of the tag. They also include an integrated transmitter-anchor design. Prototypes have been produced and will be delivered for laboratory testing on 15 April 2013.

Passive Acoustic Component:*NMML Long-term moorings:*

The first of the ARCWEST passive acoustic moorings are still deployed. Analysis will begin after retrieval during the 2013 vessel survey. Locations for the 2013 moorings (Fig. 1) were determined in coordination with the oceanographic and lower trophic level components of ARCWEST and a tentative vessel schedule was drafted. These locations and the tentative schedule have continued to evolve as survey plans have been fine-tuned. Paperwork has been submitted to the Western Acquisition Division to hire survey personnel. Field equipment and supplies are being purchased.

Sonobuoys:

Work under this item will begin during the 2013 vessel survey. Thanks to the continued support of Theresa Yost (Naval Operational Logistics Support Center), Jeffrey Leonhard, Todd Mequet, and Edward Rainey (Naval Surface Warfare Center, Crane Division), and Robin Fitch (I&E Director Marine Science, Office of the Assistant Secretary of the Navy) we have a sufficient supply of sonobuoys for the 2013 ARCWEST field season.

Oceanographic and Lower Trophic Level Component:*Moorings:*

The first of the ARCWEST oceanographic moorings were deployed in August 2012 and are still in the water. Analyses will begin after retrieval during the 2013 vessel survey.

