

Status of the Northern Fur Seal, *Callorhinus ursinus*, in Canada*

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This report reviews the general biology, status, and management of the Northern Fur Seal (*Callorhinus ursinus*), with special reference to its status in Canadian waters. While Northern Fur Seals do not breed within Canadian waters, they can be found in large numbers in the waters offshore of British Columbia year-round, and occasional stragglers are found inshore. Generally found only in small groups during the pelagic phase of their life, the largest numbers occur in British Columbia waters from January through June. The eastern North Pacific population has declined significantly over the last 30 years, but the cause is unknown.

Ce rapport examine en général la biologie, le statut et la gestion de l'otarie à fourrure, (*Callorhinus ursinus*) avec référence particulière à son statut dans les eaux canadiennes. Bien que les otaries à fourrure ne se reproduisent pas dans les eaux canadiennes, on les trouve quand même toute l'année en grand nombre au large de la côte de la Colombie-Britannique et quelques errants viennent parfois dans les eaux côtières. Bien que généralement ils ne forment que de petits groupes pendant la phase pélagique de leur vie, c'est dans les eaux de la Colombie-Britannique, de janvier à juin, que l'on trouve les plus grands regroupements. La population de l'est du Pacifique nord a connu un important déclin ces trente dernières années, mais la cause est inconnue.

Key Words: Northern Fur Seal, *Callorhinus ursinus*, Otarie à fourrure, otariid, status, British Columbia.

This review of the general biology, status, and management of the Northern Fur Seal, *Callorhinus ursinus* (Linnaeus 1758), was prepared on behalf of the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). A compilation and assessment of the available information on this species is used to evaluate its status in Canadian waters. For this species such a task is relatively easy in comparison to the many lesser known species of marine mammals in Canadian waters, because of the extensive investigations undertaken by U.S., Russian, and Canadian researchers.

The Northern Fur Seal, a member of the sea lion family (Otariidae), is the second smallest pinniped found on the west coast of Canada. Adult males reach a length of 1.9 m and a weight of about 200 kg, while females are much smaller, reaching a length of 1.3 m and a weight of 35 kg (Figure 1). The pelage of adults is generally a brownish-grey colour. The vibrissae colour varies with age, being black in juveniles and white in fully grown adults.

Distribution

Northern Fur Seals range throughout the northern Pacific from central Japan (latitude 36°N) and the Sea of Japan north to the Bering Sea, and south along the west coast of North America to the area of the

U.S.-Mexican border (latitude 32°N) [Figure 2]. Fur seals can be found throughout this range in almost all months of the year, but peak abundance varies seasonally and geographically. Off the Canadian west coast, females and subadult males are typically found during the winter off the continental shelf (Bigg 1990). Occasional animals are seen in inshore waters in British Columbia, and stragglers occasionally come ashore, usually at sea lion haulouts (e.g., Race Rocks, off southern Vancouver Island).

Three breeding colonies occur in Russia; at Robben (Tyuleniy) Island and the central Kuril Islands in the Sea of Okhotsk, and Commander Island in the western Bering Sea. In the United States, colonies occur at the Pribilof Islands (St. George and St. Paul islands) in the eastern Bering Sea, at Bogoslof Island in the southeast Bering Sea, and at San Miguel Island and nearby Castle Rock off southern California. Reeves et al. (1992) noted that a few fur seals also haul out seasonally on Southeast Farallon Island and occasionally on San Nicolas Island, off California.

Protection

International

The Interim Convention on Conservation of North Pacific Fur Seals lapsed in 1984, when the United

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States Senate failed to ratify a protocol for extension. This international agreement protected the fur seal from hunting at sea, but also allowed for the commercial harvest of fur seals in the Pribilof Islands. Attempts to establish a new treaty for the protection of the fur seal have failed; consequently the species is vulnerable to future hunting of animals at sea. Under the terms of this agreement Canada received 15 percent of the skins from harvests, and was also obliged to undertake research on this species.

The Northern Fur Seal is not listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), thus international trade is not monitored or regulated.

