

Emptying the Oceans: A Summary of Industrial Whaling Catches in the 20th Century

ROBERT C. ROCHA, Jr., PHILLIP J. CLAPHAM, and YULIA V. IVASHCHENKO

“Some of the larger factory vessels with their capacity of over 2,500 barrels of oil per day capture more in two days than the original floating factories of 1904 were able to carry away with them in an entire season. One modern factory ship can take more whales in one season than the entire American whaling fleet of 1846 which number over 700 vessels.” Lt (j.g.) Quentin R. Walsh, U.S.C.G., 1938

Introduction

In the 1860's, the Norwegian whaler and sealer Svend Føyn introduced the steam-powered whale catcher and the exploding harpoon gun to the whaling industry (Tønnessen and Johnsen, 1982). In the 1870's, he improved upon shore-based factory processing to a level that came to be considered a standard for the industry (Tønnessen and Johnsen, 1982). By the time the 20th century began, the era of mod-

ern whaling—at least in the Northern Hemisphere—was well under way.

Sixteen shore whaling stations had been established in Norway by 1883 (Risting, 1922; Dickinson and Sanger, 2005), and others were in operation in Newfoundland, Greenland, Russia, and Japan. In 1903, another Norwegian, Christen Christensen, introduced the first factory ship, the wooden steamship *Telegraf*, into the waters off Spitsbergen (Tønnessen and Johnsen, 1982). Their primary targets were blue, *Balaenoptera musculus*; fin, *B. physalus*; and humpback whales, *Megaptera novaeangliae*.

However, industrial whaling south of the equator did not begin to resemble operations in the north until 5 years into the 20th century. Between 1900 and 1903, the only whales processed industrially were humpbacks caught via net and brought to a shore factory in Whangamumu Bay in New Zealand, a factory that had been established in 1890. The average catch was

8 whales per year during the 20-year operation of this factory (Lillie, 1915; Allison, 2012).

The first shore factory in the Southern Ocean was established in Grytviken (Cauldron Bay) on South Georgia Island by the Norwegian Carl Anton Larsen, from the Compañía Argentina de Pesca, in late 1904 (Tønnessen and Johnsen, 1982). In 1903, one humpback whale was killed by modern methods by Adolf Andresen in the Straits of Magellan, but his processing station was not established until 1905 (Tønnessen and Johnsen, 1982).

Thus, between 1900 and 1908, more whales were captured by industrial whaling methods in the Northern Hemisphere. By 1909, however, whaling south of the equator had surpassed that in the north. This trend continued until 1993, when the catch of whaling operations became comparable in the two hemispheres and were focused largely on minke whales, *Balae-*

Robert C. Rocha, Jr., is with the New Bedford Whaling Museum, 18 Johnny Cake Hill, New Bedford, MA, 02740 (rrocha@whalingmuseum.org). Phillip J. Clapham is with the National Marine Mammal Laboratory, Alaska Fisheries Science Center, National Marine Fisheries Service, NOAA, 7600 Sand Point Way, NE, Seattle, WA 98115, and Yulia Ivashchenko is with the National Marine Mammal Laboratory and also with Southern Cross University, Military Road, East Lismore NSW 2480, Australia.

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ABSTRACT—Late 19th century technological advances for capturing whales, when combined with the expansion of processing capabilities in the early 20th century, created an industry that could catch and quickly render virtually any whale in any ocean. Here, using the current International Whaling Commission (IWC) database and other sources, we provide the first accounting of the total global catch by industrial whaling operations in the 20th century. In sum, we estimate that nearly 2.9 million large whales were killed and processed during the period 1900–99. Of this total,

276,442 were killed in the North Atlantic, 563,696 in the North Pacific, and 2,053,956 in the Southern Hemisphere.

The years 1925–39 in the Southern Hemisphere and 1946–75 in both hemispheres saw the highest totals of whales killed. For the entire 20th century, the largest catches were of fin, *Balaenoptera physalus*, and sperm whales, *Physeter macrocephalus*, with 874,068 and 761,523 taken, respectively; these comprised more than half the total of all large whales taken.

As noted in other publications, when one species began to decline, another was sought

and hunted to take its place. In addition to reported catches, it is now known that the USSR conducted illegal whaling for more than 30 years. The true Soviet catch totals for the Southern Hemisphere were corrected some years ago, and a more recent assessment of the actual number of whales killed by Soviet factory fleet ships in the North Pacific between 1948 and 1979 has provided us with more accurate numbers with which to calculate the overall global catch. The estimate for the total global catch by the USSR is 534,204 whales, of which 178,811 were not reported to the IWC.

noptera acutorostrata, and Antarctic minke, *B. bonaerensis*.

Until World War I, industrial whaling in the Southern Hemisphere focused primarily on humpbacks. After this, several participating countries (England, Denmark, Norway, Japan, Canada, and the United States in the Northern Hemisphere and South Africa, England, Chile, Norway, and Argentina in the Southern Hemisphere) took full advantage of the previously unexploited stocks of large rorquals (Allison, 2012). These species had not (with the exception of humpbacks) been available to the traditional Yankee whalers, whose small wooden boats could not be rowed fast enough to catch these whales.

The ability of a modern catcher boat to fire exploding harpoons and inject air into these fast-swimming whales (that would have otherwise sunk when they were killed) removed any advantage a whale might have had over a whaling ship. Modern whalers also found new populations of sperm whales, *Physeter macrocephalus*, to hunt and also took southern right whales, *Eubalaena australis*, when they were encountered.

Between the 1920's and the 1980's, industrial whaling went through periods of expansion and crisis. As with many industries, these fluctuations led to international efforts to regulate the use of the primary resource, with varying but usually unsuccessful effect.

In the late 1920's, members of the League of Nations declared that whales needed "urgent international measures" to protect them from extinction and thus set up a committee of experts to find a solution (Redekop, 2010). At the same time, in 1929, Norway adopted its own Norwegian Whaling Act to regulate the annual killing of whales in the open sea and thus (at least in theory) sustain the industry (Tønnessen and Johnson, 1982).

Soon afterward, the League of Nations efforts led to the signing, by 26 countries, of the Convention for the Regulation of Whaling at the Geneva Convention in September 1931. This act entered into force in 1935 (Tøn-

nessen and Johnson, 1982) and served as the first measure of protection for bowhead whales, *Balaena mysticetus*; right whales, *Eubalaena* spp.; and gray whales, *Eschrichtius robustus*; all of which had been heavily exploited historically.

Subsequently, the International Agreement for the Regulation of Whaling was signed in London in 1937. However, many parts of this measure were ignored. After World War II, in late 1945, the United States hosted 19 countries at the International Whaling Conference (Tønnessen and Johnson, 1982). Ultimately, this led in 1946 to the creation of the International Convention for the Regulation of Whaling (ICRW) and the governing body for this Convention, the International Whaling Commission (IWC) (IWC, 2002).

Conservation measures were clearly an important part of this document, although protection of whales was undertaken for the strictly commercial purpose of attempting to ensure that the industry remained sustainable. As the Convention worded it, the aim was "to provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry."

