The Minister approved this conservation advice and transferred this species from the Vulnerable to the Endangered category, effective from 23/12/2020

Conservation Advice

Neophoca cinerea

Australian Sea Lion

Taxonomy

Conventionally accepted as *Neophoca cinerea* Peron, 1816. It is the only species within the genus. No subspecies are recognised.

Summary of assessment

Conservation status

Endangered: Criterion 1 A2(b)

Vulnerable: Criterion 3 C1 & C2(a)(i)

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

This advice follows assessment of information provided by a nomination from the public to change the listing status of the Australian Sea Lion.

Public consultation

Notice of the proposed amendment and a consultation document was made available for public comment for 32 business days between 21 June 2018 and 3 August 2018. 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 Australian Sea Lion is the only pinniped species endemic to Australia (Gales et al. 1992). It has a blunt snout with small tightly rolled external ears. Males are a dark blackish or chocolate brown colour, with blondish white fur extending from the top of the head to the nape of the neck. The neck is broad and obscure and the forequarters very large; the foreflippers are also large and broad. Females are silvery ash-grey above and yellow to cream underneath (Gales 2008). Pups are dark chocolate brown to charcoal in colour at birth and lighten to a smoky grey before becoming brown (Goldsworthy 2015). However, the pelage of pups up until their moult at around 4−5 months of age (Higgins & Gass 1993; Dennis & Shaughnessy 1996) is highly variable (Goldsworthy 2015). After moulting the coat of a juvenile is similar to that of an adult female (Goldsworthy et al. 2009a).

Males reach a length of 185–225 cm from head to tail, while females reach a length of 130–185 cm (Gales 2008). Males weigh 180–250 kg, whereas females weigh 65–100 kg (Gales 2008).

Distribution

Breeding colonies for the Australian Sea Lion are found only in South Australian and Western Australian waters, from Kangaroo Island in South Australia to the Houtman Abrolhos Islands in Western Australia (Gales et al. 1994). However, the species is known to forage in Commonwealth waters adjacent to these states (DSEWPaC 2013a). The historical range for breeding colonies is thought to be larger and extended east into Bass Strait (Gales et al. 1994; Ling 1999).

Breeding colonies occur on islands or remote sections of coastline. Breeding has been recorded at 81 sites: 34 in Western Australia and 47 in South Australia (Goldsworthy 2015). Of these, around 58 are regular breeding colonies at which five or more pups per breeding cycle have been recorded (Shaughnessy et al. 2011). These regular breeding colonies are habitat critical to the survival of the species, because they are used to meet essential life cycle requirements (DSEWPaC 2013b). Only five sites currently produce more than 100 pups per breeding season, all of which are in South Australia (Goldsworthy et al. 2015). Survey data from a large proportion of sites indicate that the average pup production per breeding season is around 40 per site, with most sites (approximately 70 percent) producing fewer than 30 pups per breeding season (Goldsworthy 2015).

It is likely that other small breeding colonies exist but are yet to be discovered. Two of the breeding sites in Western Australia (George Island and Draper Island) were discovered relatively recently, during surveys undertaken in 2011−2014 (Friedman & Campbell 2014). Two new breeding sites were also discovered in South Australia in 2014 (Curta Rocks and Williams Island) (Goldsworthy et al. 2015).

Lone or small numbers of animals regularly visit haul-out sites and occasionally visit other locations (Shaughnessy et al. 2011). In addition to the breeding sites, 151 locations have been identified as haul-out sites: 61 in Western Australia and 90 in South Australia (DSEWPaC 2013b).

Based on geographic distance analysis among colonies, 13 distinct Australian Sea Lion metapopulations or regions can be identified. Six of these are in Western Australia, and seven are in South Australia (Pitcher 2018).

Cultural Significance

Australian Sea Lions were used as a resource by Indigenous populations. In the early 1800s, the explorer King observed local Aborigines on King George Sound (WA) catching a seal and cooking it, then mixing its oil with ochre to use for decorative purposes (Campbell 2005).

The Australian Sea Lion (Bulgura) is an important totem for the Wirangu people, who are the traditional custodians of the Chain of Bays region in South Australia (Friends of Sceale Bay, n.d).

Relevant biology/ecology

<u>Life cycle and breeding</u>

The Australian Sea Lion is slow to mature. Females have few young over their lifetime, to which they commit extended maternal care (Gales & Costa 1997). It is the only pinniped species which has a non-annual breeding cycle, with intervals between pupping seasons of 17–18 months (Ling & Walker 1978; Higgins & Gass 1993; Shaughnessy et al. 2006; Goldsworthy et al. 2014). Breeding seasons are protracted in duration (4−9 months) and are asynchronous between colonies, with the breeding season of individual colonies occurring at various times of the year (Gales et al. 1992; Shaughnessy et al. 2006; Goldsworthy et al. 2014). The timing of breeding at many colonies can only be accurately predicted 1−2 seasons in advance, due to variation in the inter-breeding interval (S Goldsworthy pers comm, cited in Friedman & Campbell 2014).

Surveys undertaken in Western Australia during 2011−2014, using direct pup counts, suggest that a number of south coast colonies may have shifted their timing of breeding (either earlier or later than the predicted timing) by up to six months compared to original observations from the 1990s (Friedman & Campbell 2014). These variations have likely occurred over the last 10−15 years and were not explained by any single or identified subset of environmental variables; it is possible that changes in the timing of breeding will continue (Friedman & Campbell 2014). However, these data are preliminary and require follow-up investigations (Friedman & Campbell 2014). The surveys from the 1990s involved a single visit to the south coast colonies, and the predicted timing of breeding may not have been accurate due to insufficient observations (P Shaughnessy 2018. pers comm 22 June).

Female Australian Sea Lions become sexually mature at 4.5−6 years of age, and males at six years or more (Goldsworthy 2015). The mean age of breeding females is 11 years, with the oldest breeding female recorded being 24 years old (McIntosh 2007). Age-specific survival probabilities are high (0.98) after six years of age and are similar for males and females; the maximum longevity recorded is 26 years for females and 21.5 years for males (McIntosh 2007).

