

avoiding the long, arduous hearing procedure of the MMPA and ESA, the regulations needed to protect the bowhead whale could be implemented quickly. However, such rapid implementation ran the risk of abrogating the civil rights of Eskimos since they would be excluded from the decision making process.

Fortunately the circumstance of a special meeting of the IWC in December 1977, to reconsider the status of North Pacific sperm whales, gave the United States an opportunity to reopen the issue of the hunt for bowhead whales. Eskimo participation was obtained in developing a management proposal for submission to the IWC. The plan allowed a limited hunt with quotas on numbers struck as well as on numbers landed and promised to increase significantly the level of research undertaken⁷. Regulations for the hunt

were to be implemented and enforced through the Whaling Convention Act.

On reviewing the U.S. proposal, the IWC's Scientific Committee reiterated its findings that on biological grounds the hunt should not be allowed but recognized that the IWC might wish to consider subsistence or cultural needs which were beyond its expertise⁸. The IWC did consider these other aspects of the problem and finally agreed to remove the ban and to allow a take in 1978 of 12 whales landed or 18 struck, whichever occurred first.

This decision by the IWC established in 1978 the most ambitious U.S. research program ever devoted to a single species of large cetacean. As indicated by the following papers, dramatic results have already emanated from this effort. However, a far more encouraging aspect of the research program has been the willing participation by Es-

kimos in all of its phases. Such participation and cooperation must necessarily be the keynotes of any successful effort to balance the legitimate needs of both the Eskimo people and the bowhead whale.

Literature Cited

⁷U.S. Department of Commerce. 1978. Bowhead whales: A special report to the International Whaling Commission, 63 p. + 3 Append. U.S. Dep. Commer., Natl. Oceanic Atmos. Admin., Washington, D.C.

⁸International Whaling Commission. 1977 Report of the Scientific Committee Special Meeting: North Pacific Sperm Whale Assessments. Cronulla, Australia, 21-26 November 1977, 31 p. Int. Whaling Comm., The Red House, Station Road, Histon, Cambridge CB4 4NP, England.

Bockstoce, J. 1978. A preliminary estimate of the reduction of the western Arctic bowhead whale (*Balaena mysticetus*) population by the pelagic whaling industry: 1848-1915. Mar. Mammal Comm., Washington, D.C., 33 p.

Braham, H., B. Krogman, S. Leatherwood, W. Marquette, D. Rugh, M. Tillman, J. Johnson, and G. Carroll. 1979. Preliminary report of the 1978 spring bowhead whale research program results. Rep. Int. Whaling Comm. 29:291-306.

Carroll, G. 1976. Utilization of the bowhead whale. Mar. Fish. Rev. 38(8):18-21.

International Whaling Commission. 1977. Appendix 6 to Chairman's report of the twenty-eighth meeting. Rep. Int. Whaling Comm. 27:33

_____. 1978. Report of the Scientific Committee. Rep. Int. Whaling Comm. 28:38-92

Marquette, W. M. 1979. The 1977 catch of bowhead whales (*Balaena mysticetus*) by Alaskan Eskimos. Rep. Int. Whaling Comm. 29:281-289.

Rice, D. 1977. A list of the marine mammals of the world (third edition). U.S. Dep. Commer., NOAA Tech. Rep. NMFS SSRF-711, 15 p.

Historical Shore-Based Catch of Bowhead Whales in the Bering, Chukchi, and Beaufort Seas

WILLMAN M. MARQUETTE and JOHN R. BOCKSTOCE

Introduction

The Eskimos of northwestern Alaska have hunted the bowhead whale, *Balaena mysticetus*, since about A.D. 800, and there is archaeological evidence to suggest that the practice developed about 1,000 years earlier on St. Lawrence Island and the Siberian coast near the Bering Strait (Bockstoce, 1977; Fig. 1, 2). Whaling during an 8-week spring hunt and during a 4- to 8-week

autumn hunt at some villages provided the Eskimos with perhaps one-half of their winter food supply; until the 19th century, bowheads and Eskimos existed as co-inhabitants of a presumably stable ecosystem (Dunbar, 1953; Bockstoce, 1976).

In 1848, however, an event occurred that destroyed that stability. In that year a Yankee whaleman, Captain Thomas Roys of Sag Harbor, N.Y., discovered the rich bowhead whaling grounds

Willman M. Marquette is with the National Marine Mammal Laboratory, Northwest and Alaska Fisheries Center, National Marine Fisheries Service, NOAA, 7600 Sand Point Way N.E., Bldg. 32, Seattle, WA 98115. John R. Bockstoce is Curator of Ethnology, New Bedford Whaling Museum, 18 Johnny Cake Hill, New Bedford, MA 02740.

north of the Bering Strait. Not only were the whales plentiful, but he found the bowheads to be slow, docile, and, most important, they had such a thick layer of blubber and great quantity of whalebone (baleen) that an average sized whale yielded 11,923 liters (100 barrels) of oil and 681 kg (1,500 pounds) of baleen (Bockstoce, 1980).

Word of Captain Roys' success spread quickly, and in 1852 more than 200 ships were operating in the Bering Strait region. The ice and weather took a terrible toll of ships and men, but the profits were worth the risk. The whalers continued to press farther north into the

Chukchi Sea, and eventually made their way into the Beaufort Sea where in 1889 they discovered the bowhead's feeding ground near the Mackenzie River Delta and Amundsen Gulf, Northwest Territories, Canada (Fig. 3).

It was baleen that eventually caused the near extinction of the western Arctic stock. After 1880 the demand for baleen grew as manufacturers increasingly came to value the flexible, resilient whalebone for use as corset stays, skirt hoops, and in umbrellas. At the beginning of this century the price of baleen rose to more than \$5/454 g (1 pound), making an adult bowhead worth more than \$10,000. The baleen was so valuable that the plates from an exceptionally large bowhead could pay all expenses of an Arctic cruise.

Although whaling vessels had systematically sailed the Bering and Chukchi Seas for 30 years, the Arctic Eskimos did not come into any significant contact with the whalers until after 1880 (Bockstoce, 1978). By that decade the increasing scarcity of the whales motivated the Pacific Steam Whaling Company of San Francisco, Calif., and other operators to establish shore-based stations along the Alaskan coast. This enabled the whalers to hunt bowheads in the early spring far in advance of the whaling fleet as the whales swam through open leads in the ice on their way to summer feeding grounds in the eastern Beaufort Sea. The venture was immediately successful and for a few years the number of whales killed increased, but this was short-lived (Bockstoce, 1978; Table 1, C-79).

During the 1880's the whalers found it more and more difficult to catch bowheads, and in response they began to press eastward past Point Barrow in pursuit of the migrating whales. For a short time in the 1880's the numbers of whales captured increased as steam powered vessels succeeded the slower and less maneuverable sailing ships. By the early 1900's, however, the number of whales taken again declined, for the population was now severely reduced. Their scarcity drove the price of baleen higher and higher, ultimately causing the industry to collapse in 1909 when spring steel began taking an increasing

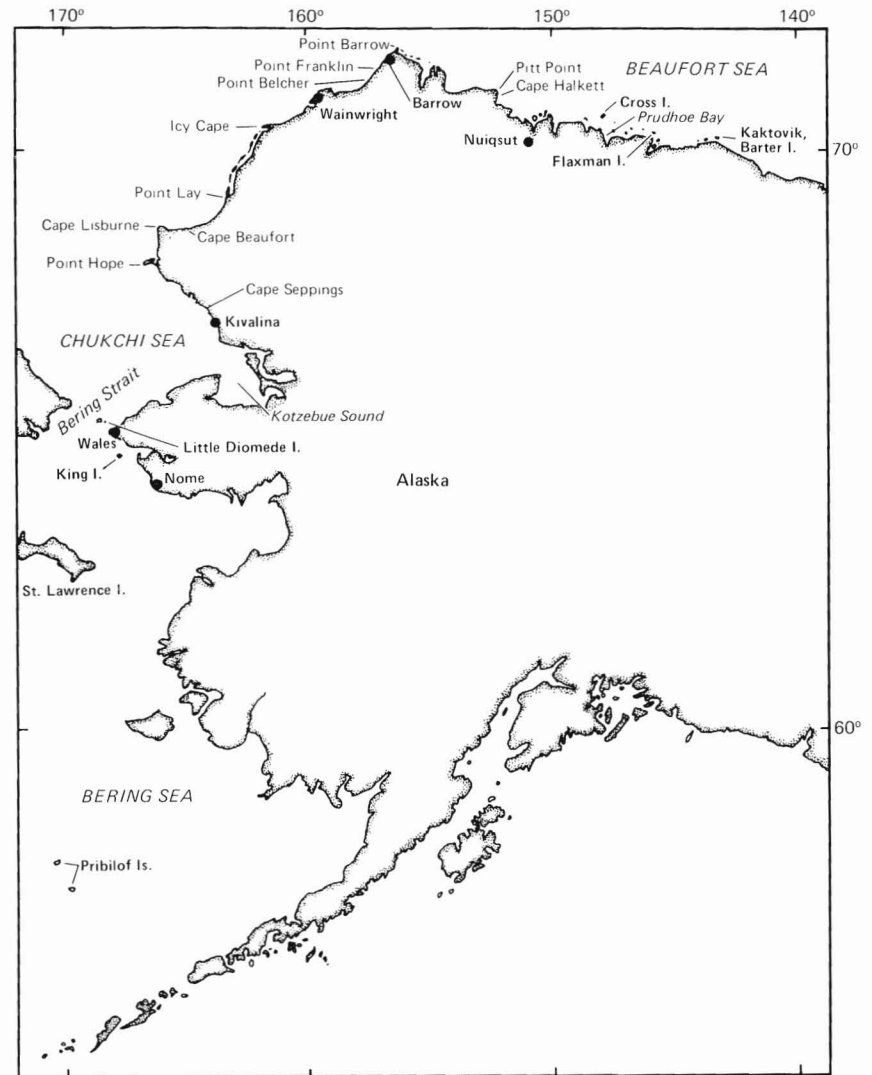


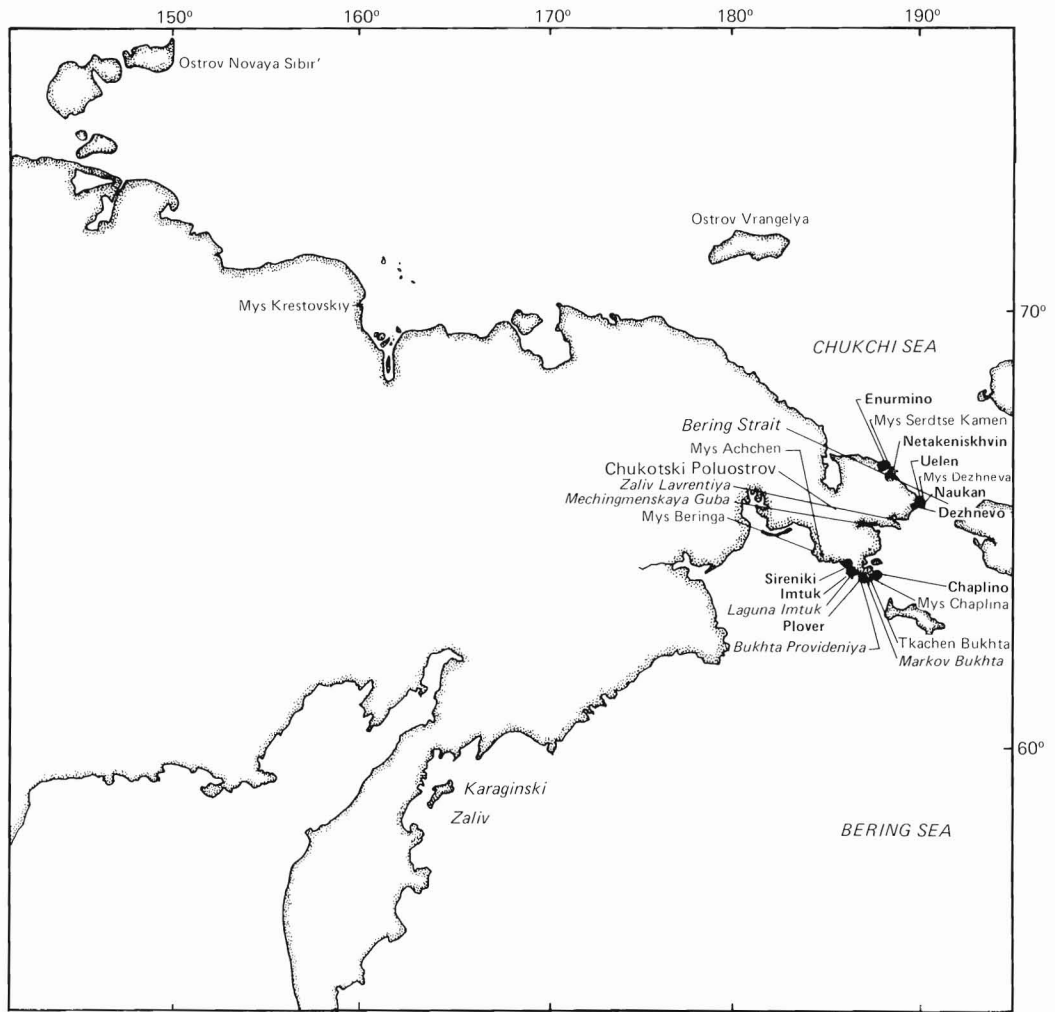
Figure 1.—Shore-based bowhead whaling sites on the Alaskan coast.

share of the market as a cheaper substitute for baleen.

