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Estimating Sustainable Bycatch Rates for California Sea Lion Populations in the Gulf of California

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Commercial and subsistence fisheries pressure is increasing in the Gulf of California, Mexico. One consequence often associated with high levels of fishing pressure is an increase in bycatch of marine mammals and birds. Fisheries bycatch has contributed to declines in several pinniped species and may be affecting the California sea lion (*Zalophus californianus*) population in the Gulf of California. We used data on fisheries and sea lion entanglement in gill nets to estimate current fishing pressure and fishing rates under which viable sea lion populations could be sustained at 11 breeding sites in the Gulf of California. We used 3 models to estimate sustainable bycatch rates: a simple population-growth model, a demographic model, and an estimate of the potential biological removal. All models were based on life history and census data collected for sea lions in the Gulf of California. We estimated the current level of fishing pressure and the acceptable level of fishing required to maintain viable sea lion populations as the number of fishing days (1 fisher/boat setting and retrieving 1 day's worth of nets) per year. Estimates of current fishing pressure ranged from 101 (0-405) fishing days around the Los Machos breeding site to 1887 (842-3140) around the Los Islotes rookery. To maintain viable sea lion populations at each site, the current level of fishing permissible could be augmented at some sites and should be reduced at other sites. For example, the area around San Esteban could support up to 1428 (935-2337) additional fishing days, whereas fishing around Lobos should be reduced by at least 165 days (107-268). Our results provide conservation practitioners with site-specific guidelines for maintaining sustainable sea lion populations and provide a method to estimate fishing pressure and sustainable bycatch rates that could be used for other marine mammals and birds

Palabras clave: Specialist, california sea lion, *zalophus californianus*, bycatch, Baja California, gill-net entanglement, population viability

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