

# Important Bird Areas: Tristan da Cunha and Gough Island

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**ABSTRACT** The Tristan da Cunha archipelago and nearby Gough Island are the only cool-temperate oceanic islands in the South Atlantic. They are globally important breeding sites for eight million pairs of seabirds, including four endemic breeding species. The islands also are home to seven landbird species, all of which are found nowhere else. Tristan da Cunha and Gough are regarded as separate Endemic Bird Areas (EBAs) because of their unique landbirds. They share many of the same seabirds, although Spectacled Petrel *Procellaria conspicillata* is found only on Inaccessible, and virtually all Tristan Albatrosses *Diomedea dabbenena* and Atlantic Petrels *Pterodroma incerta* breed on Gough, following catastrophic declines on Tristan. Inaccessible and Nightingale Islands have been little affected by people; they remain free of introduced mammals, and Inaccessible is home to the smallest surviving flightless bird in the world, the Inaccessible Rail *Atlantisia rogersi*. Tristan has been less fortunate, as rats, mice and a host of other alien species have been introduced there by humans. Both Tristan Moorhen *Gallinula nesiotis* and Tristan Bunting *Nesospiza acunhae* became extinct shortly after the island was colonised by humans, and most seabird populations are either extinct or have been greatly reduced. Gough is plagued by introduced House Mice *Mus musculus*, which are slowly eroding its claim of being the greatest seabird island in the world. Urgent action is needed to remove mice from Gough, and there is potential to restore parts of Tristan if Black Rats *Rattus rattus* and mice are eradicated.

The Tristan da Cunha archipelago and Gough Island are remote volcanic islands in the central South Atlantic Ocean, roughly midway between the southern tip of Africa and South America. In addition to the main island (also called Tristan da Cunha, but hereafter referred to simply as 'Tristan', lying at 37°6'S 12°16'W and with a land surface area of 96 km<sup>2</sup>), Tristan da Cunha includes Inaccessible (14 km<sup>2</sup>) and Nightingale (4 km<sup>2</sup>), plus Nightingale's outlying islets of Stoltenhoff and

Alex Island. The three main islands are only 20–30 km apart, but separated by water more than 500 m deep, and have always been separate islands. Gough Island (40°20'S 10°0'W, 65 km<sup>2</sup>) lies 380 km SSE of Tristan da Cunha, and its climate is distinctly cooler, wetter and windier than that of the northern islands. All four islands are the mountainous summits of massive shield volcanoes that rise up from the abyssal depths of the South Atlantic. Nightingale is the oldest and smallest island, with rocks

In this paper, common and scientific names of seabirds which are not part of 'The BB List of Western Palearctic Birds' follow Shirihai (2007) at the request of the author.

dating back some 18 million years, whereas the oldest rocks on Tristan are only 200,000 years old. Inaccessible and Gough are of intermediate ages, roughly 3–4 million years old (Ryan 2007).

Despite lying on the edge of the 'Roaring Forties', the islands' climate is cool temperate rather than subantarctic. Mean air temperatures at sea level on Tristan are 15°C (range 2–25°C) and 12°C on Gough (ranging between -3 and +25°C). The weather is characterised by the regular passage of cold fronts that sweep across the islands from the west, bringing abundant rainfall (average 1,670 mm per year on the coast of Tristan and 3,000 mm on Gough), and snow at higher elevations. Even on clear days, the islands' peaks (more than 2,000 m on Tristan and 850 m on Gough) are frequently blanketed in dense, orographic cloud. As a result, precipitation is greater at high elevations.

The islands have never been connected to a continental landmass, so their terrestrial fauna and flora have had to disperse over several thousand kilometres of ocean. They have achieved this by flight (birds and some insects), 'hitching' (e.g. seeds attached to a bird's feathers or feet), windborne dispersal (e.g. seeds and spores), or rafting on floating debris. Human introductions have recently added to the means of establishment on the islands, as discussed below. The prevailing westerly winds and currents have resulted in most colonists arriving from South America, even though the islands are slightly closer to Africa. Because some organisms are more able to disperse than others, the terrestrial biota is 'disharmonic',

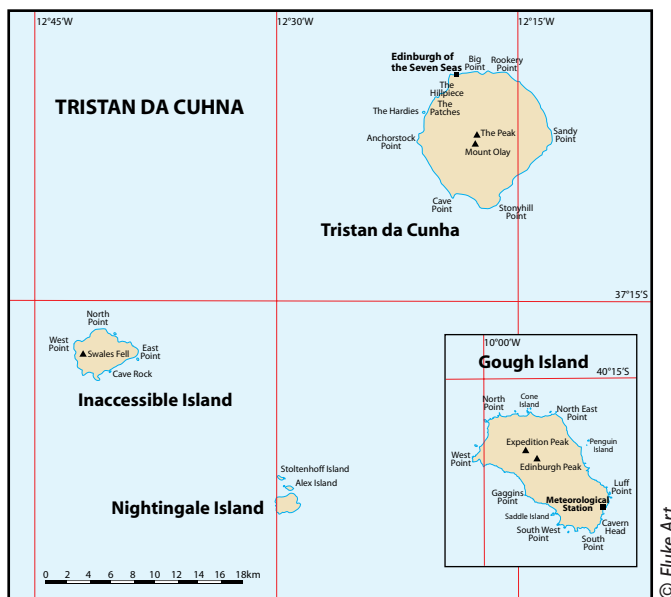


Fig. 1. The Tristan da Cunha archipelago and Gough Island.

missing many of the usual components of terrestrial ecosystems such as ants (Formicidae), amphibians, reptiles and terrestrial mammals (Ryan 2007). The few organisms that make the arduous journey, and are able to survive there, often evolve into endemic species.

Although the islands were discovered by Portuguese explorers in the early 1500s, the lack of safe anchorage discouraged colonisation until the early 1800s, when Tristan da Cunha was annexed by Britain. The current population of some 270 people constitutes the world's most isolated human community, more than 2,400 km south of St Helena. Inaccessible and Nightingale are uninhabited, while there is a South African weather station on Gough. Access is possible only by sea. Fishing is the main economic activity, supplemented by small-scale tourism and sales of stamps. The islands are a UK Overseas Territory, governed by an Administrator appointed by the UK Foreign Office and an Island Council.

