A Special Report
to the International Whaling Commission

Bowhead Whales

U.S. DEPARTMENT OF COMMERCE
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SPECIAL REPORT TO THE INTERNATIONAL WHALING COMMISSION: BOWHEAD WHALES 1978

The bowhead whale has for centuries traditionally been hunted by Eskimos on the North Slope of Alaska to meet their subsistence needs. Due to commercial whaling in the 1800's, the bowhead has become one of the endangered great whales. Concern for the protection of marine mammals and endangered species led the United States to enact the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. Both Acts establish stringent controls on the taking of marine mammals. At the same time, these Acts, as well as the International Whaling Commission Schedules, have recognized the importance of hunting to historical subsistence cultures, and have provided appropriate exceptions to the controls for Alaskan native subsistence needs.

In 1977, in response to growing concern for the bowhead whale, the International Whaling Commission removed the exemption for native subsistence harvest of bowhead whales and established a 1978 quota of 12 landed or 18 struck, whichever occurred first. In response to the action of the IWC, the United States in cooperation with Alaskan Eskimos and other interested groups, has developed comprehensive research and management programs aimed at increasing our knowledge of bowhead whales and ensuring that the bowhead whale hunt is carried out in a manner consistent with protection of the whale population and satisfaction of legitimate subsistence needs of the Alaskan Eskimos.

In its management program, the United States has not only sought to control the 1978 harvest within the limits established by the International Whaling Commission, but has also made significant efforts to increase the efficiency of the hunt, assure the full utilization of all whales taken, and provide alternative means of meeting subsistence needs to the extent that such means exist.

This effort was made possible through the full cooperation of and substantial sacrifice displayed by the Eskimo community. Eskimo whalers formed the Alaska Eskimo Whaling Commission to represent subsistence bowhead whalers, to implement local control over the harvest, and to meet the quota established by the IWC. The Alaska Eskimo Whaling Commission was intimately involved in the research and management programs.

As part of the effort to increase the efficiency of bowhead whaling, the Eskimo whalers and the weapons manufacturers met prior to the spring hunt to improve whaling weapons. The Alaska Eskimo Whaling Commission established regulations requiring whalers to use hand-thrown weapons with attached lines before allowing the use of shoulder guns. The resulting increase in efficiency combined with some improvements in the whaling weapons, substantially reduced the

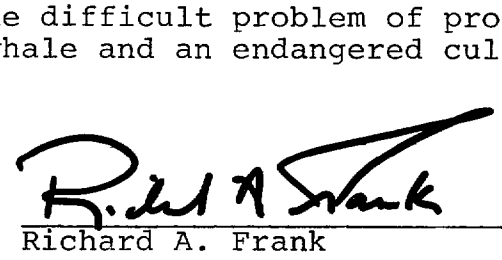
loss rate. Whereas in 1977 the Eskimos lost about 75 percent (82) of the whales struck, in 1978 they lost only 33 percent (5) of the whales struck. Moreover, in addition to minimizing waste through increased hunting efficiency, by all indications the Eskimo community further minimized waste by utilizing every whale landed.

In its bowhead research program, the United States not only conducted the most comprehensive census of its kind in history, but also studied population dynamics and acoustic techniques. The program included an ice-based census camp designed to count whales traveling through a nearshore lead near Barrow, Alaska, aerial surveys at the site of the census camps to validate observations made by ice camp observers, and land camp observations, in conjunction with vessel and aerial surveys, of the early and late migration patterns. Determined to gather the best data possible, researchers maintained a 24-hour observation schedule from two different bases, utilizing radio checks between bases to increase accuracy. Finally, 174 hours of aerial surveys helped validate the census counts and delineate the spatial and temporal distribution of whales during migration.

Based on figures available as of May 30, 1978, we estimate that the population of the stock of bowhead whales which migrates past Alaskan Eskimo whaling villages was in the range of 1,783-2,865 whales, with 2,264 bowheads considered the best available estimate. One thousand seven hundred thirty four bowhead whales were actually sighted. The population estimate incorporates formulae to correct figures for total observation time, duplicate sightings, and validation of animals believed to have been missed. The figures will be updated after we have included the June 1978 sightings.

This special report to the International Whaling Commission details for the Commission and other interested parties the United States' research and management programs, and the results of those programs obtained so far. It is hoped that this report will be viewed as serving a broader purpose than the mere recitation of the procedures and results relating to the bowhead whale hunt of spring 1978. I believe that the scientific techniques studied and developed in our research program have broad application beyond their use here, and that the entire research program provides a model which should prove of benefit to similar future endeavors.

This report is presented to indicate what has been accomplished in the continuing commitment by the United States to seek a resolution, in cooperation with the International Whaling Commission and all other interested parties, of the difficult problem of protecting both an endangered species of whale and an endangered culture.



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I. 1978 MANAGEMENT PROGRAM - AN INTERIM REPORT

Summary

Prior to the spring bowhead whale hunting season, regulations were published by the National Marine Fisheries Service (NMFS) to implement the United States' management program and the International Whaling Commission's (IWC) Schedule (see Appendix B). NMFS agents were trained, equipped, and sent to the field in advance of hunting activities. The field program was assisted by the Alaska Eskimo Whaling Commission (AEWC) representatives and Eskimo reporting officers.

The spring hunt generally followed the regulatory requirements. Ten whales were taken and five additional animals were struck and lost. In the spring 1977 hunt, 26 whales were landed and 82 additional whales were struck and lost.

Following the International Whaling Commission's determination in December 1977, to establish a bowhead whale quota for 1978 of 12 landed or 18 struck, whichever comes first, the United States embarked upon an ambitious effort to develop a comprehensive managment and regulatory program to implement the Commission's decision. The United States' program involved parallel and coordinated efforts by the Federal Government and by the Alaska Eskimo Whaling Commission (the "AEWC"), a voluntary association of native whalers created in September 1977, to bring the hunt within the limits established by the Commission, to insure proper monitoring of whaling activities, to increase the efficiency of whaling techniques, and to provide for the full utilization of all whales taken. The following paragraphs document

(A) the rules and regulations established under the management program;

(B) the preparations made for the 1978 whaling season; and

(C) the results of the management program to date.

A. Rules and Regulations Governing Bowhead Whaling

(1) United States Regulations

Utilizing the Whaling Convention Act of 1949 (the "Act"), a United States statue designed to implement provisions of the International Convention for the Regulation of Whaling (the "Convention"), the United States Government published, in April 1978, rules and regulations governing the taking of bowhead whales by Eskimos for subsistence purposes. These rules and regulations are set forth in Appendix B. Their major provisions are as follows:

(a) Quotas -- The central element of the Federal regulations is a provision for the allocation of the overall quota established by the Commission among the nine whaling villages of the North Slope of Alaska.1/ This village-by-

1/The location of the villages is set out in Figure 1, Appendix C.

village allocation scheme was worked out in cooperation with the AEWC in recognition of the particular needs of each whaling village. The precise allocation among the villages is as follows:

Kaktovik	- 1 whale landed or 2 struck, whichever occurs first
Nuigsut	- 0 whale landed or 0 struck, whichever occurs first
Barrow	- 3 whales landed or 4 struck, whichever occurs first
Wainwright	- 2 whales landed or 2 struck, whichever occurs first
Point Hope	- 2 whales landed or 2 struck, whichever occurs first
Kivalina	- 1 whale landed or 2 struck, whichever occurs first
Gambell	- 1 whale landed or 2 struck, whichever occurs first
Savoonga	- 1 whale landed or 2 struck, whichever occurs first
Wales	- 1 whale landed or 2 struck, whichever occurs first

(b) Transfer of Allocations Between Villages -- Recognizing the possibility that a village may not take all of its quota, Federal regulations provide for the transfer, upon request, of unused allocations from one village to another.

(c) Licenses -- Both the Convention and the Act prohibit whaling without a license. Federal regulations implement these requirements and establish a general licensing regime for Eskimo whalers. In addition to making provision for individual licenses, Federal regulations, recognizing the unique cultural circumstances on the North Slope of Alaska, provide for the issuance of licenses to all whaling captains registered with or belonging to a whaling association representing a significant number of whaling captains, such as the AEWC.

(d) Reporting -- Federal regulations call for all whaling captains to report the striking, attempted striking or landing of any bowhead whale. Additionally, captains are required to keep written records of their whaling activities.

(e) Prohibited Acts -- Federal regulations provide, inter alia, that no person shall be permitted to whale except a licensed whaling captain; that no whaling captain may continue to whale once his village quota is reached; that no whaling captain shall engage in whaling for any calf or any bowhead whale accompanied by a calf; that no whaling captain shall engage in whaling in a wasteful manner; and that no whaling captain shall engage in whaling with a harpoon, lance or explosive dart which does not bear his permanent mark.

(2) AEWC Regulations

Because Eskimo cooperation and self-restraint was essential for the success of the United States management regime, the Federal Government determined that substantial regulatory authority should be exercised by Eskimos themselves. The AEWC developed its own management plan to provide for coverage of matters not directly dealt with in the Federal rules. Among other matters the AEWC Management Plan (found at Appendix A to this report2/) provides for registration of captains with the AEWC; establishes reporting requirements for all members of the association; establishes levels of harvest on a village-by-village basis, consistent with Federal regulations and the requirements of the Schedule; and creates sanctions, including denial of participation in the hunt, for any person violating the AEWC rules.

Perhaps the most significant element of the AEWC Management Plan is the rules establishing hunting techniques intended to improve substantially the efficiency of the hunt. The rules provide that lines and floats must be attached to harpoons and darting guns, and that shoulder guns may be used only when accompanied by a harpoon, after a line has been secured to a whale, or when pursuing a wounded whale with a float attached to it.

B. Preparations for the Whaling Season

During the winter and early spring of 1978, the United States Government undertook a number of activities to prepare for the spring whaling season and to ensure that the management plan it had developed would be properly implemented. Preparations involved briefing affected members of the Eskimo community; carrying out a personnel training program; establishing logistical support; deploying personnel to the whaling villages; and seeking to improve hunting weaponry.

2/A status report of the activities of the AEWC is also found in Appendix A.

(1) Briefing of the Eskimo Community

Representatives of the Federal Government undertook a broad-scale effort to inform the Eskimo community of all aspects of the Federal management plan. They solicited the views of the Eskimo community in order to ensure that the scheme ultimately adopted was compatible with the needs of that community. There were almost daily contacts between representatives of the Federal Government in the field and representatives of the AEWC throughout the regulatory development process, and the development of both the Federal regulations and AEWC regulations was closely coordinated to ensure that there were no gaps in the overall management program.

(2) Personnel Training

Agents who were assigned to the bowhead program completed an arctic survival training course sponsored by the U.S. Air Force during late February and March 1978. On April 3 and 5, 1978, they were briefed on enforcement policy, regulations, overall field plans, personnel assignments, equipment, relationship to local people and AEWC, and reporting procedures.

(3) Logistics

The scarcity of support facilities and equipment in the whaling villages required the bowhead program to be largely self-supporting. Rental housing for agents was arranged at Savoonga, Gambell, and Barrow. An insulated field shelter obtained from the Naval Arctic Research Laboratory at Barrow was flown into Point Hope. Tents or "sleeping bag space" in school buildings were utilized at other villages. Biologists stationed at Cape Lisburne lived in snow caves and tents.

Transportation in the whaling areas was provided by snow machines purchased locally and supplied with emergency gear, including tents. Chartered aircraft were obtained for transportation between villages and for surveillance near Barrow.

Communications equipment by the agents included telephones and radios. Walkie-talkies were loaned to selected whaling crews at Kivalina, Pt. Hope, and Barrow to augment local communication capabilities.

(4) Deployment of Personnel

Agents and Eskimo Assistants (Reporting Officers or AEWC Representatives) were assigned to the villages listed below. As the hunt progressed, they moved between villages according to the progress of whaling activities.

Village	Federal Agents	Reporting Officers	AEWC Representatives
Savoonga	2	1	1
Gambell	2	1	1
Pt. Hope	3	2	1
Kivalina	1	2	1
Barrow	4	None	1
Wainwright	2	None	1
Wales	1	None	None

(5) Improvements in Hunting Weaponry

Frequent malfunctions of weapons are credited with contributing to the problem of losing whales that are struck. In recognition of this situation, the U.S. National Marine Fisheries Service ("NMFS") contracted with Mr. Renton Meininger, Jr., President, Naval Company, Inc., to visit several whaling villages and identify needed improvements in the weapons. During March 1978, Mr. Meininger met with Eskimo whalers in Gambell, Savoonga, Point Hope, and Barrow. The discussions resulted in identifying causes for weapons failure and ideas for enhancing the reliability and effectiveness of the weapons.

C. Results of the U.S. Management Program to Date

The spring 1978 season was carried out in compliance with Federal regulations and the AEWC Management Plan. Overall, only ten whales were landed, and five whales were struck but lost, well within in the quota established by the Commission.3/ No citations were issued for any violations of either Federal or AEWC regulations. The results of the hunt, the operation of the regulations, and the coordination and control efforts undertaken are described below.

(1) Results of the Hunt

(a) Hunting Effort and Success -- The principal whaling events of the 1978 spring hunting season were as follows:

Village	Whales Taken: Dates & Captain	Whales Struck & Lost: Dates	Number of Crews
Savoonga	One whale April 16 Capt. Nelson Alowa	None	8
Gambell	One Whale April 21 Capt. Vern Slwooko	Four April 19 (1) April 21 (3)	21

3/Two whales remain to be taken in the fall hunt.

Village	Whales Taken: Dates & Captain	Whales Struck & Lost: Dates	Number of Crews
Wales	None	None	3
Kivalina	None	None	3
Pt. Hope	Two Whales 1st Whale - May 2 Capt. Seymour Tuzroyluk 2nd Whale - May 4 Capt. John Tingnook	None	15
Wainwright	Two Whales 1st Whale - May 6 Capt. Felton Segevan 2nd Whale - May 19 Capt. Neil Panik	None	5
Barrow	Four Whales 1st Whale - May 1 Capt. Robert Aiken 2nd Whale - May 2 Capt. Jacob Adams 3rd Whale - May 2 Capt. Harry Brower 4th Whale - May 3 Capt. Jonathan Aiken	May 3 (1)	27
TOTAL:	10 whales	5 Lost	82 Crews

(b) Efficiency of the Hunt -- The spring 1978 bowhead hunt was conducted in a more efficient manner than in the past. In the spring 1977 hunt, 26 whales were landed and an additional 82 whales were struck and lost (Figures 4 and 5, Appendix C). In the spring of 1978, there were only five whales known to be struck but not retrieved. Improvement in the efficiency of the hunt can be attributed, at least in part, to the prohibition in the AEWC regulations against the use of the shoulder gun alone and the requirement that a whale be struck with a harpoon or darting gun with line attached.

It is difficult to evaluate precisely how many whales which are struck but lost are mortalities. Of the five whales known to be struck but not retrieved in the spring of 1978, one strike would be classified as a superficial wound, not resulting in mortality. This whale, struck once with a harpoon near Gambell on April 21, 1978, was initially called a miss by the whaling crew because the harpoon did not engage firmly and the bomb apparently neither penetrated or detonated.

(c) Whale Utilization -- The Eskimo community made conscientious efforts to utilize fully and completely every whale which was landed. Every indication is that the Eskimos

were successful in this effort. There is no evidence that any part of the whale which could be utilized in any manner was wasted or improperly disposed.

(2) Operation of the Regulations -- Quotas and Transfers

With the exception of the village of Barrow, each whaling village's activities were within the quota initially assigned to it. On May 2, 1978, the quota for the village of Barrow was reached. Nonetheless, several crews remained in their whaling camps, and on May 3, two additional whales were killed, although one was lost in the moving ice pack. Thus, as of May 3, Barrow was one in excess of its landed quota of three whales.

It was the view of certain leaders of the Eskimo community, at the time the landed quota was exceeded, that two of the whales were "Ingutuks" (small fat whales) and not bowheads. Therefore, they concluded that it was still permissible to continue whaling. The U.S. Commissioner visited Barrow on May 7, at the request of the AEWC, and after lengthy discussion with the whalers, he found that "an honest dispute as to fact" existed as to whether the fourth whale was actually a bowhead. However, he stressed that he had now clarified the situation and that all whales in the herd were considered to be bowheads by the Federal government. As a result, there could be no excuse for violations. Whaling thereafter ceased at Barrow. Furthermore, an unused quota from Point Hope was transferred from that village to Barrow, in accordance with Federal regulations, so that the final landed quota at Barrow is equal to the number actually taken.

In addition to the transfer from Point Hope to Barrow, two other allocations were made during the season. The village of Savoonga, which was allocated a quota of one whale landed or two struck, managed to land the first whale which it struck, and transferred, with government approval, its remaining strike to the village of Gambell. A second request for a quota transfer was initiated by the village of Kivalina which failed to strike the one whale alloted to it. Kivalina proposed transferring its quota to Point Hope. Since the migrating whales passed Point Hope before the quota could be used, a retransfer of the quota to Barrow, as described above, was effected.

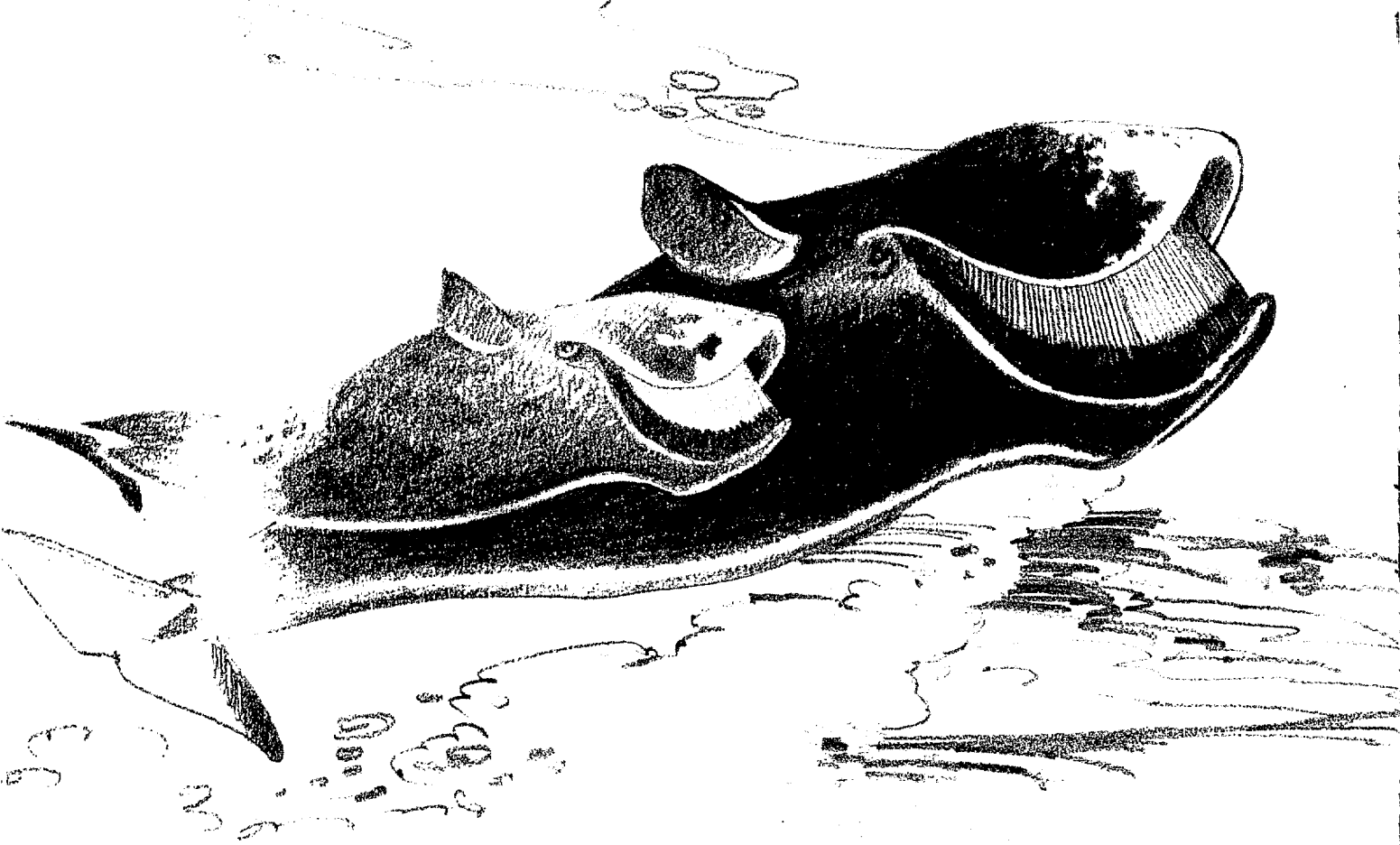
(3) Coordination and Control

(a) Collaboration with the Eskimos -- Nominated by the AEWC and hired by the U.S. Government, Eskimo reporting officers acted as the primary contact between Government agents and the whaling crews. These reporting officers and AEWC representatives worked with NMFS agents on a daily basis

in implementing the management program. In addition, U.S. agents became acquainted with the senior whaling captains in all villages. These interactions between the Eskimos and the government created a highly satisfactory and effective working relationship which must be given great credit for the overall success of the 1978 program.

(b) IWC Observer -- The Government of Denmark provided an IWC observer, Mr. Elias Jacobsen, who resides in Greenland. Mr. Jacobsen arrived in Anchorage on April 14, 1978. Accompanied by a NMFS agent, Mr. Jacobsen went to Gambell where he spent one week and accompanied a whaling crew for one day. The second week of his trip was spent in Barrow. Mr. Jacobsen departed Alaska on April 28, 1978.

(c) Counting Strikes -- While language barriers made it difficult for government agents to monitor activities of the whaling crews while hunting was in progress, the reporting officers or AEWC representatives helped to reconstruct events upon the return of the whalers to the ice camps. Thus, while it is impossible to have exact information concerning the nature of strikes in unretrieved whales, the U.S. Government is confident in the tally of strikes as recorded.



II. 1978 RESEARCH PROGRAM - AN INTERIM REPORT

The spring 1978 bowhead whale research program was carried out by personnel of the Arctic Whales Task, Marine Mammal Division, NMFS, NOAA. The bowhead whale research is continuing actively; therefore, the results in this report cover data collected through May 30, 1978. An analysis of results of individual projects will begin when the spring research season ends June 10, 1978. Complementary research projects (e.g. vessel survey) will not have begun, so a complete analysis of bowhead whale population data, including those for the spring, summer, and fall months, will not be available until December 1978. Since a complete determination of the size of the western Arctic population of bowhead whales cannot be made until all of the 1978 project results are completed, the information contained in this report is tentative.

The objectives of the 1978 bowhead whale research plan were to:

(1) estimate the abundance of that part of the bowhead whale population which migrates past the spring Eskimo whaling camps;

(2) determine the temporal and spatial distribution of bowheads before, during and after the spring-summer migration period; and

(3) collect biological samples from the whales that were harvested so an assessment of age and reproductive status of the whales taken could be made.

