Australia's system for abating major threats to biodiversity

A PRIORITY FOR REFORM OF THE EPBC ACT

Joint submission by the

Invasive Species Council and Bush Heritage Australia

to the independent review of the EPBC Act

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About the Invasive Species Council

The Invasive Species Council was formed in 2002 to advocate for stronger laws, policies and programs to keep Australian biodiversity safe from weeds, feral animals, exotic pathogens and other invaders. It is a not-for-profit charitable organisation with over 2500 supporters, funded entirely by donations from supporters and philanthropic organisations.

About Bush Heritage Australia

Bush Heritage Australia was formed in 1991 and is an independent not-for-profit that buys and manages land, and also partners with Aboriginal people, to conserve Australia's magnificent landscapes and irreplaceable native species forever. Today it helps protect over 11.3 million hectares across Australia on its reserve and partnership properties.

Endorsements

This submission prepared by the Invasive Species Council and Bush Heritage Australia has been endorsed by the following organisations:

- Australian Association of Bush Regenerators
- Nature Conservation Council of NSW
- Nature Conservation Society of South Australia
- Victorian National Parks Association

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INTRODUCTION

If Australians are to protect what is most distinctive about this country – its plants, animals and ecological communities, most unique to Australia – we urgently need to overcome many threats to nature. At least 100 endemic Australian species have gone extinct since 1788 – mostly due to invasive species and land clearing[1] (see Box 1).

Extinction remains as contemporary as ever. Since the last review of the EPBC Act, in 2009, 5 more animal species have been lost (3 totally extinct and 2 extinct in the wild),[1] while dozens more are on the brink of extinction and hundreds more are edging towards it.[2–6]

How do we stop extinctions and reverse declines? That should be the primary focus of this 10-year review of the EPBC Act. Without major reforms, Australia is likely to lose many more species in the near future.

Much of the public commentary on conservation in Australia has focused on the importance of improving the national system for listing and recovering threatened biodiversity – by ensuring that threatened species (and ecological communities) are efficiently listed as such, that all threatened biota have a recovery plan and that recovery plans are implemented.

But just as important as reforming recovery efforts should be a concerted national focus on abating the major threats causing decline.

In this, the conservation system should be like the health system. To deal with major threats to human health (eg the recently emerged coronavirus), there needs to be both a strong focus on clinical services for afflicted people and on coordinated research and strategies to reduce the threat (eg development of a vaccine). A national conservation system lacking effective means to abate major threats is like a health system that simply leaves it to each local health service to deal with the coronavirus threat.

Therefore, among the most important parts of the EPBC Act are the sections (in Part 13) specifying processes to identify and facilitate national action on major threats – the listing of key threatening processes (KTPs) and the preparation and implementation of threat abatement plans (TAPs). In this submission, we call these processes 'the KTP system'.

Currently, 21 KTPs are listed under the EPBC Act (Table 1). Collectively, these KTPs imperil thousands of native species and ecological communities.

The current KTP system is conceptually sound. It makes sense that major threats should be listed nationally and that, under federal leadership, a listing should then catalyse a plan and collaborative action to abate the threat. And, as demonstrated by a few successes, the current model can work well.

However, the majority of threats to nature in Australia have not been abated, and many are worsening. Therefore, the KTP system is not achieving the relevant object of the EPBC Act – to provide for the protection of threatened species and ecological communities.

In this submission we identify major impediments to the effectiveness of the KTP system and reforms needed to strengthen the system. The system should be retained – something like it is essential for conservation – but it needs strengthening and expanding.

Most of this submission is based on 2 documents: a discussion paper on the KTP system published by the Invasive Species Council in 2018[7] and an unpublished report from an expert workshop hosted by the Invasive Species Council in 2019. Most of the reforms proposed here were developed in that workshop. Not all the proposals here require changes to the EPBC Act. Those that do are marked with an asterisk (*).

The benefits of a strong KTP system

Strengthening the KTP system should be one of the highest priorities for the following reasons (explained in more detail below):

(1) Abatement of key threats is the most effective and cost-effective way to protect and recover threatened species and ecological communities.
(2) Effective threat abatement benefits many other species and ecological communities and improves overall environmental health.
(3) Effective threat abatement brings many social and economic benefits, including for agriculture.

Effectiveness for recovery: A few major threats have caused the majority of extinctions and declines in Australia – particularly invasive species and habitat loss[1,8–10] – so abating these key threats would help recover large numbers of species. Otherwise, recovery of many species will not be feasible. A concerted focus on threat abatement would also be cost-effective: enduring abatement (eg by improved control techniques, biological control or stricter regulation) is far less expensive over the long term than species-by-species conservation efforts.

Benefits for biodiversity and environmental health: Abating major threats would also be of great benefit for biodiversity and environmental health in general. It would help the recovery or resilience of many non-listed species and communities, including those that are threatened but not listed due to data deficiencies or inefficient listing processes and those not yet threatened but in decline. Abating threats is important also for improving the resilience of species to climate change.

Non-environmental benefits: Abating major threats to biodiversity can bring many non-environmental benefits – particularly when KTPs also threaten major Australian industries such as agriculture and tourism (eg many invasive species) and social wellbeing (eg red fire ants). Abatement programs can also economic benefits through generated jobs and services, often in regional and rural economies (eg much of the work of Indigenous rangers are focused on threat abatement).

Box 1. Major threats to Australian biodiversity

At least 100 Australian species have gone extinct since European colonisation.[1] Most extinct plants have been lost to land clearing and most extinct animals to invasive species (mammals mainly to feral cats, foxes and changed fire regimes, frogs to chytrid fungus, island birds to exotic rodents and hunting, and lizards to the wolf snake).[1,8] Invasive species have also been the leading cause of extinctions globally.[11] Three extinctions (2 mammals and a lizard) and 2 extinctions in the wild (2 lizards) have occurred since 2009.[1]

Invasive species are currently the most prevalent threat to Australia's native plants and animals – imperilling 94% of nationally threatened vertebrates and 80% of plants (82% of the total).[9] Ecosystem modifications (due mainly to altered fire and hydrological regimes) are the second-most prevalent threat, affecting 74% of listed species, and agricultural activity is the third, affecting 57% of threatened species. These are IUCN categories of threat, which do not include a specific 'habitat loss' category, but a 2011 analysis found that habitat loss threatens 80% of nationally listed species.[10]

We cannot save species and ecological communities without dealing with these major threats – invasive species, habitat loss, altered fire regimes, altered hydrological regimes and livestock grazing. Yet there are no KTP listings for the last 3 of these. Land clearing is a listed KTP but has no threat abatement plan. And although 14 KTPs are invasive species, a large number of major invasive threats are not listed as individual KTPs, but are instead included within the 'novel biota' KTP, a moribund listing without any abatement plans. This means the KTP system is not applied for several major threats to biodiversity and only partially for the 2 leading threats (invasive species and habitat loss).

Table 1. Current listed key threatening processes

Key threatening process[A]	Abbreviated KTP	Year listed	# listed species/ECs impacted[B]
Competition and land degradation by rabbits	Rabbits	2000	>300
Competition and land degradation by unmanaged goats	Feral goats	2000	56
Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*)	Root-rot fungus	2000	144
Incidental catch (or bycatch) of seabirds during oceanic longline fishing operations	Longline fishing	2000	18
Predation by European red fox	Foxes	2000	74
Predation by feral cats	Feral cats	2000	>150
Incidental catch (bycatch) of sea turtles during coastal otter-trawling operations within Australian waters north of 28 degrees south	Otter trawling	2001	3
Land clearance	Land clearing	2001	Not stated
Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases	Climate change	2001	Not stated
Predation, habitat degradation, competition and disease transmission by feral pigs	Feral pigs	2001	159
Psittacine circoviral (beak and feather) disease affecting endangered psittacine species	Beak & feather disease	2001	16 [12]
Infection of amphibians with chytrid fungus resulting in chytridiomycosis	Chytrid fungus	2002	27
Injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris	Marine debris	2003	20
The reduction in the biodiversity of Australian native fauna and flora due to the red imported fire ant, *Solenopsis invicta*	Red fire ants	2003	Not stated
Loss of biodiversity and ecosystem integrity following invasion by the yellow crazy ant (*Anoplolepis gracilipes*) on Christmas Island, Indian Ocean	Yellow crazy ants, Christmas Island	2005	10+
The biological effects, including lethal toxic ingestion, caused by cane toads (*Bufo marinus*)	Cane toads	2005	Not stated
Predation by exotic rats on Australian offshore islands of less than 1000 km^2 (100,000 ha)	Exotic rats on islands	2006	Not stated (~20 extinctions)
Invasion of northern Australia by gamba grass and other introduced grasses	Invasive grasses, north Australia	2009	28
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	Escaped garden plants	2010	Not stated
Novel biota and their impact on biodiversity	Novel biota	2013	Not stated
Aggressive exclusion of birds from potential woodland and forest habitat by over-abundant noisy miners (*Manorina melanocephala*)	Noisy miners	2014	>11

Notes: **A.** The list of KTPs is at [13]. **B.** This is the number of threatened species and ecological communities (ECs) noted as threatened in the TAP, background information or listing advice. The numbers are often not comprehensive and do not include non-listed species that are also impacted. The novel biota and land clearance KTPs each threaten hundreds of listed species and ecological communities.[9,10]

REFORMING THE KTP SYSTEM

We consider here the 3 major elements of the existing KTP system – (1) the listing of KTPs, (2) the development of threat abatement plans and other responses and (3) implementation of abatement plans. We also consider (4) additional mechanisms to improve the effectiveness of KTP abatement, including for (5) invasive species, as well as (6) general governance issues.

