

Soviet catches of whales in the North Pacific: revised totals

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ABSTRACT

The USSR conducted a global campaign of illegal whaling beginning in 1948. Catch records for Soviet pelagic operations in the Southern Hemisphere (and the northern Indian Ocean) have been largely corrected, but major gaps have remained for the North Pacific. Here, using newly discovered whaling industry reports, corrected figures for Soviet catches in this ocean are provided. During the period 1948–79, a minimum of 190,183 whales were killed by the USSR in the North Pacific (195,783 if one includes an estimate for sperm whales taken in years for which there are no true data); of these, only 169,638 were reported to the IWC, a difference of 20,568 whales (26,168 including the sperm whale estimate). Figures were falsified for 8 of 12 hunted species, with some catches over-reported to camouflage takes of illegal species. Revised catch totals (caught vs. reported) are as follows: blue whale – 1,621 vs. 858; fin whale – 14,167 vs. 15,445; humpback whale – 7,334 vs. 4,680; sperm whale – 153,686 vs. 132,505; sei whale – 7,698 vs. 11,363; North Pacific right whale – 681 vs. 11; bowhead whale – 145 vs. 0; gray whale – 172 vs. 24. Bryde's, minke, killer and Baird's beaked whale catches were reported correctly. Of all the hunted species, sperm and North Pacific right whales were the most heavily impacted. Major falsifications for sperm whales involved figures for both total catch and sex ratio.

KEYWORDS: WHALING-MODERN; ILLEGAL WHALING; REVISED CATCHES; NORTH PACIFIC; NOTHERN HEMISPHERE; HUMPBACK WHALE; GRAY WHALE; BOWHEAD WHALE; SPERM WHALE; RIGHT WHALE; BLUE WHALE; FIN WHALE; SEI WHALE; BRYDE'S WHALE

INTRODUCTION

Whaling has a long history in the North Pacific. Aboriginal subsistence whaling existed in different areas of this ocean for centuries (Reeves and Smith, 2006). Webb (1988) places the beginning of commercial whaling in the North Pacific at the end of the 1700s, with a major expansion in the 19th century; this was traditional sail-based whaling and concentrated largely on slower species such as sperm (*Physeter macrocephalus*), humpback (*Megaptera novaeangliae*), gray (*Eschrichtius robustus*), North Pacific right (*Eubalaena japonica*) and bowhead (*Balaena mysticetus*) whales. Later, as innovations such as steam catcher boats and explosive harpoons were introduced, faster species such as blue (*Balaenoptera musculus*), sei (*B. borealis*) and fin whales (*B. physalus*) were taken, and by the early 20th century most baleen whales were being regularly hunted in this region.

A number of nations were involved in North Pacific whaling, primarily: Americans, Canadians, UK and Norway. Russian whaling, however, had been virtually non-existent, with the exception of a successful operation conducted by Otto V. Lindholm (a Finn but Russian subject) in the Okhotsk Sea during the period 1864–84, and a brief operation using modern methods operating from Gaydamak near Vladivostok during 1889 by Akim G. Dydymov (Vebermann, 1914).

Modern-type whaling in the eastern North Pacific dates back to 1906 with the opening of the first land-based whaling

station in British Columbia (Webb, 1988), while in Japan the first shore station was established in 1896 (Reeves and Smith, 2006). In 1932, the USSR began commercial whaling in the North Pacific using a converted factory ship named *Aleut*, which for 16 years was the only Soviet whaling operation in this ocean (Ivashchenko *et al.*, 2011; Zenkovich, 1954). Soviet whaling expanded after World War II with the restoration, in 1948, of former Japanese land stations in the Kuril Islands. The *Aleut* fleet and catchers from the Kurils stations were operating in the western North Pacific exclusively until 1959; by that time the whale resources in this part of the North Pacific had been heavily depleted and the focus of the Soviet operations moved east, first to the waters around the eastern Aleutian Islands and then into the Gulf of Alaska (GoA), eastern Bering Sea (BS) and areas off the western coast of North America.

In the space of just two years (1962–63), three new large whaling factory ships were added to the Soviet North Pacific whaling operation, with the main focus remaining in the eastern North Pacific⁴. As a result of this expansion, catches dramatically increased from 3,970 whales in 1961, to 12,945⁵ in 1964 and continued to increase in subsequent years. Catches of sperm whales (the primary target of Soviet whalers in the North Pacific⁶) increased five-fold from 1962 (3,035) to 1966 (15,205). Such intensive whaling continued in the North Pacific until 1969, with up to four Soviet whaling fleets working in the area simultaneously. Examples

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⁴ At the same time the Kurils stations were closing over a period of 4 years (1961–64) due to a decline in whale abundance in the area.

⁵ Unless otherwise noted, all catch figures given in this paper are those derived from the formerly secret reports described in Methods, and are assumed to be an accurate record of the true Soviet catch. These figures are in contrast to the figures officially reported to the IWC which, with the exception of some late years of the Aleut fleet, are known to have been falsified.

⁶ In this paper the term 'primary target' means the whale species that was the principal focus of the whaling fleet's search operations during the season, and which therefore usually made up the majority of the catch. For example, blue whales were never the primary target despite being highly prized when available; in contrast, sperm whales and sometimes fin and humpback whales would be the primary target, and the distribution of these species would determine the major search areas of the fleets.

