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YULIA V. IVASHCHENKO, PHILLIP J. CLAPHAM, and ROBERT L. BROWNELL, Jr.

Introduction

At the Tenth Biennial Conference on the Biology of Marine Mammals in November of 1993, Alexey Yablokov (then Special Advisor for Ecology and Health to Russian President Boris Yeltsin) revealed that the Soviet Union had conducted a vast global campaign of illegal whaling that began in 1948 and lasted three decades (Yablokov, 1994). Yablokov described how the U.S.S.R., while in theory bound by the International Convention for the Regulation of Whaling, 1946 to which it was a signatory, had swept the seas in search of whales, routinely disregarding quotas, prohibitions, and other regulations established by the International Whaling Commission (IWC). In general, violations took three forms: the taking of protected species, altering of reported biological data to camouflage catches of under-sized animals or lactating females, and over-reporting of "legal" species to provide credible catch totals.

Although some uncertainty remains about the true number of the U.S.S.R.'s catches during this period, the difference between what was actually caught and what was reported to the IWC[1] was large (Clapham and Ivashchenko, 2009). These catches, together with the poorly regulated whaling of other nations, drastically reduced the populations concerned, and in at least one case (that of the eastern population of the North Pacific right whale, *Eubalaena*

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[1]Catch data were actually reported to the Bureau of International Whaling Statistics, which was the central repository for such data under the IWC.

ABSTRACT—In 1948, the U.S.S.R. began a global campaign of illegal whaling that lasted for three decades and, together with the poorly managed "legal" whaling of other nations, seriously depleted whale populations. Although the general story of this whaling has been told and the catch record largely corrected for the Southern Hemisphere, major gaps remain in the North Pacific. Furthermore, little attention has been paid to the details of this system or its economic context.

Using interviews with former Soviet whalers and biologists as well as previously unavailable reports and other material in Russian, our objective is to describe how the Soviet whaling industry was structured and how it worked, from the largest scale of state industrial planning down to the daily details of the ways in which whales were caught and processed, and how data sent to the Bureau of International Whaling Statistics were falsified.

Soviet whaling began with the factory ship Aleut *in 1933, but by 1963 the industry had a truly global reach, with seven factory fleets (some very large). Catches were driven by a state planning system that set annual production targets. The system gave bonuses and honors only when these were met or exceeded, and it frequently increased the following year's targets to match the previous year's production; scientific estimates of the sustainability of the resource were largely ignored. Inevitably, this system led to whale populations being rapidly reduced. Furthermore, productivity was measured in gross output (weights of whales caught), regardless of whether carcasses were sound or rotten, or whether much of the animal was unutilized.*

Whaling fleets employed numerous people, including women (in one case as the captain of a catcher boat). Because of relatively high salaries and the potential for bonuses, positions in the whaling industry were much sought-after. Catching and processing of whales was highly mechanized and became increasingly efficient as the industry gained more experience. In a single day, the largest factory ships could process up to 200 small sperm whales, Physeter macrocephalus*; 100 humpback whales,* Megaptera novaeangliae*; or 30–35 pygmy blue whales,* Balaenoptera musculus brevicauda. *However, processing of many animals involved nothing more than stripping the carcass of blubber and then discarding the rest. Until 1952, the main product was whale oil; only later was baleen whale meat regularly utilized.*

Falsified data on catches were routinely submitted to the Bureau of International Whaling Statistics, but the true catch and biological data were preserved for research and administrative purposes. National inspectors were present at most times, but, with occasional exceptions, they worked primarily to assist fulfillment of plan targets and routinely ignored the illegal nature of many catches.

In all, during 40 years of whaling in the Antarctic, the U.S.S.R. reported 185,778 whales taken but at least 338,336 were actually killed. Data for the North Pacific are currently incomplete, but from provisional data we estimate that at least 30,000 whales were killed illegally in this ocean. Overall, we judge that, worldwide, the U.S.S.R. killed approximately 180,000 whales illegally and caused a number of population crashes. Finally, we note that Soviet illegal catches continued after 1972 despite the presence of international observers on factory fleets.

japonica), may have irreversibly damaged a population's chance of recovery.

In the years following Yablokov's revelation, various papers have provided the details of these illegal catches. Due largely to the efforts of some Soviet biologists who had preserved formerly secret materials from that period, most of the falsified data for the extensive Soviet whaling operations in the Southern Hemisphere have now been replaced with true catch numbers (Yablokov, 1995; Zemsky et al., 1995, 1996; Yablokov et al., 1998; Mikhalev, 2000, 2004; Clapham and Baker, 2002). Attempts have also been made to correct the record for the North Pacific (Yablokov and Zemsky, 2000), but this remains incomplete and large gaps exist for some species.[2]

The general story of Soviet illegal whaling has now been told by a number of authors (Yablokov et al., 1998; Ivashchenko et al., 2007; Berzin, 2008; Clapham and Ivashchenko, 2009). However, with the exception of some information in a posthumously published memoir by the Soviet whale biologist Alfred Berzin (2008), there has been little recounting of the details of Soviet whaling operations, or of the economic context in which this industry operated. Here, we use available published material (primarily in Russian) together with extensive interviews of former Soviet biologists and whalers to describe how the Soviet whaling industry was structured and how it worked, from the largest scale of state industrial planning down to the daily details of the ways in which whales were caught and processed by the factory fleets, and how the crews of these fleets were managed and paid. We also describe the method by which catch data were falsified in reports to the IWC.

Materials and Methods

Our objectives were to understand the primary mechanisms of the Soviet industrial planning system and their application to the whaling industry, and to investigate the details of how whaling was conducted. This required a review of materials that are primarily in Russian, including books and the formerly secret scientific, production, and inspection reports of the whaling industry, as well as information available on various websites devoted to whales or whaling in Russia and Ukraine. We also reviewed Soviet reports to the IWC. However, the majority of information was derived from interviews, as described below.

Interviews

Extensive information about Soviet whaling was gathered from interviews with a number of individuals who had formerly held positions in the Soviet whaling industry. These included scientists as well as former captains or other crew members of whaling vessels and (in one case) an artist who had been assigned to a shore whaling station in the Kuril Islands. The interviews covered a variety of topics ranging from everyday operations and working conditions to submission of catch reports and dealings with the Ministries and administration; they also included personal details of the interviewees' lives and careers. The full interviews will be published separately, but brief biographies of the major interviewees are given below.

Vyacheslav Alexseevich Zemsky, Ph.D., born in 1919, worked as a whale biologist aboard the factory ships *Aleut, Slava,* and *Yuriy Dolgorukiy*, starting in 1946. For many years, Zemsky worked in the VNIRO[3] laboratory in Moscow and in AtlantNIRO (the Kaliningrad branch of VNIRO), studying whales and seals. He was one of the first Soviet scientists to propose that the pygmy blue whale is a separate species (although today it is considered a subspecies, *Balaenoptera musculus brevicauda*). He is one of the leading marine mammal scientists in the former Soviet Union; Zemsky participated in the disclosure of true data for the Soviet catches and was a coauthor of a number of papers on that topic. He now lives in Moscow and was interviewed in April 2008.

Dmitriy Dmitrievich Tormosov, Ph.D., born in 1937, worked as both a biologist and a national whaling inspector aboard the factory ships *Yuriy Dolgorukiy*, *Slava,* and *Sovetskaya Rossia* at various times between 1961 and 1974. Tormosov kept more than 57,000 individual catch records (so-called "whale passports," see below), primarily from the *Yuriy Dolgorukiy* fleet, and these have been used to construct an extensive true catch record for Soviet whaling in the Southern Hemisphere. Tormosov has published or coauthored many papers on Soviet whaling statistics or the biology of whales. He lives in Kaliningrad, Russia, but was interviewed for this study in Odessa in October 2008.

Nikolai Doroshenko, Ph.D., born in 1938, started his work as a marine biologist on board the whaling factory ship *Vladivostok* in 1963 in the North Pacific. In various years until 1975 he participated in scientific studies on the *Dalniy Vostok, Vladivostok,* and *Sovetskaya Rossia*. For many years he worked in the TINRO laboratory (the Pacific branch of VNIRO in Vladivostok). He was on board when Soviet fleets were working in the Gulf of Alaska and in the southeastern Bering Sea, and he later revealed the truth about the Soviet operations in these areas, notably with regard to the fleets' destruction of North Pacific right whales. He retired from his position in TINRO and still lives in Vladivostok. He was interviewed in St. Petersburg in September 2006 and again in Vladivostok in November 2009 and May 2011.

Grigori Georgievich Derviz, born in 1930, is an artist who in 1955 worked as a research assistant on the land whaling station at Paramushir in the Kuril Islands. Although he subsequently became a highly respected artist (and a member of the Russian Academy of Arts), Derviz had a great interest in biology, and spent much of his time at Paramushir making drawings and paintings of whales and the whaling process, and of the men and women who worked there. He was interviewed at his home in Moscow in October 2008 and again in November 2009.

[2]The North Atlantic was the one ocean where the U.S.S.R. did not operate.

[3]VNIRO stands for the Vserosiyskiy Nauchno-issledovatel'skiy Institut Ribnogo khozyaistva i Okeanographii (All-Union Research Institute of Fisheries and Oceanography).

