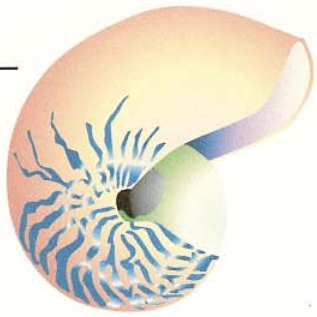

Coastal Marine Institute

University of Alaska

Traditional Knowledge Regarding Bowhead Whales in the Chukchi Sea near Wainwright, Alaska

Lori T. Quakenbush
Principal Investigator

Henry P. Huntington
Co-Principal Investigator

Final Report
OCS Study MMS 2009-063

September 2010

Minerals Management Service
Department of the Interior

and the

School of Fisheries & Ocean Sciences

University of Alaska Fairbanks

This study was funded in part by the U.S. Department of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) through Cooperative Agreement No. 0102CA85294, Task Order No. 72989, between BOEMRE, Alaska Outer Continental Shelf Region, and the University of Alaska Fairbanks.

This report, OCS Study MMS 2009-063, is available from the Coastal Marine Institute (CMI), School of Fisheries and Ocean Sciences, University of Alaska, Fairbanks, AK 99775-7220. Electronic copies can be downloaded from the MMS website at www.mms.gov/alaska/ref/akpubs.htm. Hard copies are available free of charge, as long as the supply lasts, from the above address. Requests may be placed with Ms. Sharice Walker, CMI, by phone (907) 474-7208, by fax (907) 474-7204, or by email at skwalker@alask.edu.
Once the limited supply is gone, copies will be available from the National Technical Information Service, Springfield, Virginia 22161, or may be inspected at selected Federal Depository Libraries.

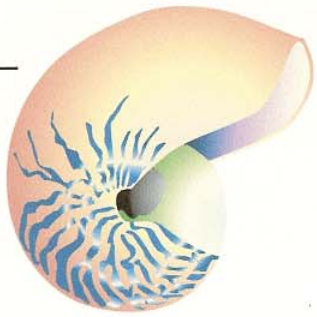

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Table of Contents

List of Figures

Abstract

Bowhead whales (*Balaena mysticetus*) are an important subsistence and cultural resource for coastal people of western and northern Alaska, as well as an important component of the ecosystems of the Bering, Chukchi, and Beaufort seas. There is extensive traditional knowledge regarding bowhead whale migration and behavior near subsistence whaling villages in Alaska. The Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) is funding a satellite telemetry study to document bowhead whale movements, important habitats, and interactions with industrial activities. The purpose of this project is to collect traditional Iñupiat knowledge regarding bowhead whales so that it can be combined with data from the satellite telemetry study for a more complete understanding of the migrations and local movements of bowhead whales. Seven whaling captains from the Chukchi Sea village of Wainwright shared their knowledge of ice conditions, timing of migration, feeding and mating behavior, conditions necessary for whaling, and their concerns about oil and gas activities. The collection and sharing of traditional knowledge regarding bowhead whale migration timing and feeding areas near Wainwright will add to the overall understanding of bowhead whale ecology so that impacts of offshore oil and gas activities on bowhead whales and the people who hunt them can be minimized.

Introduction

The general migratory patterns of bowhead whales in the Bering, Chukchi, and Beaufort seas are well documented (Moore and Reeves 1993). The details of whale movements and activity throughout the migratory range are not well known. Offshore industrial activity in the region is increasing, including seismic exploration, oil and gas development, and ship traffic. A better understanding of bowhead whale movements and habitat use is needed, therefore the Alaska Department of Fish and Game (ADF&G) with funding from the MMS, and PIs Quakenbush and Huntington with funding from the MMS through the Coastal Marine Institute (CMI) are conducting two related projects to learn more about bowhead whale movements and behavior.

The first project involves ADF&G in cooperation with the Alaska Eskimo Whaling Commission (AEWC), the North Slope Borough, and others placing satellite transmitters on a small number of whales to learn more about the movements and behavior of individual whales over large portions of the migratory range. Forty-four transmitters have been deployed; 35 in Alaska and 9 in Canada. Thirty-five transmitters were placed on whales near Barrow; four in spring and 31 in fall. Efforts to place transmitters on whales near Kaktovik have not been successful due to weather conditions. In 2007, ADF&G worked with the Canadian community of Aklavik and two whalers from Kaktovik to tag five bowheads near Shingle Point in Canada. In August of 2008 and 2009, ADF&G worked with whalers from Kaktovik, Point Hope, and the Canadian community of Tuktoyaktuk to tag one bowhead in 2008 and three in 2009. In Alaska, efforts will continue in Barrow and work with Yup'ik whaling captains on St. Lawrence Island will begin to extend the work to the Bering Sea. The satellite transmitter tracking

project has been funded by the MMS (Contract No. 01-05-CT39268) and tagging efforts in Canada have been supported by the Department of Fisheries and Oceans Canada.

The second project began at the request of the AEWC, because they wanted the knowledge of generations of whalers regarding bowhead whale movements and behavior near their villages (traditional knowledge) to be recorded and included in reports in addition to the movements and behaviors of the tagged whales. Traditional knowledge from discussions with whaling captains and crew members in Wainwright (reported here; Fig. 1), and in Kaktovik and Barrow (reported separately; Huntington and Quakenbush 2009a) were recorded to document bowhead whale movements and behavior near those communities.

Traditional Knowledge (also called Traditional Ecological Knowledge) and its value to science was well described by Huntington and Mymrin (1996):

> Traditional Ecological Knowledge (or TEK) is a system of understanding one's environment. It is built over generations, as people depend on the land and sea for their food, materials, and culture. TEK is based on observations and experience, evaluated in light of what one has learned from one's elders. People have relied on this detailed knowledge for their survival—they have literally staked their lives on its accuracy and repeatability. TEK is an important source of information and understanding for anyone who is interested in the natural world and the place of people in the environment. Many scientists recognize the value of working with people who live in an area and who have great insight into the natural processes at work in that area. While the scientific perspective is often different from the traditional perspective, both have a great deal to offer one another. Working together is the best way of helping us achieve a better common understanding of nature.

Observations that form traditional knowledge and scientific observations are independent sources of information that when combined, can increase our depth of knowledge (Huntington et al. 2004). Traditional knowledge can provide details about the patterns of larger numbers of whales, over a longer time period, in more localized areas; complementing the information gathered by satellite telemetry about the patterns of a few whales, over a relatively short time period, in larger areas. This traditional knowledge project used the same approach that the Native Village of Savoonga used when documenting traditional knowledge about bowhead whales on St. Lawrence Island (Noongwook et al. 2007). Traditional knowledge research was also conducted in Kaktovik and Barrow with funding from ConocoPhillips (Huntington and Quakenbush 2009a), which was used as match by the CMI for research in Wainwright. This report presents the results of the interviews conducted in Wainwright.

The objectives of this project were 1) to gather traditional knowledge about bowhead whale movements, distribution, and long-term changes in population size, composition, and abundance in the Chukchi region, specifically near the village of Wainwright; 2) prepare a document compiling the traditional knowledge for the

community of Wainwright; 3) engage a whaling captain as a co-author of the report; and 4) incorporate traditional knowledge into the results of the satellite tagging study for reports and publications. Although we were not able to find a whaling captain that was interested in helping co-author the report, the interviews with the whaling captains provided an additional opportunity to discuss the real-time locations and tracks of the tagged whales, as well as the satellite tagging project in general, and future plans for tagging.

Methods

We used the semi-directive interview method (Nakashima and Murray 1988; Huntington 1998) to conduct a single group discussion with seven whaling captains, who were identified and invited to participate by the head of the Wainwright Whaling Captains Association. The captains had an average of 35 years of whaling experience ranging from 15 to 45. The discussion took place in Wainwright in late February 2008. This method was also used to document traditional knowledge on St. Lawrence Island in Noongwook et al. (2007).

