Australian Government
Department of the Environment and Energy

Consultation Document on Listing Eligibility and Conservation Actions

Thalassarche cauta cauta (Shy Albatross)

You are invited to provide your views and supporting reasons concerning:

1) the eligibility of *Thalassarche cauta cauta* (Shy Albatross) for inclusion on the EPBC Act threatened species list in the Endangered category

2) the necessary conservation actions for the above species.

Evidence provided by experts, stakeholders and the general public are welcome. Responses can be provided by any interested person.

Anyone may nominate a native species, ecological community or threatening process for listing under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or for a transfer of an item already on the list to a new listing category. The Threatened Species Scientific Committee (the Committee) undertakes the assessment of species to determine eligibility for inclusion in the list of threatened species, and provides its recommendation to the Australian Government Minister for the Environment.

Responses are to be provided in writing either by email to:
species.consultation@environment.gov.au

or by mail to:

The Manager
Territories, Environment and Treaties Section
Australian Antarctic Division
Department of the Environment and Energy
203 Channel Highway
Kingston TAS 7050

Responses are required to be submitted by 15 February 2019.

Contents of this information package	Page

General background information about listing threatened species

The Australian Government helps protect species at risk of extinction by listing them as threatened under Part 13 of the EPBC Act. Once listed under the EPBC Act, the species becomes a Matter of National Environmental Significance (MNES) and must be protected from significant impacts through the assessment and approval provisions of the EPBC Act. More information about threatened species is available on the Department's website at: http://www.environment.gov.au/biodiversity/threatened/index.html.

Public nominations to list threatened species under the EPBC Act are received annually by the Department. In order to determine if a species is eligible for listing as threatened under the EPBC Act, the Threatened Species Scientific Committee (the Committee) undertakes a rigorous scientific assessment of the status of the species to determine if the species is eligible for listing against a set of criteria. These criteria are available on the Department's website at: http://www.environment.gov.au/biodiversity/threatened/pubs/guidelines-species.pdf.

As part of the assessment process, the Committee consults with the public and stakeholders to obtain specific details about the species, as well as advice on what conservation actions might be appropriate. Information provided through the consultation process is considered by the Committee in its assessment. The Committee provides its advice on the assessment (together with comments received) to the Australian Government Minister for the Environment about the eligibility of the species for listing under a particular category and what conservation actions might be appropriate. The Minister decides to add, or not to add, the species to the list of threatened species under the EPBC Act. More detailed information about the listing process is at: http://www.environment.gov.au/biodiversity/threatened/nominations.html.

To promote the recovery of listed threatened species and ecological communities, conservation advices and, where required, recovery plans are made or adopted in accordance with Part 13 of the EPBC Act. Conservation advices provide guidance at the time of listing on known threats and priority recovery actions that can be undertaken at a local and regional level. Recovery plans describe key threats and identify specific recovery actions that can be undertaken to enable recovery activities to occur within a planned and logical national framework. Information about recovery plans is available on the Department's website at: http://www.environment.gov.au/biodiversity/threatened/recovery.html.

Privacy notice

The Department will collect, use, store and disclose the personal information you provide in a manner consistent with the Department's obligations under the *Privacy Act 1988* (Cth) and the Department's Privacy Policy.

Any personal information that you provide within, or in addition to, your comments in the threatened species assessment process may be used by the Department for the purposes of its functions relating to threatened species assessments, including contacting you if we have any questions about your comments in the future.

Further, the Commonwealth, State and Territory governments have agreed to share threatened species assessment documentation (including comments) to ensure that all States and Territories have access to the same documentation when making a decision on the status of a potentially threatened species. This is also known as the 'common assessment method'. As a result, any personal information that you have provided in connection with your comments may be shared between Commonwealth, State or Territory government entities to assist with their assessment processes.

The Department's Privacy Policy contains details about how respondents may access and make corrections to personal information that the Department holds about the respondent, how respondents may make a complaint about a breach of an Australian Privacy Principle, and how the Department will deal with that complaint. A copy of the Department's Privacy Policy is available at: http://environment.gov.au/privacy-policy.

Information about this consultation process

Responses to this consultation can be provided electronically or in hard copy to the contact addresses provided on Page 1. All responses received will be provided in full to the Committee and then to the Minister.

In providing comments, please provide references to published data, where possible. Should the Committee use the information you provide in formulating its advice, the information will be attributed to you and referenced as a 'personal communication' unless you provide references or otherwise attribute this information (please specify if your organisation requires that this information is attributed to your organisation instead of yourself). The final advice by the Committee will be published on the Department's website following the listing decision of the Minister.

Information provided through consultation may be subject to freedom of information legislation and court processes. It is also important to note that under the EPBC Act, the deliberations and recommendations of the Committee are confidential until the Minister has made a final decision on the nomination, unless otherwise determined by the Minister.

Thalassarche cauta cauta

Shy Albatross

Taxonomy

Thalassarche cauta cauta (Gould 1840).

Thalassarche cauta cauta (Shy Albatross) is included on the list of threatened species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DoEE 2018a, 2018c). This nomenclature is based on advice from the Australian Biological Resources Study (ABRS), which follows the taxonomic treatment of Gill et al. (2010).

There is some debate about whether *Thalassarche cauta cauta* should be recognised as separate species. 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) (Robertson & Nunn 1998).

A major review of the genetic, morphological, and behavioural evidence concerning the species was undertaken by the Taxonomy Working Group of the *Agreement on the Conservation of Albatrosses and Petrels* (ACAP) following guidelines for taxonomic decision-making, based on Helbig et al. (2002) (Double 2006). The review concluded there was convincing genetic evidence for placing Shy Albatross in the genus *Thalassarche* (Nunn et al. 1996; Robertson & Nunn 1998) The review also concluded that the species can be distinguished by a single qualitative trait (mitochondrial sequences) (Abbott & Double 2003a; Abbott & Double 2003b; Abbott et al. 2006a), and using a combination of two independent traits (morphometric measurements and bill coloration) all adults can be accurately diagnosed (Robertson & Nunn 1998; Double et al. 2003). The review noted that while adult *Thalassarche steadi* (White-capped Albatross) (closely-related to *Thalassarche cauta*) dispersed widely outside the breeding season and frequently reached South African waters, the dispersal of adult Shy Albatross always remained close to their breeding islands (Brothers et al. 1997; Brothers et al. 1998; Hedd et al. 2001; Abbott et al. 2006a), and despite the common occurrence of White-capped Albatross in Australian waters close to the Shy Albatross breeding colonies, no gene flow was detectable (Abbott & Double 2003a).

