

**NOPP 2015 Principal Investigator Annual Report for the
Marine Arctic Ecosystem Study (MARES)**

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LONG-TERM GOALS

The Marine Arctic Ecosystem Study (MARES) is an integrated ecosystem research initiative study to investigate the interrelationship among the physical, biological, and chemical and components of the Eastern Beaufort Sea ecosystem from Kaktovik, Alaska, to the Mackenzie River delta in Canadian waters.

OBJECTIVES

The overarching goals of the study are to better understand the interrelationship of the physical, biological, chemical, and human systems, including traditional knowledge, of the Beaufort Sea and to advance scientific prediction capabilities for linkages between marine life, human uses, sea ice, atmospheric and oceanic processes and river discharge. It is important for BOEM and its NOPP partners to study and monitor areas known for high biological productivity and prevalent subsistence use to ensure their protection. During 2015, Pilot Phase investigations were launched in Marine Mammal Tagging and Tracking and Biophysical and Chemical Oceanography focus areas.

APPROACH AND WORK PLAN

Task Order 1 – Management Support Services

1. The objective of this TO is to provide management oversight for all task orders issued against the base contract. Specific work elements are: project and data management; project coordination; and meeting facilitation.
2. Key Individuals – Jeff Green, Project Director; Francis Wiese, Technical Director.

Task Order 2 - Marine Mammal Tagging and Tracking

1. The overarching goal of the Marine Mammal Program is to attempt to understand the inter-relationships of biophysical and chemical parameters on different species of marine mammals that use this ecosystem. The marine mammal pilot field program focused on tagging bearded seals, spotted seals and beluga whales in 2015 (though none of the latter species were tagged). Animals were tagged with Sea Mammal Research Unit (SMRU) CTD-fluorometer tags. The CTD-fluorometer tags transmit

location, environmental (e.g. temperature, salinity, and fluorescence), and dive profile data via satellite while they are attached to the animal and also store additional higher resolution information. These data will help us understand habitat features that are important to the animals as well as understand behavior associated with oceanographic features.

2. The pilot program was carried out in collaboration with Andy VonDuyke and Robert Suydam from the North Slope Borough (NSB) and Lori Quakenbush from the Alaska Department of Fish and Game (ADF&G). Rowenna Gryba, Brendan Kelly and Francis Wiese were key participants from MARES.
3. Work in 2016 will include tagging of bearded seals, spotted seals, beluga whales and bowhead whales with SMRU CTD-fluorometry tags. Field work will be conducted collaboratively with the NSB.

Task Order 3 – Biochemical and Physical Oceanography

1. The MARES 2015 Pilot Biophysical and Chemical Observations Program Task Order 3 (M15PD00012) cruise planned for deployment of an autonomous glider for approximately six weeks, and deployment of a mooring array to be retrieved in the summer of 2016. Deployment was planned for the eastern U.S. Beaufort Sea with the objective of testing the latest technology and equipment to acquire biophysical and chemical time series data, and work towards describing the biogeochemical impact of the Mackenzie river plume in that area. For the mooring devices to be deployed during whaling season, BOEM and the Alaskan Eskimo Whaling Commission had agreed on August 21, 2015 to proceed only with mooring deployment once the communities of Nuiqsut and Kaktovik had completed their annual harvest of bowhead whales.
2. Robert Pickart, Senior Scientist, Woods Hole Oceanographic Institute; Donglai Gong, Scientist, Virginia Institute of Marine Science
3. Wrap-up TO3 and integrate lessons learned into TO4

WORK COMPLETED

Task Order 1 – Management Support Services

Activities completed in 2015 were all specified management services, preparation of project work plans, subcontractor management, reporting, invoicing and financial management, and coordination with BOEM and its partners.

Task Order 2 - Marine Mammal Tagging and Tracking

Field efforts in 2015 served to test the proposed tags and tagging methods and establish communications with communities for future tagging efforts. The pilot program was carried out in collaboration with the North Slope Borough (NSB) to reduce duplication of effort and to increase efficiency by combining resources and experience. Three spotted seals and two bearded seals were tagged in Dease Inlet and Kugrua Bay, AK in collaboration with the North Slope Borough (NSB) under the permit of Alaska Department of Fish and Game (ADF&G). Unsuccessful efforts were made to tag beluga whales at Point Lay, AK and Omalik Lagoon due to the early migration of beluga through the region.

