MANAGEMENT PLAN FOR THE GOUGH ISLAND WILDLIFE RESERVE

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Foreword by His Honour Philip H. Johnson
Administrator, Tristan da Cunha

I am writing this foreword to a scientific document as a non-scientific person. I hope I shall be forgiven for taking the view of a lay-person on some aspects. The world is getting smaller as the human population increases, and it is essential that a balance is struck between the needs of man and beast (and birds, fish and plants, etc.).

Gough Island has had many scientific visitors since the first in 1811. The lay-person might ask what on earth can there be left to learn about the place? Even a cursory glance at the Management Plan, produced by our friends at the Percy FitzPatrick Institute of African Ornithology at the University of Cape Town, with financial backing from the Foreign and Commonwealth Office in London and the U.K. branch of the World Wide Fund For Nature, will answer that question. The Tristan da Cunha Government will do all within its power to uphold the sound and necessary recommendations made in the Plan within the very real constraints of its own limited resources.

Gough is a unique island which should be kept as nature intended it to be. This was recognized when it was declared a Wildlife Reserve under the 1976 Conservation Ordinance of Tristan da Cunha. It will be re-emphasized under its proposed new status as a Nature Reserve and I am sure that the Government of Tristan and the eminent members of the newly formed Gough Island Wildlife Reserve Advisory Committee (GIWRAC) will do all they can to protect it.

My predecessor, Mr B. E. Pauncefort, O.B.E., was instrumental in commissioning this Management Plan. I am pleased to have been the Administrator to see it completed and put in force. I hope that my successor will have the pleasure of seeing Gough Island appear on the World Heritage List to give it the universal status it so richly deserves.

P. H. Johnson
Administrator

Tristan da Cunha
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1. SUMMARY

Gough Island is a small oceanic island in the central South Atlantic. It is a British Possession, forming part of the Dependency of Tristan da Cunha and is uninhabited save for a meteorological station manned by South Africans. A commercial fishery for rock lobster and octopus as a by-catch takes place within inshore waters. In 1976 Gough Island and its surrounding waters out to three nautical miles were proclaimed a Wildlife Reserve.

The island has been little affected by human activities and therefore is a resource of great conservation and scientific research significance. Its land and seabird communities are especially significant. To date, however, the Wildlife Reserve has not benefited from having a formal management plan that prescribes human activities within it, in order to conserve the island's indigenous biota and natural environment to the greatest degree possible.

The Gough Island Wildlife Reserve should be managed as a Strict Nature Reserve/Wilderness Area (IUCN Category I) and as a World Heritage Convention Natural Site, with emphasis placed on the conservation and scientific study of its indigenous biota and ecological processes, as well as on its geological and scenic features.

Principal management objectives for the Gough Island Wildlife Reserve are:

1. To conserve the indigenous flora and fauna and ecological processes in as natural a state as possible
2. To maintain geological features and processes and scenic features
3. To prevent the human-induced introduction of alien flora and fauna and to eradicate or control, as far as possible, previously introduced and established alien species
4. To protect historical sites and artifacts when not in contradiction with the above three objectives
5. To encourage and facilitate research into the natural sciences that is not in contradiction with the above four objectives
6. To prohibit or control human activities ashore that are or may be in contradiction with the above five objectives
7. To allow and manage fishing activities that do not cause irreversible change to the marine environment and its biota
8. To promote an awareness through education of the value and significance of the Gough Island Wildlife Reserve
9. To register the Gough Island Wildlife Reserve with the Convention for the Protection of the World Cultural and Natural Heritage as a Natural Site

This management plan for the Gough Island Wildlife Reserve has been produced at the request of the Tristan da Cunha Government. It consists of two main sections: a description and resource inventory, and prescriptions for management. Supporting information is given in appendices. The prescriptions section sets out in detail practices and policies to be followed by all visitors to the Wildlife Reserve.

This management plan should be revised at five-year intervals. To this end, it is recommended that annual environmental inspections of Gough Island by a Conservation Officer of the Tristan Government, or other suitably qualified person appointed by the Tristan Administrator, be undertaken at the time of the annual relief of the meteorological station. Provision of logistic support for annual inspections should form part of a new lease for the South African meteorological station above Transvaal Bay.

A Gough Island Wildlife Reserve Advisory Committee (GIWRAC) has been established to advise the Administrator of Tristan da Cunha on matters dealing with the application and revision of the management plan and with environmental management of and research at Gough Island (see Appendix 9).

An important aim of the management plan is to provide the necessary information for supporting the nomination of the Gough Island Wildlife Reserve for inclusion in the World Heritage List of the Convention for the Protection of the World Cultural and Natural Heritage. The United Kingdom placed Gough Island on its indicative list for the World Heritage Convention in November 1985, describing the island as "one of the most spectacularly beautiful and least disturbed of the temperate islands in the Southern Hemisphere". With the completion of the

management plan, it is hoped that formal nomination to the World Heritage Convention will follow.

In addition, consideration should be given to the desirability and feasibility of appointing resident Conservation Officers on an annual basis to act as wardens of the Gough Island Wildlife Reserve; extending the reserve's seaward boundaries to 12 nautical miles (boundary of territorial waters); making the existing conservation ordinance more embracing by protecting all indigenous biota; and renaming the Wildlife Reserve the Gough Island Nature Reserve.

2. INTRODUCTION

Uninhabited oceanic islands are one of the few habitats in the world that remain in a state relatively undisturbed by humans. However, past exploitative activities and the introduction of alien biota often have affected oceanic islands to a greater or lesser extent (e.g. Moors 1985, Walton 1986). Those oceanic islands without permanent habitation and that have remained largely free of introduced animals and invasive plants are few in number, and are therefore of special conservation significance.

Gough Island in the South Atlantic Ocean is one such island, being largely free of the effects of human-induced perturbations (Wace & Holdgate 1976). Gough Island is the only oceanic island in the South Atlantic Ocean which is fully protected, having been proclaimed a Wildlife Reserve in 1976. The island, although part of the United Kingdom's Dependency of Tristan da Cunha, supports a meteorological station operated year-round by the Republic of South Africa under lease. It is otherwise uninhabited, and the only current economic activity within the reserve is inshore fishing for Tristan Rock Lobster *Jasus tristani* and, recently, octopus *Octopus* sp. as a by-catch of the rock lobster fishery.

The presence of the meteorological station and the fishery means that the potential for environmental disturbance exists. Various prescriptions exist in terms of the relevant conservation and fishery ordinances and orders, the lease for the operation of the meteorological station (the old lease expired on 31 July 1993; a new lease is under negotiation at the time of publication), and the fishing concession (expires 31 December 1996), but the exceptional conservation value of Gough Island warrants more formal protection in the form of a management plan.

The need for a management plan for the Gough Island Wildlife Reserve has been identified for some time, but no action transpired until August 1990, when the then Administrator of Tristan da Cunha, Mr B.E. Pauncefort, O.B.E., approached the Percy FitzPatrick Institute of African Ornithology, University of Cape Town, with a request to produce a plan. Two research officers of the Institute, who had previously been appointed Conservation Officers of the Government of Tristan da Cunha, took up the task after funding was made available in January 1992 by the United Kingdom Foreign & Commonwealth Office and the World Wide Fund For Nature UK.

An essential part of the preparation of the management plan was two environmental inspections of Gough Island, by P.G. Ryan in September-October 1991, and by J. Cooper in October-November 1992. Biological research conducted at Gough Island by research staff of the FitzPatrick Institute every year since 1979 has provided essential background information. A complete review of the published literature of Gough Island also has been undertaken and is appended as a bibliography to the management plan. Published and unpublished information made available by BirdLife International, Cambridge, UK, the Scott Polar Research Institute, University of Cambridge, UK, the World Conservation Monitoring Centre, Cambridge, UK and the UK Foreign & Commonwealth Office, London has been consulted. The first draft of the management plan was submitted for comment in December 1992. Based on comments received, two subsequent drafts were produced in January and March 1993. The final version submitted in June 1993 was accepted by the Tristan da Cunha Government in September 1993.

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The Joint Nature Conservation Committee (JNCC) of the United Kingdom produced a draft World Heritage nomination for Gough Island in 1993. With the legal adoption and publication of the management plan, it is expected that formal nomination to the World Heritage Convention soon will follow.

The management plan that follows consists primarily of two sections: a description and resource inventory, and prescriptions for management. Supporting information is given in appendices.

3. DESCRIPTION AND RESOURCE INVENTORY

3.1 Position, national and conservation status, and applicable legislation

3.1.1. Position

Gough Island (40° 21'S, 09° 53'W) is a cold-temperate island of volcanic origin in the central South Atlantic Ocean, approximately mid-way between the southern tip of Africa and South America (Fig. 1). The Tristan da Cunha group of three islands, located some 350 km NNW of Gough Island, are the nearest other land masses.

3.1.2 National status

Gough Island was proclaimed a British Possession on 29 March 1938 by Captain R.L.B. Cunliffe, R.N. of the H.M.S. *Milford* (Crawford 1941), as part of the Dependency of Tristan da Cunha, which falls under the Crown Colony of St Helena.

3.1.3 Conservation status and applicable legislation

The land birds of Gough Island have been protected since March 1950 under the Wild Life (Tristan da Cunha) Protection Ordinance. This law was replaced by the Tristan da Cunha Conservation Ordinance which came into force on 12 June 1976 (Appendix 2), which proclaims the island, its islets and waters out to three nautical miles (5.6 km) as a Wildlife Reserve. In terms of this ordinance, native plants, mammals and birds of the island are protected and the importation of alien animals and plants is prohibited, as is any agricultural or horticultural activity or the construction of buildings and roads and the erection of aerial masts without permit. Protection of terrestrial invertebrates and marine biota is not covered by the 1976 Conservation Ordinance.

The Gough Island Wildlife Reserve has been given the status of a Scientific/Strict Nature Reserve (The World Conservation Union (IUCN) Category I, the highest category of protection) by Clark & Dingwall (1985).

Waters within 200 nautical miles (370 km) of the island are protected by the Tristan da Cunha Fishery Limits Ordinance of 1983, as amended by Ordinances Nos. 2 of 1991 and 1992 (Appendices 3a-c). Commercial fishing without a license within the stated limits is prohibited, with a maximum fine of £ 2 000 000 and forfeiture of fishing gear and catch in terms of the 1991 amending ordinance. The 200-nautical mile limit around Gough Island overlaps in the northwest with that of Tristan da Cunha.

Fishing rights within 12 nautical miles (22.2 km) of the coastline are restricted to a single concession holder, subject to quota controls and size limits for the main target species, the Tristan Rock Lobster and recent restrictions on the catching of fin fish (Subsection 3.10.2 below). However, illegal fishing activities are known to have occurred within the 200-nautical mile zone (Roscoe 1979, Ryan & Cooper 1991, Subsection 3.10.2 below). Enhanced fisheries protection is now being addressed by the Tristan Government and the UK authorities following an inspection by a consultant fisheries advisor in the second half of 1992 (A.P. Kirk, United Kingdom Foreign & Commonwealth Office *in litt.*). The current fishing concession expires on 31 December 1996. The terms of a new concession have yet to be finalized.

A ten-year lease between the Governor of St Helena and the South African Government allowed for the demise of approximately 16 acres (*c.* 6 ha) of land above Transvaal Bay for the operation and maintenance of a meteorological and wireless telegraph station. The lease allowed for scientific research with the prior written permission of the Governor. The lease prohibited the introduction of livestock, domestic animals and flora, other than potatoes. This lease expired on 31 July 1993, and a new lease is being negotiated between the South African and United Kingdom Governments at time of publication (P. Karmy, United Kingdom Foreign and Commonwealth Office *in litt.*).

3.2 General description and access

3.2.1 General description

Gough Island has an area of some 65 km^2 and is roughly rectangular, 14 km long and up to 6 km wide, with the long axis running northwest-southeast (Fig. 2). The island is mountainous,

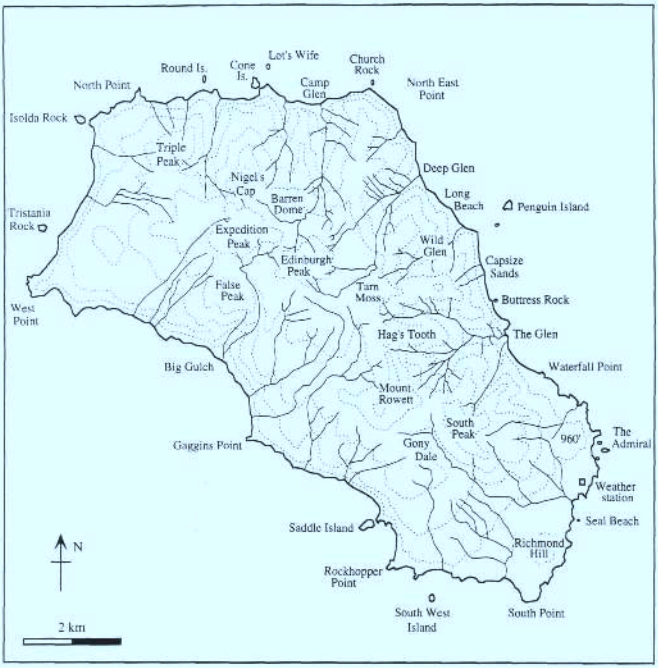

Figure 1

The Gough Island Wildlife Reserve, redrawn from Holdgate 1958. Contour interval = 150 m

with steep cliffs around much of the coastline, and an undulating plateau that rises up to 910 m above sea-level. The east side of the island is dissected by a series of deep, steep-sided valleys, termed glens (Cover Plate), which are separated by narrow, serrated ridges. Along the west side of the island, rounded slopes extend from the central plateau to the western sea cliffs. The only area of relatively level land below 200 m is in the south of the island. Boulder beaches are found along much of the shoreline beneath the cliffs. Numerous offshore islets, stacks and rocks are present, most within 100 m of the main island, and none more than 1 km offshore (Plates 1 & 2). The largest stacks support vascular plants and breeding birds.

3.2.2. Access

Access by sea to the meteorological station above Transvaal Bay is by means of a crane mounted on the 30-m high cliff top which can transfer both personnel and equipment. There are no wharves, jetties or permanent moorings for ships. Landing elsewhere on the island, mainly on the east and north coasts, is only feasible in calm conditions using small inflatable boats or dinghies. There is no landing strip for fixed-wing aircraft but a *c.* 15 m-square wooden platform (built in 1980) serves as a "helipad" for helicopters at the meteorological station. There is no public access to the island, although tourist vessels from time to time express an interest in visiting. A South African research and supply vessel, the m.v. *S.A. Agulhas*, operated by the Department of Environment Affairs as part of the South African National Antarctic Programme, visits Gough Island each austral spring (September-November) to resupply and relieve personnel at the meteorological station. Two rock lobster vessels, currently the *Tristania II* and *Hekla*, fish around the island for several months throughout the year. They are not permitted to make landings, but do transfer needed supplies to and remove mail from the meteorological station several times a year and occasionally request medical help from the station.

Fairly safe anchorages are found off the eastern, leeward shore of the island, north of The Glen in Milford Bay, in Quest Bay and in Transvaal Bay. When there are easterly winds, however, ships have to leave the island, or seek shelter in Snug Harbour, west of South Point (Fig. 2).

3.3 Discovery, derivation of name and history of human activity

3.3.1 Discovery and derivation of name

Gough Island is thought to have been first sighted by the Portuguese sailor Gonçalo Alvarez, probably in 1505. The name I. de Go. Alvarez which appears on early maps was later corrupted to I. Diego Alvarez (Wace 1969). However, due to confusion about the locality of the island, it was renamed after Captain Charles Gough of the British barque *Richmond* in 1731. The first landing was possibly made in 1675 by Antoine de la Roche (Wace 1969).

Holdgate (1958) gives derivations for place-names applied to geographical features at Gough Island up to 1956. A few additional names are now in common use by members of South African meteorological teams, but these have never been officially adopted or published on maps or charts.

3.3.2 History of human activity

The island was visited by sealers and whalers during the 19th century, until seal and whale populations were severely depleted (Verrill 1895, Wace 1969). These early visitors also collected fresh water and food (birds, eggs and plants such as the wild celery *Apium australe*), and introduced a number of alien organisms, including House Mice *Mus musculus* and potatoes *Solanum tuberosum*. Sealing gangs often remained ashore for several months. Some vessels made commercial collections of seabird eggs and guano, and even attempted mining for diamonds in 1919 (Appendix 4). In 1878 the American sailing ship *Philena Winslow* was wrecked on Gough, along with its cargo of coal. The crew were rescued and taken to Tristan da Cunha (Green 1960). This is the only known shipwreck on Gough, save for a Tristan Investments' fishing dinghy, wrecked at The Glen in 1990.

Sealing was briefly restarted at Gough Island in the second half of the 1950s by the fishing company, whose concession allows for sealing under permit. Only a few hundred animals were taken. An application in 1976 by the fishing company for a sealing permit to take 500 animals was not granted (archival information) and no commercial sealing has taken place subsequently. Illegal sealing occurred in several years before 1955-56 on a small scale (Wace & Holdgate 1976).

The first scientific observations of note were made by the sealer George Comer who spent several months ashore in 1888 (Verrill 1895). Additional

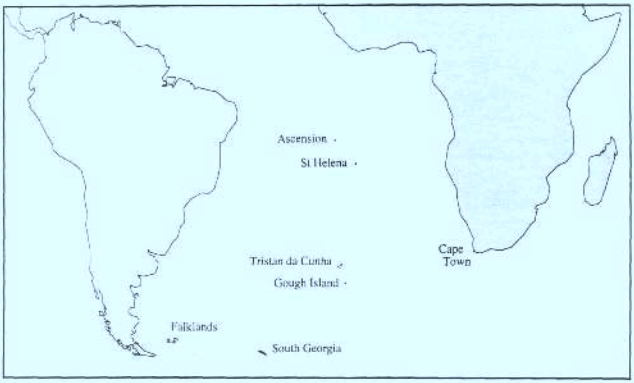

Figure 2

The position of Gough Island relative to Africa, South America, Tristan da Cunha, and other islands in the South Atlantic Ocean

observations were made during the first half of the 20th century, when brief visits to the island were made by several vessels (Wace & Holdgate 1976, Appendix 4). The 1937-1938 Norwegian expedition to Tristan da Cunha planned a visit to Gough Island which did not transpire. Consequently, the first intensive investigation was during the 1955-56 summer by the privately organized Gough Island Scientific Survey. This expedition was based at The Glen on the east coast, and made inventories of the island's fauna and flora, as well as investigating the island's geology, palaeoecology, and producing the island's first detailed map (Holdgate 1958).

In 1956 the South African Weather Bureau took over the expedition's hut and continued weather observations, initially as part of South Africa's contributions to the International Geophysical year (IGY) (Cooper & Headland 1991). In April 1963, the station was moved to its present locality above Transvaal Bay (Le Roux 1965), and is currently staffed by seven men throughout the year (see Subsection 3.10.3 below for a summary of current activities at the station). Non-meteorological observations have been largely restricted to the approximately month-long relief periods during spring when the station is resupplied. Biologists and sometimes other scientists (geologists, physicists) have undertaken research every year during this period since 1973 (Appendix 4).

Removal of birds and seals of several species for primarily commercial purposes (for supply of live animals to zoological gardens) was carried out intermittently up until 1984 (Table 1). Northern Rockhopper Penguins *Eudyptes chrysocome moseleyi* were caught in the greatest numbers (at least 844, Table 1) and most recently. No permits have been issued for the collection of live specimens for supply to zoos since 1984 (P.H. Johnson, Administrator of Tristan da Cunha *in litt.*).

Collection of specimens of the island's biota has been carried out since the early visits (Appendix 4). In recent years, few specimens of live seals and birds have been collected, most being obtained from birds found dead in the vicinity of the meteorological station (Table 2).

3.3.3. History of the fishery

The commercial fishery for Tristan Rock Lobster commenced around Gough Island in the period 1949-1951 from the fishing vessel *Pequena*, utilizing dinghies and baited hoop nets, after exploratory fishing from the same vessel in 1948 (Anon. 1948, Heydorn 1969). From September 1951 the *Tristania*, a fishing vessel of the sole concession holder, the then Tristan Development Company, deployed 26 dinghies, freezing their catch aboard. In the 1950s the *Frances Repetto* also fished at the island. In 1963 the South Atlantic Islands Development Corporation, registered in Hamilton, Bermuda and operating through Tristan Investments (Pty) Ltd of Cape Town, South Africa, obtained a new 35-year sole concession and has subsequently used a number of different vessels (*Hilary*, *Melodie* and *Gillian Gaggins*) in Gough waters. In 1967 the *Tristania* was converted to use 20 steel traps on each of six to nine long lines (Roscoe 1979, Pollock 1981). From late 1969 the exposed northern waters of Gough were fished using traps, after the sheltered eastern coast had been largely fished out (Roscoe 1979, Pollock 1981). The *Tristania* was replaced by the larger *Tristania II* in June 1973. In 1983 the *Hekla* commenced fishing in Gough waters, usually in alternation with the *Tristania II* (C.R.W. Dickason, Tristan Investments pers. comm.). Current fishing practices are described in Subsection 3.10.2 below.

The 1950-1966 catch of rock lobster in Gough waters is not known because separate statistics for each island in the Tristan-Gough group were not kept (Roscoe 1979). From 1965 to 1976 there was a decline in the rock lobster population of Gough waters, based on a decrease in total catches and catch per unit effort (CPUE) (Roscoe 1979). Prior to 1970, the average annual catch at Gough was 470 t (MRAG 1991). For the period 1970-71 to 1978-79 the annual catch in Gough waters varied from 64 to 380 t whole mass (Pollock 1981), giving a mean of 180 t. During this nine-year period both CPUE and size composition decreased, the latter only slightly. For the period 1985-1989 the average annual catch of rock lobster in Gough waters was 118 t. The 1989-90 catch was 164 t (MRAG 1991). From these figures and trends it may be inferred that the rock lobster population of Gough Island waters has decreased substantially from pre-exploitation levels.

According to MRAG (1991), the history of catches and effort suggests a severely depleted spawning stock of rock lobster at Gough Island, and that even with the setting of a Total Allowable Catch (TAC) of 90 t (see Subsection 3.10.2 below), it would take a number of years for the stock to recover to "conventionally safe

TABLE 1

REMOVAL OF LIVE BIRDS AND SEALS FROM GOUGH ISLAND*

Year	Rockhopper Penguin *Eudyptes chrysocome*	Gough Moorhen *Gallinula comeri*	Southern Elephant Seal *Mirounga leonina*	Notes
1950s		"up to 30"		Holdgate 1957
1956		12		Released on Tristan da Cunha, M.K. Swales *in litt.*
1956	12	12		Liversidge 1956**
1965		12		Crawford 1965
<1976	300		4	Elephant seals in 1974
1976	72		3	36 pairs of penguins
1977	100			50 pairs of penguins; apparently over-collection was made
1979	80	2		1 pair of moorhens, 73 penguins collected W.R.P. Bourne *in litt.*
1980	80			114 originally collected, but all escaped, A.J. Williams *in litt.*
1981	100			
1984	100			99 collected, J. Cooper pers. obs.

* Information for 1976-1984 of numbers permitted to be collected supplied by P.H. Johnson, Administrator, Tristan da Cunha, *in litt.*, 3 April 1992; for before 1976 of actual numbers collected supplied by J. Visser, *in litt.*, 20 May 1992. Detailed information is lacking on earlier collections of animals, although it is known that birds, eggs and guano have been collected since the early 19th century (e.g. Wace & Holdgate 1976). Sealing has taken place intermittently from at least the early 19th century to after 1956 (Wace 1969, Wace & Holdgate 1976).

** In addition, the Gough Island Scientific Survey removed three Yellownosed Albatrosses *Diomedea chlororhynchos*, six Subantarctic Skuas *Catharacta antarctica*, and 14 Gough Buntings *Rowettia goughensis*.

TABLE 2

SEALS AND BIRDS (INCLUDING CORPSES) COLLECTED FOR SCIENTIFIC STUDY AT GOUGH ISLAND SINCE ENACTION OF THE TRISTAN DA CUNHA CONSERVATION ORDINANCE OF 1976

Year	Numbers and species	Publications
1977-78	220 Subantarctic Fur Seals	Bester 1989, 1990b Bester & Laycock 1985
1979	(details unknown)	W.R.P. Bourne *in litt.*
1979	5 Rockhopper Penguin chicks	Williams & Imber 1981, Williams & Laycock 1981
1980	"Small numbers of seabird eggs of three species, 125 specimens of 18 bird species"*	Clancey 1981, J.C. Sinclair *in litt.*
1980	2 adult Great Shearwaters*	Randall *et al.* 1983
1983	205 specimens of 15 bird species*	Furness 1985
1984	20 female Great Shearwaters and their eggs	Hoberg 1986, Hoberg & Ryan 1988, Ryan 1986b, 1987b, 1988b, Ryan *et al.* 1988
1986	2 Sooty Albatrosses**	Cooper 1988b, Jackson 1990
1988	2 Gough Buntings	Ryan 1992
1990	89 Broadbilled Prions*	Klages & Cooper 1992

* Most specimens were of birds found dead or injured as prey of Subantarctic Skuas or by flying into buildings above Transvaal Bay. In addition to these birds, numerous bird corpses collected from 1982-1990, mainly of burrowing petrels Procellariidae, have been supplied to South African museums by the FitzPatrick Institute, University of Cape Town, but no detailed records are available.

** Accidental death of birds held in temporary captivity for experimental purposes (see Jackson 1990).

Appendix 5 *inter alia* lists all known scientific visits to Gough Island prior to 1976, many of which resulted in collection of animal specimens for scientific purposes; see also Williams & Imber (1982).

levels".

Up to 1983, no size limit was imposed on the fishery, save that the gear used allowed small rock lobster to escape (Roscoe 1979). In 1983, following scientific advice (Pollock 1991), a minimum carapace length of 70 mm was adopted. Research on Tristan Rock Lobster has been carried out at Gough in 1967, 1971-1973, 1977 and 1989 by limited SCUBA diving on the east coast, tagging, and examination of commercial catches (Appendix 5).

