Benign Research on a South Atlantic Jewel: Towards a Management Plan for Gough Island

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INTRODUCTION

In a changing world, uninhabited oceanic islands form one of the few habitats that remain relatively unaffected by direct human disturbance. However, many oceanic islands have been affected by the introduction of alien biota, especially predatory mammals such as cats and rats (e.g., Moors 1985). Uninhabited oceanic islands that are free of introduced predators are of special conservation significance and warrant the highest form of protection. In this paper we discuss the conservation status of Gough Island, a "jewel" in the South Atlantic, and suggest how it may best be managed to maintain its current near-pristine state.
A BRIEF DESCRIPTION
OF GOUGH ISLAND

Gough Island is in the central South Atlantic Ocean. It is a British possession, under the dependency of the government of Tristan da Cunha, which in turn is a dependency of St. Helena. Gough Island lies some 350 km south-southeast of the Tristan da Cunha islands at 40 degrees 20 minutes south latitude, 9 degrees 56 minutes east longitude, just south of the Subtropical Convergence. It has an area of 6,500 ha. It is mountainous and of volcanic origin, rising to 910 m, with high coastal cliffs (Ollier 1984; Chevallier 1987). The climate is cold temperate with strong winds and heavy rainfall (Höfflich 1984; Ryan in prep.). The low-lying vegetation includes woodland and fernbrake, but the higher altitudes support only wet heath and feldmark (Wace 1961). The vertebrate fauna is made up primarily of 22 species of breeding sea and land birds (Table 1), southern elephant seals Mirounga leonina and subantarctic fur seals Arctocephalus tropicalis, some of which occur in large numbers (Holdgate 1965; Swales 1965; Williams and Imber 1982; Williams 1984; Watkins 1987; Bester 1990). Endemic species of flora and fauna occur (Wace and Holdgate 1976), notably the two land bird species (Collar and Stuart 1985). The island supports practically the complete world population of the small northern race of the wandering albatross Diomedia exulans dabbenena (Watkins 1987; Ryan et al. 1990) and an estimated 48% of the population of the northern rockhopper penguin Eudyptes chrysocome moseleyi (Cooper et al. 1990). Introduced aliens are restricted to house mice Mus musculus, invertebrates, and plants (Holdgate 1965; Holdgate and Dickson 1965; Wace and Holdgate 1976; Wace 1986; FitzPatrick Institute, unpublished data). More detailed descriptions of the environment and biota of Gough Island are given by Wace (1961), Holdgate (1965), Wace and Holdgate (1976), Chamberlain et al. (1985), Clark and Dingwall (1985), and references therein. Watkins and Cooper (1983) give a scientific bibliography for the island.

Table 1. The breeding birds of Gough Island

<table>
<thead>
<tr>
<th>Species</th>
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<tbody>
<tr>
<td>northern rockhopper penguin</td>
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<tr>
<td>Eudyptes chrysocome moseleyi</td>
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<tr>
<td>wandering albatross</td>
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<tr>
<td>Diomedia exulans</td>
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<tr>
<td>yellownosed albatross</td>
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<tr>
<td>D. chlororhynchos</td>
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<tr>
<td>sooty albatross</td>
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<tr>
<td>Phoebetrio fusca</td>
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<tr>
<td>southern giant petrel</td>
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<tr>
<td>Macronectes giganteus</td>
</tr>
<tr>
<td>greatwinged petrel</td>
</tr>
<tr>
<td>Pterodroma macroptera</td>
</tr>
<tr>
<td>Atlantic petrel</td>
</tr>
<tr>
<td>P. incerta</td>
</tr>
<tr>
<td>Kerguelen petrel</td>
</tr>
<tr>
<td>P. brevirostris</td>
</tr>
<tr>
<td>softplumaged petrel</td>
</tr>
<tr>
<td>P. mollis</td>
</tr>
<tr>
<td>broadbilled prion</td>
</tr>
<tr>
<td>Pachyptila vittata</td>
</tr>
<tr>
<td>grey petrel</td>
</tr>
<tr>
<td>Procellaria cinerea</td>
</tr>
<tr>
<td>great shearwater</td>
</tr>
<tr>
<td>Puffinus gravis</td>
</tr>
<tr>
<td>little shearwater</td>
</tr>
<tr>
<td>P. assimilis</td>
</tr>
<tr>
<td>greybacked storm petrel</td>
</tr>
<tr>
<td>Garrodia nereis</td>
</tr>
<tr>
<td>whitefaced storm petrel</td>
</tr>
<tr>
<td>Pelagodroma marina</td>
</tr>
<tr>
<td>whitebellied storm petrel</td>
</tr>
<tr>
<td>Fregetta grallaria</td>
</tr>
<tr>
<td>common diving petrel</td>
</tr>
<tr>
<td>Pelecanoides urinatrix</td>
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<tr>
<td>subantarctic skua</td>
</tr>
<tr>
<td>Catharacta antarctica</td>
</tr>
<tr>
<td>brown noddy</td>
</tr>
<tr>
<td>Anous stolidus</td>
</tr>
<tr>
<td>Antarctic tern</td>
</tr>
<tr>
<td>Sterna vittata</td>
</tr>
<tr>
<td>Gough moorhen</td>
</tr>
<tr>
<td>Gallinula comeri</td>
</tr>
<tr>
<td>Gough bunting</td>
</tr>
<tr>
<td>Rowettia goughensis</td>
</tr>
</tbody>
</table>

