

Number 314

July 31, 1979

CONTRIBUTIONS IN SCIENCE

NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY

THE CATCH OF BOWHEAD WHALES (*BALAENA MYSTICETUS*) BY ESKIMOS, WITH EMPHASIS ON THE WESTERN ARCTIC

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Published by the NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY • 900 EXPOSITION BOULEVARD • LOS ANGELES, CALIFORNIA 90007

ISSN: 0459-8113

Suggested Citation: *Contrib. Sci. Natur. Hist. Mus. Los Angeles County*. 314:1-14.

Contributions in Science are articles in the earth and life sciences, presenting results of original research in Natural History. *Science Bulletin* (Numbers 1-30; 28 June 1965 to 10 April 1978) and *Contributions in Science* (Numbers 1-300; 23 January 1957 to 16 June 1978) were merged into a single imperial octavo serial beginning with Number 301.

Contrib. Sci. Natur. Hist. Mus. Los Angeles County. 1979. 314:1-14.

THE CATCH OF BOWHEAD WHALES (*BALAENA MYSTICETUS*) BY ESKIMOS, WITH EMPHASIS ON THE WESTERN ARCTIC^{1, 2}

BY FLOYD E. DURHAM³

ABSTRACT: The success of Eskimo spring whaling along the northwestern coast of Alaska depends on the opening of offshore leads in the sea ice, the presence of bowheads, and the number and ability of the hunters to kill, secure, and butcher these animals. Physical factors, such as wind, current, and temperature affect the formation of leads. The number and proximity of leads to shore, the frequency and manner of passing of bowheads, and the topography and duration of the ice platform are variable, but are most dependable at the promontories where the major whaling villages are located.

The time period and the actual number of years for which data are available (in parentheses), the number of whales killed, and the yearly average at the principal villages are: Barrow, 1852–1973 (52 yrs), 371 whales, 7/yr; Point Hope, 1879–1973 (60 yrs), 241 whales, 4/yr; and Wainright, 1922–1973 (32 yrs), 48 whales, 1.5/yr.

The total of the three villages is 660 whales with a combined average of 12.5/yr. Five of the several minor stations active from 1961 to 1973 took 22 whales, average of 2/yr, making a total average of known whales secured in Alaska 14.5/yr through 1973. Recent harvests (1974–1977) have been considerably higher than the stated average.

Bowhead whales (*Balaena mysticetus* Linnaeus 1758) of the western Arctic and the Eurasian coast migrate southward into the Bering Sea in winter. On their annual spring migration northward most of the bowheads swing eastward into the Beaufort Sea passing close to promontories along the northern Alaskan coast where Eskimo whaling villages (Fig. 1) have been active for perhaps 5000 years (Rice 1974).

Although several authors (Scammon 1874; Bailey and Hendee 1926; Brower, Farrelly and Anson 1942; Rainey 1940 and 1947; Sonnenfeld 1960; Maher and Wilimovsky 1963; Stefansson 1924; Johnson, et al. 1966; Lindsay 1968; Davidson 1972; Rice 1974; and Durham 1974) have described the hunting of bowhead whales by Eskimos, scant information is available on the number of whales taken.

Prior to the coming of commercial whalers, explorers, and missionaries to the Alaskan Arctic in the mid-19th century, the only evidence of bowhead catches were bone-strewn beaches of Eskimo shore whaling stations, such as the ancient one at Barter Island; whale bones in the ruins of old village houses, such as those at Point Barrow; and the jaw bones of whales in the cemetery fence at Point Hope. Because the Eskimos do not have a written language, only their legends and folklore reveal the feastings and starvings of those coastal people who relied mainly on bowheads for food, fuel, building materials, and tools. Relatively prosperous whaling cultures developed in some larger villages. With competition from commercial whalers, the Eskimo catch of whales and food supply derived from it decreased. Introduced diseases depleted the native population, resulting in fewer men to hunt the diminishing stock of whales.

A few of the commercial whalers, explorers, and scientists

made casual notes of bowheads taken. It was only after the Eskimos learned English that they started keeping written records of catches — beginning about 1890 at Point Hope and about 1928 at Barrow. Wainright people still rely on memory. During recent years the Naval Arctic Research Laboratory (NARL) at Barrow has recorded all whale kills along the north coast of Alaska, and several research institutions are keeping supplementary records. Several investigators (herein mentioned) have reported fragments of catch data for several Eskimo villages, but the only extensive record is that of Maher and Wilimovsky (1963) on Barrow whaling from 1928 to 1960. To these published sources I have added my data from 1961 to 1973 and numerous unpublished records, mostly from personal communications. In the few instances of conflicting data, I chose the source judged to be the most reliable.

Table 1 shows up to 1973 the known catch of bowheads by Eskimos from 1928 (46 yrs) for Barrow; from 1879 (60 yrs) for Point Hope; and from 1922 (32 yrs) for Wainright. Catch data

¹Sponsored in 1973 by the National Marine Fisheries Service and prior years by the Arctic Institute of North America with the financial support of the Office of Naval Research under contract N00014-70-A-0219-0001 (subcontract ONR-367).

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TABLE 1

Catches of bowhead whales at the Alaskan whaling villages of Barrow (including Point Barrow, Barrow Village, and Cape Smythe), Point Hope and Wainwright, 1852–1973. Data sources as follows (a blank indicates no data): *Barrow*, 1852–1853 from Simpson (1855); 1882–1885 from Murdoch (1885), (10 whales mentioned by Murdoch assigned to 1884); 1928–1960 from David Brower, reported in Sonnenfeld (1960), Maher and Wilimovsky (1963), and Bee and Hall (1956). *Point Hope*, 1879 from Bean (1887); 1890–1948 from Don C. Foote (personal communication); 1949–1960 from H. Kinneveauk (personal communication), and Johnson, *et al.* (1966). *Wainwright*, 1922 from Bailey and Hendee (1926); 1941, 1949–1950 from Maher and Wilimovsky (1963); 1961–62 from D.W. Rice (personal communication); remaining years from R. Aveoganna, W. Bodfish, W. Ekak, H. Killbear, and F. Milan (personal communication). All other data from author and NARL.

BARROW				POINT HOPE	WAIN- RIGHT	BARROW				POINT HOPE	WAIN- RIGHT
YEAR	SPRING	AUTUMN	TOTAL	TOTAL	TOTAL	YEAR	SPRING	AUTUMN	TOTAL	TOTAL	TOTAL
1852			17			1937	9	0	9		
1853			7			1938	2	2	4		5
1879				5		1939	6	0	6		
1882			1			1940	0	0	0	5	
1883			1			1941	2	0	2	8	1
1884			10			1942	7	3	10		
1885			28			1943	6	0	6		1
1890				1		1944	0	0	0		2
1892				0		1945	3	0	3	3	6
1898				1		1946	4	5	9	2	1
1901				1		1947	2	2	4	5	1
1902				2		1948	5	0	5	0	
1903				0		1949	0	0	0	4	2
1904				0		1950	4	0	4	2	2
1907				0		1951	9	0	9	4	
1908				13		1952	0	0	0	2	2
1909				12		1953	17	0	17	4	
1911				3		1954	1	0	1	3	
1912				1		1955	15	0	15	1	1
1913				1		1956	1	1	2	2	0
1914				2		1957	0	0	0	3	0
1915				3		1958	0	0	0	2	0
1916				7		1959	0	0	0	1	0
1917				3		1960	15	0	15	4	0
1918				7		1961	2	2	4	2	1
1919				2		1962	0	3	3	6	1
1920				3		1963	2	1	3	3	2
1921				2		1964	1	10	11	1	1
1922				13	3	1965	3	1	4	2	0
1924				16		1966	3	4	7	4	1
1925				10		1967	0	3	3	1	0
1926				13	1	1968	9	0	9	3	2
1927				3		1969	10	0	10	3	4
1928	7	4	11			1970	15	0	15	8	0
1929	9	4	13			1971	11	2	13	5	2
1930	5	2	7			1972	15	4	19	14	2
1931	8	3	11	1		1973	15	2	17	5	3
1932	4	3	7			Totals	238	69	371	241	48
1933	0	5	5								
1934	1	3	4								
1935	6	0	6								
1936	4	0	4	4	1						

Grand total of three stations: 660

from 1961 (13 yrs) for five minor whaling stations in or near the Arctic are given in Table 2.

