THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Minister approved this Conservation Advice and transferred this species from the Vulnerable category to the Endangered category, effective from 03/07/2020

Conservation Advice

Thalassarche cauta

Shy Albatross

Taxonomy

Thalassarche cauta (Gould 1840).

Originally named *Diomedea cauta* (Gould 1840), this species was considered polytypic until it was placed in the genus *Thalassarche* and elevated to a separate species as *Thalassarche cauta* (Shy Albatross). There has been some debate about whether *Thalassarche cauta* should be recognised as separate species. A major review of the genetic, morphological, and behavioural evidence concerning the species concluded that the available data warranted recognition of *Thalassarche cauta* at the species level (ACAP 2006; Double 2006; DoEE 2019). Recognition of *Thalassarche cauta* at the species level is now widely supported.

Conservation Status

Thalassarche cauta (Shy Albatross) is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) effective from 16 July 2000.

The Threatened Species Scientific Committee (the Committee) have since reviewed *Thalassarche cauta* and concluded that the highest category for which it is eligible is Endangered: Criterion 2 B2 (a), (b)(v).

Thalassarche cauta has been found to eligible under the following criteria:

Criterion 2: B2 (a), (b)(v) Endangered

The main factors that make the species eligible for listing in the Endangered category under Criterion 2 are that the area of occupancy of the species is restricted; the geographic distribution is precarious for the survival of the species, because its number of locations is restricted; and there is a projected decline in the number of mature individuals for the Albatross Island subpopulation, and inferred declines for the Pedra Banca and Mewstone subpopulations.

Listing recommendation under the EPBC Act

Thalassarche cauta is eligible for listing in the Endangered category under the EPBC Act.

Species can also be listed as threatened under state and territory legislation. For information on the current listing status of this species under relevant state or territory legislation, see http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.

Description

The Shy Albatross is medium-sized black, white and grey albatross measuring 90-100 cm in length with a wingspan of 2.1-2.6 m. The species is generally white with black upperwings, black margins and a dark tab intruding into the base of the underwing, and grey-black tail. The head has a distinctive white cap and contrasting pale grey face with dark eyebrow. The bill is relatively long and pale grey-yellow with a yellow tip, and yellow at the base of the upper beak. Immature birds have darker grey wash on the head and sides of the neck, with a grey bill with a darker tip (Pizzey & Knight 2012).

Distribution

The Shy Albatross is the only albatross species endemic to Australia. The species has breeding colonies on three small islands off Tasmania: Albatross Island in western Bass Strait (40°22'S, 144°40'E); the Mewstone (43°44'S, 146°22'E); and Pedra Branca (43°52'S, 147°00'E) in southern Tasmanian waters (Brothers et al. 1997). The two southern subpopulations are relatively proximate (50 km apart) and are separated from Albatross Island by 400 km and 450 km, respectively (Alderman et al. 2011).

Adult Shy Albatrosses predominately occur in waters adjacent to Tasmania and southern Australia (Abbott et al. 2006a). The range of juvenile birds extends however across the Indian Ocean to southern Africa and potentially the south-western Atlantic Ocean (Barton 1979; Alderman 2012; Jiménez et al. 2015).

Cultural Significance

The Tasmanian Aboriginal people of the north-west region called Albatross Island *tangatema* and they may have visited the island by canoe in calm conditions when the journey between Hunter and Albatross Islands could be safely negotiated (Wastell et al. 2015). For the Tasmanian Aboriginal people of the southern region the *palawa kani* nomenclature for Albatross Island is *namanu rruni* (Alderman 2018, pers comm, 5 September 2018).

Relevant Biology/Ecology

The Shy Albatross is a long-lived species with a generation length of at least 22 years (known-aged individuals live up to 40-45 years), characterised by low annual adult mortality (<0.1 per cent), annual breeding, long-term pair-bonding, and low fecundity (one egg per breeding attempt) (Alderman et al. 2011; BirdLife International 2018; IUCN 2019; Garnett et al. 2011). The total population in 2017-18 was estimated at about 30 000 mature individuals (Alderman 2018). The species is susceptible to additional external mortality events, such as bycatch in fisheries, climate change, and stochastic events (Baker et al. 2007; Alderman et al. 2011; Alderman 2012; Phillips et al. 2016).

Shy Albatross are a colonial species (DSEWPC 2011a). The breeding cycle is about eight months long, although birds are present at the colonies year-round (ACAP 2012). The nests are a semi-permanent conical mound up to 30 cm in height composed of soil and a variety of organic material (MacDonald & Green 1963). Egg laying occurs predominately in September, with chicks hatching in December, and fledging commencing in April, when the birds are about four and a half months old, although there are minor variations between colonies (Abbott et al. 2006b). During incubation, and for the first three to four weeks after hatching, the parents alternate at the nest, with the chicks thereafter provisioned, but left unattended until fledging occurs (Brooke 2004; Hedd & Gales 2005).

Breeding site fidelity is high for Shy Albatross (Abbott et al. 2003). Immature birds return to their breeding colony at least three years after fledging, and commence breeding when at least five to six years old, with an average breeding age of nine years (Brothers et al. 1998; Hedd & Gales 2005; Alderman 2012).

