

Submission to the Senate Inquiry on Australia's faunal extinction crisis

The ongoing decline in the population and conservation status of threatened fauna

National Environmental Science Program Threatened Species Recovery (TSR) Hub

The Hub's research aims to support recovery of terrestrial and freshwater threatened species and biodiversity. Among the authors of this submission are individuals who have devoted decades of their lives to understanding threatened species and the factors that affect them, and worked with many policy-makers, on-ground managers and the community to help conserve these species.

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This submission addresses the following term of reference for the Inquiry:

(a) the ongoing decline in the population and conservation status of Australia's nearly 500 threatened fauna species

Premise of submission

The submission provides context to the Inquiry by reporting on and interpreting information about the extent of ongoing decline in the status of Australia's threatened species. Since the inception of the EPBC Act there have been extinctions and ongoing declines in threatened species populations, indicating a need to adjust legislative, policy, management, and practice settings to achieve the Act's objective of preventing extinction.

Key Issues

- In a global context, the rate of extinctions for mammals in Australia is exceptionally severe.
- Extinctions of Australian animal species are continuing: in the last decades, two Australian endemic mammal species have been rendered extinct, one reptile species has been made extinct and two other Australian reptile species have been rendered extinct in the wild. Again, this number of recent extinctions of vertebrates is exceptional by global standards.
- The number of animal species listed as threatened under the EPBC Act has increased by ca. 57% since the Act's inception and is continuing to increase.
- Only 13 animal species have been de-listed since the Act's inception, and only one of these (Muir's corella) may be considered a case of genuine improvement.
- The EPBC Act conservation status of five animal species has been down-listed (i.e. to a less threatened status) since the Act's inception, mostly due to taxonomic review or new information indicating that the species was not as imperilled as originally thought. In contrast, 46 species have had their conservation status up-listed, mostly because of ongoing and severe deterioration in their conservation outlook.

- Where recent population trajectory information is available, the overwhelming trend for EPBC Act-listed animal species is for ongoing population decline (174 species); in contrast, only three listed species are considered to be increasing. Extinction is a likely end result of ongoing population decline for threatened species. The evidence is clear: recovery – the goal of threatened species management – is not being achieved for the vast majority of listed species.

What is working?

- For a small minority of species (mostly highly imperilled mammals), intensive management (such as exclosure fencing and translocations to cat-free islands) is producing some recovery.
- The ongoing incremental increase in the number of species listed as threatened is slowly remedying the lack of comprehensiveness of the original EPBC Act list.

Implications

- A1. Following IUCN guidelines, the explicit basis for de-listing, down-listing or up-listing should be given for all cases where the EPBC Act conservation status of a taxon is changed, or reviewed and not changed, in a manner that can readily be used to determine whether such change is due to real recovery (or decline) or other factors such as taxonomic changes. Such reporting has recently been undertaken, but is not currently mandated under legislation.
- A2. Regularly reporting the population trajectory of all EPBC Act listed species (along with the reliability of such trajectory information), would act as a measure of the benefits (or otherwise) of listing, could guide intensive recovery efforts, and help prioritise actions to conserve consistently declining species.
- A3. A formal process of regular (e.g. every 10 years) re-assessment of the conservation status of all listed threatened species would ensure that a species' listed status provides a timely and accurate indicator of a species' changing extinction. Rapidly declining species could be re-assessed more frequently.
- A4. The listing under the EPBC Act of *Extinct* species be reviewed and updated more frequently to ensure that it more properly reflects the known extent of loss of Australian biodiversity since European settlement.
- A5. Data about trends in listed species should be included in a national System of Environmental-Economic Accounts that are used together with the System of National Accounts in decision-making about natural resource management.

Discussion

The rate loss of Australian mammals and reptiles is exceptionally high

Australia's record of extinctions is exceptionally poor. The proportional extent of loss has been largest for endemic mammals: at least 34 Australian mammal species have been made extinct since European settlement (see Supplementary Information S1). Note that 27 mammal taxa are listed as Extinct under the EPBC Act, however this includes seven subspecies, so only 59% of the extinctions of Australian mammal species are formally acknowledged under the Act, severely under-playing the extent of loss.

