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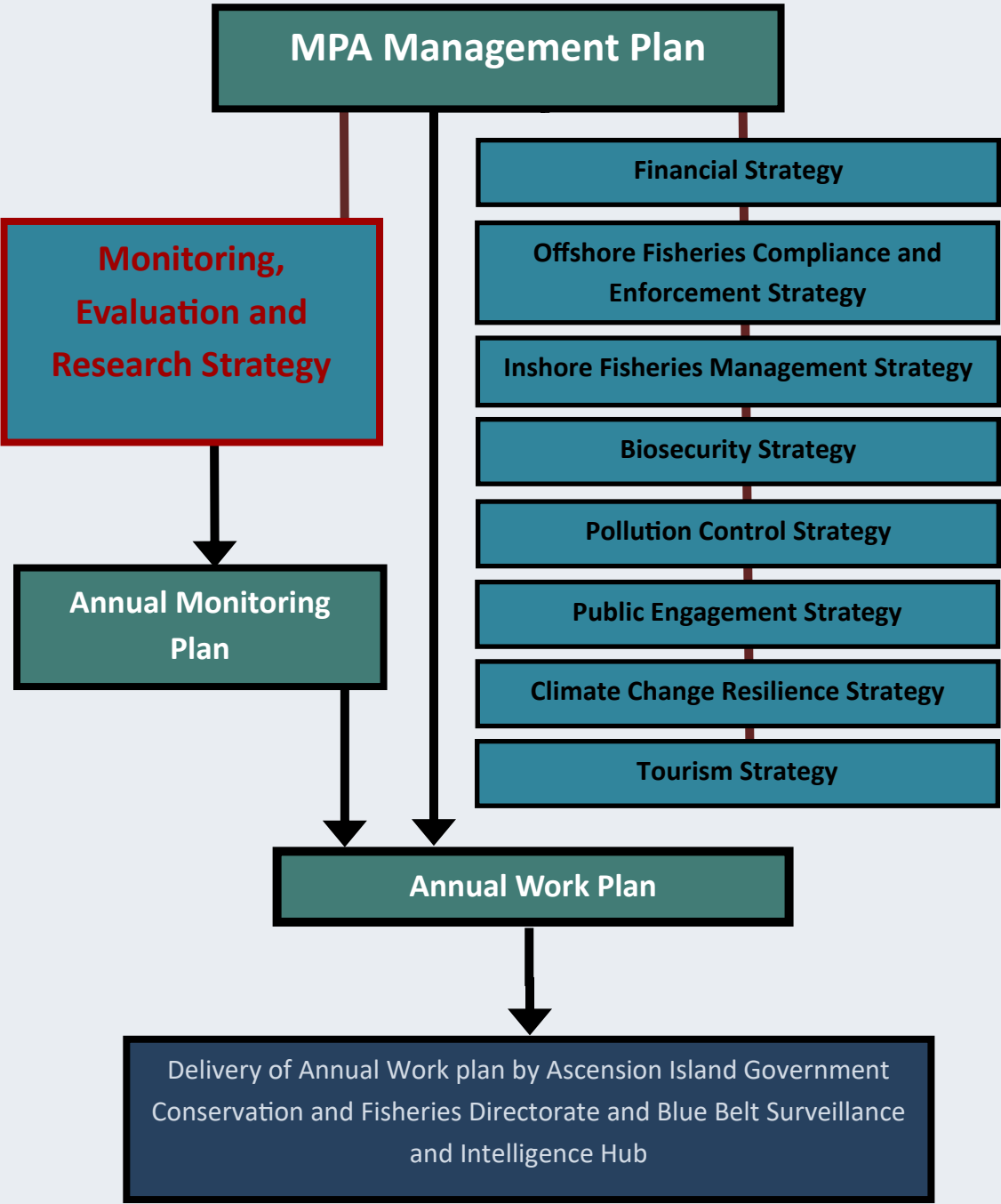
Ascension Island Marine Protected Area

Monitoring, Evaluation and Research Strategy

2021-2026



This Monitoring, Evaluation and Research Strategy is one of a number of documents created to support the management of the Ascension Island Marine Protected Area (MPA). The relationship of this Strategy to the overarching MPA Management Plan and other associated documents is shown below:



Executive Summary

- This strategy sets out a five year plan for how Monitoring, Evaluation and Research will be carried out in the Ascension Island Marine Protected Area (MPA).
- Monitoring and evaluation will be crucial to the success of the MPA as they enable the refinement and improvement of management, demonstrate progress to supporters and allow the sharing of best practice with other MPAs.
- Monitoring will be divided into two distinct areas:
 1. Monitoring management implementation will record whether management actions have been completed and whether the year 1 and year 5 output targets for each of the 22 actions have been achieved.
 2. Performance monitoring will consider progress towards the MPA's 21 operational objectives using metrics identified for each of them. This will incorporate what are sometimes called ambient, threat and management effectiveness monitoring.
- Evaluation will take the form of an Annual Review and a more comprehensive Five Year Review. Both will involve external oversight and will be published.
- 16 local research priorities have been identified. These will lead to better management decisions or improve monitoring methods.
- The Ascension MPA is well-placed to become a research hub for the study of ocean science and MPA effectiveness. Ascension does not have the resources to conduct this research, but actions will be taken to encourage scientists to visit Ascension.

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Introduction

Purpose of the Monitoring, Evaluation and Research Strategy

It is crucial to know if the creation and management of the Ascension Island Marine Protected Area (MPA) are having a positive effect in achieving the site's objectives. This is important so we can:

- Demonstrate the impact of the support and resource expended on MPA management and attract new supporters and increased investment.
- Improve management of the MPA by learning from experience.
- Share knowledge with other MPAs to benefit global marine conservation.

This strategy sets out the **Monitoring** that will be carried out in the MPA. It also highlights the significant gaps in knowledge that impair our ability to make good management decisions, and it is here that our **Research to inform local management** will be targeted.

The focus of our monitoring and local research will be areas where information will lead to better management decisions. Monitoring and research can consume considerable resources and so this must be justified by asking:

- Would management be altered depending on the results of the monitoring or research? and
- How big a benefit would that change bring in terms of achieving the MPA's objectives?

Obtaining the information is not sufficient in itself. The evaluation section of this strategy describes how the results of monitoring and research will be used to report progress and guide management. This requires a culture of openness and a willingness to alter established management practices where they are not working.

As the MPA Management Authority, our first priority is directing resources towards the questions we need to answer to improve management. However, the Ascension MPA could be a global asset for the understanding of marine processes and ecosystems more generally, and one of the strategic objectives of the MPA is to promote research into ocean environments. Therefore, in addition to our local research activities, this strategy identifies areas of **Research with Global Relevance** where Ascension could provide an important location for wider of research questions to be investigated and describes some of the activities we will undertake to attract scientists and turn Ascension into an international research hub.



Background to the Ascension Island MPA

The Ascension Island MPA was designated in August 2019 and covers the entirety of the island's 445,000km² Exclusive Economic Zone. The MPA includes many notable species and habitats. It has been designated to protect the totality of ecosystems and natural processes within the MPA.

The Strategic Objectives of the MPA are:

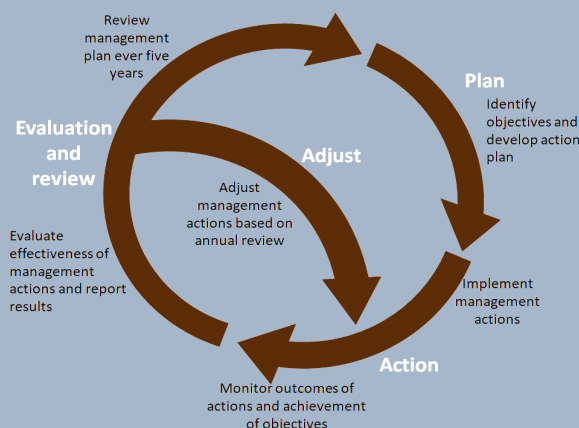
1. To conserve Ascension Island's marine biodiversity, habitats and ecological functions for long-term ecosystem health
2. To promote the sustainable development and management of socio-economic activities that are compatible with protection of the marine environment
3. To promote scientific research and share knowledge about Ascension Island's marine biodiversity in order to encourage support for marine conservation locally, nationally and internationally
4. Supporting Objective: To achieve effective governance and management of the MPA that is transparent and underpinned by sustainable financial and human resources

Under each of these Strategic Objectives sit a total of 21 operational objectives that break the strategic and supporting objectives down into specific and clearly-defined aims against which we can measure progress (Appendix 1).

The MPA Management Plan sets out 22 activities that will be undertaken to achieve these operational objectives (Appendix 2). They have been selected to address the most pressing threats to the MPA and provide the greatest environmental and socio-economic benefit. Where possible, they are based on activities that have been shown to work on Ascension or in other similar situations, but there is still much uncertainty about what management activities will be effective. This Monitoring, Research and Evaluation Strategy combined with a willingness to embrace adaptive management will be crucial to refining and improving our management activities and ensuring the success of the MPA.

Adaptive Management

Adaptive management is the process by which the success of a management action is monitored as it is being carried out and the results used to improve management by either reconsidering or refining the action in the future. It is an iterative process with many cycles of implementation, evaluation and review.



Effective Adaptive Management requires good monitoring and a willingness to act on the results, even if this means altering or abandoning existing practices.

Role of External Committees

It is important that the monitoring, research and evaluation carried out through this strategy and the management decisions that flow from them are open to scrutiny and external input. Two external committees will play a crucial role in the development and evaluation of the MPA monitoring and research.

Scientific Advisory Committee

Made up of eight leading academics and experts with relevant experience to the MPA. These will be drawn from around the world and contribute a range of expertise on marine research and conservation. The Committee will meet remotely to feed into the annual review of MPA performance and input into the preparation of Annual Monitoring Plans. The Committee will also identify potential areas for new research and collaboration and ensure scientific rigor in all the work undertaken.

Inshore Fisheries Advisory Committee

Made up of eight volunteers from the Ascension fishing community supported by MPA Officers. It will input into the preparation of Annual Monitoring Plans and facilitate data collection from the local fishery for monitoring and research purposes. The Committee will have a central role in recommending any management action in response to data on the health of inshore fish stocks.

In addition to these Committees, the elected Ascension Island Council, MPA Steering Group and MPA Youth Committee will input into the annual review of MPA performance and make recommendations on any revisions to the MPA Management Plan.





Monitoring

Monitoring

This is the ongoing, long-term monitoring that will provide the evidence base for evaluating the success of the MPA. It will largely be delivered by the Ascension Island Government Conservation and Fisheries Directorate.

This section can be further divided into:

- **Monitoring management implementation** - have planned management actions been completed and outcomes achieved?
- **Performance monitoring** - are we achieving the MPA's objectives?

Though connected, these need to be treated separately so we can distinguish between situations where objectives aren't met because the actions weren't carried out properly and other instances where the actions were completed but weren't sufficient to achieve the objectives. This is important for guiding the future management responses: in the first situation we would redouble our efforts to complete the actions; in the second we would have to identify new actions.

Monitoring management implementation

This is the process of measuring the resources required to carry out management actions (inputs), whether the activities have been completed and whether the outcomes were achieved as planned.

The MPA Management Plan has identified a total of 22 high or medium priority management actions, each with a quantifiable target for the outcomes that should be completed by Year 1 and Year 5 after MPA implementation. These targets are shown in Appendix 2 and form the basis of the management assessment.

Monitoring Inputs

Measuring the inputs allocated to deliver a management action can be important to ensure the benefit justifies the cost. Resources are scarce and need to be allocated to achieve the greatest benefit. For many of the actions listed in Appendix 2, the main input required will be MPA staff time. It would impose too great a monitoring burden to record accurately the staff time allocated to each individual action and so this will not be done as a matter of course. However, we will monitor inputs on a subset of the actions that consume considerable time or have very uncertain outcomes. In these cases the amount of resource required to deliver the action will be an important factor in deciding whether to continue or expand the action. In these specific cases (highlighted in Appendix 2) staff time and other inputs will be monitored through work recording and dedicated budget lines for operating and capital expenditure in order to feed into the evaluation of future management options.

Monitoring outcomes

The means of verifying whether outcomes have been achieved is shown for each management action in Appendix 2. For simple actions it will be a relatively easy process to demonstrate and evidence whether actions have been completed and outcomes achieved by the target date. More complex actions will be broken down into phases and milestones set at each annual review in order to track progress against the five year target. All of the actions involve members of AIG staff in their delivery and so recording the completion of actions and reasons for slippage or failure should require only an internal information gathering process.

Annual reviews will be carried out to highlight areas where planned actions and outcomes have not been achieved. The form of these reviews is described in more detail in the Evaluation section of this strategy.

Performance monitoring

Monitoring whether we have completed planned actions is not sufficient alone; we need to know if those actions are effective and contributing to the achievement of the MPA's objectives. The operational objectives of the MPA will be key to this as they break the overarching strategic objectives down into something measurable. This measurement will be done using the metrics identified for each of operational objectives and the methods described in more detail in Appendix 1.

The operational objectives include biological, socio-economic and governance elements of what a successful MPA should look like. Monitoring progress against these objectives will provide the evidence-base for a wide-ranging assessment of the MPA's performance (described in more detail in the Evaluation section of this strategy) .

Due to the scope of our operational objectives, monitoring performance against them will encompass what in other protected areas might be termed ambient, threat and management effectiveness monitoring.

Ambient monitoring - monitoring the background health of biological systems to detect any trends.

Monitoring operational objectives 1a, 1c and 1g relating to species diversity and abundance, ecosystem complexity and habitat extent and condition mean we will be collecting data on the health of biological systems.

Threat monitoring – monitoring the scale of an identified threat and its impact on habitats and ecosystems.

Monitoring operational objectives 1b, 1d, 2b and 2c relating to threats in offshore and inshore ecosystems and the impact of inshore fisheries will provide the information needed for ongoing threat assessments in the MPA.

Management Effectiveness – there are many tools available that consider a range of criteria to measure the effectiveness of protected area management.

We have selected operational objectives that cover the criteria where we think it is most important to collect ongoing empirical data to support these assessments (Appendix 3).

