ENVIRONMENTAL ASSESSMENT

for

ISSUING ANNUAL QUOTAS TO THE ALASKA ESKIMO WHALING COMMISSION FOR A SUBSISTENCE HUNT ON BOWHEAD WHALES FOR THE YEARS 2003 THROUGH 2007

Prepared by
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

February 23, 2003

Table of Contents

1 PURPOSE AND NEED FOR ACTION

The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) proposes to issue annual quotas to the Alaska Eskimo Whaling Commission (AEWC) to allow continuation of their subsistence hunt for bowhead whales from the Western Arctic stock[1] for the years 2003 through 2007. NOAA Fisheries' objective is to accommodate Federal trust responsibilities by recognizing the cultural and subsistence needs of Alaskan Natives, to the fullest extent possible consistent with applicable law, and to ensure that any aboriginal subsistence hunt of whales does not adversely effect the conservation of the Western Arctic bowhead whale stock.

This Environmental Assessment (EA), prepared pursuant to the National Environmental Policy Act (NEPA), considers four alternatives for issuance to the AEWC of a share of the quota approved by the International Whaling Commission (IWC), including a no action alternative. The proposed action would comply with NOAA Fisheries' responsibilities under section 101(b) of the Marine Mammal Protection Act (MMPA) and responsibilities under the auspices of the International Convention for the Regulation of Whaling (ICRW) by granting the AEWC an IWC quota for bowhead whales for nutritional and subsistence purposes, with limits that conserve the Western Arctic bowhead whale stock.

1.1 Eskimo Tradition of Subsistence Hunt of Whales

Inupiat and Siberian Yup'ik Eskimos have hunted bowhead whales continuously for over 2,000 years (Stoker and Krupnik, 1993). Hunting bowhead whales in Alaska remains a communal activity that supplies important meat and *maktak*[2] for the entire community as well as for feasts and during annual celebrations. Formalized patterns of hunting, sharing, and consumption characterize the modern bowhead harvest. Of all subsistence activities in these communities, the bowhead whale hunt represents one of the greatest concentrations of effort and time. It is the principal activity through which traditional skills for survival in the Arctic are passed to younger generations. It also provides ongoing reinforcement of the traditional social structure. Thus, in addition to being a major source of food, the bowhead subsistence hunt is a large part of the cultural tradition of these communities and modern cultural identity (Braund et al., 1997).

Subsistence takes have been regulated by a quota system under the authority of the IWC since 1977. Alaska Native subsistence hunters, from 10 northern Alaskan communities, take less than one percent of the stock of bowhead whales per year. Since 1977, the number of strikes has ranged between 14 and 75 animals per year, depending in part on changes in IWC management strategy due to higher estimates of bowhead whale abundance in recent years, as well as hunter

[1]Also referred to as the Bering-Chukchi-Beaufort Seas stock and the Bering Sea Stock.

[2]*Maktak* is whale skin and a layer of blubber that is used for food.

efficiency. (Angliss et al., 2001)

The total annual take of Western Arctic bowhead whales by Alaska Natives over the last ten years, including whales that are struck but lost, was reported to be 52 whales in 1993, 46 in 1994, 57 in 1995, 44 in 1996, 66 in 1997, 54 in 1998, 47 in 1999, 47 in 2000, 75 in 2001 and 50[3] in 2002 (Angliss et al., *in press*).

The quota regulated through the IWC also allows the Russian Chukotkan Natives to hunt bowhead whales from the Western Arctic stock. The annual distribution of the quota between Russian and Alaska Natives is determined through a bilateral agreement between the U.S. and Russian Governments. (See Appendix 9.1)

1.2 International Whaling Commission and Governance of Aboriginal Whaling

In 1946, the United States signed the ICRW. The ICRW is the treaty that serves to manage and conserve all great whale species. Each Contracting Government to the ICRW is represented on the IWC. The IWC recognizes aboriginal whaling as a category distinct from commercial whaling and exempt from the current moratorium on commercial whaling. The ICRW indicates that the IWC may not allocate specific quotas to any particular nationality or group of whalers. Because of this prohibition, the IWC sets an overall aboriginal subsistence harvest for a relevant stock, based on the request of Contracting Governments on behalf of the aboriginal hunters. In the case of Alaska Eskimo and Russian Native subsistence hunts, the United States and Russia make a joint request for a subsistence quota for bowhead whales to the IWC.

Quotas for aboriginal subsistence hunts are set based on cultural and nutritional need, provided that the quotas are either sustainable or low enough to allow stocks to recover if they had previously been depleted by commercial whaling. There is no formal IWC definition of aboriginal subsistence hunts, only working group guidelines that have never been formally adopted by the Commission.

1.3 International Whaling Commission Action on Quota Requests

Since the late 1970's the IWC has determined catch limits for bowhead whale harvests, after considering the nutritional and cultural need for bowhead whales by Alaska Eskimos and the level of harvest that is sustainable. In 1986, the IWC accepted a method to calculate subsistence and cultural need of Alaska Eskimos for bowhead whales. This method incorporates the historic and current size of the Eskimo population residing in Alaskan subsistence hunting villages and the number of bowhead whales historically landed by each community (See Appendix 9.4). Because bowhead subsistence hunts are a community-wide activity, it is appropriate to consider

[3]Preliminary report, including 2 abandoned whales.

the community population in association with the historic harvest levels. Besides abundance of bowhead whales, community population levels are a critical factor that influences harvests because the community population dictates the number and size of subsistence hunt crews and the amount of meat and *maktak* needed to feed the community, share with others, and provide for annual celebrations (Braund et al., 1997).

The first calculation of nutritional and cultural need was submitted to the IWC in 1983 and was accepted by the IWC in 1986 (U.S. Government, 1983). Using the same method for calculating need, the second calculation was submitted to and accepted by the IWC in 1988, when more extensive research provided additional historical subsistence hunting and human population data. The 1988 study used the most recent Eskimo population data available at that time, ranging from 1983 to 1987, to calculate then-current need (Braund, Stoker and Kruse, 1988). The third calculation of need was submitted to and accepted by the IWC in 1994, based on July 1, 1992 human population data generated by the State of Alaska, Department of Labor. The fourth calculation, submitted to the IWC in 1997, utilized the same method accepted by the IWC in 1986 for calculating need, presenting revised calculations based on July 1, 1997 human population data generated by the State of Alaska, Department of Labor (Braund et al., 1997). This same calculation was submitted to the annual IWC meeting in 2002, as no new calculation has been conducted since 1997. This need statement demonstrated a documented nutritional and cultural need for 56 landed bowhead whales per year.

1.3.1 Recent IWC Quota Discussions

At its 49th annual meeting in 1997, the IWC approved a 5-year quota for the aboriginal subsistence take from the Western Arctic stock of bowhead whales (IWC, 1998). The quota allowed for a total of up to 280 whales to be landed in the years 1998 through 2002. For each of these years, the number of bowhead whales struck was not to exceed 67 whales, except that any unused portion of a strike quota from any year was to be carried forward and added to the strike quota of any subsequent year, provided that no more than 15 strikes were added to the strike quota for any one year.

The basis for the quota was a joint request by the Russian Federation and the United States, requesting an annual average of 56 landed bowhead whales (or a total of 255 for the Alaska Eskimos and 25 for the Chukotka Natives over the 5-year period). This request was based on the most recent Alaska Eskimo documented nutritional and cultural need of 56 landed whales per year. This quota therefore, did not fulfill the AEWC documented need since 5 landed whales per year were allocated to Russian Natives. The annual strike limits and quotas for bowhead whales were determined at the beginning of each year after consultation with the AEWC and renewal of the U.S.-Russia bilateral agreement governing the allocation, between the two countries, of the bowhead whale subsistence quota.

At the 52nd annual meeting of the IWC, held in June and July of 2000, the IWC Scientific Committee proposed a structure for block quotas for the bowhead whale aboriginal subsistence

hunt to be used as part of the Scientific Committee's proposed development of an Aboriginal Whaling Management Plan (AWMP). The proposed AWMP structure called for five-year block quotas with an inter-annual carry-over allowance of up to 50 percent of unused strikes, including strikes from the previous quota block (IWC, 2001).

At the 53rd IWC annual meeting, held in July of 2001, the Commission agreed with the Scientific Committee's recommendations with respect to carry-over. The Scientific Committee also noted that if, under a recommended Strike Limit Algorithm, current aboriginal subsistence need is met, then a revised Schedule paragraph might simply specify a block strike limit quota with an annual cap on strikes. The Scientific Committee also reiterated its 1999 advice for the Western Arctic stock of bowhead whales, specifically, that it is very likely that an annual catch limit of 102 whales or less would be consistent with the requirements of the Schedule (IWC, 2002).

At the IWC's 54th annual meeting, held in May of 2002, the Scientific Committee again reiterated its advice with regard to strike and catch limits (see Appendix 9.2). The Scientific Committee presented the proposal for an AWMP to the IWC, and although the proposal was agreed to in principle, it was not formally adopted by the IWC. Despite the support of the Scientific Committee Chair at the May meeting, the IWC did not renew the aboriginal subsistence catch limits for Western Arctic bowhead whales. However, at a special meeting of the IWC held in October of 2002, the IWC renewed the bowhead catch limits by consensus, allowing for a combined total of up to 280 whales to be landed in the years 2003 through 2007 by Alaskan Eskimos and Russian Chukotkan Natives. For each of these years, the number of bowhead whales struck shall not exceed 67 whales, except that any unused portion of a strike quota from any year (including from the 1998 through 2002 quota block) shall be carried forward and added to the strike quota of any subsequent year, provided that no more than 15 strikes shall be added to the strike quota for any one year. Since this quota of 56 landed whales per year continues to be shared between Alaskan and Russian Natives, the quota does not meet the documented need for landed whales by Alaska Natives.

1.4 Alaska Eskimo Whaling Commission

The AEWC was formed in 1977 to represent the bowhead subsistence hunting communities of Alaska in an effort to convince the U.S. Government to take action to preserve the Eskimos' subsistence hunt of bowhead whales. The AEWC also agreed to cooperate with the U.S. in scientific research efforts and to develop a management plan to be followed by all of the bowhead subsistence hunters to help improve the efficiency of the subsistence hunt.

The members of the AEWC are the registered bowhead subsistence captains and their crew members from the 10 northern Alaskan communities of Gambell, Savoonga, Wales, Little Diomede, Kivalina, Point Hope, Wainwright, Barrow, Nuiqsut, and Kaktovik. There are two classes of members: voting members and non-voting members. Voting members are the

registered bowhead subsistence captains in each community. The crew members are non-voting members of the AEWC. The AEWC is directed by a board of ten Commissioners; one elected from each of the above villages. This Board has authority over all of the Commission's affairs (AEWC By-Laws, 1982 and as amended and restated October 14, 1992). Federal authority for cooperative management of the Eskimo subsistence bowhead whale hunt is shared with the AEWC through a cooperative agreement between the AEWC and the United States Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) (See Appendix 9.5).

1.5 Explanation of Legal Issues

1.5.1 Federal Trust Responsibilities and Government-to-Government Relationship

The concept of "trust responsibility" is derived from the special relationship between the Federal Government and Indians, first delineated by Supreme Court Chief Justice John Marshall in *Cherokee Nation v. Georgia*, 30 U.S. 1 (5 Pet.) (1831). Later, in *Seminole Nation v. United States*, 316 U.S. 286 (1942), the Court noted that the United States has charged itself with moral obligations of the highest responsibility and trust toward Indian tribes. The scope of the Federal trust relationship is broad and incumbent upon all Federal agencies. The U.S. Government has an obligation to protect tribal land, assets, and resources as well as a duty to carry out the mandates of Federal law with respect to American Indian and Alaska Native tribes. This unique relationship provides the Constitutional basis for legislation, treaties, and Executive Orders that grant unique rights or privileges to Native Americans (*Morton v. Mancari*, 417 U.S. 535, 551-53 (1974)).

In furtherance of this trust responsibility and to demonstrate respect for sovereign tribal governments, the principles described above were incorporated into Secretarial Order No. 3206, dated June 5, 1997, and signed by the Secretaries of Commerce and Interior. This Order, entitled "American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act," directs both Departments to carry out their responsibilities under the ESA in a manner that harmonizes the Federal trust responsibility to tribes, tribal sovereignty, and statutory missions of the Departments, so as to avoid or minimize the potential for conflict and confrontation. However, this Secretarial Order does not extend to Alaska Natives, and as such, on January 19, 2001, the Secretary of Commerce and the Secretary of the Interior signed Secretarial Order No. 3225. This Order is entitled "Endangered Species Act and Subsistence Uses in Alaska" (Supplement to Secretarial Order 3206) and essentially extends the principles articulated in Order No. 3206 to Alaska Natives.

Executive Order (EO) 13084, issued May 14, 1998, requires each Federal agency to establish meaningful consultation and collaboration with Indian tribal governments (including Alaska Natives) in formulating policies that significantly or uniquely affect their communities. Entitled "Consultation and Coordination with Indian Tribal Governments," the order requires agency policy making to be guided by principles of respect for tribal treaty rights and responsibilities that

arise from the unique legal relationship between the Federal Government and the Indian tribal governments. Furthermore, on issues relating to treaty rights, EO 13084 directs each agency to explore, and, where appropriate, use consensual mechanisms for developing regulations.

On November 6, 2000, EO 13175 replaced EO 13084. The order carries the same title and strengths as the previous order about the government-to-government relationship between the U.S. Government and Indian tribes. E.O. 13175 requires that all Executive departments and agencies consult with Indian tribes and respect tribal sovereignty as they develop policy on issues that impact Indian communities.

1.5.2 International Convention for the Regulation of Whaling

The objective of the ICRW is the proper conservation and management of world whale stocks, thus making possible the orderly development of the whaling industry. The ICRW established the IWC to provide for a continuing status review of whale stocks and for such additions to or modifications of the agreed conservation measures as might be desirable. Catch limits for aboriginal subsistence hunts are set by the IWC based on cultural and nutritional need, provided that the quotas are either sustainable or low enough to allow stocks to recover if they have been depleted by commercial whaling. The ICRW is implemented domestically through the Whaling Convention Act (WCA), which governs U.S. participation in the IWC and management of whaling activities under U.S. jurisdiction. To ensure consistency between domestic and international obligations, the WCA provides that it is unlawful for any person subject to the jurisdiction of the U.S. to engage in whaling in violation of the ICRW or the Schedule to the ICRW. See 16 U.S.C. 916c(a); 50 C.F.R. 230.3.

1.5.3 Marine Mammal Protection Act and Endangered Species Act

Bowhead whales are listed as endangered under the Endangered Species Act (ESA) and depleted under the Marine Mammal Protection Act (MMPA). NOAA Fisheries is responsible for conservation and management of the Western Arctic stock of bowhead whales pursuant to both of these Acts.

The ESA is the principal federal law that guides the conservation of endangered or threatened species. Under the ESA, an ‘‘endangered species’’ means “any species which is in danger of extinction throughout all or a significant portion of its range...” 16 U.S.C. 1532(6). Section 10 of the ESA provides for scientific research on listed species, as well as for activities that enhance the propagation or survival of listed species. In addition, the ESA expressly provides for Alaska Native subsistence activities (see 16 U.S.C. 1539(e)). Under section 7 of the ESA, NOAA Fisheries consults with itself and with the U.S. Fish and Wildlife Service on the effects of its proposed action on endangered and threatened species.

The MMPA is the principal federal law that guides marine mammal conservation. Section 2(6) of the MMPA provides, in part, that marine mammals are resources of great international

significance, and that a management goal should be to obtain sustainable populations of marine mammals (16 U.S.C. 1361(6)). Under the MMPA, a "depleted" species or population stock is one in which the species or population stock is below its optimum sustainable population or that is listed as an endangered or threatened species under the ESA (16 U.S.C. 1362(1)). Under the MMPA, marine mammals are protected by a prohibition on take. However, as in the ESA, the MMPA also expressly provides for Alaska Native subsistence activities (see 16 U.S.C. 1371(b)). In addition, section 113 of the MMPA specifically states that the provisions of the MMPA are in addition to, and not in contravention of, existing international treaties, conventions, or agreements (e.g., the ICRW).

1.5.4 Federal Licenses Necessary to Implement the Proposed Action

A license is issued by the AEWC to bowhead subsistence captains through the procedures set out in NOAA Fisheries's regulations (50 CFR 230.5) for aboriginal subsistence hunting allowed by the IWC. These procedures require that the hunting of whales for subsistence purposes may only be conducted in accordance with a cooperative agreement between the relevant Native American organization and NOAA Fisheries. NOAA Fisheries must also annually publish aboriginal subsistence whale hunting quotas and any other limitations on such hunting in the Federal Register (50 CFR 230.6).

1.5.5 NOAA-AEWC Cooperative Agreement

The purposes of the NOAA-AEWC Cooperative Agreement are to protect the Western Arctic population of bowhead whale and the Eskimo culture, to promote scientific investigation of the bowhead whale, and to effectuate the other purposes of the MMPA, the WCA, and the ESA, as these acts relate to the aboriginal subsistence hunts for whales. In order to achieve these purposes, the agreement provides for:

1. Cooperation between members of the AEWC and NOAA in management of the subsistence bowhead whale hunt, and

2. An exclusive enforcement mechanism carried about by the AEWC and applied to any violation by bowhead subsistence captains (or their crews) who are registered members of the AEWC of any provisions of the MMPA, the ESA, or the WCA, as these acts may relate to aboriginal subsistence hunts; of the ICRW; of the regulations of the IWC; of the AEWC management plan; or of the agreement itself.

The Cooperative Agreement contains inspection and reporting provisions, as well as management and enforcement provisions. (See Appendix 9.5)

1.6 Public Involvement and Scoping Process

On December 19, 2001 (66 FR 65472) NOAA Fisheries issued a notice of intent to prepare an Environmental Assessment for issuing a bowhead whale subsistence quota to the AEWC for the years 2003 through 2007. NOAA Fisheries requested comments on issuing a quota, information on the affected environment, or the environmental consequences of issuing the quota. NOAA Fisheries also mailed the notice of intent to the following 25 interested parties:

- Alaska Beluga Whale Committee
- Alaska Department of Fish and Game
- Alaska Eskimo Whaling Commission
- Barrow Whaling Captain's Association
- British Petroleum Exploration (Alaska)
- Congressman Don Young
- Greenpeace
- Humane Society of the United States
- Inupiat Community for the Arctic Slope
- Kaktovik Whaling Captain's Association
- Jessica Lefevre
- LGL, Ltd.
- Marine Mammal Commission
- Minerals Management Service
- Native Village of Barrow, Alaska
- Nuiqsut Whaling Captain's Association
- North Slope Borough (Mayor of)
- North Slope Borough (Department of Wildlife Management)
- Phillips Alaska
- Senator Frank Murkowski
- Senator Ted Stevens
- Steven Braund
- Trustees for Alaska
- U.S. Fish and Wildlife Service
- Western Geco, LLC

Comments from the public were accepted through January 31, 2002. NOAA Fisheries received five comment letters as a result of the notice of intent and incorporated the issues identified in the comment letters into the draft EA.

A draft EA was made available December 9, 2002 for a 30-day public comment period. Comments were accepted through January 8, 2003. NOAA Fisheries received three comment letters during this comment period and incorporated the concerns addressed in the comment letters in the final EA.

1.7 Alternatives Considered and Rejected

Alternatives considered but discarded included alternatives that both substantially decreased and increased the absolute and annual bowhead whale subsistence quota for Alaskan Eskimos. A substantially decreased quota would not meet Alaskan Eskimo documented need for bowheads. A substantially increased quota may exceed Eskimo subsistence needs and would not be adequately protective of bowheads if it exceeds an annual removal limit of 102 bowhead whales. One option under Alternative 4 would be to compensate the AEWC for not exercising its subsistence rights. While it may be appropriate for the AEWC to receive compensation for economic harm due to a prohibition of a commercial activity, in this case the AEWC is requesting a quota for cultural and nutritional subsistence purposes, something that cannot be compensated with money. Such alternatives were rejected because they do not meet the first objective of the proposed action, which is to meet the documented cultural and nutritional needs for bowhead whales by Alaskan Eskimos. While the No Action Alternative does not meet this first objective, NOAA Fisheries has included it in accordance with NEPA.

The second objective of the proposed action is to ensure that any subsistence whale hunting activity does not exceed the recommended annual removal limit of 102 bowhead whales, as advised by the IWC Scientific Committee (see Appendix 9.2) for the Western Arctic bowhead whale stock. Therefore, any alternatives resulting in annual removals exceeding 102 were not considered further.

2 ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Under the Whaling Convention Act, NOAA Fisheries issues quotas on an annual basis. In order to comprehensively assess the effects of a proposed bowhead quota, for the specified 5-year block, NOAA Fisheries is evaluating them over a five year period.

2.1 Alternative 1 – Grant the AEWC a quota of 255 landed whales over 5 years (2003 through 2007), with an annual strike quota of 67 bowhead whales per year, where no unused strikes are added to the quota for any one year.[4]

[4]The quota for 255 landed whales represents the U.S. portion of the total quota of 280 landed whales granted by the IWC. The strike quota of 67 whales plus any carry-over is the full strike quota. The actual allocation of strikes between Alaska Eskimos and Russian Chukotkan Natives is determined on an annual basis through a bilateral agreement between the U.S. and Russian Governments.

Under this alternative, NOAA Fisheries would (through annual quotas[5]) grant the AEWC a quota of 255 landed whales over 5 years (2003 through 2007), with an annual strike quota of 67 bowhead whales per year. Under this alternative, no unused strikes from a previous year would be added to the quota for a subsequent year, notwithstanding the IWC's approval of a carry-over of unused strikes in the bowhead subsistence quota.

2.2 Alternative 2 (Proposed) – Grant the AEWC a quota of 255 landed whales over 5 years (2003 through 2007), with an annual strike quota of 67 bowhead whales per year, where no more than 15 unused strikes are added to the strike quota for any one year.

Under this alternative (the proposed action), NOAA Fisheries would (through annual quotas) grant the AEWC a quota of 255 landed whales over 5 years (2003 through 2007), with an annual strike quota of 67 bowhead whales per year. Under this alternative, 15 unused strikes from a previous year (including from the 1998 through 2002 quota block) could be added to the quota for a subsequent year, consistent with the IWC quota. A carry-over of 15 unused strikes was approved by the IWC, in addition to the block quota of 280 whales. A carry-over allows for variability in hunting conditions from one year to the next within limits that conserve the Western Arctic bowhead stock.

2.3 Alternative 3 – Grant the AEWC a quota of 255 landed whales over 5 years (2003 through 2007), with an annual strike quota of 67 bowhead whales per year, where, for unused strikes, up to 50 percent of the annual strike limit (that is, 33 whales) is added to the strike quota for any one year.

Under this alternative, NOAA Fisheries would (through annual quotas) grant the AEWC a quota of 255 landed whales over 5 years (2003 through 2007), with an annual strike quota of 67 bowhead whales per year. Under this alternative, up to 50 percent of the unused annual strike limit from a previous year (including from the 1998 through 2002 quota block) could be added to the quota for a subsequent year. This quota, including the 50 percent carry-over, would be consistent with recommendations of the IWC Scientific Committee.

2.4 Alternative 4 (No Action) – Do not grant the AEWC a quota.

Under this alternative, NOAA Fisheries would not issue the AEWC a subsistence whaling quota for cultural and nutritional purposes.

---

[5]The actual quota issuance to the AEWC would be made on an annual basis by NOAA Fisheries. See 50 CFR 230.6.

3 AFFECTED ENVIRONMENT

3.1 Geographic Location

The Western Arctic stock of bowhead whales occurs in the Bering, Chukchi, and Beaufort Seas. The Bering Sea is in the northernmost region of the Pacific Ocean, bordered on the north and west by Russia, on the east by mainland Alaska, and on the south by the Aleutian Islands. The Bering Sea is connected to the Arctic Ocean, which includes the Chukchi Sea on the northern side of the Bering Strait and the Beaufort Sea to the east of the Chukchi Sea.

3.2 The Western Arctic Stock of Bowhead Whale

Bowhead whales are distributed in seasonally ice-covered waters of the Arctic and near-Arctic, generally north of 54˚N and south of 75˚N in the western Arctic Basin (Moore and Reeves, 1993). For management purposes, five stocks are currently recognized by the IWC. Small stocks occur in the Sea of Okhotsk, Davis Strait, Hudson Bay, and in the eastern North Atlantic (IWC, 1992). These small bowhead stocks are comprised of only a few tens to a few hundreds of individuals (Shelden and Rugh, 1995). The largest remnant population, and only stock that is found within U. S. waters, is the Western Arctic stock, which occurs in the Bering, Chukchi, and Beaufort Seas. Figure 1 shows the approximate distribution of the Western Arctic stock of bowhead whales, including migratory patterns.

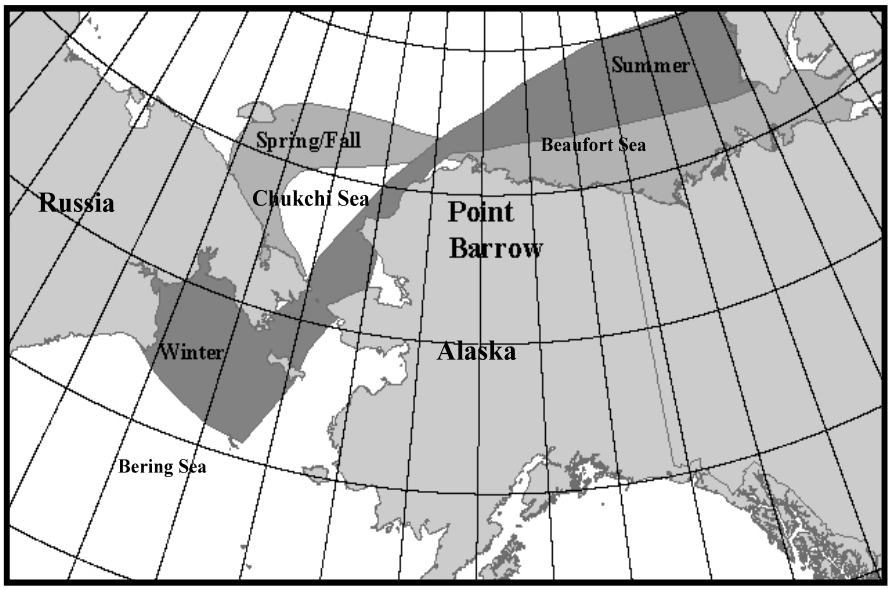


Figure 1 - Bowhead Whale Distribution

3.2.1 Current Abundance, Trends, Genetics, and Status

Abundance and Trends. All stocks of bowheads were severely depleted during intense commercial whaling prior to the 20th century, and most of these stocks have not shown significant evidence of recovery even though a century has passed since commercial whaling stopped (Woodby and Botkin, 1993). Only the Western Arctic stock has recovered significantly (Zeh et al., 1993). In order to assess the size of this stock, NMFS began a study of abundance in 1976 by conducting visual counts of whales during the spring while they were migrating past ice-based sites north of Point Barrow, Alaska (Krogman, 1980). This census has been conducted under the direction of the North Slope Borough, Department of Wildlife Management since the mid-1980s (Dronenberg et al., 1986; George et al., 1988). These counts continue to be the primary source of abundance information for this stock (George et al., 2002). As part of the North Slope Borough, summary counts are corrected for whales missed by the observers, in particular through the use of acoustic arrays that detect the location of vocalizing whales (Zeh et al., 1993).

Analysis of data collected during the 1993 visual and acoustic census (Raftery and Zeh, 1994; Zeh et al., 1995a) conducted near Point Barrow resulted in a population estimate of 7,992 bowhead whales (95% C.I. = 6,900-9,200) (IWC, 1995). Zeh et al. (1995b) continued to refine the estimate using newly available acoustic data. The 1988 Bayes empirical method applied to these data yielded a population estimate of 7,500 (95% C.I. = 6,400-9,200) (Zeh et al., 1993, 1995b). An alternative method, the N4/P4 method, which compared the estimated number of whales passing within the viewing range of census observers (N4) and the proportion detected by a hydrophone array (P4), resulted in an estimate of 8,000 animals (95% C.I. = 6,900-9,200). Incorporating a larger sample of acoustic data from the 1993 census resulted in an estimate of 8,200 animals (95% C.I. = 7,200-9,400) (IWC, 1997). An annual rate of increase of 3.1% (95% C.I. = 1.4 to 4.7%) was computed for the observation period between 1978 and 1993 (IWC, 1995; Zeh et al., 1995b). Including the revised abundance estimate slightly increased the annual rate of increase to 3.2% (95% C.I. = 1.4-5.1%) (IWC, 1997).

The most recent bowhead whale census took place from April 5 to June 7, 2001 (George et al., 2002). In 1,130 hours of watch effort, observers recorded 3,295 new sightings and 532 that may have been seen more than once. There were 121 calves seen (3.7% of the population), the highest count ever made. In the abundance estimate, summary counts were corrected for periods when no watch was in effect and for whales missed by observers during watch periods, based on results of acoustic arrays. The resulting estimate was 8,637 (SE=1,019; CV=0.118) whales within 4 km viewing range of the observers (N4). The estimate of the proportion of the population of whales that were observed within this range (correcting for whales that were detected acoustically but not seen, P4) was 0.876 (SE=0.033; CV=0.038). The resulting total estimate (N4/P4) for the Western Arctic stock of bowhead whales is 9,860 (SE=1,222; CV=0.103; 95% CI 7,700 to 12,600). The estimated annual rate of increase from 1978-2001 is 3.3% (95% CI 2% to 4.7%). The data are still preliminary as the entire set of acoustic data has not been analyzed; however, the estimates are not expected to change substantially (George et

al., 2002).

Genetics. Rooney et al. (2001) analyzed patterns of genetic variability among bowhead whales. Samples were taken from the northern coast of Alaska, and from whales landed on St Lawrence Island in the Bering Sea. The results of the research indicated that there was no genetic bottleneck in the western Arctic stock and that the level of genetic variability has remained relatively high (nucleotide diversity = 1.63%) in spite of the depletion of the stock before the 1900s. The stock reached its lowest abundance around 1914, when commercial whaling ceased; it is estimated that at that time there were 1,000 to 3,000 bowhead whales in the stock (Woodby and Botkin, 1993).

Status. Since 1931, bowhead whales have been protected from commercial whaling internationally, first under the League of Nations Convention, and since 1949 by the ICRW. Eskimos have been taking bowhead whales for at least 2,000 years (Marquette and Bockstoce, 1980; Stoker and Krupnik, 1993), and subsistence takes have been regulated by a quota system under the authority of the IWC since 1977. Alaska Native subsistence hunters take approximately 0.1-0.5% of the stock per year, from 10 Alaska communities (Philo et al., 1993). Present day subsistence whaling takes place primarily during the spring and fall migrations.

The Western Arctic stock of bowhead whales has been increasing in recent years (George et al., 2002). However, this stock remains listed as endangered under the ESA. Because of this listing as endangered this stock is classified as a depleted and a strategic stock under the MMPA.