Poaching of rock lobster has been a regular occurrence, being recorded at the Tristan-Gough Islands in 1969, 1970, and in 1972-1974 (Roscoe 1979) and more recently (C.R.W. Dickason pers. comm.). In the early days of the fishery, Rockhopper Penguins, albatrosses and sharks were caught for use as bait (Roscoe 1979, Wace & Holdgate 1976), as were locally caught fin fish until very recently (see Subsection 3.10.2 below).

The fishing company took over buildings at the deserted station at The Glen for storage purposes in the 1960s and also installed plastic and metal piping and a diesel pump to supply fresh water to their vessels (Wace & Holdgate 1976, archival information). Use of The Glen by the fishing company had apparently ceased by the end of the 1970s.

3.4 Geology, geomorphology and soils

3.4.1 Geology and geomorphology

Gough Island is a basaltic shield volcano with a complex structure resulting from four main periods of volcanic activity.

The first was a basaltic period (the Older Basaltic Group) comprised of three formations, with the earliest lavas dating back at least 2.55 My, and the upper formations ranging up to 0.55 My old (Le Roex 1985, Maund *et al.* 1988). The lower flows are characterized by picrite basalt, olivine-pyroxene basalt and trachybasalt, whereas the upper flows range from picrite basalt to trachyandesite (Le Maitre 1962, Le Roex 1985). These strata were fed by dense swarms of intrusive dykes that radiate from the centre of the island (Chevallier 1987). The basaltic flows are exposed along the eastern side of the island where they form the deeply eroded valleys or glens. Being more resistant to erosion than the surrounding lavas, the dykes frequently protrude from the present landscape as long, narrow walls, contributing to the serrated appearance of the sides of the glens. The end of the basaltic period was marked by the formation of a central crater or caldera. The eastern side of the caldera is still visible, forming the edge of the plateau between Tarn Moss and Nigel's Cap (Chevallier 1987).

A series of aegerine-augite trachytic plugs occurred from 0.84 to 0.47 My ago, forming such features as Hag's Tooth, Pummel Crag and Richmond Hill (Le Roex 1984, Chevallier 1987, Maund *et al.* 1988, Fig. 2).

After a period of quiescence and major erosion, the third period was of trachyte extrusives, dated from 0.30 to 0.12 My, that filled the caldera and flowed out primarily to the west, to form the present landscape found on the plateau and along the west and south coasts. Most flows arose from the main vent centred beneath Expedition Peak, but smaller intrusive plugs are scattered throughout the island. There are many less prominent trachytic dykes in the present landscape than there are basaltic dykes; the best examples are found along the crest of Green Hill and around Big Gulch.

The fourth and youngest phase of volcanic activity was a basaltic eruption that formed the Edinburgh Peak cone and surrounding lava flows (Chevallier 1987, Maund *et al.* 1988). Major volcanic activity ceased at least 0.1-0.2 My ago (Le Roex 1984, Maund *et al.* 1988), but ash layers found in peat cores from Albatross Plain suggest that smaller eruptions may have occurred as recently as 2500 y ago (Hafsten 1960, Wace & Holdgate 1976). However, these ash layers may have been redeposited by fluvial erosion (M.W. Holdgate, The World Conservation Union *in litt.*).

There is some evidence of raised beaches along the southeastern coastline, suggesting that the island has been uplifted (Gribnitz & Kent 1989), contrary to earlier views (Ollier 1984, Wace & Ollier 1984). Marine erosion maintains the sea cliffs, and apparently outpaces fluvial erosion, accounting for the many rivers that terminate in waterfalls at the coast. A dramatic example of cliff erosion occurred in April 1992 when the Archway in Transvaal Bay collapsed over a period of a few days.

3.4.2 Soils

Soils are poorly developed; a deep mantle of peat

covers much of the island (Wace 1961). Peat slips are frequent on the steeper slopes during periods of heavy rainfall which can also cause severe scouring of streams (Ryan 1993, Plates 11 & 12). Such slips are important for maintaining plant diversity in the fern bush vegetation type (Wace 1961, Milton *et al.* 1993). Only the exposed ridges and mountain peaks support a thin layer of mineral soil, comprised of course gravels and humus (Wace 1961).

Very little is known of the marine sediments within the Wildlife Reserve.

3.5 Bathymetry and oceanography

3.5.1 Bathymetry

Gough Island rises steeply from the surrounding seabed which is more than 3000 m-deep (Chevallier 1987); shallow shelf waters around the island are limited. Gough and the Tristan da Cunha Islands form part of a chain of volcanic seamounts which extend eastward from the Walvis Ridge towards the mid-Atlantic Ridge. On a more local scale, Gough is the westernmost of three seamounts aligned along the Gough Fracture Zone (Chevallier 1987). McNish Seamount, slightly smaller than Gough Seamount, is 80 km east of Gough Island, whereas the larger RSA Seamount lies farther east. Both McNish and RSA Seamounts rise to within 500 m of the sea surface, and fall at least in part within the 200-nautical mile zone around Gough Island.

3.5.2 Oceanography

Little is known about the oceanographic features surrounding Gough Island (Shannon *et al.* 1989). The Subtropical Convergence typically lies to the north of the island, but varies greatly in its intensity in the central South Atlantic (Lutjeharms *et al.* 1993). Mean sea-surface temperatures range from 11 to 13°C (Wace & Holdgate 1976). Ocean currents are from the west, associated with the prevailing winds, and average 0.5 knots (Baker *et al.* 1964). The tidal range is small, averaging less than 0.5 m.

3.6 Climate

At 40°S, Gough Island lies on the edge of the westerly wind belt known as the 'Roaring Forties', and has a cold-temperate oceanic climate. Mean annual air temperature near sea-level is 11.5°C, with relatively little annual variation (Fig. 3a). Extreme air temperatures near sea-level range from -3 to 25°C, with monthly means of daily minima and maxima 6.6 and 11.1°C in midwinter (August), and 12.1 and 17.4°C in midsummer (February). The mean daily temperature range is 4 to 5°C, and mean relative humidity is 80% (Höflich 1984). Snow can fall on the peaks between May and January, but rarely occurs at sea-level, even in mid-winter.

Frontal rainfall occurs throughout the year (Fig. 3b) in association with the passage of cyclonic depressions. The annual average rainfall near sea-level is 3116 mm, with relatively little inter-annual variation (extremes of 2577 and 3743 mm have been recorded between 1963 and 1991 at Transvaal Bay). Cold fronts are most frequent in winter, resulting in a slight winter peak in precipitation (56% of the annual average). Mean monthly rainfall in summer (October-March) at Gough is 230 mm, whereas that in winter (April-September) is 289 mm (South African Weather Bureau data). However, the largest daily rainfall totals (100-200 mm) are concentrated in spring and autumn. Precipitation at higher altitudes is probably even greater than at sea-level, boosted not only by increased rainfall but also by input from orographic clouds, which form over the island (Mullock 1957). Typically, the cloud base is between 300 and 500 m, although occasionally it descends virtually to sea-level.

Mean wind speed is 12 $m.s^{-1}$, with a tendency for stronger winds in winter. Gales blow on 5% of summer days, compared with 15% of winter days (Höflich 1984). Wind strength typically increases with altitude, and can be exceptionally strong on exposed ridges.

3.7 Terrestrial flora and vegetation

The vegetation of Gough Island has been described by Wace (1961) and Wace & Dickson (1965), with Groves (1981) providing the most recent comprehensive species list for vascular plants, although there have been subsequent additions and revisions to the flora (Wace 1986, Roux 1993a,b, Appendix 5). The flora is typical of southern cold-temperate oceanic islands (Moore 1971), with a relatively low species diversity, and a large preponderance of ferns and cryptogams (79% of recorded species, Table 3). Allowing for

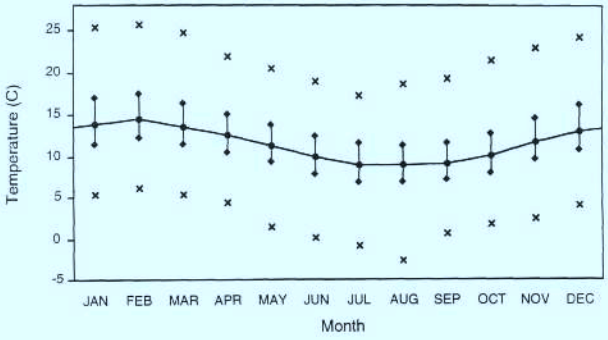

Figure 3a

Mean, minimum and maximum daily air temperatures and extremes at Transvaal Bay, Gough Island

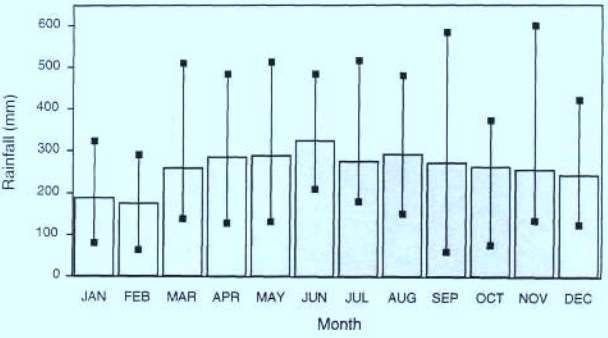

Figure 3b

Mean, minimum and maximum rainfall at Transvaal Bay, Gough Island, from Höflich 1984

Plate 1: The Admiral, Midshipman and Commodore stacks off Southeast Point, with Luff Point in the background. Tussock grassland covers the slopes in the foreground (P.G. Ryan, 1991)

Plate 2: Saddle Island, in Repetto Bay, on the western side of Gough Island, taken from the Southern Giant Petrel *Macronectes giganteus* colony in mixed *Phylica arborea* and *Blechnum palmiforme* fern bush on the slopes of Low Hump (P.G. Ryan 1991)

incomplete taxonomic coverage (Wace & Dickson 1965), 12 species are considered endemic to Gough Island, and an additional 49 species are restricted to Gough and the Tristan group of islands. The great overlap between the floras of Gough and Tristan, especially among the best-known vascular plants, supports their inclusion in a single phytogeographic province. Endemism is greatest among vascular plants and mosses (Table 3), but this may reflect differences in the knowledge of these taxa.

The origins of the angiosperm flora are primarily southern South American or circumpolar sub-Antarctic (Wace & Dickson 1965, Groves 1981), although there are some African affinities (e.g. the Island Tree *Phylica arborea*, Milton *et al.* 1993). Ferns and cryptogams also show mostly South American and sub-Antarctic affinities, but share many more species with southern Africa (Wace & Dickson 1965). Several plant species are restricted to the Gough-Tristan group and the cool temperate islands in the southern Indian Ocean, Isles Amsterdam and St Paul, possibly as a result of seed dispersal by seabirds (Wace & Dickson 1965).

The vegetation exhibits marked changes with altitude in relation to climatic differences (Wace 1961). The characteristics and dominant species of each of the main vegetation types, listed in order of ascending altitude, are presented below.

3.7.1 Tussock grassland

Tussock grassland (see Plate 1) is largely restricted to the offshore stacks, sea cliffs, and adjacent slopes where salt spray is regular. Tussock grassland extends farther up the seaward slopes on the exposed west side of the island (up to 300 m) than on the eastern side (generally less than 100 m), where fern bush is better developed. The tussock grasses *Spartina arundinacea* and *Parodiochloa flabellata* are the dominant species in this formation; distinct assemblages are found in areas dominated by each of the tussock grasses, as well as in penguin colonies and seal wallow grounds (Wace 1961). In a few areas, such as above South Point, dense *Spartina* virtually excludes other macrophytes. At most sites, however, other species occur between the tussocks; characteristic species include the ferns *Asplenium obtusatum*, *Elaphoglossum laurifolium*, *Blechnum australe*, *B. penna-marina*, as well as the heath *Empetrum rubrum*, and forbs such as *Chenopodium ambrosioides*, *Apium australe* and *Rumex frutescens*. The endemic *Cotula goughensis* is restricted to the upper beach and coastal cliffs. Scattered *Phylica* trees also occur in tussock grassland.

Marine erosion results in fairly frequent landslips, slumps and rockslides onto the boulder beaches. The coastal vegetation also is heavily trampled in many places by colonies of seals and penguins. These disturbed sites support the greatest diversity of introduced species found at the island, including *Agrostis stolonifera*, *Holcus lanatus*, *Poa annua*, *Plantago lanceolata*, *Rumex obtusifolius*, *Stellaria media* and *Sonchus* spp. Native species found in these disturbed habitats, in addition to the two tussock grasses, include *Scirpus bicolor*, *Cotula goughensis*, *Apium australe* and *Callitriche christensenii*.

3.7.2 Fern bush

Fern bush (see Plates 2, 3 & 11) occurs above the coastal tussock grassland up to an altitude of about 500 m. It is better developed on the more sheltered eastern side of the island, and is most extensive on the southern coastal lowlands. The deciduous fern *Histiopteris incisa* forms the dominant climax assemblage in fern bush, forming stands which, in the absence of perturbations, eventually come to exclude other species. The *Histiopteris* rhizomes form a dense mat, which, together with the smothering effect of dead fronds dropped in autumn and the rapid growth of new fronds in spring, prevent other species germinating. However, two other plants also characterize fern bush.

Phylica arborea (Rhamnaceae), the Island Tree, is a fine-leafed, evergreen tree that can attain heights of up to 4 m in sheltered situations, but is more typically semi-procumbent, with a canopy 2-3 m high (Plate 3). The branches support dense growths of epiphytic lichens, mosses and some ferns. Where canopy cover is dense there is little understorey, but in more open woodland there is a dense understorey dominated by ferns such as *Ctenitis aquilina*, *Histiopteris incisa*, *Elaphoglossum laurifolium* and *Asplenium obtusatum*. *Nertera depressa* and a variety of sedges, grasses and mosses also grow under the canopy in places.

Sophora microphylla, the only other woody tree on the island, is restricted to a few individuals in Sophora Glen. Otherwise only known from the Pacific Ocean, *Sophora* is absent from the Tristan Islands.

TABLE 3

NUMBERS OF PLANT SPECIES (EXCLUDING ALGAE) RECORDED FROM GOUGH ISLAND

	Dicots	Monocots	Ferns	Mosses	Hepatics	Fungi	Lichens	Total
Endemic to Gough Island	1	2	1	6	2	0	0	12
Endemic to Gough-Tristan	4	9	14	17	5	0	0	49
Other native species	11	8	17	43	73	20	24	172
All native species	16	19	32	66	80	20	24	257
Introduced species	15	9	0	0	0	0	0	24
Grand total	31	28	32	66	80	20	24	281

Adapted from Wace & Dickson 1965, Groves 1981, Crafford 1986, Wace 1986c, Roux 1993a,b and FitzPatrick Institute unpubl. data.

The tree-like fern *Blechnum palmiforme*, or Bog Fern as it is known to the Tristan Islanders, is the other species characteristic of fern bush. *Blechnum palmiforme* has a trunk-like stem up to 300 mm in diameter, and although it can reach heights of up to 2 m in sheltered spots, it is typically 0.5-1 m high, with an apical array of stiff, cycad-like fronds. *Acaena sarmentosa* often forms dense mats between *B. palmiforme* plants, with a variety of ferns and angiosperms on the bases of the tree fern stems and in the gaps between stems, including *Elaphoglossum* spp., *Hymenophyllum* spp., *Lycopodium diaphanum*, *Apium australe*, *Nertera depressa*, *Carex* spp. and *Scirpus* spp.

Fern bush is a dynamic community, dependent on peat slips to maintain plant diversity. Slips are triggered by heavy rainfall, and generally strip off the vegetation and underlying peat layer to the bedrock (Wace 1961, Milton *et al.* 1993, Ryan 1993). Fresh slip faces are colonized by mosses and *Scirpus bicolor*, followed by *Nertera depressa*, *Empetrum rubrum*, *Lycopodium diaphanum*, and various grasses and sedges, as well as *Phylica arborea* and *B. palmiforme* seedlings. As the slip site ages, *Histiopteris incisa* and *Acaena sarmentosa* start to appear, the former eventually coming to dominate the area, crowding out other species and preventing the germination of their seeds. The fern bush is a mosaic of recent and old slips, each supporting different plant assemblages. Peat slips tend to occur more frequently on steeper slopes, resulting in more open assemblages, whereas slips are infrequent on flatter ground, resulting in a preponderance of *Histiopteris*-dominated assemblages (Wace 1961).

3.7.3 Wet heath

Wet heath occurs from the upper limit of fern bush to above 800 m in sheltered locations. It is a transitional vegetation type, with fairly short plants, less than 1 m high, and is a diverse assemblage, containing species found in virtually all other vegetation types. At the upper edge of the fern bush, *Phylica* trees and *Blechnum* tree ferns become progressively shorter, ultimately assuming the same height as the surrounding vegetation. Procumbent *Phylica* plants less than 0.2 m high do not produce flowers. Wet heath is characterized by a diverse array of fern species, interspersed by a variety of sedges, grasses, other angiosperms, and mosses. The most abundant vascular species include *Ctenitis aquilina*, *B. palmiforme*, *B. penna-marina*, *Elaphoglossum* spp., *Acaena sarmentosa*, *Apium australe*, *Empetrum rubrum*, *Nertera depressa*, and *Agrostis*, *Deschampsia*, *Carex* and *Scirpus* spp. Wace (1961) recognizes three assemblages within the complex, dominated by *B. palmiforme*, *E. rubrum*, and grasses and sedges, respectively.

3.7.4 Feldmark and montane rock communities

Feldmark (see Plate 13) is an assemblage of dwarf, cushion-forming or crevice plants, found above 600 m on exposed areas such as ridges. Dwarf *Empetrum rubrum*, *Lycopodium magellanicum*, *Huperzia insularis*, *Acaena stangii*, *Agrostis media*, *A. carmichaelii* and several sedges, mosses and lichens characterize this alpine community. Other, more widespread species include *Apium australe*, *Hydrocotyle capitata* and *Nertera depressa*.

3.7.5 Peat bogs

Peat bogs are widespread on the level uplands of Gough Island above 600 m. Bogs form in depressions, accumulating layers of peat up to 5 m deep in valleys such as Albatross Plain and Mildred Mire (Fig. 2). The Tarn Moss bogs are more extensive but overlay peat layers only 2 m deep. The bogs are sodden, and are dominated by *Sphagnum* mosses and a number of hepatics. *Tetroncium magellanicum* and *Scirpus* spp. are the only abundant vascular plants found in the bogs, although a wider diversity occurs along bog margins, including *Empetrum rubrum* and various grasses.

3.7.6 Alien plants

Some 24 introduced plant species have been recorded at Gough Island (Table 1, Appendix 5), although the status of some seemingly native species has been questioned (e.g. *Parodiochloa flabellata*, Groves 1981). The ranges of most alien plants are limited to the areas around landing sites, human habitations, or along adjacent beaches, where there is frequent disturbance by trampling or slumps and rock falls. Only four species are widespread in the interior of the island: *Rumex obtusifolius* (see Plate 10) and three grasses, *Agrostis stolonifera*, *Holcus lanatus* and *Poa annua*; these species are most frequent along stream banks, where there is constant disturbance after heavy rain, and along paths. *Sonchus oleraceus* and *S. asper* also occur in the interior of the island, but are scarce.

At present, introduced species form a relatively minor component of the island vegetation. Alien species require some form of disturbance to

Plate 3: Blechnum palmiforme tree ferns in open fern bush vegetation dominated by *Acaena sarmentosa*, *Elaphoglossum* spp. and various sedges. A *Phylica arborea* copse is in the middle of the picture, with the slopes of South Peak in the background (P.G. Ryan, 1991)

penetrate native vegetation, and most are transient. Only *Agrostis stolonifera* and *Holcus lanatus* are not readily displaced by native species; these two grass species are the plants most likely to effect long-term changes in the vegetation of Gough Island. Both species are most abundant in moist sites, and already form large stands on wet cliffs along the east coast and along some water courses.

A few introduced plants are persistent at specific localities, such as potatoes around the meteorological station in small numbers and at Waterfall Point, and *Senecio burchellii*, introduced in building sand from South Africa to the site of the upper magnetometer hut near the station in April 1983 (Wace 1986a). Annual weeding of *S. burchellii* and *Conyza floribunda* at this locality from 1984 to 1992 (coupled with the use of the herbicide "Roundup" on 17 October 1986) may now have achieved eradication (Appendix 5). Neither species has been recorded elsewhere on the island and they seem unable to spread into undisturbed vegetation. However, the latter is widespread on Tristan da Cunha and Inaccessible Islands (pers. obs.).

Potatoes were found growing as early as 1811 and from 1955 until at least 1970 potatoes, lettuces, carrots, cabbages, onions and radishes were cultivated at the old and new meteorological stations in small vegetable plots (Wace & Holdgate 1976, Wace 1986).

Flowers of the Port Jackson Willow *Acacia saligna* have been found attached to packing cases brought ashore on two occasions, in the late 1980s and in 1990. All flowers seen were collected but some were likely to have been blown into the surrounding vegetation. No seeds were seen.

3.8 Terrestrial fauna, including population estimates of seals and birds

Like the flora, Gough Island's fauna is characterized by a relatively low species diversity and a high degree of endemicity, at least among terrestrial animals (Holdgate 1965). A feature of the fauna is a number of flightless species of both birds and insects. Reptiles, amphibians, freshwater fish and native terrestrial mammals are absent from the island, and there also are gaps in the invertebrate fauna (Holdgate 1965).

3.8.1 Indigenous mammals

Only two naturally-occurring mammals breed at Gough Island, Southern Elephant Seals *Mirounga leonina* and Subantarctic Fur Seals *Arctocephalus tropicalis*. Both species' populations were affected adversely by sealing during the 19th century, but have recovered to varying degrees since the cessation of sealing. Currently some 200 000 fur seals and about 100 elephant seals (including pups) are found at Gough Island. Fur seals are increasing in numbers, but the elephant seal population appears stable (Bester 1990a). The fur seals breed at beaches all around the island, but most abundantly on the exposed west coast, whereas elephant seals are largely restricted to the sheltered beaches between Capsize Sands and Deep Glen on the east coast of the island (Bester 1990a). Marked fluctuations in numbers occur seasonally. Both species of seals probably feed primarily outside the waters of the Wildlife Reserve, although the diet of the elephant seal at Gough Island has not been studied (Bester & Laycock 1985).

Southern Right Whales *Eubalaena australis* come close inshore at the island in very small numbers, up to three animals being sighted at a time. The species has been drastically reduced as a result of whaling, the last activity in the South Atlantic occurring during the 1960s at nearby Tristan da Cunha (Best 1988). Dusky Dolphins *Lagenorhynchus obscurus* regularly occur in large schools within the waters of the Wildlife Reserve (P.B. Best, Mammal Research Institute, University of Pretoria pers. comm., pers. obs.). Other species of cetaceans are likely to occur within the Wildlife Reserve from time to time (P.B. Best pers. comm.).

3.8.2 Introduced mammals

The introduced House Mouse *Mus musculus* is the only terrestrial mammal, other than humans, that currently occurs at Gough Island. Mice were presumably brought ashore inadvertently during the 19th century by sealers; they were present by 1888 (Verrill 1895). Mice are now widespread and abundant, occurring in all habitat types from the coast to the island summit. House Mice are not thought to be present on islets, rocks and stacks in Gough waters, including the vegetated ones, but this needs investigation.

House Mice have evolved a large body size at Gough Island (Rowe-Rowe & Crafford 1991) and, contrary to Wace & Holdgate (1976), probably

have a significant impact on the island's invertebrate fauna, which forms an important part of their diet (J.E. Crafford, Department of Biological Sciences, University of Venda pers. comm.).

Other mammals have been introduced to the island since the meteorological station was established in 1956. Domestic Sheep *Ovis aries* (up to 20 animals) were kept at The Glen and on Capsize Sands between Buttress Rock and Reef Point (Fig. 2) for fresh meat purposes from 1956 to 1963, and breeding took place (E. Viljoen, *ex* team member pers. comm.). In August 1960 there were six lambs on Capsize Sands. Later the rams were removed. No sheep were kept at Transvaal Bay. According to Wace (1961) the sheep rapidly destroyed the *Parodiochloa flabellata* tussock at The Glen and on Capsize Sands, causing erosion by selective overgrazing. However, Wace & Holdgate (1976), based on a later visit, state that little damage had occurred, which could suggest that the vegetation recovered after removal of the sheep in 1963.

Domestic Goats *Capra hircus* (unknown number, but apparently more than one) also were kept at The Glen during summer 1958-59 for at least six months, apparently to supply fresh milk (E. Viljoen pers. comm.), but without the permission of the British Authorities. All had been destroyed prior to June 1960 at British request. A bulldog *Canis familiaris* and a ship's cat *Felis catus* were temporarily based at The Glen in 1919 (Green 1960). A domestic dog was present on the island in 1957 (Wace & Holdgate 1976) and two more were present in January 1962.

Despite the claimed sighting of a rat *Rattus* sp. near the meteorological station in November 1983 (Watkins & Furness 1986), there are no confirmed records from the island. An intensive search in October 1984 (Wace 1986b,c) failed to find any signs of rats on the island, and the sighting is now thought to have been of an exceptionally large House Mouse (Cooper & Ryan 1993, in press). However, the presence of a decomposed corpse of a rat in a crate containing parts for a new crane landed at the meteorological station in May 1968 (Elliott 1969, Wace & Holdgate 1976) and another corpse found aboard the supply ship sailing to Gough in 1974 (Richardson 1984) emphasize the need for ongoing precautions to prevent rats reaching the island.

Six albino Brown or Norwegian Rats *Rattus norvegicus*, all sterilized females, were taken to Gough Island during the October 1984 relief, with the permission of the Tristan da Cunha Government, to act as captive lures for any rats that might be present. No rats were attracted and the captive rats were all were removed from the island at the end of the relief voyage (Wace 1986b,c).