ACAP concluded that the available data warranted recognition of *Thalassarche cauta* and *Thalassarche steadi* as divergent and diagnosable species (Resolution 2.5) (ACAP 2006). The ACAP taxonomy has been adopted by the International Union for Conservation of Nature (IUCN) concerning the Red List of Threatened Species (IUCN, 2018), BirdLife International (del Hoyo et al. 2014; BirdLife International 2016), and the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention) concerning listing migratory species in the Appendices to the Bonn Convention (Resolution 12.27) (CMS 2017).

Recognition of *Thalassarche cauta* at the species level has been widely supported (e.g. Rheindt & Austin 2005; Chambers et al. 2009; ACAP 2012; Jiménez et al. 2015; Phillips et al. 2016). Few argue against separate species status (Penhallurick & Wink 2004; Penhallurick 2012, Sangster et al. 2015). The *Thalassarche cauta* nomenclature has since been widely adopted (Garnett et al. 2011; ACAP 2012; del Hoyo et al. 2014; BirdLife International 2016; Phillips et al. 2016; CMS 2017; IUCN 2017; *contra* Gill et al. 2010; Sangster et al. 2015; DoEE 2018a, 2018c).

Research is presently underway concerning the Shy Albatross using genome-scale sequencing technologies to sequence regions around 'ultra-conserved elements' of the genome that may potentially provide a time-calibrated molecular phylogeny (Welch 2018, pers comm, 11 June 2018). This research extends the existing genetic analyses for Shy Albatross beyond mitochondrial sequences, and will provide additional information about the genetic distinction between this species and the White-capped Albatross.

Species Information

Description

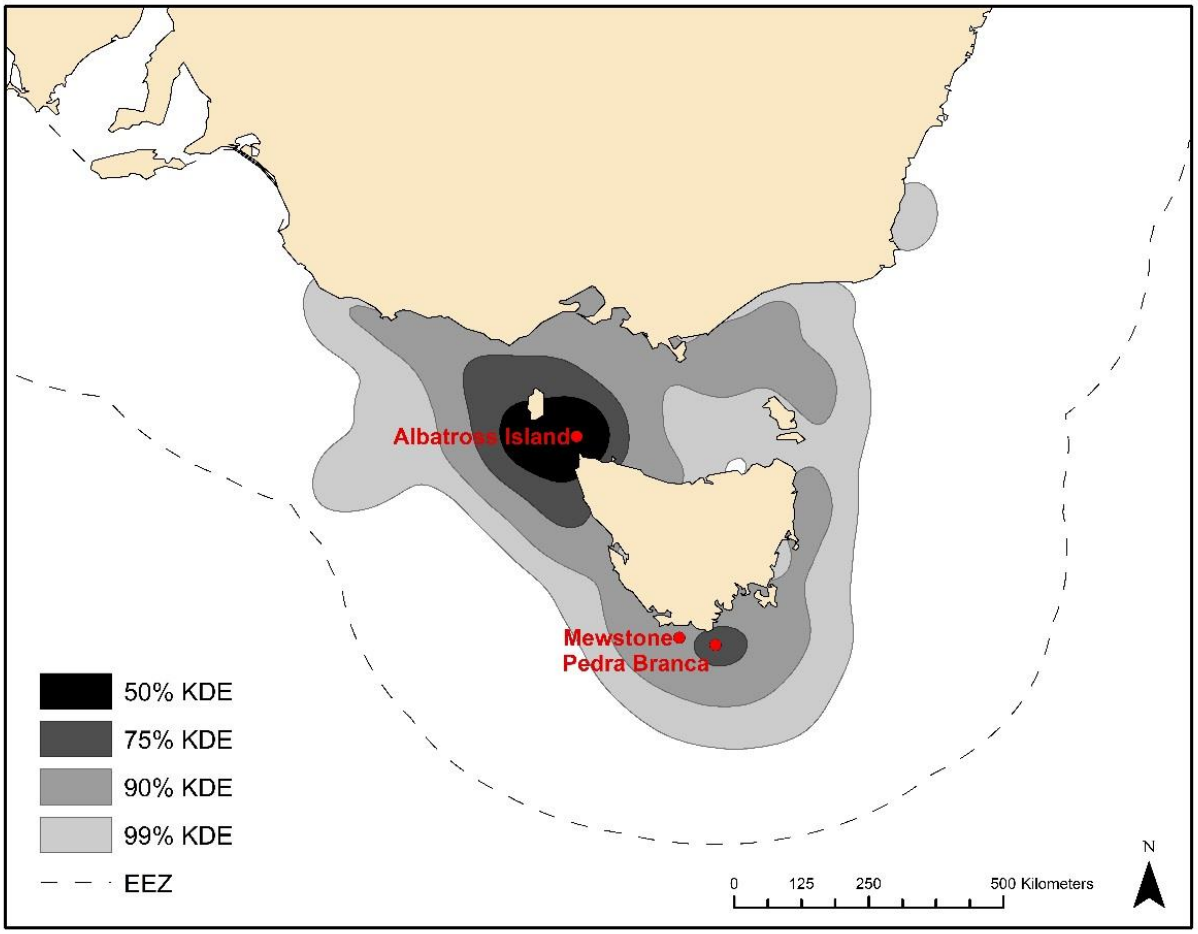
The Shy Albatross is medium-sized black, white and grey albatross (90-100 cm; wingspan 2.1-2.6 m) (Pizzey & Knight 2012). The body is generally white with black upperwings, black margins and a dark tab intruding into the base of the underwing, and grey-black tail (Pizzey & Knight 2012; IUCN 2017). The head has a distinctive white cap and contrasting pale grey face with dark eyebrow. The bill is relatively long and pale grey-yellow with yellow tip, and yellow at the base of the upper mandible (Pizzey & Knight 2012). Immature birds have darker grey wash on head and sides of neck, with a grey bill with darker tip (Ibid).