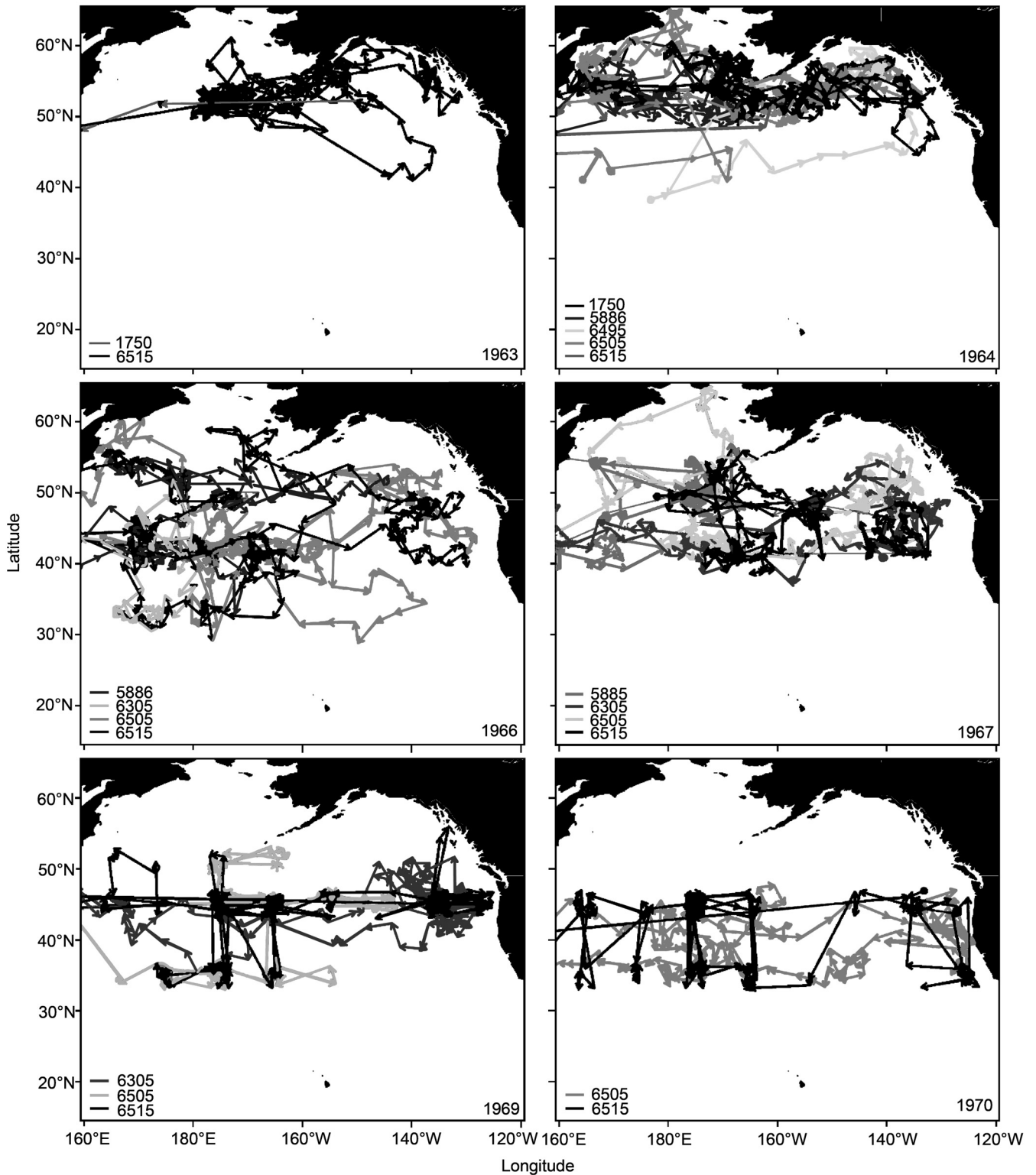


Fig. 1. Examples of search effort (tracks) of Soviet whaling operations in the North Pacific for selected years. Codes for the fleets/stations are as follows: 1750 Kuril land stations; 6515 *Vladivostok*; 6505 *Dal'ny Vostok*; 5885 and 5886 *Aleut*; 6495 *Sovetskaya Rossiya*; 6305 *Slava*. Solid circles show the beginning and end of the season. Arrows define the direction of movement of the fleet during the season. The plots (which represent noon positions of the factory ship) show only days when catches were made, since these were the only days for which positions were reported.

of the geographic scope of the Soviet whaling effort is given in Fig. 1.

The high catches, both in the North Pacific and elsewhere in the world, were driven by very specific requirements of the Soviet economic system to meet or exceed annual production targets (see details in Ivashchenko *et al.*, 2011). The need to catch so many whales forced the Soviet whalers

to hunt all species and all sizes and the result was an extensive global campaign of illegal whaling that went on, secretly and unchecked, from 1948 until sometime in the 1970s (Berzin, 2008; Clapham and Ivashchenko, 2009; Ivashchenko *et al.*, 2011).

The USSR was a signatory to the International Convention for the Regulation of Whaling (1946) and as such it was

Table 1
List of IWC regulations relating to North Pacific whaling operations.

Years	Regulation	Species covered	Details
1948	Minimum length and age/reproductive status Protected areas Protected species	Blue whale, fin whale, humpback whale, sei whale, sperm whale All species Right whale, bowhead whale, gray whale	70, 60, 35, 40, 38 (35 for land stations) feet, respectively; no lactating females or calves east of 150°W from 0 to 35°N; west of 150°W from 0 to 20°N. Only aboriginal hunting allowed.
1953	Protected area	Baleen whale, sperm whale	20°–66°N (to 72°N for sperm whales) in the eastern North Pacific, Bering Sea and all Aleutian Islands.
1964	Method of capture	Gray whale	Forbidden to kill 'except by aborigines or a Contracting Government on behalf of aborigines and only when the meat and products of such whales are to be used exclusively for local consumption by the aborigines'.
1966	Protected species	Blue whale, humpback whale	All areas of the North Pacific north of the Equator.
1967	Limited catches	Fin whale, sei whale	Lowering the catches to bring them to a sustainable level.
1968	Limited catches	Sperm whale	Approximately 8,000–10,000.
1971	National quotas (USSR)	Fin whale, sei whale (with Bryde's whale) and sperm whale	700, 1,527 and 7,716, respectively.
1972	International Observer Scheme	All species	Independent observers placed on all factory ships.
1972	Change in the minimum size limit	Sperm whale	From 35 feet to 30 feet.

required to follow catch restrictions defined in the Schedule of the International Whaling Commission (IWC). Such restrictions typically included areas in which hunting was prohibited, as well as various mandates regarding protected species and the minimum allowable length for catches of 'legal' species; for reference, the major regulations relating to whaling in the North Pacific are summarised in Table 1. This created an obvious conflict with the requirements for increasing catches and production. Accordingly, the reports submitted to the Bureau of International Whaling Statistics (BIWS) from each Soviet whaling fleet were sanitised, with almost all illegally caught whales removed or (in some cases) replaced by falsified numbers for legal species (Ivashchenko *et al.*, 2011). Following the revelation of this illegal whaling by Yablokov (1994), an effort was made by former Soviet whale biologists to correct the catch records using true data that had been kept secret for many years; this has now been largely accomplished for Soviet whaling operations in the Southern Hemisphere⁷, but large gaps in the true catch record have remained for the North Pacific.

A complete and accurate catch series is a prerequisite for the IWC's Comprehensive Assessment process which attempts to estimate a whale population's current status relative to its pre-exploitation level (IWC, 1989). Here, using recently discovered, formerly secret reports and other materials from the Soviet whaling industry, a revised catch series for Soviet whaling in the North Pacific Ocean is provided.

METHODS AND MATERIALS

The different Soviet whaling fleets and land stations, together with the periods of time in which they were active, are shown in Table 2. At various times, five factory fleets were operational, as well as five land stations located on four islands in the Kurils.

Catch figures as officially reported by the USSR to BIWS were taken from the IWC's catch database*.

⁷ In the Southern Hemisphere (primarily the Antarctic), the USSR killed 338,336 whales, of which only 185,778 were reported (Ivashchenko *et al.*, 2011).

*IWC summary catch database, version: October 2010. [Available from: C. Allison, IWC, Cambridge, UK].

The corrected catch totals given in this paper are based upon various Russian-language sources, consisting of published Soviet literature about catches prior to 1948 and reports from Soviet whaling operations summarised in Table 2. The latter are formerly secret reports and represent the primary source of information. They include:

- (1) scientific reports summarising catches by area and time, as well as measurement and biological data, and assessments of the status of species and stocks;
- (2) whaling production reports, which summarise the types and quantities of products derived from the caught whales; and
- (3) reports from the Soviet government's official whaling inspectors who were present aboard factory ships.

These materials were previously unpublished and largely unavailable until their declassification. They were recently discovered during searches of public archives in Russia (see Ivashchenko *et al.*, 2011 for further details).

However, the range of available reports is not entirely complete, with some types of report missing for specific years and whaling fleets; a list of source material is given in Table 3. Furthermore, the information contained in the reports is not always consistently presented. Some reports have considerable detail on catches (including individual positions and dates), while others give only a gross summary

Table 2

List of all whaling fleets and land stations operated by the Soviet Union in the North Pacific. The number of catchers in operation varied.

Fleet/station name	Years of operation	Areas of operation	No. of catchers
Aleut	1933–67	North Pacific	3–8
Kuril land stations	1948–64	Kuril Islands and areas around (~200 miles)	12–15
Slava	1966–69	North Pacific	10–15
Sovetskaya	1962–65, 1973	North Pacific	15–25
Rossiia	1978–79		
Vladivostok	1963–78	North Pacific	10–13
Dalniy Vostok	1963–79	North Pacific	10–13

Table 3

List of available reports for the Soviet whaling fleets that worked in the North Pacific. Shaded cells represent years when true catch data are not available and the data reported to the International Whaling Commission are considered incomplete.

	<i>Aleut</i>	Kuril Islands	<i>Sovetskaya Rossiya</i>	<i>Vladivostok</i>	<i>Dal'niy Vostok</i>	<i>Slava</i>
1948			x	x	x	xx
1949			x	x	x	xx
1950			x	x	x	xx
1951			x	x	x	xx
1952	W		x	x	x	xx
1953	W		x	x	x	xx
1954			x	x	x	xx
1955			x	x	x	xx
1956			x	x	x	xx
1957			x	x	x	xx
1958			x	x	x	xx
1959	P	W	x	x	x	xx
1960		W	x	x	x	xx
1961		W	x	x	x	xx
1962	P		S,W	W ¹	x	xx
1963 ²	W		S,W	W	W,F	xx
1964	L		S	S	S	xx
1965 ³		x	S	W,P	W,F	xx
1966 ²		x	W	W	W	
1967		x	xx	S	S,I	
1968	x	x	xx	W,I	S	S
1969	x	x	xx	W	S	S
1970	x	x	xx	S	S	x
1971	x	x	xx	S	S	x
1972	x	x	xx	S	S	x
1973	x	x		S	S	x
1974	x	x	xx	S	S	x
1975	x	x	xx	S	S	x
1976	x	x	xx	S	S	x
1977	x	x	xx	S	S	x
1978	x	x	x	S	S	x
1979	x	x	x	x	S	x

Key: S = scientific report; W = whaling production report; I = inspector's report; P = production reports; L = length measurement journals; F = financial and statistical reports; x = fleet did not exist; xx = fleet not operating in the North Pacific.

