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## **Invertebrate diversity and endemism at Gough Island and threats from introduced species**

### **FINAL PROJECT REPORT**

Project Ref. 162/8/253

**Darwin Initiative for the Survival of Species**  
*7<sup>th</sup> Round*

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31 October 2002



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## 1. Darwin Project Information

<b>Project title:</b>	Invertebrate diversity and endemism at Gough Island and threats from introduced species.
<b>Country:</b>	British Dependent Territory.
<b>Contractor:</b>	University of Sheffield.
<b>Project Reference No:</b>	162/8/253.
<b>Grant Value:</b>	£137,536 (incl approved increases).
<b>Starting/Finishing dates:</b>	1 July 1999 to 31 July 2002 (Reporting to 31 October 2002).

## 2. Project Background/Rationale

- *Describe the location and circumstances of the project*

This project was conducted on Gough Island, which is part of the U.K. Dependent territory of Tristan da Cunha. Gough Island lies in the middle of the South Atlantic (40°17'–40°22' S, 9°52'–10°01' W), approximately 350 kilometres SSE of Tristan da Cunha and 2610 km from South Africa. As well as being remote, it is small (6500 ha) and mountainous. The first recorded human landfall on Gough was made in 1675 (Wace 1969), and subsequent visitors have included members of sporadic scientific/cartographic expeditions, commercial sealing and whaling expeditions of the 19<sup>th</sup> century and, since 1956, the annually rotated staff of a South African meteorological station (the island's only standing human construction). The relative lack of human influence on Gough has resulted in the island maintaining some of the most 'apparently' pristine natural communities of any temperate oceanic island in the world. As a result, Gough was declared a wildlife reserve under the Tristan da Cunha conservation ordinance of 1976, gained Scientific/Strict Nature Reserve Status, under IUCN Category I in 1985, and in 1995 was inscribed on the IUCN World Heritage list (under criteria iii, iv).

- *What was the problem that the project aimed to address?*

The aims of the project were to use British expertise for collaboration with and training of local scientists, in order to establish the current status of indigenous and introduced invertebrate species on Gough Island, and factors that threaten their survival.

- *Who identified the need for this project and what evidence is there for a demand for this work and a commitment from the local partner?*

The need for this project was identified through discussions between researchers from University of Sheffield and the University of Pretoria, who have an active programme of work on the biodiversity of southern hemisphere islands, the Administration of Tristan da Cunha, which has the statutory responsibilities for the conservation of biodiversity of Gough Island, and the South

African Department of Environmental Affairs & Tourism (DEAT), which operates a meteorological station on Gough Island, maintains the only continuing human presence on the island, and is responsible for ensuring that its activities comply with the provisions of the management plan for the island approved by the U.K. government (Cooper & Ryan 1994). All parties recognised the need for this project, particularly to underpin future developments of the management plan. All parties were extremely supportive throughout the project. We would note that the Administration and DEAT were especially helpful in assisting in the resolution of two significant complications that arose during the execution of the work (see Section 3).

### **3. Project Summary**

- ***What were the purpose and objectives (or purpose and outputs) of the project?***

The main objectives of the project were as follows:

- (i) to use British expertise for collaboration with and training of local scientists, in order to characterise and evaluate the unique invertebrate biodiversity of Gough Island;
- (ii) to carry out the necessary survey work to establish the current status of indigenous and introduced species, and factors which threaten their survival;
- (iii) to develop and establish a database that will help to evaluate the survey information and recommend future conservation measures;
- (iv) to facilitate the exchange of information with experts on techniques for appropriate evaluation and management of the unique biota of this globally important island reserve;
- (v) to collaborate on the production of scientific papers and articles in popular press highlighting the conservation importance and fragility of the biodiversity resource of this uniquely conserved British Dependent Territory;
- (vi) to establish close links between the University of Sheffield and the Tristan da Cunha Government to subsequently provide advice on these and other conservation issues, and monitor progress/achievements;
- (vii) to promote the dissemination of the biodiversity value of Gough Island to the world scientific, 'conservation' and political communities.

- ***Were the original objectives or operational plan modified during the project period? If significant changes were made, when was approval given by the Darwin Secretariat?***

Carrying out research on Gough Island brings with it significant logistical obstacles. The Island is extremely remote, with the only means of transport being by ship (the journey from Cape Town takes about seven days). The Island is supplied once a year, at which time stores and personnel are turned over, with the incoming personnel expected to remain on the island for a full year.

The operational plan was modified during the project period in the following ways:

- (i) In agreement with the Department, the start and completion dates were set back by 3 months at the grant acceptance stage, to allow time for staff recruitment, and the completion date was set back by a further month in May 2002 (and with no budgetary implications), to assist in completion of some of the products of this research. The project therefore ran from 1 July 1999 to

31 July 2002, with a final reporting period for principal and administrative staff to 31 October 2002.

(ii) We experienced an unexpected staff change (reported to DETR on 26 October 1999) following which, in agreement with DETR, spending plans were adjusted, although our overall budget remained unchanged. Dr A.G. Jones was appointed from 29 November 1999, through to completion of the project in July 2002, replacing Dr I. Downie as Postdoctoral Research Associate.

(iii) Ms L. Mabulu was evacuated from Gough Island at the end of June 2001, in accordance with the advice provided by Major (Dr.) C.J.S. Duvenage of 1 Military Hospital, South Africa, through concerns over possible health problems, although these later proved to have been unfounded. Whilst this somewhat limited subsequent fieldwork, it did not greatly impact on the completion of this component of the project.

- ***Which of the Articles under the Convention on Biological Diversity (CBD) best describes the project?***

<b>Project Contribution to Articles under the Convention on Biological Diversity</b>		
<b>Article No./Title</b>	<b>Project %</b>	<b>Article Description</b>
<b>7. Identification and Monitoring</b>	40%	Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities which have adverse effects; maintain and organise relevant data.
<b>8. In-situ Conservation</b>	10%	Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
<b>12. Research and Training</b>	30%	Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries (in accordance with SBSTTA recommendations).
<b>13. Public Education and Awareness</b>	10%	Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.
<b>17. Exchange of Information</b>	10%	Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge
<b>Total %</b>	<b>100%</b>	

- ***Briefly discuss how successful the project was in terms of meeting objectives. What objectives were not achieved, or only partly achieved, and have there been significant additional accomplishments ?***

The project has met all of its principal objectives. British expertise has been deployed for collaboration with and training of local scientists, to characterise and evaluate the unique invertebrate biodiversity of Gough Island. Survey work has been carried out to establish the current status of indigenous and introduced species, and factors that threaten their survival. The project has also facilitated the exchange of information with experts on techniques for

appropriate evaluation and management of the unique biota of this globally important island reserve.

Drawing from the results of these investigations, we have collaborated on the production of scientific papers and articles in popular press highlighting the conservation importance and the fragility of the biodiversity resource of this uniquely conserved British Dependent Territory. We have promoted the dissemination of the biodiversity value of Gough Island to the world scientific, 'conservation' and political communities. A further achievement of this project are the close links that have been established between the University of Sheffield, the Universities of Pretoria/Stellenbosch, and the Tristan da Cunha Government. These will provide continuing advice on conservation issues, and further monitoring of progress/achievements. An additional legacy of this project will be a popular review of the biodiversity of Gough Island, which is currently in preparation, with funding assistance from the UK Foreign & Commonwealth Office (see Section 11).

#### **4. Scientific, Training, and Technical Assessment**

- *Please provide a full account of the project's research, training, and/or technical work.*
- *Research - this should include details of staff, methodology, findings and the extent to which research findings have been subject to peer review.*

The fieldwork component of this project was set up in August/September 1999 by Professors K.J. Gaston and S.L. Chown, and conducted in 1999/00 by Dr A.G. Jones and Ms C. Hänel, and in 2000/01 by Ms P. Skepe and Ms L. Mabulu. Subsequent laboratory work was carried out principally by Dr A.G. Jones, but drawing on the assistance of a large number of taxonomic specialists from around the world.

The main components of the work were as follows:

##### **(i) Characterisation of the invertebrate fauna of Gough Island**

Invertebrate sampling was carried out between September 1999 and September 2001. Ninety localities, ranging from sea level to the highest peak were sampled multiple times. A variety of sampling methods were employed appropriate to the locality. These comprised: active collecting, including hand capture, sweep-netting, beating, dredging, rock-scrubbing, and kick-sampling; trapping, including the use of Malaise traps (82 trapping runs giving a total of 1272 consecutive days of sampling), light trapping, sticky trapping, and pitfall trapping; and laboratory extractions where a total of 893 vegetation and substrate samples were separated into approximately 2000 individual Tullgren extractions. The invertebrate samples thus collected were separated into orders on Gough Island, preserved appropriately, and returned to the UK to be identified. Once in the UK, the samples were sorted into species within orders by Dr Jones, and unknown or dubious species sent to taxonomic experts for identification.

