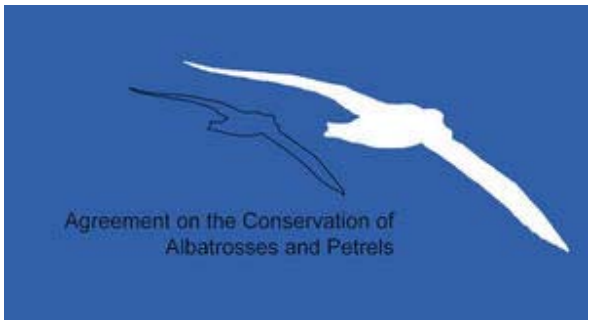

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Albatross populations: status and threats

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CHAPTER THREE

Albatross populations: status and threats

R. GALES[1]

The population and conservation status of the world's albatrosses are reviewed within the framework of recent taxonomic changes. The latest estimates of size of breeding populations (pairs) at all known localities of each of the 24 proposed species are presented; population trends are assessed where sufficient data are available. Despite increased efforts in population monitoring, the status (i.e., population trends) of two-thirds of the world's *ca.* 150 albatross populations remain unknown. For those that are known, almost half are decreasing. The threats currently facing each species are briefly reviewed. The best available evidence indicates that longline fishing is the most serious threat facing albatrosses today. Twenty-one of the 24 species are known to be killed on longline hooks, including rare and endangered species. Widespread implementation of appropriate mitigation measures is urgently required.

Key words: Albatrosses, Population Status, Threats, Conservation, Longline Fishing.

INTRODUCTION

THE status of albatross populations is increasingly a focus of attention for seabird biologists, conservation groups, fisheries scientists and managers, fishing practitioners and industry representatives. This is primarily due to realization of the high number of birds being killed during commercial fishing operations, resulting in the decrease of many albatross populations. Gales (1993) reviewed the status of albatross populations and the factors affecting them, and concluded that direct mortality associated with commercial fishing operations is the most serious threat facing albatross populations. The fishery most commonly reported to be associated with albatross bycatch is longlining, both demersal and pelagic.

Stimulated by increasing concern regarding the extent of these interactions, and the consequences for albatross populations, many new data have been collected since the 1993 review. These new data enable better understanding of the current status of albatross populations and the factors affecting them. Coincidentally, in a major revision of albatross systematics, Nunn *et al.* (1996) and Robertson and Nunn (1997) propose elevating the rank of several taxa, which would result in an increase from 14 to 24 species. The interaction between taxonomy, management and conservation raises many issues, particularly the problems of identifying the units of taxonomic concern (Groombridge 1993). This chapter incorporates the scientific nomenclature for the genera and species proposed by Robertson and Nunn, following the consensus reached at the 1995 Albatross Conference.

The purpose of this chapter is to update and revise the data and assessments presented in Gales (1993) in light of the new taxonomy. Status assessments inevitably focus at the level of taxonomically defined units, usually at the species level (see Croxall and Gales 1997). The extent of the recent taxonomic revision of albatrosses, and the fact that this may still undergo further development, makes it important also to review the status of albatrosses at the island population level. Consideration at the population level improves our understanding of the status of albatrosses and the threats they face, and is of particular importance in relation to management and conservation issues.

POPULATION NUMBERS AND DYNAMICS

Species profiles

The population size information is from the sources listed in Appendix 1. Species distributions and timing of breeding information are from the sources cited in Gales (1993). The status assessments were based on all available comparable data, not merely comparisons of the two most recent counts or surveys which may not

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necessarily be comparable in methodology and accuracy. This is important given the annual fluctuations which may occur in albatross population size, particularly for the biennial-breeding species. The descriptions of the threats described in the species profiles are largely restricted to the threats currently affecting albatrosses. An historical account of all threats, past and present, is in Gales (1993).

Wandering Albatross *Diomedea exulans*

Previous name: Wandering Albatross *Diomedea exulans exulans.*

Breeding distribution and jurisdiction: South Georgia (United Kingdom); Crozet and Kerguelen Islands (France); Marion and Prince Edward Islands (South Africa); Macquarie Island (Australia).

Breeding frequency and season: Biennial breeder (when successful). Most eggs laid between December and February, the eggs are incubated for *ca.* 11 weeks, chicks hatch in March–April and fledge 40 weeks later between November and February.

Population size: Annual breeding population estimated at 8 500 pairs (see Appendix 1A), representing about 28 000 mature individuals, perhaps 55 000 birds in total. Reliability of survey data for this species is generally good, with time series population data for at least five island sites. Most Wandering Albatrosses breed in the South African sector, with the Marion Island and Prince Edward Island populations accounting for 36% of the global population.

Status: In 1995 the Macquarie Island population of Wandering Albatrosses was listed as an endangered species under the *Australian Endangered Species Protection Act 1992.*

The status of eight populations is known, and of these three are thought to be increasing, four are decreasing and one is stable. The tiny Macquarie Island population is currently stable after previous declines, currently with <10 pairs breeding annually.

The rates of population decrease vary according to population and the time frame over which changes are assessed. The Ile de la Possession (Crozet Islands) population has decreased by over 50% over the last two decades, compared to the 28% population decrease documented for the Bird Island (South Georgia) population since the early 1960s (Weimerskirch and Jouventin 1997; Croxall *et al.* 1997). The rate of decrease of the Crozet population has changed from –7% p.a. (1970–76), to –1.4% p.a. (1977–85) and has recently started to recover at 4% p.a. (1986–95) Weimerskirch *et al.* 1997). The Bird Island population, however, continues to decrease (Croxall *et al.* 1997).

Threats: The major factor affecting this species is mortality associated with commercial fishing operations, particularly longlining (Gales 1993), a view supported by assessments at the 1995 Albatross Conference and by Birdlife International (1995). Whilst other fishing operations also impact on the species (e.g., trawling and dropline fishing), the extent of mortality is much less than that associated with longline fishing.

Longline fishing does not affect Wandering Albatrosses equally across their range because different populations have different foraging distributions, and this affects the extent of overlap with fisheries. The South Georgia population may be most at risk from longline fishing operations throughout the southern sectors of the Atlantic, Indian and Pacific Oceans, whereas the Crozet population is more vulnerable to fishing operations within the Indian Ocean and Australian region. The vulnerability of Wandering Albatrosses to longline fishing may also differ within populations as a result of specific migration patterns during the breeding season and by birds of different sex, age and breeding status (and so influence extent of exposure to longline fishing: see Prince *et al.* 1997; Weimerskirch 1997).

The status of populations is dependent upon the spatial and temporal distribution of longline fishing effort. The recent signs of recovery, evidenced by increases in both adult and juvenile survival rates of the Crozet Island Wandering Albatross population, have been ascribed to the shift in longline fishing effort away from the birds foraging grounds (Weimerskirch *et al.* 1997).

Tristan Albatross *Diomedea dabbenena*

Previous name: Wandering Albatross *Diomedea exulans dabbenena.*

Breeding distribution and jurisdiction: Inaccessible Island (Tristan da Cunha group) and Gough Island (United Kingdom).

Breeding frequency and season: Biennial breeder (when successful). No published studies of breeding ecology, presumed most eggs laid between December and February and chicks fledge the following November to February.

Population size: The total breeding population is estimated at fewer than 2 000 pairs (see Appendix 1A). This suggests about 1 000 pairs breeding in any one year and perhaps 6 000–7 000 birds in the total global population. This species is virtually restricted to Gough Island with only two to three pairs breeding each year on Inaccessible Island in the Tristan da Cunha group (Ryan *et al.* 1990). The reliability of survey data for the population on Gough Island is poor, the only available data being a rough estimate in the 1980s (J. Cooper, pers. comm.).

Status: Endemic to territories of the United Kingdom.

As there are no time series data for the population on Gough Island, the status of this population is unknown. Given the trends of other albatross populations in the Indian Ocean it is likely that this population also has decreased since the 1980s. The population on Inaccessible Island was much larger in the past but the current population of 2–3 pairs appears to be stable (Ryan *et al.* 1990). Historically, Tristan Albatrosses also bred on the main island of the Tristan Group but were extirpated by humans at the turn of the Century (Watkins 1987).

Threats: Human persecution of Tristan Albatrosses at the breeding sites has been largely (if not totally) eliminated (J. Cooper, pers. comm.). Whilst small plastic particles have been collected from regurgitates of Tristan Albatrosses on Gough Island (J. Cooper, pers. comm.), the most likely threat to this population comes from longline fishing. Band returns confirm that Tristan Albatrosses from Gough Island are killed on longline hooks, and the foraging distribution of this species, which encompasses the South Atlantic Ocean and coastal regions of Southern Africa, place the species in contact with numerous longline fleets (J. Cooper, pers. comm.). Knowledge of the population status of this species and extent of fishing-related mortalities is urgently required.

Antipodean Albatross *Diomedea antipodensis*

Previous name: Wandering Albatross *Diomedea exulans antipodensis.*

Breeding distribution and jurisdiction: Antipodes Island and Campbell Island (New Zealand).

Breeding frequency and season: Biennial breeder (when successful). Egg laying starts in January (Antipodes Island) and February (Campbell Island) and chicks fledge between January and March the following year.

Population size: The annual breeding population is estimated at 5 150 pairs (see Appendix 1A), indicating a global population of 17 000 adults, or 33 000 individuals. The species is essentially restricted to Antipodes Island, although about six pairs also breed on Campbell Island each year.

Status: Endemic to New Zealand.

The current estimates of population size are reliable. A lack of comparable data prior to 1994, however, precludes any assessment of the status of the Antipodes Island population. Occasional surveys of the Campbell Island population of Antipodean Albatrosses since the 1960s suggests that this population has been stable at low numbers for at least three decades.

Threats: The only factor which has been identified as a threat to Antipodean Albatrosses is longline fishing. This species has been confirmed as being killed on longlines targeting tuna in New Zealand waters (Murray *et al.* 1993). Outside the breeding season, this species is known to migrate from New Zealand eastwards to Chile and the Patagonian shelf before returning to New Zealand sea mounts and the Tasman Sea (D. Nicholls, pers. comm.). The flights over the southern Pacific Ocean and Tasman Sea would put it in contact with oceanic longline fleets. The prolonged periods spent off the coast of Chile, an area where longline fishing effort is increasing, also presents a threat to individuals of this species.

Gibson's Albatross *Diomedea gibsoni*

Previous name: Wandering Albatross *Diomedea exulans gibsoni.*

Breeding distribution and jurisdiction: Auckland Island (New Zealand).

Breeding frequency and season: Biennial breeder (when successful). Most eggs laid between December and January and chicks fledge the following year between January and February.

Population size: The annual breeding population of Gibson's Albatrosses is estimated at about 6 200 pairs breeding each year (see Appendix 1A), perhaps 10 000 pairs in total, or 40 000 individuals. This species is restricted to breeding on three islands within the New Zealand sub-antarctic Auckland Island group: Adams Island (5 800 pairs; 95% population), Disappointment Island (250 pairs; 4% population) and Auckland Island (65 pairs; 1% population).

