

Vaquita (*Phocoena sinus*)

The vaquita is one of the world's rarest marine mammals (Fig. 18). It was first described in 1958, but, due to its elusive nature, little is known about it. Vaquitas are generally similar to harbor porpoises with respect to life span, patterns of growth, age at sexual maturity, seasonal reproduction, and mating season. In contrast to the harbor porpoise, the calving interval for adult female vaquitas may be greater than one year. This has important implications for the potential growth rate of the population and therefore its ability to compensate for human-related sources of mortality and recover from low population levels. The vaquita is found only in the shallow (<50 m), nearshore (<40 km) waters of the northern Gulf of California (Fig. 19).

Abundance, Trends, and Status

Little information is available on population abundance and trends. A survey conducted in 1993 resulted in an abundance estimate of 224 animals. A more complete survey conducted in 1997 resulted in an abundance estimate of 567 animals, with a 95 percent confidence interval from 177 to 1,073. The difference between the two estimates does not indicate population growth because the 1997 survey involved greater effort and covered a



Figure 18. The vaquita is one of the smallest cetacean species with males reaching a maximum size of about 1.4 m and females about 1.5 m. (Photo by Caterina D'Agrosa.)

greater area, including extremely shallow areas of the northern Gulf of California.

Historical abundance was almost certainly greater than current abundance, and the decline appears to be due, at least in part, to incidental mortality in fisheries conducted from the early 1900s to the present. Data collected as late as 1993 to 1995 suggested 39 to 84 vaquita mortalities per year in gillnet fisheries for chano, shrimp, and shark and, to an unknown degree, by illegal fishing for totoaba. If the population numbered in the hundreds during this later period, then the level of take is greater than the species' potential rate of increase, and it must have been declining. Current population trends cannot be described.

The International Union for the Conservation of Nature has listed the vaquita as critically endangered. In 1979 the Convention on International

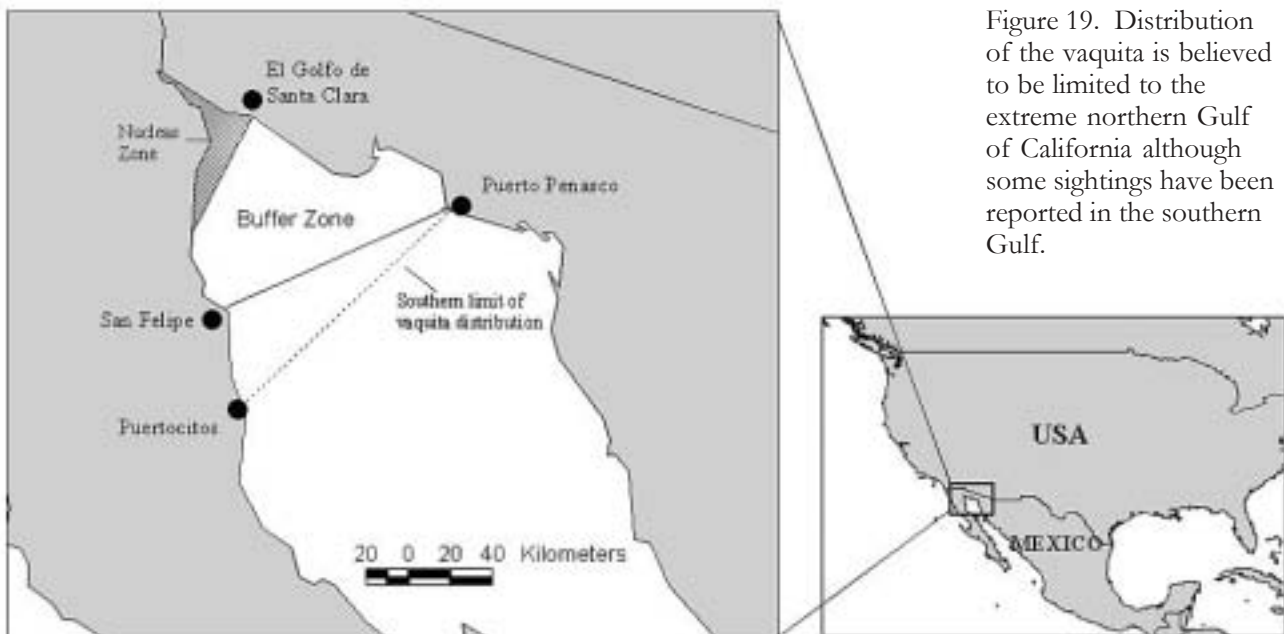


Figure 19. Distribution of the vaquita is believed to be limited to the extreme northern Gulf of California although some sightings have been reported in the southern Gulf.

Trade in Endangered Species of Wild Fauna and Flora listed vaquita on Appendix I. Both Mexico and the United States list the vaquita as endangered, thereby providing some measure of protection under both countries' domestic laws.

Threats

Currently, incidental mortality in fisheries remains the most significant threat to the vaquita. Although gillnets still appear to pose the greatest threat, a smaller but significant number of vaquita are also killed in trawl nets. Fisheries-related mortality appears to be driving the population toward extinction, perhaps in the foreseeable future.

A recent review of risk factors affecting the vaquita identified three other possible threats: habitat alteration, pollution, and inbreeding depression. Since the 1940s water has been diverted from the Colorado River for agricultural, industrial, and domestic uses, thus reducing flow to the upper Gulf of California. The reduced flow may lead to a reduction in productivity and consequently adversely affect habitat for many species in the northern Gulf. Evidence to date, however, suggests that productivity has not yet been dramatically reduced, and the current risk of extinction to vaquita from this factor is currently low. Nevertheless, monitoring of nutrients and productivity in the northern Gulf is essential to determine if and when such changes might occur.