3.2.2 Migration and Distribution

General Migration Pattern. The Western Arctic stock is widely distributed in the central and western Bering Sea in winter (November to April), generally associated with the marginal ice front and found near the polynyas of St. Matthew and St. Lawrence Islands and the Gulf of Anadyr (Bogoslovskaya et al., 1982; Brueggeman, 1982; Braham et al., 1984; Ljungblad et al., 1986; Brueggeman et al., 1987; Bessonov et al., 1990; Moore and Reeves, 1993; Mel'nikov et al. 1998). From April through June, these whales migrate north and east, following leads in the sea ice in the eastern Chukchi Sea until they pass Point Barrow, where they travel east towards the southeastern Beaufort Sea (Braham et al., 1980; Braham et al., 1984; Marko and Fraker, 1981). Most of the summer (June through September), bowhead whales are found in the Beaufort Sea (Hazard and Cubbage, 1982; Richardson, 1987; McLaren and Richardson, 1985; Richardson et al., 1986, 1987a, b; Moore and Clarke, 1991), predominately over outer continental shelf and slope habitats (Moore et al., 2000). Spatial distribution seems to vary between years (Richardson et al., 1987b; Davis et al., 1983; Thomson et al., 1986), affected in part by surface temperature or turbidity fronts and anomalies (Borstad, 1985; Thomson et al., 1986).

During the fall (early September to mid-October), bowhead whales migrate across inner shelf waters (Moore et al., 2000), moving west out of the Beaufort Sea, as evidenced during aerial surveys (Richardson, 1987; Ljungblad et al., 1987; Moore et al., 1989a; Moore and Clark, 1991),

radio-tracking (Wartzok et al., 1990) and satellite-tracking (Mate et al., 2000; Krutzikowsky and Mate, 2000). From mid-September to mid-October bowheads are seen in the northeast Chukchi Sea, some as far north as 72°N (Moore et al., 1986; Moore and Clark, 1992). Whales migrate into the Chukchi Sea, with some whales turning southwest along the axis of Barrow Canyon (Moore and Reeves, 1993), while others head toward Wrangel Island (Mate et al., 2000; Krutzikowsky and Mate, 2000). When they reach the Siberian coast, they follow it southeast to the Bering Strait (Bogoslovskaya et al., 1982; Zelensky et al., 1995). Fall migrants begin arriving on the northern coast of the Chukotka Peninsula in mid-September (Mel'nikov et al., 1998), October (Mel'nikov et al., 1997), or November (Mel'nikov and Bobkov, 1994), with large inter-year differences in the timing of the fall migration through the Chukchi Sea (Mel'nikov et al., 1998). Whales continue to arrive along the Chukotka coast even in December (Mel'nikov et al., 1998). There appears to be a split in the migration across the Chukchi Sea, with some whales crossing from Point Barrow westward toward Wrangel Island (Mate et al., 2000), and others heading more directly from Point Barrow to the Bering Strait (Moore and Reeves, 1993; Mel'nikov et al., 1998). By late October and November, many whales arrive in the Bering Sea (Kibal'chich et al., 1986; Bessonov et al., 1990), where they spend the winter.

Bowheads in the Bering or Chukchi Seas in Summer. Very few bowhead whales are found in the Bering or Chukchi seas in summer (Dahlheim, et al., 1980; Miller et al., 1986); however, there have been enough sightings to indicate that not all bowhead whales migrate to the Beaufort Sea (Mel'nikov et al., 1998). Many have been seen in summer in the northeastern Chukchi Sea (Moore, 1992), and small groups have been observed traveling northwest along the Chukchi Peninsula in May (Bogoslovskaya et al., 1982; Bessonov et al., 1990; Ainana et al., 1995; Zelensky et al., 1995), June (Mel'nikov and Bobkov, 1993) and July (Mel'nikov et al., 1998). Studies conducted in 1994 have shown the presence of bowhead whales throughout the summer along the southeastern portion of the Chukchi Peninsula (Ainana et al., 1995) and the easternmost portion of the peninsula (Zelensky et al., 1995). Moore et al. (1995) suggested that bowheads seen in the Chukchi Sea in early October could have migrated from the Beaufort Sea three weeks earlier, as whales seen in the Alaskan Beaufort Sea in August and early September were often swimming in a westerly direction (Moore et al., 1989b).

Segregation by size and sex. During the spring migration, temporal segregation by size and sex class occurs in three overlapping pulses, the first consisting of sub-adults, the second of larger whales, and the third composed of even larger whales and cows with calves (Nerini et al., 1987; Rugh, 1990; Angliss et al., 1995). Along the Chukchi Peninsula, Russian Chukotkan Natives noted the appearance of large numbers of mothers with calves in late-March and early April followed by immature and adult animals (Bogoslovskaya et al., 1982). In the Beaufort Sea in summer, aggregations have usually consisted of only juveniles or of large whales that may include calves (Richardson, 1987; Davis et al., 1986). In 1983, Cubbage and Calambokidis (1987) found a significant inverse correlation between longitude and size class; encounter rates for larger whales increased moving west to east in the Beaufort Sea. Onshore and offshore distributions varied annually, suggesting that "sex- or age-class segregation patterns are temporally and spatially fluid and cannot be defined rigidly for any region or period" (Moore and

Reeves, 1993). Segregation by size also occurs during the fall migration (Braham, 1995). George et al. (1995) showed a clear trend in progressively smaller whales harvested between August and November. Along the Chukchi Peninsula, the fall migration splits into two pulses (Bogoslovskaya et al., 1982; Mel'nikov and Bobkov, 1993; 1994), though segregation by size or sex class was not confirmed as the cause.

3.2.3 Commercial Whaling

Distribution of historical catches. Bowheads were first commercially hunted in the Bering Sea in 1848, and in the following year more than 40 vessels took part in the fishery. Total catches were quite variable during the early years of the fishery. After low catches in 1853 and 1854, the fleet abandoned the Bering Strait and arctic grounds for the Okhotsk Sea grounds in 1855, 1856 and 1857. As hunting continued and the population was reduced, the whalers went farther and farther north and east. After decimating the Okhotsk Sea population, the fleet returned to the Bering Strait in 1858, remaining there and farther north for the next half-century. In 1889, steamships reached the summer feeding grounds off the Mackenzie River Delta which remained the major focus of the industry until 1914, about the time that commercial whaling collapsed (Bockstoce and Botkin, 1980).

3.2.4 Subsistence Hunts

Eskimos have been taking bowhead whales for at least 2,000 years (Stoker and Krupnik, 1993). Subsistence takes have been regulated by a quota system under the authority of the IWC since 1977. There are ten Alaska villages currently participating in subsistence hunts: Gambell, Savoonga, Little Diomede, and Wales are located along the coast of the Bering Sea; Kivalina, Pt. Hope, Wainwright and Barrow are along the coast of the Chukchi Sea; the Chukchi and Beaufort Seas meet at Pt. Barrow; and Nuiqsut and Kaktovik are on the coast of the Beaufort Sea.

Recent catch history. Present day subsistence hunting takes place primarily during the spring and fall migrations. Table 1 shows the number of Western Arctic bowhead whales harvested, struck and lost, and the total number taken by Alaska Natives between 1978 and 2002.

Table 1. Bowhead Whale Takes By Alaska Natives, 1978-2002

Year	Harvested	Struck/Lost	Total Take
1978	12	6	18
1979	12	15	27
1980	16	18	34
1981	17	11	28
1982	8	11	19

1983	9	9	18
1984	12	13	25
1985	11	6	17
1986	20	8	28
1987	22	9	31
1988	23	6	29
1989	18	8	26
1990	30	14	44
1991	27	19	46
1992	38	12	50
1993	41	11	52
1994	34	12	46
1995	43	14	57
1996	39	5	44
1997	48	18	66
1998	41	13	54
1999	42	5	47
2000	35	12	47
2001	49	26	75
2002	39[6]	11	50

In addition, 5 landed Western Arctic bowhead whales are included in the annual quota for takes by Chukotka Natives in Russia under the IWC quota for the Western Arctic bowhead stock (IWC, 1998).

[6] This number includes 2 animals which were abandoned due to weather.

3.2.5 Natural Mortality

Little is known about naturally occurring diseases and death in bowhead whales (e.g., Heidel and Albert, 1994). Studies of harvested bowhead whales have discovered bacterial, mycotic and viral infections but not the level to which they contribute to mortality and morbidity (Philo et al., 1993). Skin lesions, found on all harvested bowhead whales, were not malignant or contagious. However, potentially pathogenic microorganisms inhabit these lesions and may contribute to epidermal necrosis and the spread of disease (Shotts et al., 1990). Exposure of these roughened areas of skin to environmental contaminants, such as petroleum products, could have significant effects (Albert, 1981; Shotts et al., 1990); although, Bratton et al. (1993) concluded that such encounters were not likely to be hazardous.

Evidence of ice entrapment and predation by killer whales, *Orcinus orca*, has been documented in almost every bowhead whale stock. The percentage of whales entrapped in ice is considered to be small, given that this species is so strongly ice-associated (Tomilin, 1957; Mitchell and Reeves 1982; Nerini et al., 1984; Philo et al., 1993). The ice may also provide some protection from killer whale attacks. The frequency of attacks is unknown and killer whale distribution in northern waters has not been well documented (George et al., 1994). Of 195 whales examined during the Alaskan subsistence harvest (1976-92), 8 had been wounded by killer whales (George et al., 1994). Seven of the eight bowhead whales were greater than 13 m in length, suggesting either that scars are accumulated over time, or young animals survive a killer whale attack. Overall, the frequency of attacks on bowhead whales in the Bering Sea stock appears to be low (George et al., 1994). However, from the available data, it is not possible to assess the level of predation on bowhead whales by killer whales, particularly in terms of size-class selection and encounter rates.

3.2.6 Contaminants

There are a number of contaminants persistent in the Arctic marine environment including PCBs, DDTs, organochlorines and chlordanes. However, there are very limited data on baseline hydrocarbon concentrations in prey or tissues of bowhead whales, or data on the "normal" biochemical and histologic (microscopic) findings used to assess oil related exposure and impacts. Organochlorines (OCs) are ubiquitous, persistent contaminants and are lipophilic (fat loving) and tend to bioaccumulate in lipid-rich tissues (e.g., blubber). Recent analyses presented at a 2002 bowhead health and physiology workshop (Barrow, Alaska) indicates that among different blubber strata there may be differences in vertical distribution of organochlorines as well as lipid content in bowhead whales (Willetto et al., 2002). This has been shown for other mysticetes. Information available on OC concentrations in water from the Bering-Chukchi-Beaufort Sea suggests that contaminant levels vary along the migratory range of the bowhead whale. The OC levels consistently fluctuated with seasonal migration between the Beaufort and Bering Seas over a 3.5 year period indicating active feeding must be occurring in both areas to alter contaminant levels and profiles in tissues (discussed in Willetto et al., 2002).

Approximately 350 high quality blubber samples from bowhead whales were analyzed for lipid content, and the proportion of neutral lipids (i.e., triglycerides, non-esterified free fatty acids) is a key factor affecting the accumulation of lipophilic OCs (discussed by Ylitalo in Willetto et al., 2002). In addition, a subset of these blubber samples (blubber from 29 animals) was also analyzed for selected organochlorines [e.g., PCBs, DDTs, hexachlorobenzene (HCB)]. Lipid concentrations of bowhead blubber ranged from 25 – 83%, primarily triglycerides (94 – 100%). The mean lipid concentrations were significantly different among the three collection years (1998, 1999, 2000) and by season (fall versus spring) (discussed by Zeh in Willetto et al., 2002). In general, concentrations of OCs slightly increased with length in male bowhead whales. Concentrations of DDTs and PCBs also increased with length in female whales, up to the length of approximately 10 meters. Mean concentrations of DDTs and PCBs were generally lower for the adult female bowhead whales compared to juvenile animals. Gender plays a significant role in the accumulation of these contaminants as males accumulate some OCs whereas females do not. The OC levels were low compared to the levels reported in blubber of most other marine mammals from Alaska (Willetto et al., 2002).

Geographic differences in contaminant exposure and accumulation (contamination varies by region) is reflected in OC concentrations in blubber of the bowhead whale, which is very likely a result of feeding in the respective regions, i.e. the Bering and Beaufort Seas. There is an influence of age, gender, and/or concentration on PCB biotransformation (discussed by Hoekstra in Willetto et al., 2002). Also, Arctic marine mammals are known to be high in cadmium (Cd), mercury (Hg), and selenium (Se) and are age-associated, however Hg and Se are comparably very low in bowhead whales (Woshner et al., 2001; 2002).

Available research concludes that bowhead whales: occupy a low trophic position, feeding in Bering and Beaufort Seas is reflected by variations in C isotope and OC profiles; metabolism and biotransformation of OCs is consistent with other cetaceans, and stereo-specificity of accumulation of chiral OCs suggests that biotransformation may be more complex in cetaceans than previously believed (Willetto et al., 2002).

In summary, it appears that contaminant levels for bowhead whales vary by age, gender and length, but generally does not exceed those of other marine mammals in Alaska and are considered relatively low.

3.2.7 Fishery Interactions

No observer program records of bowhead whale mortality incidental to commercial fisheries in Alaska exist (Angliss et al., 2001). However, there have been several cases of entanglements recorded during the Native subsistence harvest (Philo et al., 1992). These reports included three harvested bowheads that had scars attributed to rope entanglements, one bowhead found dead entangled in ropes similar to those used with fishing gear in the Bering Sea, and one bowhead with ropes on it that were attributed to rigging from a commercial offshore fishing pot, most likely a crab pot. There have been two other recent reports of bowheads with gear attached or

marks that likely were from crab gear (J. C. George, North Slope Borough, Barrow, AK, pers. comm.). Aerial photographs in at least two cases have shown ropes trailing from the mouths of bowheads (NMFS, NMML, unpubl. data). Although incidental take of bowhead whales is apparently rare, there has been one reported entrapment and death of a young bowhead whale in a fishing net in Japan (Nishiwaki and Kasuya, 1970). Incidental takes of bowhead whales in fisheries have rarely been reported and are thought to not be an issue of concern; in particular because the habitat selected by bowheads (ice-covered seas) limits commercial or sport fisheries activities (Small and DeMaster, 1995).

3.2.8 Offshore Activities, Petroleum Extraction

Much of the habitat of the Western Arctic stock of bowhead whales is within active or potential lease areas for offshore oil extraction. Extensive information about the effects of oil and gas activities on bowhead whales is discussed in several documents: (1) a Biological Opinion prepared by NOAA Fisheries for the Minerals Management Service (MMS) pursuant to section 7 of the Endangered Species Act on Oil and Gas Leasing and Exploration Activities in the Beaufort Sea, Alaska, 2000 (NMFS, 2001), (2) a Draft Environmental Impact Statement prepared pursuant to the National Environmental Policy Act for the Beaufort Sea Planning Area, Oil and Gas Lease Sale, Sales 186, 195, and 202 (MMS, 2002), (3) a Final Environmental Impact Statement prepared by the U.S. Army Corps of Engineers, Alaska on the Beaufort Sea Oil and Gas Development Project/Northstar (U.S. Army, 1999), (4) the NOAA Fisheries March 4, 1999, Biological Opinion on the proposed Northstar project (NMFS, 1999).

The Biological Opinion prepared for oil and gas leasing and exploration activities by the MMS in the Beaufort Sea considered the effects on bowhead whales if there was to be oil and gas leasing and exploration on the Outer Continental Shelf portion of the U.S. Beaufort Sea. The actions analyzed may affect bowhead whales by vessel operations, marine geophysical (seismic) exploration, traffic, drilling sounds from various structures, and oil spills. The probability of a large oil spill is considered to be remote during exploration, but was assessed due to the pronounced effects it might have on the bowhead and the potentially higher probabilities associated with subsequent development and production phases.

There have been approximately seven Federal oil and gas leases sales within the Alaskan Beaufort Sea beginning with the Joint State Federal Sale held in December 1979. The most recent Federal sale was Sale 170 in August 1998. Three additional sales are scheduled for the Beaufort Sea in 2003, 2005, and 2007 (NMFS, 2003). Prior to 2000, no permanent facilities, or oil production, existed on the Beaufort Outer Continental Shelf (OCS) outside of State waters. There are presently two offshore production facilities within State waters in the Beaufort Sea: Northstar and Endicott.

The potential effects of those projects, and leasing and development of the OCS have been considered in the biological opinions regarding oil and gas leasing and exploration activities and oil production facilities (NMFS, 1999, 2001). These oil and gas activities introduce noise into

the marine environment which may disturb bowhead whales. Based upon the predicted acoustics of the Northstar project, one of the activities covered under the biological opinions, and the bowhead whales' migrational pathways, NOAA Fisheries estimates that up to 215 (maximum 774) bowheads might be taken[7] by incidental harassment by Northstar-related oil production activities in any one year (66 FR 65923, December 21, 2001; 67 FR 77750, December 19, 2002) and that up to 1,533 whales per year may have been taken by harassment during the Northstar construction period in 2000 and 2001. In addition, in any year in which offshore seismic activities occur in the Beaufort Sea an additional 1,275 to 2,550 bowheads may be taken by harassment, although in 2000, that number was estimated to be only 750 bowheads may have reacted to this noise during their annual fall migrations. There is considerable variability associated with any such estimate; NOAA Fisheries would not expect this number of bowhead whales to be harassed year after year. No estimation of bowhead whale takes due to noise from the Endicott project, covered by the 2001 biological opinion, is available. However, Endicott is near shore and in relatively shallow waters, through which noise propagation into areas used by bowhead whales would be greatly attenuated.

Current State leases with production, such as Endicott, are well removed from the normal fall migration route of the bowhead whale. Bowhead whales are not likely to be affected by noise from the Endicott project due to its distance from the bowhead's fall migration route and the limited distance into the marine environment that noise travels from gravel structures.

Elevated sound levels in the marine environment could alter the hearing ability of whales, causing temporary or permanent threshold shifts if the sound levels are sufficiently high and the bowheads are in close proximity to the noise source. There is, at present, insufficient information on the hearing ability and sensitivities of bowhead whales to adequately describe this potential. Information suggests most continuous and impulsive underwater noise levels would be at levels or durations below those expected to injure hearing mechanisms. Nonetheless, marine seismic activities may present concerns with respect to hearing. Sound has also been shown to cause avoidance in migrating bowhead whales. Seismic activities, and the possible use of ice breakers to support OCS activities present the highest probability for avoidance of any of the activities associated with oil exploration. Studies have shown noise from ice breakers may be detected by acoustic instruments at distances exceeding 50 km (NMFS, 2003). It is reasonable therefore, to assume that bowheads could also detect this noise at this distance. The distance at which bowheads may react to noise is poorly described, but is likely to exceed 20 km as described below.

Marine geophysical research or other activities involving seismic airguns may introduce significant levels of noise into the marine environment, and has been demonstrated to alter the behavior of bowhead whales. Research on the effects of offshore seismic exploration in the Beaufort Sea, supported by the testimony of Inupiat hunters based on their experience, has shown

[7]Take as defined by the MMPA means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.

bowhead whales avoid these operations when within 20 km of the source and may begin to deflect at distances up to 35 km (Richardson, 1999). Davies (1997) concludes bowheads avoided an active drilling rig at a distance of 20 km.

Monitoring studies of 3-D seismic exploration (8-16 airguns totaling 560-1500 cubic inches) in the nearshore Beaufort Sea during 1996-1998 have demonstrated that nearly all bowhead whales will avoid an area within 20km of an active seismic source, while deflection may begin at distances up to 35km. Sound levels received by bowhead whales at 20km ranged from 117-135 dB re 1µPa rms and 107-126 dB re 1µPa rms at 30km, but did not persist beyond 12 hours after seismic operations (Richardson, 1999). The received sound levels at 20-30km are considerably lower levels than have previously been shown to elicit avoidance in bowhead or other baleen whales exposed to seismic pulses. Although high noise levels may cause temporary or permanent effects to bowhead whale hearing, or impact their use of sound to communicate or navigate, the effects appear to be temporary and unlikely that they would prevent the survival and recovery of this species.

The Biological Opinion prepared for oil and gas leasing and exploration activities described potential physical and behavioral effects of an oil spill on the Western Arctic stock of bowhead whales contacting oil, particularly freshly-spilled oil, as potential causes of harm or death. Additionally, an oil spill reaching into the spring lead system has the potential to impact a significant number of whales. Several coincidental events would be necessary for this scenario: the spill would have to coincide with the seasonal migration and the spill would have to be transported to the area that the whales occupy (e.g. the migrational corridor or spring lead system). The impact of such an event could be significant, yet the statistical probability for the coincident occurrence of these events is believed to be low. It must also be recognized that the spring lead system is not static, as leads open and close and whales navigate not only through the leads but surrounding ice (Clark and Ellison, 2000). Because of these factors, it is difficult to assess the potential number of whales which could be impacted.

3.3 Other Wildlife

A wide variety of marine mammals, birds, and other marine organisms occur in the area where Alaskan Natives hunt for bowhead whales. These species are identified and discussed briefly below. Additional information about each marine mammal species can be found in Angliss et al. (2001).

3.3.1 Other Marine Mammals

Under the MMPA, marine mammals are protected by a prohibition on take; however, section 102(a)(2) of the MMPA expressly allows for subsistence hunting of marine mammals by Alaskan Natives. Many Alaskan villages hunt a variety of marine mammals including the bearded seal, ringed seal, spotted seal, ribbon seal, beluga whale, bowhead whale, and polar bear, and walrus

(MMS, 2002). A discussion of the current status and trends of all marine mammals that inhabit the area where Alaska Eskimos hunt for bowhead whales follows.

Spotted Seal. Spotted seals (*Phoca largha*) are distributed along the continental shelf of the Beaufort, Chukchi, Bering, and Okhotsk Seas south to the northern Yellow Sea and western Sea of Japan (Shaughnessy and Fay, 1977). Of eight known breeding areas, three occur in the Bering Sea.

Satellite tagging studies indicate that spotted seals summering along the Chukchi Sea coast migrate south in October and pass through the Bering Strait in November (Lowry et al., 1998), moving south into the Bering Sea with the ice edge through December (Lowry et al., 2000). Preferred habitat for spotted seals in Alaska during January-April is the transition zone of pack ice between the southern fringe of ice and the heavier southward-drifting pack ice (Burns et al., 1981a; Lowry et al., 2000). Pups are born in the pack ice during March-April; during April-May, spotted seals inhabit the southern margin of the ice edge (Braham et al., 1984), and move to coastal habitats after the ice retreats (Fay, 1974; Shaughnessy and Fay, 1977). During August-October, spotted seals inhabit coastal and estuarine habitats in the northen Bering and Chukchi Sea (Braham et al., 1984; Lowry et al., 2000). Availability of food nearby and freedom from disturbance seem to be important criteria for selection of coastal haulout sites (Lowry, 1982).

A reliable estimate of spotted seal population abundance, abundance trends, and stock structure is currently not available (Rugh et al., 1997; Angliss et al., 2001). Burns (1973) estimated 200,000 to 250,000 animals in the Bering Sea stock, including Russian waters, based on the distribution of "family" groups (mother and pup, with attending male) on ice during the mating season. However, comprehensive systematic surveys were not conducted to obtain these estimates.

Spotted seals are an important species for Alaskan subsistence hunters, primarily in the Bering Strait and Yukon-Kuskokwim regions, with estimated annual harvests ranging from 850-3,600 seals taken during 1966-1976 (Lowry, 1984). From September 1985 to June 1986, the combined harvest from five Alaska villages was 986 animals (Quakenbush, 1988). The mean annual subsistence take of spotted seals in the northern part of Bristol Bay from 1993-1995 was 5,265 animals (Wolfe and Mishler, 1993; 1994; 1995; 1996; Angliss and Lodge, *in press*)

Bearded Seal. Bearded seals (*Erignathus barbatus*) are circumpolar in their distribution, extending from the Arctic Ocean south to Hokkaido in the western Pacific. In Alaskan waters, bearded seals occur on the continental shelves of the Bering, Chukchi, and Beaufort Seas (Burns, 1981a; Johnson et al., 1966; Ognev, 1935). The majority of bearded seals move south with the seasonally advancing sea ice in winter (Burns, 1967). Pups are born in the pack ice from March through mid-May (Burns, 1967). In summer, many of the seals that winter in the Bering Sea move north through Bering Strait during April - June, and are distributed along the ice edge in the Chukchi Sea during the summer (Burns, 1967; 1981a). Some seals, particularly juveniles, may spend the summer in open-water areas of the Bering and Chukchi seas (Burns, 1981a).

Reliable estimates of abundance, abundance trends, and stock structure are not available. Early estimates of the Bering-Chukchi Sea stock range from 250,000 to 300,000 animals (Popov, 1976; Burns, 1981a; Burns et al., 1981a).

Bearded seals are an important species for Alaskan subsistence hunters, with estimated annual harvests of 6,788 (Angliss and Lodge, *in press*).

Ribbon Seal. Ribbon seals (*Phoca fasciata*) inhabit the North Pacific Ocean and adjacent fringes of the Arctic Ocean, most commonly in the Okhotsk and Bering seas (Burns, 1981b). During the breeding season, ribbon seals are found only in the pack ice of the Okhotsk and Bering seas (Kelly, 1988b).

In Alaska waters, ribbon seals are found in the open sea, on the pack ice, and only rarely on shorefast ice (Kelly, 1988b). Ribbon seals in Alaska range northward from Bristol Bay in the Bering Sea into the Chukchi and western Beaufort Seas (Burns, 1970; 1981b; Braham et al., 1984; Moore and Barrowclough, 1984), inhabiting the northern part of the Bering Sea ice front from late March to early May (Burns, 1970; 1981b; Braham et al., 1984), and moving north with the receding ice edge in May to mid-July (Shustov, 1965a; Tikhomirov, 1966; Burns, 1970; 1981b; Burns et al., 1981a). Ribbon seals usually haul out on thick pack ice (Shustov, 1965a; Tikhomirov, 1966; Burns, 1981b; Burns et al., 1981a) and only rarely on shorefast ice (Bailey, 1928). In April, they have been found throughout the ice front but most abundantly over deep water south of the continental shelf (Braham et al., 1984). As the sea ice recedes in May-June, two major rafted remnants of the pack ice remain: the Alaskan massif (from Bering Strait to eastern St. Lawrence Island and south to Nunivak Island) and the Anadyr massif (from the Gulf of Anadyr toward St. Matthew Island); ribbon seals are thought to be associated with the Anadyr massif (Burns et al., 1981b). Little is known of the distribution of ribbon seals after the ice recedes from the Bering Sea (Kelly, 1988b); they are presumed to be solitary and pelagic in summer and fall but their distribution is unknown (Burns, 1981b). Many ribbon seals may migrate north to the Chukchi Sea during the summer (Kelly, 1988b), while others may remain pelagic in the Bering Sea, near the edge of the continental shelf (Burns, 1970; 1981b). Single ribbon seals have been observed during the summer (June-August) within 84 miles of the Pribilof Islands (Burns, 1981b), near Cordova, Alaska (Burns, 1981b) and south of the Aleutian Islands (Stewart and Everett, 1983).

A reliable estimate of abundance, abundance trends, and stock structure for the Alaska stock of ribbon seals is currently not available (Angliss et al., 2001). The worldwide population of ribbon seals was estimated at 240,000 in the mid-1970s, with an estimate of 90,000 to 100,000 in the Bering Sea (Burns 1981b).

Ribbon seals are also taken by Alaska Native subsistence hunters, primarily from villages in the vicinity of the Bering Strait and to a lesser extent at villages along the Chukchi Sea coast (Kelly, 1988b). The annual subsistence harvest was estimated to be less than 100 seals annually from 1968 to 1980 (Burns, 1981b). The annual subsistence harvest in Alaska is estimated to be 193

(Angliss and Lodge, *in press*).

Ringed seal. Ringed seals (*Phoca hispida*) are found throughout the arctic in areas of seasonal sea ice as well as in areas covered by the permanent polar ice cap (McLaren, 1958; Smith, 1987; Kelly, 1988c; Ramsay and Farley, 1997; Reeves, 1998). In the North Pacific Ocean, they are found in the Bering Sea and range as far south as the seas of Okhotsk and Japan. Most ringed seals overwinter, breed, give birth, and nurse their young within the shorefast sea ice (McLaren, 1958; Smith and Stirling, 1975), although some breeding seals (and pups) have been observed in pack ice (Finley et al., 1983).

In the Chukchi and Beaufort Seas, ringed seals haul out in highest densities in shorefast ice during the May-June molting season, immediately following the March-April pupping season (Johnson et al., 1966; Burns and Harbo, 1972; Frost et al., 1988; 1997; 1998; 1999). Little is known about the distribution of ringed seals during the "open water" season, July-October, but ringed seals have been seen both hauled out on pack ice and foraging in open water some distance away from the nearest sea ice (Smith, 1987). Ringed seals migrate north and south with the retreat and advance of the sea ice edge, but some seals in areas of seasonal shorefast sea ice may be sedentary (Burns, 1970; Smith, 1987; Heide-Jørgensen et al., 1992; Kapel et al., 1998; Teilmann et al., 1999). In addition to ice-associated migrations, ringed seals can also travel long distances east or west, particularly young seals (Smith, 1987; Kapel et al., 1998).

A reliable estimate of abundance, abundance trends, and stock structure for the Alaska stock of ringed seals is currently not available (Angliss et al., 2001). Crude estimates of population in Alaskan waters include 1-1.5 million (Frost, 1985) or 3.3-3.6 million, based on aerial surveys conducted in 1985, 1986, and 1987 (Frost et al., 1988).

Ringed seals are an important species for Alaska Native subsistence hunters. The annual subsistence harvest in Alaska is estimated to be 9,567 (Angliss and Lodge, *in press*).

Pacific Walrus. The Pacific walrus (*Odobenus rosmarus*) occurs primarily in the shelf waters of the Bering and Chukchi Seas (Allen, 1880; Smirnov, 1929). Most of the population congregates during the summer in the southern edge of the Chukchi Sea pack ice between Long Strait, Wrangell Island, and Point Barrow (Fay et al., 1984). The remainder of the population, primarily adult males, stays in the Bering Sea during summer (Brooks, 1954; Burns, 1965; Fay, 1955; Fay, 1982; Fay et al., 1984). Females and sub-adult males migrate toward Bering Strait in the autumn when the pack ice begins to re-form (Fay and Stoker, 1982a). Walruses use terrestrial haulout sites when suitable haulout sites on ice are unavailable. The major haulout sites are located along the northern, eastern, and southern coasts of the Chukchi Peninsula, on islands in the Bering Strait, on the Punuk Islands, on Round Island in Bristol Bay (Lentfer, 1988), and at Cape Seniavan on the north side of the Alaska Peninsula.

The current size and trend of the Pacific walrus population is unknown (Gorbics et al., 1998). The total initial estimate of 270,000 to 290,000 animals in 1980 was later adjusted to about

250,000 (Fay et al., 1984; Fedoseev, 1984).

Round Island, one of the most important terrestrial haulout sites in the United States, is a state preserve and federal regulations prohibit entry of fishing vessels inside 12 miles (672.22[a][4]). Walruses have been reported to be taken incidentally in domestic groundfish trawl fisheries of the eastern Bering Sea. NOAA Fisheries observer data collected from 1992 to 1996 indicate that approximately 17 animals were caught each year. In cases where sex could be identified, all were males. Most (80%) were already decomposed upon catch, indicating that at least a portion of the catch consisted of individuals whose mortality was unrelated to fisheries interactions, representing harvest loss or natural mortality.

Polar bear. Polar bears (*Ursus maritimus*) are circumpolar in their distribution in the northern hemisphere. Two stocks occur in Alaska: the Chukchi/Bering Seas stock and the southern Bering Sea stock. Polar bear movements are extensive and individual activity areas are enormous. A reliable abundance estimate for the Chukchi/Bering seas population currently does not exist. The most recent estimate, made by the IUCN Polar Bear Specialist Group in 1998 estimated this population to be approximately 2,000-5,000 animals. The abundance of the southern Beaufort Sea stock is estimated to be 1,765 animals (Angliss et al., 2001).

