

Distribution and Abundance of Steller Sea Lions, *Eumetopias jubatus*, on the Asian Coast, 1720's–2005

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Introduction

The Steller sea lion, *Eumetopias jubatus*, is widely distributed in the waters of the North Pacific Ocean and ranges along the west coast of North America from California to Alaska reaching the Bering Strait and the Asia coast. In Asia the range extends southward to encompass the coastal waters of the western Bering Sea, eastern Kamchatka, the Commander Islands, the Kuril Islands, the Sea of Okhotsk (including Shantarsky and Sakhalin

Islands), Tatar Strait, around Hokkaido, and along the Asian coast of the Sea of Japan to the southern extremity of the Korean Peninsula, including Peter the Great Bay (Fig. 1, 2) (Scammon, 1874; Allen, 1870, 1880, 1892; Smirnov, 1908; Ognev, 1935; Nishiwaki and Nagasaki, 1960; Chapsky, 1963; Nishiwaki, 1966; Heptner et al., 1976).

Steller sea lion distribution throughout Asia is not uniform, occurring year-round in some regions and seasonally in others. In some regions, sea lions form large concentrations and in other regions they are sparsely distributed. Figure 2 shows all known Steller sea lion rookeries and haulout sites along the Asian coast over the last 263 years (1742–2005).

Their distribution on the Asian coast has varied significantly over this time period. Steller sea lions were numerous on Bering Island when discovered by George Steller in 1742, but they ceased

breeding there and almost disappeared from the Commander Islands during the mid to late 19th century (Steller, 1751; Stejneger, 1898; Grebnitsky, 1902). They again became numerous and started breeding at the Commander Islands 100 years later, during the mid 20th century (Marakov, 1957, 1964; Muzhchinkin, 1964; Nesterov, 1964; Chugunkov, 1968, 1971, 1982, 1990; Pryanishnikov and Pinigin, 1972; Mymrin and Phomin, 1978; Burkanov, 1986, 1988; Vertyankin and Nikulin, 1988). Steller sea lions were rarely sighted off Chukotka in the western Bering Sea in the 1930's, but were common there in the 1980's (Mymrin, 1991; Melnikov, 2001; Belopolsky¹;

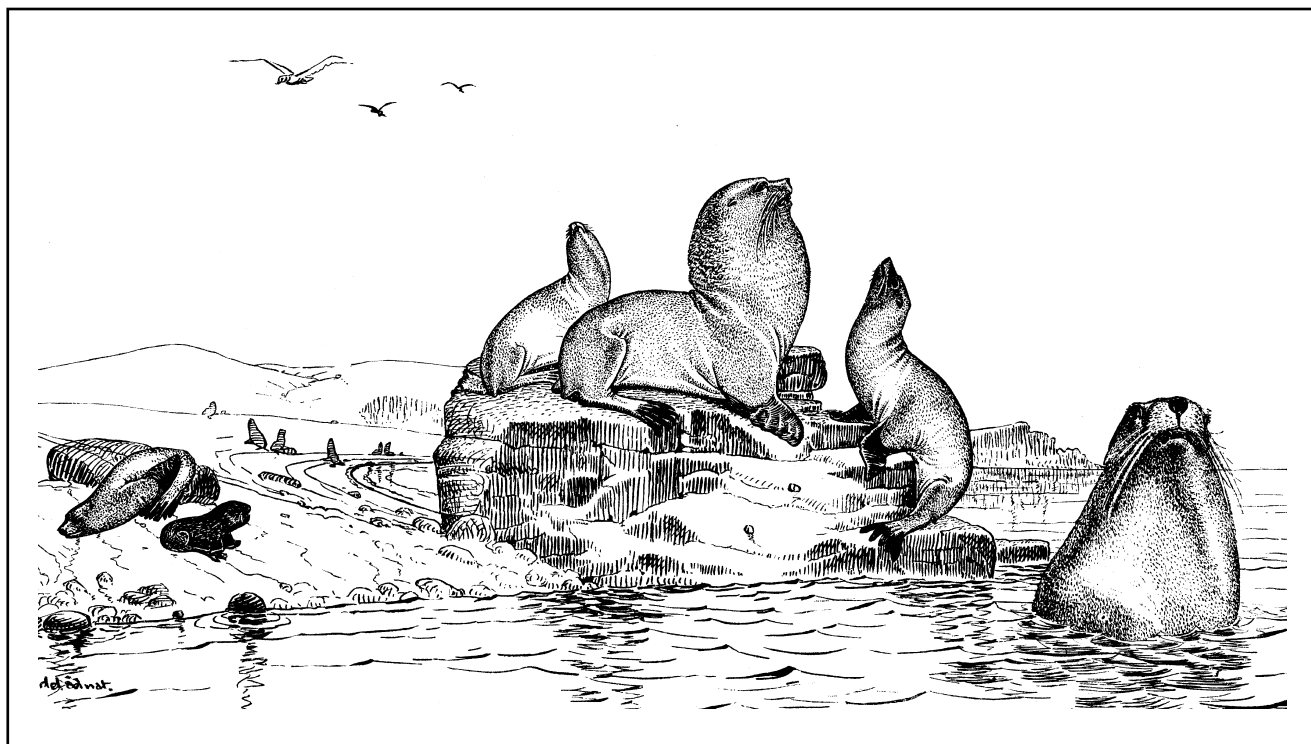
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¹Belopolsky, L. O. 1931. Brief preliminary report on marine mammals of the Anadyr Region (1930–1931) [Predvaritel'nye dannye po izucheniyu morskikh mlekopitayushchikh Anadyrskogo rayona (po rabotam v 1930–1931 gg)]. TINRO, Vladivostok, Archive TINRO #121, 25 p.

ABSTRACT—We analyzed published and archived records for the past 250 years to assess changes in distribution and abundance of Steller sea lions, *Eumetopias jubatus*, along the Asian coast from the Bering Strait to the Korean Peninsula. We found that the northern extent of Steller sea lion distribution has not changed but that the southern limit has moved north by some 500–900 km (~300–500 n.mi.) over the past 50 years. Additionally, the number of animals and their distribution has changed on the Commander Islands, Kuril Islands, and Kamchatka Peninsula. We found no changes in the number of rookeries in the northern Sea of Okhotsk, but a new rookery was established at Tuleny Island on the eastern coast of Sakhalin Island. We estimate that the total abundance of Steller sea lions along the Asian coast in the late 19th cen-

tury was about 115,000 animals; during the 1960's, the total estimate was about 27,000 (including pups), most of which were in the Kuril Islands. The fewest number of Steller sea lions occurred in the northwestern Pacific in the late 1980's–early 1990's when only about 13,000 individuals (including pups) were estimated in the entire region. During the 1990's, and especially in early 2000, an increasing trend in abundance occurred in most areas. Present estimated abundance of Steller sea lions in Asia is about 16,000 individuals (including about 5,000 pups), about half of which occur in the Kuril Islands. Changes in abundance occurred during all time periods but varied by site and period. Specifically, over the past 150 years Steller sea lion abundance at most sites has changed. There were no rookeries on the Commander Islands between

1850 and 1960 and abundance was low, but by 1977, abundance increased to 4,800 individuals and a rookery was established in the mid 1980's; abundance there has declined since the early 1980's and in 2004 only 895 individuals (including 221 pups) were counted during the breeding season. Between 1940 and 2004, abundance along the eastern coast of Kamchatka declined from ~7,000 to ~600 individuals, an overall reduction of 90%. Steller sea lion abundance on the Kuril Islands declined by >90% from the 1800's to 2005; the most severe decline there occurred during 1969–1981. Steller sea lion numbers in the northern part of the Sea of Okhotsk declined during 1930–2002 from 7,200 to 3,100 individuals. Numbers at Tuleny Island have increased since establishment of a rookery there during 1983–2005 and by immigration from other sites.



Sea lions on the Pribilof Islands (Elliott, 1882).

Freiman²). In the late 19th century to the early 20th century, Steller sea lions were common in Peter the Great Bay (Siberian coast of the Sea of Japan) (Ognev, 1935); however, as early as the 1930's their population was greatly reduced and by the late 20th century they were rarely seen in this region (Trukhin, 2001).

As reviewed by Loughlin (1998), Steller sea lions are the largest of the sea lion and fur seal subfamily and show a marked difference in size of the sexes with males being from two to three times larger than females. Males can be as large as 1,120 kg and grow to 3.25 m long. Females average 250 kg and are about 3.2 m long. Pups weigh 16–23 kg, are about 1 m long at birth, and are quite docile.

Steller sea lions are not known to migrate, but they do disperse widely at

times of the year other than the breeding season. Generally, animals up to about 4 years-of-age tend to disperse farther than adults. As they approach the age when they begin to breed, they have a propensity to stay in the general vicinity of the breeding islands, and, as a general rule, Steller sea lions return to their island of birth to breed as adults.

The breeding season extends from late May to early July throughout the range. Males establish territories in mid May on sites traditionally used by females for giving birth. Some copulations may occur at rest (haulout) sites between females not giving birth and by males which cannot hold territories on rookeries. Males are sexually mature by 3–7 years-of-age, but they generally are not physically large enough to establish and maintain a territory until 9–11 years-of-age; by 13–16 years-of-age they are too old and battered to maintain a territory. Females reach sexual maturity between 3 and 6 years-of-age and may continue to give birth to a pup until they are into their 20's. They give birth to a single pup. Females may nurse their

pups from 4 months to 1–2 years, but pups are generally weaned just prior to the next breeding season.

This review analyzes published and archived records of Steller sea lion distribution and abundance in the Russian Far East for the past 260 years. Our review provides an assessment of changes in distribution and abundance along the Asian coast from the Bering Strait to the Korean Peninsula. The Steller sea lion range off the Asian coast covers a huge geographic area making comparative analysis of population dynamics throughout the range difficult. For example, of the 11 Steller sea lion sites known in the Commander Islands over the past 260 years, abundance data for the breeding season for a particular year or even over a decade are only available for 3–5 sites.

For our analysis, we grouped the Asian Steller sea lion data into seven regions including five breeding regions and two regions where sea lions rookeries are absent (the western Bering Sea and Japanese waters including the Asian coast of the Sea of Japan). The

²Freiman, S. Y. 1931. Harvest and biology of pinnipeds of the northern Sea of Okhotsk. Pinnipeds of the Chukchi Peninsula [Promyslovaya biologiya lastonogikh severnogo poberezh'ya Okhotskogo morya. Lastonogie Chukotskogo poluostrova]. TINRO, Vladivostok, Archive TINRO #90, 34 p.

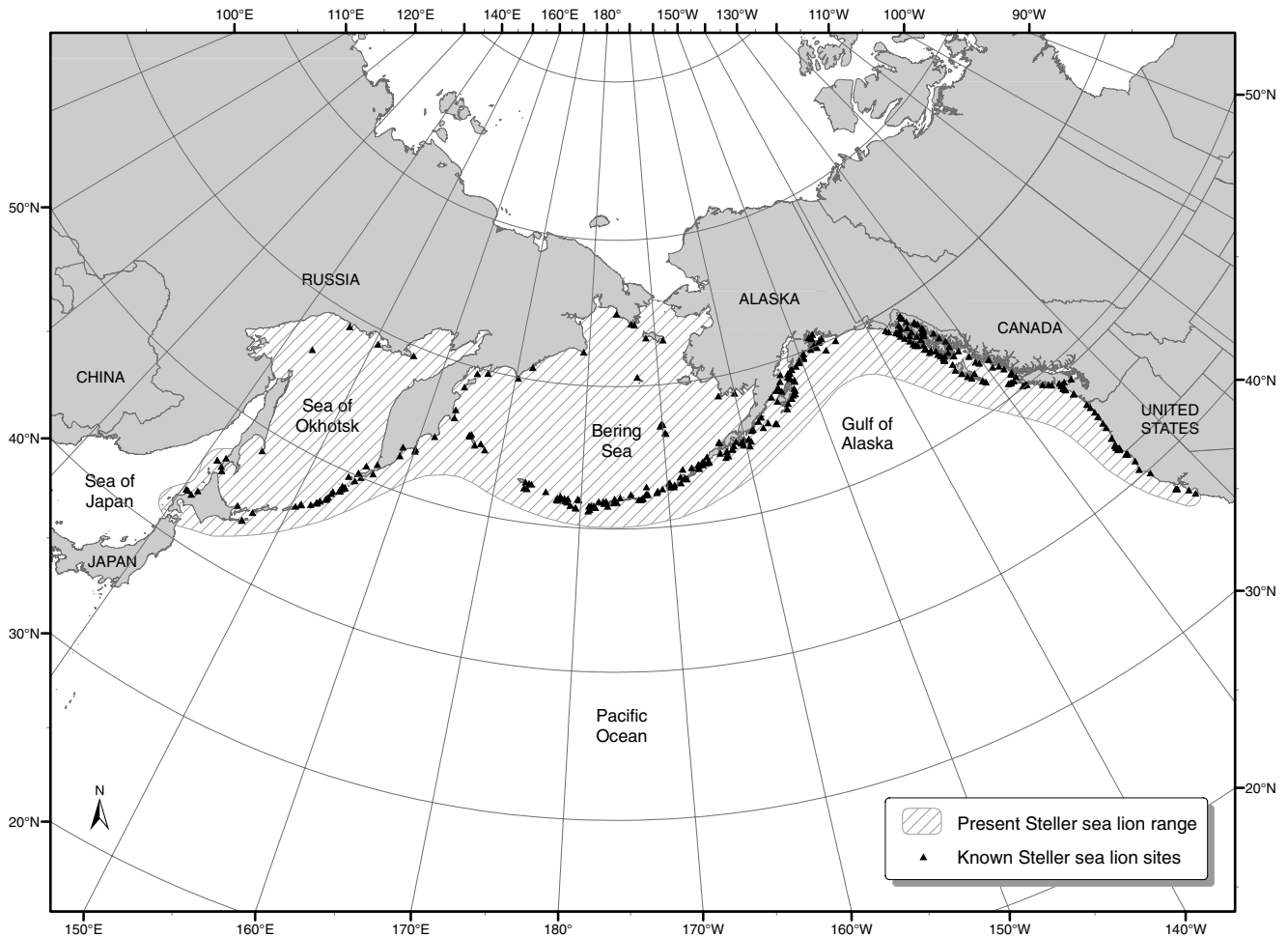


Figure 1.—Present Steller sea lion distribution in the North Pacific Ocean.

five breeding regions include the Commander Islands, eastern Kamchatka coast, the Kuril Islands, Sakhalin, and the northern Sea of Okhotsk (Fig. 3). The boundaries between these regions are somewhat arbitrary and sightings of marked sea lions indicate that they often move from one region to another, but during the breeding season those movements are minimal (Burkanov et al., 1995; Burkanov³).

We made several assumptions during our reconstruction of the historical

abundance of Steller sea lions in the northwestern Pacific Ocean for the past 260 years. The most important is that we combined results of reported data for specific sites and/or areas over several years or even decades. We did this because the existing data were typically not obtained during surveys designed to count sea lions, but for other purposes. These surveys were conducted in different years, by different people, and by various methods. Often the historical data were based on information from visiting scientists who relied on anecdotal information of local fishermen or hunters.

We also made some assumptions based on the sizes of rocks or beaches used by the animals for rookeries and haulout sites (e.g. Iony Island). It is

important to note that we emphasized when data collected during the breeding season (June–July) were pooled. All abundance and reconstruction analyses presented in this review are based on direct count data only. We did not use correction factors to improve any count data, and our use of the terms “abundance” and “count” are identical unless stated otherwise.

History of Steller Sea Lion Research on the Asian Coast

George Steller described Steller sea lions as a separate species while serving as a naturalist with Vitus Bering, 1741–1742. Steller’s report (Steller, 1751) contains detailed data on behavior, reproduction, abundance, and seasonal population fluctuations of

³Burkanov, V. N. 2006. Unpublished data on file at Natural Resources Consultants, Inc., 1900 W. Nickerson St., Suite 207, Seattle, WA 98119, and Kamchatka Branch of the Pacific Institute of Geography, Far East Division of Russian Academy of Sciences, 6 Partizanskaya St., Petropavlovsk-Kamchatsky, Russia, 683000.

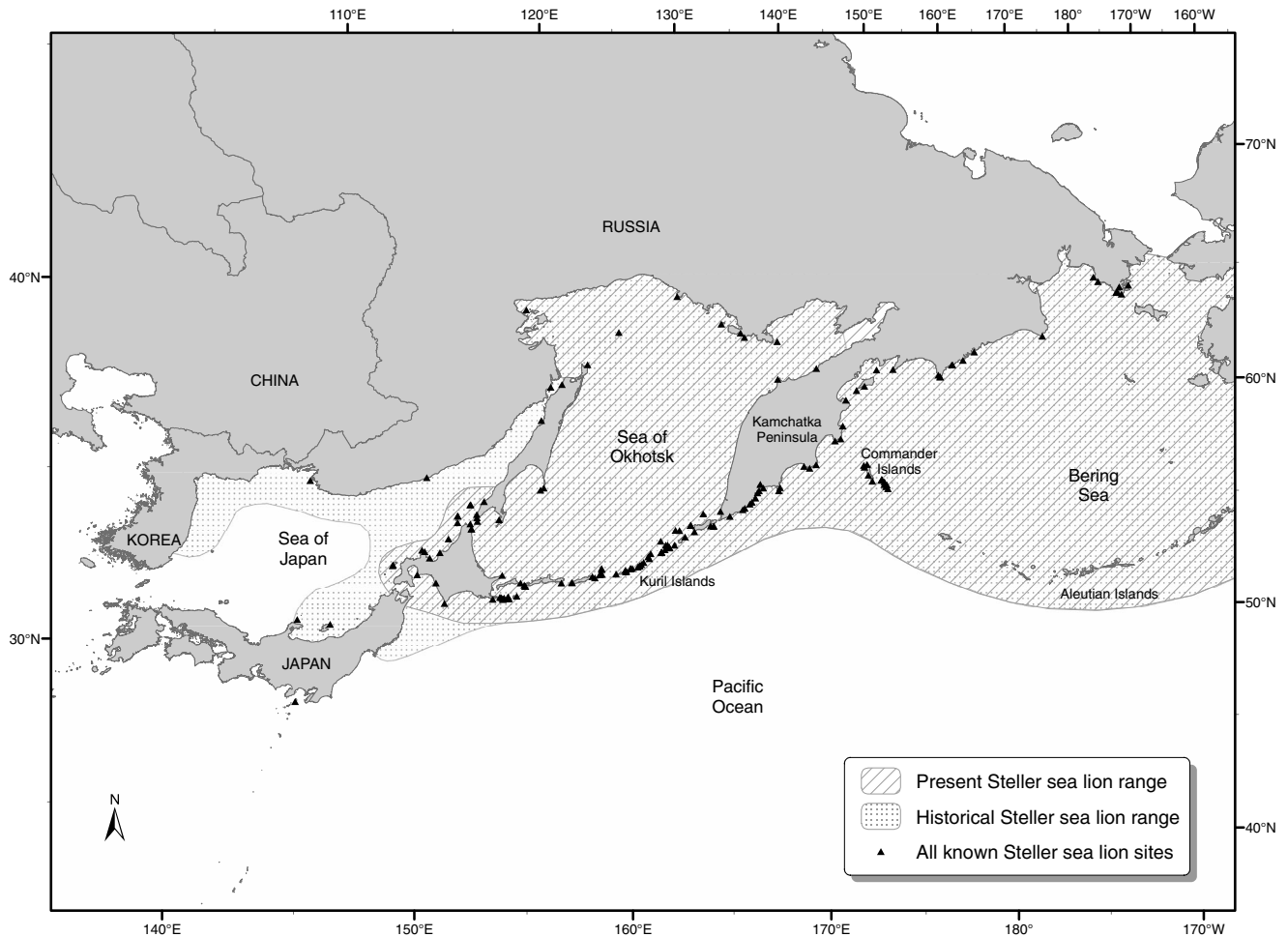


Figure 2.—Present and historic range of Steller sea lions along the Asian coast, 1700's – 2000's, including our area of study.

Steller sea lions collected by him while marooned on Bering Island. Steller sea lion information was also collected by Stepan Krasheninnikov, a student of the Russian Academy of Sciences who had been sent to Kamchatka from the fall of 1737 through July 1741 to explore the unknown regions in the area (Krasheninnikov, 1755). Krasheninnikov's many trips around Kamchatka yielded much data on the plant and animal life of the Kamchatka Peninsula and also on the life and culture of the indigenous human residents of Kamchatka and neighboring islands. Other information supplementing Steller's description is found in the voyage logbook compiled by Sven Waxell (Waxell, 1940), another member of Bering's expedition.

The Steller report (Steller, 1751) and materials from other members of the Bering expedition (Krasheninnikov, 1755; Waxell, 1940) provide insight into the distribution of the Steller sea lion during the second half of the 18th century. Records and archive materials are also available from the first hunting expeditions following the discovery by Bering of the route to Alaska. These records provide details of sea otter, *Enhydra lutris*, and northern fur seal, *Callorhinus ursinus*, harvests, which were of great commercial importance (Pallas, 1789; Berkh, 1823; Veniaminov, 1840; Efimov, 1948, 1950; Fedorova, 1985).

Documentation of the voyages of Russian ships to the Aleutian Islands

and Alaska during the second half of the 18th century (Pallas, 1789; Berkh, 1823; Berg, 1929; Efimov, 1948, 1950; Zubkova, 1948; Makarova, 1968) make it clear that the major objective of the expeditions was the search for unknown islands and lands that were home to mammals of commercial importance, including sea otters and northern fur seals.

According to Russian regulations of the time, expedition organizers were official state representatives obliged to deliver to the exchequer the taxes (*yasak*) collected from the aborigines of the newly discovered islands. In addition, they had to pay a 10% tax from all commercial harvests. Accordingly, the historical archives contain information

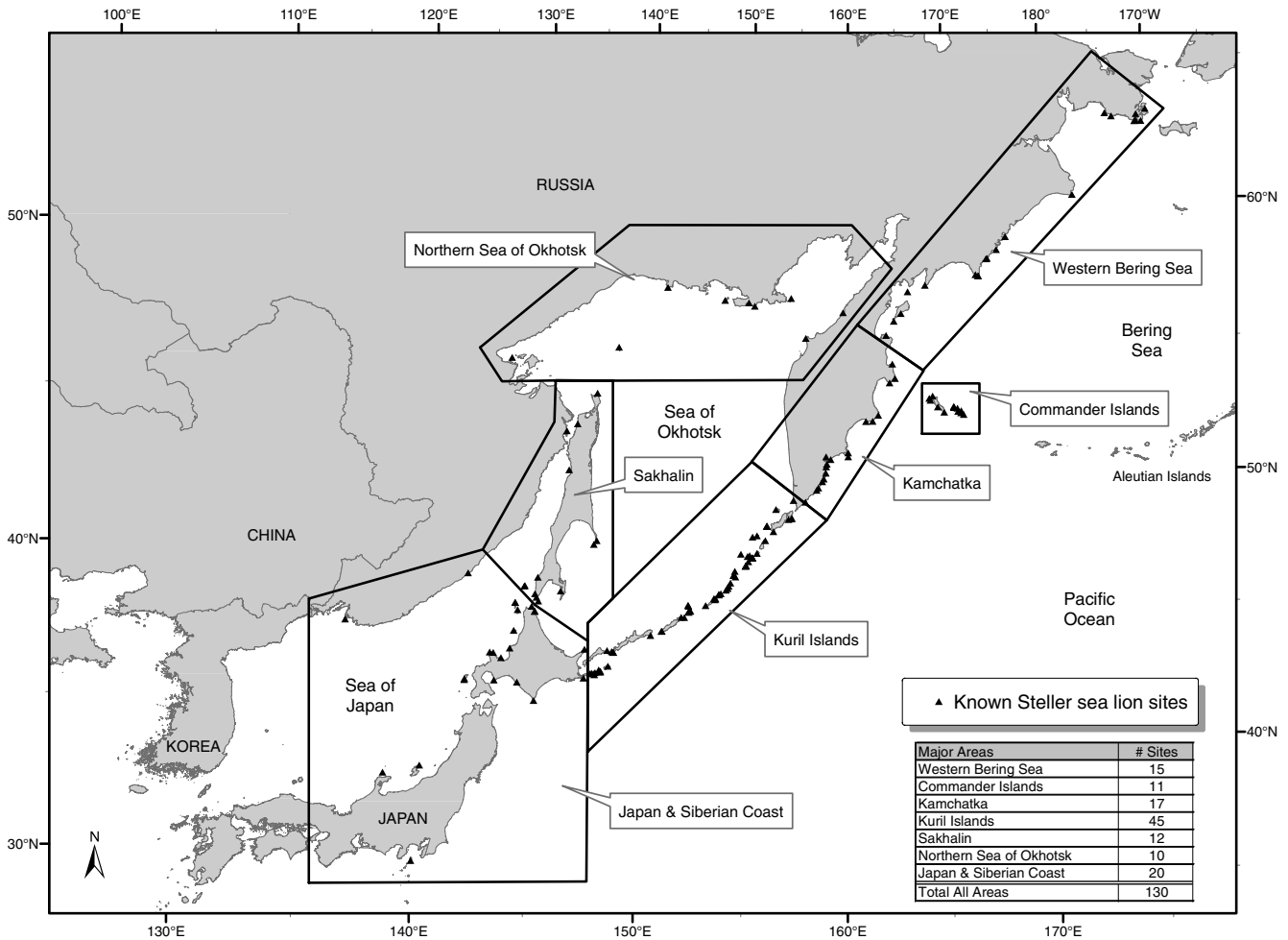


Figure 3.—Seven geographic regions along the Asian coast used in our analysis.

on almost every ship that visited Alaska, the Aleutian Islands, and Kuril Islands including the number of sea otter and fur seal pelts (but not Steller sea lions) taken for the exchequer and for the companies (Efimov, 1948).

Despite its exceptional importance in the life of the indigenous people, the Steller sea lion was not highly valued by the Russians, and they did not pay any taxes on its harvest; thus, the magnitude of sea lion harvests was not reflected in their reports. At the same time, Pallas (1789) reported that while wintering on the Commander Islands before traveling farther east, the Cossacks “hunt various marine mammals, particularly Steller sea lions, whose meat is very tasty, and they take the skins of this animal

along to the eastern islands.” Hunting Steller sea lions without firearms was a labor-intensive and dangerous business (Steller, 1751; Krasheninnikov, 1755; Berkh, 1823; Waxell, 1940). Presumably, the Russian hunters traded sea lion skins for sea otter pelts to the Aleut natives who used them to build small skin boats (baidarkas).

Data on Steller sea lion distribution and abundance were rarely reported (Tikhmenev, 1861, 1863; Ditmar, 1901). An exception is the study by Bishop Innokenty Veniaminov (Veniaminov, 1840), which provides the most detailed account of the human residents of the eastern Aleutian Islands and also the distribution, abundance, and biology of numerous animal species, including the

Steller sea lion. Veniaminov reported the decline in Steller sea lion abundance due to intensive harvest as early as the 1830’s.

More evidence regarding the harvest of the Steller sea lion is found in the memoirs of Kirill Khlebnikov, the Alaska governor’s assistant during 1817–1832 (Fedorova, 1985). Khlebnikov confirmed the report of a Steller sea lion harvest on St. George Island (Pribilof Islands) (Veniaminov, 1840). St. George Island residents were obligated to take 2,000 Steller sea lions per year to provide dry skins to be transported to Sitka Island for the manufacture of skin boats. At that time, large and small skin boats (baidaras and baidarkas) were the most important, and nearly the sole,

means of transport used by Russian and indigenous residents to move between the islands and the Alaska coast. The reports by Federova (1985) and Veniaminov (1840) are important for the general understanding of the settlement of Alaska by Russian hunters and fur traders, the structure of pinniped and sea otter harvests, the number of vessels, types of transportation used by the indigenous people, and the administration of the huge region concerned.

A large body of data had accumulated on the morphology, biology, and distribution of Steller sea lions by the end of the 19th century. Allen (1880) stated: "Since the publication of my paper on Eared Seals, in 1870, our knowledge of this species has greatly increased, mainly through the published observations of Captain Scammon and Mr. H. W. Elliot. . . . Aside from Steller's early account of the northern sea lion, little had been published relating to the habits of this species prior to 1870. Now, however, with possibly one exception, none of our Pinnipeds is better known."

By the end of the second half of the 19th century, intensive and uncontrolled pelagic harvest of fur seals aroused concern on the part of a number of countries, primarily Russia, Japan, Great Britain, and the United States. A number of surveys of fur seal rookeries on the Commander, Kuril, and Tuleny Islands were conducted resulting in additional data on Steller sea lions (Bryant, 1870, 1890; Elliot, 1873, 1882; Voloshinov, 1887, 1889; Rosset, 1888; Slyunin, 1895; Stejneger, 1898; Grebnitsky, 1902). A succinct summary of Steller sea lions on Sakhalin Island was written by Nikolsky (1889).

Of particular importance are the publications by Captain Snow (1897, 1902, 1910) who engaged in sea otter and fur seal harvests on the Kuril Islands from 1873 to the end of the 19th century. He provided the location of the islands, a detailed description of Steller sea lion distribution, including 18 Steller sea lion rookeries, and other marine mammal breeding sites. Snow's publication is the first precise and most complete description of Steller sea lion rookeries in the North Pacific region. For

instance, Steller sea lion rookeries on the Kamchatka coast (a more settled and accessible region than the Kuril Islands) were not described until the 1980's, 100 years after the work by Snow on the Kuril Islands.

The first Russian report to summarize available data on Steller sea lion morphology, biology, distribution, and population dynamics was by Smirnov (1908). It was followed by a series of more comprehensive reports that included the most inclusive data on Steller sea lions published in the late 19th to early 20th century (Shmidt, 1916; Kardakov, 1929; Dukul' et al., 1929), and also some valuable personal reports published by Ognev (1935).

The first systematic field surveys of the distribution and abundance of marine mammals, in particular the Steller sea lion on the western Asian coast, were conducted as late as the 1930's during a special scientific marine mammal hunting expedition by the Pacific Fishery Research Station (TIRKh, the predecessor of the Pacific Research Fisheries Center, TINRO) and the Moscow Research Institute of Fishery (the predecessor of the All-Russian Research Institute of Fisheries and Oceanography, VNIRO). In 1929–30, three researchers wintered at the villages of Tauisk, Siglan, and Yamsk on the northern coast of the Okhotsk Sea searching for marine mammals. In 1930, seven researchers stayed in the villages of Tigil, Ust-Bolsheretsk (western coast of Kamchatka), Karaga (eastern coast of Kamchatka), Anadyr, and Lavrentiya Bay (Chukotka).

Marine mammals were also surveyed by TIRKh fishery observers in the villages of Kichiga, Ust-Kamchatsk, Tilichiki, and in Shlyupochnaya Bay north of Olyutorsky Cape (Belopolsky⁴). These surveys yielded abundant data on the biology, distribution, and numbers of Steller sea lions off the Asian coast (Freiman, 1935a,b; Barabash-Nikiforov, 1935; Barabash, 1937; Belopol-

⁴Belopolsky, V. O. 1932. Research report on biology and harvest monitoring of pinnipeds in the Karaginsky Region, 1930–1931 [Otchet o rabote po izucheniyu biologii i promysla lastonogikh v Karaginskoy rayone, 1930–31gg]. TIRKh, Vladivostok, Archive TINRO #102, 78 p.

sky^{1,4}; Freiman²; Lun⁵; Nikulin^{6,7,8,9}; Pikharev¹⁰). Unfortunately, World War II (WWII) interrupted the surveys, which were not resumed until the mid 1950's. These later surveys focused on the restoration of northern fur seal and sea otter stocks and management of cetacean and phocid harvests. Special marine mammal laboratories were established for this purpose by TINRO in Kamchatka, Sakhalin, and Magadan.

In 1955, the Shirshov Institute of Oceanology, USSR Academy of Sciences, conducted a detailed survey of Steller sea lion rookeries on the Kuril Islands (Klumov, 1957a, b). TINRO was largely responsible for monitoring Steller sea lions and other marine mammals in the area (Belkin, 1965, 1966a, b; Perlov, 1970, 1974, 1975; Kuzin et al. 1977, 1984). Since the mid 1990's, integrated surveys organized by the Kamchatka Federal Department for Protection and Restoration of Fish Resources and Fisheries Regulations (Kamcha-

⁵Lun', S. S. 1932. Research report of Tigil observer S. Lun' of TIRKH's scientific expedition, 1930–1931 [Issledovatel'sky otchet Tigil'skogo nablyudatelya nauchno-zveroboynoy ekspeditsii TIRKha S. Lunya v 1930–31]. TINRO, Vladivostok, Archive TINRO #379, 35 p.

⁶Nikulin, P. G. 1932. Research report on pinniped investigations on ice in the southwest part of the Sea of Okhotsk and a Steller sea lion survey in Iony and Yamsky Islands (first cruise of the *S/V Nazhim* in summer, 1932) [Otchet ob izucheni lastonogikh vo l'dakh yugo-zapadnoy chasti Okhotskogo morya i sivucha na o. Iony i Yamskikh ostrovakh (pervyy reys sudna «Nazhim» letom 1932)]. TINRO, Vladivostok, Archive TINRO #389, 21 p.

⁷Nikulin, P. G. 1935. Steller sea lion biology and harvest in the Sea of Okhotsk (1932–1933) [Materialy po biologii i promyslu sivucha Okhotskogo morya (po dannym 1932–33)]. TINRO, Vladivostok, Archive TINRO #736, 25 p.

⁸Nikulin, P. G. 1937a. Quantitative analysis of the abundance of Steller sea lions on Iony Island [K voprosu kolichestvennogo opredeleniya stada sivucha na o. Iony]. TINRO, Vladivostok, Archive TINRO #1639, 10 p.

⁹Nikulin, P. G. 1937b. Steller sea lions of the Sea of Okhotsk and their harvest. Biological features of Steller sea lions [Sivuch Okhotskogo morya i ego promysel. Biologicheskaya kharakteristika sivucha]. TINRO, Vladivostok, Archive TINRO #1244, 34 p.

¹⁰Pikharev, G. A. 1938. Steller sea lion survey in the Sea of Okhotsk (Iony Island) for total available catch estimation [Obsledovanie zapasov sivucha v Okhotskom more (rayon o-vov Iony) dlya opredeleniya kontingenta vozmozhnogo vyboya]. TINRO, Vladivostok, Archive TINRO #1975, 8 p.

trybvod) and the Kamchatka Branch of the Pacific Institute of Geography, Far Eastern Branch, Russian Academy of Sciences, have been conducted to monitor Steller sea lions (Burkanov et al., 1995, 2002; Pavlov and Isono, 1999; Burkanov, 2000; Trukhin and Burkanov, 2002, 2004).

On the Commander Islands, marine mammals have been monitored by the Kamchatka Branch of TINRO and the Commander Island Fish Protection Inspection, Kamchatrybvod (Marakov and Nesterov, 1958; Muzhchinkin, 1964; Nesterov, 1964; Khromovskikh, 1966; Chelnokov, 1971, 1972, 1978, 1983; Mymrin et al., 1978, 1979; Vertyankin and Nikulin, 1988; Burkanov et al., 2003c; Marakov^{11, 12}; Nesterov¹³; Khromovskikh and Tomatov¹⁴; Khromovskikh^{15, 16}). Since 1991, scientists of the Kamchatka Branch of the Pacific Institute of Geography, Far Eastern Branch, Russian Academy of Sciences, have been monitoring Steller sea lions on Yugo-Vostochny Cape, Medny Island (Mamaev and Burkanov, 1995, 1996;

Mamaev et al., 2000; Burkanov, 2000; Burkanov et al., 2003a,b). Members of the Komandorsky State Nature Reserve (Zagrebelny¹⁷) have participated in year-round monitoring of marine mammals on Bering Island since 1994.

Surveys on Tuleny Island (Sakhalin Island) were primarily conducted in summer by TINRO scientists (e.g. Kuzin and Naberezhnykh, 1991; Kuzin, 1996, 2001; Kuzin and Pavlov, 2000). In fall and early winter between 1977 and 1985, members of the Sakhalin Federal Department for Protection and Restoration of Fish Resources and Fisheries Regulations (Sakhalinrybvod) conducted surveys from aircraft during air patrols of the 200-mile economic zone of the U.S.S.R. (Annual report^{18, 19, 20, 21}).

