ISRA
IMPORTANT SHARK AND RAY AREAS

Blue lines indicate the area meeting the ISRA Criteria; dashed lines indicate the suggested buffer for use in the development of appropriate place-based conservation measures

AZORES ISRA

European Atlantic Region

PORTUGAL

0–3,300 metres

120,273 km²

SUMMARY

Azores is located in the middle of the north Atlantic Ocean and sits in the central and eastern part of the Azores Archipelago, an autonomous region of Portugal. It includes the coastal habitats of seven islands, shallow banks, and seamounts, encompassing diverse habitats. The area overlaps with two Ecologically or Biologically Significant Marine Areas, nine Key Biodiversity Areas, and six protected areas. Within this area there are: **threatened species** (e.g., Leafscale Gulper Shark *Centrophorus squamosus*); **reproductive areas** (e.g., Tope *Galeorhinus galeus*); **feeding areas** (Whale Shark *Rhincodon typus*); **undefined aggregations** (e.g., Common Stingray *Dasyatis pastinaca*); and the area sustains a **high diversity** of sharks (19 species).

CRITERIA

Criterion A – Vulnerability; Sub-criterion C1 – Reproductive Areas; Sub-criterion C2 – Feeding Areas; Sub-criterion C5 – Undefined Aggregations; Sub-criterion D2 – Diversity

DESCRIPTION OF HABITAT

Azores is located in the middle of the north Atlantic Ocean. It sits in the central and eastern part of the Azores Archipelago, an autonomous region of Portugal. The area includes the coastal (subtidal and circalittoral) rocky and sandy habitats of seven islands, three shallow banks (Formigas, Dom João de Castro, and Princess Alice) and nearly 400 seamounts of various summit depths, mostly aligned across the Mid-Atlantic Ridge. Island shelves, slopes, and seamount summits are characterised by a diverse and rich mosaic of vulnerable marine habitats including black and cold-water corals and sponge gardens (Morato et al. 2008, 2020). The intermingled basaltic rocky reefs and soft sediments extend down to the base of the slopes and the latter into the abyssal plain surrounding them.

Dynamic features associated with the complex seabed topography are typical of the region, such as seamount-related circulation patterns but also eddies and filaments generating from the southern branch of the Gulf Stream passing about 100 nm south of the area and traveling north (Caldeira & Reis 2017). In climatological-oceanographic terms, the Azores represents an ecotone: its otherwise temperate geographic location is influenced by the north Atlantic subtropical gyre via the southeastern branch of the Gulf Stream. There are no major rivers discharging and the biogeochemistry is thus determined largely by the localised upwelling and circulation patterns. This includes the increased productivity generated by the nutrient-rich deeper layer resurgence and trapping circulatory processes on top of seamounts, which are believed to be responsible for the concentration of prey (Afonso et al. 2020).

The area overlaps with the Ridge South of the Azores and North Azores Plateau Ecologically or Biologically Significant Marine Areas (EBSA; CBD 2025a, 2025b). It also overlaps with nine Key Biodiversity Areas (KBAs): Faial, Graciosa, Pico da Vara, Pico – Norte, Santa Maria, São Jorge – Nordeste, São Jorge – Oeste, São Miguel – Sul, and Terceira (KBA 2025a, 2025b, 2025c, 2025d, 2025e, 2025f, 2025g, 2025h, 2025i). In addition, it overlaps with six protected areas: Ilhéus das Formigas Natural Reserve, Reserva Natural Marinha do Banco Condor, Reserva Natural Marinha do Banco Princesa Alice, Banco D João de Castro Natural Reserve, Ilhéu da Praia Natural Reserve, and Ilhéu da Baixo Natural Reserve (UNEP-WCMC & IUCN 2025).

This Important Shark and Ray Area is benthic and pelagic and is delineated from inshore and surface waters (0 m) to 3,300 m based on the bathymetry of the area.

ISRA CRITERIA

CRITERION A – VULNERABILITY

Nineteen Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species regularly occur in the area. Threatened sharks comprise one Critically Endangered species, four Endangered species, and six Vulnerable species; threatened rays comprise two Critically Endangered species, three Endangered species, and three Vulnerable species (IUCN 2025).

SUB-CRITERION C1 – REPRODUCTIVE AREAS

Azores is an important reproductive area for two shark and three ray species.

Caloura-Vila Franca ISRA within the Azores area is important for Tope reproduction. Baited Remote Underwater Video Stations (BRUVS) and social media records demonstrate the importance of

Caloura-Vila Franca for neonate and young-of-the-year (YOY) Tope. Between 2018–2022, 589 benthic and pelagic stereo-BRUVS were deployed around nine islands of the Azores Archipelago at 5–60 m depth (P Afonso unpubl. data 2018–2022). Of these, 65 stereo-BRUVS were deployed around São Miguel Island (18 pelagic and 47 benthic) during August–September (48 within Caloura–Vila Franca; 10 pelagic and 38 benthic). Neonate and YOY (<70 cm TL) Tope were recorded only in benthic BRUVS (at 30–60 m depth), at São Miguel (n = 13 deployments) and Faial Island (n = 2 deployments), and the maximum number of neonates/YOY of a species observed in a single frame (MaxN) ranged between 1–13. Of the 13 deployments with neonates and YOY around São Miguel Island, eight were within Caloura–Vila Franca (21% of benthic deployments in the area), and included six with a MaxN of 5–13 (P Afonso unpubl. data 2018–2020). Size-at-birth for Tope is 30–40 cm total length (TL) (Ebert et al. 2021). Between July and August 2024, seven BRUVS were deployed across the area at 13–23 m depth (ElasmoAzores unpubl. data 2024). Neonate and YOY Tope (~30 cm TL visually estimated) were recorded in all deployments, and the MaxN ranged 1–7. In three deployments, MaxN was ≥3 sharks (Elasmobase Project unpubl. data 2024). A record of a neonate caught by line fishing in June 2021 is also available on a citizen science platform (iNaturalist 2024). BRUVS surveys occurred mostly in late summer–early autumn, but according to the biology of the species, juveniles remain in nursery grounds for up to two years and may move into deeper water in winter (Ebert et al. 2021).

North Faial ISRA within the Azores area is important for Smooth Hammerhead reproduction. Based on scientific fishing, BRUVS surveys, and telemetry, North Faial has been identified as a nursery area for Smooth Hammerhead (Afonso et al. 2022; Das et al. 2025). These data sources demonstrate repeated use of this area by neonates, YOY, and small juveniles over multiple years, evidence of aggregation, and higher presence and residency within this area than in the adjacent areas year-round and seasonally, therefore meeting all criteria for defining shark nursery areas (Heupel et al. 2007).

Aggregations of 3–20 small juvenile Smooth Hammerheads swimming at the surface are known to occur in this area during summer (P Afonso pers. obs. 2010–2025). Between October 2018–November 2019, 53 Smooth Hammerheads (54–159 cm TL) were caught in scientific longline sets (20 benthic and 1 pelagic) within this area (~2.8 km off the coast). Of these, 17 were neonates/YOY (54–80 cm TL), representing 32.1% of the total catch (Das et al. 2025). Size-at birth for Smooth Hammerhead is 49–63 cm TL (Ebert et al. 2021). Additionally, one pregnant female was reportedly caught inshore in North Faial by a fixed gillnet in August 1997 (P Afonso pers. obs. 2025). Smooth Hammerheads >200 cm TL are only occasionally seen nearshore, always isolated, and only in the summer (Afonso et al. 2022). This evidence suggests that pregnant females come to give birth within the area and that neonates stay within the island shelf until reaching pre-adulthood life stage (Afonso et al. 2022)

Between 2018–2022, 589 benthic and pelagic BRUVS were deployed around eight islands of the Azores Archipelago, of which 185 were within this area. This area had a significantly higher relative abundance of Smooth Hammerheads. The highest MaxN (maximum number of individuals of a species observed in a single frame) per year ranged from 3–14 in this area (Afonso et al. 2022; Das et al. 2025). Stereo measurements of sharks were possible in 64 deployments. Neonates and YOY (<80 cm TL) were identified in four of the eight sampled islands (n = 20 deployments; 7 within this area). The MaxN of neonates and YOY was three and was recorded in three deployments, of which two were within this area.

