Submission to the independent review into the operation of the Environment Protection and Biodiversity Conservation Act 1999

Invasive Species Council Inc

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SUMMARY

The EPBC Act is meant to provide the legal framework for implementing Australia's obligations under the Convention on Biological Diversity, among other international conventions. It should therefore address the CBD 2010 goal specific to invasive species:

> Goal 6. Control threats from invasive alien species.
>
> Target 6.1: Pathways for major potential alien invasive species controlled.
>
> Target 6.2: Management plans in place for major alien species that threaten ecosystems, habitats or species.

Arising from this goal, the key question we pose and address in this submission is:

> **How can the EPBC Act better operate to effectively address the threats of invasive species to matters of national environmental significance and Australia's biodiversity?**

Along with land clearing and climate change, invasive species are one of the three top threats to Australia's biodiversity and many matters of national environmental significance (MNES). But the EPBC Act does not provide an adequate framework to address their threats, particularly the threats of invasive species already in Australia.

A large proportion of actions involving invasive species harmful to the environment are not regulated under the EPBC Act. They are left to the states and territories to regulate, but because most states are failing to do so, there is in effect no regulation of most invasive species in Australia.

The review should consider reforms to improve Australia's capacity to:

- Prevent imports and introductions of new invasive taxa that are potentially harmful to biodiversity
- Prevent the establishment or spread of already introduced taxa potentially harmful to biodiversity
- Manage the threats to biodiversity and MNES caused by established invasive taxa
- Manage the synergistic threats to biodiversity of climate change and invasive species.

The table below summarises existing EPBC Act provisions, and limiations in the scope and operation of the Act.

Category	Relevant actions	Existing EPBC provisions	Limitations in existing scope & operation
Introduction phase (import into Australia)	Import of invasive taxa, including new genetically distinct variants of permitted invasives species; Import of goods with risk of associated invasive species.	Regulation of import of live specimens	Most invasive taxa permitted without assessment; Many goods traded without sufficient environmental oversight
Establishment & spread of invasive species	Trade and use of invasive taxa within Australia; Management of established invasive species.	Impact assessments of controlled actions	Trade and use of most invasive taxa is not regulated; Actions involving invasive taxa that are likely to have a significant impact are not referred for assessment; Limited management of established and spreading invasive species.
Harm to biodiversity / MNES	Prevent and minimise harm	Key threatening processes and Threat abatement plans; Recovery plans; Other plans & strategies.	No regulations associated with KTPs & poorly funded; Limited management actions to address harms of invasive species.
Climate change synergies	Prevent and minimise harmful interactions	As above, where relevant to invasive species interacting with climate change.	As above; no climate change adaptation focus on invasive species.

The scope of the Act could be greatly improved to encompass all the major pathways by which invasive species significantly harm MNES and biodiversity. The most serious limitation is with the establishment and spread of invasive taxa once they are already in Australia. The Act already envisions (in section 301), but does not have the necessary regulations to enact, controls on the trade and use of invasive species within Australia. It is from the many thousands of existing and potential invasive species already in Australia that most problems will emerge and worsen. The scope could also be improved in other ways, eg. by specifying actions that should be referred for assessment (linked to a list of invasive species under s301) and improving federal capacity to address harms through the declaration of key threatening processes.

We provide case studies to exemplify the current inadequacies of the Act and recommendations to address them.

1. INTRODUCTION

1.1 Who we are

The Invasive Species Council (ISC) is a environmental non-government organisation established in 2002 to promote better policies on invasive species. The activities of ISC are outlined on its webpage (see <http://www.invasives.org.au/home.html>), and especially within the pages of its newsletters, which appear on the website.

1.2 Our focus in this submission

The EPBC Act is meant to provide the legal framework for implementing Australia's obligations under the Convention on Biological Diversity, among other international conventions. It should therefore address the CBD 2010 goal specific to invasive species:

> **Goal 6. Control threats from invasive alien species.**
>
> **Target 6.1: Pathways for major potential alien invasive species controlled.**
> **Target 6.2: Management plans in place for major alien species that threaten ecosystems, habitats or species.**

Arising from this goal, the key question we pose and address in this submission is:

> **How can the EPBC Act better operate to effectively address the threats of invasive species to matters of national environmental significance and Australia's biodiversity?**

The question is most relevant to the first, second and fourth of the review's terms of reference. We structure the first part of this submission (sections 2-6) to accord with the topics and questions posed in the discussion paper. The second part of the submission (sections 7 and 8) derive from ISC's submission to the senate inquiry into the operation of the EPBC Act — they exemplify the problems identified with case studies and list recommendations.

1.3 Invasive species and biodiversity

'Invasive species' is used here as defined by the IUCN[1] to describe an introduced species "that becomes established in natural or semi-natural ecosystems or habitat, is an agent of change and threatens native biological diversity".

Along with land clearing and climate change, invasive species are one of the three top threats to Australia's biodiversity[2] and many matters of national environmental significance (MNES). Invasive

1 IUCN (2000).

species have caused numerous extinctions — foxes and cats are thought to be responsible for most of the mammal extinctions and chytrid fungus has caused the extinction of six frog species — and threaten a high proportion of federally listed threatened species.[3] Invasive species threaten and transform ecological communities and undermine ecological processes by destroying native vegetation, changing fire regimes and hydrology. Invasive species do not respect the borders of high value conservation areas; they are one of the most serious threats to many protected areas, including World Heritage Areas and Ramsar wetlands.

Although many people think that the environmental problems resulting from invasive species are due to mistakes of the past, the problem is not declining with time. The rate of plant naturalisations is increasing (eg. as the recent Victoria State of Environment report[4] found) and there are thousands more environmental weeds-in-waiting amongst the more than 27,000 exotic plants already in Australia (more than there are indigenous plant species).[5] As recent incursions of invasive ant and bee species, and foxes to Tasmania indicate, Australian biodiversity faces ongoing threats from accidental and deliberate introductions. Australians continue to engage in numerous unregulated activities that entail a high risk of harming Australia's biodiversity through the introduction and spread of invasive species — trading in invasive species, planting serious weeds for gardens and pastures, farming feral animals that escape, placing aquarium fish into waterways, translocating feral animals for hunting, and importing and exporting products.

Because invasive species are such a serious threat to Australia's biodiversity, there is good reason for the EPBC Act to play an important role in regulating the management and use of invasive and potentially invasive species. State and Territory legislation is mostly ineffective in doing so. There are good opportunities with reform of the EPBC Act to prevent or limit the harm of invasive species and to fulfill the objectives of the Act and Australia's obligations under the Convention on Biological Diversity.

2 Walker & Steffen (1997); Australian Biosecurity Group (2005); Cork et al. (2006).
3 Coutts-Smith & Downey (2006).
4 Commissioner for Environmental Sustainability (2008). The report found that an estimated average of 7.3 new plants establish in Victoria per year, and this number is increasing by a rate of 0.25 plants per year.
5 Randall (2007).

2. Scope of the Act

Currently, invasive species threats are addressed in the EPBC Act mainly through (a) the assessment of proposals to import new species that may harm biodiversity and (b) through the declaration of Key Threatening Processes (KTPs) and the development of Threat Abatement Plans (TAPs). Threats could also be addressed through assessment of potential controlled actions involving invasive species, but in practice this is not occurring.

There are major gaps in this two-pronged approach, gaps both of regulation and implementation. In particular, there is no federal regulation of the internal trade or use of thousands of introduced species permitted into the country that are a threat or potential threat to biodiversity (and which mostly are not listed as key threatening processes). A major implementation gap is that many very serious invasive species threats are not listed as KTPs and TAPs tend not to be properly funded or implemented. Nor are other plans or strategies relevant to invasive species. In addition, actions involving invasive species that potentially have a significant impact on MNES are not being assessed.

