Gough and Inaccessible Islands World Heritage Site management plan

2015-20

Tristan Conservation Department and RSPB

giving nature a home

Foreword

All of the four main islands of the Tristan Group are unique, but Gough and Inaccessible have been globally recognised for their immense natural value, resulting in their World Heritage Site designation. These tiny islands hold many endemic species of plants, birds, and invertebrates, as well as being rich in history and being surrounded by the waters that produce the Tristan rock lobster on which the local economy depends.

The Tristan Island Council and Conservation Department welcome this revised management plan for Gough and Inaccessible. There are many major challenges ahead for these islands, including the proposed project to eradicate mice from Gough Island. If successfully implemented, developing the next phase of this plan in 2020 should herald a brighter future for the biodiversity of these islands.

It is already clear that no single organization will be able to carry out all of the work needed, and the people, Island Council, Fisheries and Conservation departments of Tristan da Cunha look forward to working in partnership with many individuals and organisations to implement this plan by 2020.

Our thanks go to the many people who have taken the time to comment on previous drafts of this document.

Ian Lavarello
Chief Islander

December 2015

Trevor Glass
Head of Conservation Department

December 2015

Acknowledgements

The Tristan da Cunha Government, with support from the Foreign and Commonwealth Office and the Department for International Development (UK), funded production of this management plan.

This revised management plan was drafted by the Tristan Conservation Department in collaboration with RSPB, and with stakeholders on Tristan da Cunha, in the UK and South Africa. Special thanks are due to all of those people who took the time to contribute comments to assist in the development of this document.

Contents

Executive Summary

The remote South Atlantic islands of Gough and Inaccessible with their surrounding submarine areas are home to unique assemblages of plants and animals, isolated from the rest of the world by 2,000 miles of open ocean and some of the world's fiercest weather. Gough and the surrounding waters to 3 nautical miles were first declared a World Heritage Site (WHS) in 1995 and the site was extended to include Inaccessible and both islands' surrounding waters to 12 nautical miles in 2004. This management plan sets out the shared vision and management objectives of the Tristan Island Council, Tristan Conservation Department and other stakeholders for the WHS in the next 5 years.

More than any other ecosystems around the globe, oceanic islands are threatened by non-native and invasive species – in the case of Gough and Inaccessible WHS, this is especially highlighted by the effects of introduced house mice, non-native plants and non-native invertebrates. The ecosystems on these islands are particularly vulnerable to invasions having been isolated from the rest of the terrestrial and shallow marine worlds for millennia. The key challenge of this management plan is to successfully implement the eradications of house mice from Gough, and a suite of non-native plants from both Inaccessible and Gough islands while ensuring that biosecurity measures are rigorously implemented to prevent any further importations of non-native species, both terrestrial and marine.

The Tristan Island Council is the executive authority for this plan, but they cannot achieve the objectives stated in it alone. It will take a concerted effort by a large partnership of stakeholder organisations and individuals to realise the vision for the islands. Their expertise, resources, development potential and support will be integral to its success. This document is a call to all these stakeholders to work together as a partnership to achieve the shared objectives.

Because Gough and Inaccessible islands are among the least disturbed environments on earth, the plan adopts a precautionary approach to management - one of minimal interference while redressing the damage already caused by introductions, but tempered by the premise that human presence for sustainable harvesting, research, education and enjoyment is acceptable within limits. A set of high level management objectives were produced and they are listed on page 19. The following vision for the WHS in 25 years was also agreed.

The Vision

The Gough and Inaccessible Islands World Heritage Site is one of the most pristine environments left on earth. The islands are rightly considered to be among the most important seabird islands in the world. Following the successful eradication of house mice on Gough, breeding seabird numbers have returned to levels recorded before invasive species gained a foothold. The Gough Bunting and the Tristan Albatross no longer face the threat of global extinction and invasive plants, especially *Sagina* (pearlwort) and *Phormium* (New Zealand flax) have been eradicated from the WHS. We have a good knowledge of the marine life in the deep waters which comprise the vast majority of the area of the WHS. This is testament to the co-operative efforts of the Tristan and UK Governments, Tristan community, and individuals, states and organisations internationally to continue the excellent and sustainable management of these islands of global conservation importance. The islands continue to be sites of excellent scientific research into their natural environments. We will continue to work together to ensure our children can enjoy these unique and unspoilt islands.

Acronyms

ACAP	Agreement on the Conservation of Albatrosses and Petrels
BAS	British Antarctic Survey
CBD	Convention on Biological Diversity
DCMS	Department for Culture Media and Sport
DEA	Department of Environmental Affairs (RSA)
DEFRA	Department for the Environment, Food and Rural Affairs
DFID	Department for International Development
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
FCO	Foreign and Commonwealth Office
HMG	Her Majesty's Government
IUCN	International Union for the Conservation of Nature
IUU	Illegal, Unreported and Unregulated (fishing activity)
JNCC	Joint Nature Conservation Committee
MARAM	Marine Resource Assessment and Management (UCT)
MRAG	Marine Resource Assessment Group (UK)
MSC	Marine Stewardship Council
NGO	Non-government Organisation
OTEP	Overseas Territories Environment Programme
RBG-Kew	Royal Botanic Gardens Kew
RSA	Republic of South Africa
RSPB	Royal Society for the Protection of Birds
RZSS	Royal Zoological Society of Scotland
SANAP	South African National Antarctic Programme
SAWS	South Atlantic Weather Service (RSA)
T-BAG	Tristan Biodiversity Action Group
TDC	Tristan da Cunha
TDC-CD	Tristan Conservation Department
UCT	University of Cape Town
UKOT	United Kingdom Overseas Territory
UKOTCF	UKOT Conservation Forum
UN	United Nations
WHS	World Heritage Site

Throughout the text, reference to the Tristan Group or Tristan islands means all the islands of the Tristan da Cunha group (i.e., including Gough and Inaccessible as well as Tristan itself, Nightingale and all other islands).

Background Context

Two excellent documents precede this revised management plan for the Gough and Inaccessible Islands World Heritage Site. The *Management Plan for the Gough Island Wildlife Reserve* (Cooper & Ryan 1994) and *Inaccessible Island Nature Reserve Management Plan* (Ryan & Glass 2001) set out management objectives and detailed policy and prescriptions for Gough and Inaccessible respectively. Both contain comprehensive accounts of the natural and human history of the two island components of the WHS. Updated description and resource inventories and management policies and guidelines for Gough and Inaccessible are now included in Appendices 1 and 2 of this plan. The Biodiversity Action Plan for the Tristan da Cunha Islands (2012-2016) also contains an excellent description of the islands' habitats and species, as well as of human activities on Tristan and Nightingale islands (Tristan da Cunha Government & RSPB 2012). Readers wishing to know more about the details of habitats and species mentioned in this current plan are directed to these three documents. A good general account of the Natural History of Gough Island has been provided by Hänel, Chown & Gaston (2005) and of all the Tristan islands by Ryan (2007). A comprehensive bibliography of the Tristan Islands up to around 1997 is given by Helyer & Swales (1998) and Hänel (2008) and a revised and updated bibliography for Gough and Inaccessible islands up to 2015 is included in Appendix 15 of this plan. For context, this plan has an updated summary statement of the important natural features of the WHS, concentrating on those influencing management decisions, but there has been no attempt to re-write the descriptive parts of the earlier management plans for each separate island The main focus in this work has been to prioritise management actions for the conservation of the WHS over the next five years.

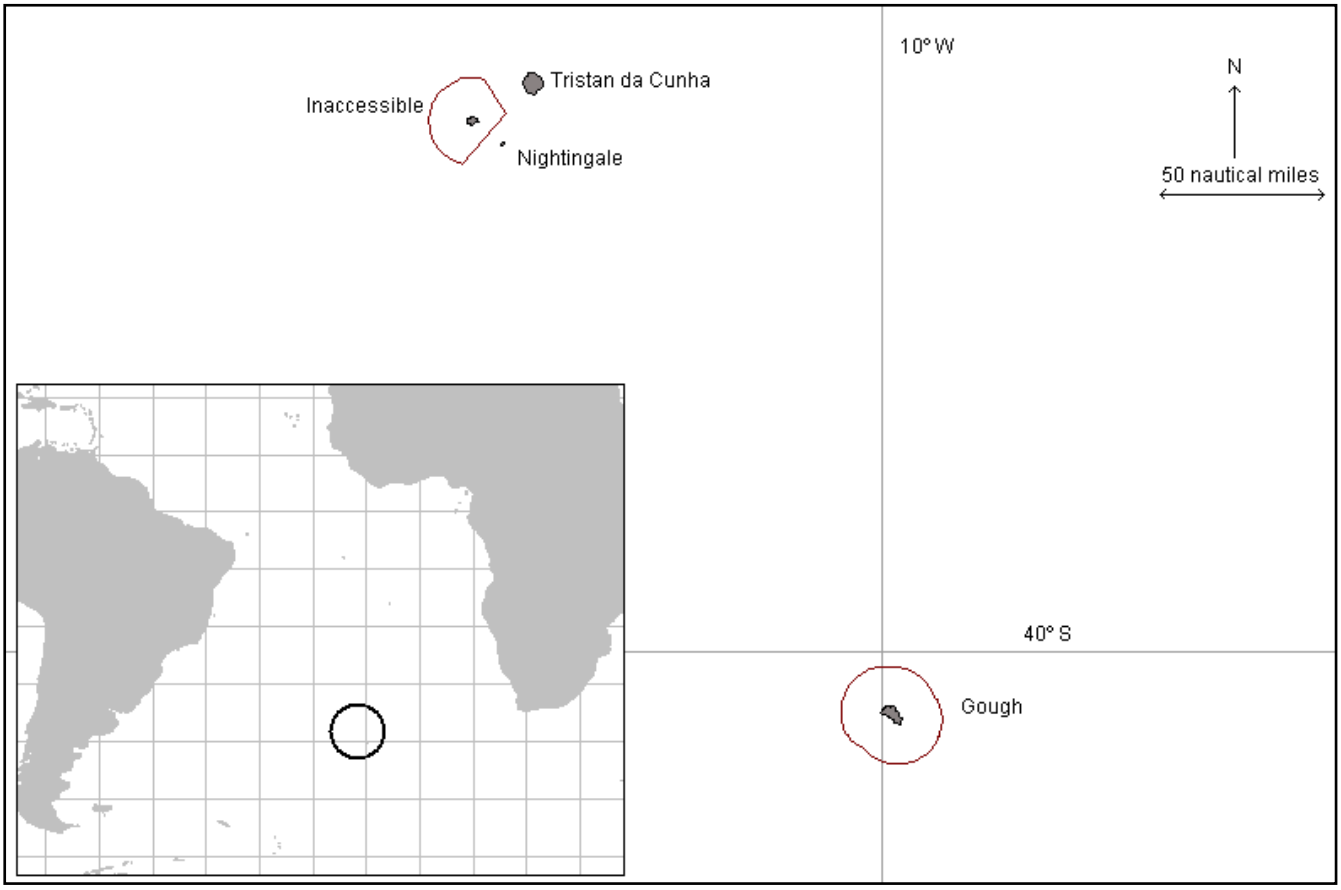


Figure 1: Map showing the location of the Gough and Inaccessible Islands World Heritage Site

It is important to understand that management and other activities within the WHS occur within an existing framework of statutory regulation and procedural guidance. The most relevant of these are The Conservation of Native Organisms and Natural Habitats (Tristan da Cunha) Ordinance 2006 (Appendix 13) and The Tristan da Cunha Fisheries Limits Ordinance 1983 (and amendments, Appendices 14a, 14b, 14c). In addition, the procedural guidance contained in the two earlier

management plans mentioned above has been reviewed and updated to form part of this plan (see especially Appendices 2-9). Therefore, the high level objectives, priority actions and policies / prescriptions contained in this plan including its appendices supersede the two previous plans for the two separate islands.

