ARCTIC
VOL. 32, NO. 2 (JUNE 1979), P. 91-121.

The Annual Catch of Greenland (Bowhead) Whales in Waters North of Canada 1719-1915: A Preliminary Compilation.

W. GILLIES ROSS[1]

ABSTRACT. The international composition of the whaling fleets that sought *Balaena mysticetus* north of Canada before 1915 has long been a deterrent to the compilation of a complete set of voyage and catch data. Using unpublished whaling logbooks and journals, manuscript annual summaries of Dutch and British whaling, and other sources, the author assembles data annually for each of the whaling grounds of Davis Strait, Hudson Bay, and the Beaufort Sea, which indicate that more than 29,000 whales were secured. Considering gaps in the coverage and the mortality of wounded escaped whales, the total kill during the whaling period may have exceed 38,000. This reconstruction is considered preliminary; additional research could improve the completeness and accuracy of the information.

RÉSUMÉ. La composition internationale des flottes de baleinières qui ont chassé la *Balaena mysticetus* dans le nord du Canada avant 1915 a toujours nui à la compilation des voyages et des prises. A l'aide de livres de bord et de journaux personels non-publiés, et de résumés annuels hollandais et anglais concernant la chasse à la baleine, ainsi que d'autres sources, l'auteur a rassemblé des données année par année pour chacun des territoires de chasse du detoit de Davis, de la baie d'Hudson, et de la mer de Beaufort. Ces données indiquent que le nombre de prises s'élève à plus de 29,000. Considérant la manque de données durant certaines périodes, ainsi que la mortalité des baleines qui se sont échapées après avoir été blessées, le nombre total de prises durant la période de chasse a vraisemblablement dépassé 38,000. L'auteur considère ce travail préliminaire. Un examen plus approfondi devrait permettre de compléter et de préciser les renseignments sur le sujet.

INTRODUCTION

The Greenland whale *Balaena mysticetus* — also known as the right whale, polar whale, common whale and, in the western Arctic of North America, the bowhead — was pursued intensively by European and American whalemen for more than three centuries until about 1915, when the scarcity of whales and the availability of substitutes for whale oil and baleen brought about the cessation of the hunt. Aside from a small annual harvest by aboriginal peoples of the North, especially in northwest Alaska, the Greenland whale has gone unmolested for the last 60 years or so, enjoying international protection for most of this time. Despite the duration of this protected period, however, opinion is divided on the question of whether the species is successfully recovering from the low levels of the early part of the century. Its survival may yet depend upon future policies of conservation and utilization among both native and non-native peoples.

[1]Department of Geography, Bishop's University, Lennoxville, Québec, J1M 1Z7

Although the Greenland whale has managed to escape the onslaught of modern whaling in the twentieth century, its exceedingly low numbers have impeded scientific inquiry into physiology, behaviour, stock identity and so on, while the lack of reliable statistics on the distribution and intensity of human predation during the whaling period has hindered research into the whale's earlier zoogeographic characteristics.

Thus, some of the questions that are fundamental to the establishment of meaningful policies relating to the Greenland whale have not yet been adequately answered. What was its geographical distribution through time? Where were the limits of discrete population stocks? What were the migratory patterns within the various stocks? How rapidly did whalemen kill whales in the different regions? How low did population levels fall? What have been the trends since the close of commercial whaling? What levels of aboriginal or commercial harvesting can now be sustained without endangering the species? Only a dozen or so years ago N. A. Mackintosh (1965, p. 27) observed, "so long has it [the Greenland whale] remained inaccessible to biologists that knowledge has advanced very little since Scoresby's well known account of it published in 1820, and the work of a few other nineteenth century writers . . .", and according to Mitchell (1977, p. 4) "the bowhead whale issue is one of the least known, poorly studied and most important of the current great whale problems."

This paper addresses in a preliminary way the problem of inadequate whaling statistics. It presents a partial compilation of the number of whaling voyages and the number of Greenland whales secured, annually, by the whaling fleets of Holland, Germany, the United States, and Great Britain, in the three separate whaling grounds of the Canadian Arctic, namely the Davis Strait whale fishery, the Hudson Bay whale fishery, and the Beaufort Sea whale fishery (Fig. 1). The total geographical area covered thus extends from the Alaska/Canada boundary (141° W) to Cape Farewell, Greenland (44° W).

The published literature contains a number of statistical summaries of arctic whaling that are relevant to the region under consideration, but this body of material has several disadvantages for cetacean research. Specifically, its shortcomings are as follows:

1) some of the best material is in obscure publications (Munroe, 1854; Wätjen, 1919);
2) some information is presented by decade, rather than by year (Scoresby, 1820, vol. 2, following p. 155). While this may have the advantage of smoothing out annual variations the purposes of some scholars may be served more effectively by figures on an annual basis;
3) many summaries cover less than the entire whaling period, usually because they were published before the end of whaling (Leslie *et al.*, 1851);
4) two or more discrete whaling grounds or stock areas are sometimes combined in one table. In particular, the Davis Strait fishery is often

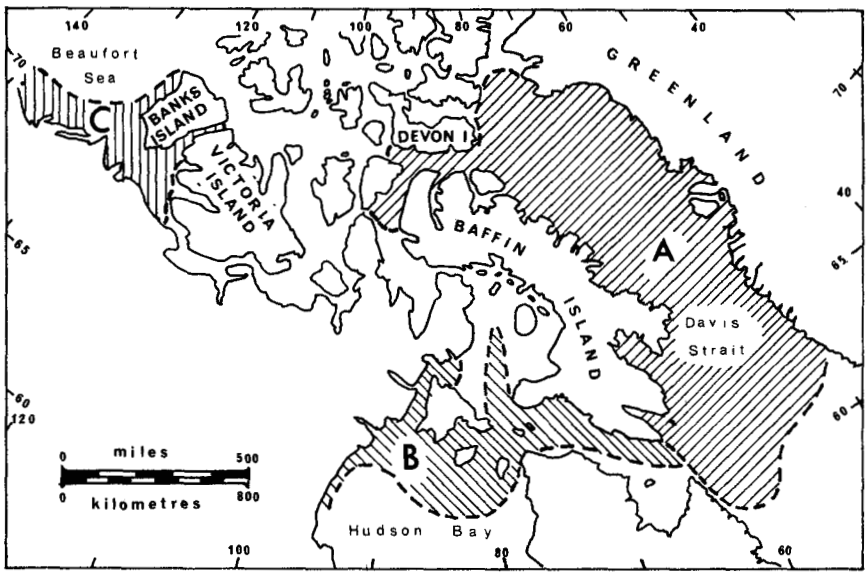

FIG. 1. Location and approximate limits of the three whale fisheries north of Canada: A. Davis Strait; B. Hudson Bay; C. Beaufort Sea.

combined with the "Greenland" fishery, which occupied the waters between Greenland and Spitsbergen (Lindsay, 1911, p. 220);

5) even when catches are given for a specific whaling ground it is seldom recognized that vessels occasionally visited more than one ground in the course of a voyage. Greenland whalers sometimes went on to Davis Strait, and Hudson Bay whalers often visited Cumberland Sound on the Davis Strait grounds;

6) figures are commonly given for one nation or another (de Jong, 1978) whereas more than one nation were usually active on a whaling ground;

7) summaries are often presented for a particular port only (Dixon, 1976, p. 227);

8) many secondary sources do not cite the origin of their data, making it difficult to assess their accuracy (Lubbock, 1955);

9) the reliability of statistical summaries varies; minor discrepancies are common and striking contradictions sometimes occur: Scoresby (1820, vol.2, following p. 155) states that 368 Dutch ships in Davis Strait took 1162 whales during the decade 1739-1748, whereas Jenkins (1921, p. 308) gives for the same period and whaling ground a total of 1047 Dutch vessels and no fewer than 5562 whales secured!

10) not all summaries list the number of whales killed and some record only the returns of oil and bone (Starbuck, 1878).

For the reasons oulined above the whaling literature published to date fails to give an adequate overview of the international whale fishery in the arctic regions. The few complete and thorough compilations that exist — notably that of de Jong (1977, 1978) — are confined to the whaling industry of a particular country, a legacy of the fact that the compilation of whaling statistics was initially carried out in the ports of the countries involved and later united in a national sense, often with inconvenient differences between countries in recording procedures, reliability of the figures, and units used. Zoogeographical studies of the Greenland whale and ecological studies of the interactions among native peoples, Euro-American whalemen, and whales, require statistics presented for discrete whale stock areas or whaling grounds and encompassing the efforts of all the nations involved. But such figures do not exist.