Using the semi-directive method, researchers initiate a discussion around various topics of interest, but allow the participants to determine the order in which topics are discussed and to make connections between various topics that the researchers might not have anticipated. The discussion is thus more fluid than would be a standardized questionnaire. The discussions were conducted in English, as all participants were comfortable in that language, though the participants occasionally discussed a particular point in Iñupiaq before providing a summary in English.

The researchers included the two Principal Investigators (PI); PI Quakenbush, a marine mammalogist who is also the PI of the satellite transmitter study, and PI Huntington, a social scientist with experience in traditional knowledge studies. PI Huntington also took part in the St. Lawrence Island study mentioned earlier. PI Huntington led the discussion, and both PIs asked follow-up questions. Both researchers were experienced in the methodology having previously worked together with whaling captains in Barrow and Kaktovik (Huntington and Quakenbush 2009a). Having both forms of expertise helped in framing the discussions and in asking appropriate follow-up questions. The meetings also allowed the opportunity for PI Quakenbush to share and discuss preliminary results of the satellite transmitter study, specifically the movements of tagged whales.

We prepared a draft report, which was made available to the participants for their review and comments. Comments and changes received from the participants were incorporated into the final report. The revised report (Huntington and Quakenbush 2009b; Appendix A) was reviewed and approved by the Wainwright Whaling Captains (March 2009) and the Alaska Eskimo Whaling Commission (October 2009) before it was shared outside of the whaling communities.

Results

Seasonal Movements

Spring. In the past, bowhead whales first arrived at Wainwright in late April, but in recent years they arrive earlier so that now they appear in the area in early April and at times even in March. Most whales have passed by early June. The movements of bowhead whales near Wainwright are determined primarily by ice conditions. Leads in the local area affect local distribution, whereas the condition of leads to the south influences the timing of the migration as a whole. The prevailing east-northeast winds tend to open the leads near Wainwright, with currents playing a role, too. West winds tend to close the lead, making whaling impossible. When the lead is closed, the whales travel farther from the shorefast ice. Currents are stronger by Point Belcher, and there is a strong current near the Kuk River mouth by Wainwright in late May and early June (Fig. 1). The whales often follow the shorefast ice edge, but may also travel directly from the Icy Cape area to the Point Belcher area, staying farther offshore as they pass the village. Wainwright whalers hear from St. Lawrence Island whalers and from Point Hope whalers that bowheads are migrating. They expect bowhead whales to reach the Wainwright area about a week after they reach Point Hope, depending on ice conditions in between.

Summer. Bowhead whales have been seen occasionally in June and July after the shorefast ice has broken up near Wainwright. After the whaling season, hunters often seek bearded seals in the pack ice. At these times they may see bowhead whales still migrating. One such whale was seen near Point Franklin in June of 2007 (Fig. 1). Many large whales were seen in July 2007 while hunters were out after bearded seals. These are believed to be part of the third wave, the large whales that come last. Whales have been seen later in July on a few occasions, near Wainwright and Icy Cape. Three very large bowheads were seen by the Kuk River mouth one July about 35 years ago (Fig. 1).

Fall. Bowhead whales do not generally follow the coast southwards from Barrow during their fall migration. Bowhead whales have been seen a few times near Wainwright in October.

Behavior

Size Segregation. Whalers recognize three different waves (also called pulses, runs, and schools) of whales made up of different sized whales that pass in spring. The first wave is primarily small, young whales, and occurs when the leads first open. The whales in the first wave migrate past Wainwright through open leads or ponds of open water. The second wave of whales, comprised of mid-sized whales, also requires open leads or ponds. For both waves, if the lead closes or if leads are not available to the south, the whales may delay their migration to await more favorable conditions. The whales may congregate in open pools while waiting for the leads to open up.

The third wave of whales, which includes the largest whales and also most of the mother-and-calf pairs, takes place in the second half of May and early June. These large mother whales are capable of pushing up through young ice (up to approximately 18" or 45 cm thick) to create breathing holes. Whales following behind will use the same breathing holes, which can be dangerous to people on the ice if the holes are covered with snow and thus invisible from above. Later whales follow the path set by the first whales. Young boys at whaling camps are told to keep quiet so that blows could be heard even when the lead was closed, but it was also important to keep quiet so that the whales would not be disturbed while setting the migratory path for the other whales to follow. Bowhead whales can also find cracks in thicker ice through which they can breathe. They are thus able to migrate even when the main lead system is closed. Whales in the third wave may also be found in cracks and openings far out in the pack ice.

Mating. Mating behavior consists of several males and one female. The female and one male will stay in one location, rolling slowly over and over so that each has the opportunity to breathe without disengaging. The other males will slowly circle the mating pair. Whalers once asked elders about the advisability of hunting a mating pair. The elders discouraged this, saying that first the whales were making more whales, and second that they might become violent if disturbed at this time and thus would be hazardous to the whalers. For these reasons, mating whales are left alone.

Calving. Calving has been seen in a few locations (Fig. 2). Calves are occasionally seen in late April, but more typically in late May and June. Calves are small and gray, rather than the black of an older whale. Elders emphasized the need to look carefully when whaling to make sure that an adult whale is not accompanied by a calf. Whales with calves should not be taken.

Feeding. Feeding is often seen along the edge of the shorefast ice (Fig. 2). Whales will swim parallel to the edge with their mouths open. They may have trouble closing their mouths, sometimes using the ice by pushing their lower jaw against the ice to help shut their mouths. Whales are also known to swim under the shorefast ice to feed, circling under a particular area or traversing the area by breathing through cracks in the shorefast ice or pushing up through young ice to create breathing holes. Whalers have seen and heard whales surfacing between their camps at the ice edge and land, as the whales migrate under the shorefast ice. In one case, the whalers had cut a hole in the ice behind their camp, and found a whale breathing in that hole. In another case, where whales were repeatedly circling under the shorefast ice, the whalers approached and the whales quickly moved away from the area. Whales also feed under young ice, where food can often be found.

Other Information

Ice Conditions. Before whaling, Wainwright whalers wait for the leads to be open wide, to help reduce the struck-and-lost rate. The pattern of leads varies from year to year in the Wainwright area. In some years, the lead has remained open all spring,

whereas in other years there has been hardly any open water during whaling season. When nearshore leads do not open, whalers may have to travel farther offshore, either across young ice or on un-grounded ice susceptible to breaking off, both of which are dangerous.

Wainwright whalers seek open leads closest to shore. The whalers will have been on the ice throughout the winter, watching where the ice breaks off and assessing where it is likely to do so in spring, which helps them plan. In most years, whaling starts near Point Belcher to the north of the village (Fig. 2), where the currents and ice conditions tend to create leads closer to shore. The ice is typically rough in this area. A key concern is finding a suitable location for hauling a whale onto the ice for butchering. The ice needs to be thick enough to support a whale and have a large, flat area for the whale and the cutting-up activities. The whalers begin by seeking such a place, often traveling the lead edge by boat and then cutting a trail to the suitable location. Searching on the shorefast ice would be much more difficult due to the difficulty of traveling over rough ice. In recent years, the ice has been thinner, making it harder to find such a place.

As the season progresses, leads may open up closer to Wainwright, and the whalers may move to the southwest from Point Belcher, seeking other locations to set up whaling camps. In some years, the whalers may go as far south as Icy Cape, though that is not as common (Fig. 2). One year, migrating ducks at Icy Cape were so numerous that the whalers' camps and gear were covered in duck droppings, reducing the appeal of returning to that particular location.