Summary of Significance

Biological

Gough and Inaccessible Islands World Heritage Site (WHS) consists of the entire land masses of the two islands and their attendant satellite sea stacks (amounting to 7,900 ha), and the sea surface, water column and sea bed out to 12 nautical miles, encompassing an area of 390,000 ha (see Figure 1, above). Although our information base for the marine element is very limited, it is clear that the plant, invertebrate and vertebrate communities are hugely important (Ryan 2007). The marine algae are a very diverse group of organisms on the Tristan islands, with over 120 species recorded from the more northern islands, including Inaccessible, and more than 65 species from Gough (Scott 2015). Algal and marine invertebrate communities are significantly different on Gough and Inaccessible, due to the Subtropical Ocean Convergence boundary between the islands, where cold sub-polar water meets warmer South Atlantic water. This keeps sea temperatures significantly warmer (by 4-5°C) at Inaccessible and the top islands, than around Gough. Gough is more sub-Antarctic in nature, while Inaccessible and the other northern islands are related to South American and South African marine communities, but with up to 40% of algal species endemic to the Tristan islands. Short seaweed turfs and kelp beds in particular are an important habitat for small animals, including numerous crustaceans, molluscs and worms, which provide food for fish and important refuge for young Tristan rock lobster *Jasus tristani*. The shallow water invertebrate assemblage is also significant as an isolated and virtually undisturbed marine ecosystem with generally low species diversity but with many endemic species. The deeper waters around the islands within the 12 nm limit of the WHS have never been systematically surveyed, but are likely to support an important range of invertebrate and vertebrate life. Surveys at depths between 100-300m have found marine animal communities very different to those in shallow water above 50m (British Antarctic Survey 2013). Virtually nothing is known of life in deep water between 300-3000m, which comprises the vast majority of the area of the WHS; there is also a major gap in knowledge of life between 50-100m, the main depths of the lobster fishery.

The terrestrial floras and plant communities of the two islands are not particularly diverse when compared to continental areas, mainly due to their isolation and the difficulties of trans-oceanic dispersal (Wace & Dickson, 1965). However, a substantial proportion of both flowering and non-flowering plant species are endemic to the Tristan island group as a whole, and a few are endemic to individual islands, giving the flora here a global significance in biodiversity terms. Although the majority of seabirds on both islands are not closely dependent on particular habitats, land birds and a plethora of terrestrial invertebrate life are, giving these habitats added significance.

There is scope for considerable further study of the terrestrial invertebrate assemblages on both Gough and Inaccessible, but enough has been done to define the broad characteristics of the fauna (Holdgate 1965; Jones *et al.* 2003). There are a number of endemic species of beetles, flies and snails while several species of flightless moth are endemic to the Tristan group, some to individual islands including the two components of the WHS.

More is known about the bird life of the two islands than any other taxa, but even here detailed information on population sizes and distributions is sparse, particularly for the burrow nesting petrel species. However, it can be said without fear of contradiction that the WHS supports one of the largest and most important breeding seabird assemblages in the world, hosting in the order of 5 million breeding seabirds (Cuthbert & Sommer 2004; Ryan 2006). Most of these are burrowing petrels and shearwaters that visit the islands to breed in both summer and winter seasons, but spend the majority of their lives at sea. They include the entire world population of spectacled petrel *Procellaria conspicillata* (IUCN status: Vulnerable, endemic to Inaccessible), almost all Atlantic petrels *Pterodroma incerta* (Endangered, near-endemic to Gough), and over three million pairs of great shearwaters *Puffinus gravis* (Least Concern, near endemic to the Tristan Group). Gough and

Inaccessible islands also host a hugely important group of ground nesting seabirds including the entire world population of Tristan albatross *Diomedea dabbenena* (Critically Endangered) along with

substantial proportions of the world's Atlantic yellow-nosed albatross *Diomedea chlororhynchos* (Endangered) and sooty albatross *Phoebetria fusca* (Endangered). The coasts of both islands support the majority of the world's northern rockhopper penguin *Eudyptes moseleyi* population (Endangered) (Cuthbert *et al.* 2009). As well as ground nesting seabirds, the WHS supports several endemic and endangered land birds: the world's smallest flightless bird, the Inaccessible rail *Atlantisia rogersi* (Vulnerable), Gough moorhen *Gallinula comeri* (Vulnerable), Gough bunting *Rowettia goughensis* (Critically Endangered) and Inaccessible bunting *Nesospiza acunhae* (Vulnerable) which are all endemic to either Gough or Inaccessible, although a population of the Gough moorhen has also been established on the main island of Tristan (Ryan 2007).

There are no native terrestrial mammals on the whole island group. Large and increasing numbers of sub-Antarctic fur seal *Arctocephalus tropicalis* breed here and there are small numbers of Southern elephant seals *Mirounga leonina* (Bester *et al.* 2006; Ryan 2007). The waters of the WHS support populations of dusky dolphins *Lagenorhynchus obscurus* and the rare Shepherd's beaked whale *Tasmacetus shepherdi*, and they are also known to be a nursery area for Southern right whales *Eubalaena australis* (Best *et al.* 2009). The marine area out to 200 nm is a Whale Sanctuary, declared by Tristan's Island Council in March 2001.

Cultural and Economic

Until the 1850s very few people had visited either island. Seal hunters visited Gough in the 19th Century and again in the 1950's. Inaccessible Island was the scene of a major shipwreck in 1821, the survivors being rescued by the newly-established Tristan community who visited the island fairly regularly thereafter. An attempt to establish a permanent settlement on Inaccessible in 1937 failed after six months. A scientific and weather station was established on Gough in 1955-56 by the Gough Island Scientific Survey (Holdgate 1958) and has been continued since then by the South African government: it is manned by 6 to 9 people on a year-long tour. For a four-week period in spring each year, a relief is carried out which more than doubles the numbers of people on the island. The weather station is a key part of South Africa's weather forecasting service. Inaccessible Island has no permanent human presence, though is visited occasionally by Tristanians and researchers. A commercial fishery for the Tristan rock lobster *Jasus tristani* around the shallow waters of both Gough and Inaccessible, within the WHS, is of vital importance to the sustainability of the human community of Tristan da Cunha. Some harvesting of introduced apples *Malus* sp. and driftwood also occurs on Inaccessible. The advent of large, ocean going cruise ships and private yachts in the South Atlantic has increased the number of day-visitors to the island group, though only a few currently land on Inaccessible, and only with the appropriate permissions and biosecurity measures in place, and accompanied by a local guide (see Appendix 5), while tourist landings on Gough are prohibited. This infant tourist trade is also seen as important to the future sustainability of the community. The islands have hosted explorers and researchers for at least the last 50 years, drawn to them to record and study the unique and spectacular wildlife and ecology of the WHS. More detailed descriptions of the history and visits to both islands are included in Appendices 1 and 2.

Scientific Research

Substantial scientific work on Gough Island began with the six-month programme by the Gough Island Scientific Survey (Holdgate 1958), during which the vegetation was comprehensively surveyed (Wace 1961). On Inaccessible Island work was done by a Norwegian Scientific Expedition to Tristan da Cunha in 1937-38 (Christophersen 1940, 1947, and other references) and a Denstone Expedition in 1982 (Swales 1989). Since 1999, year-round teams of biologists have been present on Gough and for up to a year at a time; research visits to Inaccessible have been far less frequent (see Appendix 1). In the marine environment, the 1955-56 Gough Island Scientific Survey made the first comprehensive collections of intertidal organisms at Gough (Chamberlain 1965, Chamberlain *et al.* 1985). In the subtidal, Darwin-funded projects at Tristan da Cunha between 2007 and 2015 completed dive surveys in the shallow subtidal to 30m at 15 sites around Inaccessible and at 37 sites at Gough (Scott 2010 & 2015). These projects provided the first comprehensive descriptions of shallow water communities, together with species lists and specimen collections (see Appendix 1).

Important Features Table

This table lists those features of key importance within the WHS and indicates important factors influencing their conservation status.

Important Feature	Status and factors
Vertebrates	
Birds	
Tristan albatross *Diomedea dabbenena*	IUCN Critically Endangered. Endemic to Gough (1800 prs: Cuthbert *et al.* 2013a) and Inaccessible (0-2 pairs Ryan 2006; McClelland *et al*. submitted) Declining through predation by house mice and long-line fishing mortality.
Gough bunting *Rowettia goughensis*	IUCN Critically Endangered Gough endemic. Declining and critically small world population of 400-500 prs (Ryan & Cuthbert 2008). Probably affected by introduced house mice.
Northern rockhopper penguin *Eudyptes moseleyi*	IUCN Endangered (recently split from *Eudyptes chysocome*). Large majority (>80%) of world population on Tristan group including Gough and Inaccessible. Large declines historically to 65,000 prs in 2006 (Cuthbert *et al.* 2009) with 54,000 prs on Inaccessible in 2004 (Robson *et al*. 2011).
Atlantic yellow-nosed albatross *Thalassarche chlororhynchos*	IUCN Endangered. Endemic to the Tristan Island group. 15-20% of the world population on Gough (5,300 prs: Cuthbert *et al*. 2013a). Smaller population on Inaccessible (2,000 prs: Ryan 2006). Declining on Gough through long-line fishing mortality.
Sooty albatross *Phoebetria fusca*	IUCN Endangered. At least 20% of world population (3,500 prs on Gough and 500 on Inaccessible: Cuthbert *et al*. 2013a; Ryan 2006); 60% decrease since 1970s. Declining on both islands through long-line fishing mortality. On Gough predation by house mice is lowering productivity.
Atlantic petrel *Pterodroma incerta*	IUCN Endangered. Near endemic to Gough. Large population (900,000 prs: Rexer-Huber *et al*. 2014) but trend is predicted to be decreasing, probably due to predation by house mice. Probably breeds at Inaccessible too (Ryan 2007).
Spectacled petrel *Procellaria conspicillata*	IUCN Vulnerable. Inaccessible endemic. Small population (20,000 prs in 2011: Ryan & Ronconi 2011), but trend is increasing numbers.
Inaccessible rail *Atlantisia rogersi*	IUCN Vulnerable. Inaccessible endemic. Smallest flightless bird in the world. Current population estimate at 8,400 prs (Ryan & Glass 2001).
Gough moorhen *Gallinula comeri*	IUCN Vulnerable. Gough endemic. Small population (4,250 prs: Cuthbert & Sommer 2004b) probably affected by house mice. Also present on Tristan, introduced in 1956.
Inaccessible bunting *Nesospiza acunhae*	IUCN Vulnerable. Endemic to Inaccessible. Large population (10,000 pairs: Ryan 2007). Could be affected by impacts of the introduced scale insect and associated sooty mould on the *Phylica* fruit production, on which they rely (Ryan *et al*. 2014).
Tristan thrush *Nesocichla eremita* ssp. *gordoni*	IUCN Near Threatened (at species level). Endemic Inaccessible sub-species. Small but stable population (850 pairs: Ryan & Glass 2001).
Southern giant petrel *Macronectes giganteus*	IUCN Least Concern. Trend of small Gough population is stable (currently around 240 prs: Cuthbert *et al.* 2013a).
Great shearwater *Puffinus gravis*	IUCN Least Concern. Huge breeding population on Inaccessible (ca. 2 million prs: Ryan & Glass 2001) and Gough (980,000 prs: Cuthbert 2004) - 60% of world population. Migrates to the northern hemisphere and back. Known to be caught in long-lines in North Atlantic.
Other breeding seabirds assemblage.	A numerically vast (ca. 5 million individuals) and species diverse assemblage - one of the largest in the world. Species are: Kerguelen petrel *Pterodroma brevirostris*, great-winged petrel *P. macroptera*, soft-plumaged petrel *P. mollis*, blue petrel *Halobaena caerulea*, broad-billed prion *Pachyptila vittata*, MacGillivray's prion *P. macgillivrayi*, grey petrel *Procellaria cinerea* (IUCN Near Threatened), little shearwater *Puffinus assimilis*, grey-backed storm-

	petrel *Garrodia nereis*, white-faced storm-petrel *Pelagodroma marina*, white-bellied storm-petrel *Fregatta grallaria*, black-bellied storm-petrel *F. tropica*, common diving petrel *Pelecanoides urinatrix*, Subantarctic skua *Stercorarius antarcticus*, Antarctic tern *Sterna vittata*, brown noddy *Anous stolidus.*

