Annual Assessment of Subsistence Bowhead Whaling Near Cross Island, 2005: cANIMIDA Task 7 Annual Report

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Executive Summary

This Task Order, funded by the Minerals Management Service (MMS) has as its broad objective the description of subsistence whaling as currently conducted near Cross Island by residents of Nuiqsut. This effort is designed to measure basic descriptive parameters of Cross Island whaling so that observed changes (if any) can be analyzed in relation to such factors as oil and gas activities, weather and ice conditions, or other variables. Special attention is devoted to geospatial information through the sharing of GIS information by participating whaling crews. Annual project reports are only for the purposes of reporting information collected, with no analysis of the information either as a self-contained database or in conjunction with the many pertinent external databases. A final report will provide a comparative analysis for all data years (201-2007). As a second broad objective, the project is designed as a collaborative effort of MMS and its contractor, Applied Sociocultural Research (ASR), the subsistence whalers from Nuiqsut, and the Alaska Eskimo Whaling Commission (AEWC). This report documents the results of the 2005 field season of this component of the cANIMIDA project.

Three methods of information collection are employed – systematic observations, collection of daily vessel locational information from handheld GPS units, and whalers' self-reports and perceptions. Emphasis has been placed on such measures as:

- Number of crews actively whaling (observation)
- Size and composition of crews, and fluctuation over the whaling season (observation)
- Number of whales harvested (observation, self-report)
- Days spent whaling, and days prevented from whaling observation, self-report)
- Days suitable for whaling when whaling did not occur (observation, self-report)
- Subsistence activities occurring other than whaling (self-report, observation)
- Location of whale sightings and whale harvest (GPS, self-report)
- Location of whale searching (GPS, self-report)
- Local weather and ice conditions (observation,
- self-report)
- Bowhead whale behavior in the Cross Island area, and differences from the past (self-report)
- Changes in access or other issues related to the whale hunt, such as increased effort for the same (or reduced) harvest, increased risk, increased cost (self-report)

In 2005, the first whaling crew went to Cross Island on 30 August, and the fifth and last crew arrived on Cross Island 8 September. Overall, the 2005 Nuiqsut whaling season was marked by very poor weather and rough seas, which affected not only the whalers but also all other maritime activities. Few days were suitable for "scouting" by the whalers, and on only one day were a large number of whales seen. On most days suitable for scouting, whalers encountered non-whaling vessels, some engaged in support to the petroleum industry and others not, but none related to Northstar. The whalers concluded that barges directly affected their hunt on two days in 2005, and that such influences may have occurred on other days as well. Only one whale was taken by Nuiqsut whalers in 2005, on 14 September. Nonetheless, the whalers called a cease fire on 24 September because of the forecast of more bad weather and the possibility of imminent freeze up, and on 25 September all crews left for Nuiqsut. In summary, the 2005 Cross Island hunt was negatively affected by bad weather and pack ice. The 2005 hunt was also perceived by the whalers to have been affected by tug and barge traffic, but not by Northstar-related activities.

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Acronyms and Abbreviations Used

Acronym or Abbreviation	Expanded Term or Reference
UA[1]	Ahkiviana Whaling Crew
BO[1]	Oyagak Whaling Crew
IAN	Aqargiun Whaling Crew
NAP[1]	Napageak Whaling Crew
NUK[1]	Nukapigak Whaling Crew
#	Number
ACS	Alaska Clean Seas
AEWC	Alaska Eskimo Whaling Commission
ANCSA	Alaska Native Claims Settlement Act
ANIMIDA	Arctic Nearshore Impact Monitoring in Development Area
BP	Barometric Pressure
BPXA	British Petroleum Exploration Alaska
cANIMIDA	continuation of ANIMIDA
CI	Cross Island
esp.	especially
F	Fahrenheit (temperature measurement)
ft	Feet
GIS	Geographical Information System
GPS	Geographic Positioning System
HAD	Human Activities Database
HCC	High Cloud Cover
HP	Horse Power
IHLC	Inupiat History, Language, and Culture Commission
IWC	International Whaling Commission
MFCI	Miles From Cross Island
mmddyy	Date Format – month/day/year
MMS	Minerals management Service
MPH	Miles Per Hour
N,S,E,W and combinations	Compass directions (north, south, east, west, northeast, etc)
NA	Not Applicable
NQT	Nuiqsut
NSB	North Slope Borough
NSB DW	North Slope Borough Department of Wildlife Management
OCS	Outer Continental Shelf
OWA	Oil/Whalers Agreement
TOT	Total Time (of individual boat trips)
UNK	Unknown
w/number or /number	With the specified number (of people)
WCA	Whaling Captains Association
WCC	Whaling Communication Center
WD	West Dock (Prudhoe Bay)
WF	Weather File (time series of weather station measurements)

[1]When crews use multiple boats, each boat is differentiated by a number after the crew designation (1-4)

Acknowledgments

This work would not have been possible without the assistance of a great number of people. Foremost among them must be the whalers and other residents of Nuiqsut. While it is unfair to single out individuals when all provided essential information and support in what is after all a communal and cooperative undertaking, I would be remiss if I did not explicitly thank those whaling captains and their crews who extended me the hospitality of their cabins. This is the report on my fifth field season on Cross Island, for which the Ahkiviana crew served as my hosts. Paul Kittick, as my host for the first year when the project was still an unknown quantity to the whalers, also has my utmost appreciation. Archie Ahkiviana agreed to be my host the second year, when Paul did not whale, and Billy Oyagak served as my host the third season, and they both also have my profound thanks. The late Thomas Napageak was my host for the fourth season. I of course also thank the other crews who were out on Cross Island for the 2001-2005 seasons (Nukapigak, and Aqargiun), and David Pausanna for all the help he has given me over the phone and while I have been in Nuiqsut. I cannot begin to list the other residents of Nuiqsut who shared much more of their time and knowledge than I had any reason to expect. Maggie Ahmaogak of the AEWC has also been generous with her advice, support, and cooperation.

Industry has also provided a good deal of help in various forms, from advice to more concrete logistical support. Ray Jucubczak, Concie Rock, and Bill Streever at BPXA were especially notable in this regard, although several individuals at Alaska Clean Seas were also very helpful. BPXA also assisted with the transformation of the raw GPS track information into more usable GPS-based maps for the 2001-2003 data. Although these maps have since been replaced through more recent in-house software, their early assistance is much appreciated. More recently, other industry participants in the Conflict Avoidance Agreement have also provided logistical support, and BP has provided supplemental financial support for the Cross Island research effort in conjunction with their annual application for permits for the Northstar production unit.

MMS, as the sponsor of the project, also deserves a formal “Thank you.” Dick Prentki has been an ideal COTR, even though the course of the project has not always been smooth.

Lastly, the entities for which ASR performed this work as a subcontractor for the 2001-2003 field seasons, LGL Limited of Alaska and Battelle, must be thanked for their willingness to trust that the work would be accomplished with a minimum of oversight on their part. The budget for this limited task would not support a good deal of administrative overhead, and both worked with me to make it work. I am especially grateful to Dale Funk at LGL.

The above notwithstanding, all errors and shortcomings of this report are the responsibility of Michael Galginaitis and ASR. Please advise me of as many errors, misunderstandings, or confusing discussions as you find, so that whatever effort continues in this regard can bear as much fruit as possible. But again, none of this work would be possible without the cooperation and support of the Nuiqsut whalers, to whom I again give my most profound thanks.

Introduction and Objectives of the Task Order

This Task Order, funded by the Minerals Management Service (MMS) has as its broad objective the description of subsistence whaling as currently conducted near Cross Island by residents of Nuiqsut. It is the only socioeconomic component of the cANIMIDA program, which focuses more on physical science. While "traditional" subsistence whaling has been well documented in a number of locations, contemporary subsistence whaling is not as well documented, especially in terms of changes over time. This effort is designed to measure basic parameters of Cross Island whaling so that observed changes (if any) can in the future be analyzed in relation to such factors as oil and gas activities, weather and ice conditions, or other variables. Observations, and the narrative annual report summarizing them, will focus on descriptive measures of activities associated with whaling. Special attention is devoted to geospatial information through the sharing of GIS information by participating whaling crews. Project annual reports are only for the purposes of reporting information collected, with little analysis of the information either as a self-contained database or in conjunction with external databases. Among the many external databases of potential pertinence to the descriptive information collected under this task order are the Human Activities Database (HAD), although the database does not contain information later than 2000, and thus does not cover the time period of this project. Thus the HAD is primarily historical and is of most interest in terms of what information can be recovered about Nuiqsut whaling seasons prior to 2001. Since the details of industrial activities are for the most part confidential, the information tends to be more general than specific. Of perhaps more potential utility for the more detailed information collected for this effort through the ANIMIDA and cANIMIDA projects are remote sensing information on ice cover or other geophysical parameters. Other linkages for potential future analysis (AEWC records of whale harvest, or untranscribed IHLC tapes, for example) also exist. These may be discussed in the final synthetic report, following the last field season for this task under cANIMIDA (2007). Products already produced for this project include Galginaitis 2006 and Galginaitis and Funk 2003, 2004, 2005.

As a second broad objective, the project is designed as a collaborative effort among MMS (and its contractor, Applied Sociocultural Research), the subsistence whalers from Nuiqsut, and the Alaska Eskimo Whaling Commission (AEWC). Beyond the goal of seven years of descriptive information on Cross Island subsistence whaling activities, the project was to develop a system for collecting information that local whalers themselves could adopt, adapt, and maintain. The methodology has now been developed sufficiently, but the transition to local implementation of the program has been slow and is still in process.

An Overview of Contemporary Subsistence Whaling in Alaska

The Inupiat of the North Slope maintain a vital native culture -- with kinship, dependence on hunting wildlife resources, and a respectful relationship to the land as fundamental values. Hunting provides most of the meat consumed by Inupiat. Whaling not only provides a significant part of this food, but is also a key social organizational activity for North Slope Inupiat. Whaling is also a central ideological idiom for the expression of key cultural values, and an important vehicle for the transmission of those values (Worl 1980; Rexford 1997a, 1997b). Subsistence whaling has been (and continues to be) a key focus for Inupiat and Yupik culture and society (Bering Straits area, Northern coastal Alaska) for at least 1,000 to 1,500 years (Dumond 1984,

Stoker and Krupnik 1993, McCartney 1994). However, nothing more than a brief orientation to contemporary subsistence whaling in Alaska is attempted in this report, and references are illustrative, not exhaustive. This discussion provides only a general description of some key aspects of the organization of subsistence whaling, within the context of its management regime, that are important for an understanding of this project's methods and results. This discussion proceeds from the general to the more specific.

In Alaska, ten coastal communities currently field whaling crews and are members of the Alaska Eskimo Whaling Commission (AEWC). The AEWC was formed in 1977 in direct response to the International Whaling Commission's (IWC) decision to ban the Alaskan subsistence bowhead whale hunt. The IWC had two main concerns – that the bowhead whale population was too small to sustain a regular harvest, and that subsistence hunting methods were too wasteful (too many animals were killed but then "lost"). As a result of a complicated series of negotiations, the United States and the AEWC convinced the IWC to allocate an initially small quota of bowheads that could be harvested in 1978. This quota was accompanied by a data collection program to measure and monitor the bowhead whale population and the efficiency of subsistence whaling harvest. This has resulted in an increased confidence in the robust size of the bowhead whale population and an incentive for the reduction of "struck and lost" whales (increase in the efficiency of the hunt) which has been quite successful. Because the bowhead population has been steadily increasing, along with the overall success rate of the hunt, the IWC has consistently increased the quota of animals available for harvest. Currently AEWC co-manages the Alaskan subsistence bowhead whale hunt with the National Oceanic and Atmospheric Administration, Department of Commerce.

The AEWC is essentially a self-regulating body that has implemented management practices that protect the reproductive capability of the resource, increase whaling success and/or reduce waste, increase the safety of the hunt, and enforce individual accountability for not complying with these practices. For example, whales with calves cannot be taken. This not only maximizes the population's growth, but is also a safety rule, since Inupiat whalers know that female bowheads with calves are the most aggressive and dangerous animals to approach. The first strike on a whale in the fall must be made with a darting gun (recent change in AEWC Management Plan), so that a bomb is shot into the whale at the same time that a float is attached to the whale with a harpoon. Since not all whales are killed with the first strike, the float serves to both slow the whale down and to assist the whalers in following it. A research program to increase the efficiency of whaling bombs has been ongoing, with periodic workshops to disseminate information and new technology to the whalers (2005 was the first year that the penthrite bomb, often termed the "superbomb," was available to Nuiqsut whalers). Guidelines for the size of whales to be taken are suggested, since experience has shown that larger whales pose the potential for more wastage than smaller whales (they potentially take more time to tow and butcher, and time often is directly related to wastage). AEWC sanctions have been most severe for violation of the quota set for a given community or for striking a mother with a calf – the revocation of the right to go whaling for a specified number of years. Other sorts of violations may result in fines or public censure. In short, the AEWC has constructed a flexible system that rewards its members for compliance with rules and practices that foster both AEWC and IWC goals, and potentially penalizes them for noncompliance. Few cases of noncompliance have occurred, and this management regime is consistently cited as one of the most successful

examples of such management (Huntington 1992). The original decision documents for the 1978 IWC action (U.S. Department of Commerce 1978, 1977) also contain much of interest.

The IWC sets an overall quota for the hunt, and the AEWC in turn allocates that quota among the whaling communities. Each whaling community is represented by a local Whaling Captains' Association (WCA) at the AEWC, and each local WCA is responsible for managing the hunt in its respective community. Nuiqsut initially received an allocation of one whale landed or one strike, whichever occurred first, for 1978. That is, a harpoon that hits a whale counts as a strike, regardless of whether that animal is actually taken or not. Not all "struck and lost" whales necessarily die, but the conservative AEWC/NOAA management system assumes that they do. Nuiqsut's current allocation is four whales or four strikes. Unused strikes and quota can be transferred between communities, quota is now allocated in multi-year blocks, and there can be some "roll-over" of quota from one year to the next. Thus, the harvest in some years for any given community may be greater than the "normal" quota allocated, if a community's WCA requests and is granted one or more strikes over their "normal" quota allocation.

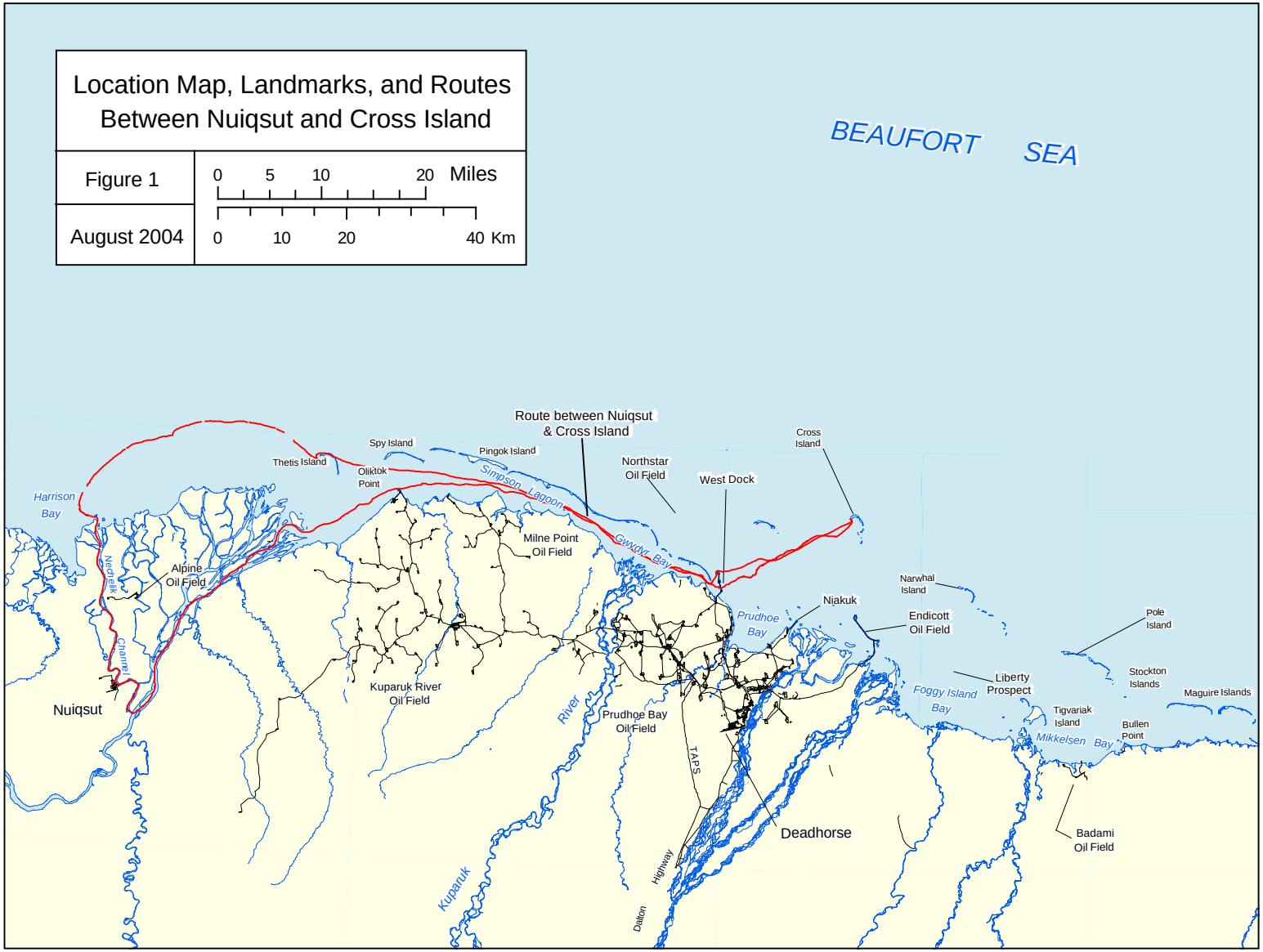
Subsistence whaling in Alaska occurs in the spring (generally April-May) and the fall (generally September-October), when the bowhead whale migration brings them reasonably close to the whaling communities. In the spring, bowhead whales migrate north through the Bering Strait and then, in Alaskan waters, east of Point Barrow into Canadian waters, where they spend the summer (some also go west into Russian waters). In the fall they reverse this course. Spring whaling differs from fall whaling. In the spring whales are migrating through relatively narrow open leads in the ice whereas in the fall the water is generally more open. Some years can be very different, however and there can be thick floating ice near Cross Island in the fall. The first years documented by this project, 2001-2004, were relatively ice-free, but in 2005 floating pack ice confined Nuiqsut whalers within the barrier islands for most of the whaling season. Spring leads do not open up close enough to Nuiqsut or Kaktovik to allow these communities to whale in the spring. In the fall, because whales are not confined by leads and generally so far offshore at those points, it is difficult in most years for whaling communities south of Barrow to whale (although Wainwright and especially St. Lawrence Island whalers have increasingly taken a few whales in the fall). Thus most whaling communities, located on the Bering and Chukchi Seas, whale in the spring. Barrow, located where the Chukchi and Beaufort Seas meet, whales in both the spring and the fall. Nuiqsut and Kaktovik whale only in the fall. Spring whalers have traditionally and historically used only skin boats (until recently), whereas fall whalers use more durable wood, aluminum, and fiberglass boats. This is related to three general seasonal differences: the greater need to avoid unnecessary noise in the spring, the harsher environmental conditions of fall whaling (rougher seas, more floating ice), and the greater need for speed in the fall to find and pursue whales in more open water. Recent changes in spring whaling, especially in Barrow, have been described and discussed in Wohlforth (2004), and interested readers are referred to that source. This report discusses only Nuiqsut whaling, currently conducted from and near Cross Island in the fall.

The Historical Context of Cross Island Whaling

The present community of Nuiqsut has a relatively short history, having been resettled in 1973. However, Inupiat use and occupation of the Nuiqsut area has a very long history, which is the basis for Nuiqsut's status as a village recognized under the Alaska Native Claims Settlement Act (ANCSA). Nuiqsut is located about 12 miles inland on the Colville River (Figure 1), which is not a typical location for a whaling community. However, its residents trace their ancestry to people who whaled in the mid-Beaufort Sea (including near Cross Island) in the first half of the twentieth century, as well as prior to that time. Treatments of the complex and dynamic history of the North Slope region in general, and the Nuiqsut area in particular, can be found in Brown 1979, Galginaitis et al. 1984, Hoffman et al. 1988, Galginaitis 1990, and Long 1996. These sources are the basis for the information in this section. Figure 1 shows the location of Nuiqsut on the Colville River, and Cross Island in the Beaufort Sea, as well as typical routes between Nuiqsut and Cross Island and some significant landmarks in between. Cross Island is about 73 miles northeast of Nuiqsut "as the crow flies" and from 92 to 109 miles away by boat, depending on which channel of the Colville River can be used to reach the ocean. When the water level in the river is high, the more direct route can be used. When the water level is low, the more direct river channel is too shallow for most boats, so the longer route is used. Cross Island itself is about eleven miles offshore, but more importantly from a logistical point of view it is ten miles from the Endicott causeway and fifteen miles from West Dock.

Prehistoric use of Cross Island has not been well documented or investigated archaeologically, but documentation for more recent use is quite extensive. Families who lived on and used Cross Island seasonally during the first half of the twentieth century included the Woods, Pausanna, Saavgaq, Ulaaq, Ahsoak, Ahgook, Ikpikuk, Ahvakana, Akpik, Sovalik, Kaigelak, Tigulak, Ahsogeak, Ahkivgak, Ekolook, and Ekowana (Smith 1980). Perhaps most important in terms of whaling was Taaqpak, who used Cross Island as a whaling base from the early twentieth century through the late 1940s. Documentation for his whaling harvests is quite incomplete, but includes accounts of whales taken near Cross Island in 1922, 1927, 1928, and 1938. While relatively few of today's active whalers learned directly from Taaqpak, many have learned from those who were on his crews (or in turn learned from those who knew Taaqpak). Taaqpak himself maintained that Inupiat had hunted whales near Cross Island for centuries (Carnahan 1979:21-31). Thus whaling near Cross Island has a strong cultural continuity.

When Nuiqsut was resettled in 1973, many of the original settlers traveled from Barrow with the supplies necessary for their life in tents for a year or more. They used a variety of means – sleds towed by a small Cat (a tractor with tracks), snow machines, and weasels (another sort of tracked vehicle, of WW II vintage). One of these original founders took the first whale for Nuiqsut that fall, while on his way to Kaktovik to obtain some *muktuk* and meat to take back to the village. He and his crew had been looking for whales and had been out about six weeks. They had not seen any whales in that time, although they had seen a great number of seals, which was about their only source of food after the third week of their trip. By the sixth week the whaling captain had concluded that they were too late – that the whales had either passed them by or were too far from the shore for them to find and successfully land. On the chance that Kaktovik whalers had been more successful (since communications were much more rudimentary in 1973 than currently, he did not know if Kaktovik had taken any whales or not), he decided to go to



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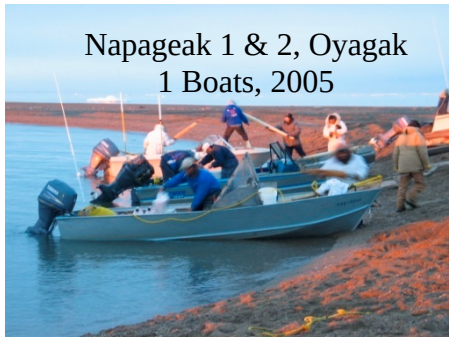
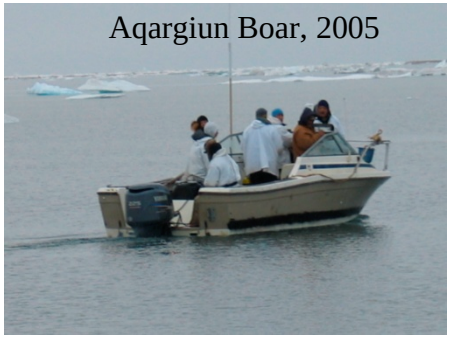
Napaeak 1, 2005

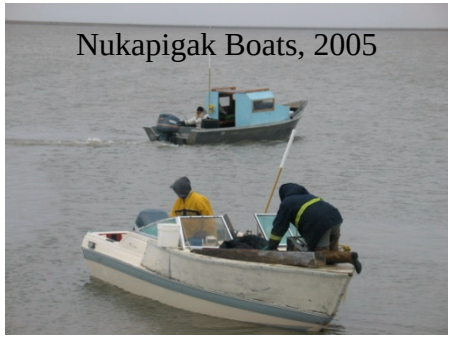
Napageak 1 & 2, Oyagak 1 Boats, 2005



Aqargiun Boar, 2005



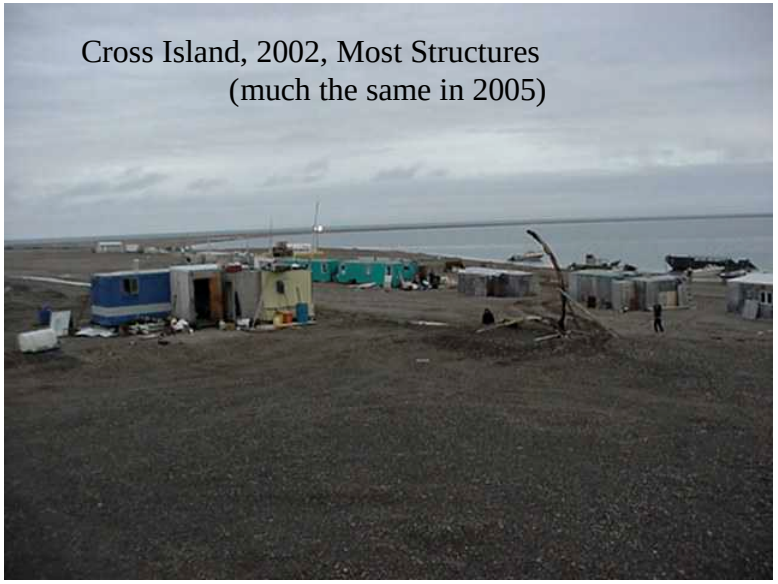
Nukapigak Boats, 2005



Nuiqsut, July 2003

Some Contextual Photographs

Cross Island, 2002, Most Structures (much the same in 2005)



Ahkiviana and Oyagak Boats, 2005
Oyagak1 1st on left, Ahkiviana1 3rd from left
Other two boats used for support tasks only

Only Whale Landed, 2005 – Napageak Crew Male, 40'9"

Butchering Rest/Tool Area, Winch Shack in the Background with Napageak Flag

Kaktovik to obtain some *muktuk* and meat to take back to Nuiqsut. They then came upon a whale in the Brownlow Point/Flaxman Island area, in shallow water. They took this whale, butchered it, and returned to Nuiqsut with as much as possible. Several boats from Nuiqsut then made another trip to the harvest site to recover more of the *muktuk*.

