An ‘Ascension Island Ocean Sanctuary’: An Initial Review of Options for Surveillance and Enforcement

A report for
the Centre for Environment, Fisheries & Aquaculture Science,
the Ascension Island Government,
& the UK Foreign & Commonwealth Office

The Royal Society for the Protection of Birds

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Acronyms

AIFSC	Ascension Island Fishing and Spearfishing Charters
AIG	Ascension Island Government
AIS	Automatic Identification System
CECAF	Fishery Committee for the Eastern Central Atlantic
CEFAS	Centre for Environment, Fisheries, and Aquaculture Science
EEZ	Exclusive Economic Zone
EFZ	Exclusive Fishing Zone
EUOCT	European Union Overseas Countries and Territories
FAO	Food and Agriculture Organisation
FCO	Foreign and Commonwealth Office
ICCAT	International Commission for the Conservation of Atlantic Tunas
IUCN	International Union for the Conservation of Nature
IUU	Illegal, Unreported and Unregulated fishing
MCS	Monitoring, Control and Surveillance
MoD	Ministry of Defence
MPA	Marine Protected Area
NMIC	National Maritime Information Centre
NSMS	The UK National Strategy for Maritime Security
OTs	Overseas Territories (of the United Kingdom)
PNMN	Papahānaumokuākea Marine National Monument
PSSA	Particularly Sensitive Sea Area
RAPPICC	Regional Anti-Piracy Prosecution and Intelligence Coordination Centre
REFLECS	Regional Fusion and Law Enforcement Centre for Safety and Security at Sea
RFMO	Regional Fisheries Management Organisation
RN	Royal Navy
RSPB	Royal Society for the Protection of Birds
SEAFO	South East Atlantic Fisheries Organisation
VMS	Vessel Monitoring System

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Executive Summary

Ascension's waters are vast and remote, but they benefit from infrastructure not available at many other Overseas Territories (OTs), namely an airport and visits by Ministry of Defence (MoD) and Royal Navy (RN) vessels.

The National Maritime Information Centre (NMIC) is already gathering data on maritime activity across the OTs. However, for the UK to build awareness of its leadership on maritime security issues across the OTs, NMIC should establish an Office for OTs Maritime Security.

A Marine Protected Area (MPA) can be declared immediately using Ascension's pre-existing legislation. However, effective enforcement requires the legislation to be strengthened in some areas.

Monitoring and enforcing a large-scale marine reserve encompassing all but the inshore 5nm of Ascension's waters could be done for around £400,000 per annum. This includes:

- Vessel Monitoring System - <£40k pa;
- Automatic Identification System - <£5k pa;
- Patrol vessel charter – £300k pa (average cost - likely to vary significantly each year);
- Historical satellite information – cost unknown, some may be free.

These costs could be borne through several options, none of which would be available to support the costs of monitoring and enforcement of a commercial fishery. These include:

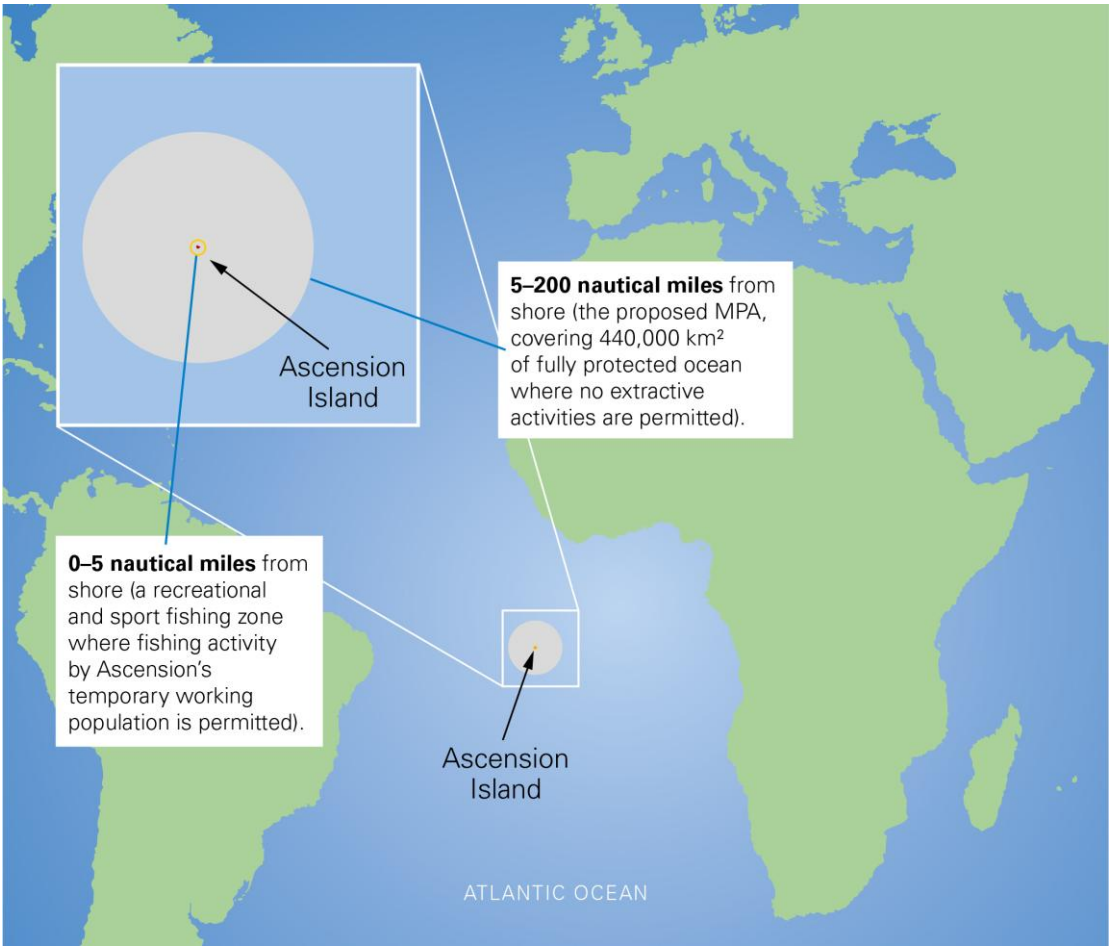
- Introducing fees for the sports fishery at Ascension;
- Partnerships with wealthy individuals or foundations (as per the Chagos MPA);
- Agreements with scientific institutions for research access.

