Threatened Species Strategy (2021–31)
Joint submission by the Society for Conservation Biology Oceania and the Ecological Society of Australia

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Executive summary

Australia is rich in biological diversity and is considered one of 17 megadiverse countries, which collectively contain more than 70% of the world's species (Mittermeier, 1997). However, Australia is also a leader in species extinctions, with more than 100 species becoming extinct since European colonisation (Woinarski *et al.*, 2019), and nearly 1,900 species and ecological communities currently threatened with extinction (Department of Agriculture, Water and the Environment, 2020).

Preventing further extinctions and associated ecosystem collapse, and improving the conservation status of Australia's threatened species, requires a strong commitment to effective and evidence-based policy instruments with sufficient government investment and support.

Australia's first Threatened Species Strategy (the Strategy) concluded in June 2020 and a new 10-year Strategy is currently being developed. Given that the conservation status of most of our threatened species and ecosystems is not improving and in many cases is deteriorating further, it is critical that we reflect on the original Strategy and consider how the new Strategy can be designed to ensure more effective management and protection of Australia's remarkable, but imperilled, species.

Below we provide responses to the questions from the discussion paper. Our key recommendations are that:

1. **The new Strategy has comprehensive and evidence-based representation of both priority species and threats.**

2. **There is greater investment in knowledge gain and a more representative listing process for at-risk species.**

3. **Focal species, threats and actions are identified through a formal prioritisation process that is informed by decision science, and is objective, transparent and repeatable.**

4. **Targets are developed according to 'SMART' criteria and are embedded in a framework that explicitly links them to measured conservation outcomes.**

5. **The Strategy's purpose statement uses more explicit language, such as '*improve conservation status*' and '*prevent extinctions*', rather than '*increase security*', which is vague.**

6. **The overarching objective for priority species conservation is explicit, e.g. '*improved conservation status'* and '*prevent extinctions*', rather than '*improved trajectory*'.**

7. **The two overarching objectives are supported by explicit and measurable targets relating to the recovery of individual priority species and places.**

8. **The action area '*Mitigating priority threats*' is underpinned by data on the number of species affected by, and the relative impacts of, different threats.**

9. **The action area '*Preserving, restoring & improving habitat*' is explicit about reducing rates of clearing and destruction of threatened species habitat.**

10. **Significant Commonwealth financial investment and other support is delivered to ensure that the Strategy can achieve its aims.**

11. **The action area '*Investment guidance*' is broadened to include optimisation of spending to improve conservation outcomes and return on investment.**

The SCBO and ESA welcome the opportunity to provide further information and to discuss our submission in more detail. We may be contacted using the details below:
SCBO: tim.doherty@sydney.edu.au
ESA: policy@ecolsoc.org.au

This submission was prepared on behalf of:
- the SCBO by its Policy Committee and approved by the Chair of the Policy Committee and President, 13 November 2020; and

- the ESA by its Policy Working Group and approved by the Vice President (Public Policy and Outreach) and President, 13 November 2020.

Responses to questions from the discussion paper

> **1. What has been the most valuable contribution or outcome of the Australian Government's current Threatened Species Strategy, and why?**

Any policy or national strategy that puts the needs of threatened species to the fore is critical to the preservation and recovery of Australia's declining biodiversity. The Threatened Species Strategy represents an important first step in recovering threatened plants and animals of Australia, as it represents the first, national approach to threatened species recovery. It was the first, nationally spearheaded attempt to plan for how the Federal Government would prioritise effort and work in partnership with the community, and state and territory governments, to recover threatened species. The messaging strategy appears to have been particularly effective at capturing the attention of the broader public and putting the spotlight on the issue of threatened species conservation in Australia.

> **2. What are the three most important changes you would like to see in a new Threatened Species Strategy, and why?**

The three most important changes necessary for maximising the impact and effectiveness of the new Threatened Species Strategy are to 1) include more comprehensive and evidence-based representation of both focal species and 2) threats, and 3) for the targets to be more specific, measurable and relevant.

1) More comprehensive representation of species
The taxonomic breadth of the current Threatened Species Strategy is biased towards a subset of birds, mammals and plants that were identified as priority species. The process by which this list was constructed has received criticism for lacking strong justification in some cases, and most importantly, for there being insufficient recognition of the many threatened frog, reptile, invertebrate and fish species in Australia (Table 1).