To assess the relationship of bowhead whale movements to the census effort, an integrated research program was conducted and included:

(1) an ice based census camp designed to count whales passing by in the nearshore lead near Barrow, Alaska;

(2) aerial surveys conducted at the site of the census camps to help validate sightings made by the ice camp observers;

(3) land camp observations of the early and late migration patterns of bowheads in conjunction with aerial and vessel surveys (June 12 - June 20, 1978); and

(4) exploration of the usefulness of active sonar and passive recordings as tools for determining the distribution and abundance of whales near the ice based counting camps.

The spring and summer bowhead whale research projects, including times, locations, and personnel employed, are included in Appendix I.

During 1976 and 1977, the Marine Mammal Division, NMFS, made population studies dealing with the distribution and abundance of bowhead whales in the northern Bering Sea and Arctic Ocean under the Alaska Outer Continental Shelf Environmental Assessment Program (OCSEAP). The OCSEAP

project was the forerunner of the expanded 1978 bowhead research effort Several limitations in 1976 and 1977 reduced our ability to assess adequately the population of bowhead whales. First, logistic support and contractual arrangements through two U.S. Government organizations were not fulfilled, which eliminated portions of our research time that coincided with the movement of bowheads. Second, we were able to support only one census camp at Barrow and one at Pt. Hope, with fewer numbers of observers than would have been optimal. Third, environmental conditions severely limited how long we could stay on the ice to count whales. And fourth, limited funds during 1976-1977 prevented us from spending enough time in all areas where bowheads migrate. This reduced our effectiveness by diluting any specific effort at any one place or time.

Increased funds support for 1978 will enable us to make a more precise estimate of abundance than previously (1978 funding, Figure 2, Appendix C). Also, we have developed reliable procedures to evaluate the biases associated with the census effort.

This report includes:

(1) a population index estimate of the number of whales migrating past the Alaska Eskimo whaling camps and

(2) a comparison of this year's results with those obtained in 1976 and 1977. The report summarizes bowhead distribution, evaluates factors related to the movement and behavior of whales passing the counting camps and associated census biases, summarizes the 1978 spring hunt, and itemizes the biological samples collected and the planned analyses.

Methods, Results, and Discussion

Aerial Surveys

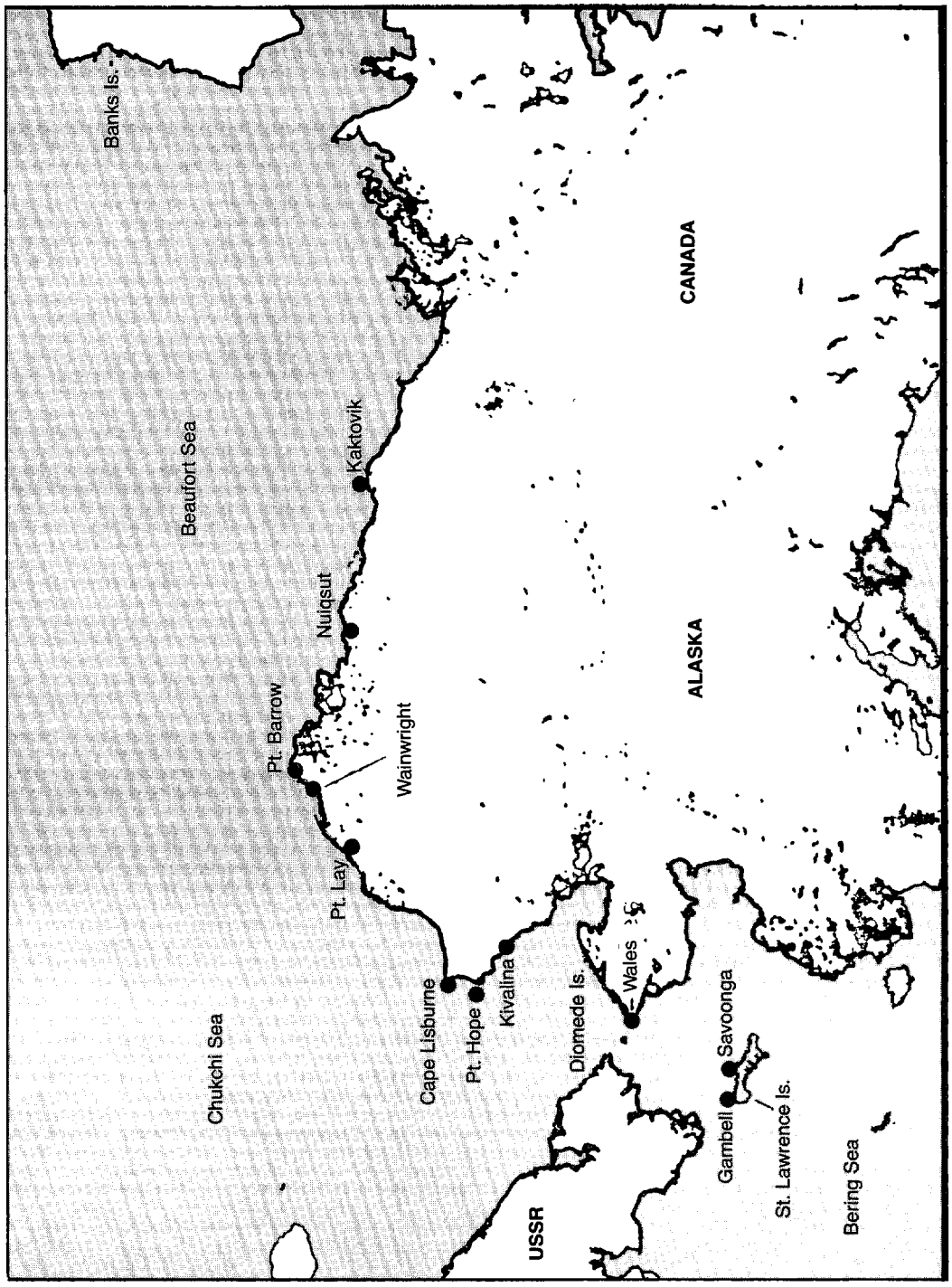
The objectives of the aerial survey projects were to:

(1) delineate the temporal and spatial distribution of bowhead whales during the spring and summer migration period and

(2) help validate the census counts at the Barrow ice camp. Aerial surveys were not intended to produce a population estimate.

Between April 19 and May 23, 1978, 174 hours of aerial surveys were flown in search of bowhead whales in the waters from St. Lawrence Island northeastward to Pt. Barrow, Alaska, and eastward to Banks Island, Northwest Territory, Canada (Figure 1). In general, systematic aerial surveys were used to delineate gross migratory routes and details of distribution and movements of whales across the Bering Strait, across nearshore leads, and up to 75 miles offshore from those leads at Pt. Lay and Pt. Barrow and to test the efficiency of the ice camp observers who were counting whales as they passed the counting station. By May 30, an estimated 450 bowhead whales were seen; many were duplicates from preceding days.

Figure 1. Bowhead whales study area.



Distribution and Migration Timing. During this season, the majority of bowheads passing the northwest tip of St. Lawrence Island apparently remained close to the Soviet coast, migrating through the Bering Strait west of Big Diomede Island (Figure 1). Once north of the Bering Strait, they followed a narrow migratory corridor, generally corresponding to the northerly (010° - 020° magnetic) oriented pack ice fracture zone and passing within a few hundred meters to as far as 45 km seaward of Pt. Hope and Cape Lisburne. North of Cape Lisburne, the nearshore lead widened to as much as 56 km before narrowing dramatically just south of Pt. Barrow (Figure 2). This condition persisted throughout the survey period.

From Pt. Lay northward, the whales remained within the nearshore lead, showing preference for the ice edges (i.e. the shorefast ice, refrozen lead and the pack ice edges, holes in the refrozen lead, and all areas of calmer water. Few of the animals were seen in the open waters of the leads, and none were seen outside the nearshore lead system even though 45.4 percent of our survey effort near Barrow was offshore (Table 1). The narrowing of the lead near Barrow and the apparent absence of whales in offshore leads seems to have brought essentially all migrating bowhead whales within viewing range of the Barrow ice camp census teams.

After the whales passed Pt. Barrow, they continued to use the nearest shore lead system, at least to 141° W. longitude, reaching the northwest coast of Banks Island, Canada, by early May. Two whales were observed off NW Banks Island on May 8 by pilots from the Naval Arctic Research Laboratory. There were no whales along the southwestern shore of Banks Island on May 13, 1978. Poor weather prevented more detailed surveys of the northwest tip of Banks Island where satellite imagery showed open water. The nearshore lead in the Beaufort Sea was approximately 100 km offshore. Surveys of the Beaufort Sea this year support the hypothesis proposed by Braham and Krogman (1976) that the spring migration to the western Canadian Arctic occurs in offshore leads.

On May 22, six bowheads were observed heading northwest, north of the Bering Strait toward the north side of the Chukotskiy Peninsula, USSR.

Animals migrating later in the spring may avoid the nearshore lead in favor of more open water passages west of the Bering Strait into Soviet waters of the Chukchi Sea. Aerial surveys near the Soviet coast were not made because the U.S. request to fly over Soviet territory was not granted by the USSR. Additional assessment of bowhead movements, after the whaling period ends, is planned (whale migration, Figure 3, Appendix C).

Validation of the Ice Camp Census Study. Bowhead whales passing the ice camp counting stations were independently tallied from the aircraft as it flew a "race track" pattern over the lead immediately adjacent to the camps. During the 19 simultaneous survey periods (ranging from 16 minutes to 2 hours and 39 minutes), whales were scored by both ice camp and aerial methods; the aircraft counted 93 whales and the corrected ice camp counts accounted for 83.5 whales (among mean pooled value for the two camps) (Table 2).

Figure 2
Ice Conditions in the Bering, Chukchi, and Beaufort Seas, May 12, 1978

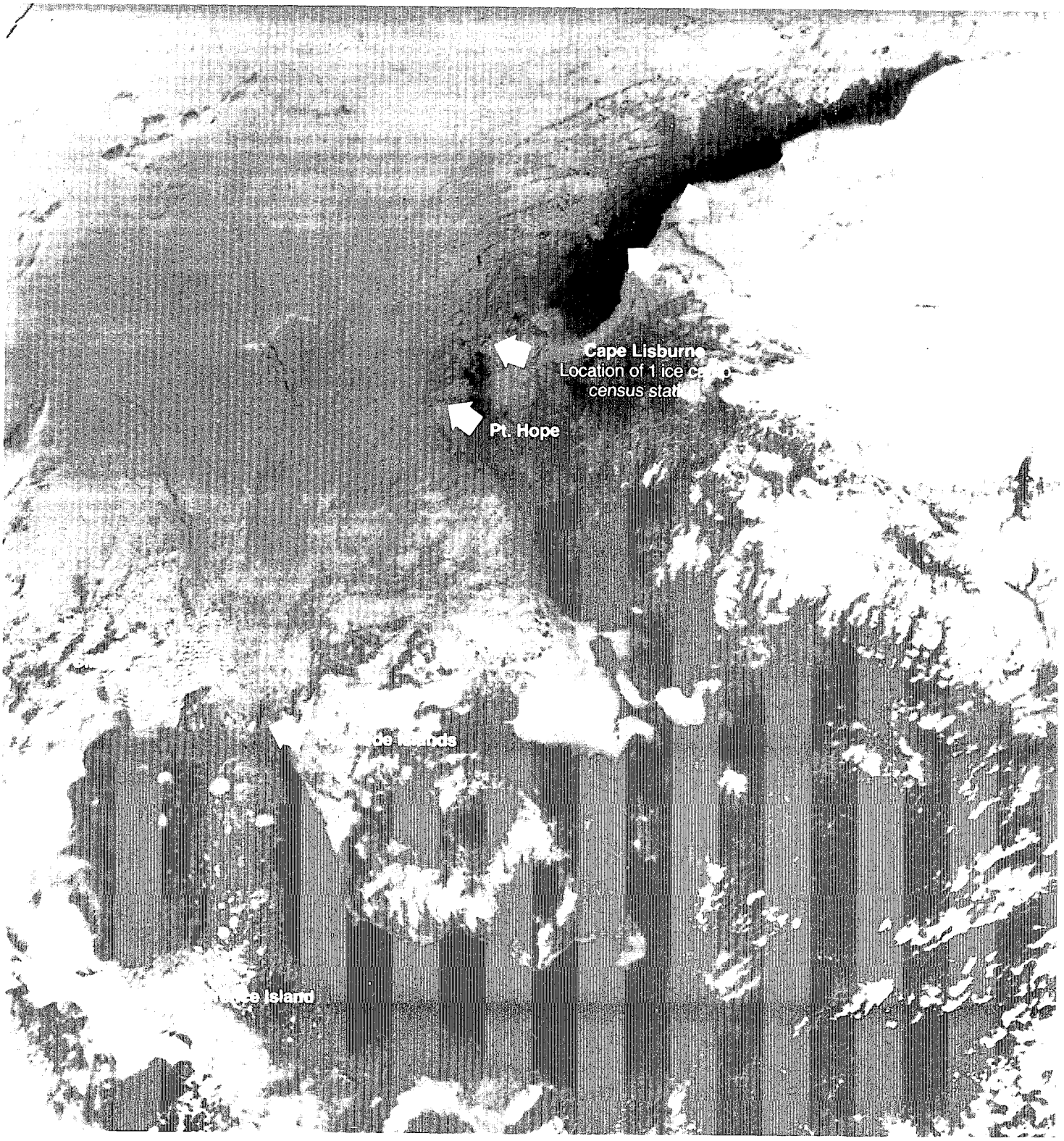


TABLE 1. Comparison of bowhead whale counts in the nearshore lead and surveys of areas seaward of the pack ice edge in the eastern Chukchi Sea, May 1978.

Date	Area	Nearshore Leads			Offshore Leads		
		# miles	#A[1/]	D[2/]	# miles	#A	D
May 4	Barrow 156°-157°30'	106.2	14	.13	209.5	0	0
May 5							
A	Barrow 156°-157°30'	112.0	17	.15	103.5	0	0
B	Pt. Lay 163°-163°30'	20.0	1	.05	75.0	0	0
C	Other Areas 155°-163°00'	268.5	18	.07			
May 6							
A	Other Areas 156°30'-164°10'	364.0	50	.14			
B	"Ice Camp" 156°31'-156°26'				33.0	0	0
May 7							
A	Barrow 156°45'-159°	90.5	2	.02			
B	S.W. Barrow 159°-160°	23.0	0	0	163.0	0	0
May 8							
A	Barrow 156°-158°	66.5	7	.11	214.0	0	0
B	Other Areas 155°-156°	51.0	11	.22			
May 10							
A	"Ice Camp" 156°20'-156°52'				67.0	0	0
B	"Ice Camp" 156°22'-156°59'				100.0	0	0

1/ #A = number of animals
2/ D = density; animals/mile

TABLE 1.- continued

Date	Area	Nearshore Leads			Offshore Leads		
		# miles	#A[1/]	D[2/]	# miles	#A	D
May 12							
A	Barrow-Deadhorse 156°40'-148°	215.5	27	.13	143.8	0	0
B	Deadhorse-Inuvik 148°-140°35'	100.0	14	.14	64.0	0	0
May 16	"Ice Camp" 156°11'-156°42'				58.0	0	0
Totals		1,477.2	161	.11	1,230.0	0	0

1/ #A = number of animals
2/ D = density; animals/mile

The difference in the number of whales counted by the two ice camp teams and by the aircraft team ranged from -9 to +8.5 whales for a mean difference ($\bar{D}$) of -0.5. A paired t-test indicated no significant difference in the number of bowhead whales counted from the air or ice. This indicated that the ice camp observers were essentially observing all whales present or that both survey methods were biased in the same direction.

The aerial survey test for ice camp observer efficiency resulted in a positive correlation for paired counts collected during the simultaneous ice camp and aerial surveys of the nearshore lead ($P < 0.01$; where $r_{sample} = 0.459$ and $r_{crit.} = 0.446$ for a two tailed test at 17 d.f.). This indicated that samples were drawn from the same population.

The rigorousness of the aerial "race track" method leads to a confirmation that the observers at both ice camps rarely missed animals. Only two groups of two animals each were seen solely by the aircraft team and missed by the ice camp observers during the simultaneous sampling period. The four whales missed by the ice camp observers were behind unusally large ice floes in the lead immediately across from the ice camps. This condition was rare during the aerial survey period to May 20. The missed whales were only 4 percent of the total number of whales counted by the aircraft team during the 19 ice camp-aerial survey flights (Table 2). Four anomalous sessions, numbers 16-19 in Table 2, introduces the possibility that during some periods, particularly during periods of high whale density., the ice camp observers may have overcounted (estimated to be 10-20 percent). These values, representing possible over or undercounting, have not been systematically evaluated yet. These problems are addressed in the ice camp census study.

Ice Camp Census Study

The objectives of the ice camp bowhead whale census were to:

(1) determine a population index for 1978;

(2) develop a method whereby a level of uncertainty can be ascribed to the index;

(3) reduce index bias;

(4) provide a basis for comparing the 1978 index with indices developed in 1976 and 1977;

(5) determine the effective sample space adjacent to the ice camp which is being surveyed by observers; and

(6) collect behavioral data which may be useful toward defining the statistical parameters used in aerial and shipboard survey.

Summary of Field Events. Bowhead whales were counted as they migrated northeasterly through the nearshore lead system near Barrow, Alaska. The field survey started April 15 and is expected to end during the first week

TABLE 2. Comparison of aerial and combined ice camp counts of bowheads in the nearshore lead north of Pt. Barrow, Alaska, May 1978.

#	Date	Approx. Start Time	Approx. End Time	Total Time	Total Counts		
					Ice Camp[1/]	Aerial Survey	Difference
1	May 3 78	1622	1644	22 min.	4	6	-2
2	May 4 78	1007	1225	2 hr. 18 min.	0	0	0
3	May 5 78	1919	2100	1 hr. 41 min.	6	8	-2
4	May 6 78	1001	1114	1 hr. 13 min.	6.5	5	+1.5
5	May 6 78	1129	1145	16 min.	2	1	+1
6	May 6 78	1416	1546	1 hr. 30 min.	9.5	4	+5.5
7	May 6 78	1549	1613	24 min.	2	3	-1
8	May 8 78	1010	1104	54 min.	1.5	2	-0.5
9	May 8 78	1202	1228	26 min.	1.5	2	-0.5
10	May 8 78	1443	1543	1 hr. 0 min.	5.5	4	+1.5
11	May 8 78	1657	1752	55 min.	1.5	6	-4.5
12	May 8 78	1958	2047	49 min.	4	5	-1
13	May 9 78	0935	1214	2 hr. 39 min.	4	3	+1
14	May 9 78	1424	1550	1 hr. 26 min.	6	2	+4
15	May 9 78	1556	1730	1 hr. 34 min.	0	2	-2
16	May 10 78	0945	1047	1 hr. 2 min.	2	11[2/]	-9
17	May 10 78	1152	1240	48 min.	2	9	-7
18	May 10 78	1445	1634	1 hr. 49 min.	18.5	10[3/]	+8.5
19	May 10 78	1720	1809	49 min.	7	10[4/]	-7
				23 hr. 35 min.	83.5	93	$\bar{D}$=-0.5

1/ Corrected ice camp total based on mean count recorded by South Camp plus mean number of missed whales by South Camp as recorded by North Camp.

2/ Four whales seen by aircraft on offshore side of ice floe near pack ice edge; missed by both ice camps.

3/ Aircraft plotted two whales moving through area which were recorded as "new" whales from 4 to 6 times each; a third whale logged as new by North Camp was judged by aircraft to be a duplicate.

4/ Two whales moving together logged inaccurately as new whales on second surfacing.

of June. Because of the constant daylight during spring and summer in the arctic, a 24-hour observation schedule was maintained. Two camps with 8 persons each were deployed on the shorefast ice next to the nearshore lead approximately 4.8 km north of Pt. Barrow. Two observers at each camp watched together (for a total of four observers) for shifts of three hours in length.

The two camps, called South Camp and North Camp, were located 833 m apart. Whales moved along the nearshore lead from South Camp toward North Camp. South Camp maintained the primary count of whales, while the mission of North Camp was to estimate the number of whales missed by South Camp observers.

To measure the uncertainty of an observer's judgments at South Camp regarding single and multiple sightings of the same whale, each observed whale was categorized as (1) a newly sighted whale when an observer was sure the whale had not been seen before; (2) a duplicate whale when an observer was sure that the whale had been seen before; and (3) a conditional duplicate whale when an observer was unsure whether the whale had been seen before.

To determine the number of whales missed by South Camp, South Camp radio broadcasted all sighting information on a real time basis to the North Camp observers. By monitoring radio messages from South Camp, North Camp observers were alerted to whales by the counting station. Communication was one way because North Camp observers did not radio back information which could alert South Camp to whales that South Camp had not seen yet. For each sighting made by North Camp observers, a decision was made whether or not the observed whale definitely was seen by South Camp or definitely was not seen by South Camp. If the North Camp observers were not sure the whale was observed by South Camp, a question mark was recorded.

The Alaska Eskimo Whaling Commission (AEWC) sponsored a whale counting camp manned by residents of the Barrow community. Two NMFS biologists assisted camp members of the Barrow community with data collection procedures. Methodology employed at the AEWC camp was similar to that in 1976 and 1977 because most watches ($\simeq$ 65 percent) were single man watches extending from 4 to 8 hours. The AEWC Camp was positioned approximately 5 km southwest of South Camp.

Eskimo whalers also independently participated in the spring count by recording hours watched and numbers of whales seen in their AEWC/NMFS whaling captains' logbooks.

A summary of the actual counts for all camps and observers follows. Although the primary mission of North Camp was to estimate the number of whales missed, a total count was also obtained and recorded for comparative purposes.

Camp Name	Period of Watch	Total Hours Watched	New Sightings	Conditional Duplicates	Total Sightings
South Camp	April 15-May 30	867:47	1389	212	1601
North Camp	April 21-May 24	505:37	1157	327	1484
AEWC Camp	April 24-May 24	589:32	885	104	994
Eskimo Whalers	April 29-May 2	67:30	344	-	344

Population Index for 1978. Assuming the best estimate of whales passing one location during a period not watched is a count made during that period at a nearby location, the data from more than one camp were synthesized (Figure 3) to achieve a total observational effort of 967 hours and 24 minutes out of a total of 1104 hours (87.6 percent of total time available). The index based upon these combined data will be referred to as the "Combined South Camp Index."

The contribution of whale counts by the AEWC Camp to the Combined South Camp Index equals one as the number of whales tallied by that camp was one during times when South Camp was not watching. The contribution of Eskimo whalers to the Index equal 26, 213, and 129 whales based upon 24, 24, and 19 hours, 30 minutes of watch made on April 29 and 30 and May 1 when the South Camp observers were not watching. Evaluation of counts among different Eskimo whalers, combined with results of aerial surveys made on April 29 and May 1 confirm that a peak number of whales moved by Barrow during this period.

