

# THREATENED SPECIES SCIENTIFIC COMMITTEE

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

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The Minister approved this Conservation Advice and retained this species in the Vulnerable category, effective from 07/12/2016

## Conservation Advice

### *Mirounga leonina*

southern elephant seal

#### **Taxonomy**

Conventionally accepted as *Mirounga leonina* (Linnaeus 1758). No subspecies are recognised (Committee on Taxonomy 2015).

#### **Summary of assessment**

##### **Conservation status**

*Mirounga leonina* is assessed as Vulnerable as there are insufficient data to remove it from the list referred to in section 178 of the EPBC Act.

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

##### **Reason for conservation assessment by the Threatened Species Scientific Committee**

*Mirounga leonina* was listed as Vulnerable under the predecessor to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the *Endangered Species Protection Act 1992* and transferred to the EPBC Act in July 2000.

This advice follows assessment of new information in *The Action Plan for Australian Mammals 2012* (MAP) (Woinarski et al., 2014) provided to the Committee to change the listing status of *Mirounga leonina*. The MAP considered that the species' status was Near Threatened and should be removed from the list referred to in section 178 of the EPBC Act.

##### **Public consultation**

Notice of the proposed amendment and a consultation document was made available for public comment for 32 business days between 4 May and 17 June 2016. Any comments received that were relevant to the survival of the species were considered by the Committee as part of the assessment process.

#### **Species information**

##### **Description**

The southern elephant seal is the largest pinniped species and exhibits the most extreme sexual dimorphism of any mammal with males weighing up to 3800 kg and up to 9 times more than females (Hindell & Perrin 2009). The male southern elephant seal reaches over 4 m from head to tail, although size can vary somewhat between localities (Hindell 2008). Adult males often have intensive scarring on the neck and carry a prominent erectile proboscis, or trunk, which gives the species its common name and adds resonance to the male's vocal challenges to other adult males. Females are much smaller (200-260 cm and 250-800 kg) and lack the intensive scarring and prominent proboscis of adult males. Females and young males have a robust body, large eyes and bulbous nostrils (Menkhorst & Knight 2001).

On land both sexes are brown above, slightly paler below, and in water they appear uniformly dark grey. Pups are black. Females and young males can be distinguished from other true seals in the region, as other species are paler or have spots or streaks which southern elephant seals lack (DEH 2004a). Like other members of the 'true' seals (family Phocidae), the southern elephant seals are unable to 'walk' using their fore flippers, they move on their belly in a lunging, caterpillar-like motion (DEH 2004a).

## **Distribution**

Globally, the southern elephant seal has a nearly circumpolar Southern Hemisphere distribution with most breeding colonies and haul-out areas occurring on subantarctic islands north of the seasonal pack ice zone. Their range extends throughout most of the Southern Ocean down to high latitude sites on the Antarctic continent (Ling & Bryden 1992). The International Union for Conservation of Nature (IUCN) notes that the estimated global population of the species was 650 000 in the mid 1990s and currently classifies the species as Least Concern (Hofmeyr 2015). The IUCN identifies four distinct populations of southern elephant seals: at or close to Argentina; in the Atlantic sector; in the Indian sector (includes Heard Island) and in the Pacific sector (Macquarie Island is the only substantial population) (Hofmeyr 2015).

In the Australian jurisdiction, the species breeds and hauls-out mainly on Macquarie Island approximately 1500 km south-southeast of Australia, and Heard Island approximately 4000 km southwest of Australia (Shaughnessy 1999; Hindell 2008). Historically, large colonies of southern elephant seals occurred on islands in the western Bass Strait before these were extirpated by European sealers in the early 1800s (Ling & Bryden 1992; Ling 1999; Shaughnessy 1999) and subfossils have been found from the northwest coast of Tasmania (Bryden et al., 1999).