The 34 mammal extinctions comprise more than 10% of the ca. 325 Australian terrestrial mammal species present at 1788. No other country – indeed no other continent – has suffered anywhere near that many mammal extinctions over this period. Indeed, the IUCN Red List considers that 'only' 83 mammal species have been made extinct since 1500 – although that tally is incomplete, and especially so for Australian mammals. As a contrast, and to highlight the exceptionality of the Australian extent of loss, only one terrestrial mammal species, the sea mink *Neovison macrondon*, was made extinct in continental North America over the last 200 years (IUCN Red List database).

Notably, **the rate of Australian mammal extinctions has continued largely unabated, with an average of 1-2 Australian endemic mammal species being made extinct per decade since about the 1850s**. Two Australian endemic mammal species, the Bramble Cay melomys and Christmas Island pipistrelle, have been made extinct since 2009 (Woinarski *et al.* 2017). In contrast, there have been no extinctions this century of mammal species elsewhere in the world (IUCN Red List database). Although these two latest Australian mammal extinctions were of species with very small (island) ranges, a feature of the extinctions of the Australian mammal fauna was that many of the now-extinct species had vast ranges and large population sizes.

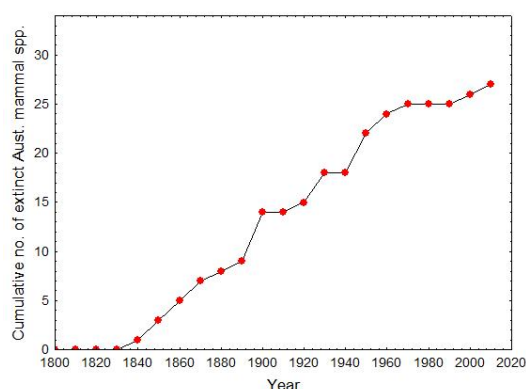


Figure 1. The cumulative number of extinctions of Australian endemic mammal species across time, since 1800. Note that, for some species, the dating of extinction is too difficult to assess, so the graph does not include all extinct species. (Modified from Woinarski *et al.* 2014).

Extinctions in Australian reptiles are also notable. The first known extinction of an Australian endemic reptile species since 1788 occurred in 2014, with the death in captivity of the last known Christmas Island forest skink *Emoia nativitatis*. Two other Australian endemic lizards, Lister's gecko *Lepidodactylus listeri* and blue-tailed skink *Cryptoblepharus egeriae*, became extinct in the wild at

about the same time (with last records in the wild of 2012 and 2010 respectively). The extinction, or extinction in the wild, of these three Australian endemic lizards represents about 10% of the 31 global reported reptile extinctions since 1500 (IUCN Red List database). Other than the case of the death in captivity in 2012 of 'Lonesome George', the last surviving Pinta giant tortoise *Chelonoidis abingdonii* whose wild population was extirpated in the 1970s, these three Australian reptile extinctions are the only known extinctions of reptiles in the world since the 1970s.

A notable feature of the three extinctions of Australian endemic vertebrates that occurred in the last decade is that there was no formal government review or Inquiry into those losses. Such coronial or other inquiries are good practice for many other aspects of unexplained deaths or of systemic failures in the governance of our society. They provide a mechanism for identifying the factors that caused the losses and of the shortcomings in policy or management that failed to prevent those poor outcomes; and they provide a means to learn from the failures and hence institute better practice or policy settings such that future comparable losses can be made less likely to occur (Woinarski *et al.* 2017).

Listed threatened fauna species are undergoing continuing decline

As at 31 July 2018, there are 511 animal taxa (species, subspecies and populations) listed as Extinct, Threatened or Conservation Dependent under the EPBC Act. This is a substantial increase from the ca. 327 animal taxa listed at the Act's establishment in 2000.

