

Vaquita (*Phocoena sinus*) - The Little Known Porpoise

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Abstract

The vaquita (*Phocoena sinus*) is a small and very elusive porpoise that ranges in a limited geographical area in the Gulf of California, Mexico. Despite various efforts to conserve this critically endangered species, the latest research reveals that it may become extinct within a few years. Little is known of the vaquita as it was first scientifically described in 1958 and the first physical specimens were only recovered in 1985 when sighting surveys were also begun. A review of the little known and available knowledge on its biology, habitat, and physiology was compiled to better understand and recognise how truly unique this species is. After more than 5 decades since its discovery, if the current trends continue, it would seem that the only knowledge about the vaquita will be the very few photographs ever taken and some specimens recovered as bycatch. [JMATE. 2015;8(1):10-14]

Keywords: *Phocoena sinus*, Biology, Habitat, Physiology

Introduction

It is estimated that, if current trends continue, the vaquita (*Phocoena sinus*) will become extinct within the next 4-5 years (5). The vaquita was only 'discovered' less than 60 years ago and very little is directly known about this species and in fact there are a limited number of pictures of the vaquita in its natural habitat (4). The following article will describe its habitat, some unusual physiological traits, and general characteristics of this highly endangered and under studied porpoise.

The vaquita is a shy small porpoise of the family *Phocoenidae*, averaging 1.5 meters in length and weighing 45-50 kilograms (12). Figure 1a shows that its coloration varies from a dark grey dorsal surface which gets lighter along on its lateral sides and ending in a very light grey or white abdomen (12). There are no defined body stripes or color patches as seen in other species such as the Dall's porpoise (*Phocoenoides dalli*) (12). However, (Figure 1b), there are very well defined black patches that surround both the eyes and the lips (3). It is an elusive animal that avoids contact with boats, rarely congregates together in groups larger than 7 individuals, with a life span of approximately 21 years (3).

Habitat

The vaquita is endemic in the northwest region of the Gulf of California, also known as the Sea of Cortez, mainly between 30°45'N and 114°20'W flanked by the Mexican coastal regions of the Baja California Peninsula on the west and Mexican states along the northern and eastern coast line. (Figure 2a) The entire Gulf of California is a partially-enclosed sea measuring approximately 1,000 km long and averaging 150 km wide (19). In 1993, the Mexican government created the Upper Gulf of California and Colorado River Delta Biosphere Reserve (total size 12,000 km²) of which approximately 8,000 km² is open water and coastline designated as a buffer region. (Figure 2b) The vaquita refuge or "core area" is an area of 2,500 km² and is approximately 40 km northeast of San Felipe, Baja California, Mexico, and is partially situated in this biosphere reserve (7) (Figure 2b).

The vaquita have been observed in waters as deep as 40 m (130 feet) and are most commonly found approximately 40 km (25 miles) off shore (12). Their distribution may be due to the warmer waters found near the coast: 30°C near the shore versus 26°C in deeper waters (3,10). The sea surface temperature ranges from 13-21°C in the winter, to 28-31°C in the summer (19).

The vaquita's aquatic environment is described as turbid and dynamic with various upwellings and tidal currents (7). The coastal environment is composed of mixed sands, silt, mud, with rocky reefs and rhodolith beds, coastal lagoons, seagrass beds, coral reefs, and hydrothermal vents (19). The high nutrient enrichment of the Gulf of California can be attributed to year-round tidal mixing and wind-driven coastal upwellings during the winter (8). This results in an increase in phytoplankton which becomes trapped on the inside of the basin. The gulf is also abundant in zooplankton which is a source of food for various fish larvae (8). As

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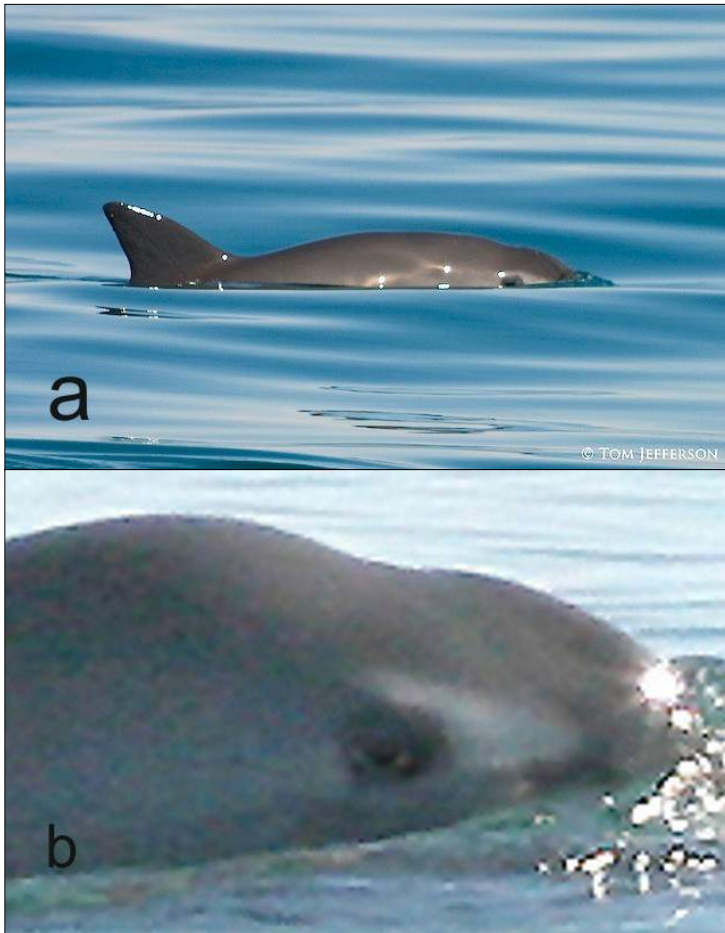