##### **(ii) Characterisation of the diets of mice on Gough Island**

Mice were trapped by overnight opportunistic deployment of twenty to thirty snap traps, baited with a mixture of peanut butter and raisins. Trapping was carried out in the lowland fern bush

habitat of Gough Island's southern plateau between September 1999 and July 2000, with a minimum of 20 individuals trapped per month. No trapping was carried out closer than 250 m to the meteorological station. Once retrieved, male mice were classified as reproductively active or inactive (depending on scrotal development), while females were classified as non-reproductive, pregnant, or lactating. All the mice were then weighed and the stomachs removed and preserved in 70% ethanol. Stomach contents were sorted under 25x magnification using a dissection microscope and food items were separated into categories.

For each food item identified, a percentage volume (PV) of the total stomach content was estimated. Percentage occurrence (PC) of a particular food item was recorded as the percentage of stomachs examined in the same sampling period in which it was found. Diet variety was recorded as the number of differing food items found in stomachs collected in the same sampling period and used to calculate diet diversity as  $1/\sum P_i^2$  where  $P_i = PV/100$ . Relative importance values (RIV) for each food item were then calculated as  $RIV = 100 \times IV/\sum IV$ , where IV (importance value) =  $PV \times PC/100$ .

To identify altitudinal differences in diet, mice were also trapped opportunistically at two upland sites in wet heath vegetation. Site A, at approximately 500 m a.s.l. was sampled in March 2000, while site B, at approximately 700 m a.s.l., was sampled in May 2000.

### **(iii) Climate change**

Monthly mean precipitation and temperature data for Gough Island between 1963-2000 were obtained from the South African Weather Bureau.

## **The principal findings of this research work are as follows:**

### **(i) Composition of the invertebrate fauna**

Lacking more than half of the world's orders, and being depauperate in species number, the pterygote insect fauna of Gough Island is both impoverished and disharmonic, a pattern typical of remote Southern Ocean Islands. A total of 99 free-living pterygote insect species were recorded, 84 from native habitats and a further 15 restricted to the meteorological station. The total indigenous pterygote insect fauna of Gough Island is thought to comprise 28 species, the remaining 71 species probably colonising as a result of accidental introduction by human activity (see Tables 1 and 2). Of the indigenous pterygote insect species recorded, 24 appear to be endemic to the Tristan da Cunha Island group. Eighteen of these are only known from Gough Island with at least six likely to be true Gough Island endemics (Table 1), further taxonomic and survey work (on other islands) being required to confirm the status of the remainder. Including *D. punctatonervosa*, a Tristan da Cunha endemic that may have been accidentally introduced to Gough Island, a total of 25 pterygote species endemic to the Tristan da Cunha group are found on Gough Island. This compares to a crude estimate of 12 endemic species in the whole of the U.K. (D. Sheppard, English Nature, personal communication).

Despite the isolation of Gough Island and its limited human history, approximately 72% (71) of the pterygote insect species recorded are likely to have been accidentally introduced (see Tables 1 and 2). Of these introductions, 15 are restricted to the environs of the meteorological station,

the remainder being established in native environments, often with large and widespread populations (e.g. of 135 666 individual Diptera recorded in native habitats, 48.89% were introductions, one of which, *Calliphora croceipalpis*, contributes the vast bulk of lowland dipteran biomass). In contrast to the primarily Neotropical ancestry of the indigenous fauna, approximately 83% of the introduced pterygote species recorded are either Holarctic in origin or with widespread Holarctic distributions. The majority of these species are likely to have arrived in the Tristan da Cunha Islands via shipping from European ports, or from Southern Africa, introduced populations of many of these species being found in the Cape Town region.

Non-apterygote insect terrestrial invertebrates recorded on Gough Island include platyhelminths, annelids, molluscs, tardigrades, isopods, ostracods, copepods, cladocerans, amphipods, myriapods, arachnids (including mites, spiders and a pseudoscorpion) and springtails. The taxonomic identification of the non-apterygote collections is likely to take some years to complete due to the size of the collection and difficulty in identification, although good progress has been made with several groups, and some have already been completed.

In total, 10 of the indigenous pterygote insect species of Gough Island exhibit brachyptery, these being *B. inaccessibilensis*, *Lissothrips* sp., *L. involucer*, *P. natvigi*, *T. scirpophilus*, *S. holdgatei*, *Symplecta* sp., *S. altissima*, *D. goughensis*, *P. goughi* (see also Brinck, 1948; Holdgate, 1965). The evolution of brachyptery in island faunas has been widely discussed (Darlington, 1943; Carlquist 1974; Crafford et al., 1986; Roff, 1990), the most likely reasons for its development being the high costs of wing development but reduced need for dispersal on islands, combined with possible removal of actively flying individuals by continual drift out to sea. In this context, it is noteworthy that most of the brachypterous species are restricted to windy, upland areas of Gough Island, but this may also be a result of predation by mice, which are more common at low elevations.

Whatever the mechanism of colonisation, the remote locality of Gough Island is likely to have been a considerable barrier to successful natural colonisation, resulting in the impoverished nature of the extant fauna and flora. Geological evidence suggests that Gough Island first emerged from the sea 2-3 million years before present (mybp) (Maund et al., 1988) and is unlikely to have experienced glacial conditions that may have eliminated ancient faunas and floras on oceanic islands further south (Mercer, 1983; Hall, 1990). Assuming both a uniform colonisation rate commencing 2 mybp, and that indigenous species of shared genera are a result of *in situ* cladogenesis, only 21 successful colonisation events, one occurring every 95,000 years, are required to explain the extant indigenous free-living pterygote insect fauna of Gough island. As this rate does not account for extinctions, it is likely to be an underestimate. However, even were 99% of successfully colonising pterygote species to have become extinct since the Island emerged; the colonisation rate would still only approximate one species per millennium.