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A BRIEF HISTORY OF GOUGH ISLAND

Gough Island is named after Captain Gough of the Richmond, who sighted the island in 1731. However, it is thought to have been first discovered in 1505 by Goncalo Alvarez, a Portuguese seaman. The first landing may have been in 1675 by Antoine de la Roche (Wace 1969). Early visits were primarily for the purposes of seal hunting and gangs sometimes stayed ashore for extended periods prior to the 20th century (Wace 1969). The island was not formally annexed as a British possession until 1938 (Crawford 1941).

Scientific observations at Gough Island commenced with the sealer G. Comer in 1888 (Verrill 1895). Short visits by mainly exploration and research expeditions (listed in Wace and Holdgate 1976) set the pattern for the next 67 years. In 1955, the first detailed research was undertaken at Gough Island by members of the Gough Island Scientific Survey, a private expedition. This six-month expedition resulted in the first topographical map of the island (Heaney and Holdgate 1957), a number of scientific publications, mainly biological (see references in Wace and Holdgate 1976), and a popular account (Holdgate 1958). The 1955-1956 expedition field hut at The Glen was taken over by the South African Weather Bureau in 1956, who operated a meteorological station there until 1963, when it was moved to Transvaal Bay, where it continues today. Gough Island is currently inhabited by a seven-member meteorological team year-round, with more people (up to 40) staying ashore during the three-week annual relief period.

Following on from the published results of the Royal Society Expedition to Tristan da Cunha in 1962, which did not visit Gough (Holdgate 1965; Wace and Dickson 1965), and a "Conservation Survey" in 1968 (Wace and Holdgate 1976), subsequent research on the island has been undertaken largely during the annual relief periods, primarily by staff of the Percy FitzPatrick Institute of African Ornithology of the University of Cape Town, as part of the South African National Antarctic Programme (SANAP). A total of 13 expeditions has been undertaken by the FitzPatrick Institute between 1979 and 1990. Unfortunately, support for a 1991 visit was not forthcoming from SANAP. However, P.G. Ryan visited the island in October 1991 during the annual takeover at the request of the British authorities to conduct an environmental inspection, in his capacity as a conservation officer of the Tristan da Cunha government (Ryan 1991a).

RESEARCH AT GOUGH ISLAND BY THE FITZPATRICK INSTITUTE

Research at Gough Island by the FitzPatrick Institute since 1979 has concentrated on aspects of the population sizes (e.g., Williams and Imber 1982; Williams 1984; Watkins 1987) and ecology of the large populations sea birds, primarily albatrosses, skuas, and penguins. A long-term demographic study of yellow-nosed albatrosses Diomedea chlororhynchos commenced in 1982 (Furness 1982; Cooper and Lutjeharms 1992). Birds banded as chicks have been recorded visiting the study colony as six-to-eight-year-olds, but none has as yet been recorded breeding (FitzPatrick Institute unpub. data). In 1987 a comparative study was commenced on the diets of both surface- and burrow-nesting seabirds (Klanges et al. 1988; Klanges and Cooper 1992). Less research was conducted on the two endemic landbirds of the island (Watkins and Furness 1986) which are listed as rare by Collar and Stuart (1985). In addition to ecological research, members of FitzPatrick Institute expeditions to Gough Island have conducted taxonomic, behavioral,
anatomical, and physiological studies on seabirds (e.g., Brooke et al. 1980; Brooke 1989; Hayes et al. 1990; Jackson in press).