Mammals	
Sub-Antarctic fur seal *Arctocephalus tropicalis*	IUCN Least Concern. Important large and increasing population (80% of world population) (Bester & Ryan 2007).
Southern elephant seal *Mirounga leonina*	IUCN Least Concern. Small population on Gough, probably stable. Most northerly breeding Southern elephant seals in the world.
Cetacean assemblage	Important populations of Shepherd's beaked whale *Tasmacetus shepherdi*, Southern right whale *Eubalaena australis* and dusky dolphin *Lagenorhynchus obscurus* (Best *et al*. 2009).
Fish	
Inshore fish assemblage	Dependent on a limited shelf habitat area. A unique assemblage, relatively isolated from other communities, made up of few species including one endemic - klipfish *Bovichtus diacanthus*. Other species include fivefinger *Acantholatris monodactylus,* false jacopever (soldier) *Sebastes capensis*, telescope fish *Mendosoma lineatum*, and Tristan wrasse *Nelabrichthys ornatus.*
Sharks	Great white *(Carcharodon carcharias)* IUCN Vulnerable, recorded from Gough (Andrew *et al*. 1995). Great hammerhead (*Sphyrna mokarran)* IUCN Endangered, recorded from Tristan and Inaccessible (Andrew *et al*. 1995). Broad-nosed seven-gilled shark (*Notorynchus cepedianus)* IUCN Data Deficient. Although relatively common, this shark is restricted to shallow waters where it can be vulnerable to by-catch.
Marine Invertebrates	
Tristan rock lobster *Jasus tristani*	Commercially fished to depths of around 150m. For a long time considered to be endemic to Tristan da Cunha group and nearby seamount areas, but recent genetic work has shown it to be conspecific with *Jasus paulensis* from the St Paul and Amsterdam islands and Indian Ocean seamounts (Groeneveld *et al* 2012).
Shallow water invertebrate assemblage	Shallow marine ecosystems are as isolated as those on land, so there are many endemics, including the large barnacle *Austromegabalanus isolde*, whelk *Argobuccinum tristanense*, and bivalve *Tawera philomela*. Many more new species are turning up from diving surveys (Scott 2015), with sponge species particularly diverse. These assemblages are a collection of chance arrivals, adding up to a unique community, the dynamics of which we know almost nothing. Very few species and short food chains, making them particularly vulnerable to competition from vigorous introduced species, disease and climate change.
Terrestrial Invertebrates	
Terrestrial invertebrate assemblage	High rates of endemism (Jones *et al*. 2003a). Effects of introductions unknown/uncertain but likely to be negative. Many indigenous species may be threatened.
Endemic moths *Peridroma goughi* *Dimorphinoctua goughensis* *Dimorphinoctua cunhaensis* *Dimorphinoctua pilifera* *Protoleucania exoul* *Agonopterix goughi*	Many species are flightless or partly so. Vulnerable to house mouse predation (Jones *et al*. 2003b) and parasitism by introduced wasps. May have gone through a rapid decline recently as fewer individuals are noted now than in previous years.
Water beetles *Liodessus involucer* *Lancetes dacunhae* *Senilites tristanicola*	All three endemic to the Tristan group (Barber-James 2007). Incidental capture in the Gough Meteorological Station water supply causes unnecessary mortality.

Endemic weevil assemblage *Tristanodes* spp.	Sparsely recorded but important assemblage of rare beetles, showing impressive evolutionary radiation into 11 species.
Parasitic ticks, lice and flies	Most are parasitic on birds. Many are rare or threatened, reflecting the status of their bird hosts, particularly Tristan albatross lice (3 species), Sooty albatross lice (2 species), Atlantic yellow-nosed albatross lice (4 species) and Atlantic petrel lice (5 species) (Hanel & Palma 2007).
Endemic snails	At least 9 species endemic to the Tristan Group, with *Succinea flexilis* endemic to Gough, *Balea swalesi* endemic to Inaccessible, and three species of *Balea* confined to Inaccessible and Gough islands. Probably part of house mouse diet but conservation status undetermined.
Other invertebrate taxa	Includes endemic pseudoscorpion, arachnids, crustaceans, collembolans, tardigrades, roundworms, cestode worms, and flatworms (Ryan 2007). Very poorly known groups probably affected by house mice and non-native invertebrate introductions.
Terrestrial plants and plant communities	
Wet heath *Isolepis sulcata (syn. Scirpus sulcatus*) bog *Sphagnum* bog *Phylica* woodland Tussock grassland Fern bush Feldmark-montane habitat	Although many of these are closely analogous to other vegetation on South Atlantic Islands and elsewhere, the habitats on Gough and Inaccessible have developed virtually free from human interference, making them valuable undisturbed habitats. The fern bush habitat formed by *Phylica* trees, bog fern (*Blechnum palmiforme*) and other ferns (notably *Histiopteris incisa*) (Wace 1961; Wace & Dickson 1965) is particularly interesting and relatively diverse. A black sooty mould associated with scale insects on *Phylica* trees has been identified as *Seiridium phylicae* (Crous *et al*. 2012) though the effects are currently unknown.
Flowering plants	Many endemics including one taxon restricted to Inaccessible and four species to Gough (Ryan 2007). *Rostkovia tristanensis* is IUCN Red List Data Deficient
Clubmosses and ferns	A large number endemic to the Tristan group including one fern restricted to each of Inaccessible and Gough (Ryan 2007).
Mosses, lichens and other cryptogams	The least well recorded group of plants. (Approx. 100 spp. of lichens (Elix 2005). Probably many endemics, including *Lepraria goughensis* (a lichen) recently discovered and known only from Gough Island (Elix 2005).
Marine plants and plant communities	
Marine algal community	A distinct, diverse and ecologically important community with a large number of endemic species. Seaweed turfs harbour numerous small invertebrates, and provide vital shelter for newly-settled rock lobsters.
Kelp beds (*Macrocystis pyrifera* and *Laminaria pallida*)	An important keystone habitat in the shallow marine zone, highly productive, dampening wave action and providing foraging, shelter and breeding habitat for animals including the commercially-important rock lobsters. Giant kelp is at the edge of its temperature tolerance at Inaccessible and the other northern islands, so vulnerable to climate change; any increase in seawater temperatures could have a drastic effect on its production and on its associated fauna.
Bull kelp *Durvillaea antarctica* and *Desmarestia ligulata* (brown seaweed)	Potential indicators of marine climate change. Both found commonly around Gough but bull kelp is absent from Inaccessible and the rest of the northern islands, while *Desmarestia ligulata* is found only very rarely on Inaccessible.
Cultural	
Sealers caves and other artefacts on Gough	Culturally important to Tristan people and probably of wider significance as historical evidence of the human occupation of the islands.
Meteorological station on Gough	Key to South African weather forecasting service and climate recording. Also provides logistic support for ecological research and non-native species management programmes.
Tristan rock lobster fishery	Key economic importance to Tristan da Cunha community.
Wilderness landscape	Rugged and remote wild landscape in the middle of a vast ocean.

Management Framework

Tristan da Cunha (including Gough Island) is a United Kingdom Overseas Territory. It forms part of the UK Overseas Territory of St Helena, Ascension and Tristan da Cunha, and is administered by a UK-appointed representative, with support from an elected Island Council. The Tristan da Cunha Conservation Ordinance, 1976 replaced an earlier Protection Ordinance, and provided broadly for the conservation of flora and fauna in all the islands and islets of the group, as well as the territorial waters. This legislation also provided for the designation of Gough Island and adjacent territorial waters extending out to three nautical miles as a Wildlife Reserve. This legislation was amended in 1984, 1986 and finally in 1997, when Inaccessible Island and its territorial waters, within 12 nautical miles of the island, was declared a Nature Reserve. The same amendment changed the designation of Gough Island from a Wildlife Reserve to a Nature Reserve, and extended the area of the Nature Reserve to include the territorial waters out to 12 nautical miles. In February 2006, the Tristan da Cunha Conservation Ordinance, 1976 was replaced by the Conservation of Native Organisms and Natural Habitats (Tristan da Cunha) Ordinance, 2006 (see Appendix 13), a modern and comprehensive conservation ordinance.

The Tristan da Cunha Government established a Conservation Department in 2008. The Tristan Conservation Department comprises four permanent staff members: a Head of Conservation, a clerk and two conservation officers. The Department is supported by the Tristan “Darwin team”, ten government employees who received conservation fieldwork training under a Darwin Initiative project.

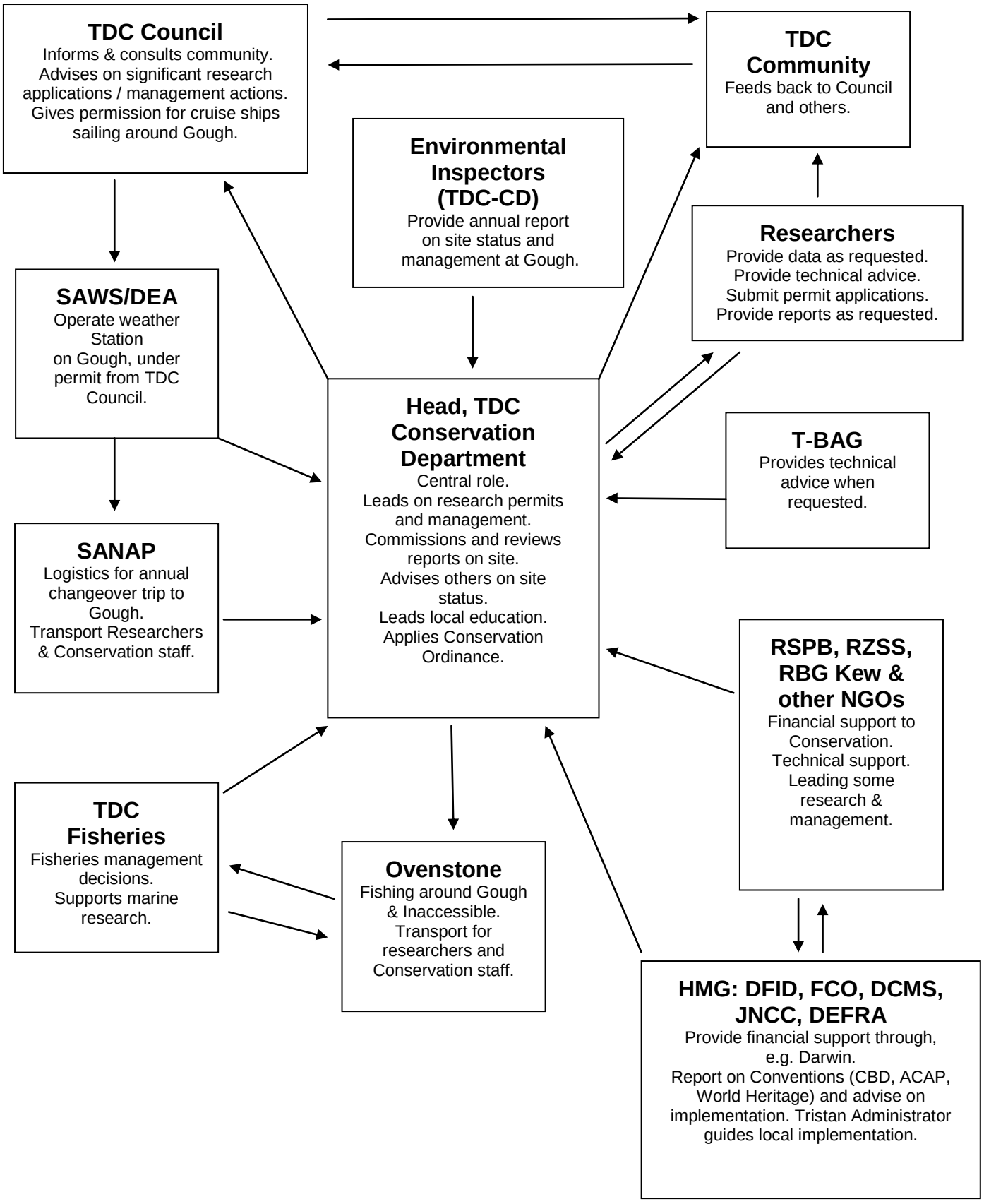
The Tristan da Cunha Environment Charter was signed jointly by the Government of Tristan da Cunha and the UK Minister for Overseas Territories in September 2001. The Environment Charter outlines the environmental management commitments of the UK Government and the Government of Tristan da Cunha, and serves as a framework policy to guide the development of management policies and plans.