Table 1. Pterygote insect species recorded on Gough Island

	Status	Species
Indigenous (28 species)	Endemic to Gough Island – 6 species	<i>Agonopterix goughi</i> , <i>Aridius</i> sp., <i>Dimorphinoctua goughensis</i> , <i>Peridroma goughi</i> , <i>Symplecta holdgatei</i> , <i>Symplecta</i> sp.
	Endemic to the Tristan da Cunha Island group – 8 species	<i>Dimecoenia tristanensis</i> , <i>Lancetes dacunhae</i> , <i>Liodesus involucer</i> , <i>Nesothrips inaccessiblensis</i> , <i>Ptinella natvigi</i> , <i>Scaptomyza altissima</i> , <i>S. frustulifera</i> , <i>Tristanodes scirpophilus</i>
	Potentially endemic to Gough Island – 10 species	<i>Lissothrips</i> sp., <i>Dimecoenia</i> spp. (5 + species), <i>Scatella</i> sp., <i>Telmatogeton</i> sp. near <i>sanctipauli</i> , <i>Thalassosmittia</i> sp. near <i>thalassophila</i> , <i>Thoracochaeta</i> sp.
	Naturally occurring but found outside the Tristan da Cunha Island group – 4 species	<i>Clunio</i> cf. <i>africanus</i> , <i>Nothodelphax atlanticus</i> , <i>Ornithomyia parva</i> , <i>Pentarthrum carmichaeli</i>
Accidentally introduced (71 species)	Indigenous to the Tristan da Cunha Island group – 1 species	<i>Drosophila punctatonervosa</i>
	Alien to the Tristan da Cunha Island group – 70 species	<i>Aphidius colemani</i> , <i>Anaphothrips obscurus</i> , <i>Aptinothrips rufus</i> , <i>Aulacorthum circumflexum</i> , <i>A. solani</i> , <i>Blattella germanica</i> , <i>Bradysia nocturna</i> , <i>Bryophaenocladus</i> sp. , <i>Calliphora croceipalpis</i> , <i>Cavariella aegopodii</i> , <i>Cercyon depressus</i> , <i>Cerobasis annulata</i> , <i>C. guestfalica</i> , <i>Coelopa</i> cf. <i>africana</i> , <i>Cryptolestes pusilloides</i> , <i>Cryptophagus pseudodentatus</i> , <i>Deropeltis</i> sp., <i>Diadegma</i> sp. , <i>Dicranomyia distans</i> , <i>Ectopsocus briggsi</i> , <i>Endrosis sarcitrella</i> , <i>Fannia canicularis</i> , <i>Frankliniella antarctica</i> , <i>Fucellia tergina</i> , <i>Henoticus californicus</i> , <i>Hylotrupes bajulus</i> , <i>Hylurgus ligniperda</i> , <i>Jacksonia papillata</i> , <i>Kleidotoma</i> sp. , <i>Lepinotus inquilinus</i> , <i>Leptocera caenosa</i> , <i>Limnophyes minimus</i> , <i>Liposcelis bostrychophila</i> , <i>L. decolour</i> , <i>L. pubescens</i> , <i>Lucilia sericata</i> , <i>Lycoriella</i> sp. A., <i>Lycoriella</i> sp. B., <i>Megaselia rufipes</i> , <i>Meoneura obscurella</i> , <i>Merothrips brunneus</i> , <i>Monopis crocicapitella</i> , <i>Mycophila fungicola</i> , <i>Myzus ornatus</i> , <i>M. persicae</i> , <i>Notolinus hottentottus</i> , <i>Oryzaephilus surinamensis</i> , <i>Peridroma saucia</i> , <i>Phaenoglyphis villosa</i> , <i>Phthitia plumosula</i> , <i>Prosopantrum flavifrons</i> , <i>Psychoda albipennis</i> , <i>Psyllipsocus ramburii</i> , <i>Ptinus tectus</i> , <i>Pullimosina heteroneura</i> , <i>Quedius mesomelinus</i> , <i>Rhopalosiphum padi</i> , <i>R. rufiabdominalis</i> , <i>Sciophila parviareolata</i> , <i>Sepedophilus filicornis</i> , <i>Sitophilus oryzae</i> , <i>Spelobia parapusio</i> , <i>Sphaeriestes sculptilis</i> , <i>Stegobium paniceum</i> , <i>Stilpnus</i> sp. , <i>Thoracochaeta brachystoma</i> , <i>T. zosteriae</i> , <i>Thrips hawaiiensis</i> , <i>T. tabaci</i> , <i>Trichopria</i> sp.

Table 2. The numbers of indigenous and introduced species of free-living pterygote insects recorded from Gough Island, categorised according to order.

	<b>Indigenous</b>	<b>Present in native habitats by 1955-56</b>	<b>Introduced Present in native habitats by 1999-2002</b>	<b>Only recorded as base pests</b>
Blattodea	0	0	0	2
Psocoptera	0	2	1	5
Thysanoptera	2	0	6	0
Hemiptera	1	4	4	0
Lepidoptera	3	3	0	0
Coleoptera	6	3	3	8
Diptera	16	11	13	0
Hymenoptera	0	2	4	0
<b>Total (%)</b>	28 (28.28)	25 (25.25)	31 (31.31)	15 (15.15)

### (ii) Rates of introductions

The introduction of species to areas that lie beyond the limits to their natural distributions is having a major homogenising influence on flora and fauna, making previously distinct biotas more similar to one another. The scale of introductions has frequently been commented on, but its sheer pervasiveness has been less well quantified. Of the 99 species of free-living/ non-vertebrate parasite pterygote insects recorded from Gough Island, 71 (72%) are established introductions, the highest proportion documented for any southern ocean island. Estimating that there have been a grand total of about 200 landings on Gough Island since first human landfall, this equates to one successful establishment with every three to four landings. As most of the introduced species in Table 1 were absent in 1955-56 but recorded in 1999-2001, it is reasonable to assume that the majority of introductions have occurred since the construction of the meteorological station in 1956. If these arrived at a uniform rate, then, since 1956, aliens have been introduced to Gough Island at the astounding rate of one species every one to two years. This human mediated introduction rate is over 500 times greater than the assumed natural rate (given Gough Island to be 2 my old and assuming 99% of the indigenous pterygote species that successfully colonised later became extinct), resulting in the situation that introduced free-living pterygote insect species already outnumber indigenous species by more than two to one.

Generalisations drawn from other areas suggest that this may be only one tenth of the number of alien pterygote insect species that may have arrived at the island, implying that most landings lead to the arrival of at least one alien. In sum, our data from Gough Island indicate that even in remote locations, where human activities are very low by global standards, biological invasions are a pervasive feature of the landscape. Thus, like climate change, species introductions seem set to leave a considerable footprint on even the most isolated local communities, that might prove very difficult to reverse over the longer term. However, unlike climate change, future invasions can readily be minimized by changes to local policy. At least for Southern Ocean islands these

changes are as simple as reducing the numbers of visitors and increasing the stringency of quarantine procedures.

### (iii) Mouse diets

At Gough Island, non-commensal house mice (*Mus musculus* L.) are extremely abundant and were probably introduced in the early 19th century. The population has a single breeding season from September to March and mean body mass is notable in being amongst the largest reported for non-laboratory *M. musculus* (Fig. 1). At low elevations (< 250 meters above sea level), avian carrion (or possibly live avian material) was the most prevalent dietary item during September and October (Fig. 2). From November to February, plant material constituted the bulk of stomach contents and from March to July lumbricid worms were the most common food item. Indigenous invertebrate matter contributed little to mouse diet, independent of season. At altitudes greater than 500 meters above sea level, larvae of endemic brachypterous moths, *Dimorphinoctua goughensis* and *Peridroma goughi* made up a significant proportion of stomach contents (Figs 3 & 4). In light of studies elsewhere, these data indicate that mouse predation is likely to pose a significant threat to these species. Successful eradication of mice from smaller, heavily vegetated islands surrounding New Zealand suggests that the same action could potentially be taken at Gough Island. However, the costs of such an operation would be large.

Figure 1. Comparison of mean body masses for various mouse populations. Masses were taken from a number of published sources. Where masses given in the literature were divided by sex and/or sampling events, means were calculated.

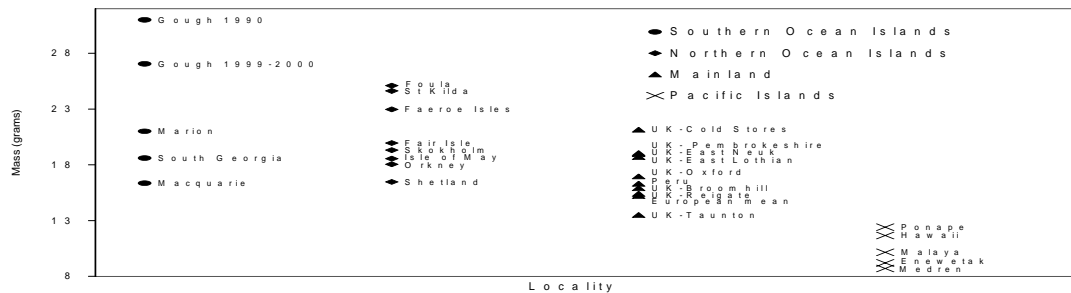


Figure 2. Temporal variation in the diet of lowland mice populations. To indicate seasonality, a curve showing total daylight time (time in minutes between sunrise and sunset) is also included.

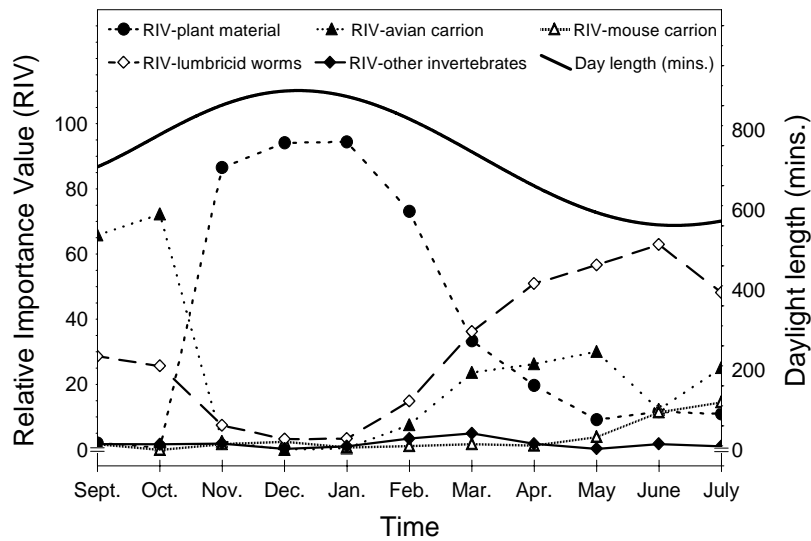


Figure 3. Variation in food consumption between lowland and upland mice during March 2000.