Other Species. Whalers have seen other species of whales in the region. Identifying which species is difficult, but characteristics such as a small dorsal fin make it clear that they are not bowhead or gray whales. Fin and minke whales are likely candidates, and there is a possibility that sperm and blue whales have been seen in the area, too. A sperm whale was seen during bearded seal hunting about 30 years ago, recognized by its blunt head (whalers being familiar with Moby Dick). Beluga whales are common during the spring migration, typically migrating ahead of one or more bowheads. In summer, belugas congregate near Icy Cape. In some years, they come close to Wainwright and are hunted, whereas in other years they do not come past Icy Cape along the coast.

Recent Changes. In recent years, the ice has been changing. The ice used to start forming in October, but now may not form until December or even until after Christmas. The resulting thinner ice can be blown offshore more easily during winter storms, further reducing the time it has to thicken and become anchored to provide safe locations for whaling camps. Break-up of the shorefast ice used to occur in late June and July, but now the ice may start to rot in May (both from sun on top and from currents underneath), making travel on the ice dangerous and limiting the season that the whalers can be out whaling. The lack of multi-year sea ice and other large, thick floes has allowed the whales to begin their migration earlier in the spring. In the past, bowhead whales first arrived in late April, but in recent years they arrive in early April and at times even in March.

Whalers Concerns. Wainwright whalers are concerned about offshore oil and gas activities in the Chukchi Sea. In 1968, there was seismic testing offshore during the spring migration. The whalers saw no whales, not even a blow, that spring. Barrow provided whale meat and maktak to Wainwright for Thanksgiving and Christmas. The whalers were supposed to have been compensated for the loss of whaling that year, but never were. For planned activities in the Chukchi Sea, the Wainwright whalers believe stringent conditions should be imposed to protect marine mammals and their food. They also have seen (probably heard of) impacts from the activity near Prudhoe Bay, recognizing that Barrow and Nuiqsut whalers report that the whales now migrate farther offshore in the fall than before. In Wainwright, the whalers believe that this means whales would not travel southwest near the eastern coast of the Chukchi Sea where they might be accessible to whalers in the fall, but would stay offshore to the north as they migrate across to the Russian coast.

Traditional Knowledge and the Satellite Tracking Study

At the time of the meetings (February 2007) we had only a few tracks of tagged whales to present for discussion with the whalers that were directly relevant to Wainwright. We have more now and can explore how traditional knowledge from Wainwright and the satellite tracking data fit together. In fall, tracks of tagged whales have shown that most whales leaving the Beaufort Sea pass Barrow traveling west, toward Wrangel Island, Russia (Fig. 3; Quakenbush et al.2010). A few whales have traveled west, turned around, and returned to Barrow along the coast of Alaska passing near Wainwright in September and early October. These whales upon leaving Barrow for the second time, traveled in a more west southwest direction bypassing Wrangel Island on the way to the northern Chukotka Peninsula, and did not travel near the Alaska coast at all (Quakenbush et al. 2010). These tracks of tagged whales appear to corroborate the reasons that Wainwright does not see many whales in the fall and thus does not have a fall whaling season. During the interview, the whalers mentioned that some crews were talking about trying to see if they could catch whales in the fall time, but they recognized that few whales are seen then.

The whalers commented that they see whales arrive in the spring as early as late March and early April now, compared to late April in the past. In spring of 2009 all of the tagged whales (n=6) passed Wainwright between 14 April–7 May. Although we do not have any comparable data from tagged whales to complement the traditional knowledge that bowhead whales travel in waves segregated by size this information emphasizes our need to distribute tags among waves in order for the timing of tagged whale movements to be representative of the population. Also knowing that bowhead whales sometimes feed along the shorefast ice during the spring migration may help to interpret dive data collected by the tags. We cited both traditional knowledge reports in our publication describing bowhead whale movements in fall in the Chukchi Sea (Quakenbush et al. 2010) to document segregation by size during migration (Huntington and Quakenbush 2009a), and movement behavior relative to heavy vs. light ice years (Huntington and Quakenbush 2009a, b).

Discussion

Although we had some ideas about the type of information contained within traditional knowledge (e.g., movements, distribution, and changes in population size, composition, and abundance) we did not know what would emerge from the process. We did not try to force any topics and believe that what was shared was likely to be information that was best known or important. In addition, we believe that the omission of information is also of importance. For example, in Barrow we heard that in the fall bowhead whales travel south closer to the Alaska coast in years when ice is heavy than they do in years when ice is light (Huntington and Quakenbush 2009a). In Wainwright we heard that few whales are seen in the fall and observations during that time period relate to hunting other marine mammals. There was no distinction between fall movements in heavy vs. light ice, which is consistent with no fall whale hunt regardless of ice conditions.

In spring, bowhead whales reliably travel in three pulses of similar sized whales. The smallest whales come first, followed by the medium-sized whales, and then the largest whales and new calves come last. This behavior has been document by whalers from Gambell and Savoonga (Noongwook et al. 2007), Barrow (Huntington and Quakenbush 2009a), and Wainwright (this study). Scientists have also documented this difference in timing by size during spring migration from aerial photogrammetric surveys of bowhead whales (Nerini et al. 1987). In fall, Barrow and Kaktovik report some size segregation in movements but it is less reliable and less separated in time (Huntington and Quakenbush 2009a).

The changes that the Wainwright whalers have observed in the sea ice in winter may be affecting the timing of the bowhead migration in the spring. Sea ice now forms later in the fall (December instead of October), and when it does there is less multi-year ice mixed in so the ice is thinner and can break up in spring more quickly allowing the spring migration to begin earlier (late March–early April instead of late April). Barrow whalers also noted that the spring migration is earlier now (Huntington and Quakenbush 2009a). In the spring of 2009, tagged whales began leaving the Bering Sea on 31 March and all had passed Barrow between 15 April and 8 May (L. Quakenbush, unpubl. data).

The practice that females with calves should not be harvested and mating whales should be left alone are examples of traditional conservation measures that recognize calves are needed to ensure good hunting in the future. Reproductive females tend to be the large females (>40 ft. long). The traditional practice of not taking cows with calves has been incorporated into the Management Plan developed by AEWC. Permissible Harvesting Methods state that “Whaling captains and crews should harvest bowhead whales that are less than 40 feet plus (+) or minus (-) 15% in length” and “no whaling captain or crew shall attempt to harvest a calf or a cow accompanied by a calf” (AEWC Management Plan 2005). These methods protect reproductive females with and without calves.

The whalers are concerned about how seismic operations may affect whaling and recalled an event in 1968 where they believe seismic activity on the ice in the spring affected their whaling success. Information about seismic testing in the 1960s is difficult to obtain. Federal records at the MMS office in Anchorage show permits were issued for open water seismic in 1968 for fall only. We have no information about such activities in state waters. The best available harvest records show that Wainwright landed two bowhead whales in 1968 and none in 1967 (Marquette and Bockstoce 1980) indicating that the year of the event may have been different. Regardless of the specific details of what occurred in the late 1960s, the whalers base their concerns about seismic activity on their past experiences as well as available information about current and planned activities.

The quality of traditional knowledge depends on the experience of the individuals sharing their knowledge and their reputation for being knowledgeable about the topic. These factors are best judged by members of the community and can be accomplished by a community review of the results prior to a final report and dissemination (Huntington et al. 2004). For those reasons, the semi-directed interview process has the ability to identify observations that may not be widely shared so that they can be modified during the discussion. The draft report was reviewed by the Wainwright whaling captains and AEWC prior to sharing it outside the community. This process allowed others, not part of the discussions, to see if the information is consistent with what they know, which allows for a more accepted product. It also ensures that any misinterpretations or misrepresentations on our part were identified and rectified.

