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Vaquita Fact Sheet

DISCOVERY AND TAXONOMY

Discovery: The vaquita first became known to the scientific community after the discovery of a bleached skull on the beach north of Punta San Felipe in Baja California Norte, Mexico, on 18 March 1950. The following year two additional skulls were found and these three skull specimens formed the basis for the description of a new species of porpoise, *Phocoena sinus*, (Norris & McFarland, 1958).

Nomenclature: In Latin, *sinus* means “bay”, referring to the occurrence of the species in the Gulf of California. The Spanish common name for the species is vaquita (“little cow”). Vaquita (or sometimes “vaquita marina”) is the most commonly used name for the species. An alternative English name for the species is the Gulf of California harbor porpoise, the common name ascribed in the original species description.

Taxonomy: The porpoises, Phocoenidae, are one of ten families that comprise the suborder Odontoceti, the toothed whales. Of the six living species of porpoises, four comprise the genus *Phocoena*, including two in the Northern Hemisphere (the vaquita and the harbour porpoise, *P. phocoena*) and two in the Southern Hemisphere (the spectacled porpoise, *P. dioptrica*, and Burmeister's porpoise, *P. spinipinnis*). There are two additional species in the family: the finless porpoise, *Neophocaena phocaenoides*, found in coastal waters of the western Indian Ocean (Persian Gulf) to South and East Asia, and Dall's porpoise, *Phocoenoides dalli*, in the colder waters of the North Pacific.

Evolutionary Relationships: The vaquita is believed to represent a relict population of an ancestral species, most clearly related to Burmeister's porpoise, that crossed the equator from the Southern Hemisphere during a period of Pleistocene cooling (Norris & McFarland, 1958). Genetic analyses have corroborated this interpretation (Rosel et al., 1995).

NATURAL HISTORY

Size and Shape: At 1.5m (about 5 feet) in length, the vaquita is among the smallest cetaceans in the world. As with other porpoises, the vaquita is small but robust (Figure 1). It has a rounded head (no “beak”) and, as in most other porpoises, the teeth are flat or spade shaped (teeth are conical in shape in dolphins). The most conspicuous features of the coloration pattern are the relatively large black patches around the eyes and lips. The most striking external character is the shape and height of the triangular dorsal fin which is proportionally much higher and wider than in all other porpoises except the spectacled porpoise. With its relatively large surface area, the vaquita's dorsal fin is suggested to be an adaptation for removing excessive heat in warm upper Gulf of California waters via a vascular counter-current heat exchange system.

Distribution: The vaquita is known to occur only in the extreme northern Gulf of California, Mexico, mainly north of 30° 45'N and west of 114°20'W (Brownell, 1986; Gerrodette et al., 1995; Figure 2). The 'core area' of the vaquita distribution is centered around Rocas Consag (31°18'N, 114° 25' W), east of the town of San Felipe, Baja California (Rojas-Bracho et al., 2006). The vaquita has the smallest geographical range of any marine mammal. Nearly the entire population lives within a 4,000 sq-km (1,519 sq.-mile) area, an area less than ¼ the size of metropolitan Los Angeles. The range of the vaquita coincides with most of the Upper Gulf of California and Delta of the Colorado River Biosphere Reserve, one of the earth's most extraordinary marine habitats supporting a diversity of macro-invertebrates, fishes, birds, marine reptiles and marine mammals.

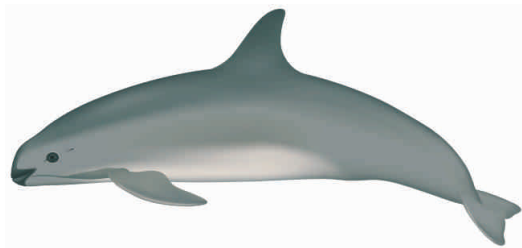


Figure 1. Illustration of a Vaquita by Uko Gortor.

Group Size and Behavior: Vaquitas occur in small groups of 1-3 individuals; often just a mother and calf pair. They are typically inconspicuous at the surface (they rarely splash, jump or leap) and they avoid boats. This behavior, coupled with their small body size, make them difficult to observe.

Feeding: Vaquitas are generalist feeders, consuming a wide variety of over 21 benthic and demersal (bottom-dwelling) teleost fishes and squids (Findley et al., 1995).

Predators: Large sharks and killer whales, *Orcinus orca*, are potential predators of vaquitas.

Longevity: The life span of the vaquita is expected to be similar to that of the harbor porpoise, approximately 20 years; the oldest vaquita known to date was estimated to be 21 years of age (Hohn et al., 1996).

Growth and Reproduction: Sexual maturation is estimated to occur at 3-6 years of age. The maximum population growth rate is not likely to exceed 4% annually, a rate commonly used for porpoises (Rojas-Bracho et al., 2006). Most births occur in early March, presumably following a peak in ovulations and conceptions in approximately mid-April. The gestation is estimated to be 11 months. Unlike most other porpoise species which breed every year, vaquitas appear to give birth every 2 years.

Mating system: The mating system and social structure of the vaquita have not been studied. However, it has been inferred from the large testes size (almost 3% of body mass), reverse sexual dimorphism (females are bigger than males) and small group sizes that sperm competition plays an important role in the species' reproductive strategy (Hohn et al., 1996).

POPULATION STATUS

Abundance: Historical abundance of the vaquita is unknown, but genetic evidence indicates that the population was never large (Rojas-Bracho et al., 2006). The most precise estimate of abundance was obtained from a cooperative Mexican-American survey conducted in 1997 that sampled the entire geographical range of the species and estimated there were 567 individuals (95% CI 177-1073; (Jaramillo-Legoretta et al., 1999). A new estimate in 2007 that was based on the 1997 population size, natural birth and death rates, and continued rates of bycatch (lethal entanglement) suggested that only about 150 individuals remained, only a portion of which were mature and contributing to recovery through reproduction (Jaramillo-Legoretta et al., 2007). Assuming continued rates of bycatch, the current (2008) population size may be as low as about 125 individuals (Barbara Taylor, personal communication).

