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GUADALUPE FUR SEAL (*Arctocephalus townsendi*)

STOCK DEFINITION AND GEOGRAPHIC RANGE

Commercial sealing during the 19th century reduced the once abundant Guadalupe fur seal to near extinction in 1894 (Townsend 1931). Prior to the harvest it ranged from Monterey Bay, California, to the Revillagigedo Islands, Mexico (Fleischer 1987, Hanni et al. 1997; Figure 1). The capture of two adult males at Guadalupe Island in 1928 established the species' return (Townsend 1931); however, they were not seen again until 1954 (Hubbs 1956). Guadalupe fur seals pup and breed mainly at Isla Guadalupe, Mexico. In 1997, a second rookery was discovered at Isla Benito del Este, Baja California (Maravilla-Chavez and Lowry 1999) and a pup was born at San Miguel Island, California (Melin and DeLong 1999). Individuals have stranded or been sighted as far north as Blind Beach, California (38° 26' 10" N, 123° 07' 20" W); inside the Gulf of California and as far south as Zihuatanejo, Mexico (17° 39' N, 101° 34'W; Hanni et al. 1997 and Aurioles-Gamboa and Hernadez-Camacho 1999). The population is considered to be a single stock because all are recent descendants from one breeding colony at Isla Guadalupe, Mexico.

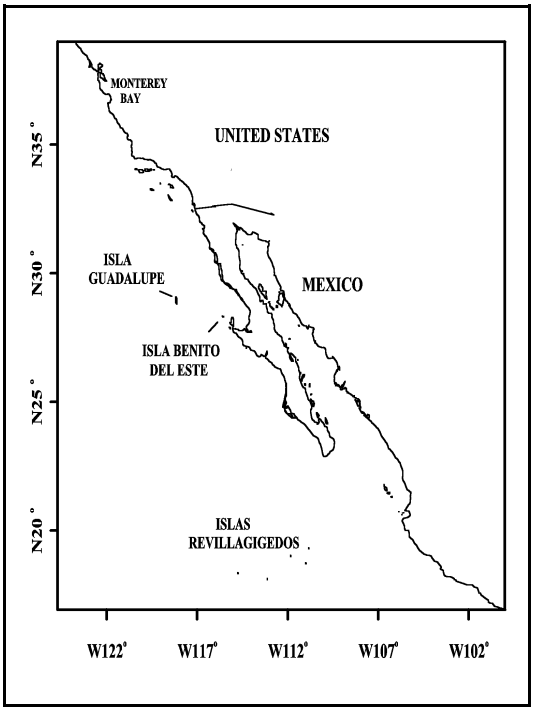

Figure 1. Geographic range of the Guadalupe fur seal, showing location of two rookeries at Isla Guadalupe and Isla Benito Del Este.

POPULATION SIZE

The size of the population prior to the commercial harvests of the 19th century is not known, but estimates range from 20,000 to 100,000 animals (Wedgeforth 1928, Hubbs 1956, Fleischer 1987). The population was estimated by Gallo (1994) to be about 7,408 animals in 1993. The population estimate was derived by multiplying the number of pups (counted and estimated) by a factor of 4.0.

Minimum Population Estimate

All the individuals of the population cannot be counted because all age and sex classes are never ashore at the same time and some individuals that are on land are not visible during the census. Sub-sampling portions of the rookery indicate that only 47-55% of the seals present (i.e., hauled out) are counted during the census (Gallo 1994). The 1993 count of all age classes plus the estimate of missed animals was 6,443 (Gallo 1994). The minimum size of the population in Mexico can be estimated as the actual count of 3,028 hauled out seals [The actual count data were not reported by Gallo (1994); this number is derived by multiplying the estimated number hauled out by 47%, the minimum estimate of the percent counted]. In the United States, a few Guadalupe fur seals are known to inhabit California sea lion rookeries in the Channel Islands (Stewart et al. 1987).

Current Population Trend

Counts of Guadalupe fur seals have been made sporadically since 1954. Records of Guadalupe fur seal counts through 1984 were compiled by Seagars (1984), Fleischer (1987), and Gallo (1994). The count for 1988 was taken from Torres et al. (1990). A few of these counts were made during the breeding season, but the majority were made at other times of the year (Figure 1). Also, the counts that are documented in the literature generally provide only the total of all Guadalupe fur seals counted (i.e., the counts are not separated by age/sex class). The counts that were made during the breeding season, when the maximum number of animals are present at the rookery, were used to examine population growth (Gallo 1994). The natural logarithm of the counts was regressed against year to calculate the growth rate of the population. These data indicate that the population of Guadalupe fur seals is increasing exponentially at an average annual growth rate of 13.7% (Gallo 1994; Figure 2).

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

The maximum net productivity rate can be assumed to be equal to the annual growth rate observed over the last 30 years (13.7%) because the population was at a very low level and should have been growing at nearly its maximum rate.

