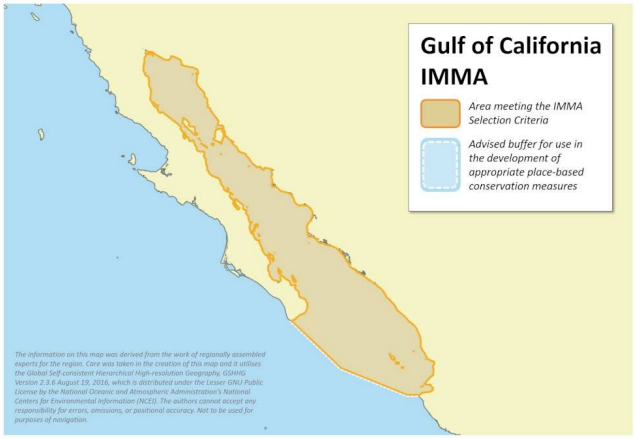


## Area Size

275,846 km²

## Qualifying Species and Criteria

Blue whale – *Balaenoptera musculus*

Criterion A; B (2); C (1, 2)

Fin whale – *Balaenoptera physalus*

Criterion A; B (1)

Vaquita – *Phocoena sinus*

Criterion A; C (1)

Humpback whale – *Megaptera novaeangliae*

Criterion C (1)

Criterion D (2)- Marine Mammal Diversity

*Aethalodelphis obliquidens, Arctocephalus philippii townsendi, Balaenoptera acutorostrata, Balaenoptera borealis, Balaenoptera edeni, Balaenoptera musculus, Balaenoptera physalus, Berardius bairdii, Delphinus delphis, Eschrichtius robustus, Eubalaena japonica, Feresa attenuata, Globicephala macrorhynchus, Grampus griseus, Indopacetus pacificus, Kogia breviceps, Kogia sima, Megaptera novaeangliae, Mesoplodon densirostris, Mesoplodon ginkgodens, Mesoplodon peruvianus, Orcinus orca, Peponocephala electra, Phocoena sinus, Physeter macrocephalus, Pseudorca crassidens, Stenella attenuata, Stenella coeruleoalba, Stenella longirostris, Steno bredanensis, Tursiops truncatus, Zalophus californianus, Ziphius cavirostris*

# Gulf of California IMMA

## Summary

The Gulf of California is a long and narrow basin approximately 1,400 km long and 150 km wide, bound by the Baja California Peninsula and the mainland of the northwest coast of Mexico. The IMMA hosts 31 species of cetaceans and two pinniped species, the Californian sea lion (*Zalophus californianus*) which has several reproductive colonies in the IMMA, and the Guadalupe fur seal (*Arctocephalus philippii townsendi*). Among the cetacean populations present in the Gulf of California, there are resident populations of common bottlenose dolphins (*Tursiops truncatus*), fin whales (*Balaenoptera physalus*) and vaquita porpoises (*Phocoena sinus*), the most endangered species in the world. Other migratory cetaceans such as blue (*B. musculus*), humpback (*Megaptera novaeangliae*) and gray whales (*Eschrichtius robustus*) also use the area as a wintering ground. Other species that are rarer include the Pacific right whale (*Eubalaena japonica*).

## Description:

The Gulf of California has a high productivity rate, this is the result of its topography, its latitudinal position and the upwelling events that caused outcrops throughout the year; Within this region, five priority marine areas have been defined for conservation: The Loreto-Los Cabos corridor, the Upper Gulf of California, the Midriff Islands of the Gulf of California-Bahía de los Ángeles, the Humedales de Sonora, Sinaloa and Nayarit / Bahía de Banderas. and, finally, the Très Marías Islands (Morgan et al., 2005).