There are quantitative targets provided for each metric. For the biological metrics these often relate to the baseline condition at the time of designation since we consider the ocean around Ascension to be in good health. There is always a high degree of variability in biological systems and failure to meet a target does not necessarily imply there is a problem that needs intervention. Instead the targets will act as triggers for further investigation if they are not met, as described in the evaluation section of this strategy.

We are aware of four major limitations of our performance monitoring approach:

1. **It is difficult to know if the MPA is working without having something to compare it to.** To test whether the MPA is having an overall positive effect on achieving its objectives, we need to know what would have happened in the absence of an MPA. Comparisons with conditions prior to the designation will be useful for this, but Ascension's marine environment started from a healthy position and so we are not expecting any dramatic increases in the ecological metrics. In the face of climate change and global pollution, success could actually be defined as retaining what we already have or even just slowing the decline. To measure this we need to compare it to an area not protected by the MPA. We will attempt to do this by comparing pelagic ecosystems within and outside of the MPA boundary. However, the inshore ecosystem around Ascension is unique and there is no well-matched control site against which we can compare our effectiveness.
2. **There is a heavy reliance on indicator species and habitats for biological monitoring.** This is a common approach across protected areas and is an appropriate way to balance the need for monitoring with the available resources. It is effective when the suite of indicator species provides a good representation of the ecosystem as a whole and where species that are highly vulnerable to known threats are used as 'canaries in the coal mine'. The rationale for selecting the indicator species used in our monitoring is provided in Appendix 4. However, we are aware that we don't yet have a comprehensive picture of the species present within the MPA, an ecosystem model to show how they interact or a good knowledge of the vulnerability of individual species to different threats. This prevents a truly evidence-based selection of the suite of indicator species. Some of the work proposed in the 'Research to inform local management' section of this strategy is aimed at addressing the most serious of these knowledge gaps.
3. **We can't measure all the metrics we have identified.** This is a major problem, but we have chosen to be open about it and address it head on. There is no point limiting ourselves to only those metrics we can measure if they don't tell us what we actually need to know. By stating the metrics we would like to measure it will provide impetus to focus work on those we can't yet achieve. Much of the 'Research to inform local management' section below is aimed at establishing baselines and monitoring for some of those troublesome metrics. Others, such as the validation of remote methods to detect IUU vessels and methods to measure accurately the abundance of pelagic species, are outwith the scope of our abilities and will take global research efforts. Fortunately many MPAs are grappling with these same issues and so it is fertile ground for collaboration.
4. **In many cases it will be difficult to link the success or failure to achieve the MPA objectives directly to our management activities.** Where more than one action or external uncontrolled drivers (e.g. climate change or air access to Ascension) are potentially affecting an operational objective, it may be difficult to disentangle the effects and know exactly what contribution any individual management action is making. This is not ideal, but to isolate and measure the impact of any one action, we would need to halt other actions and control for external variables for a period long enough to monitor the results (active adaptive management). This simply isn't feasible in many cases. It might be possible for actions that are extremely costly or present trade-offs with other objectives where the risk of a poor decision is great enough to justify the cost of such investigation. However, in many cases we will have to do our best to infer which actions are having the greatest benefit from the detailed nature of the effect we are seeing and look to other MPAs using similar actions for evidence of effect.

An Annual Monitoring Plan will be prepared in January of each year and sent to the Scientific Advisory Committee for review and comment. A typical plan for the monitoring fieldwork is shown below:

2020												2021		
	April	May	June	July	August	September	October	November	December	January	February	March		
1						RUV trials								
2			Abundance transects									Water quality and edNA	edNA and plankton	
3														
4					Water quality and edNA			Water quality and edNA						
5														
6							edNA and plankton		Abundance transects, RUVs, edNA					
7				edNA and plankton										
8														
9														
10														
11							Beach clean		Recreational catch sampling	Offshore research cruise	Analyse log book returns			
12	Recreational catch sampling					Recreational catch sampling								
13			Recreational catch sampling	Collate C&E data									Recreational catch sampling	
14									Recreational catch sampling					
15					Recreational catch sampling						Swell height	Research fishing		
16		Recreational catch sampling						Swell height						
17					Swell height									
18		Swell height												
19					Recreational catch sampling									
20							Research fishing							
21			Beach clean	Research fishing								Beach clean		
22														
23			Fish export			Public questionnaires/interview								
24														
25		Water quality												
26														
27						Quadrats and settlement panels								
28														
29						Dive clean								
30			Maintenance and clean					Maintenance and clean					Maintenance and clean	
31														

The monitoring is designed to be delivered by a minimum staff resource of three qualified divers with increased trained personnel to deliver the offshore research cruise. It is estimated that the monitoring fieldwork (including a 20 day offshore cruise) will require 260 man days per year to complete with an additional 100 days for analysis and write up. This does not include any additional research projects being undertaken.



Evaluation

Evaluation

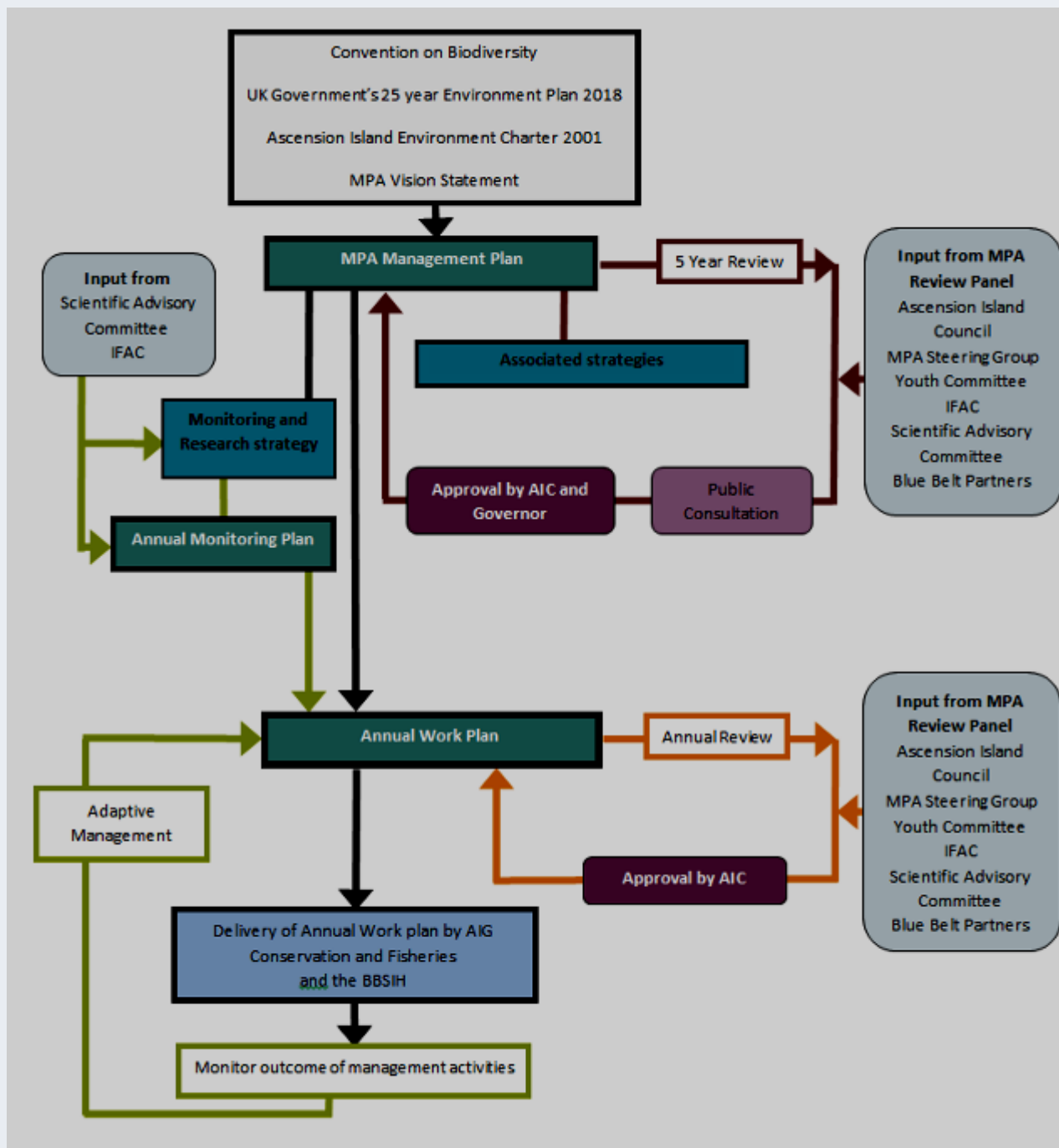
The monitoring described above provides the raw material for our evaluation. We will use it both to demonstrate how well we are achieving the MPA's objectives and to improve management decisions. The evaluation process will be transparent and involve external oversight to ensure it is rigorous and objective.

To balance the need for frequent evaluation against the resource required to undertake it and the need for some stability in management activities, we have adopted a model of annual review combined with a more detailed and comprehensive five year review.

Annual Review	
Prepared by	Ascension Island Government Conservation and Fisheries Directorate
External contributors	MPA Steering Group, Scientific Advisory Committee, Inshore Fisheries Advisory Committee and Youth Committee take part in initial workshop to discuss results and make written comments on draft report. Final report presented to Ascension Island Council before publication.
Management decisions supported	The results of the annual review will be used to reprioritise actions and develop the following year's Annual Workplan.
Content	<ul style="list-style-type: none">Record of progress in completing actions and delivering the outcomes of each action listed in the Annual Workplan. Graph results where appropriate.Further analysis and explanation for any outcomes not achieved as planned.Summary of performance against the targets for each operational objective (though not all metrics will be measured in every year). Graph results where appropriate.Further analysis of any operational objectives not being achieved to understand the cause of failure (distinguishing between undelivered actions, actions that were inadequate to meet the objectives and uncontrolled external factors). Analysis also considers how robust the monitoring data are and the level of certainty.Summary of the results of any research projects carried out on the past year.Description of the proposed changes to future management in light of the analyses above addressing all areas where targets are not met.Workplan for the coming year incorporating changes to management and any planned research projects.Financial statement for the previous year and proposed budget for the coming year.
Outputs	<ul style="list-style-type: none">Annual Summary aimed at a public audience. This will use maps and graphics to summarise performance.Management review document aimed at the Management Authority and partners containing links to all monitoring data and detailed analysis.Social media snapshots highlighting key areas of progress.Workplan and budget for the coming year.
Timescale	First drafts to be circulated by end of January each year. Final versions to be available by end of March each year.
Distribution	Both the Annual Summary and Management Review will be published on the MPA website. Snapshots will be distributed via AIG Conservation social media accounts.

Five Year Review	
Prepared by	Ascension Island Government Conservation and Fisheries Directorate
External contributors	Blue Belt partners, MPA Steering Committee, Scientific Advisory Committee, Inshore Fisheries Advisory Committee, Youth Committee, Island Council, Public consultation.
Preparation process	<ul style="list-style-type: none"> • Workshop with stakeholders to review progress • Draft review report and revised MPA Management Plan produced by AIGCFD and circulated to contributors • Remote meeting of contributors to discuss report findings and revised Management Plan • Second draft of documents prepared and circulated for public consultation • Final version of revised Management Plan recommended by Ascension Island Council and adopted by Governor. Publication on the MPA website
Management decisions supported	The review will underpin the revision of the MPA Management Plan, which will set the direction of the MPA for the next five years.
Content	<ul style="list-style-type: none"> • Record of progress in completing actions and delivering the five year outcomes for each action in the Management Plan. Graph results where appropriate. • Further analysis and explanation for any actions revised through the annual review process. • Summary of performance against the targets for each operational objective. Graph results where appropriate. • Further analysis of any operational objectives not achieved at the end of the five year planning cycle. Identify where actions have failed to achieve the objectives and what assumptions in the results chain were violated to cause this. • Identify any new threats to the MPA objectives that have become apparent during the five year planning cycle. • Evaluate the adequacy of the monitoring programme and whether it is providing the information needed to track progress and improve management. • Review the research undertaken over the previous five years and its incorporation into management decisions. • Use analysis above to review the suitability of the operational objectives, actions for delivering them and methods of monitoring them. • Review the financial performance of the MPA against the Financial Strategy and produce a new Financial Strategy including projections of income and expenditure for the next five years. • Produce a revised MPA Management plan for the next five year cycle incorporating the lessons learned from the review. • Derive an Annual Workplan for the coming year from the new Management Plan.
Outputs	<ul style="list-style-type: none"> • Five Year Review Summary aimed at the public describing the performance of the MPA and explaining the revisions made to the Management Plan. This will be written in an accessible style with graphics. • Five Year review Report aimed at Management Authority and partners containing detailed monitoring data, analysis and a thorough evaluation of management. It will provide a clear justification for the changes included in the revised MPA Management Plan. • Social media snapshots highlighting key areas of progress. • Revised MPA Management Plan and associated strategies.
Timescale	First drafts to be circulated by end of November 2025. Public consultation January 2026. Final versions to be completed by end of March 2026.
Distribution	<ul style="list-style-type: none"> • All documents will be published on the MPA website. • Snapshots will be distributed via AIG Conservation social media accounts. • The results of the review will be presented at conferences and meetings of MPA managers.

The diagram below illustrates the process and organisations involved in the annual review and five year revision of the MPA Management Plan



The evaluation of the MPA's performance will be of interest to a range of audiences and we will produce outputs designed to address their interests at an appropriate level of detail. This will include formal review reports as well as summary documents, infographics and brief snap shots of progress for dissemination via social media. The outputs from the evaluation will be easily accessible, enabling full disclosure on the aspects of the MPA that are working, and those that need further improvement.

Audience	Main interests	Format of outputs
Ascension MPA delivery team/Project partners	Are the planned outcomes being achieved? What is not working and why? How can management be improved? How can resources be used most effectively?	Full review document
AIG Management/ Ascension Island Council	Is the project meeting overall objectives? Are international commitments being met? Is management staying within budget? Are there any unintended impacts?	Review summary. Presentations
MPA funders	Are the planned outcomes being achieved within the expected timeframe? Are wider benefits being seen?	Review summary. Infographics of results for dissemination to support base.
Academics	Can management effectiveness be demonstrated by robust data? What knowledge gaps still exist?	Full review document and raw data. Conference presentations
Managers of other MPAs	What management actions have been shown to work or not and could this be replicated in other MPAs?	Review summary with potential follow up requests for raw data.
Wider public	Is the MPA achieving what it set out to do? Are there any unintended impacts?	Presentations. Social media snapshots of progress. Infographics of results.

