BOWHEAD WHALE DIET INVESTIGATION: ST. LAWRENCE ISLAND, ALASKA BERING SEA

Final Project Report

Cooperative Agreement 06-017
Alaska Dept. of Fish & Game
North Slope Borough

Prepared for:
State of Alaska Department of Fish & Game
(State Wildlife Grant T-1-16, project 3)

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This study was paid for by the Alaska Dept. of Fish and Game State Wildlife Grant (T-1-16 project 3) and the North Slope Borough.

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Above all, we thank the whaling captains and community members of St. Lawrence Island who gave their support to this project and assisted with sample collection. We thank North Slope Borough (NSB) Mayor Edward Itta and former NSB Mayor George Ahmaogak, Sr. for their support of this project on-going since 2005.

All NSB Department of Wildlife Management staff played an important role in the success of the project, especially Taqulik Hepa, Harry Brower, and Dolores Vinas. We thank the staff at NSB Grants Division and Pam Clemons.

This study was paid for by the ADF&G (State Wildlife Grant T-1-16, project 3) and North Slope Borough (matching funds). We thank the Alaska Dept. of Fish & Game for collaborating with the North Slope Borough on this study of the bowhead whale.

Introduction

The bowhead whale (*Balaena mysticetus*) is a large baleen whale that feeds on zooplankton and spends its entire life in cold northern waters. Although recent studies indicate that the bowhead whale population is recovering from commercial exploitation (George et al. 2004) it remains federally listed as an Endangered Species.

Our knowledge of bowhead feeding ecology is incomplete and perplexing. It is reasonable to surmise that bowheads might migrate to a zooplankton-rich feeding area for the summer. Yet, the BCB (Bering-Chukchi-Beaufort) bowheads leave their Bering Sea wintering grounds each spring, just prior to the most productive period (Coyle et al. 1996), and travel to the less productive Beaufort Sea. They return to the Bering Sea each fall just before the productivity decreases for the winter. It is interesting to note that at the onset of 19th century commercial whaling, however, a segment of the population remained in the Bering and Chukchi seas throughout the summer (Bockstoce and Bodkin 1983).

Bowhead diet studies by the North Slope Borough, Department of Wildlife Management (NSB-DWM), the Alaska Eskimo Whaling Commission (AEWC), and the Alaska Department of Fish and Game (ADF&G) have examined stomach contents of bowheads harvested for subsistence (Carroll et al. 1987, Lowry 1993, Lowry et al. 2004) primarily from the Beaufort Sea region. Zooplankton, especially, copepods and euphausiids, were the most important food items found, and more than 75% of the whales harvested and examined in the fall were actively feeding. The Alaskan Beaufort Sea is considered a major feeding area during the summer and early fall (Lowry et al. 2004). Isotope studies from bowhead baleen and muscle have indicated that the Bering Sea is a greater contributor of energy to adult bowheads (Schell et al. 1989) than the Beaufort Sea; the Beaufort may be more important to sub adult whales (Hoekstra et al. 2002; Lee et al. 2005).

For this study we proposed to collect stomach contents and other biological tissues from bowhead whales harvested in spring and late fall from the northern Bering Sea to document bowhead feeding, provide quantitative diet data, and determine prey composition.

Prior to this study, the stomach contents of one bowhead from the Bering Sea were documented in the published literature (Hazard and Lowry 1984; Lowry 1993). This stomach contained mostly epibenthic organisms (gammarid amphipods) in contrast to the stomachs from the Beaufort Sea, which contained more planktonic organisms (copepods and euphausiids).

At St. Lawrence Island, in the Bering Sea, bowhead whales are harvested by two Siberian Yupik communities, Gambell and Savoonga. These communities typically harvest bowheads during both the spring (April–May) and fall (October–November) migrations. St. Lawrence Island has a harvest quota of 16 strikes per year for both villages; however, the quota has not been reached in recent years due to poor weather and ice conditions. Whalers from St. Lawrence Island report that whales are commonly seen milling in the spring, a behavior associated with feeding (Wursig et al. 1985), and reports of food in stomachs are apparently not unusual (Hazard and Lowry 1984). This annual harvest allows an opportunity for the study of bowhead diet in the Bering Sea by examining stomach contents.