Over the period since 2000, 15 animal taxa have been de-listed, of which two (ghost bat *Macroderma gigas* and western grass-wren (Gawler Ranges) *Amytornis textilis myall*) have subsequently been re-listed. [Note that two other animal species – the spotted-tailed quoll (SE Australia) *Dasyurus maculatus* and grey nurse shark *Carcharias taurus* – were de-listed as single entities but re-listed at the same time each with two constituent taxa.]

In contrast to the well-defined IUCN process (IUCN Standards and Petitions Subcommittee 2016), whereby the reasons for de-listing (or up-listing or down-listing) must be explicitly given (e.g. because of genuine improvement in status, because of taxonomic change, or because of the availability of more information, etc.), the Act (at s. 186) does not require that the reasons for de-listing (e.g. because of genuine improvement, taxonomic review, or increase in knowledge) be provided, and such categorical explanation has not been provided consistently in the past Advices to Minister recommending de-listing – although we recognise and welcome that the categorical basis for de-listing has been provided by the TSSC in recent advices. The historic lack of consistency makes it difficult to determine whether de-listings of species formerly regarded as threatened under the Act arise due to recovery aided by management or other inputs arising from listing. Our assessment is that almost all of the EPBC Act de-listings of animal species are due simply to taxonomic reappraisal (e.g. Roper River scrub-robin *Drymodes superciliaris colcloughi*, Boullanger Island dunnart *Sminthopsis griseoventer boullangerensis*) or to new information indicating that the original listing was probably unjustified (mostly arising from surveys finding new populations: e.g. graceful sun-moth *Synemon gratiosa*, Gove crow butterfly *Euploea alcathoe enastri*, slender-billed thornbill (western) *Acanthiza iredalei iredalei*). Our assessment indicates that **only one animal taxon has been de-listed since the Act's inception because of genuine improvement in status**: this case is

Muir's corella *Cacatua pastinator pastinator*, which has undergone substantial population increase, perhaps due to effective enforcement of conservation laws, although other factors may have been involved.

In contrast to the 15 de-listings of animal taxa since the Act's inception, 199 animal species (of which one was newly listed as Extinct) have been added to the list of threatened species since the initial set of listings in 2000. This substantial increase in the number of listed threatened animal species does not necessarily imply a deterioration in the conservation of Australia's fauna (although it mostly likely does so), but is also largely because of the substantial lack of comprehensiveness in the original listing (i.e. although the set of animal species transferred to the EPBC Act threatened listing at its inception was reasonably complete for birds and mammals, it included only a very small proportion of imperilled species in other animal groups). This lack of comprehensiveness has not yet been remedied, with many highly imperilled fauna species, particularly of less well known taxonomic groups, not yet listed.

Many listed threatened species are not monitored (see our response to Term (i)). However, an assessment of the current population trajectory of species is a requirement for the consideration of the IUCN Red List conservation status of species, and this information is partly independent of the EPBC Act listing process. We aggregated this IUCN-derived trajectory information for EPBC Act-listed threatened frogs, reptiles, birds and mammals (280 endemic taxa only, see Supplementary information S3). Overwhelmingly, this evidence demonstrates that EPBC Act-listed threatened animal species are undergoing continuing decline (174 taxa = 62% of considered taxa); in contrast, only three EPBC Act-listed threatened animal taxa are reported in the IUCN assessment to be showing population increase (1.1% of considered taxa) (Gould's petrel *Pterodroma leucoptera leucoptera*, Glossy Black-Cockatoo (Kangaroo Island) *Calyptorhynchus lathami halmaturinus*, and Western Barred Bandicoot (Shark Bay) *Perameles bougainville bougainville*). If this assessment considers species only (i.e. excluding listed subspecies), the population trajectory given in IUCN assessments is for 112 EPBC Act-listed species to be decreasing, 23 to be stable, 25 to have unknown trends, and 0 to be increasing. Hence, listing is generally not achieving recovery, at least over the ca. 20-year time period over which the EPBC Act has operated.

For those species that are currently monitored, we can apply trend analysis methods to investigate whether they are declining or increasing. In a NESP TSR project, we used the Living Planet Index to evaluate trends in Australia's threatened birds – this Index is used to inform five of the Aichi Biodiversity Targets, in particular Target 12, preventing extinction of known threatened species. We found that, for the small percentage of Australian species that are monitored well enough to produce reliable data over time, threatened birds are overall declining (Bayraktarov et al. 2018).