Distribution

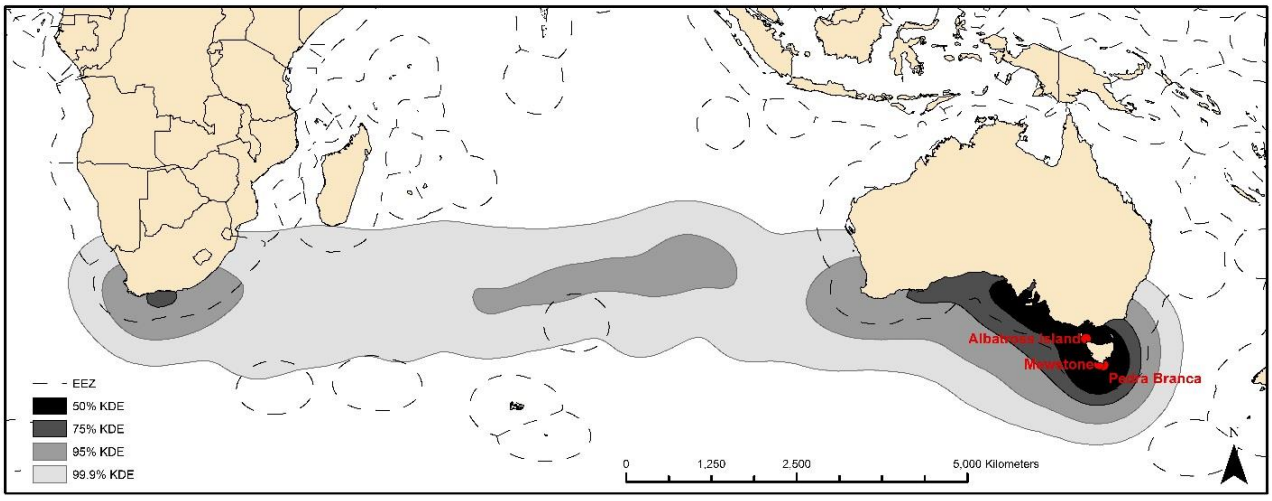
The Shy Albatross is the only albatross species that is endemic to Australia (DSEWPC 2011a). The species has breeding colonies on three small islands off Tasmania: Albatross Island in western Bass Strait (40°22'S, 144°40'E); the Mewstone (43°44'S, 146°22'E) and Pedra Branca (43°52'S, 147°00'E) in southern Tasmanian waters (Figure 1) (Brothers et al. 1997; Alderman et al. 2011). The two southern subpopulations are relatively proximate (50 km) and are separated from Albatross Island by 400 km and 450 km, respectively (Alderman et al. 2011). Direct information sources indicate that adult Shy Albatrosses predominately occur in waters adjacent to Tasmania and southern Australia (Figure 1(a)) (Brothers et al. 1997; Brothers et al. 1998; Hedd et al. 2001; Abbott et al. 2006a; Alderman et al. 2010; Alderman et al. 2011; Mason et al. 2018). Figure 1 provides a kernel density estimation (KDE) derived from satellite-tracking data, based on methods in Mason et al. (2018). These data are skewed by tracking data for birds from Albatross Island in Figure 1(a), which are greater than that from the Mewstone and Pedra that are logistically difficult to visit and less studied. The range of juvenile birds extends across the Indian Ocean to southern Africa and potentially the south-western Atlantic Ocean (Figure 1(b)) (Barton 1979; Abbott et al. 2006a; Alderman et al. 2010; Alderman 2011; ACAP 2012; del Hoyo et al. 2014; Jiménez et al. 2015).

Figure 1: Current distribution of *Thalassarche cauta cauta* (Shy Albatross) based on records between 1993-2016 using kernel density estimation (KDE) and methods in Mason et al. (2018), with exclusive economic zones (EEZs) indicated.

(b) Adult Shy Albatross at-sea distribution.



(b) Juvenile Shy Albatross at-sea distribution.



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 (known-aged individuals live up to 40-45 years), characterised by low natural adult mortality (<0.08% annual adult mortality), slow breeding (annually), long-term pair-bonding, and low fecundity (there is only one egg per breeding attempt) (Alderman et al. 2011). The species is therefore susceptible to additional external mortality events such as fishing bycatch and climate change, and natural stochastic events (Baker et al. 2007; Alderman et al. 2011; Alderman 2012; Thomson et al. 2015).

Shy Albatross are a colonial species that breeds annually (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). Predominately, egg laying occurs 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 about every three days at the nest, with the chicks thereafter provisioned, but left unattended until fledging occurs (Brooke 2004; Hedd & Gales 2005).

Breeding site fidelity is high with immature birds returning to their breeding colony at least three years after fledging, and commencing breeding when at least five to six years old, with an average age for commencing breeding of nine years (Brothers et al. 1998; Alderman et al. 2012; Thomson et al. 2015).

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). The species is recognised as a fishing vessel follower, with fish processing discharges accounting for a significant portion of the species' diet (Brothers et al. 1998; Gales 1988; Marchant & Higgins 1990).

Current understanding of the status of the three Shy Albatross subpopulations varies. Albatross Island is the most accessible site and well-studied. The subpopulation on Albatross Island was significantly reduced by feather and egg collection from possibly 20 000 pairs in the late 1700s to about 300 nests by 1909 (Johnstone et al. 1975). The subpopulation has since increased with the total number of breeding pairs at Albatross Island estimated in 2017-18 at about 5800 ± 700 (Alderman 2018). The Mewstone breeding colony is logistically difficult to access and this limits monitoring of this subpopulation to annual aerial surveys to determine the estimated number of fledging chicks. The subpopulation was estimated in 2017-18 to be in the order of

9900 ± 200 potential breeding pairs (Alderman 2018). The subpopulation at Pedra Branca is also logistically difficult to access, and is monitored by aerial survey, with an estimate in 2017-18 of 120 ± 2 potential breeding pairs at this location (Ibid).

