Australian Academy of Science

SUBMISSION TO THE

# SENATE INQUIRY INTO THREATENED SPECIES

**FROM THE AUSTRALIAN ACADEMY OF SCIENCE / SEPTEMBER 2018**

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## Overview

As a developed nation with a unique and rich (megadiverse) fauna, Australia has a global responsibility to protect its species. This responsibility is embodied in international obligations under the Convention on Biological Diversity (CBD) and other instruments, and national environment legislation, including the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) and similar laws of State and Territory governments. The Australian Academy of Science submission to this Inquiry focuses on those Terms of Reference where published research can provide guidance and insight. Accordingly, this submission will focus on terms a, b, d, f, g, i and j.

## Recommendations

The Academy makes the following recommendations to address Australia's faunal extinction crisis:

- **Increase attention to and funding for ameliorating major threatening processes** – especially land clearance, invasive species and inappropriate fire regimes. Each of these will also interact with impacts of accelerating climate change. Effective management will require a regional, ecosystem-based approach, as allowed under the EPBC Act
- **Develop and fund priority actions for management of faunal groups beyond birds and mammals, especially fish.** It may be possible to combine recovery actions for groups of aquatic species (fish, turtles, frogs) where there are common threatening processes
- **Deal with data deficiencies caused by inadequate taxonomic knowledge of Australia's biota**, and by inadequate range and status information for many species
- For priority species across all faunal groups, **update (with stakeholder engagement) and resource Recovery Plans established under the EPBC Act.** Again, it should be possible to achieve efficiencies through multi-species, regional approaches given common threats
- **The Department of Environment should seek advice from the scientific community** on how advances in technologies and methods for monitoring and modelling can improve "best practice" and create efficiencies for management of threatened species. This should be done at regular intervals to ensure policy makers and managers are informed of, and able to use, these advances to the benefit of Australian fauna. The Australian Academy of Science National Committee for Ecology, Evolution and Conservation is an appropriate body to provide such advice.

## Responses to the Terms of Reference

### *a. The ongoing decline in the population and conservation status of Australia's nearly 500 threatened fauna species*

The most recent accounting of the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (accessed September 6, 2018) lists 892 Australian species of animal that are either extinct (40 species), critically endangered (106 species), endangered (196 species) or vulnerable (590 species). This is around 13% of the 6923 species so far assessed according to IUCN criteria.

Given the vast majority of Australian species are unique to our continent and not found anywhere else on the planet, the Academy considers that ensuring the survival of these species is the responsibility of the Australian government and the Australian people. Indeed, several extinct or threatened species represent significant parts of the tree of life (Woinarski, et al., 2015).

The situation is especially dire for our globally unique mammals, 10% of which have become extinct since European colonization and a further 21% now classified as threatened. Noting the time lag between last sighting to declaring a species extinct, there is as yet no sign of reduction in the rate at which we are losing species of mammals (Woinarski, et al., 2015). The recent extinctions of a bat and lizard found only on Christmas Island, and a rodent found only on Bramble Cay in Torres Strait emphasise the need to change how we assess threats and act on them (Woinarski, et al., 2017).

The present Threatened Species Strategy does not include in any meaningful way, fish, amphibian or reptile species, or invertebrates. In 1993, an Action Plan for Australian freshwater fish (Wager & Jackson, 1993) identified 18 species with high priority for conservation investment (with estimated cost of $3.6M). Currently there are 36 species at the highest priority listed under the EPBC Act, with another 38 listed under state legislation or by the Australian Society for Fish Biology. This is about 25% of the total known fauna (~300 species; ~70% endemic), which is itself likely to be a substantial underestimate. Further, a recent analysis identified some 55 species that are potentially vulnerable, mostly in northern Australia (Le Feuvre, et al., 2016). For frogs and reptiles, 32 and 63 species respectively are currently listed under the EPBC act, emphasising the need for explicit actions led by Federal agencies.