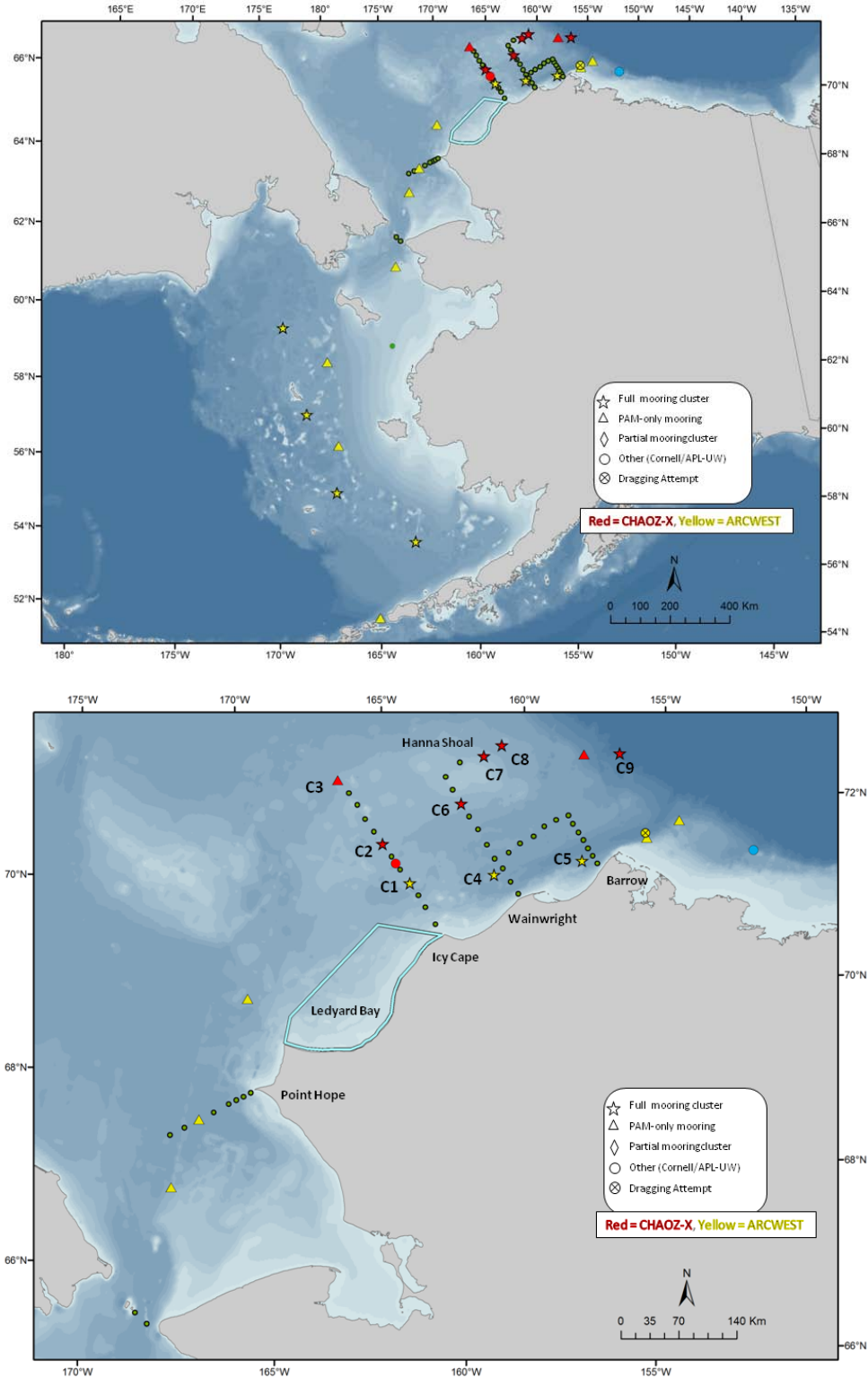


Figure 1. Planned passive acoustic and oceanographic moorings to be deployed in the Chukchi, Beaufort, and Bering Seas (upper panel, zoomed into the Chukchi and Beaufort Seas in the lower panel) for 2013. The yellow moorings will be analyzed under ARCWEST, and the red moorings will be analyzed under the CHAOZ extension interagency agreement should it be funded.

Satellite Tracked Drifters:

Twelve drifters were deployed during the last field season (Fig. 2). Those drifters still transmitting are being tracked. During the first quarter, their movement indicated the speed and direction of the ice rather than the currents. Movies of the drifter tracks will be periodically updated.

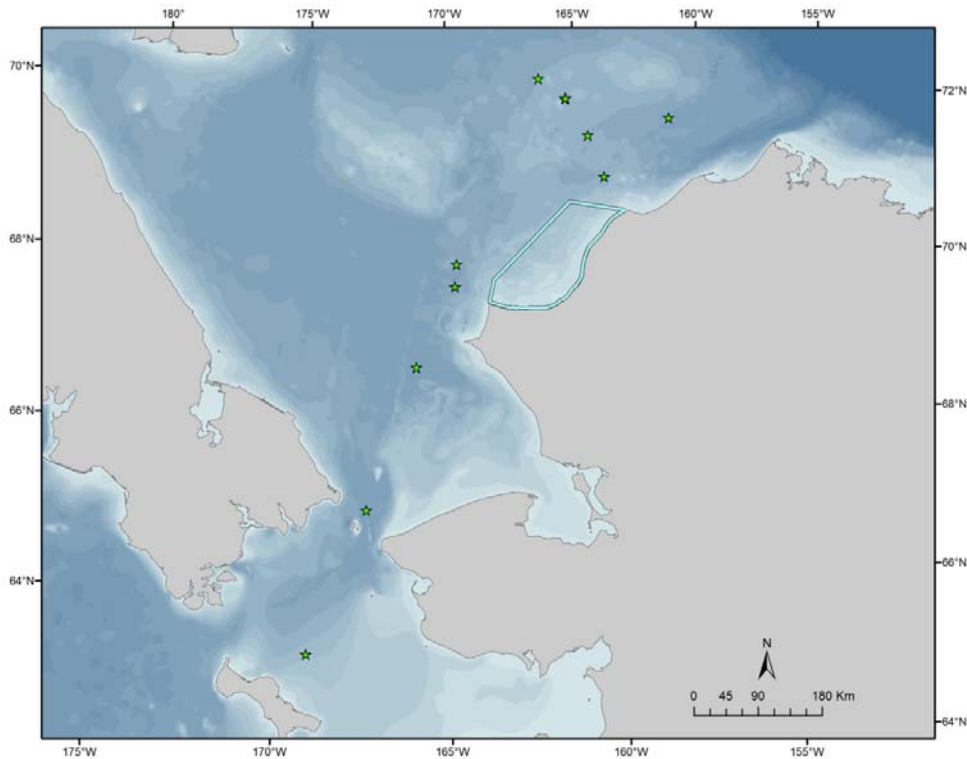


Figure 2. Deployment locations of ARGOS drifters in 2012 (green stars).

