ANNEX 9

STATUS AND TRENDS OF ANTARCTIC AND SUB-ANTARCTIC SEABIRDS

(Chairman of the Bird Biology Subcommittee, SCAR)

STATUS AND TRENDS OF ANTARCTIC AND SUB-ANTARCTIC SEABIRDS

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In 1988 at the request of CCAMLR the Subcommittee reviewed the status and trends of Antarctic and sub-Antarctic seabirds and published its conclusions *(Cormorant* 16: 138-158 (1988)). In 1990 CCAMLR indicated that it wished again to consider this topic in detail at its 1992 meeting and invited the Subcommittee to update the 1988 review. The Subcommittee undertook this review at the meeting of XXII SCAR at Bariloche, Argentina in June 1992. Members and observers present are listed at Appendix 1.

2. Three sources of material for this review were available at the meeting. First, data on the forms provided by CCAMLR (listed at Appendix 2). Second, data from the published literature (see reference list) and third, personal communications from scientists present at the meeting.

3. Concern was expressed over the CCAMLR forms in that independently of circulation via the Secretary of the Bird Biology Subcommittee, CCAMLR had also provided these forms to individual researchers, some of whom had replied direct to CCAMLR rather than to the Bird Biology Subcommittee. This had resulted in some submitted data (e.g., for Japan) being unavailable for review at this meeting. The forms themselves were also felt to be too complicated. In particular they seemed to be designed to acquire primary data from research studies, rather than achieving a summary of the conclusions of these. This was felt to be inappropriate and potentially misleading.

4. The main data reviewed by the Subcommittee are summarised in detail, by species and site or area in Table 1 and Appendix 3. The emphasis here is on data newly available since the 1988 review for sites where at least two comparable counts are available. However, many of the more significant longterm datasets are also summarised, whether or not new data are available. It should be noted that, particularly for Antarctic Peninsula penguins, substantial additional relevant historical data can be found in Croxall and Kirkwood (1979) and Poncet and Poncet (1985 and 1987).

5. In its discussion of these data the Subcommittee emphasised that most data, even from exactly the same site, derive from a few counts widely separated in time. Breeding populations of most, if not all, Antarctic and sub-Antarctic seabirds show substantial natural fluctuations. Different apparent 'trends' can be produced by the selection of particular years from a longterm dataset (see e.g., Trivelpiece *et al.*, 1990) and thus interpretations from fewer, more disjunct data can be

misleading. In addition, interpretation of essentially the same data can be substantially different, as for southern giant petrels at Iles Crozet (Voisin, 1988; Bretagnolle *et al.*, 1991; Voisin, 1991). Thus the 'changes' indicated in the tabulation should not necessarily be taken as evidence of systematic population change. The source documents, particularly the published papers, should be consulted in conjunction with this summary.

6. The Subcommittee offered the following general conclusions:

(i) For many species of Antarctic and sub-Antarctic seabirds, data are generally inadequate to make any accurate assessment of population trends at any site in the region. For most other species, adequate data exist for only one or two sites. Only commitments to continuous longterm studies will remedy this situation.

(ii) Of species for which adequate data exist for at least one site, most are currently fluctuating appreciably around a basically stable level, or increasing slightly.

(iii) The king penguin is the only species for which significant population increases are currently taking place at most, if not all, breeding localities. These increases are likely to reflect changes in the species' biological environment, presumably involving their main prey, myctophid fish.

(iv) Adélie penguins have increased steadily in the Ross Sea since 1982. Populations are generally stable elsewhere, including at sites where significant population increases occurred between the l950s and 1970s.

(v) Chinstrap, and possibly macaroni, penguins, which showed substantial local or regional population increases in the 1950s through 1970s are now stable or, at most, slightly increasing.

(vi) There is less evidence than previously that species are continuing to increase in numbers because of increased availability of refuse in the vicinity of stations. Treatment of human refuse, although much improved, still needs attention, especially when the potential main beneficiaries are predatory species whose population increases will be to the likely detriment of other birds.

(vii) The southern giant petrel and nearly all albatrosses for which adequate data are available are decreasing at most or all sub-Antarctic islands. The southern giant petrel has decreased significantly at all breeding sites on the Antarctic continent but the

situation in the Antarctic Peninsula area is more complex. The declines are most likely related to incidental mortality associated with fisheries but better data, especially for grey-headed albatrosses and giant petrels, are urgently needed.

