

# Coastal Marine Institute

University of Alaska

## Satellite Tracking of Pacific Walruses: The Planning Phase

Lori Quakenbush  
Principal Investigator

Final Report  
OCS Study BOEMRE 2010-035

November 2010

**Minerals Management Service  
Department of the Interior**

and the

**School of Fisheries & Ocean Sciences**



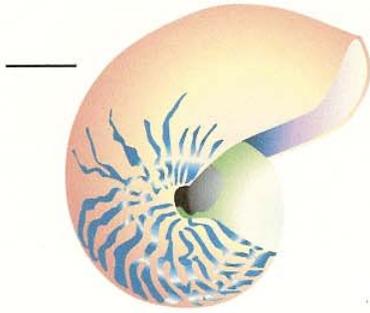
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University of Alaska Fairbanks

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## **Abstract**

Pacific walrus (*Odobenus rosmarus*) are an important subsistence and cultural resource for coastal people of western Alaska and they are an important component of the Bering and Chukchi seas ecosystems. Walrus winter together in the Bering Sea, however subadults and females with dependent young summer in the Chukchi Sea while many adult males remain in the Bering Sea. The rapid retreat of sea ice in recent years is changing walrus summer habitat and may be changing their summer distribution and haulout behavior, requiring that walrus haul out on land instead of ice. Oil and gas activity has recently increased in the Chukchi Sea and may compound the impact to walrus elevating the importance of understanding walrus movements, feeding behavior, and habitat requirements necessary for the conservation and management of the species. Satellite transmitters placed on walrus near the communities of Little Diomedea, Wales, Nome, Point Hope, Point Lay, Wainwright, and Barrow in spring would provide information on migration route, speed of travel, feeding areas and haulout behavior. Working cooperatively with the Eskimo Walrus Commission and walrus hunters from these communities, we designed a study to deploy satellite transmitters and conduct counts and observations on haulouts that are encountered near villages in spring and fall. These data will provide information that will help answer important questions about walrus movements, feeding and haulout behavior, and will help identify important habitats. The study is designed to involve walrus hunters and other local people without interfering with subsistence walrus hunting activities.

## Introduction

Walrus have been important for subsistence communities along the coasts of the Bering and Chukchi seas for many years (Brooks 1953, Ray 1975) and they continue to be important (Fay and Bowlby 1994, Benter and Snyder 2005). Walrus meat and blubber is used for food, hides are used for boat skins, and ivory is used for artwork that provides cash for fuel, ammunition, and other needs. Walrus are also key components to the marine ecosystem for their role in re-suspending bottom sediments and making nutrients available in the water column for use by other organisms (Oliver et al. 1985, Nelson et al. 1994, Bornhold et al. 2005, Ray et al. 2006).

In recent years, the sea ice has retreated more rapidly and to a greater extent in the Bering and Chukchi seas (Rigor and Wallace 2004, Comiso 2006, Serreze *et al.* 2007, Stroeve et al. 2007). Evidence also indicates that oceanographic conditions in this region have been changing (Niebauer 1980, 1983, 1988, Trenberth 1990, Ebbesmeyer *et al.* 1991), which suggests changes in the ecosystem may be occurring that may decrease the productivity of benthic habitats where walrus feed (Grebmeier *et al.* 2006). Female walrus give birth in spring as they move north with the ice (Fay 1982). They use the sea ice as a platform for resting between feeding bouts. Walrus feed on the ocean bottom, usually in water less than 100 m in depth (Fay and Burns 1988) and if the ice retreats off of the shelf, over deep water, it will no longer be available for walrus to use for resting between feeding bouts. These ice conditions may create a nutritional challenge for subadults and females with calves if they must feed near terrestrial haulouts, thus limiting the overall area available for feeding. Therefore, the changes in the extent and duration of the sea ice in summer may be changing the distribution of females, calves, and subadults. Renewed interest in oil and gas in the Chukchi Sea adds to the urgency to understand walrus movements, behavior, and important habitat areas in the Chukchi Sea in summer in order to provide protection to the species in the form of effective mitigation measures. Walrus that are stressed by recent changes in sea ice conditions may experience compounded impacts if they are prevented from using important habitats due to oil and gas activities.