Table 1. Number of threatened species in different taxonomic groups that are classified as Vulnerable (VU), Endangered (EN) or Critically Endangered (CR) under the EPBC Act. Source: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl, accessed 11/11/20.

	VU	EN	CR	Total
Birds	63	55	17	135
Fish	24	19	7	50
Frogs	12	10	15	37

Invertebrates	13	22	30	65
Mammals	59	38	10	107
Plants	589	555	198	1342
Reptiles	31	20	10	61
			Grand total	1797

Work subsequently conducted through the National Environment Science Program and other initiatives has identified the reptile, frog, freshwater fish, bird, mammal and plant species thought to be at highest risk of extinction (Geyle *et al.*, 2018, 2020; Silcock & Fensham, 2018; Gillespie *et al.*, 2020; Lintermans *et al.*, 2020). For instance, Lintermans et al. (2020) found that 20 of the 22 freshwater fish species they assessed had a >50% chance of extinction in the next 20 years.

We recommend that the results of these analyses, along with other data relating to current levels of investment and management, be used to objectively identify focal species or communities under the new Strategy. Investment data could include information on both current and potential levels of investment in a species, as well as the cost-effectiveness and return-on-investment of existing recovery actions. Data on management could include information on what actions are currently being performed for a species and where, and how effective they have been. These different characteristics of data should be implemented in a decision science framework (e.g. structured decision making, strategic foresight, priority threat management) to ensure that final decisions on which species are represented in the strategy are evidence-based, science-informed, repeatable and transparent (Tulloch *et al.*, 2015, Chadès *et al.*, 2015).

We also recommend that there is greater investment in knowledge gain and a more representative listing process for threatened species. There are no fungi listed as threatened under the *Environment Protection and Biodiversity Act 1999* (EPBC Act), despite more than 80 species being listed under State/Territory lists as of 2016 (Cresswell & Murphy, 2017), and 15 Australian fungi species being listed as threatened or near threatened on the IUCN Red List (IUCN, 2020). Because one of the prioritisation principles for the Strategy is for focus species to be listed under the EPBC Act, at-risk but underrepresented species such as fungi will be excluded from conservation initiatives under the Strategy.

A more comprehensive and representative assessment and listing process will ensure that future conservation actions capture the full range of species threatened with extinction in Australia. This can be achieved through taxa-targeted workshops focused on bringing together taxa experts to inform assessment—a targeted Fungi Red-Listing

Workshop in Australia in 2019 increased the number of Australasian fungi assessed for the IUCN Red List from 1 to 71 in a single week (https://fungimap.org.au/australian-fungi-included-on-iucn-red-list-of-threatened-species/).

2) More comprehensive representation of threats

The current Strategy focuses very strongly on feral cats as a threatening process and less so on other threats that impact large numbers of species and ecosystems. These threats include:

- Habitat destruction, degradation and fragmentation caused by mining, logging, urbanisation and agriculture
- Inappropriate fire regimes
- Other pest animals and weeds
- Overgrazing
- Pollution, and
- Climate change.

For instance, agricultural activity is a threat to 73% of invertebrates, 82% of birds, 69% of amphibians and 73% of mammals listed as threatened in Australia (Kearney *et al.*, 2019). Urban development and climate change threaten 15–33% and 29–56% of threatened species, respectively, depending on the taxonomic group (Kearney *et al.*, 2019). Rabbits threaten more than double the number of species than feral cats do (322 and 123, respectively; Kearney *et al.*, 2019). Feral cats and other invasive species, including foxes, feral horses, feral deer, buffel grass and gamba grass, are undoubtedly key threats to Australian biodiversity that warrant significant attention. However, this should not come at the cost of addressing other threatening processes.

Habitat loss in particular has been severely overlooked by current policy initiatives, despite being widely recognised by experts as a leading threat to Australia's biodiversity and ecosystems. An assessment by the Threatened Species Recovery Hub found that habitat loss and introduced animals have contributed to similar numbers of extinctions in Australia (62 and 64 species, respectively; Woinarski *et al.*, 2019). Recent research has also shown that similar numbers of threatened species will benefit from retaining and restoring habitat (86%) and effectively managing invasive species (82%; Kearney *et al.*, 2020).

It is also important to note that multiple threats can interact with each other to have worse impacts than if they occurred on their own, such as weeds and fire (Setterfield *et al.*, 2010), climate change and fire (Mariani *et al.*, 2018), and predation and habitat fragmentation/degradation (Doherty *et al.*, 2015). As such, accounting for the full range

of threats operating in ecosystems, and their interactions, can result in more effective management and an increased return on investment (Auerbach *et al.*, 2014, 2015).

