



## Area Size

297,319 km<sup>2</sup>

## Qualifying Species and Criteria

Sei whale – *Balaenoptera borealis*

Criterion A

Sperm whale – *Physeter macrocephalus*

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

Long-finned pilot whale –

*Globicephala melas edwardii*

Criterion C (1, 2)

Common bottlenose dolphin – *Tursiops truncatus*

C (1, 2)

Atlantic Spotted dolphin – *Stenella frontalis*

Criterion C (1, 2)

Common dolphin – *Delphinus delphis*

Criterion C (1, 2)

Risso's dolphins – *Grampus griseus*

Criterion C (1, 2)

Killer whale – *Orcinus orca*

Criterion C (2)

South American fur seal –

*Arctocephalus australis*

Criterion C (2)

Criterion D (2) - Marine Mammal Diversity

*Arctocephalus australis*, *Balaenoptera borealis*,  
*Delphinus delphis*, *Globicephala melas edwardii*,

*Grampus griseus*, *Orcinus orca*, *Physeter  
macrocephalus*, *Tursiops truncatus*, *Stenella*

*frontalis*

# Southwest Atlantic Subtropical Continental Slope and Canyons System IMMA

## Other Marine Mammal Species

### Documented

*Balaenoptera acutorostrata*, *Balaenoptera bonaerensis*,  
*Megaptera novaeangliae*, *Stenella coeruleoalba*,  
*Stenella longirostris*

### Summary:

This IMMA ranges from the 200m to 3000 m isobaths and from Santa Catarina State (ca. 27° S), southern Brazil, to Buenos Aires Province (ca. 38° S), northern Argentina. It is under the influence of the Brazil current, and subantarctic waters transported by the Falkland (Malvinas) currents as well as continental waters from La Plata River and Patos Lagoon plumes, which form the subtropical shelf front. Surface and subsurface upwelling events influence the productivity of the area that sustains diverse array of cetacean species and is an important aggregation area for sperm whales (*Physeter macrocephalus*). At least eight cetacean and one pinniped species use the area regularly either throughout the year or seasonally for feeding and/or breeding purposes.

### Description:

The Southwest Atlantic Subtropical Continental Slope and Canyon System IMMA ranges from the 200 to 3000 m isobaths and from Santa Catarina State (ca. 27° S), southern Brazil, to Buenos Aires Province (ca. 38° S), northern Argentina. It is under the influence of the Brazil current, the sub-Antarctic waters

transported by the Falkland (Malvinas) currents and continental waters from La Plata River and Patos Lagoon plumes, which form the subtropical shelf front (STSF) (Acha et al., 2004; Möller et al., 2008; Piola et al., 2008). The STSF is characterised by a sharp thermohaline transition between these water masses. This front changes its intensity and location over the continental shelf according to the predominance of seasonal southerly and northerly wind regimes and the continental water is exported towards the shelf break and slope, with localised effects promoted by a series of canyons perpendicularly-oriented along the slope (Piola et al., 2000, 2008). These processes and surface and subsurface upwelling events influence the productivity in offshore waters by enhancing the concentration of inorganic nutrients, chlorophyll-a (Chl-a) and density of zooplankton (Braga et al., 2008; Muelbert et al., 2008). These productive waters support a large biomass of both pelagic and demersal species of fish and cephalopods (e.g. Haimovici et al., 2004, 2009, 2014) which in turn are part of the food web involving cetaceans, sea birds, turtles and large pelagic fish (Santos & Haimovici, 2000, 2001, 2002). The area is also an important longline fishing ground targeting tuna, tuna-like fish and sharks, with frequently reported interactions with diverse species of marine mammals, birds, turtles and non-target sharks and rays (e.g. Secchi & Vaske Jr., 1998; Dalla Rosa & Secchi, 2007; Bugoni et al., 2008a, b; Passadore et al., 2012, 2015). Furthermore, this IMMA partially overlaps with the Southern Brazilian Sea Ecologically or Biologically Significant Area (EBSA), which is characterized as a region of high productivity and importance for deep-sea corals, demersal and pelagic fishes, seabirds, sea turtles as well as for whales and dolphins (Secretariat of the Convention on Biological Diversity, 2014).

## **Criterion A: Species and Population Vulnerability**

Sperm whales (*Physeter macrocephalus*) and sei whales (*Balaenoptera borealis*) both occur throughout this IMMA and are, classified respectively as Vulnerable, under criterion A1d (Taylor et al., 2019), and Endangered, under criterion A1abd (Cooke, 2018) on the IUCN Red List. Sperm whales were intensively hunted in the area (e.g. Smith et al., 2012). Despite an IWC agreement to suspend hunting of sperm whales in international waters, commercial catches of sperm whales continued in northeastern Brazil between 1960 and 1967 (Ramos et al., 2001). Sei whale populations were also targeted by commercial whaling in their western South Atlantic breeding grounds as well as in their Southern Ocean feeding grounds. In Brazil, the sei whale was one of the main target species for coastal whaling operations (Williamson, 1975). It is estimated that about 4,700 sei whales were captured off the Brazilian coast between 1947 and 1974 (Zerbini et al., 1997). Currently, noise pollution from seismic prospecting, chemical contaminants, collision with vessels and incidental catches in high seas fisheries are among the potential threats for both species.

## **Criterion B: Distribution and Abundance Sub-criterion B2: Aggregations**

The IMMA encompasses a historical sperm whale hunting ground, and historical whaling data indicate the area's longstanding importance for the species (Smith et al., 2012). Combined data from Di Tullio et al. (2016) and Zerbini et al. (2004) indicate that sperm whales occur in the IMMA throughout the year.