In Kamchatka, several local surveys (along the southeastern coast, Verkhoturov Island, and along the northeastern coast) of Steller sea lion rookeries were conducted from the 1960's to 1970's (Kharkevich and Vyatkin, 1977; Kasyanov²²; Chugunkov²³; Khromovskikh^{15, 16}), and a series of aircraft, boat, and ship surveys of Steller sea lion rookeries were made in the 1980's (Burkanov, 1986, 1988; Burkanov et al., 1988, 1990). These studies were followed by those of the Marine Mammals Protection Service,

Kamchatrybvod. Until the 1980's, Chukotka and the northern Sea of Okhotsk received the least amount of study with regard to Steller sea lions (we could not find any publications on Chukotka between the 1930's and 1980's). However, in the 1980's and 1990's, Steller sea lion surveys were conducted in these areas (Maminov et al., 1991; Mymrin, 1991; Zadalsky, 1997, 2000, 2001, 2002; Grachev, 2000; Melnikov, 2001; Burkanov et al., 2002).

A number of large-scale concurrent Steller sea lion surveys were performed throughout the entire range by Russian and U.S. scientists (Perlov et al., 1990; Burkanov et al., 1990, 1991; Maminov et al., 1991; Loughlin et al., 1992; Burkanov et al., 2002, 2003a,b,c). A program of marking Steller sea lion pups in Russia was initiated in 1989 (Merrick et al., 1990; Perlov et al., 1990) which yielded further detailed data on sea lion movement and the structure of intra-specific groups of Steller sea lions (Burkanov et al., 1995; Kuzin, 1996; Kuzin and Pavlov, 2000; Kuzin et al., 2002; Trukhin and Burkanov, 2002, 2004; Altukhov and Burkanov, 2004).

Rookeries and Haulout Sites on the Asia Coast from the 18th to the 20th Centuries

Since Steller first described the Steller sea lion in 1751, over 130 rookeries and haulout sites have been identified on the Asian coast (Fig. 2, 4). The majority of these sites were described during the late 19th century and the early 20th century (Stejneger, 1887; Rosset, 1888; Nikolsky, 1889; Snow,

²²Kasyanov, N. F. 1962. Brief report of the expedition on a survey and habitat description of sea otters, sea lions, fur seals, and other pinnipeds near the coast of the Kamchatka Peninsula [Kratky otchet ekspeditsii po obsledovaniyu i opisaniyu mest obitaniya kalanov, sivuchey, kotikov i drugikh lastonogikh u poberezh'ya Kamchatskogo poluoostrova]. TINRO, Vladivostok, Archive TINRO #8051, 9 p.

²³Chugunkov, D. I. 1968. Data on population and distribution of pinnipeds in coastal waters and haulouts of northeastern Kamchatka in spring-summer 1968 [Materialy o chislennosti i raspredelenii lastonogikh v vesenne-letniy period 1968 g. v pribrezhnykh vodakh i na beregovykh zalezhhakh severo-vostoka Kamchatki]. Petropavlovsk-Kamchatsky, Archive Kamchatrybvoda, 14 p.

¹¹Marakov, S. V. 1956. Report of the Commander Observation Unit of TINRO, April–November 1956 [Otchet Komandorskogo NP TINRO, April–November 1956]. TINRO, Vladivostok, Archive TINRO #5407, 49 p.

¹²Marakov, S. V. 1957. Report of the Commander Observation Unit of TINRO, November 1, 1956–November 1, 1957 [Otchet za period s 1 Nov. 1956 goda po 1 Nov. 1957 goda. Komandorsky nablyudatel'ny punkt]. TINRO, Vladivostok, Archive TINRO #5840, 21 p.

¹³Nesterov, G. A. 1962. Data on Steller sea lion biology in the Commander Islands [Materialy po biologii sivuchey Komandorskikh o-vov]. KoTINRO, Vladivostok, Archive TINRO #1388, 10 p.

¹⁴Khromovskikh, B. V., and Tomatov E. P. 1965. Steller sea lion survey in the Commander Islands in spring 1965 [O provedenii ucheta chislennosti sivuchey na Komandorskikh o-vakh v vesenniy period 1965]. KoTINRO, Petropavlovsk-Kamchatsky, Kamchatsky oblastnoy Archive, 9 p.

¹⁵Khromovskikh, B. V. 1971. Abundance and distribution of marine mammals on south-east Kamchatka Peninsula and the Commander Islands in 1971 based on an aerial survey [Materialy aeroucheta chislennosti i razmeshcheniya morskikh zverey na yugo-vostoke Kamchatki i Komandorskikh ostrovakh v 1971]. TINRO, Vladivostok, Archive TINRO #12726, 18 p.

¹⁶Khromovskikh, B. V. 1973. Aerial surveys of sea otter habitats in south and southeast Kamchatka and the Commander Islands [Materialy aviaobsledovaniy mest obitaniya kalanov na yuge i yugo-vostoke Kamchatki i na Komandorskikh ostrovakh]. TINRO, Vladivostok, Archive TINRO #13555, 17 p.

¹⁷Zagrebelny, S. V. 2002. State Nature Preserve *Komandorsky*, Nikolskoe Kamchatskoy Oblasti, Russia, 684500. Personal commun.

¹⁸Annual report on marine mammal conservation and harvest monitoring in Sakhalin and Kuril Regions in 1983 [Otchet po okhrane i kontrolyu za promyslom morskikh mlekopitayushchikh, obitayushchikh v Sakhalino-Kuril'skom basseyne v 1983 godu.]. 1984, 39 p.

¹⁹Annual report on marine mammal conservation and harvest monitoring in Sakhalin and Kuril Regions in 1985 [Otchet po okhrane i kontrolyu za promyslom morskikh mlekopitayushchikh, obitayushchikh v Sakhalino-Kuril'skom basseyne v 1985 godu.]. 1985, 39 p.

²⁰Annual report on marine mammal conservation and harvest monitoring in Sakhalin and Kuril Regions in 1986 [Otchet po okhrane i kontrolyu za promyslom morskikh mlekopitayushchikh, obitayushchikh v Sakhalino-Kuril'skom basseyne v 1986 godu.]. 1986, 46 p.

²¹Annual report on marine mammal conservation and harvest monitoring in Sakhalin and Kuril Regions in 1987 [Otchet po okhrane i kontrolyu za promyslom morskikh mlekopitayushchikh, obitayushchikh v Sakhalino-Kuril'skom basseyne v 1987 godu.]. 1987, 51 p.

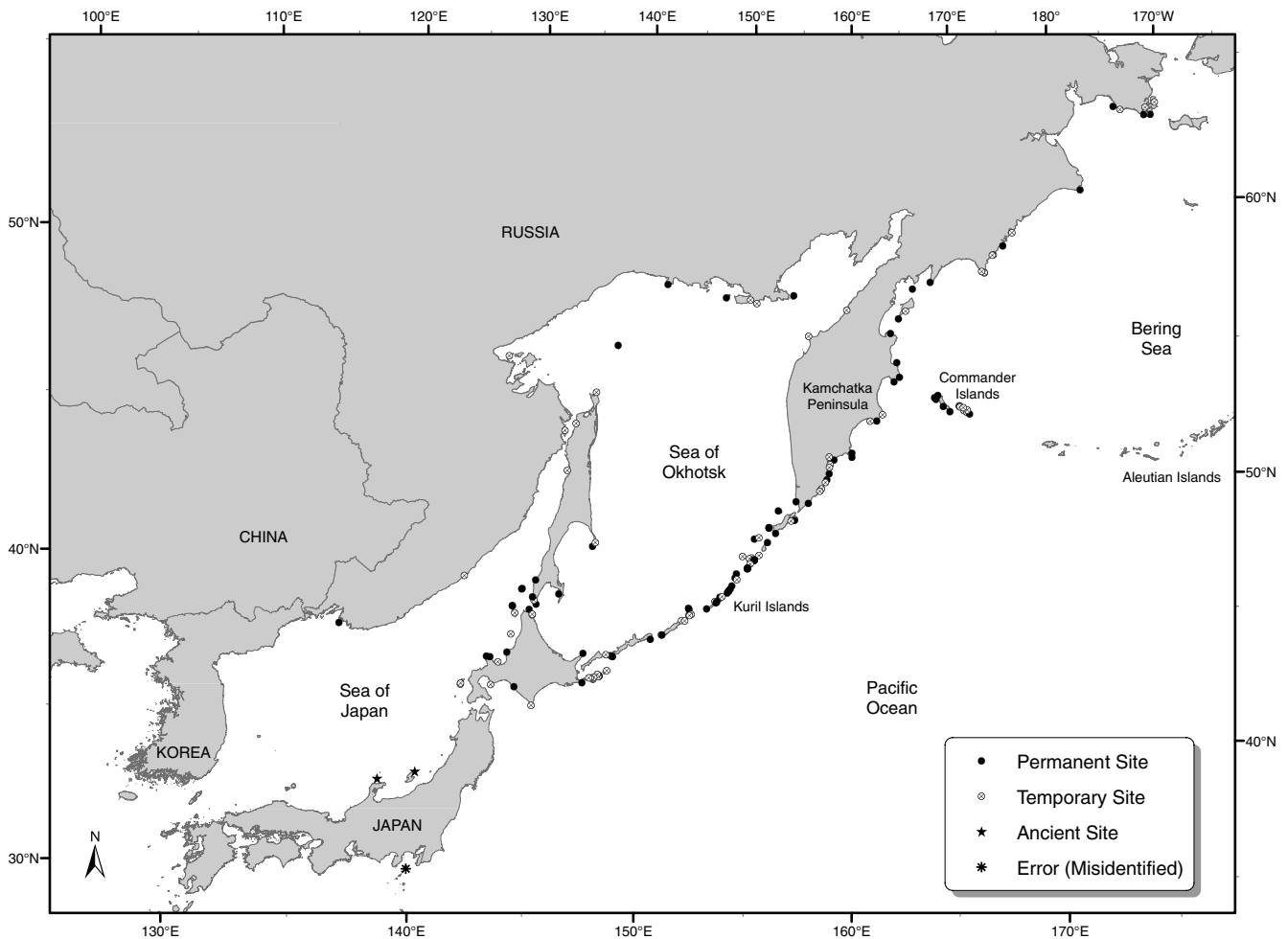


Figure 4.—All known permanent, temporary, ancient, and misidentified Steller sea lion rookeries and haulout sites along the Asian coast, 1742 to present.

1897; Slyunin, 1900; Ditmar, 1901; Shmidt, 1916; Kardakov, 1929; Dukul' et al., 1929; Barabash-Nikiforov, 1935; Ognev, 1935; Sergeev, 1936, 1940; Nikulin, 1937; Belopolsky⁴). However, a number of sites were first reported in the 1950's–1980's (Averin, 1948; Klumov, 1957a; Gurvich and Kuzakov, 1960; Muzhchinkin, 1964; Nesterov, 1964; Perlov, 1983b; Burkanov, 1986, 1988; Mymrin, 1991; Marakov¹²; Khromovskikh¹⁵). On the Kuril Islands, Belkin (1966b) divided Steller sea lion rookeries and haulout sites into several classes based on space available, frequency of use, and the number of animals using that space. Major rookeries and haulout sites were occupied constantly by about

400 animals, whereas minor sites were infrequently used and occupied by fewer animals, often based on weather and available prey. Major sites comprise rookeries (reproductive sites) and haulout sites (nonreproductive sites). Nonreproductive sites were subdivided into two subclasses with respect to sex and age: bachelor male sites and juvenile (both sexes) sites.

Perlov (1980) distinguished only three types of sites (rookeries, juvenile sites, and bachelor sites) on the Kuril Islands with respect to sex and age composition of the individuals on land. However, he also indicated that his characterization of haulout sites was fairly subjective.

Over time, changes may occur in the use of a haulout site. Some sites change from rookeries into nonreproductive haulouts and vice versa (Perlov, 1980; V.N. Burkanov, personal observations). These transformations have been particularly rapid during the last 30 years due to the considerable decline in Steller sea lion abundance over the bulk of its range. Thus, the classification of Steller sea lion rookeries and haulout sites in our review relies on only two parameters proposed by Belkin (1966b), which we somewhat modified. One is the presence or absence of newborn pups at the site, and the second, constancy or duration of use by Steller sea lions. The following

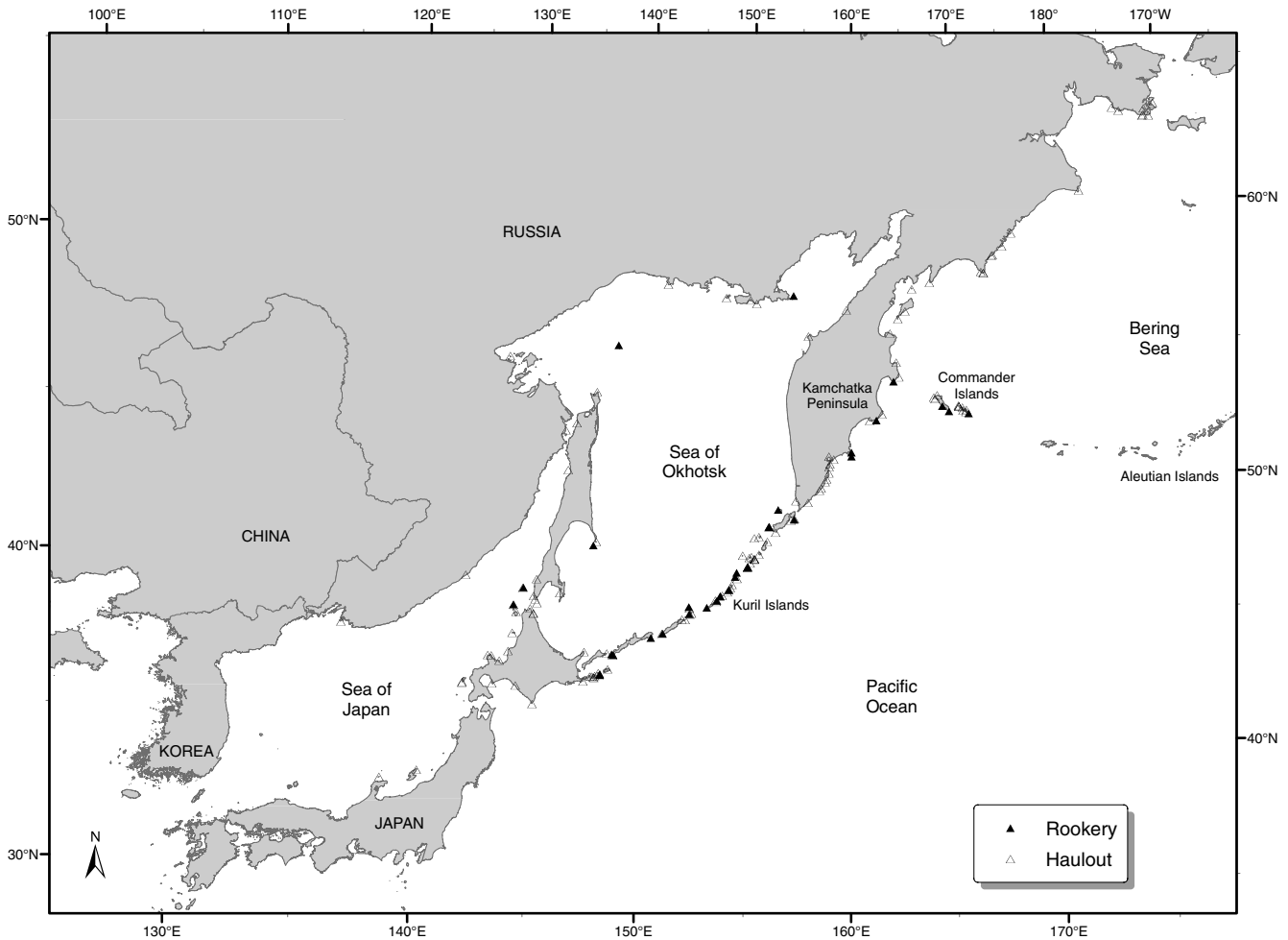


Figure 5.—All known permanent Steller sea lion rookeries and haulout sites along the Asian coast, 1742 to present.

4 criteria define terrestrial sites used by Steller sea lions in Russia.

- 1) Rookeries—sites where newborn pups occur during the breeding season (≥ 10 pups/year) in a protracted period (≥ 5 years),
- 2) Haulout sites—all sites where pups are not born or occur there irregularly (< 5 years) and/or in small numbers (< 10 pups/year),
- 3) Permanent sites—sites used regularly during a protracted period (≥ 10 years) year around or in a particular season, and
- 4) Temporary sites—haulout sites where Steller sea lions occur irregularly (not every year) or have been recorded only a few times.

According to the above classification, all rookeries are permanent sites and all temporary sites are haulouts (Fig. 4–6).

Seasonal Patterns of Steller Sea Lion Distribution

Abundance of Steller sea lions in every region varies with the season. While on Bering Island, Steller (1751) wrote “They are found in this island in spring, as well as in winter and summer, but only in certain parts—those are rocky and near precipices. Nevertheless, others come here every year along with the sea bears (northern fur seals).” While on the Pribilof Islands, Elliot (1873, cited in Allen, 1880) reported, “The time of arrival at, stay on, and

departure from the island is about the same [(as in the fur seal)]; but if the winter is an open, mild one the sea lion will be seen frequently all through it, and natives occasionally shoot them around the island long after the fur seals have entirely disappeared for the year. It also does not confine its landing to these Pribilof Islands alone ... it has been and is often shot upon Aleutian Islands and many rocky islets of the northwest coast ... they do not migrate back and forth every season.” Allen (1880) distinguished the above feature of the Steller sea lion as one of its most important distinctions from the northern fur seal. Based on Charles Bryant’s observation, Allen (1880) stated “Even after the breeding season they keep close to

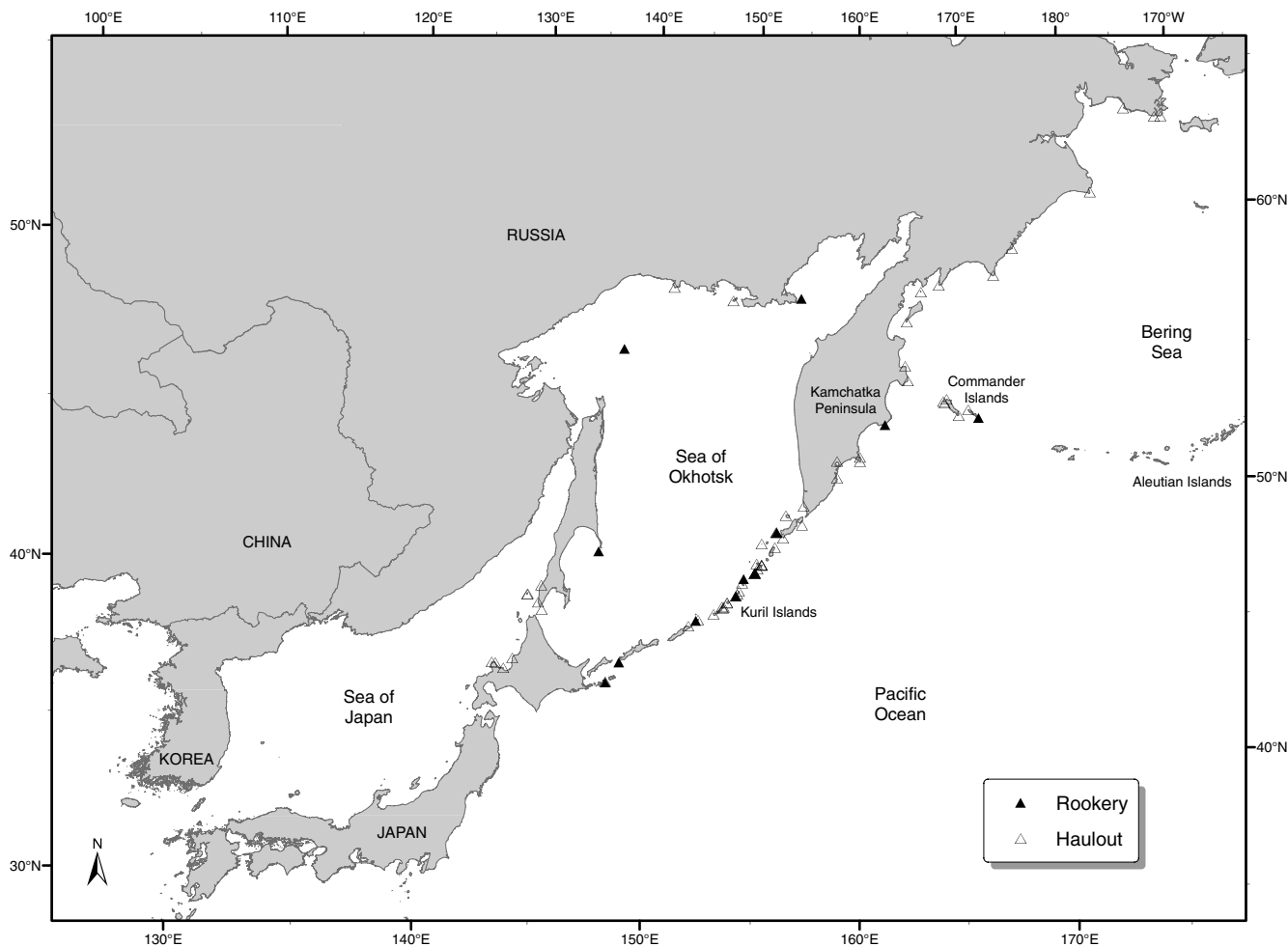


Figure 6.—Permanent Steller sea lion rookeries and haulout sites along the Asian coast in the 2000's.

the shore near the breeding station until the severe weather of January. After this time they are seen only in small groups till the shores are free from snow and ice in the spring.”

The range of Steller sea lions along the Asian coast extends for 4,000 km (over 2,000 n.mi.) north-eastward and includes a variety of different climate conditions from season to season. Coastal waters are frozen during winter in the northern and western parts of the sea lion's range off Chukotka, eastern Kamchatka, Sea of Okhotsk, and Sakhalin. During harsh winters, the entire southern area of the Sea of Okhotsk, including the Lesser Kuril

Islands and northern coast of Hokkaido Island, is covered by a dense ice layer.

The date when sea lions leave rookeries and haulouts varies with the onset of winter. Typically the onset of winter occurs in November–December off the Chukotka coast. Steller sea lions were recorded at a site until mid November (Mymrin, 1991), and mid December on the Yamsky Islands, Iony Island, and Tuleny Island (Kosygin et al., 1984). In general, these reports contend that in Asia, Steller sea lions do not haul out on land north of lat. 54°N during winter (Fig. 7), and they do not use haulout sites if blocked by ice.

In the early 1960's, development of fisheries and hunts of true seals (Phocidae) on ice resulted in observations of Steller sea lions at the ice edge in the Bering Sea (Tikhomirov, 1964a, b; Popov, 1982; Burkanov, 1988; Semenov, 1990; Mymrin²⁴). The authors have seen aggregations of hundreds of Steller sea lions on the ice in the mid 1980's in Karaginsky Gulf and

²⁴Mymrin, N. I. 1999. Role of traditional use of nature by aborigines of Chukotka in biodiversity of the Bering Sea [Rol' sistemy traditsionnogo prirodopol'zovaniya aborigenov Chukotki v biologicheskom raznoobrazii Beringova morya]. Report to World Wildlife Fund (WWF), 55 p.

Olyutorsky Gulf in the area between Karaginsky Island and the eastern side of the Goven Peninsula. From an aircraft, Kosygin et al. (1984) watched 20 sea lions hauled out on the ice in the Shelikhov Gulf on 19 February 1982, and fishermen commonly report numerous groups of Steller sea lions wintering in the Sea of Okhotsk off the western shore of Kamchatka. Sea lions also occur there during winter far from shore in areas where polynyas persist and fishing vessels operate. Adult and subadult males are more abundant and seen more frequently on the ice than females and juveniles (Tikhomirov, 1964a, b; Popov, 1982; Perlov, 1983a; Calkins, 1998).

Steller sea lions occur off Hokkaido and haul out on rocks in winter and rarely in summer (Fig. 7) (Nishiwaki and Nagasaki, 1960; Ito et al., 1977; Yamanaka et al., 1986). Seasonal differences occur in Steller sea lion abundance on rookeries and haulout sites on eastern Kamchatka, and several rookeries in the Kuril Islands (Fig. 8, 9), and at Nevelsk Port on the west side of Sakhalin Island (Belkin, 1966b; Perlov, 1970; Chupakhina et al., 2004). These observations also support the seasonal movements of Steller sea lions southward in winter. Based on his observations and evidence by local residents, Belkin (1966b) reported a marked seasonal pattern in the use of Steller sea lion rookeries and haulout sites on the Lesser Kuril Islands, believing that Steller sea lions migrate there from the more northerly Kuril Islands. Belkin (1966b) believed that a “substantial” proportion of Steller sea lions winter in the area of the summer rookeries and haulouts, but the winter distribution of Steller sea lions from the Kuril Islands remains obscure.

Regional Changes in Distribution and Abundance from the 18th to the 20th Centuries

Western Bering Sea

Summary of Surveys and Reports

Our analysis relies on published and unpublished data and personal commu-

nications with marine biologists, fishermen, and hunters collected during more than 20 years of marine mammal studies in the Russian Far East. There are no summary data available on the distribution, abundance, and exploitation of Steller sea lions in the western Bering Sea. Data collected by TIRK coastal observers between 1929 and 1932 have been largely unpublished or were not preserved. In fact, we did not find any reports of fisheries observers from Shlyupochnaya Bay (Koryak coast), the villages of Kichiga (northern Karaginsky Gulf) and Tilichiki (Korf Gulf), nor can they be found in individual copies in the archives of TINRO or its branches, or in the personal archives of researchers (Belopolsky¹; Freiman²; Belopolsky⁴; Razumovsky^{25, 26, 27}).

Pinniped haulout sites were monitored during a terrestrial survey in the 1950's in the Koryak National Okrug (Fig. 10) (Gurvich and Kuzakov, 1960). Their report lacks detailed information on the methods and dates, but it does include a useful list of Steller sea lion haulout sites in the region.

In 1962, Kasyanov²² conducted the first census of marine mammals on some haulouts on the eastern coast of Kamchatka, including the western Bering Sea from Karaginsky Island to Vitgenshtein Cape. The data from that survey remained unpublished, but they are preserved in the TINRO archive.

In late May–early June 1968, Chugunkov²³ conducted a survey of pinniped haulouts in Karaginsky Gulf off Goven Cape, but his report was not published. His report (held in the Kamchatrybvod archive) contains data

on Steller sea lion abundance on the islands of Karaginsky, Verkhoturov, and off Goven Cape.

In the 1970's, Vyatkin and Marakov (1972) and Kharkevich and Vyatkin (1977) worked on Verkhoturov Island for several seasons. Summary data on the distribution of Steller sea lions off Chukotka in the late 1970's are also available in the publication by Perlov (1983b). In 1979, Burkanov began working in Kamchatka and took part in nine complete surveys (1982, 1983, 1985, 1987, 1989, 1994, 1999, 2002, and 2004) and a number of partial surveys of the southern half of the Kamchatka coast. Only a small portion of these data have been published (Burkanov, 1986, 1988, 2000; Burkanov et al., 1990, 2003a).

In September 1991, Kitaev observed Steller sea lions on the haulout site at Krashennnikov Cape.³ From the 1980's to date, Kamchatrybvod Marine Mammal Protection Service has been conducting surveys of Steller sea lion haulouts in the western Bering Sea, and those data were given to us for analysis. From the early 1980's, Mymrin (1991, Mymrin²⁴) worked in Chukotka and collected and published data on the distribution and abundance of Steller sea lions in the western Bering Sea. He told us that an Eskimo hunter in Chukotka killed a Steller sea lion with a plastic tag on its flipper which came from Kozlov Cape.

A detailed review of the recent (1990–96) distribution of Steller sea lions in Chukotka was performed by Melnikov (2001); information on distribution and abundance of Steller sea lions during winter in the western Bering Sea is also available (Tikhomirov, 1964a, 1964b; Popov, 1982; Semenov, 1990). Vertyankin and Kovalevsky²⁸ provide data on the abundance and age-sex composition of Steller sea lions off Cape Krashennnikov on Karaginsky Island in November 1995 and 1996. Some data are available on the number of Steller

²⁵Razumovsky, V. I. 1929. Preliminary report on observations of Karaginsky Island [Predvaritel'ny otchet po nablyudeniuyu Karaginskogo ostrova]. TINRO, Vladivostok, Archive TINRO #256, 4 p.

²⁶Razumovsky, V. I. 1931. Brief preliminary report on pinniped surveys in Chukotka, 1931 [Kratky predvaritel'ny otchet o rabote nad lastonogimi Chukotki, 1931]. TINRO, Vladivostok, Archive TINRO #39, 24 p.

²⁷Razumovsky, V. I. 1932. Development of Steller sea lion harvests in the Russian Far East Region [Perspektivy morskikh sivuchevykh promyslov DVK]. TINRO, Vladivostok, Archive TINRO #168, 15 p.

²⁸Vertyankin, V. V., and V. A. Kovalevsky. 1997. The status and dynamics of the sea lion population in the haulout on Karaginsky Island (Russia). 15 p. Kamchatrybvod, unpublished manuscript.

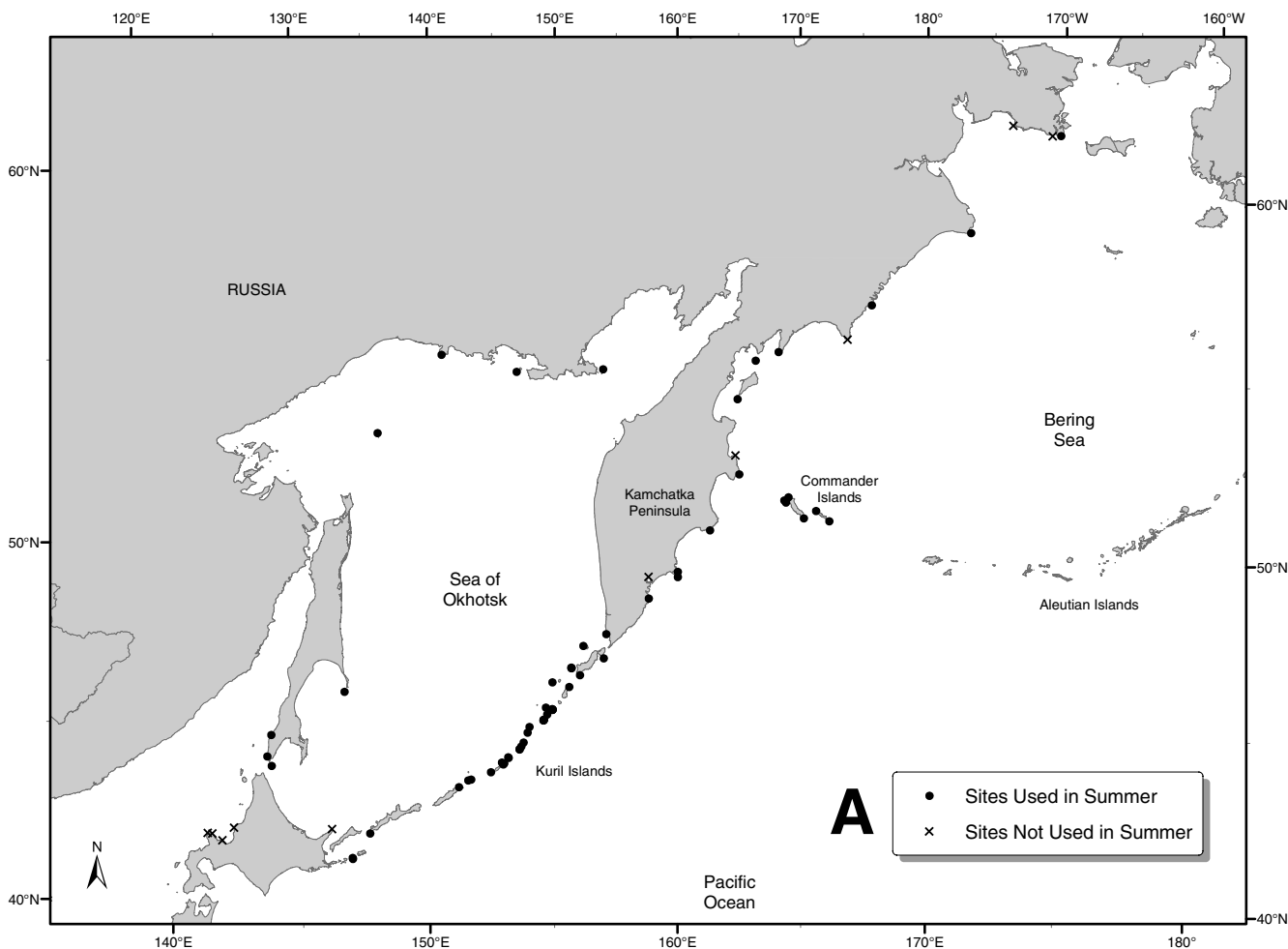


Figure 7.—Seasonal changes in the use of current rookeries and haulout sites on the Asian coast by Steller sea lions during summer (A) and winter (B).

sea lions taken as bycatch in the wall-eye pollock, *Theragra chalcogramma*, and Pacific herring, *Clupea harengus pallasii*, fisheries in Olyutorsky Gulf in 1991–92 and 2002 (Burkanov et al., 2006b, Burkanov et al.²⁹).

²⁹Burkanov, V. N., E. G. Mamaev, and A. V. Tret'yakov 1992. Report on the completion of scientific research on the theme of The organization of monitoring and an explanation of the reasons for the decline in sea lion population in the Kamchatka region [Otchet o vypolnenii nauchno-issledovatel'skikh rabot po teme: Organizatsiya monitoringa i vyyavlenie prichin snizheniya chislennosti sivucha v Kamchatskom regione]. Kamchatsky filial TIG DVO RAN, Petropavlovsk-Kamchatsky, Archive KF TIG DVO RAN, 21 p.

Distribution and Age–Sex Composition

Steller (1751) and Krasheninnikov (1755) stated that Steller sea lions do not occur north of lat. 56°N, but neither author provided evidence to support their conclusion. In the winter of 1739–40, Krasheninnikov made a trip from the mouth of the Kamchatka River (Nizhne-Kamchatsk) along the eastern coast to the mouth of the Karaga River. However, sea lions do not occur there near shore at that time of the year, so it is no surprise that he did not see them. Krasheninnikov (1755) described the daily life of the Koryak natives residing on Karaginsky Island, but he did not mention sea lions in his account.

Steller could have received information from Vitus Bering or other participants in Bering's first voyage in 1728 when they discovered the strait between Asia and North America. A navigation log of the first voyage indicates that the explorers observed Steller sea lions near Navarin Cape (Fig.10, site 6) located at lat. 63°N (Sopotsko, 1983) on 27–28 July 1728. We assume the information from the ship's log is more reliable than Krasheninnikov's and Steller's statements of the absence of sea lions north of 56°N.

