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Seabirds and Seals at the Prince Edward Islands

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at the Prince Edward Islands*



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Cover page: shows a Crozet shag at Marion Island (photo B. M. Dyer)

CONSERVING SURFACE-NESTING SEABIRDS AT THE PRINCE EDWARD ISLANDS: THE ROLES OF RESEARCH, MONITORING AND LEGISLATION

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South Africa's subantarctic Prince Edward Islands support substantial proportions of the global populations of a number of surface-nesting seabirds. Populations of most of these have decreased at the islands since the 1980s and 12 of 16 species are regarded as Threatened or Near Threatened regionally or internationally. The main causes of population decreases are thought to be by-catch mortality of albatrosses and giant petrels in longline fisheries, and environmental change influencing availability of prey to penguins and the Crozet shag *Phalacrocorax [atriceps] melanogenis*. It is proposed that the Prince Edward Islands Special Nature Reserve be expanded to include surrounding territorial waters so as to afford additional protection for seabirds breeding there, especially those species feeding near to the islands. Consideration needs also to be given to listing species as threatened or protected in terms of planned new legislation in South Africa and then developing management plans for them, preferably linked closely with the Agreement on the Conservation of Albatrosses and Petrels and the National Plan of Action (NPOA) – Seabirds. The islands should also be nominated as a Ramsar Wetland of International Importance in recognition of their importance to seabirds, with 13 of the 16 species exceeding the 1% of the global population criterion. A combination of research, monitoring and legislation will help conserve the surface-nesting seabirds of the Prince Edward Islands into the 21st century, but only providing the effects of climate change can somehow be addressed.

Key words: conservation, environmental legislation, Marion Island, monitoring, Prince Edward Islands, seabirds, Subantarctic

The Prince Edward Islands comprise Marion Island (290 km²; 46°52'S, 37°51'E) and Prince Edward Island (44 km²; 46°38'S, 37°57'E). They are South African territory in the south-western Indian Ocean, having been annexed in 1947 and 1948 respectively. Together with the Crozet, Kerguelen (French) and Heard and Macdonald (Australian) islands, they form the South Indian Ocean or Kerguelen Biogeographical Province. The nearest land to the Prince Edward Islands is Île aux Cochons (Crozet Islands), 950 km to the east (Hänel and Chown 1997).

In all, 29 species of birds have been recorded breeding at the Prince Edward Islands Special Nature Reserve, of which 16 are surface-nesting seabirds; the remainder are burrowing petrels and the single non-seabird species, the lesser sheathbill *Chionis minor* (Williams *et al.* 1979, Cooper and Brown 1990). Estimates of the numbers of surface-nesting species breeding at the islands have been made on earlier surveys, especially for Marion Island (e.g. Rand 1954, Williams *et al.* 1975, 1979, Watkins 1987). Cooper and Brown (1990) presented a summary of the annual breeding populations of the different species known or thought to breed at the islands in the 1980s. The large bird populations of the island group have led to it being

declared an Important Bird Area by BirdLife International (Barnes and Huyser 1998, Barnes *et al.* 2001).

In the 1990s, it became apparent that long-term climatic change might be influencing the populations of some seabirds in the Southern Ocean. For example, environmental change was thought to have caused decreases of rockhopper penguins *Eudyptes chrysolome* at several localities (Cunningham and Moors 1994, Bingham 1998, Guinard *et al.* 1998). At Marion Island, mean surface air temperature increased by 1.2°C between 1969 and 1999 and annual precipitation decreased after the mid 1960s (Smith 2002). Mean sea surface temperature (SST) increased by 1.4°C between 1949 and 2002 (Mélise *et al.* in press). At the same time, there was growing concern that incidental mortality of seabirds in longline fisheries (Brothers 1991) was adversely affecting populations of certain species of albatrosses (Diomedidae) and petrels (Procellariidae; e.g. Croxall *et al.* 1990, Jouventin and Weimerskirch 1990, Weimerskirch *et al.* 1997, Weimerskirch and Jouventin 1998). South African longline fisheries were operating in the vicinity of the Prince Edward Islands and elsewhere within the foraging ranges of birds breeding there (Ryan and Boix-Hinzen 1998, 1999, Nel *et al.* 2002a). Other longline fishing fleets oper-

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ating in the Southern Ocean also were expected to kill birds from the Prince Edward Islands (Nel *et al.* 2002b). Fur seal *Arctocephalus* spp. populations were increasing at the Prince Edward Islands (Wilkinson and Bester 1990) with potential to influence the numbers of seabirds there (Crawford *et al.* 1989, Guinard *et al.* 1998, Hofmeyr and Bester 1993).