1. Listing KTPs

Fundamental to an effective KTP system is that all major threats are listed – for both informational and abatement purposes. The current KTP list is far from comprehensive, with several major threats not listed. Australia needs an efficient scientific process for systematically and comprehensively listing KTPs.

Current impediments

Impediment 1.1. Reliance mainly on ad hoc public nominations for KTP identification

Currently, the KTP system relies on KTP nominations, mostly from NGOs, rather than a systematic identification of threats (Table 2).

The rate of KTP listings has greatly slowed in recent years: 6 KTPs were listed prior to 2000, carried over from the previous national law, 12 KTPs were listed during the first decade of the EPBC Act (2000-2009), but only 3 were listed during the second decade (2010-2019). No nomination has been accepted for assessment since 2011. Many public nominations have been rejected for assessment (eg Table 6). Preparing KTP nominations is very demanding, and there is no guarantee under the current system that a major threat will be nominated, that the nomination will be assessed, or that a credible nominated major threat will be listed.

Impediment 1.2. Slow, inefficient processing of KTP nominations

The 3 KTP listings of the past decade took 3–5 years from nomination to listing while the 3 nominations rejected in the past decade took 4–6 years (Table 3) (see Box 2 for the process). One nomination still under assessment, contemporary fire regimes, was nominated more than a decade ago. This should be an obvious KTP listing, for inappropriate fire regimes is recognised as one of the leading threats to biodiversity.[9,10] Several KTP nominations were not assessed (they weren't placed on the annual assessment priority list), including one on altered flow regimes of watercourses,[14] a recognised major threat to biodiversity.[9]

Impediment 1.3. Ministerial discretion on KTP assessments and listings

The current process to list KTPs is vulnerable to political interference. The decision-maker is the environment minister, who is provided with advice from the Threatened Species Scientific Committee. The minister decides which KTP nominations are assessed and whether to accept advice by the Threatened Species Scientific Committee to list a KTP (Box 2). Ministerial discretion means that credible nominations can be rejected without assessment and scientific advice to list major threats ignored. For example, in 2011, the then-environment minister refused the advice of the threatened Species Scientific Committee to list invasive fish as a KTP, with no reason given.[15]

Impediment 1.4. Insufficient focus on emerging threats.

> Although the current KTP system allows for the listing of emerging threats ('a process is a threatening process if it threatens, or may threaten …'), the system is mainly focused on established threats for which there is strong evidence. Red imported fire ants are the only emerging threat listed as a KTP. Concerted national action on an emerging threat could prevent it becoming an entrenched threat.

Reforms needed

*Recommendation 1. Systematic KTP listing**

KTPs should be comprehensively identified and listed through a systematic scientific process overseen by the TSSC. In addition, a public nomination process should be retained to ensure that emerging, contentious or poorly known threats are also assessed. The KTP list should be regularly reviewed to keep it up-to-date.

Rationale: The key threats to Australian biodiversity are mostly well known and can be identified by reviewing scientific literature, the SPRAT database, recovery plans and state of the environment reports. This would be much more efficient, less expensive and less of an impost on community resources than relying mainly on public nominations. It would result in a comprehensive authoritative list of KTPs. Public nominations could be useful for identifying new KTPs, as a supplement to the systematic process. One option would be to develop a KTP version of the Species Expert Assessment Plan (for assessing species groups) focused on threatening processes that affect multiple species.[16]

*Recommendation 2. Scientific decision-making**

The Threatened Species Scientific Committee (or equivalent independent committee of experts) is the appropriate decision-maker for scientific and technical decisions, including to list KTPs.

Rationale: Decisions that are scientific and technical in nature, particularly whether a threatening process is a KTP, which nominations for KTPs are evaluated, and the most appropriate abatement responses should be made by scientific experts and not be subject to ministerial discretion. This is consistent with the NSW system for listing KTPs. Removing ministerial discretion will make the process not only more credible and useful, but more efficient and less time-consuming.

*Recommendation 3. A focus on emerging threats**

An additional threat category – an emerging threatening process (ETP) – should be established to facilitate precautionary or urgent interventions to prevent emerging threats becoming KTPs.

Rationale: Although the current KTP system allows for the listing of emerging threats, it is mainly focused on established threats for which there is strong evidence. Acting on emerging threats is far more effective and cost-effective than responding once a threat is entrenched. An ETP category would be useful in cases such as myrtle rust (subsequent to the failure of the eradication effort) to facilitate urgent national action to prevent species becoming threatened. ETP listings should have a lower burden of proof than those for KTPs (because evidence is likely to be hard, slow or expensive to compile or does not yet exist and because of the benefits of early intervention). Regular horizon scanning (as recommended by the 2009 review of the EPBC Act)[17] would be useful to identify potential ETPs. This preventative approach to key threatening processes would require formal linkages between environment threat abatement and complementary government programs such as biosecurity.

*Recommendation 4. Specified composition of the threatened species scientific committee**

The Threatened Species Scientific Committee should include suitably qualified experts from relevant scientific disciplines, with these disciplines specified in the EPBC Act. It should not include sectoral or industry representatives lacking relevant scientific expertise.

Rationale: For effective decision-making by the scientific committee, it is important that it contains the full breadth of relevant expertise. The EPBC Act does not specify that the committee must contain any particular expertise or level of qualification, with the composition entirely a decision for the environment minister. If the proposed requirement would make the committee too unwieldy, there could be provision to establish subcommittees to draw in additional expertise.

Box 2. The current process for listing a KTP

The process for assessing and listing KTPs is long and complex and the environment minister makes most of the final decisions:

- A KTP is nominated – by an NGO, member of the public, state or federal government agency or the Threatened Species Scientific Committee (TSSC).
- The TSSC considers the nomination and decides whether to place it on the 'proposed priority assessment list' (in an annual process covering nominations for threatened species, ecological communities and KTPs).
- The TSSC prepares assessment recommendations for the environment minister.
- Departmental staff brief the environment minister on the recommended assessments.
- The environment minister determines whether a KTP nomination is to be included on the 'final priority assessment list'.
- For each nomination on the final priority assessment list, the department undertakes extensive consultation (including with state and territory governments) and prepares a draft listing advice.
- The TSSC reviews the draft listing advice.
- The department undertakes statutory public consultation (including requests for comment or information from relevant experts) on each priority nomination.
- The TSSC assesses and revises the KTP listing advice.
- The TSSC makes its recommendation to the environment minister about whether to list a KTP and whether to prepare a threat abatement plan.
- Departmental staff brief the minister on the listing recommendations.
- The minister decides whether to list a KTP and whether to require a threat abatement plan. The EPBC Act does not require the minister to provide reasons if he/she decides to reject the TSSC advice.

Note: There is also a process for delisting KTPs.

Table 2. A comparison of Australia's most prevalent threats and listed KTPs

Threat category	Threatened taxa impacted (%)	Relevant KTPs listed	Examples of potential KTPs not listed
Invasive species	82.0	14 KTPs: Novel biota, foxes, cats, rabbits, goats, pigs, rodents, phytopthora, red fire ants, yellow crazy ants, invasive grasses, escaped garden plants, chytrid fungus	The majority of invasive species threats are not individually listed (novel biota is an all-encompassing KTP)
Ecosystem modifications	74.1		Altered fire regimes Altered hydrological regimes
Agricultural activity	56.9	Land clearing	Livestock grazing
Human disturbance	38.4		Recreational activities
Climate change	34.8	Climate change	
Transportation	30.3		Roads and railways
Overexploitation	27.4	Longline fishing Otter trawling	Logging Gathering plants

Notes: Of the top seven threat categories identified by Kearney et al. (2018) – those that impact on at least 25% of threatened species – the majority of relevant potential KTPs encompassed by these categories are not listed as KTPs. In particular, inappropriate fire regimes and hydrological regimes are missing. Both have been nominated as KTPs, but the fire nomination is still under consideration 12 years later (Table 3) and the hydrological nomination was rejected without assessment.[14] Most of the 'examples of potential KTPs not listed' (column 4) are 'subclass threats' in the Kearney et al paper and some (eg recreation) may not be appropriate as KTP categories.

Table 3. Time from KTP nomination to listing or rejection

Nominated key threatening process	Year nominated[A]	Year listed/ rejected	Years taken to list/reject
Invasion of northern Australia by gamba grass and other introduced grasses	2007	Listed 2009	2
Introduction in Australian inland waters of native or non-native fish that are outside their natural geographic distribution	2007	Rejected 2011	4
Loss and degradation of native plants and animal habitats by invasion of escaped garden plants	2007	Listed 2010	3
Damage to marine ecosystems by trawling in the area of the Southern and Eastern Scalefish and Shark Fishery	2007	Rejected 2013	6
Contemporary fire regimes resulting in the loss of vegetation heterogeneity and biodiversity throughout Australia	2008	Not complete	>10
The introduction of novel biota and its impact on biodiversity	2008	Listed 2013	5
Biodiversity decline and habitat degradation in the arid and semi-arid Australian rangelands due to the proliferation, placement and management of artificial watering points	2009	Rejected 2014	5
Aggressive exclusion of birds from potential woodland and forest habitat by overabundant noisy miners *Manorina melanocepla*	2011	Listed 2014	3

Notes: A. Information about the year of nomination was gleaned from the annual 'finalised priority assessment lists',[18] which are the lists of nominated species, ecological communities and key threatening processes approved for assessment by the environment minister each assessment year. It is assumed that nominations on the priority list were made the same year as they were placed on the list, but they may have been made in earlier years.