To the extent that regulation via the EPBC Act is the most effective way of addressing the threats of invasive species, the EPBC Act should regulate actions or provide the basis to address threats in each of the following four categories. Relevant to our obligations under the Convention on Biological Diversity, the first two represent pathways of introduction and spread, and the third category is management-focused. Although the fourth category could be considered in the first three categories, it represents a serious escalation of problems that warrant special focus:

- Prevent imports and introductions of new invasive taxa[6] that are potentially harmful to biodiversity (introduction phase of invasive species pathways)
- Prevent the establishment or spread of already introduced taxa potentially harmful to biodiversity (establishment & spread phase)
- Manage the threats to biodiversity caused by established invasive taxa (harm phase)
- Manage the synergistic threats to biodiversity of climate change and invasive species (climate change synergies)

The EPBC Act currently addresses just the first and third of these categories, and only to some extent. A large proportion of actions that affect invasive species harmful to the environment are not regulated under the EPBC Act. They are left to the states and territories to regulate, but because most states are failing to regulate on invasive species that harm biodiversity and MNES there is in effect no regulation of most invasive species in Australia.

6 'Taxa' is used here in recognition that subspecies or cultivars or other genetically distinct subsets of species may have different invasive features, and that it is often important to focus at a lower level of taxonomy than species. Although the term 'invasive species' is used throughout the submission, we do not restrict our concern to species.

A key question for the review is how expansive the EPBC Act should be in addressing the major problems such as invasive species that affect biodiversity and MNES. Should the Act regulate, and provide capacity for the federal environment department to act, in areas that have been the domain of the states or other government departments? In this submission we recommend this should be the case, as existing approaches are not working to prevent and manage the threats of invasive species and are limiting Australia's capacity to meet its obligations.

2.1 Objects of the Act

The first three objects of the Act are highly relevant to this submission. Protection of the environment (including MNES), conservation of biodiversity, and ecologically sustainable use of natural resources cannot be achieved without addressing the threats of invasive species. As we discuss, there are many deficiencies in current regulations that may be best addressed by expanding and improving the performance of the EPBC Act.

The fifth object about promoting a cooperative approach is also relevant to this submission. The threats of invasive species require reform of the relationships between the federal government and state/territory governments, and between governments and the community, including land-holders. Most of the invasive species in Australia are left to state/territory regulation, and there are processes to promote cooperation between the various governments. But these cooperative arrangements have not been effective in addressing the threats. We submit it would improve cooperation if the federal government assumed a stronger regulatory role.

Question 1(a): Are the objects of the Act appropriate to the Commonwealth's role in environment protection and management? The objects seem appropriate. The main point of our submission is that the EPBC Act does not provide sufficient means and is not sufficiently well implemented to meet the objects with respect to invasive species threats.

We note with respect to one of the principles of 'Ecologically Sustainable Development' (that decision-making should integrate long-term and short-term considerations) that many invasive species do not cause environmental harm until decades or centuries after their introduction. Recent work in Europe by Williamson and colleagues has shown that weeds may not reach their maximum range size until "at least 150 years, possibly twice that, on average," after introduction.[7] We also note with respect to the precautionary principle (that lack of full information should not postpone action) that it is typically impossible to predict the outcome of introductions of exotic species.

2.2 Matters covered by the Act

The discussion paper lists four main areas covered by the Act, the first three of which we address. We have nominated four main categories of regulation/management needed for invasive species (addressing the introductions, establishment and spread, and harm phases of invasive species

7 Williamson et al. (2009).

threat as well as climate change synergies). These are only partially covered by the existing matters covered by the Act.

Environmental impact assessment: Although many actions involving invasive species result or are likely to cause significant impacts on MNES, we do not know of any that have been referred for assessment as potential controlled actions under the EPBC Act.

The DEWHA's Significant Impact Guidelines[8] identify the following categories of potential 'significant impact' involving invasive species. We provide the examples:

- ❖ Threatened and migratory species: a significant impact may result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat. (Eg. an invasive pasture grass is sown near habitat for the endangered Gouldian Finch or Golden-shouldered Parrot.)
- ❖ Threatened ecological communities: a significant impact may cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including assisting invasive species that are harmful to the listed ecological community to become established. (Eg. a deer farm (there is a high rate of deer escapes from deer farms) is established near endangered Littoral Rainforest.)
- ❖ Ramsar wetlands: a significant impact may result in an invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland. (Eg. the invasive pasture grasses Tall Wheat Grass or Phalaris are planted near a Ramsar wetland.)
- ❖ The Commonwealth marine environment: a significant impact may result in a known or potential pest species becoming established in the Commonwealth marine area. (Eg. using a potentially invasive species in an aquaculture facility.)

This list should also include World Heritage Areas (invasive species are not noted in the guidelines on significance), for many actions can result in the introduction and spread of invasive species into WHAs, such as planting weeds or introducing feral animals in their vicinity.

It is appropriate to address two of the top three threats to biodiversity — climate change and habitat loss — by including them as triggers for impact assessment. However, there are difficulties fitting invasive species, the third of these major threats, into the current assessment framework. Release of greenhouse gas emissions and clearance of vegetation occur as a result of deliberate actions, and are regarded as intentional. It is convenient to take a threshold approach to these issues — requiring assessment when they exceed a certain amount or area respectively. However, although there is a high rate of escape of invasive species from cultivation, gardens and other situations, the person taking that action (eg. a farmer, a gardener, a pet owner) would not typically intend that escape to occur (although they might be expected to understand the risks of escape). The escape, establishment, spread and environmental impact of an invasive species may occur many years or decades after the action is taken and be difficult to trace to a particular person's actions. The impacts of invasive species are also often indirect, compromising the resilience of

8 Department of Environment Water Heritage and the Arts (DEWHA) (2006).

biodiversity and the capacity of MNES to withstand other threats, such as climate change and habitat loss. Furthermore, the potential impacts are highly uncertain, as they involve complex, unpredictable interactions between biotic and abiotic components of the environment over decades and centuries. While there should be more focus on potential controlled actions involving invasive species, these need to be supplemented by other approaches more appropriate for invasive species threats.

Question 1(e): What kind of impacts should be considered under the Act? Does the Act adequately encompass not just direct but also indirect impacts? The Act does not adequately encompass either the direct or indirect impacts of invasive species. This situation could be improved by identifying triggers for assessment directly relevant to invasive species (which also recognise indirect impacts) — such as actions involving invasive species identified on a list in EPBC Regulations (such as provided for in Section 301).

However, for many actions the direct and indirect impacts of invasive species can only be effectively addressed by regulations specific to invasive species, for example as provided for by the existing, but not enacted, section 301 of the Act, which allows for regulation of actions involving a list of invasive species (discussed here in section 4.2).

Question 1(f): Does the test of significance, in the context of actions having a 'significant' impact on a matter of NES, operate effectively in practice? If you think that there should be another test, what should it be? As discussed, there are limits to the applicability of the current framework to invasive species issues because of the unintended, indirect, uncertain and long lag times of impacts of actions involving invasive species. The definition and applicability of significance could be improved by specifically addressing these, eg. by specifying that the timeframe of 'significant impact' extends decades/centuries into the future and encompasses the potential for numerous other interactions to cumulatively result in significant harm.

A different test than significance is applied for the assessment of introductions of new species for live import in weed and pest risk assessments. These assessments are more precautionary than the significance test, with rejection of proposed imports that do not fall below a threshold of accepted level of potential risk. This sort of test is more appropriate for invasive species, and it should be applied beyond the Australian border to invasive or potentially invasive taxa already in Australia. A risk-based approach may be more appropriate for some assessments under the EPBC Act.