The two Australian populations are effectively demographically independent (McMahon pers. comm., 2016). The distance between Heard Island and Macquarie Island is approximately 5300km. Tagging and branding studies show interchange of southern elephant seal populations between Heard Island and the population at Kerguelen Island (approximately 450 km northwest) (Ling & Bryden 1992; Shaughnessy 1999). Tagging studies at Macquarie Island, show very limited mixing with the Indian Ocean sector though small numbers of animals have been recorded migrating to and from the New Zealand subantarctic islands (considered as part of the Pacific sector), especially Campbell Island, approximately 700km east north east of Macquarie Island (van den Hoff 2001). The two most recent studies of southern elephant seals across their circumpolar distribution have confirmed genetic and population trend linkages between Heard Island and Kerguelen Island and a marked differentiation between Heard/Kerguelen Islands and the Macquarie Island population (Corrigan et al., 2016; Hindell et al., 2016).

Some individuals have been recorded in coastal habitats from Tasmania and southern Australia with mainland records extending from New South Wales near Sydney, to Victoria, South Australia and Western Australia (Mawson & Coughran 1999; Shaughnessy 1999; Hindell 2008; Shaughnessy et al., 2012). Occasional pupping is seen on Maatsuyker Island (southern Tasmania) (Shaughnessy 1999) where there are semi-regular surveys conducted and the last count in 2015 recorded 12 mostly sub-adult males (Alderman pers. comm., 2016). Some individuals from Macquarie Island move north to southern Australia (Hindell 2008) or migrate south to the Antarctic coast (Hindell 1991). Adult seals (mostly males) are found near Davis and Casey Stations in Antarctica (Hindell et al., 1991; Ling & Bryden 1992; Shaughnessy 1999) and although limited pupping occurs in Antarctica (Hindell & Perrin 2009), no new colonies have emerged (van den Hoff pers. comm., 2016).

## **Cultural significance**

Though the origin of the genus name appears to be well recognised as deriving from the aboriginal word 'miouroung', there is no further differentiation as to the particular Indigenous group that used this name for the species. However, given the past distribution of the species in western Bass Strait and northern Tasmania and the presence of fossilised remains in middens

of the region, there is a high likelihood that this is the area where 'miouroung' was first used (for example see LeBoeuf & Laws 1994).

### **Relevant biology/ecology**

Southern elephant seals spend most of their lives at sea and prefer to haul-out on gently sloping sandy and cobblestone beaches but will also use sea ice, snow and rocky terraces, and rest in vegetated habitats and mud wallows above beaches (Ling & Bryden 1992; Shaughnessy 1999; Jefferson et al., 2008). Animals appear to be largely solitary at sea and can disperse some thousands of kilometres away from breeding colony sites during their pelagic phase with strong preferences evident for individual foraging regions (Hindell & McMahon 2000; Bradshaw et al., 2002, 2004; Hindell et al., 2003).

Elephant seals exhibit a polygynous mating system with large males establishing dominance hierarchies on breeding beaches and defending their territory where they monopolise mating with up to 100-300 or more females in harems during the two month breeding period (Ling & Bryden 1992; van den Hoff et al., 2007; Hindell & Perrin 2009). Southern elephant seals have an annual breeding, moulting and foraging cycle, with adults coming ashore to reproduce from August to October and pregnant females arriving at their natal breeding sites from September to October to give birth, mate and then rapidly wean their pups approximately 23-25 days after birth (Ling & Bryden 1992; Hindell 2008; Hindell & Perrin 2009). They return to sea for approximately 10-14 weeks then haul-out during summer to moult, with few southern elephant seals, mostly juveniles, onshore during winter (Shaughnessy 1999; Field et al., 2005).