We recommend that focal species, threats and actions in the new Threatened Species Strategy be identified through a formal prioritisation process that is informed by decision science, and is objective, transparent and repeatable. Such an approach could draw on information such as species' extinction risk, the range of threats they face, the degree to which they overlap with other threatened species, current levels of investment and management, and other factors (e.g. species values to ecosystems as service providers to humans or to diversity in general; feasibility of recovery; Joseph *et al.*, 2009; Brazill-Boast *et al.*, 2018).

The principle of **complementarity** is critical to ensuring that the Threatened Species Strategy is representative across different taxa and regions and threats (Chadès *et al.,* 2015). Prioritisation approaches that ignore complementarities between species, actions and regions may fail to identify the optimal sets of strategies to implement under limited budgets because they do not account for redundancies (Tulloch *et al.,* 2013). For example, choosing a set of threat management strategies that exhibit the highest individually ranked cost-effectiveness may benefit similar species and hence may be less desirable than a combination of strategies that target different species (Chadès *et al.,* 2015).

Failing to account for complementarities means that managers risk allocating scarce resources to species or places that are already benefitting from management, to the detriment of species that do not receive any protection (e.g. because they rely on less cost-effective strategies). The ideal suite of strategies is complementary; that is, it protects as many species as possible, without unnecessary overlap or redundancy in the benefits generated by management strategies (Justus & Sarkar 2002; Tulloch *et al.,* 2013). Incorporating complementarity into a Priority Threat Management approach to recovering threatened species in the Pilbara region of Australia was shown to double the impact of priority threat management approaches. In contrast, a recovery strategy that did not account for complementarity and simply ranked management strategies by cost-effectiveness cost almost twice as much ($9.71 million/year) as a strategy that identified complementary management benefits across all species to be managed (Chadès *et al.,* 2015).

3) Targets should be SMARTer

Some targets in the first Threatened Species Strategy were either difficult to measure, were not measured directly, and/or were not explicitly linked to conservation outcomes (such as a percentage increase in a threatened species' distribution or abundance). This

inhibits rigorous evaluation of the success/failure of management interventions, return on investment, and hence, appropriate reporting of progress towards the Strategy's stated goals.

Targets such as '*20 threatened mammals with improved trajectories by 2020*' are difficult to measure, and it is unclear how such a target is linked to on-ground outcomes. 'Improved trajectory' was not defined, thus, it could variously be interpreted as a 1% increase in the abundance of all populations of that species, a 10% increase in the abundance of priority populations of that species, or a 20% increase in the range of the species.

Vague targets also create issues when attempting to evaluate the effectiveness of a management strategy aiming to recover a species or ecological community. Without clear targets, it is difficult to answer questions such as '*Given the existing levels of recovery and projected investment into that species, can an improvement be achieved?*', and '*If a species has "improved" during that time, how do we know that the change is due to recovery efforts?*'.

Specifying targets helps decision-makers articulate what they expect to occur if they undertake a particular management action to recover a species. We can only say that the recovery efforts directly led to a species' improvement over time if a) we first know what the desired outcome for the species is (e.g. the 'endpoint' that we are aiming at for a population's abundance or distribution), and b), if we know the counterfactual, i.e. the scenario expected to occur under 'business as usual', which in many situations is simply doing nothing (Maron *et al.*, 2015).

We recommend that targets in the new Strategy be developed according to 'SMART' criteria. Targets that are *Specific, Measurable, Ambitious but Achievable, Relevant,* and *Time-bound*, enable effective monitoring and reporting of progress (Carwardine *et al.*, 2009). For instance, a SMART target might be "*Within 5 years, recovery efforts will ensure that population densities of species X in priority areas increase by 10%*", whereas an 'unSMART' target might be "*Within 5 years, we will have eliminated all threats affecting key populations of species X*".

Because many of the targets in the first Threatened Species Strategy failed to meet the SMART criteria, many have not been met. There is little evidence that the set of selected threatened mammal and bird species improved between 2015 and 2020, with the mid-term report finding that only 35% (14 species) had improving trajectories compared to pre-2015, including six species that were still declining but at a slower rate (Geyle *et al.*, 2019). It should also be noted though that the species with improving trajectories were

not compared to the counterfactual, e.g. an *a priori* prediction of what might have happened if they were not targeted by the Threatened Species Strategy, so it is impossible to determine whether the 14 improving trajectories are a result of the Strategy itself.