Most of the six members of this 1973 crew are now active Nuiqsut whalers, and the captain, belying his age, was one of the most active Nuiqsut whalers until his recent death (2005). In the years immediately after 1973 relatively few crews whaled from Nuiqsut, with relatively infrequent success. Nuiqsut whalers regularly went to other communities in the spring to participate in spring whaling (a pattern that some continue up through the present), and sometimes in the fall, rather than whale in the mid-Beaufort Sea area. The next "Nuiqsut" whale was not taken until 1982, although crews whaled from various locations between 1973 and 1982 – Pingok Island, Narwhal Island, and Cross Island among them. A summary of whale harvest by Nuiqsut crews is presented in Table 1 below. Nuiqsut whalers attribute at least part of their relative lack of success in the 1970s and 1980s to interference from oil and gas exploration, as well as poor weather and ice conditions in some years, and a difficult logistical situation. These factors are also evident in the three years with the greatest incidence of "struck and lost" whales (1989-1991 or 1992). Once Cross Island was established as a logistical center for Nuiqsut whaling, and Nuiqsut whalers gained experience there, harvest success became much more regular. Another factor in this increased success may be more moderate ice conditions since 1992 (although this may be countered by greater sensitivity to higher winds when ice cover is lacking).

Cross Island is a low sandy barrier island with an artificial higher area built from gravel. This higher area was constructed for past oil and gas exploratory drilling. Cross Island is about 3 miles long and 150 yards wide, and is constantly changing due to erosion and redeposition. Especially in the earlier years logistical support for whaling on Cross Island was very difficult. Whalers had to haul or find their own gas and water, and hunted and fished to provide most or all of their food. There was at most one cabin for however many people were whaling. Since the mid-1980s, with the advent of the Oil-Whalers Agreement (OWA) in 1986 between the oil industry and fall whalers (represented by the AEWC), logistical considerations have become somewhat easier. The current agreement is referred to as the "Conflict Avoidance Agreement" (CAA). The oil and gas industry (and especially BPXA) has been providing logistical support of various sorts to Nuiqsut whalers as a mitigation measure for potentially disrupting subsistence whaling by exploration, development, and/or production activities. With the increased interest in offshore exploration in the Beaufort Sea in 2005 and for the foreseeable future, other energy companies are also significant participants in the CAA.

At the most basic level, the OWA/CAA provides for the constant communication between industry and the whalers about all of their respective ongoing activities, so that each can avoid interfering with the other. The mechanism for this mutual communication is the Whaling Communication Center (WCC – also referred to as the "Conflict Avoidance Communication Center", the "Oil/Whalers Communications Center", or "Com Center") in Deadhorse. The WCC operates during each fall whaling season and is staffed by bilingual radio operators. All industry and whaling vessels are required to report their activities to the WCC in real time (purpose, time left, time returned, significant events as they occur), and the WCC maintains a log of these reports which is archived by the AEWC. This provides a record of activities as they take place, and also

Table 1: Recent Harvest of Bowhead Whales near Cross Island

Year	Whales			Notes
	Quota	Landed	Struck & Lost	
1973	NA	1	0	
1982	1	1	0	
1986		1	0	
1987		1	0	
1989		2	2	Oil industry vessel disturbance noted
1990		0	1	Oil industry disturbance, also rough seas
1991	3	1	2	Poor weather, bad ice conditions
1992	3	2	1	
1993	3	3	0	Very favorable conditions
1995	4	4	0	
1996	4	2	0	
1997	4	3	1	
1998	4	4	1	
1999	4	3	0	
2000	4	4	0	Very favorable conditions
2001	4	3	0	
2002	4	4	1	
2003	4	4	0	Poor weather
2004	4	3	0	Poor weather
2005	4	1	0	Very poor weather, bad ice conditions, disruption

Notes: Years of no harvest and no "struck and lost" are not listed. This does not imply that no whaling effort was made that year. "Quota" was not applicable in 1973.
Source: Compiled from AWC records, personal communications from Nuiqsut whalers, and field notes from the 2001-2005 whaling seasons

documents to some extent the whaling activities. It also allows the WCC to advise industry of planned industry activities that may interfere with ongoing whaling, or to suggest windows of opportunity (when whaling is not taking place) when industry activity may have minimal potential effects. Unfortunately, vessel activity not associated with the oil and gas industry (for example, commercial barge traffic) need not coordinate with the WCC in the same way, so that this is not a totally effective mechanism for the mitigation of all such potential effects. Other sorts of logistical support have been supplied at least in part by industry. These have included low-cost connex units (converted into seasonal cabins on Cross Island); a winch to help haul whales up at Cross Island; assistance with a steadier supply of gasoline; a generator system to supply electricity to the cabins during the whaling season; diesel fuel (for the winch and generator); water and other supplies; help with transporting the butchered whale to Nuiqsut; at least limited phone service for one or two crews; help with mobilization and demobilization; and the assurance of available emergency assistance. Alaska Clean Seas (ACS) is the industry's contractor for much of this OWA support, as a small part of its overall responsibilities (which are mainly logistical and/or related to oil spill response). BPXA and ConocoPhillips provide most of the funding for ACS, but BPXA bears the majority of OWA-related costs since ConocoPhillips has little or no offshore interests. The AEWC

does pay for some of the services provided under the OWA, but the amount and exact services are not reported. Neither industry nor the AEWC discloses the financial terms of the OWA.

Preparations for whaling, in one form or another, take place during the entire year. This report focuses on the activities during the harvest season. The final preparation of boats and equipment happens in August, and a meeting of the NWCA is conducted to set a date for the start of the hunting effort and to review the rules and regulations. Labor Day is the normative date for whaling crews to go to Cross Island, but it is not unusual for individual crews to go out earlier, especially if Labor Day is "late." In 2004, one crew (with two boats) went out August 15. This was considered extremely early by the other crews, but this captain was thinking that the migration of whales had been earlier in the last several years than it had historically been and that weather in early September had been increasingly marginal for whaling in the last several years. The combination of bad weather and mechanical problems did not allow him to fully test his conjectures. The few times that his crew went scouting in August they did not see any whales. Crews prefer to go out together or with multiple boats, for safety, so that two boats is usually the minimum number.

Once the crews are on Cross Island the focus is on whaling. Boats usually go scouting for whales on all possible days unless a whale was taken the prior day, in which case butchering usually has priority (although this pattern may be changing). When a whale is taken, it is towed to Cross Island, hauled up on the gravel beach, and butchered. Select parts of the whale from the captain's share ("*tavsi*") are sent to Nuiqsut via whaling boat the same or the next day "to feed the village". Occasionally it will be flown to Nuiqsut from West Dock, but will still be accompanied by a crew member to "run the flag" to the captain's house upon its arrival in Nuiqsut. The rest of the meat, *muktuk*, organs, and baleen is packed into plastic fish totes (or heavy, reinforced, corrugated cardboard boxes in 2004-2005) and transported to West Dock and then to Nuiqsut (most recently via ACS barge to West Dock and air freight to Nuiqsut). What is left of the whale is disposed of in the "bone yard." Once the quota is taken or conditions threaten to prevent returning to Nuiqsut (usually mid- to late-September), the whalers clean up the island, pack, and leave. Successful captains for that season will fly their flags.

Nuiqsut whalers first used wood boats and relatively small motors. Although they remember these vessels with fondness, and long for the economy of those motors, they also remember that they were limited in terms of speed and towing capability. Currently Nuiqsut whalers all use aluminum or fiberglass boats, 17 to 24 feet long, with motors of 70 to 225 horsepower. It is possible that a 16-foot boat may be used as a whale boat on occasion, but it would not be considered a primary boat. A few boats have cabins, but most are open. Boats typically scout for whales with a complement of three or four people, although some boat crews are as small as two and as big as eight. Although single boats do take whales on occasion, it is not encouraged and Nuiqsut boats almost always scout for whales in pairs, in case of mechanical break downs or other emergencies. Whaling crews with two or three boats are willing to whale on their own, but it is commonly agreed that five to seven boats is a preferable number to have available for whaling on a given day. More boats would be useful, and the availability of fewer boats decreases the efficiency, safety, and overall chance for success of the hunt.

Methodology

The data to be collected for this research will be discussed in terms of methods, with emphasis on the actual collection of descriptive information. In addition, it is important to address the issue of "hypothesis testing" in relation to the products of this research effort.

Hypothesis Testing

MMS explicitly required, as part of the proposal submission, the formulation of hypotheses related to potential changes in Cross Island subsistence whaling. These hypotheses can later be tested using the information collected by this research effort. Two major hypotheses were formulated:

- H1: Subsistence whaling activity and behaviors in the vicinity of Cross Island are significantly changed by offshore oil developments at Northstar and/or Liberty.
- H2: General subsistence activities on/near Cross Island are significantly changed by oil and gas activities associated with Northstar and/or Liberty.

These hypotheses are not stated in the "null hypothesis" format as such a formulation is counterintuitive to at least some of the local research participants and perhaps to the general public at-large. It will be necessary to express their implementation in that form for quantitative testing. It was explicitly recognized that the annual reports would not be able to test these hypotheses. Such tests will require more data (longer time series) and significant effort devoted to analysis, and will be part of the synthetic cANIMIDA final report (after the 2006 or 2007 field season).

In summary, the hypotheses have been formulated as examples of possible relationships that are testable after concrete empirical (and ideally quantitative) measures of Cross Island whaling that implement empirical facets of them have been compiled for a number of years. The hypotheses (and the measures to test them) thus guide the practical methods of collecting and archiving the information, to ensure that they will be useful for testing these hypotheses (as well as others as they are developed).

Descriptive Data Categories

The primary goal of data collection is the compilation of quantified measures of subsistence whaling behavior. Emphasis has been placed on such measures as:

- Number of crews actively whaling
- Size and composition of crews
- Fluctuations in active crew size and composition over the whaling season
- Number of whales harvested
- Days spent whaling
- Days prevented from whaling (weather, equipment failure or repair, etc.)
- Days suitable for whaling when whaling did not occur
- Subsistence activities occurring other than whaling
- Location of whale sightings and whale harvest
- Location of whale searching
- Local weather and ice conditions

These measures are a mixture of descriptive characteristics suggested by MMS and factors derived from or related to the perceptions of whalers on how and why whale behavior has changed, requiring that whalers change their behavior in hunting whales. For instance, size and composition of crews are fundamental descriptive characteristics that must have some relationship with the availability of whales. They also depend on the alternative (non-Cross Island) activities available to the crew members, such as alternative subsistence activities, wage labor opportunities, education, and so on. Because of the focus on Cross Island activities, information on the "full" range of factors that may be affecting the data collected was thus not compiled, but the range of possibilities was generally elicited from whalers during discussions of topics such as crew composition or crew recruitment. In this sense, these generally descriptive measures are thus also characteristics identified by Nuiqsut whalers as potentially significant and variable measures from year-to-year. The locations of whale sightings, harvests, and general whale searching behavior are all important in the examination of whether whales can be found in the same locations every season, or if this changes from year-to-year. If the latter, what causes such shifts in location is important. Nuiqsut whalers have experienced such variation and have suggested a number of factors to account for it. This project develops information to examine these questions about variation and changes in Cross Island whaling behavior. For instance, this information will allow for a preliminary (albeit rough) examination of "catch per unit effort" as well as factors associated with the distance whalers need to travel from Cross Island to whale.

Nuiqsut whalers generally agreed the suggested measures were significant and pertinent to the issues to be addressed. During the first field season (2001) Nuiqsut whalers also wanted to ensure that their more general perceptions and observations of whale behavior, and especially changes in whale behavior that had implications for hunting success or safety, were adequately noted. Such perceptions are also the most likely way for Nuiqsut whalers to contribute to future hypothesis formation and testing. Thus, information categories were added to ensure that whalers' perceptions and observations were noted on:

- Bowhead whale behavior in the Cross Island area, and differences from past experience; and
- Changes in access or other issues related to the whale hunt, such as increased effort for the same (or reduced) harvest, increased risk, increased cost, and so on.

These aspects of the research assumed more importance after the 2005 whaling season. Whalers reported that commercial (non-whaling) vessel traffic interfered with their whaling activities, and BP requested that the researcher present a report on these aspects of the Cross Island subsistence whaling season at the stakeholder meetings conducted to collect information during the annual agency permitting process for planned offshore activities. MMS, the sponsor of this project, determined that this was not a conflict of interest with the purposes of the research – and indeed, was a direct example of how the information from the project could be used for ongoing management decisions. Thus, the project results of the 2005 Cross Island subsistence whaling season were presented at the 2006 "Open Water" meetings in Anchorage on April 18, to an audience of stakeholders including at a minimum Government agencies, industry, whalers, scientists, and environmentalists. A similar presentation for the 2007 season is planned for the Open Water meeting in April.

Thus, the objective of the MMS Cross Island project is to describe Cross Island whaling using measures that document year-to-year variability in whaling and, when sufficient time series data are available, will allow tests of hypotheses on the causes of this variability. Concern about potential effects of oil and gas development on whaling is the prime motivation for the MMS project, but it is recognized that other factors can strongly affect Cross Island whaling and thus need to be considered as well. These other factors include weather and ice conditions, equipment problems, whalers' decisions, and non-industrial human activities. During the MMS-sponsored project, information is collected on level of hunting effort, including how many boats go out each day, crew size, how much time is spent on the water, lengths of trips in miles, and furthest point away from Cross Island during each trip. Information is also collected on the abundance and distribution of whales, including the number and location of whales observed and/or struck by the whalers. This information will be applied to internal MMS management leasing plans and decision, as well as stipulation requirements, and has also been recognized as important for the management decisions for other agencies.

Information on the level of hunting effort was collected by systematic observations by the researcher, who was on Cross Island for most of the whaling season in each of 2001–2005. This information was supplemented by conversations with all of the boat crews. Further information on the hunting effort, and on the abundance and distribution of whales, was obtained by issuing Garmin handheld GPS (Global Positioning System) units to all boats. The whalers were given instructions on how to record the GPS coordinates (track) of the boat's trip, and how to mark waypoints of significance, including whale sightings and strikes, sightings of vessels other than whaling vessels, and other pertinent observations. This information is then mapped, and is the basis for the Figures included in this report. It should be noted that whaling crews mark relatively few points when on the water, and the points they do mark represent the boat's position at the time a whale or group of whales was seen. These whales may be quite close or miles away (depending on the conditions of the day).

This information was supplemented by subsequent conversations with each boat crew, while reviewing the mapped GPS information on a laptop computer with them. When reviewing tracks after their return, crew members would often identify locations where they saw whales, and these points were added to the GPS information. Some of these points were boat positions, and some were estimated positions of whales (and thus not on a boat track). Other points were reference coordinates and may represent past whale sightings, so they also may not be on boat tracks. Galginaitis did not accompany the whalers in their boats while they were hunting, since it is not permissible for any non-Native to participate actively in hunting marine mammals.

Consultation

Consultation for the fifth field season built upon and was coordinated with that for the four previous seasons, as described in previous annual reports. These consultation efforts occurred in conjunction with efforts on behalf of several other MMS projects. In addition to periodic phone calls (primarily to the Native Village of Nuiqsut, the City of Nuiqsut, and various whaling captains in Nuiqsut; and the AEWC and IHLC in Barrow), consultation efforts consisted of the following:

- Trips in February and March of 2005 (02/1-2 to Barrow, 02/05-11 to Kaktovik and Nuiqsut, 03/17-19 to Barrow), primarily for other projects. However, there was some limited opportunity in Barrow and Nuiqsut to discuss preliminary results/conclusions of the 2004 report with Nuiqsut whalers and AEWC officers, and also to check some information with Nuiqsut whalers. This also allowed some preliminary discussion of arrangements for the 2005 season.
- Trip of 05/12-16 to Nuiqsut and Barrow was for further review of the 2004 annual report but also to explicitly arrange for the 2005 fieldwork, as much as that was possible. While captains do not want to commit to whaling this far in advance of the season, most will give an indication whether they intend to go or not, and this is useful in planning the need for equipment expenditures and so on. It is never too early to look for a host crew for the next season, and that was one of the explicit tasks of this trip.
- Trip of 8/27-9/25/05 to Nuiqsut and Cross Island. This encompassed the 2005 field season, but the period 8/27-9/05 was spent in Nuiqsut waiting to go out to Cross island. A good portion of this time was spent in consultation with Nuiqsut whalers about the upcoming season.
- 10/10/05 telephone conversation with the co-captain of one of the Nuiqsut crews, concerning several aspects of the 2005 season of special concern to him, and scheduling sometime in early 2006 to discuss these points face-to-face in Anchorage.
- February 23-27, 2006 trip to Nuiqsut to report to present a short summary of the 2005 season's research effort and report at a NWCA meeting. Consultations with the whaling captains, both as a group and in individual meetings, refined and corrected accounts and explanations of the GPS tracks, and especially vessel encounter events. Early planning of the 2006 field season was also initiated.
- March 13, 2006 consultation with Edward Nukapigak in Anchorage. The discussion focused on the GPS tracks for the Nukapigak crew in 2005 and the 2005 annual report, but also included future plans for the 2006 season.
- March 17, 2006 attendance at the AEWC meeting in Anchorage, for the session where GTX presented its plan for 2006 open-water seismic activities in the Chukchi and Beaufort Seas. Other petroleum industry companies also presented their plans. The AEWC had requested these presentations as a prelude to the negotiation of a global Conflict Avoidance Agreement between the subsistence whalers and the petroleum industry, instead of a number of individual such agreements between each company planning activities and the whalers.
- April 18, 2006 presentation of the Cross Island research (and specifically 2005 results) at the annual Open Water meeting, sponsored by NOAA to facilitate communication about the permitting process for oil and gas exploration. The presentation was explicitly related to BP's permit renewal requests for Northstar, since the project is designed as part of the monitoring effort for Northstar, but was of more general interest because of all the other planned activities for the 2006 open water season (seismic especially). This was also another opportunity to talk with the AEWC representatives about the progress of the project, and the obtain comments from Nuiqsut whalers, AEWC, and industry on the 2005 draft report (as presented to the meeting).
- Most subsequent trips to Nuiqsut included at least a small component of review for the 2005 annual report, but were focused more on the 2006 or later research efforts. The barge encounters of 2005 did remain a topic of frequent discussion for the Nuiqsut whalers, however, and remained difficult to document in a precise way.

As in most prior years, the field arrangements were not totally firm until shortly before the season started. The researcher did not arrive on Cross island until September 6, while the first crew traveled to Cross island on August 30, and two others on September 4. All scouting activity for these boats was recovered from the memories of their GPS units once the researcher arrived on Cross Island. Thus, although the researcher was not present for the entire 2005 subsistence Cross Island whaling season, data for the entire season was collected and represents all scouting activity for the full season.

Data Collection

The logistics for data collection in 2005 were somewhat more problematic than in other years, but in the end did not compromise the ability to collect complete and accurate data. The first crew left for Cross Island on 8/30, and two others on 9/04. The crew the researcher accompanied did not leave until 9/05 and because of engine problems did not reach Cross island until 9/06. Between 8/30 and 9/06 there were four days when boats went out scouting for whales – one boat on 8/31, 9/02, and 9/03 and four boats on 9/05. Fortunately, all had GPS units from prior years (some more than one) with the tracking feature turned on, and all of these tracks were still in machine memory when the researcher reached Cross Island and was able to download the units. In addition, GPS tracks for "travel" days between Nuiqsut and Cross Island were obtained for three crews, as well as some tracks for trips between Cross Island and West Dock.

In 2005, the first whaling crew went to Cross Island on 30 August, and the fifth and last crew arrived on Cross Island 8 September. Overall, the 2005 Nuiqsut whaling season was marked by very poor weather and rough seas, which affected not only the whalers but also all other maritime activities. Few days were suitable for "scouting" by the whalers, and on only one day were a large number of whales seen. On most days suitable for scouting, whalers encountered non-whaling vessels, some engaged in support to the petroleum industry and others not, but none related to Northstar. The whalers concluded that barges directly affected their hunt on two days in 2005, and that such influences may have occurred on other days as well. Only one whale was taken by Nuiqsut whalers in 2005, on 14 September. Nonetheless, the whalers called a cease fire on 24 September because of the forecast of more bad weather and the possibility of imminent freeze up, and on 25 September all crews left for Nuiqsut. In summary, the 2005 Cross Island hunt was negatively affected by bad weather and pack ice. The 2005 hunt was also perceived by the whalers to have been affected by tug and barge traffic, but not by Northstar-related activities.

The whaling seasons for the five crews ranged in length from 18 to 27 days, counting travel days. The seasons for the individual crews were 27, 22, 22, 21, and 18 days. The whalers encountered a great deal of ice in 2005, which was a dramatic change from the previous four years. The weather was also very unfavorable in 2005, and was dominated by strong east winds of 15 to 45 miles per hour. Wind speed as recorded at Cross Island exceeded 15 miles per hour consistently on 9–12 Sept., 15–20 Sept., 21–23 Sept., and part of 24 Sept. These periods of strong winds were generally consistent with those evident from wind measurements at Northstar (Richardson 2006).

At least one boat went out scouting for whales on 8 different days (and also went out one day without whaling equipment to hunt seals). The researcher was on Cross Island for only 5 of these days, but was able to collect GPS tracks and whaler accounts for all scouting days. The first crew

scouted for whales on 8 days (and hunted for seals on another), but on 2 of those scouting days were by themselves. Two crews scouted for whales on 6 days, one crew on 5 days, and the last crew on 3 days. Each crew devoted 2 days or (in one case) 3 days to travel to and from Cross Island. Various boats were disabled at times due to mechanical problems of various sorts, but weather was a much more significant factor in limiting scouting effort. Weather prevented any scouting activity on at least 16 days, and ice and weather limited scouting activities to some extent even on those days when boats did go out scouting.

The whalers encountered barges on at least three days when they were scouting for whales, and noted barge sightings on at least several other days. None of these barges were engaged in Northstar-related activities. Whalers reported that, on at least two of those days, barges significantly affected whale behavior and the conduct of the hunt. More detailed information on these barge sightings / interactions is provided below (see discussion of observed vessel activity, below). Whaler observations and reports of whale feeding behavior and "skittish" behavior are also briefly discussed below, in separate sections.

Crews spotted whales on most (but not all) scouting days, although—with one exception—not in the numbers seen in previous years. The one exceptional day was the one day in 2005 when a whale was taken by the Cross Island whalers (14 Sept.). Also, the call detection rate offshore of Northstar was relatively high that day, as compared with most other days during the 2005 monitoring season (Richardson 2006). The generally lower numbers of whales seen in 2005 as compared with other recent years were attributed for the most part to the heavy ice cover encountered on most days. The ice cover (and fog) also limited the areas that could be searched for whales (see discussion of offshore distribution of whales, below). Only one whale was taken, a 40'9" (12.4 m) male taken by the Napageak crew, about 27 miles (43 km) east of Cross Island (Table 2). A more detailed day-by-day summary of whaling activity for the entire Cross Island whaling season is presented in Table 5 later in this report.

Table 2: Summary Characteristics[1] of Whales Struck Near Cross Island, 2005

Date	Time Struck	Length	Sex	Whale ID	Miles from Cross Island	Bearing from Cross Island	Notes
9/14/04	2:16 PM	40'9"	Male	05N1	25.9	82° true	Napageak

[1]All characteristics are from direct observations or GPS records made on the day of the activity, other than the WhaleID number. WhaleID numbers are assigned by the North Slope Borough Department of Wildlife Management (NSB DW). Times are approximate and are derived from the recorded GPS tracks and/or radio logs, combined with whalers' accounts, as are the distances from Cross Island.

Three types of data were collected during the 2006 field season, as discussed above. These are GPS information; systematic observations of quantifiable measurements of various components of subsistence whaling activity; and whalers' observations on whale behavior (and especially changes in such behavior). This last sort of information is often accompanied by perceptions of possible causes for such changes and the implications such changes may have for subsistence whaling activities. Each is discussed in an appropriated section below.

GPS Data

All whaling crews participating in the research in 2005 had participated in the research in previous years. Thus, all crews whaling in 2005 were reasonably familiar with the goals and methods of the project, and in using a GPS unit. All crews had been issued GPS units previous years, but several required an additional unit either because of using an additional boat or loss (or other unavailability) of a unit. Whalers were again instructed to record the locations of whale strikes, whale kills, or other subsistence activities or observations. Most boats had at least one crew member familiar with GPS units, and most boats used them as a matter of course. GPS tracks were recovered for all scouting trips (100 percent, for 48 of 48 scouting trips).

All crews were instructed to keep the "tracking" feature on, which recorded the path the boat traveled each time it went out. As in previous years, tracks were sometimes incomplete or composed of several separate tracks, due to the unit's memory limitations, whalers turning the unit off and on, loss of battery power, or the unit losing its positional fix. These problems did not occur with the frequency of previous years, however – due in part to the past experience of the crews with the project and in part to the use of more 60MAP and GPS V units (with more unit memory) than in the past. As for recent years, all boats were provided with a power cord so that the GPS units could be operated from the boat's electrical system, so that depleted batteries were not the problem they had been in the first two years of the project. However, not all boats were wired to use such cords. Also, all boats were provided with a boat-mounted holder for the GPS unit, so that the units would be readily available, secure, and not be mistakenly shielded from satellite signals due to being put in a pocket. Still, at times satellite coverage was spotty and reception was lost. Whalers were instructed how to mark points, and told to mark the points where whales were seen. Whalers were also asked to mark other events such as "blows," other animals (polar bears, seals, and so on) and key points in their trip (the ice edge between "open-water and the ice pack, places where weather conditions change, and so on). Positions where whales were seen, struck, or killed were marked by a number of crews, but were seldom if ever labeled and so required additional discussion with the crew and additional processing of the "track" file. Relatively few points were marked in 2005, but whalers were able to approximately locate many points while reviewing their tracks on the computer screen, and the researcher was able to make some fairly reliable conclusions about other whale event points from the GPS track characteristics. In any event, the process of increasing the incidence of marking significant points will require steady attention and constant encouragement.