Shy Albatross forage singly and take prey predominately from the sea surface, but may dive to three metres and swim to over seven metres in depth (ACAP 2012). Their diet consists mainly of fish and cephalopods, with secondary foods including tunicates and crustaceans (Hedd & Gales 2001; Hedd et al. 2001). The species follows fishing vessels with fish processing discharges accounting for a significant portion of the diet (Brothers et al. 1998; Gales 1988; Marchant & Higgins 1990).

Threats

Table 1: Threats impacting the Shy Albatross in approximate order of severity of risk, based on available evidence.

Threat factor	Threat type and status	Evidence base
Fishing activities		
Fisheries bycatch	Known current	Shy Albatrosses are vulnerable to injury and death associated with commercial fishing, particularly pelagic longline fishing, demersal longline fishing, demersal trawl, and mid-water trawl (Alderman et al. 2010; Alderman et al. 2011). Birds may be hooked or entangled by longline fishing gear and injured or drowned. Birds may also collide with or become entangled by trawl gear, particularly warp wires and net sonde cables.
		Misidentification of 'shy-type albatrosses' in reported fisheries interactions with seabirds occurs, as it is not easy to distinguish Shy Albatross from the closely related *Thalassarche steadi* (White-capped Albatross) (Abbott et al. 2006a). Thomson et al. (2015) estimated that both trawl and longline each took ~6000 birds between 1964 and 2010. Robust data on rates of seabird interactions and associated mortality within State-managed commercial and recreational fisheries are unavailable for Shy Albatross.
		There is some overlap between the distribution of Shy Albatross, particularly juveniles, and high seas pelagic longline fishing effort off south-east Australia and in the Indian Ocean, particularly in the pelagic longline fishery for *Thunnus maccoyii* (Southern Bluefin Tuna) (Inoue et al. 2011).
Climate change		
Temperature rise	Potential	Warmer air temperatures during the breeding season are predicted to lead to declining breeding success on Albatross Island, which will become more pronounced under future climate change scenarios (Thomson et al. 2015). Heatwaves cause mortality in surface nesting birds reducing breeding success. Increases in the number of extreme heatwaves days (>35 °C) are projected for Melbourne (the closest capital city for which projections have been made)—from the current average each year of 11 days (1981-2010) to between 16 days (RCP 4.5) and 24 days (RCP 8.5) by the year 2090 (Ibid).
Rainfall	Potential	Wetter conditions (heavier rainfall events) during the breeding season may adversely affect breeding success

		on Albatross Island, but such events are likely to be intermittent (Ibid).
Sea surface temperature	Potential	Projections suggest increased sea surface temperatures in the waters adjacent to the Albatross Island breeding colony (Ibid). Warmer waters are linked to declining ocean productivity by reducing mixing of nutrient-rich waters to the surface, although upwelling in the nearby Bonney Coast may increase and offset wider declines in productivity. Shy Albatross are however highly mobile foragers and may adapt to changes in the distribution of prey species over time.
Storm surges	Potential	Projections indicate rising mean sea levels and increasing occurrence of storm surges affecting southern Tasmania (McInnes et al. 2012). An increase in the occurrence of storm surges may impact the Shy Albatross subpopulation at Pedra Branca (elevation 60 m above sea level). There may be more frequent damage to nesting habitat; recognising that nests are located on the sheltered side of the island.
Disease		
Disease	Known current	Shy Albatross breeding at Albatross Island are affected by an *Ixodes eudyptidis* (Tick) borne *Phlebovirus* (Hunter Island Group virus I) (Woods 2004; Wang et al. 2014; Uhart et al. 2018). This avian poxvirus clinically affects over 40 per cent of pre-fledging chicks (Alderman 2018). Severity and distribution of outbreaks vary from year to year, but often result in dramatic reductions in breeding success and consequently chick production for the year, due to weight loss and death among chicks (MacDonald & Green 1963; Wang et al. 2014; Alderman 2018). Disease links with climate change are likely (Thomson et al. 2015).
Interspecies competition		
Competition for nesting habitat	Known current	Shy Albatross at the small Pedra Branca colony face interspecies competition for nesting habitat with *Morus serrator* (Australasian Gannet), which is increasing across its range (Alderman 2018). Australasian Gannets destroy Shy Albatross nests by stealing nesting material (Ibid). This interaction is linked to the observed decline in the number of chicks produced each year at Pedra Branca (Alderman et al. 2011).

Marine pollution		
Marine plastics	Known potential	Marine plastic levels are estimated to be high in the Tasman Sea region and there is an increasing potential for marine plastics to affect Shy Albatross adults and chicks through marine plastic ingestion, and associated physical and chemical impacts (Wilcox et al. 2015; Roman et al. 2016). The Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (2018) (TAP-marine debris) identifies Shy Albatross as among the EPBC Act listed species adversely affected by marine debris (DoEE 2018a).
Human disturbance		
Human disturbance	Known past	Public access to Shy Albatross breeding colonies was previously unregulated. Human disturbance impacts at breeding colonies included risks concerning trampling nests, flushing brooding adults during egg incubation, and potential fire risks from camping activities.
Harvest from the wild		
Harvesting for feathers and eggs	Known past	Significant harvesting of adult Shy Albatross for their feathers and eggs occurred at Albatross Island during the 1800s with the subpopulation declining from about 20 000 birds to about 300 birds by the end of that century (Green 1974; Johnstone et al. 1975; Brooke 2004). As a listed threatened species, the Shy Albatross is protected from any take under Tasmanian and Commonwealth legislation (*Threatened Species Protection Act 1995* (Tas), EPBC Act).