Industrial whaling resumed in robust fashion in the 1950's, with Norway, Great Britain, Japan, and the USSR hunting in both hemispheres. In the Northern Hemisphere, Canada, Denmark, Iceland, Spain, Portugal, Korea, and China were hunting whales commercially. In the Southern Hemisphere, whaling operations were registered to Brazil, France, South Africa, Australia, Chile, New Zealand, Peru, and Panama, and the Netherlands and Argentina became involved in the region for the first time. A final expansion of Antarctic whaling took place between 1955 and 1961 (Tønnessen and Johnson, 1982).

For much of the 1950's, '60's, and '70's, the number of whales caught by most whaling nations, and the size of those whales, continued to decline. Smaller whale species, discussed later in this paper, were targeted. Japan

and the USSR, however, continued to meet their quotas. While some of this was due to having more numerous and more powerful whale catchers, it was also because much of the whaling was being conducted illegally.

The Japanese were catching many undersized whales in their coastal fishery and falsifying their reports in order to conform to IWC regulations (Kasuya, 1999; Kasuya and Brownell, 1999, 2001; Kondo and Kasuya, 2002). Similarly, the USSR is now known to have conducted large-scale illegal catches for more than three decades (Yablokov, 1994; Clapham and Ivashchenko, 2009; Ivashchenko et al., 2013; Ivashchenko and Clapham, 2014). On a much smaller scale, between 1951 and 1956 a factory ship registered in Panama, the *Olympic Challenger*, owned by Aristotle Onassis' Olympic Whaling Company, was consistently "shooting anything that swam and at any time" (Elliot, 1997).

By 1972, more protective attitudes in the United States toward whaling had sufficiently influenced national politics such that both the Marine Mammal Protection Act and the Endangered Species Act were passed within a span of 14 months. In 1972, the United Nations Conference on the Human Environment, held in Stockholm, Sweden, passed a resolution, by 52 votes to 0, calling for a 10-year moratorium on commercial whaling. Similar resolutions were introduced in the IWC in 1972, 1973, and 1974, but the proposal did not receive the required three-fourths majority (IWC, 1975). Nonetheless, by 1982, pro-conservation nations held a substantial majority at the IWC, and duly voted to enact a moratorium (technically a zero-catch limit) on all commercial whaling.

When this vote was taken in 1982, there were 10 countries still in the business of whaling. Iceland, Norway, Spain, Portugal, and Korea were whaling in the north, while Brazil, Peru, Chile, and the USSR were operating in the south. Only Japan still had operations in both hemispheres. The following year whaling operations attributed

to the Philippines were initiated. Research into this endeavor has indicated that Japanese nationals owned and operated all facets of this business, which was terminated in 1986 (Davies, 1986; Barut, 1994; Acebes, 2009). Peruvian whaling had its final season in 1983, and Portuguese whaling ended in 1987 (Allison, 2012).

Once the moratorium took effect with the 1985–86 Antarctic whaling season, all nations, other than Norway, Japan, and the USSR ceased industrial commercial whaling. Japan, Norway, and the USSR all lodged objections to the ban (under the Convention, an objection lodged within 90 days means that the objecting nation is not bound by any decision of the IWC, and this includes the moratorium). However, the Soviets continued whaling for only one more year (Allison, 2012).

Japan initially objected to the moratorium but withdrew this objection under U.S. threat of fisheries sanctions and thereafter exploited Article VIII of the Convention, which permits member states to issue permits to kill whales for scientific research (so-called “scientific whaling,” see Clapham, 2014). Iceland, the Republic of Korea, and Norway also received permits for scientific whaling between 1986 and 1994 (IWC, 2004). Iceland withdrew from the IWC in 1992 but subsequently rejoined in 2002, lodged an objection to the Moratorium, and resumed commercial whaling in 2006. Norway halted their scientific whaling and in 1993 also resumed commercial hunting under the objection provision (IWC, 1995).

Remarkably, there has been no complete accounting of the total number of whales taken by industrial whaling in the world’s oceans in the 20th century. Clapham and Baker (2008) attempted to assess totals for the Southern Hemisphere, including revised catch totals for the USSR, which, as noted above, conducted extensive illegal whaling after World War II (Clapham and Ivashchenko, 2009; Ivashchenko et al., 2011).

No attempt has previously been made to determine the total catch for

the Northern Hemisphere, in part because revised Soviet totals for the North Pacific were not available until very recently (Ivashchenko et al., 2013). Here, using the current IWC database (Allison, 2012), corrected Soviet catch totals, and other sources, we provide an accounting of total catches by all industrial whaling operations worldwide from 1900 to 1999. In addition, we examine trends in the species that were targeted, compare hunt totals and activity between hemispheres, and highlight the periods of most intense hunting.

Materials and Methods

For the purpose of this report, any whale that was processed at a shore whaling station or on a floating factory ship was considered to have been killed by industrial methods. Some whales taken without the use of harpoon cannons, such as those caught by net at Whangamumu Bay in New Zealand, are included in these totals, since they were processed on shore in a factory. The same is true for those caught by traditional methods off the Azores, since they were subsequently towed back to shore-based factories.

All known catches for species caught by subsistence whaling hunts were omitted from the tallies. These include the native operations for humpback whales at St. Vincent and West Greenland, as well as catches of bowhead whales by Alaska natives, and takes of gray whales by the native people of Chukotka (Russia) (Reeves, 2002).

Other species were caught off the coast of West Greenland using the catcher boats *Sonja* and *Sonja Kaligtoq* between 1924 and 1954, and were hand flensed along the coast (Kapel, 1979). Between 1954 and 1958, a shore station in Tovqussaq was used to process whales caught by the *Sonja Kaligtoq* crews (Kapel, 1979). Since then, motorized boats with bow-mounted cannons have been used annually to hunt fin and minke whales (and, more recently, humpback whales). These have been considered aboriginal hunts since 1978, as has

a small hunt off East Greenland that began in 1982. These aboriginal kills have also been omitted from the catch totals summarized here. Although the motorized boats sometimes provided access to species that were not part of the traditional aboriginal hunt, the noncommercial use of the whales warrant their omission from our tallies.

Annual totals from the International Whaling Commission database (Allison, 2012) for each of the large whale species listed were tallied for each hemisphere; for the Northern Hemisphere, separate totals were calculated for the North Atlantic and North Pacific. The revised totals for Soviet whale catches in the North Pacific for the period 1948–79, recently compiled by Ivashchenko et al. (2013), were used to replace the Soviet totals in the IWC database.

Catches for North Pacific right whales were compiled from the IWC database (Allison, 2012) and Brownell et al. (2001)¹, with corrections made by one of us (YVI) to reflect the most recent accounting of Soviet illegal catches of this species. Corrected Soviet numbers were published in Ivashchenko and Clapham (2012) and Ivashchenko et al. (2013); however, additional catches have come to light since then, and the total for Soviet takes of this species now stands at 765 (of which only 11 were reported to the IWC; Ivashchenko, unpubl. data).

Revised Soviet data for Bryde’s, *B. edeni*; minke, gray, and unspecified/other whales for the years 1948–79 were available only as a sum total and not as annual data. Those totals were included in the final tallying.