Eventually the statistical information presented for separate whaling grounds could include a number of useful parameters, such as size of ships (tonnage), number of ships lost, returns of oil and bone, and size of whales (by oil and bone yields). This paper, however, in summarizing only the number of voyages and whales, has a more limited objective.

THE DAVIS STRAIT WHALE FISHERY

Whaling prior to 1719

The beginnings of European whaling in the Davis Strait region are obscure, but it must be emphasized that the year 1719, which is so often cited by English-language authorities as the beginning of Davis Strait whaling (Scoresby, 1820, vol. 2, p. 68; Southwell, 1904, p. 80; Jenkins, 1921, p. 168; Lubbock, 1955, p. 82), and which is taken as the initial year of this summary of the annual whale catch, was preceded by a century or so of irregular whaling and trading efforts along the west coast of Greenland by vessels sent out from Holland and the Danish-Norwegian kingdom. The significance of the date 1719 is not that it marked the beginning of European whaling beyond Cape Farewell (which it did not), but that it marked the beginning of regular and intensive whaling operations in that region and the beginning of a systematic annual tabulation of Davis Strait whaling statistics by the Dutch. The lack of documentation of earlier Dutch and Danish activities in the region unfortunately precludes them from being included in this paper. Hopefully the researches of European historians will eventually bring these facts to light.

Dutch whaling 1719-1826

Despite the presence at various times of whaleships from Germany, the United States, England, and Scotland, the Davis Strait fishery of the eighteenth century was dominated by the Dutch (Fig. 2). The number of their voyages to the region rose rapidly; in 1721 more than 100 vessels departed from Dutch ports for the Davis Strait grounds, a phenomenon that was repeated in 1726, 1727, 1732, 1733 and 1735. The peak of Dutch activity, during the decades 1720-1740 (Fig. 2), was followed by steady decline through

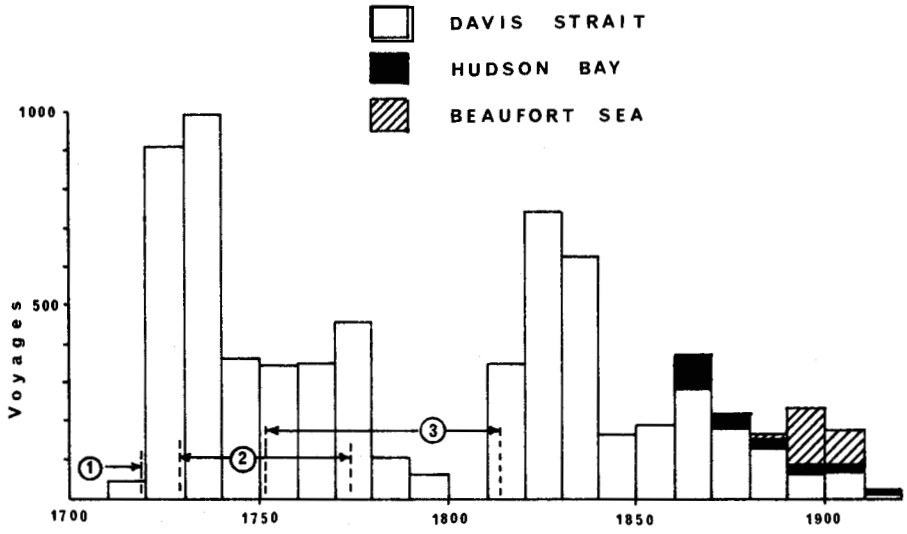

FIG. 2. Number of voyages by decade to the three whale fisheries north of Canada 1719-1915. (Source TABLES 3,4,5). This graph does not include data for the following aspects of the Davis Strait fishery: 1) earlier than 1719; 2) American whaling c. 1729-1775; 3) British whaling c. 1751-1814.

the remainder of the century. After 1792 Dutch whaling efforts were negligible.

Dutch Davis Strait whaling is generously represented by statistical information. The foremost primary source of data is a collection of the annual whaling summaries that recorded by port each whaleship, owner, and captain, the number of whales caught, and the quantity of blubber and, after 1740, oil obtained. Such lists were printed and distributed before the arrival of the whaling fleet from the arctic grounds, with columns in which the particulars of each voyage could later be entered by shipping agents, company clerks, or other interested persons. The earliest of these annual statistical summaries to represent the Davis Strait whale fishery is entitled "Lyst der Groenlands-vaarders, van Holland, Hamburg en Bremen, als meede de Straad-Davids vaarders. In den jaare 1719 uytgevaaren", published in Amsterdam by Karel van Ryschooten. After 1720 two separate lists were published annually, one for Greenland and one for Davis Strait. Lists for individual years can be found scattered among archives and museums in Holland, England and the United States, but the only virtually complete set of annual lists, to my knowledge, exists in the Municipal Archives of Amsterdam, and is referred to herein as the "Amsterdam Lists". Because figures were entered by hand on the printed lists by various persons, possibly in different ports, contradictions sometimes exist between two or more lists for the same year. For example, a list for 1770 in the Amsterdam Municipal Archives gives a total of 45 ships, 84½ whales, and 3839 casks of blubber, while another list for the same year in the Maritime Museum at Rotterdam

gives 45 ships, 85½ whales, and 3847 casks of blubber. A secondary source apparently based on similar lists gives figures that are slightly different again: 46 ships, 84½ whales, 3815 casks of blubber (van Sante, 1770). In such cases it is seldom possible to determine which of the conflicting figures is correct.

A number of secondary sources appear to have relied upon annual lists of Dutch whaling. The earliest was probably the publication of van Sante (1770), a copy of which in the Municipal Archives of Amsterdam contains handwritten editions up to 1826. Wätjen (1919) published data from both the annual lists and the compilation of van Sante, which differ slightly, and subsequent publications have generally depended on one or the other of these sources. The most recent set of Dutch whaling statistics, with a review and assessment of the statistical literature, has been presented by de Jong (1977, 1978), who selects the higher figures (of whales, blubber and oil) from Wätjen's two sources (van Sante and the annual lists), and works through this data to provide, by year, several important economic indicators of whaling activity, including the average returns of blubber per ship, average number of whales flensed per ship, and average amounts of blubber obtained per flensed whale.

For data on the number of Dutch voyages to the Davis Strait grounds and the number of whales secured there, this paper utilizes the Amsterdam Lists, which constitute a near-continuous run of primary statistical information from 1719 to 1826. Data for missing years (1733; 1738; 1739; 1740; 1745; 1748; 1821-26) are taken from van Sante (1770). These sources show that in that period Dutch ports sent a total of 3329 whalers to the Davis Strait fishery and obtained the produce of 7644 whales (Table 3).

German whaling 1719-1792

Several German ports on the Elbe and Weser rivers sent whaleships to the Davis Strait fishery through the eighteenth century. The most notable of these ports was Hamburg, but Altona, Bremen, Emden, and Gluckstadt also participated. De Jong (1977) has presented statistics on Hamburg whaling 1719-1783, based on a manuscript compiled by Grube (1846). Primary statistics on German whaling also exist in the same Amsterdam Lists adopted herein for Dutch whaling. Which of the two manuscript sources is more reliable can not readily be ascertained, but this paper uses the Amsterdam Lists for German whaling because they appear to be more complete. They contain several ports (rather than Hamburg alone) from 1719 to 1780, and they continue to record German voyages to Davis Strait until the year 1792 whereas the Grube/de Jong entries terminate in 1783. Data for missing years are taken from de Jong (1977), whose figures are derived from Grube (1846).

According to the Amsterdam Lists the North Sea ports of Germany sent 264 ships to the Davis Strait whale fishery during the period 1719-1792, and obtained 327 whales (Table 3).

American whaling in the eighteen century

New England whaleships began reaching northward into the Davis Strait region in 1732, according to Macy (cited in Starbuck, 1878, vol. 1, p.

24). Another source puts the date of the first voyage earlier, in 1729 (Bernard, 1761, p. 233). Through the 1730's a number of American whalers exploited these grounds, but whaling fell off in subsequent decades. After the Seven Years War there was a brief resurgence of American arctic whaling from 1768 until the outbreak of the American Revolutionary War in 1775, following which American whalers ignored Davis Strait until midway through the nineteenth century.