DISTRIBUTION AND DEPLETION

The bowhead, or Greenland whale, inhabits Arctic and occasionally sub-arctic waters. Of the three or possibly four principal stocks which flourished historically, that of the western Arctic (Chukchi and Bering Seas) has best survived commercial whaling of the species from the early 1600s to the early 1900s (Tomilin 1967). The commercial whale fishery is generally held responsible for the nearly worldwide extirpation of the bowhead by the end of the 19th century. Rice (1974) estimated the western Arctic

stock at 4000–5000 during the period from 1868 to 1884. The collapse of the baleen market and the end of commercial bowhead whaling occurred in 1909. Although all stocks show some recovery, the bowhead is still legally classified as an “endangered species” by the United States Endangered Species Act of 1973 and a “protected stock” by the International Whaling Commission.

During the summer months the western Arctic stock is principally in shallow waters of the northern Bering, Chukchi, and Beaufort Seas (Fig. 1), extending eastward as far as Banks Island (Rice 1974). However, Mansfield (1971) reports recent sightings of bowhead whales east of Banks Island in the Amundsen and Coronation Gulfs, and assigns these whales to the western Arctic

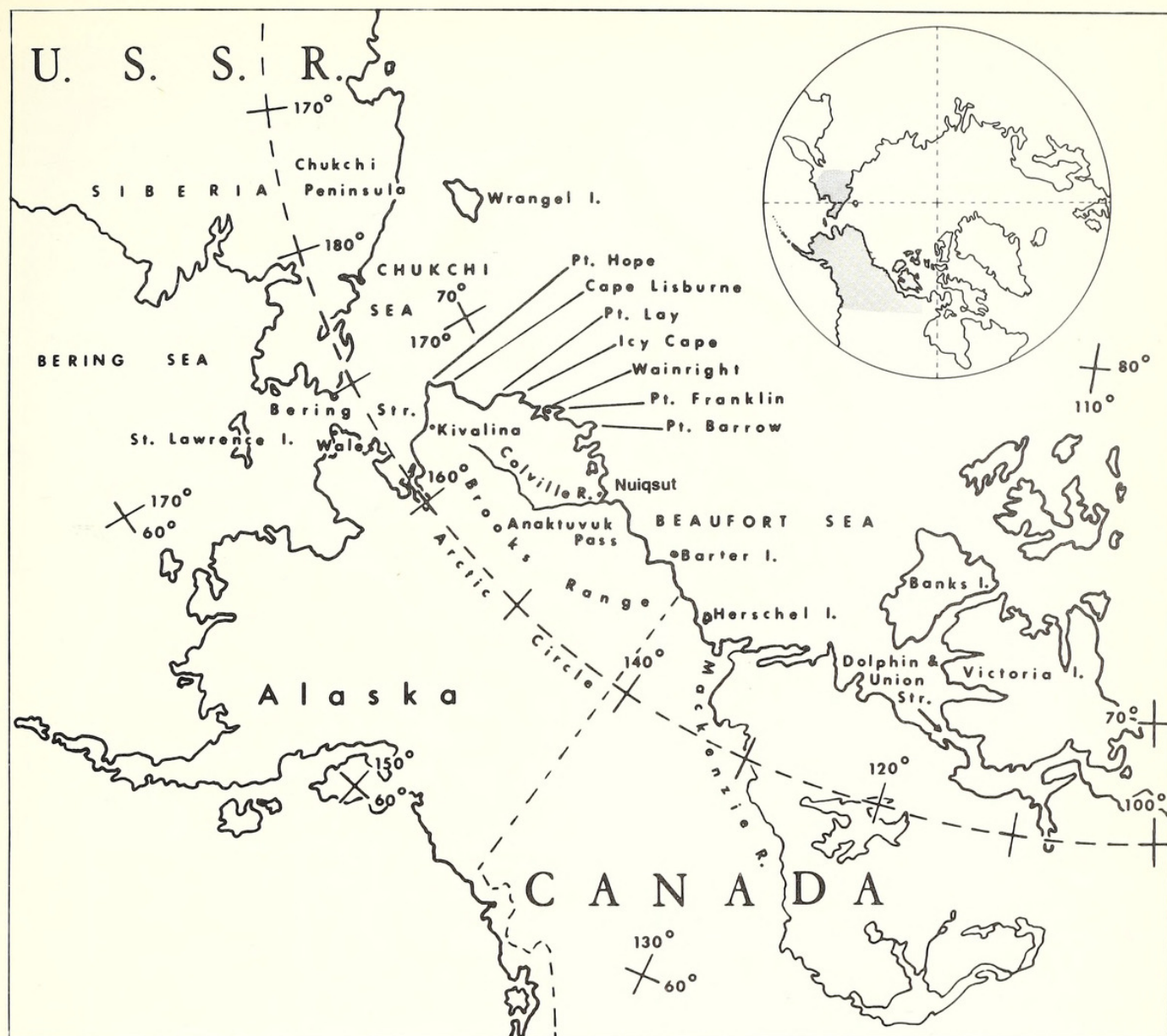


FIGURE 1. Principal Eskimo whaling villages in the western Arctic.

stock. Bowheads that occur in the Okhotsk and East Siberian Seas (Chukchi Peninsula) are thought to belong to this same stock (Tomilin 1967). However, Townsend (1935), based upon Scammon (1874), considered the Okhotsk bowhead as separate from the western Arctic stock, and Rice and Scheffer (1968) list it as a fourth stock. As the shore ice and pack ice form in autumn, the whales in the Arctic Ocean migrate southward through the Bering Strait.

PRINCIPAL VILLAGES

BARROW

Barrow is one of the largest (population about 2100) and oldest Eskimo whaling villages (Fig. 1). Bowheads appear there in mid-April. Spring whaling begins then and continues through

May. The whales return in the autumn ahead of the pack ice and are hunted from about mid-September to mid-October.

The oldest catch records are by Simpson (for years 1852–53), Murdoch (for 1882–85), and David Brower (for 1928–54) and were assembled by Sonnenfeld (1960). The annual catch of whales varied even more in the 19th century than in the 20th. The catch of 17 in 1852 indicated that the Barrow Eskimos, using only primitive whaling gear, were successful hunters even before the Yankee whalers arrived in 1854 (Table 1). Because of the reduced number of bowheads and competition from commercial whalers, the Eskimos took only a few whales during the 30 years following 1853 (Murdoch 1885). When the commercial fleet went beyond Barrow in the mid-1880s to better whaling grounds off the northwestern Canadian mainland and Banks Island, Eskimo whaling improved as indicated by the catch of 28 whales in 1885. The Cape Smythe whaling station was established at Barrow by Charles Brower in 1884 (Vanstone 1958). This enter-