2. Threat abatement responses

If a threat is serious enough to be listed as a key threatening process, it surely warrants a national abatement response.

To more effectively abate major threats, Australia needs mandatory national responses to KTPs that (among other things):

- specify and prioritise abatement actions and research
- integrate with recovery plans
- identify commitments, targets, costs, requirements for monitoring and reporting and triggers for review
- advance the interests of co-beneficiaries where interests are aligned.

Impediments

Impediment 2.1 Optional threat abatement responses

Almost a third of listed KTPs (6 of 21) have no threat abatement plan – due to the minister deeming it not a 'feasible, effective or efficient way' to abate those threats. But there are no criteria for 'feasible', 'effective' and 'efficient', which undermines the credibility and transparency of decision-making. Although it is clearly not feasible to develop a single threat abatement plan for the novel biota KTP, it encompasses numerous invasive species warranting abatement responses. Also used to justify a non-response are existing processes focused on the threat (eg the national weed strategy in the case of escaped garden plants[19]). But there are no requirements to demonstrate that these alternative processes are effective, to monitor their abatement progress, or to initiate action if they prove ineffective. For KTPs without a threat abatement plan, the listing is essentially moribund, for there is no requirement to monitor or report on the threat or abatement efforts. The threat level for most KTPs without TAPS is likely to have increased since their listings.

Impediment 2.2 Insufficient resources and inefficient processes for abatement planning

The development of threat abatement plans is very slow. It has taken an average of four years to prepare a threat abatement plan for nine KTPs listed since 2001 (all those for which a plan has been developed since the EPBC Act came into force) and a similar time to revise abatement plans subsequent to reviews. One revision for the root-rot fungus plan took eight years, and revisions of the plans for red foxes and feral goats have not been completed seven years after they were reviewed. Of 14 existing abatement plans (including the non-statutory invasive ant biosecurity plan[20]), 5 (36%) are at least 8 years old (Table 4). The major impediments to more efficient TAP development and revision are too little funding and too few departmental staff. Consultation with state and territory governments is also often time consuming.

Impediment 2.3 Insufficient coordination between threat abatement and recovery planning

For a substantial number of Australia's approximately 1800 listed threatened species, the abatement of threats is the primary recovery action needed. But there is no explicit process or framework for integrating recovery plans (or conservation advices or recovery management actions) and threat abatement plans to optimise the efficiency of threat abatement and recovery efforts.

Impediment 2.4 The siloing of threat abatement planning

Current KTP processes typically offer little opportunity for the involvement of other sectors or government departments. This is despite many KTPs also being a threat to human health and wellbeing and industries such as agriculture and tourism. One recent exception is the *National Invasive Ant Biosecurity Plan 2018-2028,*[20] developed in collaboration with the biosecurity agency, but this is not a statutory threat abatement plan. More-collaborative planning is likely to lead to more innovative and ambitious plans, as demonstrated for the longline fishing plan (see Box 4).

Reforms needed

*Recommendation 5. A mandated instrument of response**

All listed KTPs (or KTP subsets in the case of multi-threat KTPs) should have an instrument of response. Initially, a *threat response statement* should be developed, as part of or as soon as possible after a KTP listing, as an independent science-based statement of what is needed to abate the threat, specifying the urgency, benefits and likely costs of abatement and providing advice about the most appropriate instruments (whether planning, policy or regulatory) to facilitate abatement. Then, a full *threat abatement plan* should be developed unless the following circumstances apply: (1) abatement is significantly constrained by deficiencies of data, operational knowledge or other forms of technical feasibility or (2) abatement can only be achieved through other processes such as legislative or policy changes. Both instruments must specify monitoring, reporting and review obligations (see section 3).

Rationale: All KTPs warrant an abatement response, but these should be flexible to respond to different circumstances and different types of KTPs. The initial threat response statement is important as a short-term response: to precipitate urgent abatement actions and to identify longer-term abatement strategies, whether that is through an abatement plan or another process such as legislative change. The response should be a scientific document (produced independently of government) outlining what is needed to abate the KTP with no account taken of the political, social or economic feasibility of doing so. Feasibility is an important consideration for the subsequent abatement plan, which should include clear commitments for government-led actions. One useful model is the two-step approach taken by the Ontario government for threatened species (see Box 3).

Recommendation 6. Prioritised abatement actions

To guide prioritisation of threat abatement actions, a 'priority threat management' approach is needed to identify the best returns on investment actions, based on the likely costs, potential benefits and feasibility of the proposed actions.

Rationale: Prioritisation of threat abatement actions should be explicit and transparent. 'Priority threat management' is a framework that prioritises actions based on their comparative returns on investment, calculated as benefit x feasibility/cost.[21] The required information is (a) potential benefit (eg recovery of threatened species), (b) estimated costs of abatement actions, (c) feasibility (calculated by multiplying the probabilities of uptake and success). This approach can be used to calculate returns on investment for each action in an abatement plan, combinations of actions, and entire plans. Generalisations are often necessary, including coarse spatial resolution and a reliance on expert estimates.

*Recommendation 7. Essential elements of threat abatement plans**

Threat abatement plans should include the following elements (among other things):

- the implementation obligations and commitments of all parties
- the costs of implementation
- a monitoring and reporting regime to track threat status and outcomes for threatened biota
- explicit targets for abatement and triggers for review/revision of the plan (eg based on density-damage relationships or the development of new abatement techniques)
- 2 classes of actions:
  - prescribed actions – those which are spatially or otherwise explicit (eg a critical research program) with assigned responsibilities
  - described actions for future or other-party implementation, with the role of the plan being to specify priorities, create a mandate and maximise abatement opportunities (eg to take advantage of on-ground opportunities as they arise and synergies with recovery plans and other abatement plans)
- information about interactions with other threats and strategies for responding to those interactions
- how the abatement plan will be integrated with relevant recovery plans and other abatement plans
- the co-benefits of abatement, and actions to optimise social and economic benefits

*Rationale***:** Such elements are essential for effective threat abatement plans, improving the prospects that they will be implemented, that threats will be monitored and that abatement actions will be modified as circumstances change. Planning requirements should be informed by an analysis of successful and unsuccessful abatement programs (see section 3).

Recommendation 8. Alignment with recovery plans and actions

A framework is needed for integrating recovery actions for threatened species and ecological communities into threat abatement plans. This can be facilitated by mapping KTPs and species threatened by each KTP to prioritise focus areas and species for abatement actions and optimise benefits across broad geographical areas.

Rationale: The recovery of many threatened species relies on effective threat abatement, so a framework to facilitate integration of recovery planning and threat abatement planning is essential to optimise their effectiveness and cost-effectiveness. The efficiency of this approach is illustrated by the large number of species threatened by particular KTPs (for example, rabbits threaten more than 300 listed species and ecological communities, feral cats and pigs more than 150 each and dieback disease more than 140, see Table 1). With better integration, many recovery plans could be focused primarily on the recovery actions needed once the threat is reduced. Better integration should enable more resources to be dedicated to long-term abatement solutions, ultimately benefiting many more species.

Recommendation 9. Collaboration with other sectors

Partnerships with non-environmental beneficiaries of threat abatement should be sought to develop threat abatement plans or other types of abatement plans.

Rationale: Threat abatement plans are rightly focused on actions to abate environmental threats. But where interests are aligned, developing threat abatement plans in partnership with other departments or other beneficiaries of threat abatement will better coordinate and increase threat abatement resources and public support. Many threats to biodiversity are also threats to tourism,

agriculture, other primary industries, and human health and amenity. One example is the *National Invasive Ant Biosecurity Plan 2018-2028*[20] (not a statutory TAP), developed in collaboration with the biosecurity agency, which is focused on invasive ants beyond those listed as KTPs and focused on protecting 'biodiversity, agriculture, infrastructure, human health and public amenity'.

Recommendation 10. Accessible data repository

A publicly accessible repository of data and information should be created to support decision-making about threat abatement actions. If new data is needed, a 'value of information' approach should be used to prioritise the collection of data that will be most beneficial for decision-making.

Rationale: Such a repository is in the interests of transparency and would be a useful resource for researchers as well as those implementing the threat abatement plan. Prioritising the data to be collected means cost-efficient use of research funding.

