

## What is the vaquita

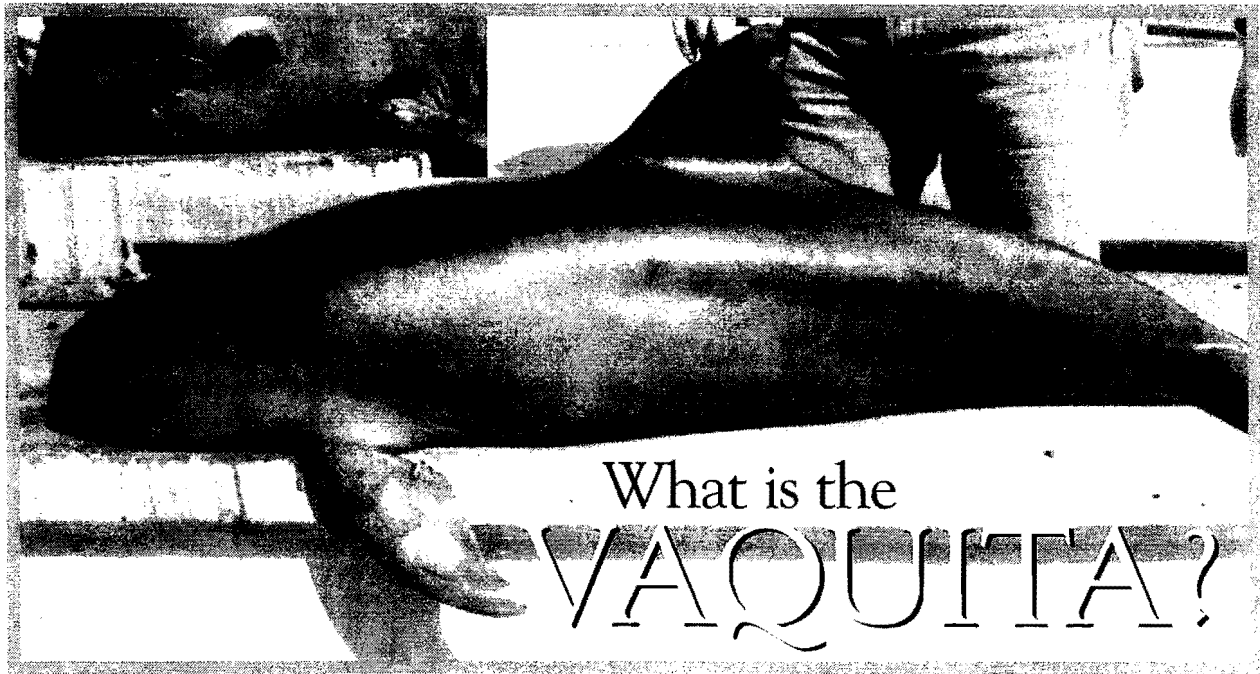


Figure 1

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The vaquita is the only species of true porpoise inhabiting subtropical waters and it's only found in the Northern part of the Gulf of California. Vaquita is a relatively new, charismatic porpoise to science and the general public. The external morphology of the vaquita was first described in 1958 by Norris and McFarland, but it still took 29 years before it was fully described by Brownell and his collaborators in 1987. The vaquita is the smallest of all the porpoises and probably of any marine cetacean. The average length for females is 140.6 cm while males are slightly smaller (average length of males is 134.9 cm). It can be easily distinguished by the large black patches around the eyes and lips, the proportionately larger flippers and the taller, more falcate dorsal fin as compared to other porpoises (see fig. 1).

### WHAT DO WE KNOW ABOUT VAQUITA?

#### Distribution

Vaquita is the only marine mammal species endemic to México. The historical distribution remains a matter of discussion. Based on historical anecdotes some researchers have suggested that vaquita might have extended its range all along the Gulf of California and as far south as the Islas Mariás. However, the evidence as it currently stands, supports the historical and current geographical range of this species being restricted to the Northern part of the Gulf of California (see fig. 2).