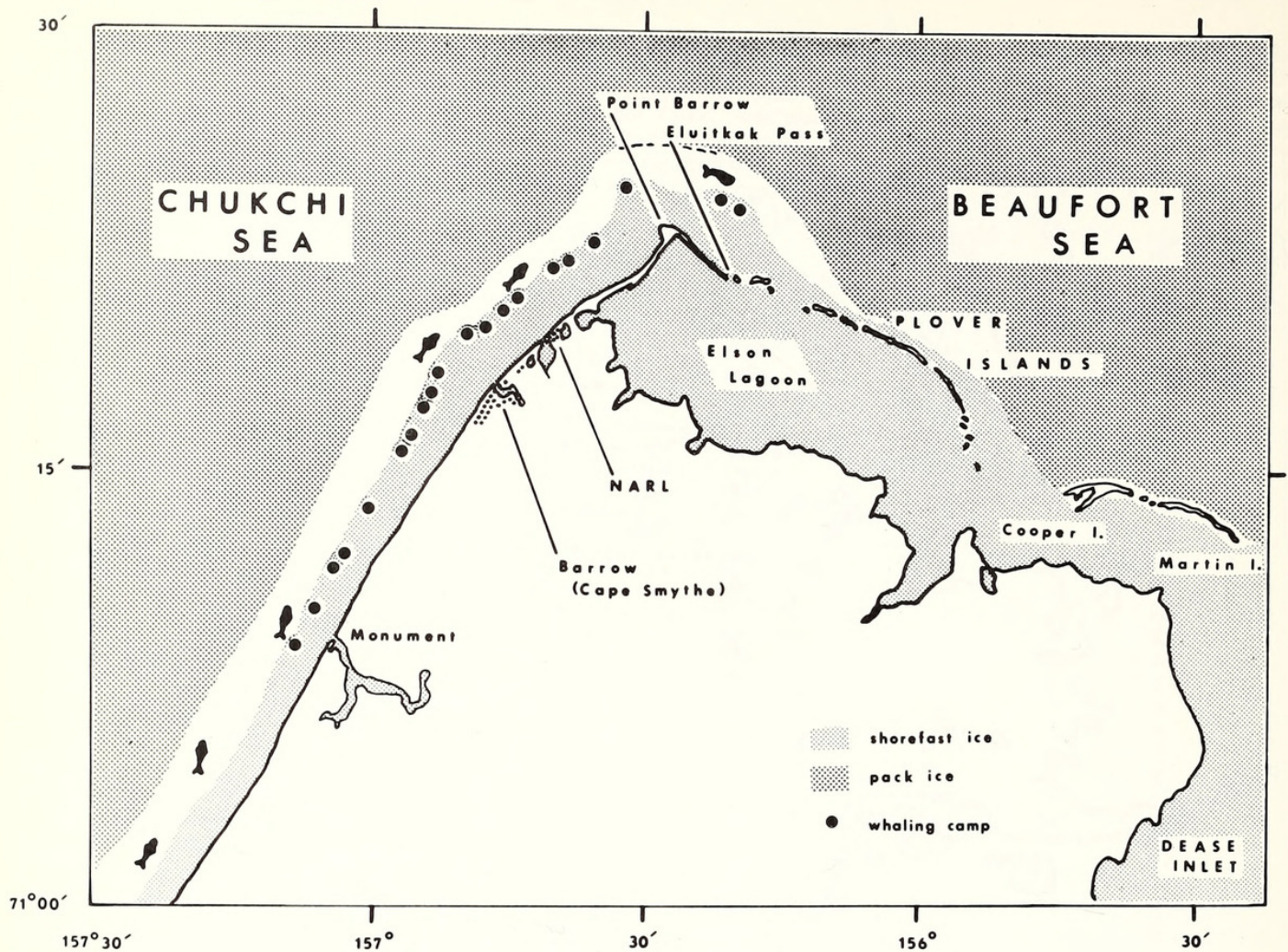


FIGURE 2. Typical ice conditions and bowhead whale migration route at Point Barrow, Alaska.

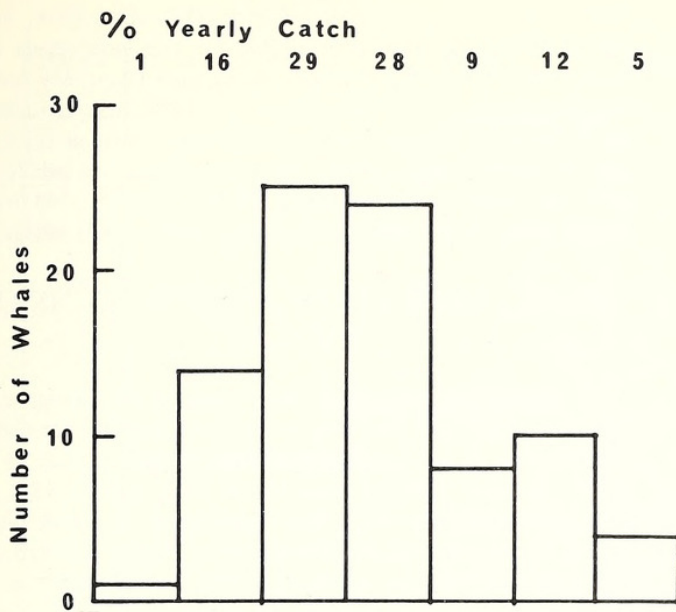
prise hastened the Eskimo's changing from the old style to early modern whaling, and has been described by authors previously cited.

More recent catch records (1928–1960) were summarized by Maher and Wilimovsky (1963). Thereafter, through 1973, I personally observed whaling at Barrow or obtained catch data from reliable sources. From 1852 to 1973 (data for 52 yrs) 371 bowheads (0–19 whales/yr, av 7) were taken. Seven years were lean (no whales taken) and 16 were feast years (ten or more whales at Barrow). Success in whaling varies from year to year and between spring and autumn seasons, particularly the latter. Whales were not taken in ten of the spring seasons and 24 of the autumn seasons. Ten or more whales (maximum 17) were taken in eight spring seasons, but ten whales were obtained in only one autumn season.

Bowheads are sometimes sighted by Eskimos off Barrow in early April, which agrees with the observations of Maher and Wilimovsky (1963), but are seldom hunted until mid-April. My data show that the earliest spring kill was 25 April 1969. However, the first kill usually occurs with remarkable regularity two weeks later. The records of NARL show that the first whale of the 1955 season was taken 6 May. The first bowhead I saw butchered was 6 May 1961. Records show that the first bowhead

obtained in the spring during the 13 years (1961–73) I was at Barrow, was taken from 4 to 6 May in 50 percent of the years. Of the 41 spring whales harvested during 1971–73, 11 (37 percent) were taken between 5 and 7 May. Fifty-two percent of the whales taken in the springs between 1961 and 1973 were harvested in the first two quarters of May, and 71 percent in the first three quarters (Fig. 3). Whales were taken in the last quarter in one-third of the years. The 1969 whaling season began unusually early (10 whales were taken in the last quarter of April) and continued unusually late (the last whale was taken 2 June, the first whale killed in June at Barrow for 15 years). September 21, 1965 was the earliest autumn catch from 1961–1973. During this period four whales were taken in the third quarter of September. The whalers are most successful in the first quarter of October when 11 (37 percent) of the 30 autumn bowheads were caught. Sixty percent of the autumn whales were taken in the first half of October. Whales were taken in the third quarter in only one-fifth of the years, the latest catch being 23 October in both 1966 and 1973. Autumn whaling is less rewarding than spring whaling. Often the best efforts of the whalers in autumn are entirely thwarted by the vastness of the hunting area, the frequency and severity of storms, or the encroachment of ice. The season ends about mid-October.