Although the sporadic eighteenth century American whaling activities in Davis Strait are discussed in general terms by Starbuck (1878, vol. 1) and specific voyages are described by Stackpole (1953, chapter 3) it appears that no comprehensive data on number of voyages or size of catch have survived. In addition, there is some vagueness about destination; in the period 1768-1775 the appelations "northern fishery" and "northern fleet" used by Starbuck (*op.cit.*, p. 174) make it impossible to distinguish Davis Strait whaling from that along the Labrador coast or in the Strait of Belle Isle and the Gulf of St. Lawrence.

The lack of statistics on the American eighteenth century fishery in Davis Strait makes it necessary to exclude these voyages from this compilation.

American whaling 1846-1892

Records have survived, however, for the American nineteenth century whaling in Davis Strait. The statistical summaries of American whaling voyages from 1784 to 1928 compiled by Starbuck (1878) and Hegarty (1959) provide for each voyage the ship's name, rig, tonnage, captain, owner or agent, destination, dates of departure and arrival, and returns of sperm oil, whale oil, and bone (baleen). These exhaustive sources are utilized in this paper, with certain modifications.

Modification of source data.

i) Starbuck (1878) and Hegarty (1959) express catch in barrels of oil and pounds of bone, whereas this paper endeavours to reconstruct the number of whales killed. For those voyages described in surviving logbooks or journals, the numbers of whales secured are known, and those data are used directly in this paper. But for the remaining American voyages, for which no primary information on whale kill exists, it is necessary to convert the quantities of oil or bone given by Starbuck or Hegarty into probable numbers of whales obtained. The conversion factor employed in this paper will be discussed below.

ii) Because every American cruise to the Arctic had an Atlantic beginning, a vessel's catch could include species other than bowhead whales. The compilations by Starbuck and Hegarty differentiate "sperm oil" (the oil of sperm whales) and "whale oil" (the oil of baleen whales). American nineteenth century whaleships in the Atlantic region rarely pursued other baleen species, such as fin whales, humpbacks, or bottlenose whales, and therefore the "whale oil" figures are taken herein as a reflection of bowhead whale kills only.

iii) American whaleships destined for one arctic whaling ground, such as Davis Strait, occasionally spent as much as a year cruising in the Atlantic before heading north. When the itinerary of the vessels is known the bowhead catch is assigned to the arctic part of the voyage.

iv) The destinations given by Starbuck and Hegarty for the Eastern Canadian Arctic include "Davis Strait", "Cumberland Inlet" (which is within the Davis Strait whaling grounds), and "Hudson Bay." In some instances, however, whaling masters declared for one region but subsequently sailed to another. When the recorded destination, from examination of a surviving logbook, journal or other document, is known to be incorrect, the catch figures have been transferred to the appropriate region.

v) Wintering voyages: when a vessel wintered in the Arctic the catch figures given by Starbuck and Hegarty for the entire voyage must somehow be apportioned between the individual years. If a reliable logbook or journal exists the dates of each whale kill are a matter of record, but when such documents are lacking the catch must be divided in some arbitrary manner. Table 1 indicates the way in which catches have been divided, based on an examination of over 50 logbooks and journals of wintering voyages.

vi) Double-region voyages: a similar problem arises when a whaler visited both Hudson Bay and Davis Strait during one voyage. Again, unless a logbook, journal, or other document reveals the location of whale kills, the catch of the entire voyage must be arbitrarily divided and assigned to each region. But because the logbook records of double-region voyages are too meagre to calculate reliable proportions, it is necessary to base the allocation of catch on the potential whale-hunting period in each region. Table 2 presents the schema for division of catch in such cases.

All of the double-region itineraries in Table 2 are known to have been implemented by American whalers. They all involved visits to both Hudson Bay and Cumberland Sound (on the Davis Strait grounds). The most common of them was the first (a); of 10 documented double-region voyages 8 were of this type.

TABLE 1. Division of Catch: Wintering Voyages
(Percentage of catch assigned to each season)

ITINERARY	SEASON		
	I	II	III
a) Hudson Bay; two-season voyage (one winter)	33	67	-
b) Hudson Bay; three-season voyage (two winters)	20	40	40
c) Davis Strait; two-season voyage (one winter)	50	50	-
d) Davis Strait; three-season voyage (two winters)	33	33	33

TABLE 2. Division of Catch: Double Region Voyages
(Percentage of catch assigned to each region)

ITINERARY	HUDSON BAY	DAVIS STRAIT
a) First summer in Hudson Bay; winter and summer in Cumberland Sound	25	75
b) First summer, winter, and second summer in Hudson Bay; visited Cumberland Sound on the way home	85	15
c) First summer, winter, and second summer in Hudson Bay; second winter and third summer in Cumberland Sound	55	45
d) First summer, winter, and second summer in Hudson Bay; second winter, third summer, third winter, and fourth summer in Cumberland Sound	40	60

vii) In cases where ships visited both Hudson Bay and Cumberland Sound the catch must first be apportioned between the two regions (according to Table 2), and then those portions representing more than a year must be divided among the individual years of the voyage (according to Table 1). Of course, this complex and somewhat arbitrary partition of the catch is only carried out when there is not a logbook or journal to reveal precisely where and when each whale was killed.

Bone conversion factor.

In an earlier paper (Ross, 1974) whale kills in Hudson Bay were calculated for each decade by converting oil returns, by converting bone returns, and by extrapolating known whale kill data from certain logbooks to the total number of voyages. Because of the irregular distribution through time of logbook-documented voyages, the latter method is not appropriate to the present attempt to arrive at annual, rather than decadal, whale kill figures. Conversion of oil or bone returns seems preferable, and of these, bone conversion should be the more accurate method, and will be employed in this paper. Bone could be extracted comparatively quickly and was much lighter, easier to handle, and more capable of being transported in whaleboats or on dog sleds, than blubber. Consequently, it was bone, rather than blubber, that tended to be saved when whales were killed far from the ship, in rising gales, among heavy pack ice, or near inhospitable lee coasts. Furthermore, declining oil prices and rising bone prices after about 1870, coupled with the increasing utilization of long whaleboat cruises away from the ship in spring and early summer, resulted in an even greater proportion of whalebone being saved while blubber was left on the carcass.

TABLE 3. Davis Strait 1719-1911: Whaleships and Whale Catch

	SHIPS					WHALES				
Year	Dutch	German	American	British	Total	Dutch	German	American	British	Total
1719	29	4			33	43	1			44
1720	58	6			64	138	7			145
1721	107	15			122	65	8			73
1722	67	6			73	126	11			137
1723	44	4			48	113	5			118
1724	60	2			62	135	6			141
1725	81	9			90	251	27			278
1726	110	23			133	114	23			137
1727	100	19			119	179	14			193
1728	83	9			92	195	14			209
1729	91	8	A*		99	117	9	A*		126
1730	83	8			91	212	8			220
1731	95	13			108	254	6			260
1732	137	19			156	213	15			228
1733	118	6			124	136	1			137
1734	89	8			97	225	6			231
1735	101	4			105	226	6			232
1736	92	1			93	267	1			268
1737	88	4			92	149	4			153
1738	74				74	115				115
1739	58				58	52				52
1740	33				33	114				114
1741	34				34	136				136
1742	48	1			49	50	2			52
1743	50				50	76				76
1744	39				39	183				183
1745	31				31	207				207

1746	40			40	216				216
1747	37	1		38	132	4			136
1748	1			1	0				0
1749	41	4		45	206	16			222
1750	44	4		48	58	2			60
1751	45	5	B*	50	66	5		B*	71
1752	42	5		47	108	9			117
1753	48	3		51	100	3			103
1754	36	1		37	18	0			18
1755	29			29	41				41
1756	26			26	39				39
1757	21			21	10				10
1758	8			8	66				66
1759	22	2		24	39	0			39
1760	15	3		18	78	10			88
1761	23	3		26	70	7			77
1762	26	3		29	66	4			70
1763	35	2		37	132	8			140
1764	38	2		40	31	1			32
1765	35	3		38	82	11			93
1766	31	4		35	32	0			32
1767	33	3		36	80	3			83
1768	36	3		39	208	9			217
1769	42	4		46	155	7			162
1770	45	4		49	85	6			91
1771	40	3		43	38	0			38
1772	38	2		40	240	12			252
1773	43	2		45	250	9			259
1774	48	3		51	178	5			183
1775	41	3		44	19	1			20
1776	39	3		42	145	7			152
1777	42	3		45	178	5			183