The costs of monitoring and enforcing a sustainable commercial fishery at Ascension are hard to quantify, but would be higher than those for a marine reserve given the further

requirements for scientific surveys, observer coverage, and the increased complexity of assessing infractions.

As the costs of a fishery will be significantly more than £400k per annum, and the income averaged at only £700k per annum between 2010-2013, it is likely that a sustainable commercial fishery at Ascension would be economically marginal, or even loss-making.

Map showing the proposed ‘Ascension Island Ocean Sanctuary’:



1. Overview

The Ascension Island Government (AIG) has commissioned a review of the potential options for a commercial fishery in Ascension's waters. As part of this review, the feasibility of establishing a Marine Protected Area (MPA) as an alternative means of managing Ascension's marine environment will be considered. The RSPB believes that the creation of a large scale, fully protected MPA extending from five miles offshore to the full extent of Ascension's Exclusive Fishing Zone (EFZ) – an area of over 440,000 km^2 - represents the best opportunity to protect the biodiversity of Ascension's waters and contribute to the conservation of the pelagic ecosystem of the tropical Atlantic. This position has been reached having taken account of:

- Achieving the best outcome for the conservation of marine biodiversity and ecosystems;
- Contributing to meeting globally agreed targets for ocean conservation;
- Meeting the wishes of contractors working on Ascension Island to continue with sustainable recreational and sports fishing in the near shore area; and
- Achieving all the above in the most cost-effective manner.

In this paper we present information on how a large, fully protected MPA in Ascension Island's waters could effectively be monitored and enforced at minimal cost, and likely at less cost than a sustainable commercial fishery. We will first give an account of measures that are relevant to, and would enhance, monitoring and enforcement of all the OTs' marine areas, because all OTs share some challenges that could be most effectively and cheaply dealt with centrally by the UK. We will then move on to look at options that are specific to Ascension Island and its particular situation.

2. Issues and measures relevant to all UK Overseas Territories

2.1 The importance of maritime security in the UK Overseas Territories

Despite some recent successes, the outlook for our oceans remains bleak. Poor management of fisheries and marine biodiversity remains the norm, with a report this year by the United Nations Food and Agriculture Organisation (FAO) concluding that 90 percent of world fish populations are fully fished or overfished[i]. In fact, based on the latest available analysis, not a single nation has managed to achieve the status of "good" management, as per the standards set by the FAO Code of Conduct for Responsible Fisheries, with 60 percent of nations failing the assessment[ii,iii]. The 2013 report from the International Programme on the State of the Ocean and the IUCN (International Union for the Conservation of Nature) found that overall, risks to oceans *"have been significantly underestimated and that the whole of marine degradation is greater than the sum of its parts and is now happening at a much faster rate than predicted previously"*. Overfishing was highlighted as one of the crucial factors that is increasingly undermining the ocean's ability to act as a "buffer" against the worst impacts of climate change[iv].

While inadequate management is one concern, illegal, unreported and unregulated fishing (IUU) is also a major threat to the sustainability of the world's fisheries and health of our oceans. Some sources suggest that IUU fishing accounts for up to $23.5 billion in lost income worldwide and up to 20 percent of all wild fish catches globally[v]. Continued IUU fishing at this level will result in the overexploitation of target species, as well as negative impacts on other species (caught as bycatch or affected by changes in food webs).

The fragility of the global marine environment was recognised in the Ministry of Defence's 2010 Global Strategic Trends report, which further stated that over the next 30 years *"... local and regional shortages [of natural resources]* will *occur, increasing the likelihood of societal instability and of disagreement between states, and providing the triggers that* may

ignite conflict"[vi]. Concerns over dwindling resources and illegal maritime activity are now giving rise to increased global appetite to improve enablers (surveillance, law, ability to respond etc) of our maritime security objectives. The 2014 UK National Security Strategy lists "*shaping a stable world*" as one of its overarching aims[vii]. It is clear that well-managed marine ecosystems, with the crucial natural resources and climate regulators that they provide, are a necessary attribute of a stable world, but one that is currently under threat.

The UK has the fifth largest marine zone in the world when the OTs are taken into account, and as such has both an opportunity and a responsibility to lead the way in good governance of the oceans in areas within its national jurisdiction. The Foreign Secretary wrote in the 2012 Foreign and Commonwealth Office (FCO) White Paper on the OTs: *"The Coalition Government has a vision for the Territories ... of natural environments protected and managed to the highest international standards"*[viii]. The RSPB applauds this vision, and believes it must encompass marine areas that are effectively monitored and enforced. Unfortunately, for the marine environment, where scientific monitoring and enforcement of laws is in many cases almost entirely lacking, there is a long way to go before this vision becomes a reality. However the RSPB believes that Ascension's waters provide an excellent way for the government to demonstrate global leadership in responsible stewardship of our seas in a way that is relatively inexpensive and easy to achieve.

2.2. Responsibility and leadership

A crucial first step in establishing effective marine security for the OTs is to establish responsibility and demonstrate leadership.

The UK National Strategy for Maritime Security (NSMS), published in May 2014, listed 5 objectives for the UK, including: "*To protect the resources and population of the UK and the Overseas Territories from illegal and dangerous activity, including serious organised crime and terrorism*". Footnote 25 of the Strategy states that "*While the Overseas Territories have, in the main, taken responsibility for policing their maritime zones, the UK has an ongoing scalable responsibility in many areas.*"[ix]

The NSMS represents an important step forward for the maritime security of the OTs, as it makes responsibility for defence against criminal activity in the OTs' marine areas a key objective for the UK government. However, as footnote 25 implies, currently it is the position of the UK government that surveillance and enforcement of the OT's marine areas is a devolved responsibility. In the majority of cases, this policy suffers from skills and capacity constraints, and can only serve to increase costs (for multiple trainings, duplicative facilities and equipment). A far better policy in terms of maximising cost efficiency, and for achieving the UK's stated aim of good governance of OT environments, would be for the surveillance and enforcement of the OTs' marine areas to be coordinated centrally from the UK. This would make best advantage of skills, equipment, and information that already exist, and also the UK's established diplomatic links.