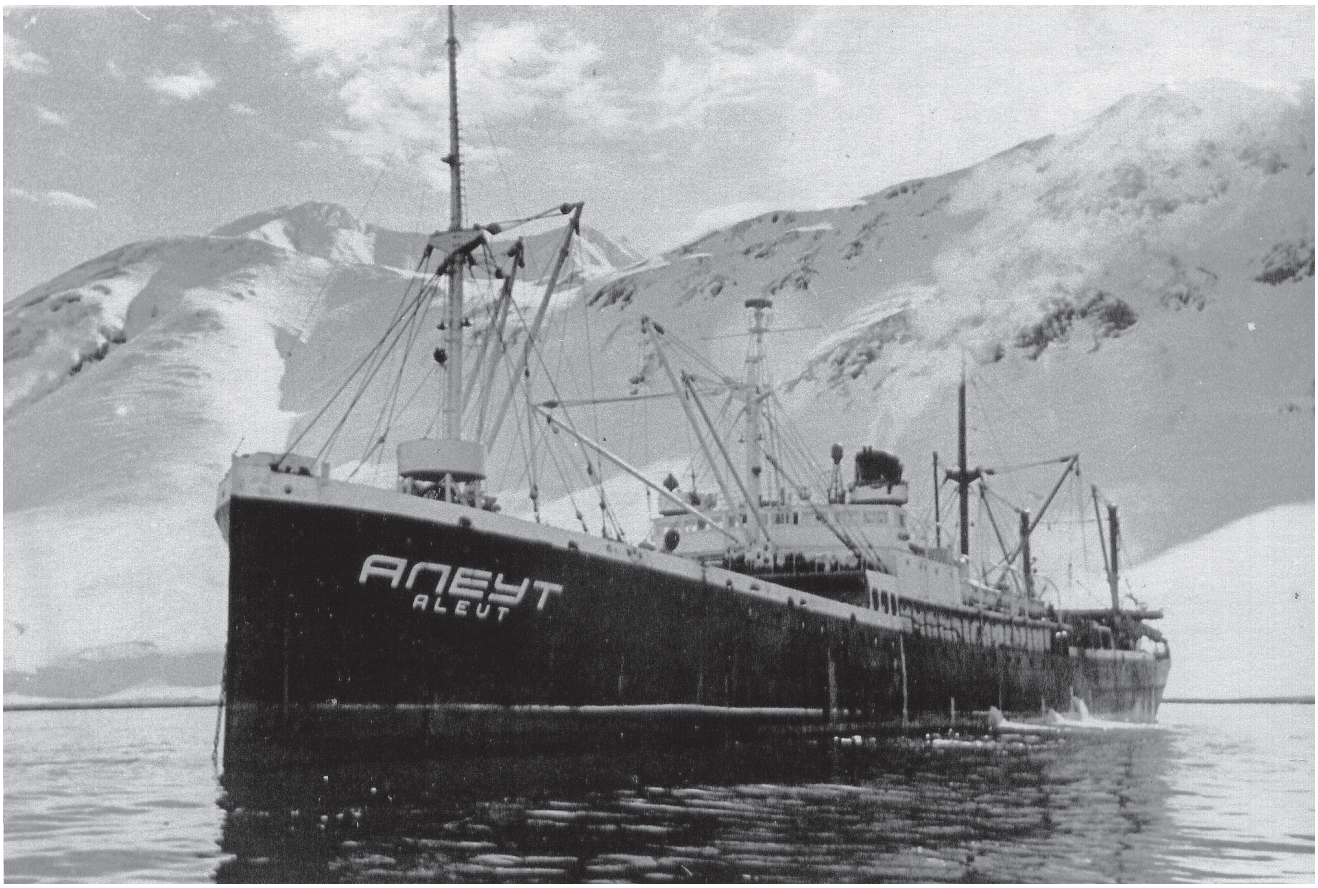


Figure 1.—The first Soviet factory ship, the *Aleut*. Photo: Alfred Berzin.

Other minor details of whaling operations were obtained from interviews with former whalers (primarily in Vladivostok), but these are not listed individually here.[4]

Results and Discussion

Soviet Whaling: Origins and Global Expansion

Commercial whaling by the U.S.S.R. had its origin in 1932 with the conversion of the American cargo vessel *Glen Ridge* into a 5,055 gross ton (GT) whaling factory ship which was renamed *Aleut* (Zenkovich, 1954; Berzin, 2008).[5] The *Aleut* (Fig. 1), together with three steam catcher boats, began whaling operations in 1933, initially hunting the then-abundant baleen and sperm whales, *Physeter macrocephalus*, in the coastal waters of Kamchatka and Chukotka. In 1946, after the end of the Second World War, the U.S.S.R. added a second factory ship and began operations on baleen and sperm whales in the rich whaling grounds of the Antarctic[6]; this was the *Slava*[7], which at 12,639 GT was bigger than the *Aleut* and attended by a larger fleet[8] of between 8 and 15 catchers (Anonymous, 1954; Bulkeley, 2010). Also at this time (from 1948), the Soviet Union began to use five former Japanese land whaling stations along the Kuril Islands, with catchers that were converted World War II American corvettes (Fig. 2).

Additional expansion of the whaling industry did not occur until 1959 when, during three consecutive seasons (1959–61), the Soviets added a new factory ship each year to their Antarctic operations; these included two large, purpose-built sister ships, *Sovetskaya Ukraine* and *Sovetskaya Rossia*, as well as the *Yuri Dolgorukiy*, which was a converted passenger liner. The *Sovetskaya Ukraine* and the *Sovetskaya Rossia*

[4]Note on sources: Facts and information in this paper that are not cited or footnoted are derived by the authors from the interviews with Soviet biologists and others mentioned in the text.

[5]The first modern whaling vessel in (pre-revolutionary) Russia was the *Mikhail* (3,643 GT), purchased in 1903 by Count Heinrich Hugovitch Keyserling together with three steam catchers for his operation in the Russian Far East. The *Mikhail* was seized during the Russo–Japanese War of 1904–05.

[6]Although Soviet whaling in the Antarctic began in 1946, Norwegians were present on board *Slava* for the first two seasons; thus, illegal catches did not begin until the 1948/49 season.

[7]Formerly *Empire Venture* (UK), *Wikinger* (Germany), and *Vikingen* (Norway) (Anonymous, 1954). *Slava* sailed for the Antarctic on 22 December 1946 and began whaling operations in January the following year.

[8]The term "fleet" here refers to the collection of vessels (catchers, scout boats, etc.) working with a specific factory ship (e.g. "the *Slava* fleet").

Figure 2.—A converted American corvette used as a whale catcher at the Kuril Islands shore whaling stations. Painting by Grigori Dervis, 1955.

(32,024 and 33,154 GT, respectively) were the largest whaling factory ships ever built. Finally in 1963, two new large factory ships named the *Vladivostok* and the *Dalniy Vostok* were added to pelagic whaling operations in the North Pacific. Thus, Soviet whaling expanded from its modest coastal beginnings with the *Aleut* in 1933 to a global operation encompassing seven factory fleets and several land stations, across much of the world's oceans. Details of each whaling fleet or land station, including its years and areas of operation, are given in Table 1.

Soviet Industrial Planning: The Target Plan System and Its Application to the Soviet Whaling Industry

Soviet whaling was a government-owned and government-controlled industry.[9] In the beginning, the Ministry of Food and Light Industry was responsible for licensing, enforcement of laws and regulations, prosecutions, and all communication activities related to whaling by the U.S.S.R. (IWC, 1953). Later, a separate Ministry of Fisheries was established and put in charge of the fishing and whaling industries. As with everything in the U.S.S.R., whaling was based upon a system of production targets set by the industrial plans created by the State Planning Committee of the Council of Ministers (Gosplan[10]). These targets defined bonuses (as well as privileges, awards, and other recognition) in the system. The responsibilities of the State Planning Committee were described by Sysoev (1974) as follows:

> "Gosplan is in charge of long-term and current planning on a national scale, and it also controls the progress made in the fulfilment of economic plans, especially with regard to the main indicators, and prepares measures to avoid the emergence of disproportions."[11,12]

Industrial plans set 5-year, 1-year, and monthly production targets. Upon meeting these targets (monthly, and at the end of the season each year), workers would receive a 25% bonus above their regular salary; exceeding the target by 20% would increase the bonus to 60% of the workers' pay. This created an obvious and strong incentive for catching more whales. Furthermore, because of this system (and the fact that fleet workers were provided free food for months at a time), whaling potentially paid among the highest salaries of any industry. As a result, employment was very competitive, and it was difficult to obtain a position in the fleets.

Salary bonuses were calculated based upon monthly production. For example, if workers exceeded the monthly target in January by 20–60% but did not meet the target in February, they would receive their bonus for only 1 month. As

[9]The description given here is of necessity a simplification of what was in reality an immensely complex bureaucratic system with numerous elements and hierarchies.

[10]Gosplan is the acronym for Gosudarstvennoe Planirovanie, which means "State Planning."

[11]"Disproportions" here means excessive production, beyond that which would be required for distribution, or for integration of component parts into a particular industry. For example, the intent could be to avoid making too many wheels for automobile production plants, beyond the number that they could use in their production target of cars. However, it is worth noting that, in whaling, "disproportionate" production occurred regularly, despite the lack of demand for many of the products.

[12]Here and with quotations elsewhere, translations from the original Russian into English were made by the senior author.

Table 1.—List of all whaling fleets and land stations operated by the Soviet Union. The number of catchers in operation varied, and catchers would sometimes move around between different factory fleets.

Fleet/station name	Home port	Years operated	Areas of operation	No. of catchers
Aleut	Vladivostok	1933–1967	North Pacific	3–8
Kuril land stations	Kuril Islands	1948–1964	western North Pacific	12–15
Slava	Odessa	1946–1966	Antarctic	8–23
	Vladivostok	1966–1969	North Pacific	
Sovetskaya Ukraina	Odessa	1959–1975	Antarctic	15–25
Sovetskaya Rossia	Vladivostok	1961–1980	Antarctic	15–25
			North Pacific	
Yuriy Dolgorukiy	Kalinigrad	1960–1975	Antarctic	15–17
Vladivostok	Vladivostok	1963–1978	North Pacific	10–13
Dalniy Vostok	Vladivostok	1963–1979	North Pacific	10–13

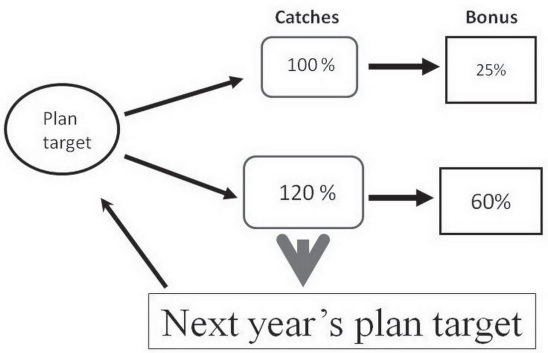


Figure 3.—The Soviet target plan system and bonuses. Bonuses were paid for meeting and exceeding the production target, and the following year's target was then generally set at 100% of the current year's production (although this changed with population declines in later years).