Biodiversity conservation: One of the two ways in which the EPBC Act addresses the threat of invasive species is through the declaration of Key Threatening Processes (KTPs) and the development of Threat Abatement Plans (TAPs). Of 17 currently listed KTPs, 12 involve invasive species (seven for vertebrates pests, two for invertebrate pests and three for pathogens). Of 10 TAPs, nine are for invasive species.

The identification of KTPs and the development of TAPs is an appropriate way to manage the threats of established high-threat invasive species. However, the plans are generally poorly funded and therefore often not effective (eg. Phytyophthora, see case study 7.3.1), and they cover only a

small proportion of the key threats to biodiversity from invasive species (eg. flammable pasture grasses are not included, see case study 7.3.2). They are also not linked to any federal regulatory capacity, relying instead on each state to regulate where needed to enact the TAPs (eg. see case study 7.1.3 on tramp ants).

Invasive species threats are also addressed through provisions regulating the import of wildlife specimens into Australia. The federal government has recently made some wise decisions under these provisions by prohibiting the import of Savannah Cats and Bumblebees after assessments were conducted. A similar risk-based assessment process applies to exotic plant imports, regulated under the Quarantine Act 1908. These regulations provide a reasonable prospect of preventing the deliberate import of new high-risk invasive species (at least in some categories) into Australia. However, many invasive taxa (both species and lower level categories such as cultivars) are not assessed under these provisions, mostly because they were already in the country when the new system was enacted. And some environmentally relevant biosecurity functions not regulated by the EPBC Act are not well covered or implemented under other legislation (eg. see case-studies 7.1.1, 7.1.3, 7.1.4).

Protected areas: Commonwealth protected areas are under great threat from invasive species. These are most severe on Christmas Island, where several endemic species are under imminent threat of extinction or have recently gone extinct, mostly likely due to invasive species. Commonwealth conservation reserves, World Heritage Areas and Ramsar wetlands all need much more effective protection from invasive species, both those already established in protected areas and those that are potential invaders (see case studies 7.2.3, 7.2.1, 7.1.3). The Wet Tropics WHA is under great threat from a great array of exotic garden plants, which will be given much greater invasion opportunities when more cyclones damage rainforest under climate change.

The harm to many protected areas from invasive species is in part a failure of implementation (eg. insufficient funding) and in part an insufficiency in regulation of the use of invasive species around protected areas. There are, for example, no regulations preventing the planting of highly invasive weeds near these areas or duty of care provisions that hold people responsible for the impacts of their use of invasive species.

2.3 Improving the scope of the Act

The Scope of the Act should be expanded to more effectively protect MNES and biodiversity against invasive species. In terms of the four categories of invasive species threat identified here, the scope should be expanded in the following ways to encompass or improve responses to the following.

Category	Relevant actions	Existing EPBC provisions	Limitations in existing scope & operation
Introduction phase (import into Australia)	Import of invasive taxa, including new genetically distinct variants of permitted invasives species; Import of goods with risk of associated invasive species.	Regulation of import of live specimens	Most invasive taxa permitted without assessment; Many goods traded without sufficient environmental oversight
Establishment & spread of invasive species	Trade and use of invasive taxa within Australia; Management of established invasive species.	Impact assessments of controlled actions	Trade and use of most invasive taxa is not regulated; Actions involving invasive taxa that are likely to have a significant impact are not referred for assessment; Limited management of established and spreading invasive species.
Harm to biodiversity / MNES	Prevent and minimise harm	Key threatening processes and Threat abatement plans; Recovery plans; Other plans & strategies.	No regulations associated with KTPs & poorly funded; Limited management actions to address harms of invasive species.
Climate change synergies	Prevent and minimise harmful interactions	As above, where relevant to invasive species interacting with climate change.	As above; no climate change adaptation focus on invasive species.

The scope of the Act could be greatly improved to encompass all the major pathways by which invasive species seriously harm MNES and biodiversity. The most serious limitation in the scope of the EPBC Act is with the second phase, the establishment and spread of invasive taxa once they are already in Australia. The Act already envisions (in section 301), but does not have the necessary regulations to enact, controls on the trade and use of invasive species already in Australia. It is from the many thousands of invasive species already in Australia that most invasive species problems will emerge and worsen. The scope could also be improved in other ways, eg. by specifying actions that should be referred for assessment (linked to a list of invasive species under s301) and improving federal capacity to address harms through the KTP provisions.

Recommendation: Expand the scope of the EPBC Act to provide an effective response to all major pathways and threats of invasive species to biodiversity and MNES that are not currently addressed in other jurisdictions. This includes regulations to restrict the use and trade of invasive species or potential invasive species that are already in Australia.

3. ASSESSMENT AND APPROVALS

A grazier planting Tall What Grass (*Lophopyrum ponticum*) near a Ramsar wetland or Buffel Grass (*Pennisetum ciliare*) in or near the habitat of a listed threatened species is unlikely to even consider whether that action should be referred as a potential controlled action, let alone refer it for assessment (see case study 7.2.1). Government agencies, who could refer it, are unlikely to know that the action is being undertaken or accept that it should be referred. Developers of residential projects are not likely to consider the actions of future gardeners in planting invasive garden plants as part of their action. There is a widespread lack of public awareness about invasive species (invasive garden plants are not required to be labelled as such) and the likely impacts of using invasive species. The impacts may not be manifest until many years in the future and they are often unpredictable. Although there are undoubtedly many actions involving invasive species that will have a significant impact upon a MNES, none has been referred for assessment under the EPBC Act as far as we know.

State and territory governments have the capacity to more effectively regulate the use of invasive species so that there is no need for federal assessment. However, they are largely failing to do so. For example, in Victoria, where Tall Wheat Grass is a particularly serious threat (to MNES including Ramsar wetlands and threatened species), the Department of Primary Industries, which is responsible for assessing weed risks, developed and released the most popular cultivar of Tall Wheat Grass and promotes its planting for salinity mitigation.[9] Most state and territory governments regulate the use of a very small proportion of invasive species, in part due to conflicts of interest and in part due to inefficient regulatory approaches to declarations of weeds and pests.

Question 2: Does the public understand their responsibilities under the Act to refer proposed actions to the Minister? Based on the lack of referrals for actions involving invasive species and for the reasons discussed above, we submit that the public does not understand their responsibilities with respect to invasive species. Nor are they likely to, unless there are specific triggers identified, much greater awareness of the risks associated with use of invasive species and better regulation of invasive species.

Because it is unrealistic to expect the public to know whether an action involving an invasive species is likely to have a significant impact, we recommend a more precautionary definition for 'likely' which includes situations when the proponent is unable to determine the likely impact.

Question 3: Are appropriate projects being referred for approval? Does the referral process meet the objects of the Act? For reasons discussed above, the answer is no. Actions involving invasive species are not being referred at all for assessment. And because invasive species do not fit well into the EPBC assessment framework the objects of the Act are not being met. Invasive

9 Booth, Carr and Low (in preparation) a report on invasive pasture plants promoted for salinity mitigation. We note that the current review of the noxious weeds list in Victoria, which is meant to bring the list up to date, is not assessing any of the invasive pasture plants for possible declaration. This demonstrates the conflict of interests in having agricultural departments responsible for assessing and managing environmental weeds and pests.

species continue to be used in ways that will lead to significant impacts on MNES without any assessment.