Status: Endemic to New Zealand.

The Gibson's Albatross population on Adams Island was estimated as 13 000 pairs in the 1970s but inconsistent survey techniques preclude valid comparisons with more recent information. This population has been studied annually since 1991 so knowledge of recent population trends should soon be forthcoming.

Threats: On Auckland Island the effects of introduced pests (cats and pigs) have the potential to limit the breeding success of Gibson's Albatrosses. The only other threat identified for the species is longline fishing. Gibson's Albatrosses were a significant bycatch species in the tuna longline fishery operating in New Zealand waters between 1988 and 1992 (Murray *et al.* 1993). This species is also killed on longline hooks deployed to catch tuna in the Australian region (Gales, Brothers and Reid, unpubl. data).

Satellite tracking studies have shown that Gibson's Albatrosses traverse areas over the Tasman Sea and eastwards into the Pacific

Ocean during the breeding season. Foraging areas used by males and females were mutually exclusive, with female birds frequenting the Tasman Sea in the vicinity of 40°S, whilst the males dispersed westwards at lower latitudes or, alternatively, travelled north-east towards the mid-Pacific Ocean (Elliot *et al.* 1995). These differences, and the sex-specific adult survival rates (males being higher than females; Walker and Elliot 1995) may not be coincidental. The continuing studies of this species should clarify the role of longline fishing in the population and conservation status of Gibson's Albatrosses.

Northern Royal Albatross *Diomedea sanfordi*

Previous name: Northern Royal Albatross *Diomedea epomophora sanfordi.*

Breeding distribution and jurisdiction: Chatham Islands (Big and Little Sister, and the Forty Fours), South Island (Taiaroa Head) of New Zealand. All New Zealand jurisdiction.

Breeding frequency and season: Biennial breeder (when successful). The full breeding cycle usually extends from November to September. Egg period lasts 79 days and nestling period about 240 days.

Population size: The annual breeding population is estimated at about 5 200 pairs, equivalent to a total breeding population of 8 500 pairs (see Appendix 1A), and perhaps 34 000 individuals in total. The Chatham Islands population accounts for >99% of the population, with <20 pairs breeding at Taiaroa Head each year. This small population includes five Southern Royal × Northern Royal Albatross hybrids, mixed pairs also occur at Enderby Island (C. J. Robertson, pers. comm.).

Status: Endemic to New Zealand.

The population of Northern Royal Albatrosses at the Chatham Islands is decreasing and this trend is expected to continue (see below). The population at Taiaroa Head, established in 1920, is slowly increasing being assisted by intensive human surveillance and management.

Threats: In the past, harvesting by humans has affected the Northern Royal Albatrosses on the Chatham Islands and though now illegal, small-scale harvesting of chicks is still thought to occur (C. J. Robertson, pers. comm.). The current population decrease of this population however, is thought to be mainly a result of nesting habitat degradation following severe storms in the 1980s (Robertson 1997). The effects of climatic changes and perturbations, which result in changes to the nesting habitat either through drying out or storm damage, are likely to have a significant effect on the status of this species for many years to come (Robertson 1997). The mainland colony of Northern Royal Albatrosses at Taiaroa Head (Dunedin, New Zealand) has increased, assisted by control of predators and human interference, and despite the incidence of flystrike which is responsible for some mortality of hatchlings (see Robertson 1997).

Fishing operations also affect Northern Royal Albatrosses. These birds are caught on longlines in the waters off southern Australia (Gales, Brothers and Reid, unpubl. data), and their extensive oceanic distribution exposes them to interactions with an array of longline operations. Fishing-related mortality at sea, whilst perhaps not the primary threat to this species, serves to hasten the decrease of the population.

Southern Royal Albatross *Diomedea epomophora*

Previous name: Southern Royal Albatross *Diomedea epomophora epomophora.*

Breeding distribution and jurisdiction: Campbell Island, Enderby Island, Adams Island and Auckland Island (New Zealand).

Breeding frequency and season: Biennial breeder (when successful). Most eggs laid in November–December, chicks hatch in February–March and fledge after eight months in October–November.

Population size: The annual breeding population is estimated as about 7 870 pairs, equivalent to a total breeding population of *ca.* 13 000 pairs (see Appendix 1A), and perhaps 50 000 individuals in total. There are four breeding sites but >99% of birds breed at Campbell Island, while the remaining three populations have fewer than 55 pairs breeding annually.

Status: The status of Southern Royal Albatrosses at Campbell Island is thought to be increasing but interpretation of counts is difficult due to inconsistent census efforts. The breeding population appears to have increased (at least until the 1980s), recovering from the effects of human predation during the sealing era, and the effects of burning and grazing during the farming era (until 1931). Fluctuations in the numbers of annual breeding population (23% between 1995 and 1996, P. Moore, pers. comm.) make recent trends difficult to interpret. The relict population at Enderby Island is currently increasing, following recolonization in 1940 after extirpation in the 1860s.

Threats: The impacts associated with the sealing and farming periods on Campbell Island ceased in the 1930s. At sea, trawling operations are known to have killed Southern Royal Albatrosses, but this appears to have been mitigated on vessels where the use of netsonde monitor cables were abolished (Bartle 1991). Today, longlining represents the major threat to Southern Royal Albatrosses. Southern Royal Albatrosses are known to have been caught on longlines in the

South Atlantic Ocean, the Indian Ocean and in the Australian Fishing Zone (Gales 1993 and references therein). All banded Southern Royal Albatrosses caught in the Australian Fishing Zone are from Campbell Island. The circumpolar dispersal of this species allows for extensive overlap with longline operations, and the nature and magnitude of the bycatch for most of these fleets remains to be quantified.

Amsterdam Albatross *Diomedea amsterdamensis*

Previous name: Amsterdam Albatross *Diomedea amsterdamensis*.

Breeding distribution and jurisdiction: Amsterdam Island (southern Indian Ocean), French jurisdiction.

Breeding frequency and season: Biennial breeder (when successful). Most eggs laid in February–March, chicks hatch in May and fledge in January–February of the following year.

Population size: Total breeding population estimated at 20 pairs (*ca.* 13 eggs laid each year), perhaps 90 birds in total (see Appendix 1A). One breeding site.

Status: Endemic to Amsterdam Island, an external territory of France. Classified as *Critically Endangered* (Collar *et al.* 1994). This species is listed by the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals) as *Endangered* under Appendix 1.

Threats: Subfossil records show that population was historically much larger, restriction of current population being caused by fire and habitat degradation by cattle, and probably by deaths associated with fishing activities (Jouventin *et al.* 1989; Weimerskirch and Jouventin 1997). The impact of cattle is now restricted by exclusion fences, but predation by cats and rats remains a potential threat. The current population trend mirrors that of other Wandering Albatross populations in the Indian Ocean, and may have been similarly depleted by deaths on longline hooks set in proximity to the island during the 1970s and 1980s (Weimerskirch and Jouventin 1997). Whilst these local fishing activities have contracted, there are concerns regarding overlap between these birds and longliners operating in subtropical-tropical waters (H. Weimerskirch, pers. comm.). Amsterdam Albatrosses were recorded as bycatch on longliners operating south of Tasmania in 1992 (N. Brothers, pers. comm.). For this *Critically Endangered* species, any increase in mortality rates above natural levels would likely be catastrophic.

Short-tailed Albatross *Phoebastria albatrus*

Previous name: Short-tailed Albatross *Diomedea albatrus*.

Breeding distribution and jurisdiction: Torishima Island in Izu Islands, off southeastern Japan and Minami-kojima (Senkaku Islands) (Japan). Recent unsuccessful breeding attempt at Midway Atoll, Hawaii (USA).

Breeding frequency and season: Annual breeding. Eggs are laid in October–November, hatch in December–January, and chicks fledge in May–June.

Population size: While currently confined to two breeding locations, the Short-tailed Albatross was formerly an abundant species breeding on at least 11 Japanese islands. The toll taken by feather hunters and volcanic eruptions almost exterminated the species by the 1940s. In 1950, a relict population was discovered on the volcanic ash slopes of Torishima Island and this population is slowly recovering with 156 eggs laid in 1995. On Minami-kojima, the presence of a small population was confirmed in 1988, and in 1991 this population was estimated at 15 pairs (Hasegawa 1991). One Short-tailed Albatross egg was laid at Midway Atoll in 1993, but failed to hatch (Richardson 1994).

The total breeding population in 1995 was *ca.* 170 pairs (see Appendix 1B), perhaps 700–800 birds in total.

Status: Endemic to Japan.

Classified as *Endangered* (Collar *et al.* 1994). This species is listed by the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals) as *Endangered* under Appendix 1.

Population status information is only available for the Torishima population which has been increasing at 7% p.a. (Hasegawa 1991).

Threats: The small size of the population of this species and restricted range (currently only two island breeding sites in Japan) combine to provide an unfavourable conservation status. Vulnerability is exacerbated by Torishima Island being an active volcanic island and the unstable nature of the ash slopes where the birds breed. Efforts to attract birds to nest on more stable slopes have been successful with one chick hatching in this new colony in 1996 (H. Hasegawa, pers. comm.).

Ingestion of plastics poses a potential risk to these birds (see Gales 1993), but the most serious risk to these birds is the mortality associated with fishing practices. Short-tailed Albatrosses are known to scavenge from longline vessels in the Pacific Ocean and Bering Sea/Gulf of Alaska region and birds have been seen at the colonies trailing fishing line from their beaks (H. Hasegawa, pers. comm.). To date there are three confirmed records of Short-tailed Albatrosses being killed on longline hooks set in the North Pacific (P. Gould, in litt.). All three birds were

immatures although birds of all age classes are known to follow fishing vessels (Camp 1993). Given their primarily inshore distribution at sea, it is the short-range fisheries of Japan which potentially pose the greatest threat to this species (P. Gould, in litt.). However, the extent of fisheries-related mortality for this species in any fishery is unknown, and any efforts to document the extent of such mortality would be problematical given the extremely low population size and low level of observer coverage. For this *Endangered* species, however, the loss of any individuals to longline hooks represents a serious threat to the population.

Waved Albatross *Phoebastria irrorata*

Previous name: Waved Albatross *Diomedea irrorata.*

Breeding distribution and jurisdiction: Espanola Island (Galapagos Islands, Ecuador) and La Plata Island (Ecuador).

Breeding frequency and season: Annual breeding. Most eggs laid in May (April–June), chicks hatch in July and fledge in December.

Population size: Breeding population estimated at *ca.* 15 590 pairs (see Appendix 1B), perhaps 70 000–80 000 birds in total. Two breeding sites, with >99.9% (n = 15 580) eggs laid on Isla Espanola (Galapagos Islands, Ecuador), and only *ca.* 10 eggs laid each year on La Plata Island (Ecuador).

Status: Endemic to Ecuador. Considered *Near Threatened* (Collar *et al.* 1994).