Traditional knowledge from this project has been shown to be a valuable addition to what we need to know about bowhead whales in order to understand bowhead whale ecology in the Chukchi Sea. Traditional knowledge has also helped to plan the satellite tag deployments and to interpret the satellite tag data and it is being incorporated into our scientific reports and publications. Relationships developed during the discussions have allowed for continued interactions regarding the tagged whale results and for planning the direction of the tagging study. Traditional knowledge and satellite telemetry has proven to be a powerful combination of information and this project has allowed whalers and scientists to add to what is known about bowhead whales in the Chukchi Sea.

Acknowledgments

We are particularly grateful to the Alaska Eskimo Whaling Commission for their recommendation to collect traditional knowledge as it relates to bowhead whale movements and behavior and for their support and encouragement. Jack Panik and the Wainwright Whaling Captains' Association were extremely helpful in inviting the captains to participate, planning the research trip, and reviewing the draft report. We appreciate the participation of Terry Tagarook and the other whaling captains, who chose to remain anonymous, for sharing their knowledge of bowhead whale behavior and whaling near Wainwright for this project. Rossman Peetook recommended that the report be approved by AEWC. We thank the Coastal Marine Institute for funding the project, with funds originally from the Bureau of Ocean Energy Management, Regulation and Enforcement and matching funds from ConocoPhillips. We thank Caryn Rea for her

role in providing the funds from ConocoPhillips. John Citta prepared the maps used during interviews and Justin Crawford made the figures in this report. Chris Campbell provided comments that greatly improved our report. The Bureau of Ocean Energy Management, Regulation and Enforcement funded the satellite telemetry project that prompted the traditional knowledge component contained in this report.

Study Products

Presentations

Regular updates to the Alaska Eskimo Whaling Commission 2006–2009.

Quakenbush, L. 2007. Traditional knowledge of bowhead whale migratory patterns near Wainwright, Alaska. Annual presentation to CMI, February. Fairbanks, AK.

Quakenbush, L. 2008. Traditional knowledge of bowhead whale migratory patterns. Presentation to Indigenous People's Council of Marine Mammals, January. Anchorage, AK.

Quakenbush, L. 2008. Traditional knowledge of bowhead whale migratory patterns near Wainwright, Alaska. Annual presentation to CMI, February. Fairbanks, AK.

Publications

Quakenbush, L.T., J.J. Citta, J.C. George, R.J. Small, and M.P. Heide-Jørgensen. 2010. Fall and winter movements of bowhead whales (*Balaena mysticetus*) in the Chukchi Sea and within a potential petroleum development area. Arctic 63(3).

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Noongwook, G., the Native Village of Gambell, the Native Village of Savoonga, H.P. Huntington, and J.C. George. 2007. Traditional knowledge of the bowhead whale (*Balaena mysticetus*) around St. Lawrence Island, Alaska. Arctic 60(1):47–54.

Quakenbush, L.T., J.J. Citta, J.C. George, R.J. Small, and M.P. Heidi-Jørgensen. 2010. Fall and winter movements of bowhead whales (*Balaena mysticetus*) in the Chukchi Sea and within a potential petroleum development area. Arctic 63(3).

Figure 1. Study area and other places mentioned in the text. Blue dots denote villages and orange dots are places mentioned in the text.

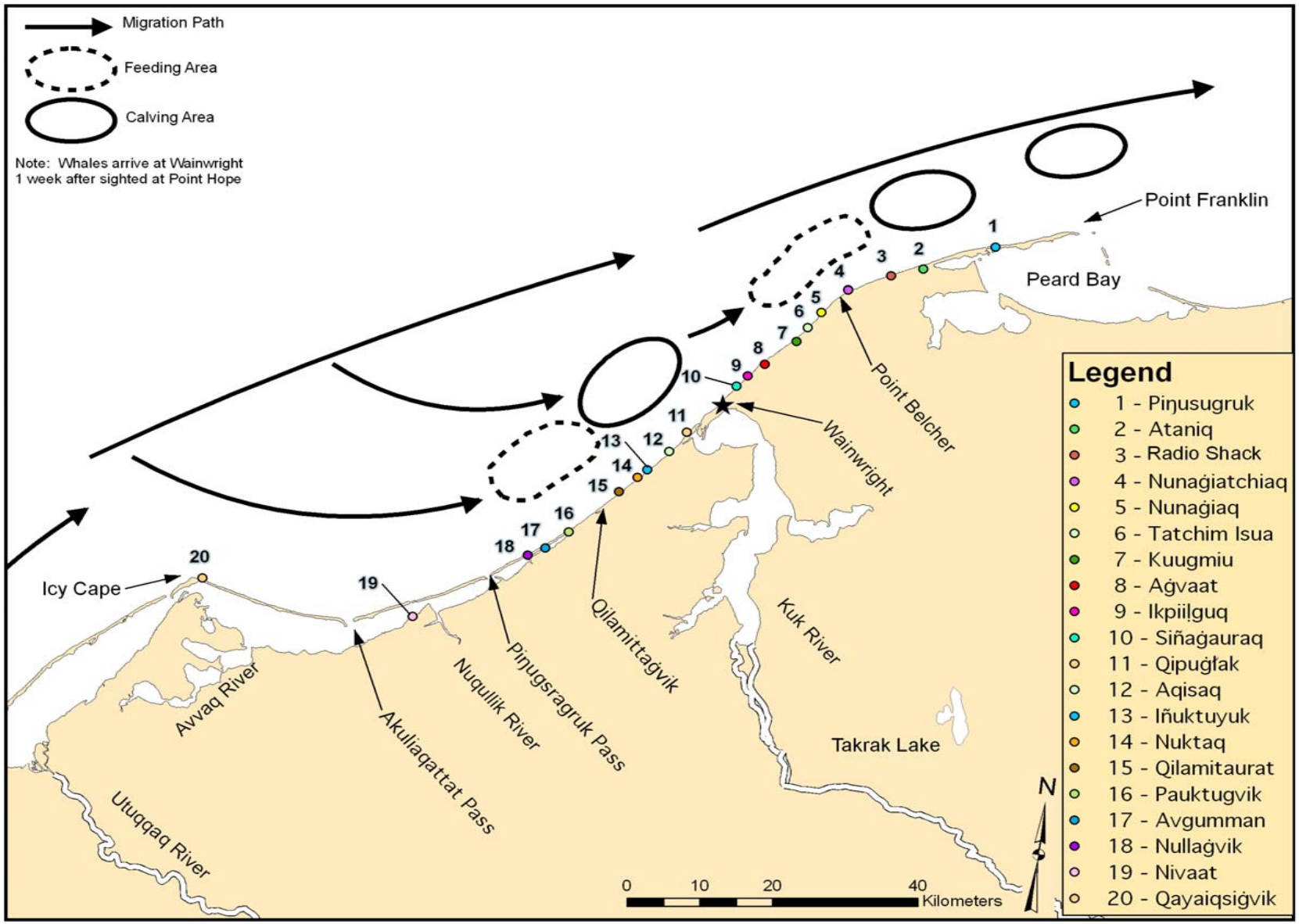


Figure 2. Movements and behavior of bowhead whales in spring near Wainwright, Alaska relative to local landmarks and other coastal features. Whales have been observed calving, mating, and feeding in the nearshore lead near Wainwright. Calves are occasionally seen in late April, but more typically in late May and June.

