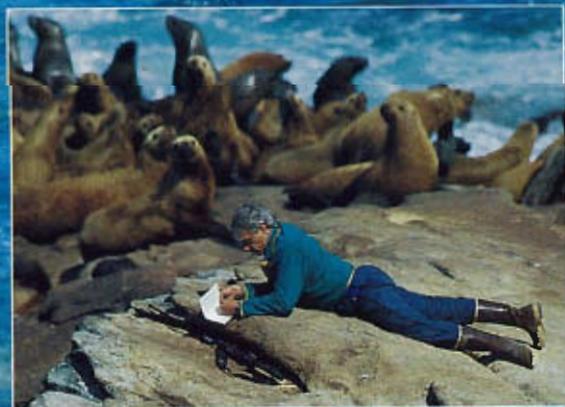

STELLER SEA LIONS

Still Threatened
in Alaska

by Don Calkins

All photos by John Hyde



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In December, 1990, Steller sea lions were placed on the federal Endangered Species List as a threatened species. This action was taken after scientists documented a precipitous decline in the sea lion population in the area from the Kenai Peninsula to Kiska Island in the central Aleutians. Numbers of adult and juvenile sea lions declined on major rookeries and haulouts in this area from 105,289 in the mid-1950s to 23,064 in 1989. The counts have continued to decline since then to 22,754 in 1990 (a 1 percent decline from 1989 to 1990) and 21,726 in 1991 (a 5 percent decline from 1990 to 1991), and 20,672 (a 5 percent decline from 1991 to 1992). If this trend continues, the population may soon reach a level which requires elevating the designation from threatened to endangered.

There are a variety of theories on the reasons for the decline, including exposure to toxic substances, harvest by humans, interactions with fisheries, entanglement with marine debris, diseases, and redistribution of the population to other areas. However, little concrete scientific evidence is available on the causes. Certainly multiple factors must be involved, but the one for which the best supporting evidence exists is that sea lions are nutritionally stressed. Sea lions collected in the Kodiak area during the 1980s (after the decline began) were significantly smaller in body size than sea lions collected in the same area ten years earlier. They were also in an anemic condition. I believe this is a reflection of nutritional stress, probably caused by fundamental changes in the sea lions' prey base.

Life History

Steller sea lions are the largest pinniped species of the family *Otariidae* or eared seals found in Alaska. Males can weigh up to a ton and can reach 13 feet in length. Females are about half the size of males. This species is about three to four times the size of the California sea lion, their nearest relative and the only other sea lion found in North America.

Steller sea lions are found throughout coastal Alaskan waters from the border between Alaska and Canada through the Gulf of Alaska, throughout the Aleutians, and into the Bering Sea. In summer they can be found as far north as Bering Strait, and in winter males use the Bering Sea ice edge as a hauling platform. Generally sea lions concentrate on rookeries in the spring and early summer for pupping and breeding. They use haulouts to rest at many locations along the coast and at all times of year. Some rookeries are used only for breeding and may be used little at other times of the year. Other rookeries are used as haulouts during the year when pupping and breeding are not taking place. Some haulouts are used seasonally and not used the rest of the year, and some are used primarily by certain sex and age classes during parts of the year. Distribution and hauling behavior is



complicated and not completely understood.

Pupping begins at rookeries in approximately mid-May. The largest adult males maintain and defend territories on the rookeries and breed with females when they are receptive, usually

about 11 to 14 days after the birth of the pup. In the Gulf of Alaska and Aleutians, pupping reaches a peak in late June, but may be earlier in Southeast Alaska. Very few pups are born after the end of the first week of July. One pup is born to a female. Twinning

occurs but is very rare. Pups usually remain with their mother and some may suckle up to three years. Some females first breed at three years and produce a pup at four. By six years old, all females are sexually mature and, in the Gulf of Alaska, about 92

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percent of these are pregnant each year. After the egg is fertilized in the female sea lion, the embryo does not immediately implant on the uterus wall. Instead it remains in the uterus in a dormant stage called delayed implantation. In October, the embryo implants, and a normal growth pattern of the fetus follows. Sea lions experience a very high reproductive failure rate, perhaps among the highest of any mammal. Even though 92 percent of the females are pregnant in the fall, only about 55 percent actually produce a pup.

Steller sea lions are very efficient marine predators, feeding on a wide variety of prey species. Mid-water schooling fishes such as pollock, Pacific cod, herring and capelin are their primary prey. Sea lions also take substantial numbers of squid, octopus, and salmon when and where they are available. Pollock is the single most important prey species. Studies conducted in the Gulf of Alaska in the mid-1970s and the mid-1980s and the Bering Sea in the early 1980s by the Alaska Department of Fish and Game (ADF&G) showed that greater than 50 percent of the diet was composed of pollock. However, sea lions used the pollock resource differently in the 1970s than in the 1980s in the Gulf of Alaska. They consumed more pollock in the 1980s than in the 1970s, but the pollock they ate in the 1980s were about 37 percent smaller by weight. This means that an individual sea lion had to spend more time, and thus expend more energy, in the 1980s to obtain the same amount of biomass obtained in the 1970s. Little is known about the diet of sea lions in Southeast Alaska. The few samples taken indicate that Pacific cod and pollock are important there.