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) for this stock is calculated as the minimum population size (3,028) times one half the default maximum net growth rate for pinnipeds (½ of 12%) times a recovery factor of 0.5 (for a threatened species, Wade and Angliss 1997), resulting in a PBR of 104 Guadalupe fur seals per year. The vast majority of this PBR would apply towards incidental mortality in Mexico.

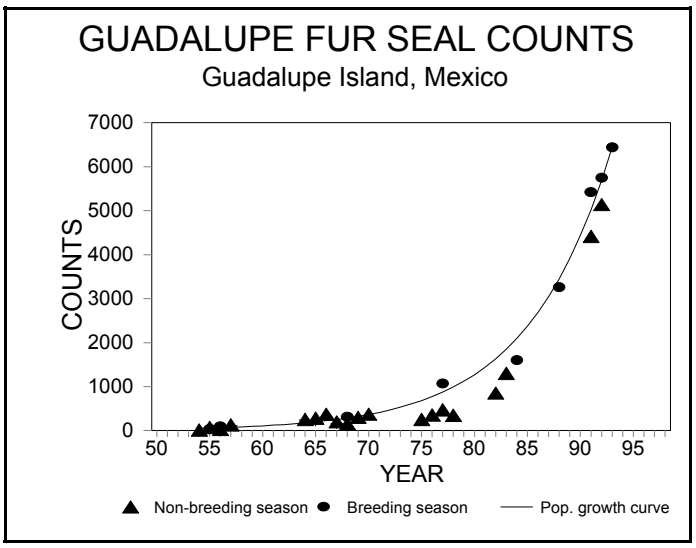

Figure 2. Counts of Guadalupe fur seals at Guadalupe Island, Mexico, and the estimated population growth curve derived from counts made during the breeding season.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fisheries Information

Drift and set gillnet fisheries may cause incidental mortality of Guadalupe fur seals in Mexico and the United States. In the United States there have been no reports of mortalities or injuries for Guadalupe fur seals (Barlow et al.1994, Julian 1997, Julian and Beeson 1998, Cameron and Forney 1999. No information is available for human-caused mortalities or injuries in Mexico. However, similar drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California, Mexico and may take animals from the same population. Quantitative data are available only for the Mexican swordfish drift gillnet fishery (Sosa-Nishizaki et al. 1993). The total number of sets in this fishery in 1992 can be estimated from data provided by these authors to be approximately 2,700, with an observed rate of marine mammal bycatch of 0.13 animals per set (10 marine mammals in 77 observed sets; Sosa-Nishizaki et al. 1993). This overall mortality rate is similar to that observed in California driftnet fisheries during 1990-93 (0.15 marine mammals per set), but species-specific information is not available for the Mexican fisheries. There are currently efforts underway to convert the Mexican swordfish driftnet fishery to a longline fishery (D. Holts, pers. comm.). The number of set gillnets used in Mexico is unknown.

Other mortality

Juvenile female Guadalupe fur seals have stranded in central and northern California with net abrasions around the neck, fish hooks and monofilament line, and polyfilament string (Hanni et al. 1997).

STATUS OF STOCK

The state of California lists the Guadalupe fur seal as a fully protected mammal in the Fish and Game Code of California (Chap. 8, sec. 4700, d), and it is listed also as a threatened species in the Fish and Game Commission California Code of Regulations (Title 14, sec. 670.5, b, 6, H). The Endangered Species Act lists it as a threatened species, which automatically qualifies this as a "depleted" and "strategic" stock under the Marine Mammal Protection Act. There is insufficient information to determine whether the fishery mortality in Mexico exceeds the PBR for this stock. The total U.S. fishery mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered to be insignificant and approaching zero mortality and serious injury rate. The population is growing at approximately 13.7% per year.

Table 1. Summary of available information on the incidental mortality and injury of Guadalupe fur seals in commercial fisheries that might take this species (Julian 1997, Julian and Beeson 1998, Cameron and Forney 1999, M. Perez per. comm, Appendix 1). Mean annual takes are based on 1994-98 data unless noted otherwise.

Fishery Name	Year(s)	Data Type	Percent Observer Coverage	Observed Mortality	Estimated Mortality (CV in parentheses)	Mean Annual Takes (CV in parentheses)
CA driftnet fishery for sharks and swordfish	1994 1995 1996 1997 1998	observer	17.9% 15.6% 12.4% 22.8% 20.2%	0 0 0 0 0	0 0 0 0 0	0[1]
CA set gillnet fishery for halibut and angel shark	1994 1995 1996 1997 1998	observer 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[2]
WA, OR, CA ground fish trawl fishery (At-sea processing Pacific whiting fishery only)	1994 1995 1996 1997 1998	observer	53.8% 56.2% 65.2% 65.7% 77.3%	0 0 0 0 0	0 0 0 0 0	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 CA set gillnets were not observed after 1994; mortality was extrapolated from effort estimates and previous entanglement rates.