To address declining populations among threatened species, causal processes must be addressed. The major threatening processes in Australia today are invasive species, broad scale ecosystem modification, inappropriate fire management, habitat clearing for agriculture, and climate change. This mix is quite different from that which occurs on other continents and requires Australian-specific research and action (Woinarski, et al., 2015; Kearney, et al., 2018). Addressing single threatening processes, such as predation by cats, is important and may achieve measurable outcomes, but is insufficient if other threatening processes are not addressed.

The present Threatened Species Strategy takes a “top 20” approach to threatened species management, where 20 threatened mammal species, 20 threatened bird species and 30 threatened plants are targeted for intervention to improve their population trajectories. The Academy recommends a more holistic approach, where **ecosystem-level targets are considered** supplemented by monitoring of a comprehensive suite of indicator species. In addition, faunal groups beyond mammals and birds must be considered in the Threatened Species Strategy, especially fish, frogs and reptiles.

Despite the serious plight of a large proportion of the fauna, successful recovery of species is possible given sustained effort and investment over decades. Urgent recovery actions have rescued four fish species from imminent extinction (Lintermans, 2013; Lyons, et al., 2018) and a multispecies, system-level approach has proven successful for conservation of multiple threatened species in the Mary River in Queensland (Smith & Connell, 2018). With ongoing management and investment our threatened species can recover.

Common characteristics of successful actions are:

1. Strategic planning based on scientific evidence and action plans that are flexible to enable rapid response to changing circumstances
2. Action plans implemented by an effective and representative group of stakeholders with one or more champions who are committed over the long term (allowing continuity of knowledge transfer)
3. Legislative and policy settings that support the recovery effort
4. Adequate and continuous resourcing of recovery actions
5. Effective communication with decision makers and the public (Garnett, et al., 2018).

The Academy notes that effective and well-resourced Recovery Plans established under the EPBC Act meet these predictors of success.

### *b) The wider ecological impact of faunal extinction*

There is as yet sparse evidence for direct ecological impact of extinctions on Australian ecosystems. However, it is known that loss of species will have a major impact on ecological processes and will severely affect ecosystems (Young, et al., 2016). Depending on the level of redundancy of ecological functions across species, we would expect some impact on key roles such as seed dispersal, pollinator services, and soil aeration/processes. The loss of many mid-size burrowing mammals from the arid and semi-arid rangelands, and their replacement by hard-hooved cattle and sheep for agriculture, is likely to have detrimental effects on soil processes and productivity. Reversing these changes is possible if an ecosystems approach is taken: for example, recent studies of soil processes following reintroduction of bettongs to semi-natural enclosures demonstrate positive effects on soil fungi, which in turn are critical to woodland health (Batson, et al., 2016) and hence may have flow-on effects to other threatened woodland species.

*d) The adequacy of Commonwealth environment laws, including but not limited to the Environment Protection and Biodiversity Conservation Act 1999, in providing sufficient protections for threatened fauna and against key threatening processes*

Recovery Plans (RPs) backed by the EPBC Act have – when properly resourced – been effective in reversing declines of many species. Conversely, the absence of enforcement and/or resourcing has been a contributing factor in recent extinctions (Woinarski, et al., 2017). In its original form the EPBC Act mandated development of RPs for listed species. However, amendments in 2006 reduced the requirement to 'conservation advice'. In practice, the Minister can choose to ignore 'conservation advice', where RPs were previously legally binding instruments. This clearly is a retrograde step and should be reversed.

While the EPBC Act is a reasonably effective tool for ameliorating local impacts from processes such as land clearing (Woinarski, et al., 2015), it is demonstrably ineffective against broad-scale threatening processes. Addressing such processes – including introduced species, changed fire regimes and climate change – require a serious commitment, including listing as Key Threatening Processes (KTPs) and developing the ensuing Threat Abatement Plans (TAPs). At present the KTPs accepted under the EPBC Act range from the very specific to the very broad, the latter including impacts of land clearance, climate change and novel species. As yet, there is no specific KTP relating to changes in fire regimes. Thirteen TAPs have been developed, of which 11 relate to invasive species or pathogens. The absence of TAPs relating to land clearance, fire regimes and climate change is apparently justified by the Threatened Species Scientific Committee because of parallel initiatives across jurisdictions. There are grounds for concern that these other initiatives fail to explicitly consider impacts of these overarching KTPs, and interactions among them, on threatened species in the context of the EPBC Act. Without a stronger commitment to addressing threatening processes, the numbers of listed species will continue to grow, further over-stretching resources and leading to accelerating extinctions.