The researcher visited each crew that had gone out scouting after they came back, in order to download the information from their GPS unit into his laptop computer. This ensured that the GPS units were always available to the crews should they decide to go out at short notice. This procedure also enabled the crews to immediately see where they had been that day with the mapping software, and allowed the crew an opportunity to discuss their trip with the researcher while it was very fresh in their minds. The utility of this information, as concretely represented on the mapped tracks displayed by the computer, has been obvious to the whalers since the inception of the project and is one reason for the high degree of participation. An example of the combined tracks for one day of scouting can be seen in Figure 2. This is the track for 09/14/05 (to be discussed in more detail below), when the Napageak crew landed the only whale of the 2005 season. This figure also includes symbols representing the estimated positions of the barge

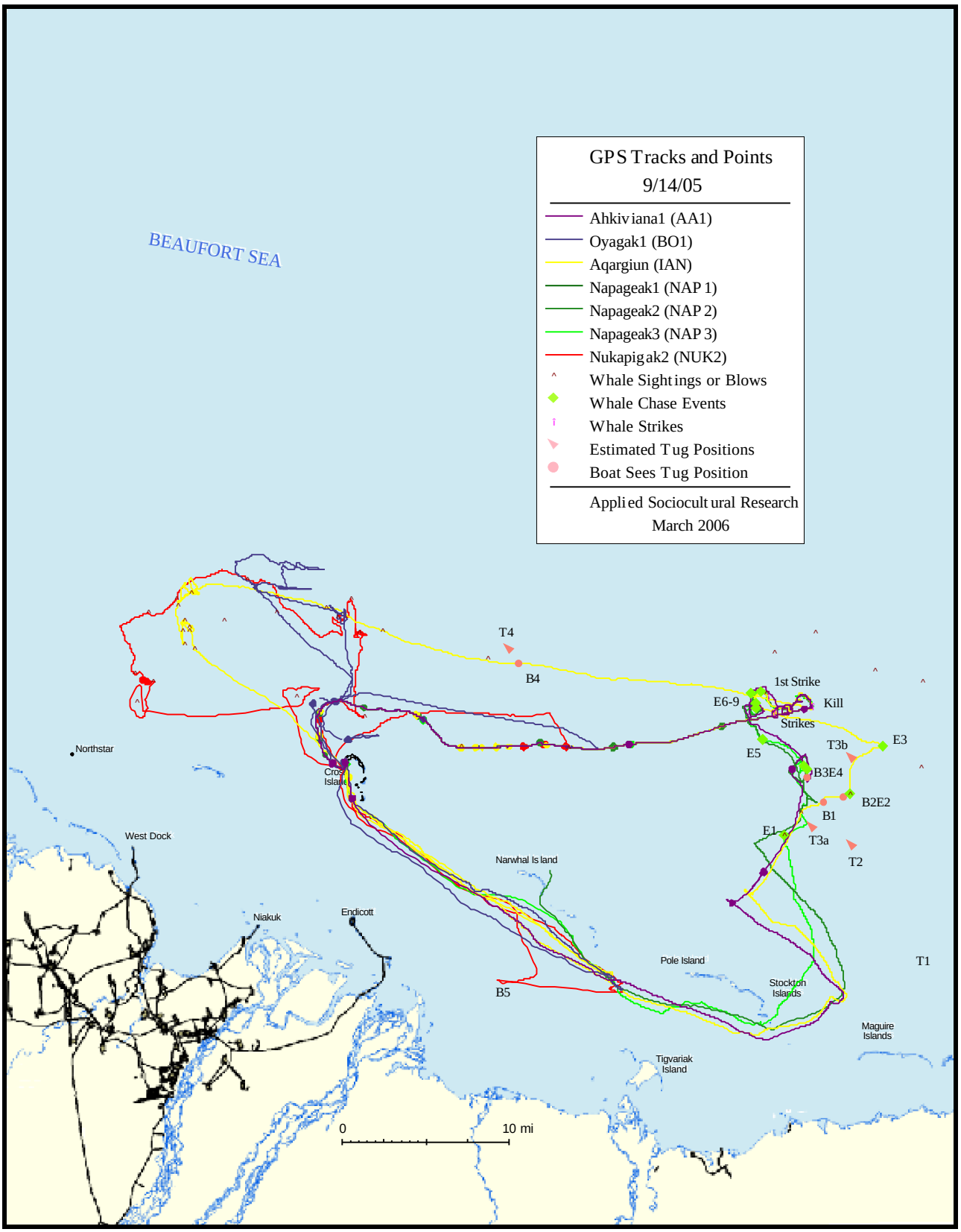


Figure 2: Composite Scouting Tracks for a Single Day – 9/14/05

encountered during whaling that day, as well as indications of whale sightings. Note that for whales, one symbol may represent several whales, and some symbols may represent the same whales(s) seen by different boats. Seven boats total scouted that day and assisted in the hunt and tow. Tracks for all days that boats went out scouting appear in electronic Appendix A on the CD-ROM attached to this report. The MMS Alaska OCS Region holds the processed GPS data files for all the tracks for the 2005 season.

Hunters were also asked to report other subsistence efforts and results, in terms of time spent, species, number, and location in terms of GPS coordinates. Little such activity was reported, but perhaps more than in previous years. Crews expended some effort hunting seals (which were very abundant on some days), although they did not report taking any. One crew took a bearded seal on the way back to Cross Island from scouting on 9/07. Polar bears were numerous, and present throughout the season, even before the single whale was landed. Two polar bears were shot and processed, which has been typical during the course of the project (one or two taken per whaling season).

Daily boat report forms were used to capture the GPS and associated information. The form for the 2005 field season was the same as used for the 2004 field season. A form is completed for each boat that goes out scouting or engages in some other significant whaling activity. Table 3 below presents as example of the form completed for the boat that landed the whale on 09/14/05. Forms for the other six boats out scouting that day are not included in the body of this report, but appear, along with all the other boat report forms, in electronic appendix B on the CD-ROM attached to this report. Those boats not out scouting on any given day do not have a separate form completed for each of them, but rather have their activities and status summarized on a single form. On days when no boats go out scouting, all will be on one form. Table 4, as an example, contains the information for all the boats that did not go out scouting on 09/08/05. One boat never went out scouting (support functions only), another went to West Dock on errands (and had a somewhat questionable engine) and three others were traveling to Cross Island from Nuiqsut. Four boats did go out scouting. The forms are organized in Appendix B in terms of date rather than by crew as in most past reports. Figures of individual boat tracks for each day have not been produced, a departure from past reports, since this information is conveyed more economically in figures for each scouting day containing the tracks of all boats out scouting that day. Indices to Appendix B are provided by both date and crew to assist the reader in finding specific boat report forms (although the diligent reader could use Table 5 to guide him or her in this task). A list of acronyms and abbreviations used is provided on page ix.

The information used in the Table 3 example was not chosen at random, but because it is the most eventful day of the 2005 Cross Island subsistence whaling season. Not only was 9/14 the only day Nuiqsut whalers landed a whale in 2005, it was also the day of their most contentious encounter with a non-whaling vessel (to be discussed below). The information on the form also demonstrates some of the difficulties presented in the waypoint information reported in this (and previous) documents. Although instructed to mark waypoints whenever whales are spotted or where significant events take place, no crew in fact can mark all such points, for a variety of reasons. This last topic will be discussed first, but in this instance is of course directly related to the other two points.

Table 3: Example Daily Boat Report Form

cANIMIDA Task 7 Data Collection Form, 2005 **Use one form for each vessel/day**

Date: 09/14/05 **Crew:** Napageak **GPS Type:** _____

Vessel	Type	Length	HP Motor	# crew aboard/notes
NAP3	AL	18'	115 HP Yamaha	4

Whaling today? **If not, why not?**

Time departed: **7:49** **Time returned:** **"26:00" [2:00 on 09/15/05]**

Duration of 18hr 11min, Roundtrip of 108 miles, furthest point from Cross Island of 32.3 miles

Waypoints or Coordinates noted

Way Point #	Lat/Long	Time	Notes (if whale - # of animals, direction of travel, behavior)
Nap3_091405a	**N70.42388 W146.84188**	**11:44**	**First blow seen by NAP3**
Nap3_091405b	N70.48308 W146.78804	12:50	Blow, chasing the whale (probably a different whale) - also reported as ua1_091405a.
nap3_091405c	N70.50566 W146.87944	13:16	Blow, chasing the whale (same whale as "b")
nap3_091405d	N70.53347 W146.91184	13:58	Several blows seen, for whale being chased (and landed)
nap3_091405e	N70.53075 W146.86110	14:42	a strike on the whale, or other chase event
nap3_091405f	N70.52128 W146.85416	12:46	NAP3 estimated position of Tug when they saw it – NAP3 at approximately nap3_091405b

Describe the day's activity (traveling, hours searching for whales)

Direction of initial search (and explanation):	SE along ice edge, looking for a break to go N to open water
Time spent actively scouting/# people looking:	4 – see general narrative for the day and below
Time spent in travel/tow/assistance to other boats/on "break":	34 min preparing to tow; 9hr 22min tow

Notes: See general description of the day for larger context.

NAP3 headed out SE along the ice edge and at about 30.2 miles from Cross Island found a way N through the floating ice to open water (somewhat west of the other 3 boats). They saw the first whale/blow of the day at nap3_091405a (11:44) and the boats converged at that time. They lost track of this whale, but saw quite a few others. NAP3 was chasing a whale (nap3_091405b and nap3_091405c) with UA1 and NAP2, and the IAN boat a different whale further to the east, when they encountered a barge (nap3_091405b and nap3_091405f) that they believed contributed to their losing track of these whales. Note that the time of the barge sighting and the location of boats is reasonably consistent with each other, but that the estimation of the location of the barge is quite variable – other than that it was in the area and close enough to affect the behavior of the whales being chased. After the barge left the area, other whales were seen and the NAP3 boat made the first strike on the whale that was landed. Strike and other positions were located after the boats return to the island, and from points marked by other boats on the water. The NAP3 boat did not locate any additional whale sightings (but did confirm that there were lots of whales around).

Observations of Whaling Crew – weather, sea state, ice-conditions

Fog or clouds?		**Weather notes:**	BP rose 70 29.9@ 3PM and then falling		
Wind Direction:	shift	**Wind speed and other notes:**	Shift from west to south to east, 0-8 mph		
% Ice Coverage:	variable	**Ice Type:**	Floating	**Other Notes:**	
Wave Height:		**Other notes on sea conditions:**	Open water to N of pack ice, both SE and NW (and N) of CI BUT had to go 30-33 miles SE to be able to go N. Water calm.		
Other pertinent notes:					

Note: Cross Island weather observations are compiled in a separate file (weather station + observer)

Engaged in any other subsistence activities? No **If yes, describe below**

GPS track? Yes **GPS File Name:** NAP3_091405T.gdb

If not, why not?

Table 4: Daily Boat Report Form for Boats Not Out Scouting

cANIMIDA Task 7 Data Collection Form, 2005 **Use one form for all non-scouting vessels/day**

Date: 09/08/05 **Crew:** Various **GPS Type:**

Vessel	Type	Length	HP Motor	# crew aboard/notes
BO1	FG	18'	80 HP Yamaha	To Cross Island w/4
BO2	AL	18'	70 HP Yamaha	To Cross Island w/2 – originally designated as BO3
NAP2	AL	19'	60 HP Yamaha	To Cross Island w/4 – originally designated NAP3
NUK1	AL	24'	200 HP Yamaha	To West Dock w/2, back w/2 – support vessel only
UA2	AL	18'	75 HP Yamaha	Support vessel only

Whaling today? No **If not, why not?** NUK1 and UA2 usable only for support tasks. Others in transit to Cross Island from Nuiqsut.

Time departed: NA **Time returned:** NA

Waypoints or Coordinates noted

Way Point #	Lat/Long	Time	Notes (if whale - # of animals, direction of travel, behavior)
NA			

Describe the day's activity (traveling, hours searching for whales)

Direction of initial search (and explanation):	NA
Time spent actively scouting/# people looking:	NA
Time spent in travel/tow/assistance to other boats/on "break":	NA
Notes:	NA

Observations of Whaling Crew – weather, sea state, ice-conditions

Fog or clouds?	Fog	**Weather notes:**	Again, fog off and on		
Wind Direction:	Variable	**Wind speed and other notes:**	3-8		
% Ice Coverage:	Variable	**Ice Type:**	Thick floating ice	**Other Notes:**	Open water inside islands
Wave Height:		**Other notes on sea conditions:**	Very thick ice outside islands (not passable) to the north. Note NAP1 found open water 10+miles N of Cross Island, but also fog.		
Other pertinent notes:		Cross Island weather available for 2:37 PM 9/06/05 to 5:21 AM 9/25/05 (WSF_2005.xls).			

Note: Cross Island weather observations are compiled in a separate file (weather station + observer)

Engaged in any other subsistence activities? **If yes, describe below**

GPS track? Yes **GPS File Name:** NAP2_090805T-trans.gdb; NUK1_090805T-trans.gdb

If not, why not? Tracks for BO1 and BO2 not collected as GPSs had tracking set "off"

Whaling events happen so quickly that crew members are fully occupied with their duties and sometimes cannot divert their attention to mark a point (or perhaps even remember to do so). When points are marked, crews seldom take the time to assign them names, so that they are designated with "default" numbers. When waypoints are marked for whales, they still do not necessarily represent the same thing. Waypoints indicating where a whale was struck or killed for the most part represent the immediate area where that event took place. Those indicating a whale sighting are less precise, showing the position of a boat when a whale was sighted. It may indicate a whale seen a short distance away, or the "blow" of a whale seen in the distance (up to 2 or 3 miles away). Also, a waypoint may represent one whale or multiple whales. For some tracks, there are no waypoints that the crew marked while they were on the water, but quite a few that they could approximate when they later reviewed the track with the researcher. Many of these points represent whale sightings, and are not necessarily any less precise than points marked on the water – but in most cases can be assumed to represent whales or blows seen at a greater distance than for a waypoint actually marked when on the water.

Since most crews discussed most of their trips with the researcher, it has been possible to collect more waypoint information that is present in the raw GPS data files, but with a potential loss of precision. Crews remember how many whales they have seen on a trip (except in cases where blows were both distant and numerous), and generally where they were. When looking at the mapped tracks of their trip they are able to identify where they saw whales, so that an approximate waypoint can be generated. In most cases, sighting locations are associated with changes in a boat's direction. Such "generated" waypoints are differentiated from those actually marked by crews by using lowercase letters in their labels.

In Table 3, for example, the Napageak crew did not mark any points while they were out on the water. They were able, with reasonable accuracy, to locate some significant points of the day once they had returned to land and could review the GPS tracks with the researcher. Thus they indicated the general area where they saw their first blow on 9/14 (point "a") and the blows for the different whale that they and other boats were chasing (points "b" and "c") when they encountered the barge. Point "f" is their estimate of the barge's location, but probably has more margin of error associated with it. Estimated points "d" and "e" are associated with the whale seen, chased, and landed once the barge had left the area. Note that they did not mark or even estimate where they had struck the whale – that location came from crew members in other boats who were not as busy at the time, with a cross-check of the time of the strike reported to the Communication Center.

Some marked waypoints are also somewhat ambiguous in meaning, however, since the crew may assign one meaning or memory to a point when in fact it may have another. That is, especially when whales are harvested, whalers may misidentify the waypoints that they do mark. Given that crew members have little attention to spare in this situation, and that the waypoints themselves are usually only numbered, and that the crew may not remember exactly how many waypoints were marked (or if all attempts to mark points actually succeeded), such confusion can be expected. However, since whalers communicate with each other, the Com Center, and sometimes their Cross Island base station, by radio it is often possible to note when significant events take place by what is said on the radio and noting the time. When compared to the date stamps on waypoints these notes can then aid in the interpretation of what the waypoints actually

represent. It should also be noted that the researcher is also a potential source of confusion, in that his understanding of a crew's description of their trip activities and events may in fact be in error – the researcher may misinterpret what the crew tells him. The data as presented is the result of comparative cross-checks using the information obtained from all sources (GPS, crew accounts, and radio notes).

Ambiguities of meaning influence the way in which the points can be used but not to the extent that they do not have meaning. Whale sighting waypoints cannot be interpreted as point locations. Whale strike and kill locations can generally be interpreted as point locations, but not necessarily precise point locations. Boats are always moving and waypoints are seldom if ever marked at the precise time that a strike is made or a whale is killed. "Time of death" is also imprecise at best. Once a whale is struck, communication about the status of the hunt or kill is kept to a minimum, since too much talk only strengthens the whale. The whalers are also very conservative before announcing that the whale is dead by offering a prayer of thanks on the radio. They do not do so until they are absolutely sure that the whale is dead.

Table 4 is an example of how the Daily Report Form was used to reduce the number of forms to complete for those days when not all boats went out scouting, as discussed above. Separate forms were still used to record information for those boats that did go out scouting on 09/08/05 (see Appendix A). A single form was used for the five boats, from four crews, that did not go out scouting that day. Note that three of these boats were from crews that had single boats out scouting that day, and the other two were from a crew on its way to Cross Island. A rough indication of what else the crews did on those days (and if the boats were used for other purposes than scouting) is noted, but not in detail. Attempts were made to determine if weather, mechanical problems, or other obligations such as butchering was the major factor in a boat not going out scouting on any given day. For some days where multiple factors applied determining which was most important may not have been possible.

Systematic Observations

Systematic observations were also transferred to the standardized recording forms (daily boat report forms). These observations are the basis for the summary tables that appear in the "Results" section, as well as the completed daily vessel activity forms. From these records it is possible to make a basic "census" of the crews on the island, and to track changes as people came to Cross Island and left. In addition, notes were made on which crews went out on each day. In most cases it was possible to note who went out in each boat. From these basic observations can be derived some of the most basic measures of subsistence whaling activity – number of active crews (and boats), size and composition of crews, fluctuations in crew size and composition, and days spent whaling. The GPS data provide systematic locational information for whaling activities. This information also was recorded on the daily boat report forms. Examples of the daily boat report forms appeared above as Tables 3 and 4. The complete series of forms is included electronically as Appendix A. A list of the acronyms and abbreviations used in these tables (and elsewhere in the report) is provided on page ix.

In addition, very basic weather observations were made (temperature, wind direction and strength, degree of fogginess or clarity, barometric pressure). A weather station was installed on Cross Island, with a remote data logger to record the information. The data logger functioned for the period 9/06/05 (2:37 PM) through 9/25/05 (5:21 AM), with readings every five minutes for temperature (outdoor and indoor), wind speed, wind direction, barometric pressure, and relative humidity (file CI2004WF.xls, also included electronically as Appendix C). There were short periods of data gaps for one reason or another – signal interference, instruments freezing up, or other factors. Graphs of barometric pressure, wind speed, and wind direction appear as Figures 5 - 7 in the "Results" section below.

Since January 1, 2001 MMS has maintained a weather station at Endicott, which is close enough to Cross Island to be pertinent. The data log is available at **www.resdat.com/mms**. This is another potential data set of interest for the analysis of the whaling data (MMS also maintains weather stations at Northstar, Badami, Milne Point, and Cottle Island). Other potential sources of weather information and whaling activities are the communications logs of the Whaling Communications Center. Since the researcher could not go out in the boat while they scouted for whales, he had little ability to judge the degree of ice cover, although the Nuiqsut whalers did report their observations in a general way. There was considerable ice cover in 2005. Ice observations are noted on the daily boat report forms. Information on ice cover may also be obtainable from remote sensing sources or the MMS aerial bowhead survey.

Whalers' Observations

Whalers would sometimes make observations on whale behavior or give their thoughts on how and why whale behavior in the Cross Island area was different in 2005 than it had been in the past. Much of this was recorded in the daily field notes. Much is of limited immediate relevance to the central aims of this project. A summary is included in the "Results" section below.

Results

Results are discussed in this section in terms of the quantitative observations designed as measures of subsistence whaling activity and the less quantifiable observations and perceptions of Nuiqsut whalers about whale behavior in 2006 as compared to previous years.

Quantitative Measures

The most basic summary of information, extracted from Table 5 and Figure 3, describes the primary characteristics of Cross Island subsistence whaling of most concern for MMS. In 2005, five crews from Nuiqsut whaled from Cross Island. Three crews used primarily one boat each for whaling, although two of these crews had one other boat for logistical help. A fourth crew (the first to reach Cross island in 2005) had three whaling boats, but mainly due to mechanical problems used only their primary boat on all but two of the days they went out scouting. The fifth crew had two whaling boats, but again mainly due to mechanical problems they used only their primary boat on all but one day they went scouting. Thus, although formally there were eight boats that went out scouting for whales at least once in 2005, functionally there were closer

to five whaling boats at Cross island for most of the 2005 whaling season. The day the only whale of the season was landed, 9/14, seven days went out scouting and all assisted in the chase and/or tow.

Crew Characteristics

The size and composition of the crews varies from year to year. In 2005 all crews displayed direct kinship relationships among most members (most people in Nuiqsut can trace indirect kinship relationships with most others). Three of the crews consisted of the captain and at least one of his sons. In one of these cases, there were several sons, plus a sibling, a cousin, and a nephew-in-law of the captain. A second case was a father, two sons, a niece, and three other more distant relations. The third was a father and son, and five others not so obviously related to the captain. A fourth crew consisted of a mother (who stayed in Nuiqsut) and three of her sons, a son-in-law, a grandson, and another relative that was not precisely defined. The mother was the widow of the former captain, and functioned as the principal decision-maker and central organizer/funder for the crew. In the past she has spent the whaling season at Cross Island, but in recent years has designated one of her sons as co-captain, with responsibilities for managing the hunting activities while the crew is at Cross Island. The fifth crew consisted of a young captain and an assortment of his relatives - two of his uncles, with their sons; a sister and her husband; the captain's father-in-law; at least one of the captain's cousins, and at least one non-relative.

There were few female crew members on Cross Island in 2005 – two (one on each of two crews) – as well as the female crew captain who no longer goes out to Cross Island with her crew. A total of forty-four different individuals were on Cross Island as part of a crew at some time during the 2005 season (this does not count the captain who stayed in Nuiqsut). Nineteen of the forty-four were not "adults" – a much higher percentage than in previous seasons documented by the project. However, more of these were in that intermediate stage of "adolescence" or "young adult" (high school/college age) – sixteen of the nineteen. Some were more at the "adult" end of the category than were others, but it would require a nuanced analysis of context to properly categorize each individual, for little benefit in this report. Only three crew members were younger than high school age, which is comparable to previous years. No single crew had more than one crew member of this age, although all crews except one had at least three members who were of high school/college age (one crew had one, one crew had six, and the other three had three). Once all five crews were on Cross Island, the total number of crew members varied from 32 to 43

All but one crew were closely divided between "adults" and younger crew members, but all but one had more adults than younger members. The extremes varied from a crew with one college-aged and five adult members on Cross Island to another with three high school/college-aged members, one younger than that, and three adults. The other three crews were almost evenly split between adults and younger crew members, with most of the younger members being of at least high school age. Crew composition did vary throughout the season, but apparently more for idiosyncratic reasons (need to return to work, medical concerns, the condition of boats) and not in any systematic way. The expectation was that once a crew member was at Cross Island that he (or she) would stay for the duration of the season, unless there was a good reason for an

Table 5: Summary of Boat Activity, Cross Island Whaling, 2005

Date	Table 5: Summary of Boat Activity, Cross Island Whaling, 2005																Notes
	Ahkiviana[1]		Aqargiun		Napageak						Nukapigak				Oyagak[2]		
	Ahkiviana1		IAN		Napageak1		Napageak3		Napageak2		Nukapigak1		Nukapigak2		Oyagak1		
	Boat Crew	Trip Time	Boat Crew	Trip Time	Boat Crew	Trip Time	Boat Crew	Trip Time	Boat Crew	Trip Time	Boat Crew	Trip Time	Boat Crew	Trip Time	Boat Crew	Trip Time	
08/30/05	Preparing for Whaling		Preparing for Whaling		To CI w/7		Waiting for Parts and Getting Ready for Whaling		Waiting for parts and Getting Ready for Whaling		Preparing for Whaling				Preparing for Whaling		7 people on CI
08/31/05					5	3:00											7 people on CI, sealing trip
09/01/05					Shore												7 people on CI
09/02/05					4	7:18											7 people on CI
09/03/05					4	6:48											7 people on CI
09/04/05			To CI w/7		To WD w/3						To CI w/3		To CI w/2				20people on CI
09/05/05	To CI w/3 W/UA2 w/3		6	8:19	4	8:30					3	6:13	2	6:05			20 people on CI
09/06/05			Shore		To WD w/3						Disabled[3]		Assist UA1				26 people on CI
09/07/05	5	2:15	6	11:16	4	9:09							5	11:18			26 people on CI
09/08/05	5	5:54	7	8:20	5	1:14			To CI w/4		To WD w/2		3	7:17	To CI w/4 W/BO2		36 people on CI
	5	5:28			5	5:39											
09/09/05	WEATHER, but NAP1 to West Dock w/5, back w/4 on 9/10								WEATHER, but NUK2 to West Dock w/2, back w/2 on 9/10 NUK 2 to West Dock w/2, back w/4 on 9/10								36 people on CI
09/10/05																	37 people on CI
09/11/05																	37 people on CI
09/12/05																	37 people on CI
09/13/05	5	7:08 5:17	8	7:30 5:11	4	2:00	3	3:49	3	1:47 4:22 6:23	Disabled		4	8:04	4	7:37 3:37	42 people on CI
09/14/05	5	19:00	7	19:16	4	2:52 14:35	4	18:11	3	18:42			4	3:08 7:36 6:01	4	3:34 5:36 6:56	42 people on CI, whale taken by Napageak crew
09/15/05	Butcher/Weather						Butcher/Weather				Butcher-Disabled		Butcher/Weather				42 people on CI
09/16/05																	42 people on CI
09/17/05	WEATHER										Weather-Disabled		WEATHER				42 people on CI
09/18/05							WEATHER										42 people on CI, helicopter
09/19/05																	43 people on CI, helicopter
09/20/05							To NQT w/3		To NQT w/4								40 people on CI, helicopter
09/21/05	5	7:57	6	8:23	4	2:25	IN NUIQSUT				Disabled		5	8:57	3	9:32	32 people on CI
					4	0:35											
09/22/05	WEATHER										Weather-Disabled		WEATHER				32 people on CI
09/23/05																	32 people on CI, barge
09/24/05																	32 people on CI
09/25/05	To NQT w/3[5] W/AA2 w/3		To NQT w/7		To NQT w/?						To NQT w/3		To NQT w/2		To NQT w/3 W/BO2 w/3		32 people on CI, then 0

[1]Ahkiviana crew also came with UA2, which was used only for logistical support

[2]Oyagak crew also came with BO2, which was used only for logistical support. BO3 never came to Cross Island.