The numbers given here are the best estimate of the total catch at this time. New information is continually being added to the IWC database (Allison, 2012), and that database includes ex-

¹There is a discrepancy between the total numbers of non-Soviet catches of North Pacific right whales reported in the IWC database and those given in Table 3.2 of Brownell et al. (2001), with the latter showing 12 more than the IWC data. Because the Brownell et al. table includes a block of 28 animals taken from 1911 to 1938, with uncertainty noted in this total, we have used the lower IWC figures.

Table 1.—Total catches of large whales by industrial whaling operations, species, and hemisphere, 1900–99.

Species	Catches (no. of animals)			
	North Atlantic	North Pacific	Southern Hemisphere	Total
Blue	6,699	8,838	363,648	379,185
Fin	72,069	75,538	726,461	874,068
Sperm	40,046	314,942	406,535	761,523
Humpback	4,454	29,131	215,848	249,433
Sei	13,048	73,903	204,589	291,540
Bryde's	254	13,795	7,913	21,962
Minke	131,866	34,826	117,213	283,905
Right	141	967	4,452	5,560
Gray	0	3,350	0	3,350
Unspecified/Other	7,865	8,406	7,297	23,568
Sub-total	276,442	563,696		
Hemisphere Totals		840,138	2,053,956	2,894,094

peditions for which no information on catch has been found to date, notably during the early 1900's. Furthermore, it should be noted that Bryde's whales were not distinguished from sei whales until the early 1900's (and often not until much later), and for many years they continued to be listed as sei whales.

Finally, it is important to note that some catch totals for the North Pacific are likely to be incorrect to an unknown degree. The IWC database still contains data from the Japanese coastal fishery that are known to be falsified, notably for sperm whales (Kasuya, 1999); furthermore, analyses of sperm whale length data have

raised suspicions about the reliability of the pelagic Japanese catch statistics for this species (Cooke et al., 1983). We currently have no way of estimating the degree of unreliability in these data, and North Pacific totals for sperm whales are reported with that caveat.

Results and Discussion

The technological advances of the late 19th century, when combined with the expansion of processing capabilities in the early 20th century, created an industry that could essentially catch and quickly process any whale in any ocean. In total, the years from 1900 through 1999 saw nearly 2.9 million

large whales killed and processed globally by industrialized whaling. Total catches by species and hemisphere are summarized in Table 1. Tables 2 and 3 break down catches for each hemisphere by 10-year periods, and trends in catches for each species are graphically represented in Figures 1a and 1b. More detail is provided in Tables 4 and 5, which give catch totals by species and by year for the Northern and Southern Hemispheres, respectively.

Fin whales were killed in larger numbers (874,068) than any other species, with sperm whales (761,523) being the second-most hunted. Together, these two whales comprise more than half (56.5%) of the large cetacean species killed globally in the 20th century. This proportion is almost the same (55.1%) when looking at the numbers for only the Southern Hemisphere. In the Northern Hemisphere, the sperm whale was the most heavily hunted (354,988 catches)², followed by the minke whale and the fin whale.

²This number for sperm whales is likely an underestimate because of the known unreliability of Japanese coastal whaling statistics, as noted above, together with the possibility that Japanese pelagic catch statistics are also unreliable to an unknown degree.

Table 2.—Northern Hemisphere industrial whaling totals, including illegal Soviet whaling, by decade, 1900–99 (Soviet data for which only sum totals are available are not included).

Species	1900–1909	1910–1919	1920–1929	1930–1939	1940–1949	1950–1959	1960–1969	1970–1979	1980–1989	1990–1999
Blue	4,830	3,040	2,738	1,126	554	1,483	1,731	35	0	0
Fin	12,570	18,548	23,977	12,599	11,931	25,137	30,824	9,769	2,252	0
Sperm	294	3,449	7,512	11,793	21,666	64,092	153,193	82,429	4,960	0
Humpback	4,409	7,437	8,005	2,513	923	2,538	7,700	60	0	0
Sei	2,903	6,460	7,677	5,446	5,255	10,941	33,439	14,253	577	0
Bryde's	0	0	20	4	418	934	480	4,940	3,786	1
Minke	0	38	156	7,578	23,752	38,976	36,929	37,550	17,606	3,418
Gray	0	1,057	550	747	480	28	339	0	0	0
Right	92	72	88	46	35	84	676	15	0	0
Unspec.	11,212	2,153	147	2,250	43	299	4	5	13	0
Total	36,310	42,254	50,870	44,102	65,057	144,512	265,315	149,056	29,194	3,419

Table 3.—Southern Hemisphere industrial whaling totals, by decade, 1900–1999.

Species	1900–1909	1910–1919	1920–1929	1930–1939	1940–1949	1950–1959	1960–1969	1970–1979	1980–1989	1990–1999
Blue	758	30,263	84,319	163,687	40,389	29,149	13,696	1,387	0	0
Fin	1,070	36,753	66,084	137,490	100,705	262,404	111,776	10,178	1	0
Sperm	11	4,122	6,609	21,540	34,888	96,997	141,754	99,735	879	0
Humpback	11,603	57,205	14,090	31,758	11,105	58,849	31,195	43	0	0
Sei	661	2,549	6,373	2,333	4,305	21,302	131,538	35,528	0	0
Bryde's	3	607	322	57	450	252	1,619	3,577	1,026	0
Minke	0	6	1	0	1	132	3,196	64,152	45,974	3,751
Right	331	487	119	122	2	250	3,137	4	0	0
Unspec.	1,363	3,311	313	2,198	87	15	9	1	0	0
Totals	15,800	135,303	178,230	359,185	191,932	469,350	437,920	214,605	47,880	3,751

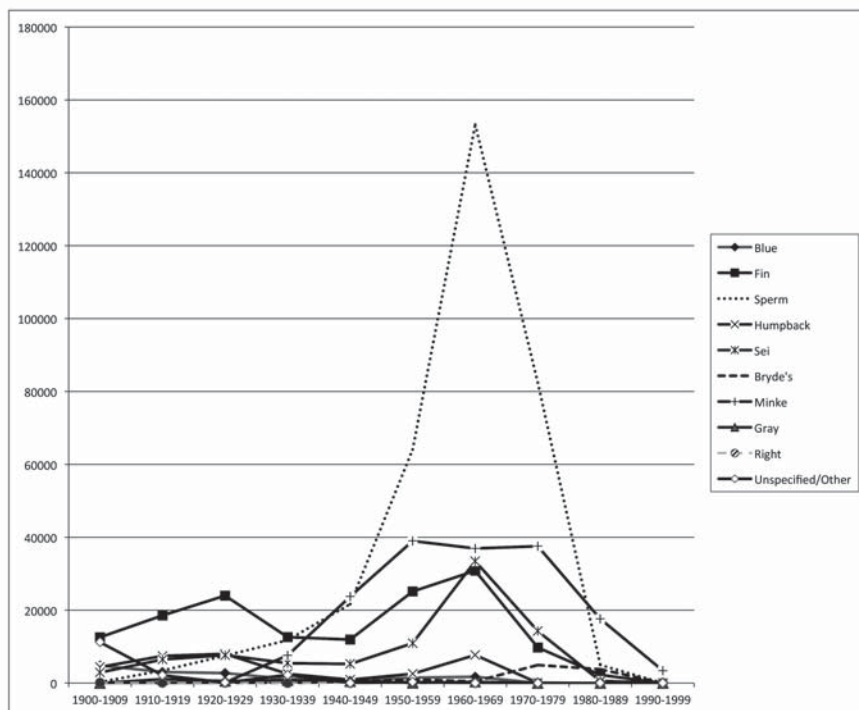


Figure 1a.—Northern Hemisphere industrial whaling totals, including Soviet whaling, by decade, 1900–99 (data from Table 2).