Demographic trends for Shy Albatross are determined using the program TRIM (Trends and Indices for Monitoring data) that provides estimates of the percentage of population size change over time (Pannekoek & Strien 2001; Alderman 2018). Alderman (2018) used 10 and 20 year time-scales for consistency with ACAP assessments (Table 1). Table 1 summarises the current size and status of the three Shy Albatross subpopulations, with the total population currently estimated to comprise ~30,000 mature individuals.

Table 1: Breeding effort of Shy Albatross at Albatross Island, the Mewstone and Pedra Branca, 2017-18 (stable ↔; moderate decline ↓; steep decline ↓↓; moderate increase ↑; steep increase ↑↑).

Breeding pairs	**Albatross Island**	**Mewstone**	**Pedra Branca**
2017-18 estimate*	5800 ± 700	9900 ± 200	120 ± 2
10 year trend**	-0.34 ± 0.15% ↓	↓?	-4.02 ± 0.88% ↓
20 year trend**	+0.75 ± 0.06% ↑	↓?	-4.78 ± 0.1% ↓↓

* ± represents Standard Error; ** ± represents 95 per cent Confidence Interval.

Demographic trends vary across the three Shy Albatross subpopulations. For Albatross Island there has been an overall decline in breeding effort over the past 10 years, with an apparent increase over the past 20 years; for the Mewstone the time series shows an uncertain trend at this stage; and for Pedra Branca the trend is declining over 10 year and 20 year time scales (Table 1) (Alderman 2018).

The number of successfully reared juveniles each year has a strong influence on subsequent chick production. This measure of breeding success has only been studied in detail at Albatross Island (ACAP 2012). Breeding success in 2017-18 was 30.0 per cent (26.7-33.6) which is the second lowest recorded at Albatross Island over the 20 year time-series (mean over this period was 42.5 per cent) (Alderman 2018). Alderman (2018) notes that a spike in breeding effort observed in 2017-18 at Albatross Island was associated with a high proportion of first-time breeders (22 per cent of all known aged breeding birds were breeding for the first time) most likely associated with a pulse of high juvenile survival rates for the 2007-08 and 2008-09 cohorts. Alderman (2018) also notes inter-annual variability in vital rates appears to be increasing over time. Longer time-series are required for the Mewstone subpopulation to provide a robust measure of the population trend than would be required if breeding effort data were available. More importantly for the Mewstone and Pedra Branca subpopulations is that the results of satellite tracking provide additional evidence that juvenile survival at these locations is lower than on Albatross Island (Alderman et al. 2010, 2011).

Threats

There has been considerable directed research into the threats affecting Shy Albatross, whether at sea, on land, or generalised in nature (Table 2).

Table 2: Threats affecting Shy Albatross in approximate order of severity of risk, based on available evidence.

Number	Threat factor	Threat type and status	Evidence base
1.0	Fishing activities		
1.1	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 (Baker et al. 2007; Alderman et al. 2010; Alderman et al. 2011; Phillips et al. 2010). 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 White-capped Albatross (Abbott et al. 2006a; Inoue et al. 2011; AFMA 2018). Thomson et al. (2015) estimated that both trawl and longline each took ~6000 birds over the model period from 1964 to 2010. Robust data on rates of seabird interactions and associated mortality within State-managed commercial and recreational fisheries are unavailable for Shy Albatross. 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 (DoE 2014; AFMA 2018). Interactions with trawl fishing gear may have been reduced significantly with the introduction of bird scaring lines (AFMA 2018; Koopman et al. 2018), however, cryptic mortalities that may account for over 20 per cent of seabird bycatch in trawl fisheries, may still be occurring, but not reported (Parker et al. 2014).

			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). The draft National Plan of Action to reduce incidental catch of seabirds in Australian fisheries (NPOA-seabirds) was released in 2017 (DAWR 2017). The scope of the NPOA-seabirds includes all commercial, recreational and other relevant capture fisheries and actions including understanding the nature and extent of seabird interactions across Australian fisheries jurisdictions.
2.0	Climate change		
2.1	Temperature rise	Potential	Thomson et al. (2015) predict that warmer air temperatures during the breeding season will be linked to declining breeding success on Albatross Island and will continue to become more pronounced under future climate change scenarios. Heatwaves are known to 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 of 11 days (1981-2010 period) to between 16 days (RCP 4.5) and 24 days (RCP 8.5) by the year 2090 (Ibid). Koopman et al. (2018) suggest that reductions in seabird bycatch in southern Australian trawl fisheries from the use of bird scaring devices may offset losses of Shy Albatrosses due to potential future temperature changes (Thomson et al. 2015). A suite of prioritised intervention options have been identified to improve the breeding success of Shy Albatross in a changing climate (Alderman and Hobday 2017). 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 provide better nesting sites. As well, an initial study demonstrated that the spraying of chicks with permethrin was effective in substantially reducing pox prevalence (see below) (Ibid).
2.2	Rainfall	Potential	Thomson et al. (2015) predict that possibly wetter conditions (heavier rainfall events) during the breeding season will be linked to declining breeding success on Albatross Island and will continue to become more pronounced under future climate change scenarios.

2.3	Sea surface temperature	Potential	Projections suggest increased sea surface temperatures in the waters adjacent to the Albatross Island breeding colony (Thomson et al. 2015). Warmer waters are linked to declining ocean productivity by reducing mixing of nutrient-rich waters to the surface, although upwelling activity in the nearby Bonney Coast may increase and offset wider declines in productivity, and, overall, this is expected to lead to further declines in foraging success for this species, and reduced breeding success (Ibid).
2.4	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. There may be more frequent damage to nesting habitat; recognising that nests are located on the sheltered side of the island.
3.0	Disease		
3.1	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). Alderman & Hobday (2017) reported the preliminary results from spraying chicks at Albatross Island against ectoparasites with Avian Insect Liquidator (Piperonyl, Butoxide, Permethrin and Methoprene). Over 100 chicks were treated at two sites with chick survival rates improving after spraying. Investigations are underway to identify modes of disease transmission, factors influencing inter-annual variability of outbreaks, (Alderman 2018).
4.0	Interspecies competition		
4.1	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). This interaction is thought to be the primary cause of the observed decline in the number of chicks produced each year at Pedra Branca (Alderman et al. 2011).