The 1978 index is a mean index and as presented in this document is the summation of the estimated number of whales which passed by South Camp per day. The mean index ($I_{\bar{x}}$) is calculated as the average of the low index (I_L) and the high index (I_H). The low index is calculated as the summation of the products of the rate of whales per hour of watch during each day multiplied by 24 hours, with rates based only on new sightings (conditional duplicates are treated as duplicates thus contributing zero (= 0) whales to the low index). The high index is calculated as the summation of the products of rates per hour times 24 hours with rates based on new sightings plus conditional duplicates (conditional duplicates are treated as new whales thus making a full contribution to the index). The mean Combined South Camp Index as presented below is considered the best estimate using available data because it is likely that some conditional duplicates will be new whales and some will be duplicates:

$$I_{\bar{x}} = \frac{I_L + I_H}{2} = \frac{1797 + 2017}{2} = 1907$$

and the measure of uncertainty (μ_I) is equal to:

$$\mu_I = \pm \frac{I_H - I_L}{2} = \frac{2017 - 1797}{2} = \pm 110$$

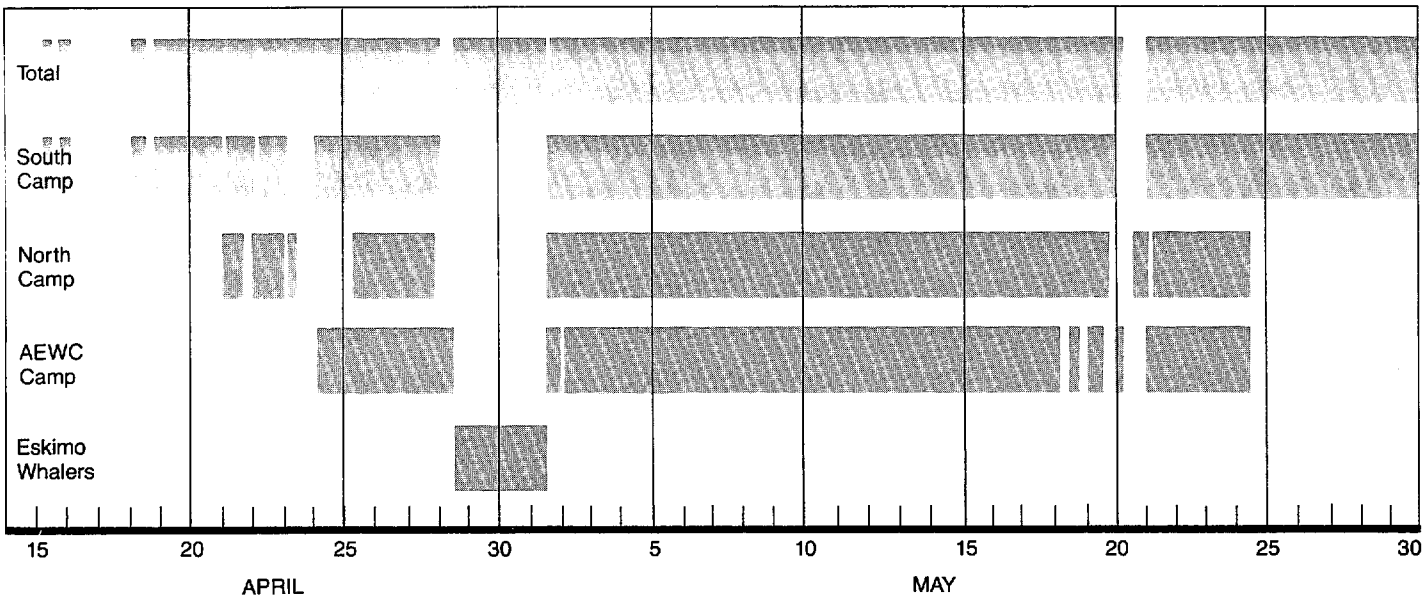


FIGURE 3. Watch effort summary for bowhead whale counts near Barrow, Alaska, April 15 through May 30, 1978. Horizontal lines indicate periods of watch. The best estimate of the number of whales passing South Camp, during intervals when South Camp was not counting, is a count made during the interval by observers at a nearby camp. For example, Eskimo whalers watched April 29 through May 1 when no other camps watched, and their counts have been included in the synthisized total. The 1978 Combined South Camp Index is based on this combined effort with 91.4 percent effort attributable to South Camp; and 0.1 percent to North Camp; 2.4 percent to the AEWC Camp: and 6.1 percent to the Eskimo whalers.

Therefore, the 1978 mean Combined South Camp Index is equal to 1907 $\pm$ 110.

Addressing conditional duplicate whales, and the potential for over-counting, an evaluation was made of the percentage of conditional whales within each total of the AEWC, South and North Camps. AEWC tallied 11 percent conditionals, South Camp 13.2 percent conditional, and North Camp 22 percent conditionals. Since North Camp observers were faced with the more rigorous problem of evaluating not only their own single versus multiple sightings but also whales missed or not missed by South Camp observers, the higher percent of conditionals at North Camp probably reflected a closer measure of observer ability to discriminate new from duplicate whales.

To adjust the mean Combined South Camp Index to include 22 percent conditional duplicates (which results in a more conservative estimate), one proceeds as follows:

$$\text{conditionals} = I_H \times 0.22 = 2017 \times 0.22 = 444$$

and:

$$I_L = I_H - \text{conditionals} = 2017 - 444 = 1573$$

thus, a corrected mean index equals:

$$\bar{I}_x = \frac{I_L + I_H}{2} = \frac{2017 + 1573}{2} = 1795$$

where:

$$\mu = \frac{I_H - I_L}{2} = \frac{2017 - 1573}{2} = \pm 222$$

resulting in:

$$\bar{I}_x = 1795 \pm 222$$

The adjustment equates to a downward correction of 12.5 percent to the most conservative index (I_L); a 5.9 percent downward adjustment to the mean index ($\bar{I}_x$); and a 0 percent downward adjustment to the least conservative index (I_H).

This new estimate of 1795 $\pm$ 222 does not take into account the number of whales missed. Estimates using North Camp data for the percentage of whales which passed undetected by South Camp were based on 110 two-hour sample blocks. One method of determining the highest percentage of total whales missed by South Camp (29.6 percent) is to accept that North Camp observers were correct in every instance when they were sure a whale had been missed by the South Camp. The lowest calculable estimate (11.8 percent) of the percentage of whales missed is to allow whales missed to equal the number missed by South Camp as recorded by North Camp minus the number of new whales seen by South Camp. The calculated number missed is treated as zero for

every block that the number missed becomes a negative value. From these calculations the mean estimate becomes 20.7 percent missed whales.

There was a significant but low correlation between the number of whales by South Camp and the number of whales recorded as missed by North Camp ($P < 0.001$, $r_{sample} = 0.329$, $r_{critical} = 0.187$) based on a two-tailed test with 108 d.f. Based upon the described procedure, and the resultant low correlation, a correction should be applied once to the calculated index, rather than to individual time periods of watch by counting stations used for the Combined South Camp Index. The summarized adjustments, therefore, are as follows:

	Correction Factor	Combined Count	Index
Lowest index (I_L)	11.8 percent	1573 ÷ (1-.118)	1783
Mean index ($I_{\bar{x}}$)	20.7 percent	1795 ÷ (1-.207)	2264
High index (I_H)	29.6 percent	2017 ÷ (1-.296)	2865

Applying percent adjustments for number of whales missed results in a best estimate of 2,264 whales with a total measure of uncertainty of 1,082 ($I_H - I_L$) of which 481, or 44 percent of the uncertainty, lies between the mean and the lowest estimate, whereas 601 or 56 percent lies between the mean and the highest estimate.

Based upon this preliminary analysis, the best estimate of the number of bowheads which passed by Barrow from April 15 through May 30 is 2,264 with the previous stated range of uncertainty.

Comparison of Indices, 1976 to 1978. The 1978 index (Figure 4) was higher than indices achieved in 1976 (762 revised from 796 originally quoted in Braham and Krogman (1977), and 715 in 1977). The increase in counts can be attributed to several factors. First, increase in survey effort is responsible for much of the change. Figure 5 partially illustrates the increase in effort by comparing the number of hours watched per day during the same time frame among years.

These graphs clearly illustrate the variation in watch effort among years. For all years, the strategy was to maintain an unbroken 24-hour watch schedule. The 1976 and 1977 watch-effort histograms illustrate how often this strategy was diluted by fog, closed leads, and unstable ice conditions.

During 1976, observers were not able to begin counting until April 25 and then the lead essentially remained closed until April 30. The lead was closed again, or nearly so, one or more days preceding May 1, 6, 13, and 22. Similar events occurred in 1977 when the lead remained closed April 24-29 and again from May 2-4. During 1978, the lead partially closed once from April 28 through May 1 in the vicinity of South Camp, but Eskimo whalers were able to make counts where the lead was open further south. It should be noted that in late May the lead was closed for a few days, but not until after most whales had moved through.

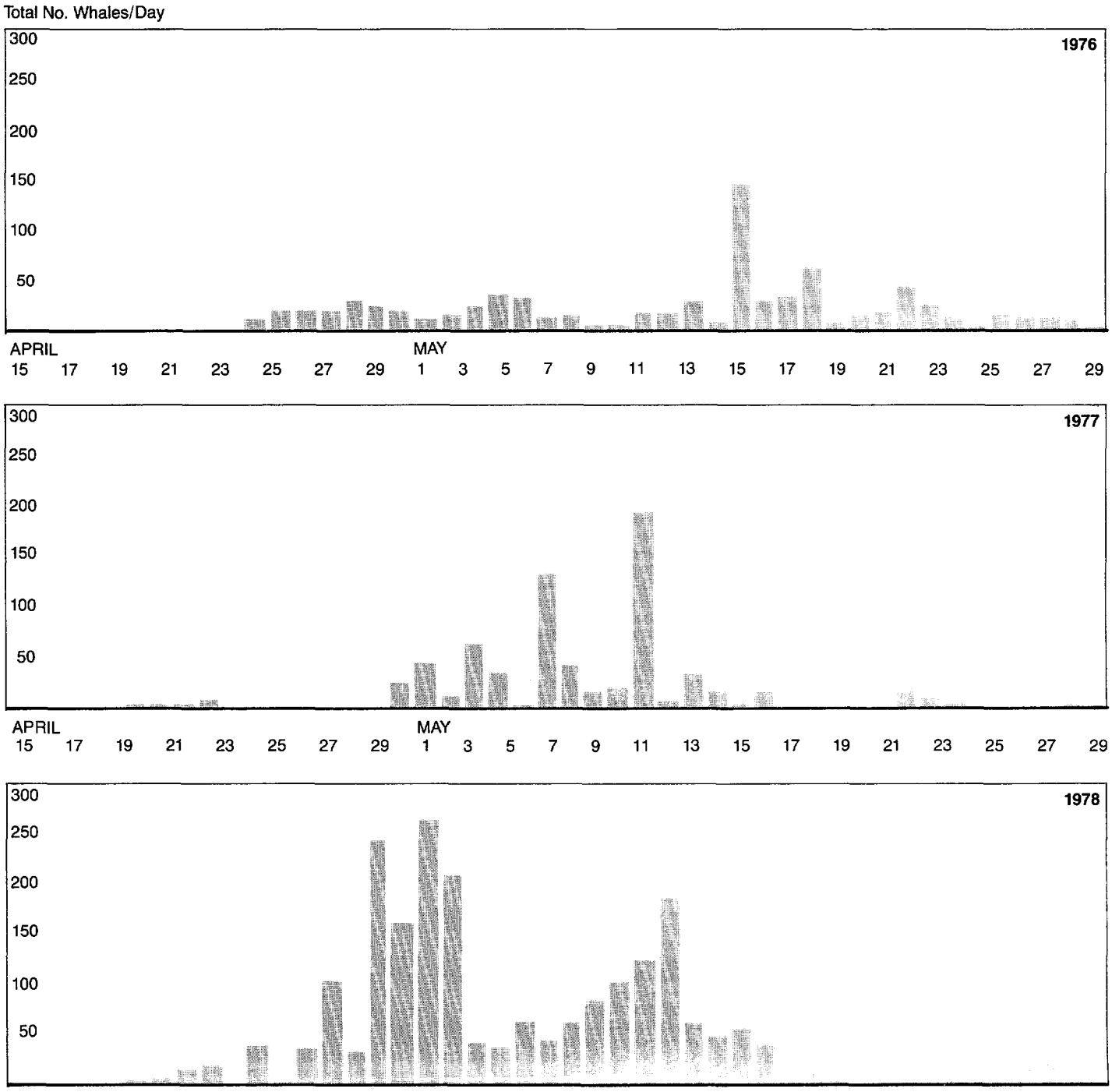


FIGURE 4.-- Comparison among years (1976-1978) of estimated total number of bowhead whales migrating northwardly past Barrow, Alaska, from April 15 through May 30. For comparison, totals are based on hourly rates per day times (x) 24 hours.

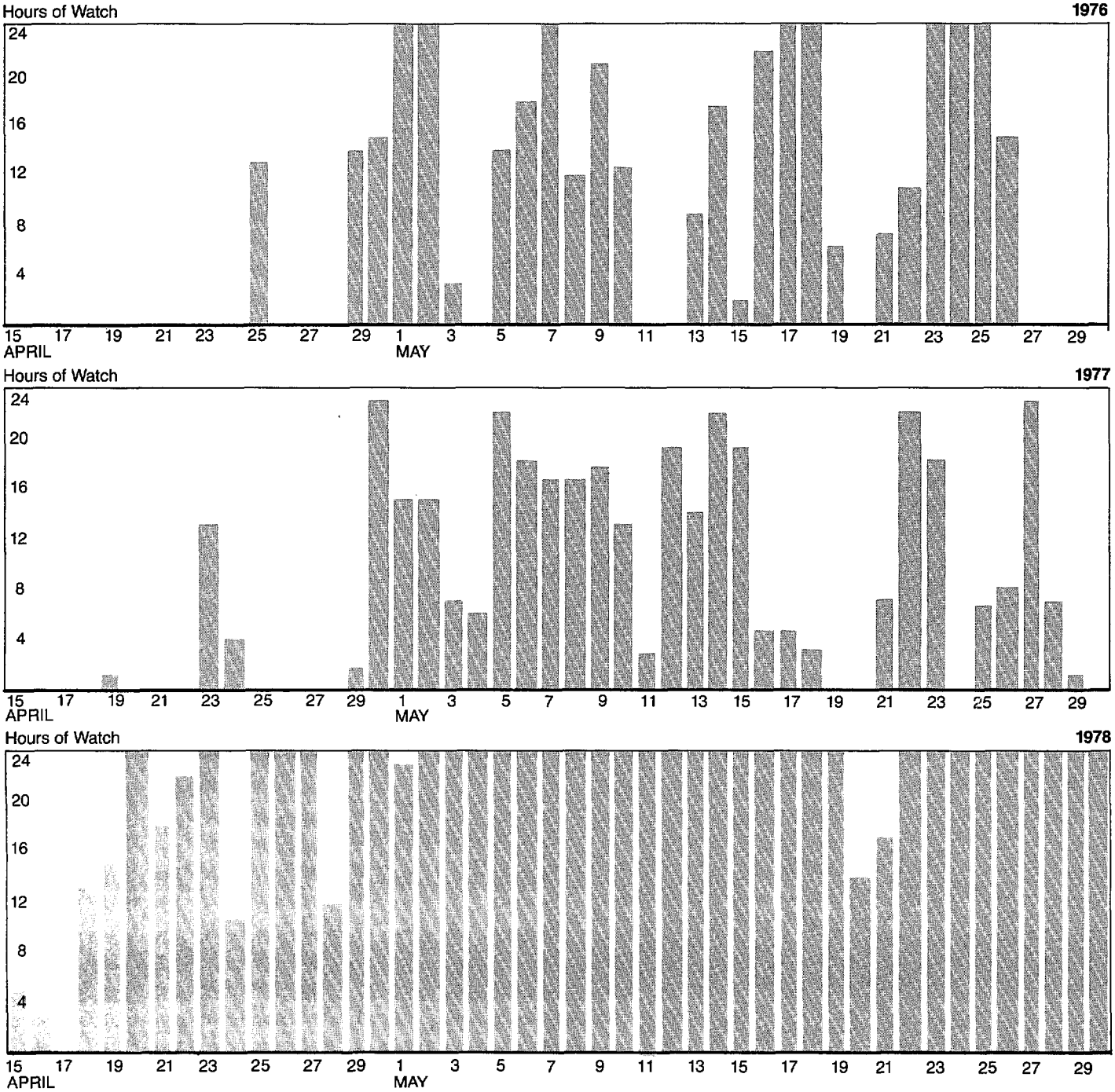


Figure 5. Comparison among years (1976-1978) of observer effort (total hours of watch/hour) from April 15 through May 30. The schedule for 1976 and 1977 called for rotating single observers every four hours, the 1978 schedule called for two teams of two observers each (four total) to rotate every three hours. Percent of total survey hours watched were: 1976 = 37.0 percent; 1977 = 35.8 percent; 1978 = 86.7 percent.

In addition to the outstanding environmental conditions, another factor contributing to the increase in the index was a change in location of the ice camps. During 1976 and 1977, the primary location for counting was 10 - 20 km to the southwest of Pt. Barrow where our observers stationed themselves near Eskimo whalers. In that vicinity, the lead is generally 11-32 km in width, whereas immediately north of Pt. Barrow, where the 1978 camps were located, the lead width is generally 1-11 km wide. This year the lead was open wider than 500 meters approximately 94 percent of the time.

Another important factor contributing to a higher count this year was the increase in observer effort. The 1978 observer schedule called for 2 people on watch rotated every 3 hours; in years past with much reduced funding levels, the observer schedule called for 1 person on watch rotated every 4 hours.

Observers at South Camp conducted all watches from an unusually high perch (high ice ridges). Height of eye at the South Camp was approximately 11.8 meters above sea level yielding a view to the horizon of 10 km. More typical of years past, observers were located on young ice with eye height varying between 2 and 4 meters yielding a view to the horizon of 4 to 6 km.

Factors which may have contributed to the increase in 1978 are: (1) better survey location and conditions; (2) increase in observer effort; and (3) adjustment for negative bias due to missed whales.

From April 25 through May 30, 18 bowhead whales were identified as calves by the South Camp. These sightings were distributed throughout the survey period somewhat uniformly.

Date Observed	No. Calves Seen
April 25	1
27	1
May 2	7
8	1
9	3
10	1
11	1
12	1
23	1
24	1

The 18 young-of-the-year bowhead calves represents approximately 1.3 percent of the total number of bowheads seen by the South Camp observers to May 30. Extrapolated to the mean Combined South Camp Index of 2,264, so far at least 29 bowhead whales may have been added to the population. This value does not consider calf mortality and also should be viewed with extreme caution because of the bias associated with the difficulty of seeing calves swimming by beyond more than a few hundred yards. Moreover, since cows with calves apparently migrate quite late in the season (Marquette, 1977), the count is incomplete, and we plan to utilize a vessel during June and July to obtain better estimates.

Land Based Census Study

The research objectives of the Cape Lisburne land based whale study were to:

(1) delineate the onset and termination of the bowhead whale spring migration along the nearshore lead system and

(2) attempt to census the population migrating by Cape Lisburne.

Four researchers arrived at Cape Lisburne on April 1. During the first week, a camp was established by digging snow caves near the western-most bluffs of the Cape. The snow caves provided adequate shelter until early May, when an early thaw made it imperative to use tents. Systematic watch efforts began April 2 but were intermittent until the camp was completely established on April 10. Observations were made from four sites at different altitudes, depending upon the height of the cloud ceiling. Behavior of whales was especially easy to observe from the 280 m high bluffs which overlook nearly continuously open waters (Figures 1 - 2). A watch will be in effect until the middle of June.

Between April 2 and May 24, 541 hours of systematic watch were conducted; 339 were in good to excellent visibility (Figure 6). Poor weather was generally the limiting factor. Temperatures were recorded as low as -26°C and winds frequently rose above 60 kts in exposed areas. Low clouds and high winds prevented work 32 percent of the time and fog occluded parts of the open leads 54 percent of the time. Initially, six hours were not watched each night due to darkness, but by May 10, a 24-hour watch was attempted.

For 16 days after the initial watch effort began, no bowhead whales were observed. A tentative bowhead sighting was made on April 14, but might have been an error due to observer inexperience. On April 18, a significant number of bowhead whales were observed; therefore, we feel that date was the beginning of the migration past Cape Lisburne. This "wave" of animals lasted for five days (Figure 7). Because of a corresponding pulse of whales, the season's first, occurred at the Pt. Barrow ice camps three days later on April 21 (Figure 4), it was apparent that our census camps were in position well in advance of the spring bowhead whale migration along the northwest coast of Alaska.

A total of 242 bowhead whales (not including 37 tentative or potential duplicate sightings) were seen (Table 3). Using only counts from good to excellent visibility conditions and calculating the number of whales passing during unobserved periods, an estimated 608 bowheads passed within our viewing range at Cape Lisburne to May 29. The daily totals of bowhead counts through the season are graphed in Figure 7. Due to problems with visibility during periods when counts should have been high and based on records from the Barrow ice camp, this estimate is undoubtedly low. Counts have yet to be corrected for changes in sighting ability with visibility, and for factors of partial obstruction of the lead relative to the whale corridor, for site differences, and differences between observers.

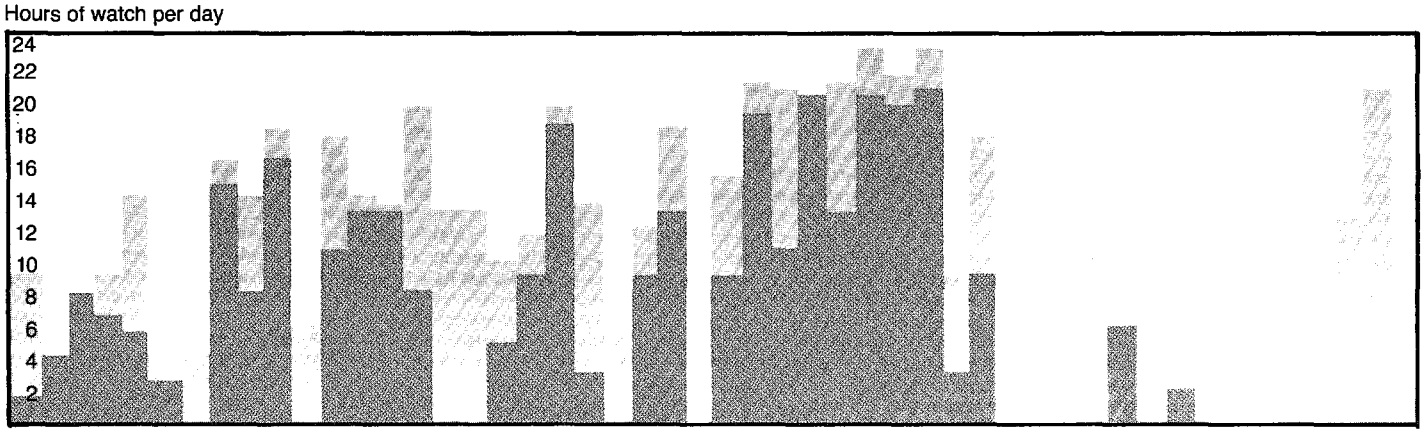


FIGURE 6. Bowhead whale watch effort at Cape Lisburne, 1978. Upper box indicates number of hours spent on watch per day; shaded area shows number of hours spent in good to excellent visibility.