How judged by the Committee in relation to the EPBC Act criteria and regulations

Criterion 1. Population size reduction (reduction in total numbers)			
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered Very severe reduction	**Endangered** Severe reduction	**Vulnerable** Substantial reduction
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%

A1   Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2   Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3   Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(*a*) *cannot be used for A3*]

A4   An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a)   direct observation [*except A3*]

(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

Evidence:

Insufficient data to determine eligibility under Criterion 1.

The Committee considers that the available data are insufficient to demonstrate that the Shy Albatross meets the requirements of Criterion 1.

Climate change is predicted to negatively affect the Shy Albatross subpopulation on Albatross Island (Thompson et al. 2015). In a more recent population model developed by the Department of Primary Industries, Parks, Water and Environment (DPIPWE), declining juvenile survival recorded for the Shy Albatross subpopulation on Albatross Island is predicted to lead to a population decline (Alderman et al. 2011; Carlyon 2019 unpublished). However, the Committee notes a discrepancy between model projections and empirical data on the number of breeding pairs on Albatross Island, and that observational data of Shy Albatross away from the breeding grounds do not indicate declines (Gorta et al. 2019). This leads to uncertainty about the extent of future population decline within three generations, and so the Committee considers that at the present time, the data are insufficient to determine eligibility against this criterion.

Criterion 2. Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km^2	< 5,000 km^2	< 20,000 km^2
B2. Area of occupancy (AOO)	< 10 km^2	< 500 km^2	< 2,000 km^2
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (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: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Eligible under Criterion 2 B2 (a), (b)(v) for listing as Endangered.

The area of occupancy (AOO) is for the Shy Albatross is restricted. Section 4.10 of the IUCN Red List Guidelines states that "in some cases … the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon" (IUCN Standards and Petitions Subcommittee 2017). Consistent with these guidelines, the AOO for the Shy Albatross may be defined as the total area of occupied breeding colonies. Multiplying the number of breeding locations (three) by the minimum grid size (2 x 2 km) gives an AOO of approximately 12 km^2, which is restricted. The number of locations upon which the AAO is based (three) is also restricted (Garnett et al. 2011; DoEE 2019c). High breeding site fidelity limits the capacity for the species to establish new breeding sites.

The outputs from an age-, stage-, and sex-structured population model developed by Thomson et al. (2015) predict a decline in the Albatross Island subpopulation due to climate change effects. Comparable climate change effects are inferred for the Mewstone and Pedra Branca subpopulations, based on predicted climate change impacts at similar latitudes to these breeding sites (White et al. 2010).

A population model has developed for the Shy Albatross subpopulation on Albatross Island, which considers the demographic consequences of trends in key demographic parameters, notably juvenile survival (Alderman et al. 2011; Carlyon 2019 unpublished). The number of Shy Albatross breeding pairs on Albatross Island increased from 1998 to 2005, decreased from 2005 to 2017, and increased in 2018-19 due to a recruitment pulse. Despite the fluctuations in the empirical data on the number of breeding adults, the population model (and another model by Thompson et al. 2015) predicts a decline in the number of breeding females in the Albatross Island subpopulation of over 30 per cent in three generations (Carlyon 2019, pers comm, 19 July 2019, 10 October 2019). The Committee notes however that discrepancies exist between the model's predictions and the most recent empirical data, and considers that although population models suggest a future decline, there is uncertainty around the extent of this decline.

Further research is needed to better understand the cumulative effects of climate change upon the Shy Albatross, the relationships between climate variables and adult survival, breeding frequency, and juvenile survival, and the species' ability to adapt to these changes over comparatively short time-frames (e.g. Chambers et al. 2011, 2013; Hobday et al. 2014; Krüger et al. 2017; Alderman & Hobday 2017).

Based on the known foraging distribution and consequent risk of fisheries overlap, juvenile survival is likely to be lower at the Mewstone than at Albatross Island (Alderman et al. 2010, 2011). In the best-case scenario, the Mewstone subpopulation's status and trends are considered as equivalent to those at Albatross Island, but are likely to be worse (Carlyon 2019, pers comm, 10 October 2019).

The Pedra Branca subpopulation represents less than one per cent of the global breeding population). There is a predicted decline in the Pedra Branca subpopulation that is linked to interspecies competition (Alderman et al. 2011; Alderman 2018; ACAP 2012).

The Committee considers that the area of occupancy of the species is restricted, and the geographic distribution is precarious for the survival of the species because its number of locations is restricted and the number of mature individuals is projected and inferred to decline. Therefore, the species has met the relevant elements of Criterion 2 to make it eligible for listing as Endangered B2 (a), (b)(v).

Criterion 3. Population size and decline		Critically Endangered Very low	Endangered Low	Vulnerable Limited
Estimated number of mature individuals		< 250	< 2,500	< 10,000
AND either (C1) or (C2) is true				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)	Very high rate 25% in 3 years or 1 generation (whichever is longer)	High rate 20% in 5 years or 2 generation (whichever is longer)	Substantial rate 10% in 10 years or 3 generations (whichever is longer)
C2	An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival based on at least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b)	Extreme fluctuations in the number of mature individuals			

Evidence:

Not eligible for listing under Criterion 3.