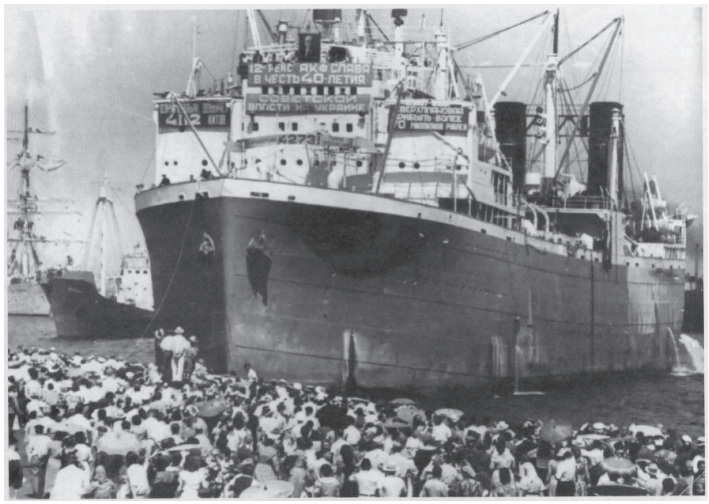


Figure 4.—The Soviet factory ship *Slava* returning to her home port of Odessa at the end of its 12th Antarctic whaling season (1957–58). The banners advertize the success of the fleet in exceeding production plan targets (and note that the season was dedicated to the "40th anniversary of Soviet Ukraine"). Photographer unknown.

a result, whalers would not slow their pace of work even if they had had a very productive time at the beginning of the season. If the overall total for the entire season exceeded target thresholds, an additional bonus was paid.

The system of plan targets worked in different ways. A 5-year target was set at the beginning of the period and would not be changed, but a new 1-year target would be set annually; how this target was calculated varied considerably from year to year. In some instances, the new year's target would be based upon 100% of the previous year's productivity; an example involving the *Sovetskaya Rossia* fleet is given below. In other years, targets were increased but at a lower rate, and without any obvious connection with the whaling results of the previous year. In the Soviet fishing industry, targets were frequently set by taking the actual average Catch Per Unit Effort (CPUE) for the present year and multiplying it by the number of vessels in the fleet (Sysoev, 1974); it is likely that a similar system was sometimes used to calculate whaling targets (with catcher CPUE as the metric), but we cannot be certain.

However targets were calculated, the result was that, in order to receive a bonus (at least in the years prior to depletion of populations), the whalers had to kill more whales than in the previous year to meet the new target. A simplified scheme of targets and bonuses is illustrated in Figure 3. The actual system was considerably more complicated. Multiple targets were set, involving not only the number of whales to be killed, but also gross output, as well as a list of specific products; examples from two factory fleets are given in Table 2. Meeting or exceeding these various targets led to additional bonuses.

We could find only one instance in which a Soviet whaling fleet exceeded the yearly catch or gross output targets by 20% (the *Dalniy Vostok* fleet obtained 121% of their allotted target in the 1967 season), which would have triggered a 60% salary bonus (Fig. 3); however, we examined reports from only the North Pacific together with a few *Sovetskaya Rossia* reports for the Antarctic.

A consequence of this system was that, because the initial 5-year target remained unchanged, whalers could, by exceeding each year's annual target, attain catches that were several times the 5-year target. Such success was routinely reported with great fanfare in the Soviet media, and factory ships themselves would sometimes advertise this on returning to port at the end of a season (Fig. 4). In terms of the exploitation of the resource, however, the result

Table 2.—Example of plan targets and actual results for particular whaling products for two factory fleets (all weights are in tons). Figures are taken from Soviet production reports for the two fleets/seasons concerned.

	Sovetskaya Rossia 1961/62			*Dalniy Vostok* 1964		
Item	Plan target	Actual	% of the plan target	Plan target	Actual	% of the plan target
Total output (raw weight)	128,500	141,938.6	110.4	97,000	112,733.5	116.2
Food blubber	20,430	20,607.9	100.9	11,300	9,164.4	81.1
Medicinal blubber	570	1,146	201.1	850	1,020.4	120
Technical blubber (highest quality)	4,070	5,026	123.5	2,285	7,599.7	332.6
Technical blubber (secondary quality)	280	0	0			
Spermaceti	1,000	522.3	52.2	670	1,742.3	260
Blubber total	26,350	27,302.2	103.6	16,405	19,526.8	119
Food meat frozen	2,000	3,545.1	177.3	900	1,501.8	166.9
Frozen meat for animals	1,900	1,842.2	97	1,950	1,727	88.6
Meat total	3,900	5,387.3	138.1	2,850	3,228.8	113.8
Bone meal	5,100	5,491	107.7	5,130	6,402.9	113.3
Frozen liver	690	808.5	117.2	?	?	
Sperm whale teeth	3	0	0	4.5	1	22.2
Ambergris		0.0186				

of catches that increased every year was that the whaling rapidly became unsustainable.

Catch setting, and use of natural resources generally, was supposed to be based upon scientific assessments and rational management, as explained in an exposition of the socialist economy and its basis (Sysoev, 1974):

> "Science is one of the main features of planning ... Many scientific institutions in the U.S.S.R. participate in the solution of the problems facing the planned development of the socialist economy."

The same publication has a chapter entitled "Measures to safeguard fish stocks," and this discusses the main tasks of the Principal Administration for the Preservation and Reproduction of Fish Stocks, and the regulations (overseen by the Ministry of Fisheries) of fishing and other marine resource exploitation, including whaling. These tasks included:

> "To safeguard fish stocks, work out and implement measures to reproduce and regulate fisheries in the water bodies of the U.S.S.R.... To draw up proposals for limits on catches of valuable commercial fishes [and] marine animals ... coordinating them with the relevant main administrations of the Ministry of Fisheries of the U.S.S.R., research institutes and organizations of the fishing industry, and submitting them for approval."

Despite this, in reality exploitation of marine resources was based almost entirely upon economics or the ambitions of officials. The opinions of scientists (who were required to analyze whale population dynamics and recommend sustainable catch levels) were routinely and usually completely ignored.

For example, the Ministry of Fisheries gave a target for gross output for the 1961–62 season of *Sovetskaya Rossia* as 128,500 tons; actual results for that season were 141,938.6 tons (exceeding the target by 10.4%). The following season the target for gross-output was set as 138,150 tons, with an actual production of 153,985.4 tons (exceeding the new target by11.5%). In both seasons the target was exceeded because of whaling success in the North Pacific; as a result, the *Sovetskaya Rossia*'s production target for this area was doubled, from 12,320 tons in 1962 to 24,150 tons in 1963.

Routine inflation of targets was exacerbated by other factors. For example, in years in which certain important national events were celebrated (which was frequently: e.g. the anniversary of the October revolution, the 130-year anniversary of Bellingshausen's trip to Antarctica[13], etc.), whalers would usually make a counter-proposal to increase their allotted targets by some amount of product. Alexei Solyanik (1952), the infamous and most successful whaling fleet commander of all (Sakhnin, 1965; Berzin, 2008), wrote in his description of *Slava's* first five seasons in the Antarctic:

> "Soviet whalers named the fifth Antarctic season after Stalin. In their letter to Comrade Stalin, the crew of the fleet committed themselves to exceeding the target plan for whale oil by 30 thousand poods[14]."

In contrast, failure to meet targets was punished. In addition to potentially not receiving a bonus, under-performing captains or other officers could be demoted, and workers rated poorly would not be rehired the following season. Furthermore, the teams or individuals deemed responsible for compromising production were sometimes named in reports. Here is a quotation from the production report of the whaling fleet *Vladivostok* for the 1965 season (Anonymous, 1965a), commenting on the poor output of two catcher boats:

> "The failure to meet the monthly target [for May] by the catcher *Vliyatel'niy* was related to poor coordination between Captain V. I. Klepikov and the harpooner G. N. Stasenko, and also neglecting of teamwork. The failure to meet the target on the part of *Robkiy* can be explained solely by the neglect and passiveness of the crew."

Likewise, the production report of the whaling fleet *Dalniy Vostok* for the 1965 season (Anonymous, 1965b) berates the harpooners of two catchers, but also points to a more systemic problem:

> "The catchers *Velichaviy* and *Vazniy* did not meet their monthly target. Both vessels had a deficit mainly because of poor work by the harpooners ... During June the catches often exceeded the processing ability of the factory ship and this led to catchers losing time waiting for carcass delivery, and a long holding time for the whale carcasses before processing. Because of the reasons described above, less than half of the whale products were able to be frozen and that resulted in the monthly target of frozen products not being met."

In fact, such wastage was a common problem in Soviet whaling. One specific and rather confusing parameter of the plan targets was that productivity was calculated in gross output and not in final (net) products. The reason for this lay within the Ministry's reporting system; the whaling industry was placed together with the fisheries industry and their annual reports were reviewed together using the same system of evaluation. The problem was that gross output in fisheries (measured as the weight of whole fish) is similar or almost equal to the final net product output (the weight of processed fish). This is not the case for whaling, where much or most of the

[13]Fabian Gottlieb Benjamin von Bellingshausen (1778–1852) was a Russian naval officer who, during an expedition to circumnavigate the globe in 1820, reportedly made the first sighting of the Antarctic continent. See Bulkeley (2010) for an interesting discussion of how this was later used to bolster Soviet territorial claims in the Antarctic, with ties to the first Antarctic expedition of the *Slava* whaling fleet.

[14]A pood is an old Russian measure of weight equal to 16.8 kg or 37 lb. Accordingly, the increase involved here would be by 504,000 kg or 504 t.

huge bulk of each whale was discarded. Yet this system allowed whalers to record catches (and therefore production) as the total calculated weight of all whales caught, rather than the amount of product produced.[15]

In reality, the actual amount of products that were processed was a secondary goal. The net production depended upon the condition of the whale (from fresh to rotten) when it was brought back to the factory ship. Capture of large whales (such as blue whales, *Balaenoptera musculus*, and fin whales, *B. physalus*) would yield very large production numbers, even if the amount of products actually processed from them might be low. Further details of processing and the use of different parts of whales are described below.

