

ORDER PINNIPEDIA

This is a group of specialized animals, well-adapted for life in the sea. Thick hides with heavy layers of fat underneath, and in some cases fur, protect them from the cold. Their fore and hind limbs are modified to form flippers, as their name Pinnipedia, or feather-feet, suggests. The tail is short or obsolete. The seals are excellent swimmers, and at times spend long periods at sea.

There are three families in this group: the Otariidae, comprising the sea lions and fur seals; the Phocidae, comprising the hair seals or so-called true seals; and the Odobenidae, the walruses, which are restricted to Arctic waters.

The Otariidae, sometimes known as eared seals, are characterized by having a small external ear pinna and by having a hind flipper which turns forward for locomotion, enabling them to move on land at a comparatively rapid gallop. The fore-flippers are large, and are the chief source of propulsion in swimming. The fur seals have a dense, soft undercoat, protected by longer, coarse guard hairs, while the sea lions have a harsh coat of no value as fur. The members of this family have a small number of breeding spots, or rookeries, to which they may return year after year. These are located mostly on offshore islands. The males of breeding age arrive first at these spots and battle other males until relatively few are left, each in possession of his own territory; the rest are forced out to lead celibate lives. The victorious males acquire large harems, the northern fur seal 20 to 50, the Steller sea lion 10-20, the California sea lion probably about the same as the Steller or a little less (about 10 the most common, with the highest count 18, according to one authority). The female gives birth to a single pup, then breeds within a few days to a week. The breeding habits of the northern fur seal are the best known of the family, but the pattern is somewhat the same in all. These seals spend up to several months on land at breeding time, the breeding males sometimes going longer than 2 months (in the fur seal) without ever leaving to feed, the females going to sea to feed and returning every 2 or 3 days to a week to nurse their young. They haul up to rest and sleep at other times on whatever is available. However, in the case of migratory northern fur seals, they may spend months at a time without touching land, and sleep floating on their backs in the water.

The Phocidae are unable to turn their hind flippers forward and use them for propulsion on land, so are much less motile there than the eared seals and can only worm their way along. They have smaller fore-flippers than the eared seals, and propel themselves in water chiefly with the hind flippers. They have no external ears. Breeding habits vary. The harbor seal does not breed in organized colonies nor have harems, though it has been variously described as polygamous or promiscuous. The elephant seal, on the other hand, does breed in colonies, but much more loosely organized ones than those of the eared seals.

Ages of most pinnipeds can be determined by making sections of their teeth and counting the growth rings.

Like the cetaceans, the seals seem to use a form of sonar. This may explain the finding of blind seals which are fat and in good condition.

THE SEA LION CONTROVERSY

The California and Steller sea lions are the best known and most often seen of all our marine mammals. The general public sees them as interesting and very appealing wild animals cavorting in the water near shore, or hauled out on rocky spots or other resting places; as amusing hams, and beggars for food, in pools where they are confined for public display; and, in the case of the California sea lion, as very intelligent performers when trained. The commercial fisherman, on the other hand, sees them as unmitigated nuisances: consumers of tons of valuable fish, destroyers of valuable gear and interferers with fishing operations, species of no value which ought to be exterminated. He addresses them in uncomplimentary terms when they come near his boat, and shoots them when they become too annoying. Their nuisance value to fishing operations cannot be denied, nor the loss to the fisherman who pulls in his white seabass gill nets and finds three whole fish and five heads out of a scanty catch of eight fish, for example. I saw this happen to a

friend with whom I went fishing in Monterey Bay, and his remarks about the Fish and Game protecting the sea lions were far from complimentary. In the north, the fur seal and the harbor seal are looked upon with an unfriendly eye by salmon fishermen.

But what are the facts of the case, looked at from all angles? The overall picture of the feeding habits of sea lions and other seals throughout the year is still very little known. The total poundage of food they consume is not known, though it is probably less than the fishermen claim. Also, the percentage of fish eaten which are of value to commercial or sport fishermen compared with the percentage of those of little or no value, or those which might actually be harmful, is not known. For example, sea lions at times feed on salmon, taking them from gill nets or from hooks. But how often do they catch free-swimming salmon? And since they have been known to feed on lampreys, which are serious predators on the salmon, who knows but that in the long run they might not do more good than harm? Of the stomachs examined, many have been found to contain so-called scrap fish, or squid, or crustaceans, and many biologists feel that these constitute the major portion of their diet. Also, it is claimed that fish are always abundant in the vicinity of large rookeries. But much still remains to be found out.