*f) The adequacy of the management and extent of the National Reserve System, stewardship arrangements, covenants and connectivity through wildlife corridors in conserving threatened fauna*

The National Reserve System (NRS) plays a key role in protecting faunal species, chiefly by protecting areas from further land clearing and associated habitat loss and degradation. However, due to other threatening processes – notably invasive species, novel pathogens and inappropriate fire regimes – many faunal species have declined or even gone extinct within the NRS. This includes frogs in the Australian Wet Tropics (McDonald & Alford, 1999), and small mammals in Kakadu National Park and other NRS areas (Woinarski, et al., 2011).

The NRS can only prevent further declines in threatened species if the managers (mostly state agencies or Indigenous Ranger Groups) have sufficient knowledge and resources for ecological management of fire, weeds and feral animals (Kearney, et al., 2018).

Further, while protected areas are extremely important, they can often only sustain populations of threatened species if the areas around them are managed sustainably. For example, invasion of introduced hot-burning grasses from adjacent pastoral properties into National Parks, such as gamba grass in Litchfield National Park, or buffel grass in West MacDonnell National Park (both in the Northern Territory) is modifying arid and monsoonal woodlands that are crucial to species persistence (Bowman, et al., 2014; Miller, et al., 2010).

Wildlife corridors through multiple use landscapes have an important function in connecting populations of threatened species in core protected areas and in providing breeding habitat. Wildlife corridors will be especially crucial as anthropogenic climate change impacts species – many species will need to move across habitats to track climate change. Rehabilitation of corridors across currently fragmented systems will therefore be crucial. This is substantiated in the 2012 *National Wildlife Corridors Plan* (Department of Sustainability, Environment, Water, Population and Communities, 2012) and such activities are strongly supported by community groups across the country and by the Academy.

### *g) The use of traditional knowledge and management for threatened species recovery and other outcomes as well as opportunities to expand the use of traditional knowledge and management for conservation*

The value of Traditional Ecological Knowledge (TEK) held by Australia's first peoples is becoming increasingly recognised in management of threatened species and the habitats on which they depend (Ens, et al., 2015). TEK was invaluable to understanding the scale and pace of declines of desert mammals (Ziembicki, et al., 2013) and to restoring historical fire-management in areas that (until recently) were depopulated or subject to inappropriate fire management. Indigenous Rangers have direct responsibility for management across Indigenous Protected Areas (IPAs), often in very remote regions that are otherwise not managed ecologically. Some three quarters of listed terrestrial and freshwater vertebrates occur in lands under some form of indigenous control, further emphasising the value of indigenous participation in recovering threatened species (Renwick, et al., 2017). The growth of IPAs and of Indigenous Ranger programs, both heavily informed by TEK, offers a clear pathway to increasing uptake of traditional knowledge in management within and beyond IPAs. It is important these programs retain stable and sufficient resourcing. TEK can and should be integrated with scientific knowledge to develop "two-way" management processes for threatened species recovery.

*h) The adequacy of existing funding streams for implementing threatened species recovery plans and preventing threatened fauna loss in general*

Given the large and increasing number of species listed for conservation, and associated recovery plans, it is inevitable governments (and NGOs) will need to prioritise investment. The Academy recommends **regional-level, systems-driven approaches that prioritise habitat preservation and addresses threatening processes across multiple species.** The "top 20"-style approach is useful for focussing public attention on threatened species, but risks allowing other groups of species, or other mammals or birds not in the top-20, to become yet more threatened as disrupting processes continue unchecked. The Academy recommends a cohesive strategy of overall prioritisation based on existential threat (including fauna other than mammals and birds), actions to identify other sets of species facing the same threatening processes, and multispecies or regional plans to ensure that the status of non "top-20" species do not decline further.