In the last few years the research activities of the FitzPatrick Institute at Gough Island have broadened to include a wider investigation of the island's biota than its birds, with special attention being paid to studies of greater conservation significance. The sighting on the island of what was thought to be a rat *Rattus* sp. in October 1983 (Wace 1986a, 1986b; Watkins and Furness 1986) and the accidental introduction of several new species of alien plants in April 1983 (Wace 1986c) were spurs to this broadening of research scope. No subsequent sightings of rats have been made despite investigations, and we now believe that the 1983 sighting was of a house mouse, which attain very large sizes at Gough Island (Rowe-Rowe and Craf- ford 1992). Recent research by the FitzPatrick Institute at Gough Island has been "benign" in nature, in that no indigenous members of the biota have been killed or excessively disturbed, in keeping with the island's protected status under the 1976 Conservation Ordinance.

Examples of recent conservation research by the FitzPatrick Institute at Gough Island include studies of mercury levels in seabirds, plastic ingested by seabirds, stranded artifacts, and the impact of the lobster fishery on seabirds (Furness 1985; Furness et al. 1986; Ryan 1987, 1991b; Ryan et al. 1988). In 1990, an eight-person team from the Fitz-Patrick Institute visited the island and *inter alia* undertook investigations into the suspected role (Breytenbach 1986; Ryan et al. 1989) of the house mouse in affecting the regeneration of the island tree *Phyllica arborea*, the present status and distribution of alien flora on the island, and a study of the endemic Gough bunting *Rowettia goughensis* (Ryan 1992; Rowe-Rowe and Cra- ford 1992; Milton et al. in press; FitzPatrick Institute unpub. data). In 1991 P.G. Ryan made observations on the effects of heavy rainfall on the spread of alien plants and continued studies of the yellownosed albatross and Gough bunting as part of his environmental inspection on behalf of the government of Tristan da Cunha (Ryan 1991a, submitted MS).

**The Conservation Status of Gough Island**

In March 1950, the Wild Life (Tristan da Cunha) Protection Ordinance gave legal protection to the landbirds of Gough Island. Primarily as an outcome of the Gough Island Scientific Survey and concerns about introduction of aliens and the capturing of birds for the zoo trade, calls were made to improve further the conservation status of Gough Island (Anonymous 1957; Holdgate 1957). In April 1976 the island and its territorial waters out to three nautical miles were protected in terms of the Tristan da Cunha Conservation Ordinance of 1976 and proclaimed a wildlife reserve. The 1950 ordinance and its 1952 amendment were repealed by the 1976 ordinance. The Gough Island Wildlife Reserve is classified as IUCN Category I, Scientific/Strict Nature Reserve (Clark and Dingwall 1985). The reserve is protected in terms of the ordinance from exploitation of its biota. The ordinance further protects Gough Island from the erection of buildings without permits, agricultural activity, and the importation of alien biota and their propagules. However, a commercial fishery for Tristan rock lobster *Jasus tristani* takes place within territorial waters and therefore within the reserve (Pollock 1981). Drift-netting for tuns (Scombridae), along with incidental mortality of northern rockhopper penguins and other marine life has occurred recently within a 200-nautical-mile zone around

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Gough Island, although the area is protected by the Tristan da Cunha Fisheries Limits Ordinance of 1968, as amended by Ordinance No. 3 of 1977 (Ryan and Cooper 1991).

A ten-year lease between the governor of St. Helena (who has jurisdiction over the Tristan Dependency) and the South African government allows for the demise of approximately 16 acres (6 ha) of land at Transvaal Bay for the erection and maintenance of a weather and wireless telegraph station. The lease allows for scientific research to be undertaken at the island if permission is obtained from the governor of St. Helena in advance. Other terms of the lease deal with disallowing the introduction of livestock, domestic animals, and flora other than potatoes. The current lease is due to expire on 31 July 1993. A request for a new lease has recently been made by the South African authorities (A.P. Kirk, South Atlantic and Antarctic Department, United Kingdom Foreign and Commonwealth Office, in litt.).