POINT HOPE



BARROW

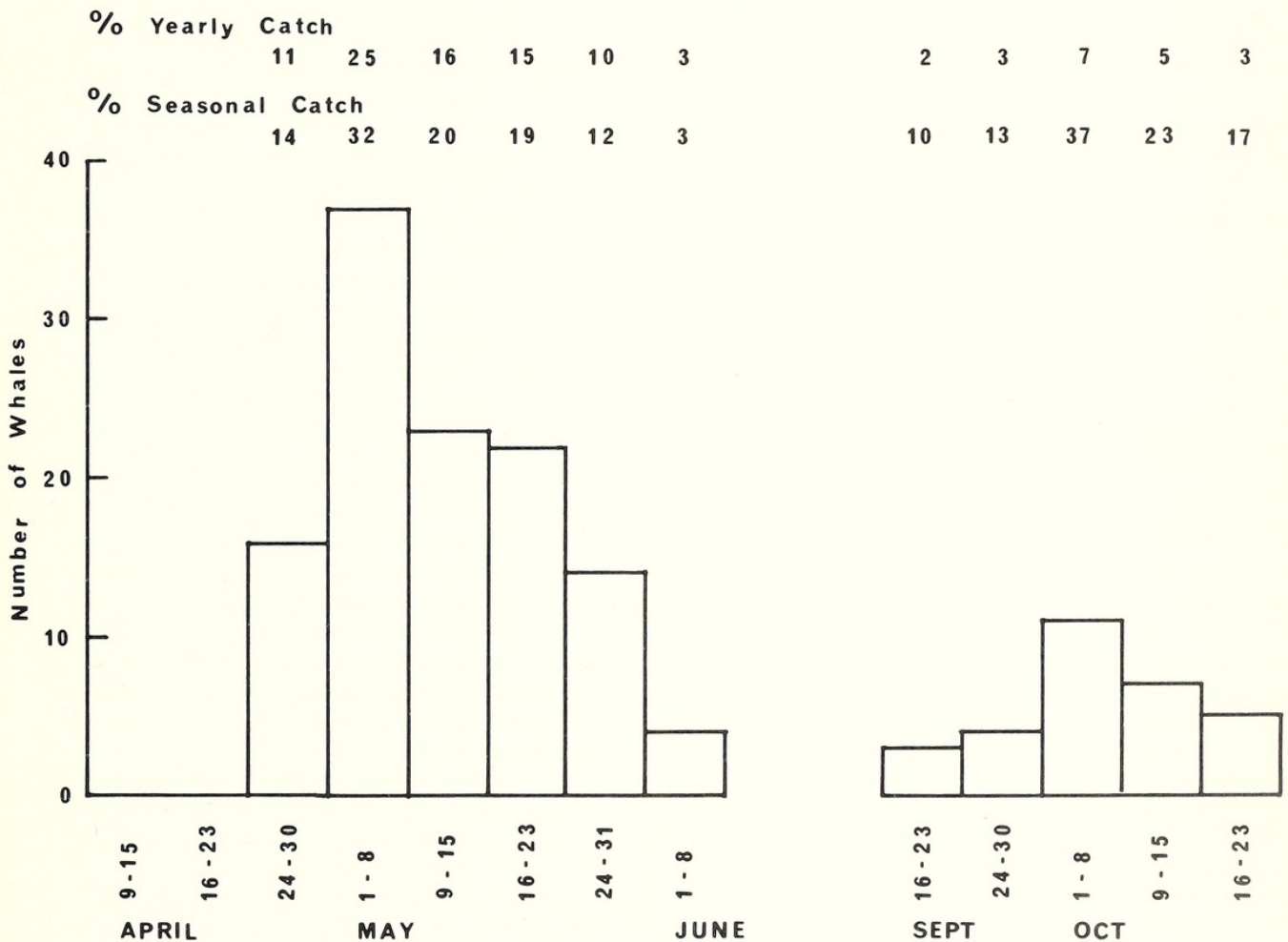


FIGURE 3. Histogram showing the actual and relative frequency of kills of bowhead whales of known dates by seasons and quarter months at Barrow (1928-1973) and Point Hope (1949-1973). Struck and lost whales are not included.

POINT HOPE

Point Hope, 560 km (350 mi) southwest of Barrow, is a village of about 500 Eskimos (Fig. 1). Although it has less than half as many whaling crews as Barrow, its catch of whales is more consistent. The first record for Point Hope is for 1879 and records are fairly consistent after 1890. The take of 241 whales in 60 years varied from zero to 16 per year (av 4). None were taken in five years, and ten or more were taken in seven years. A catch of five whales, constituting a feast year, occurred 16 times. Sixteen whales taken in 1924 is the largest recorded catch for the village (Table 1).

The lead near Point Hope opens in early April when bowheads are commonly seen, trails from the village to the lead are opened, and camps are set up on the ice. Foote (personal communication) gave 19 March as the earliest date when bowheads were sighted. However, in 1971 the first whale was seen 1 March (Herbert Kinneveauk, personal communication via John Bockstoce).

During the last 25 years for which kill dates are available, 48 of the 86 bowheads (57 percent) were killed between 24 April and 8 May, 63 (73 percent) were killed between 16 April and 8 May (Fig. 3). The earliest and only catch prior to 16 April was 9 April 1954. Bowheads were taken 16–23 April in eight of 23 years. Because of adverse ice and wind in 1973, only a half dozen whales were sighted in April, and the first kill was not until 5 May. One whale was taken in the last quarter of May in each of four years. A single bowhead was taken 28 May 1967, the latest catch in 23 years. Whaling continues into June if ice conditions permit. Early records (1890–1948) of whales killed at Point Hope were casually kept. However, since 1949 written records have been faithfully kept by Herbert Kinneveauk who supplied the information for 1949 to 1960. Thereafter, I kept in touch with the villagers.

Although Point Hope ranks second after Barrow (in whales taken), it is first in uniformity of catch, particularly from 1945 to 1969 (Table 1) when one to six whales were taken each year. Prior to 1945 the fluctuation in the catch of zero to sixteen whales may have been due to competition by commercial whalers, semicommercial whaling by the Eskimos, or faulty records.

WAINRIGHT

One hundred thirty-five km (85 mi) southwest of Barrow is Wainright, which ranks third in population (about 400 Eskimos) and in bowheads taken. Although there is a long spring season at this location, catches are sporadic, usually meager, and the arduous season often ends in failure. Although the village is not on a promontory, it is surprisingly successful at whaling. Bowheads have been reported off Wainright in March by seal hunters (Waldo Bodfish, personal communication), but hunting of whales usually starts in early May. Because of persistent shore-fast ice in late May and early June, many of the whales taken are large males and pregnant or lactating females which pass by late in the season (see Runs of Whales). The latest catch reported for any spring season is that of a 16 m (53 ft) male by Raymond Aguvluk on 20 June 1968. Bowheads are sometimes seen off Wainright in autumn, but never in sufficient numbers to justify hunting them. The village also lacks plank boats and heavy machinery for beaching and butchering whales in autumn. The 400 inhabitants of Wainright support about four whaling crews. Forty-three

whales (up to six per year) have been taken since 1936, interspersed with many lean years (Table 1). The most recent lean period was 1956–1960 when no whales were taken. My indications of whaling failures in the 1920s and 1930s may be misleading because the villagers concentrated their efforts at Icy Cape (see discussion of Icy Cape), averaging about one whale per year. The catch of six bowheads off Wainright in 1945 was a record. Three whales make a feast year for this small village.

SPRING MIGRATION AND THE RUNS OF WHALES

As the Yankee commercial fleet waited in the spring at St. Lawrence Island and Nome for a chance to enter the ice-choked Chukchi Sea, it was passed by bowheads on their way to the Arctic (Brower, Farrelly, and Anson 1942; Cook 1926; and Scammon 1874). This is the true beginning of the spring migration of the bowhead of the western Arctic, which occurred, and still does, with annual regularity. The inherent urge of the whale is timed with the breaking up of the ice pack. The whales use leads (channels of open water) as passageways through sea ice from the Bering Strait to their summer feeding grounds off the Mackenzie River and Banks Island, northern Canada. The lead opens with the first moderation of temperature and brisk easterly wind.