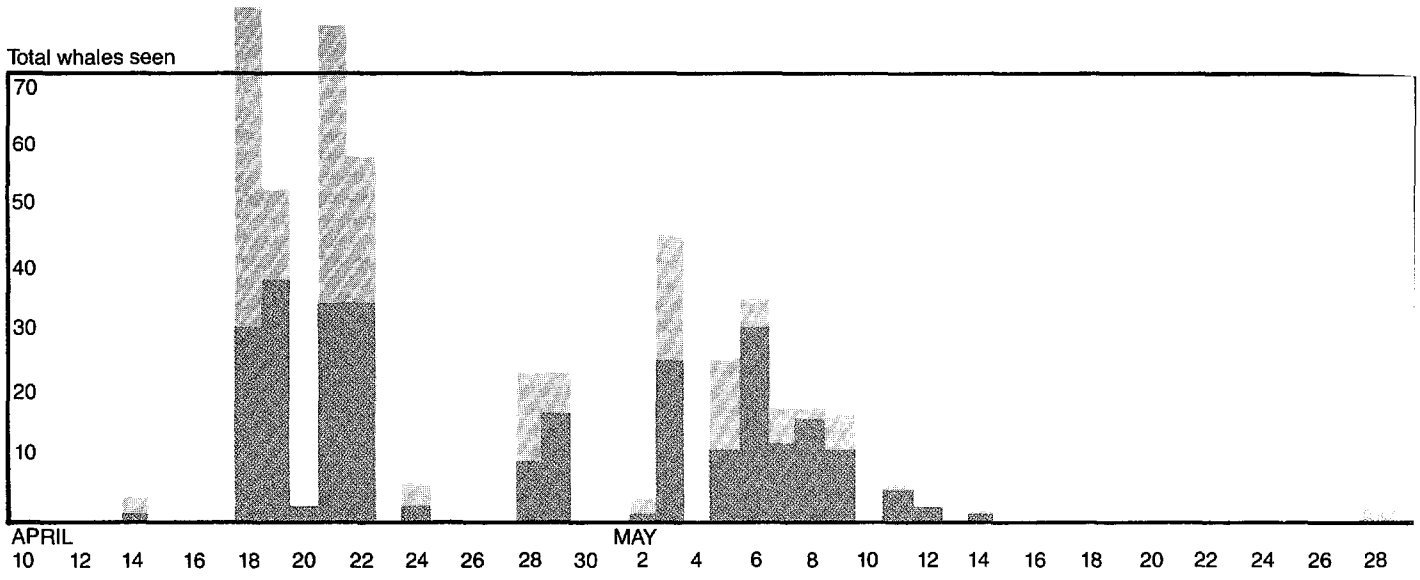


FIGURE 7. Bowhead whale sightings from Cape Lisburne, 1978. Shaded area indicates actual counts; upper box is the estimated number of whales passing that day based on only good to excellent visibility using actual, conditional duplicate and tentative sightings.

Bowhead whales generally passed Cape Lisburne on a northeasterly course. Under some lead conditions, whales passed near the fast ice but most were seen close to the pack ice. The further west the far shore of the lead occurred, the further west whales were seen. A total of 170 bearings were made on whales sighted (using a TIA theodolite). The average sighting was 4.5 km from the observers; the maximum distance was 14.8 km, which approaches the outer limit of reliable visibility under excellent conditions. A frequency distribution of bearings suggests two major migration corridors, one of 2-3 km (1-2 km beyond the fast ice) and a second at 7-10 km from the observers.

Sightings made at 14 km occurred on one day. It is unknown how often whales passed at this distance on other days, nor is it known how many whales travelled past Cape Lisburne more than 15 km to the west. Poor weather conditions prevailed during times when we had planned to survey beyond 15 km with an airplane.

Rates of movements based on 46 pairs of sightings were calculated using a theodolite and a hand programmed calculator, a total of 14.3 hours of observation covering 60.2 km of whale routes. The maximum time spent observing any one whale was 1 hour, 58 minutes.

Bowhead whales passing Cape Lisburne were clocked at 2.6 knots. The speed of whales moving between Cape Lisburne and Barrow was estimated to be 1.0-3.2 knots, depending on whether the April 18 peak at Cape Lisburne is compared to the April 21 or the April 28 peaks at Barrow. Because the lead was persistently open, it is felt that the April 18 and April 21 data are most comparable, and that bowheads swim at a rate of 2.6-3.2 knots. Data collected during aerial surveys show that bowheads were swimming at about 3.0 knots.

Surface and divetimes were measured on 15 bowheads and totalled 105 minutes for 180 surfacings during 5 hour, 30 minutes of observations. The mean at-surface-time for 101 recorded blows was 8.0 seconds. During 36 breaches the mean was 5.0 seconds. Mean dive time made within a blow sequence was 18.4 seconds (n=144); the median was 11 seconds. Dives between blow sequences ranged from 1 minute, 39 seconds, to over 28 mintues with no apparent regularity.

Sixty-five, or 23 percent of all bowheads sighted, were seen breaching. As many as 39 breaches were counted in one unbroken series. On 26 occasions, fluke-slapping was noted with a maximum of 33 high slaps occurring in a single series. Synchronous breaching and fluke-slapping with as many as four whales participating was observed on several occasions suggesting that these behaviors have a communicatory function. Milling and loitering, believed to be occasions for courtship and copulation, were recorded five times. Whales were seen resting at the surface five times.

Most whales were seen along common corridors with the corridors varying according to ice conditions. There seemed to be a strong tendency for the whales to follow each other, even to the point of selecting common breathing sites both among scattered holes and along the far shore of the open lead.

TABLE 3. Summary of bowhead sightings at Cape Lisburne, 1978.

Date	Time Observing	Good-Exc. Visibility Time	Bowhead Counts	Bowhead Rate[1/]	Est. Total[1/]
April 2	:10	0	0	?	0
3	0	0	-	-	-
4	0	0	-	-	-
5	1:30	1:30	0	0.0	0
6	0	0	-	-	-
7	3:00	0	0	-	-
8	0	0	-	-	-
9	0	0	-	-	-
10	9:30	2:00	0	0.0	0
11	4:30	4:30	0	0.0	0
12	8:30	8:30	0	0.0	0
13	9:25	7:04	0	0.0	0
14	14:41	6:45	1?	0.15	3.6
15	4:27	2:58	0	0.0	0
16	14:38	0	0	0.0	0
17	16:20	14:50	0	0.0	0
18	14:45	8:20	28-29	3.48	83.5
19	18:25	16:45	31-37	2.21	53.0
20	6:44	0	2	?	64.4
21	17:50	10:45	33-34	3.16	75.8
22	14.32	13.16	32-34	2.41	57.8
23	14:00	13:00	0	0.0	0
24	20:00	8:15	2	0.24	5.8
25	13:15	0	0	?	2.9
26	13:40	0	0	?	2.9
27	10:35	5:30	0	0.0	0
28	12:00	9:35	9	0.94	22.6
29	20:20	18:15	13-17	0.93	22.3
30	14:05	3:25	0	0.0	0
May 1	6:05	0	0	?	1.2
2	12:30	9:42	1	0.10	2.4
3	18:35	13:00	19-25	1.92	46.1
4	0	0	-	-	36.2
5	13:45	10:00	8-11	1.10	26.4
6	21:45	20:00	27-29	1.45	34.8
7	21:02	11:30	9-12	0.78	18.7
8	20:30	20:30	13-16	0.78	18.7
9	21:15	13:25	7-12	0.76	18.0
10	23:20	20:30	0	0	0.0
11	22.10	20.10	5	0.25	6.0
12	23:30	21:00	2	0.10	2.4
13	9:25	3:45	0	0.0	0
14	18:00	9:30	1	0.11	2.6

1/ Rate of sightings is based on counts of whales seen during good to excellent visibility conditions divided by the respective hours. All conditional duplications and tentative sightings are included. Estimates include interpolations for days without good visibility.

TABLE 3. (Continued)

Date		Time Observing	Good-Exc. Visibility Time	Bowhead Counts	Bowhead Rate[1/]	Est. Total[1/]
May	15	2:00	0	0	?	-
	16	0	-	-	-	-
	17	0	0	-	-	-
	18	10:45	0	0	?	-
	19	8:50	6:15	0	0.0	0
	20	8:20	0	0	?	-
	21	8:20	2:30	0	0.0	0
	22	4:05	0	0	?	-
	23	0	0	-	-	-
	24	0	0	-	-	-
	25	3:00	-	0	-	-
	26	8:19	-	0	-	-
	27	13:00	-	0	-	-
	28	20:41	-	1	-	-
	29	2:00	-	0	-	-

1/Rate of sightings is based on counts of whales seen during good to excellent visibility conditions divided by the respective hours. All conditional duplications and tentative sightings are included. Estimates include interpolations for days without good visibility.

Harvest Data and Biological Samples

The objectives of the harvest monitoring and biological sampling project were to:

(1) collect biological samples for reproductive, age and growth, and food studies and

(2) determine the nature and extent of catch and effort expended by the Eskimos during the harvest of bowhead whales in the spring.

For the harvest monitoring activity, biologists were stationed at five whaling villages during the whaling season (Figure 1). In each village the NMFS observers made every effort to work closely with the local AEWC representative and individual whaling captains to provide a team approach to monitoring the harvest and collecting biological samples. In addition, the biologists spent considerable time obtaining information on bowhead whale natural history and whaling activity from local whaling captains, crew members, and knowledgeable elders in the villages.

The biologists visited each whaling camp as often as possible and gathered information on the number of bowheads sighted, killed and recovered, and struck but subsequently lost. When a whale was taken the biologists obtained morphological measurements, collected specimen material for sex and age determination, tissue samples for chemical and biochemical analyses (e.g. for chromosomal counts, and enzyme separation), and took photographs for later verification of individual whales. These activities were sanctioned by the AEWC.

During the 1978 spring season, two biologists each were stationed at Gambell and Savoonga (combined), April 10 to May 15; Pt. Hope, April 20 to May 29; Wainwright, April 22 to May 23; and Barrow, April 17 to May 30. Whaling activities at Kivalina were monitored by the Pt. Hope crew, and at Wales by the NMFS enforcement team on St. Lawrence Island.

Whaling Activities for 1978. Residents from the seven coastal villages of Gambell and Savoonga on St. Lawrence Island, and the mainland villages of Wales, Kivalina, Pt. Hope, Wainwright, and Barrow were actively engaged in the 1978 spring hunt (Figure 1). Ice conditions east of Barrow do not permit spring whaling by residents of Nuiqsut or Kaktovik, but Eskimos at these villages participate in the fall hunt (i.e. September and October) as do the Barrow whalers. The 1978 spring whaling activities are summarized in Table 4.

Gambell. Whaling began at Gambell on April 14 and ended April 21 after the quota of one bowhead was filled. A total of 21 crews were actively engaged in whaling. One whale was taken and four others were reported struck and lost. Additional research was conducted with several Eskimo captains after the whale was taken.

Savoonga. Eight crews at Savoonga began whaling at 0700 hours on April 16, and by 0845 hours had filled their quota of one whale landed. No other whales were reported struck or lost.

Wales. Three crews were actively engaged in whaling at the village of Wales, but no whale has been taken to date. Information is not available at this time on whales that may have been struck and lost.

Kivalina. Three crews were actively engaged in whaling but no whales had been taken or struck at Kivalina by May 16. As a result of unfavorable ice conditions, few whales were seen migrating within reach of the Kivalina hunters and their quota of one whale was transferred to the village of Point Hope on May 16.

Point Hope. A total of 15 crews were actively engaged in whaling at the village of Point Hope. The whaling season began April 17 and ended May 4 when the second whale was taken to complete their quota. On May 16, the village of Kivalina transferred their quota of one whale to Pt. Hope in anticipation of a better opportunity there for taking a whale during the remainder of the spring season. Pt. Hope Eskimos often share their whales with Kivalina villagers.

Wainwright. Although there were eight crews at Wainwright, only five were actively engaged in whaling at any one time during the season. The whaling season began April 27 and ended May 19 when the second whale had been taken, filling their quota. A female, pregnant with a 37 cm (14.5 inches) fetus, was taken on May 6.

Barrow. The whaling season began on April 17 and ended on May 5 at Barrow. A total of 27 whaling captains had registered for whaling this spring. In the past, Barrow has had as many as 36 crews out in a single spring season. Although the village of Barrow had been allotted three whales, or four whales struck, a total of four whales were landed; two were designated as "Ingutuks" by the whalers.

As of May 30, a total of 10 bowhead whales were harvested by 82 whaling crews in five villages. This means that an autumn hunt for the remaining two whales will be conducted by the villages of Nuiqsut and Kaktovik, unless Pt. Hope whalers take the whale reallocated to them by Kivalina.

Whales Struck and Lost. Although it was not possible for NMFS enforcement agents to monitor activities of the whaling crews while hunting was in progress (radio communication between crews was invariably in the Eskimo language), the Eskimo Reporting Officers or local AEWC Representatives were helpful in reconstructing events once the hunters returned. As in past seasons, data on struck and lost whales were obtained primarily from statements made by the whalers. In some cases, these were corroborated by entries in AEWC/NMFS Whaling Captain's Logbooks.

Five whales were reported as struck and lost during the spring hunt (Table 4). This number is low compared with those struck and lost during the spring hunts of previous years (Marquette, 1977):

Year	No. Lost	No. Crews
1973	10	45
1974	27	46
1975	26	75
1976	35	63
1977	82	90
1978	5	82

Although better information concerning the exact nature of strikes in unretrieved whales would be desirable, we have confidence in the tally of strikes as recorded. The probable reasons for the low struck and lost record this year follows:

(1) the average whaling period for 1978 was about 15 days as opposed to 35 to 40 days during 1974 to 1977;

(2) increased concern by whalers and close adherence to the AEWC regulations; and

(3) weapon improvements.

The exact fate of unretrieved whales is still unknown. A whale that has been struck and lost does not necessarily imply that it has been fatally injured. Of particular importance may be that some bombs fired into whales fail to explode. Table 5 indicates that out of 26 bombs used to successfully land five whales, ten, or 38 percent failed. Survival is probably greater for a struck and lost whale if a bomb failes to explode within it. However, it must be noted that evidence of previous strikes, (e.g. old imbedded bombs or harpoons), has not been found since NMFS began monitoring the harvest.

Table 6 summarizes the circumstances under which three whales were struck and lost. This information was obtained from the AEWC/NMFS Whaling Captain's Logbooks. Unfortunately, similar data were not available for the fourth whale lost at Gambell, nor for the one lost at Barrow. After evaluating the comments in the Table, it is possible that at least the third whale could have survived after being struck. Its ultimate fate, however, is unknown.

Table 7 provides some limited evidence that struck and lost whales are still alive shortly after an encounter. Unfortunately, the village and date these whales were struck is unknown, making it impossible to estimate how long they survived or if they continued to survive after being sighted.

The above data are limited and conjectural. The nature of the wounds typically inflicted by harpoons and bombs is a persuasive reason to consider all struck whales as mortalities until more information is available to allow modificaton of this view.

Biological Samples. All biological samples collected from whales taken this year are summarized in Table 8. Biological samples from 11 whales have been sent to six cooperating scientists for establishing normal histology,

pathology, chromosome and genetics studies, comparative cetacean blood protein chemistry, and enzyme studies on stock discreteness (Table 9).

A chromosome count on one whale (#78B4), designated as an Ingutuk, was 2n=42. Bowhead whales characteristically have a 2n=42 count (Gordon Jarrell, University of Alaska, pers. comm.). Other baleen whales studied, excluding right whales which have not been tested, have a chromosome count of 2n=44.

Additional tissue analyses will be conducted to assess stock discreteness and whether genetic non-intermixing is occurring. Baleen, eyes, and ear plugs will be analyzed for use in aging individual whales.

Bioacoustics and Sonar Feasibility Study

Bioacoustics. The objectives of the bioacoustics feasibility study were to:

(1) determine logistic factors which would affect equipment operations in a cold environment, the usefulness and reliability of a portable system with accompanying paraphernalia, and what are the best methods of collecting data and

(2) make recordings of bowhead whales if the whales are vocalizing.

Between May 9 and 26, twenty-seven 5-inch reel tape recordings, totalling 13 1/2 hours, were made from the North Camp using a KSP hydrophone and Uher 4400 tape recorder. It is estimated that twenty-three of these tapes contain bowhead vocalizations. Many of these sounds occurred when bowheads clearly were seen passing the ice camp. None of these sounds was heard when whales were not passing. Not all whales that passed during the recording sessions vocalized.

We are not aware of any other verified bowhead whale recordings before this season, in spite of considerable effort by other researchers. Two existing tapes of "whale sounds", recorded at a time and place when bowheads could have been present, do not sound like those on our tapes. Our recordings are similar to sounds made by Atlantic right whales. The recordings have just arrived from the field and require analysis before any conclusions can be made. The preliminary results of the passive (acoustic) recordings were encourgaging. However, many logistic problems must be solved, possibly by upgrading equipment and procedures, before this technique can be used in the census effort and biological studies program.

Sonar. Active device. A Wesmar 60 kHz sonar system was cooperatively shared by Alaska Fish and Game, the Naval Arctic Research Laboratory, and the National Marine Fisheries Service. Many logistic problems developed, including difficulties in timing and support between all parties. Not enough time was spent with the system to prove its capability, although one unverified whale was claimed to have been "observed" with the sonar.

TABLE 4.

Bowhead Whaling Activities by Alaskan Eskimos, Spring 1978

Village	Number of crews	Whaling season began	Whaling season ended	NMFS/AEWC Quota landed	NMFS/AEWC Quota struck	Whales landed: Sex and Length Female (cm)	Whales landed: Sex and Length Male (cm)	Whales landed: Date	Whales landed	Struck and lost
Gambell	21	14 Apr.	21 Apr.	1	2	—	1383	21 Apr.	1	4
Savoonga	8	16 Apr.	16 Apr.	1	2	—	1090	16 Apr.	1	0
Wales[1]	3			1	2	0	0	—	0	0
Kivalina[2]	3	26 Apr.	16 May	1	2	0	0	—	0	0
Point Hope	15	17 Apr.	[3]	2	2	930	—	2 May	2	0
							970	4 May		
Wainwright	5	27 Apr.	19 May	2	2	1630[4]	—	6 May	2	0
						—	1516	19 May		
Barrow	27[6]	17 Apr.	3 May	3	4	851	—	1 May	4	1
						—	840	2 May		
						—	838[5]	2 May		
						—	975[5]	3 May		
Totals	82			11	16	3	7		10	5

[1]unused quota reverts to Nuiqsut
[2]whaling quota transferred to Point Hope
[3]whaling still active as of 30 May
[4]an embryo 37 cm in length found in whale
[5]designated as an ingutuk by the Eskimos
[6]registered with AEWC number of crews which participated in the hunt unverified

TABLE 5. Bomb failures recorded for five whales landed during the spring 1978 bowhead whale hunt; data are not available for the remaining five whales landed.

Whale Identification	Number of Bombs Used	Number Which Failed
78B1	2	1
78B3	4	2
78WW1	6	0
78WW2	5	3 1/
78G1	9	4
	26	10

1/Two were known to explode, but fate of other three not clearly stated; they were presumed to have failed.

TABLE 6. Circumstances under which three bowhead whales were struck and lost at Gambell during the spring 1978 hunt.

DATE	TIME	COMMENTS
April 19	1245	One bomb used and exploded; harpoon pulled out and whale swam under ice.
April 21	1420	All bombs failed but number used unknown; whale swam under ice.
April 21	2200	Shell and bomb in darting gun both failed; all gear lost as whale swam under ice.

TABLE 7. Sightings of struck and lost bowhead whales by NMFS research personnel during the spring 1978 hunt.

Date	Location	Observer	Comment
May 3	Off Pt. Barrow	AEWC ice camp observer	Whale towing float; hurt and swimming slowly
May 5	46 km So. of Wainwright	Aerial survey observer (1 sighting)	Whale trailing long line
May 12	42 km NE of Barrow	Aerial survey crew (2 sightings)	Whale trailing yellow line without float

TABLE 8. Biological features of bowhead whales taken during spring 1978 and specimen samples collected.

Date	Apr 16	Apr 21	May 1	May 2	May 2	May 2	May 3	May 4	May 6	May 19
Length, cm	1090	1383	851	840	838[2]	930	975[2]	970	1630	1516
Sex	M	M	F	M	M	F	M	M	F	M
Specimen No. and samples	78S1[1]	78G1	78B1	78B2	78B3	78H1	78B4	78H2	78WW1	78WW2
Baleen	4	6	4		3	1	6	1	4	5
Eyes	2	2	1	1	1	1	2	1	1	2
Ear: plugs		2					1		1	
glove finger		2	1				1		1	
ossicles		2	2				1		1	1
bullae		2								
Ovaries						2			2	
Ectoparasites	1								1	1
Hair									1	1
Stomach contents	1									
Blood			1		1		1			1
Urine				1						
Cartilage					1					
Mandible				1	1		1			1
Rib			1[3]		1[3]					
Vertebrae					1		1			1
Histological										
Tiss. - Skin			1[3]	1	1[3]	1	1	1	1	1
Blubber		1	1[3]		1[3]					
Liver	1		1	1	1	1	1	1		1
Lung	1		1	1		1	1	1		1
Kidney	1			1	1	1	1	1	1	1
Heart	1			1	1	1	1	1		
Testes	1			1			1			1
Stomach							1			
Spleen							1	1		
Vagina									1	
Penis	1									

TABLE 8. Biological features of bowhead whales taken during spring 1978 and specimen samples collected.--con't.

Date	Apr 16	Apr 21	May 1	May 2	May 2	May 2	May 3	May 4	May 6	May 19
Length, cm	1090	1383	851	840	838[2]	930	975[2]	970	1630	1516
Sex	M	M	F	M	M	F	M	M	F	M
Specimen No. and samples	78S1[1]	78G1	78B1	78B2	78B3	78H1	78B4	78H2	78WW1	78WW2
Histological Tiss.-										
Intestine, sm.						1		1		1
Intestine, lg.							1			1
Mammary									1	
Umbilicus									1	
Diaphragm					1	1				1
Bladder				1						
Muscle			1[3]		1[3]		1[3]			1
Tongue										1
E.M. Tiss.[4]										
Liver			1				1			1
Heart							1			
Lung							1			
Muscle										1
PCB Tiss.[5]										
Liver			1	1	1	1	1	1		1
Blubber	1		1	1	1	1	1	1	1	1
Kidney						1		1		
Mesenterie fot.					1					
Karotype Tiss.										
Skin							1			
Lung							1			

1/Specimen numbering code: 78(year); Letter (village), Number (order taken that year).
2/Whales designated as Ingutuk by the Eskimos.
3/Collected and donated to NMFS by Mayor E. Hopson.
4/Electron microscopy. 5/Polychlorinate biphenyl analyses.

