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NORTHERN FUR SEAL (*Callorhinus ursinus*): San Miguel Island Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Northern fur seals occur from southern California north to the Bering Sea and west to the Okhotsk Sea and Honshu Island, Japan (Fig. 1). During the breeding season, approximately 74% of the worldwide population is found on the Pribilof Islands in the southern Bering Sea, with the remaining animals spread throughout the North Pacific Ocean (Lander and Kajimura 1982). Of the seals in U.S. waters outside of the Pribilofs, approximately 1% of the population is found on Bogoslof Island in the southern Bering Sea and San Miguel Island off southern California (NMFS 1993). Northern fur seals may temporarily haul out on land at other sites in Alaska, British Columbia, and on islets along the coast of the continental United States, but generally outside of the breeding season (Fiscus 1983).

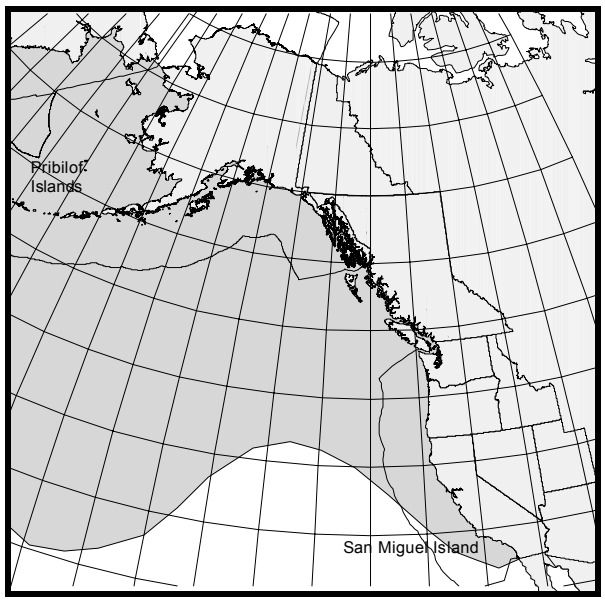

Figure 1. Approximate distribution of northern fur seals in the eastern North Pacific (shaded area).

Due to differing requirements during the annual reproductive season adult males and females typically occur ashore at different, though overlapping times. Adult males usually occur on shore during the 4-month period from May-August, though some may be present until November (well after giving up their territories). Adult females are found ashore for as long as six months (June-November). After their respective times ashore, seals of both genders spend the next 7-8 months at sea (Roppel 1984). Adult females and pups from the Pribilof Islands migrate through the Aleutian Islands into the North Pacific Ocean, often to the Oregon and California offshore waters. Many pups may remain at sea for 22 months before returning to their rookery of birth. Adult males from the Pribilof Islands generally migrate only as far south as the Gulf of Alaska (Kajimura 1984). There is considerable interchange of individuals between rookeries.

The following information was considered in classifying stock structure based on the Dizon et al. (1992) phylogeographic approach: (1) Distributional data: geographic distribution is continuous during feeding, geographic separation during the breeding season, high natal site fidelity (DeLong 1982); (2) Population response data: substantial differences in population dynamics between Pribilofs and San Miguel Island (DeLong 1982, DeLong and Antonelis 1991, NMFS 1993); (3) Phenotypic data: unknown; and (4) Genotypic data: unknown. Based on this information, two separate stocks of northern fur seals are recognized within U.S. waters: an Eastern Pacific stock and a San Miguel Island stock. The Eastern Pacific stock is reported separately in the Stock Assessment Reports for the Alaska Region.

POPULATION SIZE

The population estimate for the San Miguel Island stock of northern fur seals is calculated as the estimated number of pups at rookeries multiplied by an expansion factor. Based on research conducted on the Eastern Pacific stock of northern fur seals, a life table analysis was performed to estimate the number of yearlings, 2 year olds, 3 year olds, and animals at least 4 years old (Lander 1981). The resulting population estimate was equal to the pup count multiplied by 4.475. The expansion factors are based on a sex and age distribution estimated after the harvest of juvenile males was terminated. A more appropriate expansion factor for the San Miguel Island stock is 4.0, based on the known increased immigration of recruitment-age females (DeLong 1982) and mortality and possible emigration of adults associated with the El Niño Southern Oscillation event in 1982-1983 (R. DeLong, pers. comm.). A 1998 pup count resulted in a total count of 627 pups, a 79.6% decrease from the 1997 count of 3,068 (Melin and DeLong 2000). In 1999, the population began to recover with a total pup count of 1,084 (S. Melin, unpubl. data). Based on the 1999 count and the expansion factor, the most recent population estimate of the San Miguel Island stock is 4,336 (1,084 x 4.0) northern fur seals. Currently, a CV for the expansion factor is unavailable.