(viii) There is less evidence than previously that species are continuing to decrease because of human disturbance, though better data are needed on populations in the vicinity of bases.

(ix) Burrowing seabirds at most sub-Antarctic islands continue to be seriously affected by introduced animals; the example of South Africa in probably having eradicated cats from Marion Island needs to be emulated as widely and as rapidly as possible.

(x) There is still only circumstantial evidence that decreases in any seabird population can be attributed to decreases in food availability at sea. There is no evidence that any population decline reflects effects of commercial fishing.

(xi) There is increasing evidence of the importance of the physical environment in influencing reproductive performance and even population dynamics of Antarctic seabirds, especially species of high latitudes. It is crucial that all seabird monitoring studies should record physical variables as an integral part of the program.

(xii) Despite numerous examples of changes in abundance of seabird populations that correlate with previous or simultaneous changes in characteristics of the biological or physical environment, we have only a very poor knowledge of how such environmental factors operate and interact, or of how seabird populations are regulated. These remain vital fields for enhanced research.

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Table 1: Changes in populations of Antarctic and sub-Antarctic seabirds.

Species	Site	Years of Data	Mean Annual Change		Reference
			Year	%	
Emperor penguin	Pointe Geologie	1952, 1958, 1962-1986	1975-86	-7.5	Jouventin and Weimerskirch, 1990
King penguin	Crozet	1962, 1965, 1981, 1986	1962-86	-0.4*	Jouventin and Weimerskirch, 1990
		1962, 1967, 1981, 1986	1962-86	+7.3	Jouventin and Weimerskirch, 1990
		1967, 1981, 1986	1967-86	+10.4	Jouventin and Weimerskirch, 1990
	Kerguelen	1962, 1985	1962-85	+6.3	Jouventin and Weimerskirch, 1990
		1962, 1985	1962-85	+7.2	Jouventin and Weimerskirch, 1990
		1974, 1985	1974-85	+19.6	Jouventin and Weimerskirch, 1990
	Heard (Spit Bay)	8y 1963-1988	1963-88	+25.5	Gales and Pemberton, 1988
	Macquarie	1930, 1980	1930-80	+6.9	Rounsevell and Brothers, 1984
	South Georgia	1914, 1946, 1976, 1986	1976-86	+5.0	Croxall *et al*., 1988
Adélie penguin	Cape Bird	1965-70, 1974-87	1982-88	+10.1	Wilson, 1990
	Cape Hallett	1981-87	1981-82	+9.9	Taylor *et al*., 1990
	Beaufort I	1981, 1983-1987	1981-87	+6.1	Taylor *et al*., 1990
	Franklin I West	1981, 1983-1987	1981-82	+8.5	Taylor *et al*., 1990
	Pointe Geologie	1958, 1984	1958-84	+2.1	Jouventin and Weimerskirch, 1990
	Windmill Is	1961, 1971, 1989	1961-71	+9.6	Woehler *et al*., 1991
			1971-89	+0.8	Woehler *et al*., 1991
	Signy Island	4y 1948-1979	1948-79	+3.6	Croxall *et al*., 1981
		1979-1992	1979-92	+0.4	Croxall *et al*., 1988 and unpubl.
	Admiralty Bay	7y 1977-1986	1977-86	+0.2	Trivelpiece *et al*., 1990
Chinstrap penguin	Admiralty Bay	7y 1977-1986	1977-86	-3.1	Trivelpiece *et al*., 1990
	Signy Island	4y 1948-1979	1948-79	+7.3	Croxall *et al*., 1981
		1979-92	1979-92	-0.1	Croxall *et al*., 1988 and unpubl.
	Bouvetoya	4y 1958-1978	1958-78	+14.6	Bakken, 1991
		1979, 1990	1978-90	-7.6	Bakken, 1991
	Half Moon Is	1965, 1990	1965-90	+1.5	Favero and Silva, 1991
	Harmony Pt	4y 1964-1988	1964-88	+5.5	Favero *et al*., 1991

