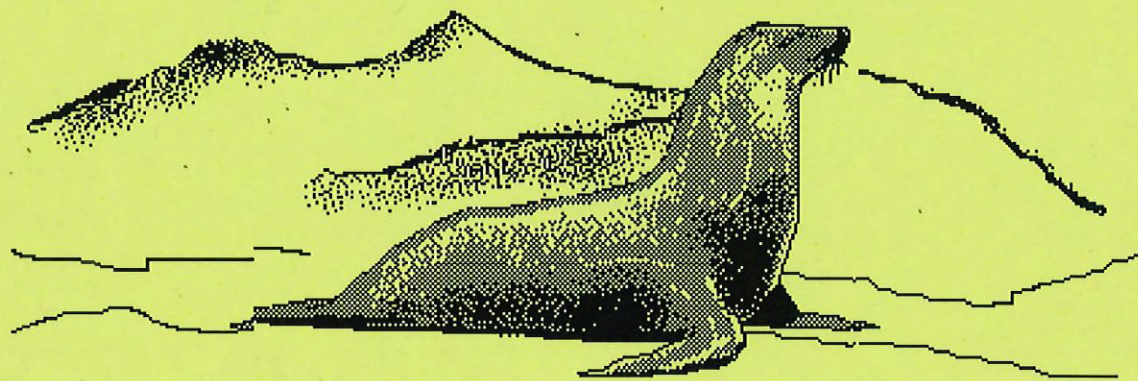


**Steller Sea Lion Counts in Oregon
During June and July, 1975-1991**



**Oregon Department of Fish and Wildlife
Nongame Wildlife Program**

STELLER SEA LION COUNTS IN OREGON
DURING JUNE AND JULY, 1975-1991

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ABSTRACT

Steller sea lion (Eumetopias jubatus) abundance and distribution in Oregon was monitored by aerial photographic survey and limited ground visits to rookeries between 1975 and 1991. Steller sea lions were found hauled out at ten different locations along the Oregon coast. Newborn pups were seen at three sites, with most occurring at Rogue Reef and Orford Reef on the southern coast. The greatest pup count occurred in 1990 when 794 were observed during ground visits and aerial surveys. Statewide counts of adult and juvenile Steller sea lions have fluctuated between 2,500 and 3,000 over the past 10 years. Sea lion abundance in Oregon probably increased from the 1,500 to 2,000 adults and juveniles counted during the mid- to late-1970's. The relatively short data series and questions of survey methodology used during the 1970's made it difficult to more accurately assess trends in Steller sea lion abundance in Oregon at this time.

INTRODUCTION and METHODS

Oregon Department of Fish and Wildlife (ODFW) initiated pinniped surveys along the Oregon coast in 1984 as part of a cooperative project with the National Marine Fisheries Service (NMFS). The major objectives of the project were to assess the status and trends of marine mammal populations in Oregon and to examine the interactions of marine mammals with Oregon fisheries and fish resources. Similar surveys of pinniped distribution and abundance in Oregon were conducted in cooperation with Oregon State University (OSU) from 1975 to 1983. The data gathered from all surveys were used to develop annual indices of species abundance for detection of trends in population size and distribution. One of the principal species monitored by these projects has been the Steller (northern) sea lion, *Eumetopias jubatus*.

Techniques for collecting and analyzing data on the distribution and abundance of Steller sea lions reported here were similar to those used for pinnipeds in other areas on the west coast of North America (Braham et al. 1980; Miller et al. 1983; Beach et al. 1985; Bigg 1985; Merrick et al. 1987; Brown 1988). Surveys in Oregon were flown in a single-engine, high-wing aircraft at altitudes of 700-1000 ft. Statewide surveys of Steller sea lions were conducted over a 1-2 day period, targeting moderately low tides during mid-day (1000-1400 hours) when the most adult and juvenile animals were expected to be onshore (Withrow 1982). Data collected during surveys included date, time, location, an estimate of the number of sea lions at each location, and a description of weather conditions at the time of the survey. Photographs of all animals at each site were taken using a hand-held 35 mm SLR camera, a 70-210 mm zoom lens, and high-speed color slide film. Counts made from these slides constitute the abundance and distribution data reported here.

Surveys of Steller sea lions in Oregon conducted during the reproductive period (late May to early July) were used for comparison of abundance between

years. The sum of counts at all sea lion rookeries and haul-out areas statewide during the reproductive period constituted the annual index of sea lion abundance for that year. A linear regression of the natural logarithm of the counts was used to determine if the trend in annual index counts over the reporting period was significantly different from zero.

Most counts of Steller sea lion pups reported here were made from aerial photographs. Beginning in 1985, ground counts of Steller sea lion pups were made at several locations during visits to pupping areas late in the reproductive period. Visits to these sites were made by small boat. Pups were counted by walking around the perimeter of the rookery and herding pups toward the center.

