Current status of pinnipeds in the Sea of Okhotsk

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The Sea of Okhotsk is one of the main regions of pinniped distribution in the Russian Far East. There are 7 species of the pinnipeds living: 2 species (Steller sea lion and northern fur seal) are represented by the Otariidae family and 5 species (bearded seal, ringed seal, spotted seal, harbor seal and ribbon seal) are members of the Phocidae family.

In the second part of the last century, all species of true seals, except harbor seals, were the objects of harvest, and were caught year round. Consequently, these species were studied as well. However, in 1994 ship-based harvests of ice seals in the Sea of Okhotsk ended, resulting in a reduced level of study.

The main species for harvest in the Sea of Okhotsk was ringed seal, annual catches of which reached almost 100,000 individuals in certain years. The catch quantity of other pinnipeds was also impressive (Table 1). The most intensive harvest began in 1955, when the Far East fishing fleet flotilla was developed. The strength of the harvest led to a rapid decline in the number of seals. For example, the number of ringed seals in the Sea of Okhotsk dropped from 1 million to 600,000 from the mid-1950s to the mid-1960s. In 1969, some limitations on the seal harvest were enacted.

The last census of true seal populations in the Sea of Okhotsk was conducted in 1990 (Table 2). It can be seen from the table that the decrease in the number of seals stopped for nearly all species, and that the number of ringed seals has yet to fully rebound.

Table 1 Statistics of the commercial harvest of true seals in the Sea of Okhotsk (individuals).

Year	Ringed seal	Spotted seal	Ribbon seal	Bearded seal	Total
1955	72517	1987	9384	6562	90450
1960	98310	9264	3444	5202	116220
1965	83448	3996	5152	4737	97333
1970	30386	4618	5213	3127	43344
1975	19188	3937	3500	1435	28060
1980	5898	1689	3451	1616	12654
1985	17248	6846	10000	2959	37053
1990	22372	7352	14695	4639	49058
1995	284	132	0	101	517
2000	196	976	18	190	1380

Table 2 Data of aerial surveys of seal numbers (thousands) in the Sea of Okhotsk.

Year	Ringed seal	Ribbon seal	Spotted seal	Bearded seal
1968	780	116	67	233
1969	855	208	177	253
1974	876	173	172	110
1976	539	201	268	125
1979	706	449	246	187
1981	777	410	234	104
1986	833	508	174	143
1988	565	630	156	143
1989	709	445	96	105
1990	710	562	178	95

Eared seals, compared to the situation nowadays, have been better studied in recent years. Because the fur seal is regarded as a harvestable species, constant studies were focused on identifying the maximum sustainable yield. The Steller sea lion is a threatened species, particularly in the western Aleutian region, and this has motivated special attention devoted to research.

Steller Sea Lions

At the present time there are 14 major Steller sea lion (*Eumetopias jubatus*) rookeries in Russia, where annual reproduction of this species takes place (Fig. 1). Only 3 rookeries are located outside of the Sea of Okhotsk. Of the remaining 11, 7 are located on the Kuril Islands. In the 1970s, populations decreased rapidly, especially on the Kuril Islands. In the 1980s the numbers stablized at the lowest level ever seen during the whole period of research. The reasons for the population decline are still unknown, but the numbers have yet to recover. At the same time, during the several last years, there has been a trend of slow increase in pups born on the Kuril Islands.

Compared to the depressed condition of sea lion conditions in the Sea of Okhotsk, the rapidly growing population of sea lions on Robben (Tyuleny) Island on the eastern end of Sakhalin (Fig. 1) seems rather unusual. Sea lions were regularly observed on this island at least from the end of the 19th century, but the rookery only became reproductive in the 1970s, when about one to two pups started to appear almost annually. In 1980 six pups were born; since then, the number of newborn pups has begun to increase rapidly (Fig. 2). Currently, the Robben Island sea lion rookery can be described as flourishing. In 2006 the number of pups there exceeded 600 individuals.