[3]Motor not reliable enough for scouting, but good enough for transportation and logistical support

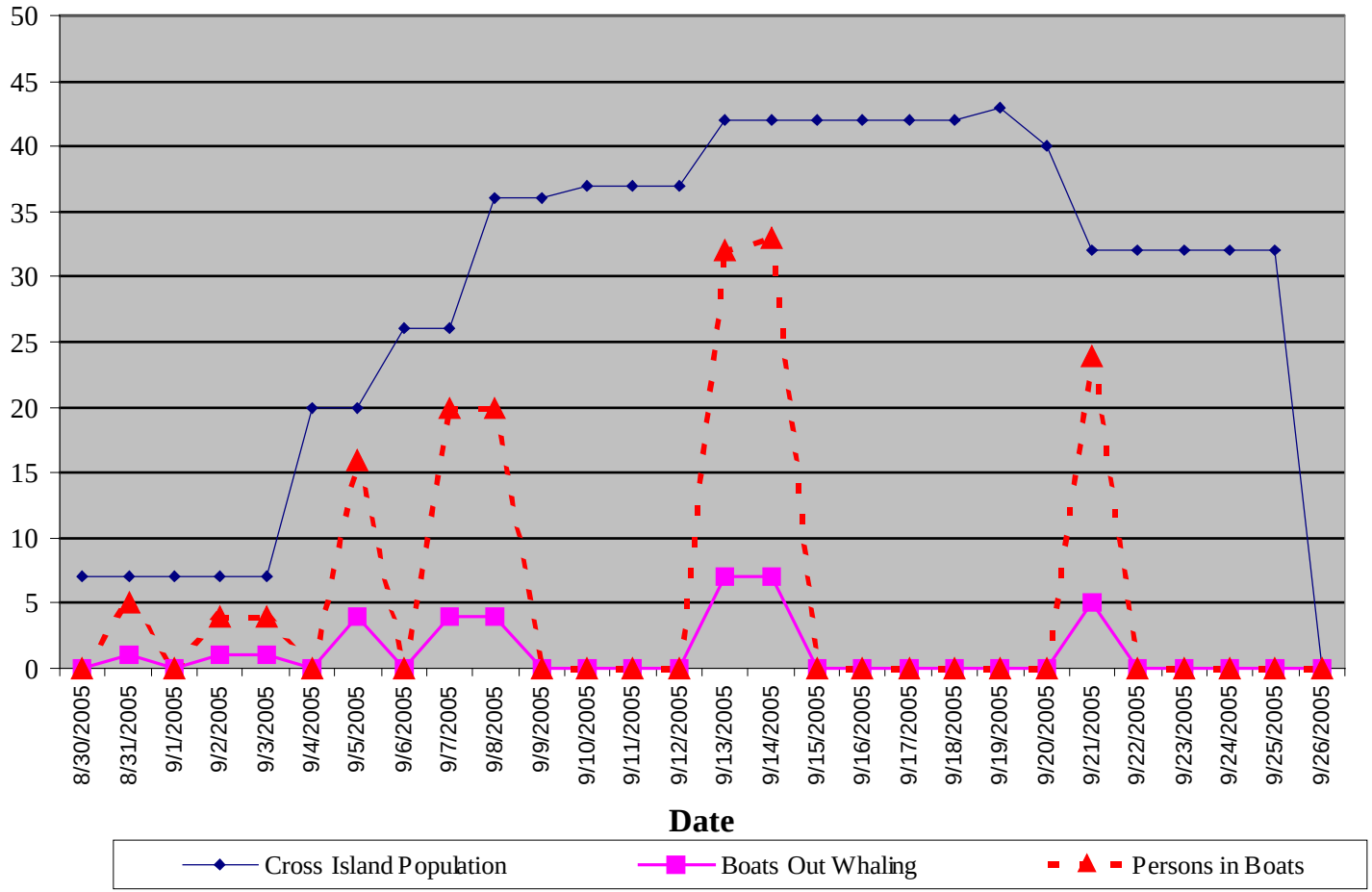
[4]Actually made two trips lasting 1:14 and 5:39

[5]UA1 went to West Dock with 4, but left with 3 as 1 flew from Deadhorse to Anchorage

GPS tracks were collected for all boats and all days of scouting activity. On some days, some boats made multiple scouting trips.

Figure 3: Cross Island Population and Scouting Activity, 2005

Number of People and Boats, by Day



exception. The smallest crew had six crew members on Cross island, two had seven, one had nine (eight for most of the season), and one had fifteen (but actually peaked at fourteen bodies on Cross Island for a period of eight days, with fewer crew members on Cross Island for the other sixteen days of the season)

Crews also differed in the number of people who actually manned the boat while whaling (termed here "boat-crew"). There may also have been a tendency for female crew members to go out scouting in the boat less often than male crew members. A whaling boat normally requires a minimum of three crew members – a driver, a harpooner, and a person in charge of the float – although boats will sometimes go out with only two crew members. A fourth crew member is sometimes assigned to the shoulder gun. Depending on conditions and intuition, a whaling captain may desire to take as few crew members as possible (to have a light, fast boat) or as many extra as possible (to have as many eyes watching for whales as possible).

The average Boat-crew in 2005 for all crews and all boats was 4.4 people. As discussed above, all crews were more-or-less single boat crews, but three crews used only one boat for whaling. One such single-boat crew made seven scouting trips, on six different days, in 2005. They had a boat-crew of six on three days, a boat-crew of seven on two days, and a boat-crew of 8 on two days (average of 6.9). Another single-boat crew also made seven scouting trips on six different days, all with a boat-crew of five. A third single-boat crew made six scouting trips on three different days, with a boat-crew of four except on one trip (average of 3.8). Two crews used more than one whaling boat, although as discussed above both used a single boat much more often than their other boats. For one of these crews, the primary boat made twelve scouting trips on nine different days, with a boat-crew of 4 on nine days and a boat-crew of five on three days (average of 4.3). Two other boats made six scouting trips on two different days with an average boat-crew of 3.2 (one trip with four, five trips with three). The overall boat-crew average for this crew was 3.9. The other crew's primary boat made eight scouting trips on six different days, with a boat-crew ranging from two to five (average of 3.8). A second boat made two scouting trips for this crew on two different days with an average boat-crew of 2.5. The overall boat-crew average for this crew was 3.8.

Thus, for four of the five crews, the average boat-crew was a little less than four people. The exception was the crew that used the boat that could carry the most people, and whose captain as a rule preferred to take his entire crew (or as many who wanted to go as he could fit) out scouting. The more typical boat used by Nuiqsut whalers is best suited for a boat-crew of three or four. A larger boat-crew would either slow the boat considerable, reduce safety while whaling, or both.

Whaling Days

During the 2005 whaling season there were nine different days when Nuiqsut whalers went scouting for whales. On three of these days, only one boat went out. On three other days, four boats went out. On one day, five boats went out, and on two days seven boats went out. This totals to thirty-four "boat-days". However, on several days, individual boats made two (seven cases) or three (three cases) separate trips, stopping back at Cross island for varying lengths of

time to refuel or for some other reason. Thus, although there were 34 "boat-days," there were 47 separate scouting trips (plus one aborted scouting trip).

The whaling seasons for the five crews ranged in length from 18 to 27 days, counting travel days. The seasons for the individual crews were 27, 22, 22, 21, and 18 days. The whalers encountered a great deal of ice in 2005, which was a dramatic change from the previous four years. The weather was also very unfavorable in 2005, and was dominated by strong east winds of 15 to 45 miles per hour. Wind speed as recorded at Cross Island exceeded 15 miles per hour consistently on 9–12 Sept., 15–20 Sept., 21–23 Sept., and part of 24 Sept. These periods of strong winds were generally consistent with those evident from wind measurements at Northstar (Richardson 2006).

At least one boat went out scouting for whales on 8 different days (and also went out one day without whaling equipment to hunt seals). The researcher was on Cross Island for only 5 of these days, but was able to collect GPS tracks and whaler accounts for all scouting days. The first crew scouted for whales on 8 days (and hunted for seals on another), but on 2 of those scouting days were by themselves. Two crews scouted for whales on 6 days, one crew on 5 days, and the last crew on 3 days. Each crew devoted 2 days or (in one case) 3 days to travel to and from Cross Island. Various boats were disabled at times due to mechanical problems of various sorts, but weather was a much more significant factor in limiting scouting effort. Weather prevented any scouting activity on at least 16 days, and ice and weather limited scouting activities to some extent even on those days when boats did go out scouting.

Figure 4 displays all the boat tracks for the 2005 whaling season, color-coded by day to aid in the following discussion. Crews spotted whales on most (but not all) scouting days, although—with one exception—not in the numbers seen in previous years. The one exceptional day was the one day in 2005 when a whale was taken by the Cross Island whalers (14 Sept.). Also, the call detection rate offshore of Northstar was relatively high that day, as compared with most other days during the 2005 monitoring season (Richardson 2006). The generally lower numbers of whales seen in 2005 as compared with other recent years were attributed for the most part to the heavy ice cover encountered on most days. The ice cover (and fog) also limited the areas that could be searched for whales (see discussion of offshore distribution of whales, below). Only one whale was taken, a 40'9" (12.4 m) male taken by the Napageak crew, about 27 miles (43 km) east of Cross Island.

The whalers encountered barges on at least three days when they were scouting for whales, and noted barge sightings on at least several other days. None of these barges were engaged in Northstar-related activities. Whalers reported that, on at least two of those days, barges significantly affected whale behavior and the conduct of the hunt. More detailed information on these barge sightings / interactions is provided below (see discussion of observed vessel activity, below). Whaler observations and reports of whale feeding behavior and "skittish" behavior are also briefly discussed below, in separate sections.

The quantitative measures for the 2005 season are displayed for comparative purposes with those from all prior documented seasons in Table 6 (above), but will not be discussed in any detail in this report. Perhaps the most important characteristic of the 2005 season was that ice conditions

Figure 4: Cross Island GPS Tracks, 2005 Season, by Day

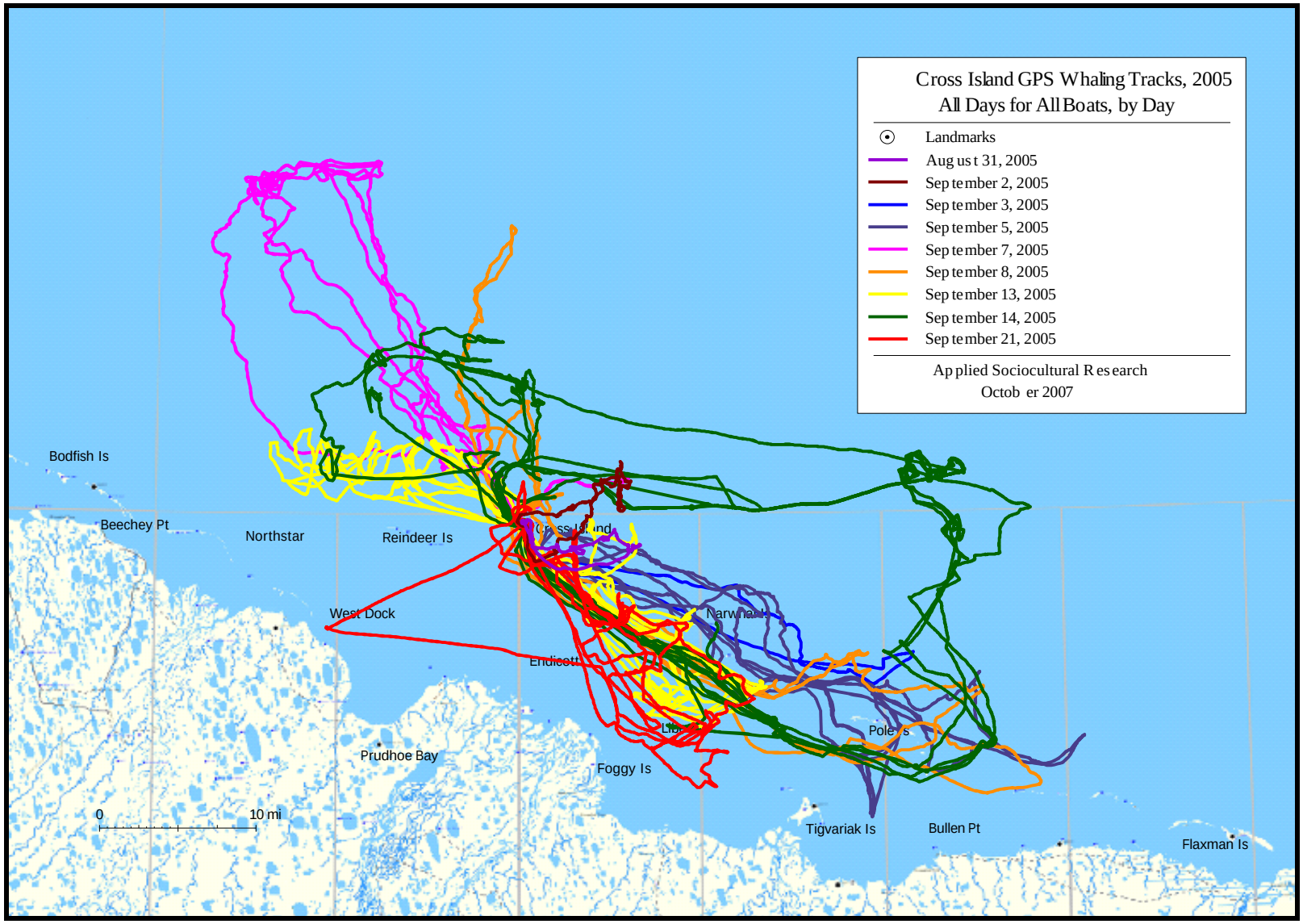


Table 6: Quantitative Measures of Cross Island Whaling Effort 2001-2005

Metric		Season				
Measure	Type	2001	2002	2003	2004[5]	2005
Quota	count	4	4	4	4	4
Whales Taken	count	3	4	4	3	1
Whales S&L	count	0	1	0	0	0
Active Crews	count	4	3	4	4	5
Scouting Boats	count	7	9	10	8	8
Cross Island Population	average	27.7	26.6	20.4	18.9	29.8
	range	19-35	9-37	9-33	5 to 33	7 to 43
Support Boats	count	1	0	1	1	2
Length of Season[1]	count	24	23	19	30	27
Weather Days	count	8-9	4	8	10	11-15
# days scouting[2]	count	12[6]	15[6]	7	12[7]	9[7]
# days whales seen[3]	count	9	9	7	6	7
# boat days[4]	count	57	65	33	41	34
Boats scouting/day	average	4.8	4.3	4.7	3.4	4.1
	median	5	5	5	2.5	4
	range	1 to 7	1 to 7	2 to 8	1 to 7	1 to 7
Boat crew size	average	3.9	3.6	3.1	3.6	4.5
	median	4	3	3	3	4
	range	3 to 6	2 to 6	2 to 6	2 to 7	2 to 8
Length of trip (miles)	average	85.6	65.1	36.4	47.8	61.9
	median	91	66.3	34.7	40.3	56.3
	range	9.7 to 136	21.1 to 115.1	6 to 66	7.8 to 104	6.3 to 144
Duration of trip (hours:minutes)	average	9:55	8:04	4:28	7:24	7:15
	median	10:08	9:03	4:15	6.1	6:48
	range	1:00 to 17:05	1:52 to 13:50	0:36 to 9:06	2.4 to 17	0:35 to 19:16
Furthest point from Cross Island (miles)	average	23.9	19.8	11.5	12.5	19.5
	median	23.7	19.8	12.2	12.2	18.4
	range	2 to 44	7.9 to 30.1	1.8 to 22.6	2 to 24.7	1.6 to 38.5
Strike distance from Cross Island (miles)	average	19.5	13.4	9.3	9.7	25.9
	median	18.6	15.1	9.9	9.4	25.9
	range	17.9 to 21.9	7.0 to 18.1	5.2 to 12.2	8.1 to 11.6	25.9
Strike Direction from Cross Island -degrees	average	64°	67°	56°	36°	82°
Total Effort (Hours)	sum	575.3	532.5	156.4	299.4	340.5

[1]Number of days with at least one crew on Cross Island, includes day of arrival at and departure from Cross Island.
[2]Number of days when at least one boat went out scouting for whales
[3]Number of days when at least one crew saw whales while scouting from a boat. Blows were seen from Cross Island on a few non-scouting days, but are not included in these totals.
[4]Each boat scouting for whales on any given day counts as one "boat day" – regardless of the duration of the trip or if whales are seen or not. Thus if 2 boats scout on one day and 4 boats scout on the next, the total for the two days would be 6 boat days. A single boat can take multiple trips on a single day, but it would still be only one "boat-day".
[5]One crew went to Cross Island well before other crews, so total season measures may be misleading. See 2004 Annual Report.
[6]On one of these days, only one crew with one boat went scouting.
[7]On two of these days, only one crew with one boat went scouting. On another day, this same boat went out sealing (no whale gear).

Source: Derived from GPS track information and field observations

confined the whalers within the barrier islands for almost the entire season (Figure 4). They saw few whales within the barrier islands, and those they did see tended to be difficult to approach in the ice or else were hard to follow due to fog and other conditions. On the one day they could reach open water (which required somewhat greater effort than in some past years, but was probably about the median in terms of the six seasons documented for this project), they found whales and were successful in landing one whale. However, they also encountered a barge during this hunt, and believe that this barge spooked the first whale they were chasing that day. It was not until the barge left the area that they saw, chased, and landed a different whale. Some aspects of the difference between the 2005 season and previous seasons are briefly discussed in the sections below, but most such analysis will be deferred until the final synthetic report for the project. The number of days when boats went out scouting for whales, and days on which they saw whales, were somewhat below the average for all five seasons. Length of trip (both time and distance) were the median values for the five seasons and fairly close to the average value for the five seasons as well. The "average" distance of whales strikes from Cross Island (for the one whale landed) was the farthest of all five seasons, indicating the degree to which natural conditions limited the whalers' chances for success and the potential for anthropogenic factors to further decrease those chances. The furthest point reached from Cross island during scouting trips was towards the long end of the documented range for the project, but was the median value for the five seasons. Total effort expended on the water was again in the median of the range documented for the five seasons and is fairly close to the average value.

The "total effort" measure still requires some additional refinement and analysis, since it confounds a number of, in principle, "effort components" that can be differentiated from each other. Such components would include:

- transit time (at high speed en route to a search area or on the way back to Cross Island)
- scouting time (when actually looking for whales)
- following and chasing time (after finding a whale)
- towing time (after killing a whale)
- other miscellaneous activities (assistance to other boats, mechanical breakdown, rest breaks, and so on).

A detailed breakout of such separate activities is not easily done at present, although it is possible through close analysis of the GPS track information. Rough breakouts could perhaps be compiled with a reasonable level of effort, but more exact accounting (leading to perhaps person-hour levels of effort estimates) would require more effort. This topic will be addressed in the final synthetic report.

Some generalizations, based on all five documented seasons, about the factors influencing decisions to go whaling are possible, although no systematic model can yet be developed. If the weather is suitable for successful scouting of whales (slight or no wind, slight or no chop, good visibility), all boats physically able to whale will go out. Some captains will go out in more marginal weather than others, and such decisions are quite situational in nature. A crew that has not been out recently seems more likely to go out in marginal weather than those crews that have

been out more recently. Crews that have not harvested whales seem more likely to go out whaling than those crews that have landed whales. A captain may call a "rest day" for a crew that has been working hard, especially if conditions are marginal. Trips on days with marginal weather conditions tend to be shorter than on days with better weather. After the harvest of a whale the butchering must reach a well-defined point before whaling can resume. For Nuiqsut whalers this is generally the next day for crews other than that which took the whale, and is often the next day for that crew as well. Crews go whaling in suitable weather and any deviation from that pattern has a specific explanation.

The weather factors that seem to be most directly related to when Nuiqsut whalers scout for whales are barometric pressure and wind speed (and to some extent direction). Barometric pressure changes relatively slowly, and whalers often scout when it is in transition, but good scouting conditions tend to correspond with high barometric pressure or times of transition. Figure 5 displays the barometric pressure at Cross Island for the 2005 whaling season, and the discussion below will relate barometric pressure to scouting activity. Nuiqsut whalers do not observe barometric pressure directly – or, at least did not do so until the start of this research and the appearance of a weather station on Cross Island. If the barometric pressure trend is available, whalers will take it into account when deciding whether to scout for whales or not. Since it is at best a rough predictive tool, however, and whalers know from experience that a (relatively brief – up to several hours) period of good scouting conditions can occur when the wind shifts directions, whalers will sometimes go out scouting even when the barometric pressure is falling. Nuiqsut whalers thus rely much more on their direct observations of the wind and their experience as to what the future wind conditions will likely be. Whalers prefer days with no wind, and winds up to 5 mph, or even 10 mph, are acceptable. Scouting can occur even with higher winds, given other circumstances. Wind speed for the 2005 Cross Island whaling season are displayed in Figure 6, with wind direction displayed in Figure 7. The following discussion will show that scouting activities correspond with periods of lower wind speeds. It should be noted that conditions on Cross Island are not necessarily the same as experienced when scouting for whales, but the general trends are often the same (complete weather file in electronic appendix). It should be noted for 2005, both ice conditions and weather influenced scouting activity. Ice prevented the whalers from reaching open water on most days when they could go out scouting, and weather prevented them from even trying to scout on more days in 2005 than any of the previous study years.

During the period of time for which weather measurements are available, scouting occurred on 8/31, 9/02-03, 9/05, 9/07-08, 9/13-14, and 9/21. The weather measurements did not start until 9/06, but whaler reports were that ice conditions prevented any travel outside of the barrier islands, and that on days with no scouting activity the wind speed was high. All scouting days after 9/06 occurred when the barometric pressure was rising or at a peak (Figure 5) and wind speed was low (Figure 6). Note that the peak of barometric pressure on 9/10-11 corresponded with a period of very high wind (20 to 35 mph) and that no scouting occurred on those days. In Predominant wind for the season was an East wind, but it should be noted that of the three scouting periods that took place while the weather station was operating, two were during a period of shifting winds (9/07-08 and 9/13-14). The east wind moderated in speed, but