			Cameras have been placed on Pedra Branca to monitor interactions between the two species (Alderman 2018). Australasian Gannets were observed to be destroying Shy Albatross nests by stealing nesting material. Non-invasive methods, such as installing artificial nests, are being investigated.
5.0	Marine pollution		
5.1	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 plastic ingestion, and associated physical and chemical impacts, to affect Shy Albatross chicks in the future (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 2018d). The annual monitoring of the Shy Albatross subpopulation at Albatross Island includes monitoring of marine debris egestion and entanglement (DSEWPC 2011b; Alderman 2018). The TAP-marine debris outlines a range of actions designed to prevent, remove and manage marine debris including marine plastics that enter the marine environment (DoEE 2018d).
6.0	Human disturbance		
6.1	Human disturbance	Known past	Public access to Shy Albatross breeding colonies was previously unregulated. The public no longer has a general right of access to the breeding colonies (*National Parks and Reserves Management Act 2002* (Tas) s 37; *National Parks and Reserved Land Regulations 2009* (Tas) regs 17(1)(c), 28). Entry requires authorisation by the Tasmanian Parks and Wildlife Service, and may be subject to conditions.
6.0	Harvest from the wild		
6.1	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) s 51, EPBC Act part 13).

Assessment of available information 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:

Assessment is made here against **A4ae** using evidence of a projected population decline in Shy Albatross numbers at the Albatross Island subpopulation and an inferred decline of Shy Albatross numbers for the subpopulations at the Mewstone and Pedra Branca; and evidence of the effects of pathogens affecting the Albatross Island subpopulation.

Shy Albatross are a long-lived species (known-aged individuals live up to 40-45 years), characterised by low natural adult mortality (<0.08% annual adult mortality) and low fecundity of one egg per breeding attempt (Baker et al. 2007; Alderman et al. 2011; Alderman 2012; Thomson et al. 2015). The total population in 2017-18 is estimated to comprise about 30 000 mature individuals (Alderman 2018).

The trends in survey data calculated for the most recent 10 year and 20 year periods, using the program TRIM (Pannekoek et al. 2001; Alderman 2018), do not provide information relevant to the time-scale under this criterion of 66 years (population reduction over three generations) (IUCN 2018).

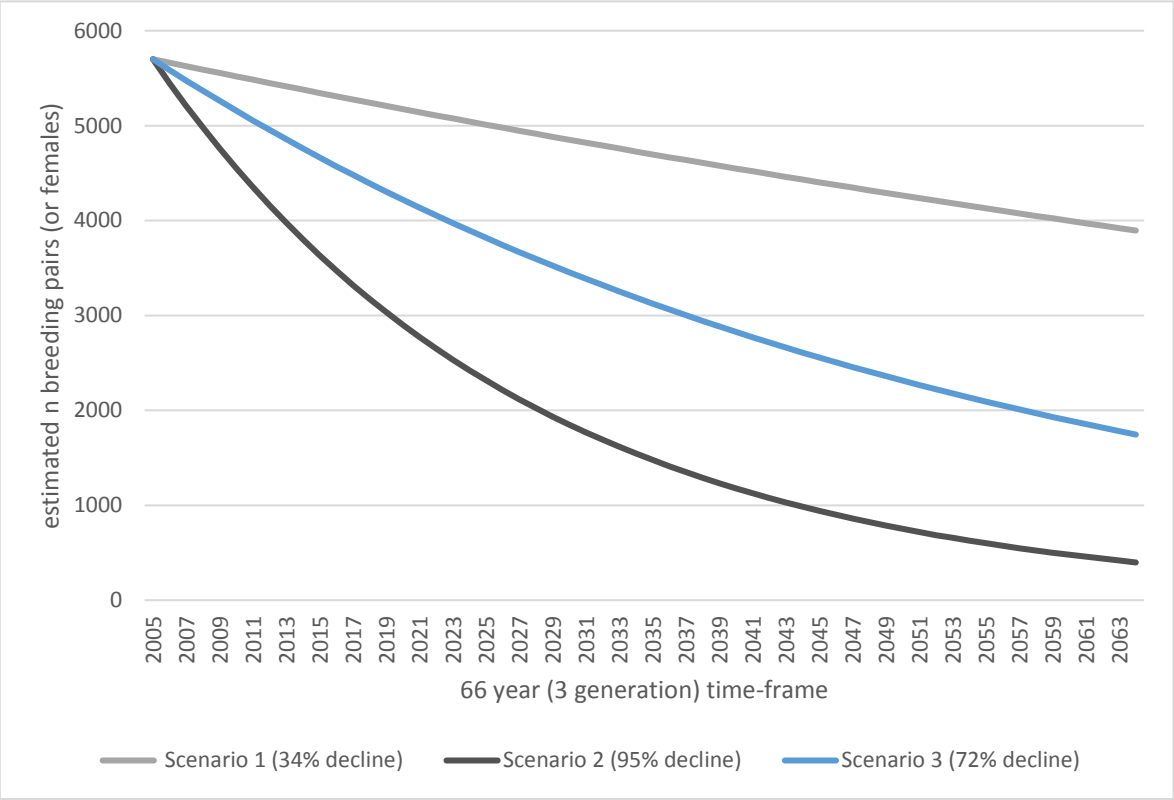
Climate change is predicted to negatively influence Shy Albatross subpopulation trends at Albatross Island (Thomson et al. 2015). The subpopulation at Albatross Island represents approximately 35 per cent of the global breeding population, and is the site of a long-term monitoring program that provides comprehensive data on population trends, and demographic and breeding parameters. 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. Using rain and temperature forecasts under climate scenarios A2 (high emissions) and B1 (low emissions), this subpopulation is predicted to decline, in the worst case scenario, to as little as 1865 breeding pairs by 2100; a population reduction of 67 per cent over 85 years. Comparable climate change effects (increased rainfall and temperature forecasts) are inferred for the Mewstone subpopulation (about 65 per cent of the global breeding population) and Pedra Branca subpopulation (less than one per cent of the global breeding population) based on predicted climate change impacts for Hobart (White et al. 2010), which is at a similar latitude (42°53'S) to the Mewstone (43°22'S) and Pedra Branca (43°52'S).