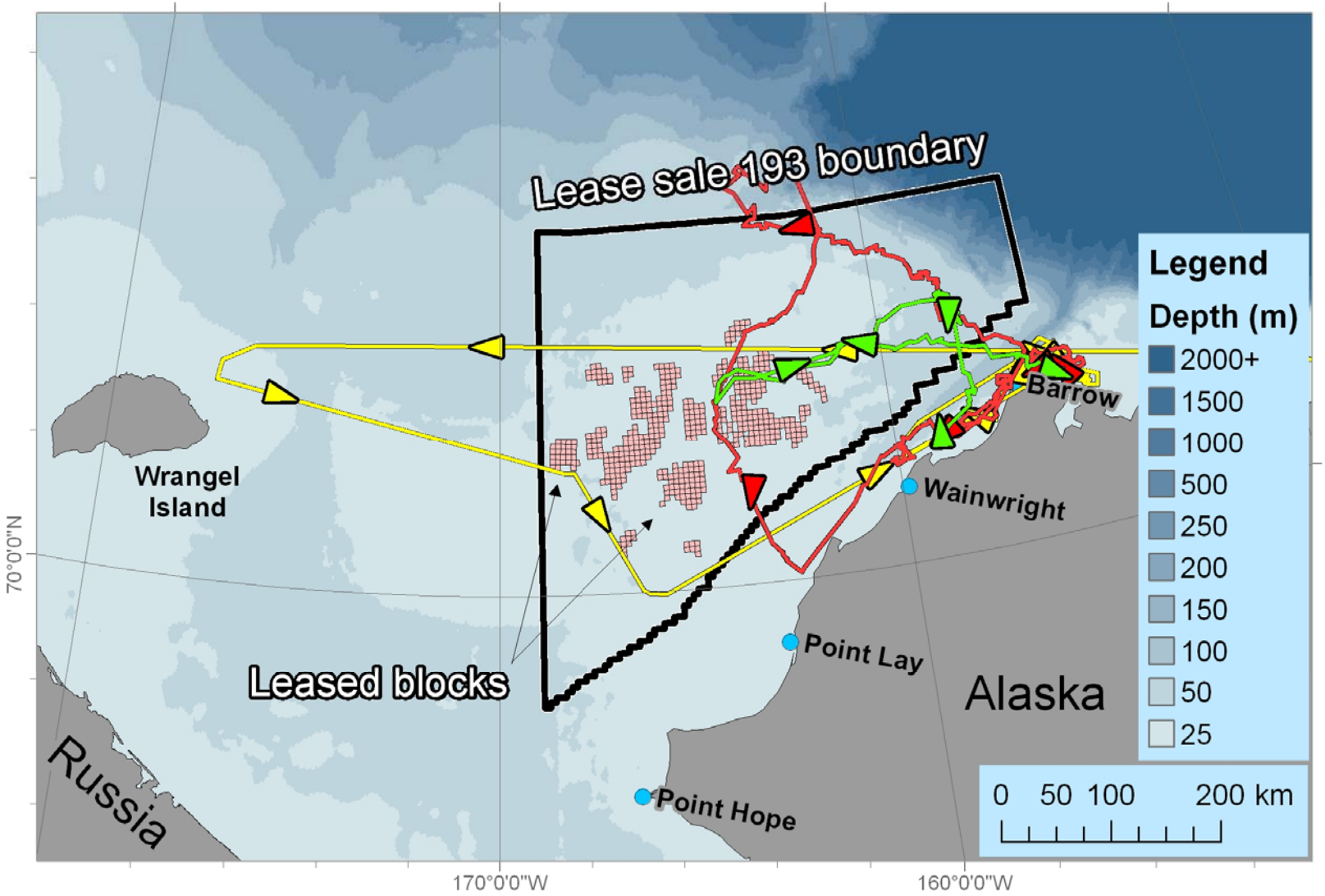


Figure 3. Tracks of three satellite-tagged bowhead whales that returned to the Barrow area after moving west into the Chukchi Sea, 2008.

Appendix A. Report to the Alaska Eskimo Whaling Commission on traditional knowledge of bowhead whale migratory patterns near Wainwright, Alaska.

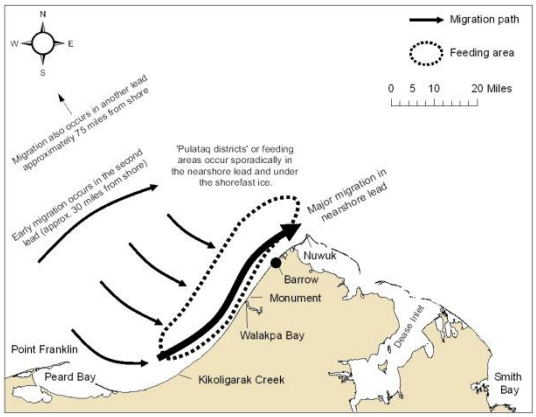
Traditional Knowledge of Bowhead Whale Migratory Patterns near Kaktovik and Barrow, Alaska

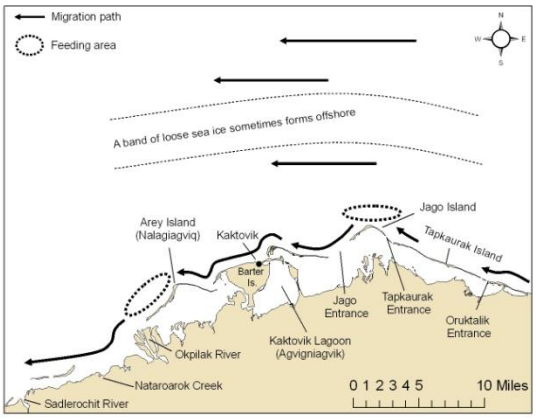
Report to:

The Barrow and Kaktovik Whaling Captains Associations

and

The Alaska Eskimo Whaling Commission





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Traditional Knowledge of Bowhead Whale Migratory Patterns near Kaktovik and Barrow, Alaska

Henry P. Huntington and Lori T. Quakenbush

Introduction

The general migratory patterns of bowhead whales in the Bering, Chukchi, and Beaufort Seas are well documented. The details of whale movements and activity throughout the migratory range are not as well known. Offshore industrial activity in the region is increasing, including seismic exploration, oil and gas development, and ship traffic. A better understanding of bowhead movements and activity is needed to help determine how to minimize the impacts of industrial activity on whales and those who hunt them. The Alaska Department of Fish and Game (ADF&G), in cooperation with the Alaska Eskimo Whaling Commission (AEWC), is conducting two related projects to learn and document more about bowhead whale movements and activities.

First, ADF&G is placing satellite transmitters on a small number of whales to learn more about the movements and behavior of individual whales over large portions of the migratory range. To date, 40 transmitters have been deployed; 31 in Alaska and 9 in Canada. Thirty-one were placed on whales near Barrow; five in spring and 26 in fall, and most were tagged by Barrow whalers. Efforts to place transmitters on whales near Kaktovik have not yet been successful due to weather conditions. In 2007, ADF&G and whalers from Kaktovik and Point Hope, Alaska, have worked with the Canadian communities of Aklavik and Tuktoyaktak to tag nine bowheads in August. George Tagarook and Eddie Arey from Kaktovik assisted with this tagging effort at Shingle Point. In 2008, ADF&G worked with the Canadian community of Tuktoyaktuk to tag one bowhead in August. George Tagarook from Kaktovik and Ray Koonuk from Point Hope assisted with this tagging effort near Atkinson Point. In Alaska, ADF&G plans to continue its efforts in Barrow and also to work with whaling captains on St. Lawrence

Island to extend its work to the Bering Sea. The satellite transmitter work has been funded by the Minerals Management Service (MMS) and tagging efforts in Canada are supported by the Department of Fisheries and Oceans Canada.

Second, at the request of the AEWC, ADF&G has interviewed whaling captains and crew members in Kaktovik and Barrow to document traditional knowledge of bowhead movements and behavior near those communities. This information will provide details about the patterns of large numbers of whales in more localized areas, complementing the information gathered by satellite telemetry about patterns of a few whales over larger areas. The traditional knowledge project uses the same approach that the Native Village of Savoonga used when documenting traditional knowledge about bowhead whales on St. Lawrence Island (Noongwook et al. 2007). This study was funded by a grant from ConocoPhillips. This report presents the results of the interviews.