Furthermore, sperm whales were the most frequently recorded species during ten ca. 35-day long dedicated ship-based cetacean line transect surveys conducted in the IMMA from 2009 and 2015.



Figure 1: Adults and newborn calf sperm whales (*Physeter macrocephalus*) sighting within IMMA in 2023 summer survey. Photo credit: Rodrigo Genoves/Projeto Talude

Sperm whale sightings represented approximately a third (n=140) of all cetacean sightings identified to species level (n=344) (Di Tullio et al., 2016; Ecomega, unpublished data). Sperm whale encounter rates were highest at depths over 1000 m. This supports previous studies in the same area (Zerbini et al., 2004) showing that the continental slope is an important aggregation area for this species.

During austral autumn months fewer sperm whale sightings of larger mean group sizes were documented. Abundance estimates of this species within the IMMA varied from 271 (95% CI: 72 – 1021) in the autumn of 2010 to 1,253 (CI: 660 – 2378) in the spring of 2012 (Di Tullio, 2016). Sperm whales were again the most frequently observed species during a recent ca. 35-day-long summer survey carried out in Feb-Mar 2023. In this survey, several new-born calves were documented.

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

This IMMA is an incredibly productive marine area that provides food resources that aggregate a number of marine mammal species (and other megafauna groups) and provide a nutritional base and appropriate habitat for activities associated with reproduction. During ten ca. 35-day long dedicated ship-based cetacean line transect surveys conducted in the IMMA from 2009 and 2015, calves were regularly present in observed groups of the following species: sperm whales (10.2% of all sightings – n=176), common dolphins (*Delphinus delphis* – 37% of all sightings, n=38), common bottlenose (*Tursiops truncatus* – 41.5% of all sightings, n=41), Atlantic spotted dolphins (*Stenella frontalis* – 48% of all sightings, n=46), Risso's dolphins (*Grampus griseus* – 20% of all sightings, n=10) and long-finned pilot

whales (*Globicephala melas edwardii* – 39% of all sightings, n=18) (Lima et al., 2021; Ecomega, unpublished data).

During recent surveys conducted in the IMMA sperm whales were the most frequently sighted species on the continental slope area and many groups with new-born calves were observed, especially in the austral summer (Di Tullio, 2016; Ecomega, unpublished data).

### **Sub-criterion C2: Feeding Areas**

The productive waters of this IMMA support a large biomass of both pelagic and demersal species of fish and cephalopods (e.g. Haimovici et al., 2004, 2009, 2014) which in turn are part of the food web involving cetaceans, pinnipeds and other large pelagic predators that occur in the area (Santos and Haimovici, 2000, 2001, 2002). Skin samples of ten species of free-ranging odontocetes sampled in the IMMA were used to conduct an analysis of Carbon (C) and Nitrogen (N) isotopic composition revealed the trophic structure and habitat of cetaceans and their prey. The results indicate that this IMMA is an important feeding area for several species (Troina et al., 2020a,b, 2021) that occupy different trophic positions. For example, sperm whales occupy one of the highest trophic positions followed by the long-finned pilot whale, and both species feed mainly on oceanic prey. Species occupying lower trophic positions and feeding in waters of the shelf break include common dolphins, common bottlenose dolphins and Atlantic spotted dolphins, followed by killer whales (*Orcinus orca*) (Troina et al., 2020a,b, 2021). These data provide indirect, but robust indications of the importance of the shelf-break and continental slope for these (and certainly other non-analysed) species.

## **Criterion D: Special Attributes**

### **Sub-Criterion D2: Diversity**

At least sixteen species of marine mammal have been documented in this IMMA (e.g. Di Tullio et al., 2016; Passadore et al., 2008; Uruguayan unpublished data). Nine of those were frequently recorded and met at least one of the criteria to be included as qualifying species in this IMMA. The habitat appears to be especially important for sperm whales and sei whales and several small and mid-sized delphinids, such as Atlantic spotted dolphins, short beaked common dolphins, bottlenose dolphins, long-finned pilot whales, and Risso's dolphins (*Grampus griseus*) that regularly use the area throughout the year for both feeding and breeding purposes. The area also hosts South American fur seals for feeding (e.g. Zerbini et al., 2004; Di Tullio et al., 2016; Franco-Trecu et al., 2021; de Lima et al., 2022; Ecomega, unpublished data; Uruguay, unpublished data).

Small delphinids show latitudinal and in-offshore gradients as well as seasonal variation in distribution patterns within the IMMA, which could indicate habitat partitioning between some species (Di Tullio et al., 2016). For instance, common dolphin's density decreased in areas beyond the 250 m isobath where the presence of Atlantic Spotted dolphin increased (Di Tullio et al., 2016). The common bottlenose dolphin and Long-finned pilot whale were observed forming mixed groups and at depths of ~500 m within this IMMA (Di Tullio et al., 2016). The density of Risso's dolphin increased in waters deeper than 600 m (Di Tullio et al., 2016).

Other species are less frequently recorded in this IMMA include striped (*Stenella coeruleoalba*) and spinner (*Stenella longirostris*) dolphins; common (*Balaenoptera acutorostrata*) and Antarctic (*Balaenoptera bonaerensis*) minke whales, and humpback whales (*Megaptera novaeangliae*).



Figure 2: Mixed group of Long-finned pilot whales (*Globicephala melas edwardii*) and bottlenose dolphins (*Tursiops truncatus*) sighted within IMMA. Photos credits: Projeto Talude



Figure 3: Common dolphin (*Delphinus delphis*) sighted within IMMA. Photos credit: Projeto Talude



Figure 4: Atlantic spotted dolphin (*Stenella frontalis*) sighted within IMMA. Photos credit: Projeto Talude

## Supporting Information

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