The predictions of Thomson et al. (2015) extend beyond the time-scale for three generations (66 years) and the predicted decline in the Albatross Island subpopulation over the time-scale of 66 years might not meet the threshold of greater than 50 per cent reduction. The key result from this integrated model is the quantification of a mechanism (i.e. breeding success) through which climate change will negatively influence Shy Albatross subpopulation trends in the future with temperature and rainfall conditions expected to continue to worsen under future climate scenarios. This relationship is regardless of fisheries effects, although a reduction in bycatch will have a positive effect. For example, since the modelling was undertaken, the work of Koopman et al. (2018) suggest that with the uptake of bird scaring devices in the southern Australian trawl fisheries "it is likely the fishery has reduced bycatch beyond the 50% (from 2010 levels) needed to offset losses due to potential future temperature changes."

The projected declines due to climate change are likely to be underestimates. The research conducted by Thomson et al. (2015) considers only one mechanism (breeding success). There are cumulative effects of climate upon Shy Albatross populations' breeding behaviour and foraging ecology. Understanding the relationships between climate variables and adult survival, breeding frequency, and juvenile survival will be needed to understand fully the effects of a changing climate on Shy Albatross and similar species, as well as 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 2018).

A population model for Shy Albatross on Albatross Island has been developed by the Department of Primary Industries, Parks, Water and Environment to better understand the demographic consequences of values and trends to key demographic parameters (Alderman et al. 2011; Thompson et al. 2015; Alderman 2018, pers comm, 29 November 2018). The population model predicts changes in the subpopulation from 2005 to 2064; the next three generations (66 years). The model includes scenarios based on: (i) mean parameter values over a 20-year period (upper limit), (ii) conservative parameter estimates (middle line), and (iii) mean parameter values over a 10-year period (lower limit) (Figure 2). The number of breeding pairs is predicted to decline over the next three generations from 5700: (i) to 3700 pairs (34 per cent), (ii) to 1600 pairs (72 per cent), and (iii) to 300 pairs (95 per cent), respectively under each scenario (Alderman 2018, pers comm, 29 November 2018).

Figure 2: Population growth model developed from a life-table of observed data from Albatross Island calculating the net reproductive rate R_0 to be ~0.55 (declining <1 stable = 1, increasing >1). Grey lines indicate upper and lower estimates of observed breeding pairs, blue line is the modelled population.



Based on 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). This gives rise to the inference that in the best case scenario, the Mewstone subpopulation's status and trends are equivalent to those at Albatross Island, but are more likely to be worse. The Pedra Branca subpopulation (less than one per cent of the global breeding population) is too small for valid inferences to be made about future population trends.

Available data suggest that pathogens do not cause severe reductions in the Albatross Island subpopulation over a three generation time-frame. Shy Albatross breeding at Albatross Island are affected the tick-borne 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 markedly from year to year, but may result in a dramatic reduction in breeding success and consequently chick production in individual years (MacDonald & Green 1963; Wang et al. 2014; Alderman 2018). Disease links with climate change are likely (Thomson et al. 2015). There is however, no evidence that the disease outbreaks would likely result in a severe reduction in the Albatross Island subpopulation, and there is no evidence of the pathogen adversely affecting the other Shy Albatross subpopulations, the Mewstone and Pedra Branca, at this time, but the risk of spread of this avian pox virus should not be discounted.

The data presented above appear to demonstrate that the species is **eligible for listing as Vulnerable A4ae** under this criterion, but not eligible for listing as Endangered A4ae. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

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 indicating distribution is precarious for survival:			
(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:

Assessment is made here against **B2ab(v)** using evidence of predicted declines in Shy Albatross numbers affecting the Albatross Island, Mewstone and Pedra Branca subpopulations.

The extent of occurrence (EEO) for Shy Albatross is estimated at 2.78 million km^2, which is not limited (Figure 1) (Garnett et al. 2011).

The area of occupancy (AOO) 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 (3) 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 (3) is restricted (Garnett et al. 2011; DoEE 2018c). The islands on which Shy Albatross breed are listed as critical habitat under the EPBC Act (DoEE 2018b). These islands comprise: Albatross Island (about 33 ha), the Mewstone (about 13 ha) and Pedra Branca (about 2.5 ha), a total of less than 0.5 km^2 (Garnett et al. 2011; DoEE 2018b).

Population declines are predicted and inferred for the Shy Albatross subpopulations. Thomson et al. (2015) predict a decline in the Albatross Island subpopulation under climate change scenarios due to changing rain and temperature forecasts. The Department of Primary Industries, Parks, Water and Environment predicts a decline in the Albatross Island subpopulation (see Criterion 1) (Alderman 2018, pers comm, 29 November 2018). Comparable climate change effects are inferred to result in a decline in the Mewstone subpopulation (see Criterion 1). There is a predicted decline in the Pedra Branca subpopulation that is linked to interspecies competition (Alderman et al. 2011, 2018; ACAP 2012).

The data presented above appear to demonstrate that the species is **eligible for listing as Endangered B2ab(v)** under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. The conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

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:

The number of mature individuals is estimated to be ~30 000 (see Criterion 1), which is not limited (Alderman 2018).

The data presented above appear to demonstrate that the species is not eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

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:

The number of mature individuals is estimated to be ~30 000 (see Criterion 1), which is not low (Alderman 2018).

The data presented above appear to demonstrate that the species is not eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

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:

No population viability analysis has been undertaken (Garnett et al. 2011).

The data presented above appear to demonstrate that there are insufficient data to demonstrate if the species is eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

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.

Conservation Actions

Recovery Plan

Shy Albatross are subject to an existing recovery plan: 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.