RESULTS and DISCUSSION

Steller sea lions hauled out at ten locations along the Oregon coast, from the south jetty of the Columbia River in the north, to Rogue Reef in the south (Table 1). Substrate type at all haul-out sites was rock or cobble. Statewide reproductive period counts of Steller sea lions in Oregon ranged from approximately 1,500 to 3,200 adult and juvenile animals between the years 1976 and 1991 (Table 2). Counts from 1976 to 1981 ranged from 1,500 to 2,100 adults and juveniles, while counts from 1982 to 1991 tended to be greater and ranged from 2,000 to 3,200.

Regional Stock Status

There are no comparable counts of Steller sea lions in Oregon that can be used to assess the status of the species prior to the mid-1970's. Anecdotal information suggests that frequent shooting and occasional use of explosives at rookeries before implementation of the Marine Mammal Protection Act (1972) may have kept sea lion numbers below those reported here. Steller sea lion counts reported here show an apparent increasing trend between 1976 and 1991 (Table 2). Some portion of this

increase reflects an improvement in quality and consistency of survey technique, and not just a real increase in animal numbers over the same period. Aerial surveys conducted before 1982 were not always flown during the optimum period (late June to early July) or at mid-day when peak numbers of sea lions are known to haul out. Surveys conducted since 1982 have been carried out in a more consistent manner. These later surveys (1982 to 1991) do not show a significant upward trend in abundance ($P \geq 0.05$).

Steller sea lions also occur on NW and SW Seal Rocks at St. George Reef off northern California. This haul-out and pupping site is located 40 miles south of Rogue Reef and can be considered part of the regional concentration of sea lions in this area. In July of 1990 a ground count of 674 adult and juvenile sea lions and 124 pups was made at this site. In July of 1991 aerial photo counts of adult and juvenile animals at St. George Reef was 676 and the pup count was 50.

Based on Steller sea lion life table data collected in the Gulf of Alaska, Calkins and Pitcher (1983) suggested that the total number of animals present at the end of the pupping season should average 4.5 times the number of pups born. Applying this correction factor to the 918 pups counted from St. George Reef to Three Arch Rock (124 at St. George Reef; 492 at Rogue Reef; 298 at Orford Reef; and 4 at Three Arch Rock) results in a population estimate of 4131 individuals in the northern California to northern Oregon coastal area in July of 1990. The validity of applying a correction factor developed from Alaska data to Oregon pup counts is unknown.

Status of Rogue Reef and Orford Reef Rookeries

Most reproductive activity occurred at Rogue Reef and Orford Reef on the southern Oregon coast, with small numbers of pups occasionally observed at Three Arch Rock on the north coast. Counts of adult and juvenile Steller sea lions at

Rogue Reef from 1975 to 1991 ranged from 800 to 1,500 animals. Counts of adults and juveniles at Orford Reef ranged from 400 to 900 animals over the same period (Table 3).

Pup Counts

Nearly all Steller sea lion pups in Oregon were born on Pyramid Rock at Rogue Reef, and on Long Brown Rock at Orford Reef. Pup counts from aerial surveys made between 1984 and 1991 ranged from 176 to 463 at Pyramid Rock and from 57 to 181 at Long Brown Rock (Table 4). Ground counts of pups during visits to Pyramid Rock at Rogue Reef from 1985 to 1990 ranged from 370 to 552. One ground count of pups on Long Brown Rock at Orford Reef was made in 1990 when 298 pups were found (Table 4). Small numbers of pups (fewer than 6) were also seen at Three Arch Rock in 1985, 1988, 1989, 1990, and 1991.

Successful identification and counting of pups at Rogue Reef and Orford Reef from aerial photos varied between surveys. The dark brown pelage of newborn pups was often difficult to distinguish from the dark and uneven rock surface, particularly in photos taken during poor weather and lighting conditions. Thus, pup counts from aerial surveys at Pyramid and Long Brown Rocks may underestimate pup abundance in any single year. The accuracy of such aerial counts may be too variable to identify minor trends in pup production over short periods. For example, the greater pup counts at Rogue Reef and Orford Reef rookeries in 1988 and 1989, relative to previous years, are considered to be a result of better survey timing and higher quality of aerial photos, and not to any measurable increase in production

Ground counts of pups at Rogue Reef and Orford Reef were consistently greater than those made from aerial photographs taken during the same year (Table 4). For example, the ground count of 298 pups at Long Brown Rock in 1990 was nearly three times the count made from aerial photos taken on the day before.

Adult and Juvenile Numbers

Trends in counts of adult and juvenile Steller sea lions at Rogue Reef, the largest rookery in Oregon, from 1975 to 1991 were similar to statewide trends (Table 3). Counts prior to 1982 were lower (800-900) than counts made since 1982 (1000-1500). Once again, the overall increase in counts probably represents both an improvement in survey technique and some actual increase in sea lion numbers.

Although the greatest counts of adult and juvenile Steller sea lions at Orford Reef were made after 1982, the difference between pre- and post-1982 counts were not as apparent as they were at Pyramid Rock or for statewide counts (Table 3). A decrease in sea lion numbers at Orford Reef was observed from 1987 to 1989. The 1989 count was among the lowest made during the breeding period since 1975. Numbers of sea lions using Seal Rock, the secondary pupping site at Orford Reef declined from 226 in 1987 to 3 in 1989.