The human population of Gough Island is a transient one, currently consisting of seven men for most of the year, with up to 32 living ashore during relief periods. Women, mainly biologists, have occasionally visited the island during relief periods, but none has yet spent a full year on the island.

3.8.3 Indigenous birds

Birds dominate the vertebrate fauna of Gough Island, both in terms of diversity and numbers. A total of 54 species has been recorded, of which 22 are known or are thought to breed at the island. Twenty breeding species are seabirds (Appendix 6).

Two bird species, the Gough Moorhen *Gallinula comeri* and Gough Bunting *Rowettia goughensis*, are the only native terrestrial vertebrates; both are endemic to the island. The moorhen is closely related to the Tristan Moorhen *G. nesiotis*, which is presumed extinct on the main island of Tristan. The current population of moorhens on Tristan is thought to be descended from six pairs of Gough Moorhens released near Edinburgh Settlement on 15 May 1956 (M.K. Swales, Denstone College *in litt.*). Gough Buntings are related to the *Nesospiza* buntings endemic to the Tristan islands, but also bear close resemblance to the Fuegian genus *Melanodera*. Both species have fairly small total populations at Gough Island (Appendix 6), and given their probable susceptibility to introduced mammalian predators, have been listed as rare in the Red Data Book (Collar & Stuart 1985).

Little is known about the ecological importance of the two species. Both have catholic diets, including invertebrates, seeds and fruits, other vegetable matter, and carrion (Collar & Stuart 1985, Watkins & Furness 1986, FitzPatrick Institute unpubl. data). The Gough Moorhen has been suggested to take eggs from Yellownosed Albatross *Diomedea chlororhynchos* nests on Tristan, resulting in it becoming unprotected there in terms of a 1984 amendment to the Conservation Ordinance, but this behaviour has not been observed at Gough Island. Gough

Buntings probably play an important role in seed dispersal, particularly of *Nertera depressa* and *Empetrum rubrum*. They occur throughout the island, but are most abundant on the island plateau and along the coast. Gough Moorhens are flightless and are restricted to the fern bush and coastal tussock grassland, where there is adequate cover.

The vast majority of birds breeding at Gough Island are seabirds. Most seabirds have sub-Antarctic affinities, either being species that also breed at sub-Antarctic islands farther south, or having closely related congeners that do so. The only species with a tropical affinity is the Brown Noddy *Anous stolidus*, for which species Gough Island is its southernmost breeding locality (Watson 1975). Censuses of breeding bird numbers are problematic, particularly for the 12 petrel species which nest in burrows, but conservative population estimates are summarized in Appendix 6. More than a million pairs of seabirds breed at Gough Island, and, although no species is endemic to the island, several populations represent significant proportions of global populations. Two species, the Atlantic Petrel *Pterodroma incerta* and Great Shearwater *Puffinus gravis*, are wholly or virtually restricted as breeding species to the Tristan-Gough group of islands. Virtually the entire population of Atlantic Petrels breeds at Gough Island, with only a few hundred pairs remaining at Tristan (where they have been greatly reduced by human consumption in the past, Richardson 1984). Huge numbers of Great Shearwaters breed at Inaccessible (Fraser *et al.* 1988) and Nightingale Islands (Ryan *et al.* 1990), but Gough Island must support at least 10% of the world population.

Other species whose breeding populations at Gough Island represent significant proportions of global populations include Northern Rockhopper Penguin (48%; Cooper *et al.* 1990), Sooty Albatross *Phoebetria fusca* (perhaps one quarter, Williams 1984), as well as all but two pairs of the small northern race of the Wandering Albatross *Diomedea exulans dabbenena* (Watkins 1987, Ryan *et al.* 1990). Numbers of burrow-nesting seabirds are poorly known throughout the Southern Ocean islands (Croxall *et al.* 1984, Croxall 1991), but it is certain that Gough Island supports globally-important populations of many of these species.

Southern Giant Petrels *Macronectes giganteus* and Subantarctic Skuas *Catharacta antarctica* are the only seabirds that feed on the island. Giant petrels scavenge carrion, especially seal carcasses and afterbirths. Skuas eat large numbers of burrowing petrels and also steal eggs and chicks from penguin colonies. The two tern species feed on small fish, mostly caught in coastal waters within the Wildlife Reserve.

Other seabirds feed primarily farther offshore, outside the Wildlife Reserve, but they play an important role in the island's terrestrial ecology. They constitute the majority of the island's birds and import large amounts of nutrients and energy from marine systems in the form of guano, moulted feathers, egg shells and carcasses. Trampling, burrowing, and surface nest-building also creates openings in the vegetation, assisting the maintenance of plant diversity, but also promoting the spread of alien plants. *Poa annua*, *Holcus lanatus* and *Rumex obtusifolius* are often found at bird-disturbed sites.

Breeding seabirds also import pollutants from distant foraging areas, resulting in contamination of the terrestrial ecosystem. This is evidenced by the large amount of plastic carried in seabird stomachs (Furness 1985, Ryan 1987), but also includes heavy metal and persistent organochlorine pollution (Muirhead & Furness 1988, Ryan *et al.* 1988). Plastic fragments imported by seabirds are frequent in the lowland peats of Gough Island. Great Shearwaters are particularly important in this regard, because they are trans-equatorial migrants, foraging in the relatively heavily-polluted northwest Atlantic Ocean during the non-breeding season.

In addition to the 22 breeding species, an additional 24 seabird species have been recorded ashore or in the surrounding waters of Gough Island, eight of which are regular non-breeding visitors (Appendix 6). Eight shore and landbird vagrants have been recorded (Appendix 6), of which the Cattle Egret *Bubulcus ibis* is the only species that occurs regularly. Based on observations at Tristan (e.g. Richardson 1984), other landbird vagrants presumably occur fairly regularly, but are less likely to be detected at Gough Island due to the paucity of observers, dense vegetation cover, rugged terrain and the great predation risk posed by Subantarctic Skuas.

3.8.4 Introduced birds

The only introduced birds at Gough Island were small numbers of Domestic Fowls *Gallus domesticus* kept at the meteorological station at The Glen and then at the new station at Transvaal

Bay from 1956 to at least 1971 or 1973 as a source of fresh eggs (Wace & Holdgate 1976, Wace 1984). The stock was regularly supplemented with new birds, but breeding did occur, as reported on several occasions in the *News Letter of the South African Weather Bureau*. The poultry were fed imported grain. There is no evidence that avian diseases were transmitted to the native avifauna from the domestic fowl, although tests for the presence of virus antibodies in scavenging birds have not been undertaken at Gough Island. Poultry is no longer kept at Gough Island in terms of the old lease.

3.8.5 Invertebrates

Terrestrial invertebrates have been little studied at Gough Island. More than 100 free-living species have been recorded, but many taxa are poorly represented, and the true number of species is likely to be much greater (Holdgate 1960, 1965, Wace & Holdgate 1976, FitzPatrick Institute unpubl. data). An additional 24 parasitic invertebrate species have been recorded from vertebrate hosts at the island. At least eight free-living invertebrate species are endemic to Gough Island, and an additional 14 species are restricted to Gough and the Tristan islands (Holdgate 1965). However, compared to the Tristan Islands, radiation among invertebrate taxa has been limited. Only eight species of freshwater invertebrates are known (Holdgate 1959/60).

Several flies and moths are flightless. The two flightless drosophilid flies in the genus *Scaptomyza* are of considerable evolutionary and biogeographic interest, having apparently conspecific forms on widely separated islands (Williamson 1981). Of the 100 free-living species so far identified from Gough Island, 17 are introduced, and a further 27 possibly are introduced (Holdgate 1965). These species arrived in supplies brought by expeditions. The establishment of several alien species resulted in the first introduction of a number of higher taxa, including slugs, millipedes and centipedes. Some introduced invertebrates are spreading on the island. For example, in 1968 introduced slugs were recorded only at The Glen and vicinity (Wace & Holdgate 1976), but were observed above Transvaal Bay in November 1992. In addition, earthworms have changed from being scarce to abundant in lowland areas since the 1950s as a result of the introduction of an alien species, *Lumbricus* sp.. Virtually nothing is known about the consequences of these recent alterations to the invertebrate fauna at Gough Island. Despite suppositions that alien species have largely occupied vacant niches at the island (Holdgate 1965, Wace & Holdgate 1976), it is probable that further investigation will show there have been changes in the abundance of native invertebrate species. Nutrient cycling and peat formation processes may also be affected.

In recent years, fresh vegetables brought ashore during relief periods have been checked for the presence of invertebrates. In 1990, *c.* 10 live snails *Helix adspersus* were found in one cauliflower, and caterpillars, mites and aphids were found among cauliflowers and cabbages. All were collected and removed from the island.

3.9 Marine and littoral biota

The marine and littoral environment of the Gough Island Wildlife Reserve is less well known than is the terrestrial environment. Information on algae and littoral ecology is given by Chamberlain (1965) and Chamberlain *et al.* (1985). The former reference reports 40 species of marine algae: two endemic to Gough, six endemic to the Tristan-Gough group of islands and 19 cosmopolitan. Chamberlain *et al.* (1985) found that most littoral species present at Gough were widespread at Southern Ocean islands: they recorded 79 invertebrate species.

The subtidal fringe can be divided into two zones: down to 5 m dominated by the bull kelp *Durvillea antarctica* and to beyond 20 m dominated by the seaweed *Laminaria pallida* and the giant kelp *Macrocystis pyrifera*. Shallow-water benthic biota are sparse, although calcareous algae and sea urchins, especially *Arbacia dufresnii*, were commonly observed during SCUBA dives in 1967, 1981 and 1989 (Heydorn 1969, Koop & Anderson 1982, Pollock 1991, Appendix 4). Whelks *Argobuccinum* sp., chitons, starfishes, sea anemones, bryozoans, barnacles, slipper limpets, nudibranchs and sponges also occur. Fish and Tristan Rock Lobster were abundant during dives. The absence of bivalves and limpets in the inter- and subtidal zone is notable, and probably accounts for the absence of the Kelp Gull *Larus dominicanus* as a breeding species (Appendix 6). No littoral species are thought to have been introduced as a result of human activities or presence (Chamberlain *et al.* 1985).

Knowledge of the fish fauna of the Tristan-Gough Islands has been recently summarized (Andrew *et*

al. 1994, Appendix 7). Twenty coastal species have been recorded within Gough inshore waters, but it is likely the list is incomplete due to under-collecting. Commonly caught species include Soldier *Helicolenus mouchezi*, False Jacopever *Sebastes capensis*, Fivefinger *Acantholatris monodactylis*, Snoek *Thyrsites atun* and Barrelfish or Bluefish *Hyperoglyphe perciforma*.

Little is known about the interactions between the marine biota. Rock lobster consume calcareous corralines *Lithothamnion* spp. and algae in the absence of bivalves and are preyed upon by octopus and several species of fish (Roscoe 1979). At the Tristan Islands the rock lobster also consumes sea urchins, whelks and barnacles (Pollock 1991). The larger fish are primarily piscivorous, but also feed on cephalopods, salps and invertebrates (Andrew *et al.* 1994). Sea urchins, which feed on seaweed, are thought to be important in causing the absence of an "algal turf" (Koop & Anderson 1982).

Tristan Rock Lobster, fin fish, and recently octopus are exploited in waters of the Gough Island Wildlife Reserve (Roscoe 1979, Cooper & Ryan 1993, in press, see Subsection 3.10.2 below).

3.10 Present human activities, structures and artifacts

3.10.1 Present activities

Present activities at Gough are restricted to inshore commercial fishing for Tristan Rock Lobster and octopus (the latter as a by-catch of the lobster fishery), limited non-commercial fin fishing from rock lobster vessels and from the shore, operation of a meteorological station, research on the island's biota, and from 1991, annual environmental inspections by a Conservation Officer of the Tristan da Cunha Government (Cooper & Ryan 1993, in press, Appendix 4).

3.10.2 Fishing activities

The rock lobster fishery is currently operated from two vessels of Tristan Investments (Pty) Ltd of Cape Town, the operating company of the South Atlantic Islands Development Corporation Ltd, registered in Bermuda. Usually only the *Tristania II* or the *Hekla* fish in Gough waters at any one time, and a fishing vessel is not always present. Fishing is conducted by long-line baited traps deployed from the vessels and also from baited hoop-nets set from two-man power boats (two from the *Tristania II*, four from the *Hekla*) (Ryan 1991). The catch is either frozen whole after cooking or the tails are frozen raw (C.R.W. Dickason, Tristan Investments (Pty) Ltd pers. comm.). All fishing occurs within 2.2 km of the shore, wholly within the boundary of the Gough Island Wildlife Reserve, and within a depth of 90 m (Roscoe 1979).

Although the fishery is operated by a single concession holder, poaching has occurred over many years (Roscoe 1979, C.R.W. Dickason pers. comm, see Subsection 3.3.3 above). As recently as 16 January 1992, a presumed rock lobster poacher was photographed in Quest Bay (J.S. Wium, 1991/92 team member pers. comm.). Poaching vessels are thought to land their catches in Cape Town as being caught at Vema Seamount, which is in international waters and supports the same species of rock lobster as occurs at Gough (Heydorn 1967, Lutjeharms & Heydorn 1981a,b, C.R.W. Dickason pers. comm.). Poaching vessels are thought to avoid concession vessels by listening to their radio communications.

From 1991-92 annual total allowable catch quotas (TACs) have been set for the Gough rock lobster fishery by the Tristan Government. In the 1991-92 fishing season (1 May-30 April) the TAC was set at 97 t whole mass (Cooper & Ryan 1993, in press). For the 1992-93 season a reduced TAC of 82 t was set (Anon. 1992) but this figure was contested (C.R.W. Dickason pers. comm.). The 1993-94 TAC remains at 82 t (Anon. 1993).

The rock lobster fishery causes some deleterious effects on birds, detailed by Ryan (1991) who describes ameliorative techniques that could be adopted to reduce mortalities. These relate mainly to reducing deck lights at night and covering open lifeboats that trap dazzled seabirds. Non-biodegradable rubbish is also dumped from fishing vessels while in Gough waters (Ryan 1991, pers. obs.).

From 1991 octopus has formed a by-catch of the fishery. Separate figures for the catch at Gough are not available, but *c.* 20 t was taken in the Tristan-Gough islands in 1991 (C.R.W. Dickason pers. comm.). It is not known what effect removal of this known rock lobster predator may be having on the inshore environment.

Voluntary minimum size limits of 250 mm for Fivefinger, 600 mm for Snoek and 400 mm for Bluefish in Tristan-Gough waters were set by the fishing company in July 1992 (C.R.W. Dickason & P.H. Johnson pers comm.). The 250-mm size limit for Fivefinger has been supported by the Tristan Government, which has requested legislation for boat, but not for shore fishing for this size limit (Anon. 1992a, P.H. Johnson pers. comm.). Until 1992 fin fish of several species were caught for use as rock lobster bait (Roscoe 1979), but from 1993 only frozen bait imported from South Africa is to be used because fin fishing from vessels is likely to be restricted to non-commercial catches only (C. Glass, Tristan Islander & P.H. Johnson pers. comm.).

Limited recreational fishing takes place from the shore of Gough Island by members of the meteorological team and during reliefs, both by rod and line and very occasionally by speargun. No restrictions on catch size or minimum sizes have been placed on shore fishing by the Tristan Government, but as from 1991 the South African Department of Environment Affairs has not allowed fish caught ashore to be taken to South Africa on its vessels. It also does not allow fishing aboard its vessels while they are in Gough waters, in interpretation of the Tristan da Cunha Fishery Limits Ordinance of 1983 that does not permit unauthorized fishing from unlicensed vessels within 200 nautical miles of the Tristan-Gough islands (Appendix 3a).

3.10.3 Activities of the meteorological station

The meteorological station above Transvaal Bay (Plate 4) currently is operated by a seven-member team outside the annual relief period, which lasts about three weeks. Regular observations of weather conditions are made, which currently include two radiosonde ascents daily, at noon and midnight (recording wind speed and direction, barometric pressure, temperature and humidity) and synoptic observations ("synops") at three-hourly intervals of temperature, pressure, wind speed and direction and cloud cover. Precipitation is recorded three times a day. Daily hours of sunshine also are recorded. Since November 1990 much of the weather recording near ground level (e.g. precipitation, temperature, pressure, wind speed and direction) has been automated, but manual readings are still taken. Weather information is transmitted to South Africa for use in weather prediction five times a day, either by high frequency (HF) or (from November 1991) via satellite.

Other activities at the station are related to maintaining diesel engines which generate electricity, and other equipment (e.g. deep freezes, plumbing, etc.) required for the efficient operation of the station.

Team members engage in fishing, snorkel diving, scenic and wildlife photography and camping and exploration trips into the mountainous interior and along the east coast for recreational purposes. Observations on whales, seals and birds are sometimes made by team members, who also report signs of strange vessels presumed to be poachers to Tristan da Cunha.

3.10.4 Research activities

From the 1970s until 1990, research activities, mainly in September-November during annual reliefs at the meteorological station, were supported financially and logistically by the South African National Antarctic Programme (SANAP) of the Department of Environment Affairs (but formerly the Department of Transport) with the approval of the Governor of St Helena in terms of the old lease agreement. Since 1990, SANAP has stopped supporting research at the Tristan-Gough islands, so the only research activities in the last three years have been those conducted as part of the environmental inspections conducted on behalf of the Tristan Government (Cooper & Ryan 1993, in press, Appendix 4). Research on upper-atmosphere physics and geology has taken place but no programmes are currently in operation. From time to time, research has been undertaken on Tristan Rock Lobster in Gough waters (Appendix 4, see Subsection 3.3.3 above). Results in the form of publications of research at Gough are listed in Appendix 1.

3.10.5 Environmental inspections

Annual environmental inspections, primarily in the vicinity of the station above Transvaal Bay, but also along the east coast and in the interior, have concentrated on assessing effects of the presence of and activities at the station on the natural biota, on recording the presence and distribution of alien biota, especially plants, and in continuing long-term (since 1982) demographic research on Wandering and Yellownosed Albatrosses and Subantarctic Skuas.

3.10.6 Structures and artifacts

The only permanent structures at Gough Island are at the South African meteorological station above

Plate 4: The South African meteorological station above Transvaal Bay, with South Peak in the background (P.G. Ryan, 1991)

Plate 5: Gough House and upper air building from the fuel tanks. Tafelkop appears as a flat-topped hill on the central horizon, with Ruin Ridge to the left, and the 1760' peak to the right (P.G. Ryan 1991)

Transvaal Bay (Plate 4). These include eight buildings, a number of aerials (primarily one rhombic, one V-beam and three long wire) and their masts, four water barrels mounted on a platform, ten 14 000-litre diesel tanks erected in 1973 and linked by metal pipe to a small holding tank one-third of the way down the cliff, a cliff-top crane and associated look-out platform (the latter replaced in November 1992 after the original was lost when the Archway collapsed in April 1992), a wooden helicopter landing platform built in 1980 (replacing an earlier and smaller one at a different site) and a small metal footbridge (called "Blechnum Bridge") built in October 1986 (replacing a wooden swing bridge at the same site) over a stream (Fig. 4).

The buildings are connected by metal catwalks (see Plate 8) which can be lit by small lamps. A water pipe (see Plate 12) extends from a stream some hundreds of metres to the base, and two sewage/waste water pipes empty into the sea (see Plate 10). Two incinerators, one an open cage, the other a seldom-used closed structure, stand close together on a concrete platform (see Plate 9).

The current crane and its engine room were erected in 1982, replacing an earlier crane. The current accommodation building ("Gough House", see Plate 5), including the upper air building, was built in two stages in 1983 and 1984, partially replacing the original accommodation and upper air buildings on much the same site, which had been extended previously on at least one occasion. A new store for inflammable liquids and lubricants was built in 1986 farther away from the main engine room for safety purposes, and in 1987 two new deep freezes and a coldroom were erected, and the old ones demolished. The other buildings still present date from the 1960s and 1970s. In October 1991 a large mast formerly used for aircraft navigation was removed. In November 1992 the two small magnetometer huts, built in April 1983 (the upper, absolute hut, see Plate 11) and November 1990 (the lower, electronic hut), and situated away from the main group of buildings, were dismantled and removed from the island, as was a defunct anemometer mast. The hut built in 1990 itself replaced one on the same site which was built prior to 1982, but not before 1979.

The remaining wooden buildings of the old meteorological station, Gonçalo Alvarez, at The Glen had fallen into disrepair by 1984, being occupied by fur seals. Their remnants were burnt on site or removed during October 1987, leaving little but their concrete bases and a few commemorative inscriptions (Cooper 1986) at The Glen as a sign of human occupation.

There are no permanent moorings, jetties, roads, field huts, cairns or maintained tracks away from the station on the island. Temporary nest markers (primarily thin bamboo poles) identify albatross nests in study areas at Transvaal Bay and on Tafelkop (see Plate 4). Over the years a large number of birds has been ringed and colour-banded at the island (Cooper 1988a). No remains of shipwrecks are present on Gough's coastline, but accumulated litter on the eastern coastline is prevalent (Ryan 1987a). The remains of a fibre-glass fishing dinghy, lost in 1990, are present above high-water mark at The Glen and the Sophora Glen. Accumulated camping rubbish at Waterfall Camp near Edinburgh Peak was removed in October 1993 by helicopter, but the remains of a wooden box are still present in Goney Dale, from where most accumulated camping rubbish has been removed by researchers during station reliefs in the last five years. The practice of depositing food caches in wooden boxes in the mountainous interior and at The Glen that pertained during the first half of the 1980s has ceased. All camping rubbish is now returned to the meteorological station for disposal, with the exception of human wastes.

3.11 Resource significance

3.11.1 Non-renewable resources

There are no known non-renewable resources of any economic significance within the Gough Island Wildlife Reserve. An attempt to mine for diamonds in 1919 was a complete failure, being based on the supposed presence of diamondiferous gravel which had actually been collected in South Africa (Green 1960, Appendix 4). No non-renewable marine resources (e.g. oil-bearing strata, manganese nodules) are known, or are thought likely to be present.

3.11.2 Renewable resources

The most important renewable resources currently being exploited are rock lobster and octopus (see Subsection 3.10.2 above). Fin fish are a potentially important resource, but are currently only exploited for non-commercial purposes.

Resources potentially available include seals,

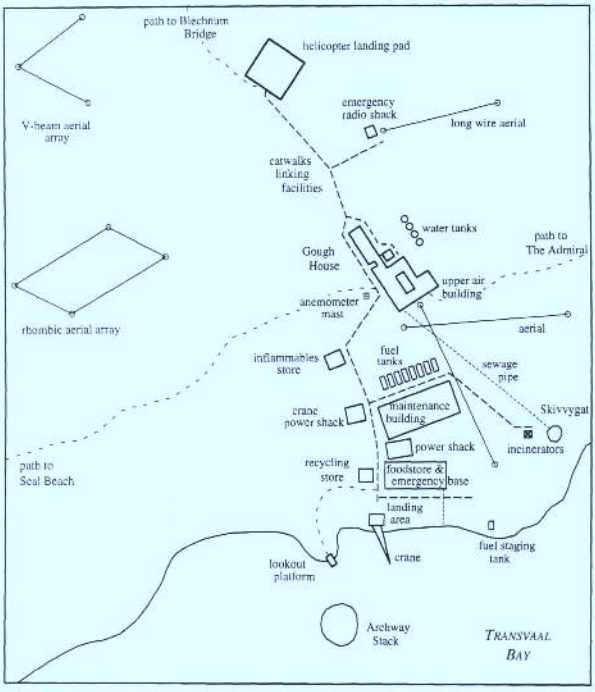

Figure 4

The South African meteorological station at Transvaal Bay, Gough Island

seabirds and their eggs and guano, but collection of these is prohibited without permit from the Tristan da Cunha Government. Some domestic stock (e.g. sheep) could be kept on the island, but their presence is prohibited in terms of legislation (Appendix 2) and the old lease. However, Gough Island is too far distant from Tristan da Cunha for these resources to be of practical use to the Tristan community. Collection of peat and kelp, which have commercial value in some parts of the world, appears impractical. Collection of animals and plants for research purposes, for museum collections and for zoological and botanical gardens is strictly controlled.

3.11.3. Other resources

The Gough Island Wildlife Reserve, with its spectacular scenery, large populations of birds and seals, and little-modified environment, represents a most significant resource for scientific study, for conservation, for controlled tourism and for educational and inspirational purposes. Gough Island has historical significance as a site of sealing and other activities in the past (see Section 3.3 above). However, no archaeological investigation has as yet been undertaken.

Strategic value appears limited, but the island is important in providing a base for the collection of meteorological data used for the making of weather forecasts for the southern African region and for global weather reporting (see Subsection 3.10.3 above), and as a base to observe and listen by radio for poaching vessels within the fishery limits of 200 nautical miles.

The potential for limited tourism exists, given the nature of the island and its rich and unique biota, but the lack of safe landing sites for small boats and the often rough seas makes tourism difficult. No infrastructure (e.g. landing jetties, airstrip, adequate accommodation ashore) that could support tourists exists (see Subsection 3.10.6 above).

Educational uses for the island (e.g. production of films) is possible, but limited infrastructure ashore is a restricting factor.

4. MANAGEMENT POLICY STATEMENT AND OBJECTIVES

4.1 Management policy statement

The Gough Island Wildlife Reserve should be managed as a Strict Nature Reserve/Wilderness Area (IUCN Category I) and as a World Heritage Convention Natural Site, with emphasis placed on the conservation and scientific study of its indigenous biota and ecological processes, as well as of its geological and scenic features.

