STATE OF CALIFORNIA
DIVISION OF FISH AND GAME
FISH BULLETIN No. 14
Report on the Seals and Sea Lions of California
1928

By
PAUL BONNOT
Department of Commercial Fisheries

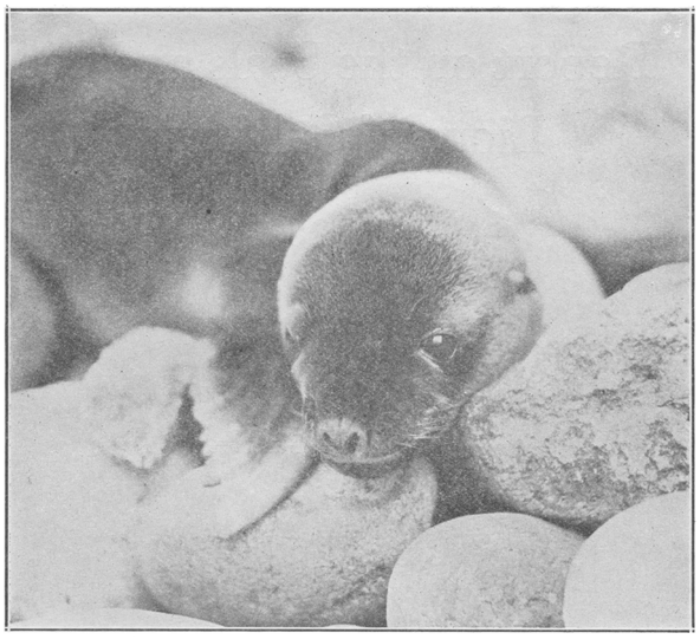

FIG. 1. Sea lion pups are helpless little fellows for the first month of their lives. Seal Harbor, San Clemente Island, June 23, 1927.

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1. LETTER OF TRANSMITTAL

MR. N. B. SCOFIELD,
In Charge, Department of Commercial Fisheries,
California Division of Fish and Game,
Department of Natural Resources.

SIR: I have the honor to report that, in pursuance of your instructions to make a survey of the seals and sea lions on the coast of California, I have, through information contained in the literature, by corresponding with and interviewing such men as were interested, or who had knowledge of the subject, and by personal visits to all of the known rookeries in the state, compiled the following report of conditions past and present, together with a few notes concerning the general habits of these animals.

Respectfully submitted.

PAUL BONNOT,
Assistant, Division of Fish and Game,
Department of Commercial Fisheries.
September 1, 1928.

2. REPORT ON THE SEALS AND SEA LIONS OF CALIFORNIA

By PAUL BONNOT.

In 1926 a few complaints and several petitions were received by the Division of Fish and Game from the fishing industries regarding damage to fishing by seals and sea lions.

2.1. Object of Investigation.*

Early in 1927 the complaints became more numerous. This was the direct result of propaganda by sea lion hunters from Oregon. These men have hunted sea lions for several seasons for a bounty in the state of Oregon. As the sea lions in Oregon are becoming scarce, due to their activities, they made a trip along the coast of

FIG. 2. A typical California sea lion rookery. Pups can be seen at the left. Gull Island, off Santa Cruz Island, June 14, 1927.

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California, stopping at all the principal fishing centers, locating the rookeries, and talking to the fishermen, with a view to hunting in California. As there was no possibility that the Division of Fish and Game would consider a bounty on seals and sea lions, the hunters tried

* I wish to acknowledge my indebtedness to the following: Mr. Norton Stewart of the Santa Barbara Museum of Natural History, the late John Rowley of the Los Angeles Museum, and Dr. Harry Wegeforth, president of the San Diego Zoological Society, all of whom gave me valuable information concerning rookeries and habits of seal and sea lions; the members of the United States Lighthouse Service, who rendered me valuable assistance; the members of the Division of Fish and Game, of California; Dr. Barton W. Evermann, Mr. Alvin Seale, and Mr. Wallace Adams of the California Academy of Sciences, through whose courtesy and assistance I obtained pictures of the harbor seal (Mr. Seale and Mr. Adams also gave me information regarding seals and sea lions in captivity); Mr. Okeson Bonnot, who acted as photographer during the cruise in the southern part of the state in 1927, and who, despite the unfavorable weather conditions which prevailed, obtained a pictorial history of that part of the work.

to interest the fishermen to the extent of raising a fund with which to pay a small bounty. The fishermen's organizations agreed to raise the fund, but nothing has been done toward it to date.

The fishing industries, in their complaints, set forth as their grievances that the seals and sea lions are very numerous; that they are on

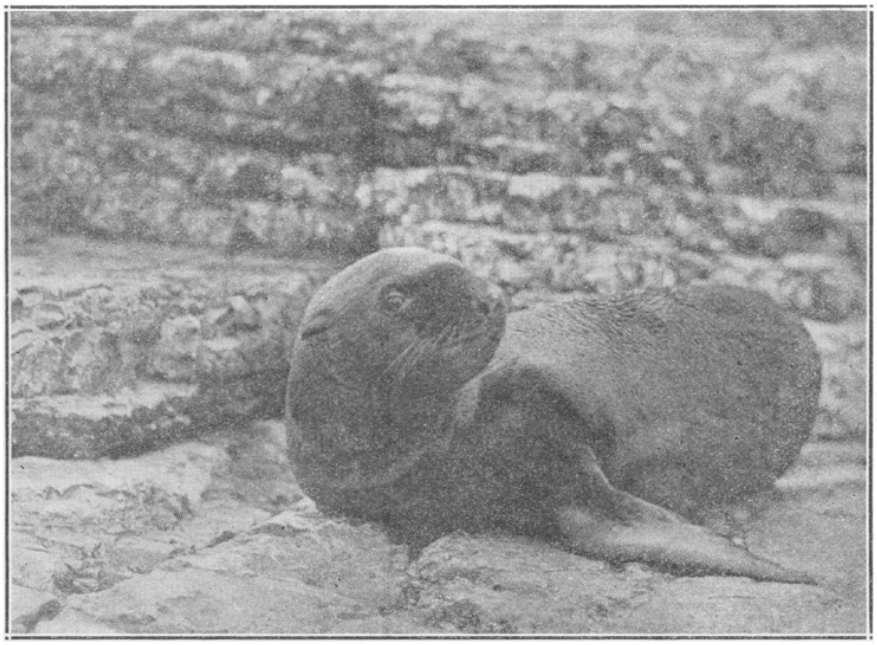

FIG. 3. Steller pup. The Steller pups are much larger than the Californias. They are of much heavier build and not so soft and graceful. Año Nuevo, July 2, 1928.

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the increase, and that they take enormous quantities of fish and cause considerable damage to gear.

There are two species of sea lions: Steller's sea lion (Eumetopias stelleri); the California sea lion (Zalophus californianus), and the one species of seal, the harbor seal (Phoca vitulina), found on the coast of California.

2.2. Species and Range of Seals and Sea Lions Found in California

The harbor seal (Phoca vitulina) has a worldwide distribution and does not occur in great numbers anywhere. In California it is found in small groups along the entire coast.

The sea lions have evidently changed their ranges in recent years. The earliest work on sea lions in California which covers the subject to any extent is Scammon's invaluable book, "The Marine Mammals of the Northwest Coast of North America," published in San Francisco in 1874. Scammon seems to have been in doubt regarding the two species of sea lions found in California. He refers to Eumetopias stelleri, the Steller sea lion, and Zalophus gillespei (Zalophus californianus), the California sea lion, but describes the range of the former as the Galapagos Islands to Alaska and the latter as the coast of South America.

Allen, writing in 1880, recognizes the two species as occurring in California. Under the heading Zalophus californianus he quotes, "from the pen of a nonscientific writer," that "the sea lions congregate by thousands on the Farallones. It is an extraordinary interesting sight to see these marine monsters, many of them bigger than an ox * * *." This can only apply to Eumetopias, as the largest Zalophus bulls are not as big as an ox.

Again Allen quotes Mr. Elliott, in referring to the difference between the California and Alaska sea lions, calling attention to the dissimilarity of their voices. "The northern sea lion," he says, "never barks or howls like the animal at the Farallones or Santa Barbara. Young and old of both sexes, from one year and upward, have only a deep

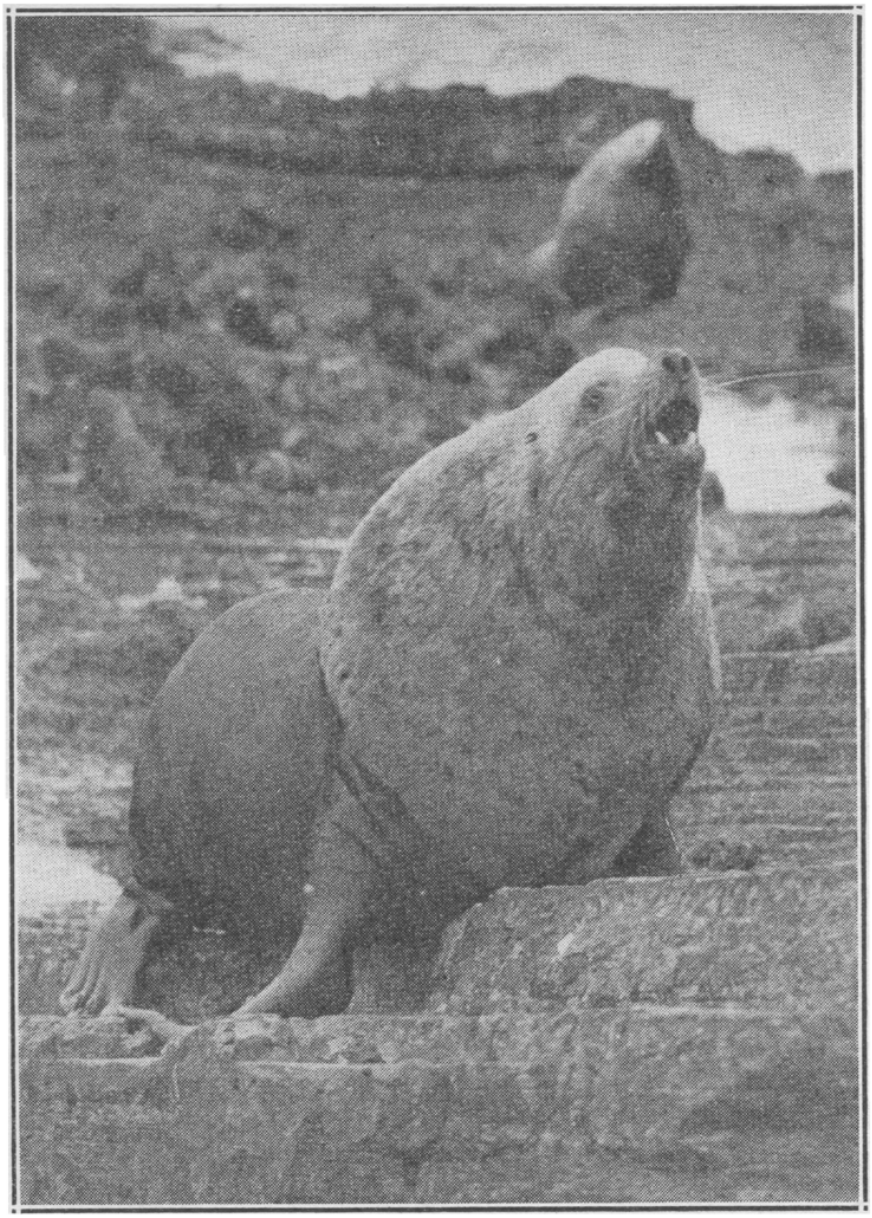

FIG. 4. Steller bull. The herd bulls at Año Nuevo will drive off a man who gets too close. Año Neuvo, July 2, 1928.

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bass growl and prolonged, steady roar; while at San Francisco sea lions break out incessantly with a honking bark or howl, and never roar."

Townsend, in the New York Zoological Society Bulletin for 1918, says: "Sea lions are found all along the west coast. The California

sea lion extends from the Gulf of California to the southern end of Vancouver Island, while the northern sea lion ranges from central California to Bering Sea."

Starks, in the *American Museum Journal* for 1918, says: "Steller's sea lion is found from Bering Straight southward to the Santa Barbara

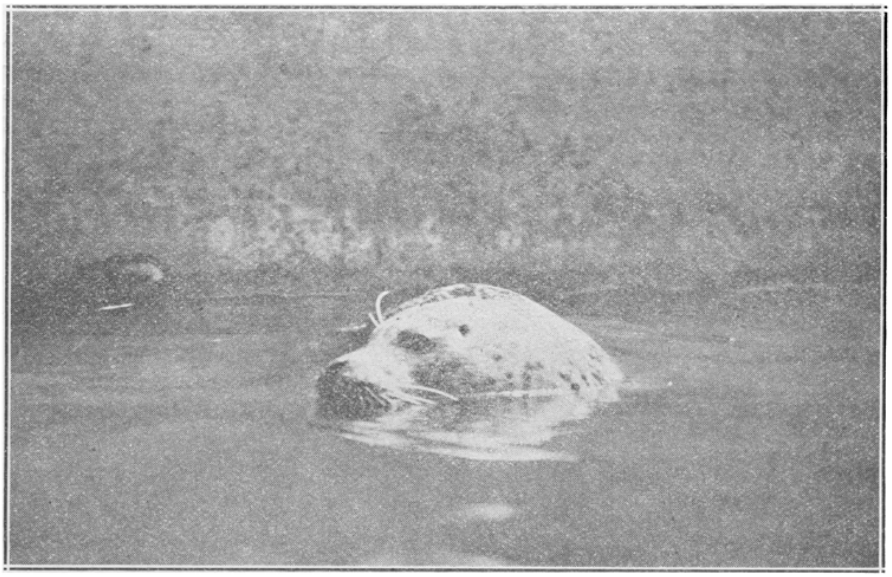

FIG. 5. All that is usually seen when a harbor seal comes up to blow. Steinhart Aquarium, San Francisco, August 20, 1927.

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Islands. The range of the California sea lion has not been well made out. It is found along the entire California coast and indefinitely northward. Its southern range is at least to Cape San Lucas and the Gulf of California. Although these two forms mingle along the Pacific coast for several hundreds of miles, their breeding ranges scarcely overlap, for the southernmost rookery of Steller's sea lion is said to be on Santa Rosa Island, while the northernmost rookery of the California sea lion is said to be on San Miguel Island, which is a few miles north of Santa Rosa Island." Starks has a footnote in which he states that he uses "said to be" advisedly, not having been over some of the ground himself and therefore using information from other people.

From the foregoing it would appear that the ranges of the two species have never been definitely placed in California. At the present time the Steller sea lion ranges from Santa Cruz Island northward and breeds from Santa Rosa Island northward; while the California sea lion ranges from the Farallones southward and breeds from Point Carmel southward. The breeding ranges overlap from Point Carmel on the north to Santa Rosa Island on the south. In former times the California sea lion seems to have been fairly abundant as far north as San Francisco, but at the present time it is rather rare north of Point Carmel.

2.3. History of Sea Lions in California

Before 1860 sea lions were extremely numerous along the California coast. During the sixties they were commercially valuable and their

numbers therefore steadily decreased until the late seventies, when the products gained from them (oil and hides) were bringing such a low price that it was unprofitable to hunt them.

Scammon, in 1874, says: "A few years ago great numbers of sea lions were taken along the coast of upper and lower California, and thousands of barrels of oil were obtained. The number of seals slain exclusively for their oil would appear fabulous when we realize that it requires, on an average, throughout the season, the blubber of three or four sea lions to produce a barrel of oil. Their thick, coarse-grained skins were not considered worth preparing for market in a country where manual labor was so highly valued. At the present time, however, they are valuable for glue stock, and the seal hunter now realizes more comparative profit from the hides than from the oil."

In 1899, the sea lion question in California became acute. At the behest of the fishing industries, the Fish and Game Commission called a meeting in San Francisco to discuss the situation and to decide on a course of action. The fishing industries were represented and several scientific men attended. The conclusions arrived at by this conference were that the sea lions were too numerous, that they were destructive to the fishing industries and that their numbers should be reduced. As most of the large rookeries were located on lighthouse reservations, the commissioners wrote to the Honorable Lyman Gage, Secretary

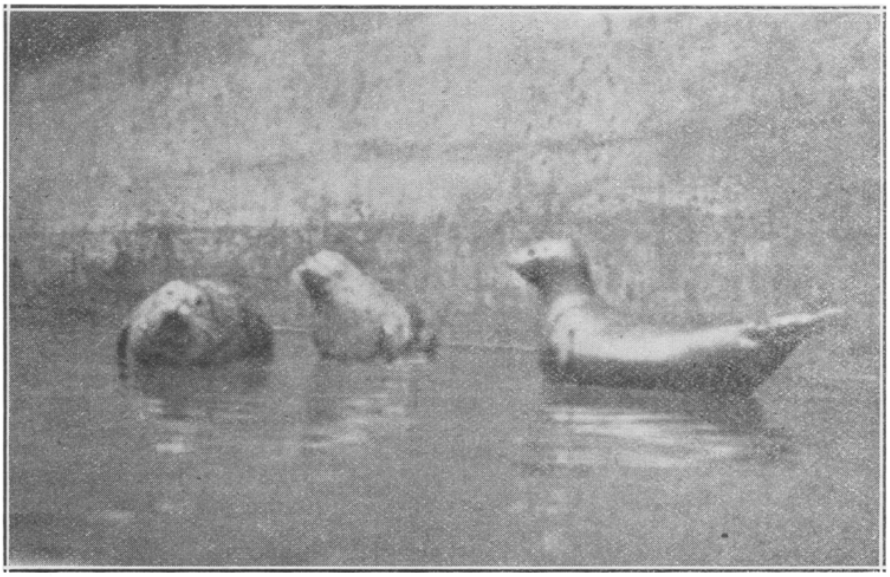

FIG. 6. Three harbor seals, Steinhart Aquarium, San Francisco, August 20, 1927. The one on the right in a characteristic pose.