### EBA and IBA status

Tristan da Cunha and Gough qualify as Endemic Bird Areas because they are home to seven endemic landbirds (as described in this paper), with five confined to the Tristan da Cunha EBA (Inaccessible Rail, Tristan Thrush, and Inaccessible, Nightingale and Wilkins' Buntings), Gough Bunting endemic to the Gough EBA and Gough Moorhen occurring on both Tristan and Gough (see Stattersfield *et al.* 1998). Although seabirds were not included by BirdLife in their EBA analysis, Atlantic Yellow-nosed Albatross breeds only on Tristan da Cunha and Gough, Tristan Albatross and Atlantic Petrel are virtually endemic to Gough, and Spectacled Petrel is endemic to Inaccessible. All four main islands are listed as Important Bird Areas as they support globally significant populations of numerous bird species (Fishpool & Evans 2001).



**305.** Edinburgh of the Seven Seas, the settlement on Tristan, with a fishing boat anchored offshore. The tongue of black rock along the shore on the left of the photo is part of the lava flow from the 1961 eruption that led to the entire population being evacuated to the UK. *Peter Ryan*

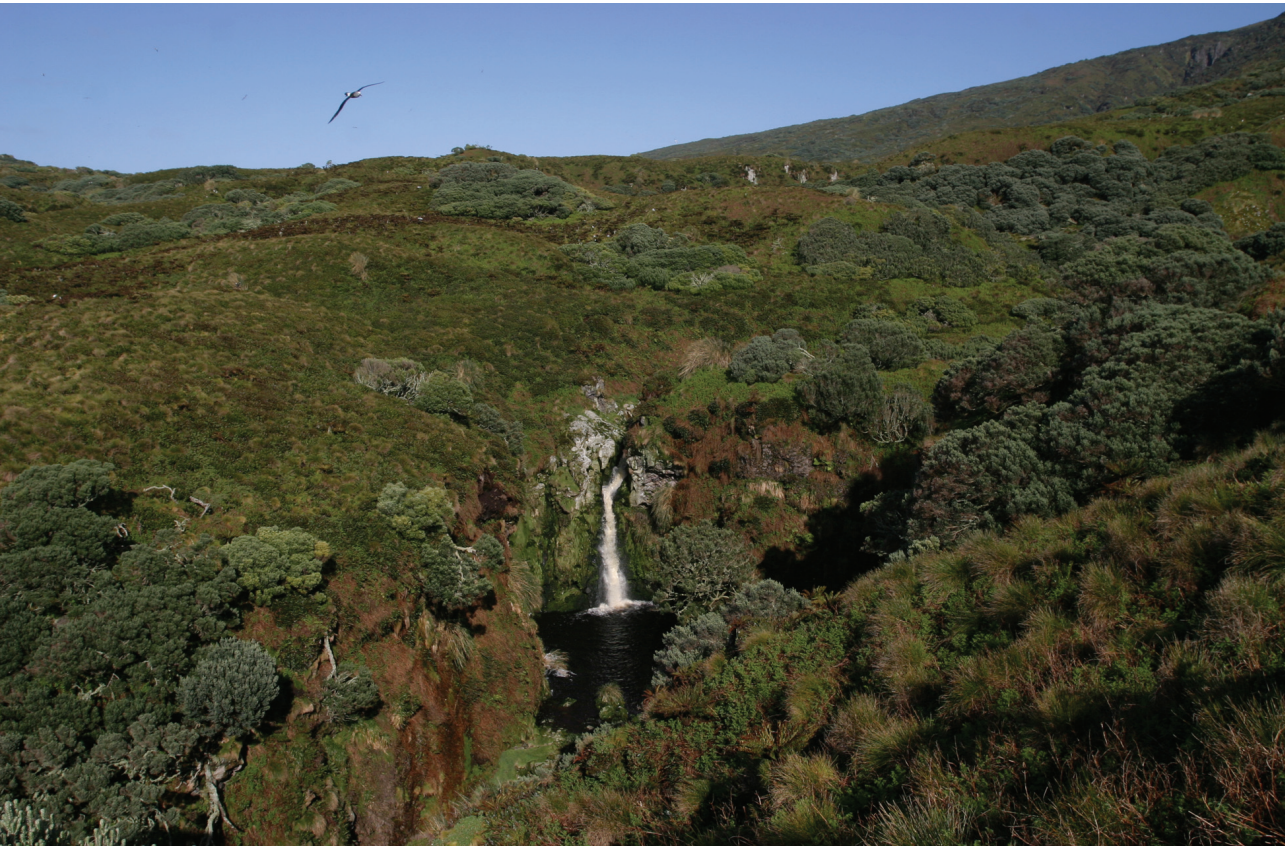
**306.** The east coast of Gough Island is characterised by deeply incised valleys termed 'glens'. The right-hand beach was a favoured landing site for sealers, and was the base for the Gough Scientific Expedition in 1956, but the South African weather station is located farther south, away from the influence of the mountainous interior. *Peter Ryan*





**307.** The Ponds on Nightingale Island, with Stoltenhoff in the middle distance and the 2,060-m peak of Tristan protruding above the haze. The Ponds are swamps formed in hollows on top of Nightingale Island. The woodland around the Ponds is home to almost the entire population of Wilkins' Buntings *Nesospiza wilkinsi*. Peter Ryan

**308.** Fern bush is a distinctive vegetation community which occurs on parts of all four main islands in the archipelago (photographed here on Gough). A key part of this community is the Island Tree *Phyllica arborea*, the only large, woody plant on the islands, and which has played a role in the evolution of the endemic buntings *Nesospiza*. Peter Ryan





Peter Ryan

**309.** Sooty Albatrosses *Phoebastria fusca* are the most aerial of albatrosses, soaring effortlessly around the islands' cliffs. Preliminary courtship apparently takes place in flight, with pairs engaging in synchronised gliding displays.

#### *Island habitats*

Marine erosion has outpaced fluvial erosion, resulting in narrow beaches and steep coastal cliffs subject to occasional rock falls and slumping. Sandy beaches are rare, mainly confined to Tristan. Offshore, the bottom drops away steeply from most islands, providing little habitat for inshore-feeding seabirds. A band of giant kelp *Macrocystis pyrifera* occurs 50–200 m offshore in many places, especially off the more sheltered, eastern shores (Ryan 2007).