TABLE 3 — Cont'd

	SHIPS					WHALES				
Year	Dutch	German	American	British	Total	Dutch	German	American	British	Total
1778	47	3			50	55	1			56
1779	45	2			47	36	0			36
1780	36	1			37	91	2			93
1781					0					0
1782					0					0
1783	14	1			15	2	0			2
1784	6				6	8				8
1785	1				1	5				5
1786	7				7	39				39
1787	7				7	41				41
1788	11	2			13	21	0			21
1789	8	2			10	23	6			29
1790	14	2			16	10	0			10
1791	13	2			15	18	0			18
1792	14	2			16	2	0			2
1793	1				1	0				0
1794	3				3	14				14
1795					0					0
1796					0					0
1797	1				1	1				1
1798					0					0
1799					0					0
1800					0					0
1801					0					0
1802	1				1	0				0
1803					0					0

1804			0			0
1805			0			0
1806			0			0
1807			0			0
1808			0			0
1809			0			0
1810			0			0
1811			0			0
1812			0			0
1813			0			0
1814		67	67		537	537
1815		49	49		263	263
1816		45	45		379	379
1817		53	53		370	370
1818		63	63		371	371
1819		63	63		391	391
1820		57	57		768	768
1821	1	79	80	6	936	942
1822	1	61	62	2	352	354
1823	1	54	55	11	1395	1406
1824	2	79	81	0	587	587
1825	2	88	90	2	486	488
1826	3	87	90	0	470	470
1827		66	66		957	957
1828		83	83		1186	1186
1829		88	88		865	865
1830		91	91		161	161
1831		80	80		395	395
1832		62	62		1485	1485
1833		74	74		1632	1632
1834		69	69		871	871
1835		70	70		167	167
1836		64	64		66	66

TABLE 3 — Cont'd

	SHIPS					WHALES				
Year	Dutch	German	American	British	Total	Dutch	German	American	British	Total
1837				37	37				88	88
1838				34	34				412	412
1839				29	29				84	84
1840				20	20				14	14
1841				8	8				15	15
1842				4	4				55	55
1843				16	16				135	135
1844				21	21				105	105
1845				16	16				373	373
1846			1	19	20			0	92	92
1847			1	20	21			9	71	80
1848			1	14	15			8	59	67
1849			1	16	17			9	202	211
1850			1	14	15			5	41	46
1851			1	14	15			4	70	74
1852			1	13	14			0	56	56
1853			2	14	16			9	78	87
1854			2	13	15			9	82	91
1855			2	16	18			0	45	45
1856			3	16	19			1	170	171
1857			4	21	25			8	47	55
1858			3	25	28			14	69	83
1859			4	20	24			12	154	166
1860			9	26	35			21	87	108
1861			8	30	38			19	235	254
1862			5	27	32			27	113	140

1863	4	17	21	7	38	45
1864	8	14	22	26	40	66
1865	10	12	22	43	65	108
1866	14	20	34	44	46	90
1867	15	17	32	39	17	56
1868	10	17	27	16	124	140
1869	9	16	25	18	29	47
1870	7	12	19	16	78	94
1871	6	11	17	3	38	41
1872	3	13	16	1	113	114
1873	3	12	15	1	171	172
1874	2	14	16	7	212	219
1875	3	16	19	8	96	104
1876	3	16	19	7	70	77
1877	2	15	17	4	87	91
1878	4	17	21	2	10	12
1879	3	13	16	3	71	74
1880	2	14	16	3	119	122
1881	3	12	15	3	48	51
1882	2	11	13	0	79	79
1883	2	7	9	0	18	18
1884	2	9	11	0	79	79
1885	1	13	14	0	29	29
1886	1	14	15	0	19	19
1887	1	9	10	4	14	18
1888		8	8		8	8
1889	1	4	5		11	11
1890	1	8	9	2	18	20
1891	1	6	7	1	6	7
1892	1	6	7	0	8	8

TABLE 3 — Cont'd

	SHIPS					WHALES				
Year	Dutch	German	American	British	Total	Dutch	German	American	British	Total
1893				5	5				33	33
1894				6	6				16	16
1895				6	6				6	6
1896				5	5				7	7
1897				4	4				9	9
1898				3	3				6	6
1899				6	6				28	28
1900				6	6				16	16
1901				5	5				10	10
1902				5	5				11	11
1903				6	6				9	9
1904				5	5				9	9
1905				8	8				20	20
1906				7	7				6	6
1907				8	8				3	3
1908				7	7				4	4
1909				3	3				2	2
1910				7	7				11	11
1911				5	5				1	1
TOTAL	3,329	264	173	2,575	6,341	7,644	327	413	20,010	28,394

*This table does not include the following aspects of the Davis Strait fishery:

A. American whaling from its inception in 1729 to its termination about 1775;

B. British whaling from its inception about 1751 to 1814.

Nine reliable logbooks or journals from 86 American single-region voyages to Davis Strait between 1847 and 1891 record 70 whale kills, and for the same voyages the total bone obtained, according to Starbuck and Hegarty, was 97,407 pounds. The average yield, therefore, was 1,392 pounds of bone per whale, and despite the small sample from which it is derived, this figure is used to obtain the American whale catch data presented in Table 3.

The data on American whale catch presented in Table 3 is derived from surviving logbooks or journals as far as possible. For voyages not represented by such documents the figures are derived from the bone returns of Starbuck and Hegarty, divided among years for wintering voyages, apportioned between the two whaling grounds of Davis Strait and Hudson Bay when both were clearly visited, and converted to estimated numbers of whales by employing an average yield per whale of 1,392 pounds of bone. Using these methods the American nineteenth century whale catch on the Davis Strait whaling grounds is calculated to be 413 whales, the result of 173 "ship-seasons". (A voyage in which a vessel wintered would be counted as a voyage in each calendar year making two "ship-seasons").

FIG. 3. Prior to 1857, when the Scots first introduced auxiliary power to the Davis Strait whaling fleet, all the whalers operating in waters north of Canada were sailing vessels, their movements heavily dependent upon winds, currents, and ice conditions. Steam whalers were more effective in the pursuit of whales and were used with particular advantage in the Beaufort Sea fishery. In Hudson Bay, on the other hand, sail whalers continued to be dominant until the cesssation of the industry in 1915. Above is the Scottish steam whaler *Eclipse* in Pond Inlet about 1903. (Photo by A. P. Low, Public Archives of Canada).

British whaling 1751-1911: sources

As Dutch whaling activities declined in Davis Strait during the second half of the eighteenth century British enterprise increased in that region. Although Lubbock (1955, p. 114) states that British whalers probably began sailing to Davis Strait about 1773, it appears that the Scots were visiting the region as early as 1751 (Sanger, 1978) and the English not later than 1759 (Dixon, 1976, p. 226). Efforts reached a peak in the years 1820-1840, dropped sharply in the next decade, and then slowly declined during the subsequent three-quarters of a century (Fig. 2).