National

Canada: In Canada the Northern Fur Seal is protected under the 1993 Marine Mammal Regulations of the Fisheries Act of Canada. These regulations control the hunting of this species in Canadian waters by all except aboriginals, who are required to obtain a licence. Fees for such a licence are low (\$5), and issuance is at the discretion of the Minister of Fisheries and Oceans. "Disturbance" is prohibited through these regulations, except when hunting under licence, as is the operation of aircraft within 600 m of any live seal on land.

United States: After the international convention lapsed in 1984, management of this species in U.S. waters became subject to the Fur Seal Act of 1966 and the Marine Mammal Protection Act of 1972. The commercial harvest on the Pribilof Islands ended because the National Marine Fisheries Service (NMFS) determined that such a harvest could not take place under domestic laws. Current levels and conditions for a subsistence harvest are regulated under these Acts. In 1988 the U.S. population was listed as depleted under the Marine Mammal Protection Act. Under this Act, a conservation plan was prepared for this species (National Marine Fisheries Service 1993), outlining protective measures and research activities to be undertaken by the U.S. National Marine Fisheries Service.

Population Size(s) and Trends

Several stocks have been generally recognized for the Northern Fur Seal; however, tag returns suggest that some exchange occurs between breeding colonies. The Pribilof Islands population is the largest, comprising three quarters of the world's total, with just less than one million individuals in the early 1990s (National Marine Mammal Laboratory, unpublished data). This population was thought to number between two to three million individuals in the mid-1800s (National Marine Fisheries Service 1993), and was estimated at approximately 2.1 million individuals in the 1940s (Kenyon et al. 1954; Lander and Kajimura 1982; Briggs and Fowler 1984). Based on pup counts, the population

on St. Paul Island (representing about 80% of the Pribilof stock) has remained relatively stable since the early 1980s, while the St. George stock has undergone a significant decline since the late 1970s (York and Fowler 1992). The Pribilof Island population(s) appear to be well below the level of maximum net productivity (Ragen 1995). Northern Fur Seals first began breeding at Bogoslof Island in the southeast Bering Sea in 1980, and the population in 1988 comprised over 400 individuals, increasing at a rate of 57% per year (Loughlin and Miller 1989). Fur seals also began breeding at San Miguel Island (California) in 1968 and at nearby Castle Rock in 1972. The San Miguel colony numbered approximately 5000 individuals by 1993 and was increasing (DeLong et al. 1993).

Habitat

Terrestrial habitats for Northern Fur Seals are generally limited to their rookeries, which are scattered around the North Pacific rim in close proximity to the continental slope. Fur seals have strong fidelity to traditional sites that are typically composed of a rocky substrate (on San Miguel Island they use a sand beach). Although all rookeries in the U.S. are federally owned, the Pribilof Islands are inhabited and non-rookery lands are owned by local communities which are developing support facilities for fishing industries. Consequently, several types of habitat degradation are possible.

Ocean habitats appear to vary by the sex and age group(s) of fur seals present. In the summer breeding season, continental slope waters in the eastern Bering Sea are the principal destination for adult females on foraging trips. The use of continental shelf and slope waters of British Columbia and the states of Washington, Oregon, and California by adult females during winter is well documented from pelagic sealing data (Bigg 1990). Adult males from the Alaskan populations appear to remain in Alaskan waters year-round, some remaining in the Bering Sea and some moving south into the Gulf of Alaska in mid-winter. Subadults of both sexes use coastal waters of British Columbia and Washington as well as offshore areas of the North Pacific (Kajimura 1984; Bigg 1990). The highest concentrations in the open ocean occur along the continental shelf break and in association with other major oceanographic frontal features, such as canyons, sea mounts and valleys (Kajimura 1984). Although water quality in these areas is unknown, it appears to be suitable with the exception of areas subjected to oil spills. Trends in the availability of prey in these areas are unknown.