It is important that we share the results of our management with other MPA managers and academics so they can learn from our experience and we can achieve the Ascension MPA's objective of furthering global marine conservation. This will best be achieved through peer networks such as Big Ocean and contributions to review and guidance documents.

Protected Area Management Effectiveness Assessment

An annual Protected Area Management Effectiveness (PAME) assessment will be undertaken each year using a tool developed by the Blue Belt Programme (Appendix 3). This tool will be applied consistently to all MPAs and Marine Management Areas across the OTs taking part in the Blue Belt Programme. It will provide a useful overview of MPA performance for external organisations and allow for comparison of sites within the programme and more widely across the globe as the tool is similar to others used internationally. The assessment tool will also be useful to identify any major gaps in MPA management and governance. Much of the data collected through the monitoring described in this strategy will provide evidence to support assessment against many of the tool's criteria (Appendix 3).

The PAME tool does not have a strong focus on measuring the ongoing achievement of outcomes and so is not well-designed for managers seeking to improve their actions through adaptive management. It also effectively imposes an externally-selected and somewhat reductive view of what an MPA should look like through the selection of the criteria included in the tool. Therefore, while we will undertake an annual assessment using the PAME tool and see it as an important way to make international comparisons, our primary evaluation will focus on the monitoring performance against our own operational objectives, which represent an Ascension-specific view of what a successful MPA looks like.



Research

Research to Inform Local Management

These are discrete research projects designed to provide a direct benefit to MPA management. An objective of the MPA is that it will be managed adaptively and effectively using the best available information. There are considerable gaps in our knowledge of the biological and social features of the MPA that constrain our ability to make good decisions. In the short-term, a precautionary approach will be taken in data-poor situations, but to provide evidence-based management there is an urgent need to address the highest priority gaps.

Establishing baselines and optimum methods for ongoing monitoring are very high priorities, but there is also a much wider scope encompassing fundamental research on the biology of key species, habitat mapping and threat analysis.

The research topics have been listed in their order of importance for improving MPA management and a provisional schedule of how they will be delivered over the next five years is shown on the following page. The timings are largely driven by the priority ranking, but also the need for external partners and funding, as well as the practicalities of undertaking the work.



1. Multibeam echosound (MBES) survey of inshore habitats

Purpose: Establish extent and distribution of inshore habitat types. Provides the basis for species distribution mapping and extrapolation of species density data to estimate abundance and contribute to stock assessments of inshore fished species. Allows proper stratified sampling design to monitor species diversity, species abundance and habitat quality through transects, quadrats, settlement panels and water quality testing. Enables environmental impact assessment of proposed developments in the inshore environment.

Contributes to MPA objectives: 1c, 1g, 2b

Collaborators: UK Hydrographic Office, British Geological Survey

Description: Conduct multibeam survey of entire inshore area around the island out to the 100m isobath using boat-mounted portable MBES system. Record rugosity and map inferred habitat in the following categories: lava flows, boulder fields, smooth rock, sand and rhodolith beds at an approximately 1m spatial resolution. Ground-truth mapping output through dive surveys. Method modified from the Dove et al. 2019 study on Hawaiian Islands.

Outputs: GIS layer of benthic habitat types out to 100m isobath. Compatible with existing mapping data covering 100-1000m depth range.

2. Data underpinning stock assessments of inshore species

Purpose: Provide foundation for ongoing, robust stock assessments of inshore fished species and estimation of maximum sustainable yield. These can be used to identify any need for the introduction of inshore fisheries management measures and provide a basis to monitor their effectiveness.

Contributes to MPA objectives: 1c, 1d, 1f, 2b

Collaborators: Cefas

Description: The following data will be collected for the five inshore species most heavily exploited in the fishery: rockhind grouper, moray eel, spiny lobster, squirrelfish and glasseye snapper. Samples will be collected from the recreational fishery and through research fishing.

Parameter	Method
Size at age	Length and weight measurements. Otolith aging of fish species. Claw size used to age spiny lobster.
Age at first maturity	Maturity determined by histological examination of gonads. Aging as above.
Fecundity	Capture of mature females and counts of progeny
Frequency of spawning	Tagging studies
Mating pattern	Behavioural observations. Potential DNA analysis of progeny
Longevity	Aging as above

Outputs: Estimates of maximum sustainable yield for five species exploited by the inshore recreational fishery. Spread sheet and model that allow the incorporation of new data and future re-estimates of maximum sustainable yield.

3. Establish socio-economic baselines

Purpose: Create baseline and monitoring strategy for measuring progress against socio-economic objectives.

Contributes to MPA objectives: 2a, 2d, 2e, 3a, 3c, 4c

Collaborators: University of Cardiff

Description: Create data gathering protocols including dedicated survey methodologies and incorporation of questions into existing information sources (e.g. visa and business permit applications). Design analysis and evaluation of data specifically to measure attainment of MPA objectives. Conduct monitoring according to protocols to provide baseline data.

Outputs: Monitoring protocols for measuring progress against socio-economic objectives. These will include the content of any questionnaires and surveys as appropriate. Data from the first year of conducting this monitoring in the form of a data-base and summary report.

4. Inshore ecosystem model using stable isotope analysis

Purpose: Understand trophic relationships between species to allow predictions of indirect impacts of threats to individual species. Provide baseline for ecosystem complexity against which shifts can be measured. Refine suite of indicator species used in biological monitoring to ensure it is representative of different trophic levels and includes any keystone species.

Contributes to MPA objectives: 1c, 2c

Collaborators: University of Windsor, University of Exeter

Description: Collect muscle samples from a minimum of 15 individuals from a range of inshore species across all taxa. Stable isotope analysis looking at ratios of ^{13}C and ^{15}N will be undertaken at the University of Windsor and University of Exeter. The result will be an ecosystem model showing the trophic interactions between inshore species.

Outputs: Isotope ratios for all species tested. An ecosystem model of inshore species.

5. Establish eDNA primers for to study inshore and offshore diversity and biosecurity surveillance

Purpose: Allow eDNA to be used to record the presence of species within the MPA and look for temporal patterns of relative abundance in inshore environments. Develop eDNA as an effective and efficient means of detecting the presence of non-native marine species.

Contributes to MPA objectives: 1a, 1c, 1d

Collaborators: Pew Charitable Trusts, academic partner

Description: Collect tissue samples from all offshore and inshore indicator species and marine species identified as high risk potential invaders to Ascension during an horizon scanning assessment (Roy *et al.* 2019). Develop primers that can reliably identify the presence of these species from water samples.

Outputs: Primers able to detect a range of offshore and inshore vertebrates including important indicator species and high risk non-native species. Plan for routine eDNA biodiversity surveys and biosecurity surveillance.

6. Galapagos shark movements

Purpose: Establish temporal and spatial movement patterns and degree of residency of Galapagos sharks around Ascension Island.

Contributes to metrics for objectives: 1a

Collaborators: University of Exeter

Description: Tag 20 Galapagos sharks of a range of sizes around Ascension Island Coast using SPOT satellite tags. Through by-catch in the recreational and sports fisheries, tag and release as many Galapagos sharks as possible with external spaghetti tags. Record re-sightings of spaghetti tagged fish by fishermen, AIGCFD staff or members of the public.

Outputs: Shapefile of individual tracks. Heat maps of species distribution over different seasons. Recapture records of spaghetti tagged individuals.

7. Develop methods for monitoring nocturnal inshore communities

Purpose: Incorporate the significant proportion of species that are nocturnal in the monitoring of inshore areas of the MPA.

Contributes to MPA objectives: 1c, 1d

Collaborators: St Helena ENRD, University of Exeter

Description: Trial the use of transects on SCUBA, remote underwater video and sound recording to measure species presence and abundance at night. Address issues of safety, data quality and reliability to arrive at a monitoring method that can be practically deployed.

Outputs: Monitoring protocol for nocturnal species including selection of methods and indicator species.

8. Movements of rockhind grouper

Purpose: Understand movements patterns of rockhind grouper around coast of Ascension to establish if there is replenishment of the most heavily fished areas, which is necessary to estimate maximum sustainable yield

Contributes to MPA objectives: 1c, 2b

Collaborators: University of Windsor

Description: Deploy gates of acoustic receivers at five locations around the coast of Ascension. Insert acoustic tags into 40 grouper caught at locations around the island. Record detections at the gates over the two to ten year life of the tag batteries. Look for evidence of seasonal movement patterns and individual migrations. In particular look at any movement into or out of the north-west sector that is subject to the greatest fishing pressure.

Outputs: Map of individual grouper movement patterns. Summary data of average movement distance and movement timing. Evidence-based recommendations for sustainable fishing of rockhind grouper.

9. Movements of seabirds outwith the nesting season

Purpose: Determine range of Ascension frigatebird and masked booby outside of breeding season to establish overall use of the MPA and relevance of these species as indicators of marine ecosystem health.

Contributes to MPA objectives: 1a

Collaborators: University of Exeter

Description: Attach non-retrieval satellite tags to ten Ascension frigatebirds and ten masked boobies at the end of the breeding season. The battery life of the tags is predicted to be 100 days, which based on past experience will encompass the period between breeding attempts. Data will be downloaded and used to create individual tracks and heat maps of habitat use for each species.

Outputs: Shapefile of individual tracks. Heat maps of species distribution.

10. Morphology of turtle nesting beaches and susceptibility to sea level rise

Purpose: Understand the vulnerability of turtle nesting habitat to sea level rise and quantify the impact of climate change scenarios on turtle breeding success.

Contributes to MPA objectives: 1d, 1g

Collaborators: University of Exeter

Description: Create three dimensional map of the most important turtle nesting beach on Ascension. Collect data on nest locations and the impact of inundation on hatching success through nest excavations. Use continuous loggers to record wave height adjacent to the beach. Combine these datasets with predictions of future sea level rise and extreme swell events to estimate the likely impact of climate change on the area of nesting habitat and turtle productivity.

Outputs: Three dimensional models of nesting beach including mapped nest distribution. Datasets of nest productivity and swell heights. Model predicting impact on turtle hatchling numbers.

11. Vulnerability of inshore species to climate change

Purpose: Establish the tolerance range of inshore species to water temperature and pH through physiological experiments so their vulnerability to climate change can be established. This combined with the ecosystem model described in section D can then be used to model the impact of climate change scenarios on Ascension's inshore habitat. The most vulnerable species will be used a future indicator species to monitor climate change impacts.

Contributes to MPA objectives: 1c, 1d

Collaborators: BAS

Description: Experimental aquaria will be set up on Ascension with the ability to control and maintain water temperature and pH. Species of fish, crustaceans, echinoderms and molluscs will be exposed to a range of temperatures and pHs. Stress responses and lethal limits will be measured for each species.

Outputs: Temperature and pH tolerance ranges for each of the tested species.

12. Genetic sub-structuring of yellowfin tuna, bigeye tuna and rockhind grouper

Purpose: Establish whether there are distinct sub-populations of yellowfin tuna, bigeye tuna and rockhind grouper present within the MPA and if so do they differ in their spatial and temporal distribution and likely vulnerability to threats.

Contributes to MPA objectives: 1f

Collaborators: St Helena ENRD, ICCAT, Cefas, Academic partner to carry out the genetic analysis

Description: Collect tissue samples from tuna caught across the Atlantic and from multiple sites within the MPA. Some can be easily obtained from the fisheries in Ascension and St Helena, but research fishing during offshore cruises and the cooperation of ICCAT registered commercial vessels will be required to collect the range of samples required. Grouper samples will be collected from the recreational catch on Ascension and St Helena and research fishing in the less frequently fished parts of the coast around Ascension. Samples will be collected over a number of years to allow for temporal effects. Existing SNP chips for yellowfin and bigeye tuna will be used to analyse the samples and identify population sub-structuring. A new SNP chip for rockhind grouper will need to be developed.

Outputs: Cladogram showing any structuring in the populations of each of the three species. Distribution maps showing any spatial pattern in the distribution of different sub-populations.

13. Explore hydrothermal vent fields and Mid-Atlantic Ridge structures within the MPA

Purpose: Map the distribution and activity levels of hydrothermal vent fields in the MPA. Identify species and communities associated with the vents and any threats to their survival.

Contributes to MPA objectives: 1a, 1b, 1g

Collaborators: Academic partners

Description: Search of areas surrounding the Mid Atlantic Ridge and known vent fields to identify their extent and distribution. Remote sampling of the vents using multibeam sonar, underwater video and measurement of water quality parameters. Collection of water, sediment and biological samples to characterise the physical habitat and vent ecosystems and look for any impact of plastic pollution.

Outputs: Maps of vent fields. Datasets of physical and chemical properties of water and sediment. List of species present.

14. Map inshore current patterns and model larval movement

Purpose: To map the local currents around Ascension and understand patterns of larval movement and retention along the coast. This will enable improved predictions of the impact of pollution events and climate change.

Contributes to MPA objectives: 1c, 1d

Collaborators: To be confirmed

Description: Using a boat mounted current meter, measure the speed and direction of waterflows at 100 locations around the island. This will be repeated four times over the course of a year to identify any seasonal patterns in the currents and link to remote measurements of regional current patterns to understand their influence on inshore water movement patterns. A particle tracking model will be used to predict the distribution of larvae and pollution impacts from origin points based on information about spawning locations and the most likely sites of spill incidents.

Outputs: Map of local currents in different seasons. Output from model displaying dispersal probabilities based on a range of origin points.

15. Establish baseline for mesophotic communities (30-150m depth)

Purpose: To determine species diversity and abundance in the mesophotic zone and understand the migration of animals between depth zones. Identify potential indicator species and means of monitoring them.

Contributes to MPA objectives: 1c, 1d

Collaborators: To be confirmed

Description: Carry out surveys using fixed remote underwater video cameras and a towed ROV during both day and night at sites around the coast between 30 and 200m depth. Collect water samples at the sites for DNA analysis and to measure the physical and chemical properties of the habitats. Analysis of the data will look at the comparisons of species presence between day and night samples and any relationship with data from the epiphotic zone, suggesting daily migration between the two. Highly abundant species or those only found in the mesophotic zone will be considered as candidate indicator species and monitoring protocols refined for future use.