Only two surveys have been conducted at Isla Espanola between 1970 ("at least 12 000 pairs", Harris 1973) and 1994 (two estimates from same survey: 15 581 pairs by Anderson 1995 and "approximately 17 000 pairs" by Douglas 1995); hence the population status cannot yet be confirmed. The status of the La Plata Island population is also unknown. Restriction of breeding range to only two sites greatly enhances the potential significance of any threat.

Threats: Mass abandonment of colonies and loss of eggs through egg rolling contribute to breeding failures (egg rolling behaviour occurs when no nesting material is available and is thought to result from thermal stress, Douglas 1995). The introduction of goats in the past may have had an indirect impact due to vegetation destruction and thermal exposure of the nest sites. Goats have since been removed from Isla Espanola but persist on La Plata Island. Flooding may also occasionally cause nest failure (Harris 1973).

It is not known if Waved Albatrosses have been caught on longline hooks as there have been no observations aboard fishing vessels in areas frequented by the birds. From satellite tracking studies it is clear that there is overlap between longline activities and the foraging areas of the birds but observations suggest that Waved Albatrosses do not readily follow boats (Anderson *et al.* 1997). Waved Albatrosses are, however, known to be scavengers of squid (Harris 1973) and Merlen (1996) warns of the potential of a learned response by the birds to taking squid baited hooks should longline fisheries become more concentrated in the vicinity of the breeding grounds. Both legal and illegal longline fishing efforts for tuna and other pelagic fish have increased in the waters surrounding the Galapagos Islands (Merlen 1996).

Examination of the presence of interactions with fishing practices in the foraging range of these birds remains a high priority. There are still no available data regarding seabird bycatch from the Peruvian region, although Greenpeace International have received reports of seabird bycatch in the area (M. Earle, pers. comm.).

Laysan Albatross *Phoebastria immutabilis*

Previous name: Laysan Albatross *Diomedea immutabilis.*

Breeding distribution and jurisdiction: Northwestern Hawaiian Islands, especially Midway Island and Laysan Island (USA), recently established on Mukojima (Bonin Islands, Japan); recent expansion to Guadalupe Island, Clarion Island and San Benedicto Island (Mexico).

Breeding frequency and season: Annual breeding. Most eggs are laid in November–December, hatch in January–February, and most chicks fledge in June–July.

Population size: The most numerous of the North Pacific Albatross species. The current population is approximately 607 000 breeding pairs (see Appendix 1B), representing perhaps two and a half to three million birds in total.

Status: Given the relative abundance of this species, compared to other species of albatross, its status is generally considered to be relatively secure at present (see Croxall and Gales 1997). However, of the 16 breeding sites documented for the species, two populations, representing 93% of the total breeding stock, are known to be decreasing. The population at Midway Atoll, which accounts for 70% of the global population, showed relatively rapid recovery following the cessation of human depredation at the turn of the Century until the 1960s, after which the rate of increase in numbers slowed (McDermond and Morgan 1993). Counts in 1991/92 showed a decrease of 15% (E. Flint, pers comm). The status of the Hawaiian Island colonies will become more clear with repetition of standardized

counts. There is evidence of range expansion and re-occupation at some Hawaiian Island breeding sites, in addition to the recent colonizations in Mexico and Japan (see Appendix 1B).

Threats: A myriad of threats affect Laysan Albatrosses, but since the cessation of widespread harvesting of eggs and adults by Japanese 100 years ago, and the end of the intensive control programmes of the US military, mortality associated with fishing interactions represent the most recent and significant threat to the species.

Drift netting in the North Pacific Ocean since 1978 is estimated to have killed 212 900 Laysan Albatrosses (2.5% excess mortality/year: Gould and Hobbs 1992; Johnson *et al.* 1992). An estimated 17 548 were killed in 1990 alone, primarily by Japanese (54%) and Korean (27%) squid fisheries (Johnson *et al.* 1992). Whilst high seas drift netting was banned in 1992, similar rates of mortality are suspected for the North Pacific Ocean longline fisheries which have flourished since the cessation of drift netting (Ludwig *et al.* 1997). Whilst catch rates of albatrosses in North Pacific Ocean longline fisheries are not yet well known, indications suggest that they are similar to, or even in excess of, catch rates of Southern Ocean species. Japanese fishing masters have reported that the Pacific region is one of high bird catch rates (N. Brothers, pers. comm.). These reports are supported by observations on Hawaiian-based vessels targeting swordfish, where 85 Laysan Albatrosses were caught on one trip (Anon. 1996). Whilst the global Laysan Albatross population has tolerated pressure from fisheries bycatch in the past, it is not known at what level these anthropogenic impacts will be reflected in population trends. With the establishment of standardized and widespread population census efforts, and attempts to obtain catch rate information on fishing boats, this should become clearer in the future.

Black-footed Albatross *Phoebastria nigripes*

Previous name: Black-footed Albatross *Diomedea nigripes.*

Breeding distribution and jurisdiction: Hawaiian Island, (USA) and Izu Islands, Bonin and Senkaku Islands (Japan).

Breeding frequency and season: Annual breeding. Most eggs are laid in November, hatch in January, and most chicks fledge in June.

Population size: Current population approximately 58 500 breeding pairs (see Appendix 1B), perhaps 260 000–290 000 birds in total.

Status: By 1980 this species had largely recovered from the catastrophic population decreases resulting from indiscriminate harvesting by feather hunters at the turn of 20th Century. However, the recovery was retarded by habitat modification by rabbits and humans. The population recovery then halted as a consequence of bycatch associated with the North Pacific Ocean high seas squid and large mesh driftnet fisheries. These fisheries now illegal under a moratorium agreed in 1992.

The major populations are either decreasing or of unknown status. Of the 12 populations, only the three relatively small populations in Japan (which represent 4% of the global population) are increasing, the nine Hawaiian populations either decreasing (five populations representing 47% of the global population) or of unknown status. Clarification of rates of decrease are difficult due to variations in census techniques (McDermond and Morgan 1993) but current annual surveys now incorporate >70% of population (E. Flint, pers. comm.).

Threats: This species has faced an array of threats over the last 100 years (see Gales 1993), including direct human persecution up until the 1950s. Recently, the most important significant threat is bycatch associated with fishing operations. During the 1980s thousands of Black-footed Albatrosses were killed each year in drift nets, principally belonging to the Japanese and Korean squid fisheries (Northridge 1991). Whilst high seas drift netting has since been banned (due to the moratorium imposed as a result of devastating levels of bycatch), even higher rates of bycatch of Black-footed Albatrosses are now being detected in the rapidly expanding North Pacific Ocean longline fisheries that largely replaced drift netting (see Lugwig *et al.* 1997). Preliminary data from the Hawaiian-based longline fishery for swordfish alone indicates that more Black-footed Albatrosses are taken annually in longline interactions than were taken in the entire North Pacific Ocean high seas drift net fishery each year (Flint 1995).

Longline fishing fleets targeting tuna in the North Pacific Ocean and sablefish in Alaskan waters are both known to catch Black-footed Albatrosses (Flint 1995; Ogi 1995). Preliminary estimates of hooking rates indicate that the catch rates in the North Pacific exceed those that have caused Southern Ocean albatross populations to decline. An estimated 23 382 Black-footed Albatrosses were killed on longlines targeting swordfish and tuna between 1990 and 1994 (Anon. 1996). These bycatch rates constitute 91% of the human-caused mortalities, the remaining 9% being caused by chemical pollutant contaminants (Ludwig *et al.* 1997). Mortality rates of this magnitude which serve to exacerbate the mortality incurred from natural sources, primarily inundation of nests by waves, cannot be sustained by the population.

Black-browed Albatross
Thalassarche melanophrys

Previous name: Black-browed Albatross *Diomedea melanophrys*.

Breeding distribution and jurisdiction: Falkland Islands, South Georgia (United Kingdom); Cape Horn (Chile); Crozet Islands, Kerguelen Islands, (France); Heard and McDonald Islands, Macquarie Island, Bishop and Clerk Islands (Australia); Antipodes Islands, Campbell Island and Snares Island (New Zealand).

Breeding frequency and season: Annual breeding. Timing of breeding varies with location, but generally the breeding season extends from September to April.

Population size: The most abundant of the southern albatross species (Appendix 1C). Current population is approximately 682 000 breeding pairs, perhaps 3 000 000 birds in total. This species is most numerous at the Falkland Islands (80% of global populations), particularly at Steeple Jason Island where about 250 000 pairs breed annually. The smallest Black-browed Albatross populations occur on the Australian and New Zealand sub-antarctic islands.

Status: Black-browed Albatrosses are the most widely distributed of all albatross species and their population status varies with respect to location of colony. The status of many of the smaller populations is not known, although current studies in both the Australian and New Zealand sectors should partially redress this situation. Whilst some colonies have shown signs of increases, low rates of adult survival and juvenile recruitment at the two most intensively studied populations (Bird Island and Kerguelen Island) are causing the populations to decline (see Croxall *et al.* 1997; Weimerskirch and Jouventin 1997).

Threats: The complex picture of the status of the various Black-browed Albatross populations is most likely a consequence of the differing degree of interactions between this species and various fishing operations. During the breeding season, Black-browed Albatrosses forage in continental shelf waters and birds from different colonies within island breeding sites may frequent different regions of these shelf waters (Prince *et al.* 1997; Weimerskirch 1997). The use of different foraging grounds by the different populations may explain disparate trends in status between colonies; birds from some colonies being afforded short-term gains by commuting to waters used by trawlers (and scavenge from discards), and birds from other colonies foraging in areas heavily fished by longliners (Weimerskirch 1997).

Given the distribution of fishing effort in relation to the colonies of this species, and the local nature of the birds foraging during the breeding season, Black-browed Albatrosses may face the greatest threats from fisheries of any albatross species (Weimerskirch and Jouventin 1997). Outside of the breeding season these birds travel to more distant shelf waters, and so interactions with fisheries depend on the concentration of fishing in each area. For example, the developing Hake longline fishery off the South African coast will most likely affect Black-browed Albatrosses from South Georgia, whereas Black-browed Albatrosses from the Falkland Islands most likely interact with longline operations off the Patagonian shelf (Prince *et al.* 1997; Schiavini *et al.* 1997; Neves and Olmos 1997).

Longline fishing off Australia by Japanese and Australian fleets is known to kill Black-browed Albatrosses from Kerguelen and Macquarie Islands (Gales, Brothers and Reid, unpubl. data). Black-browed Albatrosses are one of the commonest species in the seabird bycatch off Australia, but band returns from Black-browed Albatrosses killed on longlines off Australia are restricted to birds from Kerguelen Island (annual breeding population of *ca.* 3 000 pairs whose status is decreasing) and Macquarie Island (annual breeding population 38 pairs, with an unknown status).

Longlining thus constitutes the primary threat to Black-browed Albatrosses, with Australasian longlining representing the major threat to Indian Ocean and Australian populations. Longlining off Africa threatens the South Georgia population and longlining off South America threatens the Falkland and Chilean populations.