Throughout the period of commercial exploitation Eskimos continued to take the bowhead for cultural and subsistence needs. After commercial whaling ceased, the Eskimo harvest continued at a relatively constant low level for 60 years. Beginning in 1970, however, Eskimo whaling effort steadily increased, as well as the number of whales taken; furthermore, the number of whales that had been struck but lost also greatly increased (Marquette, 1979).

Because of growing concern for the survival of this now rare and endangered species, the International Whaling Commission (IWC) in 1978 imposed an annual quota on the numbers of whales that could be landed or struck. Scientific determination of the status of this stock is hampered, however, by a paucity of data on the past catch of bowheads by whalers. The objective of this paper, therefore, is to provide a compilation of all known data on the historical catch of bowhead whales during shore-based operations along the coasts of the Bering, Chuk-

Figure 2. — Shore-based bowhead whaling sites on the U.S.S.R. coast.



chi, and Beaufort Seas. Analysis of the data and interrelated factors will be accomplished in a future report. Pelagic catch data, needed to complement an analysis of total take, are presented in a preliminary paper by Bockstoce (1980).

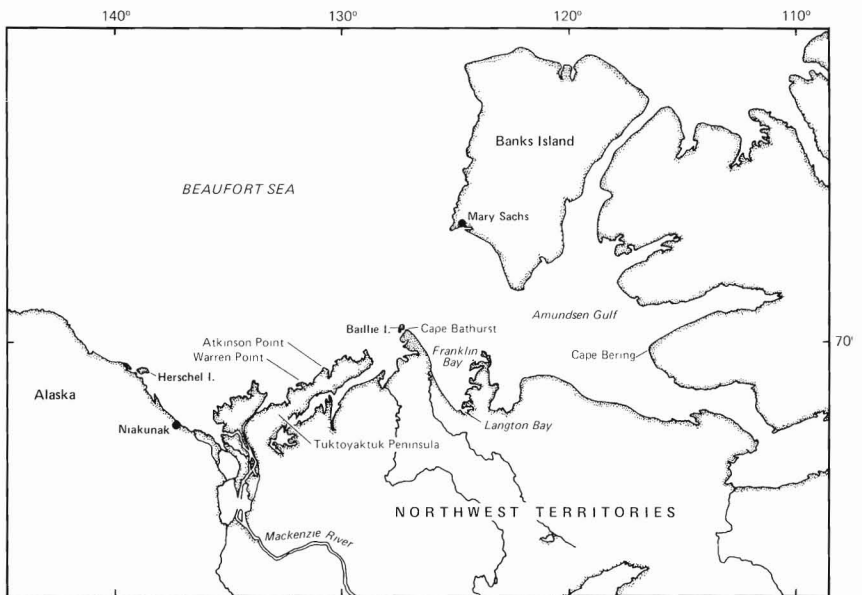


Figure 3. — Shore-based bowhead whaling sites on the Canadian coast.

Table 1.—Unpublished sources of data on whaling effort and the catch of bowhead whales by shore-based whalers in the western Arctic.

Code (C) no.	Source	Code (C) no.	Source	Code (C) no.	Source
1	Logbook <i>Thomas Dickason</i> , 29 June 1870. Providence Public Library, Providence, R.I.	29	F. A. Milan. (Department of Anthropology and Geography, University of Alaska, Fairbanks, AK 99701 Pers. commun. to Marquette, 19 April 1977).		Use Inventory. Commission on History and Culture, North Slope Borough, Barrow, AK 99723.
2	C. L. Hooper. Pers. commun. to William Windom, 14 June 1881. U.S. Revenue Cutter Service, Alaska File, R.G. 26, National Archives, Washington, D.C.	30	Journal <i>Leo</i> , 29 August 1879. Old Dartmouth Historical Society, New Bedford, Mass.	55	Logbook <i>Montpelier</i> , 6 August 1849. Providence Public Library, Providence, R.I.
3	Brower, C. D. 1863-1937. The northernmost American, an autobiography. Unpubl. manuscr., 3 vols., 895 p. Copy in Naval Arctic Research Laboratory library, Barrow, AK 99723.	31	U.S. Revenue Cutter Service, Alaska File. Refuge Station correspondence, R.G. 26, Microcopy 641/17 Frame 765, National Archives, Washington, D.C.	56	Logbook <i>Betsy Williams</i> , 7 July 1852. Kendall Whaling Museum, Sharon, Mass.
4	Logbook <i>F.A. Barstow</i> , 3 June 1891. Providence Public Library, Providence, R.I.	32	Logbook <i>Mary and Helen</i> , 12 August 1880. Old Dartmouth Historical Society, New Bedford, Mass.	57	Logbook <i>George and Susan</i> , 20 July 1859. New Bedford Free Public Library, New Bedford, Mass.
5	Journal <i>Orca</i> , 1 June 1891. Southampton Museum, Southampton, N.Y.	33	Sonnenfeld, J. 1956. Changes in subsistence among Barrow Eskimo. Unpubl. rep., 589 p. Arctic Institute of North America, Proj. No. ONR-140. Copy in Naval Arctic Research Laboratory library, Barrow, AK 99723.	58	Logbook <i>Camilla</i> , 4 July 1865. New Bedford Free Public Library, New Bedford, Mass.
6	Journal <i>Belvedere</i> , 23 July 1911. Private collection.	34	Rice, D. W. 1964. Eskimo whaling in Arctic Alaska. Unpubl. manuscr., 23 p. U.S. Fish Wildl. Serv., Bur. Commer. Fish. Avail. from Natl. Mar. Mammal Lab., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way N.E., Bldg. 32, Seattle, WA 98115.	59	I. Krupnik. Institute of Ethnography, Moscow, U.S.S.R. Pers. commun. to Bockstoce.
7	F. H. Fay (Institute of Marine Science, University of Alaska, Fairbanks, AK 99701. Pers. commun. to Director, Mar. Mammal Div., Natl. Mar. Fish. Serv., Seattle, WA 98115, 9 October 1973).	35	D. W. Rice. (Natl. Mar. Mammal Lab., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way N.E., Bldg. 32, Seattle, WA 98115. Pers. commun. to Marquette, 26 October 1979.)	60	Logbook <i>John P. West</i> , 21 June 1866. Mariners Museum, Newport News, Va.
8	C. J. Morgan (Institute for Environmental Studies, University of Washington FM-12, Seattle, WA 98195. Pers. commun. to Marquette, 25 July 1978).	36	R. K. Nelson. 1965. North Alaskan Eskimo exploitation of the sea ice environment. Unpubl. manuscr. Arctic Aeromedical Laboratory, Fort Wainwright, Alaska. Copy at Naval Arctic Research Laboratory library, Barrow, AK 99723.	61	Logbook <i>John P. West</i> , 12 July 1866. Mariners Museum, Newport News, Va.
9	Marquette, W. M. Harvest of bowhead whales by Alaskan Eskimos in 1973. Unpubl. manuscr. Natl. Mar. Mammal Lab., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way N.E., Bldg. 32, Seattle, WA 98115.	37	Naval Arctic Research Laboratory (Staff). 1972. Eskimo whaling at Barrow, Alaska. Unpubl. rep., 24 p. Naval Arctic Research Laboratory, Barrow, AK 99723.	62	Journal <i>Cornelius Howland</i> , 23 June 1869. Providence Public Library, Providence, R.I.
10	Fiscus, C. H., and W. M. Marquette. 1975. National Marine Fisheries Service field studies relating to the bowhead whale harvest in Alaska, 1974. Processed rep., 23 p. Northwest Fisheries Center, Natl. Mar. Fish. Serv., NOAA, Seattle, WA 98115.	38	Journal <i>Alexander</i> , 5 July 1904. Dukes County Historical Society, Mass.	63	Logbook <i>Fanny</i> , 1871. Typescript 79-122. Old Dartmouth Historical Society, New Bedford, Mass.
11	Harry, G. Y., Jr. 1973. Arctic whales and the Eskimos. Unpubl. rep., 26 p., submitted as SC/25/Doc. 23 to the International Whaling Commission, London, June 1973, by Mar. Mammal Div., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way N.E., Bldg. 32, Seattle, WA 98115.	39	C. D. Brower. 1886-1945. Diary. Copy in Naval Arctic Research Laboratory library, Barrow, AK 99723.	64	Logbook <i>Northern Light</i> , 27 June 1877. Old Dartmouth Historical Society, New Bedford, Mass.
12	G. A. Seaman (P.O. Box 80642, College, AK 99708. Pers. commun. to Marquette, 25 June 1976).	40	Logbook <i>Orca</i> , 26 July 1892. Private collection.	65	Logbook <i>Mary and Helen</i> , 23 May 1880. Old Dartmouth Historical Society, New Bedford, Mass.
13	Logbook <i>Cornelius Howland</i> , 5 July 1869. New Bedford Free Public Library, New Bedford, Mass.	41	Unidentified clipping, Scrapbook, Old Dartmouth Historical Society, New Bedford, Mass.	66	Logbook <i>Thrasher</i> , 22 May 1885. Private collection.
14	M. A. Healy. Pers. commun. to Secretary of the Treasury, 6 September 1888. U.S. Revenue Cutter Service, Alaska File, R.G. 26, National Archives, Washington, D.C.	42	Logbook Refuge Station, Barrow, Alaska; U.S. Revenue Cutter Service, Alaska File, R.G. 26, National Archives, Washington, D.C.	67	Logbook <i>Francis Palmer</i> , 3 July 1887. Kendall Whaling Museum, Sharon, Mass.
15	W. Howland. Pers. commun. to wife, 14 July 1890. Old Dartmouth Historical Society, New Bedford, MA 02740.	43	Logbook <i>Mermoid</i> , 16 August 1896. Kendall Whaling Museum, Sharon, Mass.	68	Journal <i>Orca</i> , 1 June 1891. Southampton Museum, Southampton, N.Y.
16	D. C. Foote. (Geography Department, McGill University, Montreal, Que., Can. Pers. commun. to D. W. Rice, 2 November 1964, and records in Archives, Rasmuson Library, University of Alaska, Fairbanks).	44	Logbook <i>Belvedere</i> , 10 May 1898. Old Dartmouth Historical Society, New Bedford, Mass.	69	Logbook <i>Belvedere</i> , 11 May 1907. Kendall Whaling Museum, Sharon, Mass.
17	Journal <i>Orca</i> , 17 July 1891. Private collection.	45	O. C. Hamlet. Pers. commun. to the Secretary of the Treasury, 11 September 1906. U.S. Coast Guard, Historical Files of the Public Affairs Division, Washington, D.C.	70	Rosene Papers, Box 3, Archives Suzallo Library, University of Washington, Seattle, WA 98195.
18	Journal <i>Orca</i> , 21 July 1892. Private collection.	46	Logbook <i>Belvedere</i> , 25 July 1907. Kendall Whaling Museum, Sharon, Mass.	71	U.S.-U.S.S.R. Environmental Agreement, Section V: Marine Mammals Project, 1973 to present. Annual meetings with exchange of data on marine mammals in the Arctic. Natl. Mar. Mammal Lab., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way N.E., Bldg. 32, Seattle, WA 98115.
19	Journal <i>Mary D. Hume</i> , 5 July 1893. Baker Library, Harvard University, Cambridge, Mass.	47	Logbook <i>John and Winthrop</i> , 29 July 1912. Private collection.	72	Bompas, W. The Esquimaux of the Mackenzie River. Unpubl. manuscr. Anglican Church Missionary Society, London, Engl.
20	M. A. Healy. Pers. commun. to Secretary of the Treasury, 25 September 1895; U.S. Revenue Cutter Service, Alaska File, Refuge Station correspondence, R.G. 26, National Archives, Washington, D.C.	48	Greist, M. 1968. Nursing under the north star. Private publ., Monticello, IN 47960 (copy in Monticello Public Library), 172 p.	73	Journal <i>Narwhal</i> , 10 August 1898. Dukes County Historical Society, Mass.
21	Edson. Pers. commun. to Board of Missions, 1 July 1896. Episcopal Church Historical Society, Austin, Tex.	49	F. E. Durham. (Los Angeles County Museum of Natural History, 900 Exposition Blvd., Los Angeles, CA 90007. Pers. commun. to Director, Mar. Mammal Div., Natl. Mar. Fish. Serv., 7600 Sand Point Way N.E., Bldg. 32, Seattle, WA 98115, 3 December 1972).	74	P. J. Usher (P. J. Usher Consulting Services, 185 Somerset Street W., Suite 309, Ottawa, Ontario, Can. K3P 0J2. Pers. commun. to Bockstoce).
22	J. Driggs. Pers. commun. to Wood, 23 May 1902. Episcopal Church Historical Society, Austin, Tex.	50	Durham, F. E., and S. Burgess. 1972. Eskimo effort in bowhead whaling at Point Barrow, Alaska. Unpubl. manuscr., 19 p. University of Southern California, Los Angeles.	75	R. M. Gilmore (Natural History Museum, P.O. Box 1390, San Diego, CA 92112. Pers. commun. to Marquette, 8 April 1980).
23	Logbook <i>William Baylies</i> , 18 July 1906. Kendall Whaling Museum, Sharon, Mass.	51	F. E. Durham. (Los Angeles County Museum of Natural History, 900 Exposition Blvd., Los Angeles, CA 90007. Pers. commun. to Director, Mar. Mammal Div., Natl. Mar. Fish. Serv., 7600 Sand Point Way N.E., Bldg. 32, Seattle, WA 98115, 13 October 1972).	76	F. E. Durham (Los Angeles County Museum of Natural History, 900 Exposition Blvd., Los Angeles, CA 90007. Pers. commun. to Marquette, 27 February 1980).
24	Logbook <i>William Baylies</i> , 27 July 1907. Old Dartmouth Historical Society, New Bedford, Mass.	52	G. H. Jarrell. (Division of Life Sciences, Biological Sciences Program, University of Alaska, Fairbanks, AK 99701. Pers. commun. to Marquette, 11 October 1978).	77	Braham, H. W., B. Krogman, W. Marquette, D. Rugh, J. Johnson, J. Brueggeman, M. Dahlheim, M. Nerini, S. Savage, and R. Sonntag. Research in the western Arctic on bowhead whales, June-December 1979. Unpubl. manuscr. Natl. Mar. Mammal Lab., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way N.E., Bldg. 32, Seattle, WA 98115.
25	Logbook <i>John and Winthrop</i> , 16 July 1912. Private collection.	53	Journal <i>Alexander</i> , 25 May 1905. Dukes County Historical Society, Mass.	78	R. Barnes (Fisheries and Marine Service, Environment Canada, Inuvik, Northwest Territories, Canada X0E 0T0. Pers. commun. to Daniel O. Stewart, Natl. Mar. Fish. Serv., 632 Sixth Avenue, Anchorage, AK 99501, 15 December 1979).
26	Rev. H. Kinneveauk. (Point Hope, AK 99766. Pers. commun. to Marquette, 28 May 1976).	54	North Slope Borough. Beaufort Sea Traditional Land	79	Braham, H. W., and B. D. Krogman. 1977. Population biology of the bowhead (<i>Balaena mysticetus</i>) and beluga (<i>Delphinapterus leucas</i>) whales in the Bering, Chukchi, and Beaufort Seas. Processed rep., 29 p. Natl. Mar. Mammal Lab., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way N.E., Bldg. 32, Seattle, WA 98115.
27	Durham, F. E. 1979. Recent trends in bowhead whaling by Eskimos in the western Arctic with emphasis on utilization. Center for Environmental Education, Inc., Washington, D.C., 53 p.			80	Marquette, W. M. 1977. The 1976 catch of bowhead whales (<i>Balaena mysticetus</i>) by Alaskan Eskimos, with a review of the fishery, 1973-1976, and a biological summary of the species. Processed rep., 80 p. Natl. Mar. Mammal Lab., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way N.E., Bldg. 32, Seattle, WA 98115.
28	Journal <i>Mary and Helen II</i> , 2 August 1886. Nantucket Historical Association, Nantucket, Mass.				