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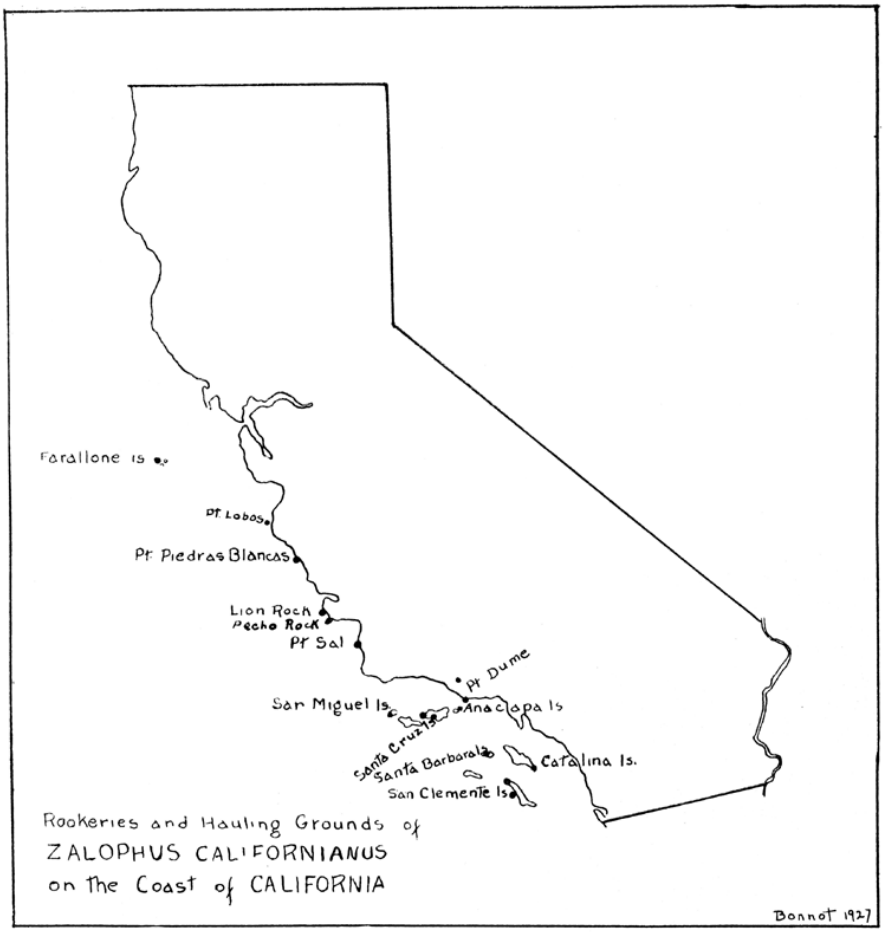
of the Treasury, for permission to kill sea lions on the federal lighthouse reservations. This request was granted on April 27, 1899. The Commission sent two men to the Farallon Islands and two to Año Nuevo Island, both lighthouse reservations, but before any killing had been done the permission was revoked by wire, on May

31st.* On June 9th a letter from the Treasury Department gave the information that the suspension was due to protests from the United States Fish Commission, the Secretary of the United States Department of Agriculture, the New York Zoological Society, and various others. The California Commission stated its case at greater length, and the

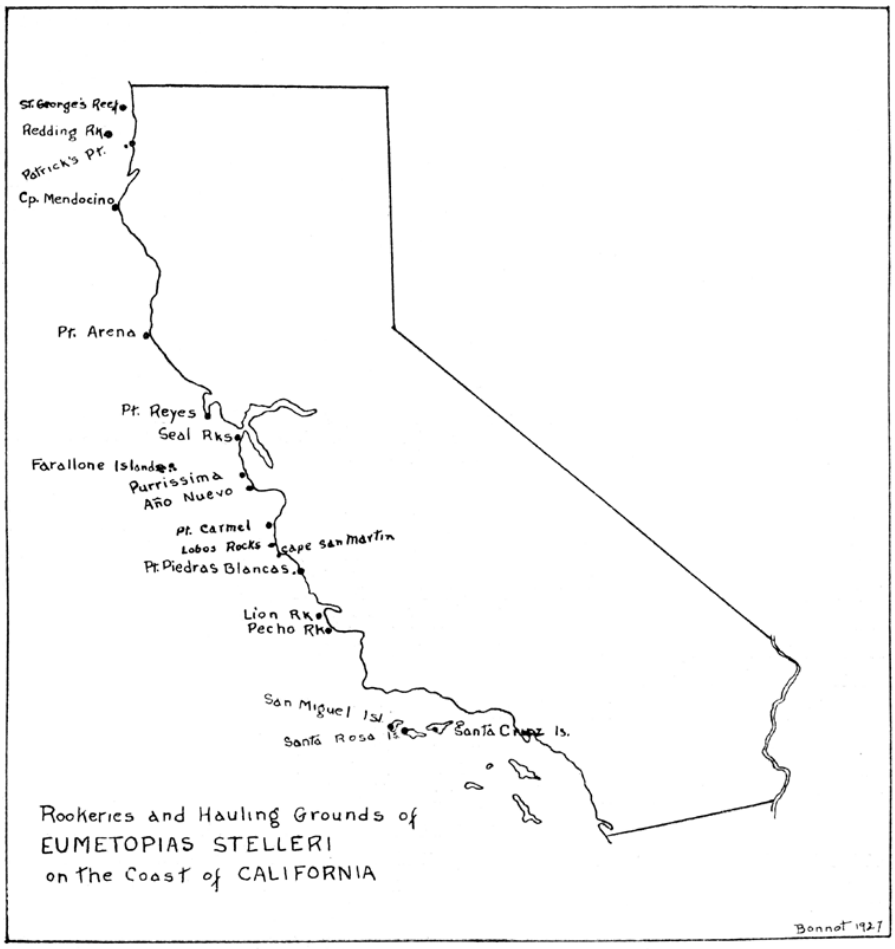


United States Commissioner of Fisheries withdrew his opposition. The other protestants, however, could not be induced to withdraw their opposition and the Lighthouse Board refused to cancel the suspension.

While this controversy was at its height, in the summer of 1899, Professor L. L. Dyche of the University of Kansas made examinations of sea lion stomachs at Monterey and found only squid contained therein, although at the time salmon and other fish were plentiful in the bay. Dr. C. H. Merriam, in *Science*, May 17, 1901, uses this work of Dyche's in an article in support of the contention that the sea lions are not detrimental to the fishing industry.

* Mr. Walter Welch, field agent for the Fish and Game Commission, tells me that in 1899 he was a deputy for the commission in Santa Cruz County and that before the Lighthouse Board canceled the permission to kill sea lions on the reservations several thousand were killed at Año Nuevo.

In 1900, the Lighthouse Board still refusing to grant permission to kill sea lions on the federal reservations, the California Commission asked for the appointment of a special commission to investigate the matter thoroughly. This commission was appointed. It consisted of Cloudsley Rutter, chairman; R. E. Snodgrass, named by the California Fish and Game Commission, and E. C. Starks from the California Academy of Sciences. This commission studied the sea lions in California, and its findings were published in the Commissioner's Report of the United States Commission of Fish and Fisheries for 1902. They came to the conclusion that little damage was done to fishing gear by the sea lions. In regard to food, they arrived at the conclusion that the Steller sea lion is largely a fish consumer and the California sea lion is largely a squid eater. "It seems apparent, however, that either species feeds on whatever is most convenient."



Although the California Commission could not kill sea lions on the federal reservations, they were so confident of the correctness of their stand that several of their deputies were ordered to hunt sea lions, and a great many were killed. Their report of 1901–1902 states: "The

action of this commission in causing a reduction of the sea lion herds, the killing of which was carried on for a few weeks in the spring of 1899, also in 1900, because of the inroads made on the supply of food fish, particularly salmon, has been the subject of more or less newspaper criticism. It arose chiefly from the groundless fear that one of

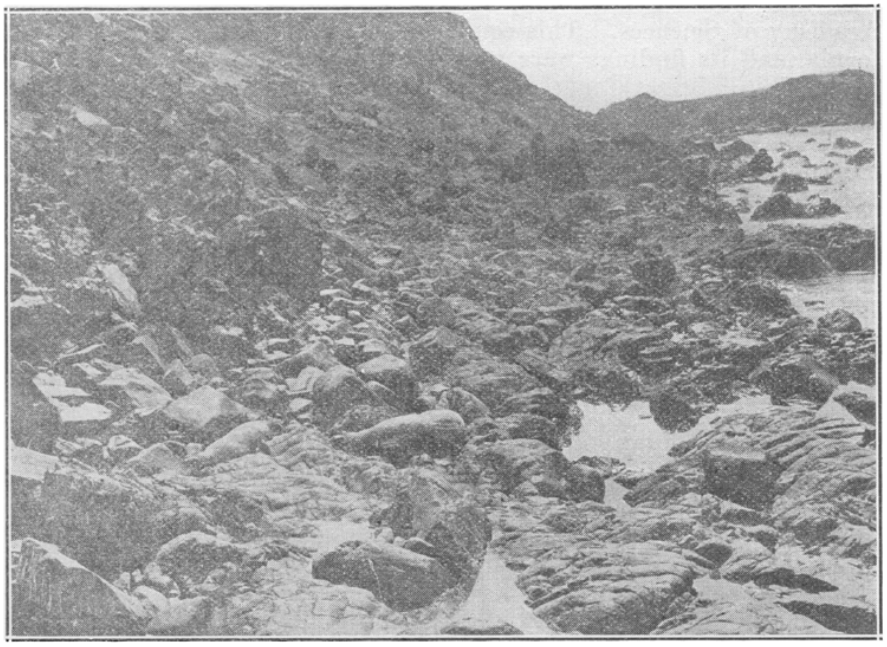


FIG. 9. Dead cows and pups. There are more animals here than appear at a casual glance. They blend so well with the rocks that they are made out with difficulty. Flea Island, San Miguel, June 16, 1927.

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the picturesque features of San Francisco, the Seal Rocks, would be destroyed.* When our methods, scene of operation, and reasons therefor were made known, the criticism quickly subsided. Though no seals have been killed for more than two years, it is a fact that not since that time have they been seen in any numbers in the bays and rivers, and complaints about damage to nets and taking of fish have been very infrequent."

Between 1902 and 1909 little was heard of the sea lions. Captain H. B. Nidever of San Pedro has supplied me with the information that in 1907 and 1908 several men systematically hunted sea lion bulls at San Miguel Island and killed practically all the bulls of breeding age.

In 1909 the sea lions had been so reduced that several natural history societies and interested parties sponsored a bill for their protection, "forbidding the killing, maiming or capturing of sea lions in the waters of Santa Barbara channel and on land adjacent thereto, or in fish and game district nineteen." This was primarily to prevent the extermination of the California sea lion.

* The late John Rowley of the Los Angeles Museum had in his possession a picture taken in 1889 which shows a flourishing rookery of Steller sea lions on the Seal Rocks at San Francisco. This place is and has for a long time been only a hauling ground.

Since 1909 there has been no organized killing, though a small but steady drain has been acting on the herds. Several individuals add to their incomes by killing the breeding bulls for the penis and testicles, known to the trade as "trimmings." These are sold to the Chinese, who manufacture a medical preparation supposed to rejuvenate the aged. A number of California sea lions are taken annually to be used for exhibition purposes in zoological gardens and circuses. This species is used almost exclusively, as the Steller is too large and difficult to handle.

In 1927 the fishing interests of San Pedro and Santa Barbara sponsored a bill (Senate Bill No. 547, introduced by Senator Charles W. Lyon of Los Angeles) which would have repealed section 637*c* of the Penal Code, the law of 1909. If this had passed, it would have taken all protection from the sea lions in California. This was subsequently withdrawn. Another bill (Assembly Bill No. 820, introduced by Assemblyman Morgan Keaton of Long Beach) would have given the Fish and Game Commission power to control the seals and sea lions "where it determined such reduction was necessary." This also was withdrawn. A third bill relating to sea lions (Assembly Bill No. 199,

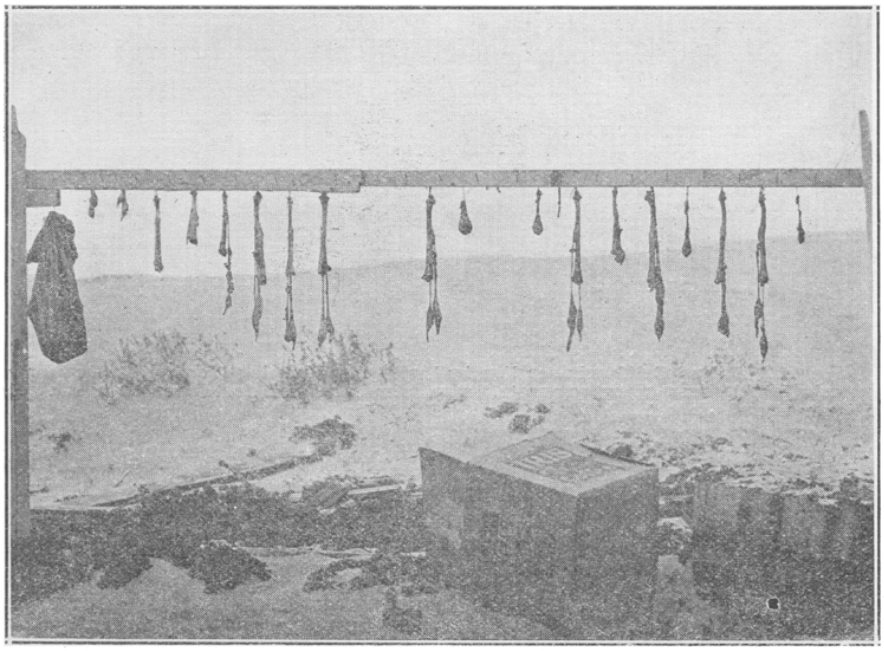

FIG. 10. Sea lion trimmings (penis and testes) hung out to dry. These are sold to the Chinese, who manufacture from them a preparation for the rejuvenation of the aged. San Miguel Island, June 16, 1927.

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introduced by Assemblyman T. R. Finley of Santa Barbara), which passed both houses and was signed by the Governor May 17, 1927, affords protection to the California sea lion only in fish and game districts 19, 20, and 20A. This is approximately the same territory covered by the old law, but is more definite as to boundaries and includes Catalina Island, which was not in the previous law. This law became effective July 29, 1927.

2.4. History of Seals in California

The harbor seal has never been abundant enough in California to warrant any legislation. In former times it was apparently a little more numerous than at present. Mr. Walter Welch, field agent for the Division of Fish and Game, tells me that in 1890 he engaged in the hunting of these animals for their hides. At that time they had extensive "rookeries" at the southern end of San Francisco Bay, near Alviso.

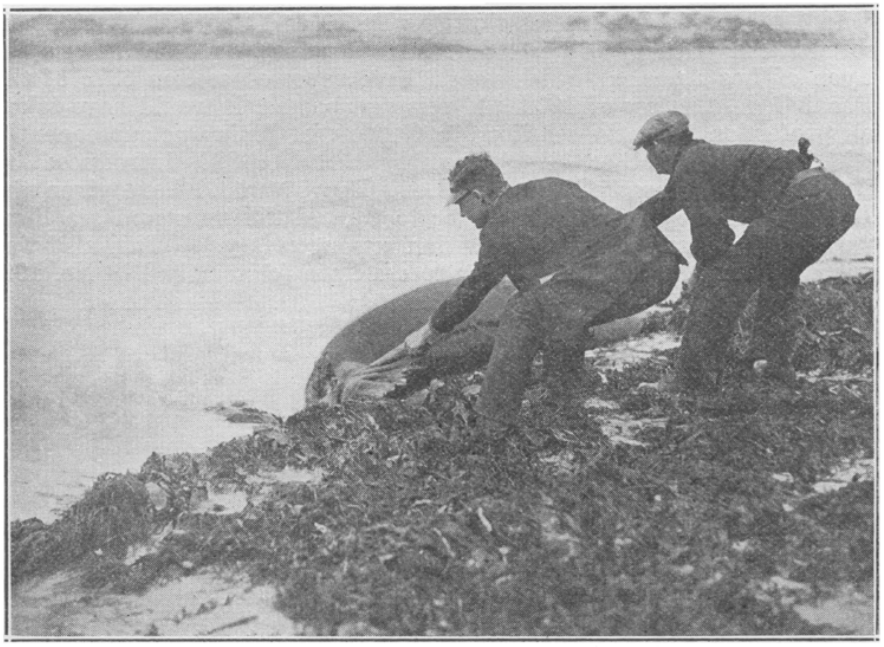

FIG. 11. A dead California sea lion bull with the trimmings removed. Six hundred pounds of fertilizer going to waste. The trimmings sell for about $3 a set. San Miguel Island, June 16, 1927.

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2.5. Natural Enemies of Seals and Sea Lions

The seals and sea lions have a number of natural checks on their increase acting at all times. The rate of mortality among the pups is very high. Numbers of them are drowned each year; they are crippled or killed outright by being trodden on by the adult members of the herds; some starve, as when they become lost the cows do not make any prolonged search for them, and another cow will have nothing to do with them. The greatest enemy of the adults are the killer whales (Orca). Several men have described to me the panic which runs through a sea lion herd on the appearance of these savage animals. An Orca which was killed at the Pribiloff Islands some years ago contained thirty-two adult fur seals. Their capacity and ability to capture such fast-swimming animals as eared seals can be gauged from this. Large sharks no doubt get a few sea lions. In 1925, while I was at Monterey, California, a cow fur seal (Callorhinus) was brought to me for identification. It had been found on the beach north of Monterey, in a dying condition. It was still warm when I saw it. It

had been bitten through the body just anterior to the hind flippers and the backbone was broken. The bite was undoubtedly that of a shark.

Sea lions seem to be fairly free from disease. During the survey a number of animals were observed which were blind. A young California bull was the first observed at Point Bennett, San Miguel Island, on June 10, 1927. At Frazer Point, on June 14, 1927, there was a full-grown bull, and at Gull Island on the same date was found another, both totally blind. These animals were all in good condition, the conclusion being that the affliction was of recent origin. It was possible to observe these animals at close range. The disease seems to be an infection of the conjunctiva, leaving the eye covered with a bluish white film.*

Whether the eye itself is affected or whether the animal recovers before falling prey to some of its enemies I do not know. Animals with a handicap of this sort do not long survive in the natural environment. Whether this represents an epidemic or a usual condition will be an interesting future study.

In 1928 I saw two Steller cows which were blind. One of these was on Saint George Reef and the other at Point Bennett, San Miguel Island. Both appeared to have the same disease, which differed from

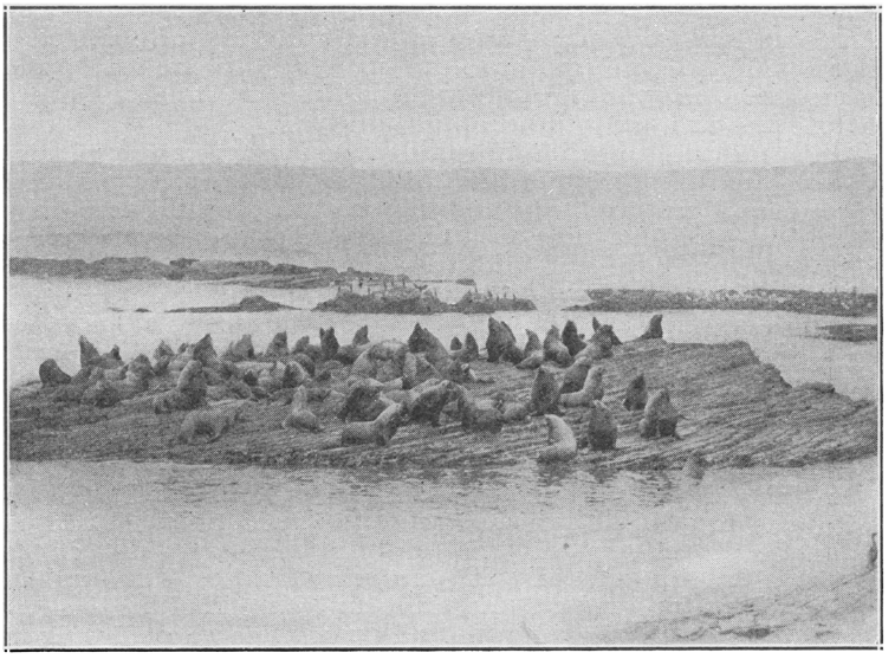


FIG. 12. Part of the Año Nuevo Steller Rookery Bulls, halfbulls and cows which are not breeding. Año Nuevo, July 2, 1928.

FIG. 12. Part of the Año Nuevo Steller Rookery Bulls, halfbulls and cows which are not breeding. Año Nuevo, July 2, 1928

that observed last year in the Californias. In this case the eyes were tightly closed and continually exuded water.

Professor G. F. Ferris of Stanford University tells me there are two species of sucking lice (Anoplura) found on both species of sea lions. These are Antarctophthirus microchir (Troues and Neum) and Echinophthirius fluctus. The harbor seal is the host of a third species, Achinophthirus horridus (Olfers).

There is a short note in the *Journal of Mammology* (Vol. 5, No. 2, May, 1924) by R. C. Murphy, which tells of finding Phocid whiskers in a lump of ambergris taken from a sperm whale in the West Indies. This would seem to indicate that the sperm whale may be added to the enemies of the pinnipedes.

2.6. Activities of Sea Lion Hunters

While the survey was in progress, in 1927, an Oregon hunter cruised down the California coast. He killed sea lions at Saint George Reef, Cape Mendocino, Purisima, and Point San Luis, and then entered District 19 and killed a large number on Flea Island, at the west end of San Miguel Island. His methods are very destructive. He killed bulls, cows and pups, taking only the "trimmings" and scalps, and leaving the carcasses in all cases either lying on the rookery or floating in the sea.

A Santa Barbara man was arrested on the west end of San Miguel Island on June 16, 1927, with the "trimmings" of twelve sea lions in his possession. He pleaded guilty in the justice court at Santa Barbara on June 21st, and paid a fine of $100.

At Cape Mendocino, in 1927, I talked with a Portuguese who, with his three sons, goes there every year for a vacation. He explained to me that they generally managed to pay for the expense of their vacation by killing bull sea lions for the trimmings. He has been doing this for a number of years. He had the trimmings of sixteen bulls already; these were hung on a rack, drying.

On San Miguel Island on June 6, 1928, I found the trimmings of ten bull sea lions hanging on a rack on a point opposite Lion Rock. There was nothing to indicate who owned them.

The Cape Mendocino rookery was visited again in 1928 by the same hunters who were there last year. They obtained the trimmings of sixty-two bulls.

2.7. Sea Lions Taken for Scientific Purposes

On June 20, 1928, I accompanied Harry H. Sheldon of Santa Barbara to San Miguel Island to collect sea lions for the Pasadena Institute of Technology. Due to rough weather only a part of the desired animals were obtained. A Steller bull and a California bull were shot, but the tide carried away the California before we could work on him. We found him two days later, washed up on the rocks and took the skull. The Steller bull was skinned and the skeleton taken. A large Steller cow was then killed. She was very old, blind and with old, worn teeth. She had hauled out evidently to die. Her stomach contained three greenish colored skate eggs. Her skin and skeleton were taken.