Normally a hunting lead 1.5 to 6.5 km (1 to 4.5 mi) offshore, from Will Rogers-Wiley Post Monument to beyond Point Barrow, is accessible to Barrow whalers so that some 20 to 25 hunting camps can be set up at strategic points along this 40 km (25 mi) stretch. Occasionally the leads are short and broken, or lie at nearly right angles to shore, as I observed in 1973. Rarely no shore lead opens as in 1968 when no shot was fired. In 1962 a continuous and reasonably stable lead, extending from Kotzebue Sound to Banks Island (Foote, personal communication), allowed the bowheads to pass Barrow 240 km (150 mi) offshore outside the hunting range of the Eskimos. Equally rare is a long and relatively stable lead that forms early near shore allowing whales to pass steadily for some three months, within easy reach of the hunters. Such may have been the case in 1882 and 1883 when Murdoch (1885) described the spring migration past Barrow as a "run." Maher and Wilimovsky (1963) agreed. However, on the basis of my observations, catch data, and the opinion of Eskimo whalers, I conclude that the spring migration normally consists of a series of runs with the peaks 7 to 15 days apart. A run is when many whales pass during a period of a few days. These runs are most evident at promontories such as Point Hope and Point Barrow, but they are also mentioned by John Burns (personal communication) at St. Lawrence Island where leads do not form.

Because of variations in temperature and currents, and in direction, velocity, and duration of wind, leads tend to open, close, and reopen, with shifting winds, to freeze over, and shift position throughout the season. These changes may be gradual, requiring days or weeks, or they may occur in moments with alarming speed and force sufficient to destroy a whaling camp, hunting equipment, and a secured whale, and to even threaten human life. Such changes in the lead affect the migration of the bowhead. Prolonged closing of a shore lead tends to confine the whales in "ponds" of open sea water (polynyas) or forces them to travel in leads so far from shore as to be beyond the sight and reach of the Eskimos. When the lead reopens the halted whales may pass through in considerable numbers, sometimes singly, in

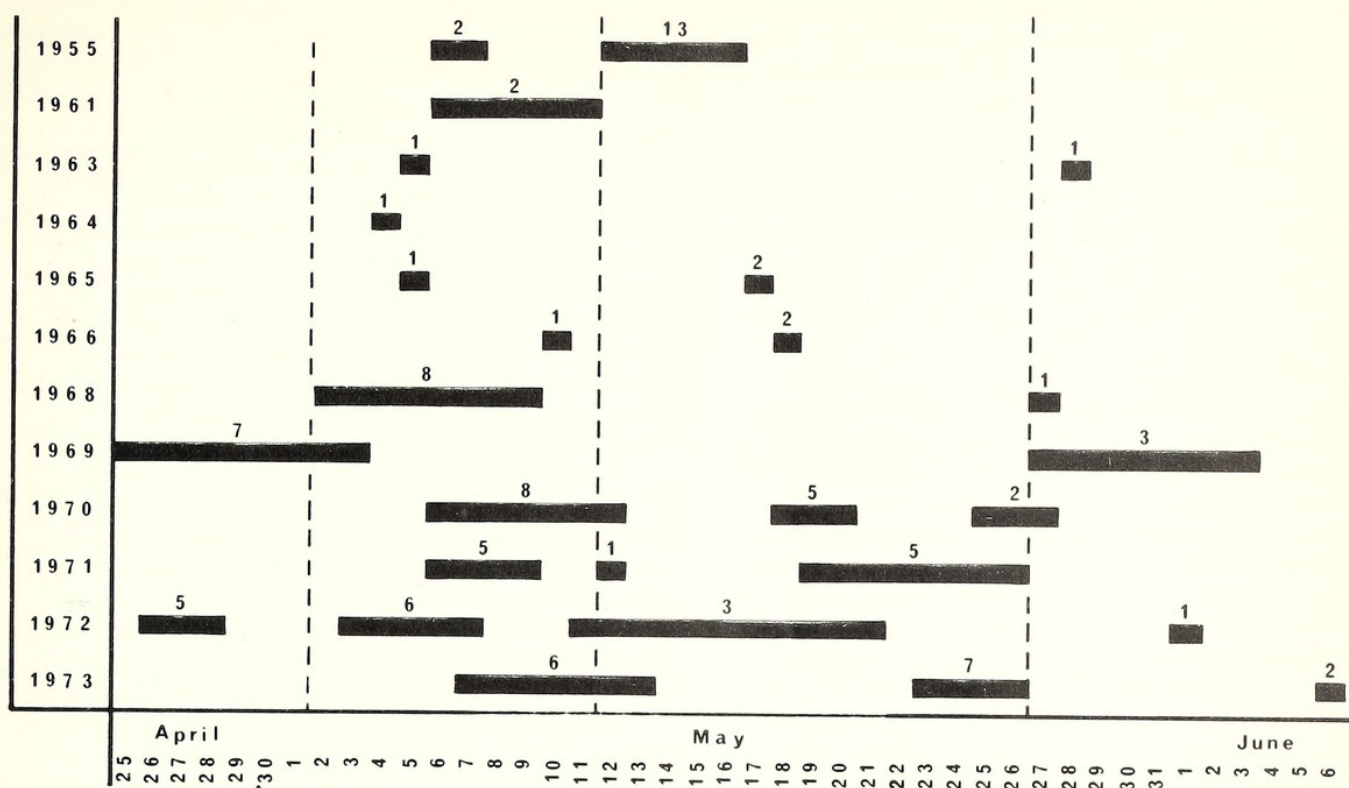


FIGURE 4. Successful hunting periods (indicated by horizontal black bars) and respective number of bowhead whales secured (numbers above horizontal bars) at Barrow during years for which date-of-kill data are available. The spacing of these periods of harvest suggest that most of the bowhead whales pass Barrow in a series of four runs (indicated by vertical, dashed lines).

twos and threes or in herds so large and compact that it is impossible to count them. For example, during a four day period (5–8 May) Sam Taalak (personal communication) observed a remarkably consistent pattern of one whale passing every ten minutes. Equally spectacular were the 500 whales that passed Wainright (Nelson 1969), and the hundreds of whales seen daily at Point Hope in 1972 (Billy Weber, personal communication). Except for such unusual and long-remembered field observations by whalers and others, most of the evidence of runs is obtained from meager catch data which usually give only the number and dates of kills with no mention of size, sex, number of sightings, whales struck and lost, and the “days dead” of stinkers (dead whales found by hunters). On the basis of whales killed and recovered at Barrow, particularly during feast years, there appears to be four runs (Fig. 4). The data is best read horizontally by year. Breaks between runs are suggested by broken vertical lines. When few whales were taken (1961–1966) most of these were taken in the first three weeks of May (i.e. runs 2 and 3). It is only when the sampling is larger, and the killing span is longer, as in 1972, that the four runs are clearly shown from catch data. Although 1970, 1971, and 1973 also yielded large catches, the spans were short and only two or three runs at most are shown per season. This does not mean that bowheads did not pass and were not fired upon by hunters in the other runs. For example, the 1955 data illustrates this when adjusted to show dates of kills rather than dates of recoveries. That year the Barrow crews were on the lead 25 April for the first run but had no success. Two whales were taken 6–7 May in the second run. The third run, beginning 12 May when a whale was struck and lost, was very successful,

totaling 13 whales, and apparently extending to 23 May. However, the run actually ended 16 May after the 10th whale of the season had been killed and harvested and other whales had been struck but lost. The remaining 6 days (17–23 May) were expended in salvaging some muktuk and dog food from 5 stinkers, apparently all shot on or before 16 May. There was no need to hunt in June (fourth run) because the village was abundantly supplied with whale products.

It is apparent that the second run, about 2–11 May, is the most productive. However, if the lead develops and the whales appear in the last week of April, as was the case in 1969 and 1972, many whales may be taken during the first run. Disintegration of the sea ice the last half of May may allow great numbers of whales to pass and many to be killed as was the case in 1970, 1971, and 1973, although the whales of the third run are sometimes relatively inaccessible to hunters because the widening leads confine them less and less.