Fulfilling our responsibility for the OTs' marine areas could be achieved via the following methods:

2.2.1 Office for OTs Maritime Security

A crucially important component of monitoring and enforcing the OTs' marine areas against illegal activity is an individual (or group of individuals) with responsibility over maritime security in the waters of the OTs. Given the small-scale of many Overseas Territory Governments, and the shared nature of the counter-IUU task across the OTs (the vast majority of which currently have zero, or inadequate, enforcement and surveillance), it would make most sense for this office to sit centrally in a UK-based position, probably within the National Maritime Information Centre (NMIC). From here it could work collaboratively with the Ministry of Defence (MoD), the FCO, OT Governments, civil society and other stakeholders to deliver best practice maritime security and enforcement across each of the OTs.

NMIC was established in 2010 to monitor and intercept illegal narcotics traders within UK and OT seas[x], and appears to already be providing the role of a centralised hub for information and responsibility for the OTs maritime security regarding all manner of illegal

activities, including environmental crimes such as fisheries infractions. However, NMIC's role in this respect does not seem to be well known by OT Governments, or by civil society. The creation of a new Office for OTs Maritime Security within NMIC would raise crucial awareness of the fact that they are providing this role, thus enhancing the public perception of the UK's good governance of the OTs' waters at home, internationally, and in the OTs themselves. Importantly, this increased awareness, enhanced by a public information campaign, could also deter IUU vessels from OT waters, as they will be perceived as inviting higher risk of interception and infraction than in other areas.

2.2.2 Membership of Regional Fisheries Management Organisations (RFMOs)

An important part of an effective Monitoring, Control, and Surveillance (MCS) regime is to prevent illegal activity before it takes place. Fishing vessels will be deterred from undertaking illegal activities within areas where an effective monitoring, control and enforcement regime is known to operate. Although many RFMOs have come under criticism for failing to take adequate action to protect stocks, and membership can be expensive, membership of the relevant RFMOs is still a straightforward way of increasing awareness of and influencing the implementation of an active MCS regime because it demonstrates that the coastal state is taking marine management seriously.

UK (OT), which brings together the Territories of Bermuda, the British Virgin Islands, the Turks & Caicos Islands, and St Helena, Ascension and Tristan da Cunha, is already a member of the International Commission for the Conservation of Atlantic Tunas (ICCAT) but not the Fishery Committee for the Eastern Central Atlantic (CECAF), despite the most northerly section of the Ascension EFZ falling within its boundary[xi]. Nor is UK (OT) currently a member of the South East Atlantic Fisheries Organisation (SEAFO), which, although it covers only the high seas, is of relevance given that it surrounds the entire EFZs of Ascension, St Helena and Tristan da Cunha. However, the EU is a member of both CECAF and SEAFO. It might be possible to become involved in these latter two RFMOs via the EU, and doing so would therefore minimise costs.

3. Measures specific to Ascension Island

In the waters bordering Ascension Island there is evidence that illegal activity is even worse than the global picture, or around other OTs, with fisheries scientists estimating that IUU fishing accounts for up to 40 percent of fish caught in the Eastern Central Atlantic FAO region within which Ascension lies[xii]. ICCAT data suggests that illegal fishing is likely to have taken place within Ascension's EFZ in the past, and that Ascension's marine environment is most at risk from Asian pelagic longline fishing (Japan, Taiwan, China, the Philippines) between the months of December and March (although fishing outside these months, and illegal purse seine fishing, is also likely to have taken place)[xiii].

Regardless of whether or not a marine reserve is established at Ascension, the implementation of an effective MCS and enforcement regime is therefore a matter of urgency.

3.1. Non-technical and legal measures

The creation of an 'Ascension Island Ocean Sanctuary' as a fully protected marine reserve would be a low cost action that would demonstrate the commitment of the UK government to this isolated Territory. It is difficult and expensive to provide support to this region, yet through this act, the importance of Ascension Island to the UK government will be clearly stated without a large expenditure of resources. Many vessels will respect the marine reserve boundaries and be deterred from conducting IUU activities in Ascension's waters purely on the basis that it is a designated marine reserve[xiv]. For those that are not dissuaded by the presence of a marine reserve, the following non-technical measures will greatly enhance security at minimal (or zero) cost.

3.1.1 Legal framework

A well-written and comprehensive legislative framework is an essential component of any effective MCS regime. A successful legal framework must include elements that facilitate detection, response, adjudication, and the development of bilateral agreements with neighbouring and international partners. According to the Director of Fisheries at the US Coast Guard, best practice legislation for a marine reserve should include[xv]:

a) Detection

i. The power to establish a reporting system;

ii. The power to use chartered and volunteer vessels, as well as remote electronic monitoring (e.g., VMS/AIS, cameras, satellites, and any other means of detection).

b) Response

i. Ability to use chartered or third-party platforms for enforcement;

ii. Allow partner-nation enforcement on behalf of Ascension, especially in regard to port-based enforcement;

iii. Allow voluntary reports, photographic evidence, or data from remote electronic monitoring (e.g. satellites) as evidence.

c) Adjudication

i. Prosecution based on sighting and position data, or breaches of permit requirements;

ii. Third-party or proxy adjudication;

iii. Prosecution In absentia or ex parte;

iv. Penalties that act as a deterrent - at a minimum 75 percent of the value of the vessel, plus catch.

d) International co-operation

i. Reporting of IUU fishing activity via international instruments;

ii. Bilateral enforcement agreements;

iii. Adjudication assistance.