Although Steller sea lions are found throughout much of the North Pacific rim from central California to Japan, the majority of the population is found in Alaska. In a 1989 survey conducted by the National Marine Fisheries Service (NMFS), ADF&G, and other agencies, 70 percent of the worldwide population was counted in Alaska. That survey also showed that although the population was stable in Southeast Alaska, the numbers had declined in other parts of Alaska to alarmingly low levels.

Listed as Threatened Species

As part of their responsibility under the Endangered Species Act, NMFS convened a panel of marine mammal and fisheries experts to prepare a recovery plan for the species. The Recovery Team is comprised of eleven members from government agencies (two from ADF&G), fisheries organizations, universities, and private consultants. The Recovery Plan Team submitted a draft Recovery Plan to NMFS on October 3, 1991, but that plan had not been implemented by October 1, 1992.

One result of placing Steller sea lions on the Endangered Species List is that substantially more money has been made available for monitoring the population and investigating the decline. In 1991 the U.S. Congress provided \$1.5 million, to be shared between ADF&G and NMFS, for high priority research identified in the draft Steller Sea Lion Recovery Plan. ADF&G received \$689,000 through this Congressional grant for work beginning on March 1, 1992.

Research currently conducted by ADF&G as a result of this grant includes the following: sea lion counts in Southeast and Southcentral Alaska; investigations of diseases associated with premature pups; testing immobilizing drugs; comparison of



ADF&G biologist Dennis McAllister attaches a satellite transmitter to a Steller sea lion on Forrester Island as Dr. Don Calkins looks on.

composition and numbers of sea lions between the Forrester Island rookery in Southeast Alaska and Marmot Island rookery near Kodiak (a comparison between the area of decline and an area not experiencing a decline); investigations of movements, feeding patterns, diving behavior, habitat use, and patterns of interactions between sea lions and commercial fisheries; and investigations of disease agents and pollutants in tissues.

As part of the joint effort between NMFS and ADF&G to monitor the status of sea lions in Alaska, we surveyed from the Barren Islands to the Canada/Alaska border. Sea lion surveys are flown during the breeding season in late June when highest concentrations of adult and juveniles are found on shore. Small aircraft are used along the coast to photograph all sea lions at rookeries and haulouts. The slide photos are projected onto a paper screen, and all the sea lions are then counted. This year's ADF&G photo counts were flown by Jon Lewis and Dennis McAllister who took a total of 2,880 photographs. NMFS personnel are conducting a similar survey throughout the rest of the state. Final results of the survey are not available yet, but it appears the trend we have seen in the ADF&G surveyed areas in the last three years will remain the same. Numbers in Southeast Alaska appear stable, while in the northeastern Gulf of Alaska the decline appears to be continuing.

Premature pups which had died were collected at Cape St. Elias in March 1992 by ADF&G wildlife technicians Walt Cunningham and Susan Stanford. The pups were thoroughly necropsied and sampled for diseases by Dr. Terry Spraker, a veterinary pathologist from Colorado State University, and Denise Brady, a veterinary technician and bacteriologist with the San Diego County Veterinarian's Office. Samples from this work have not been completely processed, so the results are not yet available.

Immobilizing drugs were tested at Forrester Island and the Hazy Islands in May and again at Forrester Island and at the White Sisters in June. Because sea lions are declining so rapidly, scientists must be extremely careful not to sacrifice any more animals for scientific purposes than is necessary. Consequently, we are attempting to develop immobilizing drugs and procedures so we can get the information we need without killing individual sea lions. Some of the information we hope to collect routinely includes weights, measurements, a tooth for aging, blubber biopsy for environmental contaminants testing, blood samples for overall condition and disease investigations, and a skin biopsy for genetic studies. We also will attach a satellite-linked radio transmitter and possibly pump stomachs for investigations of food habits. These experiments are being conducted with the assistance of veterinary anesthesiologist Dr. Bruce Heath from Colorado State University and Dr. Terry Spraker.



So far we have perfected a technique for administering gas anesthesia to sea lions in the field, which has allowed greater time and latitude for working on immobilized sea lions than we have had in the past. The next part of this work will involve testing new, experimental drugs which we hope will eliminate the need to use the cumbersome gas anesthesia machine.

Studies of composition and numbers of sea lions at Marmot Island were conducted by Kathryn Chumbley from NMFS National Marine Mammal Laboratory in Seattle and Susan Stanford and Jason Waite from ADF&G. Information collected this year and in the past will be compared with data collected from Forrester Island where sea lions are not declining. The Forrester Island studies were conducted by Dave Johnson and Boyd Porter with ADF&G. A camp was established on Lowrie Island, which is a part of the Forrester Island rookery, and daily counts and observations were conducted from mid-May until mid-August. Plans for the future are to establish a permanent research facility on Lowrie Island similar to the one established on Marmot Island in 1978.