The segregation of age and sex groups in the first three runs is not sharp. The catch is primarily of immature whales (estimated to be one to three years old) 7.3 to 9 m (24 to 30 ft) long which are not wary and which tend to follow the flaw (edge of the shorefast ice) more closely than do the older whales. Although large whales are occasionally taken in the first run (e.g. an 18.3 m (60 ft) one on 24 April 1956) and in the second run (e.g. two 15.2 m (50 ft) whales on 5 and 7 May 1956), those 12 m (40 ft) and longer are not common until the second and third runs. Whales of all ages and both sexes pass in the fourth run, the last week of May and first week of June, but the run is characterized by the slow-moving cows with nursing calves. Large males may

also be present.

Usually the shore ice platform deteriorates by the end of May so that whaling becomes dangerous or impossible. Whaling is then casual and the take is small but occasionally late whaling (the fourth run) is successful at Barrow, as in 1969. It is often the best part of the season at Wainright.

It is thought that whales continue to pass Barrow during the rest of June but that the disintegrating sea ice keeps the Eskimos on shore and prevents their observing the migrating whales.

The speed of migration along the Alaskan coast in spring has already been suggested by the contrast in beginning, peak, and end of the spring whaling (Fig. 3). The same pattern of whaling as at Point Hope also occurs one to two weeks later at Barrow, suggesting that two weeks may be required for the whales to travel the 560 km (350 mi) from Point Hope to Barrow, that is, about 40 km (25 mi)/da or 1.6 km (one mi)/hr.

Improved airplane and radio communications allow a closer estimate of speed of migration. When a lead opens and whales pass Point Hope, whalers at Barrow are alerted and they prepare to intercept the whales ten days later (Pete Sovalik, personal communication). With ideal ice and weather conditions, the 10-day travel time indicates 56 km (35 mi)/da or 2.4 km (1.5 mi)/hr.

Tomilin (1967) gives speeds of 7.4 km (4.6 mi)/hr for a "relaxed bowhead" and 13 to 16 km (8 to 10 mi)/hr for a wounded whale. He also suggests that the migration may be interrupted for periods of sleep and by temporary confinement to polynyas (a small area of open water, or a pond, completely surrounded by sea ice).

RETURN MIGRATION AND AUTUMN WHALING

Anthropologists, explorers, whalers, scientists, and others have described ancient and current spring whaling by Eskimos, but little has been reported on autumn whaling. Actually most of the whales taken by commercial whalers in the western Arctic in the last half of the 19th century were taken in autumn. By the time the whaling ships worked their way from Bering Strait to Point Barrow, the whales were returning. Most of the commercial whalers operated from sailing or steam ships and harpooned the whales in the open sea. They used their open whale boats as drags for wearing down the whales. In certain areas off Alaska, these whales were and are accessible to the local Eskimos. They, too, made harpoon and line fast in the whale, but used floats of seal skin (currently of plastic), as in their spring hunting, to mark and tire the fleeing whale.

In summer the pack ice usually withdraws some 80 km (50 mi) making available the shallow seas where bowheads tend to feed in summer. Sometimes by early August the first whales start their return migration. They travel westward from Banks Island and the delta of the Mackenzie to Point Barrow. A few turn southwest to follow the coast, as illustrated by the three whales that were taken off Barrow in 1964, and the several I sighted off NARL in 1967. Formerly, when bowheads were more numerous, local folklore indicates that some autumn whaling occurred at Wainright and Point Hope. However, most of the whales avoid these coastal villages and travel westward across the Chukchi Sea. The whales then turn south and pass through the Bering Strait to winter in the Bering Sea where they frequent the southern edge of the ice, which usually extends across the Bering Sea

from southwestern Alaska to the Kamchatka Peninsula (Rice 1974). The southern extent of the winter pack ice varies from year to year; in less severe winters the whales may not need to escape through the Bering Strait (Nishiwaki 1967 and Scammon 1874).

Some autumn whaling occurs or has occurred at Barter Island and Cross Island; however, the Barrow area, from the Will Rogers-Wiley Post Monument to the Point and eastward along the Plover Islands, is the major place where autumn whaling is profitable. Point Barrow has a long whaling history, judging from the remains of the ancient Nuwuk village at the Point. It is to be noted that in Eskimo spring whaling the skulls are normally left on the ice after flensing or are returned to the sea in a ritual. Because of the numerous skulls I, and Bee and Hall (1956), found at the Point, I conclude that they are from whales taken in the local open sea in autumn which were towed to shore for butchering. It seems practical to me for the Eskimos to have used these skulls as abutments for sod houses rather than to move the massive, non-floating skulls back to sea to appease the spirits. The Nuwuk Eskimos also whaled in the spring (Murdoch 1885).

The Nuwuk village was abandoned, probably because of excessive shore erosion and the flooding of their drinking water pond with sea water. Living was also easier at Cape Smythe (the present Barrow village). Commuting between Barrow and the Point (16 km, 10 mi) for autumn whaling was not easy. There was seldom sufficient snow for dog sledding and the distance for paddling an umiak, particularly with a whale in tow, was excessive. It can be assumed that the major effort was thereafter focused on spring whaling at the lead which usually develops from the Monument to the Point. Nevertheless, autumn whaling has continued with varying degrees of success through historic time. Maher and Wilimovsky (1963) point out that the migration past Barrow starts in middle or late August and that 20 percent of the whales harvested from 1928 to 1960 were taken in autumn.

When power launches and outboard motors for umiaks were available, the Eskimos took renewed interest in autumn whaling. Distance to good whaling ground east of the Point was less of a problem. I observed that beginning about mid-September, the same few experienced crews, season after season pursued whales mostly in plank boats. Umiaks were also used, particularly for scouting prey and following wounded whales. Ten crews were about the maximum number for autumn whaling during the period of my observations. With the increased speed, power, and comfort accorded by the plank boats, the Eskimos extended their autumn hunting range off Barrow, particularly east of the Point. Although Cooper Island (Fig. 2) is one of the best hunting sites, aggressive hunters now go as far east as Tangent Point, or even to Cape Simpson, to be the first to meet the oncoming whales. The hunters sometimes encounter herds of 50 to 60 whales along the Plover Islands (Thomas Brower, personal communication). This area may be a rest stop for the whales and provide an opportunity for them to feed, judging from stomach contents. During autumn the whales are less wary than they are in spring. Unusual success was attained in 1964 when 10 whales, a record number for autumn whaling, were taken by 10 crews. Seven of the 10 whales were taken near Cooper Island. As the pack ice came in and young ice formed, the whales were confined closer to shore and were easier for hunters to reach and kill. Whaling at the Point ended 9 October, with the simultaneous butchering of three whales which were towed to the beach near NARL because Barrow was already blocked by young ice. By 16 October this ice

had thickened into a working platform off Barrow. Three whales were harvested in a lead in two days, in the manner of spring whaling.

Other autumn seasons have been failures, some costly. The severe storm of 3 October 1963 nearly inundated Barrow as the autumn season was getting under way. Many of the whaling boats, stored on the beach, were seriously damaged. Although only one whale had been taken, all efforts were turned to bracing the village for the approaching winter. In 1968 the pack ice went out 240 km (150 mi) and did not return until December, thus creating an expansive hunting area. One whale was taken, but so far from shore it could not be towed to the beach. In 1969 the ice never left shore all summer. In 1970 the pack ice came in early and remained on shore at Barrow preventing the launching of the plank boats. Two crews prepared to whale in umiaks at the Point. One crew set up camp on 30 September. On 6 October it returned to the village for a brief rest because the sea was rough, the fog thick, and no whales had been seen. The second crew never went out. The season ended 11 October because of the strong current of the Chukchi Sea and the formation of young ice. Thus the autumn failures in 1968 to 1970 (Table 1) can be attributed to abnormal, contrary ice conditions.