Primary Conservation Actions

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
    - 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]
    - 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]
    - 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]
    - 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]
    - 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
    - Determine baseline presence of disease on breeding islands and implement stringent quarantine measures where appropriate. [B.7.1]
    - 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]
- 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 assessed for presence of feral species: Tasmanian islands to be of highest priority. [B.4.3]

- Loss of/competition for nesting habitat
    - Monitor 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]

Stakeholder engagement

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

- Educating fishers and promoting public awareness of the threats to albatrosses and giant petrels
    - Design and implement education strategies for fisheries with significant risk of albatross and giant petrel interactions. [D.12.1]
    - 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
    - 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 an petrels in international conservation and fishing forums
    - 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]
    - 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]
    - 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
    - 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 with respect to: gaps and limitations in sample size, overlap with fisheries and consequent risk, and population trend. 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, 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 (2003b) Phylogeography of shy and white-capped albatrosses inferred from mitochondrial DNA sequences: implications for population history and taxonomy. *Molecular Ecology* 12, 2747-2758.

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.

Abbott CL, Double MC, Trueman JWH, Robinson A & Cockburn A (2005) An unusual source of apparent mitochondrial heteroplasmy: duplicate mitochondrial control regions in *Thalassarche* albatrosses. *Molecular Ecology* 14, 3603-3613.

ACAP (Agreement on the Conservation of Albatrosses and Petrels) (2006) Report of the Second Session of the Meeting of the Parties. 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 1 October 2018. Available at: http://www.acap.aq/en/acap-species/299-shy-albatross/file

AFMA (Australian Fisheries Management Authority) (2018) Protected species interaction reports. Viewed 1 October 2018. Available 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 (2016) *Thalassarche cauta*. The IUCN Red List of Threatened Species 2016. Viewed 1 October 2018. Available on the Internet: http://www.iucnredlist.org/details/full/22729604/0

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

Brothers N (1991) Albatross mortality and associated bait loss in the Japanese longline fishery in the Southern Ocean. *Biological Conservation* 55, 255-268.

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 GK, Moeke C, Steel R & Truseman JWH (2009) Phylogenetic analysis of the 24 named albatross taxa based on full mitochondrial cytochrome *b* DNA sequences. *Notomis* 56, 82-94.

CMS (Convention on the Conservation of Migratory Species of Wild Fauna) (2017) Taxonomy and nomenclature. UNEP/CMS/Resolution 12.27. Manila. Available on the Internet at: https://www.cms.int/en/document/taxonomy-and-nomenclature-0

DAWR (Department of Agriculture and Water Resources) (2017) National Plan of Action to reduce incidental catch of seabirds in Australian fisheries. Viewed 1 October 2018. Available at: http://www.agriculture.gov.au/SiteCollectionDocuments/fisheries/environment/bycatch/consultation-draft-npoa-seabirds.pdf

del Hoyo J, Collar NJ, Christie DA, Elliott A & Fishpool LDC (2014) *HBW and BirdLife International Illustrated Checklist of the Birds of the World. Volume 1: Non-passerines*. Lynx Edicions BirdLife International. Barcelona, Spain and Cambridge, UK.

DoE (Department of the Environment) (2014) Threat Abatement Plan for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations. Department of the Environment, Canberra. Available at: http://www.environment.gov.au/approved-taps.

DoEE (Department of the Environment and Energy) (2018a) EPBC Act list of threatened fauna. Viewed 1 October 2018. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=fauna

DoEE (2018b) Listed critical habitat in Species Profile and Threats Database, Department of the Environment and Energy, Canberra. Viewed 1 October 2018. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcriticalhabitat.pl?id=4

DoEE (2018c) *Thalassarche cauta cauta* in Species Profile and Threats Database, Department of the Environment and Energy, Canberra. Viewed 1 October 2018. Available at: http://www.environment.gov.au/sprat

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

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

Double MC, Gales R, Reid T, Brothers N & Abbott CL (2003) Morphometric comparison of Australian shy and New Zealand white-capped albatrosses. *Emu* 103, 287-294.

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.

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.

Gill BJ, Bell BD, Chambers GK, Medway DG, Palma RL, Scofield RP, Tennyson AJD & Worthy TH (2010) *Checklist of the birds of New Zealand, Norfolk and Macquarie Islands, and the Ross Dependency, Antarctica.* 4th edition. Te Papa Press and Ornithological Society of New Zealand. Wellington. Available online at: http://nzbirdsonline.org.nz/sites/all/files/checklist/Checklist-of-Birds.pdf.

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

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.

Helbig AJ, Knox AK, Parkin DT, Sangster G & Collinson M (2002) Guidelines for assigning species rank. *Ibis* 144, 518-525.

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 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) (2018) The IUCN Red List of Threatened Species, Version 2018-1. Viewed 1 October 2018. Available 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.

Kostoglou P (1996) *Sealing in Tasmania: Historical Research Project*. Tasmanian Parks and Wildlife Service. Hobart.

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.

Mason C, Alderman R, McGowan J, Possingham HP, Hobday AJ, Summer M & Shaw J (2018) Telemetry reveals existing marine protected areas are worse than random for protecting the foraging habitat of threatened shy albatross (*Thalassarche cauta*). *Diversity and Distributions*, 31 August 2018. Viewed 1 October 2018. Available at: https://doi.org/10.1111/ddi.12830.

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.

Nunn GB, Cooper J, Jouventin P, Robertson CJR & Robertson GG (1996) Evolutionary relationships among extant albatrosses (Procellariiformes: Diomedeidae) established from complete cytochrome-*b* gene sequences. *Auk* 113, 784-801.

Onley D & Scofield P (2007) *Albatrosses, petrels and shearwaters of the world*. Christopher Helm. London.

Pannekoek J & Van Strien A (2001) *TRIM 3 Manual. (Trends and Indices for Monitoring Data)* Research paper No. 0102. Statistics. Voorburg, Netherlands.

Penhallurick J & Wink M (2004) Analysis of the taxonomy and nomenclature of the Procellariiformes based on complete nucleotide sequences of the mitochondrial cytochrome b gene. *Emu* 104, 125-147.

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.

Phillips K, Giannini F, Lawrence E & Bensley N (2010) *Cumulative assessment of the catch of non-target species in Commonwealth fisheries: a scoping study*. Bureau of Rural Sciences. Canberra.

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

Plomley NJB (1966) *Friendly mission–The Tasmanian journals and papers of George Augustus Robinson: 1829-1834*. Tasmanian Historical Research Association. Hobart.