Table 4. Listed KTPs and the status of threat abatement plans

KTP	Year listed	Year of abatement plan[A]	Latest available review[B]
Rabbits	2000	1999/2008/2016	2013
Feral goats	2000	1999/2008	2013
Root-rot fungus	2000	2001/2014/2018	2006
Longline fishing	2000	1998/2006/2014/2018	2011
Foxes	2000	1999/2008[C]	2013
Feral cats	2000	1999/2008/2015	2014
Otter trawling	2001	X	
Land clearing	2001	X	
Climate change	2001	X	
Feral pigs	2001	2005/2017	2011
Beak & feather disease[C]	2001	2005/X	2012
Chytrid fungus	2002	2006/2016	2012
Marine debris	2003	2009/2018	2015
Red fire ants[D]	2003	2006/2019	2012
Yellow crazy ants, Christmas Island[D]	2005	2006/2019	2012
Cane toads	2005	2011	X
Exotic rodents on islands[E]	2006	2009	2015
Invasive grasses, northern Australia	2009	2012	X
Escaped garden plants	2010	X	
Novel biota	2013	X	
Noisy miners	2014	X	

Notes: ***A***. Dark grey highlight = no threat abatement plan; light grey = an out-of-date abatement plan. Pink = a current abatement plan (published within the past 5 years). ***B***. Additional plans may have been reviewed but the review has not been released. ***C.*** The abatement plan for beak and feather disease ceased in 2015 and was replaced by a threat abatement advice. ***D***. The environment minister decided in 2013 that the tramp ants TAP (which covers red fire ants and yellow crazy ants KTPs) would not be revised, but that a supplementary threat abatement advice would be developed. However, in 2019 a National Invasive Ant Biosecurity Plan was published that includes these species. It is not a statutory threat abatement plan. ***E.*** In 2016 the environment minister decided that the exotic rodents on islands TAP would be revised, but this apparently is still in preparation.

Box 3. A 2-step planning approach for threat abatement

The Ontario government does not have the equivalent of a KTP system, but its planning approach for threatened species is potentially a useful model to adapt for KTPs. Ontario's threatened species law requires preparation of a recovery strategy for each listed species that provides science-based advice to the government on what is required to achieve recovery. Within 9 months, the government is required to publish a response to the strategy outlining their priorities and intended actions. The Ontario government's 2013 response statement for American chestnut (an endangered species) is an example of a clear, succinct (4 pages) plan for abating a key threatening process (chestnut blight).[22] The 'government-led actions' section specifies 7 actions the government will undertake, and the 'government-supported actions' section specifies 7 additional actions it endorses as necessary, 3 of which are identified as high priority and to be given priority consideration for funding over the subsequent 5 years.

3. Implementing threat abatement plans

Australia's ever-growing list of threatened species and ecological communities as well as reviews of individual threat abatement plans show that many abatement plans are poorly implemented. The available reviews (for 11 of 21 KTPs) reported good progress on abating 4 KTPs (27% of abatement plans, 19% of KTPs), moderate progress on 4 KTPs (27% of plans, 19% of KTPs) and poor progress on 3 TAPs (14% of KTPs, 20% of plans). Nonetheless, the examples of good abatement progress demonstrate that major threats to Australian biodiversity are surmountable.

Essential to effective threat abatement are mandatory monitoring and reporting, abatement cost estimates, and development of a skilled threat abatement service sector. Substantially higher levels of funding are needed, which is likely to require new funding sources.

Impediments

Impediment 3.1 Lack of monitoring, and disjointed and inadequate reporting requirements

Australia's generally depauperate state of biodiversity monitoring applies to the KTP system.[23] For almost all KTPs, there is little or no tracking of the status of the KTP (exceptions include the likes of land clearing and climate change, which are monitored not due to their listing as KTPs) or of the biodiversity threatened by KTPs. A recent survey found that 21–46% of threatened vertebrate species and 70% of threatened ecological communities 'are not monitored at all' and for those that are monitored, the quality of monitoring is often 'suboptimal'.[23] The only obligation for implementing threat abatement plans is on Commonwealth land (1% of Australia's land area), but there is no monitoring or reporting on the extent to which this is done or its effectiveness.

Due to a lack of monitoring, the 5-yearly reviews mostly report on activities rather than progress in protecting biodiversity – as acknowledged, for example, in the review of the feral pig threat abatement plan: 'Broadly, it is difficult to determine how the work that has been done on feral pigs has abated the threat because of inadequate monitoring and the differentiation of the threat from feral pigs with that from other threatening processes'.[24] The review found that feral pig control is patchy; effective, wide-scale programs to manage pigs are few; and knowledge of the level of control needed in particular environments is poor.

Impediment 3.2 Poor understanding of the elements of success

Based on the available 5-year reviews of threat abatement plans, we found moderate to good progress on threat abatement reported for fewer than 40% of KTPs (Table 5). Good progress had been achieved on implementing 4 plans: longline fishing (see Box 4), red imported fire ants, yellow crazy ants on Christmas Island and exotic rodents on islands. One KTP for which moderate progress was reported, feral cats, has recently been subject to a more concerted abatement effort, resulting in much better progress.

What distinguishes the effective abatement programs? No review has been conducted to determine the elements of success and the threat abatement plan may not have been the main driver of abatement effort in all cases (eg for red fire ants). Obvious likely elements of success include leadership, adequate funding and a working group responsible for implementation.

Impediment 3.3 Lack of information about funding levels and funding needs

Funding for actions specified in threat abatement plans (even if not driven by the plan) may come from a wide variety of sources, including state, federal and local governments, non-government, philanthropic and private sources, and research funding bodies. There is also a huge voluntary contribution to managing many KTPs, particularly invasive species. But we do not know how much is actually spent on abatement (even at a federal government level), and there has never been an estimate of how much is needed to properly implement abatement plans.

The level of funding needed to achieve KTP abatement is essential information. But there is no requirement under the EPBC Act for threat abatement plans to specify the costs of abatement actions (plans 'may' state such costings) and there is no standard framework to derive cost estimates. There is no quantification of outcomes (returns on investment).

Impediment 3.4 Insufficient funding for threat abatement

It is clear from the limited progress on threat abatement that the gap between available funding and funding needed for implementing TAPs is large. Inadequate funding was one of the main criticisms that emerged from the 2013 senate inquiry into 'Effectiveness of threatened species and ecological communities' protection in Australia', articulated in dozens of submissions to the inquiry. The committee said it was 'concerned by the evidence received about the lack of funding and implementation' of threat abatement plans.[25] It recommended longer-term funding options, targeted funding for implementation of recovery and abatement plans, prioritising funding, and more funding for researching effective control methods for invasive species and for controlling feral animals.

Impediment 3.5 Lack of commitments to implement threat abatement plans

Except for the federal government on Commonwealth lands, there are no obligations for any government or anyone else to implement threat abatement plans (Box 5). There is no agreement between the federal, state and territory governments to implement abatement plans (section 6). As explained in most abatement plans, 'Where a [plan] applies outside Australian Government areas in states or territories, the Australian Government must seek the cooperation of the affected jurisdictions, with a view to jointly implementing the TAP.' The government emphasises in public information that KTP listings are mostly obligation-free.[26]

- 'Listing a key threatening process does not regulate or prevent actions undertaken by the states, territories or individual property managers.
- Listing a key threatening process does not regulate or prevent actions undertaken by property managers.
- Key threatening processes do not trigger the EPBC Act (key threatening processes are not matters of National Environmental Significance under the EPBC Act).
- Listing a key threatening process does not cause any change to property practices.'

Impediment 3.6 Lack of assigned responsibility for implementing plans

Many threat abatement plans lack a taskforce or working group to drive implementation and monitor progress. This is likely to be essential for effective implementation (eg see Box 4 on one of the few successful threat abatement programs – for the longline fishing KTP).

Reforms needed

Recommendation 11. Analysis to determine best practice threat abatement processes

To develop best practice guidelines for threat abatement planning and implementation, the outcomes of threat abatement programs should be independently analysed (including by interviews of participants) to identify elements of successful and unsuccessful plans.

Rationale: Such analysis is important to inform the development of best practice standards for the development and implementation of threat abatement plans.

*Recommendation 12. Comprehensive monitoring and reporting to track KTPs and abatement progress**

Monitoring and reporting must be mandatory for each KTP. A national monitoring and reporting framework and standards should include a focus on the status of each KTP and the status of biodiversity threatened by each KTP. Reporting requirements should be harmonised across projects and programs to enable tracking of national progress. The federal government should report in detail on its implementation of threat abatement plans on Commonwealth land to demonstrate whether it is fulfilling its obligations under the EPBC Act, and to exemplify best practice and leadership.

Rationale: It is impossible to track abatement progress and assess the effectiveness of investment unless there is detailed monitoring and reporting. This is fundamental to any conservation program. The most important indicator of abatement is the status of the biodiversity threatened by the KTP. For example, reporting for the feral cat TAP should include not only how many cats are killed or the area of land in cat-free enclosures or island sanctuaries but the status of impacted threatened species. Harmonising and aggregating site-specific and project-specific reporting will facilitate national tracking of the status of KTPs and progress in threat abatement.

Recommendation 13. Assigned responsibilities for implementing abatement plans

Each threat abatement plan should have an implementation taskforce with sufficient expertise, stakeholder representation and authority to take responsibility for driving implementation and monitoring progress. Typically, this should include both government and non-government representatives and, where interests are aligned, representatives from other sectors.

Rationale: A team to drive implementation is essential. Teams need the right mix of expertise and stakeholder motivation to be effective. The successful longline fishing abatement team includes government, industry and environmental NGO representatives (see Box 4).

*Recommendation 14. Costings for threat abatement**

To guide the level of investment needed, current levels of funding and the costs of effective threat abatement (eg to recover certain numbers of threatened species over defined timeframes) should be calculated. The costs of not abating threats should also be quantified. Each threat abatement plan should specify the costs for high-priority abatement actions.

Rationale: If Australia is to be serious about abating key threats, the costs to achieve that over specified timeframes is essential information. A National Environmental Science Program project has recently commenced to develop such costings, with an initial focus on developing maps of major threats. This project should be accorded extremely high priority. A complementary project to assess the costs of not abating threats is also important as it is likely to justify much greater investment in threat abatement.