The advantages of autumn whaling are several. Although the catch shows an irregular harvest over the years, there is the possibility of taking half as many whales as in the spring. In plank boats or motor launches the whalers enjoy cabin comforts of warm meals, dry clothing and a sheltered place to sleep. Whaling can be done with minimum labor because the motorized umiak and whale boat transport men and supplies and tow dead whales to the village for butchering. On shore, tractors and trucks are available for beaching the whale and hauling whale products to storage areas. The ease of autumn whaling is in sharp contrast to the traversing of rough shore ice in spring to get the umiak launched in the lead, the man-handling of the dead whale with block and tackle, and the labor of hauling sled loads of meat back to the village. All this involves considerable time, manpower, whaling equipment, and the repairing and replacing of freight sleds and snowmobiles. With two harvest seasons per year, the average freshness of the consumed whale meat is increased.

The disadvantages of autumn whaling are its unpredictableness and hazards. Autumn weather in the hunting area is less stable. With vast expanses of Arctic Ocean, abrupt storms can imperil the small whaling boats. The relentless Chukchi current, particularly strong at this season, sweeps past Barrow and the Point like a river and can carry small, underpowered boats beyond the point of return. The planking of the best boat cannot hold up against the grinding action when the current carries ice floes. If the pack ice has withdrawn an unusually great distance, the hunting area is so vast that whales are not readily found, and in the search, the whalers may get lost, run out of fuel, or, if successful, be unable to tow their catch to shore. Whenever the pack is dangerously close to shore, the whalers, whether Eskimo or Yankee (Vanstone 1958), in rounding the Point, took the chance of the pack grounding on shore and blocking return. A half dozen men can beach an umiak and haul it out of reach of surf and ice, whereas plank boats require tractor power for beaching and launching. There are no harbors available. Plank boats are expensive and difficult to freight in. Maintaining one may be beyond the abilities of the owner.

SECONDARY BOWHEAD WHALING AREAS AND CATCH RECORDS SEA OF JAPAN

A young bowhead was accidentally taken by commercial Japanese whalers at Osaka Bay in the Sea of Japan in June 1969 (Nishiwaki and Kasuya 1970). The occurrence of a bowhead at this low latitude ($33^{\circ} 28' N$), particularly in summer, is the southernmost record. Presumably the whale was a vagrant from the Bering-Chukchi Sea, Okhotsk Sea, or Sea of Japan. Whales in the latter two areas were nearly or completely extirpated many years ago. However, Rice and Scheffer (1968) reported sightings of bowheads in the Okhotsk Sea in 1966–68.

EAST SIBERIAN SEA

Siberian Eskimos north of Bering Strait took 19 bowheads in 1885 while the American fleet took 136 (Bodfish 1936). Stefansson (1924) noted that a good many bowheads were killed in the spring by Siberian Eskimos at Indian Point, Plover Bay, and East Cape (Mys Dezhneva). Residents of the Chukotskiy Peninsula took up to ten bowheads per year until recently (Tomilin 1967). According to A.V. Yablokov (personal communication) these Eskimos depend primarily on walrus and seals, although they may take a few, perhaps one to five, bowheads per year. Soviet scientists indicate that these people take almost no bowheads because they prefer gray whales (*Eschrichtius robustus*). Therefore the USSR government, using modern commercial whaling gear and vessel, took 125–194 gray whales per year during 1965–1973 purportedly for Eskimo subsistence (George Y. Harry, personal communication).

ST. LAWRENCE ISLAND

The Eskimos of St. Lawrence Island have traditionally taken only a few whales because the hunting of walrus and seals is more productive. However, a gray or "summer whale" is occasionally harvested, as in 1970 and 1972 (John Burns, personal communication). Spring whaling is also in the "open sea" because no lead forms for concentrating bowheads near shore. Strong currents and wind may retard towing a dead whale to shore. There are no sheltered beaches. The Eskimos had no heavy machinery to aid in beaching and butchering whales.

A 9.1 m (30 ft) bowhead was killed about 1966 (John Bockstoe, personal communication). Three bowheads were taken in 1967 (John Burns, personal communication). Thomas Poulter observed haphazard attempts to butcher an 18.3 m (60 ft) whale taken 1 May 1968 at Gambell. One bowhead was taken in 1971 and two in 1972 (John Burns, personal communication). The larger of the latter two was estimated at 13.5 m (45 ft) (Steven Burgess, personal communication).

Formerly the Islanders were more numerous and bowhead whaling was more productive, particularly at Southeast Cape and Southwest Cape, neither of which is now inhabited (John Burns, personal communication). By 1973 the snowmobile enabled whalers to reopen operations at Southwest Cape, and four small bowheads were taken during the first spring run in mid-April. Meanwhile, Gambell crews, working in local waters, took two small whales the same year. The Islander's success in the last

few years suggests that the combined take of the two villages, Gambell and Savoonga, may exceed that of Wainright, presently listed as the third ranking village (Table 2).

WALES

Wales is a small village of 120 Eskimos on the east shore of the Bering Strait. The pack ice normally blocks the Strait in winter. Yankee whaling ships, heading for the Arctic, occasionally took a bowhead near Wales as they encountered the southbound current laden with ice floes in April (Cook 1926). By May the currents run steadily to the northward and the sea mammals migrate into the Arctic (Bailey and Hendee 1926). Even in this turbulent hunting ground, Wales' Eskimos successfully hunted bowheads with stonetipped lances prior to the appearance of Yankee whalers about 1850, and they continued to be successful whalers after adopting steel harpoons and bomb guns (Bailey and Hendee 1926).

Chester Lampe, an Eskimo who lived in Wales as a boy, recalled six crews getting one or two whales a year about 1916 (personal communication). Winton Wayapuk, Sr. (personal communication), formerly a member of a whaling crew, recalled that bowheads up to 9 m (30 ft) were occasionally taken. Winton's brother-in-law, Arthur Navgeruk, probably took the last bowhead of that period in 1938. Nevertheless, the Eskimos unsuccessfully continued to hunt bowheads and gray whales using only rifles. The only whale meat available to them was an occasional stranded whale until 1969 when spring whaling was revived. The village acquired a darting gun and some simple whaling gear. A medium-sized bowhead was successfully taken and harvested 15 April 1970 by Silas Kaumanacheak and Mr. Christianson. This was Wales' first fresh whale since 1938.

TABLE 2

Recent catches of bowhead whales at secondary whaling sites in western and northern Alaska, 1961–1973. Data sources as follows (a blank indicates no data): *St. Lawrence Island*, from J. Burns, J. Bockstoce, S. Burgess, and T. Poulter (personal communications); *Kivalina*, from N. Hank (personal communication); *Cross Island*, from NARL. All other data from author.

STATIONS

YEAR	St. Lawrence Island	Wales	Kivalina	Cross Island	Barter Island	Total
1961	0	0	0	0	0	0
1962	0	0	0	0	0	0
1963	0	0	0	0	0	0
1964	0	0	1	0	2	3
1965	0	0	0	0	0	0
1966	1	0	0	0	0	1
1967	3	0	0	0	0	3
1968	1	0	0	0	0	1
1969	0	0	0	0	0	0
1970	0	1	1	0	0	2
1971	1	0	1	0	0	2
1972	2	0	1	0	0	3
1973	6	0	0	1	0	7
TOTAL	14	1	4	1	2	22

KIVALINA

Kivalina is a small village 110 km (65 mi) south of Point Hope. Because a good whaling ground is not available there, some of the men join the crews at Point Hope each spring and thus, for their services, get a ton or more of whale meat for Kivalina. Murray Johnson helped revive whaling at Kivalina in 1960 by providing the village with whaling gear. No whale was taken until about 1964 (Table 2). Now there are four crews and an active whaling program. One whale was taken each year in 1970, 1971, and 1972 (Nicholas Hank, personal communication). Whales were not taken in 1973. A few of the Kivalina men continue to whale with Point Hope crews.