Genetic Diversity: No polymorphism has been found in the mitochondrial DNA control region (Rosel & Rojas Bracho, 1999) and in the *DQB* locus of the Major Histocompatibility Complex (MHC) and limited diversity was found in the *DRB* locus of the HMC, (Munguía-Vega et al., 2007) of 43, 25 and 29 vaquita specimens, respectively. These findings are consistent with the hypothesis that the evolutionary history of the species included a bottleneck or founder event. Judging by the results of simulations of plausible population dynamics, vaquitas have probably always been rare, and their loss of genomic variability likely occurred over evolutionary time (Taylor & Rojas-Bracho, 1999; Munguía-Vega et al., 2007).

Threat assessment: Rojas-Bracho & Taylor (1999) examined whether four hypothesized factors constituted threats that could place the vaquita at risk of extinction. The putative threats and conclusions about their importance are: (1) habitat alteration from reduced flow of the Colorado River does not currently appear to be a threat because ecosystem productivity (nutrient levels and chlorophyll) remains high in vaquita habitat and vaquitas examined after dying in fishing nets appeared to be feeding normally (ie., they were not emaciated), (2) pollutant loads in tissues of bycaught animals are low and available data show that pollutants pose no threat to the survival of the remaining population, (3) reduced



Figure 2. The distribution of the vaquita, shown in red, is the smallest geographical range of any cetacean species.

fitness from inbreeding depression and loss of genetic variability are unlikely to pose high risk currently, though risk will increase if vaquitas remain at low abundance over long periods of time, and (4) mortality resulting from fisheries bycatch poses high risk because deaths in nets far exceed possible replacement by births. The authors note that short term management should not be hindered by uncertainty in estimating the magnitude of these threats, and primary conservation efforts should be directed toward immediate elimination of incidental fishery mortality. These conclusions have been repeatedly confirmed by CIRVA, the International Committee for the Recovery of the Vaquita (CIRVA 1997, 1999, 2004).

Interaction with Fisheries: Coincident with the recognition of the vaquita as a new species was the realization that individuals were being incidentally taken in artisanal and commercial fisheries (Norris & Prescott, 1961). From around the mid-1930s (Brownell, 1982) to the mid-1970s (Flanagan & Hendrickson, 1976), the most important fishery in terms of vaquita by-catch was the commercial gillnet fishery for totoaba, *Totoaba macdonaldi* (a large fish of the croaker family Sciaenidae that is endemic to the Gulf of California). This fishery was officially closed in 1975 because of the depleted status of the target species. Since that time, and perhaps before, it has become known that vaquita are incidentally caught in gill nets set for shrimp and fish (Figure 3). D'Agrosa et al. (2000) found that some level of vaquita bycatch is known to occur in most, if not all, types of gill nets used in this area. The artisanal gillnet fisheries in the northern Gulf of California generally involve the use of boats known as pangas which are (mainly) fiberglass, outboard-powered boats 6-8meters long crewed by two or three local men (Vidal et al., 1994). The gillnet fishery is highly dynamic due to a combination of environmental variation, market factors and overexploitation (Rojas-Bracho et al., 2006). Much of the market for fish is domestic. Species targeted include corvina *Cynoscion othonopterus*, mackerels (sierra, *Scomberomorus sierra*; also *S. concolor*), chano (*Micropogonias megalops*), sharks (including *Carcharhinus* spp., *Sphyrna* spp., *Rhizoprionodon* spp. and *Mustelus* spp.), and skates and rays (including *Myliobatis* spp., *Rhinobatus* spp., *Dasyatis brevis*, *Mobula* spp.). The high-value shrimp fishery in the northern Gulf includes a large commercial trawling fleet as well as the pangas that fish with gill nets. The product, especially fresh-frozen shrimp, is consumed locally or exported to the United States (Rojas-Bracho et al., 2006).



Figure 3. Vaquita incidentally caught in gillnets in the northern Gulf of California in 1985. Photo by Alejandro Robles.

Bycatch estimates: Gill nets for fish and shrimp cause incidental mortality (bycatch) of vaquitas. The only published study that estimates bycatch is from 1993-95 and refers to El Golfo de Santa Clara, one of the three main fishing ports (D'Agrosa et al., 2000). The authors estimated that 39 individuals were killed per year (95% CI 14-93) using combined data from observers and interviews with fishermen. Assuming a similar rate of mortality from the port of San Felipe, the extrapolated estimate of incidental mortality for the two ports was 78 vaquita killed/year in 1993 (D'Agrosa et al., 2000), which is well above what would be sustainable for this species (D'Agrosa et al., 2000; Rojas-Bracho et al., 2006).

Population Trend: Recent acoustic surveys indicate that the population is currently declining rapidly (Jaramillo-Legoretta & Rojas-Bracho, 2008). These data agree with population estimates based on the 1997 visual abundance estimate, combined with the increased number of pangas in the area and the known kill rate, and potential vaquita population growth rate (Jaramillo-Legoretta et al., 2007). Refining the precise rate of decline could take a decade or more and cost millions of dollars but would not change the fundamental dilemma or alleviate the severe risk of extinction (Jaramillo-Legoretta et al., 2007).

Legal Status: The International Union for the Conservation of Nature (IUCN) has placed the vaquita in the Critically Endangered category. Both the Mexican Official Standard NOM-059 and the U.S. Endangered Species Act list the vaquita as Endangered. Under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) the species is listed in Appendix I.

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