Figure 5: Barometric Pressure at Cross Island, 9/06/05-9/25/05

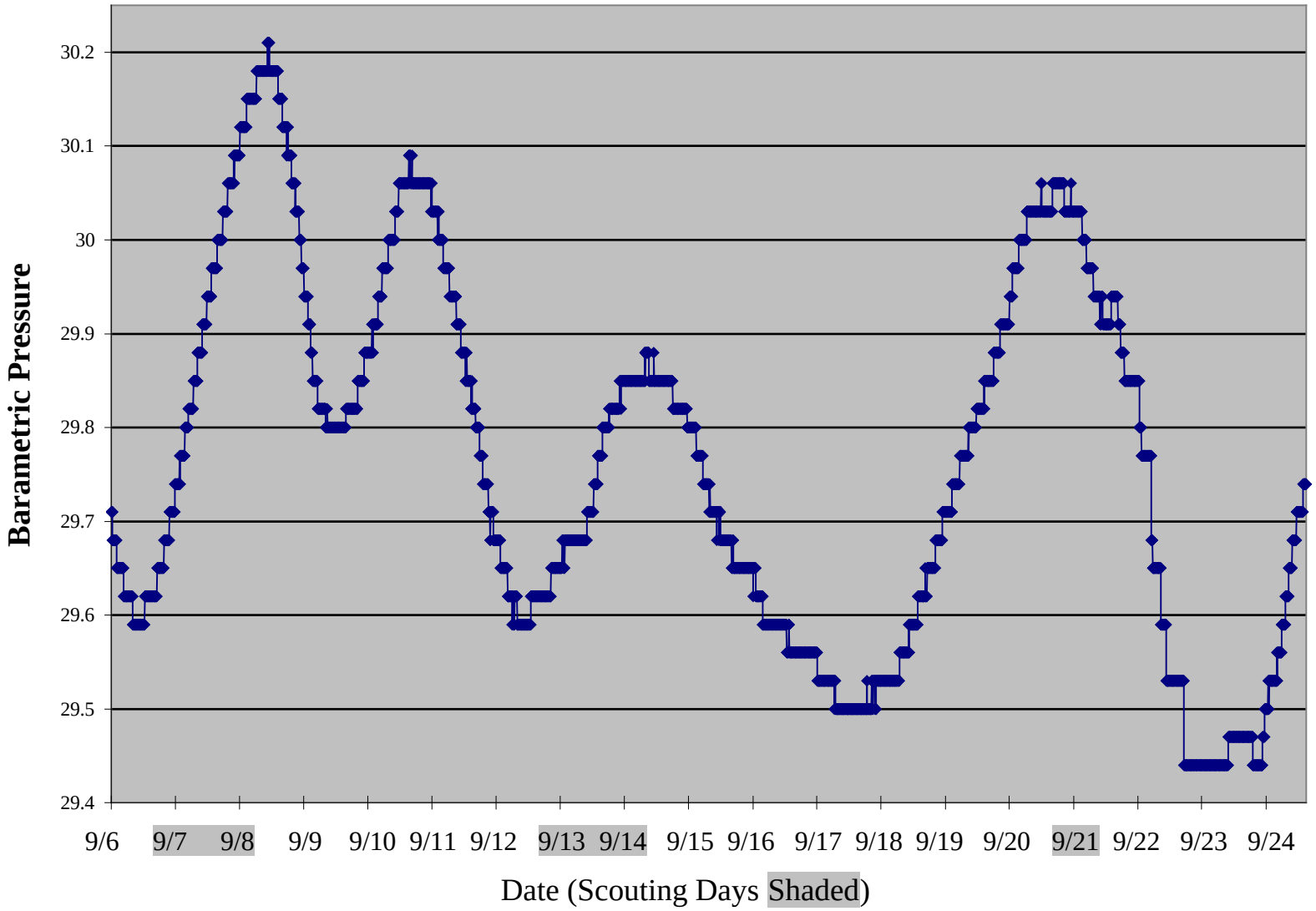


Figure 6: Wind Speed at Cross Island, 9/06/05-9/25/05

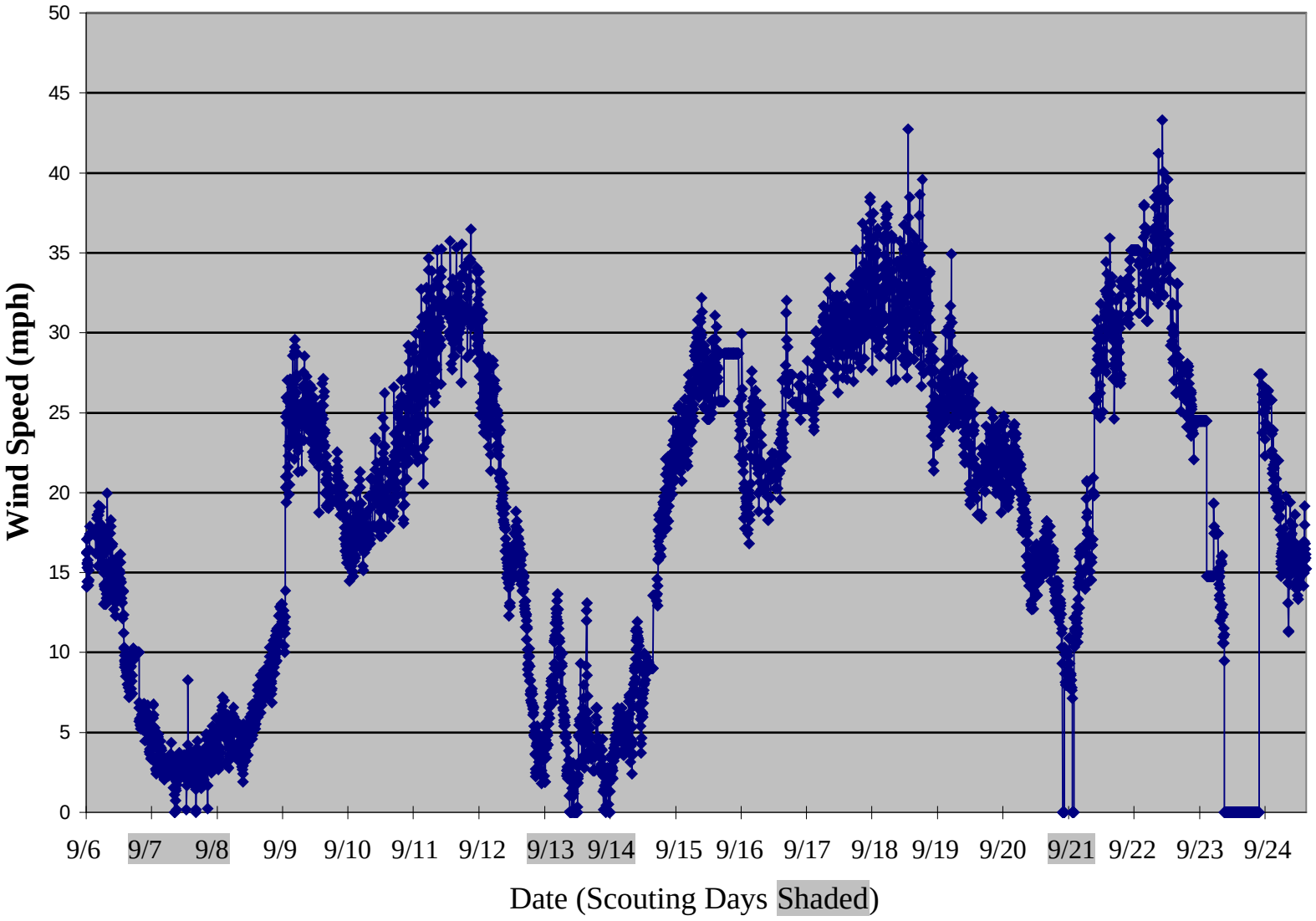
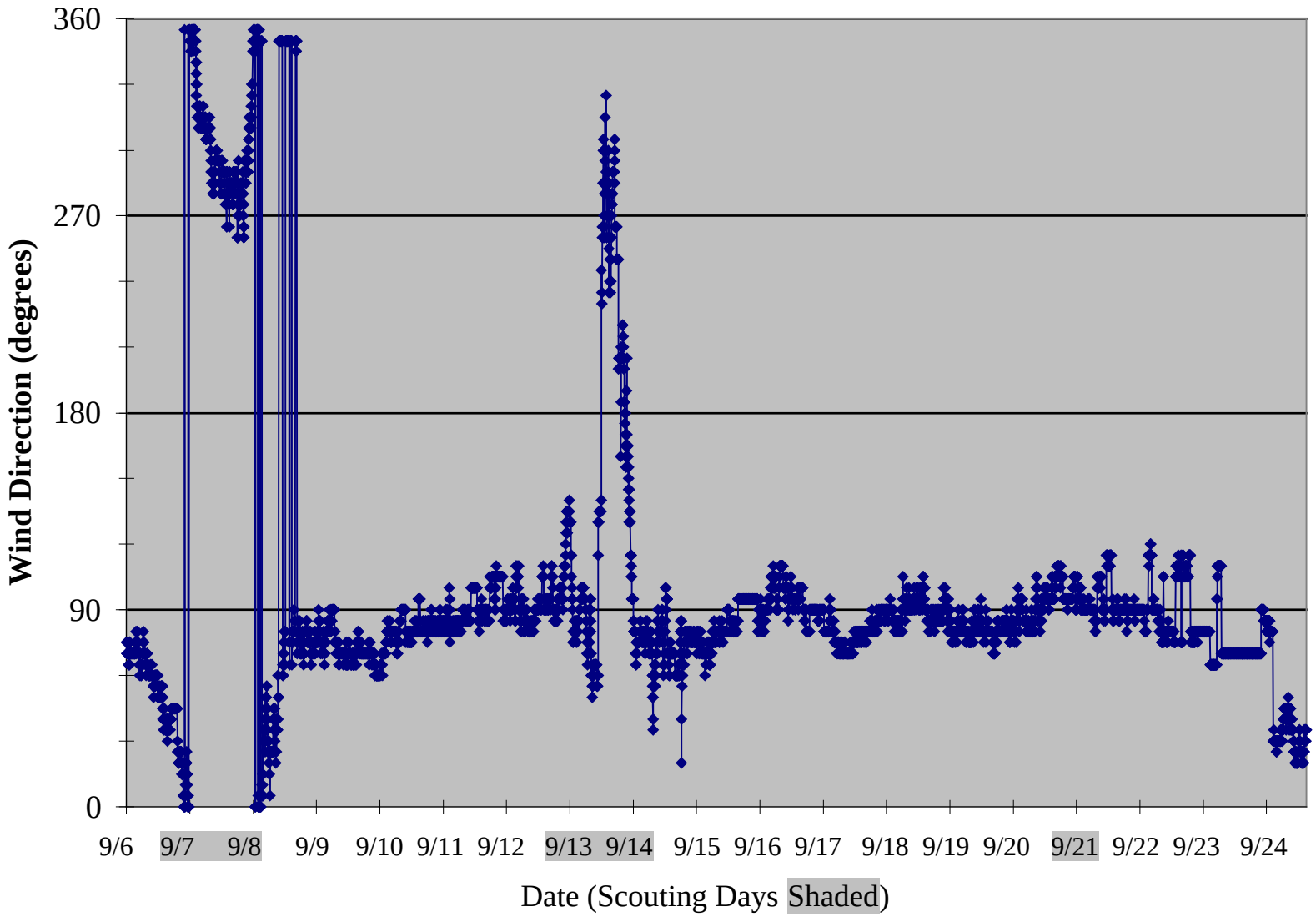


Figure 7: Wind Direction at Cross Island, 9/06/05-9/25/05

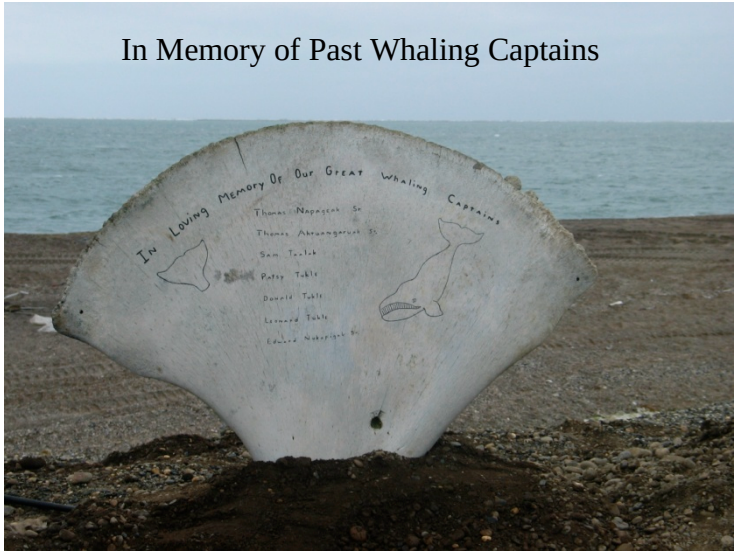


First Cuts to Define Strips

Peeling *Muktuk*

Butchering, 2005
Whalers' Memorial, Erected 2005

In Memory of Past Whaling Captains



maintained its direction, on 9/21. Scouting did not take place during the 2005 season if the wind speed was above 10-15 mph. In summary, non-scouting days were associated with the lowest barometric pressures recorded (Figure 5) and the highest wind speeds (Figure 6). The reverse was true for scouting days. Low wind speed may have been associated with a shift in wind direction.

"Non-Whaling" Boat Activity

In addition to searching for whales, several Nuiqsut whaling vessels made trips between Cross Island and West Dock. Most commonly, trips are made for logistical reasons – to pick up supplies, needed parts, or to drop off and pick up crew members. Generally, after the harvest of a whale a certain portion of it is sent to Nuiqsut to "feed the village." In most cases the successful captain will designate one or more of his crew members to take one of his boats to Nuiqsut for this purpose. If conditions for boat travel are poor, the "fresh kill" may be taken to West Dock and flown to Nuiqsut – but will still usually be accompanied by the captain's flag and a crew member to run the flag to the captain's house.

This information collection effort focuses explicitly on Cross Island whaling activity. No attempt was made to systematically collect information on preparation, support, or other crew member activities that occurred elsewhere (primarily in Nuiqsut). Whaling support activities from non-Nuiqsut sources (mainly oil and gas industry support through Alaska Clean Seas barges) were quite evident, but mainly in terms of island infrastructure. At least one non-ACS also stopped at Cross Island to lend logistical assistance to the whalers. Due to high sea conditions that prevented boat activity and emergency situations on Cross Island, there were also several helicopter trips between West Dock and Cross Island to support the whalers. Helicopters were used only to bring in critically needed supplies or to provide transportation off the island in such emergency situations, and not on a routine basis or to provide direct assistance for the hunt itself. Such assistance is a component of the Conflict Avoidance Agreement between industry and the whalers. ACS did of course use their barges to mobilize the Cross Island infrastructure before the first crew arrived, and demobilized this equipment on the day that the whalers left. Whalers made fairly frequent trips from Cross Island to West Dock, but these have not been counted or compared to previous years. Documentation of contacts and interactions through telephone, FAX, or non-whaling non-Nuiqsut vessel were not fully documented.

GPS Information

All whaling crews agreed to carry and use GPS units. All track information is presented in the electronic appendices, with two examples from the 2005 season in the body of the report – Figures 2 (single day) and Figure 4 (composite of all tracks, by day). Figure 7 presents all GPS projects for each project season, by year, for comparative purposes. A list of waypoints noted by the whalers is presented in Table 7. The level of information obtained varied from boat to boat, but for all boats and for all crews at least partial tracking information was obtained, along with

the unlabeled points where whales were observed (or struck). In Table 5, as discussed above, the days that boats went out whaling are shaded. Light shading indicates that a GPS track was obtained form that boat for that day. There were 34 different "boat days" (48 scouting trips) for which GPS tracks were possible. GPS tracks were collected for all 48 scouting trips (including one aborted scouting trip). All GPS tracks collected have been transmitted to MMS in Garmin MapSource (*.gdb) and shapefile formats.
Not all waypoints listed in Table 7 were actually marked by crews while they were out on the water. Some were described by crews during their reviews of GPS tracks. Waypoints that were marked by crews during their trips have labels with capital letters. Thus, not all whale sightings were marked, and not all unmarked whale sightings were later described to the researcher. The daily boat report forms may include some additional likely whale sightings that are not included in Table 7, but these additional points are based on whalers' general accounts, and no specific locational information. It is likely that not all whale sightings are included on the daily report forms, although most individual whales sighted are probably represented. Multiple sightings of the same whale were usually reported as such by most crews, but most crews only marked a single position for a whale unless they followed it for a significant period of time and/or struck it. Different crews may mark the position of the same whale, so the number of different whales observed may require an analysis of all points and tracks in relation to each other.

Waypoints are of three types – whale sightings/strikes, reference points (generally whales seen on previous days or by other boats), and "unknown significance". Whale sightings may have actually been marked by a crew, or may have been located on their track when reviewing it with the researcher at some point. Strike locations are relatively fixed, but sightings may be for a whale or blow located anywhere from 10 feet to several miles from the boat, and thus are less fixed in terms of position. Each waypoint number consists of three parts: BoatID (upper case for points marked while out on the water, lower case for points located while discussing the GPS track with the researcher), Date(mmddyy), and Sequence Number.

Other Subsistence Activities

Little non-whaling subsistence activity was documented on or near Cross Island during the whaling season, but perhaps more than in previous seasons. Of course, a great deal of "non-whaling" subsistence activity took place throughout the year in order to support the whaling effort. Whalers did note that they had seen many seals and some birds, but did not mark these points and generally described such sightings as taking place where ice was encountered (which of course was quite often). Polar bears were a concern, two nuisance bears were shot and processed (on different days). One bearded seal was taken by a crew during its return to Cross Island after an unsuccessful scouting trip. No other seal harvest was reported. A few birds may have been taken, but no fishing took place while the whalers were on Cross Island.

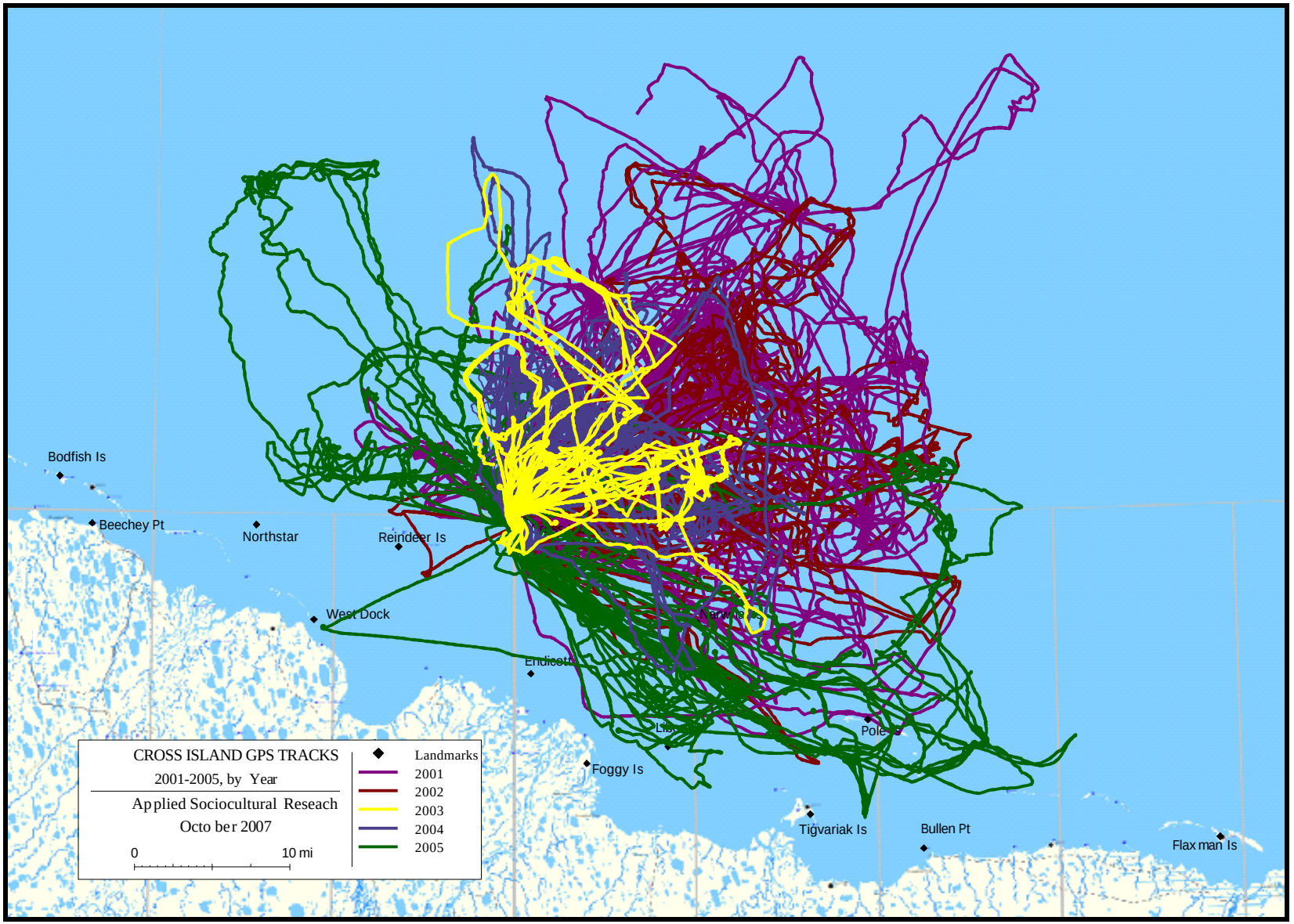


Figure 8: All Cross Island Whaling Tracks, 2001-2005, by Year

Table 7: Waypoints of 2005					
Date	Crew	Way Point #	Lat/Long	Time	Notes
08/31/05	Napageak	nap1_083105a	N70.46384 W147.82976	20:32	General location of seals in ice and along ice edge
08/31/05	Napageak	nap1_083105b	N70.47523 W147.75788	21:16	General location of seals in ice and along ice edge
08/31/05	Napageak	nap1_083105c	N70.46886 W147.69435	21:39	General location of seals in ice and along ice edge
08/31/05	Napageak	nap1_083105d	N70.46721 W147.67810	21:56	General location of seals in ice and along ice edge, also an *oogruk*
09/02/05	Napageak	nap1_090205a	N70.48859 W147.81833	13:57	General location of seals in ice and along ice edge
09/02/05	Napageak	nap1_090205b	N70.50950 W147.79806	14:27	General location of seals in ice and along ice edge
09/02/05	Napageak	nap1_090205c	N70.54179 W147.71159	15:40	General location of seals in ice and along ice edge
09/02/05	Napageak	nap1_090205d	N70.52874 W147.70041	16:27	General location of seals in ice and along ice edge
09/02/05	Napageak	nap1_090205e	N70.52843 W147.68571	16:36	General location of seals in ice and along ice edge
09/02/05	Napageak	nap1_090205f	N70.52362 W147.69799	16:46	Polar bear and cub on the ice
09/02/05	Napageak	nap1_090205g	N70.50770 W147.72229	17:09	General location of seals in ice and along ice edge
09/02/05	Napageak	nap1_090205h	N70.50376 W147.71670	17:20	General location of seals in ice and along ice edge
09/02/05	Napageak	nap1_090205i	N70.50933 W147.81169	19:01	General location of seals in ice and along ice edge
09/02/05	Napageak	nap1_090205j	N70.50514 W147.84751	19:12	General location of seals in ice and along ice edge
09/02/05	Napageak	nap1_090205k	N70.49812 W147.88313	19:21	General location of seals in ice and along ice edge
09/03/05	Napageak	nap1_090305a	N70.39296 W147.26315	12:54	Whale seen FROM this position
09/03/05	**Napageak**	**nap1_090305b**	**N70.39331 W147.24264**	**13:02**	**Coordinates given by NAP1 for whale sighting**
09/03/05	Napageak	nap1_090305c	N70.39224 W147.23433	13:00	Estimated position of whale seen by nap1_90305a, just inside ice pack - exact time UNK
09/03/05	Napageak	nap1_090305d	N70.35500 W147.19148	13:26	NAP1 report to Com Center of open water, waiting for whale to come up, calm
09/03/05	Napageak	nap1_090305e	N70.36712 W146.91236	15:24	Turnaround point of trip, stopped and rested
09/05/05	Napageak	NAP1_090505a	N70.34011 W146.98553	10:58	NAP1 marked point - unknown reason
09/05/05	Napageak	nap1_090505b	N70.34768 W146.73041	11:51	Tried to reach open water to the N, but ice too thick – est. 1 miles away
09/05/05	Napageak	nap1_090505c	N70.28658 W146.44629	12:53	Tried to reach open water to the N, but ice too thick – est. not far
09/05/05	**Nukapigak**	**nuk1_090505a**	**N70.26660 W147.08558**	**13:39**	**Saw whale -- first blow. Also seen by IAN and NUK2**
09/05/05	Nukapigak	nuk1_090505b	N70.23603 W147.03740	13:50	Second blow of same whale

Table 7 (Continued): 2005 Waypoints					
Date	Crew	Way Point #	Lat/Long	Time	Notes
09/07/05	Aqargiun	IAN_090705a	N70.78849 W148.76607	13:12	Unknown marked point
09/07/05	Aqargiun	IAN_090705b	N70.79167 W148.70013	12:42	Coordinates given for NUK2 – waiting for whale to surface (IAN never saw this whale)
09/07/05	**Aqargiun**	**ian_090705c**	**N70.80663 W148.70212**	**14:25**	**2nd whale by ice chunk, with *oogruk* (followed whale for 2 or 3 blows)**
09/07/05	Aqargiun	ian_090705d	N70.80626 W148.68516	15:01	Spots the whale. NUK2 says it dives and looking for it. Both boats close together
09/07/05	Aqargiun	ian_090705e	N70.81412 W148.62570	16:47	Two larger whales seen by NUK2 and IAN
09/07/05	Napageak	NAP1_090705a	N70.73775 W148.67133	11:54	Whale (reported as "not actually all that small"). Also reported by nuk2
09/07/05	Napageak	nap1_090705b	N70.80937 W148.74050	14:03	Coordinates from IAN
09/07/05	**Napageak**	**nap1_090705c**	**N70.82018 W148.61441**	**16:43**	**Spotted a small whale**
09/07/05	Napageak	NAP1_090705d	N70.81797 W148.52785	16:56	Probable whale sighting (one being followed)
09/07/05	**Napageak**	**nap1_090705e**	**N70.81711 W148.42588**	**17:41**	**Sees a whale right here too**
09/07/05	Nukapigak	nuk2_090705a	N70.63061 W148.37106	10:52	NUK2 reported to IAN that they had seen two whalebirds
09/07/05	**Nukapigak**	**nuk2_090705b**	**N70.73598 W148.66947**	**11:29**	**NUK2 reports spotting a whale (to IAN & NAP1)[NOTE - not on track]-22.5 miles NW of CI**
09/07/05	Nukapigak	NUK2_090705c	N70.76588 W148.67831	12:24	NUK2 radios coordinates to IAN
09/07/05	Nukapigak	NUK2_090705d	N70.76680 W148.67872	12:25	NUK2 marked, less than .1 mile North of "a"
09/07/05	Nukapigak	nuk2_090705e	N70.76957 W148.67971	12:27	NUK2 reports spotting a whale (small) & it dives (.3 miles North of "a") Same whale as "b"
09/07/05	Nukapigak	NUK2_090705f	N70.79148 W148.70147	12:42	NUK2 gives coord for their position - waiting for whale
09/07/05	**Nukapigak**	**nuk2_090705g**	**N70.79958 W148.73212**	**13:52**	**Reports spotting a whale that then dives**
09/07/05	**Nukapigak**	**nuk2_090705h**	**N70.82047 W148.49043**	**17:34**	**Spots 2 whales side by side**
09/07/05	Nukapigak	nuk2_090705i	N70.55611 W148.20928	20:30	*Oogruk* taken (7 miles from CI they say)
09/07/05	Ahkiviana	UA1_090705a	N70.52652 W147.71707	17:02	UNK – did not see whales, much ice and fog – seals and an *oogruk*
09/08/05	Aqargiun	ian_090805a	N70.35520 W147.58280	13:49	Reports seeing a barge E of Endicott, heading east, estimated as 11 miles from Cross island
09/08/05	**Napageak**	**nap1_090805a**	**N70.78415 W148.18259**	**15:40**	**Whale sighting (est. position of whale, boat position not marked)**
09/08/05	**Ahkiviana**	**ua1_090805a**	**N70.36679 W147.03729**	**10:45**	**Heard blow at E point of track but were blocked by ice and turned around**

Table 7 (Continued): 2005 Waypoints

Date	Crew	Way Point #	Lat/Long	Time	Notes
09/13/05	Oyagak	BO1_091305a	N70.51150 W148.30865	10:19	whale dirty ice (est. position) - boat to the North
09/13/05	Oyagak	BO1_091305b	N70.56225 W148.55323	12:32	swells in ice
09/13/05	**Oyagak**	**BO1_091305c**	**N70.32003 W147.68196**	**19:13**	**Probable whale sighting (small)**
09/13/05	**Oyagak**	**bo1_091305d**	**N70.39658 W147.68099**	**20:42**	**whale 10 mile**
09/13/05	**Aqargiun**	**IAN_091305a**	**N70.33210 W147.54538**	**17:42**	**Coordinates given for small whale sighting**
09/13/05	Aqargiun	IAN_091305b	N70.32378 W147.56441	18:12	Second sighting of this whale, heading south
09/13/05	Napageak	nap2_091305a	N70.45619 W147.70037	11:17	described as a stop, but not evident on track
09/13/05	Napageak	nap2_091305b	N70.46342 W147.68310	11:25	described as a stop, but not evident on track
09/13/05	Napageak	nap2_091305c	N70.32732 W147.58299	18:31	Spots a whale, presumed to be the one IAN first saw
09/13/05	Napageak	nap2_091305d	N70.33851 W147.32956	20:26	Karluk Island
09/13/05	**Napageak**	**nap2_091305e**	**N70.38570 W147.62331**	**20:43**	**Saw the whale go down**
09/13/05	Napageak	nap3_091305a	N70.32090 W147.55753	19:20	Saw at least one blow (est. location of whale)
09/13/05	**Nukapigak**	**nuk2_091305a**	**N70.56962 W148.24386**	**13:12**	**saw a whale, 8.1 miles NW of CI (no track, mapped on NAP2)**
09/13/05	Ahkiviana	ua1_091305a	N70.60437 W148.37898		Not a sighting, ref. Point – NAP1 & whales (coordinates to UA)
09/13/05	Ahkiviana	ua1_091305b	N70.59692 W148.28721		Not a sighting, ref. Point - icy swells (coordinates from another boat)
09/13/05	**Ahkiviana**	**ua1_091305c**	**N70.56078 W148.25050**	**12:11**	**whale area (sighting)**
09/14/05	Oyagak	BO1_091405a	N70.46501 W147.96774	7:26	Points "a"-"c" are almost the same, with no known meaning (may be an accident)
09/14/05	Oyagak	BO1_091405b	N70.46480 W147.96755	7:26	Points "a"-"c" are almost the same, with no known meaning (may be an accident)
09/14/05	Oyagak	BO1_091405c	N70.46466 W147.96741	7:26	Points "a"-"c" are almost the same, with no known meaning (may be an accident)
09/14/05	**Oyagak**	**bo1_091405d**	**N70.62143 W148.15957**	**12:31**	**see and chase whale**
09/14/05	**Oyagak**	**bo1_091405e**	**N70.64980 W148.13907**	**13:59**	**Probable whale area**
09/14/05	**Oyagak**	**bo1_091405f**	**N70.62367 W148.01217**	**15:58**	**BO1 saw many blows and whales, but did not mark any. These are two general areas (above and below point) where they saw blows and/or whales**
09/14/05	Oyagak	bo1_091405g	N70.61879 W147.98959		
09/14/05	Oyagak	bo1_091405h	N70.52899 W147.78168	23:10	Whale seen during tow (boat location)
09/14/05	Aqargiun	ian_091405a	N70.44936 W146.73934	12:16	Est. position of IAN when they saw barge (2.5 miles away)
09/14/05	Aqargiun	ian_091405a'	N70.46576 W146.67004	12:16	Possible correction for position of ian_091405a
09/14/05	Aqargiun	ian_091405b	N70.42840 W146.65257	12:16	Est. position of barge when seen by IAN
09/14/05	Aqargiun	ian_091405b'	N70.44376 W146.58197	12:16	Possible correction for position of ian_091405b