Presently there is a sea lion haulout site near Navarin Cape and sightings of swimming sea lions near Bering's ship at this time of year was plausible. The

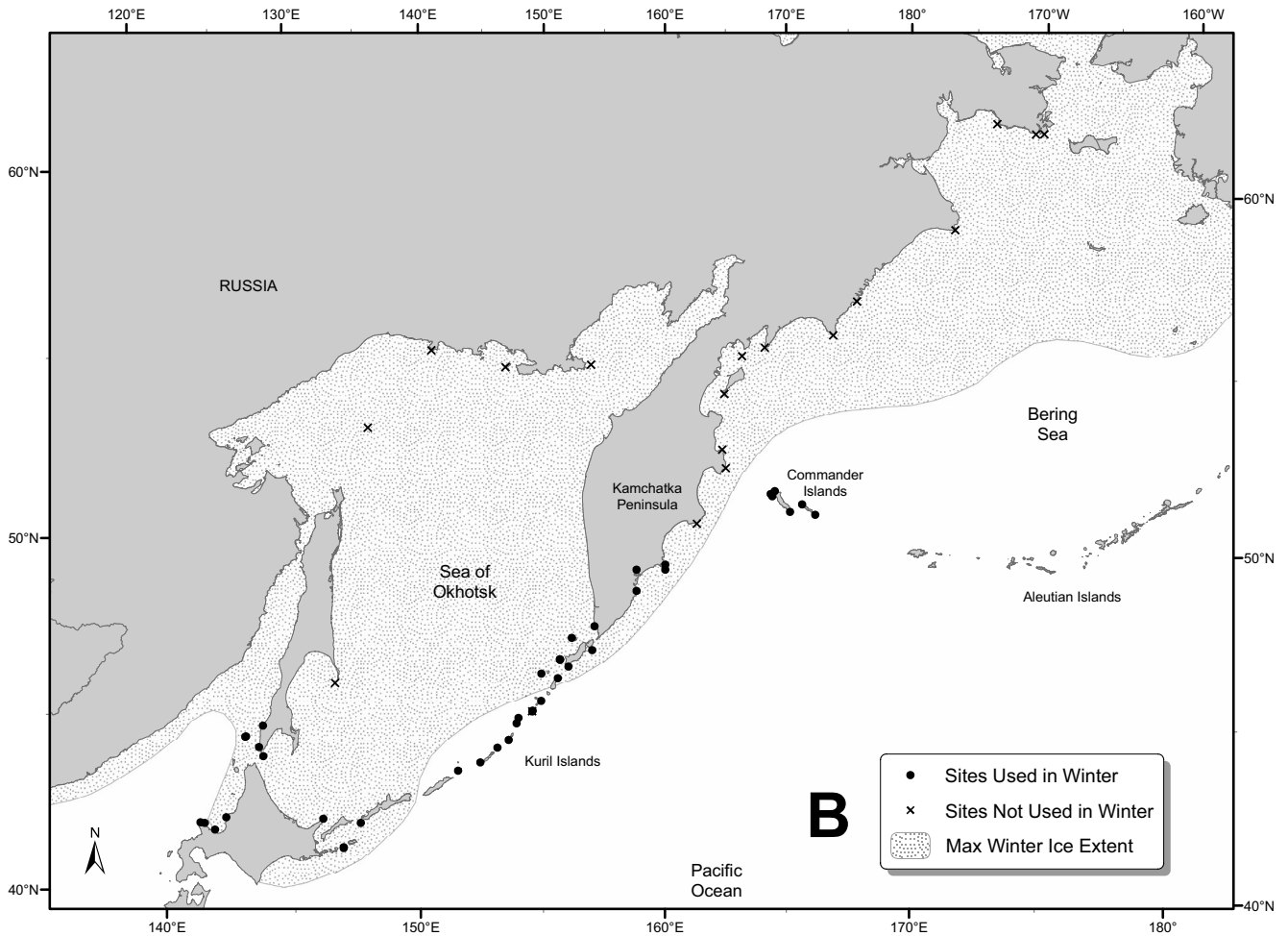


Figure 7.—Continued.

absence of Steller sea lions north of lat. 56°N is one of several errors that occurred in Steller’s publication, though they may not be Steller’s error, but errors of those who compiled Steller’s data from his field notes or a misprint (e.g. printed 56 instead of 65). We conclude that in the first half of the 18th century, Steller sea lions inhabited waters of the western Bering Sea as far north as lat. 63°N.

Although Steller (1751) and Krashennikov (1755) indicated that Steller sea lions do not occur north of lat. 56°N, a navigation log of Bering’s first voyage shows that sea lions were observed at lat. 63°N at Navarin Cape. In the late 19th century, Allen (1880) noted that

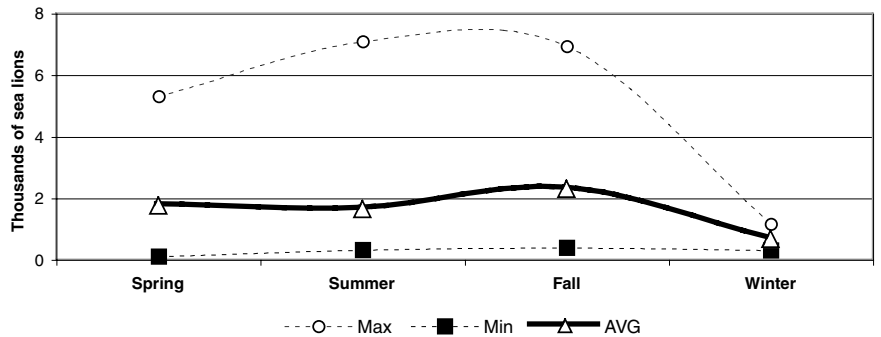


Figure 8.—Seasonal changes in average minimum and maximum values of Steller sea lion abundance on the eastern Kamchatka coast, 1933–2002.

the northern extent of the Steller sea lion range was obscure. Referring to W. H. Dall and H. W. Elliott, he proposed

that Steller sea lions did not occur north of the southern ice edge (St. Matthew Island, roughly lat. 61°N).

However, in his section on Steller sea lion habitats, Allen (1880) included the “shores of the North Pacific, from Bering Strait southward to California and Japan” as the distribution range. Referring to Elliott (1882), Smirnov

(1908) included the entire Bering Sea as part of the Steller sea lion range without giving any distribution details, and Ognev (1935) stated that the northern extent of the range was lat. 66°N (i.e. Bering Strait). It is difficult to under-

stand what evidence led Ognev to arrive at that conclusion. Presumably, he was guided by Allen’s (1880) hypothesis or he had some further evidence he did not mention.

The first reliable evidence of the northern extent of the Steller sea lion’s range in Asia is contained in the report by Belopolsky¹, a TIRKh (TINRO) coastal observer. He noted that according to Eskimos, Steller sea lions occurred “very rarely” on the Chukotka Peninsula (lat. 64°N), but “they know of these mammals.” During Belopolsky’s stay in that region (1930–31), Eskimos harvested two Steller sea lions off the northern coast of the Anadyr Gulf

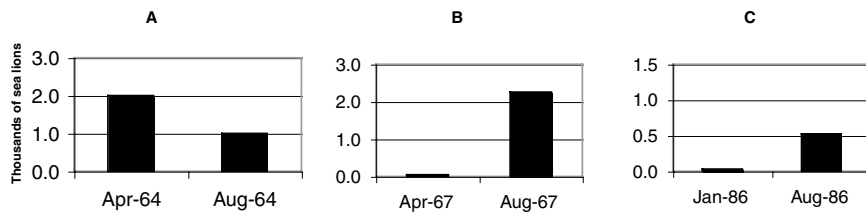


Figure 9.—Seasonal changes in abundance of Steller sea lions at specific sites on the Kuril Islands (Belkin, 1966b; Perlov, 1970; Burkanov, text footnote 3; Kuzin, text footnote 36). A = Peshchernaya Rock; B = Brat Chirpoev; C = Dolgaya Rock.

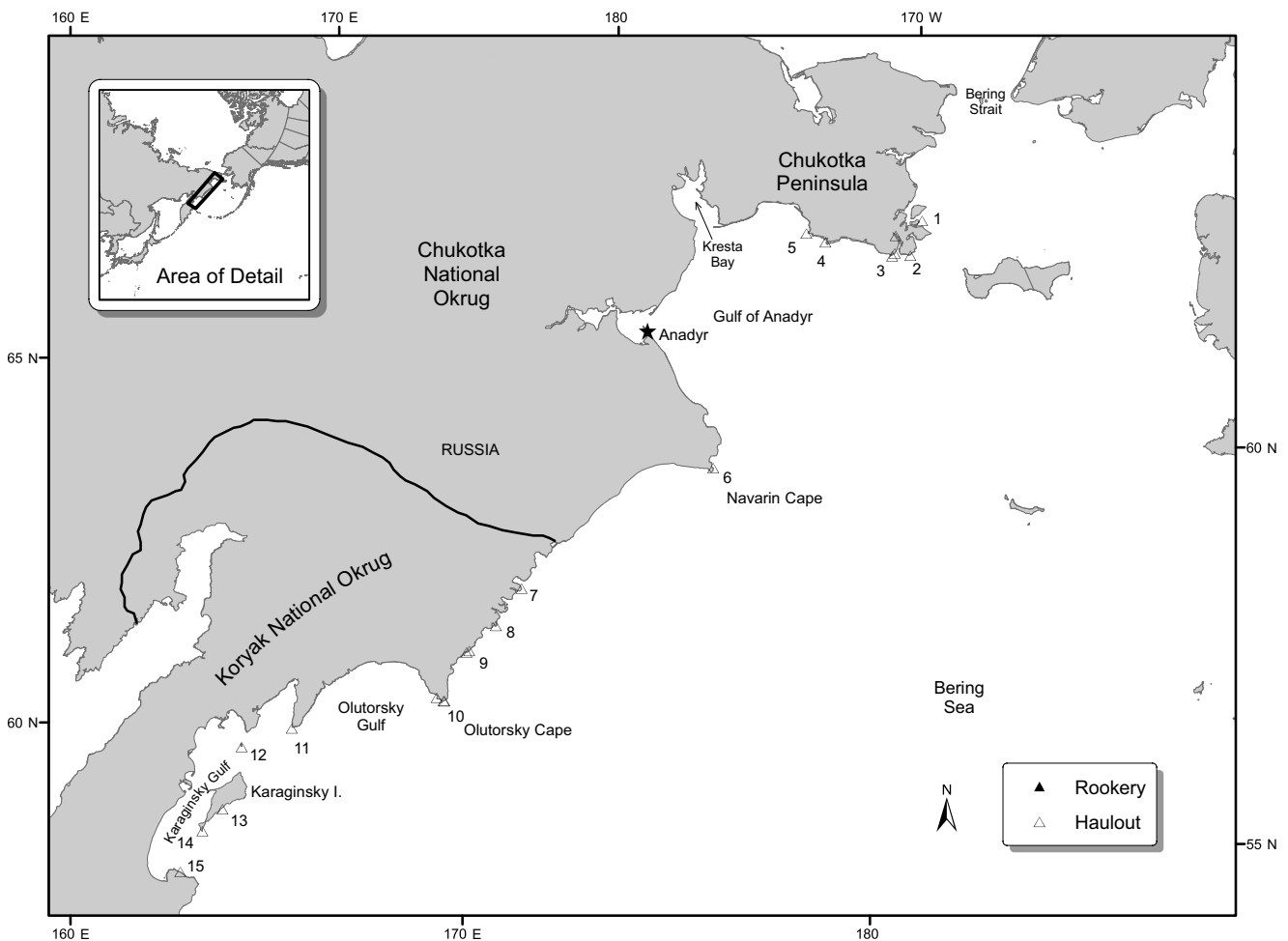


Figure 10.—Steller sea lion sites used in the western Bering Sea, 1730’s to present. 1-Nuneangran Island; 2-Chukotsky Cape; 3-Erdmana Island, Lesovskogo and Stoletiya Capes; 4-Achchen Cape; 5-Bering Cape; 6-Chesna Cape; 7-Dyryavy Cape; 8-Vit-genshteyn Cape; 9-Temny Cape 1 and 2; 10-Stupenchaty, Olutorsky, and Irina Capes; 11-Govena Cape; 12-Verkhoturou Island; 13-Karaginsky Island Uril Cape; 12-Karaginsky Island Krashenninnikov Cape; 15-Nachikinsky Cape.

(Kresta Bay and Bering Cape, Fig. 10, site 5).

On 10 July 1931, Belopolsky¹ watched a Steller sea lion swimming off Meechkin Spit. He also reported a group of Steller sea lions hauled out on the pebble spit in Dezhnev Bay between Navarin Cape and Olyutorsky (sighted by the pilot, Landin, from an aircraft in 1930). However, the pilot likely mistook numerous largha seals, *Phoca largha*, for Steller sea lions in this area. Another TIRKh observer mentioned that one Steller sea lion was taken in Chukotka in the summer of 1929, but he also believed Steller sea lions to be an “occasional” species in that region (Freiman²). No evidence of Steller sea lions dwelling off the western and southern coast of Anadyr Gulf (Fig. 10) is available.

Belopolsky⁴ studied marine mammal resources in the Karaginsky District of Kamchatka from August 1930 to October 1931 and reported that “. . . in the Region, I happened to sight the Steller sea lion on the islands Karaginsky and Verkhoturov. According to interviews, the Steller sea lion occurs off Nachikinsky Cape; and young lions, in Korf Gulf and off Govena Cape, if only rarely. On Verkhoturov Island, Steller sea lions haul out on the reefs of the southeastern aspect. This is the region’s largest haulout, but its population does not exceed 50 individuals. Another haulout is in the south of Karaginsky Island, at Krashennikov Cape, with a population of no more than 15 individuals, which haul out at two sites on three cliffs. Steller sea lions haul out in the course of the entire summer and fall. According to Koryaks, there are no Steller sea lions in winter.”

The available evidence suggests that in the 1930’s, Steller sea lions occurred along the entire coast in the western Bering Sea from Karaginsky Gulf in Kamchatka to Bering Strait. Apparently the appearance of sea lions in Chukotka in the 1930’s became more regular and frequent compared to the 1920’s and earlier periods. In the 1950’s, the southern part of the region (the Koryak coast) had at least five Steller sea lion haulouts, and their population was considerably higher than that reported in the

1930’s (Gurvich and Kuzakov, 1960). These data corroborate data collected in September 1962 by Kasyanov²² who surveyed six haulouts (Fig. 10, sites 7 and 10–14), but Steller sea lions were only present at three of them (Table 1, sites 8, 12, and 14). In March–June 1962 during an experimental harvest of true seals in the Bering Sea, Tikhomirov (1964a, b) observed large aggregations of Steller sea lions on the ice edge in the eastern Bering Sea (between the Pribilof Islands and St. Matthew Island) and in Olyutorsky Gulf. In May, both males and pregnant adult females were present (Tikhomirov, 1964a). He attributed the large number of Steller sea lions resting on the ice with the coincidence of foraging on herring schools along the southern ice edge.

In spring (late May–early June) 1968, Steller sea lions were seen at the haulout site at Verkhoturov Island and swimming off Govena Cape (they were absent from the haulout) and Krashennikov Cape, Karaginsky Island. At that time, there was still considerable ice in the southern Karaginsky Gulf. Mostly young individuals were observed hauled out on the Verkhoturov Island haulout site (Chugunkov²³).

Steller sea lions occurred in small groups of up to 30 animals off Chukotka during summer–fall of the 1980’s (Mymrin, 1991). They hauled out onto coastal cliffs at several sites along the southern side of the Chukotka Peninsula at Bering Cape and in Provideniya Bay (at Stoletiya Cape and Lesovsky Cape), Nuneanran Island, and also at walrus haulouts (Perlov, 1983b; Mymrin, 1991, Mymrin²⁴). Steller sea lions of all ages, but primarily young males, occurred along the coast until late fall (November 1987) and were seen swimming and on the ice 36 km (20 miles) south of Chukotsky Cape (Mymrin, 1991).

When surveying Navarin Cape, we recorded a small group of young Steller sea lions on the reefs off Chesna Cape (Fig. 10, site 6) in June 1984. The operators of a nearby meteorological station located in Gavriil Bay reported that Steller sea lions hauled out there regularly throughout the summer. Farther south in Olyutorsky Gulf and

Karaginsky Gulf, Steller sea lions were numerous during the entire ice-free period and hauled out on Karaginsky Island, Verkhoturov Island, around Olyutorsky Cape, and Vitgenshtein Cape (Burkanov, 1986, 1988; Burkanov et al., 1988, 1990).

During the Russian–American research cruise in March through April 1981, Steller sea lions were seen on the ice edge from Karaginsky Gulf to long. 178°W (Popov, 1982; Calkins, 1998). When denser ice fields were examined close to the shore between Cape Olyutorsky and Dezhnev Bay, Steller sea lions were not sighted (Popov, 1982). All animals harvested on this cruise (110 individuals) consisted of sexually mature males.

In the first half of the 1990’s, single individuals or small groups of up to six Steller sea lions were sighted along the southern and eastern coasts of Chukotka (including Bering Strait) as early as late May (Melnikov, 2001). They were sighted less frequently in June, but counts increased again in July through August. Even though Steller sea lions were common in summer in Bering Strait and moved towards the Chukchi Sea, they were never sighted off the northern coast of the Chukchi Peninsula. Nevertheless, Melnikov (2001) proposed the northern extent of the Steller sea lion range to be north of Bering Strait (lat. 66°N), somewhere in the Chukchi Sea.

Prior to ice formation in fall, Steller sea lions occur frequently in groups of up to six animals off the southernmost part of the peninsula; that is, Chukotsky Cape (Fig. 10, site 2). It’s very likely that these individuals are returning from the Chukchi Sea and Bering Strait (Melnikov 2001). The latest sighting of a Steller sea lion in that region was 25 December 1995.

In the late 1990’s, no Steller sea lions were recorded on the haulout sites at Navarin Cape and Chesna Cape (Vaisman³⁰). Along the Koryak coast and the northern half of eastern Kamchatka

³⁰Vaisman, A. 2004. WWF-Russia, 19/3 Nikoloyamskaya St., Moscow, Russia, 109240. Personal commun.

Table 1.—Maximum counts of Steller sea lions on haulout sites in the western Bering Sea, 1930's–2000's.

Site no. ¹	Site name	No. of Steller sea lions							
		1930's	1940's	1950's	1960's	1970's	1980's	1990's	2000's
1	Chukotka/Nuneangran Island	0					Few		
2	Chukotka/Chukotsky Cape	0					Few		60
3	Chukotka/Provideniya, 3 sites						Few		30
4	Chukotka/Achchen Cape						Few		Few
5	Chukotka/Bering Cape	0					30	Few	Few
6	Chukotka/Chesna Cape						30		70
7	Dyryavy Cape						30	59	2
8	Vitgenshteyn Cape	Unknown		Many	350		3,000	250	13
9	Temny, 2 sites						20	0	1
10	Olyutorsky Cape, 3 sites						520	140	Few
11	Govena Cape	Few		1,500	20		2,250	0	1
12	Verkhoturov	50		500	450	1,000	3,000	120	90
13	Karaginsky/Uril Cape	0			0		700	0	0
14	Karaginsky/Krashenninnikov Cape	15		200	120	200	700	200	44
15	Nachikinsky Cape	Few		Few		Few	Few	0	0
	Sources	Belopolsky text footnotes 1 and 4; Freiman text footnote 2.	no data	Belov ² ; Gurvich and Kuzakov, 1960	Kasyanov text footnote 22; Chugunkov text footnote 23	Kharkevich and Vyatkin, 1977; Vyatkin ³	Perlov, 1983b; Mymrin, 1999; Mymrin text footnote 24; Burkanov, 1986, 1988, and personal archive	Semenov ⁴ ; Testin ⁵ ; Kovalevsky and Komarov ⁶ Vertyankin and Kovalevsky text footnote 28	Burkanov et al., 2003a; Burknov, N. V., unpubl.; Melnikov, 2001; Vazhenina, 2004; Zagrebina and Litovka, 2004

¹ Site numbers as indicated on Figure 10.

² Belov, G. A. 1957. Hunting economy on Karaginsky Islands and its perspectives (survey report in summer 1957) [Okhotnich'e khozyaystvo o. Karaginskogo i perspektivy ego razvitiya (Otchet po obsledovaniyu o. Karaginskogo za leto 1957 goda)]. Kamchatskaya ekspeditsiya VNIIZhP i KORPS, Petropavlovsk-Kamchatsky, Archive VNIIZhP, 63 p.

³ Vyatkin, P. S. 1979. Kamchatka Branch of All-Union Research Institution of Game Management and Fur Farming, 43 Osipenko, St. Petropavlovsk-Kamchatsky, Russia, 683006. Personal commun.

⁴ Semenov, A. R. 1991. Kamchatrybvod, 9, Partizanskaya St. Petropavlovsk-Kamchatsky, Russia, 683000. Personal commun.

⁵ Testin, A. I. 1991. Kamchatrybvod, 9, Partizanskaya St. Petropavlovsk-Kamchatsky, Russia, 683000. Personal commun.

⁶ Kovalevsky, V. A., and V. A. Komarov 1995. Report on business trip to Olutorsky Region (July 28–September 27, 1995) [Otchet o komandirovke v Olyutorskiy rayon (28 iyulya–27 sentyabrya 1995 g.)]. Kamchatrybvod, Petropavlovsk-Kamchatsky, Archive Kamchatrybvoda, 17 p.

in the early 1990's, sea lions were a common species, occurring consistently on all haulout sites, but abundance was lower than in the late 1980's. Sea lions seen at Krashenninnikov Cape (Karaginsky Island, Fig. 10, site 14) in November 1995 and 1996 consisted of up to 50% sexually mature bulls, 30% young males (3–6 years old), and the remaining 20% included juveniles (1–2 years old) and pups (4–5 months old) with their nursing mothers (Vertyankin and Kovalevsky²⁸). We found no records of Steller sea lions breeding in the Western Bering Sea region. All 15 sites are used as haulout sites by Steller sea lions during the ice-free season only.

Abundance

Data on Steller sea lion abundance in the western Bering Sea prior to the 1930's does not exist; the existing data show that abundance was relatively

low during the 1930's. Sea lions were occasionally seen on the Chukotka coast in summer and were infrequently harvested by Eskimo hunters then (Belopolsky¹; Freiman²). Abundance along the Chukchi Peninsula and in Anadyr Gulf probably did not exceed several dozen or perhaps a hundred individuals, and there were no sites where Steller sea lions hauled out regularly.

South of Navarin Cape, Steller sea lions occurred more frequently. A haulout site did exist at Vitgenshtein Cape, but abundance data are lacking. In Karaginsky Gulf and Olyutorsky Gulf, Steller sea lions were common but at low levels of abundance. At least three Steller sea lion haulout sites existed (Verkhoturov Island, Krashenninnikov Cape on Karaginsky Island, and Nachikinsky Cape) where several dozen individuals hauled out in summer (Belopolsky⁴). Total abundance in the

western Bering Sea in summer probably did not exceed 200–300 sea lions during the 1930's (Table 1).

By the mid 1950's Steller sea lion abundance increased in the southwestern Bering Sea. Up to 1,500 sea lions hauled out off Govena Cape in spring, up to 500 on Verkhoturov Island in summer, and over 200 in late summer on Krashenninnikov Cape on Karaginsky Island (Table 1). An estimated 50 individuals were at the small Nachikinsky Cape haulout site and several hundred to several thousand sea lions were estimated at the Vitgenshteyn Cape haulout site. Thus, in spring and summer the southwestern Bering Sea provided habitat for over 1,000 (and presumably several thousand) Steller sea lions.

In late May–early June 1962 and September 1968, two surveys of haulout sites were conducted. In the first survey, there were 113 sea lions on one haulout

Table 2.—Steller sea lion counts in the western Bering Sea, 1982–2004. Bold numbers are estimates based on the best available data.

Site no. ¹	Site name	No. of Steller sea lions by date and type of count									
		1982 June 1–6 Aerial	1983 July 1–12 Boat	1985 June 5–Aug. 7 Aerial	1987 June 10–July 4 Aerial & Boat	1989 June 19–23 Aerial	1991 June 23–27 Boat	1994 June 24–30 Aerial	1999 July 8–Aug. 24 Aerial & Boat	2002 June 23–28 Boat	2004 June 18–21 Boat
7	Dryvay Cape	30	0				0	0	2	0	0
8 ²	Vitgenshtein Cape	3,000	2,300	2,000	750	550	167	107	123	13	0
9	Terny, 2 sites	0			20		0	0		1	0
10 ²	Olyutorsky Cape, 3 sites	250	220	70	237	225	140	2	5	0	0
11 ²	Govena Cape	250	0	0	0	9	0	0	0	0	1
12 ²	Verkhoturov	1,300	600	600	244	410	120	91	52	3	90
13 ²	Karaginsky/Uril Cape	110	110	700	0	5	0	0	0	0	0
14	Karaginsky/ Krasheninnikov Cape			700		387	85	200	47	1	44
15	Nachikinsky Cape			0	0	0	0	0	0	0	0
	Sites surveyed	10	8	8	9	8	10	10	9	11	11
	Total counted	4,940	3,120	4,070	1,251	1,586	512	400	229	18	135
	Total at five trend sites	4,910	3,230	3,370	1,231	1,199	427	200	180	16	91

¹ Site numbers as indicated on text Figure 10.

² Trend sites.

site at Verkhoturov Island, about 20 were in the water off Govena Cape, and 2 were sighted off Krasheninnikov Cape (Chugunkov²³). During the second survey, Steller sea lions were seen on three haulouts (Krasheninnikov Cape on Karaginsky Island, Verkhoturov Island, and at Vitgenshtein Cape; Table 1) with a rough estimate of 1,000 sea lions (Kasyanov²²) (and based on data obtained from interviews, up to 1,500 Steller sea lions were on Verkhoturov Island in May). Thus, at least 1,500 Steller sea lions were on haulout sites in spring during the mid 1950's and the early 1960's in northern Karaginsky Gulf (Gurvich and Kuzakov, 1960; Kasyanov²²). In spring 1968, Steller sea lion abundance did not exceed 200 (Chugunkov²³).

Few data are available for the area during the 1970's, but it is known that Steller sea lions continued to use haulout sites on Krasheninnikov Cape (Karaginsky Island) and Verkhoturov Island. Kharkevich and Vyatkin (1977) recorded up to 1,000 hauled out regularly on Verkhoturov Island in the mid 1970's, and Burkanov³ found about 1,000 Steller sea lions on Verkhoturov Island in September 1979. There are no data on Steller sea lion abundance on Krasheninnikov Cape, but in the 1970's there were up to several hundred observed in the vicinity (Vyatkin³¹). A small number of Steller sea lions were also found at a haulout site on

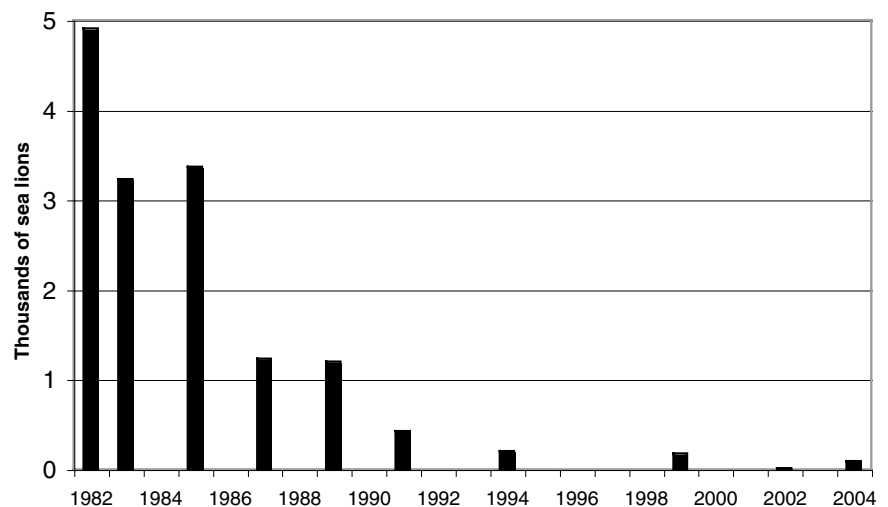


Figure 11.—Counts of non-pup Steller sea lions at five trend sites in the western Bering Sea, 1982–2004.

Nachikinsky Cape during the same time period (Bondarev³²).

During summer (June through August) 1982–2004, 10 surveys were conducted covering the bulk of Steller sea lion haulouts in the southwestern Bering Sea (Table 2). Most animals

were young males, but some adult females were seen nursing yearlings; no newborn pups were seen. Steller sea lion abundance in 1982 totaled about 5,000 animals and declined every year since; in 2002 only 18 individuals were counted (Fig. 11, Table 2). The 20-year decline was 99.7%, or 22.5% per year. Although Steller sea lion abundance in the western Bering Sea declined to only dozens of individuals in the summer of 2002 (Burkanov et al., 2003a,b), a boat survey in 2004 showed a slight increase to over a hundred individuals (Table 2).

³¹Vyatkin, P. S. 2004. Kamchatka Branch of the Pacific Institute of Geography, Far East Division of Russian Academy of Sciences, 19a Prospekt Rybakov, Petropavlovsk-Kamchatsky, Russia, 683024. Personal commun.

³²Bondarev, N. P. 1979. Karaginsky Hunting Interprise, Ossora, Kamchatskoy Oblasti, Russia, 688700. Personal commun.

The overall trend in Steller sea lion abundance in the western Bering Sea was low in the 1930's and they were considered rare along the Chukotka coast. By the mid 1950's abundance increased in Karaginsky Gulf and Olyutorsky Gulf to several thousand individuals. In the late 1960's, sea lion abundance in spring declined, only to increase again in the mid to late 1970's (Fig. 12). In the early 1980's, Steller sea lion abundance in summer was at least 5,000 animals, and they were common throughout the entire region, including Chukotka. During the last 20 years of the 20th century, Steller sea lions declined by 22.5% per year and by the early 21st century sea lion abundance decreased to about a hundred individuals, similar to the 1930's.

Commander Islands

Distribution and Age-Sex Composition

The earlier reports on the Commander Islands (Steller, 1751; Waxell, 1940) describe only habitat relief features that were important to Steller sea lions when forming rookery sites, but they do not specify locations of rookeries. The map drawn by Steller (1743) suggested that Steller sea lions were distributed in the southwest part of Bering Island (Steller called one of the local bays Sea Lion Bay). Steller (1751) also described the breeding behavior of Steller sea lions and documented a shared Steller sea lion and northern fur seal rookery on the southwest coast of Bering Island. The sea lion population on Bering Island increased in summer and breeding most likely occurred on the southwest side of the island in the vicinity of Gladkovskaya Bay, Lisinskaya Bay, and Manati Cape (Fig. 13, sites 19 and 20).

Participants of Vitus Bering's voyage did not visit Medny Island, but there is evidence from Pallas (1789) that Steller sea lions were there, at least in winter; no observations of sea lions breeding at the island were reported. Pallas (1789) states "In the fall Russian fur harvesters go to Bering and Medny islands where they stay for the winter. In the latter they hunt various marine mammals, especially Steller sea lion..." Thus, in the mid 18th century, Steller sea lions

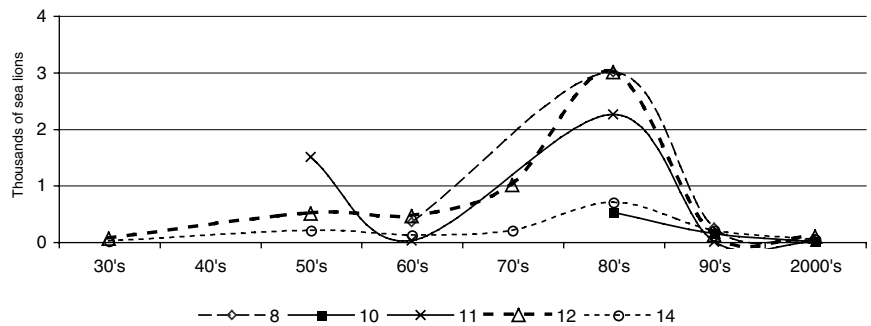


Figure 12.—Observed changes in maximum counts of Steller sea lion at specific haulout sites in the western Bering Sea, 1930's–2000's. See Figure 10 and Table 1 for site number and site names.

also lived on Medny Island, at least in winter.

There is no information on the distribution and number of Steller sea lion rookeries on the Commander Islands in the first half of the 19th century, although the first permanent human residents arrived on the islands in 1805 to harvest fur seals there. According to Grebnitsky (1902), Steller sea lions had not been abundant in the Commander Islands since the mid 19th century. Stejneger (1898) visited the Commander Islands and all the existing fur seal rookeries several times in the late 19th century, but dedicated only a few lines in his large publications to Steller sea lions: "The sea lion was formerly quite abundant, but now become nearly extinct on both islands, though still numerous in certain localities on the Kamchatka coast. In 1895 I saw only one individual on Sivuchy Kamen' at Northern Rookery [(Yushina Cape)], Bering Island." Grebnitsky (1902) and Suvorov (1912) also stated that Steller sea lions occurred on the Commander Islands in greater numbers during winter than summer when only single individuals were present.

The reported low abundance of Steller sea lions on the Commander Islands continued until the mid 1920's. Marakov (1964) mentioned an unpublished report by Kulagin who wrote that in 1923, individuals and small groups of Steller sea lions were often seen at the northern fur seal rookery [(Yushina Cape)] hauled out at Sivuchy Kamen' (Fig. 13, site 16). Steller sea lion sites

at Bering Island were located at Ariy Kamen', Manati Cape, and Yushina Cape, and at Medny Island only at Yugo-Vostochny Cape (Fig. 13). Ognev (1935), referring to Kardakov, stated: "To Bering Island Steller sea lions come (on average) in October to stay till March. Prior and after that period their abundance is low, but in the summer, near fur seal rookeries it is always possible to see individuals, mainly young ones, of 1–2 years. At Bering Island, Steller sea lions formed haul outs in winter on Manati Cape (southern extremity of the island) and partly in the Gladkovskaya Bay (around it, to be exact), a bit to the north of Manati Cape on the west side. There they stay in low abundance. Their population on Manati Cape is about 500–1,200. On Medny Island they concentrate in winter at the south-east extremity (fur seal rookery) and reach up to 2,000 heads." In addition to the three sites mentioned by Kardakov (Ognev, 1935), Barabash-Nikiforov (1935) reported winter haulout sites at Ariy Kamen' (northwest extremity of Bering Island) and the northwest coast of Medny Island. Both authors state that only males are harvested at the islands; one female was killed by a local hunter in April 1932.

During the early 1920's to the late 1930's, Steller sea lions were sighted on Bering Island at Ariy Kamen', Gladkovskaya Bay, and Manati Cape, and on Medny Island at Yugo-Vostochny Cape and Sivuchy Kamen' (little island in Bobrovaya Bay on the northwest coast; Fig. 13, site 21).

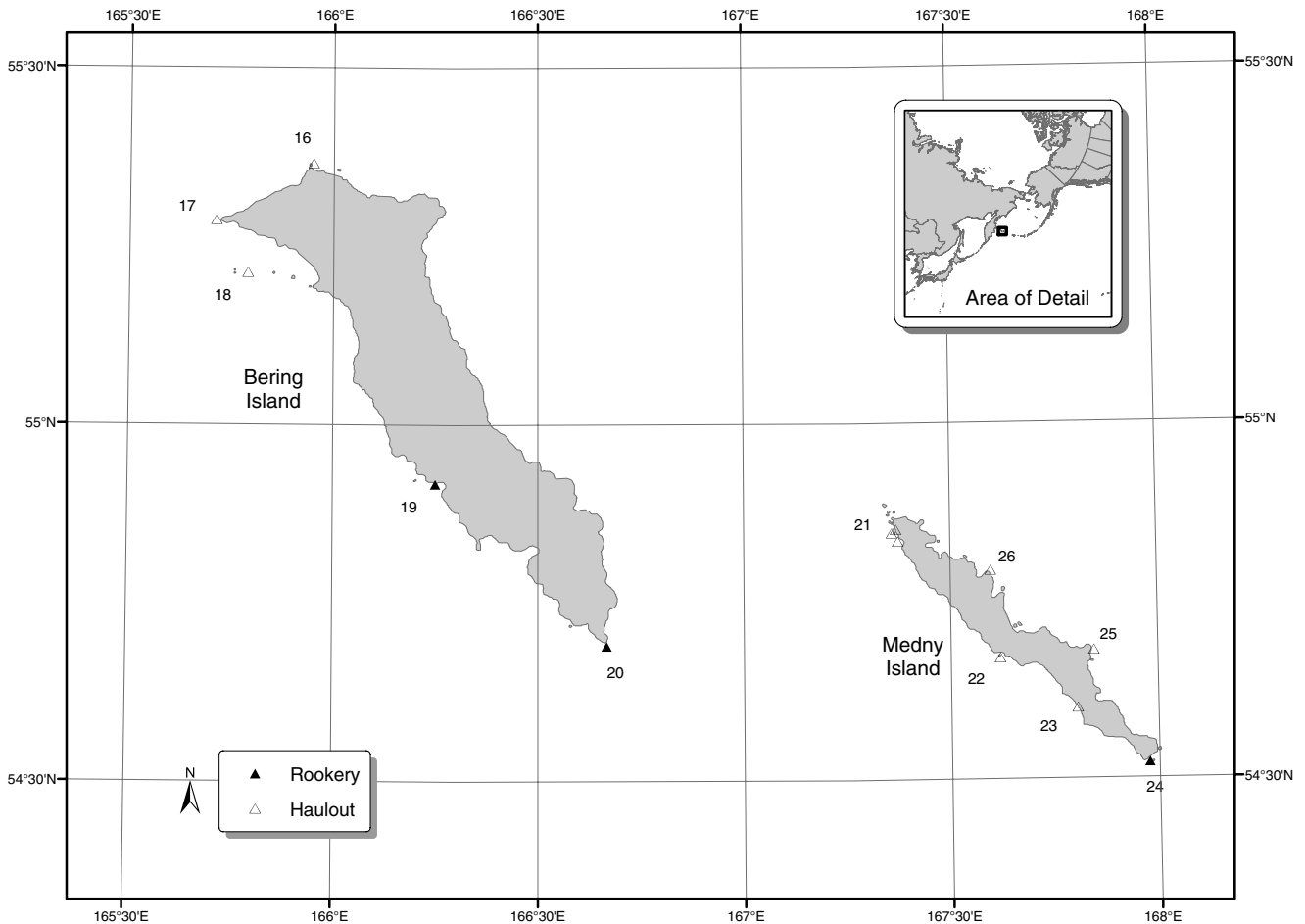


Figure 13.—Steller sea lion sites on the Commander Islands, 1742 to present. 16-Yushina Cape; 17-Severo-Zapadny Cape; 18-Ariy Kamen' Island; 19-Gladkovskaya Bay; 20-Manati Cape; 21-Bobrovye Rocks, Krasnaya Bay, Sivuchy Kamen' Island (northwest), Bobrovaya Bay; 22-Kosoy Kamen' Rock; 23-Uril'e fur seal rookery; 24 – Yugo-Vostochny Cape; 25-Cherny Cape; 26-Sivuchy Kamen' Island (east).

