

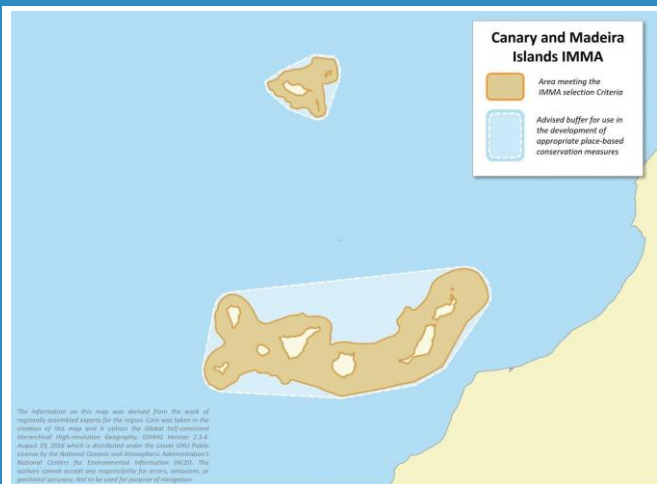
Canary and Madeira Islands IMMA

Summary

The Madeira archipelago and the Canary Islands are important for 11 of the 21 cetacean species that regularly occur in the area. This IMMA is located in the subtropical East Atlantic, not far from the Northwest Africa upwelling area, and is influenced by the Azores and Canary currents. The area is at the boundary between the distributional ranges of cetacean species normally associated with tropical and those associated with temperate waters. The area encompasses a diversity of important habitats for cetaceans such as islands, with insular shelves and canyons, seamounts, oceanographic fronts, deep sea, and open ocean habitats. Island-associated common bottlenose dolphins (*Tursiops truncatus*) and short-finned pilot whales (*Globicephala macrorhynchus*) are resident in Madeira archipelago and in the Canary Islands. In the latter archipelago, there are also island-associated Blainville's beaked whales (*Mesoplodon densirostris*) and Cuvier's beaked whales (*Ziphius cavirostris*). Additional species use the area seasonally to feed, rest, socialise, and breed, while others pass through the area during their migratory and nomadic movements. The islands are also known to regularly host aggregations of sperm whales.

Description:

The IMMA encompasses the coastal waters of Madeira archipelago and the Canary Islands. The offshore waters west of Northwest African coast, between the Canary Islands and the area off the southwest Portuguese coast are considered an Area of Interest (AoI) for cetaceans as well. The main physiographic features in the area are the Canary



Area Size

50 006 km²

Qualifying Species and Criteria

Sperm whale – *Physeter macrocephalus*

Criterion A; B (2)

Bryde's whale – *Balaenoptera edeni*

Criterion B (2)

Common bottlenose dolphin – *Tursiops truncatus*

Criterion B (1,2)

Short-finned pilot whale –
Globicephala macrorhynchus

Criterion B (1, 2)

Cuvier's beaked whale – *Ziphius cavirostris*

Criterion B (1, 2)

Blainville's beaked whale –
Mesoplodon densirostris

Criterion B (1)

Atlantic spotted dolphin – *Stenella frontalis*

Criterion B (2)

Common dolphin – *Delphinus delphis*

Criterion B (2)

Marine Mammal Diversity

Criterion D (2)

Balaenoptera edeni, *Delphinus delphis*,
Globicephala macrorhynchus, *Grampus griseus*,
Mesoplodon densirostris, *Physeter macrocephalus*,
Stenella coeruleoalba, *Stenella frontalis*, *Steno
bredanensis*, *Tursiops truncatus*, *Ziphius cavirostris*

Islands and associated seamounts, located close to the African continent, the Madeira archipelago further north and offshore, and the seamounts (e.g. Goringe, Biometore, Seine) located close to the Aol northern limit. Besides the static features, such as islands and seamounts, the IMMA is influenced by several dynamic oceanographic features. Between Azores and Madeira, the Azores Current and the associated frontal system, with sharp thermal and density gradients and cyclonic and anticyclonic eddies, result in increased primary productivity (Pingree et al., 1999; Barbosa Aguiar et al., 2011; Romagosa et al., 2020). Not far from Madeira, and especially close to the Canary Islands, there is the coastal upwelling along the Northwest Africa coast (from Gibraltar to Cape Blanc), which may be a key region for the export of organic matter and nutrients to the open ocean, especially in late autumn-winter (Aristegui et al., 2004). The Madeira archipelago and the Canary

Islands are the visible part (above sea level) of mountains rising from the ocean floor, from depths over 5400 m (Heezen et al., 1959). The underwater sections of the islands (and seamounts) are natural barriers to oceanic circulation at different depths, generating, together with currents and winds, oceanographic phenomena such as local upwelling or island-induced eddies (Caldeira et al., 2002). The island-induced turbulent flow processes, together with nutrient-rich land run-off and benthic processes in shallow waters, contribute to the increase of primary productivity around oceanic islands (Doty & Oguri, 1956; Caldeira et al., 2002; Palacios, 2002), a phenomenon called the "island mass effect" (after Doty & Oguri, 1956). The static nature of islands and seamounts, combined with the higher productivity and related prey aggregating effect (Fiedler, 2009), is advantageous to cetaceans.