Table 7 (Continued): 2005 Waypoints					
Date	Crew	Way Point #	Lat/Long	Time	Notes
09/14/05	**Aqargiun**	**ian_091405c**	**N70.50068 W146.58046**	**13:17**	**Lost a small whale they had been following**
09/14/05	**Aqargiun**	**ian_091405d**	**N70.46273 W146.37666**	**13:00**	**General area of blows seen to the east of whales actively being chased**
09/14/05	Aqargiun	ian_091405e	N70.53465 W146.84134	14:44	Location for NAP whale indicated by IAN during chase after strike
09/14/05	**Aqargiun**	**ian_091405f**	**N70.60188 W147.16905**	**19:25**	**Est. position of "Moby Dick" blow seen to the north during tow**
09/14/05	**Aqargiun**	**ian_091405g**	**N70.50249 W147.40087**	**20:45**	**Approx. boat position during tow when a whale seen**
09/14/05	**Aqargiun**	**ian_091405h**	**N70.50466 W147.68120**	**22:21**	**Approx. boat position during tow when a 2nd whale was seen**
09/14/05	Aqargiun	ian_091405i	N70.53511 W148.04686	24:52	Narrow passage in the ice pack allowing turn towards Cross Island
09/14/05	Napageak	NAP1_091405a	N70.30771 W147.29669	9:37	Turnaround point SE of CI
09/14/05	**Napageak**	**nap1_091405b**	**N70.58891 W148.37808**	**12:00**	**Area where NAP1 saw their first whales of the day, some chasing activity**
09/14/05	**Napageak**	**nap1_091405c**	**N70.61024 W148.40530**	**12:02**	**Est. location for blow seen and approached but not seen again - boat was to the South of the blow - saw up to 6 blows at same time from this area**
09/14/05	**Napageak**	**nap1_091405d**	**N70.60431 W148.40915**	**12:52**	**Another blow (but is location of boat - blow to the south)**
09/14/05	**Napageak**	**nap1_091405e**	**N70.61385 W148.30148**	**UNK**	**Large blow seen inside of ice pack – not approached as estimated at 60'**
09/14/05	**Napageak**	**nap1_091405f**	**N70.63750 W148.38936**	**14:15**	**Another blow, chased – est. at 25' whale BUT NAP3 struck in the E**
09/14/05	**Napageak**	**nap1_091405g**	**N70.62048 W147.98775**	**15:24**	**Many whales seen in this area on the way to assist NAP3**
09/14/05	**Napageak**	**nap1_091405h**	**N70.57619 W147.52921**	**16:00**	**Many whales also seen in this area and to the W. E of here only saw 1 more. NAP1 saw a barge from this point, est. 1 mile away (NE)**
09/14/05	Napageak	nap1_091405i	N70.58869 W147.55127	16:00	Est. position of barge from NAP1 at point "h"
09/14/05	Napageak	NAP1_091405j	N70.54012 W146.87445	14:23	Coordinates given to NAP1 for position of NAP3 when it asked for help (NAP1 35 miles to the west)
09/14/05	Napageak	nap1_091405k	N70.53383 W146.77206	16:47	Point where NAP met up with other boats and the dead whale
09/14/05	Napageak	nap2_091405a	N70.44319 W146.79804		Early chase event on landed whale, pre-strike
09/14/05	Napageak	nap2_091405b	N70.53487 W146.90716	13:45	NAP2 seems to have had a chance at the whale but missed
09/14/05	Napageak	NAP2_091405c	N70.54532 W146.87949	14:16	Position of NAP2 when NAP3 struck whale
09/14/05	**Napageak**	**nap2_091405d**	**N70.54758 W146.88306**	**14:15**	**Position of NAP3 when they struck the whale**
09/14/05	Napageak	nap2_091405e	N70.54464 W146.87686	14:21	Position of NAP boats soon after first strike
09/14/05	**Napageak**	**nap2_091405f**	**N70.53506 W146.76451**	**16:04**	**Location of NAP boats at "Hey Hey Hey" cheer (dead whale)**
09/14/05	Napageak	nap2_091405g	N70.53530 W146.76546	16:20	NAP2 announced they were preparing to tow (but coordinates given or recorded seem incorrect - not on any track)
09/14/05	Napageak	nap2_091405h	N70.53296 W146.78360	17:00	NAP2 announced start of tow (at speed)

Table 7 (Continued): 2005 Waypoints					
Date	Crew	Way Point #	Lat/Long	Time	Notes
09/14/05	**Napageak**	**nap3_091405a**	**N70.42388 W146.84188**	**11:44**	**First blow seen by NAP3**
09/14/05	Napageak	nap3_091405b	N70.48308 W146.78804	12:50	Blow, chasing the whale (probably a different whale) - also reported as ua1_091405a.
09/14/05	Napageak	nap3_091405c	N70.50670 W146.89510	13:16	Blow, chasing the whale (same whale as "b")
09/14/05	Napageak	nap3_091405d	N70.53347 W146.91184	13:58	Several blows seen, for whale being chased (and landed)
09/14/05	Napageak	nap3_091405e	N70.53075 W146.86110	14:42	a strike on the whale, or other chase event
09/14/05	Napageak	nap3_091405f	N70.52128 W146.85416	12:46	NAP3 estimated position of Tug when they saw it - NAP3 at approximately nap3_091405b
09/14/05	Nukapigak	nuk2_091405a	N70.30309 W147.85805	9:36	Looked like a blow, but was a drill rig on the land - Est location of rig, seen from about 9 miles away and approached to about 6 miles away
09/14/05	**Nukapigak**	**nuk2_091405b**	**N70.54813 W148.11095**	**11:20**	**Probable whale sighting**
09/14/05	**Nukapigak**	**nuk2_091405c**	**N70.55629 W148.52483**	**12:16**	**whale sighting**
09/14/05	**Nukapigak**	**nuk2_091405d**	**N70.56020 W148.48355**	**12:38**	**Probable whale sighting**
09/14/05	Nukapigak	nuk2_091405e	N70.56656 W148.53090	12:57	Possible whale sighting
09/14/05	**Nukapigak**	**nuk2_091405f**	**N70.62019 W148.50002**	**13:50**	**whale sighting - radio reports of whale sightings from 13:45-14:06 and en route to whale struck by NAP3**
09/14/05	**Nukapigak**	**nuk2_091405g**	**N70.61970 W147.99881**	**15:56**	**whale sighting (lots)**
09/14/05	Nukapigak	nuk2_091405h	N70.63190 W147.96711	16:20	Probable whale sighting (also reported by BO1_091405e)
09/14/05	**Nukapigak**	**nuk2_091405i**	**N70.60342 W147.94444**	**16:47**	**Probable whale sighting**
09/14/05	Nukapigak	nuk2_091405j	N70.53005 W147.93422	18:17	Possible whale sighting
09/14/05	**Ahkiviana**	**ua1_091405a**	**N70.48112 W146.77738**	**12:38**	**Chasing whale, likely chance for a strike here – lost track of whale. Nap3 also chased this whale and reported this point (nap3_091405b).**
09/14/05	Ahkiviana	ua1_091405b	N70.47029 W146.78074	12:49	Position of UA1 when first sighting of tug reported
09/14/05	Ahkiviana	ua1_091405c	N70.48964 W146.66446	12:50	Estimated position of tug thought to have influenced whale above
09/14/05	Ahkiviana	ua1_091405d	N70.48003 W146.77381	13:00	Position of UA1 at 1:00 PM (whale no longer seen)
09/14/05	Ahkiviana	ua1_091405e	N70.54450 W146.87686	14:26	Reported strike location (from another boat)
09/14/05	Ahkiviana	ua1_091405f	N70.53547 W146.76186	15:54	Reported kill location) from another boat)

Table 7 (Continued): 2005 Waypoints

Date	Crew	Way Point #	Lat/Long	Time	Notes
09/21/05	Aqargiun	IAN_092105a	N70.53512 W148.04687	UNK	Point from tow of 9/14-Narrow passage in the ice pack allowing turn towards Cross Island
09/21/05	Aqargiun	IAN_092105b	N70.41305 W147.83793	10:05	
09/21/05	Aqargiun	IAN_092105c	N70.36750 W147.81544	11:30	
09/21/05	Aqargiun	IAN_092105d	N70.27298 W147.47318	13:00	Coordinates from NUK2
09/21/05	Aqargiun	IAN_092105e	N70.34554 W147.75043	13:21	
09/21/05	Aqargiun	IAN_092105f	N70.31500 W147.66087	13:47	
09/21/05	Aqargiun	IAN_092105g	N70.31231 W147.65507	13:49	
09/21/05	Aqargiun	IAN_092105h	N70.30691 W147.65123	14:41	
09/21/05	Aqargiun	IAN_092105i	N70.35281 W147.72932	15:21	
09/21/05	**Nukapigak**	**nuk2_092105a**	**N70.26938 W147.47058**	**12:58**	**NUK2 report to Com Center of barge and whale**
09/21/05	Nukapigak	nuk2_092105b	N70.27628 W147.44594	13:03	NUK2 coordinates for barge (13:03 on GPS track)
09/21/05	Nukapigak	nuk2_092105c	N70.27719 W147.47753	13:17	NUK2 could still see barge, whale spooked and gone
09/21/05	Nukapigak	NUK2_092105d	N70.27742 W147.49414	13:21	NUK2 radioed coordinates - maybe last saw barge
09/21/05	Ahkiviana	UA1_092105a	N70.42189 W147.80424	10:35	

NOTES:

- Duplicate whale sightings may appear in this list, but each whale sighted is only **BOLDED** once.
- Strike and kill locations are in RED. These whales may or may not also have a **BOLDED** waypoint sighting.
- Some waypoints represent single whales, while others represent two or more whales.
- Few waypoints can be taken as precise locations, since they may represent distant sightings (such as blows in the distance) or near ones (such as a whale next to the boat or the ice edge).
- For the most part, waypoints marked by crews out on the water or coordinates radioed to the Communications Center or other boats are identified in CAPITAL letters (NUK2_092105d), while those located after-the-fact by examination of GPS tracks with the crew are labeled with lowercase letters (nuk2_092105c).

Nuiqsut Whalers' Observations and Perceptions of Whale Behavior in 2005

Ice conditions in 2005 affected whaling more than for any of the previous seasons. The whalers were confined to within the barrier islands, except for one day, and saw few whales except for that one day. They remarked that the whales were probably where they usually were, or perhaps pushed out a bit farther by the ice, but that they could not reach them because of the ice. When ice conditions moderated on 9/14, this proved to be the case.

Observed Whale Feeding Behavior in 2005

There were no reports of whale feeding behavior during the 2005 Cross Island whaling season. This does not necessarily mean that feeding did not occur, or that Nuiqsut whalers did not observe it. However, it is an indicator that whale feeding activity was not very obvious in 2005. Possible explanations, not mutually exclusive, are as follows:

- Whale feeding is not commonly observed by Nuiqsut whalers near Cross Island;
- Few whales were observed by whalers during the 2005 season;
- On most days when scouting was possible, ice conditions made it difficult to observe whales for more than the shortest periods of time;
- On most days when scouting was possible, swells and waves (due to wind) still made spotting and observing whales difficult;
- Barge and other vessel activity may have "spooked" the relatively few whales seen;
- A major part of the migration may have bypassed the area accessible to the whalers.

For the four years previous to 2005, only one observation of whale feeding was reported and recorded. This was a spectacular sighting of a whale feeding on the surface with its mouth open, about 7.8 miles (12.6 km) from Cross Island, bearing 34° true. The captain, a very experienced whaler, remarked that this was the first time he had seen this. This does not necessarily indicate that Nuiqsut whalers did not observe whale feeding behavior on other occasions in 2001–2005 when they were out scouting. However, it probably means that such observations were not common. If other sorts of feeding behavior had been observed during 2001–2005, they would probably have been reported.

Most feeding by bowhead whales is below the surface and difficult to recognize via surface observations; however, there have been some previous observations of bowheads feeding actively at the surface in the Canadian and Alaskan Beaufort Sea, with mouths open (Würsig et al. 1984, 1989; Richardson and Thomson [eds.] 2002). The first whale taken by a Nuiqsut crew, in 1973, was reported to have been feeding on the bottom near Flaxman Island. Some other whales landed at Cross Island have been found to have recently-consumed food in their stomachs (Lowry and Sheffield 2002; Lowry et al. 2005; Lowry et al. 2004).

"Skittish" Whale Behavior During 2005

Nuiqsut whalers saw relatively few whales in 2005, compared to previous years, and were difficult to follow. In some cases whalers indicated that whales were traveling fast, not staying on the surface very long, and changing direction in unpredictable ways when first sighted. In other cases they indicated that a whale that had been traveling at normal migration or traveling speed suddenly began to take evasive action – more than would be expected simply from the approach of the whalers' boats. The 9/14/05 and 9/21/05 accounts in Annex 3.1 are examples. Whalers interpreted such "spooked" behavior by whales as reactions to encounters with barges and other vessels in the area. This interpretation was based on the whalers' previous encounters with similar bowhead behavior in the presence of vessels. The whalers noted that the one day and area where they found a large number of whales behaving in a normal (unspooked) way was NW of Cross Island in an area with no other vessel traffic (at least none that they knew of) on 9/14/05. While chasing whales, whalers directly observed changes in the behavior of several whales that they believe were related to the presence and activities of other (non-whaling) vessels in the area. Whalers did not suggest any alternative explanations for the "spooked" behavior of so many of the whales that they saw SE and E of Cross Island.

Ice conditions prevented whalers from searching NW of Cross Island in 2005 except during part of one day. However, ice conditions were not mentioned as a possible reason for why some whales behaved in a more "spooked" way than in previous years. As discussed in the next section, ice and weather were the major factors that whalers suggested made whales more difficult to find in 2005. Ice and weather were not considered to be factors that would make whales behave in a more "skittish" manner. However, especially to the SE of Cross Island inside the ice pack, Nuiqsut whalers reported that—once whales were found—they were often difficult to follow and chase because of "skittish" or "spooky" behavior induced, they thought, by other (non-whaling, non-Northstar) vessel activity in the area.

In 2001, whalers also reported that whales seemed to be more skittish than normal, but in 2001 (unlike 2005) they suggested several possible explanations. Among these were industrial activities, but the list for 2001 also included natural causes of various sorts. None of these alternatives were suggested as alternative explanations in 2005. The two years were very different in terms of environmental conditions. In 2001 there was almost no ice and the whales found by whalers were quite distant from Cross Island. (Acoustic monitoring in 2001 also found that the whales were farther offshore in that year than in some subsequent years—specifically 2003 and 2004: Richardson et al. 2004; Richardson and Williams [eds.] 2005, Blackwell et al. MS.) Whalers went far to the NW and NE of Cross Island when scouting for whales in 2001. In 2005, whalers were for the most part effectively confined to the SE of Cross Island by ice.

General Offshore Distribution of Whales

Whalers remarked that 2005 was a year of very poor whaling conditions. Winds were consistently high (above 10-15 miles per hour) and ice conditions prevented whalers from reaching the areas where they had consistently found whales in the past (except for part of one day). Thus it was no surprise that whalers saw relatively fewer whales in 2005 than in previous years. The whalers did not suggest that there were actually fewer whales in the area. Rather,

they theorized that the wedge of pack ice that prevented them from going much north of Cross Island was encouraging most of the migrating whales to stay well north of Cross Island, in more open water (supporting the results reported Richardson 2006). This ice allowed the whalers to travel most easily to the SE of Cross Island, and this is the direction that most of their scouting trips took (Figure 4). This was a pattern very different from other recent years, when most trips were either NW or NE of Cross Island, with a few more easterly and only a very few with a southerly component (Figure 8).

In 2005, scouting trips to the SE of Cross Island did allow the whalers to find a few whales. However, the whalers' primary objective was stated to be to go SE far enough to reach the eastern end of this pack ice so that they could eventually turn north into more open water. They succeeded in doing so on 9/14/05 (Figure 2) and found whales essentially due east of Cross Island, in an area where the hunters had taken whales in previous years. That was the one location and date in 2005 when the Nuiqsut whalers were successful in taking a whale.
There were difficulties with this strategy, however. These whales were quite distant from Cross Island (27 miles or so) and the tow would prove to be quite long. The two choices for the tow were

- to try to retrace the hunters' path to the whales, which had been south and then northeast on the shore side of the ice pack, or
- to travel more directly west on the ocean (or relatively open-water) side of the ice pack, with the hope that they could then find their way south or southeast through the ice pack to Cross Island.

Before reaching the whales 27 miles to the east, the crews of three boats had turned back to Cross Island, as they thought that they had already traveled too far from Cross Island, in conditions that would not allow them to successfully harvest and recover a whale. After stopping back at Cross Island to refuel, they tried to go NW to see if they could penetrate the ice pack that way into more open water (Figure 2). They succeeded in doing so and found a great number of whales within 10–15 miles NW of Cross Island, in an area where Nuiqsut whalers often find whales. This confirmed their idea that the whales were on the north side of the ice pack. Because the other four boats were already chasing a whale SE of Cross Island, and might need assistance with the tow if they were successful, the boats to the NW of Cross Island were told not to strike any whales. The NW boats did continue to chase whales to be in position to strike in case a decision to take two whales in one day was made. The SE whale, when it was finally killed, proved to be moderately large, and the tow was anticipated to be rather long and difficult. Thus, the decision not to strike a second whale had been prudent. The NW boats returned to Cross Island and then went out to help with the tow of the SE whale. Their trip to the NW did have the benefit that it enabled the tow to proceed with a reasonable expectation that the hunters could find a way through the pack ice to Cross Island from a position north or a little northwest of Cross Island. Thus, the tow could take a relatively direct route back to Cross Island. Even so, the whale did not arrive at Cross Island until early on 9/15.

In general, Nuiqsut whalers report that significant ice cover allows whales to "hide" and thus makes them more difficult to spot. Significant ice cover also allows whales that are seen to escape more easily; it makes them more difficult to follow. Whales can dive under ice, whereas boats must travel around it. Thick ice cover, such as that encountered near Cross Island in 2005, may also direct most of the migration farther north into more open water, while at the same time

effectively preventing Nuiqsut whalers from reaching or accessing those areas. When Nuiqsut whalers were able to reach the more open water to the north of the ice pack, they did find whales and were able to follow and chase them. However, on those few days when Nuiqsut whalers could penetrate the ice pack to reach open water NW of Cross Island, weather (wind) prevented them from being able to scout, except on 9/14/05. After the whale taken on 9/14/05, weather prevented all scouting activity until 9/21/05. Even on 9/15 the wind was 16.5 miles per hour from the east. Whalers tried to go north, but encountered "surf waves" that made conditions too dangerous for scouting. They thus concentrated their efforts on the open water SE of Cross Island again, and did find whales (although not in large numbers, and not as nearly as many as had been seen NW of Cross Island on 9/14).

Nuiqsut whalers believe that the migration of whales in 2005 was similar to that of previous years, but that ice and weather conditions prevented the whalers from reaching and seeing most of the whales. They also believe that many of the whales that they did see, at least in the area SE and E of Cross Island, were affected by non-whaling vessel activity in the area, and that this had a detrimental effect on the success of their subsistence whaling (see following section).

Nuiqsut Whalers' Reports of Vessel Activities, 2005

Whalers had a concern for the potential effects of non-whaling vessel traffic on the whale migration, and the success of their hunt, for the entire 2005 season. This had been a concern for all prior seasons, but was exacerbated in 2005 by the limitations imposed on both whaling and other marine activities by the weather and ice conditions. A summary of whaler observations and concerns about this topic is provided as Annex A. This information was recorded by the author staying with the whalers on Cross Island. Summaries are included only for those days on which vessel activity was reported, or for days on which whale scouting activity occurred. For days that are not listed, neither activity was reported. Blows of whales were spotted from Cross Island on several days when whaleboats did not go out scouting due to adverse conditions. The log compiled by the Whaling Communications Center has also been consulted to verify some of the details of timing and locations.

Whalers reported seeing activity by vessels on six separate days during the 2005 whaling season, five of which were days when the whalers were actively scouting for whales (9/03, 9/05, 9/08, 9/14 and 9/21 were "scouting days"; 9/04 was not). Figures 2 and 9 show the details for two of those dates, 9/14 and 9/21. On another "scouting day", whalers did not see vessel activity but were informed that such activities were scheduled (9/13). None of the vessels encountered were engaged in support for Northstar. Whalers accounts of these encounters became more detailed later in the season, perhaps because the researcher was not on Cross Island until 9/06 and also perhaps because the whalers became increasingly sensitive to the potential disruptive effects such vessel encounters could have on their whaling activities. Whalers also had few good opportunities to approach or strike whales early in the season, as conditions for finding whales were not very good. Relatively few whales were seen prior to 9/14, and those whales that were seen were seen for relatively brief periods of time. How much of this can be attributed to vessel activity in the area as opposed to adverse environmental conditions is difficult to assess, and Nuiqsut whalers did not express developed statements in this regard. Given the conditions, they perceived that vessel traffic may have been a factor on days prior to 9/14 (specifically 9/05 and

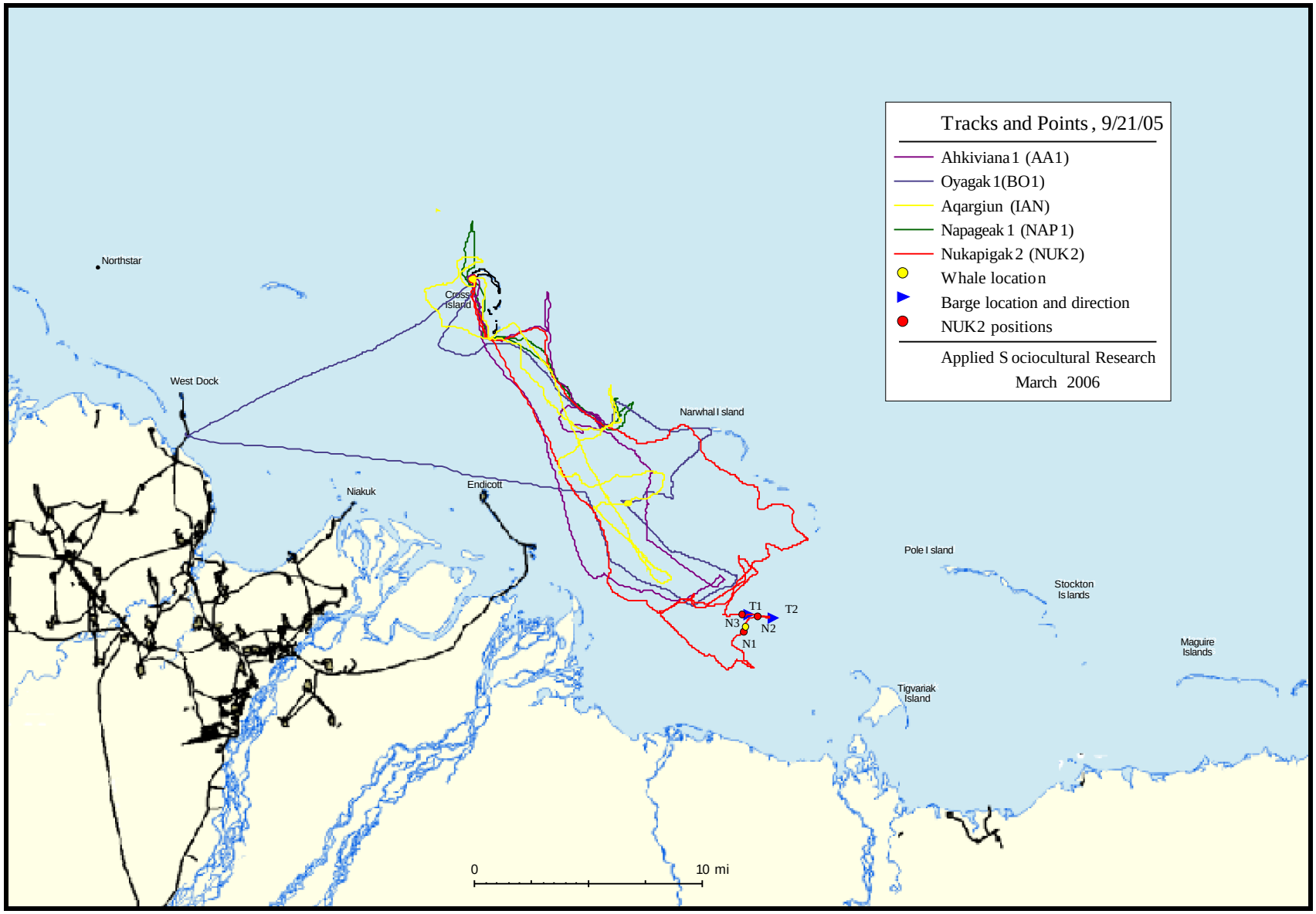


FIGURE 9: Nuiqsut GPS Tracks, 9/21/05

9/08, and maybe 9/13), but the scarcity and brevity of whale sightings could not be definitely attributed to that vessel traffic.

However, whalers report that vessel activity directly affected the conduct of their hunt on 9/14 and 9/21 (see Annex A). It is not possible to demonstrate that, in the absence of vessel activity, the Nuiqsut whalers would have taken more than one whale, and they did not make that assertion. It would not be culturally appropriate for a whaler to state that a harvest was likely, under any circumstances. However, within the cultural constraints of not taking the harvest of any animal for granted, it was fairly clear that the whalers thought that their chances for taking more than one whale would have been substantially increased without the interference posed by the vessel traffic. This is the author's interpretation of the various whalers' accounts. An earlier kill to the east of Cross Island on 9/14 might have allowed an attempted strike at a second, smaller whale to the NW of Cross Island on that day. Chances for a strike on 9/21 were apparently quite promising prior to the appearance of a barge (Fig. 9; Annex 1), although of course success can never be assumed.

The major environmental difference between the 2005 whaling season and the prior year's documented by the MMS "Annual Assessment of Subsistence Bowhead Whaling Near Cross Island" (2001–2004) is that, in 2005, ice and weather confined the whalers' scouting activities primarily to nearshore waters SE of Cross Island. The same ice and weather conditions also made these nearshore waters the preferred operating areas for non-whaling vessel traffic. That is, both the whalers and commercial vessels desired to operate in the available open water areas during the limited periods of good weather. Adverse interactions among vessels, whales, and whalers are likely in such a situation, although perhaps not inevitable. Vessel traffic in the area east of Cross Island encountered by the Nuiqsut whalers in 2005 was not associated with BP's Northstar Development, 17.5 miles (28 km) west of Cross Island.

Nuiqsut whalers do have some generalized perceptions of how industrial activities affect their hunt, based on their experiences of such activities. The proximity of onshore development facilitates the logistical support of Cross Island whaling, and Nuiqsut whalers make frequent supply runs (weather permitting) between Cross Island and West Dock. Logistical support and emergency assistance (barge, helicopter) from industry are at times requested by the whalers. However, whalers perceive offshore exploration, development, production, and support activities as potentially adverse to whaling, primarily because of noise and/or potential spills and accidents.

However, for Northstar in particular, whalers have not reported effects on their hunt from its development and production activities, although oil spills and noise are still of concern for the potential disruptive effects they could have. BP has made consistent efforts to decrease the risk of spills and to reduce the effects of vessel and air traffic to Northstar as much as possible. Northstar is to the west of Cross Island and "downstream" in terms of the migration from where Nuiqsut whalers normally scout for whales. Thus, Nuiqsut whalers do not expect Northstar to be as problematic in terms of direct effects on whaling as would development to the north and east of Cross Island (Ahmaogak 2002: 5, 14). This is not inconsistent with the conclusions of Richardson 2006, which found a statistically significant, but small, deflection effect in the

southern boundary of the bowhead migration route for some years when noise from Northstar was at its highest levels. Nuiqsut whalers, however, prefer not to whale near industry facilities, if they can avoid doing so. In 2005, whalers explicitly indicated that they turned away from Northstar rather than approach it too closely (the closest approach was 2.5 miles, and in general whaling boats maintained a distance of at least 4-5 miles away). Nuiqsut whalers also indicate that Barrow whalers may have observed some effects from Northstar, as Northstar is east (and "upstream" in terms of the bowhead migration) from Barrow.