Outputs: Data on the presence, relative abundance and size of species in the mesophotic zone. Protocol for monitoring the mesophotic zone including list of indicator species.

16. Recruitment rates of land crabs

Purpose: Measure recruitment rates of the long-lived near endemic land crab to ensure continued population viability.

Contributes to MPA objectives: 1c

Collaborators: University of Liverpool

Description: Establish a monitoring network of pitfall traps around the Ascension coastline to detect the number of land crab larvae returning to the island. Trends in the number of larvae detected between years will be used as a measure of population health. The spatial distribution of larvae detected will be used to infer larval retention patterns around the island.

Outputs: Finalised protocol for monitoring larvae returning to land. Data on the number of larvae caught at each sampling site.



Research with global relevance

The Ascension MPA is well-placed to become a research hub for the study of ocean science and MPA effectiveness. The significance of this research will go beyond local management concerns to inform marine conservation globally. Some of these research questions are very relevant for the Ascension MPA, but need comparisons across multiple MPAs to draw meaningful results and so are best undertaken by international collaborations instead of at a local scale.

Areas of research where Ascension could make a valuable contribution include:

- **The effectiveness of large scale MPAs, particularly any benefits for highly migratory species**
- **Carbon sequestration and storage in near pristine pelagic ecosystems**
- **Methods for tracking and preventing illegal, unregulated and unreported fishing in remote areas**
- **The effectiveness of methods to ensure economic benefits from MPAs flow to local communities**
- **Incorporating climate change adaptation into MPA planning**
- **The existence and importance of noise refugia in our oceans for marine species**
- **Biogeography and natural colonisation and speciation in remote marine habitats**

Ascension does not have the resources to conduct this research so instead we will work to attract scientists to work on Ascension through the following actions.

1. Establish an MPA Scientific Advisory Committee

The MPA Scientific Advisory Committee will provide oversight and guidance in the development and implementation of this Strategy. In addition it is hoped they will act as ambassadors for the MPA, raising the island's profile amongst the research community and encouraging scientists to work on Ascension. Their existing professional networks and contacts made through conferences will achieve much greater reach than staff based on Ascension could ever achieve and effectively target research groups working in areas relevant to the MPA.

2. Attendance at international conferences and membership of networks such as Big Ocean to raise the profile of Ascension amongst the research community.

Travelling from Ascension is difficult and expensive. Remote attendance at conferences is likely to become more acceptable and open up greater opportunities for MPA staff to participate in such events. However, face to face contact will always be preferable and so we will identify a small number of high impact conferences for MPA staff to attend and present at. We will become an active member of Big Ocean to expose Ascension to the work being carried out in other MPAs and pursue collaborative projects across the network.

3. Develop a 'promotional package' aimed at scientists to sell Ascension as a research hotspot.

Ascension is a remote military island and the logistics of working here can be challenging. We will make it easy for scientists interested in working on Ascension to find out all the information they need. The promotional package will inspire researchers to work at Ascension by setting out the amazing opportunities the island offers, but also include the practical information they will need on topics such as permits, travel, accommodation, equipment, lab facilities and sample shipping. We will use publication records to identify research groups actively working on the subjects listed above and send the package to them as well as making it available via the MPA website.

4. Develop facilities for visiting researchers including field equipment, lab upgrade and accommodation.

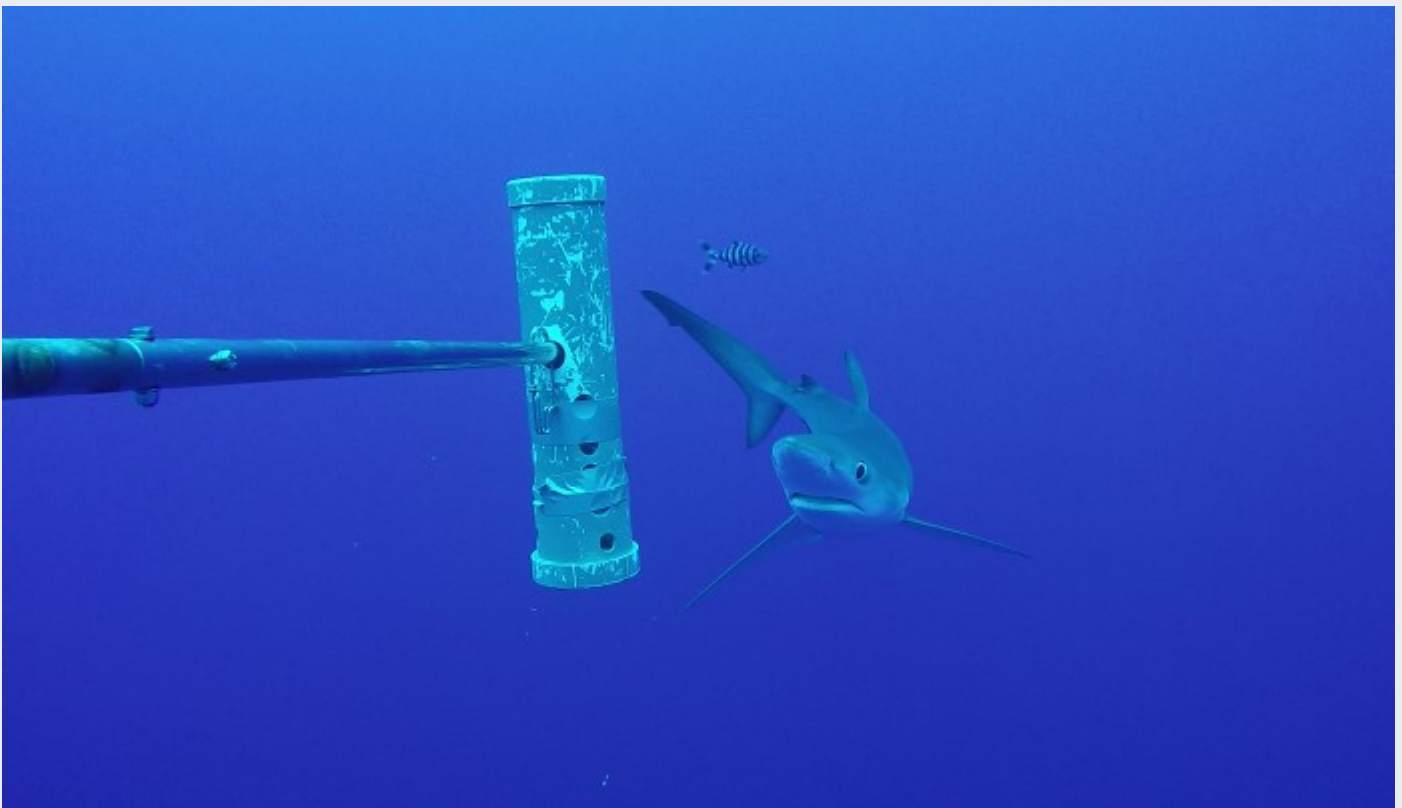
In the short-term, Ascension will not be able to provide a fully-equipped laboratory capable of conducting the complete suite of analysis techniques used in modern marine science. However, this is something we would like to build by working with researchers to identify the most important gaps in provision and initially seeking grant funding to address these. Bench fees and equipment lease agreements would be used to meet the cost of maintaining the facilities and enhancing them over the long-term. We will work with private accommodation, vehicle and inshore boat providers on Ascension to ensure they can meet the standards expected by researchers and have the required insurance and safety certificates.

5. Provide a data collection service for institutions that are conducting research projects consistent with the MPA objectives

In some cases it will be easier and more cost effective for scientists based on Ascension to collect samples or data to feed into global research projects. This will still benefit the MPA through increasing the island's international profile and improving the evidence-base for management decisions. This option will be included in the promotional package for scientists and promoted at network events.

6. Co-supervise MSc and PhD projects

We will look for opportunities to co-supervise MSc and PhD students delivering the research topics identified in this plan. It provides a cost effective means of delivering research and also creates a cohort of young scientists with a connection to Ascension that could benefit the MPA for many years to come as they develop their careers. AIG is not in a position to supervise such projects alone or apply for research funding and so we will need to search out academic partners working in these areas.





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Appendices

Appendix 1. Performance monitoring methods

The table on the next page sets out how we will collect data to measure progress against the MPA’s operational objectives. Indicator species for the biological metrics have been identified to make the monitoring regime manageable. The suite of indicators has been chosen to be representative of different groups, sensitive to known threats and include species for which we have good baseline data. More information about the selection criteria is provided in Appendix 4.

Research projects described in the ‘Research to Inform Local Management’ section are designed to improve this monitoring plan over time. The outcome of the ecosystem models and climate change vulnerability testing would further refine the selection of indicator species. Mapping inshore habitats will not only provide a baseline for monitoring the extent and condition of habitat types, but also improve how sampling locations are selected for monitoring biological diversity and abundance. The monitoring plan will be flexible enough to incorporate these findings to improve data collection over the lifetime of this plan.

The details of specific highlighted **monitoring methods** will be developed as specific protocols.

Objective	Relevant management actions	Metric	Monitoring method	Indicator species	Baseline	Target
1a. No loss of species or reduction in species abundance or ecosystem complexity in offshore areas	Prevent illegal offshore fishing	Presence and abundance (expressed as density or catch/observation per unit effort) of specific set of indicator species. Trophic positions for indicator species (using stable isotope analysis (SIA)).	Seabird monitoring through annual counts of breeding pairs and productivity. Isotope analysis on feather samples collected from turbine mortalities, chicks and regurgitated prey.	Ascension frigatebird	Annual counts of breeding pairs and productivity monitoring at mainland breeding sites since 2004.	Number of breeding pairs increases each year between 2021 and 2026.
	Monitor new threats to the MPA habitats		Measures of body condition of breeding adults.	Masked Booby		No change in trophic position of indicator species.
	Non-native species control (around seabird nesting sites)		Baited Remote Underwater Videos (BRUVs) during Offshore research cruises.	Yellowfin tuna Big eye tuna Blue shark Galapagos shark	BRUV results from EU BEST Seamount and Darwin ASIOS projects 2016-19.	Relative abundance expressed as encounter rate is at least 80% of baseline levels set at designation.
			Hydroacoustic surveys during Offshore research cruises	Pelagic fish zooplankton	Results from transects around seamounts during Darwin ASIOS project 2017	Biomass estimated from backscatter results is higher in pelagic habitats within the MPA compared to areas outside of the boundary and within 80% of baseline.

Objective	Relevant management actions	Metric	Monitoring method	Indicator species	Baseline	Target
1a. No loss of species or reduction in species abundance or ecosystem complexity in offshore areas	Prevent illegal offshore fishing	Presence and abundance (expressed as density or catch/observation per unit effort) of specific set of indicator species. Trophic positions for indicator species (using stable isotope analysis (SIA)).	Water sample collection for edNA monitoring of species presence during Offshore research cruises and Yacht citizen science project.	Yellowfin tuna Bigeye tuna Blue shark Galapagos shark Wahoo Flying fish Lophelia coral Humpback whale Bottlenose dolphin Pantropical dolphin silky shark Whale shark Manta ray Rainbow runner	To be established	Presence detected at least once in every sampling year
	Monitor new threats to the MPA habitats					
	Non-native species control (around seabird nesting sites)		Collection of isotope samples through Research fishing during Offshore cruises	Flying fish Yellowfin tuna Wahoo Blue shark Galapagos shark		
			Collection of isotope samples from Ascension Recreational catch	Yellowfin tuna Wahoo	Isotope samples collected by Kate Downes To be established	
			Plankton tows during Offshore research cruises and Yacht citizen science project.	Zooplankton assemblage	To be established	Diversity index of plankton species is at least 80% of baseline levels set at designation.

Objective	Relevant management actions	Metric	Monitoring method	Indicator species	Baseline	Target
1a. No loss of species or reduction in species abundance or ecosystem complexity in offshore areas	Prevent illegal offshore fishing. Monitor new threats to the MPA habitats. Non-native species control (around seabird nesting sites).	Presence and abundance (expressed as density or catch/observation per unit effort) of specific set of indicator species. Trophic positions for indicator species (using stable isotope analysis (SIA)).	Remote sensing to measure chlorophyll a levels.	Phytoplankton assemblage	Archived remote data	Seasonal patterns of chlorophyll a levels not differ from baseline.
			Video transects during offshore research cruises	Lophelia coral Deep benthic species to be determined.	To be established	Relative abundance expressed as encounter rate is at least 80% of baseline levels set at designation.
Objective	Relevant management actions	Threat types	Metric	Baseline	Monitoring	Target
1b. Proxy objective: surveillance, compliance and enforcement regime effectively detects all known threats to offshore environment.	Prevent illegal offshore fishing. Monitor new threats to the MPA habitats.	Illegal fishing in the offshore environment	Number of incidents identified by surveillance system.	Number of incidents and enforcement actions recorded by MMO 2016–2019.	BBSIH record all incidents and enforcement actions. Use of VIIRS, passive acoustic monitoring on seamounts to validate synthetic aperture radar detection rates.	Successful enforcement action undertaken for 100% of confirmed detections.
			Number of successful illegal fisheries enforcement actions. Validation of detection rates.			Cross referencing of different surveillance strategies indicates a 90% correlation in detections.
			Climate change impacts	Sea surface temperatures Ocean current patterns Oxygen levels Ocean pH	Archived remote sensing data. Data from past PIRATA cruises.	Remote sensing of sea surface temperature and ocean current patterns. Water sampling and analysis undertaken on PIRATA Cruises.
						To be established

Objective	Relevant management actions	Threat types	Metric	Baseline	Monitoring	Target
1b. Proxy objective: surveillance, compliance and enforcement regime effectively detects all known threats to offshore environment.	Prevent illegal offshore fishing. Monitor new threats to the MPA habitats.	Plastic pollution	Density of macro and micro plastic in surface waters.	To be established	Plankton tows during offshore research cruises and Yacht citizen science project to measure microplastic pollution.	Density of plastic is below baselines recorded at designation.
			Density of plastic in stomach contents of pelagic species.		Plastic in stomach contents of samples from Research fishing and Seabird monitoring.	Density of plastic recorded in stomach contents is below any published lethal or harmful levels established for indicator or closely related species.
			Density of plastic in benthic sediments.		Plastic in benthic substrate samples collected during Offshore cruises.	
			Noise pollution	Historic AIS data would provide vessel density.	Infer noise pollution from vessel density recorded using AIS.	Estimated noise pollution levels are at least 20% lower inside the MPA boundary compared to areas outside of the MPA.
					Direct measure of anthropogenic noise from acoustic measurements.	Anthropogenic noise recorded at seamounts is lower than baseline levels established at designation.