The Scientific Review Board of a multidisciplinary study entitled "Bowhead whale feeding in the eastern Alaskan Beaufort Sea" conducted from 1997 to 2000 identified the need for diet data from the Bering Sea (Richardson and Thomson 2002) and included a recommendation for "the continued collection of stomach contents from harvested whales, particularly from areas where no such data have been collected, to provide a broader base of the range of prey species, times, and locations at which bowhead whales feed."

During this cooperative study with the ADF&G, we collected and studied stomach contents and other biological tissues from bowhead whales harvested in spring and late fall from the northern Bering Sea by working with the whaling captains of St. Lawrence Island. The principal investigators were John C. George, NSB Department of Wildlife Management and Gay Sheffield, Alaska Dept. of Fish & Game.

Planning meetings were held with the Savoonga Whaling Captains Association. Annual field work reports and results presentations were made to the Gambell and Savoonga IRA Tribal Councils, Sivuqaq Native Corporation, and the Savoonga Whale Captains Association. Reports of work accomplished were also provided to the AEWC, St. Lawrence Island AEWC Commissioners, Gambell Boat Captains Association, and the Savoonga Whaling Captains Association. One of the most important aspects of this project that Sheffield conducted on St. Lawrence Island has been to include the communities in project development, research, decisions, and results. This community outreach effort helps support and promote future studies of the bowhead whale.

Results of this project will compliment the ongoing National Marine Mammal Laboratory's study near Barrow, Alaska entitled "Bowhead whale feeding in the western Beaufort Sea". The objectives of this Minerals Management Service funded study include documenting patterns and variability in the timing and locations of bowhead whales feeding and documenting bowhead whale prey distributions in the western Beaufort Sea.

This study was paid for by the North Slope Borough (matching funds) and ADF&G (State Wildlife Grant T-1-16, project 3). All of the information contained in this introduction and the following sections is included in a separate final report by Gay Sheffield to the ADFG State Wildlife Grant T-1-16.

Methods

Gay Sheffield traveled to St. Lawrence Island to collect stomach contents, harvest data, and other biological tissues from bowhead whales harvested on St. Lawrence Island in 2005, 2006, 2007, and 2008 in cooperation with the Gambell Whale Captains Association, Savoonga Boat Captains Association, NSB-DWM, Alaska Eskimo Whaling Commission (AEWC), and ADF&G.

Biological sampling occurred concurrently with the butchering process. Whenever possible the stomach of each harvested whale was examined visually and samples collected from the fore stomach. Stomach content samples were held frozen until analysis.

In the laboratory, aliquots of stomach or intestine samples were thawed, rinsed, and sorted into major taxonomic groups, and examined microscopically at the University of Alaska's Institute of Marine Science for identification.

All data for this project was entered into electronic database, including the NSB Dept. of Wildlife Management database that includes information on all bowhead whales harvested in Alaska (this database allows comparisons to be made by season, sex, and bowhead body size class).

Harvest records (1972-2008) provided by the NSB-DWM were reviewed for information on feeding status during the spring. Whales were classified as either "feeding", "not feeding", or "uncertain" based on descriptive field records and/or laboratory data. If records indicated that a substantial amount (ie. at least 10 items or one liter of prey) was present in a stomach, the whale was classified as feeding. If field records indicated the stomach was empty, the whale was classified as not feeding. If field records recorded the presence of only a small amount of prey (i.e. less than 10 items or 1 liter), or that food was present but no quantity was indicated, the feeding status of the whale was recorded as uncertain. Items such as algae, feathers and pebbles were not considered to be food items. We compared the proportion of whales classified as "feeding", due to evidence of food in their stomachs, during the spring migration between the Bering Sea and the Beaufort Sea using chi-square tests. Whales with feeding status classified as uncertain were not included in this comparison.