Therefore, it was decided to intensify monitoring of seabirds at Marion Island in order to establish trends in the populations of some species. There was also a need to obtain information on numbers of seabirds at rarely visited Prince Edward Island, where until 2001 there had not been a survey of seabirds in midsummer, which is when many of the seabirds breed (Cooper and Brown 1990, Ryan *et al.* 2003a). Lack of information hampered estimation of world populations for some species (e.g. Ellis *et al.* 1998) and precluded assessment of the impact of fishing activities on others. Emphasis was placed on obtaining information on numbers and population trends for surface-nesting seabirds, which were easier to count than species breeding in burrows and which had been shown or were expected to be sensitive to environmental change and by-catch mortality (e.g. Nel *et al.* 2002a).

The suite of papers in this inaugural volume of the *African Journal of Marine Science* collates information on population sizes and trends of surface-nesting seabirds at the Prince Edward Islands, along with some information on demographic parameters (Cooper *et al.* 2003, Cooper and Weimerskirch 2003, Nel *et al.* 2003), collected mainly in the decade prior to, and during, a dedicated expedition to the islands in December 2001. Unpublished and published information on surface-nesting seabirds at the Prince Edward Islands collected prior to the 1990s and in 2002 has been included or referred to where relevant. Valuable information on the locations of colonies was gained (Underhill *et al.* 2003).

In addition to considering seabirds, the suite of papers presents new information on the status of fur seals *Arctocephalus* spp. at Prince Edward Island (Bester *et al.* 2003), which is particularly relevant given the likelihood that interactions between birds and seals will increase as seal populations expand (Hofmeyr and Bester 1993, David *et al.* 2003). It also documents the distribution and spread of alien vascular plants at Prince Edward Island, which may be partially attributable to dispersal of propagules by birds and seals (Ryan *et al.* 2003b). Additionally, Akkers (2002) gives preliminary results of at-sea movements of several seabirds and fur seals satellite-tracked during the expedition, and Cooper and Underhill (2002) report a vagrant blacksmith plover *Vanellus armatus* from Prince Edward Island.

In this overview of the status and conservation of surface-nesting seabirds at the Prince Edward Islands, estimates are presented of the overall numbers of such birds breeding at the islands at the commencement of the 21st century, the proportions of the global populations that breed at the islands are considered and the national and international conservation status of each species is reviewed. Attention is drawn to likely population decreases for a majority of surface-nesting seabirds at the island, and several initiatives aimed at improving the conservation status of the Prince Edward Islands and their surface-nesting seabirds are detailed.

SIZE AND STATUS OF POPULATIONS OF SURFACE-NESTING SEABIRDS

Information on the numbers of surface-nesting seabirds breeding at Marion Island (Crawford *et al.* 2003d) and Prince Edward Island (Ryan *et al.* 2003a) in 2001/02 is summarized in Table I. For king penguins *Aptenodytes patagonicus* at Marion Island, a population midway between upper (van Heezik *et al.* 1995) and lower estimates was assumed. For terns at Marion Island, we have used the mean numbers reported between 1996/97 and 2002/03, excluding 1997/98 for Kerguelen tern *Sterna virgata* when there was unusual breeding by this species there (Crawford *et al.* 2003e).

The proportions of the global populations of surface-nesting seabirds that breed at the Prince Edward Islands range from insignificant for gentoo penguin *Pygoscelis papua*, kelp gull *Larus dominicanus* and Antarctic tern *Sterna vittata* to almost half in the case of wandering albatross *Diomedea exulans*. The Prince Edward Islands support some 10% or more of the populations of eight surface-nesting seabirds, including one-third of Crozet shags *Phalacrocorax [atriceps] melanogenis*, which only breed elsewhere at the Crozet Islands, and about 20% of eastern rockhopper penguins *Eudyptes chrysocome filholi* and Indian yellow-nosed albatrosses *Thalassarche carteri* (Table I, Marchant and Higgins 1990, Delany and Scott 2002).

It is clear that, both from an international viewpoint (BirdLife International 2000) and a South African perspective (Barnes 2000), most of the surface-nesting seabirds at the Prince Edward Islands are Threatened (Endangered or Vulnerable) or Near Threatened, based on World Conservation Union (IUCN) category of threat criteria (Table I). The Crozet shag was not regarded as Threatened at an international level because of uncertainty regarding its specific status (A. J. Stattersfield *in litt.*). It forms part of the imperial shag or cormorant *P. atriceps* complex, and its classification as

Table I: Estimates of the population (pairs) of surface-nesting seabirds at Marion Island and Prince Edward Island in 2001/02 and their contribution to the world populations of these species. Information for Marion Island from Crawford *et al.* (2003d) and Prince Edward Island from Ryan *et al.* (2003a). For king penguins at Marion Island the estimate is the mid point between lower (Crawford *et al.* 2003d) and upper (van Heezik *et al.* 1995) estimates of overall numbers breeding at the island. For albatrosses the annual breeding population is indicated. For terns at Marion Island the estimates are the mean numbers reported breeding between 1996/97 and 2002/03 (excluding 1997/98 for Kerguelen tern). The international (BirdLife International 2000) and South African (Barnes 2000) classifications of conservation status are indicated, as well as the trend over the most recent decade (1992/93–2002/03): D – decreasing; I – increasing; S – stable