Footnotes: ¹Officially the factory ship *Vladivostok* began to work in 1963, but there is a whaling production report for 1962 because in that year some of this fleet's catchers were assigned to the Kuril Islands land stations, *Aleut* or *Sovetskaya Rossiya*; as a result, the takes for these catchers were sometimes double-counted and are not included in the calculated totals. ²True catch figures for some years for the whaling fleets *Vladivostok* and *Dal'niy Vostok* were provided to one of the authors (RLB) by A.A. Berzin, but actual reports were not found to confirm Berzin's data. ³For 1965, one summary table is available combining into a single figure the total catches for two fleets, *Vladivostok* and *Dal'niy Vostok*, but no other details are given (Ivashchenko *et al.*, 2007).

of sighted or killed whales during one- or two-month periods and/or over large geographic areas, with no vessel tracks shown. In other words, possession of a particular report does not necessarily mean that there is detailed information about catches for that fleet and whaling season. However, for the purpose of tallying total catches from the North Pacific, the available information is usually sufficient, with the exceptions noted below.

In a few cases, information in whaling production reports directly contradicts catch data given in other types of report for the same whaling fleet and year. This was not the case for the whaling production and scientific reports for the whaling fleet *Sovetskaya Rossiya*, all of which provide the same catch numbers for all whale species. However, a different situation exists for the two Soviet whaling fleets *Vladivostok* and *Dal'niy Vostok*, for which the reported catch numbers are sometimes significantly different between the

two report types. The difference is especially notable in those years with large catches of right or bowhead whales, where these takes have usually been replaced with names of other species (fin, sei and even humpback whales, the latter being also illegal to take from 1966 on). This appears to have been an attempt to hide catches of protected species in the production reports. This is strange in view of the fact that all such reports were secret. In some cases, there is disagreement not only in the reported numbers but also in the species taken. For example, for the 1967 whaling season the reports from the whaling fleet *Dal'niy Vostok* (Anon, 1967; Latishev *et al.*, 1968; Raskatov and Latishev, 1967) describe very different catch results. In the whaling production report the total catch for the year is given as 135 fin, 294 sei, 267 humpback and 4,089 sperm whales (total = 4,785). In contrast, in the scientific and inspectors reports the final numbers are 120 fin whales, 145 sei, 36 humpback,

Table 4
Soviet catches during the period 1932–47 by the Aleut whaling fleet, by year and species.

Year/ species	Blue whale	Fin whale	Humpback whale	Sei whale	Gray whale	Right whale	Minke whale	Sperm whale	Killer whale/Baird's beaked whale
1932	–	5	–	3	–	–	–	–	–
1933	5	109	26	–	2	–	–	57	–
1934	2	150	51	1	54	–	1	74	0/6
1935	1	208	143	–	34	1	–	94	3/0
1936	5	210	68	–	102	–	1	113	2/1
1937	0	146	59	1	11	1	0	198	0/0
1938	0	104	43	0	54	0	0	64	0/2
1939	0	238	43	0	29	2	4	156	5/1
1940	2	161	33	0	47	0	0	213	2/2
1941	9	244	7	11	57	0	2	194	4/5
1942	2	203	12	0	101	0	3	215	11/7
1943	0	132	29	0	99	0	0	216	1/1
1944	0	141	0	21	0	3	0	50	0/0
1945	1	131	1	0	30	1	0	206	3/0
1946	2	117	10	0	22	1	0	326	12/6
1947	0	129	10	0	1	0	0	470	0/0
Total	29	2,428	535	40	643	9	11	2,658	43/32

4,495 sperm, 43 blue, 132 right, 124 gray, 1 killer whale (*Orcinus orca*) and 1 Baird's beaked whale (*Berardius bairdii*) (total = 5,097); note that the five latter species are not mentioned at all in the production report.

In other years, simple differences in catch results always involve a lower number of blue and sperm whales (sometimes including other species too) in the whaling production reports. For example, for the 1966 season of the *Dalny Vostok* fleet, the whaling production report and scientific report give 5 vs. 45 blue and 5,265 vs. 5,752 sperm whales, respectively. Similar figures for the 1967 season of the *Vladivostok* fleet are 1 vs. 51 blue and 3,679 vs. 4,861 sperm whales.

No explanation is given for such differences; it is possible that the numbers in the production reports were an attempt to keep the same average size/weight proportions for sperm whales as those used to calculate the target plan in the first place⁸. There is no obvious explanation for the difference in the number of blue whales killed.

Overall, from discussions with individuals who were present at the time, and familiar with fleet operations⁹, it was clear that the true catch figures are those in either the scientific or inspection reports, and accordingly those data have been used in any cases of conflict with figures given in production reports. However, for those years when only whaling production reports are available (see Table 3), the figures given there have been used.

As no true catch data are available for several fleets/years in which sperm whales were the primary target, it has been necessary to apply a correction factor in order to estimate the true catch of this species. The correction factor was based upon known differences between the officially reported and actual catches for years and fleets for which complete data were available; specific details of these calculations are given

⁸ In the Soviet planning system, catches were translated into raw output weight based upon the average data from previous seasons for different species (using a table that converted length to weight). In all production reports, discussion regarding the achievement of production targets notes that the average weight of sperm whales taken reflects a high proportion of under-sized (illegal) animals.

⁹ Details of the interviewees, and an overview of Soviet illegal whaling operations in general, are given in Ivashchenko et al. (2011).

below in the section on sperm whales. For all other species there does not appear to be any need to apply correction factors.

We have not accounted here for lost whales, which would include animals that were struck but escaped, lost during towing, killed and flagged but not subsequently recovered or whales used as fenders and not processed. No details regarding lost whales were found in the reports; however, former whalers indicated that the number of lost whales was very small, as it was critical to bring as many whales as possible to the factory ship to meet production quotas.

RESULTS AND DISCUSSION

The analysis presented here deals largely with Soviet catches (both legal and illegal) from 1948 to 1979; however, previously published catches of the Aleut whaling fleet from 1932 to 1947 are given for reference in Table 4. During the period 1948–79, a minimum of 190,183 whales were killed by the USSR in the North Pacific (Table 5). The USSR

Table 5

Total catches of whales in the North Pacific by the USSR, 1948–79, by species.

Species	Actual catch	Reported catch	Difference
Blue whale	1,621	858	+763 (189%)
Fin whale	14,167	15,445	–1,278 (92%)
Humpback whale	7,334	4,680	+2,654 (157%)
Sperm whale	153,686*	132,505	+21,181 (116%)
Sei whale	7,698	11,363	–3,665 (68%)
Gray whale	149	1	+148 (-)
North Pacific right whale	681	11	+670 (6,191%)
Bowhead whale	145	0	+145 (-)
Baird's beaked whale	146	148	–2 (99%)
Killer whale	401	401	0 (100%)
Bryde's whale	3,466	3,517	–51 (99%)
Minke whale	689	686	+3 (101%)
Total	190,183*	169,615	+20,568 (112%)

*If an estimate is added for catches in years for which no data exist (see details in the sperm whale section), the total sperm whale catch is estimated at 159,286, and the overall total for Soviet catches in the North Pacific would be 195,783 whales.

reported 169,638 whales to the IWC and many of these reports involved falsifications of species, sex and length; consequently, it is not correct to state that 169,638 (or 89%) of the 190,183 killed whales were accurately reported.