The Threatened Species Index of Australia (https://tsx.org.au/) shows that threatened species' populations have, on average, remained at abundances 25+% lower than those of 15 years ago (for mammals), or declined even further (for birds; Figure 1). More worryingly, of the 20 threatened mammals and 20 threatened birds that were targeted by the Strategy, some still do not have consistent, standardised, long-term monitoring programs, making it impossible for us to reliably track whether or not their populations have changed, even if substantial efforts have gone into their recovery.
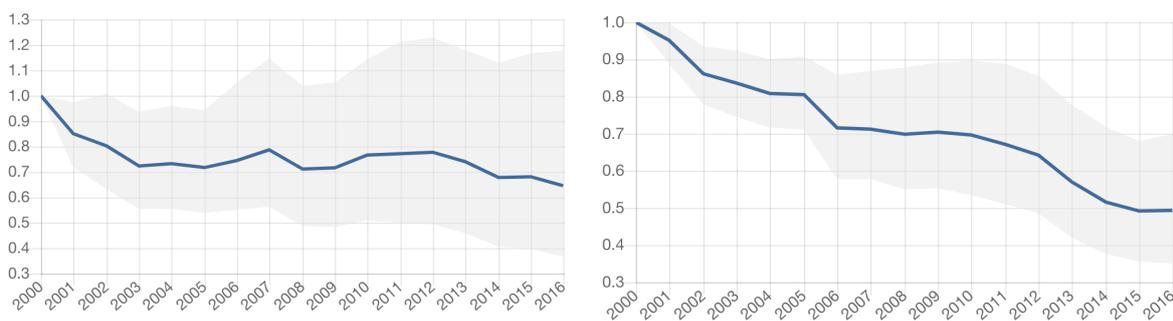

Figure 1. Threatened Species Index trends for mammals (left) and birds (right) from 2000 to 2016 (the latest data available). Source: https://tsx.org.au/tsx/#/. Accessed 10/11/2020.

Ideally, targets should be embedded in a framework that explicitly links them to monitoring and conservation outcomes (e.g. an increase in species' population size and/or distribution). For instance, a management target of '*effective management of feral horses over 10,000 hectares of threatened species habitat*' should ideally be linked in with a direct potential outcome (e.g. '*a 10% increase in population size of priority species whose current declines are driven by feral horse impacts*'). There should then be monitoring of habitat condition or threatened species recovery as a result of the management of feral horses to enable proper impact evaluation.

In contrast, the feral cat culling target (2 million cats by 2020) was widely promoted, but it was not explicitly linked to on-ground outcomes for biodiversity (Doherty *et al.*, 2019). Even if the target is met, which it may not be (Garrard *et al.*, 2020), we do not know what the conservation benefit of killing 2 million cats across Australia over five years will be because the target is not explicitly linked to the recovery of relevant threatened species. Explicitly linking targets from the Strategy to conservation outcomes will ensure that the targets are SMART and allow for ongoing monitoring and adaptation of management interventions to ensure the targets are met within the life of the Strategy.

3a. Do you think the proposed elements of the new Threatened Species Strategy provide a sound foundation for increasing security and supporting recovery of Australia's threatened species? (Yes, no, unsure).
3b. Why do you think this?

3a: No.

3b: We welcome the proposed hierarchical structure of the new Strategy. It is valuable to have an overarching purpose statement that guides everything below. However, the proposed purpose statement is vague. It is unclear what '*increase security*' means. **We recommend that the purpose statement uses more explicit phrases, such as '*improve conservation status*', '*increase population size by x%*' and '*prevent extinctions*'.**

The two proposed objectives are for improved trajectories of priority species and improved condition of priority places by 2031. As described above, '*improved trajectories*' is a vague objective. **We recommend that this objective be made more explicit, e.g. '*Improved conservation status of priority species by 2031*'.** However, we also recognise that the nature of responses will vary across species. As such, **we also recommend that this objective be complemented by explicit targets for individual species**, such as a 20% increase in total population size, or a 50% increase in the number of populations protected in safe havens. Having explicit targets nested under higher level objectives should enable clearer and more effective targeting of actions along with reporting of progress.