Recommendation 15. Adequate funding to abate KTPs so as to prevent extinction and reverse biodiversity decline

A substantial increase in funding is needed for all aspects of the KTP system. Government funding programs should give high priority to investing in threat abatement, and there should be long-term funding security for the implementation of threat abatement plans**.** Options for a new biodiversity levy should be investigated.

Rationale: Much greater levels of funding for the KTP system are essential. Because it is essential for the recovery of most threatened species and benefits many other species as well, this should be a very high funding priority. Options for new funding sources should be investigated. The biosecurity system will soon be boosted by funding from the imposition of a container levy, as recommended by the 2017 Independent review of Australia's biosecurity system.[27] It is equivalent to 1% of the current cost of importing a container to Australia and was projected to raise $305 million over the 3 financial years from 2019–20.

Recommendation 16. A focus on collateral benefits of threat abatement

The non-environmental co-benefits of threat abatement should be identified and promoted, and, wherever possible, the threat abatement goals for biodiversity should be aligned or supplemented with economic and social goals.

Rationale: Identifying and quantifying the non-environmental benefits of threat abatement can help justify a stronger investment in threat abatement. Other benefits include improved ecosystem services, human health and economic gains. For example, feral cat eradication on Kangaroo Island will reduce the cost to the livestock industry of exotic diseases (toxoplasmosis and sarcocystis) spread by feral cats and yellow crazy ant eradication in the Wet Tropics will protect important tourism and farming assets.

Recommendation 17. Support for a threat abatement service industry

An effective KTP system will require the services of a threat abatement working force as exemplified by Indigenous ranger teams. Support for developing a threat abatement service industry would deliver many economic and social as well as environmental benefits. This would require long-term funding security for abatement programs.

Rationale: A small but highly effective threat abatement industry already exists in the form of Indigenous land and sea ranger programs. This could be expanded through the 56 NRM groups nationally, many of which have core capacities. The benefits of a threat abatement industry would include job creation and stronger rural economies, improved human health, future-proofing, the development of new technology, and the protection of agricultural and tourism assets.

Table 5. The effectiveness of abatement programs (based on 5-yearly government reviews)

KTP	Latest review available[A]	Review findings	Conclusion
Longline fishing	2011 Reviewer unknown[B]	Considerable progress has been made under successive TAPs due to the 'fishing industry, researchers and non-governmental stakeholders working with government … in a feasible, effective and efficient way'.	Good progress
Red imported fire ants	2012 Independent review[28]	'Reasonable progress' against goals, objectives and a number of the actions. This species is subject to national eradication co-funded by federal, state and territory governments.	Good progress
Yellow crazy ants, Christmas Island	2012 Independent review[28]	'Reasonable progress' against goals, objectives and a number of actions (for 6 species). Crazy ants intensively managed on Christmas Island. (*Addendum*: In 2017 a biological control agent was released.[C])	Good progress
Exotic rodents, islands	2015 Government review[29]	Significant advances in eradication & management techniques. Improved information base. Network established, symposiums. Eradications on 3 islands, including Macquarie. Improved capacity for sustained control on priority islands. Biosecurity plans for 2 islands. But a number of priority islands still impacted.	Good progress
Feral cats	2014 Government review[30]	Goal of minimising impacts not met. Significant advances in research & control techniques. Island eradications – 1 complete, 3 in progress. Some fenced sanctuaries. New baits. Improved monitoring. Public awareness growing. But land managers still limited in their ability to control cats. Lack of resources for control. (*Addendum*: Since 2015 there has been a greatly strengthened commitment to abatement.[C])	Moderate progress (but much better progress since 2015)
Red foxes	2013 Government review[31]	Except in small areas, goal of abating impacts on biodiversity not met. Asset protection approach widely adopted. Some predator-proof sanctuaries. Eradication on some islands (program in Tasmania). Improved diagnostics. Some cross-tenure control programs. Better ecological understanding. Improved techniques for monitoring and control.	Moderate progress
Rabbits	2013 Government review[32]	Progress includes rabbit eradications on several islands & better knowledge of impacts. But control programs have often been ad hoc, lacked strategic prioritisation, and were rarely initiated for threatened species or ecological community recovery (drivers are usually agricultural or social). New strains of RHD identified. (*Addendum*: A new strain of a biocontrol agent has since been released.[C])	Moderate progress
Feral pigs	2011 Government review[24]	Improved tools: guidance to land managers on control, nationally consistent monitoring, updated mapping, 2 new baits. Some federally funded control programs. But impacts in high biodiversity sites not accurately monitored. Few effective, wide-scale programs. Poor public recognition of problem. Limited knowledge of numbers that need controlling to abate threat in particular sites.	Moderate progress
Root-rot fungus	2006 Independent review[33]	Plan lacked timelines & budget; did not identify responsible parties. Objectives not easily measurable. Implementation team not established. Ad hoc, short-term funding precludes a strategic approach. Little improvement in management, continued spread.	Poor progress
Chytrid fungus	2012 Government review[34]	Some progress: national map, historical surveys reliable diagnostic protocols, biology investigated, captive breeding programs, national chytrid working group established. But the two plan goals have largely not been achieved. Critical gaps in knowledge. Most research work not government funded. No national coordinated surveillance. Of 68 actions, 8 were completed & 39 were partially completed.	Poor progress

KTP	Latest review available[A]	Review findings	Conclusion
Beak & feather disease	2012 Government review[35]	Working group established. Improved coordination. Dedicated funding needed to establish a good system to capture and disseminate information. Hygiene and disinfection protocols developed. Some research, but gaps in knowledge remain. Exploring potential for vaccine. No surveillance of wild birds due to cost. Of 26 actions, 12 completed, 7 partially completed. But the 2 TAP goals were not met – risks have not diminished.	Poor progress
Marine debris	Effectiveness unknown – no review of 2009 plan		
Invasive grasses, northern Australia	Effectiveness unknown – no review of 2012 plan		
Feral goats	Effectiveness unknown – no review of 2008 plan		
Cane toads	Effectiveness unknown – no review of 2011 plan		

Notes: **A.** Some TAPs may have been reviewed without the review being published or the TAP revised. All reviews should be made publicly available. **B.** We have not been able to find the review of the longline fishing TAP, so have taken on face value the comment in the latest TAP about the success of previous TAPs. **C.** For a few TAPs we have added an addendum to the review findings to note recent abatement progress. Table current as at May 2018.

Box 4. Elements of a successful threat abatement plan

Evan Quartermain (Humane Society International)

This threat abatement plan for the incidental catch of seabirds during oceanic longline fishing operations has achieved a significant reduction in albatross and petrel deaths in Australia's longline fisheries. The KTP was listed in 1995 and abatement plans were published in 1998, 2006, 2014 and 2018.

Why the threat abatement plan has worked:

- it has been in place for 20 years and has been semi-regularly updated
- it has only tackled Commonwealth fisheries
- it has been implemented through regulations and management plans
- there has been wide support from stakeholders, especially government departments, the Australian Fisheries Management Authority and industry
- a strong NGO advocate (Humane Society International) has been involved in the abatement team
- the plan's stated aim of zero bycatch has driven fishery improvements
- the plan contains criteria against which the outcomes are measured; AFMA reports annually against these criteria and whether and where the plan has been breached
- there are escalating management responses when the TAP criteria are breached – ranging from investigation to closure of a fishing area, providing industry with an incentive to minimise seabird bycatch.

Box 5. The limited obligations under the EPBC Act for listing and abating KTPs

Section 3(2) of the EPBC Act about how the Act's objects are achieved states that it 'enhances Australia's capacity to ensure the conservation of its biodiversity by including provisions to: … *identify processes that threaten all levels of biodiversity and implement plans to address these processes*'

Listing KTPs: Although the environment minister 'must' establish a list of KTPs (s183), there is no explicit obligation for this list to be comprehensive. The minister 'must not add a threatening process to the list unless satisfied that it is eligible' (s188), but there is no converse obligation to add threatening processes that are eligible. Although the minister must obtain and consider advice from the scientific committee about additions to the KTP list, s/he is not obliged to take that advice. The minister is also not obliged to consider the precautionary principle in the decision.

Preparing threat abatement plans: The minister 'must' decide to have an abatement plan if s/he 'believes' this is a 'feasible, effective and efficient way to abate the process' and vice versa (s270A). Reasons must be provided. The precautionary principle must be considered in the minister's decision about whether to have a plan (s391).

The mandatory contents of a threat abatement plan are (a) the objectives to be achieved, (b) the criteria against which achievement of the objectives is to be measured and (c) the actions needed to achieve the objectives (s271). The minister must seek to make a plan jointly with states and territories in which the KTP occurs or may adopt a plan made by a state or territory (s270). A plan must be made and in force within 3 years of the decision to have the plan (s273). The minister must consider (but is not obliged to take) the advice of the scientific committee on the content of a plan (s274). Each plan must be reviewed by the minister within 5 years (s279). The minister may revoke a TAP; s/he must publish the reasons for this (s283).