Planned Future Activities

- As this is written, the draft report for the 2007 field season is also in preparation and the 2006 annual report has been revised and submitted to MMS as "final". The synthetic analytical report covering 2001-2007 is also in preparation. The data for 2001-2007 has been delivered to the Core Contractor for preparation of the standard database. There have been minor corrections throughout the database, and shape files for all GIS information will be submitted to MMS. This is the completion of the draft annual report for 2005;
- Consultation with Nuiqsut whaling captains about the 2007 annual report, and presentation of results. This may well be in conjunction with such consultation for the synthetic final report. This trip has not been planned as yet;
- Presentation of 2007 results (with comparison to previous study years) at the ALSO conference in Orlando in early March;;
- Presentation of 2007 results at the 2008 (April) Open Water meetings (in the session devoted to BPXA's Northstar permit applications);
- Continued work on the synthetic analytical report, which should be completed in draft form by 12/15/08, and to be reviewed with Nuiqsut participants early in 2009. This report will then be finalized after receipt of comments from North Slope participants and MMS.

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Electronic Appendices (on accompanying CD-ROM)

Annual Assessment of Subsistence Bowhead Whaling Near Cross Island, 2005 Annual Report (cANIMIDA Task 7) – PDF file "AnRpt2005.pdf" (with Annexes A: Summary Accounts of Scouting Activity/Observations and B: GPS Tracks for all Cross Island Whaling Boats for 2005, by Day).

Summary Accounts, 2005 – PDF file: "APX_A.pdf"

GPS Tracks for all Boats for all Days, 2005, by Day – PDF file: "Apx_B.pdf"

Boat Report forms for all boats for all days, 2005 – PDF file: "Apx_C.pdf"

Data file from Cross Island weather station for 2006 in Excel format: "Apx_D,xls"

Annex A: Summary Accounts - Scouting Activity/Observations

This Annex 1 summarizes specific observations made by Nuiqsut whalers of activities by vessels other than whaling vessels during the 2005 Cross Island whaling season. This information was recorded by a researcher (MSG) staying with the whalers on Cross Island. Summaries are included only for those days on which vessel activity was reported, or for days on which whale scouting activity occurred. For days that are not listed, neither activity was reported. Crews and boats are indicated by acronyms for convenience. These are the same acronyms as are used in the legends of the Figures 2 and 9:

- UA refers to the Ahkiviana crew
- BO refers to the Oyagak crew
- IAN refers to the Aqargiun crew
- NAP refers to the Napageak crew
- NUK refers to the Nukapigak crew
- Numbers after the above acronyms refer to a specific boat for multi-boat crews. The number 1 boat is usually the boat with the captain on it. No number means the crew used only 1 boat.

8/31/05
Only NAP1 out, hunting for seals (did not take whaling gear along in boat). Saw many seals, but no whales. Did not report seeing any vessel activity.

9/02/05
Only NAP1 out. Saw many seals, but no whales. Did not report seeing any vessel activity.

9/03/05
Only NAP1 out scouting. Saw only one whale, and only 1 or 2 people on the boat saw it. They did see a barge during their trip as well (position not noted on the GPS track).

9/04/05
NUK2, on the way from Nuiqsut to Cross Island, saw a barge. Position not marked or indicated on track. They reported it [when they arrived at West Dock] and were told by Security that it was probably the Kaktovik fuel barge. No boats were out scouting on 09/04.

9/05/05
UA1 and UA2, on the way from Nuiqsut to Cross Island, saw a barge; position not marked or indicated on track. Barge heading west? Four boats (from three crews) scouted for whales on 9/05. Three of the boats saw the same whale south of Pole Island. NAP1 did not see any whales, although it looked in the same area where it saw a whale on 9/03 (SE towards Pole Island).

9/07/05
IAN, NAP1, NUK1, and NUK2 out scouting. NAP1 saw no whales. The other boats all saw the same, single whale (or rather, its blow). They all saw many seals. Much ice, no reported other vessel activity.

9/08/05
IAN boat reported a barge at 1:53 PM (point Barge_153). No indication of how far away the barge was or in what direction. Barge was east of Endicott. Com Center determined that it was a Crowley barge and had departed from West Dock for Badami (heading east). Four boats went scouting on 9/08. No whales were spotted to the SE of Cross Island on 9/08. The UA1 boat did hear a blow (or blows) in the ice to the east of its easternmost position (10:44 AM). Ice and fog limited where the boats could go. NAP1 went more north than the other boats and saw a whale to the north of Cross Island (east of where NUKs had seen a whale on 9/07). They saw this whale in the late afternoon, well north (25+ miles) and west of where IAN saw the barge.

9/09/05
No boats went scouting. An officer of the Nuiqsut Whaling Captains Association (NWCA) called the NSB Planning Department to discuss two issues – the barges harassing all the animals in the open water inshore of the barrier islands (the only open water there was) and the polar bears harassing the whalers on the island.

9/13/05
Six boats (from five crews) out scouting. A plane flew over Cross Island at 8:34 AM and was determined to be a FWS polar bear survey plane. At 9:15 AM Com Center advised the whalers of planned industry boat movements for the day – a trip from West Dock to the north of Northstar (ice reconnaissance) and the *Agvik* going towards Cape Simpson. [Whalers made no objection – was to the west of their intended scouting.] Boats did see whales on 9/13. BO1 saw a whale about 7.5 miles west of Cross Island (initially thought to be black ice), another about 4.6 miles west of Narwhal Island (southeast of Cross Island), and another about 7 miles SW of Narwhal Island (pretty much south of the other whale). IAN (and NAP1 and perhaps other boats) were chasing a whale south of Narwhal Island in the early evening – 5:40 to 6:30 PM or so. The NUK2 boat apparently saw a whale SW of Cross Island in the morning. No barge activity observed by the whalers.

9/14/05 (Figure 2 in text)
Seven boats (from five crews) out scouting. All initially went SE, but three turned back about 20 miles from Cross Island, thinking that the whales being seen by other boats were too far away, given the ice conditions. These three boats then went NW of Cross Island. The other four boats continued SE and saw whales about 27 miles from Cross Island (Figure 2), but much farther out (outside of the barrier islands) than whales had been seen on prior days. They were able to find the eastern end of the ice pack and head north into more open water. Whalers (NAP3, NAP2, IAN, UA1) had scouted the areas SE of Cross Island and S of Pole Island where they had seen whales before, but did not see any until about 9.4 miles NE of Pole Island (11:44 AM or so). They attributed the lack of animals in this area to possible vessel activity in the area, since the whalers were following a "path" of calmer water to the NW, similar to the path of a vessel that could have been in front of them most of the morning. The tug and barges that they later spotted probably generated this hypothesis, but it could not have been the same tug since the tug observed was first seen to the south and/or east of the whalers (see accounts below). For the boats SE of Cross Island, the action started when—at about 11:44—the NAP2 and NAP3 boats spotted some blows (point E1 on Figure 2) and went to the NE, where they found several whales. They called the UA1 and IAN boats and all four in effect chased different whales, but in the same general area.

The IAN whale was the smallest and went off to the east, whereas the others went more north. About 12:30 (point B1) the IAN boat heard what would turn out to be the Canadian barge, but at first thought that it could have been a helicopter. About 12:40, while still chasing the whale, they saw what appeared to be some "black ice" to the south and realized that it was a tug with two large barges (point B2 was the boat's position, point T2 the tug's estimated position). They estimated the distance as 4 miles. At the same time the whale they had been chasing made a 90 degree turn and went straight north (point E2). The IAN boat went to high speed and followed until about 12:53, when they went to slow speed to wait for the whale to surface again, whereupon they could resume the chase. They slowly searched this area until 1:16 PM or so, at which point they concluded that the whale had given them the slip (point E3), at least partially due to the noise and interference of the Canadian tug. The IAN boat then went to help the NAP1 and NAP2 (and by that time UA1) boats chase their whales.

The whale next largest in size was chased by the NAP2 and UA1 boats. They chased this whale NW, then NE, and finally S and apparently had a good striking opportunity about 12:38 PM, but the boat stalled at a critical moment and the chance was lost, and the whale dove (point E4). They regrouped and were searching the area at low speed, waiting for the whale to resurface. They spotted the Canadian tug at about 12:46 (boat position B3, tug's position uncertain, but probably somewhere on a line between or in an area defined by T3a and where first placed by UA1 at T3b). They turned north, away from the tug, and continued at slow speed in hopes of seeing the whale when (and if) it resurfaced. They never saw signs of this whale again. They searched and waited in the area until about 1:05 PM, at which point they went to join the NAP3 boat in pursuit of the one whale still in sight (point E5). NAP3 called the other boats to come help chase after NAP3 spotted a blow presumed to be one of the whales the boats had been chasing. The failure of this whale to resurface nearby was also attributed at least in part to interference from the Canadian tug.

The NAP3 boat was chasing a larger whale at this same time, somewhat to the north of the other boats. At about the time they first saw the Canadian tug, 12:48 PM, the whale they were following also dove. The NAP3 boat searched

in a circle and waited until 1:05 PM for the whale to resurface, at which time the NAP3 crew saw a blow about 2.7 miles NW of their position (point E5). NAP3 saw it because they were further north than the other boats. They assumed at the time that it was the whale that they had been chasing, although the time submerged and the distance traveled were both somewhat greater than would be expected. However, a whale "spooked" by a tug could act in this way. This could also have been a different whale. In any event, NAP3 spotted this whale and called the other boats and all went to chase it. About 1:45 a boat had a chance to strike, but missed. This and other sightings were marked by points E6-9. About 2:15 the NAP3 boat struck the whale and put a float on it (point "1st Strike"). At some point a second float was put on the whale, and additional bombs (shoulder gun shots) were placed about 2:42 PM (point "Strikes"). The kill was announced at 4:04 PM (point "Kill"). The relatively long time between the first strike and the kill was attributed in part to the whale being "spooked" by the Canadian barge so that it was difficult to approach. There were some equipment failures as well. At least one crew believes that the Canadian barge added at least two hours and 12+ miles to the hunt, by its "spooking" the whales the boats were chasing.

In sum, the boats that went to the SE of Cross Island did succeed in landing a whale, but had spotted only a few whales before seeing the barge. The location of this barge was difficult to estimate in relation to the boat tracks. After the tug passed to the west, the whalers saw quite a few other whales and blows during the chase of the whale they landed. That is, once the tug was gone, signs of whales were very evident. The exact line of travel of the tug cannot be precisely determined from the information obtained, but is as generally indicated in Figure 2 (with a wide margin of error). The Canadian tug was heading generally NW in direction, and was south of the whaling boats while they were chasing whales and well west of them at the time the whale was killed. The boats to the NW of Cross Island, with no barge in the area, saw lots of whales all day, until encountering the Canadian tug (boat position B4, tug estimated position T4) on their way to assist the boats now east of Cross Island with killing and towing the whale. After that point, they saw only one whale. They concluded that, since the barge had not reached the NW area as yet, the whales were not spooked and boats to the NW of Cross Island (NAP1, BO1, NUK2) thus saw whales.

Boats (NAP1, NUK2, BO1) were seeing whales and following them to the NW of Cross Island from about 12:00 PM (noon) on. These whales were 11.5 to 14 miles from Cross Island (NW). The boats had encountered thick ice when traveling north, but between 6 and 10 miles out, the ice coverage thinned out. Water conditions were conducive to scouting and many whales were seen.

Specific locations of the Canadian barge were not marked by the whalers on the water. However, whalers from all four boats participating in the active hunt (NAP3, NAP2, UA1, and IAN) later estimated where they thought they were (and estimated where the barge was) when they saw it. Note that these records imply that IAN saw [or heard] the barge between about 12:07 and 12:15 PM (estimated from the GPS track), well before UA1 reported it on the VHF radio. The IAN boat was the northernmost boat at 12:15 but was east of the other boats as well.

Some later information obtained from the IAN crew was as follows: When they first saw the whale, it was "playing around" and going slow, taking its time. The next time they saw it blow it was going very fast, due north. It came up about 4 or 6 times "real fast", and then went down still going due north for several miles. It went down again and IAN looked for it for several miles but never saw it again. After it was first disturbed [by the barge, they think], it popped up ¼ of a mile later and headed due north [away from the barge]. They lost track of this whale. UA1 had said they were chasing a whale (with NAP3, after losing track of the one they had been chasing with NAP2), so IAN went west to join the other boats, as described above. IAN indicated that they would have had a chance at the first whale they had seen if it had not been spooked [by the barge]. All crews involved indicated that this chase (and kill) were significantly influenced by the presence of the tug and barges.

One boat crew indicated that they saw the barge to the east of them when they had started to go north into open water east of Pole Island (tug estimated position T1). They did not indicate their boat's position. This observation was not documented in the Whalers' Communication Center log, nor was it recorded in notes made during the 2005 whaling season. The other three boat crews did not see the tug until about 12:40 or 12:48, when they were chasing whales and the tug was much closer. However, they also said that it was possible that the fourth boat did see the tug earlier and that they (the other boat crews) simply did not notice. The position noted for the tug by the fourth boat is consistent with later locations estimated by the other boats. They said the tug was to the east of them and was skirting the edge of the ice, headed in a northeast direction (similar to that of the whale boats once they were east of Pole Island but had not yet seen any blows or whales, south of point E1). The position noted on the figure is very approximate, however, as neither the time nor the distance were remembered with great precision.

9/19/05
No scouting. An NWCA representative called NSB Planning about the barge situation, and they talked with NWCA officers as well. A tentative meeting between NSB Planning and the Nuiqsut whalers on Cross Island was set up for Thursday 9/22 (but later canceled due to weather conditions).

9/20/05
No scouting. Com Center informs Nuiqsut whalers (9:17 AM) that the white plane with red stripes will be doing a whale count today and is preparing to take off towards Kaktovik. At 10:22 the Com Center called to any barges operating in Michelson Bay to respond – but none do. Not clear that barges were operating.

9/21/05 (Figure 9 in text)
Five boats (from five crews) went out scouting. At 11:34 AM the FWS polar bear survey plane asked for permission to fly over Cross Island. The whalers asked him to stay away – but the ceiling was so low that the mission was aborted anyway. He was looking for some place to fly but there was fog everywhere.

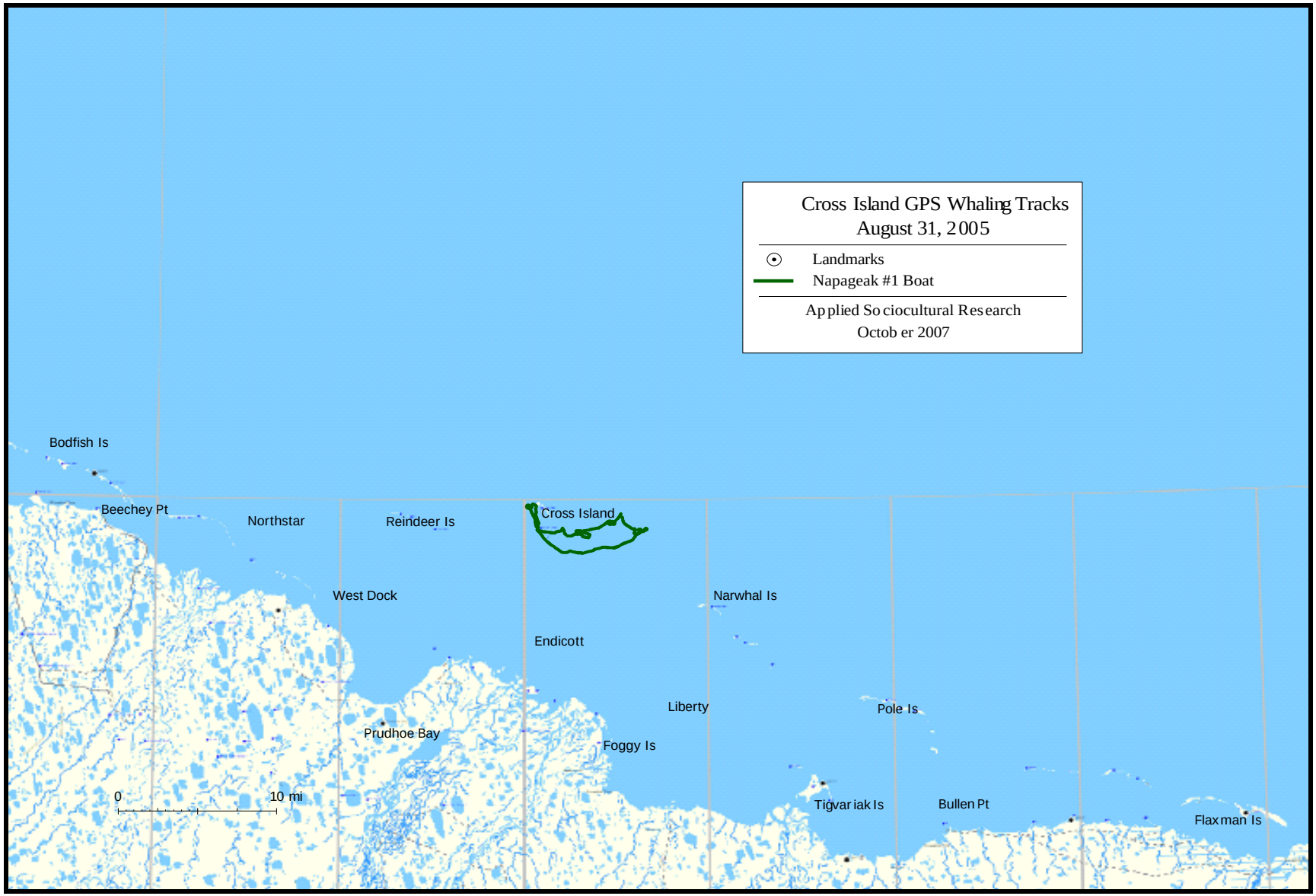
About 1:00 PM, NUK2 reported seeing a barge and together with the researcher constructed the following account of the encounter with the barge: Once NUK2 found the current they followed it. They saw 4 "whale birds" in the current and followed sort of a zigzag course. They started to smell something and followed the birds. The fog was to the north, maybe ½ mile away. The birds landed and the NUKs saw the whale in a clear area [to the south of the fog] and they could see the land (mountains) and Pole Island to the east. "We saw a whale and there is a barge right in front of us" and they give their coordinates as N70 16 34.16 W147 26 45.4. The whale came up and went down about 3 times and then went down. They then speeded up in the boat to go to the whale, and saw the boat/barge coming out of the fog. Almost as soon as they saw the whale they also saw the tug and barge (points a & b) emerge from the fog almost directly north of the whale, about ½ to ¾ miles away from their boat. They then lost track of this whale. They reached the position where the whale had been, but did not see its trail. (Whalers can often tell which way a whale is headed by the way its flippers are oriented, and/or the trail of bubbles that it leaves; when it dives it leaves a sort of whirlpool and "trail".) The boat was headed east away from the fog and towards the clear area and the sunshine. It was going fast to the SE.

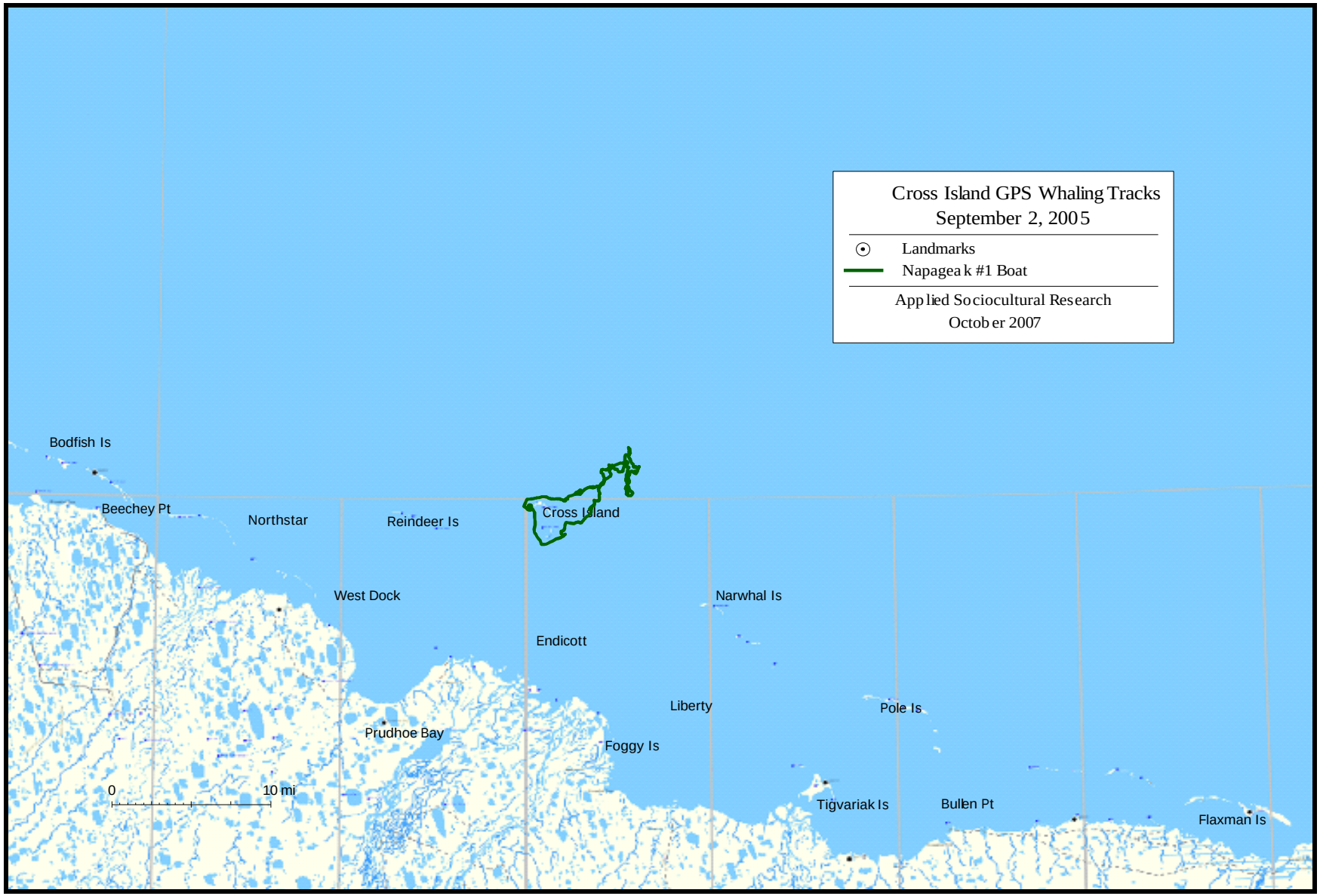
After the whale submerged the NUK2 boat started to go towards the barge in order to record its identification number and other information (about 1:03). NUK2 got to within 1/8 mile of the barge when the Communications Center said that they knew it was a Crowley barge. NUK2 backed off at this point and went to look for the whale again, but they never saw it again. This was the only whale they saw all day. NUK2 continued looking for the whale to the west, and could see the tug continuing to the east and north, back into the fog. At this point the whale was already spooked and gone – about 1:17 PM (the estimated position of the barge was not given). The NUK2 crew repeated that they were following the current and only saw the whale once. It popped up 3 or 4 times really fast and was acting scared – it acted like a "spooked" whale. Once they saw the barge, they never saw the whale again and then went north, and inside of the fog. They said that the whale must have gone north or they would have seen it, but it was so foggy that they could see nothing so they went back south to the current. They met up with UA1 (at about 2:37PM) and talked about the current and headed SW together. Fog started to roll in but it was still clear to the south (they could see the land) so they went back to the current again and again could smell something – but saw only 1 bearded seal and lots of ducks. They followed the ice towards Narwhal Island (north and then northwest) and saw seals. The ice extended in a band SE of Cross Island for about 8 miles, with many seals.

There was intermittent talk about the barge situation, through at least 3:00 PM (NSB Planning took part in this talk on VHF radio before heading back to Barrow). The wind started to pick up and most boats return to Cross Island by 5:00 PM.

9/23/05
On this date, Canadian barge transported portable generators and other relief supplies from West Dock to the whalers on Cross Island. Conditions are such that smaller vessels cannot go out, and aircraft cannot fly.