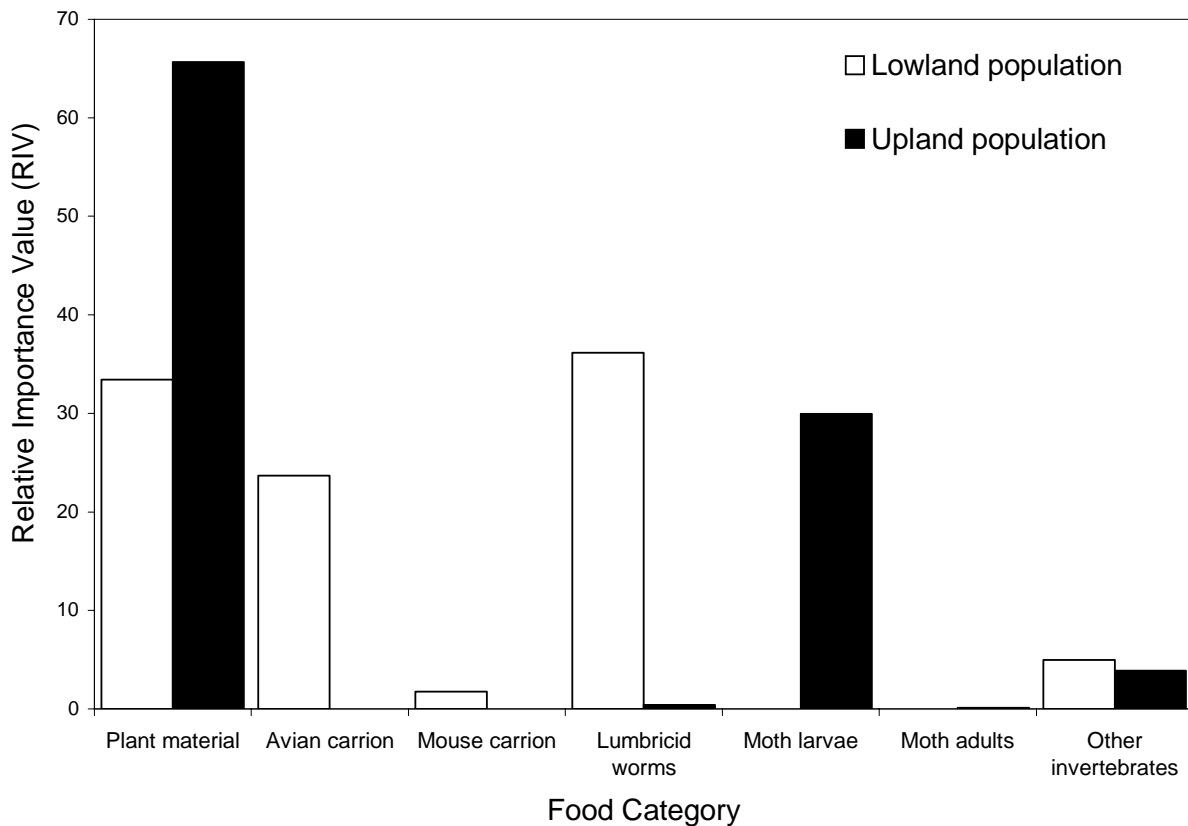
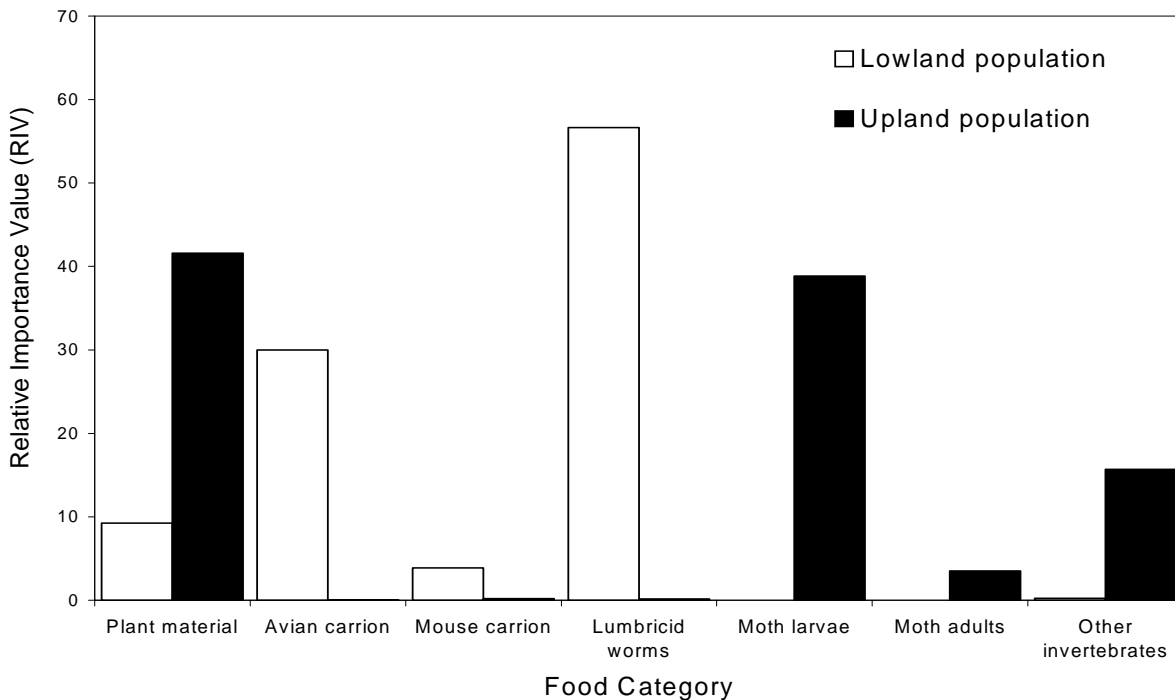


Figure 4. Variation in food consumption between lowland and upland mice in May 2000.