The battle over sea lions in California has raged for many years. In the 1860's and 1870's, before there was any regulation, many were killed for their oil; this was during a time of widespread exploitation of marine mammals for their oil or fur. In more recent years, the policy has varied between protecting them strictly and making sporadic attempts at cutting down their numbers in response to public pressure. The latter action has had many of the bad features of other attempts at cutting down so-called predators, plus some special ones of its own. As had been suggested, the overall relationship of the sea lions to other life in the sea is not well known. There are strong objections from people who like sea lions. The animals are difficult to kill in the water; many are merely injured, which few people would condone. The bodies of those that are killed in the water are difficult to recover, with the result that many carcasses wash up on beaches, creating a nuisance. One of the easiest methods, that of killing pups on the rookeries, is distasteful to all but the most hardened. Moreover, many of the rookeries are almost inaccessible. Control is expensive.

What is the end result of trying to cut down the sea lion population? None, it has been found, except very temporarily. There is a shortage of desirable space for rookeries in California. Thinning down the numbers of sea lions could merely create more space for new ones to move in from Mexico and from Oregon, or from wildlife sanctuaries. Moreover, since mortality of pups from trampling on the crowded rookeries is high, thinning them out would result in higher survival, and the population would soon be back to where it was before.

In the past several years there has been great concern about pollutants in the marine environment and their possible effects on marine animals. An associative relationship has been found between high residue levels of the insecticide DDE and the industrial chemical PCB and premature pupping in California sea lions.

The California Department of Fish and Game has conducted shore and aerial censuses of sea lions at intervals over much of the past half century, and these counts, admittedly low, indicate the population has stabilized at about 25,000 animals. Other researchers place this figure nearer 40,000. Whichever estimate is correct, the vast majority of these are California sea lions.

Some people have been disturbed by finding dead sea lions on beaches, and have speculated that this was due to pollution-caused disease or to large-scale shooting by humans. I think the general public is simply more conscious of the environment these days. People who live near beaches always have been aware of dead sea lions. People who operate oceanarias also can tell you that many pups that are brought in to them are infested with lung worms or other parasites, and do not survive. Mortality in pups is high from disease and other natural causes; I think losses from willful shooting by humans or from pollution has been and is very small.

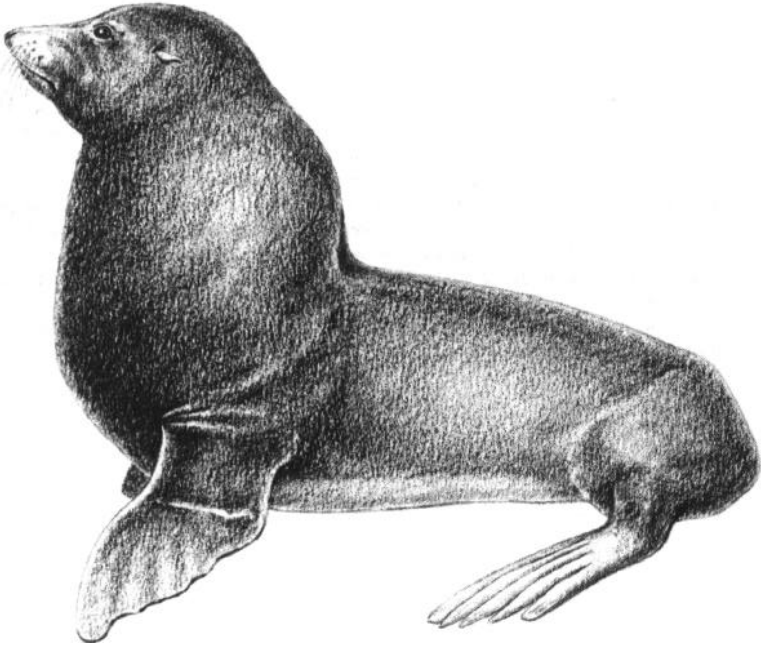
It is no longer legal to take sea lions for their meat or hides, and the Marine Mammal Protection Act of 1972 moved the responsibility for issuing permits for live capture of

California sea lions and harbor seals from the California Department of Fish and Game to the National Marine Fisheries Service.