Satellite telemetry is a powerful tool used to address questions regarding movements, habitat use, and disturbance especially for marine mammals (Fancy et al. 1988; Heide-Jørgensen et al. 2003; Citta et al. 2007; Quakenbush et al. 2007, 2008). Locations from satellite transmitters on individual walruses can determine migration speed and routes, residence time in important feeding areas, distance between feeding areas and haulouts, and time spent on haulouts. Satellite transmitters can collect and transmit diving information to provide behavior at specific locations that can be correlated with feeding and resting. Some satellite telemetry studies have been done with Pacific walruses (Hills 1992, Jay et al. 2001, Jay and Garner 2002, Jay and Hills 2005,) and the existing satellite transmitter technology is well suited for use with walruses, although to date the retention time of transmitters is shorter than desired (Jay et al. 2006).

## **Objectives**

**Objective 1:** Work with the subsistence walrus hunters to design a study using satellite telemetry as a tool to document the general pattern of spring and summer movements of walruses in the Chukchi Sea; identify feeding areas and haulout locations; document behavior associated with feeding, hauling out on land, and oil industry activities.

**Objective 2:** Work with the subsistence walrus hunters to design a study that includes deploying transmitters, counting walruses on haulouts, conducting behavioral observations, and providing protection against disturbance when walruses are encountered on land; all conducted by local people in coordination with scientists.

**Objective 3:** Provide an opportunity for collaboration with walrus hunters, the Eskimo Walrus Commission (EWC), North Slope Borough (NSB), U.S. Geological Survey (USGS), U.S. Fish and Wildlife Service (USFWS), Minerals Management Service (MMS), Alaska Department of Fish and Game (ADF&G), oil companies, and other interested parties. This relationship provides opportunities for input into the study design and for local involvement in the tagging, counts, behavioral observations, and protection against disturbance.

## **Methods**

The project objectives were accomplished through communications and meetings with interested parties, and through presentations and discussions at EWC meetings.

## Results

### Study Plan

Collaborations with the Eskimo Walrus Commission (EWC) established during the University of Alaska Coastal Marine Institute Study “Satellite Tracking of Walruses in the Chukchi Sea: The Planning Phase” will continue throughout the study. In order to address all of the objectives, walruses will be tagged by local hunters from several villages during the spring and when hauled out in the fall. Up to 45 walruses will be tagged annually.

**Objectives.** The objectives of this study include:

*Objective 1:* Work with the subsistence walrus hunters to deploy satellite transmitters on walruses of different age and sex classes in order to document and describe the general pattern of spring and summer movements in the Chukchi Sea including movements to feeding areas, haulout locations, and interactions with oil industry activities.

*Objective 2:* Conduct counts, behavioral observations, and provide protection against disturbance when walruses are hauled out on land.

*Objective 3:* Conduct all aspects of the study in a way that does not interfere with subsistence hunting.

*Objective 4:* Share data with USGS to maximize the information available regarding movements, habitat use, haulout behavior, and interactions with industrial activities.

*Objective 5:* Conduct traditional knowledge interviews in interested villages to collect information on what generations of walrus hunters know about movements, feeding areas, behavior and terrestrial haulouts.

**Satellite Tagging.** Walrus hunters from coastal villages will be trained in the use of the tagging equipment and tag deployment and permit-related protocols. Satellite tags have been

developed and tested by USGS researchers and their contractors and by researchers in Greenland and Canada. We may use other tags as they become available or as the data needs change. The current tags transmit location and duration while swimming and when hauled out of the water.

It is likely that the availability of walruses near shore and near communities for tagging will not be predictable. Therefore, having a trained crew with tagging equipment in each village that can respond to walruses nearby will be critical to deploying tags and recording numbers and behavior at terrestrial haulouts.

In Year 1, we will attempt to deploy a total of 15 tags from Diomedede, Wales, Point Hope, or Pt. Lay in late May and early June 2010 depending upon ice conditions and where walruses can be found. We will also attempt to deploy a total of 15 tags from Wainwright or Barrow in June. In summer and fall we will respond to sightings of walruses using land haulouts near villages and attempt to deploy up to 15 tags at land haulouts. Methods will be developed with the hunters for approaching and tagging walruses with minimal disturbance to the herd while they are hauled out.