Target plans for each fleet were set individually. In addition, there was a competition between the fleets for the largest catch during each season. All these factors drove Soviet whalers to kill more and more whales, notably as they gained more experience, and as new and larger factory ships were introduced. Indeed, to have "the largest in the world" for everything was a major characteristic of Soviet political mentality, and this was manifest in the whaling industry in the building of the huge *Sovetskaya Ukraina* and *S. Rossia*. This was originally meant to demonstrate the superiority of communism over capitalism with the ability of "free" people to attain great results; in reality it resulted in factories, farms, ships, institutes, and other entities that were designed and built with the primary goal of being the largest in the world, with efficiency and sustainability often being, at best, a secondary afterthought.

In summary, the Soviet planning system—and calculation of production targets—was in theory based upon principles of sustainable use and scientific recommendations or assessment of resources, and this represented one of many prominent claims by the U.S.S.R. in the political war against capitalism. In reality it devolved into an unregulated system which, for many industries, consumed natural resources with considerable waste (Ericson, 1991; Berzin, 2008). This was exacerbated by the fact that its output was not based upon genuine economic needs or national demand, nor was it constrained by the need to show profits.

Figure 5.—A catcher from the *Slava* fleet. Photographer unknown.

Structure of the Soviet Whaling Fleets

The *Aleut* was the first Soviet whaling factory ship, and was a relatively small operation. However, beginning with the *Slava* in 1946, Soviet factory ships became larger, with larger fleets of faster and more powerful catcher vessels (Fig. 5). This capital expansion required more workers, larger plan targets, and more whales. The selection of workers was very rigorous, and most positions were very competitive. There were requirements of good health and experience; in addition, other characteristics were important, such as being a communist or politically active, married with a family, and having no criminal or any other compromising records. At the same time, Soviet industry (including whaling) was quite progressive in that it employed significant numbers of women (see below).

While at a minimum the factory fleets required enough people to perform the main job (killing and processing enough whales to meet and exceed plan targets), each Soviet factory ship was in effect a small country away from the homeland. Each fleet had many subdivisions to support various aspects of the industry, and this resulted in an overall crew complement that was large. The two largest factory ships, the *Sovetskaya Ukraina* and the *Sovetskaya Rossia,* each had about 560 people on board, not including the crews of the catchers (some 25–31 seamen for each), making in total more than a thousand people in each fleet.

Among the divisions of the fleet were the whaling departments themselves, which included the processing teams and blubber boiling factory staff, as well as workers responsible for storage. Then there was the chemistry lab, and operation of the galley and laundry. In addi-

[15]Since whales were usually too large to weigh, this figure was based upon a standard table of length and weight for different species by months. This table was available on each factory ship, and it was based upon calculations by Kleinenberg and Makarov (1955) using data from the early years of operation of the *Aleut*.

Figure 6.—The newspaper *Kaliningradskiy Kitoboy* ("Kaliningrad Whaler") that was printed on board the factory ship *Yuriy Dolgorukiy*. Photographer unknown.

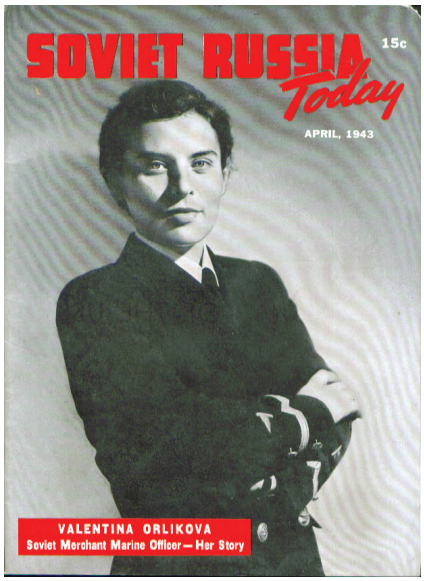


Figure 7.—Valentina Orlikova, who became the only known female captain of a whale catcher. The photograph is from a magazine cover in 1943; she commanded a catcher from 1947 to 1953.

tion, each fleet had a newspaper printed on board (Fig. 6)[16], a school, a library, a cinema and an accountants office, as well as a large command group.

A notable feature of Soviet whaling fleets was the presence on board of a relatively large number of women. They served not only as cooks and laundry workers, but also as scientists, radio operators and, in one case, even the captain of a catcher. This latter individual was Valentina Yakovlevna Orlikova, who commanded the catcher *Storm* during 1947–53; in 1943 Orlikova was prominently featured in Soviet propaganda for her previous posting as an officer in the merchant marine (Fig. 7).[17]

Scientists were present on all but one of the factory ships: the *Aleut* did not have a scientific group for a number of years because of a shortage of trained whale biologists in the Vladivostok laboratory, which was supplying scientists to three other whaling fleets from the same home port. The Kuril land whaling stations had scientists from the Moscow institutes only periodically.

Overall the position of scientists on board was widely viewed by other crew members as useless with regard to the end result of production, and science was tolerated largely because, in the words of biologist Dmitriy Tormosov, "Everyone else had science, so we should too" (personal commun., October, 2008).

The command system on Soviet whaling fleets was quite complicated. Each fleet was led by a group of five people. The overall command of the fleet lay with the Captain-Director. Next in rank was a Commissar (political officer), followed by a First Vice-Captain (or Relief Captain) who was responsible for directing and overseeing whale catches. There was also a Vice-Captain in charge of whale processing and production, and a Chief Engineer. Each factory ship had an additional special post termed the "Engineer of Whaling." This man was responsible for plotting the daily positions of the catchers and whale catches on a map, and organizing the collection of whale carcasses to be brought back to the factory ship for processing. At the end of the whaling season, the Engineer of Whaling was primarily responsible for falsifying catch data (see below).

A national whaling inspector was present on each factory ship to (in

[16]On the *Aleut* the newspaper was called *Harpoon*, on the *Slava* the *Soviet Whaler*, and on the *Yuri Dolgorukiy* the *Kaliningrad Whaler*.

[17]http://letopisi.ru/index.php/Валентина_Яковлевна.

theory) oversee the enforcement of whaling laws and regulations (e.g. the prohibitions on taking undersized whales, lactating females, or protected species); this was required under the International Convention for the Regulation of Whaling 1946, to which the U.S.S.R. was a signatory. The inspection system is discussed further below.

Salaries

The salary system in the fisheries industry of the Soviet Union was quite complex. In a textbook for universities, Sysoev (1974) described details of the system, which was developed in the 1950's to:

> "differentiate and regulate the level of wages of different groups and categories of workers, depending on the quality of their labor, working conditions, and skills, as well as on the specific features and importance of the various industrial branches and enterprises, and on their disposition."

In the whaling industry, each person earned a basic salary based upon his or her qualifications and position. However, this salary could be increased, notably through a system of regional wage coefficients; these multiplied the salary by a coefficient depending on where the fleet was working, the underlying logic being that work was harder in some areas than others. For the Antarctic below latitude (lat.) 40°S the coefficient was 2.0. For North Pacific regions it varied from 1.6 to 2.0: for north of the Bering Strait, as well as the Kuril and Commander Islands the coefficient was 2.0, while it was 1.8 for Kamchatka and northern Sakhalin, and 1.6 for southern Sakhalin (Sysoev, 1974). The catchers associated with a whaling fleet regularly operated at a considerable distance from the factory ship, sometimes 200 nmi or more away; in some cases, this could actually put them in a different wage zone for a day (e.g. if they ventured north of lat. 40°S). As a result, for the purpose of paying salaries, the daily position of the factory ship was used for the entire fleet. Once the factory ship was below lat. 40°S, this would result in an increase in everyone's salary, regardless of where they might otherwise be. The higher coefficient, as well as the potential for production bonuses, was the reason most of the seamen wanted to go quickly to the Antarctic without any delay in areas north of lat. 40°S.

Additional bonuses were based on monthly individual/team production and depended on the number of whales caught, the amount of oil produced, the number of whales processed, etc. The basic bonuses for meeting or exceeding the plan target applied to everyone in the fleet, but certain other bonuses related to specific elements of production were not given to scientists, or to other workers not involved in the actual catching and processing of whales. Whaling inspectors, however, would receive all types of bonuses. Salaries were calculated and reported to whalers weekly or monthly, and were paid every month to the families at home (Kotlyar, 1952).

The Whaling Process

A detailed description of the process of Soviet whaling and the research conducted on whales can be found in a number of Soviet publications, primarily from the early period of the industry (Arsen'ev and Zemskiy, 1951; Kotlyar, 1952; Zenkovich, 1954; Sleptsov, 1955; Solyanik, 1956). Not surprisingly, these descriptions omit all mention of the illegal aspects of the whaling. Instead, one finds many stories about the heroic hard work and dedication of many people working together to meet a target plan and to help the homeland with critically important products from the whales that they killed; this aspect of whaling was publicized widely both inside and outside the Soviet Union. Below, we describe the details of the whaling itself.