Evolution of Shore-Based Whaling

Shore-based bowhead whaling in the United States (State of Alaska) can be conveniently subdivided into three chronological phases of activity: aboriginal (before 1885), commercial (1885-1909), and subsistence (1910 to present). Similar phases of whaling activity also occurred along the shores of northwestern Canada and the Chukchi Peninsula of the Union of Soviet Socialist Republics (U.S.S.R.). However, because of the better documentation on shore-based whaling, only the Alaskan chronology is discussed in this paper.

Aboriginal Phase

Prior to making contact with the commercial whalers in the 1880's, Alaskan Eskimos hunted the bowhead using only primitive handcrafted equipment. Harpoons rigged with sealskin floats were used to slow the whale in its flight. When the exhausted animal could no longer flee, the hunters cautiously approached it and, after severing its tail tendons to prevent the whale from submerging, its chest cavity was repeatedly pierced with lances until it bled to death. Because the Yankee whalers were at first extremely wary of both the ice and Eskimos in the Arctic, records of contacts made between the two groups during this period provide scant information on the yearly catch of bowheads by the Eskimos.

Commercial Phase

In northwestern Alaska it was the establishment of shore-based whaling stations during the 1880's that marked the end of aboriginal whaling and the beginning of a commercial phase. Each station consisted of a building or native hut that housed a skeleton crew of Yankee whalers and their whaling equipment. Originally, one whaler was in charge of each boat, and he was assisted by five to seven Eskimos hired as crew members. As shore-based whaling prospered some stations employed all-Eskimo crews to man additional boats. Although the natives still needed whales for food, the baleen provided a market for their labor as crew members,

or, if they were hunting on their own, directly provided a saleable commodity. In both practices the result was the same: They received money or staple foods and manufactured goods in payment and, after the whaling station's crews had stripped the whales of their baleen, the carcasses were usually given to the Eskimos for food.

During the commercial phase the natives began to obtain darting and shoulder guns in trade from the whalers. These implements were developed by American whalers especially for quickly killing bowheads before they could escape among the protective ice floes. The darting gun was a small, smooth-bore weapon with a detachable harpoon fixed to the end of a wood shaft. It enabled the harpooner to shoot a small bomb into the whale at the instant he harpooned the animal. The bomb was designed to explode a few seconds later, deep inside the whale, causing instant death or injury sufficient to restrict its flight. The shoulder gun, usually of brass and weighing about 12 kg (27 pounds), fired a similar bomb through the air and was accurate to about 15 m (50 feet). It allowed the gunner to dispatch a wounded, potentially dangerous whale from a safe distance.

Subsistence Phase

Collapse of the whaling industry early in the 20th century ushered in the third phase in the history of shore-based whaling—a return to whaling as a subsistence activity. The Eskimos did not, however, return to the use of primitive whaling weapons that had been utilized during aboriginal times. Instead, they continued to use the darting and shoulder guns which greatly increased their hunting efficiency.

The subsistence phase, which began in 1910 and continues today, is separated into two periods marked by different levels of hunting effort and catch. From 1910 to 1969, whaling was characterized by a relatively low but steady level of activity. During 1970-77, however, a rapid increase occurred in hunting effort and in the numbers of whales taken and struck but lost (Marquette, 1979).

Methods

Sources of Data

Data on shore-based whaling in the Bering, Chukchi, and Beaufort Seas during the 19th and 20th centuries have been compiled by the authors for approximately a decade. Much of the information was obtained from unpublished sources (Table 1). Conflicting data occasionally were encountered, but these were resolved by selecting information from the source we judged most reliable. Also, some data which earlier were thought to be correct, when reported by Marquette (1979), required revision. Although the data presented are as complete as possible based upon information available to date, important gaps still exist in our records and we would appreciate comments from persons having additional information.

Eskimos traditionally have not kept a written record of their catches; at Barrow, however, the famous whaler and trader Charles Brower compiled a record of whales that he took from 1886 until the 1920's (Brower, 1942; Table 1, C-3). Brower's son David continued to record the catch from 1928 to 1960 (Sonnenfeld, 1960; Maher and Wilimovsky, 1963). At Point Hope early catch data from 1890 to 1948 were assembled by Foote (Table 1, C-16). Since 1949, a whaling record has been kept by Herbert Kinneveauk, a Point Hope whaler (Table 1, C-26). The remaining data used in this paper came from published and unpublished accounts by explorers, scientists, schoolteachers, nurses, adventurers, magazines, newspapers, church records, whalers' journals and logbooks, and personal communications with Eskimos and scientists who have visited whaling villages.

Recording of Data

Data on shore-based whaling along the coasts of the Bering, Chukchi, and Beaufort Seas is reported by country and includes the United States (State of Alaska, Fig. 1), U.S.S.R. (Fig. 2), and Canada (Fig. 3). Information on strandings of bowheads throughout these areas also have been included.

Information reported in this paper on shore whaling in Alaska includes yearly

statistics by village on: Numbers of whales landed, killed but lost, and struck but lost; numbers of crews whaling; and data sources (Table 2). In a few instances the yearly catch for some villages was reported as "a few," "some," or "several" whales had been caught, or that the natives had "a lot of baleen." To utilize this type of information it was necessary to use a figure representing an average amount for accounts of this type. Mayokok (1950) reported that in about 1915 there were "several" crews at Wales; Durham (1979) recorded an account of six crews at that village in about 1916. Allen (1978), neglecting to state how many whales had been caught, reported that "quite a lot" of whalebone had been taken at Point Hope in 1906; the log-book from the whaling vessel *William Baylies* (Table 1, C-23) recorded that nine whales had been taken there that year. Finally, Fraker et al. (1978) arbitrarily selected the amount of five to be used for all accounts of "several" bowhead whales reported as being sighted. Using these examples it was assumed that a quantity of five represented a reasonable amount to use in such cases; these estimated numbers are given in parentheses in the catch tables to separate them from the known catch¹.

Information on the numbers of crews whaling at all Alaskan villages has been compiled in an attempt to obtain some insight into the total effort expended annually by Eskimos for hunting bowhead whales (Table 2, Fig. 4). In most instances, the figures given represent a minimum number of crews because the total sum of active crews at a given village is seldom found in the literature. Occasionally it was possible to establish a specific number of crews whaling at some villages because the

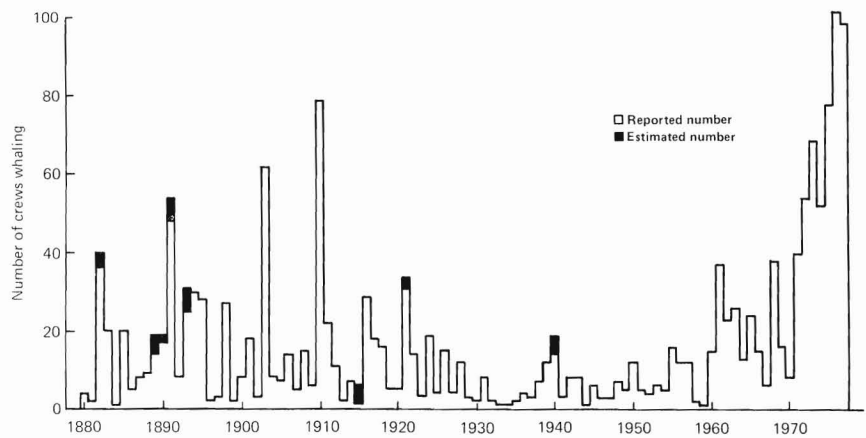


Figure 4.—Number of crews hunting bowhead whales yearly in Alaska. Because records are scarce, figures represent minimal numbers only to provide an index to whaling effort.

names of captains (crew leaders) that had successfully taken whales during a particular year were reported.

Additionally, information was collected on whales that had been struck but lost and those killed and lost. Numbers of individuals struck and lost have an as yet unquantified effect on estimates of mortality. Also, past reports on the bowhead catch frequently omitted those that had been killed but lost for various reasons. Since these incidents are important elements of total mortality, they have been recorded.

Information reported on shore-based whaling by Eskimos in the U.S.S.R. and Canada has been limited to the yearly catch of whales by village and data sources because of sparse data found on the other aspects of whaling.

Bowhead strandings in the Bering, Chukchi, and Beaufort Seas, including those found dead and beached, floating at sea, or frozen into the ice, are reported as they represent one aspect of total mortality within the population. This category includes whales that may have died as a result of whaling activities, e.g., those struck but lost. Although the fate of whales that have been struck but not retrieved is unknown, we do know that some individuals recover after being struck (Cook, 1926; Bodfish, 1936; Albert et al., 1980).

Results and Discussion

United States

Aboriginal Phase

Because of a paucity of information on aboriginal whaling, it is difficult to determine the numbers of whales harvested by Eskimos prior to 1885 when the commercial phase began (Table 2). Simpson (1854-55), who wintered at Barrow soon after the commencement of commercial whaling in the Bering Strait region, reported that the natives there killed 17 bowheads in 1852 and 7 in 1853. Although the 1852 catch was a successful harvest, 1853 was considered an extremely poor year, verging on disaster. Ray (1885) reported that 24 bowheads were landed at Barrow in 1854. During the period 1855-78, the available data indicate that five were taken at Point Hope in 1869, five at St. Lawrence Island in 1870, and four at Icy Cape in 1872. Murdoch (1885) noted that 10 bowheads were landed at Barrow in 1881. At Point Hope, village elders related to Rainey (1947) that their ancestors sometimes took as many as 15-18 whales during the spring season. From the available data, at least 8 or 10 whales per year were taken by the Alaskan Eskimos prior to 1884. This minimal estimate cannot be compared

¹The reader is advised that the authors could not come to a mutual agreement on the use of an estimated value for use in cases where the catch was given as a few, some, several, or a lot. The senior author therefore elected, for reasons stated, to use an average amount to facilitate presentation of such information in the tables and graphs. It is of course very possible that considerably more or perhaps fewer animals were taken, and the estimated values should be interpreted with care.