After the brief breeding and subsequent moulting season, southern elephant seals return to sea for many months and migrate to distant foraging grounds where they feed intensively to increase blubber reserves used during migration back to natal breeding colonies where they fast (Hindell & Perrin 2009). They are major upper trophic level predators of the Southern Ocean with key foraging areas including cold Antarctic waters, frontal zones with increased productivity and water masses between the northern edge of the pack ice zone up to subantarctic waters north to 50°S (Hindell et al., 1991, 2003; Bradshaw et al., 2004). Females forage in deep open ocean habitats, while adult males travel to higher latitude feeding areas in the Southern Ocean including the Antarctic continental shelf where they appear to target more benthic prey, while juvenile males may remain in the pack ice (Hindell et al., 1991; Field et al., 2007; Hindell & Perrin 2009). Older southern elephant seals tend to make fewer trips but travel further from their natal colonies (Field et al., 2005). Southern elephant seals feed mainly on deep-water squid and to varying extents on myctophid and other fish, with some records of *Euphausia* spp. krill in stomach contents; differences in diet are evident between sexes and age groups indicating some degree of resource partitioning (Slip 1995; van den Hoff et al., 2002; Newland et al., 2009, 2011). Southern elephant seals are extraordinary divers, remaining submerged for up to 90 percent of their time at sea and often reaching depths of 600 m or greater during dives lasting 20-35 minutes (Hindell 2008). Dive records include dive depths of over 2000 m, and dive lengths up to two hours (see for example Hindell et al., 1992; McIntyre et al., 2010).

Female southern elephant seals are sexually mature at 3-6 years and males are sexually mature at 4-6 years but few males breed successfully until at least 10 years of age and do not usually control a harem until they are approximately 12-14 years of age (Jones 1981; Ling & Bryden 1992; McMahon et al., 2003; Hindell 2008). Pupping interval is one year (Shaughnessy 1999) with females typically giving birth to a single pup with rare twin births (McMahon & Hindell 2003). Maximum longevity is 20-23 years for females and 20-25 for males (Jones 1981; Hindell 2008).

Surveys of the southern elephant seal population are regularly undertaken on Macquarie Island, with a subset of breeding sites surveyed annually and the whole island surveyed every five years when possible (van den Hoff et al., 2014). The most recent island census was undertaken in October 2014 when an estimated 15,265 breeding females were counted (providing a total population estimate of 48,000 individuals) (van den Hoff pers. comm., 2016). The 2014 total is smaller than the estimated 64,180 individuals for 2004 (van den Hoff et al., 2007). This corresponds with the premise that the number of southern elephant seals at Macquarie Island

continues to decrease (van den Hoff et al., 2014) albeit at a rate slower than previously detected (Hindell & Burton 1987). Indeed, Hindell et al. (2016) noted that the Macquarie Island population “stands out as anomalous compared to all of the others, as it continues to decrease”. The exact causes of this continued decline remain uncertain, however, they are more likely related to changes in food supply mediated by climate and oceanic variability (de Little et al., 2007; van den Hoff et al., 2007, 2014) than direct anthropogenic impacts (Burton & van den Hoff 2002; McMahan et al., 2005a).

Southern elephant seal numbers on Heard Island suffered a sharp (50 percent) decline from the 1950s to the 1990s as did other population areas in the Indian Ocean (Burton 1986; McMahan et al., 2005a). The Kerguelen Islands are regularly surveyed and the colonies there appear to have stabilised or be increasing slightly. The IUCN considered that the Indian Ocean sector had recorded either increasing numbers or had ceased decreasing (Hofmeyr 2015). Observations by Slip & Burton (1999) have suggested a stabilisation of the Heard Island subpopulation between 1985 and 1992 however no further ground surveys have been undertaken. Slip & Burton’s estimated count for total breeding females in the 1992/93 summer was 17-18,000.

Experts consider that in the absence of Heard Island survey data, the Kerguelen Island population, with more regular surveys and confirmed interchanges with Heard Island seals, can be considered as a proxy for the Heard Island population (McMahan pers. comm., 2016). For this reason, the population trend at Heard Island is considered stable or likely to be increasing.

### Threats

Threats to the southern elephant seal are outlined in the table below (modified from Woinarski et al., 2014 and DotE 2016).