Task Order 3 – Biochemical and Physical Oceanography

Field efforts in 2015 served to assess the deployment logistics associated with the Eastern U.S. boundary of the Beaufort Sea during open-ice season in September 2015. The USCG vessel Sycamore arrived at the study location with all mooring devices on board but due to deteriorating sea conditions and much prolonged subsistence whaling activities the vessel was eventually forced to return to port without deploying the mooring devices. An autonomous Slocum glider was deployed immediately north of the study region but a leak was detected during its first dive to 200m and the device had to be recovered. Later investigations found that the leak was caused by a manufacturing error which has since been addressed.

RESULTS

Task Order 1 – Management Support Services

All required deliverables were submitted on time.

Task Order 2 - Marine Mammal Tagging and Tracking

The pilot program successfully deployed the SMRU CTD-fluorometry tags in an area and on species where this has not been done before. The tags are still transmitting data and a more extensive analysis will be completed once tags have stopped transmitting. To date, four of the tags are transmitting data (2 spotted seals and 2 bearded seal). One of the tagged bearded seals, captured Sept. 17, stopped transmitting location data on October 5th, but resumed transmitting on October 23rd. On Dec. 5, one of the spotted seal tags stopped transmitting. The spotted seals are diving to the bottom, although they show considerable variation in dive duration and maximum dive depth between animals. The bearded seals are diving to the bottom, as anticipated. A total of 321 temperature profiles have been collected up to Dec. 1, 325 salinity profiles and 319 fluorescence profiles by the 5 tagged animals. Preliminary state space modelling results suggest that ARS and transiting behavior states can be modeled and identified with the data collected.

Task Order 3 – Biochemical and Physical Oceanography

No data was collected during the pilot program.

IMPACT AND APPLICATIONS (Please note N/A for sections not applicable)

1. National Security

TO2 N/A

TO3 N/A

2. Economic Development

TO2 N/A

TO3 N/A

3. Quality of Life

Task Order 2 - Marine Mammal Tagging and Tracking

Information collected as part of the larger marine mammal program can be used to help provide information to local communities about potential changes in the accessibility of subsistence species. Overall changes in the ecosystem that may impact marine mammal habitat suitability (e.g., changes in sea ice) can provide information on future ecosystem health.

Task Order 3 – Biochemical and Physical Oceanography

Part of the overarching objective of collecting data on the physical, chemical and biological oceanographic processes of the Eastern Beaufort is to be able to understand how changes to this system may potentially affect other trophic levels of this ecosystem and subsequently directly influences the availability of subsistence resources for coastal communities and traditional way of life for this region.

4. Science Education and Communication

TO2 N/A

TO3 N/A

TRANSMISSIONS (Please note N/A in sections that are not applicable)

1. National Security

TO2 N/A

TO3 N/A

2. Economic Development

TO2 N/A

TO3 N/A

3. Quality of Life

TO2 N/A

TO3 N/A

4. Science Education and Communication

TO2 N/A

TO3 N/A

RELATED PROJECTS

ADF&G, NMML and NSB all have marine mammal tagging programs that include the tagging of spotted and bearded seals and beluga whales. Research has been primarily focused on animal

movement and habitat use. We have collaborated with both ADF&G and NSB to minimize duplication of efforts and effects on local marine mammal populations and communities.

The NSB has been tagging spotted seals and juvenile bearded seals in the Chukchi Sea, as well as beluga whales. During 2015 we collaborated with the NSB for the ice seal and beluga tagging programs.

<http://www.north-slope.org/departments/wildlife-management/studies-and-research-projects/ice-seals/ringed-seal-research/ringed-seal-research-results-2015-tagging>

<http://www.north-slope.org/departments/wildlife-management/studies-and-research-projects/beluga-whale/beluga-research-eastern-chukchi-sea-stock/beluga-movements-and-satellite-tracking>

ADF&G have also been tagging bearded seals, but focused in the western Chukchi Sea. The MARES 2015 marine mammal tagging was conducted under the ADF&G permit.