Question 6: Does the Act operate effectively in conjunction with State and Territory planning and environmental impact legislation? Are existing bilateral agreements achieving the objects of the Act? Because most state and territory approaches to controlling and managing invasive species are inadequate, we recommend the federal government expands the capacity of the Act to make up for these deficiencies.

Question 8: Does the use of strategic approaches, such as strategic assessments and bioregional plans, provide opportunities for streamlining Commonwealth involvement in environmental issues? Do such approaches provide an appropriate means for dealing with cumulative impacts? Strategic assessments may be an appropriate approach to some invasive species threats. For example, there could be a strategic assessment of the impacts of planting flammable pasture grasses in northern Australia, which includes the likely interactions with climate change change and which results in the identification of where and under what conditions such plantings might be approved. This could include restrictions on the sale and planting of invasive species and the development of enforceable codes of conduct.

4. BIODIVERSITY

Although KTP listings represent the major capacity within the EPBC Act to deal with the impacts of invasive species they receive little focus in the discussion paper. Although the listing of KTPs and development of TAPs are an appropriate way to initiate and organise actions to address the threats of invasive species, the process as currently operated is not very effective. Too few of the threats are listed (see case study 7.3.2), there is insufficient funding for TAPs (see case study 7.3.1) and there are no associated regulations.

Question 9: Does the Act provide an effective regulatory framework for the conservation of Australia's biodiversity? If not, what improvements could be made? Because the Act does not provide an effective framework to deal with one of the top three threats to biodiversity, it cannot be said to be an effective framework. One of the most important reforms is to enact provisions under Section 301, which are specific for invasive species and allow the federal government to regulate the trade or use of invasive species where the states are not satisfactorily addressing the threat of particular species. This recommendation is discussed in section 4.2

Question 10: What are your views on the process for nominating threatened species, ecological communities and key threatening processes? Most of the existing KTPs involve invasive species, but we are uncertain how many nominations involving invasive species have been rejected. There are many gaps in the currently listed KTPs, as noted, that involve invasive species, arising either because they haven't been regarded as a priority for assessment or because they haven't been assessed. Either way, the process of nomination isn't leading to a comprehensive listing of KTPs. It would be useful to have KTPs that group invasive species according to threat or use. For example, flammable pasture grasses are a major category of threatening invasive plants that should be declared (see case study 7.3.2).

4.1 Climate change and invasive species

To meet its biodiversity objects, the Act needs to provide the capacity for Australia to effectively address the synergistic and interacting impacts of climate change and invasive species.

Climate change will worsen the world's invasive species problems,[10] and many of the threats of climate change to biodiversity will be manifested by invasive species benefiting from climate change. Conversely, invasive species will worsen the impacts of climate change by rendering species and ecological communities more vulnerable to its impacts and as some invasive species are used in response to climate change.

Likely interactions between climate change and invasive species include the following:[11]

- Native species killed or stressed by climate change may be replaced by invasive species.
- Some invasive species will increase their range or impacts under a different climate.

10 Dukes & Mooney (1999).
11 Low (2008).

- Some pathogens will benefit from higher temperatures and native species may become more susceptible to pathogens due to climate stress.
- Extreme events that are predicted to occur more often under climate change will facilitate the spread of invasive species.
- 'Transformer' invasive species, such as flammable pasture grasses, cause feedback loops that may exacerbate the harms caused by climate change.
- Fast-growing weeds may grow even faster under rising CO_2 levels, and the balance between herbivores and plant pathogens may shift in favour of weeds.
- Native species may become invasive under climate change when they colonise new areas.
- Climate change will be used to justify the use of invasive species for cultivation (eg. new drought-tolerant perennial invasive weeds; weeds as biofuels[12]), and their spread into new areas (eg. a shift of agriculture to northern Australia).

These threats highlight the current lack of effective regulation and management of invasive species. It is telling that climate change and invasive species have apparently already interacted to cause the first presumed climate change extinctions. In Central and South America, the recent extinction of 70 frog species is thought to be due to Chytrid Fungus benefiting from unusually warm years.[13]

To address the synergistic threats of climate change and invasive species, there is need to (a) develop adaptation strategies for climate change that include a strong focus on invasive species problems, and (b) improve Australia's capacity to prevent and manage invasive species problems. To address the harms of climate change for biodiversity, it is necessary to more effectively address the harms of invasive species.

It will also be important to prevent new invasive species threats that may be justified or promoted because of climate change, such as the development of a biofuels industry using weedy species, the development of new weedy pasture/crop species and cultivars adapted to new climate conditions and the introduction of new weedy garden plants adapted to dry conditions.

Question 19: Does the Act provide an appropriate and responsive legislative framework for addressing climate change and other emerging pressures in the context of environmental protection and biodiversity conservation? If not, how can such matters be considered when making decisions under the Act? The interacting threats of climate change and invasive species justifies a much greater regulatory role for the EPBC Act in invasive species issues and the development of programs under the Act to better manage invasive species. Priorities include[14]:

- A national program to "identify and remove climate change sleepers that threaten biodiversity", including the eradication of small outlying populations of invasive or potentially

12 Low & Booth (2007).
13 La Marca et al. (2005); Pounds et al. (2006); Thomas et al. (2006). This conclusion is contested by others, who consider the extinctions are a result of the fungus alone. This conclusion is contested by others who consider the extinctions are a result of the fungus alone.
14 These recommendations are amongst those in a report by Low (2008), for the federal environment minister's Biological Diversity Advisory Committee.

invasive species, which may spread under different climate conditions, and the control or eradication of invasive or potentially invasive species that could multiply after fire, cyclones and floods, extreme events that will increase with climate change.

- A national strategy to control invasive flammable grasses. " Flammable grasses may represent the single most serious category of introduced invasive species ..., because they can destroy native vegetation over immense areas via a positive feedback loop, which would worsen under climate change."
- Regulations and policies by which to assess the risks of planting proposed biofuel crops and hardier pasture and horticultural species/cultivars that are likely to worsen Australia's environmental weed problems.[15]

Recommendations: Develop a federal environment strategy to address the synergistic threats of climate change and invasive species that includes regulatory reforms in the EPBC Act where necessary. Prioritise reforms to regulation of invasive species proposed in this submission as part of adapting to climate change. Implement reforms to prevent climate-change-motivated industries, such as biofuels, or climate-change-motivated changes in land use worsening the invasive species problem. Ensure that risk assessments for invasive species and management approaches take climate change into account.

4.2 Regulations specific to the threat of invasive species

Not mentioned in the discussion paper for this review is the potential under Section 301A of the EPBC Act to develop regulations for the control of non-native species that could overcome many of the existing shortcomings (particularly due to the failure of many state and territory governments to effectively regulate the trade and use of invasive species). Section 301 allows for the development and maintenance of a list of species, other than native species, whose members threaten or would likely threaten biodiversity; and the regulation of trade in those species and actions involving those species. The relevant section reads:

5.108 The regulations may:

(a) provide for the establishment and maintenance of a list of species, other than native species, whose members:

- (i) do or may threaten biodiversity in the Australian jurisdiction; or
- (ii) would be likely to threaten biodiversity in the Australian jurisdiction if they were brought into the Australian jurisdiction; and

(b) regulate or prohibit the bringing into the Australian jurisdiction of members of a species included in the list mentioned in paragraph (a); and

(c) regulate or prohibit trade in members of a species included in the list mentioned in paragraph (a):

- (i) between Australia and another country; or
- (ii) between 2 States; or
- (iii) between 2 Territories; or
- (iv) between a State and a Territory; or

15 Low and Booth (2007); Booth, Carr & Low (in preparation). We note that Air New Zealand CEO has called for Jatropha curcas to be permitted for import and cultivation in Australia, although it is recognised as a weed risk.