Active Acoustics:

The first of the ARCWEST TAPS-6NG instruments are still deployed. One instrument is at IC6 and the other just west of the Wainwright line upstream from the head of Barrow Canyon. Analysis will begin after retrieval of these two instruments during the 2013 vessel survey.

Lower Trophic Level Sample and Data Analyses:

No lower trophic level sampling or data analyses occurred as part of ARCWEST in 2012. All of the sampling was wrap up for CHAOZ.

Physical/Chemical Oceanographic Sampling:

No physical/chemical oceanographic sampling occurred as part of ARCWEST in 2012.

2013 Field Season Planning:

Locations for the 2013 oceanographic and active acoustic mooring (Fig. 1) have been determined in coordination with the passive acoustic component of ARCWEST. Locations for lower trophic level and physical/chemical oceanographic sampling have been determined. A tentative vessel schedule was drafted. These locations and the tentative schedule have continued to evolve as survey plans have been fine-tuned. The plan for ARCWEST in 2013 is for three moorings sites, fewer onshore/offshore transects, and a box of hydrographic and plankton stations around the Barrow Arch (Peard Bay). The plan includes an additional four mooring sites should the CHAOZ extension interagency agreement be funded. Field equipment and supplies are being purchased. We were only able to purchase 5 new sets of TAPS-6NG transducers, therefore we will deploy active acoustics at a total of 6 sites should the CHAOZ extension project occur simultaneously with ARCWEST. The sixth site will use the TAPS-6NG instrument retrieved in 201. The first quarter of 2013 was spent placing orders for new floats, pressure canisters, batteries, electronic components, etc. to construct 5 new TAPS-6NG units. We expect to complete assembly, testing, and calibration during the second quarter.

Significant technical, schedule, or cost problems encountered

Challenges for the 2013 field season include: obtaining a contract for a research vessel, paying for increases in fuel costs that have occurred since the ARCWEST proposal was written and approved, mooring costs that have more than doubled, and obtaining the additional mooring instruments required for the 2013 field season. The last issue is a challenge because the MOU was signed so late in the last fiscal year, that no expenditures or obligations could be made using Year 1 funds. We could not use or access these funds until late in the first quarter of FY13.

Costs for a vessel charter are projected to be higher than anticipated in 2011 when the ARCWEST budget was submitted. The draft vessel schedule for 2013 has reduced the number of days dedicated to satellite tagging large whales to meet the projected vessel costs.

Significant meetings held or other contacts made

23 January 2013 – Napp presented the ARCWEST draft field season plan at the 2013 Arctic Field Season Coordination Briefing convened by Sheyna Wisdom of Olgoonik Fairweather during AMSS.

24 January 2013 – Friday, Clapham, Berchok, Crance, Napp, Stephanie Grassia, Ellen Garland, Kim Sheldon, and Julie Mocklin who met with Jeff Denton (BOEM) to discuss ARCWEST.

27 February, 2013 – Friday, Kennedy, and Crance met with Steff and Fowler (Western Acquisition Division) to discuss the ARCWEST vessel charter planning.

29 March, 2013 – Friday met with Steff and Fowler (Western Acquisition Division) to discuss the ARCWEST vessel charter.

29 March, 2013 – Clapham, Berchok, Stabeno, Napp, Kennedy, and Friday met to discuss the timing of the ARCWEST vessel survey.

3 April, 2013 – Rone, Kennedy, Berchok, and Crance had a conference call with Dave Steckler to discuss the potential use of a new survey program, Mysticetus.

Presentations and Publications

6 March, 2013 – Friday presented a summary of the ARCWEST project at the U.S./Russia Marine Mammal Working Group Meeting.