In the past, commercial and sport fishermen who were fishing from boats were allowed to kill sea lions if they were destroying gear or otherwise interfering with fishing operations. Under the provisions of the act, such killing is unlawful, but permits to capture and take sea lions which are interfering with fisheries can be issued by the National Marine Fisheries Service.

GUADALUPE FUR SEAL

Arctocephalus townsendi



This animal is related to the northern fur seal, but is even more closely related to several species found in the southern hemisphere. The male gets to 5 or 6 feet; the female is slightly smaller. The color of both male and female is dark brown or blackish-gray, with yellowish-gray head and neck; the silvery-appearing mane of long guard hairs surrounding the neck and shoulder region is quite conspicuous. It is readily distinguished from the northern fur seal, and especially the very short-faced male of the latter, by its long, pointed muzzle, described as "collie-like"; its profile is concave, or what is known as dish-faced. The Guadalupe seal's voice is quite different from that of the sea lion, the most commonly heard sounds being a deep growl or deep roar.

The story of this seal is another of the stories of marine animals man has brought to extinction or near-extinction. Unlike some of the others, which have made successful comebacks, this one is still in a precarious position. Formerly common from the Farallon Islands off San Francisco to the San Benito Islands off Baja California, Mexico, it was the object of such heavy exploitation for its fur that by the middle of the 19th century it was

near extinction. It was then found again and hunted until 1894. Several scientific expeditions to Guadalupe Island next found and collected what they believed to be the last remaining specimens - a deplorable act on the part of what should be conservation-minded institutions.

Then, in 1926, two fisherman found some again at Guadalupe, and one of them told the director of the San Diego Zoo of his find. He said he had counted 60, though his companion said there were 35-40. The director engaged him to capture some, and in 1928 he delivered to the zoo two males, which lived about a year. Unfortunately, he quarreled with the director, swore he would kill the whole herd, and reportedly did so.

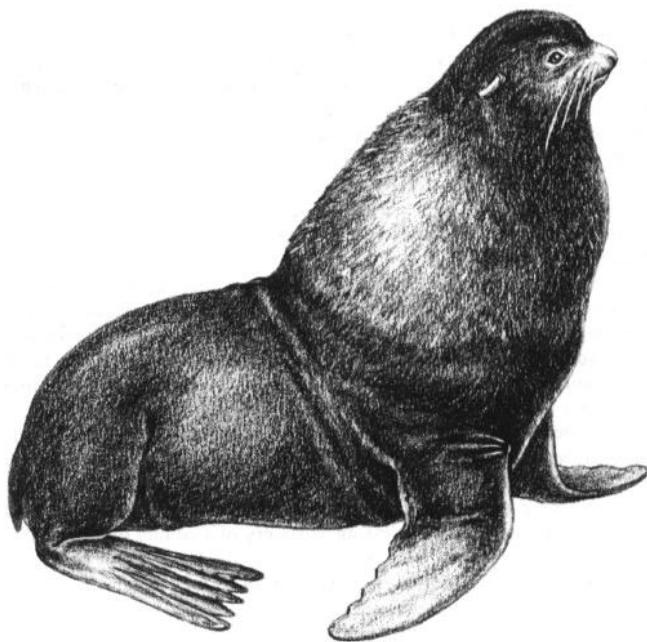
Numerous subsequent expeditions to the island failed to find any, though one individual saw several there on each of several trips during the 1930's always at the same spot. Then, in 1954, an expedition visited this spot and counted 14. In 1955 they returned and counted more than twice that number; and they were seen on four subsequent visits. A subsequent count gave 107, and a still later count (January or February 1964), made from on land, revealed 240. Three years later 372 animals were counted and the total population estimated at 500. Conditions have continued to be favorable for the fur seal at Guadalupe Island and in 1977 a count of about 1,000 was made. A live individual was taken in 1964 for the San Diego Zoo, and two more for exhibit in Mexico.