Threat factor	Consequence rating	Extent over which threat may operate	Evidence base
Climate and oceanographic variability and change	Moderate to severe	Large	Altered climate and oceanographic conditions and El Niño events in the Southern ocean have been correlated with changes in foraging success, pup production and survival, and changes in population dynamics for southern elephant seals in the Australian region and elsewhere (e.g. McMahan & Burton 2005; de Little et al., 2007; McMahan et al., 2008)
Fisheries catch, entanglement and bycatch	Minor	Moderate	There are some records of direct interactions between southern elephant seals and fisheries in the Australian region. A few southern elephant seals have died in aquaculture nets, trawl nets and longline gear (including at least 18 deaths since 2004, van den Hoff pers. comm., 2016) (Burton & van den Hoff 2002; van den Hoff et al., 2002; Shaughnessy et al., 2003; Kemper et al., 2003). It is also possible that some unreported deaths occur from illegal fishing.

Prey depletion due to fisheries (potential threat)	Minor	Minor	Toothfish and <i>Euphausia</i> spp. krill remains have been recorded from some southern elephant seal stomachs but the extent of spatial overlap with foraging areas and potential competition for food resources with these fisheries is likely to be low at present, but may increase as Southern Ocean fisheries expand in future (van den Hoff et al., 2002; Hindell et al., 2003)
Pollution (including marine debris)	Minor	Minor	There is some potential for increasing exposure to chemical pollution and ingested plastic fragments to cause stress or impair health and potentially increase disease risks for individuals (Shaughnessy 1999; Evans 2003). Southern elephant seals have been recorded as entangled in marine debris in Australian waters but the population impact is unknown (Shaughnessy et al., 2003)

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

<b>Criterion 1. Population size reduction (reduction in total numbers)</b>			
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	<b>Critically Endangered Very severe reduction</b>	<b>Endangered Severe reduction</b>	<b>Vulnerable Substantial reduction</b>
<b>A1</b>	<b>≥ 90%</b>	<b>≥ 70%</b>	<b>≥ 50%</b>
<b>A2, A3, A4</b>	<b>≥ 80%</b>	<b>≥ 50%</b>	<b>≥ 30%</b>
A1	<p><i>based on any of the following:</i></p> <ul style="list-style-type: none"> <li>(a) direct observation [except A3]</li> <li>(b) an index of abundance appropriate to the taxon</li> <li>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</li> <li>(d) actual or potential levels of exploitation</li> <li>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</li> </ul>		
A2			
A3			
A4			

**Assessment: Insufficient data to determine eligibility**

**Evidence:**

The generation time for the southern elephant seal population at Macquarie Island was initially estimated to be 7.9 years (McMahon et al., 2005b) and thus Woinarski et al. (2014) considered the population decline at Macquarie Island to be under 30 percent over three generations. However, recent work by Desprez (2014) found that the generation time for southern elephant

seals at Macquarie Island was 11.3 years. The earlier result was based on a smaller data set and shorter time series (McMahon pers. comm., 2015). McMahon and Hindell have re-evaluated survey data of southern elephant seals at Macquarie Island using a number of methods and concluded that the decrease for the population was 1.5 percent per year over the 64 year time series (McMahon pers. comm., 2015). They also found no compelling evidence for any change to this rate. When taking into account the modified generation length, the population has therefore declined by approximately 40 percent over three generations. The cause(s) of the decline are not understood (see for example McMahon et al., 2005a; de Little et al., 2007; van den Hoff et al., 2007, 2014).

Though the Heard Island population was estimated to be relatively stable from 1985-1992 (Burton 1986; Slip & Burton 1999), it has not been assessed in recent decades but is inferred to be either stable or increasing slightly based on the connection with Kerguelen Island. Woinarski et al., (2014) considered the rate of decline likely to approach but unlikely to exceed 30 percent over 3 generations when using the previous generation length of approximately 24 years.

Given the lack of any specific monitoring of the Heard Island population and consequent uncertainty about the population trend and size relative to Macquarie Island, it is difficult to estimate the trend for the two populations combined. The Committee considers that there is insufficient information to determine the eligibility of the species for listing in any category under this criterion.