4.2 Management objectives

Principal management objectives for the Gough Island Wildlife Reserve are:

1. To conserve the indigenous flora and fauna and ecological processes in as natural a state as possible.
2. To maintain geological features and processes and scenic features.
3. To prevent the human-induced introduction of alien flora and fauna and to eradicate or control, as far as possible, previously introduced and established alien species.
4. To protect historical sites and artifacts when not in contradiction with the above three objectives.
5. To encourage and facilitate research into the natural sciences that is not in contradiction with the above four objectives.
6. To prohibit or control human activities ashore that are or may be in contradiction with the above five objectives.
7. To allow and manage fishing activities that do not cause irreversible change to the marine environment and its biota.
8. To promote an awareness through education of the value and significance of the Gough Island Wildlife Reserve.
9. To register the Gough Island Wildlife Reserve with the Convention for the Protection of the World Cultural and Natural Heritage as a Natural Site.

5. PRESCRIPTIONS FOR MANAGEMENT

5.1 Preamble

Section 5 of the management plan for the Gough Island Wildlife Reserve sets out in detail specific management policies required to be enforced to achieve the management objectives set out in Section 4.2 above.

5.2 Legal and administrative authority

The legal and administrative authority of the Gough Island Wildlife Reserve is and should be the Administrator of Tristan da Cunha (acting after consultation with the Island Council when required by law to do so), in terms of the Tristan da Cunha Conservation Ordinance of 1976, as amended, the Tristan da Cunha Fishery Limits Ordinance of 1983, as amended, and any existing fishing concession(s) and leases within the boundaries of the reserve (Appendices 2-3).

The Administrator may and should appoint Conservation and Sea Fishery Officers in terms of the ordinances mentioned above. Such officers have authority in terms of these ordinances, *inter alia*, to protect the Gough Island Wildlife Reserve and its biota. Conservation Officers should include suitably qualified biologists with a knowledge of the biota and environment of the Gough Island Wildlife Reserve. Consideration should be given to basing a Conservation Officer on Gough itself.

The Administrator should establish a "Gough Island Wildlife Reserve Advisory Committee" (GIWRAC) to offer advice relating to all aspects dealing with the protection and management of the reserve, as well on matters pertaining to research and monitoring (see Sections 5.6-8 below). GIWRAC should have as members Tristan Conservation and Sea Fishery Officers, a representative of the UK Foreign & Commonwealth Office, persons with recent experience of research at Gough Island, and persons with experience of research at and management of southern oceanic islands generally. Such a committee is expected to offer advice to the Administrator, especially on applications for activities within the reserve as laid out in the management plan (see Appendix 9).

The Administrator or his nominee should act as Chairperson of GIWRAC, which will normally conduct its business by post. A GIWRAC Secretary should be appointed who is not resident on Tristan da Cunha and is most preferably a Conservation Officer. It is recommended that the total membership of GIWRAC, including the two office bearers designated above, should not exceed eight persons.

Specifically, but not restrictively, GIWRAC will offer advice on the application and issuing of permits (see Section 5.19 below), environmental impact procedures (see Section 5.21 below), deciding on a tourism policy (see Section 5.18 below) and in revisions of the management plan (see Section 6 below).

5.3 Access and use of boats and aircraft

Access to the Gough Island Wildlife Reserve, except for *force majeure*, is prohibited unless prior written approval has been given by the Administrator of Tristan da Cunha, in terms of the Conservation Ordinance of 1976 and any current concessions and leases. *Force majeure* visits must be reported as soon as is practicable to the Administrator and must last no longer than is absolutely necessary coincident with safety and health reasons.

Access to the Gough Island Wildlife Reserve is by sea only, with landing affected by helicopter at the meteorological station's helicopter platform above Transvaal Bay or by transfer from the visiting vessel to small boat or raft for landing via the cliff-top crane at the same locality.

Boat and helicopter landings elsewhere on the island (except by *force majeure*) are restricted to *bona fide* environmental management or scientific purposes and may only take place with the written or verbal approval of the Administrator of Tristan da Cunha and only after a permit to visit the Wildlife Reserve has been obtained.

Landings by helicopters and boats away from the meteorological station above Transvaal Bay (the logistic zone, see Section 5.4 below) must not cause excessive disturbance to seals and birds.

Shores containing large numbers of seal and penguin colonies must be avoided during breeding seasons. To this effect, no helicopter landings are allowed within 200 m of seals and breeding penguins. Helicopter overflights of seals and breeding penguins are to be kept to a minimum.

Southern Right Whales, Southern Elephant Seals and dolphins may not be deliberately approached closer than 50 m by small boats.

No jetties, wharves, permanent moorings or airstrips for fixed-wing aircraft may be erected within the Gough Island Wildlife Reserve.

Use of terrestrial wheeled vehicles is not allowed anywhere within the Wildlife Reserve, except for hand-pulled trolleys restricted to catwalks between buildings and the helicopter platform at the meteorological station. Use of air-cushion and amphibious vehicles is not allowed anywhere within the Wildlife Reserve.

Refuelling of helicopters ashore is not allowed, except for emergency purposes within the logistic zone (see Subsection 5.4.1 below). Helicopters may not fly over or land on the island at night except for emergency reasons.

Airdrops by fixed-wing aircraft are to be restricted to the logistic zone and are only to take place for compelling reasons (e.g. supply of needed medicines). The permission of the Administrator is to be sought in advance, unless under emergency conditions when a full report must be made as soon after the event as is practicable.

5.4 Management zoning system and allowed activities

Human activities within the Gough Island Wildlife Reserve are restricted geographically by a zoning system, that allows for the operation of a meteorological station, for the conduct of a commercial fishery, for scientific activities and for the conservation of the island and its biota. To this end four zones are defined.

5.4.1 Logistic zone

The logistic zone consists of a c. 6-ha demise above Transvaal Bay to the South African Government for the operation and maintenance of a meteorological and wireless telegraph station by the South African Department of Environmental Affairs and Tourism.

All permanent construction activities are restricted to this zone, which is also the only zone in which year-round habitation is allowed. The number of persons allowed to stay overnight within the zone is restricted to 39 (the current number of bunks and beds in the meteorological station), unless prior permission is obtained from the Administrator.

Access to the logistic zone for resupply or other logistic purposes may be by helicopter or by small boat via the cliff-top crane (see Section 5.3 above). Access from other parts of the island is restricted to personnel returning to the meteorological station on foot or after being collected from elsewhere on the island by helicopter or small boat.

The construction or extension of buildings and other structures within the logistic zone may only be carried out with the approval of the Administrator of Tristan da Cunha (in terms of the old lease). Such constructions and extensions and associated activities must result in minimal disturbance or harm to the indigenous biota and to the natural land forms within the logistic zone. Consideration must be given to the aesthetic and visual consequences of the design and placement of permanent structures.

Redundant permanent structures in the logistic zone are to be removed, but in such a way as to cause as little harm and disturbance as possible, and their sites are to rehabilitated to a natural a state as is feasible.

As a general principle, no new aerial masts or stays should be erected within the logistic zone and concerted efforts should be made to reduce the present number, by switching from high frequency to satellite voice communications as soon as is feasible. Such removals will greatly reduce the death of birds from night strikes. Reducing bird strikes by making aerials and stays more visible at night (perhaps by use of mounted balls or streamers) should be investigated by GIWRAC.

The Administrator will decide whether proposed constructions or extensions warrant an environmental impact assessment (EIA) being carried out. In making his decision whether to call for an EIA or not the Administrator may be guided by advice received from GIWRAC which will judge the proposed constructions and

extensions on their likely short- and long-term effects on the island's biota and environment. If an EIA is considered necessary, then the procedures outlined in Section 5.21 below are to be followed. As a guideline, if effects are considered likely to be more than minor or transitory then an EIA should be recommended (see Section 5.21 below & Appendix 8).

Maintenance of existing buildings and other structures within the logistic zone may be undertaken in terms of the old lease without the specific approval of the Administrator. However, the Administrator must be informed annually of maintenance activities carried out within the logistic zone.

5.4.2 Marine zone

The marine zone consists of all the surrounding seas of Gough Island and its islets from low-water mark to three nautical miles (5.5 km) offshore, corresponding to the seaward boundary of the Gough Island Wildlife Reserve (Appendix 2). It is intended to introduce legislation to increase the boundary of the Wildlife Reserve to 12 nautical miles (22.2 km), the limit of territorial waters (P.H. Johnson pers. comm.).

Access to the marine zone will be from the open sea or from the shore abutting the logistic zone. All visiting vessels (including yachts) must be in possession of rodent-free certificates and may be required by the Administrator to call at Tristan da Cunha to clear customs, immigration and health controls before proceeding to Gough Island.

Visiting vessels of the lessee and fishery concession holder(s), without the prior permission of the Administrator, may launch small boats for the purposes of transferring cargo and personnel to the logistic zone via the cliff-top crane and between vessels or for fishery-related purposes (concession holder(s) only). Use of small boats by the lessee or concession holder(s) for other purposes, other than safety purposes associated with helicopter flights, must have the prior approval of the Administrator. Any accidents leading to strandings ashore or loss of small boats within the marine zone must be reported as soon as possible to the Administrator.

Commercial fishing is allowed within the marine zone, within the terms of existing concessions. Commercial fishing activities are currently restricted by the concession holder to the Tristan Rock Lobster with an octopus by-catch. The Tristan Rock Lobster fishery is controlled by means of a total allowable catch (TAC) system, set annually by the Tristan Government (see Subsection 3.10.2 above), and by a minimum size limit (currently a carapace length of 70 mm).

The commercial fishery is to be operated so that it causes no irreversible changes to the marine environment of the Gough Island Wildlife Reserve. To this effect, an on-site investigation of the marine zone and the effect(s) of the current commercial fishery on it is required. Such an investigation is seen as being in addition to the current annual exercises undertaken by Tristan da Cunha's fishery advisors, which result in the setting of annual TAC quotas for Tristan Rock Lobster.

Commercial fin-fishing within the Wildlife Reserve should not be allowed. Non-commercial and recreational fishing is allowed for fin fish from the shore abutting the logistic zone and from commercial fishing vessels by rod and hand line, but only after the written approval of the Administrator is obtained on an annual basis for personnel resident within the logistic zone and for each fishing vessel visiting the marine zone. Recreational fishing by other techniques, elsewhere from the shore or from vessels other than those of concession holders, is not allowed.

Fin fishing must be for immediate or near-immediate human consumption purposes only. Catching of fin fish for use as rock lobster bait or freezing for the purposes of eventual removal from the Wildlife Reserve should not be allowed. Use of spear guns or snorkel or SCUBA equipment to catch fin fish or shell fish, including rock lobster, for non-scientific purposes is not allowed. Use of traps for the purposes of catching rock lobster or octopus is restricted to the current fishery concession holder(s).

Minimum size limits for fin fish may be set from time to time by the Administrator on the advice of GIWRAC and will apply to fin fish caught both from the shore and from fishing vessels. Currently operable minimum sizes are given in Subsection 3.10.2 above. No quotas are currently set for fin fish catches.

Recreational diving, using snorkels, SCUBA or otherwise, is allowed from the shoreline abutting the logistic zone only.

Any *force majeure* activities within the marine zone must be reported to the Administrator, with

full details, as soon as is practicable.

5.4.3 Scientific research zones

From time to time, the Administrator, after taking advice from the GIWRAC, may designate areas of the island, other than within the logistic or marine zones, as scientific research zones. Such zones shall be no larger than is required for their purposes and shall exist only as long as is required for the scientific activity.

Access to scientific research zones shall ordinarily be on foot only, and only after the prior approval of the Administrator or a designated Conservation Officer is obtained. However, entry to scientific research zones abutting the low-water mark may be made by small boat. Approval for entries will ordinarily be given on an annual basis. Such approval will designate party size, to be restricted to four persons at any one time unless compelling reasons exist.

Visits to scientific research zones must not last longer than is necessary for their purposes. Overnight camping in scientific research zones is not allowed unless specifically permitted in individual zones.

Access to scientific research zones is not allowed other than for *bona fide* scientific or environmental management purposes, except in the case of *force majeure*, such as the evacuation of an injured person. In the last case, a report must be made to the Administrator or designated Conservation Officer as soon as is practicable. Helicopter landings or low overflights are not allowed in scientific research zones except for emergency purposes, and must afterwards be reported as soon as is practicable.

Holders of permits to enter scientific research zones must keep a record of entries, recording dates, names of persons entering and activities conducted, and must report such details annually to the Administrator.

Recreational activities, including hill walking and camping, will not be allowed in scientific research zones unless the designation of a zone specifically allows for such activities. Examples where this may apply is where an existing normal route taken in travelling around and over the island passes through an area to be made a scientific research zone.

Scientific research zones must be marked at the usual entry point(s) with a sign bearing their name, purpose and date of expiry. Such signs will be temporary only and will be removed on expiry of the scientific research zone.

Offshore islets, stacks and rocks are to be treated as equivalent to scientific research zones, and all landings are prohibited unless under permit for compelling environmental management or scientific purposes or for *force majeure* reasons. In the last case, a report must be made to the Administrator as soon as practicable. All requests for landings must be referred to the Administrator, who may seek an opinion from GIWRAC.

5.4.4 Conservation zone

All of the Gough Island Wildlife Reserve, other than the logistic, marine and any currently designated scientific research zones and islets, stacks and rocks, is designated as a conservation zone.

Access to the conservation zone may be by foot from the logistic zone, by helicopter landings or by landings from small boats. Such access must avoid crossing scientific research zones unless such access is specifically allowed for in the designation of the scientific research zones. Visits to the conservation zone are allowed for recreational purposes by personnel residing in the logistic zone only, as well as for scientific research and environmental management purposes, providing that prior approval from the Administrator is obtained annually for personnel residing in the logistic zone.

Overnight and camping visits to the conservation zone will be limited to individual parties of four persons and to a maximum of eight persons at any one time. Duration of overnight and camping visits must not exceed seven days unless forced to be longer by adverse weather conditions.

Personnel of current fishing concession holders are not allowed access to zones other than the marine and logistic zones, except for emergency purposes. Such visits should be reported as soon as possible to the Administrator.

Activities allowed within the conservation zone include walking, climbing, exploration, photography, camping, scientific observations and any activities required for environmental management purposes. Various restrictions as to

conduct in the conservation zone (and in other zones) are described in various sections below.

The general principle is that no material other than human wastes may be left behind by visitors, and that the biota and geological samples may not be collected or unduly disturbed, except for *bona fide* scientific and conservation purposes under permit, and then only to the minimum level necessary.

5.5 Protection of historical sites and artifacts

The collection and disturbance of historical sites and artifacts are not allowed, unless for scientific research purposes and then with the prior approval of the Administrator, who may seek the advice of GIWRAC.

Historical sites and artifacts are defined as anything predating the Gough Island Scientific Survey of 1955-56 (Appendix 4). Disturbance includes handling and the temporary moving of artifacts for photographic or for any other purposes, and the defacing of artifacts in any way.

An archaeological investigation is required to discover, record and study historical sites and artifacts (including any graves) at Gough Island. Any known or newly discovered sites may be designated as scientific research zones to give them extra protection against disturbance by not allowing visits for recreational purposes.

If considered warranted because of ongoing deterioration or risk of loss or damage, but only after archaeological study, artifacts may be removed temporarily or permanently for preservation and/or curation outside the reserve or may be repositioned within the reserve. As a general principle, however, artifacts are to be left *in situ* to weather naturally, or to be preserved on site if considered necessary. The Administrator will designate a museum to act as a custodian of any permanently removed artifacts, and to this end may seek the advice of GIWRAC.

5.6. Protection of terrestrial, littoral and marine biota

Except for scientific research purposes under permit (see Sections 5.7 & 5.8 below), and for commercial fishery purposes in terms of currently existing concessions (see Subsections 3.10.2 & 5.4.2 above), all biota of the Gough Island Wildlife Reserve are protected against disturbance and collecting for commercial or for any other non-scientific purpose. Specifically, sealing ashore or in the waters of the Gough Island Wildlife Reserve is not allowed.

To this end, the existing Tristan da Cunha Ordinance of 1976 needs to be expanded to protect all indigenous biota, including invertebrates and marine life, and not just indigenous birds, mammals and terrestrial plants. Consideration should then be given to renaming the Wildlife Reserve the "Gough Island Nature Reserve", in keeping with such an expansion of emphasis. If so renamed, then GIWRAC should be renamed the Gough Island Nature Reserve Advisory Committee.

In addition, the current boundaries of the reserve (three nautical miles) should be extended to 12 nautical miles, the limit since 1968 of territorial waters of the Tristan Dependency.

The Gough Island Wildlife Reserve should be proclaimed a natural site with the World Heritage Convention as soon as is possible.

Consideration should be given to the designation of the upland wet heaths and peat bogs of Albatross Plain, Goney Dale, Mildred Mire and Tarn Moss as a Wetland of International Importance with the Ramsar Convention for their breeding populations of the near-endemic race of the Wandering Albatross (see also Section 5.22 below). To this end, a review of all wetland sites at Gough Island and their significance in terms of the Ramsar Convention should be undertaken, as has already been recommended (Hepburn *et al.* 1992).

The collection of five specimens of indigenous animals and plants for the sole purpose of display in zoological and botanical gardens is not considered to represent a scientific research activity and is therefore not allowed within the Gough Island Wildlife Reserve. Collection of specimens for research purposes is treated in Subsection 5.8.2 below.

Consideration should be given to stationing a Conservation Officer at Transvaal Bay outside the period of annual reliefs of the meteorological station, to provide for better policing of the marine zone (see Section 5.9 below) and to

conduct monitoring and inspection activities ashore throughout the year (see Section 5.7 below). Transport to the island and board and accommodation and required logistic support ashore (e.g. launching of small boats, use of radio communications, etc.) for the year-round placement and relief of a Conservation Officer should be at the cost of the South African Government, in terms of a new lease agreement.

Alternatively, consideration could be given to awarding some official powers to the Officer-in-charge (the "Team Leader") of the meteorological station.

If a full-time Conservation Officer is not stationed at Gough Island, then an annual environmental inspection must be undertaken during the time of the relief of the meteorological station, by a Conservation Officer who preferably has prior experience of the island and its biota. Such an inspection should receive the same support from the South African Government as outlined above

5.7 Resource inventories and monitoring

Scientific observations that result in inventories of the indigenous and introduced biota of the Gough Island Wildlife Reserve are allowed under permit issued by the Administrator, who may seek the advice of GIWRAC.

Such inventories should attempt to sample all relevant habitats and be quantified in nature. Whereas the larger terrestrial animals and plants are reasonably well known (see Sections 3.7 and 3.8 above), there is a need to obtain more complete inventories for microscopic flora and fauna, including parasites, and of marine flora and fauna (see Section 3.9 above).

Monitoring of selected populations, species and habitats is also allowed under permit issued by the Administrator, who may seek the advice of GIWRAC. Examples are monitoring the breeding success and population sizes and demographics of seals and seabirds, the spread of alien biota, especially plants (see Section 5.12 below), and the formation of and regeneration of vegetation on peat slips and along newly eroded river banks. Any effects (e.g. trampling of plants, accelerated peat erosion and displacement of breeding penguins) of the increasing fur seal population should also be monitored.

Pollution levels within the Wildlife Reserve should also be monitored: examples are shoreline patrols for washed-up litter (jetsam), plastic particles ingested by seabirds, and pesticide, PCBs and heavy metal levels in selected species of the biota, especially seabirds.

Residents at and visitors to the meteorological station should be encouraged to keep records of sightings of oiled seabirds and entangled seals and birds. Records of birds killed by colliding with structures within the logistic zone and aboard visiting vessels should also be kept. Such records should be reported to the Administrator and to GIWRAC on an annual basis (see Subsection 5.8.2 below).

The monitoring of marine species that are commercially exploited is a special case dealt with in Section 5.9 below.

5.8 Scientific research, collection of specimens and provision of archives

5.8.1 Scientific research

Scientific research on the indigenous and introduced biota and geological and geomorphological features and processes of the Gough Island Wildlife Reserve and for trigonometrical surveying purposes is allowed under permit issued by the Administrator, acting on advice of GIWRAC. Such research must be essentially "benign" in nature and lead to no unnecessary disturbance or collecting of specimens.

Research may take place anywhere on the island and scientific research zones may be designated to facilitate such research. However, ongoing or planned scientific research for which scientific research zones have or will be designated must not be compromised by new research proposals, and unless the original designation is altered by the Administrator, new research activities are not allowed within currently existing scientific research zones.

Priority for scientific research will be given to those proposals which will contribute to the environmental management of the island, but essentially "pure" research will not be disallowed, providing it is judged to be of sufficient merit and will not cause undue harm. To make such

judgements the Administrator may obtain the advice of GIWRAC.

Scientific research into aspects other than those dealing with the Gough Island Wildlife Reserve itself (e.g. upper-air physics, magnetic observations, meteorology) are allowed only within the logistic zone, and after approval has been received from the Administrator. Such research activities must not cause undue disturbance or harm to the indigenous biota or to the natural land forms present within the logistic zone. The Administrator may take such expert opinion as may be necessary, including from GIWRAC, to judge the scientific merits of such proposals. Proposals for any new structures required for such research must first be subjected to the procedures outlined in Section 5.4 above and Section 5.21 below.

5.8.2 Collection of specimens

Application to collect specimens must be made separately to applications to conduct research (see Section 5.19 below). Collections must be limited in scope to the minimum required for the purposes of the research and must not jeopardize the populations from which they are collected.

Under exceptional circumstances biota may be collected for conservation purposes (e.g. to establish a captive breeding population of endemic landbirds elsewhere if rats ever became established ashore; captive animals might then be reintroduced if the rats could be eliminated) but only after environmental impact assessment procedures have been carried out by GIWRAC (see Subsection 5.11.2 and Section 5.21 below).

Residents at and visitors to the meteorological station and personnel aboard visiting vessels should release at night only and away from lights all burrowing petrels ("nightbirds") which are trapped in or under buildings or aboard vessels. Crevices, including open lifeboats, where birds can become lodged aboard visiting vessels must be covered to avoid them trapping seabirds. Reduction in artificial light levels will reduce the problem (see Subsection 5.13.4 below).

Birds found sick or injured should preferably be left alone to be killed by Subantarctic Skuas, or killed humanely if seriously injured or dying (e.g. by colliding with buildings and other structures). If practicable, heavily oiled birds should be collected to avoid their oil being ingested by skuas. Entangled birds should be caught and set free after removal of the entangling material, but entangled seals should preferably be left alone, given the danger from bites and the disturbance that catching them is likely to cause.

The Administrator will consider all applications for collection permits in conjunction with GIWRAC.

Animals must be killed by as humane a method as is feasible under the circumstances. Animals taken into temporary captivity for experimental purposes (including for ringing and tagging, measurements, and collecting blood samples in the field) must be released unharmed at their sites of capture. Marking techniques must not result in subsequent harm to animals.

Whenever possible, samples should be collected from animals found dead (e.g. seal and bird corpses) rather than by killing live animals.

Geological, peat and soil samples must be collected by hand or by using hand-held geological hammers and corers only. No explosives or powered drills or corers may be used for such sampling. Their collection must not lead to undue disturbance of the island's biota, to the permanent alteration of breeding habitats of seals and birds, or to increased erosion. Permission must be obtained from the Administrator for geological sampling in existing scientific research zones, unless such sampling was specifically allowed for when the scientific research zone was established.

It is the responsibility of the person undertaking collections to ensure that all relevant quarantine measures are complied with when taking samples to home institutions.

After completion of studies, material collected under permit (including specimens of biota and geological samples) must be deposited in museum(s) or other depositories designated by the Administrator who may take advice from GIWRAC, except where destructive study techniques have rendered the collected samples of no further scientific value.

5.8.3 Provision of archives

Archives should be established to hold copies of all publications, reports and other relevant documents, including maps and charts, that deal with the Gough Island Wildlife Reserve. Archives should be established at more than one centre, one

of which should be on Tristan da Cunha. It should be made a provision of the issuing of permits for various activities within the Wildlife Reserve that sufficient copies of relevant documents be deposited with the designated archives within a reasonable period of time.

5.9 Management and policing of marine resources

The general principle is that the marine resources of the Gough Island Wildlife Reserve must be managed in such a way that no irreversible change is caused to the marine environment and its biota.

Details of controls imposed on the commercial and recreational fisheries are given in Subsection 5.4.2 above.

Policing of the fishery is required. Fishing vessels thought to be unlicensed that are seen or heard by radio and known or thought to be within the waters of the Gough Island Wildlife Reserve (the marine zone, Subsection 5.4.2 above) are to be reported by members of the meteorological station and by fishery concession holders as soon as possible to the Administrator, most preferably with photographic and other tangible evidence.

Patrols by deep-water vessels of or contracted by the Tristan da Cunha Government of Gough waters should be made if and when feasible. Such vessels should carry aboard a Sea Fishery Officer, who has powers conferred by the fishery limits ordinances and orders of the Tristan da Cunha Government (Appendices 3a-e).

Vessels of current fishery concession holder(s) must carry aboard a Sea Fishery Officer at the cost of the concession holder(s).

5.10 Code of conduct

The guiding principle is that all visitors to the Gough Island Wildlife Reserve must cause as little disturbance to the indigenous biota and natural environment as possible.

To this end, the prescriptions of relevant ordinances and orders of the Tristan da Cunha Government and current concessions and leases (Appendices 2-3) must be followed and lawful orders of the Administrator and Conservation and Sea Fishery Officers obeyed and advice received from GIWRAC followed.

Further prescriptions and guiding information are given in the other Sections of Chapter 5 of the management plan. In addition to such prescriptions, the deliberate feeding of wildlife is prohibited anywhere within the Gough Island Wildlife Reserve.

5.11 Control of imported material

One of the key management objectives is to prevent the human-induced introduction of alien organisms to the Gough Island Wildlife Reserve (see Chapter 4 above). This requires controls being placed on the types of articles and material that may be brought into the reserve, and careful examination of all allowable items to ensure that they contain no propagules of alien organisms. In addition, the use of certain hazardous materials must be strictly controlled within the Wildlife Reserve.