- (v) by a constitutional corporation; and

(d) regulate and prohibit actions:

- (i) involving or affecting members of a species included in the list mentioned in paragraph (a); and
- (ii) whose regulation or prohibition is appropriate and adapted to give effect to Australia's obligations under an agreement with one or more other countries; and

(e) provide for the making and implementation of plans to reduce, eliminate or prevent the impacts of members of species included in the list mentioned in paragraph (a) on biodiversity in the Australian jurisdiction.

We recommend that these provisions be implemented by developing regulations. The current approach to seeking better consistency and effectiveness of state/territory regimes through cooperation between state, territory and federal governments is not working. Given the national significance of the threats of invasive species and the greater efficiency that can be achieved through a centralised approach to issues that are common across state boundaries, there is good reason to use the powers under the EPBC Act to achieve some of these goals. Although all governments have agreed in principle for many years to the need to prevent and manage invasive species problems, the problems have become worse rather than better under most state/territory regimes (WA is a standout exception with its permitted list approach).

As there are many different categories of invasive species, with different management implications, it would be appropriate to develop and maintain different lists of invasive species with national significance under Section 301, with different regulations and policies applying to each of those lists. It would be sensible to develop lists for different categories of management applicable to invasive species: prevention, eradication, containment, control and mitigation. The development of different categories of lists of invasive species was recommended by the federal senate inquiry on invasive species in its report *Turning Back the Tide – the Invasive Species Challenge*.[16] The recommended lists included:

- *National Quarantine List*: comprised of invasive species of national importance that are a high invasion risk for Australia, may or may not have already invaded Australia, and whose early detection will enable cost-effective eradication.
- *National Alert List*: comprised of invasive species of national importance that are naturalised, have a restricted range, are predicted to have a major impact on the environment or industries, and whose eradication is feasible and cost- effective. It should also include introduced invasive plant species of national importance, which are garden plants that are yet to escape and are subject to national early warning surveillance action.
- *National Control List*: comprised of invasive species of national importance that are naturalised and generally widespread, are having a major impact on the environment or industry, and whose containment or control will assist protect the values of areas of national environmental significance.

16 Senate Environment Communications Information Technology and the Arts References Committee (2004).

Another potential category (or subcategory) is a list for containment, consisting of those species that cannot be eradicated but are not widely established and having a major impact, where the focus should be to prevent spread into new regions.

Regulations appropriate to each of these categories should be developed under the EPBC Act, including restrictions on import, trade and use necessary to achieve prevention, eradication, containment, control and mitigation goals.

Recommendations: As a high priority, develop regulations under s301 of the EPBC Act to develop effective approaches to nationally significant invasive or potentially invasive species. This includes developing national lists of invasive species (identifying those species for prevention, eradication, containment, control and mitigation) and regulating trade and use of these invasive species to achieve environmental goals.

5. INTERNATIONAL MOVEMENT OF WILDLIFE

The current risk-based approach to assessing specimens for live import is appropriate, although it has great limitations, some due to international trade rules and some due to inadequacies of regulation and practice. Recent ministerial decisions to refuse the import of Bumblebees and Savannah Cats are examples of effective decision-making under the EPBC Act.

The major limitation with the import assessments under the EPBC Act (and also under the Quarantine Act) are due to WTO rules, which constrain which species Australia can prohibit from import. Australia is constrained from prohibiting invasive or potentially invasive species already in Australia that are not being controlled as pest species. (International phytosanitary measures specify that import prohibitions can apply only to 'quarantine pests', which are defined as pests 'of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled[17] — note that 'economic importance' is taken to include environmental importance). The continued importation of an exotic species already in Australia greatly increases the prospects of it becoming invasive or having greater invasive impacts. This may be due to greater 'propagule pressure' or because genetic variability or new genetic traits give a species greater invasability or because it is introduced or spread to more suitable areas.

There are two ways of improving Australia's capacity to prohibit risky imports without breaching WTO rule: official control of more invasive or potentially invasive species in Australia and restrictions on new genetic variants of existing permitted imports (at a taxa level lower than species). Most risk assessments are conducted at a species level, but some subspecies or variants are permitted or prohibited for import,[18] and the phytosanitary measures allow prohibition of taxa at a taxonomic level lower than species if it can be scientifically justified. This should permit Australia to require risk assessments of genetically distinct variants of existing invasive species such as feral cats, dogs, goats, olives, and pasture grasses (see case study 7.1.1).

There is also a need for greater environmental focus in many biosecurity functions not regulated by the EPBC Act. These are discussed in association with the case studies 7.1.3 and 7.1.4. For some environmentally relevant biosecurity functions not regulated by the EPBC Act, there is a bias against those for environmental protection (compared to those for agricultural protection). Better environmental oversight of biosecurity could be facilitated through reforms to the EPBC Act (and/or in other ways through quarantine reforms). Australia needs programs with a stronger environmental focus to protect against and respond to accidental introductions of invasive species harmful to the environment.

17 Secretariat of the International Plant Protection Convention (2007). Economic impacts are taken to include "impacts that may be less easily quantified in direct economic terms, such as certain effects on the environment as related to plant health." According to the glossary of phytosanitary terms, pest is defined as "Any species, strain or biotype of plant, animal, or pathogenic agent, injurious to plants or plant products"

18 For example, two subspecies of Bituminaria bituminosa have recently been granted approval for import, but the species itself is not permitted and would probably not pass a weed risk assessment.

Question 20: Does the Act currently provide appropriate regulation for the sustainable use of wildlife and international wildlife trade? With respect to wildlife which is potentially invasive in Australia the Act does not effectively regulate for sustainable use. The worst category for invasive animals is probably aquarium fish, as discussed in case study 7.1.2. As discussed, many invasive plants (assessed under the Quarantine Act) are not regulated.

Question 21: Do you think that current assessment and decision-making processes for the listing of specimens suitable for live import could be refined and simplified? It is important to maintain a precautionary approach to these decisions. Some commentators have called for a cost-benefit approach rather than a precautionary approach, but this would probably result in the import of even more invasive species harmful to the environment. We recommend that genetically distinct variants of permitted invasive species be assessed rather than automatically granted entry. For example, a new drought-hardy cultivar of an existing permitted invasive pasture grass should undergo risk assessment as it could extend the distribution and increase the threats of the existing invasive weed.

6. PROTECTED AREAS

Invasive species are a/the major threat to most of the Commonwealth managed protected areas, particularly in combination with the other major threat of climate change. There is the need for management plants that address both existing and emerging threats, and more effective regulation of the use of invasive species that could affect these areas.

Question 27: What are your views on the effectiveness and utility of Commonwealth heritage strategies and management plans for protecting World, National and Commonwealth Heritage values? Currently, there is ineffective management of invasive species in most Commonwealth managed protected areas. For example, as discussed in case study 7.2.3, the Wet Tropics Management Authority has no budget or strategy for eradicating or controlling emerging threats to the World Heritage values of the Wet Tropics WHA. On Christmas Island, species are going extinct due to invasive species (the future of some will be reliant on captive breeding).

Question 28: Given that the protection and conservation of Australia's heritage is shared between the different levels of government, are there any improvements in the current legislative arrangements that would be of benefit? The current shared management arrangements can mean that no government properly takes responsibility for responding to the threat of invasive species (and other threats), hoping or expecting that the other level(s) will. Given the international and national significance of these areas the federal government should ultimately take responsibility where state and local governments do not. In the Wet Tropics region, for example, local government does not have sufficient resources to manage existing declared weeds let alone sleeper or emerging weeds; the state government does not provide these resources and fails to regulate invasive or potential invasive species in the region. The federal government also takes no action. To address the problems the federal government should initiate and at least part fund a strategy to address the threats of invasive species and regulate to limit future invasive species threats.