TABLE 9. Biological samples from 11 bowhead whales taken in 1977 and 1978 and sent to six cooperating scientists.

Bowhead Whale Number	Samples sent[1]					
	Blood	Eyes	Liver, lung, skin, misc.	Intes-tines	Urine & urogen. system	Follicular Fluid
77B7			x			
77B9			x			
77B19			x			
78B1	x	x				
78B2			x		x	
78B3[2]	x		x			
78B4[2]	x	x	x			
78H1						
78H2						
78WW1						x
78WW2	x			x		

[1] One tissue sample of each specimen collected in 1978 sent to University of Pennsylvania School of Veterinary Medicine.

[2] Reported to be an Ingutuk by AEWC

Limitations of range and frequency of the output "signal" may prevent this system from being useful. More testing and greater support by all parties must be accomplished before an adequate assessment can be made.

Sonic tag. A whale tracking feasibility study was introduced this year to help reduce the struck and lost rate by attaching a sonic tag to a darting gun harpoon float line and then following the struck animal with an acoustic receiver.

At the beginning of the season, two Eskimo whaling crews at Barrow were equipped with two transmitter tags each and portable receivers and directional hydrophones to carry in their umiaks. Both crews were instructed in use of the equipment. The test was intended to determine whether such equipment would make it possible for a whaling crew to track a struck animal and capture a whale that might otherwise escape. Since the Barrow quota was three whales and approximately 30 crews were on the ice, there was not much hope that any of the tags would actually be attached to whales. In fact, two were, but in the urgency and excitement of going after the whales, neither crew remembered to switch on the transmitters. Fortunately both whales were captured. Although the results were not conclusive, both participating crews were enthusiastic over the potential usefulness of the equipment and expressed hope that the test would be repeated next year.

Summary and Conclusions

1. No bowhead whales migrated past our census camps before the camps became operational. The beginning of the migration past Cape Lisburne was April 18. The subsequent first arrival of bowheads at Barrow was on April 21, three days later. The distance and time needed to travel confirms our estimate of an individual whale's swimming speed of 3.0 knots.

2. Our best estimate of the number of bowhead whales in that segment of the population passing Barrow, Alaska, between April 15 and May 30 using data from the Barrow ice camp census study is 2,264. This estimate is corrected for total observation time (87.6 percent of the total time during the season), duplicate sightings, and validation of whales believed to have been missed. The absolute lower end of the estimate is 1,783 animals, and the upper end 2,865.

3. No bowhead whales were seen in the offshore leads in the Chukchi Sea between Pt. Barrow and Pt. Hope, even though an essentially equal effort of aerial surveys was conducted nearshore (54.6 percent) and offshore (45.4 percent). The migration of the western Arctic population of bowhead whales occurs in the nearshore leads along the northwest coast of Alaska to Pt. Barrow. It appears that the entire population migrating during the spring was available for counting by the ice camp census teams.

4. Correlated observations between the aerial survey and ice camp census teams indicated that both methods were sampling animals from the same population (i.e. sample universe). Preliminary results suggest that the two counting methods verified individual whale sightings. Therefore, if a bowhead were present, it was highly probable that it was counted by the ice camp census teams.

5. The 1978 population index is based on the combined effort of the NMFS whale counting camps, the AEWC camp, and Eskimo whalers. The percent effort to the index attributable to each group was South Camp, 91.4 percent; North Camp, 0.1 percent (adjustments reflected in the South percent effort); AEWC Camp, 2.4 percent; and Eskimo whalers, 6.1 percent.

6. The census index for 1978 was higher than for 1976 and 1977 because of the following, and perhaps other, reasons.

   a. The observation effort based on the number of days spent was more than twice as great in 1978 than in 1976 or 1977.

   b. The person/hours of watch in 1978, as opposed to 1976 and 1977, was four times as great, or five times as great if the AEWC Camp is considered.

   c. The lead was open the entire season.

   d. Weather (wind and fog) was much less of a problem than in past years.

   e. The lead was characteristically open 3-6 km (2-4 miles) most of the season, allowing for continued observation across the lead.

   f. The 1978 census camps were located farther north than the 1976-77 camps, and at a place where the lead is narrower, which increased the chances of viewing the entire lead.

   g. Shorter watch hours, greater rotation of observers, and an additional year's experience probably accounted for less bias associated with observer effectiveness.

   h. Less whaling activity in 1978 near Barrow, along the edge of the nearshore lead, may have resulted in fewer whales moving further away from the fast ice (unconfirmed)

   i. The observation point north of Pt. Barrow, on grounded sea ice, was a much more stable platform than ever before and reduced the need to be frequently moving away from the lead during real or imagined unsafe ice conditions.

i. The observation point north of Pt. Barrow, on grounded sea ice, was a much more stable platform than ever before and reduced the need to be frequently moving away from the lead during real or imagined unsafe ice conditions.

j. The viewing platform (perches on top of second year grounded ice) this year was higher than in 1976 or 1977, allowing us to look farther across the lead.

7. Our hypothesis proposed in 1976, that beyond Pt. Barrow bowhead whales migrate offshore through the Beaufort Sea to northwest of Banks Island, Canada, in the spring, was corroborated. That segment of the population which migrates in the nearshore lead along the northwest coast of Alaska does not appear to head west into the Chukchi Sea, but rather north and east into the Beaufort Sea.

8. The wintering "grounds" and early spring area of the bowhead population are still unknown. Presumably these occur in the southwest Bering Sea near the ice front in Soviet waters. It is thought that this area and time would be ideal for censusing. Research support should be directed into this area from February to May.

9. Bowhead whale "vocalizations" (i.e. sounds) were successfully recorded. This preliminary study has shown that some whales can be detected while moving by the ice camps, and that acoustics may be a possible tool in future counting plans. Sonar did not prove useful this year because of the limited capability and availability of the system used.

10. A total of 10 bowhead whales were landed as of May 30, 1978. Additionally, five whales were reported to have been struck, but lost. Without corroborating evidence, it was assumed that all five whales perished. The number of struck and lost was significantly lower this year than in past years, probably due to the short whaling period, increased hunter efficiency, and less mechanical failure of the weaponry.

11. The chromosome number of one bowhead whale taken this year (#78B4, an Ingutuk) was $2n = 42$. This fits the known chromosome count for bowhead whales, but is different than the $2n = 44$ for other baleen whales (i.e. other than the right whale which has not been studied).

12. Eighteen young-of-the-year calves were uniformly seen by the South Camp observers between April 25 and May 24. This count is 1.3 percent of the total count at South Camp; 1,389 from April 15 to May 30. Through simple extrapolation for the mean combined South Camp index so far at least 29 new bowheads may have been added to the population. Several factors suggest this is an underestimate.

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Appendix I
Spring and summer 1978 bowhead research project effort and personnel summarizations--continued.

Research Project	Inclusive Dates	Location of Research	Project leader	Project personnel
Land camp census	April 1-June 17	Cape Lisburne	D. Rugh	J. Cubbage K. Hazzard A. Taber
Sonar-bio-acoustics	April 20-May 28	Barrow	J. Johnson	M. Dahlheim
Vessel Survey	June 12-July 20	No. Bering-So. Chukchi Seas	S. Leatherwood	K. Balcomb H. Braham[1/] T. Bray M. Dahlheim Eskimo[1/ 4/] C. Goebel P. McGuire

[1/] limited participation
[2/] biological studies coordinator
[3/] field camp co-coordinator
[4/] Gambell, AK AEWC eskimo representative (by invitation)

Appendix I
Spring and summer 1978 bowhead reserach project effort and personnel summarization

Research Project	Inclusive Dates	Location of Research	Project leader	Project personnel
Aerial Survey	April 19-June 11	No. Bering Sea-Arctic Ocean	S. Leatherwood	R. Everitt[1/] C. Goebel B. Lawton R. Storro-Patterson R. Sonntag[1/] D. Withrow[1/]
Harvest & Biological studies	March28-June5	Barrow, Wainwright, Pt. Hope, Gambell, & Savoonga	W. Marquette	K. Balcomb K. Haflinger G. Jarrell E. Knutson R. McLain M. Nerini[2/] J. Patee R. Tramaine
Ice camp census	April 15-June 5	Barrow	B. Krogman	J. Bruggeman G. Carroll[3/] C. D'Vincent P. Field T. Fleischner R. Fritsen P. Hessing S. Home E. Iten C. Peterson J. Smithhisler R. Schuette

III. 1978 WEAPONS IMPROVEMENT - AN INTERIM REPORT

Actions Taken to Improve the Efficiency of Methods Utilized in the Harvest of Bowhead Whales

During the latter portion of the Nineteenth Century, commercial whalers operating in the Bering and Chukchi Seas introduced explosive killing devices to Eskimo whalers who hunted bowhead whales for subsistence purposes. The manufacture and use of these devices have essentially remained unchanged during the Twentieth Century. These devices consist of a hand-thrown darting gun which implants a harpoon with a float attached in the whale. The impact of a harpoon being placed triggers a charge that propels an explosive bomb into the whale, while a shoulder gun propels an explosive bomb, but does not implant a harpoon. Use of a darting gun requires the hunters to approach the whale at close range; however, a shoulder gun may be fired from any distance within the range of the gun. The explosion of the bomb inside the whale is intended to be the killing method; however, the whale often sounds and must be tracked in order to be recovered. The float which is attached by a darting gun greatly enhances the chances of recovering a whale.

Both the darting gun and shoulder gun are manufactured by the same company in Doylestown, Pennsylvania. The manufacturer is a small family enterprise that has passed from father to son during this century. Prior to 1978, there had been no direct contact between the whalers who utilize the devices and the manufacturer. After the manufacturer ships the devices to the North Slope of Alaska, the whalers hand-load the weapons according to instructions included with the devices and their own experience or preference. Occasionally, they make selective modifications to both weapons and bombs to suit their preferences and methods of whaling.

Information collected in 1977, through interviews with Eskimo whalers, indicated that as many as 82 strikes may have occurred which did not result in the landing of a whale. In response to the concern of the International Whaling Commission, the National Marine Fisheries Service (NMFS) arranged for meetings between the manufacturer and representatives of the Alaska Eskimo Whaling Commission.

In a meeting held October 14, 1977, in Washington, D.C., Eskimo whalers and the manufacturer compared notes and information which resulted in several suggested changes in the use and manufacture of the devices. As a result of that meeting, the U.S. Government contracted with the manufacturer to modify a darting gun and shoulder gun and incorporate the changes that had been discussed. When the modifications were completed, the manufacturer traveled to the North Slope of Alaska and visited several whaling villages to demonstrate the modifications and consult with the whalers regarding the hand loading of both the propellant charges and explosive charges which, in the past, had reportedly caused several "misfires" and resulted in whales being struck and lost. As a result of this cooperative effort, further modifications are being made by the manufacturer. Some modified weapons are expected to be available to the whalers in 1978.

The United States implemented a management program in cooperation with the Alaska Eskimo Whaling Commission to control the 1978 hunt in accordance with measures adopted and recommended by IWC. Based on extensive discussions between the U.S. Government and the Commission, each party assumed responsibility for implementing portions of the 1978 program.

Regulations were promulgated by the Alaska Eskimo Whaling Commission which required that whales must be struck with a harpoon or darting gun with line and float attached, or simultaneously with a harpoon and shoulder or darting gun. The purpose of the Eskimo whaling regulations is to avoid "long range" attempts with the shoulder gun which were reportedly the cause of many whales being struck and lost in the past.

Several changes to the guns and bombs already have been made and include:

(1) The barrel of the guns have been manufactured of bronze instead of steel, reducing the problem of rust which interfered with proper discharge and travel of the bombs.
(2) The weight of both guns has been reduced for easier handling.
(3) Hot rolled steel has been used in the harpoon shaft to improve flexibility and reduce the likelihood of the harpoon dislodging itself from the whale.
(4) The bottom surface of the toggle head of the harpoon has been widened to provide for better retention once it has been implanted in the whale.
(5) The point on the bombs has been made shorter and blunter to provide for more certain penetration, reducing the possibility of misplacement or "glancing" effect.

(6) The barrels have been shortened to allow a visual check to see if the bomb is properly seated before firing; a reason cited for under-firing and misfires.
(7) Loading procedures have been thoroughly reviewed with the whalers to assure proper and safe firing of the explosive charges.
(8) Investigations have begun to determine if a more suitable explosive powder can be utilized. The standard black powder is highly susceptible to moisture, causing misfires. Also, black powder is less explosive than some new powders. The safety of the whalers is an important consideration in this investigation.

IV. ALASKAN ESKIMO SUBSISTENCE DEPENDENCE ON BOWHEAD WHALES

Eskimos in nine whaling villages in northwest Alaska have depended on the bowhead whale for subsistence needs and as the cornerstone of their culture for centuries. Even though Eskimo culture has been impacted by U.S. domestic legislation and regulation governing a variety of issues from native claims to wildlife management and by oil development on the North Slope, the cultural and nutritional importance of the bowhead whale has remained unchanged.

In establishing proper regulations relating to the bowhead whale, it is essential to balance the need to preserve the whale stock and the subsistence and cultural needs of the Eskimo community. This paper discusses the nature of the Eskimo diet and the role of the bowhead in that diet; describes subsistence and cultural dependence on the bowhead; and evaluates the viability of alternative foodstuffs. It concludes that the bowhead whale is integral both to the health of Eskimos and their culture, and that an annual take of at least 24 to 32 whales is necessary to meet Eskimo needs. These conclusions, and the facts on which they are based, are primarily derived from and found in more detail in the results of the US/ International Biological Program study of Eskimos of Northwestern Alaska--A biological Perspective (1978), a Smithsonian Institution study: The North Alaskan Eskimo--A Study in Ecology and Society (1959) and recent studies and surveys undertaken by the U.S. Department of Health, Education, and Welfare and the U.S. Department of the Interior.

(1) The Eskimo Diet

Maintenance of a traditional way of life for the Alaskan Eskimo is heavily dependent upon the hunting and use of subsistence resources. Many of the households obtain a major portion of their resources from subsistence hunting, according to a 1978 survey by the U.S. Department of the Interior.

Whales, seals and caribou have been the major components of the northern coastal Eskimo aboriginal diet. Fish, birds and walrus have been minor components. 1/ The native diet is high in protein and fat and low in carbohydrates. 2/ According to a 1971-1972 nutritional survey in the villages of Wainwright and Point Hope, Alaska, 34% of the calories of the inhabitants of Wainwright and 18% in Point Hope were obtained from such native species; the adult members of the populations at

Wainwright and Point Hope obtained approximately 75% and 57%, respectively, of their protein from these native species. 3/

The consumption of these native species, particularly whales, confers certain specific advantages to the native population:

1. Nutritional analysis has shown that fresh whale blubber (muktuk) is a good alternative source of Vitamin C. Early explorers noted the absence of scurvy, a vitamin C deficiency disease, among native populations despite the absence of fruits or vegetables in the diet. Oils of marine mammals are also high in vitamins A and D. 4/

2. Although an all-meat diet is low in calcium, consumption of cartilage and soft bones of native animal species supplements calcium intake. 5/ This may be important where the incidence of lactose intolerance precludes the addition of calcium-rich dairy products to the diet. 6/

3. The meat of marine mammals is a good source of dietary iron. Iron-deficiency anemia noted in village children has been related to their lower consumption of native species as opposed to consumption by adults of the village. 7/

4. The high saturated fat content generally ascribed to animal fats does not apply to a diet of seal and whale blubber. Polyunsaturated fats in these native foods may have contributed to the low serum cholesterol levels of premodern Eskimos. 8/

5. Because of its content, a three ounce portion of muktuk provides about 20% of an average male Eskimo's daily caloric needs.

In sum, the traditional native diet, despite its lack of variety, can supply all nutrients essential to good health, provided that native food species are available in adequate amounts and their meat is prepared according to traditional methods. 9/

(2) Nutritional Dependence on the Bowhead

The bowhead whale is a principal ingredient of this traditional Eskimo diet. The following calculations attempt to quantify basic protein needs of the Eskimo population and the amount of whale meat required to satisfy that need. These calculations are founded on information supplied by the U.S. Department of Health, Education and Welfare. Based on those figures, a significant portion of the protein requirement of the population of the nine whaling villages (and a substantial portion of some of the other vitamin needs) is met by the harvest of 24 average

size whales. These figures are approximate, since the required protein intake varies from person to person and since some information on the dietary habits and the use of other foods as a protein source is estimated. In addition, Eskimos in inland villages are dependent, to a certain extent, on bowhead whale meat. While we do not know the portion of their diet accounted for by whale meat nor the precise number of people involved, three to five whales are required to satisfy the subsistence needs of inland villages. This would indicate a nutritional need for a total harvest of bowhead whales of 27 to 29. */

A. Whale Production

1. Average weight of all whales caught during the period 1973-1977 is 15.9 metric tons.

2. Useable portions of the whale:

   red meat = 31% of overall body weight
   viscera (all eaten) = 14%
   blubber (eaten portion) = 6%

3. Whale size/yield figures:

   15.9 metric tons total weight = 7.2 metric tons of red meat and viscera.

B. Eskimo Needs

1. Population of nine whaling villages (current) total = 4200 (4% are under 2 years of age and eat little or now whale meat)

Adult Males (25+)	Adult Females (25+)	Children
20% (840)	9% (380)	67% (2810)

* While it has been suggested by some that historical take levels can be used to establish subsistence dependence, an historic approach to determining subsistence or cultural need is inadequate for several reasons: 1) historic records are incomplete (harvest records are available for only two of nine whaling villages); 2) the historic approach fails to take into account the decline of the Eskimo population following contact with the outside world and subsequent recovery to about 40% of precontact level and; 3) an historic approach understates subsistence dependence because it includes years when climatic conditions prevented the harvest, although there was a need for such a harvest.

2. Daily Nutritional Requirements:

	Adult Males	Adult Females	Children
Protein	56 grams	46 grams	30-35 grams
Whale Meat & Viscera	170 grams	128-142 grams	85-114 grams

3. Annual requirements of whale meat and viscera assuming daily intake to satisfy substantially all protein needs:

(Population) times (annual needs per person)

Category	Population	Need	Requirement
Adult Males	840	137	52
Adult Females	380	108	19
Children	2810	80	102
TOTAL	4030	325	173 metric tons

4. Estimated number of whales to satisfy annual requirements:

173 metric tons of meat and viscera divided by 7.2 metric tons of useable meat and viscera per average whale = 24 whales.

(3) Cultural Dependence on the Bowhead Harvest

Beyond the nutritional need is a further and less tangible Alaskan Eskimo dependence on the bowhead. Bowhead whaling serves as the central force of the community binding it together and reaffirming the culture. 10/ Restrictions imposed upon bowhead whale hunting from other than natural causes have the potential of disrupting community and cultural integrity. When the culture is experiencing pressure from outside elements, as it has to a great extent in this decade, maintenance of bowhead whaling becomes even more critical.

Observations during the spring 1978 hunt indicate that a minimum requirement of whaling opportunity, which the bowhead whale hunt has traditionally produced, is necessary to maintain the positive role of sharing and cooperation. This social and cultural need is apart from nutritional requirements. While some whaling is clearly better than none, abnormally small quotas have an adverse impact upon the cultural integrity of

the community. Since other subsistence activities are individual rather than communal, the bowhead whale hunt has no substitute to reinforce the spirit of the community and facilitate preservations of the Eskimo culture.

The United States Government has attempted to determine what measurement of "whale availability" might be used to establish subsistence dependence from a cultural standpoint, and has found it exceedingly difficult to quantify this important but intangible factor.

The Eskimos have suggested that one can quantify this cultural dependence by measuring the number of whales landed per whaling crew involved in the hunt. In order to do so, the data on the number of crews hunting in the various whaling villages was examined. The number of crews was divided by the number of whales landed. On the basis of this year's survey, it was assumed that the number of crews were minimally required for each whaling village (30 for Barrow, 15 for Point Hope and 8 for Wainwright). The crew members are lower than actual crew numbers over the years for which calculations were made. The whales per crew ratio was then multiplied by the number of crews which resulted in an estimate of 32 whales, required for the maintenance of cultural integrity.

(4) Lack of Availability of Alternative Species

Because of the endangered status of the bowhead population, alternative food sources should be considered in meeting Eskimo needs. The United States Government has concluded that, unfortunately, none of these sources is a viable alternative of substantial size.

One method of substitution considered would be the importation of foodstuffs from the lower 48 United States. Such foods, however, have not traditionally been part of the Eskimo diet. The northwest Alaskan Eskimo population, adapted over centuries to the native diet, may not be able to adjust to alternative food sources without adverse consequences to nutritional health. 11/ Change in the northwest Alaskan Eskimo diet that has already taken place in some areas has resulted in adverse health effects on Eskimo health. There has been a rapid increase in the prevalence of certain diseases characteristic of industrialized societies: obesity, cardiovascular disease, hypertension, 12/ as well as an alarming increase in iron-deficiency anemia. 13/, 14/

Eskimos seem to possess unique metabolic capabilities which have enabled them to adapt to their aboriginal all-meat diet. 15/, 16/ These adaptations appear to limit their ability to

assimilate possible alternative and processed foodstuffs. For example, northwest Alaskan Eskimo populations exhibit lactose and sucrose intolerance. 17/ The presence of enzymes to break down these two sugars would be non-selective in a population lacking traditional sources of these substances. A modern diet, including milk and sweet foods, disrupts the metabolism of these sugar intolerant individuals. The consumption of native foods by the residents of Wainwright is comparable to estimates made 15 years ago, but Point Hope shows a decrease in consumption of native species in the last 15 years. 18/ Wainwright adults, whose diet most closely resembles that of the aboriginal Eskimos, appear to have a health advantage over the adult population of Point Hope. 19/, 20/

Other alternative food sources can be found to some extent, but these sources will not account for a substantial replacement to whale meat because of problems with availability, hunting effort and Eskimo acceptance.

Historically, the caribou was the primary alternative to the bowhead. In lean years of bowhead harvest, caribou were available to make up for deficits and vice versa. Unfortunately, at a time when the bowhead whale harvest is being limited, the caribou harvest is also being severely restricted. Caribou herds have been subject to large cyclical fluctuations in size over a 30-40 year period, and are presently near a low point in the cycle. From 1970 to 1977, the Western Arctic caribou herd declined from a reliable estimate of 242,000 animals to between 50,000 and 75,000 animals. Historically, Alaskan Eskimos and other natives annually took 25,000 to 30,000 caribou for use in 30 native communities which utilized this subsistence resource. At the present time, a 5,000 animal limit (up from 3,000 in 1977) exists. 21/ The inland villages with limited access to marine resources are much greater users of caribou than the whaling villages. Of the quota in 1977, the whaling villages took perhaps a thousand caribou and may take 1,500 of the 5,000 in 1978. 22/ Thus, caribou cannot make up the deficit from a reduced bowhead harvest. Indeed, one of the reasons for an increase in whales taken in the recent past has been the relative scarcity of caribou.