British whaling lacks published statistical summaries that cover the entire whaling period on an annual basis, such as those representing Dutch and German whaling efforts (van Sante 1770; Wätjen 1919; van der Woude 1972; de Jong 1977; 1978). There are, however, several notable sets of unpublished statistics which cover large segments of British whaling history. The first set of primary material exists at the Central Library in Hull, England. Entitled "An account of the success of the Ships at the Greenland and Davis' Straits Fisheries from the Year 1772 to the Year 1842 both inclusive", it contains hand-written summaries of whaling, year by year. From 1812 onwards,

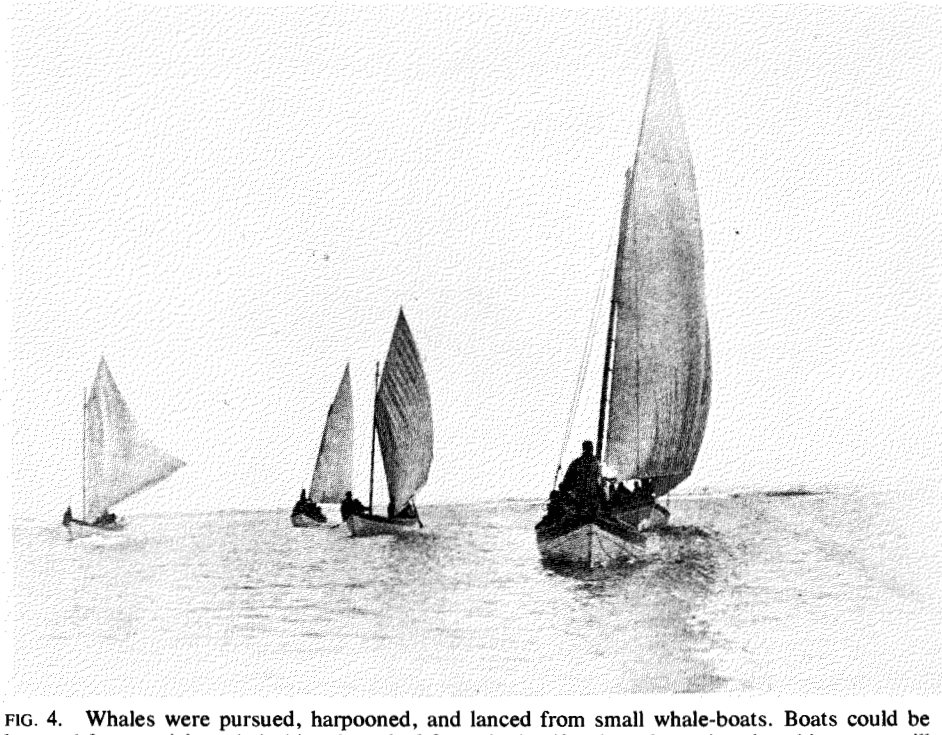

FIG. 4. Whales were pursued, harpooned, and lanced from small whale-boats. Boats could be lowered from cruising whaleships, launched from the landfast ice when wintering ships were still frozen into harbour, or operated from year-round shore stations. In the photograph above boat crews of the American schooner *Era* cruise for whales in northwestern Hudson Bay in 1904. (Photo by A. P. Low, *Cruise of the Neptune*, 1906, p. 34).

FIG. 5. The discarded artifacts of the whaling industry outlast the quarry. Try pots for the rendering of whale oil from blubber mark the site of a nineteenth-century whaling station at Kekerten in Cumberland Sound, Baffin Island. Cumberland Sound was one of the principal foci of whaling activity in the Eastern Canadian Arctic after 1840, but few Greenland whales have been sighted in the region during the last half century. (Photo: Gil Ross).

Greenland and Davis Strait data are listed separately, including for each ship the number of whales killed and the quantity of oil obtained, but prior to 1812 the lists fail to distinguish between Greenland and Davis Strait fisheries, and give only oil returns, with no whale numbers. An additional limitation is that before 1814 these annual summaries give information for Hull vessels only; other ports are excluded. This set of annual summaries will be referred to as the "Hull Lists".

The second important body of statistical data consists also of annual lists giving particulars of British whaling voyages, but these are printed lists, along the lines of the Dutch model (Amsterdam Lists), with the results of each voyage sometimes added later by hand and at other times printed. The year 1815, for example, is represented by "An Account of the Number of Fish with [the] Produce of Oil and Bone, brought by each Ship [from the?] Greenland and Davis's Streights Whale Fisheries, for the Year 1815", printed in London by the firm of Devereux and Lambert, oil and whalebone factors and insurance brokers. This statistical summary, organized by port, gives for each

ship the name of captain, whaling ground visited, catch of whales, and quantities of oil (in tons) and bone (in tons and hundred weight) obtained. Curiously, the survival of such lists bears a remarkable similarity to the situation in Holland. Although some lists for specific years exist in various archival collections, only one nearly continuous run of the lists has come to light, in the possession of the Dundee firm of Robert Kinnes & Sons. Because figures were in some years entered by hand upon printed forms, and because more than one firm of brokers and merchants might have been at work in several whaling ports preparing such lists, different versions of the lists for particular years may exist, and it is therefore essential to indicate which version is being used. Accordingly this collection of lists will be termed the "Kinnes Lists".

The Kinnes Lists begin in 1790 and end in 1911, but the first quarter-century is represented by only a few years of statistics, and data from the Greenland fishery are mixed with those for Davis Strait. For the Davis Strait whale fishery, therefore, the period effectively covered by the Kinnes Lists is 1814-1911.

Another unpublished source of information on British arctic whaling, located in the Arbuthnot Museum and Public Library of Peterhead, Scotland, is a typescript entitled "An abstract of the whale and seal fishery at Peterhead from its commencement in 1788 to 1874". These "Peterhead Lists" record no Davis Strait voyages earlier than 1821, contain no information on ships from other ports, and terminate in 1874, three decades before the end of Peterhead whaling. Accordingly these data have not been used in this paper.

British whaling 1751-1814

Prior to 1814 the statistical record of British whaling, according to the sources above, is incomplete and confused. The Kinnes Lists represent a few years only, mix figures for the two whaling grounds of Greenland and Davis Strait, and omit catch. The Hull Lists give voyage and oil returns, but for Hull vessels only, and again without distinguishing between the two major whale fisheries. Whale catch data for a number of Davis Strait voyages are provided in the book by Lubbock (1955) and in his research notes (Lubbock n.d.) but sources of his information are not revealed, the extent of omission is unclear, and the accuracy is questionable. Scattered information in the Kinnes Lists, Hull Lists, and Lubbock (1955) reveals that more than 280 British voyages to Davis Strait occurred from 1773 to 1814, but the duration and magnitude of early British enterprise in that region were evidently far greater than this; intensive scrutiny of newspapers and other sources has shown that Scottish ports alone sent more than 350 vessels to Davis Strait during the period 1751-1814 (Sanger, 1978). The reconstruction of British whaling statistics for the years earlier than 1814, which will require lengthy and meticulous research in British newspapers and a variety of obscure sources, is not within the scope of this paper.

British whaling 1814-1911

For the period 1814-1911, this paper employs the voyage and catch data of the Kinnes Lists. This set of data covers a longer period than the Hull Lists; the inclusion within it of lists prepared in a variety of cities (London, Dundee, Glasgow) may tend to equalize any error resulting from distance away from the ports of arrival; and the printed character and commercial function of the lists suggests that accuracy, while not always obtained, was at least intended. For years missing on the microfilm used for this paper (1817; 1823) and years in which the Kinnes Lists are either incomplete (1837) or vague as to whaling grounds (1833), data from the Hull Lists are employed.

In attempting to extract annual information for the Davis Strait fishery from the Kinnes Lists problems arise in connection with wintering and double-region voyages.

Wintering voyages.

The Kinnes Lists are neither consistent nor accurate in reporting winter voyages. Sometimes they record them in the year of departure but at other times they record them in the year of arrival; a few such voyages are reported in both years and other wintering voyages are mistakenly listed as one-season voyages. They identify a total of about 30 wintering voyages, whereas more than 50 intentional wintering voyages are known to have occurred, as well as a number of unintentional winterings when vessels were beset and forced to spend a winter drifting with the ice pack. Exhaustive research with newspaper and other sources is required before the precise number and duration of wintering voyages can be ascertained. In this paper the Kinnes List information, incomplete as it is known to be, is accepted; in all of the voyages indicated as wintering in Davis Strait the catch is divided equally between the years for Table 3. Otherwise, the catches are simply assigned to the years in which they are reported in the Kinnes Lists.

Double-region voyages.

Voyages to more than one whaling ground, if they existed prior to 1856, are not indicated in the Kinnes Lists; from 1814 to 1855 inclusive the destinations are either Greenland or Davis Strait. But from 1856 on a number of double-region itineraries are identified: Greenland and Davis Strait; Greenland and Cumberland Sound; Newfoundland and Davis Strait; Labrador and Davis Strait; Newfoundland and Greenland. Aside from the question of whether these destinations are accurate, which this paper does not attempt to answer, there is the problem of what part of the catch in a double-region voyage was taken in Davis Strait. Examination of newspaper sources for a few random years (such as 1875) shows that what the Kinnes Lists described as voyages to "Greenland and Davis Strait" were two separate voyages, the first to Greenland and the second to Davis Strait, and furthermore that the Greenland voyages, made in late winter-early spring, were primarily for seals, while the Davis Strait voyages, in which the vessels departed about 1 May, were for whales. Accordingly, in this paper, the assumption is made that the entire

bowhead whale catch of such a voyage (indicated as one double-region voyage but actually two separate voyages) was secured in Davis Strait. This arbitrary aproach will tend to exaggerate the Davis Strait catch, for some of the whales may been taken on the Greenland grounds, but the exaggeration will probably be small.