The terrestrial vegetation changes with altitude. Nightingale, the smallest and lowest island of the group, is almost entirely blanketed in tall tussock grass, *Spartina arundinacea*. Tussock grass also covers the coastal cliffs of Inaccessible, and this vegetation once occurred in the lowlands of Tristan, but has been replaced by short, heavily grazed pastures dominated by introduced grasses and other plant species. The drier, well-drained slopes on Tristan (and locally on Inaccessible) are carpeted in ferns,

especially the widespread *Blechnum pennamarina*. On Gough, *Spartina* shares the coastal cliffs with a smaller tussock grass, *Parodiocloa flabellata*. Areas disturbed by seals and penguins are characterised by sedges and an array of weedy species, including two species of *Cotula* daisies endemic to the islands.

Away from the coast, tussock grass gives way to fern bush, a diverse community characterised by Island Trees *Phyllica arborea* and spectacular, cycad-like Bog-ferns *Blechnum palmiforme*. The Island Tree is the only large, woody plant on the islands, and has played an important role in the evolution of the endemic buntings *Nesospiza*. Fern bush is confined to the area around the Ponds on Nightingale (see plate 307), but covers most of the plateau of Inaccessible and the lower base of Tristan, where it extends up to 800 m above sea level. On Gough, fern bush occurs almost to sea level, but peters out around 450 m. At higher elevations, strong winds and cooler temperatures inhibit the growth of tall

vegetation. Fern bush gives way to wet heath, a short vegetation more typical of the sub-antarctic islands, dominated by grasses, sedges and ferns. Higher still, and on exposed ridges, wet heath grades into feldmark and other alpine communities, dominated by dwarf, cushion-forming plants.

Soils are generally shallow and poorly developed, but slow rates of decomposition promote the accumulation of peat. Deep layers of peat have formed in some areas, but regular slips occur on steeper slopes, triggered by extremely heavy rain (up to 300 mm in a day). Open water is scarce, confined to a few small ponds and crater lakes. Depressions typically are filled by bogs. Although some *Sphagnum* bogs occur on Tristan, most bogs are covered in a dense floating mat of the sedge *Scirpus sulcatus*. On Gough, however, the higher rainfall promotes the formation of extensive *Sphagnum* bogs in upland areas.

### Breeding seabirds

As on most oceanic islands, there are relatively few bird species. Seabirds predominate, there being 22 breeding species, many of which occur in huge numbers (Appendix 1). Four species and two subspecies breed nowhere else. Since access to the islands is possible only by sea, taking 5–6 days from Cape Town, visitors have the opportunity to become well acquainted with most of the seabirds during the journey.

### Penguins

Just one species of penguin breeds on the islands, the Northern Rockhopper Penguin *Eudyptes moseleyi*. Recent genetic and vocal analyses have confirmed the suspicions of field biologists that this species is quite distinct from the Southern Rockhopper Penguin *E. chrysolome*. Besides occurring on Tristan da Cunha

and Gough, Northern Rockhoppers are found only on Amsterdam and St Paul, cool-temperate islands at similar latitudes in the central Indian Ocean. Tristan da Cunha and Gough support some 80% of the world population. As for the Southern Rockhopper, numbers have decreased historically, and Cuthbert *et al.* (in press) suggest that it qualifies as Endangered. Northern Rockhoppers are seasonal visitors, arriving in late winter (August), laying in September, and fledging chicks in December–January. After a brief recovery period, the adults return to the island to moult, then disappear out to sea for the winter.

### Albatrosses

Three species of albatross breed on the islands, of which two are endemic. The Tristan Albatross *Diomedea dabbenena* is genetically the most distinctive of the Wandering Albatross *D. exulans* complex (Nunn & Stanley 1998). It differs from the more widespread southern form in being smaller and substantially darker in all plumages. It breeds in wet-heath vegetation, where it is sufficiently open for the birds' running take-offs and landings. Adults return in November–December, lay in January and the chicks fledge in November. Successful breeders typically take a year off after breeding and so raise one chick every two years at most. It was once quite common on Tristan and Inaccessible, but was a favourite food source of the early settlers, who quickly wiped out the Tristan population and, with the help of feral pigs, managed to do almost the same on Inaccessible. Currently, only 1–2 pairs survive on Inaccessible, confined to the highest ridge on the island. The rest of the population, estimated at 2,200 pairs, breeds at Gough (Cuthbert *et al.* 2004).

At the other end of the albatross size spectrum, the Atlantic Yellow-nosed Albatross

### Birding on Tristan: when, where and how

Tristan is the most remote community in the world. Access is only possible by ship, and takes roughly a week each way from Cape Town. Most tourists are restricted to brief visits on cruise ships. Up to ten cruises call at the islands each year. They offer a chance to see all the islands, with landings possible at Nightingale and Inaccessible from the smaller, natural history cruises. However, visits are brief, and inclement weather may prevent landing, even on Tristan. All vessels must first call at Tristan before visiting the outer islands. The best time to visit the islands is in summer (between September and April), when the weather is more settled. The period from October to December is the best time for birds, but the weather is perhaps more favourable for landings later in summer.

There is accommodation on Tristan, but independent visitors need to apply to the Administrator for permission to visit. Berths are limited on the fishing vessels that visit the islands 6–8 times per year. Once on Tristan it is usually possible to arrange a day trip to Nightingale and perhaps Inaccessible. Gough is closed to tourists. For further information about visiting the islands, consult Ryan (2007) and the Tristan website [www.tristandc.com](http://www.tristandc.com)



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310. Adult Northern Rockhopper Penguins *Eudyptes moseleyi* are readily distinguished from Southern Rockhoppers *E. chrysocome* by their extravagant head plumes.



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311. Tristan Albatrosses *Diomedea dabbenena* are slightly smaller than Wandering Albatrosses *D. exulans*, and take much longer to attain equivalent plumage stages. This is a typical breeding female.



Peter Ryan

**312.** A pair of Atlantic Yellow-nosed Albatrosses *Thalassarche chlororhynchos* courting on Second Pond, Nightingale Island. The four ponds are covered in a dense mat of *Scirpus sulcatus* that provides nesting sites for some 1,200 pairs of albatrosses.



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**313.** An Antarctic Tern *Sterna vittata* of the large, pale Tristan race *S. v. tristanensis*.