In 1995, Gough Island, and its territorial waters (up to 3 nautical miles), was afforded World Heritage Site status by the World Heritage Convention of UNESCO, as a ‘Natural Site’. In 2004, the World Heritage Site was expanded to include Inaccessible Island and its territorial waters, and renamed the ‘Gough and Inaccessible Islands World Heritage Site’. In 2008, Gough and Inaccessible islands and their territorial waters were designated Wetlands of International Importance under the Ramsar Convention by the UK Government. Formal listing by the Convention followed in September 2009 as site number 1868 (Gough) and 1869 (Inaccessible).

The Conservation of Native Organisms and Natural Habitats (Tristan da Cunha) Ordinance, 2006 gives statutory force to the general protection of the WHS. In it, the Tristan Island Council declared the WHS (along with all breeding colonies of the northern rockhopper penguin on the main island of Tristan da Cunha) a Nature Reserve. Strict protection is given to all native organisms, while a system of permits enables access and limited harvesting to take place by Tristan residents. The Ordinance makes it an offence to transport any native organisms between islands or to introduce any non-native organisms. In parallel to this, the Tristan da Cunha Fisheries Limits Ordinance 1983 (as amended) makes provision for the control of commercial fishing activity within the Tristan da Cunha exclusive economic zone, up to 200 nm offshore from the islands.

The UK is a State party to the Ramsar and Bonn Conventions; the UN Convention on Biological Diversity; and the Agreement on the Conservation of Albatrosses and Petrels (ACAP). These conventions provide international obligations to take conservation action for albatrosses and petrels as well as to take broader measures for the protection of important habitats and species. By agreement with the Tristan da Cunha government, the conventions mentioned above have been extended to cover Tristan da Cunha, and therefore the Tristan Government is obliged to fulfil their requirements locally. Tristan has already developed a Biodiversity Action Plan that relates closely to this management plan but covers the entire island group and its seas. A review of work in implementing ACAP and prioritising a future work programme has also been written (Wolfaardt *et al*. 2009).

The diagram on the next page shows the current relationships between the various government departments, NGOs and other partners.


TDC Council
Informs & consults community.
Advises on significant research applications / management actions.
Gives permission for cruise ships sailing around Gough.
TDC Community
Feeds back to Council and others.
Environmental Inspectors (TDC-CD)
Provide annual report on site status and management at Gough.
Researchers
Provide data as requested.
Provide technical advice.
Submit permit applications.
Provide reports as requested.
SAWS/DEA
Operate weather Station on Gough, under permit from TDC Council.
Head, TDC Conservation Department
Central role.
Leads on research permits and management.
Commissions and reviews reports on site.
Advises others on site status.
Leads local education.
Applies Conservation Ordinance.
T-BAG
Provides technical advice when requested.
SANAP
Logistics for annual changeover trip to Gough.
Transport Researchers & Conservation staff.
RSPB, RZSS, RBG Kew & other NGOs
Financial support to Conservation.
Technical support.
Leading some research & management.
TDC Fisheries
Fisheries management decisions.
Supports marine research.
Ovenstone
Fishing around Gough & Inaccessible.
Transport for researchers and Conservation staff.
HMG: DFID, FCO, DCMS, JNCC, DEFRA
Provide financial support through, e.g. Darwin.
Report on Conventions (CBD, ACAP, World Heritage) and advise on implementation. Tristan Administrator guides local implementation.

Current management and monitoring action

Through the Conservation Ordinance 2006, significant management action has already taken place on Gough and Inaccessible, particularly in relation to controlling the transfer of organisms and propagules between islands and to the island group from external sources. A detailed operating/conduct code developed by the Tristan Government provides guidelines on best practice to be observed by visitors and managers of the two islands (see Appendices 2-5 and 20-21).

The two previous management plans instituted separate zoning strategies for Gough and Inaccessible islands. On Gough, these were Logistic, Marine, Scientific research and Conservation zones; on Inaccessible there were Accommodation, Natural, Wilderness and Marine zones. Within these various areas, defined in detail in the respective management plans, certain activities are constrained or allowed. Under this plan, these have been integrated into a single zoning strategy covering the whole WHS, with the following zones - Logistic, Tourist, Marine, Scientific Research, and Conservation (Appendix 2:2.4).

A programme to eradicate *Sagina* on Gough has been implemented since 2000 and is ongoing (Gremmen *et al*. 2001; Cooper *et al*. 2011). Previous eradication methods included manually removing individual plants, stripping soil, and heat-treating soil and rocks to kill the soil seed-base, but were found to be ineffective. The current regime includes regular treatment with liquid and granular pre- and post-emergence herbicides. *Sagina* has been eradicated from 10,000 m^2 of steep cliff habitat, and the removal of plants from hard-to-access nooks and crannies on the cliffs at the original site near the weather station continues. However, *Sagina* has been reintroduced into some areas and paths that have been cleared of the plant. This highlights the ease with which this species can be spread by human footfall and the need to restrict movements in infested areas. The protocol for the cleaning of work-wear before and after entering infested areas, must be rigorously implemented to prevent reinfestation and to prevent *Sagina* from establishing elsewhere on Gough.

New Zealand flax (*Phormium tenax*) plants have also been systematically removed from Inaccessible Island since 2004, (last monitored in 2014) and a number of small annual and perennial non-native plants have been removed as they have appeared, usually in the vicinity of the weather station or near Blenden Hall on Inaccessible (Ryan *et al*. 2008; Ryan *et al*. 2012).

The major effects of introduced house mice (*Mus musculus*) on the ecology of Gough have been recognised within the last decade (Cuthbert & Hilton 2004, Wanless *et al*. 2007, Cuthbert *et al*. 2013b and 2013c). A feasibility study into the potential eradication of mice from Gough has been carried out (Parkes 2008), as have studies into bait acceptance (Cuthbert *et al*. 2011) and the effectiveness of aerial baiting (Cuthbert *et al*. 2014). The RSPB is actively engaged with the Tristan government and other stakeholders in planning the mouse eradication. The eradication is technically feasible, and pilot fundraising studies are underway. The goal is currently for operations to take place in 2019.

Long-term monitoring of Tristan and Atlantic yellow-nosed albatross demographics has been carried out since the early 1980's, while monitoring of Atlantic petrels and other burrowing petrels began in 2001 (Cuthbert & Sommer 2004b; Cuthbert *et al*. 2013a).

In 2011, the Tristan rock lobster fishery received Marine Stewardship Council (MSC) certification, but with conditions regarding Harvest Control Rules (HCR), by-catch and mitigation measures. In conjunction with MARAM and MRAG, HCR and Operating Management Procedures (OMP) were produced, and annual audits were successfully completed after meeting all three conditions for certification. In 2016 the certification expires and is due for reassessment for a further 5 years (J.P. Glass pers. comm.). A Darwin Plus project 2013-2015 provided biologists to assist the Fisheries Department in increasing knowledge of various aspects of the life history of lobsters, and in fisheries management particularly relating to MSC status requirements.

An extensive programme of scientific research and survey work into a wide range of taxa is ongoing within the WHS, mainly by biologists from South Africa and the UK, including a Darwin project which included surveys in the subtidal around Inaccessible in 2007, and a Darwin Plus project to survey the subtidal at Gough in 2014-15. The bibliography in the Appendix 15 lists the published results of this impressive effort.

Outstanding management issues and proposed actions

A Non-native species: management and prevention of new introductions

In common with many island ecosystems around the world, non-native invasive species are without doubt the most important immediate threat to the ecology of Gough and Inaccessible Islands WHS. Introduced house mice on Gough have a serious negative effect on seabird productivity, and are suspected of affecting the Gough bunting and a number of invertebrates and plants, including many rare and/or endemic species. It is worth remembering that house mice and black rats (*Rattus rattus)* are present on Tristan da Cunha and if either species were to reach Inaccessible Island, the consequences for its ecology would be devastating. Inter-island transfers of non-natives are as problematic as transfers from outside the entire island group. Consequently, elimination of these introduced species from Tristan would not only benefit the island community but be another line of defence for the WHS, as well as more rigorous implementation of inter-island biosecurity between Tristan and the WHS.

The WHS has also been subject to the introduction of numerous plant species, some benign but some vigorously invasive including *Sagina procumbens* (procumbent pearlwort) which can form a smothering mat over wide areas of habitat, *Holcus lanatus* (Yorkshire fog, a grass) which can become dominant in patches and *Phormium tenax* (New Zealand flax) which can form dense stands. The arrival of several species of parasitic wasps in the Tristan group has led to serious concern about their effects on native moths, particularly the group of important flightless endemic moths. The effects of introducing several species of slug, an earthworm, and other invertebrates to the WHS are unknown but unlikely to be positive.

The marine environment is no less susceptible to non-native introductions. One species of fish *Diplodus argenteus* (South American porgy) has recently become established in Tristan waters, though not yet within the WHS, as far as is known. However, this fish is a prolific broadcast spawner and it is only a matter of time before it establishes around Inaccessible. With increasing ship movements between the Tristan Group and continental Africa and America, the likelihood of damaging introductions of marine organisms to the WHS is also increasing. For instance, an oil rig en route from Brazil to Singapore was released from its shackles during bad weather on 30 April 2006 and was subsequently lost from sight. It was discovered on Tristan on 7 June 2006 and was responsible for the arrival of the South American Porgy, and possibly other species (Wanless *et al*. 2009). In 2011, after the wrecking of the MS *Oliva* at Nightingale, *Mytilus galloprovinicialis* (Mediterranean mussel), a species that has been invasive elsewhere, was found on the wreck. All specimens that were found were removed, but there has been little monitoring since. At only 14 miles distant from Nightingale, the seashores of the WHS at Inaccessible could be threatened should the mussels subsequently be found to have reproduced and established at Nightingale. The seaweed *Bonnemaisonia hamifera* , a species that has been introduced to widely separated locations around the world by human vectors, was discovered growing densely in the harbour on Tristan in 2013, and several other seaweed species are thought to have been introduced since the 1930s. Given the intrinsic importance of the marine environment around Gough and Inaccessible islands, the sensitivity of coastal marine ecosystems to change and the reliance of the Tristan economy on these same systems, a precautionary approach to all marine introductions is paramount. Given the increased amounts of shipping passing the islands, measures are urgently required that ensure that shipping traffic is aware of the islands' importance for wildlife, and keeps a safe distance.

The movement of people between islands and across the islands' landscapes is a key factor in enabling the transport and establishment of introductions, especially plants whose preferred habitats are characterised by disturbance and the availability of bare soil.

The continued use of the weather research station on Gough enables significant access to the island that would otherwise be logistically impractical, allowing researchers and others to visit for extended periods. The over-wintering team also provides an important flow of monitoring information from Gough on various aspects of wildlife and environment. Inevitably, this activity has also led to several introductions of plants and invertebrates to Gough Island with a new species of invertebrate estimated to become established on the island for every 3-4 landings (Gaston *et al*. 2003). Within the life of this plan, options and proposals for replacing the weather station infrastructure will be put forward by

SANAP in close consultation with TDC Government. This should provide an opportunity to build robust biosecurity measures into the design of the station to make it less likely that non-native biota are transferred onto Gough.

Proposed priority actions

- Initiate or continue eradication programmes for the most pressing problem species (house mice and *Sagina procumbens* on Gough, NZ flax and a suite of other plants on Inaccessible).
- Investigate the impacts of *Ichneumon insulator* particularly on the native moth fauna of Inaccessible and explore eradication options and feasibility.
- Prepare and implement a comprehensive bio-security plan for all human movements and activity on the islands to reduce the transfer of non-native biota between and within islands to include a risk assessment of non-native vector routes. This should build on the operating codes already in place and should be consistent with operating codes for SANAP and DEA visits to Gough and Inaccessible.
- Include bio-security measures in the re-development of the Gough Island weather station to maximise the opportunity to reduce non-native introductions by this route.
- Investigate measures to minimise risk from seagoing traffic, for example the introduction of the IMO designation of Particularly Sensitive Sea Area (PSSA).