Species	Population (pairs)			World annual breeding population	Source	Proportion of world population	Status BirdLife International	Status South Africa	Trend 1992/93 to 2002/03
	Marion Island	Prince Edward Island	Combined breeding population						
King penguin	218 000	3 000	221 000	1 650 000	a	0.13			S/I
Gentoo penguin	844	475	1 319	317 000	a	<0.01	Near Threatened	Near Threatened	D
Macaroni penguin	363 000	9 000	372 000	9 000 000	a	0.04	Vulnerable	Near Threatened	D
Eastern rockhopper penguin	67 000	45 000	112 000	665 000	a	0.17	Vulnerable	Near Threatened	D
Wandering albatross	1 869	1 850	3 719	8 500	b	0.44	Vulnerable	Vulnerable	S
Grey-headed albatross	6 229	3 000	9 229	92 300	b	0.10	Vulnerable	Vulnerable	S
Indian yellow-nosed albatross	0	7 500	7 500	36 500	b	0.21	Vulnerable	Vulnerable	S
Dark-mantled sooty albatross	564	1 000	1 564	15 655	b	0.10	Vulnerable	Near Threatened	D
Light-mantled sooty albatross	179	150	329	21 600	b	0.02	Near Threatened	Near Threatened	D
Northern giant petrel	295	300	595	11 500	c	0.05	Near Threatened	Near Threatened	S/D
Southern giant petrel	1 430	1 400	2 830	31 000	c	0.09	Vulnerable	Near Threatened	D
Crozet shag	344	50	394	1 200	d	0.33		Vulnerable	D
Subantarctic skua	546	250	796	7 500	e	0.11			D
Kelp gull	24	30	54	>1 000 000	e	<0.01			D
Antarctic tern	6	<5	<15	42 000	e	<0.01			S/D
Kerguelen tern	19	<5	ca 60	2 000	e	0.03	Near Threatened	Endangered	S

a = Ellis *et al.* (1998) modified for Prince Edward Islands

b = Gales (1998)

c = BirdLife International (2000)

d = Jouventin *et al.* (1984), Crawford *et al.* (2003e)

e = Higgins and Davies (1996), Delany and Scott (2002)

a full species is provisional (Marchant and Higgins 1990). However, the population at the Prince Edward Islands is unlikely to intermingle with populations elsewhere and, following a rapid decrease from about 900 pairs or more in the mid 1990s to fewer than 400 pairs in 2001/02, it should now be regarded as Endangered (Crawford *et al.* 2003f).

The only surface-nesting seabirds at the Prince Edward Islands that are not regarded as Threatened or Near Threatened are the king penguin, which has been increasing in many parts of its range (Ellis *et al.* 1998) and may be increasing at Marion Island (Crawford *et al.* 2003d) and the Subantarctic skua *Catharacta antarctica*, kelp gull and Antarctic tern, which all have a wide distribution with large populations in the subantarctic region (Higgins and Davies 1996, Delany and Scott 2002, Table I). Kerguelen terns are considered Endangered in South Africa because of their small

population size and few breeding localities at the Prince Edward Islands (Barnes 2000).

THREATS TO SURFACE-NESTING SEABIRDS

For most (9–11 of 16; 56–69%) surface-nesting seabird species at the Prince Edward Islands, populations have decreased in the past 10 years (1992/93–2002/03, Table I). For species foraging close to the islands, such as gentoo penguin, rockhopper penguin and Crozet shag (Cooper 1985, Adams and Wilson 1987, Brown 1987), and possibly also for macaroni penguin *E. chrysolophus* (Crawford *et al.* 2003b), which is able to feed farther offshore (Brown 1987, Akkers 2002), it seems likely that the decreases have resulted from an altered availability of food. This is suggested by a

changed contribution of species to the diet of Crozet shags (Crawford *et al.* 2003e). Since the 1990s, breeding success of gentoo penguins *Pygoscelis papua*, macaroni penguins, rockhopper penguins and Crozet shags has probably been inadequate to maintain these populations (Crawford *et al.* 2003a, b, c, e). However, this conclusion has often been based on demographic parameters measured at other localities, and it will be important to assess survival of immature birds and adults at Marion Island. In 1997, late breeding by gentoo penguins resulted in high losses of eggs and chicks to returning Subantarctic skuas (Crawford *et al.* 2003a), but more typically abandonment of nests or starvation have been the main causes of nest failure (see also Williams and Burger 1979).

