

INTRODUCTION

Of some 9,700 bird species recognized to date, only about 300 (c 3%) can be considered seabirds (depending on one's definition of a seabird). Thus, while 9,400 landbirds inhabit some 30% of the globe (the land), the 300 seabirds inhabit the remaining 70% (the sea), coming to land generally only to breed. For most of the year they must derive their living from the marine environment.

Population and monitoring studies over the last 20 years have enhanced our knowledge of seabirds, and Birdlife International, in *Birds to Watch 2* (Collar et al. 1994), classifies 20% of seabirds as globally threatened, compared with 12% for all bird species: clearly, all is not well with the World's seabirds. While pelagic seabirds may be long-lived, they generally lay only one egg (which is not replaced if lost), breed once a year (in some cases once every two-years), and consequently have a lower reproductive output than landbirds, which tend to be shorter-lived but lay larger clutches of eggs more frequently. Given that Man's track record of destruction (either directly, by taking eggs and killing birds, or indirectly, by the introduction of mammalian predators to islands) is not one to be proud of, seabirds must now contend with increasing degradation of the sea (heavy metals, oil pollution, plastic, etc) as well as increasing loss of life (gill nets and long-line fishing). Some seabird populations are now being reduced not only at their breeding sites but also more frequently on the open ocean. This does not bode well for large, long-lived seabirds, some of which do not breed until their tenth year.

While the long-term prospects for seabirds may look dark, there are a few rays of hope. South Africa's only overseas possession, Marion Island (Prince Edward Islands), is now apparently cat-free after an intensive ten-year eradication programme; time will tell if seabird populations on Marion increase. New Zealand, which probably has more breeding seabird species than anywhere else, is now able to eradicate rats on small to medium-sized islands; some formerly rare species are now recovering. Alec and Frank Zino from Madeira succeeded in bringing a halt to seabird slaughter on the Salvages, and are now committed to saving their rare and endemic *Pterodroma* petrels. Also David Wingate has almost single-handedly ensured the continued survival of the Bermuda Petrel.

Whether it is from the efforts of individuals, of conservation bodies or of governments, there should be some co-ordinated global marine conservation strategy for seabirds (as well as for all

marine life). The following one example should suffice. Monitoring studies indicate that Wandering Albatross populations are rapidly decreasing, to the extent that the bird is now classified as Vulnerable: numbers have fallen by some 50% in the last 20-30 years, mainly as a result of drowning on tuna long-lines. Having observed these ultimate flying machines at sea around the Southern Ocean and breeding on subantarctic islands, I find it a sobering thought that this awe-inspiring bird could become extinct in my or my son's lifetime. The fact that they fly does not in any way mean that they will not go the same way as the Great Auk.

This book is an attempt to illustrate the diagnostic characters of seabirds by a combination of photographs and written text. For reasons of space it has not been possible to illustrate every plumage phase and every subspecies, and in some cases – fortunately these are few – it has proved impossible to obtain any photographs.

Seabird identification often relies heavily on jizz and flight, as well as a colour combination of primarily browns, greys, white and black. All of these parameters become variable with different meteorological conditions: thus, a species' 'field variability' must be appreciated. There is no definitive at-sea 'seabird description', and I make no apology for the use of the words 'generally' and 'variable' in my descriptions.

Following Croxall et al. (1984), I have employed a strict definition of a seabird. While this includes all the Sphenisciformes and all the Procellariiformes, some non-marine Pelecaniformes and Lariformes have been excluded (see Appendix I). Inevitably, a few decisions may appear a little arbitrary.

Since the publication of Harrison's *Seabirds: an Identification Guide* (1983) and *Seabirds of the World: a Photographic Guide* (1987), knowledge, taxonomy and technology have advanced considerably. There is a new taxonomy (Sibley and Monroe 1990), with taxa previously regarded as subspecies now being assigned specific status. In many cases, the visible differences become minimal in the field (eg Hawaiian and Galapagos Petrels), and this can hinder and even prevent specific

identification. Moreover, the 14 species of albatross recognized at present may soon be re-evaluated to constitute as many as 24 species. The new taxonomy has generated much heated discussion since its publication in 1990, and it was consequently decided to adopt an approach similar to that of Birdlife International (1994). For ease of use, the familiar sequence of families as used by Morony et al. (1975) has been maintained, but the order of birds within families follows that proposed by Sibley and Monroe. This appears to be the line of least resistance while the taxonomic debate continues at present. Different taxonomic interpretations from those of Sibley and Monroe are mentioned in the text, and in some cases the English names have conformed a little more to local usage, which in most cases is preferable.

With the increasing knowledge of the status, populations and distribution of seabirds, it is now possible to estimate a species' global population. While for many birds (especially burrow-nesters) these are, at best, estimates, I have tried to include such information where known, though in many cases figures just do not exist. Only by careful counting and monitoring over time will trends become apparent. All references to classified species are taken from *Birds to Watch 2* by Birdlife International (Collar et al. 1994): see Appendix II for the classification criteria.

