Ascension Island Marine Protected Area Evidence and Options Document

Third Draft February 2019

The evidence and options presented here have been developed by Ascension Island Government, with support from the University of Exeter, the Blue Belt Programme delivery partners (MMO and CEFAS), and SAERI's Natural Capital Project.

Executive Summary

- The UK Government's Blue Belt Programme aims to establish a Marine Protected Area (MPA) with the conservation objective of maintaining and conserving Ascension Island's marine environment. Options for achieving this objective are presented in this document, based on unbiased assessments of the accompanying ecological, economic and social evidence on the value of Ascension Island's marine environment.
- The UK Government's commitment to close permanently at least 50% of Ascension's Exclusive Economic Zone (EEZ) to commercial fishing sets a lower limit of 221,761.5km^2 for any Ascension MPA designation.
- This Evidence and Options document considers that, to achieve the objective of protecting Ascension's marine environment, the island MPA will be a clearly-defined spatial area where commercial fishing and mineral extraction is prohibited in order to provide protection for biodiversity. No restrictions are proposed on the recreational fishery as part of an MPA designation.
- Ascension's waters are home to many species of high conservation value including fish, turtle and seabird species that are considered globally important.
- Over 99% of the Ascension Island EEZ is open water habitat and is used by a variety of marine species. Some of these would benefit from a protected area although others spend considerable time beyond Ascension's legislative boundaries so the benefit of an MPA is less clear.
- Of the existing marine activities, commercial fishing is assessed as having the greatest impact on biodiversity and the Atlantic bigeye tuna fishery is currently thought to be unsustainable. However, bycatch within the commercial tuna longline fishery was not shown to be higher in Ascension Island waters than surrounding high seas areas
- Recreational and sportsfishing, marine pollution and mineral extraction may also have an impact on some species and habitats.
- Commercial longline fishing for tuna species has been licensed in the Ascension Island EEZ since 1988, with all commercial fishing conducted by foreign flagged vessels. This is the only commercial fishing effort permitted in Ascension's EEZ. Licence revenue has historically contributed to overall island income; current revenue is £0-40,000 per annum.
- The decline in licence uptake has been partly attributed to overall decreases in fishing effort in the Atlantic since the 1990's and decreasing market demand for bigeye tuna. Increased regulation of boats fishing within the EEZ since 2015 may also have reduced licence sales. There is little prospect of biegeye stocks recovering in the short to medium term and Ascension could not lower its standards for vessel safety and catch monitoring, suggesting demand for licences to fish in Ascension's EEZ is unlikely to increase in the foreseeable future.
- If AIG were to manage a licensed fishery alongside the proposed MPA, management costs (compliance, enforcement and general MPA management) have been estimated at £363,928 per year when the fishery is active. Putting the fishery into a state of dormancy would result in estimated management costs of £116,078 per year with the additional cost of expert assessment each time the dormancy period is reviewed. No income would be derived from a dormant fishery.
- Management of an MPA across the entire EEZ with no licensed fishery is estimated to be less costly at £116,078 per year, with additional activities such as ecological monitoring reliant on support from external partners.
- Interest generated by MPA designation could also attract charitable donations, including potential long-term funding mechanisms such as a trust fund, though this may be contingent on the entire EEZ being designated as an MPA. Other avenues of generating revenue through an MPA, such as sportsfishing, are discussed, though many are highly dependent on improved access to the island.
- Two MPA options are presented and summarised:
    - **MPA Option 1**: 50% of the EEZ designated as an MPA, including areas of highest biodiversity value, where commercial fishing and mineral extraction are prohibited. The size, position and shape of the non-MPA area is designed to maximise the likelihood of fishing licence sales in balance with the conservation objectives of the MPA area. Compliance and enforcement activity is required to prevent illegal, unreported or unregulated (IUU) fishing incursions into either the MPA or the fishing area, in addition to the active management of the commercial licensed fishery. A version of this option would involve putting the fishery in the undesignated 50% into a temporary state of dormancy.
    - **MPA Option 2**: permanent designation of 100% of the Ascension EEZ as an MPA where commercial fishing and mineral extraction are prohibited. All areas of high biodiversity in the EEZ are no longer vulnerable to the direct and indirect pressures of a commercial fishery. Monitoring and surveillance activity is required to ensure no IUU fishing incursions into the MPA.

Contents

1. Aim and scope of the document

This document sets out the importance of Ascension Island's marine environment and provides options for a Marine Protected Area (MPA). The UK Government's Blue Belt Programme aims to establish an MPA around Ascension by 2019 with the conservation objective of maintaining and conserving the island's marine environments. The focus is on commercial extractive industries and an MPA will not prohibit recreational or subsistence uses of the near-shore marine environment by the local community.

This document summarises the available evidence relating to marine habitats and species distribution around Ascension and their vulnerability to current human resource use. It considers the impact of a potential MPA on both biodiversity and human activities and evaluates MPA options. There are no recommendations against each option as this paper is an unbiased assessment of each MPA option for Ascension's decision makers. Additional information and methodological details are contained within a series of Appendices for further reference.

Further evidence will be gathered through a public consultation exercise and this iterative process will inform a final recommendation from the Ascension Island Council early in 2019.

2. Background

2.1 The Blue Belt Programme and Ascension Island

Through its Blue Belt Programme, the UK Government is supporting its commitment to establishing long-term protection for over 4,000,000km^2 of the marine environment around five of its Overseas Territories (OTs) and their dependencies. These OTs have committed to designating (or have already designated) large scale areas for marine protection. The Blue Belt is being delivered over four years (2016-2020) through a partnership between OT governments and communities, academic institutions, NGOs and two UK Government bodies, namely the Centre for Environment, Fisheries and Aquaculture Science (Cefas) and the Marine Management Organisation (MMO). This is being done on behalf of the Foreign and Commonwealth Office (FCO) and the Department for Environment, Food and Rural Affairs (Defra) (Appendix 1).

The Blue Belt is designed to provide support to the OTs in developing, implementing and enforcing marine protection strategies. This involves improving our scientific understanding of the marine environment and ensuring management strategies are evidence-based, enforced and sustainable in the long-term. As part of the Blue Belt objectives, the UK Government made a commitment to establish, by 2019, an MPA that will permanently close at least 50% of Ascension Island's 200 nautical mile exclusive economic zone (EEZ) to commercial fishing, subject to an evidence-based analysis of the most appropriate location and the views of the local community.

2.2 What do we mean by a Marine Protected Area?

Internationally accepted definitions of an MPA are broad and can encompass a wide range of management objectives, human uses and legislative frameworks. Nonetheless, all describe a defined spatial area where the primary objective is to conserve biodiversity and ecosystems, rather than to achieve sustainable development or manage resources, and is managed accordingly.

Following such definitions, and to enable the delivery of the Blue Belt commitment, this Evidence and Options document considers that an Ascension Island MPA will be a clearly-defined spatial area

where commercial fishing and mineral extraction are prohibited in order to provide protection for species and habitats.

The Ascension MPA will have the following high-level conservation objectives:

- To maintain and conserve biodiversity, natural heritage, habitats, species or landscapes with legal protection status.
- To maintain and conserve biodiversity, natural heritage, habitats, species or landscapes without legal protection status.
- To maintain key ecological functions (spawning grounds, nursery grounds, feeding zones, nesting areas, migration routes etc.).
- To promote sustainable management and development of socio-economic activities.
- To educate on environmental issues and improve public awareness.
- To foster scientific research.

3. Conservation value of Ascension Island's EEZ

This section describes the key marine habitats and species found around Ascension and considers both their distribution and their global importance for conservation.

Ascension Island's marine habitats support a unique range of marine assemblages, some of which are found nowhere else on the planet

The seas around Ascension support a unique collection of marine species, which in some cases are not found anywhere else on the planet, leading to several NGOs recognising Ascension as being the location of important marine biodiversity (RSPB, 2018).

3.1 Habitats

More than 99.9% of Ascension Island's EEZ is comprised of oceanic waters deeper than 500m. The remaining 297km^2 that is shallower than 500m is limited to the narrow coastal shelf around Ascension Island itself and the summits of three prominent seamounts (Figure 1).

Ascension lacks shallow water coral reefs, seagrass beds or mangroves found around other tropical islands (Price & John, 1980). Instead, the shallow seas around the island are dominated by expanses of sand and rhodolith beds, interspersed with rocky volcanic reef and boulder fields. It is this habitat that supports the greatest diversity of species and many of the species found only in Ascension.

The three seamounts found within Ascension's EEZ rise to between 77m and 265m below the ocean surface and support much richer ecosystems than the open waters that surround them (Appendix 2).

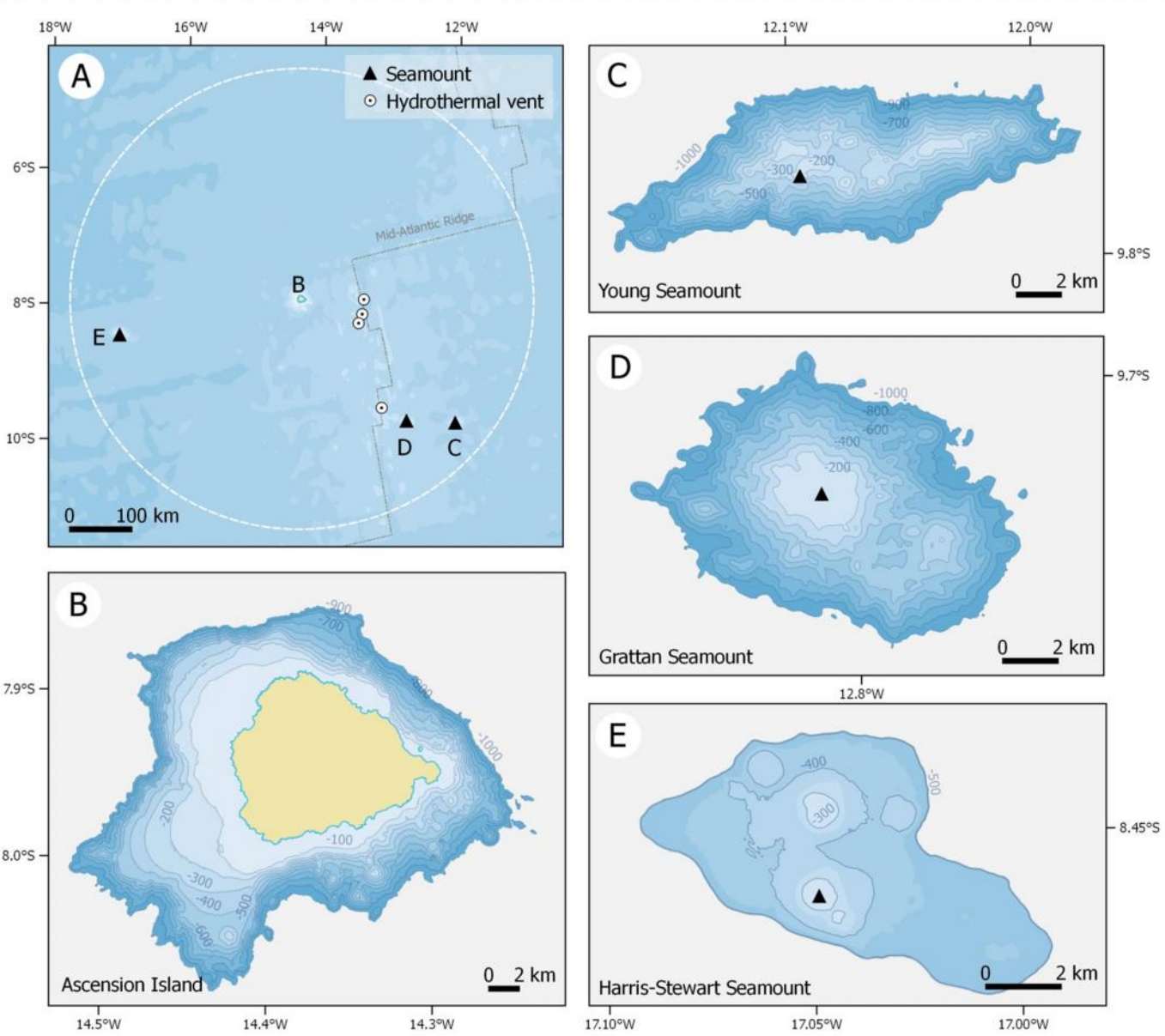


Figure 1. The Position of Ascension island, seamounts and hydrothermal vents within the EEZ (A) and water depth around Ascension Island (B), and the three seamounts (C,D,E)

Away from the island and seamounts, habitats for marine species are deep water, primarily defined by the shifting dynamics of ocean currents and water masses. An analysis of oceanographic data suggests the presence of two distinct zones within the Ascension Island EEZ: a northern zone characterised by consistently strong westward flows and high productivity at the surface, and a less energetic southern zone. Historically, commercial long-lining effort has been concentrated on the boundary between these two regions.

Four hydrothermal vents have also been described within the Ascension Island EEZ distributed along the mid-Atlantic ridge at depths ranging from 1700m to 3600m. The vents support highly specialised ecosystems that are able to cope with extreme conditions and live off the chemicals emitted from the vents (Vrijenhoek, 2010). Based on expeditions to similar habitats is likely that there are species around the vents that have yet to be discovered or studied (Goffredi et al . 2017).

Deep-sea habitats including seamounts and hydrothermal vents situated within Ascension's EEZ are recognised diversity hotspots that could include species new to science

3.2 Species

a. Turtles

Ascension Island supports one of the world's largest nesting aggregations of the endangered green turtle (*Chelonia mydas*), with an estimated 25,000 nests annually (Weber *et al.* 2012). Tagging and genetic data indicate that green turtles nesting on Ascension migrate to foraging grounds distributed along the Brazilian continental shelf (Hays *et al.*, 2002; Appendix 3). A well-defined oceanic migration corridor runs to the west of the Island as it passes through the EEZ (Figure 2; Hays *et al*., 2002; Appendix 3). However, for the majority of the time that green turtles are within Ascension's EEZ they are mating or resting between nesting events less than 5km from the shore.