Between 2010 and 2019, 15 juvenile Smooth Hammerhead (90–147 cm TL) were tagged between July–September with acoustic tags and satellite (SPOT) tags (Afonso et al. 2022). Smaller sharks (80–90 cm TL) were also captured but released as tagging was focused on larger individuals due to tag size (P Afonso et al. pers. obs. 2010–2019). Thirteen of the 15 acoustic transmitters were detected on the

array of acoustic receivers on the Faial-Pico shelf (the shelf area surrounding Faial Island and the adjacent Pico Island). Only data from nine transmitters were used based on uncertainty of natural behaviour of six individuals (possibly predated). Tagged individuals were co-detected at stations on the north coast of Faial Island at the same hour on up to 1,398 occasions (n = 2–6 individuals), thereby providing support that small juveniles aggregate and remain within this area (Afonso et al. 2022). All acoustically tagged sharks showed greater site fidelity and resulting home ranges centred on this area with no detections on receivers in adjacent areas (Afonso et al. 2022). All five transmitting SPOT-tagged individuals revealed a constant moving pattern over the northern island shelf of Faial for months even when away from the acoustic receiver detection range (Afonso et al. 2022). Finally, tagging undertaken between 2019–2025, which included YOY individuals, also shows increased residency along the north shore of Faial, despite individuals eventually moving out over the contiguous shelf of Faial and Pico islands on a regular basis (R Priester et al. unpubl. data 2025).

Monte da Guia ISRA within the Azores area is important for Common Stingray reproduction. Between 1997–2023, yearly underwater visual census (UVC) surveys (straight line 50 x 5 m transects parallel to the coast over rocky and sandy substrate at depths between 10–25 m) were conducted during the boreal summer around all islands of the Azores Archipelago (n = 2,509 surveys). Common Stingrays measuring <32 cm disc width (DW) were observed in 4.8% of surveys within Monte da Guia (in the outer section of Porto Pim Bay; n = 27 of 554 surveys). Outside this area, the frequency of occurrence was 1.7% (n = 35 of 1,955 surveys). When only considering UVCs conducted on sandy substrate, Common Stingrays of this size were observed in 30% of the surveys. The maximum number of individuals <32 cm DW per survey within this area was three, while outside this area, all individuals were larger. Common Stingrays YOY measure ~30 cm DW in the northeastern Mediterranean Sea (Yeldan et al. 2009). Another survey conducted annually between 2009 and 2012 using snorkel UVCs inside the bay (three parallel lines across the bay: one in shallow waters, another in the middle, and a third in the outer portion, over sandy substrate) showed an average 2.5 stingrays per transect, 90% of measured <30 cm DW (P Afonso unpubl. data 2025).

During July–August 2021, 27 individuals (ranging 17.6–60.0 cm DW) were captured using scoop nets while freediving and tagged with external acoustic tags. Of those, 10 were <29 cm DW (37%). Individuals were tracked for up to 172 days using the surrounding receiver array (P Afonso unpubl. data 2021–2022). Tagged Common Stingray detections were restricted to five of the 15 acoustic stations around Faial and Pico, nearly all within the Monte da Guia area, especially in the Porto Pim Bay side. The weighted residency index (IWR) inside the Monte da Guia area was generally high, with ~74% of individuals exhibiting an IWR >0.75 (mean ± standard deviation = 0.82 ± 0.26). The 10 tagged juveniles (17.6–29 cm DW) exhibited particularly elevated residency throughout the summer months with an average IWR of 89% (range, 61–100%) within the area (P Afonso unpubl. data 2021). Additionally, local ecological knowledge (LEK) interviews were conducted with fishers, maritime tourism operators, and other ocean users on Faial Island in 2021 (n = 22). Respondents (n = 5; 23% of interviews) indicated that this area had the highest reported sightings of stingrays. Of these, four interviewees mentioned that the area was particularly important for small individuals (<30 cm DW) (Soares 2021).

São Roque Bay ISRA within the Azores area is important for Common Stingray and Common Eagle Ray reproduction. During February–September 2008, 25 research dives were conducted on São Miguel Island with the goal to identify ray species. Of these dives, 12 were undertaken within São Roque Bay (Garcia 2008). Additionally, between April–October 2024, the Elasmobase Project recorded visual counts of sharks and rays via citizen science SCUBA dives across 28 dive sites. A total of 767 dives were monitored totalling 591.4 hours across the Azores. Of these, nine dive sites and 597 dives totalling 454.7 hours (65.4% of overall dive time) were within this area (Elasmobase unpubl. data. 2024).

Common Stingrays (n = 23; estimated to measure 20–100 cm DW) were recorded from February–September 2008, of which 20 (86.9%) were in this area (Garcia 2008). Of the 23 Common Stingrays, seven were 20–35 cm DW (June–September), six of which were from within this area (85.6%) (Garcia 2008). Between April–October 2024, 300 Common Stingrays were reported on 163 dives within this area (27.3% of dives in this area), of which at least 44 were determined to be pregnant (reported on 40 dives from May–October), inferred by observations of distended abdomens. In addition, 13 neonates/YOY (~30 cm DW) were reported on 12 dives (Elasmobase unpubl. data. 2024). Size-at-one-year-old for Common Stingrays is 23 cm DW for males and 31 cm DW for females (Yeldan et al. 2009). Common Stingrays were regularly seen in aggregations of 3–9 individuals and were reported on 32 dives (5.4% of dives in this area) between June–October. In the 19 dive sites outside of São Roque Bay, eight neonates/YOY were reported (on six dives), four aggregations of 3–4 individuals, and no pregnant females were documented, highlighting the importance of São Roque Bay within this area for Common Stingray reproduction (Elasmobase unpubl. data. 2024). Diving in this area occurs primarily during the summer months, and according to the diving community, aggregations, pregnant females, and neonates were regularly and predictably observed from 2018–2023 (Elasmobase unpubl. data. 2018–2023). Across several sites in the Mediterranean Sea, aggregations of pregnant and mature male Common Stingray are recorded in early summer, pregnant females with fully developed foetuses have been captured in June, and neonates are observed during the end of June and early July (Saadaoui et al. 2015; Grancagnolo et al. 2023). These observations are similar to the findings from this area suggesting a regional pattern in reproductive behaviour.

Between June–August 2008, seven Common Eagle Rays (40–70 cm DW) were recorded (Garcia 2008). Four were within this area (one estimated at 40 cm DW and three between 50–70 cm DW) and three outside the area in three different regions (one at 40 cm DW and two between 60–70 cm DW) (Garcia 2008). Additionally, in 2024, Common Eagle Rays were recorded on 88 of the 597 dives in this area (14.7%) (Elasmobase unpubl. data. 2024). Of 107 individuals observed, 64 were considered neonates/YOY as their visually estimated size ranged 15–30 cm DW and YOY Common Eagle Rays are 35–40 cm DW (Özten et al. 2024). Neonates were recorded only between May–August and represented 33.7% of observations during this period (n = 29). Outside this area, four neonates (20–30 cm DW observed in July) and seven YOY (40 cm DW observed May–August) were recorded (out of 21 individuals recorded on 20 dives) (Elasmobase unpubl. data. 2024). In France and Tunisia, mature females and neonates have been reported between August and February, aligning with the observations within this area (Capapé et al. 2007). Diving in this area occurs primarily during the summer months, and according to the diving community, aggregations, and neonates were consistently observed from 2018–2023 (Elasmobase unpubl. data. 2018–2023).