Other alternatives such as seals, walrus, waterfowl and fish are not practical. Climatic conditions and the amount of effort required to make up for the bowhead food loss by hunting these species are such that these species cannot effectively replace bowheads, which provide high quantities of meat to subsistence people in the form of a few animals. For example, it would be impossible in the space of a single year for the community to hunt and kill enough birds to replace even one bowhead whale. Because beluga whales are not in large supply

and are used for subsistence purposes in western Canada, the U.S. is reluctant to encourage substantial further use of these whales. The gray whale (classified as endangered) is occasionally taken by Alaskan natives for food. Although the meat of the gray whale is eaten, the muktuk is unacceptable as food because the skin is encrusted with barnacles and the blubber is difficult to chew. Also, the gray whale is considered to be more difficult and more dangerous to hunt than the bowhead, and tends to sink when killed.

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APPENDICES

A. STATUS REPORT SUBMITTED BY THE ALASKA ESKIMO WHALING COMMISSION, May 1978; MONETARY GRANT FROM THE ALASKA LEGISLATURE IN SUPPORT OF ACTIVITIES OF THE ALASKA ESKIMO WHALING COMMISSION

B. UNITED STATES REGULATIONS FOR BOWHEAD MANAGEMENT PROGRAM

C. FIGURES 1 - 5

APPENDIX A

STATUS REPORT SUBMITTED BY THE ALASKA ESKIMO WHALING COMMISSION, May 1978; MONETARY GRANT FROM THE ALASKA LEGISLATURE IN SUPPORT OF ACTIVITIES OF THE ALASKA ESKIMO WHALING COMMISSION

STATUS REPORT SUBMITTED BY

THE ALASKA ESKIMO WHALING COMMISSION
May 1978

What is the Alaska Eskimo Whaling Commission?

The Alaska Eskimo Whaling Commission (AEWC) is an organization composed of all whaling captains from the nine Alaska Eskimo whaling villages. The Commission has a governing body composed of nine commissioners (one elected from each of the whaling villages by the whaling captains from those villages). The Commission has elected a Chairman and Vice Chairman from its membership and has also appointed a Secretary-Treasurer. A list of the Commissioners and officers of the Alaska Eskimo Whaling Commission is attached (see Attachment A).

When Was the Alaska Eskimo Whaling Commission Created?

The Commission was created on September 1, 1977, in Barrow, Alaska. For the first time in recorded Eskimo history, Alaska Eskimo whaling captains from nine remote whaling villages gathered in one place to discuss the ways in which the Eskimo community might respond to the International Whaling Commission's ban on subsistence hunting of the bowhead whale.

Why Was the Alaska Eskimo Whaling Commission Created?

For centuries Alaska Eskimos have hunted the bowhead whale in a controlled and intelligent fashion. Hunters who have shown disrespect to the bowhead whale by harvesting it in an inefficient way have been ostracized from the community. Nevertheless, the Eskimos realize that even the most ingrained traditions sometimes need emphasis and reinforcement, particularly when outside forces are promoting social change.

The whaling captains at their meeting in Barrow also realized that some people were disseminating misinformation concerning the manner in which most Eskimos were hunting and using the bowhead whale. The whalers believed it was essential to communicate to the outside world the facts concerning Eskimo hunting of the bowhead in their remote part of the world.

Finally, the whalers recognized that their intuitive knowledge of the bowhead could not be easily communicated to the outside world. They also realized that the present body of information concerning the bowhead whale was woefully inadequate and even misleading. They, therefore, recognized the need for extensive scientific investigation of the bowhead whale to insure continuing existence of both the bowhead whale and Eskimo society.

Given these needs, the Alaska Eskimo Whaling Commission was created with a threefold purpose:

1) To insure that bowhead whale hunting was conducted in a traditional, non-wasteful manner;

2) To communicate to the outside world the facts concerning bowhead whale hunting, the way it was done, the centrality of the hunt to the cultural and nutritional needs of the Eskimo, the Eskimo's knowledge of the whale, and the reasons why any moratorium on such hunting would have disastrous impact upon the Eskimo community; and

3) To promote extensive scientific research on the bowhead whale so as to insure its continued existence without unnecessary disruption of Eskimo society.

What Has the Alaska Eskimo Whaling Commission Done?

The AEWC serves as an organized forum through which Eskimos can inform people in remote villages and in the outside world. Operating with funds first from the North Slope Borough and then from the State of Alaska, the AEWC has performed three primary functions: education, regulations, and research.

1. Education

The AEWC has engaged in numerous educational efforts. It has encouraged the production of a film portraying Alaska Eskimo whaling of the bowhead. It has answered inquiries and has responded to allegations from outsiders unfamiliar with Alaska Eskimo whaling.

Representatives of the Alaska Eskimo Whaling Commission have testified in Washington and in Alaska concerning the cultural and nutritional importance of bowhead whale hunting for Alaskan Eskimos. In addition, representatives of the AEWC have visited state and federal officials to tell their story and urge that the IWC action establishing arbitrary quotas on the number of bowheads which can be harvested be overturned and that an appropriate management plan which does not pose a risk to either the Eskimos or the bowhead whale be established.

During the Spring 1978 hunt, AEWC members talked to conservationists and reporters who had come to Alaska to view subsistence whaling at first hand. Many who came with negative attitudes went away convinced of the legitimacy of the Eskimo hunt of the bowhead whale.

2. Regulation

The AEWC fought to have the United States object to the initial IWC moratorium and present an alternative domestic regulatory program at the December meeting of the IWC. While the United States rejected this approach, the AEWC was successful in obtaining from the U.S. Government a commitment to fight for a restoration of the subsistence exemption at the December meeting.

AEWC representatives met with Vice President Mondale, Secretary of Interior Andrus and Undersecretary of Interior James Joseph to discuss Eskimo participation at the IWC December meeting. At that meeting with government officials the AEWC committed itself to the development of an Alaska Eskimo regulatory program. Having received further assurances that the United States was committed to the continuation of the bowhead whale hunt for Alaskan Eskimos, the AEWC agreed to participate in the December meeting of the IWC.

Subsequent to the meeting with the Vice President, the AEWC presented to the Secretary of Interior Cecil Andrus a regulatory program adopted by the AEWC on November 5, 1977. That regulatory program was in place before there was any U.S. domestic regulation of Alaskan Eskimo subsistence whaling. The Alaska Eskimo Whaling Commission management plan insures that traditional Eskimo hunting methods will be allowed and that the number of whales attempted to be harvested but not harvested will be substantially reduced. Specifically, the plan provides:

a) Whaling captains must register with the AEWC and agree that they and their crews will abide by AEWC regulations.

b) Records of whales sighted, struck, and harvested must be kept.

c) The shoulder gun may be used only

(i) when accompanied by harpoon with or without a darting gun.

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

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

d) The level of harvest shall not exceed subsistence needs.

e) Violation of regulations will result in the violator being prohibited from whaling for a period of from one to five whaling seasons.

During the Spring hunt, the AEWC management plan has been honored by all Eskimo whalers. When a misunderstanding arose in Barrow concerning the kind of whales that could be taken under the IWC Schedule, the AEWC called an emergency special meeting which was attended by the U.S. IWC Commissioner. The AEWC was instrumental in resolving the misunderstanding and urged the whalers not to take Ingutuks even though the IWC Schedule language might not prohibit whaling for Ingutuks. For this year, the AEWC is committed to compliance with the letter and the spirit of IWC directives in order to enhance the likelihood of speedy resolution of the aboriginal whaling question by the IWC.

The AEWC has worked with the U.S. Government to devise a method by which the IWC will have definite guidelines to treat aboriginal whaling differently than commercial whaling.

3. Research

Eskimo whalers are working with the U.S. government on scientific research on the Bowhead whale and on research on weapons improvement. Eskimos are far more familiar with ice conditions and the behavioral patterns of the Bowhead whale than are most scientists. The government scientists have been receptive to many of the suggestions of the whalers and have utilized the whaler's assistance in conducting the research. The AEWC continues to promote more sophisticated research, however, and to that end is helping to fund an exploratory sonar program to determine whether sonar can be used to estimate more accurately the size of the Bowhead population. The AEWC is urging that joint research programs be undertaken with the Soviet Union and Canada in the hopes of establishing better information about the size of the Bowhead population and environmental risks to the species.

In response to criticisms concerning the number of whales attempted to be harvested but not harvested, the Alaska Eskimo Whaling Commission has met with the person who manufactures the subsistence whaling weapons and has suggested improvements in design so as to maximize the opportunity for successfully harvesting the whale. These weapons improvements combined with the requirement under the AEWC management plan for securing the whale with a harpoon (or darting gun) with line attached before any shoulder gun can be used has substantially improved the efficiency of the Bowhead whale harvest.

A final area of research, a study of historic levels of Eskimo whaling, has been begun by the AEWC. The AEWC believes the figures currently available on historic levels of aboriginal whaling are inaccurate. Accurate information on the level of catch may provide a better index of the status of the whale population over the years.

What Will the Alaska Eskimo Whaling Commission do in the Future?

The Commission is committed to trying to convince the IWC to restore the native exemption for Bowhead whale harvesting. The Commission will work with the IWC and U.S. to promote scientific research and to devise adequate and fair methods of controlling aboriginal whaling in full cooperation with aboriginal peoples. In the meantime, the AEWC will continue to implement its own management plan for Bowhead whale hunting to insure timely and adequate self-regulation of Bowhead whale hunting for subsistence purposes.

AEWC Management Plan

Synopsis

Management of the Bowhead Whale hunt is achieved under the AEWC plan through two mechanisms:

1. Regulation of hunting methods.

2. Establishment of a special scientific committee (with Eskimo representation but controlled by scientists) which will set overall limits on the hunt at levels no greater than the net recruitment rate of the species.

The special scientific committee would be composed of nine members appointed by a highly respected scientific organization. It would have the specific tasks of estimating the level at which animals could be taken without decreasing the population; estimating the mortality rate for animals struck but not harvested; and making recommendations on weapons which may improve the efficiency of the hunt. The whalers would not be permitted to take whales beyond the limits imposed by the special scientific committee.

Violation of any hunting regulations will result in the violator being forbidden to participate in the hunt, and in addition, fines may be assessed.

AEWC Commissioners

Kaktovik	Herman Aishanna
Nuiqsut	Thomas Napageak
Barrow	Jacob Adams
Wainwright	Rossman Peetook
Point Hope	John Oktollik
Kivalina	Oscar Swan
Wales	*Roy Angnaboogok
Gambell	Roger Silook
Savoonga	Thomas Gologergon

Officers

Jacob Adams - Chairman

Roger Silook - Vice Chairman

Dale Stotts - Secretary-Treasurer

*President of local Whaling Captains' Association

Subpart A - Introduction

§100.1 Purpose of regulations

It is the purpose of the regulations contained herein to: (a) insure an efficient subsistence harvest of bowhead whales; and (b) provide a means within the Alaskan Eskimo customs and institutions of limiting the bowhead whale harvest in order to prevent the extinction of such species.

§100.2 Scope of regulations

The regulations contained herein apply to the subsistence hunting of bowhead whales by Eskimos located in the State of Alaska.

Subpart B - Alaska Eskimo Whaling Commission

§100.11 Powers

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

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

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

(2) 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 in lieu of, regulations contained herein.

§100.12 Duties

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

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

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

Subpart C - Regulations

§100.21 Definitions

(a) "bowhead whale" means a whale whose scientific name is Balaena 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) "Scientific Committee" means the committee established pursuant to §100.26 of these regulations.

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

(i) "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) (hereafter FEIS).

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

(iii) "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.)

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

(g) "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.

(h) "whaling village" means the Alaska Eskimo village in which resides a whaling captain and crew which participates in the harvest or attempted harvest of bowhead whales.

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

§100.22 Registration

(a) Each captain shall register with the AEWC on forms provided by the AEWC for that purpose which disclose his name, address, age, qualifications as captain, names of crew members, 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.

§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 or his crew.

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

(1) the size of the bowhead whale,

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

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

(c) Each whaling captain shall make such 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.

§100.24 Permissible 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 §100.21(f).

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

(3) the shoulder gun may be used

(i) when accompanied by harpoon with or without a darting gun.

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

(iii) 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.

§100.25 Traditional proprietary claim

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

§100.25 Level of harvest

(a) The AEWC shall establish the levels of harvest and attempted harvest for each whaling village during each season. Such levels may be set by methods including, but not limited to, the following:

(i) Specification of number of whaling crews permitted to harvest or attempt to harvest bowhead whales during specified periods;

(ii) Specification of the size or age of whales which may be taken during specified periods, after consultation with the Scientific Committee.

(iii) Specification of the number of whales that may be taken by each crew.

(iv) Specification of the number of bowhead whales which may be harvested or attempted to be harvested by each village.

(b) The level of harvest supported by scientific data shall be no greater than that necessary to meet the cultural and nutritional needs of the Eskimo inhabitants of the State of Alaska.

(c) In establishing the levels of harvest and attempted harvest, the AEWC shall not establish levels of harvest or attempted harvest greater than the carrying capacity of the bowhead whale stock, supported by scientific data.

(d) The carrying capacity of the bowhead whale stock shall be determined by a Scientific Committee appointed by the Polar Research Board of the National Academy of Sciences. The Scientific Committee shall consist of nine members who are qualified by reason of their education and experience to make objective determination concerning the carrying capacity of the bowhead whale stock. Three of the nine members shall be members of the Eskimo community. The AEWC shall make recommendations to the Polar Research Board for the choice of Eskimo members.

(e) In determining the carrying capacity of the bowhead whale stock the Scientific Committee shall not consider any prospective threats to the species resulting from oil and gas development within the habitat of such

species. Provided, however, that this section may be further implemented by the Scientific Committee and the AEWC at a later date in the event of actual risks.

(f) The mortality rate for attempted harvest shall be determined by the Scientific Committee.

Subpart D - Penalties

§100.31 Denial of participation in harvest:

(a) Any person who the AEWC determines has violated the regulations contained herein 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 seasons.

(b) Any person who willfully violates the regulations contained herein shall be subject to a fine of not more than $1,000 assessed by the AEWC. No person shall harvest or attempt to harvest the bowhead whale until such fine has been paid.

1978 Interim Regulations

1. No whaling captain shall continue to hunt the Bowhead Whale after the quota set forth in S230.74 C.F.R. for his village of domicile is reached. A violation shall result in the imposition of penalties established under S100.31 of the AEWC Management Plan.

2. No whaling captain shall engage in whaling for any calf or any Bowhead Whale accompanied by a calf. A violation shall result in the imposition of penalties established under S100.31 of the AEWC Management Plan.

In addition to these interim regulations for 1978, an amendment to the AEWC Management Plan was adopted as a clarification: that the words "carrying capacity" in S100.26(c) be changed to "net reproductive rate".

References to a Special Scientific Committee occur in several places in the AEWC Management Plan. Such a Special Commitee will not be established this year because the functions planned for the Committee are superceded by the IWC quota. For the present, the references to the Special Scientific Committee will remain in the AEWC Management Plan, but will not be used for 1978. We may wish to discuss this further and make amendments at a future AEWC meeting.

University of Alaska, Fairbanks

Fairbanks, Alaska 99701

Arctic Environmental Information
and Data Center
707 A Street
Anchorage, Alaska 99501

June 2, 1978

Mr. Peter Jensen
U.S. National Marine Fisheries Service
Page Building
2001 Wisconsin Avenue
Washington, DC 20235

Dear Pete:

I have enclosed a brief narrative statement regarding the grant by the Alaska legislature to the Alaska Eskimo Whaling Commission that we talked about on the phone yesterday. If you need more, let me know.

Sincerely,

Dave Hickok
Director

DH/lm
Encl.

cc: Jake Adams
Howard Braham
John Burns
Herb Melchior
Ellen Partridge

Monetary Grant from The Alaska Legislature in Support of Activities of The Alaska Eskimo Whaling Commission

Bowhead whales have been an important nutritional and cultural resource for Alaskan Eskimos for thousands of years. This dependency was recognized by Congress when they provided an exemption to the Marine Mammal Protection Act that permitted aboriginals to continue to take bowheads. Increasing bowhead harvest and loss rates had caused concern to the International Whaling Commission (IWC) and its Committee of Scientific Advisors for several years, although the Eskimos who depended on the whales were not made aware of it.

The June 1977 decision by the IWC to rescind the exemption made the Eskimos fully aware that they had a problem. After their first reaction of shock and anger had subsided, about 70 whaling captains met at Barrow in August of 1977 to consider their position. As a result of this meeting the Alaska Eskimo Whaling Commission (AEWC) was created. Although the Eskimos have never been convinced of the validity of the data used by the IWC in reaching its decision and their first major action was to deny that the IWC had jurisdiction over subsistence whaling, the AEWC also developed its own management plan, covering methods of harvest, self-regulation, and the responsibilities of captains. The whaling captains also recognized that their best course of action was to participate fully in any further decisions that affected the bowhead and the hunt. Representatives of the AEWC participated in the special meeting of the IWC in December of 1977 at which a quota was established that restricted taking to 12 whales taken or 18 struck.

These activities of the AEWC, as well as their need to defend their position in courts, gave rise to considerable administrative and legal costs in addition to the costs that would be incurred by implementation of their own management plan. Early expenses of the AEWC were underwritten by the North Slope Borough, the local government entity headquartered at Barrow, which represents the most northerly whaling communities, but this could only be an interim funding source.

In recognition of the responsible position of the AEWC and the need for further funding, concurrent bills were introduced into the Alaska State Senate and House in January and February of 1978. These bills would appropriate $250,000 for the AEWC to assist them in voluntary efforts to ensure whale stock viability, specifically in (1) gathering data on the population, migration, and habits of the bowhead whale; (2) monitoring of the subsistence harvest of whales; (3) reducing the number of whales struck and lost; (4) presenting the data gathered and otherwise representing the interest of Alaskan subsistence whaling to the federal government and the IWC.

After the legislature had unsuccessfully approached first the Alaska Department of Fish and Game, then the University of Alaska's Institute of Marine Science to administer these funds, the university's

Arctic Environmental Information and Data Center (AEIDC) agreed to provide this service. This was with the understanding that AEIDC would merely administer the funds and would not undertake to manage field programs.

The appropriation passed the legislature in final form March 22, 1978, and included a letter of intent as follows:

> The legislature intends that these funds will be distributed immediately by Alaska Environmental Information and Data Center to Alaska Eskimo Whaling Commission and other entities to insure that the program will be implemented in the spring of 1978. This distribution will be based on Alaska Environmental Information and Data Center certification of an expenditure plan developed by the participating entities. A program report by the grantees shall be submitted to the Legislature by the Alaska Environmental Information and Data Center on the accomplishments of the program no later than May 1, 1979.
>
> In administering these funds, the Legislature expects the Alaska Environmental Information and Data Center to receive, to the maximum extent possible, mutual agreement between the Alaska Eskimo Whaling Commission and federal and state wildlife agencies on the project for which grants are to be made.

The bill was signed by the Lieutenant Governor on March 29, 1978.

During development of the legislation the AEWC began making its plans in coordination with the National Marine Fisheries Service (NMFS) Alaska Department of Fish and Game (ADF&G), and AEIDC. The first planning meeting was held at Barrow March 10 that resulted in a preliminary plan for AEWC administration, research and surveillance, other activities, and a preliminary budget.

This budget, submitted to the Alaska Legislature, was the basis for field assistance to the NMFS, participation in bio-acoustics feasibility studies, possible review of the entire program by the National Acadamy of Science, a study of historic whale harvest by Eskimos, and reimbursement of administrative costs to AEIDC.

Following further planning with NMFS, AEWC chairman Jacob Adams submitted a budget request to AEIDC on April 24, 1978 and received funds to the amount of $210,000 to cover its operations. Of this amount, $143,000 was to be spent in the field to participate in NMFS bowhead whale counting activities. The objective was to have counting crews on the ice by the third week in April.

This plan called for 10 Eskimos at Barrow, 12 at Wainwright, and 12 at Point Hope for a period of six weeks. A boat and crew was also to be provided at St. Lawrence Island.

As the whale migration began and crews went into the field, the plans were modified considerably. Fewer Eskimos actually participated than had been planned. Plans for Barrow crews were carried out much as planned. Only one crew operated at Wainwright, however, and there were difficulties keeping a full crew at Point Hope. Plans at Gambell were apparently changed and a larger number of boats was used for a much shorter period.

Although details of the operation are not yet available, Jacob Adams estimated on May 12, that about half of the funds that AEWC had planned to use for assistance to NMFS would remain at the end of the season. Accordingly, at a meeting with personnel from AEWC, NMFS, and ADF&G, a revised budget request by AEWC was made up to include the remainder of the spring bowhead migration period and boat charter and crews for joint aerial-surface surveys of bowhead whale habitat in late summer and fall. A copy of this amended budget request by letter to David Hickok, dated May 12, 1978 is attached. The sum of $12,000 for aircraft charter was reallocated by AEWC to NMFS aerial surveys because NMFS field crews were forced to use their fall flying allocation to continue surveys and were planning to forego spring activities that were deemed important.

The joint aerial surface surveys will require dedication of funds and personnel by NMFS and/or ADF&G.

It is too early to comment on the success of the operation or on problems and possibilities for improvement. It seems clear, however, that the establishment of communication between AEWC and federal and state regulatory agencies was strengthened by this program. If this participation contributed to acceptance of IWC quotas and NMFS regulation by the whalers, and to the enhanced stature of the AEWC that resulted from the conduct of its members during the spring 1978 whaling season, it will have accomplished a great deal.

ALASKA ESKIMO WHALING COMMISSION
P.O. BOX 570
BARROW, ALASKA 99723

May 12, 1978

Funds to be reallocated from AEWC by amendment of May 12, 1978 to budget submitted April 24, 1978

1.	Assistance to National Marine Fisheries Service spring aerial survey. (flight time)	$12,000.00
2.	Advisory service to spring bio-acoustics program (2 captains for about 3 weeks @ $560.00/week)	3,500.00
3.	Additional assistance to National Marine Fisheries Service spring counting crews (4 men for about 3 weeks @ $560.00/week)	7,000.00
4.	Fall visual and bio-acoustical survey AEWC share 1 month charter of mv Ivik @ $750.00/day with crew (total cost=$22,500.00) Remainder to be contributed by National Marine Fisheries Service and Alaska Department of Fish and Game	10,000.00
	Observers (10 for 1 month @ $560.00/week)	22,400.00
	Camp support	2,600.00
		$35,000.00
5.	Statistical analysis of existing population data through 1977. (contract with Dr. Claudette Bradley, Harvard University)	3,000.00
6.	Preparation of mv Ivik for fall visual and bio-acoustical survey. (4 man weeks @ $560.00/man week	2,240.00
	TOTAL	$62,740.00

Budget for AEWC Research and Surveillance Program - March 10, 1978.