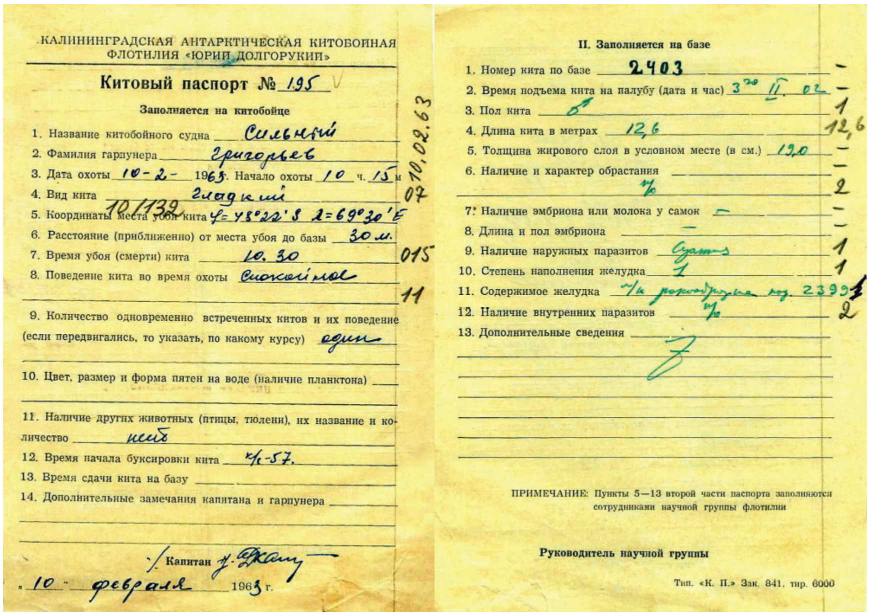
Killing and Towing Whales

Once in the whaling area, catchers would often form a front spreading out in a line with a distance between two catchers of about 8–10 nmi; this was based on the assumption that one catcher could see whales within a radius of about 10 nmi. Once this front was formed, the catchers would begin to search. They would be in radio contact with the factory ship and usually with each other, keeping the fleet captain fully aware of catcher actions and results. This way each fleet would cover a large area in a very efficient way.[18] When whales were found, catchers would begin the hunt, with multiple vessels sometimes converging on an area where whales were concentrated.

For each catch, the catcher crew (or scientist if one was aboard) filled out the front side of a special document called a "whale passport" (Fig. 8). This logged the number of the passport, the date, catcher's name, harpooner's name, time the hunt (chase) began, whale species, position and time of the kill, approximate distance to the factory ship, behavior of the whale during the hunt, number of whales seen in the beginning and if possible the direction of their movements, the presence of plankton patches (shape, size, and color), presence of other animals (species and number of birds, seals), beginning time that the whale was under tow, time of delivery to the factory ship, and any additional comments from the captain or harpooner. Not all of the details were filled out every time, but a suite of essential data was required.

Killed whales were either put "on flag" for later pick-up (a pole with a flag was inserted into the carcass, which had been inflated with compressed air to prevent it from sinking; Fig. 9), or were immediately towed by the catcher. Whenever a whale was put "on flag" its position and some other details of wind and current direction would be reported to the factory ship to enable its subsequent recovery by either a "tag boat" or by one of the catchers themselves at the end of the day. One or two of the catchers would usually help the tag boat to collect killed whales. Very few flagged whales were lost, since this would result in a loss of productivity.

[18]An example is given by Mikhalev (1997): in early November 1966, the *Sovetskaya Ukraina* fleet entered the Arabian Sea from the Gulf of Aden, then proceeded north along the coast of Oman and across to the coasts of Pakistan and northwestern India. Their catchers swept the area and killed 238 humpback whales in 10 days.



КАЛИНИНГРАДСКАЯ АНТАРКТИЧЕСКАЯ КИТОБОЙНАЯ ФЛОТИЛИЯ «ЮРИЙ ДОЛГОРУКИЙ»

Китовый паспорт № 195

Заполняется на китобойце

1. Название китобойного судна Сильный
2. Фамилия гарпунера Григорьев
3. Дата охоты 10-2-1963 г. Начало охоты 10 ч. 15 м 10,02,63
4. Вид кита гладкий 07
5. Координаты места убоя кита φ=48°22'S λ=69°30'E 10/132
6. Расстояние (приближенно) от места убоя до базы 30 м.
7. Время убоя (смерти) кита 10.30 015
8. Поведение кита во время охоты спокойное 11
9. Количество одновременно встреченных китов и их поведение (если передвигались, то указать, по какому курсу) один
10. Цвет, размер и форма пятен на воде (наличие планктона)
11. Наличие других животных (птицы, тюлени), их название и количество нет
12. Время начала буксировки кита
13. Время сдачи кита на базу
14. Дополнительные замечания капитана и гарпунера

Капитан

10 февраля 1963 г.

II. Заполняется на базе

1. Номер кита по базе 2403
2. Время подъема кита на палубу (дата и час)
3. Пол кита ♂ 1
4. Длина кита в метрах 12,6 12,6
5. Толщина жирового слоя в условном месте (в см.) 19,0
6. Наличие и характер обрастания 2
7. Наличие эмбриона или молока у самок
8. Длина и пол эмбриона
9. Наличие наружных паразитов 1
10. Степень наполнения желудка 1 1
11. Содержимое желудка
12. Наличие внутренних паразитов 2
13. Дополнительные сведения

ПРИМЕЧАНИЕ: Пункты 5—13 второй части паспорта заполняются сотрудниками научной группы флотилии

Руководитель научной группы

Тип. «К. П.» Зак. 841, тир. 6000

Figure 8.—Whale passport (front and back), the document filled out on the factory ship's processing deck; the form recorded catch and biological information on each killed whale. This passport is for a 12.6 m male southern right whale (*Eubalaena australis*) killed in the Kerguelen islands region on 10 February 1963. Photo: Dimitriy Tormosov.

Figure 9.—Whales "on flag." The carcasses have been marked for later pickup and towing to the factory ship. Photo: Nikolai Doroshenko.

Much of the time, catchers would commonly be spread over a large area and could range as far as 200 nmi from the factory ship (or even more in extreme cases). A "front" of 20 catchers could be spread out over 200 nmi, especially in areas where there was no prior information on whale distribution. However, towing a whale back to the factory ship from a long distance resulted in many whales arriving already rotten, and thus unsuitable for processing. When catchers could not find many whales near the factory ship, one of the catchers would be sent searching for other aggregations of whales, ranging up to 600 nmi away (Kotlyar, 1952).

Competition between catchers and fleets, as well as the need to fulfill monthly targets, forced catchers to continue hunting, even in bad weather. After the first few years of Soviet whaling, catchers reportedly could be found hunting whales in poor weather conditions, thus maintaining high catches when foreign fleets might return with unfulfilled quotas (Kotlyar, 1952). The same incentive inevitably resulted in Soviet catchers being encouraged to take whale species that were illegal to hunt (such as southern and North Pacific right whales, as well as gray, *Eschrichtius robustus;* bowhead, *Balaena mysticetus;* and, later, blue and humpback whales) and later also to hunt other baleen and sperm whales outside permitted seasons, areas, or quotas (see also the Appendix).

Processing

The butchering (flensing) process was very organized and efficient, and sometimes a staggering number of whales were processed in a 24-h period. The processing deck of each factory ship (Fig. 10) was divided into two parts. The rear processing deck was dedicated to stripping a whale of its blubber and removing the lower jaw and tongue. After being hauled up the stern slipway of the factory ship (Fig. 11), a whale would first be placed on the rear deck and the blubber rapidly removed (typically in 10–12 min, Kotlyar, 1952). While the carcass underwent this initial processing, the second side of the whale "passport" was filled in, mainly by scientists, who recorded the number of the whale (assigned in order from the beginning of the whaling season), the date and time the whale was hauled onto the processing deck, sex, length, blubber thickness, presence of a fetus and/or milk (for mature females), length and sex of a fetus, internal and external parasites, fullness and contents of the stomach, and any additional information of note.

At the same time, the whale was recorded in a journal (a registry of catches) with similar but less detailed information; typically, this was done by a seaman on the processing deck.

After initial processing, the whale was moved to the central part of the processing deck. There, a separate flensing team separated the head, cut off the meat, removed bones and internal organs, and put all useful parts of the animal into boilers or into a line for processing bone-meal.

The whole process of butchering a whale would take about 30 min from beginning to end. One of the major drivers of such efficiency was the "socialistic competition" which was found

Figure 10.—The processing deck of the factory ship *Slava*. Photo: I. P. Golovlev.

everywhere in the Soviet Union, and in particular in the whaling industry.

Beginning from the second season of the *Slava,* the fleet created two flensing teams, operating in shifts of 12 h each. These teams competed constantly with each other. At the end of a month or season one team would be announced as the winner of the socialistic competition and would receive a reward (typically a monetary bonus as well as honor). The result of this competition was a constant increase in efficiency during the early years: during the second season on the *Slava* each team typically processed 8 to 12 whales per 12-h shift, but by fifth season the two shifts could process up to 48 whales in 24 h (Kotlyar, 1952).

This is how P.A. Kotov (Kotlyar, 1952) described a notable day of competition between flensing teams:

"On the 8th of March, International Women's Day, catchers were reporting very large catches. 45 whales, 50 whales, finally 71 whales—the victorious results of the day. By 18:00 there were 25 carcasses already floating behind the factory ship and all four tag boats were in line to deliver more whales …

"Long before the beginning of work, all 53 flensers came together on the sides of the ship to observe this ever-increasing number of carcasses, and became eager to begin work, and to get the top ranking [in their socialistic competition with the other shift]. Every 10–15 minutes a whale is smoothly lifted through the stern slip … It is 6:00 am and the bleak fall sun shows above the horizon, and the shifts are changing. The victorious results are announced: 25½ whale carcasses were processed [by the first shift]. This established a new record for *Slava* during all her years of work in the Antarctic …

"At the beginning of the second shift there are still 20 whales by the stern slipway of the factory ship. This is a chance for the other team to take the lead. The second shift is working with high intensity, like a well-regulated mechanism but … one of the tag boats delayed their carcass delivery by 20 minutes and so by the end of the shift at 18:00 there are 24½ processed carcasses …. It will soon will be the end of the whaling season and the first shift will become the winner of the competition …"