Notably, according to the submarine relief, the region of Canal de Ballenas and the Midriff Islands presents different biological and oceanographic

characteristics compared to the rest of the gulf since the southern threshold of the Salsipuedes basin blocks the deep circulation of the Canal de Ballenas towards the rest of the Gulf Álvarez-Borrego and Lara-Lara (1991). This region has the lowest surface temperatures and the highest concentrations of nutrients and CO2 (Álvarez-Borrego et al., 1978); both parameters are persistent. Tidal currents are intense, with high rates of tidal energy dissipation (up to >0.3 W m-2; Argote et al. 1995). In addition, tidal mixing on the Midriff Islands represents a constant supply of cold, nutrient-rich water to the surface throughout the year (Álvarez-Borrego, 2000). Therefore, primary productivity is high (Tershy et al., 1991), making the region the main fishing area for sardines and anchovies in the Mexican Pacific. It is also a critical shrimp and sierra fishing area (WWF, 2022).

This cIMMA includes the Flora and Fauna Protection Area of the Gulf of California, Upper Gulf of California and Colorado River Delta (marine portion), San Pedro Mártir Island, El Vizcaíno (marine and coastal belt of the Gulf of California), National Park Loreto Bay, Cabo Pulmo National Park, Cabo San Lucas Flora and Fauna Protection Area, Marías Islands, Isabel Island National Park, San Lorenzo Archipelago, Marieta Islands and the Balandra Ecological Conservation and Community Interest Zone.

Figure 1: Fin whale (*Balaenoptera physalus*) in La Paz Bay, B.C.S. Photo credit: L. Viloria-Gómora PRIMMA-UABCS.