*Thalassarche chlororhynchos* is also endemic to the islands. Smaller and more agile than Tristan Albatross, it breeds at lower elevations. Most nests are in fern bush, often sheltered under tree canopies, but some are in quite dense tussock grass and others occur right down to the beach on the south side of Nightingale. Unlike Indian Yellow-nosed Albatrosses *T. carteri*, they typically breed singly or in loose aggregations, but concentrations occur around some open areas such as the Ponds on Nightingale. Most pairs breed annually, arriving in late August, laying in September–October, and fledging chicks in March–April. The population is hard to count, but the largest numbers are thought to occur on Tristan, mainly in the inaccessible southeast quadrant. The last formal assessment suggested that numbers were decreasing on all islands, and as a consequence it was listed as Endangered (Cuthbert *et al.* 2003). Recent data are more optimistic, however, suggesting some recovery since 2000 (author's unpublished data).

The islands are also the global stronghold of the exquisite Sooty Albatross *Phoebastria fusca*. Together with its close relative, Light-mantled Sooty Albatross *P. palpebrata*, it has the highest aspect ratio of any bird (in other words it has very long, narrow wings), and is supremely adapted to exploit strong winds. Conversely, it is cumbersome on land, and breeds on cliffs, where it can land and take off right at the nest. Combined with its dark plumage, its cliff-nesting habits make counting difficult, but perhaps 6,000 pairs breed on the islands each year, with the majority on Gough. It breeds in summer, laying a few weeks after the Atlantic Yellow-nosed Albatross, and takes slightly longer to raise its chick. As with Tristan Alba-

tross, successful pairs seldom breed in successive years (Ryan 2007).

### Southern Giant Petrel

Southern Giant Petrels *Macronectes giganteus* formerly bred on Tristan, but their sole legacy is the name 'Nellie Hump', given to a prominent ridge above the village. They are now confined to Gough, where there are three colonies at mid elevations along the west coast, and a few pairs at sea level on the east coast, near to the last population of Southern Elephant Seals *Mirounga leonina* on the island. The Southern Giant Petrel population on Gough has increased in recent years, probably linked to growth in Subantarctic Fur Seal *Arctocephalus tropicalis* numbers (Ryan 2007).

### Tristan Skua

The confusing 'brown skua' complex that breeds around the southern oceans is represented by Tristan Skua *Stercorarius antarctica hamiltoni*, which is endemic to Tristan da Cunha and Gough. It is widespread and fairly abundant, breeding on all the islands, albeit in small numbers on Tristan where it is still persecuted as a potential predator of poultry and lambs. On the other islands, its diet is dominated by small seabirds, especially prions *Pachyptila* and storm-petrels (Hydrobatidae), although it will tackle larger species, including Great Shearwaters *Puffinus gravis* and Spectacled Petrels *Procellaria conspicillata*. Breeding pairs typically defend territories with sufficient numbers of burrowing petrels to support their brood of two chicks. Competition for territories is fierce, with roughly half the population forced into non-breeding 'clubs'. In the 1980s, Bob Furness demonstrated the demand for

### Conservation

Visitors must be extremely vigilant not to introduce any new species to the islands, or to move species between islands, including native species (given the evolution of island-specific populations). Be sure to clean your boots, clothing and field equipment (e.g. camera bags, backpacks, tripod legs) before arriving on the islands, and when moving between islands. Turn out all your pockets and clean the seams. Pay special attention to seeds trapped in velcro on waterproofs and packs. Rats and mice pose the greatest threat to the islands' birds. When leaving from Tristan to the outer islands, make sure that your equipment is rodent-free. Day visitors are not allowed to take food to Inaccessible, specifically to reduce the risk of rodents getting ashore. Fire is another hazard, so no smoking is allowed on the outer islands.

Few birders will have the privilege to visit Tristan and Gough, but you can still help to promote the islands' conservation. Recent studies by New Zealand experts suggest that it is technically feasible to eradicate mice from Gough and rats from Tristan. Given the massive impacts of these introduced predators, it is vital to ensure that funds are made available for eradication programmes. Birders can help by supporting calls to the British Government to fund rodent eradication projects at Tristan and Gough. For further information, visit [www.rspb.org.uk/ourwork/conservation/projects/tristandacunha/publications.asp](http://www.rspb.org.uk/ourwork/conservation/projects/tristandacunha/publications.asp)

breeding opportunities on Gough by removing one member of a breeding pair every day for two weeks. In each case, the vacancy was filled within a day (Furness 1987).

### Terns

Unlike the other seabirds, Brown Noddy *Anous stolidus* and the endemic race of Antarctic Tern *Sterna vittata tristanensis* seldom venture far offshore while breeding. It is interesting to see how these two terns interact at the very edges of their ranges. The noddy is a largely tropical species that reaches its southern limit on Gough, whereas Antarctic Tern reaches its northern limit on Tristan. Both are southern-summer breeders, with Brown Noddy laying before Antarctic Tern. A few Antarctic Terns remain around the islands in winter, but all the noddies have left the islands by May and return in September. Although many noddies breed on cliffs with the Antarctic Terns, some pairs also breed in trees.

### Burrow-nesting seabirds

The remaining 14 breeding seabirds are all petrels that nest in burrows, and are largely nocturnal visitors to the islands. As a result, it is easy to overlook the sheer abundance of these birds. They greatly outnumber all other birds, with roughly three million pairs breeding in Tristan da Cunha and five million pairs on Gough (Appendix 1). Their nocturnal behaviour is one important mechanism for reducing the risk of predation by Tristan Skuas and the only species that visits regularly during the day is the large Spectacled Petrel. Great Shearwaters arrive at dusk when incubating, but become more daring once their chicks hatch. Seeing more than a million Great Shearwaters mass offshore at Nightingale each afternoon, then come crashing ashore at dusk, is one of the world's great seabird spectacles. Even that is perhaps surpassed by the sight of tens of thousands of petrels flying overhead by spotlight at night on Gough. Broad-billed Prion *Pachyptila vittata* is the most abundant species on Gough, which supports over two million pairs, but around the weather station there are also large numbers of Atlantic *Pterodroma incerta* and Soft-plumaged Petrels *P. mollis*, Common Diving-petrels *Pelecanoides urinatrix* and White-faced Storm-petrels *Pelagodroma marina*. Great Shearwaters are abundant and Little Shearwaters *Puffinus assimilis* locally

common in tussock grass along the coast, whereas Kerguelen Petrels *Pterodroma brevirostris* are common farther inland. Venturing out at night on Inaccessible or Nightingale offers a similar spectacle, although the species differ somewhat: there are no Atlantic Petrels and White-bellied Storm-petrels *Fregetta grallaria* outnumber White-faced Storm-petrels in most habitats. The main island of Tristan stands in stark contrast to the other three islands, with virtually no nocturnal seabirds, thanks to the combined impacts of human exploitation and introduced predators.