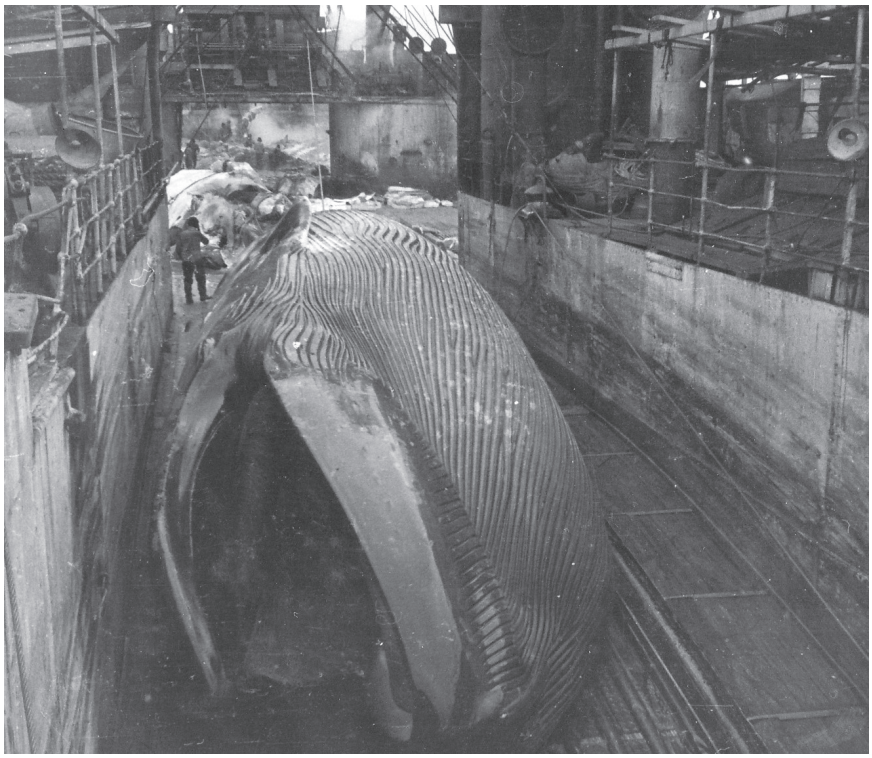


Figure 11.—A blue whale on the stern slipway of the factory ship *Slava*. Photo: I. P. Golovlev.

The processing capacity of a factory ship greatly depended upon the species of whale concerned. In a single day on the huge *Sovetskaya Ukraina,* the flensing teams could process up to 200 small sperm whales, 100 humpback whales, or 30–35 pygmy blue whales.[19]

After a whale was dismantled on the flensing deck, the next part of the process involved the blubber-boiling factory, which had its own competitions. Here, problems arose: when large numbers of whales were killed, the flensing teams could not process all of them before they turned rotten, or whales were sometimes delivered in an already-rotten state due to extended towing. These whales were lifted on deck, and measured and recorded (and thus were included in gross production results). However, while the blubber was still often stripped and processed, the rest of the whale was thrown overboard unused. Sometimes carcasses were in such poor condition that after measuring they were thrown overboard completely intact, without even the blubber taken from them. In some periods, only the blubber was taken from even fresh whales, because the storage space for bone-meal was already full, or if there were too many carcasses awaiting processing. In such cases, even large blue whales were stripped of blubber and thrown overboard. The processes, machinery, and other technical equipment used by the Soviet whaling industry are described in great detail for factory ships, catchers, and cargo ships by Bodrov and Grigoriev (1963).

[19]Some of the Soviet catch data were questioned by Japanese scientists on the basis that so many whales could not be processed in the time available (IWC, 2006, p. 151–152). However, it should be noted that the Japanese factory ships processed whale carcasses far more thoroughly and for many more products than did the Soviets who, in some years or periods, took only blubber. At times of especially high catches such as in the 1959–60 and 1960–61 Antarctic whaling seasons, more than 100 humpback whales could potentially be processed in a day if just the blubber was stripped.

Whale Products

For many years, from 1933 until at least the end of 1952, the main whaling product was whale oil. All whale meat was either boiled to extract the oil or processed into fertilizer, with some amount reserved for canning. Only later did Soviet whaling begin to utilize baleen whale meat (frozen or canned) for human consumption.[20]

All bones were loaded into boilers to extract the oil or were processed as bone-meal. A number of different products were made from whales depending on the species and condition of the carcass. Baleen whales that were processed fresh were used for human consumption as frozen and canned meat, and oil used to make margarine. Sperm whales were processed into industrial oil and bone-meal. In addition, medicinal products were sometimes derived for use in the medical industry and in hospitals. Whale liver was processed separately (it was typically salted and stored) to extract vitamin A later. Some effort was made to develop methods to extract hormones from the pancreas and other organs, but this was never accomplished on an industrial scale.

Baleen whale products were destined largely for human consumption, while the products taken from sperm whales were primarily consigned for industrial use or animal food. As a result, after sperm whales were processed, the regulations required all processing lines of the blubber-boiling factory to be cleaned before any baleen whales were processed. In later years, especially in the North Pacific, when the number of baleen whales caught represented a small proportion of the total catch (relative to sperm whales, the primary target) these occasional mysticetes would be processed together with sperm whales for bone-meal and industrial oil.

Whale oil and other products (except for meat, which was kept in freezers) were stored in tanks; these huge reservoirs each had a capacity of 500–600

[20]Bodrov and Grigoriev (1963) list different kinds of canned whale meat and also give recipes for sausage ingredients as well as ways to cook whale meat and liver.

GT. These tanks contained, at different times, fuel, diesel, whale oil, bone-meal, water, or salted liver. They were thoroughly washed before each change of contents. Periodically, a supply tanker would arrive and all whale products were transhipped, thus freeing up space for new whale products.

Whaling Fleet Mechanical Equipment

Overall, the Soviet whaling fleets represented a large capital investment. Beginning with the *Slava* after World War II, each factory fleet had modern equipment designed for catching and processing whales, and this machinery was constantly modernized and improved to make all aspects of the whaling process more efficient (Bodrov and Grigoriev, 1963). As a state-owned industry that was free from the pressure to generate profits, the Soviet whaling industry could afford large capital outlays; however, it became more difficult to justify such expenses after catches dropped significantly in the early 1970's, and stricter controls, reduced catch quotas, and greater inspection requirements were finally established by the IWC.

Reporting

There was considerable bureaucracy involved with Soviet state industries, and whaling was no exception. The whaling fleets were required to produce many summary reports at the end of each season; these included a scientific report, various production reports, statistical reports, financial reports, reports on technological methods and innovations, whaling inspection reports, injury and safety reports, and reports on activities related to the work of the Communist Party.

Catch numbers given in the various reports for a single season of one whaling fleet sometimes differ significantly. A good example concerns reports for the *Vladivostok* fleet in 1968, which illegally killed 127 bowhead whales in the Okhotsk Sea. The scientific report and whaling inspector's report give the same numbers, including the 133 bowheads together with 182 fin whales and 37 sei whales; by contrast, the production report does not mention bowheads at all, and instead gives 260 fin whales and 106 sei whales. It is not clear why the production reports sometimes include clearly falsified data; this was apparently an attempt to cover up illegal catches, but this is odd given that production reports (like everything else) were classified as secret. In other cases (for example, the material we have examined for the *Sovetskaya Rossia* fleet), catch numbers in all of the reports agree.

Transit and Foreign Ports

Soviet whaling cruises averaged 7–8 mo. The fleets working in the Antarctic typically left their home ports in September or the beginning of October, and returned in May. While in transit to the Antarctic, a fleet would sometimes stop to whale illegally in the tropics. Examples include the *Sovetskaya Ukraina* and the *Slava*, which left from Odessa on the Black Sea and pursued a route through the Mediterranean and the Suez Canal and on into the Red Sea; both fleets hunted humpbacks and other whales in the Arabian Sea in 1965–66 (Mikhalev, 1997) before continuing south to the Antarctic. During transit, everyone earned only their basic salary, even if they were actually whaling; the salary coefficients noted above applied only from the official start (as set by IWC regulations) of the whaling season in the Antarctic.

When a fleet entered a foreign port, crew members were given shore leave. However, they were divided into groups of three or four, with the requirement that one of the members must be a Communist Party member or an officer, who was responsible for ensuring that the crew members behaved appropriately and did not attempt to defect. The overall intent during such port visits was to portray Soviet people as orderly, happy, friendly citizens of a great country. Bad behavior on shore was severely punished. In extreme cases, the much-coveted seaman's passport—the document that allowed men and women to go to sea—would be taken away; without this, one could not work on a ship, or earn the (relatively) lucrative seaman's salary. On the return voyage at the end of the whaling season, the crew would be instructed on how to respond if anyone should ask how many whale catches had been made.

Science

Scientists were a regular part of the whaling fleet crew from the inception of Soviet whaling. Beginning with the *Aleut*'s operations in the Far East, the scientific research goal was to discover whaling areas that could support high catches. In addition, scientists were employed to conduct research on the whales, their prey, and their environment to better predict whale distribution and thus improve the efficiency and results of the whaling endeavor. As noted earlier, whale biologists were working on each factory ship, with a few exceptions. There were also usually one or two oceanographers on board, and catcher captains also collected data on weather and oceanography whenever possible. Technicians working in the factory ship's chemistry lab were charged with storing products derived from the processing of whales, and analyzing their quality (e.g. the pH of whale oil and the quality of this oil and of bone-meal).

In the daily regime, two whale biologists would alternate working in 12-h shifts alongside the flensing teams. In addition to the primary information recorded in the whaling journal on the processing deck, they would collect detailed biological data, to be analyzed in studies of population abundance, structure, and dynamics. Alone, or with an assistant, they would take measurements of different parts of the whale's body, cut out ear plugs (for age determination), measure and preserve embryos, ovaries, and testes, and collect tissue samples from other organs, as well as parasites and stomach contents. All this information was initially recorded in a small field notebook, and at the end of the shift the scientist would copy it into a scientific (whaling) journal and ensure that all samples taken were clearly recorded.

Based on scientific journals and the whale passports (which were transferred at the end of the season to the research institutes concerned), scientists began to analyze the data on the return voyage

from the whaling grounds and prepared a scientific report of the voyage; two or three copies of this were archived with the home institute and with the Fisheries Ministry. According to the rules, whale passports were kept only for a few months, until data analyses were complete and reports were prepared; after this, they were destroyed (usually by burning). As a result of this requirement, all of the original detailed information was largely lost. The major exception was the retention of more than 57,000 passports from the *Yuriy Dolgorukiy* factory fleet, representing a complete record of 15 years of whaling. These were secretly preserved by the biologist Dmitry Tormosov, who regarded the destruction of this material as an unacceptable waste of original data.