1.	AEWC Administration		
	Administrator - 3 mo. @ $2,500.00	$ 7,500.00	
	Coordinator for science and enforcement	7,500.00	
	Secretary	2,500.00	
	Travel	40,000.00	
	Legal Costs	20,000.00	
	Contingency	10,000.00	
			$87,500.00
2.	Enforcement of AEWC regulations (cooperation with NMFS enforcement) - reporting officers (12 men for 6 weeks - 72 man weeks @ $560.00 per man week) - this is low priority for AEWC and not included in total - $40,320.00.		
3.	AEWC assistance to NMFS research Additional crews after season and surveillance during whaling at Pt. Hope, Wainwright, and Barrow. These men may be combined with NMFS crews or operate independently.		55,000.00
4.	Study of historic whale harvest at AEWC whaling villages.		15,000.00
5.	Sonar feasibility studies. Four men to assist NARL for remainder of FY 78.		30,000.00
6.	National Academy of Science review of overall bowhead research program.		40,000.00
7.	AEIDC administration of this program.		7,000.00
8.	Contingency		15,500.00
			$250,000.00

Budget to be submitted to Alaska Legislature for supplemental appropriation to support the bowhead whale program.

APPENDIX B

UNITED STATES REGULATIONS FOR BOWHEAD MANAGEMENT PROGRAM

[3510-22]

Title 50—Wildlife and Fisheries

CHAPTER II—NATIONAL MARINE FISHERIES SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DEPARTMENT OF COMMERCE

PART 230—WHALING

Taking of Bowhead Whales by Indians, Aleuts, or Eskimos for Subsistence Purposes

AGENCY: National Marine Fisheries Service.

ACTION: Final rule.

SUMMARY: The aboriginal exemption to the Schedule of the International Whaling Convention (Convention) which allows the taking of either 12 bowhead whales landed or 18 struck is allocated among the nine Alaskan Eskimo whaling villages which have traditionally participated in the subsistence hunt. In implementing the obligation of the United States under the Convention, these final regulations require appropriate licensing of whaling captains, call for reporting of various data, proscribe certain acts, set out penalties, and provide for, to the extent possible, the maximum utilization of all whales taken.

DATES: These regulations are effective April 3, 1978.

ADDRESSES: Assistant Administrator for Fisheries, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, 3300 Whitehaven Street NW., Washington, D.C. 20235.

FOR FURTHER INFORMATION CONTACT:

William P. Jensen, Marine Mammal and Endangered Species Division, National Marine Fisheries Service, 3300 Whitehaven Street NW., Washington, D.C. 20235, phone: 202-634-7461.

SUPPLEMENTARY INFORMATION:

BACKGROUND

Whaling activities conducted by persons subject to the jurisdiction of the United States are governed by the Whaling Convention Act (WCA, 16 U.S.C. 916a-1) which implements the Convention domestically. The body of

the Convention sets out the rights and duties of Contracting Governments, and the Schedule to the Convention (Schedule), which is deemed to be a part thereof, contains regulations adopted by the International Whaling Commission (Commission).

Until recently, the Schedule expressly exempted aborigines, which includes Alaskan Eskimos, from the prohibitions imposed on "the taking of gray or right whales," provided that the meat and products of such whales were used exclusively for local consumption by the aborigines. The hunting of bowhead whales, a species of right whale, has been an important part of the culture and subsistence lifestyle of Alaskan Eskimos for centuries. Hunting occurs in U.S. waters off the coast of Alaska during the spring and fall as the bowhead whales migrate north and east through near shore leads (openings in the ice) in the spring and then west and south as ice forms in the fall. Residents of nine villages participate in the hunt as the bowhead whales pass their respective village. Weapons used in the hunt, the darting and shoulder guns, have not changed substantially since the peak of the commercial whaling era in the middle part of the last century. Skin covered whaling vessels known as umiaks remain the most commonly used vessel.

Procedural History

In June 1977, the Commission amended the Schedule to impose a prohibition on the taking of bowhead whales by deleting the words "or right" from the quoted provision of the Schedule. Since such a prohibition would have had a severe impact on Alaskan Eskimos, the United States considered objecting to the amendment, as permitted by the Convention. In aid of reaching a decision on what was considered to be a "major Federal action significantly affecting the quality of the human environment," an environmental impact statement was prepared, entitled "International Whaling Commission's Deletion of Native Exemption for the Subsistence Harvest of Bowhead Whales", pursuant to the National Environmental Policy Act (42 U.S.C. 4321-4347).

In October 1977, the United States decided not to object in light of its commitment to international conservation. Recognizing both the need to preserve the central elements of the Eskimo culture and to conserve the bowhead whale stocks, the United States believed that a limited subsistence hunting of bowhead whales should be permitted. Therefore, the United States set out to develop a comprehensive research program and conservation regime to control subsistence hunting for presentation to the Commission's Scientific Committee at its meeting of November 21-25, 1977. In addition, the conservation regime was published as proposed regulations in the Federal Register (42 FR 60185) on November 25, 1977, under the authority of the Marine Mammal Protection Act (MMPA, 16 U.S.C. 1361-1407).

At a special meeting on December 6-8, 1977, the Commission adopted an amendment to the Schedule which allowed a limited taking of bowhead whales from the Bering Sea stock: 12 whales landed or 18 whales struck, whichever comes first. The amendment further prohibited the taking of any calf or any bowhead whale accompanied by a calf. The United States received official notice of the action on December 29, 1977. By the terms of the Convention, this amendment to the Schedule entered into effect at 12 (noon), March 20, 1978. In light of the Commission's action, the conservation regime published as proposed regulations under the MMPA was withdrawn on January 30, 1978 (43 FR 3921).

Pursuant to section 916k of the WCA, amendments to the Schedule must be published in the Federal Register. As the present Schedule now embraces whaling operations carried on by persons subject to the jurisdiction of the United States, the entire revised Schedule, as amended, was published on March 8, 1978 (43 FR 9481).

On March 6, 1978 (43 FR 9174), the National Marine Fisheries Service (NMFS) published proposed regulations to implement the amendment to the Schedule under the authority of the WCA.

Public Comments

Comments on the proposed regulations were solicited from all interested parties. In view of the time which remained before the anticipated beginning of the spring hunt, these comments were to be received on or before March 20, 1978. The following parties submitted comments:

Alaska Eskimo Whaling Commission
Marine Mammal Commission
Friends of the Earth
Connecticut Cetacean Society
Alaska Legal Services Corporation
Whale Center
Alaska Conservation Society
The Whale Protection Fund
Environmental Defense Fund
Defenders of Wildlife
Floyd Durham
Winton Weyapuk, Jr.

In addition, on March 23, 1978, a meeting was held with the legal representatives of the Alaska Eskimo Whaling Commission (AEWC) to clarify the intent of the AEWC comments. Copies of the comments received and the record of the aforementioned meeting are available for review at the offices of the National Marine Fisheries Service, 3300 Whitehaven Street NW., Room 410, Washington, D.C. In response to those comments, the following outlines the rationale underlying these final regulations:

Quotas

Several of the comments indicated that the village-by-village quota scheme did not assure a closure of the whaling season after the twelfth whale was landed or the eighteenth struck, and, as a result, the United States would not be meeting its obligation under the Convention.

The limited quota, which was adopted by the Commission, was in response to the subsistence and cultural needs of the Alaskan Eskimos and the need to protect the bowhead whale stocks from further depletion. Article IX of the Convention states that:

> "Each Contracting Government shall take appropriate measures to ensure the application of the provisions of this Convention and the punishment of infractions against the said provisions in operations carried out by persons or by vessels under its jurisdiction."

Cognizant of the reasons for which the quota was adopted, NMFS has determined that a village-by-village quota, which assures to each whaling village the opportunity to engage in whaling, is the appropriate measure to carry out the intent of the Commission.

Historically, nine whaling villages have participated in the subsistence hunt as independent units, each one seeking to meet its own critical nutritional needs. In addition, participation in this hunt is an essential element of the Eskimo culture, which has remained substantially unchanged for centuries. The cultural aspects of the hunt pervade the entire Eskimo community, and are of paramount significance to the social structure of each village. A system, which provides an opportunity of meeting these needs, is consistent with the intent of the Commission to recognize the cultural and subsistence needs of Alaskan Eskimos.

No system is likely to be successful without the cooperation of that segment of society which is being regulated. The village-by-village quota has been viewed as equitable by the Eskimos. A system which could deprive a village of a fair opportunity to secure needed food for its inhabitants would undoubtedly be met with resistance. Should closure of the whaling season occur under such a system, there is a significant risk that any village adversely affected by rigid application of an undistributed quota would violate the quota if that village considered it necessary to meet critical nutritional needs of its inhabitants. Though violations would be punished, the difficulty involved in preventing these violations could result in an adverse impact on the bowhead whale stocks. Since the

Commission's prime concern is the protection of the bowhead whale stocks, a system, which is equitable, accepted by the Eskimos, and, therefore, subject to fewer infractions, has been adopted.

Irrespective of the overall quota, any excess of the village quota is a violation of the regulations. This arrangement complies with the obligation of the United States to punish infractions against the provisions of the Convention by assuring that all landings or strikes in excess of the 12/18 quota, as allocated, will be subject to sanction.

LICENSES

The licensing provision, § 230.73, has been revised to respond in part to the comments received on the manner in which Alaskan Eskimo whalers presently regulate their activities. The unique situation presented by Eskimo subsistence whaling, both geographically and culturally, dictates that normal licensing procedures be modified.

The nine villages involved in subsistence whaling are spread over a thousand miles of desolate terrain. Communication between representatives of the Federal government and inhabitants of the individual villages is impeded by a lack of modern communication facilities and, in some cases, language difficulties. The AEWC is an essential link between individual whalers and the outside community, particularly the Federal government. The whaling regulations of the AEWC, which are widely accepted by Eskimo whalers, provide a comprehensive set of controls on Eskimo whaling activities. Through its registration system, the AEWC is gathering information on individual whaling captains equivalent to that required of applicants for licenses in the proposed regulations.

Consequently, a provision has been added to § 230.73, which allows the Assistant Administrator to issue a license to captains registered with a whaling association if he determines that: (1) The association has established a system for regulating whaling activities of its members; (2) the system requires captains to provide information equivalent to that required of other applicants for licenses; and (3) the information has been made available to the Assistant Administrator or his representative. This provision operates in lieu of the formal application process in order to meet the exigencies posed by the imminence of the spring whaling season, to take advantage of the valuable resources resident in the AEWC, and to minimize Federal interference with traditional cultural community activities.

WASTE

Comments were received on both the manner in which a whale may be taken and utilized. It was suggested that the final regulations be more specific with respect to these matters. The Convention does not require us to regulate wasteful taking. Moreover, the AEWC has specific regulations on this subject. The general proscription of wasteful manner in these final regulations contemplates the prohibition of whaling activities generally recognized as wasteful. The use of a rifle to strike a bowhead whale clearly is not likely to result in its landing and, therefore, falls within this proscription. Similarly, the use of a shoulder gun without implanting in the whale a dart with line and float attached, which could result in the loss of the whale, would be a violation of the regulations.

Due to the manner in which a proprietary interest in a whale is established (i.e., by using a darting gun to implant in the whale a dart with line and float attached), the great social value attached to this interest, and the limited number of whales that may be taken, NMFS has determined that detailed Federal regulations to supplement those regulations by which the Eskimos govern their whaling activities are not necessary to ensure that proper hunting methods are employed.

Comments regarding the inclusion of provisions governing the utilization of whales have been considered. In light of the number of whales which may be taken, the maximum utilization of each whale is likely as a practical matter and need not be a subject of Federal regulation.

SALVAGE OF STINKERS

In response to the comments received, this provision has been revised to reflect practical circumstances and to clarify the status of any stinker salvaged. The definition of stinker has been changed by deleting the words "on the ice," as stinkers are not found upon the ice. Section 230.75 does not require that all fragments of harpoons, lances, or explosive darts be searched for and retrieved from the salvaged whale. In order to confirm the identity of the captain that struck the whale, for the purposes of establishing the ownership of the whale and to confirm a reported strike, all such devices which are found during the salvage must be turned over to the Assistant Administrator or his representative. As parts of such devices may be reused, the Assistant Administrator or his representative will promptly return them unless they are considered evidence of an unreported strike. Whales salvaged as stinkers are presumed to be struck whales of the whaling village of domicile of the captain whose distinctive mark appears on the harpoon, lance, or explosive dart found in the whale. If not reported earlier, the strike shall be deemed to have occurred at the time of recovery of the device.

HARASSMENT

It was suggested that "harassing" should be deleted from the definition of whaling. While whaling captains may not harass whales, it is important that the activities of others not party to a village whaling operation be subject to control. This is to ensure that only the permitted taking of bowhead whales occurs, and that no activity interfers with the successful landing of any bowhead whale struck. Activities such as shooting at whales from shore with rifles, which, as one commentator asserts takes place, or buzzing whales with airplanes are prohibited by retaining the word "harassing" in the definition of "whaling."

GENERAL

To the extent possible, other comments have been reflected in the final regulations. The word "native" as it appears before whaling captain has been deleted. In accord with an agreement among Eskimo whalers, the additional strike has been allocated to Barrow; it now has a quota of four strikes. We have been advised by the AEWC that the village of Nuigsut, which whales in the fall, has agreed to relinguish its quota to the village of Wales on the understanding that it will be given preference in any reassignment of quotas under § 230.74(c). Section 230.74 has been revised accordingly. Written records required by § 230.76 are to be kept by each whaling captain and not his representative. In determining whether these reports comply with the requirements of the regulations, NMFS will take into account language difficulties. To notify more expeditiously all affected whaling captains of the attainment of a village quota, the Assistant Administrator shall notify the individual captains, and not their representative, using all reasonable means of communication.

The provision relating to inspection, formerly § 230.73(a)(1)(iii)(E), has been deleted. Its inclusion has been determined to be misleading as it could possibly be viewed as a waiver by the Assistant Administrator of all other reasonable searches and inspections. All searches and inspections shall be carried out to the extent permitted by law.

Due to the imminence of the spring whaling season and the need to ensure an equitable distribution of the limited number of bowhead whales that are permitted to be taken, it is found for good cause shown that the thirty day delay in the effective date of these regulations may be waived. Consequently, these regulations are effective April 3, 1978.

50 CFR Part 230 is amended by revising § 230.10(b) to read as follows:

§ 230.10 Licenses and scientific permits [Amended].

* * * * *

(b) No permit or license shall be issued except as provided in § 230.13 and §§ 230.70 through 230.77. Licenses issued under § 230.73 shall be governed solely by the requirements of §§ 230.70 through 230.77.

50 CFR Part 230 is amended by adding a new undesignated center heading, entitled NATIVE SUBSISTENCE, which reads as follows:

NATIVE SUBSISTENCE

Sec.
230.70 General.
230.71 Definitions.
230.72 Prohibited Acts.
230.73 Licenses and Certificates of Inclusion.
230.74 Quotas.
230.75 Salvage of Stinkers.
230.76 Reporting by Whaling Captains.
230.77 Penalties.

AUTHORITY: Whaling Convention Act (WCA 16 U.S.C. 916a-1).

NATIVE SUBSISTENCE [NEW]

§ 230.70 General.

The provisions of §§ 230.70 through 230.77, which govern native subsistence whaling for bowhead whales, shall expire on December 31, 1978.

§ 230.71 Definitions.

(a) As used in §§ 230.70 through 230.77 of this Part 230:

(1) "Administrator" means the Administrator of the National Oceanic and Atmospheric Administration;

(2) "Assistant Administrator" means the Assistant Administrator for Fisheries of the National Oceanic and Atmospheric Administration;

(3) "Bowhead" means a whale of the Bering Sea stock of bowhead whales, *Balaena mysticetus;*

(4) "Calf" means any bowhead which is less than 21 feet in length as measured from the point of the upper jaw and the notch between the tail flukes;

(5) "Landing" means bringing a bowhead or any parts thereof onto the ice or land in the course of whaling operations;

(6) "Whaling captain" or "captain" means any Indian, Aleut, or Eskimo domiciled in a whaling village who is in charge of a vessel and a whaling crew;

(7) "Stinker" means a dead uncaimed bowhead found upon a beach, stranded in shallow water, or floating at sea;

(8) "Strike" means hitting a bowhead with a harpoon, lance, or explosive dart;

(9) "Whaling" means the hunting, striking, harassing, killing, or landing of bowheads, but does not include the salvage or processing of any stinker;

(10) "Whaling crew" means those persons under the control of a captain, who collectively participate as a unit in whaling;

(11) "Whaling village" means any of the villages of Gambell, Savoonga, Wales, Kivalina, Point Hope, Wainwright, Barrow, Nuigsut, and Kaktovik in the State of Alaska; and

(12) "Wasteful manner" means a method of whaling which is not likely to result in the landing of a struck bowhead or which does not include all reasonable effort to retrieve the bowhead.

§ 230.72 Prohibited acts.

(a) No person shall engage in whaling except:

(1) A whaling captain licensed in accordance with the provisions of § 230.73;

(2) A whaling captain included under the terms of a license issued in accordance with the provisions of § 230.73; or

(3) A member of a whaling crew under the control of a captain referred to in subparagraphs (1) and (2) of this paragraph.

(b) No whaling captain shall engage in whaling for any calf or any bowhead whale accompanied by a calf.

(c) No whaling captain shall engage in whaling in a wasteful manner.

(d) No whaling captain shall continue to whale after, (1) the quota set forth in § 230.74 for his village of domicile is reached, or (2) the license under which he is whaling is suspended as provided in § 230.73(e).

(e) No whaling captain shall claim domicile in more than one whaling village.

(f) No person may salvage a stinker without complying with the provisions of § 230.75.

(g) No whaling captain shall engage in whaling with a harpoon, lance, or explosive dart which does not bear a permanent distinctive mark described by the captain in a document submitted to the Assistant Administrator identifying the captain as the owner thereof.

§ 230.73 Licenses and certificates of inclusion.

(a) A license may be issued to a whaling captain or a representative of one or more captains who applies on their behalf.

(1) Applications for a license shall contain:

(i) Name, address, and telephone number, if any, of the applicant. If the applicant is an organization or corporate entity, a copy of the corporate or organizational charter shall be included;

(ii) The name and village of domicile of the applicant (if he is a whaling captain) and of each captain represented by the applicant;

(iii) A statement by the applicant (if he is a whaling captain) and each whaling captain represented by the applicant:

(A) That he understands and will comply with the regulations of this part;

(B) That the whaling crew contains at least five members;

(C) That any vessel to be used contains adequate equipment for whaling and that there are adequate provisions for the whaling crew; and

(D) That no member of the whaling crew will receive money for participation in the native subsistence whaling;

(iv) A description of the distinctive marking to be placed on each harpoon, lance, and explosive dart of each captain covered by the application.

(2) The application for a license shall be submitted to the Assistant Administrator for Fisheries, National Marine Fisheries Service, Washington, D.C. 20235.

(3) A license fee of $100 is required. A check in this amount made payable to the National Marine Fisheries Service must accompany the application.

(4) The Assistant Administrator shall determine the adequacy and completeness of an application, and if found to be inadequate or incomplete will promptly notify the applicant.

(b) Notwithstanding the provisions of paragraph (a) of this section, the Assistant Administrator may issue a license, on his own initiative, to whaling captains registered with or belonging to a whaling association representing a significant number of whaling captains if the Assistant Administrator, in his discretion, determines that: (1) The association has established a system for regulating whaling activities of its members; (2) the system requires the captains to provide information equivalent to that required to be submitted by an applicant under paragraph (a) of this section; and (3) such information has been made available to the Assistant Administrator or his representative.

(c) A license issued under this section shall contain a limitation on the number of whales that may be landed or struck, as provided in § 230.74.

(d) Upon issuance of a license, the Assistant Administrator shall issue a certificate of inclusion to each native whaling captain represented by the license holder. Each certificate shall state the whaling village of domicile claimed by the captain and describe the distinctive mark to be permanently affixed to the equipment of the captain. Such certificates are not transferable.

(e) A license issued under this section shall be valid for whaling in 1978 only. The Administrator may suspend any license issued pursuant to this sec-

tion if he, in his discretion, determines that a change in circumstances resulting from unauthorized whaling activities in 1978 creates an emergency presenting an imminent hazard to the viability of the bowhead population. Immediately upon such determination, the Administrator shall advise all holders of licenses and certificates of inclusion of the suspension and the reasons therefor. Any affected license holder shall, upon request, be entitled forthwith to a informal hearing to determine whether the suspension should be modified or lifted.

§ 230.74 *Quotas.*

(a) During the calendar year 1978, the quota for bowheads is allocated among whaling villages as follows:

(1) Kaktovik—1 whale landed or 2 struck, whichever occurs first
(2) Nuigsut—0 whale landed or 0 struck, whichever occurs first
(3) Barrow—3 whales landed or 4 struck, whichever occurs first
(4) Wainwright—2 whales landed or 2 struck, whichever occurs first
(5) Point Hope—2 whales landed or 2 struck, whichever occurs first
(6) Kivalina—1 whale landed or 2 struck, whichever occurs first
(7) Gambell—1 whale landed or 2 struck, whichever occurs first
(8) Savoonga—1 whale landed or 2 struck, whichever occurs first
(9) Wales—1 whale landed or 2 struck, whichever occurs first

(b) When the number of bowheads struck or landed by whaling captains domiciled in a whaling village equals the quota for such whaling village as set forth in paragraph (a) of this section, whaling by all captains domiciled in that whaling village shall cease. All license holders and certifcate holders shall be notified promptly by the Assistant Administrator using all reasonable means of communication. Licenses and certificates of inclusion held by whaling captains domiciled in a whaling village which has reached its quota shall not be valid after the quota for that whaling village has been reached.

(c) If for any reason the landing or struck quota for a whaling village is not reached, the part of the quota which remains may be reassigned, upon request of such village, to a second whaling village by the Administrator: *Provided,* That no other whaling village has exceeded its quota at the time of the reassignment. In making such reassignment the Administrator shall consult with representatives of as many whaling villages as time reasonably permits and shall initially give preference to the village of Nuigsut.

§ 230.75 Salvage of stinkers.

(a) Any person salvaging a stinker shall submit to the Assistant Administrator or his representative an oral or written report describing the circumstances of the salvage within 12 hours of such salvage. He shall provide promptly to the Assistant Administrator or his representative each harpoon, lance, or explosive dart found in or attached to the stinker who shall return the device to the owner thereof promptly unless it is retained as evidence of a possible violation.

(b) There shall be a rebuttable presumption that a stinker has been struck by the captain whose mark appears on the harpoon, lance or explosive dart found in or attached thereto, and, if no strike has been reported by such captain, such strike shall be deemed to have occurred at the time of recovery of the device.

§ 230.76 Reporting by whaling captains.