On June 26, 1928, I sailed for San Clemente Island with Albert C. Rogers of the Colorado Museum, Denver, Colo. Rogers wished to obtain a group of California sea lions for his museum. We had a very

successful trip. The animals obtained were: one adult bull, two adult cows, one yearling cow and three pups. In obtaining these animals we lost, after they had been shot, an adult bull, an adult cow and a young cow. In collecting for museum purposes the skull is necessary, and the animals are shot through the shoulder when possible. They do not live very long after receiving such a wound, but most of them are able to get to the water and are lost. The head shot is instantly fatal. I did all the shooting on this trip and tried to be as careful as possible, always waiting for one animal to die before shooting another. One cow which we obtained managed to get overboard after being shot, but she floated. We found the best method of obtaining pups, without injury to the skin and skull, was to put them in a sack and drop them overboard with a weight attached for ten minutes.

Statistics from other parts of the country showing seals and sea lions taken under a bounty system in the last few years.*

Scalps taken in the state of Oregon:

1921 1863	1925	seals 1375
1922 1595		sea lions 155
1923 1510	1926	seals 350
1924 1830		sea lions 187

The hunters used rifles and sometimes mines were laid on the rookeries, which did great damage to cows and pups.

Scalps taken in the state of Washington:

1922–23 741
1923–24 271
1924–25 1171
1925–26 1057

These sea lions were taken in Puget Sound, Gray's Harbor, and Willapa Bay. There were no organized raids on the rookeries.

Sea lions killed by organized raiding in Queen Charlotte Sound during May and June of each year:

1922 220	1925	sea lions 1658
1923 1885		pups 1169
1924 2706	1926	sea lions 1245
		pups 711

One of the main objections to a bounty system is shown in the above tables. As far as I know there is no record of the stomach contents of a single animal represented in the above numbers, or any other data pertaining to them. In California the larger rookeries of Steller sea lions are on lighthouse reservations and are closed to killing. Only one of these rookeries, Año Nuevo, is close to any commercial fishing. The only other place where large numbers of sea lions are found is the west end of San Miguel Island, a long way from any extensive commercial fishing, and the killing of sea lions in such a place would not benefit the fishing industry. The sea lion hunter would, of course, do most of his killing at places similar to San Miguel, where there are comparatively large numbers of the animals and he could make a quick and large killing. The methods used by professional hunters are very destructive and not productive of any useful knowledge of the animals, inasmuch as they are interested only in proving that the animal has been killed and take therefore only the scalp, leaving the

* Precarious status of the seal and sea lion on our northwest coast. Theo. H. Scheffer, *Journal of Mammology*, Vol. 9, No. 1.

rest to rot. They kill indiscriminately, bulls, cows and pups. Quite a few animals are shot in the water, and not more than 60 per cent of such animals are recovered, so that any figures giving the numbers killed in any part of the country can be supplemented by at least 10 per cent in order to arrive at the true figures.

2.8. Food and Damage to Fishing Gear

Seals and sea lions are carnivorous animals and it is, therefore, evident that they eat flesh of some sort. It has been shown that they are not particular as to the form this flesh takes. I have listened to a great deal of hearsay evidence tending to show that the seals and sea lions eat only commercially valuable fish and do a great deal of damage to gear of various kinds.

The only conclusive evidence I have been able to gather, however, all tends to the opposite conclusion. The only sure means of ascertaining what an animal has been feeding on is to look into its stomach. This has been done in several cases. The investigating commission of 1901 killed sea lions of both species from Point Arena to San Clemente Island. The contents of the stomachs of these animals covered a wide range of material and included very little that could be classed as commercially valuable fish. Professor L. L. Dyche in 1899 opened the stomachs of a number of sea lions secured by him along the coast south of Monterey Bay. He found only squids and octopi. During June, 1928, I opened the stomachs of several sea lions, but with rather negative results. The only thing I found was skate eggs in a Steller cow. Dr. Theo. H. Scheffer has published an article in the *Journal of Mammology*, dealing with the harbor seal in the state of Washington. The stomach contents of thirty-five seals is given, and only two of this number "contained food items in kind or quantity worth considering with respect to their direct bearing on the fishing industry."

I have taken the liberty to copy the articles referred to above, as they contain the sort of evidence needed.

On questions of this sort we must not jump at conclusions. The work of Professor Dyche, for instance, has been used in an effort to show that the California sea lion eats only squid.

In Monterey Bay and vicinity we would expect to find the sea lions eating squid, as the squid are plentiful there, but there are many places in the range of the sea lions where the squid are absent or in small numbers. There can be litttle doubt, it seems to me, that the seals and sea lions eat fish, and sometimes commercially valuable ones, but the available evidence all tends to show that the great bulk of the food is coarse fish not used commercially or organisms which are detrimental to commercial fish and fishing.

In regard to damage to gear the evidence again is very vague. I have listened to at least a hundred men on this subject; I have seen nets of various kinds with holes of different sizes in them and I have inspected fish with large pieces bitten out of them. In every case the damage was laid to the seals or sea lions, but the evidence was all circumstantial. I have talked with only one man who told me that he had actually seen a sea lion tear a large hole in a net, and that is the only direct evidence I have been able to get on the subject. In all other cases

the men did not actually see the seals or sea lions take their fish or break the net, but assumed that they had done so because they were known to be or were actually seen in the vicinity.

On this question, as on that of food, we can not be dogmatic. The seals and sea lions do cause a certain amount of damage to gear, but at present it does not seem to be very extensive, and a good deal of damage is caused by other organisms and credited to the sea lions and seals for want of a better explanation.

A good deal of information about the sea lions has been based on the behavior and life history of the fur seal, which is comparatively well known. One instance of this concerns the feeding habits of the bulls. The bull fur seal hauls out in June, and does not fish, or go into the water, till sometime in August. At the end of the breeding season they are very emaciated and run down, as would be expected. It has been assumed that the sea lion bulls follow the same course. of this I am extremely doubtful. Both the findings of Professor Dyche in 1899 and those of the investigating commission in 1900 show that the stomachs of the bulls contained food as well as those of the cows. Also in observing the animals during the past two years I have made note of the fact that the bulls do not appear to fall off in weight, but end the breeding season in as good condition as they began it. It is true that of the few animals which I examined the stomachs of, the bulls contained nothing, but this can also be said of the cows. However, I was only able to examine a comparatively few animals.

I examined the stomachs of a number of sea lions during June, 1928, with rather negative results. These animals were mostly taken for museum specimens.

Santa Barbara Island, June 8, 1928, 4 p.m.
California cow : stomach empty except for a little brownish material and a number of nematode parasites.
San Miguel Island (Point Bennett), June 21, 1928, 8 a.m.
Steller bull : stomach empty except for nematode parasites.
Steller cow : stomach empty except for three greenish colored eggs of a skate or shark. This animal was in a bad way, being blind and with very bad teeth. Evidently dying of old age.
San Clemente Island (Seal Harbor).
California bull, June 27, 1928. 9 a. m. Stomach empty. Few nematode parasites.
California cow, June 27, 1928, 2 p.m. Stomach empty. Nematodes.
California cow, June 27, 1928, 4 p.m. Stomach empty. Nematodes.
California cow, June 28, 1928, 7 p.m. Stomach empty. No nematodes. This was a young cow.
Three California pups were also taken here and examined, but they had only milk in the stomachs, as was to be expected.

On the Saint George Reef rookery on May 25, 1928, I examined the excreta of sea lions, as the rocks are high here and the sea does not wash them. The main ingredient seemed to be a tiny pelecepod shell. There were countless thousands of these little shells, some of them still embedded in the feces of the animals.

Following is a tabulated statement of the stomach contents of 42 sea lions, 18 of the species Eumetopias stelleri and 24 of the species

Zalophus californianus. An examination of this table shows, among other things, the following points: *Report of the Sea Lion Investigation, 1901.*[*]

(1) of the 26 sea lions whose stomachs contained food, fish remains were found in 18 and squid or octopus in 15.

(2) All of the 13 Steller sea lions whose stomachs contained food had eaten fish and 5 had eaten squid or octopus. The number of squid eaten was small, 6 being the maximum number in 1 sea lion, while the quantity of fish was large, at least 35 pounds being taken from one stomach.

(3) of the 13 California sea lions whose stomachs contained food, 5 had eaten fish and 11 had eaten squid. The quantity of fish was inconsiderable, 17 small fishes being the maximum, while the remains of 100 to 300 squid were found in each of 5 stomachs.

This study, as far as it goes, indicates that the Steller sea lion is largely a fish consumer and the California sea lion is chiefly a squid eater. It seems apparent, however, that either species feeds on whatever is most convenient.

TABLE OF STOMACH CONTENTS OF SEA LIONS

Specimen number	Rookery	Sex	Age	Date	Hour	Food present
	Eumetopias					
1	Point Arena	Male	Bachelor	July 31	noon	Yes
2	Point Arena	Male	Bachelor	July 31	2 p. m.	Yes
3	Point Arena	Male	Bachelor	August 1	10 a. m.	Yes
4	Point Arena	Male	Bachelor	August 1	10 a. m.	Yes
5	Ano Nuevo	Male	Bachelor	July 15	7 a. m.	Yes
6	Ano Nuevo	Male	Adult	July 14	5 a. m.	No
7	Ano Nuevo	Female	Adult	July 14	5 a. m.	Yes
8	Ano Nuevo	Female	Adult	July 14	5 a. m.	Yes
9	Ano Nuevo	Female	Adult	July 14	5 a. m.	No
10	Ano Nuevo	Female	Adult	July 15	7 a. m.	Yes
11	Ano Nuevo	Female	Adult	July 15	7 a. m.	Yes
12	Ano Nuevo	Female	Adult	August 29	9 a. m.	Yes
13	Ano Nuevo	Female	Adult	August 29	3 p. m.	No
14	Ano Nuevo	Female	Adult	August 30	8 a. m.	Yes
15	Ano Nuevo	Female	Adult	August 30	----------	Yes
16	Ano Nuevo	Female	Adult	August 30	3 p. m.	Yes
17	Ano Nuevo	Female	Adult	August 30	3 p. m.	No
18	Ano Nuevo	Female	Adult	August 30	6 p. m.	No
	Zalophus					
19	China Harbor	Male	Bachelor	July 23	7 a. m.	Yes
20	Santa Cruz Islands	Male	Bachelor	July 24	8 a. m.	Yes
21	Santa Cruz Islands	Male	Bachelor	July 24	8 a. m.	Yes
22	Santa Cruz Islands	Male	Bachelor	July 24	9 a. m.	Yes
23	Santa Cruz Islands	Male	Bachelor	July 31	8 a. m.	No
24	Santa Cruz Islands	Male	One year	August 1	5 a. m.	Yes
25	Santa Cruz Islands	Male	Adult	July 23	8 a. m.	No
26	Santa Cruz Islands	Male	Adult	July 29	10 a. m.	No
27	Santa Cruz Islands	Male	Adult	July 29	10 a. m.	No
28	Gull Island	Female	One year	July 28	6 a. m.	Yes
29	East End Cove	Female	Young	August 1	4 a. m.	Yes
30	China Harbor	Female	Adult	July 23	8 a. m.	No
31	China Harbor	Female	Adult	July 23	8 a. m.	Yes
32	China Harbor	Female	Adult	July 29	10 a. m.	Yes
33	China Harbor	Female	Adult	July 29	10 a. m.	No
34	China Harbor	Female	Adult	July 31	7 a. m.	Yes
35	China Harbor	Female	Adult	July 31	7 a. m.	No
36	China Harbor	Female	Adult	July 31	10 a. m.	No
37	China Harbor	Female	Adult	Jyly 31	11 a. m.	No
38	East End Cove	Female	Adult	August 1	5 a. m.	Yes
39	East End Cove	Female	Adult	August 1	5 a. m.	Yes
40	China Harbor	Female	Adult	August 1	5 a. m.	No
41	San Clemente Islands	Female	Adult	August 6	9 a. m.	Yes
42	San Clemente Islands	Female	Adult	August 6	1 p. m.	No

[*] From Report of the United States Commissioner of Fish and Fisheries for the Fiscal Year Ending June 30, 1902, pp. 111–119.

TABLE OF STOMACH CONTENTS OF SEA LIONS

[*] From Report of the United States Commissioner of Fish and Fisheries for the Fiscal Year Ending June 30, 1902, pp. 111–119.

KIND AND QUANTITY OF FOOD—(Table of stomach contents of sea lions—continued)

Specimen number	Rock-fish	Clupeoid fish	Carangoid fish	Hake	Large fish, 12 to 18 in. long	Small fish	Skate	Shark	Hog fish	Chimera	Fish bones: Number of quarts	Fish bones: Representing at least fish	Small squid	Giant squid	Octopus	Shrimp	Crab	Gasteropod shell	Milk	Stones ½ to 1 in. in diameter	Stones 1 to 3 ins. in diameter
1							2				4	52	1	1			1				
2											2	25									
[3]3					16	1		6				23									8
4											3	40	1								4
5					1							7	2								
6																					
7							4		1			7				[2]					
8	14							2				16									
9																					
10											2	15									
11	[3]										1	6									
12		30	1									31	6								1
13																					
14											½	5			1						
15											2	15									
[4]16											½	15									
17																					
18																					
19				2		17						19	4								14
20													200								
21													200								
22	3									1		3									
23																					
24																			[3]	31	
25																					
26																					
27																					
[5]28						7						7	8					1		15	
29													[3]								
[6]30																					
31													[3]								
32						[3]					1	5	[3]								
33																					
34													300								
35																					
36																					
37																					4
38													300								
39													100							4	
40																					3
41						[3]					1	5	[3]								
42																					
Totals	17	30	1	2	17	25	6	8	1	1	18	286	1122	1	1	[2]	1	1		50	34

[1] Several "sea pens."
[2] Few.
[3] Indicates that the form mentioned was present but number could not be determined.
[4] Unrecognizable material.
[5] Shell apparently empty when swallowed.
[6] Filled with a clear liquid in which floated a light, yellow, flaky substance.

TABLE OF STOMACH CONTENTS OF SEA LIONS

Very little positive information was obtained regarding the damage done to the fishing industry at southern points. On one trip made with the fishermen a net was found torn in one place, but there was no proof that the injury was done by sea lions. The testimony of the fishermen was so contradictory that it is of no value. One fisherman claims that in securing $3 worth of fish his net was damaged $75, while another claims that there is very little damage done by sea lions. One man holds that the sea lions are becoming more numerous and destructive every year, while another claims that they are rapidly becoming exterminated.

Notes made during June, July, August and September, 1899, at Monterey Bay and along the coast for twenty-five miles south of Point Pinos.

Notes on the Food Habits of the California Sea Lion *(Zalophus californianus).*[*]

(1) June 25. An old cow dead on the beach at Point Pinos. Stomach full of small squid, beaks, arms and pens.
(2) June 27. Cow (bullet hole in head) half a mile south of Point Pinos. Stomach full of squid.
(3) June 27. Short distance from No. 2. Two or three year old male. Dead for some time and hair slipping. Stomach full of the chewed-up arms of an octopus.
(4) June 30. Old bull about two miles south of Point Pinos. Trimmings and whiskers removed. Shot through the head. Stomach full of flesh of "giant squid." Pieces of flesh taken from the stomach as large as a person's hand.
(5) July 7. Cow at Point Pinos. Stomach contained a few parts of squid beaks and a bunch half as large as one's fist of the pens.
(6) July 9. Cow dead on beach near "Seal Rocks," about three miles south of Point Pinos. Stomach well filled with chewed parts of giant squid.
(7 and 8) July 16. Two cows a mile south of Point Pinos. Both feeding on giant squid. Stomach, (1) contained two quarts, and (2) a gallon of chewed flesh and arms of giant squid.

Between July 20 and August 16 twelve sea lions were killed (year-lings, two year olds and old cows). Seven contained giant squid. One was full of octopus, four were empty, except for a few remains of pens and beaks of squid.

During this time three cows came ashore dead. Stomachs all contained squid.

An old bull, killed some time before and cut for trimmings, was found on the beach. The stomach contained giant squid meat.

An old cow came ashore about three miles south of Point Pinos, shot through the head. The stomach contained remains of an octopus.

Dr. Dyche concludes from the data he collected that the sea lions prefer squid when both squid and fish are present, but if only fish are present they will eat fish.

No.	*Place and time taken*	*Results of stomach examinations*
1	Nisqually Flats Oct. 20, 10 a.m.	Stomach well filled. More or less intact remains of thirty-five herrings and two tomcod or similar fish of about ½ to ¾ lb. size; flakes of a few additional herrings and tomcod; a number of nematode parasites.
2	Nisqually Flats, Oct. 20, 11 a.m.	Contents between two and three pints. Flakes and bones of twelve small fish of the herring type, three apparently tomcod, and two resembling sculpin; a few shrimp; a few nematodes.
3	Nisqually Flats, Oct. 21, 4 p. m.	Contained somewhat less than a pint. Remains of eighteen shiners more or less intact (3 or 4 inches long) and mass remains of perhaps three or four more; remains of copepods that were probably parasitic on the fish; a few mematode parasites.
4	Point Polnell, Oct. 12	Stomach small, apparently that of a young seal. Contained somewhat less than a pint, consisting entirely of small shrimp to the number of 135; no nematodes.
5	Point Polnell, Oct. 12	Stomach small, apparently that of a young seal. Contained only remains of five small shrimp and one very small fish.
6	Nisqually Flats, Nov. 3, 11 a.m.	Stomach small; empty except for a few nematode parasites.

[*] L. L. Dyche. Transactions Kansas Academy of Science 1903. Vol. 18, p. 179.

7	Nisqually Flats, Nov 30, noon	Stomach of medium size; empty except for a considerable number of nematode parasites.
8	Nisqually Flats, Nov. 30, 1 p.m.	Stomach large; empty except for a considerable number of nematode parasites.
9	Nisqually Flats, Dec. 27, 2 p.m.	Stomach had apparently been empty, but when the animal was shot the cavity filled with about a quart of blood, which had hardened into one mass containing, embedded, numbers of parasitic nematodes.
10	Nisqually Flats, Jan. 6, noon	Stomach well filled. Contents about four quarts of fish flakes and bones pretty well broken up in the process of digestion; remains of a dozen fish of the tomcod type identifiable, and flakes or bones of perhaps as many more present; two squids about five inches long; some bone and flakes indicative of small herring.
11	Nisqually Flats, Jan. 18, 1 p.m.	Stomach well filled. Remains (flakes and bones) of at least ten small fish a few inches long and two somewhat larger, perhaps ten to twelve inches long. These were of both the herring and the tomcod types; a number of nematode parasites
12	Nisqually Flats, May 15, 9 a.m.	A medium-sized stomach, empty except for a small quantity of mud apparently swallowed after the animal had sunk to the bottom when shot. A few nematode parasites.
13	Nisqually Flats, May 15, 3 p.m.	A medium-sized stomach, empty except for a few round worm parasites.
14	Nisqually Flats, May 15, 4 p.m.	Stomach contents about three pints. Flakes and bones of at least three fish of the sculpin and tomcod types and accumulated otoliths of four or five others; a very few round worms.
15	Nisqually Flats, May 18, 4 p.m.	A large stomach, with food pretty well digested, about a pint of finely comminuted material remaining. Identified: the remains of at least two small flounders; calcareous plates and parts of the digestive tract of an ophinoid starfish; several small crustaceans, probably parasites; beak of a squid; a dozen or more eye lenses of small fish; nematode parasites.
16	Nisqually Flats, Sept. 10, 9 a.m.	Stomach large; empty except for a few parasitic round worms.
17	Rosario Straits, Oct. 23, 1 p.m.	A large stomach containing about two quarts of fish flakes and bones. All remains of the sculpin and tomcod types, probably the former. There were three distinct homoceral tails; considerable number of round worm parasites.
18	Rosario Straits, Oct. 23, 7 a.m.	A very large stomach, about one-half filled. This seal had made a meal of a single octopus with arms at least fifteen inches long; some of them practically intact. The cup-like sucker discs (less digestible) were mingled with the comminuted remains of the more digestible body, and the beak was intact. A great many nematode parasites.
19	Bellingham Bay, Oct. 30, 5 p.m.	A large, much distended stomach containing the remains of a single silver salmon weighing about ten lbs. (stomach contents still weighed 9.07 lbs.). Tail, pelvic girdle, fins and large pieces of skin and flesh still intact.
20	Bellingham Bay Oct. 30, 5 p.m.	Contents of stomach about three pints. Flakes and parts of the spinal column of three small fish of the salmonoid type less than a foot in length; numerous bristle antennae of the shrimp; a great number of parasitic nematodes.
21	Nisqually Flats, Aug. 8, noon	Young seal. Stomach thin-walled; empty except for a small quantity of curdled milk.
22	Nisqually Flats, Aug. 15, noon	Young seal. Stomach quite small, thin-walled; empty except for a small quantity of curdled milk.
23	Nisqually Flats, Aug. 15, noon	Young seal. Stomach contained a little curdled milk.
24	Nisqually Flats, Aug. 21, 7 p.m.	Young seal. Stomach light colored, thin-walled; contained a few tablespoonfuls of curdled milk.
25	Nisqually Flats, Aug. 21, 7 p.m.	Young seal. Stomach light colored, thin-walled; contained a small quantity of curdled milk.
26	Nisqually Flats, Aug. 22, 5 p.m.	Young seal. Stomach light colored, thin-walled; empty except for clotted blood incidental to internal hemorrhage.
27	Nisqually Flats, Aug. 22, 5 p.m.	Young seal. Stomach contained a considerable quantity of curdled milk.
28	Nisqually Flats, Aug. 22, 6 p.m.	Young seal. Stomach contained a little curdled milk.
29	Nisqually Flats, Aug. 22, 6 p.m.	Young seal. Stomach contained a little curdled milk mixed with a small quantity of sea bottom silt.
30	Nisqually Flats, Aug. 22, 6 p.m.	Young seal. Stomach contained a little curdled milk.
31	Nisqually Flats, Aug. 22, 9 p.m.	Young seal. Stomach contained a little curdled milk.
32	Nisqually Flats, August	A small stomach, but thick-walled; empty.