Few data exist on Steller sea lions in the Commander Islands from the 1930's through the 1950's, but in the mid 1950's through the early 1960's, the principal haulout sites were similar in number and were located in the same sites as in the 1930's (Marakov, 1964, 1972; Muzhchinkin, 1964; Nesterov, 1964; Khromovskikh, 1966; Chugunkov, 1968, 1971, 1982; Marakov^{11, 12}; Nesterov¹³). Marakov (1964) and Nesterov (1964) mentioned two additional haulout sites at Medny Island at Kosoy Kamen' Rock off the west coast, and at Cherny Cape on the east coast. They did not state when these haulouts were established, but from the context we assume they

existed through the 1950's and early 1960's.

After nearly a century (about 1850–1950) of low abundance, Steller sea lions reappeared on the islands in summer in the mid 1950's. They formed more or less regular haulouts on five sites at Bering Island, including Yushina Cape, Severo-Zapadny Cape, Ariy Kamen' Island, Gladkovskaya Bay, and Manati Cape, and at five sites on Medny Island, including Yugo-Vostochny Cape, Kosoy Kamen', Sivuchy Kamen' (Bobrovaya Bay), Sivuchy Kamen' (Zhirovskaya Bay), and Cherny Cape (Fig. 13). Steller sea lions hauled out year-round at Manati Cape (Bering Island) and at Yugo-Vostochny Cape (Medny Island).

The remaining sites were mainly used in the winter.

In the late 1970's, the distribution pattern of Steller sea lions at the islands changed again when sea lions stopped using haulout sites at Cherny Cape and Kosoy Kamen' on Medny Island. Since 1978 they ceased using the haulout site in Gladkovskaya Bay on Bering Island, and since 1983 they ceased using the haulout site at Sivuchy Kamen' (Bobrovaya Bay) on Medny Island (Vertyanin and Nikulin, 1988). At about the same time, sea lions disappeared from the Sivuchy Kamen' haulout on the east coast of Medny Island, whereas the haulout at Yugo-Vostochny Cape (Medny Island) became a rookery, and



After one hundred years, Steller sea lions ceased to breed on Commander Islands. First pup was sighted on Medny Island on July 4, 1962. Photo by Sergey V. Marakov.

Shared Steller sea lion and northern fur seal rookery at Yugo-Vostochny Cape on Medny Island, Commander Islands. Top picture taken in July 1955. Photo by Sergey V. Marakov. Bottom picture taken in July 2006. Photo by Evgeny Mamaev.



New Steller sea lion and northern fur seal haulout on Bobroye Rocks, northern tip of Medny Island, August 2006. Photo by Alexey Chetvergov.

the number of pups started to increase (Chelnokov, 1983). In the early 1980's, pups (2–33 pups per year) were born at Manati Cape, Bering Island. By the mid to late 1980's Steller sea lions used three haulout sites and one rookery at Bering Island and the Yugo-Vostochny Cape rookery on Medny Island (Fig. 13). From the 1980's to the present, all age and sex classes of Steller sea lions have been present year-round on the Commander Islands.

Pup production ceased at Manati Cape (Vertyanin and Nikulin, 1988; Burkanov, 2000; Burkanov et al., 2003a) and had not resumed as of 2005. All other Steller sea lion locations remained the same as in the late 1980's except for the haulout that was reestablished near the northwestern tip of Medny Island on Bobroye Rocks (Fig. 13, site 21).

Steller sea lions have inhabited the Commander Islands year-round for the past 260 years, although seasonal changes in abundance and age and sex structure of hauled out animals has occurred. In the 18th and 19th centuries, Steller sea lions bred on both islands; since the mid 20th century, sea lions bred regularly only at Medny Island. A few new-born pups have been sighted irregularly and in low numbers at Bering Island haulout sites in the late 20th century.

Abundance

Non-pup Population data for Steller sea lions on the Commander Islands are only available since the 1930's (Table 3). The data were obtained from various published and archive sources and require some clarification. In most cases the animals were censused at different haulouts by different observers coincidental to fur seal studies. Table 3 contains data for years when surveys were conducted in a majority of the region's haulout sites that could be estimated from surveys conducted in other years.

In the 1930's, during late fall and winter, there were 2,000–3,000 Steller sea lions present (Barabash-Nikiforov, 1935; Ognev, 1935), but Barabash-Nikiforov (1935) noted that with the onset of

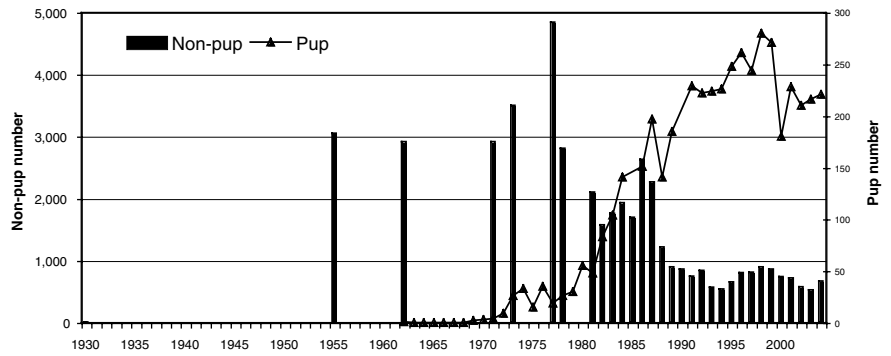


Figure 14.—Changes in Steller sea lion abundance on the Commander Islands during summer, 1930–2002.

the breeding season almost all sea lions left the islands; only sea lions that were on the haulouts with northern fur seals remained. According to Chugunkov (1968) there were five Steller sea lions at the Uril'e haulout on Medny Island in summer 1930. The picture by A. I. Kardakov, published by Ognev (1935), shows two Steller sea lions in July 1930 at the fur seal rookery at Yugo-Vostochny Cape, Medny Island.

Marakov (1964) mentioned that during 1935–1941, free-ranging Arctic fox, *Alopex lagopus*, farms were active on both islands. To provide food for foxes the Aleut hunters shot Steller sea lions when possible. Although sea lions were taken by hunters and disturbance was high, sea lion numbers slowly increased. Marakov (1964) reported sharp increases in Steller sea lion abundance on the Commander Islands during WWII and soon after (1942–50). During the mid 1950's, sea lions occurred on the islands year-round. Marakov (1964) estimated their number at 4,000–4,500 animals, but actual count data in summer did not exceed 3,050 individuals (Marakov, 1964; Nesterov, 1964; Muzhchinkin, 1964; Chelnokov, 1978; Marakov^{11, 12}), mostly hauled out on Medny Island (Table 3).

Steller sea lion abundance was highest in winter–spring, but in the early 1960's, Steller sea lions were seen more frequently at the haulout sites on Bering Island in summer. Muzhchinkin (1964) reported that in 1961, 15 Steller sea lions hauled out on Yushina Cape and up to 250 hauled out on Bering Island at

Severo-Zapadny Cape (in late summer). A haulout site with 200 Steller sea lions was at the southern end on Manati Cape. Steller sea lion abundance in summer on the Commander Islands during late June 1962 was estimated at roughly 3,000 individuals (Table 3, Fig. 14) (Muzhchinkin, 1964), and females were becoming more frequent (Nesterov¹³). A survey of all haulouts in March–April 1965 produced an estimate of 10,000 sea lions (Table 4); a census of the same haulouts in summer yielded only 2,300 (Khromovskikh, 1966). In February 1968, 10,850 Steller sea lions were counted (Table 4), whereas in September, 1,742 were counted (Mymrin and Phomin, 1978).

Two aerial surveys of the Commander Islands were conducted (Khromovskikh^{15, 16}), the first was on 12 June 1971. Estimated sea lion abundance was 2,370–3,470 animals (mean = 2,920). The most important aspect of this survey is that all known Steller sea lion haulouts were surveyed in one day. In addition, the mean value of the aircraft census of Steller sea lions on Cape Yugo-Vostochny, Medny Island, was similar to the counts (mean = 1,207; range = 1,217 – 1,233) of three land surveys conducted at about the same time as the aerial survey (Chelnokov, 1978; Chelnokov³³).

³³Chelnokov, F. G. 2003. Seasonal changes in abundance of Steller sea lions at Yugo-Vostochny rookery Medny I., 1966–1984, 1986–1987, and 2002. (Database) [Sezonnaya dinamika chislennosti sivuchey na Yugo-Vostochnom lezhishche o.Medny v 1966–1984, 1986–1987 i 2002. (Baza dannykh)]. Report to North Pacific Wildlife Consulting, LLC, Petropavlovsk-Kamchatsky, 28 p.

Table 3.—Abundance during summer of non-pup Steller sea lions on the Commander Islands, 1930–2004. Bold numbers are estimates based on the best available data.

Year	Survey dates	Site and site number ¹											Total	Sources
		Yushina Cape 16	Severo- Zapadny Cape 17	Ariy Kamen' 18	Gladkov- skaya Bay 19	Manati Cape 20	Medny all NW sites 21	Kosoy Kamen' Rocks 22	Uril'e 23	Yugo- Vostochny Cape 24	Cherny Cape 25	Sivuchy Kamen' (E) 26		
1930's	Summer	0	0	0	0	0	0	0	5	2	0	0	7	Ognev, 1935; Barabash-Nikiforov, 1935; Chugunkov, 1968; V. Burkanov (VB) estimation
1955's	Summer	0	0	0	0	0	1,000	0	0	2,000	50	0	3,050	Marakov text footnotes 11 and 12; Nesterov, 1964; Chelnokov, 1978; Muzhchinkin, 1964; VB estimation
1960's	June–Aug.	15	250	0	0	200	200	0	0	2,500	0	0	3,165	Muzhchinkin, 1964; VB estimation
1971	12 June	50	20	0	0	350	1,250	0	0	1,250	0	0	2,920	Khromovskikh text footnote 15 VB estimation
1973	25 June–3 July	20	0	0	0	70	630	0	0	2,783	0	0	3,503	Khromovskikh text footnote 16; Chelnokov, 1978, 1983; VB estimation
1977	24 May–10 July	11	87	120	152	2,013	280	0	0	1,898	0	208	4,769	Chelnokov, 1978, 1983; Myrmin and Phomin, 1978; Vertyankin and Nikulin, 1988; VB and V. Nikulin (VN) estimation
1978	June–July	3	68	7	0	200	750	0	0	1,579	0	0	2,607	Chelnokov, 1983; Vertyankin and Nikulin, 1988; VB and VN estimation
1981	3 June–23 July	0	21	0	0	900	0	0	0	1,180	0	0	2,101	Chelnokov, 1983; Vertyankin and Nikulin, 1988; VB and VN estimation
1982	10 June–26 July	30	28	60	0	500	9	0	0	950	0	0	1,577	Vertyankin and Nikulin, 1988; Chelnokov text footnote 33; Burkanov, V. N. unpubl. counts and estimation
1983	1 June–27 July	76	13	45	0	600	0	0	0	1,027	0	0	1,761	Vertyankin and Nikulin, 1988; Nesterov, 1989; VB estimation
1984	20 June–10 July	40	31	0	0	1,000	0	0	0	859	0	0	1,930	Vertyankin and Nikulin, 1988; Nesterov, 1989; VB estimation
1985	25 May–10 July	30	50	0	0	820	0	0	0	800	0	0	1,700	Vertyankin and Nikulin, 1988; Nesterov, 1989; VB estimation
1986	10 June–10 July	60	235	50	0	1,500	0	0	0	788	0	0	2,633	Vertyankin and Nikulin, 1988; Nesterov, 1989; Chelnokov text footnote 33; Shcherbakov ² ; VB estimation
1987	11 June–1 July	30	35	10	0	1,000	0	0	0	1,200	0	0	2,275	Vertyankin and Nikulin, 1988; VB estimation
1988	17–26 June	11	12	60	0	488	0	0	0	650	0	0	1,221	Burkanov et al., 2003c; Nikulin et al. ³ ; VB estimation
1989	15 June–13 July	18	36	1	0	410	0	0	0	426	0	0	891	Burkanov et al., 1990; 1991; VB estimation
1990	19 June–7 July	21	10	30	0	361	0	0	0	443	0	0	865	Nikulin et al. ³ ; VB estimation
1991	13 June–6 July	30	12	12	0	303	0	0	1	385	0	0	743	Vishnevskaya ⁴ ; Mamaev et al., 2000; Burkanov et al., 2003c; VB unpubl. data and estimation
1992	29 May–19 July	22	11	50	0	397	0	0	0	368	0	0	848	Mamaev et al., 2000; Vertyankin ⁵ ; VB estimation
1993	3–30 June	20	6	84	0	114	0	0	0	341	0	0	565	Mamaev ⁶ ; Burkanov et al., 2003c; Nikulin et al. ³ ; VB estimation
1994	10 June–2 July	12	4	3	1	142	0	0	0	378	0	0	540	Burkanov et al., 2003c; Nikulin et al. ³ ; VB estimation
1995	1–28 June	29	4	54	0	147	0	0	0	402	0	0	636	Burdin ⁷ ; Mamaev ⁶ ; Burkanov et al., 2003c; Nikulin et al. ³ ; VB estimation

continued

Table 3.—Continued.

Year	Survey dates	Site and site number ¹											Total	Sources
		Yushina Cape 16	Severo- Zapadny Cape 17	Ariy Kamen' 18	Gladkov- skaya Bay 19	Manati Cape 20	Medny all NW sites 21	Kosoy Kamen' Rocks 22	Uril'e 23	Yugo- Vostochny Cape 24	Cherny Cape 25	Sivuchy Kamen' (E) 26		
1996	15 June–10 July	15	6	200	0	59	0	0	0	529	0	0	809	Mamaev ⁶ ; Burkanov et al., 2003c; Nikulin et al. ³ ; VB estimation
1997	16 June–10 July	26	13	16	0	59	0	0	0	694	0	0	808	Mamaev ⁶ ; Burkanov et al., 2003c; Nikulin et al. ³ ; VB estimation
1998	16 June–25 July	12	14	59	0	55	27	0	0	723	0	0	890	Mamaev ⁶ ; Burkanov et al., 2003c; Nikulin et al. ³ ; VB estimation
1999	21 June–4 July	32	6	87	0	12	0	0	0	725	0	0	862	Mamaev ⁶ ; Vertyankin ⁵ ; Nikulin et al. ³ ; VB estimation
2000	20 June–5 July	40	15	70	0	31	7	0	1	569	0	0	733	Mamaev ⁶ ; Nikulin et al., 2001; Nikulin et al. ³ ; Burkanov et al., 2003c
2001	26 June–6 July	53	34	15	0	15	0	0	0	601	0	0	718	Mamaev ⁶ ; Nikulin et al. ³ ; Burkanov et al., 2003c; VB estimation
2002	16 June–3 July	37	42	11	0	4	38	0	0	432	0	0	564	Burkanov et al., 2003c; Vertyankin ⁵ ; Zagrebely ⁸
2003	18 June–3 July	47	4	10	0	14	29	0	0	426	0	0	530	Blokhin ⁹ ; Mamaev ⁶ ; Vertyankin ⁵ ; Zagrebely ⁸ ; VB estimation
2004	23 June–15 July	28	108	4	0	4	12	0	0	518	0	0	674	VB unpubl.; Blokhin ⁹ ; Mamaev ⁶ ; Zagrebely ⁸

¹ Site numbers as indicated on text Figure 13.

² Shcherbakov, I. 1986. Counts of marine mammals on Severo-Zapadny fur seal rookery in summer 1986. [Uchety morskikh zverey na Severo-Zapadnom lezhbichshe letom 1986 g.]. Kamchatrybvod, Petropavlovsk-Kamchatsky, Archive Kamchatrybvod, 12 p.

³ Nikulin, V. S., V. V. Vertyankin, and V. V. Phomin. 2003. Sevostroybvod. 58 Koroleva St., Petropavlovsk-Kamchatsky, Russia, 683024. Personal commun.

⁴ Vishnevskaya, T. Y. 1991. Brief trip report on Steller sea lion observation on Manati Cape, Bering Island. [Kratkiy otchet o nablyudeniya za sivuchami na myse Manati o. Beringa]. 6 p. Burkanov, V. N. personal archive.

⁵ Vertyankin, V. V. 2002. Sevostroybvod. 58 Koroleva St., Petropavlovsk-Kamchatsky, Russia 683024. Personal commun.

⁶ Mamaev, E. G. 2005. Vyatka Agricultural Academy, 133 Oktyabrsky Pr. Kirov, Russia 610017. Personal commun.

⁷ Burdin, A. M. 1995. Kamchatka Institute of Ecology and Nature Management Russian Academy of Sciences, 6 Partisanskaya St., Petropavlovsk-Kamchatsky, Russia 683000. Personal commun.

⁸ Zagrebely, S. V. 2004. Komandorskiy Nature Preserve. Nikolskoe, Kamchatskoy oblasti, Russia 684500. Personal commun.

⁹ Blokhin, I. A. 2004. KamchatNIRO, 18 Naberezhnaya St., Petropavlovsk-Kamchatsky, Russia 683000. Personal commun.

Table 4.—Counts of Steller sea lions during the non-breeding season on the Commander Islands, 1965–2005. Bold numbers are estimates based on the best available data.

Year	Survey dates	Site and site number ¹											Total	Sources
		Yushina Cape 16	Severo- Zapadny Cape 17	Ariy Kamen' 18	Gladkov- skaya Bay 19	Manati Cape 20	Medny, all NW sites 21	Kosoy Kamen' Rocks 22	Uril'e 23	Yugo- Vostochny Cape 24	Cherny Cape 25	Sivuchy Kamen' (E) 26		
1965	Mar 23–Apr 4	0	20	1,100	450	3,100	50			5,160		160	10,040	Khromovskikh, 1966
1965	May	0	31	800	50	140	615			660		10	2,306	Khromovskikh, 1966
1968	February				N.d. ²								10,850	Mymrin and Phomin, 1978
1968	September				N.d.								1,742	Mymrin and Phomin, 1978
1977	May 9–28					2,013	280			1,700			3,993	Mymrin and Phomin, 1978
1978	Mar 20–Apr 5		4	138		800	750			954			2,646	Vertyankin and Nikulin, 1988; Nikulin et al. ³
1988	Mar 31–May 13	3	0	60	0	820	0	0	0	300	0	0	1,183	Burkanov et al., 2003c; Nikulin et al. ³
1990	Apr 8–16	220	40	150	0	180	0	0	0	278	0	0	868	Burkanov et al., 2003c; Nikulin et al. ³
1991	Apr 21–26	200	0	100	0	300	15	0	0	200	0	0	815	Burkanov et al., 2003c; Nikulin et al. ³
1994	Apr 24–27	56	1	80		70	0	0	0	200	0	0	407	Burkanov et al., 2003c; Nikulin et al. ³
2005	Mar 30–Apr 5	36	1	183		48	0	0	0	225	0	0	493	Purtov and Burkanov, 2005

¹ Site number as indicated on Figure 13.

² N.d.—No details.

³ Nikulin, V. S., V. V. Vertyankin, and V. V. Phomin. 2003. Sevostroybvod. 58 Koroleva St., Petropavlovsk-Kamchatsky, Russia, 683024. Personal commun.

The second aerial survey occurred in 1973 (Khromovskikh¹⁶). Unfortunately, the report lacks data on Steller sea lion abundance at Cape Yugo-Vostochny. Aircraft survey data coupled with the coastal census on Yugo-Vostochny Cape by Chelnokov (1978) yields an estimate of 3,503 individuals in late June–early July 1973 (Table 3).

We obtained census data for 1977 from a variety of sources (Chelnokov, 1978, 1983; Myrmin and Phomin, 1978; Vertyankin and Nikulin, 1988) which indicated high abundance of Steller sea lions on Manati Cape. The earliest census was on 24 May, considerably earlier than censuses at other haulouts or during the preceding years. Unfortunately this haulout site was not surveyed later in June–July. If this difference is ignored, 1977 had the greatest Steller sea lion abundance at haulout sites in summer amounting to about 5,000 individuals. For the first time, the number of Steller sea lions on Bering and Medny Islands in summer was almost equal to winter abundance.

By 1978, there were changes in seasonal population dynamics of Steller sea lions on the Commander Islands. The census conducted at the same March–April dates as in 1965 demonstrated a sharp decline in sea lions wintering on the islands. The count in 1978 totaled only 2,646 sea lions, which was about one-third of the estimates in 1965 (10,040 animals) and 1968 (10,850 animals) (Table 4). A similar number of Steller sea lions (~2,600) remained on the Commander Islands in the summer of 1978. Steller sea lion abundance then declined until 1982 by an average of 17.3% per year (Table 5). The decline occurred primarily on Medny Island. Between 1982 and 1986, abundance in summer increased by 67.0%, or 10.4% per year during summer (Table 5). From 1986 to 1994 the abundance of Steller sea lions on the Commander Islands during the breeding season dwindled again by 79.3% (17.3% per year). The greatest decline (–46.1%) occurred in the winter 1987–88 and the rate of decline was much lower in subsequent years. After 1988, no noteworthy differences in the abundance

of Steller sea lions between winter and summer were recorded. In contrast, their numbers during the breeding season were somewhat higher than in winter or spring (Table 3, 4), suggesting that unlike the seasonal pattern observed during 1910–30's, some Steller sea lions breeding on the Islands migrated to other regions in winter.

Between 1994 and 1998, Steller sea lion numbers increased during the breeding season by 65.4% (13.0% per year; Table 5). The greatest increases in sea lion numbers occurred in 1995 and 1996 (20.0% and 23.1%, respectively). From 1998 to 2004, the number of Steller sea lions declined by 25.1% (7.1% per year). A spring survey conducted in late March–early April 2005 indicated patterns of seasonal abundance were similar to those in the late 1970's through 1990's; the number in winter and spring was slightly lower than in summer (Table 4) (Purtov and Burkanov, 2005).

Pups From the mid 19th century to 1962, Steller sea lions did not breed on the Commander Islands (Grebnitsky, 1902; Barabash-Nikiforov, 1935; Muzhchinkin, 1964); the first pup was recorded on 4 July 1962 at the Yugo-Vostochny Cape rookery on Medny Island (Muzhchinkin, 1964), but none were observed over the next 7 years, although some instances of mating and abortions were recorded (Chelnokov, 1971; Chugunkov, 1990). Pups have been born every year on Yugo-Vostochny Cape, Medny Island, since 1969 (Chelnokov, 1971; 1983). On Bering Island, three newborn pups were first sighted on Manati Cape in 1982 (Table 6). Pups were regularly sighted at that rookery (i.e. 30 pups in 1987) until 1991, but since then no sea lion pups have been born at the Manati Cape haulout site (Vertyankin, 1986; Vertyankin and Nikulin, 1988; Burkanov et al., 2003a). One pup was born for the first time on Severo-Zapadny Cape in 1986, two pups were seen on Ariy Kamen' in 1999, and one pup was seen on Yushina Cape in 2000 (Chugunkov, 1990; Vertyankin³⁴).

³⁴Vertyankin, V. V. 2001. Sevostroybvod, 58 Koroleva St., Petropavlovsk-Kamchatsky, Russia, 683024. Personal commun.

Table 5.—Cumulative and annual changes in trends of abundance of non-pup Steller sea lions on the Commander Islands, 1930–2004.

Time period ¹	Years	Abundance trends	
		Change (%)	
		Per year	Cumulative
1930–2004	75	1.3	9528.6
1930–1955	25	27.5	43471.4
1955–1977	23	1.6	58.7
1977–2004	28	–6.3	–86.1
1977–1982	6	–17.3	–67.4
1982–1986	5	10.4	67.0
1986–1994	9	–17.3	–79.3
1994–1998	5	13.0	65.4
1998–2004	7	–7.2	–25.1
2000–2004	5	–4.8	–9.2

¹ Time periods reflect changes in abundance shown in Figure 14.

Although pups were sighted at all four currently active haulout sites on the Commander Islands, presently the only major rookery is on Yugo-Vostochny Cape, Medny Island. The number of pups that appeared at the Commander Islands rookeries and haulouts between 1962 and 2005 is presented in Table 6 and Figure 14.

The number of pups born on the Commander Islands increased rapidly through immigration from 3 in 1970 to 236 in 2005. Numbers have fluctuated slightly with a peak of 280 in 1998, but the overall trend is increasing (Table 6).

Eastern Kamchatka

Distribution and Age–Sex Composition

Steller sea lions were first reported from the Kamchatka Peninsula by Steller (1751) and Krasheninnikov (1755): “They are hunted a great deal near Kronotsky Cape and around the island near the mouth of the Ostrovnaya River, around Avacha Gulf, and from here as far, as Lopatka Cape . . . The sea lion is never seen in the Penzhin Sea. The reason why these beasts come hither (to the Commander Islands, VB) in June, July, and August, are for parturition, for rearing and teaching the pups, and for copulation. Before and after this period they are found in greater numbers on the shores of Kamchatka.”

Major sites where Steller sea lions occur adjoin steep cliffs along the Kamchatka, Kronotsky, and Shipunsky Pen-

Table 6.—Pup counts of Steller sea lions on the Commander Islands, 1962–2005.

Year	Commander Island pup counts		Comments	Sources
	Pups born	Cumulative changes, %		
1962	1			Muzhchinkin, 1964
1963–69	0			Chelnokov, 1971; Chugunkov, 1990
1970	3	50.0		Chelnokov 1971 and 1978, Chugunkov, 1990
1971	4	33.3		Chelnokov, 1978; 1983
1972	9	125.0		Chelnokov, 1978; 1983
1973	26	188.9		Chelnokov, 1978; 1983
1974	33	26.9		Chelnokov, 1978; 1983
1975	15	-54.5		Chelnokov, 1978; 1983
1976	35	133.3		Chelnokov, 1978; 1983
1977	19	-45.7		Chelnokov, 1978; 1983
1978	26	36.8		Chelnokov, 1983
1979	30	15.4		Chelnokov, 1983
1980	55	83.3		Chelnokov, 1983
1981	48	-12.7		Chelnokov, 1983
1982	83	72.9	3 pups at Manati Cape, Bering Island	Chelnokov text footnote 33 ; VB unpublished data
1983	104	25.3	2 pups at Manati Cape, Bering Island	Chelnokov text footnote 33; Vertyankin and Nikulin, 1988
1984	141	35.6		Chelnokov text footnote 33
1985	No data		5 pups at Manati Cape	Vertyankin, 1986
1986	151	7.1	8 pups at Manati Cape, 1 pup at S–Zapadny Cape	Vertyankin and Nikulin, 1988; Chugunkov, 1990; Chelnokov text footnote 33
1987	197	30.5	30 pups at Manati Cape	Vertyankin and Nikulin, 1988; Chelnokov text footnote 33
1988	141	-28.4	11 pups at Manati Cape	Nikulin et al. ¹
1989	185	31.2	8 pups at Manati Cape	Burkanov et al., 1991
1990	No data			
1991	229	23.8	2 pups at Manati Cape	Burkanov et al. text footnote 29; Vishnevskaya ²
1992	222	-3.1	3 pups at Manati Cape	Mamaev and Burkanov, 1995; Nikulin et al. ¹
1993	224	0.9	4 pups at Manati Cape	Mamaev and Burkanov, 1995; Nikulin et al. ¹
1994	226	0.9	2 pups at Manati Cape	Mamaev et al., 2000; Nikulin et al. ¹
1995	248	9.7	pups on Medny Island only	Mamaev et al., 2000
1996	261	5.2	pups on Medny Island only	Mamaev et al., 2000
1997	244	-6.5	pups on Medny Island only	Mamaev et al., 2000
1998	280	14.8	4 pups at Manati Cape	Mamaev et al., 2000; Nikulin et al. ¹
1999	271	-3.2	2 pups at Ariy Kamen'	Mamaev et al., 2000; Nikulin et al. ¹
2000	180	-33.6	1 pup at Yushin Cape	Mamaev ³ ; Vertyankin ⁴
2001	228	26.7		Mamaev ³
2002	210	-7.9	2 pups at Ariy Kamen'	Burkanov et al., 2003a
2003	216	2.9	1 pup at Ariy Kamen'	Mamaev ³ ; Nikulin et al. ¹
2004	221	2.4	1 pup at Ariy Kamen'	Mamaev ³ ; Nikulin et al. ¹
2005	236	6.8	YV Cape only, no pups at Ariy Kamen'	Mamaev ³ ; Zagrebely ⁵

¹ Nikulin, V. S., V. V. Vertyankin, and V. V. Phomin. 2003. Sevostroybvod. 58 Koroleva St., Petropavlovsk–Kamchatsky, Russia, 683024. Personal commun.

² Vishnevskaya, T. Y. 1991. All-Russian Research Institute of Nature Conservation, Znamenskoe–Sadki, Moscow, Russia, 117628. Personal commun.

³ Mamaev, 2005. Vyatka Agricultural Academy, 133 Oktyabrsky Pr. Kirov, Russia 610017. Personal commun.

⁴ Vertyankin, V. V. 2001. Sevostroybvod. 58 Koroleva St., Petropavlovsk–Kamchatsky, Russia 683024. Personal commun.

⁵ Zagrebely, S. V. 2005. Komandorskiy Nature Preserve. Nikolskoe, Kamchatskoy oblasti, Russia 684500. Personal commun.

insulas, and along the southeastern Kamchatka coast (Fig. 15). This region has 16 Steller sea lion sites (Steller, 1751; Krasheninnikov, 1755; Ditmar, 1901; Shmidt, 1916; Nikulin, 1937; Sergeev, 1940; Averin, 1948; Kuleshov, 1950; Burkanov, 1988; Khromovskikh^{14,15}), but most are inaccessible to humans or terrestrial predators.

Few data are available on age and sex of Steller sea lions occurring on eastern Kamchatka shores. From descriptions of the hunting practices of indigenous people by Krasheninnikov (1755), we conclude that adult males were common there, but so were young individuals through historical times (Ditmar, 1901). Information on the presence of females

and pups is available from the early 20th century (Shmidt, 1916). We note that during the last 100 years all ages and sexes of Steller sea lion were present year-round in this area (Shmidt, 1916; Nikulin, 1937; Sergeev, 1940; Averin, 1948; Kuleshov, 1950; Burkanov, 1988; Burkanov et al., 2002, 2003a). There are three breeding sites located at Kamchatsky Cape (Fig. 15, site 29), Kozlov Cape (site 31), and around Shipunsky Peninsula (sites 33, and 34).

The literature and archive information indicate that few changes in sea lion distribution occurred in the Kamchatka region over the last 260 years. However, the number of sites used in the area changed considerably over time.

When sea lion abundance was high, there were more active sites, whereas during low abundance the number of sites decreased.

Seasonal patterns

Steller sea lions occur year-round off eastern Kamchatka even though abundance varies seasonally with high numbers in spring, summer, and fall, and low numbers in winter (Fig. 8). The eastern Kamchatka coast is characterized by cold winters with abundant snow, and in November, as ice forms on the cliffs used as haulout sites, sea lions abandon these sites. Until the mid 1980's sea lions were observed regularly at most sites off southeastern Kamchatka

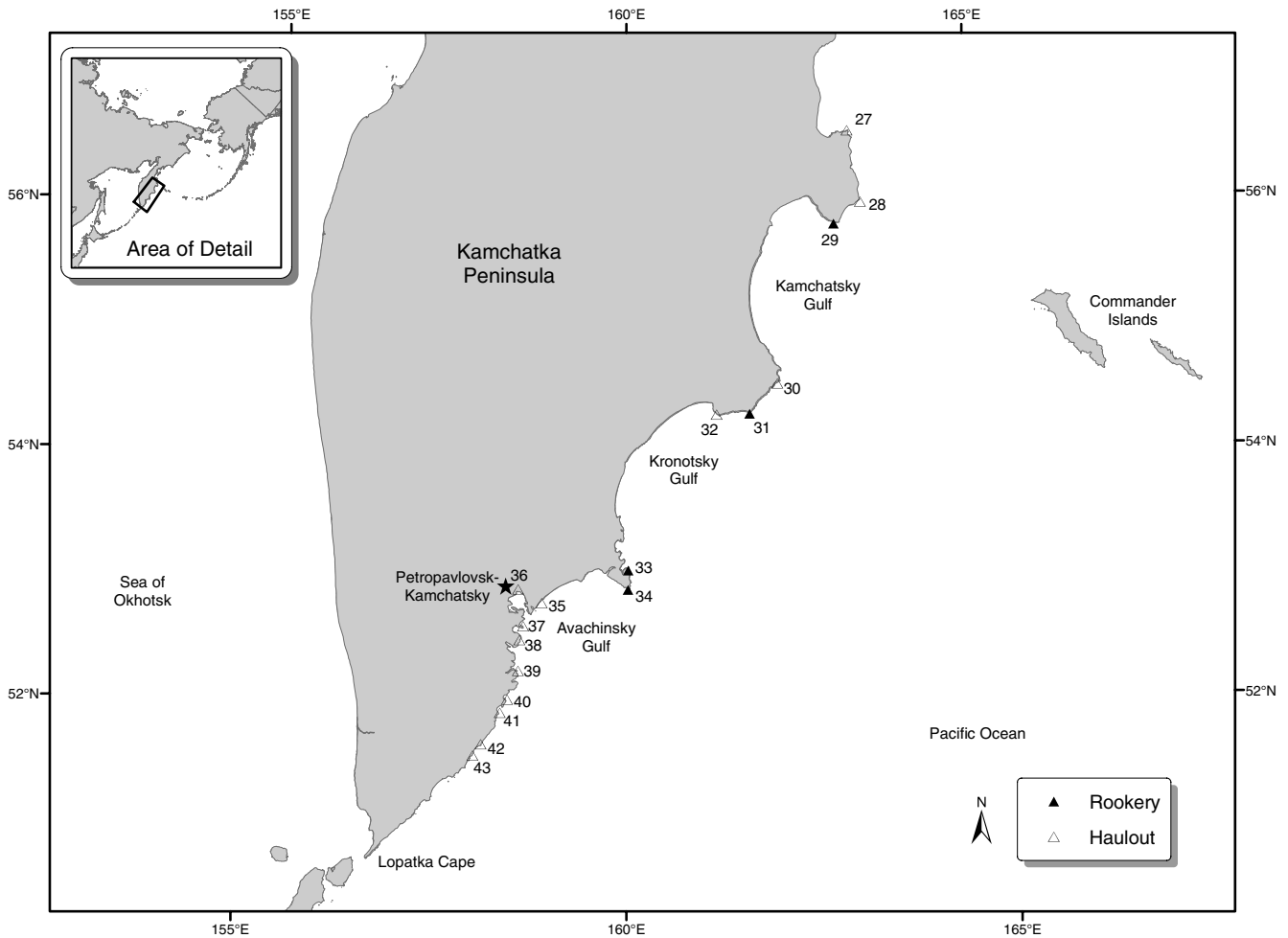


Figure 15.—Steller sea lion sites on the eastern Kamchatka Peninsula coast, 1730's to present. 27-Sivuchy Cape (East); 28-Afrika Cape; 29-Kamchatsky Cape; 30-Kronotsky Cape; 31-Kozlov Cape; 32-Olga Cape; 33-Zheleznaya Bay; 34-Shipunsky Cape; 35-Khalaktyrsky Rock; 36-Avacha Bay (Pier RKZ); 37-Starichkov Island; 38-Bezmyanny Cape; 39-Kekurny Cape; 40-Sivuchy Kamen'; 41-Krugly Cape; 42-Krestovy Cape; 43-Kuzachin Cape

(Fig. 15, sites 33–43). Since 2000, they have been observed only during winter at three sites on Shipunsky Cape, Avacha Bay, and Kekurny Cape (Fig. 15, sites 34, 36, and 39). During inclement weather conditions the animals cross over iced coastal reefs onto the mainland where they are protected from strong winds and high waves. In late winter drifting ice appears, but sea lions are still present. During heavy storms, Steller sea lions are commonly blocked on shore by a zone of storm-pressed compact ice stretching from shore to open water for several miles. Steller sea lions do not use in winter haulout sites north of Shipunsky Peninsula (Fig. 15,

sites 27–32) except during very warm and calm winters when they occur along the shore and occasionally are sighted on the offshore ice.