5.11.1 Import of alien organisms

In terms of the old meteorological station lease, no livestock, domestic animals or flora, except for potatoes, may be "introduced into" Gough Island. However, in recent years, 10-20 varieties of fresh fruits and vegetables have been imported to the meteorological station annually. There have been no controls on fresh produce carried aboard ships entering the marine zone.

Live insects and snails have been found in leafy vegetables sent ashore (cabbages, lettuces, cauliflowers, etc.), and importation of such produce therefore ceased in 1991. No further importation of leafy vegetables (especially brassicaceous ones) and fauna, including livestock and domestic animals, will be permitted to the Wildlife Reserve, other than leafy vegetables held and used aboard vessels visiting the marine zone.

Because other fresh produce may also carry propagules (e.g. fungal moulds on fruit, thrips in onions), when and if feasible, fresh produce to be taken ashore at Gough Island should be irradiated before its embarkation at the visiting vessels' home ports. This applies especially to poultry products (including eggs) which can transmit avian diseases. Any leafy fresh produce aboard vessels entering the Wildlife Reserve's marine zone must be retained aboard and not sent ashore.

Poultry produce may not be taken into the scientific research and conservation zones or dumped in the marine zone. Care must be taken to lessen the risk of propagules floating ashore on food remains dumped at sea. To this end, sealed garbage bags that may float may not be dumped within the marine zone.

Dry food stores must be examined prior to packing at visiting vessels' home ports to ensure that they are certifiably free of weevils, meal worms and their eggs, and any other invertebrates, such as cockroaches. A Conservation Officer based at or inspecting the meteorological station must check all produce for propagules on its arrival ashore and also regularly inspect stored food, storage containers and spaces in the food store, pantry, kitchen, cold room and deep freeze at the meteorological station for propagules. Any infestations found must be promptly dealt with by fumigation (see also Section 5.12 below).

Other materials which have a high risk of carrying propagules to the island include construction and packing material, personal clothing and camping equipment.

All construction equipment must be washed down thoroughly before being loaded aboard visiting vessels at their home ports, especially items which have or may have been standing in the open. This material also should be inspected for propagules both aboard ship before being taken ashore and on its arrival at the island. If propagules are found aboard vessels the offending material must not be offloaded until it has been rendered propagule-free by fumigation or other methods.

The use of imported sand and gravel ashore is to be limited as much as possible. Its use outside the logistic zone is not allowed. All such material must be steam-cleaned prior to arrival at the island. Any left-over sand and gravel must be kept in its original containers and must not be stored ashore in the open.

Visitors (including any tourists, see Section 5.18 below) to the Wildlife Reserve must be made aware of the need to check their clothing and camping equipment for grass and other seeds, which must be destroyed before personnel go ashore. Conservation Officers included with visiting parties must inform visitors of the need for this practice.
The accidental introduction of rats (see Subsection 3.8.2 above) poses perhaps the most serious threat to the island's fauna. Strict controls must therefore be instituted to ensure that the island remains rat-free. All foodstuffs must be packed in rodent-proof containers in certifiable rodent-free storerooms at visiting vessels' home ports. All vessels entering the Wildlife Reserve must be inspected and have a rodent-free certificate issued shortly before sailing from their last ports of call. A copy of this certificate is to be forwarded to the Administrator or handed to an accompanying Conservation Officer prior to a vessel entering the Wildlife Reserve. Efficient rat-guards must be kept in place on all ships' hawsers from the time the rodent-free certificate is issued until the vessel sails from its last port of call. Vessels should have equipment aboard to trap or poison any rodents found while at sea.

GIWRAC should consider the advisability of there being poison baits and efficient rat traps placed at the meteorological station and aboard visiting vessels that can be immediately utilized if rats or their signs are sighted or their presence suspected. The problems of House Mice "swamping" poison bait stations and traps ashore and the risks of incidental mortality of birds will, however, need to be addressed. GIWRAC should take advice from experts in the subject and consult the relevant literature (e.g. Moors *et al.* 1992 and references therein) before recommending the use of poisons ashore.

These restrictions apply equally to vessels moving between Gough Island and the Tristan da Cunha Islands, where rats and alien plants and invertebrates not present at Gough occur. Care must also be taken not to transfer propagules of native species between the islands by following procedures outlined above, especially cleaning and inspecting clothing and camping equipment, and also cleaning helicopter wheels between flights.

5.11.2 Rehabilitation and reintroduction of indigenous biota

The rehabilitation or reintroduction of biota indigenous to the Gough Island Wildlife Reserve from elsewhere (such as vagrant penguins and seals from South Africa) is not allowed, to avoid the risk of introducing new diseases (e.g. Newcastle Disease in birds).

Under exceptional circumstances, it may be desirable to reintroduce or rehabilitate biota for valid conservation purposes. Such rehabilitations and reintroductions must first be subjected to an environmental impact assessment by GIWRAC

(see Section 5.21 below).

5.11.3 Hazardous products

In addition to excluding the introduction of alien organisms, controls are required on the use of certain hazardous or toxic substances within the Gough Island Wildlife Reserve.

The importation of radioactive substances is strictly limited by permit (see Section 5.19 below). Only scientific research uses will be considered. Use of radio-active substances is restricted to the logistic zone, unless there is compelling cause for the Administrator to waive this restriction who may seek the advice of GIWRAC. All used radio-active materials and wastes are to be removed from the Wildlife Reserve as soon as is practicable. A thorough account of the use and disposal of all radioactive material used under permit within the Wildlife Reserve must be reported to the Administrator soon after completion of the research activity.

Similarly, the use of pesticides is strictly controlled. As a general principal the use of such products is to be limited as much as possible. They are not be used outside the logistic zone or away from vessels operating in the marine zone. Short-acting, localized pesticides such as pyrethrin-based insecticides may be used when essential within the buildings of the meteorological station only or in vessels offshore (see Subsection 5.11.1 above), but containers must be disposed of correctly after use (see Subsection 5.13.1 below). Other use in the logistic zone must be approved in advance by the Administrator. Herbicides should not be used without a full evaluation by GIWRAC of their likely impact on the environment.

The use of other products that can have lasting environmental impacts is to be limited wherever possible. Used freons and halons from refrigerators, freezers and fire extinguishers should be collected and removed from the Wildlife Reserve for recycling or disposal at home ports. Aerosols used ashore should be "ozone-friendly" and biodegradable detergents and cleaning and disinfectant agents should be used whenever feasible.

The use of firearms or explosives anywhere within the reserve area is not allowed except under exceptional situations and then only with the approval of the Administrator (see Section 5.19 below). One exception to this rule is the use of safety and rescue flares aboard vessels and by parties away from the logistic zone in times of genuine emergencies.

5.12 Alien biota control and monitoring

The abundance and distribution of alien biota within the Wildlife Reserve must be monitored at least annually by a qualified biologist, and steps must be taken to control the spread of alien species where practical. House Mice are now widespread throughout the island, and no control measures other than keeping the station buildings mouse-free are practical at this stage. However, it remains a long-term goal to attempt the removal of mice from Gough Island.

A survey is needed to assess the importance of alien invertebrates in the Wildlife Reserve. Until such time, no management measures can be considered. However, steps must be taken to ensure that the meteorological station is kept free of invertebrate pests such as weevils. To this end, the various food storage areas at the meteorological station must be inspected and fumigated regularly, and all contaminated stores must be removed from the Wildlife Reserve (see Subsection 5.11.1 above).

Most introduced plants in the reserve are too widespread to consider practical control measures. However, localized introductions can be eradicated by regular weeding and by ensuring that there is no opportunity for dispersal. Control measures (which must include the complete incineration of removed material) by station residents against the two species (*Conyza floribunda* and *Senecio burchellii*) which became established in 1983 after the construction of the now removed upper magnetometer hut must be continued to ensure that these species definitely are eradicated (see Appendix 5). It also is recommended that potato and *Sonchus* plants be weeded out from around the meteorological station on a regular basis by residents at the station, most preferably by removing plants before tuber formation or seed set.

The spread of alien plants within the reserve can be controlled in part by ensuring that people travelling around the island do not carry seeds adhered to their clothing or equipment. All clothing and camping equipment must be cleaned thoroughly by brushing and/or washing and boots must be washed before leaving the logistic zone.

Plate 6: Crushed glass and metal cans packed into used wooden food boxes stacked outside the food store and emergency base, awaiting annual removal to South Africa (J. Cooper, 1992)

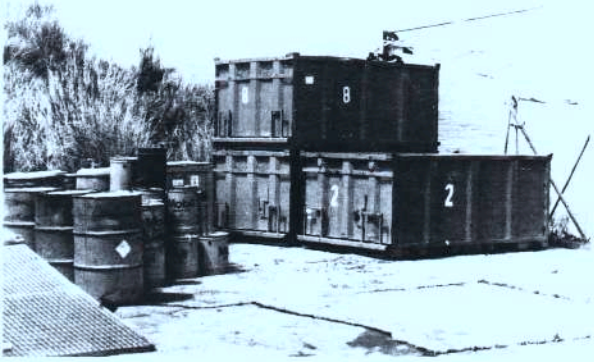

Plate 7: Drums containing used engine lubricants and other liquid wastes, and large metal skips for assorted solid wastes stored on the landing platform awaiting annual return to South Africa. Part of the crane's jib is visible, with *Spartina arundinacea* tussock grass in the background (J. Cooper, 1992)

Rigorous measures also are required to prevent the arrival of additional alien species at the island (see Subsection 5.11.1 above). Detection of new alien species requires regular inspections by trained biologists.

5.13 Treatment of human-derived wastes and pollution prevention

The guiding principal is to reduce any impact from human activities within the Wildlife Reserve to the absolute minimum. However, artifacts known or thought to predate 1955 are to be regarded as having historical significance and therefore are not to be disturbed (see Section 5.5 above).

5.13.1 Solid wastes

The amounts of plastic and other non-biodegradable packaging and wrapping material sent to the Wildlife Reserve must be kept to a minimum. Reusable bubble packing sheets should be used in preference to polystyrene or other loose packing chips. To this end and whenever feasible, supplies should be repacked at home ports before sending them to the Wildlife Reserve. The use of re-useable packing cases is recommended (Plates 6 & 7).

Solid wastes generated at the meteorological station must be divided into three categories: food wastes, "burnables" (untreated wood, paper and cardboard only), and other products which must be removed from the Wildlife Reserve for correct disposal at visiting vessels' home ports. Macerated food wastes (no items larger than 10 mm across) may be disposed of directly into the sea at Skivvygat, a hole in the sea cliffs adjacent to the base (Fig. 4, Plate 10). To this end, the meteorological station should be supplied with a macerator. The only exception is poultry products (including eggshells), which must be incinerated or removed from the Wildlife Reserve to reduce the risk of introducing avian diseases to local bird populations.

"Burnables" may be incinerated provided the current incinerators (Plate 9) are replaced by an efficient, enclosed, clean-burning incinerator. The alternative to installing a new incinerator is to store all burnable wastes for annual removal from the Wildlife Reserve. Ashes from the incinerators after each fire should be collected and stored in a dry condition in sealed containers for annual removal from the Wildlife Reserve for correct disposal on the mainland.

Metal cans, glass and plastic bottles, and other containers, as well as plastic packaging and rubber materials, must be stored inside suitable containers or buildings (to avoid wind-borne litter) for return to home ports and eventual recycling (see Plates 6 & 7). Metal cans and glass containers should be crushed and plastic material should be compressed and baled to reduce the volume of stored wastes. Such processing must take place within a building.

Medical wastes and expired medicines, used batteries, aerosol containers and metal pellets used in hydrogen production for upper-air balloons should be retained separately and returned to home ports for correct disposal.

All residents at and visitors to the meteorological station must be fully educated as to the need to sort wastes at source to ensure their correct disposal. Where the exact nature of a given waste product is unclear, the conservative course of action (i.e. removal to home ports) should be followed. This applies especially to laminated paper products which can release toxic compounds if incinerated.

Littering anywhere within the Wildlife Reserve is prohibited. This includes, but is not restricted to, food wrappers, crown corks, beverage can tabs, cigarette ends, spent matches and small items of construction and maintenance equipment.

Personnel travelling outside the logistic zone on the island must return all non-human wastes to the base for disposal following the procedures described above. Defaecating is not permitted within scientific research zones, unless specifically allowed for in terms of the designation of individual zones.

Vessels operating within the reserve should be subject to the same controls on solid waste disposal as is the meteorological station as described above. To this end, Annex V of the International Convention for the Prevention of Pollution from Ships (MARPOL), which prevents the dumping of persistent solid wastes close inshore, should be made applicable to the Tristan da Cunha Dependency. Under this convention, only macerated food could be dumped within the Wildlife Reserve's marine zone.

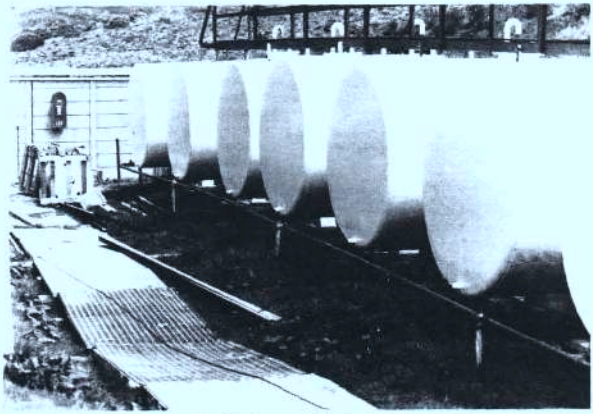

Plate 8: Fuel tanks for storage of diesel for the meteorological station's generators, with a catwalk and the crane power shack in the background (J. Cooper, 1992)

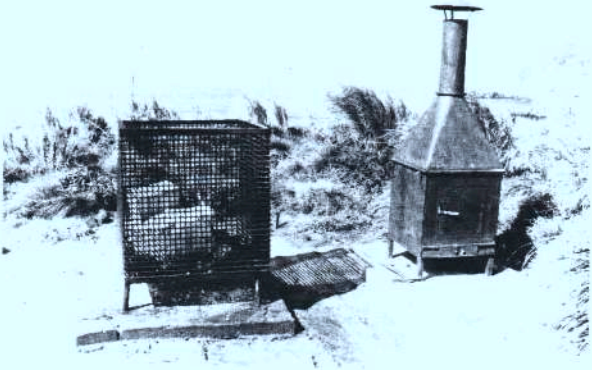

Plate 9: The open and closed incinerators near Skivvygat, used primarily for burning wood, cardboard and paper wastes from the meteorological station (P.G. Ryan, 1991)

5.13.2 Sewage and other liquid wastes

The current waste-water system at the meteorological station is adequate for the number of personnel it services. Liquid wastes from Gough House are carried in a pipe to the disposal site at Skivvygat (Plate 10); another pipe from the emergency base empties over the nearby cliff into the sea (Fig. 4). Both pipes must be inspected regularly and any leaks fixed on discovery. Wastes from the meteorological station include untreated sewage and "grey water" from the kitchen, laundry and upper air building; those from the emergency base comprise only domestic sewage and "grey water" from a shower and sink. A few waste water outlets (including from the distilled water facility in the upper air building) that currently open directly under the station must be linked to the sewage system.

The practice of disposing of used photographic chemicals in the waste-water system must cease. All used photographic chemicals and solutions must be collected and returned to the mainland for correct disposal, as must be used engine oils, greases, paints, turpentine and other toxic and noxious liquid chemicals.

Residents and visitors need to be clearly instructed in the correct disposal methods for various liquid wastes. Detergents used are to be fully biodegradable and low in phosphates to minimize the impact of releasing untreated sewage. Disinfectants should be used with circumspection.

Vessels present within the Wildlife Reserve are subject to the same controls as is the meteorological station.

5.13.3 Diesel pumping and storage

Diesel pumping from supply vessels to the meteorological station must occur only during daylight hours and during ideal sea and weather conditions to reduce the risk of accidental spillages. While diesel pumping occurs it must take precedence over all other ship and shore activities. Extreme caution must be exercised to avoid spillages. Consideration should be given to using a more robust pipe if excessive pressure build-up results in leaks and ruptures. These restrictions also apply to any ship-to-ship fuel transfer that may take place within the Wildlife Reserve's marine zone.

Containment berms and spill-trays must be constructed under the diesel storage tanks and taps at the meteorological station to contain accidental discharges. Any leakages or spillages estimated to be more than 10 litres from vessels, shore facilities or from transfer hoses must be reported as soon as practicable to the Administrator, along with information on the date and locality of spill, estimated amount, causes and ameliorative actions taken. All smaller leakages and spillages within the Wildlife Reserve must be recorded, with details as given above, and reported annually to the Administrator. The Administrator may refer such reports to GIWRAC for an opinion.

5.13.4 Light pollution

The use of external lights at night must be kept to a minimum throughout the Wildlife Reserve. Use of lights to attract birds at night is only allowed for scientific research purposes and then only with the approval of the Administrator.

As a general rule, only the minimum necessary amount of lighting should be used at night, and outside lights at the meteorological station must be of low wattage and designed to shine downwards only. Bridge-mounted spotlights may not be used to illuminate factory operations on fishing vessels.

All windows at the meteorological station and portholes and open doorways on visiting vessels must have effective blackout blinds which must be closed during the hours of darkness. These precautions are particularly important on misty nights, when birds are more prone to be disoriented by artificial light sources. Once birds are seen to be affected by lights, lights must be dimmed or extinguished, with the exception of ships' navigational lights.

Release of light-attracted and trapped birds is discussed in Subsection 5.8.2 above.

5.13.5 Noise pollution

Artificial noise sources such as from diesel and other engines and refrigeration motors at the meteorological station and aboard visiting vessels should be reduced as much as is feasible.

5.14 Fires and fire control

To avoid the risk of vegetation and peat fires, nofires are permitted anywhere ashore at Gough Island away from designated sites in the logistic

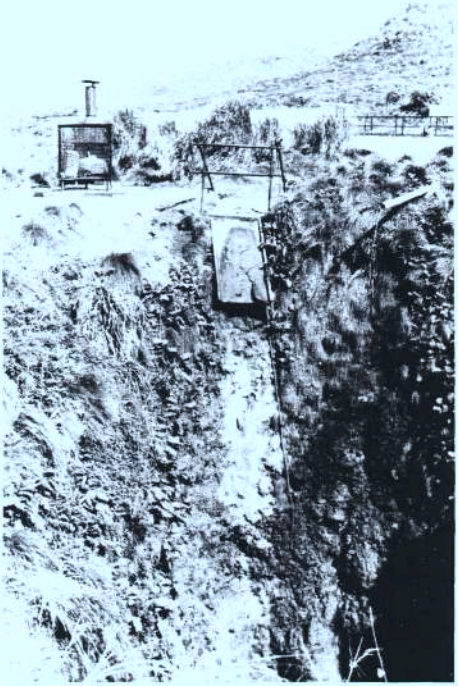

Plate 10: Skivvygat, showing the disposal chute for food wastes, the main sewage outfall pipe and the nearby incinerators. Broad-leafed forbs below the chute are alien *Rumex obtusifolius* (P.G. Ryan, 1991)

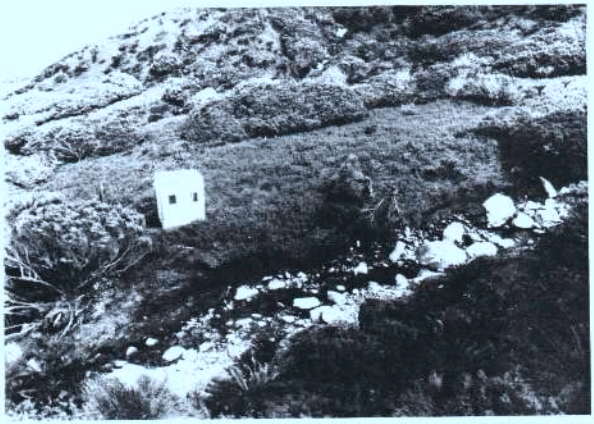

Plate 11: The upper magnetometer hut (removed in 1992), site of the introduction of several alien plants in 1983. The stream banks were stripped of vegetation by a flood in April 1991 (P.G. Ryan, 1991)

Plate 12: Members of the South African meteorological team collecting water supply piping washed away in the April 1991 flood (P.G. Ryan, 1991)

zone. Only two sites are currently so designated: the barbecue (braai) site within the enclosed courtyard of Gough House at the meteorological station and the incinerators for burnable refuse next to the waste-disposal chute at Skivvygat (Fig. 4, Plate 9). Use of the current incinerators will halt as soon as a clean-burning enclosed incinerator is installed.

Fires must be attended at all times, and appropriate fire-fighting equipment in working order must always be immediately to hand. The incinerators may not be used during strong winds or at night. No fires are allowed away from designated sites for any purpose, including for cooking. Campers are limited to using gas or liquid fuel camp stoves.

Care must be taken by all persons smoking to avoid discarding spent matches and cigarette ends, whether alight or not, anywhere ashore within the Wildlife Reserve except within the meteorological station. To this end, visitors and residents should be encouraged to confine smoking to designated areas within the meteorological station.

Safety and rescue flares may only be used in times of genuine emergencies and all care must be taken that such flares do not cause fires ashore. Any fires that do start from flares (or from any other causes) must be extinguished promptly on discovery.

Hot exhaust fumes from diesel engines pose a fire risk if they vent onto the ground. All exhausts from diesel engines must therefore be vented upward at a height of at least three metres above ground level to avoid drying out and igniting the peat.

5.15 Paths, erosion and peat slips

The guiding principle is to minimize the damage caused by people trampling the vegetation and underlying peat. Disturbance of the native vegetation along paths promotes erosion and creates openings for alien plants to become established. Consequently, as few paths as possible should be used.

Away from the logistic zone, all transport on the island is by foot along unimproved paths. Meteorological station residents and all visitors to the island must follow established routes wherever possible to reduce the area subject to trampling and to minimize the spread of alien plants. Around the meteorological station there are established paths to South East Point, Seal Beach and up to Tafelkop and South Peak. All visitors to the central plateau must follow the 'Golden Highway' route to and from Tafelkop; existing routes down the various spurs of Ruin Ridge to the west of Tafelkop (see Plate 4, Fig. 5) are to be considered closed and may not be used except for emergency, environmental management or scientific research purposes. A notice to this effect is to be posted where the two access routes fork a little way inland from Blechnum Bridge.

The erosion status of the Golden Highway route to Tafelkop needs to be assessed during annual environmental inspections (see Section 5.6 above) to decide whether an alternative route, such as via Ruin Ridge, should be opened once more to allow the main route to recover. The recovery of the closed Ruin Ridge route also should be monitored during annual environmental inspections.

Walkers on the plateau must always attempt to follow ridge-crests, where exposed rock and harder ground result in less erosion, to avoid tearing open the vegetation cover and causing peat slumping, which occurs when walkers travel on slopes away from ridges (Plate 13). Contouring along slopes is not permitted unless absolutely necessary, and routes should follow the shortest route between valley floors and ridges.

The least damaging route from Tafelkop to South Peak involves joining the ridge between South Peak and Hill 1760 at its lowest point, and following the ridge to South Peak, and this route must therefore be used. Walking directly between Tafelkop and South Peak (and *vice versa)* is not allowed.

Sphagnum peat bogs found on the plateau are particularly prone to trampling damage and should be skirted wherever possible. The Tafelkop bog must be skirted rather than crossed since this is the most heavily disturbed peat bog on the island. Expansive areas of peat bogs to be avoided are found in Albatross Plain, Mildred Mire and Tarn Moss, but smaller areas are scattered in poorly-drained areas throughout the plateau.

The steep slopes of the island are subject to frequent peat slips after heavy rain. Newly-exposed peat slips provide an opening for alien plants to become established, and in order to reduce the risk of introducing seeds of alien plants should only be visited for scientific research

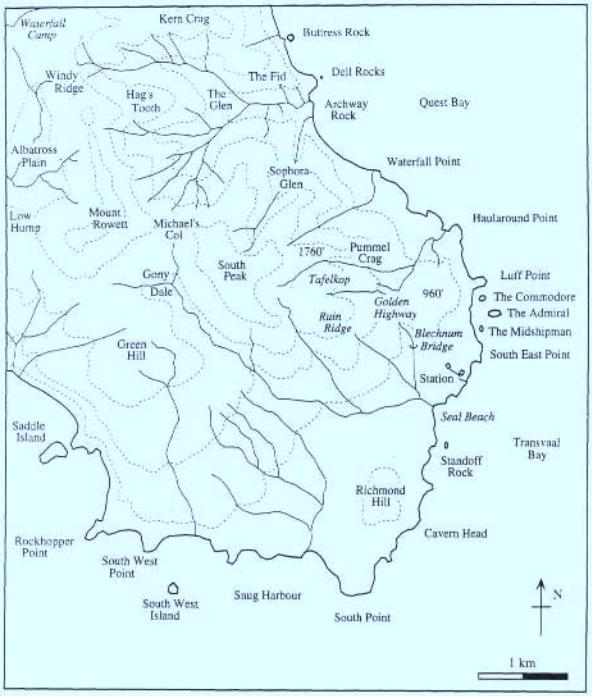

Figure 5

The southeastern part of Gough Island, with the names of features added since the station moved to its present site from The Glen given in italics. Contour interval = 150 m

Plate 13: Path erosion due to foot traffic in feldmark vegetation on the north slope of South Peak (P.G. Ryan, 1991).

purposes.

5.16 Erection of temporary structures

The guiding principle is that no permanent structures are to be erected outside the logistic zone and that the erection of temporary structures within scientific research and conservation zones must be kept to the necessary minimum. Zones are defined in Section 5.4 above.

Temporary structures may be erected within the logistic zone, providing that the procedures outlined in Subsection 5.4.1 above are followed.

Temporary structures may be erected in scientific research zones (e.g. beacons, cairns, tents, hides, field and nest and other scientific markers, quadrats, traps, cages, tripods, surveying poles, etc.) but for scientific research or environmental management purposes only, and only with the prior approval of the Administrator, who may consult GIWRAC or a Conservation Officer. Such approval will normally form part of the designation of the zone. Removal of all such temporary markers must be made by the date of expiry of the scientific research zone, unless the duration of existence of the zone is extended by the Administrator.