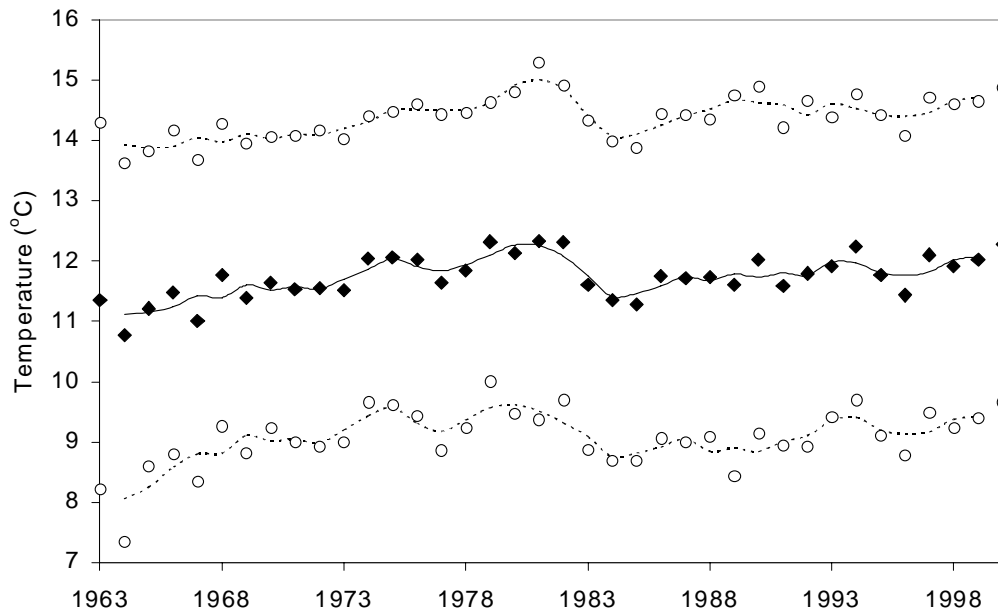


#### (iv) Climate change

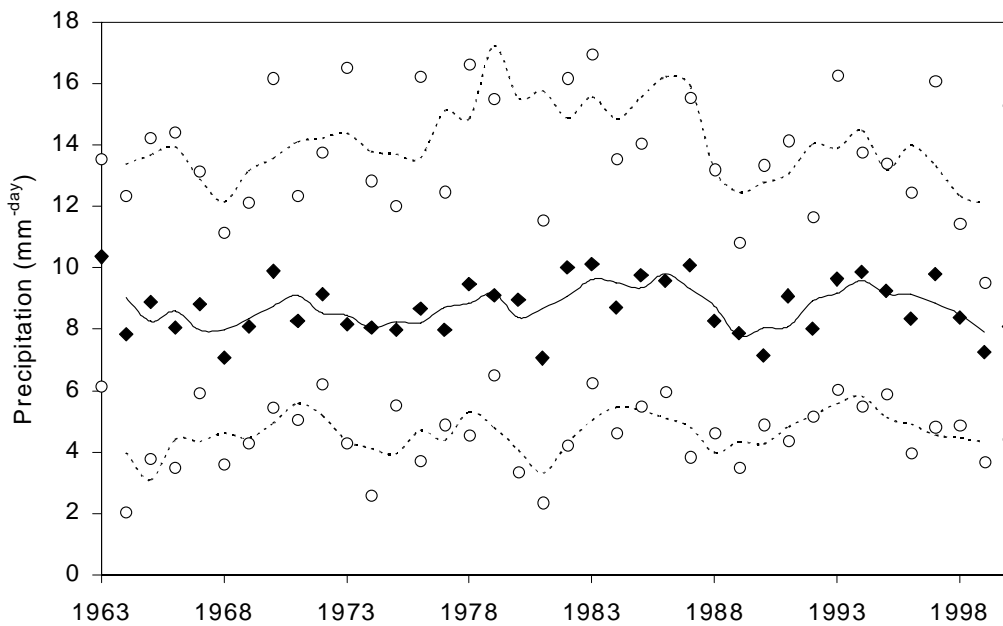
The climate at Gough Island is changing. Based on meteorological data collected on Gough Island, we have identified a significant rise in temperature of ca 0.6 °C between 1963 and the year 2000 (annual mean  $r = 0.494$ ,  $n = 37$ ,  $P < 0.01$ ; warmest month  $r = 0.537$ ,  $n = 37$ ,  $P < 0.01$ ; coolest month  $r = 0.402$ ,  $n = 37$ ,  $P < 0.05$ ) (Fig. 5a), but no clear trend in the level of precipitation (Fig. 5b). This is in keeping with the expectations for this part of the Southern Ocean, and indeed it may be expected that temperatures in this region will rise even further in the next 50 years. The conservation implications of these changes are likely to be substantial and will mostly centre on interactions between introduced and indigenous species.

Figure 5. Annual variation in mean (a) temperature, and (b) precipitation, based on the daily records taken at the Gough Island meteorological station from 1963-2000. Annual means are represented by solid diamonds, with means for the warmest/wettest and coldest/driest months represented by circles. In order to visualise trends, three year running means have been added, the solid lines representing annual means, and the dotted line representing the warmest/wettest and coldest/driest months.

(a)



(b)



The results of all of the research conducted by the project on Gough Island have been or are being written up for publication in international peer-reviewed journals (see Section 6).

#### **(v) Establishing reference collections of the invertebrate fauna of Gough Island**

Collections of specimens of the majority of the pterygote insect species from Gough Island have already been deposited at the NHM, and at the Northern Flagship Institution (NFI, previously Transvaal Museum). In addition, specimens of species from particular taxa have been deposited in those museum collections with which the taxonomic specialists working with the Gough Island project are principally associated (and which therefore invariably already have significant holdings in these groups). A similar strategy of depositing representative specimens in the NHM and the NFI, and in the museums with which specialists are associated is being adopted for other invertebrate groups as identified material becomes available, and has been agreed to by these specialists.

- ***Training and capacity building activities.***

Training took two forms in this project. First, the field assistants employed on the project (three South Africans) were all trained in invertebrate collection techniques, as well as gaining experience in small island life. They thus gained a number of transferable skills. Second, and in addition to agreed project outputs, during January 2000 two Tristanians were trained by team members in invertebrate sampling techniques. It is hoped that this will help increase awareness amongst Tristan islanders of conservation issues pertaining to their own invertebrate fauna and also provide a skill base for any future biodiversity studies which might be undertaken in the Tristan island group.

## **5. Project Impacts**

- ***What evidence is there that project achievements has led to the accomplishment of the project purpose? Has achievement of objectives/outputs resulted in other, unexpected impacts?***

In addition to the research results detailed above, our team has also helped to ensure a lasting legacy in this region through involvement in a number of additional conservation initiatives. This involvement did not significantly detract from our primary work, and broadly aimed to assist practical implementation and further development of the 1993 Wildlife Management Plan for the Gough Island Reserve:

(i) *Control and management of alien plant species on Gough Island* – During 2000 a concerted effort, funded through the UK FCO, was made to remove from Gough the recently introduced plant species *Sagina procumbens*, along with its entire seed bank. This project was supervised by Dr N. Gremmen and is of global importance as it is the first such project to attempt to remove an alien plant species in this manner. Our project team aided in this eradication by: acting to monitor known areas of colonization and identify new patches of growth, weeding and boiling *Sagina* patches prior to the arrival of Dr Gremmen on Gough, aiding in monitoring the

effectiveness of eradication techniques by completing germination experiments set up by Dr Gremmen prior to his departure from Gough, and replanting treated areas with endemic plants in order to prevent erosion and possible recolonisation by any surviving *Sagina* seeds.

Besides the *Sagina* eradication program we have also attempted to limit the spread of the alien grass *Poa annua*. The alien grass was observed to be growing in great numbers around the region of the base helipad. As this is where the main path into the island begins, it is possible that grass seeds may be spread into previously pristine habitats by adhering to the boots or clothes of walkers. For this reason we attempted to remove as much of these plants as possible by weeding the area. The plants collected were then burnt on the island in an incinerator.

(ii) *Monitoring and prevention of colonisation by alien animal species* - During the project our team advised base members on protocols designed to maintain the integrity of the Gough ecosystem. In order to maintain a base on Gough it is necessary to supply that base, and this provides opportunities for both foreign flora and fauna to colonise the island. In collaboration with base personnel, a quarantine procedure was set up for situations where unavoidable transfer of items from ship/helicopter to shore was required. Base personnel were educated as to the reasons for observing strict quarantine procedures and when ship-to-shore transfer was made during the year these protocols were observed. Our team monitored all items coming ashore, with the exception of those arriving during the September takeover periods (these being the responsibility of the conservation officer employed by the Gough Island Conservation Committee). The quarantine protocols used during the year (which comprise hand searching, fumigation and freezing methods) were discussed with the September 2000 takeover conservation officer. Several alien invertebrate species were discovered in arriving cargo and preserved for future reference. Once fully identified, this list of aliens will be made available to the Gough Island Management Committee.

(iii) *Collection and donation of herbaria of Gough Island flora* - Besides the collection of invertebrates, specimens of many of the island's vascular plants were collected and a triplicate herbarium collection was created. Of these, one was left on Gough as an aid for all future scientific expeditions. A commemorative plaque (indicating the support of the Darwin Initiative) was put up in the base as a historical record of this donation. Of the other two collections, one was sent to Tristan da Cunha and one donated to the national herbarium of South Africa. These collections were donated in the hope that they will be of use to future scientists from both the UK and SA (and indeed the rest of the world) and as a demonstration of good will and cooperation between the two countries. Indeed the Tristan collection has already been accessed by the Austrian botanist Dr G. Jakubowsky who in return constructed and donated to the Gough herbarium a key to all the Tristan-Gough endemic grasses.

(iv) *Beach debris recording and collection* - During 1999/2000 a list was kept of all the human-made debris that was observed to have been washed ashore on Gough. These items were collected and appropriately disposed of where possible. The rationale for these collections was twofold. First, the collection of human waste is of direct conservation benefit to the island, many items being non-biodegradable and/or potentially dangerous to the island's fauna. Second, the appearance of strange buoys and long-lines may give vital clues as to the existence of illegal fishing in Gough waters. The results of the beach collections (comprising of descriptions of the



debris discovered, along with the date on which it was found) were passed on to the conservation officer employed by the Gough Island Management Committee during the September 2000 takeover period.

(v) *Monitoring the use of paths* - During 1999/2000 a list was kept of all expeditions made across Gough Island. These data comprised the date, number of people, time of departure, destination and expected time of return. In addition to this 'base list', logbooks were left at three other points on the island for the same purpose. Whilst being an important safety measure allowing a group's intended destination to be identified in the case of an emergency, these data also allow the relative degree of path use to be assessed. By comparing patterns in use to observed erosion, the impact of walking on Gough might be determined and used to choose routes that will minimize human erosion on the island. As with the beach debris data this information was passed onto the conservation officer employed by the Gough Island Management Committee during the September 2000 takeover period.