Abundance

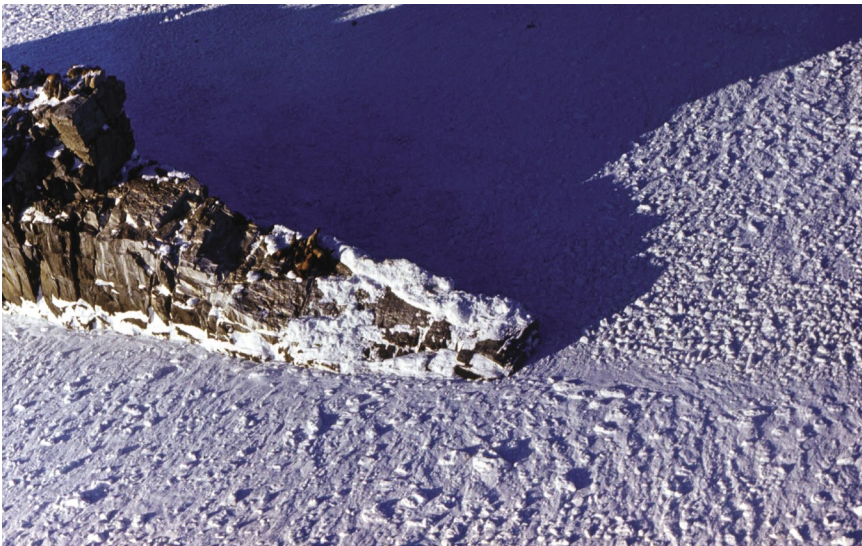
Non-pups The Kamchatka Peninsula was a starting point for many historical expeditions for the discovery of “new lands,” and a number of distinguished researchers visited this area but failed to leave any quantitative information on the abundance of Steller sea lions in the region in the 18th–19th centuries. Published data provides evidence that Steller sea lions were fairly numerous off eastern Kamchatka in the

first half of the 18th century (Steller, 1751; Krasheninnikov, 1755; Ditmar, 1901; Grebniysky, 1902). According to Krasheninnikov (1755) they were regularly harvested by indigenous people of Kamchatka (Kronotsky and Shipunsky Peninsulas).

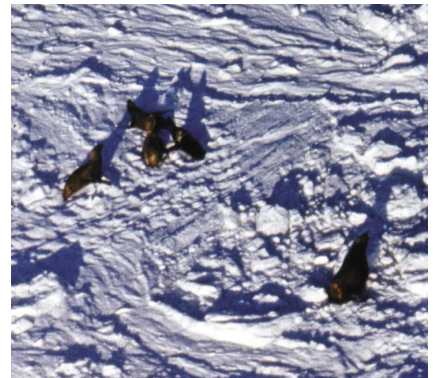
The geologist Karl Ditmar (1901) made a complete report of his stay in Kamchatka in the mid 19th century. He observed that Steller sea lions hauled out at Shipunsky Cape, Olga Cape, Kozlov Cape, and in Zheleznaya Bay (Fig. 15). Ditmar's data suggest only a small number were present at most sites during his June–July observation period. Ditmar's (1901) data suggest



Kekurny Cape haulout, East Kamchatka, 5 July 2006. Photo by Vladimir Burkanov.



Same haulout as above, blocked by ice after severe winter storm. Photo by Alexander Bednykh.



Animals have to crawl over the ice several miles to reach open water. Photo by Alexander Bednykh.



Steller sea lions hauled out on ice flow in Karaginsky Gulf in May 2005. Photo by Vladimir Burkanov.



Haulout at Zheleznaya Bay, East Kamchatka, 18 October 2002. Photo by Jason Waite.



Rookery on Kozlov Cape, East Kamchatka, 7 June 2005. Photo by Vladimir Burkanov.

Table 7.—Counts of Steller sea lions on the eastern Kamchatka coast, 1983–2004. Boldface numbers are estimates based on the best available data.

Site no. ¹	Site name	Steller sea lion counts								
		1983 June 11– July 18	1987 June 3– July 17	1989 June 19– July 5	1991 June 28– July 11	1994 June 30– July 7	1999 June 12– July 8	2001 June 14– July 27	2002 June 17– July 8	2004 June 13– July 22
27 ²	Sivuchy Cape (East)	40	0	3	0	0	0	0	0	0
28	Afrika Cape	N.d. ³	0	0	13	0	N.d.	59	45	28
29 ²	Kamchatsky Cape	500	270	575	111	154	59	30	0	0
30	Kronotsky Cape	0	N.d.	23	N.d.	N.d.	0	15	0	0
31 ²	Kozlov Cape	787	712	551	240	313	498	362	208	299
33 ²	Zheleznaya Bay	24	0	43	250	10	51	161	142	69
34 ²	Shipunsky Cape	175	480	185	79	50	53	2	35	50
35 ²	Khalaktyrsky Rock	168	188	36	3	3	0	0	0	0
36 ²	Avacha Bay (Pier RKZ)	0	0	0	0	0	0	0	0	0
37 ²	Starichkov Island	0	0	0	0	0	0	0	0	0
38 ²	Bezymyanny Cape	0	0	0	0	0	0	0	0	0
39 ²	Kekurny Cape	330	40	126	106	112	59	114	106	130
40 ²	Sivuchy Kamen'	49	0	0	5	0	0	0	0	0
41 ²	Krugly Cape	0	0	0	0	0	0	0	0	0
42 ²	Krestovy Cape	0	0	0	0	0	0	0	0	0
43 ²	Kuzachin Cape	0	0	0	0	0	0	0	0	0
	Total all sites	2,073	1,690	1,542	807	642	720	684	536	576
	Total at trend sites	2,073	1,690	1,519	794	642	720	669	491	548
	Cumulative trend	100.0%	-18.5%	-26.7%	-67.7%	-69.0%	-65.3%	-67.7%	-76.3%	11.6%

¹ Site number as indicated on Figure 15.

² Trend sites.

³ N.d. = No data.

that in the mid 19th century Steller sea lion abundance on eastern Kamchatka shores was not high. It is worth noting that Steller sea lions stopped breeding on the Commander Islands during the same time period (Grebnitsky, 1902).

Schmidt (1916) reported that Kamchatsky Cape was a rookery after visiting there in early June 1908 (Fig. 15, site 29). His characterization of the site as a rookery was based on the physical size of the hauled out sea lions, their behavior, the presence of newborn pups and decomposing placentas. The high abundance of Steller sea lions on the Kamchatka coast in the early 20th century is supported by data on the harvest of 600 newborn pups at Kozlov Cape in 1920 (Averin, 1948).

The first quantitative data used to estimate total Steller sea lion abundance off eastern Kamchatka dates back to the 1940's when abundance (reported as maximum counts) was provided by local hunters to Averin (1948) as roughly 5,000–7,000 sea lions. This estimate is equivocal when compared to the count at Shipunsky Peninsula (Fig. 15, sites 33 and 34) in 1940 (Averin, 1948) was 4,000–5,000 individuals; Nikulin (1937) reported 500–600 for the same site in late July 1935. Nikulin also noted that with the exception of

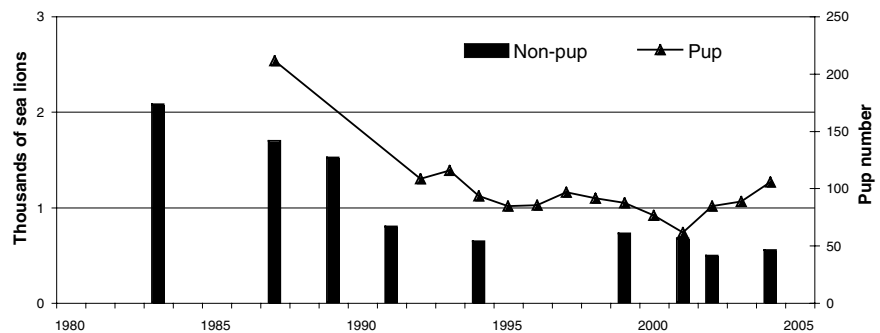


Figure 16.—Steller sea lion abundance of non-pups and pups at trend sites in eastern Kamchatka, 1983–2002.

Shipunsky Cape, only a few individual Steller sea lions occurred along the rest of the eastern coast of Kamchatka. This statement does not seem accurate either, however, because over 1,400 Steller sea lions were observed at Kozlov Cape in 1942 (Averin, 1948). Apparently sea lion abundance varied considerably over time, and the hunters who reported their estimates to Averin provided maximum values observed per year, whereas Nikulin stated results of a single survey at Shipunsky Cape during a harvest by the sealing ship *Nazhim* (Nikulin, 1937). Despite these differences, Averin's data appear to provide a comprehensive insight into the total Steller sea lion

abundance in the region during the 1930's and early 1940's.

Comparable data on Steller sea lion abundance off eastern Kamchatka during the breeding season are available since the 1980's (Burkanov, 1986, 1988, 2000; Burkanov et al., 2002, 2003a). Over a 21-year period (1983–2004), nine complete surveys were conducted (Table 7; Fig. 16). In 1983, Steller sea lion abundance was roughly 2,000 animals and by 2004, abundance declined fourfold to about 500 sea lions (73.6%, or 6.3% per year). Between 1983 and 1994, sea lion abundance declined at a greater rate (10.8% per year). Subsequently, between 1994 and 1999, the

Table 8.—Counts of Steller sea lion pups on eastern Kamchatka rookeries, 1908–2004.

Year	Pup counts						Total	Sources
	Kamchatsky Cape		Kozlov Cape		Shipunsky/Zheleznaya			
	Date	Pup numbers	Date	Pup numbers	Date	Pup numbers		
1908	June 2	Many					Many	Shmidt, 1916
1920			Summer	600+ ¹			>600	Averin, 1948
1935					July	30 ¹	Unknown	Nikulin, 1937
1942			July 4	300			>300	Averin, 1948
1946					Early July	0	Unknown	Kuleshov, 1950
1987			July 10	218			218	VB unpubl. data
1992			June 28	115	July 1	14	129	VB unpubl. data
1993			June 29	115	July 3	5	120	VB unpubl. data
1994			July 6	93	July 6	0	93	Burkanov et al., 2003a
1995			June 18	90			90	Vishnevskaya ²
1996	July	4	June 28	87	July 9	3	94	Vertyankin text footnote 34
1997			July 8	96			96	Vishnevskaya ²
1998			June 26	94			94	Vertyankin text footnote 34
1999			June 29	87	Aug. 5	1	88	Burkanov et al., 2003a
2000			July 6	76			76	Vertyankin text footnote 34
2001			June 21	61	June 22	3	64	Vertyankin text footnote 34
2002	June 30	0	July 7	88	July 6	2	90	Burkanov et al., 2003a
2004	June 17	0	June 30	107	June 14	0	107	Burkanov et al., 2006a

¹ Pup harvest number.

² Vishnevskaya, T. Y. 1997 All-Russian Research Institute of Nature Conservation, Znamenskoe-Sadki, Moscow, Russia, 117628. Personal commun.

trend in abundance increased 12.1% (2.3% per year). After 1999, sea lion abundance declined again. The decline over the next 5 years (1999–2004) was 23.9% (6.2% per year).

Pups The first available data on Steller sea lion pup production on eastern Kamchatka were reported by Shmidt (1916) who observed pups at Kamchatsky Cape in early June 1908. Nikulin (1937) provided numbers of Steller sea lion pups harvested (30 individuals) by the sealing ship *Nazhim* in early July 1935 off Shipunsky Cape. Averin (1948) discussed in detail the harvest of Steller sea lion pups on Kozlov Cape in early July 1942 and provided data on the history of harvests of Steller sea lions at that site between 1919 and 1942 (Table 8). Generally, these reports provide evidence that total sea lion pup abundance during 1910–40 off eastern Kamchatka was about 1,000 (600 pups were taken on Kozlov Cape only in 1919). At that time there were large rookeries situated at Kamchatsky Cape, Kozlov Cape, and around Shipunsky Peninsula (Shmidt, 1916; Nikulin, 1937; Averin, 1948). According to Averin (1948) and Kuleshov (1950), the total Steller sea lion abundance (and particularly the abundance of young animals) declined as early as the mid 1940's due to the intensive and

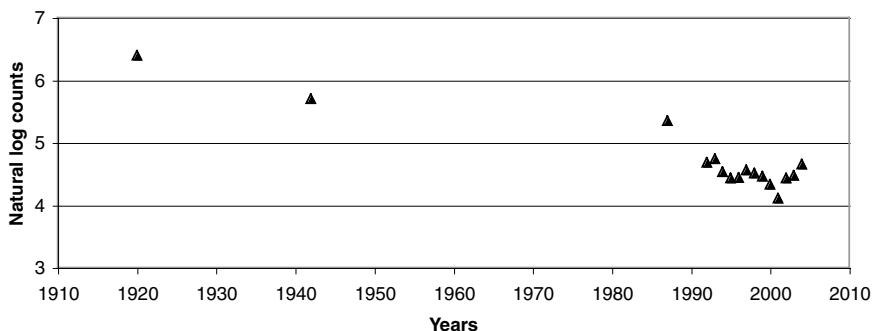


Figure 17.—Pup counts of Steller sea lions at Kozlov Cape, 1920–2004.

unregulated harvest of pups. Kuleshov (1950) reported that in early July 1946 he saw no pups around Shipunsky Peninsula because all had been killed by hunters.

We found no quantitative data on pup abundance off eastern Kamchatka between 1946 and 1987 in the literature or available archives. Long-term population changes in sea lion pups can only be found for a rookery at Kozlov Cape (Fig. 17). However, the estimate (600 pups) for 1920 reflects the number of pups taken at that rookery (Averin, 1948). Considering the limited number of sites suitable for breeding at Kozlov Cape, it appears unlikely that the abundance of pups was much higher than the reported harvest level. Presumably,

in 1920 the entire pup population was killed. Thus, over the last 82 years (1920–2004) the abundance of newborn Steller sea lions at Kozlov Cape has declined from 600 individuals in 1920 to 107 in 2004 (82.5%). The total rate of decline averaged 2.3% per year, but was not uniform over time. Between 1920 and 1942, pup abundance declined by 50% (3.1% per year), and subsequently (1942–87) declined by another 30%. However, the total rate of annual decline was low, constituting less than 1% per year. Between 1987 and 1994, pup abundance declined by 55.9%, which was the largest over the entire period, averaging 10.7% per year. Between 1994 and 2004, pup abundance did not change dramatically in this region, and



Above: Khitraya Cliff (Srednego Islands) is a flat rock, which rises 5-8 meters above the water. Left: It is hard to obtain an accurate number on non-pups on Khitraya Cliff, but the spook pup count is reliable, July 12, 2002. Photos by Vladimir Burkanov.

Rookery on Antsiferov Island. Late May (above) and early July (right) 2003. Photos by Vladimir Burkanov.



the last few years have resulted in a positive trend (Table 8).

Kuril Islands

Distribution and Age–Sex Composition

Steller sea lion information for the Kuril Islands was first obtained during the voyage of Captain M. P. Shpanberg in 1738–39 (Divin, 1971). Steller (1751) wrote in his work: “Captain Shpanberg on his chart has named a certain island from the number of these animals that he found upon it, and from a cliff overhanging their city, the “Palace of Sivutch” (Russian name of Steller sea lion).” The Shpanberg map was very general, and it was difficult to understand the exact location of the island. Presumably, the island he described is the present day Raykoke Island.

The presence of Steller sea lions throughout the entire Kuril Island range in the first half of the 18th century was reported by Steller (1751) and Krasheninnikov (1755). Steller wrote: “They are found in the Kuril Islands and almost as far as Matmej (Hokkaido) Island.” Neither Steller nor Krasheninnikov worked on the Kuril Islands and they must have obtained data on Steller sea lions from another member of the Bering expedition, perhaps Captain M. P. Shpanberg, and possibly the Kamchatka residents.

Krasheninnikov (1755) reported a large Steller sea lion site on Atlasov Island: “Lopatka residents (the southern extremity of Kamchatka) and residents from ... the two mentioned islands (Shumshu and Paramushir) travel there in their boats for the harvest of Steller sea lions and seals, which are in high abundance there.” The distance to Atlasov Island from Lopatka Cape or the Shumshu Islands is over “40 versts” (about 46 km), and the weather in the region under survey is largely misty. Such skin boat trips are very dangerous “... not infrequently, driven away by the storm, the navigators get lost without a compass, starve, with no mainland or islands in sight, and they take their bearings by the moon and by the sun.” These accounts suggest that the indigenous people would not have risked the rough passage to Atlasov Island if there had

been other Steller sea lion sites off the southern Kamchatka Peninsula.

The first detailed information on the location of Steller sea lion haulout sites and rookeries on the Kuril Islands was obtained in the late 19th century when Snow (1897) described 18 major Steller sea lion rookeries. Similar to the first half of the 18th century (Krasheninnikov, 1755), Steller sea lions were present throughout the entire Kuril Islands chain. The large number of rookeries reported by Snow suggests all age classes and both sexes of Steller sea lions occurred on the islands. In the early 20th century (1904–13), the distribution of sea lions did not change. Tikhenko (1914) reported only a single extra haulout site on Onekotan Island (Fig. 18, site 52). Subsequently, until the mid 1950’s, no data have been available in the Russian literature as to the distribution of Steller sea lions on the Kuril Islands.

Since 1955 regular surveys of Steller sea lions have been conducted on the Kuril Islands (Klumov, 1957a; Nikolaev, 1965; Belkin, 1966b; Perlov, 1970, 1972; Voronov, 1974; Kuzin et al., 1984; Merrick et al., 1990; Maminov et al., 1991; Trukhin, 2000; Kornev et al., 2001; Burkanov et al., 2002). Comparison of the published data suggest that the locations and status of the rookeries and haulouts described by Snow (1897) and Tikhenko (1914) in the late 19th century through early 20th century were only slightly different from those of today (Table 9).

Snow (1897) sighted Steller sea lion pups at 18 rookeries in the late 19th century, and in 2001 pups were sighted at 13 rookeries, but the majority of pups were found only at five major rookeries (Burkanov et al., 2002). In 2001, pups were found on the islands of Antsiferov, Lovushki (Dolgaya and Vysokaya Cliffs), Raykoke, Srednego (Khitraya Cliff), and Brat Chirpoev, similar to where Snow reported them (Fig. 18). During the last 40 years, Steller sea lions ceased to breed on Brouton Island, the Kotikovaya Cliff (Lovushki Islands), or Vladimir Cliff (east side of Shumshu Island). Occasionally, newborn pups appear at other sites reported by Snow

(1897), but their abundance there does not exceed 30 individuals.

Snow (1897) reported that Steller sea lions do not form haulouts on Paramushir, Onekotan, Makanrushi, Kharimkotan, and Chirinkotan Islands, but Tikhenko (1914) recorded a haulout site on Onekotan Island. In the mid 1950’s, Klumov (1957a) reported a Steller sea lion haulout site on Kharimkotan Island, and Voronov (1974) reported haulout sites on Rasshua, Paramushir, and Shiashkotan Islands. For many years Steller sea lions were not sighted on Ekarma Island, but in 2000, 2001, and 2005 a haulout site was observed there (Trukhin, 2000; Kornev et al., 2001; Burkanov et al., 2002).

Perlov (1970) noted a redistribution of Steller sea lions between islands in the late 1960’s and associated the population decline on Raykoke Island with the concurrent increase on Antsiferov Island. He indicated seasonal patterns in the change of Steller sea lion abundance on the Kuril Islands and the decline of Steller sea lions in their joint habitats with northern fur seals (Kotikovaya Cliff on Lovushki Island and Khitraya Cliff on Srednego Island). However, despite the frequent redistribution of animals between islands and considerable changes in their total abundance, the general distribution of Steller sea lions and the location of haulouts and rookeries in the Kuril Islands have not changed.

Summary of Surveys and Available Count Data

Steller sea lion abundance in the Kuril Islands shows some well defined seasonal dynamics, similar to other portions of the range. Abundance during winter and spring is greater in the southern and northern parts of the chain and less around the central portion of the chain (Belkin, 1966b; Perlov, 1970). Conversely, in summer, abundance is greater around the major rookeries situated in the central region.

Between 1873 and the mid 1890’s, “up to 100 thousand Steller sea lions hauled out” at rookeries and haulouts of the Kuril Islands in summer (Snow, 1897). Subsequently, Snow (1910) noted: “Sea-lions (*Otaria stelleri*) are

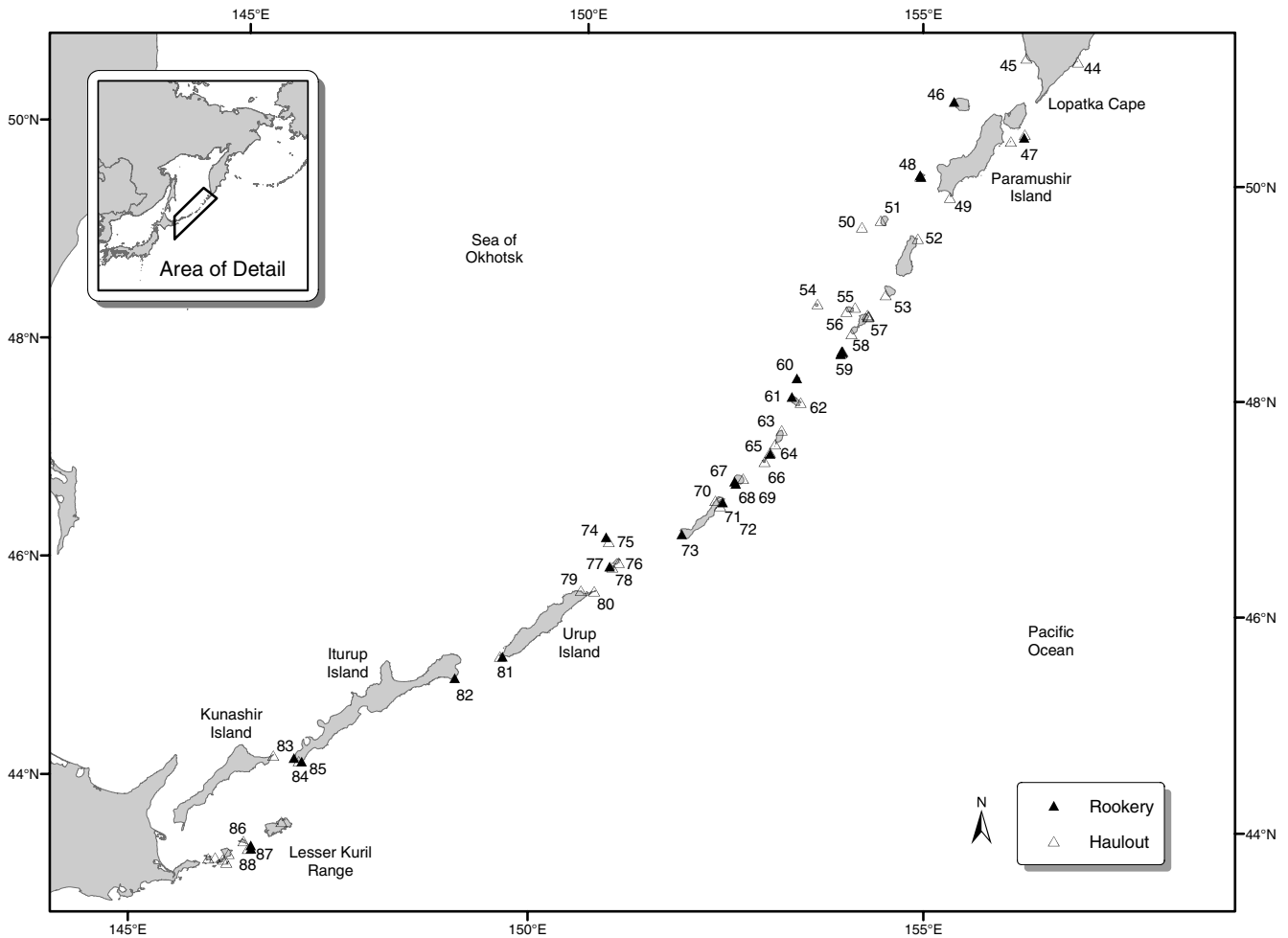


Figure 18.—Steller sea lion sites on the Kuril Islands, 1880's to present. 44-Kamchatka/Gavryushkin Rock; 45-Kamchatka/Sivuchy Cape (West); 46-Atlasov/Kudryavtsev Cape; 47-Shumshu/Vladimir Rock, Tanaka Reef and Ptichii Islands; 48-Antsiferov/Vydar' Rock and Rookery; 49-Paramushir/Khmyr' Rock; 50-Avos Rock; 51-Makanrushi Island; 52-Onekotan/Kamen Yasnoy Pogody Rock; 53-Kharimkotan Island; 54-Chirinkotan; 55-Ekarma/NE; 56-Ekarma/Bezvodny Cape; 57-Shiashkotan/Krasny Cape (four sites); 58-Shiashkotan/Yuzhanin Cape; 59-Lovushki/Dolgaya, Reefs, Vysokaya, Nizkaya and Kotikovaya Cliff; 60-Raykoke Island; 61-Matua/Lisiy Cape; 62-Matua/Toporkov Island; 63-Rasshua/Severnoy Cape; 64-Rasshua/Yuzhny Cape; 65-Srednego/Chernye and Khitraya Cliff; 66-Ushishir Island; 67-Ketoy/Monolitny Cape; 68-Ketoy/Lezhbishchny Cape; 69-Ketoy/Ostrokonechnaya Rock; 70-Simushir/Krasnovataya Rock; 71-Simushir/Kosyakov Cape; 72-Simushir/Palez Rock; 73-Simushir/Aront Cape; 74-Broutona/NW; 75-Broutona/Sivuchy Cape; 76- Chirpoy/Udushlivy Cape; 77-Brat Chirpoev/Rookery; 78-Brat Chirpoev/Uglovaya Bay; 79-Urup/Chayka Island; 80-Urup/Tayra Rock; 81-Urup/Van-Der-Linda Cape and Revuny Rocks; 82-Iturup/Neukrotimy Cape; 83-Iturup/Gnevny Cape; 84-Iturup/Popovich Cape; 85-Iturup/Rikord Cape; 86-Peshchernaya Rock; 87-Shishki Islands; 88-Lis'i Islands and other temporary haulouts at Lesser Kuril Range.

numerous: there were eighteen large breeding rookeries of these animals on the islands, but even these comparatively valueless animals have been very much reduced in numbers." Unfortunately, the author did not specify the period over which the animals declined, but it can be inferred from the text that he was referring to the 1900's. Snow's reports were used by the Japanese who indicated "there are very many Steller

sea lions" on the Kuril Islands in the early 20th century (Tikhenko, 1914).

Both sources were highly subjective, based on personal perception by the authors rather than quantitative surveys. Conclusions by Snow (1910), which were a result of his long-term observations in the region (about 1873–1900), are more reliable. Interestingly, at least two Russian authors believe that Snow greatly overesti-

mated the abundance of Steller sea lions in the Kuril Islands (e.g. Klumov, 1957a; Voronov, 1974).

We found no other data indicating the abundance of Steller sea lions on the Kuril Islands during the period of Japanese jurisdiction (1875–1945). However, Inukai (1968) documented a massive harvest of about 20,000 sea lions killed with dynamite for skins and food during WWII.

Table 9.—Abundance of non-pup Steller sea lions by island in the Kuril Islands, 1883–2005. Bold numbers are estimates based on pooled data from adjoining surveys or reconstructed from the best available data.

Site no. ¹	Location	1873–1890's	1904–1913's	Non-pup abundance	
				1955 ²	1959–1962
				Count (max)	Count (max)
46	Atlasov/Kudryavtsev Cape	One site at NW side	One site at NW side	200	4000
47	Shumshu/Vladimir Rock	One rookery	Not mentioned	300	300
48	Antsiferov/all sites	Two sites, rookery, many	Three sites, very many	2,000	800
49	Paramushir/Khmyr' Rock	No haulouts, seen in water only	No haulouts, only seen in water	Not mentioned	80
50	Avos' Rock	One small haulout	One small haulout	60	50
51	Makanrushi	No haulouts	No haulouts	Not mentioned	Not mentioned
52	Onekotan/one site	No haulouts	One site at NE side	Not mentioned	150
53	Kharkimkotan	No haulouts	No haulouts	25	Not mentioned
54	Chirinkotan	No haulouts	No haulouts	Not mentioned	Not mentioned
55–56	Ekarma/two sites	One site at NE point	One site at NE point	0	0
57–58	Shiashkotan/all sites	No haulouts, seen in water only	No haulouts, seen in water only	60	500
59	Lovushki/all sites	Large rookery, many	There are SSL	4,000	1,265
60	Raykoke	Large rookery, very many	Large rookery at E side, very many	800	900
61–62	Matua/two sites	One site at N end	One site at N end	100	250
63–64	Rasshua/two sites	No haulouts, seen in water only	No haulouts, seen in water only	Not mentioned	300
65–66	Srednego/all sites	7–10 thousand, breeding	Not mentioned	4,000	1,000
66	Ushishir/one site	Not mentioned	One site at SW rock	50	20
67–69	Ketoy/three sites	Three sites: SW, SE, and E sides	Two sites at SW and SE points	700	350
70–73	Simushir/all sites	Two sites: SW and NE ends, many	Two sites: SW and NE ends, many	145	200
74–75	Broutona/two sites	One site at NW side	One site at NW side	150	200
77	Brat Chirpoev/Rookery	One site, thousands	One site at SW side	2,070	2,000
79–81	Urup/all sites	One site at SW cape	One site at SW cape	300	50
82–85	Iturup/all sites	Two sites at SW and NE ends	Two sites at SW and NE ends	400	1,000
86	Peshchernaya Rock	There is a haulout	Not mentioned	Doesn't exist (?)	Not mentioned
87	Shishki	There is a haulout	Not mentioned	Doesn't exist (?)	Not mentioned
	Total	In summer "at least 100,000 hauled out"	"Very many", no count available	15,360	9,815
	Sources	Snow, 1897 and 1910	Tikhenko, 1914	Klumov, 1957a	Voronov, 1974

The first complete census of Steller sea lions on the Kuril Islands was in 1955 (Klumov, 1957a, b). The haulout sites and rookeries were surveyed from a small ship between 12 June and 10 October 1955. Steller sea lions were counted largely from the ship by 2–3 observers using 12× binoculars. Frequently, the author would determine the number of animals in a small plot of the rookery or haulout site and then extrapolate those counts to the entire area. No special census of pups was conducted; however, Klumov reported the presence or absence of pups at particular sites and provided values of total abundance.

This technique yielded inaccurate results, particularly for the larger sites. For example, the difference between the minimum and maximum estimates of Steller sea lion abundance on Lovushki and Srednego Islands was 25–30%. The total sum of maximum estimates for all sites provided in the publication was 15,360 individuals, although Klumov increased the estimate to 17,000 with

no clarification of how that value was derived (Klumov, 1957a; Fig. 19).

Thus, we question the results of Klumov's methods and therefore question the results of the Lesser Kuril Islands surveys (principally the two sites at the cliffs on Peshchernaya and Shiski Islands). Klumov reported that there were no Steller sea lion sites there, whereas Belkin (1966b) claimed that the above statement was unjustified because he surveyed the area in 1963–64 and reported that Steller sea lions occurred in the Lesser Kuril Islands year-round. Snow (1897) also reported the presence of Steller sea lions in this area.

Voronov (1974) estimated total Steller sea lion abundance on the Kuril Islands and off southern Sakhalin Island in 1956–62 was 10,100 individuals "without taking into account the young." Unfortunately, Voronov's (1974) estimates do not have much validity because the date of the survey was not provided nor were the data the result of a direct census of animals, but rather the result of aver-

aging data collected at different times using different methods. Note also that the estimate included Sakhalin Island and is not specific to the Kuril Islands (as in Table 9).

Between 26 August and 2 October 1961, Nikolaev (1965) "took a most complete census" of Steller sea lions on all islands of the Kuril Islands north of Kunashir Island (Fig. 18, sites 46–85). The Lesser Kuril Islands range (Fig. 18, sites 86–88) was not surveyed. Nikolaev did not specify the details of the census technique, nor did he state whether pups were counted. A total of 10,992 Steller sea lions were counted (Nikolaev, 1965). The author pointed out that "... a number of sites (except those at Lovushki Islands) were 50–70% filled; and those on Brouton Island, 30–40%-filled." It is unclear what abundance estimate the author is referring to in claiming that the Steller sea lion sites in the Kuril Islands accounted for 50–70% of the total abundance. He further states, "Thus, there are grounds to believe that

Non-pup abundance

1961 ²		1963		1968		1969		1975	
Date	Count	Date	Count	Date	Count	Date	Count	Date	Count
21 Sept.	750	31 July	1,000	23 July	372	26 July	1,030	20 Aug.	540
20 Sept.	222	21 July	700	25 July	245	31 July	291	25 Aug.	273
22 Sept.	1,600	27 July	750	28 July	917	24 July	892	17 Aug.	1,314
21 Sept.	130	no date	0	26 July	6	01 Aug.	6	16 Aug.	407
Not surveyed		07 Aug.	100	28 July		22 July	61	Not surveyed	
22 Sept.	1	Not surveyed		Not surveyed		Not surveyed		Not surveyed	
23 Sept.	285	06 Aug.	345	28 July	230	22 July	600	30 Aug.	118
23 Sept.	0	Not surveyed		Not surveyed		Not surveyed 31 Aug.		2	
Not surveyed		16 July	74	29 July		22 July	89	Not surveyed	
26 Sept.	0	Not surveyed		Not surveyed		Not surveyed		Not surveyed	
26 Sept.	430	17 July	27	29 July	316	21 July	647	Not surveyed	
27 Sept.	1,850	2, 15 Aug.	1,518	01 Aug.	1,110	01 July	1,145	10–11 Aug.	1,011
27 Sept.	1,000	15 July	1,000	13 Aug.	488	08 July	654	01 Sept.	539
28 Sept.	230	15 July	442	13 Aug.	213	09 July	276	Not surveyed	
29 Sept.	400	14 July	500	16 Aug.	172	07 July	172	Not surveyed	
29 Sept.	1,000	13 July	3,000	16 Aug.	3,250	01 July	3,073	02 Aug.	947
29 Sept.	50	13 July	70	18 Aug.	8	06 July	8	07 Aug.	32
29 Sept.	800	13 July	450	19 Aug.	158	05 July	361	02 Sept.	186
01 Oct.	216	10 July	250	21 Aug.	54	05 July	260	Not surveyed	
02 Oct.	160	07 July	110	22 Aug.	16	03 July	62	05 Sept.	4
02 Oct.	1,600	07 July	1,500	24 Aug.	2,183	29 June	1,235	05 Sept.	985
28 Aug.	268	01 July	75	27 Aug.	267	26 June	267	07, 13 Sept.	279
Not surveyed		18–26 June	1,516	31 Aug.	942	18 June	1,205	25 July	493
Not surveyed		31 May	1,000	05 Sept.	10	14 June	1,100	28 July	567
Not surveyed		31 May	232	05 Sept.	272	814 June	750	28 July	700
	10,992		14,659		11,371		14,184		8,397
Nikolaev, 1965		Belkin, 1966b		Perlov, 1970		Kuzin et al., 1984; Kuzin ³		Kuzin et al., 1984; Kuzin ³	

continued

in 1961 the Kuril stock of Steller sea lions was 15–17 thousand individuals” (Nikolaev, 1965).

Even if one agrees with his first statement as to a total abundance of 50–70% animals at the rookeries and haulout sites, a simple calculation of total abundance would yield 16,500–18,700 individuals which disagrees with Nikolaev’s total abundance statement. The discrepancies in the data provided by Nikolaev make them untenable.