Provision for the prohibition of fishing within certain parts of the EFZ is already provided for within Ascension Island legislation, namely the Fishery Limits (Licensing of Fishing) Order[xvi]. The National Protected Areas Ordinance provides the legal framework to create an MPA immediately throughout most of the EFZ[xvii]. However, certain changes will be required to strengthen this, e.g. through inserting the requirements as listed above. It is particularly important that any new legislation allows for evidence from satellites to be used as well as for sanctions to be imposed *in absentia* or *ex parte* and enforced through friendly nations.

There are several additions or alterations that could easily be made to Ascension's pre-existing legislation to make it more robust and better able to serve as a tool for deterrence, as well as prosecution. For example, the current legislation should be altered to allow the inspection of vessels that come in to port at Ascension unexpectedly (for example, needing repair or for a medical emergency), as many of these vessels may have been fishing. Another example is to make it illegal to carry gear un-stowed without a fisheries licence. If no licences were granted throughout the EFZ then all vessels transiting Ascension's waters would be required to have their gear stowed, or face prosecution. This method has been successfully deployed in several countries, including Namibia[xviii], which has brought its marine life back from the brink thanks to its world-leading MCS and enforcement regime.

3.1.2 Voluntary check-in requirements

All vessels entering the Ascension EFZ should be encouraged to register their presence via the Vessel Monitoring System or an Automatic Identification System (VMS, AIS - see 3.2.1 and 3.2.2 below). Vessels should transmit their name, expected entry date, time, and location, their expected path through the EFZ and their expected exit date, time, and location. Whilst vessels transiting through the EFZ cannot be required to submit this information, most vessels will be willing to undertake this simple requirement. Those vessels that do not submit their information and that are subsequently detected within the EFZ can then be singled out for further investigation.

Additionally, a routine message from Ascension Island over radio to vessels transiting the EFZ could broadcast that there is no fishing authorised, and encourage any vessel seeing

potential fishing activity to contact the relevant authorities on Ascension via phone or email with information, including a photo where possible.

3.1.3 Permits

Requiring all vessels that enter the Ascension Island EFZ to obtain a permit before entry would be an even more robust enforcement measure than voluntary reporting. However, access to the EFZ or EEZ of a coastal state (outside of the 12nm territorial zone) for innocent passage by vessels is required under the United Nations Convention on the Law of the Sea, which makes it illegal – under normal circumstances – to require vessels to obtain permission for entry. However, if part or all of Ascension's waters were to be designated as a Particularly Sensitive Sea Area (PSSA) through the International Maritime Organisation, AIG would be enabled to adopt stricter rules, such as the requirement of all vessels to obtain a permit[xix].

This system has been successfully adopted in both the Great Barrier Reef Marine Park and the Papahānaumokuākea Marine National Monument (PMNM) in the Northwest Hawaiian Islands. This latter marine reserve provides a good comparison for how monitoring and enforcement of a large and remote marine reserve can be undertaken without the need for permanent enforcement vessels. Instead, the authorities responsible for the PMNM have established it as a PSSA and require permits for entry, as well as requiring all vessels to carry VMS[xx]. Voluntary monitoring surveillance by transiting vessels and infrequent and opportunistic patrols by US Coast Guard vessels provide adequate monitoring capability and have a sufficient deterrent effect to ensure that IUU is kept to a minimum within the reserve.

If Ascension Island's EFZ were designated as a marine reserve, application for PSSA status would be more likely to be successful, because the presence of a marine reserve would give credibility to the idea that it is an important area worthy of special protection.

3.1.4 Making better use of pre-existing data and capacity

It is reasonable to assume that Ascension and the other OTs within the South Atlantic are under a constant level of fairly high surveillance, given their military importance. Much of this surveillance data would be incredibly useful for detecting illegal activity within Ascension's EFZ.

Yet many of the details connected to this information – some of which will be high security and classified – are not needed for the purposes of the MCS regime. The public need not know these details, just that the system is working (this is analogous to the police, where although the public know that surveillance and appropriate investigations are taking place, specific information about these investigations is not shared. This generalised knowledge both reassures the public and deters criminals). Surveillance data obtained from any source, if passed to and interpreted by someone with a responsibility and experience of detecting illegal fishing (which is fairly easily spotted from satellites by the course and speed of the boat being observed), could be used to activate appropriate enforcement action. This would be a clear task for the Office for OTs Maritime Security proposed above, and because such data remained within Government, it would not compromise the security required by the military.

A good example of how available data can be used to build up a comprehensive picture of vessel activities within national waters is the recent launch of a collaboration between Satellite Application Catapult (which receives core funding from the Department for Business, Innovation and Skills) and the Pew Charitable Trusts[xxi]. They are aiming to build a system that allows large amounts of surface vessel data to be held in one place, protected, organized and provided appropriately to those authorities who most need it. This system can operate using open source data and surveillance and either contribute to official sources of data or receive data into it from official sources. Having worked as hoped in testing and demonstrated the 'proof of concept' this system has now transitioned into going 'live' (T Long, pers. comm.).

A good example of the joining-up of pre-existing capacity is the recent transformation of the Regional Anti-Piracy Prosecution and Intelligence Coordination Centre (RAPPICC) based in the Seychelles, set up by the FCO in 2013[xxii]. As piracy activity has recently declined in the

Indian Ocean, this year the centre changed its name to the Regional Fusion and Law Enforcement Centre for Safety and Security at Sea (REFLECS[3]) and broadened its remit to include environmental crimes such as fisheries infractions, as well as human trafficking and drugs smuggling[xxiii]. This decision makes the best use of capacity and skills, enabling staff to focus on the most current pressing issues, and therefore achieves better value for money for the FCO (who gave over £500k of funding to build the Centre[xxiv]), and more publicity for the centre.