Objective	Relevant management actions	Metric	Monitoring method	Indicator species	Baseline	Target
1c. No loss of species or reduction in species abundance or ecosystem complexity in inshore areas.	Regulate and manage inshore fisheries Implement Marine Pollution Control Plan Control developments in the MPA Biosecurity controls	Presence and abundance (expressed as density or catch per unit effort) of specific set of indicator species (including species of conservation concern and representative species from different taxa and habitats). Trophic positions for indicator inshore species (using isotope analysis).	Catch per unit effort derived from Catch data from recreational and sports fisheries.	Rockhind grouper Spiny lobster Glasseye snapper Yellow Spotted Moray	To be established	Relative abundance expressed as catch per unit effort is at least 80% of five year average (where time series data are available) or at least 80% of baseline levels set at designation.
			SCUBA transects at 12 sites around the Ascension coast.	Rockhind grouper	Abundance transects undertaken at up to 11 sites since 2002.	Relative abundance expressed as density is at least 80% of five year average (where time series data are available) or at least 80% of baseline levels set at designation.
				Yellow Spotted Moray	To be established	
				Ascension wrasse		
				Bearded fireworm		
			Remote underwater video recording at 12 sites around the Ascension coast.	Rockhind grouper Spiny lobster Yellow Spotted Moray Ascension wrasse Bearded fireworm	To be established	Relative abundance expressed as encounter rate is at least 80% of baseline levels set at designation.

Objective	Relevant management actions	Metric	Monitoring method	Indicator species	Baseline	Target
1c. No loss of species or reduction in species abundance or ecosystem complexity in inshore areas.	Regulate and manage inshore fisheries	Presence and abundance (expressed as density or catch per unit effort) of specific set of indicator species (including species of conservation concern and representative species from different taxa and habitats). Trophic positions for indicator inshore species (using isotope analysis).	Passive acoustic monitoring at 12 sites around the Ascension coast	Overall diversity of inshore diurnal communities	To be established	Relative diversity is at least 80% of baseline levels set at designation
	Implement Marine Pollution Control Plan			Overall diversity of inshore nocturnal communities		
	Control developments in the MPA			Snapping shrimps (Alpheus spp.)		
	Biosecurity controls					
			Collection of isotope samples through Recreational catch sampling.	Rockhind grouper Spiny lobster Glasseye snapper Yellow Spotted Moray	To be established	No change in trophic position of all indicator species.
			Collection of isotope samples through Research fishing	Rockhind grouper fry Ascension wrasse Bearded fireworm Lightfoot crabs	To be established	No change in trophic position of all indicator species.

Objective	Relevant management actions	Metric	Monitoring method	Indicator species	Baseline	Target
1c. No loss of species or reduction in species abundance or ecosystem complexity in inshore areas.	Regulate and manage inshore fisheries	Presence and abundance (expressed as density or catch per unit effort) of specific set of indicator species (including species of conservation concern and representative species from different taxa and habitats). Trophic positions for indicator inshore species (using isotope analysis).	Water sample collection for eDNA monitoring of species presence.	Rockhind grouper	To be established	Presence of all indicator species detected at least once in every sampling year.
	Implement Marine Pollution Control Plan			Spiny lobster Glasseye snapper Yellow Spotted Moray Ascension wrasse Bearded fireworm White Spotted Moray Broadbanded eel All 23 other endemic or near endemic fish species Anchialine endemics		
	Control developments in the MPA			Diadem urchin	To be established	No loss of any indicator species from sample sites compared to baseline.
	Biosecurity controls			Rustic rock snail Bryozoan assemblage Coralline algae assemblage Sponge assemblage		
			SCUBA quadrats at 12 sites around the Ascension coast.			Relative abundance expressed as density is at least 80% of baseline levels set at designation.

Objective	Relevant management actions	Metric	Monitoring method	Indicator species	Baseline	Target
1c. No loss of species or reduction in species abundance or ecosystem complexity in inshore areas.	Regulate and manage inshore fisheries	Presence and abundance (expressed as density or catch per unit effort) of specific set of indicator species (including species of conservation concern and representative species from different taxa and habitats). Trophic positions for indicator inshore species (using isotope analysis).	Settlement panels with DNA identification.	Bryozoan assemblage	To be established	No loss of any indicator species from sample sites compared to baseline.
	Implement Marine Pollution			Coralline algae assemblage		
	Control Plan			Sponge assemblage		
	Control developments in the MPA		Plankton trawls.	Zooplankton assemblage	To be established	Diversity index of plankton species is at least 80% of baseline levels set at designation.
	Biosecurity controls		Turtle nesting abundance and productivity monitoring.	Green turtle	Annual nest counts Nest productivity data	Five year average for nesting attempts is at least 10% higher than baseline set at designation. Nest productivity is at least 80% of average since 2010.

Objective	Relevant management actions	Threat types	Metric	Baseline	Monitoring method	Target
1d. Monitoring, regulation and management regime effectively tackles all known threats to inshore ecosystems.	Implement Marine Pollution Control Plan Control developments in the MPA Biosecurity controls	Pollution discharges from the island.	Volume and concentration of discharge.	To be established	Water quality sampling	No increase in volume and concentration of discharges relative to baseline set at designation. Area impacted by pollution discharges does not exceed that recorded at designation baseline.
			Difference in water quality parameters between discharge plumes and surrounding water.			
			Difference in species diversity and abundance between discharge plumes and surrounding water.			
			Number of spills.			
			Scale and impact of any incidents.	To be established	Collation of spill incidents reports	No spill incidents occur.
			Amount of litter removed during beach and dive cleans.			
			Density of plastic in sediment samples.			
			Amount of plastic in stomach contents of seabirds and fish.			
		Marine litter including plastics.	Amount of litter removed during beach and dive cleans.	Beach litter data collected since 2017	Marine litter removal data	No increase in litter accumulation rates.
			Density of plastic in sediment samples.			
			Amount of plastic in stomach contents of seabirds and fish.			
			Amount of plastic in stomach contents of seabirds and fish.			
			Amount of plastic in stomach contents of seabirds and fish.		Benthic sampling for plastic pollution Plankton tows to measure microplastic pollution. Plastic in stomach contents of samples from Research fishing and Seabird monitoring	No increase in plastic and microplastic levels relative to baseline conditions.
			Amount of plastic in stomach contents of seabirds and fish.			
			Amount of plastic in stomach contents of seabirds and fish.			
			Amount of plastic in stomach contents of seabirds and fish.			

Objective	Relevant management actions	Threat types	Metric	Baseline	Monitoring method	Target
1d. Monitoring, regulation and management regime effectively tackles all known threats to inshore ecosystems.	Implement Marine Pollution Control Plan Control developments in the MPA Biosecurity controls	Biosecurity	Number of new marine species introductions.	To be established	Water sample collection for eDNA monitoring of high risk invasives.	No new non-native species recorded.
			Number of infringements of marine biosecurity regulations.		Data on inspections, detections, responses and enforcement recorded by Biosecurity Officers.	Fewer than five serious infringements annually.
			Outcome of response actions.			Effective response undertaken for all incidents.
Objective	Relevant management actions	Metric	Climate change	To be established	Water quality sampling	To be established
			Sea surface temperatures Ocean current patterns Oxygen levels Ocean pH			
1e. Maintain size distribution and age at maturity of species in inshore areas.	Regulate and manage inshore fisheries Implement Marine Pollution Control Plan	Length and age at maturity of specific set of indicator species (including species of conservation concern and representative species from different taxa and habitats).	Recreational catch sampling	Rockhind grouper	Emma Nolan's PhD data. Recreational catch monitoring 2015- 2020	Length distribution, length at age and length at maturity are within 10% of historical average or baseline set at MPA designation for all indicator species.
				Yellowfin tuna	Kate Downes' PhD data. Recreational catch monitoring 2015-2020	
				Glasseye snapper	To be established	
				Spiny lobster	To be established	

Objective	Relevant management actions	Metric	Monitoring method	Indicator species	Baseline	Target
1e. Maintain size distribution and age at maturity of species in inshore areas.	Regulate and manage inshore fisheries. Implement Marine Pollution Control Plan.	Length and age at maturity of specific set of indicator species (including species of conservation concern and representative species from different taxa and habitats).	Research fishing	Rockhind grouper Yellowfin tuna Glasseye snapper Spiny lobster Ascension wrasse Black triggerfish	To be established	Length distribution, length at age and length at maturity are within 10% of historical average or baseline set at MPA designation for all indicator species.
			Remote underwater video recording - Stereo RUVs with scale pole to allow length estimation from still images.	Rockhind grouper Yellowfin tuna Glasseye snapper Spiny lobster Ascension wrasse Black triggerfish	To be established	
			Measure 100 female nesting turtles annually.	Green turtle	To be established	
Objective	Relevant management actions	Metric	Monitoring method	Indicator species	Baseline	Target
1f. No loss of genetically distinct sub-populations from inshore or offshore areas.	Recognise genetically distinct sub-species in legislation.	Presence and distribution of genetically distinct sub-populations of indicator species.	Collection of genetic samples during Recreational catch sampling.	Rockhind grouper	Need to establish if genetic subpopulations exist - use St Helena as outgroup.	Presence of all genetically distinct sub-populations of indicator species at least once in every four years of sampling.
				Yellowfin tuna	To be established	
			Collection of genetic samples from research fishing during Offshore cruises	Yellowfin tuna Bigeye tuna Galapagos shark	To be established	

Objective	Relevant management actions	Metric	Monitoring method	Habitat types	Baseline	Target
1g. No reduction in the extent or condition of key habitats.	Implement Marine Pollution Control Plan.	Distribution and extent of key benthic habitats in inshore and offshore areas. Levels of key physical and chemical parameters compared to baseline references.	Dive and ROV surveys to measure habitat extent and score physical damage to habitat.	Rhodolith beds Rocky reef Sandy substrate	To be established through Multibeam echosound survey of inshore habitats.	Area of monitored habitat types is within 95% of baselines.
	Control developments in the MPA.			Beaches Coastal plateau Anchialine pools	Aerial photographs from 2006 and 2015.	Area of monitored habitat types is within 95% of baselines.
	Non-native species control.			Rhodolith beds Rocky reef Sandy substrate Anchialine pools	To be established	Physical and chemical parameters are within 20% of five year seasonal average (if time series data are available) or within 20% of baseline conditions.
	Conduct regular litter clearance.					
	Restoration of turtle nesting beaches.					
			Remote sensing of ocean current patterns, sea surface temperature, chlorophyll, noise pollution.	Pelagic habitats	Archived remote sensing data.	Physical and chemical parameters are within 20% of five year seasonal average.
			Video transects during offshore research cruises to score physical damage to habitat.	Sea mounts Hydrothermal vents	To be established	No physical damage recorded.

Objective	Relevant management actions	Metric	Monitoring method	Indicator species	Baseline	Target
2a. People living on Ascension have access to recreational and fishing opportunities that are equitably shared and enjoyed by the community.	Regulate and manage inshore fisheries. Guidance and regulations for sports fishing and ecotourism.	Number of fishing permits issued. Fisherman satisfaction surveys.	Fishing permit recorded at point of issue by Conservation. Annual total published. Annual/biennial repetition of satisfaction surveys with responses from at least 20 fishermen.		Number of fishing permits issued in first year of issue to people living on Ascension. Results of fishermen satisfaction surveys carried out in first year of MPA.	Number of fishing permits issued as a percentage of the Ascension population is within 10% of baseline. At least 75% of respondents to questionnaire report being satisfied or very satisfied with management of the fishery.
Objective	Relevant management actions	Metric	Monitoring method	Indicator species	Baseline	Target
2b. As a minimum, no harvested stocks in the inshore zone fall below maximum sustainable yield.	Regulate and manage inshore fisheries.	Catch data and maximum sustainable yield for all harvested species.	Catch per unit effort derived from Catch data from recreational and sports fisheries.	Rockhind grouper Spiny lobster Moray eel Glasseye snapper Squirrelfish	To be established. Maximum sustainable yield for each species still to be estimated.	All stocks above maximum sustainable yield in all years.

Objective	Relevant management actions	Metric	Monitoring method	Indicator species	Baseline	Target
2c. Ecological relationships between harvested, dependent and related species are maintained in inshore areas.	Regulate and manage inshore fisheries.	Abundance of key dependent and related species. Trophic level of harvested, dependent and related species.	SCUBA transects at 12 sites around the Ascension coast.	To be established through development of ecosystem model and stomach content analysis.	To be established	For all indicator dependent species, abundance expressed as density is at least 80% of baseline levels set at designation.
			Remote underwater video recording at 12 sites around the Ascension coast.			
			Collection of isotope samples through Research fishing.			No change in trophic position of all indicator dependent species.

Objective	Relevant management actions	Metric	Monitoring method	Baseline	Target
2d. Ascension is recognised as one of the world's best destinations to enjoy responsible sports fishing and ecotourism activities that have no negative impact on the behaviour or health of protected species.	Guidance and regulations for sports fishing and ecotourism Global public engagement campaign	Number of tourists visiting Ascension. Visitor satisfaction surveys.	Primary purpose of visit recorded on visa application forms. Collect data from immigration.	Number of tourists identifying as fishermen on visa applications from 2014-2016.	The number of fishing tourists visiting Ascension increases each year post-designation and is 50% higher than 2017 baseline by 2025 (subject to outcome of 'Future of Ascension' discussions).
		Level of brand recognition amongst sports fishing and ecotourism groups			
		Scores from compliance checks on licensed operators.			
		Number of infractions reported.	Questionnaires distributed to tourists at departure.	To be established	At least 80% of tourists report being satisfied or very satisfied with their visit to Ascension.
		Number of trips/ people engaging in sports fishing or ecotourism activities	Repeat brand recognition survey with target audience in sports fishing and ecotourism operators and consumers every two years	To be established	50% increase in proportion of respondents aware of Ascension as a destination. At least 80% of respondents with knowledge of Ascension report positive association.
			Annual compliance checks carried out on all licensed sports fishing and ecotourism businesses.	To be established	At least 90% compliance rate across all inspection criteria and all businesses. Infractions are reported in less than 5% of trips and less than 1% of people engaging activities.