For species with overlapping generations, generation time is defined as the mean age of mothers of all newborn females (the mean interval between the birth of a mother and the birth of her offspring, weighted by the proportion of individuals in each age class), assuming a stable distribution (Caughley 1977). Generation length for the Australian Sea Lion has been calculated using the IUCN Generation Length Calculator Tool (https://www.iucnredlist/org/resources/generation-length-calculator), with data on observed fecundity and survival from the Seal Bay subpopulation. Generation time for the Australian Sea Lion, assuming that it does not vary between colonies, is estimated to be 14.1 years (Goldsworthy 2020).

Pups are continuously attended by their mother for the first 9–10 days after birth, after which adult females alternate between foraging trips to sea and nursing bouts ashore (Goldsworthy 2015). Lactation periods are protracted, with females nursing their pups for 15–18 months, usually weaning them before giving birth again (Goldsworthy 2015). However, females will nurse offspring for three or more years if they do not pup in the subsequent breeding season or their new pup dies (Goldsworthy 2015). Following their postnatal moult at 4−5 months of age, pups will actively swim on their own, with pups exploring adult foraging habitat at least eight months prior to weaning (Lowther & Goldsworthy 2012).

Males defend harems of a few females at high density breeding sites but defend one female at a time at less dense colonies (Gales 2008). Both males and females are very territorial during the breeding season, often becoming aggressive. When this aggression is directed towards pups it can contribute significantly to their mortality (Gales 2008). Adult females behave aggressively toward pups that are not their own (Goldsworthy 2015).

Some male Australian Sea Lions, that congregate in 'bachelor colonies' on islands adjacent to the Perth metropolitan region during the non-breeding season, have been observed to migrate up to 280 km north each breeding season (Gales et al. 1992). There is little or no movement of females between breeding colonies, even those separated by short distances (Campbell et al. 2008a; Goldsworthy & Lowther 2010; Lowther et al. 2012). Females show a high level of natal site fidelity, only breeding at the site where they were born (Campbell et al. 2008a). Evidence suggests that fine-scale foraging site fidelity and specialization is a driver limiting dispersal of female Australian sea lions (Lowther et al. 2011, 2012), and that females are likely dependent on food resources acquired within local proximity to their natal breeding colony.

Predators of Australian Sea Lions include the *Carcharodon carcharias* (White Shark) (Shaughnessy et al. 2007) and presumably *Orcinus orca* (Orca) (Ling 2002).

Habitat and diet

The Australian Sea Lion uses a variety of habitats when onshore, including exposed islands and reefs, rocky terrain, sandy beaches and vegetated foredunes and swales (Dennis & Shaughnessy 1996, 1999). They also use caves and deep cliff overhangs as haul-out sites or breeding habitat (Dennis & Shaughnessy 1996, 1999).

Foraging activities are restricted to waters on the continental shelf, with juveniles, adult females and adult males rarely exceeding diving depths of 90 m, 130 m, and 150 m respectively (Goldsworthy et al. 2010). Australian Sea Lions are benthic foragers, feeding on a wide variety of demersal prey. The inshore breeding and foraging habitat of the Australian Sea Lion is responsible for interactions with fisheries and aquaculture (Gales 2008).

The diet includes fish, cephalopods (squid, cuttlefish and octopus), sharks and rays, crustaceans (rock lobsters, crabs and prawns), penguins, eels and gastropods (Gales & Cheal 1992; McIntosh et al. 2006; Baylis et al. 2009; Fragnito 2013; Peters et al. 2015; Berry et al. 2017). Important prey species include several commercially fished species, as identified in Goldsworthy (2015). However, the diet and feeding behaviour can vary markedly between individual animals (Fragnito 2013) and across the species' distribution (Berry et al. 2017).

Australian Sea Lions forage at all times of day and dive continuously while at sea (Costa & Gales 2003). Individual dives rarely exceed eight minutes in duration (Kirkwood & Goldsworthy 2013). Foraging trips to sea are relatively short compared to other sea lions, with maximum durations of 5.1, 6.2 and 6.7 days in juveniles, adult females and adult males, respectively (Higgins 1993; Higgins & Gass 1993; Lowther & Goldsworthy 2011; Kirkwood & Goldsworthy 2013).

The maximum recorded foraging ranges of juveniles and adult females are 118 km and 190 km respectively (Goldsworthy et al. 2010). Adult males range much further and have been tracked up to 340 km from their colony. There is marked within and between-colony variability in the foraging behaviour of juveniles, adult females, and males (Goldsworthy et al. 2009a, 2010; Lowther & Goldsworthy 2011; Lowther et al. 2012).

Threats

Historically, the main threat to the Australian Sea Lion was over-harvest due to commercial seal hunting during the late 18th, 19th and early 20th centuries (Dennis & Shaughnessy 1996; Ling 1999). Although this activity ended in 1949 (Ling 1999), populations have probably not recovered to pre-exploitation levels (DSEWPaC 2013a). The pre-harvested population size is unknown. However, while population sizes of *Arctocephalus pusillus doriferus* (Australian Fur Seal) and *Arctocephalus forsteri* (Long-nosed Fur Seal) have increased significantly in Australia since the early 1990s, the population size of the Australian Sea Lion remains low (Goldsworthy et al. 2010) despite it having been less heavily exploited (Ling 1999). Nevertheless, the population size may have always been low (Ling 1999), and the species may have congregated in relatively small numbers per site even prior to exploitation by European arrival (Warneke 1982).