3.2. Technological measures

3.2.1 Vessel Monitoring Systems

Vessel Monitoring Systems (VMS) track the position of vessels whilst they are within a specified zone (i.e. an EEZ) by using on-board tracking devices that transmit information via satellite to shore-based receiver systems. Whilst not all vessels currently have to carry VMS, vessels within an EEZ/EFZ can be requested to forward their position and details to the VMS via their onboard transponder. Of course, VMS is not effective in detecting boats that either switch off their system or don't carry a system, but such vessels can be detected by other satellite or other surveillance means (e.g., AIS, see 3.2.2 below). The use of VMS makes it much easier to identify those vessels that warrant further investigation, as any vessel that does not forward its position to the VMS but is detected by other means when inside national waters is likely to be engaging in illegal activity.

Until the fishery on Ascension Island was closed in 2013, a VMS requirement was in place to monitor legal vessels operating within the EFZ. This system comprised both a master control centre in London, and an additional control centre (for data analysis and tracking) based on St Helena[xxv]. Currently this system is not being used whilst a review of options for Ascension's marine area is being undertaken. However, whether or not a fishery is licensed within Ascension's waters, the use of a VMS will provide vital information on the presence of vessels within the EEZ. A request for vessels traveling through Ascension's EEZ to turn on

their VMS should be added to Ascension Island's legislation, and, though not mandatory, vessels not complying would merit further scrutiny.

Running a VMS monitoring centre at Ascension should cost less than £40,000 per year, and we understand that it is the stated intention of the Ascension Island Government to establish an independent system at Ascension. However, given that there is a pre-existing VMS centre operating out of St Helena, and another shared by the Falkland Islands and South Georgia and the South Sandwich Islands, these costs could likely be reduced to around £20,000 per year if Ascension shared either of these centres – and has the additional benefit of information sharing as many of the boats transit between these areas.

3.2.2 Automatic Identification System (AIS)

Automatic Identification Systems (AIS) are designed to provide information from ships to other ships and coastal authorities automatically. All vessels over 300 gross tonnage are required by law by the International Maritime Organisation to carry an AIS, which should provide information on their identity, type, location, course, speed, and other safety-related information[xxvi], and in 2009 the EU extended this requirement to all EU-flagged fishing vessels over 15m in length[xxvii].

AIS uses the VHF marine radio frequency, and therefore its range is limited, often extending just marginally more than line of sight (although it enjoys almost global satellite coverage, albeit for a cost to harvest the data). This seems highly variable however, with anecdotal evidence from the Falkland Islands indicating that in good conditions their AIS picks up information from vessels up to 250nm from shore (Falkland Islands Fisheries Department, pers. comm.). It is possible therefore that an AIS receiver positioned on top of Green Mountain may well have sufficient height to cover most of, if not all of, Ascension's EFZ when conditions are right. Additional AIS transceivers could potentially be placed on buoys towards the edge of Ascension's EFZ to extend the range of coverage. Furthermore, should a marine reserve be established, these AIS units could transmit to vessels the precise coordinates of the marine reserve, ensuring that no vessel can claim ignorance of new regulations.

AIS can be very cheap, each unit costing in the range of £2,000 to purchase and with low ongoing maintenance costs. There may even be the opportunity on Ascension to obtain useful AIS data for no cost, through a partnership agreement with the US Military, who have their own AIS to serve the airbase on Ascension.

3.2.3 Radar and satellite surveillance

The acquisition of dedicated real-time data from commercial radar satellites covering Ascension's EFZ is not likely to be cost-effective, unless done as part of a system used by several parties, such as the Satellite Applications Catapult/Pew Charitable Trusts system (as mentioned above).

However, historical satellite data for the region are likely to exist, given the importance of Ascension Island for the UK and the US Military. If so, these data should be available at relatively low cost, and would be very valuable as a means of assessing where potential illegal activity has likely taken place in the past. This information will help to more accurately and cost-effectively direct enforcement action in the future. Again, the Pew/Catapult system would be well positioned to conduct analysis of this data and feed it back into the system for appropriate use by UK. Of course, as per section 3.1.5, much of the data may be classified and some information may have to be redacted, but information that is non-sensitive will still be of use in planning enforcement for the future. It is difficult to estimate the cost of this data without knowing what might be available and from where it would be obtained (i.e. an internal or external source).

3.2.4 Enforcement vessel(s)

Traditionally, enforcement at sea has relied upon the availability of one or several dedicated vessels that are equipped not only to detect illegal activity but also to intercept it. However, this option is both expensive and not necessary at all times. Advances in technology, international cooperation, and also legislation mean that it is no longer necessary to have patrol vessels in place throughout the year, and physical interdiction is often not crucial to

securing a prosecution. For example, in 2009 VMS position reports were used to successfully prosecute a Spanish-flagged vessel engaged in illegal fishing activity in the remote areas of the United States EEZ, despite the fact that the vessel had not been boarded[xxviii]. Given Ascension's remote location and large EFZ, a full time enforcement vessel (or vessels) would not be a cost-effective option.

However, Ascension is visited every month by an MoD vessel en route to the Falkland Islands, as well as intermittent RN ships, US cargo ships, and other vessels transiting through. The AIG should ask that these vessels monitor the EFZ for potential illegal activity on their way, by capturing the name, number and activity engaged in by any suspect vessel, as well as where possible capturing photographic evidence. In the case of the MoD or RN vessels it would not be unreasonable for the AIG to ask the vessel to approach the EFZ from an area where they suspect there is greater likelihood of illegal fishing being undertaken, in order to give the vessel the best chance of observing (and deterring) IUU fishing activity.

There are already existing partnerships that could be extended to facilitate this: For example, the military protection of the waters around the Falkland Islands, South Georgia and the South Sandwich Islands, and Ascension Island, are the responsibility of the Commander British Forces South Atlantic Islands. Although Fishery Patrols are not currently part of this mandate, it would be reasonable to draw up a partnership between the MoD and the FCO and/or NMIC to share information and even conduct surveillance and possibly enforcement within Ascension's EFZ.