B Access, infrastructure management and development

The Tristan Government leases a small (10 ha) area on Gough Island to the South African Department of Environmental Affairs. The current lease was renewed in 2013 for 20 years and covers the continuing use of the weather station. It, and the small hut (Blenden Hall) on Inaccessible Island are the only substantial infrastructure developments within the WHS. A plan to substantially refurbish the weather station is being prepared by DEA at present.

Footpath routes used by researchers and others provide corridors of disturbance and transmission that help non-natives spread within islands, as has been observed on Gough in relation to the spread of *Sagina* along paths to recreational fishing sites close to the Meteorological Station. Some paths also cause trampling damage to sensitive habitats such as mires. The minimisation of footpaths on both Gough and Inaccessible, and the restriction of access to certain areas for the takeover and overwintering teams on Gough, should be a management goal.

Both sub-Antarctic fur seals and northern rockhopper penguin colonies are known to be particularly sensitive to human approaches. Though there is no evidence that this has any effects on breeding numbers or productivity, a precautionary approach to disturbance of these species at least should be taken. The potential for increasing number of day visitors from cruise ships and other boats could also threaten bio-security. The intense, though temporary disturbance caused by over-flying helicopters is perceived as a problem for some species. Many of the night flying petrels nesting on Gough and Inaccessible are attracted to bright artificial lights during the hours of darkness. They can then collide with windows and other parts of buildings and ships to their injury, and prions on land in particular, can then be more susceptible to predation by skuas at first light. Although unlikely to cause a conservation problem for these birds at a population scale, it is nonetheless an unnecessary cause of disturbance and potential mortality that can easily be solved through reducing external lighting at night and using window blackouts.

Finally, the “by-catch” of freshwater fauna in the weather station drinking water supply system is causing needless mortality to at least two endemic water beetles in an already depauperate freshwater invertebrate community. The installation of a system that reduces or eliminates this problem should be pursued.

Proposed priority actions

- Implement a single consistent zoning plan for the WHS.
- Prepare and implement an access plan for Gough and Inaccessible islands that minimises both disturbance to key habitats and species, including from overflying and artificial lighting, and reduces the potential for the spread of non-natives to new areas of the WHS.

- Reduce or eliminate “by-catch” of freshwater fauna in the Weather Station water supply system.

C Fishery

The importance of the rock lobster fishery to the Tristan economy is hard to overstate. The current fishery, carried out by a single company, Ovenstone, is thought to be sustainable, and attained MSC certified status in 2011. It is closely controlled using a catch quota set annually, a minimum harvestable size for lobsters, and a closed season for fishing to allow lobsters to breed. The nature of the marine environment and the lack of comprehensive knowledge on the ecology of the Tristan rock lobster and the marine ecosystem of which it is part should mean that a precautionary approach to fishery management should be maintained, especially as very little is known about marine life in the 40-100m depth zone, the main depths of the fishery. In 2015 two trawler licences were issued for exploratory fishing for all finfish of commercial value, in particular for Alfonsino *Beryx decadactylus* and Bluenose *Hyperoglyphe antarctica*. There was also a long-liner fishing licence for Tuna (Southern Bluefin Tuna, Albacore, Bigeye). Licenses issued for Trawlers were for between 14-45 days, and for long-liners for 4 months (although usually they only stayed for about 30-40 days in the zone). These vessels are also able to report on any IUU fishing which very probably takes place and should be strenuously resisted, especially where long-lines or drift nets are being used. This is one of the greatest threats posed to the fishery and there is virtually no capacity to assess or control this activity. In January 2015 the Tristan Sea Fishery Observer on board a trawler observed six different types of illegal fishing gear on the seamounts in the Tristan EEZ, including jigging gear, gill netting and both surface and bottom long-line gear (J.P. Glass pers. comm.).

Proposed priority actions

- Continue to set catch quotas and size limits based on the best available information on stock size and population ecology for Tristan rock lobster, using a precautionary approach where uncertainty prevails.
- Fulfil annual requirements for Marine Stewardship Council certification for the rock lobster fishery.
- Counter the potential for IUU fishing in the WHS.
- Continue research into the habitat and feeding requirements of juvenile lobsters, and other unknown aspects of the biology of this keystone species.

D Species inventory/baseline and native seed bank

Written accounts of species recorded on Gough and Inaccessible islands over the years are scattered in the published literature and probably also in private notebooks. With the importance of many species and groups of plants and animals so widely recognised, a single comprehensive database of species recorded on and around the Tristan Group, and particularly within the WHS would make a valuable tool in the conservation management of the islands’ wildlife. The presence of so many endemic species and sub-species of plants makes the maintenance of a secure seed bank a wise precaution.

Proposed priority actions

- Create a single, widely accessible and comprehensive database of biota recorded within the WHS.
- Continue to work in partnership with Kew Gardens, London to accumulate a comprehensive seed bank of plants native to the WHS.

E Research, survey and monitoring programme

A prioritised research programme at the WHS aims to answer critical management questions such as the effects of non-native introductions on native biota. The programme is focused on the effects of mouse predation on breeding birds at Gough and on the control and eradication of *Sagina*. Monitoring of sea and land bird populations, surveying the inshore marine environment and research into the establishment of a Marine Protected Area are part of an ongoing programme. This is based on priorities established under this and the previous management plan, and under the Biodiversity Action Plan for the Tristan da Cunha Islands (2012-16). The programme is agreed and implemented through collaborative efforts between TDC-CD, RSPB, UCT and other stakeholders. An updated scientific research permit system will ensure that research interests, particularly on the ecological impacts of non-native introductions, are in line with management priorities in order to direct management actions

at the most pressing problems. Over the next 5 years, there will be an annual summer visit to Gough by Fisheries and Conservation department staff. The purpose of these visits will be to carry out monitoring work in the marine environment (e.g. diving and collecting data from sea temperature

loggers) and in terrestrial habitats, to build up datasets to inform the ongoing research and restoration programme. Many of the groups of animals and plants most important to the ecology of the islands, notably terrestrial invertebrates and marine algae and invertebrates, are currently under-recorded. For the deep sea below 300m, which comprises the vast majority of the area within the WHS limits, virtually nothing is known of the marine life and communities. There is also a significant gap in knowledge between 40m (the lower limit of dive surveys) and 100m (the upper limit of remote surveys from large vessels), despite this being the main depth affected by lobster fisheries. Monitoring the effects of introductions on Tristan, will inform management decisions on these species before they reach Inaccessible or Gough. Even for the better-studied groups such as birds, our knowledge of the distribution and abundance of many species of key importance on a global scale is incomplete. Measuring changes in abundance and productivity is a key challenge in monitoring the success of management actions and in teasing out the effects of off-site factors such as climate change.

Proposed priority actions

- Implement a programme of research, survey and monitoring based on management priorities as indicated by this management plan.
- Encourage other research that is compatible with the conservation objectives in this plan, and only permit research that is not in conflict with the same objectives, bearing in mind the sensitivity of some species and habitats to disturbance.
- Implement the updated scientific research permit system and procedures.

F Wider off-site factors impacting the WHS

Long-line fisheries across the Southern, South Indian and both the South and North Atlantic Oceans are having a serious effect on many species of seabirds nesting on Gough and Inaccessible. Most worryingly, Tristan and Atlantic yellow-nosed albatrosses foraging areas overlap with long-line fishing vessel activity and subsequent by-catch of these species has caused adult survival rates on Gough to fall below that needed to sustain their populations (Cuthbert *et al*. 2003; Cuthbert et al 2005; Wanless *et al*. 2009). Spectacled petrels (Inaccessible endemic) and great shearwaters (virtually endemic to the Tristan group) are also caught as a by-catch in long-line fisheries off South America and in the North Atlantic respectively (Ryan *et al*. 2006; Dunn, 2007). The Endangered sooty albatross is also likely to be caught, though there is no by-catch data to support this. Measures to reduce or eliminate the by-catch of birds on long-lines are relatively easy and cheap to carry out, and they are being adopted by a growing number of operators. However, the number of long-line fishing vessels around the world is enormous, setting thousands of kilometres of line and an estimated one billion baited hooks every year. For albatrosses and other seabirds on Gough also suffering reduced productivity caused by house mice predation of chicks, this problem is a critical one.

Climate change is also likely to lead to negative impacts on the islands' natural resources. Predictions of the effects of climate change in the South Atlantic are scant. General warming, an indication of wetter winters and drier summers and increased storminess appear to be the likely outcomes (JNCC website information). The influence of the sub-tropical convergence on the ecology of Gough and Inaccessible islands is profound, and any changes in oceanic currents which influence the position of this major ocean feature around the Tristan group, are likely to have serious consequences for the islands, especially their marine component. Giant kelp is an example of a keystone marine species that is already at the limit of its temperature tolerance at the northern islands, including Inaccessible. Such effects may be particularly severe for species that forage in waters relatively close to islands, such as northern rockhopper penguins. Changes in the marine systems and at-sea conditions have been raised as potential key factors behind the observed declines in northern rockhopper penguin numbers (Cuthbert *et al*. 2009; Birdlife International 2010). Changing temperature and weather patterns could also increase the likelihood of non-native species impacts.

The effects of plastic and other non-biodegradable material pollution on the WHS is also of serious concern. Many of the birds nesting on the WHS are prone to ingest small plastic objects while foraging at sea, which are then regurgitated as food offerings to chicks waiting at the nest to be fed (Ryan 1988). In areas of the Pacific, this has led to increased mortality of albatross chicks. Plastics

can also directly affect sea mammals through entanglement and ingestion. With such wide foraging and migration movements, these birds and mammals are at risk from such pollution in vast areas of the oceans. Local control of waste disposal will help, but far wider action is needed to remove this threat to biodiversity.

The grounding of the MS *Oliva* in 2011 graphically illustrated the threat from shipping and its cargo and fuel to the Tristan islands. With an increase in shipping traffic, the establishment of a Particularly Sensitive Sea Area (PSSA) around Gough and Inaccessible could contribute to reducing the risks of introductions and pollutions from marine incidents. (See action under Section A above).

Proposed priority actions

- Continue support for international efforts to reduce by-catch of seabirds in long-line and trawl fisheries, especially in the Southern Ocean and South Atlantic.
- Eliminate unmitigated long-line fishing in the WHS and, if possible, the EEZ.
- Develop climate change scenarios for the Tristan da Cunha group and assess any likely impacts on key habitats and species in the WHS (e.g. the potential effect of sea temperature rise on the marine microfauna).
- Continue strict control of waste disposals in the marine environment within the WHS.
- Support international partners and organisations to address the issue of micro-plastic and other pollution at sea.

G Awareness and education

Of key importance to the continued good environmental management of the WHS is to raise awareness of the importance of the islands on a global level. From the local community of Tristan da Cunha to international organisations and governments, from cruise ship operators to visiting researchers: all these groups and individuals need to be aware of the importance of the islands and the management in place to protect and enhance their ecosystems.

Proposed priority actions

- Encourage all members of the Tristan da Cunha community to take an active part in the implementation of this plan.
- Ensure that key information on the WHS and wider wildlife (terrestrial and marine) is covered by the Tristan school curriculum.
- Encourage researchers and others to promote the WHS in published work.
- Develop a key message and key audience plan as part of an awareness raising strategy.

High level objectives

1 To conserve and maintain the indigenous biological diversity of the World Heritage Site (both marine and terrestrial), including genetic diversity, species diversity and the diversity of ecological processes.

2 To minimise interference with natural processes and the destruction or degradation of natural features through human actions.

3 To prevent the introduction of any individual non-native animals, plants, other organisms or their propagules.

4 To maintain intrinsic wilderness values of these islands, including scenic features and geological/geomorphological structures and processes.

5 To eradicate non-native species with a significant impact on native ecosystems and species where feasible, and restore and rehabilitate ecosystems damaged by non-native species and other threats.

6 To protect historic sites and artefacts without conflicting with objectives 1–5.

7 To promote an awareness through education of the intrinsic value, significance and vulnerability of the islands and their biota.

8 To promote research relevant to objectives 1–7, identified as a priority under this plan, and to allow research not in conflict with these objectives.

9 To allow and manage sustainable fishing activities that do not cause significant change to the marine environment and its biota.

Priority management actions for the 5-year plan period

Note 1: It is likely that an eradication programme for mice will take some time to implement. Given the lag time to measure any effects on seabird productivity and survival, it was felt by the consultation group to be inappropriate to set avian population size and demographic targets for Gough in this plan period.