General Biology

Reproduction

Female Northern Fur Seals may produce their first pup at four years of age, and the majority are pupping by six years of age (York and Hartley 1981). A



FIGURE 1. Northern Fur Seals. Photo by O.W. Otsen. The small animal at left is an adult female, the large animal is an adult male.

single pup is born within two days of the arrival of a female at the breeding colony. Parturition appears to be stimulated by arrival at the breeding colony and the presence of conspecifics (Bigg 1984). For the first 8-10 days after birth, females remain ashore until they come into estrous and mate. After that time they regularly leave the colony for foraging trips of 4-10 days. Insley (1992) demonstrated that calls used between mother-offspring pairs of Northern Fur Seals were highly variable between individuals, but varied little for a particular individual, allowing the mother and pup to reunite after separating. Pups remain on the breeding islands until they are weaned in late fall. Pup weight depends in part on that of the mother and on sex, male pups are larger at birth (Boltnev 1993). Adult males remain ashore and fast while defending breeding territories. Juvenile males also haul out during the breeding season and fast, typically losing about 20% of their body mass during this time (Baker et al. 1993).

Diet

Knowledge of the diet of the Northern Fur Seals comes primarily from the examination of stomach contents of animals killed as part of a joint U.S.-Canadian research program from 1958 to 1974

(Kajimura 1984; Perez and Bigg 1986), and in part from scat analysis (Antonelis et al. 1990, 1993). Primary prey species vary seasonally (Perez and Bigg 1986). Differences in diet also occur throughout their range, both on a large (Perez and Bigg 1986) and small scale (Antonelis et al. 1993). Small schooling fishes are the primary food species in terms of energy content. In British Columbia waters, Pacific Herring (*Clupea harengus*) and various species of squid comprise about 70% of the diet. Walleye pollock, sablefish, rockfishes, whiting, and salmonids form the remainder of the diet (Perez and Bigg 1986). Historical evidence suggests that the composition of the diet has fluctuated over time with changes in fish stocks; sardines were once extremely abundant in the eastern North Pacific but were overfished in the 1940s until the stocks collapsed. There is some evidence that sardines were commonly eaten by Northern Fur Seals off Vancouver Island in the early 1930s (Clemens and Wilby 1933).

Movements

In general, Pribilof Island fur seals migrate south to winter along the west coast of Canada and the United States. However, patterns of movement of this species are extensive and complex, with timing

and migratory routes depending on age, sex and reproductive condition (Bigg 1990). Bigg (1990) suggested that fur seal migration from the Bering Sea after the breeding season facilitated both the avoidance of low temperatures and access to sources of prey. He also suggested that the age-related differences in migratory timing and routes likely results from a combination of the learning of productive foraging areas and the need to return to the breeding areas when animals reach reproductive age. The origin of sex-related differences in migration may result in part from differences in the timing of arrival to and departure from the breeding colonies. Adult females both arrive at and leave colonies later than adult males. Males start to arrive at colonies in May to establish territories and females start arriving in mid-June. Males depart in late summer while females remain until late fall while they continue to nurse their young. The fall movements of pups away from the rookeries is not random; estimated minimum swimming speed of pups between St. Paul Island and the Aleutians was between 36 to 61 km/day (Ragen et al. 1993). Fowler et al. (1993) demonstrated that male Northern Fur Seals generally return to their natal rookery, although individuals sometimes emigrate to other rookeries or, rarely, form new colonies.

Short-distance movements around San Miguel Island by females nursing pups were examined by Antonelis et al. (1990), who found that females foraged primarily in oceanic waters over the continental slope. These females departed the colony in greatest numbers in mid-day, possibly a thermoregulatory behaviour in response to increasing temperatures and solar radiation.

Behaviour

Northern Fur Seals generally exhibit strong site fidelity to their rookeries. Despite disturbance associated with commercial harvesting by human inhabitants on the Pribilof Islands from the late 1700s until recently, seals continue to occupy nearly all the same rookeries. This species appears to be tolerant to short term disturbance associated with human activities (Gentry and Gilman 1990). The proximity of these islands to the continental slope likely contributes to their continued use of these rookeries.