Campbell Albatross *Thalassarche impavida*

Previous name: Black-browed Albatross *Diomedea melanophrys impavida* (or New Zealand Black-browed Albatross).

Breeding distribution and jurisdiction: Campbell Island (New Zealand).

Breeding frequency and season: Annual breeding. Adults return to colonies in August, laying eggs in September-October. Successful breeders and chicks depart colonies in April–May.

Population size: The 26 000 pairs are restricted to Campbell Island (see Appendix 1C).

Status: Endemic to New Zealand.

Photographic evidence suggests decreases in the population between the 1960s and 1980s, one colony decreasing by 33% (Moore 1995). Current status during the 1990s not yet determined.

Threats: In the past human predation and sheep have affected the Campbell Albatross population. These threats no longer exist and predation of eggs and chicks by Skuas *Catharacta lonnbergi* and Northern Giant Petrels *Macronectes halli* (Moore and Moffat 1990) are the only identified threats to the species on land.

At sea, Campbell Albatrosses are mainly confined to the waters off southern Australia and New Zealand and the western Pacific Ocean (C. J. Robertson, pers. comm.). High capture rates of Campbell Albatrosses have been recorded from longliners operating off New Zealand and southern Australia (Murray *et al.* 1993; Gales, Brothers and Reid, unpubl. data). Bycatch of this species in New Zealand constitutes mainly new juveniles, but adults in breeding condition are also caught during summer off the Tasmanian coast. Of all returns recovered from banded albatrosses killed on longliners off Australia between 1987 and 1994, 13% were from Campbell Albatrosses (Gales, Brothers and Reid, unpubl. data). This evidence confirms that Australasian longlining is the major threat facing Campbell Albatrosses.

Buller's Albatross *Thalassarche bulleri*

Previous name: Buller's Albatross (or Southern Buller's Albatross) *Diomedea bulleri bulleri.*

Breeding distribution and jurisdiction: Snares and Solander Islands (Solander Island and Little Solander Island), (New Zealand).

Breeding frequency and season: The breeding biology of this species is poorly known. They are typically annual breeders, the adults returning to the colonies in December. Eggs are laid in January–February, their chicks hatch in March–April and fledge from late August to late October.

Population size: The breeding population estimated at about 11 000 pairs (see Appendix 1C), perhaps 50 000 to 55 000 birds in total. Most of these birds are from the Snares Islands population (77% of the population), with the remainder from Solander and Little Solander Islands.

Status: Endemic to New Zealand. Considered Near Threatened by Collar *et al.* (1994).

Given the paucity of reliable survey data for this species, determination of population status is not possible at present. Current research should soon clarify the current status of Buller's Albatrosses (P. Sagar, pers. comm.).

Threats: The only identified threat facing Buller's Albatrosses is mortality associated with fishing activities (Gales 1993). Many Buller's Albatrosses are known to have been killed by colliding with netsonde monitor cables on trawlers, but this source of mortality has been mitigated with the prohibition of this apparatus, at least in New Zealand waters (Bartle 1991). Buller's Albatrosses are also known to be hooked on longlines in waters off Australia and New Zealand (Murray *et al.* 1993; Gales, Brothers and Reid, unpubl. data). The autumn/winter breeding characteristic of Buller's Albatrosses focuses the risk from longlining as it is during the winter months that fishing effort is concentrated within the foraging range of breeding adults (Murray *et al.* 1993; Sagar and Weimerskirch, in press).

The current research into the demographic status and oceanic distribution of Buller's Albatrosses will assist understanding of impacts associated with longline fishing on this species.

Pacific Albatross *Thalassarche* nov. sp.

Previous name: Buller's Albatross (or Northern Buller's Albatross) *Diomedea bulleri platei.*

Breeding distribution and jurisdiction: Three Kings and Chatham Islands (Big and Little Sister Islands, and the Forty Fours) (New Zealand).

Breeding frequency and season: Annual breeding. Pacific Albatrosses lay eggs in November, hatch in January and chicks fledge in June.

Population size: The breeding population is estimated at about 18 000 pairs (see Appendix 1C), perhaps 80 000–90 000 birds. The population size estimates for the two large populations (Big Sister Island and the Forty Fours, with >95% of global population) are crude, assessed on the basis of area. The size of the Three Kings population (believed to be <1% of the total population) is also poorly known. Reliable population size data exists only for the Little Sister Island population (estimated at <4% of population).

Status: Endemic to New Zealand.

An evaluation of the status of this species is not possible given the lack of reliable population data.

Threats: Consistent with the lack of population data for this species, there is also little information regarding threats to the species. Distribution at sea is also poorly known as a result of confusion with Buller's Albatrosses. Despite this uncertainty, it has been suggested that the species is highly migratory during the non-breeding season, ranging eastward across the southern Pacific Ocean to the western South American coast (Lindsey 1986). During the breeding season the birds are known to forage in the area of the Challenger Rise, coincident with longline operations (C. J. Robertson, pers. comm.). To date there are no reports of deaths of these birds on longlines. However, in the areas prospected by these birds, both during the breeding and non-breeding season, longline operations proceed largely in the absence of any observer coverage.

Shy Albatross *Thalassarche cauta*

Previous name: Shy Albatross *Diomedea cauta cauta.*

Breeding distribution and jurisdiction: Albatross Island, Mewstone and Pedra Branca (Australia).

Breeding frequency and season: Annual breeding. Most eggs are laid in September, hatch in December and chicks fledge in April. Adults attend colonies in winter between breeding seasons.

Population size: The breeding population is estimated at about 12 200 breeding pairs (see Appendix 1C), approximately 55 000–60 000 individuals.

Status: Endemic to Australia.

The population estimates for this species are of moderate accuracy only, except for the Albatross Island colony in Bass Strait. This colony is showing signs of a slow recovery following the devastation executed by feather and egg collectors at the turn of the Century. The current population level on Albatross Island (5 000 pairs) constitutes about 25% of the estimated original island population size having increased from only 300 pairs (1.5% of initial population) in 1909. The trends of the Mewstone and Pedra Branca populations (estimated at 59% of the species population) is unknown.

Threats: A viral disease is known to reduce productivity rates during some years for the Albatross Island colony (see Gales 1993). There is, however, no evidence of this disease elsewhere in the species' range.

The major threat facing Shy Albatrosses is incidental mortality associated with fishing operations. In the Australian region, Shy Albatrosses constitute over 10% of the seabird bycatch on Japanese tuna longlines and most of these were adult birds (Gales, Brothers and Reid, unpubl. data). Based on assessments of foraging ranges as determined from satellite tracking (Brothers *et al.* 1977a) and fishing effort, it is likely that these birds are from the southern Tasmanian populations, whose status is unclear. Shy Albatrosses are also killed on longlines set by the Australian domestic fishing fleet (Brothers and Foster, in press). The spatial and temporal concentration of tuna fishing effort to the south and east coasts of Tasmania, and the recent increase in the Australian domestic longline fishery, is consequently of major concern with respect to this species. The three populations are differentially vulnerable as a result of their differences in foraging zones: the southern populations being vulnerable throughout their annual cycle. Band recoveries reveal that juveniles of the southern Tasmanian population migrate to waters off southern Africa and so are also placed at risk from longline fisheries in this region (Brothers *et al.* 1997b).

Recent proposals to increase the commercial squid *Nototodarus gouldi* fishery in Bass Strait, within the foraging ranges of the Albatross Island population, may also pose a threat. Direct competition for common prey may affect the birds if squid quotas increase with no regard to the food requirements of the albatrosses.

White-capped Albatross *Thalassarche steadi*

Previous name: Shy Albatross (or White-capped Albatross) *Diomedea cauta steadi.*

Breeding distribution and jurisdiction: Disappointment Island, Adams Island, Auckland Island (Auckland Island group) and Bollons Island (Antipodes Island group) (New Zealand).

Breeding frequency and season: Poorly known as there have been no detailed studies. Egg laying starts in mid-November, hatching in February and young fledging in mid-August (Robertson 1985). Likely to breed annually. No data available on breeding success, survival or recruitment for this species.

Population size: The breeding population is estimated at *ca.* 75 000 breeding pairs (see Appendix 1C), approximately 350 000–375 000 individuals.

Status: Endemic to New Zealand.

As there are no accurate estimates of population size for the species, there can be no reliable assessments of status or trends.

Threats: On Auckland Island habitat destruction by feral pigs has led to some reduction in nesting area, at least in the past.

At sea, the major threat facing White-capped Albatrosses is incidental mortality associated with fishing operations. In New Zealand waters White-capped Albatrosses constituted 85% of the bycatch associated with squid trawlers (Bartle 1991). This level of bycatch was not sustainable and has since been reduced by the prohibition on the use of netsonde monitor cables in New Zealand waters. White-capped Albatrosses are also known to be killed on bluefin tuna longlines in New Zealand waters (Murray *et al.* 1993), but due to difficulty in distinguishing this species from Shy Albatrosses, assessment of extent and magnitude of bycatch in other areas is problematical. This confusion also impedes understanding of the distribution of this species at sea. Knowledge of the status of this species, and its distribution at sea is urgently required.

Salvin's Albatross *Thalassarche salvini*

Previous name: Shy Albatross (or Salvin's Albatross) *Diomedea cauta salvini.*

Breeding distribution and jurisdiction: Snares and Bounty Islands (New Zealand). Penguin Island (Crozet Islands; France).

Breeding frequency and season: No detailed studies; assumed to be an annual breeder. Eggs hatch at Bounty Islands in mid-November, so laying

presumed to occur in early October. Chicks fledge in late March to early April.

Population size: The breeding population is estimated at *ca.* 76 500 breeding pairs (see Appendix 1C), approximately 350 000–380 000 individuals. New Zealand populations account for >99% of the global population, <5 pairs nesting on Penguin Island (Crozet Group) in the Indian Ocean each year.

Status: Knowledge of the New Zealand populations is poor, the estimate of the major population on the Bounty Islands being derived from extent of breeding area. Given the lack of repeated counts for any of the populations of this species, the status and population trend of the species remains unknown.

Threats: There is no information regarding the threats faced by this species, either on land or at sea. The extensive marine distribution of this species (extending north to 5°S in the Humboldt Current, and also in the Indian Ocean and off the coasts of Australia and South Africa (Marchant and Higgins 1990), would place the species potentially at risk from both tropical and temperate longline operations. On the Pacific coast of South America, Salvin's Albatrosses concentrate over the continental slope region, their distribution coinciding with that of the developing longline fishery (Spear *et al.* 1995). It is likely that this fishery will impact on Salvin's Albatrosses.

Chatham Albatross *Thalassarche eremita*

Previous name: Shy Albatross (or Chatham Island Albatross) *Diomedea cauta eremita.*

Breeding distribution and jurisdiction: The Pyramid (Chatham Islands, New Zealand).

Breeding frequency and season: There have been no detailed studies of the breeding biology of this species. It is presumed to breed annually. Eggs are laid in August and September, and chicks are presumed to fledge in April (Robertson and van Tets 1982). Two Campbell Albatrosses are regularly seen amongst Shy Albatrosses on Albatross Island (Bass Strait, Tasmania) but there have been no observed attempts at breeding.