The Committee considers that the Shy Albatross does not meet the requirements of Criterion 3, as the population is estimated at approximately 30 000 mature individuals (Alderman 2018), which is not limited.

Criterion 4.   Number of mature individuals

	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
Number of mature individuals	< 50	< 250	< 1,000
D2[1] Only applies to the Vulnerable category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to Critically Endangered or Extinct in a very short time.	-	-	**D2.** Typically: area of occupancy < 20 km^2 or number of locations ≤ 5

[1] *The IUCN Red List Criterion D allows for species to be considered as Vulnerable under Criterion D2. The corresponding Criterion 4 in the EPBC Regulations does not currently include the provision for listing a species under Vulnerable D2. As such, a species cannot currently be listed under the EPBC Act under Criterion D2 only. However, assessments may include information relevant to D2. This information will not be considered by the Committee in making its recommendation of the species' eligibility for listing under the EPBC Act, but may assist other jurisdictions to adopt the assessment outcome under the common assessment method.*

Evidence:

Not eligible for listing under Criterion 4.

The Committee considers that the Shy Albatross does not meet the requirements of Criterion 4, as the population is estimated at approximately 30 000 mature individuals (Ibid), which is not low. The Committee considers under Criterion 4 D2 that while the species would meet the area/number of locations requirements, there is not a plausible future threat that could drive the species to Critically Endangered or Extinct in a very short time.

Criterion 5.   Quantitative Analysis

	Critically Endangered Immediate future	Endangered Near future	Vulnerable Medium-term future
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

Evidence:

Insufficient data to determine eligibility under Criterion 5.

As a population viability analysis has not been undertaken (Garnett et al. 2011), there are insufficient data to demonstrate if the Shy Albatross is eligible for listing under Criterion 5.

Adequacy of survey

For this assessment it is considered that the survey effort has been adequate and there is sufficient scientific evidence to support the assessment outcome.

Conservation Actions

Shy Albatross are subject to an existing recovery plan: the National Recovery Plan for threatened albatrosses and giant petrels 2011-2016 (DSEWPC 2011b). The recovery plan establishes a coordinated conservation strategy for albatrosses and giant petrels listed as threatened under the EPBC Act. The plan encompasses 19 albatross species and two giant petrel species including the Shy Albatross.

The overall objective of the plan is:

> to ensure the long-term survival and recovery of albatross and giant petrel populations breeding and foraging in Australian jurisdiction by reducing or eliminating human related threats at sea and on land.

There are five specific objectives under the plan:

1. Research and monitoring of the biology, ecology and population dynamics of albatrosses and giant petrels breeding within Australian jurisdiction is sufficient to understand conservation status and to implement effective and efficient conservation measures.

2. Land-based threats to the survival and breeding success of albatrosses and giant petrels breeding within areas under Australian jurisdiction are quantified and reduced.

3. Marine-based threats to the survival and breeding success of albatrosses and giant petrels foraging in waters under Australian jurisdiction are quantified and reduced.

4. Fishers are educated and public awareness is raised on the threats to albatrosses and giant petrels.

5. Substantial involvement in the promotion and development of improved and, ultimately, favourable conservation status of albatrosses and giant petrels globally in international conservation and fishing fora is maintained.

The recovery plan highlights that it is not anticipated that its objective will be achieved within the lifetime of the plan (10 years) (Ibid), rather, the recovery plan will be deemed successful if positive trends, in terms of achieving the overall objective, can be demonstrated against the following criteria:

1. The population status and trends of albatrosses and giant petrels breeding under Australian jurisdiction are known, verified and updated and, where possible the demographic parameters of those trends are known.

2. All Australian fisheries are assessed for their risk of adverse interactions with albatrosses and giant petrels where relevant. Where sufficient risk is present, robust observer / data collection programs are implemented to statistically quantify bycatch rates and best practice mitigation measures are promptly implemented to reduce/eliminate mortality. Where bycatch is occurring in longline fisheries, bycatch rates should be reduced in line with the requirements of the Threat Abatement Plan for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations.

3. All factors adversely influencing the conservation status of albatross and giant petrel populations breeding and foraging within Australian jurisdiction are identified and, where feasible, prevented, minimised or eliminated.

4. Education and support amongst fishers and fisheries management bodies is improved.

Conservation and management priorities

The recovery plan includes a range of actions to achieve specific objectives. Actions concerning *conservation and management priorities* affecting Shy Albatross are provided below (recovery plan action codes are indicated).