Kaktovik

Bowhead whales have occasionally been seen in the Kaktovik area in July and early August, for example in Camden Bay or 8–10 miles offshore from Kaktovik. The main migration begins in late August, with whales moving westwards (Figure 1). The first whales in the migration are typically large ones that establish the route of the migration. Whalers do not hunt these whales, allowing the migratory pattern to be established in the expectation that later whales will follow regardless of whaling activity. This behavior is also recognized in migrating caribou and other animals. The migration continues through September and into October, but Kaktovik whalers stop whaling before the migration ends and so are not sure how late in the fall the whales continue to come by.

Some whales travel close to the shore, pausing to feed in the passes between barrier islands or just off of the islands where water flowing from the lagoons mixes with ocean water. In these areas, bowheads leave depressions in the sea floor that can be seen by whalers when the water is calm. Whales have been seen with mud on their stomachs when feeding in these areas. Other whales travel farther offshore, generally swimming steadily westward. “Traveling” whales can be distinguished from feeding whales because

traveling whales surface to blow once and then continue, whereas feeding whales surface many times and stay in the same area. When the leader of a group of feeding whales shows its flukes during a dive, it signals to the other whales that it is time to leave. Whales are not seen close to shore every year. That whales have long been found nearshore is indicated by Arey Island's Iñupiaq name, Nalagiagviq, which means "place to listen for whales."

In some years, there is a band of loose pack ice (it is possible to boat through without difficulty) a few miles wide between 5 and 15 miles offshore. Bowheads are known to migrate on both sides of the ice and also among the ice floes. When being hunted, whales may hide or seek refuge in the ice. In years with ice, bowheads are generally closer to shore than in years without ice. Sometimes whalers go as far as 20 miles offshore to find whales.

Kaktovik whalers have seen few patterns in whale size or other characteristics during the bowhead migration. Large whales may tend to come earlier (not counting the first few whales that set the migratory path), but whales of all sizes are seen throughout the migratory period. Whalers noted that they do not see the "super-big" whales that are sometimes taken at Barrow. They speculated that those whales may be farther offshore than the whalers go (i.e., more than 20 miles). Cows and calves start coming by in mid-September, later than the earliest whales to migrate past Kaktovik. Small whales may be more common close to shore, but large whales and even cow-calf pairs are seen close to shore, too. Calves may be separate from their mothers, making it difficult for whalers to tell if a small whale is a calf or not.

Since whaling resumed in Kaktovik in the early 1960s, whalers have noticed more whales and a decrease in sea ice during whaling season. Whalers used to be able to climb onto ice floes and use high ice as a lookout for whales. Other aspects of whale behavior, such as the timing of the migration or feeding behavior near shore, have not changed. There has been considerable change in the barrier islands, with both erosion and build-up seen. Some passes have become shallower. Until the 1950s, the lagoon now called Kaktovik

Lagoon was known as Agvigniagvik, or “place to hunt whales,” from an earlier period of whaling in the region. Today, beluga whales occasionally enter this lagoon, but it is too shallow for bowheads.

Bowhead whales are known to be sensitive to noise. When a thermos was accidentally knocked over in one whaling boat, a nearby bowhead whale immediately dove and was not seen again. Kaktovik whalers are thus worried about offshore oil activity in their area, fearing that the noise may deflect bowhead whales away from shore.

In the fall of 2006, whalers noticed millions of jellyfish in the waters off Kaktovik. This has been seen in other years, too. A Bering wolfish was caught near Kaktovik in the summer of 2006, the first time one had been seen in the area. Overall, fishing success has declined in recent years. Dolly varden and cisco were the most common fish. Today, there are more salmon than formerly.

Kaktovik whalers generally do not begin whaling until early September, when the air temperature is cool enough to preserve the meat during butchering. They typically finish whaling in September, having reached their allocation of whales before the migration ends and before the weather deteriorates. Prior to and after whaling, Kaktovik residents are typically hunting on land or fishing in rivers or the nearshore, and thus have limited opportunities to see whales when they are not actively whaling.

Barrow

Bowhead whales have been seen near Barrow as early as February, but the main migration begins in mid-April. Offshore from Barrow, there are three lead systems in the spring sea ice. Moving outwards from shore, the first lead begins at the edge of the shorefast ice. Beyond this lead, there is pack ice out to another lead about 30 miles offshore. The third lead is about 75 miles offshore, but is narrow. There are also different current movements in the different leads with the farthest lead having the strongest current. Whalers who flew planes while guiding polar bear hunts in the 1960s have noticed these patterns. When the second lead is long, a few large bowhead whales have

been seen there in early April, but beluga whales are more common in that lead than are bowheads.

The main migration in the nearshore lead begins with a small number of mid-sized whales ("qairaliq"), followed by larger numbers of small whales in mid- to late April (Figure 2). The whales are plentiful during the three to four days the first wave lasts. The whalers let the first 50–100 whales of the first wave go past to establish the path. A second wave, consisting of mid-sized whales, typically arrives in early May after a gap of two or three days from the first wave. The second wave has many whales, and lasts about a week. After another period of fewer whales, the final wave of large whales, including cows and calves, arrives in mid-May and continues into June.

One whaling crew has noticed a recognizable whale appearing year after year, always on April 23, indicating that perhaps some individual whales follow their own annual patterns.

Whale behavior is the same during all three waves, although whales in the first wave may spend more time in the area, feeding or playing. While many bowheads migrate quickly through the Barrow area (perhaps aware of the presence of whalers), some stop and feed under the shorefast ice. Feeding whales may circle many times under the ice, returning to open water to breathe. This behavior is termed "pulataq" in Iñupiaq, and the whalers recognize "pulataq districts" along the edge of the shorefast ice. Whaling camps may be located at places where bowheads are expected to emerge from under the shorefast ice. Whales migrating quickly through the area tend to be farther from the edge of the shorefast ice.

A cow with a calf may leave the calf in bays in the shorefast ice while the cow travels ahead to scout conditions along the route. The cow will then retrieve the calf and continue the migration. Some females give birth in the Barrow area.

Barrow residents often hunt walrus and seals offshore, west of Barrow in July. During the interviews, respondents did not report seeing bowhead whales west of Barrow in July. During the review of a draft of this report by the AEWC, however, it was remarked that bowhead whales have been seen west of Barrow in July in recent years. The difference may reflect the intentional selection of older respondents, many of whom are less active now and who therefore may not have observed recent changes in distribution, timing or behavior. Occasionally bowhead whales are seen north of Barrow in summer. Many gray whales are seen in this season. Gray whales may enter Dease Inlet, as do belugas, but bowhead whales require deeper water.

In the 1940s, when one respondent was growing up at Cape Halkett, bowhead whales were not seen in that area.

Bowhead whales return to the area near Point Barrow in late August, though some large whales were seen 20–30 miles offshore in open water in early August one year. Generally, the large whales come first in the fall migration, followed by mid-sized whales, with small whales coming last (Figure 3). This pattern is less distinct in fall than is the three-wave pattern in spring. Bowhead whales may feed near the barrier islands east of Point Barrow. Whales are heavier in fall than in spring. In years with heavy pack ice in fall, whales will head southwest from Point Barrow. In years with light or no pack ice in fall, whales may stay near Point Barrow longer before heading west. The migration tends to occur later in years with little or no ice than in years with heavy ice, with whales in the area through late October. Small whales that stay close to shore may encounter gray whales southwest of Barrow.

