

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the Environment Protection and Biodiversity Conservation Act 1999

Threatened Species Scientific Committee Submission to Australia's Extinction Crisis Inquiry 31 August 2022

Emeritus Professor Helene Marsh (Chair), Dr Rhonda Butcher, Professor Kingsley Dixon, Associate Professor Rachael Gallagher, Professor Richard Harper, Professor Christopher Johnson, Professor David Keith, Professor Sarah Legge, Associate Professor Nicola Mitchell, Associate Professor Brett Murphy, Professor Colin Simpfendorfer, Professor Stephen van Leeuwin (Members)

Introduction to the TSSC

The Threatened Species Scientific Committee (TSSC) is a statutory, part-time committee of scientists established by the *Environment Protection and Biodiversity Act 1999* (the EPBC Act) to provide independent scientific advice to the Minister for the Environment, particularly in relation to recovery plans, threat abatement plans and conservation advices, as well as the listing of threatened species, ecological communities and key threatening processes.

The TSSC currently comprises 12 scientistsⁱ, who collectively have extensive knowledge and experience of flora and fauna conservation and ecology, threatened species listing and conservation planning processes. The TSSC includes one Indigenous member and one member with expertise in agriculture. The previous Minister's most recent member appointments followed an open call for Expressions of Interest and formal evaluation process conducted by a selection committee.

The TSSC's submission to this Inquiry directly addresses the Terms of Reference below. This submission also builds on our previous submission to this inquiry in 2018. The TSSC has also made two comprehensive, expert submissions to the Independent Review of the EPBC Actⁱⁱ which are also relevant to this Inquiry.

The TSSC was also part of the expert group that provided advice on Environmental Standards to the Independent Review of the EPBC Act, including the standards for Threatened Species and Ecological Communities, Migratory Species, and Data and Information.

The TSSC (or a subset of members) would welcome the opportunity to meet with the Environment and Communications Committee to contribute directly to matters of mutual interest and concern.

TSSC Secretariat

Australian Government Department of Climate Change, Energy, the Environment and Water
GPO Box 3090, CANBERRA ACT 2601
TSSCSecretariat@environment.gov.au

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

- Australia is exceptionally rich in biodiversity. Almost 8% of all the world's described species of plants, animals and fungi occur in Australia. Many occur nowhere else: >85% of Australia's plants, mammals, reptiles and amphibians are endemicⁱⁱⁱ.
- Declines and extinctions of plants and animals reduce the wellbeing of Australian peoples and national prosperity. Australia's plants and animals are deeply connected to the cultural fabric of the nation, including to belief systems of Australia's Indigenous peoples. They also contribute to the economy through ecotourism and ecosystem services that support sustainability of primary industries. Australians place very high value on iconic species, including threatened species such as the koala and Wollemi pine, which represent a much broader suite of flora, fauna and the unique ecosystems they inhabit.
- Many species are in decline, resulting in a steady increase in the number of species listed as threatened under the EPBC Act. Over the 10 years from 2011 to 2020, the number of listed mammal and bird species rose by 14% and 24% respectively^{iv}. As of August 2022, 556 animal and 1,402 plant species were listed as threatened on the Commonwealth of Australia's Species Profile and Threats Database.
- The TSSC expects the number of listed species to increase substantially for the foreseeable future as a result of ongoing continental-scale threats that lack effective and strategic amelioration.
- 67 animal and 37 plant species are listed as Extinct. Given the incomplete knowledge of most groups, the true totals must be far higher. Thirty-nine mammals are extinct, representing 10% of the fauna scientifically described since European colonisation; another 21% are currently threatened^v. Many plant species have not been sighted since their discovery in the nineteenth century but are not yet listed as Extinct due to uncertainty regarding their habitat affiliations and location. Invertebrates are even less well known, but rates of threat and extinction are likely to be of similar magnitude to vertebrates.
- Known extinctions of vertebrates are likely to increase sharply over the next two decades. An analysis of Australia's 47 most imperilled vertebrates concluded that nine have a >50% probability of extinction within the next 20 years, and another 16 may already be extinct but are not yet listed as such because of lack of study^{vi}.
- While the conservation status of vertebrates (birds [830 species], mammals [379 species] and sharks [328 species]) is reasonably well known, for most other animal and plant groups information is poor. Of the ~320,000 invertebrate species, around 70% are yet to be described^{vii}. For invertebrates and plants (~26,000 species) that have been described, knowledge of distribution and abundance is often sparse and, in many cases, limited to the place where they were found. Knowledge of groups such as fungi is even poorer.
- Most endemic plants are yet to be assessed for conservation status. Australia has the highest percentage of endemic plant species of any country (88% of its 21,266 formally described higher plants), but only 39% have a conservation status assessment. This compares unfavourably with more than 85% assessed in the US and 100% in South Africa and China (see TOR j).
- For many plant and animal species listed as threatened, monitoring is either not undertaken or is inadequate. Therefore, it is often not possible to detect trends that signal increased risk of extinction or to evaluate effectiveness of policy in abating the risks of extinction (see TOR i).
- The factors causing decline of species are well understood in general. The most important are: impacts of invasive species; changes to ecosystems due mainly to inappropriate fire regimes and water flows; habitat loss and modification due to agriculture and timber production; bycatch in fisheries; and climate change^{viii}.
- The threat of climate change is rapidly increasing, especially in the form of frequency and intensity of extreme climatic events. Major ecological disturbances such as the 2019/20 fires and the 2022 floods will cause step-changes in the downward trajectory of species. The number of species listed as threatened will increase and the conservation status of many species already listed will deteriorate. The

