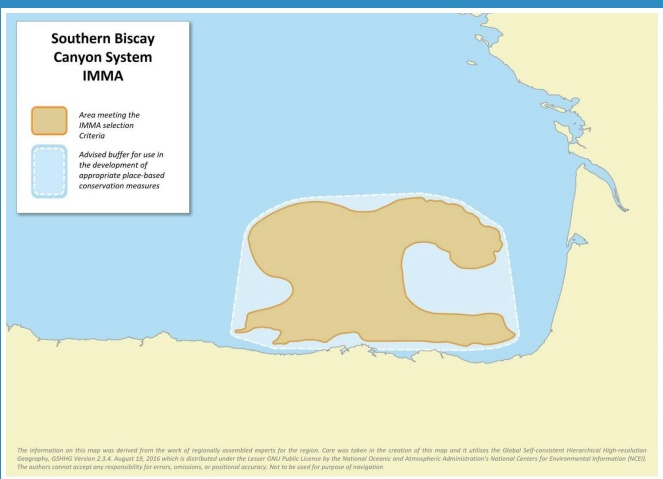

Area Size

29 906 km²

Qualifying Species and Criteria

Sperm whale – *Physeter macrocephalus*

Criterion A, B (2)

Sei whale – *Balaenoptera borealis*

Criterion A

Fin Whale – *Balaenoptera physalus*

Criterion A

Cuvier's beaked whale – *Ziphius cavirostris*

Criterion B (2)

Criterion D (2) - Marine Mammal Diversity

Balaenoptera acutorostrata, Balaenoptera borealis, Balaenoptera physalus, Delphinus delphis, Globicephala macrorhynchus, Globicephala melas, Grampus griseus, Hyperoodon ampullatus, Megaptera novaeangliae, Mesoplodon bidens, Mesoplodon densirostris, Mesoplodon europaeus, Mesoplodon mirus, Orcinus orca, Physeter macrocephalus, Phocoena phocoena, Stenella coeruleoalba, Tursiops truncatus, Ziphius cavirostris

Southern Biscay Canyon System IMMA

Summary

The Santander, Torrelavega and Cap Breton canyons form part of a wide complex of submarine canyons located to the north of the Costa Cantabria in the southern Bay of Biscay. This system descends steeply from the continental shelf edge at 200m into the Bay of Biscay abyssal plain with depths exceeding 4,000 m. The interaction of oceanographic processes and bathymetry in this area drives productivity and creates habitats for at least 19 cetacean species. Of particular interest are the frequently encountered sperm whales (*Physeter macrocephalus*) and Cuvier's beaked whales (*Ziphius cavirostris*), which are recorded in the area year-round, as well as other beaked whales such as northern bottlenose whales (*Hyperoodon ampullatus*), Sowerby's beaked whales (*Mesoplodon bidens*), True's beaked whales (*Mesoplodon mirus*) and Blainville's beaked whales (*Mesoplodon densirostris*).

Description:

A wide complex of submarine canyons characterises the southern part of the Bay of Biscay (Quero et al., 1989). The Santander and Torrelavega canyons are oriented north-south with a depth gradient in the same direction, while the Cap Breton canyon is oriented east-west. The area experiences seasonal stratification and related cycles of surface primary productivity typical of mid-latitudes (Romero-Romero et al., 2016). The Bay of Biscay is subject to seasonal upwelling in the summer which enhances primary productivity. Due to the interaction of oceanographic processes with bathymetry, canyons in general can be productive and can be particularly important for

Figure 1: Fin whale (*Balaenoptera physalus*) in Bay of Biscay. Photo credit: ORCA

deep diving odontocetes that depend on the oceanographic processes at play (Moors-Murphy, 2014).

Criterion A: Species or Population Vulnerability

This IMMA provides good habitat for sperm whales (*Physeter macrocephalus*), which are listed as vulnerable on the IUCN Red List (Taylor et al., 2019). It also hosts fin whales (*Balaenoptera physalus*), which are listed as vulnerable on the IUCN Red List of Threatened Species (Cooke, 2018a). Sei whales (*Balaenoptera borealis*) are also found in this area, and are listed as endangered on the Red List (Cooke, 2018b).

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

Consistent sightings of beaked whales, particularly Cuvier's beaked whales (*Ziphius cavirostris*), have been recorded throughout the Torrelavega Canyon, Santander Canyon and Cap Breton Canyon (ORCA, 2019; Laran et al., 2017; MacLeod et al., 2011; Smith, 2010), with habitat modelling studies predicting very high beaked whale densities in these canyons (Virgili et al., 2022).