Question 29: What are your views on the effectiveness of the operation of the provisions for Ramsar wetlands and the utility of management plans for those wetlands? As with the other protected areas, there is a failure to protect against the threats of invasive species. There are no restrictions on planting invasive pasture grasses near wetlands, and very little management of already established weeds.

7. CASE STUDIES

7.1 Case studies relevant to import and introduction of invasive species

7.1.1 Boer Goats, Bengal Cats and other high-risk variants allowed entry

There was recently a strong public outcry against the proposal to import Savannah Cats – a hybrid of Domestic Cats and African Servals – and the environment minister responded by changing the definition of 'domestic cat' to exclude those variants with African Serval genes. This was a good decision that will prevent Australia's feral cat population exerting even stronger predatory pressure on wildlife.

However, there are many other imports of variants of 'permitted' species that could worsen our environmental problems, and these are not attracting regulatory attention. Here are some examples.

Boer Goats and Kalahari Goats have been imported from South Africa to produce more drought-hardy goat breeds for Australia. Males are bred with female feral goats, creating what is effectively a superior feral goat – if they escape into the wild.

Water Buffalo are being imported from Asia to breed with Water Buffalo of wild origin (previously introduced). The buffalo farms are in regions where cyclone damage to fences could facilitate their escape into the wild – which, given time, they almost certainly will..

New dog breeds created from Coyotes and Wolves may become a problem in future, leading to increased predation of native animals and livestock.

Bengal Cats, like Savannah Cats, could worsen the feral cat problem. They are hybrids between Domestic Cats and Leopard Cats, which are native to the rainforests of South East Asia. Bengal Cats are fonder of water, and fonder of climbing trees, than feral domestic cats. They are also more likely to hunt inside rainforest, a habitat avoided by Australia's feral cats.

There are many plant examples as well. Pampas Grass (*Cortaderia selloana*) was not a major weed for decades because all the plants in gardens were female. When a new colour variant was imported – a hermaphrodite – the plants began setting seed and pampas grass became a serious environmental weed. Olives are South Australia's worst woody weed, and new varieties have been imported into South Australia which can be expected to cross-pollinate with the wild plants, increasing their genetic variability and thus pest potential. Tibouchina shrubs (*Tibouchina* is a genus of shrubs originating from South America) grown in Brisbane gardens produce no viable seed, but in Hawaii they are major weeds with seeds spread widely by birds. Scores of other horticultural examples of existing and potential threats due to the import of new variants could be given.

The import of genetically distinct varieties of existing permitted species is a major source of pest and weed risk for Australia as new variants may have new features that significantly increase their pest risk or turn existing non-pest species into invasive risks. In the case of the savannah cat, it was recognised by the federal environment department and the minister that their increased size and capacity to add to the predator pressure on native species had the potential to adversely affect biodiversity. Other features that may be bred into a species that create or increase pest risk include tolerance for different conditions (eg drought), capacity to survive in new habitats, and increased fertility or vigor. Many exotic plants grown in Australia probably lack the genetic diversity to produce healthy seeds or vigorous offspring, growers relying instead on striking cuttings (eg. Tibouchina shrubs). When new imports of different genetic make-up are allowed entry, they increase the potential for species to reproduce. The introduction of greater genetic variety into an existing exotic species population may make the difference between pest and non-pest.

While it would be best for Australia's environment to prevent the import of all invasive species damaging to the environment, this is not possible under international trade laws. International phytosanitary measures specify that import prohibitions can apply only to 'quarantine pests', which are defined as pests "of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled."[19]

This should not prevent prohibitions on the import of new variants that are not yet present or present but not widely distributed and being officially controlled. Currently, the risk assessment approach in Australia focuses mostly at a species level. Once a species is on the permitted list, new variants are almost automatically granted entry. There needs to be a more systematic capacity in the approach to new imports to respond to the potentially increased invasiveness risk of new variants of existing permitted species. Although this would make risk assessment of imports a more onerous process, it is far more efficient to prevent entry of new variants than it is to try to manage the impacts once they have become invasive (and much better for conservation of biodiversity). This should also apply to biological control agents, as different biotypes may have different ecological characteristics.

Recommendations: Limit permitted status to the genetically distinct variants of invasive species that cannot be prevented entry (according to WTO trade rules) rather than entire species, and prohibit the import of new genetically distinct variants that may increase the risks to biodiversity of permitted species. Similar limitations should apply to biological control agents.

7.1.2 Aquarium fish – major invasion risks

The aquarium industry is the main source of introduced fish in Australian waters, responsible for 22 of 34 fish naturalisations.[20] Some invasive fish species are doing great harm, and their numbers keep growing – by a dozen just in the past two decades.

There are many deficiencies in the regulation of the aquarium fish trade. The permitted list for imports is large, and in some cases it includes entire genera rather than species. The process to

19 Secretariat of the International Plant Protection Convention (2007).
20 Lintermans (2004).

reduce this list to species only is slow. There are many species on the permitted list that are likely to be of high environmental risk. In fact, in 2004, 40% of the 22 naturalised aquarium fish were on the permitted import list, "clearly indicating the difficulties of undertaking sound establishment risk assessments with limited ecological knowledge."[21] There is very limited information about the invasion risks of fish species, both those on the permitted list and those being assessed, which makes risk assessment difficult. One recently naturalised aquarium fish, the White Cloud Mountain Minnow (*Tanichthys albonubes*) is on the permitted import list, "suggesting it has undergone some form of risk assessment for establishment, yet has recently established in streams on the central coast of NSW, and in suburban Brisbane."[22] It has been recommended that the list should be reduced to about 100 species to make it more practicable to regulate imports and reduce risk.[23]

Identification of fish species when they are imported is a major challenge, particularly as species-specific morphological characters have not developed in juveniles and DNA identification is not available. Quarantine officers often do not have sufficient expertise. The only way of addressing this problem may be to require that imported fish are of sufficient maturity to permit identification.

There is also a major risk of importing disease with fish. A 2005 review notes that "disease occurrence in ornamental fish post quarantine indicates inadequate pre-border policies, inadequate duration of quarantine, and inadequate inspection and surveillance during quarantine."[24] Staff shortages and lack of resources are a part of the problem. There is a high risk that diseased ornamental fish will "act as the vector for release of pathogens into the environment and the potential for exposure of native fish."[25]

With aquarium fish there has also been a failure to require basic duty of care actions, such as warnings at point of sale about the environmental risks of dumping unwanted aquarium fish, waterweeds and snails. There needs to be a major information campaign to reduce this high-risk activity.

In 2006, the Natural Resource Management Ministerial Council adopted the report *A Strategic Approach to the Management of Ornamental Fish in Australia*.[26] This strategy addresses some of the problems and it is important that it be properly funded and implemented.

Aquarium fish have the highest rate of recent naturalisations of any category of pest animals. The permitted list needs revision to remove genera and high-risk species, and quarantine processes to identify species and disease need improvement. There also needs to be a much better effort to educate the public so as to prevent dumping and translocations of unwanted fish, snails, plants and other aquarium material.

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21 Lintermans (2004).
22Lintermans (2004).
23 Lintermans (2004), citing McKay (1984).
24 Chong & Whittington (2005).
25 Chong & Whittington (2005).
26 Marine and Coastal Committee of the Natural Resource Management Standing Committee (2005).

It is not only aquarium fish for which better quarantine processes are needed. There have been problems identified, for example, with plant imports, with importers deliberately or accidentally bringing in products under the wrong name, identifying them as one of the permitted species. To protect against this, there needs to be more rigorous quarantine testing procedures to check that importers accurately identify imported products.