Barrow whalers have noticed an increase in the number of whales over the past several decades. At the same time, changes in ice conditions and an increase in noise from snowmachine travel on the shorefast ice have led to noticeable changes in the spring migration pattern near Barrow. Fewer bowheads travel next to the edge of the shorefast ice, and fewer bowheads are seen southwest of Barrow. Whaling crews that used to set up camps near the Monument (approximately 12 miles southwest of Barrow) have had to

move farther north along the shorefast ice. This shift may be the result of thinner ice conditions and less multi-year ice, which is associated with feeding opportunities for bowhead whales, thus reducing the attraction of the shorefast ice southwest of Barrow. Bowhead whales are also arriving earlier in spring now than they did in the past.

The shorefast ice has become thinner in spring and more susceptible to breaking off and being blown away from shore. The shore-fast ice breaks apart earlier than it used to. In fall, there is more open water and the ice forms later. In November 1964, a 28-foot bowhead whale was landed at Barrow and hauled up onto sea ice for butchering. In more recent years, no shorefast ice has been present in November, at least not of sufficient thickness to bear the weight of a bowhead whale and allow butchering to take place on the ice.

When a test well was drilled offshore near Point Barrow, whales diverted their migration around the area, even though no drilling occurred during the migration. The noise from the idle drill ship was still sufficient to affect the whales. After the drilling ceased and the rig was removed, the whales reverted to normal behavior in the area within a couple of years.

Barrow whalers have seen whales much larger than those that have been landed. Some whalers believe that the very large whales would have tough meat and maktak, and so might not be worth hunting.

Methods

This study used the same basic methods to document traditional knowledge as those used by Noongwook et al. (2007), and described in detail there. (That paper also describes the ways that traditional knowledge is acquired among Yupik whalers. The description is generally applicable to Barrow and Kaktovik as well.) Specifically, we used the semi-directive interview (Huntington 1998). Unlike Noongwook et al., however, our interviews were with one or two persons at a time, rather than with larger groups. In the semi-directive interview, researchers initiate a discussion around various topics of

interest, but allow the person being interviewed to determine the order in which topics are discussed and to make connections between various topics that the researchers might not have anticipated. The interview is thus more fluid than would be a standardized questionnaire. The interviews were conducted in English, as all participants were comfortable in that language.

The research trip took place in early February 2007. In Kaktovik, we interviewed six whalers or whaling captains. They had an average of about 30 years of whaling experience, ranging from 18 to 45 years. In Barrow, we interviewed five whalers or whaling captains plus one locally resident scientist who had over 25 years of experience working with and learning from the whalers. The Barrow whalers and whaling captains had an average of over 50 years of whaling experience, ranging from 40 to 64 years. In both cases, the persons being interviewed were recommended by the head of the local whaling captains association or by chain referral (one participant recommending additional persons to interview). This report includes the information told to us by the whaling captains and whalers that participated in interviews in each village. As noted earlier, there may be additional information known by others that is not included here, particularly concerning recent changes. Because the environment continues to change, there may be merit in developing a mechanism for recording and reporting ongoing observations made by whalers and hunters.

The researchers included a marine mammalogist (LTQ) who is also the principal investigator of the satellite transmitter study, and a social scientist (HPH) with experience in traditional knowledge studies (and who also took part in the St. Lawrence Island study mentioned earlier). Having both forms of expertise helped in the conduct of the interviews and in asking appropriate follow-up questions. The interviews also allowed LTQ to share preliminary results of the satellite transmitter study, specifically the movements of two tagged whales. This information was in most cases shared at the end of the interview, the exceptions occurring when one respondent arrived as the previous interview was ending.

Following the trip, LTQ and HPH prepared a draft report, which was provided to the individuals who were interviewed and the presidents of the Barrow and Kaktovik whaling captains associations for corrections and comments. The corrections and comments were incorporated into a final report, which was approved by the AEWC.

Acknowledgments

We are grateful to ConocoPhillips for funding the traditional knowledge project. We are particularly grateful to the Alaska Eskimo Whaling Commission for its support and encouragement, and to the Barrow Whaling Captains Association and the Kaktovik Whaling Captains Association for helping set up interviews, plan the research trip, and review the draft report. Eugene Brower and Fenton Rexford were extremely helpful as our primary local contacts. John "Craig" George in Barrow helped identify participants and also agreed to be interviewed himself. In Kaktovik, we interviewed Charles M. Brower, Eddie Rexford, and four others who preferred to remain anonymous. In Barrow, we interviewed Ben Itta, David U. Leavitt, Warren Matumeak, Johnnie Brower, John "Craig" George, and one individual who preferred to remain anonymous. Although Harry Brower, Jr. was not interviewed, he assisted in developing the project and he reviewed the draft report and provided valuable comments. John Citta prepared the maps used during interviews and the figures in this report. Minerals Management Service is funding the satellite telemetry project that prompted the traditional knowledge interviews.

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Huntington, H.P. 1998. Observations on the utility of the semi-directive interview for documenting traditional ecological knowledge. Arctic 51(3):237-242.

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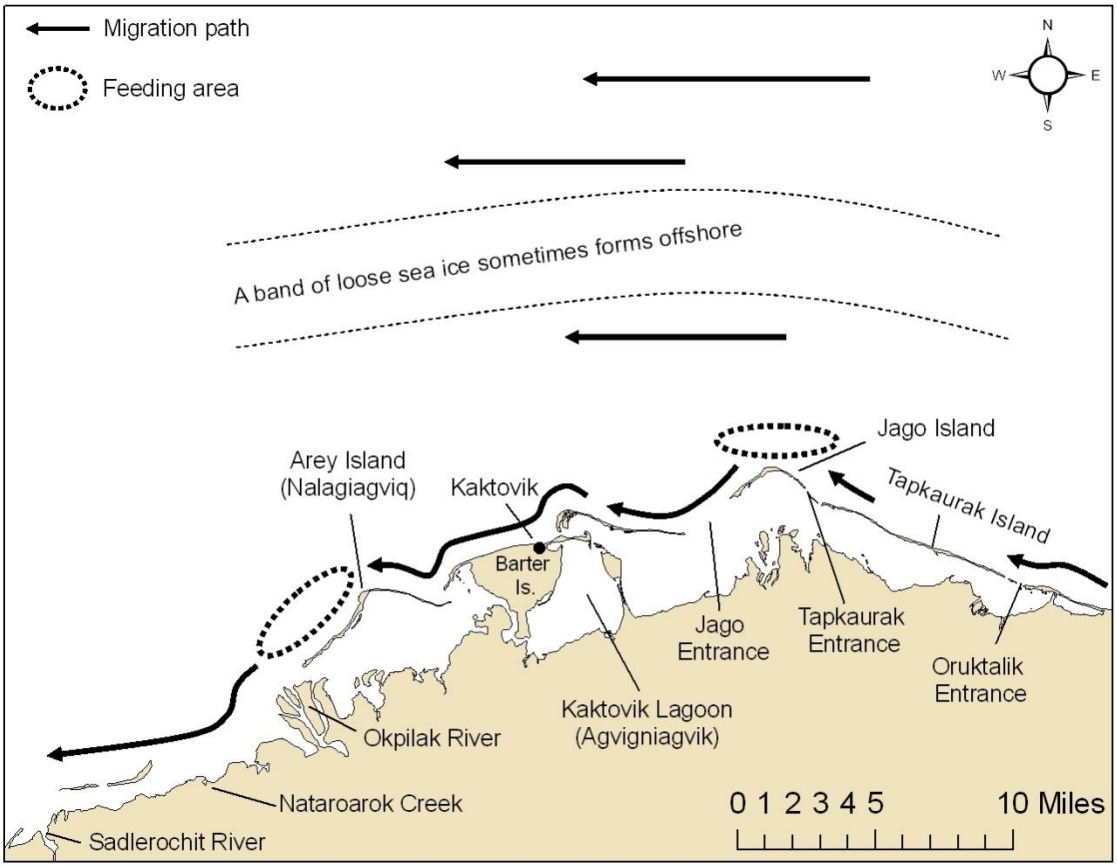

Figure 1. Movements and behavior of bowhead whales near Kaktovik, Alaska in August–September. Some whales travel close to shore, feeding in the passes between barrier islands and outside of Jago and Arey islands, however they may feed also feed at other places along the coast in this area. Whales also pass farther offshore and whalers may go as far as 20 miles from shore to find whales. Sometimes there is a band of loose ice 5–15 miles offshore. Whales travel to the north and south of this ice and through it. In years with more ice whales tend to travel closer to shore.