Objective	Relevant management actions	Metric	Monitoring method	Baseline	Target
2e. A significant proportion of revenue from sports fishing and ecotourism is retained on island.	Tourism development strategy	Total tourist spend. Tourist spend disaggregated by origin of tourists and means of booking services. Income to businesses licensed on Ascension (direct and indirect).	As part of business permit, require tourist sector businesses to collect and share data on the number of customers, their origin and their spend on an annual basis.	To be established	Total tourist spend increases each year post-designation and is 50% higher than 2017 baseline by 2025 (subject to outcome of 'Future of Ascension' discussions).
			Questionnaires/face to face surveys of visitors at departure to give estimate of average indirect spend.		At least 50% of total tourist spend goes to businesses licensed on Ascension.
2f. Future developments are assessed and designed to be compatible with the conservation objectives of the MPA.	Control developments in the MPA	Number of development proposals and number of accompanying Environmental Impact Assessments (EIA). Scale of residual impacts predicted.	Collation of development proposals and EIAs undertaken by MPA Officers.	To be established	EIAs undertaken for 100% of development proposals in the MPA. No proposals that would have significant residual impacts proceed.
Objective	Relevant management actions	Metric	Monitoring method	Baseline	Target
3a. The Ascension Island MPA becomes a world-renowned site for the scientific study of marine ecosystems	Develop Ascension as a scientific research hub	Number of research permits. Number of scientific expeditions. Number and citation record of peer-reviewed papers published All metrics split by scientific discipline	Record number of permits issued and expeditions undertaken. Follow up requirement of permit that AIGCFD notified of all publications	Research permit records from 2014 Records of expeditions and publications since 2014	The number of research permits issued, expeditions undertaken and papers published increases each year post-designation and is 50% higher than 2014-2017 baseline by 2025'

Objective	Relevant management actions	Metric	Monitoring method	Baseline	Target
3b. Ascension becomes an active and influential member of international networks of MPA managers, and initiates and participates in collaborative projects.	Develop Ascension as a scientific research hub.	Number of network events attended. Number and value of collaborative projects.	Record events attended. Financial records of external grant income.	Five year average of event attendance and external grant funding 2015 to 2020.	Minimum of one international event attended in person each year. Value of collaborative projects 50% higher than baseline by 2025.
3c. Every person on Ascension is aware of the MPA and its purpose.	Ascension Island public engagement campaign.	Proportion of Ascension population aware of the MPA and its aims. Proportion of Ascension population expressing support for the MPA. Number of people participating in on-island events disaggregated by demographic groups.	Biennial questionnaire and face to face surveys with sample of island population.	Baseline questionnaire results.	100% awareness of MPA amongst the Ascension public. At least 80% of people living on the island report being supportive or very supportive of the MPA.
			Record of people attending MPA events split by demographic characteristics.	To be established	At least 50% of Ascension population participates in at least one MPA event. All demographic groups are participating in MPA events.

Objective	Relevant management actions	Metric	Monitoring method	Baseline	Target
3d. The Ascension MPA and the conservation and scientific work being undertaken reaches a global audience leading to increased political and financial support.	Global public engagement campaign	Number of social media followers. Number of media articles. Value of crowd funding campaigns.	Analytics provided by social media platforms. Maintain record of media articles. Financial records of crowd funding income.	Baseline data on social media engagement, number of media articles and crowd funding between 2018 and 2020.	Number of social media followers, engagements and crowd funding income increases by 100% from baseline by 2025
Objective	Relevant management actions	Metric	Monitoring method	Baseline	Target
4a. The legal and operational framework for the MPA (Primary and secondary legislation, regulations, management plan) is fit-for-purpose and enforcement action is effective.	Effectively enforce regulations	Primary and secondary legislation, regulations and management plan in place. Number of reported breaches of legislation and number of enforcement actions. Number of incidents of damaging activities not covered by legislation.	<div>Legislation and Management Plan are published on the MPA website.</div> <div>Record kept of reported breaches of legislation and enforcement by Police and Conservation Directorate.</div> <div>Record kept of incidents damaging the MPA.</div>	None - no MPA legislation or management in place prior to designation.	<div>Primary and secondary legislation and Management Plan adopted within two years of designation.</div> <div>All reported breaches of legislation investigated and effective enforcement action taken where appropriate.</div> <div>All activities that could potentially damage the MPA are covered by legislation or policies.</div>

Objective	Relevant management actions	Metric	Monitoring method	Baseline	Target
4b. Management actions are designed to deliver the MPA objectives, based on the best available information and subject to regular monitoring and review.	Strengthen governance structures. Monitoring and evaluation regime.	Proportion of management actions completed.	Completion of management actions recorded in annual review.	None	80% of actions in annual work plan completed each year.
		Proportion of operational objectives achieved.	Achievement of operational objective <u>targets recorded</u> in annual review.		100% of operational objective targets met.
		Review of MPA performance completed.	MPA performance review published on MPA website.		Review published by March each year.
Objective	Relevant management actions	Metric	Monitoring method	Baseline	Target
4c. The Ascension Island community is effectively engaged in MPA governance structures and benefits equitably from management decisions.	Strengthen governance structures.	Proportion of management documents with external review and public consultation.	Records kept of responses to consultations and attendance at consultation events.	Response to MPA Evidence and Options Consultation.	All major management decisions have input from stakeholders.
		Number of people contributing to MPA reviews and consultations split by demographic groups.			At least 20% of the Ascension community participates in at least one consultation exercise over the five year course of the Management Plan.
		Number of people on the advisory committees split by different stakeholder groups and the number of documents and decisions they advise on. Proportion of people on Ascension who are satisfied with opportunities to contribute to MPA.	Records of committee membership split by demographic groups.		All committees have a minimum of six members throughout the five year management period. All demographic groups represented across committees.

Objective	Relevant management actions	Metric	Monitoring method	Baseline	Target
4c. The Ascension Island community is effectively engaged in MPA governance structures and benefits equitably from management decisions.	Strengthen governance structures.	Proportion of people on Ascension who report having benefited from the MPA split by demographic group.	Questionnaire/face to face interviews conducted with a of sample of Ascension population.	To be established	80% of Ascension population report being satisfied with opportunities to contribute to MPA management. 80% of all demographic groups making up the Ascension population report a benefit from the MPA.
4d. Human and financial resources are secured to deliver effective management.	Sustainable financing strategy.	Number of MPA staff. Staff skills complement. Amount and duration of core funding secured.	Staff retention records	Staffing levels at designation.	Full team of 5.5FTE MPA staff. Vacancies filled with maximum of three month gap.
		Staff training records		Staff skill complement at designation.	All core skills present within MPA management team.
			MPA budget and annual financial review	Secured funding at designation.	Core management costs met and secured for minimum of three year periods. Total funding for MPA projects from external sources is at least 100% of core budget.

Appendix 2. Monitoring Management Implementation

The table below lists the management actions identified in the MPA Management Plan. It describes the targets for each action and the means by which we will verify whether the targets have been met. Highlighted actions are those where the inputs (resources allocated to deliver the action) will also be monitored to ensure they are providing good value.

Title	Description	Operational objective	Targets	Means of Verification
1. Prevent illegal offshore fishing	Establish effective surveillance, compliance and enforcement regime to prevent illegal commercial fishing within the MPA. This will use a risk-based approach and be based on remote satellite surveillance technology and enforcement via the flag state of offending vessels. More detail is provided in the Offshore Fisheries Compliance and Enforcement Strategy.	1a, 1b.	Year 1: Surveillance system in operation based on risk assessment. Staff trained. System for monitoring effectiveness established. Year 5: All cases of suspect vessels in the MPA are investigated and appropriate enforcement action taken. Evidence collection is always of the standard required for prosecution. Failures in investigations and enforcement are analysed and used to refine procedures and capture lessons learnt.	Annual report from BBSIH detailing surveillance activity and reporting on incidents. Staff training records.
2. Monitor new threats to the MPA habitats	Conduct annual horizon scanning exercise to identify threats to the MPA not currently being managed. This will be achieved by reviewing activities underway or proposed in the Ascension MPA and the experience of other MPAs in the Blue Belt and Big Ocean networks. Newly-identified threats will be incorporated into management and monitoring workplans as appropriate.	1b, 1d	Year 1: Threat assessment published. Year 5: Annual threat assessments published. All known threats quantified or under research.	Record of threat assessment being published on MPA website. Independent Scientific Advisory Panel review of threat identification and monitoring.
3. Regulate and manage inshore fisheries	Introduce Inshore Fisheries legislation including a permit and licence scheme for all inshore fishing. Establish a Stakeholder-led adaptive management system to regulate inshore fisheries based on data collected by fishermen and AIGCFD. The Inshore Fisheries Advisory Committee will play a key role in identifying the need for management and the most appropriate measures. The strategy will include actions to publicise the new system including public meetings, signage and local news articles. More detail is provided in the Inshore Fisheries Management Strategy.	1c, 1e, 1f, 2b, 2c	Year 1: Inshore Fisheries legislation drafted and management system established. Public meetings held and design for leaflets and signs completed. Year 5: Monitoring system in place for all exploited stocks. Catch data being supplied by at least 70% of fishermen. Annual assessments made on exploited stocks by the IFAC. Evidence-based management measures agreed and introduced if required. Signs present at all main fishing areas. Leaflets available at key sites for visitors and video shown at arrivals hall in airport. Information on fishing regulations included with all contracts.	Legislation published on website. Photographs and feedback from public meetings. Photographs of signs, leaflets and video on display. Record of data supplied relative to number of people on fishing register. Minutes of IFAC and AIC meetings.

Title	Description	Operational objective	Targets	Means of Verification
4. Implement Marine Pollution Control Plan	Review and improve on-island pollution control measures and spill response capability through implementation of recommendations in the Marine Pollution Control Plan.	1c, 1g	<p>Year 1: Marine pollution control plan published and pollution response capability assessed by Maritime and Coastguard Agency.</p> <p>Year 5: Adequate bunding and spill control measures in place around all fuel storage sites. Effective treatment and disposal of all waste effluents. Emergency spill containment plans and equipment in place.</p>	Record of pollution control plan, MCA review and emergency spill containment plans being published on MPA website.
5. Review Protected Areas legislation	Review the National Protected Areas Ordinance, Wildlife Protection Ordinance and Harbours Ordinance to ensure they are compatible with the MPA Regulations and effective at preventing damaging activities in the MPA.	1c, 1g	<p>Year 1: National Protected Areas, Wildlife Protection and Harbour Ordinances reviewed and deficiencies identified.</p> <p>Year 5: Updated Ordinances drafted as required.</p>	Review document produced. Updated Ordinances published in Gazette and online.
6. Recognise genetically distinct subspecies in legislation	Carry out research to identify the presence of any genetic sub-populations of charismatic or exploited species within the MPA. Review and if necessary update the Wildlife Protection Ordinance and feed into development of inshore Fisheries legislation to include genetically-distinct populations.	1f	<p>Year 1: Begin collecting samples from Ascension recreational catch</p> <p>Year 5: Evidence for inclusion of separate sub-populations of one species considered.</p>	Report detailing research and recommendations published on website. Any update to legislation published on website.
7. Control developments in the MPA	Establish effective development control and/or licensing system incorporating robust Environmental Impact Assessment (EIA).	1g, 2f	<p>Year 1: Pilot EIA process with developments undertaken by AIG Operations</p> <p>Year 5: EIA and development control process and/or legislation in place covering all developments in the MPA.</p>	Documented examples of EIA undertaken for AIG operations. Updated legislation/policy published on website.
8. Non-native species control	Control invasive non-native species in coastal Nature Reserves to protect sea turtle and seabird nesting habitat and maintain the natural character of these sites. This will be achieved through the mechanical removal and chemical control of invasive plant species and the targeted poisoning of rodents around sensitive sites.	1c, 1g	<p>Year 1: Complete eradication of non-native shrubs in all coastal nature reserves. Establish rodent monitoring protocol.</p> <p>Year 5: Extend buffer zones clear of non-native shrubs further from coastal nature reserves. Targeted rodent control programme initiated around all coastal nature reserves.</p>	Maps and photographs showing shrub cover in protected areas and buffer zones. Records of rodent trapping effort and catch efficiency.