For changes in food availability that are brought about by climate change, there is little scope for interventive management other than to secure the future of genetic material, e.g. by captive breeding. This has been proposed for South Africa's bank cormorant *P. neglectus* (du Toit *et al.* 2003) and may prove necessary for the population of Crozet shags at the Prince Edward Islands if it continues to decrease in size.

In 1997/98, coincident with a strong *El Niño* event, there was exceptionally good breeding at Marion Island by five species of seabirds able to forage far from the island – king penguins, wandering albatrosses, grey-headed albatrosses *Thalassarche chrysostoma*, northern giant petrels *Macronectes halli* and southern giant petrels *M. giganteus* – and by Kerguelen terns. By contrast, breeding was unusually poor for two inshore foragers – gentoo penguin and Crozet shag (Crawford *et al.* 2003f). The similar responses by birds with similar foraging ranges suggest that environmental conditions influenced the availability of prey. *El Niño* events have affected seabirds and seals at other localities in the Southern Ocean (Croxall 1992, Chastel *et al.* 1993). A clearer understanding of how climate change may influence seabirds is likely to be forthcoming from comparative studies of the impacts of *El Niño* events at breeding localities distributed throughout the Southern Ocean (see Guinet *et al.* 1994).

No haematozoa were found in any of 89 blood smears from macaroni penguins or 80 smears from rockhopper penguins at Marion Island collected in 2001 (Schultz and Petersen 2003). Subantarctic penguins are adapted to an environment free of haematozoan vectors and have not developed an immune system to deal with such pathogens. If, as a result of global climate change or because of anthropogenic or avian introduction, vectors become established at the Prince Edward Islands, this could lead to acute infections and mass mortality, underlying the need to prevent introduction of haematozoa and vectors to the islands (Schultz and Petersen

2003). In order to minimize the possibility of introducing avian diseases to the Prince Edward Islands it is required that domestic chicken eggs be first irradiated and that only deboned poultry meat be supplied to the Marion Island base. All poultry waste is stored deep-frozen at Marion Island for annual return to South Africa. No poultry produce of any kind may be taken to Prince Edward Island (Prince Edward Islands Management Plan Working Group 1996).

Oil spills have had severe effects on penguins, especially when oil was washed ashore at landing beaches (e.g. Underhill *et al.* 1999, Crawford *et al.* 2000). It is required that the utmost care be taken to avoid spillage during fuel transfer operations at the Prince Edward Islands (Prince Edward Islands Management Plan Working Group 1996). However, a major spill, if it occurred when macaroni and rockhopper penguins are breeding at the island, may have disastrous consequences for these birds. In 1980 “some hundreds” of rockhopper penguins died after being oiled by deliberately dumped contaminated diesel fuel at Marion Island (Williams 1984, Cooper and Condy 1988). It is crucial that a contingency plan to deal with the consequences of an oil spill at the islands be developed. In 1997/98, the death of two wandering albatross chicks was caused by ingestion of large amounts of plastic (Nel and Nel 1999).

Seals may affect seabirds by displacing them from nesting sites, rendering access to breeding sites difficult or inflicting heavy mortality (Crawford *et al.* 1989, David *et al.* 2003). They also may compete for food. These aspects have not been studied in any depth at the Prince Edward Islands, but the continued increase in fur seal populations (Bester *et al.* 2003) suggests that interactions between seals and birds may become important there (Hofmeyr and Bester 1993, Ryan *et al.* 2003a).

Fishing has the potential to affect seabirds both by depleting food sources and by causing direct mortality. At the Prince Edward Islands, mortality from pelagic (tuna *Thunnus* sp.) and demersal (Patagonian toothfish *Dissostichus eleginoides*) longline fisheries in the Southern Ocean is the more serious threat and may already have caused decreases of wandering albatrosses, grey-headed albatrosses, both *Phoebetria* albatrosses (dark-mantled *P. fusca* and light-mantled *P. palpebrata*), both giant petrels and white-chinned petrels *Procellaria aequinoctialis* (Nel *et al.* 2002a, b, Crawford *et al.* 2003d). South Africa is in the process of developing a National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (NPOA-Seabirds) as recommended by the Food and Agriculture Organization of the United Nations' (FAO) Committee on Fisheries (FAO 1999, Cooper and Ryan

2002). The draft NPOA-Seabirds sets an interim target of reducing seabird mortality in the South African Patagonian toothfish fishery to below 0.05 birds/thousand hooks, a level that was surpassed by the fishery within its first six years of existence (Nel *et al.* 2002a).