There were undoubtedly some instances in which ships whaling off the east coast of Greenland, experiencing little success, sailed around Cape Farewell to try their luck on the Davis Strait grounds. Such bona fide double-region voyages do not appear to have received special recognition in the Kinnes Lists, but it is likely that intensive historical research will in time reveal the full particulars of all these voyages. At present these Greenland/Davis Strait double-region voyages masquerade in the Kinnes Lists as single-region voyages to either Greenland or Davis Strait, and we are forced to accept the mixing of whale catch data that has probably occurred.

The ships listed in the Kinnes Lists as having visited Newfoundland or Labrador as well as Davis Strait, appear to have performed authentic double-region voyages, (rather than two distinct voyages to separate areas). The quarry in Newfoundland water was clearly seals, so that the whale catch of the entire voyage can be confidently assigned to Davis Strait, where Greenland whales were to be found in summer months.

The Kinnes Lists terminate in 1911. British whaling, however, did not end abruptly. A small number of ships continued to sail into Davis Strait for another two decades, but they rarely pursued whales, for few remained. Their function was primarily to secure or to collect from land stations and trading posts a miscellany of animal products, both terrestrial and marine, including skins, ivory, and now and then some whale oil and bone, acquired by Eskimo hunters and trappers. For Davis Strait this compilation, like the Kinnes Lists, ends somewhat arbitrarily with the 1911 season.

According to Table 3 a total of 2,575 British voyages (or ship-seasons) to the Davis Strait fishery in the period 1814-1911 resulted in a catch of 20,010 bowhead whales.

THE HUDSON BAY WHALE FISHERY

British whaling 1765-1911

The commercial pursuit of Greenland whales in Hudson Bay was initiated by Churchill-based sloops of the Hudson's Bay Company in 1765. This modest experiment was not starred by success and the Company abandoned it in 1772 after nine voyages had secured only six whales. The whale stock then enjoyed a long respite until the inauguration in 1860 of the second, far more intensive, period of whaling in the Bay, pioneered and dominated by American vessels from New England ports. In the second half of the nineteenth century the Hudson's Bay Company again sent a few whalers into the Bay, and other British ships played a minor role in this fishery. Particulars on the Company voyages of both eighteenth and nineteenth centuries, extracted from manuscript ships' logbooks, are as previously reported (Ross,

1973a,b,c). Data on other British voyages and whale catches are taken from the Kinnes Lists. All together, 34 British vessels appear to have taken only 39 Greenland whales in Hudson Bay.

American whaling 1860-1915

The rising price of baleen in the second half of the nineteenth century helped to bring about a renewed American effort in the Eastern Arctic. Two highly successful voyages into the northwest reaches of Hudson Bay in 1860 were followed by a spurt of activity in that region. Half of all the American voyages into the Bay occurred in the first decade, following which there was a marked diminution of effort until the cessation of whaling in 1915 (Ross, 1975, p. 37).

American whalers normally wintered in Hudson Bay and frequently visited the Davis Strait ground (Cumberland Sound in particular) on the same voyage. This makes it necessary to divide the catch of such voyages into separate years and discrete whaling grounds. The remarks made concerning this point under Davis Strait, and the schema for catch division outlined in Tables 1 and 2, are applicable for Hudson Bay as well, and need not be repeated. Starbuck (1878) and Hegarty (1959) are again used as data sources, but in converting their figures for pounds of bone into numbers of whales the average yield of bone must be calculated from catches obtained solely in Hudson Bay.

Bone conversion factor:

A previous attempt to convert bone quantity to whales in Hudson Bay (Ross, 1974, p. 94) calculated an average yield from data on 73 whales killed between 1889 and 1903, as reported by one whaling master; the figure obtained was 1,065 pounds of bone per whale. But Captain Comer did not record the source of his figures, and the span of years is late in the whaling period and short in duration. Here, therefore, the average yield is calculated from manuscript logbook information, in the same manner as for Davis Strait (above). Thirty-four logbooks record the killing of 211 whales from 1860 to 1912, and for the same voyages Starbuck and Hegarty report a total of 193,410 pounds of bone secured, making an average yield of 916 pounds per whale; this conversion factor will be used in this paper.

By dividing the bone returns reported by Starbuck and Hegarty for all known wintering and double-region voyages into the appropriate years and whaling grounds, adding the returns of single-season voyages to Hudson Bay, and then converting the bone quantities into estimated numbers of whales, it appears that 176 American ship-seasons in Hudson Bay resulted in a total catch of 532 whales (Table 4).

THE BEAUFORT SEA WHALE FISHERY

American whaling 1889-1908

As whaling on the Hudson Bay and Davis Strait grounds declined through the last decades of the nineteenth century a vigorous American fishery

TABLE 4. Hudson Bay 1860-1915: Whaleships and Whale Catch

	SHIPS			WHALES		
YEAR	AMERICAN	BRITISH	TOTAL	AMERICAN	BRITISH	TOTAL
1765		1	1		0	0
1766		1	1		0	0
1767		1	1		1	1
1768		2	2		1	1
1769		1	1		0	0
1770		1	1		0	0
1771		1	1		3	3
1772		1	1		1	1
1860	2		2	12		12
1861	2		2	33		33
1862	5		5	34		34
1863	13		13	77		77
1864	19		19	88		88
1865	13		13	46		46
1866	8	1	9	25	0	25
1867	9	2	11	13	0	13
1868	2		2	4		4
1869	2		2	9		9
1870	2		2	8		8
1871	2		2	16		16
1872	5		5	8		8
1873	2		2	10		10
1874	2		2	6		6
1875	2		2	15		15
1876	1		1	2		2
1877	5		5	4		4
1878	6		6	4		4
1879	4		4	12		12
1880	4		4	4		4
1881	6		6	5		5
1882	3		3	8		8
1883	3		3	5		5
1884	2		2	3		3
1885	3		3	2		2
1886	4	1	5	3	2	5
1887	2	1	3	2	0	2
1888	2		2	0		0
1889			0			0

TABLE 4 — Cont'd

	SHIPS			WHALES		
YEAR	AMERICAN	BRITISH	TOTAL	AMERICAN	BRITISH	TOTAL
1890			0			0
1891	1		1	0		0
1892	1	1	2	4	1	5
1893	2	1	3	1	2	3
1894	2		2	6		6
1895	3	1	4	2	1	3
1896	5	1	6	11	0	11
1897	4	1	5	3	2	5
1898	3	1	4	10	0	10
1899	2	2	4	9	0	9
1900	2	1	3	6	1	7
1901	2	1	3	7	5	12
1902	2	1	3	0	1	1
1903	1	1	2	2	5	7
1904	1	2	3	1	2	3
1905	1	1	2	9	3	12
1906		1	1		1	1
1907	1		1	0		0
1908	1	1	2	0	1	1
1909	1	1	2	0	1	2
1910	1	1	2	0	2	2
1911	1	1	2	2	3	5
1912	1		1	1		0
1913	1		1	0		0
1914	1		1	0		0
1915	1		1	0		0
TOTAL	176	34	210	532	39	572

commenced in the Western Canadian Arctic. Following an exploratory boat trip to the Mackenzie River delta in 1888-89, the frontier of the long-established Bering Sea fishery expanded eastward along the north Alaskan coast into Canadian waters in 1889, and for almost 20 years high baleen prices supported an intense whaling effort undertaken by a fleet of wintering steam whalers and other vessels from San Francisco. Hunting pressure quickly reduced the stock of whales, and baleen prices fell steadily after 1904. The year 1908 marked the last real whaling enterprise; voyages of

subsequent years, as in the Eastern Arctic after 1915, depended mainly on the fur trade.