Figure 1: (a) Overall coloration of the vaquita. Photograph reproduced with permission (T. Jefferson); (b) Coloration around the vaquita eye. Photograph reproduced with permission (T. Kieckhefer).

such, the Gulf of California is rich in plankton which gives rise to an abundance of fish species that provides the vaquita with ample sources of food such as demersal or benthic fish, squid, and crustaceans (7). There are also a variety of large paleic fish such as tuna, billfish, approximately 40 elasmobranch species, and squid that live in the Gulf (8,19).

Other marine mammal species also flourish in the Gulf of California throughout the year, though they are usually found in deeper more oceanic waters south of the vaquita's range in the northern part of the gulf. There are in total 31 cetacean species such as blue (*Balaenoptera musculus*), humpback (*Megaptera novaeangliae*), gray (*Eschrichtius robustus*), sperm (*Physeter macrocephalus*), Baird's beaked (*Berardius bairdii*), and Bryde (*Balaenoptera edeni*) whales who utilize the gulf as a feeding and breeding area (8). Additionally, fin

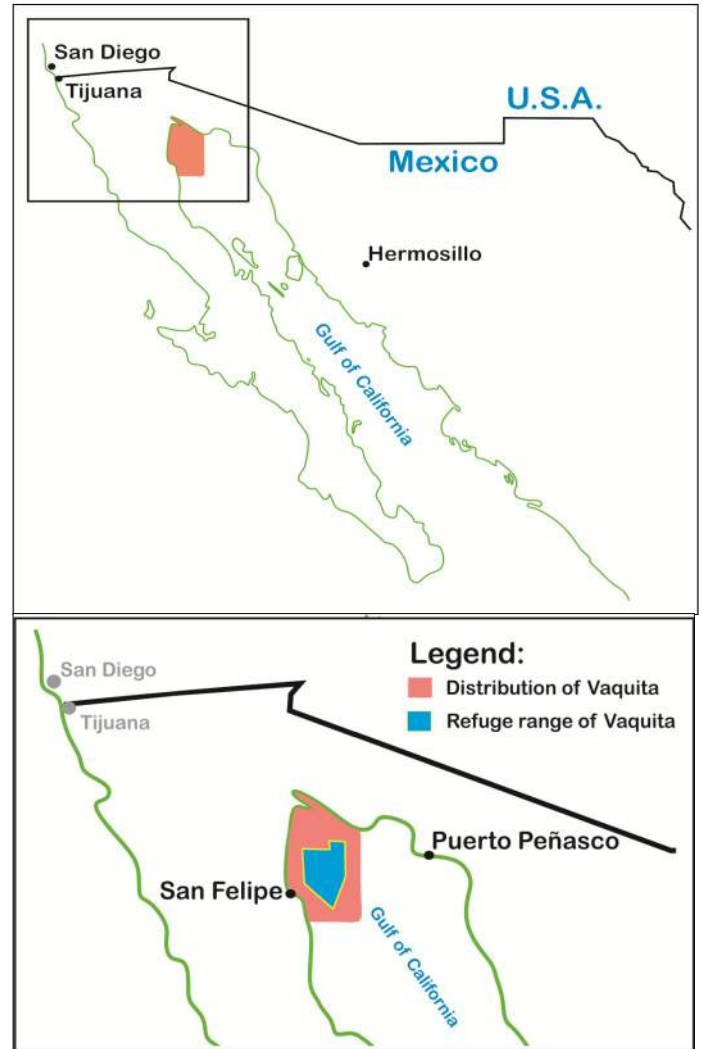


Figure 2: (a) The orange polygon represents the area encompassing the range of the vaquita located at the northern most area of the Gulf of California; (b) The vaquita current refuge area is depicted visually in blue.

whales (*Balaenoptera pysicalus*) are occasionally seen in the vaquita's range. The California sea lion (*Zalophus californianus*) is the only pinniped to breed in the Gulf, with over 13 breeding colonies reported (8). The Gulf is also a flourishing breeding ground for other seabirds and marine turtles species.