Princess Alice Bank ISRA within the Azores area is important for Sicklefin Devil Ray reproduction. Pregnant female Sicklefin Devil Rays occur regularly and predictably in Princess Alice Bank in larger numbers than in other places across the species distribution (except for Ambrósio Seamount, also located in the Azores; Sobral 2013; A Sobral unpubl. data 2025). Between 1990–2024, photo-identification data collected from UVC surveys and citizen science (on a daily basis, weather permitting) revealed Sicklefin Devil Ray aggregations in the area composed of 7–15 individuals on average with a maximum of 45 individuals recorded at any one time (Sobral 2013; Solleliet-Ferreira et al. 2020; A Sobral unpubl. data 2025). Since 2012, pregnancy has been consistently assessed and was assigned to an individual when a noticeable distended abdomen was observed in photographs. However, depending on the angle from which the picture was taken, pregnancy may be difficult to assess, suggesting that the proportion of pregnant females is likely to be underestimated (A Sobral unpubl. data 2025). Of 103 individuals identified by photo-identification in the area, 36 were females, 49 males, and 18 undetermined. Ten of these females (27%) were pregnant and occurred in the area between June–October (Sobral 2013; Sobral & Afonso 2014). The area is important for the gestation of this species as females in different stages of gestation are found in the area with extended

abdomens growing noticeably bigger as the summer advances (A Sobral unpubl. data 2025). Additionally, five females have been resighted across multiple years (1–8 years between resighting) in this area with three observed during different pregnancies up to seven years apart, indicating that this location provides refuge and/or ideal conditions for gestating females (A Sobral unpubl. data 2025). One pregnant female recorded in this area in 2011 was resighted pregnant in 2017 in Ambrosio Seamount, ~450 km southeast from this area (A Sobral unpubl. data 2025). Females are also regularly observed with mating scars (healed) and recorded males are all adults or sub-adults. Courtship behaviour has also been observed in the area (A Sobral unpubl. data 2025), although it does not seem to be a consistent behaviour (A Sobral unpubl. data 2025). There are no records of neonate, YOY, or juveniles in the area.

Ambrósio Seamount ISRA within the Azores area is also important for Sicklefin Devil Ray reproduction. Pregnant female Sicklefin Devil Rays occur regularly and predictably in Ambrósio Seamount in larger numbers than in other places across the species' distribution (except for Princess Alice Bank, also in the Azores; Sobral 2013; A Sobral unpubl. data 2025). Between 1990–2024, photo-identification data collected from UVC surveys and citizen science (on a daily basis, weather permitting) revealed Sicklefin Devil Ray aggregations in the area. These were composed of 7–15 individuals on average with a maximum of 45 individuals recorded (Sobral 2013; A Sobral unpubl. data 2025). Since 2012, pregnancy has been consistently assessed and was assigned to an individual when a noticeable distended abdomen was observed in photographs. However, depending on the angle from which the photo was taken, pregnancy may be difficult to assess, indicating that the proportion of pregnant females is likely to be underestimated (A Sobral unpubl. data 2025).

Of 166 individuals identified by photo-identification in the area, 62 were females, 92 males, and 12 undetermined. Thirteen of these females (20.9%) were pregnant and occurred in the area between June–October (Sobral 2013; Sobral & Afonso 2014). The area is important for the gestation of this species as females in different stages of gestation are found in the area with extended abdomens growing noticeably bigger as the summer advances (A Sobral unpubl. data 2025). Additionally, nine individuals (two females and seven males) have been resighted across multiple years (1–8 years between resighting) in this area with one of the females observed during two different pregnancies five years apart, indicating that this location can provide refuge and/or ideal conditions for gestating females (A Sobral unpubl. data 2025). One pregnant female recorded in this area in 2017 was first recorded pregnant in 2011 in Princess Alice Bank ~450 km northwest of Ambrósio Seamount (A Sobral unpubl. data 2025). Females are also regularly spotted with mating scars (healed) and males are all adults or sub-adults. Courtship behaviour has also been observed in the area (A Sobral unpubl. data 2025), although it does not seem to be a consistent behaviour (A Sobral unpubl. data 2025). There are no records of YOY or juveniles in the area.

SUB-CRITERION C2 – FEEDING AREAS

Azores is an important feeding area for one shark species.

Ponta da Pico ISRA within the Azores area is important for Whale Sharks feeding. Observations from fishery observers, animal-borne camera tags, and UVC surveys have shown that Whale Sharks regularly aggregate in Ponta da Pico to feed on baitfish (Fontes et al. 2020, 2024; B Macena et al. unpubl. data 2025).

Records of Whale Sharks associated with the pole-and-line tuna fishery in the Azores operating between May–November were collected by fishery observers between 2008–2013 (Fontes et al. 2020). Whale Sharks were recorded in association with tunas and were observed preying on bait balls of snipefishes (*Macroramphosus* spp.) corralled by large schools of Bluefin Tuna (*Thunnus*

thynnus), Bigeye Tuna (*T. obesus*), Skipjack (*Katsuwonus pelamis*), and Yellowfin Tuna (*T. albacares*), with the second largest number of associations across the archipelago (after Santa María Island) recorded in this area (Fontes et al. 2020, 2024; B Macena et al. unpubl. data 2025). This behaviour was also observed daily during UVCs and tagging trips conducted in the area during summer between 2019–2024 and from videos recorded by animal-borne tags where 166 sightings of Whale Sharks feeding were recorded (B Macena et al. unpubl. data 2025). It has been reported that Whale Shark observations increase in these months when the sea surface temperature is highest (22–24°C) and chlorophyll-*a* decreases (Afonso et al. 2014).

Photographs were also collected between 2008–2022 from UVCs and the diving community across the Azores (Alsina 2021; B Macena et al. unpubl. data 2025). Of 182 Whale Sharks photo-identified, 80 (43.9%) were recorded around Ponta do Pico. Individuals were recorded between July–November with a higher number observed in August and September (Alsina 2021; B Macena et al. unpubl. data 2025) which matches the season when the tuna fishery operates in the area. In addition, Whale Sharks tagged either with satellite transmitters (n = 19) or with biologgers (n = 24) and monitored between 2019–2024 showed that individuals move around Ponta do Pico during summer months (B Macena et al. unpubl. data 2025).

Santa María Island ISRA within the Azores area is also important for Whale Sharks feeding. Observations from fishery observers, animal-borne camera tags, and UVC surveys have shown that Whale Sharks regularly and predictably aggregate in Santa María Island to feed on baitfish (Fontes et al. 2020, 2024; B Macena et al. unpubl. data 2025). Records of Whale Sharks associated with the pole-and-line tuna fishery in the Azores operating between May–November were collected by fishery observers between 2008–2013 (Fontes et al. 2020). Whale Sharks were recorded in association with tunas and were observed preying on bait balls of snipefishes (*Macroramphosus* spp.) corralled by large schools of Bluefin Tuna (*Thunnus thynnus*), Bigeye Tuna (*T. obesus*), Skipjack Tuna (*Katsuwonus pelamis*), and Yellowfin Tuna (*T. albacares*), with the largest number of aggregations across the archipelago recorded in this area (Fontes et al. 2020, 2024; B Macena et al. unpubl. data 2025). This behaviour was also observed daily during UVCs and tagging trips conducted in the area during summer between 2019–2024 and from videos recorded by animal-borne tags where 161 sightings of Whale Sharks feeding were recorded (B Macena et al. unpubl. data 2025). It has been reported that Whale Shark observations increase in these months when the sea surface temperature is highest (22–24°C) and chlorophyll-*a* decreases (Afonso et al. 2014).