Nearly half of the Sea of Okhotsk Steller sea lions reproduce on the Kuril Islands, where 7 reproductive rookeries are located, among them there are 5 rookeries, on which the number of pups born annually ranges from 200 to 800 (Fig. 3).

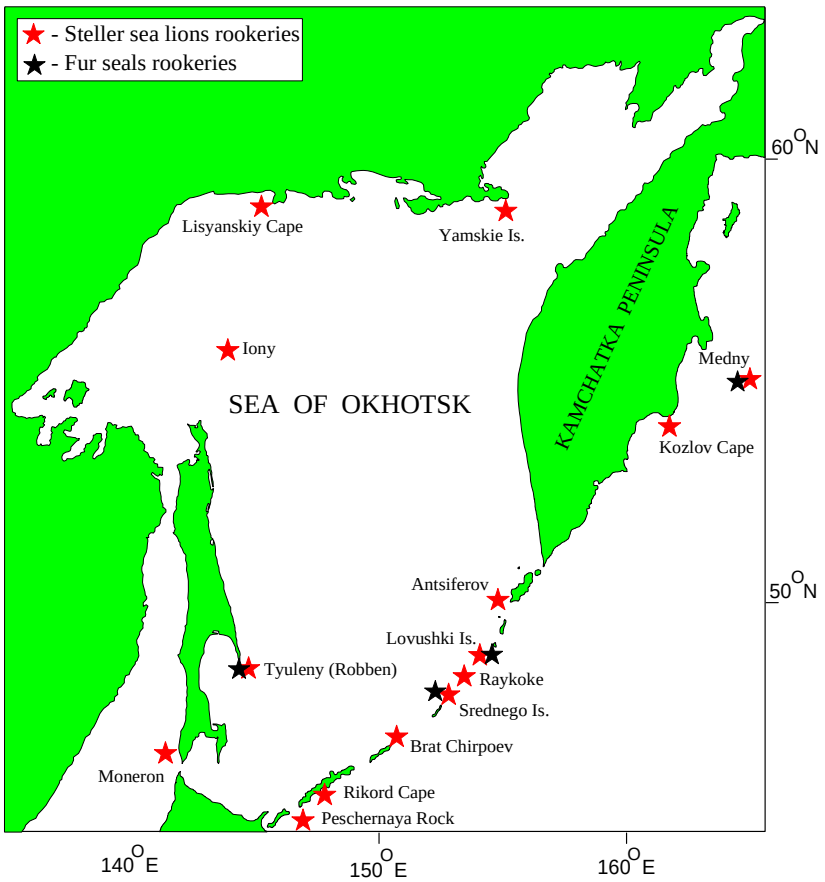

Fig. 1 Distribution of eared seal rookeries in Russia.