A large aerial survey (SAMM: *Suivi Aérien de la Mégafaune Marine, Aerial Census of Marine Megafauna)* was conducted over the Bay of Biscay and English Channel in winter 2011–2012 and summer

2012. Using conventional distance sampling, the relative density of beaked whales within a stratum that included the slope waters of the Bay of Biscay and the coast of Spain (including this IMMA) was estimated to be 0.006 individuals/km^2 (CV=50-70% for both winter and summer seasons (Laran et al., 2017a), which is high and, for example, consistent with those estimated for the Mozambique Channel in the Indian Ocean (Laran et al., 2017b).

High densities of beaked whales in the south-eastern Bay of Biscay are also well described by various large-scale surveys such as SCANS-II (Small Cetaceans in European Atlantic waters and the North Sea), CODA (Cetacean Offshore Distribution and Abundance) and SCANS-III (Lacey et al., 2022).

Long-term citizen-science data collected from ferry-based platforms of opportunity surveys from March through October between 2006 and 2018 suggested that beaked whales were present year-round, with increased encounter rates in summer (Robbins et al., 2022) (ORCA sightings databases).

The Cuvier's beaked whale is the most abundant ziphiid in the Bay of Biscay, with encounter rates 12 to 16 times higher than those for northern bottlenose whales (*Hyperoodon ampullatus*) and Sowerby's beaked whales (*Mesoplodon bidens*) (Virgili et al., 2022). The Santander, Torrelavega and Cap Breton canyons support particularly high densities of Cuvier's beaked whales, with one study reporting an encounter rate of 1.2 per 100 nautical mile (nmi) in the southern Bay of Biscay, particularly around the Santander canyon, compared to 0.09 per 100 nmi in the northern part of the bay (Kiszka et al., 2007). The highest corrected density estimate of Cuvier's beaked whales was 0.132 animals/km^2 in 2006 in the Torrelavega Canyon. This density is higher than any other published estimates for this species anywhere (MacLeod et al., 2011). Citizen-science data from POP surveys in this region include 329 sightings of Cuvier's beaked whales from 2007 to 2022, with 683 individual animals (uncorrected for resightings) sighted (including 13 calves), with group sizes of 1-7 individuals (ORCA sightings databases).

Figure 2: Cuvier's beaked whales (*Ziphius cavirostris*) spotted surfacing in this IMMA. Photo credits: ORCA

Figure 3: Sperm whale (*Physeter macrocephalus*) in Bay of Biscay. Photo credit: ORCA

Sperm whales are regularly sighted throughout the area, but show a preference for deep oceanic waters in the southern Bay of Biscay (Hobbs et al., 2007; Kiszka et al., 2007; Waggitt et al., 2020). Encounter rates are higher in the southern Bay of Biscay (0.8 per 100 nmi), especially in the proximity of the Santander Canyon, than in the northern Bay (0.09 per 100 nmi), indicating this area to be an important area of aggregation for sperm whales (Kiszka et al., 2007). From the large scale seasonal aerial survey SAMM conducted in winter 2011–2012 and summer 2012, sperm whale density was estimated as 0.005 individual/km^2 (CV=69%, corrected for availability bias) in summer and decreased in winter from the same slope stratum of the Bay of Biscay, including the eastern part of the Spanish coast, as described for Cuvier's beaked whales (Laran et al., 2017).

Long-term citizen-science platform of opportunity surveys (2006-2022) recorded sperm whales throughout the Torrelavega Canyon during every month of data collection (March to October), suggesting that they are present year-round (ORCA sightings databases). Analyses of the combined data from SCANS-II and CODA predicted highest densities of sperm whales in the deep-water areas northwest of Spain and in the southeastern Bay of Biscay, an area which includes the Santander Canyon (Rogan et al., 2017).

Criterion D: Special Attributes
Sub-criterion D2: Diversity

This IMMA contains habitat that supports a diversity of cetacean species. The varied topography in a relatively small space renders this a critical habitat that supports multiple species with distinct habitat preferences (Kiszka et al., 2007).