As detailed below, the average differences between actual and reported catch figures for sperm whales were used to estimate catch totals in those years for which reports are not available; this correction would bring the total catch for all species to 195,783. Thus, the nominal difference between reported and actual catches was 20,568 whales (or 26,168 including the sperm whale estimate); but as noted above this difference is not strictly meaningful because of other falsifications in the official reports.

The difference between actual and reported catches is much lower than in the Antarctic, in part because the intensive period of whaling in the North Pacific was shorter, with fewer fleets and resources involved. Revised catch totals are given in Table 6 (blue whales), Table 7 (fin whales), Table 8 (humpback whales), Table 9 (sei whales) and Table 10 (sperm whales). Further details are given, by species, below.

Some gaps and uncertainties remain in the North Pacific catch record. As noted above, true catch data are missing for some years (1963 for *Dal'ny Vostok*; 1969 for *Vladivostok*; and 1966/67 for *Slava*). The effect of these omissions on catch figures is likely to be only minor for all species except

sperm whales, which are known to have been the primary target of whaling operations during the years concerned. Further details are given below.

Overall, unless additional data are recovered the figures reported here probably represent the best assessment of the total Soviet catch for the period 1948 to 1979, with the caveat that the numbers given for sperm whales are likely to be underestimates of the true catches (see below).

Most species of whales from the North Pacific were misreported to some degree, but right, bowhead and sperm whales were the main species for which catch data were falsified. Of these, the first two species were officially completely protected, while for sperm whales a large part of the Soviet catch consisted of undersized females. None of the right and bowhead whale catches were reported; instead, fictional fin, humpback and sei whale takes were created in the catch reports to cover up the products from these whales. Reported catches of sperm whales represented only a part of the true total for this species; additionally, the true sex ratio of the catch was significantly altered. For example, the scientific report for the 1975 season (Ivashchenko *et al.*, 2007) notes that in the two years (1970/71) before the IWC's International Observer Scheme was implemented, the true Soviet sperm whale catches were 9,011 females and 5,725 males; however, the catch was reported to BIWS as 1,789 females and 12,290 males.

Table 6

Soviet catches of blue whales in the North Pacific, 1948–78. Numbers in parentheses are the officially reported catches. Shaded cells represent years for which true catch data (from either scientific reports or whaling inspectors' reports) are not available; in these cases, the data reported to the International Whaling Commission have been used even though these are considered incomplete.

	<i>Aleut</i>	Kuril Islands	<i>Sovetskaya Rossiya</i>	<i>Vladivostok</i>	<i>Dal'ny Vostok</i>	<i>Slava</i>	Total (reported)
1948	3	0					3 (3)
1949	3	0					3 (3)
1950	5	2					7 (7)
1951	7	9					16 (16)
1952	7	17					24 (24)
1953	11	10					21 (21)
1954	12	23					35 (35)
1955	4	27					31 (31)
1956	7	45					52 (52)
1957	9	44					53 (53)
1958	0	14					14 (14)
1959	22	19					41 (41)
1960	0	14					14 (14)
1961	2	15					17 (17)
1962	19	11	37				67 (30)
1963	14	1	108	299	88		510 (348)
1964	17	0	79	25	67		188 (77)
1965	10		43	163			216 (72)
1966	0			15	45	0	60 (0)
1967	0			51	43	0	94 (0)
1968				3	28	25	56 (0)
1969				2	15	33	73 (0)
1970				7	12		19 (0)
1971				4	3		7 (0)
1972				0	0		0 (0)
1973			0	0	0		0 (0)
1974				0	0		0 (0)
1975				0	0		0 (0)
1976				0	0		0 (0)
1977				0	0		0 (0)
1978			0	0	0		0 (0)
Total	152	251	267	592	301	58	1,621 (878)

Table 7

Soviet catches of fin whales in the North Pacific, 1948–79. Numbers in parentheses are the officially reported catches. Shaded cells represent years for which true catch data (from either scientific reports or whaling inspectors' reports) are not available; in these cases, the data reported to the International Whaling Commission have been used even though these are considered incomplete.

	<i>Aleut</i>	Kuril Islands	<i>Sovetskaya Rossiya</i>	<i>Vladivostok</i>	<i>Dal'niy Vostok</i>	<i>Slava</i>	Total (reported)
1948	229	26					255 (255)
1949	64	53					117 (117)
1950	92	106					198 (198)
1951	90	157					247 (247)
1952	234	241					475 (475)
1953	145	179					324 (324)
1954	238	266					504 (504)
1955	79	219					298 (298)
1956	65	241					306 (306)
1957	81	173					254 (254)
1958	39	328					367 (367)
1959	132	223					355 (355)
1960	128	265					393 (393)
1961	83	156					239 (239)
1962	437	77	65				579 (514)
1963	140	90	512	795	432		1,969 (1,150)
1964	62	76	417	1,200	1,168		2,923 (2,576)
1965	128		318	642			1,088 (1,492)
1966	196			273	110	154	733 (1,347)
1967	439			82	120	177	818 (1,188)
1968				182	297	80	559 (1,064)
1969				258	48	113	419 (593)
1970				17	103		120 (412)
1971				12	14		26 (187)
1972				29	228		257 (250)
1973			1	0	137		138 (138)
1974				16	157		173 (173)
1975				0	33		33 (33)
1976				0	0		0 (0)
1977				0	0		0 (0)
1978				0	0		0 (0)
1979			0		0		0 (0)
Total	3,101	2,876	1,313	3,506	2,847	524	14,167 (15,445)

THE ALEUT FLEET AND KURIL ISLANDS

Some uncertainties remain with regard to catches by the Kuril Islands land stations and the *Aleut* fleet, and there is little information with which to assess the validity of the catch data reported by these operations to BIWS. A total of five land stations situated on four of the Kuril Islands were operating for different periods of time. Islands and station names were as follows: Iturup Island – *Kasatka* and *Yasniy*; Simushir Island – *Skalistsiy*; Shikotan Island – *Ostrovnoy*; and Paramushir Island – *Podgorniy*.

No scientific reports are available for these stations, or from *Aleut*. However, a few whaling production reports have the same numbers as those in the IWC database, except for one journal from *Aleut* which gives whale length measurements for 1964 (Anon, 1964) (see below).

There is little reason to believe that significant falsifications of the catch were made at the Kuril land stations, since they were operating at a time when whales were locally abundant and catches of all locally occurring species except right and gray whales were legal. An individual who worked at one of these stations in 1955 related that whalers sometimes increased the reported length of undersized sperm whales to equal or exceed the legal size, or reported a few small animals as one large whale (G. Derviz, pers. comm., October 2008); it is not clear how frequent these falsifications were, but they do not seem to

have been extensive. It has therefore been assumed that the reported catches for the Kuril land stations are largely accurate and that they omitted only a small number of right whales taken during their years of operation (Anon, 1960; 1961); there was also a catch of ten right whales taken for research purposes in 1955, but these were reported (Klumov, 1962).

A similar situation existed for the *Aleut* whaling fleet in at least its early years. *Aleut* had more flexibility than the land stations in terms of whaling areas and species taken, but also possessed a relatively low capacity due to the small number of old-type catchers in its fleet and this small factory ship's inability to process large numbers of whales (A.P. Avtukhov, pers. comm., May 2010). Our assumption, based upon the general agreement between production reports and the numbers reported to BIWS, is that *Aleut's* catches were falsified or under-reported before 1959 only for protected species (such as right and perhaps gray whales), and involved only small numbers of animals. The situation for the later years of operation (1960–67) is somewhat more complicated.

A brief review of *Aleut's* history is helpful here. Up until 1959, *Aleut* did not have the capability to travel far from land because of logistical issues relating to (among other things) the availability of fresh water on board; consequently, the factory ship remained close to land off Kamchatka,

Table 8

Soviet catches of humpback whales in the North Pacific, 1948–79. Numbers in parentheses are the officially reported catches. Shaded cells represent years for which true catch data (from either scientific reports or whaling inspectors' reports) are not available; in these cases, the data reported to the International Whaling Commission have been used even though these are considered incomplete.