<b>Criterion 2. Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy</b>			
	<b>Critically Endangered Very restricted</b>	<b>Endangered Restricted</b>	<b>Vulnerable Limited</b>
B1. Extent of occurrence (EOO)	< 100 km <sup>2</sup>	< 5,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>
B2. Area of occupancy (AOO)	< 10 km <sup>2</sup>	< 500 km <sup>2</sup>	< 2,000 km <sup>2</sup>
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			

### **Assessment: Insufficient data to determine eligibility**

#### **Evidence:**

Southern elephant seals have a broad geographic pelagic distribution encompassing millions of square kilometres but they aggregate to reproduce in breeding colonies where harems are spread over smaller areas of coastal habitat (Hindell & Perrin 2009; Hofmeyr 2015). Therefore the extent of occurrence during their dispersed pelagic phase is very large, but their area of occupancy in natal breeding colonies is small (Woinarski et al., 2014).

Consequently, southern elephant seals have an extent of occurrence >20,000 km<sup>2</sup>, and their area of occupancy at the two main breeding areas on Macquarie and Heard Islands is less than 500 km<sup>2</sup> (Woinarski et al., 2014). The population is restricted to ≤ 5 locations (in the Australian region) and there is an observed and projected continued decline observed in the number of mature individuals at Macquarie Island (see Criterion 1). The Heard Island numbers are considered as not declining, and may be increasing (McMahon pers. comm., 2016).

The Committee considers that the species' area of occupancy is restricted, as is the geographic distribution. There is a continuing decline in the number of mature individuals at Macquarie Island, however, given the uncertainty in the population trend at Heard Island it is uncertain

whether there is an overall decline. Therefore, the Committee considers that there is insufficient information to determine the eligibility of the species for listing under this criterion.

<b>Criterion 3. Population size and decline</b>			
	<b>Critically Endangered Very low</b>	<b>Endangered Low</b>	<b>Vulnerable Limited</b>
Estimated number of mature individuals	<b>&lt; 250</b>	<b>&lt; 2,500</b>	<b>&lt; 10,000</b>
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)	<b>Very high rate 25% in 3 years or 1 generation (whichever is longer)</b>	<b>High rate 20% in 5 years or 2 generation (whichever is longer)</b>	<b>Substantial rate 10% in 10 years or 3 generations (whichever is longer)</b>
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	<b>≤ 50</b>	<b>≤ 250</b>	<b>≤ 1,000</b>
(a) (ii) % of mature individuals in one subpopulation =	<b>90 – 100%</b>	<b>95 – 100%</b>	<b>100%</b>
(b) Extreme fluctuations in the number of mature individuals			

**Assessment: Ineligible**

**Evidence:**

The total abundance of southern elephant seals in the Australian region is difficult to estimate due to their widely dispersed distribution over millions of square kilometres of the Southern Ocean during their foraging phase, while their remote breeding distribution, particularly on the isolated Heard Island makes repeated monitoring surveys logistically difficult. However, the most recent Macquarie Island census was undertaken in October 2014 and resulted in a total population estimate of 48,000 individuals (van den Hoff pers. comm., 2016). Slip and Burton’s (1999) estimated count for total breeding females/pup production on Heard Island in the 1992/93 summer was 17-18,000 and although there have been no further surveys there, the total population in the Australian region is well in excess of 10,000.

The Committee considers that the species has not met the required elements of this criterion.

<b>Criterion 4. Number of mature individuals</b>			
	<b>Critically Endangered Extremely low</b>	<b>Endangered Very Low</b>	<b>Vulnerable Low</b>
Number of mature individuals	<b>&lt; 50</b>	<b>&lt; 250</b>	<b>&lt; 1,000</b>

**Assessment: Ineligible**

**Evidence:**

As noted under Criterion 3, the number of mature individuals of southern elephant seals is not low and the Committee considers that the species has not met this required element of this criterion.