Figure 1: Sperm whale (*Physeter macrocephalus*) social group logging off Madeira. Photo credit: Pauline Gauffier © Madeira Whale Museum

Criterion A: Species or Population Vulnerability

The sperm whale (*Physeter macrocephalus*) is classified globally as Vulnerable according to the IUCN Red List (Taylor et al., 2019). The IMMA encompasses seamounts and open water habitats used by the species in the central east Atlantic, namely for groups of females and calves (Freitas et al., 2004; Pérez-Gil et al., 2015; Fais et al., 2016; Alves et al., 2018; Correia et al., 2020).



Figure 2: Sperm whale (*Physeter macrocephalus*). Photo credit: CEAMAR / A Servidio

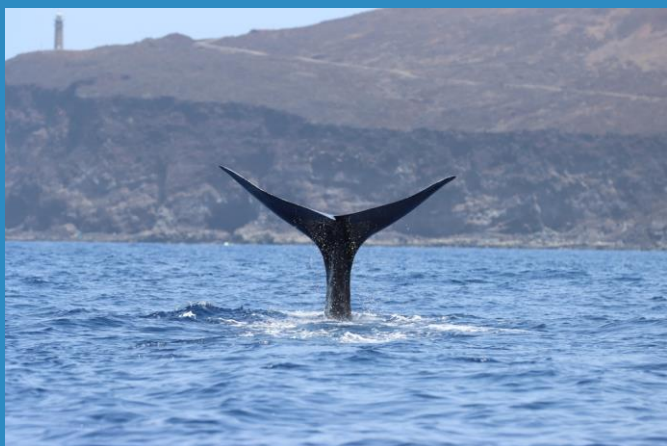


Figure 3: Sperm whale (*Physeter macrocephalus*) spotted near island. Photo credit: CEAMAR / N Varo

Sperm whales can be sighted in all months of the year in Madeira and the Canary Islands (Freitas et al., 2004; Martín et al., 2014). In the latter archipelago there are two peaks of sightings (April-May and October-November) and some animals appear to show some degree of site fidelity, given that 25 of 141 photo-identified animals have been re-sighted (Martín et al., 2014). The last abundance estimate using Distance sampling methodology during 2009-2010, was 220 individuals (95% CI=117-413) (Fais et al., 2010, 2016); this number of animals has the capacity to produce 2.42 offspring per year (1.1% of the total number of animals) (Whitehead, 2002). Considering that 2.32 sperm whales/year on average are reported stranded with signs of collision, it is highly likely that the mortality rate due to collision of the sperm whale in the Canary Islands exceeds the species' own natural recruitment capabilities (Fais et al., 2016). Although there is no information on abundance trends for the species in the IMMA area, it can be considered as seriously threatened in the Canary Islands.



Figure 4: Sperm whales (*Physeter macrocephalus*) spotted in the waters of Madeira. Photo credit: Ágatha Gil / CIIMAR



Figure 5: Sperm whales (*Physeter macrocephalus*) spotted in the waters of Madeira. Photo credit: Ágatha Gil / CIIMAR

Criterion B: Distribution and Abundance

Sub-criterion B1: Small and Resident Populations

Island-associated resident populations of common bottlenose dolphins (*Tursiops truncatus*) and short-finned pilot whales (*Globicephala macrorhynchus*) are present in the Madeira archipelago (Alves et al., 2013; Dinis et al., 2016), with estimated abundances of 183 animals (n=183; IC95%=155 – 218) and 140 animals (95%CI: 131–151), respectively (Dinis, 2014; Alves et al., 2015).



Figure 6: Mother and calf bottlenose dolphin (*Tursiops truncatus*).
Photo credit: Philippe Verborgh © Madeira Whale Museum



Figure 7: Bottlenose dolphins (*Tursiops truncatus*) with calf.
Photo credit: CEAMAR / M Pérez-Gil

In the Canary Islands, sightings of bottlenose dolphins (*Tursiops truncatus*) can occur throughout the year on all the islands (Martín et al., 1992; Politi et al., 1996; Ritter, 1996; Carrillo & Tejedor, 2002), with communities that show high fidelity to specific areas, where they are considered residents (e.g. SAC Franja marina de Mogán and Franja marina Teno-Rasca) (Martín & Carrillo, 2000; Carrillo & Tejedor, 2002; Marrero & Fernández, 2018). However, movement of individuals between islands of the archipelago has been observed (Tobeña et al., 2014).