Table 1 continued

Species	Site	Years of Data	Mean Annual Change		Reference
			Year	%	
Gentoo penguin	Crozet	1970, 1985, 1986	1970-86	-2.0	Jouventin and Weimerskirch, 1990
	Heard I	1952, 1987	1952-87	+2.5	Woehler, 1991
	Signy I	1979-1992	1979-92	+2.1	Croxall *et al*., unpubl.
	Harmony Pt	6y 1903-1988	1903-88	+5.4	Favero *et al*., 1991
Macaroni penguin	Kerguelen	1962, 1985	1962-85	+0.7	Jouventin and Weimerskirch, 1990
	Bird I, South Georgia	1958, 1977	1958-77	+9.7	Croxall and Prince, 1990
		1977-1992	1976-92	-0.7	Croxall *et al*., unpubl.
	Bouvetoya	5y 1958-81	1958-81	+17.1	Bakken, 1991
		1979-1990	1979-90	-0.9	Bakken, 1991
Wandering albatross	Bird I, South Georgia	1976-1992	1976-92	-1.0	Croxall *et al*., 1990 and unpubl.
	Possession I, Crozets	5y 1960-85	1960-85	-2.4	Jouventin and Weimerskirch, 1990
	Cochon I, Crozets	3y 1964-1981	1964-81	-2.0	Jouventin and Weimerskirch, 1990
	Kerguelen	1971, 1985	1971-85	-5.7	Jouventin and Weimerskirch, 1990
	Marion I	7y 1974-89	1974-91	-0.7	J. Cooper, unpubl.
Black-browed albatross	Crozet	1978, 1986, 1987	1978-87	-3.1	Jouventin and Weimerskirch, 1990
	Bird I, South Georgia	1976-1989	1976-89	+0.8	P.A. Prince *et al*., unpubl.
Grey-headed albatross	Bird I, South Georgia	1977-1990	1977-90	-1.8	P.A. Prince *et al*., unpubl.
Southern giant petrel	Pointe Geologie	1956-1984	1956-84	-5.5	Jouventin and Weimerskirch, 1990
	Giganteus I	1956, 1985	1956-85	-8.2	Woehler and Johnstone, 1991
	Hawker I	1970, 1988	1970-88	-7.8	Woehler and Johnstone, 1991
	Frazier Is	1956, 1983	1956-83	-2.1	Woehler and Johnstone, 1991
	Signy I	4y 1937-1985	1937-85	-6.5	Rootes, 1988
	Anvers I	?-1992	19?-92	+?	W.R. Fraser, unpubl.
	Harmony Pt	1965, 1989	1965-89	+0.7	Favero *et al*., 1991
	Marion I	6y 1985-1992	1985-92	-2.2	J. Cooper, unpubl.
	Heard I	1951, 1988	1951-88	-1.9	Woehler, 1991

Table 1 continued

Species	Site	Years of Data	Mean Annual Change		Reference
			Year	%	
Northern giant petrel	Bird I, South Georgia	1980-1985	1980-85	-7.0	Jouventin and Weimersksirch, 1990
	Crozet	6y 1973-1982	1973-82	+4.3	Hunter, 1984
	Marion I	6y 1985-1992	1985-92	+4.1	J. Cooper, unpubl.
Antarctic fulmar	Haswell I	1963, 1979	1963-79	-1.8	Woehler and Johnstone, 1991
	Rauer I	1981, 1985	1981-85	+10.7	Woehler and Johnstone, 1991
	Windmill Is	1962, 1985	1962-84	+3.5	van Franeker *et al*., 1990
Antarctic petrel	Haswell I	1962, 1979	1962-79	-8.1	Woehler and Johnstone, 1991
	Tauer I	1981, 1985	1981-85	-2.4	Woehler and Johnstone, 1991
	Windmill I	1962, 1984	1962-84	+6.0	van Franeker *et al*., 1990
Cape petrel	Haswell I	4y 1957-1975	1957-79	-0.6	Woehler and Johnstone, 1991
	Windmill I	1962, 1978, 1984	1962-84	+10.0	van Franeker *et al*., 1990
	Harmony Pt	1965, 1989	1965-89	+7.6	Favero *et al*., 1991
Sub-Antarctic skua	Bird I, South Georgia	1959, 1977, 1981	1959-81	+3.8	Prince and Croxall, 1983
	Signy I	1959-1966, 1983	1959-83	+3.8	Hemmings, 1984
Antarctic skua	Anvers I	1974-1990	1974-90	+6.6	W.R. Fraser, unpubl.
Kelp gull	Half Moon I	1966, 1991	1966-91	+2.5	Favero and Silva, 1991
	Harmony Pt	1965, 1989	1965-89	+8.1	Favero *et al*., 1991
Blue-eyed shag	Signy I	20y 1948-1981	1948-81	+6.0	Shaw, 1984
	Half Moon I	1953, 1991	1953-91	+7.2	Favero and Silva, 1991
	Harmony Pt	1965, 1989	1965-89	+3.4	Favero *et al*., 1991

* Colony by permanent station.