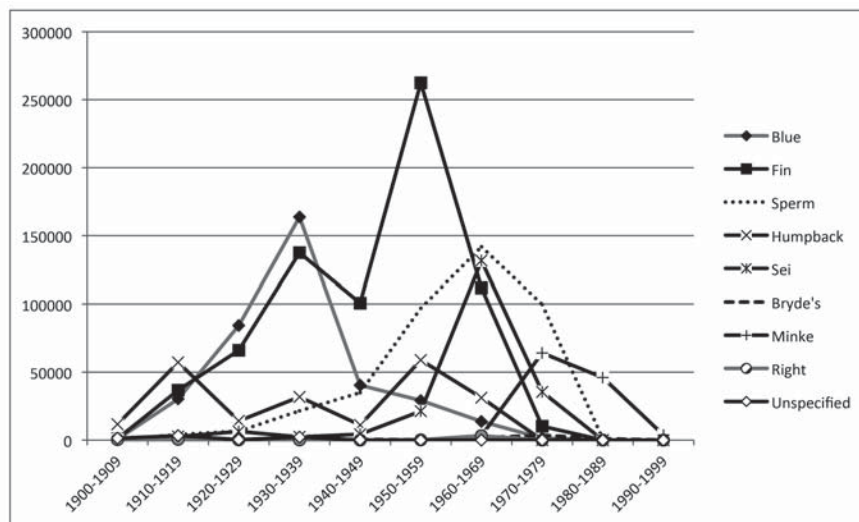


Figure 1b.—Southern Hemisphere industrial whaling totals, by decade, 1900–99 (data from Table 3).

The year 1925 marked the arrival in the Antarctic of the first modern pelagic stern-slip factory ship, the British vessel *Lansing* (Clapham and Baker, 2008). The ability to quickly process large numbers of whales in habitats far offshore greatly increased the efficiency of the industry. Beginning in 1927, industrial whalers were consistently killing more than 20,000 whales annually in the Southern Hemisphere (they had surpassed this total in 1912, 1913, and 1925). Only a 1-year cessation of whaling by Norway, in 1931, brought the total below 20,000. Between 1934 and 1939 more than 34,000 whales were killed each year. The onset of World War II and the repurposing of resources led to a 6-year period of reduced whaling. However, once the war ended, the business of hunting whales resumed.

Twentieth century whaling was far more intense in the Southern Hemisphere (though no less devastating to some populations north of the equator): the number of whales killed in the Southern Hemisphere was 2.5 times greater than in the Northern. Over the three decades following World War II, the most intensive 5-year period for whaling in the Southern Hemisphere was 1957–61, when 280,133 whales were killed and processed. By contrast, the most intensive 5-year span for whales in the north was 1966–70, when 153,722 whales were killed. The year 1960 had the highest regional 1-year total for the century, with 62,129 animals killed in the Southern Hemisphere. In the north, the highest 1-year total was 33,473 whales in 1966.

Taken together, the global total for the years 1957–61 was 368,878 large whales. The 3 highest years were 1959–61, with each of those 3 years having global totals approaching or exceeding 75,000 whales. A further 69,466 were killed in 1964.

The trends in the numbers highlighted here, whether by hemisphere (Fig. 1a, b) or globally, echo prior analyses of catch numbers and related economics. As stated by Schneider and Pearce (2004), “Analysis of the data reveals a

Table 4.—Northern Hemisphere industrialized whaling catches, including corrected Soviet data (1948–79). Data from C. Allison, IWC summary catch database Version 5.3, Date: 25 October 2012, Areas: North Atlantic and Arctic, North Pacific, Japan and Korea, and Ivashchenko et al. Soviet North Pacific catches 2012. Annual totals exclude all Soviet data for North Pacific right whales.

	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1900-1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1910-1919	Total
Blue	381	299	142	492	862	1,002	477	391	412	372	4,830	336	577	605	248	400	174	164	235	140	161	3040	7,870
Fin	502	570	673	988	1945	1,882	1,179	1,365	1,576	1,890	12,570	1,731	2,705	2,112	1,905	2,661	1,735	1,444	1,045	1,724	1,486	18,548	31,118
Sperm	0	8	2	152	13	11	10	16	13	69	294	78	238	178	204	380	312	438	278	729	614	3,449	3,743
Humpback	131	308	423	722	697	323	323	293	510	679	4,409	888	1,296	1,135	773	1,043	594	455	350	306	597	7,437	11,846
Sei	40	29	58	106	176	136	473	476	646	763	2,903	503	581	390	567	554	731	461	728	1,027	918	6,460	9,363
Bryde's	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Minke	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	6	7	14	38	38	
Gray	0	0	0	0	0	0	0	0	0	0	0	0	122	193	132	174	139	78	69	104	46	1,057	1,057
Right	0	0	2	2	2	0	6	25	28	27	92	19	3	13	3	7	8	9	2	3	5	72	164
Unspecified/Other	597	1,029	1,643	966	651	747	1,033	2,140	4,706	4,663	11,212	1,304	185	319	27	83	0	61	0	104	70	2,153	13,365
	1,651	2,243	2,943	3,428	4,346	4,101	3,501	4,706	4,663	4,728	36,310	4,859	5,707	4,945	3,859	5,303	3,703	3,110	2,713	4,144	3,911	42,254	78,564

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1920-1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1930-1939	Total
Blue	242	60	163	174	261	321	351	257	500	409	2,738	237	75	157	86	94	172	85	123	56	41	1,126	3,864
Fin	1,653	1,019	1,864	2,606	3,183	3,733	3,638	2,464	2,070	1,747	23,977	1,729	879	1,033	1,373	1,167	981	1,118	2,005	1,077	1,237	12,599	36,576
Sperm	424	387	840	712	640	780	937	783	1,012	997	7,512	1,001	368	470	903	961	1,132	1,566	1,865	1,618	1,909	11,793	19,305
Humpback	790	331	993	933	624	1,085	1,135	1,218	556	340	8,005	331	109	229	302	292	374	271	263	121	221	2,513	10,518
Sei	1,081	565	552	801	961	944	858	790	538	587	7,677	571	478	455	421	488	511	506	622	658	736	5,446	13,123
Bryde's	0	0	0	0	0	0	2	18	0	0	0	0	0	0	0	0	0	0	0	0	4	4	
Minke	6	20	20	20	20	20	13	13	9	15	156	60	194	369	546	731	908	1,078	1,283	1,422	987	7,578	7,734
Gray	68	116	49	27	18	142	53	42	21	14	550	30	11	17	106	154	144	188	14	54	29	747	1,297
Right	5	8	5	11	11	10	10	10	10	7	88	2	8	20	4	5	2	0	6	0	0	42	130
Unspecified/Other	41	11	13	20	0	44	18	0	0	0	147	300	3	0	5	506	615	613	0	208	0	2,250	2,397
	4,310	2,517	4,499	5,304	5,718	7,081	7,031	5,577	4,717	4,116	50,870	4,261	2,125	2,750	3,746	4,393	4,839	5,425	6,181	5,214	5,164	44,098	94,968