2019/20 fires caused population declines in land vertebrates and freshwater crayfish severe enough to make another 70-82 species eligible for listing as threatened and to place 21-27 already-listed species in a more severe category of threat^{ix}. This represents a 22-26% increase in listed species for these groups of animals. Similar proportional increases in the number of threatened species are likely for plants and other invertebrates^x. Climate change, which is a threat multiplier, will amplify the continuing impact of other threatening processes, particularly invasive species and inappropriate fire regimes, leading to reduced resilience of flora and fauna and slower rates of recovery.

TOR (b) the wider ecological impact of faunal and flora extinction:

- Decline of populations of flora and fauna, and extinction of species, has the larger effect of reducing the functional diversity of biota in ecosystem biota. The general result is reduction of resilience of ecosystems and loss of important ecosystem services^{xi}.
- For example, declining diversity of insects diminishes many essential ecosystem functions such as pollination and nutrient cycling^{xii}. Some species are 'keystones' or 'ecological engineers' that support the existence of many others. For example, as bilbies dig for their food, they create foraging pits that are important for trapping seeds and organic matter, controlling erosion and facilitating regeneration of many species of plant in arid systems. Bilby burrows also provide cool refuges for many other species of animals^{xiii}. Another threatened marsupial, the woylie, transports and buries seeds of sandalwood in WA which increases natural regeneration of this economically and culturally important tree^{xiv}
- Therefore, declines and extinction of some species have cascading effects that result in the disappearance of many others, causing far-reaching declines in the diversity, health and economic productivity of ecosystems.

TOR (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 species and against key threatening processes:

The TSSC agrees with Professor Graeme Samuel that fundamental reform of the EPBC Act is required to improve protection for threatened species and abate key threatening processes. The TSSC is particularly concerned that the EPBC Act does not deal with cumulative impacts.

Our comments below are illustrative of our opinions rather than exhaustive.

- The TSSC recognises the significant potential of legally enforceable National Environmental Standards proposed by Professor Samuel to make a difference without compromising environmental sustainability. Thus, the TSSC strongly supports the development and enshrining in law of a suite of standards as recommended by the Samuel Review. We consider that such standards would provide confidence that regulatory decision making was not contributing to the decline in Australia's biodiversity. The draft standards proposed in the *Environment Protection and Biodiversity Conservation Amendment (Standards and Assurance) Bill 2021* are not adequate for this purpose.
- Statutory conservation planning instruments such as conservation advices, recovery plans and threat abatement plans are written by scientists and conservationists to guide recovery actions and threat abatement. Together with Significant Impact Guidelines, all these instruments provide information that can guide a regulator, but they do not prescribe the standard of practice required for the threatened and migratory species and threatened ecological communities that trigger the EPBC Act (see Box 1).
- Outcome-focused, environmental standards like those proposed in Appendix B of the Final Report of the Samuel Review would provide fit-for-purpose, legally enforceable rules that accredited third parties must apply nation-wide. Outlining the requirements for decision-making to all stakeholders in this way would:
 1. Improve investment certainty and environmental outcomes by reducing the subjectivity inherent in the current, process-focused application of the Act, and