There is also the need to continuously improve the quality of risk assessments generally to ensure they are best practice, that the risk assessors are skilled and that new information is incorporated. For example, it is vital to account for climate change in risk assessments - including the potential distribution of an introduced species under new climatic conditions, the increased potential for naturalisation and spread due to extreme climate events and the increased vulnerability of some native species to harm caused by invasive species.

Recommendations: Strengthen processes controlling the importation of aquarium fish and other categories of live imports to reduce the risks of introduction and release of invasive species. This includes revising the permitted list for aquarium fish, and implementing better quarantine processes to identify imported fish and plant species and fish diseases. There should be continuous efforts to improve the quality of risk assessments, which includes taking better account of the ways that climate change will affect invasive species.

7.1.3 Yellow Crazy Ants – the failure to conduct surveillance and the need for a stronger environmental focus

Yellow Crazy Ants (*Anoplolepis gracilipes*) are one of the tramp ant species (Red Imported Fire Ants, *Solenopsis invicta*, are another), ants that are spread around the world with traded products, and are adapted to humanised environments. The worst of these tramp ants disrupt whole ecosystems by outcompeting native ants, tending pest species and preying on native species.

Unlike fire ants, Yellow Crazy Ants are not a serious problem for humans, but they are for biodiversity. For example, on Christmas Island in 1989 they were found to have reached densities of up to 2254 foraging ants per square metre in the rainforest, and dominated 30 per cent of the island (3000 hectares). Within the areas they controlled, the ants were killing nearly all the ground-dwelling animals, including the island's unique red crabs. More than 20 million crabs died from a total population of 100 million. Ants spray formic acid in their eyes, blinding them, then overwhelm them, finally taking over their burrows. They may have contributed to the extinction of the Christmas Island Shrew and Christmas Island Blind Snake, neither of which has been seen for many years.

Crazy ants have been found on Christmas Island, in the Northern Territory, Queensland and New South Wales. In contrast to the strongly coordinated and well-funded program ($180 million) to eradicate red imported fire ants, there has been little concerted action on Yellow Crazy Ants. We assume this is because they are primarily an environmental threat rather than an economic and social threat.

The major pathway for the introduction of yellow crazy ants is via imported timber, pallets of which are brought in wrapped in plastic. There is limited inspection of such goods, and AQIS relies on importer declarations that these goods have been appropriately treated. The unwrapping of these pallets would typically not occur until distributed to an end user from a timber importer, far away from quarantine. There are no requirements for companies to inspect these pallets or to report any ants (or other species) that they find in them. This is in contrast to inspection, reporting and movement requirements that were imposed on companies to prevent the spread of red imported fire ants in Queensland. For example, companies are obliged to obtain Movement Certificates before transporting soil, hay, pot-plants or mulch in certain areas.

In Queensland, ISC called for a program to check timber yards for Yellow Crazy Ants, which has since occurred on a once-off basis. However, there needs to be ongoing surveillance and other measures to prevent future incursions and manage existing problems.

Despite the extreme threat to biodiversity, there is currently very little funding for the eradication or control of crazy ants. Nor is there a coordinated program of preventative quarantine action in countries of origin to improve conditions so that their importation is less likely. Although Yellow Crazy Ants threaten matters of national environmental significance, and have the potential for much greater threat, the federal environment department has mostly left it up to the quarantine services and the states to deal with these threats. The department may provide some funding for control programs, but it has not thus far provided leadership on efforts to prevent and control environmentally damaging incursions. (We understand the department intends to better coordinate efforts in future.)

There is much that could be done to reduce the threat of imports of ants such as Yellow Crazy Ants. After fire ants were discovered in Australia, New Zealand established a National Invasive Ant Programme. But Australia does not have an equivalent program. Australia should be working in countries of origin to prevent accidental imports, such as New Zealand is doing with its contributions to the Pacific Ant Prevention Program. New Zealand has also been running a surveillance program, targeting high risk sites such as ports every year. Australia should also have a surveillance program targeting ports, airports and other high-risk sites. The Urban Hazard Site Surveillance Program currently fulfils this function in capital cities, but needs to be expanded in geographic reach and placed on a permanent footing. There should be incursion response plans that spell out the actions required to eradicate new tramp ant infestations when these are found. There should be a national awareness program, and a program to improve Australia's taxonomic capacity to identify exotic species (When fire ants were first found in Queensland no one at the Museum or anywhere else in the state identified them because there wasn't an expectation that this species would be found here.) Many of these actions would be taken if the Threat Abatement Plan for tramp ants (2006) was to be properly implemented.[27] As far as we know, there has only been limited action thus far.

With the accidental import of invasive species potentially harmful to the environment mostly a matter for Australia's quarantine services and state agencies (with the focus on pre-border and post-border work, respectively), there tends to be a lack of focus on environmental pests,

27 Department of the Environment and Heritage (2006).

particularly in contrast to economic pests. The contrast between the efforts to control red imported fire ants and yellow crazy ants exemplifies this bias against environmental pests.

As demonstrated for Yellow Crazy Ants, responses to environmental pests occur on a case-by-case basis. There are no programs to guide and fund responses to accidental incursions of environmental pests, in contrast to the tactical response system, run through the Plant, Animal and Aquatic Animal Health Committees, to respond to outbreaks of livestock disease or an Emergency Plant Pest for a particular industry (which apparently also has its inadequacies).

The CSIRO notes that consultation through AusBIOSEC revealed that "environmental biosecurity capacity lags well behind industry capacity across the quarantine continuum."[28] They note in particular that "invertebrate and disease threats to the natural terrestrial environment and the entire aquatic environment are the least well understood and response readiness remains almost completely unresourced." In addition, research into environmental biosecurity threats is lacking. This would include biological control research to manage populations of invasive species.

The CRC for Plant Biosecurity also notes that surveillance for environmental and other pests is lacking in Australia: "Only a limited amount of active surveillance is undertaken in Australia and the capacity and capability to undertake surveillance activities has decreased to low levels."[29] The federal government has only a limited role in post-border surveillance, with most of it undertaken by the states.

With AQIS and Biosecurity Australia, as well as the states, failing to sufficiently focus on environmental pests, there is need for the DEWHA to become more involved in quarantine matters, and to have a clear oversight and funding capacity for those invasive species with potential to harm biodiversity. There is the need for much greater involvement of environmental officers in strategies and activities to prevent the accidental import/release of invasive species harmful to the environment.

This has been partly acknowledged by DEWHA. They suggest that their biosecurity role should expand:[30]

> to fill the current gaps in addressing environmentally impacting invasive species along the biosecurity continuum. These are particularly in the post-border areas of preparedness and eradication responses to nationally significant incursions...The main areas of expansion will be to prevent new incursions establishing, which is far more cost-effective than the ongoing control of established invasive species.
>
> DEWHA's role would be national co-ordination of such measures as identification of the major potential environmental invasive species threats, development of national preparedness plans, surveillance, reporting and nationally cost-shared eradication responses to incursions for nationally significant invasive species.

28 CSIRO (2008).
29 CRC for Plant Biosecurity (2008).
30 Department of Environment Water Heritage and the Arts (DEWHA) (2008).

There should be consideration of whether reforms to the EPBC legislation would facilitate DEWHA's capacity to undertake this expanded role.

Recommendations: Develop a stronger environmental focus to improve environmental biosecurity and prevent/manage the accidental import and release of environmentally harmful invasive species. Develop prevention, surveillance and eradication/control programs to address environmentally significant threats. Mandate the federal environment department to expand their role and take a lead in programs to address nationally significant incursions. Provide the capacity for DEWHA to have an oversight role in environmentally relevant quarantine processes.