REFERENCES

Aurioles-Gamboa, D. and C. J. Hernadez-Camacho. 1999. Notes on the southernmost records of Guadalupe fur seal, Arctocephalus townsendi, in Mexico. Mar. Mamm. Sci. 15:581-583.

Barlow, J., R. W. Baird, J. E. Heyning, K. Wynne, A. M. Manville II, L. F. Lowry, D. Hanan, J. Sease, and V. N. Burkanov. 1994. A review of cetacean and pinniped mortality in coastal fisheries along the west coast of the USA and Canada and the east coast of the Russian Federation. Rept. Int. Whaling Comm., Special Issue 15:405-425.

Cameron, G., and K. A. Forney. 1999. Estimates of cetacean mortality in the California gillnet fisheries for 1997 and 1998. Paper SC/51/O4 presented to the International Whaling Commission, May 1998 (unpublished). 14 pp.

Fleischer, L. A. 1987. Guadalupe fur seal, *Arctocephalus townsendi*. In J. P. Croxall and R. L. Gentry (eds.). Status, biology, and ecology of fur seals. Proceedings of an international symposium and workshop. Cambridge, England, 23-27 April 1984. p. 43-48. U.S. Dept. of Commerce, NOAA, NMFS, NOAA Tech. Rept. NMFS 51.

Gallo, J. P. 1994. Factors affecting the population status of Guadalupe fur seal, *Arctocephalus townsendi* (Merriam, 1897), at Isla de Guadalupe, Baja California, Mexico. Ph.D. Thesis, University of California, Santa Cruz, 199 p.

Hanni, K. D., D. J. Long, R. E. Jones, P. Pyle, and L. E. Morgan. 1997. Sightings and strandings of Guadalupe fur seals in central and northern California, 1988-1995. J. of Mamm. 78:684-690.

Holts, D. Southwest Fisheries Science Center, National Marine Fisheries Service, P.O. Box 271, La Jolla, CA 92038.

Hubbs. C. L. 1956. The Guadalupe fur seal still lives! Zoonooz, S. D. Zool. Soc. 29(12):6-9.

Julian, F. 1997. Cetacean mortality in California gill net fisheries: Preliminary estimates for 1996. Paper SC/49/SM02 presented to the International Whaling Commission, September 1997 (unpublished). 13 pp.

Julian, F. and M. Beeson. 1998. Estimates for marine mammal, turtle, and seabird mortality for two California gillnet fisheries: 1990-95. Fish. Bull. 96:271-284.

Maravilla-Chavez, M. O. and M. S Lowry. 1999 Incipient breeding colony of Guadalupe fur seals at Isla Benito del Este, Baja California, Mexico. Mar. Mamm. Sci. 15:239-241.

Melin, S. R. and R. L. DeLong. 1999. Observations of a Guadalupe fur seal (Arctocephalus townsendi) female and pup at San Miguel Island, California. Mar. Mamm. Sci. 15:885-888.

Perkins, P., J. Barlow, and M. Beeson. 1992. Pinniped and cetacean mortality in California gillnet fisheries: 1991. Rept. Int. Whaling Commission, Working Paper SC/44/SM14.

Seagars, D. J. 1984. The Guadalupe fur seal: a status review. National Marine Fisheries Service, Southwest Region, Admin. Rep. SWR-84-6. 29pp.

Sosa-Nishizaki, O., R. De la Rosa Pacheco, R. Castro Longoria, M. Grijalva Chon, and J. De la Rosa Velez. 1993. Estudio biologico pesquero del pez (*Xiphias gladius*) y otras especies de picudos (marlins y pez vela). Rep. Int. CICESE, CTECT9306.

Stewart, B. S., P. K. Yochem, R. L. DeLong, and G.A. Antonelis Jr. 1987. Interactions between Guadalupe fur seals and California sea lions ant San Nicolas and San Miguel islands, California. In J. P. Croxall and R. L. Gentry (eds.). Status, biology, and ecology of fur seals. Proceedings of an international symposium and workshop. Cambridge, England, 23-27 April 1984. p. 103-106. U.S. Dept. of Commerce, NOAA, NMFS, NOAA Tech. Rept. NMFS 51.

Torres-G., A., A. Aguayo-L., and N. Valdez-T. 1990. Tamaño y distribucion de la poblacion del lobo fino de Guadalupe, *Arctocephalus townsendi* (Merriam, 1897), durante el verano de 1988. [Abstracts] XV Reunion internacional para el estudio de los mamiferos marinos, 18-20 April 1990. La Paz, B. C. S., Mexico.

Townsend, C. H. 1931. The fur seal of the California islands with new descriptive and historical matter. Zoologica 9:443-457.

Wedgeforth, H. M. 1928. The Guadalupe fur seal (*Arctocephalus townsendi*). Zoonooz, S. D. Zool. Soc. 3(3):4-9.