In his report of the 1991 inspection, P.G. Ryan (1991a) made 18 specific suggestions towards improving the conservation status of the island (see Table 2). These recommendations are currently being taken up by the British authorities.

WORLD HERITAGE CONVENTION

In November 1985, Lord Elton, the U.K.'s environment minister, announced that Gough Island had been placed on the indicative list of sites that the U.K. proposed to submit to the Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention) for inclusion in the World Heritage List (U.K. Department of the Environment 1985). To date, however, no nomination has been made to the World Heritage Committee (A.H. Corner, Heritage Division, U.K. Department of the Environment in litt.). The indicative list justified Gough Island for World Heritage status because of its being "one of the most spectacularly beautiful and least disturbed of the temperate islands in the southern hemisphere" and for its importance for scientific research.

In a review of required conservation action in U.K. Dependent Territories, Oldfield (1987) recommended that Gough Island be formally proposed as a World Heritage Natural Site. The 18th Session of IUCN, held in Perth Australia, in late 1990, called upon nations to consider their subantarctic islands for nomination to the World Heritage Convention (IUCN 1991). Although Gough Island is not considered to fall within the subantarctic biogeographic region (Smith and Lewis Smith 1987), the 1990 IUCN resolution can be taken to include Gough, considering that IUCN's Commission on National Parks and Protected Areas (CNPPA) included the island in their review of "Insulantarctica" (Clark and Dingwall 1985). In 1990, the Australian government formally nominated the subantarctic Heard and McDonald Islands to the World Heritage Convention (Rootes 1991), and the Tasmanian government called for comment on its proposal to nominate subantarctic Macquarie Island (Anonymous 1990). The Heard and McDonald Islands' nomination was deferred and will be reconsidered during 1992 (J. Thorsell, IUCN, pers. comm.). The Australian government has now submitted a nomination for Macquarie Island (J.D. Harrison, World Conservation Monitoring Centre, in litt.). However, no island in the Southern Ocean has as yet been included in the World Heritage Convention (P.R. Dingwall, CNPPA, in litt.). The subject of World Heritage Convention status for "subantarctic islands" (including Gough Island) was discussed at a joint Scientific Committee on Antarctic Research (SCAR)/IUCN
### Table 2. Summary of recommendations arising from the 1991 inspection of Gough Island

1. Rat excluders should be on all ships’ hawsers prior to sailing for Gough, and there should be an annual inspection of the base area on Gough for signs of rats.
2. No leafy vegetables should be landed, and poultry products should be incinerated.
3. All material that is landed should be inspected for propagules. In particular, sand and other construction materials should be steam-cleaned before coming ashore. Landing of such material should be kept to a minimum.
4. The pantry at the base should be thoroughly cleaned and infested foodstuffs removed from the island to eradicate infestations of flour weevils Tribolium spp.
5. The upper magnetometer hut and the area downstream of it should be inspected annually for signs of two localized alien plants, Conyza sumatrensis and Senecio burchellii. Any plants found should be carefully weeded out (including roots) and incinerated.
6. Paths on the upland areas should follow ridges to reduce slope erosion.
7. A more robust pipeline should be used for pumping diesel ashore.
8. Traps should be built under the diesel tanks and taps to contain accidental spillages.
9. Effective blackout blinds should be fitted to all windows on the weather station, and the number of outside lights reduced.
10. Ships anchored off the island should also keep their light emissions to a minimum.
11. The switch to satellite-based communications should be encouraged to allow the reduction in the number of radio aerials.
12. The exhaust from the crane’s generator should be redesigned to void upwards.
13. Emphasis should be given to educating short-term visitors to the island, to ensure suitably “environmentally friendly” attitudes, including the necessity to sort refuse at its source, and the dangers of leaving on lights after dark.
14. All visitors should be explicitly warned not to dispose of noxious wastes in the wastewater system (e.g., photographic chemicals, turpentine, etc.).
15. The current incineration system should be reviewed to reduce the risk of tussock and peat fires and the spread on unburnt and partially burnt material. Consideration should be given to adopting a “garbage in—garbage out” approach to the weather station.
16. Degradable packaging should be used, given the problem of windborne litter.
17. Dumping of persistent wastes (all except food and sewage) by vessels fishing around the island should be prohibited.
18. An annual inspection should be conducted by a Tristan conservation officer with biological training and experience of Gough Island, and of the alien plants and animals found there. Such inspections should incorporate long-term monitoring studies to assess human impacts on the biota.