Meanwhile, in Californian waters, fishermen claimed they had seen them near the Santa Barbara Islands in the summer of 1929; and three young males were seen at Piedras Blancas, San Luis Obispo Co., during the 1938 California Fish and Game Department sea lion census. In 1949, a biologist saw a single male, estimated to be 5 -1/2 feet long and weighing 300 pounds, on each of four trips to San Nicolas Island. On two subsequent trips, in 1949 and 1950, he did not see it; however, there are many caves on the island where these animals could hide. A small adult male was seen on San Miguel Island in 1968, and from 1969 to 1977 two to three males were seen there each summer, but so far only one small, immature female has been sighted at this island.

Little is known of the habits of the Guadalupe seal. Its breeding behavior is probably quite similar to that of the northern fur seal.

NORTHERN (ALASKA) FUR SEAL

Callorhinus ursinus



This is possibly the best known of all the seals in the world. Much has been written about its habits. One of the most interesting accounts, and a fairly accurate one, is given in Kipling's story of "The White Seal"

The factors that have made these animals known are the value of their fur, plus the great numbers in which they congregate on breeding rookeries where they are readily available to man. The story is well known how the fur seals, threatened with extinction by heavy killing, were given protection by international treaty in 1911, and brought back to a good-sized herd by wise management. The original herd was estimated to have contained at least 2 million animals. In 1911, there were fewer than 125 thousand. The treaty stopped pelagic sealing (that is, killing at sea) north of the 30th parallel (except for Eskimos and Indians using primitive methods). Shore sealing management was left to the country having jurisdiction over the rookery area. There are now believed to be 1.3 million in the Pribilof Islands, Bering Sea (owned by the United States), about 265,000 in the Commander Islands (owned by the Soviet Union), 165,000 on Robben Island and 33,000 in the Kuril Islands (both owned by the Soviet Union). In the Pribilofs and Commander and Robben Islands a certain number of young (2 to 5-year-old) surplus males are cropped. About 40,000 to 50,000 pelts are taken each year, with the majority coming from the Pribilof Islands. The average value of the seal skins was about \$100 apiece in 1977. The original agreement involved Russia, Japan, Great Britain, and the United States. Russia managed her own territory; the United States managed the Pribilofs, giving 15% of the profits to Japan and 15% to Canada for their cooperation. In 1941, the Japanese cancelled their participation in the treaty, claiming damage to their fisheries from the seals; the United States took 80% and gave 20% to Canada. In 1957, the Interim Convention on Conservation of North Pacific Fur Seals came into force. The United States and Russia gave 15 % of their take to Japan and 15% to Canada.

The northern fur seals have rookeries to which they return year after year; a seal usually returns to the rookery on which it was born. The conservatism of these and the Guadalupe fur seals in returning to the same spots regardless of molestation by man has been one of the factors leading to the heavy toll taken of them. (It has been reported that sea lions, on the other hand, will move to new rookeries if disturbed too much.) The old males come first to the rookeries. There is incessant fighting, and each of the successful ones claims and holds a territory of usually less than 40 feet square. The females come later, have their pups, and in 5-7 days breed again. After breeding, the mother gives the pup a heavy feeding of very rich milk, then may leave it a week or more while she goes off to sea to feed, perhaps as far as 100 miles. She nurses the pup for 3 months, then leaves it. The male, meanwhile, stays on land without eating or drinking for about 2 months, mainly during June and July, or perhaps longer. He lives on his accumulation of fat, and may lose many pounds. The successful male may get and hold a harem of 20 to 50 females, with an average of about 40.

After the breeding season is over, the older males stay in the north, younger males go south a ways, and the females and youngest males make long migrations, with round trips of up to 6,000 miles. Most go down the coast to opposite California, occasionally as far as between Guadalupe and San Benito Islands, Baja California; a few go to the vicinity of northern Japan. They usually stay well out to sea, 10 to 100 miles or more, and spend months without coming ashore, sleeping while floating on their backs.

On November 28 and 29, 1967, two pups were found on the beach in Monterey Bay. One was captured and found to be in poor condition, and died in a week. Disease, malnutrition, or injury would probably be the only factors which would normally cause these seals to come ashore away from their northern breeding grounds. However, in July 1968, biologists made the surprising discovery of a colony of about 100 northern fur seals on San Miguel Island. The colony consisted of one adult male, approximately 40 females, and 60 young ranging in age from an estimated few days to several weeks. Five females bore tags or tag scars, indicating they had been born on American or Russian islands in the Bering Sea. Thirty-three females and 36 pups in the San Miguel herd were tagged. All females examined had white vibrissae showing that they were older than 5 years.