Ascension Island supports one of the world's largest nesting aggregations of endangered green turtles

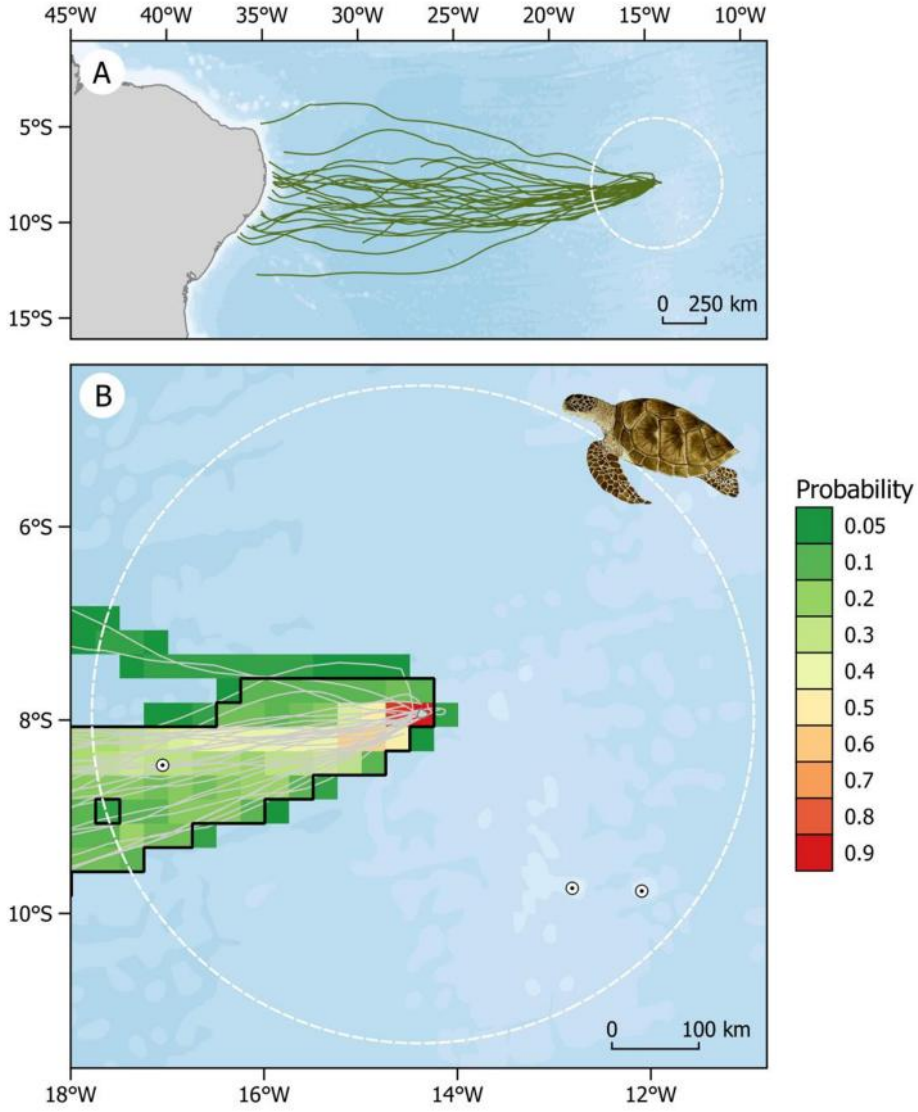


Figure 2. The tracks of green turtles from their nesting beaches on Ascension to feeding grounds off the coast of Brazil (plot A) and the modelled route of the migration corridor through the EEZ (plot B)

Two other species of marine turtle also visit Ascension's waters but do not breed there. Small numbers of juvenile hawksbill turtles (*Eretmochelys imbricata*) are found year-round in shallow, coastal habitats within 2km of the shore (Weber et al, 2017, Appendix 3). Leatherback turtles (*Dermochelys coriacea*) are also occasionally sighted in offshore waters; however, tracking data collected from continental nesting grounds on both sides of the Atlantic suggests that Ascension does not lie on an important migratory route for this species (Fosette et al., 2014).

b. Seabirds

11 species of seabird breed on Ascension Island and populations of many are currently recovering strongly following an eradication of feral cats that took place between 2002 and 2004. Tracking studies on four species: Ascension frigatebirds (*Fregata aquila*), masked boobies (*Sula dactylatra*), brown boobies (*Sula leucogaster*) and sooty terns (*Onychoprion fusctaus)* show unpredictable prey distributions in the open ocean forcing all species to roam over a large marine area with no clear hotspots of foraging activity (Figure 3; Oppel et al., 2017; Appendix 3). Ascension frigatebirds have the widest range during the breeding season, with 95% of movements occurring within 670km of the Island. For nesting masked boobies and sooty terns, estimated ranges are 411km and 256km, respectively.

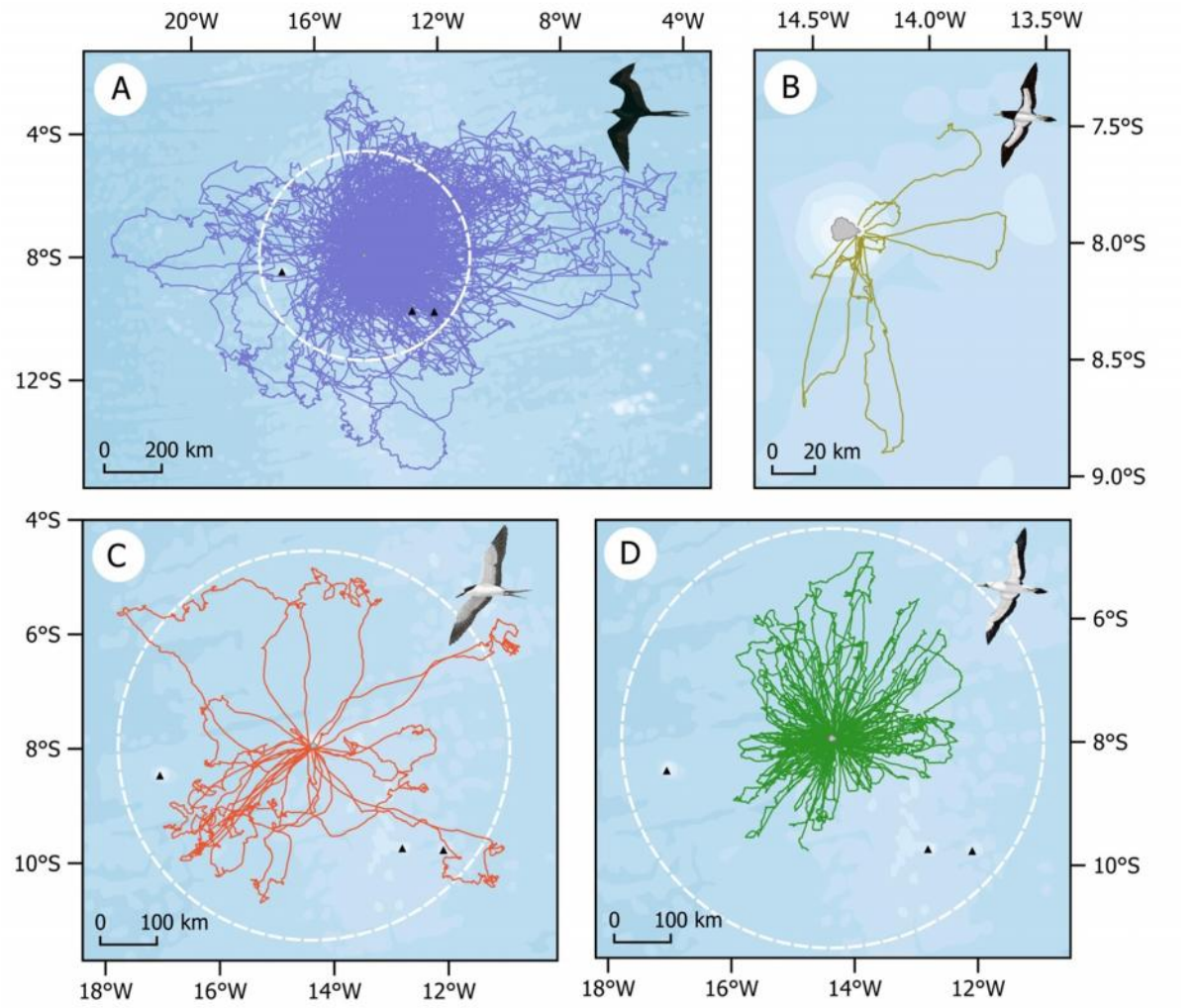


Figure 3. Tracks of Ascension frigatebirds (A), brown boobies (B), sooty terns (C) and masked boobies (D) tagged at their nesting sites on Ascension Island. The white line indicates the position of the Ascension EEZ.

Sooty terns feed mainly on flying fish and rely on predatory fish, such as tuna, driving them to the surface. The number of sooty terns on Ascension appears stable at present, but in the 1960s and 1990s their numbers crashed and this could have been partly due to declines in the stocks of tuna that forced the terns to switch to less nutritious prey (Ratcliffe et al., 1999).

c. Sharks

In 2017 all shark and ray species (known to be present in Ascension waters) were added to the Wildlife Protection Ordinance (2013). This action was taken in view of the recognised vulnerability of several shark species, many being listed at "Vulnerable", "Near Threatened" or "Endangered" by the International Union for Conservation of Nature (IUCN).

The dominant shark species around the island and seamounts are Galapagos (*Carcharhinus galapagensis*) and silky sharks (*Carcharhinus falciformis*). Tracking of Galapagos sharks suggests that they are predominantly coastal, spending the majority of their time within a 10km radius of the Island, although there is some evidence of occasional forays into deeper waters as far as ~ 100km from shore (DPLUS046, 2016, Appendix 3). Observations of small juvenile Galapagos sharks suggest the species breeds around Ascension. Resident or semi-resident populations of Galapagos and silky sharks are also found around the Grattan and Young seamounts with higher densities within 7km of the summits (Appendix 2).

Several species of shark occur within the Ascension Island EEZ, with some species being affiliated in particular to inshore and seamount habitats.

At least nine other shark species have been reported within Ascension's EEZ, but data on their distributions are generally too limited to identify hotspots of abundance. Limited tracking data from blue (*Prionace glauca*), oceanic whitetip (*Carcharhinus longimanus*) and tiger sharks (*Galeocerdo cuvier*) suggest that these are highly mobile and range widely across the Atlantic (Figure 4, Appendix 3). There is no evidence these species breed within Ascension's waters, but the EEZ may contain important feeding or foraging areas for some shark species, particularly around the seamounts.

d. **Billfish**

Ascension Island's EEZ supports a variety of marlin species some of which are classified as 'Vulnerable' on the IUCN red list. 10 Atlantic blue marlin (*Makaira nigricans*) and one Atlantic sailfish (*Istiphorus albicans*) have been tagged and tracked close to Ascension (Figure 4, Appendix 3). The marlin tended to disperse out of the EEZ over periods of weeks and migrated to destinations including Cape Verde, the Gulf of Guinea and the central north Atlantic (DPLUS046, 2016). The single sailfish showed a more extended period of residency around Ascension before migrating to northern Brazil.

Billfish, particularly sailfish, appear to be more common in the vicinity of the southern seamounts than in the wider ocean, with this effect seen as far as 20km from the summits.

Ascension Island's EEZ supports populations of tuna and billfish species that have a conservation status of 'Vulnerable' and are key target species for both recreational and commercial fishers

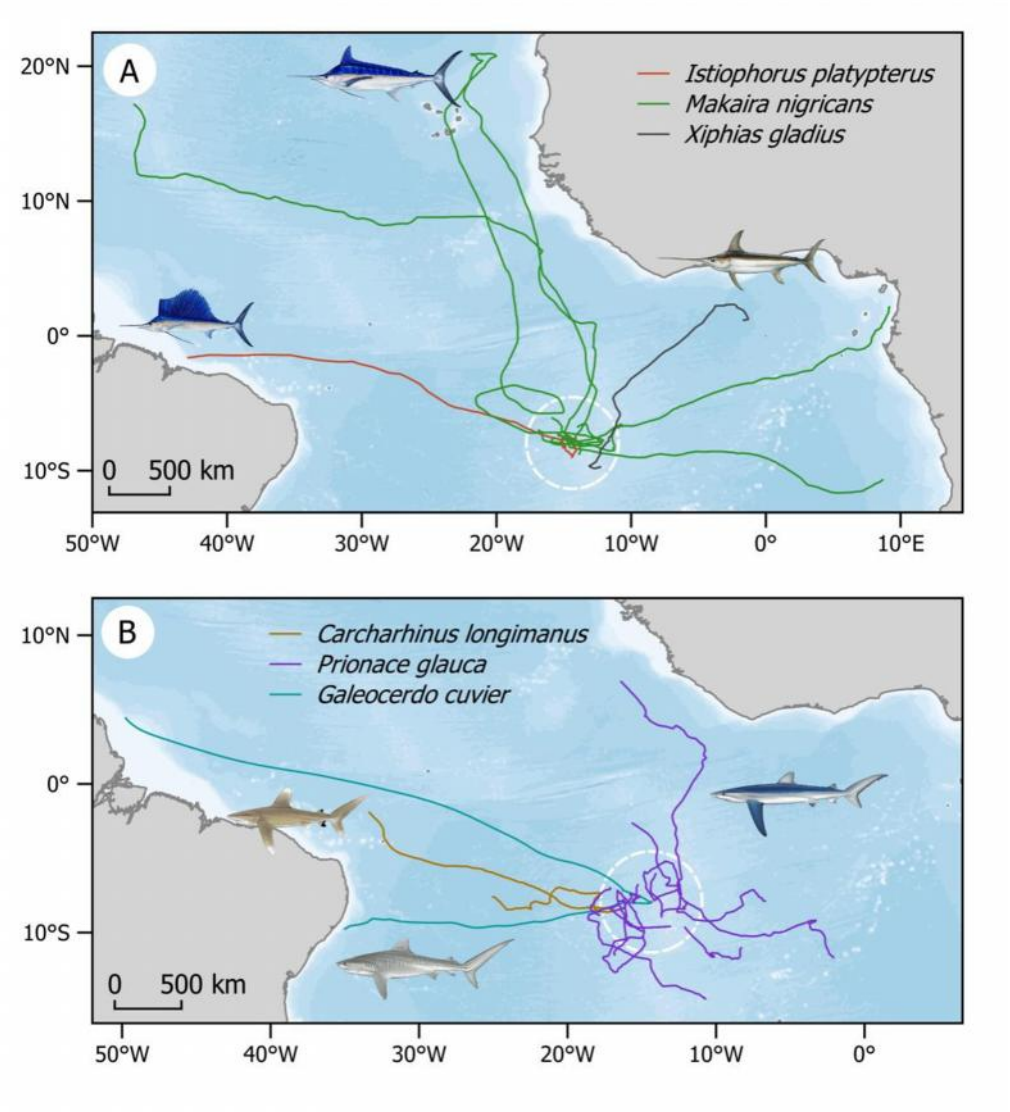


Figure 4. The routes taken by a) billfish and b) sharks tagged within the Ascension EEZ (shown by the white circle).

e. Tuna

Yellowfin tuna (*Thunnus albacares*) appear to be present in higher abundances around Ascension and the southern seamounts than in offshore waters. Tagging data suggest that individual yellowfin tuna can remain within Ascension's waters for periods of 100 to 200 days, with the majority of this time spent within 20km of the Island (Figure 5, Richardson et al. 2018; Appendix 3). Some tagging of bigeye tuna (*Thunnus obesus*) has been carried out around seamounts and suggests a degree of site fidelity and at least short-term residency around these features.