- ***If there were training or capacity building elements to the project, to what extent has this improved local capacity to further biodiversity work in the host country and what is the evidence for this? Where possible, please provide information on what each student / trainee is now doing (or what they expect to be doing in the longer term).***

The postdoctoral researcher (Dr A.G. Jones) who worked on this project is now using the experience he gained to work on conservation issues on other UK overseas territories in the South Atlantic.

One of the field assistants (Ms C. Hänel) was employed by the Australian Antarctic Division to undertake similar survey work on Macquarie Island, and is now employed on the Gough Island review project (see Section 11). The other field assistants are now employed in entomological positions in South Africa (both P. Skepe and L. Mabulu are employed by the Agricultural Research Council), and their training on the Gough Island project in insect systematics assisted substantially with their competitiveness for these positions.

- ***Discuss the impact of the project in terms of collaboration to date between UK and local partner. What impact has the project made on local collaboration such as improved links between Governmental and civil society groups?***

A further legacy of this project is the links that have been established between the University of Sheffield, the Universities of Pretoria/Stellenbosch, the Tristan da Cunha Administration, and the Gough Island Wildlife Research Advisory Committee (GIWRAC). These will provide continuing advice on conservation issues, and further monitoring of progress/achievements. The findings of the project will be used by the GIWRAC in the formulation of a revised management plan for Gough Island. In addition, detailed discussions took place between the then Administrator of Tristan da Cunha, Mr B. Baldwin, the chief islander Mr J. Glass and Prof. Gaston, regarding the possibility of extending biodiversity inventory and action plan work to other islands in the Tristan group, particularly Tristan da Cunha itself. Mr Baldwin's term of office unfortunately concluded before this work could be taken forward, however discussion has been held with other organisations over the development of such a project.

- *In terms of social impact, who has benefited from the project? Has the project had (or is likely to result in) an unexpected positive or negative impact on individuals or local communities? What are the indicators for this and how were they measured?*

Because of the nature of Gough Island, there is no resident local community on which the project could directly socially impact. However, it has certainly served to improve awareness of environmental issues amongst the teams based at the meteorological station on the island, and appears to have contributed to a greater awareness of such issues amongst the populace of Tristan da Cunha and a heightened desire to understand the biodiversity present on that island and the threats that it may face. An interest in the invertebrates of the other islands in the Tristan da Cunha archipelago has also been kindled in the Tristan da Cunha administration.

## 6. Project Outputs

- *Quantify all project outputs in the table in Appendix II using the coding and format of the Darwin Initiative Standard Output Measures.*

The outputs of the project are detailed in Appendix II.

- *Explain differences in actual outputs against those in the agreed schedule, i.e. what outputs were not achieved or only partly achieved? Were additional outputs achieved? Give details in the table in Appendix II.*

In addition to the project outputs detailed above, a database of higher plants and invertebrates from Gough Island has been established as part of a wider database on the invertebrates, higher plants, birds and mammals of the Southern Ocean Islands. This database is primarily used as a tool for research purposes, and information is being disseminated in research papers. However, in 2003/4 this entire database will go on line via the Australian Antarctic Division data centre (the RiSCC database). The way in which data are served up from this centre is such that each time that the Gough or Tristan Island data that we have compiled are accessed, the Darwin Initiative, and the Universities of Sheffield and Stellenbosch will be credited, and a request will be made that use of the data credits these organizations and the South African National Antarctic Programme. A further additional output of this project will be a popular review of the biodiversity of Gough Island, which is expected to be published during 2003 (see Section 11).

- *Provide full details in Appendix III of all publications and material that can be publicly accessed, e.g. title, name of publisher, contact details, cost.*

Details of publications are given in Appendix III. In addition, several further publications are in preparation or have been submitted. These are:

- (i) Jones, A.G., Chown, S.L. & Gaston, K.J. The free living pterygote insect of Gough Island. [completed ms, appended; this is a detailed report on the composition and identification of this group of invertebrates]

- (ii) Jones, A.G., Chown, S.L. & Gaston, K.J. Introduced house mice (*Mus musculus* L.) on Gough Island: seasonal cycles and conservation concerns. [revised version submitted to *Biodiversity & Conservation*]
- (iii) Jones, A.G., Chown, S.L., Ryan, P.G., Gremmen, N.J.M. & Gaston, K.J. Conservation threats on Gough Island: a case study for terrestrial conservation in the Southern Oceans. [revised version submitted to *Biological Conservation*]
- (iv) Gaston, K.J. Jones, A.G. & Chown, S.L. Rates of species introduction to a remote oceanic island. [submitted to *Proceedings of the Royal Society, London B*]
- (v) Jones, A.G., Chown, S.L. & Gaston, K.J. Invertebrate species of Gough Island [in preparation]

In addition, a number of other taxonomic publications are planned in collaboration with the specialists who have been working on the material that has arisen from the sampling programme conducted during the project. These are in various states of development, determined by the time that these collaborators can invest in this work. However, we anticipate that a significant body of material will be generated. A further additional output of this project will be a popular review of the biodiversity of Gough Island, which is expected to be published during 2003 (see Section 11). Further details will be recorded on the Darwin Monitoring Website Publications database, which is currently being compiled.

- ***How has information relating to project outputs and outcomes been disseminated? Will this continue or develop after project completion and, if so, who will be responsible and bear the cost of further information dissemination?***

A number of popular and scientific presentations have been given, to highlight the findings of this project. These include:

- (i) Gaston, K.J. 2001. *Gough Island and introduced species*. Darwin Initiative Seminar, London, May. (oral presentation)
- (ii) Jones, A.G. 2001. Arthropod diversity and conservation on Gough Island. *Proceedings of the Thirteenth Congress of the Entomological Society of southern Africa*, 2-5 July 2001, Pietermaritzburg. (oral presentation).
- (iii) Jones, A.G., Gaston, K.J. & Chown, S.L. 2001. The Gough Island Terrestrial Invertebrate Survey. *UK Overseas Territories Conservation Forum*, 13 March 2001, London (oral presentation).
- (iv) Jones, A.G., Gaston, K.J. & Chown, S.L. 2002. The Gough Island Terrestrial Invertebrate Survey. *UK Overseas Territories Conservation Forum*, 10 January 2002 (oral presentation).
- (v) Jones, A.G., Gaston, K.J. & Chown, S.L. 2002. Invertebrate conservation on Gough Island. *Invertebrate Conservation in Britain and its Overseas Territories*, 19-20 April 2002, Linnean Society, London. (oral presentation).

Seminars have also been given at the Universities of Sheffield, Pretoria and Stellenbosch.

In addition, a popular review of the biodiversity of Gough Island (see Section 11) and will provide a further vehicle for dissemination of information and material derived from the project, including many photographs (rarities, given the difficulty of access to Gough).

## 7. Project Expenditure

- ***Tabulate grant expenditure using the categories in the original application***

A summary of proposed, approved and actual expenditure throughout the project is provided in the following table. The 'proposed' expenditure, is that which was originally detailed in the original grant application. The 'approved' expenditure, is that which has subsequently been approved by the Department. The 'actual' expenditure is that which has been expended within each category in each 'year' of the project. The 'actual' and 'balance' figures provided in this table are provisional, until audit of the project account has been completed.

- ***Highlight agreed changes to the budget***

At the outset, the Department agreed that the schedule of staff costs would be set back by three months, to allow time for recruitment (Apr-Jun 1999). This sum was reallocated to the final year of the project, and the completion date was similarly set back by three months at that time. Logistical necessity actually required us to allocate staff funds to the Universities of Pretoria and Stellenbosch in line with the original schedule, three months ahead of the staff element of the funds being received by the University of Sheffield.

In Oct/Nov 1999, we experienced an unexpected staff change on the project, with Dr I. Downie being replaced by Dr Alex Jones as post-doctoral researcher. The Department agreed to re-scheduling of a proportion of staff funds to enable Dr Jones to be recruited, equipped and transported to Gough Island. Details of this staff change, and reallocation of funds, were provided in the First Annual Report.