The AIG could not ask transiting vessels to intercept any potentially illegal activity, unless they had the necessary trained staff and security equipment on board, and most vessels would be unlikely to wish to delay their passage by undertaking such actions. On the other hand, the actions required to simply monitor potentially illegal vessels whilst transiting the waters of an OT are not onerous. Indeed, RN crews are expected to excel at performing several tasks at once, and the opportunity to increase military productivity by using monitoring tasks (such as surface surveillance and over-the-horizon targeting activities) as an important deliverable in demonstrating British sovereignty of these waters, would we believe be welcomed by the OTs, UK politicians, and the UK public, and result in good publicity for the RN.

The periodic presence of a MoD or RN vessel monitoring Ascension's waters could be sufficient to deter some illegal activity, particularly if it is demonstrated to result in significant fines or other sanctions. For those whom it does not deter, the UK (via the FCO, NMIC, or the Department for International Development) can pass their details on to the flag state, which is then responsible, under international law, for taking action against the vessel[xxix]. If the state in question takes no action after several infractions by any individual vessel, the UK is able to take this matter up through the appropriate international conventions, which will then put pressure on the state concerned to comply.

If, following monitoring activity, and possible input from historical satellite data, the UK would like to employ the further measure of a dedicated vessel, a cost-effective option would be to do so only during those times when the occurrence of illegal activity is deemed especially likely based on the evidence gathered. It may be possible to covertly hire a fishing vessel for a fraction of the price of a standard enforcement vessel, the added advantage being that vessels engaged in illegal activity may not suspect another fishing vessel of conducting enforcement actions (however, there are registration considerations that would need to be carefully thought through if chartering a fishing vessel). The price of hiring a vessel for the necessary period will vary depending on the type of vessel and time of year but would likely be in the region of £100,000 - £200,000 per month (based on the costs of the Chagos[xxx] and South Georgia[xxxi] patrol vessels). It would be best also to combine the chartering of such a vessel with the use of aircraft surveillance, as detailed below.

3.2.5 Aircraft surveillance

In a 1990 report to AIG assessing the value of a potential fishery, a combination of aircraft surveillance and a patrol vessel to perform at-sea interdictions was recommended as the most cost-efficient, adequate option for monitoring and enforcement of Ascension's EFZ. It was estimated that two five-hour flights per month between December and March would be necessary to cover the portion of the EFZ most at risk from illegal fishing and deter or spot the majority of IUU activity[xxxii]. Ascension is in a fortunate position compared to many of the OTs, in that it has its own airport and access to aircraft, and it would be worth investigating

the possibility of utilising down time of existing aircraft for airborne surveillance of the EFZ. However, Ascension does not currently have access to a search and rescue helicopter, which would probably be required to assist with aircraft surveillance in case of accidents. The cost of a helicopter for this purpose would likely not be deemed cost effective for the advantage that airborne surveillance will bring. Furthermore, negotiations with the US Airbase would also be required, but as with an ocean-going patrol vessel, it would not be necessary to deploy such surveillance frequently.

The occasional use of an aircraft for monitoring purposes, in areas and at times identified as being especially at-risk for illegal activity, would be a useful addition to a maritime security regime at Ascension, and if a search and rescue helicopter becomes available at some point in the future should definitely be considered. The cost of such flights would depend on what agreements could be reached with the military, (or if an agreement were not possible, the charter of a light aircraft specifically for this purpose) but based on the costs incurred by the Falklands Islands for similar patrols, would likely be around £10,000 per flight.

If the absence of a search and rescue helicopter means that the chartering of such an aircraft were not possible, then options could be explored around the current conversations regarding transport between Ascension and St Helena following the decommissioning of the *RMS St Helena* (due to retire in 2016). Regardless of whether airborne transport from Ascension to the new airport on St Helena is undertaken, or another ship is commissioned, monitoring and enforcement of Ascension (and St Helena's) waters should be borne in mind during these deliberations.

4. Costs

4.1 Estimated costs for monitoring and enforcing a marine reserve

This paper has presented various measures that could be employed to monitor and enforce Ascension's EFZ in the event that a marine reserve were established. The estimated costs of these measures are presented again below for ease of reference.

Item	Estimated average cost per annum
Vessel Monitoring System (VMS)	<£40,000
Automatic Identification System (AIS)	<£5,000
Purchase of historical satellite information	?
Patrol vessel charter (£100,000 - £200,000 per month)	£300,000
TOTAL estimated cost per annum	**<£400,000**

4.2 Funding mechanisms

There are a number of possible financing mechanisms to enable a marine reserve at Ascension to be monitored and enforced adequately.

The Ascension Island Fishing and Spearfishing Charters (AIFSC) is the Island's only sports fishing company. The company has a vested interest in the protection of Ascension's waters, their website stating that *"…the waters here are virtually untouched by commercial fishing and we hope to keep it this way*"[xxxiii]. AIFSC is reported to already charge almost £1,000 per day for a pelagic charter. Demand appears high with consistent bookings, and would likely increase further once the surrounding waters were publicly declared the Atlantic's largest fully-protected marine reserve, closed to all commercial fishing. This would give the sport fishery a unique profile and marketing angle. As well as raising revenue via taxation, visitor and sport-fishing licence fees, AIG could also introduce an auction system to sell the rights to land 'world-record attempt' marlin as an additional way to raise funds. This would ensure that the maximum possible revenue from this highly lucrative industry was achieved with the minimum environmental damage.

Ascension Island has been identified as one of 50 'Hope Spots' by the extremely well-connected Sylvia Earle Alliance, and is one of the only opportunities for large-scale full protection in the tropical Atlantic[xxxiv]. This gives Ascension a unique cachet and considerable appeal to high-net worth individuals in the US and the UK who may be persuaded to donate

towards enforcements costs or a MPA Trust Fund. The RSPB has offered initial fundraising capacity to both AIG and the FCO to assist with this.

If declared, Ascension - with its direct air access - would likely become the most easily accessible ecosystem-scale no-take zone in the world, and the only one in the Atlantic. It would therefore be of considerable interest to visiting marine scientists and researchers. Scientific users could help pay for equipment, overhead and boat costs, or be required to pay a user fee as a contribution towards enforcement costs of the MPA.