Workshop on Protection, Research and Management of Sub-Antarctic Islands, held at Paimpont, France, in April 1992.

In terms of the operational guidelines for the implementation of the convention (Unesco 1991), "State Parties are encouraged to prepare plans for the management of each natural site nominated." Accordingly, the Foreign & Commonwealth Office of the U.K. government, which has the responsibility for the nomination of sites in U.K. Dependent Territories to the Convention, has delayed formally nominating Gough Island until a management plan can be prepared and implemented (A. H. Corner in litt.), although the existence of a plan is not a formal prerequisite for nomination (Unesco 1991).

A MANAGEMENT PLAN FOR THE GOUGH ISLAND WILDLIFE RESERVE

In their monograph "Man and nature in the Tristan da Cunha Islands," Wace and Holdgate (1976) gave guidelines for environmental management and recommended that Gough Island by conserved for scientific research on its native biota. Clark and Dingwall (1985), in a conservation review of southern islands for the CNPPA, recommended the production of a detailed management plan for Gough Island and "regular monitoring of the efficiency of conservation measures." Detailed management plans or equivalent documents have been published or are in draft form for a number of the cold temperate and subantarctic islands of the Southern Ocean (New Zealand Department of Lands and Survey 1983, 1984, 1987; Decante et al. 1987; Keage 1987; Bonner and Croxall 1988; Tasmania Department of Parks, Wildlife, and Heritage 1990), but no such plan currently exists for Gough Island (or for any other island in the Tristan-Gough group).

In August 1990, the administrator of Tristan da Cunha, B. E. Pauncefort, approached the authors in their capacities as conservation officers of the Tristan da Cunha government with a request for a management plan for the Gough Island Wildlife Reserve. After acceptance in principle of the request, Pauncefort applied in early 1991 to the United Kingdom section of the World Wide Fund for Nature (WWF-UK) for funding towards the costs of producing a plan. Later in 1991 WWF-UK granted partial funding, with the balance being provided by the U.K. Foreign & Commonwealth Office (A.P. Kirk in litt.). A contract was formally entered into in January 1992 and a draft management plan is to be submitted by the end of the year. An idea of the planned contents is in Table 3.

Table 3. Management plan for Gough Island: Draft table of contents

1. Summary
2. Introduction
3. Description and resource inventory
   3.1 Position, national and conservation status, and applicable legislation
   3.2 Locality, discovery, and derivation of name
   3.3 History of human activity
   3.4 Size, topography, geomorphology, and geology

Table 3 (continued)

3.5 Climate
It is expected that the plan will inter alia recommend that the Gough Island Wildlife Reserve be formally nominated to the World Heritage List, thereby further improving the conservation status of a “fragment of paradise” (Oldfield 1987), and that the continuation of benign research on the island’s biota should be both encouraged and supported by the U.K. and South African authorities.

ACKNOWLEDGMENTS

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from both within and outside the FitzPatrick Institute, who have conducted research with us at Gough Island. The librarians of the International Council for Bird Preservation and the Scott Polar Research Institute, both of Cambridge, U.K., and the U.K. Foreign & Commonwealth Office and the Tristan da Cunha government allowed access to unpublished information on Gough Island. This paper was presented at the 4th World Parks Congress in Caracas, Venezuela. Financial support for the attendance of the senior author at the congress was received from the Bremner Bequest Travel Grants Fund of the University of Cape Town. Special thanks are due to the following for their support, information, and interest: A.H. Corner, P.R. Dingwall, J.D. Harrison, R.K. Headland, M.W. Holdgate, P.H. Johnson, A.P. Kirk, S. Oldfield, B.E. Pauncefote, R. Perry, M.G. Richardson, J. Thorsell, and N.M. Wace. We dedicate this paper to the members of the Gough Island Scientific Survey: they led the way.

REFERENCES


Jackson, S. In press. Do seabird gut sizes and mean retention times reflect adaptation to diet and foraging method? *Physiological Zoology*.


Verrill, G. E. 1895. On some birds and eggs collected by Mr. Geo. Comer at Gough Island, Kerguelen Island, and the island of South Georgia, with extracts from his notes, including a meteorological record for about six