Results

Biological samples were collected from twelve (12) of thirteen (13) bowhead whales harvested for subsistence purposes during fall 2005-spring 2008 (Appendix 1). Digestive tract content samples (from stomachs or intestines) were obtained from eight (8) of the harvested whales examined during this period. The internal organs remained inaccessible for two (2) whales (07S4, 07G2) that were butchered while floating in the ocean. The suite of other biological samples (ex. muscle, eye, skin, etc.) collected were transferred to the NSB-DWM (12 harvested whales) for ongoing studies and/or archived at the University of Alaska Museum for future studies (Appendix 2).

We identified prey from eight whales harvested during the monitored period (n=5 spring; n=3 fall). Over nine types of prey taxa were identified from the diet samples collected during this project (Appendix 3). Copepods occurred most frequently and were identified in 87% of the five whales sampled during the spring. These samples provided the first spring prey data from bowhead whales in the northern Bering Sea since 1982. Due to sampling conditions it was difficult to obtain quantitative data. There was evidence of epibenthic feeding with amphipods, cumaceans, polychaetes, and clams identified, though less frequently, as prey items. Euphausiids were not present in any whales sampled during the spring.

The three adult female whales harvested during late November 2005 had been feeding recently prior to death and euphausiids dominated each diet sample. These are the first diet data from the fall migration of bowhead whales into the northern Bering Sea. The sample sizes for feeding status between seasons is small and we recommend caution when interpreting these results. However, there are indications there may be a seasonal difference in the proportion of whales feeding as has been determined in bowhead whale diet studies in the Beaufort Sea

A review of St. Lawrence Island harvest records (1972-2008) revealed feeding status information for 28 whales. Nine whales were classified as “feeding”, 14 whales were classified as “not feeding”, and 5 whales were classified as “uncertain”.

We compared the proportion of whales feeding during the spring migration harvested near St. Lawrence Island in the Bering Sea (30%; n=20) and whales harvested during the spring migration near Barrow in the Beaufort Sea (34%; n=91; Lowry et al. 2004) and there was no difference (P= 0.73). During the spring, bowhead whales apparently feed with some regularity throughout the range of their spring migration in Alaskan waters.

Discussion

Results of this study have increased our understanding of the feeding ecology of bowhead whales in several ways. First, we have provided documentation that during the late fall migration bowhead whales feed as they move through the Bering Strait and enter the northern Bering Sea. While the sample size is small, it is interesting that all three whales examined in the fall had been feeding. Second, feeding near Saint Lawrence Island during the spring is a relatively regular event with a third of the animals examined showing evidence of feeding. Our data indicate that this rate of feeding activity is similar to that of bowhead whales traveling past Barrow in the Beaufort Sea during the latter part of the spring. Our sample sizes for Bering Sea diet are small so we recommend caution when interpreting these results. There are indications there may be a seasonal difference in the proportion of whales feeding similar to bowhead whale diet studies in the Beaufort Sea. Also, our data indicate there are seasonal differences in the prey composition consumed with euphausiids dominate in the fall diet but not present in the spring. Lastly, the data we document are consistent with bowhead whale feeding behavior observed by Alaska Native whalers from Saint Lawrence Island.

We have provided a new but still incomplete description of seasonal bowhead feeding activities and diet in this region. We recommend future collections of bowhead diet samples, harvest data, and other biological tissues from bowhead whales harvested on St. Lawrence Island in cooperation with the Gambell Whale Captains Association, Savoonga Boat Captains Association, NSB-DWM, Alaska Eskimo Whaling Commission (AEWC), and ADF&G to further understand the health, status, and feeding ecology of bowheads in the northern Bering Sea / Bering Strait region.