Investigators later learned from a Santa Barbara commercial fisherman that from his boat he had counted between 8 and 10 adults on San Miguel in 1965, and between 15 and 20 adults in 1966, and about the same number in 1967. Since its discovery, the San Miguel Island fur seal colony has grown rapidly. A second breeding colony was reported on Castele Rock offshore San Miguel Island in 1972. By 1977 about 1,000 pups were born in the two small colonies at San Miguel Island.

The males are dark brown, with gray neck and shoulders; the females and young are more grayish. There is a light patch visible across the chest. The males get very large, reaching a length of 7-8 feet and a weight of up to 700 pounds, while females get to only 4-5 feet and a weight of 130 pounds. Males have a very short muzzle; they are easily distinguished from the Guadalupe fur seals or from sea lions. Also, they have longer hind flippers than the sea lions.

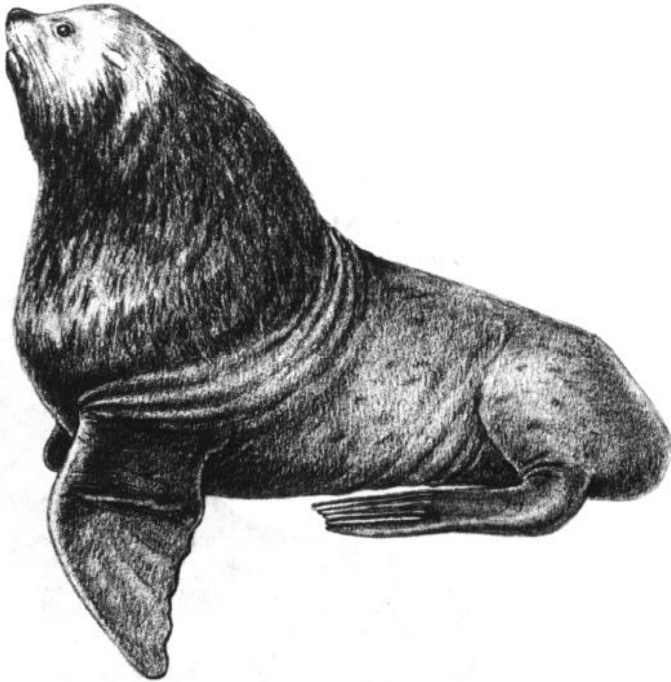
Some males and females mature sexually at age 3, almost all are reproducing by age 7. At least one seal is known to have lived in the wild to 26 years.

About 60 kinds of food remains have been found in fur seal stomachs, mostly small schooling fishes and squid. Herring is said to be an important item in their diet. Off California, anchovies, sauries, hake, and squid compromise the great part of their diet.

Their enemies, aside from man, are killer whales and large sharks, and a parasitic nematode worm which kills up to 20% of the pups each season. Many of the pups are crushed to death on the rookeries by fighting males. The greatest mortality to pups is probably from exposure as they make the transition to a pelagic life. During their first year at least 50% of the pups die from various causes.

STELLAR SEA LION

Eumetopias jubatus



The Steller, or northern, sea lion is found from Bering Strait, Alaska, to southern California. Its breeding grounds extend throughout most of this range, from the Pribilof Islands to the southern California Channel Islands; however, only a small percentage breeds south of Ano Nuevo Island (between Monterey and San Francisco). The breeding grounds are usually rocky spots on islands. The females arrive on the rookeries in mid-May or early June, give birth to their pups, and breed in June or early July. Each male has a harem of 10 to 20 females.

The number of Stellers counted in Department of Fish and Game censuses from 1927 through 1970 remained fairly constant at 4,000 to 7,000, but this has been based upon the erroneous assumption that breeding colonies north of Point Conception were Stellers, while those south of there were Californias. A critical census conducted by the National Marine Fisheries Service during the height of the breeding season in 1976 showed over 1,500 California sea lions between Point Arquello and Ano Nuevo Island, and fewer than 1,000 Stellers. Refined estimates indicate the total breeding population of Stellar sea lions in California is 1,500 to 1,700 animals. The largest colonies are at Ano Nuevo and the Farallon Islands.