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ANTARCTIC SEABIRD POPULATION STATUS:
SUMMARY OF REPLIES RECEIVED

Nation	Locality	Species	Reviewer
Argentina	King George Island	Southern giant petrel	N.R. Coria
Argentina	Hope Bay	Greater sheathbill	N.R. Coria
Argentina	Harmony Point, Nelson I	Gentoo penguin	M. Favero
Argentina	Harmony Point, Nelson I	Chinstrap penguin	M. Favero
Argentina	Harmony Point, Nelson I	Southern giant petrel	M. Favero
Argentina	Harmony Point, Nelson I	Cape petrel	M. Favero
Argentina	Harmony Point, Nelson I	Blue-eyed shag	M. Favero
Argentina	Harmony Point, Nelson I	Kelp gull	M. Favero
Argentina	Harmony Point, Nelson I	Antarctic tern	M. Favero
Argentina	Harmony Point, Nelson I	Greater sheathbill	M. Favero
Argentina	Potter Pen, King George I	Southern giant petrel	M. Favero
Argentina	Potter Pen, King George I	Wilson's storm petrel	M. Favero
Argentina	Potter Pen, King George I	Kelp gull	M. Favero
Argentina	Potter Pen, King George I	Antarctic tern	M. Favero
Argentina	Potter Pen, King George I	Sub-Antarctic skua	M. Favero
Argentina	Potter Pen, King George I	South polar skua	M. Favero
Argentina	Potter Pen, King George I	Greater sheathbill	M. Favero
Argentina	Half Moon Is	Chinstrap penguin	M. Favero
Argentina	Half Moon Is	Cape petrel	M. Favero
Argentina	Half Moon Is	Wilson's storm petrel	M. Favero
Argentina	Half Moon Is	Blue-eyed shag	M. Favero
Argentina	Half Moon Is	Kelp gull	M. Favero
Argentina	Half Moon Is	Antarctic tern	M. Favero
Argentina	Half Moon Is	Greater sheathbill	M. Favero
Australia	Amanda Bay	Emperor penguin	E.J. Woehler
Australia	Auster Island	Emperor penguin	E.J. Woehler
Australia	Fold Island	Emperor penguin	E.J. Woehler
Australia	Frazier Islands, Wilkes Land	Southern giant petrel	E.J. Woehler
Australia	Kloa Point	Emperor penguin	E.J. Woehler
Australia	Mawson Region	Adélie penguin	E.J. Woehler
Australia	Mount Biscoe	Adélie penguin	E.J. Woehler
Australia	Proclamation Island	Adélie penguin	E.J. Woehler
Australia	Prydz Bay	Adélie penguin	E.J. Woehler
Australia	Rauer Island	Adélie penguin	E.J. Woehler
Australia	Rookery Islands	Adélie penguin	E.J. Woehler
Australia	Taylor Glacier	Emperor penguin	E.J. Woehler
Australia	Vestfold Hills	Adélie penguin	E.J. Woehler
Australia	Windmill Islands	Adélie penguin	E.J. Woehler
France	Adélie Land	Emperor penguin	H. Weimerskirch
France	Adélie Land	Antarctic fulmar	H. Weimerskirch
France	Adélie Land	Adélie penguin	H. Weimerskirch
France	Adélie Land	Snow petrel	H. Weimerskirch
France	Adélie Land	Southern giant petrel	H. Weimerskirch