At least 19 species of cetaceans occur regularly in or around these canyons, ranging from small dolphin species such as common (*Delphinus delphis*) and striped dolphins (*Stenella coeruleoalba*) to large baleen whales such as fin and minke whales (*Balaenoptera acutorostrata*) (Matear et al., 2019). Of particular interest are the frequently encountered Cuvier's beaked whales and sperm whales which are recorded in this area year-round, as well as other beaked whales, such as northern bottlenose whales, Sowerby's beaked whales, True's beaked whales (*Mesoplodon mirus*), Blainville's beaked whale (*Mesoplodon densirostris*) and Gervais' beaked whales (*Mesoplodon europaeus*) (Robbins et al., 2022; Pelagis, 2021; Rogan et al., 2017; Kiszka et al., 2007).

A 10-year citizen-science (ORCA sightings databases) platform of opportunity study reported species richness to be highest in the southern-most areas of the Bay of Biscay near Santander Canyon (Matear et al., 2019). Larborde (2008) also reported that a higher species richness was evident over the submarine canyons, based on CODA data.

In addition to the well documented deep divers, baleen whales were also frequently documented during dedicated boat-based and aerial surveys such as SCANS III and IV (Hammond et al., 2021; Lacey et al., 2022; Gilles et al., 2023), and SAMM (Laran et al., 2017a, 2022). These species are also reported through citizen-science data collection from ferries (ORCA, 2019) or the compilation of multiple data sets (Waggitt et al., 2020). Fin whales (*Balaenoptera physalus*) are sighted frequently in the southern Bay of Biscay in waters >2,000 m deep, with a clearly oceanic distribution in the summer (Laran et al., 2017; Hammond et al., 2021; Lacey et al., 2022).

Supporting Information

Cooke, J.G. 2018a. *Balaenoptera physalus*. The IUCN Red List of Threatened Species 2018: e.T2478A50349982. https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T2478A50349982.en. Accessed on 11 April 2023.

Cooke, J.G. 2018b. *Balaenoptera borealis*. The IUCN Red List of Threatened Species 2018: e.T2475A130482064. https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T2475A130482064.en. Accessed on 12 April 2023.

Gilles, A., Authier, M., Ramirez-Martinez, N.C., Araújo, H., Blanchard, A., Carlström, J., Eira, C., Dorémus, G., Fernández Maldonado, C., Geelhoed, S.C.V., Kyhn, L., Laran, S., Nachtsheim, D., Panigada, S., Pigeault, R., Sequeira, M., Sveegaard, S., Taylor, N.L., Owen, K., Saavedra, C., Vázquez-Bonales, J.A., Unger, B., and Hammond, P.S. 2023. Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys. Final report published 29 September 2023. 64 pp. https://tinyurl.com/3ynt6swa.

Hobbs, M., Macleod, C., Brereton, T., Harrop, H., Cermeno, P., and Curtis, D. 2007. A new breeding ground? The spatio-temporal distribution and bathymetric preferences of sperm whales (*Physeter macrocephalus*) in the Bay of Biscay. In: Proceedings of the European Cetacean Society Conference, ECS, San Sebastian, Spain, p. 5.

Kiszka, J., Macleod, K., van Canneyt, O., Walker, D., and Ridoux, V. 2007. Distribution, encounter rates and habitat characteristics of toothed cetaceans in the Bay of Biscay and adjacent waters from platform-of-opportunity data. ICES Journal of Marine Science 64(5): 1033-1043.

Lacey, C., Hammond, P.S., Gilles, A., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J., Viquerat, S., and Øien, N. 2022. Modelled density surfaces of cetaceans in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. SCANS-III project report 2. https://scans3.wp.st-andrews.ac.uk/files/2022/08/SCANS-III_density_surface_modelling_report_final_20220815.pdf.

Laran, S., Authier, M., Blanck, A., Doremus, G., Falchetto, H., Monestiez, P., Pettex, E., Stephan, E., Van Canneyt, O., and Ridoux, V. 2017a. Seasonal distribution and abundance of cetaceans within French waters- Part II: The Bay of Biscay and the English Channel. Deep Sea Research Part II: Topical Studies in Oceanography 141, 31-40.

Laran, S., Authier, M., Van Canneyt, O., Dorémus, G., Watremez, P., and Ridoux, V. 2017b. A Comprehensive Survey of Pelagic Megafauna: Their Distribution, Densities, and Taxonomic Richness in the Tropical Southwest Indian Ocean. Frontiers in Marine Science 4 (2017): 139. https://doi.org/10.3389/fmars.2017.00139.