#### Abundance

The vaquita is one of the most difficult animals to survey due to its murky habitat, brief and erratic surfacing intervals, and elusive behavior. The combination of these factors complicate any field study. Even under the best of weather conditions, without the appropriate

vessel and very powerful binoculars (like big-eyes used by tuna fishing boats, which have a 25x150 magnification power), it's a hard task. Despite these difficulties, it was clear to several researchers that the animal is scarce. Encounter rates during transect surveys ranged from approximately two to seven individuals per 1,000 km. These figures are very low if compared with other cetaceans of the Gulf, and with a species related to the vaquita, the harbor porpoise, which was 47 per 1,000 km in central California. Other research provided estimates and models that also suggested a small population size, probably in the few hundreds. Though evidence clearly pointed to a small population size, Mexico's fisheries authorities denied that the population size was small or restricted to the Northern Gulf. In 1993, a portion of a scientific cruise focused on estimating the abundance of this species. This estimate was published in 1997 and at that time became the best population size estimate. Barlow and his collaborators

confirmed what was already suspected: the population size was in the few hundreds. Still some authorities discarded the results. In 1997, together with Tim Gerrodette of the South West Fisheries Science Center in La Jolla, Calif., we performed a more complete survey covering all the potential vaquita range using three vessels. The results were again consistent with a population in the few hundreds (less than 600 animals).

#### Life history

It took many years to collect enough information to have an insight of the life history of vaquita. We now know that it's a seasonal reproducer with most births occurring around March. The best data indicates that gestation last 10-11 months. The maximum observed lifespan is 21 years. There are still several important things that we need to know in order to make better predictions. Age of sexual maturity is difficult to estimate because of the lack of juvenile animals researched, but all females less than 3 years were immature and all females older than 6 years were mature. Also, we don't know their birth, mortality or survival rates, or other information critical to building effective management strategies. For example, there's a lack of data on social organization, habitat use and population dynamics, among other parameters.

The most noticeable aspect of this area of research is the unusual age distribution of the vaquita. Most individuals (62 percent) were found to be between 0 and 2 years of age. The remainder of individuals (31 percent) was between 11 and 16 years old, with few speci-

mens found to be between 3 and 10 years. There was a complete absence of specimens from individuals between the ages of 3 and 6.

Studies done on the stomach contents show that vaquitas consume a variety of prey species — 23 varieties reported so far — primarily fish and squid.

No pathological study of the recovered specimens has been published. However, morphological abnormalities in the vertebrae, an unusual number of digits (6), and a pathological condition of the ovaries (calcification of corpora albicantia) have been reported.

### RISKS TO THE VAQUITA

The vaquita's vulnerability to extinction is likely to be caused by two factors: natural processes and human interactions. In the former case, the vulnerability to extinction might be because it's a naturally rare species. Its population is in low numbers, its distribution is restricted, and the species consists of a single population. In the latter, the vaquita's vulnerability to extinction can be due to anthropogenic effects. These human disturbances are potentially critical added risk factors to small natural populations.

This has been a controversial issue for a long time. Despite designation, both nationally and internationally, as one of the most endangered marine mammal species in the world, there are disagreements on the most significant risk factors that threaten vaquita's survival. This lack of agreement over which risk factors are most significant hindered management decisions. Recently, more for political reason than for scientific ones, the issue has been brought back to life.

The center of this controversy has primarily been the damming of the Colorado River and the use of gillnets. The debate between these two positions, incidental mortality versus the lack of flow of the Colorado River, has extended for several decades and polarized the position of those responsible for the management and protection of the vaquita. Brownell first raised the idea of the potentially detrimental effects on vaquita survival caused by the reduced flow of the Colorado River in the early 1970s, during the 28th meeting of the IWC. Since that time, this position gained strength, particularly within the government sector of Mexico. Different Mexican Federal agencies, including the national marine mammal program during that time, maintained that the lack of flow from the Colorado River was the main cause of decline and current endangered status of the vaquita. These agencies argued that not only was there enough evidence to suggest that bycatch during fishing activity is not the major risk factor for vaquita, but also that there was evidence to the contrary.