	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1940-1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1950-1959	Total
Blue	53	79	20	16	7	27	46	66	142	98	554	73	125	147	157	223	155	161	154	132	156	1,483	2,037
Fin	867	1,134	767	734	898	847	1,419	1,459	2,037	1,769	11,931	1,992	2,053	1,886	1,836	2,697	2,718	2,719	3,084	3,224	2,928	25,137	37,068
Sperm	2,378	2,388	1,325	1,821	1,748	1,050	2,187	2,420	3,046	3,303	21,666	4,073	4,943	4,557	4,661	5,331	6,539	7,800	8,593	9,008	8,567	64,092	85,758
Humpback	201	81	72	116	75	21	36	38	170	113	923	147	103	131	122	286	195	256	330	495	473	2,538	3,461
Sei	432	692	308	399	789	108	556	405	643	923	5,255	420	759	960	975	1,180	962	1,154	969	1,651	1,911	10,941	16,196
Bryde's	0	0	0	0	0	0	29	158	115	116	418	243	280	411	0	0	0	0	0	0	0	934	1,352
Minke	727	2,365	2,459	1,911	1,610	1,878	2,013	2,716	3,893	4,180	23,752	2,275	3,195	3,898	2,931	3,952	4,840	4,338	4,444	5,265	3,838	38,976	62,728
Gray	105	57	101	99	6	58	22	31	0	1	480	0	1	0	10	0	0	0	0	8	9	28	508
Right	1	5	6	13	3	1	0	0	0	0	30	0	0	1	0	0	0	2	0	0	1	4	34
Unspecified/Other	8	0	0	0	0	35	0	0	0	0	43	0	0	49	29	82	98	28	13	0	0	299	342
	4,772	6,801	5,058	5,109	5,136	4,025	6,308	7,293	10,047	10,503	65,052	9,223	11,460	12,039	10,741	13,751	15,507	16,458	17,587	19,783	17,883	144,432	209,484

Table continued

Table 4.—continued

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1960-1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1970-1979	Total
Blue	86	92	150	605	254	279	61	97	56	51	1,731	20	8	0	1	0	0	1	2	3	0	35	1,766
Fin	2,946	2,421	2,651	3,725	4,816	3,480	3,195	3,040	2,497	2,053	30,824	1,839	1,424	1,464	822	875	558	561	430	945	851	9,769	40,593
Sperm	8,711	8,230	8,581	13,171	13,093	18,405	23,017	20,890	18,967	20,128	153,193	16,131	11,974	6,977	7,036	8,805	8,508	7,798	6,696	4,861	3,643	82,429	235,622
Humpback	298	526	1,920	2,722	1,450	538	82	106	46	12	7,700	28	21	0	0	10	0	0	0	0	0	60	7,760
Sei	1,294	1,025	2,216	2,680	3,789	3,291	3,824	5,208	5,073	5,039	33,439	3,966	3,221	2,638	2,004	1,336	699	13	139	139	98	14,253	47,692
Bryde's	0	0	196	0	0	0	2	22	171	89	480	73	281	130	73	705	804	972	721	380	801	4,940	5,420
Minke	3,991	3,856	3,987	4,083	3,796	3,391	3,232	3,266	3,795	3,532	36,929	3,812	3,764	4,497	3,930	3,525	3,543	4,055	3,612	3,288	3,524	37,550	74,479
Gray	9	4	4	3	2	20	4	57	99	66	339	0	0	0	0	0	0	0	0	0	0	339	0
Right	0	3	3	3	3	0	0	0	2	0	11	0	0	0	2	1	1	0	0	1	0	4	15
Unspecified/Other	0	0	0	0	0	0	3	1	0	0	4	0	0	1	0	0	0	0	0	4	0	5	9
	17,335	16,157	19,708	26,991	27,218	29,388	33,473	32,729	30,673	30,978	264,650	25,869	20,693	15,707	13,868	15,257	14,112	13,401	11,601	9,620	8,917	149,045	413,695
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1980-1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1990-1999	Total
Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fin	459	404	347	269	271	210	76	80	68	68	2,252	0	0	0	0	0	0	0	0	0	0	0	2,252
Sperm	1,517	1,163	621	414	454	400	200	191	0	0	4,960	0	0	0	0	0	0	0	0	0	0	0	4,960
Humpback	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sei	103	100	71	100	95	38	40	20	10	0	577	0	0	0	0	0	0	0	0	0	0	0	577
Bryde's	755	485	482	545	528	357	317	317	29	19	3,786	0	0	0	0	0	0	0	0	1	0	1	3,787
Minke	3,557	3,212	3,391	2,848	1,753	1,365	759	673	29	19	17,606	0	1	95	226	280	318	465	617	725	691	3,418	21,024
Gray	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unspecified/Other	3	4	3	3	3	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	13
	6,394	5,368	4,915	4,179	3,101	2,370	1,392	1,281	107	87	29,194	0	1	95	226	280	318	465	617	726	691	3,419	32,613

Soviet numbers for right whales not entered into decades

	1900-1919	1920-1939	1940-1959	1960-1979	1980-1999	Totals	Addl Soviet	Total All
Blue	7,870	3,864	2,037	1,766	0	15,537	0	15,537
Fin	31,118	36,576	37,068	40,593	2,252	147,607	147,607	354,988
Sperm	3,743	19,305	85,758	235,622	4,960	349,388	5,600	354,988
Humpback	11,846	10,518	3,461	7,760	0	33,585	0	33,585
Sei	9,363	13,123	16,196	47,692	577	86,951	86,951	166,692
Bryde's	0	24	1,352	5,420	3,787	10,583	3,466	14,049
Minke	38	7,734	62,728	74,479	21,024	166,003	689	166,692
Gray	1,057	1,297	508	339	0	3,350	149	3,350
Right	164	130	34	15	0	1,108	145	1,108
Unspecified/Other	13,365	2,397	342	9	13	16,126	145	16,271

Soviet numbers for right whales entered into decades

	1900-1919	1920-1939	1940-1959	1960-1979	1980-1999	Totals	Addl Soviet	Total All
Blue	7,870	3,864	2,037	1,766	0	15,537	0	15,537
Fin	31,118	36,576	37,068	40,593	2,252	147,607	147,607	354,988
Sperm	3,743	19,305	85,758	235,622	4,960	349,388	5,600	354,988
Humpback	11,846	10,518	3,461	7,760	0	33,585	0	33,585
Sei	9,363	13,123	16,196	47,692	577	86,951	86,951	166,692
Bryde's	0	24	1,352	5,420	3,787	10,583	3,466	14,049
Minke	38	7,734	62,728	74,479	21,024	166,003	689	166,692
Gray	1,057	1,297	508	339	0	3,350	149	3,350
Right	164	130	34	15	0	1,108	145	1,108
Unspecified/Other	13,365	2,397	342	9	13	16,126	145	16,271