Most petrels breed in the austral summer, although Grey Petrel *Procellaria cinerea*, Great-winged Petrel *Pterodroma macroptera* and Atlantic Petrels lay in autumn or early winter, with chicks fledging the following summer. This strategy proved costly on Tristan, where they were much sought-after as food during the lean winter period by the islanders and introduced predators alike. As a result, only a handful of pairs survive on Tristan, the last remnants of what were presumably vast populations before the island's colonisation. Petrels are now suffering the same fate on Gough, where starving House Mice *Mus musculus* have taken to eating seabird chicks each winter (see below). This has been well documented for the endemic Atlantic Petrel, with fewer than 20% of pairs managing to raise a chick each year, compared with typical breeding success of 60–70% in other *Pterodroma* petrels (Cuthbert 2004; Wanless 2007). Despite its still substantial population on Gough, the Atlantic Petrel is now listed as Endangered.

Two species of burrowing petrel are confined to a single island in the group. The diminutive Grey-backed Storm-petrel *Oceanites nereis* is a widespread subantarctic species that reaches its northern limit on Gough. The other is the Spectacled Petrel, which breeds on the plateau of Inaccessible – the only breeding site in the world for this species. This may not always have been the case. Historical records from the Indian Ocean, coupled with the presence of sub-fossil remains of a large *Procellaria* petrel on Amsterdam Island, suggest that it may have bred there prior to the introduction of mammalian predators (Ryan 1998). Spectacled Petrels on Inaccessible also came perilously close to extinction when feral pigs roamed the island, but fortunately the pigs died out before the last petrels were eaten, and the population



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**314.** Spectacled Petrels *Procellaria conspicillata* breed only on the higher parts of the plateau of Inaccessible Island. Their colonies create distinctive boggy patches among dense stands of Bog-ferns *Blechnum palmiforme*.



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**315.** The Great Shearwater *Puffinus gravis* is the most abundant bird at the islands, despite no longer breeding at the main island of Tristan. In areas of dense tussock grass, some pairs lay on the ground.

has recovered well, despite ongoing at-sea mortality due to longline fisheries. Recent surveys suggest that the population is still increasing, with some 10,000 pairs breeding on Inaccessible each summer (Ryan *et al.* 2006).

Another species that has been confirmed breeding on only one island in the group is Sooty Shearwater *Puffinus griseus*. A few pairs have bred on Tristan, but the species has also been observed among Great Shearwaters gathering off Inaccessible prior to coming ashore, and a few may breed among the vast numbers of Great Shearwaters at other islands. However, the most enigmatic seabird is the white-bellied race of Black-bellied Storm-petrel *F. tropica melanoleuca*, reported to breed on Gough (Brooke 2004). It is not known for certain whether one or two species of *Fregetta* storm-petrel breed on Gough; most authors have ignored the problem, and treat all white-bellied birds as White-bellied Storm-petrel, but the status of Black-bellied Storm-petrel does need to be resolved (Shirihai 2007). Unfortunately, the *Fregetta* storm-petrels breed quite late in the summer, and few people have had a chance to examine many birds on Gough, given that the annual relief of the weather station takes place in spring. It has become increasingly rare in spring, thanks no doubt to the unwanted attentions of mice on the island.

### Landbirds

The seven extant landbirds, described below, are all endemic to the islands. In addition, two further landbird populations (a moorhen and a bunting) became extinct on Tristan sometime during the nineteenth century, one or both of which are likely to have been additional endemic species.

### Moorhens

Some authorities consider that Gough Moorhen *Gallinula comeri* and the now-extinct Tristan Moorhen *G. nesiotis* were conspecific, but both taxa became flightless and must thus have evolved from independent colonisations by vagrant Common Moorhens *G. chloropus*. It provides an interesting example of how the same suite of adaptations evolves in parallel when birds are exposed to similar conditions – in this case, selection for reduced wings and more robust legs and feet (Olson 1973). It is intriguing to speculate why the moorhen on Tristan became extinct when, in 1956, eight

Gough Moorhens released at Sandy Point successfully colonised Tristan and are now widespread and relatively abundant wherever sufficient cover exists. One possibility is that feral cats played a key role in the disappearance of the original population; this aggressive predator has since died out on Tristan.

### Inaccessible Rail

Probably the most sought-after of the islands' birds is the Inaccessible Rail *Atlantisia rogersi*, which is confined to Inaccessible Island. It was described only in 1923, even though scientists on the *Challenger* expedition were alerted to the bird by the Stoltenhoff brothers when they were rescued from the island in 1873. It is abundant, occurring virtually throughout the island, including on the near-vertical sea cliffs, but is more often heard than seen, as it spends most of its time creeping mouse-like through the island's dense vegetation (Fraser *et al.* 1992). Its territorial call is a high-pitched trill, possibly suggesting a distant *Rallus* ancestor. It has been on the island for so long that its wings have reduced to little more than vestigial stumps, and its plumage has become soft and fur-like. Loss of flight is common in many island rails, and serves to reduce the energetic demands of growing and maintaining large wings and associated musculature. Quite why the Inaccessible Rail evolved such small size is unknown. It is the smallest surviving flightless bird in the world, and is permanently at risk should mammalian predators ever reach the island.

Inaccessible Rails are most vocal in spring, when pairs defend territories vigorously. However, they are easy to locate year-round, because pairs remain in contact with regular 'chik' or 'chik-ik' calls. They lay two eggs in a ball-shaped nest woven from grass and sedge leaves that is accessed via a tunnel through the surrounding vegetation. The chicks leave the nest shortly after hatching. When threatened by a Tristan Thrush *Nesocichla eremita*, the parents raise their vestigial wings and squeal loudly, but thrushes still kill many chicks. Unwary adults occasionally fall victim to Tristan Skuas.