- Incidental catch during fishing operations

    o All actions in the Threat Abatement Plan for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations are fully implemented. [C.8.1]

    Note: Observed and reported interactions of seabirds with longline fishing gear has reduced significantly under successive threat abatement plans for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations, particularly through the use of technologies and techniques for avoiding or minimising seabird interactions, particularly, bird scaring lines, line weighting, night setting and bird exclusion devices (DoEE 2018b; AFMA 2019).

    o The scale and nature of interactions between albatrosses and giant petrels and trawl fishing operations in Australian waters are quantified and, if required, reporting processes are improved and bycatch is mitigated. [C.8.2]

    Note: Interactions with trawl fishing gear may have been reduced significantly with the introduction of bird scaring lines (AFMA 2019; Koopman et al. 2018), however, mortalities may still be occurring, but not reported that may account for over 20 per cent of seabird bycatch in trawl fisheries, (Parker et al. 2013).

    o All longline and trawl fisheries, both Commonwealth and State managed, are and continue to be assessed for the risk of albatross and giant petrel interactions, and where required, a program for the collection, synthesis and analysis of data relating to incidental mortality of albatrosses and giant petrels is introduced. [C.8.3]

    Note: The National Plan of Action for minimising incidental catch of seabirds in Australian capture fisheries (NPOA-seabirds) was released in 2018 (DAWR 2018). The scope of the NPOA-seabirds includes all commercial, recreational and other relevant capture fisheries and actions include understanding the nature and extent of seabird interactions across Australian fisheries jurisdictions.

    o Where bycatch in a fishery is identified as significant, limits or other appropriate management arrangements, to prevent significant adverse impacts on the conservation status of the albatross and giant petrel species and populations, are implemented. [C.8.4]

    o Determine vulnerability of species to bycatch mortality using molecular species assignment methods (and building on previous genetic provenance work). [C.8.5]

- Parasites and disease

    o Determine baseline presence of disease on breeding islands and implement stringent quarantine measures where appropriate. [B.7.1]

    o Quantify the demographic impact of disease on Shy Albatross on Albatross Island. [B.7.2]

- Climate change

  - The effects of climate change predicted for marine and terrestrial environments of albatrosses and giant petrels within Australian jurisdiction are synthesised. The likely impacts on albatrosses and giant petrels breeding and foraging within Australian jurisdiction are assessed and reported and knowledge gaps identified (long term monitoring strategies are important for understanding and tracking impacts of climate change). [A.3.1]

    Note: A suite of prioritised intervention options has been identified to improve the breeding success of Shy Albatross in a changing climate (Ibid). An artificial nest project is underway at Albatross Island (Alderman 2018). Over 100 artificial nests built with mudbrick and aerated concrete have been deployed with about 90 per cent used by breeding pairs during the 2017-18 breeding season—these raised structures provide better nesting sites, and potentially better ventilation.

- Feral pest species

  - Stringent formal quarantine measures are in place and adhered to (including regulated access to all breeding islands). [B.4.2]

  - Breeding islands are assessed for presence of feral species: Tasmanian islands to be of highest priority. [B.4.3]

- Loss of/competition for nesting habitat

  - Monitor the Shy Albatross population on Pedra Branca for the relative distribution and abundance of Australasian Gannets. Document interactions between Shy Albatross and Australasian Gannets and assess appropriate methods that may limit adverse interactions between the species. [B.6.1]

- Human disturbance at the nest

  - Implement or continue restrictions (through protected area and other arrangements) on human disturbance at and access to albatross and giant petrel breeding sites. [B.5.1]

    Note: The public no longer has a general right of access to the breeding colonies under Tasmanian legislation. Entry requires authorisation by the Tasmanian Parks and Wildlife Service, and may be subject to conditions.

Stakeholder Engagement

The recovery plan includes a range of actions to achieve specific objectives. Actions concerning *stakeholder engagement* affecting Shy Albatross are provided below (recovery plan action codes are indicated).

- Educating fishers and promoting public awareness of the threats to albatrosses and giant petrels

    o Design and implement education strategies for fisheries with significant risk of albatross and giant petrel interactions. [D.12.1]

    o Where feasible, encourage the development by industry and others of measures that allow consumers to distinguish products from 'albatross and giant petrel friendly' fisheries. Develop criteria that might facilitate formal recognition of such fisheries. [D.12.2]

- Human disturbance at the nest

    o Education material regarding the impacts of wildlife disturbance should be provided to all visitors to albatross and giant petrel breeding colonies. [B.5.2]

- Achieving substantial progress towards global conservation of albatrosses and petrels in international conservation and fishing forums

    o Promote best practice seabird by-catch mitigation, data collection and dissemination by foreign fishers, including through international fora such as the Commission for the Conservation of Antarctic Marine Living Resources, Commission for the Conservation of Southern Bluefin Tuna, Indian Ocean Tuna Commission, Western and Central Pacific Fisheries Commission and other applicable international arrangements to which Australia is a Party. [E.13.1]

    o Use diplomatic and other means to encourage countries to co-operate to conserve albatrosses and petrels, including by avoiding or mitigating fisheries bycatch. [E.13.2]

    o Encourage the Agreement on the Conservation of Albatrosses and Petrels to develop strong relationships with regional fisheries management organisations, the Food and Agriculture Organization of the United Nations and other relevant bodies, including by promulgating assessments of albatross and giant petrel species population trends and status, their spatial distribution and bycatch mitigation measures. [E.13.3]

Survey and monitoring priorities

The recovery plan includes a range of actions to achieve specific objectives. Actions concerning *survey and monitoring priorities* affecting Shy Albatross provided below (recovery plan action codes are indicated).