It is worth noting that none of these financing mechanisms are likely to be available to the same degree to underwrite costs to support a commercial fishery, which, as outlined below, could potentially prove economically unviable if conducted in the environmentally responsible and sustainable manner required by the UK OTs White Paper 2012.

4.3 Differences in marine reserve and fishery costs for monitoring and enforcement

This paper has not attempted to quantify costs for monitoring and enforcing a sustainable fishery at Ascension Island. However, it is reasonable to expect that the running costs - both in terms of finances and time - of such a fishery, may exceed the income. The average license revenue for the four years that the fishery was running at Ascension (2010 – 2013) was just under £700k per annum, with no signs of an upward trend[xxxv]. As has been established above, the costs of enforcing and monitoring a marine reserve could be expected to cost around £400k per annum, and there is good reason to expect that a sustainable fishery would cost substantially more to operate.

To achieve good ocean governance and ensure compliance with fisheries regulations, vessels must be strictly licensed, inspected, carry accredited on-board observers, provide safe working conditions for all crew and maintain accurate logbooks. The species concerned (target and bycatch) must be scientifically monitored to determine population trends. In addition, in an EEZ or EFZ that permits fishing, it is much harder, and therefore more costly,

to ascertain whether a fishing vessel present within the area is operating legally or illegally. In a fully protected marine reserve where no extractive activity is permitted, the assessment of whether or not illegal activity is taking place is simplified to one simple question: is the vessel fishing? If yes, the activity is illegal and appropriate action can be taken. Equally, if reserve boundaries are well flagged (e.g. through use of AIS as outlined above) it is much harder for vessels found to be operating illegally to maintain that they were unaware of their infraction.

In short, in a fully protected marine reserve, the cost of licensing, vessel inspections, and observers falls to nil and scientific monitoring falls from essential (to ensure sustainability of catches) to desirable (to monitor the status of the species). Furthermore the task of surveillance falls in complexity and therefore cost, since fewer vessels have to be checked and the activities of those vessels are more easily understood, thereby requiring less work.

Whilst the costs of establishing and enforcing a marine reserve are not insubstantial, the available evidence suggests that where MPAs are large (as would be the case around Ascension) the costs per unit area are substantially decreased when compared with smaller reserves. For example, PMNM, one of the world's largest MPAs, cost just $96 per km to establish whereas Bibilik MPA in the Philippines, at less than 1km^2, cost over $100,000 per km[xxxvi]. Moreover, the many benefits of establishing a marine reserve have been found to far outweigh the costs, both in terms of short-term financial benefits (e.g., increase in tourism, which on Ascension could be recreational sport fishing within 5nm of shore, and also scientific tourism) but also medium and long-term benefits to the sustainability of global marine catches (worth $129 billion per year[i]) and to marine ecosystem services (worth $4.5-$6.7 trillion per year[xxxvii]). Overall, the costs of running a marine reserve have been estimated as significantly lower than the costs of running a fishery, both in direct financial terms and also in terms of the benefits that accrue at a global level[xxxviii].

5. Conclusion

Historically, monitoring and enforcement of Ascension Island’s marine environment has been limited to non-existent, even during the brief period when fishing was officially licensed between 2010 and 2013. Ascension Island presents a challenge for traditional forms of maritime security because its EFZ is both large and isolated, and there is limited finance and capacity. However, Ascension benefits from infrastructure not available at other remote OTs, namely the presence of an air base and runway and frequent visits from MoD and US vessels in transit.

In this paper, various options have been presented for monitoring and enforcement of a proposed marine reserve to encompass the majority of Ascension’s EFZ. Of course, just as it is impossible to reduce crime to nil on land, so it is in the sea, but implementation of the methods outlined in this paper to track and monitor vessels, combined with increased surveillance capability and the ability to enforce as and when necessary, should provide a good standard of maritime security, and certainly better than most national waters worldwide. This could be achieved for less than £400,000 per year.

It is probable that the costs of MCS and enforcement would be significantly higher were the EFZ to be fished rather than protected, as there are more costs associated with the ongoing maintenance of a fishery than there are of an MPA. Whilst the financial benefits of establishing a fishery at Ascension Island are likely to be marginal at best, the establishment of a marine reserve would have enormous benefits to marine biodiversity, and the reputation of Ascension and the British government as global leaders in the good governance of the ocean.

6. References

[i] FAO (2014). *The State of World Fisheries and Aquaculture.* FAO, Rome, p 7. http://www.fao.org/3/d1eaa9a1-5a71-4e42-86c0-f2111f07de16/i3720e.pdf

[ii] Pitcher, T.J., Kalikoski, D., Pramod, G., Short, K., (2008). *Safe Conduct? Twelve Years Fishing under the UN Code.* WWF, Gland, Switzerland, p 63.

[iii] Pitcher, T.J., Kalikoski, D., Pramod, G., Short, K., (2009). *Not honouring the code.* Nature 457, p 658–659.

[iv] Rogers AD (Ed.) (2013). *The Global State of the Ocean; Interactions Between Stresses, Impacts and Some Potential Solutions. Synthesis papers from the International Programme on the State of the Ocean 2011 and 2012 Workshops.* Marine Pollution Bulletin, 74(2), p 491 – 552. http://www.stateoftheocean.org/pdfs/IPSO-Papers-Combined-15.1.14.pdf

[v] Pew Charitable Trusts, Ending Illegal Fishing project: http://www.pewenvironment.org/campaigns/ending-illegal-fishing-project/id/8589941944

[vi] Ministry of Defence (2010). *Global Strategic Trends – Out to 2040.* Development, Concepts and Doctrine Centre, London, UK, p 11. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/33717/GST4_v9_Feb10.pdf

[vii] Ministry of Defence (2011). *Overseas Territories: the Ministry of Defence's Contribution*. Directorate-General Security Policy, London, UK p 1. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/27626/overseas_territories.pdf