Minimum Population Estimate

The survey technique utilized for estimating the abundance of northern fur seals within the San Miguel Island stock is a direct count, with no associated CV(N) as sites are surveyed only once. Additional estimates of the overall population size (i.e., N_{BEST}) and associated CV are also unavailable. Therefore N_{MIN} for this stock can not be estimated by calculating the log-normal 20th percentile of the population estimate. Rather, N_{MIN} is estimated as twice the maximum number of pups born in 1999 (to account for the pups and their mothers) plus the maximum number of adult and sub-adult males counted for the 1999 season, which results in an N_{MIN} of 2,336 ((1,084 x 2) + 168). This method provides a very conservative estimate of the northern fur seal population at San Miguel Island.

Current Population Trend

The population of northern fur seals on San Miguel Island originated from the Pribilof Islands population during the late 1950s or early 1960s (DeLong 1982). The colony has increased steadily, since its discovery in 1968, except for severe declines in 1983 and 1998 associated with El Niño Southern Oscillation events in 1982-1983 and 1997-1998 (DeLong and Antonelis 1991, Melin and DeLong 2000). El Niño events, which occur periodically along the California coast, impact population growth of fur seals at San Miguel Island and are an important regulatory mechanism for this population (DeLong and Antonelis 1991; Melin and DeLong 1994, 2000; Melin et al. 1996).

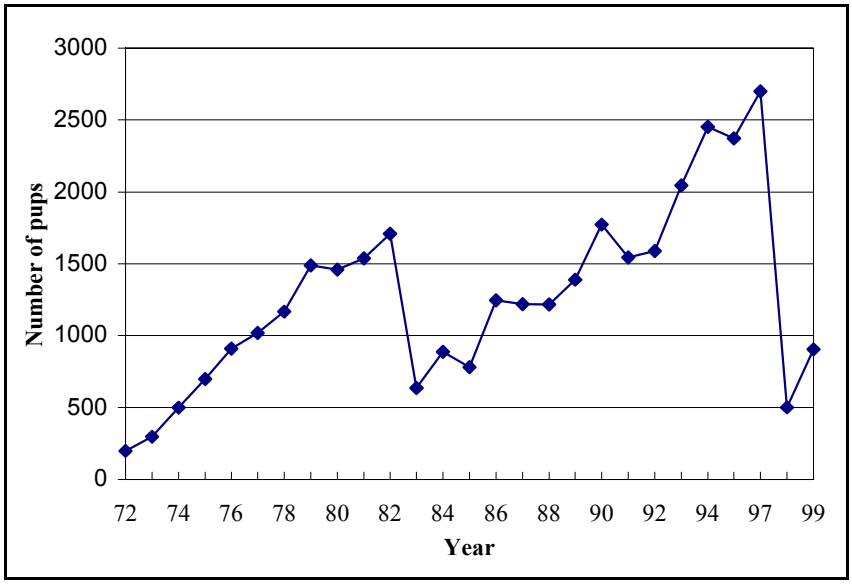

Figure 2. Northern fur seal live pup counts on San Miguel Island, 1972-1999. Counts from 1996 were incomplete and have not been included in the figure.

Specifically, live pup counts increased about 24% annually from 1972 through 1982, an increase due, in part, to immigration of females from the Bering Sea and the western North Pacific Ocean (DeLong 1982) (Fig. 2). The 1982-1983 El Niño event resulted in a 60.3% decline in the northern fur seal population at San Miguel Island (DeLong and Antonelis 1991). It took the population 7 years to recover from this decline, because adult female mortality occurred in addition to pup mortality (Melin and DeLong 1994). The 1992-1993 El Niño conditions resulted in reduced pup production in 1992, but the population recovered in 1993 and increased in 1994 (Melin et al. 1996).

From July 1997 through May 1998, the most severe El Niño event in recorded history affected California coastal waters (Lynn et al. 1998). In 1997, total fur seal pup production was 3,068 pups, the highest recorded since the colony has been monitored. However, it appears that up to 87% of the pups born in 1997 died before weaning, and total production in 1998 was only 627 pups, a decline of 79.6% from 1997 (Melin and DeLong 2000). Although total production increased to 1,084 in 1999 (S. Melin, unpubl. data), a slow recovery from the 1998 decline is anticipated if adult female mortality occurred in addition to the high pup mortality in 1997 and 1998 (Melin and DeLong 2000).

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

The northern fur seal population in the Pribilof Islands increased steadily during 1912-1924 after the commercial harvest no longer included pregnant females. During this period, the rate of population growth was approximately 8.6% (SE=1.47) per year (A. York, unpubl. data), the maximum recorded for this species. This growth rate is similar and slightly higher than the 8.12% rate of increase (approximate SE=1.29) estimated by Gerrodette et al. (1985). Given the extremely low density of the population in the early 1900s, the 8.6% rate of increase is considered a reliable estimate of R_{MAX}.