- Population monitoring programs

    o Develop strategy (where required) for and obtain population estimates for all albatross and giant petrel populations breeding under Australian jurisdiction. Reliable estimates at the time of this plan are consistently available for Shy Albatross at Albatross Island, the Mewstone and Pedra Branca. [A.1.1]

- Continue long-term demographic studies of albatrosses on Macquarie Island and Shy Albatross on Albatross Island and assess survivorship data on a regular basis. [A.1.2]

- Australia participates in national and global dissemination of population status and trend data. [A.1.3]

- Foraging distributions

  - At sea data for albatross and giant petrel populations breeding within Australian jurisdiction are evaluated concerning gaps and limitations in sample size, overlap with fisheries and consequent risk, and population trends. Identify priority populations, species, age and breeding status and, where appropriate, undertake further foraging investigations. Submit remote tracking data to Procellariiform Global Tracking Database. [A.2.1]

- Incidental catch during fishing operations

  - Monitor the frequency of fishing equipment ingestions / entanglement at breeding colonies as part of existing population monitoring programmes. [C.8.5]

- Marine pollution

  - Where feasible, population monitoring programmes also monitor, in a standardised manner, the incidence of oiled birds at the nest, marine debris egestion / entanglement at the nests, and egg shell thinning. [C.11.1]

Information and research priorities

The recovery plan includes a range of actions to achieve specific objectives. Actions concerning *information and research priorities* affecting Shy Albatross provided below (recovery plan action codes are indicated).

- Competition with fisheries for marine resources

  - Encourage research to quantify the scale and nature of dietary requirements of albatrosses and giant petrels, with priority for populations breeding in Australian jurisdiction. Provide these data to the Australian Fisheries Management Authority and other agencies managing fisheries that overlap with albatross and giant petrel species. Promote the incorporation of total dietary requirements of albatross and giant petrel populations into fisheries assessments and the development of improved management strategies. [C.9.1]

- Dependence on fisheries discards

  - Continue to monitor the effects of offal discharge on the reproductive success of albatrosses and giant petrels, to the extent feasible. [C.10.1]

  - Continue to encourage management of offal discharge to prevent birds habituating to this food source. [C.10.2]

References cited in the advice

Abbott CL & Double MC (2003a) Genetic structure, conservation genetics, and evidence of speciation by range expansion in shy and white-capped albatrosses. *Molecular Ecology* 12, 2953-2962.

Abbott CL, Double MC, Gales R, Baker GB, Lashko A, Robertson CJR & Ryan PG (2006a) Molecular provenance analysis for shy and white-capped albatrosses killed by fisheries interactions in Australia, New Zealand, and South Africa. *Conservation Genetics* 7, 531-542.

Abbott CL, Double MC, Gales R & Cockburn A (2006b) Copulation behaviour and paternity in shy albatrosses (*Thalassarche cauta*). *Journal of Zoology* 270, 628-635.

ACAP (Agreement on the Conservation of Albatrosses and Petrels) (2006) Report of the Second Session of the Meeting of the Parties: Christchurch, New Zealand, 13-17 November 2006. Available on the Internet at: https://www.acap.aq/en/meeting-of-the-parties/mop2/mop2-final-report/982-mop2-final-report-of-acaps-second-meeting-of-the-parties-e/file.

ACAP (2012) Species assessments: shy albatross *Thalassarche cauta*. Version 19 September 2012. Viewed 15 October 2019. Available on the Internet at: http://www.acap.aq/en/acap-species/299-shy-albatross/file.

AFMA (Australian Fisheries Management Authority) (2019) Protected species interaction reports. Viewed 15 October 2019. Available on the Internet at: http://www.afma.gov.au/sustainability-environment/protected-species-management/protected-species-interaction-reports/.

Alderman RL (2012) *The shy albatross (*Thalassarche cauta*) population trends, environmental and anthropogenic drivers, and the future for management and conservation*. PhD thesis. University of Tasmania. Hobart.

Alderman R (2018) Shy albatross in Australia: Population and conservation assessment report for the 2017/18 season. Marine Conservation Program, Department of Primary Industries, Water and Environment. Hobart.

Alderman R, Gales R, Hobday AJ & Candy SG (2010) Post-fledging survival and dispersal of shy albatross from three breeding colonies in Tasmania. *Marine Ecology Progress Series* 405, 271-285.

Alderman R, Gales R, Tuck GN & Lebreton JD (2011) Global population status of shy albatross and an assessment of colony-specific trends and drivers. *Wildlife Research* 38, 672-686.

Alderman R & Hobday AJ (2017) Developing a climate adaptation strategy for vulnerable seabirds based on prioritisation of intervention options. *Deep Sea Research II* 140, 290-297.

Baker GB, Double MC, Gales R, Tuck GN, Abbott CL, Ryan PG, Petersen SL, Robertson CJR & Alderman R (2007) A global assessment of the impact of fisheries-related mortality on shy and white-capped albatrosses: Conservation implications. *Biological Conservation* 137, 319-333.

Barton D (1979) Albatrosses in the western Tasman Sea. *Emu* 79, 31-35.

BirdLife International (2018) *Thalassarche cauta*. The IUCN Red List of Threatened Species 2018. Viewed 15 October 2019. Available on the Internet at: http://www.iucnredlist.org/details/full/22729604/0.

Brooke M (2004) *Albatrosses and petrels across the world*. Oxford University Press. Oxford.