From April 2000, the Department agreed annual increases of 3.5% on UK staff costs, 5% on Pretoria/Stellenbosch staff costs, and 3% on project expenses. Revised budget schedules were submitted and approved by the Department in April 2000 and April 2001, and revised figures are included in the summary table. In April 2001, the Department also approved, (i) additional staff costs for the post-doctoral researcher (to accommodate annual pay awards by the University), plus, (ii) an additional sum to accommodate a predicted increase in helicopter charges by DEAT.

In May 2002, the Department agreed that surplus funds could be reallocated to extend the employment contract of the post-doctoral researcher by one month to enable additional work on the project outputs. In October 2002, the Department further agreed to allocate any final surplus funds towards completion and publication of a popular review of the biodiversity of Gough Island (see Section 11). The additional expenditure on post-doc salary, and the allocation of final surplus to additional printing costs, are both included in the summary table.

The project principals and administrator continued working on the project until 31 October 2002, further developing project outputs and further enhancing the legacy of the project. This also allowed time for final figures on expenditure to be obtained from the University finance system, to be incorporated within this final project report.

Insert budget summary table...

- ***Explain any variation in expenditure where this is +/- 10% of the budget***

The summary table includes all approved variations in the project budget, and also describes all variations in project expenditure. In addition to the variations for which specific approval was sought from the Department (as detailed above), there were a number of more minor variations in actual expenditure, which together helped to ensure the most efficient use of project funds, and also helped to ensure that the project remained on schedule and within budget. For example, funds allocated for PC purchase in 2001/02 were spent a year earlier (2000/01), to assist the post-doctoral researcher in processing the large volume of data arising from the first year's fieldwork on Gough Island.

The small surpluses from each of the first two years of the project were carried forward each year. In October 2002, the Department agreed that any final surplus would be allocated towards the cost of producing and publishing a popular review of the biodiversity of Gough Island (see Section 11). The summary table gives a provisional final balance of £2,900, which is reallocated to the printing budget for this purpose.

## **8. Project Operation and Partnerships:**

- ***How many local partners worked on project activities and how does this differ to initial plans for partnerships? Who were the main partners and the most active partners, and what is their role in biodiversity issues? How were partners involved in project planning and implementation? Were plans modified significantly in response to local consultation?***

With regard to partners, the project was structured as initially proposed. It was run initially jointly from the University of Sheffield and the University of Pretoria, with the move of Professor S.L. Chown from the University of Pretoria to the University of Stellenbosch in 2001 resulting in the responsibilities being likewise shifted. The logistics of the project were provided by the South African Department of Environmental Affairs and Tourism, and the practicalities of the project were coordinated with the administration of Tristan da Cunha (largely through Mr B. Baldwin, who has recently completed his term as Administrator, and Mr J. Glass, the chief islander).

- ***During the project lifetime, what collaboration existed with similar projects elsewhere in the host country? Was there consultation with the host country Biodiversity Strategy (BS) Office?***

Only one other biodiversity/conservation project was conducted on Gough Island during the period of this one, a study of breeding bird populations carried out jointly by the RSPB and the Percy-Fitzpatrick Institute in 2000/01, with support from the FCO. There were good relations between the staff working on the two projects, however opportunities for direct collaboration were limited, beyond some mutual assistance with logistics.

The host country does not have a Biodiversity Strategy Office, however this role is fulfilled jointly by the Administrator of Tristan da Cunha and the chief islander, with whom there were frequent consultations, and who were both supportive of our project and extremely helpful in its implementation.

- ***How many international partners participated in project activities? Provide names of main international partners.***

We have involved taxonomic specialists from around the world, including P. R. Ackery, T. Anderson, D. A. Barraclough, R. Belshaw, P. A. Brown, M. L. Buffington, D. J. Carter, P. Chandler, P. S. Cranston, R. H. L. Disney, I. Gauld, A. Hamilton, P. M. Hammond, K. Harris, J. Ismay, C. Lienhard, C. H. C. Lyal, L. A. Mound, W. N. Mathis, H. Mendel, I. Miller, G. Nordlander, D. Notton, P. M. O'Grady, P. Oosterbroek, D. L. J. Quick, J. Roháček, O. A. Saether, P. Stary, F. J. van Veen, P. Vilkamaa, M. D. Webb, T. Wheeler, S. W. Wilson and in particular R. I. Vane-Wright and the staff of the Natural History Museum

- ***To your knowledge, have the local partnerships been active after the end of the Darwin Project and what is the level of their participation with the local biodiversity strategy process and other local Government activities? Is more community participation needed and is there a role for the private sector?***

In South Africa, strong ties with DEAT continue to be maintained, and Prof. Chown advises on conservation policy for the island operations of the DEAT. Moreover, the strong partnership with DEAT led to the joint development of a Capacity Building Programme for Climate Change Research ([www.sun.ac.za/zoology/space/climate](http://www.sun.ac.za/zoology/space/climate)), that has as its main aims the understanding of interactions between invasive species and climate change and its implications for conservation of this small island. The success of the capacity building component of this Darwin Initiative grant contributed substantially to convincing the DEAT that the local host was capable of undertaking such a programme.

## **9. Monitoring, Evaluation and Lesson Learning**

- ***Please explain your strategy for monitoring and evaluation (M&E) and give an outline of results. How does this demonstrate the value of the project? e.g. what baseline information was collected (e.g. scientific, social, economic), milestones in the project design, and indicators to identify your achievements.***

The project was monitored and evaluated throughout, against the main objectives, work schedule and budget schedule provided in the original submission. Our strategy involved allocating responsibilities to PB (Financial & Admin), SLC (RSA logistics) and KJG (overall objectives & QA). This enabled effective monitoring of the project throughout, and efficient liaison with, and production of progress reports to, the Darwin Secretariat.

- ***During the project period, has there been an internal or external evaluation of the work or are there any plans for this?***

The progress of the project was evaluated through the regular submission of reports both to the Darwin Initiative and to the South African National Antarctic Programme (DEAT). The published outputs of the project are all being sent to international journals for which they will be subject to peer review.

- ***What are the key lessons to be drawn from the experience of this project? We would welcome your comments on any broader lessons for Darwin Initiative as a programme or practical lessons that could be valuable to other projects, as we would like to present this information on a website page.***

The principal practical lessons that we learnt from this project (aside from the project findings) concerned the logistics of running intensive fieldwork in such a remote location and under challenging topographic and climatic conditions. These are probably not broadly applicable to the Darwin Initiative in the sense posed by the question, but we would be happy to pass on the benefit of our experience to other projects that might be funded by the Initiative and will be operating under related constraints.

## **10. Darwin Identity**

- ***What effort has the project made to publicise the Darwin Initiative, e.g. where did the project use the 'Darwin Initiative' logo, promote Darwin funding opportunities or projects? Was there evidence that Darwin Fellows or Darwin Scholars/Students used these titles?***

In all public references to this project explicit mention has been made to the Darwin Initiative, including in oral presentations and manuscripts (published and unpublished). Use has been made of the logo when giving illustrated talks/lectures. Moreover, a general poster concerning the work on Gough Island, and displaying the Darwin Initiative logo, was displayed at the Scientific Committee on Antarctic Research's Biology Symposium in Amsterdam in October 2001. This poster is on permanent display in the Department of Zoology, University of Stellenbosch, and in the Department of Animal & Plant Sciences, University of Sheffield. The Darwin Initiative will be further promoted through the planned publication of a popular review of the biodiversity of Gough Island (see Section 11). There were no Darwin Fellows/Scholars/Students involved in this project.

- ***What is the understanding of Darwin Identity in the host country? Who, within the host country, is likely to be familiar with the Darwin Initiative and what evidence is there to show that people are aware of this project and the aims of the Darwin Initiative?***

The Administration of Tristan da Cunha is very familiar with the Darwin Initiative. Moreover, the South African National Antarctic Programme, and especially its senior management staff, are well aware of the programme, having been fully briefed on several occasions as to the way the Darwin Initiative works and our funding by the Initiative. There is no longer a necessity to elaborate on the Darwin Initiative either at DEAT, or the Universities of Pretoria and Stellenbosch (at the research management level) in South Africa. All staff are now well aware of the Darwin Initiative and its aims. The Darwin Initiative was also publicized at a major meeting of the Entomological society of southern Africa during a presentation of work on Gough Island by Dr. Jones. Thus, most of the entomological research fraternity are aware of the initiative. Using a hotlink on Prof. Chown's homepage ([www.sum.ac.za/zoology/space](http://www.sum.ac.za/zoology/space)) anyone investigating his research can also be taken directly to the Darwin Initiative home page.