In more recent times, interactions with commercial fishing and entanglement in fisheries-related marine debris have been identified as key threats to the species (DSEWPaC 2013a). Demersal gillnet fisheries are understood to be one of the primary threats to the Australian Sea Lion. Since 2010, a range of management measures have been implemented to mitigate the impact of fisheries on the species. However, these measures have not been in place for long enough to have had an observable effect on Australian Sea Lion populations, and the species' long breeding cycle makes it more difficult for populations to recover after direct or indirect mortality (Orsini & Newsome 2005). Low levels of mortality in any given location is a concern, as most colonies are very small and hence vulnerable to a range of threatening processes (Table 1). Once extirpated, colonies are unlikely to re-establish due to high female site fidelity.

Table 1: Threats impacting the Australian Sea Lion

Threat factor	Threat type and status	Evidence base
Fishing activities		
Fisheries bycatch	known current	In the recent past, interactions with demersal gillnet operations have been a significant cause of mortality, which likely limited population growth (Goldsworthy et al. 2010). Individuals caught in nets often drown (Page et al. 2004) or escape and die later from injuries (Hamer et al. 2011). Mortality rates in Commonwealth fisheries off SA were estimated at 3.9% of the overall female population (or 142−266 individuals) per breeding cycle (Goldsworthy et al. 2010). Since 2010, the Australian Fisheries Management Authority has introduced a range of management measures (e.g. spatial closures, bycatch trigger limits for extended closures, and 100% observer coverage) in the gillnet sector of the Southern and Eastern Scalefish and Shark Fishery (SESSF), to mitigate the impacts of bycatch mortality on Australian Sea Lion populations off SA (AFMA 2012, 2013, 2015). These measures have been effective in reducing mortalities of the species in Commonwealth fisheries to <4 per breeding cycle since 2010, with a total of 21 mortalities over 2010−2019. Pups and juveniles are known to get caught inside rock lobster pots while attempting to predate on the lobsters (Campbell et al. 2008b). Quantitative studies are scarce, but mortality rates are lower than that from gillnets (Campbell et al. 2008b; Goldsworthy et al. 2010). Bycatch in rock lobster pots has been largely mitigated through the introduction of sea lion excluder devices (SLEDs) in the WA and SA Rock Lobster fisheries, implemented in 2009 and 2013 respectively, which have been effective in preventing sea lions from entering the pots (Mackay & Goldsworthy 2017). Similar measures are also in place for the WA South Coast Crustacean Fishery (DPIRD 2018. pers comm 3 August). State-managed gillnet fisheries have a lower impact on Australian Sea Lions. Observer data from shark vessels in the 1990s indicate that sea lion bycatch in the WA Temperate Demersal Gillnet and Demersal Longline Fishery (TDGDLF) was 4−7 individuals per year (WAFIC 2018. pers comm 3 August). DPIRD (unpublished data) estimated bycatch rates of female sea lions in the WA demersal gillnet fisheries was 3−6 individuals per breeding cycle between 2007 and 2017 (DPIRD 2018. pers comm 3 August). In 2016, management measures were introduced in the SA Marine Scalefish Fishery to limit the number of days large mesh nets can be deployed in high risk Marine Fishing Areas (PIRSA 2018a). In June 2018, gillnet exclusion zones were established in the WA TDGDLF to reduce the risk of Australian Sea Lions interacting with demersal gillnets (DPIRD 2018).

Marine aquaculture	known current	Collision or entanglement with subsurface infrastructure in aquaculture facilities is a threat to the species. A small number of Australian Sea Lion deaths have been recorded as a result of drowning in anti-predator nets (Kemper & Gibbs 1997). In SA, arrangements have been introduced to mitigate impacts from finfish aquaculture (including exclusion buffers around breeding colonies and haul-out sites) and oyster farms (hard plastic clips must be used to secure oyster baskets to infrastructure). In 2015/16 no adverse interactions with Australian Sea Lions were reported in aquaculture facilities (PIRSA 2017). In WA, the Mid-West Aquaculture Development Zone at Abrolhos Islands is currently the only area that overlaps with the Australian Sea Lion. Negative interactions with shellfish and coral aquaculture infrastructure in this area are considered unlikely (DPIRD 2019. pers comm 12 April).
Sealing	known past	Historically, the main threat to the Australian Sea Lion was over-harvest due to commercial seal hunting during the late 18th, 19th and early 20th centuries (Dennis & Shaughnessy 1996; Ling 1999). Although this activity ended in 1949 (Ling 1999), populations have probably not recovered to pre-exploitation levels (DSEWPaC 2013a). Quantifying the effect of sealing is difficult because of poor records of harvest. The evidence from cargo records of ships carrying exported skins suggest that the harvest of sea lions was considerably lower than that of other seal species because of the lower quality of their pelts (Ling 1999, 2002). However, sea lions were also harvested for oil and because this cannot be differentiated from that of other species in shipping manifests it is impossible to quantify the number of additional sea lions killed (Ling 1999,2002).
Marine debris		
Entanglement in marine debris	known current	Entanglement in marine debris (e.g. fragments of fishing rope) is likely to be a significant source of mortality for Australian Sea Lions and may be contributing to their lack of recovery in certain parts of their range (Page et al. 2004; Shaughnessy et al. 2006; Peters & Flaherty 2013). Entanglements have been observed in both South Australia and Western Australia (e.g. Mawson & Caughran 1999; Page et al. 2004; Peters & Flaherty 2013). A study at Seal Bay during the 1990s and early 2000s found that about 1.3% of the overall population was likely to have entanglements, one of the highest rates reported for any pinniped (Page et al. 2004). Annual surveys undertaken over 1991−1999 at Anxious Bay, a remote beach in the Great Australian Bight, found that the majority of litter washed ashore originated from commercial fishing activities within the Bight (Edyvane et al. 2004). A study by Peters & Flaherty (2013) in Gulf St Vincent found that marine debris predominantly comprised plastics consisting of fragments, packaging, and containers, with marine rope fragments a common occurring debris type.