Likewise, **we recommend that the proposed objective of *Improve habitat condition of priority places* be supported by SMART targets for individual places**. What represents good or high condition habitat will vary between ecosystems and species, thus example targets could be '*A 20% decrease in the area burnt by late dry season fires in national park X by 2026*', or '*A 50% increase in the amount of dense ground cover at reserve X by 2026*'.

We welcome the approach of having two 5-year action plans nested within the 10-year Strategy. Given that over the life of the Strategy much new knowledge will be developed, unplanned events will occur (e.g. bushfires), and some species or places may become more or less threatened, it makes sense to adopt a staged approach. The second 5-year plan has the opportunity to build on the successes and lessons of the first plan.

The discussion paper states that the action plans will detail priority species, places and actions, and milestones, and targets. As suggested above, **we strongly recommend**

that each of these components is developed within a clear framework that links priority species and places to threats and actions (Tulloch *et al.*, 2015)**, and that these components be supported by specific, measurable and relevant targets**. We also suggest that the action plans be responsive to both changing environmental conditions, such as those brought about by the 2019/2020 megafires (Ward *et al.*, 2020), and to successes or failures of specific management strategies. If mid-term assessment of a target finds that progress has been significantly lower than expected, evaluation of why this is, and what steps can be taken to improve progress, may help prevent complete failure of the management strategy.

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4. Have we missed an important element? Please tell us about it.

Funding

It is vital that the next Threatened Species Strategy comes with significant levels of government financial investment, and other forms of support, that is sufficient for the Strategy to deliver on its aims. The first Threatened Species Strategy sought co-investment from industry via a project prospectus. Industry involvement in threatened species conservation is vital and co-investment opens up a diverse set of opportunities, including raising awareness. However, the first prospectus did not attract significant industry investment, meaning many important projects aimed at recovering species did not proceed.

It is estimated that to recover all of Australia's listed threatened species would cost ~AUD$1.69B p.a. (Wintle *et al.*, 2019), which overall is a very small proportion of Australia's annual budget. Such funding would not only help recover our threatened species and ecosystems but also provide valuable employment opportunities (e.g. via contracted pest control, weed management and wildlife monitoring) for communities, including regional and Indigenous Australians. We therefore suggest this funding needs to be delivered as a priority to help rapid delivery of improved conservation outcomes for Australia's threatened species, as part of the next Strategy.

A prioritisation approach that explicitly accounts for and articulates the feasibility and costs of different threatened species recovery programs and landscape management strategies will help investors understand how much benefit can be achieved from a given level of investment (e.g. using a "Project Prioritisation Protocol" for individual species, or a "Priority Threat Management" protocol for landscapes/regions, or a return-on-investment approach for actions; Joseph *et al.*, 2009; Auerbach *et al.*, 2014; Chadés *et al.*, 2015; Firn *et al.*, 2015).

5. How important do you think each of the prioritisation principles in the current Threatened Species Strategy is for identifying priority species in the new Strategy? (Extremely important, very important, moderately important, slightly important, not at all important)

Science

     Conservation status   Extremely

     Importance to the environment   Moderately

     Uniqueness   Very

     Importance to people   Moderately

Action

     Chance of success   Very

     Benefit   Very

     Umbrella action   Very

     Cost   Very

Partnership

     Community   Moderately

     State and territory governments   Very

     Broader leveraging   Very

     Australian Government programmes and policies   Moderately

6. Could you suggest improvements to these prioritisation principles in a new Threatened Species Strategy? Why do think these improvements are important?

The prioritisation principles outlined in the first Strategy and the discussion paper provide clues as to why the 70 priority species and recovery initiatives were chosen. What is lacking is a robust and transparent planning and decision-support framework for selecting priority species and actions.

At the national scale, planning and decision support frameworks help policy-makers and practitioners increase planning rigour, project accountability, stakeholder participation, transparency in decisions, and learning (Schwartz *et al.*, 2018). At the local scale, such tools help identify and conceptualise management issues, facilitate working with communities to collate data through participatory techniques, and engage key stakeholders in management decision making (Wendt *et al.*, 2016). These tools are invaluable for the Strategy to clearly articulate objectives and values, clarify the benefits and costs of decisions, and ensure transparency of prioritisation decisions. Using a decision-support tool in the Strategy, for instance, would help clarify how, or if, different weightings are used to support different values for the prioritisation (e.g. conservation status vs. importance to people).