3	Nisqually Flats, August	Young seal. Stomach contained a little curdled milk.
3	Nisqually Flats, August	Young seal. Stomach contained a little curdled milk.
3	Nisqually Flats, August	A very large stomach, but content only about a quart—mostly strips and irregular shaped pieces of cartilage, apparently from the head of a skate; large number of round worms; quantity of mud, probably swallowed at the time animal was shot; claws of two small crabs.

2.8.1. Summary

of the thirty-five stomachs examined, fourteen contained food as recorded; thirteen were of young seals still receiving nourishment from the parent; eight were empty at the time the animal was killed. Only two of the stomachs contained food items in kind or quantity worth considering with respect to their direct bearing on the fishing industry. These were numbers 19 and 20, both of which held salmon.

The food items represented herring, tomcod, shiners, sculpins, shrimp, crabs, squid, octopus, skate, starfish, salmon and flounder.

2.9. Future Care and Reductions of the Seals and Sea Lions in California

A census should be taken every year to determine the increase or decrease of the herds and to gather some facts relating to migrations.

A few rookeries are close to lighthouses or on lighthouse reservations, and these could be checked by the cooperation of the lighthouse service. Most of the rookeries and hauling grounds, however, are so widely separated and are situated, in some cases, in such inaccessible locations that they could be checked only by a detailed investigator who could devote six weeks or two months to the work during the breeding season, and such other time as could be spared.

2.9.1. Suggested Method for Taking a Census of Sea Lions

The methods used in taking a census of the fur seals will not do when dealing with sea lions. Sea lions are not creatures of such blind instincts as fur seals and their habits and activities are governed to a greater extent by their immediate environment.

As the sea lion rookeries in California are small, only three exceeding four hundred animals, direct methods seem to get the best results. The adult animals can be actually counted with some degree of accuracy. To supplement this, pictures should be taken which, when enlarged, will give a very close count of the animals. The pup count can also be taken, but for purposes of a census does not give very much useful data. The pupping of the cows extends over a period of several months, and by the time the last pups are born the first ones are already swimming and difficult to record. The sea lions breed on small, offshore rocks and the rate of mortality among the pups is very high, so that a month or six weeks after the beginning of the pupping season only a small percentage of the first born pups are represented on the rookery.

The fur seal census computes most of its data from the pup count, taking as its first supposition that every pup represents an adult cow. This again would not work out with sea lions. There seem to be a certain percentage of adult cows on every rookery of the sea lions, in most cases hauled out with the surplus bulls, who are sterile; or at least not breeding. I have handled several of these in collecting

museum specimens, etc., and they were without pups. I examined them carefully, thinking that perhaps they had lost their pups, but in all cases the mammary glands were nonfunctional, and they contained no foetus.

Unlike the fur seals, who are accustomed to man, the sea lions are very timid and go overboard if closely approached. The method used for taking the census in this report was to approach the rookery under cover if possible, or if this could not be done, to approach the animals very slowly. When within a reasonable distance a count or estimate was made and a picture or pictures taken. A closer position was then gained and the same procedure repeated. It was found that when counts were made the photographs bore them out, but when estimates were made the photographs proved them to be high in nearly all cases.

As the sea lions are on or close to the rookeries during the breeding season, a method of survey such as is outlined above will give a very close census of the adult population. At the present time there is no increase among the sea lions in California. Not more than 50 per cent of the pups reach the age of one year, and the death rate among the adults, due to natural checks, will offset this.

The population of seals and sea lions has evidently decreased a great deal since the early days when the animals were hunted commercially. The annual increase, under natural conditions, will about offset the natural death rate. When man is included as a check, the death rate rises and the birth rate automatically drops.

The harbor seal (Phoca), having such a large range, occurring in such small numbers and being exceedingly shy, will continue to be a part of the natural fauna. In view of the fact that they are not numerous enough to cause damage to fishing, they should not be killed at the present time.

The Steller sea lion (Eumetopias) is about holding its own all along the coast. It occurs nowhere in numbers that are detrimental to the fishing industries except at Año Nuevo. As this herd is large and close to several important fishing centers, it should, by careful killing, be reduced to one thousand animals and allowed to remain at that number.

The California sea lion (Zalophus) has a restricted range in California; its rookeries are readily accessible, but it is becoming very scarce. It occurs nowhere in such numbers as would be detrimental to the fishing industries except at San Clemente Island. An extensive fishery is located in the waters surrounding this island. The rookery at Seal Harbor is the largest California sea lion rookery in California. In view of these facts, I should advocate the killing of the surplus bulls (about half the total number of bulls) at Seal Harbor. This would remove a great many animals without injury to the herd.

By careful killing the herds could be maintained on a stable basis, without danger of extermination, nor in such numbers as would jeopardize the fishing industries. This killing should be directed or done by trained men. The methods used in other parts of the country to kill sea lions in order to protect the fishing industries would spell extermination for the California sea lion in a few season. The Steller sea lion, with a much greater range and larger existing numbers, would last longer, but would eventually go the same road. These animals are

too little known as yet to warrant their wholesale destruction, as is advocated by the fishing industries and professional hunters. There is no doubt that they do some damage to the fishing industries, but they may be, at the same time, a check on some other organisms of which we know nothing, which, if allowed to develop unchecked through the extermination of the sea lions, might be far more destructive to fishing than the sea lions are at present, and a great deal more difficult to deal with. The fishing industries are not, at the present time, suffering from the inroads of the seals and sea lions to such an extent that any reduction in their numbers is necessary beyond that which I have recommended.

In order to reduce the sea lions, when such reduction is deemed necessary, the least wasteful and most humane method is to kill a certain

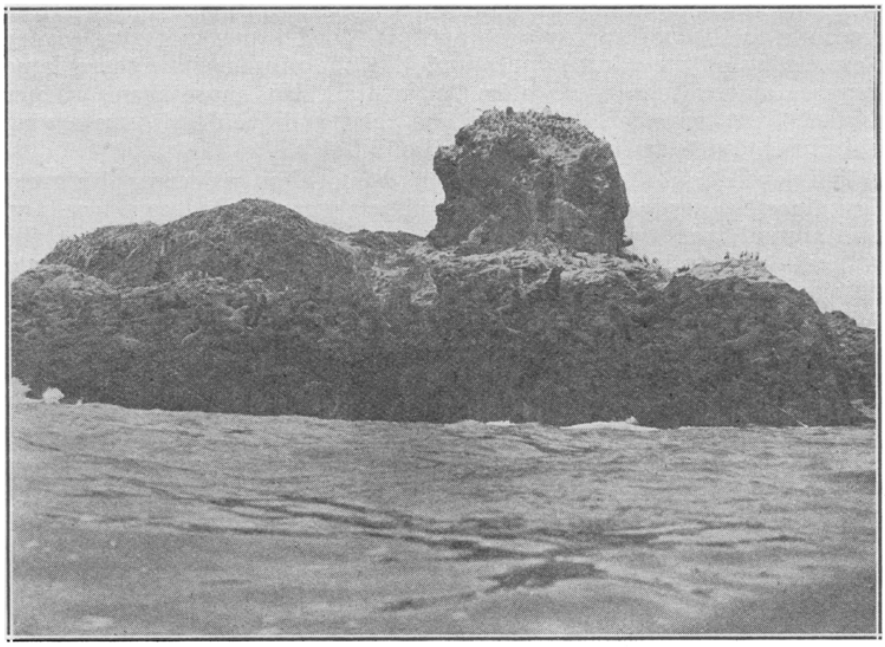


FIG. 13. The south end of the main rookery. Mostly California sea lions. A few Stellers at the left. Point Piedras Blancas, June 5, 1927.

FIG. 13. The south end of the main rookery. Mostly California sea lions. A few Stellers at the left. Point Piedras Blancas, June 5, 1927

percentage of the pups. The pups are practically helpless for the first month of their lives and can be handled without trouble. The male pups only should be killed, leaving always a certain number of good male specimens to carry on the necessary breeding. In this way the reduction can be easily and accurately handled, and will leave the herds in a healthy condition without allowing them to increase to too great an extent.

The seals and sea lions were once taken for their hides and oil. At the present time these products have such a small comparative value that it is not profitable to kill them. There may come a time, however, when these products will again have value, and it is therefore advisable to retain these animals as a source of potential wealth, aside from their place in the biological balance.

2.10. Census of Seals and Sea Lions in California, 1927 and 1928

The following data relating to location and population of seals and sea lions are compiled from reports and personal observations. I have enumerated the places where seals and sea lions are found on the coast from north to south. Some of these can hardly be considered rookeries and I have so stated in dealing with them. In nearly all cases counts were made and checked from photographs. When it was impossible to count, an estimate was made and checked from a photograph. The grand total in 1927 is a little high, I think, as, after the survey was made, a great many sea lions were killed by hunters.

The information obtained from fishermen regarding location is accurate, but that which deals with numbers is valueless. The fisherman speaks of thousands when there are perhaps one hundred and fifty. He is perfectly honest in this, but a poor observer.

In all cases when speaking of bulls, adult bulls are meant. In speaking of cows, cows and young animals of both sexes are meant, as it is impossible to determine the sex of the young animals unless they are actually handled.

It has been suggested to me that as most of the rookeries and hauling grounds could only be checked once during the season, that the figure obtained might not be a true indicator of the particular place. I realize this, but had to make the most of the time at my disposal. Also a knowledge of the habits of these animals will tend to help in this matter. The seals and sea lions, for instance, do most, if not all, of their fishing at night or early morning. A count of a rookery, from 10 o'clock in the morning till 3 or 4 o'clock in the afternoon will come as close to the actual number as it is possible to get. I have taken all these things into consideration in the collecting of these data.

A comparison of the figures obtained in 1927 and 1928 show some surprising results. From Point Piedras Blancas south the Steller sea lion shows a decrease in 1928 over the previous year. The California sea lion in the same territory shows a decided increase, but with a movement to the south.

The sea lions all along the coast were harried considerably in 1927 by hunters, which may have had something to do with this condition. Again, the sea lions do not seem to be such slaves to habit as are the fur seals, and the shifting about from year to year may be a regular mode of procedure with them.

The condition of several rookeries offers much room for speculation. At Piedras Blancas in 1927 was a large mixed rookery. In 1928 this was deserted by both species. Flea Island, near the west end of San Miguel Island, was predominantly Steller in 1927, while in 1928 the Californias were more numerous. Isthmus Rock, also near the west end of San Miguel Island, was untenanted in 1927 and in 1928 supported a fair sized rookery of both species. All these places seem to be in the same condition, the weather conditions are about the same, and the only explanation which seems to cover the situation at all is that of the mysterious "intangible barrier." In other words, there are natural inhibitions which effect the sea lions, but which do not present themselves to our senses in a recognizable form. The sea lions are intelligent animals and do not waste much time deserting a place which affects them unfavorably.

COMPARISON AND RATIO OF SEXES

	Eumetopias				Zalophus			
	1927		1928		1927		1928	
	Male	Female	Male	Female	Male	Female	Male	Female
St. Geroge Reef			179	432				
Turtle Rocks			60	140				
Point Arena			46	160				
Farallon Islands			125	415				
Point Carmel			40	160			20	50
Cape San Martin			10	40				
Piedras Blancas	13	199	20	85	21	65		
Lion Rock	6	80			1	20		
Pecho Rock	15	120	10	85	1	6	15	60
San Miguel Islands	80	515	142	450	39	110	69	360
Sandy Point	2	47	2	36				
Frazer Point					8	55	12	68
Gull Island					35	110	20	85
Anacapa Island					7	27	11	16
Santa Barbara					35	90	67	260
Seal Harbor					55	180	52	176
Totals	116	961	634	1,998	202	663	266	1,075
Ratios	12%		31%		30%		24%	

COMPARISON AND RATIO OF SEXES

These figures do not represent the total number of sea lions in California. They are taken from the large and typical rookeries merely to show the relative percentage between males and females. The percentages will, however, be approximately correct for the whole coast.

2.11. ROOKERIES AND HAULING GROUNDS OF SEALS AND SEA LIONS IN CALIFORNIA

ROOKERIES AND HAULING GROUNDS OF SEALS AND SEA LIONS IN CALIFORNIA

Rookery or hauling ground	Eumetopias		Zalophus		Phoca	
	1927	1928	1927	1928	1927	1928
St. George Reef	1,500	611				
Redding Rock	200					
Turtle Rocks	200	200				
Cape Mendocino	700	700				
Point Arena	300	206			30	30
Point Reyes						
Tomales Bay					40	40
Farallon Islands	700	540	6	(?)		
Seal Rocks						
The Sisters					40	40
Calaveras Point					75	100
Purisima	150	42				
Ano Nuevo	1,500	1,500				
Bird Rock					27	30
Point Carmel	(?)	200	(?)	70		
Point Sur					38	40
Lobos Rocks	(?)	110				
Cape San Martin	(?)	50				
Piedras Blancas	212	100	86	1		
Lion Rock	86		21	6		
Pecho Rock	135	95	7	75		
Point Sal			10			
Point Arguello				10		
Goleta Slough					40	40
Point Dume			11			
Seal Beach					30	30
San Miguel Islands	595	592	149	429	3	
Sandy Point	49	38				
Frazer Point	2		63	88		
Gull Island	18	10	150	105		
Anacapa			34	27		
Santa Barbara Islands			125	327		
Catalina Island			15	40		
Seal Harbor	1		235	228		
Castle Rock			29	23		
Totals	6,348	4,994	941	1,429	320	350

Table

As males and females are born in equal numbers there must be several good reasons why the adults are represented in the unequal numbers shown above. In some places, of course, the adult bulls are taken for trimmings, and this may be the reason why there is seldom a surplus of adult bulls on any one rookery. So few are these adult bulls that there is little or no fighting on any of the rookeries, as the half bulls can not hope to compete with a full grown herd bull, and there are only enough of these to go around.

Species Number Eumetopias stelleri

1927	1500
1928	611

2.11.1. Saint George Reef (Rookery)

Saint George Reef is a group of rocks and sunken ledges extending 6½ miles northwestward and westward from Point Saint George. There are nine visible rocks in the group. The lighthouse is situated on Northwest Seal Rock. Southwest Seal Rock lies about two miles to the southeast of Northwest Seal Rock. These two rocks are the largest in the vicinity.

In 1927 I did not personally visit this rookery, but was furnished with an estimate of the number of animals there by the lighthouse keeper, Mr. Georges Roux, who placed the number at 1500.

In 1928 I surveyed the ground personally, my visit being on May 25, 1928. The rookery proper is situated on Southwest Seal Rock. There were a number of sea lions also on several of the smaller rocks which compose the reef.

	Bulls	*Cows*	*Totals*
Star Rock	1	—	1
Hump Rock	6	8	14
East Rock	8	12	20
Whale Rock	4	12	16
Southwest Seal Rock	100	400	500
Northwest Seal Rock	60	—	60
Totals	179	432	611

On Southwest Seal Rock there were nine live pups and two dead ones. There was an old cow here who was blind. Her eyes were closed and showed traces of water running from them.

The 60 males at Northwest Rock were all young and half bulls, evidently staying close to the rookery, but not daring to land on it. They were lying in a raft in a cove on the south side of the rock.

Species Number Eumetopias stelleri

1927	200
1928	none

2.11.2. Redding Rock (Hauling Ground)

Redding Rock is 94 feet high. It lies offshore 4½ miles broad off Mussel Point. It rises from deep water and its sides are practically straight. On the north side is a small area of broken rock.

In 1927 I did not visit Redding Rock, but was supplied with information concerning it from several coasting captains who estimated the sea lions at 200.

On May 24, 1928, I visited the Rock. There were no sea lions there at all. The area on which sea lions could haul out is very small and utterly unsuitable for a rookery. I have no doubt that in the off

season sea lions haul out here, coming from the larger rookeries in the vicinity.

Species Number	Eumetopias stelleri
1927	200
1928	200

2.11.3. Turtle Rocks (Rookery)

Turtle Rocks, two in number, lie one mile off shore from Rocky Point. They are of small extent, one being 20 and the other 50 feet in height.

In 1927 I was given an estimate of 200 for this place by Capt. William Crone of Requa.

On May 25, 1928, I passed the Rocks and was able to make a close estimate. I placed the number at 200; 60 bulls and 140 cows. There were no pups.

Species Number	Eumetopias stelleri
1927	700
1928	700

2.11.4. Cape Mendocino (Rookery)

The Cape Mendocino Rookery is located on the seaward face of what is called on the charts Sugar Loaf Rock. This rock is 331 feet high, and 250 yards from the mainland. It is connected to the cape at low water by a narrow neck of rocks and shingle beach. A number of sea lions are also found on the small rocks which lie to the north of Sugar Loaf. The main rookery, however, is on the larger rock.

In 1927 I visited the rookery on July 7. It is almost impossible to gain the seaward side of the rock and I was forced to gather a good deal of my information from the lighthouse keeper.

In 1928 I visited the rookery on August 8. The breeding season was about over. The lighthouse keeper told me that there were about the same number of sea lions as last year.

The adult bulls are systematically killed here for the trimmings. In 1927 I saw only one adult bull. The hunters had obtained at the time I visited them sixteen sets of trimmings. In 1928 I saw 3 adult bulls. The hunters obtained in 1928 the very large number of 62 sets of trimmings.

Species Number	Eumetopias stelleri
1927	300
1928	206

Species Number	Phoca vitulina
1927	30
1928	30

2.11.5. Point Arena (Rookery)

The Point Arena Rookery lies about a mile south of Point Arena on three small rocks, which are about two hundred yards off shore.

In 1927 I visited this rookery on July 6, and made an estimate. Most of the sea lions were on the seaward side of the rocks and therefore not visible from the shore. The assistant keeper at the Point Arena Light told me that in 1920 several men practically wiped out this rookery, and that they "tried out" the oil, sold the hides and took the meat and offal to Petaluma for chicken feed.

In 1928 I was able to survey the rookery from the seaward side and make a close estimate. I placed the number at 40 adult bulls and 160

cows on the main rocks and 6 half bulls on a small rock a quarter of a mile to the south of the others.

The harbor seals haul out at the point close to the lighthouse. They seem to associate in bands whose numbers stay more or less constant.

2.11.6. Point Reyes (Fishing Ground)

I visited Point Reyes on April 21 and July 23, 1927, and on May 31, 1928. The only sea lions I have seen around Point Reyes was on July 23, 1927. At one time this point supported an extensive rookery. Due to the activity of the Fish and Game Commission in 1899–1900, however, it was exterminated. At present the sea lions seem to fish in the vicinity and a few will haul out for a short time occasionally. Only Steller sea lions are seen here.

Species Number	Phoca vitulina
1927	40
1928	40

2.11.7. Tomales Bay (Hauling Ground)

I have not seen these animals. My information is from Dr. G. R. Hubbel, of Petaluma, who has a summer cabin on Tomales Bay. He says this herd of seals have been residents in Tomales Bay for years.

Species Number	Eumetopias stelleri
1927	700
1928	540
Species Number	Zalophus californianus
1927	6
1928	? ?