Nation	Locality	Species	Reviewer
France	Amsterdam Island	Amsterdam albatross	H. Weimerskirch
France	Amsterdam Island	Yellow-nosed albatross	H. Weimerskirch
France	Crozet Islands	Gentoo penguin	H. Weimerskirch
France	Possession Island	King penguin	H. Weimerskirch
France	Possession Island	Wandering albatross	H. Weimerskirch
France	Possession Island	Northern giant petrel	H. Weimerskirch
France	Possession Island	Southern giant petrel	H. Weimerskirch
France	Kerguelen	Balck-browed albatross	H. Weimerskirch
New Zealand	Cape Bird	Adélie penguin	K.-J. Wilson
Norway	Bouvetoya	Adélie penguin	V. Bakken
Norway	Bouvetoya	Chinstrap penguin	V. Bakken
Norway	Bouvetoya	Macaroni penguin	V. Bakken
South Africa	Gough Island	Rockhopper penguin	J. Cooper
South Africa	Gough Island	Wandering albatross	J. Cooper
South Africa	Gough Island	Yellow-nosed albatross	J. Cooper
South Africa	Gough Island	Southern giant petrel	J. Cooper
South Africa	Gough Island	Sub-Antarctic skua	J. Cooper
South Africa	Marion Island	King penguin	J. Cooper
South Africa	Marion Island	Macaroni penguin	J. Cooper
South Africa	Marion Island	Rockhopper penguin	J. Cooper
South Africa	Marion Island	Wandering albatross	J. Cooper
South Africa	Marion Island	Grey-headed albatross	J. Cooper
South Africa	Marion Island	Northern giant petrel	J. Cooper
South Africa	Marion Island	Southern giant petrel	J. Cooper
South Africa	Tristan da Cunha	Yellow-nosed albatross	J. Cooper
Spain	Deception Island	Chinstrap penguin	J. Moreno
United Kingdom	South Georgia	King penuin	J.P. Croxall
United Kingdom	Signy Island	Adélie penguin	J.P. Croxall
United Kingdom	Signy Island	Chinstrap penguin	J.P. Croxall
United Kingdom	Signy Island	Gentoo penguin	J.P. Croxall
United Kingdom	Bird Island, South Georgia	Gentoo penguin	J.P. Croxall
United Kingdom	Bird Island, South Georgia	Macaroni penguin	J.P. Croxall
United Kingdom	Bird Island, South Georgia	Wandering albatross	J.P. Croxall
United Kingdom	Bird Island, South Georgia	Black-browed albatross	J.P. Croxall
United Kingdom	Bird Island, South Georgia	Grey-headed albatross	J.P. Croxall

APPENDIX 3

SUMMARY OF THE STATUS AND TRENDS OF ANTARCTIC AND SUB-ANTARCTIC SEABIRDS BY SPECIES

Emperor penguin (*Aptenodytes forsteri)*

The significant population decline at Pointe Geologie does not seem to be matched by the (very limited) data available for other breeding sites. The Pointe Geologie decline has usually been attributed to changing physical environmental conditions relating to the local environment of the colony and/or to the extent of ice cover and date of ice breakout (Jouventin *et al*., 1984; Jouventin and Weimerskirch, 1991). Longterm studies, with annual counts, of other breeding populations are obviously desirable; it was noted that Australia had recently commenced such work.

King penguin (*Aptenodytes patagonicus*)

Populations continue to increase very substantially at all breeding sites where data exist (South Georgia, Crozet, Kerguelen, Heard, Macquarie). Increases are least at Marion Island. Reasons for the increases are uncertain. Whereas initial increases at some sites may have represented response to human exploitation in the l9th and early 20th centuries, it is most unlikely that populations are still 'recovering' today. In addition, evidence for actual human exploitation at several sites is very weak or non-existent. Increases are thus most likely to reflect enhanced levels of availability of food, especially myctophid fish.

Adélie penguin (*Pygoscelis adeliae*)

The most extensive data are for the Ross Sea (and especially Cape Bird). Here, colonies may have declined pre-1970, remained stable through the next decade and have certainly increased significantly since 1982-83. Elsewhere on the Antarctic continent the limited data broadly suggest population stability, at least in the 1980s, or increases between the late l950s to mid 1980s (e.g., Woehler *et al*., 1991), or in the late 1980s. At sites on the Antarctic Peninsula and nearby island groups, the evidence of increases between the 1950s to late 1970s is unequivocal. Thereafter, depending on site, populations have either fluctuated substantially but remained generally stable overall, or decreased locally. Some decreases may have been due to human disturbance but declines at many sites (e.g., Anvers Island area) cannot have been caused in this way. At Bouvet,

Adélie penguins appear to breed only sporadically (on three of five visits; Bakken, 1991). Adélie penguin population changes may be especially closely linked to changes in the physical environment, particularly ice cover (Croxall *et al*., 1988; Fraser *et al*., 1992), but these relationships are not necessarily on an immediate or proximate basis.