Examples of decision-support planning and prioritisation frameworks that have been used by governments and non-government agencies at regional or national scales to determine conservation priorities include:

- systematic conservation planning to inform questions such as "Where are the critical locations for action?" (e.g. Fiji, Papua New Guinea, Great Barrier Reef, South Africa; Margules & Pressey, 2000; McIntosh *et al.*, 2017);
- structured decision making to identify optimal actions to achieve desired outcomes while balancing diverse stakeholder objectives in the face of uncertainty (e.g. USA; Runge *et al.*, 2011);
- the Project Prioritisation Protocol to balance benefits and costs of species recovery programs (e.g. New Zealand and NSW; Joseph *et al.*, 2009; Brazill-Boast *et al.*, 2018);
- Priority Threat Management to choose the optimal management strategy from competing choices with differing benefits and costs (e.g. Canada, Murray Darling Basin, Pilbara; Chadés *et al.*, 2015; Carwardine *et al.*, 2019); and
- Strategic Foresight, which assesses plausible planning actions given uncertain future conditions of the social and natural world (e.g. horizon scanning to identify actions most likely to achieve a desired future state given known risks and future uncertainties, used by the UK Department for Environment, Food and Rural Affairs; Cook *et al.*, 2014; Garnett *et al.*, 2016).

Key concepts in these prioritisation frameworks include estimation of likely benefits to species with and without management, current and future uncertainties or risks to success (feasibility), and costs.

For example, formal prioritisation of priority species and actions has been used very effectively in New South Wales and New Zealand (Joseph *et al.*, 2009; Brazill-Boast *et al.*, 2018). In New South Wales, species were placed into different management streams and appropriate management actions were determined through structured consultations with species experts and local managers (Brazill-Boast *et al.*, 2018). Species were then prioritised for recovery based on quantitative data on their relative benefits (calculated as the difference between their likelihood of recovery with and without management), likelihood of success and management implementation cost, and a simple cost-efficiency equation. The development of the new Threatened Species Strategy provides the ideal opportunity to adopt a best practice prioritisation approach, including using similar principles for the selection of priority species at the national level.

Further, the discussion paper states that the prioritisation principles will be used to select priority species, places and actions, but the principles are not universally applicable to

each of those three things. The 'Science' principles are species specific, but could perhaps be generalised to also include places. The 'Action' principles relate to the intersection of species/places and actions, and the 'Partnership' principles relate to the intersection of actions and stakeholders. Because these principles are not explicitly linked, and their selection is not supported by a clear evidence base, it is difficult to understand how each principle will be applied and how they will interact with each other to select priority species, places and actions.

The principles do not mention relative levels of current investment or existing management actions for species or places. This means that species that are already heavily invested in could be prioritised to the determinant of highly endangered species that are less well known or less charismatic. Accounting for leverage has been shown to improve the results of a prioritisation process for selecting target species for managing and monitoring threats to biodiversity (see for example Tulloch *et al.*, 2011).

The principle of **complementarity** is also critical to ensuring that prioritisation approaches to select species, regions and threat management actions are not only representative across taxa and regions and threats, but also result in decisions that avoid redundancies (Chadès *et al.,* 2015; Tulloch *et al.,* 2013). A complementary set of species or landscape management programs protects as many species as possible, without unnecessary overlap or redundancy in the benefits generated by management strategies (Justus & Sarkar 2002; Tulloch *et al.,* 2013).

We recommend that the identification of priority species be done through a formal prioritisation process that is objective, transparent and repeatable, and that approaches species recovery in a decision science framework, accounting for complementarity between species and regions and threats, benefits of managing threats, feasibility, and costs (e.g. Carwardine *et al.*, 2019; Joseph *et al.,* 2009; Tulloch *et al.,* 2013)**.** Such an approach would draw on much of the information that is already represented by the prioritisation principles, but it would do so in a structured and data-driven way, providing a more robust and transparent list of priority species.

We suggest that such an approach could include information such as species' extinction risk, the range of threats they face, the degree to which they overlap with other threatened species, current levels of investment and management, and other factors (e.g. importance to people; feasibility of recovery). Importantly, the approach could draw on principles from:
- Strategic Foresight to assess risks and future uncertainties (in management success, in species extinction risk);

- Structured Decision Making to explicitly incorporate these risks and uncertainties into the decision-making process;
- Systematic Conservation Planning and Priority Threat Management to allocate actions and management strategies across space in a way that ensure comprehensive representation of threatened species; and
- the Project Prioritisation Protocol to maximise the number of species recovered relative to budget available.