Note that this assessment of population trends for listed species should not be construed to indicate that listing is having no beneficial impact: quite likely, declining trends may have been even more pronounced for many listed taxa had they not been listed. Indeed listing (and the conservation benefits that listing sometimes may generate) may have prevented some extinctions.

Inadequacy of current listing review processes

There is no formal process under the EPBC Act for regular review of the conservation status of listed threatened species (cf. some jurisdictions, such as the Northern Territory). Lacking such obligation to periodically review the status of threatened species, consideration of down-listing or up-listing to reflect improved knowledge tends to be opportunistic and incidental. Since the Act's inception, five animal taxa have been down-listed (e.g. from Endangered to Vulnerable), in all cases because information obtained since the original listing demonstrated that that the taxon had a larger population than that thought at the time of the original listing, i.e. rather than genuine recovery in response to management. In contrast, 46 species have been up-listed (Supplementary Information S2), in some cases by two categories (e.g. from Vulnerable to Critically Endangered). In almost all of these up-listing cases, it is because of genuine deterioration in the status of the species, notwithstanding any protection that inclusion on the EPBC Act list may have provided. Given that the assessment process does not require regular or comprehensive review of the conservation status of listed species, the number of down-listings and up-listings is likely to represent a substantial underestimate of the actual number of listed species whose status merits changing.

For some Australian species, the rapid rate of population decline often requires rapid response in the determination of conservation status (and in the urgency and effectiveness of management), and the current administrative process may not keep up with the rate of decline. For example, the Christmas Island pipistrelle was listed as Endangered in 2001, and up-listed to Critically Endangered in 2006, only three years before its extinction (Woinarski 2018). The Christmas Island forest skink was not listed as threatened under the EPBC Act until January 2014, nearly four years after it was last reported in the wild, and only four months before its extinction (Andrew *et al.* 2018; Woinarski *et al.* 2017).

The large proportion of listed threatened species that are undergoing continued decline is a serious concern, because many of these species are already close to extinction, and the inevitable consequence of ongoing population decline is extinction.

Explanatory notes:

The endemic EPBCA-listed taxa reported to have stable (60 taxa, or 21% of those considered) or increasing populations are mostly mammal species that have suffered historic catastrophic decline to very low population size, but for which havens (such as cat-free islands or predator-proof enclosures) now allow for some population increase. Note, however, that this population increase is relative to the extremely low population sizes these species had reached; even with the contribution of havens, the population sizes and distributions of these mammal species are a tiny fraction of their pre-European values.

*We note also that the assessment here relates to recent and current population trajectories. A recent analysis of the conservation outlook for Australian birds and mammals by the NESP TSR Hub indicates that – with continuation of the current levels of conservation management – the rate of extinctions in Australia for these two groups of species is likely to increase substantially over the next 20 years (Geyle *et al.* 2018).*

Supplementary information

Supplementary information S1: Australian endemic mammal species that have been made extinct since European settlement of Australia

The complement of species present in Australia at 1788 is imperfectly known, because some species present then may have disappeared without trace. A range of lists and tallies have been reported, with the list of Extinct species recognised by the *Environment Protection and Biodiversity Conservation Act* not including many species known to be extinct. For example, the EPBC Act list, as at 31 July 2018, recognised only 20 Australian mammal species as extinct. This formal under-reporting of extinction is a problem, as it results in an under-estimate in the extent of our biodiversity loss.

The table below lists 34 mammal species that have been made extinct in Australia since 1788. We note: (1) the listing of extinct *Perameles* species follows recent taxonomic review (Travouillon and Phillips 2018); (2) this listing excludes the possible extinction of *Zaglossus bruijnii* in Australia (Helgen *et al.* 2012) due to doubts about the provenance of the only known Australian specimen (Burbidge in press) and because this species also occurs beyond Australia; (3) this listing also excludes three recognised but not yet described rodent species (one *Pseudomys* and two *Notomys* species) from the Kimberley, known only from subfossil material that may have post-dated European settlement (Start *et al.* 2012).