With diminishing sea ice predicted in the Bering Sea, the northern Bering Sea / Bering Strait region is expected to become a shipping corridor between Asian nations and Atlantic markets. Concerns exist over the potential effects of increased ship traffic associated with oil/gas development, commercial shipping, commercial fisheries, as well as ecotourism the availability and quality of all marine resources in the region due to increased pollution, underwater noise, and human interactions. Alaska Native communities in this region are highly reliant on the bowhead whale for nutritional and cultural needs.

This project could not have been done without the cooperation and support of SLI whaling captains. One of the most important aspects of this project has been Sheffield's work to include the Native community in the scientific work. This project helped to enhance a good working relationship amongst subsistence users and biologists. It also increased our collective Native and scientific knowledge of the bowhead whale.

Preliminary results of this bowhead sampling and diet project has been presented to and discussed with whaling captains, residents, as well as St. Lawrence Island IRA council members and Alaska Eskimo Whaling Commission representatives.

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APPENDICES

Appendix 1. Summary information for bowhead whales harvested near St. Lawrence Island during the 2005-2008 monitored whaling seasons. Pregnant animals indicated by *. Estimated total lengths are indicated by **. Whales not sampled (at all) are indicated by italic font. No whales were harvested during 2006.

ID Number	Village	Date	Sex	Total length (meters)
05S5 *	Savoonga	29-Nov-2005	Female	16.5 m
05S6 *	Savoonga	29-Nov-2005	Female	17.1 m
05S7 *	Savoonga	29-Nov-2005	Female	18.3 m
07G1	*Gambell*	*3-Apr-2007*	*Female*	*8.8 m*
07S1	Savoonga	13-Apr-2007	Male	10.0 m
07S2	Savoonga	15-Apr-2007	Female	8.3 m
07S3	Savoonga	16-Apr-2007	Male	10.7 m
07S4	Savoonga	27-Apr-2007	Female	15.2 m
07G2	Gambell	1-May-2007	Female	16.3 m
07G3	Gambell	1-May-2007	Female	15.3 m
07G4	Gambell	1-May-2007	Female	15.2 m
08S1	Savoonga	7-Apr-2008	Female	7.6 m **
08S2	Savoonga	27-Apr-2008	Male	13.7 m **

Appendix 2. Tissue samples collected from bowhead whales harvested near St. Lawrence Island during 2005-2008 and the recipient of those tissues.

	Stomach	Intestine	Eyeball	Skin	Muscle	Kidney	Liver	Spleen	Blubber	Ovaries	Testis	Baleen
05S5	ADF&G	ADF&G	NSB	NSB / UAM	-	-	-	-	-	-	-	NSB
05S6	ADF&G	-	-	NSB / UAM	-	-	-	-	-	NSB	-	NSB
05S7	-	ADF&G	NSB	NSB / UAM	-	-	-	-	-	-	-	NSB
07S1	ADF&G	ADF&G	NSB	NSB	NSB / UAM	-	-	-	NSB	-	-	-
07S2	ADF&G	-	NSB	NSB	NSB / UAM	NSB / UAM	NSB / UAM	NSB / UAM	NSB	NSB	-	-
07S3	-	ADF&G	NSB	NSB	NSB / UAM	NSB / UAM	NSB / UAM	NSB / UAM	NSB	-	-	-
07S4	-	-	NSB	NSB	NSB / UAM	-	-	-	-	-	-	-
07G2	-	-	-	NSB	NSB / UAM	-	-	-	-	-	-	-
07G3	-	ADF&G	NSB	NSB	NSB / UAM	-	-	-	NSB	-	-	-
07G4	-	ADF&G	NSB	NSB	NSB / UAM	-	-	-	NSB	-	-	-
08S1	-	ADF&G	NSB	NSB	-	-	-	-	NSB	-	-	NSB
08S2	-	ADF&G	NSB	NSB	-	NSB	-	-	NSB	-	NSB	NSB

ADF&G = Alaska Department of Fish and Game (Nome)
NSB = North Slope Borough, Department of Wildlife Management (Barrow)
UAM = University of Alaska Museum (Fairbanks)

Appendix 3. Prey items identified from diet samples of bowhead whales harvested near St. Lawrence Island during 2005-2008.