2.11.8. Farallon Islands (Rookery)

The Farallon Rookery is located on a small rock known as Saddle Rock, which lies a short distance to the southeast of Maintop, the most western and the smallest of the main Farallon group. The lighthouse is situated on Maintop.

The Farallones, at one time, supported the largest rookery along the coast. Here also occurred in vast numbers the Guadalupe fur seal (Arctocephalus townsendi). I was somewhat disappointed in 1927, therefore, to find a comparatively small number of sea lions there. On the northwest side of the Maintop there were a few steller bulls, and hauled out with them were 6 Californias, 1 bull and 5 cows.

In 1928 I was not able to visit this rookery personally, but the condition of it was reported to me by the lightkeeper, who placed the number at 415 cows and 125 bulls. He makes no mention of Californias so I have not enumerated them for this year.

Species Number	Eumetopias stelleri
	Various

2.11.9. Seal Rocks (San Francisco) (Hauling Ground)

The Seal Rocks at the entrance to San Francisco Bay has been a hauling ground only, for a long time, although an occasional pup is born here. At the present time the number of animals hauling there is small and most of them leave during the breeding season. I have included the animals found here in my estimate of the Farallon Islands, from which place, I think most of them come.

Species Number	Phoca vitulina
1927	40
1928	40

2.11.10. The Sisters (San Francisco Bay) (Hauling Ground)

The Sisters are several small rocks lying off Point San Pedro, near McNear's Landing. The seals here have been reported to me on good authority. They have been there a number of years.

Species Number	Phoca vitulina
1927	75
1928	100

2.11.11. Calaveras Point (Hauling Ground)

Calaveras Point is in the eastern end of San Francisco Bay, about a mile from the town of Alviso. It is merely a point which extends out farther into the bay than the rest of the surrounding mud flats. Mowry Slough lies close to it and is also a place of resort for this group of seals. I have not myself seen these animals but have my information from the engineers who surveyed this marsh land and installed some machinery on Mowry Slough for the Arden Salt Company. They told me that the pups first appeared during the early part of April and that this year there were a large number of pups. This is no doubt the remnant of the "rookeries" which flourished here thirty years ago, from which skins were taken at that time.

Species Number	Eumetopias stelleri
1927	150
1928	42

2.11.12. Purissima (Hauling Ground)

Purissima, in San Mateo County, lies a few miles south of Half Moon Bay. The sea lions haul out on several flat rocks, about half a mile offshore. The shore line here is a series of perpendicular bluffs and the observer can look down into the hauling ground without trouble. The rocks are partly awash at all times, and during heavy weather the seas wash over them.

In 1927 (April 6, May 2, July 13), there were 140 or 150 animals here. One of the men at the ranch, which lies along the coast here, informed me that about the middle of May a boat had put in and killed a great many animals.

In 1928 (July 10), the number of animals was smaller. I counted 42; 10 bulls and 32 cows. There were no pups. The cows (?) were all large except one. Most of the animals I took for cows may have been young bulls.

From the report of the Commissioner of Fish and Fisheries (1902) I find the following data relating to Purissima:

Date 1901	*No.*	*Date 1902*	*No.*
July 15	225	Jan. 15	16
July 31	312	Jan. 31	42
Aug. 15	578	Feb. 15	0
Aug. 31	558	Feb. 28	68
Sept. 15	302	Mar. 15	7
Sept. 30	370	Mar. 31	29
Oct. 15	417	Apr. 15	66
Oct. 31	313	Apr. 30	36
Nov. 15	311	May 15	122
Nov. 30	59	May 31	64
Dec. 15	48	June 15	78
Dec. 31	90	June 30	143

Species Number	Eumetopias stelleri
1927	1500
1928	1500

2.11.13. Año Nuevo (Rookery)

Año Nuevo Island lies offshore about half a mile. It is thirteen miles south of Pescadero and five miles south of Pigeon Point. There is a small lighthouse on the island which constitutes a federal reservation. Being easy of access and supporting the largest sea lion rookery on the California coast, Año Nuevo has been the basis of practically all work done on sea lions in the last twenty years. Dr. Barten W. Evermann, writing in the *Journal of Mammalogy* in 1921 (Vol. 2, No. 1), gives a very interesting account of the sea lions found there. He places the number of animals at close to two thousand, and quotes the lighthouse keeper as saying that the bulls outnumbered the cows two to one.

In 1927 I visited the rookery twice, on March 9 and on July 14. The number of animals did not exceed 1500. I counted 127 surplus bulls herded by themselves on small rocks, a short distance from the main rookeries. These, with the herd bulls, would give a total of about 150 bulls. The number of pups was proportionately large, though there were a good many dead on the rookeries and floating along shore.

In 1928 I visited the rookery on July 2. I estimated the total number of animals as approximately the same as last year. The number of pups does not seem to be so large this year and a greater number of dead.

On July 25, 1928, I visited the rookery again in company with Professor Gordon F. Ferris of Stanford University. The rookery on this date was only about half the size it was on my former visit. Only a few of the larger herd bulls were represented. The lightkeeper told us that the animals were leaving steadily.

The surviving pups were well grown and all could swim. The number of dead pups in the sea and on the beaches represent at least 50 per cent of the year's increase. This, when there have been no storms and conditions have been ideal. There have been reports of a good many adult animals coming ashore at Pescadero, shot through the head. Some of these may be cows, and therefore their pups would starve. There were several pups, recently dead, or dying, which had been bleeding from the mouth. This may have been some disease or they may have had some internal injury from being trodden on by the old ones, or from being buffeted by seas, while learning to swim.

We caught a sick pup (the healthy ones are too large and heavy to handle with bare hands), and Professor Ferris collected a number of lice from it. It was fairly alive with them, and almost every other hair had the eggs attached to them. A sick animal, having less resistance than a well one, seems to have a greater number of parasites.

Species Number	Phoca vitulina
1927	27
1928	30

2.11.14. Bird Rock (Seventeen Mile Drive) (Hauling Ground)

The territory ranged over by this group of seals seems to be between Cypress Point and Point Pinos on the Monterey Peninsula. They can be seen from the Seventeen Mile Drive hauled out on one of the large bird rocks, or one or two will be seen by fishermen who are fishing the tide pools.

Species Number	Eumetopias stelleri
1927	?
1928	200

Species Number	Zalophus californianus
1927	?
1928	70

2.11.15. Point Carmel (Point Lobos) (Rookery)

This rookery is located on Whaler Rock, which lies half a mile offshore form Point Carmel (known locally as Point Lobos). There is one large rock and several small ones.

In 1927 this rookery was only called to my attention late in the year. The breeding season was over at that time and a large number of California sea lions were hauled out there.

On June 5, 1928, I surveyed the rookery. I was not able to land on the rock and had to do what counting I could from the skiff. The two species of sea lions were mixed up indiscriminately on the different rocks. I counted and estimated as follows:

	Bulls	*Cows*	*Totals*
Stellers	40	160	200
Californias	20	50	70
Totals	60	210	270

I heard pups on the rocks, but did not see any. This is the northernmost rookery of the California sea lion.

Species Number	Phoca vitulina
1927	38
1928	40

2.11.16. Point Sur (Hauling Ground)

This group of animals haul out on a broken reef which runs out to sea from the beach. It is two miles south of the Point Sur light and a mile north of the Big Sur River. In 1927, on May 23, there were 8 nursing pups and 30 adult animals. The pups were well grown and took to the water readily when I approached as near as was possible. Upon withdrawing a short distance, adults and young climbed out on the rocks again and most of the pups resumed their interrupted meal.

Species Number	Eumetopias stelleri
1927	?
1928	110

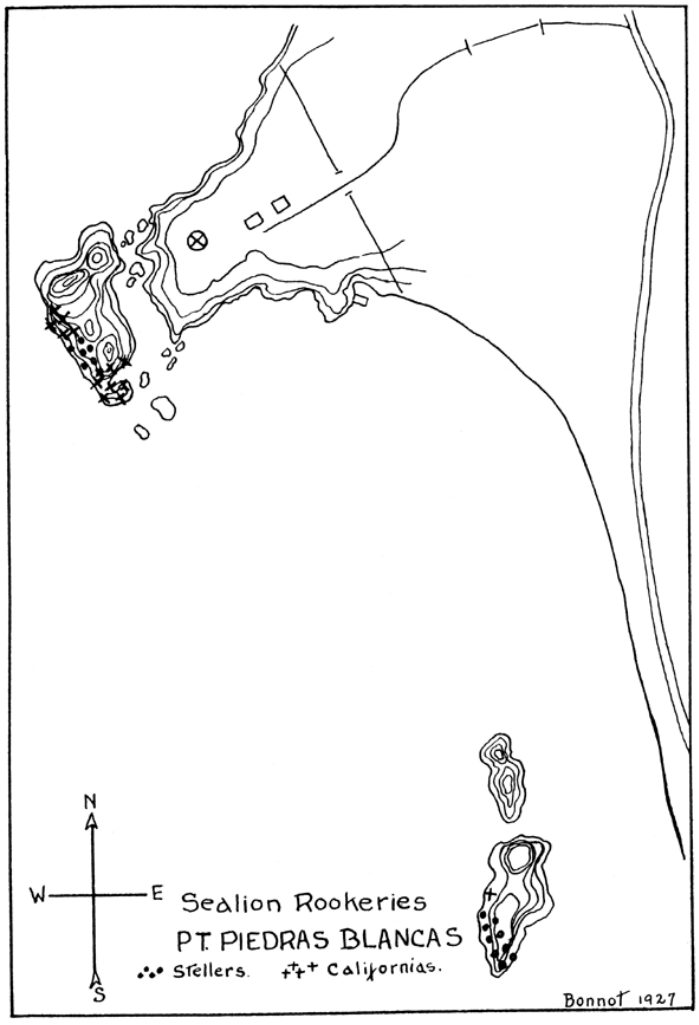
2.11.17. Lobos Rocks (Rookery)

The Lobos Rocks Rookery is on the larger of several rocks which lie half a mile off Point Soberanes. They are of small extent and rise abruptly from deep water.

In 1927 I received some vague rumors of sea lions in the vicinity of Lobos Rocks, but as this part of the coast must be visited by water I was unable to verify my information.

On June 5, 1928, I surveyed the rocks. It was very foggy and there was a heavy ground swell running. I estimated the animals at 10 bulls and 100 cows. I could see pups and hear them. There were no half bulls and yearlings about that I could see. They may have been on some other rock in the vicinity, but due to the fog I did not see them.

Species Number	Eumetopias stelleri
1927	?
1928	50



Sea lion Rookeries PT. PIEDRAS BLANCAS

2.11.18. Cape San Martin (Rookery)

The Cape San Martin Rookery is situated on two small rocks one forty-four feet high and the other thirty feet in height. They lie offshore about a half mile.

I did not know of this place in 1927. In 1928, on June 5, I surveyed it. I counted 10 adult bulls and 40 cows. On the smaller rock there was a single adult California bull. There were no pups that I could see.

Species Number	Eumetopias stelleri	
	1927	212
	1928	100
Species Number	Zalophus californianus	
	1927	86
	1928	1

2.11.19. Point Piedras Blancas (Rookery)

The Piedras Blancas Rookeries are two in number. The larger of the two is located on a large rock, separated from the point by a narrow strip of water. In 1927 this rookery was used by both Steller and California sea lions, the Stellers occupying the center and the Californias the two ends. A smaller rookery is situated on one of two small rocks which lie south of the point about a mile and as far offshore. The smaller rookery is for practical purposes a pure culture of Stellers. In 1927 I visited these rookeries on May 25 and on June 5. In 1928 I visited them on June 5.

The population in 1928 was radically different from that of 1927. I could see no reason for this, as these rookeries have not, to my knowledge, been shot up or disturbed in any way.

1927

	Steller			*California*		
	Bulls	*Cows*	*Totals*	*Bulls*	*Cows*	*Totals*
Larger rookery	8	120	128	20	60	80
Smaller rookery	5	79	84	1	5	6
Totals	13	199	212	21	65	86

1928

	Steller			*California*		
	Bulls	*Cows*	*Total*	*Bulls*	*Cows*	*Total*
Larger rookery	—	—	—	1	—	1
Smaller rookery	20	80	100	—	—	—
Totals	20	80	100	1	—	1

Species Number	Eumetopias stelleri	
	1927	86
	1928	none
Species Number	Zalophus californianus	
	1927	21
	1928	6

2.11.20. Lion Rock (Rookery)

Lion Rock lies two and three-quarter miles southeast from Point Buchon and 600 yards offshore. It is 240 yards long in a northwest and southeast direction and 112 feet high.

In 1927 (June 4), there were 86 Stellers on this rookery, 6 bulls and 80 cows; and on a small rock, a quarter of a mile to the north, 21 Californias, 1 bull and 20 cows. The position occupied by the Californias was small and not suitable for a rookery. I gathered that they had merely hauled out there temporarily.

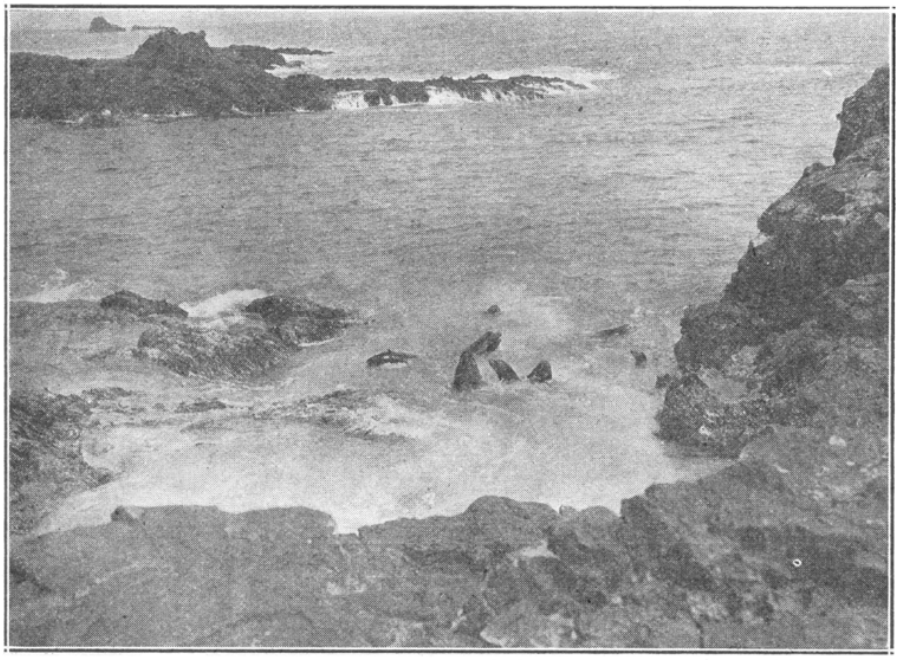


FIG. 15. California bulls unloading from the main rookery. On the lower of the two rocks in the distance is the other rookery. Point Piedras Blancas, June 5, 1927.

FIG. 15. California bulls unloading from the main rookery. On the lower of the two rocks in the distance is the other rookery. Point Piedras Blancas, June 5, 1927

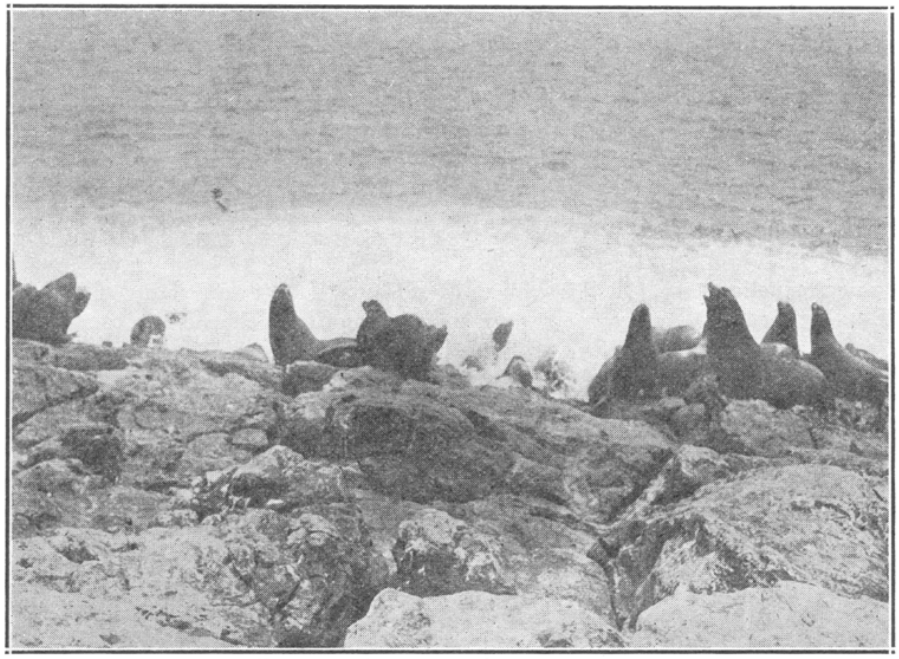


FIG. 16. California sea lions on the main rookery. Point Piedras Blancas, June 5, 1927.

FIG. 16. California sea lions on the main rookery. Point Piedras Blancas, June 5, 1927

In 1928 (June 6), there were only six small California cows on the same place occupied by the Californias last year. The larger rock, where I saw the Stellers last year, was deserted.

Species Number	Eumetopias stelleri	
	1927	135
	1928	95
Species Number	Zalophus californianus	
	1927	7
	1928	75

2.11.21. Pecho Rock (Rookery)

Pecho Rock, thirty-one feet high, lies offshore half a mile, and is three miles north of the Point San Luis light.

In 1927 (June 4), the rookery consisted mostly of Stellers, being 15 bulls and 120 cows. On one corner of the rookery was a small group of Californias—a bull and 6 cows.

In 1928 (June 6), the two species have a different proportion. Estimated:

	Bulls	*Cows*	*Total*
Stellers	10	85	95
Californias	15	60	75
Totals	25	145	170

This rookery, as noted, was practically all Stellers last year. It was shot up after I made the survey of this part of the coast. This may have something to do with the smaller number of Stellers this year.

Species Number	Zalophus californianus	
	1927	10
	1928	none

2.11.22. Point Sal (Hauling Ground)

In 1927 this group of animals were lying on a small shelf on a large bird rock. They were all cows and may have been traveling toward a rookery. The date was June 4th.

In 1928 there were no animals here at all when we passed the point.

Species Number	Zalophus californianus	
	1927	?
	1928	10

2.11.23. Point Arguello (Hauling Ground)

The animals observed here on June 6, 1928, were resting on two small black rocks close to the point. There were 2 bulls and 8 cows. As the situation is very poor for a rookery this is probably merely a hauling ground.

Species Number	Phoca vitulina	
	1927	40
	1928	40

2.11.24. Goleta Slough (Hauling Ground)

This group of animals haul out on a sand spit at the mouth of Goleta Slough. I have not seen pups here, but several individuals have told me there are pups here every year.

Species Number	Zalophus californianus	
	1927	11
	1928	?

2.11.25. Point Dume (Hauling Ground)

On June 3, 1927, there were 11 animals here; 1 bull and 10 cows. The bull was by himself on a small rock and the cows all together on another. The cows were all small, about yearling size. I saw no large cows at all in the vicinity.

Species Number	Phoca vitulina
1927	30
1928	30

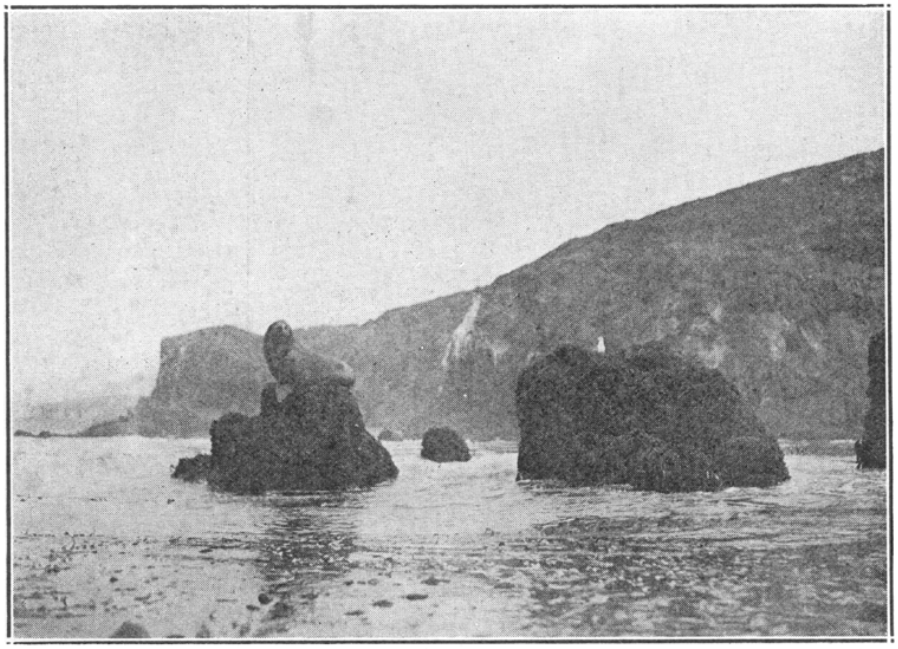


FIG. 17. A California bull posed for his picture. He seemed to be very friendly and barked at us inquiringly. Point Dume, June 3, 1927.