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

### **Assessment: Insufficient data to determine eligibility**

#### **Evidence:**

A population viability analysis (PVA) was undertaken for the Macquarie Island population of southern elephant seals which estimated earliest and mean time to extinction as 307 and 564 years respectively, and indicated a low probability of extinction within 300 years (McMahon et al., 2005b). This PVA analysis was undertaken prior to the recent work that concluded the generation length for elephant seals at Macquarie Island is 11.3 years (Desprez, 2014). An updated PVA may now estimate different extinction times. It has not been possible to undertake a PVA for the Heard Island population.

There is insufficient information to demonstrate if the species is eligible for listing under this criterion.

#### **Consideration for delisting**

The southern elephant seal is currently listed as Vulnerable under the EPBC Act. The assessment presented in this Conservation Advice suggests that the subspecies may no longer be eligible to be listed under the EPBC Act, as it cannot explicitly be shown to satisfy the listing criteria in any category.

However, the assessment also indicates a deficiency in data for this species. There are two major colonies in the Australian jurisdiction which are largely demographically independent, at Macquarie Island and Heard Island. There has been no monitoring of Heard Island for over 20 years and its population trajectory must be inferred based on monitoring of Kerguelen Island, 450km away. Because both the size and population trend are uncertain, the overall trend for the species in Australia cannot be assessed with confidence and thus the species may continue to be eligible for listing under Criteria 1 or 2.

#### **Conservation actions**

##### **Recovery Plan**

The combined *Sub-Antarctic Fur Seal and Southern Elephant Seal Recovery Plan* (DEH 2004b) has two main objectives: to maintain current levels of protection for these two species to enable population growth so that these species can be removed from the threatened species list under the EPBC Act; and to ensure that any future anthropogenic impacts are not limiting their recovery. The Recovery Plan noted that in the absence of significant current anthropogenic threats, the only identified action was to monitor populations of these species in the Australian region.

The *Review of the Sub-Antarctic Fur Seal and Southern Elephant Seal Recovery Plan* (DotE 2016) was conducted in 2015 and found that regular population monitoring activities did occur at Macquarie Island, but not Heard Island. Although monitoring for subantarctic fur seals ceased after the 2011/12 season as a result of reduced resources, elephant seal monitoring is still undertaken (Isthmus counts each year and whole island surveys every five years).

The Review recommended that a recovery plan was not needed for the two species as significant anthropogenic threats were not demonstrated and a revised Conservation Advice would update relevant information and conservation/research priorities.

A recovery plan is therefore not recommended for this species. The southern elephant seal appears to be recovering from historic exploitation with increasing or stable numbers in all population sectors except at Macquarie Island. Though the Macquarie Island decline is not understood yet, there is no current significant anthropogenic threat affecting the species. There are existing management arrangements outlined below that are location-specific and threat-specific and this updated Conservation Advice identifies priority actions and research.

### Primary conservation action

As the decline of southern elephant seals continues at Macquarie Island with no single evident cause, it is important to understand any anthropogenic impacts that may affect the recovery of the species in the future and address these as soon as possible. Receiving accurate and timely reports of fisheries interactions with the species, whether the interaction is lethal or not, as well as opportune information on impact of marine debris or pollution events, may prompt responsive mitigation measures or initiate management responses even at the remote sites where the species is found.

### Conservation and management priorities

Southern elephant seals are managed as a listed Vulnerable species and a marine species protected under the Commonwealth EPBC Act. They are also listed as Rare under the South Australian *National Parks and Wildlife Act 1972*, and as Endangered under the Tasmanian *Threatened Species Protection Act 1995* with corresponding protection and management in Tasmanian and South Australian jurisdictions. The two major Australian breeding colonies occur in protected areas in the Macquarie Island Nature Reserve and the Heard Island Wilderness Reserve respectively, and both islands are listed as World Heritage sites. Macquarie Island is also protected under Tasmanian legislation as a Nature Reserve and is on the National Heritage List, thereby providing additional protection under the EPBC Act. Waters around Macquarie Island are protected up to three nautical miles from the coast under Tasmanian legislation and 3 - 20 nautical miles from the coast in the Commonwealth Macquarie Island Marine Park. Waters to 1000 m depth around Heard Island are similarly protected in the Commonwealth Heard Island and McDonald Islands Marine Reserve. Southern elephant seals also occur regularly, and some pups have been recorded, at Maatsuyker Island off Tasmania, which is part of the Tasmanian Southwest National Park and the Tasmanian Wilderness World Heritage Area.