	<i>Aleut</i>	Kuril Islands	<i>Sovetskaya Rossiya</i>	<i>Vladivostok</i>	<i>Dalnyi Vostok</i>	<i>Slava</i>	Total (reported)
1948	8	5					13 (13)
1949	0	7					7 (7)
1950	4	18					22 (22)
1951	1	8					9 (9)
1952	17	9					26 (26)
1953	11	6					17 (17)
1954	21	8					29 (29)
1955	8	23					31 (31)
1956	31	10					41 (41)
1957	50	2					52 (52)
1958	10	4					14 (14)
1959	74	5					79 (79)
1960	57	3					60 (60)
1961	335	19					354 (354)
1962	1,213	2	608				1,823 (1,215)
1963	772	5	505	1,122	226		2,630 (2,247)
1964	168	0	144	660	437		1,409 (242)
1965	82		148	240			470 (243)
1966	0			70	7	0	77 (0)
1967	0			70	36	0	106 (0)
1968				5	24	17	46 (0)
1969				0	1	4	5 (0)
1970				0	13		13 (0)
1971				1	0		1 (0)
1972				0	0		0 (0)
1973				0	0		0 (0)
1974				0	0		0 (0)
1975				0	0		0 (0)
1976				0	0		0 (0)
1977				0	0		0 (0)
1978			0	0	0		0 (0)
1979			0	0	0		0 (0)
Total	2,862	134	1,405	2,168	744	21	7,334 (4,680)

Chukotka, the Commander Islands or the Kurils. A refit in 1959 (including installation of a modernised fresh water supply system) allowed the fleet to cover new whaling areas farther from land and increase the catch of sperm whales (and other species) by moving farther east in the North Pacific. Productivity was enhanced in 1961 by the temporary addition to the *Aleut* fleet of new catcher vessels which had been built to service the not-yet-completed new factory ship *Sovetskaya Rossiya*.¹⁰ Accordingly, from 1960 to 1962, *Aleut's* catches of sperm, fin and humpback whales increased; since all three species were at the time legally catchable, there would have been no reason to falsify reports to BIWS.

In 1962, using catchers from another new factory fleet, the *Vladivostok*, *Aleut* took 1,200 humpback whales. High catches of humpback and sperm whales followed in 1963 (this time with help from catchers built for the new *Dalnyi Vostok*), but by 1964 whale abundance in the eastern North Pacific had dropped and there was increased competition from not only the large new Soviet factory fleets, but also from Japan. As a result, the smaller, slower *Aleut* had to seek out other areas, and in order to meet its production quotas

during this time *Aleut* began to take more sperm whales and probably an increased proportion of females and undersized animals.

Although it is likely that some under-reporting began around 1964 (only one report gives some details), the level of falsification for sperm whale catch numbers by the *Aleut* fleet is considered low. One journal reported data on whale length measurements from the 1964 season, and provided numbers that for some but not all species are higher than those officially reported: blue whales 17 vs. 8 reported; fin 57 vs. 90; humpback 168 vs. 35; sei 66 vs. 86; and sperm whales 1,662 vs. 1,369. In the report of whale length measurements, 441 of the 1,662 sperm whales are listed as female. While it is known that only 168 of the 441 females were reported to the IWC, there is no way of assessing the overall composition of the 293 under-reported whales (i.e. whether they were lactating females, calves, or under-sized animals of either sex). It is likely that some under-reporting occurred in the *Aleut's* final few years of operation (1964–67) due to the rising competition and other factors mentioned above. Except for the one journal, there is no information to assess the extent of under- and mis-reporting. However, in reality the limitations of this old fleet would likely not allow catches much larger than those officially reported to BIWS; our best guess is that the difference in catch numbers lies in the low hundreds. Consequently, for the catches summarised

¹⁰ Typically, catchers would be built before a new factory ship was completed. The larger floating factories such as *Sovetskaya Rossiya* had up to 25 catchers each, and some of these could be put into operation as they were produced.

Table 9

Soviet catches of sei whales in the North Pacific, 1948–79. Numbers in parentheses are the officially reported catches. Shaded cells represent years for which true catch data (from either scientific reports or whaling inspectors' reports) are not available; in these cases, the data reported to the International Whaling Commission have been used even though these are considered incomplete.

	<i>Aleut</i>	Kuril Islands	<i>Sovetskaya Rossiya</i>	<i>Vladivostok</i>	<i>Dalний Vostok</i>	<i>Slava</i>	Total (reported)
1948	3	36					39 (39)
1949	21	60					81 (81)
1950	7	51					58 (58)
1951	16	52					68 (68)
1952	13	188					201 (201)
1953	26	86					112 (112)
1954	22	126					148 (148)
1955	28	128					156 (156)
1956	16	171					187 (187)
1957	36	108					144 (144)
1958	19	336					355 (355)
1959	93	131					224 (224)
1960	59	140					199 (199)
1961	57	52					109 (109)
1962	303	79	92				474 (382)
1963	47	16	112	168	256		599 (530)
1964	66	35	288	144	121		654 (630)
1965	86		203	417			706 (695)
1966	268			177	78	306	829 (1,545)
1967	379			115	145	347	986 (1,994)
1968				37	154	119	310 (1,105)
1969				409	88	220	717 (1,091)
1970				46	47		93 (782)
1971				23	10		33 (299)
1972				23	32		55 (71)
1973			7	0	88		95 (95)
1974				3	39		42 (42)
1975				0	24		24 (24)
1976				0	0		0 (0)
1977				0	0		0 (0)
1978			0	0	0		0 (0)
1979			0	0	0		0 (0)
Total	1,565	1,795	702	1,562	1,082	992	7,698 (11,363)

here, officially reported data from the *Aleut* fleet were used on the assumption that if there were unreported takes, these would be too low to significantly increase the total. In addition, it has been assumed that there was no falsification of the sex ratio in *Aleut*'s sperm whale catch; however, given the unavailability of scientific reports for this fleet for certain years, there is no way of assessing the validity of this assumption.

Catch data by species

Blue whale

Blue whale catches (Table 6) were limited, and the species was never a primary target for Soviet whalers in the North Pacific. The total catch of blue whales for the period 1948–79 was 1,621, vs. 858 reported to BIWS (= 763 under-reported). The 1,621 animals represent less than 0.9% of the total Soviet catch of 190,183 whales (see Table 5). An additional 29 blue whales were caught before 1948. Most of the blue whale catches were made in the eastern North Pacific, with high catches in just three years: 510, 188, and 216 whales for 1963–65, respectively.

Fin whale

Fin whales were one of the main target species among baleen whales but still made up a relatively small portion (a little more than 7%) of the total Soviet catches in the North Pacific

(Table 7). The total catch of fin whales for 1948–79 was 14,167, vs. 15,445 reported to BIWS (= 1,278 over-reported). An additional 2,428 fin whales were caught before 1948. Fin whales were used to cover up illegal takes of blue, bowhead and right whales, resulting in the over-reporting noted here.

Humpback whale

The Humpback whale was not an important whaling species until 1961, when the Soviet whaling fleets began exploring the Aleutian Islands and then the pelagic eastern North Pacific (Table 8). Catches then increased significantly and were very high for a few years. By 1965 the stocks were already recognised as being heavily depleted and the IWC introduced complete protection for the North Pacific populations in 1966. However, Soviet catches continued, further depleting what was left of the previously large populations in the GOA, BS and Aleutians areas. The total catch for 1948–79 was 7,334, vs. 4,680 reported to BIWS (= 2,654 under-reported); the 7,334 whales represent 3.9% of the total Soviet catch. An additional 535 humpback whales were caught before 1948. Falsification of the catches began even before the species was under protection and it is not clear why this early falsification occurred. One possible explanation is that a sharp increase in the catch numbers may have resulted in criticism by other IWC members. The result

of these catches was that by 1970 humpback whales were relatively scarce in most areas of the North Pacific.