There are also known resident short-finned pilot whales in the coastal waters of the southwest of Tenerife Island (Heimlich-Boran, 1993; Montero & Martín, 1993; Carrillo & Tejedor, 2002; Servidio, 2014; Marrero et al., 2016; Marrero & Fernández, 2018; Servidio et al., 2019). Estimates by Servidio (2014) are also capture-recapture techniques by photo-identification. The short-finned pilot whales in Southwestern Tenerife were estimated between 636 (95%CI: 602–671) and 1,247 animals (95%CI: 920–1 690) depending on whether or not possibly transient animals were considered in the estimate (Servidio, 2014). More recent estimates (2015, 2017, 2018, 2019 and 2020) using capture-recapture techniques by photo-identification for the same area, show that the local community of the species has remained relatively stable in the past several years, with 362 individuals considered as residents (ICI=252-746) (Marrero et al., 2016; Marrero & Fernández, 2018; Pimentel et al., 2021; García-Pastor et al., 2021).



Figure 8: Short-finned pilot whales (*Globicephala macrorhynchus*).
Photo credit: CEAMAR / A Servidio



Figure 9: Mother and newborn calf short-finned pilot whale (*Globicephala macrorhynchus*).
Photo credit: Philippe Verborgh © Madeira Whale Museum

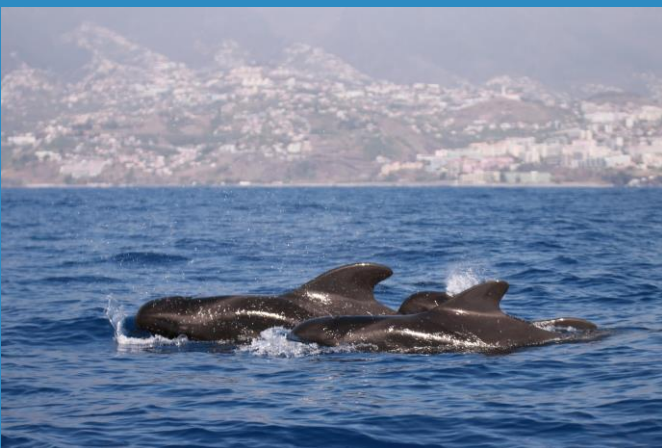


Figure 10: Short-finned pilot whales (*Globicephala macrorhynchus*) encountered off Madeira Island. Photo credit: Ágatha Gil / CIIMAR

Other resident island-associated species are Cuvier's beaked whales (*Ziphius cavirostris*) and Blainville's beaked whales (*Mesoplodon densirostris*) in El Hierro Island (Aguilar de Soto, 2006; Aparicio et al., 2006; Reyes Suárez, 2018). Both resident beaked whale populations appear to be small, with photo-ID studies conducted between 2012 and 2015 yielding mark-recapture estimates of 33 (95% CI: 24-46) island-associated Blainville's beaked whales and 39 (95% CI: 34-44) island-associated Cuvier's beaked whales (Reyes Suárez, 2018). Blainville's beaked whales are also considered a resident species in the southwest of Tenerife (SAC Franja marina Teno-Rasca), where they can be sighted throughout the year with some individuals being re-sighted in up to 12 different occasions since 2012 (Montañés, 2020). The total estimate of the Blainville's beaked whale community in SW Tenerife, using capture-recapture techniques by photo-identification, was 137 individuals (n=137; IC95%=133-145) (As. Tonina. unpublished data). Although a detailed study to document movement between the islands has not been conducted, movement of animals has been observed between the islands of Tenerife, La Gomera, La Palma and Gran Canaria (As. Tonina. unpublished data).



Figure 11: Cuvier's beaked whale (*Ziphius cavirostris*).
Photo credit: CEAMAR / M Pérez-Gil



Figure 12: Cuvier's beaked whale (*Ziphius cavirostris*) sighted between Madeira and Porto Santo islands. Photo credit: Anxo Gende / CIIMAR

The resident animals of the above mentioned species are genetically part of wider and expectedly larger oceanic populations (Quéroil et al., 2007; Alves et al., 2013; Onoufriou et al., 2020), although there is evidence that the Cuvier's beaked whale cluster of the Canary Islands has slightly lower diversity when compared to the remaining North Atlantic clusters (Onoufriou et al., 2020).