Prior to the 20th century, when Alaska's polar bears were hunted primarily by Alaskan Natives, both stocks probably existed near carrying capacity. The size of the Beaufort Sea stock appeared to decline substantially in the late 1960's and early 1970's due to excessive harvest rates when sport hunting was legal. Similar declines could have occurred in the Chukchi Sea, although data are unavailable to test that assumption. Since passage of the MMPA, harvest rates have declined and both stocks appear to have increased. Polar bear stocks in Alaska have no direct interaction with commercial fisheries activity (Angliss et al., 2001).

The 1991-1996 mean U.S. harvest from the Chukchi/Bering Sea stock was 45.2 animals per year. Development of a management agreement for this stock between Native representatives of Alaska and Russia, and the United States and Russian governments, is ongoing. In 1997, a Cooperative Agreement was developed between the U.S. Fish and Wildlife Service and the Alaskan Nanuuq Commission to facilitate local participation in activities related to the conservation and management of polar bears pursuant to section 119 of the MMPA (Angliss et al., 2001).

The 1996-2000 mean U.S. harvest from the Beaufort Sea stock was 32.4 animals per year. A management agreement between Canadian Inuit and Alaskan Inupiat of the North Slope has been in place since 1998. Since initiation of this local user agreement, the combined Alaska/Canada mean harvest from this stock has been 58.8 animals per year, which is less than an annual allocation guideline of 80 and PBR level of 73 animals per year.

Gray whale. Gray whales (*Eschrichtius robustus*) occur across the coastal and shallow water areas of both the eastern and western reaches of the North Pacific Ocean, as well as the Bering,

Chukchi, and Beaufort Seas. Two stocks are recognized: the western Pacific or Korean stock (considered highly endangered under the ESA) and the eastern North Pacific stock (removed from the ESA in 1994 (Rugh et al., 1999)). Only the eastern North Pacific stock is found in the Bering Sea/Aleutian Islands and Gulf of Alaska. This population migrates annually along the coast of North America from summer feeding areas in the Bering, Chukchi, and Beaufort Seas to winter grounds in sheltered waters along the Baja Peninsula (Rice and Wolman, 1971).

The eastern North Pacific gray whale population has made a remarkable recovery since its depletion in the early 1900s caused by commercial whaling. Gray whales were listed as endangered under the ESA on June 2, 1970 (35 FR 8495). Then, following a comprehensive evaluation of their status (Breiwick and Braham 1984), NOAA Fisheries concluded on November 9, 1984 (49 FR 44774), that this population should be listed as threatened, instead of endangered, under the ESA. However, no further action was taken until 1991 when a subsequent review was completed and made available to the public on June 27, 1991 (56 FR 29471). The latter review showed the best available abundance estimate (in 1987/88) was 21,296 whales with an average annual rate of increase of 3.29% (Buckland et al., 1993a). Calculations indicated that this population was approaching carrying capacity (Reilly, 1992). Therefore, NOAA Fisheries proposed, on November 22, 1991 (56 FR 58869), that this population be removed from the list of endangered and threatened wildlife under the ESA. After an extensive review period, NOAA Fisheries published a final notice of determination (58 FR 3121, January 7, 1993) that this population should be removed from the list because the population had recovered to near its estimated original population size and was neither in danger of extinction throughout all or a significant portion of its range, nor likely to again become endangered within the foreseeable future. On June 16, 1994 (59 FR 31094), the eastern North Pacific gray whale population was formally removed from the list of endangered and threatened wildlife under the ESA.

In 1997/98 the eastern North Pacific gray whale population was 26,635 whales (95% CI = 21,878 to 32,427) (Hobbs and Rugh, 1999). However, estimates from the most recent surveys in the winters of 2000/2001 and 2001/2002, are lower than the 1997/98 estimate. The preliminary estimate for 2000/01 is 18,761 whales (95% C.I. 15,429 to 22,812) and for 2001/02 is 17,414 (95% CI = 14,322 to 21,174) (Rugh et al., 2002). Most of these surveys started in mid-December and ran until mid-February; however, the 2001 southbound migration continued for another three weeks. Consequently, the systematic counts were extended until March 5, 2001. In 2002, migration timing returned to normal with the southward migration ending in mid-February (Rugh et al., 2002).

Previous analysis of abundance estimates from shore-based counts indicates that the population increased by approximately 2.5% per year (SE=0.3%) between 1967/68 and 1995/96 (Buckland and Breiwick, 2002). A Bayesian analysis of gray whale population dynamics for the same period suggested the rate of increase of the population could have been 3.4% (95% CI=2.5-4.2%), if the Russian Chukotkan Natives had not continued a harvest of roughly 40-80 whales per year (Wade and DeMaster, 1996). A provisional analysis incorporating the preliminary data from 2000/01 and 2001/02 speculates that the low estimates could have been a result of an

unusual number of whales that did not migrate as far south as Granite Canyon in these years or that the high mortality rates observed in 1999 and 2000 may indicate a decline in gray whale abundance (Rugh et al. 2002).

Although the estimates of migrating gray whales seem to be decreasing between 1997/98 and 2000/01 to 2001/02, this decline in abundance appears to be temporary and related to the unexplained gray whale mortality event that occurred in 1999 and 2000. The population is estimated to currently be at 99% to 100% of carrying capacity (Wade and Perryman, 2002). However, it is impossible to determine how much of the drop in the estimates is due to a real decline in the population and how much is sampling error in the estimate. Evidence that the decline is temporary comes from stranding data (Norman et al. 2000, Gulland et al.2002, Gulland pers. comm.), calf production data (Perryman et al., 2002; Perryman pers. comm.; Urban et al., 2002), and a change in body condition of whales during the southward migration (Le Boeuf et al., 2000, Perryman and Rowlett, 2002).

Subsistence hunters in Alaska and Russia have traditionally harvested whales from this stock (summarized in Ferrero et al., 2000; Angliss et al., 2001). The only reported takes by subsistence hunters in Alaska during the previous decade were two whales taken in 1995. Russian Chukotkan subsistence hunters reported taking no gray whales during 1993, 44 in 1994, 90 in 1995, 43 in 1996, 79 in 1997, and 122 in 1998, 121 in 1999, 113 in 2000, and 112 in 2001. This level of take is well below the 1968-93 average of 159 whales per year, during which time the population size increased. In 2002, the IWC approved a 5-year subsistence quota (2003 through 2007) of 620 gray whales, with an annual cap of 140 based on statements of need from aboriginal groups in Russia and the U.S. (IWC, 2002). The U.S. and Russia have agreed that the quota will be shared with an average annual harvest of 120 whales by the Russian Chukotka Natives and 4 whales by the Makah Indian Tribe (Gearin, 1999).

Beluga whale. Beluga whales (*Delphinapterus leucas*) are distributed throughout seasonally ice-covered arctic and subarctic waters of the Northern Hemisphere (Gurevich, 1980), and some stocks are closely associated with open leads and polynyas (nonlinear openings in the sea ice) in ice-covered regions (Hazard, 1988). Depending on season and region, beluga whales may occur in both offshore and coastal Alaskan waters, with concentrations in areas now designated as separate stocks: Bristol Bay, eastern Bering Sea, eastern Chukchi Sea, and Beaufort Sea (Angliss et al., 2001). Most beluga whales from these summering areas are assumed to overwinter in the Bering Sea, but few data exist to support this conclusion (O'Corry-Crowe et al., 1997; O'Corry-Crowe and Lowry, 1997). The Bristol Bay and eastern Bering Sea stocks occur within the Bering Sea/Aleutian Islands and Gulf of Alaska.

The total corrected population abundance estimate for the Bristol Bay stock is 1,555 animals, 7,986 animals in the eastern Bering Sea stock, 3,710 animals in the eastern Chukchi Sea stock, and 39,258 animals in the Beaufort Sea stock (Angliss et al., 2001). The eastern Bering Sea population is thought to be stable or increasing (Angliss et al., 2001); the Bristol Bay stock is considered stable (Frost and Lowry, 1990); belugas in the Beaufort Sea stock are considered to

be stable or increasing (Angliss et al., 2001), and there is no evidence that the eastern Chukchi Sea stock is declining (Angliss et al., 2001).

The annual subsistence take by Alaska Natives between 1993-1997 was 61 animals per year from the Beaufort Sea stock, 68 animals per year from the eastern Chukchi sea stock, 121 animals per year from the eastern Bering Sea stock, and 19 animals per year from the Bristol Bay stock. These estimates may be negatively biased because of under reporting by villages or unreliable estimates of struck and loss rates during subsistence hunts. The Alaska Beluga Whale Committee monitors the subsistence harvest of beluga whales (Angliss et al., 2001).

Minke whale. Minke whales (*Balaenoptera acutorostrata*) are distributed worldwide. Sightings range from Point Barrow, Alaska, in the Chukchi Sea, through the Bering Sea and Bristol Bay, and in coastal and offshore waters of the Gulf of Alaska (Leatherwood et al., 1982; Mizroch, 1992; POP, 1997). Few data are available on migratory behavior and apparent "home ranges" of the Alaska stock of minke whales (e.g., Dorsey et al., 1990). In the central Bering Sea, an estimated 936 minke whales (95% CI 473-1,852, CV = 0.35) were observed during the summer of 1999 (Moore et al., 2000). However, this covers only a small portion of the Alaska stocks range. Seabird surveys around the Pribilof Islands indicated an increase in local abundance of minke whales between 1975-78 and 1987-89 (Baretta and Hunt, 1994). No data exist on trends in abundance in Alaskan waters (Angliss et al., 2001).

Subsistence takes of minke whales by Alaska Natives are rare, but have been known to occur. Only seven minke whales are reported to have been taken for subsistence by Alaska Natives between 1930 and 1987 (C. Allison, International Whaling Commission, The Red House, Station Road, Histon, Cambridge, UK, pers. comm.). The most recent harvest (2 whales) in Alaska occurred in 1989 (Anonymous, 1991).

Killer whale. Killer whales (*Orcinus orca*) have been observed in all oceans and seas of the world (Leatherwood et al., 1982) and are found throughout Alaska waters from the Chukchi Sea to southeast Alaska (Braham and Dahlheim, 1982). They occur primarily in coastal waters, although they have been sighted well offshore (Heyning and Dahlheim, 1988). Seasonal movements in polar regions may be influenced by ice cover and in other areas primarily by availability of food. An estimated 723 killer whales belong to the eastern North Pacific resident stock. Resident killer whales are not known to eat other marine mammals (Angliss and Lodge, *in press*). Population trends of this stock are currently unknown. The estimated annual mortality of killer whales from commercial fisheries is 1.4 animals per year. There is no reported subsistence harvest of killer whales in Alaska (Angliss et al., 2001).

Transient killer whales are the only known predators of bowhead whales (Angliss and Lodge, *in press*). In a study of marks on bowheads taken in the subsistence harvest, 4.1% to 7.9% had scars indicating the bowheads had survived attacks by killer whales (George et al., 1994).

Harbor Porpoise. Harbor porpoises (*Phocoena phocoena*) are found in the eastern North

Pacific Ocean from Point Barrow, along the Alaskan coast, and down the west coast of North America to Point Conception, California (Gaskin, 1984; Suydam and George, 1992; Dahlheim et al., 2000). They occur primarily in coastal waters, but are also found where the shelf extends offshore (Gaskin, 1984; Dahlheim et al., 2000). In the summer of 1991, an aerial survey covering the Bristol Bay region was conducted, resulting in a corrected abundance estimate of 10,946 animals in the Bering Sea stock of harbor porpoise. No survey effort was conducted north of Cape Newenham, when harbor porpoise are regular visitors as far north as Point Barrow in the summer months, or in the vicinity of the Pribilof Islands or along the Aleutian Islands. The 1991 survey covered less than one-tenth of the range occupied by the Bering Sea stock of harbor porpoise. Currently, there is no reliable information on abundance trends (Angliss et al., 2001).

Three commercial fisheries operate in the range of the Bering Sea stock of harbor porpoise. The mean annual mortality rate resulting from observed mortalities was 1.2 animals. Subsistence hunters in Alaska have not reported to take from this stock of harbor porpoise (Angliss, et al., 2001).

3.3.2 Marine Birds

Many species of birds occur in substantial numbers in the Arctic Coastal Plain and Beaufort Sea habitats and nearly all are migratory, present sometime during the period from May to early November. Species include waterfowl, shorebirds, loons, seabirds, hawks and eagles, ptarmigan, and songbirds (MMS, 2002). Birds hunted by Alaska Eskimos in Barrow, Kaktovik, and Nuiqsut include the snowy owl, ret-throated loon, tundra swan, eiders (common, king, spectacled, steller's), ducks, geese, and ptarmigan (MMS, 2002).

Three bird species that are listed under the ESA and that inhabit the areas where Alaska Eskimos hunt for bowhead whales are described below.

Short-tailed Albatross. The Short-tailed Albatross (*Diomedea albatrus*) is listed as endangered under the ESA and by Alaska. These birds mate for life, laying eggs in October or November and incubating them for 65 days. Chicks leave the nest after 5 months to go to the North Pacific. Adults also spend the summer at sea, feeding on squid, fish, and other organisms. Most summer sightings of these birds are in the Aleutian Islands, Bering Sea, and Gulf of Alaska. During the late 1800s and early 1900s, hunters killed an estimated five million birds, stopping only when the species was nearly extinct. Protection of their nesting grounds have lead to increased number of short-tailed albatross, from fewer than 50 birds in the late 1940s to over 600 birds in 1993 (Alaska Department of Fish and Game, 2001, Short-tailed Albatross).

Spectacled Eider. The Spectacled Eider (*Somateria fischeri*) is a threatened species under the ESA and also listed as a species of special concern in Alaska. An estimated 7,370 spectacled eiders occupied the Arctic Coastal Plain of Alaska in June 2001, about 2% of the estimated 363,000 world population (MMS, 2002) of Spectacled eiders nest in wet tundra near ponds on

the Arctic coasts of Alaska and Russia and on the coast of the Yukon-Kuskokwim Delta in Alaska. Nesting pairs arrive together each spring, but the males leave after egg incubation begins. In late summer, the females and young join the males at sea (Alaska Department of Fish and Game, 2001, Spectacled Eider). The only known wintering area lies south of St. Lawrence Island in the Bering Sea. Because few eiders are observed in marine areas along the Beaufort coast in spring, a majority may migrate to the nesting areas overland from the Chukchi Sea (MMS, 2002). Spectacled eiders have declined dramatically in Alaska since the 1960s (Alaska Department of Fish and Game, 2001, Spectacled Eider), although the arctic population has shown a non-significant decreasing trend from 1993-2002 (MMS, 2002). Causes for this decline are not known but may include some combination of reduced food supplies, pollution, overharvest, lead shot poisoning, increased predation, and other causes (Alaska Department of Fish and Game, 2001, Spectacled Eider).

Steller's Eider. Steller's Eider (*Polysticta stelleri*) is a threatened species under the ESA and an Alaska species of special concern. Steller's eiders are diving ducks that feed on mussels in marine waters during the winter and insect larvae in freshwater ponds during the breeding season of spring and summer. Their current breeding range includes the arctic coastal plain in northern Alaska and northern coastal areas of Russia, where they nest on the tundra near small ponds. In winter, most of the world's population of Steller's eiders range throughout the Alaska Peninsula and eastern Aleutian Islands. In Alaska, the breeding population may number as few as 1,000 individuals. The current world population estimate is 150,000 to 200,000 birds, but the population is thought to have declined by as much as 50 percent between the 1960s and 1980s. Causes for decline of Steller's Eider are unknown (Alaska Department of Fish and Game, 2001, Steller's Eider).

3.3.3 Other Species

Arctic coastal waters support a diverse community of planktonic and epontic species that are prey for fish, birds, and marine mammals. Both marine and anadromous fish inhabit coastal arctic waters. Marine fish include arctic cod, saffron cod, twohorn and fourhorn sculpins, Canadian eelpout, arctic flounder, capelin, Pacific herring, Pacific sand lance, and snailfish. Migratory (anadromous) fish common to the arctic environment include arctic cisco, least cisco, Bering cisco, rainbow smelt, humpback whitefish, broad whitefish, Dolly Varden char, and inconnu. Although uncommon in the North Slope region, salmon are present in arctic waters and used by Alaska Eskimos (MMS, 2002).

Fish species used by Alaska Eskimos in Barrow, Kaktovik, and Nuiqsut include salmon (chum, pink, silver, king, and sockeye), whitefish (round, broad, humpback, least cisco, Bering/Arctic cisco), Arctic char, Arctic grayling, burbot, lake trout, northern pike, capelin, rainbow smelt, arctic cod, tomcod, and flounder (MMS, 2002).

Terrestrial mammals hunted by Alaska Eskimos in Barrow, Kaktovik, and Nuiqsut include caribou, moose, brown bear, dall sheep, musk ox, arctic fox, red fox, porcupine, ground squirrel,

wolverine, weasel, wold, and marmot (MMS, 2002).

3.4 Eskimo Tradition of Subsistence Hunt of Bowhead Whales

Bowhead whale hunting has been a part of Alaska Eskimo culture for at least 2,000 years (Stocker and Krupnik, 1993). Ten subsistence hunting communities along the western and northern coasts of Alaska participate in annual bowhead whale hunts and rely on the hunts for both cultural and subsistence needs (Braund, 1997). Hunting occurs in U.S. waters primarily during the spring and fall migrations as the bowhead whales move north and east through near shore leads in the spring, and then west and south as ice forms in the fall. Historically, residents of the ten villages participate in one or more of the semi-annual hunts (Stocker and Krupnik, 1993).

3.4.1 Methodology of Eskimo Subsistence Hunt

The hunting of bowhead whales by Alaska Eskimos is believed to date back several thousand years with the use of harpoons and lances fashioned from stone, ivory, and bone. Seal-skin or walrus-skin covered whaling vessels known as umiaks remain the most commonly used vessel for the spring hunt (Stocker and Krupnik, 1993). Crew sizes currently average six persons per vessel (www.mms.gov/alaska/native/rexford/rexford.htm). Before the whales arrived during each migration, ritual ceremonies were performed in special houses known as karigi, to ensure a successful hunt and to honor the whale (Ellis, 1991).

Alaska Eskimos continue to use these traditional methods to take whales today, but have gained experience in the use of darting and shoulder guns as a method of improving efficiency and humane killing methods (Stocker and Krupnik, 1993). The harpoon with line and float attached is always used first since it is the forwards part of the darting gun. Once the darting gun is thrown, the shoulder gun is almost always used as a back-up. The AEWC has convened a Weapons Improvement Program in order to work towards improving humane killing methods (e.g., reducing time to death) and the efficiency of the hunt (i.e., struck to landed ratio)[8]. Hunts occur twice a year in the spring and fall seasons, based on ice and weather conditions. In the fall season, aluminum skiffs or small open boats with outboard motors are used for the hunt, due to the open water conditions.

Traditionally, most of the whale was used for food, though other parts of the whale were used to make whaling gear, fishing equipment, traps, tools, and for many other practical day-to-day uses (Ellis, 1991). The gut was made into waterproof clothing and translucent windows, and the oil was used for heating, cooking and lighting (Ellis, 1991). The bones were utilized for fences,

[8]The efficiency of the hunt is also expected to improves as a result of the passage of an emergency towing assistance provision contained in section 403 of the Hydrographic Services Improvement Act Amendments of 2002. Pub. L. 107-372.

house construction and sled runner (Ellis, 1991). Today, bowhead is still an important source of subsistence, where the skin and blubber known as maktak, are either eaten raw or boiled in salted water (Ellis, 1991).

Although early historical records were not kept, it is estimated that Alaska Eskimos may have taken 20 whales a year (Ellis, 1991).

3.4.2 Recent Spring and Fall Hunts

1999 Spring Hunt. For the 1999 Spring hunt, the total number of whales landed was 29 and 5 lost. The weapon used was a darting gun with line and float attached. Not all communities landed whales; whales were predominantly landed in Barrow (AEWC, 2000).

1999 Fall Hunt. For the 1999 Fall hunt, the total number of whales landed was 12 and 0 lost. The weapon used was a darting gun with line and float attached. Whales were landed in Barrow, Nuiqsut and Kaktovik (AEWC, 2000). The 1999 year efficiency ratio, which is the total number of whales struck compared to the total number of whales landed, for both the Spring and Fall hunts was 89%.

2000 Spring Hunt. For the 2000 Spring hunt, the total number of whales landed was 15 and 9 lost. In most cases, a harpoon with float and line attached, darting gun and shoulder gun were used. Wainwright and Barrow took the most whales out of the ten bowhead subsistence communities.

2000 Fall Hunt. For the 2000 Fall hunt, the total number of whales landed was 20 and 3 lost. In most cases, a harpoon with float and line attached, darting gun and shoulder gun were used. Barrow, Nuiqsut and Kaktovik participated in hunts. The hunting efficiency, in 2000 for both the Spring and Fall hunts was 74%.

2001 Spring Hunt. For the 2001 Spring hunt, 32 whales were landed and 25 were lost. In most cases, a harpoon with float and line attached, darting gun and shoulder gun were used. It was noted that the hunting efficiency was lower due to poor ice and weather conditions.

2001 Fall Hunt. For the 2001 Fall hunt, 16 whales were landed and 1 was lost. In most cases, a harpoon with float and line attached, darting gun and shoulder gun were used. The hunting efficiency in 2001 for both the Spring and Fall hunts was 65%.

2002 Spring Hunt. For the 2002 Spring hunt, 8 whales were landed, including 2 whales abandoned due to weather, and 7 were lost. In most cases, a harpoon with float and line attached, darting gun and shoulder gun were used.

2002 Fall Hunt. For the 2002 Fall hunt 31 whales were landed and 4 lost. In most cases, a harpoon with float and line attached, darting gun and shoulder gun were used.

4. ENVIRONMENTAL CONSEQUENCES

4.1 Effects of the Alternatives on Western Arctic Stock of Bowhead Whales

The Western Arctic stock of bowhead whales was last assessed by the IWC in 1998 (IWC, 1999). Recent IWC stock assessments have been based on age- and sex-structured population models and incorporate density-dependence. Management related parameters such as replacement yield, RY, and the related but slightly different quantity, Q0, (Wade and Givens, 1997) have been estimated using Bayesian methods (RY is the number of animals that can be removed from the population which leaves the population at the end of the year the same size as at the start of the year; Q0 accounts for populations above Maximum Sustainable Yield Levels (MSYL), the population level which results in the maximum sustainable yield and is defined to be 90% of MSY when a population is above MSYL). Bayesian methods provide a framework for using prior information in an assessment and allow different types of data to be incorporated in the assessment. With Bayesian methods, true probability statements can be made with respect to the various output parameters from population modeling (e.g., historical abundance, population growth rate, and replacement yield (RY or Q0)). The affect of any bowhead whale take on the population is determined by the population's present abundance and productivity (a stock assessment output).

Stock assessments of bowhead whales usually provide estimates for a number of parameters associated with stock productivity (e.g., rate of increase, ROI, and a measure of stock productivity, MSYR, the maximum sustainable yield as a fraction of the MSYL). The most important parameter used by the Scientific Committee (SC) of the IWC to provide management advice to the Commission is the replacement yield since it estimates the number of animals that can be taken. The 1998 management advice of the IWC SC was based on the lower 5th percentile of the RY and Q0 values (thus implying that there is an equal or greater than 95% probability that the true RY or Q0 is equal to or greater than the 5th percentile value). This was based on four combinations of assessment methods from two assessments of the status of the Western Arctic bowhead stock. Therefore, the assessment is a conservative estimate of replacement yield. The lowest RY value was 108 (range: 108-123), and the lowest Q0 value was 102 (range: 102-120). The SC reported that the population "appears to be near MSY, and would very likely increase under catches of up to 108 animals" (IWC, 1999). It further noted that "in terms of sub-paragraph 13(a) of the Schedule, appropriate catch levels in these circumstances should not exceed 90% of MSY. The calculations reported therefore indicate that it is very likely that a catch limit of 102 whales or less would be consistent with the requirements of the Schedule" (IWC, 1999). Any takes less than 102 should therefore allow the Western Arctic bowhead stock to continue to increase and will have relatively minor impact on the health of the stock, currently estimated to be about 9,860 whales and increasing at 3.3% annually (with an annual harvest; George et al., 2002).

The IWC has established the 5-year block quota for this stock, allowing a total of 280 bowhead whales to be landed. Annual strike quotas would be established at 67 bowhead whales struck, with an allowance for the carry-over of 15 unused strikes from any previous year (including 15 unused strikes from the 1998-2002 block quota). Thus, it would be possible for as many as 82 strikes to occur in any given year, unless the landed limit of 280 had been met. The IWC has sanctioned the aboriginal harvest of whales from this stock by both the United States and Russia. The annual strike limits and quotas for bowhead whales are determined at the beginning of each year after consultation with the AEWC and renewal of the U.S-Russia bilateral agreement governing the allocation, between the two countries, of the bowhead whale subsistence quota.

Accordingly, in the EA, alternatives are developed based on this recommended strike limit (inclusive of takes in both Alaska and Russia). The alternatives primarily assess the merits of different options in the carry-over strikes without suggesting a change to the extant strike quota provided through the international forum of the IWC and as established through several decades of scientific research and calculations.

Under Alternative 1, the maximum annual removal would be 67, assuming all 67 strikes result in a whale killed. This is significantly less than the replacement yield of 102 whales estimated by the Scientific Committee of the IWC. If 67 animals were removed annually for 5 years, this would result in a total of 335 whales removed during the 5-year block from 2003 through 2007. Such a removal would still allow the bowhead whale stock to increase since the harvest is less than the replacement yield. However, there would not be any carry-over of strike limits from one year to the next, reducing options for the harvest.

Under Alternative 2, the maximum annual removal of bowhead whales in any one year would be 82 animals (67 strikes + 15 strike carry-over, again assuming that all strikes result in mortality). The maximum mortality of bowhead whales from subsistence hunting over the five years of the quota period could be at most 350 whales, again assuming that all strikes result in death. This number is calculated by the annual strike limit of 67 per year, with the allowed carry-over of 15 strikes from the 1998 through 2002 quota block. Therefore, 15 + (67 x 5) = 350 for the 5-year block quota. If all strikes and carry-over strikes are used, a potential maximum average removal of 70 (= 350 / 5) animals per year is still less than the replacement yield of 102 animals per year and would still allow the bowhead whale stock to increase, albeit at a slightly slower rate than Alternative 1. This would allow a maximum of 15 strikes to be carried into a succeeding year, which would provide some flexibility to the Eskimos following a year in which the hunt was not successful.

Under Alternative 3, the maximum removal in any year would be 100 whales (67 + (0.5 x 67)), where half of an annual quota can be carried over to the following year. The maximum mortality of bowhead whales from subsistence hunting over the five years of the quota period could be at most 368 whales, again assuming that all strikes result in death. This number is calculated by the annual strike limit of 67 per year, with the allowed carry-over of 33.5 (= 67 x 0.5) strikes from the 1998 through 2002 quota block. Therefore, 33.5 + (67 x 5) = 368 total animals that could

potentially be removed. A maximum annual removal of 101 animals and, if all strikes and carry-over strikes were used, an average removal of less than 74 (= 368 / 5) animals per year is still less than the replacement yield of 102 animals per year and would still allow the bowhead whale stock to increase, albeit at a slightly slower rate than Alternatives 1 or 2. This alternative would provide more flexibility in harvest limits than Alternatives 1 or 2, particularly for helping Eskimos through devastating seasons when few whales can be taken.

Alternative 4 would likely result in a harvest, given Alaska Eskimo dependence on bowhead whales. This could potentially slow or reverse the current bowhead whale rate of increase if Eskimos exceed their typical harvest levels. However, the level of subsistence harvest of Western Arctic bowhead whales has been on average 41 landed animals per year between 1992-2002 (Angliss et al., *in press*), less than any of the quota limits proposed under the other Alternatives.

4.2 Effects on Individual Whales

During the annual spring and fall hunts, whalers will approach and attempt to strike bowhead whales, but not all of these whales will be killed or struck. Unless struck, whales would be unlikely to be injured during the act of being hunted (pursuit), or when exposed to disturbance by hunting vessels or equipment. Those individual whales that are not struck or killed may be affected by the hunt in other ways. Among other things, individual whales that are not struck may be disturbed by approaching hunters and their vessel noise. An annual quota for both landed and struck whales at the level approved by the IWC compared to the stock estimate of 9,860 whales ensures that only a small fraction of the whales will ever be approached or disturbed by Alaska Eskimo subsistence hunters. Additionally, actions such as the Weapons Improvement Program, have reduced the potential for struck and lost whales by the Alaska Eskimo hunters to potentially die without being landed (IWC, 2000). The recently enacted emergency towing assistance authority should further improve hunting efficiency. See section 403 of Pub. L. 107-372.

Hunting actions have the potential to harass bowhead whales which are not being pursued, by the presence of vessels or underwater noise. The sound of one or more bomb detonations during a strike is audible for some distance. Acousticians listening to bowhead whale calls as part of the census report that calling rates drop after such a strike. The range at which whales may be affected is unknown, and is likely to vary with environmental conditions (e.g., depth of water, ambient noise levels, ice conditions, bottom structure) and the depth at which the bomb detonates.

Whaling crews have observed that whales may act “skittish” and wary after a bomb detonates, or may be displaced further offshore (E. Brower, pers. com.). However, disturbances to migration as a result of a strike are temporary (J. George, 1996), as evidenced when several whales may be landed at Barrow in a single day. There is some potential that migrating whales, particularly

calves, could be forced into thicker offshore ice as they avoid these noise sources. The experience of Native hunters suggests that the whales would be more likely to temporarily halt their migrations, turn 180 degrees away from the disturbance (i.e. move back through the lead systems), or become highly sensitized as they continue moving (E. Brower, pers. com.).

Alternatives 1, 2, and 3 would each allow Alaska Eskimo hunters to strike bowhead whales, with Alternative 1 allowing the fewest strikes, and Alternative 3 the most strikes. Similarly, indirect effects on individual whales are likely to be the fewest with Alternative 1 and the most with Alternative 3.

Under Alternative 4, strikes of bowheads during the hunt would be a function of the number of whales that the hunters felt it was appropriate to take without a quota from NOAA Fisheries.

4.3 Cumulative Effects

Cumulative impacts are those combined effects on the quality of the human environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what federal and non-federal agency or person undertakes such other actions. See 40 CFR 1508.7, 1508.25(a) and 1508.25(c). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

4.3.1 Offshore Petroleum Extraction Activities

The spring season appears to be a particularly critical period in the bowheads' annual cycles as this is the time most if not all of the population migrates, through areas covered by dense ice, where migration routes are constrained and most likely to be blocked by elevated sound sources (Richardson et al., 1995b). Exposure to man-made sound and contaminants may produce short- and long-term effects (Richardson and Malme, 1993; Bratton et al., 1993). However, Richardson and Malme (1993) state that data are not available to assess long-term impacts. Further, Richardson notes that in the shorter term, research in 1996 through 1998 show that some seismic noise can deflect fall migration of bowheads to further offshore (Miller et al., 1999; Richardson, 1999). There has been concern expressed by residents of the Arctic (Ahmaogak, 1985, 1989) regarding the cumulative and long-term effects of anthropogenic noises on Western Arctic bowhead whales. Anthropogenic impact is a function of the extent that industrial activities coincide with the bowhead whales' seasonal occupation of certain regions and the whales' tolerance level of the impacts (Richardson and Malme, 1993; Bratton et al., 1993).