The Academy considers current levels of resourcing to be inadequate for its purpose, both for rigorous assessments of taxonomic groups or KTPs proposed for listing and development of RPs or TAPs, and for implementation of recovery actions. Australia is the only biologically megadiverse nation with a developed economy, but a 2013 analysis (Waldron, et al., 2013) found that Australia was among the 40 countries with the worst record of investment in conservation. This is before substantial cuts to funding of the Federal Department of Environment over recent years.

Given the uniqueness of Australia's biodiversity and our international responsibilities, this underfunding of all stages of threatened species management is disturbing. Australia must be a responsible steward for its environment, including its native biodiversity. The impact of periodic underfunding in many portfolios can be reversed as governments and their priorities change. But extinction of species is forever.

*i) The adequacy of existing monitoring practices in relation to the threatened fauna assessment and adaptive management responses*

Regular monitoring of faunal populations has demonstrated value in detecting unexpected declines, such as the rapid declines and extinctions of frogs in eastern Australian rainforests in the early 1990s, or the widespread decline of small mammals across our monsoonal tropics in the last 20 years. However, monitoring is often left to researchers or communities rather than governments, meaning resourcing is subject to the variability and uncertainty of competitive grant systems. Monitoring of threatened species should be a responsibility of government. The development of regular monitoring mechanisms ensures an appropriate action plan can be implemented and therefore prevent the further decline of already threatened species.

Specific monitoring of threatened species is currently inadequate. A recent review (Legge, et al., 2018) found that around 30% of listed species are not monitored at all, and for many others monitoring is insufficient to robustly detect change in population sizes. Monitoring of decline was inadequate for some species that are now – and recently – extinct, such as the Christmas Island pipistrelle (Woinarski, et al., 2017).

On-ground monitoring is labour-intensive, but is necessary at regular intervals, especially as populations respond to management (such as predator exclusion or habitat management) or to extreme climate events. It is crucial such monitoring is fit for purpose and cognisant of new developments in statistical modelling of trends in population size, structure and distribution. As a complement, there is high potential for use of new technologies from genomics and remote sensing (including but not limited to environmental DNA assays, camera traps, and drones). The capabilities present in the Australian science community can monitor occurrence, age, structure, diet and genomic diversity in managed systems as they respond to management (or lack thereof). The Federal Department of Environment has connected with a strong cadre of conservation biologists via the Threatened Species Hub of the National Environment Sciences Program. However, there is further innovation across the science sector that could be mobilised. The Academy strongly recommends the Department of Environment seek advice from the scientific community on how these advances in monitoring and modelling can improve "best practice" for management of threatened species.

### *i) The adequacy of existing assessment processes for identifying threatened fauna conservation status*

Accurate assessments based on adequate data is clearly a key first step in any effective conservation mechanism. Species that are poorly known, or indeed unknown, are unlikely to be adequately conserved (although this can be ameliorated to some extent if KTPs are managed across ecosystems). Two key data deficiencies mean Australia is not yet in a position to have a sound understanding of even a basic metric such as the number of threatened species.

The first is that current best estimates are 70% of the Australian biota are undiscovered and un-named. Given the broad scale of threats discussed under a) above (invasive species, broad-scale ecosystem modification, inappropriate fire management, habitat clearing for agriculture, and climate change), it is very likely many undetected at-risk or threatened species exist. Some of these, in the least-known groups such as invertebrates or soil fungi, may be ecological key-stones, the loss of which may reverberate through ecosystems and impact more iconic species. Given Australia's biological megadiversity, species discovery is still occurring even in relatively well-known groups such as birds and reptiles. Furthermore, most newly-discovered species are rare and/or range-restricted, making them very likely candidates for threatened status. Support for the disciplines of taxonomy and biosystematics, which provide the basic framework for making threat assessments, is therefore necessary in any comprehensive strategy for conservation and sustainable management.

The second is that many species are currently known from very few specimens. This inevitably leads to a Data Deficient categorisation under IUCN criteria; yet many of these species are prime candidates for threatened status when properly assessed. Support for adequate field survey and management of biodiversity collections is necessary to prevent Data Deficient categorisation hiding a large (but impossible to measure) number of threatened species.

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