FIG. 17. A California bull posed for his picture. He seemed to be very friendly and barked at us inquiringly. Point Dume, June 3, 1927

2.11.26. Seal Beach (Hauling Ground)

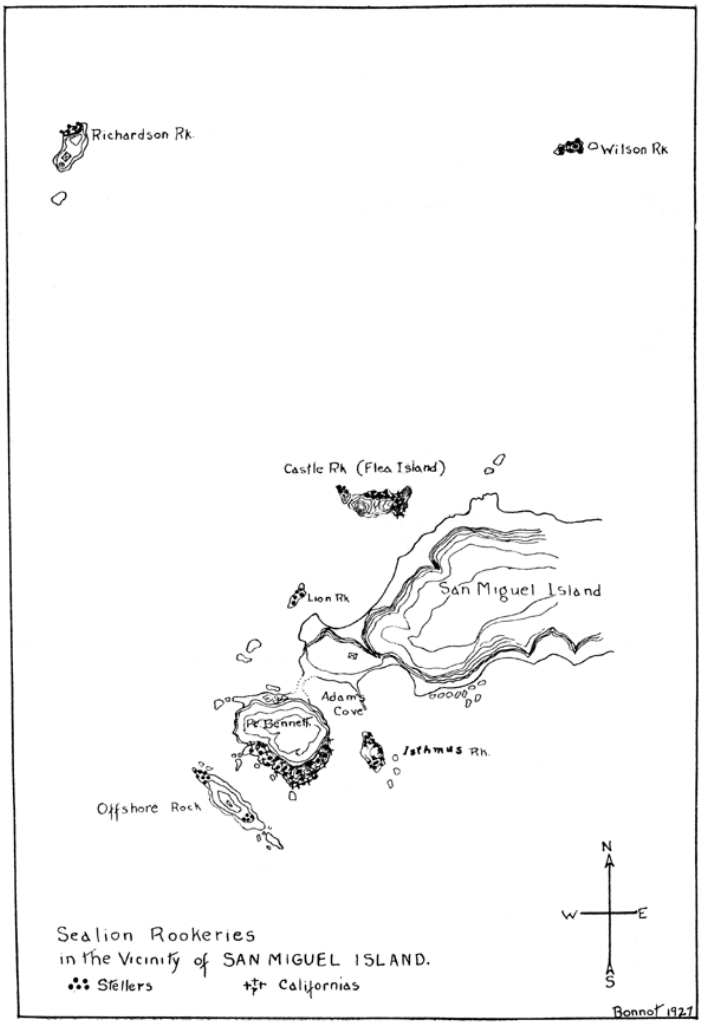
I have not seen these animals, but from descriptions furnished me, they are harbor seals. They haul out in a small slough close to Seal Beach and have been a bone of contention between the beach authorities and the local fishermen for several years.

Species Number	Eumetopias stelleri
1927	595
1928	592
Species Number	Zalophus californianus
1927	149
1928	429

2.11.27. San Miguel Island (Rookery and Hauling Ground)

I have treated the rookeries and hauling grounds about San Miguel Island together, as they are close together and may be considered one group.

San Miguel is the most westerly of the Santa Barbara Islands. It thrusts a rocky and reef surrounded coast into the Pacific Ocean, and takes the brunt of the ocean's wrath in stormy weather. The sea lions have selected this rough and windswept region for their rookeries. A reference to the accompanying


Richardson Rk.
Wilson Rk
Castle Rk (Flea Island)
San Miguel Island
Lion Rk
Adam's Cove
Pt Bennett
Isthmus Rk.
Offshore Rock
N
W
E
S
Sealion Rookeries
in the Vicinity of SAN MIGUEL ISLAND.
Stellers
Californias
Bonnot 1927

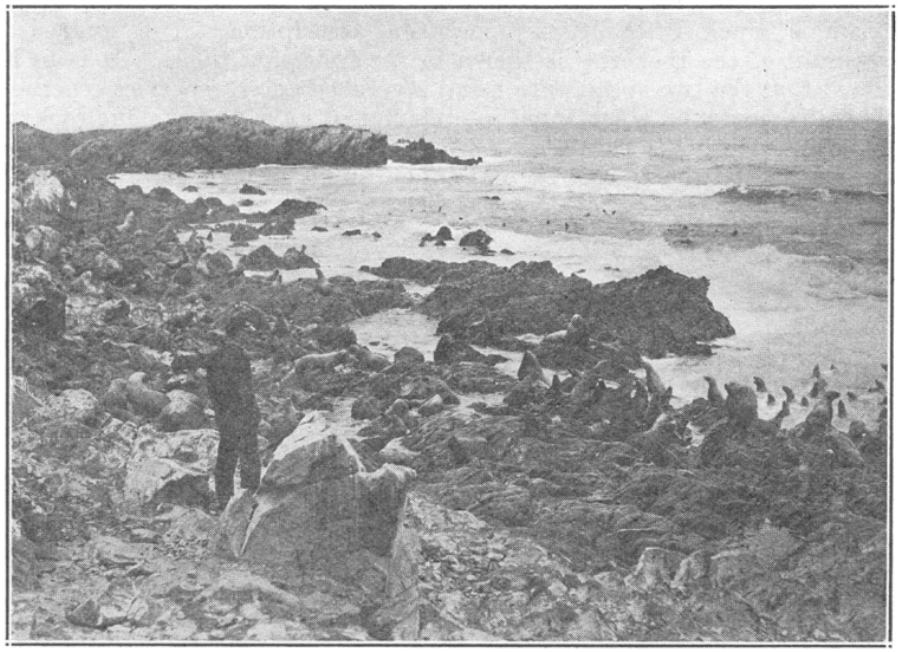


FIG. 19. The Stellers were more reluctant to go overboard. Flea Island, San Miguel Island, June 13, 1927.

FIG. 19. The Stellers were more reluctant to go overboard. Flea Island, San Miguel Island, June 13, 1927

FIG. 20. Steller bulls and cows. A California bull in the immediate foreground. Point Bennett, San Miguel Island, June 10, 1927.

FIG. 20. Steller bulls and cows. A California bull in the immediate foreground. Point Bennett, San Miguel Island, June 10, 1927

map will show the locations of these various rookeries and hauling grounds much better than a written description. The numerical strength of the rookeries is shown in the following tables. It is to be noted that the two species are using several of these rookeries together. There is, no doubt, a continual interchange of animals from one rookery to another, and the figures as a whole are nearer the truth than those for individual rookeries. Point Bennett seems to be a hauling ground

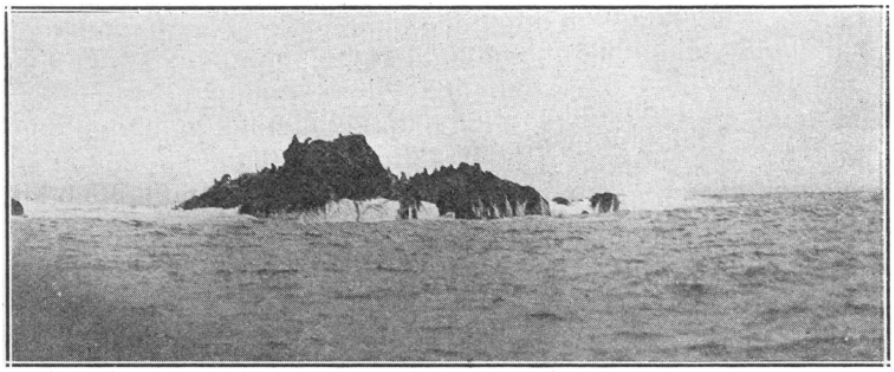


FIG. 21. Steller sea lions. The California sea lions do not seem to like exposed offshore rocks but have their rookeries in more sheltered places. Wilson Rock, Off San Miguel Island, June 13, 1927.

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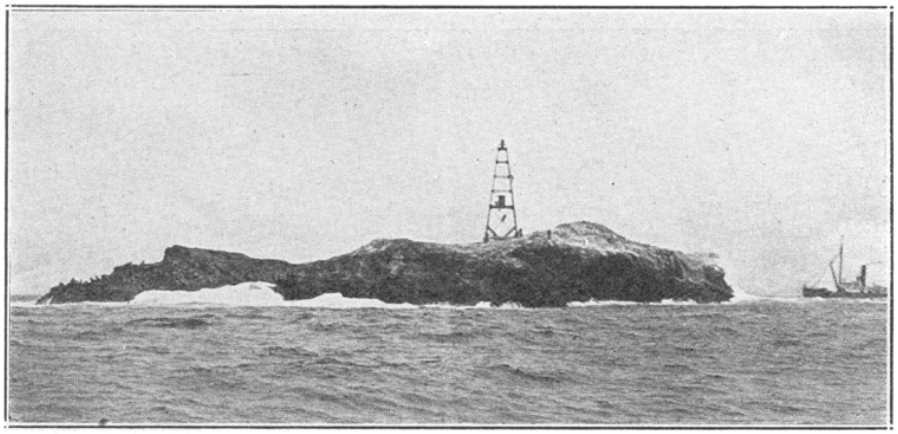

FIG. 22. Steller sea lions. The lighthouse tender lying in the lea of the rock. The men can be seen working in the tower. This is an automatic light. Richardson Rock, Off San Miguel Island, June 13, 1927.

FIG. 22. Steller sea lions. The lighthouse tender lying in the lea of the rock. The men can be seen working in the tower. This is an automatic light. Richardson Rock, off San Miguel Island, June 13, 1927

for the entire region, where the surplus bulls, and old and diseased animals which are unable to hold their own on the rookeries haul out. I have never seen pups here.

I have visited this region several times. I made a survey between June 10 and 13, 1927. I checked over it again on June 7, 1928, and spent several days (June 21 to 23, 1928) supervising the taking of specimens of sea lions by Mr. Harry H. Sheldon of Santa Barbara.

1927 San Miguel Island Rookery / hauling ground	Eumetopias			Zalophus			
	Bulls	*Cows*	*Total*	*Bulls*	*Cows*	*Total*	*Total*
Point Bennett	11	20	31	12	30	42	73
Isthmus Rock	—	—	—	—	—	—	—
offshore Rock	6	35	41	—	—	—	41
Lion Rock	8	—	8	—	—	—	8
Flea Island	35	240	275	27	80	107	382
Richardson Rock	14	185	199	—	—	—	199
Wilson Rock	6	35	41	—	—	—	41
Totals	80	515	595	39	110	149	744

1928 San Miguel Island Rookery / hauling ground	Eumetopias			Zalophus			
	Bulls	*Cows*	*Total*	*Bulls*	*Cows*	*Total*	*Total*
Point Bennet	6	10	16	—	—	—	16
Isthmus Rock	20	—	20	6	30	36	56
offshore Rock	15	60	75	—	—	—	75
Lion Rock	10	20	30	—	—	—	30
Flea Island	60	200	260	60	300	360	620
Richardson Rock	25	130	155	3	30	33	188
Wilson Rock	6	30	36	—	—	—	36
Totals	142	450	592	69	360	429	1021

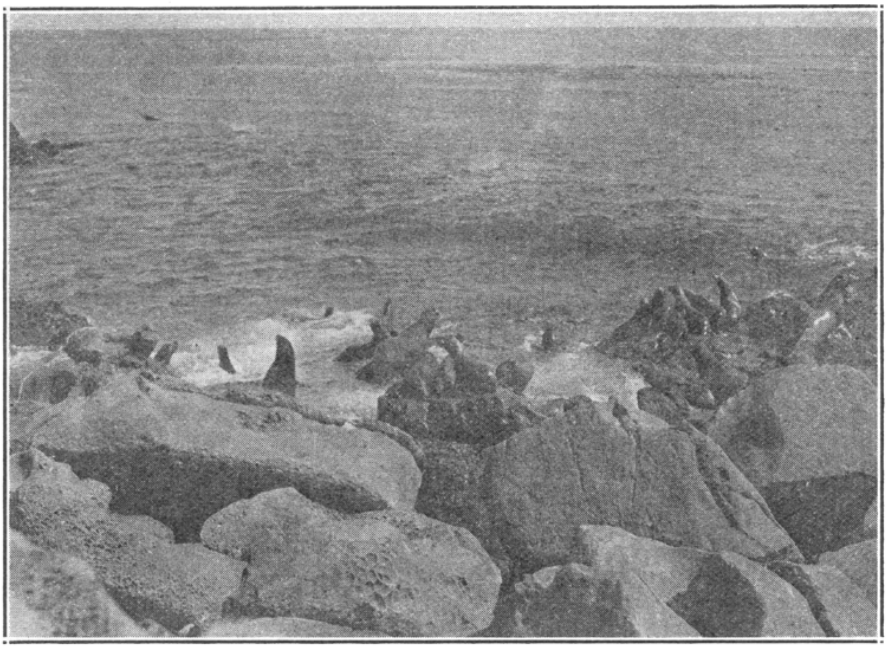

FIG. 23. California sea lions. Point Bennett, San Miguel Island, June 10, 1927.

FIG. 23. California sea lions. Point Bennett, San Miguel Island, June 10, 1927

On June 7, 1928, there were on Flea Island the following: Steller pups; alive 45, dead 5; California pups; alive 201, dead 4. In 1927 the Stellers were the more numerous on Flea Island, but in 1928 the status was reversed and the Californias predominated.

Species Number	Eumetopias stelleri
1927	49
1928	38

Sandy Point is at the extreme west end of Santa Rosa Island. The rookery is on two small rocks, about two hundred yards from the point.

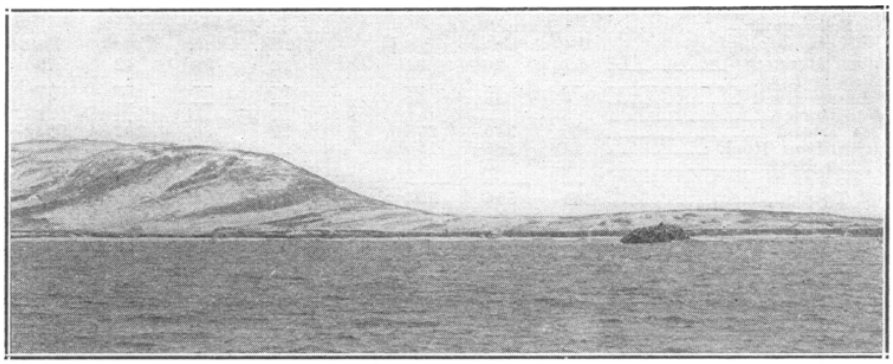

FIG. 24. A small rock lying about three hundred yards from Sandy Point, Santa Rosa Island, June 13, 1927. This is the most southern Steller rookery.

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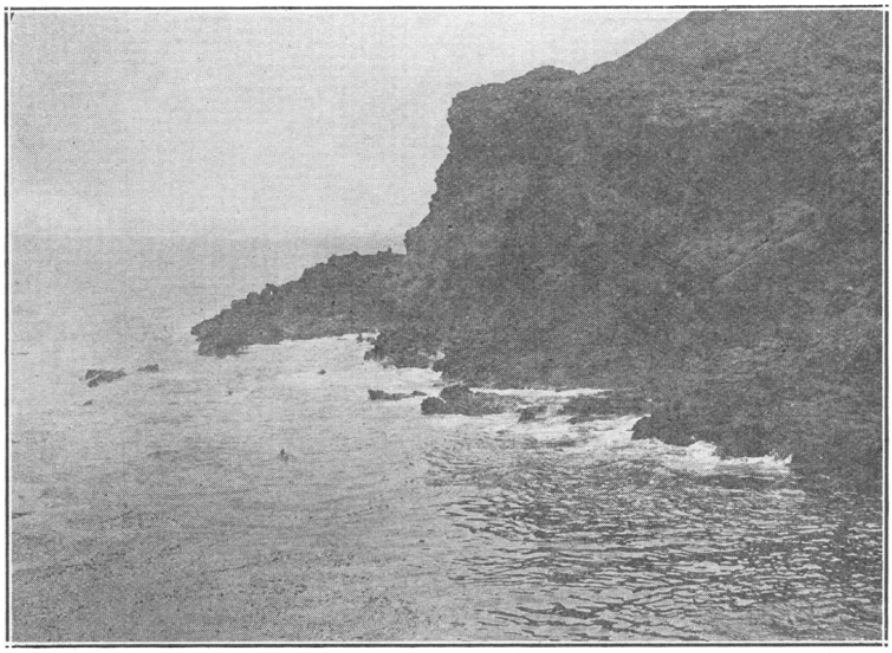


FIG. 25. California sea lions. A well sheltered rookery. The rocks are volcanic and extremely rough. Frazer Point, Santa Cruz Island, June 14, 1927.

FIG. 25. California sea lions. A well sheltered rookery. The rocks are volcanic and extremely rough. Frazer Point, Santa Cruz Island, June 14, 1927

2.11.28. Sandy Point (Rookery)

In 1927 (June 13), there were 2 big bulls and 47 cows. In 1928 (June 7), there were 2 bulls and 36 cows. The cows were all small. The place is very unfavorable for a rookery, inasmuch as it is on the windward side of the channel and during heavy weather would get the full force of the wind and sea. The Steller sea lions seem to like this sort of situation, however, in preference to a more sheltered one. This is the southernmost rookery of the Steller sea lion.

Species Number	Zalophus californianus
1927	63
1928	88

2.11.29. Frazer Point (Rookery)

This rookery lies in the lee of Frazer Point, at the west end of Santa Cruz Island. It is on a flat ledge of volcanic rock, which is very rough, with bluffs behind it. It is very difficult of approach from either the land or water. There were 8 adult bulls and 55 cows here in 1927 (June 14). Swimming about close to the rookery were 2 adult Steller bulls.

In 1928 (June 8), there were 12 bulls and 68 cows. I saw no pups at all.

Species Number	Eumetopias stelleri
1927	18
1928	10
Species Number	Zalophus californianus
1927	145
1928	105

2.11.30. Gull Island (Rookery)

Gull Island is a high mass of rocks at the southwest side of Santa Cruz Island. It lies a mile offshore and is surrounded by heavy beds of kelp. The main body of the rookery is on the east side of the rock, toward Santa Cruz Island.

In 1927 (June 14), the animals here were divided into species and sexes as follows: Stellers, bulls 10, cows 8; Californias, bulls 35, cows 110. The Stellers seemed to be stragglers. They had no pups and were for the most part asleep on the higher rocks.

In 1928 (June 8), there were the following numbers: Stellers, bulls 10, cows none; Californias, bulls 20, cows 85. There were 20 California pups alive. I saw no dead ones.

Species Number	Zalophus californianus
1927	34
1928	27

2.11.31. Anacapa (Rookery)

The rookery on Anacapa lies on the north side of the East Rock. It is situated on two small beaches, one of which runs back into a cave. In 1927 (June 22), there were 7 bulls and 27 cows here. In 1928 (June 8), there were 11 bulls and 16 cows. This place is rather favorable for

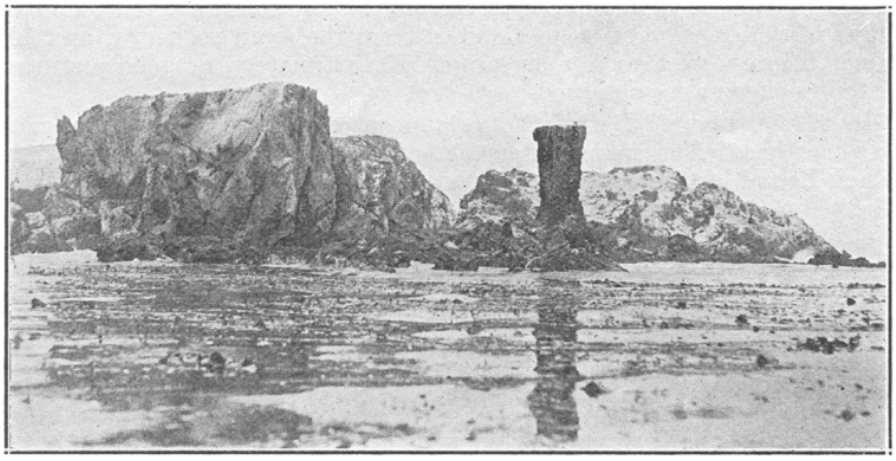


FIG. 26. Mostly California sea lions. A few Stellers can be seen. Gull Island, Santa Cruz Island, June 14, 1927.

