

Conservation Advice

Ardenna carneipes

flesh-footed shearwater

Taxonomy

The Australian Faunal Database recognises *Ardenna carneipes* as the official name for the flesh-footed shearwater, and does not recognise any sub-species.

However, the taxonomy of the Flesh-footed Shearwater is controversial. The species was traditionally placed by most authors within the genus *Puffinus* (Christidis & Boles, 1994; Mayr & Cottrell, 1979; Sibley & Monroe, 1990). However, genetic studies by Austin (1996), Heidrich and colleagues (1998) and Nunn and Stanley (1998) identified two distinct lineages within *Puffinus*. Penhallurick and Wink (2004) proposed that the two lineages be recognised as separate genera: *Ardenna*, containing six species including the Flesh-footed Shearwater, and *Puffinus*, containing 14 species. This treatment was accepted by Christidis and Boles (2008) but rejected by Remsen and colleagues (2008) pending further investigation. The species is retained in the genus *Puffinus* by Remsen and colleagues (2008), BirdLife International (2007) and Onley and Scofield (2007).

Conservation status

Not eligible for listing under the EPBC Act.

The flesh-footed shearwater was listed as vulnerable under the NSW Threatened Species Conservation Act 1995 in September 2013 and as rare under the South Australian National Parks and Wildlife Act 1972 in June 2011.

Reason for conservation assessment by the Threatened Species Scientific Committee

This advice follows assessment of information provided by a public nomination to list *Ardenna carneipes* (flesh-footed shearwater).

Description

The Flesh-footed Shearwater is a large (length 40–47 cm; wingspan 99–107 cm; weight 510–750 g), broad-winged, blackish-brown shearwater with dark brown irides, a pale horn bill (tipped black) and flesh-pink legs and feet (Enticott & Tipling, 1997; Johnstone & Storr, 1998; Marchant & Higgins, 1990). Individuals are typically solitary at sea, although flocks of hundreds of birds can form around sources of food, and at dusk when individuals raft together offshore from their breeding islands (Bartle, 1974; Johnstone & Storr, 1998; Marchant & Higgins, 1990; Warham, 1958). Pairs nest in colonies (Marchant & Higgins, 1990; Powell et al., 2007).

Distribution

The Flesh-footed Shearwater is a trans-equatorial migrant. The species is widely distributed across the southern Indian and south-western Pacific Oceans during the breeding season with colonies located on Saint Paul Island (France) in the southern Indian Ocean (Jouventin, 1994; Roux, 1985), on 41 islands off the coast of south-western Western Australia (Burbidge & Fuller, 1996), on Smith Island off the coast of Eyre Peninsula in South Australia (Robinson et al., 1986), on Lord Howe Island (Priddel et al., 2006) and on approximately 20 islands around the eastern and western coasts of the North Island of New Zealand to Cook Strait (Brooke, 2004; Marchant & Higgins, 1990; Taylor, 2000). The birds depart their colonies at the completion of the breeding season. The available data suggest that individuals from western colonies migrate west to South Africa, north to the Arabian Sea, Maldives and Sri Lanka, and north-west to the Pacific Ocean (the latter based on observations of birds flying south through Indonesia at the end of the non-breeding season); and that individuals from eastern colonies migrate north to the northern Pacific Ocean (mainly to waters off Korea, Japan and Russia, but also in smaller numbers to

waters west of North America, and with one recent sighting west of Mexico) (Brooke, 2004; Carboneras, 1992; Marchant & Higgins, 1990; Radamaker & McCaskie, 2006).

Cultural Significance

The Indigenous cultural value for this species is unknown.

Relevant Biology/Ecology

The Flesh-footed Shearwater nests in colonies in burrows under trees or shrubs. On Lord Howe Island it favours the flatter areas in the central lowlands (Priddel et al., 2006). Most feeding is undertaken offshore over continental shelves where it feeds on fish and squid, mostly caught by pursuit-plunging (Marchant & Higgins, 1990). The Flesh-footed Shearwater readily takes baits from longlines (Baker & Wise, 2005).

A generation time of 18.3 years (BirdLife International, 2011) is derived from an average age at first breeding of 5.8 years and an annual survival of adults of 92.0%, both extrapolated from congeners.

Threats

Incidental mortality arising from interactions with longline fishing operations is considered one of the main threats to flesh-footed shearwaters (Gales et al., 1998; Baker et al., 2002; Baker & Wise, 2005; Australian Antarctic Division, 2006). The Flesh-footed shearwater routinely attends fishing vessels to feed on cast baits, discarded scraps and attracted prey (Baker et al., 2002; Baker & Wise, 2005; Bartle, 1974). Seabirds can be killed or injured when they ingest baited hooks during the setting or hauling of longlines; ingest hooks embedded in discarded scraps; or are shot by fishermen. The death of breeding birds by any of these causes can also result in the loss of eggs or dependent young. The main cause of mortality is drowning when hooked birds are dragged underwater by the weight of the longline. This most frequently occurs during setting of the longline (Australian Antarctic Division, 2005; Baker et al., 2002).