		Rope debris items found included bundled rope containing a deceased juvenile Australian Sea Lion, and around 3 tonnes of rope collected off Cape Hart, Kangaroo Island.
Ingestion of plastic	potential	Small and micro-sized plastics have been found in the scats of many seal species around the globe, including *Arctocephalus pusillus doriferus* (the Australian fur seal) at Seal Rocks, Victoria (R McIntosh 2018. pers comm 2 August). The impacts of plastic ingestion on seals is most likely to present as toxic effects such as endocrine disruption, caused by chemicals released from the particles (Gallo et al. 2018). There is evidence of such impacts for some large marine animals, but impacts on Australian Sea Lions have not been investigated (Gallo et al. 2018). Impacts may be synergistic as plastic particles attract heavy metal particles, and climate impacts such as warming sea temperatures can enhance the effects (R McIntosh 2018. pers comm 2 August).
Disease and parasites		
Hookworm	known current	Disease is a significant cause of mortality in Australian Sea Lions. Necropsies on 128 pups found no direct cause of mortality in half of the cases, with the deaths likely attributable to disease and pathogens (McIntosh 2007). Hookworm-associated haemorrhagic enteritis is a major threat to pup health and survival, causing reduced growth rates and reductions in blood health parameters (Marcus et al. 2014, 2015a; Lindsay et al. 2018). Higher hookworm infection intensity is associated with higher colony pup mortality, with both factors showing corresponding seasonal fluctuations (Marcus et al. 2014). Haematophagus hookworm significantly affects two major breeding colonies in South Australia, with 100% of these colonies' pups infected (Marcus et al. 2014). Treatment of pups at Dangerous Reef with Ivermectin in 2011 and 2013 (Marcus et al. 2015b) and 2017 (Lindsay et al. 2018) resulted in significant improvements in growth and blood health parameters, with no adverse impacts observed and 100% elimination of hookworm infection. Further research is planned to evaluate the effects of Ivermectin on long-term survival of pups (R Gray 2018. pers comm 3 August). The extent to which hookworm may be limiting growth in Australian Sea Lion colonies is unclear, but small colonies are particularly susceptible to the impacts of a disease outbreak (DSEWPaC 2013b). Climate change could also increase the levels of mortality from hookworm (see below).
Tuberculosis	potential	Tuberculosis due to *Mycobacterium pinnipedii* has been recorded in Australian Sea Lion colonies in Western Australia (Mawson & Coughran 1999; Cousins et al. 2003). In 2017, *M. pinnipedii* was confirmed as the cause of mortality in a juvenile Australian sea lion stranded on Kangaroo Island (R Gray 2018. pers comm 3 August), the first report of tuberculosis in the species in South Australia. It is likely that turberculosis causes greater mortality in the

		species, however insufficient data are available due to limited opportunities to necropsy individuals (R Gray 2018. pers comm 3 August).
Toxoplasmosis	potential	The parasite *Toxoplasma gondii* is an emerging pathogen of marine mammals, due to contamination of marine environments with terrestrial run-off containing *T. gondii* oocysts shed by feline hosts (R Gray 2018. pers comm 7 June). Top order marine predators are often infected after oocyst accumulation in prey species such as mussels and fish (Carlson-Bremer et al. 2015). In sea lions, as in most other species, toxoplasmosis causes abortion and disease in pups which have been infected via transmission from the mother (Carlson-Bremer et al. 2015). Susceptibility of the Australian Sea Lion to *T. gondii* is evident from reports of meningitis in an adult and severe disease with subsequent mortality in a pup (Kabay 1996), with *T. gondii* the suspected cause. *T. gondii* DNA has been detected in the brain of a Long-nosed Fur Seal found moribund and diseased on a northern Sydney beach; the first confirmed case of toxoplasmosis in an Australian pinniped (Donahoe et al. 2014). This suggests that *T. gondii* oocysts originating from mainland Australia may act as a disease threat to native marine fauna (Donahoe et al. 2014). The prevalence of *T. gondii* in the Australian marine environment requires further investigation (Kirkwood & Goldsworthy 2013).
Other microbiota from human sources	potential	*Giardia duodenalis* is one of the most common protozoan parasites identified as causing enteric disease in pinnipeds (R McIntosh 2018. pers comm 2 August). Delport et al. (2014) found that *G. duodenalis* presence in Australian Sea Lions was highest in populations <25 kms from humans, suggesting that the parasite was likely dispersed from human sources. The bacteria *Escherichia coli* has been identified in the faeces of sea lion pups at Seal Bay and Dangerous Reef (Fulham et al. 2018). The *E. coli* strains were associated with humans and had antimicrobial resistance genes (Fulham et al. 2018). Impacts on Australian Sea Lions are unknown, but the spread of human-associated bacteria into marine ecosystems can expose wildlife to atypical bacteria that have the potential to cause disease and alter the gut biome (Fulham et al. 2018). Gut microbiota play an important role in the maintenance of mammalian metabolism and immune system regulation, and disturbance to this community can have adverse impacts on animal health (Delport et al. 2016).
Pup mortality from conspecifics		
Young pup mortality from aggressive males	known current	This is a large contributor (31.6% of 128 dead pups sampled over 3 breeding seasons, 2002−2006) to young pup mortality at Seal Bay (McIntosh & Kennedy 2013). However, in 49% of mortalities cause of death could not be determined from gross necropsy. Improving survival rates for pups