Belkin (1966b) surveyed the coastal waters of all the Kuril Islands between 31 May and 8 August 1963 and conducted a detailed census of Steller sea lions at haulout sites, rookeries, and in the water. This was the first precise and complete pup count of the Kuril Islands. The counts of non-pups were made by several observers from elevated sites on land. The total number of animals counted was 15,905 non-pups (14,659 on land and 1,246 in water) and 3,687 pups. Rounding these counts, Belkin (1966b) estimated total abundance

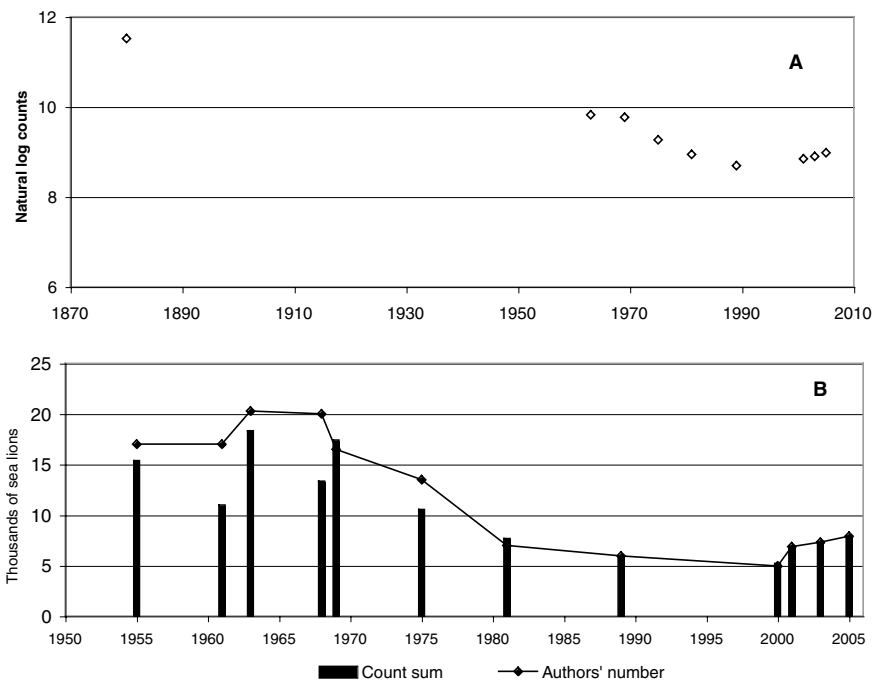


Figure 19.—Abundance (all ages and both sexes) of Steller sea lions in the Kuril Islands. A = 1880–2005; B = 1955–2005.

Table 9.—Continued.

Site no. ¹	Location	Non-pup abundance							
		1980		1981		1983		1989	
		Date	Count	Date	Count	Date	Count	Date	Count
46	Atlasov/Kudryavtsev Cape	28 June	160	08 Aug.	270	29 June	152	11 July	97
47	Shumshu/Vladimir Rock	29 June	281	15 Aug.	203	Not surveyed		11 May 87	170
48	Antsiferov/all sites	04 July	968	12 Aug.	346	30 June	459	10 July	542
49	Paramushir/Khmyr' Rock	27 June	18	16 Aug. 82	83	16 Aug. 82	83	09 June	133
50	Avos' Rk.	16 Aug. 82	40	16 Aug. 82	40	24 June	0	10 July	9
51	Makanrushi	Not surveyed		Not surveyed		Not surveyed		Not surveyed	
52	Onekotan/one site	04 July	12	04 July 80	12	24 June	0	11 July	21
53	Kharinkotan	Not surveyed		Not surveyed		Not surveyed		Not surveyed	
54	Chirinkotan	Not surveyed		08 Aug. 80	38	Not surveyed		Not surveyed	
55–56	Ekarma/two sites	Not surveyed		Not surveyed		Not surveyed		Not surveyed	
57–58	Shiashkotan/all sites	13 Aug.	136	03 Aug.	164	24 June	171	07 July	321
59	Lovushki/all sites	12, 18 Aug.	875	1–2 Aug.	960	29 July	836	19 June	760
60	Raykoke	18 Aug.	292	11 Aug.	411	25 June	372	21 June	266
61–62	Matua/two sites	18 Aug.	26	11 Aug.	107	19 Aug. 82	170	27 June 91	52
63–64	Rasshua/two sites	07 Aug.	27	15 Aug.	56	19 Aug. 82	42	24 Aug. 86	71
65–66	Srednego/all sites	19 Aug.	404	29–30 July	1,030	27–28–June	800	22 June	566
66	Ushishir/one site	607 Aug.	23	07 Aug. 80	23	20 Aug. 82	20	24 Aug. 86	7
67–69	Ketoy/three sites	22 Aug.	426	13 Aug.	208	24 June	0	04 July	216
70–73	Simushir/all sites	08 July	253	10 July	188	24 June	0	02 July	110
74–75	Broutona/two sites	23 Aug.	6	13 Aug.	3	Not surveyed		Not surveyed	
77	Brat Chirpoev/Rookery	23 Aug.	890	28 July	688	13 July	542	24 June	585
79–81	Urup/all sites	21 June	132	12 July	176	28 Aug. 82	369	27 Aug. 88	80
82–85	Iturup/all sites	13 June	706	26 July	490	19 July	743	28 June	122
86	Peshchernaya Rock	27 July 81	137	27 July	137	15 May	332	27 Mar. 88	250
87	Shishki	27 July 81	201	27 July	201	15 May	402	27 Mar. 88	110
	Total		6,013		5,834		5,493		4,488
	Sources	Kuzin et al., 1984; Kuzin, 1989; Kuzin ³		Kuzin et al., 1984; Kuzin ³		Maminov et al., 1991; Kuzin ³		Merrick et al., 1990; Maminov et al., 1991; Kuzin ³	

¹ Site number as indicated on Figure 18.

² Pups also included.

³ Kuzin, A. E. 2004. TINRO-Center 4, Shevchenko Alley, Vladivostok, Russia 690950. Personal commun.

⁴ Tsurupa, A. I. 2001. Kamchatka Branch of the Pacific Institute of Geography Russian Academy of Sciences, 6, Partizanskaya St., Petropavlovsk-Kamchatsky, Russia, 683000. Personal commun.

⁵ Nevedomskaya, I. A. 1999. State Nature Preserve *Kurilsky*, Yuzhno-Kurilsk Sakhalinskoy oblasti, Russia, 694500. Personal commun.

was 16,000–16,500 non-pups and 3,700–3,800 pups. In conclusion, he stated that total abundance of Steller sea lions on the Kuril Islands in 1963 was 20,000–20,500 (Belkin, 1966b). It is noteworthy that the survey data are complete and presented in detail and probably provide the first reliable data of sea lion abundance in the Kuril Islands, even though there was inconsistency in reconciling the count data with the final numbers (Belkin, 1966b).

Between 23 July and 5 September 1968, Perlov (1970) performed a detailed survey of the Kuril Islands. Similar to Belkin (1966b), he counted non-pups from elevated sites after landing and then counted pups. Perlov (1970) estimated total abundance of all ages was 13,347 individuals (11,371 non-pups, 1,976 pups). However, the

sites were surveyed about one month later than in 1963, from which the author concluded that the counts in 1968 were slightly underestimated.

Perlov (1970) noticed that the abundance of Steller sea lions on Raykoke Island had declined by almost 50% but had increased at Antsiferov Island. The number of animals in 1968 at Khitraya Cliff (Srednego Island) also declined by over 20% compared to Belkin's (1966a) count in 1962 (not in Table 9). A low abundance of Steller sea lions was noted at Peshchernaya and Shishki Cliffs. Perlov accounted for those changes by assuming a redistribution of sea lions over to other sites in the Kuril Islands. Perlov also reported a declining trend in abundance (particularly pups) at Kotikovaya Cliff (in the Lovushki Islands) during the previous 4 years

(Perlov, 1970). In summary, Perlov concluded that the Kuril Islands were home to about 20,000 Steller sea lions, and with over 10 years of observations (since 1955) their abundance had not increased despite the lack of harvests (Perlov, 1970).

Another complete Kuril Islands survey of Steller sea lions was conducted between 14 June and 1 August 1969, roughly the same dates as in 1963 (Kuzin et al., 1977, 1984). Total abundance of sea lions was 17,434 individuals (14,184 non-pups, 3,250 pups).

Another survey was conducted between 25 July and 13 September 1975 coinciding with the same dates as the survey by Perlov in 1968 (Perlov, 1970; Kuzin et al., 1977, 1984). Some unpublished information that was missing from these reports was provided to us

Non-pup abundance

1995		2000		2001		2003		2005	
Date	Count	Date	Count	Date	Count	Date	Count	Date	Count
29 June	19	27 June	4	25 June	0	Not surveyed		27 Jul	0
Not surveyed		Not surveyed		25 June	135	27 June	170	25 Jul	52
30 June	549	02 July	372	26 June	565	10 July	509	01, 06 July	659
06 July	74	05 July	23	27 June	76	27 June	0	29 Jul	1
05 July	23	06 July	201	28 June	111	Not surveyed		03 Aug	89
Not surveyed		06 July	47	27 June	1	Not surveyed		30 Jul	0
05 July	82	06 July	43	27 June	35	Not surveyed		30 Jul	53
Not surveyed		14 July	48	28 June	0	Not surveyed		12 Aug	92
Not surveyed		17 July	0	Not surveyed		Not surveyed		07 Jul	68
Not surveyed		17 July	19	29 June	34	Not surveyed		07 Jul	59
04 July	119	18 July	160	29 June	256	11 July	236	07 Jul	170
03 July	1,036	18–19 July	521	30 June	959	07 July	984	02 Jul	1,178
01 July	401	19 July	230	02 July	349	05 July	393	01 Jul	411
02 July	40	20 July	131	03 July	116	05 July	84	31 Jul	48
01 July	69	21 July	137	03 July	126	14 July	181	11 Jul	392
01 July	428	21 July	562	04 July	1,036	12 July	1,042	09 Jul	830
01 July	1	22 July	8	Not surveyed		Not surveyed		11 Jul	14
Not surveyed		26 July	96	05 July	122	14 July	112	12 Jul	213
Not surveyed		27 July	180	05 July	139	13 July	92	13 Jul	166
Not surveyed		28 July	0	06 July	0	13 July	0	14 Jul	0
02 Aug.	608	28 July	400	06 July	566	03 July	664	07 Jul	700
Not surveyed		29 July	0	Not surveyed		30 June	77	14 Jul	30
Not surveyed		03 Aug.	1	10 July	134	22 July	107	16 Jul	143
02 Jun 99	560	08 Aug.	3	09 July	146	02 July	167	16 Jul	57
02 Jun 99	75	Not surveyed		09 July	127	02 July	44	16 Jul	119
	4,084		3,186		5,033		4,862		5,544

Burkanov, V. N. unpubl. data; Tsurupa⁴; Nevedomskaya⁵

Trukhin, 2000; Kornev et al., 2001

Burkanov et al., 2002

Burkanov, V. N., unpubl. data

Burkanov et al., 2006a

for analysis by Dr. Kuzin from his personal archives (Tables 9, 10). Their data probably should be treated with caution because the papers have misprints as to census dates and some discrepancies regarding abundance values.

The reports indicated that Steller sea lion abundance on the Kuril Islands was 13,500 in 1975 (Kuzin et al., 1984). However, the sum of abundance estimates (Tables 3, 4 in Kuzin et al., 1984) for different islands totaled 10,501 (8,397 animals age 1 and older and 2,104 pups), a 20% difference from the original estimate, which was not accounted for by the authors. Even considering the expected number of sea lions at haulout sites and rookeries that were not surveyed (possibly as many as 1,500 individuals), the difference remains substantial (Table 9).

After 1975, surveys of Steller sea lion sites were combined with surveys for northern fur seals or sea otters resulting in some sea lion sites being missed (Kuzin et al., 1984; Merrick et al., 1990; Maminov et al., 1991; Kuzin³⁵). The data from these surveys are difficult to interpret. To estimate Steller sea lion abundance on all the Kuril Islands, the results of censuses over several years (1980, 1981, 1983, 1989, 1995, and 2003) were pooled (Tables 9 and 10).

Between 27 June and 8 August 2000, all of the Kuril Islands were surveyed using a sail yacht and an inflatable boat (Trukhin, 2000; Kornev et al., 2001). The survey provided census data of

³⁵Kuzin, A. E. 2003. TINRO-Center, 4 Shevchenko Tupik, Vladivostok, Russia, 690950. Personal commun.

all pinniped species, sea otters, and an inventory of marine bird colonies. Only a few Steller sea lion sites were missed (Shumshu/Vladimir Cliff, three sites at Urup Island, Rikord Cape on Iturup Island, and the easternmost reef of Shishki Island). At large rookeries and haulout sites the animals were counted from elevated sites on land, whereas small aggregations of Steller sea lions were counted from a boat. Pups were counted by several observers passing through the entire rookery and counts were averaged. The total abundance of Steller sea lions in the entire region was estimated at 4,947 (3,191 aged 1 year and older and 1,756 alive pups; note that these values do not match those in Tables 9 and 11 because five non-pups and two pups were seen on islands not included in the tables).

Table 10.—Summary of the abundance of non-pup Steller sea lions on 19 locations in the Kuril Islands, 1963–2005. Boldface numbers are estimates based on the best available data.

Site no. ²	Location	Non-pup abundance summary ¹										
		1963	1969	1975	1980	1981	1983	1989	1995	2001	2003	2005
46	Atlasov/Kudryavtsev Cape	1,000	1,030	540	160	270	152	97	19	0	0	0
47	Shumshu/Vladimir Rock	700	291	273	281	203	180	170	150	135	170	52
48	Antsiferov/all sites	750	892	1,314	968	346	459	542	549	565	509	659
49	Paramushir/Khmyr' Rock	0	6	407	18	83	83	133	74	76	0	1
50	Avos' Rock	100	61	50	40	40	0	9	23	111	100	89
52	Onokotan/one site	345	600	118	12	12	0	21	82	35	44	53
57–58	Shiashkotan/all sites	27	647	400	136	164	171	321	119	256	236	170
59	Lovushki/all sites	1,518	1,145	1,011	875	960	836	760	1,036	959	984	1,178
60	Raykoke Island	1,000	654	539	292	411	372	266	401	349	393	411
61–62	Matua/two sites	442	276	140	26	107	170	52	40	116	84	48
63–64	Rasshua/two sites	500	172	100	27	56	42	71	69	126	181	392
65–66	Srednego/all sites	3,000	3,073	947	404	1,030	800	566	428	1,036	1,042	830
66	Ushishir Island	70	8	32	23	23	20	7	1	7	11	14
67–69	Ketoy/three sites	450	361	186	426	208	0	216	156	122	112	213
70–73	Simushir/all sites	250	260	256	253	188	0	110	120	139	92	166
74–75	Broutona/two sites	110	62	4	6	3	0	0	0	0	0	0
77	Brat Chirpoev/Rookery	1,500	1,235	985	890	688	542	585	608	566	664	700
79–81	Urup/all sites	75	267	279	132	176	369	80	70	50	77	30
82–85	Iturup/all sites	1,516	1,205	493	706	490	743	122	130	134	107	143
	Total	13,353	12,245	8,074	5,675	5,458	4,939	4,128	4,075	4,782	4,806	5,149

¹ Source is table 9.

² Site number as indicated on Figure 18.

Despite the fact that Steller sea lion sites were fully surveyed, the data should be treated with caution. The method for estimating pup abundance is unquestionably reliable. However, comparing abundance data of adult individuals with those of pups at the rookeries on Raykoke Island, Dolgaya Cliffs (Lovushki Islands), and Khitraya Cliffs (Srednego Islands) indicates that pup abundance at those rookeries was higher (by 17% or 39%) than non-pups. Hence, the number of non-pups was undercounted at those sites (Trukhin, 2000; Kornev et al., 2001).

Between 25 June and 10 July 2001, a census of Steller sea lions on the Kuril Islands was conducted (Burkanov et al., 2002). All haulouts and rookeries were surveyed, except the northern and southern extremities of Urup Island and one site at Chirinkotan Island, totalling 6,873 individuals (5,033 age 1 year and older and 1,840 live pups (Tables 9 and 11); an additional 33 pups were seen at other sites and are not included in Table 11.

Another survey was conducted in June and July 2003. Haulout sites at Avos' Rock, Makanrushi, Onokotan, Kharimkotan, and Chirinkotan, and a small rookery on a low reef near the east side of Vysokaya Rock (Lovushki

Islands) weren't surveyed due to inclement weather. Animal numbers were estimated based on survey data collected in previous years (Tables 9 and 10). All Kuril Islands Steller sea lion rookery and haulout sites were surveyed between 26 June and 12 August 2005 resulting in a total of 5,544 non-pup and 2,251 live pups counted at all sites in the Kuril Islands.

Abundance Trends

Non-pups Summarizing the survey data presented above, we conclude that Belkin (1966b) obtained the first reliable data on the abundance of Steller sea lions on the Kuril Islands in the early 1960's. If the data of Snow (1897) and Belkin (1966b) are assumed correct, then between 1880 and 1960 the total number of Steller sea lions on the Kuril Islands declined by 80%, from 100,000 to 20,000 animals (Table 10). But during the 1960's Russian scientists believed that Snow's (1897, 1902) estimates were high, and even though WWII may have affected sea lions in that area, they were sure that the population of Steller sea lions in the Kuril Islands was in pristine condition and was not affected by human activity (Klumov, 1955; Belkin, 1966b; Perlov, 1970; Voronov, 1974).

The data for Steller sea lion counts for 19 locations on the Kuril Islands between 1963 and 2005 is reliable enough to allow comparative trend analyses (Table 10). Data in Table 10 are from counts presented in Table 9, excluding counts from the 1968 and 2000 surveys which were underestimated. The results show that the Steller sea lion population in the Kuril Islands has declined since the 1960's. Change in abundance between 1963 and 1989 was -69.1%, or -5% annually. The decline stopped during the 1990's and the population increased during the early 2000's. The increase between 1989 and 2005 was 24.7% or 1.5% per year. During the last 5 years an increasing trend has occurred and, since 2001, non-pup abundance increased by 26.4% or 2.3% per year. The current abundance of Steller sea lions on the Kuril Islands is about 38.6% of that in 1963, when the first reliable survey occurred.

Comparison of the estimate of Steller sea lions at the Kuril Islands by Snow (1897) during the late 19th century with those conducted over the last 40 years reveals similar rates of decline in abundance of sea lions between 1880 and 1963 (2.2% per year) and also during the later period between 1963 and 2005 (2.4% per year). If the estimate by Snow

was correct, the general rate of decline over the past 120 years has been 2.4% per year.

Pups For pup trend analysis, we used count data from five major islands where over 95% of all pups were born in the past 50 years. Twenty-two pup counts were conducted on these rookeries between 1963 and 2005 (Table 11). However, for comparative trend analysis only 13 estimates were used from major rookery surveys (trend sites) in late June–July (Table 12; Fig. 20). The census of pups during later dates (August–September) would have resulted in underestimates because most pups would have abandoned the rookeries by that time. Nevertheless, we included some pup counts during late July or even early August, even though they were likely undercounted because they were the only data available for this period and results of these late counts were reliable enough to detect changes.

Over a 42-year period (1963–2005), counts of Steller sea lion pup abundance varied widely in the Kuril Islands rookeries (Fig. 20). Between 1963 and 1989, abundance steadily declined from 3,673 to 1,442 pups or by 60.7% (3.6% per year). After 1989, the trend increased reaching 2,251 pups by 2005, or by 56.1% (2.2% per year). However, the general pup trend for the entire period from 1963 to 2005 was –38.7%, or –1.3% per year. Overall, the pattern of Steller sea lion pup population dynamics is quite similar to the general population dynamics of non-pups in the region.

Sakhalin Island

Distribution and Age–Sex Composition

Steller sea lions have been documented off Sakhalin Island since the early 19th century. Nikolsky (1889) was the first to describe the wildlife of Sakhalin Island, and he wrote, “Steller sea lions occur in huge numbers along the coasts of Sakhalin, throughout their entire length except the coast opposite to the mouth of the Amur River.” Nikolsky referenced many publications that were written between 1806 and 1886 and provided detailed descriptions of Steller sea lion distribution. He reported

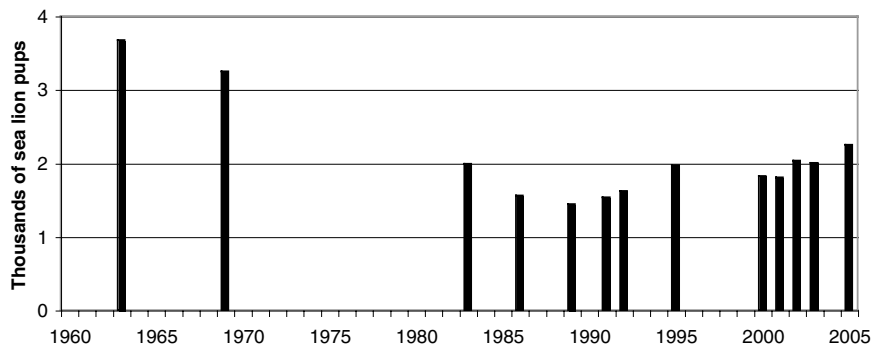


Figure 20.—Pup counts of Steller sea lions at five major rookeries in the Kuril Islands, 1963–2005.

the northernmost sighting of Steller sea lions at western Sakhalin in the area between Due Cape and Unandy Cape (roughly lat. 51° 20'N) and off eastern Sakhalin north of Rymnik Cape (north of lat. 50°N).

It is not clear what led Nikolsky to conclude that Steller sea lions were abundant off the northern coast of the island because he had not personally examined those areas, nor did he reference other researchers who had visited the northern coast. The largest concentrations of Steller sea lions then were at southern Sakhalin Island. Nikolsky (1889) reported, “They keep there on cliffs, capes and smaller islands.”

The sighting of “several families” of Steller sea lions on Tuleny Island in summer 1887 was mentioned by Rosset (1888). He killed one lactating female on the island, but he did not mention the presence of a pup. Snow (1910) visited Tuleny Island several times in the late 1890's during fall and early winter, but did not mention Steller sea lions, likely because they were absent during that time of the year. There are no data on the age or sex composition of the populations, nor is it known whether Steller sea lions bred on Sakhalin in the 19th century.

There is no information in the Russian literature on the distribution of Steller sea lions off Sakhalin in the early 20th century. There are some records of animals observed in the 1930's. Nikulin (1937) reported a “small” site on the northern end of the island at Elizavety Cape (Fig. 21, site

121). He also recorded hundreds of Steller sea lions hauled out on ice off the southeast coast of Sakhalin on 20 May 1935.

Pikharev (1941) sighted several Steller sea lions in La Perouse (Soya) Strait on 27 April 1938, and in mid May 1939, he regularly sighted them on the ice off eastern Sakhalin. On 19 May 1939, Pikharev (1941) noted that “Steller sea lions were very numerous” on and off northern Sakhalin. He reported both adult males and females. Sleptsov (1950) reported the harvest of a single Steller sea lion (female) on the ice in Aniva Bay and off eastern Sakhalin, also in May 1939.

It is known that Steller sea lions hauled out below the cliffs at Kamen' Opanosti, Moneron Island, breakwater of the Port Nevelsk, Tuleny Island, and Cape Elizavety (Kurcheva, 1955; Belkin, 1966b; Voronov, 1974; Itoo et al., 1977; Perlov, 1977; Perlov and Maminov, 1979; Kuzin and Naberezhnykh, 1991; Perlov and Chupakhina, 1991). There is one questionable record of Steller sea lions hauled out on Dzhaore Cape and Langry Cape in Tatar Strait (Kurcheva, 1955). However, sites off Sakhalin were haulouts. Itoo et al. (1977) reported “many” Steller sea lions pups on Moneron Island in early 20th century based on anecdotal information from local fishermen. The first confirmed mention of a rookery was when Steller sea lions started breeding on Tuleny Island in the early 1970's (Kuzin and Naberezhnykh, 1991; Perlov and Chupakhina, 1991). On Moneron Island about 25 new born

Table 11.—Counts of live Steller sea lion pups on five major rookeries in the Kuril Islands, 1963–2005.

		Non-pup abundance by rookery and site no. ¹						
		Antsiferov Island		Lovushki Island				
Year		Vydar' Rock	Rookery	Dolgaya	Reefs	Vysokaya	Nizkaya	Kotikovaya
1963	Date	27 July 63	27 July 63	3–4 Aug. 63	N.d. ²	3–4 Aug. 63	3–4 Aug. 63	3–4 Aug. 63
	Count	50	15	893		0	0	110
1967	Date	N.d.	25 July 67	28–30 Jul 64	N.d.	N.d.	N.d.	N.d.
	Count		30	750				
1968	Date	N.d.	28 July 68	30 Jul–8 Aug 68	N.d.	N.d.	N.d.	N.d.
	Count		114	524				
1969	Date	N.d.	24 July 69	N.d.	14 July 69	N.d.	N.d.	14 July 69
	Count		15		623			30
1975	Date	N.d.	17 Aug. 75	N.d.	10 Aug. 75	11 Aug. 75	11 Aug. 75	10 Aug. 75
	Count		127		398	17	137	27
1976	Date	N.d.	N.d.	04 Aug. 76	4 Aug. 76	04 Aug. 76	N.d.	N.d.
	Count			574	13	101		
1977	Date	N.d.	N.d.	01 Aug. 77	N.d.	01 Aug. 77	N.d.	02 Aug. 77
	Count			323		79		16
1979	Date	N.d.	N.d.	17 Sept. 79	17 Sep. 79	17 Sept. 79	N.d.	N.d.
	Count			203	41	5		
1980	Date	04 July 80	N.d.	12 Aug. 80	N.d.	18 Aug. 80	N.d.	N.d.
	Count	0		380		22		
1981	Date	12 Aug. 81	12 Aug. 81	31 July 81	N.d.	01 Aug. 81	01 Aug. 81	02 Aug. 81
	Count	2	6	340		50	10	8
1982	Date	N.d.	15 Aug. 82	10 Aug. 82	N.d.	11 Aug. 82	N.d.	09 Aug. 82
	Count		7	248		145		3
1983	Date	N.d.	30 June 83	26 June 83	N.d.	N.d.	N.d.	N.d.
	Count		189	492				
1986	Date	N.d.	N.d.	05 Aug. 86	N.d.	07 Aug. 86	07 Aug. 86	08 Aug. 86
	Count			221		52	0	2
1989	Date	N.d.	10 July 89	20 June 89	N.d.	19 June 89	N.d.	N.d.
	Count		220	364		8		
1991	Date	N.d.	N.d.	24 June 91	N.d.	N.d.	N.d.	N.d.
	Count			458				
1992	Date	N.d.	30 June 92	27 June 92	N.d.	N.d.	N.d.	N.d.
	Count		232	554				
1995	Date	05 July 95	05 July 95	03 July 95	03 July 95	03 July 95	03 July 95	03 July 95
	Count	0	210	545	0	98	0	0
2000	Date	02 July 00	02 July 00	19 July 00	N.d.	N.d.	19 July 00	19 July 00
	Count	0	253	489			0	0
2001	Date	26 June 01	26 June 01	01 July 01	30 June 01	30 June 01	30 June 01	30 June 01
	Count	0	203	507	0	41	0	0
2002	Date	N.d.	09 July 02	10 July 02	N.d.	N.d.	N.d.	N.d.
	Count		244	408				
2003	Date	10 July 03	10 July 03	07 July 03	N.d.	N.d.	07 July 03	07 July 03
	Count	0	220	416			0	0
2005	Date	06 July 05	06 July 05	1,2,4 July 05	02 July 05	02 July 05	02 July 05	02 July 05
	Count	0	273	524	0	159	0	0

¹ Site number as indicated on Figure 18.

² N.d. = No data or sites not surveyed.

³ Kuzin, A. E. 2004. TINRO-Center. 4, Shevchenko Alley, Vladivostok, Russia, 690950. Personal commun.

⁴ Perlov, A. S. 1999. Results of Steller Sea Lion Research in the Russian Far East conducted by TINRO from the 1930's to the 1990's. [Rezultaty issledovaniy sivuchey (Eumetopias jubatus) na Dal'nem Vostoke Rossii, provedennykh TINRO v 1930-kh–1990-kh godakh (baza dannyykh)]. Report to Russian Marine Mammal Council, 74 p. On file at Library, NMML, Seattle, Wash.

⁵ Pavlov, N. N. 1996. Kamchatrybvod, 9 Partizanskaya St., Petropavlovsk-Kamchatsky, Russia 683000. Personal commun.

pups were seen for the first time in June 2006 (Ponteleeva³⁶).

A detailed survey of marine mammal sites on Sakhalin was conducted between 28 August and 28 September 1983 by Sakhalinrybvod (Annual Report¹⁸). Small groups of Steller sea lions were recorded off the northeastern and southwestern coasts of the island and other small haulout sites were

found on the cliffs of Kamen' Opasnosti and Tuleny Island. In addition, Kosygin et al. (1986) reported a site on the southwestern coast (Fig. 21, site 109). Lagerev (1988) surveyed Sakhalin Island by helicopter in September 1986 and saw a Steller sea lion site on the east of Krilion Cape (Fig. 21, site 108). According to Chupakhina³⁷, two Steller sea lion sites were recorded

on Moneron Island (Sanko Cliff and Poyasnoi Island) in May 1997 (Fig. 21, sites 110–111) and a site used frequently by sea lions was noted in the spring of 1997 off Kuznetsov Cape (site 109). Single Steller sea lions were repeatedly sighted swimming in the region of the Molikpaq oil drilling platform off the northern coast of Sakhalin (Sobolevsky, 2000).

Thus, for the last 200 years, Steller sea lions were often observed on Sakhalin Island and in the water near the

³⁶Ponteleeva, O. I. 2003. Sakhalinrybvod, 43a Emel'yanova St. Yuzhno-Sakhalinsk, Russia, 693006. Personal commun.

³⁷Chupakhina, T. I. 2003. Sakhalinrybvod, 43a Emel'yanova St. Yuzhno-Sakhalinsk, Russia, 693006. Personal commun.

Non-pup abundance by rookery and site no.¹

Raykoke Island		Srednego Island		B. Chirpoev Island		Total	Sources
Rookery		Khitraya Cliffs		Rookery			
15 July 63 350		13 July 63 1,500		07 July 63 755		3,673	Belkin, 1966b
03 Aug. 67 103		02 Aug. 67 1,054		07 July 63 755		2,692	Perlov, 1970
13 Aug. 68 214		02 Aug. 67 1,054		24 Aug. 68 70		1,976	Perlov, 1970
08 July 69 477		06 July 69 1,500		29 June 69 605		3,250	Kuzin et al., 1977 and 1984; Perlov, 1980
01 Sept. 75 286		02 Aug. 75 778		05 Sept. 75 334		2,104	Kuzin et al., 1984; Kuzin ³
18 Aug. 76 240		31 July 76 735		16 Aug. 76 530		2,193	Kuzin et al., 1984; Kuzin ³
N.d.		03 Aug. 77 916		09 Aug. 77 227		1,561	Kuzin ³
N.d.		11 Sept. 79 135		14 Oct. 79 237		621	Kuzin ³
18 Aug. 80 155		19 Aug. 80 300		23 Aug. 80 405		1,262	Kuzin et al., 1984; Kuzin ³
11 Aug. 81 136		30 July 81 730		28 July 81 426		1,708	Kuzin et al., 1984; Kuzin ³
13 Aug. 82 138		19 Aug. 82 230		21 Aug. 82 281		1,052	Kuzin et al., 1984; Kuzin ³
25 June 83 168		27 June 83 746		13 July 83 397		1,992	Maminov et al., 1991
04 Aug. 86 141		02 Aug. 86 583		30 July 86 356		1,355	Kuzin ³ ; our estimation
21 June 89 157		22 June 89 426		24 June 89 267		1,442	Merrick et al., 1990; Maminov et al., 1991
23 June 91 185		N.d.		22 June 91 244		887	Loughlin, T. R., unpubl. data; our estimation
27 June 92 193		26 June 92 415		25 June 92 229		1,623	Perlov ⁴
04 July 95 271		01 July 95 458		08 July 96 390		1,972	Burkanov, V. B., unpubl. data; Pavlov ⁵
19 July 00 260		21 July 00 499		28 July 00 253		1,754	Trukhin, 2000; Kornev et al., 2001; our estimation
02 July 01 213		04 July 01 591		06 July 01 252		1,807	Burkanov et al., 2002
10 July 02 269		12 July 02 692		09 July 02 360		1,973	Burkanov, V. B., unpubl. data
05 July 03 256		12 July 03 692		30 June 03 329		1,913	Burkanov, V. B., unpubl. data
08 July 05 205		09 July 05 772		10 July 05 308		2,241	Burkanov et al., 2006a

island. In the 19th century they occurred at several sites on the southern half of the island. Supposedly, in the 19th century, Steller sea lions did not breed on the Sakhalin coast as no sightings of newborn pups were recorded. Nikolsky (1889) believed that their distribution on Sakhalin included the northern coast; however, he provided no evidence to support this statement.

In the 20th century, the distribution pattern off Sakhalin changed only slightly when Steller sea lions ceased to haul out in the Tatar Strait (Fig. 21, sites 118–120), but they still occurred off the coast around the entire southern half of the island. In the 1960's, one "small" site

Table 12.—Trends in Steller sea lion pup counts on the Kuril Islands, 1963–2005. Boldface numbers are estimates based on the best available data

Year	Pup count trends ¹					Total
	Rookery					
	Antsiferov Island	Lovushki Island	Raykoke Island	Srednego Island	B. Chirpoev Island	
1963	65	1,003	350	1,500	755	3,673
1969	15	653	477	1,500	605	3,250
1983	189	492	168	746	397	1,992
1986	205	275	141	583	356	1,560
1989	220	372	157	426	267	1,442
1991	226	458	185	420	244	1,533
1992	232	554	193	415	229	1,623
1995	210	643	271	458	390	1,972
2000	253	559	260	499	253	1,824
2001	203	548	213	591	252	1,807
2002	244	468	269	692	360	2,033
2003	220	506	256	692	329	2,003
2005	283	683	205	772	308	2,251

¹ Source is Table 9.

existed briefly off the northern extremity of Sakhalin on Cape Elizavety (Voronov, 1974); sea lions were not sighted there in 1983 or 1986. (Lagerev, 1988; Annual Report¹⁸).

Steller sea lions have occurred on Tuleny Island since the 19th century, but it is not clear whether they were numerous in the first half of the 20th century because they were pushed off by humans to protect northern fur seals (Tikhenko, 1914). There are reliable data indicating that the species occurred there since the early 1950's, with the bulk of individuals being adult males (Perlov and Chupakhina, 1991).

Currently, there are five major sites where Steller sea lions haul out on Sakhalin Island. Two of these sites are on the southwestern coast (the breakwater at Port Nevelsk and at Kuznetsov Cape), and the others are on Moneron Island, Kamen' Opasnosti Cliff, and Tuleny Island (Fig. 21).

Abundance

Most of the coastal waters of Sakhalin Island are covered with compact ice during winter. From January to April, only the southern coastal waters are ice-free, but during cold winters this area is also partially covered with ice.

According to T. I. Chupakhina³⁷ and O. I. Ponteleeva³⁶, Steller sea lions off southern Sakhalin (Kamen' Opasnosti Cliff, Kuznetsov Cape, breakwater in the town of Nevelsk) are only numerous in late winter and spring. During the breeding season, there are few animals and most are young. On Tuleny Island, Steller sea lions occur constantly after the ice breakup around the island in May, until the ice returns in December to January (Annual Report^{18, 19}).

It is quite possible that the southern coast of Sakhalin provides wintering grounds for Steller sea lions originating from the northern Sea of Okhotsk and Tuleny Island. They may migrate there along with the ice drift in late December to early January, and move northward in May when the ice recedes. Nikolsky (1889) reports a higher abundance of Steller sea lions off southern Sakhalin in May; he attributed this phenomenon to spawning Pacific herring, *Clupea harengus pallasi*, arriving at the coast.

No single comprehensive survey of Steller sea lions around Sakhalin Island has ever been conducted during the breeding season (late May to early July). Describing the ubiquitous abundance of Steller sea lions in Sakhalin coastal waters, Nikolsky (1889) gave no quantitative data. However, one example he provided is illustrative of that "abundance." In fact, quoting Mr. Rudakovsky, who "sighted huge herds of Steller sea lion", Nikolsky (1889) wrote: "At a distance of no more than 30 feet from the boat, about 100 individuals would surface to submerge again together." If the "huge herds" estimate corresponds to 100 individuals, the estimate by Nikolsky in the 19th century was high. Rosset (1888), who visited Tuleny Island in 1887, reported only "several families of Steller sea lions." A more definitive conclusion on the abundance of Steller sea lions off Sakhalin Island in the 19th century is not possible.