Temporary structures may be erected in the conservation zone only during the period of visits (e.g. tents and hides, nest and other scientific markers, quadrats, traps, cages, surveying poles, climbing equipment such as pitons, etc.). All such structures must be removed by the end of visits.

The use of any temporary structures within the conservation zone that are likely to cause anything more than a transient effect must receive the prior approval of the Administrator, who may seek the advice of GIWRAC. Temporary structures erected in all zones should not obstruct the free flow of water or the pathways of seals and birds, especially penguins.

Permanent structures are not allowed within scientific research zones or the conservation zone, including but not restricted to beacons, cairns, field refuges and field huts.

5.17 Safety and rescue provisions

The guiding principle is that visitors to the Gough Island Wildlife Reserve enter the reserve at their own risk, must be responsible for their own health and safety, and must be able to undertake such rescue operations as may be required.

To this effect visiting vessels and the meteorological station must be stocked with medical, safety and rescue equipment that will allow rescues to be undertaken both within the marine zone and on the island itself. Eventualities that may occur include parties being marooned on shores away from the logistic zone at Transvaal Bay, accidents with small boats, walkers on the island becoming injured, lost or beset by bad weather, and anglers being washed off rocks. Four deaths have occurred at Gough Island since 1956 from the last two situations, so care needs to be taken at all times.

Emergency visits are permitted to scientific research zones and to the conservation zone for rescue purposes without prior approval, but such visits must be reported to the Administrator in detail as soon as is practicable. In addition, any significant disturbances to the indigenous biota or natural environment due to rescue attempts anywhere within the Gough Island Wildlife Reserve must be reported.

5.18 Tourism policy

It is considered that the Gough Island Wildlife Reserve is not a suitable place for visits by tourists, whether arriving by yacht or passenger vessel. The paucity of sheltered landing beaches makes landings from small boats such as inflatable dinghies difficult on days of good weather and impossible on days of bad weather. Facilities at the meteorological station are inadequate to support tourism and tourist visits could adversely affect the daily work of the residents.

The steep coastline means that landings away from the logistic zone would have to be concentrated at seal and breeding penguin shores of the relatively sheltered east coast where the chances for disturbance of animals are high. Access to the interior from this area is only feasible in the vicinity of The Glen.

If tourism is to be considered, an environmental impact assessment (EIA) procedure should first be followed (See Section 5.21 below). In advance of

an EIA, some suggestions on managing tourism at the Gough Island Wildlife Reserve are given below.

Vessels, including yachts, must first clear customs, immigration and health controls at Tristan da Cunha before proceeding to Gough Island. Tourist landings should be restricted to day visits only, to small parties (<20 persons) and to The Glen only. A sign should be erected at The Glen shoreline, to state that tourists are entering the Gough Island Wildlife Reserve and that disturbing animals and damaging plants, collecting of any material (including rocks) and littering are prohibited. In addition, a suitably labelled boundary marker should be erected beside The Glen stream a little way above the penguin colony, demarcating the inland limit for tourists. No other signs (such as for interpretative material) should be provided ashore to avoid detracting from a wilderness experience.

Tourist landings should be from small boats only. Landings by helicopter should not be allowed.

Small boats from tourist vessels should be allowed to travel along the eastern and northern coastlines outside the surf and kelp zones, in order to view the scenery and wildlife. No anchoring by small boats should be allowed, nor cutting of kelp or fishing. Boats should not approach Southern Right Whales, Southern Elephant Seals or dolphins in the water at distances of less than 50 m. Boats should stay at least 50 m from the shore and should not travel at excessive speeds.

All tourist visits, including shore cruises, must be accompanied by a Conservation Officer, after the prior approval of the Administrator has been obtained for the visit. A system of visiting and landing fees with a charge per person should be instituted and the tour operator should cover all costs of including a Conservation Officer with the tour, including return to home port.

Once within the Gough Island Wildlife Reserve, the tour operator and all tourists must obey the instructions of the accompanying Conservation Officer, and the various prescriptions and guidelines included within this management plan.

The Conservation Officer accompanying the tourist parties should ensure that no alien plant or animal propagules are transferred ashore in clothing or equipment (see Sections 5.11 and 5.12 above).

Additionally, tourist parties landing at The Glen are not to take food ashore for consumption and are not to approach penguins and seals closer than five metres. Tourists should be informed that there will be no toilet facilities ashore and that all human wastes must be deposited below the high water mark. Smoking ashore by tourists should not be allowed.

If tourism takes place, a monitoring programme should be set up to make annual counts of the numbers of seals and breeding penguins and their breeding success at The Glen, and in the adjacent Sophora Glen as a control. To this end, The Glen and Sophora Glen should be declared a scientific research zone. Alternatively, a tourism zone could be established for the former locality. Tourists should not be allowed to visit the Sophora Glen. Trampling effects also should be monitored in The Glen and the area used by tourists surveyed regularly for new alien plants and invertebrates.

Visits deemed to have no environmental management or scientific value and which require overnight stays, such as for recreation, exploration, climbing or amateur ("ham") radio purposes, are not allowed within the Gough Island Wildlife Reserve.

5.19 Application and issuing of permits

In the first instance all inquiries about visits, scientific research and commercial fishery activities within the boundaries of the Gough Island Wildlife Reserve and any related matters must be made to the Administrator of Tristan da Cunha, who may consult GIWRAC when considered appropriate. Such enquiries must at least initially be made by post or facsimile mail (see Appendix 9 for address).

At the Administrator's decision, inquirers may be asked to copy or redirect their enquiry to the South Atlantic and Antarctic Department, United Kingdom Foreign & Commonwealth Office, London, to GIWRAC or to a Conservation Officer who resides away from Tristan da Cunha.

The Administrator may take such expert advice as deemed necessary to judge applications for visits and planned activities within the Gough Island Wildlife Reserve, especially from GIWRAC and from Conservation and Sea Fishery Officers of the Tristan Government. The Administrator's decision is to be regarded as final.

The Administrator will issue permits for approved visits and activities, in terms of advice received, the current ordinances and orders of Tristan da Cunha, and in terms of this management plan. The Administrator may attach provisions and limitations to the issuing of permits, including but not limited to the size of parties involved. Persons being issued with permits must accept such conditions in writing prior to the visit or activity, and must report in writing once the visit or activity is completed to the Administrator and GIWRAC within a time limit imposed by the issued permit. Such reports must describe the actual visit and activities undertaken in detail.

A non-refundable fee may be charged for the processing and issuing of permits. All successful permit applicants must be supplied with copies of this management plan and relevant ordinances of the Tristan Government. A charge may be made for the issuing of such documents. Prior to the permitted visit or activity successful applicants must make themselves aware of the contents of such documents and bring them to the attention of all members of their parties, whether residents at or visitors to the meteorological station, ship's crews and officers, passengers, or tourists.

5.20 Contraventions and penalties

Any contravention of the prescriptions of this management plan or of relevant ordinances of the Tristan Government must be reported to the Administrator or a Conservation or Sea Fishery Officer as soon as possible. Full details of the nature of and how the contravention occurred must be given in writing.

The Administrator, who may obtain advice from GIWRAC and Conservation and Sea Fishery Officers when considered necessary, will decide whether any penalties should be imposed. In this case the penalties outlined in current relevant ordinances will apply. In addition, the Administrator may decide to withdraw the permit forthwith or after a period of time, and also to inform the contravening permit holder that further applications for permits will not be considered.

In judging contraventions, the Administrator will take into account the severity of the contravention, including whether it is likely to have caused a transient or a permanent effect, and also whether the contravention was deliberate or was the result of an unforeseen event. In the case of contraventions deemed deliberate by the Administrator, penalties imposed should be more severe. In this regard *de jure* contraventions arising out of *force majeure* or emergency activities within the Gough Island Wildlife Reserve will be judged as unforeseen events, unless they are not reported as soon as is practicable and in full detail to the Administrator.

The non-reporting or excessively late reporting of contraventions, whether deliberate or not, will be regarded as an offence, and suitable penalties imposed following the procedures outlined above.

5.21 Environmental impact assessment procedures

The Administrator may, after taking advice from GIWRAC if considered necessary, call for an environmental impact assessment (EIA) procedure to be followed prior to granting a permit for any proposed visit or activity within the Gough Wildlife Reserve. EIAs will be conducted under the aegis of GIWRAC and costs may be charged to the applicant. If site visits are required, EIAs may take some time to conduct. The Administrator will take into account the findings of EIAs in making subsequent decisions.

Such activities include, but are not necessarily restricted to, decisions to allow tourism within the Wildlife Reserve, any construction or extension of buildings and structures within the logistic zone, and the setting up of scientific research zones. All activities and visits that are deemed likely to have more than a minor or transient impact are to be considered for EIA procedures.

Currently existing procedures for EIAs should be followed. Annex I to the Protocol on Environmental Protection to the Antarctic Treaty of October 1991 (the "Madrid Protocol", Appendix 8) lists procedures which could be adopted, although the reporting mechanisms will, of course, differ, because Gough Island is outside the Antarctic Treaty area. These procedures include an Initial Environmental Evaluation (IEE), which is followed by a Comprehensive Environmental Evaluation (CEE) if considered warranted. IEEs and CEEs may recommend monitoring programmes to assess the effects of the proposed visits and activities (see Section 5.7 above & Appendix 8).

5.22 Education and awareness

Efforts should be made to increase awareness of the Gough Island Wildlife Reserve and to educate visitors and others on the need for environmental management of the island.

5.22.1 Education of residents and visitors

Robust signs, proclaiming that the island is a Wildlife Reserve and that its natural environment and biota are to be respected and protected, should be erected at entry points (helicopter landing platform and crane) to the logistic zone, at entry points to scientific research zones (see Subsections 5.4.1 & 5.4.3 above) and if tourism is allowed, at The Glen (see Section 5.18 above). Such signs should also bear the name of the Tristan da Cunha Government.

Copies of the management plan and the relevant ordinances and orders of the Tristan da Cunha Government should be made readily available at the meteorological station and by the captains, tour organizers and libraries of visiting vessels.

It is considered part of the duty of officers-in-charge of the meteorological station to ensure that all residents and visitors to the station are aware of and always follow all the various prescriptions of the management plan and relevant ordinances, orders, concessions and leases. In this regard the following policies and practices especially need to be explained: waste disposal; not disturbing and feeding wildlife, especially birds; reducing light pollution to a minimum; staying to established paths and routes; cleaning clothing and camping equipment; and fire and incineration procedures.

A "Visitor's guide to the Gough Island Wildlife Reserve", essentially an abbreviated, illustrated version of the management plan, should be written and supplied to all visitors to the Wildlife Reserve, including officers and passengers (and any tourists) of visiting vessels, and to residents at and visitors to the meteorological station.

When annual environmental inspections are carried out by a Conservation Officer (see Section 5.6 above), then the officer should give an address to visitors to the island before their arrival (i.e. aboard the visiting vessel) that explains the value of the island and its biota, and outlines the "dos and don'ts" of the management plan, also giving opportunities to answer questions both then and during the period of the visit. Similar addresses should be given by Conservation Officers aboard any visiting tourist vessels (see Section 5.18 above).

Awareness of the need for environmental management at Gough Island should be increased among those organizations which are responsible for activities within the reserve: primarily the South African Government's Department of Environment Affairs (including its Weather Bureau) and Tristan Investments (Pty) Ltd, and its parent company, the South Atlantic Islands Development Corporation Ltd. To this end such organizations should obtain sufficient copies of the management plan, visitor's guide and the relevant ordinances and orders of the Tristan da Cunha Government.

The Administrator may consider the official adoption of unofficial and unmapped names that are in use for geographical features on the island. He may seek the advice of GIWRAC in this regard.

5.22.2 General awareness and education

Existence of the management plan and its prescriptions, and the existence of the Gough Island Wildlife Reserve itself, should be made known among the general public. Awareness should also be increased among the populace of Tristan da Cunha. Ways in which this could be achieved include the production of illustrated articles in natural history and other popular magazines and newspapers, a special issue of postage stamps of Tristan da Cunha commemorating the formation of the Wildlife Reserve in 1976 and/or the management plan, and the production of natural history documentary films and videos for television.

Archival and museum collections (see Subsections 5.8.2 & 5.8.3 above) must be available for study and for interpretation to the general public.

Some of the above suggestions if adopted will require visits to the island by photographers and journalists. In this case, procedures outlined in the management plan for visiting the island and activities ashore must be followed.

Registration of the Gough Island Wildlife Reserve with the World Heritage Convention and the registration of Ramsar Wetland(s) of International Importance on the island will also help increase general awareness if suitably publicized.

5.23 Availability of the management plan

The management plan is available to all interested persons and organizations from the Administrator, Tristan da Cunha, from the GIWRAC Secretary, and from the South Atlantic and Antarctic Department, United Kingdom Foreign & Commonwealth Office, London. See Appendix 9 for relevant addresses.

6. REVISION OF THE MANAGEMENT PLAN

The management plan for the Gough Island Wildlife Reserve shall be revised at five-yearly intervals, commencing five years after it first comes into force. The Administrator may approach GIWRAC to undertake such revisions. Revised plans or amending texts should also be published and be available as public documents.

Notwithstanding the above, the Administrator, who may take the advice of GIWRAC on the matter, may decide to institute a revision of the management plan in a period of less than five years if the situation is considered to warrant a revision. To help in this regard, the Administrator (or GIWRAC if so designated) should make an annual environmental assessment of activities and visits to the Gough Island Wildlife Reserve and arrange for an annual inspection of the reserve by a suitably qualified and experienced Conservation Officer, most preferably at the time of the annual relief of the meteorological station (see Section 5.6 above).

The Conservation Officer must report in writing to the Administrator within one month of completion of an annual inspection, who may then request the comments of GIWRAC on the report. Such reports should, *inter alia*, make recommendations for changes to the management plan if any are considered warranted. If considered urgent enough, the Administrator should issue new regulations which will then apply in addition to or in replacement of those listed in the current management plan.

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This management plan is dedicated to the people of Tristan da Cunha and to the magic of Gough.

8. REFERENCES

Most references in the text are listed in Appendix 1. Those not so included are listed below.

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9. APPENDICES

Nine appendices follow that include a bibliography of Gough Island, ordinances relevant to the environmental management of the reserve, tabulated information on the island's history and biota, and a list of members of the Gough Island Wildlife Reserve Advisory Committee (GIWRAC).

APPENDIX 1

A BIBLIOGRAPHY OF GOUGH ISLAND

Introduction

The scope of the bibliography is limited to articles and books published or in press, ordinances, charts and theses that deal wholly or in part with Gough Island (40°20'S, 09°52'W) and its territorial waters in the central South Atlantic Ocean up to July 1994. Only selected articles of the many published in the *News Letter of the South African Weather Bureau* and the *Antarktiese Bulletin* have been included. The bibliography excludes newspaper articles and unpublished reports. Important sources used were Burdecki (1963), Wace & Holdgate (1976), Cooper & Brooke (1981) and Watkins & Cooper (1983).

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APPENDIX 2

TRISTAN DA CUNHA CONSERVATION ORDINANCE, 1976

Tristan da Cunha

No. 1 of 1976

Made 2nd April, 1976.
Published in the Gazette 2nd April, 1976.
Date of Commencement As provided in section 1(2)

AN ORDINANCE

to make provision for the conservation of the fauna and flora of Tristan da Cunha.

Enacted by the Governor of St. Helena and its Dependencies:

1. (1) This Ordinance may be cited as the Tristan da Cunha Conservation Ordinance, 1976.

(2) This Ordinance shall come into operation on such day as the Administrator shall notify to the public, in such manner as he may consider best for that purpose.

2. (1) In this Ordinance unless the context otherwise requires:

"Administrator" means the Administrator of Tristan da Cunha;

"Administrator in Council" means the Administrator acting after consultation with the Island Council;

"Animal" means any member of the animal kingdom;

"bird means any member of the class Aves at any stage of the life cycle and includes eggs;

"Island Council" means the Island Council of Tristan da Cunha;

"Mammal" means any member of the class mammalia;

"Plant" means any member of the plant kingdom;

"Resident of Tristan da Cunha" means a person born in Tristan da Cunha Islands, the husband, wife or child of any such person and any person who has lived on the main island of Tristan da Cunha for a period of at least one year immediately preceding the date of the event in issue or, as the case may be, the act or omission of which complaint is made but not including in that period any period during which his residence was authorised by a permit;

"Territorial waters" means a zone having for its inner boundary the low water line on the coast of the land area of Tristan da Cunha islands or any part thereof or any other baseline from which the territorial waters are measured and for its seaward boundary a line each point on which is three nautical miles from the nearest point on the aforesaid inner boundary and includes the air space above that zone as well as the seabed and the subsoil thereof;

"Tristan da Cunha Islands" means the main island of Tristan da Cunha, Gough Island, Inaccessible Island, Nightingale Island, Middle Island, Stoltenhoff Island and the islets belonging to any of those islands.

(2) In this Ordinance-

(a) any reference to a land area includes the area of the territorial waters of that land area; and

(b) a reference to a native animal or to a native plant shall be interpreted as meaning an animal or plant the presence of which in Tristan da Cunha Islands resulted from natural process of dispersal of the species to which the animal or plant belongs.

3. (1) No person shall wilfully within Tristan da Cunha Islands-

(a) set fire to any vegetation except for agricultural or horticultural purposes;

(b) spread, discharge or dump any noxious chemical except within a building or in a place approved by the Administrator for the disposal of such materials;

(c) spread by spray or other means any insecticide or pesticide except within a building or tent or for

agricultural or horticultural purposes and except within the settlement of Edinburgh in the main island of Tristan da Cunha for public health purposes.

(2) No person shall wilfully within Tristan da Cunha Islands except with a permit and in accordance with the terms thereof-

(a) import any kind of live animal or plant not native to Tristan da Cunha Islands;

(b) liberate or disseminate any kind of live animal or plant not native to Tristan da Cunha Islands except in an area used for agricultural or horticultural purposes;

(c) engage in any action causing disruption of the soil or vegetation other than soil or vegetation in a garden or area used for agricultural or horticultural purposes.

(3) No person shall wilfully within Gough, Inaccessible, Nightingale, Middle or Stoltenhoff Islands, islets belonging to Tristan da Cunha or in any area in the main island of Tristan da Cunha for the time being declared to be a sanctuary under section 5 of this Ordinance except with a permit and in accordance with the terms thereof construct any house, hut, shed, jetty, landing strip, road or runway or erect any mast, pole, aerial beacon or any other installation or undertake any agricultural or horticultural activity.

(4) No person, not being a resident of Tristan da Cunha, shall in Inaccessible Island, except with a permit and in accordance with the terms thereof, wilfully pick, cut down, uproot or destroy any native plant.

4. Within the main island of Tristan da Cunha the birds and mammals specified in the First Schedule to this Ordinance are hereby declared to be protected species and no person shall, except with a permit and in accordance with the terms thereof, wilfully kill, capture or molest any bird or mammal of any species so specified.

5. (1) The Administrator in Council may at any time declare any area of the main island of Tristan da Cunha to be a sanctuary.

(2) Within any sanctuary under this Ordinance no person shall, except with a permit and in accordance with the terms thereof, wilfully kill, capture or molest any native bird or native mammal.

6. Within Inaccessible, Nightingale, Middle and Stoltenhoff Islands and islets belonging to Tristan da Cunha-

(1) No person, not being a resident of Tristan da Cunha, shall, except with a permit and in accordance with the terms thereof, wilfully kill, capture or molest or attempt to kill, capture or molest any native bird or native mammal;

(2) No resident of Tristan da Cunha shall, except with a permit and in accordance with the terms thereof, wilfully, kill, capture or molest or attempt to kill, capture or molest any native bird or native mammal other than of a species specified in the Second Schedule of this Ordinance.

7. (1) Gough Island is hereby declared to be a wildlife reserve.

(2) Within a wildlife reserve no person shall, except with a permit and in accordance with the terms thereof,

(a) wilfully kill, capture or molest any native bird or any native mammal;

(b) pick, cut down, uproot or destroy any native plant.

8. (1) The Administrator in Council may from time to time vary-

(a) the first and second schedules to this Ordinance by adding or deleting any species of bird or mammal;

(b) the areas declared to be sanctuaries on the main island of Tristan da Cunha

(2) Notice of any variation proposed to be made under subsection (1) of this section shall be posted publicly in such place in the Settlement of Edinburgh as the Administrator may direct and any resident of the main island of Tristan da Cunha who objects to the proposed variation shall be entitled within one calendar month of the posting aforesaid, to give notice in writing addressed to the Administrator and delivered to his office that he objects to the proposed variation giving his reasons for such objection.

(3) The Administrator in Council shall as soon as practicable consider any objection under subsection (2) of this section and the Administrator shall decide thereafter whether the proposed variation shall or shall not be made and if he decides that the variation shall be made it shall come into force three calendar months after the date on which the Administrator so decides otherwise the proposed variation shall lapse.

9. (1) The Administrator may issue a permit to any person named in the permit-

(a) to do any of the things forbidden to be done without a permit by the provisions of this Ordinance;

(b) to take for commercial purposes the number of seals (Arctocephalus tropicalis) specified in the permit provided that the person to whom the permit is issued is an employee of the South Atlantic Islands Development Corporation or its subsidiary Tristan Investments (Pty.) Ltd. and provided also that the permit shall lapse forthwith if that person ceases to be such an employee;

(2) A person to whom a permit is granted under paragraph (b) of subsection (1) of this section shall inform the Administrator within one month after the date of the expiry of the permit of the number of seals of each sex taken under the permit and shall if required to do so produce for inspection by the Administrator or person authorised by the Administrator in that behalf the skins or other products retained by the permit holder.

(3) A person to whom a permit has been granted under paragraph (a) of subsection (1) of this section or to whom oral permission has been given under subsection (4) of this section shall inform the Administrator from time to time and not later than one month after the date of the expiry of the permit or of the period specified when oral permission was given of anything he has done under the permit or oral permission, including the number of each species of bird or mammal taken by him by virtue of the permit or oral permission.

(4) A resident of Tristan da Cunha may for himself or for another resident but not for a person who is not a resident of Tristan da Cunha do any of the things forbidden to be done without a permit by sections 4, 5 or 6 of this Ordinance for which he has first obtained the oral permission of the Administrator or of the person authorised under subsection (6) of this section and of the Chief Islander. Provided that any native bird or native mammal taken under oral permission may not be disposed of to any person who is not a resident of Tristan da Cunha and provided that in any proceedings under this Ordinance in which a person claims that he has been given oral permission as aforesaid it shall be for that person to prove that he had such permission.

(5) A permit issued under this section or oral permission given under this section shall be for a period and shall be restricted to such area, in consideration of such payments and subject to such restrictions, terms and conditions as may be included in the permit or specified when the oral permission is granted.

(6) The Administrator may authorise a person to act on his behalf under this section either generally or for purposes specified in the authorisation.

10. Except to the extent to which it conflicts with any rights granted to the South Atlantic Islands Development Corporation by the Crown Agents for Overseas Governments and Administrations acting for and on behalf of the Governor of St. Helena the provisions of this Ordinance shall apply to the said Corporation and its employees and its subsidiary Tristan Investments (Pty) Limited and its employees.

11. Records shall be kept by the Administrator or by his direction of all permits granted and all permission given including particulars of the period and conditions thereof and of all activities conducted and of the numbers of each species of bird and mammal taken under permits issued or under oral permission given under the provisions of section 9 of this Ordinance and such records shall be made available for inspection by any member of the Island Council.

12. Any person who has in his possession any animal or plant which under section 3 of this Ordinance may not be imported, liberated or disseminated or has in his possession any native bird or native mammal killed or captured in contravention of this Ordinance shall be guilty of an offence and the animal, plant, native bird or native mammal shall be disposed of as the Administrator may direct.

13. (1) Any person who contravenes or attempts to contravene any of the provisions of section 3, section 4, subsection (2) of section 5, section 6 or subsection (2) of section 7 of this Ordinance or does not give the information required by subsection (2) or (3) of section 9 of this Ordinance shall be guilty of an offence.

(2) Any person guilty of an offence referred to in section 12 or in subsection (1) of this section shall be liable-

(a) if a resident of Tristan da Cunha, for a first offence to a fine not exceeding five pounds and for a second or subsequent offence a fine not exceeding fifteen pounds;

(b) if not a resident of Tristan da Cunha, for a first offence to a fine not exceeding twenty pounds

and for a second or subsequent offence to a fine not exceeding one hundred pounds.

(3) In any proceedings under this Ordinance in which it is alleged that an animal or plant is or is not a native animal or a native plant the Court shall presume that the animal or plant is a native animal or a native plant unless the Court is satisfied the presence in Tristan da Cunha Islands of the species to which the plant or an animal belongs probably resulted from deliberate or accidental introduction by man.

14. Where any person has been convicted of an offence under section 13 of this Ordinance-

(a) any animal, plant or product thereof which has been the subject of such conviction shall be forfeited to the Administrator and the Court may, in addition to any penalty that may be imposed, order any firearm, machine, instrument, trap, net apparatus, article or material which has been used in the commission or concealment of the offence to be forfeited also to the Administrator;

(b) any such animal, if native to Tristan da Cunha Islands, shall, if alive, be released whenever possible in its appropriate habitat; and

(c) any such animal, if not native to Tristan da Cunha Islands and any such animal, if of a kind the import of which is contrary to subsection (2) of section 3 of this Ordinance or if its release would be impracticable or if it is dead or inanimate, and any plant and anything forfeited to the Administrator under this Ordinance shall be disposed of as directed by the Administrator and if such animal, plant or thing as is referred to in this paragraph is sold, the proceeds thereof shall be applied for the benefit of and accrue to the funds of Tristan da Cunha.

15. (1) The provisions of this Ordinance may be enforced by conservation officers who for that purpose shall have the powers conferred by the next succeeding section of this Ordinance.