For the 1963 season there is considerable variation regarding total humpback whale catches for the *Dal'ny Vostok* whaling fleet. Three different sources give three different numbers: 323 were officially reported to the IWC; Doroshenko (2000) lists 226 as the total humpback catch for the *Dal'ny Vostok* fleet; finally, a *Dal'ny Vostok* whaling production report (Anon, 1963b) gives a figure of 546. The IWC data are known to be incorrect and are not considered further here; however, that leaves a choice between 226 and 546 whales.

It is known that the factory ship *Dal'ny Vostok* left her home port in Vladivostok only in the middle of June and prior to that time her catchers worked with the factory fleets *Sovetskaya Rossiya*, *Vladivostok* and *Aleut*, as well as with the Kuril Islands land stations. For the production report one can assume that 320 humpback whales were killed by the catchers assigned to *Dal'ny Vostok*, but processed elsewhere before the factory ship of this fleet left port. The production report still counts these whales as hunted by the fleet, while the scientific report would have counted only those whales that were processed on the decks of the factory ship to which the catchers were actually assigned (in this case, *Dal'ny Vostok* from the end of June through November). Whaling production reports from other fleets give the number of humpback whales caught by the *Dal'ny Vostok* catchers as 75 for the *Sovetskaya Rossiya* fleet and 161 for *Aleut* and *Vladivostok* (Anon, 1963a; 1963b). However, adding up all these numbers (including the scientific report catches) gives a total that is still 84 animals short of the production report's figure of 546 whales.

Another reason for listing a larger number of humpback whales could be to cover up the production from illegal catches of right whales that year. Since it is not possible to determine the origin of the humpback whale catch figure in the whaling production report, this number was not used in the calculation of the total North Pacific catch. In the catch tables for the 1963 season for the other fleets, catches from the scientific reports were used; to be consistent with that, the final number of the *Dal'ny Vostok* catches of humpback whales in 1963 was taken as 226.

Sei whale

A secondary choice for Soviet whalers, sei whales were nevertheless subject to high catches in some years. In addition, 'fake' sei whale catches were reported to cover up illegal takes of other species. The total catch for 1948–79 was 7,698 vs. 11,363 reported to the IWC (= 3,665 over-reported) (Table 9). Only 40 sei whales were caught before 1948. Since there are a few years for which scientific reports are not available, and when the reported sei whale catches were relatively high (1966, 1967 and 1969), it is possible that these numbers were over-reported. However, without the true data it is not possible to assess the level of falsification and the total catch number given here (7,698) is probably higher than the actual catch for this species. It is also impossible to assess whether any of the sei whales taken in lower latitudes were actually Bryde's whale (*Balaenoptera edeni*). The combination of high Soviet takes and extensive Japanese pelagic catches caused serious depletion of sei whale populations in the North Pacific.

Right and bowhead whales

The Soviet right and bowhead whale catches are not discussed in depth here; however, many new details are now available on numbers, distribution and composition of catches and these are described in Ivashchenko and Clapham (2012). The total estimated Soviet catch of right whales in the North Pacific is 681¹¹, of which only 11 were officially reported (ten taken off the Kurils under a permit for scientific research, and one reported as a 'mistake' in the eastern North Pacific in 1964; see Brownell *et al.*, 2001). Of 681 animals, 529 were killed in the eastern North Pacific (the Gulf of Alaska and the south-eastern Bering Sea).

Overall, the catches of right whales occurred over a period of a few years. In 1958–61 the *Aleut* fleet and Kuril land stations were taking 1–2 animals a year (for a total of 10 whales); however, beginning in 1962 the catches quickly increased. In 1962, 23 right whales were killed (with 21 taken by *Sovetskaya Rossiya*); in 1963 the catch was 275 whales (112 taken by *Sovetskaya Rossiya* and the remainder by *Vladivostok* and *Dal'ny Vostok*); in 1964 the catch was 200 whales (22 by *Sovetskaya Rossiya*, 178 by *Vladivostok* and *Dal'ny Vostok*). In 1965 and 1966 the total catches for all fleets decreased to 20 and 3 right whales, respectively. However, in 1967 whalers of the *Dal'ny Vostok* fleet found an aggregation of right whales in the Okhotsk Sea and a total of 134 whales were killed that year (126 in the Okhotsk Sea and 8 others in different parts of the North Pacific by *Dal'ny Vostok* and *Vladivostok*). Possibly a few of the right whales were taken in 1968 in the Okhotsk Sea by *Vladivostok*, with the last known right whales killed in 1971 around the Kuril Islands. The majority of animals taken in 1963/64 were large, mature whales occurring over an extensive area of the Gulf of Alaska in deep offshore waters, with the overall distribution similar to that of 19th century American whaling catches plotted by Townsend (1935) (Ivashchenko and Clapham, 2012). In the western North Pacific, catches of 152 right whales were distributed around the Kuril Islands (on both sides) and along the eastern coast of Sakhalin Island. The latter involved 132 right whales killed in the Okhotsk Sea in 1967/68.

The total catch of bowhead whales in the North Pacific was at least 145, all of them taken in the Okhotsk Sea (primarily in the Shantar Archipelago and Shelikov Bay) in 1967; at least 18 of these whales were killed by the *Aleut* fleet. An additional 127 bowheads were killed by the *Vladivostok* fleet in 1968 (Ivashchenko and Clapham, 2012). None of these catches were reported.

Gray whale

The total catch of gray whales during 1948–79 was 149 animals, of which only 1 was reported. An additional 643 gray whales were killed before 1948. In 1967, 124 of the 149 gray whales were killed by Soviet catchers in the Bering Sea (Doroshenko, 2000).

A scientific and scout vessel named *Druzhniy* (which was also a catcher) and another Soviet catcher (of the type used from the Kuril Islands land stations [A.A. Berzin,

¹¹ This total includes all known catches of right whales and an additional 10 whales taken in the period 1958–62 by the *Aleut* whaling fleet or by Kuril land stations; these latter animals are listed in the whaling production reports as 'other' or 'dau hval' (which means 'dead whale' in Norwegian). Given that all other species were listed and identified separately in the reports concerned, we inferred that these 10 animals represented illegal takes of right whales.

Table 10

Soviet catches of sperm whales in the North Pacific, 1948–79. The last column is an estimate of the actual catch for years in which true data are not available (see text). Numbers in parentheses are the officially reported catches. Shaded cells represent years for which true catch data (from either scientific reports or whaling inspectors' reports) are not available; in these cases, the data reported to the International Whaling Commission have been used even though these are considered incomplete.

	<i>Aleut</i>	<i>Kuril Islands</i>	<i>Sovetskaya Rossiya</i>	<i>Vladivostok</i>	<i>Dal'niy Vostok</i>	<i>Slava</i>	Total (reported)	Correction
1948	574	390					964 (964)	
1949	774	986					1,760 (1,760)	
1950	588	1,469					2,057 (2,057)	
1951	765	1,474					2,239 (2,239)	
1952	731	1,641					2,372 (2,372)	
1953	865	1,521					2,386 (2,386)	
1954	816	1,192					2,008 (2,008)	
1955	996	1,494					2,490 (2,490)	
1956	998	1,693					2,691 (2,691)	
1957	1,174	1,821					2,995 (2,995)	
1958	1,430	2,185					3,615 (3,615)	
1959	1,560	1,878					3,438 (3,438)	
1960	2,228	1,487					3,715 (3,715)	
1961	1,917	1,401					3,318 (3,318)	
1962	1,011	1,347	677				3,035 (3,304)	
1963	1,093	659	693	1,898	2,298		6,641 (5,783)	800
1964	1,662	452	1,133	2,135	2,171		7,553 (5,886)	
1965	1,572	0	1,452	0	9,932		12,956 (8,196)	
1966	1,522	0	0	6,391	5,752	1,540	15,205 (9,477)	1,600
1967	432	0	0	4,861	4,495	2,620	12,408 (9,431)	1,600
1968			0	1,548	4,853	5,139	11,540 (9,542)	
1969				3,152	2,933	5,016	11,101 (8,211)	1,600
1970				4,113	4,982		9,095 (8,585)	
1971				2,715	2,926		5,641 (5,525)	
1972				854	788		1,642 (1,736)	
1973			501	23	1,544		2,068 (2,068)	
1974				2,265	1,700		3,965 (3,965)	
1975				2,056	1,683		3,739 (3,748)	
1976				2,076	1,595		3,671 (3,671)	
1977				1,991	1,275		3,266 (3,266)	
1978			325	871	968		2,164 (2,164)	
1979			748	0	1,200		1,948 (1,948)	
Total	22,708	23,090	5,529	36,949	51,095	14,315	153,686* (132,505)	5,600