		improved population projections from population viability analyses (McIntosh 2007).
Deliberate killing		
Shooting, spearing or clubbing by humans	known current	There have been numerous recorded instances of deliberate killing of Australian Sea Lions, and reports of fishers and aquaculture operators shooting individuals perceived to be a threat to their operations (Kemper et al. 2003). The overall mortality due to deliberate killings cannot be estimated as most deaths go unreported (DSEWPAC 2013b).
Habitat degradation and pollution		
Marine aquaculture	known current	The primary impact from marine aquaculture is loss of habitat. The use of rack and line structures for mussel and oyster farming in shallow waters often results in the loss of seagrass beds (Wear et al. 2004; Bryars et al. 2007), which are important foraging habitat for the Australian Sea Lion (Goldsworthy et al. 2009b; Lowther et al. 2011). Finfish aquaculture activities may alter water chemistry due to nutrient influxes from fish effluent and unconsumed feed, leading to significant changes in the abundance and diversity of benthic flora and fauna (Brown et al. 1987). These impacts from aquaculture are likely to be localised (DSEWPAC 2013b).
Other development	known current	Onshore and offshore development can degrade, and result in the loss of, important coastal habitats for Australian Sea Lions (McIntosh 2007; Goldsworthy et al. 2009b). Impacts are likely to be localised.
Oil spills	potential	Oil spills pose a threat to all pinniped populations, especially those near major shipping lanes (Shaughnessy 1999). Oiling of pinnipeds can lead to hypothermia if the fur is affected, or poisoning if oil is ingested, resulting in reduced foraging and reproductive fitness or death (DSEWPAC 2013b). In Australia, two oil spills have affected seals to date, one in 1991 (Gales 1991) and one in 1995 (Pemberton 1999). Sub-surface oil contamination can also persist at sub-lethal levels for many years, affecting wildlife populations (Peterson et al. 2003). With increasingly busy transport shipping activity at the western and eastern ends of the Australian Sea Lion range, the risk and potential impacts of oil spills have increased (DSEWPaC 2013b).
Pollution from terrestrial sources	suspected current	Land-based runoff and pollutants pose a threat to the species, either through direct impacts on health, or indirectly by affecting prey availability or feeding substrate (DSEWPaC 2013b). Elevated concentrations of mercury have been found in liver and hair samples from Australian Sea Lion pups at Seal Bay and Dangerous Reef, together with evidence of immunosuppression and an increased age at which pups became free of hookworm (R Gray 2018. pers comm 3 August). Mercury concentrations were significantly higher in dead compared to live pups, and significantly higher than

		those in other Australian pinnipeds (R Gray 2018. pers comm 3 August). Significant concentrations of persistent organic pollutants (POPs) have been found in Australian fur seal pups and juvenile females in Bass Strait; in juvenile females POPs were associated with hair loss syndrome (Taylor et al. 2018) which has significant impacts for individual foraging success. POPs bio-accumulate in upper trophic species and cause a variety of toxic effects including immunosuppression, cancer and endocrine disruption (R Gray 2018. pers comm 3 August).
Human disturbance		
Tourism, recreational boating and aircraft	potential	Disturbance from land and boat based wildlife tourism, commercial and recreational boating activities, and aircraft may result in behavioural disturbance, including displacement from or abandonment of sites (Kirkwood et al. 2003; Orsini 2004; McIntosh 2007; Goldsworthy et al. 2009b). Disturbance from inappropriate use of drones is also an emerging threat (DBCA 2018. pers comm 12 September). Disturbance of breeding colonies may be particularly detrimental, when the feeding of pups may be disrupted due to the mother fleeing (Orsini 2004; Lovasz et al. 2008), or when the colony stampedes towards the sea and tramples pups in the process (DSEWPAC 2013b). Similar situations for other pinniped species are known to contribute to shorter feeding times by mothers, resulting in a reduced growth rate of pups (Lidgard 1996).
Noise	potential	Studies of pinnipeds in the Northern Hemisphere indicate that exposure to sharp, short sounds of moderate intensity for extended periods (e.g. from seismic surveys, construction or operation activities) may cause avoidance behaviour and/or hearing threshold changes in pinnipeds (Gordon et al. 2003). Seismic pulses may also affect bony fish (e.g. Turnpenny & Nedwell 1994) which pinnipeds feed on.
Competition and prey depletion		
Competition with humans	potential	Prey availability is vital to the survival of top predators such as the Australian Sea Lion (Berry et al. 2017). Several commercial fisheries exploit species that are important prey for the Australian Sea Lion, which may reduce foraging and thus reproductive success. However, little is known about the direct impacts of competition with humans for the same fish stocks, or indirect impacts through alteration of trophic structures, on Australian Sea Lions (DSEWPaC 2013b). Berry et al. (2017) found that the important commercial species in WA, *Sepioteuthis australis* (Southern Calamari Squid) and *Panulirus cygnus* (Western Rock Lobster), were present in <25% of faecal samples (36 Australian Sea Lion scats collected across 1500 km of its distribution in WA). Hall & Wise (2011), in an analysis of data from WA commercial finfish fisheries from 1976 to 2005, found no reduction in mean trophic level or mean maximum length in finfish catches, suggesting that

		trophic structure has not significantly changed as a result of fishing in the region.
Competition with other pinnipeds	potential	Australian Sea Lions may compete for food with other marine predators, particularly other pinnipeds. Much of their range overlaps with the Long-nosed Fur Seal and, to a lesser extent, the Australian Fur Seal. However, the degree of inter-specific competition for prey resources is unknown; it is likely that the three species are able to exploit different food resources (DSEWPaC 2013b).
Climate change		
Sea level rise and 'wave wash' events	potential	Most breeding colonies of Australian Sea Lions are on very low lying islands. Under future climate change scenarios, it is projected that sea levels may rise by up to 82 cm by 2100, from 2005 levels (IPCC 2014). If this occurs, several smaller breeding colonies will become completely submerged. Climate change is also projected to result in an increased frequency and likelihood of extreme weather events (IPCC 2014). In the marine environment these are associated with strong winds and large swells in shelf and coastal regions, which can inundate land. Seal pups can be washed off rocks during bad weather, which may occur more often under climate change.
Temperature rise	potential	Global mean surface temperature is projected to increase by up to 4.8°C by 2100, from 2005 levels (IPCC 2014). Higher temperatures may increase the likelihood of epizootics in pinniped populations (Shaughnessy 1999); mass seal mortalities have been associated with high ambient temperatures and high seal densities onshore (Lavigne & Schmitz 1990). Increasing ocean temperatures (IPCC 2014) could alter primary productivity and the amount and composition of prey that seals feed upon (Shaughnessy 1999). In years with warmer seas, *Arctocephalus australis* (South American Fur Seal) mothers undertook longer hunting trips and spent less time nursing their young, resulting in the pups having weakened immune systems and higher mortality from hookworms (Seguel et al. 2018). Experiments on captive Australian Sea Lions, Australian Fur Seals and Long-nosed Fur Seals suggest that Australian Sea Lions have less flexibility in their physiology to adjust to changes in water temperature, and will be less resilient in a changing climate (Ladds et al. 2017).