There can be no question of the role major rivers play as nutrient and sediment transportation agents. Justification for these concerns

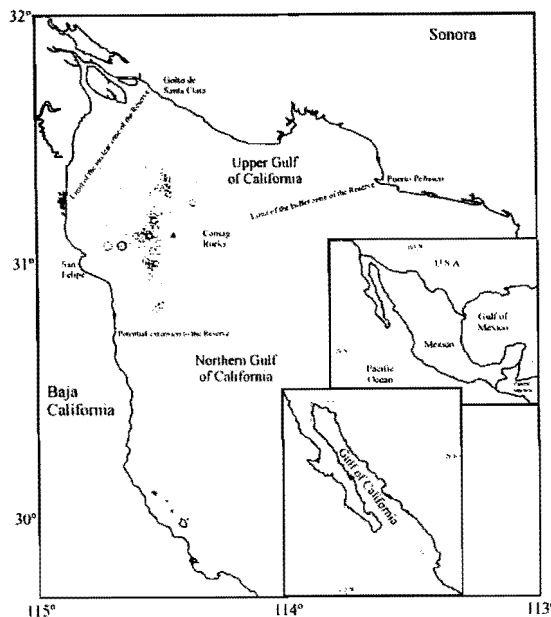


Figure 2

come from experiences in other fluvial systems, such as the Nile River and Delta, where several fisheries collapsed following the damming of the river. However, gillnets were discarded as the main risk factor in internal reports of the Mexican government fisheries agency. Mention should be made that in several other papers, gillnets were considered as a major and an immediate factor. The first reports of incidental catch of vaquitas in totoaba (a scianid fish) nets came from Norris and Prescott in 1961. Since then a good amount of data was gathered regarding the bycatch of vaquita. This data, together with the fact that entanglement is common among most porpoise species (e.g. *Australophocaena dioptrica*, *P. spinipinnis*, and *P. phocaena*), validated this concern. For example, total bycatch of harbor porpoise in the Gulf of Maine/Bay of Fundy per year in the early '90s was in the several thousands. At that time, the average population size estimate for this porpoise in this area was more than 47,000 animals. It was then suggested that such a level of bycatch was very probably unsustainable. The 1995 IWC's Scientific Committee, through its small cetaceans subcommittee, considered that the similarities of population parameters of vaquita with harbor porpoise in the Gulf of Maine/Bay of Fundy, together with other parameters (i.e. life history), indicated that the incidental take of vaquita was also unsustainable. International and national voices rose to demand the Government to take immediate conservation actions. Still the Fisheries Department denied the indirect evidence, even though several dozen vaquita carcasses were recovered from gillnets by a group led by Omar Vidal in Guaymas, Sonora. In 1995, the first research quantifying the bycatch of this species proved that it was a major problem to the population. Caterina D'Agrosa pub-

lished her thesis and later a paper where it was shown that 39 vaquitas are killed in gillnets each year. Still the Colorado River controversy survived. Two years later, together with Barb Taylor from the SWFSC, we published a risk factor analysis paper proving that it's bycatch, and not the lack of flow from the Colorado River, that will drive vaquita to extinction. Other risk factors considered were pollution and inbreeding. However, none of them represented an immediate risk factor to the survival of vaquita.

### THE VAQUITAS' STATUS

With the information available, what can we say of the status of vaquita? The vaquita, with the possible exception of the baiji (*Lipotes vexillifer*), is the most endangered small cetacean in the world. It is classified in the most critical conservation categories by the International Union for the Conservation of Nature (IUCN), the Convention on International Trade in the Endangered Species of Wild Fauna and Flora (CITES), the U.S. Endangered Species Act and the Mexican Standard 059 by the Mexican government.

In 1996, the IUCN concluded that the extinction of the vaquita is likely unless conservation efforts are substantially increased. Other Mexican and international organizations have also stated the critical endangered status of this species.