Chinstrap penguin (*Pygoscelis antarctica*)

Major population increases (at faster rates than for Adélie penguins) were generally characteristic of the l950s to mid 1970 period. Since then most of the few data indicate substantial fluctuations or, at most, a very reduced rate of continued increase. There is no longer evidence of colonisation of new sites nor of significant increases at the edge of the species breeding range. Decreases at some sites are perhaps attributable to human disturbance, though the data for Bouvet cannot be explained in this way. Chinstrap penguin fluctuations are also undoubtedly influenced by changes in the physical environment (Croxall *et al.*, 1988; Fraser *et al.*, 1992) but possibly to a lesser extent than Adélies and with even less obvious simple correlations.

Gentoo penguin (*Pygoscelis papua*)

This species shows the largest interannual population fluctuations (influenced to some (considerable?) extent by its early age of first breeding) in the genus Pygoscelis. Few data are adequate to demonstrate any systematic trend. Generally, therefore, populations are believed to be stable or, perhaps, increasing (currently or in the past) at a few localities (e.g., Nelson Island, Ardley Island, Signy Island and Heard Island).

Macaroni penguin (*Eudyptes chrysolophus*)

Data from South Georgia and Bouvet suggest that populations are currently fairly stable after substantial increases prior to the 1970s - and a possible decline at South Georgia in the early 1980s. Marion Island populations appear relatively stable.

Rockhopper penguin (*Eudyptes chrysocome*)

No relevant data within the CCAMLR Convention Area of a species very difficult to census accurately. Substantial population declines for the Campbell and Auckland Islands have been reported by Moors (1986) and Cooper (1992) but the causes of these remain entirely speculative.

Wandering albatross (*Diomedea exulans*)

Population decreases have been reported for all breeding sites where sufficient data exist. There is some suggestion of slower rates of decrease/stabilisation at Crozet but not at South Georgia. Incidental mortality associated with longline fisheries is probably the most significant cause of the population decline (Croxall *et al.*, 1984; Jouventin *et al.*, 1984; Weimerskirch and Jouventin, 1987; Croxall and Prince, 1990; Croxall *et al.*, 1990; Brothers, 1991).

Amsterdam albatross (*Diomedea amsterdamensis*)

Stable or perhaps slightly increasing from very low population levels (Jouventin *et al.*, 1989), partly due to removal of cattle and consequent restoration of breeding habitat.

Black-browed albatross (*Diomedea melanophris*)

Decreasing at the Crozet Islands, possibly increasing at Heard between the 1950s and 1980s and essentially stable at Bird Island, South Georgia, where decreases in some colonies are balanced by increases in others (Prince *et al.*, unpublished data). It is difficult to interpret the status of this species because local fishing activities could contribute to population increase (through enhanced opportunities for scavenging food) and also to decreases (through incidental mortality).

Grey-headed albatross (*Diomedea chrysostoma*)

A significant decrease at Bird Island since 1975 across all colonies (Prince *et al.*, unpublished data). The causes are unknown but less likely to be fishery-related than for the other species of albatross at South Georgia because the grey-headed albatross is not typically associated with fishing boats. Populations at Marion Island, and censussed in seven years between 1974-91, have fluctuated considerably but without any clear trend (J. Cooper, pers. comm.).

Southern giant petrel (*Macronectes giganteus*)

There have been decreases in breeding populations at South Georgia, Marion and Heard Islands. The situation at Crozet is controversial (Voisin, 1988; Bretagnolle *et al*., 1991; Voisin, 1991). Populations at all continental sites are declining. In the Antarctic Peninsula the situation is more complicated. The species appears to be stable at some sites (e.g., Nelson Island, (Favero *et al*.,

1991), Laurie Island since 1981/82 (D. Vergani, pers. comm.), Potter Cove, King George Island, (N. Coria, pers. comm.)). There have been substantial declines at some other sites (e.g., Signy Island (Rootes 1988)) but the population at Anvers Island has increased substantially over the last two decades (W.R. Fraser, pers. comm.). Human disturbance can have an undoubted influence on this species but the declines include several sites where this is unlikely to have been a factor. Incidental mortality is also likely to influence this ship-associated species, especially in sub-Antarctic areas.