Brothers N, Gales R, Hedd A & Robertson G (1998) Foraging movements of the shy albatross *Diomedea cauta* breeding in Australia — implications for interactions with longline fisheries. *Ibis* 140, 446-457.

Brothers NP, Reid TA & Gales RP (1997) At-sea distribution of shy albatrosses *Diomedea cauta cauta* derived for records of band recoveries and colour-marked birds. *Emu* 97, 231-239.

Chambers LE, Devney CA, Congdon BC, Dunlop N, Woehler EJ & Dann (2011) Observed and predicted effects on climate change on Australian seabirds. *Emu* 111, 235-251.

Chambers LE, Dann P, Cannell B & Woehler EJ (2013) Climate as a driver of phenological change in southern seabirds. *Int J Biometeorol* 58, 603-612.

DAWR (Department of Agriculture and Water Resources) (2018) *National Plan of Action for minimising incidental catch of seabirds in Australian capture fisheries*. Canberra. CC BY 4.0.

DoEE (Department of the Environment and Energy) (2018a) Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (2018). Available on the Internet at: http://www.environment.gov.au/approved-taps.

DoEE (2018b) Threat Abatement Plan for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations (2018). Department of the Environment, Canberra. Available on the Internet at: http://www.environment.gov.au/approved-taps.

DoEE (2019) *Thalassarche cauta cauta* in Species Profile and Threats Database, Department of the Environment and Energy, Canberra. Viewed 15 October 2019. Available on the Internet at: http://www.environment.gov.au/sprat.

Double M (2006) Report of the Taxonomy Working Group to the Advisory Committee. Agreement on the Conservation of Albatrosses and Petrels, Second Meeting of the Advisory Committee, Brasilia, Brazil, 5-8 June 2006, AC2 Doc 11.
Available on the Internet at: https://www.acap.aq/en/advisory-committee/ac-2/ac2-meeting-documents/1702-ac2-doc-11-report-of-taxonomy-working-group/file.

DSEWPC (Department of Sustainability, Environment, Water, Population and Communities) (2011a) Background Paper, Population status and threats to albatrosses and giant petrels listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth of Australia. Hobart.

DSEWPC (2011b) National Recovery Plan for threatened albatrosses and giant petrels 2011-2016. Commonwealth of Australia. Hobart.

Gales R (1998) Albatross populations: status and threats, in G Robertson & R Gales (eds), *The albatross: biology and conservation*. Beatty and Sons. Chipping Norton, Surrey. pp. 20-45.

Garnett ST, Szaba JK & Dutson G (2011) *The action plan for Australian birds 2010*. CSIRO Publishing. Collingwood, Victoria.

Gould J (1840) Descriptions of new birds from Australia. *Proceedings of the Zoological Society of London* 8, 169-179.

Gorta SBZ, Smith JA, Everett JD, Kingsford RT, Cornwell WK, Suthers IM, Epstein H, McGovern R, McLachlan G, Roderick M, Smith L, Williams D & Callaghan CT (2019) Pelagic citizen science data reveal declines of seabirds off south-eastern Australia. *Biological Conservation* 235, 226-235.

Green RH (1974) Albatross Island, 1973. *Records of the Queen Victoria Museum* 51, 1-17.

Hedd A & Gales R (2001) The diet of shy albatrosses (*Thalassarche cauta*) at Albatross Island, Tasmania. *Journal of Zoology* 253, 69-90.

Hedd A & Gales R (2005) Breeding and overwintering ecology for shy albatross in southern Australia: Year round patterns of colony attendance and foraging trip durations. *The Condor* 107, 375-387.

Hedd A, Gales R & Brothers N (2001) Foraging strategies of shy albatross *Thalassarche cauta* breeding at Albatross Island, Tasmania, Australia. *Marine Ecology Progress Series* 224, 267-282.

Hobday AJ, Chambers LE, Arnould JPY, Patterson TA, Wilcox C, Tuck GN & Thomson RB (2014) Developing adaption options for seabirds and marine mammals impacted by climate change. Final Report. FRDC-DCCEE marine National Adaption Research Project 2010/533. Available on the Internet at: https://publications.csiro.au/rpr/pub?pid=csiro:EP141169.

Inoue Y, Yokawa K, Minami H, Ochi D, Sato N & Katsumata N (2011) Distribution of seabird bycatch at WCPFC and the neighbouring area of the southern hemisphere. Paper presented to 7th regular session of Scientific Committee (Pohnpei, Federated States of Micronesia, 9-17 August 2011) (WCPFC-SC7-2011/EB-WP-07). Available on the Internet at: https://www.wcpfc.int/node/2770.

IUCN (International Union for Conservation of Nature) (2019) The IUCN Red List of Threatened Species, Version 2019-2. Viewed 15 October 2019. Available on the Internet at: http://www.iucnredlist.org/search.

IUCN Standards and Petitions Subcommittee (2017) Guidelines for using the IUCN Red List categories and criteria, Version 13. Available on the Internet at: http://www.iucnredlist.org/documents/RedListGuidelines.pdf.

Jiménez S, Marquez A, Abreu M, Forselledo R, Pereira A & Domingo A (2015) Molecular analysis suggests the occurrence of Shy Albatross in the south-western Atlantic Ocean. *Emu* 115, 58-62.

Johnstone GW, Milledge D & Dorwood DF (1975) The white-capped albatross of Albatross Island: numbers and breeding behaviour. *Emu* 75, 1-11.