During tagging the following information will be recorded:

1. Date and time
2. Location (GPS coordinates)
3. Tagger
4. Type of tag
5. Type of boat
6. Distance to target walrus when tag deployed
7. Placement of tag on walrus marked on drawing and digital photo documentation, if possible
8. Reaction of target walrus to tag
9. Reaction of target walrus to boat
10. Reaction of nearby walruses to tagging activity
11. Number of walruses in the group
12. Number of calves in the group
13. Age and sex class of tagged walrus
14. If tagged walrus has a calf

Walrus on ice will be approached in a boat from downwind. Tags will be deployed with crossbows. Walrus on land will be approached from land using the wind and cover to avoid detection until in position to deploy a tag.

Prior to deployments in Year 2, we will evaluate the results from the tags deployed in Year 1 to determine the best allocation of tags by location, season, and what if any changes in methods should be made. In Year 2 we will attempt to deploy 45 tags in spring, summer, and fall. Prior to deployments in additional years, we will evaluate the results of previous years in order to determine the best allocation of tags by location and season.

***Terrestrial Haulout Surveillance.*** Walrus hunters from coastal villages will conduct boat surveys to locate walrus hauled out on land. When found, the number of walrus, their sex and age composition, and their behavior and condition will be recorded. As soon as possible a report will be made to a designated person. That person will be responsible for notifying EWC, USFWS, USGS, MMS, O&G so that the area can be avoided by boats and aircraft. A surveillance plan will be initiated and the group will be monitored until they leave the haulout. Someone will be stationed at a location nearby to observe the animals and offer protection against disturbance if necessary and possible.

During the surveillance period the following information will be recorded:

1. Data and time first observed
2. GPS coordinates of the haulout
3. Total number of walrus on beach
4. Sex and age composition of the walrus
5. Physical condition of the walrus
6. Color of the walrus
7. Behavior of walrus (i.e., sleeping, alert)
8. Causes of disturbances
9. Reaction to disturbances
10. Date and time last observed or when walrus left the beach

***Traditional Knowledge.*** Walrus hunters will be interviewed to collect local knowledge of walrus migration timing, behavior, feeding areas, and haulouts. Hunters to be interviewed will be selected by the EWC Commissioner for that village. All interviews will be voluntary and interviewees will be compensated for their time. Information will be written into a report with maps, a draft report will be prepared and approved by the interviewees and then by the EWC before it is shared outside of the walrus hunting community. Once the report is approved the information will be incorporated into the scientific reports and presentations so that the movements and behavior of the tagged walruses will be presented with the traditional knowledge of movements and behavior.

***Project Design.*** Participation of Alaska Native subsistence walrus hunters is a key component of this project. This is true for all aspects of planning, development, field logistics, expertise regarding walrus behavior, tag deployment and for tagging so that there is no interference with the walrus subsistence harvest. If hunters decide there are acceptable levels of interference, those levels will be identified and approved by the walrus hunters of the community that would be affected. Without such approval, all tagging will be done without interfering with any walrus hunting activities. Prior to tagging any walruses, participating villages will approve of the tagging plan and any issues regarding subsistence hunting will be addressed. If concerns can not be addressed tagging will not be conducted from that village.

A similar satellite telemetry study is being conducted with bowhead whales in cooperation with the Alaska Eskimo Whaling Commission and local Whaling Captain's Associations (Quakenbush and Small 2008). This project has been successful in tagging 40 bowhead whales in Alaska and Canada, acquiring valuable information on migration, feeding, diving behavior, and documenting interactions with seismic vessels while not interfering with subsistence whaling. This project is widely accepted among whaling communities in Alaska and subsistence communities in Canada. We have trained whalers to deploy the tags and three whalers have been added to our research permit as co-investigators for tagging.