Table 2.—Data on shore-based bowhead whaling at sites in Alaska.

Site and year	No. of crews	Number of whales			Sources (Literature cited and code (C) number in Table 1)	Site and year	No. of crews	Number of whales			Sources (Literature cited and code (C) number in Table 1)		
		Struck and lost	Landed	Killed but lost				Total killed	Struck and lost	Landed		Killed but lost	Total killed
St. Lawrence Island					Kivalina								
1870	—	—	5	—	5	C-1	1958	1	—	—	—	—	Morgan (1974)
1880	1	—	1	—	1	Keim (1969)	1960	1	—	—	—	—	Saario and Kessel (1966)
1881	—	—	1	—	1	Hooper (1881), C-2	1961	0	0	0	0	0	Saario and Kessel (1966)
1886	—	—	2	—	2	C-3	1964	—	—	1	—	1	Durham (1979)
1891	—	—	4	—	4	C-4, C-5	1970	—	—	1	0	1	Morgan (1974)
1894	—	—	(2) ¹	—	(2)	Cook (1926)	1971	—	—	1	0	1	Morgan (1974)
1899	—	—	1	—	1	Cook (1926)	1972	—	—	1	0	1	Morgan (1974)
1903	1	—	0	—	0	Cook (1926)	1973	—	—	0	1	1	Morgan (1974)
1909	—	—	0	—	0	Bodfish (1936)	1974	5	1	0	0	0	Morgan (1974), C-10
1911	—	—	3	—	3	C-6	1975	5	0	0	0	0	Marquette (1976)
1921	20	—	—	—	—	Hunt (1975)	1976	3	0	0	0	0	Marquette (1978)
1928	3	2	—	—	—	Geist (1937), Keim (1969)	1977	3	2	1	1	2	Marquette (1979)
1929	—	—	1	—	1	Keim (1969)	Point Hope						
1936	—	—	1	—	1	Smith (1937)	1869	—	—	(5) ²	—	(5)	C-13
1937	—	—	1	—	1	Smith (1937)	1880	—	—	5	—	5	Bean (1887), Hooper (1881)
1940	—	—	5	—	5	Hughes and Hughes (1960)	1882	8-10	—	—	—	—	Murdoch (1891)
1952	—	—	1	—	1	Rodahl (1963)	1885	10	—	12	—	12	Brower (1942), C-3
1953	—	1	2	—	2	C-7	1888	—	—	12	—	12	C-14
1954	—	—	0	—	0	Hughes and Hughes (1960)	1889	—	—	18	—	18	Poole (1971)
1955	11	—	2	—	2	Hughes and Hughes (1960), C-7	1890	1	—	1	—	1	C-3, C-15, C-16
1956	—	—	1	—	1	C-7	1891	8-10	—	8	—	8	Woolfe (1893), C-17
1957	—	—	0	—	0	C-7	1892	—	—	0	—	0	C-16, C-18
1958	—	—	0	—	0	C-7	1893	8-10	—	13	—	13	Woolfe (1893), C-19
1960	—	1	0	—	0	C-7	1894	—	—	3	—	3	Klengenberg (1932)
1961	—	1	1	—	1	Alaska* (1965), C-7	1895	—	—	0	—	0	C-20
1962	—	4	0	—	0	Alaska (1965), C-7	1896	—	—	33	—	33	C-16, C-21
1963	—	—	0	—	0	Alaska (1965)	1897	—	—	32	—	32	Eskimo (1897)
1964	—	—	0	—	0	Alaska (1965)	1898	—	—	2	—	2	Eskimo (1898)
1965	1	—	1	—	1	Alaska (1965)	1901	—	—	1	—	1	C-16, C-22
1966	2	—	2	—	2	C-8	1902	—	—	2	—	2	C-16, C-22
1967	—	—	3	—	3	Durham (1979)	1903	60	1	4	—	4	Allen (1978)
1968	20	4	1	—	1	Durham (1973), C-7	1904	4	—	1	—	1	Allen (1978)
1969	1	—	2	—	2	Alaska (1969b)	1905	1	—	2	—	2	Allen (1978)
1971	—	—	1	—	1	Durham (1979)	1906	1	—	9	—	9	C-23
1972	12	3	2	0	2	Burgess (1974)	1907	—	—	0	—	0	C-16, C-24
1973	20	1	6	—	6	C-9	1908	—	—	13	—	13	C-16
1974	11	2	2	—	2	Stevens (1976), C-10	1909	1	—	13	—	13	Marsh and Cobb (1910)
1975	23	—	1	1	2	Marquette (1976)	1910	22	—	1	—	1	Marsh and Cobb (1911), Allen (1978)
1976	22	5	8	0	8	Marquette (1978)	1911	—	—	3	—	3	C-16
1977	27	8	2	0	2	Marquette (1979)	1912	—	—	9	—	9	C-25
Wales					1913								
1888	1	—	1	—	1	Ray (1975)	1913	—	—	1	—	1	C-16
1889	10-12	12	3	—	3	Thornton (1931)	1914	—	—	2	—	2	C-16
1890	10-12	2	0	0	0	Thornton (1931)	1915	—	3	3	—	3	C-16
1891	10-12	29	1	—	1	Thornton (1931)	1916	—	1	7	—	7	C-16
1893	—	—	2	—	2	Eskimo Bull. (1893)	1917	2	2	3	—	3	Reese (1918), C-16
1895	—	—	0	—	0	Ray (1975)	1918	—	—	7	—	7	C-16
1897	—	—	0	—	0	Eskimo Bull. (1897)	1919	—	—	2	—	2	C-16
1900	—	—	0	—	0	Bernardi (1912)	1920	—	—	3	—	3	C-16
1901	16	—	8	—	8	Eskimo (1936), Jackson (1906)	1921	—	—	2	—	2	C-16
1902	—	—	11	—	11	Witten (1904)	1922	—	—	13	—	13	C-16
1906	—	—	0	—	0	Andrews (1939)	1923	—	—	1	—	1	Mayokok (1955)
1907	—	—	0	—	0	Andrews (1939)	1924	14	1	16	—	16	Thomas (1962), C-16
1908	—	—	0	—	0	Andrews (1939)	1925	—	—	10	—	10	C-16
1909	—	—	0	—	0	Andrews (1939)	1926	—	—	13	—	13	C-16
1910	—	—	0	—	0	Andrews (1939)	1927	—	—	3	—	3	C-16
1911	—	—	0	—	0	Andrews (1939)	1931	—	—	1	—	1	Allen (1978)
1912	—	—	0	—	0	Andrews (1939)	1936	—	—	4	—	4	Eskimo (1937)
1913	—	—	0	—	0	Andrews (1939)	1940	10-15	8	5	—	5	Larsen and Rainey (1948), Rainey (1940)
1914	—	—	0	—	0	Eskimo (1916)	1941	—	13	14	—	14	Alaska (1941, 1943)
1915	(5) ²	—	0	—	0	Andrews (1939), Mayokok (1950)	1945	—	—	3	—	3	C-16
1916	6	—	1	—	1	Eskimo (1916), Durham (1979)	1946	—	—	2	—	2	C-16
1918	—	—	1	—	1	Eskimo (1918)	1947	—	—	6	—	6	C-16
1922	6	—	—	—	—	Bailey (1971)	1948	—	—	0	—	0	C-16
1938	1	—	1	—	1	Durham (1979)	1949	4	—	4	—	4	C-26
1939-68	—	—	0	—	0	U.S. Fed. Field Comm. (1968)	1950	2	—	2	—	2	C-26
1950	7	—	—	—	—	Mukluk Telegraph (1950)	1951	4	8-10	4	—	4	C-16, C-26
1969	—	—	1	—	1	C-11	1952	2	—	2	3	5	Weed (1957), C-26
1970	2	—	1	—	1	Durham (1979)	1953	4	—	4	—	4	C-26
1971	—	—	1	—	1	C-12	1954	3	—	3	—	3	C-26
1972	—	—	0	—	0	C-12	1955	1	—	1	—	1	VanStone (1962), C-26
1973	—	—	0	—	0	C-12	1956	9	3	2	—	2	VanStone (1962), C-26
1974	—	—	0	—	0	C-12	1957	3	—	3	—	3	C-26
1975	—	—	0	—	0	C-12	1958	1	—	2	—	2	C-26
1976	2	0	0	0	0	Marquette (1978)	1959	1	—	1	—	1	Johnson et al. (1966), C-26
1977	2	0	0	0	0	Marquette (1979)	1960	13	8	4	—	4	Johnson et al. (1966), C-16, C-26
							1961	13	2	2	—	2	Johnson et al. (1966), C-16, C-26

*The title of this magazine from the beginning of publication in 1935 through 1958 was *The Alaska Sportsman*, from 1959 through August 1969 it was *Alaska Sportsman*, and from September 1969 to the present it has been *Alaska*.

Table 2.—Continued.

Site and year	No. of crews	Number of whales			Sources (Literature cited and code (C) number in Table 1)	Site and year	No. of crews	Number of whales			Sources (Literature cited and code (C) number in Table 1)		
		Struck and lost	Landed	Killed but lost				Total killed	Struck and lost	Landed		Killed but lost	Total killed
1928	7	1	11	—	11	Maher and Wilimovsky (1963), Vincent (1944), C-33	1975	30	10	10	1	11	Marquette (1976)
1929	—	—	15	—	15	Maher and Wilimovsky (1963), C-33	1976	36	18	23	8	31	Marquette (1978)
1930	1	—	7	—	7	Maher and Wilimovsky (1963), C-33	1977	35	56	20	2	22	Marquette (1979)
1931	1	—	11	—	11	Maher and Wilimovsky (1963), C-33	Nuiqsut						
1932	2	—	7	—	7	Maher and Wilimovsky (1963), C-37	1973	1	—	1	—	1	C-9
1933	—	—	5	—	5	Maher and Wilimovsky (1963), C-3	1974	1	—	0	—	0	C-10
1934	—	—	4	—	4	Maher and Wilimovsky (1963), C-33	1975	1	0	0	0	0	Marquette (1976)
1935	—	—	6	—	6	Maher and Wilimovsky (1963), C-33	1976	3	0	0	0	0	Marquette (1978)
1936	—	—	4	—	4	Maher and Wilimovsky (1963), C-33	1977	4	0	0	0	0	Marquette (1979)
1937	—	—	9	—	9	Maher and Wilimovsky (1963), C-33							
1938	—	—	4	—	4	Maher and Wilimovsky (1963), C-33	Kaktovik, Barter Island						
1939	10	—	6	—	6	Maher and Wilimovsky (1963), C-33, North (1940)	1964	2	—	2	—	2	Durham (1979), C-51
1940	—	—	0	—	0	Maher and Wilimovsky (1963), C-33	1972	—	—	1	—	1	C-52
1941	—	—	8	—	8	Alaska (1941)	1973	2	—	3	—	3	C-9
1942	7	—	10	—	10	Maher and Wilimovsky (1963), Vincent (1944), C-33	1974	2	—	2	—	2	C-10
1943	7	—	6	—	6	Maher and Wilimovsky (1963), Vincent (1944), C-33	1975	2	0	0	0	0	Marquette (1976)
1944	—	—	0	—	0	Maher and Wilimovsky (1963), C-33	1976	7	0	2	—	2	Marquette (1978)
1945	2	—	2	1	3	Maher and Wilimovsky (1963), Buice (1947)	1977	5	0	2	0	2	Marquette (1979)
1946	1	—	9	—	9	Maher and Wilimovsky (1963), C-33, Alaska (1947)	Miscellaneous Locations						
1947	—	—	4	—	4	Maher and Wilimovsky (1963), C-33	King Island						
1948	—	—	5	—	5	Maher and Wilimovsky (1963), C-33	1897	—	—	1	—	1	Cook (1926)
1949	—	—	0	—	0	Maher and Wilimovsky (1963), C-33	Little Diomed Island						
1950	—	—	4	—	4	Maher and Wilimovsky (1963), C-33	1905	—	—	1	—	1	Jones (1927), C-53
1951	—	—	9	1	10	Maher and Wilimovsky (1963), Spencer (1959), C-33	1910	—	—	1	—	1	Bodfish (1936)
1952	—	—	0	—	0	Maher and Wilimovsky (1963), Spencer (1959), C-33	1916	11	—	1	—	1	Eide (1952)
1953	1	—	17	—	17	Maher and Wilimovsky (1963), Lindsay (1957), C-33	1976	7	—	—	—	—	Brummer (1977)
1954	—	—	1	—	1	Maher and Wilimovsky (1963), C-33	Kotzebue Sound						
1955	—	(5) ²	19	—	19	Maher and Wilimovsky (1963), Durham (1979), Freuchen and Salomonsen (1958)	1880	—	—	1	—	1	Nelson and True (1887)
1956	—	—	2	—	2	Maher and Wilimovsky (1963)	Cape Lisburne						
1957	9	—	0	—	0	Maher and Wilimovsky (1963), Alaska (1957)	1950	1	—	1	—	1	Durham (1979)
1958	—	—	0	—	0	Maher and Wilimovsky (1963)	Cape Halkett						
1959	—	—	0	—	0	Maher and Wilimovsky (1963)	1919	1	—	1	—	1	C-54
1960	—	—	15	—	15	Maher and Wilimovsky (1963)	Cross Island/Prudhoe Bay						
1961	18	3	6	1	7	Caldwell and Caldwell (1966), C-35, C-37	1921	2	—	1	—	1	Carnahan (1979), Shapiro and Metzner (1979), C-54
1962	17	2	5	1	6	C-35, C-49	1922	1	—	1	—	1	Carnahan (1979)
1963	21	—	5	—	5	Groom (1963), C-37	1927	1	—	1	—	1	Carnahan (1979), C-54
1964	7	6	11	—	11	C-27, C-37, C-49	1928	1	—	1	—	1	Carnahan (1979)
1965	19	—	4	—	4	C-37, C-50	1935	1	—	1	—	1	Shapiro and Metzner (1979)
1966	7	15	7	—	7	Poulter (1966), C-27, C-37	1938	1	—	1	—	1	Carnahan (1979)
1967	4	—	3	—	3	C-37, C-49	Flaxman Island						
1968	10	—	10	1	11	C-37	1929	1	—	1	—	1	Wentworth (1978)
1969	11	—	11	—	11	Morgan (1974), C-37	Unlocated						
1970	2	—	16	—	16	Alaska (1970), McVay (1973), Johnson (1977)	1898	13	—	—	—	—	Bertholf (1899)
1971	25	—	13	—	13	C-37, C-50	1916	—	—	1	—	1	Bower and Aller (1917)
1972	27	—	20	—	20	Okakok (1972), C-11, C-37	1917	—	—	2	—	2	Bower and Aller (1918)
1973	28	7	17	—	17	C-9	1923	—	—	2	—	2	Bower (1925)
1974	21	20	9	2	11	C-10	1937	—	—	6	—	6	Alaska (1938)