<i>Thylacinus cynocephalus</i>	Thylacine
<i>Chaeropus ecaudatus</i>	Pig-footed Bandicoot
<i>Perameles eremiana</i>	Desert Bandicoot
<i>Perameles fasciata</i>	Liverpool Plains Striped Bandicoot
<i>Perameles myosorus</i>	Marl
<i>Perameles notina</i>	South-eastern Striped Bandicoot
<i>Perameles papillon</i>	Nullarbor Barred bandicoot
<i>Macrotis leucura</i>	Yallara, Lesser Bilby
<i>Bettongia anhydra</i>	Desert Bettong
<i>Bettongia pusilla</i>	Nullarbor Dwarf Bettong
<i>Caloprymnus campestris</i>	Desert Rat-kangaroo
<i>Potorous platyops</i>	Broad-faced Potoroo
<i>Lagorchestes asomatus</i>	Kuluwarri, Central Hare-wallaby
<i>Lagorchestes leporides</i>	Eastern Hare-wallaby
<i>Notomacropus greyi</i>	Toolache Wallaby
<i>Onychogalea lunata</i>	Crescent Nailtail Wallaby
<i>Crocidura trichura</i>	Christmas Island Shrew
<i>Pteropus brunneus</i>	Dusky Flying-fox
<i>Nyctophilus howensis</i>	Lord Howe Long-eared Bat
<i>Pipistrellus murrayi</i>	Christmas Island Pipistrelle
<i>Conilurus albipes</i>	White-footed Rabbit-rat

<i>Conilurus capricornensis</i>	Carpentarian Rabbit-rat
<i>Leporillus apicalis</i>	Lesser Stick-nest Rat
<i>Notomys amplus</i>	Short-tailed Hopping-mouse
<i>Notomys longicaudatus</i>	Long-tailed Hopping-mouse
<i>Notomys macrotis</i>	Large-eared Hopping-mouse
<i>Notomys mordax</i>	Darling Downs Hopping-mouse
<i>Notomys robustus</i>	Broad-cheeked Hopping-mouse
<i>Pseudomys auritus</i>	Long-eared Mouse
<i>Pseudomys glaucus</i>	Blue-grey Mouse
<i>Pseudomys gouldii</i>	Gould's Mouse
<i>Melomys rubicola</i>	Bramble Cay Melomys
<i>Rattus macleari</i>	Maclear's Rat
<i>Rattus nativitatis</i>	Bulldog Rat

Supplementary information S2: Population trajectory of EPBC Act-listed threatened animal species, based mainly on recent IUCN assessments

Note that few of the EPBC Act-listed threatened invertebrate and fish species have been Red List assessed, so these taxonomic groups are not included here. Note also that IUCN Red List assessments are at species level rather than at subspecies level, so population trajectories for EPBC Act-listed threatened bird and mammal subspecies were derived from the relevant recent Action Plans (Garnett *et al.* 2011; Woinarski *et al.* 2014). This tabulation excludes Extinct species, and species that are not endemic to Australia (given that the Red List assessment of population trajectories for such species may reflect trends outside Australia). Note that the date of the Red List assessment of population trajectory is not constant, but for birds, reptiles and mammals has mostly been 2015 or later.

Note that there is an element of non-independence in this assessment, given that population decline may be one of the eligibility criteria for listing as threatened. However, almost all of the trajectories given here post-date listing.