Photographs were also collected between 2008–2022 from UVCs and the diving community across the Azores (Alsina 2021; B Macena et al. unpubl. data 2025). Of 182 Whale Sharks photo-identified, 167 (91.7%) were recorded around the western coast of Santa María Island. Individuals were recorded between July–November with the higher number of observations in August and September (Alsina 2021; B Macena et al. unpubl. data 2025). This also matches the season when the tuna fishery operates in the area. In addition, Whale Sharks tagged either with satellite transmitters (n = 31) or with biologgers (n = 39), and monitored between 2019–2024, showed that individuals move around Santa María Island during summer months (B Macena et al. unpubl. data 2025).

SUB-CRITERION C5 – UNDEFINED AGGREGATIONS

Azores is an important area for undefined aggregations of two shark and three ray species.

North Terceira ISRA within the Azores area is important for undefined aggregations of Tope. In the Azores Exclusive Economic Zone, scientific surveys were conducted annually using benthic longlines divided into depth strata of 50 m intervals across 0–1,200 m and consisting of a mainline unit

composed of four skate sides ~45 m long with ~30 hooks with soak times between 4–6 hours (Pinho et al. 2020; Das et al. 2022). Between 2010–2017, 256 fishing sets (554,360 hooks) were deployed in the depth range where the species have been recorded regionally in the longline surveys (0–650 m; E Giacomello & D Das unpubl. data 2025). Of the 256 fishing sets deployed, 13 (5.1%) were inside North Terceira and of 286 Tope captured between 2010–2017 in 69 sets, 113 (39.5%) were caught inside this area (E Giacomello & D Das unpubl. data 2025). Six of these fishing sets recorded >10 Tope caught on a single fishing set, of which four were recorded in this area (E Giacomello & D Das unpubl. data 2025). Catch-per-unit-effort (individuals/1,000 hooks) in this area was the highest across the Azores and ranged between 0.7–8.5 (average = 2.9), while outside this area ranged 0–7.9 (average = 0.3; E Giacomello & D Das unpubl. data 2025). Within the Azores, it has been reported that Tope catches increase in shallow waters (<150 m) with larger catches of smaller sharks in nearshore habitats (Santos et al. 2020).

In addition, LEK supports the importance of this area for aggregations of Tope. Of 163 fishers interviewed in 2020 on all nine islands of the Azores Archipelago, 56 reported observing Tope aggregations (36 from São Miguel Island and 20 from Terceira Island). Among the 20 that observed aggregations around Terceira Island, 14 identified specific locations, with half of them explicitly indicating this area, while the remaining indicated the west coast (n = 3) and the southwest coast (n = 4). These aggregations were described as occurring year-round, typically involving around 10–20 individuals, including both juveniles and adults (Soares 2021). Fishers reported the presence of aggregations here more frequently than in other islands of the archipelago (Soares 2021). Aggregations of juvenile and adult Tope have been recorded in coastal areas where high catches of the species occur (Lucifora et al. 2004; Nosal et al. 2021). Additional information is required to understand the nature and function of these aggregations.

São Jorge ISRA within the Azores area is important for undefined aggregations of Smooth Hammerhead. Based on BRUVS and LEK interviews, juvenile and YOY Smooth Hammerheads aggregate in São Jorge, mostly during the summer (P Afonso unpubl. data 2018–2022). Aggregations were defined as BRUVS recording at least three individuals in a single video frame (i.e., MaxN = >3).

Between 2018–2022, 589 benthic and pelagic stereo-BRUVS (169 were mono-BRUVs and used only at Faial Island in 2018) were deployed around eight of the nine islands of the Azores Archipelago (all except Terceira Island) at 5–60 m depth (P Afonso unpubl. data 2018–2022). Around São Jorge Island, 64 stereo-BRUVS (31 pelagic and 33 benthic) were deployed during August–September 2019 and 2020, 42 of which were inside this area (24 pelagic and 18 benthic). Smooth Hammerheads were recorded in almost all islands (except Corvo Island) but aggregations were only observed at Faial Island (n = 9 deployments; 3.6% of the total deployments at this island; mean MaxN = 4.9 individuals), São Jorge Island (n = 3; 4.7%; mean MaxN = 4.3), Flores Island (n = 1; 1.4%; MaxN = 3), Pico Island (n = 1; 1.9%; MaxN = 4), and São Miguel Island (n = 1; 1.5%; MaxN = 3). All three deployments from São Jorge Island were within this area, representing 7.1% of the 42 deployments in this area. Of the eight individuals with size estimated in São Jorge, four were considered YOY (61.3–66.6 cm TL), two juveniles (~131 cm TL), and two adults (209.5–246.2 cm TL). Size-at birth for Smooth Hammerhead is 49–63 cm TL (Ebert et al. 2021).

Additionally, between 2018 and 2022, 163 LEK interviews were conducted with fishers, maritime tourism companies, and other ocean-users on all nine islands of the Azores Archipelago (P Afonso unpubl. data 2018–2022). Of these, 14 LEK interviews were conducted on São Jorge Island, of which 10 (n = 70%) interviewees noted that this area was important for Smooth Hammerhead sightings and aggregations. Of the 14 interviewees, three reported having seen large groups of 10–50+ individuals on warm sunny days (some seen repeatedly on different days). Six of the eight interviewees that mentioned the size of Smooth Hammerheads reported the occurrence of individuals <2 m TL. Both BRUVS and LEK indicate that aggregations are mostly formed by juveniles and YOY. Of the five

interviewees that reported seasonality, summer was mentioned by four, matching the occurrence of juvenile Smooth Hammerheads aggregations at Faial Island (Afonso et al. 2022). Additionally, São Jorge was the only island mentioned by interviewees of different islands for aggregations of Smooth Hammerheads (one from Pico Island and one from São Miguel Island). Further information is required to understand the nature and function of these aggregations.

Fanal Bay ISRA within the Azores area is important for undefined aggregations of Common Stingray. Between 2019–2023, opportunistic records of Common Stingray were recorded during diving trips in Fanal Bay. Observations included 12–30 Common Stingrays per dive in aggregations of 3–4 animals between July–September (JP Barreiros pers. obs. 2019–2025). Records during the rest of the year comprised a maximum of six individual rays that were not aggregating (JP Barreiros pers. obs. 2019–2025). During September–October 2024, as part of an ongoing project, 17 UVC surveys ranging 20–30 minutes were conducted in the area (~3 dives per week) to survey the number of individuals and gather information on the sex of Common Stingrays (JP Barreiros unpubl. data 2019–2025). A total of 142 individuals (~65% in aggregations of >3 individuals) were observed. Sex was identified for 120 individuals: 87 were females (61.3% of total) and 33 were males (23.2%). The majority of individuals were recorded in September (n = 118, average ~13 per dive) (JP Barreiros unpubl. data 2019–2025).

This is the only scientific survey that has been conducted in the area, however, this site is recognised by the local community of Terceira Island and by divers for its high abundance of rays (JP Barreiros unpubl. data 2019–2025). The total number of sightings was three times higher during high tide than during low tide, with a decreasing trend in the number of sightings with decreasing temperature (that started to drop after mid-September) (JP Barreiros unpubl. data 2019–2025). It has been suggested that aggregations of Common Stingrays are most likely to be associated with breeding and increase only during warmer periods (Chaikin et al. 2020). In fact, aggregations in this area are present between July–September when waters are warmer, the sex ratio was 2.6 females: 1 male, and immature individuals (<30 cm DW) are also observed in this area (>15 during September–October 2024). Common Stingray YOY measure ~30 cm DW in the northeastern Mediterranean Sea (Yeldan et al. 2009). However, further information is required to understand the nature and function of these aggregations.