Implementing threat abatement plans: A Commonwealth agency must not take any action that contravenes an abatement plan (s268) and the Commonwealth must implement a plan to the extent it applies in Commonwealth areas (s269). For plans that apply in a state or territory, the Commonwealth 'must seek the co-operation of the State or Territory with a view to implementing the plan jointly with the State or Territory' (s269). No other implementation obligations are specified. The minister may give states or territories or persons financial or other assistance to make or implement an abatement plan (s281). The only reporting obligation is that the department secretary 'must include in each annual report a report on the making and adoption' of each threat abatement plan during that year (s284).

4. Additional processes for abating the most complex KTPs

Threats to biodiversity vary greatly in magnitude and scale, and for many of the most harmful and complex threats, the current KTP system does not provide adequate abatement options. This means that many of the most harmful KTP listings are moribund. Australia needs fit-for-purpose policy options for responding to complex KTPs.

Impediments

Impediment 4.1 Lack of effective policy options for abating many threats

> The KTP system offers only a threat abatement plan as the response to a KTP. But for many threats, this is not sufficient. Some KTPs (eg land clearing) require mainly a policy or regulatory response. Others (eg invasive species, see next section) require a mix of regulatory, policy and management responses. Under the current KTP system, there is no clear path for developing effective fit-for-purpose responses to the more complex and challenging KTPs.

Reforms needed

*Recommendation 18. The capacity to develop effective additional responses to complex KTPs through listing them as matters of national environmental significance**

A clear process and fit-for-purpose policy options are needed under the EPBC Act for developing effective responses to KTPs. The most effective response to a KTP will depend on the complexity and scale of the threat and effective abatement mechanisms. Threat abatement plans are likely to suffice as the primary response instrument for relatively simple or smaller scale KTPs (eg a disease) or those that mostly occur on land or water under Commonwealth jurisdiction (eg long-line fishing). For the most complex and harmful KTPs such as invasive species, land clearing, altered fire regimes and hydrological regimes, additional response options are needed. Making these KTPs matters of national environmental significance would facilitate federal leadership and the development of the most effective responses.[36]

Rationale: TAPs do not suffice as an effective response for all KTPs, particularly those that are complex, large-scale and require regulatory as well as management responses. Listing a KTP as a matter of national environmental significance enables the federal government to establish a policy framework for abating the threatening process and to more effectively coordinate a national response. Every response should start with a plan. A threat abatement statement or plan can also serve as the basis for future monitoring of, reporting on and reviewing of abatement efforts. Furthermore, most responses, even those dealt with mainly through regulatory and policy changes, would probably also require coordinated national efforts that can be achieved through an abatement plan, eg a resilience plan for climate change adaptation.

5. A new system for invasive species

A KTP process is often the only effective way to address invasive species threats – it is mostly impractical to abate entrenched species through legislation, and developing effective abatement methods often requires research and a dedicated long-term focus. Abatement is often ecologically, technically and socially complex, and needs to involve several jurisdictions and sectors.

Invasive species have caused the majority of extinctions in Australia,[1,8] as they have globally.[11] They continue to be the most prevalent threat to Australian species, impacting 94% of listed animal species and 80% of plants.[9] They also interact with other major threats – for example, many invasive grasses greatly elevate fire risks,[37,38] and land clearing and livestock grazing, as well as extreme events that will be exacerbated by climate change often benefit invasive species.[39–43] More than 250 invasive species are listed as threats to threatened species or ecological communities.[9]

Given the already extreme challenges of managing existing invaders and the numbers of new invaders, Australia needs a comprehensive bespoke system for abating threats by invasive species and preventing new threats.

Impediments

5.1 Numerous and highly diverse invasive species threats ignored in KTP system

Although invasive species make up two-thirds of currently listed KTPs, the listings of individual species (eg feral pigs) or species groups (eg escaped garden plants) are far from comprehensive of major invasive threats. Instead, the other threats have been captured in an all-encompassing 'novel biota' listing (covering introduced vertebrates, invertebrates, terrestrial plants, aquatic plants and algae, marine organisms and pathogens). Encompassing such a multitude of invasive species in one listing would be helpful if it led to action to abate the highest priority threats. But, so far, the only action catalysed by the listing has been publication of a few fact sheets.[44] The listing document for the novel biota KTP acknowledges that the purpose of the listing is mainly for information: 'to recognise the threat that all novel biota pose to the Australian environment and to highlight the vast array of different novel biota and the threats they pose'. But it means that invasive threats to hundreds of listed species and ecological communities are being neglected under the KTP system.

5.2 Insufficient resources for assessing and responding to invasive species threats

Even though the listing document for the novel biota KTP says it is 'anticipated individual novel biota KTPs will continue to be listed as stand-alone KTPs', the main effect of the listing has been to stymie further invasive species listings (Table 6). The guidelines for the novel biota listing state that the list of invasive species KTPs 'has grown so large that individual evaluations could divert the Government's attention and resources for many years'.[45]

5.3 Reliance on other inadequate processes for threat responses

In the case of the escaped garden plants KTP, listed in 2010, the-then environment minister claimed there was no need for a threat abatement plan due to existing arrangements for preventing new weeds and managing emerging and established weeds.[19] But the minister is not required to show that these other processes are effective, to monitor abatement progress, or to initiate action if existing processes prove ineffective. The available evidence shows that the weed threat continues to grow and that new weeds continue to emerge. For example, the sale

of dozens of invasive nursery plants is still permitted in most states and territories.[46] The 2009 Hawke review of the EPBC Act found that the poorly regulated trade of potential invasive species within Australia represented a substantial failure of state and territory laws.[17] Three senate inquiry have also criticised the failure of Australian governments to effectively regulate domestic trade in harmful species.[25,47,48] It could be partly remedied through the use of existing powers under the EPBC Act (section 301A) to regulate the trade of non-indigenous species, but these provisions have never been enacted.

5.4 Limited focus on emerging threats

Many invasive species threats have emerged only recently. For example, myrtle rust (a pathogen of Myrtaceae plants) was first detected in 2010 but has already led to NSW listing 2 formerly widespread plants as critically endangered and is causing serious declines in probably more than 40 other taxa.[49–51] A wolf snake on Christmas Island, which arrived in the 1980s, has caused the recent extinction of three lizard species.[1] More invasive threats will inevitable emerge as new species arrive in Australia or become a threat after having been introduced in the past. But there is no national system for assessing or responding to emerging invasive threats, to prevent them becoming an entrenched problem.

Reforms needed

*Recommendation 19. A new system for invasive species**

A separate process should be established for assessing and responding to invasive species – facilitated by listing invasive species as a matter of national environmental significance under the EPBC Act. All established exotic species in Australia (including those established outside their native range within Australia) should be systematically assessed and categorised by an expert invasive species committee as the basis for action to prevent and minimise harm to biodiversity as well as non-environmental values (eg human health and wellbeing, agriculture, tourism and other economic activities). Management categories could include the following: (1) priority for eradication, (2) priority for containment, (3) priority for control, (4) not to be traded, (5) of economic importance and escapees to be controlled, (6) no action. Threat abatement plans or an equivalent should be developed for invasive species or species groups that meet the criteria for KTPs.

Rationale: A separate process for invasive species is needed due to the extremely high number of harmful species – they already make up two-thirds of listed KTPs and dozens more individual or grouped species warrant KTP listing. A separate process would increase efficiency and facilitate the involvement of the various types of expertise needed to assess their impacts or likely impacts. A comprehensive national approach is needed to arrest the growing number of invasive species and limit the environmental and economic harm they are causing. The proposed approach can be established by regulation.

Table 6. Invasive species KTP nominations not assessed or rejected since 2008

KTP nominated	Species/ECs threatened[A]	Reason[B]
Ecosystem degradation, habitat loss and species decline due to invasion in southern Australia by introduced tall wheat grass (*Lophopyrum ponticum*)[52]	28	Not assessed due to the novel biota KTP
Ecosystem degradation, habitat loss and species decline in arid and semi-arid Australia due to the invasion of buffel grass (*Cenchrus ciliaris* and *C. pennisetiformis*)[38]	29	Not assessed due to the novel biota KTP
Herbivory and habitat degradation by feral deer[53]	18	Not assessed due to the novel biota KTP
Introduction, establishment, and spread of, and infection by, exotic rust fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae[54]	>40[C]	Not assessed due to the novel biota KTP
Loss of habitat and native flora due to expansion of the weed lippia (*Phyla canescens*)[55]	42	Not assessed due to the novel biota KTP
The invasion, establishment and spread of *Lantana camara* impacts negatively on native biodiversity including many EPBC listed species and communities[56]		Not assessed due to the novel biota KTP
Introduction in Australian inland waters of native or non-native fish that are outside their natural geographic distribution[15].	9	Rejected by ministerial prerogative

Notes: **A.** This is the number of threatened species (spp) and ecological communities (ECs) for which evidence is provided in the KTP nomination or, for the rejected nomination, the number accepted by the Threatened Species Scientific Committee. **B.** The reasons for not assessing nominations are provided at [57]. The ministerial rejection of the non-native fish nomination is noted at [15]; no reasons were provided. **C.** The extent of the threat is not clear yet because myrtle rust was first detected in Australia only in 2010 but 2 species have been listed as critically endangered in NSW and serious declines are strongly suspected for more than 40 other taxa.[49]

6. Improving governance

For the KTP system to be effective, much higher national higher priority must be accorded to abating the major threats to Australian biodiversity. The hallmarks of this would be strong national leadership, an agreement between the federal, state and territory governments to achieve abatement, robust accountability mechanisms, and public outreach and engagement, with realistic levels of funding (see section 3).