¹Natives reported to have about 2,000 pounds of baleen, assumed 2 bowheads taken. These estimated values are given in parentheses.

²For reports of a few, some, several, or a lot, an estimated value of five was assumed to be an average amount (see text and text footnote 1).

³Durham (1979) reported that as many as 11 crews whaled at Icy Cape.

⁴14,000 pounds of baleen reported, assumed 1,500 pounds per average large bowhead.

⁵10,000 pounds baleen plus two whales reported, assumed 1,500 pounds per average large bowhead.

with periods after 1884 when data are probably more complete and better represent the total annual catch by all whaling villages.

Commercial Phase

Shore-based commercial whaling began at Point Barrow in 1885 (Brower,

1942), and many other stations were soon established along the northwest coast of Alaska. By the winter of 1897-98, for example, 13 such stations, owned and operated by white men, were strung out along the coast between Point Hope and Cape Seppings (Bertholf, 1899; Fig. 1). These shore stations

thoroughly changed the character, but not the technique of Eskimo whaling. As many as 60 crews whaled at some stations in the spring (Allen, 1978), and most were made up of Eskimos from throughout northwestern Alaska. Before long, the number of crews operating had increased substantially above

the aboriginal level (Table 2). For example, shore-based commercial whalers more than tripled the number of Eskimo crews hunting at Point Hope prior to the establishment of whaling stations (Foote and Williamson, 1966).

The increased whaling effort during the commercial phase (1885-1909) is reflected in the increased take (Fig. 5). A total of 552 whales were taken during this 25-year period, resulting in an average annual catch of 22 animals. During this period an annual harvest of 38-49 whales occurred seven times. Although data gaps in the record mean that a total catch during the period cannot be determined, it appears likely that the harvest for some years exceeded 50 whales.

Subsistence Phase

Collapse of the commercial whaling industry in 1909 ushered in the third phase of Eskimo whaling—a return to whaling as a subsistence activity. Because bowheads were now commercially of little value, the number of Eskimo crews declined to near the aboriginal level as many native whalers turned to fur trapping as their only means of trading for manufactured goods. Trapping forced the Eskimos to leave the whaling villages and to disperse inland or along the coast. By 1914 the Alaskan Eskimos had almost abandoned whale hunting (Jenness, 1957). The incentive for whaling was so weak that in 1928 Brower (Table 1, C-3) remarked laconically that, although whaling conditions were good and whales were plentiful, many were bombed and lost because the Eskimos seemed to have forgotten how to whale and showed no interest in learning again because whalebone was now hardly worth taking.

During the period 1910-69, the annual catch dropped sharply, fluctuating between 1 and 25 animals except in 1925 when 32 were taken (Fig. 5). Years with high catches were relatively infrequent, exceeding 20 whales only seven times. During this 60-year period, the available records indicate a total of 704 bowheads were taken averaging 11.7 annually.

Beginning in 1970, however, the catch increased drastically (Fig. 5).

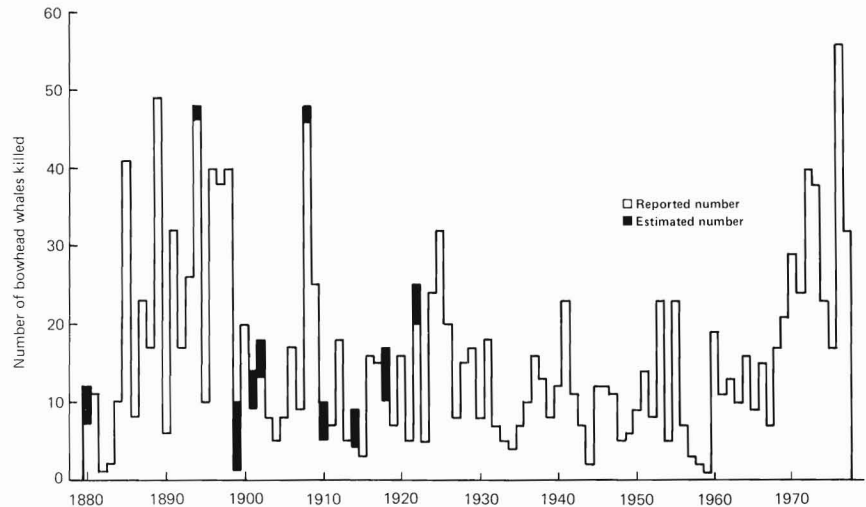


Figure 5. — Number of bowhead whales killed annually by shore-based whalers in Alaska.

From 1970 through 1977 a total of 259 bowheads, an annual average of 32.4 whales, were landed. This 8-year take alone consisted of 37 percent of the total taken during the previous 60 years. Since 1970, whaling effort during the spring season at Barrow has increased by more than 50 percent over the level during the 1960's, and a similar increase has occurred at St. Lawrence Island (Marquette, 1979; Table 1, C-80). A significant increase in effort has been recorded for the villages of Point Hope and Kivalina. In addition, there has been a marked increase in the number of crews hunting during the autumn at Kaktovik and Nuiqsut in recent years (Table 2). Beginning in 1978 the hunt has been on an annual quota basis established by the IWC; therefore, our study of the Alaskan catch concludes with the harvest for 1977.

U.S.S.R.

Whaling Villages

Little information is available on the locations where bowhead whales were taken by the Siberian Eskimos. Villages located on the Chukchi Peninsula (Fig. 2) are favorably situated for hunting bowheads during the spring and autumn migrations (Braham et al., 1980; Cook, 1926). However, because the animals

move beyond the area accessible to small whaling boats during the spring, the main whaling season is in the autumn (Tomilin, 1957). Tomilin (1957) stated that southbound migrating bowheads occasionally enter bays and inlets along the coast. In December 1933, for example, 2 bowheads were observed in Plover Bay and 10 were sighted in Tkachen Bay. Hunters at the village of Naukan in Bering Strait informed Tomilin that three to four times more whales were seen during the autumn than in the spring.

Eskimo hunters considered Mys Chaplina (also called Indian Point), across the Strait of Anadyr from St. Lawrence Island, to be the most productive place for whaling along the Chukchi Peninsula as it projects far out into the sea. Moreover, many large polynyas form there during ice covered periods. Tomilin (1957) also stated that natives residing along the north coast of the Chukchi Peninsula between Mys Dezhneva (also called East Cape) and Mys Serdtse-Kamen' seldom saw bowheads in the spring, but whaled primarily during the autumn; the catch was, however, poorer than that of Siberian Eskimos whaling in the Bering Strait. Zenkovich (1934) visited villages from Bukhta Provideniya (Providence Bay) to Mys Dezhneva in 1933

Table 3.—Number of bowheads landed by shore-based whalers at sites on the Chukchi Peninsula, U.S.S.R.

Year	Site								Total	Source (Literature cited and code (C) number in Table 1)	
	Bering Sea					Chukchi Sea					
	Laguna Imtuk	Sireniki/Imtuk	Plover Bay	Markov Bukhta	Chaplino	Zaliv Lavrentiya	Naukan	Uelen	Netakeniskhvin/Enurmino	Unlocated	
1849	—	—	—	—	—	—	—	1	—	1	C-55
1851	—	—	—	—	—	—	—	1	—	1	Friend (1853)
1852	—	—	—	—	—	—	—	1	—	1	C-56
1859	—	—	4	—	—	—	—	—	—	4	C-57
1865	—	—	—	—	—	—	—	1	—	1	C-58
1866	—	3	5	—	—	—	—	1	—	9	C-59, C-60, C-61
1869	—	—	—	—	—	2	—	—	—	2	C-62
1870	—	—	(5) ¹	—	—	—	—	1	—	1+(5)	Nelson and True (1887), Wilkinson (1905)
1871	2	—	—	—	1	—	—	—	—	3	Wilkinson (1905), C-63
1877	—	—	—	—	—	—	—	5	—	5	C-64
1880	—	—	—	1	—	—	—	—	—	1	C-65
1884	—	—	—	—	5	—	—	—	—	5	C-66
1885	—	—	—	—	—	—	—	—	—	19	Bodfish (1936)
1886	—	—	(5) ¹	—	—	—	—	(5) ¹	—	(10)	C-3
1887	—	—	—	—	—	—	—	1	—	1	C-67
1891	—	—	0	—	—	—	—	—	—	0	C-68
1894	—	—	1	1	(1) ²	—	—	—	—	2+(1)	Russell (1898), C-59
1895	—	—	—	—	3	—	1	1	—	5	C-59
1898	(5) ¹	—	(4) ²	—	—	—	—	—	—	(9)	Cook (1926)
1899	—	—	—	—	1	1	—	1	—	3	Cook (1926), C-59
1900	1	—	1	—	—	—	—	—	—	1	Cook (1926), Crad (1939)
1902	2	—	—	—	—	—	—	—	—	2	Jones (1927)
1903	—	—	—	1	—	—	—	—	—	1	Jones (1927)
1906	3	—	—	—	—	—	—	—	—	3	C-69
1907	—	—	2	—	—	—	—	—	—	2	C-70
1908	1	—	—	1	—	—	—	7	2	11	C-59
1909	3	—	3	—	—	—	—	—	—	6	Bodfish (1936), C-70
1920	—	4	—	—	—	—	1	—	—	5	C-59
1924-32	—	—	—	—	—	—	—	6	—	6	Tomilin (1957)
1927	—	—	—	—	—	—	1	—	—	1	C-59
1928	—	2	—	—	—	—	—	—	—	2	C-59
1929	—	1	—	—	—	—	1	—	—	2	C-59
1930	—	1	—	—	—	—	—	—	—	1	C-59
1932	—	5	—	—	—	—	2	—	—	7	C-59
1933	—	6	—	—	—	—	2	—	—	8	Tomilin (1957), C-59
1934	—	6	—	—	—	—	2	—	—	8	C-59
1935	—	2	—	—	—	—	0	—	—	2	C-59
1936	—	0	—	—	—	—	3	—	—	3	C-59
1937	—	2	—	—	—	—	—	—	—	2	C-59
1958	—	1	—	—	—	—	—	—	—	1	Yablokov and Bel'kovich (1967)
1972	—	—	—	—	—	—	—	—	—	1	C-71
1973	—	—	—	—	—	—	—	—	—	2	C-71
1974	—	—	—	—	—	—	—	—	—	3	C-71
1975	—	—	—	—	—	—	—	—	—	2	C-71
1976	—	—	—	—	—	—	—	—	—	0	C-71
1977	—	—	—	—	—	—	—	—	—	0	C-71

¹For several, few, or some reported, an estimated value of five was used as an average (see text and text footnote 1). These estimated values are given in parentheses.

²Estimated from baleen obtained in trade from natives.

and reported finding hand harpoons with grenades (bombs) in native homes at Sireniki, Naukan, Dezhnevo, and Uelen (also called Whalen). In a later publication Zenkovich (1954) listed Chaplino as an important whaling village and stated that whaling also occurred at a few other (unnamed) locations. Sleptsov (1955) named Uelen, Sireniki, and Naukan as the principal whaling villages on the Chukchi Peninsula.