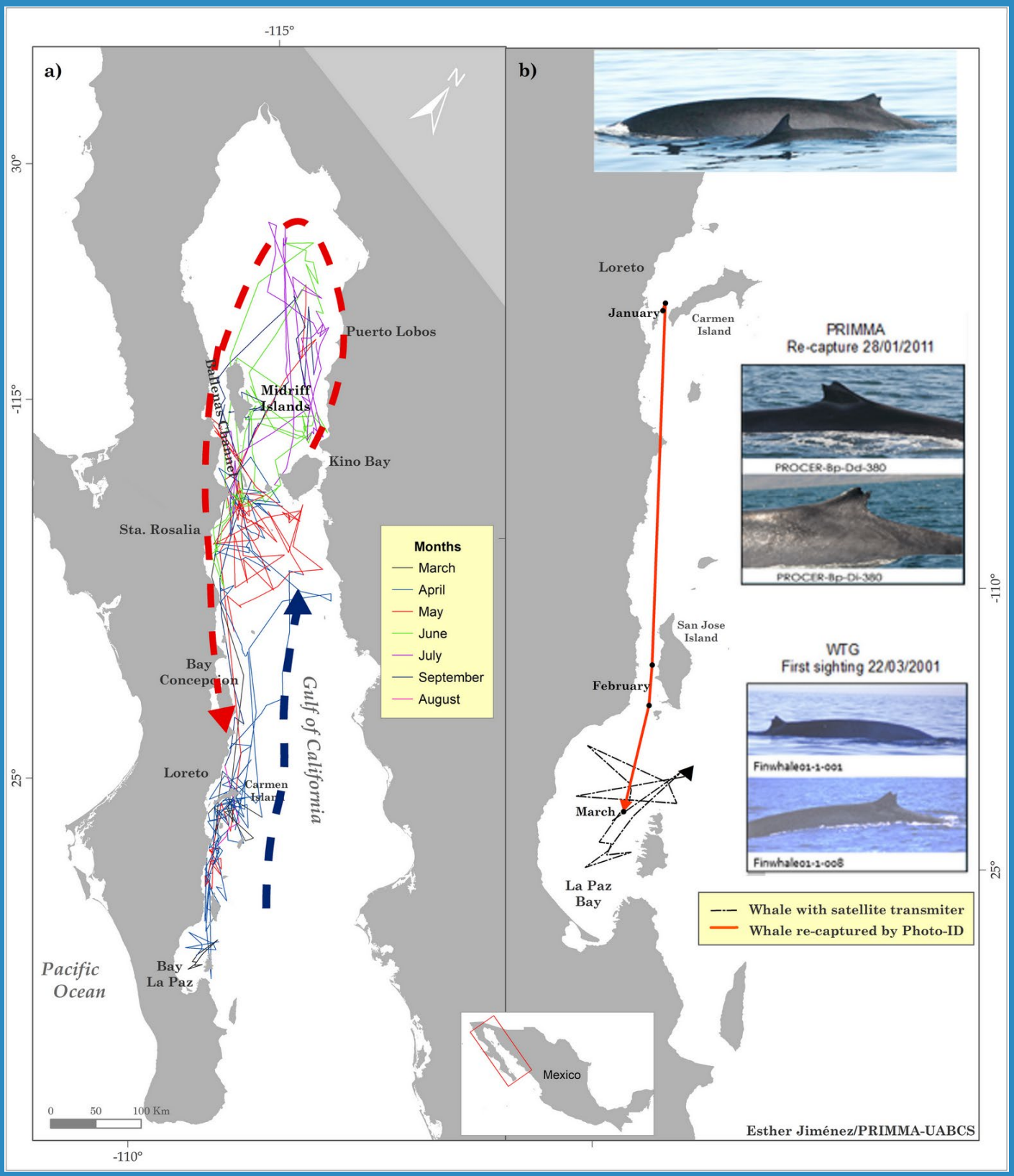


Figure 2: a) Seasonality of movements of eight fin whales tagged in March 2001 from SSM-derived locations. b) the black line indicates the whale with tag PTT 10834 tagged and photographed in the Bay of La Paz by the Whale Telemetry Group (WTG), Marine Mammal Institute, Oregon State University during 2001. The orange line indicates the photographic re-capture location of this whale in 2011 by Programa de Mamíferos Marinos (PRIMMA/UABCS), Universidad Autónoma de Baja California Sur, Mexico, in the company of a calf.
(Reproduced from Jimenez et al., 2019)

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## Criterion A: Species or Population Vulnerability

There is a resident population of fin whales (*Balaenoptera physalus*) in the Gulf of California, which is genetically and acoustically isolated, with low genetic diversity (π = 0.00052) (Bérubé et al., 1998; Bérubé et al., 2002). Fin whales are designated as Vulnerable (VU) on the IUCN Red List of Threatened Species (Cooke, 2018).

The upper Gulf of California is home to the entire remaining population of the endemic vaquita (*Phocoena sinus*), which is considered Critically Endangered (CR) on the IUCN Red List of Threatened Species (Rojas Bracho et al., 2022). The estimated rate of decline is exceptionally high: with an estimated 48% decline in 2017 (95% Bayesian credible interval – CRI, 78% decline to 9% increase) and 47% in 2018 (95% CRI, 80% decline to 13% increase). The estimated total population decline since 2011 is 98.6% making the vaquita porpoise the most endangered species in the world.

## Criterion B: Distribution and Abundance Sub-criterion B1: Small and Resident Populations

Three abundance estimates have been generated for the Gulf of California's resident population of fin whales: 820 individuals (95% CI 594-3.229) based on line transects carried out in 1993 (Gerrodette & Palacios, 1996); 656 individuals (95% CI 374-938) based on capture-recapture methods based on fieldwork carried out in 2004 (Díaz-Guzmán, 2006); finally, Rivera-León et al. (2019) based on molecular analyses, estimated an "effective population size" of around 250.

Based on the presence of females with calves, the main nursery area for fin whales in the Gulf of California is Bahía de La Paz and the San José Channel in both the warm season (May-November) and the temperate season (December-April) (Jiménez López, 2019; Bernot et al., 2021). Females with calves have only been recorded in the warm season of Ángel de la Guarda Island and southern Tiburon Island. There are also three areas where fin whale feeding behavior has been documented: Bahía de los Ángeles-Canal de Ballenas- Grandes Islas, Bahía de La Paz, and Bahía Kino, with fewer records Bahía de Loreto (Jiménez López, et al., 2019).

The entire population of Critically Endangered vaquitas is confined within the limits of this IMMA. In the Summer of 2018, it was estimated that fewer than 19 vaquitas remained (posterior mean 9, median 8, 95% CRI 6–19; Jaramillo-Legorreta et al., 2019). Acoustic data have shown a substantial reduction in the area used by the remaining vaquitas. In 2019 CIRVA, the international recovery team called on the Government of Mexico to fully mobilize its enforcement assets to eliminate illegal fishing in this small area where the last few vaquitas remain (12 km x 24 km), called the Zero Tolerance Area (ZTA).