Note 2: Resources have not been secured to carry out many of the actions listed in this table. Therefore, implementation of many aspects of this plan will be dependent on adequate resources being found (e.g. raising £7.3 million for the eradication of mice from Gough). However, some of the objectives of the plan (e.g. fisheries management) are part of core work of the Tristan government, so will proceed without additional resources. Although all of the actions identified are considered to be high priority, those that are shaded orange are the actions/groups of actions that are considered essential to preserve the values of the site.

Note 3: Acronyms/terms used in table and not elsewhere in this document: TDC-FD – Tristan da Cunha Fisheries Department; TDC Government – Tristan Administrator and Island Council**.**

A Non-native species: management and prevention of new introductions

High level objectives supported: 1, 3, 5, 8

	Actions/targets	Target/indicator	When	Additional Cost	Responsibility [Lead (Main supporting)]
A1	Implement or continue eradication programmes for the most pressing problem species	As below	As below	As below	As below
A1.1	**Eradicate house mice *Mus musculus* from Gough**	**No house mice present**	**Winter 2019**	**£7,300,000**	**TDC-CD, RSPB (other stakeholders)**
A1.2	**Monitor for rodent presence on Gough once eradication complete**		**2019-2020 (and post-eradication to 2022) then annually**	**(Included in the eradication budget)**	**TDC-CD, RSPB**
A1.3	**Eradicate *Sagina procumbens* from Gough**	**No individual plants present.** **No reduction in extent of near-pristine terrestrial vegetation communities**	**Before 2020; ongoing post-eradication surveillance**	**£300,000**	**TDC-CD, RSPB (UCT, other site users)**
A1.4	**Monitor for presence and population size on Gough of *Sagina procumbens***				
A1.5	**Eradicate New Zealand flax *Phormium tenax* from Inaccessible, and other plants from WHS (*Verbena bonariensis*, *Solanum tuberosum*, *Juncus effusus*, *Agrostis gigantea*, *Brassica rapa*, *Cynodon dactylon*)**	**No individual plants of named species present. No reduction in extent of near-pristine terrestrial vegetation communities**	**Before 2020; ongoing post-eradication surveillance of each species**	**£75,000**	**TDC-CD, UCT, RSPB**
A1.6	**Monitor presence and population size of key non-native species**				
A1.7	Assess whether the introduced scale insect *Coccus hesperidum* and the associated sooty mould *Seiridium*	Impacts assessed	Before 2020	c£50,000	TDC-CD, UCT (RBG-Kew)

	phylicae found on *Phylica* trees and ferns at Blenden Hall (Inaccessible) pose a threat to the island's ecosystems				
A2	**Biosecurity advisor to visit to assist with preparation and implemention of biosecurity plan for Tristan da Cunha Islands & to deliver training across the biosecurity continuum, to government staff**	**No establishment of any new non-native species**	**Before December 2016**	**Costs for 6-12 months**	**TDC-CD**
A3	**Prepare and implement a comprehensive bio-security plan for all human movements and activity on the islands to reduce the transfer of non-native biota between and within islands to include a risk assessment of non-native vector routes. This should build on the operating codes already in place and should be consistent with operating codes for e.g. SANAP and DEA visits to Gough and Inaccessible**	**No establishment of any new non-native species**	**Before 2017**	**Time (Approx 3 months dedicated)**	**TDC-CD (SANAP, DEA, other stakeholders)**
A3.1	**Implement effective bio-security, quarantine and early warning procedures to minimise the risk of non-native species introductions, inter-island transfers and intra-island spreading (including in marine environment)**		**2017 and ongoing**	**Time (1 month per year) and unknown equipment costs**	**TDC-CD (SANAP, DEA, other stakeholders)**
A4	Include biosecurity measures in the re-development of the Gough meteorological station to maximise the opportunity to reduce non-native species introductions	No further establishment of non-native species via Gough meteorological station	Prior to any re-development	None (part of core work)	TDC-Government, SANAP, DEA
A5	Investigate feasibility of PSSA designations for Gough and Inaccessible to minimise risk of introductions and pollutions from marine	PSSAs designated	asap	Time	TDC-Government

	incidents				

B Access, infrastructure management, and development

High level objectives supported: 1, 2, 4, 6

	Action	Target/indicator	When	Cost	Responsibility
B1	**Develop a decommissioning strategy for all structures, especially the current meteorological station buildings on Gough**	**Decommissioning strategy documented and followed**	**Before 2017**	**Time (1 month dedicated)**	**TDC Government**
B1.1	**Lead on negotiations for the development of plans for the new base at Gough**	**Plans for the new base developed**	**Before 2020**	**None (part of TDC Gov core work)**	**TDC Government**
B2	Implement a single consistent zoning plan for the WHS	No increase in the extent of anthropogenic infrastructure (including pathways) outside specified zones (e.g. Logistic Zone on Gough). Appropriate EIA processes are implemented for new structures	Ongoing	Time (1 month)	TDC Government
B2.1	Survey the extent and condition of the path networks on both islands during yearly work programme on each island	Survey report; records of any changes to paths	Annually	None (part of regular visits)	TDC-CD (Site users)
B3	Implement an access plan for Gough and Inaccessible islands that minimises disturbance to key habitats, species and sites, including from overflying and artificial lighting, and reduces the potential for the spread of non-natives to new areas of the WHS and damage to historic sites and artefacts	Reduced trampling effects in sensitive habitats from 2009 baseline. Visitors and other site users managed effectively to minimise the risk of significant disturbance to key species and habitats, and promote awareness. No loss of culturally important artefacts.	Before 2017	Time (3 months dedicated)	TDC Government (Site users)

		Phylica and *Sophora* woodland protected from loss of trees through human actions. No damaging activity to near pristine marine shallow water (<40m) benthic habitats			
B4	Develop and implement a scientific research permit system, with guidelines for the application process and natural history data management	Research permits in place with all researchers and site users	Before April 2016 and ongoing	Time (1 month dedicated)	TDC Government (JNCC)
B4.1	Produce a risk assessment for each researcher visiting the islands	Level of threat assessed and mitigation measures implemented	Before April 2016 and ongoing	Time (1 month and part of core work)	TDC Government
B5	Investigate seriousness of, and if necessary, reduce or eliminate "by-catch" of freshwater fauna in the Met Station water supply system	By-catch no longer considered an issue	Before 2020	Time (1 month dedicated) £1,000	TDC-CD (researchers)
B6	Develop a disaster contingency plan for the WHS (covering oil spills, shipwrecks, disease outbreaks, evacuation protocols etc)	Contingency plan published and disseminated	Before 2020	Time (3 months dedicated)	TDC Government

C Fishery

High level objectives supported: 9

	Action	Target	When	Cost	Responsibility
C1	Continue to set catch quotas and size limits based on the best available information on stock size and population ecology for Tristan rock lobster, using a precautionary approach where uncertainty prevails	Annual rock lobster catch per unit effort is maintained at desired levels (as set by TDC-FD)	Annually	No additional	TDC-FD
C2	Monitor rock lobster catches per unit of fishing effort		Annually	No additional	TDC-FD
C3	Fulfil Marine Stewardship Council certification requirements for the rock lobster fishery	MSC certification upheld	Annually then every 5 years	No additional	TDC-FD
C4	Counter the potential for IUU fishing in the WHS, and if possible, the EEZ	IUU fishing absent	Ongoing	Time (1 month per year)	TDC-FD, JNCC
C5	Continue research into unknown aspects of lobster biology, particularly of juvenile stages	Info available to inform fisheries management decisions	Ongoing	£50,000	TDC-FD, researchers

D Species inventory/baseline and native seed bank

High level objectives supported: 1, 7, 8

	Action	Target	When	Cost	Responsibility
D1	Create a single, widely accessible and comprehensive database of biota recorded within the WHS	All biota recorded in a single location	Before 2020	Time (3 months) & database costs (c£10,000)	TDC-CD (JNCC)
D1.1	Establish distribution and population size of known endemic plants (5 on Gough and 2 on Inaccessible)	Population and distribution information available to allow broad assessment of population trends in future years	Before 2020	£50,000	TDC-CD (RBG-Kew, researchers)
D1.2	Confirm presence and distribution of endemic	Population and distribution	Before 2020	£50,000	TDC-CD (researchers)

	moths (*Peridroma goughi* and *Dimorphinoctua goughensis, Dimorphinoctua cunhaensis, Dimorphinoctua pilifera* and *Protoleucania exoul*)	information available to allow assessment of population trends in future years			
D1.3	Establish sites for long-term monitoring of animal and algal communities and species in the sub-tidal marine environment around both islands, and implement monitoring programme	Information on assemblages and abundance to allow broad assessment of changes in ecology in future years	Before 2017	Time	TDC-FD
D1.4	Exploratory sample surveying of deep (>40m) water areas for surface-dwelling, pelagic, and benthic species	Information on deep water species assemblages recorded	Before 2020	£50,000	TDC-FD, TDC-CD (researchers)
D2	Continue to work in partnership with RBG Kew to accumulate a comprehensive seed bank of plants native to the WHS	Seed bank includes all native species	Ongoing	Time (1 month per year)	TDC-CD, RBG Kew

E Research, survey and monitoring programme

High level objectives supported: 1-6, 8

	Action	**Target**	**When**	**Cost**	**Responsibility**
E1	Implement and review annually, a programme of research, survey and monitoring based on management priorities as indicated by this management plan	Research plan in place, including ongoing activities described below. Other research encouraged but only if compatible with the conservation objectives in this plan, bearing in mind the sensitivity of some species and habitats to disturbance	Ongoing with annual review	Time (2 months dedicate)	TDC-CD, researchers (JNCC)
E1.1	Monitor breeding Tristan albatross population	Annual survey on both Inaccessible and Gough (confirming continued presence on Inaccessible)	Annual	£20,000	TDC-CD, RSPB, UCT
E1.2	Monitor Gough bunting, to include pre- and post-eradication monitoring to measure the effect of mouse eradication on the bunting	At least two surveys within the duration of the plan	Twice before 2020	£60,000	TDC-CD, UCT, RSPB
E1.3	Survey spectacled petrel population on Inaccessible	At least one survey within duration of plan confirms population size remains above 10,000	2019	£20,000	TDC-CD and UCT (RSPB)

E1.4	Confirm continued presence and relative abundance (order of magnitude) of Inaccessible rail and Inaccessible bunting	Annual check confirming presence and once within duration of plan to assess abundance	Annual and 2019	£5,000	TDC-CD and UCT (RSPB)
E1.5	Research and monitoring of introduced porgy on Tristan	Information available on likely effects on WHS if/when the porgy reaches Inaccessible	Ongoing	£50,000	TDC-FD, researchers

F Wider off-site factors impacting the WHS

High level objectives supported: 1, 2, 8, 9

	Action	**Target**	**When**	**Cost**	**Responsibility**
F1	Continue support for international efforts to reduce by-catch of seabirds in long-line and trawl fisheries, in Southern Ocean & South Atlantic	Participation in ACAP meetings, implementation of ACAP Strategy	Ongoing	Time	TDC-FD and CD, JNCC (BL and RSPB)
F2	Develop climate change scenarios for the Tristan da Cunha group and assess any likely impacts on key habitats and species in the WHS	Climate change scenarios developed and potential future impacts on WHS considered	Before 2020	£30,000	TDC-Government, JNCC, researchers
F2.1	Collect baseline information on populations of giant kelp *Macrocystis pyrifera*, bull kelp *Durvillaea antarctica* and *Desmarestia ligulata* (brown seaweed) as potential future indicators of warming marine conditions	Baseline information exists, to allow monitoring of future changes	Before 2020	£50,000	TDC-FD, TDC-CD, researchers
F3	Continue strict control of waste disposals in the marine environment within the WHS.	Waste control protocols followed	Ongoing	None (part of core work)	TDC-CD, TDC-FD and all site users
F4	Support international partners to address the issue of micro-plastic and other pollution at sea and gather information from ad hoc monitoring from dead birds of plastic ingestion by seabirds	Participation in international fora	Ongoing	Time (few days per year)	TDC-FD and CD, UCT, JNCC

G Awareness and education

High level objectives supported: 7

	Action	Target	When	Cost	Responsibility
G1	Encourage all members of the Tristan da Cunha community to take an active part in the implementation of this plan	Tristan da Cunha leads implementation of this plan, and management of the WHS	Throughout plan	None (part of core work)	TDC-CD
G2	Encourage researchers and others to promote the WHS in published work	WHS is recognised as an important site for conservation and scientific research	Throughout plan	None (part of core work)	TDC-CD and all
G3	Develop a key message and key audience plan as part of an awareness raising strategy	Importance of protecting WHS and funding restoration is recognised	2019, part of Gough mouse project	None (part of core work)	TDC-CD, RSPB, other stakeholders
G4	Review progress on WHS Management Plan actions each year and update actions	WHS Management Plan is a working tool	Annually	None (part of core work)	TDC-CD, RSPB
G5	Develop tools, materials etc for Tristan school teachers	WHS included in school curriculum	Throughout plan	Time (& costs £10,000)	TDC-CD, TDC-FD, other stakeholders, researchers

Stakeholder contacts

This plan is owned by the Tristan Island Council. However, the need for an inclusive partnership of stakeholders is clear. Many individuals, organisations and government departments in both the UK and RSA have a stake in the World Heritage Site and its management. The following table lists those who are already engaged with the objectives of the plan and those whose support is essential for its successful implementation.