(a) All whaling captains shall provide to the Assistant Administrator or his representative an oral or written report within 12 hours of the striking, attempted striking, or landing of a bowhead. The Assistant Administrator is authorized to provide Technological assistance to facilitate prompt reporting. The report shall include at least the following information:

(1) The number, dates, and locations of each strike, attempted strike, or landing;

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

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

(4) An explanation of circumstances associated with the striking or attempted striking of any bowhead not landed; and

(5) The number of bowheads sighted by the whaling captain or any member of the whaling crew.

(b) Each captain shall keep a written record of the information required in paragraph (a) of this section, and shall forward the record to the Assistant Administrator within a reasonable time after whaling for bowheads has ceased for the season. In any event the report shall be submitted by July 15 for the preceding spring whaling season and by December 15 for the preceding fall whaling season.

§ 230.77 Penalties.

Any person who whales in contravention of these regulations, or violates any other provision of the Whaling Convention Act or of these regulations shall be subject to the penalties set forth in 16 U.S.C. 916 e and 916 f, and any other penalties provided by law.

Dated: March 30, 1978.

JACK W. GEHRINGER,
Deputy Director, National Marine Fisheries Service.

[FR Doc. 78-8736 Filed 3-31-78; 8:45 am]

[1505-01]

CHAPTER II—NATIONAL MARINE FISHERIES SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DEPARTMENT OF COMMERCE

PART 230—WHALING

Taking of Bowhead Whales by Indians, Aleuts, or Eskimos for Subsistence Purposes

Correction

In FR Doc. 78-8736 appearing at page 13883 in the issue for Monday, April 3, 1978, in the third column of page 13885, the last sentence of the last paragraph now reading "Consequently, these regulations are effective April 13, 1978" should have read "Consequently, these regulations are effective April 3, 1978."

[3510-12]

Title 50—Wildlife and Fisheries

CHAPTER II.—NATIONAL MARINE FISHERIES SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DEPARTMENT OF COMMERCE

PART 230—WHALING

Taking of Bowhead Whales by Indians, Aleuts, or Eskimos for Subsistence Purposes

AGENCY: National Marine Fisheries Service.

ACTION: Final rule.

SUMMARY: Pursuant to the authority granted by the Whaling Convention Act, the National Oceanic and Atmospheric Administration (NOAA) promulgated regulations on April 3, 1978, with respect to native subsistence whaling for bowhead whales for 1978 (43 FR 13883). The regulations provide a village by village allocation of the bowhead whales that may be taken by native subsistence whalers during the year. Paragraph 230.74(c) of those regulations provides for the reassignment of quotas among native villages by the Administrator but does not allow for such assignment if, at the time, any other whaling village has exceeded its quota. This emergency amendment would permit an assignment in such case by the Administrator unless he determines that the assignment is likely to result in exceeding the overall quota for native whaling villages of twelve whales landed or eighteen struck.

DATES: This amendment is effective May 24, 1978.

ADDRESSES: Assistant Administrator for Fisheries, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, 3300 Whitehaven Street NW., Washington, D.C. 20235.

FOR FURTHER INFORMATION CONTACT:

William P. Jensen, Marine Mammal and Endangered Species Division, National Marine Fisheries Service, 3300 Whitehaven Street NW., Washington, D.C. 20235, phone 202-634-7461.

SUPPLEMENTARY INFORMATION: At a special meeting on December 6-8, 1977, the International Whaling Commission adopted an amendment to the Schedule to the International Whaling Convention (Convention) which allowed a limited taking of bowhead whales from the Bering Sea stock: 12 whales landed or 18 struck, whichever occurs first. This amendment was published in the FEDERAL REGISTER on March 8, 1978, (43 FR 9481), as provided by section 916k of the Whaling Convention Act (16 U.S.C. 916a-l), and became binding on persons subject to the jurisdiction of the United States. On April 3, 1978, (43 FR 13883) NOAA further implemented the Schedule provisions by promulgating regulations which subdivided the overall quota among the native whaling villages of Alaska. The regulations authorize village quotas to be reassigned from one village to another, provided that no other whaling village has exceeded its quota at the time of the reassignment. The purpose of the proviso was to restrain the total take to the overall quota level.

The Spring hunt is rapidly approaching a conclusion. The season is likely to end within the next two weeks, and opportunities for whaling are rapidly disappearing from some villages. Whaling has already ceased in several villages. To date, all affected whalers, the Alaska Eskimo Whaling Commission and the entire Eskimo community have cooperated in seeking to abide by the regulations. Although one village has exceeded its quota by one whale as the result of a bona fide misunderstanding of the regulations, several villages are under their quota. The threefold purpose of the regulations—to prevent taking in excess of the limits imposed by the Schedule to the Convention, to distribute the overall quota equitably, and to provide for the critical nutritional need of the villages—would not be served by absolutely prohibiting reassignments at this point in the season due to the overage in one village.

In view of the foregoing, I find that immediate amendment of the regulations is necessary, notice and public comment thereon are impractical and contrary to the public interest, and good cause exists for making this amendment effective immediately.

§ 230.74 [Amended]

Accordingly, 50 CFR Part 230 is amended by revising § 230.74(c) to read as follows:

* * * * *

(c) If for any reason the landing or struck quota for a whaling village is not reached, the part of the quota which remains may be reassigned by the Administrator, upon request of such village, to a second whaling village: *Provided*, That if any other whaling village has exceeded its quota at the time the reassignment is requested, the Administrator shall not reassign the quota if he determines that it is likely to result in the total number of whales landed or struck exceeding 12 or 18, respectively. In making such reassignment, the Administrator shall consult with representatives of as many whaling villages as time reasonably permits.

Dated: May 19, 1978.

JAMES P. WALSH,
Acting Administrator.

[FR Doc. 78-14523 Filed 5-23-78; 8:45 am]

APPENDIX C

FIGURES 1 - 5

Location of Major Whaling Villages Figure 1

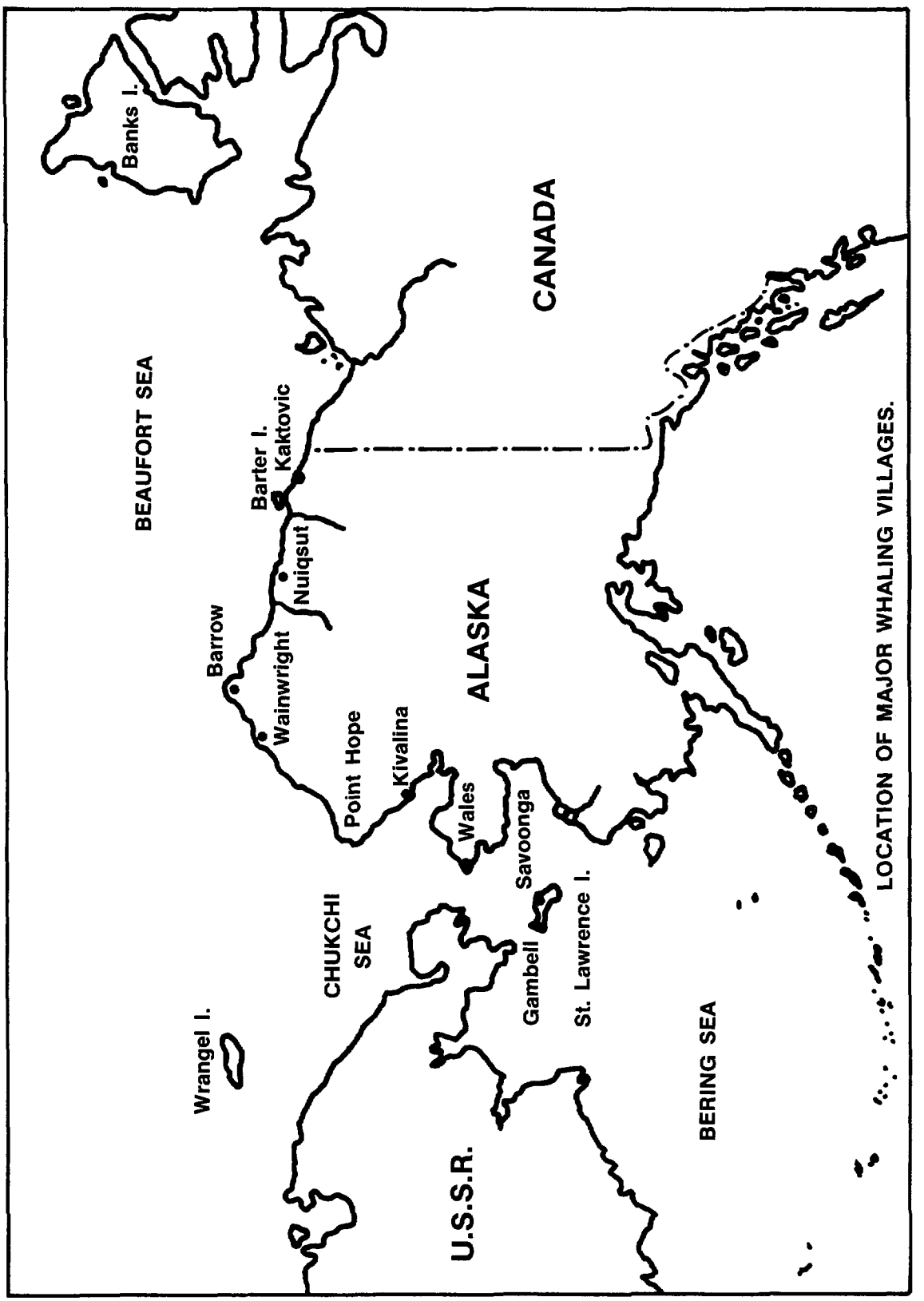
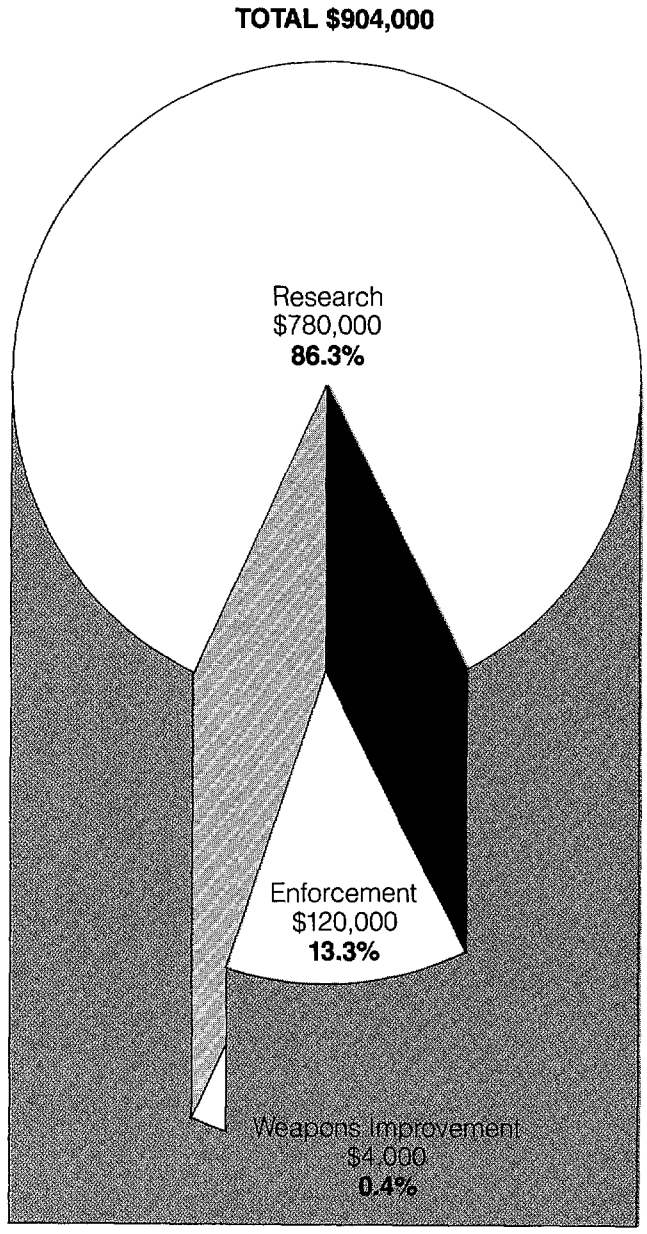


Figure 2

1978 Funding of U.S. Bowhead Whale Program



Bowhead Whale Migrations

Figure 3

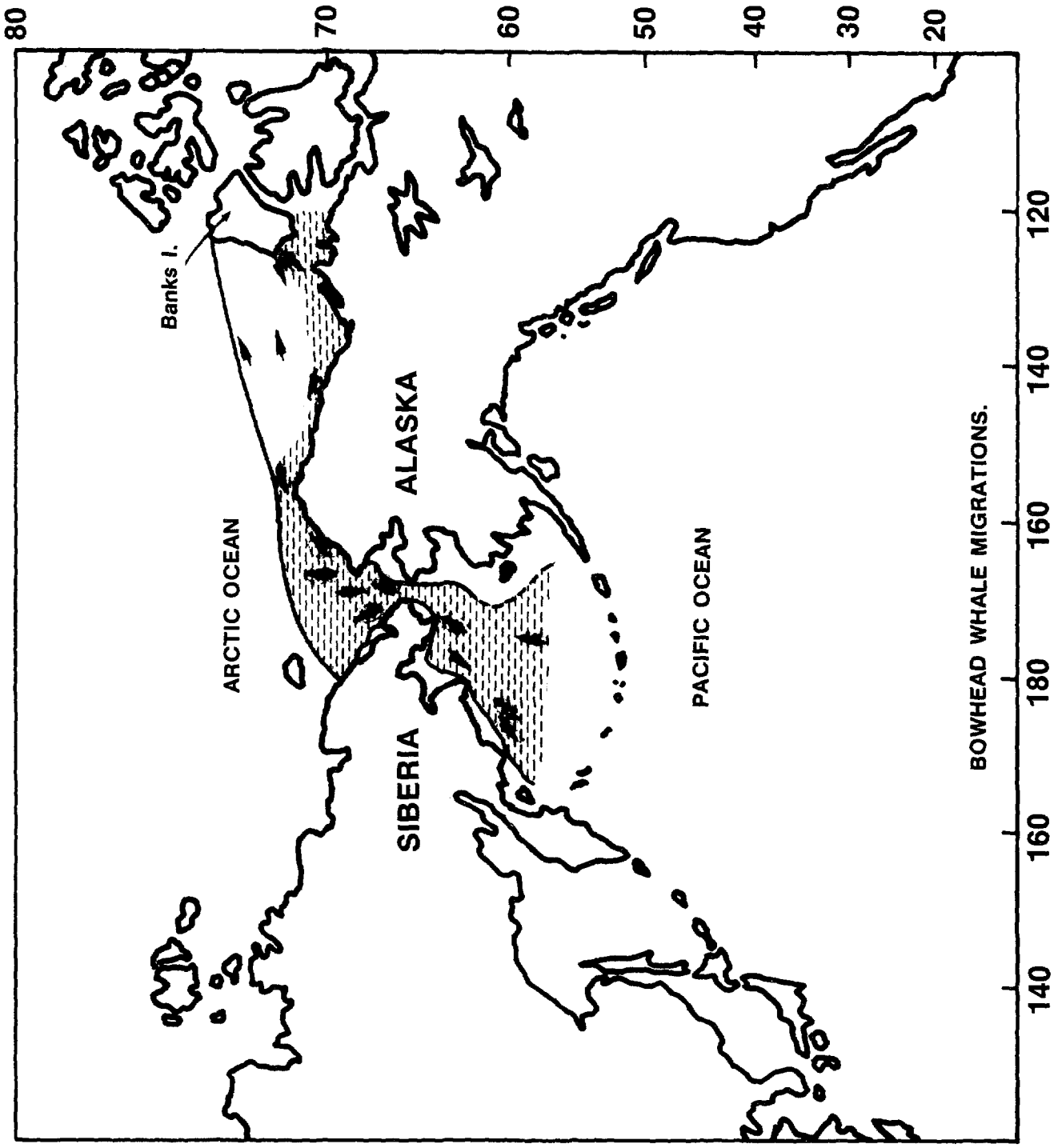


Figure 4 **Bowhead Whales Known Struck in Recent Years by Alaskan Eskimos in the Western Arctic Ocean**

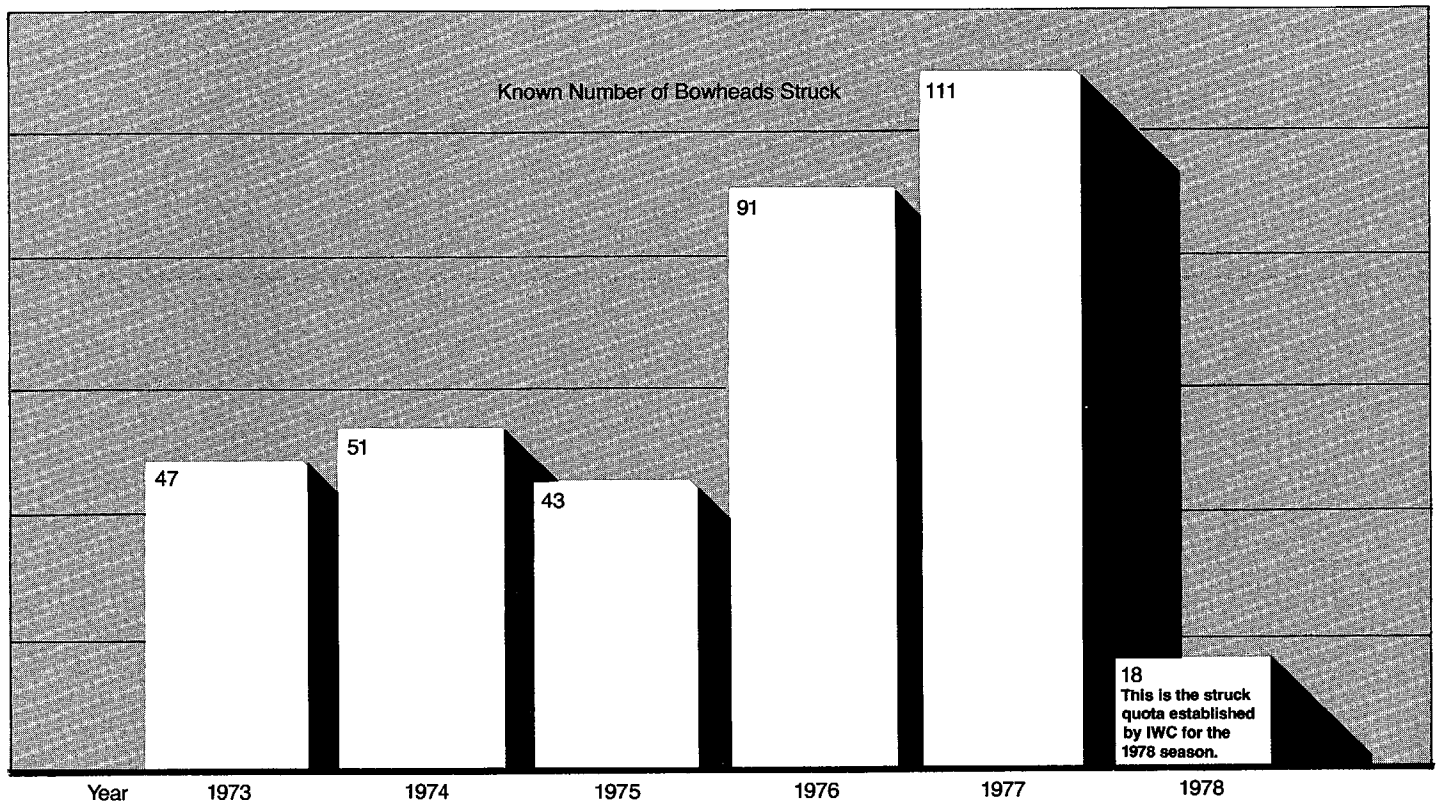
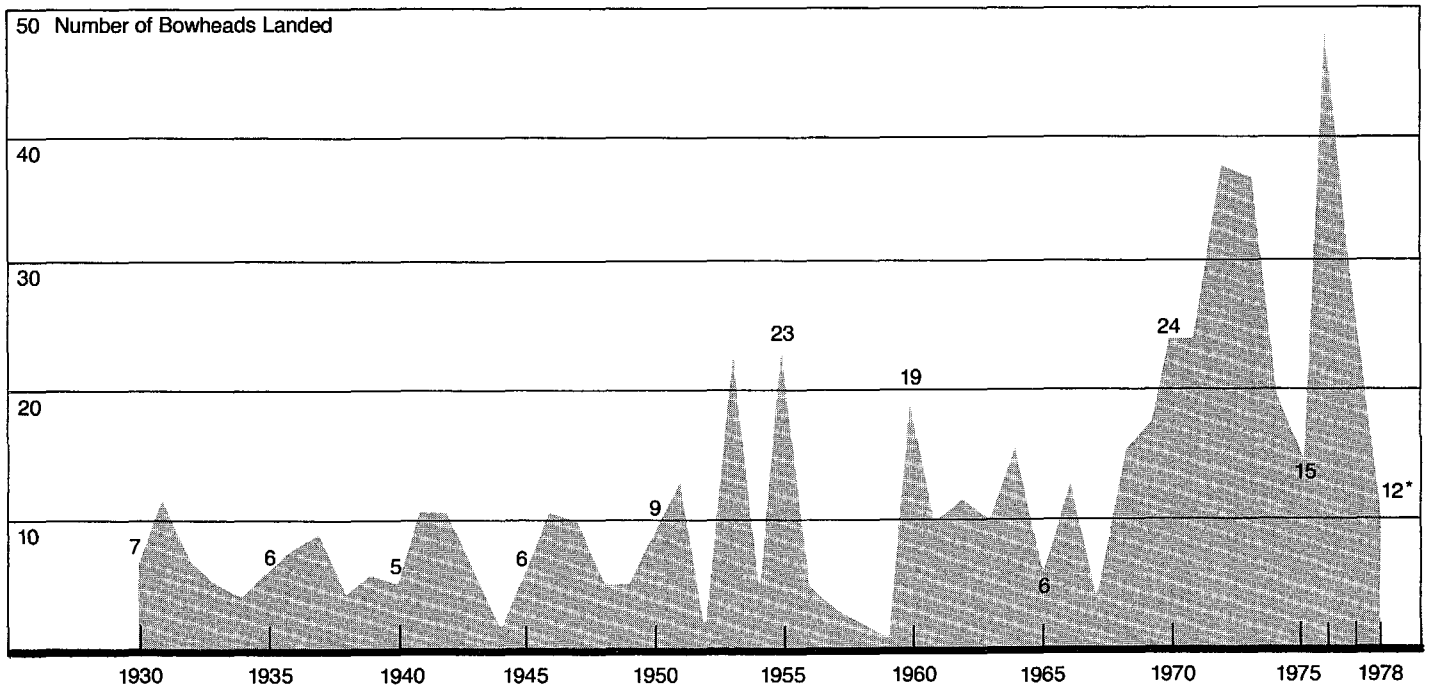


Figure 5 **Bowhead Whales Taken by Alaskan Eskimos and Shore-based Stations in the Western Arctic Ocean**



*This is the landed quota established by the IWC for the 1978 season.