Koopman M, Boag S, Tuck GN, Hudson R, Knuckey I & Alderman R (2018) Industry-based development of effective new seabird mitigation devices in the southern Australian trawl fisheries. *Endangered Species Research* 36, 197-211.

Krüger L, Ramos JA, Xavier JC, Grémillet D, González-Solís J, Petry MV, Phillips RA, Wanless RM & Piava VH (2017) Projected distributions of Southern Ocean albatrosses, petrels and fisheries as a consequence of climate change. *Ecography* 41, 195-208.

MacDonald D & Green RH (1963) Albatross Island. *Emu* 63, 23-31.

Marchant S & Higgins PJ (eds) (1990) *Handbook of Australian, New Zealand and Antarctic Birds. Volume One - Ratites to Ducks*. Oxford University Press. Melbourne, Victoria.

McInnes KL, O'Grady JG, Hemer M, Macadam I, Abbs DJ, White CJ, Corney SP, Grose MR, Holz GK, Gaynor SM & Bindoff NL (2012) *Climate futures for Tasmania: extreme tide and sea-level events technical report*. Antarctic Climate and Ecosystems Cooperative Research Centre, Hobart, Tasmania.

Parker G, Brickle P, Crofts S, Pompert J, & Wolfaardt A (2013). Research into undetected seabird mortality in a demersal trawl fishery. Agreement on the Conservation of Albatrosses and Petrels, Fifth meeting of the Seabird Bycatch Working Group: La Rochelle, France, 1-3 May 2013, SBWG5 Doc 07.

Phillips RA, Gales R, Baker GB, Double MC, Favero M, Quintana F, Tasker ML, Weimerskirch H, Uhart M & Wolfaardt A (2016) The conservation status and priorities for albatrosses and large petrels. *Biological Conservation* 201, 169-183.

Pizzey G & Knight F (2012) *The field guide to the birds of Australia*, 9th edition. Harper Collins. Sydney.

Roman L, Schuyler QA, Hardesty BD, Townsend KA (2016) Anthropogenic debris ingestion by avifauna in Eastern Australia. *PLoS ONE* 11(8): e0158343. https://doi.org/10.1371/journal.pone.0158343.

Thomson RB, Alderman RL, Tuck GN & Hobday AJ (2015) Effects of climate change and fisheries bycatch on shy albatross (*Thalassarche cauta*) in Southern Australia. *PLoS ONE* 10(6): e0127006. https://doi:10.1371/journal.pone.0127006.

Uhart MA, Gallo L & Quintana F (2018) Review of diseases (pathogen isolation, direct recovery and antibodies) in albatrosses and large petrels worldwide. *Bird Conservation International* 28, 169-196.

Wang J, Selleck P, Yu M, Ha W, Rootes C, Gales R, Wise T, Crameri S, Chen H, Broz, I, Hyatt A, Woods R, Meeham, B, McCullough, S & Wang L-A (2014) Novel phlebovirus with zoonotic potential isolated from ticks, Australia. *Emerging Infectious Diseases* 20, 1040-1043.

Wastell R, Newton M & Alderman R (2015) *On Albatross Island*. Focal Printers. Hobart.

White CJ, Grose MR, Corney SP, Bennett JC, Holz GK, Sanabria LA, McInnes KL, Cechet RP, Gaynor SM & Bindoff NL (2010) *Climate futures for Tasmania: extreme events technical report*. Antarctic Climate and Ecosystems Cooperative Research Centre, Hobart, Tasmania.

Wilcox C, Van Sebille E & Hardesty B (2015) Threat of plastic pollution to seabirds is global, pervasive, and increasing. *PNAS* 112, 11899-11904.

Woods R (2004) Result of a preliminary disease survey in Shy Albatross (*Thalassarche cauta* Gould 1841) chicks at Albatross Island, Bass Strait Tasmania. Annual Conference of the Australian Association of Veterinary Conservation Biologists. Canberra. May 2004.

Other sources cited in the advice

Agreement on the Conservation of Albatrosses and Petrels, done on 19 June 2001, 2258 UNTS 257 (entered into force 1 February 2004). Viewed: 15 October 2019. Available at: https://treaties.un.org/.

Alderman R (2018) Personal communication by telephone, 5 September 2018, Marine Conservation Program, Department of Primary Industries, Parks, Water and Environment, Tasmania.

Alderman R (2018) Personal communication by email, 29 November 2018, Marine Conservation Program, Department of Primary Industries, Parks, Water and Environment, Tasmania.

Carlyon K (2019) Shy Albatross population model, based on demographic parameter estimates. In possession of author, Hobart.

Carlyon K (2019) Personal communication by email, 19 July 2019, Marine Conservation Program, Department of Primary Industries, Parks, Water and Environment, Tasmania.

Carlyon K (2019) Personal communication by email, 10 October 2019, Marine Conservation Program, Department of Primary Industries, Parks, Water and Environment, Tasmania.

Environment Protection and Biodiversity Conservation Act 1999 (Cwth) Viewed: 15 October 2019. Available at: http://comlaw.gov.au/.

Threatened Species Protection Act 1995 (Tas) Viewed 15 October 2019. Available at: https://www.legislation.tas.gov.au/.