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for this stock is calculated as the minimum population estimate (2,336) times one-half the observed maximum net growth rate (½ of 8.6%) times a recovery factor of 1.0 (for stocks of unknown status that are increasing in size, Wade and Angliss 1997), resulting in a PBR of 100 San Miguel Island northern fur seals per year.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fisheries Information

Northern fur seals taken during the winter/spring along the west coast of the continental U.S. could be from the Pribilofs and thus belong to the Eastern Pacific stock. However, it is the intention of NMFS to consider any takes of northern fur seals by commercial fisheries in waters off California, Oregon, and Washington as being from the San Miguel Island stock. Information concerning the three observed fisheries that may have interacted with northern fur seals are listed in Table 1. There were no reported mortalities of northern fur seals in any observed fishery along the west coast of the continental U.S. during the period from 1994-1998 (Table 1; Julian 1997, Julian and Beeson 1998, Cameron and Forney 1999). Overall entanglement rates in the California/Oregon thresher shark/swordfish drift gillnet fishery dropped considerably after the 1997 implementation of a Take Reduction Plan, which included skipper education workshops and required the use of pingers and minimum 6-fathom extenders (Barlow and Cameron 1999). Because of the changes in this fishery after implementation of the Take Reduction Plan, mean annual takes in Table 1 are based only on 1997-1998 data. Fishing effort in the California angel shark/halibut set gillnet fishery was substantially reduced as a result of a California voter proposition banning gillnet fishing in certain areas (Julian 1997, Julian and Beeson 1998). For this fishery, there were no observed sets after 1994. The estimated mean mortality rate in observed fisheries is zero northern fur seals per year from this stock.

An additional source of information on the number of northern fur seals killed or injured incidental to commercial fishery operations is the self-reported fisheries information required of vessel operators by the MMPA. During the period between 1994 and 1998, there were no fisher self-reports of northern fur seal mortalities from any fisheries operating within the range of this stock. Self-reported fisheries data are incomplete for 1994, not available for 1995, and considered unreliable after 1995 (see Appendix 4 of Hill and DeMaster 1998).

Table 1. Summary of available information on the incidental mortality and injury of northern fur seals (San Miguel Island stock) in commercial fisheries that might take this species and calculation of the mean annual mortality rate; n/a indicates that data are not available. Mean annual takes are based on 1994-98 data unless noted otherwise.

Fishery name	Years	Data type	Percent observer coverage	Observed mortality	Estimated mortality	Mean annual takes (CV in parentheses)
CA/OR thresher shark/ swordfish drift gillnet	94 95 96 97 98	obs data	17.9% 15.6% 12.4% 23.0% 20.0%	0 0 0 0 0	0 0 0 0 0	0[1]
CA angel shark/halibut set gillnet	94 95 96 97 98	obs data extrapolated estimates (1995-98)	7.7% 0% 0% 0% 0%	0 0 0 0 0	0 0[2] 0[2] 0[2] 0[2]	0 0
WA/OR/CA groundfish trawl (Pacific whiting component)	94 95 96 97 98	obs data	53.8% 56.2% 65.2% 65.7% 77.3%	0 0 0 0 0	0 0 0 0 0	0
CA/OR thresher shark/ swordfish drift gillnet	94-98	self reports	n/a	n/a, n/a, n/a, n/a, n/a	n/a	-
CA angel shark/halibut set gillnet	94-98	self reports	n/a	n/a, n/a, n/a, n/a, n/a	n/a	-

Fishery name	Years	Data type	Percent observer coverage	Observed mortality	Estimated mortality	Mean annual takes (CV in parentheses)
unknown west coast fishery	94-98	strand data	n/a	0, 0, 0, 0, 0	n/a	0
Minimum total annual takes						0

[1] Only 1997-98 mortality estimates are included in the average because of gear modifications implemented within the fishery as part of a 1997 Take Reduction Plan. Gear modifications included the use of net extenders and acoustic warning devices (pingers).
[2] The California set gillnets were not observed after 1994; mortality was extrapolated from effort and previous entanglement rates.

Strandings of northern fur seals entangled in fishing gear or with injuries caused by interactions with gear are a final source of fishery-related mortality information. During 1994-1998, no northern fur seal strandings occurred. Fishery-related strandings during 1994-1998 resulted in an estimated annual mortality of zero animals from this stock. This estimate is considered a minimum because not all stranded animals are found, reported, or examined for cause of death (via necropsy by trained personnel).

STATUS OF STOCK

The San Miguel Island northern fur seal stock is not considered to be "depleted" under the MMPA or listed as "threatened" or "endangered" under the Endangered Species Act. Based on currently available data, the estimated annual level of total human-caused mortality and serious injury (0) does not exceed the PBR (100). Therefore, the San Miguel Island stock of northern fur seals is not classified as a strategic stock. The minimum total fishery mortality and serious injury for this stock (0) is not known to exceed 10% of the calculated PBR (10) and, therefore, can be considered to be insignificant and approaching zero mortality and serious injury rate. The stock size decreased 79.6% from 1997 to 1998 and began to recover in 1999. The status of this stock relative to its Optimum Sustainable Population (OSP) level is unknown, unlike the Eastern Pacific northern fur seal stock which is formally listed as "depleted" under the MMPA.

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