As noted in Section 3.2.8 of this EA, extensive information about the effects of oil and gas activities on bowhead whales is discussed in several documents: (1) a Biological Opinion prepared by NOAA Fisheries for the Minerals Management Service (MMS) pursuant to section 7 of the Endangered Species Act on Oil and Gas Leasing and Exploration Activities in the Beaufort

Sea, Alaska, 2000 (NMFS, 2001), (2) a Draft Environmental Impact Statement prepared pursuant to the National Environmental Policy Act for the Beaufort Sea Planning Area, Oil and Gas Lease Sale, Sales 186, 195, and 202 (MMS, 2002), (3) a Final Environmental Impact Statement prepared by the U.S. Army Corps of Engineers, Alaska on the Beaufort Sea Oil and Gas Development Project/Northstar (U.S. Army, 1999), and (4) the NOAA Fisheries March 4, 1999, Biological Opinion on the proposed Northstar project (NMFS, 1999).

The Biological Opinion prepared for oil and gas leasing and exploration activities concluded that the effects from an encounter with aircraft generally are brief and whales should resume their normal activities within minutes (Patenaude et al., 2002). Bowheads may exhibit temporary avoidance behavior to vessels at a distance of 1-4 km. Many earlier studies indicate that most bowheads exhibit avoidance behavior when exposed to sounds from seismic activity. Bowheads also exhibited tendencies for reduced surfacing and dive duration, fewer blows per surfacing, and longer intervals between successive blows. Studies in the 1980s indicated that bowheads appeared to recover from these behavioral changes within 30-60 minutes following the end of seismic activity (Richardson et al., 1986; Ljungblad et al., 1988). Monitoring studies of 3-D seismic exploration in the nearshore Beaufort Sea during 1996-1998 have demonstrated that nearly all bowhead whales will avoid an area within 20km of an active seismic source (Richardson, 1999). Sound levels received by bowhead whales at 20km ranged from 117-135 dB re 1µPa rms and 107-126 dB re 1µPa rms at 30km, but did not persist beyond 12 hours after seismic operations (Richardson, 1999). Data from monitoring seismic operations from 1996-98 suggested that the offshore displacement may have begun roughly 35 km (19 n. mi. or 22 st. mi.) east of the activity, and may have persisted >30km to the west (Richardson, 1999). Bowheads reoccupied the area within 12-24 hours after seismic surveys ended (Richardson, 1999).

Bowheads have been sighted within 0.2-5 km from drill ships, although bowheads change their migration speed and swimming direction to avoid close approach to noise-producing activities. During autumn migration however, bowheads may avoid drill ships and their support vessels at 20-30 km. There are no observations of bowhead reactions to icebreakers breaking ice, but it has been predicted that roughly half of the bowheads would respond at a distance of 4.6-20 kilometers when the S:N is 30 dB. Overall, bowhead whales exposed to noise-producing activities most likely would experience temporary, nonlethal behavioral effects.

The MMS investigated the probability of spilled oil contacting bowhead whales (MMS, 2002). Specific offshore areas (Ice/Sea Segments or ISS) were identified and modeled for probability of contact. Certain of these ISS's overlay the migratory corridor of the bowhead. Using data from the MMS oil spill analysis for Sale 170, and assuming an oil spill of 1,000 barrels or more occurred at any of several offshore release areas (launch boxes) during the summer season, the chance of that oil contacting these ISS's within 30 days during the summer season ranged from 5-82%. Therefore, there is high variability from the effects of an oil spill impacting ISS areas.

If an oil spill were concentrated in open water leads, it is possible that a bowhead whale could inhale enough vapors from a fresh spill to affect its health. The effects of oil contacting skin are

largely speculative, but may include pre-disposing whales to infection. It has been suggested that if oil gets onto the eyes of bowhead whales it would enter the large conjunctival sac (Zhu, 1996) and move inward 4 to 5 inches (10 to 13 cm) and get behind most of the eye (Albert, pers. comm., 1997). The consequences of this event are uncertain, but some adverse effects are expected. Bowhead whales may ingest oil encountered on the surface of the sea during feeding, resulting in fouling of their baleen plates. Albert (1981) suggests that broken off baleen filaments and tar balls are of concern because of the structure of the bowhead's stomach; causing a blockage within a narrow passage of the digestive system.

Engelhardt (1987) stated that bowhead whales are particularly vulnerable to effects from oil spills due to their use of ice edges and leads where spilled oil tends to accumulate. The impacts of oil exposure to the bowhead whale population would also depend upon how many animals contacted oil. If oil found its way into leads or ice-free areas frequented by migrating bowheads, a significant proportion of the population could be affected.

Most whales exposed to spilled oil could be expected to experience temporary, nonlethal effects from skin contact with oil, inhalation of hydrocarbon vapors, ingestion of oil-contaminated prey items, baleen fouling, reduction in food resources, or temporary displacement from some feeding areas. A few individuals may be killed as a result of exposure to freshly spilled oil. However, the combined probability of a spill occurring and also contacting bowhead habitat during periods when whales are present is considered to be low, and the percentage of the bowhead whale stock so affected is expected to be very small. Contaminated food sources and displacement from feeding areas also may occur as a result of an oil spill, but NOAA Fisheries has concluded (NMFS, 2001) it is unlikely that the availability of food sources for bowheads would be affected given the abundance of plankton resources in the Beaufort Sea (Bratton et al., 1993).

4.3.2 Cumulative Effects of Environmental Variability

The bowhead hunt is conducted in the ice-laden waters of the Chukchi and Beaufort Sea portions of the Arctic Ocean. During the spring bowhead migration, the hunters set up camps on the shore-fast ice and hunt the bowheads along the ice edge (sometimes miles offshore), as the whales migrate through the spring lead system. This spring hunt, in particular, can be extremely dangerous as ice moves constantly with the wind and currents. Shore-fast ice can break free of the shore, taking the hunters with it. Sea ice may ram into the shore-fast ice, crushing the ice shoreward, forming thousands of meters of pressure ridges, and potentially stranding or even killing anyone who is unable to make it back to shore (AEWC personal communication, 2002). In recent years, the polar temperatures and arctic ice appears to have become even more unpredictable (AEWC personal communication, 2002). While no data is currently available to determine the impacts of climate changes on the bowhead hunt, climate changes are expected to have an impact.

A few years ago, during the spring hunt, a large sheet of shore fast ice broke free from the shore near Barrow, carrying over 150 people and their equipment with it. Not too many years ago,

those people would have been lost. They were able to be saved only because the North Slope Borough now has search and rescue helicopters and equipment. These treacherous ice conditions can also affect the success of the bowhead hunt and cause considerable variation in hunting success between villages and across years (AEWC personal communication, 2002).

In 2001, ice obstructing the spring lead system and fog over the open water made the spring bowhead hunt more difficult than usual, especially in the villages of Pt. Hope and Barrow. These environmental conditions were noted by the scientists conducting the bowhead census, which are conducted in the spring near Pt. Barrow. The struck/lost ratio reflected such environmental conditions as efficiency fell from an average of 78% between 1997-2000 to 65% in 2001 (AEWC personal communication, 2002). Compared with the last successful census, in 1993, the scientists noted that visibility was substantially poorer in 2001 than in 1993, especially because of fog and slushy or broken ice in the leads (AEWC personal communication, 2002). Spring bowhead hunts, which are conducted from the shore fast ice in the spring ice lead system, are much more difficult when there is fog or the lead system is choked with ice.

Moving ice, wind, and ocean current can carry a struck whale under the ice; moreover, recovery of struck whales can be further compromised by ice in the leads and poor visibility. Therefore, when a whale is lost, the crews engage in an intense search. However, as with the primary hunt, the success of these searches usually depends on ice, weather, and current. Hunters do not wait for ideal conditions to launch their hunt because the major portion of the bowhead migration may last for only 2-3 weeks in the spring and a few weeks in the fall (AEWC personal communication, 2002).

4.3.3 Ship Strikes and Gear Interactions

Incidental take of bowhead whales in fishing gear apparently is rare. A young bowhead was reported to have died after being entrapped in a fishing net in Japan and another in northwest Greenland in a net used to capture beluga whales (Shelden and Rugh, 1995). Between 1976 and 1992, only three ship-strike injuries were documented out of a total of 236 bowhead whales examined from the Alaskan subsistence harvest (George et al., 1994). Since this publication, six additional whales have been noted with ship-strike injuries (1995-2002) out of approximately 180 examined whales (pers. comm. with C. George). The low number of observed ship-strike injuries suggests that bowheads either do not often encounter vessels or they avoid interactions with vessels, or that interactions usually result in the death of the animals. However, it appears that the rate may have increased slightly in recent years.

Line entanglement or other fishing gear interaction is also known to occur within this population. Preliminary data from the North Slope Borough Department of Wildlife records line wounds on bowhead whales; finding between 0 and 33 per cent of examined whales showed such injuries (of varying degree or severity) for the years 1990-2001. However, they suggest perhaps 10% of the population exhibits clearly identifiable line injuries (George, 2001). One whale was landed in 1999 at Barrow with crab fishing gear wrapped through the mouth which had caused serious

injuries. Burns (1993) suggested the most likely source for such entanglement is the commercial crab fisheries in the Bering Sea, such as the tanner crab fishery in late winter and spring north of the Pribilofs and St. Matthew Island. These fisheries occur over the continental shelf using pots (which may weigh 318 kg) tethered to floats by long nylon lines. While incidental losses of bowheads from entanglement is unknown (Burns, 1993), Small and DeMaster (1995) note that incidental take of bowhead whales in fisheries have rarely been reported and are not thought to be an area of concern, especially because bowhead habitat (ice-covered areas) limits commercial and sport fisheries activities.

4.3.4 Research Activities

A number of research activities have the potential to impact bowheads. Listed below are activities from both governmental and research organizations.

The greatest potential impact from arctic-based research is underwater noise generated by icebreakers. The SBI project plans to operate from the US Coast Guard HEALY and POLAR STAR icebreakers. Although radiated noise levels for these ships has not been measured, estimated source levels for icebreakers of similar size range from 177-191 dB re 1 μPa-m (Richardson et al., 1995: Table 6.5). Increases in noise level (5-10 dB) during ice breaking are caused by propeller cavitation, are broad band (10-10,000 Hz), and are extremely variable over the period of pushing ice. Noise from research activities aboard the icebreakers, or from ice camps may also be audible underwater, but their source level would be expected to be much lower than that of a ship breaking ice. It should be noted that ambient sea-ice noise is also extremely variable, with source levels of 124-137 dB re 1 μPa-m for 4 and 8 Hz tones measured for ice deformation noises at pressure ridges (Richardson et al., 1995).

4.4 Effects on Other Wildlife

None of the alternatives is expected to present any significant effects to other wildlife. The U.S. Fish and Wildlife Service (FWS) was consulted and concurred with NOAA Fisheries' conclusion that the proposed action is not likely to adversely impact ESA listed species under FWS jurisdiction (U.S. Fish and Wildlife Service, 2002). Just as individual whales may be indirectly affected by hunting activities, e.g., vessel noise (see section 4.2), other wildlife such as seals or polar bears may also be disturbed by these activities. Moreover, the Native villages and communities who currently harvest bowhead whales would be likely to alter their harvest patterns of other subsistence foods depending on the number of bowhead whales harvested. This currently occurs, as other species may be sought out when bowheads cannot be hunted due to weather/ice or whenever a village's hunting is only partially successful. At these times it is possible that the harvest of other animals may increase, such as seals, ducks, fish, caribou, bear, walrus, beluga whales, or dall sheep. It is not possible to quantify this effect, as each subsistence food may have its own individual value and place within the Native diet. A pound of bowhead whale maktak is not necessarily replaceable by a pound of caribou or whitefish, even if that were

possible.

4.5 Socio-cultural Effects

The estimated population of these ten subsistence hunting villages was 8,300 in 1997, with Native Alaskans comprising between 64 and 97 per cent of the total. The importance of the bowhead whale in these Eskimo villages cannot be overstated. The AEWC has stated "whaling, more than any other activity, fundamentally underlies the total lifeway of these communities" (AEWC Brochure, *undated*). Eskimos have hunted the bowhead whale for over 2000 years, and it remains the dominant aspect of their culture. Subsistence hunts are a year round activity in these villages, beginning each winter with preparation of skin boats and caribou hunting for meat supplies for the crews, preparation of ice cellars, outfitting the camps with supplies, spring whale hunting, shared harvesting and distribution of whales, cultural events celebrating the harvest, summer time hunting for bearded seals for use in building umiaks for the following year's spring bowhead hunt, and fall whaling (in Barrow, Nuiqsut, and Kaktovik).

Bowhead whale meat and oil provide important contributions to the Eskimo diet, and are thought to be especially valuable in supplying high-calorie protein in a cold and harsh climate. A permanent loss of whale meat could precipitate physical, psychological, and/or cultural trauma that often accompanies drastic and forced dietary changes (Michie, 1979). The sale of bowhead whale meat is prohibited, however edible portions are shared throughout the communities of Alaska's north slope. Bowhead whales also provide raw materials for the creation of Native handicrafts, which may be legally sold.

In 1997, the AEWC documented a level of 280 landed whales over a five year period as necessary to provide for the nutritional and cultural needs of these communities. Today, their need is at least as great. Any alternative which would provide fewer whales would be expected to have some level of adverse impact to socio-economic and cultural structure within these villages. It is not likely the nutritional or cultural void created would or could be filled with substitute foods. Imported foods cannot take the place of whale and other marine mammals which are absolutely necessary in the diets of Eskimos (Michie, 1979).

4.5.1 Effects on Eskimos

Alternatives 1, 2, and 3 would address Alaska Eskimo cultural and nutritional subsistence needs. Alternative 3 would be viewed as more favorable to the AEWC because it would allow Alaska Eskimos the maximum flexibility in conducting their subsistence hunts from year to year. Alternative 2 would be preferred over alternative 1 by the AEWC because it gives Alaska Eskimos more flexibility in conducting the subsistence hunt from year to year.

Alternative 4 would be viewed by the AEWC as a failure by the U.S. Government to uphold Native rights of Alaska Eskimos. Since the MMPA and ESA expressly provide for the right for

Alaska Native subsistence hunting, and since there is no conservation-based rationale for denying the quota, a denial of a quota would not comport with NOAA Fisheries's objective to accommodate Federal trust responsibilities to the fullest extent possible consistent with applicable law. Alternative 4 could also provoke confrontation between the AEWC and NOAA Fisheries. Cooperative research and management efforts between the AEWC and NOAA Fisheries that benefit marine mammals could be jeopardized.

4.5.2 Effects on Other Tribes and Aboriginals

The IWC provided for aboriginal groups to hunt whales in the original Schedule of Regulations adopted in 1946. The Commission began regulating aboriginal subsistence hunts when it first set catch limits for bowhead whales in 1977. Issuing a bowhead quota to the AEWC so that Alaskan Eskimos can continue a subsistence hunt of bowhead whales sets no new precedent that could increase commercial or subsistence hunts.

The media has reported that Canadian Tribes have also conducted subsistence hunts. Canada is not a member of the IWC, and the U.S. government opposes any hunts by Canadian Natives unless Canada seeks and receives authorization from the IWC. Nonetheless, Canada has, since 1991, allowed its Natives to take bowhead whales regularly from the Davis Strait and Hudson Bay stocks of bowhead whales.

Alternatives 1 through 3 would promote cultural diversity and recognize the importance of maintaining traditions for the coherence of Alaska Eskimo groups. These alternatives would also make it possible for the AEWC to carry on subsistence hunts that are sanctioned by the IWC. Official recognition that traditional subsistence activities, such as whale hunts, are culturally valuable, will be reassuring to Native Americans in general.

Alternative 4 could affect working relationships with other tribes that would view NOAA Fisheries' action under this alternative as a breach of faith by the U.S. Government in upholding Native subsistence rights. Most Native tribes throughout the U.S. would likely view Alternative 4 as a failure on the part of NOAA Fisheries to exercise its trust responsibility with respect to Alaska Eskimos, and possibly as insensitivity to the cultural diversity of Native Americans in general.

4.5.3 Effects on the General Public

There is a segment of the U.S. population that is opposed to whaling, particularly commercial whaling (according to letters and environmental group communications to the U.S. Government). However, many citizens and non-governmental groups understand and appreciate the cultural and nutritional needs of Alaskan Natives to harvest bowhead whales in a subsistence hunt. Some citizens and groups oppose all whaling, no matter the situation.

Alternatives 1, 2, and 3 would involve the issuance of a quota for a subsistence harvest.

Alternative 1 limits the flexibility by not allowing for any strike carry-over. Alternatives 2 and 3 provide for differing degrees of annual flexibility in rolling over unused strike quotas from year to year, with a 15 strike maximum carry-over for Alternative 2, and a 50% of strikes maximum carry-over for Alternative 3. All of these alternatives should be acceptable to citizens who want to control whaling but recognize the value of allowing subsistence activities by Alaskan Native groups to continue. Alternative 1 may be most acceptable to citizens who do not agree with providing some flexibility in managing the hunt, while Alternative 3 may be most acceptable to citizens who believe in providing for maximum flexibility of the hunt. Alternative 4 would not grant the AEWC a quota. This alternative may be supported by citizens opposed to all whaling. However, since it is probable that Alaskan Eskimos would continue to hunt, given their dependence on bowheads, Alternative 4 may also be the least acceptable to citizens and organizations who are opposed to whaling since it could result in an unregulated hunt.

5. FINDING OF NO SIGNIFICANT IMPACT

This EA considers the environmental consequences of four alternatives regarding issuance of annual quotas to the AEWC for a subsistence hunt on Western Arctic bowhead whales for the years 2003 through 2007. The proposed action, Alternative 2, would grant the AEWC annual quotas that meet the documented need of Alaskan Eskimos for at least 255 landed whales over 5 years (2003 through 2007), with an annual strike quota of 67 bowhead whales per year, where no more than 15 unused strikes are added to the strike quota for any one year.

To determine the significance of the action analyzed in this EA, NOAA Fisheries is required by NEPA and 40 CFR 1508.27 to consider the context and intensity of the proposed action. In this EA, the action was analyzed as a whole, upon the affected region, by affected interests, and short- and long-term effects. Additionally, the severity of the impacts were analyzed. The following text summarizes this analysis of the proposed action with consideration to both context and intensity.

The proposed action will not significantly affect the Western Arctic bowhead whale stock. Under this proposal, the maximum annual removal of bowhead whales in any one year would be 82 animals (67 strikes + 15 strike carry-over, assuming that all strikes result in mortality). The maximum mortality of bowhead whales from subsistence hunting by Alaska Eskimos over the five years of the quota period could be at most 350 whales, again assuming that all strikes result in death. This number is calculated by the annual strike limit of 67 per year, with the allowed carry-over of 15 strikes from the 1998 through 2002 quota block. Therefore, $15 + (67 \times 5) = 350$. The number of whales landed is limited to 255 whales over the 5 year period. A maximum annual removal of 82 animals and, if all strikes and carry-over strikes used, a maximum average removal of 70 animals per year is less than the replacement yield of 102 animals per year. Therefore, this alternative would still allow the bowhead whale stock to increase. Again, these figures assume that all strikes will be used and all strikes will result in mortality.

The proposed action would not have significant impacts on other wildlife. The proposed action allows for the same landed and strike quota that has been in place for Alaska Eskimos from 1998-2002 and therefore is not likely to cause Alaska Eskimos to shift subsistence hunting activities to other wildlife, which would have the potential to increase subsistence hunting pressure on other species. No endangered or threatened species or their critical habitat will be significantly affected by the proposed action.

The proposed action would meet the documented subsistence needs of Alaska Eskimos for bowhead whales to the greatest extent possible and is consistent with the MMPA and ESA.

The proposed action would promote cultural diversity and recognize the importance of maintaining traditions for Alaska Eskimo groups. The proposed action would not set any precedent that could increase subsistence hunting pressure on bowhead whales.

The proposed action would not have a significant impact on the general public, although there may be opposition to the proposed action by citizen groups that oppose whaling.

The proposed action is not directly related to any other actions by the U.S. Government concerning harvest of bowhead whales, whaling activities, or other marine mammal activities that would, together with the other actions, result in cumulatively significant impacts.

The proposed action will not cause substantial damage to the ocean or coastal habitats. Whaling on an aboriginal subsistence scale has minimal impacts on the ocean and coastal habitats. There is little incidental take of other species during a bowhead whale subsistence hunt. The level of subsistence harvest authorized by the IWC allows the continued increase in whale stocks.

For these reasons and those described in more detail in this EA, it is hereby determined that the granting of a share of the IWC aboriginal subsistence quota for bowhead whales to the AEWC will not significantly affect the quality of the human environment, and that preparation of an environmental impact statement on this action is not required by Section 102(2) of the National Environmental Policy Act or its implementing regulations.

Rebecca Lent

for William T. Hogarth, Ph.D.
Assistant Administrator for Fisheries

2/23/03

Date

6. LIST OF PREPARERS

Robyn Angliss	Alaska Fisheries Science Center National Marine Fisheries Service Seattle, WA
Jeff Breiwick	Alaska Fisheries Science Center National Marine Fisheries Service Seattle, WA
Winnie Chan	Office of Protected Resources National Marine Fisheries Service Silver Spring, MD
Roger Eckert	Office of General Counsel National Oceanic and Atmospheric Administration Silver Spring, MD
Emily Menashes	Office of Protected Resources National Marine Fisheries Service Silver Spring, MD
Stacey Nathanson	Office of General Counsel National Oceanic and Atmospheric Administration Silver Spring, MD
Kim Shelden	Alaska Fisheries Science Center National Marine Fisheries Service Seattle, WA
Bradley Smith	Alaska Regional Office National Marine Fisheries Service Anchorage, AK
Chris Yates	Office of Protected Resources National Marine Fisheries Service Silver Spring, MD

7. COORDINATION AND CONSULTATION

NEPA requires Federal agencies to reduce delay in the NEPA process by cooperating with other affected agencies before an EA or EIS is prepared. Cooperative planning is encouraged when more than one agency (Federal, state, tribal, or local) is involved in the project or program. The FWS was consulted, and concurred with NOAA Fisheries' conclusion that the proposed action is not likely to adversely affect ESA listed species under FWS' jurisdiction (U.S. Fish and Wildlife Service, 2002). The AEWC was consulted during the scoping process and the development of alternatives. Additionally, although NOAA Fisheries is the lead agency in this process and the agency with expertise on the biological aspects of bowhead whales, the AEWC was consulted about the social, economic, and cultural impacts of various alternatives. The AEWC also had an opportunity to comment on the draft EA.

8. REFERENCES

Ahmaogak, G. 1985. Comments regarding the development of a policy pertaining to research in the U.S. Arctic. Inuit Studies 9(2): 27-32.

Ahmaogak, G. 1989. Protecting the habitat of the bowhead whale. p. 593-597 in: L. Rey and V. Alexander (eds.). Proceedings of the sixth conference of the Comite Arctique International, New York, 13-15 May 1985.

Ainana, L., N. Mymrin, L. Bogoslovskaya, and I. Zagrebin. 1995. Role of the Eskimo Society of Chukotka in encouraging traditional Native use of wildlife resources by Chukotka Natives and in conducting shore based observations on the distribution of bowhead whales, *Balaena mysticetus*, in coastal waters off the south-eastern part of the Chukotka Peninsula (Russia) during 1994. Rep. to Dep. Wildl. Manage., North Slope Borough, Barrow, Alaska, by Eskimo Soc. Chukotka, Provideniya, Russia. 135 p.

Alaska Department of Fish and Game. 2001. Short-tailed Albatross. Available at: http://www.state.ak.us/local/akpages/FISH.GAME/wildlife/geninfo/game/albatros.htm

Alaska Department of Fish and Game. 2001. Spectacled Eider. Available at: http://www.state.ak.us/local/akpages/FISH.GAME/wildlife/geninfo/game/sp_eider.htm

Alaska Department of Fish and Game. 2001. Steller's Eider. Available at: http://www.state.ak.us/local/akpages/FISH.GAME/wildlife/geninfo/game/st_eider.htm

Alaska Eskimo Whaling Commission. 2000. Spring and Fall Harvest Report for 1999. Submitted by the Alaska Eskimo Whaling Commission in compliance with the NOAA-AEWC Cooperative Agreement.

Albert, T. F. 1981. Some thoughts regarding the possible effect of oil contamination on the bowhead whale, *Balaena mysticetus*. In T. F. Albert (Editor), Tissue structural studies and other investigations on the biology of endangered whales in the Beaufort Sea, p. 945-953. Rep. to Bur. Land Manage. from Dep. Vet. Sci., Univ. Md., College Park, NTIS No. PB86-153566.

Allen, J.A. 1880. History of North American pinnipeds. A monograph of the walruses, sea-lions, sea-bears, and seal of North America. U.S. Geol. Geogr. Surv. Terr., Misc. Publ. 12. U.S. Gov. Print. Off., Washington, D.C. 785 p.

Angliss, R.P., D.J. Rugh, D.E. Withrow and R.C. Hobbs. 1995. Evaluations of aerial photogrammetric length measurements of the Bering-Chukchi-Beaufort Seas stock of bowhead whales (*Balaena mysticetus*). Rep. Int. Whaling Comm. 45:313-324.

Angliss, R.P. and K.L. Lodge. *In press*. 2002 Alaska Marine Mammal Stock Assessments. U.S. Dept. Comm., NOAA Tech. Memo. NMFS-AFSC-xxx.

Angliss, R.P., A. Lopez and D.P. DeMaster. 2001. Alaska Marine Mammal Stock Assessments, 2001. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-124, 203 p.

Anonymous. 1991. International Whaling Commission Report. Report of the International Whaling Commission 41: 1-2.

Bailey, A.M. 1928. An unusual migration of the spotted and ribbon seals. Journal of Mammalogy 9: 250-251.

Baretta, L., and G.L. Hunt, Jr. 1994. Changes in the numbers of cetaceans near the Pribilof Island, Bering Sea, between 1975-78 and 1987-89. Arctic 47: 321-326.

Bessonov, B., V.V. Mel'nikov and V.A. Bobkov. 1990. Distribution and migration of cetaceans in the Soviet Chukchi Sea. In Conference Proceedings, Third Information Transfer Meeting, p. 25-31. U.S. Minerals Manage. Serv., Alaska OCS Reg.

Bockstoce, J.R. and D.B. Botkin. 1980. The historical status and reduction of the western Arctic bowhead whale (*Balaena mysticetus*) population by the pelagic whaling industry, 1848-1914. Final Rep. to Natl Mar. Fish. Serv., Old Dartmouth Histor. Soc., Contract 03-78-M02-0212, 31 Mar. 1980. v + 120p.

Bogoslovskaya, L.S., L.M. Votrogov and I.I. Krupnik. 1982. The bowhead whale off Chukotka: migrations and aboriginal whaling. Rep. Int. Whaling Comm. 32: 391-399.

Borstad, G.A. 1985. Water colour and temperature in the southern Beaufort Sea: remote sensing in support of ecological studies of the bowhead whale. Can. Tech. Rep. Fish. Aquat. Sci. No. 1350. 68 p.

Braham, H.W. 1995. Sex and size composition of bowhead whales landed by Alaskan Eskimo whalers. p. 281-313 in: A.P. McCartney (ed.). Hunting the largest animals: native whaling in the western Arctic and subarctic. The Canadian Circumpolar Institute Studies in Whaling No. 3, Occas. Publ. No. 36. 345 p.

Braham, H.W., J.J. Burns, G.A. Fedoseev, and B.D. Krogman. 1984. Habitat partitioning by ice-associated pinnipeds: distribution and density of seals and walruses in the Bering Sea, April 1976. Pages 25-47, in Fay, F. H. and G. A. Fedoseev (eds.), Soviet-American cooperative research on marine mammals. Vol. 1. Pinnipeds. U. S. Department of Commerce, NOAA Technical Report NMFS 12.

Braham, H.W., M.A. Fraker and B.D. Krogman. 1980. Spring migration of the western Arctic population of bowhead whales. Mar. Fish. Rev. 42(9-10): 36-46.

Braham, H.W. and M.E. Dahlheim. 1982. Killer whales in Alaska documented in the Platforms of Opportunity Program. Report of the International Whaling Commission 32: 643-646.

Bratton, G.R., C.B. Spainhour, W. Flory, M. Reed and K. Jayko. 1993. Presence and potential effects of contaminants. P. 701-744 in: J.J. Burns, J.J. Montague, and C.J. Cowles (eds.). The Bowhead Whale. The Society for Marine Mammalogy Special Publication Number 2. v-xxxvi, 1-787.

Braund, Stephen R. & Associates. 1997. Quantification of Subsistence and Cultural Need for Bowhead Whales by Alaska Eskimos, 1997 Update Based on 1997 Alaska Department of Labor Data. IWC/54/AS1.

Braund, S.R., S.W. Stoker, and J.A. Kruse. 1988. Quantification of Subsistence and Cultural Need for Bowhead Whales by Alaska Eskimos. Stephen R. Braund & Associates, Anchorage, Alaska. Prepared for the Bureau of Indian Affairs, Department of the Interior. International Whaling Commission TC/40/AS2.

Breiwick, J.M., and H.W. Braham (eds). 1984. The status of endangered whales. Marine Fisheries Review 46(4): 1-64.

Brooks, J.W. 1954. A contribution to the life history and ecology of the Pacific walrus. Alaska Coop. Wildl. Res. Unit, Univ. Alaska, Fairbanks, Spec. Rep. 1. 103 pp.

Brueggeman, J.J. 1982. Early spring distribution of bowhead whales in the Bering Sea. J. Wild. Manage. 46: 1036-1044.

Brueggeman, J.J., B. Webster, R. Grotefendt, and D. Chapman. 1987. Monitoring the winter presence of bowhead whales in the Navarin Basin through association with sea ice. Rep. for U.S.

Minerals Manage. Serv. by Envirosphere Co., NTIS No. PB88-101258, 179 p.

Buckland, S.T. and J.M. Breiwick. 2002. Estimated trends in abundance of eastern Pacific gray whales from shore counts, 1967/68 to 1995/96. J. Cetacean Res. Manage. (Special Issue) (SC/A90/G9) 4: 41-48.

Buckland, S.T., J.M. Breiwick, K.L. Cattanach, and J.L. Laake. 1993a. Estimated population size of the California gray whale. Marine Mammal Science 9: 235-249.

Burns, J.J. 1965. The walrus in Alaska: its ecology and management. Alaska Dep. Fish and Game, Fed. Aid Wild. Restor. Proj. Rep. 5. 48 p.

Burns, J. J. 1967. The Pacific bearded seal. Federal Aid in Wildlife Restoration, Projects W-6-R and W-14-R. Alaska Department of Fish and Game, Juneau. 66p.

Burns, J.J. 1970. Remarks on the distribution and natural history of pagophilic pinnipeds in the Bering and Chukchi seas. Journal of Mammalogy 51: 445-454.

Burns, J.J. 1973. Marine mammal report. Alaska Department of Fish and Game, Pittman-Robertson Project Report. W-17-3, W-17-4, and W-17-5.

Burns, J.J. 1981a. Bearded seal - *Erignathus barbatus* Erxleben, 1777. Pages 145-170 in Ridgway, S. H. and R. H. Harrison (eds.), Handbook of marine mammals. Vol. 2. Seals. Academic Press, New York.

Burns, J.J. 1981b. Ribbon seal - *Phoca fasciata* Zimmermann, 1783. Pages 89-109, in Ridgway, S. H. and R. H. Harrison (eds.), Handbook of marine mammals. Vol. 2. Seals. Academic Press, New York.

Burns, J.J. 1993. Epilogue. *In*: The bowhead whale. J.J. Burns, J. J. Montague, and C.J. Cowles (Eds). The Society for Marine Mammalogy. Special Publication Number 2. Lawrence: Allen Press, Inc.