Pollutants also pose a threat to vaquita. Some contaminants have been shown to reduce reproductive fitness and suppress immune system function of marine mammals. Freshwater drainage into the northern Gulf of California contains pollutants from agricultural runoff from both the United States and Mexico. However, contaminant levels in vaquita are low relative to levels detected in other species, and the risk to vaquita appears to be low at the current time.

Inbreeding depression is a decrease in population growth or potential for recovery due to the increased expression of deleterious alleles in small populations. Although genetic data and risk models based on these data indicate that inbreeding depression is not currently a problem for vaquita, it may limit the population's ability to recover, particularly if the population continues to decline.

Recovery Efforts

Mexico—In June 1993 the Mexican government established the Upper Gulf of California and Colorado River Delta Biosphere Reserve to protect endemic species, such as the vaquita and totoaba. In 1996 a management plan for the reserve was completed, and a reserve director and staff were appointed to implement the plan. The plan describes the physical, biological, social, and economic environments of the area and reviews activities under way to study and protect the unique resources in the reserve. Among the goals identified in the plan are reducing immediate threats to vaquita and other protected species and ensuring the managed and sustained use of the area's natural resources. Associated measures limit tourism, research, fishing, and aquaculture in certain areas of the reserve. However, vaquita have not been sighted in areas where fishing is prohibited, and gillnet fishing is still permitted in portions of the reserve where vaquita sightings are more likely to occur. In addition, other important vaquita habitat falls outside the reserve boundaries and is not protected.

In 1997 Mexico's National Fisheries Institute convened a panel of international scientists, the International Committee for the Recovery of the Vaquita (CIRVA), to draft a recovery plan for vaquita. The plan recommended, among other things, (1) moving the borders of the biosphere reserve to better encompass the distribution of vaquita and (2) phasing out gillnets and shrimp trawls from the core area of the biosphere reserve, starting with an immediate ban on large-mesh gillnets.

International—At its 1991 meeting the International Whaling Commission (IWC) Scientific Committee recommended that actions be taken to fully enforce the totoaba fishery closure. The committee also recommended that a management plan be developed that includes evaluation of incidental take of vaquita in fisheries and a program to monitor the status of the species. At its 1994 meeting the IWC Scientific Committee commended the Mexican government for its efforts to protect the vaquita, but concluded that the reported levels of incidental catch could result in extinction of the species. It therefore reiterated its recommenda-

tions that the incidental mortality of vaquita be monitored and that surveys be conducted to improve abundance estimates. In response to the Scientific Committee's findings, the IWC adopted a resolution in 1994 commending the Mexican government for creating a biosphere reserve in the upper Gulf of California and encouraging it to develop a management plan for the reserve. At the 1995 meeting Mexico reported to the IWC on actions taken with regard to the reserve, including efforts to enforce existing regulations and improve measures to prevent environmental degradation. As noted above, the reserve plan was completed in 1996.

At its June 1996 meeting the IWC Scientific Committee again reiterated its concern about the vulnerability of the species and again recommended that immediate action be taken to eliminate bycatch of vaquita in all fisheries in the upper Gulf of California. The committee also encouraged more research on degradation of the estuarine habitat in the upper Gulf of California and the potential effects on vaquita. The IWC subsequently adopted a resolution on small cetaceans, which congratulated the Mexican government for developing the biosphere management plan and for its strategy for recovery of the vaquita, but also endorsed the conclusion of the recovery plan that, to ensure the survival of vaquita, all bycatch needs to be eliminated as soon as possible.

Current Efforts

Recovery efforts for the vaquita are complicated by socioeconomic considerations. Three communities within the biosphere reserve rely on fishing. The two larger communities, Puerto Peñasco and San Felipe, have diversified economies with strong trade and service sectors and their reliance on fishing appears to be declining. El Golfo de Santa Clara is a much smaller community, with few trade and service activities, and relies almost exclusively on fishing for its economy. Nonetheless, despite a decline of fisheries in the late 1980s and early 1990s and some subsequent economic

diversification, the fishing industry is still an important source of income in all three communities. Finding a long-term solution will require the development of alternative economic opportunities for workers currently involved in the northern Gulf fisheries, particularly those using gillnets. CIRVA, the World Wildlife Fund, and Conservation International are currently working with Mexico's Minister of the Environment on a joint strategy that consists of four elements: conservation, education, understanding and incorporating socioeconomic considerations, and establishing a legal framework for conservation.

In October 2002 the Mexican Minister of the Environment implemented a ban on shrimp trawling and large-mesh gillnet fishing in the core area of the biosphere reserve, as recommended in the vaquita recovery plan. Local trawl fishermen and their families protested by interfering with U.S.–Mexican border operations for several days. The Ministry capitulated and allowed local fishermen to continue to trawl in the biosphere reserve although fishermen from outside the area were banned from trawling in the closed areas. On 19 December 2002 the Marine Mammal Commission wrote to the U.S. Department of State to inform officials about the endangered status of the vaquita, alert them to the volatile situation involving recovery measures, and request assistance in identifying appropriate means for international cooperation to facilitate vaquita recovery.

For the past two years, the Commission has provided funding to the Programa Nacional de Investigación y Conservación de Mamíferos Marinos from the National Institute of Ecology to study the potential for acoustic detection techniques to determine abundance, habitat use, and distribution of vaquita (see Chapter VIII). These acoustic detection techniques will also be useful for monitoring the success of the recovery plan. Initial results indicate that the range of the vaquita appears to be much more restricted than scientists previously believed.