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History and Present Status of the Northern Elephant Seal Population

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ABSTRACT. The northern elephant seal, Mirounga angustirostris , was presumed extinct by 1892 owing primarily to commercial harvesting for their blubber oil that began in the early 1800s. A small, residual breeding colony survived, however, and with legal protection from further hunting, it grew rapidly through the early 1900s. Immigrants steadily colonized other island and mainland sites in Baja California and California so that by 1991 seals were breeding on fifteen islands and at three mainland beaches. Sixty-four percent of 28,164 northern elephant seal pups born in 1991 were produced on two southern California Channel Islands, San Miguel and San Nicolas. The entire elephant seal population was estimated to number around 127,000 in 1991 and was apparently still increasing by more than 6% annually. The remarkable demographic vitality and sustained population increase of northern elephant seals has evidently been unaffected by the species' low genetic variability and contrasts with recent declines of some populations of the more genetically polymorphic southern elephant seal, M. leonina .

Few, if any, living species today have been so deeply scored, so driven to the very brink of extermination

—L. M. Huey (1930)

Numerous terrestrial and marine species, like the northern elephant seal, experienced great population reductions in the nineteenth and twentieth centuries. But the single remarkable fact about the history of the northern elephant seal population is that despite only narrowly averting extinction, it rebounded with an unparalleled, century-long period of exponential increase (see, e.g., Reeves, Stewart, and Leatherwood 1992 and McCullough and Barrett 1992 for reviews of trends in pinnipeds and other vertebrates). Here we briefly review the population reduction and document its impressive recovery. We focus on number of births as an index of growth during the past three decades and estimate current population size.

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Prehistory

Northern elephant seals lived in California waters by the late Pleistocene, evidently derived from monachine ancestors (Callophoca group) that entered the Pacific Ocean from the Caribbean through the Central American Seaway in the early Pliocene (Hendey 1972; Barnes and Mitchell 1975; Repenning, Ray, and Grigorescu 1979; de Muizon 1982). Little is known about their distribution during the Pleistocene when dynamic eustatic changes (Orr 1967; Vedder and Howell 1980) both greatly increased and decreased shoreline habitat available to pinnipeds, but archaeological remains show that elephant seals were in southern California waters when humans colonized the region over 15,000 years ago (e.g., Walker and Craig 1979; Snethkamp 1987; Bleitz 1993). Relatively large numbers of aboriginals lived on most of the California islands through the early nineteenth century, using the diverse marine resources on and near the islands for food, clothing, and housing; elephant seals and other pinnipeds were particularly important to aboriginal subsistence (Meighan 1959; Reimnan 1964; Glassow 1980; Stewart et al. 1993).

Commercial Exploitation

Elephant seal, sea otter, whale, and fur seal hunters operated on and around the California islands from the early 1800s through the 1860s (Scammon 1870, 1874; Ogden 1933, 1941), but they left few records of northern elephant seal harvests. By 1850, northern elephant seals were scarce (Scammon 1870, 1874); it was not until 1866 that northern and southern elephant seals were scientifically recognized as taxonomically distinct (Gill 1866; but see Stewart and Huber 1993).

What we know to be incontrovertible about northern elephant seals in the early and mid-1800s is the following. Their distribution and abundance prior to 1840 is unknown. A few northern elephant seals were killed by sealers at Islas Los Coronados in 1840 and 1846, at Santa Barbara Island in May 1841, and at Cedros and Guadalupe islands in 1846 (Busch 1985). Scammon made a disappointing sealing expedition along the California coast in 1852; during a 5-month period he collected about 350 barrels of oil (Scammon 1874), probably the equivalent of around 100 to 200 adult elephant seals (see Busch 1985). Another 10-month expedition in 1857 met with even less success. Between 1865 and 1880, only a few elephant seals were reported at Isla de Guadalupe and Islas San Benito. Because all were killed as they were encountered, the species was considered extinct by the late 1870s (Townsend 1885). But in 1880, a small herd was discovered on the Baja California mainland south of Isla Cedros, at Bahia San Cristobal (fig. 2.1). Over the next four years, all 335 seals that were seen were killed by

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the crews of six ships that visited the beach regularly, mostly in autumn. Three years later, in 1883, 80 elephant seals were found and killed at Isla de Guadalupe, and 4 were killed there in 1884. The species was again considered extinct, and no elephant seals were seen until May 1892, when C. H. Townsend and A. W. Anthony discovered 9 at Isla de Guadalupe; 7 of them were killed for the Smithsonian's museum collection (Townsend 1912; Anthony 1924). "This action was considered justifiable at the time, as the

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species was considered doomed to extinction by way of the sealer's trypot and few if any specimens were to be found in the museums of North America" (Anthony 1924: 146). The species was again presumed extinct, for the third time. But small numbers continued to show up at Isla de Guadalupe through 1911, and museum collectors continued to kill them: 4 in 1904 (Townsend 1912) and 14 of 40 on May 26, 1907. "This was a severe stroke dealt to a struggling species, but the appetite of science must be satisfied" (Huey 1930: 189). Townsend returned to Isla de Guadalupe on March 2, 1911, and killed 10 more seals but this time left 125 alive on the beach; on his return voyage to San Diego he searched for elephant seals at Bahia San Cristobal, Islas San Benito, and Isla Cedros but found none (Townsend 1912).