*This number represents a minimum catch for sperm whales; if a correction factor is added, the total removal will be 159,286 whales.

pers. comm., 28 November 1993 to RLB]) were observed and photographed about 75 miles out (64°00'N, 168°40'W) by an aircraft en route from Savoonga, St. Lawrence Island to Nome, Alaska on 27 June 1967 with a few gray whales in the vicinity (James G. Mills, pers. comm. 6 December 1967 to RLB; and see Mills' photo of the *Druzhniy* in Berzin, 2008, Plate 29). The harpoon line from the *Druzhniy* was out, but there was no sign of a whale at the end of it. Furthermore, Mills reported that his pilot observed three smaller vessels and one larger one in the distance. These vessels were reported to the Northeast Cape Air Force Station on St. Lawrence Island. A US Air Force aircraft flew over the area and identified a Soviet factory ship with whale carcasses on deck, but they could not identify them to species. Based on records submitted to the IWC by the Soviets, the closest Soviet factory ship was supposedly almost 800 miles away at the time. However, in light of the observations by Mills and the US aircraft, it is possible that gray whales were killed in this location and the official report of the factory ship's location 800 miles away was false.¹²

¹² Although this incident suggests that factory ship positions were sometimes falsified, overall the noon positions of factory ships reported to the IWC are consistent with locations given in the Soviet scientific and production reports that were available to us for this study.

In addition to the above commercial catches of gray whales, 4,166 aboriginal catches were made between 1948 and 1979 (Yablokov and Bogoslovskaya, 1984). Between 1948 and 1957, these catches averaged 42 whales annually, but from 1958 to 1979 the average annual take was 170. This suggests a change in catching methods; starting in 1969, the whale catcher *Zvezdny* was used to take gray whales for the Chukotka natives because most local hunting with small boats had ceased (Ivashin and Mineev, 1981).

Sperm whale

Sperm whales were the primary target of Soviet whaling operations in the North Pacific. Here, two catch totals are given (Table 10); a minimum known and a second figure that includes a correction factor for unknown takes (explained further below). The total catch for the period 1948–79 was 153,686 (minimum) or 159,286 (estimated), vs. 132,505 reported to BIWS (= 21,181 or 26,781 under-reported). An additional 2,658 sperm whales were caught before 1948. The catches of sperm whales increased substantially with the introduction of new whaling fleets into the area and from 1966 made up 80–85% of the total Soviet catch of all species. As a result, a large part of the total number of sperm whales after 1962 was taken in the central and eastern North

Pacific. Starting in 1966, the catch consisted of a large number of females, and falsified data were submitted regarding both numbers and sex ratio. In 1966 the *Dal'niy Vostok* fleet reported taking 3,327 sperm whales, including 153 females; in reality the catch was 5,752 sperm whales, of which 3,660 were females. In the same year, the *Vladivostok* fleet reported 3,088 sperm whales, but actually caught 6,391, including 4,679 females.

This type of under-reporting of totals, and mis-reporting of sex ratio, continued until 1972. In creating the impression that males were under heavy pressure, these falsified data prompted the IWC to change the minimum legal length for sperm whales in June 1972 (down to 30 feet) in order to encourage the taking of more females (IWC, 1974). Tragically, this exacerbated an already dire situation for females, which (unknown to the IWC) were already under extreme whaling pressure from the Soviets as well as from Japanese operations, which also falsified sex ratio data (Berzin, 2008; Kasuya, 1999).

The submitted data on sex and length of sperm whales were falsified by changing a few small females or juveniles into a single adult male for the resulting report. Given that the USSR is believed to have usually accurately reported the noon positions of their factory ships, it is somewhat surprising that no one ever questioned how so many males could have been taken when the fleets were spending much of their time in lower latitudes.

No true catch data are currently available for the following: 1963 for *Dal'niy Vostok*; 1969 for *Vladivostok*; and 1966/67 for *Slava*. For years with known true and falsified data the average difference between them was 1,600 sperm whales (range: 454–3,303). Accordingly, to estimate the catches for the unknown years, 1,600 whales were added to the reported total for the years 1966/67 (*Slava*) and 1969 (*Vladivostok*). However, half of this number (800) was rather arbitrarily used for *Dal'niy Vostok* in 1963 because it was the first season for this fleet and the factory ship left its home port later in the season, presumably resulting in a lower catch than in subsequent years. These correction factors are certainly not ideal, but they represent the simplest solution to the problem given the available data; the true differences for the missing years are unlikely to be much greater or smaller than our crude estimate.

Given these assumptions, the total estimate of under-reported sperm whales for the seasons and fleets in question is 5,600 animals. This puts the corrected total Soviet catch of sperm whales in the North Pacific during 1948–79 at 159,286 whales.

Brownell *et al.* (2000) analysed the true data on sperm whale catches available at that time, and concluded that until 1973 some Soviet whaling fleets were taking 1.8 times more sperm whales than reported. This correction factor was derived from true catch data that were then available from two factory fleets, *Dal'niy Vostok* and *Vladivostok*; the factor was then applied to three other factory fleets for which true data were unavailable. However, there are two problems with this estimate. Firstly, in tables 3, 4 and 5 of Brownell *et al.* (2000) the 'true' catch of sperm whales is reported incorrectly; specifically, for some years the number of females is added to the total catch (which already included

the females), resulting in almost double the number of whales used in the calculations. Secondly, the difference between true and reported sperm whale catch totals for *Dal'niy Vostok* and *Vladivostok* was greater than for at least two of the three other factory fleets, so any correction factor derived from these two fleets would overestimate the true catch for the other three. Consequently, the Brownell *et al.* (2000) estimate of about 180,000 sperm whales taken by Soviet fleets in the North Pacific is excessive; as noted above, we estimate the true total catch at 159,286.

It is true that in some years the difference between reported and actual sperm whale catches was high (2,400–3,303 whales); however, it is worth noting that in the later years (1969–72) the difference between the reported and actual total catches was not as significant (454–1,240 whales) but that the sex ratio of the catch was falsified to a great extent. Overall, it is difficult to apply a single correction factor to the Soviet catches due to the variable operational conditions under which the fleets were working during that period of time.

Other species: not falsified

The following four species were also occasionally taken by Soviet whalers in the North Pacific. Catch totals are given for the period 1946 to 1979 unless otherwise noted.

- (1) Minke whales (*Balaenoptera acutorostrata*): this species was never an important target for Soviet whalers. A total of 86 minke whales were caught, vs. 83 reported. Only 12 minke whales were killed before 1948.
- (2) Baird's beaked whales (*Berardius bairdii*): 146 caught vs. 148 reported. In some reports catches were listed as bottlenose whales. Confusion between the species (i.e. *Berardius* spp. vs. *Hyperoodon* spp.) seems to have been common until it was clarified that the range of bottlenose whales does not include the North Pacific (Tomilin, 1967).
- (3) Bryde's whale (*Balaenoptera edeni*): 4,069 caught vs. 4,120 reported.
- (4) Killer whale (*Orcinus orca*): 401 whales caught, all of which were reported. Before 1948 an additional 31 killer whales were taken.