Whaling Activities

The catch of bowhead whales by Siberian Eskimos is poorly documented (Table 3). Tomilin (1957) noted that hunters at the villages of Netakeniskhvin and Enurmino caught only six whales between 1924 and 1932. He further stated that hunters along the northeast coast of the Chukchi Peninsula (presumably prior to 1955) took up to 10 whales annually using primitive

methods. Zenkovich (1934) stated that up to 10 bowheads were killed annually at villages from Bukhta Provideniya to Mys Dezhneva. According to Sleptsov (1955), 10-20 bowheads were taken annually at Uelen, Sireniki, and Naukan. Geller (1957) noted that whalers at the village of Naukan caught whale calves weighing up to 10,160 kg (10 long tons), and that "many" bowheads occurred in Mechingmenskaya Guba (Mechigmen Bay) and were hunted by Eskimos using high powered rifles and firing up to 1,000 bullets during a single all-day hunt. Geller also stated that the local inhabitants avoided hunting humpback, *Megaptera novaeangliae*, and gray, *Eschrichtius robustus*, whales because they were too dangerous to pursue in small boats. Although Zimushko (1969) reported that bowheads were rarely taken by Siberian Eskimos, Ivashin et al. (1972) stated that during the more successful years they took up to 10 bowhead whales annually; unfortunately, no further details were given, such as time of year (presumably in autumn) or location.

Additional data on the early years of whaling by Siberian Eskimos has been provided by American authors. Information obtained from American whaling vessel logbooks and other whaling publications indicate that Eskimos inhabiting settlements at Zaliv Lavrentiya (St. Lawrence Bay), Mys Chaplina, Markov Bukhta (Marcus Bay), Plover Bay, Laguna Imtuk (also called John Howland Bay), Mys Achchen, and Mys Beringa (Cape Bering) hunted bowhead whales from May through October during early commercial whaling. Cook (1926), providing firsthand information, stated that Eskimos from Mys Dezhneva to Mys Chaplina on the west side of the Bering Strait, were very good hunters and, as the whales passed through the Strait in the spring and autumn, many were taken. Furthermore, he wrote that every settlement from Mys Dezhneva to John Howland Bay, a distance of about 232 km (125 n.mi.), was outfitted with boats and whaling gear obtained in trade with Yankee commercial whalers. Stefansson (1913) noted that a good many (number unspecified) bowheads were killed in the

spring by Siberian Eskimos at Mys Chaplina, Plover Bay, and at Mys Dezhnova. Foote (1966) wrote that Eskimos from at least one (unspecified) village on the Chukchi Peninsula were still hunting bowheads during the mid-1960's.

Catch Data

Insufficient data preclude a reliable estimate of the number of bowheads taken annually by Siberian Eskimos relative to the three major periods (aboriginal, commercial, and subsistence) of hunting. However, a rough estimate of the minimum annual harvest by decade is useful. From 1849 to 1859 the minimum mean annual take was 1.8 (Table 4). During the period 1860-1940, however, where the number of sample years was 38, no difference in catch by decade was noted (annual mean of 4.1). Apparently the annual take of bowhead whales did not vary greatly between the period when commercial whaling took place compared with the postcommercial or subsistence phase. Eight bowheads landed from 1972 to 1977 (annual mean of 1.3) were taken by means of U.S.S.R. gray whale catcher boats (Table 1, C-74). Siberian Eskimos have not hunted bowheads using traditional means since 1969 when chartered whaling vessels began to be used for taking gray whales to reduce the number of individuals struck but lost (Ivashin and Mineev, 1978; Zimushko and Ivashin, 1980).

Catch data for Siberian Eskimos are admittedly scarce, but the available information suggests that a relatively low harvest took place, perhaps 3-6 whales annually (Table 3). Since our findings indicate a lower annual catch than the approximately 10 whales reportedly taken annually in the Soviet literature, it appears that some significant records may be missing.

Whaling effort by Siberian Eskimos cannot be evaluated because of insufficient data. In 1887 and 1907, however, 35 and 20 crews, respectively, were reported whaling (Aldrich, 1889; Bodfish, 1936; Table 1, C-73). This suggests that a substantial effort was made relative to the catch (one whale in

Table 4.—Average number of bowhead whales landed by decade in the U.S.S.R. by Eskimos.

Ten-year periods	No. of years that catch is known	Total no. of whales landed	Average no. of whales landed (per year)
1849	1	1	1.0
1850-1859	3	6	2.0
1860-1869	3	12	4.0
1870-1879	3	14	4.7
1880-1889	4	17	4.2
1890-1899	5	20	4.0
1900-1909	7	28	4.0
1920-1929	5	16	3.2
1930-1939	7	31	4.4
1970-1979	6	8	1.3

Table 5.—Number of bowheads landed by shore-based whalers in northwest Canada.

Location	Year	No. of whales	Source (Literature cited and code (C) number in Table 1)
Herschel Island	1888	1	Hadley (1915)
Niakunak	1918ca	1	Fraker (1977)
Between Cape Bathurst and Herschel Island	1915	1	Stefansson (1921)
Atkinson Point	1869	1	C-72
Baillie Island	1898	1	C-73
Baillie Island	1901	0	Cook (1926)
Baillie Island	1922	1	C-74

1887 and two in 1907) or that the catch data are underreported. Because the number of whales harvested each year can vary greatly even with near equal effort (Marquette, 1976, 1978, 1979; Braham et al., 1979; Table 1, C-80), comparisons of effort and catch are meaningless without more reliable documentation.

Canada

Whaling Activity and Catch

During the 19th century and first years of the 20th century, Eskimos in the western Canadian Arctic area hunted bowheads at Warren Point, Cape Bathurst, Langton Bay, and Franklin Bay (Maguire, 1857; Anderson, 1926, 1946; Fig. 3). After 1909, when baleen lost its commercial value, Eskimos continued to hunt bowheads only sporadically and occasionally may have killed one as late as the 1920's (Anderson, 1946; Fraker, 1977; Table 1, C-57). Regrettably, so few data have been found that a meaningful analysis of the Cana-

Table 6.—Bowhead whales found dead on the beach, frozen in the ice, or floating at sea in the Bering, Chukchi, and Beaufort Seas.

Location	Year	No. of whales	Sources (Lit. cited and code (C) number in Table 1)
United States:			
Cape Beaufort	1826	1	Beechey (1832)
Pribilof Islands	1889	3	Jordan (1899)
Pitt Point	1913	1	Bailey and Hendee (1926), Allen (1978)
Prudhoe Bay	1913	1	Stefansson (1921)
Cape Halkett	1914	2	Jenness (1957)
St. Lawrence Is.	1931	1	C-75
Wales	1936	1	Collins (1937)
Kivalina	1951	1	Mukluk Telegraph (1951)
Little Diomedede Is.	1953	1	Carlson (1966)
Nome	1968	1	Alaska (1969a)
Barrow-Wainwright	1971	1	C-76
St. Lawrence Is.	1975	4	Fay (1975)
St. Lawrence Is.	1976	1	Fay et al. (1977)
Point Barrow	1976	2	Marquette (1978)
Point Barrow	1979	1	C-77
Canada:			
Herschel Is.	1894	1	Cook (1926)
Langton Bay	1905	1	Stefansson (1921)
Langton Bay	1910	1	"
Cape Bering	1911	1	"
Mary Sachs, Banks Is.	1914	1	"
Tuktoyaktuk Peninsula	1972	1	Kuyt (1974)
"	1973	1	Hoek (1978)
"	1974	5	Hoek (1978)
"	1975	3	Hoek (1978)
Herschel Is.	1978	2	C-78
Soviet Union:			
Uelen	1853	1	Holmes (1857)
Ostrov Vrangelya	1881	1	Hooper (1884)
Ostrov Novaya Sibir'	1928	1	Tomilin (1957)
Karaginskii Zaliv	1932	(40-60) ¹	"
Uelen	1933ca	6	"
Mys Krestovskiy	1943	1	"

¹Reported that scores perished in the ice; we estimated 40-60.

dian Eskimo harvest in this area is impossible. Information located to date merely shows that from 1869 to 1922, six bowheads were taken by Eskimos along the Canadian coast of the Beaufort Sea (Table 5).

Strandings

Known bowhead strandings along the coasts of the Bering, Chukchi, and Beaufort Seas are listed in Table 6. These deaths may have resulted from any one or a combination of the following causes: 1) Natural mortality; 2) whales killed at sea by commercial whaling vessels and cast adrift after being stripped of their baleen; 3) whales that were struck but lost; or 4) accidental deaths, including entrapment in the ice. Strandings have been recorded

separately from the catch because it cannot be determined when death occurred or if the whales died as a result of whaling activities. Only a small number of strandings have been reported. This was probably more a result of a lack of interest in reporting such events rather than an actual indication of mortality other than catch data.

Acknowledgments

We are grateful to those who collected data through the years and kindly shared their information with us: John J. Burns, Alaska Department of Fish and Game, Fairbanks; Francis H. Fay, University of Alaska, Fairbanks; Don C. Foote (deceased), formerly at McGill University, Montreal, Quebec, Canada; Herbert Kinneveauk, Point Hope, Alaska; Frederick A. Milan, University of Alaska, Fairbanks; Staff of the Naval Arctic Research Laboratory, Barrow, Alaska; and Clinton Swan, Kivalina, Alaska. Sincere thanks are due also to all the many friends, whalers, and village residents who, by sharing their personal knowledge and experience with the authors, provided much valuable information on whaling.

Several individuals have assisted in the field study of Eskimo whaling conducted by the National Marine Fisheries Service in Alaska from 1973 through 1977. We extend our appreciation to them for their assistance: Michael F. Busby, Geoffrey M. Carroll, Floyd E. Durham, Clifford H. Fiscus, Peter Frankson, Gordon H. Jarrell, John R. Patee, and Glenn A. Seaman.

Special thanks go to Clifford H. Fiscus and Dale W. Rice, National Marine Mammal Laboratory, Seattle, Wash., and to Elizabeth Rex, New Bedford Whaling Museum, New Bedford, Mass., for their assistance in locating information and for making publications in their private libraries available for use during this study.

For the data on the catch by Siberian Eskimos we thank Igor Krupnik, Institute of Ethnography, Moscow, and V. A. Zemski, Chief, Laboratory of Marine Mammals, All-Union Scientific Research Institute of Marine Fisheries and Oceanography (VNIRO), Moscow,

U.S.S.R., for their assistance in obtaining this information. Because of their kind cooperation we are able to present for the first time, to the best of our knowledge, a compilation of bowhead whales landed by the natives of that country.