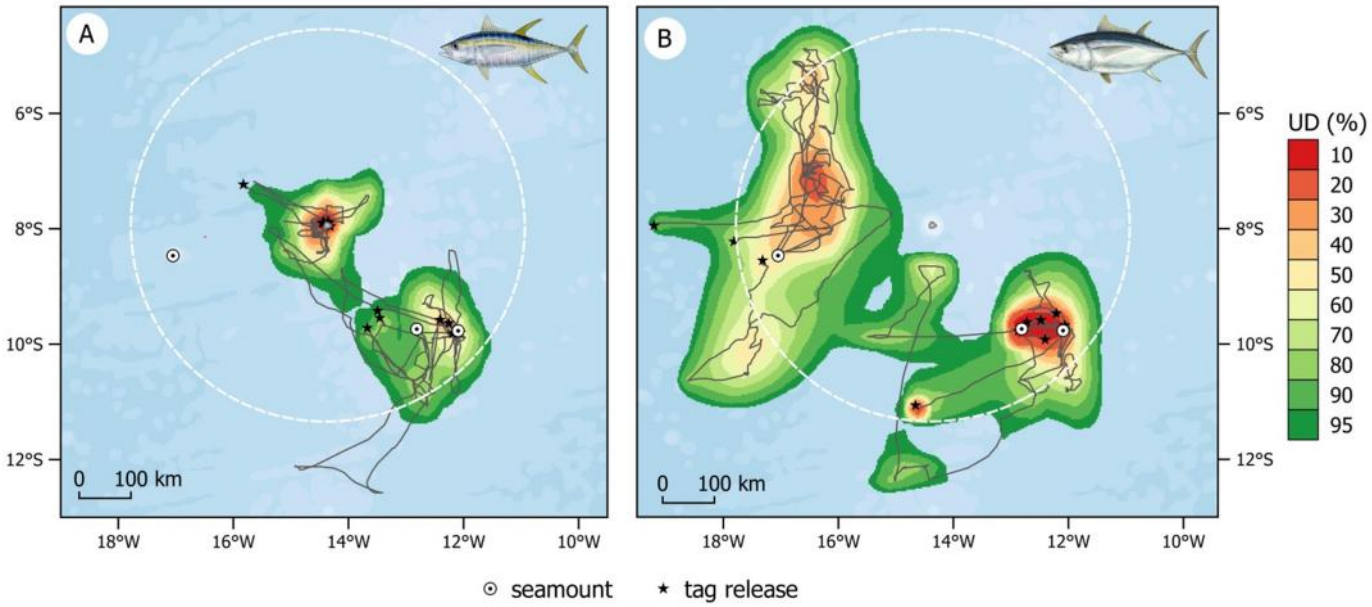


Figure 5. The tracks and modelled distribution heat maps of yellowfin tuna (A) and bigeye tuna (B) tagged in the Ascension EEZ (shown by the white circle).

4. Marine resource use in Ascension's EEZ

This section briefly considers the activities that currently takes place within Ascension's waters and identifies those that will be affected by the designation of an MPA. The likely nature and scale of those effects for the relevant activities are discussed in more detail in section 6. The legislation affecting marine activities in Ascension are listed in Appendix 4.

4.1 Commercial tuna fishery

Commercial longline tuna fishing has been licensed in the 200nm mile EEZ around Ascension Island since 1988. Bigeye tuna are the main target species, but significant catches of yellowfin tuna, swordfish and blue shark also occur, with quotas managed through the International Commission for the Conservation of Atlantic Tuna (ICCAT). Ascension Island has no registered commercial fishing vessels and annual licences are sold to foreign flagged vessels mainly from Taiwan, Japan and China. Since 2015 52.6% of the EEZ has been closed to commercial fishing and the designation of an MPA around Ascension would result in the permanent closure of at least part of the EEZ to this type of fishing. The implications of this are discussed more fully in section 6.1.

4.2 Illegal, unreported and unregulated (IUU) fishing

In addition to the licensed and regulated fishery described above, other vessels are known to undertake illegal, unreported and unregulated (IUU) fishing for tuna and other species in the Atlantic and some of these vessels may encroach into Ascension's EEZ. The risk of IUU fishing in Ascension's waters and the methods of detecting it are described more fully in section 6.2 and Appendix 9. These vessels will not respect quotas for the targeted fish species nor necessarily employ methods to limit bycatch of non-target species. To be effective, any MPA would need a robust means of tackling IUU fishing.

4.3 Recreational fishing

Recreational fishing is an important part of the local culture and provides a valuable source of protein for the island community. Fish are typically taken by rod and line, hand line or spearfishing. The main species targeted are yellowfin tuna, rockhind/grouper, moray eel, wahoo, spiny lobster and octopus. A shortage in the supply of petrol on the island has prevented many of the island's small recreational fishing boats (<15m) operating in 2018, but boat fishing does still take place and fishing from the coast is common along the north-west part of the island. The designation of an MPA would not place restrictions on recreational fishing. A parallel process to engage with fishermen to establish an Inshore Fisheries Advisory Committee (IFAC) and a mechanism to manage inshore fish stocks is currently underway. A 'spillover' effect may occur whereby recreational fishermen see a rise in catches following restrictions on the commercial fleet, but this is likely to be negligible in the case of Ascension due to the high mobility of stocks and lack of evidence of local breeding sites for species such as yellowfin tuna.

4.4 Sportsfishing

The presence of large, sometimes record-breaking fish has attracted sports fishermen to Ascension. Three commercial sportsfishing companies operated on Ascension prior to the suspension of the south Atlantic Airbridge in 2017. These mainly targeted blue marlin and tuna caught either by rod and line or by spear. An MPA around Ascension could be an added attraction for sports fishermen as they appear to place a premium on areas free from commercial exploitation. The IFAC will also consider future management of sportsfishing to ensure it is carried out sustainably.

4.5 Diving and tourism

Diving and wildlife watching are popular activities for people living on Ascension as well as for tourists. There are two dive clubs in operation on Ascension mainly catering for people living on the island. Prior to the suspension of the Airbridge in 2017, one company also offered commercial dive trips and instruction, and one island-based company offered wildlife boat trips. An MPA would not stop these activities and is likely to provide an additional draw for divers and tourists. Best-practice guidance could be introduced to encourage/require conduct that is not damaging to marine wildlife. The potential effect of an MPA on tourism are considered in section 6.3.

4.6 Sea Freight

Sea freight is the principal means by which imports reach Ascension. The MV Helena runs between South Africa, St Helena and Ascension and makes approximately four visits annually to Ascension. The Falkland Island Resupply Ship delivers goods from the UK approximately eight times a year. The USAF base on Ascension is supplied via a mixture of air and sea freight, both of which come from Fort Patrick in Florida. The majority of ships passing through Ascension's waters are transport vessels transiting the EEZ that have nothing beyond radio contact with the island. An MPA is unlikely to have any significant impact on sea freight operations other than ensuring best-practice measures are used to minimise pollution and biosecurity risks.

5. Potential impacts of marine activities on biodiversity

This section considers the effects that existing and potential future uses of the marine environment around Ascension could have on biodiversity and what the impact of designating an MPA may be.

Table 1 summarises which species and habitats could be affected by current and potential marine activities. The likelihood and severity of impacts will vary greatly and the interactions are described in more detail in the following section.

Table 1. Summary of the species and habitats affected by activities occurring in the EEZ

Species/habitat	Impact of Activity					
	Commercial tuna fishing	IUU fishing	Sportsfishing	Recreational fishing	Coastal pollution	Mineral extraction
Sharks	*	*		*	*	
Tuna	*	*	*	*		
Billfish	*	*	*			
Turtles	*	*			*	
Seabirds	*	*		*	*	
Inshore habitats		*	*	*	*	
Deep sea habitats						*

5.1 Pelagic fish

All target species of the commercial fisheries are directly affected by this activity. Bigeye tuna are the principal target species caught by pelagic longline vessels in Ascension's EEZ, but yellowfin tuna, swordfish and, to a lesser extent, blue shark are also taken. Stock assessments carried out by ICCAT suggest that overall the population of Atlantic bigeye tuna is overfished and currently below sustainable catch level (ICCAT, 2015). This means that across the Atlantic as a whole, bigeye tuna are being caught at a faster rate than they can be replaced by natural reproduction. A recent analysis by the ICCAT Scientific Committee suggested that if current catch levels continue there was only a 1% chance that the bigeye stock would recover by 2033. For yellowfin tuna, the stock is considered to be depleted as a result of past overfishing (ICCAT, 2016), but current levels of fishing are thought to be sustainable.

In addition to the licenced vessels regulated by ICCAT, IUU fishing also takes place in the Atlantic Ocean and possibly within Ascension's EEZ (Section 6.2; Appendix 10; Appleby et al., 2018). These are likely to be targeting the same species as the regulated fleet, and the mortality they inflict will further undermine the sustainability of these fisheries. There has been at least one incident of an IUU vessel suspected of shark finning in Ascension's waters.

Longlines set for tuna can catch other species. The level of bycatch reported by licensed vessels in Ascension's waters appears to be lower than for the Atlantic tuna fleet as a whole, but there is still a risk to non-target species. An assessment was made of which species around Ascension are most at risk and the most vulnerable group included sharks, turtles and seabirds (Section 5.6, Appendix 6).

Levels of bycatch reported from the Ascension Island tuna longline fishery are lower than levels reported from the Atlantic tuna fleet as a whole. At risk non-target species include sharks, seabirds and turtles

Recreational and sportsfishing vessels operating from Ascension often target large pelagic fish species. Based on customs data it was calculated that an average 6.73t tuna and 1.35t wahoo were landed for private export from Ascension annually between 2014 and 2018. This does not include the fish that is consumed on island so the total catch will exceed this, but even this figure is greater than the weight of yellowfin tuna reported by the licensed commercial vessels in 2017. However, the ICCAT catch limit for yellowfin tuna is 110,000t annually and private exports from Ascension represent less than 0.01% of this total. There are no commercial exports of target species from Ascension. No catch limits or commercial fishery exist for wahoo, but the Ascension catch can be put in the context of the total global recreational catch of 3000t per year (https://www.st.nmfs.noaa.gov/spo/FishBull/1134/zischke.pdf).

Prior to the addition of sharks to the Ascension Island Wildlife Protection Ordinance (WPO) in 2017, there was some targeting of Galapagos sharks in the inshore recreational fishery, as well as the species being caught as bycatch when targeting tuna or bottom fishing. A considerable proportion of these targeted and bycatch events resulted in mortality. There was also historical exploitation of other shark species, such as bigeye thresher (*Alopias superciliosus*) and hammerhead sharks (*Sphyrna* spp.), in the inshore recreational fishery, though this has been rare in recent years.

From the incomplete catch records available, it appears that blue marlin and yellowfin tuna are the two main species caught by the commercial sportsfishing companies that operated from Ascension. Catch and release was practiced for most of the marlin caught, though some of the largest fish were landed. A higher proportion of the yellowfin tuna caught were killed, and spear fishing of tuna necessarily results in the death of fish. No reliable data are available on the numbers of fish taken by sportsfishing companies before they ceased to operate in 2017.

5.2 Turtles

If a turtle becomes caught in a longline set for tuna, there is a very high likelihood it will die (Huang, 2015). However, it appears that green and hawksbill turtles, the species most commonly seen around Ascension, are much less likely to be caught than other species such as leatherback turtles. Turtle bycatch has been recorded by vessels in the vicinity of Ascension's EEZ, but no turtle bycatch has been reported by licensed vessels fishing in the EEZ since 2015, nor by the AIG-deployed observer who monitored one licensed vessel in 2016. The bycatch vulnerability assessment (Appendix 6) does, however, suggest that bycatch poses a risk for turtles around Ascension.

Turtles are most vulnerable to human activities during the breeding season when they congregate close to shore. Although adults were historically harvested (Weber et al., 2014), there is no reported hunting of turtles or egg collection on Ascension Island. However, marine pollution and disturbance or injury from boats are potential sources of mortality around nesting beaches close to human activity.

Turtles are most vulnerable to human activities during the breeding season as they congregate and come ashore to nest. Additional concerns include the impacts of marine plastics

5.3 Shallow inshore habitats and fish species

The highest levels of marine biodiversity, including species unique to Ascension, are found in the narrow strip of shallow water around the island. Commercial fishing is not carried out in this area, but recreational fishing from the coast or from small boats is concentrated here. The small island population and limited opportunity for exports mean that recreational fishing pressure around

Ascension is low and there is no indication that any species are currently overfished. Ascension's WPO prevents the taking of berried female lobster and 40 fish species considered most vulnerable to fishing pressure including all endemic species.