Northern giant petrel (*Macronectes halli*)

No clear pattern exists for this species with populations decreasing at Crozet and apparently increasing at South Georgia (though no data available since the mid 1980s) and Marion Island.

Smaller fulmarine petrels

Longterm data on Antarctic fulmar *Fulmarus glacialoides* and snow petrel *Pagodroma nivea* from Pointe Geologie, Adélie Land (Weimerskirch, 1990; Jouventin and Weimerskirch, 1991; Chastel *et al.*, in press) show substantial interannual fluctuations in populations but no clear trend over the last 30 years. Data for these species at other sites and all data for Cape and Antarctic petrels, *Daption capense* and *Thalassoica antarctica*, are insufficiently detailed, when viewed against this background, to indicate clearly any significant population change. Furthermore, counts of breeding populations of fulmarine petrels are particularly significantly affected by the timing of counts (J. van Franeker, pers. comm.). Most data do not have this information and so an additional source of variation is present. Increases of all four species at the Windmill Islands between the 1960s and 1984 simply reflect improved coverage and accuracy of censuses and do not indicate any population change (van Franeker *et al.*, 1990).

Burrow-dwelling petrels (Procellaridae, Hydrobatidae, Pelecanoididae)

The conclusions of the previous review still pertain. That is, despite lack of precise data, populations of species in these groups have been greatly reduced at sub-Antarctic island localities where feral animals are present. In this context, the apparent removal by South Africa of feral cats from Marion Island ranks as of one of the most significant recent achievements in the field of sub-Antarctic island conservation. It has lead to increases in breeding success for at least three species of burrowing petrels (Cooper and Fourie, 1992; J. Cooper, pers. comm.). Other nations should be strongly encouraged to follow this lead.

Local decreases in populations of burrowing petrels (especially blue petrel *Halobaena caerulea* and Antarctic prion *Pachyptila desolata*) at South Georgia have been caused by destruction of breeding habitat by Antarctic fur seals *Arctocephalus gazella* (P.A. Prince *et al.*, unpublished data).

Blue-eyed shag (*Phalacrocorax atriceps*)

This species characteristically shows considerable interannual variation in timing of breeding and population size, making assessment of population trends very difficult. Nevertheless there are clear indications of gradual longterm increases at Half Moon Island, Nelson Island and Signy Island, which may generally be typical of the species in this region.

Sub-Antarctic skua (*Catharacta lonnbergi*)

Increases on King George Island and at Nelson Island may have been facilitated by availability of refuse from nearby bases. Populations at Admiralty Bay, King George Island, away from the base area, are stable (W.R. Fraser, pers. comm.). Otherwise there are no new data since the last review.

Antarctic skua (Catharacta maccormicki)

There are few new data, either on changes in populations at continental sites associated with bases (decreases at Cape Hallett (Harper *et al.*, 1964), increases at Pointe Geologie (Jouventin *et al.*, 1984)) or on increases and range extension in the Antarctic Peninsula (Hemmings 1984). Although some changes may be attributable to more opportunities for scavenging at bases, this cannot explain the large increase at Anvers Island where no refuse has been available since 1979 (W.R. Fraser, pers. comm.). Numbers have increased substantially in the Admiralty Bay area since the first censuses in 1976. The potential influence of refuse cannot be totally discounted, although at sites where both skua species co-occur, Antarctic skuas are usually excluded from the food source by their larger congener. Thus the increases probably reflect natural, rather than man-induced, changes (W.Z. Trivelpiece, pers. comm.).

Kelp gull (Larus dominicanus)

Increases at Nelson Island, King George Island may relate to increased availability of garbage. Populations in the Anvers Island area, where no refuse is available, have remained stable (W.R. Fraser, pers. comm).

Antarctic and Kerguelen tern (*Sterna vittata* and *S. virgata*)

No new data exist for these potentially vulnerable species which, because of their tendency regularly to move breeding sites, are very difficult to census.

Greater sheathbill (*Chionis alba*)

Populations have remained stable over the last decade at Hope Bay (N.R. Coria, pers. comm.), the only site for which any quantitative data exist for this species.