Population size: There have never been any ground counts of this species. Based on aerial photographs taken in 1972, the breeding population is estimated to be *ca.* 4 000 pairs (see Appendix 1C), perhaps 18 000 to 20 000 individuals.

Status: Endemic to New Zealand.

The accuracy of the single population estimate is low. The status of this species is therefore unknown.

Threats: A significant threat to this species on land is a reduction of the quality of nesting habitat as a result of storm damage and climatic change (C. J. Robertson, pers. comm.). These birds tend to be solitary at sea and their movement patterns are not clear. They are rarely seen in coastal regions. During the non-breeding (winter) season, they are reported to disperse towards the west coast of South America where they mostly frequent pelagic waters (Spear *et al.* 1995). In 1995 a banded juvenile Chatham Albatross was reported to have been killed on a longline targeting swordfish off Chile (C. J. Robertson, pers. comm.). Chatham Albatrosses also occur off the coast of Tasmania where they are known to interact with longline fishing operations (Reid and James, in press).

Atlantic Yellow-nosed Albatross *Thalassarche chlororhynchos*

Previous name: Yellow-nosed Albatross *Diomedea chlororhynchos chlororhynchos.*

Breeding distribution and jurisdiction: Tristan da Cunha group and Gough Island (United Kingdom).

Breeding frequency and season: Likely to be annual breeder. Most eggs laid in September–October, hatch in November–December and chicks fledge in April–May.

Population size: The breeding population is estimated at *ca.* 36 800 pairs (see Appendix 1C), corresponding to approximately 165 000–185 000 individuals in total. Population size estimates are crude as no population has ever been reliably surveyed.

Status: Endemic to territories of the United Kingdom.

The absence of any reliable information on population size precludes any assessment of population trends and status for the six populations. Unpublished information indicates that the Gough Island population has shown a significant decrease since the 1980s (J. Cooper, pers. comm.).

Threats: Since the recent cessation of harvesting by humans on Nightingale Island (Tristan da Cunha group), interactions with commercial fishing operations are the most serious threats faced by Atlantic Yellow-nosed Albatrosses. Little is known about the oceanic distribution of this species and confusion with Indian Yellow-nosed Albatrosses precludes quantitative assessment of bycatch rates in most areas. Yellow-nosed Albatrosses constituted a significant proportion of the seabird bycatch observed on tuna longlines off Brazil (Neves and Olmos 1997), and it is likely that these birds were Atlantic Yellow-nosed Albatrosses (T. Reid, pers. comm.).

Further information on the status of the population and the extent of bycatch of this species are urgently required.

Indian Yellow-nosed Albatross *Thalassarche carteri*

Previous name: Yellow-nosed Albatross *Diomedea chlororhynchos bassi.*

Breeding distribution and jurisdiction: Prince Edward Islands (South Africa), Kerguelen Islands, Crozet Island, Amsterdam and St Paul Islands (France).

Breeding frequency and season: Annual breeding. Most eggs laid in September–October, hatch in November–December and chicks fledge in March–April.

Population size: The annual breeding population is estimated at *ca.* 36 500 pairs (see Appendix 1C), corresponding to approximately 160 000–180 000 individuals in total. Population size estimates are generally poor for this species across its range, the only exception being the Amsterdam Island population which represents approximately 70% of the estimated global population (Weimerskirch and Jouventin 1997).

Status: The absence of reliable time series population data preclude any status assessment for all but the Amsterdam Island population. This population has decreased by over one-third since the early 1980s and is decreasing at 7% annually as a result of increased mortality of both adults and immatures (Weimerskirch and Jouventin 1997).

Threats: It appears that interactions with commercial fishing operations are the most serious threat faced by Indian Yellow-nosed Albatrosses. Previously this conclusion was largely inferential (Gales 1993), but the recently observed population decreases and the documented bycatch of these birds on tuna longlines confirms the connection. Although the Atlantic and Indian Ocean species were not distinguished, Yellow-nosed Albatrosses constituted 14% of the seabird bycatch observed on tuna longlines off Brazil (Neves and Olmos 1997), similar to the 13% that both species comprised in the bycatch in the Australian region (Gales and Brothers 1995). In the Australian sample, adults were primarily caught during winter whereas immatures were more often caught in the summer fishing season (Gales, Brothers and Reid, unpubl. data). The only other significant source of mortality identified for this species is a viral disease which in some years causes elevated chick mortality in some colonies (H. Weimerskirch, pers. comm.).

Grey-headed Albatross *Diomedea chrysostoma*

Previous name: Grey-headed Albatross *Diomedea chrysostoma.*

Breeding distribution and jurisdiction: South Georgia (United Kingdom); Diego Ramirez and Islands Ildefonso (Chile); Kerguelen and Crozet Islands (France); Marion and Prince Edward Islands (South Africa); Campbell Island (New Zealand); Macquarie Island (Australia).

Breeding frequency and season: Biennial breeder (when successful). Most eggs laid in October, hatch in December–January and chicks fledge in April–May.

Population size: The breeding population estimated at *ca.* 92 300 pairs each year (see Appendix 1D), corresponding to approximately 250 000 mature individuals, or 600 000 individuals in total. The population estimates for this species are reasonably reliable, with the notable exception of the two colonies within the French territories and the Chilean populations.

Status: Currently considered *Near Threatened* by Collar *et al.* (1994).

The status of the populations varies with breeding location. At South Georgia over the last two decades, the Bird Island population has decreased at an annual rate of 1.4–1.8%, mainly as a result of decreases in immature survival rate (from 35% to 5% recruitment) and reduced adult survival (from 95% to 93%) (Prince *et al.* 1994a; Croxall *et al.* 1997).

The population decrease of *ca.* 20% documented for Bird Island is alarming, particularly as the South Georgian population represents nearly two thirds (59%) of the world's population. Decreases of 79–85% since the 1940s have been observed for Campbell Island albatross colonies in which Grey-headed Albatrosses predominate (Moore 1995). The only population increase recorded for the species is a recent one (since 1992) for the Marion Island population (7% of global population) which had previously decreased at 0.7% p.a. since the 1970s (J. Cooper, pers. comm.).

Threats: Grey-headed Albatrosses are vulnerable to deaths associated with fishing practices, particularly longlining. Of the longline fisheries, it is the pelagic rather than the shelf-slope fisheries which probably pose the greatest threat to this species (Prince *et al.*1997).

The decrease in the Grey-headed Albatross population at Bird Island is most probably attributable to deaths of immatures on longlines (Prince *et al.* 1994a). This is consistent with the predominance of immatures in the Grey-headed Albatross component of the seabird bycatch from Japanese tuna longlines operating off Australia (Gales, Brothers and Reid, unpubl. data) and New Zealand (Murray *et al.* 1993).

Grey-headed Albatrosses are also hooked on longlines set in Kerguelen waters (Cherel *et al.* 1996). The impacts of this mortality, however, is

not known as the populations of this species in the French territories of Crozet and Kerguelen are not routinely monitored.

Of potential, rather than realized threat, is the development of commercial squid fisheries in the Southern Ocean (Prince *et al.* 1997). As Grey-headed Albatrosses direct their foraging efforts at the squid *Martialia hyadesi*, which is a target of increasing commercial fishing interests, expansion of the squid fishery should consider the requirements of these albatrosses so that the species is not subject to further adverse effects.

Sooty Albatross *Phoebetria fusca*

Previous name: Sooty Albatross *Phoebetria fusca.*

Breeding distribution and jurisdiction: Tristan da Cunha Islands and Gough Island (United Kingdom); Prince Edward Island and Marion Island (South Africa); Kerguelen, Crozet, Amsterdam and St Paul Islands (France).

Breeding frequency and season: Biennial breeder (when successful). Most eggs laid in October, hatch in December and chicks fledge in May.

Population size: The annual breeding population is estimated at *ca.* 15 655 pairs (see Appendix 1D), approximately 100 000 individuals in total. Six breeding assemblages exist, the major sites being Gough Island and the Tristan da Cunha group in the southern Atlantic Ocean. Of the 15 island sites, detailed monitoring only occurs at the small Possession Island (Crozet Islands, Indian Ocean) population (which represents about 2% of the estimated global population).

Status: Considered *Near Threatened* by Collar *et al.* (1994).

The status of Sooty Albatrosses is known only for Possession Island population. The population decrease documented for this species is the most extensive of the six albatross species studied within the French external territories of Crozet or Kerguelen. The population is currently decreasing at a rate of 3% p.a., previous rates of decrease were as high as 6.9% p.a. (between 1979–86). These rates translate to a total decrease in the population of 58% since 1980 (Weimerskirch and Jouventin 1997). Decreasing survival rates of both adults and immatures are responsible for the observed population trends.

The status of the remaining 14 populations (comprising approximately 98% of the estimated global population) is unknown.

Threats: The adult mortality rates of Sooty Albatrosses on Possession Island (Crozet group, Indian Ocean) are significantly related to the longline fishing effort that occurs in the oceanic sectors prospected by them (Weimerskirch and Jouventin 1997). Adult and immature Sooty Albatrosses are known to be killed on Japanese longlines set both inside and beyond the Australian Fishing Zone (Gales, Brothers and Reid, unpubl. data). Information detailing the composition of seabird bycatch within the foraging area of this oceanic species (e.g., high seas, especially Indian Ocean) exists but is currently confidential to fisheries managers. From the limited information which is available, however, it is clear that Sooty Albatrosses are caught in proportionately significantly higher numbers on the high seas than in Exclusive Economic Zone fisheries, reflecting the oceanic habit of this species (Gales, Brothers and Reid, unpubl. data). Without information to the contrary, and in the absence of identification of other anthropogenic factor affecting Sooty Albatrosses, the logical conclusion is that longline fishing is responsible for the observed population decreases and is the most serious threat facing this species.

Light-mantled Albatross *Phoebetria palpebrata*

Previous name: Light-mantled Sooty Albatross *Phoebetria palpebrata.*

Breeding distribution and jurisdiction: South Georgia (United Kingdom); Prince Edward and Marion Islands (South Africa); Kerguelen and Crozet Islands (France); Heard Island and Macquarie Island (Australia); Auckland, Campbell and Antipodes Islands (New Zealand).

Breeding frequency and season: Biennial breeder (when successful). Most eggs laid in October–November, hatch in December–January and chicks fledge in May–June.

Population size: The breeding population is estimated at *ca.* 21 600 pairs each year (see Appendix 1D), approximately 140 000 individuals in total, from the nine breeding sites distributed between southern Pacific, Atlantic and Indian Oceans. Accurate population estimates are available only for the Possession Island and Macquarie Island populations, each of which constitutes about 5% of the estimated global population.

Status: Information on population trends and status is restricted to the small population on Possession Island. This population has decreased by 13% since 1980, but the demographic parameters influencing this change are not yet clear (Weimerskirch and Jouventin 1997). Indirect evidence of the decrease of this species is evident in the decreased abundance of Light-mantled Albatrosses in their summer feeding grounds since 1980 (Woehler 1996).