## Sub-criterion B2: Aggregations

Within the Gulf of California IMMA, Loreto Bay serves as an essential annual aggregation point for blue whales, where females have been seen with young and feeding has been further (Gendron, 2002). Although blue whales don't usually demonstrate a preference for a particular habitat but rather concentrate where there is food biomass (Chávez-Andrade, 2006), it is recognized that the Loreto Bay area is a critical aggregation zone for this species.

## Criterion C: Key Life Cycle Activities
## Sub-criterion C1: Reproductive Areas

The Gulf of California is a nursery area for the Northeast Pacific stock blue whales. The females, both with and without calves, return to the Gulf of California, which indicates that the area is also regularly used by females in different reproductive states (Gendron, 2002). Humpback whales (*Megaptera novaeangliae*) from the North Pacific congregate in the Gulf of California for mating, calving and nursing. Within the IMMA, they are concentrated in Los Cabos. Still, their distribution comprises from Loreto on the east coast to Bahía Magdalena on the west coast of the Baja California Peninsula. Humpback whales are distributed from Mazatlán to Bahía de Banderas on the mainland coast, including Tres Marias Islands and Isabel Island (Urbán et al., 2000). The estimated abundance of these aggregations was 3,181-4896 individuals in 2017 (Martínez-Loustalot et al., 2023). Mothers with calves are distributed close to the shore, while the singing males and competitive groups have more oceanic distribution (Martínez-Loustalot, 2017). There are movements between aggregations, and their main migratory destinations are the USA's west coast and the Gulf of Alaska and Aleutians (Urbán et al., 2000; González-Peral, 2011).

Figure 3: Humpback whale (*Megaptera novaeangliae*) at Los Cabos, B.C.S. Photo credit: J. Urbán PRIMMA-UABCS.

## Sub-criterion C2: Feeding Areas

Unlike other baleen whale species with migratory habits, that take them between productive temperate/polar regions and tropical wintering grounds, blue whales in the Gulf of California feed extensively on dense aggregations of krill species, primarily those species of krill of the Nyctiphanes simplex (Gendron, 1990). Molecular eschatology revealed that lanternfish of the family Myctophidae). were also present in 98% of fecal samples collected from blue whales in the Gulf of California (Jiménez-Pinedo, 2010).

Figure 4: Blue whale (*Balaenoptera musculus*) at Loreto, B.C.S. Photo credit: J. Urbán PRIMMA-UABCS.

## Criterion D: Special Attributes
## Sub-criterion D2: Diversity

The Gulf of California IMMA represents a critical habitat supporting a wide diversity of marine mammal species of global significance. The IMMA is home to California sea lions (*Zalophus californianus*) and Guadalupe fur seals (*Arctocephalus philippii townsendi*) (Elorriaga-Verplancken et al., 2021). In addition, The Gulf of California also hosts 31 species of cetaceans belonging to seven different families and 21 genera (Urbán, 2010). Numerous species stand out regarding the Gulf's richness of species: the fin whale (*Balaenoptera physalus*) and the Bryde's whale (*Balaenoptera edeni*) are present throughout the year.

In contrast, blue whales are present seasonally in the cold season. Four additional baleen whale species in the Mexican Pacific also use the Gulf of California: the humpback whale, the minke whale (*Balaenoptera acutorostrata*) and the gray whale (*Eschrichtius robustus*). Odontocete species that are periodically observed are killer whales (*Orcinus orca*) and short-finned pilot whales (*Globicephala macrorhynchus*) (Vidal et al., 1993; Urbán et al., 2005; Urbán, 2010). Sperm whales (*Physeter macrocephalus*) are also regularly present in association with squid in the area, particularly the species *Dosidicus gigas* (Jaquet & Gendron, 2002; Camarillo-Coop et al., 2011).

## Supporting Information


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