Stakeholder	Likely action	Contact
UK Government		
FCO	Funding, Support	Jonathan Brown
Environment Adviser, DFID	Funding, Support, Technical Advice	Pauline Scott
CBD Focal Point, Defra	Funding, Support, Technical Advice	Clare Hamilton
DCMS, World Heritage Sites	Funding	Fanny Douvier
GB Non-native Species Secretariat	Technical Advice, Support	Niall Moore
ACAP Officer, JNCC (Falklands)	Technical Advice, Support	Anne Saunders
OT Senior Advisor, JNCC	Technical Advice, Support	Tara Pelembe
Defra	Technical Advice, Funding	David Morley
Ministry of Defence	Logistics and fisheries protection.	
International NGOs and Overseas Groups		
RSPB	Technical Advice, Implementation, Facilitation	Andy Schofield (Partner Development Officer for TdC), Alex Bond (Senior Conservation Scientist), Jonathan Hall (Head of UK Overseas Territories Unit), Clare Stringer (Head of Globally Threatened Species), John Kelly (Gough Programme Manager)
RBG Kew	Technical Advice Plants	Colin Clubbe, Martin Hamilton,
Edinburgh Zoo, UKOTCF	Technical Advice, Support, Funding	Rob Thomas
British Antarctic Survey (BAS)	Technical Advice Birds Deep water marine surveys	Norman Ratcliffe Dave Barnes
BirdLife International Secretariat Birdlife International Global Seabird Programme	Technical Advice	Alison Stattersfield Stu Butchart Ross Wanless Ben Sullivan
Tristan Association	Supporter, Technical Advice	Martin Holdgate, Michael Swales,
IUCN	Supporter	Carole Martinez (IUCN OCT programme leader)
Buglife	Supporter, Technical Advice	Vicky Kindenba
Tristan Government		
Tristan da Cunha Administrator	Supporter	Alex Mitham
Tristan Government Representative	Supporter	Chris Carnegy
Chief Islander	Supporter	Ian Lavarello

Head of Environmental Conservation & Conservation Committee	Advice, Implementation	Trevor Glass
Head of Fisheries	Advice, Implementation	James Glass
Honorary Conservation Officer	Advice, Implementation	Peter Ryan
Honorary Conservation Officer	Advice, Implementation	Marthan Bester
Tristan Biodiversity Advisory Group	Advice, Implementation	Clare Stringer
Researchers		
Enviro-Fish Africa/Rhodes University	Technical Advice, Implementation	Tim Andrew
University of Cape Town,	Technical Advice, Implementation	Peter Ryan, Ross Wanless
Independent (UK)	Research, Advice	Sue Scott
Others		
Ovenstone	Implementation, Technical Advice	Dorien Venn
RSA Department of Environmental Affairs, South African National Antarctic Programme	Logistics, Implementation.	Nish Devanunthan
South Atlantic Islands Community	Supporters	
Cruise Ship Operators	Supporters, Funding, Implementation	

Appendices

There are 22 appendices accompanying the main section of this management plan. These provide further information on the islands and their management prescriptions. The appendices include descriptions and resource inventories for Gough and Inaccessible islands, prescriptions for management for both islands and island-specific management prescriptions including the biosecurity policy, measures and protocol, a bibliography of Gough and Inaccessible islands, ordinances relevant to the environmental management of the two islands, species lists for vascular plants, birds and fish, a list of members of the Tristan Biodiversity Advisory Group (T-BAG) and application forms and information to visit or conduct environmental research at Gough and Inaccessible. The description and resource inventories are based largely on the two earlier management plans of Cooper and Ryan (1994) for Gough Island, and Ryan and Glass (2001) for Inaccessible Island. These sections have been modified to include new references, updated information on the status and threats (e.g. the role of House Mice on Gough Island and eradication efforts for New Zealand flax and *Sagina procumbens*) and revised population efforts and species information where new information is now available. The prescriptions for management are again based on recommendations listed in the earlier Gough Island and Inaccessible Island management plans, however prescriptions for management have been altered to include recommendations made following annual visits by the Environmental Inspector (appointed by the Tristan da Cunha Administrator each year) and which are currently in place at Gough Island.

It is intended that these Appendices are ‘active documents’ that are published with this management plan and also available separately as files that can be downloaded from the Tristan da Cunha Association website (www.tristandc.com) and from the RSPB website. Consequently, where new information or changes are made within the duration of the life of this management plan (2015-2020), for example changes to management prescriptions, updated versions will be made available to be downloaded and used without delay. The table below lists the appendices, including the authors/responsible agency for each appendix as well as the date that each section was last modified.

List and Description of Appendices

Ref	Appendix title	Authors of latest version	Date last modified
A1	Description and resource inventory	P.G. Ryan, J. Cooper and R.J. Cuthbert, updated by Tristan Conservation Department	December 2015
A2	Management policies and prescription guidelines	P.G. Ryan, J. Cooper and R.J. Cuthbert, updated by Tristan Conservation Department	December 2015
A3	Environmental information about Gough Island and precautions to be taken by all expedition and take-over members	P.G. Ryan and J. Cooper, updated by Tristan Conservation Department	November 2015
A4	Team Conservation Officer guidelines – Gough Island	Tristan Conservation Department	November 2015
A5	Summary guidelines for day visitors – Inaccessible Island	Tristan Conservation Department	February 2016
A6	Reporting form for environmental research visits to Tristan da Cunha (incl. Gough and Inaccessible Islands)	Tristan Conservation Department	February 2016
A7	Permit application for undertaking environmental research at Tristan da Cunha (incl. Gough and Inaccessible Islands)	Tristan Conservation Department	February 2016
A8	Protocol for researchers at Tristan da Cunha (incl. Gough and Inaccessible Islands)	Tristan Conservation Department	February 2016
A9	Guidelines for applicants for environmental research permit at Tristan da Cunha (incl. Gough and Inaccessible Islands)	Tristan Conservation Department	February 2016
A10	Register of field aids on Gough and Inaccessible islands	Tristan Conservation Department	October 2015
A11	Register of field markers on Gough and Inaccessible islands	Tristan Conservation Department	October 2015
A12	Members of the Tristan Biodiversity Advisory Group (T-BAG), 2015	Tristan Conservation Department	December 2015
A13	Conservation of Native Organisms and Natural Habitats (Tristan da Cunha) Ordinance 2006	Tristan Government	2006
A14.a	Tristan da Cunha Fishery Limits Ordinance, 1983	Tristan Government	1983
A14.b	Tristan da Cunha Fishery Limits (Amendment) Ordinance, 1991	Tristan Government	1991
A14.c	Tristan da Cunha Fishery Limits (Amendment) Ordinance, 1992	Tristan Government	1992
A15	Bibliography of Gough and Inaccessible Islands	J, Cooper, updated by Tristan Conservation Department (K. Herian)	December 2015
A16	Annotated list of vascular plants recorded from Gough Island	J. Cooper and P.G.Ryan, updated by Tristan Conservation Department. (K. Herian)	November 2015
A17	Annotated list of vascular plants recorded from Inaccessible Island	P.G.Ryan, updated by Tristan Conservation Department (K. Herian)	November 2015
A18	Birds recorded from Gough and Inaccessible Islands	P.G.Ryan and R.J. Cuthbert, updated by A. Bond (RSPB)	November 2015
A19	Fish recorded from the waters off	J.P. Glass, S. Scott and T.G. Andrew,	December

	Gough and Inaccessible islands	updated by S.Scott	2015
A20a	Tristan da Cunha Biosecurity Policy	Tristan Conservation Department	February 2016
A20b	Biosecurity Measures for Visiting Vessels	Tristan Conservation Department	February 2016
A20c	Biosecurity Measures for Small Craft Visiting the Outer Islands	Tristan Conservation Department	February 2016
A20d	Biosecurity Measures for Helicopters	Tristan Conservation Department	February 2016
A21	Tristan da Cunha Biosecurity Protocol for the Marine Environment	Tristan Conservation Department	February 2016
A22	Gough Wildlife Monitoring Manual	A. Bond (RSPB)	August 2016

References

ANDREW, T.G., HECHT, T., HEEMSTRA, P.C & LUTJEHARMS, J.R.E. 1995. The fishes of the Tristan da Cunha Group and Gough Island, South Atlantic Ocean. *Ichthyological Bulletin of the J.L.B. Smith Institute of Ichthyology* 63: 1-43.

BARBER-JAMES, H. M. 2007. Freshwater invertebrate fauna of the Tristan da Cunha islands (South Atlantic Ocean), with new records for Inaccessible and Nightingale Islands. *Transactions of the Royal Society of South Africa* 62(1): 24-36.

BEST, P.B., GLASS, J.P., RYAN, P.G. & DALEBOUT M.L. 2009. Cetacean records from Tristan da Cunha, South Atlantic. *Journal of the Marine Biological Association of the United Kingdom*, 89(5): 1023-1032

BESTER, M.N., WILSON, J.W., BURLE, M.-H. & HOFMEYR, G.J.G. 2006. Population trends of Subantarctic Fur Seals at Gough Island. *South African Journal of Wildlife Research* 36: 191-194.

BESTER, M.N. & RYAN, P.G. 2007. Mammals. In: Ryan, P.G. (Ed.). *Field guide to the animals and plants of Tristan da Cunha and Gough Island*. Newbury: Pisces Publications. pp. 99-108.

BIRDLIFE INTERNATIONAL 2010. Rockhopper Penguins: A plan for research and conservation action to investigate and address population changes. Proceedings of an international workshop Edinburgh, 3-5 June 2008. Cambridge, Birdlife International.

BRITISH ANTARCTIC SURVEY 2013. South Atlantic Wilderness; assessment of Tristan da Cunha's seabed biodiversity. Unpublished report of science cruise JR287.

CHRISTOPHERSEN, E. 1940. *Tristan da Cunha, the lonely isle.* Cassell, London. 255 pp.

CHRISTOPHERSEN, E. 1947. A short account of the expedition. *Results of the Norwegian Scientific Expedition to Tristan da Cunha 1937-1938* 20: 1-24.

COOPER, J. & RYAN, P.G. 1994. *Management Plan for the Gough Island Wildlife Reserve*. Edinburgh, Tristan da Cunha: Government of Tristan da Cunha. 96 pp.

COOPER, J., CUTHBERT, R.J., GIBBS, D., GLASS, T., GREMMEN, N. J. M., RYAN P. G. and SHAW, J. D. 2011. Earth, fire and water: applying novel techniques to eradicate the invasive plant, Procumbent Pearlwort *Sagina procumbens*, on Gough Island, a World Heritage Site in the South Atlantic. In: Veitch, C.R., Clout, M.N. & Towns, D.R. (Eds.). *Island Invasives: Eradication and Management*. Gland: World Conservation Union & Auckland: Centre for Biodiversity and Biosecurity. pp. 162-165.

CROUS, P.W., GROENEWALD, J.Z., RYAN, P.G. & WINGFIELD, M.J. 2012. Fungal Planet description sheet 147: *Seiridium phylicae*. *Persoonia* 29: 186-187.