Threats: Gales (1993) concluded that it was most likely that mortality associated with fishing activities constituted the major threat to Light-mantled Albatrosses. Since then, confirmation of the capture of Light-mantled Albatrosses on longline hooks set in the Australian Fishing

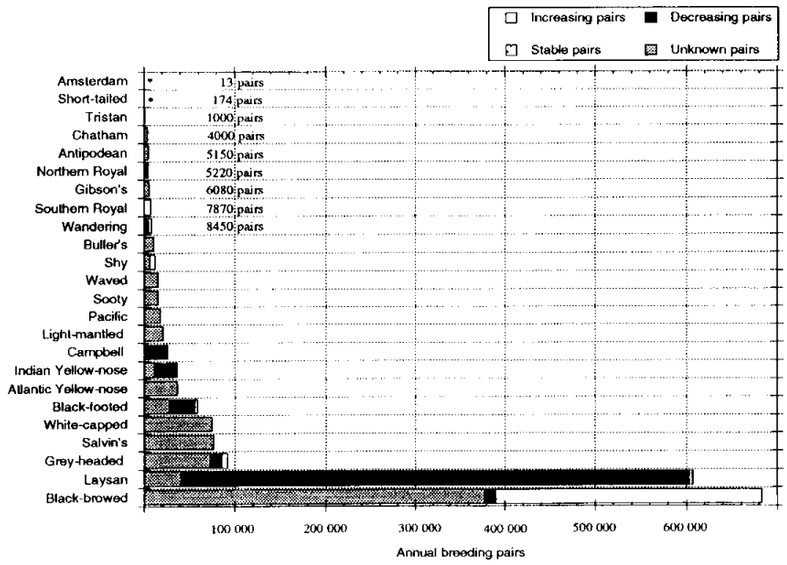

Fig. 1. Population size (annual breeding pairs) and trends of albatross species (species with less than 10 000 annual breeding pairs listed with population size for clarity).

Zone has been obtained (Gales and Brothers 1995). Satellite tracking studies indicate that interactions with longliners may be limited during the breeding season as a result of the southern distribution of the foraging grounds; however during the non-breeding periods, the birds move northwards and mix with pelagic fishing fleets (Weimerskirch 1997). The proficiency of the diving behaviour of *Phoebetria* albatrosses (Prince *et al.* 1994b) enhances their vulnerability to capture on longlines. Given this information and in the absence of other factors responsible for the decreases in the Light-mantled Albatross populations, interactions with longlining remains the most compelling factor responsible for their population decreases.

DISCUSSION

The status of albatrosses

Despite the recent increases in albatross population monitoring, the status of two-thirds of the *ca.* 150 populations of albatrosses worldwide remains unknown (Table 1). Of the 53 populations for which the current status is known, almost half (42%) are decreasing. The remaining populations are either currently increasing (43%) or stable (15%), albeit many after suffering declines in the past. These assessments of population status use the proportions of populations for which information is available rather than proportions based on the total population sizes. When population size is taken into account the situation becomes more serious as it is often the small/relict populations that are stable or showing signs of recent increase and recovery and the large populations which are either decreasing or of unknown status (Table 1). Based on the number of annual breeding pairs within populations of the different status categories, <1% are stable, 17% are increasing, and 37% are decreasing. Population trends for the remaining 48% are presently unknown.

When the trends are examined at the species level their relative abundance and status becomes more clear. Of the 24 albatross species in the proposed taxonomy, 21 species have populations that are decreasing or of unknown status for more than 50% of the entire/global population (Fig. 1). The evaluations of the conservation status of albatrosses under the IUCN guidelines (see Croxall and Gales 1997) testify to the threatened status of albatrosses worldwide.

The threats confronting albatrosses

The life history strategy of albatrosses is characterized by delayed maturity, low reproductive output, high rates of natural survival and longevity. Albatrosses are therefore particularly vulnerable to changes in fecundity and survival rates and breeding success. Of all the albatross demographic parameters, sensitivity analyses identified changes in adult survival as being the most immediately important factor influencing population trends, with a decrease of 1% p.a. being sufficient to cause a population decrease (Croxall and Rothery 1991; Weimerskirch *et al.* 1997). The next most influential demographic parameter affecting changes in albatross population trends is juvenile survival.

Table 1. Number, status and size of albatross populations (shading indicates those taxa for which ≥50% of the global population is decreasing or of unknown status).

Old taxonomy	New taxonomy	Estimated No. of annual breeding pairs	No. of populations	Status of population			
				Increasing	Stable	Decreasing	Unknown
Wandering Albatross	Wandering Albatross	8 448		43%	<1%	47%	10%
Diomedea exulans exulans	*Diomedea exulans*		9	3	1	4	1
	Tristan Albatross	1 003			<1%		>99%
Diomedea exulans dabbenena	*Diomedea dabbenena*		2		1		1
	Antipodean Albatross	5 154			<1%		>99%
Diomedea exulans antipodensis	*Diomedea antipodensis*		2		1	1	
	Gibson's Albatross	6 077					100%
Diomedea exulans gibsoni	*Diomedea gibsoni*		3				3
Amsterdam Albatross	Amsterdam Albatross	13		100%			
Diomedea amsterdamensis	*Diomedea amsterdamensis*		1	1			
Northern Royal Albatross	Northern Royal Albatross	5 218		<1%		>99%	
Diomedea epomophora sanfordi	*Diomedea sanfordi*		2	1		1	
Southern Royal Albatross	Southern Royal Albatross	7 872		99%	<1%		<1%
Diomedea epomophora epomophora	*Diomedea epomophora*		4	2	1		1
Short-tailed Albatross	Short-tailed Albatross	174		91%			8%
Diomedea albatrus	*Phoebastria albatrus*		2	1			1
Waved Albatross	Waved Albatross	15 591					100%
Diomedea irrorata	*Phoebastria irrorata*		2				2
Laysan Albatross	Laysan Albatross	607 059		<1%	<1%	93%	7%
Diomedea immutabilis	*Phoebastria immutabilis*		16	4	2	2	8
Black-footed Albatross	Black-footed Albatross	58 498		4%	2%	47%	47%
Diomedea nigripes	*Phoebastria nigripes*		12	3	1	5	3
Black-browed Albatross	Black-browed Albatross	682 316		43%	<1%	2%	55%
Diomedea melanophrys melanophrys	*Thalassarche melanophrys*		24	6	1	2	16
	Campbell Albatross	26 000				100%	
Diomedea melanophris impavida	*Thalassarche impavida*		1			1	
Buller's Albatross	Buller's Albatross	10 960					100%
Diomedea bulleri bulleri	*Thalassarche bulleri*		3				3
	Pacific Albatross	18 170					100%
Diomedea bulleri platei	*Thalassarche* nov. sp.		4				4
Shy Albatross	Shy Albatross	12 200		41%			59%
Diomedea cauta cauta	*Thalassarche cauta*		3	1			2
	White-capped Albatross	75 175					100%
Diomedea cauta steadi	*Thalassarche steadi*		4				4
	Salvin's Albatross	76 654					100%
Diomedea cauta salvini	*Thalassarche salvini*		3				3
	Chatham Albatross	4 000					100%
Diomedea cauta eremita	*Thalassarche eremita*		1				1
Yellow-nosed Albatross	Atlantic Yellow-nosed Albatross	36 750					100%
Diomedea chlororhynchos chlororhynchos	*Thalassarche chlororhynchos*		6				6
	Indian Yellow-nosed Albatross	36 492				69%	31%
Diomedea chlororhynchos bassi	*Thalassarche carteri*		6			1	5
Grey-headed Albatross	Grey-headed Albatross	92 275		7%		14%	79%
Diomedea chrysostoma	*Thalassarche chrysostoma*		10	1		2	7
Light-mantled Sooty Albatross	Light-mantled Albatross	21 567				5%	95%
Phoebetria palpebrata	*Phoebetria palpebrata*		14			1	13
Sooty Albatross	Sooty Albatross	15 655				2%	98%
Phoebetria fusca	*Phoebetria fusca*		15			1	14

Currently, with so many populations of albatrosses decreasing, the continued existence of some species is further compounded by the reduced size of many of the populations. One-third of all populations comprise fewer than 100 breeding pairs each year, and so are extremely vulnerable to stochastic events and/or catastrophes. Further, the high degree of philopatry of both juveniles and adults severely limits the ability of albatrosses to move away from sites facing adverse circumstances.

Against this background the precarious status of albatrosses worldwide is clearly evident. Affecting the status of albatross populations are a variety of factors (Table 2), some of which have always occurred, their effects being reflected in natural mortality rates. Currently, most factors

Table 2. Summary of documented threats which currently affect albatrosses. (Information from text and Gales (1993) and references therein.)

	Documented fisheries-related mortality			Other documented threats					
	Longlining	Trawling	Other	Plastic ingestion	Human predation/ disturbance	Other alien predators	Fire/floods volcanoes habitat disturbance	Oil/ chemicals	Avian pox
Wandering Albatross	x	x	x	x					
Tristan Albatross	x			x					
Antipodean Albatross	x								
Gibson's Albatross	x					x			
Northern Royal Albatross	x			x	x	x	x		
Southern Royal Albatross	x	x		x					
Amsterdam Albatross	x					?			
Short-tailed Albatross	x		?	x		?	x		
Waved Albatross	?				?	?	x		
Laysan Albatross	x		x	x	x	x	x	x	
Black-footed Albatross	x		x	x			x	x	x
Black-browed Albatross	x	x	x						x
Campbell Albatross	x								
Buller's Albatross	x	x							
Pacific Albatross	?			x	?		x		
Shy Albatross	x	x	x						x
White-capped Albatross	x	x				x			
Salvin's Albatross	?								
Chatham Albatross	x				x		x		
Atlantic Yellow-nosed Albatross	x			x					
Indian Yellow-nosed Albatross	x					x	x		x
Grey-headed Albatross	x	x		x		x			x
Sooty Albatross	x			x		x	x		
Light-mantled Albatross	x								

influencing the status of albatross populations however, involve human activities. Of these, interactions with longline fishing operations remains the single most important factor responsible for the current widespread decline of albatross populations.

Each year about 1.8 million pairs of albatrosses breed on remote island locations around the world. Each year over 100 million longline hooks are deployed to catch fish. It is these hooks which pose the greatest threat facing albatrosses today. Twenty-one of the 24 species are known to be killed on longline hooks and these deaths occur in every major oceanic sector. The evidence linking longline fishing to changes in the status of albatross populations across the world is compelling, and confirms the role of longline fishing in the observed changes in the status of many populations (see for example Weimerskirch *et al.* 1997). This conclusion has been reinforced in many of the chapters of this book.