Sub-criterion B2: Aggregations

While some island-associated resident populations of common bottlenose dolphins and short-finned pilot whales are present around the Madeira archipelago and the Canary Islands, there are also fluctuating aggregations that occur year-round (Martin et al., 2003; Carrillo et al., 2010; Ritter, 2012; Freitas et al., 2014; Dinis et al., 2016; Alves et al., 2018). The short-finned pilot whales show varied degrees of site fidelity to the islands in each archipelago (e.g. Madeira and Tenerife and others), with some animals classified as residents (and core residents), and others as visitors or transients (Alves et al., 2013; Servidio et al., 2019; Esteban et al., 2022).

There is also evidence for aggregations with some degree of site fidelity of rough-toothed dolphins (*Steno bredanensis*) in the Canaries (e.g. La Gomera, Mayr, 2005). Common dolphins (*Delphinus delphis*) and Atlantic spotted dolphins (*Stenella frontalis*) are mostly present year-round in the IMMA, with the

former having a marked seasonal inshore presence in Madeira and in the Canary Islands both in winter and spring, and the latter having a year-round presence in the Canary Islands and a seasonal presence in summer/autumn in Madeira (Freitas et al., 2004; Perez-Vallazza et al., 2008; Carrillo et al., 2010; Martín et al., 2011; Alves et al., 2018; Pérez-Gil et al., 2018; Saavedra et al., 2020).



Figure 13: Rough-toothed dolphins (*Steno bredanensis*). Photo credit: CEAMAR / A Servidio



Figure 14: Common dolphin (*Delphinus delphis*) breaking the surface. Photo credit: Ruth Esteban © Madeira Whale Museum



Figure 15: Atlantic spotted dolphin (*Stenella frontalis*) leaping out of the water. Photo credit: CEAMAR / M Pérez-Gil



Figure 16: Bryde's whale (*Balaenoptera edeni*) taking a breath. Photo credit: Elena Gutiérrez © Madeira Whale Museum

The inshore and offshore waters of the Madeira archipelago and the Canary Islands are an important habitat for Bryde's whales (*Balaenoptera edeni*), sperm whales, and Cuvier's beaked whales. Bryde's whales migrate seasonally into the area; sperm whales move between archipelagos and in offshore waters throughout the year; and Cuvier's beaked whales are present in deeper waters, with some animals showing some degree of site fidelity, for example, at El Hierro Island (Martín et al., 2001; Carrillo et al., 2010; Ferreira et al., 2021, 2022; Correia et al., 2020; Reyes, 2018). The Bryde's whales, sperm whales and Cuvier's beaked whales use the IMMAs waters to feed and breed (e.g. Freitas et al., 2004; Martín et al., 2011; Alves et al., 2018; Freitas & Penry, 2021).

Sightings and distribution models confirm the aggregations of all the above-mentioned species in both Madeira archipelago and the Canary Islands (Freitas et al., 2004; Perez-Vallazza et al., 2008; Carrillo et al., 2010; Martín et al., 2011; Ruiz et al., 2011; Freitas et al., 2014; Freitas et al., 2019; Fernandez et al., 2021).

Criterion C: Key Life Cycle Activities **Sub-criterion C2: Feeding Areas**

The IMMA includes a variety of habitats, including shallower nearshore waters, slope and canyon habitats around islands and seamounts, dynamic oceanographic features associated with currents and

fronts, and deep open ocean waters (Heezen, 1959). These habitats are used differently by the 11 species that occur regularly in the area, including the striped dolphin (*S. coeruleoalba*), the Risso's dolphin (*Grampus griseus*) and the species already mentioned above (Ritter, 2001; Martín, 2003; Perez-Vallazza et al., 2008; Carrillo et al., 2010; Martín et al., 2011; Ruiz et al., 2011; Freitas et al., 2012; Freitas et al., 2014; Alves et al., 2018). Nine other cetacean species also use the area with varied degrees of occurrence, namely, the Orca (*Orcinus orca*), the false killer whale (*Pseudorca crassidens*), pygmy sperm whale (*Kogia breviceps*), dwarf sperm whale (*Kogia sima*), Gervais' beaked whale (*M. europaeus*), fin whale (*B. physalus*), sei whale (*B. borealis*), blue whale (*B. musculus*), minke whale (*B. acutorostrata*) and the humpback whale (*Megaptera novaeangliae*) (Díaz et al., 2000; Ritter, 2001; Martín, 2003; Freitas et al., 2004; Perez-Vallazza et al., 2008; Carrillo et al., 2010; Martín et al., 2011; Freitas et al., 2012; Freitas et al., 2014; Alves et al., 2018).



Figure 17: Fin whales (*Balaenoptera physalus*) recorded offshore Madeira, in the seamounts between the archipelago and the southwest Mainland Portugal.
Photo credit: Cláudia Oliveira-Rodrigues / CIIMAR

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