As well as the legal fishery, Illegal, Unreported and Unregulated (IUU) longline fishing has been operating close to the Prince Edward Islands and elsewhere in the Southern Ocean and will continue to cause seabird mortality irrespective of national legislation (Brothers *et al.* 1999, Kock 2001, Cooper and Ryan 2002, Nel *et al.* 2002a, b). It has been estimated that between 7 000 and 17 000 seabirds have been killed by the Patagonian toothfish legal and IUU fisheries combined around the Prince Edward Islands during the first four years of their existence (Nel *et al.* 2002a). However, controls (such as its Catch Documentation Scheme) introduced by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), of which South Africa is an active member, are going some way towards reducing this scourge (Kock 2001, SC-CAMLR 2001), as should the International Plan of Action to address the problem of IUU fishing adopted by the FAO (FAO 2001). Lastly, South Africa's intended new "blue-water" fisheries patrol vessel with powers of arrest will be able to tackle the problem directly.

Although mortality from fisheries is the main concern at present, given the probable food limitation in the 1990s for seabirds feeding near the Prince Edward Islands, it would be unwise to consider the development of fisheries on the prey of these species, e.g. octopods and the decapod shrimp *Nauticaris marionis*. By contrast, longline fisheries may have provided large amounts of supplementary food to species such as the wandering albatross (Nel *et al.* 2003).

Reasons for the decrease of Subantarctic skuas and kelp gulls at Marion Island and the continued low abundance there of terns remain unclear, but possible factors include reduced food as a result of smaller populations of macaroni and rockhopper penguins (Hunter 1990), reduced availability of station garbage (Hemmings 1990), presumed changes in inshore food supply due to shifts in the position of the Subantarctic Front (E. A. Pakhomov *in litt.*) and a reduction in terrestrial invertebrate prey on Marion Island due to the effects of introduced house mice *Mus musculus* exacerbated by climatic change (Chown and Smith 1993, Huyser *et al.* 2000, Smith *et al.* 2002). Except for Kerguelen terns in 1997/98, the populations of terns have not increased noticeably following eradication of a feral cat *Felis catus* population on Marion Island in 1991 (Bester *et al.* 2000, 2002). A comparative eco-

logical study of these four larid species is required to elucidate the factors that are limiting their populations.

Given the strict management and quarantine protocols in place (Prince Edward Islands Management Plan Working Group 1996, Heydenrich and Jackson 2000), human disturbance (including indirectly by the possible introduction of new predators) of surface-nesting seabirds at the Prince Edward Islands is not considered a serious threat to their conservation, although it has been in the past for the gentoo penguin. However, it is recommended (Crawford *et al.* 2003f) that the Crozet shag be afforded enhanced protection in terms of the islands' management plan. Previously, feral cats at Marion Island had impacted severely on burrowing petrels, causing at least one species' local extinction, but effects on surface-nesting seabirds, with the likely exception of terns and possibly the gentoo penguin and kelp gull, is not considered to have been a serious conservation concern (Berruti 1981, Cooper and Fourie 1991, Cooper *et al.* 1995, Crawford *et al.* 2003a).

It has become apparent that, for some seabirds breeding at the Prince Edward Islands, there is interchange with other populations. For example, 57 wandering albatrosses that were banded at Possession Island in the Crozet Islands have been recaptured at Marion Island. Four birds banded at Marion Island have moved in the reverse direction (Cooper and Weimerskirch 2003). Similar interchanges have occurred with king penguins, a southern giant petrel and two Subantarctic skuas (Berruti *et al.* 1975, Brown and Oatley 1982, Gartshore *et al.* 1988, JC unpublished data). Clearly, to interpret correctly long-term trends in non-discrete populations of seabirds at the Prince Edward Islands, it will be necessary to understand the interrelationships between these populations and those at other breeding localities, and to institute conservation efforts at the metapopulation level.

Although several threats to the seabirds of the Prince Edward Islands have been identified, it is necessary that further monitoring and research be undertaken to assess their impacts. In particular, it will be necessary for additional surveys to be conducted to confirm population trends (especially at Prince Edward Island and at Marion Island for macaroni and rockhopper penguins, Subantarctic skuas, kelp gulls and terns) and to obtain more information on demographic parameters. Mortality of seabirds attributable to fur seals should be quantified to provide a baseline for assessing changes that may result from increases in the fur seal populations. Continued monitoring of climate and SST at the island group is necessary and should be combined with studies of the diets of selected seabirds to investigate further the influence of the environment on prey availability. More information on the foraging

areas of some seabirds, both during the breeding season and when away from the islands, is required, *inter alia* to investigate possible competition for prey resources (Brown and Klages 1987, Crawford *et al.* 2003c). The interpretation of factors influencing the dynamics of seabird populations has often been enhanced when several parameters were monitored for a number of species simultaneously (Trivelpiece *et al.* 1990, Croxall 1992, Chastel *et al.* 1993). The value of time-series that have proved useful in elucidating likely causes of changes in seabird populations at the Prince Edward Islands will be increased by their continuation. Particular value accrues when there is a clear signal, as during and after the ENSO (*El Niño* Southern Oscillation) event of 1997/98 (Crawford *et al.* 2003f).