Literature Cited

- Alaska 1970 From Ketchikan to Barrow. *Alaska* 36(9):A1.
- Alaska Sportsman. 1938. From Ketchikan to Barrow. *Alaska Sportsman* 4(4):19.
- _____. 1941 From Ketchikan to Barrow. *Alaska Sportsman* 7(10):21.
- _____. 1943 From Ketchikan to Barrow. *Alaska Sportsman* 9(1):19.
- _____. 1947 From Ketchikan to Barrow. *Alaska Sportsman* 13(5):24.
- _____. 1957. From Ketchikan to Barrow. *Alaska Sportsman* 23(9):27.
- _____. 1963. Letters, notes & comments. *Alaska Sportsman* 29(9):4.
- _____. 1965. From Ketchikan to Barrow. *Alaska Sportsman* 31(10):39.
- _____. 1969a. From Ketchikan to Barrow. *Alaska Sportsman* 35(2):28.
- _____. 1969b. From Ketchikan to Barrow. *Alaska Sportsman* 35(8):14.
- Albert, T. F., G. Migaki, H. W. Casey, and L. M. Philo. 1980. Healed penetrating injury of a bowhead whale. *Mar. Fish. Rev.* 42(9-10):92-96.
- Aldrich, H. L. 1889. Arctic Alaska and Siberia, or, eight months with the Arctic whalemén. Rand, McNally & Co., Chicago, Ill., 234 p.
- Allen, A. J. 1978. A whaler and trader in the Arctic 1895 to 1944 My life with the bowhead. Alaska Northwest Publ. Co., Anchorage, Alaska, 213 p.
- Anderson, R. M. 1926. Report on the natural history collections of the expedition. In V. Stefansson, My life with the Eskimo, p. 436-527 Macmillan Co., N.Y.
- _____. 1946. Catalogue of Canadian recent mammals. Can. Dep. Mines Resour., Natl. Mus. Can. Bull. 102, Biol. Ser. 31, 238 p.
- Andrews, C. L. 1939. The Eskimo and his reindeer in Alaska. Caxton Printers, Ltd., Caldwell, Idaho, 253 p.
- Bailey, A. M. 1971. Field work of a museum naturalist. *Denver Mus. Nat. Hist., Mus. Pict.* 22, 192 p.
- _____, and R. W. Hendee. 1926. Notes on the mammals of northwestern Alaska. *J. Mammal.* 7:9-28.
- Bean, T. H. 1887. The fishery resources and fishing-grounds of Alaska. In G. B. Goode et al., The fisheries and fishery industries of the United States, Sect. III, p. 81-115. Gov. Print. Off., Wash., D.C.
- Bee, J. W., and E. R. Hall. 1956. Mammals of northern Alaska on the Arctic Slope. Univ. Kansas, Lawrence, Mus. Nat. Hist. Misc. Publ. 8, 309 p.
- Beechey, F. W. 1832. Narrative of a voyage to the Pacific and Beering's Strait, to co-operate with the polar expeditions: performed in his Majesty's ship Blossom, under the command of Captain F. W. Beechey in the years 1825, 26, 27, 28 Carey & Lea, Phila., 493 p.
- Bernardi, S. R. 1912. Whaling with Eskimos of Cape Prince of Wales. *Courier-Journal*, Louisville, Ky., 20 October, Sect. 4, p. 1, 12.
- Bertholf, E. P. 1899. Report of Second Lieut. E. P. Bertholf, R. C. S. In Report of the cruise of the U. S. Revenue Cutter *Bear* and the overland expedition for the relief of the whalers in the Arctic Ocean, from November 27, 1897, to September 13, 1898, p. 18-114. Gov. Print. Off., Wash., D.C.
- Bockstoce, J. R. 1976. On the development of whaling in the Western Thule culture. *Folk Dan. Etnogr. Tidsskr.* 18:41-46.
- _____. 1977. An issue of survival: Bowhead vs tradition. *Audubon* 79(5): 142-145.
- _____. 1978. History of commercial whaling in Arctic Alaska. *Alaska Geogr.* 5(4):17-26.
- _____. 1980. A preliminary estimate of the reduction of the western Arctic bowhead whale population by the pelagic whaling industry: 1848-1915. *Mar. Fish. Rev.* 42(9-10):20-27.
- Bodfish, H. H. 1936. Chasing the bowhead. Harvard Univ. Press, Cambridge, Mass., 281 p.
- Bower, W. T. 1925. Alaska fishery and fur seal industries in 1923. Rep. U.S. Comm. Fish. 1924, Append. 3:47-140.
- _____, and H. D. Aller. 1917. Alaska fisheries and fur industries in 1916. Rep. U.S. Comm. Fish. 1916, Append. 2, 118 p.
- _____, and _____ 1918. Alaska fisheries and fur industries in 1917. Rep. U.S. Comm. Fish. 1917, Append. 2, 123 p.
- Braham, H. W., M. A. Fraker, and B. D. Krogman. 1980. Spring migration of the western Arctic population of bowhead whales. *Mar. Fish. Rev.* 42(9-10):36-46.
- _____, B. Krogman, S. Leatherwood, W. Marquette, D. Rugh, M. Tillman, J. Johnson, and G. Carroll. 1979. Preliminary report of the 1978 spring bowhead whale research program results. Rep. Int. Whaling Comm. 29:291-306.
- Brower, C. D. 1942. Fifty years below zero. A lifetime of adventure in the far North. Dodd, Mead and Co., N.Y., 310 p.
- Brummer, F. 1977. Life on a cold rock. *Nat. Hist.* 86(3):54-65.
- Buice, B. 1947. When the ice cake broke away. *Alaska Sportsman* 13(4):16-17, 46-47.
- Burgess, S. M. 1974. The St. Lawrence islanders of Northwest Cape: Patterns of resource utilization Ph.D. Thesis, Univ. Alaska, Fairbanks, 289 p.
- Caldwell, M. C., and D. K. Caldwell. 1966. Epimeletic (care-giving) behavior in cetacea. In K. S. Norris (editor), Whales, dolphins, and porpoises, p. 755-789. Univ. Calif. Press, Berkeley.
- Carlson, G. F. 1966. Two on the rocks. David McKay Co., Inc., N.Y., 193 p.
- Carnahan, J. W. 1979. Cross Island: A link between the past and the future. *Arct. Coastal Zone Manage. Newsl.* 22:11-14.
- Collins, H. B., Jr. 1937. Archaeological excavations at Bering Strait. In Explorations and field-work of the Smithsonian Institution in 1936, p. 63-68. Smithsonian. Inst. Publ. 3407.
- Cook, J. A. 1926. Pursuing the whale. A quarter-century of whaling in the Arctic. Houghton Mifflin Co., Boston, 344 p.
- Crad, J. 1939. Trailing through Siberia. The Travel Book Club, Lond., 270 p.
- Dunbar, M. J. 1953. Arctic and subarctic marine ecology: Immediate problems. *Arctic* 6:75-90.

- Durham, F. E. 1973. Ancient and current methods of taking the bowhead whale. Univ. Alaska, Anchorage, Alaska Sea Grant Rep. 73-9, 15 p.
- _____. 1979. The catch of bowhead whales (*Balaena mysticetus*) by Eskimos, with emphasis on the Western Arctic. Nat. Hist. Mus. Los Ang. Cty., Contrib. Sci. 314, 14 p.
- Eide, A. H. 1952. Drums of Diomedea. The transformation of the Alaska Eskimo. House-Warven Publ., Hollywood, Calif., 242 p.
- Eskimo. 1916. Eskimo news. Eskimo 1(1):6.
- _____. 1917. Whaling. Eskimo 2(1):12.
- _____. 1918. Point Hope and Prince of Wales. Eskimo 2(8):5.
- _____. 1936. Whale. Eskimo 3(4):7.
- _____. 1937. Letter, Kivalina reindeer man, 7 December 1936. Eskimo 4(1):7.
- _____. 1941. Wainwright. Eskimo 8(1):5.
- Eskimo Bulletin. 1893. (No title.) Eskimo Bull., May, 1 p.
- _____. 1897. (No title.) Eskimo Bull. 3(1), 1 p.
- _____. 1898. (No title.) Eskimo Bull. 4(1), 1 p.
- Evermann, B. W. 1914. Alaska fisheries and fur industries in 1913. Rep. U.S. Comm. Fish. 1913, Append. 2, 172 p.
- Fay, F. H. 1975. Morbidity and mortality of marine mammals. In Environmental assessment of the Alaskan Continental Shelf. July-September 1975 quarterly reports from Principal Investigators participating in a multi-year program of environmental assessment related to petroleum development on the Alaskan Continental Shelf, Vol. 1, p. 35-42. Environ. Res. Lab., Boulder, Colo.
- _____, R. A. Dieterich, and L. M. Schults. 1977. Morbidity and mortality of marine mammals (Bering Sea). In Environmental assessment of the Alaskan Continental Shelf. July-September 1977 quarterly reports from Principal Investigators participating in a multi-year program of environmental assessment related to petroleum development on the Alaskan Continental Shelf, Vol. 1, p. 21-30. Environ. Res. Lab., Boulder, Colo.
- Foote, D. C. 1966. . . of whales and whalers. In M. van Steensel (editor), People of light and dark, p. 29-33. Queens Printer, Ottawa.
- _____, and H. A. Williamson. 1966. A human geographical study. In N. J. Wilimovsky and J. N. Wolfe (editors), Environment of the Cape Thompson region, Alaska, p. 1041-1107. U.S. At. Energy Comm., Wash., D.C.
- Forrest, E. C. 1937. Daylight moon. Frederick A. Stokes Co., N.Y., 340 p.
- Fraker, M.A. 1977. The 1976 white whale monitoring program, Mackenzie estuary, N.W.T. Prepared for Imperial Oil Ltd., Calgary, by F. F. Slaney and Co., Ltd., Vancouver, Canada, 73 p.
- _____, D. E. Sergeant, and W. Hoek. 1978. Bowhead and white whales in the southern Beaufort Sea. Beaufort Sea Proj., Dep. Fish. Environ., Sidney, B.C., Tech. Rep. 4, 114 p.
- Frankson, D. 1970. Point Hope. Fairbanks Daily News-Miner, 11 May.
- Freuchen, P., and F. Salomonsen. 1958. The Arctic year. G. P. Putnam's Sons, N.Y., 438 p.
- Friend. 1853. (No title.) The Friend, a monthly journal devoted to temperance, seamen, marine and general intelligence. Vol. X. Honolulu, Hawaii.
- Geist, O. W. 1937. The spy in the igloo. Alaska Sportsman 3(12):8-9, 22.
- Geller, M. Kh. 1957. Conservation of maritime game of Chukot. In Okhrana prirody i zapovednoe delo v SSSR [Conservation of natural resources and the establishment of reserves in the USSR]. Akad. Nauk SSSR, Komissiya po Okhrane Prirody, Byull. 2. (Translated by Isr. Program Sci. Transl., 1960, p. 98-107; avail. U.S. Dep. Commer., Natl. Tech. Inf. Serv., Springfield, Va., as OTS 60-51170.)
- Groom, H. 1963. In quest of the great bowhead whale. Anchorage Daily News, 21 September, Alaska Living and TV Week:2-8.
- Hadley, J. 1915. Whaling off the Alaskan coast, from the journal of Jack Hadley of Point Barrow, Alaska. Bull. Am. Geogr. Soc. 47:905-921.
- Hoek, W. 1978. Results of reconnaissance surveys, 1972-1976. In M. A. Fraker, D. E. Sergeant, and W. Hoek, Bowhead and white whales in the southern Beaufort Sea, p. 97-101. Beaufort Sea Proj., Dep. Fish. Environ., Sidney, B.C., Tech. Rep. 4.
- Holmes, L. 1857. The Arctic whalemens; or, winter in the Arctic Ocean. Wentworth & Co., Boston, 296 p.
- Hooper, C. L. 1881. Report of the cruise of the U. S. revenue-steamer *Corwin* in the Arctic Ocean, November 1, 1880. Gov. Print. Off., Wash., D.C., 71 p. (Fac. repro. by Shorey Book Store, Seattle, Wash., 1964, 71 p.)
- _____. 1884. Report of the cruise of the U. S. revenue steamer *Thomas Corwin*, in the Arctic Ocean, 1881. 48th Congress, 1st Session, Senate Executive Doc. 204, 147 p.
- Hughes, C. C., and J. M. Hughes. 1960. An Eskimo village in the modern world. Cornell Univ. Press, Ithaca, N.Y., 419 p.
- Hunt, W. R. 1975. Arctic passage, the turbulent history of the land and people of the Bering Sea 1697-1975. Charles Scribner's Sons, N.Y., 395 p.
- Ivashin, M. V., and V. N. Mineev. 1978. O sostoyanii zapasov serykh kitov [The state of the gray whale stock]. Rybn. Khoz. 1978(3):15-17. (Translated by S. Pearson, Natl. Mar. Fish. Serv., Natl. Mar. Mammal Lab., Seattle, Wash.)
- _____, L. A. Popov, and A. S. Tsapko. 1972. Morskije mlekopitayushchie [Marine mammals]. Izd. "Pishch. Promst.," Moskva, 303 p. (Translated 1973 by Dep. Sec. State Can., Dep. Environ., Fish. Res. Board Can. Transl. Ser. 2783.)
- Jackson, S. 1906. Facts about Alaska: Its people, villages, missions, schools. Women's Board of Home Missions of the Presbyterian Church, N.Y., 58 p.
- Jarvis, D. H. 1899. Report of First Lieut. D. H. Jarvis. In Report of the cruise of the U. S. Revenue Cutter *Bear* and the overland expedition for the relief of the whalers in the Arctic Ocean, from November 27, 1897, to September 13, 1898, p. 28-103. Gov. Print. Off., Wash., D.C.
- Jenness, D. 1957. Dawn in Arctic Alaska. Univ. Minn. Press, Minneapolis, 222 p.
- Johnson, D. 1977. Controls jeopardize prosperous whaling. Anchorage Times, 3 June, p. 1-2.
- Johnson, M. L., C. H. Fiscus, B. T. Ostenson, and M. L. Barbour. 1966. Marine mammals. In N. J. Wilimovsky and J. N. Wolfe (editors), Environment of the Cape Thompson region, Alaska, p. 877-924. U.S. At. Energy Comm., Wash., D.C.
- Jones, W. B. 1927. The argonauts of Siberia (the diary of a prospector). Dorrance & Co., Phila., 165 p.
- Jordan, D. S. (editor). 1899. The fur seals and fur-seal islands of the North Pacific Ocean, Part 3, 629 p. Gov. Print. Off., Wash., D.C.
- Kashevarov, A. F. 1838. A. F. Kashevarov's coastal explorations in northwest Alaska, 1838. [In Russ.]. Edited by J. W. VanStone, translated by D. H. Kraus, Chicago Field Mus. Nat. Hist., Fieldiana: Anthropol. 69, 1977, 104 p.
- Keim, C. J. 1969. Aghvook, white Eskimo. Otto Geist and Alaskan archaeology. Univ. Alaska Press, College, Alaska, 313 p.
- Klengenberg, C. 1932. Klengenberg of the Arctic, an autobiography. Jonathan Cape, Ltd., Lond., 360 p.
- Kuyt, E. 1974. Bowhead whales in the Beaufort Sea. Blue Jay 32:117-118.
- Larsen, H., and F. Rainey. 1948. Ipiutak and the Arctic whale hunting culture. Anthropol. Pap. Am. Mus. Nat. Hist. 42, 276 p.
- Lindsay, G. E. 1957. Eskimo whaling at Point Barrow. Zoonoos 30(12):3-6.
- Maguire, R. 1857. Narrative of Commander Maguire, wintering at Point Barrow. In S. Osborn (editor), The discovery of the Northwest Passage by H.M.S. *Investigator*, Capt. R. M'Clure, 1850, 1851, 1852, 1853, 1854. From the logs and journals of Capt. L. M. M'Clure. 2d ed., p. 409-463. Longman, Brown, Green, Longmans & Roberts, Lond.
- Maher, W. J., and N. J. Wilimovsky. 1963. Annual catch of bowhead whales by Eskimos at Point Barrow, Alaska, 1928-1960. J. Mammal. 44:16-20.
- Marquette, W. M. 1976. Bowhead whale field studies in Alaska, 1975. Mar. Fish. Rev. 38(8):9-17.
- _____. 1978. The 1976 catch of bowhead whales, *Balaena mysticetus*, by Alaskan Eskimos. Mar. Fish. Rev. 40(11):18-27.
- _____. 1979. The 1977 catch of bowhead whales (*Balaena mysticetus*) by Alaskan Eskimos. Rep. Int. Whaling Comm. 29: 281-289.
- Marsh, M. C., and J. N. Cobb. 1908. The fisheries of Alaska in 1907. U.S. Bur. Fish., Rep. Comm. Fish., 1907, 64 p.
- _____, and _____. 1910. The fisheries of Alaska in 1909. U.S. Bur. Fish., Rep. Comm. Fish., 1909, 58 p.
- _____, and _____. 1911. The fisheries of Alaska in 1910. U.S. Bur. Fish., Rep. Comm. Fish., 1910, 72 p.
- Mayokok, R. 1950. We caught a whale. Alaska Sportsman 16(7):10-13.
- _____. 1955. Troubles with civilization. Alaska Sportsman 21(9):16-20, 27-32.
- McVay, S. 1973. Stalking the Arctic whale. Am. Sci. 61:24-37.
- Milan, F. A. 1964. The acculturation of the contemporary Eskimo of Wainwright, Alaska. Univ. Alaska, Fairbanks, Anthropol. Pap. 2(2):1-108.
- Minner, J. L. 1948. Muktuk. Alaska Sportsman 14(12):16-19.
- Morgan, L. 1972. Point Hope — a workable