Inshore areas are the most vulnerable to pollution and biosecurity risks due to the concentration of vessel movements and proximity to land-based sources of pollution. Until just a few decades ago, domestic waste disposal was poor, with considerable proportions of waste being discarded into the ocean. Although waste management has considerably improved in recent years (DPLUS047, 2017), low levels of litter are a persistent issue, particularly in high-use areas. The requirement for both aircraft fuel and diesel necessitates the periodic delivery of fuel to the island by sea tanker with fuel being pumped to shore stations using mobile floating pipelines. These may be considered a particular risk with the main turtle nesting beach (Long Beach) being adjacent to one of these sites. However, ship-to-shore transfers of aircraft fuel are heavily regulated and safety checked by the UK Ministry of Defence (MOD) with multi-layered safety and response plans in place. In comparison, there is limited marine pollution response from non-MOD operations, such as from leaking vessels which may threaten inshore habitats and species.

The highest levels of biodiversity and species endemism are found in the inshore environment. This habitat is most at risk from marine pollution events such as spillages

5.4 Seabirds

The main problems facing Ascension's seabird populations are on land, but they rely on the sea for their food and marine conditions have the potential to be a significant impact on the success of Ascension's important bird colonies in the future.

Activities such as commercial fishing that extract resources from the ocean reduce foraging opportunities for seabirds (Tasker et al., 2000). The diet of Ascension's seabirds include flying fish, squid and other species too small to be targeted by the commercial fishery. However, fishing pressure can indirectly bring about reductions in the prey availability for seabirds (Tasker et al, 2000). In the case of sooty terns, they can only successfully catch fish when they are driven to the ocean surface by predatory fish such as tuna and so there is a close association between the number of tuna and their feeding success (Au & Pitman, 1988).

Evidence exists for considerable seabird bycatch in some fisheries, particularly for species such as albatross (Neves et al., 2007). The low level or absence of seabird bycatch recorded from the tropical Atlantic tuna fleet likely reflects the difference in foraging behaviour between species, such as albatross, found at more southern latitudes and the tropical seabird species that nest on Ascension. Some seabird bycatch has been recorded in the inshore recreational fishery, with sub-adult frigatebirds being observed following trolled lures from sportfishing vessels, which occasionally leads to entanglement with lines above the surface. There is at least one mortality event recorded from seabird bycatch in the inshore recreational fishery at Ascension Island.

Marine pollution can cause seabird mortality either directly such as when oil coats their feathers or toxins are ingested, or indirectly by causing a reduction in fish abundance that the birds feed on (Votier et al. 2005). The risk of pollution in Ascension's seas was considered in section 5.3. The main bird breeding colonies are on the opposite side of the island from the highest risk pollution areas, and foraging sites can be hundreds of miles away, making the threat from pollution relatively low.

The main pressures on seabirds occur on land during nesting. The reduction of large pelagic predators that seabirds associate with may affect feeding success and hence overall fitness of seabird populations

The global issue of marine plastics is also recognised as a threat to Ascension seabirds, although no seabird deaths have been attributed to plastic pollution at Ascension (Barnes et al. 2018). Evidence of seabird-plastic interaction is found in nesting areas and colonies, with plastic items being relatively common in brown booby nests on the Letterbox Peninsula, and plastic found within regurgitate pellets from sooty terns within the Wideawake colonies.

5.5 Deep-Sea Habitats

Deep-sea benthic habitats are especially sensitive to physical damage as they are slow growing and often geographically isolated (Koslow et al. 2000). The most widespread and damaging human pressure exerted on deep-sea habitats globally is physical damage caused by fishing gear that comes into contact with the seabed. As deep-sea trawls are not used around Ascension Island, none of the deep-sea habitats are currently vulnerable to this pressure. However, any potential future activities which were to take place in the future that result in extraction, abrasion or penetration to the seabed would damage the habitat and slow recovering species such as *Lophelia pertusa* and deep-sea sponges would be particularly vulnerable (Roberts, 2002).

5.6 Summary of how effective an MPA would be in addressing impacts on biodiversity

From the section above, it is clear that the main activity threatening biodiversity in the Ascension EEZ is the commercial tuna fishery. An MPA around Ascension that prohibits commercial fishing would prevent the mortality of tuna and pelagic fish species through intentional capture, the risk of bycatch for other fish, turtles and seabirds, and the potential wider impacts of fishing across the pelagic ecosystem within the EEZ. However, the beneficial effect of an MPA would vary between species depending on their migration patterns, life history traits and interaction with the fishery. Table 2 attempts to summarise the information in section 3 and section 5 to identify the species that would benefit most from the commercial fishery prohibition in Ascension's waters by considering their:

Vulnerability: how susceptible individuals of a species are to being damaged by commercial fishing activity and the effect any damage would have on the wider population (e.g. the death of a single individual from a short-lived species with a high reproductive rate would have less of an overall impact than the death of one that lives to an old age and has very few young at a time)

Protectability: whether species spend the majority of their lives, or a crucial part of their life cycle (e.g. spawning), within Ascension's EEZ where they can be protected, and how confident we are in the data showing this. Overall fishing effort in the Atlantic would not be reduced by an MPA so target and bycatch species that range beyond the EEZ would see little increase in protection.

Conservation value: the conservation status of a species according to the IUCN red list, which identifies which species are most endangered and in need of greatest protection on a global scale

The assessment is limited to species for which data are available and is a relative ranking, so there may be other species that will gain from the designation and even those at the bottom of the table may see some benefit from an MPA. More details on the data and methods used to determine these rankings are provided in Appendix 6.

Table 2. Scoring of species (1-low to 5-high) in Ascension's EEZ according to how much they would benefit from the prohibition of commercial fishing in an MPA

Species	Vulnerability	Protectability	Conservation value
Silky shark	5	5	3
Green turtle	4	5	4
Hawksbill turtle	4	4	5
Galapagos shark	5	5	2

Ascension frigatebird	3	5	3
Brown booby	4	5	1
Masked booby	4	5	1
Sooty tern	3	5	1
Tiger shark	3	3	2
Blue shark	3	3	2
Oceanic whitetip shark	3	2	3
Blue marlin	2	3	3
Yellowfin tuna	1	4	3
Bigeye tuna	1	3	3
Wahoo	2	2	1
Dolphinfish	2	2	1
Sailfish	2	2	1
Swordfish	1	2	1

LOW ← MEDIUM → HIGH

Silky sharks, Galapagos sharks, green turtles and hawksbill turtles are the species judged to have some of the highest susceptibility to commercial longline fishing in the EEZ and so have the most to gain from the designation of an MPA. Tuna and other fish species exploited by the fishery are undoubtedly subject to greater direct pressure, but they range beyond Ascension's waters and so the designation of an MPA likely would not reduce the overall level of mortality for the Atlantic population as fishing effort would just be displaced outside of the EEZ. Seabirds do spend most of their time during the crucial breeding season within the EEZ, but there is little evidence that they are caught as bycatch in the Atlantic tuna fishery, so the benefit of an MPA would rest on improvements to the overall marine ecosystem.

Commercial fishing pressures on target and non-target marine species would be reduced within the Ascension Island EEZ by the implementation of an Ascension Island MPA

If mineral extraction was prohibited within an MPA, then this would prevent the only major threat to deep sea habitats in the EEZ, other than global processes such as climate change.

Potential impacts of sports and recreational fisheries have been identified for pelagic fish, inshore habitats and seabirds. These will not be addressed through an MPA, but by a separate system of inshore management developed locally on the island. Marine pollution and biosecurity risks are managed through separate processes and emergency response plans.

6. How an MPA would affect Marine Activities

This section considers the potential impact MPA designation could have on marine activities through a more detailed examination of the relevant current marine uses identified in Section 4 and consideration of possible future uses of the marine resources around Ascension. The assumption made is that the main direct change to management within an MPA would be the prohibition of commercial longline fishery in the designated area. Additional information on the economics of the commercial tuna fishery is located in Appendix 7.

6.1 The Ascension long-line fishery

Annual licences to fish within the Ascension EEZ have been sold to commercial longline tuna vessels since 1988. No commercial vessels are registered in Ascension and the industry provides no direct employment on the island, however, licence sales have made a significant contribution to island income in previous years (Figure 6).

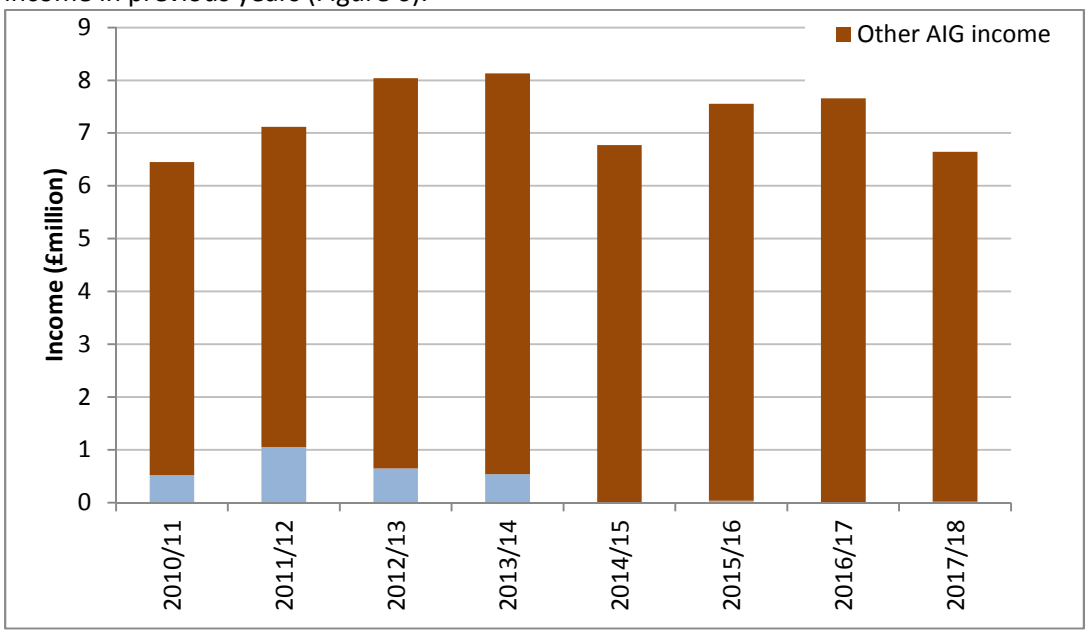


Figure 6. The income from commercial fishing licence sales shown in the context of overall AIG income.

To predict what financial contribution fishing licences could make in the future it is necessary to understand the factors influencing the Atlantic tuna fleet. The Ascension fishery is a subset of this wider fishery and so the economic drivers it faces will determine the number of vessels willing to accept the cost and regulations associated with a licence to fish in Ascension's EEZ.

a. Trends in the Atlantic fishery

The only commercial fishery that occurs within the Ascension EEZ and the main fishery occurring around the Ascension Island EEZ is a pelagic longline fishery primarily targeting bigeye tuna. The catch of bigeye tuna in the Atlantic reached an historic high in 1994 with reported catches of approximately 135,000t, but have steadily decreased to 75,000t in 2016. The two major fleets (Japanese, Taiwanese) that target big eye tuna in the Atlantic using longlines have significantly reduced their effort in recent years (Figure 7), but there is still evidence of fleet activity to the north and north east of Ascension's EEZ.

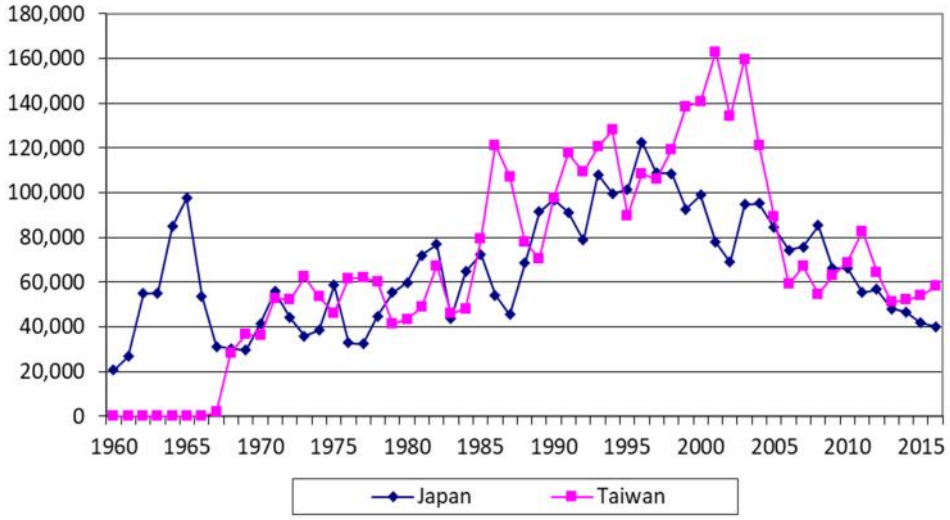


Figure 7. Effort of the Japanese and Taiwanese Longline fleet (estimated number of hooks employed) for the years 1966-2016.

Fishing effort by key fleets has decreased in the Atlantic over the past 15 years along with demand for bigeye tuna in the main market

The recent decline in fishing effort mirrors declines seen in the Atlantic bigeye tuna stock. ICAAT consider Atlantic bigeye tuna to be overfished and the stock depleted (ICCAT 2015). In response to this ICCAT imposed restrictions that limit the total catch in the Atlantic to 65,000tonnes per year, but catches from small nations exempted from the quota meant the total catch in 2017 was 78,000tonnes, undermining the effectiveness of the management measure and further delaying any recovery in the stock (ICCAT 2017).

Part of the reduction in the fishing fleet could also be due to a decline in demand for bigeye tuna in recent years, which has led to a decrease in its value. Recent market prices show an overall decrease in the value of frozen bigeye tuna with prices until the late 1990s fluctuating between £6000 and £10,000 per tonne after which they decreased to between £3000 and £6000 per tonne. Another factor may be the decline in Atlantic tuna stocks, which are assessed as overfished (ICCAT 2015). At the most recent ICCAT meeting in November 2018 members failed to reach an agreement on measures to encourage recovery of tropical tuna stocks (https://www.iccat.int/com2018/), indicating that the downward decline in the commercial tuna fishery may continue.

b. Ascension licence sales

Figure 8 shows the number of licences sold for Ascension's waters between 1988 and 2017. Though highly variable there is an obvious downward trend in licence sales. Examining the trend in licence sales in more detail, licence uptake decreased before the Ascension Island EEZ was first closed to fishing in 2005. When the fishery was reopened licence uptakes between 2010 and 2013 were similar to those reported prior to 2000, however between 2015 and 2018 only one to two licences were sold annually.