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

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

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

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

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

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

based on any of the following:

(a) direct observation [*except A3*]

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:

Eligible under Criterion 1A2(b) for listing as Endangered

Pup numbers are the most reliable basis for estimating population size in the Australian Sea Lion and are used as an index of abundance. Pups are the age group most likely to be on shore, as they have not developed at-sea foraging skills and are confined to breeding sites for at least the first five weeks of their life (McIntosh et al. 2011; Shaughnessy et al. 2011; DSEWPaC 2013b).

There has been extensive, although not comprehensive, monitoring of Australian Sea Lion colonies over many years. However, determining population trends is difficult because population estimates for individual colonies are highly variable; survey methods have varied over time within and between colonies; there are many small and isolated colonies which are not easily accessible (and thus have little data); surveys need to be carefully timed (with timing often uncertain) to accommodate protracted and asynchronous breeding; and the three generation period of approximately 42 years is long compared to time series data available for the species. Although the species has suffered a large range contraction, this occurred prior to the time-period for this assessment.

The principal source of information on population trends for this species has been the work described in detail in Goldsworthy et al. (2015). In considering that work, the Committee had additional questions that were unable to be answered from the published document and has thus worked with Prof Goldsworthy to develop further analyses, now available in Goldsworthy (2020).

As described above, the multitude of small, isolated colonies distributed over a wide area, and asynchronous breeding, make the Australian Sea Lion a particularly challenging species to monitor and both the methods and timing of surveys have varied over time. Goldsworthy (2020) describes how the available survey data were filtered to produce a subset of comparable surveys on which to conduct analyses. A challenge of the data has been that not all colonies have been surveyed since the beginning of the three generation assessment period and thus back-projection of estimates is necessary. Such back-projection generates a risk of using unrealistically high values for some colonies. Goldsworthy (2020) addressed this firstly by identifying colonies with historical data against which to determine the plausibility of back-projected estimates. For remaining colonies with large early estimates (and thus which may be influential in estimating overall trend) sensitivity analysis was applied, demonstrating that large reductions would need to be applied to the back-projected estimates to change the category for which Australian Sea Lions are eligible.

The change in pup numbers over time was estimated using linear regression of the natural logarithm of pup numbers against year. Regressions on 30 subpopulations with 3 or more datapoints (accounting for greater than 75 percent of the most recent estimates) led to an estimate of decline of approximately 64 percent over three generations. If the remaining small subpopulations (24 percent of the most recent estimate) were assumed stable the decline was 57.5 percent. Including those subpopulations with two datapoints in the regression would increase the decline to 67.5 percent.

There remains considerable variability in the data and resulting estimates used in this assessment, but the Committee is of the view that while some more sophisticated analyses may reduce this variability, it is inherent to the data available and will not be overcome in the foreseeable future. In order to accommodate this variability and enable a recommendation to be reached, the Committee requested that Prof Goldsworthy use a probabilistic Monte Carlo simulation approach as advocated by the IUCN Standards and Petitions Subcommittee (2019) to assess the likelihood of the Australian Sea Lion being eligible for a given category.

Monte Carlo simulations were run over 1000 iterations (Goldsworthy 2020). No iteration produced a decline estimate of below 30 percent. The probability of a decline greater than 50 percent over three generations was greater than 98 percent and the median decline was 61 percent. No simulations produced a decline greater than 80 percent. The median (and indeed the great majority of iterations) decline meets the threshold for Endangered under Criterion 1 A2(b).

The Committee considers that the estimated decline in the number of mature individuals of this species is severe, having declined by over 50 percent over three generations. Therefore, the species has met the relevant elements of Criterion 1 to make it eligible for listing as Endangered.

It is important to note that prior to this analysis this species was EPBC Act listed in the Vulnerable category and this assessment suggests a change to the Endangered category. Using IUCN Standards and Petitions Subcommittee (2019) terminology this is considered a ‘nongenuine change’ in listing category as it is the result of new information and a more rigorous synthesis of available information, rather than a genuine deterioration in status.

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

Evidence:

Not eligible

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 Australian Sea Lion's area of occupancy (AOO) may be defined as the total area of occupied breeding colonies. Multiplying the number of breeding locations (81) by the minimum grid size (2x2 km) gives an AOO of approximately 324 km^2. The extent of occurrence is estimated to be greater than 100 000 km^2 (Woinarski et al. 2014).

To be eligible for listing under this criterion, the species must meet at least two of the three conditions indicating that distribution is precarious for survival. The distribution is not considered severely fragmented, because more than 50 percent of the population occurs in the five largest colonies, which does not meet the requirement that "most of its individuals are found in small and relatively isolated subpopulations" (section 4.8 of the IUCN Red List Guidelines). In addition, as there are no plausible threats that rapidly affect all the individuals in a definable geographic area the term "location" cannot be used and the subcriterion that refers to the number of locations will not be met (IUCN Standards and Petitions 2019). There is a continuing decline in population size, which meets subcriterion (b), however the species does not undergo extreme fluctuations. Therefore, only one of the three conditions are met.

Following assessment of the information the Committee has determined that the geographic distribution is restricted, however it does not appear precarious for the species' survival. Therefore, the species does not meet this required element of this criterion.