2. Increase the efficiency and consistency of assessment.

Box 1: The case for using the full menu of conservation planning instruments enabled by the EPBC Act

- As at August 2022, Australia is home to nearly 2000 species and ~100 ecological communities listed as threatened (Critically Endangered, Endangered or Vulnerable) under the EPBC Act.
- The majority of these species and many ecological communities have never been considered in the Commonwealth's statutory Environmental Impact Assessment (EIA) process because they occur in areas where development has not been proposed and in some cases (e.g., national parks) is banned. For example, in the five years prior to September 2021, 776 listed threatened and migratory species (some of the latter are not also listed as threatened) were recorded in EIAs; 526 of these <5 times. 147 species 'triggered the Act' ≥ 10 times; one species 267 times.
- Thus, different species (and ecological communities) have very different conservation planning needs.
- The TSSC supports the nuanced development and implementation of the full suite of conservation planning instruments enabled by the EPBC Act including conservation advices (which we consider should be relabelled 'recovery strategies'), multi-and single entity recovery plans, place-based regional plans and recovery plans. In addition to considering the requirements of the EPBC Act, the TSSC has developed principles to guide its recommendations to the Minister regarding the appropriate statutory conservation planning instrument for a listed entity. TSSC is refining these principles in light of commitments by government to regional planning and multispecies approaches.
- All species and ecological communities listed as threatened under the EPBC Act currently have at least one statutory planning instrument to guide their recovery. Newly listed entities now have a conservation advice in place from the time they are listed, irrespective of the Minister's decision whether or not to also make a recovery plan.
- A conservation advice can be changed with the Minister's approval after consulting the TSSC, a significant advantage in this time of rapid environmental change. In contrast, the process stipulated by the EPBC Act to vary a recovery plan is much more onerous and protracted.
- The TSSC notes that the EPBC Act states that the force in law of a conservation advice is potentially less than that of a recovery plan (wording refers to the Minister needing to 'have regard to' versus 'must not act inconsistently with' respectively) but notes that the significance of this difference has never been tested in the courts and is in practice, relevant only to the minority of species (and ecological communities) that trigger the Act. Most of these entities have recovery plans. The TSSC recommends that 'must not act inconsistently with' should apply to all statutory conservation planning instruments.
- In the TSSC's opinion, protection of species and ecological communities that trigger the Act should also be enhanced through legally enforceable standards for MNES and recovery funding targeted to evidenced-based conservation priorities, especially (although not solely) the abatement of widespread threats such as invasive species that adversely affect many imperiled species and ecological communities.

- Recent research investigating the threats on terrestrial and aquatic taxa listed under the EPBC Act found that the threats impacting the most taxa were:
 1. Habitat loss, fragmentation and degradation due to anthropogenically mediated activities such as agriculture, forestry, water management and urbanisation;
 2. Invasive species; and
 3. Fire regimes that cause declines in biodiversity.
- 93% of this habitat loss is not referred to the Commonwealth government for assessment- i.e., is not scrutinised by the EPBC Act.
- In its first submission to the Samuel Review^{xv}, the TSSC detailed the problems with the current system of threat abatement. In its second submission^{xvi} to that Review the TSSC recommended a new framework for threat abatement with the features outlined in Box 2 below. Our suggested reform was not fully reflected in the Final Report of the Samuel Review.

Box 2: Features of the TSSC's recommended framework of the abatement of biodiversity threats

- The current Intergovernmental Agreement for Biosecurity should be a model for developing a new and separate framework for biodiversity threat abatement.
 - National strategic plans should be made for each of the major high-level threats, such as invasive species, habitat loss, fire regimes that cause declines in biodiversity etc. These plans should be listed in a schedule to an intergovernmental agreement on the 'Recovery of Australian biodiversity from Environmental Threats', or preferably as a component of a more generic agreement (or series of agreements) to deliver the EPBC Act reforms.
 - The EPBC Act should be amended to enable operational response plans (threat abatement plans and advices, action plans) to be developed for specific threats nested in these high-level threats.
 - The EPBC Act should be amended to enable several types of operational response plans that meet required standards to be statutory instruments to enable cross-agency and cross-jurisdictional partnerships to jointly develop statutory threat abatement instruments as appropriate for a specific threat.
 - The requirement for links between the statutory conservation planning instruments and relevant operational threat abatement instruments should be explicit and reflected in appropriate standards and updated automatically as new species and ecological communities are listed. (At present updating a threat abatement plan requires the Minister to determine that it be 'remade').
 - The requirement for Australia's performance in threat abatement to be reviewed by expert reviewers at five-year intervals should be reflected in relevant standards.
- The TSSC also recommends that the EPBC Act and its regulations are revised so that the categories and criteria for species nominations align with accepted international standards as outlined in Box 3.