Burns, J.J., and K.J. Frost. 1983. The natural history and ecology of the bearded seal, *Erignathus barbatus*. U. S. Department of Commerce, NOAA, OCSEAP Final Report 19: 311-392.

Burns, J.J. and S.J. Harbo, Jr. 1972. An aerial census of ringed seals, northern coast of Alaska. *Arctic* 25: 279-290.

Burns, J.J., L.H. Shapiro, and F.H. Fay. 1981a. Ice as marine mammal habitat in the Bering Sea. Pages 781-797 in Hood, D. W. and J. A. Calder (eds.), The eastern Bering Sea shelf: oceanography and resources. Vol. 2. U. S. Department of Commerce, NOAA, Office of Marine

Pollution Assessment, Juneau, Alaska.

Burns, J.J., L.H. Shapiro, and F.H. Fay. 1981b. The relationships of marine mammal distributions, densities and activities to sea ice conditions. U. S. Department of Commerce, NOAA, OCSEAP Environmental Assessment of the Alaskan Continental Shelf, Final Report, Biological Studies 11: 489-670.

Clark, C.W. and W.T. Ellison. 2000. Calibration and comparison of the acoustic location methods used during the spring migration of the bowhead whale, , off Pt. Barrow, Alaska, 1984-1993. J. Acoust. Soc. Am. 107 (6): 3509-17.

Colborn, T. and M.J. Smolen. 1996. Epidemiological analysis of persistent organochlorine contaminants in cetaceans. Reviews of Environmental Contamination and Toxicology 146:91-172.

Cubbage, J.C. and J. Calambokidis. 1987. Size-class segregation of bowhead whales discerned through aerial stereophotogrammetry. Mar. Mammal Sci. 3:179-185.

Dahlheim, M.E., T. Bray, and H. Braham. 1980. Vessel survey for bowhead whales in the Bering and Chukchi seas, June-July 1978. Mar. Fish. Rev. 42(9-10):51-7.

Dahlheim, M., A. York, R. Towell, J. Waite, and J. Breiwick. 2000. Harbor porpoise (*Phocoena phocoena*) abundance in Alaska: Bristol Bay to Southeast Alaska, 1991-1993. Marine Mammal Science 16: 28-45.

Davies, J. R. 1997. The impact of an offshore drilling platform on the fall migration path of bowhead whales: a GIS-based assessment. Master of Science thesis, Western Washington University. 52p.

Davis, R. A., W.R. Koski, and G.W. Miller. 1983. Preliminary assessment of the length-frequency distribution and gross annual recruitment rate of the western arctic bowhead whale as determined with low-level aerial photogrammetry, with comments on life history. Rep. to NMFS, Natl. Mar. Mamm. Lab., Seattle, Wash., by LGL Ltd, 91 p.

Davis, R. A., W.R. Koski, G.W. Miller, P.L. McLaren, and C.R. Evans. 1986. Reproduction in the bowhead whale, summer 1985. Int. Whal. Comm. Unpubl. Doc. SC/38/PS2, 123 p.

Dorsey, E.M., S.J. Stern, A.R. Hoelzel, and J. Jacobsen. 1990. Minke whale (*Balaenoptera acutorostrata*) from the west coast of North America: individual recognition and small scale site fidelity. Rep. Int. Whal. Comm. (Special Issue 12): 357-368.

Dronenburg, R.B., J.C. George, B.D. Krogman and R.M. Sonntag. 1986. Report of the 1984 spring bowhead whale (*Balaena mysticetus*) ice-based census. Rep. Int. Whal. Comm. 36: 293-8.

Ellis, Richard. 1991. Men and Whales. The Lyons Press, New York. 542 p.

Engelhardt, F. R. 1987. "Assessment of the Vulnerability of Marine Mammals to Oil Pollution." Fate and Effects of Oil in Marine Ecosystems. Proceedings of the Conference on Oil Pollution Organized Under the Auspices of the International Association on Water Pollution Research and Control (IAWPRC) by the Netherlands Organization for Applied Scientific Research. TNO Amsterdam, 23-27 Feb. 1987, The Netherlands. Eds. J. Kuiper, and W. J. Van Den Brink. Boston: Martinus Nijhoff Publishers.

Fay, F.H. 1955. The Pacific walrus (*Odobenus rosmarus divergens*): spatial ecology, life history, and population. Ph.D. Thesis. Univ., British Columbia, Vancouver. 171 p.

Fay, F. H. 1974. The role of ice in the ecology of marine mammals of the Bering Asea. Pages 383-389 in Hood, D. W. and E. J. Kelley (eds.), Oceanography of the Bering Sea. Univ. Alaska, Fairbanks, Institute of Marine Science Occasional Publication 2.

Fay, F.H. 1982. Ecology and biology of the Pacific walrus, *Odobenus rosmarus divergens* Illiger. N. Am. Fauna 74. 279 p.

Fay, F.H., B.P. Kelly, P.H. Gehnrich, J.L. Sease, and A.A. Hoover. 1984. Modern population, migrations, demography, trophics, and historical status of the Pacific walrus. U.S. Dep. Commer., NOAA, OCSEAP Final Rep. 37(1986): 231-376.

Fay, F.H. and S.W. Stoker. 1982. Reproductive success and feeding habits of walruses taken in the 1982 spring harvest, with comparisons from previous years. Eskimo Walrus Commission, Nome, Alaska. 91 p.

Fedoseev, G.A. 1965. Food of the ringed seal. Izvestiya TINRO 59:216-223. (Translated from Russian by Meg. L. Poppino, Davis, California, 1977, 10 p.)

Fedoseev, G.A. 1984. [Encountering whales in the ice fields of the Sea of Okhotsk.] Ekologiya 3: 81-83. [In Russ., partial transl. by S. Smrstik (NMML).]

Ferrero, R.C., D.P. DeMaster, P.S. Hill, M.M. Muto and A.L. Lopez. 2000. Alaska Marine Mammal Stock Assessments 2000. NOAA Technical Memomorandum NMFS-AFSC-119. 191 p.

Finley, K.J., G.W. Miller, R.A. Davis and W.R. Koski. 1983. A distinctive large breeding population of ringed seals (*Phoca hispida*) inhabiting the Baffin Bay pack ice. Arctic 36: 162-173.

Frost, K.J. 1985. Unpublished report. The ringed seal. Alaska Dep. Fish and Game, Fairbanks. 14 p.

Frost, K.J. and L.F. Lowry. 1980. Feeding of ribbon seals (Phoca fasciata) in the Bering Sea in spring. Canadian Journal of Zoology 58: 1601-1607.

Frost, K.J. and L.F. Lowry. 1990. Distribution, abundance and movements of beluga whales, *Delphinapterus leucas*, in coastal waters of western Alaska. Pp. 39-57 *in* T.G. Smith, D.J. St. Aubin, and J.R. Geraci (eds.). Advances in research on the beluga whale, *Delphinapterus leucas*. Canadian Bulletin of Fisheries and Aquatic Science 224.

Frost, K.J., L.F. Lowry, J.R. Gilbert and J.J. Burns. 1988. Ringed seal monitoring: relationships of distribution and abundance to habitat attributes and industrial activities. U.S. Department of Commerce, NOAA, OCSEAP Final Report 61 (1989): 345-445.

Frost, K.J., L.F. Lowry, C. Hessinger, G. Pendleton, D. DeMaster and S. Hills. 1999. Monitoring distribution and abundance of ringed seals in northern Alaska. Interim Report April 1998-March 1999, U.S. Department of Interior, Minerals Management Service, Cooperative Agreement 14-35-001-30810. 37 p.

Frost, K.J., L.F. Lowry, S. Hills, G. Pendleton and D. DeMaster. 1997. Monitoring distribution and abundance of ringed seals in northern Alaska. Interim Report May 1996-March 1997. U.S. Department of Interior, Minerals Management Service, Cooperative Agreement 14-35-001-30810. 42 p.

Frost, K.J., L.F. Lowry, S. Hills, G. Pendleton and D. DeMaster. 1998. Monitoring distribution and abundance of ringed seals in northern Alaska. Interim Report April 1997-March 1998, U.S. Department of Interior, Minerals Management Service, Cooperative Agreement 14-35-001-30810. 48 p.

Gaskin, D.E. 1984. The harbor porpoise, *Phocoena phocoena* (L.): regional population, status and information on direct and indirect catches. *Report of the International Whaling Commission* 34: 569-586.

Gearin, P. 1999. Makah Whaling. Page 96 in: Rugh, D.J., M.M. Muto. S.E. Moore, and D.P. DeMaster (editors). Status review of the eastern North Pacific stock of gray whales. NOAA Technical Memorandum NMFS-AFSC-103.

George, C.J. 1996. Testimony In: United States. Army Corps of Engineers. Transcript of Proceedings, Environmental Impact Statement for Beaufort Sea Oil and Gas Development, Northstar Environmental Impact Statement Project. Public Scoping Meeting, Monday, March 25, 1996, Barrow, Alaska. Prepared for the United States. Army Corps of Engineers by Alaska Stenotype Reporters. Anchorage: ASR.

George, C.J. 2001. Preliminary data on line entanglement of bowhead whales based on postmortem examinations of harvested whales. Unpub. Paper. November 14, 2001. North Slope

Borough, Division of Wildlife Management.

George, C.J., G.M. Carroll and L.M. Philo. 1988. Preliminary Report on Bowhead Whale, *Balaena mysticetus*, Census-Related Field Activities During Spring 1987 Off Point Barrow, Alaska. *In*: Report of the International Whaling Commission 38, 1988.

George, J.C., L. Philo, K. Hazard, D. Withrow, G. Carroll and R. Suydam. 1994. Frequency of killer whale (*Orcinus orca*) attacks and ship collisions based on scarring on bowhead whales (*Balaena mysticetus*) of the Bering-Chukchi-Beaufort seas stock. *Arctic* 47(3): 247-55.

George, J.C., R.S. Suydam, L.M. Philo, T.F. Albert, J.E. Zeh and G.M. Carroll. 1995. Report of the spring 1993 census of bowhead whales, *Balaena mysticetus*, off Point Barrow, Alaska, with observations on the 1993 subsistence hunt of bowhead whales by Alaska Eskimos. Rep. Int. Whaling Comm. 45: 371-384.

George, J.C., J. Zeh, R. Suydam and C. Clark. 2002. Population size of the Bering-Chukchi-Beaufort Seas stock of bowhead whales, *Balaena mysticetus*, based on the 2001 census off Point Barrow, Alaska. Paper SC/54/BRG5, presented to the IWC Scientific Committee, Shimonoseki, Japan, 27 Apr – 9 May 2002. 13p.

Gorbics, C.S., J.L. Garlich-Miller and S.L. Schliebe. 1998. Draft Alaska marine mammal stock assessments 1998: sea otters, polar bear and walrus. U.S. Fish and Wildlife Service, Alaska Region, Anchorage, AK. 45p.

Gulland, F.M.D., H. Perez-Cortes, J. Urban-R, L. Rojas-Bracho, G. Ylitalo, C. Kreuder, and T. Rowles. 2002. Eastern North Pacific gray whale unusual mortality event, 1999-2000: a compilation. Paper SC/54/BRG23 presented to the International Whaling Commission May 2002 (unpublished). 21p.

Gurevich, V.S. 1980. Worldwide distribution and migration patterns of the white whale (beluga), *Delphinapterus leucas*. Rep. Int. Whal. Comm.30: 465-480.

Hazard, K. 1988. Beluga whale, *Delphinapterus leucas*. *In*: J. W. Lentfer (Editor), Selected marine mammals of Alaska: species accounts with research and management recommendations, p. 195-235. Mar. Mammal Comm., Wash., D.C.

Hazard, K.W. and J.C. Cubbage. 1982. Bowhead whale distribution in the southeastern Beaufort Sea and Amundsen Gulf, summer 1979. Arctic 35: 519-523.

Heide-Jørgensen, M.P., B.S. Stewart and S. Leatherwood. 1992. Satellite tracking of ringed seals Phoca hispida off northwest Greenland. *Ecography* 15: 56-61.

Heidel, J.R. and T.F. Albert. 1994. Intestinal volvulus in a bowhead whale (*Balaena*

mysticetus). J. Wildl. Dis. 30: 126-128.

Heyning, J.E. and M.E. Dahlheim. 1988. Orcinus orca. Mammalian Species 304: 1-9.

Hobbs, R.C. and D.J. Rugh. 1999. The abundance of gray whales in the 1997/98 southbound migration in the eastern North Pacific. Document SC/51/AS10 submitted to the International Whaling Commission. 13 p.

International Whaling Commission. 1992. Chairman's report of the 43rd annual meeting. *Rep. Int. Whal. Comm.* 42: 11-50.

International Whaling Commission. 1995. Chairman's report of the 46th annual meeting, Appendix 4. Rep. Int. Whal. Comm. 45: 42-43.

International Whaling Commission. 1996. Report of the Scientific Committee. Rep. Int. Whal. Comm. 46: 51-106.

International Whaling Commission. 1997. Chairman's report of the forty-eighth annual meeting. Rep. Int. Whal. Comm. 47(1): 17-55.

International Whaling Commission. 1998. 48th Report of the International Whaling Commission. Cambridge, UK.

International Whaling Commission. 1999. Report of the sub-committee on aboriginal subsistence whaling. Annex G. J. Cetacean Res. Manage. 1 (Suppl.): 179-194.

International Whaling Commission. 2001. Annual Report of the International Whaling Commission 2000. Cambridge, UK.

International Whaling Commission. 2002. Annual Report of the International Whaling Commission 2001. Cambridge, UK.

International Whaling Commission. *In press.* Report of the Scientific Committee. J. Cetacean Res. Manage. 5 (Suppl.):000-000.

Johnson, M.L., C.H. Fiscus, B.T. Ostenson and M.L. Barbour. 1966. Marine Mammals. Pages 877-924 in Wilimovsky, N. J. and J. N. Wolfe (eds.), Environment of the Cape Thompson region, Alaska. U. S. Atomic Energy Commission, Oak Ridge, Tennessee.

Kapel, F.O., J. Christiansen, M.P. Heide-Jørgensen, T. Härkönen, E.W. Born, L.Ø. Knutsen, F. Riget and J. Teilmann. 1998. Netting and conventional tagging used to study movements of ringed seals (*Phoca hispida*) in Greenland. Pages 211-228 in Heide-Jørgensen, M. P. and C. Lydersen (eds.), Ringed seals in the North Atlantic. NAMMCO Scientific Publications, Vol. 1,

Tromso.

Kelly, B. P. 1988b. Ribbon seal, *Phoca fasciata*. Pages 95-106 in Lentfer, J. W. (ed.), Selected marine mammals of Alaska. Species accounts with research and management recommendations. Marine Mammal Commission, Washington, D.C.

Kelly, B. P. 1988c. Ringed seal, *Phoca hispida*. Pages 57-75 in Lentfer, J. W. (ed.), Selected marine mammals of Alaska. Species accounts with research and management recommendations. Marine Mammal Commission, Washington, D.C.

Kibal'chich, A.A., G.A. Dzhamanov, and M.V. Ivashin. 1986. Records of bowhead and gray whales in the early winter in the Bering Sea. Report of the International Whaling Commission 36: 291-292.

Krogman, B.D. 1980. Sampling strategy for enumerating the Western Arctic population of the bowhead whale. Marine Fisheries Review 42(9-10): 30-36.

Krutzikowsky, G.K. and B.R. Mate. 2000. Dive and surfacing characteristics of bowhead whales (*Balaena mysticetus*) in the Beaufort and Chukchi seas. Can. J. Zool. 78: 1182-98.

Leather wood, S., R.R. Reeves, W.F. Perrin, and W.E. Evans. 1982. Whales, dolphins, and porpoises of the eastern North Pacific and adjacent Arctic waters: a guide to their identification. NOAA Technical Report NMFS 444.

LeBoeuf, B.J., H. Perez-Cortes M., U. Urban R., B.R. Mate, and F. Ollervides U. 2000. High gray whale mortality and low recruitment in 1999: potential causes and implications. J. Cet. Res. Manage. 2: 85-99.

Lentfer, J.W. (Ed.). 1988. Selected marine mammals of Alaska: species accounts with research and management recommendations. Marine Mammal Commission. 275 p.

Lowry, L.F. 1982. Documentation and assessment of marine mammal-fishery interactions in the Bering Sea. Transcriptions of the North American Wildlife and Natural Resources Conference 47: 300-311.

Ljungblad, D.K., S.E. Moore, J.T. Clarke, and J.C. Bennett. 1987. Distribution, abundance, behavior and bioacoustics of endangered whales in the Alaskan Beaufort and eastern Chukchi Seas, 1979-86. Rep. US Minerals Manage. Serv. by Naval Ocean Systems Center, NTIS No. AD-A183934/9, 391p.

Ljungblad, D.K., S.E. Moore and J.T. Clarke. 1986. Assessment of bowhead whale (*Balaena mysticetus*) feeding patterns in the Alaskan Beaufort and northeastern Chukchi Seas via aerial

surveys, fall 1979-1984. Rep. Int. Whaling Comm. 36: 265-272.

Ljungblad, D.K., S.E. Moore, J.T. Clarke, and J.C. Bennett. 1986. Aerial surveys of endangered whales in the northern Bering, eastern Chukchi and Alaskan Beaufort Sea, 1985: with a seven year review, 1979-85. Rep. for U.S. Minerals Manage. Serv. by Nav. Ocean Systems Cent., NTIS No. PB87-115929, 443 p.

Ljungblad, D.K., B. Würsig, S.L. Swartz and J.M. Keene. 1988. Observations on the behavioral responses of bowhead whales (*Balaena mysticetus*) to active geophysical vessels in the Alaskan Beaufort Sea. Arctic 41(3): 183-194.

Lowry, L.F. 1984. The spotted seal (*Phoca largha*). Pages 1-11 in Alaska Department of Fish and Game marine mammal species accounts. Vol. 1. Juneau, Alaska.

Lowry, L.F., V.N. Burkanov and K.J. Frost. 1996. Importance of walleye pollock, *Theragra chalcogramma*, in the diet of phocid seals in the Bering Sea and northwestern Pacific Ocean. Pages 141-151 in Brodeur, R. D., P. A. Livingston, T. R. Loughlin, and A. B. Hollowed (eds.), Ecology of juvenile walleye pollock, *Theragra chalcogramma*. NOAA Technical Report NMFS 126, U. S. Department of Commerce, Seattle, Washington.

Lowry, L.F. and K.J. Frost. 1981. Feeding and trophic relationships of phocid seals and walruses in the eastern Bering Sea. Pages 813-824 in Hood, D. W. and J. A. Calder (eds.), The eastern Bering Sea shelf: Oceanography and resources, Vol. 2. University of Washington Press, Seattle.

Lowry, L.F., K.J. Frost, V.N. Burkanov, M.A. Simpkins, A. Springer, D.P. DeMaster, and R. Suydam. 2000. Habitat use and habitat selection by spotted seals (*Phoca largha*) in the Bering Sea. Canadian Journal of Zoology 78: 1959-1971.

Lowry, L.F., K.J. Frost and J.J. Burns. 1978. Food of ringed seals and bowhead whales near Point Barrow, Alaska. Canadian Field-Naturalist 92: 67-70.

Lowry, L.F., K.J. Frost and J.J. Burns. 1979. Potential resource competition in the southeastern Bering Sea: fisheries and phocid seals. Pages 287-296 in Melteff, B. R. (ed.), Proceedings of the 29th Alaska Science Conference. University of Alaska, Fairbanks, Alaska Sea Grant Report 79-6.

Lowry, L.F., K.J. Frost, and J.J. Burns. 1980a. Feeding of bearded seals in the Bering and Chukchi seas and trophic interaction with Pacific walruses. Arctic 33: 330-342.

Lowry, L.F., K.J. Frost and J.J. Burns. 1980b. Variability in the diet of ringed seals, *Phoca hispida*, in Alaska. Canadian Journal of Fisheries and Aquatic Sciences 37: 2254-2261.

Lowry, L.F., K.J. Frost and J.J. Burns. 1981a. Trophic relationships among ice-inhabiting

phocid seals and functionally related marine mammals in the Bering Sea. U. S. Department of Commerce, NOAA, OCSEAP Environmental Assessment. Alaskan Continental Shelf, Final Report, Biological Study. 11: 97-173.

Lowry, L.F., K.J. Frost and J.J. Burns. 1981b. Trophic relationships among ice-inhabiting phocid seals and functionally related marine mammals in the Chukchi Sea. U. S. Department of . Commerce, NOAA, OCSEAP Environmental. Assessment. Alaskan Continental Shelf, Final Report, Biological Studies 11: 37-95.

Lowry, L.F., K.J. Frost, D.G. Calkins, G.L. Swartzman, and S. Hills. 1982. Feeding habits, food requirements, and status of Bering Sea marine mammals. Council Document Nos. 19 and 19A (annotated bibliography), 574 p. North Pacific Fisheries Management Council, P. O. Box 103136, Anchorage, AK 99510.

Lowry, L.F., K.J. Frost, R. Davis, D.P. DeMaster, and R.S. Suydam. 1998. Movements and behavior of satellite-tagged spotted seals (*Phoca largha*) in the Bering and Chukchi Seas. Polar Biology 19: 221-230.

Marko, J.R., and M.A. Fraker. 1981. Spring ice conditions in the Beaufort Sea in relation to bowhead whale migration. Rep. for Alaska Oil Gas Assoc., Anchorage, by LGL Ltd., 98 p.

Marquette, W.M. and J.R. Bockstoce. 1980. Historical shore-based catch of bowhead whales in the Bering, Chukchi, and Beaufort seas. Mar. Fish. Rev. 42(9-10): 5-19.

Mate, B.R., G.K. Krutzikowsky and M.H. Winsor. 2000. Satellite-monitored movements of radio-tagged bowhead whales in the Beaufort and Chukchi seas during the late-summer feeding season and fall migration. Can. J. Zool. 78: 1168-81.

McLaren, I.A. 1958. The biology of the ringed seal (*Phoca hispida* Schreber) in the Eastern Canadian Arctic. Fisheries Research Board of Canada Bulletin 118: 97 p.

McLaren, P.L., and W.J. Richardson. 1985. Use of the eastern Alaskan Beaufort Sea by bowheads in late summer and autumn. In LGL and Arctic Science, Importance of the eastern Alaskan Beaufort Sea to feeding bowheads: literature review and analysis, p. 7-35. Rep. for U.S. Minerals Manage. Serv. by LGL, Inc., and Arctic Sci., Ltd., 158 p.

Mel'nikov, V.V. and A.V. Bobkov. 1993. Bowhead whale migration in the Chuckchee Sea. Russian J. Mar. Biol. 19(3): 180-185.

Mel'nikov, V.V. and A.V. Bobkov. 1994. On the bowhead whale migrations in the Chukchi Sea, 1991. Oceanology 33(5): 643-647.

Mel'nikov, V.V., M.A. Zelensky, and L.I. Ainana. 1998. Observations on distribution and

migration of bowhead whales (*Balaena mysticetus*) in the Bering and Chukchi seas. Paper AS/50/AS3 presented to the IWC Scientific Committee (unpublished). 23 p. [Paper available from the Office of this Journal.]

Mel'nikov, V.V., M.A. Zelensky, and V.V. Bychkov. 1997. Seasonal migrations and distribution of bowhead whale in waters of Chukotka. Russ. J. Mar. Biol. 23(4): 175-83.

Michie, Preston. 1979. Alaskan Natives: Eskimos and bowhead whales: an inquiry into cultural and environmental values that clash in courts of law. American Indian Law Review, Vol 7. P. 79-115. Lewis and Clark Law School.

Miller, G.W., R.E. Elliott, W.R. Koski, V.D. Moulton and W.J. Richardson. 1999. Whales. p. 5-1 to 5-109. *In*: W.J. Richardson (ed.), Marine mammal and acoustical monitoring of Western Geophysical's open-water seismic program in the Alaskan Beaufort Sea, 1998. LGL Rep. TA2230-3. Rep. from LGL Ltd., King City, Ont., and Greeneridge Sciences Inc., Santa Barbara, CA, for Western Geophysical, Houston, TX, and U.S. Nat. Mar. Fish. Serv., Anchorage, AK, and Silver Spring, MD. 390 p.

Miller, R.V., D.J. Rugh, and J.H. Johnson. 1986. The distribution of bowhead whales, *Balaena mysticetus*, in the Chukchi Sea. Mar. Mammal Sci. 2: 214-22.

Minerals Management Service, U.S. Department of Interior, Alaska OCS Region. 2002. Draft Environmental Impact Statement, Beaufort Sea Planning Area, Sales 186, 195, and 202, Oil and Gas Lease Sale.

Mitchell, E.D. and R.R. Reeves. 1982. Factors affecting abundance of bowhead whales *Balaena mysticetus* in the eastern Arctic of North America, 1915-1980. Biol. Conserv. 22: 59-78.

Mizroch, S.A. 1992. Distribution of minke whales in the North Pacific based on sightings and catch data. Document SC/43/Mi36 submitted to the Int. Whal. Comm. 37 p.

Moore, S.E. 1992. Summer records of bowhead whales in the northeastern Chukchi Sea. Arctic 45: 398-400.

Moore, S.E., and E. I. Barrowclough. 1984. Incidental sighting of a ribbon seal (*Phoca fasciata*) in the western Beaufort Sea. Arctic 37: 290.

Moore, S.E., J.C. Bennett and D.K. Ljungblad, 1989a. Use of passive acoustics in conjunction with aerial surveys to monitor fall bowhead whale (*Balaena mysticetus*) migration. Rep. int. Whal. Commn 39: 291-5.

Moore, S.E. and J.T. Clarke. 1991. Estimates of bowhead whale (*Balaena mysticetus*) numbers in the Beaufort Sea during late summer. Arctic 44: 43-6.

Moore, S.E. and J.T. Clarke. 1992. Distribution, abundance and behavior of endangered whales in the Alaskan Chukchi and western Beaufort Seas, 1991: with a review 1982-91. Report for U.S. Minerals Management Service by SAIC, Maritime Services Division. 237p.

Moore, S.E., J.T. Clarke, and D.K. Ljungblad. 1986. A comparison of gray whale (*Eschrichtius robustus*) and bowhead whale (*Balaena mysticetus*) distribution, abundance, habitat preference and behavior in the northeastern Chukchi Sea, 1982-84. Rep. int. Whal. Commn 36: 273-9.

Moore, S.E., J.T. Clarke, and D.K. Ljungblad. 1989b. Bowhead whale (*Balaena mysticetus*) spatial and temporal distribution in the central Beaufort Sea during late summer and early fall 1979-86. Rep. int. Whal. Commn 39: 283-90.

Moore, S.E., D.P. DeMaster, and P.K. Dayton. 2000. Cetacean habitat selection in the Alaskan Arctic during summer and autumn. Arctic 53(4): 432-47.

Moore, S.E., J.C. George, K.O. Coyle, and T.J. Weingartner. 1995. Bowhead whales along the Chukotka coast in autumn. Arctic 48: 155-60.

Moore, S.E., J.M. Grebmeier and J.R. Davies. 2000. Gray whale foraging habitat in the northern Bering Sea: A GIS based retrospective summary. Document SC/52/E3 submitted to Sci. Comm. of Int. Whal. Commn. 23 p.

Moore, S.E. and R.R. Reeves. 1993. Distribution and movement. p. 313-386 in: J.J. Burns, J.J. Montague, and C.J. Cowles (eds.). The Bowhead Whale. The Society for Marine Mammalogy Special Publication Number 2. v-xxxvi, 1-787.

National Marine Fisheries Service. 1999. Endangered Species Act Section 7 Consultation Biological Opinion for the U.S. Army Engineer District, Alaska on the Proposed Construction and Operation of the Northstar Oil and Gas Project. March 4, 1999. 74 p.

National Marine Fisheries Service. 2001. Biological Opinion on Oil and Gas Leasing and Exploration Activities in the Beaufort Sea, Alaska; and authorization of small takes under the Marine Mammal Protection Act. May 25, 2001.

National Marine Fisheries Service. 2003. Biological Opinion on Issuance of Annual Quotas Authorizing the Harvest of Bowhead Whales to the Alaska Eskimo Whaling Commission for the Period 2003 through 2007.

Nerini, M.K., H.W. Braham, W.M. Marquette and D.J. Rugh. 1984. Life history of the bowhead whale, *Balaena mysticetus* (Mammalia: Cetacea). J. Zool., London 204: 443-468.

Nerini, M.K., D. Withrow, and K. Strickland. 1987. Length structure of the bowhead whale population derived from aerial photogrammetry, with notes on recruitment spring 1985 and 1986.

Int. Whal. Comm. Unpubl. Doc. SC/39/PS14, 22 p.

Nishiwaki, M. and T. Kasuya. 1970. A Greenland right whale caught at Osak Bay. Sci. Rep. Whales Res. Inst., Tokyo 22: 45-62.

Norman, S.A., M.M. Muto, D.J. Rugh and S.E. Moore. 2000. Gray whale strandings in 1999 and a review of stranding records in 1995-1998. Report to Intl. Whal. Comm., SC/52/AS5. (Available at http://ourworld.compuserve.com/homepages/iwcoffice/Publications.htm or from International Whaling Commission, 135 Station Road, Impington, Cambridge, UK.

O'Corry-Crowe, G.M. and L.F. Lowry. 1997. Genetic ecology and management conscerns for the beluga whale (Delphinapterus leucas). Pp. 249-274 in: A.E. Dizon, S.J. Chivers, and W.F. Perrin (eds.). Molecular genetics of marine mammals, special publications 3. Society for Marine Mammalogy.

O'Corry-Crowe, G.M., R.S. Suydam, A. Rosenberg, K.J. Frost, and A.E. Dizon. 1997. Phylogeography, population structure and dispersal patterns of the beluga whale *Delphinapterus leucas* in the western Nearctic revealed by mitochondrial DNA. Molecular Ecol. 6: 955-970.

Ognev, S.I. 1935. Mammals of the U.S.S.R. and adjacent countries. Vol. 3. Carnivora (Fissipedia and Pinnipedia). Gosudarst. Izdat. Biol. Med. Lit., Moscow. (Translated from Russian by Israel Program for Scientific Translations, 1962, 741 p.)

Patenaude, N.J., W.J. Richardson, M.A. Smultea, W.R. Koski, G.W. Miller, B. Würsig and C.R. Greene Jr. 2002. Aircraft sound and disturbance to bowhead and beluga whales during spring migration in the Alaskan Beaufort Sea. Mar. Mamm. Sci. 18(2): 309-335.

Perryman, W.L. , M.A. Donahue, P.C. Perkins, and S.B. Reilly. 2002. Gray whale calf production 1994-2000: are observed fluctuations related to changes in seasonal ice cover. Mar. Mamm. Sci. 18: 121-144.

Perryman, W.L. and R. Rowlett. 2002. Preliminary results of a shore-based survey of northbound gray whale calves in 2001. Paper SC/54/BRG3 presented to the International Whaling Commission May 2002 (unpublished). 3p.

Philo, L.M., J.C. George and T.F. Albert. 1992. Rope entanglement of bowhead whales (*Balaena mysticetus*). Mar. Mammal Sci. 8(3): 306-311.

Philo, L.M., E.B. Shotts and J.C. George. 1993. Morbidity and mortality. P. 275-312 in: J.J. Burns, J.J. Montague, and C.J. Cowles (eds.). The Bowhead Whale. The Society for Marine Mammalogy Special Publication Number 2. v-xxxvi, 1-787.

Platforms of Opportunity Program (POP). 1997. Database of opportunistic marine mammal

sightings. Maintained by the National Marine Mammal Laboratory, Alaska Fisheries Science Center, NOAA, 7600 Sand Point Way NE, Seattle, WA, 98115.