Ascension fishing licence sales have dropped in recent years and totalled three in the years 2016 to 2018

This drop in the number of licences sold coincided with the 52.6% closure of the EEZ, an increase in licence prices, and the introduction of stricter licence requirements and enforcement protocols, which were primarily related to fishing vessel safety. In parallel to the observed decrease in licence sales, a gradual increase in licence fee occurred, from £8,000 in 1988 to £20,000 in 2017 (Figure 8). The recommended cost of a licence was based on estimated tuna revenues and the assumption that licence fees should not exceed 6% of the revenue from the tuna fishery. The current licence fee is estimated as only 1% of the revenue of the fishery, which is far below the recommended 6% of total revenue. It therefore seems unlikely that the cost of a licence is the sole reason for the low uptake.

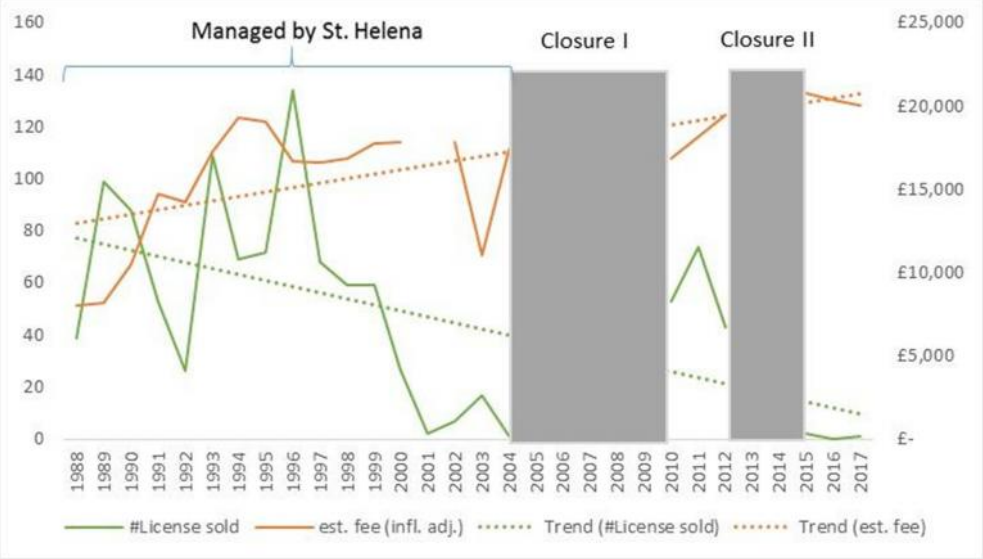


Figure 8. Licences sold and (estimated) licence fee (inflation adjusted) for commercial longline tuna fishing in Ascension's EEZ (1988-2017) (including linear trend lines).

In summary, the reduced fishing effort and shrinking market for Atlantic tuna mean it is unlikely that demand for licences to fish in Ascension's EEZ will increase in the near term and revenues of £0-40,000 per annum are likely to continue under these conditions. Ascension has no control over the main economic factors that are driving decisions made by the fleet. Changing either the cost or structure of the licence, the one area Ascension does have control over, is unlikely to affect licence uptake in and of itself. It is not possible to isolate the effect of the 52.6% closure to predict what level of licence sales could be achieved if the entire EEZ was available to fishing.

c. Impact of MPA designation on the commercial fishery

The designation of an MPA that covers at least 50% of the EEZ would make the current closure permanent and require the on-going licensing, management and enforcement of the fishery in the remainder of the EEZ. The costs of doing this are estimated in section 7.

There is no evidence that the 2015 closure of 52.6% of the EEZ has resulted in the displacement of fishing effort into the open portion of the EEZ since licence sales have been very low since 2015. However, it is possible that the current closure has displaced fishing effort to outside of Ascension's EEZ, and a 100% MPA would result in the additional displacement of the small fishing effort that does still take place in the open part of the EEZ. Satellite data do suggest that there is a relatively high density of vessels present just outside the EEZ (Figure 9 & 10), but the fishing displacement had already occurred (possibly due to the cost and regulations required to fish within the EEZ) and therefore there would be not be any further displacement as a result of an MPA.

6.2 Illegal, unreported and unregulated fishing

In addition to the vessels that have purchased licences to fish around Ascension, there are likely to be some vessels that fish illegally without licences and many of these will not be registered with ICCAT or follow their regulations. Such illicit activity is referred to collectively as illegal, unreported and unregulated (IUU) fishing. This could be damaging to Ascension's fish stocks and biodiversity and undermine the economic viability of the fishery.

Satellite monitoring technology provides a powerful tool for the identification of vessel traffic and possible IUU activity within a given geographical area. All vessels (> 24m) registered with ICCAT are required to carry Vessel Monitoring Systems (VMS), which can track vessel positions via satellite signals. In addition, any vessel purchasing a fishing licence from AIG is required to have an Automatic Identification System (AIS), which is a VHF radio-transmitted collision avoidance system that can be identified by satellites. Capturing VMS and AIS signals provides information on vessel identity, position and speed. Figure 9 shows the fishing vessel activity around Ascension detected from their AIS signals between January and March 2017.

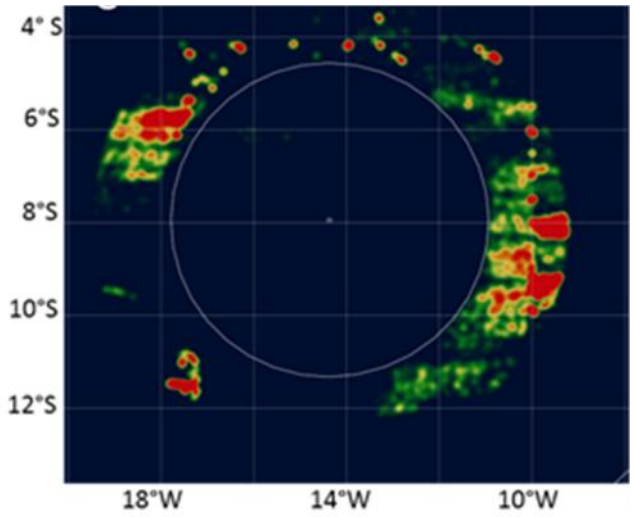


Figure 9. Heatmaps of AIS activity within the Ascension Island EEZ (white circle) and 100nm buffer zone between 1 Jan - 31 March 2017 Figure adapted from Catapult/Ocean Mind 'Ascension Island Monitoring Report' (March 2017).

IUU vessels may not be using AIS and further methods are required to detect these. Synthetic Aperture Radar (SAR) is able to detect large metal objects in the ocean and identify those most likely to be vessels. Where there is a SAR detection that doesn't correlate with a known vessel transmitting an AIS signal, it suggests that IUU fishing activity may be taking place. Between January and March 2017 a number of such vessels were detected by SAR within the Ascension EEZ and 100nm buffer zone around it (Figure 10).

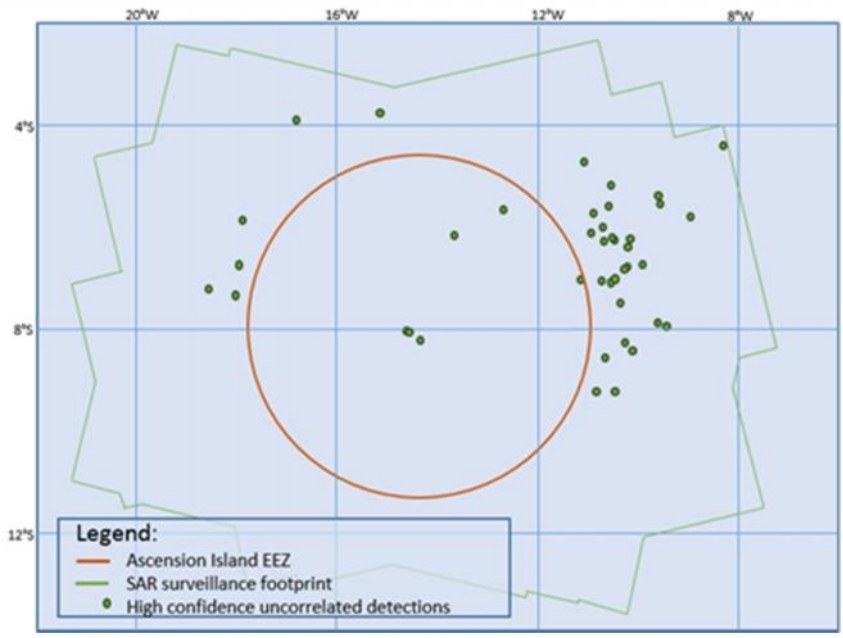


Figure 10 High confidence SAR detections uncorrelated with AIS activity for Ascension Island EEZ between 1 January and 31st March 2017. Adapted from Catapult/OceanMind 'Ascension Island Monitoring Report' (March 2017).

Using targeted satellite data analysis and other available intelligence, a Blue Belt risk profiling exercise has assessed the current IUU risk for Ascension as 'moderate' and present all year with a peak in January and February (Appendix 10).

6.3 Tourism

Tourism is one of the few avenues for Ascension to diversify its economy and increase revenues and business opportunities that is not directly linked to military activities. AIG records show that there were 1,351 and 1,446 visitors to Ascension Island in 2015 and 2016 respectively of which around 200 to 250 could be considered tourists. Gravestock (2017) suggests that there is scope in the medium-term to grow tourism on Ascension to approximately 600 per annum. This would be contingent on improved air access to the island, a willingness on the part of USAF and RAF to permit greater numbers of tourists on Ascension and investment in facilities.

The marine environment is a crucial factor drawing tourists to the island and there is potential for growth in this sector. The main markets are sportsfishing, ecotourism and scuba diving.

a. Sportsfishing

Ascension is regarded as one of the world's best sportsfishing destinations due to the presence of exceptionally large blue marlin and abundant large yellow-fin tuna. Daily charter rates of up to USD$1,800 are charged at locations such as Mexico and Barbados and similar sums were being charged by the three sportsfishing companies that operated on Ascension until 2017.

An analysis of Ascension Island visa applications between 2012 and 2018 shows that sports fishermen visited the island all-year round and contributed a significant amount of revenue to the economy (Appendix 10); conservative estimates are in the region of £300,000 per annum in 2014 and 2015 (Figure 11).

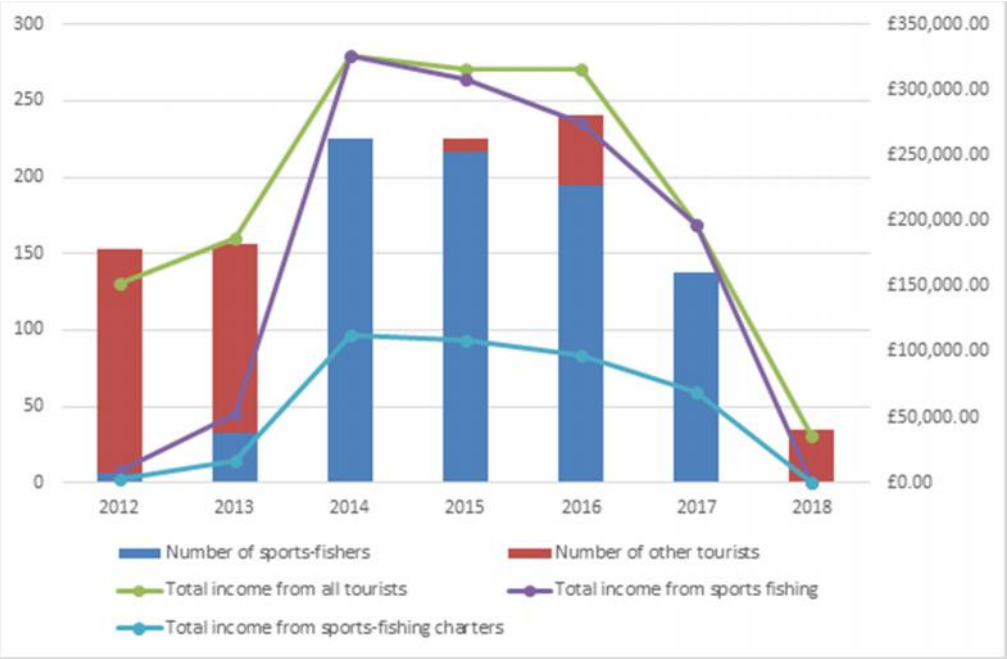


Figure 11: Number of visitors to Ascension Island and estimated sportsfishing spend 2012-2018.

b. Ecotourism and Scuba diving

The abundance of fish, seabirds and turtles, in addition to the dramatic volcanic landscape and diverse terrestrial habitats, would make Ascension an attractive destination for dedicated ecotourists or add interest for generalist tourists. The Conservation Department offers a number of wildlife related tours and these generated £10,900 in 2016/7 before the Airbridge closed, and continue to be popular with cruise ships when they visit Ascension. Income generated from tourists could include accommodation and subsistence costs, permit fees and tour fees. Access to the island is likely to be the limiting factor for any tourist industry on Ascension and no attempt has been made to project future income from this source while the timing and nature of any improvements to access remain uncertain.

Scuba diving represents a particular niche within the potential tourist market. The presence of large charismatic fish combined with year-round sunshine, generally good visibility and warm waters make scuba diving in the seas around Ascension an enjoyable, if not a world-class experience. There are currently two membership clubs on the island, which principally cater for Island residents. A dive charter business was set up prior to the suspension of the UK-Falklands air service, but failed to attract any specific dive tourism. Whilst there are approximately six million active scuba divers in the world it is likely that, without marketing, only the most adventurous would consider a visit to Ascension Island for diving.

c. **Impact of an MPA on marine tourism**

Increased income from tourism has been cited as one of the main economic benefits of MPAs. Surveys of marine tourists have shown that people are willing to pay more for the experience if the area they are visiting is protected (Gelcich et al. 2013, Grafeld et al. 2016, Wallmo & Kosaka, 2017). People are also willing to pay more for the opportunity to see large charismatic species, such as turtles and sharks, which are more likely to be present in MPAs (Oceana, 2008, Grafeld et al., 2016). This can be harnessed by Governments in the form of marine park fees.