	1900-1919	1920-1939	1940-1959	1960-1979	1980-1999	Totals	Addl Soviet	Total All
Blue	7,870	3,864	2,037	1,766	0	15,537	0	15,537
Fin	31,118	36,576	37,068	40,593	2,252	147,607	147,607	354,988
Sperm	3,743	19,305	85,758	235,622	4,960	349,388	5,600	354,988
Humpback	11,846	10,518	3,461	7,760	0	33,585	0	33,585
Sei	9,363	13,123	16,196	47,692	577	86,951	86,951	166,692
Bryde's	0	24	1,352	5,420	3,787	10,583	3,466	14,049
Minke	38	7,734	62,728	74,479	21,024	166,003	689	166,692
Gray	1,057	1,297	508	339	0	3,350	149	3,350
Right	164	130	34	15	0	1,108	145	1,108
Unspecified/Other	13,365	2,397	342	9	13	16,126	145	16,271

	1900-1919	1920-1939	1940-1959	1960-1979	1980-1999	Totals	Addl Soviet	Total All
Blue	7,870	3,864	2,037	1,766	0	15,537	0	15,537
Fin	31,118	36,576	37,068	40,593	2,252	147,607	147,607	354,988
Sperm	3,743	19,305	85,758	235,622	4,960	349,388	5,600	354,988
Humpback	11,846	10,518	3,461	7,760	0	33,585	0	33,585
Sei	9,363	13,123	16,196	47,692	577	86,951	86,951	166,692
Bryde's	0	24	1,352	5,420	3,787	10,583	3,466	14,049
Minke	38	7,734	62,728	74,479	21,024	166,003	689	166,692
Gray	1,057	1,297	508	339	0	3,350	149	3,350
Right	164	130	34	15	0	1,108	145	1,108
Unspecified/Other	13,365	2,397	342	9	13	16,126	145	16,271

	1900-1919	1920-1939	1940-1959	1960-1979	1980-1999	Totals	Addl Soviet	Total All
Blue	7,870	3,864	2,037	1,766	0	15,537	0	15,537
Fin	31,118	36,576	37,068	40,593	2,252	147,607	147,607	354,988
Sperm	3,743	19,305	85,758	235,622	4,960	349,388	5,600	354,988
Humpback	11,846	10,518	3,461	7,760	0	33,585	0	33,585
Sei	9,363	13,123	16,196	47,692	577	86,951	86,951	166,692
Bryde's	0	24	1,352	5,420	3,787	10,583	3,466	14,049
Minke	38	7,734	62,728	74,479	21,024	166,003	689	166,692
Gray	1,057	1,297	508	339	0	3,350	149	3,350
Right	164	130	34	15	0	1,108	145	1,108
Unspecified/Other	13,365	2,397	342	9	13	16,126	145	16,271

	1900-1919	1920-1939	1940-1959	1960-1979	1980-1999	Totals	Addl Soviet	Total All
Blue	7,870	3,864	2,037	1,766	0	15,537	0	15,537
Fin	31,118	36,576	37,068	40,593	2,252	147,607	147,607	354,988
Sperm	3,743	19,305	85,758	235,622	4,960	349,388	5,600	354,988
Humpback	11,846	10,518	3,461	7,760	0	33,585	0	33,585
Sei	9,363	13,123	16,196	47,692	577	86,951	86,951	166,692
Bryde's	0	24	1,352	5,420	3,787	10,583	3,466	14,049
Minke	38	7,734	62,728	74,479	21,024	166,003	689	166,692
Gray	1,057	1,297	508	339	0	3,350	149	3,350
Right	164	130	34	15	0	1,108	145	1,108
Unspecified/Other	13,365	2,397	342	9	13	16,126	145	16,271

	1900-1919	1920-1939	1940-1959	1960-1979	1980-1999	Totals	Addl Soviet	Total All
Blue	7,870	3,864	2,037	1,766	0	15,537	0	15,537
Fin	31,118	36,576	37,068	40,593	2,252	147,607	147,607	354,988
Sperm	3,743	19,305	85,758	235,622	4,960	349,388	5,600	354,988
Humpback	11,846	10,518	3,461	7,760	0	33,585	0	33,585
Sei	9,363	13,123	16,196	47,692	577	86,951	86,951	166,692
Bryde's	0	24	1,352	5,420	3,787	10,583	3,466	14,049
Minke	38	7,734	62,728	74,479	21,024	166,003	689	166,692
Gray	1,057	1,297	508	339	0	3,350	149	3,350
Right	164	130	34	15	0	1,108	145	1,108
Unspecified/Other	13,365	2,397	342	9	13	16,126	145	16,271

	1900-1919	1920-1939	1940-1959	1960-1979	1980-1999	Totals	Addl Soviet	Total All
Blue	7,870	3,864	2,037	1,766	0	15,537	0	15,537
Fin	31,118	36,576	37,068	40,593	2,252	147,607	147,607	354,988
Sperm	3,743	19,305	85,758	235,622	4,960	349,388	5,600	354,988
Humpback	11,846	10,518	3,461	7,760	0	33,585	0	33,585
Sei	9,363	13,123	16,196	47,692	577	86,951	86,951	166,692
Bryde's	0	24	1,352	5,420	3,787	10,583	3,466	14,049
Minke	38	7,734	62,728	74,479	21,024	166,003	689	166,692
Gray	1,057	1,297	508	339	0	3,350	149	3,350
Right	164	130	34	15	0	1,108	145	1,108
Unspecified/Other	1							

Table 5.—Southern Hemisphere industrialized whaling catches data from: C. Allison. IWC Summary catch database Version 5.3, Date: 25 Oct. 2012 Areas; South Pacific, South Atlantic, Indian Ocean, Southern Hemisphere.