(2) The Administrator may appoint any person to be a conservation officer and every member of the police force shall also be a conservation officer.

16. A conservation officer shall have and may exercise the following powers-

(a) he may arrest without warrant or other process any person whom he has reasonable grounds to suspect of having committed an offence under this Ordinance;

(b) he may seize and detain pending its production in Court any animal, plant or thing in respect of which he has reasonable grounds to suspect that an offence under this Ordinance has been committed or which appears to him may be required as evidence in proceedings in respect of an offence or may have been used in connection with the commission or concealment of such an offence;

(c) for the purpose of exercising his powers under this section he may go aboard any vessel within Tristan da Cunha Islands and make such search thereof and such enquiries of any person thereon as he deems necessary to ascertain whether any offence under this Ordinance has been committed and to establish any fact relating thereto;

(d) if he suspects that there is on a vessel within Tristan da Cunha Islands any person whom he reasonably suspects of having committed an offence under this Ordinance, he may board that vessel and may bring that person before a competent Court and may detain him until the alleged offence has been adjudicated upon;

(e) if he reasonably suspects that any vessel which is within Tristan da Cunha Islands has been used in the commission of an offence under this Ordinance, he may board the vessel and may require the crew thereof in accordance with any directions given by him to bring the vessel to the nearest or most convenient port and the conservation officer may detain the vessel and crew until such suspected offence has been adjudicated upon by a competent Court.

17. No action shall lie against a conservation officer in respect of any act done or omitted to be done by him in the exercise or purported exercise of his powers under this Ordinance if there shall have been reasonable cause for such act or omission.

18. Any person who obstructs a conservation officer acting in the exercise of his powers under this Ordinance or who refuses or neglects to comply with any requisition or direction lawfully made or given by a conservation officer or who refuses or neglects to answer any question lawfully asked by a conservation officer under this Ordinance shall be guilty of an offence and shall be liable to a fine not exceeding fifty pounds or to imprisonment for a term not exceeding three months or to both such fine and imprisonment.

19. For all purposes of and incidental to the trial and punishment of any person in respect of an offence under this Ordinance and to proceedings and matters preliminary or incidental to or consequential

on his trial or punishment and for all purposes of and incidental to the jurisdiction of any Court or of any constable or conservation officer with reference to such offence, the offence shall be deemed to have been committed either in the place in which it was actually committed or in any place in which the offender may for the time being be found.

20. The Wild Life (Tristan da Cunha) Protection Ordinance is hereby repealed.

Schedule I Protected birds and mammals on Tristan da Cunha (Main Island)

Tristan thrush or Starchy *Nesocichla eremita*
Tristan Gallinule or *Gallinula nesiotis*
Gough Island Gallinule or Island Cock and *G nesiotis comeri*
Wandering Albatross *Diomedea exulans*
Fur seals *Arctocephalus* species (all species)
Elephant seal *Mirounga leonina*
Southern Right Whale *Eubalaena australis*

Second Schedule: Species permitted to be taken by residents of Tristan da Cunha on Inaccessible, Nightingale, Middle and Stoltenhoff Islands without a permit

Great Shearwater or petrel *Puffinus gravis*
Sooty Albatross or peeoo *Pheobetria fusca*
Rockhopper penguin *Eudyptes crestatus*

Given under the hand of the Governor and the Public Seal of St. Helena at the Castle, Jamestown, this 2nd day of April, 1976.

C. B. KENDALL, Government Secretary.

CONSERVATION ORDINANCE

Legal Notice No. 2 of 1984.

TRISTAN DA CUNHA

THE CONSERVATION ORDINANCE 1976

THE CONSERVATION (PROTECTED BIRDS) (AMENDMENT) ORDER 1984

In exercise of the powers conferred upon the Administrator in Council by section 8 of the Tristan da Cunha Conservation Ordinance the following Order is hereby made:

1. This order may be cited as the Conservation (Protected Birds) (Amendment) Order 1984 and shall come into effect on 6 December 1984.

2. Schedule I to the Conservation Ordinance 1976 is amended as follows-

(a) By the addition of the following birds to the list of those protected on Tristan da Cunha (Main Island):

Rockhopper Penguin *Eudyptes crestatus*
Yellow-nosed albatross or molly *Diomedea chlororhynchos*
Sooty albatross or peeoo *Phoebetria fusca*
Grey or brown petrel or pediunker *Adamastor cinereus*
Broad-billed prion or night-bird *Pachyptila vittata*
Schlegel's petrel or white breasted black haglet *Pterodroma incerta*
Great-winged petrel or black haglet *Pterodroma macroptera*
Soft-plumaged petrel or night-hawk *Pterodroma mollis*
Little or Dusky shearwater or whistler *Puffinus assimilis*
White-bellied storm petrel or storm pigeon *Fregetta grallaria*
Antarctic or Swallow-tailed tern or kingbird *Sterna vittata*
Noddy tern or wood pigeon *Anous stolidus*

(b) By the deletion of the following bird from the list of those protected on Tristan da Cunha (Main Island):

Tristan Gallinule or Gough Island Gallinule or Island Cock *Gallinula nesiotis* and *G. nesiotis comeri*

Made by the Administrator in Council this 6th day of September 1984.

C. F. REDSTON
Administrator

GOVERNMENT OF TRISTAN DA CUNHA

Legal Notice No.1 of 1986

TRISTAN DA CUNHA

THE CONSERVATION ORDINANCE

THE CONSERVATION (PROTECTED BIRDS) AMENDMENT ORDER 1984

In exercise of the powers conferred upon the Administrator in Council by Section 8 of the Tristan da Cunha Conservation Ordinance the following Order is hereby made:

1. Schedule II to the Conservation Ordinance 1976 is amended as follows-

By the deletion of Sooty Albatross or Peeoo *Pheobetria fusca*

as a species permitted to be taken by residents of Tristan da Cunha on Inaccessible, Nightingale, Middle and Stoltenhoff Islands.

This species is hereby granted full protection throughout the Tristan da Cunha Islands.

Made by the Administrator in Council this 1st day of July 1986.

R. Perry
Administrator.

APPENDIX 3a

TRISTAN DA CUNHA FISHERY LIMITS ORDINANCE, 1983

Tristan da Cunha

No. 1 of 1983

Enacted 17th March, 1983.
Published in the Gazette 17th March, 1983.
Date of commencement As provided in Section 1.

AN ORDINANCE

to define the fishery limits of Tristan da Cunha and to make provision for the regulation of fishing within those limits and for other matters connected therewith

Enacted by the Governor of St. Helena and its Dependencies.

1. (1) This Ordinance may be cited as the Tristan da Cunha Fishery Limits Ordinance, 1983.

(2) This Ordinance shall take effect on such day as the Administrator shall notify to the public in such manner as he may consider best for that purpose.

2. In this Ordinance, except where the context otherwise requires-

"fishing boat" means any vessel of whatever size, and in whatever way propelled, which is for the time being employed in fishing operations or any operations ancillary thereto; "foreign fishing boat" means a fishing boat which is not-

(a) registered in Tristan da Cunha; or

(b) owned by a person who is ordinarily resident in Tristan da Cunha;

"master" means, in relation to a fishing boat, the person for the time being in command or in charge of that fishing boat or in charge of the fishing operations on board that fishing boat or, if there is no such person, any person for the time being on board that fishing boat;

"miles" means international nautical miles of 1.852 metres;

"sea fish" includes shellfish, salmon and migratory trout, and "sea fishing" has a corresponding meaning;

"shellfish" includes crustaceans and molluscs of any kind and includes any part of a shellfish and any (or any part of any) brood, half-ware or spat of shellfish and any spawn of shellfish, and the shell, or any part of the shell of a shellfish;

"Tristan da Cunha" means the Island of Tristan da Cunha, Gough Island, Nightingale Island and inaccessible Island;

"Tristan fishing boat" means any fishing boat which is not within the definition of a foreign fishing boat given above.

3. Notwithstanding any reference to fishery limits or cognate expressions in any other Ordinance the Tristan da Cunha fishery limits extend to 200 miles from the baseline from which the breadth of the territorial waters adjacent to Tristan da Cunha is measured.

4. (1) The Governor may by order designate any country and, in relation to it, areas within Tristan da Cunha fishery limits in which, and descriptions of sea for which, fishing boats registered in that country may fish.

(2) A foreign boat not registered in a country for the time being designated under subsection (1) shall not enter Tristan da Cunha fishery limits except for a purpose recognised by international law or by any convention concerning Tristan da Cunha and the government of the country to which the boat belongs, and any such boat which enters those limits for such a purpose

(a) Shall return outside the limits as soon as the purpose has been fulfilled; and

(b) shall not fish or attempt to fish while within the limits.

(3) A foreign fishing boat registered in a country designated under subsection (1) shall not fish or attempt to fish within Tristan da Cunha fishery limits except in an area and for descriptions of fish for the time being designated under this section in relation to that country.

(4) At any time when a foreign fishing boat is in an area within Tristan da Cunha fishery limits and either-

(a) it is prohibited by this section from fishing in that area at all; orthat area at all, or

(b) it is permitted under this section to fish only for certain descriptions of fish,

then its fishing gear, or so much of the gear as is not required for permitted fishing, shall be stowed in accordance with practice, or where specified, in accordance with an order made by the Governor.

(5) If this section is contravened in the case of any fishing boat-

(a) the master of the boat is liable on summary conviction to a fine not exceeding £5,000 or conviction on indictment to a fine;

(b) the court may on convicting him of an offence under this section order the forfeiture of any fish or fish gear found in the boat or taken or used by any person from the boat.

(6) The foregoing provisions of this section do not prohibit or restrict fishing by fishing boats registered in a foreign country in any area with respect to which special provision is made by any arrangement between the Government of St. Helena and the government of that foreign country for fishing by such boats for the purpose of scientific research or fishery surveys.

5. (1) The Governor may by order provide-

(a) that in any specified area within Tristan da Cunha fishery limits, fishing by fishing boats (whether Tristan fishing boats or foreign) is prohibited unless authorised by a licence granted by the Administrator;

(b) that in any specified area outside those limits fishing by Tristan fishing boats is prohibited unless so authorised.

(2) Such an order may apply to fishing generally in the specified area or to fishing-

(a) for a specified description of sea fish;

(b) by a specified method;

(c) during a specified season of the year or other period; or

(d) in the case of an order under subsection (1)(a), by fishing boats registered in a specified country,and whether the order is general or limited in scope it may provide for exceptions from the prohibition contained in it.

(3) Where any fishing boat is used in contravention of any prohibition imposed by an order under this section, the master, the owner and the charterer (if any) are each guilty of an offence under this subsection.

(4) An order under this section may authorise the making of a charge for a licence.

(5) A licence under this section shall be granted to the master, owner or charterer and may authorise fishing generally or may confer limited authority by reference to, in particular-

(a) the area within which fishing is authorised;

(b) the periods, times or particular voyages during which fishing is authorised;

(c) the descriptions and quantities of fish which may be taken;

(d) The method of sea fishing; or

(e) the specific vessel or vessels, or number of vessels to be used.

(6) A licence under this section may authorise fishing either unconditionally or subject to such conditions as appear to the Administrator to be necessary or expedient for the regulation of sea fishing, and in particular a licence may contain conditions-

(a) as to the landing of fish or parts of fish taken under the authority of the licence; or

(b) as to the use to which the fish taken may be put;

and if a licence condition is broken the master, the owner and the charterer (if any) of the vessel concerned in such breach are each guilty of an offence under this subsection.

(7) The Administrator, in granting a licence under this section, may require the master, the owner and the charterer (if any) of the vessel or vessels provided for in the licence to provide him with such statistical information as he may direct, and a person who fails to comply with such a requirement is guilty of an offence under this subsection.

(8) A licence under this section-

(a) may be varied from time to time; and

(b) may be revoked or suspended, if this appears to the Administrator to be necessary or expedient for the regulation of sea fishing.

(9) If a licence is varied, revoked or suspended the Administrator may, if he considers it appropriate in all the circumstances of the case, refund the whole or part of any charge made for the licence.

(10) The Administrator may not delegate his licensing powers under this section.

6. (1) The provisions of this Ordinance shall be enforced by sea fishery officers, and for that purpose sea fishery officers shall have the powers set out in section 7 of this Ordinance.

(2) The following persons shall be sea fishery officers, that is to say, every officer appointed in that behalf by the Administrator, and every member of the Tristan da Cunha Police Force.

7. A sea fishery officer or any person authorised by him, may exercise the following powers with respect to any fishing boat fishing or which he reasonably suspects may have fished within the fishery limits of Tristan da Cunha as defined by this Ordinance-

(a) he may go aboard the fishing boat;

(b) he may require the master, the crew or any of them to produce any certificate of registry, licence, official logbook, official paper, article of agreement, and any other document relating to the fishing boat or to the crew or any member thereof, or to any person on board the fishing boat which is in their respective possession or control on board the fishing boat;

(c) he may master the crew of the fishing boat;

(d) he may require the master to appear and to give an explanation concerning the fishing boat and any crew any other person on hoard the fishing boat, and any document mentioned it paragraph (b) of this section;

(e) he may make any examination or enquiry which he deems necessary to ascertain whether any provisions of the Tristan da Cunha (Export of Goods) Ordinance 1951, the Export and Import Control Ordinance 1976 or this Ordinance have been contravened;

(f) in the case of any person who appears to him to have committed any such contravention, he may, without summons, warrant or other process, take the offender and the fishing boat in respect of which it appears to him there has been a contravention together thereof to the Island of Tristan da Cunha until the alleged contravention has been adjudicated upon.

8. (1) No civil or criminal action shall lie against a sea fishery officer in respect of any action omitted to be done by him in exercise of his powers under this Ordinance if there shall have been reasonable cause for such act or omission.

(2) If any person obstructs a sea fishery officer when acting in the exercise of his powers under this Ordinance, or refuses or neglects to comply with any requisition or direction lawfully made or given by, or to answer any question lawfully asked by, a sea fishery officer in pursuance of this Ordinance, such person shall be guilty of an offence and shall be liable in summary conviction to a fine not exceeding £100 or to imprisonment for a term not exceeding three months or to both such fine and imprisonment.

(3) In this section, references to a sea fishery officer shall be deemed to include references to any person authorised by him for the purposes of section 7 of this Ordinance.

9. (1) Every person who commits an offence against this Ordinance or any order made hereunder, for which and powers of no other penalty is specifically provided shall be liable to a fine not exceeding £1,000.

(2) In respect of offences charged under this Ordinance or under any order made hereunder, and notwithstanding the second and third sentences of section 4 of the Police (Ascension) Ordinance as applied to Tristan da Cunha by the Tristan da Cunha Ordinances (Application) Ordinance, a Magistrate is hereby given extended jurisdiction to impose any fines up to those specified as maxima.

10. If any fine or amount of costs is adjudged to due by the master, owner or charterer of any fishing boat in respect of any contravention of the provisions of this Ordinance, the court may order that in default of payment forthwith, the defendant shall give security for payment of the amount due, and if such security to the satisfaction of the court is not given, the court may order the detention of the fishing boat concerned with the contravention, and such fishing may accordingly be detained at the Island of Tristan da Cunha until sufficient amount due is paid or until sufficient security shall be given to the satisfaction of the court.

11. The Tristan da Cunha Fish (Export) Ordinance 1967 and the Fishery Limits (Tristan da Cunha) Ordinance 1968 are hereby repealed.

Given under the hand of the Governor and the Public Seal of St. Helena at the Castle, Jamestown this 17th day of March, 1983.

P. DALE, Government Secretary

Legal Notice No. 1 of 1983.

TRISTAN DA CUNHA

THE TRISTAN DA CUNHA FISHERY LIMITS ORDINANCE, 1983

THE TRISTAN DA CUNHA FISHERY LIMITS (LICENSING OF FISHING) ORDER, 1983

In exercise of the powers conferred upon the Governor by section 5 of the Tristan da Cunha Fishery Limits Ordinance, 1983 (hereinafter called "the Ordinance") the following order is hereby made:

1. This order may be cited as the Tristan da Cunha Fishery Limits (Licensing of Fishing) Order, 1983 and shall notify to the public in such manner as he may consider best for the purpose.

2. Fishing by fishing boats defined by section 2 of the Ordinance within the Tristan da Cunha fishery limits as set out in section 3 of the Ordinance is prohibited unless authorised by a licence (hereinafter called "a fishing licence") granted by the Administrator.

3. The form and duration of a fishing licence shall be determined by the Administrator in each case and such licence may authorise fishing either unconditionally or subject to such conditions as appear to the Administrator to be necessary or expedient for the regulation of sea fishing as defined by section 2 of the Ordinance.

4. A charge may be made for each fishing licence of such sum as may be determined by the Administrator.

5. The prohibition contained under section 2 of this order shall not apply to the taking and processing of such descriptions of fish as may be authorised by the Administrator

(a) by any inhabitant or resident of Tristan da Cunha for local consumption or use; or

(b) by any vessel for consumption by the passengers and crew; or

(c) for scientific purposes.

Made this 17th day of March 1983. P. DALE,
Government Secretary

APPENDIX 3b

TRISTAN DA CUNHA FISHERY LIMITS (AMENDMENT) ORDINANCE, 1991

Tristan da Cunha

No. 2 of 1991

Enacted	27th June, 1991.
Published in the Gazette	27th June, 1991.
Date of Commencement	1st July, 1991.

AN ORDINANCE

to revise certain penalties contained in the Tristan da Cunha Fishery Limits Ordinance, *1983

Enacted by the Governor of St. Helena and its Dependencies.

Citation and Commencement

1. This Ordinance may be cited as the Tristan da Cunha Fishery Limits (Amendment) (No. 2) Ordinance, 1991, and shall be read as one with the Tristan da Cunha Fishery Limits Ordinance, 1983, (hereinafter referred to as the principal Ordinance), and shall come into force on the 1st day of July, 1991.

Amendment of Section 1

2. Section 4(5)(a) of the principal Ordinance is amended by substituting the figures "£2,000,000" for the figures "£100,000".

Amendment of Section 5

3. Section 5(11)(a) of the principal Ordinance is amended by substituting the figures "£2,000,000" for the figures "£100,000".

Given under the hand of the Governor and the Public Seal of St. Helena at the Castle, Jamestown this 27th day of June, 1991.

[M. S. Hone]

Chief Secretary

APPENDIX 3c

TRISTAN DA CUNHA FISHERY LIMITS (AMENDMENT) ORDINANCE, 1992

Tristan da Cunha

No. 1 of 1992

Enacted	29th April, 1992.
Published in the Gazette	29th April, 1992.
Date of Commencement	29th April, 1992.

AN ORDINANCE

to amend the Tristan da Cunha Fishery Limits Ordinance, 1983, so as to provide that the licensing powers of the Administrator in relation to foreign fishing vessels may also be exercised by the Governor

Enacted by the Governor of St. Helena and its Dependencies.

Citation and Commencement

1. This Ordinance may be cited as the Tristan da Cunha Fishery Limits (Amendment) Ordinance, 1992, and shall come into force on the 29th day of April, 1992.

Amendment of the Tristan da Cunha Fishery Limits Ordinance, 1983

2. Section 5 of the Tristan da Cunha Fishery Limits Ordinance, 1983, is amended by the addition of the following sub-section:

"(11) Notwithstanding anything contained in this section the Governor may exercise all or any of the Administrator's licensing powers under this section in relation to foreign fishing vessels and, for this purpose, all references to the Administrator in this section and any order made hereunder shall be deemed to be references to the Governor also."

Given under the hand of the Governor and the Public Seal of St. Helena at the Castle, Jamestown, this 29th day of April, 1992.

M. S. HONE,
Chief Secretary.

EXPLANATORY NOTE
(This note is not part of the Ordinance)

This Ordinance amends the existing law so as to enable the Governor, as well as the Administrator, to deal with the licensing of foreign fishing vessels.

APPENDIX 4

CHRONOLOGICAL LIST OF SCIENTIFIC AND RELATED VISITS TO GOUGH ISLAND, AND SELECTED RESULTING PUBLICATIONS*

Dates	Details of visit	References
8 Jan 1811	Inspection, P. Heywood, H.M.S. *Nereus*	Tagart 1832
1820s	Sealing expedition, B. Morrell	Morrell 1832
31 May 1869	Bird collection, G.T. Een, *Telegraph*	Layard 1869, Beintema 1972, Brooke 1979
1887	Hydrographic survey, H.M.S. *Royalist*	
22 Aug 1888-23 Jan 1889	Sealing expedition, G. Comer, *Francis Alleyn*	Allen 1892, Verrill 1895
Jan 1891-Feb 1892	Sealing expedition, *Wild Rose*	Brown 1905, Winterbottom 1962, Beintema 1972
22 Apr 1904	Scottish National Antarctic Expedition, S.Y. *Scotia*	Brown 1905, Bruce 1905 Darbishire 1905, Pirie & Brown 1905, Wright 1905, Brown *et al.* 1906, Campbell 1906, 1912, Pirie 1906, Murray 1908, 1912, Cardot 1911, 1912, Penard 1912a,b, Regan 1913, Brown 1923
5 months 1919	Diamond prospecting, F.X. Ziegler & J.G. Fenton, S.S. *Woodville*	Holdgate 1958, Green 1960
1 Jun 1922	Shackleton-Rowett Expedition, R.Y.S. *Quest*	Wilkins 1922, Douglas1923a,b, Lowe 1923, Marr 1923, Wild 1923a,b, Smith 1930
8 Jun 1927	Discovery Expedition, R.R.S. *William Scoresby*	Gunther 1928, Hardy 1967, Groves 1981
18 May 1930	Discovery Expedition, R.R.S. *Discovery II*	Gardiner 1939, Chamberlain *et al.* 1985
27 Feb 1933	Norwegian Antarctic expedition, M.S. *Thorshavn*	Christensen 1935, Christophersen 1934, 1935
29 Mar 1938	Proclamation, H.M.S. *Milford*	Crawford 1940, 1941
27-28 Feb 1948	Tristan Venture Expedition, M.F.V. *Pequena*	Anon. 1948, Broekhuysen & Macnae 1949
Feb 1952	Ornithological observations, H.F.I. Elliott	Elliott 1953, 1957, Rand 1955
Mar 1955	Plant collection, A. Swain	Groves 1981
14 Nov 1955-13 May 1956	Gough Island Scientific Survey, M.V. *Tristania*	Mullock 1957a,b Holdgate 1957, 1958, 1959/60, 1960, 1961, Day 1958, Wilson & Swales 1958, Hill 1959, Hafsten 1960,

		Kuschel 1960/61, Le Maitre 1960, 1962, 1965, Wace 1961, Freeman 1962, Fletcher 1963, Chamberlain 1965, Swales 1965, Carter 1966, Chamberlain *et al.* 1985
May 1956	Plant collection, R.A.B. MacMillan	Groves 1981
14 May 1956	Hydrographic survey, R.T. Tripp, S.A.S. *Transvaal*	Holdgate 1957, 1958, Mallory 1958
May 1956-1958	First & Second South African Expeditions, J.J. van der Merwe	Nagel 1958, Paclt 1959, Swales 1965, Groves 1981
Jan 1957	Duke of Edinburgh, R.V. *Britannia*	Duke of Edinburgh 1962
26 Feb 1960	N. Scheer	Voous 1961, 1962
Feb 1961	Plant collection, R.S. McKinnon H.M.S. *Owen*	Wace & Holdgate 1976, Groves 1981
Apr 1967	Rock lobster study, A.E.F. Heydorn	Heydorn 1969
1-19 May 1968	Conservation Survey	Elliott 1969, 1970a,b, Wace & Holdgate 1976
Jan 1972	Plant collection, J.I.H. Fleming, Tristan da Cunha	Groves 1981
Apr 71-Apr 1972 & Sep 1972-May 1973	Rock lobster biological study, South Atlantic Islands Development Corporation	Pollock & Roscoe 1977, Roscoe 1979
13 Oct-11 Nov 1973	SASCAR Biological Reconnaissance, N. Fairall & P.D. Shaughnessy	Johnstone *et al.* 1976, Shaughnessy 1975, Shaughnessy & Fairall 1976
21-28 Oct 1974	Ornithological observations, M.E. Richardson, Tristan da Cunha	Richardson 1984
12 Nov 1974		Curtis 1977
Oct 1974-Mar 1975, Oct 1975-Oct 1976 Summer 1977/78 Oct 1978 Oct-Nov 1980 Oct-Nov 1984	Seal studies, Mammal Research Institute, University of Pretoria, M.N. Bester	Bester 1980a,b, 1981a,b, 1982, 1984 Bester 1987, 1989, 1990a,b Bester & Laycock 1985 Kerley & Bester 1983 Voisin & Bester 1981
Oct 1975	Ionospheric measurements	Headland 1989
Oct 1976	Tristan Plants and Landform Expedition	Ollier 1984, Wace & Ollier 1984
25 Oct-1 Nov 1977	Ornithological and entomological observations, J.-F. Voisin	Voisin 1979a,b, 1980a,b, Voisin & Bester 1981
Oct-Nov 1977	Rock lobster tagging, Sea Fisheries Research Institute, D.E. Pollock	Pollock 1981
Sep-Nov 1978-1990 & 19-24 Apr 1983 (14 visits)	Ornithological and ecological studies, FitzPatrick Institute, University of Cape Town	Clancey 1978, 1981, Brooke *et al.* 1980, Williams 1980, 1984, Williams & Laycock 1981, Bourne & Imber 1982, Enticott 1982, 1984, Tomkins 1982, Williams & Imber 1982, Watkins & Cooper 1983, Cooper 1983, 1988, Imber 1983, Furness 1984, 1985, 1988, Gardiner *et al.* 1985, Furness *et al.* 1986, Hoberg 1986, Ryan 1986, 1988a,b,

SCIENTIFIC VISITS

		Watkins & Furness 1986, Watkins 1987, Brooke 1988, 1989, Hoberg & Ryan 1988, Jackson & Cooper 1988, Klages *et al.* 1988, Ryan & Watkins 1988, Ryan *et al.* 1988, 1989, Thompson & Furness 1989a,b, Jackson 1990, 1992, Hayes & Brooke 1990, Ryan 1991, Ryan & Cooper 1991, Hayes *et al.* 1991, Klages & Cooper 1992, Cooper & Lutjeharms 1992, Rowe-Rowe & Crafford 1992
Sep-Oct 1979	Fern study, National Botanical Institute, J.P. Roux	Roux 1981, 1993a,b
5-26 Sep 1981	Diving expedition, University of Cape Town, C. Hay	Koop & Anderson 1982
19-24 Apr 1983 & 30 Oct-16 Nov 1985	Invertebrate surveys, Entomology Dept, University of Pretoria, J.E. Crafford	Crafford 1986
4-18 Jul 1983	Magnetic anomaly investigation, Physics Dept, Rhodes University J.A. Gledhill	Headland 1989
21 Oct-16 Nov 1984	SASCAR Rat Investigation, M.N. Bester	Breytenbach 1986, Wace 1986a,b,c
21 Oct-16 Nov 1984	Geological sampling, Geology Dept, University of Cape Town, A.P. Le Roex	Le Roex 1985, Maund *et al.* 1988
21 Oct-16 Nov 1984	Volcanological study, Geology Dept, University of Stellenbosch, L. Chevallier	Chevallier 1987
30 Oct-23 Nov 1985	Ornithological study, Port Elizabeth Museum, N.T.W. Klages	Klages *et al.* 1988
30 Oct-23 Nov 1985	Geomorphological investigation, K.-H. Gribnitz & L.E. Kent	Gribnitz & Kent 1989
28 Sep-22 Oct 1986	University of New England, Armidale, Australia, H. Heatwole	Anon. 1986, Watkins 1986 Heatwole 1993
14 Oct-1 Nov 1988	Upper air physics, H. Ohlthaver Inst., Rhodes University, B. Bonnevie	
14 Oct-1 Nov 1988	U.K. Inspection, R.A.M. Seeger	
Jan-Feb 1989	Fish collections, Dept Ichthyology & Fisheries Science, Rhodes University, T.G. Andrew	Andrew 1993, Andrew & Hecht 1992, Andrew *et al.* 1994, in press
Apr 1989	South-East Atlantic Expedition, R.S. *Africana*, D.E. Pollock	Shannon *et al.* 1989, Pollock 1991
1-24 Oct 1990	Ornithological study, Port Elizabeth Museum, N.T.W. Klages	Klages & Cooper 1992
1-24 Oct 1990	Magnetic observations, Hermanus Observatory, B. Pretorius	
26 Sep-17 Oct 1991	First U.K. Environmental Inspection, P.G. Ryan	Ryan 1993, Cooper & Ryan 1993, in press
22 Oct-9 Nov 1992	Second U.K. Environmental Inspection, J. Cooper	
3-20 Oct 1993	Third U.K. Environmental Inspection, M.W. Fraser	

[a] Sources used were references cited in Appendix 1, especially Groves (1981), Wace & Holdgate (1976) and Williams & Imber (1982).