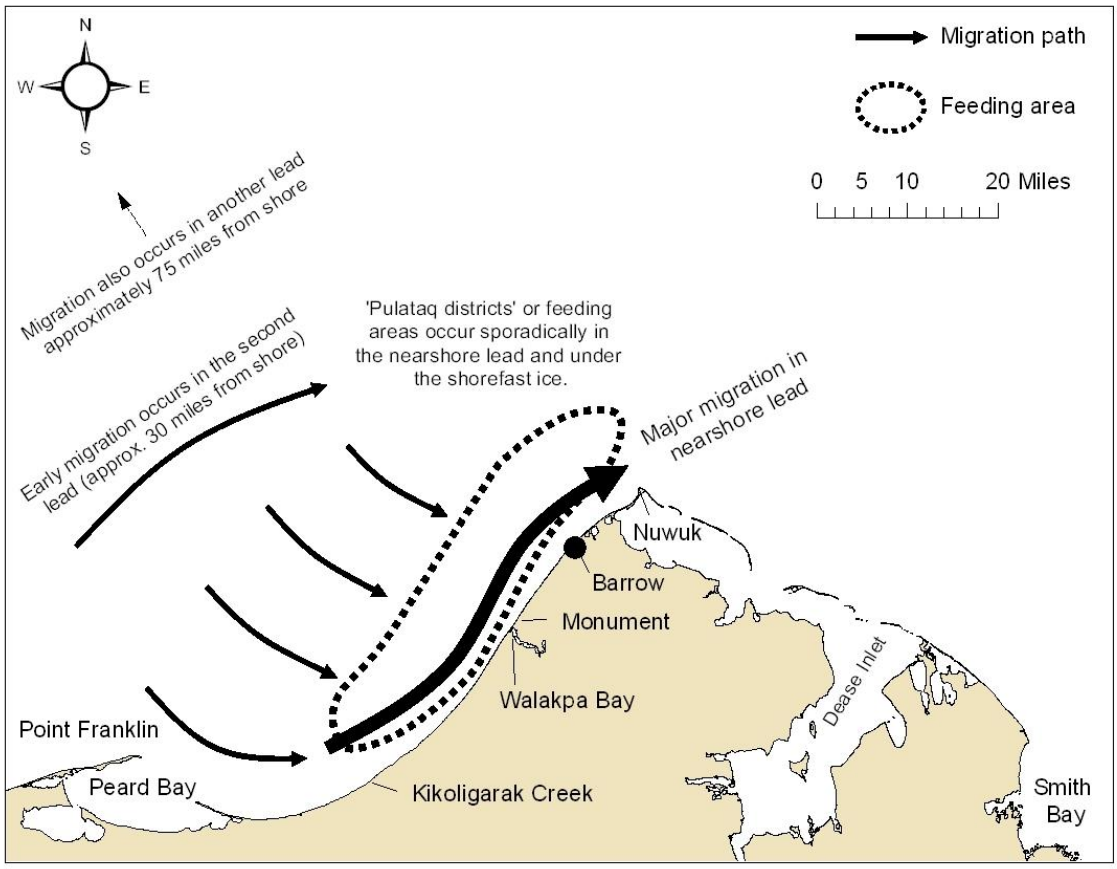

Figure 2. Movements of bowhead whales in spring near Barrow, Alaska. There are three lead systems in the spring sea ice. The closest one begins at the edge of the shorefast ice and is where the main migration occurs. The second lead occurs about 30 miles out and a third occurs about 75 miles out. Some whales move through quickly and some circle under the ice to feed. These feeding areas are called "pulataq districts".

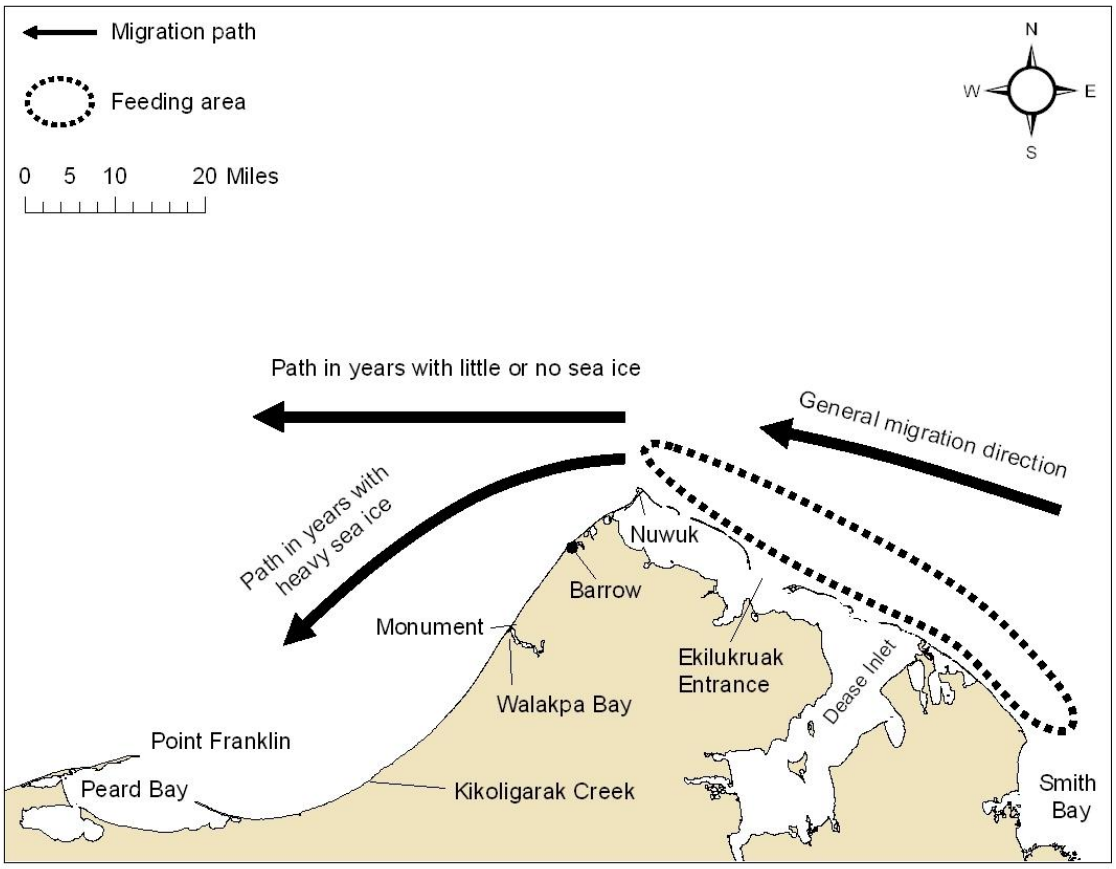

Figure 3. Movements and behavior of bowhead whales in fall near Barrow, Alaska. Bowhead whales may feed near the barrier islands between Nuwuk and Dease Inlet. In years with little or no ice, whales may stay longer near Barrow and head more west when they leave. In years with heavy ice, the whales head more southwest and they leave earlier.

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.