The Steller sea lion is tawny or yellowish-brown, as contrasted with the darker color, of the male in particular, of the California sea lion. The male lacks the characteristic head crest of the male California. The Steller attains a much greater size. Males reach 1,500-1,800 pounds, or even 2,200, and lengths of 13 feet. Females reach a little over 600 pounds, and lengths of 9 feet.

One of the best places to see these sea lions is on Seal Rocks opposite the Cliff House in San Francisco, where they occur with California sea lions.

Steller sea lions feed on fish and squid. While valuable fish such as salmon and halibut are occasionally taken, most of the fish they eat are commercially unimportant. Two killed near the mouth of the Columbia River during a salmon run had their stomachs filled with lampreys only.

While sea lions of both species usually seem friendly to swimmers, they sometimes may be aggressive. There is an instance of a sea lion seizing a skin diver off Monterey and holding him under water for a short time before releasing him.

CALIFORNIA SEA LION

Zalophus californianus



This is the trained seal of circuses and other shows all over the world, and as such has become familiar to many thousands of people. Only rarely have others of this family been trained. Both males and females are used, though trainers are said to prefer males. The males are said to be more dependable because they are not so high-strung and do not get nervous or excited. The females are said to be more aggressive, to learn faster and be less stubborn, to have better dispositions, and to get along better with the other animals; they have the disadvantage of going through the oestrus cycle with a resulting lack of food drive, and also are more difficult to tame.

The California sea lion is found from Vancouver Island, British Columbia, south to the Tres Marias Islands off Mexico. Few are found north of San Francisco, and few south of Baja California. Counts made in 1927 and 1930 showed about 1,000 Californians in the state. These counts were made by observers from boats and on foot. It was possible to get an accurate breakdown into the two species (California and Steller) and to eliminate the pups (the natural mortality is so high on these, over 50% that it is not desirable to count them). In 1946 a combination method was used involving foot counts, boats, a blimp, and planes.

In 1947 a blimp was used for all except three places, which were covered by plane. Since then, planes have been used entirely, with most counts made from aerial photographs. These counts are made at the time the animals are on the breeding rookeries. Those north of Point Conception have been assumed to be Stellers, those south of there Californias, in some counts. Pups are of necessity included.

As pointed out earlier, Department of Fish and Game census figures admittedly have been low, and recent critical censuses have shown the error of assuming that all breeding animals north of Point Conception are Stellers. Population estimates recently released by the National Marine Fisheries Service suggest there are 32,000 to 40,000 California sea lions in our waters, and 20,000 to 43,000 in Mexican waters. The total world population is estimated at 60,000 to 85,000. A unique race of California sea lions in the Sea of Japan is thought to have been exterminated by man during, or shortly after, World War II.

Breeding grounds are mainly on the offshore islands from San Miguel Island south into Mexico, on either rocky or sandy spots. A few breed as far north as Pt. Piedras Blancas, in northern San Luis Obispo County, and some as far south as the San Benito Islands off Baja California. The greatest number counted at one place in California has been at San Miguel Island (9,500, or half the total in 1961). San Nicolas Island was second highest in the 1961 count (4,600).

The seals breed in June and early July, within a few days after the females give birth to their pups.

The males reach a size variously described as 500 pounds and up to 1,000 pounds; the latter probably represents an extreme figure. The females reach 200 pounds or up to 600. The males reach 7-8 feet in length, the females 6 feet.

The food of the California sea lion consists largely of squid, octopus, and a variety of fishes (chiefly non-commercial). Out of over 300 sea lion stomachs examined in a recent study, 24 contained fish remains in the form of otoliths. There were 424 otoliths, from over 24 kinds of fish. Hake (204 otoliths) were found in 17 of the 24 stomachs; this is a very abundant fish of almost no sport or commercial value. Only 8 of the species taken were of real commercial value. The amount of food taken by seals in the wild is not known. Captive seals may consume 15 to 20 pounds of fish a day.

The males of this species are dark brown, the females often light brown or tan; both, of course, look lighter when dry than when wet. The adult male has a pronounced sagittal crest—that is, a ridge down the midline of the skull, extending from the forehead to the rear of the skull. This helps distinguish this species from the Steller sea lion.

Another characteristic that helps distinguish this species is its almost incessant barking. The Steller is said to be fairly quiet except when disturbed on hauling-out grounds, though it roars constantly on the breeding grounds.