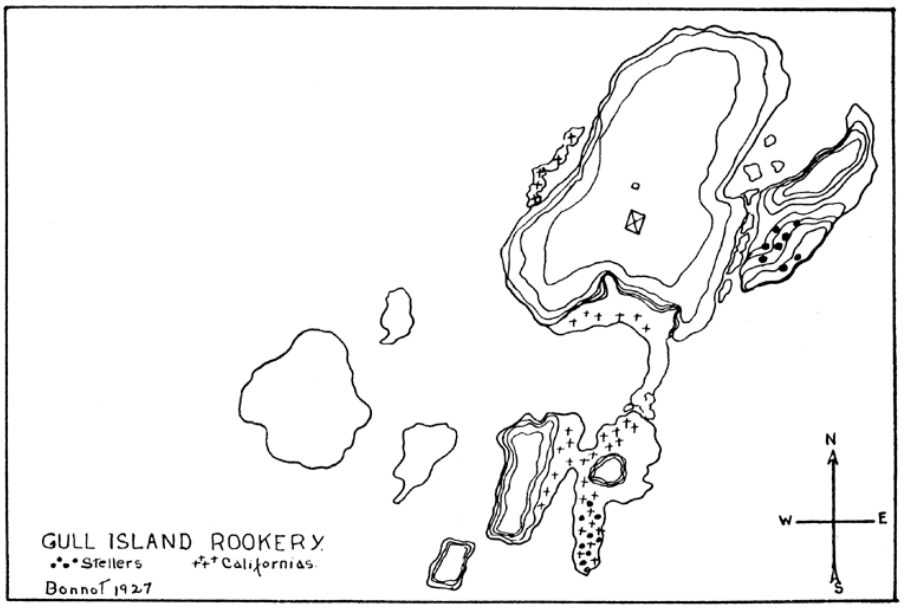
FIG. 26. Mostly California sea lions. A few Stellers can be seen. Gull Island, Santa Cruz Island, June 14, 1927

a rookery and seems to have the required amount of shelter demanded by the Californias.

Species Number	Zalophus californianus
1927	125
1928	327

2.11.32. Santa Barbara Island (Rookery)

The rookery is situated on the northwest side of Santa Barbara Island on two small, rocky beaches, opposite a large offshore rock. The rock



has no name on the charts. It is surrounded by heavy beds of kelp which extend in toward the beaches to the breaker line. The beaches are composed of coarse gravel and rocks, and are backed by high bluffs.

In 1927 (June 22), we could not land here, but pulled in as close as possible with the dory. The count showed 35 bulls (four of which were at some distance from the main rookery), and 90 cows. There were a good many pups. Unfortunately, no good pictures of this rookery were obtained.

In 1928 (June 8), I was able to land on one of the beaches, but not on the other. The same system of counting was therefore necessary which I used last year. This year's count shows: Bulls, 67; cows, 260. There were a good many pups, but there was no way to count them. I shot a small cow here and after some difficulty got her aboard the boat. The next morning I dissected her. Her stomach was empty, except for a small bunch of worms and a little brownish matter which was semiliquid.

Species Number	Zalophus californianus
1927	15
1928	40

2.11.33. Catalina Island (Hauling Ground)

Catalina Island once supported a rookery. There is much activity on and around the island at present, and the sea lions have left for

more peaceful localities. The former rookery could never have been very large, as the places used by the sea lions now and those said to have been used by them in former times are small and not very well suited for rookery sites. The place frequented by the animals at present is at the southwest end of the island, on several rocks and a small beach.

In 1927 (June 23), I counted 15 sea lions here. These were either adult bulls or animals which could well be young bulls.

In 1928 (June 9), I counted 15 bulls and 25 cows. The cows were all small and there were no pups that I could see.

Species Number	Zalophus californianus
1927	235
1928	228

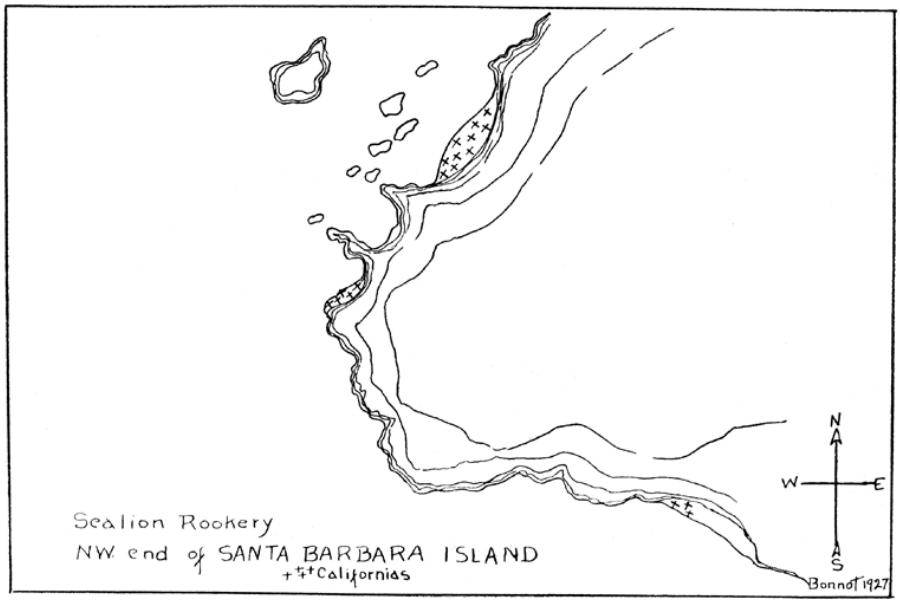
2.11.34. Seal Harbor (Rookery)

Seal Harbor lies on the west side of San Clement Island. It is a shallow bay, with a large rock setting in the center. The rookery is scattered along the edge of the bay for half a mile, on ledges of rock and rubble beaches.

In 1927 (June 17 and June 23, the counts showed 55 bulls and 180 cows. There was one large Steller bull.

In 1928 (June 9), the count shows 52 bulls and 176 cows. There were only 11 pups in the whole area on June 9. On June 27 I again visited this place and there were at least 50 pups. There were 10 pups on the large rock in the center of the bay. Last year I saw none on this rock.

Species Number	Zalophus californianus
1927	29
1928	23



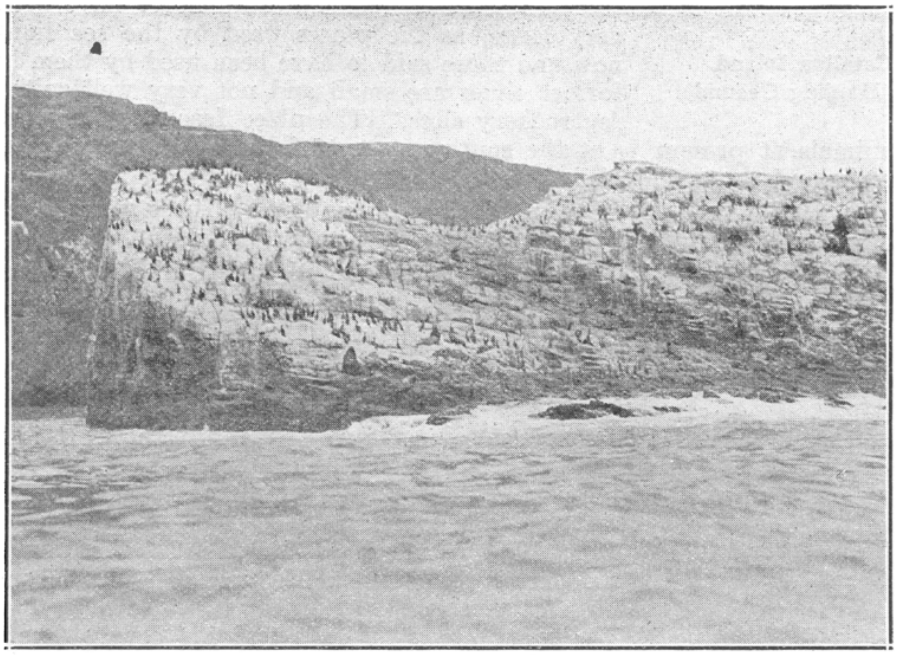


FIG. 29. The large rock in the center of the bay. California sea lions and cormorants. Seal Harbor, San Clemente Island, June 17, 1927.

FIG. 29. The large rock in the center of the bay. California sea lions and cormorants. Seal Harbor, San Clemente Island, June 17, 1927

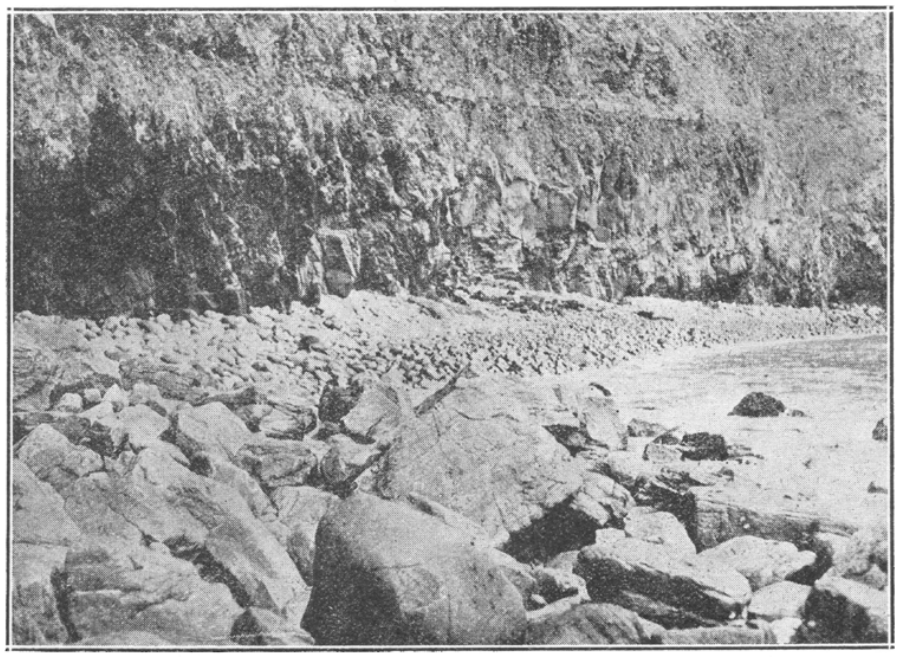


FIG. 30. California sea lions asleep. Seal Harbor, San Clemente Island, June 23, 1927.

FIG. 30. California sea lions asleep. Seal Harbor, San Clemente Island, ***June 23, 1927.***

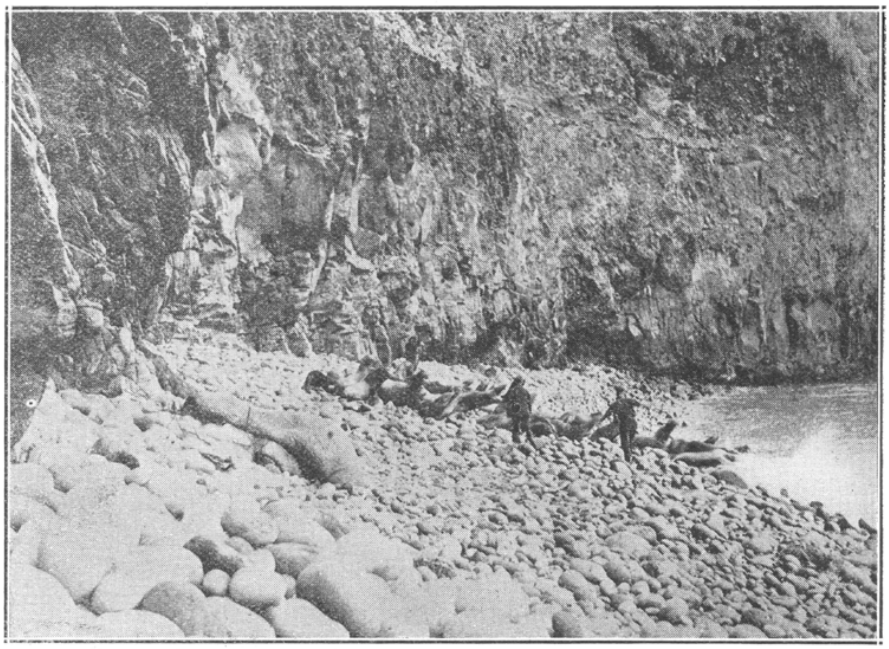
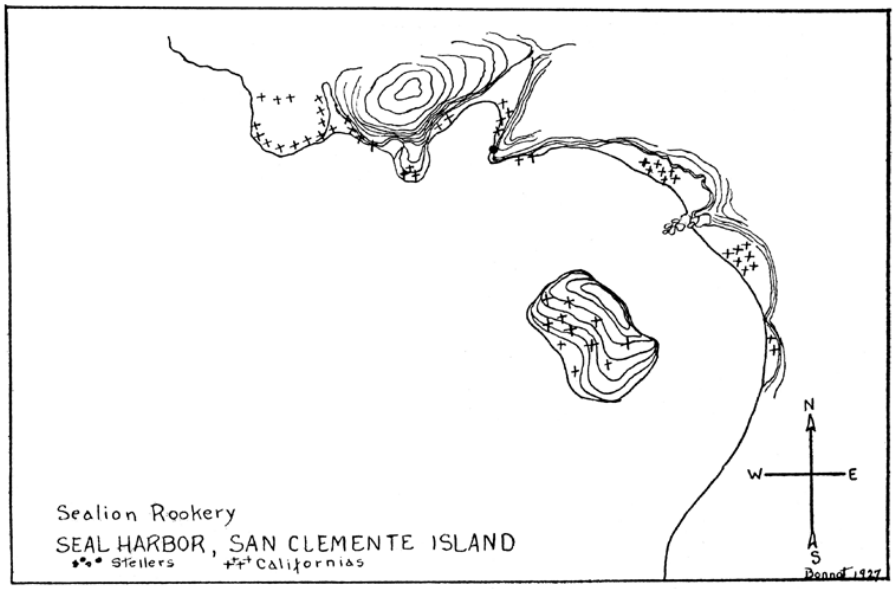


FIG. 31. The same animals shown in the previous picture. Their mode of progression when in a hurry is well shown. Seal Harbor, San Clemente Island, June 23, 1927.

FIG. 31. The same animals shown in the previous picture. Their mode of progression when in a hurry is well shown. Seal Harbor, San Clemente Island, June 23, 1927



2.11.35. Castle Rock (Rookery)

Castle Rock Rookery is a large, saddle-shaped rock a mile offshore, at the northwest end of San Clement Island. The situation is fairly good for a rookery, though it would not allow a large one.

In 1927 (June 23), I counted 5 bulls and 24 cows here. No pups were visible.

In 1928 (June 9), I counted 3 bulls and 20 cows. I again saw no pups. A close approach

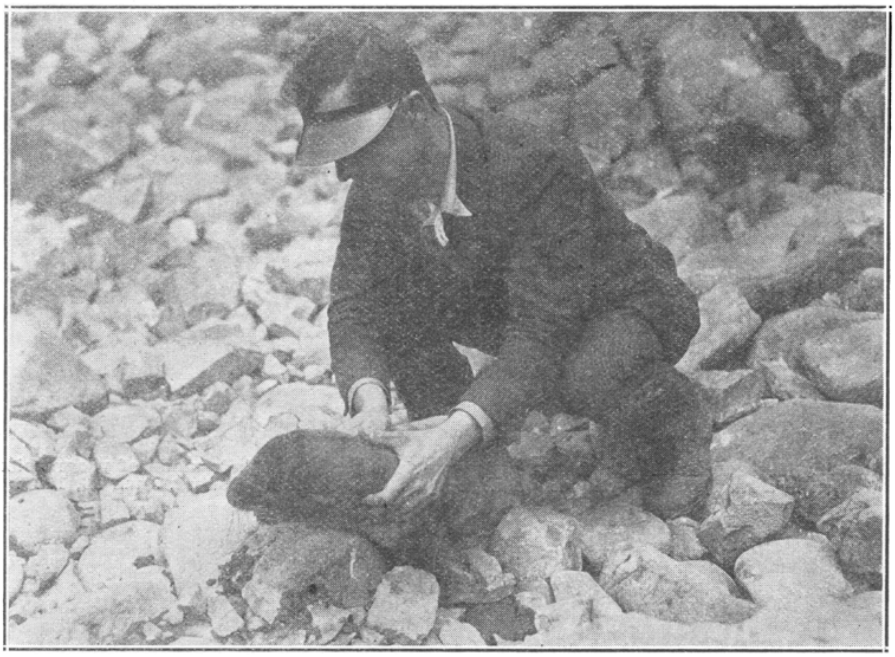


FIG. 33. When first handled the pups squawl and kick. Flea Island, San Miguel Island, June 13, 1927.

FIG. 33. When first handled the pups squawl and kick. Flea Island, San Miguel Island, June 13, 1927

to the rock is very dangerous, and I was forced to do my counting, etc., through glasses.

2.12. Notes on the General Habits of Sea Lions

As sea lions pass most of their lives in the water, they would naturally be expected to be fine swimmers. In the water the front flippers are used for swimming, the hind ones trailing behind. They swim readily on either the belly, sides or back. A favorite method of progression seems to be to rotate slowly on the long axis. I have seen yearlings jump clear of the water, make a graceful are and go in head first, like a porpoise. I have never seen an adult do this. Mr. N. B. Scofield tells me he has seen adult sea lions, at the mouth of the Klamath River, riding the surf in the same manner as men using surf boards. The animals repeated this again and again, and were evidently doing it for amusement. The adults, when landing on a steep bank, will sometimes shoot up from a wave as much as five or six feet. In moving on land they are clumsy, yet they can move with surprising speed. The front flippers are used as a base, the hind ones drawn under and the animals spring forward on them, the front flippers being hitched forward at the same time. They will dive into the water from

considerable heights, and I once saw a Steller bull leap from a rock down ten or twelve feet to a gravel beach, where he landed on his chest and continued his course to the water, apparently none the worse.

Sea lions can see a moving object very well, but do not seem to clearly see a stationary object. I have on several occasions stood or sat in full view, using my glasses and making notes, and no notice was paid to me by animals thirty or forty feet away. When I started to move off or rose to my feet, however, nearly every animal in sight saw me at once.

They do not seem to have a very keen sense of smell. They use this sense as a means of identifying one another, as do dogs, but give little indication that it is useful for distant odors.

Their hearing is also rather poor. On several occasions I have walked up to blind animals, taking no particular pains to remain quiet, and, though they seemed to sense my presence, it did not seem to be through the sense of hearing.

On the hauling grounds and rookeries, the sea lions practice no sort of sanitation, as do some animals. The places frequented by them are rocky and uneven, and therefore catch debris, such as excreta and dead

FIG. 34. A group of California pups. Seal Harbor, San Clemente Island, June 23, 1927.

FIG. 34. A group of California pups. Seal Harbor, San Clemente Island, June 23, 1927

animals. These are trampled underfoot and left. In consequence, a sea lion rookery is very dirty underfoot and very evident at close range to the olfactory nerve.

Sea lions are both diurnal and nocturnal. It is not easy to observe their comings and goings at night, but, from the continual uproar, they are as active by night as by day. When on the rookeries at the breeding season, they seem to spend a great deal of their time sleeping on the

rocks. At other seasons they move up and down the coast a short distance, swimming in small schools and fishing. On two occasions I watched several fishing at night, their movements being easily followed by the lines of phosphorescence in the water, and their loud "whosh" when they came up to blow.