Ferraria ISRA within the Azores area is important for undefined aggregations of Sicklefin Devil Ray. Opportunistic boat-based sightings of sharks and rays around São Miguel Island from ecotourism companies focused mainly on whale-watching, as well as also scuba diving boats, sailing charters, and observations from independent collaborators were gathered into a database (Elasmobase Azores unpubl. data 2024). Between April–October 2024, for each observation, the following information was collected: species, number of individuals, size estimate, behaviour, location, observer, and company. Of 145 occasions reported by 10 different organisations, 26 were of Sicklefin Devil Rays, 14 of which were within this area. Sicklefin Devil Rays were estimated to measure 200–250 cm DW. Seven instances were reports of aggregations of 8–15 (average = 12) individuals (all within this area) observed between June–August (Elasmobase Azores unpubl. data 2024). Aggregations of Sicklefin Devil Rays are known to occur in the Azores between June–October (Sobral & Afonso 2014).

Additionally, a tailored interview survey was developed to gather LEK from São Miguel's commercial fishing community (Elasmobase Project unpubl. data 2025). One on one interviews using semi-structured questions followed the snowball technique, and images of live and dead shark and ray species common to the Azores were used to aid responses of respondents. Whenever possible, interviews were held with vessel captains, and if unavailable, the first officer was interviewed. Vessel selection was random. Of 27 interviews, 13 responded about the frequency of Sicklefin Devil Ray observations around São Miguel, and four, with more than 10 years of experience, reported the sightings as often, frequently, or always (Elasmobase Azores unpubl. data 2024). Of the eight that named the main areas where they most see Sicklefin Devil Rays, four pointed to this area. The

presence of Sicklefin Devil Ray aggregations in this area was also supported by all six divers from four different companies that were informally interviewed, and three experienced spearfishers (27–42 years fishing), having dived in this area for 6–20 years. They all reported opportunistic observations of Sicklefin Devil Rays as single individuals or within aggregations, mainly from July to October each year.

Formigas Islets ISRA within the Azores area is important for undefined aggregations of Sicklefin Devil Ray. UVC surveys conducted between 2000–2023 in the area revealed regular Sicklefin Devil Ray aggregations around Formigas Islets (Sobral 2013; B Macena et al. unpubl. data 2025). Surveys consisted of belt transects (1–7 transects per dive, 50 m length and 5 m width) and were undertaken across multiple islands and seamounts around the Azores Archipelago (B Macena et al. unpubl. data 2025). Of 78 dives conducted between 1997–2011 within the area, 16.7% (n = 13) recorded aggregations of Sicklefin Devil Rays (Sobral 2013). After 2011, aggregations were recorded regularly each month and were composed of 4–60 individuals (average = 5 individuals). These aggregations were observed exclusively in the summer between June–September. The Azores are recognised as a hotspot for aggregations of the species during this period which have become the focus of recreational diving activities (Sobral 2013; Afonso et al. 2020; B Macena et al. unpubl. data 2025). Formigas Islets ranks third in terms of aggregations of Sicklefin Devil Rays in the archipelago after Princess Alice Bank (~450 km from Formigas Islets) and Ambrósio Seamount (~50 km from Formigas Islets; Sobral 2013). Additional information is required to understand the nature and function of these aggregations.

Monte da Guia ISRA within the Azores area is important for undefined aggregations of Common Eagle Ray. During August 2014, while conducting regular fish visual surveys in Monte da Guia, an aggregation of ~30 Common Eagle Rays was observed within this area (Afonso & Vasco-Rodrigues 2015). Following the first sighting, another six dedicated dives were undertaken until November (totalling seven dives). The aggregation (20–30 individuals; 30–90 cm DW) was observed on four dives from 8–14 August 2014. Dives in September (n = 2) and November (n = 1) had no records of the species. All individuals appeared to be females as no claspers were observed (Afonso & Vasco-Rodrigues 2015). Since then, aggregations of 5–30 individuals within this area have been reported on social media (n = 4 between 2017–2019), and dive operators report these aggregations regularly during the summer.

Additionally, from 2,515 UVC surveys conducted between 1997–2023, the frequency of occurrence in this area was 1.8% (10 of 554 transects), while outside this area it was 0.7% (15 of 1,955 transects) with a maximum of two Common Eagle Rays per transect (Afonso et al. 2018; P Afonso unpubl. data 2020–2021). Aggregations are predominantly found in the vicinity of the caves surrounding the Monte da Guia area but individuals are also observed over the adjacent sandy flats, including some neonates/YOY (~10–15 cm DW) in Porto Pim Bay during the summer (P Afonso unpubl. data 2020–2021). In the northwestern Mediterranean Sea, Common Eagle Ray breeds in August and September matching the seasonal occurrence of aggregations in this area (Capapé et al. 2007). Further information is required to understand the nature and function of these aggregations.

Gruta do Ilhéu das Cabras ISRA within the Azores area is important for undefined aggregations of Common Eagle Ray. During 2002–2003, year-round UVC surveys were conducted to count Common Eagle Rays within aggregations in Gruta do Ilhéu das Cabras. Surveys were undertaken opportunistically four times a month (total surveys = 221). Between June–September, aggregations of an average of eight individuals were observed in 123 surveys (55.7% of surveys), while between October–May, the average was one individual observed in 98 surveys (44.3% of surveys) (Barreiros & Rodeia 2004). Individuals were mostly swimming inside and along the entrance of the cave in the area during the day while during the night (n = 12 surveys) they were mostly resting on the substrate (Barreiros & Rodeia 2004). Of 23 individuals marked with tags designed to visually allow identification (ranging in size, 63–157 cm DW), 12 individuals were recorded within the area every year

from 2003–2006 (Barreiros & Rodeia 2004; JP Barreiros unpubl. data 2003–2006). Although no further dedicated surveys were undertaken, aggregations of 10–30 Common Eagle Rays have been regularly recorded within the area by recreational divers in ~75% of dives between July and September during 2006–2025 (JP Barreiros unpubl. data 2006–2025). Although no mating behaviour was observed, captured individuals showed mature gonads during the summer months and the sex ratio was 1:4.3 (male:female) in 2002 and 1:4.5 in 2003 suggesting a potential reproductive purpose of the area. Further information is required to understand the nature and function of these aggregations.

SUB-CRITERION D2 – DIVERSITY

Azores sustains a high diversity of Qualifying Species (19 species). This exceeds the regional diversity threshold (13 species) for the European Atlantic region. The regular presence of Qualifying Species has been documented through records from commercial fisheries, benthic longline surveys, UVC surveys, BRUVS surveys, LEK, citizen science, direct observations, photo-identification, and satellite and acoustic tracking (Afonso et al. 2014, 2022; Sobral & Afonso 2014; Thorrold et al 2014; Torres et al. 2016; Das & Afonso 2017; Fontes et al. 2020; Pinho et al. 2020; Santos et al. 2020; Vandeperre et al. 2020; Alsina 2021; Soares 2021; Das et al. 2022, 2025; Macena et al. 2022; Braun et al. 2023; Fauconnet et al. 2023; Parra et al. 2023; Arostegui et al. 2024; Priester et al. 2024; Gandra et al. 2025; P Afonso et al. unpubl. data 2025).