The future for albatrosses

The future prospects for most albatross populations are clouded by uncertainty. On the one hand, if appropriate actions are not taken, the future is bleak, given that restoring albatross populations in some oceanic sectors will require substantial and urgent reduction in the catch rates of albatrosses on longlines (Croxall *et al.* 1997). Nevertheless, it appears that reductions in excess of 90% in catch rates can be achieved immediately with mitigation techniques and procedures which have already been identified (Brothers 1991; Alexander *et al.* 1997). The power of implementation ultimately lies with the longline fishers and so it is inevitably they who will dictate the future of these birds. It is, however, the responsibility of governments across the world to promote and expedite that process.

The responsibility for redressing the situation must lie in the global realm. The degree of national jurisdiction for albatross breeding grounds is highly focused, 16 of the 24 species being restricted to islands under the responsibility of single nations, 10 species breeding on New Zealand islands alone. Specifically, the breeding grounds of albatrosses occur on islands under the jurisdiction of 10 nations: Australia, Chile, Ecuador, France, Japan, Mexico, New Zealand, South Africa, United Kingdom, and USA (Table 3). Eight of these nations also operate longline fleets (and/or provide access to longline fleets of other nations) in waters where albatrosses are known to be killed on longlines. Most of these

Table 3. Estimated percentage of each albatross species for which each nation has jurisdiction. (Bold italics indicates nations which operate longline fleets (and or provide access to longline vessels) in waters where albatross-longline mortality is known to occur.)

Species	Breeding frequency	Annual breeding pairs	***Australia***	***Chile***	Equador	***France***	***Japan***	Mexico	***New Zealand***	***South Africa***	***UK***	***USA***
Wandering Albatross	Biennial	8 450	<1			38				36	26	
Tristan Albatross	Biennial	1 000									100	
Antipodean Albatross	Biennial	5 150							100			
Gibson's Albatross	Biennial	6 080							100			
Amsterdam Albatross	Biennial	13				100						
Northern Royal Albatross	Biennial	5 220							100			
Southern Royal Albatross	Biennial	7 870							100			
Short-tailed Albatross	Biennial	174					100					
Waved Albatross	Annual	15 590			100							
Laysan Albatross	Annual	607 100					<1	<1				>99
Black-footed Albatross	Annual	58 500					4					96
Black-browed Albatross	Annual	682 320	<1	5		<1			<1		95	
Campbell Albatross	Annual	26 000							100			
Buller's Albatross	Annual	10 960							100			
Pacific Albatross	Annual	18 170							100			
Shy Albatross	Annual	12 200	100									
White-capped Albatross	Annual	75 180							100			
Salvin's Albatross	Annual	76 650							100			
Chatham Albatross	Annual	4 000							100			
Atlantic Yellow-nosed Albatross	Annual	36 750									100	
Indian Yellow-nosed Albatross	Annual	36 490				81				19		
Grey-headed Albatross	Biennial	92 270	<1	11		15			7	8	59	
Light-mantled Albatross	Biennial	21 570	7			29			35	1	29	
Sooty Albatross	Biennial	15 660				17				18	65	

nations, and others such as Taiwan, Korea, Spain, Russia, Ukraine, Bulgaria and Argentina, operate longline fleets on the high seas. China has the potential to become a major longline fishing nation. Domestic fleets from Australia, South American and African countries also operate inshore fleets which catch seabirds, including albatrosses. The birds killed in these waters may have originated from any or all of the nations responsible for the breeding islands, such is the global nature of the oceanic habits of these birds. Whether nations are responsible for the albatrosses at their breeding islands or for the fishing operations that kill albatrosses, there can be no apportioning of blame but rather acceptance of the urgency of implementing appropriate solutions.

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APPENDIX 1A

Annual population size and status of the Great Albatrosses (biennial breeding species).

Old taxonomy	New taxonomy	Location	Breeding pairs (annual)	Survey date	Survey reliability	Population status	Source*
Wandering Albatross	Wandering Albatross						
Diomedea exulans exulans	*Diomedea exulans*	**South Georgia**					
		Bird Island	1 314	1995–96	A	Decreasing	1
		Other islands	864	1984	B	?	1
		Crozet Islands					
		Ile de la Possession	349	1995	A	Increasing†	2
		Ile aux Cochons	1 060	1981	?	Decreasing	2
		Ile de l'Est	325	1982	?	Decreasing	2
		Kerguelen Islands	1 455	1992	B	Increasing†°	2
		Marion Island	1 794	1995	A	Increasing†	3
		Prince Edward Island	1 277	1984	B	Decreasing?	3,4
		Heard Island	0	1987–88	?	?	5
		Macquarie Island	10	1995	A	Stable†	6
	Tristan Albatross						
Diomedea exulans dabbenena	*Diomedea dabbenena*	Gough Island	*ca.* 1 000	1980s	C	?	3,4
		Inaccessible Island	2–3	1990	A	Stable†	7
	Antipodean Albatross						
Diomedea exulans antipodensis	*Diomedea antipodensis*	**New Zealand**					
		Antipodes Islands	5 148	1996	A	?	8
		Campbell Island	6	1995	A	Stable	9
	Gibson's Albatross						
Diomedea exulans gibsoni	*Diomedea gibsoni*	**New Zealand**					
		Auckland Island group					
		Adams Island	5 762	1995	A	?	8
		Disappointment Island	250	1993	B	?	8
		Auckland Island	65	1995	A	?	8
Northern Royal Albatross	Northern Royal Albatross						
Diomedea epomophora sanfordi	*Diomedea sanfordi*	**New Zealand**					
		Chatham Island	5 200	1995	B	Decreasing	10
		Taiaroa Head	18	1995	A	Increasing	10
Southern Royal Albatross	Southern Royal Albatross						
Diomedea epomophora epomophora	*Diomedea epomophora*	**New Zealand**					
		Campbell Island	7 800	1996	B	Increasing?	9
		Enderby Island	55	1995	A	Increasing	9
		Adams Island	15	1991	B	Stable?	8
		Auckland Island	2	1989	B	?	8
Amsterdam Albatross	Amsterdam Albatross						
Diomedea amsterdamensis	*Diomedea amsterdamensis*	Amsterdam Island	13	1995	A	Increasing†	2

*See Appendix 1E for sources of information.

APPENDIX 1B

Annual population size and status of Pacific Albatrosses (annual breeding species).

Old taxonomy	New taxonomy	Location	Breeding pairs (annual)	Survey date	Survey reliability	Population status	Source*
Short-tailed Albatross *Diomedea albatrus*	Short-tailed Albatross *Phoebastria albatrus*	**Japan**					
		Izu Islands (Torishima)	158	1995	A	Increasing	11
		Senkaku Islands (Minami-kojima)	*ca.* 15	1991	B	?	11
		Hawaii					
		Midway Atoll	1	1993	A	?	12
Waved Albatross *Diomedea irrorata*	Waved Albatross *Phoebastria irrorata*	**Galapagos Islands**					
		Isla Espanola	15 581	1995	B	?	13
		Ecuador					
		Isla de la Plata	10	1990	A	?	14
Laysan Albatross *Diomedea immutabilis*	Laysan Albatross *Phoebastria immutabilis*	**Hawaii**					
		Necker	500*	1995	B	Stable?	15
		French Frigate Schoals	2 871	1994	A	Stable	15
		Gardner Pinnacles	≤15	?	?	?	16
		Laysan	135 252	1994	B	Decreasing?	15
		Lisianski	26 500	1982	B	?	15
		Pearl and Hermes Reef	10 500	1979	B	?	15
		Midway Attoll	427 500	1991/92	B	Decreasing?	15
		Kure Attoll	3 500	1995	B	?	15
		Kauai	100	1994	A	Increasing	15
		Niihau	175	?	?	?	16
		Kaula	59	1993	B	?	15
		Oahu	10	1994	A	Increasing	15
		Moku Manu	0	1995	A	?	15
		Molokai	‡‡	?	?	?	16
		Japan					
		Bonin Islands (Mukojima)	20	1992	?	Increasing	11
		Mexico					
		Isla Guadalupe	*ca.* 50	1992	B	Increasing	17
		Isla Benedicto	≤5	1992	?	?	18
		Isla Clarion	≥2	1990	?	?	19
Black-footed Albatross *Diomedea nigripes*	Black-footed Albatross *Phoebastria nigripes*	**Hawaii**					
		Nihoa	31*	1994	B	Decreasing?	15
		Necker	112*	1995	B	Decreasing?	15
		French Frigate Schoals	2 742	1995	A	Decreasing	15
		Lysan	24 813	1995	B	?	15
		Lisianski	2 800*	1982	B	?	15
		Pearl and Hermes Reef	5 220	1996	B	Decreasing	15
		Midway Attoll	19 255	1995	A	Decreasing	15
		Kure Attoll	1 200*	1995	B	Stable?	15
		Lehua	‡‡	?	C	?	16
		Kaula	5	1993	B	?	15
		Japan					
		Senkaku Islands (Kita-kojima)	*ca.* 20	1991	C	Increasing	11
		Izu Islands (Torishima)	*ca.* 1 300	1995	B	Increasing	11
		Bonin Islands (Mukojima)	*ca.* 1 000	1993	C	Increasing	11

*See Appendix 1E for sources of information.

APPENDIX 1C

Population size and status of the annual breeding of Southern Albatrosses.

Old taxonomy	New taxonomy	Location	Breeding pairs	Survey date	Survey reliability	Population status	Source*
Black-browed Albatross	Black-browed Albatross						
Diomedea melanophrys melanophrys	*Thalassarche melanophrys*	**Falkland Islands**					
		Steeple Jason Island	250 826	1995/96	A	Increasing	20
		South Jason Island	350	1983/84	A	Stable	21
		Elephant Jason Island	600	1984/85	A	Increasing	21
		Beauchene Island	149 363	1995/96	A	?	22
		Bird Island	15 000–20 000	1995/96	C	?	23
		Grand Jason Island	50 000–100 000	1986/87	C	?	24
		West Point Island	15 400	1994/95	A	Increasing	25
		New Island	10 500	1995	A	Increasing	21
		North Island	14 625	1995	A	Increasing	21
		Saunders Island	12 505	1992/93	A	?	26
		Keppel Island	2 085	1987/88	A	?	26
		Grave Cove	170	1992/93	A	Increasing	27
		South Georgia					
		Bird Island	9 539	1995	A	Decreasing	28
		All other areas	86 713	1986	A	?	29
		Chile					
		Diego Ramirez					
		Isla Ildefonso	17 000	1985	C	?	30
		Isla Diego de Almagra	15 000	1985	B	?	30
		Crozet Islands	980	1981	A	?	31
		Kerguelen Islands	3 115	1995	A	Decreasing	32
		Heard Island	600–700	1987/88	B	?	33
		McDonald Island	82–89	1981	B	?	34
		Macquarie Island	38	1995	A	?	6
		Bishop & Clerk Island	141*	1993	B	?	35
		New Zealand					
		Antipodes Islands	*ca.* 100	1992	C	?	10
		Campbell Island	>30	1995	C	?	9
		Snares Island	1	1986	B	?	36
	Campbell Albatross						
Diomedea melanophrys impavida	*Thalassarche impavida*	Campbell Island	26 000	1992	B	Decreasing?	9
Buller's Albatross	Buller's Albatross						
Diomedea bulleri bulleri	*Thalassarche bulleri*	Snares Islands	8 460	1992	B	?	37
		Solander Island	4 000–5 000	1985	?	?	38
		Little Solander Island	300	1985	?	?	38
	Pacific Albatross						
Diomedea bulleri platei	*Thalassarche* nov. sp.	**Chatham Islands**					
		Big Sister Island	1 500	none	C	?	10
		Little Sister Island	650	1994–96	C	?	39
		Forty-Fours	*ca.* 16 000	none	C	?	10
		Three Kings	*ca.* 20	?	?	?	10
Shy Albatross	Shy Albatross						
Diomedea cauta cauta	*Thalassarche cauta*	**Tasmania**					
		Albatross Island	5 000	1995	B	Increasing†	35
		Mewstone	7 000	1995	B	?	35
		Pedra Branca	200	1995	B	?	35
	White-capped Albatross	**New Zealand**					
Diomedea cauta steadi	*Thalassarche steadi*	Disappointment Island	72 000	1993	B	?	10
		Adams Island	100	1993	B	?	8
		Auckland Island	3 000	?	C	?	10
		Antipodes Islands	50–100	1994	C	?	10
	Salvin's Albatross						
Diomedea cauta salvini	*Thalassarche salvini*	**New Zealand**					
		Bounty Islands	76 000	1978	C	?	40
		Snares Islands	≤650	1984	C	?	41
		Iles Crozet					
		Ile des Pingouins	4	1980s	A	?	42
	Chatham Albatross	**New Zealand**					
Diomedea cauta eremita	*Thalassarche eremita*	Chatham Islands	4 000	1992	C	?	10