Prey Items	05S5	05S6	05S7	07S2	07G3	07G4	08S1	08S2
Crustaceans	-	-	-	-	X	-	-	-
Euphausiids	-	X	-	-	-	-	-	-
Thysanoessa raschii	X	-	X	-	-	-	-	-
Mysids								
Mysis oculata	-	-	-	X	-	-	-	-
Amphipods	-	-	-	X	-	-	-	-
Copepods (calanoid)	-	-	-	-	X	X	X	X
c.f. Calanus marshallae	X	X	X	-	-	-	-	-
Shrimp	-	X	X	X	X	-	-	-
Pandalidae	-	-	X	-	-	-	-	-
Crangonidae	-	-	X	-	-	-	-	-
Fish (vertebra)	-	-	X	-	-	-	-	-
Bivalve (shell)	-	-	-	X	-	-	-	-
Polychaete (Spintheridae)	X	X	X	-	-	-	-	-

Alaska Department
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- REPORT TO CAPTAINS -

Gambell – May 2006

TO: GAMBELL WHALING CAPTAINS
FROM: GAY SHEFFIELD

Report to Captains: Bowhead whale specimen collection at Gambell, May 8-14, 2006
Prepared by: Gay Sheffield, Alaska Department of Fish and Game, Fairbanks, AK.

The Alaska Department of Fish and Game (ADF&G) and the North Slope Borough, Department of Wildlife Management (NSB-DWM) are working together to document the diet and feeding ecology of bowhead whales in the Bering Sea. One objective is to collect stomach contents and other tissues from bowhead whales taken by subsistence whalers at Gambell, Alaska, during spring and fall.

I visited Gambell from 8-14 May 2006. I discussed objectives, techniques, and preliminary results of the bowhead sampling and diet project with whaling captains, residents, IRA council members, teachers, students, and Sivuqaq Native Corporation board members.

Strong and constant northerly winds, cold temperatures, and the rapid formation of new ice hampered whaling efforts at Gambell this spring. Gray whales were first reported near Gambell on May 9th. A large single bowhead whale was reported on the 11th but the hunting effort had switched to walruses that were passing by on unconsolidated pack ice.

I left Gambell May 14th via helicopter to join the US Coast Guard icebreaker Healy, which was 60 miles offshore of St. Lawrence Island. The objective of this oceanographic research cruise was to learn more about the marine life on the seafloor and how it has changed in recent years. I was on board to assist with the collection of the oceanographic data as well as to try to put transmitters on seals if there was an opportunity.

Although no bowheads were harvested this spring, I would like to thank the whaling captains and their community for their interest and assistance in the sampling project. I look forward to returning this fall to continue the sample collections.

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- REPORT TO CAPTAINS -

SAVOONGA – Spring 2006

TO: SAVOONGA WHALING CAPTAINS
FROM: GAY SHEFFIELD

Report to Captains: Bowhead whale specimen collection at Savoonga, April 19-May 8, 2006
Prepared by: Gay Sheffield, Alaska Department of Fish and Game, Fairbanks, AK.

The Alaska Department of Fish and Game (ADF&G) and the North Slope Borough, Department of Wildlife Management (NSB-DWM) are working together to document the diet and feeding ecology of bowhead whales in the Bering Sea. One objective is to collect stomach contents and other tissues from bowhead whales harvested at Savoonga, Alaska, during spring and fall.

I visited Savoonga from 19 April to 8 May 2006. I discussed objectives, techniques, and preliminary results of the bowhead sampling and diet project with whaling captains, residents, the City Council, IRA council members, the school principal, teachers, and students.

Strong and frequent northerly winds combined with very cold temperatures hampered whaling efforts at Pugughileq this spring. Sea ice was blown offshore and quickly replaced with thickening new ice. Whales were observed in small groups throughout my visit.