Pelagic sharks (e.g., Bigeye Thresher, Shortfin Mako, Porbeagle) are regularly caught in the drifting surface pelagic longline fishery operating in the area (Vandeperre et al. 2020; Parra et al. 2023). Fishery-independent data from ARQDAÇO benthic longline surveys (666 longline sets) conducted between 1996–2017 in the area, and on-board observer data from the National Data Collection Framework (PNRD), CoralFISH, and the Discardless/MERCES/SPONGES fisheries observer programs (2004–2012, 2016–2018) have recorded the regular presence of deepwater species (e.g., Gulper Shark, Leafscale Gulper Shark, Roughskin Dogfish, Kitefin Shark, Velvet Belly Lanternshark, Common Blue Skate, Longnosed Skate, Shagreen Skate) (Das et al. 2022). Data from observers in the pole-and-line tuna fishery, scientific surveys, photo-identification, and tagging have recorded the regular presence of Whale Sharks associated to tuna species between 1998–2013 and 2019–2024 (Afonso et al. 2014; Fontes et al. 2020, 2024). The regular presence of Oceanic Manta Ray, Spinetail Devil Ray, and Sicklefin Devil Ray has been confirmed by UVC surveys and citizen science data provided by diving operators in the region (Sobral & Afonso 2014).

Fisheries-independent data from experimental longline and BRUVS deployments conducted since 2019 around eight of the islands in the Azores Archipelago revealed the regular presence of Tope, Smooth Hammerhead, and Common Stingray (Das et al. 2025). Local ecological knowledge from artisanal fishers operating in the area confirmed the regular presence of multiple coastal species (e.g., Common Eagle Ray; Soares 2021; P Afonso et al. unpubl. data 2025). Satellite and acoustic tagging of Leafscale Gulper Shark, Kitefin Shark, Tope, Shortfin Mako, Whale Shark, Smooth Hammerhead, and Sicklefin Devil Ray between 2010–2024 revealed the movement patterns and regular presence of this species in the area (Afonso et al. 2014, 2022; Thorrold et al. 2014; Braun et al. 2023; Arostegui et al. 2024; Gandra et al. 2025; P Afonso et al. unpubl. data 2025).

Acknowledgments

Pedro Afonso (Institute of Marine Sciences-OKEANOS, University of the Azores), Ana Henriques (WWF Portugal), Bruno Macena (Institute of Marine Sciences-OKEANOS, University of the Azores), Diana Catarino (Institute of Marine Sciences-OKEANOS, University of the Azores), Diya Das (Institute of Marine Sciences-OKEANOS, University of the Azores), Eva Giacomello (Institute of Marine Sciences-OKEANOS, University of the Azores), Frederic Vandeperre (Institute of Marine Sciences-OKEANOS, University of the Azores), Jorge Fontes (Institute of Marine Sciences-OKEANOS, University of the Azores), Laurence Fauconnet (Institute of Marine Sciences-OKEANOS, University of the Azores), Robert Priester (Institute of Marine Sciences-OKEANOS, University of the Azores), Hugo Parra (Institute of Marine Sciences-OKEANOS, University of the Azores), Gui Menezes (Institute of Marine Sciences-OKEANOS, University of the Azores), Telmo Morato (Institute of Marine Sciences-OKEANOS, University of the Azores), and Emiliano García Rodríguez (IUCN SSC Shark Specialist Group – ISRA Project) contributed and consolidated information included in this factsheet.

Information contained in this factsheet been compiled from the Ambrósio Seamount, Caloura–Vila Franca, Fanal Bay, Ferraria, Formigas Islets, Gruta do Ilhéu das Cabras, Monte da Guia, North Faial, North Terceira, Ponta do Pico, Princess Alice Bank, Santa María Island, São Jorge, and São Roque Bay ISRAs. Data were contributed by João Bernardo Barreiros (Centre for Ecology, Evolution and Environmental Changes; CHANGE - Global Change and Sustainability Institute), João Pedro Barreiros (Centre for Ecology, Evolution and Environmental Changes; CHANGE - Global Change and Sustainability Institute; University of the Azores), Joana Batalha (Elasmobase Project), Maria Joana Batalha (Elasmobase Project), Vanessa Bettcher Brito (IUCN SSC Shark Specialist Group – ISRA Project), Beatrice Cadei (University of Milano-Bicocca), Mariana Carvalho (University of Évora), Inês Caseiro Dias (Elasmobase Project), Miguel Gandra (Centre of Marine Sciences, Universidade do Algarve), Gonçalo Graça (Flying Sharks), Fátima Pérez Neira (Elasmobase Project), Antonio Sabuco Blaya (Elasmobase Project), Bruno Saraiva (Institute of Marine Sciences-OKEANOS, University of the Azores), Beatriz Silva (Elasmobase Project), and Ana F Sobral (Manta Catalog, Manta Trust) provided data. We thank all participants of the 2025 ISRA Region 02 – European Atlantic workshop for their contributions to this process.

This factsheet has undergone review by the ISRA Independent Review Panel prior to its publication.

This project was funded by the Shark Conservation Fund, a philanthropic collaborative pooling expertise and resources to meet the threats facing the world's sharks and rays. The Shark Conservation Fund is a project of Rockefeller Philanthropy Advisors.

Suggested citation

IUCN SSC Shark Specialist Group. 2025. Azores ISRA Factsheet. Dubai: IUCN SSC Shark Specialist Group.

QUALIFYING SPECIES

Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met								
				A	B	C1	C2	C3	C4	C5	D1	D2
SHARKS												
Alopias superciliosus	Bigeye Thresher	VU	0–955	X								X
Centrophorus granulosus	Gulper Shark	EN	98–1,500	X								
Centrophorus squamosus	Leafscale Gulper Shark	EN	0–3,366	X								
Centroscymnus owstonii	Roughskin Dogfish	VU	150–1,459	X								
Dalatias licha	Kitefin Shark	VU	37–1,800	X								
Etmopterus spinax	Velvet Belly Lanternshark	VU	70–2,000	X								
Galeorhinus galeus	Tope	CR	0–826	X		X				X		
Isurus oxyrinchus	Shortfin Mako	EN	0–1,888	X								

Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met								
				A	B	C1	C2	C3	C4	C5	D1	D2
Lamna nasus	Porbeagle	VU	0–1,809	X								
Rhincodon typus	Whale Shark	EN	0–1,928	X			X					
Sphyrna zygaena	Smooth Hammerhead	VU	0–200	X		X				X		
RAYS												
Dasyatis pastinaca	Common Stingray	VU	0–200	X		X				X		
Dipturus batis	Common Blue Skate	CR	10–600	X								
Dipturus oxyrinchus	Longnosed Skate	VU	70–1,230	X								
Leucoraja fullonica	Shagreen Skate	VU	30–800	X								
Mobula birostris	Oceanic Manta Ray	EN	0–1,246	X								X
Mobula mobular	Spinetail Devil Ray	EN	0–1,112	X								
Mobula tarapacana	Sicklefin Devil Ray	EN	0–1,896	X		X				X		
Myliobatis aquila	Common Eagle Ray	CR	0–537	X		X				X		

SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
Apristurus laurussonii	Iceland Catshark	LC
Centroscymnus coelolepis	Portuguese Dogfish	NT
Centroselachus crepidater	Longnose Velvet Dogfish	NT
Deania calceus	Birdbeak Dogfish	NT
Deania profundorum	Arrowhead Dogfish	NT
Etmopterus princeps	Great Lanternshark	LC
Etmopterus pusillus	Smooth Lanternshark	LC
Galeus murinus	Mouse Catshark	LC
Hexanchus griseus	Bluntnose Sixgill Shark	NT
Prionace glauca	Blue Shark	NT
Pseudotriakis microdon	False Catshark	LC
Squaliolus laticaudus	Spined Pygmy Shark	LC
RAYS		
Pteroplatytrygon violacea	Pelagic Stingray	LC
Raja clavata	Thornback Skate	NT
Rajella bigelowi	Bigelow's Skate	LC
Taeniurops grabatus	Round Fantail Stingray	NT
CHIMAERAS		
Chimaera opalescens	Opal Chimaera	LC

IUCN Red List of Threatened Species Categories are available by searching species names at www.iucnredlist.org Abbreviations refer to: CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient.