Years on EPBC Act list	Current population trajectory				
	Decreasing	Stable	Unknown	Increasing	Not given
18	116	47	21	3	9
15-17	10	1	0	0	2
12-14	10	2	1	0	1
9-11	5	1	0	0	0
6-8	9	1	1	0	0
3-5	16	6	2	0	3
0-2	8	2	2	0	1
Total	174	60	27	3	16

Supplementary information S3: Tabulation of animal species whose EPBC Act conservation status has been down-listed (e.g. from EN to VU) or up-listed since 2000

		Initial listing			
		CR	EN	VU	Conservation Dependent
Re-listed as	EX(W)		1 (Pedder Galaxias <i>Galaxias pedderensis</i>)		
	CR		17 (Spotted Handfish <i>Brachionichthys hirsutus</i> ; Armoured Mistfrog <i>Litoria lorica</i> ; Mountain Mistfrog <i>Litoria nyakalensis</i> ; Southern Corroboree Frog <i>Pseudophryne corroboree</i> ; Western Swamp Tortoise <i>Pseudemadura umbrina</i> ; Hooded Robin (Tiwi Islands) <i>Melanodryas cucullata melvillensis</i> ; Orange-bellied Parrot <i>Neophema chrysogaster</i> ; Western Ground Parrot <i>Pezoporus flaviventris</i> ; Helmeted Honeyeater <i>Lichenostomus melanops cassidix</i> ; Regent Honeyeater <i>Anthochaera phrygia</i> ; Swift Parrot <i>Lathamus discolor</i> ; Christmas Island Pipistrelle <i>Pipistrellus murrayi</i> ; Gilbert's Potoroo <i>Potorous gilbertii</i> ; Leadbeater's Possum <i>Gymnobelideus leadbeateri</i> ; Christmas Island Shrew <i>Crocidura trichura</i> ; Northern Hairy-nosed Wombat <i>Lasiorhinus krefftii</i> ; Central Rock-rat <i>Zyzyomys pedunculatus</i>)	7 (Red Handfish <i>Thymichthys politus</i> ; Speartooth Shark <i>Glyphis glyphis</i> ; Kroombit Tinker Frog <i>Taudactylus pleione</i> ; Northern Corroboree Frog <i>Pseudophryne pengilleyi</i> ; Lister's Gecko <i>Lepidodactylus listeri</i> ; Plains-wanderer <i>Pedionomus torquatus</i> ; Western Ringtail Possum <i>Pseudocheirus occidentalis</i>)	1 (Southern Bent-wing Bat <i>Miniopterus orianae bassanii</i>)
	EN			20 (Murray Hardyhead <i>Craterocephalus fluviatilis</i> ; Leatherback Turtle <i>Dermochelys coriacea</i> ; Bulloo Grey Grasswren <i>Amytornis barbatus barbatus</i> ; Australian Painted Snipe <i>Rostratula australis</i> ; Southern Black-	

				<p>throated Finch <i>Poephila cincta cincta</i>; Tiwi Islands Masked Owl <i>Tyto novaehollandiae melvillensis</i>; Mallee Emu-wren <i>Stipiturus mallee</i>; Grey-headed Albatross <i>Thalassarche chrysostoma</i>; Purple-crowned Fairy-wren (western) <i>Malurus coronatus coronatus</i>; Christmas Island Frigatebird <i>Fregata andrewsi</i>; Lord Howe Woodhen <i>Hypotaenidia sylvestris</i>; Noisy Scrub-bird <i>Atrichornis clamosus</i>; Baudin's Cockatoo <i>Calyptorhynchus baudinii</i>; Western Bristlebird <i>Dasyornis longirostris</i>; Crimson Finch (white-bellied) <i>Neochmia phaeton evangelinae</i>; Tasmanian Devil <i>Sarcophilus harrisii</i>; Subantarctic Fur-seal <i>Arctocephalus tropicalis</i>; Black-flanked Rock-wallaby <i>Petrogale lateralis lateralis</i>; Heath Mouse <i>Pseudomys shortridgei</i>; Numbat <i>Myrmecobius fasciatus</i>)</p>	
	VU	1 (Bare-rumped Sheath-tailed Bat <i>Saccolaimus saccolaimus nudicluniatus</i>)	4 (Semon's Leaf-nosed Bat <i>Hipposideros semoni</i> ; Large-eared Horseshoe Bat <i>Rhinolophus robertsi</i> ; Red-tailed Phascogale <i>Phascogale calura</i> ; Julia Creek Dunnart <i>Sminthopsis douglasi</i>)		

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