### Tristan Thrush

Tristan Thrush is an aberrant *Turdus* with streaky brown, neotenus plumage, reduced wings, enlarged legs and feet and an unusual brush-tipped tongue to aid it in lapping up egg contents. It occurs on Tristan, Inaccessible and



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**316.** A Gough Moorhen *Gallinula comeri* on Tristan. The endemic flightless moorhen originally found on Tristan apparently became extinct in the nineteenth century.



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**317.** Weighing just 40 g, the Inaccessible Rail *Atlantisia rogersi* is the world's smallest flightless bird. This individual is sunning itself after a protracted rainy spell.



Peter Ryan

**318.** According to new research, Wilkins' Bunting *Nesospiza wilkinsi* is confined to Nightingale Island, where its population has probably never exceeded a few hundred individuals.



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**319.** The small-billed Nightingale Bunting *Nesospiza questi* is barely half the mass of Wilkins' Bunting *Nesospiza wilkinsi*.

Nightingale, with different subspecies on each island, and is the only landbird to have survived the onslaught of settlers and introduced predators on Tristan, albeit in small numbers. A supreme opportunist, it is quick to explore any possibility, including the arrival of people. It can become something of a nuisance to campers on the outer islands, as a noisy, squabbling group soon gathers to peck at anything left lying around. It feeds on a wide range of prey, from berries and invertebrates to eggs, chicks and meat scavenged from skua kills (Fraser *et al.* 1994). On the eastern plateau of Inaccessible the birds have even learnt to hunt adult White-bellied Storm-petrels, holding them down with their feet while bludgeoning them to death with their bills (Ryan & Moloney 1991). The absence of the thrush on Gough has resulted in Gough Bunting taking on the opportunist's role, although not to quite the same extent. The thrush is larger than the Tristan da Cunha buntings, with a longer bill and strong legs and feet, which are used to pull up mossy vegetation in search of insects (Ryan & Cuthbert in press).

### Buntings

The buntings evolved from vagrant South American grass-finches. Only one species, Gough Bunting *Rowettia goughensis*, occurs on Gough, but several forms have evolved on Tristan da Cunha in what was presented as a classic example of simple adaptive radiation by David Lack (Lack 1947): birds with different bill size exploit different niches on both Inaccessible and Nightingale, with small-billed birds eating mainly grass and sedge seeds, while large-billed birds crack open the woody fruits of the Island Tree.

Subsequent work on Inaccessible revealed a more complex situation. In 1982/83 Mike Fraser found that there were two, altitudinally segregated colour morphs of small-billed buntings, while further investigation in the late 1980s found extensive hybridisation between large- and small-billed forms on the eastern plateau (Ryan *et al.* 1994). Genetic analyses then established that there was very little difference between populations, with the main difference being between *islands* rather than between small- and large-billed forms (Ryan *et al.* 2007).

Nevertheless, despite limited genetic differentiation, the two forms on Nightingale behave as good species, with marked vocal and mor-

phological differences and no evidence of hybridisation. Accordingly, the author's view is that two species should be recognised on Nightingale: the common, small-billed, Nightingale Bunting *Nesospiza questi* and the rare Wilkins' (or Grosbeak) Bunting *N. wilkinsi* (Ryan 2008). On Inaccessible, there are three genetic lineages, corresponding to the three ecomorphs. However, given the high levels of intergradation, at least locally, and incomplete genetic assortment, they are best treated as a single species, Inaccessible Bunting *N. acunhae*, with three subspecies: Lowland *N. a. acunhae*, Upland *N. a. fraseri* and Dunn's Bunting *N. a. dunnei* (Ryan 2008).

The extinction of buntings on Tristan brings another taxonomic dilemma, because this population is known only from the type specimen, described by Cabanis in 1873. Given the proliferation of island-specific forms in this group (Ryan *et al.* 2007; Ryan 2008), it is possible that the Tristan population was specifically distinct from those on Inaccessible and Nightingale but there is simply too little material to make an objective judgement. All we can say is that the type specimen most closely resembles the birds found on Inaccessible, and thus the Tristan population is currently treated as *N. acunhae*.

### Non-breeding seabirds and vagrants

More seabird species visit the waters around the islands than actually breed there, as 29 non-breeding species have been recorded (Ryan 2007). The small breeding population of Southern Giant Petrels is augmented by non-breeding giant petrels, including some Northern Giant Petrels *M. halli*. They are joined behind visiting ships by Cape Petrels *Daption capense*, White-chinned Petrels *Procellaria aequinoctialis* and Wilson's Storm-petrels *Oceanites oceanicus*, as well as occasional Southern Fulmars *Fulmarus glacialisoides*. The Black-browed Albatross *Thalassarche melanophris* is the commonest of the non-breeding albatrosses, of which small numbers of six other species have been recorded. Most non-breeding seabirds breed elsewhere in the southern oceans, but some northern-hemisphere species visit in summer, notably Cory's Shearwaters *Calonectris diomedea*, Leach's Storm-petrels *Oceanodroma leucorhoa* and Long-tailed Skuas *Stercorarius longicaudus*. The other species are rare visitors or vagrants to the islands.

The islands are well off the beaten track, but they nonetheless attract a fair number of vagrant land and freshwater birds, testament to the large numbers of birds that become lost at sea. At least 28 species have been recorded, mostly from Tristan (Ryan 2007). This is not just a function of there being more observers on Tristan. The island probably attracts more vagrants because of its larger size and height and, once ashore, there are relatively few predatory skuas to eat or harass birds. The most regular vagrants are Cattle Egret *Bubulcus ibis* and American Purple Gallinule *Porphyrio martinica*. In both species, it is mainly young birds that arrive after the breeding season in South America, sometimes in small flocks, and may persist on Tristan's Settlement Plain for several months. Other regular vagrants include Barn Swallow *Hirundo rustica* and a variety of shorebirds. Other vagrant passerines are extremely unusual, with single Eastern Kingbird *Tyrannus tyrannus* and Willow Warbler *Phylloscopus trochilus* being the only confirmed records.

#### A wealth of biodiversity

Birds dominate the island's fauna, but they are not the only wildlife group that makes the islands globally important for biodiversity conservation. In addition to 11 endemic bird

species, there are 27 endemic flowering plants, 14 endemic ferns, and more than 100 endemic macro-invertebrates (Ryan 2007). Levels of endemism among cryptogams and smaller invertebrates are not known, but are likely to be high.