The scientific evidence that sports fishermen are willing to pay more to fish in protected areas is less abundant, but specialist tour operators already list an absence of commercial fishing as one of the big attractions of Ascension Island (http://atlanticfishingcharter.com/ascension-island/).

In most published studies there was an existing tourism industry that was enhanced by an MPA designation (McCook et al., 2010); it is much more difficult for an MPA to stimulate a new tourist industry in remote areas (Aburto-Oropeza et al., 2011). That said, global interest generated through the creation of one of the largest MPAs in the world could be harnessed and form the centrepiece of a wider effort to market Ascension to visitors.

6.4 Potential future extractive activities

Whilst deep sea mining is still in its infancy, two licences for exploratory mining have now been granted in Papua New Guinea and Japan (Miller *et al*. 2018). The technology is still being developed with most exploratory licences backed by government funding and no truly commercial activity currently taking place. Knowledge of deep sea habitats and the potential impacts of deep sea mining remain scarce and there have been many calls, including from the World Bank, that the precautionary principle should be applied and no mining permitted until the consequences are understood.

An assessment of the natural capital present in Ascension's waters using the best available data is presented in Appendix 5. Globally the most valuable mineral deposits are associated with areas of high tectonic activity and hydrothermal vents, some of which do occur in Ascension's EEZ. However, the Mid-Atlantic Ridge close to Ascension is one of the slowest areas of spreading seafloor and vent fields are therefore smaller than in other regions. It is highly unlikely that manganese nodules, one of the resources attracting most commercial interest, are found in Ascension's waters. The very deep ocean and remote location also make Ascension's EEZ less attractive than other potential locations.

The Minerals Vesting Ordinance (1951) gives the Governor the power to grant licences for the exploitation of mineral reserves within the EEZ and all royalties associated with deep-sea mining would be the property of the Crown. To date, no comprehensiveassessment of deep sea mineral deposits has occurred in Ascension's waters. A request to carry out research/prospecting linked to the development of mineral exploitation techniques around Ascension Island was made by a company, 'Ascension Holdings Limited', in October 2016. This was refused by the Administrator on the grounds that marine management was under review. The large costs involved in survey work mean that prospecting activity would probably only be undertaken under an agreement that guaranteed exclusive future extraction rights if any economically-viable deposits are discovered.

6.5 Investment from charitable foundations and philanthropic donors

Marine conservation is a high profile issue and charitable donations to this cause totalled $1.9billion between 2010 and 2015, though most of this was given and spent in the USA (Packard Foundation, 2017). The challenge lies in converting this goodwill into sustained financial support for Ascension.

To date the Blue Marine Foundation have donated or directed £586,000 to Ascension. This has mainly funded scientific studies to inform the MPA designation process, but has also been used to repair island infrastructure such as the turtle ponds and provide equipment for the school. In written evidence submitted to the Environmental Audit Committee in October 2018, the Executive Director of the Blue Marine Foundation indicated that there was an 'overwhelming case' that designation of a 100% MPA would unlock money for Ascension Island (http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environmental-audit-committee/sustainable-seas/oral/91913.pdf).

Charitable donations are, however, inherently unpredictable. The Phoenix Island Protected Area Trust has addressed this by establishing an endowment fund capitalised by government and private donations. It aims to generate an annual income of $675,000 to fund not only management of the MPA but also provide core government funding to replace lost revenues from commercial fishing (http://phoenixislands.org/trust.php).

Financial instruments such as trust funds or endowments could provide a means by which the global interest and support generated at the point of MPA designation could be converted to a long-term funding mechanism. Blue Marine Foundation has proposed the establishment of an Ascension Trust Fund and identifed a private individual willing to donate £2million into the fund. The intention would be to use the investment yield to create an income for the island without drawing don the capital. Based on a return of 2.5-5%, this could generate a long-term income for Ascension of between £50,000 and £100,000 per year. This particular donation would be contingent on the entire EEZ being designated as a permanent MPA and restrictions could be attached to how the funds can be used.

6.6 Other activities

There are other potential activities and funding streams that could be established around Ascension's marine environment. Some of these have been successfully developed in other countries, but there are no guarantees that they would be appropriate for Ascension or that they would be dependent on any particular MPA option being chosen. Where possible, further information on these activities is provided in the appendices.

- **Carbon trading** – oceans act as a carbon sink and mechanisms are being developed whereby countries that agree to protect their marine environments can access climate change mitigation funding streams (Appendix 8).
- **Scientific expeditions –** Ascension could provide a convenient jumping off point for research into deep ocean ecosystems, global processes in the absence of land-based pressures and the effectiveness of oceanic MPAs. Scientific grant funding could be channelled into the island through income from visitors, possible vessel hire and research permit charges.
- **Film crews** – Ascension could also prove an attractive location for film makers wanting to explore relatively pristine oceans. Island income could be generated through visitor income and permit charges.
- **Volunteering** – there is a large international market for conservation volunteering opportunities. In some instances this is called 'voluntourism' as participants pay to take part and the output of the work is secondary to income generation. Such a model could be developed on Ascension if the costs of access were lower in the future.

7. Costs of management options

This section discusses the recommended baseline management strategies for the MPA options. The UK Government's commitment to close at least 50% of the EEZ to commercial fishing means that a fishery will never operate in isolation and so the costs are estimated based on a combined Fishery/MPA strategy where appropriate. Strategy costs have been estimated, where possible. For a more detailed description of these strategies and estimated costs, please see Appendix 10.

7.1 The general elements of both management strategies

Two key elements would be required to deliver a recommended baseline management strategy for both options: 1) effective compliance and enforcement (with dedicated staff) to regulate licensed

fishing, tackle IUU fishing and monitor the desired change in fishing activity; and 2) MPA management that ensures basic management activities, research and monitoring and review programmes.

a. Compliance and enforcement

Equally important for a licensed fishery and a MPA (as both will be at risk from IUU fishing), effective compliance and enforcement can be achieved through a combination of remote surveillance, enforcement activities, information management, investigations and appropriate enforcement response (including prosecutions). Ideally, a risk profile of IUU fishing activity is used to select the most appropriate combination or prioritisation of activities, using available intelligence to target specific areas during times of greatest risk.

b. General MPA management

General MPA management refers to all activities that would typically be involved in MPA management, such as research, habitat/species management, education, monitoring and review. In order to suggest the relative costs of managing different MPA options without any agreed management plan for any of the MPA options at present, we have considered that, as a bare minimum, MPA management staff would be needed to oversee and administer basic active management, research and monitoring programmes. As such, the key activities would be essentially the same for an MPA covering half or all of the Ascension Island EEZ, and therefore MPA size is not considered to affect cost estimates significantly.

A management plan will be prepared as part of the MPA designation. This will be based on best practice guidance for effective MPA management drawn from the experience of other large scale MPAs around the globe (Lewis et al., 2017). It will set out a more ambitious programme for how an Ascension MPA could be managed building on the Scientific Roadmap that led up to the designation and was supported by Blue Belt partners, NGOs and Universities. The costs involved in this could not be borne by the Ascension Island Government through current income streams and support from external partner organisations would be required to fulfill these aspirations for the world-class, active management of an MPA.

7.2 Recommended baseline strategies for Options 1 and 2

Recommended baseline management strategies and estimated costs are presented for both options.

a. Option 1: MPA and an active licensed fishery

If Ascension were to maintain a licensed fishery alongside an MPA, an effective compliance and enforcement strategy would be required both to ensure that licensed vessels comply with the regulations and that unlicensed vessels do not fish illegally in Ascension's EEZ. A recommended baseline strategy for Option 1 would involve the following compliance, enforcement and MPA management actions, and estimated costs:

i. Use satellite data to track fleet movements and IUU activity

Tracking fishing activities (licenced and IUU) would require satellite detection of VMS and AIS data (costing £19,028 per year) and SAR surveillance at areas and times of greatest IUU risk (at a minimum cost of £28,850 for 50% coverage of the EEZ per week).

ii. Use at-sea enforcement patrols to monitor the licensed fleet

For effective fisheries regulation and enforcement, it is essential to have some at-sea patrol capability to ensure the licensed fleet is compliant with the appropriate regulations. At least two chartered patrols per fishing season would be considered appropriate to monitor compliance and deter illegal fishing during the high risk months. Currently, AIG charter the *Extractor* at £72,625 for a

30 day patrol period (including transit time), and these figures are used as a minimum estimate (i.e. £145,250 for two patrols) but AIG have been informed that these costs will increase significantly in the future, or that *Extractor* may not be available. A more realistic cost for a single 30-day patrol (including transit time) would be £277,000, estimated using quotes for similar charters. A more precautionary estimate is therefore included using these quoted charter costs (i.e. £554,000 for two patrols). Additional patrol support would be required in the form of a dedicated on-board observer, and has been estimated, based on quotes received by AIG, at £35,000 per person per fishing season.

iii. Establish an effective day-to-day compliance and enforcement programme

Adequate regulation of the fishery should include processes for investigating rule-breaking, managing intelligence data, bringing local prosecutions and reviewing and amending legislation. Non-staff time costs involve legal fees for solicitors and court time (estimated at £15,000) and training fees for intelligence management and the principles of compliance and enforcement (estimated at £300).

iv. Provide sufficient, trained staff resources for compliance and enforcement

Dedicated staff would be needed to manage the satellite and intelligence data system and carry out investigations, as well as administer the licences, engage with industry, plan and undertake patrols, adhere to ICCAT regulations and undertake regular training. At least one dedicated staff member per year would be recommended (at an estimated cost of £30,000 including benefits) based on the assumption that this represents a renewal of an existing staff contract. However, a more precautionary estimate includes freight costs (estimated at £2,000 per person), in the event that a new staff member must be hired and relocated to Ascension. Additionally, 10% of AIG Crown Counsel's time would be recommended for all legal aspects (estimated at £5,000).

v. Provide sufficient, trained staff resources for general MPA management

At least one full-time equivalent MPA manager would be needed for oversight, coordination, administration and regular management plan revisions. An estimated cost is £50,000, assuming an existing contract renewal but a more precautionary estimate includes freight costs (at 2,000 per person).

vi. Ensure basic training in MPA management

A small budget would be recommended for online training (estimated at £500) to support MPA manager/s in their daily functions

These estimated costs are summarised, and compared with estimates for Option 2, in section 7.3 below.

b. Option 2: a 100% MPA

If an MPA was designated that prohibited commercial fishing throughout its EEZ, the necessary compliance and enforcement strategy would not need to include any fisheries regulation activities and would only be concerned with addressing IUU risk across the EEZ. This same strategy would also be applied during the fishery closure period if an MPA was designated covering 50% of the EEZ and the fishery in the remaining 50% was put into a temporary period of dormancy. The recommended strategy is outlined below, with associated costs.

i. Focus upon satellite data for tracking IUU activity without at-sea enforcement capacity

Without the need to board and inspect licensed fishing vessels, the value of having a patrol vessel for addressing IUU alone is reduced. Focusing more upon satellite data analysis involving AIS (£19,028) and SAR (£28,850) and any other satellite-based intelligence data as the surveillance method would be the most cost-effective option.

ii. Establish an effective day-to-day compliance and enforcement programme

In an EEZ-wide MPA, activities would involve investigating IUU, managing intelligence data, and training. However, without the presence of a patrol vessel, IUU investigations would not involve local prosecutions but would be done through the ICCAT Compliance Committee or by "black listing" the vessel. This approach has no associated cost. With the exception of a small training budget (estimated at £200), all other costs here would be staff-time.

iii. Provide sufficient staff resources for compliance and enforcement

- Dedicated staff would be needed to manage the satellite and intelligence data system and carry out investigations where necessary. At least one dedicated staff member, working 50% of the time, would be needed (at an estimated cost of £15,000), but a more precautionary estimate includes freight costs (£2,000) should a new staff member be required. Additionally, 5% of AIG Crown Counsel's time (£2,500) would be recommended to deal with all legal issues.

iv. Provide sufficient staff resources for general MPA management

One full-time equivalent MPA manager per year (£50,000 including benefits) would be required, based upon renewal of existing contracts. A more precautionary estimate includes freight costs (£2,000).

7.3 Breakdown and comparison of costs for both options

Table 3. presents a break-down of costs for Options 1 and 2.

Table 3. Breakdown of estimated costs for Options 1 & 2

Elements	**Option 1:** MPA and active fishery	**Option 2:**100% MPA
AIS / VMS system	19,028	19,028
Satellite surveillance (SAR)	28,850	28,850
At sea enforcement (current) (using charter quotes)	(minimum) 215,250 (precautionary) 624,000	-
Training	300	200
Investigative costs	5,000	-
Legal support for legislation review	10,000	-
Staff costs for C&E (including freight)	(minimum) 35,000 (precautionary) 37,000	(minimum) 17,500 (precautionary) 19,500
Staff costs for general MPA mgmt (including freight)	(minimum) 50,000 (precautionary) 52,000	(minimum) 50,000 (precautionary) 52,000
Training	500	500
TOTAL	**(minimum) 363,928 (precautionary) 776,678**	**(minimum) 116,078 (precautionary) 120,078**

The option for an MPA covering 50% of the EEZ and a temporary dormant fishery in the remaining 50% would have the same estimated cost as Option 2 (£116,078 minimum per year) during the period when the fishery is closed, and the same estimated cost as Option 1 (£363,928 minimum) when the fishery is open.

The dormant fishery option would incur the additional cost of engaging a consultant to assess the economic viability of the fishery towards the end of each dormancy period. The total cost of this would depend on the length of the dormancy period (whether the assessment had to be made every five or ten years) and the level of risk AIG were prepared to carry when deciding to reopen the

fishery – a more in depth assessment would be more expensive but reduce the chance of reopening the fishery when it would not be viable. Indicative costs would be £5,000-20,000 for each assessment.