Box 3: Changes to EPBC Act and its regulations to ensure that the categories and criteria for species nominations align with international standards

The rationale for these changes is outlined in the TSSC's submissions to the Samuel Review.

- Include the IUCN Criterion D2 in the Criteria for listing a species as 'Vulnerable'
- Abolish the Category 'Conservation Dependent' for threatened commercially harvested fish species. Enable a threatened species of commercially harvested fish listed in the categories Critically Endangered, Endangered or Vulnerable to also be eligible for listing as 'Special Management', a category that would have provisions similar to 'Conservation Dependent'.
- Revise the categories and criteria for listing an ecological community as threatened by adopting the IUCN Categories and Criteria for ecosystems as specified in the Common Assessment Method MoU between the Commonwealth and the states and territories.

- The TSSC also considers that 'Vulnerable' ecological communities should be made Matters of National Environmental Significance to better protect Australia's biota.

TOR (e) the adequacy and effectiveness of protections for critical habitat for threatened fauna under the Environment Protection and Biodiversity Conservation Act 1999:

- The protection of areas critical to the survival of species is an internationally accepted approach to the conservation of threatened species. The EPBC Act has two provisions related to the habitat of threatened species – 'Critical Habitat' (a register of areas that the Minister lists as critical to the ongoing survival of a listed threatened species or ecological communities); and 'Habitat Critical to Survival' (those areas that are required to ensure the ongoing survival of the species in the wild).
- The 'Critical Habitat' provisions of the EPBC Act have been of limited benefit to threatened species management. At present, only five species (four bird species and one plant) have habitat included on the register, and no habitat has been added since 2005.
- The main statutory restrictions to the Critical Habitat register contributing more to the recovery of threatened species are:
 1. S207A 3(A) of the EPBC Act, which limits the circumstances under which 'material' listed in the register can be made available for public inspection, if the Minister considers that the interests of relevant landholders could be impeded or compromised, and
 2. The regulation requiring extensive landholder consultations before the Minister can approve additions to the register. Thus, at present, the Register of Critical Habitat can only operate effectively where a threatened entity is present largely on Commonwealth lands, and those lands are listed on the register.
- In addition, there are challenges in identifying 'Habitat Critical to Survival' for many species because of limitations in survey and monitoring. For a subset of species (e.g., widespread or widely moving species) there are extra limitations to identifying 'Habitat Critical to Survival' because of the large area over which they occur.
- Delivering an efficient and effective Register of Critical Habitat would require high-level agreement and cooperation between the Commonwealth, and the States and Territories as well as change to the EPBC Act. The TSSC considers that the concept of a Register of Critical Habitat may have the potential to contribute to the conservation of threatened species and ecological communities if a method could be devised to implement the register outside Commonwealth land, especially private land, and if more data

were available to better define the Habitat Critical to the Survival of threatened species, especially fauna and ecological communities, especially in the face of climate change.

TOR (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:

- Aichi Biodiversity target 11, under the Convention of Biodiversity states that:
‘By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes’^{xvii}.
- Australia has met this target for coastal and marine areas but not for terrestrial areas and inland waters.
- The terrestrial and freshwater National Reserve System should be expanded to meet this target in line with the principles of Comprehensiveness, Adequacy and Representation. In addition, the principle of ‘adequacy’ (that populations protected within protected areas, and the network as a whole, are large enough to be viable) has not been incorporated into National Reserve System design.
- Currently, many threatened species and ecosystems occur outside protected areas. For example, only ~35% of threatened terrestrial and freshwater species distributions occur within protected areas, whilst nearly half of threatened species distributions occur on private land^{xviii}.
- Three-quarters of threatened species have distributions that cover more than one tenure. New protected areas are needed to improve the adequate representation of threatened species within reserves. New protected areas will also be needed to accommodate species range shifts due to climate change.
- Some of the most profound threats to Australian biota are tenure blind, including introduced species and diseases, and changes to key ecological disturbance processes like fire, as well as climate change and its interactions with other threats.
- Gazetting reserves is not enough to protect biodiversity; protected area management needs to be properly resourced to address these threats.
- Similarly, Indigenous Protected Areas (IPAs) now comprise nearly half of the National Reserve System. Recent commitments to lengthen the duration of funding agreements and expand support for the Indigenous ranger program are welcome.
- The next step is to formalise enduring (rather than short-term) funding for IPA management, so that the biodiversity and cultural values of this substantial component of the National Reserve System can be managed.
- The ability of the National Reserve System to protect biodiversity values will depend on:
 - managing threats in the landscapes surrounding the protected areas, and on maintain/restoring connectivity between protected areas. Connectivity could be enhanced by leveraging engagement and investment in private conservation through bodies like the Australian Land Conservation Alliance; and
 - leveraging payments for environmental services such as carbon mitigation and biodiversity enhancement from industries seeking to meet carbon reduction and corporate sustainability targets. This encompasses enhanced management practices on pastoral and agricultural land and near-shore environments. The Carbon Credits (Carbon Farming Initiative) Act 2011 provides the legislative basis for the creation of carbon credits via a range of activities such as avoided deforestation and reforestation and these can have direct benefits on biodiversity. Additionally, biodiversity benefits

will be augmented with the development of legislation that provides a basis for payments for biodiversity protection or recovery. The TSSC welcomes the government's recent announcement of such an initiative.

TOR (h) the adequacy of existing funding streams for implementing threatened species recovery plans and preventing threatened fauna loss in general:

- Analysis of government spending on biodiversity conservation in Australia is complicated by our federal system and definitions as to what constitutes environmental spending. Nonetheless, commentators consider existing funding streams for implementing threatened species recovery and preventing threatened fauna loss to be vastly inadequate.
- A 2013 global assessment identified Australia as one of only four developed countries featuring in the top 40 underfunded countries for conservation worldwide^{xix}. In 2018, the Australian Conservation Foundation estimated biodiversity conservation, including threatened species management, now receives less than five cents for every \$100 of Australian Government spending^{xx}.
- The case for increased spending on biodiversity conservation will be amplified by the expected increase in extreme climatic events such as fires, floods and droughts as a result of climate change. The Commonwealth government allocated \$200 million to help native wildlife and their habitats recover from the devastating impacts of the 2019/20 bushfires, a sum that some experts consider was well-short of the amount required^{xxi}.
- The TSSC considers that government funding could be spent more effectively. At present the balance between investment in conservation planning and implementation is sub-optimal. We consider that relatively more should be spent on implementation. In addition, the rationale for allocating most funding is not transparent. Both these factors result in piecemeal conservation management that focuses on single species and ecological communities for short periods, rather than the long-term adaptive management of cumulative threats to Australia's biodiversity in this time of rapid environmental change.
- **Making a recovery plan does not guarantee that its implementation will be funded. Unfunded recovery plans are 'costly yet futile'** ^{xxii}.
- Currently the backlog of overdue and sunsetting recovery plans is substantial. Addressing much of this planning backlog would consume funding that the TSSC considers would better be spent on implementation of the recovery actions outlined in the conservation advices already in place for the relevant species.
- Much criticism has focussed on the former Minister's 2022 decision not to have recovery plans for 176 listed entities, all of which have a statutory conservation advice in place. Most of these plans would need to be made without financial support from the states/territories in plan development or implementation, because most states prioritise investment in their own planning processes. The TSSC considers that the funds required to make these recovery plans would be better spent on on-ground recovery actions guided by the relevant conservation advices.
- The TSSC considers that it will be cost-effective for the Commonwealth government to invest in the recovery of the 100 priority species in the Threatened Species Strategy and Action Plan as a high priority, especially given the widespread community consultation that underpinned the development of these strategies and the potential for this investment to benefit the recovery of species outside the 100 priority species as well.
- The TSSC also applauds the government's commitment to implementing the Samuel Review's recommendation of landscape-scale, regional planning, management and investment. This approach (which needs trialling and accompanying evaluation) has the potential to be a much more effective and efficient approach to halting biodiversity decline (and supporting habitat restoration) than the present poorly coordinated practice of conservation planning and management, carried out largely at the level of individual listed species and ecological communities. Conservation advices (and where appropriate,

recovery plans) for individual species and ecological communities and plans to abate threats, could be used as inputs into regional scale planning, threat abatement and adaptive management. Some listed entities will still require investment in the implementation of single or multiple-entity recovery plans in accordance with the Committee's Modernising Conservation Planning document^{xxiii}.