Popov, L.A. 1976. Status of main ice forms of seals inhabiting waters of the U.S.S.R. and adjacent to the country marine areas. FAO ACMRR/MM/SC/51. 17 p.

Quakenbush, L.T. 1988. Spotted seal, *Phoca largha*. Pages 107-124 in Lentfer, J.W. (ed.), Selected marine mammals of Alaska. Species accounts with research and management recommendations. Marine Mammal Commission, Washington, D.C.

Raftery, A.E., and J.E. Zeh. 1994. Bowhead whale, *Balaena mysticetus*, population size estimated from acoustic and visual census data collected near Barrow, Alaska, in 1993. Int. Whal. Comm. Unpubl. Doc. SC/46/AS13, 25 p.

Ramsay, M. and S. Farley. 1997. Upper trophic level research: polar bears and ringed seals. Pages 55-58 in Tucker, W. and D. Cate (eds.), The 1994 Arctic Ocean section: The first scientific crossing of the Arctic Ocean. CRREL Special Report 96-23, U.S. Army Cold Regions Laboratory, Hanover, New Hampshire.

Reeves, R.R. 1998. Distribution, abundance and biology of ringed seals (*Phoca hispida*): an overview. Pages 9-46 in Heide-Jørgensen, M. P. and C. Lydersen (eds.) Ringed Seals in the North Atlantic. The North Atlantic Marine Mammal Commission, Tromsø, Norway.

Reilly, S.B. 1992. Population biology and status of Eastern Pacific gray whales: Recent developments. *In:* McCullough, D.R. and R.H. Barrett (eds). Wildlife 2001: Populations. Elsevier Applied Science. N.Y.

Rice, D.W., and A.A. Wolman. 1971. The life history and ecology of the gray whale (*Eschrichtius robustus*). Amer. Soc. Mammalogists Spec. Publ. No. 3. 142 p.

Richardson, W.J. (ed.) 1987. Importance of the eastern Alaskan Beaufort Sea to feeding bowhead whales, 1985-86. Rep. US Minerals Manage. Serv. by LGL Inc., NTIS No. PB88-150271, 547p.

Richardson, W.J. 1999. Marine mammal and acoustical monitoring of Western Geophysical's open water seismic program in the Alaskan Beaufort Sea, 1998. LGL Re. TA2230-3. Rep. from LGL Ltd., King City, Ont., and Greeneridge Sciences, Inc., Santa Barbara, CA., for Western Geophysical, Houston, Texas, and Nat. Mar. Fish. Serv., Anchorage, AK., and Silver Spring, MD. 390p.

Richardson, W.J., R.A. Davis, C.R. Evans, D.K. Ljungblad, and P. Norton. 1987b. Summer distribution of bowhead whales, *Balaena mysticetus*, relative to oil industry activities in the Canadian Beaufort Sea, 1980-84. Arctic 40(2): 93-104.

Richardson, W.J., C.R. Greene Jr., J.S. Hanna, W.R. Koski, G.W. Miller, N.J. Paternaude, and M.A. Smultea. 1995b. Acoustic affects of oil production activities on bowhead and white whales visible during the spring migration near Pr. Barrow, Alaska--1991 and 1994 phases. Report for U.S. Minerals Management Service from LGL, Ltd., King City, Ont., Can. OCS Study MMS 95-0051, 539p.

Richardson, W.F., C.R. Greene, Jr., C.I. Malme and D.H. Thomson. 1995. Marine Mammals and Noise. Academic Press, San Diego, CA, 576 p.

Richardson, W.J. and C.I. Malme. 1993. Man-made noise and behavioral response. P. 631-700 in: J.J. Burns, J.J. Montague, and C.J. Cowles (eds.). The Bowhead Whale. The Society for Marine Mammalogy Special Publication Number 2. v-xxxvi, 1-787.

Richardson, W.J., G.W. Miller and C.R. Greene Jr. 1999. Displacement of migrating bowhead whales by sounds from seismic surveys in shallow waters of the Beaufort Sea. J. Acoust. Soc. Am. 106(4, Pt. 2): 2281.

Richardson, W.J., B. Würsig and C.R. Greene Jr. 1986. Reactions of bowhead whales, *Balaena mysticetus*, to seismic exploration in the Canadian Beaufort Sea. J. Acoust. Soc. Am. 79(4): 1117-1128.

Richardson, W.J., B. Würsig, and G.W. Miller. 1987a. Bowhead distribution, numbers and activities. p. 257-368. In: W. J. Richardson (ed.) Importance of the eastern Alaskan Beaufort Sea to feeding bowhead whales, 1985-86. Rep. US Minerals Manage. Serv. by LGL Inc., NTIS No. PB88-150271, 547p.

Richardson, W. J., B. Würsig, G.W. Miller, and G. Silber. 1986. Bowhead distribution, numbers and activities. Pp. 146-219 in: W. J. Richardson (ed.). Importance of the eastern Alaskan Beaufort Sea to feeding bowhead whales, 1985. Report for U.S. Minerals Management Service by LGL Inc., OCS Study MMS 86-0026. NTIS No. PB87-124350, 315p.

Rooney, A.P., R.L. Honeycutt, and J.N. Derr. 2001. Historical population size change of bowhead whales inferred from DNA sequence polymorphism data. Evolution 55(8): 1678-85.

Rugh, D. 1990. Bowhead whales reidentified through aerial photography near Point Barrow, Alaska. Rep. int. Whal. Commn (special issue) 12: 289-94.

Rugh, D.J., J.M. Breiwick, R.C. Hobbs, and J.A. Lerczak. 2002. A preliminary estimate of abundance of the eastern North Pacific stock of gray whales in 2001 and 2002. Paper SC/54/BRG6 presented to the IWC Scientific Committee, April 2002. 14p.

Rugh, D.J., M.M. Muto, S.E. Moore, and D.P. DeMaster. 1999. Status review fo the eastern North Pacific stock of gray whales. NOAA Technical Memorandum NMFS-AFSC-103. 95 pp.

Rugh, D. J., K. E. W. Shelden and D. E. Withrow. 1997. Spotted seal, *Phoca largha*, in Alaska. Marine Fisheries Review. 59(1): 1-18.

Schick, R.S. and D.L. Urban. 2000. Spatial components of bowhead whale (*Balaena mysticetus*) distribution in the Alaskan Beaufort Sea. Can. J. Fish. Aquatic Sci. 57: 2193-200.

Scoresby, W. 1820. An account of the Arctic regions, with a history and description of the northern whale-fishery. Archibald Constable Co., Edinb., Vol. 1, 551pp.; Vol. 2, 524pp. [Repr. by David and Charles Repr., Newton Abbot, Devon, 1969.]

Shaughnessy, P.D. and F.H. Fay. 1977. A review of the taxonomy and nomenclature of North Pacific harbour seals. Journal of Zoology (London) 182: 385-419.

Shelden, K.E.W. and D.J. Rugh. 1995. The bowhead whale (*Balaena mysticetus*): Its historic and current status. Marine Fisheries Review. 57(3-4): 1-20.

Shotts, E.B., T.F. Albert, R.E. Wooley, and J. Brown. 1990. Microflora associated with the skin of the bowhead whale (*Balaena mysticetus*). J. Wild. Dis. 26: 351-359.

Shustov, A. P. 1965a. Distribution of the ribbon seal (*Histriophoca fasciata*) in the Bering Sea. Pages 118-121 in Pavloskii, E. H., B. A. Zenkovich, S. E. Kleinenberg, and K. K. Chapskii (eds.), Marine Mammals. Izd. Nauka, Mowcow. (Translated from Russian by U. S. Naval Oceanographic Office, Washington, D. C., 1970. Translation 474, 5 p.)

Small, R. J., and D. P. DeMaster. 1995. Alaska marine mammal stock assessments 1995. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-57, 93 p.

Smirnov, N.A. 1929. A review of the Pinnipedia of Europe and northern Asia. Izv. Otd. Priklad. Ikhtiol. 9:231-268. (Transl. From Russian by F. H. Fay, Univ. Alaska, Fairbanks.)

Smith, T. G. 1987. The ringed seal, *Phoca hispida*, of the Canadian Western Arctic. Canadian Bulletin of Fisheries and Aquatic Sciences 216: 81 p.

Smith, T. G. and I. Stirling. 1975. The breeding habitat of the ringed seal (*Phoca hispida*). The birth lair and associated structures. Canadian Journal of Zoology 53: 1297-1305.

Stewart, B. S. and W. T. Everett. 1983. Incidental catch of a ribbon seal (*Phoca fasciata*) in the central North Pacific. Arctic 36: 369.

Stirling, I., M. Kingsley and W. Calvert. 1982. The distribution and abundance of seals in the eastern Beaufort Sea, 1974-79. Canadian Wildlife Service Occasional Paper 47: 1-23.

Stoker, S.W. and I.I. Krupnik. 1993. Subsistence whaling. Pp. 579-630. *In*: J.J. Burns, J.J. Montague and C.J. Cowles (eds.), The bowhead whale. Spec. Publ. No. 2, Soc. Marine Mammology, Lawrence, KS. 787p.

Suydam, R.S. and G.C. George. 1992. Recent sightings of harbour porpoises, *Phocoena phocoena*, near Point Barrow, Alaska. Canadian Field-Naturalist 106(4): 489-492.

Teilmann, J., E.W. Born and M. Acquarone. 1999. Behaviour of ringed seals tagged with satellite transmitters in the North Water polynya during fast-ice formation. Canadian Journal of Zoology 77: 1934-1946.

Thomson, D.H., D.B. Fissel, J.R. Marko, R.A. Davis, and G.A. Borstad. 1986. Distribution of bowhead whales in relation to hydrometeorological events in the Beaufort Sea. Environ. Stud. Revolving Funds Rep. 028, 119 p. Can. Dep. Indian N. Affairs, Ottawa.

Tikhomirov, E. A. 1966. Reproduction of seals of the family Phocidae in the North Pacific. Zoologicheskii Zhurnal 45: 275-281. (Translated from Russian by Fisheries Research Board of Canada, 1971, Translation Serial 1889, 19 p.)

Tomilin, A.G. 1957. Mammals of the U.S.S.R. and adjacent countries. Volume 9. Cetacea. [Translated by the Israel Program for Scientific Translations, Jerusalem, 1967, NTTS No. TT-65-50086]. 717 p.

Urban-Ramirez, J., L.Rojas-Bracho, H. Perez-Cortes, A. Gomez-Gullardo, S. Swartz and R.L. Brownell. 2002. A review of gray whales in their wintering grounds in Mexican waters. Paper SC/54/BRG16 presented to the International Whaling Commission May 2002 (unpublished). 23p.

U.S. Army Engineer District, Alaska. 1999. Final Environmental Impact Statement: Beaufort Sea Oil and Gas Development/Northstar Project. Vols 1-4. Appendixes. Anchorage, AK.

U.S. Fish and Wildlife Service. 2002. Letter of concurrence regarding Issuance of Quotas to the Alaska Eskimo Whaling Commission from Ted Swem to Donna Wieting.

U.S. Government. 1983. Report on Nutritional, Subsistence, and Cultural Needs Relating to the Catch of Bowhead Whales by Alaskan Natives. Submitted by the U.S. Government to the International Whaling Commission at its 35th Annual Meeting.

Varanasi, U., J.E. Stein, K.L. Tilbury, D.W. Brown, J.P. Meador, M.M. Krahn, and S.L. Chan. 1993. Contaminant monitoring for NMFS marine mammal health and stranding response

program. Pp. 2516-2530 *In:* O.T. Magoon, W. S. Wilson, J. Converse, and L.T. Tobin (eds.). Coastal zone '93, Vol. 3. Proceedings of the eighth symposium on coastal and ocean management. American Society of Civil Engineers, New York, NY.

Wade, P.R., and D.P. DeMaster. 1996. A Bayesian analysis of eastern Pacific gray whale population dynamics. Document SC/48/AS3 submitted to Int. Whal. Comm. 21p.

Wade, P.R. and G.H. Givens. 1997. Designing catch control laws that reflect the intent of aboriginal subsistence management principles. Rep. int. Whal. Commn 47: 871-874.

Wade, P.R., and W. Perryman. 2002. An assessment of the eastern gray whale population in 2002. Paper SC/54/BRG7 presented to the International Whaling Commission May 2002 (unpublished). 16p.

Wartzok, D., Watkins, W.A., Würsig, B., Guerrero, J. and Schoenherr, J. 1990. Movements and behaviors of bowhead whales. Rep. to Amoco Prod. Co., P.O. Box 800, Denver, Colorado 80201. 197p.

Willetto, C.E., T.M. O'Hara, and T. Rowles (editors). 2002. Bowhead Whale Health and Physiology Workshop Report" October 1-4, 2001, Barrow, Alaska. 239p.

Wolfe, R. J. and C. Mishler. 1993. The subsistence harvest of harbor seal and sea lion by Alaska natives in 1992. Final report for year one, subsistence study and monitor system (no. 50ABNF20055). Prepared for the NMFS by Alaska Department of Fish and Game, Juneau, Alaska, 94 p. + appendices.

Wolfe, R. J. and C. Mishler. 1994 The subsistence harvest of harbor seal and sea lion by Alaska natives in 1993 Final report for year two subsistence study and monitor system (no. 50ABNF20055). Prepared for the NMFS by Alaska Department of Fish and Game, Juneau, Alaska, 60 p. + appendices.

Wolfe, R. J. and C. Mishler. 1995. The subsistence harvest of harbor seal and sea lion by Alaska natives in 1994. Final report for year three, subsistence study and monitor system (no. 50ABNF20055). Prepared for the NMFS by Alaska Department of Fish and Game, Juneau, Alaska, 69 p. + appendices.

Wolfe, R. J. and C. Mishler. 1996. The subsistence harvest of harbor seal and sea lion by Alaska natives in 1995. Final report for year four, subsistence study and monitor system (no. 50ABNF20055). Prepared for the NMFS by Alaska Department of Fish and Game, Juneau, Alaska, 69 p. + appendices.

Woodby, D.A. and Botkin, D.B. 1993. Stock sizes prior to commercial whaling. pp. 387-407. *In:* J.J Burns, J.J. Montague and C.J. Cowles (eds.) *The bowhead whale.* Soc. Mar. Mamm.

Spec. Publ. 2, 787p.

Woshner, V.M., T.M. O'Hara, G.R. Bratton, R.S. Suydam, and V.R. Beasley. 2001. Concentrations and interactions of selected essential and non-essential elements in bowhead and beluga whales of Arctic Alaska. Journal of Wildlife Diseases 37: 693-710.

Woshner, V.M., T.M. O'Hara, J.A. Eurell, M.A. Wallig, G.R. Bratton, V.R. Beasley, and R.S. Suydam. 2002. Distribution of Inorganic Mercury in Liver and Kidney of Beluga Whales, Compared to Bowhead Whales, Through Autometallographic Development of Light Microscopic Tissue Sections. Toxicologic Pathology 30 (2): 209-215.

Zeh, J.E., C.W. Clark, J.C. George, D. Withrow, G.M. Carroll and W.R. Koski. 1993. Current population size and dynamics. p. 409-489 in: J.J. Burns, J.J. Montague, and C.J. Cowles (eds.). The Bowhead Whale. The Society for Marine Mammalogy Special Publication Number 2. v-xxxvi, 1-787.

Zeh, J.E., J.C. George, and R. Suydam. 1995a. Population size and rate of increase, 1978-1993, of bowhead whales, *Balaena mysticetus*. Rep. Int. Whal. Comm. 45: 339-44.

Zeh, J. E., A. E. Raftery, and A. A. Shaffner. 1995b. Revised estimates of bowhead population size and rate of increase. Int. Whal. Comm. Unpubl. Doc. SC/47/AS10, 26p.

Zelensky, M., V.V. Mel'nikov, V.V. Bichkov. 1995. Role of the Naukan Native Company in encouraging traditional Native use of wildlife resources by Chukotka Native people and in conducting shore based observations on the distribution of bowhead whales, *Balaena mysticetus*, in waters of the Bering Sea and Chukchi Sea adjacent to the Chukotka Peninsula (Russia) during 1994. Rep. to Dep. Wildl. Manage., North Slope Borough, Barrow, Alaska, by Eskimo Soc. Chukotka, Provideniya, Russia. 105 p.

Zhu, Qian. 1996. Studies on the eyes of the Bowhead whale (*Balaena mysticetus*), ringed seal (*Phoca hispida*), and caribou (*Rangifer tarandus*). Ph.D. thesis. Institute of Oceanology, Chinese Academy of Sciences, Qingdao 266071, Peoples Republic of China. 382p.

9. APPENDICES

9.1 U.S.-Russian Federation Agreement for 2002 Regarding Subsistence Harvest of Bowhead Whales

9.2 Excerpts from the IWC Reports for 2002 (Aboriginal Subsistence Whaling Scientific Committee Report and Summary of the 5th Special Meeting of the IWC)

9.3 AEWC Management Plan

9.4 Quantification of Subsistence and Cultural Need for Bowhead Whales by Alaska Eskimos (1997)

9.5 NOAA-AEWC Cooperative Agreement (2002)

Appendix 9.1 U.S.-Russian Federation Agreement for 2002 Regarding Subsistence Harvest of Bowhead Whales

MONITORING IN 2002
BY THE UNITED STATES AND THE RUSSIAN FEDERATION
OF THE ABORIGINAL SUBSISTENCE QUOTA
FOR BOWHEAD WHALES SET BY
THE INTERNATIONAL WHALING COMMISSION

The International Whaling Commission (IWC) at its Annual Meeting in October 1997 set a five-year block quota of 280 bowhead whales landed, based on a joint proposal by the United States and the Russian Federation. The explanation accompanying the requested quota showed that the needs of both countries' Native groups could be met with an annual average of 56 landed bowhead whales (or a total of 255 for the Alaska Eskimos and 25 for the Chukotka people over the five-year period). In addition, for each of the years 1998 through 2002, the IWC limited the number of bowhead whales that may be struck to 67, except that any unused portion of a strike quota from any year, including 15 unused strikes from the 1995-1997 quota, may be carried forward. No more than 15 strikes may be added to the strike quota for any one year. At the end of the 2001 harvest, there were 15 strikes available for carry-forward, so the combined strike quota for 2002 is 82 (67 + 15).

So that the 2002 quota of bowhead strikes is not exceeded, the Russian Natives may use no more than seven strikes, and the Alaska Eskimos may use no more than 75 strikes. Each side will ensure that the numbers specified in this paragraph for its Native group are not exceeded. Each side will consider any strikes or landings in excess of the specified numbers in discussing monitoring of the quota for 2003, dependent upon the quota set at the 2002 IWC Annual Meeting.

The Russian side plans to inform the U.S. side immediately upon learning that its Natives have struck or landed a bowhead whale. The U.S. side plans to inform the Russian side once a month of the number of bowhead whales struck or landed by the Alaska Eskimos in the preceding month. In September-October, 2002, either side may initiate discussions on the transfer of unused strikes from one Native group to the other. During the first quarter of 2003, the two sides plan to confer on monitoring of the 2002 quota, including any strikes that may be carried forward from 2002.

Dated 02/13/02

Rolland A. Schmitten
IWC Commissioner
United States of America

Dated 04/25/02

Valentin Y. Ilyashenko
IWC Commissioner
Russian Federation

Appendix 9.2 Excerpts from the IWC Reports for 2002 (Aboriginal Subsistence Whaling Scientific Committee Report and Summary of the 5th Special Meeting of the IWC)

again offering the facilities of the National Marine Mammal Laboratory in Seattle. The Workshop will concentrate on reviewing the first results of *Evaluation* and *Robustness Trials* for gray whales and initiating the major review of the Greenland Research Programme.

Similarly, the Committee notes the vital importance of the continuing the Developers' Fund, if it is to make progress on the remaining issues. Details of the work plan agreed by the SWG are given in Annex E. The Committee's final workplan is discussed under Item 19.

9. ABORIGINAL SUBSISTENCE WHALING STOCK ASSESSMENTS

9.1 Annual review of catches and catch limits

9.1.1 Bering-Chukchi-Beaufort Seas stock of bowhead whales

9.1.1.1 NEW SCIENTIFIC INFORMATION

The last successful census of this stock was in 1993. Two census attempts (1999 and 2000) failed due to unstable ice and closed leads, respectively.

SC/54/BRG5 described the results of a bowhead whale census conducted near Barrow in 2001. Observers recorded a total of 3,295 'new' (not seen before) and 532 'conditional' (possibly seen before) bowhead whales during 1,130 hours of watch effort. Only half of the watch period (572 hrs) was scored as 'fair-excellent' visibility, compared to 74% in 1993. The number of calves counted in 2001 (n=121, 3.7% of the new whales) was nearly twice the 1993 count (n=66) and the highest ever recorded. Passive acoustic surveillance was used to estimate the proportion of whales within viewing range.

The estimated number of whales within 4km (N_4) of the perch was 8,637 (SE=1,019). The preliminary estimate of the proportion of whales within 4km of the perch (P_4) was 0.876 (SE=0.033). Combining these, the preliminary (N_4/P_4) abundance estimate for 2001 is 9,860 (SE=1,222; 95% CI 7,700 to 12,600). Generalised least squares were used to estimate rate of increase (ROI), taking into account the correlations among the pre-2000 abundance estimates given by Punt and Butterworth (1999). The estimated annual ROI from 1978-2001 was 3.3% (95% CI=2%, 4.7%). This was almost the same as the ROI estimated from 1978-1993 data (3.2%), but the addition of the 2001 estimate improved the precision. While the N_4 portion of the estimate will not change, further acoustic data and analysis may change the P_4 and variance estimates. Therefore, although the estimates of abundance and ROI are preliminary, they are not expected to change substantially.

An acoustic survey was performed as part of the bowhead census off Point Barrow in 2001 (SC/54/BRG18). The basic methods used to record and analyse array recordings were the same as in previous years. Analysis of 757 out of 1,044 hours of acoustic array data resulted in the detection of over 73,000 bowhead sounds and 26,606 reliable locations. Of these 13,637 were used to calculate the offshore distribution of vocal animals throughout the season. These results indicate that most (88%) vocal whales were within 4km of the perch. This is slightly less than in 1993 (93%), a year with exceptionally good ice, visibility and acoustic conditions.

SC/54/BRG15 presented the results of the shore-based counts of bowhead whales along the Chukotka Peninsula, Russia between 1999 and 2001. The purpose of this work was to determine the number of whales migrating along the western shore of the Bering Sea, where they were probably missed by counts from Point Barrow, Alaska. In spring 2001, 149 bowhead whales were counted, which is similar to the results from 1999 (n=115) and 2000 (n=162).

The Committee discussed the issue of climate change and its relevance to the bowhead whale assessment. Tynan summarised relevant climate oscillations, trends and predictions for the Arctic, particularly changes in sea ice extent and area. On shorter time scales (e.g. four-year period), the Arctic Oscillation (Thompson and Wallace, 1998) greatly affects the sea ice distribution in the Chukchi and Beaufort Seas (Wang and Ikeda, 2000). On decadal time scales, a trend of loss of sea ice area of 11% is reported for the Chukchi and Beaufort Seas. Models of sea ice show that by 2080 only a 'speck' of seasonal winter ice will remain in the Arctic (Vinnikov *et al.*, 1999).

SC/54/E11 presented stochastic bowhead population models that examine impacts of climate change and habitat degradation in the context of natural variability, such as decadal climate oscillations. Models predicted major bowhead population declines despite a rising trend in the near term. The author argued that such scenarios, while uncertain, are supported by evidence, and were suggested for incorporation into AWMP trials. In discussion, many members questioned the methods and interpretations given in the paper and stressed that the bowhead whale robustness trials investigated changes in productivity, carrying capacity and mortality, as well as random episodic mortality events (see Annex E, item 2.2 and Annex F, item 6.1.1).

9.1.1.2 CATCH INFORMATION

Catch information was summarised in SC/54/BRG20; 75 bowhead whales were struck during the 2001 Alaskan hunt, resulting in 49 animals (30 males, 19 females) landed. The efficiency (the ratio of the number landed to the number struck) of the hunt was 65.3%, which is less than the average efficiency over the past 10 years (76.5%). In 2001, ice conditions made hunting difficult, leading to a lower efficiency. Of the 19 females, two were presumably mature ($\geq$ 14.2 m in length) but neither was closely examined to determine if they were pregnant. Since 1980, 27% of the landed females $\geq$ 14.2m in length were pregnant, although this is probably an underestimate because not all females were examined closely for small foetuses.

Ohsumi asked whether reproductive tissues could be collected from harvested animals for future laboratory analysis. Thorough examinations of bowheads and tissue collection occur primarily at Barrow, where most

of the whales are harvested. Examinations and tissue collections occur opportunistically in other villages. The Committee **encourages** continued collection and examination of reproductive organs.

One female bowhead whale (15.2m; estimated 46.8 tons) was harvested off of Chukotka, Russia in 2001 (SC/54/BRG21).

9.1.1.3 MANAGEMENT ADVICE

The Committee noted that although the current catch limit ends in 2002, an in-depth assessment of this stock of bowhead whales is not scheduled until 2004. However, preliminary results from the successful new census conducted near Barrow indicate that the stock is larger than it has been in the last century and is still increasing. The Committee in addition noted that it has **agreed** the *Bowhead SLA* at this meeting (see Item 8.2.1.2.2) which it believes is its best tool for providing management advice for this stock (see Item 8.6.2). On the basis of the information discussed under Item 9.1.1 alone, the Committee **agrees** that there is no reason to change the management advice it had given last year, namely, that it is very likely that a catch limit of 102 whales or less annually would be consistent with the requirements of the *Schedule*.

The Committee reviewed data requirements for the proposed bowhead assessment in 2004. In particular, there was an interest in resolving the conflict between existing age data and the catch and abundance data. It was noted that photo-identification data, such as those collected near Point Barrow, which provide an estimate of adult survival rate, can help to resolve this. In addition, further genetic data would assist with stock assessment. However, it was noted that the SWG on the AWMP has carried out a thorough review of the sub-stock question and the Committee believes that the single-stock hypothesis is most consistent with existing data.

9.1.2 In-depth assessment of eastern North Pacific gray whales

The Committee welcomed new data on gray whale abundance, distribution in the lagoons, migration, strandings and catch. Two papers (SC/54/BRG7 and SC/54/BRG10) presented assessments for this stock.

9.1.2.1 CATCH AND STRANDING INFORMATION

SC/54/BRG21 provided details on the 2001 aboriginal catch of gray whales in the waters adjacent to Chukotka, Russia. The harvest was carried out in the Gulf of Anadyr, the Senyavin Straits and in the open waters of the Bering Sea. A total of 112 gray whales was harvested, including 62 males and 50 females.

There was some discussion of strandings in the Chukotka region. Borodin noted that while it is difficult to accumulate stranding information over such a large coastline, he believes that most have been entrapments in ice. Melnikov added that he has been collecting information over a ten-year period and believes that many gray whales are killed by killer whales. When asked whether these were mainly attacks on calves, Melnikov replied that 2-3 year olds were more frequent targets. It was also noted that the presence of killer whale scars is routinely documented when animals are harvested.

SC/54/BRG27 summarised basic biological data collected from harvested gray whales in Chukotka primarily since 1980. Most of the discussion focused on two discrete periods: 1980-1992 and 1994-2000, the latter period marking a shift to a more traditional type of hunting in coastal areas. The data obtained from harvested animals included sex, size (length), age, physiological condition and a thickness of blubber indicator (blubber thickness in millimetres divided by whale length in centimetres). Following the change in the harvest method, there was a decrease in the number of whales taken, the ratio of females in the catch and the length and corresponding age of harvested whales. A total of 542 whales were caught after between 1994 and 2000, compared to the 2,137 taken between 1980 and 1992. Females dominated the catch in the earlier period, probably due to a hunting preference for larger animals. However, the sex ratio of catches has not differed from parity since 1998. In subsequent years, the whales harvested were predominately juveniles with an average age of less than two years. The percentage of pregnant whales among mature harvested females prior to 1992 was 13.4%. However, caution should be exercised regarding the use of such data as an indicator of the true pregnancy rate in this population. The Committee **recommends** that reproductive organs be collected and archived for detailed determination of pregnancy rates, as these are some of the few animals for which this will be possible. Borodin noted that Russia would welcome such a request.

SC/54/BRG23 summarised available information on the unusual mortality of eastern North Pacific gray whales in 1999 and 2000. The number of strandings documented along the west coast of North America increased to approximately eight times the annual mean calculated between 1995 and 1998. The unusually high number of strandings in 1999 (n=283) continued in 2000, with 368 animals recovered from Mexico to Alaska. Several factors may have contributed to the large number of strandings reported in those years. Since most of the whales were not examined thoroughly, the actual cause of death is unknown. There was also a change in the demographics of stranded animals during this period relative to 1995-1998, with an increase in the proportion of females and adult whales. However, the total number of strandings recorded in 2001 was only 21. This number is within the range of annual strandings in the period 1995-1998. It was also noted that very few strandings have been recorded in 2002 (as of 1 May).

9.1.2.2 NEW SCIENTIFIC INFORMATION

SC/54/BRG24 presented a study of the distribution and abundance of gray whales in the Magdalena Bay complex at Baja California Sur, Mexico. This work compared cow calf pairs to other whales in three well-defined zones: Santo Domingo Channel (north), Magdalena Bay (central) and Almejas Bay (south). The authors proposed that Magdalena and Almejas bays

International Whaling Commission

Chairman
Prof. Bo Fernholm (Sweden)

Vice-Chairman
Com. Henrik Fischer (Denmark)

Secretary
Dr Nicky Grandy

The Red House
135 Station Road
Impington, Cambridge
CB4 9NP UK

Tel: +44 (0) 1223 233971
Fax: +44 (0) 1223 232876
Email: *secretariat@iwcoffice.org*
Internet: *www.iwcoffice.org*

NJG/JAC/29367

21 October 2002

CIRCULAR COMMUNICATION TO COMMISSIONERS
AND CONTRACTING GOVERNMENTS
IWC.CCG.286

Summary of outcomes of the
5th Special Meeting of the Commission and the private meeting of Commissioners on the RMS
14-17 October 2002, Cambridge, UK

Since not all Contracting Governments were able to participate in last week's meetings, I thought it would be helpful to provide all Commissioners and Contracting Governments with a brief summary on the outcomes of the meetings. The statement from the RMS Meeting was agreed by Commissioners at the end of the meeting. The summary of the Special Meeting has been prepared by the Secretariat.

A Chair's Report of the Special Meeting will be prepared, circulated and published in due course. Further information on the RMS meeting, including proposed next steps, will be circulated to Commissioners shortly.

Dr. Nicky Grandy
Secretary to the Commission

Summary of the outcome of the Special Meeting

Special Meeting

14 October 2002

The Special Meeting took place on 14 October 2002 at the DeVere University Arms Hotel, Cambridge, UK, under the Chairmanship of Prof. Bo Fernholm (Sweden).

The primary purpose of the meeting was to reconsider the issue of catch limits for the aboriginal subsistence catch of bowhead whales. No new limits had been agreed at the 54th Annual Meeting. In addition it had been agreed to include an item on an interim relief allocation for Japanese coastal whaling. This had also been on the agenda of the 54th Annual meeting (and a number of previous meetings).

Icelandic membership

As at the last two Annual Meetings, the major item discussed in the morning concerned the adherence of Iceland to the Convention with a reservation to Paragraph 10(e). That paragraph refers to what is popularly termed the 'moratorium' on commercial whaling. For the full terms of the reservation submitted by Iceland, see below.