These observed decreases in numbers of sea lions using Orford Reef occurred during a period of increasing boat traffic and human activity related to the commercial harvest of sea urchin in this area. During aerial surveys conducted in 1988 and 1989, observations of urchin boats operating within several hundred feet of rocks unusually devoid of sea lions were common. Seal Rock, located in the center of urchin harvest activity at Orford Reef, was largely abandoned by sea lions in 1989. It is believed that sea lions responded to unintentional disturbance by avoiding use of these traditional areas. Closures to harvest of sea urchin with 1000 feet of the three pupping rocks at Rogue and Orford Reef from May 1 through August 31 were implemented by the Oregon Fish and Wildlife Commission on May 9, 1990 to provide protection to sea lions from disturbance during the reproductive period. Increased counts of sea lions at Rogue Reef and Orford Reef in 1990 and 1991 suggest that this Commission action and the cooperation of the urchin fishery resulted in a reduction in disturbance to sea lions at these sites.

As human activities and uses of the nearshore ocean for commercial and recreational purposes increase, adequate measures to provide necessary protection to Steller sea lions from disturbance will be required. These animals are presently listed as a threatened species under the Endangered Species Act and are provided protection under the Marine Mammal Protection Act. Most Steller sea lion haul out areas and all reproductive sites in Oregon are located within the Oregon Islands and Three Arch Rock National Wildlife Refuges.

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Table 1. Name and location of Steller sea lion haul-out sites in Oregon.

Location Name	N Latitude	W Longitude
Columbia River		
South Jetty	46° 14' 00"	124° 04' 00"
Ecola Point		
Sea Lion Rock	46° 54' 29"	123° 58' 20"
Three Arch Rocks		
Seal Rock	45° 27' 50"	123° 58' 56"
Cascade Head		
Sea Lion Rocks	45° 03' 58"	124° 01' 00"
Hart Cove	45° 04' 05"	124° 00' 30"
Seal Rock		
Seal Rocks	44° 30' 28"	124° 05' 29"
Sea Lion Caves	44° 07' 30"	124° 07' 32"
Cape Arago		
Shell Isl. Area	43° 18' 45"	124° 24' 00"
Simpsons Reef	43° 18' 55"	124° 24' 30"
Blanco Reef	42° 49' 41"	124° 35' 00"
	42° 45' 25"	124° 34' 57"
Orford Reef		
Best Rock	42° 47' 28"	124° 35' 40"
Seal Rock	42° 47' 14"	124° 35' 35"
	42° 47' 18"	124° 35' 55"
Arch Rock	42° 46' 43"	124° 35' 45"
West Conical Rock	42° 46' 39"	124° 36' 00"
Steamboat Rock	42° 46' 35"	124° 36' 10"
Large Brown Rock	42° 47' 32"	124° 36' 00"
Long Brown Rock	42° 47' 28"	124° 36' 18"
Rogue Reef		
Pyramid Rock Area	42° 26' 42"	124° 28' 03"
Needle Rock	42° 26' 54"	124° 28' 57"
Double Rock	42° 26' 58"	124° 29' 15"

Table 2. Summer counts of Steller sea lions in Oregon, 1976-1991.

Year	Adult and Juvenile Count	Source
1976	1,486	OSU
1977	1,461	OSU, ODFW
1978	1,812	OSU, ODFW
1979	1,544	OSU, ODFW
1980	1,632	OSU, ODFW
1981	2,108	OSU, ODFW
1982	2,674	NMFS
1983	2,076	OSU, ODFW
1984	1,678	ODFW
1985	2,503	ODFW
1986	2,296	ODFW
1987	2,636	ODFW
1988	2,775	ODFW
1989	2,091	ODFW
1990	2,714	ODFW
1991	3,229	ODFW

OSU - Oregon State University

ODFW - Oregon Department of Fish and Wildlife

NMFS - National Marine Fisheries Service

Table 3. Summer counts of adult and juvenile Steller sea lions at Rogue Reef and Orford Reef, Oregon, 1975-1991.

Adult and Juvenile Count		
Year	Rogue Reef	Orford Reef
1975	802	716
1976	800	341
1977	815	371
1978	859	677
1979	na	689
1980	914	482
1981	810	736
1982	1,389	754
1983	958	603
1984	754	650
1985	1,174	559
1986	1,230	896
1987	1,194	929
1988	1,381	691
1989	1,001	446
1990	1,229	776
1991	1,537	836

na - count not available

Table 4. Summer counts of Steller sea lion pups at Rogue Reef and Orford Reef, Oregon from aerial and ground surveys, 1984-1991.

Year	Rogue Reef		Orford Reef	
	Pyramid Rock	Seal Rock	Long Brown Rock	
	Aerial/Ground	Aerial/Ground	Aerial/Ground	
1984	340/na	8/na	57/na	
1985	257/370	8/na	77/na	
1986	296/na	na/na	na/na	
1987	176/395	8/na	81/na	
1988	349/552	1/na	158/na	
1989	407/na	0/na	181/na	
1990	463/492	0/na	111/298	
1991	341/na	0/na	80/na	

na - count not available