### MANAGEMENT AND CONSERVATION

Over the last century, the Mexican Government has become more aware of the importance and uniqueness of the Northern part of the Gulf of California as a habitat of several species, among them the totoaba. However, they did not direct any conservation actions toward the vaquita until the early '90s. In 1992, the Government created the Technical Committee for the Preservation of the Vaquita and the Totoaba (TCPVT). This group was to recommend how to protect these two species. The TCPVT failed for several reasons. Most importantly it had no clear objectives or goals, and a lack of expertise in certain areas among its members. Some of the available resources were spent on research that could not be applied in direct conservation actions. And it was a closed group dependant on the Ministry of Fisheries. This was one of the reasons it stopped functioning; several members felt it was manipulated. An important action of the TCPVT, however, was promoting the creation of the Biosphere Reserve of the Upper Gulf of California and Delta of the Colorado River. On June 10, 1993, the Biosphere was declared and in 1995 the management plan for this reserve was published. However, this measure created some controversy. Though well received by the conservation

Continued from page 11

community, as we gained more information about vaquita, it became clear that 40 percent of the vaquita population falls out of the southern limits of this Reserve. Furthermore, there are no specific regulations on the use of gill nets in areas known to be used by vaquita. So the Biosphere Reserve is a good stepping stone, but certainly not the correct measure to protect vaquita. In 1996, an important change in policy came with the newly created Secretaría del Medio Ambiente, Recursos Naturales y Pesca (SEMARNAP), the Ministry in charge of the Environment and Fisheries for the Mexican Government. SEMARNAP was to recognize explicitly that vaquita is a species in danger of extinction, and at the same time place it on the priority list of species subject to special protection and conservation. A year later, we were invited by the President of the National Institute of Fisheries to collaborate in a strategy to prevent the extinction of vaquita. That year we formed the International Committee for the Recovery of Vaquita (CIRVA in Spanish). This recovery team was integrated by well respected researchers from Europe, Canada, U.S. and Mexico. The main goal of this International Committee was the creation of a Recovery Plan for *Phocoena sinus*; to assist the vaquita to grow, recover, and maintain a stable population for generations to come. Of particular importance, was the team would not only propose a recovery plan based on the best available scientific information, but would contemplate and consider the socio-economic impacts of any required regulations on the resource users in the affected areas.

The main conclusions of the first CIRVA meeting were:

1. The reduced flow of the Colorado River indicates that it does not pose a short-term risk for the vaquita, evidenced by three factors: a) the reported high nutrient concentrations and high rates of primary productivity of the Upper Gulf of California; b) the available data so far indicates that the vaquita consumes a number of different prey species; and c) that so far none of the specimens recovered shows signs of starving.

2. The long-term changes in vaquita habitat due to reduction of this flow, such as nutrient decline, are matters of concern and should be investigated.

3. In the short term, gillnets are the greatest risk to the survival of vaquita due to incidental take in fisheries.

4. Abundance is likely in the hundreds, and worse yet, probably the low hundreds.

5. A better abundance estimate is required as soon as possible.

During the second meeting of CIRVA several issues were discussed. The main outcome was: The new abundance estimate showed 567 vaquitas (with a CV of 0.51 and a 95 percent log-normal confidence interval from 177 to

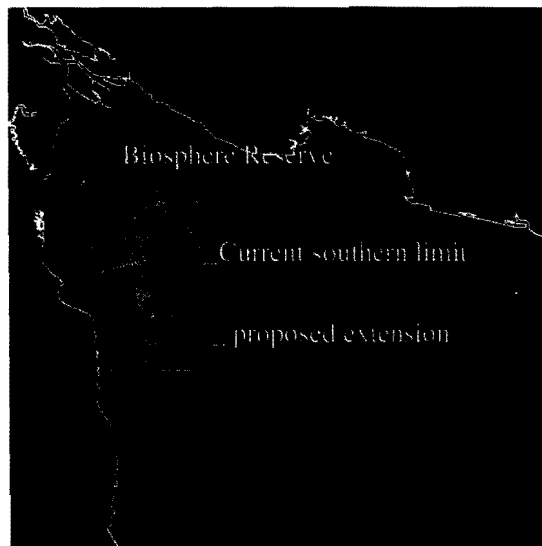


Figure 3

1,073.) This confirmed the long-suspected population size of several hundred. Most importantly, after reviewing all possible mitigation measures, the Committee, noting that vaquita are critically endangered and that immediate action is required to prevent extinction, strongly recommended that:

1. Vaquita by-catch be reduced to zero as soon as possible.
2. The southern boundary of the Biosphere Reserve be expanded to include all known habitat of the vaquita (see fig. 3).
3. Gillnets and trawlers be banned in the enlarged Biosphere Reserve (see fig. 3), in the following sequence:
  - a) Eliminate large-mesh gillnets (6-inch stretch mesh or greater)
  - b) Restrict the numbers of pangas to present levels
  - c) Restrict fishing activities to residents of San Felipe, El Golfo de Santa Clara and Puerto Peñasco and other permanent residents of the Biosphere Reserve.

**Stage Two**

- a) Eliminate medium-mesh gillnets (i.e. all those except chinchorro de línea, 3-inch stretch mesh or greater used for fishing shrimp).

**Stage Three**

- a) Eliminate all gillnets and trawlers.
4. Effective enforcement of fishing regulations begin immediately. The development of effective enforcement techniques should be given high priority because all the committee's recommendations depend on enforcement.
  5. Acoustic surveys be started immediately to begin monitoring an index of abundance and gather data on seasonal movements and habitat use of vaquita.
  6. Research be started immediately to develop and test alternate gear types and techniques to replace gillnets.

7. Education and consultation begin immediately among fishers, social scientist and biolo-

gist to seek the best alternative to gillnetting.

8. A program be developed to promote community involvement, widespread education and public awareness of the importance of the Biosphere Reserve, the vaquita and the relevance of its protection as a Mexican and world heritage site. Development of public support is critical to the success of this conservation program.

9. Measures be developed to offset the economic hardship imposed by these regulations on residents of the Upper Gulf.

10. Research be conducted to better define critical habitat of vaquita, using data collected during the 1997 abundance survey.

Since 2000 WWF, CIRVA and Conservation International (CI) have been working together in the recovery of the vaquita (*Phocoena sinus*). The core group has now been extended to include five more organizations including IFAW, Unidos para la Conservación, Asociación Sierra Madre, CEMDA and Unidos por la Música. The group, organized under the Coalition for the Upper Gulf, is to develop a general strategy for the recovery of the vaquita based on recommendations from CIRVA.

The work of CIRVA has been widely recognized by several international organizations, including the International Whaling Commission, Society of Marine Mammology and the Cousteau Society, among others. However, though we have made advancements in most of the 10 recommendations, we have failed in eliminating gill nets and trawlers. The main way to achieve that, is to come up with socio-economic alternatives for the fishermen in the region. This has been almost impossible because we are primarily dealing with isolated distant communities, with shortages of water and limited resources of alternatives to fishing as their livelihood and sole source of income. Though we have consulted with several international agencies (e.g. World Bank) about potential alternatives, most of these agencies and other institutions do not have the expertise or the interest in developing such a plan. Certainly, any suggestions would be most welcomed.

Since 1999, as recommended by CIRVA, we have been using passive acoustic techniques to investigate habitat use of the vaquita. The research is in progress, but so far the data indicates that vaquita distribution is restricted to the waters adjacent to the Baja California coast. This area is recognized as one of the main fishing grounds, heavily used throughout the year. It must be a strong voice of alert to continue with the actions of the recovery plan: avoiding the mortality of vaquita in fishing gears, helping to mitigate the impacts on local communities through actions that contribute to developing the region with alternative and healthy fishing techniques as well as other economic activities. Of course, we, as a country, do not want to witness one of the first cetacean extinctions of the century.