Of the £363,928 estimated minimum cost for managing an active fishery, £116,078 would need to be spent on enforcement whether the fishery was dormant or not. A further £252,250 is linked to the cost of chartering a patrol vessel contracting fishery observers and staff costs for managing a fishery. These contracts would need to be in place before the fishery reopened and so the costs would be incurred before licence sale income was known.

7.4 Important points to note

When considering these cost estimates, it is important to note:

- The recommended baseline management strategies represent the bare minimum required to manage either option, as MPA management activities are currently not known and could not be included in the assessment. An ideal strategy would address the agreed objectives of the MPA once they are known, through the identification of targeted management activities and associated monitoring, and these would have additional cost implications.
- These costs are minimum estimates and would be affected by changes in market forces (e.g. charter costs), unknown circumstances (e.g. investigative costs), IUU risk levels or available resources.
- Effective compliance and enforcement programmes typically use available budgets to prioritise surveillance and enforcement activities (so long as risks are adequately addressed), and recommended strategies would be expected to change once available funds were confirmed.
- Some existing costs have been included where external funds will cease to cover them (i.e. existing contracts requiring renewal), but others have not, where they are currently covered by AIG and will remain so (e.g. maintaining and running buildings).
- The costs of compliance and enforcement are currently not being met from AIG's core budget and, in the absence of a commercially-viable fishery, alternative income streams would be needed to cover the estimated costs for either MPA Option (section 8).

8. MPA options

This section evaluates potential scenarios for an MPA in Ascension's waters to allow a comparison between different options based on their biodiversity, economic and social costs and benefits. The UK Government has made a clear commitment to close at least 50% of Ascension's EEZ to commercial fishing by 2019 and so all options considered include this as a minimum.

8.1 Option development

The many possibilities for an MPA around Ascension can be narrowed down to a manageable number of options by considering constraints on its size, shape, permitted activities and timescales.

a. Size: The UK Government's commitment to close at least 50% of Ascension's EEZ to commercial fishing sets a lower limit of 221,761km^2 for an MPA. The maximum size of an MPA is the 443,523km^2 extent of Ascension's EEZ. In theory any size of MPA between these two points is possible. However, fishing licence sales are low under the current 50% closure and it is unlikely any viable fishery could operate in a smaller proportion of the EEZ. Therefore, designating 60%, 70% or 80% of the EEZ as an MPA would limit the biodiversity gains relative to 100%, but provide no economic benefit from

fisheries income. For this reason, only an MPA covering either 50% or 100% of the EEZ is considered further.

b. Shape and location: The standard approach to designing an MPA is to map the extent of seabed habitats and the distribution of species that have high conservation value, then draw a line around these as a starting point for the MPA boundary. This approach does not work well on Ascension since beyond the seamounts and the continental shelf there is little connection between the seabed and many of the species of conservation concern; instead the distributions of fish, seabirds and turtles are determined by shifting currents and upwellings (section 3). It is impossible to draw a line around a dynamic current system and it is also the case that many of the species studied range widely outside of Ascension's EEZ for at least part of their life cycle.

A different approach to designing an evidenced-based MPA is required on Ascension. The data collected on the distribution of fish, seabirds and turtles have been used to identify any consistent areas of heavy usage as high priorities for protection and a starting point for any MPA (Figure 12). Beyond these areas it can be assumed that the larger the area protected, the greater the benefit to biodiversity, but all parts of the EEZ are equally valuable from a biodiversity point of view. For Option 1 (an MPA covering 50% of the EEZ with a commercial fishery in the remainder) the coastal shelf, seamounts and turtle migration route would be included in an MPA, but the final shape would also be designed to make the remaining part of the EEZ open to commercial fishing as attractive to vessels as possible in order to maximise the likelihood of a viable fishery. This has would be achieved by:

- Making the area open to fishing one single large block. The fishing lines set by commercial tuna vessels are on average 61km long and so it is not possible to fish in small areas
- Including the areas of historical highest fishing effort within the open area as these are presumably where most fish are caught.

The final configuration of the 50% option will be determined by detailed spatial analysis of species tracking data using computer software that creates optimal protected area designs (Appendix 3). However, when ease of enforcement is also taken into account, the 50% MPA option will likely resemble the area currently closed to commercial fishing.

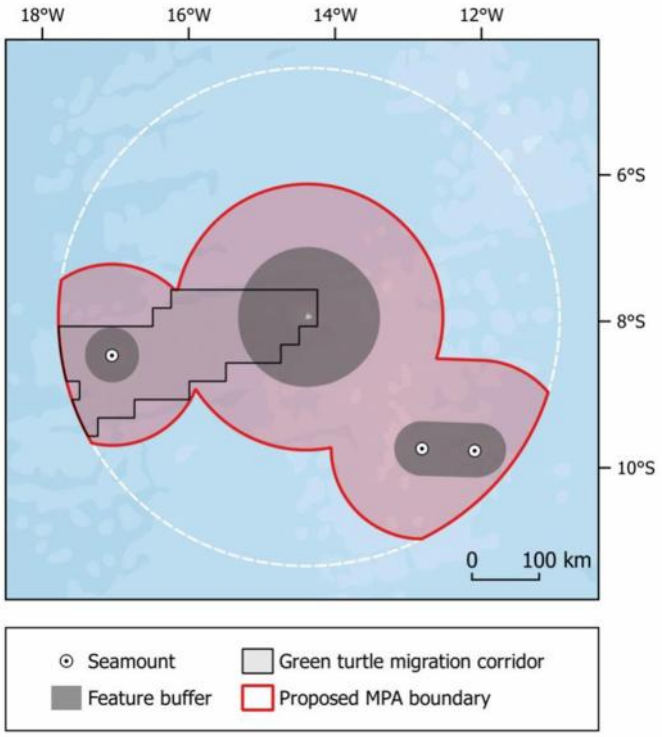


Figure 12. Map showing areas of greatest biodiversity interest within the EEZ – buffer areas around Ascension Island and the three seamounts (shown in grey) in addition to the green turtle migration corridor (outlined in black). The red line shows what an MPA would look like if the buffer areas were expanded to cover 50% of the EEZ. However, there is little scientific justification for extending the boundaries like this and the resultant area open to fishing would be logistically difficult to fish and hard to patrol and enforce so this option is not considered further.

c. Permitted activities:

There are many variations of MPA depending on what activities are permitted within the designated area. The only two activities proposed to be restricted within an Ascension MPA are commercial longline fishing and mineral extraction, noting that all other forms of commercial fishing are already restricted within Ascension's EEZ. This leads to two obvious options: an MPA covering 50% of the EEZ (Option 1) and an MPA covering 100% of the EEZ (Option 2), with no commercial fishing or mineral extraction allowed in the designated area of either.

There is technically another option. The UK Government's commitment requires that 50% of the EEZ is closed to commercial fishing and so it would be possible to designate an MPA covering 100% of the EEZ, with commercial longline fishing still permitted in half of it. Policy-makers, scientists and stakeholders often have differing views about the place of commercial fisheries within MPAs (Agardy et al., 2003; Costello & Ballantine, 2015; Ruiz-Frau et al., 2015; Sciberras et al., 2015; Everson, 2017). There are many MPAs around the world where commercial fishing is permitted in some form, and that may be appropriate and compatible with the MPA's conservation objectives in those locations. However, in the particular case of Ascension where no other current activities would be restricted as part of the MPA designation, inclusion of an area open to the same commercial fishing as at present within an MPA would invite criticism that the designation has brought about no change in management.

Any commercial fishing activity around Ascension would need to achieve a high standard of sustainability, environmental impact mitigation and effective management to ensure it was compatible with the conservation objectives of an MPA. Ascension would face considerable challenges in meeting these standards since Ascension has control over only a limited part of the target fishery's range and the Atlantic bigeye tuna and blue marlin stocks are both currently considered to be overfished (ICCAT 2015). It would not be possible to set sustainable quotas just for Ascension's waters and insisting on adherence to ICCAT quotas and regulations would be insufficient to ensure sustainability in Ascension's EEZ as the ICCAT regulations are designed to manage an Atlantic-wide fishery and not to meet the conservation objectives of an Ascension MPA.

The practical difference between this and Option 1 is that the fished area would be labelled as an MPA. Management costs for this option would be at least as high as for Option 1 and predictions of future licence sales are also likely to be similar to Option 1 since the MPA designation could not deliver a premium price for the fish and so stimulate higher demand for licences without a huge investment in traceability. The fishery is therefore predicted to run at a considerable financial loss as estimated for Option 1. Designating the entire EEZ as an MPA but allowing commercial fishing in 50% also may not attract the philanthropic funding discussed in section 6.5.

In short, this option would have at least the same management costs as Option 1, potentially not attract the potential philanthropic support of Option 2 and would be open to criticism. For these reasons this option is not considered further.

d. Time-Limited Options:
Two time-limited options were considered:

Option 1a - Dormant fishery: This would entail designating the southern 50% of the EEZ and the area around the island as an MPA, with the commercial fishery in the northern 50% put into a dormant state for a period of five to 10 years before being reviewed and potentially reopened to commercial activity.

Although in the short term there may be some associated benefit to the biodiversity protected in the adjacent MPA from a temporary closure of the fishery, given the current assessment of fish stocks and the lack of connected MPAs in the south Atlantic, a short term cessation of fishing effort would likely prove negligible.

The main benefit of this approach is that it would avoid the costs of managing a fishery at a time when it is unprofitable, but would allow for the resumption of the fishery should the fishery once again become profitable through increased licence sales. It would also enable mineral extraction and any other activities that would be deemed incompatible with the conservation objectives of an MPA to take place in the northern part of the EEZ. Management costs would be the same as for a 100% MPA while the fishery is dormant, though there would be additional costs associated with monitoring and analysis of the fishery to inform an assessment at the end of the dormancy period of whether the fishery would be profitable.

The decision on whether to resume the fishery after the dormancy would need to be made with no recent data on licence sales to act as a predictor of future revenues. The funding received through the Blue Belt has allowed Ascension to try operating a well-regulated fishery in approximately 50% of the EEZ following the 2015 review of management, and to collect three years' data on the actual income and expenditure related to the fishery without any financial risk to the island. Ascension is unlikely to be in such a data-rich position again, particularly if the costs of the review process and financial responsibility for a reopened fishery have to be met by core Ascension Island Government budgets, making future decisions much harder. Management measures (such as the patrol vessel charter and fishery observers) need to be arranged and paid for in advance and are estimated to cost a minimum of £252,250. It will be difficult to predict with certainty the number of licences that will be sold and AIG would incur the financial loss if the fishery is reopened but the critical number of licence sales required to break even is not reached.

The most likely causes for low licence demand are the deterrent effect of tighter regulations within Ascension's EEZ and the overall state of the Atlantic bigeye tuna stock. The closure of 50% of the EEZ to commercial fishing and the licence conditions requiring higher standards of vessel safety and

catch reporting introduced in 2015 cannot be reversed. Therefore, the return to a profitable fishery would be reliant on a recovery in the bigeye tuna stock and/or changing economics of the fishery.

The analysis presented in Appendix 7 suggests that global factors underlying the decline in the Atlantic longline tuna fleet are unlikely to reverse in the short to medium term. The ICCAT Standing Committee on Research and Statistics stated in July 2018 that at current catch levels there is a 1% probability that the bigeye tuna stock will recover by 2033. ICCAT did not agree any reduction in catch at the subsequent meeting in November 2018 suggesting stock recovery may be decades away. Sustainable catch levels for Atlantic bigeye tuna are estimated to be 85,000 tonnes per year (ICCAT 2017). Current catch levels are 78,000 tonnes per year. Without a substantial shift from purse seine to longline cacthes (which is very unlikely given the strong support for the purse seine fleet from the influential Spanish delegation at ICCAT) there is little headroom to increase catches above their current level and remain within sustainable limits even if stock recovery is achieved.

It is possible that other forms of fishery will develop in the Atlantic over future decades and create a new model that could be profitable on Ascension. To date, longline fishing by foreign flagged states is the only model that has ever been profitable on Ascension. The high costs of utilities, construction and shipping coupled with the lack of property rights mean an indigenous fishery or processing capability are never likely to be economically viable on the island.

Any benefits to Ascension from designating a 100% MPA might be lost if the dormant fishery option was chosen. Blue Marine Foundation have indicated that a private donor is willing to donate £2million into a Conservation Trust Fund if a permanent MPA covering 100% of the EEZ is designated. This would be used to generate an annual income for the island without drawing down the capital. Time limited options would not be eligible for this donation.

Option 2a – Time-limited MPA: Designating the entire EEZ as an MPA with a prohibition on commercial fishing, 50% of which is time-limited and subject to review.

This would entail designating a permanent MPA in the southern 50% of the EEZ, with the northern 50%, designated as an MPA for a set period of time before the designation is then reviewed. This would avoid the costs of managing a fishery at a time when it is unprofitable, but allow for the resumption of the fishery if the economic situation changes.

However, an MPA is designated primarily for the benefit of the biodiversity present within the MPA. As such, a time-limited option would only be appropriate if the conservation objectives for the site could be achieved within the time period. In the case of Ascension there is no indication that the evidence-base for designating an MPA described in this document would alter over short time periods or differs between the northern and southern sections of the EEZ, meaning there is little evidence to suggest the objectives arrived at for an MPA could be met within such time. Therefore there would be very little scientific justification for time-limiting the designation.

MPAs are designated based on scientific principles of sustainable use, protection and conservation of marine biodiversity (OSPAR, 2003). In re-establishing human activity (such as commercial fishing) that adversely affects biodiversity, the premise of the designation and its ecological coherence are contradicted.

The difference between this option and Option 1a described above is that the dormant fishery in the northern area would be called an MPA. This would only result in an economic gain if any increased donor support and goodwill that might result from a 100% MPA compared to a 50% one also applies if part of the designation is not permanent. Given the criticism of other time-limited MPAs (Brooks et al. 2016; Nicol & Day 2017) this may not be the case.

e.Withdrawal of all management

Any form of management of the EEZ will incur some financial cost. Withdrawing all management in Ascension's waters would avoid this cost and at the request of the Ascension Island Council this course of action was explored further as Option 3. The following summary describes some of the consequences of this approach.