REFERENCES

Afonso P, Vasco-Rodrigues N. 2015. Summer aggregations of the common eagle ray, *Myliobatis aquila*. *Arquipelago - Life and Marine Sciences* 32: 1–4.

Afonso P, McGinty N, Machete M. 2014. Dynamics of whale shark occurrence at their fringe oceanic habitat. *PLoS ONE* 9: e102060. https://doi.org/10.1371/journal.pone.0102060

Afonso P, Schmiing M, Fontes J, Tempera F, Morato T, Santos RS. 2018. Effects of marine protected areas on coastal fishes across the Azores archipelago, mid-North Atlantic. *Journal of Sea Research* 138: 34–47. https://doi.org/10.1016/j.seares.2018.04.003

Afonso P, Fontes J, Giacomello E, Magalhães MC, Martins HR, Morato T, Neves V, Prieto R, Santos RS, Silva MA, et al. 2020. The Azores: a mid-Atlantic hotspot for marine megafauna research and conservation. *Frontiers in Marine Science* 6: 826. https://doi.org/10.3389/fmars.2019.00826

Afonso P, Gandra M, Graça G, Macena B, Vandeperre F, Fontes J. 2022. The multi-annual residency of juvenile smooth hammerhead shark in an oceanic island nursery. *Frontiers in Marine Science* 9: 844893. https://doi.org/10.3389/fmars.2022.844893

Alsina BM. 2021. Using image analysis to study structure, population size and connectivity patterns of the whale shark *Rhincodon typus* in the Azores archipelago. Unpublished Master Thesis, University of Algarve, Algarve.

Arostegui MC, Afonso P, Fauconnet L, Fontes J, Macena BCL, Meyer C, Morato T, Braun CD. 2024. Advancing the frontier of fish geolocation into the ocean's midwaters. *Deep-Sea Research Part I: Oceanographic Research Papers* 212: 104386. https://doi.org/10.1016/j.dsr.2024.104386

Barreiros JP, Rodeia J. 2004. Preliminary results of reproductive aggregations of eagle rays (*Myliobatis aquila*) in a single volcanic cave from the Azores (NE Atlantic). *XIth European Congress of Ichthyology, Tallinn, Estonia. Abstract Volume*, 129–130.

Braun CD, Della Penna A, Arostegui MC, Afonso P, Berumen ML, Block BA, Brown CA, Fontes J, Furtado M, Gallagher AJ, et al. 2023. Linking vertical movements of large pelagic predators with distribution patterns of biomass in the open ocean. *Proceedings of the National Academy of Sciences of the United States of America* 120: e2306357120. https://doi.org/10.1073/pnas.2306357120

Caldeira RMA, Reis JC. 2017. The Azores confluence zone. *Frontiers in Marine Science* 4: 37. https://doi.org/10.3389/Fmars.2017.00037

Capapé C, Guélorget O, Vergne Y, Quignard JP. 2007. Reproductive biology of the common eagle ray, *Myliobatis aquila* (Chondrichthyes: Myliobatidae) from the coast of Languedoc (southern France, northern Mediterranean). *Vie et Milieu - Life & Environment* 57(3): 1–6.

Chaikin S, Belmaker J, Barash A. 2020. Coastal breeding aggregations of threatened stingrays and guitarfish in the Levant. *Aquatic Conservation: Marine and Freshwater Ecosystems* 30: 1160–1171. https://doi.org/10.1002/aqc.3305

Convention on Biological Diversity (CBD). 2025a. North Azores Plateau. Ecologically or Biologically Significant Areas (EBSAs). Available at https://chm.cbd.int/database/record?documentID=263489 Accessed July 2025.

Convention on Biological Diversity (CBD). 2025b. Ridge South of the Azores. Ecologically or Biologically Significant Areas (EBSAs). Available at https://chm.cbd.int/database/record?documentID=263487 Accessed July 2025.

Das D, Afonso P. 2017. Review of the diversity, ecology, and conservation of elasmobranchs in the Azores region, Mid-North Atlantic. *Frontiers in Marine Science* 4: 354. https://doi.org/10.3389/fmars.2017.00354

Das D, Gonzalez-Irusta JM, Morato T, Fauconnet L, Catarino D, Afonso P, Viegas C, Rodrigues L, Menezes G, Rosa A, et al. 2022. Distribution models of deep-sea elasmobranchs in the Azores, Mid-Atlantic Ridge, to inform spatial planning. *Deep-Sea Research Part I: Oceanographic Research Papers* 182: 103707. https://doi.org/10.1016/j.dsr.2022.103707

Das D, Priester R, Soares J, Macena B, Fontes J, Afonso P. 2025. Nearshore essential habitat of threatened sharks around a temperate oceanic island. *Marine Ecology Progress Series* 766: 73–90. https://doi.org/10.3354/meps14897

Ebert DA, Dando M, Fowler S. 2021. *Sharks of the world: A complete guide*. Princeton: Princeton University Press.

Fauconnet L, Catarino D, Das D, Giacomello E, Gonzalez-Irusta JDSM, Afonso P, Morato T. 2023. Challenges in avoiding deep-water shark bycatch in Azorean hook-and-line fisheries. *ICES Journal of Marine Science* 80: 605–619. https://doi.org/10.1093/icesjms/fsac178

Fontes J, McGinty N, Machete M, Afonso P. 2020. Whale shark-tuna associations, insights from a small pole-and-line fishery from the mid-north Atlantic. *Fisheries Research* 229: 105598. https://doi.org/10.1016/j.fishres.2020.105598

Fontes J, Afonso P, Macena B. 2024. Whale sharks and tunas hunt together. *Frontiers in Ecology and the Environment* 22: 2718. https://doi.org/10.1002/fee.2718

Gandra M, Fontes J, Macena BCL, Meyer CG, Afonso P. 2025. Long-term multitracking reveals contrasting yet highly resident movement ecologies of two sympatric and endangered deep-sea sharks. *Ocean and Coastal Management* 269: 107782. https://doi.org/10.1016/j.ocecoaman.2025.107782

Garcia SAM. 2008. Identification of skates, rays and mantas off the coast of São Miguel Island, Azores: preliminary study of potential tourist development. Unpublished PhD Thesis, University of the Ponta Delgada, São Miguel, Azores.

Grancagnolo D, Cattano C, Quattrocchi F, Milazzo M. 2023. Preliminary evidence of a potential reproductive aggregation area of the common stingray *Dasyatis pastinaca* (Linnaeus, 1758) (Chondrichthyes – Dasyatidae) in the Central Mediterranean Sea. *Mediterranean Marine Science* 24: 639–643. https://doi.org/10.12681/mms.34889

Heupel MR, Carlson JK, Simpfendorfer CA. 2007. Shark nursery areas: Concepts, definition, characterization and assumptions. *Marine Ecology Progress Series* 337: 287–297. https://doi.org/10.3354/meps337287

iNaturalist. 2024. School Shark *Galeorhinus galeus*. Available at: https://www.inaturalist.org/observations/240024600 Accessed June 2025.