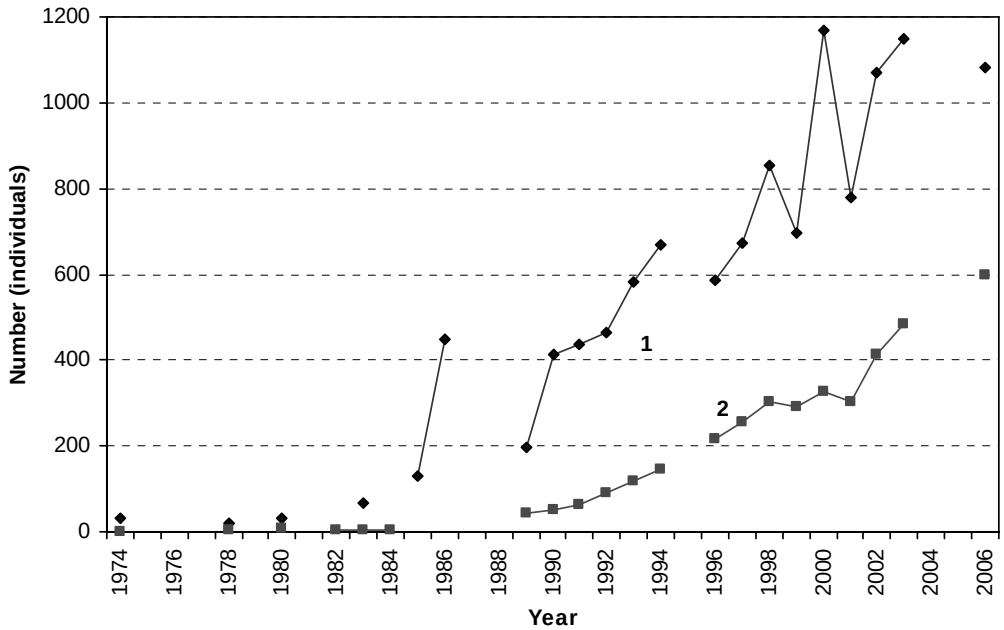

Fig. 2 Dynamics of the sea lions populations on Robben (Tyuleny) Island. 1 = +1 year old, 2 = pups.

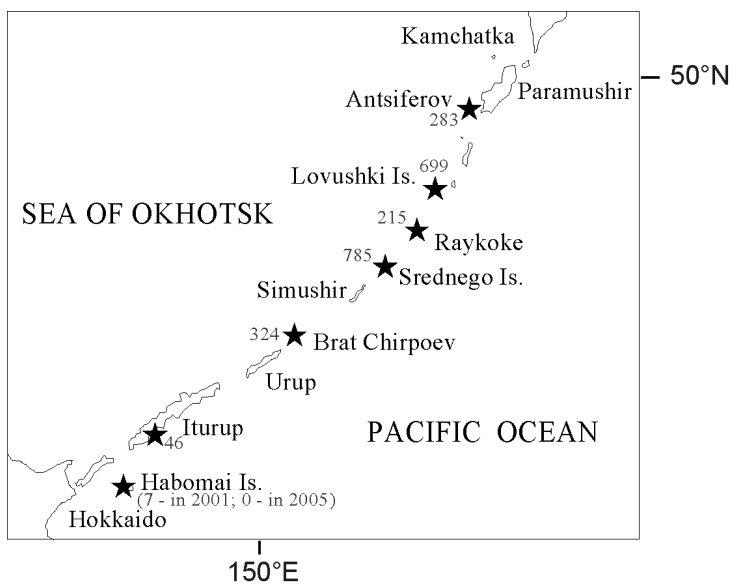

Fig. 3 Number (grey figures) of newborn sea lions on the Kuril Islands in 2005.

Northern Fur Seals

In total, there are 4 reproductive northern fur seal (*Callorhinus ursinus*) rookeries in Russian waters: the Kommandor Islands, Lovushki and Srednego Islands (both part of the Kuril Islands) and Robben Island. On the Kuril Islands, fur seal rookeries are in excellent condition; the number of pups born annually is about 20,000. The wintering grounds of fur seals, which reproduce on the islands, are generally situated on the Yamato Bank, in the central part of the Sea of Japan. Part of the population winters in the waters to the west of Japan.

Recently, an increase in the number of individuals was registered on Robben Island. From 1987–1994

about 16,000–20,000 calves were born annually on the island (Fig. 4). In 2006, the number of pups was calculated at 33,000. Nevertheless, this figure is still far from the 55,000 pups that were born here annually in the middle of the 1960s. The Kuril Islands population is not affected by harvest. On Robben Island, on the other hand, about 1,000 fur seals are harvested for fur every year; 2- to 5-year-old males are the ideal target for commercial catches on this island.

Bearded Seals

In the sealing years, this species (*Erignathus barbatus*) was mostly "ignored" and its numbers were not significantly impacted by the fisheries. Nowadays, this species is being caught in small numbers in the coastal areas of the northern part of the Sea of Okhotsk. In winter and spring, bearded seals are found on ice cover in relatively shallow waters (Fig. 5). In the late summer and autumn periods, bearded seals also keep near the shelf areas, and typically occur in waters less than 200 m depth. During this season, they form haul-outs on Sakhalin, the Shantar Islands and the northern coast of the Sea of Okhotsk.