CONCLUSIONS

In terms of total numbers, illegal whaling by the USSR after World War II was not as extensive in the North Pacific as in the Southern Hemisphere, where the difference between reported versus actual catches was approximately 152,558 whales. However, its consequences for some populations (e.g. North Pacific right whales and sperm whales) were potentially devastating. Furthermore, the difference between reported and actual catches was still substantial, being at least 20,568 whales (or 26,168, including a correction factor for sperm whales). The figures reported here represent the best accounting to date, and cannot be further refined unless new material becomes available. A few gaps and uncertainties remain, which means that the true catch totals are probably still somewhat underestimated. These would

include further unreported catches of blue, right, bowhead and gray whales, as noted above; a lack of scientific reports for the Aleut whaling fleet; and a few missing years for other fleets as detailed in Table 3. Despite these issues, for the reasons given above the true catch totals are unlikely to be substantially greater than those given here.

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REFERENCES

- Anon. 1960. Promisloviy otchet 2-oy Dalnevostochnoy Kitoboinoy flotili za 1960 god. [Whaling production report of the 2nd Far Eastern Whaling fleet for 1960]. Vladivostok, 208pp [In Russian] (Unpublished).
- Anon. 1961. Promisloviy otchet 2-oy Dalnevostochnoy Kitoboinoy flotili za 1961 god. [Whaling production report of the 2nd Far Eastern Whaling fleet for 1961]. Vladivostok, 58pp. [In Russian] (Unpublished).
- Anon. 1963a. Otchet o proizvodstvennoy deyatelnosti kitoboinoy flotili Sovetskaya Rossiya za promisel 1963 goda. [Report of the production activities of the whaling fleet Sovetskaya Rossiya for 1963]. Upravlenie proizvodstvennikh flotilii 'Dal'moreprodukt', Vladivostok, 121pp. [In Russian] (Unpublished)
- Anon. 1963b. Promisloviy otchet flotilii Aleut, Vladivostok, Dalniy Vostok za promisel 1963 goda. [Whaling production report of whaling fleets in Aleut, Vladivostok, Dalniy Vostok during the 1963 season]. Upravlenie proizvodstvennikh flotilii 'Dal'moreprodukt', Vladivostok, 208pp. [In Russian] (Unpublished)
- Anon. 1964. Zhurnal ucheta zamera kitov 1964g. . [Journal of length measurements of whales 1964]. Upravlenie proizvodstvennikh flotilii 'Dal'moreprodukt', Vladivostok, 64pp. [In Russian] (Unpublished).
- Anon. 1967. Promisloviy otchet kitoboinoy flotilii Dalniy Vostok za promisel 1967 goda. [Whaling production report of the whaling fleet Dalniy Vostok during the 1967 season]. Upravlenie Kitoboinikh Flotilii, Vladivostok, 64pp. [In Russian] (Unpublished).
- Berzin, A.A. 2008. The truth about Soviet whaling. *Mar. Fish. Rev.* 70(2): 4–59.
- Brownell, R.L., Jr., Clapham, P.J., Miyashita, T. and Kasuya, T. 2001. Conservation status of North Pacific right whales. *J. Cetacean Res. Manage. (special issue)* 2: 269–86.
- Brownell, R.L., Yablokov, A. and Zemsky, V. 2000. USSR pelagic catches of North Pacific sperm whales, 1949–1979: conservation implications. pp.123–30. *In: Yablokov, A. and Zemsky, V. (eds). Soviet Whaling Data*, Moscow: Center for Russian Environmental Policy, Marine Mammal Council.
- Clapham, P. and Ivashchenko, Y. 2009. A whale of a deception. *Mar. Fish. Rev.* 71: 44–52.
- Doroshenko, N.V. 2000. Soviet catches of humpback whales (*Megaptera novaeangliae*) in the North Pacific. pp.48–95. *In: Yablokov, A.V. and Zemsky, V.A. (eds). Soviet Whaling Data (1949–1979)*. Center for Russian Environmental Policy, Moscow. 408pp.
- Ivashchenko, Y. and Clapham, P.J. 2012. Soviet catches of bowhead (*Balaena mysticetus*) and right whales (*Eubalaena japonica*) in the North Pacific and Okhotsk Sea. *Endanger. Species. Res.* 18: 201–17.
- Ivashchenko, Y.V., Clapham, P. and Brownell, R.L., Jr. (Eds). 2007. Scientific reports of Soviet whaling expeditions in the North Pacific, 1955–1978. NOAA Tech. Memo. NMFS-AFSC-175. 36pp. [Transl. by Y. V. Ivashchenko].
- Ivashchenko, Y., Clapham, P. and Brownell, R.L., Jr., 2011. Soviet illegal whaling: The devil and the details. *Mar. Fish. Rev.* 73(3): 1–19.
- Ivashin, M.V. and Mineev, V.N. 1981. The history of gray whale harvesting off Chukotka. *Rep. int. Whal. Commn* 31: 503–05.
- IWC. 1974. Chairman's Report of the Twenty-Fourth Meeting. *Rep. int. Whal. Commn* 24:20–36.
- IWC. 1989. Report of the Special Meeting of the Scientific Committee on Planning for a Comprehensive Assessment of Whale Stocks, Cambridge, UK, 7–11 April 1986. *Rep. int. Whal. Commn (special issue)* 11: 3–13.
- Kasuya, T. 1999. Examination of the reliability of catch statistics in the Japanese coastal sperm whale fishery. *J. Cetacean Res. Manage.* 1(1): 109–22.
- Klumov, S.K. 1962. Gladkie (Yaponskie) kity Tikhogo Okeana [The right whales in the Pacific Ocean]. *Tr. Inst. Okeanol. Akad. Nauk SSSR* 58: 202–97. [In Russian].
- Latishev, V.M., Doroshenko, N.V., Erdakov, L.N., Veinger, G.M., Bardin, V.F. and Latisheva, I.M. 1968. Sostoyanie zapasov kitov v severnoy chasty Tikhogo okeana. [Condition of whale resources in the North Pacific]. TRINO, Vladivostok, 76pp. [In Russian] (Unpublished).
- Raskatov, E.A. and Latishev, V.M. 1967. Otchet gosudarstvennikh inspektorov po kitoboinomu promisluzu promislavoy sezon 1967 goda na kitoboinoy flotilii Dalniy Vostok. [Report of state whaling inspectors during the 1967 season of the whaling fleet Dalniy Vostok]. Vladivostok, 76pp. [In Russian] (Unpublished).
- Reeves, R. and Smith, T.D. 2006. A taxonomy of world whaling operations and era. pp.82–101. *In: Estes, J.A., DeMaster, D., Doak, D.F., Williams, T.M. and Brownell Jr, R.L. (eds). Whales, Whaling and Ocean Ecosystems*. University of California Press, Berkeley, CA, USA.
- Tomilin, A.G. 1967. Cetacea. *In: Heptner, V.G. (eds). Mammals of the USSR and Adjacent Countries. Mammals of Eastern Europe and Adjacent Countries*. Israel Program for Scientific Translations, Jerusalem. [Translated from Russian. Published first in Russian; Moscow, 1957. IPST Cat. No. 1124]. xxi + 717pp.
- Townsend, C.H. 1935. The distribution of certain whales as shown by logbook records of American whalships. *Zoologica (NY)* 19(1–2): 1–50+6 maps.
- Vebermann, E. 1914. Kitoboiniy promisel v Rossii. Chast 1: Istoriya promisla. [The whale fishery in Russia. Part 1: A history of the whale fishery]. *Izvestiya Moskovskogo Komercheskogo Instituta*, Moscow. 321pp + 44plts. [In Russian].
- Webb, R.L. 1988. *On the Northwest, Commercial Whaling in the Pacific Northwest 1790–1967*. University British Columbia Press, Vancouver. xxi+425pp.
- Yablokov, A.V. 1994. Validity of Soviet whaling data. *Nature, Lond.* 367(6,459): 108.
- Yablokov, A.V. and Bogoslovskaya, L.S. 1984. A review of Russian research on the biology and commercial whaling of the gray whale. pp.465–85. *In: Jones, M.L., Swartz, S.L. and Leatherwood, S. (eds). The Gray Whale Eschrichtius robustus*. Academic Press Inc., Orlando, Florida. xxiv+600pp.
- Zenkovich, B.A. 1954. Vokrug sveta za kitami. [Around the world after whales]. Government Publishers of Geographical Literature, Moscow, 408pp. [In Russian].