The system of target setting was not without its critics. As noted above, the recommendations of scientists with regard to the (lack of) sustainability of high catch levels were routinely ignored when setting production targets, and one can read the frustrations of some scientists in some of the annual reports that they were required to produce. Klumov, in his formerly secret preliminary report of the 1956 whaling season (Klumov, 1956; Ivashchenko et al., 2007) says:

> "I think that the whaling plan established for 1957 with a target of 47,000 tons of raw products is overestimated and does not reflect the real condition of whale populations in the area around the Kuril Islands. The assumption that in 1957 the whaling fleet could take 2,000 whales is unrealistic for the industry working with whaling products, and will force whaling ships to take whales that are not of full value in terms of the business.[21] Statistics for the previous years of whaling around the Kurils show that the number of full-value sperm whales taken never reached 1,000 (not including 1952 and possibly 1956, for which we do not yet have complete data), but instead ranged from 780 to 950 whales per year. In other words, all other important details of our work are ignored. Evidently we have too great an abundance of natural resources, so we can waste them and manage them so poorly."

Another example comes from the combined report of the scientific groups from the fleets *Dalniy Vostok* and *Vladivostok* for 1967 (Latishev et al., 1967):

> "At the current time, whaling in the northern waters of the Pacific Ocean is going through a very difficult time. The resources declined so dramatically in the last three years that the industry already now has to cut back the production plan targets for catches.
>
> "Mainly this situation relates to the catches of the most preferable baleen whales. Despite some increase in the amount of catches of baleen whales during the last [1967] season (8.7% of the total catch in 1967 vs. 6.3% in 1966), this happened only because of large catches of right and gray whales. In future seasons the percentage of baleen whales in the catch would not exceed 5% (in number of animals) of the total no matter what the effort.
>
> "In particular, populations of blue and humpback whales are greatly reduced, even though these whales were so numerous in the recent past. The whaling value of a number of large areas has been completely lost: the Gulf of Alaska, the Bering Sea and the waters around the Aleutian islands.
>
> "From 1964, the whaling focused its efforts completely on the sperm whales that inhabit the Central and Western regions and around the Kuril Islands. In these areas sperm whale groups consist primarily (sometimes up to 95%) of females, the reproductive part of the population that defines its abundance. Annually our whaling fleets kill more than 10,000–12,000 of these kind of sperm whales, while the size of the majority of them is below that allowed for whaling. In the 1967 season the number of undersized whales caught by the *Dalniy Vostok* and *Vladivostok* fleets made up 72% and 86% of their total catch, respectively. If one adds to that amount the number of illegal baleen whales (right, gray, blue and humpback whales), and also small-sized sei and fin whales, the picture of modern whaling appears in a very bad light.
>
> "This is only from the point of view of international law. What about biological conclusions regarding the condition of exploited populations?
>
> "Analysis of biological data by scientific groups for a number of years proves the poor condition of extremely depleted populations of some species (right, blue, humpback) and predicts a similar future for others (fin, sei and sperm whales)."

Such warnings notwithstanding, Soviet whaling continued apace, often until populations were commercially exhausted.

Inspections and Falsification of Catch Data

As noted above, each whaling fleet was required by the IWC to carry a national inspector whose job it was to enforce international regulations. Within the Soviet whaling industry, the absurdity of this inspection system lay in the way in which it was structured. The inspector was appointed by the ministry in charge of whaling (initially the Ministry of Food and Light Industry of the U.S.S.R. and later by the Fisheries Ministry); as a result, even if he was not under the direct command of the fleet captain, the whaling inspector was nonetheless employed by the same agency which paid his salary, as well as those of all the whalers.

Certainly, captains could create problems for any principled inspector, who in doing his job properly would be at odds with the crew's continual desire for bonuses; needless to say, it would not

[21] In other words, undersized whales below the legal limit established by the IWC.

be easy for an inspector to spend several months confined to a factory ship in such a potentially hostile atmosphere (indeed, this is often a fundamental weakness of all observer programs for whaling, fisheries, or any similar industry). However, it is not clear whether inspectors ever truly attempted to follow the IWC regulations, or whether they existed solely so that the U.S.S.R. could claim to have fulfilled this requirement, with no intention of true compliance.

There are examples of reports submitted by national inspectors at the end of a whaling season where inspectors apparently attempted to stop illegal whaling. For example, an inspector's report from 1968 noted that the *Vladivostok* fleet was hunting bowhead whales (a protected species) in the Okhotsk Sea in September; the report notes that the inspector cabled the ministry in Moscow to inform them of this infraction, and requested that the captain leave the area. There was no immediate response from the ministry, and the captain continued the whaling for another two weeks until the ministry finally ordered him to desist. The same report lists various other infractions, as well as the fines levied by the ministry on captains and harpooners. However, the fines concerned were relatively small: 869 whales were reported as infractions (either undersized, protected species, or lactating individuals), but only 91 fines were levied. These involved 21 individuals for a total of 1,540 roubles (approximately $3,700 at 1968 exchange rates, or an average of $176 per person).[22]

The whaling inspector together with the Engineer of Whaling was responsible for writing reports on the season's results, which were then sent to the ministry in Moscow. The need for large catches to meet plan targets, and to provide the benefits and bonuses desired by workers, conflicted in an obvious and fundamental way with the U.S.S.R.'s obligations under the ICRW to follow the whaling regulations established by the IWC. This was solved through falsified reports, which gave catch totals that were lower than those actually achieved. This reporting system is discussed further below, and a summary of reported vs. actual catches for the Antarctic is given in Table 3.

Although inspectors sometimes attempted to stop some illegal whaling (as above), for the most part this seems not to have been the case. Indeed, one inspector's report (that for the 1967 season of the *Dalniy Vostok* fleet, extracts of which are reproduced here in the Appendix) opens by stating the main duties of the inspection team, which consisted of two contradictory objectives:

> "The main task of the State Inspection [Department] was assisting with fulfilment of the State plan targets for gross output and specific products, and to decrease the number of violations of whaling regulations."

The report notes that the fleet was ordered to enter the Okhotsk Sea in September 1967, in part because they had failed to fulfill the monthly production target for August. There, they found aggregations of North Pacific right whales (a protected species) on the eastern coast of Sakhalin Island, and killed 126 animals. The whaling there was sufficiently good that they greatly exceeded the monthly production target. The following month they continued to whale illegally, killing many sperm whale mothers and calves. Significantly, the inspector's report is quite explicit about the reason for this whaling:

> "If the fleet had strictly followed the "Regulations" the yearly plan target would not have been fulfilled."

The report concludes by listing fines levied for infractions, which involved only a small minority of the illegal catches (e.g. only one of 132 right whales taken during the whole season). From other reports, we believe that the only infractions that were punished—and then only occasionally—were those involving lactating females or calves, or sometimes under-sized animals; the fact that a catch involved a species protected by IWC does not seem to have been sufficient to trigger punishment. Extracts from the full report, which provides an excellent example of the problems with the Soviet inspection system, are given in the Appendix.

Table 3.—Total catches for all Soviet whaling fleets in Antarctic, 1946–1986, by species. Source: Allison (2010). Note that actual catch totals are in some cases substantially larger than those reported by Yablokov et al. (1998) and by Clapham and Baker (2002); they reflect the most up-to-date accounting by the IWC.

Whale species	Reported	Actual
Blue & pygmy blue	3,651	13,035
Fin	52,931	44,960
Sperm	74,834	116,147
Humpback	2,710	48,721
Sei	33,001	59,327
Minke	17,079	49,905
Bryde's	19	1,468
Southern Right	4	3,368
Other	1,539	1,405
Total	185,768	338,336

The specifics of the national inspection system are not easy to understand for people who are unfamiliar with the Soviet system of planning and control, or with the whaling industry and its rules. To begin with, all true information (journals and reports) was classified as secret. None of the information or data analyses pertaining to illegal catches could be published, either inside or outside the country. As a result, even doctoral dissertations based on whaling data were classified as secret (Dmitriy Tormosov, personal commun., October, 2008).

In the absence of real inspection procedures, accurate information (such as species, length, and biological parameters) about whales caught was freely recorded in the whaling journals on the catchers and factory ships. As noted above, catch and biological information would be recorded in the whale passports, in whaling journals on the processing deck, and in scientists' journals. During the whaling season, a whaling inspector and the Engineer of Whaling would, on a daily or weekly basis, "clean" the catch data by deleting all protected species or replacing them with falsified records of fin, sei, or

[22]According to a financial report for one of the whaling fleets for 1964, the average annual salary (without bonuses) for all personnel was 3,600 rubles (about $8,600), and would have been considerably higher than this for captains and harpooners.

minke whales[23], and deleting all records of lactating females and calves as well as undersized whales (those whose length fell below the minimum legal length established by IWC). Whales that were legal but that were killed in prohibited areas or time periods also disappeared from the official record submitted to the Bureau of International Whaling Statistics (BIWS).

Falsification of the data happened not only after, but also occasionally during, the processing of whales. Sometimes when a whale was a little below the legal size its length was recorded as 0.5 or 1.0 m longer (animals who fell far short of the limit were removed from the record completely). That solved the problem of undersized whales, but it created another in terms of production figures, which were calculated based upon standardized length-weight tables; to compensate, larger whales were sometimes recorded as shorter than they actually were (Veinger, personal commun., November, 2009; Derviz, personal commun., October, 2008).

While these changes may appear insignificant, the resulting scientific analyses could show a strange and disproportionate distribution of catches by length: the absence of under-sized whales, a spike of whales with lengths just above the legal minimum and again fewer whales of the next size group. Furthermore, all of the other biological parameters for these same whales were recorded exactly as they were measured, creating even more confusion (Veinger, personal commun., November, 2009). It was such discrepancies in the later years of the Soviet whaling industry that led Mikhalev (2009) to discover that falsification of catch data was occurring even after the implementation by the IWC in 1972 of an International Observer Scheme (see below).[24]

[23]Fin, sei, and minke whales were in most cases legally catchable, and therefore false records of these species could be used to explain the products obtained by the factory fleets. This is why some of the reported figures in Table 2 are higher than the actual catch.

[24]It is our impression from interviews of former biologists that, with the exception of some post-1972 data from Antarctic fleets, such falsification was rare; the great majority of the biological data that are available for Soviet catches are accurate.