There was again a difference of views as to whether the Commission should accept Iceland's reservation. After a series of procedural votes, the Commission agreed by 19 votes to 18, that Iceland is a member of the Commission.

Catch limits for aboriginal subsistence whaling

At the 54th meeting, despite (i) agreement by the Scientific Committee that the bowhead whale stock was able to sustain the harvest, and (ii) acknowledgement of the cultural, nutritional and subsistence needs of both Alaskan Eskimos and native peoples of Chukotka, a proposal to continue to include provision for such catches failed to reach the necessary three-quarters majority (32 votes were in favour, 11 against and 2 abstentions).

At the Special Meeting, a proposal allowing up to 280 bowhead whales to be landed in the period 2003 - 2006, with no more than 67 whales struck in any year (and up to 15 unused strikes may be carried over each year), was accepted by consensus (Japan did not join, but did not block consensus). It contains a provison that this be reviewed in the light of the Scientific Committee's work at the 2004 meeting and beyond.

Interim relief allocation for Japanese coastal whaling

This issue has been discussed by the Commission for the last 15 years. It concerns the possible allocation of a catch of 50 minke whales annually to four Japanese coastal communities until the Commission has finalised a Revised Management Scheme. A draft resolution was proposed by Japan intended to forward discussions on the issue and arrive expeditiously at a solution. It was defeated by 19 votes to 16 with 2 abstentions.

Iceland's reservation

The instrument of adherence states, in translation, that Iceland:

Appendix 9.3 AEWC Management Plan

ALASKA ESKIMO WHALING COMMISSION

MANAGEMENT PLAN

SUBPART A

INTRODUCTION

SUBSECTION 100.1 PURPOSE OF REGULATIONS.

It is the purposes of the regulations contained herein to:

(a) insure an efficient subsistence harvest of bowhead whales;

(b) provide a means within the Alaska Eskimo customs and institution of protecting the habitat of the bowhead whale and limiting the bowhead whale harvest in order to prevent the extinction of such species; and

(c) provide for Eskimo regulation of all whaling activities by Eskimos who are members of the Alaska Eskimo Whaling Commission.

SUBSECTION 100.2 SCOPE OF REGULATIONS.

The regulation contained herein apply to the subsistence hunting of whales by Eskimos who are members of the Alaska Eskimo Whaling Commission.

SUBPART B

ALASKA ESKIMO WHALING COMMISSION

SUBSECTION 100.11 POWERS.

(a) The Alaska Eskimo Whaling Commission (hereinafter AEWC) is empowered to administer the regulations contained herein to insure that the purposes in Subsection 100.1 of these regulations are attained.

(b) The AEWC is empowered to enforce the regulations by:

(1) denying any person who violates these regulations the right to participate in hunting bowhead whales.

(2) making civil assessments.

(3) acting as an enforcement agent for any governmental entity authorized to enforce these regulations.

(c) The AEWC is empowered to promulgate interim regulations that are in addition to, but not inconsistent with regulations contained herein.

SUBSECTION 100.12 DUTIES.

(a) The AEWC shall administer and enforce the regulations contained herein (including any interim regulations).

(b) The AEWC shall conduct village education programs to facilitate compliance with these regulations, including training programs for whaling captains and crew.

(c) The AEWC shall initiate research for improvement of the accuracy and reliability of weapons.

SUBPART C

REGULATIONS

SUBSECTION 100.21 DEFINITIONS.

(a) "bowhead whale" means a whale whose scientific name is baleana mysticetus and which migrates past whaling villages in Alaska.

(b) "captain" means the person in charge of a whaling crew.

(c) "harvest" means to kill and bring to shore or butchering area.

(d) "non-traditional weapons" means any instrument that could be used to harvest a bowhead whale that is not a traditional weapon.

(e) "traditional weapon" means a harpoon with line attached, darting gun, shoulder gun, lance or any other weapon approved by the AEWC as such a weapon in order to improve the efficiency of the bowhead whale harvest.

(1) "harpoon with line attached" means a harpoon with a rotating head which is attached to a line and float and which has no explosive charge. (See Figures 7 and 8 of Appendix E of the FEIS on the International Whaling Commission's Deletion of Native Exemption for the Subsistence Harvest of Bowhead Whales. (October 1977) (hereinafter FEIS).

(2) "darting gun harpoon" means a harpoon with an explosive charge and with a line and float attached. (See Appendix E of FEIS of Figure 4).

(3) "shoulder gun" means a whaling gun, adapted from the era of commercial whaling in the 19th century, which has an explosive charge and which has no attached line and float. (See Appendix E of the FEIS in Figure 5).

(4) "lance" means a non-explosive sharply pointed weapon without a harpoon head.

(5) "explosive charge" as used in subparagraph (2) of this paragraph means for initial strikes a penthrite-based explosive charge developed, approved, and issued to a whaling cpatain by the AEWC, unless such explosive charge has not been issued or is not compatible with the darting gun harpoon in which case every effort shall be made by the AEWC to provide a compatible darting gun harpoon.

(f) "whaling crew" means those persons who participate directly in the harvest or attempted harvest of the bowhead whale and are under the supervision of a captain.

(g) "whaling village" means the Alaska Eskimo Whaling village in which resides a whaling captain and crew which participates in the harvest of bowhead whales and which is represented by a Commissioner of the AEWC.

(h) "whaling season" means customary period of time during which the bowhead whale is harvested, either in the Spring or Fall.

(i) "garbage" means anything that the whaling captains and crew brings out to the ice that is not biodegradable.

(j) "habitat" means the waters and associated land and ice environment used by the bowhead whale.

SUBSECTION 100.22 REGISTRATION.

(a) Each captain shall register with the AEWC on forms provided by the AEWC for that purpose which disclosed his name, address, age, qualifications as a captain, and his willingness to abide by the regulations of the AEWC and to require his crew to abide by those regulations.

(b) The AEWC shall take into account any reading or language difficulties in developing procedures and forms for registration.

SUBSECTION 100.23 REPORTS.

(a) Each whaling captain shall be responsible for keeping a written record of the number of whales:

(1) attempted to be harvested by using traditional weapons but not harvested,

(2) harvested by the captain or his crew, and

(3) sighted by the captain and his crew.

(b) Each whaling shall report the date, place, and time of any striking not resulting in harvesting and shall describe:

(1) the size and type of bowhead whale,

(2) any known latter attempted harvest or actual harvest of said whale,

(3) the reason for the captain or crew not harvesting the whale, i.e., environmental factors, the failure of traditional weapons, or other reasons, and

(4) the conditions of the whale that was not harvested.

(c) Each whaling captain shall make other reports as the AEWC requires in order to accomplish the purposes of the regulations herein or in order to advance the scientific knowledge of the bowhead whale.

SUBSECTION 100.24 PERMISSABLE HARVESTING METHODS.

(a) No whaling captain or crew shall harvest or attempt to harvest the bowhead whale in any manner other than the traditional harvesting manner.

(b) "Traditional harvesting manner" means:

(1) only traditional weapons shall be used as defined in Subsection 100.21 (e).

(2) the bowhead whale may be struck with a harpoon or darting gun with line and float attached.

(3) the shoulder gun may be used:

(i) after a line has been secured to the bowhead whale, or

(ii) when pursuing a wounded bowhead whale with a float attached to it.

(4) the lance may be used after a line has been secured to the bowhead whale.

(c) Whaling captains and crews should harvest bowhead whales that are less than 40 feet plus (+) or minus (-) 15% in length.

Subsection 100.25 TRADITIONAL PROPIETARY CLAIM.

The bowhead whale shall belong to the captain and crew which first strikes the bowhead whale in the manner described in Subsection 100.24.

SUBSECTION 100.26 LEVEL OF HARVEST.

(a) The AEWC shall establish the levels of harvest or attempt harvest for each whaling village during each season or seasons.

(b) In establishing the levels of harvest or attempted harvest, the AEWC shall consult each whaling village.

SUBSECTION 100.27 REGULATION TO PROTECT THE BOWHEAD WHALE HABITAT.

(a) All whaling crew shall bring their garbage back to land and dispose of it in a proper manner.

SUBSECTION 100.28 Native Consumption.

The meat and products, except for traditional native handicrafts, of whales taken in the subsistence hunt must be exclusively for native consumption and may not be sold or offered for sale.

SUBSECTION 100.31 DENIAL OF PARTICIPATION IN HARVEST AND FINES.

(a) Any person who the AEWC determines has violated the

regulations contained in subsection 100.24 (a) and (b) and subsection 100.26 shall, after opportunity for a hearing before the AEWC, be prohibited from harvesting or attempting to harvest the bowhead whale for a period of not less than one whaling season nor more than five whaling season; and / or

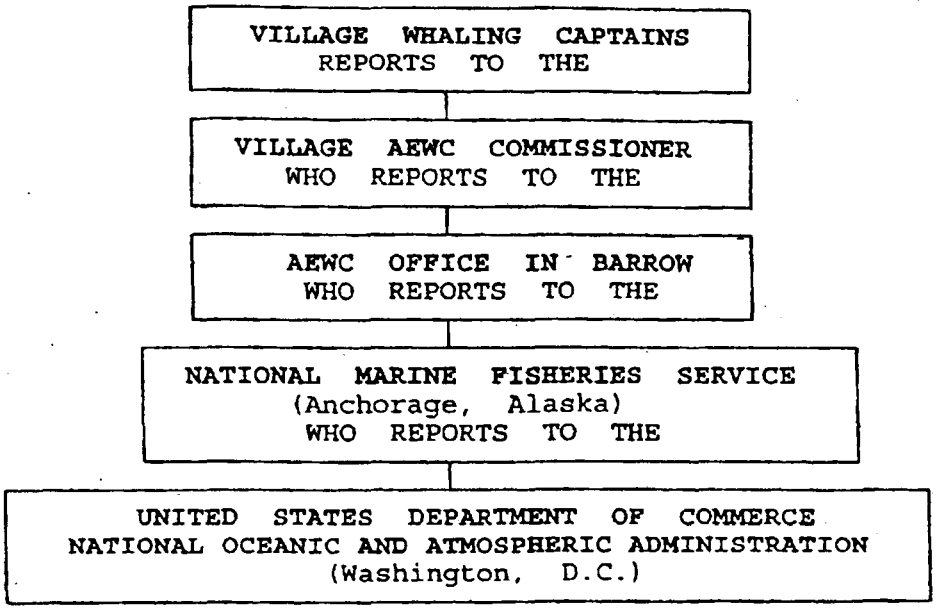
(b) Any person who violates the regulations contained in subsection 100.24 (a) and (b) and subsection 100.26 herein shall be subject to a fine of not less than $1,00.00 nor more than $10,000.00 as assessed by AEWC. The AEWC shall assess other fines at levels it deems appropriate, not to exceed $10,000.00, for other violations of this Management Plan or federal law. No person shall harvest or attempt to harvest the bowhead whale until such fine has been paid.

It is the responsibility of the whaling captains/crew to report to the Commissioner of their village on a daily basis when they are whaling. The Commissioner then reports to the AEWC Central Office in Barrow. The AEWC office takes a report which they pass on to the National Marine Fisheries Service (NMFS) office in Anchorage. Following completion of the season, the AEWC office then submits a final report to the U.S.Department of Commerce in Washington, D.C.

ALASKA ESKIMO WHALING COMMISSION

BOWHEAD WHALE HUNT

MANAGEMENT REPORTING PROCEDURES



Appendix 9.4 Quantification of Subsistence and Cultural Need for Bowhead Whales by Alaska Eskimos (1997)

QUANTIFICATION OF SUBSISTENCE AND CULTURAL NEED FOR BOWHEAD WHALES BY ALASKA ESKIMOS

1997 Update Based on 1997 Alaska Department of Labor Data

Prepared by:
Stephen R. Braund & Associates
P.O. Box 1480
Anchorage, AK 99510
(907) 276-8222
srba@alaska.net

Prepared for the Alaska Eskimo Whaling Commission
Barrow, Alaska

13 October 1997

TABLE OF CONTENTS

LIST OF TABLES

QUANTIFICATION OF SUBSISTENCE AND CULTURAL NEED FOR BOWHEAD WHALES BY ALASKA ESKIMOS

1997 Update Based on 1997 Alaska Department of Labor Data

INTRODUCTION

Inupiat and Yup'ik Eskimos of Alaska have hunted bowhead whales for over 2,000 years as the whales migrate near the communities in the spring and fall. Hunting bowhead whales in Alaska remains a communal activity that supplies important meat and maktak for the entire community as well as for feasts and ceremonies. Formalized patterns of hunting, sharing, and consumption characterize the modern bowhead harvests. Of all subsistence activities in these communities, bowhead whaling represents one of the greatest concentrations of effort, time, money, group symbolism, and significance. In addition to providing a major source of food, bowhead whaling is a large part of these communities' cultural tradition and their modern cultural identity (Braund and Moorehead 1995).

Since the early 1980s, the International Whaling Commission (IWC) has determined the quota for Alaska Eskimo bowhead whale harvests in part by considering the subsistence and cultural need for bowhead whales by Alaska Eskimos. In 1986, the IWC adopted the only method used to date to calculate subsistence and cultural need. This method incorporates the historic and current size of the Eskimo population residing in Alaskan whaling villages and the number of bowhead whales historically landed by each community. Because bowhead whaling is a community-wide activity, it is appropriate to consider the community population in association with the historic harvest levels. Besides abundance of bowhead whales, community population levels are a critical factor that influences harvests because the community population dictates the number and size of whaling crews and the amount of meat and maktak needed to feed the community, share with others, and provide for ceremonial feasts.

The first calculation of subsistence and cultural need submitted to the IWC was undertaken in 1983 (U.S. Government 1983). The second calculation was submitted to the IWC in 1988 (Braund, Stoker and Kruse 1988) when more extensive research provided additional historical whaling and human population data. The 1988 study used the most recent Eskimo population

data available at that time, ranging from 1983 to 1987, to calculate current need. The third calculation of need, performed in 1992, was based on 1990 U.S. Census population data; this update was presented to the Alaska Eskimo Whaling Commission (AEWC), but not to the IWC (Stephen R. Braund & Associates [SRB&A] 1992). The fourth calculation of need was conducted in 1994 based on July 1, 1992 population data generated by the State of Alaska, Department of Labor (SRB&A 1994). This, the fifth calculation (and fourth presented to the IWC) utilizes the same method accepted by the IWC in 1988 for calculating need, presenting revised calculations based on July 1, 1997 population data generated by the State of Alaska, Department of Labor.

REVIEW OF THE 1988 STUDY

The objective of the 1988 study was to quantify the cultural and subsistence need for bowhead whales by Alaska Eskimos (Braund, Stoker and Kruse 1988). We viewed cultural and subsistence need as independent of any biological assessment of bowhead populations and as only one of two parts of any quota request the U.S. government made to the International Whaling Commission (the second part being the biological assessment). Prior to 1988, the estimation of cultural need for bowhead whales by Alaska Eskimos had been based on the historic relationship between the size of the Eskimo population residing in Alaskan whaling villages and both the number of bowhead whales historically landed and the number of crews engaged in whaling (U.S. Government 1983). Based on data available in 1983, the cultural need for bowhead whales was established at 26 bowheads landed per year for the nine Alaska bowhead whaling communities. Assuming 75 percent efficiency, 26 landed converted to 35 strikes requested by the U.S. government at the 1983 IWC meeting. At that time, we knew the historical data on bowhead landings and Eskimo population were incomplete. Furthermore, the Alaska Eskimo whaling community believed that the cultural need for bowheads had been seriously underestimated.

NEW SOURCES OF DATA FOR THE 1988 STUDY

The new sources of data for the 1988 analysis included additional landed bowhead data and Eskimo population data.

Bowheads Landed

The study team began with the lists of landed bowheads in Marquette and Bockstoce (1980) that provided, by location, the number of crews, bowheads landed, struck and lost, killed but lost, and total bowheads killed. Additional research to make this list more complete included hiring Bockstoce and Marquette to make additions they had learned about since 1980, performing additional archival research based on both published and unpublished information (whale ship logs, teacher reports, diaries, magazines, newspapers, books, reports, etc.), researching in libraries and archives throughout the U.S., and performing fieldwork in Wainwright, Wales, Gambell and Savoonga in November and December 1987.

This research resulted in a new, longer list of bowhead landed data for 21 different locations in Alaska representing 1) historic but not current human settlements, 2) traditional whaling sites occupied seasonally, and 3) existing communities (Braund, Marquette and Bockstoce 1988). The bowhead harvest data were presented by each specific location where the activity took place from pre-1900 to 1977. The Scientific Committee reviewed and accepted the new landed data in 1988 (IWC 1989:49).

Next, we consolidated the whale harvest data from the 21 locations within the nine Alaska Eskimo communities that currently participate in bowhead whaling (e.g., whales harvested at Icy Cape, Point Belcher and Point Franklin were attributed to Wainwright, whales harvested at Cape Halkett and Cross Island/Prudhoe Bay were consolidated with Barrow). Hence, eight of the 21 locations were reassigned or consolidated with these nine communities. The last five locations (Little Diomede, King Island, Point Lay, Shaktoolik, and "unlocated") were not included in the analysis.

The reasons for consolidation included 1) the centralization into larger communities such that most of the people who lived and whaled at the smaller sites became residents of the nearby larger villages, and 2) residents of the nine active communities traditionally traveled to many smaller sites on a seasonal basis to hunt bowheads.

Next, the study team linked human population by consolidated location to whale hunting activity from 1910 to 1969. Thus, the human population per year by consolidated location (i.e., the nine whaling villages) was linked to whale hunting activity from 1910 to 1969. In this way, we were able to examine the relation between human population and bowhead harvest data.

Eskimo Population

The second source of new data for the 1988 analysis was more detailed information on the Eskimo population. The 1983 calculation of cultural need for bowheads was based on available decennial census population counts. In order to formally examine the relationship between bowhead landings and human population, however, it was necessary to have annual human population counts which could be compared to the number of bowheads landed on a village basis. Instead of simply assuming a uniform rate of change in population between census counts or assuming a continuation of present growth rates, the study team constructed a human population model incorporating data on 1) age and sex distributions; 2) birth rates; and 3) death rates.

1988 RESULTS: RECALCULATION OF CULTURAL NEED FOR BOWHEAD WHALES

Revision of Historical Base Period

As mentioned above, the 1983 calculation of cultural need was constrained by lack of data. The starting point for the base period used in 1983 varied by village from 1940 to 1950. The end point was uniformly 1970. Additional data gathered for this study and study team members' knowledge of the prevalent living conditions between 1940 and 1970 led the study team to conclude that the most appropriate base period was the 60 year period from 1910 to 1969.

The beginning year of 1910 was selected because data prior to 1900 becomes increasingly sporadic and unreliable related to both bowhead landed and human population, and commercial whaling had an effect on the number of whales landed at certain villages (especially Gambell,

Point Hope, and Barrow). Commercial whaling ceased in 1909 so 1910 begins a period free of commercial influence.

The two or three decades after the end of commercial whaling represent a significant period of heavy reliance on subsistence for the northern Alaska Eskimo. Conditions changed dramatically in the 1940s as military activities and government programs exerted strong influences on local lifestyles. The period 1940 to 1969 can be characterized as a time of increased local employment that conflicted with subsistence activities and of religious and government pressures to abandon traditional lifestyles. Despite these influences, the Eskimo continued to demonstrate an active interest in subsistence whaling. The year 1969 was chosen as the end of the base period because the period from 1970 to 1977 was a time of considerable economic change and cultural revival in the villages. These years (1970 to 1977) represent a time of increase in bowhead whaling effort, in the number of whales taken, and the number of whales struck and lost (Marquette and Bockstoce 1980). Hence, to avoid the influence of this increased harvest period, the study team chose to end the base period in 1969.

1988 Estimation of Cultural Need Based on the Relationship Between Bowheads Landed and Eskimo Population

Table 1 presents the recalculated cultural need for bowhead whales based on the IWC accepted method. The data base included 250 observations matching the Eskimo population with bowhead landed at the community level. As shown in the table, substantial landed whale data were compiled for the 60 year period (1910 to 1969) for Gambell (39 years), Point Hope (50 years), Wainwright (49 years), and for Barrow (60 years).

In Table 1, the number of bowheads needed by each community and by the region as a whole was derived by multiplying the mean number of whales landed per capita over the time period selected (1910 to 1969) by the best estimate of current human population for these communities and the region. "Current" population data was the most recent data available at the time, ranging from 1983 data for three villages, 1985 data for one village, 1986 data for two villages, to 1987

Table 1: Alaska Eskimo Whaling Communities' Subsistence and Cultural Need For Landed Bowhead Whales, 1988.\1

Community	Number of Observations\2	Total Eskimo Population for ea. yr. of a Bowhead Observation\3	Number of Bowheads Landed 1910-1969\4	Mean Landed Per Capita 1910-1969\5	1983-87 Eskimo Population\6	1987 Bowhead Need (Landed)\7	1987 Need (Landed) (Rounded)\8
Gambell	39	11,883	68	0.005722	495	2.8	3
Savoonga \9	0	----	----	0.005722	485	2.8	3
Wales	42	6,907	5	0.000724	154	0.1	1
Kivalina	7	926	3	0.003240	275	0.9	1
Point Hope	50	12,467	209	0.016764	534	9.0	9
Wainwright	49	10,723	108	0.010072	445	4.5	5
Barrow	60	44,687	379	0.008481	1,823	15.5	16
Nuiqsut \9	0	----	----	0.008481	227	1.9	2
Kaktovik	3	327	3	0.009174	154	1.4	1
Totals	250	87,920	775		4,592	38.8	41
Region\10	250	87,920	775	0.008815	4,592	40.5	41

\1 Subsistence and cultural need is based on historic per capita harvest per community multiplied by present village population.

\2 The number of observations represents the number of years for which data on landed whales were available for each community (See Appendices 1 and 2 in Braund, Stoker and Kruse 1988).

\3 Total Eskimo population represents the sum of the Eskimo population for each year there was an observation of a landed bowhead whale.

\4 Number of bowheads landed represents the sum of the observed bowheads landed between 1910 and 1969.

\5 The mean landed bowhead whales per capita is based on the total number of whales landed between 1910 and 1969 for each community divided by the sum of the total Eskimo population for each village for each year landed whale data existed between 1910 and 1969 (See Appendices 1 and 2 in Braund, Stoker and Kruse 1988). The sum of the total Eskimo population was calculated by adding the population estimates for each village for each year that there was a landed whale observation. For example, Barrow's 379 landed whales from 1910-1969 were divided by the total Eskimo population sum of 44,687 for this 60 year period (i.e., 379 divided by 44,687 = .008481).

\6 See Table 7 (in Braund, Stoker and Kruse 1988) for the source of Eskimo population data for each community.

\7 The number of bowheads needed is derived by multiplying the mean per capita landed whales (1910-1969) by the most current Eskimo population figure available for each community.

\8 The number of bowhead whales needed per individual community is rounded to the nearest whole number unless the product was less than .5; such cases were rounded up to one.

\9 Because there are no landed bowhead data for neither Nuiqsut nor Savoonga between 1910-1969, the mean per capita landed whales for Gambell was used for Savoonga and the mean for Barrow was used for Nuiqsut.

\10 The mean per capita landed whales for the region represents the total number of whales landed for all communities between 1910 and 1969 divided by the sum of the total Eskimo population for all communities for each year landed whale data existed between 1910 and 1969 (i.e., 775 whales divided by 87,920 = .008815).

Source: Stephen R. Braund & Associates, 1988.

Stephen R. Braund & Associates, 1997.

population data for three villages. The mean number of whales landed per capita over the time period was calculated from the total number of whales landed between 1910 and 1969 for each community (and for the region as a whole) divided by the total human population, by community and region, summed over all the years for which landed whale data exist between 1910 and 1969. In other words, the total human population by village and region is the sum of all village population estimates for years in which whales were landed. This sum was divided into the total landed whales in each community. Based on a mean of .008815 bowhead landed per capita from 1910 to 1969, the 1988 cultural need was 41 landed bowhead whales.

1992 UPDATE BASED ON 1990 U. S. CENSUS

In 1992, the Alaska Eskimo Whaling Commission (AEWC) asked Stephen R. Braund and Associates (SRB&A) to update the cultural and subsistence need for bowhead whales by nine Alaska Eskimo whaling communities based on more current human population data for the communities. Applying the same IWC accepted method of calculating need as used in the 1988 report (Braund, Stoker and Kruse 1988), SRB&A updated need based on 1990 U.S. Census data (see Stephen R. Braund & Associates 1992). The only variable that had changed for this calculation was the Alaska Native population for the nine whaling communities. The 1988 report was written between U.S. decennial census counts and current U.S. census data were not available. For the 1992 update, the 1990 U.S. Census data for each community was used (Alaska Department of Labor 1991). Only the Native population of each community was considered. Based on the 1990 census data, the cultural and subsistence need in the nine Alaska Eskimo communities was 47 landed bowheads (excluding Little Diomede; for a discussion of Little Diomede Island bowhead whaling, see Stephen R. Braund & Associates 1991).

1994 UPDATE BASED ON 1992 ALASKA DEPARTMENT OF LABOR DATA

In 1994, the Alaska Eskimo Whaling Commission again requested an update of cultural and subsistence need for bowhead whales, as the 1990 U.S. Census data were nearly four years old. Because the next U.S. census would not be conducted until the year 2000, the study team reviewed the available sources for current population data.

The Alaska Department of Labor (ADOL) makes annual population estimates for each incorporated community in Alaska for purposes of municipal planning. For 1992, ADOL made these estimates based on the relationship of the 1990 U.S. Census data to the 1990 Alaska Permanent Fund applications for each community. Using this relationship as the base period, ADOL estimated the 1992 community population by knowing the number of 1992 Permanent Fund applications and solving for the 1992 population (Personal communication, J. Gregory Williams April 28, 1994). In addition, the ADOL reviewed other information to ensure the accuracy and consistency of their population estimates. These additional analyses included a similar computation for each community using school enrollment information and a careful review of rural public health nurse records in each community.

The study team reviewed these population data for the 10 Alaska bowhead whaling communities recognized by the AEWC (Alaska Dept. of Labor, Research Analysis 1994).[1] Because these data were not broken down by race, they represented the total population (Alaska Native and other races) for each location. The method accepted by the IWC for calculating need depends on having population data on Alaska Natives only. In order to disaggregate the population data by race, the study team relied on the Alaska State Demographer who provided information on the percentage of Natives in each of the ten communities based on both school enrollment and the 1990 U.S. Census (SRB&A 1994 Table 2). As suggested by the Alaska State Demographer, the study team used the 1990 percent Native American figures and applied these percentages to the 1992 population estimates to arrive at the Native population for the communities.

Using the 1992 total population estimates provided by the Alaska Department of Labor and applying the percentage Native from the 1990 U.S. Census resulted in a 1992 cultural and subsistence need of 51 landed bowhead whales for the 10 communities (SRB&A 1994, Table 3).

1997 UPDATE BASED ON 1997 ALASKA DEPARTMENT OF LABOR DATA

In preparation for the 1997 IWC meeting, the Alaska Eskimo Whaling Commission requested an

[1] This analysis includes population data for the village of Little Diomede. For a discussion of Little Diomede Island bowhead whaling, see Stephen R. Braund & Associates 1991.

update of cultural and subsistence need for bowhead whales. By 1997, the 1994 update was based on the five year old 1992 population information. The Alaska State Demographer (ADOL 1997a) provided population estimates for each year from the 1990 U.S. Census (Table 2). These updates are prepared annually and include the total population (Native and other) in each of the communities. To arrive at the Native population only, the percent Native American from the 1990 U.S. Census was applied to the annual population data (Table 3). This resulted in an estimated Native population for the ten Alaska bowhead whaling communities.

Using the 7/1/97 total population estimates provided by the Alaska Department of Labor and applying the percentage Native from the 1990 U.S. Census, Table 4 presents the 1997 cultural and subsistence need for bowhead whales in the ten Alaska Eskimo communities. The number of bowheads needed by each community and by the region as a whole (all ten communities) is derived by multiplying the mean number of whales landed per capita over the base time period (1910-1969) by the estimated 1997 Alaska Native population for each community and for the region as a whole. Using this method, the need for each community is shown on Table 4. Applying the mean of .008621 bowhead landed per capita for all ten communities for the historical period (1910-1969) to the estimated 1997 regional Native population of 6,472 results in a 1997 regional cultural and subsistence need of 56 landed bowhead whales.

Table 5 compares the ten Eskimo whaling communities' need in the mid-1980s (i.e., based on 1983-87 Alaska Native population estimates in each community) with the need in 1990, 1992, and 1997. The landed need increased from 41 landed in the mid-1980s (not including Little Diomede Island) to a need of 48 landed based on the 1990 U.S. Census data to 51 landed in 1992 and 56 landed in 1997. The 1990, 1992 and 1997 landed need figures include Little Diomede Island.

Table 6 compares the mid-1980s Alaska Native population for each community with Native population of 1990, 1992 and 1997 (the four years when new population data were gathered to

Table: 2 Total Estimated Population of Ten Alaska Eskimo Bowhead Whaling Communities.\1,2

Community\3,4	4/1/90	7/1/91	7/1/92	7/1/93	7/1/95	7/1/95	7/1/96	7/1/97
Gambell	525	551	579	586	616	622	636	653
Savoonga	519	543	562	573	571	603	612	622
Wales	161	158	152	156	162	174	166	162
Diomede\5	178	175	181	177	170	154	171	174
Kivalina	317	331	370	366	376	348	353	357
Point Hope	639	668	685	676	709	719	756	749
Wainwright	492	497	531	536	537	535	560	550
Barrow	3,469	3,609	3,778	3,897	4,055	4,197	4,257	4,380
Nuiqsut	354	387	422	403	411	412	427	435
Kaktovik	224	218	215	211	208	212	221	222
Totals	6,878	7,137	7,475	7,581	7,815	7,976	8,159	8,304

\1 Population numbers represent total community population.
\2 The 1992 population data presented in this table reflect minor differences with the 1992 population data presented to the IWC in 1994 (IWC/46/AS6) due to revisions in national and state populations by the U.S. Census Bureau. The demographer's annual update to the Alaska population data results in minor readjustments to previous years' population data back to 1990. Thus, there are minor differences in the 1992 population data as reported in 1994 compared to the 1992 data reported in 1997. These differences do not change the outcome of the needs calculation.
\3 1990 population data from the 1990 U.S. Census.
\4 1991-1997 population data are from the Alaska Department of Labor, Research & Analysis Section, 1997a.
\5 Little Diomede Island was granted membership into the AEWC in 1988.

Table: 3 Estimated Native Population of Ten Alaska Eskimo Bowhead Whaling Communities, 1997.\1,2

Community	Percent Native American\3	4/1/90	7/1/91	7/1/92	7/1/93	7/1/94	7/1/95	7/1/96	7/1/97
Gambell	96.19%	505	530	557	564	593	598	612	628
Savoonga	95.18%	494	517	535	545	543	574	583	592
Wales	88.82%	143	140	135	139	144	155	147	144
Diomede	93.82%	167	164	170	166	159	144	160	163
Kivalina	97.48%	309	323	361	357	367	339	344	348
Point Hope	91.86%	587	614	629	621	651	660	694	688
Wainwright	94.31%	464	469	501	506	506	505	528	519
Barrow	63.91%	2,217	2,307	2,415	2,491	2,592	2,682	2,721	2,799
Nuiqsut	92.66%	328	359	391	373	381	382	396	403
Kaktovik	84.38%	189	184	181	178	176	179	186	187
Totals		5,403	5,605	5,874	5,939	6,112	6,218	6,372	6,472

\1 The 1992 population data presented in this table reflect minor differences with the 1992 population data presented to the IWC in 1994 (IWC/46/AS6) due to revisions in national and state populations by the U.S. Census Bureau. The demographer's annual update to the Alaska population data results in minor readjustments to previous years' population data back to 1990. Thus, there are minor differences in the 1992 population data as reported in 1994 compared to the 1992 data reported in 1997. These differences do not change the outcome of the needs calculation.
\2 Based on Percent Native American from the 1990 U.S. Census.
\3 From 1990 U.S. Census data.