Whaling ended in early May due to a combination of factors including persistent high winds, a deteriorating overland snow machine trail, and the high cost and shortage of stove oil. Small groups of walruses and bearded seals were reported at Pugughileq at this time. Meanwhile, extensive sea ice was still present at the village of Savoonga and boating there was not possible.

Although no bowheads were harvested this spring, a baleen plate from a bowhead harvested during November 2005 (#05S7) was provided by the Savoonga Boat Captains Association. This specimen was transferred to the University of Alaska Museum to be archived.

I would like to thank the whaling captains and their community for the opportunity to travel to Pugughileq this spring and for their interest and assistance in the sampling project. I am looking forward to returning to Savoonga this fall to continue the sample collections.

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- REPORT TO CAPTAINS -

ST. LAWRENCE ISLAND - SPRING 2007

FROM: GAY SHEFFIELD

Report to Captains: Bowhead Whale Specimen Collection at St. Lawrence Island, Spring 2007
Prepared by: Gay Sheffield, Alaska Department of Fish and Game, Fairbanks, AK.

The Alaska Department of Fish and Game (ADF&G) and the North Slope Borough, Division of Wildlife Management (NSB-DWM) are working together to sample bowhead whales and document information of the diet and feeding ecology of bowheads in the Bering Sea. One objective was to collect stomach contents and other tissues from bowhead whales taken by subsistence whalers at St. Lawrence Island during 2007.

I visited St. Lawrence Island from April 11 to May 13 2007. I discussed objectives and preliminary results of the bowhead sampling and diet project with whaling captains, residents, IRA council members, and Sivuqaq Native Corporation Board of Directors.

A total of eight whales were harvested at St. Lawrence Island during spring 2007 (Table 1). Biological specimens were collected from seven bowhead whales during my visit (Table 2). Stomach contents and/or intestines of five whales were examined and sampled. The internal organs were not available for two whales as these animals remained floating in the ocean during butchering. Samples of stomach and/or intestine contents were frozen for identification of prey items in the laboratory in Fairbanks. Other biological samples were provided to the NSB-DWM for ongoing studies and/or archived at the University of Alaska Museum for future studies.

In Fairbanks, subsamples of stomach contents were thawed, rinsed, and examined microscopically. Preliminary results from the laboratory indicate that three of the bowheads had been feeding prior to their deaths (Table 3). The stomachs of the two sub adult males (07S1 and 07S3) were empty or contained only parasitic worms (nematodes). Preliminary analysis indicates that shrimp dominated the diet samples from 07S2 and 07G3 though other prey was also identified. Fine quartz grit was identified from the intestine of 07G3 indicating feeding near the seafloor. Copepods dominated the sample from 07G4. Unlike the fall 2005 diet samples from bowhead whales harvested near Savoonga, no euphausiids/"krill" or fish were identified as prey items and amphipods were identified as an additional prey item during spring 2007 from 07S2. Amphipods were also sampled from the throats of 07G4 and 07G3 but it is unknown if these invertebrates were scavenging the whale carcasses (that had remained in the water >12 hr) or whether they were prey items.

Further work in the laboratory will provide details on the types of prey identified. Additional bowhead whale samples will be collected, when available, during the fall 2007 and spring 2008 harvests in order to compare diet by season, sex, and size of whales.

Tables 4-10 provide harvest data and measurements. Appendix 1 contains photographs of each whale harvested near Pugughileq (07S1, 07S2, 07S3, 07S4) and the whales harvested during May near Gambell (07G2, 07G3, and 07G 4).

I would like to thank the whaling captains and their communities for the opportunity to travel to St. Lawrence Island this spring and for their interest and assistance in the sampling project. This sampling of bowhead whales was successful due to the experience, patience, and generosity of the Savoonga and Gambell whaling captains and their communities. I am looking forward to returning this fall to continue this project.