CAPE LISBURNE

Although Cape Lisburne, 60 km (35 mi) north of Point Hope, is an excellent promontory, it was apparently too windy for even the Yankee whalers to operate there. Bodfish (1936) made no mention of finding whales or Eskimos who had taken bowheads there. Max Brewer (personal communication) stated that bowheads pass 9–13 km (6–8 mi) offshore at the Cape. Takpuk (Agnassagga, personal communication) took a bowhead there in 1950. David Hickok (personal communication) reported a village site a few miles south of the Cape where Eskimos had killed several bowheads many years ago. Scott McVay (personal communication) saw several bowheads at close range in that vicinity in 1973.

POINT LAY

Although Point Lay is an excellent promontory 280 km (175 mi) southwest of Barrow, few whales are seen there. Max Brewer (personal communication) thinks that the ice is too broken in the spring for the Eskimos to venture offshore. However, Alva Shaglook took a small bowhead there in 1930, and Tony Joule, in 1940, killed one so large that it could not be removed from the sea and was only partly utilized (Samuel Agnassagga, personal communication).

ICY CAPE

Icy Cape is 75 km (45 mi) southwest of Wainright. Its history is primarily one of temporary Eskimo hunting camps and of Yankee ships trapped in the ice. After the commercial whalers left the Arctic, Samuel Kanayuuk began whaling in 1910 and by 1939 had taken five whales at Icy Cape. In 1940 he took his sixth with the aid of Peter Panik. Samuel Agnassagga's (personal communication) father and Upicksoun whaled successfully each session at Icy Cape from 1919 through 1922. As a boy, Samuel recalls seeing nearly all of the Wainright villagers in a chain of dog sleds going to the whaling leads off Icy Cape, reportedly 106 km (66 mi) by trail (Van Valin 1941) for spring whaling. Three whales were taken about 1924 by James Angushuk, Mark Kootook, and Adam Nikaktuak (Ned Nusunginya and Samuel Agnassagga, personal communication). Luke Akiuak was another whaler. Up to eleven crews operated at Icy Cape taking a maximum of five whales in a season. There was no autumn whaling. As an adult, Samuel Agnassagga worked on Fred Forsland's crew which took two whales in 1938 and one in 1939. At least 21 bowheads were taken between 1910 and 1940. Assuming that

one-fourth of the kills were forgotten, my estimated 28 whales represent a take of one whale per year. Thereafter whaling at Icy Cape worsened (Ralph Aveoganna, personal communication). Van Valin (1941) wrote that Tigalook took a whale 2 May at a lead 32 km (20 mi) offshore to save the sick and starving villagers, some of whom were then camped 24 km (15 mi) out on the ice. By 1940 it was no longer profitable for Wainright crews to whale there. Because drift wood for fuel was lacking and there was no school for the children, the local residents abandoned the site in favor of Point Lay.

NUNNIAUK

According to Pete Sovalik (personal communication) a small Eskimo village called Nunniauk once existed 30 km (18 mi) northeast of Wainright (probably at or near the map site of the now abandoned Atanik village). This village profited, at least until 1938, by whaling in autumn when young bowheads came near the beach. The sighting of bowheads in autumn off this beach in 1966 and 1967 was reported by Waldo Bodfish (via Frederick Milan, personal communication).

CROSS ISLAND

Cross Island is 250 km (160 mi) east-southeast of Barrow in the chain of Plover Islands. Traditionally it was an old whaling site for local Eskimos in the autumn, but was abandoned many years ago. However, Thomas Napageak took a bowhead there 27 September 1973, operating out of the recently established village of Nuiqsut on the Colville River.

BARTER ISLAND

Barter Island is 480 km (300 mi) east-southeast of Barrow. The beach was formerly strewn with whale bones from successful hunting by Eskimos using primitive weapons. The Eskimos also traded extensively with inland Athabascan Indians. Whaling declined with the advent of commercial whalers in the late 1800s and the Eskimos commercialized on the needs of the white men by exchanging native products for guns, food, and liquor. Barter Island was the principal supply station between Barrow and Herschel Island. Most of the 119 inhabitants lived in the village of Kaktovik on the adjacent mainland.

Whaling equipment at Barter Island is limited and recent catches have been small. In 1964 two whales were taken, one was found dead the last week in August by James Lampe, and the other was shot 21 September by Archie Brower. Numerous whales have been seen in autumn near shore, particularly in 1940 and 1966 (Ned Nusunginya, personal communication). There is no spring whaling.

CANADIAN ARCTIC

Formerly, Canadian Eskimos whaled extensively from Herschel Island east to Dolphin and Union Strait. However, these people have now lost their whaling techniques and it is unlikely that bowhead whaling will be resumed there (Don C. Foote, personal communication). Bowheads are occasionally seen in the Northwest Passage and in Hudson Bay (Vibe 1967). Only two have been taken in recent years in the Canadian Arctic (Mansfield 1971), one of which may be the one from Foxe Basin in

1965 (Bruemmer 1971). Preliminary reports on the present status of bowheads in northeastern and central Canadian waters is given by Mansfield (1971) and Sergeant and Hoek (1974).

GREENLAND

Bowheads were reportedly exterminated in Greenland waters by the end of the 19th century. However, they are regularly seen off Godhaven, and sometimes seen in Thule Harbor, Scoresby Sound, and Store Kildway (Vibe 1967). No bowhead has been taken in several decades because the Danish government currently prohibits Greenlanders from taking them.

EURASIA

Bowheads are sometimes sighted in the Barents Sea west of Novaya Zemlya (Jonsgård 1964). They are very rare between Barents Sea and the east Siberian seas (Tomilin 1967), and are taken only occasionally by Soviet Eskimos (Zemsky, via George Harry, personal communication).

SUMMARY

Most of the world's bowheads are in the western Arctic Ocean. The overfished stock of the early 20th century was protected from further commercial exploitation in 1931. Since then they have been hunted only by Eskimos, primarily those of Alaska and Siberia who live on the shores of the Chukchi Sea. From scanty records beginning in the 1850s the three major Alaskan villages, totaling less than 3000 Eskimos, have a known take of some 565 whales in a century (1852–1969) or about 6/yr. The annual take at minor Alaskan stations and in other countries has been of little significance. However, the accelerated Eskimo take of bowheads, starting at Barrow in 1969 caused a yearly average take of 26 whales for 1970–1973 for the three major villages.

ACKNOWLEDGMENTS

I am indebted to the Naval Arctic Research Laboratory, its former directors, Max Brewer and John Schindler, and other administrators who supplied information, communication, and transportation for this study. I wish to thank the many scientists whose Arctic experiences are recognized in the text: John Bockstoe, Old Dartmouth Historical Society Whaling Museum; John Burns, Alaska Department of Fish and Game; Frederick Milan and Steven Burgess, Institute of Arctic Biology, University of Alaska; Don C. Foote, University of Alaska (deceased); David Hickok, Arctic Environmental Information and Data Center, University of Alaska; and A.V. Yablokov, Academy of Sciences, Moscow. My sincerest gratitude goes to the many Eskimo whalers, particularly Pete Sovalik (deceased), Ned Nusunginya (deceased), Chester Lampe, and Ralph Aveoganna of Barrow; Waldo Bodfish and Samuel Agnassagga of Wainright; Winton Wayapuk, Sr. of Wales; and Nicholas Hank and particularly Herbert Kinneveauk of Point Hope.

I gratefully recognize my sponsors named on the title page. I am also thankful for the many services received from the Natural History Museum of Los Angeles County, particularly the organizing and editing of this paper by Donald R. Patten and the illustrating by Carol Madle. I thank the several reviewers, George Y. Harry, Alton Roppel, David Hickok, John Burns,



Durham, Floyd E. 1979. "The catch of bowhead whales (*Balaena mysticetus*) by Eskimos, with emphasis on the Western Arctic." *Contributions in science* 314, 1–14. <https://doi.org/10.5962/p.241258>.

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