Stephen R. Braund & Associates, 1997.

Table 4: Ten Alaska Eskimo Whaling Villages' Subsistence and Cultural Need For Landed Bowhead Whales, 1997.\1

Community	Number of Observations\2	Total Eskimo Population for ea. yr. of a Bowhead Observation\3	Number of Bowheads Landed 1910-1969\4	Mean Landed Per Capita 1910-1969\5	1997 Alaska Native Population\6	1997 Bowhead Need (Landed)\7	1997 Need (Landed) (Rounded)\8
Gambell	39	11,883	68	0.005722	628	3.6	4
Savoonga \9	0	----	----	0.005722	592	3.4	3
Wales	42	6,907	5	0.000724	144	0.1	1
Diomede \10	30	3,250	11	0.003678	163	0.6	1
Kivalina	7	926	3	0.003240	348	1.1	1
Point Hope	50	12,467	209	0.016764	688	11.5	12
Wainwright	49	10,723	108	0.010072	519	5.2	5
Barrow	60	44,687	379	0.008481	2,799	23.7	24
Nuiqsut \9	0	----	----	0.008481	403	3.4	3
Kaktovik	3	327	3	0.009174	187	1.7	2
Totals	280	91,170	786		6,472	54.4	56
Region\11	280	91,170	786	0.008621	6,472	55.8	56

\1 Subsistence and cultural need is based on historic per capita harvest per community multiplied by the 1997 Alaska Native population of each community.

\2 The number of observations represents the number of years for which data on landed whales were available for each community (See Appendices 1 & 2 of Braund, Stoker & Kruse 1988 & Table 1 of Stephen R. Braund & Assoc. 1991).

\3 Total Eskimo population represents the sum of the Eskimo population for each year there was an observation of a landed bowhead whale.

\4 Number of bowheads landed represents the sum of the observed bowheads landed between 1910 and 1969.

\5 The mean landed bowhead whales per capita is based on the total number of whales landed between 1910 and 1969 for each community divided by the sum of the total Eskimo population for each village for each year landed whale data existed between 1910 and 1969 (See Appendices 1 & 2 in Braund, Stoker & Kruse 1988 and Tables 1 and 3 in Stephen R. Braund & Assoc. 1991). The sum of the total Eskimo population was calculated by adding the population estimates for each community for each year that there was a landed whale observation. For example, Barrow's 379 landed whales from 1910-1969 was divided by the total Eskimo population sum of 44,687 for this 60 year period (i.e., 379 divided by 44,687 = .008481).

\6 1997 Alaska Native population data for each community are from the Alaska Department of Labor, Research & Analysis Section (1997a) 7/1/97 population estimates of these 10 communities multiplied by the percent Native American in each community from the 1990 U.S. Census. J. Gregory Williams, State Demographer, 10/6/97 and 1990 U.S. Census.

\7 The number of bowheads needed is derived by multiplying the mean per capita landed whales (1910-1969) by the 1997 Alaska Native population for each community.

\8 The number of bowhead whales needed per individual community is rounded to the nearest whole number unless the product was less than .5; such cases were rounded up to one.

\9 Because there are no landed bowhead data for either Savoonga or Nuiqsut between 1910-1969, the mean per capita landed whales for Gambell was used for Savoonga and the mean for Barrow was used for Nuiqsut.

\10 Due to uncertainties in the landed whale data for Little Diomede Island, four different calculations of subsistence and cultural need, ranging from .4 to 1.0 bowheads, were presented (see Table 4 Stephen R. Braund & Assoc. 1991). The Little Diomede mean landed whale per capita (1910-1969) in this table represents the mean of these four calculations.

\11 The mean per capita landed whales for the region represents the total number of whales landed for all ten communities between 1910 and 1969 divided by the sum of the total Native population for all communities for each year landed whale data existed between 1910 and 1969 (i.e., 786 whales divided by 91,170 = .008621).

Stephen R. Braund & Associates, 1997.

Table 5: Comparison of Ten Alaska Eskimo Whaling Communities' mid-1980s Subsistence and Cultural Need for Landed Bowhead Whales with 1990, 1992, and 1997 Need.\1

	Mean	Mid-1980s Calculation Data				1990 Calculation Data			1992 Calculation Data			1997 Calculation Data		
Community	Landed Per Capita 1910-1969\2	Est. 1983-87 AK Na. Pop.\3	Date of Pop. Est\3	1987 Bowhead Need (Lnded)\4	1987 Need (Landed) (Rnded)\5	1990 AK Native Pop.\6	1990 Bowhead Need (Lnded)\7	1990 Need (Landed) (Rnded)\5	Est. 1992 AK Native Pop.\8	1992 Bowhead Need (Lnded)\9	1992 Need (Landed) (Rnded)\6	Est. 1997 AK Native Pop.\10	1997 Bowhead Need (Lnded)\11	1997 Need (Landed) (Rnded)\6
Gambell	0.005722	495	1987	2.8	3	505	2.9	3	530	3.0	3	628	3.6	4
Savoonga	0.005722	485	1985	2.8	3	494	2.8	3	515	2.9	3	592	3.4	3
Wales	0.000724	154	1987	0.1	1	143	0.1	1	129	0.1	1	144	0.1	1
Diomede Is	0.003678	N/A	N/A	N/A	N/A	167	0.6	1	169	0.6	1	163	0.6	1
Kivalina	0.003240	275	1987	0.9	1	309	1.0	1	356	1.2	1	348	1.1	1
Point Hope	0.016764	534	1986	9.0	9	587	9.8	10	629	10.5	11	688	11.5	12
Wainwright	0.010072	445	1983	4.5	5	464	4.7	5	505	5.1	5	519	5.2	5
Barrow	0.008481	1,823	1986	15.5	16	2,217	18.8	19	2,532	21.47	21	2,799	23.7	24
Nuiqsut	0.008481	227	1983	1.9	2	328	2.8	3	364	3.1	3	403	3.4	3
Kaktovik	0.009174	154	1983	1.4	1	189	1.7	2	183	1.7	2	187	1.7	2
Totals		4,592		38.8	41	5,403	45.3	48	5,912	49.7	51	6,472	54.4	56
Region w/o Dio	0.008815	4,592		40.5	41									
Region w/ Dio	0.008621					5,403	46.6	48	5,912	51.0	51	6,472	55.8	56

\1 Subsistence and cultural need is based on historic per capita harvest per community multiplied by the Alaska Native population of each community.

\2 See Table 1, footnote \5 for explanation of mean landed bowheads per capita.

\3 See Braund, Stoker & Kruse (1988) Table 7 for source of mid-1980s Alaska Native population data.

\4 The number of bowheads needed in 1987 was derived by multiplying the mean per capita landed whales (1910-1969) by the most current Alaska Native population data available for each community in 1988.

\5 The number of bowheads needed per individual community is rounded to the nearest whole number unless the product was less than .5; such cases were rounded up to one.

\6 1990 Alaska Native population data for each community are from the 1990 U.S. Census.

\7 The number of bowheads needed in 1990 is derived by multiplying the mean per capita landed whales (1910-1969) by the 1990 Alaska Native population for each community.

\8 1992 Alaska Native population data for each community are from the Alaska Department of Labor, Research & Analysis Section, Demographics Unit. J. Gregory Williams, State Demographer, 3/15/94.

\9 The number of bowheads needed in 1992 is derived by multiplying the mean per capita landed whales (1910-1969) by the estimated 1992 Alaska Native population for each community.

\10 1997 Alaska Native population data for each community are from the Alaska Department of Labor, Research & Analysis Section (1997a) 7/1/97 population estimates multiplied by the percent Native American in each community from the 1990 U.S. Census.

\11 The number of bowheads needed in 1997 is derived by multiplying the mean per capita landed whales (1910-1969) by the estimated 1997 Alaska Native population for each community.

Stephen R. Braund & Associates, 1997.

update the calculation of subsistence and cultural need for bowhead whales). Between the mid-1980s and 1990, the Alaska Native population in these communities grew at an annual rate of a low of -2.4 percent in Wales to a high of 6.4 percent in Nuiqsut. Because the beginning population data year varied (e.g., from 1983 to 1987), it is not possible to calculate the percent change for all of the communities combined. From 1990 to 1992, the Alaska Native population in these 10 communities grew at an annual rate of a low of -4.9 percent in Wales to 7.1 percent and 7.6 percent in Barrow and Kivalina respectively. The average annual growth rate for all ten communities was 4.7 percent during this two year period. Between the mid-1980s and 1997, the annual rate of increase in the communities ranged from -.7 percent in Wales to 4.9 percent and 5.5 percent in Barrow and Nuiqsut respectively. Between 1992 and 1997, the annual growth rate ranged from a low of -.7 percent in Diomede to a high of 3.7 percent in Gambell. The annual rate of growth for the ten communities combined during the past five years is 1.9 percent per year. This compares with an annual growth rate for the State of Alaska from 6/30/90 to 6/30/96 of 1.65 percent (Alaska Department of Labor 1997c). In addition, the 1.9 percent annual rate of growth between 1992 and 1997 for these 10 communities is substantially lower than the 4.7 percent annual rate of growth between 1990 and 1992.

In an effort to understand the growth rates in these communities, the study team collected data on the births and deaths in the communities from 1991 to 1996, the latest year for which these data are available (Table 7). These data indicate that approximately 77 percent of the regional growth from 1990 to 1996 was due to natural increase (births less deaths) and approximately 23 percent was due to migration. The annual birth rate per 1,000 persons was 26.7 while the annual death rate per 1,000 persons was 5.7. This compares with an average annual birth per 1,000 persons of 18.8 and average annual deaths per 1,000 persons of 4.0 for the State of Alaska from 1990 to 1996 (ibid.).

Table 6: Comparison of Ten Alaska Eskimo Whaling Communities' Native Population: mid-1980s, 1990, 1992, and 1997.

		1983-87 to 1990				1990 to 1992		1992 to 1997		1983-87 to 1997	
Community	Date of 1983-87 Pop. Est\1	Est. 1983-87 AK Na Pop.\1	Yrs fr 1983-87 to 1990\2	1990 AK Na Pop.\3	% Change Per Yr fr 1983-87 to 1990\4	Est. 1992 AK Na Pop.\5	% Change Per Year 1990 to 1992\6,7	Est. 1997 AK Na Pop.\8	% Change Per Year 1992 to 1997\7,9	Yrs fr 1983-87 to 1997\10	% Change Per Year 1983-87 to 1997\11
Gambell	1987	495	3	505	0.7%	530	2.5%	628	3.7%	10	2.7%
Savoonga	1985	485	5	494	0.4%	515	2.1%	592	3.0%	12	1.8%
Wales	1987	154	3	143	-2.4%	129	-4.9%	144	2.3%	10	-0.7%
Diomede Is	N/A	N/A	N/A	167	N/A	169	0.6%	163	-0.7%	N/A	N/A
Kivalina	1987	275	3	309	4.1%	356	7.6%	348	-0.4%	10	2.7%
Point Hope	1986	534	4	587	2.5%	629	3.6%	688	1.9%	11	2.6%
Wainwright	1983	445	7	464	0.6%	505	4.4%	519	0.5%	14	1.2%
Barrow	1986	1,823	4	2,217	5.4%	2,532	7.1%	2,799	2.1%	11	4.9%
Nuiqsut	1983	227	7	328	6.4%	364	5.5%	403	2.1%	14	5.5%
Kaktovik	1983	154	7	189	3.2%	183	-1.6%	187	0.5%	14	1.5%
Totals		4,592		5,403		5,912		6,472			
Region							4.7%		1.9%		

\1 See Braund, Stoker & Kruse (1988) Table 7 for source of mid-1980s Alaska Native population data.

\2 Number of years between the 1990 U.S. Census and the 1983-87 population figures for each community.

\3 1990 Alaska Native population data for each community are from the 1990 U.S. Census.

\4 1990 Alaska Native population minus 1983-87 population divided by 1987-83 population divided by the number of years from 1983-87 to 1990.

\5 1992 Alaska Native population data for each community are from the Alaska Department of Labor, Research & Analysis Section, Demographics Unit. J. Gregory Williams, State Demographer, 3/15/94.

\6 1992 Alaska Native population minus 1990 population divided by 1990 population divided by two years (the number of years from 1990 to 1992).

\7 The percent change per year for all communities (i.e., Region) does not represent a sum of community percents, but rather the percent change per year for the total population of all ten communities (i.e., region) between the designated years.

\8 1997 Alaska Native population data for each community are from the Alaska Department of Labor, Research & Analysis Section (1997a) 7/1/97 population estimates multiplied by the percent Native American in each community from the 1990 U.S. Census.

\9 1997 Alaska Native population minus 1992 population divided by 1992 population divided by five years (the number of years from 1992 to 1997).

\10 Number of years between the 1997 estimated Alaska Native population figures for each community and the 1983-87 population estimates.

\11 1997 Alaska Native population minus 1983-87 population divided by 1983-87 population divided by the number of years from 1983 to 1997.

Stephen R. Braund & Associates, 1997.

Table 7: Residential Births and Deaths in Ten Alaska Eskimo Whaling Communities, 1991-96.\1

Community\2	Native American Population 4/1/90	Native American Population 7/1/96	Native American Population Pop. Change 1990-96\3	Births Births\4 1991-96\5	Births Annual Rate/1000 Mid Period Population\6	Deaths Deaths\4 1991-96\5	Deaths Annual Rate/1000 Mid Period Population\7	Natural Increase (Births-Deaths) 1991-96\5	Net Migrants	% of Pop. Change Due to Natural Increase\8,9	% of Pop. Change Due to Migration\9
Gambell	505	612	107	102	30.2	17	5.0	85	22	79%	21%
Savoonga	494	583	89	102	31.2	19	5.8	83	6	93%	7%
Wales	143	147	4	20	24.1	9	10.8	11	-7	N/A	N/A
Diomede Is	167	160	-7	4	4.0	4	4.0	0	-7	0%	100%
Kivalina	309	344	35	62	29.0	6	2.8	56	-21	N/A	N/A
Point Hope	587	694	107	97	26.0	21	5.6	76	31	71%	29%
Wainwright	464	528	64	71	23.4	19	6.3	52	12	81%	19%
Barrow	2,217	2,721	504	414	27.7	91	6.1	323	181	64%	36%
Nuiqsut	328	396	68	55	24.5	13	5.8	42	26	62%	38%
Kaktovik	189	186	-3	24	22.5	4	3.7	20	-23	N/A	N/A
Totals	5,403	6,371	968	951		203		748	220		
Region\10					26.7		5.7			77%	23%

\1 Population, birth and death data are for Alaska Natives only.

\2 Refers to community of mother's residence and community of decedent's residence.

\3 1996 Alaska Native population in each community minus 1990 population.

\4 Birth and death data from the Alaska Department of Health and Social Services, Bureau of Vital Statistics (1997).

\5 1996 data are provisional and subject to change.

\6 Annual Rate/1000 is calculated by dividing the total births from 1991-96 by 6 years for an average annual number of births. This number is then divided by the 7/1/93 population (the mid period population from 4/1/90 to 7/1/96) multiplied by 1,000 to determine the rate/1000 people.

\7 Annual Rate/1000 is calculated by dividing the total deaths from 1991-96 by 6 years for an average annual number of deaths. This number is then divided by the 7/1/93 population (the mid period population from 4/1/90 to 7/1/96) multiplied by 1,000 to determine the rate/1000 people.

\8 Net natural increase (e.g., births minus deaths) in each community divided by total population change between 1990 and 1996.

\9 The percent of the population change due to natural increase and migration is not applicable when the population change is less than natural increase.

Stephen R. Braund & Associates, 1997.

REFERENCES

Alaska Consultants, Inc. and Stephen R. Braund & Associates

1984 Subsistence Study of Alaska Eskimo Whaling Villages. Prepared for the U.S. Department of the Interior.

Alaska Department of Labor, Research & Analysis Section

1997a Alaska Population Overview - 1997 Estimates (Forthcoming 1998). Table 4.2 Population of Places by Borough and Census Area, 1990-1997.

1997b Alaska Demographic Information - 1996 Population Data. Federal State Cooperative for Population Estimates. 9/12/97. http:\\www.state.ak.us/local/akpages/LABOR/research/pop/pop95a.htm#Popdata

1997c Alaska Population Overview - 1996 Estimates. Juneau, AK.

1991 Alaska Population Overview - 1990 Census and Estimates Juneau, AK.

Alaska Department of Labor, Research and Analysis Section, Demographics Unit.

1994 Population of Native Americans in Bowhead Whale Quota Communities, 1992. Data provided by J. Gregory Williams, State Demographer, 3/15/94.

Alaska Department of Health and Social Services, Bureau of Vital Statistics

1997 Number of Births and Deaths in Selected Villages by Race, 1991-1996.

Braund, S. R.

1992 The Role of Social Science in the International Whaling Commission Bowhead Whale Quota. Prepared for the Arctic Research of the United States Interagency Arctic Research Policy Committee 6:37-42.

Braund, Stephen R. & Associates

1994 Quantification of Subsistence and Cultural Need for Bowhead Whales by Alaska Eskimos - 1994 Update Based on 1992 Alaska Department of Labor Data. Prepared for the Alaska Eskimo Whaling Commission, Barrow, Alaska.

1992 Quantification of Subsistence and Cultural Need for Bowhead Whales by Alaska Eskimos - 1992 Update Based on 1990 U.S. Census. Prepared for the Alaska Eskimo Whaling Commission, Barrow, Alaska.

1991 Subsistence and Cultural Need for Bowhead Whales by the Village of Little Diomede, Alaska. Prepared for the Alaska Eskimo Whaling Commission, Barrow, Alaska.

Braund, S.R., W.M. Marquette, and J.R. Bockstoce

1988 Data on Shore-Based Bowhead Whaling at Sites in Alaska. Document SC/40/PS 10 submitted to the IWC Scientific Committee.

Braund, S.R. and E.L. Moorehead
1995 Contemporary Alaska Eskimo Bowhead Whaling Villages. (Stephen R. Braund & Elisabeth L. Moorehead). In Hunting the Largest Animals - Native Whaling in the Western Arctic and Subarctic A.P. McCartney, ed. Occasional Publication No. 36, The Canadian Circumpolar Institute, University of Alberta.

Braund, S.R., S.W. Stoker, and J.A. Kruse
1988 Quantification of Subsistence and Cultural Need for Bowhead Whales by Alaska Eskimos, Stephen R. Braund & Associates, Anchorage, Alaska. International Whaling Commission TC/40/AS2.

International Whaling Commission
1989 Report of the Scientific Committee. Report International Whaling Commission 39: 33-64.

Marquette, W.M. and J.R. Bockstoce
1980 Historical Shore-Based Catch of Bowhead Whales in the Bering, Chukchi, and Beaufort Seas. Marine Fisheries Review. 42(9-10):5-19. Seattle, WA.

U.S. Department of the Interior
1980 Interim Report on Aboriginal/Subsistence Whaling of the Bowhead Whale by Alaskan Eskimos.

U.S. Government
1983 Report on Nutritional, Subsistence, and Cultural Needs Relating to the Catch of Bowhead Whales by Alaskan Natives. Submitted by the U.S. Government to the International Whaling Commission at its 35th Annual Meeting.

Williams, J. Gregory
1997 Personal Communication 10/6/97. State Demographer, Alaska Department of Labor, Research & Analysis Section, Demographics Unit.
1994a Personal Communication 4/13/95. State Demographer, Alaska Department of Labor, Research & Analysis Section, Demographics Unit.
1994b Personal Communication 4/28/94. State Demographer, Alaska Department of Labor, Research & Analysis Section, Demographics Unit.

Appendix A: DOCUMENTS SUBMITTED BY THE U.S. TO THE IWC RE: ALASKA ESKIMO BOWHEAD WHALING

1979

International Whaling Commission

1979 Report of the Panel to Consider Cultural Aspects of Aboriginal Whaling in North Alaska. Meeting in Seattle, WA. February 5-9, 1979 under the auspices of the International Whaling Commission.

1980

U.S. Department of the Interior

1980 Interim Report on Aboriginal/Subsistence Whaling of the Bowhead Whale by Alaskan Eskimos.

1983

Alaska Consultants, Inc. and Stephen Braund & Associates

1984 Subsistence Study of Alaska Eskimo Whaling Villages. Prepared for the Bureau of Indian Affairs, U.S. Department of the Interior.

IWC/TC/35/AB3

U.S. Government

1983 Report on Nutritional, Subsistence, and Cultural Needs Relating to the Catch of Bowhead Whales by Alaskan Natives. Submitted by the U.S. Government to the International Whaling Commission at its 35th Annual Meeting. International Whaling Commission TC/35/AB3.

1988

IWC/TC/40/AS2

Braund, S.R., W.M. Marquette and J.R. Bockstoce

1988 Data on Shore-Based Bowhead Whaling at Sites in Alaska. Appendix 1 In Braund, S.R., S.W. Stoker, and J.A. Kruse 1988 Quantification of Subsistence and Cultural Need for Bowhead Whales by Alaska Eskimos. Stephen R. Braund & Associates, Anchorage, Alaska. Prepared for the Bureau of Indian Affairs, Department of the Interior. International Whaling Commission TC/40/AS2.

Braund, S.R., S.W. Stoker, and J.A. Kruse

1988 Quantification of Subsistence and Cultural Need for Bowhead Whales by Alaska Eskimos. Stephen R. Braund & Associates, Anchorage, Alaska. Prepared for the Bureau of Indian Affairs, Department of the Interior. International Whaling Commission TC/40/AS2.

1992

IWC/44/AS2

Braund, Stephen R. and Associates

1991 Subsistence and Cultural Need for Bowhead Whales by the Village of Little Diomede, Alaska. International Whaling Commission report IWC/44/AS 2. Prepared for the Alaska Eskimo Whaling Commission. Barrow, Alaska.

1994

IWC/46/AS6

Braund, Stephen R. and Associates

1994 Quantification of Subsistence and Cultural Need for Bowhead Whales by Alaska Eskimos - 1994 Update Based on 1992 Alaska Department of Labor Data. International Whaling Commission report IWC/46/AS 6. Prepared for the Alaska Eskimo Whaling Commission. Barrow, Alaska.

1997

IWC/49/AS

Braund, Stephen R. and Associates

1997 Quantification of Subsistence and Cultural Need for Bowhead Whales by Alaska Eskimos - 1997 Update Based on 1997 Alaska Department of Labor Data. International Whaling Commission report IWC/46/AS. Prepared for the Alaska Eskimo Whaling Commission. Barrow, Alaska.

Appendix 9.5 NOAA-AEWC Cooperative Agreement (2002)

COOPERATIVE AGREEMENT
between the
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
and the
ALASKA ESKIMO WHALING COMMISSION
as amended
1998

1. PURPOSES

The purposes of this agreement are to protect the bowhead whale and the Eskimo culture, to promote scientific investigation of the bowhead whale, and to effectuate the other purposes of the Marine Mammal Protection Act, the Whaling Convention Act, and the Endangered Species Act as these acts relate to aboriginal subsistence whaling.

In order to achieve these purposes, this agreement provides for:

(a) Cooperation between members of the Alaska Eskimo Whaling Commission (AEWC) and the National Oceanic and Atmospheric Administration (NOAA) in management of the bowhead whale hunt for 1981 through 2002; and

(b) an exclusive enforcement mechanism that shall apply during the term of this agreement to any violation by whaling captains (or their crews) who are registered members of the AEWC of any provisions of the Marine Mammal Protection Act, the Endangered Species Act, or the Whaling Convention Act, as these acts may relate to aboriginal subsistence whaling; of the

International Convention for the Regulation of Whaling, 1946; of regulations of the International Whaling Commission; of the Management Plan; or of this agreement.

2. **RESPONSIBILITIES**

NOAA has primary responsibility within the United States Government for management and enforcement of programs concerning bowhead whales. The AEWC is an association governing Alaskan Eskimo whalers who hunt for bowhead whales. The AEWC adopted a Management Plan on March 4, 1981, to govern hunting for bowhead whales by Alaskan Eskimos. Under this Cooperative Agreement, the AEWC will, in cooperation with NOAA, manage the 1981 through 2002 bowhead whale hunts. The authority and responsibilities of the AEWC are contained in and limited by this agreement and the Management Plan, as amended from time to time, to the extent the Management Plan is not inconsistent with this agreement. If the AEWC fails to carry out its enforcement responsibilities or meet the conditions of this agreement or of the Management Plan, as amended from time to time, NOAA may assert its federal management and enforcement authority and will regulate the bowhead whale hunt in a manner consistent with federal law, this agreement, and the Management Plan to the extent necessary to carry out the responsibilities that are not carried out by the AEWC. Such

assertion of federal authority will be preceded by notice to the AEWC of intent to regulate the bowhead whale hunt to the extent necessary to carry out those responsibilities and conditions, and will not be effected until the AEWC or its members have been given an opportunity to present their views on the need for such assertion in a public forum: provided, however, that in cases where irreparable harm to the bowhead whale resource might result, the assertion of federal authority may be effected immediately after notice, in which cases the public forum on the need for such assertion will be conducted as soon as practicable thereafter.

3. INSPECTION AND REPORTING

NOAA personnel shall monitor the hunt and the AEWC shall assist such personnel with such monitoring. The AEWC shall provide an oral report to NOAA daily regarding the number of strikes and landings. The AEWC shall also inform all whaling captains who are engaged in whaling activities of the number of whales struck or landed at all times. On the first of each month during the spring and fall whaling seasons, the AEWC shall inform NOAA of the number of bowhead whales struck during the previous month. The AEWC shall also provide a report to NOAA within 30 days after the conclusion of the spring hunt, and within 30 days after the fall hunt but no later than January 1, containing at

least the following information:

(1) The date and exact, to the extent practicable, location of strike for each whale struck or landed, including, at a minimum, the estimated distance and bearing from the village or whaling camp;

(2) The length (as measured from the point of the upper jaw to the notch between the tail flukes), the extreme width of the flukes, and the sex of the whales landed;

(3) The length and sex of a fetus, if present, in a landed whale; and

(4) An explanation of circumstances associated with the striking of any whale not landed, and an estimate of whether a harpoon or bomb emplacement caused a wound which might be fatal to the animal (e.g., the harpoon entered a major organ of the body cavity and the bomb exploded).

NOAA shall provide technical assistance in collection of the above information. The AEWC shall assist appropriate persons in collection of specimens from landed whales, including but not limited to, ovaries, ear plugs, and baleen plates. Such specimens shall be available to appropriate government officials. NOAA personnel cooperating with the AEWC shall work closely with the AEWC Commissioner in each whaling village to facilitate the accurate monitoring of the hunt.

4. MANAGEMENT

(1) No more than seventy (75) bowhead whales shall be struck in 1998. The AEWC and NOAA shall determine the total number of bowhead whales that may be struck in each year from 1999 through 2002, and any applicable number of bowhead whales that may be landed, through annual negotiations during the first quarter of the year for which the quota is applicable. Provided, however, that the Under Secretary may, in consultation with the AEWC, reconsider and revise the terms of this paragraph if he deems it necessary on the basis of public comments received pursuant to the Federal Register notice of the proposed allocation.

(2) The AEWC Management Plan will provide that whaling captains and crews will use their best efforts to land every whale that is struck, and strike whales that are under twelve (12) meters (39 feet) and presumed to be sexually immature.

(3) The AEWC may determine the allocation of these permitted strikes among the whaling villages.

(4) The AEWC Management Plan will provide that the meat and products of whales taken in the subsistence hunt must be used exclusively for native consumption and may not be sold or offered for sale.

5. ENFORCEMENT

(1) The AEWC agrees that whaling captains will be subject to civil monetary assessments for whales struck over any strike limit and whales landed over any landing limit that is prescribed in this agreement and the Management Plan as they may be amended from time to time. The AEWC will collect the assessments from the whaling captains and deposit them in a separate bank account from which no disbursements shall be made without the express agreement of NOAA and the AEWC. In the event of a dispute between NOAA and the AEWC over the number of whales landed or struck or the amount of the assessment, or other factual matters, NOAA will consult with the AEWC about the matter. If the dispute cannot be resolved, it will be referred to an administrative law judge for determination under a trial-type administrative proceeding of the facts and the amount of assessment. The procedures contained in 15 CFR sections 904.200-904.272 will control these proceedings. The decision of the administrative law judge may be appealed to the Administrator of NOAA. Whaling captains may also be liable for civil assessments for other violations of the Management Plan as determined by the AEWC or by an administrative law judge under the procedures described above.

(2) In consideration of the AEWC's agreement hereunder, the Government of the United States agrees that the enforcement procedure described in paragraph (1) of this section shall be the

exclusive enforcement mechanism that shall apply during the term of this agreement to any violation by whaling captains or their crew who are registered members of the AEWC of any provisions of the Marine Mammal Protection Act, the Endangered Species Act, or the Whaling Convention Act, as these Acts may relate to aboriginal subsistence whaling; of the International Convention for the Regulation of Whaling, 1946; of any regulations of the International Whaling Commission; of the Management Plan; or of this agreement.

(3) The AEWC annually will furnish NOAA the names of all registered whaling captains.

6. AUTHORITIES

This Cooperative Agreement is concluded under the authorities governing management of living marine resources, including but not limited to the Marine Mammal Protection Act of 1972 and the Whaling Convention Act of 1949.

7. DURATION

This Agreement is in effect from March, 1981, through December 31, 2002.

8. CONSULTATION

NOAA and the AEWC shall consult during the operation of this

Agreement concerning the matters addressed herein as well as all other matters related to bowhead whales which either party believes are suitable for such consultation. Specifically, NOAA shall consult with the AEWC on any action undertaken or any action proposed to be undertaken by any agency or department of the Federal Government that may affect the bowhead whale and shall use its best efforts to have such agency or department participate in such consultation with the AEWC.

9. LIMITATION OF USE

Nothing in this Agreement shall be construed to support or contradict the position of either party regarding the jurisdiction of the International Convention for the Regulation of Whaling, 1946, or the Whaling Convention Act of 1949 with respect to aboriginal subsistence whaling by Alaskan Eskimos.

Dated:_____

_____	_____
Burton Rexford Chairman Alaska Eskimo Whaling Commission	D. James Baker Under Secretary for Oceans and Atmosphere

AMENDMENT
to the
COOPERATIVE AGREEMENT
between the
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
and the
ALASKA ESKIMO WHALING COMMISSION

The Alaska Eskimo Whaling Commission (AEWC) and the National Oceanic and Atmospheric Administration (NOAA) hereby agree to amend their Cooperative Agreement as follows:

Article 4, Paragraph (1) is amended to read as follows:

"No more than 75 bowhead whales shall be struck in 2002. The AEWC and NOAA shall determine the total number of bowhead whales that may be struck in 2003, and any applicable number of bowhead whales that may be landed, through annual negotiations during the first quarter of the year for which the quota is applicable. Provided, however, that the Under Secretary may, in consultation with the AEWC, reconsider and revise the terms of this paragraph if he deems it necessary on the basis of public comments received pursuant to the Federal Register notice of the proposed allocation."

Date: 2/12/2002

Thomas Napageak
Chairman, Alaska Eskimo
Whaling Commission

Rolland A. Schmitten
U.S. Commissioner to the IWC