TOR (i) the adequacy of existing monitoring practices in relation to the threatened species assessment and adaptive management responses:

The TSSC's submission to this Inquiry in 2018 focussed on monitoring. Our main points stand and are not repeated here. We make the following additional points below in light of experience since the 2019/20 fires.

- A lack of effective monitoring reduces our capacity to respond to extreme environmental events, as was evident after the 2019/20 bushfires. Monitoring of the impacts of these fires was largely undertaken through grant funding schemes which engaged the scientific community in the absence of a national monitoring framework. This ad-hoc approach lacked a central coordination mechanism to collate, store and share the resulting data for the assessment of species threatened status under the EPBC Act.
- The chronic lack of fundamental data on the distribution and population trends of threatened species reduces our capacity to respond to extreme environmental events. This became painfully evident during the 2019-20 bushfires, and the 2022 east coast floods. In these situations, species need to be prioritised for intervention rapidly to ensure that investment is directed to where it is most needed. Such prioritisation relies on having ready access to high-quality data on species taxonomy, population genetics, distribution, population trends, traits and threats. However, the extreme events of the past 2-3 years highlighted the following deficiencies:
 - Most fundamental data are not readily accessible – data are stored across multiple government and non-government institutions and individuals, with idiosyncratic access and licensing arrangements that need to be navigated; considerable redundancy (records present in more than one database) that needs to be filtered out; and variability in curation quality that needs to be vetted.
 - In the absence of a national monitoring framework, Commonwealth (and state/territory) investment in bushfire recovery (and to a much smaller extent, flood recovery) leveraged the scientific and NRM community to undertake monitoring for the priority fire-affected species. This has represented a large step-up in the data available for many species, but not all. However, the nature and quality of information is highly variable, and its use for informing listing assessments or management interventions is likewise variable. Moreover, the funding investment is very short-term providing only a snapshot of populations, which means that we will still lack quality monitoring data to help inform the response to future extreme events.
- To enhance our ability to respond to future extreme events the following matters need to be addressed with high priority:
 - Gaps in fundamental information need to be filled with substantial data acquisition programs, including long-term monitoring across species and places. This could be achieved with policy initiatives (e.g., increased funding to data-deficient taxonomic groups or regions), and legislative reforms. For example, in Switzerland, national biodiversity surveys are mandated under the Ordinance on the Protection of Nature and Cultural Heritage (NCHO Art. 27a), with reporting required by law every three years. The surveys cover several components of biodiversity, including threatened species as well as common and widespread species, and the condition of natural habitats and agricultural land^{xxiv}).
 - **A national facility should be established to collect, curate, analyse and provide access to biodiversity data collected by multiple contributors.** Existing platforms, such as the Biodiversity Data Repository or the Atlas of Living Australia, could be enhanced to achieve this functionality. Government-led and funded national entities such as the Bureau of Meteorology provide a template for how a national biodiversity facility might operate and provide ecosystem forecasting. A national facility for storing biodiversity data would serve many purposes, including enabling the regulatory and decision-making functions of the EPBC Act.

TOR (j) the adequacy of existing assessment processes for identifying threatened species conservation status:

- Commonwealth protection of threatened entities is dependent on their listing under the EPBC Act.
- The implementation from 2015 of the Common Assessment Method (CAM) MoU between the Commonwealth and the states/territories is a significant reform that is leading to the harmonisation of processes for determining the conservation status of threatened species and ecological communities across jurisdictions. The Commonwealth's capacity to participate fully in this process will be enhanced by the legislative reforms outlined in Box 3.
- As explained at ToR (a), while the conservation status of vertebrates (birds, mammals and sharks especially) is reasonably well known, for most other animal and plant groups information is poor. An estimated 70% of invertebrates are yet to be described^{xxv}. For those invertebrates and many plants that have been described, knowledge of their life history, distribution and abundance is inadequate to assess their conservation status.
- The conservation status of most endemic plants is yet to be assessed. Only 38% of our described plant species have an assessment, **a low percentage compared with South Africa, the US and China** (see TOR (a)).
- The conservation status of > 1100 threatened species that were 'grandfathered' from the previous Endangered Species Protection Act has not been examined since at least 2000 and there are no publicly available assessment documents for these species.
- The EPBC Act has no provision for emergency listings, which is a concern in this time of rapid environmental change.
- **The TSSC considers that assessment processes will need to change because the number of assessments required already exceeds the capacity of the TSSC and the Department of Climate Change, Energy, the Environment and Water, and this situation is likely to be the 'new normal' because of the impacts of extreme weather events associated with climate change.**
- Following Victoria's lead, the TSSC considers that software options for assisting with compiling and updating Commonwealth listing assessments and the associated preparation of conservation advices should be evaluated and if found 'fit for purpose' used to assist in listing processes.
- The TSSC also considers that enhanced use should be made of Species Expert Action Plans developed by external experts as has been done for birds in collaboration with Bird Life Australia and for squamate reptiles in collaboration with the IUCN. This practice is also facilitating assessment of fire-affected species and ecological communities with Commonwealth officers and the TSSC taking important quality assurance roles.
- The TSSC proposes that new approaches are developed for efficient assessment of hyper-diverse groups such as plants and invertebrates, where the scope of assessment is incompatible with current assessment paradigms.

TOR (n) any related matters:

Management of the extinction problem

As explained above, the main factors causing the decline of Australia's biota are continental-scale threats such as the impacts of invasive species and habitat loss, inappropriate fire regimes and water use, and climate change^{xxvi}. The threats and associated impacts can be better managed to varying degrees, through a range of approaches.

- For example, many feral animals can be controlled via on-ground activities provided the scale of the response is matched to the scale of the problem, a solution related to resourcing as well as cross-jurisdictional coordination.

- Habitat loss can be reduced via legislative and market-based approaches to land clearing, but to be successful this must involve both the Commonwealth and State/Territory governments working together to address biodiversity threats in a manner similar to biosecurity threats.
- The impacts of climate change can in some cases be reduced via changes in land management; in some cases, new approaches, such as the use of biodiversity credits will have to be devised and implemented in a way that minimizes the risk of unintended consequences.

Endnotes

ⁱ <https://www.dcceew.gov.au/environment/biodiversity/threatened/tssc#:~:text=The%20Threatened%20Species%20Scientific%20Committee,the%20Minister%20for%20the%20Environment.>

ⁱⁱ Threatened Species Scientific Committee Submission to the EPBC Act Review ANON-K57V-XF2U-J; TSSC Comments on the Interim Report of the Review of the EPBC Act, Submission 20.

ⁱⁱⁱ Chapman D. A. (2009) Numbers of living species in Australia and the world.

<https://www.dcceew.gov.au/science-research/abrs/publications/other/numbers-living-species>

^{iv} SOE 2021 report: biodiversity.

<https://soe.dcceew.gov.au/biodiversity/introduction>

^v Ichii K., Molnar Z., O'bura D., Purvis A., Willis K. 2019 Chapter 2.2 Status and Trends - Nature. IPBES Global Assessment on Biodiversity and Ecosystem Services. Bonn, Germany, IPBES secretariat.

<https://www.ipbes.net/global-assessment>.

^{vi} Garnett et al (2022) Australia's most imperilled vertebrates. *Biological Conservation* 270, 109561.

<https://doi.org/10.1016/j.biocon.2022.109561>

^{vii} Chapman D. A. (2009) Numbers of living species in Australia and the world.

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^{viii} Kearney S et al (2019) The threats to Australia's imperilled species and implications for a national conservation response. *Pacific Conservation Biology* 25, 328. https://doi.org/10.1071/PC18024_CO

^{ix} Legge et al. (2022) The conservation impacts of ecological disturbance: Time-bound estimates of population loss and recovery for fauna affected by the 2019–2020 Australian megafires. *Global Ecology & Biogeography*, DOI: 10.1111/geb.13473

^x Gallagher et al (2022) An integrated approach to assessing abiotic and biotic threats to post-fire plant species recovery: Lessons from the 2019–2020

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^{xi} Ichii K., Molnar Z., O'bura D., Purvis A., Willis K. 2019 Chapter 2.2 Status and Trends - Nature. IPBES Global Assessment on Biodiversity and Ecosystem Services. Bonn, Germany, IPBES secretariat.

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^{xii} WWF. 2020 Living Planet Report 2020 - bending the curve of biodiversity loss. (eds. Almond R.E.A., Grooten M., Peterson T.). Gland, Switzerland.

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