<http://www.adfg.alaska.gov/index.cfm?adfg=marinemammalprogram.icesealmovements>

NMML has been tagging ice seals, including bearded seals and spotted seals, primarily focused in the Bering and Chukchi Seas.

http://access.afsc.noaa.gov/pubs/posters/pdfs/pLondon05_dive-behavior-spatial-variability.pdf

http://access.afsc.noaa.gov/pubs/posters/pdfs/pBoveng08_movements-bearded.pdf

OUTREACH MATERIALS

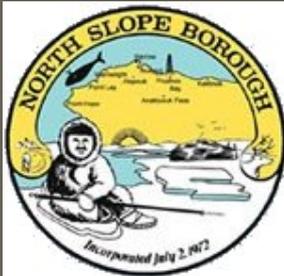
Attachment A: Presentation for the Ice Seal Commission: Proposed Marine Mammal Pilot Program

Attachment B: Marine Mammal Pilot Program Photos

ATTACHMENT A

Presentation for the Ice Seal Commission: Proposed Marine Mammal
Pilot Program

Marine ARctic Ecosystem Study (MARES) Proposed Marine Mammal Pilot Program



Ice Seal Commission
March 4, 2015
Anchorage, AK



FOCUS



- Understand how changes in the ocean and sea ice in the Beaufort Sea will alter the marine ecosystem, including the distribution and abundance of marine mammals
- Determine what features of ice and water are important to seals and whales

Proposed Pilot Program

2015

Propose to focus on bearded seals, beluga whales, and community consultations

- **Consultations** with local communities and hunters in Wainwright, Pt. Lay, Barrow, and Kaktovik
- **Tag bearded seals** in Wainwright, Alaska in collaboration with Wainwright hunters and North Slope Borough
- **Tag belugas** at Pt. Lay in partnership with the Native hunters and the North Slope Borough

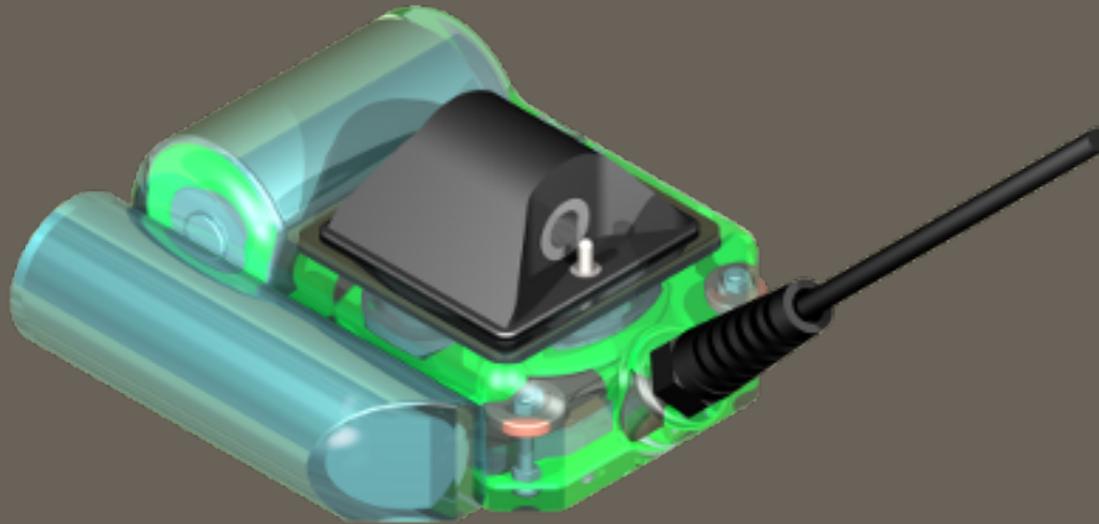
Proposed Bearded Seal Tagging

- 2015 tagging near Wainwright, Alaska,
- Where are bearded seals feeding, resting, molting, and breeding?
- What water conditions are important to these activities?
- Consult with hunters in Kaktovik, Alaska to determine the availability of bearded seals for tagging in their region in proposed 2016 and 2017 field seasons.



Proposed Tags

- SPLASH tags collect location and dive data
- CTD-fluorometer tags report location, depth, water temperature, salinity, and biological productivity