Improved camera technology and the increased opportunities for the average birder to travel the globe have meant increased knowledge and more easily obtained photographs. Many of the photographs used here have not previously been published. There is now also a plethora of books on seabirds, as well as many new identification and distribution articles published in journals. I have drawn freely on these sources, the most important of which are listed in the bibliography.

A book of this kind does not get to be written and published without help from friends and colleagues. I hope that I have mentioned them all in the acknowledgements.

Sphenisciformes

17 species. Penguins are flightless marine seabirds, generally with dark upperparts and white underparts, which evolved in the Southern Hemisphere. They range in size from the Little Penguin (40 cm; 1 kg in weight) to the Emperor Penguin (110 cm; 40 kg), although some fossil penguins were much larger.

Penguins' closest relatives are the Procellariiformes, which may initially appear strange: non-flying seabirds closely related to the most accomplished fliers! However, they are at opposite ends of the continuum of marine exploitation, one diving and the other flying, both specialized and both successful.

Unlike auks, which have compromised between diving and yet retaining flight, penguins have opted totally for the underwater diving strategy. They have thus radiated into different sizes to feed on different foods, thereby dividing up the marine resource. This has meant that long-range foraging is out of the question, although the larger species are on a par with marine mammals such as seals – Emperor Penguins are able to dive to about 400 m and remain submerged for about 20 minutes. With the legs set well back on the body acting as a rudder, and the flippers acting as paddles, penguins literally 'fly' through the water. Penguins are social, colonial seabirds with some huge colonies on subantarctic islands. Young penguins form crèches and, generally, only one young is reared per year. The most extreme breeding strategies are employed by King and Emperor Penguins. Moulting penguins are also unique: they are unable to feed, and so they must be either on land or on ice.

Populations of some penguin species are increasing for various reasons. Five species (29%), however, are now classified as Vulnerable, with a further two classified as Near-threatened.

Procellariiformes

113 species. A large order of pelagic seabirds divided into four families, and ranging in size from the Least Storm-petrel (14 cm; 25 g) to the huge Royal Albatross (115 cm; 12 kg) – a weight-difference ratio of some 1:300, not exceeded by any other bird order. The order contains more individual birds than any other seabird order, ranging from Wilson's Storm-petrel (the World's most numerous seabird?) to some of the rarest, least-known and most enigmatic seabirds such as Magenta Petrel, Zino's Petrel and

Fiji Petrel.

Procellariiformes are found in all oceans of the World. Their mobility has ensured almost unlimited radiation, although today most are found in the Southern Hemisphere, from where they originated. These are the truly pelagic seabirds in the strictest sense, with some undergoing vast annual migrations, while others spend many years at sea before returning to breed. Such wanderings inevitably mean that some birds occasionally become horribly lost and may turn up in bizarre locations (see Bourne's 1967 classic paper 'Long-distance vagrancy in the petrels').

Known as 'tubenoses' because their nostrils are external and tubular from the base of the upper mandible (nostrils separated in albatrosses but joined in the other three families), there is increasing evidence that these birds, which also have large olfactory bulbs in the brain, are able to smell their food from considerable distances. All have an extended glandular part of the stomach which helps produce the oil upon which their breeding strategy is based. They feed on fish, squid and plankton, with many feeding adaptations for long-distance foraging.

Procellariiformes are generally social and colonial breeders, using many breeding habitats (especially burrowing in the Procellariidae), but they do not use trees or bushes. They are extremely 'K-selected': the birds do not breed in some cases until they are seven to eleven years old, they lay one egg which is not replaced if lost, some species can breed only once every two years, but most birds are long-lived (up to 50 years for large albatrosses). Nevertheless, with increased man-induced mortality of pre-breeding and breeding birds at sea, mainly by long-line fishing, ever-growing numbers of species and populations are now declining (see above). It is difficult to quantify exact losses of seabirds annually to long-line fishing (as well as to drift nets and by trawling), but during 1990-94 over 30,000 Laysan Albatrosses and over 20,000 Black-footed Albatrosses were killed off Hawaii (ref. IUCN Draft Resolution June 1996) and, around New Zealand, up to 20,000 Shy Albatrosses and 10,000 Wandering Albatrosses are estimated to be killed every year by blue-fin tuna long-line fishing. These latter figures represent about 10% of the total population per year. Twelve of the 14 species of albatross have been recorded killed by long-line fishing, and six species are now rapidly

declining. Furthermore, long-line fishing also kills penguins, petrels, shearwaters, gannets and skuas.

At present, 30 species (25%) of this order are classified as either Critical, Endangered, or Vulnerable, with a further 11 species Near-threatened.