At Año Nuevo the rookeries seem to be conducted as are the rookeries of the fur seal. That is, a large bull, by right of might, collects a varying

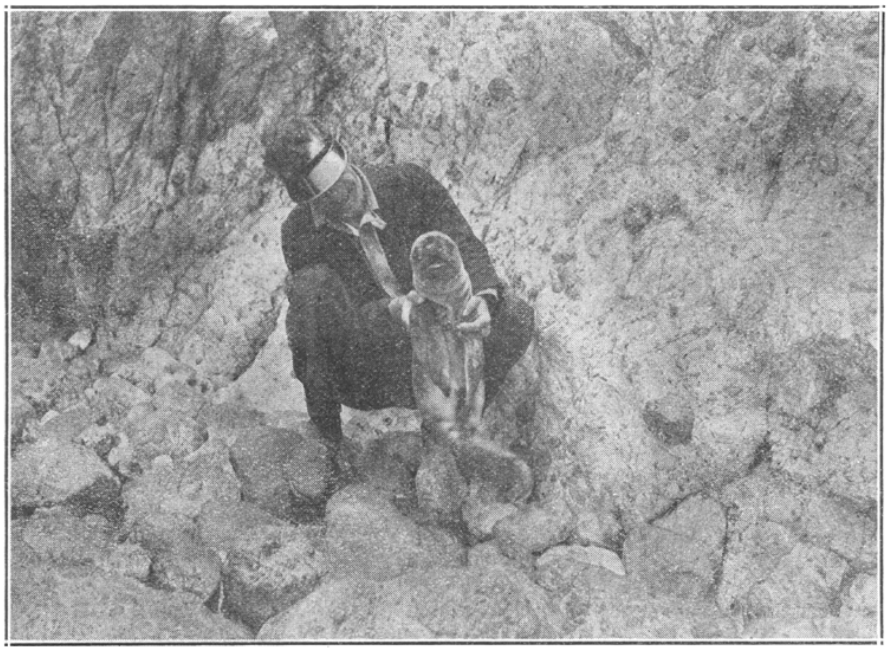


FIG. 35. California pup. With a little handling the pups become very friendly little fellows. They prefer to stay on the ground, however. Gull Island, June 14, 1927.

FIG. 35. California pup. With a little handling the pups become very friendly little fellows. They prefer to stay on the ground, however. Gull Island, June 14, 1927

number of cows, drives off all other bulls and manages his "harem" himself. He will fight desperately for his small piece of territory or to retain his cows, maintaining his stand for the whole breeding season, not even leaving to eat. At all other rookeries I visited, however, this does not apply. I saw no evidence of the so-called harems. The bulls, old and young, were mixed up indiscriminately on the rookeries. There was little or no fighting. I saw only one California bull who was cut about the chest as though he had been fighting. The nearest approach to fighting was a more or less continual wrangling among the cows, which, though noisy, seemed never to go beyond the point of making a few passes at each other.

In this regard, it might be well to mention that the Año Nuevo rookery is unique in another way. The animals there are evidently more used to man and have enjoyed protection for so long that they do not act toward him as at other places. At all other places it was necessary to "sneak" up to the animals in order to count and photograph them, but at Año Nuevo, although most of the cows and some of the bulls will unload upon the appearance of a man, the big herd bulls will not only stand their ground but will actually chase a man who gets

too close. Generally they will not press the matter, but as they look as big as an ox and weigh close to two thousand pounds, it behooves the investigator to respect their dignity and give them room.

The sea lions sometimes form what are known as "rafts." They lie together in the water in small or large bunches, apparently asleep, swinging with the action of the water. Here and there in the compact group a flipper will be elevated. The raft seemed to be formed for the most part of only one sex. I have seen cows in rafts and young bulls, or there may have been cows among them. I have never seen an adult bull of either species rafted.

Each cow has but one pup a year. The pup can not swim for several weeks after birth, but even when first born, it has a natural instinct for the water. I have seen a young pup go overboard and get a mauling from the breakers, but, upon stranding on the beach, half drowned, it not only met my attempts to help with a defiant squall, but plunged back into the next wave. On such occasions they desperately work their flippers up and down, but until the use of the flipper is learned and breathing is coordinated, they are more helpless in the water than

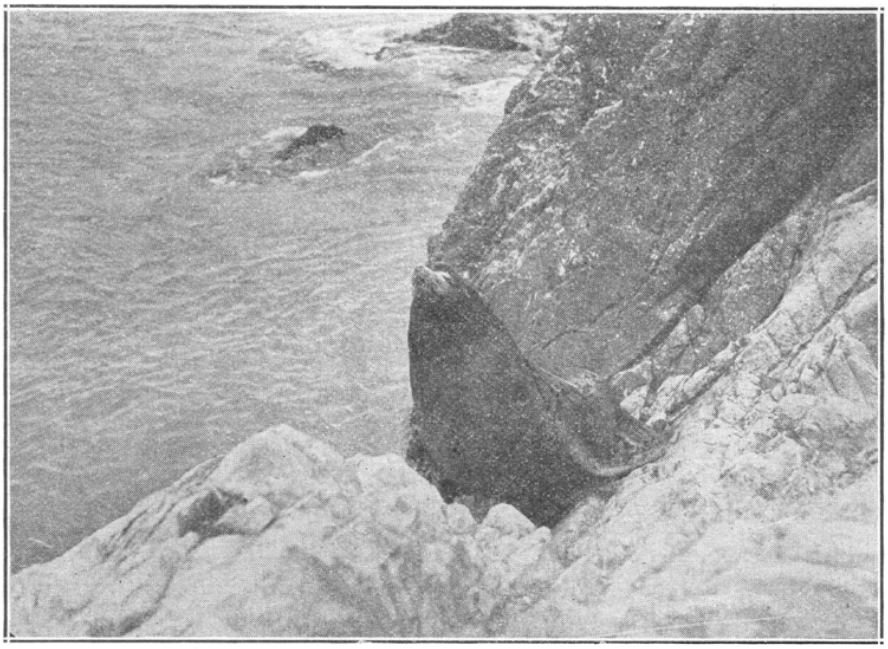


FIG. 36. A California bull posing for his picture. Flea Island, San Miguel Island, June 13, 1927.

FIG. 36. A California bull posing for his picture. Flea Island, San Miguel Island, June 13, 1927

the average terrestrial animal. The bulls pay no attention whatever to the pups, and the cows seem only interested in their own. I have several times seen a bull, while stampeding or love making, step on a pup that happened to be in the way, and its frantic squalls were lost in the uproar of the occasion. The cows seem to know their own pups, and when coming ashore will hunt their own. Another's pup, however, is treated rather roughly. I have seen a cow pick up a pup in her mouth and throw it at least ten feet with a vicious side jerk of her head. On

two occasions, while examining and photographing pups, a cow called just outside the breaker line. Her call sounded exactly like an ordinary domestic cow calling her calf. The pup, at my feet, evidently recognized the cow, as it stiffened up and answered the call with a high-pitched squall.

Sea lions are gregarious animals, but I would not call them social. They ordinarily travel about in small groups, and collect, of course, in large numbers on the rookeries, but they seem to conduct themselves toward their fellows on a strict *laissez faire* basis. When lying about on shore there is a continual snarling and growling, and if, in moving about, one animal happens to tread on another, there is at once an uproar. These disturbances seldom amount to anything, but there is little that is amiable about them.

There seems to be little or no definite communication among them. Mr. Alvin Seale, of the Steinhart Aquarium, first called my attention to the fact that they seem to communicate by touching their noses together. The sea lions at the aquarium do this. I watched for it on the rookeries and saw it many times. Each animal has, no doubt, a definite scent, and they either use this habit of touching noses as a means of identification, as everyone has seen dogs do, or there may be a more definite exchange of ideas. At Seal Harbor, San Clemente Island, I saw a half-drowned pup, squalling and splashing a hundred feet from the beach. Several cows swam up to it, touched its nose, and then, evidently finding it not their own, went on their respective ways and left it. Evidently its own mother was beyond the sound of its call, as its cries went unheeded until it drowned.

Each species has several distinctive calls, but none of them seems to convey much intelligence to other members of the same herd. After stampeding into the water when alarmed by a landing party, the animals swam up and down the rookery, just outside the breakers, roaring or barking, according to the species. There were generally several individuals too sleepy or too lazy to leave with the herd, and these paid no attention whatever to the loud uproar kept up by their fellows in the water. They only departed, in great haste, when touched. Once several of us sneaked up on a sleeping bull, the photographer focused his camera, and then with a touch of the foot the bull was awakened to furious haste.

The call of the Steller sea lion consists of a deep, hoarse roar. Both sexes have this, the bull's roar being deeper and louder. The cows "baa" for the pups, and the pups answer with the same sound, about two octaves higher.

The California sea lions make a "honking" bark, repeated steadily. They also make a smooth howl that sounds exactly like a hound. The cows and pups call as do the Stellers.

Both species snarl and growl when angry or frightened. When suddenly awakened from a sound sleep and finding themselves surrounded by several men, both species of all ages emit a loud, quavering "Ah" of surprise and fear.

In captivity sea lions do very well. They are docile, intelligent and fairly hardy. They are subject, to some extent, to pulmonary disorders. The cows only are used for exhibition purposes and for performing acts. These are, for the most part, California cows, but occasionally a

Steller cow is put on exhibition. The bulls are too large and pugnacious to be readily handled. California bulls have been taken, but an adult Steller bull has never been captured.

The impression of the rookeries most vividly remembered is the continual uproar of sound. This is seldom or never absent. While on the rookery, talking in an ordinary tone of voice is heard with difficulty. The sound ebbs and flows like the roar of the surf, with here and there a sudden breaking through of sharper sound by some individual that happens to be close at hand or that has been trodden on by one of its fellows and voices its protest.

2.13. Seals

The harbor seals are not so numerous as the sea lions, and are much more watchful and shy. They usually are seen lying together on rocks

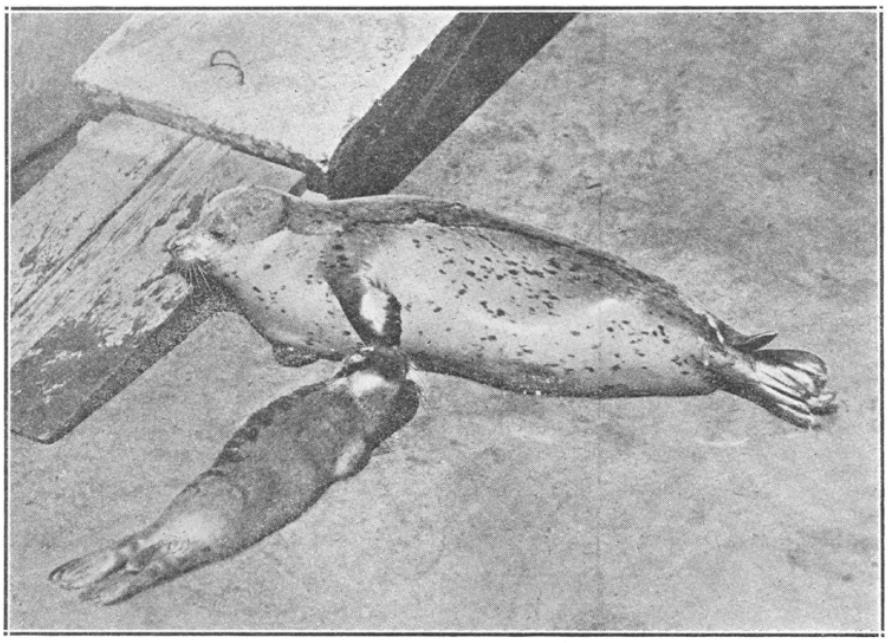


FIG. 37. A female harbor seal and pup, at the Steinhart Aquarium, San Francisco. This pup was born at the Aquarium. Photo by W. Adams.

FIG. 37. A female harbor seal and pup, at the Steinhart Aquarium, San Francisco. This pup was born at the Aquarium. Photo by W. Adams

or sand beaches close to the water. Their appearance on land is entirely different from that of the sea lion. They seem disproportionately large in the middle, tapering abruptly to the extremities. The front flippers are small in proportion to their size, and the hind flippers are not capable of being turned forward as are those of the sea lion. In moving on land, the front flippers are used in the manner of a pair of oars, assisted by muscular action of the belly muscles. The hind flippers are trailed behind. The seal is more aquatic than the sea lion. In the water, the hind flippers are used for swimming, the front ones being held close to the sides. They swim a good deal on the back. They are fast swimmers. The hind flippers are held close together and both twist together with the same movement that a fish uses. They are not noisy animals. Captain Scammon, in his "Marine Mammals of the

Northwest Coast of North America," says, "They can be regarded almost as mutes, in comparison with the noisy sea lions. It is rarely, however, any sound is uttered by them, but occasionally a quick bark or guttural whining, and sometimes a peculiar bleating is heard when they are assembled together about the period of bringing forth their young."

The breeding habits of the seal are very little known. Whether they give birth to the pups at sea or on shore has never been definitely established. Mr. Walter Welsh, field agent for the Division of Fish and Game, says that thirty years ago the harbor seal had extensive "rookeries" at the south end of San Francisco Bay near Alviso, but he can not remember definitely whether the pups were born on these "rookeries" or brought there.

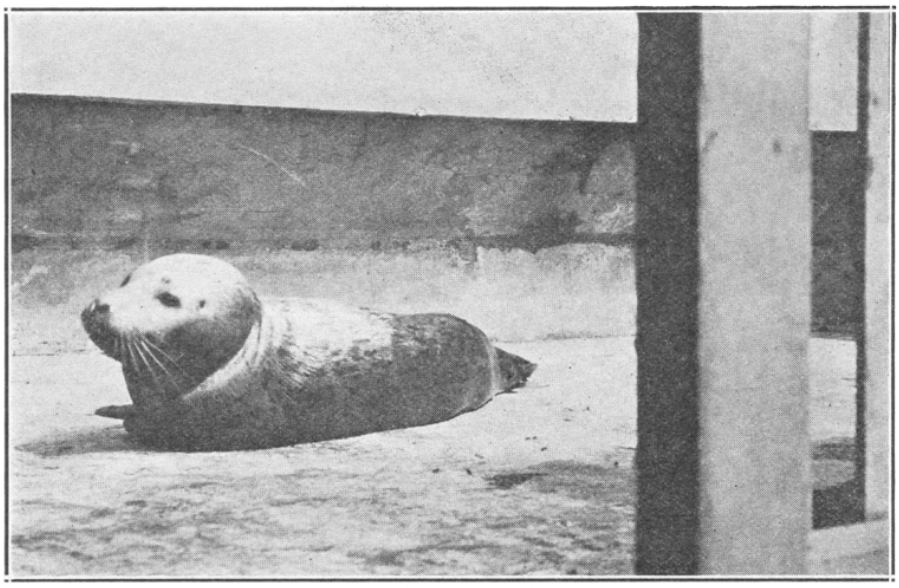


FIG. 38. A young harbor seal about five months old.

FIG. 38. A young harbor seal about five months old

In May, 1927, I saw nursing pups at Point Sur. These pups were well grown and able to swim. Apparently the seal pups earlier than the sea lion.

Mr. Wallace Adams, assistant superintendent of the Steinhart Aquarium, tells me that there have been several seal pups born at the aquarium. These were all dropped while the female was in the water, and they swam at once. This would seem to indicate that the seal pups can be born at sea. One of these pups was kept until it was five months old and was doing nicely, but it was unfortunately killed by attempting to swallow a peanut, thrown into the pool by some thoughless visitor.

The seals seem to favor bays or reefs as their living places. They do not seem to be the least migratory, and will be found hauled out in the same place over a long period of time. They fish on the reef they inhabit or work the shallow mud flats of bays.

These animals are hardy in captivity. The young animals are fairly easy to raise, and, if they can be brought to the weaning stage, they survive. They are docile and good natured, but rather stupid in comparison to the more intelligent sea lion. They can be taught a few simple tricks, however.

APPENDIX

The following data relating to the past distribution and population of seals and sea lions are obtained from correspondence in the files of the Fish and Game Commission:

Report of John Rowley to the Fish and Game Commission, August 12, 1911.

Richardson Rock (San Miguel Island), 500 (Eumetopias).

Cochie Point (Santa Cruz Island), (Zalophus).

1908 200 animals—1 adult bull.
1911 200 animals—8 adult bulls.

Abstracts from the files of the United States Biological Survey, in a letter to Mr. E. C. Starks, of Stanford University, bearing the date of August 25, 1921:

Eumetopias

Point Reyes, Hollister. October 25-November 12, 1904.

Sea lions formerly bred on the rocks near the lighthouse. A few seen on this occasion.

Zalophus

Russian River, six miles below Duncan Mills, Merriam, August 19, 1905.

Colonies of sea lions on small rocky islets on both sides of the river mouth.

Bodega Bay, Merriam, August 22–23, 1905.

A colony of sea lions occupy a rocky islet just south of Bodega Bay spit.

Point Reyes, Merriam, October 27, 1904.

Sea lions exceedingly abundant on the rocky islets and in small rocky caves about Point Reyes Light.

Pacific Grove, Hollister, May 18-June 9, 1909.

100 Zalophus near Cypress Point.

Phoca

Point Reyes Light, Merriam, October 27, 1904.

Harbor, spotted or leopard seals are common about the lighthouse and in Drake's Bay.

Point Reyes, Hollister, October 25-November 12, 1904.

Common on the bay side of Point Reyes. A few years ago they were constantly hunted for the oil by professional hunters and have become very shy. Mr. Classen's son told of seeing one catch a duck in the bay by swimming under it and catching it from underneath.

Reports of lighthouse keepers.

St. George Reef, September 17, 1921.

Estimate 1700 sea lions on Northwest rocks. Two Phoca seen in ten years.

Farallon Island, August 4, 1921.

400 live pups (no dead ones).

Farallon Islands, July 13, 1922.

400 live pups (one dead one).

Año Nuevo Island, August 9, 1921.

No perceptible change in the rookery in the last few years. 75 dead pups counted this year.

Año Nuevo Island, July 27, 1922.

600 live pups and 25 dead ones. Not many dead pups, as weather very good during entire breeding season.

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DIVISION OF FISH AND GAME OF CALIFORNIA FISH BULLETINS

* No. 1. Report on Fish Conditions. 1913; 48 pp., 3 figs. Contains:

The Abalone Industry in California. By Charles Lincoln Edwards.
The Towing of Salmon and Steelhead Fry from Sacramento to the Sea in a "Live Car." By N. B. Scofield.
The Problem of the Spiny Lobster. By Bennet M. Allen.
Investigation of the Clams of California. By Harold Heath.
Investigation of the Life History of the Edible Crab (Cancer magister). By F. W. Weymouth.
A General Report on a Quinnat Salmon Investigation Carried on During the Spring and Summer of 1911. By N. B. Scofield.
Trout and Black Bass Planting and Transplanting in the San Joaquin and Southern Sierra Districts. By A. D. Ferguson.

* No. 2. The Scientific Investigation of Marine Fisheries as Related to the Work of the Fish and Game Commission in Southern California. By Will F. Thompson. 1919; 27 pp., 4 figs.

* No. 3. The Spawning of the Grunion (Leuresthes tenuis). By Will F. Thompson, assisted by Julia Bell Thompson. July 15, 1919; 29 pp., 9 figs.

No. 4. The Edible Clams, Mussels and Scallops of California. By Frank W. Weymouth. Jan. 10, 1921; 74 pp., 19 pls., 26 figs.

* No. 5. A Key to the Families of Marine Fishes of the West Coast. By Edwin C. Starks. March 3, 1921; 16 pp., 4 figs.

* No. 6. A History of California Shore Whaling. By Edwin C. Starks. October, 1922; 38 pp., 22 figs.

* No. 7. The Life History and Growth of the Pismo Clam. By Frank W. Weymouth. 1923; 120 pp., 15 figs., 18 graphs.

* No. 8. Racial and Season Variation in the Pacific Herring, California Sardine and California Anchovy. By Carl L. Hubbs. February, 1925; 23 pp., 4 pls.

* No. 9. Preliminary Investigation of the Purse Seine Industry of Southern California. By Tage Skogsberg. 95 pp., 23 figs.

* No. 10. The Life History of Leuresthes tenuis, an Atherine Fish with Tidecontrolled Spawning Habits. By Frances N. Clark. October, 1925; 51 pp., 6 graphs, 7 pls.

No. 11. The California Sardine. By the Staff of the California State Fisheries Laboratory. 1926; 221 pp., 74 figs.

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No. 13. Seasonal Average Length Trends at Monterey of the California Sardine (Sardina caerulea). By Carroll B. Andrews. 1928.

No. 14. A Report on the Seals and Sea Lions of California. By Paul Bonnot. 1928.

These bulletins are offered in exchange for the publications of other bodies engaged in marine research. Address: California State Fisheries Laboratory, Terminal Island, California.

* Out of print.

Some time after writing the above my attention was called to the following information from Beebe's Arcturus Adventure. (Osborn Island, a small islet south of Gardner Island in the Galapagos group, April 27, 1925.):

> "As I looked from one to another of the doggish faces, I realized that every one of these pups had something the matter with its eyes. I went ashore to investigate, and of all the sea lions on that little beach there was hardly one, old or young, that was without the disease. The most pitiful sight was a small pup that was quite blind. Next day the blind pup was secured for examination and the disease diagnosed as conjunctivitis. How this was ever contracted by Galapagos sea lions no one has explained."