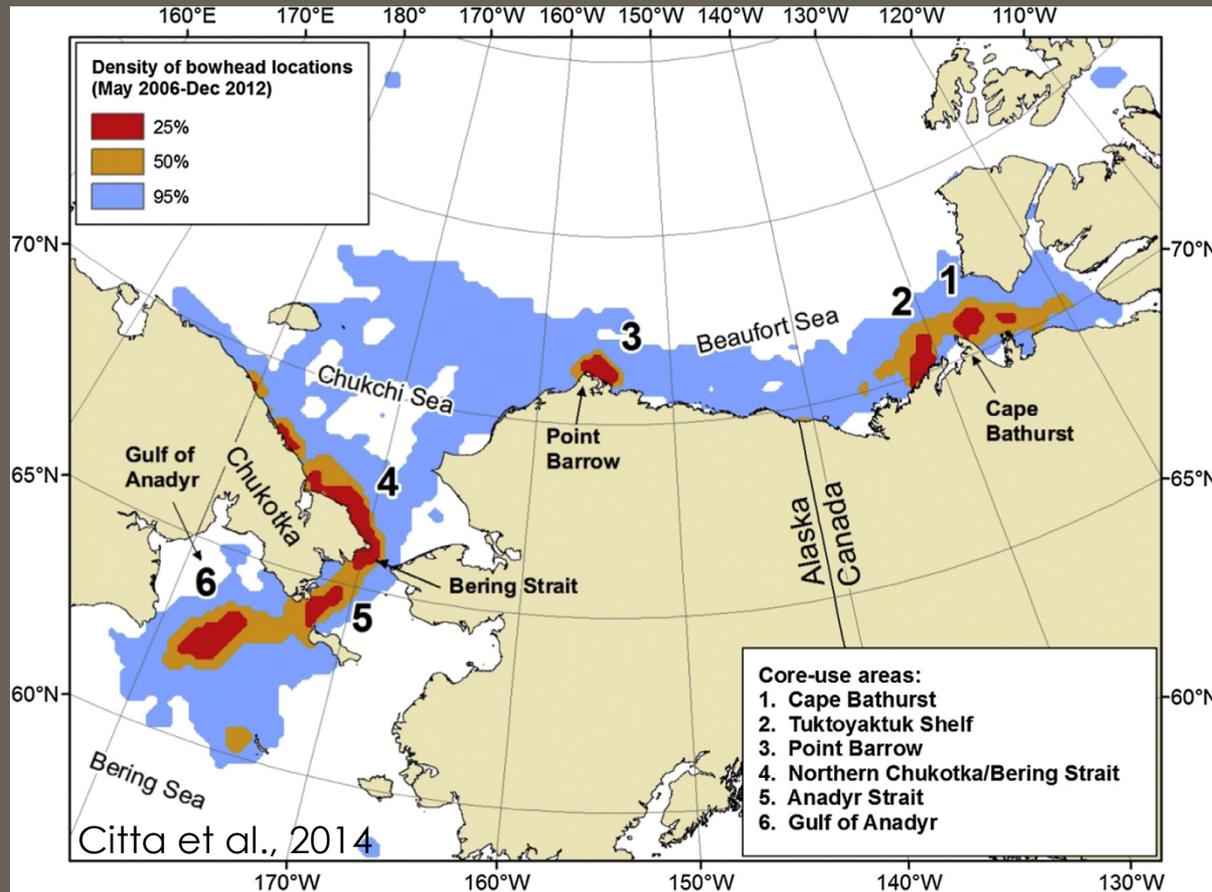
2016

Will focus on bearded seals, beluga whales, bowheads and community consultations. Actual plan will depend on feedback from hunters and communities and success of 2015 tagging program

- Tag bearded seals in Kaktovik, Alaska (NSB)
- Tag belugas in Mackenzie Delta (DFO)
- Tag bowheads in eastern Beaufort (ADFG)



Bowhead Whale core use areas



New Proposed tagging will help determine WHY they are there and HOW those characteristics may change

Potential Spotted Seal Tagging

Preliminary consultations with the North Slope Borough indicate tracking spotted seals in the Beaufort Sea could also provide important habitat-use information.

We will assess results from their findings to inform efforts in 2016 and/or 2017.

Key Technical Team Members

Rowenna Gryba:	Lead Researcher (Stantec)
Francis Wiese:	Technical Director, Quality Control (Stantec)
Brendan Kelly:	Senior Marine Advisor (Stantec)
Robert Suydam:	Senior Wildlife Biologist (North Slope Borough)
Billy Adams:	Subsistence Research Coordinator (NSB)
Andrew Von Duyke:	Wildlife Biologist (NSB)
Andrea Ahrens:	Marine Mammal Scientist (Stantec)
Sara Lindberg:	Logistics Coordinator (Stantec)



ATTACHMENT B

Marine Mammal Pilot Program Photos



Photo 1: Sub-adult spotted seal tagged August 20, 2015. Photo credit: Rowenna Gryba

NMFS PERMIT NO. 15324-01



Photo 2: Sub-adult bearded seal tagged September 8, 2015. Photo credit: Brittini Driver



Photo 3: Sub-adult bearded seal tagged September 17, 2015. Photo credit: Andy Von Duyke