Tikhenko (1914) visited Tuleny Island on 9 June (during the peak of the breeding season) and referred to Steller sea lions only as "northern fur seal competitors which are to be exterminated at the first possible opportunity."

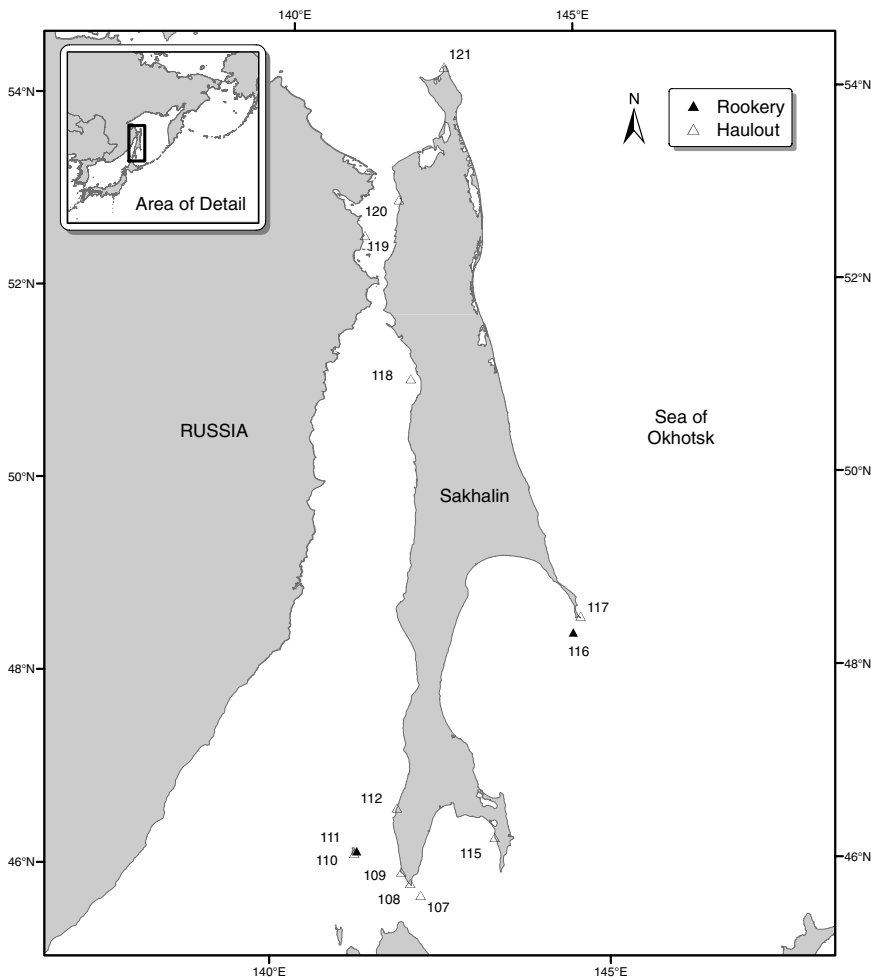


Figure 21.—Steller sea lion sites on Sakhalin Island, 1800's to present. 107-Kamen' Opasnosti Rock; 108-Krilyon Cape; 109-Kuznetsov Cape; 110-Moneron/Sanko; 111-Moneron/Poyasnoy; 112-Nevelsk; 115-Inoskotonay; 116-Tuleny Island; 117-Terpeniya Cape; 118-Sivuchy Cape; 119-Dzhaore Cape; 120-Langry Cape; 121-Elizavety Cape

He said nothing regarding sighting live Steller sea lions on the island, but judging from the animosity of the Japanese guards towards Steller sea lions, there are grounds to believe that during that time Steller sea lions were not found on the island.

Information about Steller sea lion numbers in the Sakhalin region is available only for Tuleny Island over the last 50 years (Fig. 22, Table 13). Few survey data are available to make any conclusions regarding the total abundance of the species in the whole region (Table 14). From the mid 1950's, regular monitoring of northern fur seals began by members of the Sakhalin Branch of TINRO and Sakhalinrybvod, and their reports mentioned the abundance of Steller sea lions (Perlov and Chupakhina, 1991). Since 1989, Steller sea lion abundance has been monitored by members of the TINRO-Center, and those data are the most complete for the area (Kuzin, 1996, 2001; Kuzin and Naberezhnykh, 1991; Kuzin and Kurmazov, 2000).

Between 1955 and 2003, Steller sea lion abundance on Tuleny Island has varied (Fig. 22). During the 30-year period between 1955 and 1985, abundance was not high, ranging from 50 to 100 individuals which consisted primarily of adult males. The first recorded pups appeared in 1974, but only single pups were sighted and they were normally harvested in order to reduce competition with northern fur seals (Kuzin and Naberezhnykh, 1991). Abundance of all age and sex classes of Steller sea lions increased on Tuleny Island after 1983, perhaps due to immigration.

Over the 20-year period from 1983 to 2005, the mean annual rate of increase in abundance of animals age 1 year and older was 11.6% per year. Total abundance of adults increased more than 18-fold from 65 to 1,218 individuals (maximum survey data during the breeding season) (Table 13). The abundance of newborn pups during that period increased at a greater rate, averaging 24.3% per year (Tables 13 and 15). Between 1983 and 1986, immigration must have been substantial

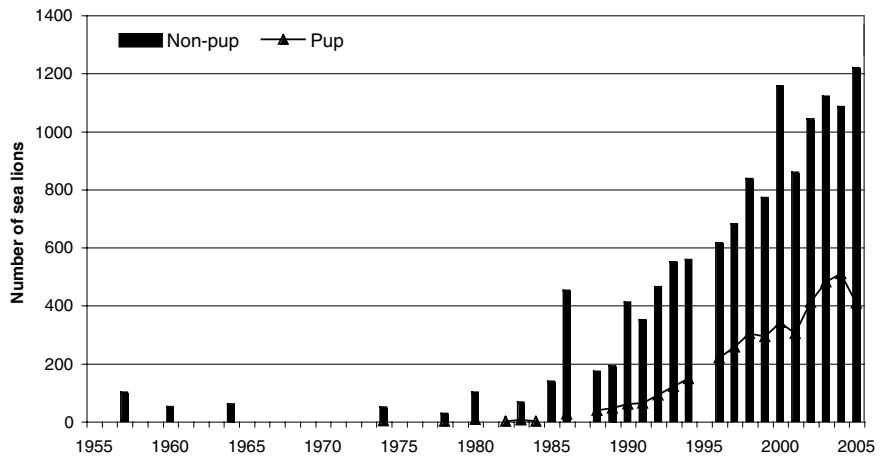


Figure 22.—Steller sea lion abundance on Tuleny Island, 1957–2005.

Table 13.—Maximum counts of Steller sea lion pups and non-pups on Tuleny Island during June and July, 1957–2005.

Year	Maximum counts		Sources
	Non-pup	Pup	
1957	100	0	Perlov and Chupakhina, 1991
1960	50	0	Voronov, 1974
1964	60	0	Perlov and Chupakhina, 1991
1974	49	1	Perlov and Chupakhina, 1991
1975	26	0	Kuzin and Naberezhnykh, 1991
1978	100	6	Perlov and Chupakhina, 1991
1980	137	0	Kuzin and Kurmazov, 2000
1982	450	25	Perlov and Chupakhina, 1991
1983	171	38	Kuzin and Naberezhnykh, 1991; Perlov and Chupakhina, 1991
1984	190	45	Perlov and Chupakhina, 1991
1985	410	59	Kuzin and Naberezhnykh, 1991
1986	350	63	Perlov and Chupakhina, 1991
1988	463	90	Annual report ¹
1989	549	120	Kuzin and Naberezhnykh, 1991
1990	557	146	Kuzin and Naberezhnykh, 1991
1991	543	192	Kuzin and Kurmazov, 2000; Kuzin, 2002
1992	615	219	Kuzin and Kurmazov, 2000; Kuzin, 2002
1993	679	256	Kuzin and Kurmazov, 2000; Kuzin, 2002
1994	836	303	Kuzin and Kurmazov, 2000; Kuzin, 2002
1995	770	291	Kuzin and Kurmazov, 2000; Kuzin, 2002
1996	1,155	340	Kuzin and Kurmazov, 2000; Kuzin, 2002
1997	857	303	Kuzin and Kurmazov, 2000; Kuzin, 2002
1998	1,041	410	Kuzin and Kurmazov, 2000; Kuzin, 2002
1999	1,119	480	Kuzin and Kurmazov, 2000; Kuzin, 2002
2000	1,084	508	Kuzin, 2002
2001	1,218	407	Kuzin, 2002
2002			Kuzin, 2002
2003			Kuzin, 2004
2004			Kuzin, 2004
2005			Kuzin, 2006

¹ Annual report on marine mammal conservation and harvest monitoring in Sakhalin and Kuril Regions in 1988 [Otchet po okhrane i kontrolyu za promyslom morskikh mlekopitayushchikh, obitayushchikh v Sakhalino-Kuril'skom bassejne v 1988 godu.], 1988, 43 p.

since pup abundance increased on average 99.3% per year (i.e. the number of pups doubled annually). During the subsequent 10 years, pup abundance was more stable with a 24.4% increase per year. However, in the period from 1997 to 2001 the rate of increase in pup

abundance was only 4.6% per year, perhaps because immigration slowed or for some unexplained reason. After 2001, the abundance of pups on Tuleny Island increased again and the mean rate of increase from 2001 to 2005 was 8.4% per year (Tables 13 and 15).

Table 14.—Date and count of Steller sea lions at haulout sites around Sakhalin Island, 1960–2003.

Year	Number of Steller sea lions										Sources
	Kamen' Opastnosty		Moneron Island		Kuznetsov Cape		Nevelsk		Elizavety Cape		
	Date	Count	Date	Count	Date	Count	Date	Count	Date	Count	
1960	Unknown	250			Unknown	300			Unknown	300	Voronov, 1974
1974	Unknown	300									Perlov, 1996
1983	27 Sept.	250	29 Sept.	2	Sept.	230	Sept.	2	Sept.	0	Kosygin et al., 1986, Annual report text footnote 18
1986									Sept.	0	Lagerev, 1988
1991	01 July	275									Perlov, 1996
1997			13 May	465	13 May	500					Chupakhina et al., 2004
2000							26 Mar.	>450			Chupakhina et al., 2004
2000					21 Apr.	>500	21 Apr.	700			Chupakhina et al., 2004
2000							18 June	400			Chupakhina et al., 2004
2002	30 July	400					14 Sept.	22			Chupakhina et al., 2004
2002							22 Oct.	>160			Chupakhina et al., 2004
2003					15 Apr.	>120					Chupakhina et al., 2004

Northern Part of the Sea of Okhotsk

Distribution and Age–Sex Composition

The first studies of the Steller sea lion by Steller (1751) and Krasheninikov (1755) indicated that the species did not occur in the Sea of Okhotsk. In fact, Steller (1751) stated “The sea lion is never seen in the Penzhin Sea” (at that time the Sea of Okhotsk was referred to as the “Penzhin Sea”). However, both of these pioneers started their expeditions in the Port of Okhotsk on the northern shore of the Sea of Okhotsk where Steller sea lions occur only rarely. They may not have seen Steller sea lions on their route to Kamchatka and their conclusions were based on surveys of a limited area of the Sea of Okhotsk. However, Sarychev (1802) stated that Steller sea lions were common and abundant on the northwestern coast of the Sea of Okhotsk and at Iony Island in summer and fall 1789.

Slyunin (1900) stated that Steller sea lions occurred in Penzhin Inlet and on the Yamsky Islands (Fig. 23, site 128). However, farther west “it is not found in Tauisk, Okhotsk or Ayan, but it reappears near the Shantarsky shores and Sakhalin (?)” Presumably, Slyunin had relied upon interviews, which he doubted, and placed a question mark at the end of the sentence due to his uncertainty on the veracity of these reports. He did not mention the Steller sea lion site at Iony Island (Fig. 23, site 123), which may not have been known to him, but the island was known to have “numerous Steller sea lions” at least in

Table 15.—Cumulative and annual changes in trends of abundance of Steller sea lion pups and non-pups on Tuleny Island, 1957–2005.

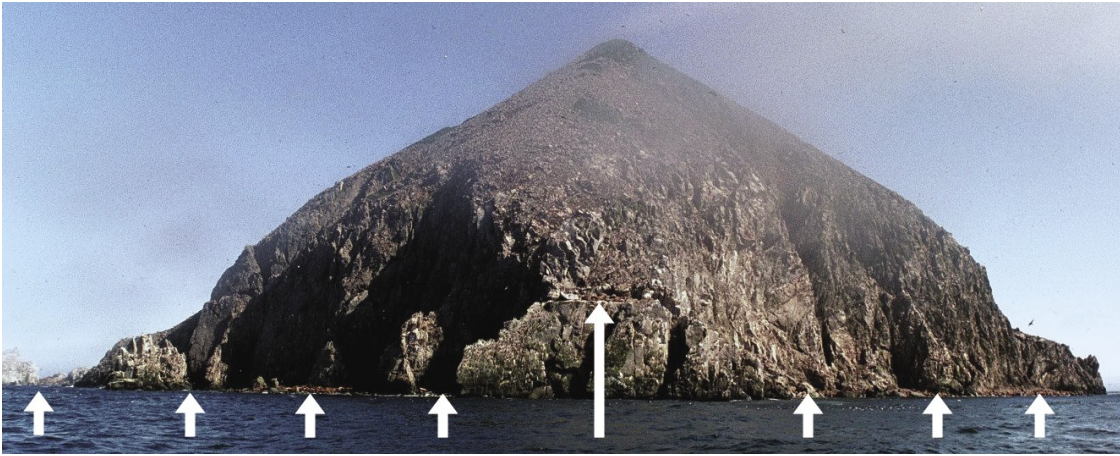
Period ¹	Years	Trends		Period ¹	Years	Trends	
		Change (%)				Change (%)	
		Per year	Cumulative			Per year	Cumulative
Non-pups:				Pups:			
1957–2005	49	8.1	1118.0	1983–2005	23	24.3	8040.0
1957–1983	27	–0.9	–35.0	1983–1986	4	99.3	400.0
1983–2005	23	11.6	1773.8	1986–1997	12	24.4	924.0
				1997–2001	5	4.6	18.4
				2001–2005	5	8.4	34.3

¹ Time periods reflect changes in abundance shown in Figure 22.

the late 18th and early 19th centuries (Sarychev, 1802; Middendorf, 1869). Smirnov (1908) included the Sea of Okhotsk in the Steller sea lion’s range, referring to data by Grebniatsky (1902). However, Grebniatsky did not work in the Sea of Okhotsk, and in his study he only wrote about the eastern coast of Kamchatka. Nichkevich (1919, as presented in Dukul’ et al., 1929) reported “particularly large sites of the Steller sea lion” on Iony Island.

The most complete and reliable data on the distribution of Steller sea lions in the Sea of Okhotsk have been available since the 1930’s when it became known that there were large rookeries on Iony Island and the Yamsky Islands (Frieman, 1935a, b; Nikulin, 1937; Freiman²). Nikulin counted up to eight rookeries on Iony Island and the surrounding cliffs. On the Yamsky Islands, Steller sea lions were found on Bolshoi Talok Island (which is currently called Matykil’ Island), where they hauled out at two large sites and one smaller site (Freiman²).

In 1930, a large haulout site was found on the southeastern side of Olsky Island (it is currently called Zavyalov Island, Fig. 23, site 125) “at the intersection of the coastline and the 59th latitude east” (Freiman²). Freiman² also reported that in the Tauï District, the Steller sea lion “is very small in number and confined to a single site.” Based on interview data, two small sites on Lisiansky Peninsula (both sides of Duginsky Cape) were found (Fig. 23, site 124). Lun²⁵ described one Steller sea lion site consisting of up to 50 animals on four small rocks in central western Kamchatka on Zubchaty Cape (Fig. 23, site 130). However, on 6 June 1931, Steller sea lions were neither on land there nor in the water. Local residents told Lun’ that Steller sea lions occurred there from spring (mid May) to fall (freezing of the coastal part of the sea), “at every rock there is a single old male surrounded by females, young bachelors hauling out on the edge. The old bull drives the bachelors out into the water. North of Cape Zubchaty, there were no Steller sea lion



West side of Iony Island. Arrows show beaches where Steller sea lions haul out. Photo by Vladimir Burkanov.



Iony Island main rookery.
Photo by Vladimir Burkanov.



Steller sea lion cave on northern side of Iony Island. Photo by Vladimir Burkanov.



Rookery on East Rock, Iony Island, 10 July 2006.
Photo by Irena Mamaeva.



Rookery on east side of Matykil Island, Yamsky Islands,
11 July 2004. Photo by Vladimir Burkanov.



Males haulout on Matykil Island, Yamsky Islands, 11 July
2004. Photo by Jason Waite.

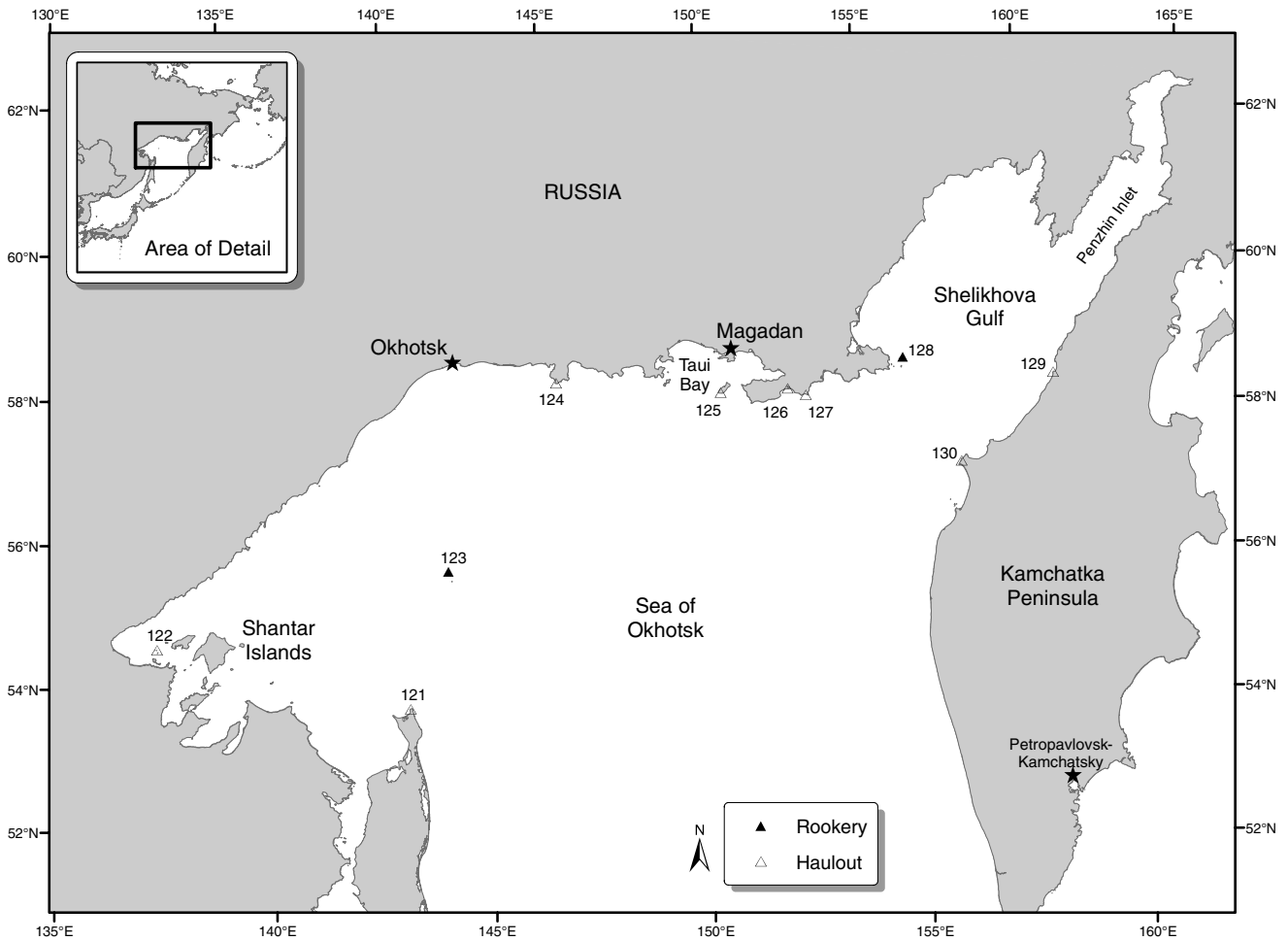


Figure 23.—Steller sea lion sites in the northern part the Sea of Okhotsk, 1800 to present. 121-Sakhalin/Elizavety Cape; 122-Shantar/Sivuchy Rock; 123-Iony Island; 124-Lisyansky Peninsula; 125-Zavyalov Island; 126-Evreinova Cape; 127-Zabiyaka Bay; 128-Yamsky Island; 129-Kakhtana Cape; 130-Zubchaty Cape

sites, but the animals were sighted swimming along the shore to the mouth of the Lesnaya River, where in spring one sea lion was harvested every year” (Lun⁵). In the Penzhin District, Steller sea lions occurred only rarely and were not of commercial importance (Freiman²).

Sergeev (1936) confirmed the presence of Steller sea lion sites on the Yamsky Islands, Lisyansky Peninsula, Zavyalov Island, and also on Iony Island. He also reported a site on the Shantarsky Islands (Fig. 23, site 122). Presumably, the animals once occurred on a small group of islands in that archipelago called the Sivuchy Islands. But Pikharev (1941) described in detail the harvests of true seals (Phocidae) on the

Shantarsky Islands between 1930 and 1939 and did not mention Steller sea lions. He wrote that Steller sea lions were very abundant on ice off Shmidt Peninsula (northern extremity of Sakhalin) on 19 May 1939. Pikharev sighted mixed groups of adult males and females of both. Because he did not see any sexually immature animals among them, he believed that adult Steller sea lions were migrating to the rookery at Iony Island. He also watched some Steller sea lion individuals on 14 July 1939 in Academy Bay (the Shantar Islands). Presumably, if Steller sea lions were present in the Shantarsky Islands, they were few and rare; Pikharev would have recorded their

presence otherwise. A small site was found about that time at Elizaveta Cape on the northern extremity of Sakhalin (Nikulin, 1937).

During WWII and until the mid 1980’s, no Steller sea lion studies were conducted in the Sea of Okhotsk. It was not until the summer of 1974 that Iony Island and the Yamsky Islands were examined (Lisitsyna, 1975; Perlov, 1977). Breeding groups were sighted in both of these locations, but abundance was low. Gutorov (a fisherman from Ust-Khayryuzovo, Kamchatka) reported to Burkanov³ that Steller sea lions ceased hauling out at Cape Zubchaty (Fig. 23, site 130) in the late 1950’s, associated with destruction of the haulout site by an

earthquake. Kurcheva (1955) reported Steller sea lion sites on the northern coast of the Sea of Okhotsk in Zabiya Bay, Evreinov Cape, and Brat'yev Cape (Fig. 23, sites 126 and 127). Zadalsky (2000), which was based on reports of old-timers, reported that in the 1960's, Steller sea lion sites probably occurred on the islands of Sapfariev and Nedorzumenia, on the rocks in Matykleisky Bay, along the coast of Koni Peninsula, and at the entrance to Nagaev Bay. Steller sea lions regularly appeared at city beaches in Magadan. However, no details of these sites are available. Of all the sites off the northern coast of the Sea of Okhotsk, only three are currently active; they are on Yamsky and Zavyalov Islands, and on Lisyansky Peninsula (Fig. 23, sites 128, 125, and 124). Zadalsky (2001, 2002) reported pups present at the Lisyansky Peninsula site in 1997–98, and 2000. Later we obtained information directly from an observer who collected these data for Zadalsky and found that she had never seen pups before and might have mistaken juveniles for pups (Utekhina³⁸).

Regular observations of Steller sea lions on the Yamsky Islands have been conducted since 1983, and Iony Island was surveyed in 1989, 1997–98, and in 2001–04 (Maminov et al., 1991; Zadalsky, 1997, 2000, 2001, 2002; Grachev, 2000; Burkanov et al., 2002, 2006a). Steller sea lions were breeding at the time of all visits to these islands. There is some unsupported evidence that they hauled out in the Shantarsky Islands in September 2001. Animals were sighted from an AN-2 airplane, but they could have been true seals mistaken for Steller sea lions (Skopets³⁹).

Comparing the distribution of Steller sea lions in the 1930's and the early 21st century, it appears that rookeries and areas of use remained the same. However, Steller sea lions ceased hauling out and were no longer sighted during the summer on the western coast of the

Kamchatka Peninsula. During the last 20 years, only single individuals were sighted there on occasion. Steller sea lions continued to populate the waters of the northern Sea of Okhotsk from the Yamsky Islands to the Lisyansky Peninsula. Similar to the late 19th century, they rarely occurred west of the Lisyansky Peninsula, but very likely there is a small haulout site on the Shantar Islands today (Fig. 23, site 122). The Steller sea lion site at Elizavety Cape on the northern extremity of Sakhalin Island and several sites at the northern coast of the Sea of Okhotsk are no longer used. Thus, 10 Steller sea lion sites are known in the region with only 5 currently active.

Abundance

Winter sea ice conditions in the northern Sea of Okhotsk are more pronounced compared with the coast of Sakhalin. During winter, most of the water, all coastal rocks, and smaller islands are covered with ice and snow. Associated with these more severe sea ice conditions there are also notable changes in Steller sea lion abundance compared with Sakhalin or the eastern coast of Kamchatka. Because of these severe weather conditions, the available historical data on the abundance of Steller sea lions at these northern sites are not comparable. Surveys were performed at different times of the year by different methods that are not fully described in the publications or reports. Often second-hand information from local residents or hunters were relied upon.

However, data for all haulout sites in the region indicated a generally negative trend in population size. In fact, Steller sea lions disappeared from the Zubchaty Cape haulout site on the western coast of Kamchatka, as did animals at Elizavety Cape on the northern extremity of Sakhalin, and at a number of sites on the northern coast. The number of Steller sea lions observed during the last 10–15 years on Lisyansky Peninsula and Zavyalov Island sharply declined (Table 16).

Seasonal dynamics Few data are available regarding Steller sea lion population dynamics with respect to season

in the Sea of Okhotsk. Nikulin (1937) quotes Smirnov (1908) who claims that “the Sea of Okhotsk provides no winter habitat to Steller sea lions on account of harsh winters. The animals leave for the Kuril Range and the coasts of Japan.” However, Smirnov (1908) reported no such data for the Sea of Okhotsk. Nikulin (1937) reported no findings on movements, but his paper describes a number of sightings of Steller sea lions on the ice edge in spring at the eastern and northern coasts of Sakhalin. His studies of pinnipeds in the northern Sea of Okhotsk cover the period from May to August (Nikulin^{6, 7, 8, 9}), but provide no data on fall or winter surveys of Steller sea lions in the Sea of Okhotsk. It is therefore likely that Nikulin's conclusion pertains to the activity of Steller sea lions near the coast in the northern Sea of Okhotsk, rather than their presence offshore in the entire Sea of Okhotsk.

There are no active haulouts on land when the Sea of Okhotsk is covered by ice in winter; sea lions appear there upon breakup, the timing of which depends on the severity of the ice cover. Nikulin⁶ quoted Freiman that during late May 1930, Steller sea lions had not yet been sighted on Iony Island, but Nikulin sighted “up to 5 thousand” individuals there, including all age and sex classes on 20 July 1932. Lisitsyna (1975) reported all age classes of Steller sea lions on the island, including pups, upon her arrival on 20 June 1974. Grachev (2000) surveyed the island from 15 June to 1 July 2000, and from the first day he observed Steller sea lions breeding there. Hence, the animals occur on the sites earlier than mid June, but the dates of arrival and of the initiation of pupping were not recorded.

Fall surveys have been conducted infrequently. Sleptsov (1950) observed a few individual Steller sea lions and only older pups on Iony Island on 11 October 1948. The shoreline of the Yamsky Islands and Iony Island is very narrow, and with the onset of fall storms and higher tides the haulout sites are completely covered by water resulting in a small number of animals on the more elevated sites. According to Kosygin et al. (1984), about 250 Steller sea lions

³⁸Utekhina, I. 2005. Magadansky Nature Preserve, 17 Kolzevaya St., Magadan, Russia 685000. Personal commun.

³⁹Skopets, M. B. 2003. Institute of Biological Problem of the North, Far East Division of Russian Academy of Sciences, 18 Portovaya St. Magadan, Russia, 685000. Personal commun.

Table 16.—Summary of Steller sea lion counts in the northern Sea of Okhotsk, 1918–2005.

Site no. ¹	Site name	Year	Month	Count summaries			Sources
				Non-pup	Pup	Total	
123	Iony Island	~1918	N.d. ²	N.d.	N.d.	5,500	(Nichkevich 1919, as presented in Dukul' et al., 1929)
		1933	7	3,500	1,510	5,010	Nikulin, 1937
		1938	7	N.d. ²	1,810	>4,340	Pikharev, see text footnote 10
		1974	7	697	302	999	Lisitsyna, 1975
		1974	7	872	337	1,209	Perlov, 1977
		1989	8	1,041	482	1,523	Maminov et al., 1991
		1997	7	1,759	1,060	2,819	Grachev, 2000
		1998	7	1,051	665	1,716	Pavlov ³
		2001	7	1,509	871	2,380	Burkanov et al., 2002
		2002	6	1,473	622	2,095	Pavlov ³
2004	7	1,356	1,402	2,758	Burkanov et al., 2006a		
124	Lisyansky Pen.	1932	Summer	Present	N.d.	Small haulout	Nikulin, 1937
		1997	7	212	20	232	Zadalsky, 2001
		1998	7	205	32	237	Zadalsky, 2001
		2000	7	205	20	225	Zadalsky, 2002
		2002	6	3	0	3	Pavlov ³
2004	7	70	0	70	Burkanov et al., 2006a		
125	Zavyalov Island	1930	Summer	Present	N.d.	N.d.	Freiman, see text footnote 2
		1986	8	N.d.	N.d.	350	Lagerev, 1988
		2001	9	128	0	128	Zadalsky, 2002
		2002	6	3	0	3	Pavlov ³
		2002	7	22	0	22	Pavlov ³
		2004	7	51	0	51	Burkanov et al., 2006a
128	Yamsky Islands	1930	Summer			2,000	Freiman, see text footnote 2
		1933	7	N.d.	>177	1,000	Nikulin, 1937
		1974	7	496	270	766	Perlov, 1977
		1975	6	N.d.	200		Zadalsky, 1997
		1983	6	430	200	630	Zadalsky, 1997
		1984	6	612	200	812	Zadalsky, 1997
		1986	6	635	240	875	Zadalsky, 1997
		1986	8	N.d.	N.d.	600	Lagerev, 1988
		1987	6	720	N.d.	720	Zadalsky, 1997
		1988	6	650	230	880	Zadalsky, 1997
		1994	6	655	185	840	Zadalsky, 1997
		1995	6	670	190	860	Zadalsky, 1997
		2000	7	887	427	1,314	Zadalsky and Pavlov, 2001
		2001	7	815	360	1,175	Zadalsky ⁴
		2002	7	599	358	957	Zadalsky ⁴
		2003	7	836	432	1,268	Zadalsky ⁴
2004	7	1,001	466	1,467	Burkanov et al., 2006a		
130	Zubchaty Cape	1931	6	0	0	0	Lun', see text footnote 5
		1931	7	50	0	50	Lun', see text footnote 5
		1950's	N.d.	250	0	250	Gurvich and Kuzakov, 1960
		1979	9	0	0	0	Burkanov V. N., unpubl. data
		1983	7	0	0	0	Burkanov V. N., unpubl. data
		1989	7	0	0	0	Burkanov V. N., unpubl. data
		1995	7	0	0	0	Burkanov V. N., unpubl. data
		1998	7	0	0	0	Burkanov V. N., unpubl. data
		2004	7	0	0	0	Burkanov et al., 2006a

¹ Site numbers as indicated on Figure 24.

² N.d. = no data.

³ Pavlov, N. N. 2002. Sevostroybvd, 58 Koroleva St., Petropavlovsk-Kamchatsky, Russia 683024. Personal commun.

⁴ Zadalsky, S. V. 2003. Magadansky Nature Preserve, 17 Kolzevaya St., Magadan, Russia 685000. Personal commun.

were seen from aircraft on Iony Island on 4 December 1982 and only 20 on 11 December 1982. On 9 December they watched 185 Steller sea lions on shore of the Yamsky Islands. Sea ice was forming then, suggesting that mid December was the limit of Steller sea lions at those sites.

No surveys of the distribution or abundance of Steller sea lions have been

conducted in winter. However, many interviews of fishermen and inspectors of Kamchatrybvd between 1982 and 1999 suggest that Steller sea lions occur in the Sea of Okhotsk during winter. They avoid dense ice in the northern Sea of Okhotsk and stay at the ice edge. Kosygin et al. (1984) watched a group of 20 Steller sea lions on the ice in Shelikhov Bay on 19 February.

Steller sea lions also occur on Kashevarov Bank, southeast of Iony Island in winter. They fed on offal from fish processing ships and groups of 20–30 or more individuals followed vessels fishing for walleye pollock, *Theragra chalcogramma* (Burkanov, 1988). These groups included adult males and females and immature individuals. It should be emphasized that sea lions marked with

brands or plastic tags at all rookeries of the Kuril Islands were sighted near these vessels during winter (Burkanov³). These observations suggest that some Steller sea lions marked as pups on Kuril Islands rookeries move northward into the Sea of Okhotsk in winter.

Steller sea lions are found in the northern Sea of Okhotsk all year. However, they haul out only during warm weather when the water is ice free. The sightings of marked individuals (Kuzin and Pavlov, 2000; Kuzin et al., 2002; Trukhin and Burkanov, 2002, 2004; Burkanov³) demonstrate that the northern Sea of Okhotsk is also inhabited by Steller sea lions from the Kuril Islands (both in winter and in summer). Steller sea lions that were born on Iony and Yamsky Islands are seen every year in large numbers on Tuleny Island and regularly occur at all the sites in the Kuril Islands.

Abundance during the breeding season The earliest information on the abundance of Steller sea lions in the Sea of Okhotsk is available from Iony Island. In the 1920's, 5,000–6,000 animals occurred there during summer (Nichkevich, 1919, as presented in Dukul' et al., 1929). There is no information available as to how this estimate was obtained. However, based on the small size of the island (a rock 0.5 km by 0.4 km with very narrow beaches and steep slopes) and the limited area where Steller sea lions can haul out suggests that the estimate is valid. In 1933, Nikulin (1937) found 1,510 newborn pups on the island and about 3,500 individuals aged 1 year or older (Table 16). He estimated the total number of Steller sea lions on Iony Island at "up to 5,000 individuals." In 1932 the majority of pups on Iony Island were harvested, and in 1933, 53% were harvested (Nikulin, 1937). In 1938, Pikharev⁹ conducted a detailed survey of pups and young individuals and found that in mid June, there were 1,810 pups and roughly 700–800 "young individuals." Thus, over the 5-year period after the survey by Nikulin in 1933 and the harvest of pups, the abundance of pups increased by 19.9%.

More recent data indicate that pup abundance on Iony Island in summer

1974 was 302–337 animals, and the abundance of individuals age 1 and older was at 697–872 animals (Lisitsyna, 1975; Perlov, 1977). Over the 36 years between 1938 and 1974, pup abundance declined by over 80%. The number of individuals age 1 year and older declined by 75–80% compared with counts in 1933.

After 1974, the breeding population at Iony Island showed an increasing trend, and the number of individuals increased slightly by 1989 (Maminov et al., 1991). Pup numbers increased to 482 (roughly by 30%), and older animals increased to 1,041 individuals (20–30%). In late June 1997, 1,060 pups and 1,759 older individuals were counted on the island (Grachev, 2000). The 1998 survey was incomplete because newborn pups and adults at several sites were only surveyed from a boat, which inevitably resulted in an underestimate. Hence, these data can only be used with caution and probably do not reflect the actual abundance of Steller sea lions.