Annex B: 2005 GPS Tracks for 2005, by Day




Cross Island GPS Whaling Tracks
September 2, 2005
Landmarks
Napageak #1 Boat
Applied Sociocultural Research
October 2007
Bodfish Is
Beechey Pt
Northstar
Reindeer Is
Cross Island
West Dock
Narwhal Is
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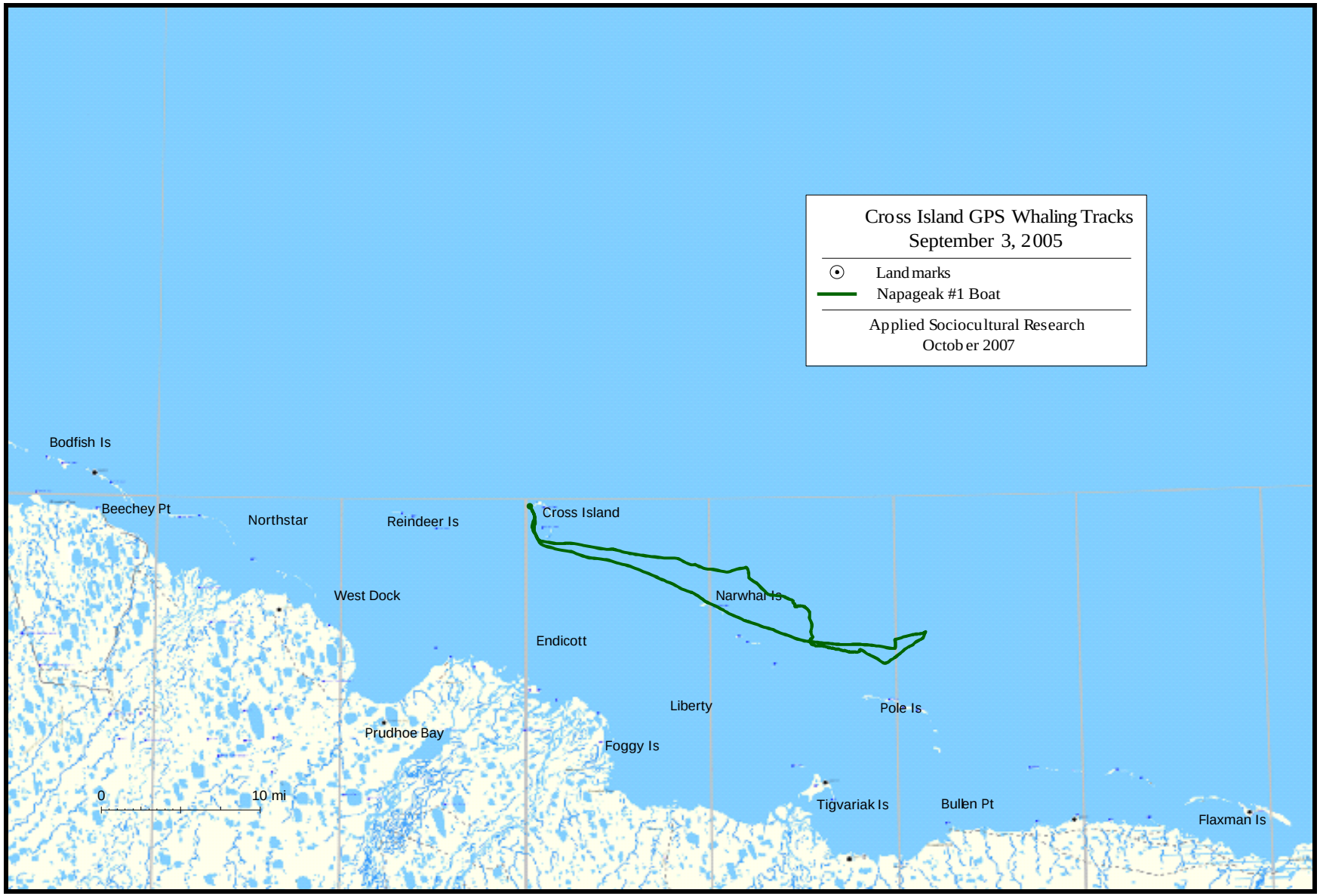
Cross Island GPS Whaling Tracks
September 3, 2005
Land marks
Napageak #1 Boat
Applied Sociocultural Research
October 2007
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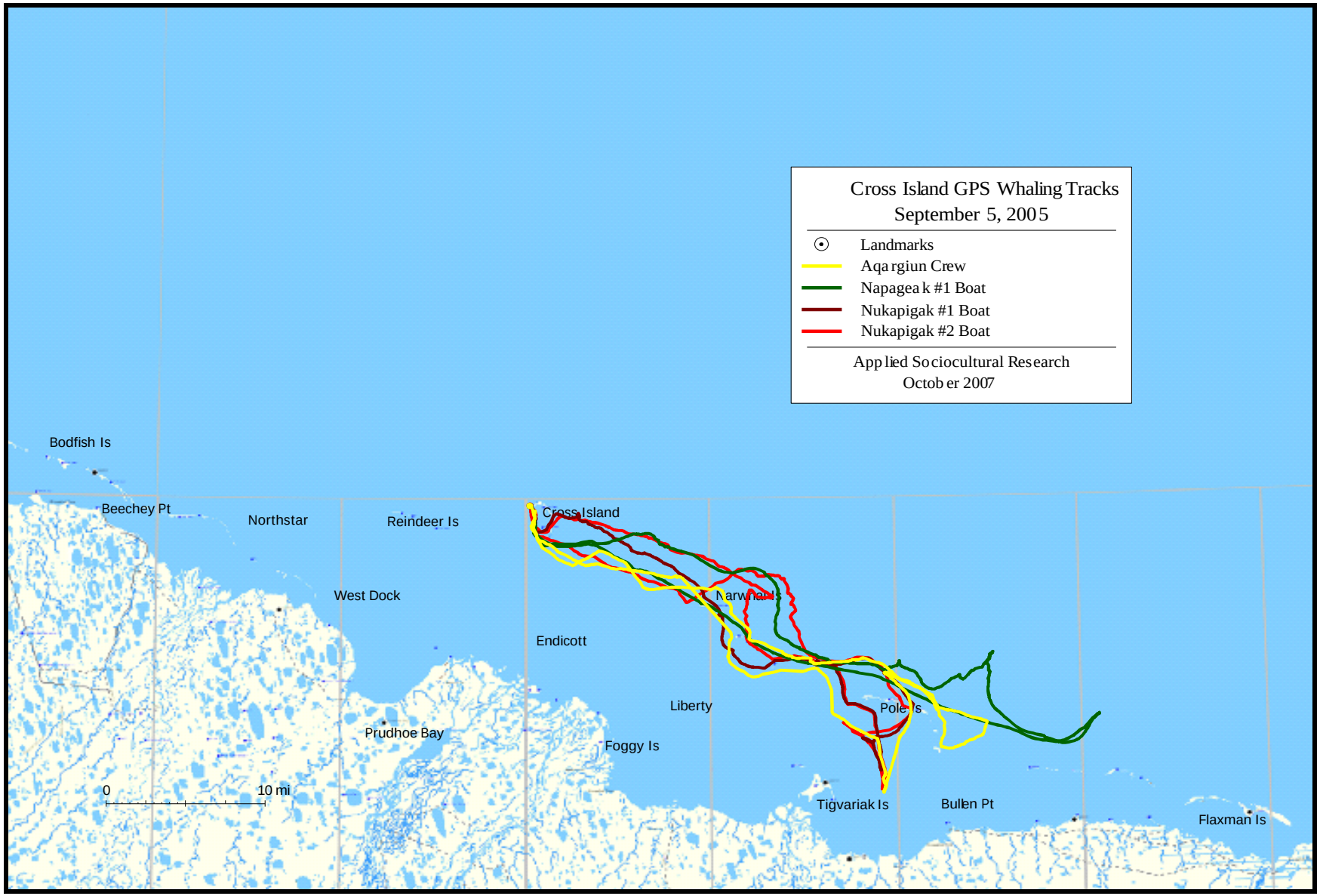
Cross Island GPS Whaling Tracks
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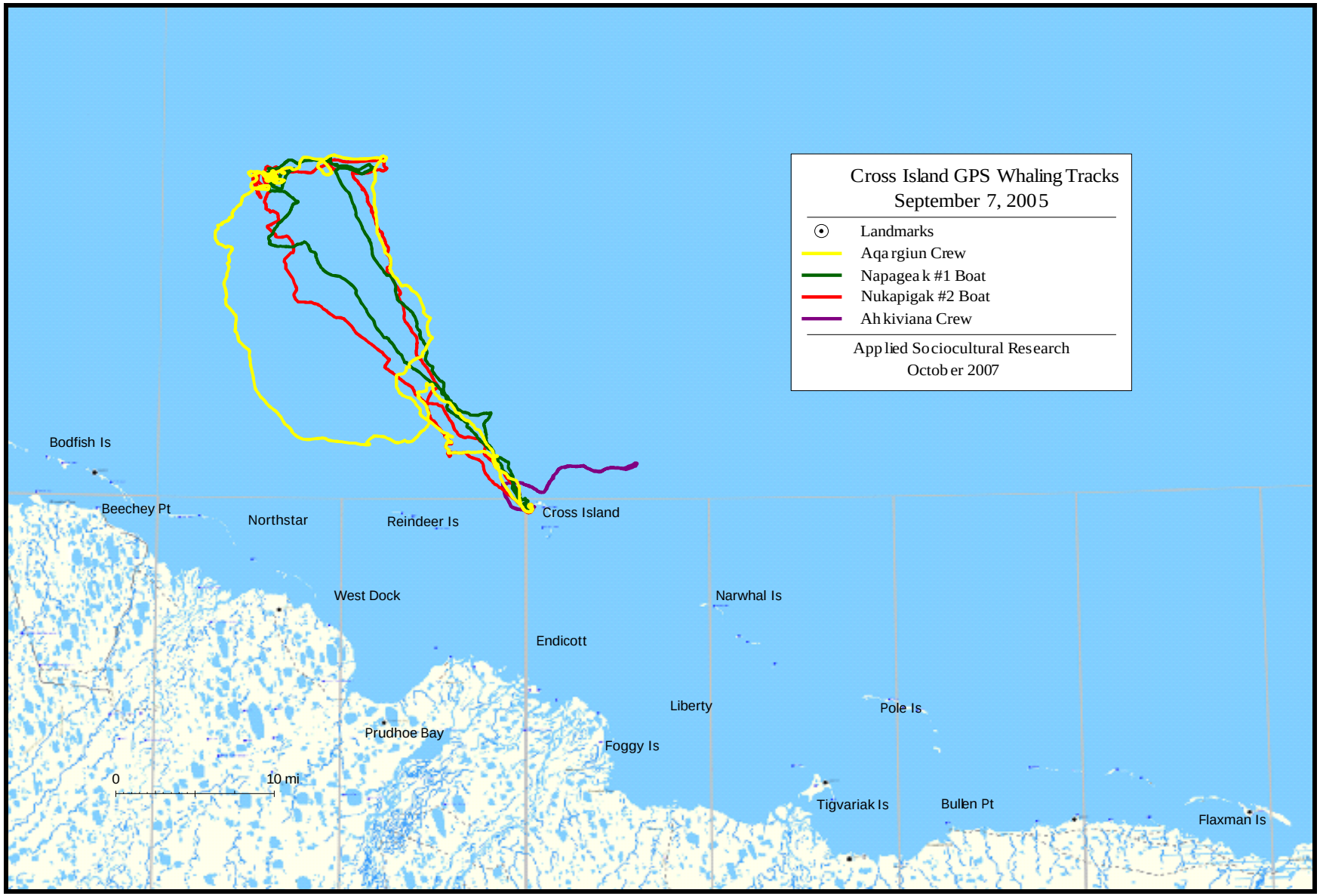
Cross Island GPS Whaling Tracks
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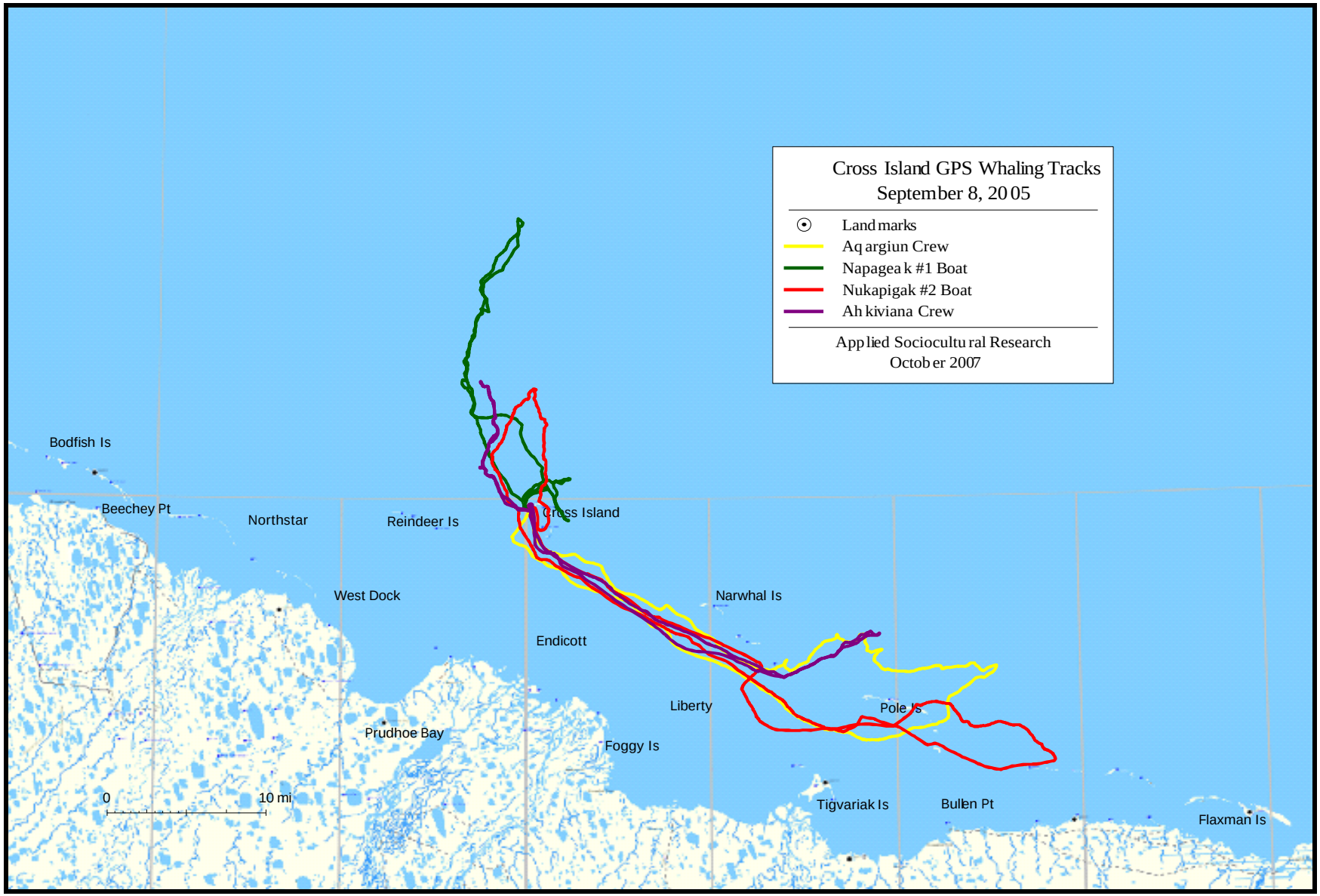
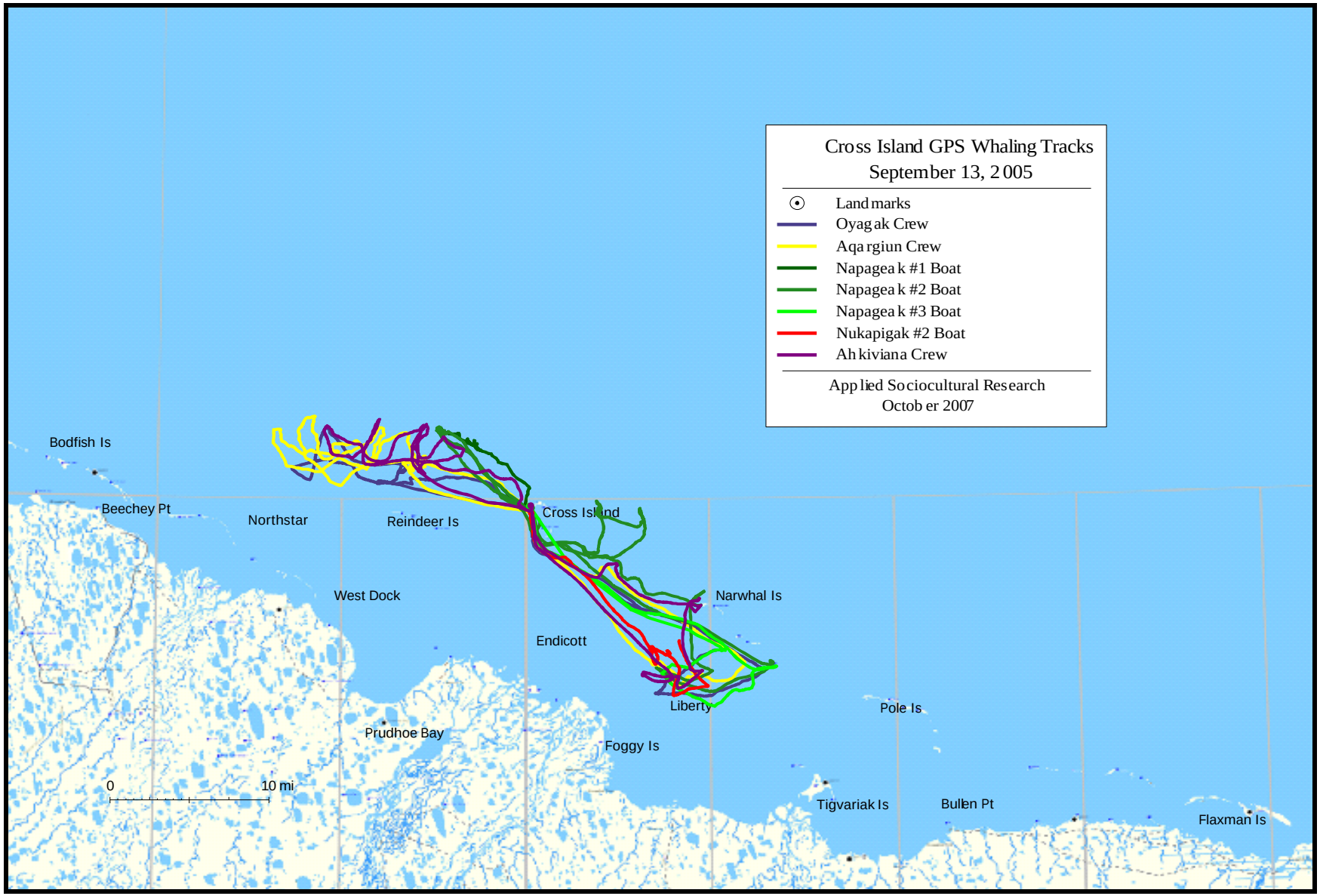
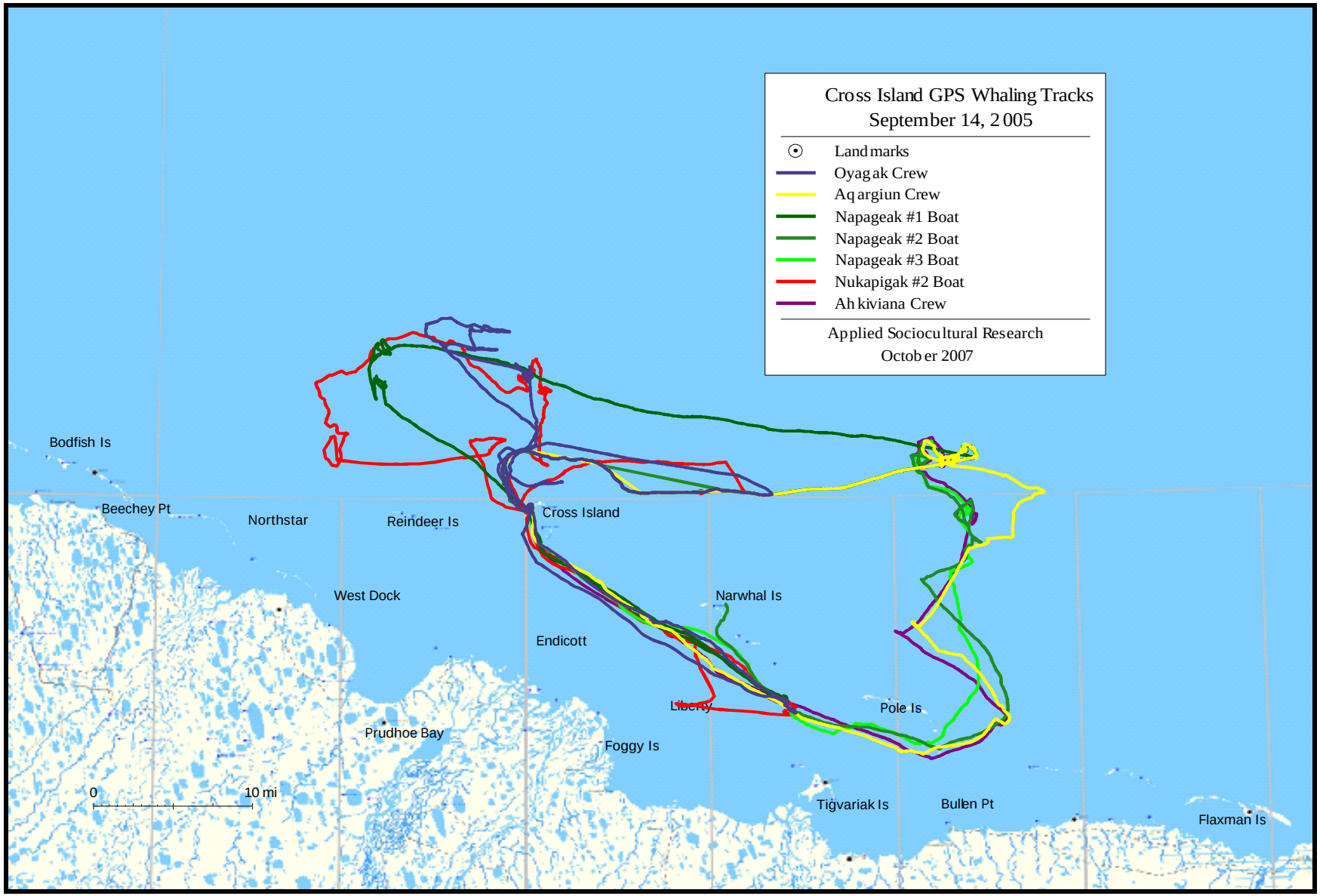
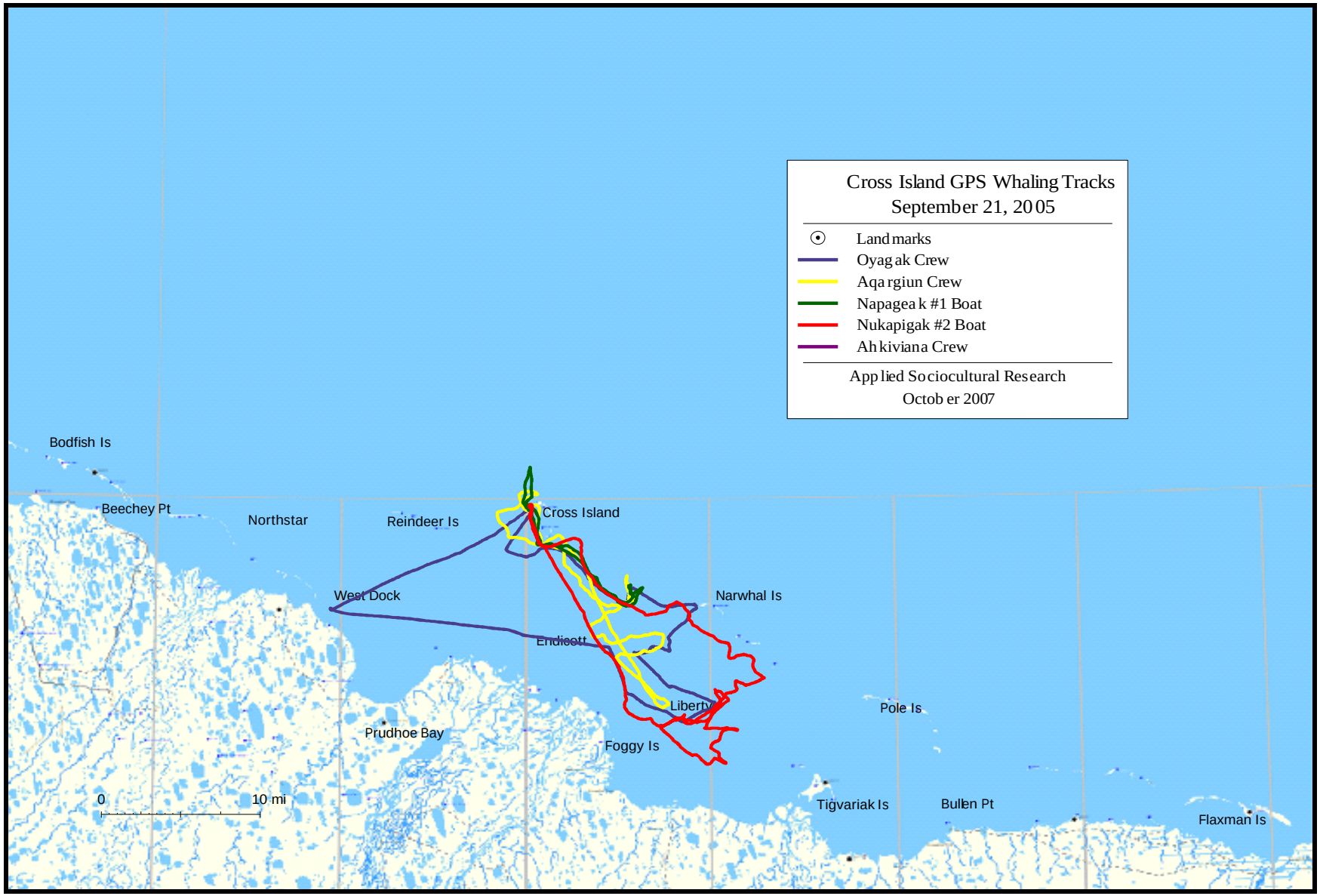
Bullen Pt
Flaxman Is


Cross Island GPS Whaling Tracks
September 8, 2005
Landmarks
Aqargiun Crew
Napageak #1 Boat
Nukapigak #2 Boat
Ahkiviana Crew
Applied Sociocultural Research
October 2007
Bodfish Is
Beechey Pt
Northstar
Reindeer Is
Cross Island
West Dock
Narwhal Is
Endicott
Liberty
Pole Is
Prudhoe Bay
Foggy Is
Tigvariak Is
Bullen Pt
Flaxman Is
0
10 mi


Cross Island GPS Whaling Tracks
September 13, 2005
Landmarks
Oyagak Crew
Aqargiun Crew
Napageak #1 Boat
Napageak #2 Boat
Napageak #3 Boat
Nukapigak #2 Boat
Ahkiviana Crew
Applied Sociocultural Research
October 2007
Bodfish Is
Beechey Pt
Northstar
Reindeer Is
Cross Island
West Dock
Narwhal Is
Endicott
Liberty
Pole Is
Prudhoe Bay
Foggy Is
0
10 mi
Tigvariak Is
Bullen Pt
Flaxman Is


Cross Island GPS Whaling Tracks
September 14, 2005
Landmarks
Oyagak Crew
Aqargiun Crew
Napageak #1 Boat
Napageak #2 Boat
Napageak #3 Boat
Nukapigak #2 Boat
Ahkiviana Crew
Applied Sociocultural Research
October 2007
Bodfish Is
Beechey Pt
Northstar
Reindeer Is
Cross Island
West Dock
Narwhal Is
Endicott
Liberty
Pole Is
Prudhoe Bay
Foggy Is
0
10 mi
Tigvariak Is
Bullen Pt
Flaxman Is


Cross Island GPS Whaling Tracks
September 21, 2005
Landmarks
Oyagak Crew
Aqargiun Crew
Napageak #1 Boat
Nukapigak #2 Boat
Ahkiviana Crew
Applied Sociocultural Research
October 2007
Bodfish Is
Beechey Pt
Northstar
Reindeer Is
Cross Island
West Dock
Narwhal Is
Endicott
Liberty
Pole Is
Prudhoe Bay
Foggy Is
Tigvariak Is
Bullen Pt
Flaxman Is
0
10 mi

Annex C: Boat Report Forms for the 2005 Season

Printed copies of the boat report forms are not included in this report, in the interests of report size. They are available in electronic form on the CD-ROM included with this report (as a PDF file.

Annex D: Weather Measurements, Cross Island, 2005

A printed copy of this database is not included in this report, in the interests of report size. It is available in electronic form on the CD-ROM included with this report (as an Excel file).

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.

The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Royalty Management Program** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.