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:

Eligible under Criterion 3 C1 & C2(a)(i) for listing as Vulnerable

In 2017, total pup production for the species was estimated to be 2993, with 2484 in SA and 509 in WA (S Goldsworthy 2018. pers comm 18 June). Assuming a stable population, the pup production to total population multiplier developed from life-table parameters for the species at Seal Bay is 3.83 (Goldsworthy et al. 2010; Goldsworthy et al. 2015). This gives a total population estimate of 11 463 individuals. Based on the same life-history table (Goldsworthy et al. 2010, Table 7.2) where mature individuals comprised 53.3 percent of the population, the estimated number of mature individuals in the population is approximately 6000, which is limited. However, this is likely to be an over-estimate as the population is probably declining (see Criterion 1). Further, given the decline outlined under Criteria 1, it can be inferred that there may be a continuing decline of at least ten percent over three generations. This meets the threshold for Vulnerable under Criterion 3 C1.

There is an inferred continuing decline in population size due to ongoing threats (Table 1). Given the high level of genetic subdivision at the breeding colony scale, individual breeding colonies may be considered subpopulations (Campbell et al. 2008a, Lowther et al. 2012; Goldsworthy 2015). From the 2014−2015 census the largest colony, Dangerous Reef, has an estimated pup abundance of 485 (Goldsworthy et al. 2015, p. 15) which equates to approximately 990 mature individuals (PIRSA 2018b. pers comm 3 August). This meets the threshold for Vulnerable under subcriterion C2(a)(i).

The Committee considers that the estimated total number of mature individuals of this species is limited, with a projected continuing rate of decline of at least 10 percent over three generations, and fewer than 1000 mature individuals in each subpopulation. Therefore, the species has met the relevant elements of Criterion 3 to make it eligible for listing as Vulnerable.

Criterion 4. Number of mature individuals			
	Critically Endangered Extremely low	**Endangered Very Low**	**Vulnerable Low**
Number of mature individuals	**< 50**	**< 250**	**< 1,000**

Evidence:

Not eligible

The total number of mature individuals is estimated to be around 6000 (see Criterion 3), which is not low. Therefore, the species does not meet this required element of this criterion.

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

Evidence:

Insufficient data to determine eligibility

McIntosh (2007) undertook a population viability analysis (PVA) for the Seal Bay population using demographic data from the period 1991−2006. The simulations resulted in a 20 percent probability of extinction within 128 years (10 generation lengths).

Goldsworthy & Page (2007) undertook a PVA of Australian Sea Lion populations in SA, which aimed to identify the level of additional (anthropogenic) mortality required to increase the risk of extinction. Assuming stable population trajectories, their analysis suggested that in the absence of anthropogenic mortality, 34 percent of subpopulations had a 20 percent probability of quasi-extinction (the number of females in a subpopulation falling to 10 individuals or lower) in 10 generations. This increased to 43 percent with sustained small levels of mortality (1−2 female deaths per subpopulation per year). In a similar PVA, Goldsworthy et al. (2010) determined that in the absence of anthropogenic mortality and assuming a stable population trajectory and density-independence, 50 percent of subpopulations in SA had a greater than 10 percent probability of extinction within 100 breeding cycles. This increased to 77 percent with the addition of the estimated fisheries bycatch mortality at the time.

A PVA has not been undertaken at the national level for the species, and it is difficult to extrapolate the above analyses to the total population.

Following assessment of the information the Committee has determined that there are insufficient data to demonstrate if the species is eligible for listing under this criterion.

Conservation actions

Recovery plan

The Committee recommends that there should be a recovery plan for the species. Stopping decline and supporting recovery is complex, due to the requirement for a high level of planning to abate the threats, a high level of support by key stakeholders, a high level of prioritisation and a highly adaptive management process. Existing mechanisms are not adequate to address these needs.

There is an existing recovery plan for the Australian Sea Lion (DSEWPaC 2013a), which is due to expire in October 2023. The objectives of the plan are to:

- Mitigate interactions between fishing sectors (commercial, recreational, and Indigenous) and the Australian Sea Lion to enable the recovery of all breeding colonies.
- Mitigate the impacts of marine debris on Australian Sea Lion populations.
- Mitigate the impacts of aquaculture operations on Australian Sea Lion populations.
- Investigate and mitigate other potential threats to Australian Sea Lion populations, including disease, vessel strike, pollution, and tourism.
- Continue to develop and implement research and monitoring programs that provide outputs of direct relevance to the conservation of the Australian Sea Lion.
- Increase community involvement in, and awareness of, the recovery program.

It is too early to determine what impacts implementation of the recovery actions have had on Australian Sea Lion populations.

Primary conservation actions

1. Minimise the bycatch of Australian Sea Lions in commercial fisheries.
2. Mitigate the impacts of marine debris on Australian Sea Lions.
3. Improve understanding of the threats posed to Australian Sea Lion populations, including cumulative impacts.

In response to the first of the above actions, the Australian Fisheries Management Authority implemented the Australian Sea Lion Management Strategy in 2010, the objective of which is to minimise accidental deaths of Australian sea lions within the Gillnet Hook and Trap Sector of the SESSF. This strategy can be accessed at: https://www.afma.gov.au/environment-and-research/protected-species/australian-sea-lions.

Conservation and management priorities

- The Committee notes that gillnet fisheries are one of the primary threats to this species. Significant changes have been made to the practices of the major gillnet fisheries within the range of the Australian Sea Lion (SESSF [Commonwealth], TDGDLF [WA]) and these are likely to contribute to recovery over time, but are not yet reflected in monitoring. A key goal of future monitoring should be the ability to detect and demonstrate if recovery is occurring following these management changes.
- Marine debris
    - Assess the impacts of marine debris on Australian Sea Lion populations, and identify the sources of marine debris which have an impact.
    - Develop and implement measures to mitigate the impacts of marine debris on the species (including reducing the amount of these marine debris entering the oceans), noting linkages with the Threat Abatement Plan for the Impact of Marine Debris on Vertebrate Marine Life.
- Disease and parasites
    - Improve human wastewater management to minimise dispersal of bacteria, parasites and pollutants into the marine environment.
    - Undertake treatment of hookworm and other parasites in neonatal pups using anti-parasitic agents.
- Pup mortality from conspecifics
    - Investigate measures for increasing protective habitat for pups (for example providing suitable artificial structures) at Seal Bay.