*See Appendix 1F for sources of information.

Appendix 1C — *continued.*

Old taxonomy	New taxonomy	Location	Breeding pairs	Survey date	Survey reliability	Population status	Source*
Yellow-nosed Albatross	Atlantic Yellow-nosed Albatross						
Diomedea chlororhynchos chlororhynchos	*Thalassarche chlororhynchos*	**Tristan de Cunha Islands**					
		Tristan de Cunha	16 000–30 000	1972–74	C*	?	43
		Nightingale Island	4 500	1972–74	?	?	43
		Inaccessible Island	1 100	1982–83	C*	?	44
		Middle Island	100–200	1972–74	?	?	43
		Stolenhoff Island	500	1972–74	?	?	43
		Gough Island	*ca.* 5 000–10 000	1972–74	C*	?	3, 43
	Indian Yellow-nosed Albatross						
Diomedea chlororhnchos bassi	*Thalassarche carteri*	Prince Edward Island	7 000	1979	C	?	45
		Kerguelen Islands					
		Ile de Croy	50	1984–87	?	?	32
		Crozet Islands					
		Ile des Pingouins	3 200	1986	?	?	42
		Ile des Apotres	1 230	1981–82	?	?	46
		Amsterdam Island	*ca.* 25 000	1981–94	B	Decreasing	47
		St Paul Island	12	?	?	?	46

*See Appendix 1E for sources of information and explanatory notes.

APPENDIX 1D

Population size and status of biennial breeding Southern Albatrosses (see also Appendix 1A).

Current taxonomy	Proposed taxonomy	Location	Breeding pairs (annual)	Survey date	Survey reliability	Population status	Source*
Grey-headed Albatross *Diomedea chrysostoma*	Grey-headed Albatross *Thalassarche chrysostoma*	**South Georgia**					
		Bird Island	6 500	1993–95	A	Decreasing	48
		All other areas	47 718	1985–86	A	?	29
		Chile					
		Diego Ramirez	10 000	?	?	?	49
		Isla Iledefonso	*ca.* 10	1984	B	?	50
		Kerguelen Islands	7 900	1984–1987	?	?	32
		Crozet Islands	5 946	1980–1982	?	?	31
		Marion Island	6 217	1995	A	Increasing*	3
		Prince Edward Island	1 500	1979	C	?	45
		Campbell Island	*ca.* 6 400	1995	B	Decreasing	9
		Macquarie Island	84	1995	A	?	6
Sooty Albatross *Phoebetria fusca*	Sooty Albatross *Phoebetria fusca*	**Tristan da Cunha Group**					
		Tristan da Cunha	2 000–3 000	1972–74	C**	?	43
		Nightingale Island	100–200	1972–74	?	?	43
		Inaccessible Island	60+	1982–83	C**	?	44
		Stoltenhoff Island	25–50	1972–74	?	?	43
		Gough Island	5 000–10 000	1972–74	C**	?	43
		Prince Edward Island	700	?	?	?	51
		Marion Island	2 055	1987	B	?	51
		Kerguelen Island	≤5	1986–87	?	?	32
		Crozet Islands					
		Ile de la Possession	273	1995	A'	Decreasing	32
		Ile de l'Est	1 300	1981–82	?	?	46
		Ile aux Cochons	400–500	?	?	?	46
		Ile des Pingouins	250	1981–82	?	?	46
		Ile des Apotres	20–30	1981–82	?	?	46
		Amsterdam Island	300–400	1995	C	?	46
		St Paul Island	?	?	?	?	46
Light-mantled Sooty Albatross *Phoebetria palpebrata*	Light-mantled Albatross *Phoebetria palpebrata*	South Georgia	5 000–7 500	?	?	?	1
		Prince Edward Island	40	1983–1990	C	?	51
		Marion Island	201	1987	B	?	51
		Kerguelen Islands	3 000–5 000	1984–87	?	?	32
		Crozet Islands					
		Ile de la Possession	996	1995	A	Decreasing	47
		Ile de l'Est	>900	1981–95	?	?	46
		Ile aux Cochons	50–100	1981–82	?	?	46
		Ile des Pingouins	30	1981–82	?	?	46
		Ile des Apotres	150	1981–82	?	?	46
		Heard Island	200–500	1954	C	?	52
		McDonald Islands	‡‡	?	C	?	53
		Macquarie Island	1 000–1 150	1994–95	A	?	6
		New Zealand					
		Auckland Islands	*ca.* 5 000	1972–73	C	?	54
		Campbell Island	>1 500	1995	C	?	9
		Antipodes Islands	<1 000	1969	C	?	55

*See Appendix 1E for sources of information and explanatory notes.

APPENDIX 1E

Sources of information for Appendix 1A–D.

1 J. P. Croxall and P. Prince (pers. comm.) and Croxall *et al.* (1990b).

2. P. Jouventin and H. Weimerskirch, pers. comm. The populations on the three Crozet Islands decreased by 4.9%, 2.6% and 6% (in listed order) between 1975 and 1982 (Weimerskirch and Jouventin 1987). Since then they have stabilized. Similarly severe declines were monitored at Kerguelen colonies between 1971 and 1985 (Weimerskirch *et al.* 1989) but have since stabilized (Weimerskirch *et al.*, in press).

3. J. Cooper, pers. comm. Marion Island population decreasing at *ca.* 0.7% per annum until 1992, since then increasing.

4. Watkins (1987).

5. Kirkwood *et al.* (1989). Only record is one pair in 1980 (Johnstone 1982).

6. Gales *et al.* (unpubl. data).

7. Ryan *et al.* (1990). Stables at this level for 50+ years (see text).

8. K. Walker (pers. comm.).

9. P. Moore (pers. comm.).

10. C. J. R. Robertson (pers. comm.).

11. H. Hasegawa (pers. comm.).

12. Richardson (1994).

13. Anderson (1995).

14. Oritz-Crespo and Agnew (1992).

15. E. Flint (pers. comm.) (USFWS, unpubl. data/State of Hawaii, unpubl. data).

16. Harrison (1990) and references therein.

17. Gallo-Raynoso and Figueroa-Carranza (1996).

18. Howell and Webb (1992) and references therein.

19. W. Everett (pers. comm.).

20. M. Riddy, unpubl. in litt. to J. P. Croxall. Earliest estimate of "30 000 young birds" in March 1962 (E. Goss to R. Napier to R. Woods). Possible increase from 200 000 to 230 000 in 1987.

21. I. J. Strange (pers. comm.) (New Island [South] Conservation Trust).

22. M. Riddy, unpubl. in litt. to J. P. Croxall. Estimate of 162 360 ± 10% (range 140 000–170 000) pairs in 1980/81 (Prince 1982) and 134 394 ± 10% pairs in 1991/92 (Thompson 1993).

23. S. and H. Poncet and M. Riddy, in litt. to J. P. Croxall. In 1939, 8 000 (out of probably 10 000) eggs were collected (R. Napier, pers. comm. to M. Riddy).

24. S. and J. Poncet, in litt. to J. P. Croxall.

25. Falklands Conservation (M. Bingham) in litt. to J. P. Croxall. Status based on comparison between estimates of 5 000–7 000 pairs in 1962/63 and 12 050 pairs (±10%) in 1989/90 (Thompson 1993).

26. Thompson (1993).

27. M. Riddy, unpubl. in litt. to J. P. Croxall. Increase from 120 pairs in 1987 (Falklands Conservation Seabird Monitoring Programme per M. Bingham).

28. Prince *et al.* (1994a) and Croxall *et al.* (1997). This population decreasing by 6.95% p.a. (since 1989/90).

29. Prince *et al.* (1994a).

30. Clark *et al.* (1992). Figure of 8 500 chicks on Isla Ildefonso translated to 17 000 pairs (J. P. Croxall, pers. comm.).

31. Weimerskirsch *et al.* (1986).

32. Weimerskirsch and Jouventin (1997).

33. Kirkwood and Mitchell (1992).

34. P. Keage (pers. comm.).

35. N. Brothers (unpubl. data).

36. A. Tennyson and C. Miskelly (pers. comm.).

37. Sagar *et al.* (1994).

38. Cooper *et al.* (1986).

39. Robertson (1991).

40. Robertson and van Tets (1982).

41. Miskelly (1984).

42. Jouventin (1990).

43. Richardson (1984).

44. Fraser *et al.* (1988).

45. Cooper and Brown (1990).

46. Jouventin *et al.* (1984) and H. Weimerskirch (pers. comm.).

47. H. Weimerskirsch (pers. comm.).

48. J. P. Croxall (pers. comm.). This population decreasing at *ca.* 1.42% p.a.

49. Schlatter (1984).

50. Clark *et al.* (1992).

51. Cooper and Brown (1990).

52. Downes *et al.* (1959).

53. Woehler (1991).

54. Bell (1975) in Marchant and Higgins (1990).

55. Warham and Bell (1979).

†Currently stable/increasing (whichever specified) at low levels after previous population declines.

°Extrapolated from partial survey.

*Indicates an extrapolation to total eggs from chicks counted later in the season.

**No complete population survey ever conducted.

‡‡Indicates breeding is suspected but not confirmed.

‡Indicates breeding is confirmed but no available information to quantify extent.

Status Reliability

A: High

B: Medium

C: Low

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