Ringed Seals

The ringed seal (*Phoca hispida*) is the most numerous seal in the Sea of Okhotsk, and is widely distributed. The largest number of ringed seals can be found in the western part of the sea. In the area of the Shantar Islands, where in the beginning of summer the ice remains for a long time, ringed seals form mass molted gatherings in June. After the ice recedes, the ringed seals disperse widely in the coastal areas of the sea, where they accumulate fat before wintering by intensive feeding on different crustacean and schooling fish species.

Spotted Seals

Currently, spotted seals (also known as largha seals, *Phoca largha*) in the Sea of Okhotsk number about 200,000. The spotted seal is widely distributed in the waters of the whole sea, forming two separate populations, which are spatially well-segregated during the reproductive season. During the reproductive period, one population center is situated in the northern part of the sea in Shelikhov Bay; the center of the other is situated along the eastern coast of Sakhalin.

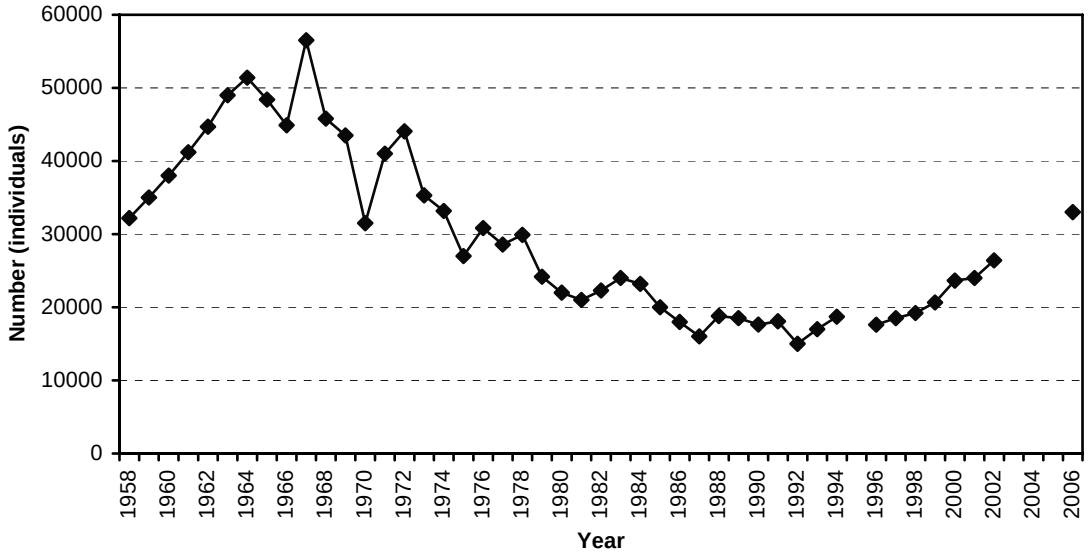

Fig. 4 Dynamics of the fur seals pups population on Robben (Tyuleny) Island.