Title	Description	Operational objective	Targets	Means of Verification
9. Biosecurity controls	Implement Biosecurity Strategy and associated legislation that establish inspections of vessel hulls and ballast water records, surveillance monitoring and measures to reduce the risk of non-native species introductions to Ascension.	1c, 1f, 1g	<p>Year 1: Begin a system of risk-based inspection and regular surveillance monitoring. Develop sequence library of high risk introductions for eDNA monitoring.</p> <p>Year 5: Biosecurity inspections are a routine part of entry procedures to Ascension. Entry and import standards have been refined based on previous success at preventing introductions and the number of interceptions and non-compliance events are low due to a high level of awareness. Regular surveillance monitoring undertaken including eDNA protocols and visual transects.</p>	<p>Legislation published on website.</p> <p>Records of inspections carried out.</p> <p>Record of entries into sequence library.</p> <p>Records of eDNA surveillance monitoring.</p>
10. Conduct regular litter clearance	Conduct regular volunteer litter clearance events to prevent the accumulation of marine plastics and other debris. This will be done around beaches and on SCUBA in shallow water habitats.	1g	<p>Year 1: Four beach cleans involving a minimum 80 people undertaken.</p> <p>Year 5: Four most popular beaches cleaned every six months. Other sites cleaned annually. Two dive cleans undertaken at popular fishing sites. In total involving a minimum 120 people.</p>	<p>Photographs of beach cleans and record of participants.</p> <p>Record of amount of litter collected separated by category.</p>
11. Restoration of turtle nesting beaches	Remove the legacy concrete structures and invasive tree roots from Long Beach. Identify barriers to the landward migration of beaches and remove any where feasible.	1g	<p>Year 1: Identify barriers to the landward migration of beaches.</p> <p>Year 5: all concrete structures and invasive tree roots removed from Long Beach. Barriers to landward migration of beaches removed where this is feasible.</p>	<p>Report identifying barriers published on website.</p> <p>Before and after photographs showing barrier removal.</p>
12. Tourism development strategy	Depending on outcome of 'Future of Ascension' discussions, develop tourism growth strategy. Employ a tourism development officer to lead an online marketing campaign and provide on-island business development support.	2d, 2e	<p>Year 1: Future of Ascension work provides clear direction for future tourist potential.</p> <p>Year 5: If appropriate, Tourism Growth strategy produced and implemented. Tourist development officer employed by AIG. Marketing strategy results in at least 300 tourists per year visiting Ascension. Support at least three island-based businesses to develop sports fishing and ecotourism.</p>	<p>Publication of 'Future of Ascension' recommendations.</p> <p>Tourism growth strategy published on website.</p> <p>Record of tourist visas.</p> <p>Record of business support funding.</p>

Title	Description	Operational objective	Targets	Means of Verification
13. Guidance and regulations for sports fishing and ecotourism	Regulations and best practice guidance put in place governing the conduct of sports fishing and ecotourism businesses. Business licence renewal linked to compliance. Regulations and guidelines on avoidance of disturbance to wildlife provided with employment contracts and entry permits and publicised through videos, briefings, leaflets and signs at key locations.	2d	Year 1: Inshore Fisheries legislation covering sports fishing operations drafted and enacted. Review of Business Permit process. Videos, briefing presentations and designs for leaflets and signs produced. Year 5: Best practice guidance documents for sports fishing and ecotourism produced via stakeholder consultation. Signs present at all main tourist areas. Leaflets available at key sites for visitors Video shown at arrivals hall and cinema. Leaflet included with all contract packs.	Legislation published on website. Photographs showing signs and leaflets. Record of consultation responses on guidance documents. Guidance published on website.
14. Sustainable financing strategy	Assess all potential sources of funding for the MPA and pursue the most promising through, for example, grant applications, permit fees and sponsorship. Preferentially target sources of long-term secured income.	3a	Year 1: Produce sustainable financing strategy. Year 5: Reduce reliance on UK Government funding to less than 33% of total MPA management costs.	Sustainable financing strategy published on website. Annual financial review published on website showing income streams for MPA.
15. Develop Ascension as a scientific research hub	Develop a 'promotional package' for visiting scientists to sell Ascension as a research hotspot. Develop facilities for visiting researchers including field equipment, lab upgrade and accommodation. Provide a data collection service for institutions that have research projects that are consistent with the MPA objectives. Co-supervise PhD and MSc projects on marine research topics identified in Monitoring and Research Plan.	3c	Year 1: Promotional package completed and distributed to all UK and relevant international academic institutions. Identify gaps in provision for visiting researchers. Year 5: Facilities developed to meet the main needs of researchers. Legal and insurance procedures to lease facilities and equipment to visiting organisations established. Data collection service including trained AIGCFD staff, equipment, protocols and sample transport procedures in place and being used by external partners.	Promotional package published on website. List of institutions that packages have been distributed to. Record of gap analysis. Before and after photographs of lab facilities. Record of data collection service being used on projects.

Title	Description	Operational objective	Targets	Means of Verification
16. Ascension Island public engagement campaign	<p>Undertake a public engagement campaign that aims to increase levels of knowledge and interest in the MPA amongst the Ascension population. This will include:</p> <ul style="list-style-type: none"> ■ Guided tours of the turtles, seabirds and land crabs ■ Development of a visitor centre at Long Beach ■ Annual marine festival ■ Public talks ■ Film screenings ■ Articles in the local press ■ School field trips ■ Dive lessons for pupils <p>It will also encourage community participation in the management of the MPA through membership of the IFAC, public consultations on governance issues and volunteer events such as litter cleans. More detail is provided in the Public Engagement Strategy.</p>	3a, 3b, 3d	<p>Year 1:</p> <ul style="list-style-type: none"> ■ At least 200 people participate in guided tours. ■ Opening of the visitor centre. ■ Marine festival initiated to mark designation of the MPA. ■ At least two public meetings held on Ascension. ■ Two screenings of relevant films. ■ Six articles produced for local press. ■ One school field trip undertaken. ■ Equipment and procedures in place to teach children to dive <p>Year 5:</p> <ul style="list-style-type: none"> ■ At least 200 people attending guided walks annually ■ Marine Festival is an annual event attended by at least 150 people ■ Annual public meetings on Ascension to disseminate results of work in the MPA. ■ Three screenings a year of relevant films. ■ Monthly articles produced for local press and blogs ■ Annual school field trip and additional beach clean trips undertaken. ■ At least three children trained each year to PADI Open Water standard 	<p>Photographs of events and record of participants.</p> <p>Photographs of the visitor centre.</p> <p>Copies of articles.</p> <p>Dive qualification records.</p>
17. Global public engagement campaign	<p>Undertake an engagement campaign aimed at the global community to raise awareness and support for the Ascension MPA and by extension the island. This will include a strong social media presence, the production of videos, attendance at international conferences, membership of networks such as Big Ocean, the development of collaborations with other Overseas Territories and MPAs and the creation of an exhibit showcasing Ascension's marine environment at a UK visitor attraction. More detail is provided in the Public Engagement Strategy.</p>	4d	<p>Year 1: One post a week on Twitter, Facebook & Instagram. Two videos of work undertaken in the MPA produced. One international conference attended by AIGCFD staff. Membership of Big Ocean network.</p> <p>Year 5: Two - three posts a week on Twitter, Facebook & Instagram. At least six videos of work undertaken in the MPA produced and distributed via social media each year. Annual attendance at a minimum of one conference by AIGCFD staff to promote MPA. A permanent display and close collaboration is established with a UK institution. At least two collaborative projects developed with other Blue Belt OTs or MPAs.</p>	<p>Copies of social media posts and videos.</p> <p>Records of conference attendance and presentations.</p> <p>Photographs of display in UK institution.</p> <p>Progress reports for collaborative projects.</p>

Title	Description	Operational objective	Targets	Means of Verification
18. Strengthen governance structures	Build on governance structures established at MPA designation to ensure there is strong leadership, accountability and involvement of the island community and other key stakeholders in decision making.	4b, 4c	Year 1: MPA governance arrangements have been agreed by the Ascension Island Council. Scientific Advisory Committee established. Year 5: Governance structures are established and demonstrated input into annual setting of workplans and 5 year review of Management Plan.	Minutes of Council meetings. Terms of Reference and membership records of Committees. Committee inputs into annual MPA review published on website.
19. Effectively enforce regulations	The MPA regulations and those in other pieces of domestic legislation that are relevant to the MPA are effectively enforced to ensure there is a high level of compliance and support amongst those using the MPA.	1b, 4a	Year 1: Regulations are drafted following consultation and introduced along with a public information campaign. MPA Officers are warranted and trained to carry out enforcement action. Year 5: Detected infringement of the regulations is at a low level. Appropriate enforcement action is taken in all cases of infringement.	Legislation published on website. Copies of warrants. Summary record of infringements and action taken published on website.
20. Meet International obligations	Implement ICCAT obligations for offshore waters, supply data on recreational catches and introduce minimum landing size for blue marlin into inshore fisheries legislation.	4a	Year 1: Establish catch reporting system including logbooks and associated information campaign for recreational fishermen. Year 5: Ascension achieving and reporting compliance with all ICCAT obligations. Catch data being supplied by at least 70% of recreational fishermen.	Copies of completed logbooks. Record of public meetings and press articles. ICCAT assessments. Record of catch data supplied relative to number of people on fishing register.

Title	Description	Operational objective	Targets	Means of Verification
21. Data management system	Establish robust data management system to collate information from biological, socio-economic and enforcement monitoring.	4b	<p>Year 1: Deficiencies in data management capacity and procedures identified.</p> <p>Year 5: Robust data management processes in place and being followed by all MPA staff and collaborators. Data storage is secure.</p>	<p>Report on data management deficiencies.</p> <p>Report on improvements in data management system.</p>
22. Monitoring and evaluation regime	Establish a monitoring and evaluation regime such that all actions are monitored and outcome evaluation is built into annual workplans.	4b	<p>Year 1: Monitoring methods identified for all management actions and incorporated into the Monitoring, evaluation and research strategy.</p> <p>Year 5: Completed cycles of monitoring, evaluation and management refinement demonstrate effective adaptive approach in place.</p>	<p>Strategy published on website.</p> <p>Annual MPA Review published on website.</p>

Appendix 3. Ascension-specific protected areas management effectiveness tracking tool

The primary aim of the tracking tool is to allow external organisations to measure the effectiveness of the Ascension Island MPA using a method common across other protected areas.

This tool is based on the most up to date version of WWF Management Effective Tracking Tool (METT; Stolten et al. 2007). As encouraged in the guidance, the standard METT has been adapted to suit local evaluation needs. This has been achieved by:

- Removing a small number of questions that are not relevant to Ascension (marking boundaries and indigenous people)
- Refining some questions by specifying what is meant by the scoring criteria in the specific context of the Ascension MPA
- Incorporating additional questions on climate change response, social inclusion and cooperation with neighbouring protected areas.

There is still sufficient overlap with the standard METT to allow comparison with other protected areas.

The Assessment will be compiled annually by a member of the Ascension Island Government Conservation and Fisheries Directorate with input from the MPA review panel. Evidence to support the assessment of many of the criteria will be produced through the Monitoring, Evaluation and Research Strategy.

Issue	Criteria	Score	Comment/ Explanation	Next steps	Evidence from relevant objective monitoring
1. Legal status	MPA not gazetted	0			4a.
	Agreement that the MPA will be gazetted, but process not begun	1			
	MPA is in the process of being gazetted	2			
	MPA is gazetted	3			
2. Protected area regulations	No regulations for controlling activities in the MPA	0			4a
	Some regulations for controlling activities in the MPA, but not all major threats controlled	1			
	Regulations controlling most activities that present a threat to the MPA are in place, but some gaps remain	2			
	Regulations controlling all activities that present a threat to the MPA are in place	3			
3. Law enforcement	Staff have no effective capacity/resources to enforce MPA legislation	0			4a
	There are major deficiencies in staff capability/resources to enforce MPA legislation	1			
	Staff have acceptable capacity/resources to enforce MPA legislation but some deficiencies remain	2			
	Staff have no excellent capacity/resources to enforce MPA legislation	3			
4. Protected area objectives	No firm objectives agreed for the MPA	0			4b
	The MPA has agreed objectives, but is not being managed according to them	1			
	The MPA has agreed objectives but is only being partially managed according to them	2			
	The MPA has agreed objectives and is being managed to meet them	3			
Question 5 on protected area design removed as MPA covers entire EEZ and so any change in design would reduce protection					
Question 6 on boundary demarcation removed as not practical in a Large scale MPA					
7. Management plan	There is no management plan for the MPA	0			4a
	The MPA management plan has been prepared but is not being implemented	1			
	The MPA management plan has been prepared and is being partially implemented	2			
	The MPA management plan has been prepared and is being fully implemented	3			
7a	The planning process allows opportunities for stakeholders to influence the management plan	+1			4b, 4c
7b	There is an established schedule and process for periodic review and updating of the management plan	+1			4a
7c	The results of monitoring, evaluation and research are routinely incorporated into planning	+1			
8. Regular work plan	No regular work plan exists	0			
	A regular work plan exists but few of the activities are being implemented	1			
	A regular work plan exists and many of the activities are being implemented	2			
	A regular work plan exists and all of the activities are being implemented	3			

9. Information on the natural resources within the MPA	There is little or no information available on the critical habitats, species, ecosystem processes and cultural values of the MPA	0			1a, 1c, 1e, 1f, 1g
	Information available on the critical habitats, species, ecosystem processes and cultural values of the MPA is not sufficient to support planning and decision making	1			
	Information available on the critical habitats, species, ecosystem processes and cultural values of the MPA is sufficient to support most key areas of planning and decision making	2			
	Information available on the critical habitats, species, ecosystem processes and cultural values of the MPA is sufficient to support all key areas of planning and decision making	3			
10. Protection system	Permits do not exist or are not effective at controlling resource use	0			4a
	Permits are only partially effective at controlling resource use	1			
	Permits are moderately effective at controlling resource use	2			
	Permits are largely or wholly effective at controlling resource use	3			
11. Research	There is no survey or research work taking place within the MPA	0			3a
	There is a small amount of survey and research work, but it is not directed towards the needs of MPA management	1			
	There is a considerable amount of survey and research work, but it is not directed towards the needs of MPA management	2			
	There is a comprehensive, integrated programme of survey and research work, which is relevant to management needs	3			
12. Management action	Active management is not being undertaken	0			4b
	Very few of the requirements for active management of critical habitats, species, ecosystem processes and cultural values are being implemented	1			
	Many of the requirements for active management of critical habitats, species, ecosystem processes and cultural values are being implemented but some key issues are not being addressed	2			
	Requirements for active management of critical habitats, species, ecosystem processes and cultural values are being substantially or fully implemented	3			
13. Staff numbers	There are no staff	0			4d. Human and financial resources are secured to deliver effective management
	Staff numbers are inadequate for critical management activities	1			
	Staff numbers are below optimum for critical management activities	2			
	Staff numbers are adequate for the needs of the protected area	3			
14. Staff training	Staff lack the skills needed for protected areas management	0			4d
	Staff training and skills are low relative to the needs of the protected area	1			
	Staff training and skills are adequate, but could be improved to achieve fully the objectives of management	2			
	Staff training and skills are aligned with the management needs of the protected area	3			
Are staff adequately trained to fulfil management objectives					
Are there enough people employed to manage the protected area?					