[viii] Foreign and Commonwealth Office (2012). *The Overseas Territories: Security, Success and Sustainability*. FCO, London, UK, p 6. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/27626/overseas_territories.pdf

[ix] HM Government (2014). *The UK National Strategy for Maritime Security*. https://www.gov.uk/government/publications/national-strategy-for-maritime-security

[x] National Maritime Information Centre (2011) *Information guide*. National Maritime Information Centre, Middlesex, UK, p4. http://www.nautinstlondon.co.uk/nautinstlondon/wp-content/uploads/2012/12/NMIC-information-booklet.pdf

[xi] Fishery Committee for the Eastern Central Atlantic (CECAF), area of competence: http://www.fao.org/fishery/rfb/cecaf/en#Org-GeoCoverage

[xii] Agnew DJ, Pearce J, Pramod G, Peatman T, Watson R, et al. (2009). *Estimating the Worldwide Extent of Illegal Fishing.* PLoS ONE 4(2): e4570. doi:10.1371/journal.pone.0004570

[xiii] Pearce, J (2009). *Combating IUU Fishing in the Waters of Ascension, St Helena and Tristan da Cunha: Advice on Options, Costs and Feasibility*. MRAG Ltd, London, UK, p 6.

[xiv] Whitlock, J (2013) *One year later: few violations reported in marine protected areas, poaching a concern.* The Coast News. https://thecoastnews.com/2013/02/one-year-later-high-compliance-in-marine-protected-areas-poaching-a-concern/

[xv] Pew Charitable Trusts, National Geographic, and the Pitcairn Island Council; Developing an Effective Enforcement System for a Marine Reserve in the Pitcairn Islands: http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Report/Enforcement-System-for-a-Pitcairn-Marine-Reserve.pdf

[xvi] Ascension Island Government (1978). *Laws of Ascension: Fishery Limits (Licensing of Fishing) Order, Cap A15.* Ascension Island.

[xvii] Ascension Island Government (2003). *Laws of Ascension: National Protected Areas Ordinance, Cap A20.* Ascension Island.

[xviii] Republic of Namibia (2000) *Marine Resources Act*. Part VIII, Article 49. http://www.mfmr.gov.na/documents/53305/832050/MarineAct2000/e22bbe42-3023-4d4d-be41-e1a83c9fa33c

[xix] International Maritime Organisation, Particularly Sensitive Sea Areas (PSSAs): http://www.imo.org/ourwork/environment/pollutionprevention/pssas/Pages/Default.aspx

[xx] Papahānaumokuākea Marine National Monument, reporting requirements: http://www.papahanaumokuakea.gov/resource/ship_reporting.html

[xxi] Satellite Applications Catapult; Catapult and Pew Charitable Trusts Join Forces in Fight Against Illegal Fishing: https://sa.catapult.org.uk/news-view/-/asset_publisher/nzNaGF403FPD/content/catapult-and-pew-charitable-trusts-join-forces-in-fight-against-illegal-fishing

[xxii] Regional Anti Piracy Prosecution and Intelligence Coordination Centre (RAPPICC): http://www.rappicc.sc/

[xxiii] REFLECS^3 – Fighting Transnational Organised Crime. http://www.oceanuslive.org/Main/ViewNews.aspx?uid=00000845

[xxiv] Gov.uk (2013) *Anti-piracy centre open for business*. https://www.gov.uk/government/news/anti-piracy-centre-open-for-business

[xxv] MRAG Ltd, St Helena Vessel Monitoring System: http://www.mrag.co.uk/experience/st-helena-vessel-monitoring-system

[xxvi] AIS Transponders http://www.imo.org/blast/mainframe.asp?topic_id=754

[xxvii] European Parliament (2009) DIRECTIVE 2009/17/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 amending Directive 2002/59/EC establishing a Community vessel traffic monitoring and information. Official Journal of the European Union.

http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32009L0017&from=EN

[xxviii] National Oceanic and Atmospheric Administration (2010). *NOAA Protects U.S. Waters From Illegal, Unreported and Unregulated Fishing: Spanish-flagged vessel charged with 67 counts of fishing without a U.S. permit.* www.noaanews.noaa.gov/stories2010/20100611_fishing.html.

[xxix] UN (1982) *United Nations Convention on the Law of the Sea*. Part V, Article 58. http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm

[xxx] The Chagos Archipelago facts (2012). *Patrol Vessel.* https://sites.google.com/site/thechagosarchipelagofacts/eppz-mpa/patrol-vessel

[xxxi] Government of South Georgia and South Sandwich Islands (2013) *Overview of financial statements and annual statistics for the year ended 31 December 2012.* South Georgia and the South Sandwich Islands. http://www.sgisland.gs/download/SGSSI%20Public%20Financial%20Report%202012.%20v.2.pdf

[xxxii] Scullion, J (1990). *Review of the Fish Resources, Fisheries and Oceanography within the Exclusive Fishing Zone of Ascension Island.* Eaton Publications, London, p 77-80.

[xxxiii] Ascension Island Fishing and Spearfishing Charters. http://www.ascensionislandfishingcharters.co.uk/

[xxxiv] Mission Blue: http://mission-blue.org/hope-spots-new/

[xxxv] Hansard (2013) HC Deb, 20 May 2013, c507W. http://www.publications.parliament.uk/pa/cm201314/cmhansrd/cm130520/text/130520w0004.htm#130520w0004.htm_wqn24

[xxxvi] McCrea-Strub A, Zeller D, Sumaila UR, Nelson J, Balmford A, Pauly D (2011). *Understanding the cost of establishing marine protected areas.* Marine Policy Vol.35 p1–9

[xxxvii] Costanza, R., d'Arge, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R. V., Paruelo, J., et al. (1997). *The value of the world's ecosystem services and natural capital.* Nature, Vol 387, p253 – 260.

[xxxviii] Balmford A, Gravestock P, Hockley N, McClean CJ, Roberts CM. *The worldwide costs of marine protected areas.* PNAS 2004;101:9694–7. http://www.pnas.org/content/101/26/9694.full.pdf+html