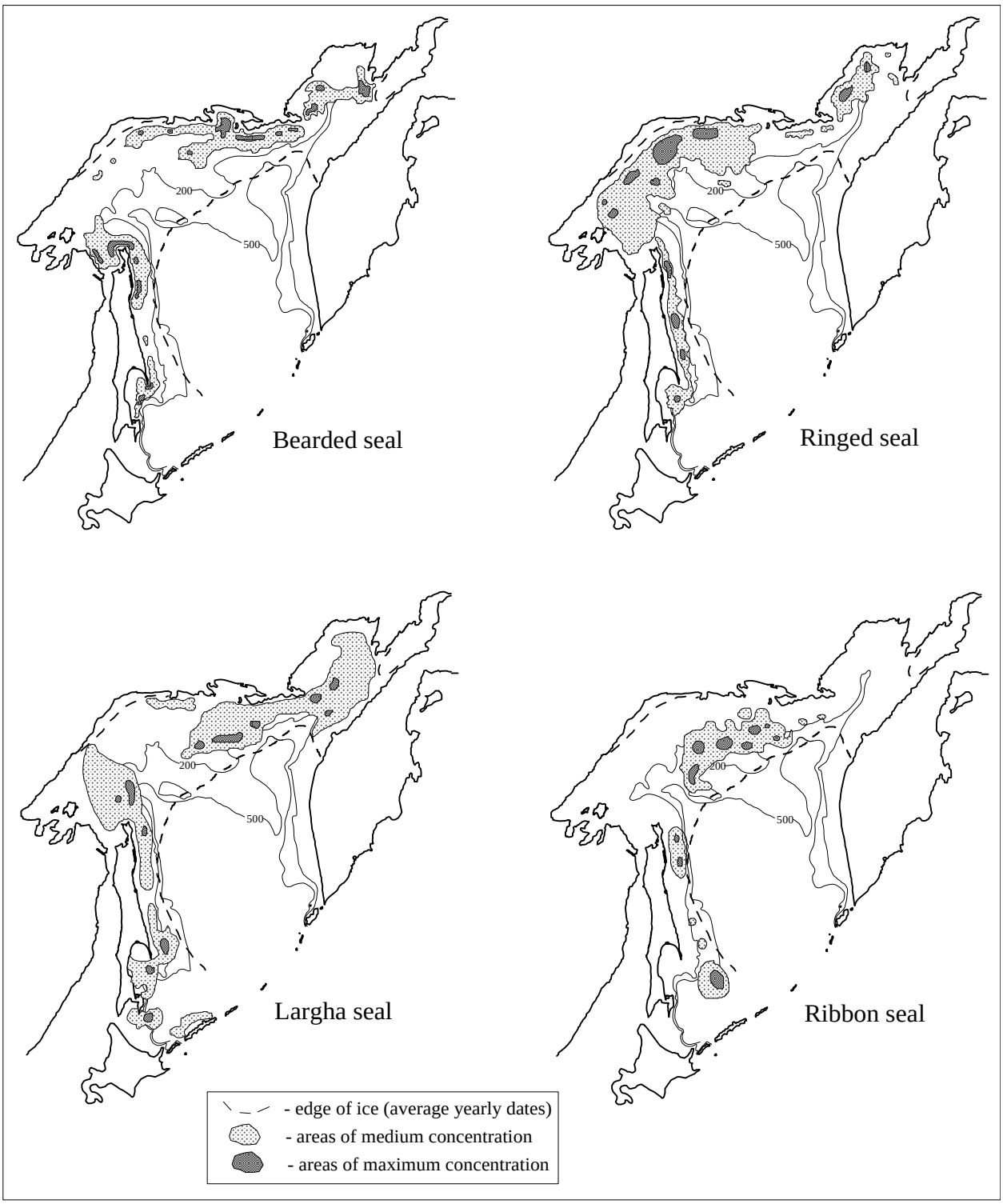

Fig. 5 Regions of maximum seal density in winter.

After the retreat of the ice cover, the spotted seal disperses along the coasts, forming large haul-outs, which can reach up to several thousand seals. The largest haul-outs are on the western coast of the Kamchatka Peninsula, and on Sakhalin (Fig. 6).

Currently, the spotted seal is the only representative of the true seals which is still harvested on the coastal haul-outs at the end of summer–early autumn on South Sakhalin and in the northren part of the Sea of Okhotsk.

Harbor Seals

Within the Sea of Okhotsk, harbor seals (*Phoca vitulina*) are found only on the Kuril Islands. Their population is not large and the species is registered in the Red Data Book of Russia. On the Kuril Islands, harbor seals are unevenly distributed. The largest number can be found on the Iturup, Shikotan and Habomai islands. In 2000 the whole territory of the Kuril Islands was carefully monitored, and about 3,000 individuals were counted. The inter-annual dynamics of harbor seal numbers indicate that the number of the seals on the Kuril Islands is roughly constant and that there is no danger to harbor seal survival in this region. The harbor seal is generally a non-migratory species, but it regularly travels locally between adjacent islands.