Impediments

Impediment 6.1 Insufficient national priority accorded to threat abatement and lack of federal leadership

Although the federal government is often limited in the extent to which it can compel other governments or individuals to undertake threat abatement, it can apply considerable pressure through strong leadership, incentives for implementation of abatement plans and use of federal powers to partially compensate for state or territory failings. But with a few exceptions, abating KTPs has been a low federal government priority. As is evident in the slowness of KTP processes, the government unit administering the KTP system is small and threadbare. The senate committee conducting the 2013 inquiry into 'Effectiveness of threatened species and ecological communities' protection in Australia' said it was 'troubled by the evidence received that the TSSC [the committee assessing KTP nominations] is under-resourced'.[25]

Leadership has improved to some extent in the past 3 years due to the appointment of a Threatened Species Commissioner as a champion for threatened species and facilitator of partnerships to implement recovery and abatement plans. In particular, this has generated considerably more focus on the feral cat KTP. That just one KTP featured as a priority in the *Threatened Species Investments and Future Opportunities* document highlights the poverty of federal government resources dedicated to threat abatement.

Impediment 6.2 Lack of agreement between federal, state and territory governments to achieve threat abatement

Under the Convention on Biological Diversity, Australia has international obligations to identify and abate threats to biodiversity. There are also obligations under the Strategic Plan for Biodiversity 2011-2020 (the Aichi targets) to abate particular threats, including land clearing and invasive species.[58] But the instruments to implement these obligations in Australia are deficient. There is, for example, no high-level agreement committing federal, state and territory governments to cooperatively achieve the abatement of major threats to biodiversity. The Intergovernmental Agreement on the Environment is almost 3 decades old and Schedule 6 on Biological Diversity is vague, lacks conservation commitments, and does not mention threat abatement.[59] This contrasts with the Intergovernmental Agreement on Biosecurity, a 2019 revision of a 2012 agreement.[60]

Although the EPBC Act enables the listing of KTPs and the development of threat abatement plans, it does not oblige the government to comprehensively list KTPs, develop abatement plans or other instruments of abatement or, except on Commonwealth land, implement abatement plans. Australia's Biodiversity Conservation Strategy 2010–2030 also does not contain any commitments about KTPs, although it has targets relevant to a few particular KTPs. All states and territories maintain threatened species lists and most have recently agreed to adopt a common assessment method with the federal government to align their listing processes and lists. There

is no such coordinated process for assessment of KTPs. Only NSW and Victoria list threatening processes and their assessment processes are different from those of the federal government.

Impediment 6.3 Lack of accountability

There is almost no accountability within the KTP system – with no obligations for monitoring or reporting on KTP status or implementation of threat abatement plans, no requirements for independent review and no consequences for failures to implement threat abatement plans.

Impediment 6.4 inadequate public outreach

There is currently little public awareness of the KTP system, the importance and benefits of abating KTPs as part of nature conservation, and potential community contributions to threat abatement. This stands in contrast to the enormous public support in New Zealand for the threat abatement program focused on eradicating exotic predators (see Box 7).

Reforms needed

Recommendation 20. A new intergovernmental agreement for biodiversity

A new biodiversity agreement between the federal and state/territory governments is needed that includes strong commitments to cooperatively abate key threatening processes.

Rationale: The essential foundation for an effective KTP system is harmonisation of abatement of KTPs by the federal, state and territory governments, underpinned by a new intergovernmental agreement with strong commitments for cooperative threat abatement (and other aspects of biodiversity conservation). This agreement should replace Schedule 6 (Biological Diversity) of the Intergovernmental Agreement on the Environment. The recently revised Intergovernmental Agreement on Biosecurity[60] is one model of such an agreement to cooperatively work towards a common goal in a very complex environment (of establishing a seamless biosecurity continuum). The array of different intergovernmental and intersectoral agreements, strategies, institutions and committees constituting Australia's biosecurity system demonstrate the complex infrastructure that is probably necessary to achieve effective cooperative implementation of TAPs and other abatement instruments.

*Recommendation 21. Stronger accountability processes**

An independent statutory office is needed to review the performance of federal and state/territory governments in meeting Australia's international and national responsibilities for biodiversity conservation, including the identification and abatement of key threatening processes. The position could be a parliamentary commissioner for biodiversity (as in New Zealand) or an inspector-general for biodiversity (as for federal biosecurity in Australia). The performance of the KTP system should also be regularly scrutinised by parliament – for example, by the establishment of a statutory joint committee on biodiversity and a requirement for annual reports to parliament on threat abatement progress.

Rationale: An independent statutory review position can be a powerful way of fostering greater accountability. Our preferred model is that exemplified by the New Zealand Parliamentary Commissioner for the Environment ((see Box 6). Parliamentary scrutiny is an additional way to increase accountability. Given the extinction crisis Australia faces, a permanent parliamentary joint committee on biodiversity is warranted. Other such committees focus on law enforcement, broadcasting of parliamentary proceedings, corporations and financial services, intelligence and security, public accounts and audit, public works and human rights.

Recommendation 22. Best practice community engagement

Community engagement and awareness building must be a high priority. The public needs to be enthused about what threat abatement can achieve by framing the mission in positive terms (eg saving Australian biodiversity rather than killing feral animals), setting ambitious and inspiring long-term goals, promoting successes and fostering public champions.

Rationale: A stronger focus on community engagement is essential to build public support and motivate involvement. One example of an inspiring program with strong community engagement is New Zealand's 'predator-free 2050' (see Box 7). Australia needs similarly ambitious goals.

Box 6. Examples of independent statutory review bodies

The New Zealand *Parliamentary Commissioner for the Environment* is an independent officer of parliament with broad powers to investigate environmental concerns.[61] S/he reports to parliament and is independent of the government of the day. The commissioner's role is to write independent reports and provide advice on environmental issues, with a mission to maintain or improve the quality of the New Zealand environment. The commissioner has wide-ranging functions and strong powers, including to obtain information. Currently, the commission has 20 staff.

The Australian *Inspector-General of Biosecurity* is an independent statutory position responsible for reviewing the performance of functions and exercise of powers by federal biosecurity officials.[62] The inspector-general makes recommendations for overall system improvements, but does not review the effectiveness of national biosecurity policies. S/he must publish an annual review program and may accept public submissions.

Box 7. New Zealand's predator-free 2050 goal

Predator-free 2050 'is an ambitious goal to rid New Zealand of its most damaging introduced predators' – rats, stoats and possums – to benefit the environment, the economy and agriculture.[63] Initially a community initiative that was joined by the government, PF2050 is founded on New Zealand's success in eradicating invasive predators from more than 110 islands. It brings together the central and local governments, iwi, philanthropists, NGOs, businesses, science and research organisations, communities, land owners and individuals, taking the effort 'from piecemeal control to co-ordinated, progressive nationwide eradication'. The Predator Free NZ Trust (a private charitable organisation) was established in 2013 to 'encourage, support and connect New Zealanders' to achieve this goal.[64]

A REFORMED KTP SYSTEM

Summary of proposed changes

The most important elements of the proposed new KTP system are the following (also summarised in Table 7). Reforms marked with an asterisk (*) require changes to the EPBC Act.

1. Improved processes for listing and abating KTPs

- Systematic listing of KTPs identified by the Threatened Species Scientific Committee or equivalent expert committee, supplemented by KTP nominations (recommendations 1–2)*
- A separate category for emerging KTPs (recommendation 3)*
- Requirement for a scientific threat response statement followed by a threat abatement plan except when information is insufficient or abatement is best abated through other processes (recommendation 5)*
- Specified elements for threat abatement plans to include implementation commitments, costings, targets, monitoring and reporting requirements and review triggers (recommendation 7)*
- Alignment with recovery planning (recommendation 8)
- A national monitoring and reporting framework and standards to track KTPs and abatement progress (recommendation 12)
- Costings – current funding levels, costs of abatement actions and overall funding needed for effective abatement (recommendation 14)
- Adequate funding to prevent extinction and reverse biodiversity decline (recommendation 15)
- Support for a threat abatement service industry (recommendation 17)

2. Additional processes for abating complex KTPs

- The capacity to develop effective additional responses to complex KTPs through listing them as matters of national environmental significance (recommendation 18)*
- A new system for invasive species – listing invasive species as a matter of national environmental significance and categorising them as the basis for action to prevent and minimise harm to biodiversity (recommendation 19)*

3. Improved governance

- A new detailed Intergovernmental Agreement on Biodiversity to engender stronger commitments and cooperation by federal, state and territory governments to abate KTPs (recommendation 20)
- Stronger accountability through a parliamentary biodiversity commissioner or equivalent (recommendation 21)*

Table 7. Summary of the major elements of an effective KTP system

Attribute	Current KTP system	Future KTP system
Inter-governmental processes	Inter-Governmental Agreement on the Environment 1992	New Intergovernmental Agreement on Biodiversity with specific commitments for KTP abatement
National legislation	EPBC Act	New or reformed environmental law with strong support for threat abatement, including: • Systematic KTP listings based only on scientific assessments • mandatory threat abatement responses, but more flexible options available • additional response options for complex KTPs facilitated by listing them as matters of national environmental significance • a new system for responding systematically to harmful invasive species
Planning	Threat abatement plans	(1) Threat abatement statements – mandatory scientific statements specifying actions needed to abate the KTP, including urgent actions, and appropriate abatement instruments (2) Threat abatement plans (except when insufficient information or achievable only through other processes): • integrated with recovery plans • abatement actions and research prioritised and costed • commitments specified • responsibility assigned to abatement taskforce • collaboration with other sectors facilitated
Funding	Ad hoc, total unknown (but insufficient)	Better alignment of existing funding with KTP priority actions A new biodiversity levy Assessment of existing funding and funding needs to abate KTPs
Monitoring and reporting	State of environment reporting No monitoring specified	• national KTP monitoring & reporting framework and standards applied • State of the environment reporting reformed and expanded to cover revised Inter-Governmental Agreement on the Environment • Parliamentary Environment Commission • Indicators and targets as part of SoE and IGAE monitoring and reporting
Auditing & reviewing	National Audit Office 5-yearly reviews of abatement plans	Auditing by Parliamentary Biodiversity Commissioner (or Inspector-General for Biodiversity Conservation) Parliamentary joint committee on biodiversity Independent 5-yearly reviews of abatement plans Additional review triggers specified in abatement plans,

Complete list of recommendations

Reforms marked with an asterisk (*) require changes to the EPBC Act.