	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1900-1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1910-1919	Total
Blue	0	0	0	0	11	51	68	106	310	212	758	365	1,292	2,590	3,112	5,376	5,702	4,441	3,159	2,219	2,007	30,263	31,021
Fin	0	0	0	0	4	104	93	122	310	437	1,070	721	2,034	5,132	5,707	4,897	6,150	2,956	2,265	3,203	3,688	36,753	37,823
Sperm	0	0	0	0	0	3	1	0	1	6	11	0	20	480	525	681	766	684	191	224	551	4,122	4,133
Humpback	8	8	8	9	188	319	449	1,399	3,422	5,793	11,603	10,201	11,830	11,185	10,553	7,605	3,888	744	316	340	543	57,205	68,808
Sei	0	0	0	0	0	97	0	0	218	346	661	225	38	175	1,055	398	98	99	109	105	247	2,549	3,210
Bryde's	0	0	0	0	0	0	0	0	0	3	3	0	73	187	126	51	96	26	0	32	16	607	610
Minkie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5	0	6	6
Right	0	0	0	0	0	16	81	93	68	73	331	99	107	23	78	25	36	20	60	18	21	487	818
Unspecified	0	0	0	0	0	130	428	520	46	239	1,363	734	1,287	419	261	0	140	470	0	0	0	3,311	4,674
Total	0	8	8	9	203	720	1,120	2,240	4,375	7,109	15,800	12,345	16,681	20,191	21,417	19,033	16,877	9,440	6,105	6,141	7,073	135,303	151,103

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1920-1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1930-1939	Total
Blue	3,023	4,637	6,787	4,926	6,714	6,196	8,663	10,278	14,333	18,762	84,319	30,490	6,657	19,023	17,456	16,625	17,892	14,670	15,174	14,175	11,525	163,687	248,006
Fin	5,924	2,787	4,339	3,914	5,364	10,173	7,019	5,953	7,708	12,903	66,084	11,171	3,336	5,517	7,824	13,228	10,294	15,865	29,446	21,479	19,330	137,490	203,574
Sperm	409	422	250	299	437	807	743	808	1,096	1,338	6,609	676	197	454	1,084	1,246	1,191	4,149	5,621	3,964	2,958	21,540	28,149
Humpback	567	370	1,710	1,572	1,420	2,686	1,878	1,345	1,408	1,134	14,090	1,441	418	506	1,089	3,283	4,906	8,806	7,206	3,810	293	31,758	45,848
Sei	107	150	143	390	672	404	1,255	1,343	1,447	482	6,373	358	44	35	26	324	187	803	285	133	138	2,333	8,706
Bryde's	17	0	3	11	84	29	60	31	60	27	322	14	0	0	0	0	0	7	36	0	0	57	379
Minkie	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Right	16	8	4	15	11	17	26	6	4	12	119	4	0	23	14	17	30	4	8	15	7	122	241
Unspecified	43	0	0	0	0	0	0	0	260	0	313	0	0	0	0	200	44	0	1	4	1,949	2,198	2,511
Total	10,106	8,375	13,236	11,127	14,702	20,312	19,644	20,024	26,056	34,648	178,230	44,154	10,652	25,558	27,493	34,923	34,544	44,304	57,777	43,580	36,200	359,185	537,415

	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1940-1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1950-1959	Total
Blue	4,975	65	127	349	1,050	3,647	9,237	6,968	7,731	6,240	40,389	7,107	5,202	4,005	2,888	2,535	1,739	1,715	1,769	1,251	938	29,149	69,538
Fin	8,168	1,382	980	1,459	1,953	9,429	14,970	21,766	19,962	20,636	100,705	20,160	23,920	23,945	28,568	28,833	27,734	28,374	27,817	27,469	25,584	262,404	363,109
Sperm	1,366	2,563	3,543	3,755	860	1,062	2,431	6,788	8,179	4,341	34,888	6,318	15,852	4,015	5,377	12,605	10,126	8,255	12,318	11,541	10,590	96,997	131,885
Humpback	2,967	181	227	174	263	461	249	253	461	5,869	11,105	5,621	4,788	3,492	2,952	4,067	6,168	3,149	4,774	8,065	15,773	58,849	69,954
Sei	139	57	86	231	102	119	469	810	788	1,504	4,305	1,157	1,642	1,852	1,576	827	906	1,955	3,615	3,076	4,696	21,302	25,607
Bryde's	0	0	0	0	0	0	0	55	238	157	450	100	23	0	7	0	0	14	36	29	43	252	702
Minkie	0	0	0	0	0	0	0	0	0	0	1	0	4	6	12	0	36	45	13	11	5	132	133
Right	0	0	0	1	0	0	1	0	0	0	2	0	22	9	17	34	18	49	19	3	79	250	252
Unspecified	26	0	0	0	0	0	31	12	17	1	87	6	0	0	0	0	1	0	8	0	0	15	102
Totals	17,641	4,248	4,963	5,969	4,228	14,718	27,388	36,652	37,376	38,749	191,932	40,469	51,453	37,324	41,397	48,901	46,728	43,556	50,369	51,445	57,708	489,350	661,282

Table continued

Table 5.—Continued.

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1960-1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1970-1979	Total
Blue	1,743	1,145	1,748	1,508	3,349	1,477	665	461	674	926	13,696	835	544	7	1	0	0	0	0	0	0	1,387	15,083
Fin	27,299	27,085	17,910	14,218	7,957	3,931	3,882	2,603	3,760	3,131	111,776	3,422	2,324	1,822	1,341	1,026	233	8	2	0	0	10,178	121,954
Sperm	11,757	14,458	15,884	21,814	20,610	12,631	13,073	9,911	9,323	12,293	141,754	12,632	17,073	13,311	12,708	14,038	10,797	6,666	6,026	5,681	803	99,735	241,489
Humpback	14,902	7,210	3,744	844	270	2,195	1,096	928	5	1	31,195	0	3	5	4	4	8	4	4	11	0	43	31,238
Sei	6,409	7,195	6,962	10,903	21,964	17,611	16,412	11,679	11,105	11,105	131,538	9,431	7,486	4,373	4,926	4,406	2,272	1,898	590	101	65	35,528	167,066
Bryde's	10	23	73	139	681	428	151	73	8	33	1,619	19	486	8	317	467	434	623	506	417	300	3,577	5,196
Minke	3	3	19	120	63	81	389	1,118	630	770	3,196	915	4,162	6,583	8,541	8,037	7,185	8,676	6,000	6,156	7,897	64,152	67,348
Right	6	1,355	727	374	82	350	161	4	4	78	3,137	2	2	0	0	0	0	0	0	0	0	4	3,141
Unspecified	0	8	0	0	0	1	0	0	0	0	9	1	0	0	0	0	0	0	0	0	0	1	10
Totals	62,129	58,482	47,067	49,920	54,976	42,392	37,028	31,510	26,079	28,337	437,920	27,257	32,060	26,109	27,838	27,978	20,929	17,875	13,128	12,366	9,065	214,605	652,525

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1980-1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1990-1999	Total
Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fin	574	289	0	0	0	0	9	7	0	0	879	0	0	0	0	0	0	0	0	0	0	0	1
Sperm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	879
Humpback	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryde's	211	162	320	333	0	0	0	0	0	0	1,026	0	0	0	0	0	0	0	0	0	0	0	1,026
Minke	7,142	7,903	7,301	6,680	5,568	5,567	4,969	273	241	330	45,974	327	288	330	330	330	440	440	438	389	439	3,751	49,725
Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unspecified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	7,927	8,354	7,621	7,014	5,568	5,567	4,978	280	241	330	47,880	327	288	330	330	330	440	440	438	389	439	3,751	51,631

	1900-1919	1920-1939	1940-1959	1960-1979	1980-1999	Totals
Blue	31,021	248,006	69,538	15,083	0	363,648
Fin	37,823	203,574	363,109	121,954	1	726,461
Sperm	4,133	28,149	131,885	241,489	879	406,535
Humpback	68,808	45,848	69,954	31,238	0	215,848
Sei	3,210	8,706	25,607	167,066	0	204,589
Bryde's	610	379	702	5,196	1,026	7,913
Minke	6	1	133	67,348	49,725	117,213
Right	818	241	252	3,141	0	4,452
Unspecified	4,674	2,511	102	10	0	7,297
Totals	151,103	537,415	661,282	652,525	51,631	2,053,956

whaling cycle very much as would be expected for an open-access marine resource that is initially abundant but which then gets successively overexploited, species by species.”