**Data Analysis.** Maps of locations of satellite tagged walrus will be posted on the State of Alaska Department of Fish and Game's website so that the locations and movements of walrus within days of their actual movements. Data received from satellite tags will be archived and analyzed for:

- 1) Movements relative to ice conditions and industrial activity
- 2) Haulout patterns relative to ice conditions
- 3) Identification of feeding areas
- 4) Distance from haulout areas to feeding areas
- 5) Time spent feeding, time spent hauled out, and time in transit between feeding and resting areas
- 6) Comparison of above among females with calves of the year, females with older calves, and independent males and females.

**Deliverables.** Presentations will be given at participating villages, EWC meetings, and professional meetings and conferences. The website will be maintained so that interested parties can stay informed of the latest information. Satellite telemetry data will be shared with USGS, USFWS, and others for real-time management and mitigation purposes. Traditional knowledge will be collected into a report and after approval that information will be combined with the telemetry data and incorporated into quarterly and annual reports as well as submitted as manuscripts in the scientific literature.

## Meetings

*Interagency Meeting, November 2007.* Researchers from USGS, USFWS, and ADF&G met in Anchorage to coordinate research objectives and discuss tag options.

*Eskimo Walrus Commission Meeting, 15–16 January 2008.* PI, Lori Quakenbush, presented the satellite tagging study idea at a meeting of the EWC commissioners in Nome for discussion. The project was of interest and importance to the EWC and they reiterated their support, especially because it includes the hunters and the local people who know about walrus and use them for subsistence.

*Eskimo Walrus Commission Meeting, 20–21 November 2008.* PI, Lori Quakenbush, presented the draft study plan for review and discussion.

*Eskimo Walrus Commission Meeting, 5–6 February 2009.* The study plan was presented, reviewed, and approved.

## **Implementation Plan**

Minerals Management Service (MMS) is funding a study to be managed by ADF&G working in close cooperation with EWC and Alaska Native subsistence walrus hunters, in which the hunters will participate in the study by providing logistics, walrus behavior expertise, and by deploying the tags whenever possible. Satellite telemetry will be used to document seasonal movements of walruses throughout their range in spring, summer, and fall. This is a 5-year study in which ADF&G will provide technical and analytical expertise, administrative support, and oversight in the study; subsistence hunters will provide expertise in aspects of field logistics and walrus behavior resulting in deployment of the satellite tags by hunters whenever possible.

The contract between MMS and ADF&G is in place and satellite transmitters have been ordered and a research permit application has been submitted. We expect that the first tags will be deployed in May 2010.

## **Discussion**

Learning more about Pacific walrus haulouts, feeding areas, and movements between the two in the Chukchi Sea is especially important given the recent decrease in sea ice and the increase in industrial activity. When and where to deploy tags will likely be determined by where the walrus are and if they are hauling out on ice or land within reasonable distances of coastal communities.

We have successfully accomplished the objectives of the planning phase and have received funding to begin the study phase. We will continue to work with the EWC and hunters from each village as the project develops.

## **Acknowledgments**

This project greatly benefited from key ideas provided by EWC commissioners. Vera Metcalf, Chris Perkins, Charles D. N. Brower, and Victor Karmun scheduled project presentations into EWC meeting agendas and supported the project. Charles Monnett was instrumental in the project concept and assisted in its development. Minerals Management Service and the Coastal Marine Institute (University of Alaska Fairbanks) provided the funding.

## Study Products

A Study Plan for using satellite telemetry to document the general pattern of spring and summer movements, feeding areas, haulout locations, and behavior relative to oil industry activities of walrus in the Chukchi Sea was developed.

### Presentations

Eskimo Walrus Commission Meeting, 15–16 January 2008, Nome. PI Quakenbush introduced the satellite tracking of walrus project and presented draft objectives and ideas for study plan discussion.

Eskimo Walrus Commission Meeting, 20–21 November 2008, Nome. PI Quakenbush presented the satellite tracking of walrus project and draft studies plan for further discussion.

Eskimo Walrus Commission Meeting, 5–6 February 2009, Anchorage. PI Quakenbush presented the draft study plan for the satellite tracking of walrus project for final review and approval.

Quakenbush, L.T. 2009. Satellite tracking of Pacific Walrus; the Planning Phase. Coastal Marine Institute Annual Project Presentations, 11 December 2008, Fairbanks.

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### **The Department of the Interior Mission**

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.