In 2001, a detailed survey of Iony Island was conducted (Table 16) and abundance was somewhat lower than in 1997 (pup numbers decreased by 17.8% and individuals 1 year of age and older decreased by 14.2%). Originally it was believed these differences were associated with the later dates of the 2001 survey (mid July). In 2002, Steller sea lion abundance declined even more. Only 622 live pups were counted (41% fewer than in 1997) and animals 1 year and older totaled 1,473 individuals (40% fewer than in 1997). An unexpected high pup (1,402 individuals) and non-pup (1,356 individuals) count occurred in early July 2004 (Table 16). Such high variation in count results between seasons in 1997–2004 can be explained as a result of the topography of the island. Its steep slopes and narrow beaches covered with large boulders make it very difficult to conduct a valid count from an inflatable boat. That plus the numerous boulders in the water near shore make it even more difficult to land on shore.

Often most of the non-pup animals jump into the water before the researchers can safely land and conduct counts from the high slopes above the rookery.

Table 17.—Trends in abundance of Steller sea lions in the northern Sea of Okhotsk, 1918–2004.

Period ¹	Abundance trends		
	Change (%)		
	Total years	Per year	Cumulative
Non-pups and pups			
Iony Island:			
1918–2004	87	–1.3	–49.9
1918–1933	16	–0.6	–8.9
1933–1974	42	–3.8	–75.9
1974–2004	31	2.6	128.1
Yamsky Islands:			
1930–2004	75	–0.3	–26.7
1930–1974	45	–1.5	–61.7
1974–2004	31	2.1	91.5
Both rookeries:			
1931–2004	74	–0.8	–41.5
1931–1974	44	–3.0	–72.7
1974–2004	31	2.3	113.9
Pups only			
Iony Island:			
1933–2004	72	–0.9	–7.2
1933–1938	6	3.7	19.9
1933–1974	42	–3.9	–77.7
1974–2004	31	3.9	316.0
Yamsky Islands:			
1974–2004	31	2.3	72.6
Both rookeries:			
1974–2004	31	3.1	207.7

¹ Time periods reflect changes in abundance shown in Figure 24.

Pup counts at specific sites were irregular among seasons and not all sites were counted during any one survey due to these topographic problems. Despite these variations in count results, it is clear that the population trend of Steller sea lions at Iony Island has increased in the last decade. Since 1974, pup abundance increased at 3.9% per year and non-pups increased at 2.6% annually (Table 17).

The first information available on Steller sea lion abundance in the Yamsky Islands is provided by Freiman.² Freiman reported that local hunters told him that up to 2,000 Steller sea lions inhabited the islands. There was an active pup harvest there "with no limitations" up to 1933 (Nikulin, 1937). According to Nikulin (1937) the total number of Steller sea lions on the Yamsky Islands in the mid 1930's was "up to 1,000 individuals." Neither author specifies whether their estimate includes pups, but it follows from the context of their reports that pups were probably included.

In 1932, the sealing ship *Nazhim* harvested 177 Steller sea lion pups on the Yamsky Islands (Nikulin⁵); how-

ever, before that ship's harvest local hunters had hunted there. The number of pups taken by local hunters is not known. Hence, the number of pups on the Yamsky Islands in 1932 probably exceeded 177 individuals (the extent of the harvest by the sealing ship).

In 1974, 270 pups and 496 non-pups were counted on the Yamsky Islands (Perlov, 1977). Over 40 years (1930–74) between the two reports, the total number declined by 61.7% from 2,000 individuals to 766 (Tables 16, 17).

Surveys of rookeries on the Yamsky Islands were conducted regularly after 1974 (Zadalsky, 1997; Zadalsky and Pavlov, 2001). Until 1995 the total number of Steller sea lions in the islands was stable at about 600–900 individuals, out of which 180–240 were pups. In 2000, the number of pups on the island more than doubled (Table 16), while abundance of individuals 1 year of age and older increased by 30%. After 2000, Steller sea lion abundance on the Yamsky Islands was about 1,000–1,400 individuals of all age classes (Table 16).

Long-term population trends of Steller sea lions over the entire region can only be based on two rookeries at Iony Island and the Yamsky Islands (Table 17, Fig. 24). In the mid 1930's, Nikulin (1937) admitted "that at all the sites (Iony, Yamsky, Olsky, etc.) the total number of Steller sea lions does not exceed 7 thousand." Hence, on Iony Island and the Yamsky Islands there were about 6,000 individuals (Nikulin, 1937) and about 1,000 individual at all other haulouts in the region. A minimum estimate of newborn pups was over 1,700 individuals (1,510 on Iony Island and over 177 at the Yamsky Islands). In 1974, the two rookeries totaled 1,975 Steller sea lions (607 pups and 1,368 individuals age 1 year and older were found). The decline in abundance over the 40-year period was roughly 72%, and the mean annual rate of decline was about 3.0% (Table 17).

An increasing trend in abundance occurred in the interval between 1974 and 1989. Unfortunately, it was difficult to determine details during this 15-year period because only one site

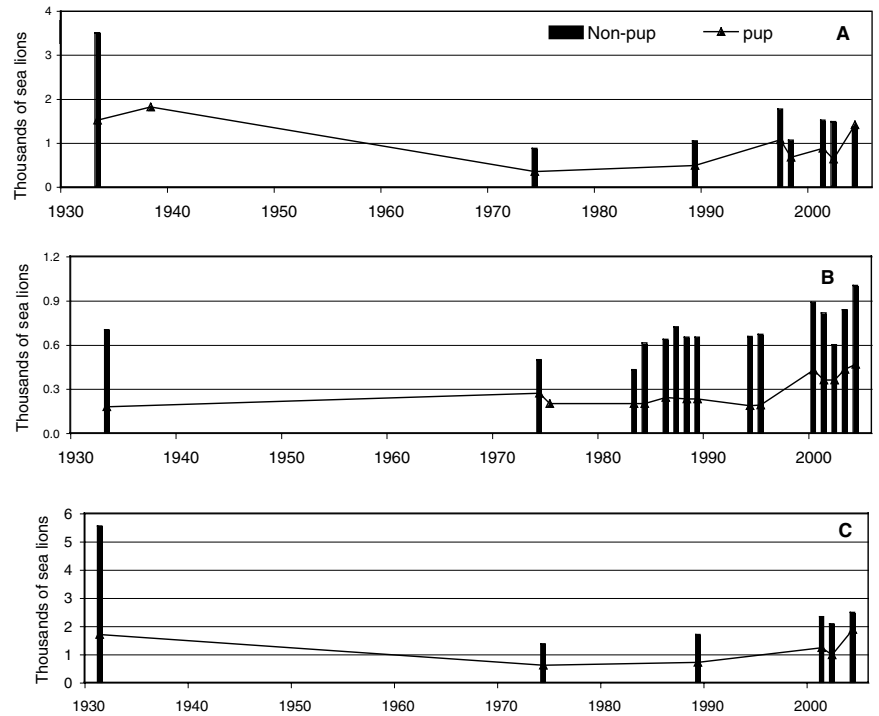


Figure 24.—Changes in abundance of Steller sea lions in the northern part of the Sea of Okhotsk, 1930–2004. A = Iony Island; B = the Yamsky Islands; C = both islands combined.

was surveyed. Judging from changes in abundance at the Yamsky Islands (Table 16), there is evidence that an increase in population size occurred during the second half of the 1980's. Between 1974 and 2004, the total number of Steller sea lions of both sexes and age classes in both rookeries increased by 113.9% from 1,975 to 4,225 individuals, and the abundance of pups increased 207.7%. The mean annual increment of increase in the total number of animals was 2.3%, and 3.1% for pups.

Japan and Sea of Japan

Distribution and age–sex composition

Coasts of Japan Slyunin (1895) reported on the distribution of Steller sea lions along the Pacific coast of Japan to the Kii province and the Idzu Peninsula (lat. 35°N) during the late 19th century. He noted that off the cities of Osaka and Kobe there is a great island called Ashika, which is the Japanese word for Steller sea lion. He reported that Steller sea lions bred there in March–April

(and, according to some information, in August–September). Slyunin reported the distribution of Steller sea lions along the western coast of Honshu to the Sado province (Vashizaki locality near Niigama at lat. 38°N and Napolisima Island at lat. 37°N in the Noto province). He also wrote that Steller sea lions along with northern fur seals "were swarming" in the sea and on the coast at Kamen' Opasnosti Cliff in La Perouse Strait (between Sakhalin and Hokkaido).

Based on archeological finds of Steller sea lion bones in ancient midden sites, Ito (1994) determined the southern extent of the Steller sea lion historical range was between lat. 37° and lat. 38°N on the western coast of Honshu (similar to Slyunin), and between lat. 38° and lat. 39°N, a more northerly location on the Pacific Coast, compared with the Slyunin (1895) data. The Slyunin (1895) data on the distribution of the Steller sea lions on the Pacific coast of Japan actually refers to another otariid species; the Japanese sea lion, *Zalophus californianus japonicus*, which was called Ashika

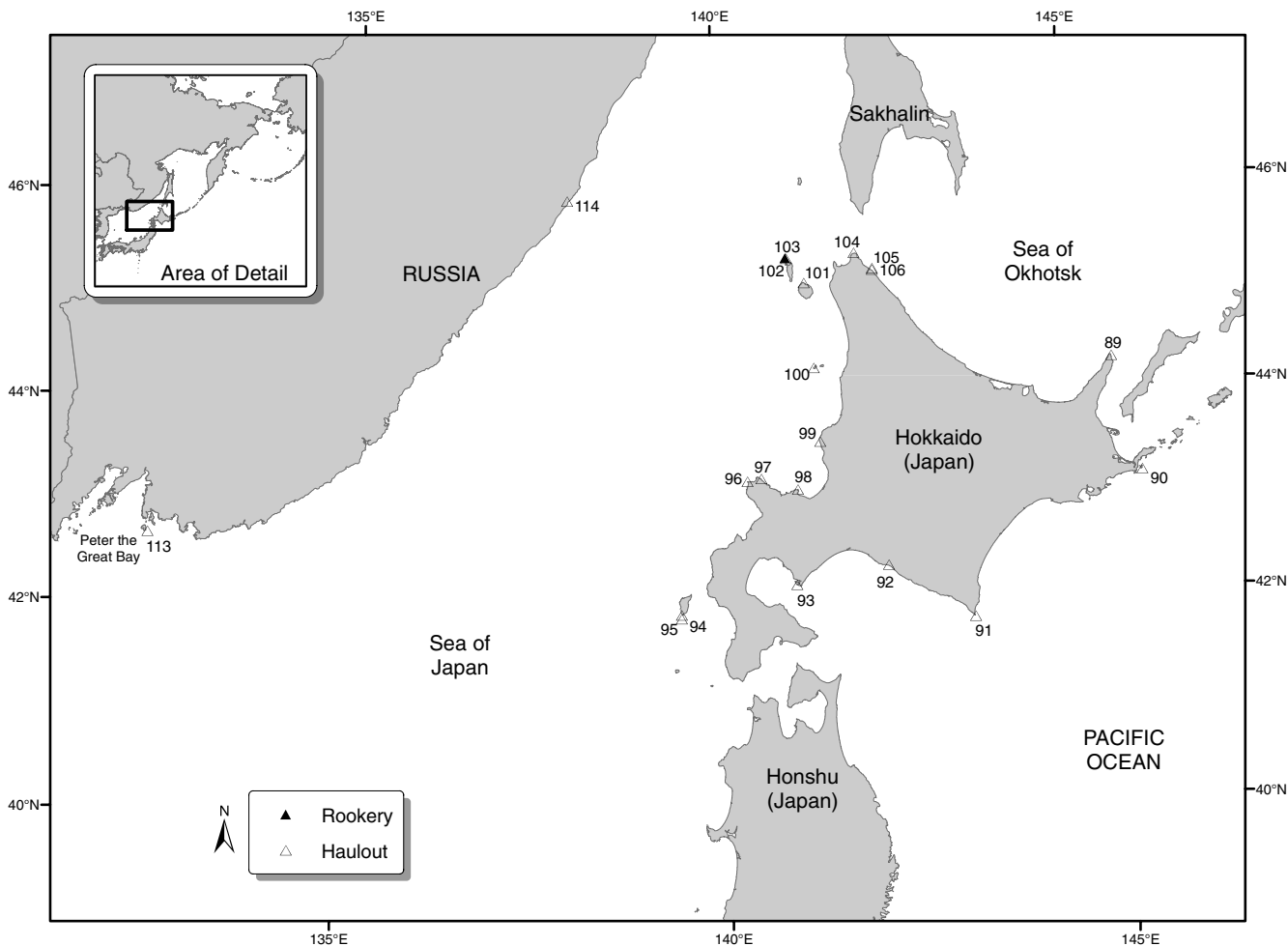


Figure 25.—Steller sea lion sites in Japan and Siberian coast, 1900's to present. Hokkaido Island: 89-Shiretoko Cape; 90-Yururi Island; 91-Erimo Cape; 92-Nikappu Todo Rock; 93-Mururan City; 94-Murotsu Island; 95-Kuki Cape Todo Rock; 96-Kamui Cape; 97-Makka Cape; 98-Todo-Iwa Rock; 99-Ofuyu Cape; 100-Teuri Island; 101-Pon-Moshiri Island; 102-Taneshima Rock; 103-Hirashima Reefs; 104-Benten-Jima Rock; 105-Onishibetsu Todo Rock; 106-Todo-Jima Rock; Siberian Coast: 113-Askold/Elagin Cape; 114-Maximovka.

by the Japanese (Nishiwaki and Nagasaki, 1960). Most certainly, fishermen reporting to Slyunin did not distinguish between the two species.

Before and after WWII, Steller sea lions rarely occurred around Hokkaido (Wada, 1998). In the late 1950's, Steller sea lion abundance increased around Hokkaido (mainly at the northern and northeastern coast) and northeastern Honshu (Fig. 25). Nishiwaki and Nagasaki (1960) claim "In the Sea of Japan, from the west coast of Hokkaido to the coast around Honshu, no Steller sea lions can be seen." Calling attention to the numerous names of islets and reefs

associated with Steller sea lions, they believed that in the past (in the 1930's or earlier), abundance and distribution were greater and wider. In the 1960's, there were two major groups of Steller sea lions off the coast of Japan that were strongly different in sex composition. Off northeastern Hokkaido (Shiretoko Peninsula) large numbers of females were sighted, whereas off the northern and northwestern coasts (beyond Soya or La Perouse Strait) there were largely adult and immature males sighted (Nishiwaki, 1966, 1967).

Steller sea lion distribution off the Hokkaido coast did not change in the

1970's. They were commonly observed at the northwestern extremity of the island and along the northern, eastern, and southern coasts. Ito et al., (1977) conducted observations in December 1975 on Rebun Island (Fig. 25, sites 102–103) and found the composition of Steller sea lions consisted of at least 80% adult males, 10% medium-sized individuals (presumably, immature males and females), and 10% young animals (1–2 years of age) at a haulout. On the southern coast of Hokkaido at Funka Bay (Fig. 25, site 93) a sea lion harvest consisted primarily of immature males (102 out of the 107 individuals taken

during 1973–76). These authors quoted data based on interviews with old fishermen and hunters who stated that in the early 20th century (1900–25), Steller sea lions bred on reefs north of Rebun Island, but there were only several or several dozens pups. After 1925, no newborn Steller sea lions were sighted on the island (similar to that observed on the entire island of Hokkaido).

In the 1980's, the distribution of Steller sea lions off the coast of Japan changed. Yamanka et al. (1986) pointed out that in addition to the northwestern extremity of Hokkaido, Steller sea lions became more common farther southward along the west coast at Shakotan (Fig. 25, sites 96–97) and even farther south. Adult males were more common around the northwestern extremity, whereas immature individuals of both sexes were more frequently observed in the central and southern portions of the island. No notable changes occurred in the distribution of Steller sea lions on the eastern coast of the island, however, Steller sea lions decreased in abundance in the southern part of the island in the Funka Bay region. Yamanaka et al. (1986) distinguished two distinct groups of Steller sea lions; one was a Shiretoko Peninsula/Pacific Ocean group and the other was a Sea of Japan group, based on considerable differences in the age and sex composition of Steller sea lions off the northeastern and northwestern coasts of Hokkaido.

From the late 1990's to 2000, Steller sea lions were more numerous in the central western coast on the Shakotan Peninsula, but they became less common at the northwestern extremity, along the eastern coast, and the southern coasts from Nemuro Strait to Funka Bay (Ishinazaka⁴⁰, Hoshino⁴¹).

At present, Steller sea lions inhabit Hokkaido coastal waters, Tsugaru Strait, and the northern tip of Honshu Island (Aomori Bay) during winter (Isono and

Wada, 1999). Only single individuals or stranded dead animals have been recorded along the northeast and northwest coasts of Honshu (Ishinazaka⁴⁰, Hoshino⁴¹). The present southern border of Steller sea lion distribution along the coast of Asia can be drawn from the end of Honshu Island northward along the west coast of Hokkaido Island to Sakhalin Island (Fig. 25). Since the 1920's, they have been absent in Japanese waters during summer and do not breed there (Ito et al., 1977; Ishinazaka, 1999; Ohtaishi and Wada, 1999).

The Siberian coast of the Sea of Japan There are several unpublished sightings of Steller sea lions along China's coast in the northern Yellow Sea, but historically, the southern limit of the Steller sea lion range off the Asian coast was the coastal waters of the Korean Peninsula (Nishiwaki, 1966, 1967; Ivashin et al., 1972; Heptner et al., 1976; Wada⁴²). No detailed information on the distribution of Steller sea lions in the western Sea of Japan is available. There is some evidence that Steller sea lions resided year-round at Askold Island in Peter the Great Bay in the late 19th century through the early 20th century (Ognev, 1935; Fig. 25, site 113). In the 1930's Steller sea lions were common off the Asian coast in the Sea of Japan, but only a few individuals were typically sighted (Dukul' et al., 1929; Nikulin, 1937). In the 1970's, they rarely occurred in that region (Kosygin and Tikhomirov, 1976).

During the summer of 1998, the entire western coast of the Sea of Japan, roughly between lat. 42°30'N and lat. 46°03'N (within the boundaries of the Primorsky Krai) was surveyed twice by Trukhin (2001) using a car. All possible rookeries and haulouts of Steller sea lions were examined, but no Steller sea lions were found. Trukhin interviewed local residents and fishermen and found that in the southern Primorye (on the border of North Korea) a single Steller sea lion was last sighted roughly in 1990. Stranded remains of two sea lions were reported

in the region. Recent sightings of Steller sea lions were reported from the northern Primorye (north of lat. 43°30'N). The animals were sighted in September through October when schools of fish were arriving. Those reports were of single individuals or groups of 2 or 3, but only a single site where Steller sea lions concentrated (27 individuals) was reported in September 1997 on the reefs not far from the village of Maksimovka (Fig. 25, site 114). These reports led Trukhin to conclude that Steller sea lions disappeared from the northern coast of Primorye in the early 1980's.

In the early 20th century, the Steller sea lion was common in the western Sea of Japan, and they presumably established several haulout sites in Peter the Great Bay and other parts of the Asian coast. During the entire 20th century, abundance progressively declined and by the early 21st century Steller sea lions had become rare in the region.

Abundance

The available data on Steller sea lion abundance in the region (Rebun Island, Nemuro Strait, Shiretoko Peninsula, Peter the Great Bay, etc.) are difficult to pool for analyses because surveys were conducted at different times. A number of reports of abundance were based on interviews of fishermen or hunters (Ito et al., 1977; Yamanka, 1987; Yamanka et al., 1986; Shimazaki and Wada, 1995; Trukhin, 2001). Estimates for the region are not based on actual census data (Nishiwaki and Nagasaki, 1960), nor do they result from the addition of the highest counts for several regions. The estimates are from surveys conducted at different times (Hoshino et al., 2004). The data provide only a general insight into the relative abundance (many vs. few) of Steller sea lions in the region during the 20th century.

During the first quarter of the 20th century, Steller sea lions occurred in the waters of Japan year-round; subsequently, they were only sighted between November and May (Ito et al., 1977). Nishiwaki (1966, 1967) wrote "On the coast of the Shiretoko Peninsula, thousands of Steller sea lions come on drift-ice floes from April to May. They

⁴⁰Ishinazaka, T. 2002. Hokkaido University, N18 W9 Kita-ku Sapporo 060-0818, Japan. Personal commun.

⁴¹Hoshino, H. 2004. Hokkaido University, N18 W9 Kita-ku Sapporo 060-0818, Japan. Personal commun.

⁴²Wada, K. 2005. 484-0095 Aichi, Inuyama-city, G-18 Sugino-yama, Tonoji, Japan. Personal commun.

may be from the Kuril Islands. After the ice floes melt, they stay on the coasts of the east part of Hokkaido until July. By August, almost all of them have gone.” This seasonal pattern of Steller sea lion population dynamics in the waters of Japan remains similar today.

In the later 19th to early 20 century, Steller sea lions occurred throughout the year off the coast of Asia bounded by the Sea of Japan, but they were most numerous during fall and winter (Ognev, 1935). Currently, Steller sea lions are absent in the southern part of their former range along the Siberian coast and are rarely sighted in the northern part of the Asian coast in the fall and winter (Trukhin, 2001).

In the early 20th century, Steller sea lions occurred off Japan during the breeding season, but the magnitude of their abundance is obscure (Ito et al., 1977). After the late 1920’s, they ceased breeding in the region and only individual Steller sea lions or small groups were sighted rarely during the breeding season around Hokkaido (Nishiwaki, 1966, 1967; Inukai, 1968; Ito et al., 1977; Yamanaka, 1983, 1987; Yamanaka et al., 1986; Ishinazaka and Endo, 1999).

Comparative data on Steller sea lion abundance off the coast of Japan are only available for the winter season in 1960–2002. In 1960–1970, the waters off Japan were home to about 1,000–3,000 Steller sea lions (Nishiwaki and Nagasaki, 1960). Up to 700–900 individuals were sighted in December to January off the northwestern extremity of Hokkaido (Ito et al., 1977). A ubiquitous and substantial decline of Steller sea lions at all of the haulouts and rookeries around Hokkaido was recorded in the early 1980’s (Yamanaka et al., 1986). Unfortunately, the authors failed to provide estimates of total Steller sea lion abundance off the coast of Japan during that time. But if we take into account that about 500 or more Steller sea lions killed annually between 1980 and 1989 (Takahashi and Wada, 1998) the total abundance in winter around Hokkaido could reach a thousand or more individuals. In January to March 2001–2003, the maximum count on

land and at sea off the western coast of Hokkaido was 390 individuals (Hoshino et al., 2004). Thus, a rough estimate reveals that the Steller sea lion population in the waters off Japan in winter between 1960 and early 2000 declined by 60–90% from 1,000–3,000 animals down to 200–400 animals.

There are several reports of Steller sea lion abundance off the coast of Asia in the Sea of Japan. Ognev (1935) reported a winter sighting of 400 Steller sea lions in Peter the Great Bay in the late 19th century. However, presumably as early as the mid 1930’s, they ceased to exist there. Only individual Steller sea lions were recorded in summer, and there is no evidence of establishment of rookeries or haulouts (Nikulin, 1937). Until the 1980’s, Steller sea lions were a common species in the coastal waters of the northwestern Sea of Japan in fall and winter (north of lat. 43°N), but there are no data on abundance available; presumably there were only several hundred individuals there. Following the 1980’s, the number of Steller sea lions in that region declined (Trukhin, 2001). The available evidence suggests that at present there are few or no Steller sea lions along the Siberian coast in the Sea of Japan during the breeding season.

Summary of General Patterns of Historical Distribution and Abundance of Steller Sea Lions in Asia

Distribution

Steller sea lions range in the northwestern Pacific Ocean from the Bering Strait (lat. 66°N) to the northern part of the Sea of Japan (Fig. 1). Compared to the late 19th century, the northern extent of the species’ distribution has not changed for over 260 years. No Steller sea lion rookeries were recorded in the western Bering Sea north of lat. 56°N (but sea lion haulouts occur as far north as lat. 65°N). Sea lions were breeding on Bering Island when the species was described by George Steller in 1742. Late in mid 19th century they ceased breeding there, and by the end of 19th century they were “nearly extinct” on the Commander Islands (Stejneger, 1898).

Steller sea lions reappeared on the Commander Islands in the 1930’s–50’s, and a rookery was established on Medny Island in the 1960’s–70’s, about 100 years after they stopped breeding there. During the 1980’s, the number of non-pups declined, but pup production increased; there are presently about 200 pups born annually on the Commander Islands. There were at least three rookeries on the East Kamchatka coast historically. Only one is now active and produces about 100 pups per year. Documents that we reviewed indicated that there were no significant changes in distribution and location of rookeries in the Kuril Islands and in the northern part of the Sea of Okhotsk during the last 260 years. The Kuril Islands were and are the major reproduction area for Steller sea lions in Asian waters.

We failed to find any reliable proof that Steller sea lions bred around Sakhalin Island historically. The species was abundant there, but only when spawning herring or salmon, *Oncorhynchus* spp., arrived near the coast. A new rookery was established on Tuleny Island in the 1980’s, and pup numbers increased rapidly; presently about 500 pups are born annually. It is possible that Steller sea lions bred in Japan in the past; a small rookery was recorded there in the early 20th century on the northwestern side of Hokkaido Island. It disappeared in the 1930’s and has not been re-established.

The southern border of the Steller sea lion range in the northwestern Pacific moved northward 500–900 km for the last 20–25 years (Fig. 2). The present southern border of Steller sea lion distribution in Japan goes through Tsugaru Strait (~lat. 42°N). There are scanty data on Steller sea lion distribution along the west coast of the Sea of Japan historically and now. Historically the species was quite common along the entire Asian coast from the mouth of the Amur River (lat. 53°N) to the Korean Peninsula (lat. 36°N), and sometimes was seen in the Yellow Sea, but rookeries do not occur there. Steller sea lions occurred there in winter and were less abundant in summer. At present, the species does not occur in this area, and its

presence in the Sea of Japan is limited to coastal waters along the west coast of Hokkaido and the southwest coast of Sakhalin Island where there are several permanent winter haulout sites. Steller sea lions arrive in late fall and leave in early spring. The major changes in distribution in the southwestern extent occurred in the first half of the 20th century.

Abundance

In the late 19th century, Snow (1897) suggested that the number of Steller sea lions in the Kuril Islands was “at least 100,000” individuals. Most Russian scientists rejected this value believing it was too high because they misinterpreted data in Snow’s (1902) book (Klumov, 1955; Belkin, 1966a; Perlov, 1970; Voronov, 1974). The phrase “hauled out” was misinterpreted by the Russian translators as “harvested” and it was therefore difficult for Russian scientists to believe that Snow’s reported total abundance estimate of 100,000 Steller sea lions in the Kuril Islands in summer was possible when a harvest was also reported as 100,000 individuals.

If there was in fact a translation error, then we accept Snow’s estimation of Steller sea lion abundance in the Kuril Islands at about 100,000 individuals in the late 19th century. At that time Steller sea lions were also abundant around Sakhalin Island (Nikolsky, 1889), on the Asian coast of the Sea of Japan (Ognev, 1935), and in the northern part of the Sea of Okhotsk (Middendorf, 1869; Slyunin, 1900). They were “almost extinct” in the Commander Islands (Stejneger, 1898), but they were common along the East Kamchatka coast (Grebnitsky, 1902). It is more likely that they were rare in the western Bering Sea as well (Nikulin, 1937).

We estimate that total abundance of Steller sea lions along the Asian coast in the late 19th century was about 115,000 animals. We base this estimate on the relative size of known and active Steller sea lion rookeries and haulout sites and some existing abundance data for particular sites or areas (Dukul’ et al., 1929; Averin, 1948). Our estimate

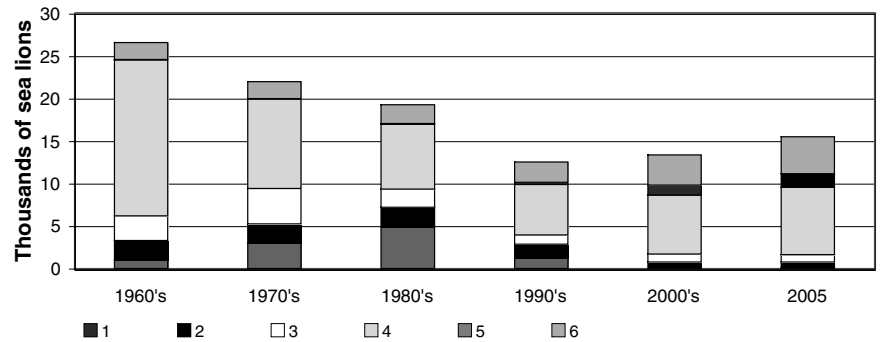


Figure 26.—Reconstructed Steller sea lion total abundance during the breeding season along the Asian coast, 1960’s–2005. 1-Western Bering Sea (WBS); 2-Commander Islands; 3-East Kamchatka; 4-Kuril Islands; 5-Sakhalin; 6-Northern part the Sea of Okhotsk.

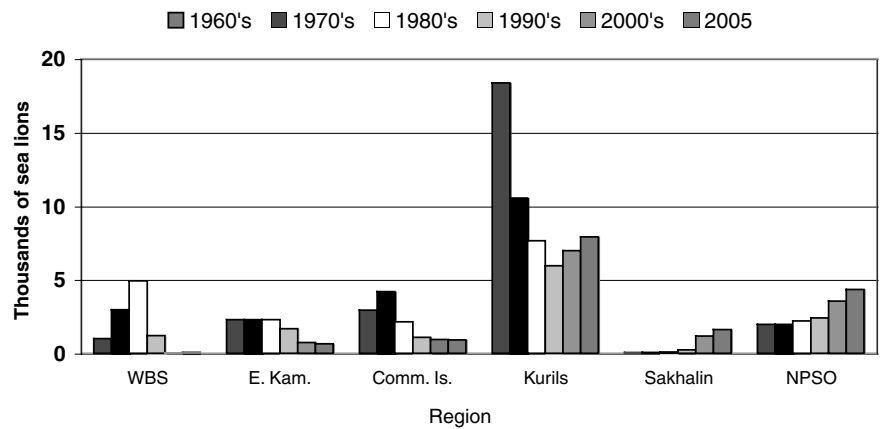


Figure 27.—Changes in Steller sea lion abundance by area, 1960’s–2000’s (in breeding season).

assumes that total Steller sea lion abundance excluding the Kuril Islands did not exceed 15,000 and that there were about 100,000 sea lions on the Kuril Islands.

After WWII, marine mammal research resumed in the Russian Far East, and count data became available to reconstruct total abundance (Fig. 26). For our analysis, we pooled disparate reports (published and unpublished) containing breeding season counts of all ages and sexes for each decade since the 1960’s.

During the 1960’s, total estimate of Steller sea lions in Asian waters was about 27,000 (including pups), most of which were in the Kuril Islands. A decline started in 1970’s when the number of Steller sea lions declined appreciably in the Kuril Islands (Fig. 27

and 28). During this time several papers were published in the Russian literature estimating total abundance of the species in Soviet waters (e.g. Tikhomirov, 1964a; Marakov, 1966; Arsenyev et al., 1973; Perlov, 1975, 1996; Heptner et al., 1976; Kosygin et al., 1985). The published values varied from 27,300 to 100,000 individuals and are different from our estimates, perhaps because most authors combined maximum counts for all known locations or whole areas in different seasons and derived an unrealistically high total abundance. They did not take into consideration the seasonal changes in abundance of sea lions in different areas.

The decline of the species continued through the 1970’s and 1980’s (Fig. 29). In contrast with total population trends

in Asia, the trend in some areas was positive. For example, while numbers declined in the Kuril Islands during the 1960's–80's, they rapidly increased in the western Bering Sea and were stable around Sakhalin Island (Fig. 26–28).

There was a slow but steady increase in sea lion numbers in the northern part of the Sea of Okhotsk throughout a 40-year period, and the number of sea lions has risen near Sakhalin Island since the mid 1980's (Fig. 27).

The fewest number of Steller sea lions occurred in the northwestern Pacific in the late 1980's–early 1990's, when only about 13,000 individuals (including pups) were estimated in the entire region. During the 1990's and especially in early 2000 the trend in abundance increased in most areas (Fig. 26–29). Large increases first occurred in the northern part of the Sea Okhotsk and Tuleny Island, and in the late 1990's–early 2000's in the Kuril Islands (Fig. 27, 28). Overall, present estimated abundance of Steller sea lions in Asia is about 16,000 individuals (including about 5,000 pups), about half of which inhabit waters around the Kuril Islands.

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This report would not have been possible without the collaborative op-

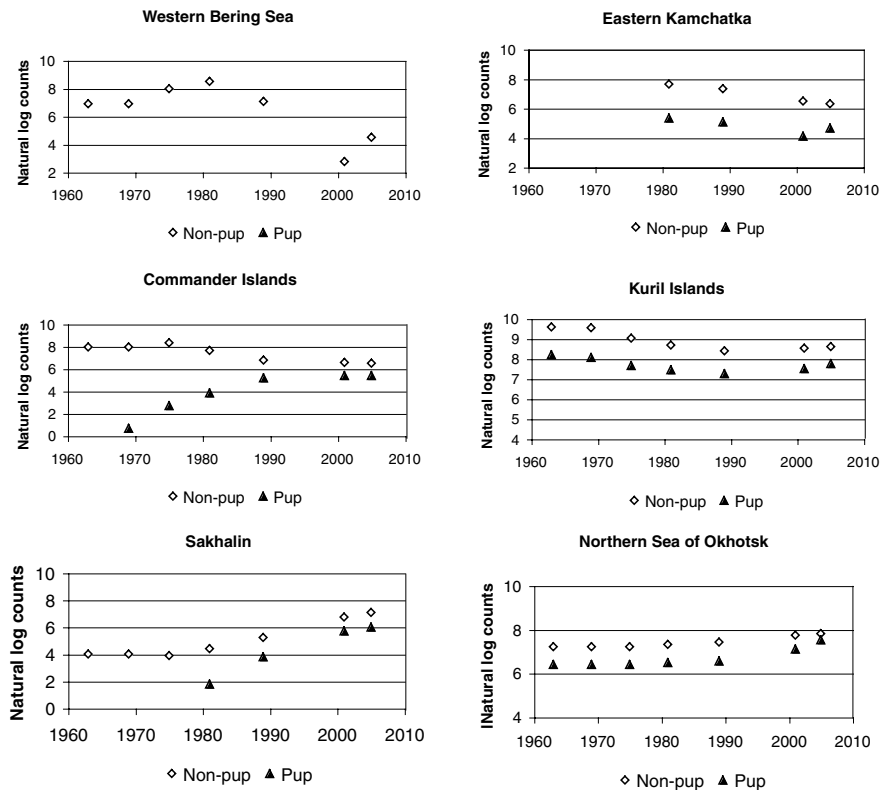


Figure 28.—Trend in Steller sea lion abundance by area, 1960's–2005 (in breeding season).

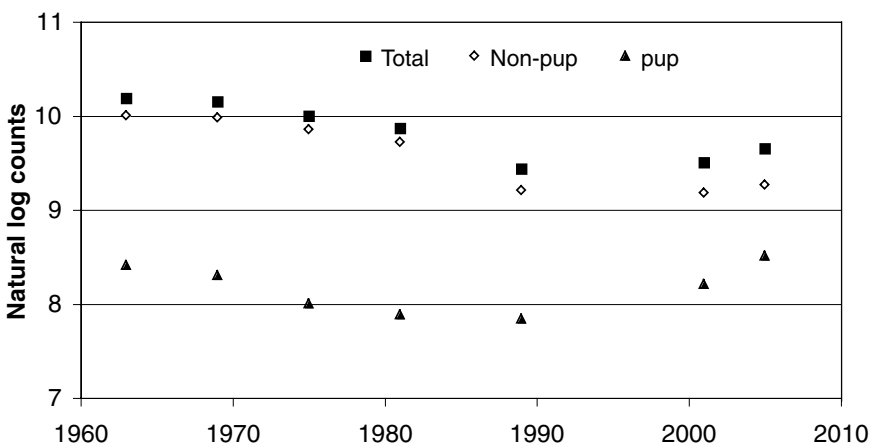


Figure 29.—General trend in Steller sea lion abundance in northwestern Pacific, 1960's–2005 (in breeding season).

portunity afforded scientists from both Russia and the United States by the bilateral environmental protection agreement established in 1972 by both countries (Project 02.05-61 "Marine Mammals" under Area V of the U.S./Russia Environmental Agreement on Cooperation in the Field of Environmental Protection). This cooperative agreement initiated Steller sea lion studies along the Asian coast.

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