IUCN. 2025. The IUCN Red List of Threatened Species. Version 2025-1. Available at: https://www.iucnredlist.org Accessed July 2025.

Key Biodiversity Areas (KBA). 2025a. Key Biodiversity Areas factsheet: Faial. Available at: https://www.keybiodiversityareas.org/site/factsheet/26977 Accessed August 2025.

Key Biodiversity Areas (KBA). 2025b. Key Biodiversity Areas factsheet: Graciosa. Available at: https://www.keybiodiversityareas.org/site/factsheet/26981 Accessed August 2025.

Key Biodiversity Areas (KBA). 2025c. Key Biodiversity Areas factsheet: Pico da Vara. Available at: https://www.keybiodiversityareas.org/site/factsheet/19717 Accessed August 2025.

Key Biodiversity Areas (KBA). 2025d. Key Biodiversity Areas factsheet: Pico - Norte. Available at: https://www.keybiodiversityareas.org/site/factsheet/26978 Accessed August 2025.

Key Biodiversity Areas (KBA). 2025e. Key Biodiversity Areas factsheet: Santa Maria. Available at: https://www.keybiodiversityareas.org/site/factsheet/26984 Accessed August 2025.

Key Biodiversity Areas (KBA). 2025f. Key Biodiversity Areas factsheet: São Jorge - Nordeste. Available at: https://www.keybiodiversityareas.org/site/factsheet/26980 Accessed August 2025.

Key Biodiversity Areas (KBA). 2025g. Key Biodiversity Areas factsheet: São Jorge - Oeste. Available at: https://www.keybiodiversityareas.org/site/factsheet/26979 Accessed August 2025.

Key Biodiversity Areas (KBA). 2025h. Key Biodiversity Areas factsheet: São Miguel - Sul. Available at: https://www.keybiodiversityareas.org/site/factsheet/26983 Accessed August 2025.

Key Biodiversity Areas (KBA). 2025i. Key Biodiversity Areas factsheet: Terceira. Available at: https://www.keybiodiversityareas.org/site/factsheet/26982 Accessed August 2025.

Lucifora LO, Menni RC, Escalante AH. 2004. Reproductive biology of the school shark, *Galeorhinus galeus*, off Argentina: Support for a single south western Atlantic population with synchronized migratory movements. *Environmental Biology of Fishes* 71: 199–209. https://doi.org/10.1007/s10641-004-0305-6

Macena B, Fontes J, Sobral A, Das D, Priester R, Afonso P. 2022. IslandShark. Oceanic islands as essential habitat for migratory sharks: final technical report (2018-2021). Horta: Instituto do Mar (IMAR) & Instituto de Investigação em Ciências do Mar - Okeanos, Universidade dos Açores.

Morato T, Machete M, Kitchingman A, Tempera F, Lai S, Menezes G, Pitcher TJ, Santos RS. 2008. Abundance and distribution of seamounts in the Azores. *Marine Ecology Progress Series* 357: 17–21. https://doi.org/10.3354/meps07268

Morato T, Afonso P, Menezes GM, Santos RS, Silva MA. 2020. Editorial: The Azores marine ecosystem: an open window into North Atlantic open ocean and deep-sea environments. *Frontiers in Marine Science* 7: 601798. https://doi.org/10.3389/fmars.2020.601798

Nosal AP, Cartamil DP, Ammann AJ, Bellquist LF, Ben-Aderet NJ, Blincow KM, Burns ES, Chapman ED, Freedman RM, Klimley AP, et al. 2021. Triennial migration and philopatry in the critically endangered soupfin shark *Galeorhinus galeus*. *Journal of Applied Ecology* 58: 1570–1582. https://doi.org/10.1111/1365-2664.13848

Özten S, Yiğin CÇ, İşmen A, Cabbar K. 2024. Biological assessment of common eagle ray, *Myliobatis aquila* (Linnaeus, 1758) from the Northeastern Mediterranean (Saros Bay), Türkiye. *Acta Biologica Turcica* 37(S4): 1–11.

Parra H, Pham CK, Machete M, Santos M, Bjorndal KA, Vandeperre F. 2023. The Portuguese industrial pelagic longline fishery in the Northeast Atlantic: Catch composition, spatio-temporal dynamics of fishing effort, and target species catch rates. *Fisheries Research* 264: 106730. https://doi.org/10.1016/j.fishres.2023.106730

Pinho M, Medeiros-Leal W, Sigler M, Santos R, Novoa-Pabon A, Menezes G, Silva H. 2020. Azorean demersal longline survey abundance estimates: Procedures and variability. *Regional Studies in Marine Science* 39: 101443. https://doi.org/10.1016/j.rsma.2020.101443

Priester CR, Dierking J, Hansen T, Abecasis D, Fontes JM, Afonso P. 2024. Trophic ecology and coastal niche partitioning of two sympatric shark species in the Azores (mid-Atlantic). *Marine Ecology Progress Series* 726: 113–130. https://doi.org/10.3354/MEPS14487

Saadaoui A, Saidi B, Enajjar S, Bradai MN. 2015. Reproductive biology of the common stingray *Dasyatis pastinaca* (Linnaeus, 1758) off the Gulf of Gabès (Central Mediterranean Sea). *Cahiers de Biologie Marine* 56**:** 389–396.

Santos R, Novoa-Pabon A, Silva H, Pinho M. 2020. Elasmobranch species richness, fisheries, abundance and size composition in the Azores archipelago (NE Atlantic). *Marine Biology Research* 16: 103–116. https://doi.org/10.1080/17451000.2020.1718713

Soares JH. 2021. Conhecimento ecológico local de elasmobrânquios costeiros no arquipélago dos Açores. Unpublished Master Thesis, Universidade dos Açores, Ponta Delgada.

Sobral AF. 2013. Biology, ecology and conservation of mobulid rays in the Azores. Unpublished PhD Thesis, University of the Azores.

Sobral AF, Afonso P. 2014. Occurrence of mobulids in the Azores, central North Atlantic. *Journal of the Marine Biological Association of the United Kingdom* 94: 1671–1675. https://doi.org/10.1017/S0025315414000964

Solleliet-Ferreira S, Macena BCL, Laglbauer BJL, Sobral AF, Afonso P, Fontes J. 2020. Sicklefin devilray and common remora prey jointly on baitfish. *Environmental Biology of Fishes* 103: 993–1000. https://doi.org/10.1007/s10641-020-00990-9

Thorrold SR, Afonso P, Fontes J, Braun CD, Santos RS, Skomal GB, Berumen ML. 2014. Extreme diving behaviour in devil rays links surface waters and the deep ocean. *Nature Communications* 5: 4274. https://doi.org/10.1038/ncomms5274

Torres P, Tristão da Cunha R, Santos Rodrigues A dos. 2016. The elasmobranch fisheries of the Azores. *Marine Policy* 73: 108–118. https://doi.org/10.1016/j.marpol.2016.07.027

UNEP-WCMC & IUCN. 2025. Protected Planet: The World Database on Protected Areas (WDPA) and World Database on Other Effective Area-based Conservation Measures (WD-OECM) [Online], February 2024, Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net Accessed May 2025.

Vandeperre F, Parra H, Machete M. 2020. A pesca com palangre de superfície nos Açores. Relatorio do projeto COSTA – COnsolidating Sea Turtle conservation in the Azores: Horta: IMAR – Instituto do Mar Projeto.

Yeldan H, Avsar D, Manaşırlı M. 2009. Age, growth and feeding of the common stingray (*Dasyatis pastinaca*, L., 1758) in the Cilician coastal basin, northeastern Mediterranean Sea. *Journal of Applied Ichthyology* 25: 98–102. https://doi.org/10.1111/j.1439-0426.2008.01075.x