At the end of the season all catch data would be edited in the same way, primarily by the Engineer of Whaling and the whaling inspector but sometimes by a special group that also included fleet scientists. All Southern Hemisphere baleen whale catches above lat. 40°S would be removed, as were records of lactating females and calves, protected species, and undersized whales (with the exception of a few "infractions" to make the data look more realistic). The data were then sent, together with scientific reports summarizing the whaling season, to the Ministry of Fisheries in Moscow, where the information from the various fleets and/or land stations was coordinated prior to submission of the falsified record to BIWS. All of these reports and data remained classified as secret until the 1990's.

There is some disagreement among our sources regarding reporting. A former whaling biologist and inspector stated that the fleets sometimes sent falsified catch data directly to BIWS (Dmitriy Tormosov, personal commun., October, 2008). However, others disagree and maintain that everything was coordinated through the ministry in Moscow. The latter seems more likely, given the necessity to ensure that the combined catch totals from all fleets did not exceed the allowable quota for legal species.

After 1972

In 1972, after many years of discussion, the IWC finally implemented the International Observer Scheme (IOS). This was first proposed by Norway in 1955 (IWC, 1956) and—for reasons which are now obvious—met with considerable resistance, notably from the U.S.S.R. The development and eventual implementation of the IOS is beyond the scope of this paper; however, some of the wording in the IOS agreement provides a clearer understanding of the position of independent observers on board a whaling fleet. The full text of the *Agreement concerning an international observer scheme for factory ships engaged in pelagic whaling in the Antarctic* is given in the Appendix to the Chairman's report of the fifteenth meeting (IWC, 1965), and includes this language regarding the "Rights and Functions of Observers":

> "An observer shall be enabled to observe freely the operations of the expedition … shall be given facilities to ascertain the species, size, sex and number of whales taken … All reports required and all records and data shall be made freely and immediately available to observers for examination …"

In light of these instructions, for many years it was widely assumed that since introduction of the IOS in 1972, there could be no falsification of data or illegal catches. However, this assumption has recently been shown to be false. Mikhalev et al. (2009) presented a paper to the IWC Scientific Committee on falsification of catch data relating to minke whales taken after 1972 by the whaling fleet *Sovetskaya Ukraina*; these catches were made despite the presence on board of inspectors from Japan. Those authors provide an example of how (and why) this falsification occurred:

> "In the data (for example), instead of 3–4 minke whales only 2–3 were recorded, and their lengths were overstated. The reason behind this relates to the way the system worked, which can be explained as follows. There was a catch quota, but the Soviet Ministry of Fisheries gave a production plan target for *products* that was completely different; the latter was calculated based upon tables of weights by length of the killed whales, but this table was unrealistically optimistic and did not account for thin or rotten animals. The difficult way to meet production quotas was to try to find whales of sufficient size to make enough products. The easier way was to kill 3 minke whales and report them as 2 larger ones; the additional whales killed but not recorded were referred to aboard the factory fleets as "green whales". There were also "air whales", which were whales that

were not caught but were recorded to meet catch-by-area targets, or to reconcile the total products with a number of whales that could conceivably make up such products. This procedure involved a fine line, because they did not want to create a situation in which the Ministry would set a higher target the following year based upon what was reported in the current season".

The violations reported by Mikhalev et al. (2009) referred to only one factory fleet, the *Sovetskaya Ukraina*, but they noted that it was likely that the "practice of illegal whaling and data falsification [after 1972] were common in other Soviet fleets as well." They also noted that all of the IOS inspectors on Soviet whaling fleets were from the Japanese whaling industry, and because Japan was at the time buying whale meat from Soviet vessels, it was in the interests of some of these inspectors to turn a blind eye to the practice. Also, on some occasions when illegal whales were being brought to the factory ship for processing, inspectors were invited into an officer's cabin and treated to "hospitality" involving food and much vodka, thus ensuring that they would not be on the processing deck when the whales arrived. Presumably, inspectors would be shown falsified records after the whales had been disposed of, but this aspect is not clear.

In summary, the IOS appears to have been subverted through a combination of deception and observer complicity.

Catch Totals

It is not our intention here to report detailed catch totals for Soviet whaling. For the Southern Hemisphere, these have been published elsewhere (Yablokov, 1995; Zemsky et al., 1995, 1996; Yablokov et al., 1998; Mikhalev, 2000, 2004; Clapham and Baker, 2002), although substantially new figures are reported in Table 3. North Pacific totals are in the process of being estimated from previously unanalyzed data (Ivashchenko, unpublished) and will be published separately.

However, we can give a brief summary of what is known to date. During more than 30 years of whaling in the Antarctic, the U.S.S.R. reported 185,778 whales taken but actually killed at least 338,336, a difference of more than 150,000 animals (Table 3, and Allison, 2010). Large gaps remain in the record for the North Pacific. The scope of the whaling there was smaller, but from provisional data we estimate that at least 30,000 whales were killed illegally in this ocean, where the major discrepancy between reported and actual catches involved sperm whales. Overall, we judge that the U.S.S.R. killed approximately 180,000 whales illegally, and caused a number of population crashes.

Two such crashes were particularly obvious. Soviet catches of almost 25,000 humpback whales in the Antarctic south of Australia and New Zealand in 1959–61 forced the closure of the shore whaling stations in those two countries (Clapham et al., 2010). Elsewhere, Soviet catches of right whales in the eastern North Pacific in the 1960's (Doroshenko, 2000) devastated an already small population, which was recently estimated through mark-recapture analysis at only 30 animals (Wade et al., 2011). The impact of Soviet catches on other populations has not been fully assessed.

Summary

In some respects, the Soviet whaling industry was socially quite progressive. Its workers had access to often innovative technology; working conditions were much of the time well controlled; and women were given equal status to men long before such advances were made in the West. Unfortunately, these positive characteristics were all overwhelmed by a system of industrial planning that had little basis in realistic resource assessments and was instead characterized by runaway socialistic competition, inefficiency, and waste. The result was uncontrolled whaling that inflicted major damage to some populations of whales that had already been depleted by "legal" whaling.

It is apparent that the U.S.S.R.'s campaign was not the only example of illegal catches or misreporting. It is now known (Kondo and Kasuya, 2002) that Japan misreported catch data from coastal whaling stations on two species (sperm whales, and Bryde's whales, *Balaenoptera edeni*) until at least 1987. However, there is currently no evidence that such violations of IWC regulations were conducted at the same scale as those practiced by the U.S.S.R., or that they were the manifestations of a planned system of deception authorized at the highest levels of government.

For most of the post-war era, the management of commercial whaling was a colossal failure (Holt, 2007). Although the widespread violations conducted by the U.S.S.R. were arguably the worst example of this mismanagement, the blame for the depletion of whale populations worldwide cannot be laid solely at the door of the Soviet system. The repeated failure of the IWC to acknowledge evidence of declining populations, and the relative ease with which member states could successfully negotiate unrealistically high quotas or block progressive proposals, provided a recipe for disaster that was only exacerbated by the secret actions of the U.S.S.R.. In short, the Soviet system was not the only "devil" involved in the business of whaling.

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Appendix

Extracts from:

Raskatov, E. A., and Latishev V. M. 1967. Otchet gosudarstvennikh inspectorov po kitoboynomu promislu za promisloviy sezon 1967 goda na kitoboynoy flotilii *Dalniy Vostok*. [Report of State whaling inspectors during the 1967 season of the whaling fleet *Dalniy Vostok*.] Unpublished report. 76 p. [In Russian, trans. by Y. Ivashchenko.]

The main task of the State Inspection [Department] was assisting with fulfilment of the State plan targets for gross output and specific products, and to decrease the number of violations of whaling regulations.

For some time during the beginning of the whaling season, when no inspectors were present, the administration of the factory ship practiced incorrect recording of undersized whales by converting some of them into a lower number of legal-sized whales, with a decrease in reported weight. Inspectors warned that this practice is unacceptable, and it ceased.

In official reports the tendency was developing towards decreasing blubber thickness, increasing body length, and changing species. For example: an undersized fin whale would turn into a legal-sized sei whale; a prohibited blue whale into a fin whale; a right whale into two humpback whales, etc.

This created significant complications in the documentation, and reports from the fleet administration and State Inspection are significantly different from each other in terms of total catch, and also by species composition, sex and length.

At the end of July the decision was made to go along the Kurils with a possibility to go deep into the Okhotsk Sea where *Aleut* has been working successfully.

In early September a scout vessel was sent to survey areas around southern Sakhalin Island, and there found aggregations of right whales. Based on numerous requests to increase production from baleen whales, and also to cover the unfulfilled target for August, the fleet headed there immediately … In one week the whole aggregation that was stretched along the eastern coast of Sakhalin was killed … Because of this excellent catch the targets for products were exceeded by 47.2% and the monthly gross output target was exceeded by 69.4%.

Conclusions for work in October:

During the month mostly unconventional [illegal under the Convention regulations] sperm whales were killed, including a large number of lactating females and calves … A record was set relative to the plan target for catches and production.

Violations during the season:

There was a constant requirement for the fleet command to increase the catch of baleen whales … After a categorical order to go into the Bering Sea, the fleet hunted fin whales, the majority of which were under-sized or lactating. In the Gulf of Anadyr the catch switched to gray whales. Only bad weather and a large distance to the factory ship (which was transferring products to the cargo ships) prevented additional prohibited catches of gray whales.

The necessity to increase production from baleen whales and compensate for the unfulfilled catch target in August forced the fleet to hunt right whales in the middle of September.

In total, illegal whales represented 68.3% of whales by number, and 48.6% by weight … If the fleet had strictly followed the "Regulations" the yearly plan target would not have been fulfilled.

In the end, for the 618 illegal whales taken (9,397 tons of raw weight), the total amount of fines levied was 780 rubles, which included warnings and fines for: 0 blue whales [out of 43 taken], 5 fin whales [of 120], 6 sei whales [of 145], 7 humpback whales [of 36], 586 sperm whales [of 4,495], 13 gray whales [of 124] and 1 right whale [of 132].