IMPROVING THE CONSERVATION STATUS OF THE PRINCE EDWARD ISLANDS AND THEIR SURFACE-NESTING SEABIRDS

Several reviews of the conservation status of the Prince Edward Islands, including of their seabird populations, have been written in the past (Williams *et al.* 1979, Heymann *et al.* 1987, Cooper and Condy 1988, Cooper and Berruti 1989). The most recent published assessment of the islands' conservation status is that given in its management plan (Prince Edward Islands Management Plan Working Group 1996), which is due for revision as outlined below.

Reviewing the islands' management plan

The Prince Edward Islands Special Nature Reserve was declared on 3 November 1995 in terms of Section 18 of South Africa's Environment Conservation Act (Act No. 73 of 1989). It was the first (and is still the only) such Special Nature Reserve proclaimed by South Africa. The boundaries of the reserve were then set at the low-water mark. This proclamation was accompanied by the formal adoption of a Management Plan for the island group; which plan was published in 1996 (Prince Edward Islands Management Plan Working Group 1996), leading to the establishment of the Prince Edward Islands Management Committee (PEIMC).

The Management Plan states (Section 22) that a "comprehensive review of the plan will be undertaken at five-year intervals". A call for comments towards a review was made by the PEIMC to its members at its 2002 meetings and the revision will commence in the second half of 2003. A number of significant events and changes at the island group has led to the necessity

to revise the plan in the near future. Apart from the poor conservation status of most of the surface-nesting seabirds breeding at the islands (Table I), these include: research which has confirmed the synergistic (and deleterious) effects of climate change and the introduction of alien species on the islands' biota and ecosystems (Chown and Smith 1993, Huyser *et al.* 2000, Smith 2002, Smith *et al.* 2002); the intention to nominate the Prince Edward Islands, and their territorial waters, to the World Heritage Convention as a Natural Site in 2004 (Department of Environmental Affairs and Tourism 2001, www.environment.gov.za); the decision to build a new base on Marion Island (Environomics 2002), with construction to commence before the end of 2003; the development of a legal (and illegal) longline fishery for Patagonian toothfish in surrounding waters, with its concomitant increased mortality of albatrosses and petrels that breed at the islands (Cooper and Ryan 2002, Nel *et al.* 2002a); the production of a 1:25 000 topographical map of Marion Island based on aerial photography; and the completion of an environmental impact assessment of tourism on Marion Island (Heydenrich and Jackson 2000), which has been coupled with renewed interest (and recent applications) to land tourists.

Expanding the Special Nature Reserve

The National Environmental Management: Protected Areas Bill is being tabled in Parliament (*Government Gazette* 450 (24151) of 6 December 2002 and www.environment.gov.za). As set out in the bill, the intended new Act will allow for the proclamation of Special Nature Reserves and "applies in the Republic, including its territorial waters, exclusive economic zone and continental shelf" (Section 4). Therefore, a Special Nature Reserve may include a marine component. It also applies to the Prince Edward Islands, which are specifically named in the bill. The opportunity now exists for the Prince Edward Islands Special Nature Reserve to be expanded to include a marine protected area out to the edge of territorial waters (12 nautical miles from shore). Advantages of implementing such a proposal include:

1. Congruity with a number of Southern Ocean island nature reserves of other nations, which extend 12 nautical miles from shore. These include Gough and Inaccessible (UK) and the Heard and Macdonald, and Macquarie (Australia) and Auckland (New Zealand) island groups.
2. South Africa's World Heritage Site nomination of the Prince Edward Islands will extend to 12 nautical miles, matching all existing World Heritage island

- sites in the Southern Ocean.
3. Longline fishing has not been permitted within eight nautical miles of the islands from 1 December 2001 (Cooper and Ryan 2002). An expansion of this no-fishing zone to all the territorial waters around the islands will offer further protection to the affected bird species.
 4. Enhanced legal protection will be extended to in-shore-foraging bird species, including the Crozet shag, two species of terns and gentoo and rock-hopper penguins, for most of which numbers are decreasing at the islands and some of which are listed as globally threatened (Table I).
 5. Inclusion of territorial waters will greatly increase the area of South Africa's first Special Nature Reserve and result in the proclamation of its largest Marine Protected Area.
 6. Currently the Special Nature Reserve is made up of two islands, 21 km apart. Expansion of the reserve's boundary to 12 nautical miles will create a single geographical entity, offering full legal protection to the shallow waters (<1000 m) linking the two islands.
 7. The expanded Special Nature Reserve will greatly increase the number of protected species within its boundaries, including a large suite of benthic marine species that have been studied to varying degrees (Hänel and Chown 1999). Several of these species represent important prey for birds and seals breeding at the islands (Cooper and Brown 1990).
 8. The soon-to-be expanded capability of South Africa to protect its waters by the provision of new fishery patrol vessels with powers of seizure and arrest will allow for more effective protection and management of the territorial waters around the Prince Edward Islands, making the declaration of an expanded Special Nature Reserve a practical option.