Ribbon Seals

This species of seal (*Phoca fasciata*) is the least studied in the Sea of Okhotsk. The reason for this is that during the ice period of the year life cycle, this seal is not connected to the land, and its summer-time habitat is situated in the pelagic area. This species is the earliest to mature, which explains the rapid growth of its population. Some females become mature at the age of 1 year, and at the age of 2 years most seals are ready to reproduce.

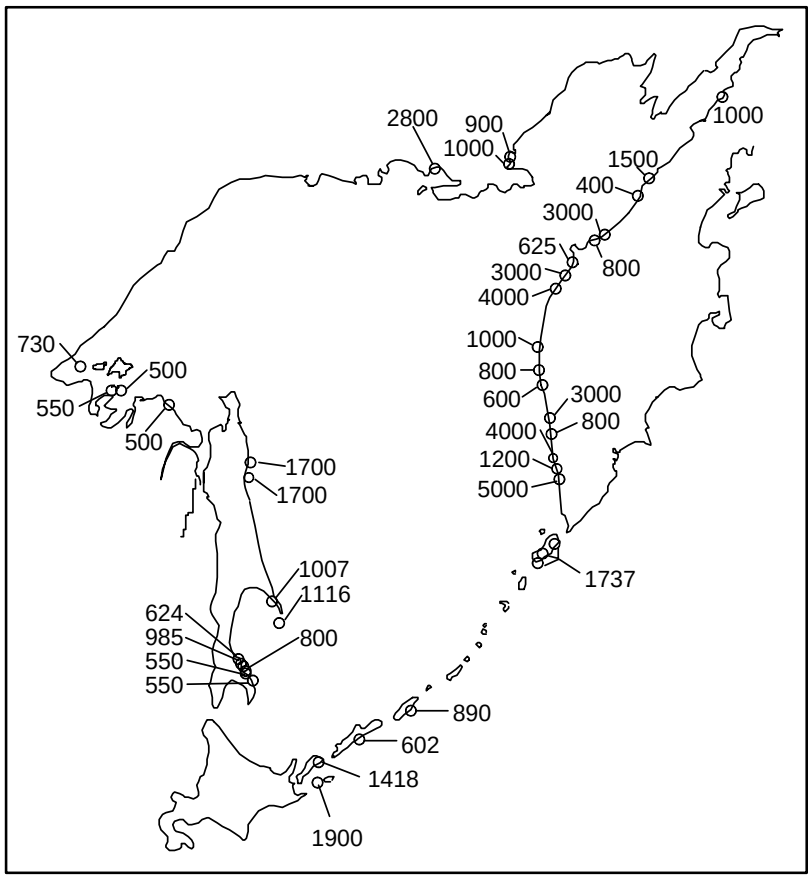

Fig. 6 The largest spotted (largha) seal haul-outs on the coast of Sea of Okhotsk and maximum number seals at each haul-out (Kuzin *et al.*, 1984; Kosygin *et al.*, 1986; Lagerev, 1988; Burkanov, 1991; Chupakhina and Panteleeva, 1991; Trukhin, 1998; Kornev *et al.*, 2001).

During the ice period, the highest density of ribbon seals is found in two areas of the Sea of Okhotsk: on the Kashevarov Bank, in the northern part of the sea, and along the east Sakhalin coastline. Reproduction for the majority of these populations takes place in these areas. Ribbon seals, after their departure from the ice, move into the open sea areas; some part of the population migrates towards the Pacific Ocean in summer.