Rheindt FE & Austin JJ (2005) Major analytical and conceptual shortcomings in a recent taxonomic revision of the Procellariiformes — a reply to Penhallurick and Wink (2004). *Emu* 105, 181-186.

Robertson CJR & Nunn GB (1998) Towards a new taxonomy for albatrosses, in G Robertson & RP Gales (eds), *Albatross biology and conservation*. Beatty & Sons. Chipping Norton, New South Wales. pp. 13-19.

Sangster G, Collinson JM, Crochet P-A, Kirwan GM, Knox AG, Parkin DT & Votier SC (2015) Taxonomic recommendations for Western Palaearctic birds: 10th report. *Ibis* 157, 193-200.

Tickell WLN (2000) *Albatrosses*. Pica Press, Robertsbridge, UK.

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. 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: 1 October 2018. 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.

Convention on the Conservation of Migratory Species of Wild Animals, done 23 June 1979, 1651 UNTS 333 (entered into force 1 November 1983). Viewed: 1 October 2018. Available at: https://treaties.un.org/.

Environment Protection and Biodiversity Conservation Act 1999 (Cwth) Viewed: 1 October 2018. Available at: http://comlaw.gov.au/.

National Parks and Reserves Management Act 2002 (Tas). Viewed 1 October 2018. Available at: https://www.legislation.tas.gov.au/.

National Parks and Reserved Land Regulations 2009 (Tas). Viewed 1 October 2018. Available at: https://www.legislation.tas.gov.au/.

Privacy Act 1988 (Cwth) Viewed 1 October 2018. Available at: http://comlaw.gov.au/.

Threatened Species Protection Act 1995 (Tas) Viewed 1 October 2018. Available at: https://www.legislation.tas.gov.au/.

Wheeler A (2015) Personal communication by email, 22 September 2015, Taxonomic Adviser,

Welch A (2018) Personal communication by email, 11 June 2018, Department of Biosciences, Durham University, United Kingdom.

Collective list of questions for *Thalassarche cauta cauta* (Shy Albatross) – your views

PART 1 INFORMATION TO ASSIST LISTING ASSESSMENT

General

1. Can you provide additional data or information relevant to this assessment?

Biological information

2. Can you provide any additional information or alternative estimates for the Shy Albatross's longevity (40-45 years), age-at-maturity (nine years) or generation length with supporting references?

3. Given that the species appears to be declining, can you provide any additional information regarding its requirements for recruitment?

Population size

4. Are you aware of any additional population assessments for this species, or albatross species in general, for Australia? Please provide reference to any supporting information?

Evidence of total population size change

5. Are you able to provide an estimate of decline in the total population size over the last three generations or prediction of decline for the next three generations (66 years)? Please provide justification for your response.

   If, because of uncertainty, you are unable to provide a single number, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of possible species numbers, and also choose the level of confidence you have in this estimate.

   Decline estimated to be in the range of:

   ☐ 1–30% ☐31–50% ☐51–80% ☐81–100% ☐90–100%

   Level of your confidence in this estimated decline:

   ☐ 0–30% - low level of certainty/ a bit of a guess/ not much information to go on

   ☐ 31–50% - more than a guess, some level of supporting evidence

   ☐ 51–95% - reasonably certain, suggests this range of decline

   ☐ 95–100% - high level of certainty, information indicates a decline within this range

   ☐ 99–100% - very high level of certainty, data are accurate within this range

6. Please provide (if known) any additional evidence which shows the population is stable, increasing or declining.

Current distribution/range/extent of occurrence, area of occupancy

7. Has the survey effort for the species been adequate to determine its national distribution? If not, please provide justification for your response.

8. Is the distribution described in the assessment accurate? If not, please provide justification for your response and provide alternate information.

9. The species appears to be **eligible for listing as Endangered B2(a)(b)(v)** under Criterion 2. Does the information provided in the advice accurately estimate the area of occupancy (see under Criterion 2 (Page 16)) of the species in Australia? If not, are you able to suggest an alternative method to best capture that information and are you able provide justification for your response?

   If, because of uncertainty, you are unable to provide an estimate of area of occupancy, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of ranges of area of occupancy, and also choose the level of confidence you have in this estimated range.

   Current area of occupancy is estimated to be in the range of:

   ☐ <10 km^2 ☐ 10 – <500 km^2 ☐ 500 – <2000 km^2 ☐ ≥2000 km^2

   Level of your confidence in this estimated extent of occurrence:

   ☐ 0–30% - low level of certainty/ a bit of a guess/ not much data to go on

   ☐ 31–50% - more than a guess, some level of supporting evidence

   ☐ 51–95% - reasonably certain, data suggests this range of decline

   ☐ 95–100% - high level of certainty, data indicates a decline within this range

   ☐ 99–100% - very high level of certainty, data is accurate within this range

10. Do you agree with the estimates of the current extent of occurrence in the advice (see under Criterion 2 (Page 16))? If not, can you provide an alternative estimate with supporting information?

    If, because of uncertainty, you are unable to provide an estimate of extent of occurrence, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of ranges of extent of occurrence, and also choose the level of confidence you have in this estimated range.

PART 2 INFORMATION ON THREATS AND NECESSARY CONSERVATION ACTIONS

Threats

11. Do you agree that the potential threats listed below are correct and that their effects on the species have been significant? Are you able to provide any documentation or evidence that these may actually be known threats for the species?

    a. fishing activities

    b. climate change

    c. disease

    d. interspecies competition

    e. marine pollution

    f. human disturbance

    g. harvest from the wild

12. Do you consider that all major threats have been identified and described adequately?

13. Can you provide additional or alternative information on threats, past, current or potential that may adversely affect this species at any stage of its life cycle, with supporting references? For example, are you aware of any proposals or plans to change the management of fisheries within the known range of Shy Albatross that would further affect the species' distribution and abundance?

14. To what degree are the identified threats likely to impact on the species in the future?

Management

15. Can you recommend any additional or alternative specific threat abatement or conservation actions that would aid the protection and recovery of the species?

16. Would you recommend translocation (outside of the species' historic range) as a viable option as a conservation action for this species/subspecies?