At its 15th Meeting in February 2003, the PEIMC endorsed a proposal to expand the area of the Prince Edward Islands Special Nature Reserve to include territorial waters out to 12 nautical miles from shore. Another possible route to follow is to declare the territorial waters around the Prince Edward Islands a Marine Protected Area in terms of the *Marine Living Resources Act* (Act No. 18 of 1998).

Declaring seabirds at the Prince Edward Islands as nationally listed threatened or protected species

In 2003, South Africa released a National Environmental Management Biodiversity Bill for public discussion

(*Government Gazette* 451 (24311) of 24 January 2003 and www.environment.gov.za). The Bill explicitly refers to the Prince Edward Islands (and to territorial waters) as falling within its scope. In terms of the bill, the Minister of Environmental Affairs and Tourism may publish in the *Government Gazette* lists of threatened (Critically Endangered, Endangered and Vulnerable) and protected species. The Minister may also then prohibit by notice "... any activity – which is of a nature that may negatively impact on the survival of a listed threatened or protected species; ...". Threatened species are defined in terms of the IUCN categories of threat, and protected species are defined as "any species which is of such high conservation value or national importance that it requires national protection." These definitions may reasonably be regarded as covering all 16 species of surface-nesting seabirds at the Prince Edward Islands (see Table I).

Further, "Biodiversity management plans" may be produced in terms of the bill, which would cover such threatened or protected species and aim to ensure the "... long term survival in nature of the species ... to which the plan relates; ...". Such plans, of a type commonly known as species action plans, could be powerful tools to enhance the protection of surface-nesting seabirds breeding at the Prince Edward Islands, for example if longline fishing is considered an activity negatively impacting on the survival of affected species in terms of the Biodiversity Bill. Biodiversity management plans can also cover a "threatened ecosystem", allowing for the possibility of the whole of the Prince Edward Islands to be so declared.

Lastly, the Biodiversity Bill requires that monitoring be undertaken to determine the conservation status of "... the various components of South Africa's biodiversity; and any negative and positive trends affecting the conservation status of the various components." As mentioned elsewhere in this paper, continued monitoring of trends of surface-breeding seabirds at the Prince Edward Islands is desirable to ensure their continued survival.

The Agreement on the Conservation of Albatrosses and Petrels

The Agreement on the Conservation of Albatrosses and Petrels (ACAP) has much scope to improve the conservation status of the surface-nesting procellariiform seabirds at the Prince Edward Islands (Cooper and Ryan 2001). In summary the Agreement aims "... to achieve and maintain a favourable conservation status for albatrosses and petrels" by *inter alia* conserving and restoring habitats, eliminating alien

species, supporting research, developing education programmes, exchanging information and supporting the FAO's International Plan of Action – Seabirds. A detailed Action Plan that expands on the above objectives is annexed to the Agreement. The Action Plan makes specific mention of fisheries mortality, conservation of terrestrial and marine habitats, impact assessment, pollution, human disturbance, the need for research and monitoring, and education and public awareness. ACAP allows for the creation of an Advisory Committee which will develop conservation guidelines (www.ea.gov.au/coasts/species/seabirds/albatross).

On 24 April 2003 South Africa acceded to ACAP, which comes into force three months after five Parties have ratified it, a position expected by the end of 2003. Once ACAP is in force, it is suggested that South Africa develop a national programme of work for the conservation of procellariiform seabirds, including those breeding at the Prince Edward Islands. This process could usefully be closely linked to the development of biodiversity management plans in terms of the planned biodiversity act, as well as taking full account of South Africa's NPOA – Seabirds (see above).

The Prince Edward Islands as a Ramsar Wetland of International Importance

Complementary to the above proposal to expand the Prince Edward Islands Special Nature Reserve to include territorial waters, are proposals made to the PEIMC and by BirdLife International (2002) to designate the islands to the Ramsar List of Wetlands of International Importance. South Africa has been a contracting party to the Ramsar Convention on Wetlands since 1975 and as such is required to designate suitable wetlands within its territory to the List. Advantages of a Ramsar Convention nomination are set out in point form below:

1. Coupled with the intended nomination in 2004 of the island group to the World Heritage Convention, a successful nomination to the Ramsar List will further enhance the international status (and awareness) of South Africa's only overseas territory. A Ramsar listing may also allow for support from the Convention, if so required, and be used to increase domestic knowledge of the island group. No other Southern Ocean island has as yet been registered as a Ramsar site.
2. At its 7th Meeting, in 1999, the Conference of Parties (COP) to the Convention adopted Resolution VII.11, which urged Contracting Parties to give "priority attention to the designation of new sites from wetland types currently under-represented on the Ramsar List", including peatlands (www.ramsar.org). Most of the lower-lying land of the Prince Edward Islands is composed of peatlands, which support significant populations of breeding seabirds of a number of species, some of which have an international Threatened status (Table I). Peatlands are rare in continental South Africa and are poorly represented within the 17 existing Ramsar wetland sites in the country (www.ramsar.org).
3. In terms of the Strategic Framework and Guidelines for the List of Wetlands of International Importance (Ramsar Convention Bureau 2000), adopted through Resolution VII.11, Contracting Parties are expected to "establish national networks of Ramsar sites fully [to] represent the diversity of wetlands and their key ecological and hydrological functions" (Objective 1). The addition of a subantarctic island group with rocky marine shores, including sea cliffs; shallow marine waters; marine subtidal aquatic beds, including kelp beds; seasonal/intermittent/irregular streams; permanent freshwater lakes; permanent freshwater marshes; and non-forested peatlands (all designated Ramsar Wetland Types), to South Africa's network of Ramsar sites would support this objective.
4. Objective 2 of the Strategic Framework aims to incorporate wetlands that include "threatened ecological communities or are critical to the survival of endemic species identified as vulnerable, endangered or critically endangered". The Prince Edward Islands support a number of threatened bird species endemic to the Southern Ocean that fit this objective (Barnes 2000, BirdLife International 2000, 2002, Table I).
5. Objective 4 of the strategic framework aims to improve cooperation with other international environmental treaties, such as the Bonn Convention on the Conservation of Migratory Species of Wild Animals (CMS, to which South Africa is a Contracting Party); which convention lists on its appendices the five species of albatross and the two surface-nesting *Macronectes* and two burrowing *Procellaria* petrels breeding on the islands that are at risk from longline fishing (see above). Designating the Prince Edward Islands to the Ramsar List would be a tangible demonstration of South Africa's contribution to this cooperative objective.
6. A preliminary analysis suggests that the Prince Edward Islands fulfil at least five of the eight criteria for identifying Wetlands of International Importance, in terms of being a representative example in its biogeographical region (Criterion 1); supporting both threatened species (Table I) and ecological communities (Criterion 2), supporting animal species

in a critical stage of their life cycle [when breeding and moulting] (Criterion 4), regularly supporting more than 20 000 waterbirds [annual breeding populations of three species of penguins exceed this figure individually, Table I] (Criterion 5), and regularly supporting at least 1% of a waterbird species or subspecies, a percentage exceeded by 13 of the 16 surface-nesting seabird species breeding at the islands – Table I, (Criterion 6).

7. Few of South Africa's Ramsar sites possess a marine component. If the Prince Edward Islands Special Nature Reserve was expanded to include territorial waters, then the successful designation of the island group to the Ramsar List would markedly increase the representation of coastal waters (<6 m) on South Africa's Ramsar site network.

As an outcome of COP8, held in November 2002, contracting parties are encouraged via Resolutions VIII.10 and 11 to assess their list of Ramsar sites against the various wetland types and to nominate strategically those sites that are not or are under-represented in their existing list, rather than making *ad hoc* nominations (www.ramsar.org). South Africa intends to commence such an assessment during the course of 2003 (J. Dini, Department of Environmental Affairs and Tourism, pers. comm.).

The PEIMC at its 15th meeting endorsed the proposal that the Prince Edward Islands be declared a Ramsar site. Since peatlands especially are under-represented and subantarctic islands are not represented on South Africa's current Ramsar list, the successful nomination of the Prince Edward Islands will markedly increase the representation of all wetland types occurring within South Africa on the country's Ramsar site network.

CONCLUSIONS

A combination of continued research and monitoring in the field and the successful completion of various initiatives to improve the formal conservation status of the Prince Edward Islands and their breeding seabirds is now required to ensure the future of surface-nesting seabirds at the islands. Given the opportunities set out in the two new national environmental management bills described in this paper, coupled with activities likely to occur within the frameworks of the international Agreement on the Conservation of Albatrosses and Petrels and the South African NPOA – Seabirds, the situation does not look too gloomy for those seabirds that have been adversely affected by

longline fishing. However, the direct and indirect effects on seabirds of climate change will be much harder to treat. Finding practical ways of addressing these effects *in situ* remains the largest challenge for the future of surface-nesting seabirds at the Prince Edward Islands. Until then, steps may need to be taken to ensure the preservation of Endangered species in captivity.

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Numbers of Subantarctic skuas have decreased at Marion Island (photo R. J. M. Crawford)