The *Threat Abatement Plan for the impacts of marine debris on vertebrate marine life 2009-2014* (DEWHA 2009) is currently being reviewed and a new plan is expected in 2017. The issue of impacts of marine debris in the Southern Ocean and subantarctic islands will be addressed in the revised plan.

Recommended management actions and research priorities are outlined in the tables below (modified from Woinarski et al., 2014 and DotE 2016).

Theme	Specific actions	Priority
Active mitigation of threats	Continue high levels of protection for the southern elephant seal in important breeding, foraging and haul-out sites. Ensure Macquarie Island/Heard Island management plans include reference to monitoring and protection for the species.	High
	Continue, and where necessary adapt, management actions to reduce disturbance and pollution/marine debris impacts on southern elephant seals and their important breeding, foraging and resting habitats	Medium-high
	Improve data collection and reporting of fisheries interactions (including entanglements) throughout the southern elephant seals' foraging ranges. This	Medium

	could incorporate improving species identification; expanding data collected by observers (photos/samples from mortalities); utilising deep sea observation systems (e.g. cameras) to observe underwater interactions.	
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### Survey and Monitoring priorities

Theme	Specific actions	Priority
Continue ongoing monitoring program based on Tasmanian DPIE (2005) survey methodology guidelines	Continue long-term population and demographic monitoring at Macquarie Island, and prioritise surveys of the population at Heard Island, to better quantify current abundance, pup production, movements and population trends	Very high
Survey to better define distribution (with reference to guidance document noted above)	Expand surveys to better define distribution patterns and movements of individuals between breeding colonies and key foraging areas and potential dispersal to Antarctica and other subantarctic islands	Medium-high
Investigate alternative survey techniques to maximise opportunity of obtaining population data	Investigate new survey technologies (e.g. use of drones) that may provide an opportunity to increase knowledge of population data on remote islands (taking into account local weather conditions).	Low-medium

### Information and Research priorities

Theme	Specific actions	Priority
Assess impacts of threats on species	Improve knowledge of climate and oceanographic variability, including El Niño events, that affect southern elephant seal foraging and reproductive success.	High
	Improve understanding of the potential risks of fisheries interactions with the species. Including analysis of logbook data and any reported interactions between Macquarie Island/Heard Island fisheries and southern elephant seals.	Medium-low
	Assess the impacts of disturbance, pollution and associated risks of disease on the health status of southern elephant seals	Low-medium
	Analysis of the occurrence and characteristics of marine debris (including micro-plastics) on remote sub-Antarctic islands and associated impacts on southern elephant seals.	Low-medium
Assess relative effectiveness of threat mitigation options	Assess the effectiveness of fisheries management and monitoring in reducing potential impacts of fisheries on southern elephant seals	Medium
Assess habitat requirements	Expand research to better understand key foraging areas for southern elephant seals and changes resulting from climate and oceanographic variability and El Niño events	Medium-high
Assess diet and life history	Improve understanding of diet and foraging ecology, and improve understanding of life history parameters controlling population growth and	Medium

	determine generation time for the Heard Island population of southern elephant seals	
Undertake research to develop new or enhance existing management mechanisms	Investigate the efficacy of using remote survey techniques such as satellite imagery for census counts on remote islands	Low-medium

### **Recommendations**

- (i) The Committee recommends that the list referred to in section 178 of the EPBC Act not be amended and the species remains listed as Vulnerable:  
*Mirounga leonina*
- (ii) The Committee recommends that there not be a recovery plan for this species.

Threatened Species Scientific Committee

6 Sept 2016

### **References cited in the advice**

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