Ascension has a responsibility to manage its EEZ. Not addressing illegal fishing would almost certainly be in contravention or contradiction of the goals and actions of various international conventions to combat it (UN's Convention on the Laws of the Sea; Straddling Fish Stocks Agreement; UN's Sustainable Development Goal 14.4; and UN's International Plan of Action for combating IUU fishing), as well as the ICCAT obligations placed on Coastal States to protect stocks.

Across the world standards of marine stewardship are gradually increasing and withdrawing all compliance and enforcement activity would open Ascension to international criticism and put it alongside the worst performing states for environmental protection. Adopting this course of action is highly likely to limit support from current and potential partner organisations and undermine any attempt to position Ascension as a global leader in marine conservation and environmental sustainability.

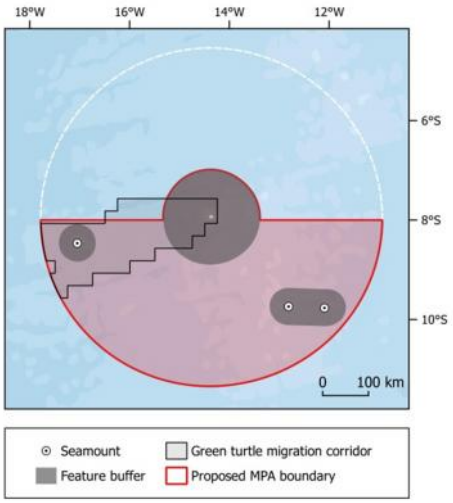
At present compliance with fishing restrictions around Ascension's EEZ appear to be good (Appendix 10). The absence of any compliance and enforcement activity could, however, lead to much higher levels of IUU activity along with permanent damage to target fish stocks and non-target bycatch species.

For these reasons a 'no management' option is not considered as a credible option for Ascension's EEZ

8.3 Option Summaries

As a result of the discussion above, three alternatives for an Ascension MPA were considered viable options. These are summarised and compared below.

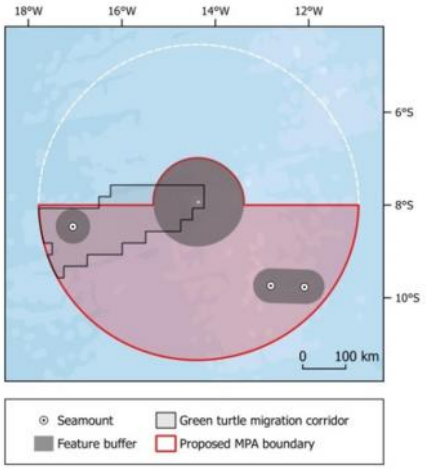
Option 1 – 50% MPA

Description	Indicative map of 50% MPA option
• MPA covers 221 761km^2 • MPA encompasses approximately 50% of EEZ, including areas of highest biodiversity around island and seamounts, and is closed to commercial fishing. • Approximately 50% of EEZ remains open to longline tuna fishery through a licence system, including the northern area most attractive to vessels. • Mineral extraction prohibited within the 50% of the EEZ included in MPA. • Recreational and sportsfishing permitted in the EEZ including the MPA. • Shape of MPA designed to cover areas of highest biodiversity value, but final shape will be determined by further spatial analysis.	

Evaluation

	**Biodiversity:** Areas of highest biodiversity value (coastal shelf, seamounts and green turtle migration corridor) are included in the MPA and protected from commercial fishing and potential mineral extraction. Pelagic fish, seabirds and turtles still vulnerable to direct and indirect mortality from commercial fishery in part of EEZ.
	**Commercial Fishery:** Area opened to commercial fishery designed to maximise likelihood of licence sales and minimise compliance costs by being a contiguous area in the northern part of the EEZ. Licence sales predicted to be between one and two per year based on past experience and current state of Atlantic tuna fleet.
	**Sportsfishing:** No restrictions on sportsfishing as part of MPA designation. Inshore fisheries management system developed separately through local advisory committee could introduce licensing and restrictions on sportsfishing such as catch and release and minimum landing sizes.
	**Recreational fishing:** No restrictions on recreational fishing in any part of the MPA. Inshore fisheries management system developed separately through local advisory committee could eventually be incorporated into MPA management plan. Very small potential benefit to recreational fishery from 'spillover' effect due to closure of commercial fishery.
	**Tourism:** MPA designation provides global publicity to market Ascension as tourist destination. MPA results in increase in prospective tourist numbers and opportunity to levy entry fee (subject to improved access).
	**Mineral extraction:** No future mineral extraction is permitted in MPA, but any applications to extract minerals in the remaining 50% of the EEZ could be considered on a case-by-case basis by AIG.
	**Economics: Costs** - surveillance and compliance and MPA management costs estimated at a minimum of £363,928 per annum with potential further partner support to deliver management plan **Income:** Commercial fishing licences generate £20,000 to 40,000. Moderate potential to increase marketing and attract premium to sportsfishing and tourist income as a result of MPA. Some potential to develop links with philanthropic organisations and research institutions and benefit from future carbon trading schemes.
	**Global reputation:** Ascension MPA becomes the 22nd largest in the world. Meets UK Government's Blue Belt commitment. UK NGOs potentially disappointed by scale of MPA.

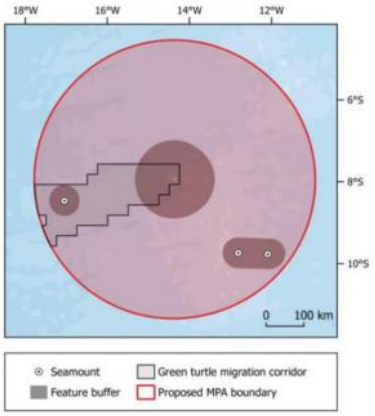
Option 1a – 50% MPA, 50% dormant fishery

Description	Indicative map of 50% MPA option
• MPA covers 221 761km^2 • MPA encompasses approximately 50% of EEZ, including areas of highest biodiversity around island and seamounts, and is closed to commercial fishing. • Approximately 50% of EEZ is classed as a fishery but this is put into a state of temporary dormancy with no licences sold and no active management of the fishery. • Management of the fishery area will be similar to that of the MPA during the dormant period. • The decision to reopen the fishery will be reviewed every five years. • Mineral extraction prohibited within the 50% of the EEZ included in MPA. • Recreational and sportsfishing permitted in the EEZ including the MPA.	

Evaluation

	**Biodiversity:** Areas of highest biodiversity value (coastal shelf, seamounts and green turtle migration corridor) are included in the MPA and protected from commercial fishing and potential mineral extraction. Pelagic fish, seabirds and turtles protected from fishing pressure in the fishery part of the EEZ during dormant period but still vulnerable to direct and indirect mortality if the fishery resumes.
	**Commercial Fishery:** Area opened to commercial fishery designed to maximise likelihood of licence sales and minimise compliance costs by being a contiguous area in the northern part of the EEZ. No licences sold during dormant period. Assessment of predicted demand for licences and management cost made at end of dormant period to decide whether to resume licence sales. Trends suggest fishery will not be profitable for at least the next decade and no evidence the fishery will ever be profitable if catches are kept within sustainable levels and licence conditions on safety standards maintained. Current licence sales of 0-2 per annum. Minimum 19 licences need to be sold to break even.
	**Sportsfishing:** No restrictions on sportsfishing as part of MPA designation. Inshore fisheries management system developed separately through local advisory committee could introduce licensing and restrictions on sportsfishing such as catch and release and minimum landing sizes.
	**Recreational fishing:** No restrictions on recreational fishing in any part of the MPA. Inshore fisheries management system developed separately through local advisory committee could eventually be incorporated into MPA management plan. Very small potential benefit to recreational fishery from 'spillover' effect due to closure of commercial fishery.
	**Tourism:** MPA designation provides global publicity to market Ascension as tourist destination. MPA results in increase in prospective tourist numbers and opportunity to levy entry fee (subject to improved access).
	**Mineral extraction:** No future mineral extraction is permitted in MPA, but any applications to extract minerals in the remaining 50% of the EEZ could be considered on a case-by-case basis by AIG.
	**Economics: Costs** - surveillance and compliance and MPA management costs estimated at a minimum of £116,078 per annum during the dormant period. Cost of assessing fishery potential estimated to be £5-20,000 in each 5 year review period. Management costs if the fishery reopens estimated to be a minimum of £363,928 per annum. £252,250 of fishery management costs need to be committed before licence revenue is known if the fishery is reopened. **Income:** No licence sale income during dormancy period. 19 licence sales need to be sold per year to break even if the fishery is resumed assuming minimum estimates for management costs. Moderate potential to increase marketing and attract premium to sportsfishing and tourist income as a result of MPA. Some potential to develop links with philanthropic organisations and research institutions and benefit from future carbon trading schemes.
	**Global reputation:** Ascension MPA becomes the 22nd largest in the world. Meets UK Government's Blue Belt commitment. UK NGOs potentially disappointed by scale of MPA.

Option 2 – 100% MPA

Description	Map of the 100% MPA option
• MPA covers 441,658km^2 • MPA encompasses 100% of EEZ and prohibits commercial fishing. • Mineral extraction prohibited throughout the EEZ. • Recreational and sportsfishing permitted in the MPA.	

Evaluation

	**Biodiversity:** Maximum protection to biodiversity achievable by Ascension. Entirety of territorial waters including areas of highest biodiversity value (coastal shelf, seamounts and green turtle migration corridor) and areas of deep sea and pelagic habitats included in the MPA and protected from commercial fishing and potential mineral extraction. Pelagic fish, seabirds and turtles no longer vulnerable to direct and indirect mortality from commercial fishery within the EEZ.
	**Commercial Fishery:** Ascension's EEZ is permanently closed to commercial fishing and licences are no longer issued or sold. Longline fishing for tuna will continue outside of the EEZ. Compliance and enforcement activity will need to be undertaken to ensure the risk of illegal, unregulated and unreported fishing to the MPA is addressed.
	**Sportsfishing:** No restrictions on sportsfishing as part of the MPA designation. Inshore fisheries management system developed separately through local advisory committee could introduce licensing and restrictions on sportsfishing such as catch and release and minimum landing sizes. Marketing benefit due to closure of commercial fishery.
	**Recreational fishing:** No restrictions on recreational fishing in any part of the MPA. Inshore fisheries management system developed separately through local advisory committee could eventually be incorporated into MPA management plan. Very small potential benefit to recreational fishery from 'spillover' effect due to closure of commercial fishery.
	**Tourism:** MPA designation provides global publicity to market Ascension as tourist destination. MPA potentially results in increase in prospective tourist numbers and opportunity to levy entry fee (subject to improved access).
	**Mineral extraction:** No future mineral extraction in permitted in Ascension's EEZ.
	**Economics: Costs** - surveillance and compliance and MPA management costs estimated at £116,078 per annum with potential further partner support to deliver management plan **Income:** No income from commercial fishing licences. Potential to increase marketing and receive premium to sportsfishing and tourist income as a result of MPA is maximised. Fully exploit potential to develop links with philanthropic organisations and research institutions and benefit from future carbon trading schemes. Possibility Ascension MPA trust could be established and capitalised by public and private donations.
	**Global reputation:** Ascension MPA becomes 16th largest in the world. Exceeds UK Government's Blue Belt commitment and meets the aspirations of UK and international NGOs. Potential for publicity is maximised.

8.4 Comparison of Options

Criterion	Option 1 - MPA covers 50% of EEZ. Commercial fishery in remaining 50%	Option 1a - MPA covers 50% of EEZ. Dormant commercial fishery in remaining 50%	Option 2 - MPA covers 100% of EEZ	Option 2a - MPA covers 100% of EEZ, 50% of which is time-limited	Option 3 - Withdrawal of all management of EEZ
Biodiversity					
Area of MPA	221,761km^2	221,761km^2	441,658km^2	221,761km^2 permanently plus 219,897km^2 for limited time period	0km^2
Biodiversity protection	Highest value areas protected	Highest value areas protected	Maximum achievable by Ascension	Highest value areas protected. Rest of EEZ protected in short-term	None
Risk of bycatch	Low in EEZ	None in EEZ in short term although risk displaced for some species	None in EEZ although risk displaced for some species	None in EEZ in short term although risk displaced for some species	Medium, unreported and unregulated
Risk of IUU fishing	Medium	Medium	Medium	Medium	High
Attractiveness to scientific researchers	Medium	Medium/High	High	Medium	Low
Economic					
Income from commercial fishing	Low. Estimated <£40,000 per annum	None in short term. Only reopen fishery if income predicted to exceed management costs	None	None in short term. Only reopen fishery if income predicted to exceed management costs	None
Cost of management (compliance, enforcement and general MPA management)	Estimated £363,928 per annum	Estimated £116,078 per annum in short term plus £5-20,000 cost of fishery assessment. £363,928 per annum if fishery resumes	Estimated £116,078 per annum	Estimated £116,078 per annum in short term plus cost of fishery assessment. £363,928 per annum if fishery resumes	£0
Likely charitable donations	Medium	Low/Medium	High. Proposed Trust fund could generate £50,000 to £100,000 per year	Low/Medium	Low
Political/reputational					
Meets Blue Belt commitment	Yes	Yes	Exceeds commitment	Yes	No
Predicted response from NGOs	Disappointment and continued lobbying	Disappointment and continued lobbying	Support	Disappointment and continued lobbying	Alarm and increased lobbying
World ranking (MPAs by area)	22nd	22nd	16th	22nd (time-limited area unlikely to be accepted as an MPA	N/A

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Appendix 3: Tracking of marine species

Appendix 4: Current marine management and legislative framework

Appendix 5: Ascension Island Natural Capital Assessment

Appendix 6: Bycatch threat to marine vertebrates in the commercial tuna longline fishery

Appendix 7: An economic assessment of the Ascension Island tuna longline fishery

Appendix 8: Carbon trading

Appendix 9: Analysis of historical Ascension tourist entry permit data

Appendix 10: Marine management strategies and costs for Ascension Island

Appendix 11: Responses of Ascension Island Councillors to the first draft of the Evidence and Options document

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