- Fishing activities
    - Continue management measures (including monitoring, management response, compliance and review) to minimise the bycatch/mortality of Australian Sea Lions in commercial fisheries and aquaculture facilities that overlap with the distribution of the Australian Sea Lion.
    - Implement mitigation measures in other fisheries (commercial, recreational and Indigenous) that have impacts on Australian Sea Lions, where required.
- Deliberate killing
    - Collect data on deliberate killings and encourage the reporting of deliberate killings to relevant jurisdictional bodies.
- Habitat degradation and pollution
    - Investigate the nature, extent and consequence of interactions between Australian Sea Lions and aquaculture activities, and mitigate any impacts (e.g. reduced habitat availability).
    - Implement measures to minimise the impacts of water pollution from marine aquaculture.
    - Require all vessels to have oil spill mitigation measures in place, and implement jurisdictional oil spill response strategies as required.
    - Protect all sea lion habitat from habitat degradation due to onshore and offshore developments.
- Human disturbance
    - Monitor and mitigate impacts (including cumulative impacts) of human interactions on Australian Sea Lion colonies.
    - Control access to breeding colonies to minimise the impacts of disturbance on Australian Sea Lions.
- Competition and prey depletion
    - Sustainably manage fish species that are important prey for Australian Sea Lions, and reduce fishing pressure if required.
- Climate change
    - Review and adjust management measures to address the threats from disease/parasites and prey depletion, if it is demonstrated that increased temperatures compound these threats.

Stakeholder Engagement

- Provide advice, education and support to fishers, community members, local governments, Indigenous organisations and regional natural resource management organisations on threats to the Australian Sea Lion and implementation of recovery actions.
- Provide information for tourists and tourism operators to promote an understanding of the Australian Sea Lion's threatened status and conservation issues, and to emphasise the importance of minimising disturbance of Australian Sea Lion colonies during visits.
- Involve community groups and tour operators in research and monitoring programs, where practical.

Survey and monitoring priorities

- Monitor population size, population trends and distribution by implementing the Australian Sea Lion monitoring framework (Lawrence & Bravington 2016; Pitcher 2018) across the species' range. In particular, monitor key colonies every breeding season to maintain knowledge of the breeding schedule and ensure accurate estimates of pup production.

Include permanent identification of pups (subcutaneous microchips) for ongoing survival and reproductive data.

- Given potential inter-site variability in the abundance and trends within and between regions across the range of the species, where possible population trend and distribution monitoring should be supplemented with comprehensive regional surveys.
  - Utilise emerging technologies such as aerial surveys, drones and remote cameras to provide a more comprehensive and complete assessment of population size and trends across the species range. Where possible, remote monitoring should be ground-truthed with appropriately timed on-ground pup counts.
  - Explore regional and species wide trends in abundance, and the local and regional factors that may be driving variation in trends in abundance across the range of the species.
  - Priority should be given to sites and regions where there is currently an absence of baseline abundance and trend data.
- Evaluate the feasibility and cost-effectiveness of remote camera methods for long-term monitoring of populations, particularly in remote locations.
- Develop standard forms for reporting and recording data, in order to provide consistent data collection; store data in a centralised online database for data management.
- Monitor the cumulative impacts of fisheries on Australian Sea Lion populations, including from bycatch, prey depletion, reduction in habitat availability, and entanglement in active fishing gear.
- Monitor the health of colonies for illness due to disease/parasites.

Information and Research priorities

- Assess the effectiveness of management actions in helping the recovery of Australian Sea Lion populations, and the need to adapt them if necessary.
- Improve knowledge on the spatial and temporal use of food resources by the Australian Sea Lion (Including trophic interactions) at the colony level, particularly in areas important to the survival of the species (e.g. vulnerable smaller colonies, or where numbers are declining), and investigate whether this affects the reproductive success of females.
- Improve knowledge on the impacts of fishing on populations, by assessing:
  - the impacts of fisheries other than the gillnet and rock lobster sectors;
  - the impacts of fishing on prey species of Australian Sea Lions, and the sensitivity of important prey species to changes in the ecosystem;
  - the impacts of fishing gear and infrastructure on the preferred habitat of, or habitat availability for, Australian Sea Lions.
- Improve understanding of the threat posed to Australian Sea Lion populations by deliberate killings, vessel strike, pollution and oil spills, by:
  - developing protocols for the collection of biological samples (to determine the cause of ill-health or death) and ensure that a portion of each sample (including those already collected) is centrally archived;
  - collecting data on deliberate killings and confirmed vessel strikes.
- Improve understanding of the threat and importance of health-related factors to Australian Sea Lion populations by:
  - undertaking research on pup mortality due to disease and parasites, and the drivers for variance in pup production and mortality across seasons (including apparent seasonal cycles) and between colonies;

- analysing the impacts of bioaccumulation of toxins on the health of Australian Sea Lions.

- Evaluate the efficacy of using a broad spectrum treatment to kill parasites (e.g. whether this improves pup survival), the potential environmental impacts of the treatment (e.g. aquatic toxicity), and the risk of parasites developing resistance;
- Assess the level of human interactions with Australian Sea Lions, and identify the cumulative impact of human interactions on Australian Sea Lion populations.
- Investigate the impacts of climate change, including:
  - the impacts of increasing ocean temperatures on the susceptibility of Australian Sea Lions to disease/parasites, and on prey species of Australian Sea Lions;
  - identify colonies at risk of becoming submerged under projected sea level rise, and the potential impact on the recovery of the species.

<u>Recommendations</u>

(i) The Committee recommends that *Neophoca cinerea* be transferred to the status of Endangered in the list referred to in section 178 of the EPBC Act.

(ii) The Committee recommends that the current recovery plan should be retained and updated as required.

Threatened Species Scientific Committee

03/06/2020

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