1. Listing KTPs

*Recommendation 1. Systematic KTP listing**

KTPs should be comprehensively identified and listed through a systematic scientific process overseen by the TSSC. In addition, a public nomination process should be retained to ensure that emerging, contentious or poorly known threats are also assessed. The KTP list should be regularly reviewed to keep it up-to-date.

*Recommendation 2. Scientific decision-making**

The Threatened Species Scientific Committee (or equivalent independent committee of experts) is the appropriate decision-maker for scientific and technical decisions, including to list KTPs.

*Recommendation 3. A focus on emerging threats**

An additional threat category – an emerging threatening process (ETP) – should be established to facilitate precautionary or urgent interventions to prevent emerging threats becoming KTPs.

*Recommendation 4. Specified composition of the threatened species scientific committee**

The Threatened Species Scientific Committee should include suitably qualified experts from relevant scientific disciplines, with these disciplines specified in the EPBC Act. It should not include sectoral or industry representatives lacking relevant scientific expertise.

2. Threat abatement responses

*Recommendation 5. A mandated instrument of response**

All listed KTPs (or KTP subsets in the case of multi-threat KTPs) should have an instrument of response. Initially, a *threat response statement* should be developed, as part of or as soon as possible after a KTP listing, as an independent science-based statement of what is needed to abate the threat, specifying the urgency, benefits and likely costs of abatement and providing advice about the most appropriate instruments (whether planning, policy or regulatory) to facilitate abatement. Then, a full *threat abatement plan* should be developed unless the following circumstances apply: (1) abatement is significantly constrained by deficiencies of data, operational knowledge or other forms of technical feasibility or (2) abatement can only be achieved through other processes such as legislative or policy changes. Both instruments must specify monitoring, reporting and review obligations (see section 3).

Recommendation 6. Prioritised abatement actions

To guide prioritisation of threat abatement actions, a 'priority threat management' approach is needed to identify the best returns on investment actions, based on the likely costs, potential benefits and feasibility of the proposed actions.

*Recommendation 7. Essential elements of threat abatement plans**

Threat abatement plans should include the following elements (among other things):

- the implementation obligations and commitments of all parties
- the costs of implementation
- a monitoring and reporting regime to track threat status and outcomes for threatened biota

- explicit targets for abatement and triggers for review/revision of the plan (eg based on density-damage relationships or the development of new abatement techniques)
- 2 classes of actions:
    - prescribed actions – those which are spatially or otherwise explicit (eg a critical research program) with assigned responsibilities
    - described actions for future or other-party implementation, with the role of the plan being to specify priorities, create a mandate and maximise abatement opportunities (eg to take advantage of on-ground opportunities as they arise and synergies with recovery plans and other abatement plans)
- information about interactions with other threats and strategies for responding to those interactions
    - how the abatement plan will be integrated with relevant recovery plans and other abatement plans
    - the co-benefits of abatement, and actions to optimise social and economic benefits

Recommendation 8. Alignment with recovery plans and actions

A framework is needed for integrating recovery actions for threatened species and ecological communities into threat abatement plans. This can be facilitated by mapping KTPs and species threatened by each KTP to prioritise focus areas and species for abatement actions and optimise benefits across broad geographical areas.

Recommendation 9. Collaboration with other sectors

Partnerships with non-environmental beneficiaries of threat abatement should be sought to develop threat abatement plans or other types of abatement plans.

Recommendation 10. Accessible data repository

A publicly accessible repository of data and information should be created to support decision-making about threat abatement actions. If new data is needed, a 'value of information' approach should be used to prioritise the collection of data that will be most beneficial for decision-making.

3. Implementing threat abatement plans

Recommendation 11. Analysis to determine best practice threat abatement processes

To develop best practice guidelines for threat abatement planning and implementation, the outcomes of threat abatement programs should be independently analysed (including by interviews of participants) to identify elements of successful and unsuccessful plans.

*Recommendation 12. Comprehensive monitoring and reporting to track KTPs and abatement progress**

Monitoring and reporting must be mandatory for each KTP. A national monitoring and reporting framework and standards should include a focus on the status of each KTP and the status of biodiversity threatened by each KTP. Reporting requirements should be harmonised across projects and programs to enable tracking of national progress. The federal government should report in detail on its implementation of threat abatement plans on Commonwealth land to demonstrate whether it is fulfilling its obligations under the EPBC Act, and to exemplify best practice and leadership.

Recommendation 13. Assigned responsibilities for implementing abatement plans

Each threat abatement plan should have an implementation taskforce with sufficient expertise, stakeholder representation and authority to take responsibility for driving implementation and monitoring progress. Typically, this should include both government and non-government representatives and, where interests are aligned, representatives from other sectors.

*Recommendation 14. Costings for threat abatement**

To guide the level of investment needed, current levels of funding and the costs of effective threat abatement (eg to recover certain numbers of threatened species over defined timeframes) should be calculated. The costs of not abating threats should also be quantified. Each threat abatement plan should specify the costs for high-priority abatement actions.

Recommendation 15. Adequate funding to abate KTPs so as to prevent extinction and reverse biodiversity decline

A substantial increase in funding is needed for all aspects of the KTP system. Government funding programs should give high priority to investing in threat abatement, and there should be long-term funding security for the implementation of threat abatement plans**.** Options for a new biodiversity levy should be investigated.

Recommendation 16. A focus on collateral benefits of threat abatement

The non-environmental co-benefits of threat abatement should be identified and promoted, and, wherever possible, the threat abatement goals for biodiversity should be aligned or supplemented with economic and social goals.

Recommendation 17. Support for a threat abatement service industry

An effective KTP system will require the services of a threat abatement working force as exemplified by Indigenous ranger teams. Support for developing a threat abatement service industry would deliver many economic and social as well as environmental benefits. This would require long-term funding security for abatement programs.

4. Additional processes for abating the most complex KTPs

*Recommendation 18. The capacity to develop effective additional responses to complex KTPs through listing them as matters of national environmental significance**

A clear process and fit-for-purpose policy options are needed under the EPBC Act for developing effective responses to KTPs. The most effective response to a KTP will depend on the complexity and scale of the threat and effective abatement mechanisms. Threat abatement plans are likely to suffice as the primary response instrument for relatively simple or smaller scale KTPs (eg a disease) or those that mostly occur on land or water under Commonwealth jurisdiction (eg long-line fishing). For the most complex and harmful KTPs such as invasive species, land clearing, altered fire regimes and hydrological regimes, additional response options are needed. Making these KTPs matters of national environmental significance would facilitate federal leadership and the development of the most effective responses [36].

5. A new system for invasive species

*Recommendation 19. A new system for invasive species**

A separate process should be established for assessing and responding to invasive species – facilitated by listing invasive species as a matter of national environmental significance under the

EPBC Act. All established exotic species in Australia (including those established outside their native range within Australia) should be systematically assessed and categorised by an expert invasive species committee as the basis for action to prevent and minimise harm to biodiversity as well as non-environmental values (eg human health and wellbeing, agriculture, tourism and other economic activities). Management categories could include the following: (1) priority for eradication, (2) priority for containment, (3) priority for control, (4) not to be traded, (5) of economic importance and escapees to be controlled, (6) no action. Threat abatement plans or an equivalent should be developed for invasive species or species groups that meet the criteria for KTPs.

6. Improving governance

Recommendation 20. A new intergovernmental agreement for biodiversity

A new biodiversity agreement between the federal and state/territory governments is needed that includes strong commitments to cooperatively abate key threatening processes.

*Recommendation 21. Stronger accountability processes**

An independent statutory office is needed to review the performance of federal and state/territory governments in meeting Australia's international and national responsibilities for biodiversity conservation, including the identification and abatement of key threatening processes. The position could be a parliamentary commissioner for biodiversity (as in New Zealand) or an inspector-general for biodiversity (as for federal biosecurity in Australia). The performance of the KTP system should also be regularly scrutinised by parliament – for example, by the establishment of a statutory joint committee on biodiversity and a requirement for annual reports to parliament on threat abatement progress.

Recommendation 22. Best practice community engagement

Community engagement and awareness building must be a high priority. The public needs to be enthused about what threat abatement can achieve by framing the mission in positive terms (eg saving Australian biodiversity rather than killing feral animals), setting ambitious and inspiring long-term goals, promoting successes and fostering public champions.

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