Laran, S., Genu, M., Authier, M., Blanchard, A., Dorémus, G., Sanchez, T., Spitz, J., Van Canneyt, O., and pp. 2022. Distribution et abondance de la mégafaune marine en France métropolitaine. Rapport final de la campagne SAMM II Atlantique-Manche – Hiver 2021. L'Observatoire Pelagis (UAR 3462, La Rochelle Université / CNRS) pour la Direction de l'Eau et de la Biodiversité et L'Office Français de la Biodiversité.

Macleod, K., Brereton, T., Evans, P.G.H., Swift, R., and Vazquez, A.J. 2011. Distribution and abundance of Cuvier's beaked whales in the canyons of Southern Biscay. IWC SC/63/SM7.

Matear, L., Robbins, J.R., Hale, M., and Potts, J. 2019. Cetacean biodiversity in the Bay of Biscay: suggestions for environmental protection derived from citizen science data. Marine Policy 109.

Moors-Murphy, H.B. 2014. Submarine canyons as important habitat for cetaceans with special reference to the Gully: a review. Deep-Sea Research II 104:6-19.

ORCA. 2019. State of European Cetaceans. ORCA: Portsmouth. Available at: https://cdn2.assets-servd.host/orca-web/production/images/Our%20work/The%20State%20of%20Cetaceans/ORCA_The_State_of_European_Cetaceans2019_Online.pdf.

Pelagis. 2021. Visual sightings of scientific surveys. https://pelabox.univ-lr.fr/pelagis/PelaObs/ Accessed 25th May 2023.

Quéro J.C., Dardignac, J. and Vayne, J.J. 1989. Les poissons du golfe de Gascogne. IFREMER. Brest: 229 pp.

Robbins, J.R., Bell, E., Potts, J., Babey, L., and Marley, S. 2022. Likely year-round presence of beaked whales in the Bay of Biscay. Hydrobiologia 846: 2225-2239.

Rogan, E., Cañadas, A., Macleod, K., Santos, M.B., Mikkelsen, B., Uriarte, A., Van Canneyt, O., Vázquez,

J.A., and Hammond, P.S. 2017. Distribution, abundance and habitat use of deep diving cetaceans in the North-East Atlantic. Deep Sea Research Part II: Topical Studies in Oceanography 141:8-19.

Romero-Romero, S., Molina-Ramirez, A., Hofer, J., and Acuna, J.L. 2016. Body size-based trophic structure of a deep marine ecosystem. Ecology 97(1): 171-181.

Smith, J. 2010. The Ecology of Cuvier's beaked whale, *Ziphius cavirostris* (Cetacea: Ziphiidae), in the Bay of Biscay. University of Southampton, School of Ocean and Earth Science, Doctoral Thesis, 229pp.

Taylor, B.L., Baird, R., Barlow, J., Dawson, S.M., Ford, J., Mead, J.G., Notarbartolo di Sciara, G., Wade, P., and Pitman, R.L. 2019. *Physeter macrocephalus* (amended version of 2008 assessment). The IUCN Red List of Threatened Species 2019: e.T41755A160983555. https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T41755A160983555.en. Accessed on 11 April 2023.

Virgili, A., Teillard, V., Doremus, G., Dunn, T.E., Laran, S., Lewis, M., Louzao, M., Martinez-Cedeira, J., Pettex, E., Ruiz, L., Saavedra, C., Begona Santos, M., Van Canneyt, O., Antonio Vazquez Bonales, J., and Ridoux, V. 2022. Deep ocean drivers better explain habitat preferences of sperm whales *Physeter macrocephalus* than beaked whales in the Bay of Biscay. Scientific Reports 12:9620.

Waggitt, J.J., Evans, P.G., Andrade, J., Banks, A.N., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T., Camphuysen, C.J., Durinck, J., and Felce, T. 2020. Distribution maps of cetacean and seabird populations in the North-East Atlantic. Journal of Applied Ecology 57(2):253-269.

Acknowledgements

We would like to thank the participants of the 2023 IMMA Regional Expert Workshop for the identification of IMMAs in the North East Atlantic Ocean. Funding for the identification of this IMMA was provided by the Water Revolution Foundation. Other sponsors for the workshop included OceanCare and ORCA (orca.org.uk), and substantial administrative support to the IMMA Secretariat was provided by the Tethys Research Institute and Whale and Dolphin Conservation.

Suggested Citation: IUCN-MMPATF (2024) Southern Biscay Canyon System IMMA Factsheet. IUCN Joint SSC/WCPA Marine Mammal Protected Areas Task Force, 2024.

PDF made available for download at
https://www.marinemammalhabitat.org/factsheets/southern-biscay-canyon-system-imma/