Table 1. Bowhead whales harvested near St. Lawrence Island during spring 2007. Approximate lengths indicated by *

ID Number	Date	Sex	Total Length
07G1	2-Apr-2007	Female	29'0" (8.8 m)
07S1	13-Apr-2007	Male	32'8" (10.0 m)
07S2	15-Apr-2007	Female	27'3" * (8.3 m)
07S3	16-Apr-2007	Male	35'1" (10.7 m)
07S4	27-Apr-2007	Female	50'0" * (15.2 m)
07G2	1-May-2007	Female	53'4" * (16.3 m)
07G3	1-May-2007	Female	50'3" * (15.3 m)
07G4	1-May-2007	Female	50'0" * (15.2 m)

Table 2. Tissues collected from seven bowhead whales harvested near St. Lawrence Island during spring 2007 and the recipient of those tissues.

	07S1	07S2	07S3	07S4	07G2	07G3	07G4
Stomach contents	ADF&G	-	ADF&G	-	-	-	-
Feces	-	ADF&G	ADF&G	-	-	ADF&G	ADF&G
Eyeball	NSB	NSB	NSB	NSB	-	NSB	NSB
Skin	NSB	NSB	NSB	NSB	NSB	NSB	NSB
Muscle	NSB/UAM	NSB/UAM	NSB/UAM	NSB/UAM	NSB/UAM	NSB/UAM	NSB/UAM
Kidney	-	NSB/UAM	NSB/UAM	-	-	-	-
Liver	-	NSB/UAM	NSB/UAM	-	-	-	-
Spleen	-	NSB/UAM	NSB/UAM	-	-	-	-
Blubber	NSB	NSB	NSB	-	-	NSB	NSB
Ovaries	-	NSB	-	-	-	-	-

ADF&G = Alaska Department of Fish and Game (Fairbanks)
NSB = North Slope Borough, Department of Wildlife Management (Barrow)
UAM = University of Alaska Museum (Fairbanks)

Table 3. Preliminary results of prey items from bowhead whales harvested near St. Lawrence Island during spring 2007.

Prey Items	07S1	07S2	07S3	07G3	07G4
Amphipods	-	X	-	-	-
Copepods	-	-	-	-	X
Metridea sp.	-	-	-	X	-
Shrimp	-	X	-	X	-

07S1

07S2

Appendix 1. (Continued)

07S3

07S4

Appendix 1. (Continued)

07G2

07G3

Appendix 1. (Continued)

07G4

Alaska Department
OF
FISH AND GAME

- REPORT TO CAPTAINS -

ST. LAWRENCE ISLAND - SPRING 2008

FROM: GAY SHEFFIELD

Report to Captains: Bowhead Whale Specimen Collection at St. Lawrence Island, Spring 2008

Prepared by: Gay Sheffield, Alaska Department of Fish and Game, Fairbanks, AK.

The Alaska Department of Fish and Game (ADF&G) and the North Slope Borough, Department of Wildlife Management (NSB-DWM) are working together to sample bowhead whales and document information of the diet and feeding ecology of bowheads in the Bering Sea. One objective was to collect stomach contents and other tissues from bowhead whales taken by subsistence whalers at St. Lawrence Island during 2008.

I visited St. Lawrence Island several times from late March 28 to early May 2008. I discussed objectives and preliminary results of the bowhead sampling and diet project with whaling captains, residents, IRA council members, and Native Corporation Board members.

Two bowhead whales were harvested at St. Lawrence Island during spring 2008 (Table 1). Biological specimens were collected from both whales during my visit (Table 2). The internal organs were not readily available for examination as the whales remained floating in the ocean during butchering. However, small fecal sample was obtained from the first whale (08S1) and the stomach and a portion of intestine from the second whale (08S2) were examined. The stomach of 08S2 was opened while floating inside a portion of the body cavity using a knife on a long pole. The stomach contained several gallons of blood clots and no sample was collected. The intestine contained green liquid and ~three ounce green lump of fecal material which was collected and frozen for further analysis in Fairbanks. Other biological samples were provided to the NSB-DWM for ongoing studies and/or archived at the University of Alaska Museum for future studies.