Investigations of feeding patterns, diving behavior, habitat use, and patterns of interactions between sea lions and commercial fisheries are being conducted by attaching satellite-linked

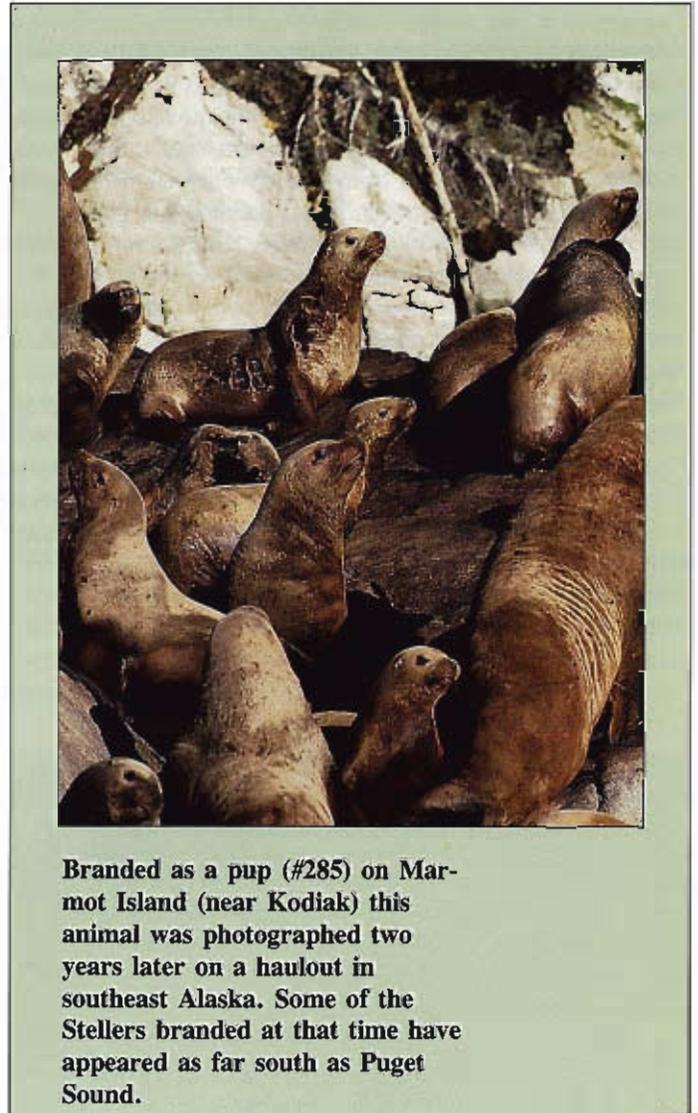
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radio transmitters to sea lions and following their movements over time. The satellite package is glued to the hair on the back of the sea lion. The package contains a sophisticated computer system which monitors when the animal is under water or on land, records the date and time of day, and stores information on dive duration and depths. When the antenna is out of the water (but not necessarily on land), it transmits information to the satellite. The satellite picks up the signal and transmits the information to a ground station. Location is calculated, and the information is available for analysis by personal computer. In this way biologists can monitor locations on land and at sea, feeding depths of sea lions, and the time spent diving.

We deployed six satellite transmitters on five adult female sea lions and one yearling female this year. Analysis of data is not complete, but most of the adults stayed in the area of the rookeries where they were fitted with the transmitters while the yearlings moved a short distance away. Much more information is available from these animals, but it will take several months to analyze. NMFS National Marine Mammal Laboratory investigators Dr. Tom Loughlin and Richard Merrick pioneered techniques for attaching radio transmitters to sea lions, and they continue to conduct similar studies in other parts of Alaska. Condition indices, prevalence of disease agents, and levels of environmental contaminants are being monitored by taking various measurements, blood samples, swabs, and biopsies from animals during immobilizing experiments and when animals are immobilized for attachment of radio transmitters.



Branded as a pup (#285) on Marmot Island (near Kodiak) this animal was photographed two years later on a haulout in southeast Alaska. Some of the Stellers branded at that time have appeared as far south as Puget Sound.

All photos © John Hyde

Information has been collected on several animals and will continue to be collected in the future, but analyses are incomplete, and conclusions have not been drawn.

These studies have been designed as ongoing investigations, lasting several years. It will be several years before we understand what is happening to sea lions. Many of the techniques needed are only now being developed. The work will require dedication of substantial funds for several years to come as well as participation of numerous individuals. ADF&G expects to continue to play an important role in these investigations.

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Steller Sea Lions

Kuskokwim Bruins

Collaring Caribou