G. A. Bartholomew and C. L. Hubbs (1960), based on their interpretations of published counts of seals from the early 1900s, estimated that the total population in 1890 numbered fewer than 100 animals and speculated that it may have been as small as 20. The actual number of elephant seals that were present during the population bottleneck (or bottlenecks) in the 1800s and early 1900s is unknown because of the following flaws in sightings reports: (1) in most cases, the dates of sightings were not reported; (2) many sightings for which dates were provided were during the nonbreeding season; and (3) the age and sex composition of the seals observed was not determined. This information is vital because the number of seals on land, as well as the composition with respect to age and sex, varies greatly with time of year (Bartholomew 1951; Le Boeuf and Bonnell 1980; Stewart 1989). For example, when Townsend (1912) visited Isla de Guadalupe on March 2, 1911, and left 125 seals alive, it would have been at the end of the breeding season. At this time, some adult males should have been present, but nearly all females should already have returned to sea, leaving their weaned pups behind. Townsend noted that the herd consisted mostly of large males and immature animals of various sizes but that there were more than 15 adult females and 6 newborn young present. The photographs he took, however, show that most of the other "immature" seals were weaned pups, and it is likely that most of the seals ashore were actually molted pups-of-the-year (i.e., about 2 months old). He, like other early authors, also concluded erroneously that early March was the beginning of the breeding season, rather than the end, which emphasizes just how little was known about the natural history of elephant seals before George Bartholomew began his pioneering work on the species in the 1940s (e.g., Bartholomew 1952).

Regardless of whether the bottleneck population numbered in the tens or perhaps low hundreds, the important point is that the thousands of elephant seals alive today are all descendants of that small remnant herd.

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Initial Recovery:

1900–1965

Northern elephant seals bred only at Isla de Guadalupe from the late 1890s through the 1920s. The colony grew steadily, despite sporadic poaching and scientific collecting (Bartholomew and Hubbs 1960). That early period of increase was chronicled by W. Rothschild (1908, 1910), C. M. Harris (1909), C. H. Townsend (1912), A. W. Anthony (1924) and L. M. Huey (1924, 1925, 1927, 1930) and thoroughly reviewed by Bartholomew and Hubbs (1960). On July 12, 1922, when mostly adult males were ashore molting, 264 seals were counted; a few months later, the Mexican government declared Isla de Guadalupe a biological reserve, and the seals were afforded protection from harassment and poaching (Hanna 1925). From that time on, elephant seals expanded their range; K. W. Radford, R. T. Orr, and C. L. Hubbs (1965) reviewed observations of seasonal migrants during the early 1900s along the coast from San Diego to southeastern Alaska. Other sightings were reviewed by Bartholomew and Hubbs (1960); seals were first seen on Islas San Benito in 1918, San Miguel Island in 1925, Los Coronados and Santa Barbara Island in 1948, San Nicolas Island in 1949, and Año Nuevo Island in 1955. Breeding evidently began in the 1930s at Islas San Benito, in the early 1950s at San Miguel, San Nicolas, and Santa Barbara islands (Bartholomew and Boolootian 1960; Odell 1974; Stewart 1989), and in 1961 at Año Nuevo Island (Radford, Orr, and Hubbs 1965).

From published and available unpublished counts, Bartholomew and Hubbs (1960) estimated that the total population numbered approximately 13,000 in 1957 and approximately 15,000 in 1960, with about 91% of the population residing at Isla de Guadalupe, 8% at Islas San Benito, and 1% on the Channel Islands.

Recent Trends and Present Status:

1965–1991

Documentation of the population's recovery improved as more became known of the seasonal patterns of terrestrial abundance in the 1950s and 1960s. Table 2.1 lists births at each rookery from 1958 through 1991. The methods used varied slightly among colonies (see appendix 2.1), but all yielded estimates of births either from combined direct counts of suckling, weaned, and dead pups or derived from corrected counts of adult females made during peak breeding season (late January). Most pup counts were made on foot in February, after most births had occurred but before pups had left the rookeries. Some Mexican beaches with difficult access were surveyed from boats. The data for the three islands of Islas San Benito are combined in table 2.1 because of their closeness to each other; data for Año