CUTHBERT, R.[J.] 2004. Breeding biology and population estimate of the Atlantic Petrel, *Pterodroma incerta*, and other burrowing petrels at Gough Island, South Atlantic Ocean. *Emu* 104: 221-228.

CUTHBERT, R.J., BROOME, K., BRADLEY, J. & RYAN, P.G. 2014. Evaluating the effectiveness of aerial baiting operations for rodent eradications on cliffs on Gough Island, Tristan da Cunha. *Conservation Evidence* 11: 25-28.

CUTHBERT, R. [J.], COOPER, J. & RYAN, P.G. 2013a. Population trends and breeding success of albatrosses and giant petrels at Gough Island in the face of at-sea and on-land threats. *Antarctic Science* 26(2): 163-171.

CUTHBERT, R.[J.], COOPER, J., BURLE, M.-H., GLASS, C.J., GLASS, J.P., GLASS, S., GLASS, T., HILTON, G.M., SOMMER, E.S, WANLESS, R.M. & RYAN, P.G. 2009. Population trends and

conservation status of the Northern Rockhopper Penguin *Eudyptes moseleyi* at Tristan da Cunha and Gough Island. *Bird Conservation International* 19: 109-120.

CUTHBERT, R.[J.] & HILTON, G.[M.] 2004. Introduced House Mice *Mus musculus*: a significant predator of endangered and endemic birds on Gough Island, South Atlantic Ocean? *Biological Conservation* 117: 483-489.

CUTHBERT, R.[J.], HILTON, G.[M.], RYAN, P.[G.] & TUCK, G.N. 2005. At-sea distribution of breeding Tristan Albatrosses *Diomedea dabbenena* and potential interactions with pelagic longline fishing in the South Atlantic Ocean. *Biological Conservation* 121: 345-355.

CUTHBERT, R.J., LOUW, H., LURLING, J., PARKER, G., REXER-HUBER, K., SOMMER, E., VISSER, P. & RYAN, P.G. 2013b. Low burrow occupancy and breeding success of burrowing petrels at Gough Island: a consequence of mouse predation. *Bird Conservation International* 23: 113-124.

CUTHBERT, R.J., LOUW, H., PARKER, G., REXER-HUBER, K. & VISSER, P. 2013c. Observations of mice predation on dark-mantled sooty albatross and Atlantic yellow-nosed albatross chicks at Gough Island. *Antarctic Science* 25(6): 763-766.

CUTHBERT, R.J. & SOMMER. E.S. 2004a. Population size and trends of four globally threatened seabirds at Gough Island, South Atlantic Ocean. *Marine Ornithology* 32: 97-103.

CUTHBERT, R.[J.] & SOMMER. E.[S.] 2004b. Gough Island bird monitoring manual. *RSPB Research Report* No. 5. Sandy: Royal Society for the Protection of Birds. 52 pp

CUTHBERT, R.[J.], SOMMER, E.[S.], RYAN, P.[G.], COOPER, J. & HILTON, G.[M.] 2004. Demography and conservation of the Tristan *Albatross Diomedea [exulans] dabbenena. Biological Conservation* 117: 471-481.

CUTHBERT, R.[J.], RYAN, P.G., COOPER, J. & HILTON, G.[M.] 2003. Demography and population trends of the Atlantic Yellow-nosed Albatross. *The Condor* 105: 439-452.

CUTHBERT, R.J., VISSER, P., LOUW, H., REXER-HUBER, K., PARKER, G. & RYAN, P.G. 2011a. Preparations for the eradication of mice from Gough Island: results of bait acceptance trials above ground and around cave systems. In: Veitch, C.R., Clout, M.N. & Towns, D.R. (Eds.). 2011. *Island Invasives: Eradication and Management.* Gland: World Conservation Union & Auckland: Centre for Biodiversity and Biosecurity. pp. 47-50.

CUTHBERT, R.J., VISSER, P., LOUW, H. & RYAN, P.G. 2011b. Palatability and efficacy of rodent baits for eradicating house mice (*Mus musculus*) from Gough Island, Tristan da Cunha. *Wildlife Research* 38: 196-203.

DUNN, E. 2007. The case for a Community Plan of Action for reducing incidental catch of seabirds in longline fisheries. A report from BirdLife International's Global Seabird Programme. BirdLife International, Cambridge, UK. 19 pp.

ELIX, J.A., ØVSTEDAL, D.O. & GREMMEN, N.J.M. 2005. A new *Lepraria* species from Gough Island, South Atlantic Ocean. *Mycotaxon* 93: 273-275.

GASTON, K.J., JONES, A.G., HÄNEL, A.G. & CHOWN, S.L. 2003. Rates of species introduction to a remote oceanic island. *Proceedings of the Royal Society of London* B 270: 1091-1098

GREMMEN, N.[J.M.], BARENDSE, J. and ORR, I. 2001. Invasion and eradication of *Sagina procumbens* L. (Procumbent pearlwort) on Gough Island. *Aliens 14*: 19-20.

GROENEVELD, J.C., VON DER HEYDEN, S., and MATTHEE, C.A. 2012. High connectivity and lack of mtDNA differentiation among two previously recognised spiny lobster species in the southern Atlantic and Indian Oceans. *Marine Biology Research* 8(8): 764-770.

HÄNEL, C. 2008. Gough Island 500 years after its discovery: a bibliography of scientific and popular literature 1505 to 2005. *South African Journal of Science* 104: 329-332 + 47 pp. of supplementary online material.

HÄNEL, C. & PALMA, R. 2007. The lice of the Tristan da Cunha Archipelago (Insecta: Phthiraptera). *Beiträge zur Entomologie* 57(1): 105-133.

HÄNEL, C., CHOWN, S.L. & GASTON, K.J. 2005. Gough Island . A Natural History . African Sun Media, Stellenbosch, 169 pp, ISBN 1-920109-03-X.

HELYER, P. & SWALES, M. 1998. *Bibliography of Tristan da Cunha*. Oswestry: Anthony Nelson. 175 pp.

HOLDGATE, M.W. 1958. Mountains in the sea. The story of the Gough Island expedition. London: MacMillan. 222 pp.

HOLDGATE, M.W. 1965. The biological report of the Royal Society expedition to Tristan da Cunha, 1962, Part 111. The fauna of the Tristan da Cunha Islands. *Philosophical Transactions of the Royal Society, London* B249: 361-402.

JONES, A.G., CHOWN, S.L., WEBB, T.J. & GASTON, K.J. 2003a. The free-living pterygote insects of Gough Island, South Atlantic Ocean. *Systematics and Biodiversity* 1: 213-273.

JONES, A.G., CHOWN, S.L. & GASTON, K.J. 2003b. Introduced House Mice as a conservation concern on Gough Island. *Biodiversity and Conservation* 12: 2107-2119.

PARKES, J. 2008. A feasibility study for the eradication of House Mice from Gough Island. *RSPB Research Report* No. 34.

RYAN, P.G. 1988. Intraspecific variation in plastic ingestion by seabirds and the flux of plastic through seabird populations. *The Condor* 90: 446-452.

RYAN, P.G. 2006. Inaccessible Island Seabird Monitoring Manual. *RSPB Research Report* 16: 1-32. http://www.rspb.org.uk/Images/InaccessibleIslandseabirdmon_tcm9-181044.pdf.

RYAN, P.G. (Ed.) 2007. *Field guide to the animals and plants of Tristan da Cunha and Gough Island*. Newbury: Pisces Publications. 162 pp.

RYAN, P.G. & CUTHBERT, R.J. 2008. The biology and conservation status of Gough Bunting *Rowettia goughensis*. *Bulletin of the British Ornithologists' Club* 128: 242-253.

RYAN, P.G., DORSE, C., HILTON, G. M. 2006. The conservation status of the spectacled petrel *Procellaria conspicillata. Biological Conservation* 131: 575-583.

RYAN, P.G. & GLASS, J.P. 2001. *Inaccessible Island Nature Reserve Management Plan.* Government of Tristan da Cunha, Edinburgh, Tristan da Cunha. 65 pp.

RYAN, P.G., GLASS, J.P., GLASS, T., BARENDSE, J. & CUTHBERT, R.J. 2012. Eradication of New Zealand flax *Phormium tenax* on Inaccessible and Nightingale Islands, Tristan da Cunha. *Conservation Evidence* 9: 58-62.

RYAN, P.G., ORTMANN, H.E. & HERIAN, K. 2014. Cascading effects of introduced scale insects on *Nesospiza* finches at the Tristan da Cunha archipelago. *Biological Conservation* 176: 48-53.

RYAN, P.G. & RONCONI, R. [A.] 2011. Continued increase in numbers of Spectacled Petrels *Procellaria conspicillata. Antarctic Science* 23: 332-336.

RYAN, P.[G.], SOMMER, E., BREYTENBACH, E. GLASS, W. & REPETTO, C. 2008. Controlling flax and other alien plants on Tristan's outer islands. *Tristan da Cunha Newsletter* 43: 28-29.

SCOTT, S. 2010. Underwater life of Inaccessible Island, Tristan da Cunha. Marine biological surveys November 2007. Report to the Tristan people and Darwin Initiative Post-Project No EIDP023.

SCOTT, S. 2015. Underwater life of Gough Island, Tristan da Cunha. Marine biological surveys January-February 2014. Report to the Tristan people, RSPB and Darwin Plus Project No. DPLUS005.

SWALES, M.[K.] 1989. The Denstone Expedition to Inacessible Island 1982-83. *Tristan da Cunha Newsletter* 4: 5-6.

TRISTAN DA CUNHA GOVERNMENT AND RSPB. 2012. Biodiversity Action Plan for the Tristan da Cunha Islands (2012-2016). Tristan Conservation Department, Tristan da Cunha, South Atlantic. 77 pp.

WACE, N.M. 1961. The vegetation of Gough Island. *Ecological Monographs* 31: 337-367.

WACE, N.M. & DICKSON, J.H. 1965. The biological report of the Royal Society Expedition to Tristan da Cunha, 1962, Part II. The terrestrial botany of the Tristan da Cunha islands. *Philosophical Transactions of the Royal Society London* B249: 273-360.

WANLESS, R.M., ANGEL, A., CUTHBERT, R.J., HILTON, G.M. & RYAN, P.G. 2007. Can predation by invasive mice drive seabird extinctions? *Biology Letters* 3: 241-244.

WANLESS, R.M., RYAN, P.G., ALTWEGG, R., ANGEL, A., COOPER, J. CUTHBERT, R. & HILTON, G.M. 2009. From both sides: dire demographic consequences of carnivorous mice and longlining for the Critically Endangered Tristan Albatrosses on Gough Island. *Biological Conservation* 142: 1710-1718.

WANLESS, R.M., SCOTT, S., SAUER, W.H.H., ANDREW, T.G., GLASS, J.P., GODFREY, B., GRIFFITHS, C. & YELD, Y. 2009. Semi-submersible rigs: a vector transporting entire marine communities around the world. *Biological Invasions* DOI/ 10.1007/s10530-009-9666-2

WOLFAARDT, A.C, GLASS, J., GLASS, T. 2009 Tristan da Cunha implementation plan for the Agreement on the Conservation of Albatrosses and Petrels (ACAP): review of current work and a prioritised work programme for the future. Tristan da Cunha Government. Tristan da Cunha.

The Tristan Conservation Department is responsible for biodiversity conservation on Tristan da Cunha. It works in partnership with organisations from around the world, especially the UK and South Africa, to reduce the rate of biodiversity loss in the Tristan islands.

The RSPB speaks out for birds and wildlife, tackling the problems that threaten our environment. Nature is amazing – help us keep it that way.

www.rspb.org.uk

We belong to BirdLife International, the global partnership of bird conservation organisations.

For further information, please contact:

Trevor Glass
Head of Conservation Department
Tristan da Cunha Government
Edinburgh of the Seven Seas
Tristan da Cunha
South Atlantic
Tel: +44 (0) 20 3014 5016
E-mail: tg.glassz@gmail.com

OR

Andy Schofield
UK Overseas Territories Officer
The RSPB, UK Headquarters.
Tel: +44 (0) 1767 680551

giving nature a home