As one species began to dwindle in abundance, another would be targeted to take its place, and typically the species that was the next size smaller. Between 1921 and 1935, blue whales (with the exception of 1925) were the primary species taken in the Southern Hemisphere, with fin whales consistently second (Fig. 1b). After 1935, as blue whale numbers decreased, not only did fin whales become the primary species, but the annual totals for this species were consistently 2.0–2.5 times higher than those of the previous 15 years. Given that two fin whales were considered, in terms of oil yield, the equivalent of one blue whale (as measured by the “Blue Whale Unit” introduced by the IWC in 1932; Schneider and Pearce, 2004), this doubling of fin whale captures helped to maintain a consistent level of production.

In 1963, the sperm whale became the most-hunted species. At this same time, however, the number of sei whales captured exceeded 10,000. This was also the last year that fin whales were taken above the 10,000 level. For the next 5 years the sei whale was the primary target until their catch numbers dropped below 10,000 a year. Sperm whales again were the preferred species from 1969 to 1975, with kills consistently exceeding 10,000 per annum. No species of baleen whale exceeded the 10,000 level after 1969. Since 1978, most of the whales caught south of the equator have been Antarctic minke, a great many of them as a result of Japanese scientific whaling (Clapham, 2014).

Although industrial whaling in the Northern Hemisphere was conducted on a smaller scale, similar patterns can be seen for several species (Table 1, 2; Fig. 1a). The cycle is most noticeable when considering the timing of the decline in fin and sei whale catches in the mid-1960’s, and the effort made after 1970 to replace them with Bryde’s

whales, a species that had been largely ignored until that time (although as noted above they were often mistaken for sei whales in earlier catches).

The other noticeable replacement in targeted species was seen for humpback and sei whales, which, between 1908 and 1932, consistently alternated between second and third place in catch totals. After 1933, minke whales became the second-most hunted baleen whale north of the equator, and humpback captures continued to decline. After 1940, minke replaced fin whales as the primary mysticete target of whalers.

One noticeable hemispheric difference in the order in which species were hunted is how much earlier minke were targeted in the Northern Hemisphere. By 1932, minke were being hunted as consistently as sperm, humpback, and sei whales. This also coincided with the drop in blue whale catches that began in 1932. While not nearly as lucrative as blue whales, minke were much more abundant, and they were routinely caught in numbers greater than 3,000 annually from after World War II until 1983. By contrast, minke were not a significant focus of whaling efforts in the Southern Hemisphere until 1967.

Before the global moratorium was passed by the IWC in 1982, whaling nations had agreed to institute bans on whaling of certain species, beginning with the cessation of commercial bowhead whaling in 1931. Other bans went into effect for right and gray whales in 1935, humpback whales in the North Atlantic in 1955, blue whales in 1966, and fin whales in the Southern Hemisphere and North Pacific in 1976 (IWC, 1977).

However, despite those bans, hunting of these species continued. The recent emergence of reliable data regarding the extent of illegal whaling conducted by the USSR between 1948 and 1979 has made clear how much poaching took place (Yablokov, 1994; Clapham and Ivashchenko, 2009; Ivashchenko et al., 2011, 2013). The estimate for the total global catch by the USSR is 534,204 whales, of

which 178,811 were not reported to the IWC.³ This new information has also shed light on the previously unexplained population decline and failure to recover of the North Pacific right whale, *Eubalaena japonica* (Ivashchenko and Clapham, 2012).

A review of annual entries in the IWC database provides evidence that other countries participated in the killing of whales after various bans were issued. Ships registered in Argentina, Brazil, Canada, Chile, Germany, Japan, Netherlands, Norway, Portugal, South Africa, and the United Kingdom killed a total of 103 right whales after 1935 (Allison, 2012). After 1966, another 87 blue whales were killed by ships registered in Denmark, South Africa, Australia, Chile, Japan, and Spain (Allison, 2012). Two of the ships registered in Spain, the *Sierra* and the *Tonna*, were actually pirate whaling ships that were not registered with an IWC nation but whose operations were linked to Japan (Clapham and Baker, 2008). Korean vessels took 84 fin whales in the North Pacific between 1977 and 1985.

Ninety-eight percent of the blue whales killed globally after the ban in 1966 were killed by Soviet whalers, as were 92% of the 1,201 humpbacks killed commercially between 1967 and 1978. The majority of these, 1,034, were killed in 1967. Of the 512 gray whales killed after 1947, 309 (60%) were killed by the United States through permits issued for scientific whaling.

Conclusion

Remarkably, despite the importance of industrial whaling to several economies and more recently as a symbol of human misuse of the world’s resources, there has until now been no attempt to estimate the total catch for the 20th century, although Clapham and Baker (2008) provided estimates for the Southern Hemisphere. Here, taking advantage of newly revised catch figures for Soviet

³These figures include an additional 85 North Pacific right whales that were not included in the totals given by Ivashchenko and Clapham (2014).

whaling in both the Southern Ocean and the North Pacific, we have provided a tally of the total number of whales killed since full-scale modern industrial whaling began shortly after 1900. That total is close to three million animals, making it (at least in terms of sheer biomass) perhaps the largest hunt in human history.

Between 1712 and 1899 it is estimated that 300,000 sperm whales were killed globally by crews on sailing vessels that used small boats to chase, harpoon, tire out, and lance them (Smith et al., 2008). The same process applied to the slower mysticetes; the primary product from sperm whales was oil, and for baleen whales, oil, and baleen.

The industrial process was much more efficient. Separate crews focused on either catching or processing, and both had the advantage of mechanization to greatly increase the speed of these operations. Between 1900 and the middle of 1962, the same number of sperm whales had been killed by industrial methods as had been taken during the 18th and 19th centuries. Astonishingly, this feat was then repeated between 1962 and 1972.

The International Whaling Commission was a body initially created in 1946 to manage hunting for the sake of the industry, not that of the whales. By the time the IWC voted in 1982 to implement a moratorium on whaling beginning in 1985, at least 2,870,291 whales (99.1% of the overall 20th century total of 2,894,094) had been killed by industrial whaling methods. As a result, many populations had been reduced to small fractions of their pristine abundance.

Southern Ocean blue whales, for example, are estimated to be at less than 1% of their prewhaling numbers (Branch et al., 2007). In addition, some populations of whales appear to have been completely extirpated (Clapham et al., 2008) or, in the case of eastern North Pacific right whales, nearly so (Ivashchenko et al., 2013). To paraphrase a famous quotation by John Gulland regarding fisheries: whaling management in the 20th century was an interminable debate about the status

of stocks until all doubt was removed. And so were most of the whales.

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