It is likely that bycatch of flesh-footed shearwaters by domestic longline fisheries has decreased in recent years. The introduction of compulsory bycatch mitigation measures by the Australian federal government has seen total seabird bycatch rates drop from an observed rate of 0.92 birds/1000 hooks in the Australian longline fishery for Southern Bluefin Tuna (Brothers & Foster, 1997) during the mid 1990s to less than 0.05 birds/1000 hooks in a number of Australian longline fisheries in recent years (Australian Antarctic Division, 2005a). Recent data from the Australian Fish Management Authority (AFMA, 2013) confirms ongoing reduced rates of bycatch from longline operations in the Eastern Tuna and Billfish Fishery (ETBF), with an estimated thirty-six seabirds caught from 59.1 million hooks set between January 2006 and December 2012, of which only one was reported as being a flesh-footed shearwater.

Other potential threats that occur across the Australian range of the flesh-footed shearwater include interactions with trawl and gillnet fisheries, dependence on fishery discards, and over-extraction of prey species by fisheries and exposure to avian parasites and disease (Baker et al., 2002). In addition, sizeable quantities of plastics have been retrieved from flesh-footed shearwater carcasses on Lord Howe Island (Reid et al., 2013) but this is likely also a problem for birds from other colonies. It is not known what impacts on survival these threats are having on flesh-footed shearwaters within Australian jurisdictions.

The breeding colony on Lord Howe is the only major colony that breeds near human habitation. Specific anthropogenic threats on Lord Howe Island include clearance or modification of habitat, degradation of habitat by cattle or introduced invasive Kikuyu Grass (*Pennisetum clandestinum*), destruction or disturbance of nesting burrows by humans or cattle, predation by domestic dogs or rodents, exposure to herbicides and mortality arising from collisions with vehicles (Department of Environment and Climate Change [NSW], 2005; Priddel, 1996, 2006; Reid et al.,

2013). At Lord Howe Island, urban expansion was the primary cause of a 35.6% reduction in the total area of Flesh-footed Shearwater breeding habitat from 1978 to 2003 (Priddel et al., 2006).

The population migrates beyond the Australian jurisdiction in the non-breeding season (Bourne & Radford, 1961; McClure, 1974; McKean & Hindwood, 1965). This pattern of extensive movement exposes the population to threats operating outside of Australian jurisdictions, with the primary external threat likely to be capture in long-line fishing operations in international waters (Baker & Wise, 2005).

How judged by the Committee in relation to the EPBC Act Criteria and Regulations

Criterion 1: Reduction in numbers (based on any of A1 – A4)

- A1. An observed, estimated, inferred or suspected population very severe $\geq 90\%$, severe $\geq 70\%$ substantial $\geq 50\%$ size reduction over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
- (a) direct observation
 - (b) an index of abundance appropriate to the taxon
 - (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
 - (d) actual or potential levels of exploitation
 - (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.
- A2. An observed, estimated, inferred or suspected population very severe $\geq 80\%$, severe $\geq 50\%$ substantial $\geq 30\%$ size reduction over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.
- A3. A population size reduction very severe $\geq 80\%$, severe $\geq 50\%$ substantial $\geq 30\%$, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.
- A4. An observed, estimated, inferred, projected or suspected population size reduction very severe $\geq 80\%$, severe $\geq 50\%$ substantial $\geq 30\%$ over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

Evidence

The Lord Howe population of flesh-footed shearwaters is the best studied of all the breeding colonies and is thought to represent approximately 5–14% of the total Australian population (Ross et al., 1996). A recent study (Reid et al., 2013) suggested that there was either 16,794 (2.5-97.5% confidence limits 14,779-18,809) breeding pairs (using the occupancy rate from one site in 2009 to estimate numbers across all colonies) or 16,267 (95% Credible Intervals 11,649-21,250) breeding pairs (using Bayesian method with occupancy rates from three years at one study site and additional data from Ross et al., 1996). Using the lower estimate, the authors (Reid et al., 2013) calculated a rate of decline of breeding pairs on Lord Howe of approximately 7% since 2002, as compared to Priddel et al. 2006.

Priddel et al. (2006) looked at burrow occupancy across the whole island over the 2002-2003 breeding season and estimated a total population of approximately 17,462 pairs on Lord Howe (no error margin provided as numbers at each site were calculated separately). Earlier estimates for Lord Howe Island put the population at about 17,500 pairs in 1971 (Fullagar et al., 1974) and between 20,000-40,000 pairs in 1978 (Fullagar and Disney, 1981).