22. Interaction with fisheries Regional management organisation (ICCAT)	There is no contact between MPA managers and ICCAT	0				
	There is contact between MPA managers and ICCAT, but little cooperation	1				
	There is contact between MPA managers and ICCAT, but only some cooperation	2				
	There is regular contact between MPA managers and ICCAT and substantial cooperation on management	3				
Question 23 on Indigenous people removed because Ascension does not have an indigenous population						
24. Local communities	Local communities have no input into decisions relating to management of the MPA	0				4c, 3c
	Local communities have some input into decisions relating to management of the MPA but no direct role in management	1				
	Local communities directly contribute to some input into discussions relating to management but their involvement could be improved	2				
	Local communities directly participate in all decisions relating to management	3				
24a	There is open communication and trust between the local community, stakeholders and MPA managers	+1				
24b	Programmes to enhance community welfare, while conserving protected area resources, are being implemented	+1				
24c	Local community actively support the MPA	+1				
25. Economic benefit	The protected area does not deliver any economic benefits to local communities	0				2e.
	Potential economic benefits are recognised and plans to realise these are being developed	1				
	There is some flow of economic benefits to local communities	2				
	There is a major flow of economic benefits to local communities from activities associated with the protected area	3				
26. Monitoring and evaluation	There is no monitoring and evaluation in the MPA	0				4b
	There is some ad hoc monitoring and evaluation, but no overall strategy and/or no regular collection of results	1				
	There is an agreed and implemented monitoring and evaluation system but results do not feed back into management	2				
	A good monitoring and evaluation system exists, is well implemented and used in adaptive management	3				
27. Visitor facilities	There are no visitor facilities or services despite an identified need	0				
	Visitor facilities and services are inappropriate for current levels of visitation	1				
	Visitor facilities and services are adequate for current levels of visitation but could be improved	2				
	Visitor facilities and services are excellent for current levels of visitation	3				
28. Commercial and sports tourism and fishery operators	There is little or no contact between managers and tourism or sports fishery operators using the MPA	0				2d
	There is contact between managers and tourism or sports fishery operators but this is largely confined to administrative or regulatory matters	1				
	There is limited cooperation between managers and tourism or sports fishery operators to enhance visitor experiences and maintain MPA values	2				
	There is good cooperation between managers and tourism or sports fishery operators to enhance visitor experiences and maintain MPA values	3				

29. Fees If fees (i.e. entry fees or fines) are applied, do they help protected area management	Although fees are theoretically applied, they are not collected	0				1a, 1c, 1e, 1f, 1g
	Fees are collected, but make no contribution to the protected area or its environs	1				
	Fees are collected, and make some contribution to the protected area or its environs	2				
	Fees are collected, and make a substantial contribution to the protected area or its environs	3				
30. Condition of values 30a-c	Many important biodiversity, ecological and cultural values are being severely degraded	0				1a, 1c, 1e, 1f, 1g
	Some biodiversity, ecological and cultural values are being severely degraded	1				
	Some biodiversity, ecological and cultural values are being partially degraded but the most important values have not been significantly impacted	2				
	Biodiversity, ecological and cultural values are predominantly intact	3				
30a	The assessment of the condition of values is based on research and/or monitoring	+1				
30b	Specific management programmes are being implemented to address threats to biodiversity, ecological and cultural values	+1				
30c	Activities to maintain key biological, ecological and cultural values are a routine part of MPA management	+1				
31. Climate change adaptation Is the protected area being consciously managed to adapt to climate change?	There have been no efforts to consider adaptation to climate change in management	0				
	Some initial thought has taken place about likely impacts of climate change, but this has yet to be translated into management plans	1				
	Detailed plans have been drawn up about how to adapt management to predicted climate change, but these have yet to be translated into active management	2				
	Detailed plans have been drawn up about how to adapt management to predicted climate change, and these are already being implemented	3				
32. Equal opportunities to be involved in management	Only one section of the community participates in management of the MPA	0				4c
	Management is mainly by one section of the community with marginal participation of others	1				
	Management is mainly by one section of the community with marginal participation of others, but there are active efforts by the management to encourage more equal participation	2				
	Those participating in management reflect the demographic make-up of Ascension	3				
33. Neighbouring protected areas	There is no contact between managers of neighbouring protected areas on issues that impact on protected area management effectiveness	0				
	There is limited contact between managers of neighbouring protected areas on issues that impact on protected area management effectiveness	1				
	There is contact between managers of neighbouring protected areas on issues that impact on protected area management effectiveness	2				
	There is regular contact between managers of neighbouring protected areas on issues that impact on protected area management effectiveness	3				

Appendix 4. Selection of indicator species

The selection of the suite of indicator species used to measure performance against the biological operational objectives is outlined below. This will be refined over future years based on the results of research projects described in this strategy. For example, we have little information about which species are particularly vulnerable to threats such as rising sea temperatures or pollution. The physiological experiments planned as part of the '**Vulnerability of inshore species to climate change**' project would help to identify sensitive, early indicators of a problem. We also have little knowledge about nocturnal and deeper water (>30m) communities in inshore areas and benthic communities on the seamounts, hydrothermal vents and abyssal plains. Greater understanding of these will help us to select a more complete suite of indicator species.

The initial selection was based on whether existing data are available or data collection is feasible within current resources for a particular species. Different selection criteria were then used for each of the operational objectives and these are described at the start of the relevant section on the following pages.

Much wider groups of species have been selected as indicators for use in eDNA monitoring in both inshore and offshore areas. This reflects the relatively low additional effort to monitor more species using this technique and species selection for this monitoring is partly driven by the existing availability of DNA primers.

Operational Objective 1c. No loss of species or reduction in species abundance or ecosystem complexity in inshore areas.

The most important criteria for selecting indicator species for this operational objective were the availability of existing data and feasibility of collecting new data. Once those were considered, the aim was to include species from a range of functional groups, habitat types and life history strategies. Species of high conservation importance were also prioritised and the intention is to include all endemic and near-endemic fish species in the eDNA monitoring. Further work will be required to determine whether species-level identification of bryozoans, coralline algae and sponges is feasible within the resource of the monitoring programme and if so whether overall diversity in these groups is a better indicator than the abundance of particular species.

Species	Base line data available	Practicality of monitoring	Functional group				Foraging habitat			Depth range (m)			Life history		Conservation status			
			Primary producer	Primary consumer	Predator	Top predator	Scavenger	Benthic	Demersal	Pelagic	0-200	200-1000	1000+	r-selected	k-selected	Endemic	Near endemic	UCN Red listed
Species selected																		
Rockhind grouper	X	H				X			X		X				X			
Spiny lobster		H				X			X		X				X			
Glasseye snapper		H				X					X				X			
Yellow spotted moray		H					X				X				X			
Ascension wrasse		H			X						X				X		X	
Bearded fireworm		H			X			X			X				X			
Snapping shrimp		H			X						X				X			
Lightfoot crabs		H			X						X				X			
Rustic rock snail		H		X				X			X				X			
Diadem urchin		H		X							X				X		X	
Bryozoan assemblage		H		X							X				X			
Coralline algae assemblage		H		X							X				X			
Sponge assemblage		H								X					X			
Phytoplankton		H		X							X				X			
Zooplankton		H		X							X				X			
Green turtle	X	H		X							X				X			X
Species selected for eDNA monitoring																		
Broadbanded eel							X			X				X				H
White spotted moray							X			X				X				H
23 endemic or near endemic fish species				X					X	X			X		X			H

The suite of indicators for Operational Objective 1c has been selected to include species likely to be affected by potential threats to inshore ecosystems, but further research is required to refine this. The list includes six species that are directly targeted by the inshore fishery. The rustic rock snail is known to be sensitive to the pollutant tributyltin (Zeidan & Boehs 2016) and there is research showing green turtles are impacted by plastic pollution (Abreo *et al.* 2016) and their nests will be adversely affected by rising temperatures (Tilley *et al.* 2019). Beyond this there is little species-specific evidence of impacts, but calcifying groups such as molluscs, sponges, coralline algae and bryozoans have been shown to be particularly vulnerable to ocean acidification (Kroeker *et al.* 2010), and the latter two groups are also known to be adversely affected by sea temperature rises (Latham 2008; Kelmo *et al.* 2004). Slow moving and sedentary benthic species such as urchins, snails, bryozoans, coralline algae and sponges are more likely to be affected by chemical pollution incidents as they are unable to move quickly

Species	Inshore fishery	Temperature	Threat vulnerabilities	Acidification	Plastic pollution	Chemical pollution
Rockhind grouper	x					
Spiny lobster	x					
Glass-eye snapper	x					
Yellow spotted moray	x					
Ascension wrasse						
Bearded fireworm						
Snapping shrimp						
Lightfoot crabs						
Rustic rock snail				x		x
Diadem urchin						x
Bryozoan assemblage				x		x
Coralline algae assemblage				x		x
Sponge assemblage				x		x
Phytoplankton						
Zooplankton						
Green turtle		x			x	
Species selected for eDNA monitoring						
Broadbanded eel	x					
White spotted moray	x					
23 endemic or near endemic fish species						

Operational Objective 1e. Maintain size distribution and age at maturity of species in inshore areas

The feasibility of collecting data on the size of a large sample of individuals was a key criterion for selecting indicator species for Operational Objective 1e. Vulnerability to impacts that are predicted to cause a reduction in the size of individuals was also an important concern. Fishing commonly removes the largest individuals from a population and so four species targeted by fishers have been included. Two fish species not targeted in the fishery (Black triggerfish and Ascension wrasse) will also be monitored to look for patterns not linked to fishing pressure. There are indications that the size of individual female turtles nesting on Ascension is decreasing and they have been included so this apparent trend can be monitored. Ocean acidification is expected to reduce the ability of molluscs to form shells and so the size and thickness of rock oyster shells will be monitored.

Where possible, indicator species selected for other objectives have been used to maximize the efficiency of the monitoring programme.

Species	Baseline data available	Practicality of monitoring	Monitored for other operational Objective	Threat/vulnerabilities		Conservation status		
				Fishing	Acidification	Endemic	Near endemic	IUCN Red listed
Rockhind grouper	X	H	X	X				
Yellowfin tuna	X	H	X	X				X
Spiny lobster		H	X	X				
Green turtle	X	H	X					X
Glasseye snapper		H	X	X				
Black triggerfish		H	X					
Ascension wrasse		H	X			X		
Rock oyster		H			X			

Operational Objective 1f. No loss of genetically distinct sub-populations from inshore or offshore areas

Indicator species included for this operational objective are those where the distribution of the species indicates genetic subpopulations are likely to have evolved and different subpopulations may exist. Our ability to collect samples from different parts of the species distribution was also an important consideration. Analysis of genetic samples will be expensive, so the suite of species for this objective is small.

Rockhind grouper are found in areas of rock substrate around the coast of Ascension, but it is not known if larval or adult fish movement is sufficient to ensure gene flow throughout this range. Most of the fishing pressure is concentrated along the north-west coast of the island meaning any subpopulation in this region could experience high exploitation rates.

Yellowfin and bigeye tuna are targeted in the Atlantic longline fishery. There has been little research into whether genetic subpopulations exist and the stocks are currently managed on the assumption that there is a single Atlantic population for each species. If this assumption is not correct, then current management recommendations will be flawed.

Galapagos shark are known to be present around Ascension and the shallow water seamounts to the southeast of the island within the MPA. We do not know if these form part of the same population or if they are largely resident.

Species	Baseline samples available	Practicality of monitoring	Distribution within the Ascension MPA	Localised pressures	Conservation status		
					Endemic	Near endemic	IUCN Red listed
Rockhind grouper	x	H	Shallow water around Ascension Island	Inshore fishing			
Yellowfin tuna	x	H	Throughout MPA	IUU fishing. Commercial fishing outside of the MPA			x
Bigeye tuna		M	Throughout MPA	IUU fishing. Commercial fishing outside of the MPA			x
Galapagos shark	x	M	Shallow water around Ascension Island; Grattan and Young Seamounts				

Operational Objective 2b. As a minimum, no harvested stocks in the inshore zone fall below maximum sustainable yield

All the species selected as indicators for this objective are prominent in the inshore fishery and the populations exploited are confined to the shallow water around Ascension. Producing estimates of maximum sustainable yield requires significant amounts of information such as age at maturity, fecundity and recruitment rates. The species selected are those for which most data are currently available and intensive survey is most feasible.

Species	Caught in inshore fishery	Practicality of monitoring	Baseline data available	Monitored for other objectives
Rockhind grouper	x	High	Good	Yes
Spiny lobster	x	High	Little in Ascension, but moderate in St Helena	Yes
Glasseye snapper	x	High	Little	Yes
Yellow spotted moray	x	High	Little	Yes
Squirrelfish	x	High	Moderate	Yes

Appendix 5. List of scientific names used in the strategy

Common name	Scientific name
Ascension frigatebird	<i>Fregata aquila</i>
Anchialine endemics	<i>Typhlatya rogersi</i> & <i>Procaris ascensionis</i>
Ascension wrasse	<i>Thalassoma ascensionis</i>
Bearded fireworm	<i>Hermodice carunculata</i>
Bigeye tuna	<i>Thunnus obesus</i>
Black triggerfish	<i>Melichthys niger</i>
Blue shark	<i>Prionace glauca</i>
Blue marlin	<i>Makaira nigricans</i>
Bluntnose sixgill shark	<i>Hexanchus griseus</i>
Bottlenose dolphin	<i>Tursiops truncatus</i>
Broadbanded eel	<i>Channomuraena vittata</i>
Bryozoan assemblage	<i>Escharoides</i> sp.
Coralline algae assemblage	e.g. <i>Mesophyllum brachycladum</i> , <i>Neogoniolithon mamillosum</i>
Diadem urchin	<i>Diadema ascensionis</i>
Flying fish	Exocoetidae
Galapagos shark	<i>Carcharhinus galapagensis</i>
Glasseye snapper	<i>Heteropriacanthus cruentatus</i>
Green turtle	<i>Chelonia mydas</i>
Humpback whale	<i>Megaptera novaeangliae</i>
Land crab	<i>Johngarthia lagostoma</i>
Lophelia coral	<i>Lophelia</i> cf. <i>pertusa</i>
Manta ray	<i>Mobula</i> sp.
Masked Booby	<i>Sula dactylatra</i>
Pantropical dolphin	<i>Stenella attenuata</i>
Rainbow runner	<i>Elagatis bipinnulata</i>
Rockhind grouper	<i>Epinephelus adscensionis</i>
Rustic rock snail	<i>Stramonita rustica</i>
Sailfish	<i>Istiophorus platypterus</i>
Silky shark	<i>Carcharhinus falciformis</i>
Sooty tern	<i>Oncychoprion fuscatus</i>
Spiny lobster	<i>Panulirus echinatus</i>
Swordfish	<i>Xiphias gladius</i>
Wahoo	<i>Acanthocybium solandri</i>
Whale shark	<i>Rhincodon typus</i>
White Spotted Moray	<i>Muraena pavonina</i>
Yellow Spotted Moray	<i>Gymnothorax moringa</i>
Yellowfin tuna	<i>Thunnus albacares</i>

Appendix 6. References

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