Pelecaniformes

50 'seabird' species. A diverse and colourful order of mainly large seabirds consisting of pelicans, gannets and boobies, tropicbirds, cormorants and shags, and frigatebirds. These are the only birds to have all four toes connected by webs (totipalmate); and they have a gular or throat pouch, which is most developed in pelicans and frigatebirds. The upper mandible is hooked in pelicans, cormorants and frigatebirds and, apart from tropicbirds, all have very small nostrils which can lack an external opening. Cormorants and frigatebirds have a semi-permeable plumage; thus, cormorants have to dry their wings after swimming, whereas frigatebirds avoid getting wet.

Pelecaniformes are believed to be derived from Procellariiform stock, with their centre of origin in the Southern Hemisphere, though most are now found in tropical and warm-temperate latitudes. Although less marine than Procellariiformes, frigatebirds and tropicbirds are pelagic. Cormorants show most adaptive radiation, being of variable size, extending from the Arctic to the seas of the Antarctic, and containing a flightless representative.

Pelecaniformes have not explored the plankton feeding niche, and consequently there are no small species. Their food is mainly fish, with some tropical species additionally taking squid. Most species are social and colonial breeders, using all breeding habitats (but not burrowing), and trees and bushes are used extensively for nesting.

Breeding strategies are varied. Frigatebirds are the most 'K-selected', not breeding until seven to 11 years old, then breeding once every two years and having low breeding success, but adults live a long time. The remaining families are 'R-selected' to a variable degree: they have shorter adolescence (two to six years), lay several eggs in a season, but have relatively high annual rates of adult mortality. These latter species, with higher annual rates of reproduction and population turnover, are better placed than 'K-selected' species to absorb and

recover from man-induced mortalities.

Eleven species (22%) are classified as Critical (one) or Vulnerable (ten), with a further five classified as Near-threatened.

Lariformes

About 107 'seabird' species. A large and diverse order of birds, comprising skuas, gulls, terns and noddies, skimmers, and auks.

The skuas are close relatives of the gulls. They are medium-sized to large piratical seabirds with hooked upper mandible, breeding in higher latitudes of both hemispheres and migrating towards and/or across the Equator in the non-breeding season. They are colonial breeders and are fiercely territorial; two eggs are laid on the ground. The *Catharacta* skuas are always dark with white flashes on the wings, whereas the *Stercorarius* skuas are polymorphic. *Stercorarius* species are circumpolar in the Northern Hemisphere, breeding in the arctic tundra and feeding on lemmings, young birds, insects, berries and carrion. Breeding success correlates with rodent abundance. None classified.

The gulls include 50 species of mainly grey, white and black seabirds varying in size from the Little Gull (25 cm; 90 g) to the Great Black-backed Gull (75 cm; 2 kg). Gulls are essentially birds of the Northern Hemisphere which have invaded the South, showing much speciation and

adaptive radiation; they occupy many breeding habitats, both natural and man-made. Gulls breed colonially, laying several eggs usually on the ground, and young are fed in the nest on a variety of food – though only the kittiwakes have exploited the plankton feeding niche. Sewage works, landfill sites, reservoirs and fish factories have encouraged gulls inland in winter, to the point of their being a nuisance and even a danger to human and other bird populations. One species is classified as Endangered, four as Vulnerable, and two as Near-threatened.

Terns and noddies are smaller and more slender than gulls, with short legs, a forked tail and webbed feet, although they are not good swimmers. Size varies from the Least Tern (23 cm; 50 g) to the Caspian Tern (54 cm; 700 g) and coloration is generally similar to that of gulls, although some terns and the noddies are dark. As a group terns are more marine than gulls and, while some tropical species are sedentary, most are long-distance migrants. Terns are social and colonial breeders, using many breeding habitats, including trees and bushes (unlike most gulls), and one species (Inca Tern) burrows. Terns feed on fish, small squid and crustaceans, which they catch by plunging into the sea. Some tropical species lay only one egg, this being related to long-range foraging, while non-tropical species lay two to three eggs. Young terns

form crèches, as do penguins and pelicans. Unlike gull populations, tern numbers are generally decreasing. Three species are classified (one Critical, two Vulnerable), and two are Near-threatened.

Auks are small black and white diving seabirds which originated in the north Pacific. They have a dense waterproof plumage, a short tail, and legs set well back on the body, and some have nuptial head plumes. Diving and flying have necessitated a compromise regarding wing size; long-distance foraging is sacrificed for an almost exclusive occupation of the diving niche. Subsequent adaptive radiation has led to feeding on different foods, as well as the evolution of a range of sizes from the Least Auklet (15 cm; 90 g) to the Guillemot (42 cm; 1 kg), the latter of which approaches the size limit to sustain flight. (The Great Auk weighed 5 kg and was flightless.) Six auks have gular pouches, thus increasing the amount of food carried to the young. One or two eggs are laid, and auks can breed when two to three years old. Breeding ecology varies considerably, as does post-hatching care of the young. Worldwide, auk numbers are now declining. One species is classified as Vulnerable and three are Near-threatened.

J.W. Enticott
Cape Town, June 1996