The waters of the Beaufort Sea were summer feeding grounds for a portion (but probably not all) of the Bering Sea stock of bowhead whales. The catch figures tabulated in this paper, therefore, certainly do not cover the entire stock but they do cover a distinct whale fishery, because the whaling grounds of Bering Sea, Bering Strait, and the Chukchi Sea were separated from those of the Beaufort Sea by about 300 miles. The shallow waters off the north Alaskan coast, besieged by the polar pack and devoid of adequate shelter, were navigated without delay by whalers and the pursuit of the whale took place mainly from Herschel Island eastward into Amundsen Gulf (Fig. 1). Thus the western limit of 141°W adopted in this paper is more than an arbitrary political boundary; it also represents approximately the western edge of the Beaufort Sea feeding grounds and whaling region, and therefore comes close to constituting a biological and economic boundary as well.

The statistical summaries of Starbuck (1878) and Hegarty (1959) are of limited use for this branch of arctic whaling. Their destinations are too vague; the term "North Pacific" often covers voyages that penetrated Bering Sea, reached into the Beaufort Sea, and returned home by way of Herald Island. In addition, the catches reported by Starbuck and Hegarty for an entire voyage would likely include bowheads caught on the way to and from the Beaufort Sea. But because incoming ships invariably stopped at Herschel Island and took their departures from there in the fall, the composition and movements of the whaling fleet were matters of common knowledge, and were frequently reported in logbooks and journals. By using such documents, and the published list of wintering vessels by Bockstoce and Batchelder (1977) a list of the ships active on the Beaufort Sea whaling grounds each year has been built up. The method used to obtain the annual catch figures presented in Table 5 is as follows. For voyages represented by reliable logbooks or journals the recorded whale kills are accepted and assigned to the appropriate year. For undocumented voyages, however, it is necessary to calculate from known logbooks and journals the average number of whales obtained per season, (a) for one-season voyages and (b) for wintering voyages of various durations, and to then extrapolate these average returns to the total number of undocumented voyages in each year. The sum of this theoretical catch and the actual catch of some vessels obtained from logbooks constitutes the total estimated whale catch in each year. The average yield employed for one-season voyages, calculated from the logbooks of 18 voyages, is 2.4 whales per ship. The yield for wintering voyages, obtained from 11 logbooks, is 4.2 whales per ship-season.

Because logbooks or journals are available for only 43 (19%) of the known 226 ship-seasons of Beaufort Sea whaling, and the whale catches of the remaining voyages are estimated from average yields obtained from those documents the annual whale catch data in this compilation may be far from accurate. The estimated catches are tabulated by year only to conform with the annual summaries presented for the Eastern Arctic fisheries. In fact, the

TABLE 5. The Beaufort Sea 1889-1908: Whaleships and Whale Catch

YEAR	SHIPS	WHALES
1889	7	17
1890	3	13
1891	3	13
1892	9	33
1893	13	52
1894	23	87
1895	22	79
1897	19	66
1897	17	50
1898	7	43
1899	13	44
1900	9	26
1901	10	28
1902	12	52
1903	12	36
1904	12	37
1905	15	51
1906	11	35
1907	8	28
1908	1	4
TOTAL	226	794

data do not justify an annual tabulation; it must be emphasized that for a particular year the fleet catch may have been much different than here indicated. The principal value of this compilation is to reveal the general order of magnitude of the whale catch in the region; the total catch figure has far greater validity than the annual ones.

It is likely that the data for annual bowhead catch in the Beaufort Sea could be improved by the utilization of additional logbooks and journals whose existence is now known, and by a systematic examination of newspaper and other sources. A recent estimate of the depletion of the Bering Sea stock of bowheads through most of its range has made effective use of the *Whalemen's Shipping List and Merchants' Transcript* and several San Francisco and Honolulu newspapers (Bockstoce, 1978). Another approach might be to extract from surviving logbooks the data sometimes given for the catches of other ships, at or near the end of the arctic season. The fundamental problem that remains, however, is how to discover or to estimate what proportion of the reported catch of a ship or of the entire fleet was obtained in the Canadian part of the Beaufort Sea rather than in waters off Alaska or Siberia traversed on the way to and from the Beaufort Sea.

By the methods employed in this paper, 20 years of American whaling in the Beaufort Sea, east of the Alaska/Yukon boundary (141°W) appear to have

resulted in the taking of 794 bowhead whales during 226 ship-seasons. By comparison, Bockstoce (1978, Table 5) has estimated the total catch of Western Arctic bowheads north of 60°N, between 1848 and 1915, at 17,956 whales.

CONCLUSIONS

Completeness of the record.

In terms of completeness this paper has several shortcomings:

1) the paper has not attempted to cover aboriginal whaling, except when natives whaled on behalf of commercial whaling stations or ships and their catches were subsequently included in the returns. For understandable reasons native subsistence whaling has largely escaped statistical documentation;
2) information on early Davis Strait whaling is absent. The activities of Danes, Norwegians, Dutch, Germans, and conceivably of other nations, prior to 1719 do not appear to have been described in a statistical sense, although it is possible that data will come to light in the future;
3) the voyages and catches of American whalers in Davis Strait during the mid-eighteenth century have not been included, owing to a lack of data;
4) statistics have not been given for the initial decades of British whaling in Davis Strait, before 1814. Research being carried out independently promises to fill this gap, at least as far as Scottish voyages are concerned;

and 5) the figures in Tables 3, 4, and 5 are for whales secured by the whaling vessels, but the death of escaped wounded whales may have amounted to an additional 20 per cent or more of the reported catch. There has been no attempt in this paper to calculate the loss rates on the three whaling grounds, but clearly this must be done before the full magnitude of whale depletion can be known.

Accuracy of the record

Printed figures tend to possess an air of unassailable reliability. The impressive columns of numbers in Tables 3, 4, and 5, by their smug, self-confident appearance, may suggest a degree of accuracy that is in fact entirely unwarranted. Any statistical reconstruction of this sort, depending upon a variety of published and unpublished sources in several countries and extending over two centuries, will be subject to error, and it may be useful to outline briefly the weaknesses of the present compilation:

1) if we look for accuracy in individual years the figures for the Beaufort Sea fishery will certainly be found sadly wanting, because for the most part they are projections of average yields during the entire whaling period — yields that themselves have been calculated from a rather small proportion of total voyages;

2) the spatial and temporal apportionings of the catch of double-region and wintering voyages in the Eastern and Western Arctic, although based on averages obtained from logbooks and journals, are nevertheless arbitrary, and consequently may result in severe distortions of the facts for particular years;

3) the conversion of bone returns into numbers of whales for the American fishery in Hudson Bay and Davis Strait, based on average yields calculated from known situations is again nothing more than an approximation. It may be too low or too high, and it is certain to mask some of the real fluctuations in whale catch that occurred from year to year;

4) errors are known to exist in all of the data sources used (although not all the errors are yet known). Two journals of a single whaling voyage sometimes disagree in respect to game kills; different versions of British or Dutch annual lists for the same year occasionally reveal contradictions; newspapers and other sources may differ again; the data in Starbuck and in Hegarty do not always agree precisely with the facts. In the British Davis Strait fishery errors or omissions on the annual lists often resulted from complications in the itineraries of whaling ships, such as wintering, double-region voyages, two voyages in one season, shipwrecks, transport of station produce on board whalers, late arrivals at port, and so on. The reliability of the Kinnes Lists, as far as the Scottish whaling is concerned, is being assessed at present by comparison with newpapers and other sources, and indications are that the lists err significantly in their reporting of number of ships, number of whales taken, and other aspects (Sanger, 1978);

and 5) there are many ways to attempt to make up for historical data that are incomplete, imprecise, contradictory, or expressed in inappropriate units (such as pounds of bone rather than numbers of whales). Different approaches inevitably yield different results, and the present compilation represents only one approach, necessarily constrained by factors of time and budget. The systematic examination of a wide variety of published and unpublished material in the United States, England, Scotland, Holland and Denmark will certainly permit the statistics presented in this paper to be improved in accuracy and completeness. The work being undertaken at present by Bockstoce (1978) and Sanger (1978) is demonstrating the value of diligent utilization of newspaper sources, and it is to be hoped that other researchers will extend these efforts to other parts of the international whale fishery in arctic regions.

Summary

This paper has provided a reconstruction of the number of voyages, and Greenland whales caught, by ships from Holland, Germany, Britain and the United States on each of the three whaling grounds north of Canada, year by year. The catch totals presented here are based primarily on sets of unpublished annual whaling summaries (Amsterdam Lists; Kinnes Lists), unpublished whaling logbooks and journals, and published whaling compilations (Starbuck, 1878; Hegarty, 1959), and they represent recorded or estimated returns from 6,777 individual voyages.