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7. Please rate each of the proposed action areas by their level of importance for inclusion in a Threatened Species Strategy (extremely important, very important, moderately important, slightly important, not at all important)
7b. Why did you rate the action areas this way?

Action areas:

Mitigating priority threats	Extremely important
Preserving, restoring and improving habitat	Extremely important
Emergency intervention	Extremely important
Planning for conservation	Extremely important
Building knowledge and tools	Extremely important
Forging partnerships	Very important
Investment guidance	Slightly important
Inspiring change	Slightly important

We welcome the broadening of the proposed action areas for the new Strategy. The action areas in the current Strategy were somewhat narrow in scope and were not representative of the full range of threats that face Australia's biodiversity and ecosystems (see response to question 3 above).

The action area '*Mitigating priority threats: major threats that impact threatened species*' will be most impactful if it is **underpinned by data on the number of species affected by and the relative impacts of different threats**. Agricultural activity, urban development, climate change and other threats impact large numbers of threatened species (Kearney *et al.*, 2019) and the development of the new Strategy provides the opportunity to recalibrate current focusses to be more representative.

We strongly support an action area that focuses on reducing land clearing and habitat loss, and restores degraded habitat. The destruction of threatened species' habitat is a major and ongoing problem in Australia. From 2000–17, 7.7 million ha of potential habitat for terrestrial threatened species and 370,000 ha of threatened ecological communities were cleared (Ward *et al.*, 2019). Recent research has highlighted that the

large majority of Australia's threatened species (86%) will benefit from retaining and restoring habitat (Kearney *et al.*, 2020). **We strongly urge for the action area of '*Preserving, restoring & improving habitat*' to be more explicit about reducing rates of clearing of threatened species habitat.**

We recommend that the action area of '*Investment guidance'* be broadened to focus not only on increasing levels of investment, but also on optimising spending to improve conservation outcomes. This could include not only Commonwealth investment in biodiversity conservation, but also that of State/Territory Governments, non-government organisations and other stakeholders. As mentioned above, the prioritisation process does not yet seem to consider existing levels of investment and management for potential priority species and places. This means that funds may not be invested most efficiently to ensure the best return on investment and improvement in species' conservation statuses. Many studies have shown that formally accounting for the costs and benefits of performing different actions or prioritising particular species helps to optimise investments (Wilson *et al.*, 2007; Underwood *et al.*, 2008; Auerbach *et al.*, 2014) and we recommend that the new Strategy adopts this approach.

> **8. Have we missed an important action area? Please tell us about why it should be included.**

No response.

> **9. What are the action areas where Commonwealth leadership would create the most value through a new Strategy? How could the Commonwealth best create value in that action area?**

No response.

> **10. What work are you or your organisation undertaking that aligns with the Threatened Species Strategy?**

The Society for Conservation Biology Oceania (SCBO, www.scboceania.org) is the peak professional group for conservation biology in the region, spanning Australia, New Zealand and Pacific Islands. Our members include conservation scientists, policy-makers and practitioners. The role of SCBO's Policy Committee is to provide scientific information for management and policy decisions about the long term sustainability and future of ecosystems and their dependent organisms, based on the best available

science. We aim to inform and improve environmental policies through engagement, access to scientific information, and responses to proposed government policies at local, national and international levels.

The Ecological Society of Australia Ltd (ESA, www.ecolsoc.org.au) is a national not-for-profit organisation formed in 1959, and is the peak group of ecologists in Australia, with over 1100 members from all states and territories. Our members work in universities and other research institutions, government departments, NGOs, private industry and consultancies. The ESA fosters excellence in ecological science and practice. We create an inclusive community to support research and knowledge sharing to better understand ecological systems, and apply this knowledge for the benefit of people and nature. The ESA's Policy Working Group focuses on promoting the application of ecological principles to the use and conservation of natural resources, and advising the government and other groups on matters relevant to ecology.

Members of both of our organisations work at the coalface of threatened species conservation. Our organisations support and foster this work, and we provide a ready conduit for others to access the extensive experience and knowledge of our members.

11. What are the opportunities to partner with the Australian Government on a new Threatened Species Strategy?

No response.

12. Do you have any other comments on what you would like to see in a new Threatened Species Strategy?

No.

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