- tradition. The Alicia Patterson Fund, N.Y., Publ. LM-5, 12 p.
- _____. 1974. The villages are alive and well, thank you. *Alaska Mag.* 40(8):33-39.
- Mukluk Telegraph. 1950. News from the villages: Wales. *Mukluk Telegraph* 1(7):1, 2.
- _____. 1951. News from the villages: Kivalina. *Mukluk Telegraph* 3(3):10.
- Murdoch, J. 1885. Mammals. In P. H. Ray, Report of the International Polar Expedition to Point Barrow, Alaska, in response to the resolution of the House of Representatives of December 11, 1884. U.S. House Rep., 48th Congr., 2d Sess., Executive Doc. 44, Part 4, p. 92-103.
- _____. 1891. Whale-catching at Point Barrow. *Pop. Sci. Mon.* 38:830-836.
- _____. 1892. Ethnological results of the Point Barrow Expedition. In J. W. Powell, 9th Annu. Rep. Bur. Ethnology, 1887-1888. U.S. Gov. Print. Off., 441 p.
- Nelson, E. W., and F. W. True. 1887. Mammals of northern Alaska. In E. W. Nelson, Report upon natural history collections made in Alaska between the years 1877 and 1881, Part 2, p. 227-293. *Arct. Ser. Publ.* 3, Gov. Print. Off., Wash., D.C.
- Nelson, R. K. 1969. Hunters of the northern ice. Univ. Chicago Press, Chicago, Ill., 429 p.
- North, F. 1940. I was their talisman. *Alaska Sportsman* 6(10):18-20, 22.
- Okakok, G. 1972. Barrow correspondent reports five whales caught at Barrow. *Tundra Times* 9(43):5.
- Ostermann, H. B. S. 1952. The Alaskan Eskimos as described in the posthumous notes of Dr. Knud Rasmussen. Rep. Fifth Thule Exped. 1921-24. Vol. 10, No. 3. [In Danish.] (Transl. by W. E. Calvert, 292 p., avail. AMS Press, Inc., N.Y.)
- Pacific Commercial Advertiser. 1872. (No title.) *Pac. Commer. Advert.*, 23 November.
- Pederson, S. 1971. Status and trends of subsistence resource use at Point Hope. In Point Hope project report, summer 1971, p. 37-86. Univ. Alaska, Fairbanks.
- Poole, D. C. 1971. Vineyard whalers in the Arctic. *Dukes Cty. Intell.* 13(1):6.
- Poulter, T. C. 1966. Recording the underwater signals of seals in the Arctic. *Arctic Inst. North Am.*, Calgary, Alberta, Final Rep., Phase II, Subcontract ONR-371, p. I-8 to I-18.
- Rainey, F. 1940. Eskimo method of capturing bowhead whales. *J. Mammal.* 21:362.
- Rainey, F. G. 1947. The whale hunters of Tigara. *Anthropol. Pap. Am. Mus. Nat. Hist.* 41:231-283.
- Ray, D. J. 1975. The Eskimos of Bering Strait, 1650-1898. Univ. Wash. Press, Seattle, 305 p.
- Ray, P. H. 1885. Report of the International Polar Expedition to Point Barrow, Alaska, in response to the resolution of the House of Representatives of December 1884. House Rep., 48th Congr., 2d Sess., Executive Doc. 44, 695 p.
- Reese, H. D. 1918. Annual report of the United States public school at Kivalina, on the shore of the Arctic Ocean. U.S. Dep. Inter., Bur. Educ. Bull. 1918(5):38-43.
- Richards, E. A. 1949. Arctic mood, a narrative of Arctic adventures. Caxton Printers, Ltd., Caldwell, Idaho, 282 p.
- Rodahl, K. 1963. The last of the few. Harper and Row, N.Y., 208 p.
- Russell, F. 1898. Explorations in the far north. Being the report of an expedition under the auspices of the University of Iowa during the years 1892, '93, and '94. State Univ. Iowa, Iowa City, 290 p.
- Saario, D. J., and B. Kessel. 1966. Human ecological investigations at Kivalina. In N. J. Wilimovsky and J. N. Wolfe (editors), Environment of the Cape Thompson region, Alaska, p. 969-1039. U.S. At. Energy Comm., Wash., D.C.
- San Francisco Chronicle. 1889. (No title.) *San Francisco Chronicle*, 30 September.
- _____. 1890a. (No title.) *San Francisco Chronicle*, 17 September.
- _____. 1890b. (No title.) *San Francisco Chronicle*, 19 September.
- Shapiro, L. H., and R. C. Metzner. 1979. Historical references to ice conditions along the Beaufort Sea coast of Alaska. Univ. Alaska, Fairbanks, Geophys. Inst. Sci. Rep. UAG R-268, 11 p., Append. A-I:1; A-II:1-39; and A-III:1-11.
- Simpson, J. 1854-55. Observations of the western Eskimo and the country they inhabit: From notes taken during two years at Point Barrow. *British Sessional Papers, House of Commons* 35:917-940.
- _____. 1875. Observations on the western Eskimo and the country they inhabit. *R. Geogr. Soc., Lond., Arct. Geogr. Ethnol.*, p. 233-275.
- Sleptsov, M. M. 1955. *Kitoobraznye dal'nevostochnykh morei* [Cetaceans of Far Eastern seas]. Izdanie vtoroe (2d ed.) Minist. Rybn. Khoz. Soyuz SSSR, Tikhookean. Nauchno-issled. Inst. Rybn. Khoz. Okeanogr., Vladivostok, 161 p. (Translated 1979 by S. Pearson, Natl. Mar. Fish. Serv., Natl. Mar. Mammal Lab., Seattle, Wash.)
- Smith, N. L. 1937. Eskimos hunt whales ceremoniously. *Alaska Sportsman* 3(10):16-18.
- Sonnenfeld, J. 1960. Changes in an Eskimo hunting technology, an introduction to implement geography. *Ann. Assoc. Am. Geogr.* 50:172-186.
- Spencer, R. F. 1959. The north Alaskan Eskimo, a study in ecology and society. *Smithson. Inst. Bur. Am. Ethnol. Bull.* 171, 490 p.
- Stefansson, V. 1913. My life with the Eskimo. Macmillan Co., N.Y., 538 p.
- _____. 1921. The friendly Arctic, the story of five years in polar regions. Macmillan Co., N.Y., 784 p.
- Stevens, R. W. 1976. Season of the whale. *Arctic in Colour* 5(1):3-5, 7.
- Taber, R. D. 1958. Eskimo hunters. 1. Whales. *Pac. Discovery* 11(3):18-21.
- Thomas, T. K. 1962. Four whales for Tigara. *Alaska Sportsman* 28(5):8-10, 40-41.
- Thornton, H. R. 1931. Among the Eskimos of Wales, Alaska, 1890-93. Johns Hopkins Press, Baltimore, 235 p.
- Tomilin, A. G. 1957. *Zveri SSSR i prilozhashchikh stran* (Mammals of the U.S.S.R. and adjacent countries). Vol. 9. *Kitoobraznye* (Cetaceans). Izd. Akad. Nauk SSSR, Moskva, 756 p. [In Russ.] (Translated by Isr. Program Sci. Transl., 1967, 717 p.; avail. U.S. Dep. Commer., Natl. Tech. Inf. Serv., Springfield, Va., as TT 65-50086.)
- U.S. Department of Interior. 1917. Annual report of the Barrow school, 1916-1917. U.S. Dep. Inter., Bur. Indian Affairs, Annu. Rep. Barrow, Alaska, 27 August 1917, 6 p.
- _____. 1919. Annual report of the Barrow school, 1918-1919. U.S. Dep. Inter., Bur. Indian Affairs, Annu. Rep. Barrow, Alaska, 30 June 1919, 7 p.
- _____. 1920. Annual report of the Barrow school, 1919-1920. U.S. Dep. Inter., Bur. Indian Affairs, Annu. Rep. Barrow, Alaska, 30 June 1920, 9 p.
- (U.S.) Federal Field Committee for Development Planning in Alaska. 1968. Fed. Field Comm. Dev. Plann. Alaska, Anchorage, U.S. Gov. Print. Off., Wash., D.C., 565 p.
- VanStone, J. W. 1962. Point Hope, an Eskimo village in transition. Univ. Wash. Press, Seattle, 177 p.
- Van Valin, W. B. 1941. Eskimoland speaks. Caxton Printers, Ltd., Caldwell, Idaho, 242 p.
- Vincent, L. S. 1944. The whale didn't get away. *Alaska Sportsman* 10(8):16-17, 26-28.
- Weed, A. L. 1957. Grandma goes to the Arctic. Dorrance & Co., Phila., 279 p.
- Wentworth, C. 1978. Battle for the Beaufort Sea, natives document subsistence use in the Pt. Thomson oil lease area. *Arct. Coastal Zone Manage. Newsl.* 14:1-4.
- Wilkinson, D. 1905. Whaling in many seas. Henry J. Drane, Lond.
- Witten, J. W. 1904. Report on the agricultural prospects, natives, salmon fisheries, coal prospects and development, timber and lumber interests of Alaska, 1903. U.S. Dep. Inter., Gen. Land Off., Wash., D.C., 98 p.
- Woolfe, H. D. 1893. The seventh or Arctic district. In R. P. Porter, Report on population and resources of Alaska at the eleventh census: 1890, p. 129-152. Gov. Print. Off., Wash., D.C.
- Yablokov, A. V., and V. M. Bel'kovich. 1967. *Kitoobraznye arktiki, perspektivy ikh ratsional'nogo ispol'zovaniya i okhrany* [Cetaceans of the Arctic, prospects of their proper utilization and conservation]. *Probl. Sev.* 11:166-181. (Translated 1968, p. 199-218. In *Problems of the North*, No. 11, avail. Natl. Res. Council Can., Ottawa, Can.)
- Zenkovich, B. A. 1934. *Kitobomyi promysel v Kamchatskom i Beringovom moryakh* (sezon 1933 goda) [The whaling industry in Kamchatka and Bering seas (1933 season)]. *Rybn. Khoz. Dal'n. Vost. No. 1-2*:113-118. (Translated by L. Hutchison, Univ. Calif. San Diego, La Jolla, Calif.)
- _____. 1954. *Vokrug sveta za kitami* [Around the world after whales]. *Geografiz.*, Moscow, 407 p. (Translated by L. Hutchison, Univ. Calif. San Diego, La Jolla, Calif., 523 p., typescript.)
- Zimushko, V. V. 1969. *Nekotorye dannye po biologii serogo kita* [Some data on the biology of the gray whale]. In V. A. Arsen'ev, B. A. Zenkovich, and K. K. Chapskii (editors), *Morskije mlekopitayushchie* [Marine mammals], p. 93-97. Izd. Nauka, Moscow. (Translated by L. V. Sagen, College Fish., Univ. Washington, Seattle, Wash.)
- _____, and M. V. Ivashin. 1980. Some results of Soviet investigations and whaling of gray whales (*Eschrichtius robustus*, Lilljeborg, 1961). *Rep. Int. Whaling Comm.* 30:237-346.