Limiting Factors

Commercial harvesting has affected the population of Northern Fur Seals in the Pribilof Islands since shortly after it was first discovered in 1786 (National Marine Fisheries Service 1993). From 1786 to 1828 an average of a hundred thousand Northern Fur Seals per year, primarily pups, were killed. Commercial harvesting of this species was directly responsible for the large reductions in population size in the late 1800s and early 1900s. The commercial harvest during this early period included pregnant females; dur-

ing the period of pelagic sealing, large numbers of animals were taken off British Columbia and in the Bering Sea (National Marine Fisheries Service 1993). Hunts were reduced in size in the early 1900s, and the population grew up to the 1940s. Approximately 300 000 females were killed between 1956 and 1968, in an effort to move the population towards the level where productivity would be maximized. The population did not respond as expected however, and pup production decreased (York and Hartley 1981). When the commercial harvest of females ceased in 1968, pup production increased and the population grew until 1976. While hunting continued during this period, it is considered unlikely to be the cause of a decline in the population size after 1976 (National Marine Fisheries Service 1993). Commercial harvests continued for this species up until the expiration of the Interim Convention on Conservation of North Pacific Fur Seals in 1984. Since that time, between about 1200 and 3700 juvenile males have been killed each year as part of a subsistence harvest. Such levels are not thought to contribute to the lack of recovery of the population (National Marine Fisheries Service 1993).

A variety of other natural and anthropogenic sources of mortality for this species have been observed. Several authors have examined causes and levels of mortality in pups, both at breeding colonies and during the winter. Calambokidis and Gentry (1985) observed that pup survival from birth to weaning was positively correlated with birth weight, which in turn was correlated with the age of the mother. Pups which weighed less than average were more likely to die from trauma, parasitic infestation and infectious disease, as well as "emaciation syndrome". Baker and Fowler (1992) examined pup weight and overwintering survival, and found that the overwintering survival of males increased with pup weight. Their small female sample size likely precluded a similar determination (Baker and Fowler 1992). They suggested that larger overwintering animals were better able to withstand cold temperatures. Larger animals are also able to dive longer (Kooyman 1989 in Baker and Fowler 1992), possibly increasing the ability to find prey. Predation by sharks, foxes, Killer Whales (*Orcinus orca*) and Steller Sea Lions (*Eumetopias jubatus*) has been recorded (Bychkov 1967; Gentry and Johnson 1980; Hanna 1922; Reeves et al. 1992; National Marine Fisheries Service 1993). Three to seven percent of fur seal neonates on St. George Island were killed by sea lions in 1974 and 1975 (Gentry and Johnson 1980); no data on mortality levels from Killer Whales or sharks are available.

Natural environmental fluctuations, such as the periodic occurrence of El Niño, has negatively affected the population breeding at San Miguel Island, although conditions for the Pribilof Island