Further work in the laboratory will provide details on the types of prey identified. Additional bowhead whale samples will be collected, when available, during the fall 2008 and spring 2009 harvests in order to compare diet by season, sex, and size of whales.

Tables 3 and 4 provide harvest data and measurements. Appendix 1 contains photographs of each whale harvested near Pugughileq (08S1, 08S2). No whales were harvested near Gambell.

I would like to thank the whaling captains and their communities for the opportunity to travel to St. Lawrence Island this spring and for their interest and assistance in the sampling project. This sampling of bowhead whales was successful due to the experience, patience, and generosity of the St. Lawrence Island whaling captains and their communities. I am looking forward to returning this fall to continue this project.

Table 1. Bowhead whales harvested near St. Lawrence Island during spring 2008. Approximate lengths are indicated by *

ID Number	Date	Sex	Total Length
08S1	7-Apr-2008	Female	24’0” * (7.6 m)
08S2	27-Apr-2008	Male	45’0” * (13.7 m)

Table 2. Tissues collected from bowhead whales harvested near St. Lawrence Island during spring 2008 and the recipient of those tissues.

	08S1	08S2
Stomach contents	-	-
Feces	ADF&G	ADF&G
Eyeball	NSB-DWM	NSB-DWM
Skin	NSB-DWM	NSB-DWM
Muscle	NSB-DWM	NSB-DWM
Kidney	-	NSB-DWM
Liver	-	-
Spleen	-	-
Blubber	NSB-DWM	NSB-DWM
Ovaries	-	-
Testis	-	NSB-DWM
Baleen	NSB-DWM	NSB-DWM

ADF&G = Alaska Department of Fish and Game (Fairbanks)
NSB-DWM = North Slope Borough, Department of Wildlife Management (Barrow)

Appendix 1. Photographs of 08S1 and 08S2 harvested during spring 2008.

08S1

08S2

ABSTRACT

BOWHEAD WHALE FEEDING IN THE NORTHERN BERING SEA NEAR SAINT LAWRENCE ISLAND, ALASKA

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We studied feeding of bowhead whales taken by Alaska Natives at Saint Lawrence Island in the northern Bering Sea during the spring (April-May) and fall (November) migrations from 1972-2008. Our objectives were to: 1) identify the proportion of harvested whales that had been feeding based on historical harvest records and 2) describe the prey identified from the stomach and/or intestinal contents of eight whales harvested during 2005-2008.

Harvest records (1972-2008) were reviewed for information on feeding status during the spring. Six whales (30%) harvested during the spring had evidence of feeding. Three whales (100%) harvested during the fall had been feeding shortly before death. The sample sizes for feeding status between seasons is small and we recommend caution when interpreting these results. However, there are indications there may be a seasonal difference in the proportion of whales feeding as has been determined in bowhead whale diet studies in the Beaufort Sea.

Of note, there was no difference (P= 0.73) in the proportion of bowhead whales feeding in the Bering Sea (30%; n=20) and the Beaufort Sea (34%; n=91; Lowry et al. 2004) during the spring migration.

Five whales harvested during spring (2007-2008) provided the first spring prey data from the northern Bering Sea since 1982. Copepods occurred most frequently and were identified in 87% of the whales sampled.

The three whales harvested during late November 2005 provided the first prey data from bowhead whales during their fall migration into the northern Bering Sea. Euphausiids dominated the diet samples of whales sampled during late November. Euphausiids were not present in any whales sampled during the spring. The sample sizes for diet samples are small and we recommend caution when interpreting these results.

The data we document is consistent with bowhead whale feeding behavior observed by Alaska Native whalers from Saint Lawrence Island. Bowhead whales feed near Saint Lawrence Island during spring and fall migrations.