Each species of seal is characterized by specific diets. In all areas of the Sea of Okhotsk the most frequently encountered types of prey of Steller sea lions are Atka mackerel (*Pleurogrammus monopterigius*), walleye pollock (*Theragra chalcogramma*), salmon (*Onchorynchus* sp.), sculpins (Cottidae), and cephalopods. Fur seals mainly feed on different types of fishes and squids. The feeding base of the bearded seal is represented by benthic invertebrates. The diet of the ribbon seal consists mostly of walleye pollock and squids. The ringed seal feeds on crustaceans and small fishes. The spotted seal diet includes different types of fish, cephalopods and crustaceans. In autumn the spotted seal concentrates in river mouths where they feed largely on stream-bound salmon. The ringed seal and the spotted seal can be described as having regional-specific feeding, and the structure of their diets in the northern and southern part of the sea varies considerably. The harbor seal eats different types of fishes and invertebrates which live in the shallow coastal waters of the Kuril Islands. All species display seasonal changes of the feeding structure.

In recent years, research on true seals in the Sea of Okhotsk carried out by Russian zoologists were, to the great extent, devoted to studying the potential impact of oil and gas development on the shelf of northeastern Sakhalin. The drilling platforms here are close to the coast, where seals form large beach rookeries. One of the rookeries is functioning in Piltun Bay, 25 km from an oil rig. There are 3 species of the seals located on this rookery: spotted seal, ringed seal and bearded seal, of which the first 2 are the most abundant. It is worth mentioning that the ringed seal haul-out here is the largest one known for this species. The number of the true seals on the haul-outs increases from summer to autumn (Fig. 7).

Intensive research performed on the rookery in Piltun Bay in 1999 did not indicate any negative influence of oil and gas development on the seal haul-out. Still, some potential risk for the haul-out exists. A severe accident occurring in the area could seriously threaten the adjacent haul-outs.

In recent years there has been a low level of ice coverage in the Sea of Okhotsk due to warming of the climate. It is, as yet, unclear what effect this has on the ice-bound seal populations. However, seasonal migrations and distributions of seals in the northern parts of the Sea of Okhotsk have been affected by late ice formation in the autumn and early breakup in spring. It is also possible that a shortage of ice cover and its comparatively short presence can affect the reproductive success and pup survival of seals. Investigation of this question requires further research.

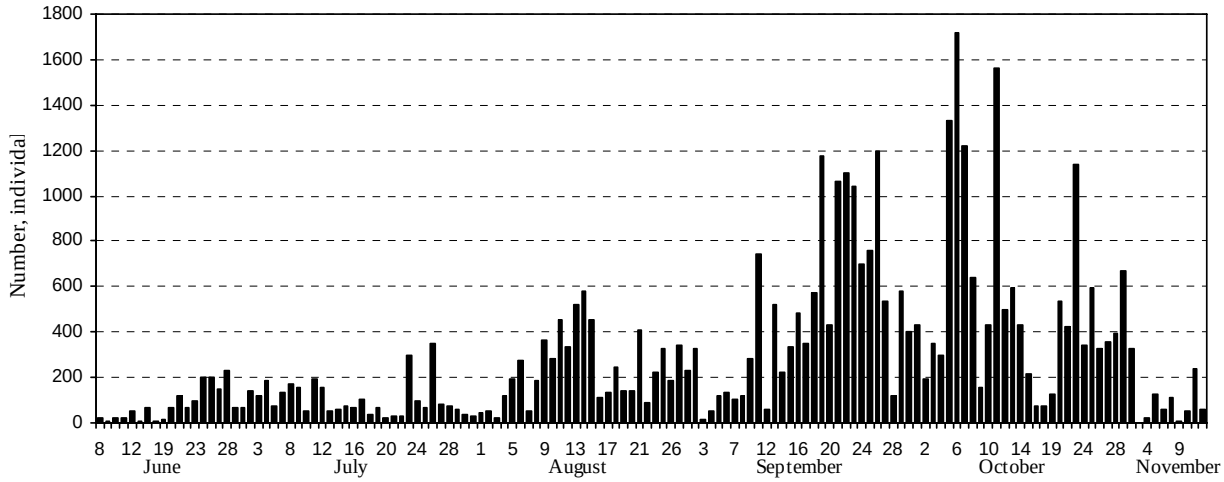

Fig. 7 Change of the number of true seals on the rookery in Piltun Bay.

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