The only native mammals on the islands are Subantarctic Fur Seals and Southern Elephant Seals that come ashore to breed and moult. Gough was the main refuge for the fur seal during the height of commercial sealing and, with some 300,000 animals, still supports 80% of the global population (Ryan 2007). Much smaller numbers of fur seals breed on Tristan da Cunha, but their populations are increasing at all three islands, possibly to the detriment of Northern Rockhopper Penguins at their stronghold on Alex Island, adjacent to Nightingale (Cuthbert *et al.* in press). The elephant seals have not recovered from intense exploitation for blubber, and only a few survive, breeding on the sheltered northeast coast of Gough. Fortunately, their numbers remain healthy farther south in the Atlantic Ocean.

There are no other terrestrial vertebrates, but the seas around the islands support a diverse marine community of fish, including one endemic species, the Klipfish *Bovichtus diacanthus*. At least 15 cetaceans have been reported



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**320.** Tristan Thrushes *Nesocichla eremita* are dietary generalists, but eggs are a sought-after component of their diet. This individual of the large, dark race *procax* on Nightingale Island has managed to break into an abandoned Atlantic Yellow-nosed Albatross *Thalassarche chlororhynchos* egg.



from the islands' waters, including several strandings and sightings of the extremely poorly known Shepherd's Beaked Whale *Tasmacetus shepherdi* (Ryan 2007). Historically the islands were an important breeding ground for Southern Right Whales *Eubalaena australis*, but their recovery was set back by illegal Soviet whaling following the temporary evacuation of Tristan in 1961 (owing to volcanic eruption and lava flows) (Best 1988). Marine invertebrates and seaweeds are poorly known, but levels of endemism are high among at least some groups, including bivalves and red seaweeds (Rhodophyta) (Ryan 2007).

### Threats to birds

With the exception of a few marginal species such as Sooty Shearwater, virtually all populations of breeding birds are of global conservation importance. In addition to the 11 endemic species (Appendix 1), the islands support more than half the global populations of Northern Rockhopper Penguin, Sooty Albatross, Broad-billed Prion, Great Shearwater, Kerguelen and Soft-plumaged Petrels, and White-bellied

Storm-petrel (Brooke 2004). Many of these species are classified by IUCN as Globally Threatened, with two Critical, five Endangered, six Vulnerable and three Near Threatened species breeding on the islands (Appendix 1). The landbirds are most at risk from introduced predators, whereas the seabirds face threats both from predators on land and from modern fishing methods at sea.

Introduced predators such as feral cats, dogs and pigs have occurred on the islands at various times, but currently the only feral mammal populations are Black Rats *Rattus rattus* on Tristan, and House Mice on Tristan and Gough (Ryan 2007). Rats are well known to have a very serious impact on island birds, and they doubtless play a major role in suppressing the numbers of burrowing petrels on Tristan. But until recently, mice were considered to affect mainly invertebrates and plants. This myth was shattered when Rich Cuthbert and Erica Sommer discovered that the very low breeding success of Tristan Albatrosses and Atlantic Petrels on Gough in 2000/01 was due to mouse predation of chicks (Cuthbert & Hilton 2004).

That mice were the culprits was confirmed by Ross Wanless and Andrea Angel, who obtained extraordinary video footage of mice attacking live chicks of both these species and of Great Shearwaters (Wanless *et al.* 2007).

Mice arrived on Gough among sealers' supplies sometime during the 1800s, and have spread across the entire island. Numbers peak in summer, with densities of up to 300 mice per hectare, but then crash in winter, when food is limited. Most bird predation occurs in winter, but some birds and eggs are taken in summer, including Gough Buntings. Populations of Tristan Albatross (Cuthbert *et al.* 2004) and Gough Bunting (Ryan & Cuthbert in press) are decreasing, and both species have just been raised to Critically Endangered (BirdLife



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**321.** An immature Gough Bunting *Rowettia goughensis* adopts the alert, sky-pointing posture when a Tristan Skua *Stercorarius antarctica hamiltoni* flies over. This large passerine takes up to four years to acquire adult plumage (Ryan & Cuthbert in press).

International 2008). Other burrow-nesting seabirds are almost certainly affected, but it is hard to quantify the impact of the mice.

Many of the islands' seabirds also are at risk from various threats at sea. Immediately around the islands they are dazzled by powerful lights on ships at night, and risk colliding with vessels (Ryan 1991). Visiting ships are required to douse all non-essential lights, but this is not always enforced. The main threat at sea for albatrosses and many large petrels is incidental mortality on fishing gear, especially longlines. All three albatrosses, giant petrels, Spectacled and Grey Petrels, and Great Shearwaters are killed on longlines. This fishing-related mortality is particularly serious for species that are also affected by mouse predation, such as Tristan Albatross and Grey Petrel. Considerable effort is being made to reduce this problem through implementation of bird-friendly fishing techniques, but better policing of high-seas fleets is a priority. There is a huge Exclusive Economic Zone around the islands, but also very little ability to ensure that only licensed fishers using approved techniques operate in their waters.

A final threat to all birds is the spectre of global climate change. Temperature increases, which have already been detected (Jones *et al.* 2003), are likely to alter vegetation dynamics and potentially increase the invasiveness of introduced species. For seabirds, shifts in global circulation patterns may be catastrophic because they rely on predictable food supplies within commuting distance of the islands while feeding their chicks. Given the paucity of islands in the South Atlantic, there are few options for them to shift their breeding sites to follow frontal zones and other areas of enhanced productivity. This may in part account for the decreases in rockhopper penguins across much of their range (Hilton *et al.* 2006).

### Conservation measures

The Tristan community is well aware of the global importance of its biodiversity heritage. Already more than 40% of the islands' meagre

land area is set aside for conservation. Gough and Inaccessible are nature reserves and together form a natural World Heritage Site, including the coastal waters out to 12 nautical miles. Although Nightingale is not formally protected, it is managed as a multi-use reserve, with limited exploitation confined to two seabird species: Northern Rockhopper Penguin (eggs only) and Great Shearwater. On the main island of Tristan, all penguin colonies are nature reserves, and only Tristan Skua and (the introduced) Gough Moorhen are not protected.