- ***Considering the project in the context of biodiversity conservation in the host country, did it form part of a larger programme that dwarfed Darwin funding or was it recognised as a distinct project with a clear identity?***

This was a distinct project with a clear identity of its own.

## **11. Leverage**

- ***During the lifetime of the project, what additional funds were attracted to biodiversity work associated with the project, including additional investment by partners?***

We estimate *ca.* £108.6K ‘in kind’ practical support to the current project. Additional funds attracted to further biodiversity work associated with the project are difficult to quantify. Nonetheless, concurrent with the second year of the project, a project on the breeding birds of Gough Island was funded by FCO (see above), and the presence of another major biodiversity project on the island may well have helped in securing this funding (the Darwin project on Gough Island was the first major piece of research work to have been conducted there for many years, and one of the most substantial pieces ever).

Recently, FCO funding has been obtained by the present team to initiate a popular review of the biodiversity of Gough Island. In October 2003, the Darwin Initiative Secretariat kindly agreed that any final budget surplus from the current Darwin Initiative project can be allocated towards production costs, to enable this popular review to be completed. The book is expected to be published during 2003, with a minimum run of 500 copies. The Darwin Initiative will be promoted through display of the logo on the book, and inclusion of a description of the aims of the Darwin Initiative within the text.

- ***What efforts were made by UK project staff to strengthen the capacity of partners to secure further funds for similar work in the host country and were attempts made to capture funds from international donors?***

Owing to Prof. Gaston’s collaboration with the partner, several additional projects were submitted using the track record established by this one for similar kinds of work in South Africa. This has included a joint application to the South African National Research Foundation. In addition, Prof. Gaston is serving as an external reviewer on a large, United States Agency for International Development grant awarded to Prof. Chown to investigate the effects of alien species on Marion Island and to build capacity in environmental change research in South Africa.

## **12. Sustainability and Legacy**

- ***What project achievements are most likely to endure? What will happen to project staff and resources after the project ends? Are partners likely to keep in touch?***

The most enduring achievements of this project are likely to be lessons that have been learnt from the research regarding the status of invertebrate species on Gough Island, and the evidence for climate change there, and actions that the Gough Island Wildlife Research Advisory

Committee may carry out in response (including in the writing of a revised version of the management plan for the island). We trust that these will lead to improved conservation actions.

The subsequent employment of the project staff has been detailed in Section 5. We have high hopes that Dr Jones will become a leading figure in work on the conservation of invertebrates on island U.K. Dependent Territories.

All the partners will keep in touch after the completion of this project.

- ***Have the project's conclusions and outputs been widely applied? How could legacy have been improved?***

It is too early to evaluate the wider impact of the conclusions and outputs of the project.

- ***Are additional funds being sought to continue aspects of the project (funds from where and for which aspects)?***

Funds have been successfully obtained from FCO to assist in the writing of a popular review of the biodiversity of Gough Island (see Section 11).

### **13. Value for money**

- ***Considering the costs and benefits of the project, how do you rate the project in terms of value for money and what evidence do you have to support these conclusions?***

The project achieved outstanding value for money. Gough Island is a very remote, but extremely important biodiversity resource that has received relatively little previous research attention. A study of this kind on Gough Island could easily have required substantially greater expenditure to achieve the same results. Our use of existing transport links, personnel and equipment, coupled with careful budget control throughout, have enabled this internationally important biodiversity project to be completed on schedule and within the agreed budget. As detailed within the current report, significant additional outputs have also been achieved, and the legacy of this project will now be even greater than expected at the outset.

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## 14. Appendix I: Outputs

*Please quantify and briefly describe all project outputs using the coding and format of the Darwin Initiative Standard Output Measures.*

Code	Total to date	Detail
<b>Training Outputs</b>		
1b	Number of PhD qualifications obtained	-
2b	Number of Masters qualifications	-
3b	Number of other qualifications obtained	-
4a	Number of undergraduate students receiving training	<b>ca. 100</b>
4b	Number of training weeks provided to undergraduate students	-
4c	Number of postgraduate students receiving training (not 1-3 above)	<b>ca. 30</b>
4d	Number of training weeks for postgraduate students	<b>9</b>
5	Number of people receiving other forms of <b>long-term</b> (>1yr) training not leading to formal qualification( i.e not categories 1-4 above)	-
6a	Number of people receiving other forms of <b>short-term</b> education/training (i.e not categories 1-5 above)	-
6b	Number of training weeks not leading to formal qualification	-
7	Number of types of training materials produced for use by host country(s)	-
<b>Research Outputs</b>		
8	Number of weeks spent by UK project staff on project work in host country(s)	<b>62</b>
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	-
10	Number of formal documents produced to assist work related to species identification, classification and recording.	-
11a	Number of papers published or accepted for publication in peer reviewed journals	<b>4</b> (plus 2 more submitted)
11b	Number of papers published or accepted for publication elsewhere	<b>5</b>
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	<b>1</b>
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	-
13a	Number of species reference collections established and handed over to host country(s)	<b>2</b>
13b	Number of species reference collections enhanced	-
<b>Dissemination Outputs</b>		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work in host country	-
14c	Numbers of conferences/seminars/workshops attended at which finding from Darwin project work have been presented/disseminated	<b>5</b>
15a	Number of national press releases or publicity articles in host country(s)	<b>5</b>
15b	Number of local press releases or publicity articles in host country(s)	-
15c	Number of national press releases or publicity articles in UK	<b>25</b>
15d	Number of local press releases or publicity articles in UK	<b>5</b>
16a	Number of issues of newsletters produced in the host country(s)	<b>12</b>
16b	Estimated circulation of each newsletter in the host country(s)	<b>ca. 1000 worldwide</b>
16c	Estimated circulation of each newsletter in the UK	-
17a	Number of dissemination networks established in host country	-
17c	Number of dissemination networks enhanced/extended in host country	-
18a	Number of national TV programmes/features in host country(s)	-

<b>Code</b>	<b>Total to date</b>	<b>Detail</b>
18b	Number of national TV programme/features in the UK	-
18c	Number of local TV programme/features in host country	-
18d	Number of local TV programme features in the UK	-
19a	Number of national radio interviews/features in host country(s)	<b>2</b>
19b	Number of national radio interviews/features in the UK	-
19c	Number of local radio interviews/features in host country (s)	-
19d	Number of local radio interviews/features in the UK	-
<b>Physical Outputs</b>		
20	Estimated value (£s) of physical assets handed over to host country(s)	-
21	Number of permanent educational/training/research facilities or organisation established	-
22	Number of permanent field plots established	-
23	Value of additional resources raised for project	-

## 15. Appendix II: Publications

*Provide full details of all publications and material that can be publicly accessed, e.g. title, name of publisher, contact details, cost. Details will be recorded on the Darwin Monitoring Website Publications database which is currently being compiled.*

<b>Type</b> (e.g. journals, manual, CDs)	<b>Detail</b> (title, author, year)	<b>Publishers</b> (name, city)	<b>Available from</b> (e.g. contact address, website)	<b>Cost £</b>
Journal	Gough Island biodiversity study goes ahead; Chown, S.L., Gaston, K.J. & Hänel, C. 2000	<i>South African Journal of Science</i> 96, 7-8.		-
Journal	World Heritage status and the conservation of Southern Ocean islands; Chown, S.L., Rodrigues, A.S.L., Gremmen, N.J.M. & Gaston, K.J. 2001	<i>Conservation Biology</i> <b>15</b> , 550-557		-
Journal	Terrestrial invertebrates of Gough island: an assemblage under threat?; Jones, A., Chown, S.L. & Gaston, K.J. 2002	<i>African Entomology</i> <b>10</b> , 83-91		-
Journal	Reynolds, J.W., Jones, A.G., Gaston, K.J. & Chown, S.L.; The earthworms (Oligochaeta, Lumbricidae) of Gough Island, South Atlantic. 2002	<i>Megadrilogica</i> <b>9</b> , 5-15		-

## 16. Appendix III: Darwin Contacts

*To assist us with future evaluation work and feedback on your report , please provide contact details below.*

<b>Project Title</b>	Invertebrate diversity and endemism at Gough Island and threats from introduced species
<b>Ref. No.</b>	162/8/253
<b>UK Leader Details</b>	
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Role within Darwin Project	Project leader
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<b>Other UK Contact (if relevant)</b>	
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Role within Darwin Project	Project administrator
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<b>Partner 1</b>	
Name	Professor S.L. Chown
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<b>Partner 2 (if relevant)</b>	
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