Evidence of declines elsewhere in Australian waters are less certain as populations are less

well surveyed or not surveyed at all. The only published estimate for the Western Australian population of flesh-footed shearwaters is for a population of between 100,000 – 310,000 pairs (Burbidge and Fuller 1996). A more recent, but unpublished, estimate suggests a lower total for Western Australia. There is not, however, sufficient confidence in either set of estimates to determine if the Western Australian population of flesh-footed shearwaters is declining. The estimate of the South Australian population is for about 3,300 pairs breeding on two islands (Goldsworthy et al., 2013). No evidence suggests the South Australian population is in decline.

Not applicable: There are insufficient data available to judge whether the species has undergone, is suspected to have undergone or is likely to undergo a very severe, severe or substantial reduction in numbers across their Australian range.

Criterion 2:

Geographic distribution (based on either of B1 or B2)

B1. Extent of occurrence estimated to be very restricted <100 km², restricted <5000 km² or limited < 20 000 km²

B2. Area of occupancy estimated to be very restricted <10 km², restricted <500 km² or limited <2000 km²

AND

Geographic distribution is precarious for the survival of the species,
(based on at least two of a–c)

- a. Severely fragmented or known to exist at a limited location.
- b. Continuing decline, observed, inferred or projected, in any of the following:
 - (i) extent of occurrence
 - (ii) area of occupancy
 - (iii) area, extent and/or quality of habitat
 - (iv) number of locations or subpopulations
 - (v) number of mature individuals.
- c. Extreme fluctuations in any of the following:
 - (i) extent of occurrence
 - (ii) area of occupancy
 - (iii) number of locations or subpopulations
 - (iv) number of mature individuals

Evidence

Flesh-footed shearwaters on Lord Howe have experienced a contraction in nesting habitat through the clearing of land for farming and housing. This decline was estimated as being approximately 13.4 hectares between 1978 and 2002, which equates to a decline of approximately 36% over 24 years (Priddel et al., 2006). Additionally, at least three populations have been lost from south-western Western Australia over the last century.

Despite the evidence for the loss of some breeding colonies in Western Australia, there is still reliable evidence of breeding on 41 islands off the coast of south-western Western Australia (Burbidge & Fuller 1996), on Smith and Lewis Islands off the coast of Eyre Peninsula in South Australia (Robinson *et al.*, 1986; Goldsworthy et al., 2013) and on Lord Howe Island (Priddel *et al.*, 2006).

Not applicable: The geographic distribution is not very restricted, restricted or limited, therefore the species is not eligible for listing under this criterion.

Criterion 3: The estimated total number of mature individuals is very low <250, low <2500 or limited <10 000; **and** either of (A) or (B) is true

- (A) evidence suggests that the number will continue to decline at a very high (25% in 3 years or 1 generation (up to 100 years), whichever is longer), high (20% in 5 years or 2

generations(up to 100 years), whichever is longer) or substantial (10% in 10 years or 3 generations years), whichever is longer(up to 100) rate; or

- (B) the number is likely to continue to decline and its geographic distribution is precarious for its survival (based on at least two of a – c):
- a. Severely fragmented or known to exist at a limited location.
 - b. Continuing decline, observed, inferred or projected, in any of the following:
 - (i) extent of occurrence
 - (ii) area of occupancy
 - (iii) area, extent and/or quality of habitat
 - (iv) number of locations or subpopulations
 - (v) number of mature individuals.
 - c. Extreme fluctuations in any of the following:
 - (i) extent of occurrence
 - (ii) area of occupancy
 - (iii) number of locations or subpopulations
 - (iv) number of mature individuals

Evidence

Reliable population counts exist for the Lord Howe Island colony (approximately 17,400 pairs; Priddel, 2006). The only published estimate for the Western Australia population suggested there was between 100,000-310,000 pairs (Burbidge & Fuller, 1996). A more recent, but unpublished, estimate suggests a lower total for Western Australia. There is not, however, sufficient confidence in either set of estimates to determine if the Western Australian population of flesh-footed shearwaters is declining. The estimate of the South Australian population is for about 3,300 pairs breeding on two islands (Goldsworthy et al., 2013). No evidence suggests the South Australian population is in decline.

Not applicable: The total number of mature individuals is not very low, low or limited, therefore the species is not eligible for listing under this criterion.

Criterion 4: Estimated total number of mature individuals:

- (a) Extremely low < 50
- (b) Very low < 250
- (c) Low < 1000

Evidence

Not applicable: The total number of mature individuals is not very low, low or limited, therefore the species is not eligible for listing under this criterion.
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Criterion 5: Probability of extinction in the wild based on quantitative analysis is at least:

- (a) 50% in the immediate future, 10 years or three generations (whichever is longer); or
- (b) 20% in the near future, 20 year or five generations (whichever is longer); or
- (c) 10% in the medium-term future, within 100 years.

Evidence

Not applicable: Population viability analysis has not been undertaken
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Public Consultation

Notice of the proposed amendment was made available for public comment for 30 business days between 12 August 2013 and 27 September 2013. Any comments received that are relevant to the survival of the species have been considered by the Committee.

Recovery Plan

There should not be a recovery plan for this species as it is not considered eligible for listing under the EPBC Act.

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