Alien species pose the greatest threat to the islands' fauna and flora. Great care must be taken not to introduce any new species to the islands, or to move species between islands. Rats, mice and other predators are the greatest threat to birds. Given the global importance of Gough for seabirds, there is an urgent need for extraordinary measures with regard to mice.



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322. Tristan Skuas *Stercorarius antarctica hamiltoni* defend their territories vigorously against intruders.



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**323.** A large Tristan Albatross *Diomedea dabbenena* chick killed by House Mice *Mus musculus* on Gough Island. In some parts of Gough, fewer than 10% of chicks survive the onslaught of mice each winter.

Feasibility studies have concluded that eradication of mice from Gough, and rats (and perhaps mice) from Tristan, is technically feasible by spreading poison bait across the island by helicopter. The challenge now is to secure the funding to actually conduct these operations. Continued vigilance also is needed to ensure that Inaccessible and Nightingale remain predator-free, especially given the presence of both rats and mice on Tristan. All goods being moved between the islands must be packed in rodent-free areas, and inspected carefully prior to leaving Tristan.

Plants and invertebrates also can have serious impacts on the islands' ecosystems. For the last decade, considerable effort has been made to eradicate Procumbent Pearlwort *Sagina procumbens*, a common European weed, from Gough. This seemingly innocuous plant has taken over vast tracts of other subantarctic islands, displacing native vegetation and changing ecological processes, and it would be disastrous if it were to reach the uplands of Gough. Efforts are also ongoing to remove New Zealand Flax *Phormium tenax* from Inaccessible and Nightingale, given its potential to dominate the native vegetation.

One of the main obstacles to effective conservation management on the islands is the

lack of human capacity (Glass & Ryan 2003). With a permanent population of only 270 people, spanning the full spectrum from children to pensioners, there are few people available for full-time conservation work. The formation of a Natural Resources Department on Tristan in the mid 1990s was a great step forward, but its small staff lacks the ability to meet all the islands' conservation obligations, with most of their energy devoted to managing the commercially important lobster fishery. Since 2000, the RSPB has been instrumental in securing funds for conservation on the islands, and promoting the development of local expertise. A Biodiversity Action Plan has been developed and a Conservation Officer post created. However, difficulty of access to the islands remains a serious stumbling block to the implementation of required conservation measures. For birds, the main conservation needs are as follows:

- to enforce strict quarantine measures for Tristan and the outer islands;
- to remove mice from Gough and rats and mice from Tristan; and
- to ensure bird-friendly fisheries throughout the ranges of Tristan's vast seabird populations.

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**324. The Atlantic Petrel *Pterodroma incerta* is the most abundant of the endemic seabirds, with more than a million pairs on Gough Island. Nonetheless, it is Endangered owing to mouse predation of its chicks.**

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**Appendix 1.** Breeding birds on Tristan da Cunha (Tristan, Inaccessible and Nightingale) and Gough Island. 'Breeding population' gives the estimated number of pairs breeding each year on Tristan da Cunha (including Inaccessible and Nightingale) and Gough Island from Ryan (2007). For biennial breeding species, the population estimates are less than the total breeding population, but the proportion breeding each year is known only for Tristan Albatross. Many of the estimates for burrowing petrels and shearwaters are crude.

		Breeding population		Global threat status
		Tristan da Cunha	Gough	
Northern Rockhopper Penguin	<i>Eudyptes moseleyi</i>	150,000	50,000	Endangered
Tristan Albatross †	<i>Diomedea dabbenena</i> *	2	1,400	Critical
Atlantic Yellow-nosed Albatross	<i>Thalassarche chlororhynchos</i> *	25,000	5,000	Endangered
Sooty Albatross	<i>Phoebastria fusca</i>	1,000	5,000	Endangered
Southern Giant Petrel	<i>Macronectes giganteus</i>	extinct	230	Near Threatened
Broad-billed Prion	<i>Pachyptila vittata</i>	200,000	2,000,000	
Spectacled Petrel	<i>Procellaria conspicillata</i> *	10,000	–	Vulnerable
Grey Petrel	<i>Procellaria cinerea</i>	50	10,000	Near Threatened
Great Shearwater	<i>Puffinus gravis</i>	2,500,000	1,000,000	
Sooty Shearwater	<i>Puffinus griseus</i>	5	–	Near Threatened
Little Shearwater	<i>Puffinus assimilis</i>	12,000	10,000	
Kerguelen Petrel	<i>Pterodroma brevirostris</i>	100	20,000	
Soft-plumaged Petrel	<i>Pterodroma mollis</i>	12,000	400,000	
Great-winged Petrel	<i>Pterodroma macroptera</i>	500	10,000	
Atlantic Petrel	<i>Pterodroma incerta</i> *	50	1,500,000	Endangered
Common Diving-petrel	<i>Pelecanoides urinatrix</i>	15,000	10,000	
Grey-backed Storm-petrel	<i>Oceanites nereis</i>	–	10,000	
White-faced Storm-petrel	<i>Pelagodroma marina</i>	6,000	10,000	
White-bellied Storm-petrel ††	<i>Fregetta grallaria</i>	50,000	10,000	
Tristan Skua	<i>Stercorarius antarctica hamiltoni</i> *	200	1,000	
Antarctic Tern	<i>Sterna vittata tristanensis</i> *	350	500	
Brown Noddy	<i>Anous stolidus</i>	400	200	
Inaccessible Rail	<i>Atlantisia rogersi</i> *	5,000	–	Vulnerable
Gough Moorhen	<i>Gallinula comeri</i> *	2,000	3,500	Vulnerable
Tristan Thrush	<i>Nesocichla eremita</i> *	1,300	–	Near Threatened
Gough Bunting	<i>Rowettia goughensis</i> *	–	500	Critical
Inaccessible Bunting	<i>Nesospiza acunhae</i> *	10,000	–	Vulnerable
Nightingale Bunting	<i>Nesospiza questi</i> *	4,000	–	Vulnerable
Wilkins' Bunting	<i>Nesospiza wilkinsi</i> *	50	–	Endangered

\* Endemic species or subspecies.

† Successful breeders seldom breed in successive years, so the actual population is larger than this.

†† Identity of the *Fregetta* storm-petrels on Gough island remains unresolved; some or all may be a white-bellied morph of Black-bellied Storm-petrel *F. tropica* (see Shirihai 2007 for details).