APPENDIX 5

ANNOTATED LIST OF VASCULAR PLANTS RECORDED FROM GOUGH ISLAND

Species	Habitat[#]	Comments
Pteridophytes		
Lycopodium diaphanum[+]	W F M	Common in wet heath and in open sites in fern bush, scarce at higher altitudes.
L. magellanicum	M	Common, dwarf form on high slopes and ridges.
Huperzia insularis[+]	W M	Fairly common, erect form, generally found in more sheltered sites than *L. magellanicum*.
Ophioglossum opacum[+]	M	Scarce, restricted to exposed plateau slopes.
Eriosorus cheilanthoides	F W	Fairly common in open sites.
Adiantum poiretii[+]	F T	Fairly common in shaded sites, typically under rock overhangs.
Vittaria vittarioides[+]	F T	Fairly common, generally on rock outcrops.
Hymenophyllum aeruginosum[+]	F W	Both species common in shaded sites or epiphytic
H. peltatum	F W	on tree-ferns and *Phylica arborea*.
Grammitis magellanica	F W	Both species fairly common, often epiphytic on
G. poeppigiana	F W	tree-ferns and *Phylica arborea*.
Hypolepis rugosula	F T	Fairly common in open fern bush and tussock grass, often around bird burrows.
Histiopteris incisa	F T	Abundant. Deciduous; forms climax vegetation in fern bush, with dense, monospecific stands disturbed only by peat slips
Thelypteris bergiana	F T	Uncommon and localized, often on coastal slips.
Asplenium aequibasis[+]	F	Uncommon on cliffs and streambanks.
A. alvarezense[+]	F	Common in shade under other plants. Often epiphytic.
A. insulare[+]	F W T	Fairly common in shaded sites, especially along stream banks.
A. monanthes	W	Rare. Recorded from a lava tunnel above Pummel Crag.
A. obtusatum	T F W	Common on cliffs and forms dense stands in open fern bush.
A. platybasis	F	Grows among *Histiopteris* and *A. obtusatum* stands below 100 m.
(Polystichum mohrioides)	(F)	Single record in 1922; presence needs confirming.
Ctenitis aquilina[+]	W F T	Common. Becomes stunted in wet heath.
Dryopteris wallichiana	F	Uncommon, typically found near stream banks.
Elaphoglossum hybridum	F	Rare, on rock faces and along water courses.
E. insulare[+]	W	Little known; restricted to wet heath above 400 m.

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E. lasiolepium[+]	F	Single collection from Seal Beach river bank, 65 m.
E. laurifolium[+]	F T	Common in open fern bush, often in dense stands.
E. succisaefolium[+]	F	Fairly common in open fern bush.
Rumohra adiantiformis	F	Common in open fern bush.
Blechnum australe	T F	Scarce, found on cliffs along the coast and inland.
B. palmiforme[+]	F W	The tree-fern. Common in fern bush, up to 2 m high, forming sub-climax with *Phylica arborea*; dwarf forms occur in wet heath.
B. penna-marina	F W M T	Widespread, most abundant in well-drained, open sites.
Spermatophytes		
Ranunculus carolii[+]	W M	Fairly common in wet sites above 400 m, scarce in montane communities.
Cardamine glacialis	W T F	Fairly common in wet sites and on cliffs.
[*]*Cerastium fontanum*	(T)	Extinct? Only collected once, in 1972.
[*]*Stellaria media*	T	Fairly common, scattered along the east coast in disturbed sites.
Phylica arborea	F T W	Common; only tree other than *Sophora*. Forms sub-climax with tree-ferns in fern bush. Wet heath has procumbent forms. Some occur in tussock grassland and on offshore stacks.
Sophora microphylla	F	Restricted to a copse of 20 trees at Sophora Glen. Origin uncertain; there is at least one sapling.
Acaena sarmentosa	F W	Abundant in sub-climax fern bush, often forming dense mats among tree-ferns.
A. stangii[+]	M W	Common, dwarf form on rocky sites on the plateau. Seeds lack hooks (cf. *A. sarmentosa*).
Callitriche christensenii[+]	T F W	Common, floating on still pools or in muddy hollows. Abundant in some seal wallows.
[*]*Oenothera indecora*	(F)	Extinct? Only recorded in 1984 at the site of the upper magnetometer hut.
Apium australe	T F W M	Common in open sites such as cliffs, peat slips and in sheltered sites on the plateau.
Hydrocotyle capitata	W F T	Fairly common in moist sites or under other plants.
Nertera depressa	W M F T	Widespread in open sites, especially abundant on the plateau. Many fruits eaten by Gough Buntings.
[*]*Conyza floribunda*	(F)	Limited to site of the upper magnetometer hut from April 1983 until at least October 1992, when only a single plant was found and removed. No plants were found in October 1993. May now be extinct due to annual weeding.
Cotula goughensis[+]	T	Endemic. Restricted to coastal cliffs; abundant around penguin colonies and seal wallows.
Gnaphalium thouarsii[+]	W F	Uncommon in open, well-drained sites, including generating peat slips.
[*]*Lactuca serriola*	(F)	Extinct? Only recorded in 1984 at the site of the upper magnetometer hut.
Lagenophora nudicaulis	W M	Fairly common in dwarf communities.

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**Senecio burchellii*	(F)	Limited to the site of the upper magnetometer hut from April 1983. Present until early 1992, but no plants were found in October 1992 or 1993. May now be extinct due to annual weeding.
**Sonchus asper*	T F W	Fairly common on the coast and around the Meteorological Station at Transvaal Bay, scarce inland. May hybridize with *S. oleraceus*.
**S. oleraceus*	T F W	Fairly common along the coast, uncommon at disturbed sites inland, scarce above 500 m.
Empetrum rubrum	W M T F	Abundant in open sites, forming small bushes on low cliffs, stunted at high altitudes.
**convolvulus*	(T)	Extinct? Five plants near The Glen in 1985, but none seen in 1990
**Solanum tuberosum*	T	Planted by sealers, some persist at scattered sites along the east coast. Plants at the Meteorological Station at Transvaal Bay probably are from tubers introduced recently.
**Verbena bonariensis*	(T)	Extinct? Only a single specimen collected.
**Plantago lanceolata*	T	Uncommon, limited to a few landing sites.
**P. major*	T	Fairly common on the coast.
Chenopodium ambrosioides	T	Restricted to open, sunny sites on cliffs and at penguin colonies.
**Rumex acetosella*	(T)	Extinct? Single specimen collected from The Glen in 1956.
R. frutescens	T	Restricted to sea cliffs and slopes. Intermediate forms with *R. obtusifolius* may be hybrids.
**R. obtusifolius*	T F W	Abundant along the coast and at disturbed sites inland, especially along stream banks to 600 m.
Rostkovia tristanensis+	M	Fairly common on exposed ridges.
Tetroncium magellanicum	M	Common in plateau peat bogs.
Carex insularis+	F T W	Common in damp sites, often forming stands.
C. thouarsii+	F T W	Fairly common, typically in open sites and often in drier areas than *C. insularis*.
Scirpus bicolor+	T F WM	Several forms occur. Abundant in disturbed sites, including seal and bird sites. Early colonizer of peat slips.
S. sulcatus	T F W	Common in fern bush, less common elsewhere. Forms large stands above the sea cliffs along the south coast.
Uncinia brevicaulis	F	Common among *Phylica* trees.
U. compacta	F W	Uncommon, often on rock outcrops.
U. meridensis	F W	Scarce.
Agrostis carmichaelii+	M W	Common in well drained montane sites.
**A. castellana*	(T)	Extinct? One record from The Glen in the 1950s.
A. goughensis+	W	Uncommon, found along streams.
**A. lachnantha*	(T)	Only recorded from The Glen and the Meteorological Station at Transvaal Bay
A. magellanica	W	Uncommon.
A. media+	W F M	Common in wet heath and in regenerating peat slips in fern bush, uncommon in montane.

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A. stolonifera	T,W, F	Abundant in disturbed sites, including waterfalls, stream banks and peat slips.
A. tenuis	T	Collected at The Glen in 1927 and the 1950s.
Calamagrostis deschampsiiformis	W	Only collected once, but may be more common.
Dactylis glomerata	(T)	Extinct? Two clumps at The Glen in the 1950s.
Deschampsia robusta	W	Endemic. Scarce, found in wet sites.
D. wacei	W	Endemic. Fairly common on slopes.
Glyceria insularis	W	Uncommon, found in wet sites, often alongstreams.
Holcus lanatus	T F W M	Abundant in disturbed sites, including peat slips, stream banks, paths and around bird burrows.
Lolium multiflorum	(F)	Extinct? Only recorded in 1984 at the site of the upper magnetometer hut.
Parodiochloa flabellata	T F W	Largely restricted to sea cliffs, it also occurs on some steep inland slopes. This species may have been introduced from The Falklands by sealers.
Poa annua	T F W M	Common along lowland streams and penguin colonies and seal areas, less common at higher altitude.
P. pratensis	T	Uncommon, only collected from The Glen.
Spartina arundinacea	T F W	Abundant on sea cliffs and stacks, scattered away from the coast; only the dense stand above South Point recalls the dominance this species attains on lowlands in the Tristan islands.

Adapted from Wace 1961, Wace & Dickson 1965, Groves 1981, Roux 1981, 1993a,b, Crafford 1986, Wace 1986a, and FitzPatrick Institute unpubl. data.

[#]Habitat types: T = tussock grassland, F = fern bush, W = wet heath, and M = montane, feldmark and moorland vegetation, after Wace (1961). Codes are listed in decreasing order of abundance, those in parentheses are highly localized.

* denotes introduced species, + species endemic to the Tristan-Gough group.

APPENDIX 6

BIRDS RECORDED WITHIN THE GOUGH ISLAND WILDLIFE RESERVE

Species	Status	Estimate of breeding pairs
King Penguin *Aptenodytes patagonicus*	n	
Gentoo Penguin *Pygoscelis papua*	n	
Chinstrap Penguin *P. antarctica*	n	
Rockhopper Penguin *Eudyptes chrysocome*	B	144 235
Wandering Albatross *Diomedea exulans*	B	1000*
Blackbrowed Albatross *D. melanophris*	N	
Shy Albatross *D. cauta*	n	
Greyheaded Albatross *D. chrysostoma*	n	
Yellownosed Albatross *D. chlororhynchos*	B	5000
Sooty Albatross *Phoebetria fusca*	B	5000*
Lightmantled Sooty Albatross *P. palpebrata*	n	
Northern Giant Petrel *Macronectes halli*	N	
Southern Giant Petrel *M. giganteus*	B	110
Antarctic Fulmar *Fulmarus glacialoides*	n	
Pintado Petrel *Daption capense*	N	
Kerguelen Petrel *Pterodroma brevirostris*	B	> 20 000
Greatwinged Petrel *P. macroptera*	B	> 5000
Atlantic Petrel *P. incerta*	B	> 20 000
Whiteheaded Petrel *P. lessoni*	n	
Softplumaged Petrel *P. mollis*	B	> 50 000
Broadbilled Prion *Pachyptila vittata*	B	> 100 000
Antarctic Prion *P. desolata*	N	
Slenderbilled Prion *P. belcheri*	n	
Whitechinned Petrel *Procellaria aequinoctialis*	N	
Grey Petrel *P. cinerea*	B	> 10 000
Cory's Shearwater *Calonectris diomedea*	n	
Great Shearwater *Puffinus gravis*	B	300 000
Sooty Shearwater *P. griseus*	N	
Little Shearwater *P. assimilis*	B	> 10 000
Wilson's Storm Petrel *Oceanites oceanicus*	N	
Leach's Storm Petrel *Oceanodroma leucorhoa*	n	
Greybacked Storm Petrel *Garrodia nereis*	b	> 10 000
Whitefaced Storm Petrel *Pelagodroma marina*	B	> 10 000
Whitebellied Storm Petrel *Fregetta grallaria*	b	> 10 000
Blackbellied Storm Petrel *F. tropica*	N	
Common Diving Petrel *Pelecanoides urinatrix*	B	> 20 000
Olivaceous? Cormorant *Phalacrocorax olivaceus*	n	
Duck *Anas* sp.	v	
Cocoi Heron *Ardea cocoi*	v	
Great White Egret *Egretta alba*	v	
Cattle Egret *Bubulcus ibis*	v	
Whiterumped Sandpiper *Calidris fuscicollis*	v	
Grey Phalarope *Phalaropus fulicaria*	n	

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American Sheathbill *Chionis alba*	v	
Subantarctic Skua *Catharacta antarctica*	B	500
Longtailed Skua *Stercorarius longicaudus*	n	
Kelp Gull *Larus dominicanus*	n	
Antarctic Tern *Sterna vittata*	B	500
Arctic Tern *S. paradisaea*	n	
Brown Noddy *Anous stolidus*	B	200
Gough Island Moorhen *Gallinula comeri*	B	2 500
European Swallow *Hirundo rustica*	v	
Willow Warbler *Phylloscopus trochilus*	v	
Gough Island Bunting *Rowettia goughensis*	B	1 000

Data sources are Griffiths & Sinclair 1982, Williams & Imber 1982, Enticott 1984, Richardson 1984, Watkins & Furness 1986, Watkins 1987, Ryan 1989, Cooper *et al.* 1990 and FitzPatrick Institute unpubl. data. Estimates for burrowing petrels are only approximate and are conservative. B = breeding confirmed; b = breeding suspected; N = non-breeding seabirds, n = scarce non-breeding seabirds. v = vagrant land and shorebirds.

* denotes annual breeding population of these biennially breeding species.

APPENDIX 7

FISH RECORDED FROM THE INSHORE WATERS OF GOUGH ISLAND*

Species	Common name
Notorynchus cepedianus	Broadnose Sevengill Shark
Hexanchus griseus	Sixgill Shark
Prionace glauca	Blue Shark
Conger wilsoni	Conger Eel
Gaidropsarus novaezelandiae	Comb Rockling
Hirundichthys rondeletii	Subtropical Flying Fish
Centriscops obliquus	Banded Snipefish
Notopogon lilliei	Round Bellowsfish
Helicolenus mouchezi	Soldier
Sebastes capensis	False Jacopever
Polyprion oxygeneios	Wreckfish
Lepidoperca coatsii	—
Trachurus longimanus	Southern Horse Mackerel
Avantholatris monodactylus	Fivefinger
Latris lineata	Striped Trumpeter
Mendosoma lineatum	—
Nelabrichthys ornatus	Tristan Wrasse
Bovichtus diacanthus	Klipfish
Thyrsites atun	Snoek
Hyperoglyphe perciformis	Barrelfish or Bluefish

* after Andrew *et al.* (1994).

APPENDIX 8

ANNEX I TO THE PROTOCOL ON ENVIRONMENTAL PROTECTION TO THE ANTARCTIC TREATY

ENVIRONMENTAL IMPACT ASSESSMENT

ARTICLE 1

PRELIMINARY STAGE

1. The environmental impacts of proposed activities referred to in Article 8 of the Protocol shall, before their commencement, be considered in accordance with appropriate national procedures.

2. If an activity is determined as having less than a minor or transitory impact, the activity may proceed forthwith.

ARTICLE 2

INITIAL ENVIRONMENT EVALUATION

1. Unless it has been determined that an activity will have less than a minor or transitory impact, or unless a Comprehensive Environmental Evaluation is being prepared in accordance with Article 3, an Initial Environmental Evaluation shall be prepared. It shall contain sufficient detail to assess whether a proposed activity may have more than a minor or transitory impact and shall include:

(a) a description of the proposed activity, including its purpose, location, duration, and intensity; and

(b) consideration of alternatives to the proposed activity and any impacts that the activity may have, including consideration of cumulative impacts in the light of existing and known planned activities.

2. If an Initial Environmental Evaluation indicates that a proposed activity is likely to have no more than a minor or transitory impact, the activity may proceed, provided that appropriate procedures, which may include monitoring, are put in place to assess and verify the impact of the activity.

ARTICLE 3

COMPREHENSIVE ENVIRONMENTAL EVALUATION

1. If an Initial Environmental Evaluation indicates or if it is otherwise determined that a proposed activity is likely to have more than a minor or transitory impact, a Comprehensive Environmental Evaluation shall be prepared.

2. A Comprehensive Environmental Evaluation shall include:

(a) a description of the proposed activity including its purpose, location, duration and intensity, and possible alternatives to the activity, including the alternative of not proceeding, and the consequences of those alternatives;

(b) a description of the initial environmental reference state with which predicted changes are to be compared and a prediction of the future environmental reference state in the absence of the proposed activity;

(c) a description of the methods and data used to forecast the impacts of the proposed activity;

(d) estimation of the nature, extent, duration, and intensity of the likely direct impacts of the proposed activity;

(e) consideration of possible indirect or second order impacts of the proposed activity;

(f) consideration of cumulative impacts of the proposed activity in the light of existing activities and other known planned activities;

(g) identification of measures, including monitoring programmes, that could be taken to minimize or mitigate impacts of the proposed activity and to

detect unforeseen impacts and that could provide early warning of any adverse effects of the activity as well as to deal promptly and effectively with accidents;

(h) identification of unavoidable impacts of the proposed activity;

(i) consideration of the effects of the proposed activity on the conduct of scientific research and on other existing uses and values;

(j) an identification of gaps in knowledge and uncertainties encountered in compiling the information required under this paragraph;

(k) a non-technical summary of the information provided under this paragraph; and

(l) the name and address of the person or organization which prepared the Comprehensive Environmental Evaluation and the address to which comments thereon should be directed.

3. The draft Comprehensive Environmental Evaluation shall be made publicly available and shall be circulated to all Parties, which shall also make it publicly available, for comment. A period of 90 days shall be allowed for the receipt of comments.

4. The draft Comprehensive Environmental Evaluation shall be forwarded to the Committee at the same time as it is circulated to the Parties, and at least 120 days before the next Antarctic Treaty Consultative Meeting, for consideration as appropriate.

5. No final decision shall be taken to proceed with the proposed activity in the Antarctic Treaty area unless there has been an opportunity for consideration of the draft Comprehensive Environmental Evaluation by the Antarctic Treaty Consultative Meeting on the advice of the Committee, provided that no decision to proceed with a proposed activity shall be delayed through the operation of this paragraph for longer than 15 months from the date of circulation of the draft Comprehensive Environmental Evaluation.

6. A final Comprehensive Environmental Evaluation shall address and shall include or summarize comments received on the draft Comprehensive Environmental Evaluation. The final Comprehensive Environmental Evaluation, notice of any decisions relating thereto, and any evaluation of the significance of the predicted impacts in relation to the advantages of the proposed activity, shall be circulated to all Parties, which shall also make them publicly available, at least 60 days before the commencement of the proposed activity in the Antarctic Treaty area.

ARTICLE 4

DECISIONS TO BE BASED ON COMPREHENSIVE ENVIRONMENTAL EVALUATIONS

Any decision on whether a proposed activity, to which Article 3 applies, should proceed, and, if so, whether in its original or in a modified form, shall be based on the Comprehensive Environmental Evaluation as well as other relevant considerations.

ARTICLE 5

MONITORING

1. Procedures shall be put in place, including appropriate monitoring of key environmental indicators, to assess and verify the impact of any activity that proceeds following the completion of a Comprehensive Environmental Evaluation.

2. The procedures referred to in paragraph 1 above and in Article 2 (2) shall be designed to provide a regular and verifiable record of the impacts of the activity in order, *inter alia*, to:

a) enable assessments to be made of the extent to which such impacts are consistent with this Protocol; and

(b) provide information useful for minimising or mitigating impacts, and, where appropriate, information on the need for suspension, cancellation or modification of the activity.

ARTICLE 6

CIRCULATION OF INFORMATION

1. The following information shall be circulated to the Parties, forwarded to the Committee and made publicly available:

(a) a description of the procedures referred to in Article 1;

(b) an annual list of any Initial Environmental Evaluations prepared in accordance with Article 2 and any decisions taken in consequence thereof;

(c) significant information obtained, and any action

taken in consequence thereof, from procedures put in place in accordance with Articles 2 (2) and 5; and

(d) information referred to in Article 3 (6).

2. Any Initial Environmental Evaluation prepared in accordance with Article 2 shall be made available on request.

ARTICLE 7

CASES OF EMERGENCY

1. This Annex shall not apply in cases of emergency relating to the safety of human life or of ships, aircraft, or equipment and facilities of high value, or the protection of the environment, which require an activity to be undertaken without completion of the procedures set out in this Annex.

2. Notice of activities undertaken in cases of emergency, which would otherwise have required preparation of a Comprehensive Environmental Evaluation, shall be circulated immediately to the Parties and forwarded to the Committee and a full explanation of the activities carried out shall be provided within 90 days of those activities.

ARTICLE 8

AMENDMENT OR MODIFICATION

1. This Annex may be amended or modified by a measure adopted in accordance with Article IX (1) of the Antarctic Treaty. Unless the measure specifies otherwise, the amendment or modification shall be deemed to have been approved, and shall become effective, one year after the close of the Antarctic Treaty Consultative Meeting at which it was adopted, unless one or more of the Antarctic Treaty Consultative Parties notifies the Depository, within that time period that it wishes an extension of that period or that it is unable to approve the measure.

2. Any amendment or modification of this Annex which becomes effective in accordance with paragraph 1 above shall thereafter become effective as to any other Party when notice of approval by it has been received by the Depository.

APPENDIX 9

MEMBERS OF THE GOUGH ISLAND WILDLIFE RESERVE ADVISORY COMMITTEE

Appointed 8 September 1993

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Administrator of Tristan da Cunha (*ex officio*)
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MANAGEMENT PLAN FOR THE GOUGH ISLAND WILDLIFE RESERVE

John Cooper and Peter Ryan

This Management Plan for the Gough Island Wildlife Reserve takes account of the provisions of the Tristan da Cunha Conservation Ordinance, 1976, as amended, and the Tristan da Cunha Fishery Limits Ordinance, 1983, as amended.

A draft of this plan was made available for comment to the members (designate) of the Gough Island Wildlife Reserve Advisory Committee, the Foreign and Commonwealth Office, London, and H.E. The Governor of St Helena. This plan is a modified version of that draft, having been varied in the light of observations made.

The draft Management Plan was funded by the Foreign and Commonwealth Office, and the World Wide Fund For Nature, United Kingdom.

The term "Administrator" when used in the plan means the person appointed by H.E. The Governor of St Helena to administer the Government of Tristan da Cunha.

APPROVAL

This Management Plan was approved by the Government of Tristan da Cunha in Council on 7 September 1993, and took effect on 22 October 1993, being seven days after publication of that approval in the Government Gazette.

Cover plate: The east coast of Gough Island from Waterfall Point, overlooking Quest Bay and The Glen (P.G. Ryan, 1990)

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Frontispiece: Yellownosed Albatross *Diomedea chlororhynchos* standing on a nest mound under a *Phylica arborea* copse near the meteorological station, Gough Island (P.G. Ryan, 1984)