Evolution

It has been reported that the vaquita may have evolved from a population of animals, possibly related to Burmeister's porpoises, that moved up from the western coast of the South American continent to the Gulf of California as a result of numerous geological events that

started during the middle Miocene era (9,13). Its range has now become limited to the northern most area of that Gulf (Figure 1a). Despite having been a small isolated population, the vaquita has remained viable, and it has been speculated that this is because they were less susceptible to inbreeding. As a result, the vaquita has fared better than other species that have smaller populations (16).

Unique Physiology

Although related to several other species, the vaquita has a number of unique and unusual physiological traits. Compared to other *phocoena* species, it has a proportionally larger dorsal and pectoral fins and tail flukes in comparison to its body size. This is possibly to help optimize heat exchange as it lives in an area where there are higher water temperatures in summer versus other species that live in cooler waters (1,14).

The carpals, found in the pectoral fins of the vaquita are different from other *Odontocetes* in that they have only 3 proximal bony elements and one cartilaginous *accessorium*. As well, polydactyly or extra digits are present in both flippers which is not found in other closely related porpoises such as the harbour porpoise (*Phocoena phocoena*) (11). A sample skeleton is shown in Figure 3.



Figure 3: Skeleton of a Vaquita. Photograph reproduced with permission (T. Kieckhefer).

General Characteristics

Silber in 1991 discovered that the acoustic signals of the vaquita were similar to other *Phocoenidae* (ie. click duration, dominant frequency and bandwidth) however, their click structure differed from other species where the maximum frequency was greater and average bandwidth was slightly less (15). Samples of the skull structure is shown in Figure 4.

It has been reported that activities such as dive times, roll over intervals, surface times, and rolls per surfacing are lower in the vaquita when compared to other species such as the harbour porpoise (*Phocoena phocoena*) (14).

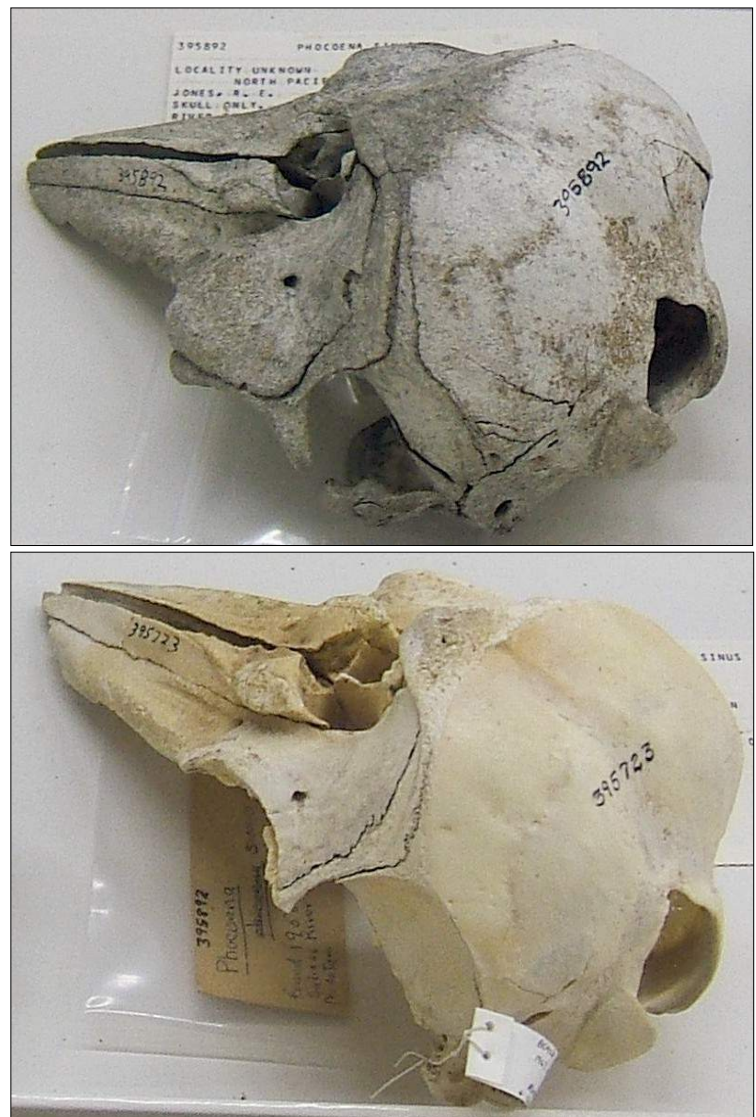


Figure 4: Samples of vaquita skull structures. Photograph reproduced with permission (T. Kieckhefer).

Conclusion

This small porpoise is highly endangered with only a few years left before it goes extinct (5). Due to the lack of concern and interest from the various political agencies and uncontrolled fishing practices, researchers have had few opportunities or specimens of this small porpoise to study which is reflected in the limited information available. The vaquita will soon be used as another example of a species that was not considered important enough to protect until it was too late. If current trends continue, in just over 5 decades, humans have directly caused another marine animal species to go extinct. How many more marine animals will future generations of humans only get to see and read about in books, the research literature, or on posters?

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