According to the data employed in this paper the whale fishery in Davis Strait (1719-1911), yielded 28,394 Greenland whales, and those in Hudson Bay (1860-1915) and the Beaufort Sea (1899-1908) 572 and 794 respectively, making a total catch in the waters adjacent to northern Canada of 29,760 whales. However, the catches from the poorly documented activities of Danes, Dutch and Norwegians earlier than 1719, from an undisclosed number of American voyages between 1729 and about 1775, and from over 400 British voyages prior to 1814 — none of which are included in this compilation — may have yielded an additional 2,000 or more whales, bringing the total catch for the three whaling grounds to 31,760. If the mortality of wounded escaped whales amounted to 20 per cent of the catch then it appears that the total number of Greenland, or bowhead, whales killed by whalemen between Alaska and Greenland during the entire span of commercial whaling may have exceeded 38,000.

ACKNOWLEDGEMENTS

Among the individuals who have contributed valuable assistance or criticism I wish to extend special thanks to the following: Anne MacIver (Department of Biology, Champlain Regional College, Lennoxville, Quebec); Dr. Cornelius de Jong (Department of Economics, University of South Africa, Pretoria), Professor Chesley Sanger (Department of Geography, Memorial University of Newfoundland); Dr. John Bockstoce (Curator of Ethnology, Old Dartmouth Historical Society, New Bedford, Massachusetts); Mr. Arthur Credland (Keeper of Exhibitions, Town Docks Museum, Hull, England). The project was carried out with financial support from the Arctic Biological Station, Department of Fisheries and the Environment, Ste.-Anne de Bellevue, Quebec, whose permission to publish is gratefully acknowledged.

REFERENCES

AMSTERDAM LISTS. Lyst de Groenlands-vaarders, van Holland, Hamburg en Bremen, als meede de Straad-Davis vaarders. In den jaare 1719 uytgevaaren. Amsterdam: Karel van Ryschooten. [Annual lists with similar titles and various printers from 1719 to 1826]. Gemeentelijke Archiefdienst van Amsterdam (Municipal Archives of Amsterdam), 24 D7-12.

BERNARD, SIR FRANCIS. 1761. Account of the coast of Labrador. Massachusetts Historical Society Collection, 1792, Series 1, vol. 1, p. 233-237.

BOCKSTOCE, JOHN R. and BATCHELDER, CHARLES F. 1977. A chronological list of commercial wintering voyages, 1850-1910. In: Bockstoce, John, Steam whaling in the Western Arctic. New Bedford, Massachusetts: Old Dartmouth Historical Society, p. 111-120.

——. 1978. A preliminary estimate of the reduction of the Western Arctic bowhead whale (Balaena mysticetus) population by the pelagic whaling industry: 1848-1915. Report to the U.S. Marine Mammal Commission, Washington, D.C. (Report no. MMC-77/08).

DE JONG, C. 1977. The hunt of the Greenland whale. A short history and statistical sources. Paper presented at the International workshop on Historical Whaling Records, Sharon, Massachusetts, 12-16 September 1977.

——. 1978. A short history of old Dutch whaling. Pretoria, South Africa; University of South Africa.

DIXON, CONRAD. 1976. The Exeter Whale Fishery Company, 1754-1787. Mariner's Mirror, 62(3): 225-231.

GRUBE, G. H. F. 1846. Verzeichnis der seit 1669 von Hamburg nach Grönland under der Strasse Davis zum walfisch - und robbenfang gesandten schiffe. Hamburg. Unpublished manuscript [cited in de Jong 1977].

HEGARTY, REGINALD B. 1959. Returns of whaling vessels sailing from American ports: a continuation of Starbuck's "History of the American whale fishery", 1876-1928. New Bedford, Massachusetts: Old Dartmouth Historical Society.

HULL LISTS. An account of the success of the ships at the Greenland and Davis' Straits fisheries from the year 1772 to the year 1842 both inclusive. Unpublished manuscript. Central Library, Hull, England.

JENKINS, J. T. 1921. A history of the whale fisheries. London: Witherby. (Reprinted in facsimile by Kennikat Press, Port Washington, N.Y., 1972).

KINNES LISTS. An account of the number of fish and produce of oil brought by each ship from the Greenland and Davis's Streights whale fishery for the year 1814. London: Devereux and Lambert. [Annual lists with similar titles and various printers from 1814 to 1911]. Robert Kinnes & Sons, Dundee, Scotland.

LESLIE, SIR JOHN, JAMESON, ROBERT, AND MURRAY, HUGH. 1851. Discovery and adventure in the polar seas and regions . . . . . London: Thomas Nelson.

LINDSAY, DAVID MOORE. 1911. A voyage to the Arctic in the whaler Aurora. Boston: Dana Estes.

LUBBOCK, BASIL. 1955. The arctic whalers. Glasgow: Brown, Son & Ferguson. Originally published 1937.

——. n.d. Lubbock Papers. [Research notebooks and abstracts of whaling logbooks, eighteenth and nineteenth centuries]. Greenwich: National Maritime Museum. Lub/38.

MACKINTOSH, N. A. 1965. The stocks of whales. London: Fishing News.

MITCHELL, EDWARD. 1977. Initial population size of bowhead whale (Balaena mysticetus) stocks; cumulative catch estimates. Unpublished paper: IWC/SC/29/Doc. 33.

MONROE, HENRY. 1854. Statistics of the northern whale fisheries, from the year 1772 to 1852. Journal of the Royal Statistical Society of London, 17: 34-42.

PETERHEAD LISTS. An abstract of the whale and seal fishery at Peterhead from its commencement in 1788 to 1874. Typescript. Arbuthnot Museum and Public Library, Peterhead, Scotland.

ROSS, W. GILLIES. 1973a. Whaling in Hudson Bay. Part I. The Marble Island whale fishery, 1765 to 1772. Beaver, 303(4): 4-11.

——. 1973b. Whaling in Hudson Bay. Part II. The voyage of the Ocean Nymph, 1866-67. Beaver, vol. 304, no. 2, p. 52-59.

——. 1973c. Whaling in Hudson Bay. Part III. The voyages of the Perseverance, 1892-97. Beaver, 304(2): 52-59.

——. 1974. Distribution, migration, and depletion of bowhead whales in Hudson Bay, 1860 to 1915. Arctic and Alpine Research, 6(1): 85-98.

——. 1975. Whaling and Eskimos: Hudson Bay 1860-1915. Ottawa: National Museum of Man (Publications in Ethnology, no. 10).

SCORESBY, WILLIAM, JR. 1820. An account of the arctic regions, with a history and description of the northern whale-fishery. 2 vols. Edinburgh: Constable. (Reprinted in facsimile by David & Charles, Newton Abbot, 1969).

SOUTHWELL, THOMAS. 1904. On the whale fishery from Scotland, with some account of the changes in that industry and of the species hunted. The Annals of Scottish Natural History, no. 50, p. 77-90.

STACKPOLE, EDOUARD A. 1953. The sea-hunters: the New England whalemen during two centuries, 1635-1835. New York: Lippincott.

STARBUCK, ALEXANDER. 1878. History of the American whale fishery from its earliest inception to the year 1876. Washington: Government Printing Office (Report of the U.S. Commission on Fish and Fisheries, Part IV). Reprinted by Argosy-Antiquarian, New York, 1964, 2 vols.

VAN der WOUDE, A.M. 1972. Het Noorderkwartier, a study in the demographic and economic history of western parts of the Netherlands. 3 vols. Wageningen: Veenman en Zoonen.

VAN SANTE, GERRET. 1770. Generale lyst der Groenlandsche visschery, zedert 1669. En der Straat-Davissche visschery, zedert 1719. In: Alphabethische naam-lyst van alle de Groenlandsche en Straat-Davissche commandeurs, die zerdert het jaar 1700 op Groenlande, en zedert het jaar 1719 op de Straat Davis, voor Holland en andere provincient, hebben gevaaren. Haarlem. Johannes Enschede. [With holograph additions to 1826]. Gemeentelijke Archiefdienst van Amsterdam, L 1.4.02.

WÄTJEN, HERMANN. 1919. Zur geschichte des holländischen walfischfangs von der sweiten hälfte des 17. bis zum beginn des 19. jahrhunderts. Hansische Geschichtsblätter, 45: 242-290.