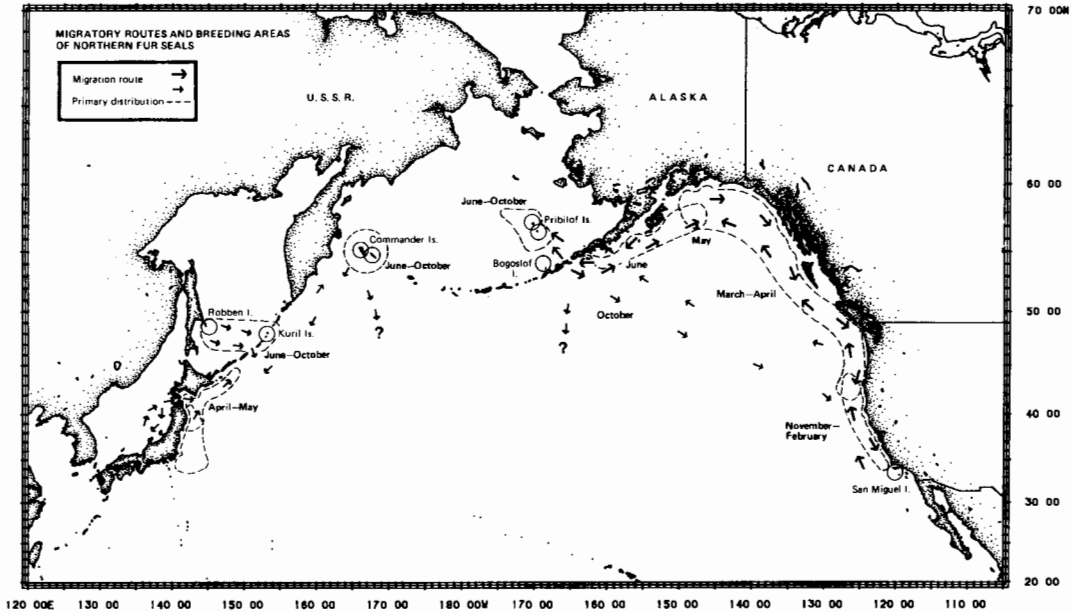


FIGURE 2. Distribution of the Northern Fur Seal off the west coast of North America. Breeding islands are located in the circles. Reproduced from Loughlin and Miller (1989) by permission.

population may be enhanced by increased sea surface temperatures associated with these events (York 1991). The 1983 El Niño occurred just prior to implantation of embryos at San Miguel Island, and resulted in an increase in pup mortality and a decrease in pup weights. DeLong et al. (1993) suggested that the later onset of the 1992 El Niño affected this population less intensely. Competition with fisheries has been suggested as a possible limiting factor for this species, both in waters surrounding breeding colonies, along migration routes, and during the non-breeding season in the North Pacific. The interactions between commercial harvesting of prey species and fur seal movements, reproductive rates or mortality is unclear, however (National Marine Fisheries Service 1993).

Calambokidis and Peard (1982) examined levels of chlorinated hydrocarbons from Northern Fur Seals in Alaska, but found concentrations well below levels thought to contribute to reproductive problems in other populations of pinnipeds. Anas (1974) reported levels of heavy metals in fur seals from Alaska and Washington State, but no information is available on potential impacts. An analysis of heavy metals by Noda et al. (1995) revealed higher cadmium concentrations in northern fur seals than in other otariids. Cadmium levels were higher, and mercury levels lower, than those reported by Anas (1974); however, heavy metal concentrations in Northern Fur Seals are variable with age, location, and probably season, making comparisons between studies difficult (Noda

et al. 1995). Entanglement in fishing gear is probably a more significant problem. Northern Fur Seals were the third most commonly caught species of marine mammal recorded in an observer program of the Japanese driftnet fishery for squid in 1989 (Anonymous 1990). Two animals were killed in an experiment drift gillnet fishery for Neon Flying Squid (*Ommastrephes bartramii*) in Canadian waters in the mid-1980s (Jamieson and Heritage 1988). Entanglement in marine debris is also a source of mortality. Fowler (1987) suggested that mortality due to entanglement in marine debris has contributed significantly to the decline in the population on the Pribilof Islands. Recent declines have also occurred in the numbers of Steller Sea Lions (Loughlin et al. 1992) and Harbour Seals, *Phoca vitulina* (Pitcher 1990) in the central and eastern Gulf of Alaska. While many possible causes have been identified (reviewed above), the exact causes of these declines continues to remain unclear.

Special Significance of the Species

This species is the only fur seal found in the temperate waters of the north Pacific Ocean and is endemic to this region. Alaskan natives on the Pribilof Islands harvest approximately 2000 subadult males annually for food.

Evaluation

The present world population of Northern Fur Seals is substantially lower than historical levels,

and causes of the decline are unclear. Although the market demand for furs is currently low, the lack of any international regulatory body or agreement on the management of the species means that killing of this species at sea could be undertaken at any time, and trade is not restricted or monitored through any international agency. Rapid development of fishing industry support services on the Pribilof Islands has the potential to adversely affect this population.

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