7.1.4 Edible fungi – the failure to implement import risk protocols for an environmental risk

Although this is currently a matter under the jurisdiction of Biosecurity Australia, we raise it as a case study demonstrating the need for greater involvement by the federal environment department in quarantine matters relevant to environmental risk.

The importation of edible fungi, some of whose hyphae can attack live wood, poses an environmental risk. Such fungi could become serious pests of plantations and native forests.

Biosecurity Australia began an Import Risk Analysis of fungi imports in 1999 and has apparently devised a fungus risk assessment protocol, but has yet to implement it.

Although ISC has not seen an Import Risk Analysis, the issues paper produced in 1999 that led up to the IRA identified the following concerns relevant to environmental risk:

1. The importation of a range of species as viable fruiting bodies would be likely to introduce exotic species which may compete with native species and impact on native biodiversity, eg mycorrhizal fungi.
2. Introduction of edible wood rotting species could result in incursions of forest product decay organisms, eg *Pleurotus, Hypsizygus, Grifola, Lyophyllum, Pholiota*.
3. The taxonomy of our native mycoflora is little understood with less than 10% of all taxa having been described.
4. There is limited information on host specificity of many arthropods and diseases and
5. incomplete survey data for both Australia and overseas.
6. There are a very large number of arthropod species for which wild edible fungi are host in exporting countries.

We are concerned that it is taking so many years to develop and implement an import risk protocol for an environmental threat. Another example of an import risk analysis for an environmental threat that has not been completed is that for ornamental bulbs. Pests that are imported with these bulbs may harm native bulbs, but the relevant analysis has not been done. In conjunction with other examples of environmental risks not properly addressed, it suggests that Biosecurity Australia

does not accord high enough priority to environmental matters. The federal environment department seems to have little role in these matters that have strong implications for biodiversity.

The DEWHA has acknowledged this in its identification of a priority to build cooperation between DEWHA and DAFF (particularly BA and AQIS) to better protect the environment and biodiversity "such that an acceptable level of environmental protection is achieved when assessing and developing quarantine policies for commodity imports."[31]

Another example demonstrating lack of quarantine focus on environmental risks is the inordinate length of time it took Biosecurity Australia to address the huge loophole in the permitted list of plant imports that allowed whole genera of some plants to be imported (rather than species). Only after strong public pressure did Biosecurity Australia move to address this major environmental risk.

We hope that the quarantine and biosecurity review currently underway recognises the deficiencies in environmental focus and makes relevant recommendations. However, as suggested above, there is obviously the need for greater oversight by the federal environment department in quarantine matters that are relevant to protecting the Australian environment. This may be facilitated by a stronger statutory basis for oversight in the EPBC Act. The DEWHA itself has questioned whether "the application of the Quarantine Act is consistent with the EPBC Act."[32]

Currently, interactions between DEWHA and Biosecurity Australia are governed by a 2002 Memorandum of Understanding (MoU). The DEWHA has already suggested that: "Higher level formal arrangements between DAFF and DEWHA may be more appropriate in future, given the broader policy role shared between the two departments since the 2002 MoU was established."[33] They also suggest that:

> it would be useful to increase co-operation between DEWHA and BA to help ensure that EPBC Act assessment and listing processes and BA IRA [Import Risk Analysis] and quarantine policies take into account relevant environmental issues and that the respective agencies are consulted early and at key stages.

We recommend that the review consider how the EPBC Act could provide the basis for a much stronger environmental focus in quarantine matters relevant to the environment.

Recommendations: As above, develop a stronger environmental focus to improve environmental biosecurity. Provide for stronger involvement of the federal environment department in import risk analysis and development/implementation of import risk protocols. Mandate the federal environment department to expand their role in environmentally relevant quarantine processes.

31 Department of Environment Water Heritage and the Arts (DEWHA) (2008).
32 Department of Environment Water Heritage and the Arts (DEWHA) (2008).
33 Department of Environment Water Heritage and the Arts (DEWHA) (2008).

7.1.5 Bumblebees – an assessment process that could be improved

This is a case where the federal approach to requiring the assessment of imports of new species will prevent the introduction of an invasive species likely to cause great damage to Australian biodiversity. However, it also shows the potential for biased assessments.

In 2006, the Australian Hydroponic & Greenhouse Association applied to import Bumblebees (*Bombus terrestris*) to mainland Australia for the pollination of tomato plants (Bumblebees are already in Tasmania). As required, the proponents provided a risk assessment report, *Draft report assessing the impact of importing live Bumblebee (Bombus terrestris) for crop pollination purposes*, to which ISC and other submitters responded. Because Bumblebees are such a serious threat, ISC and other organisations put in considerable effort to respond to this application. Unfortunately, the task was made particularly onerous because the risk assessment report submitted by the proponents was not written by independent experts. When proponents hire their own experts to write the assessment report there is a greater risk of bias, selective data and bias than there would be otherwise.

The Bumblebee assessment report for the proponents included claims that:

- Bumblebees are not a problem anywhere in the world.
- Bumblebees are uncommon, if not declining, wherever they occur.
- Bumblebees prefer exotic (European) flowers to native flowers.
- Bumblebees do not contribute to weed spread overseas.

Each claim was shown to be false with reference to the scientific literature. For example,there was evidence of scientific concerns about the impacts of *B. terrestris* in Britain, Germany, Israel, Japan, Chile, New Zealand and Australia. While ISC and other organisations could address the deficiencies in the draft risk assessment report, it would be a much more efficient process if we could rely on assessment reports being produced independently of the proponent.

The application to import Bumblebees has recently been rejected by the environment minister, and we commend this decision.

Because the assessment process for the import of new species requires the proponent to produce the assessment report – ie to hire its own experts – it tends to generate biased and unreliable information by which the government and third parties are meant to evaluate the risks associated with proposed imports. This requires those commenting on or assessing the application for import to develop sufficient expertise to assess the reliability of information provided by the proponents. A better approach would be to require independent experts to write such reports, and have the authors of the assessment report directly answerable to the assessors rather than the proponents (although the proponents would pay for the assessment).

Recommendation: Improve the assessment of proposals for import of new species by requiring that independent experts write the assessment reports. They should not be selected by the proponent.

7.2 Case studies relevant to establishment and spread of invasive species

7.2.1 Tall Wheat Grass and Gamba Grass, invasive pasture grasses to ban

Tall Wheat Grass (*Lophopyrum ponticum*) is an exotic salt-tolerant perennial grass planted by graziers and promoted as a salinity solution in southern Australia, most heavily in Victoria. However, it is also a very serious environmental weed that is invading Ramsar-listed wetlands, encroaching on federally listed threatened plant species (eg. spiny peppercress *Lipidium aschersonii*, salt-lake tussock-grass *Poa sallacustris*, spiny rice-flower *Pimelea spinescens* subspecies *spinescensis,* and curly cedge *Carex tasmanica*) and threatening the habitats of threatend species such as the federal endangered orange-bellied parrot. Tall Wheat Grass has the potential to invade numerous habitat types across about half of southern Australia, and is tolerant of drought, frost, alkalinity, salinity and waterlogging.[34]

Although Tall Wheat Grass is a highly significant threat to numerous matters of national environmental significance under the EPBC Act – Ramsar-listed wetlands and listed threatened species – it is not declared or prohibited under any state legislation, and it can be freely traded and planted. The states could and should declare it, but agricultural interests have very strong sway over listings and would strongly object to this. In fact, agricultural agencies have been amongst those who have promoted the planting of Tall Wheat Grass, and the most commonly planted variety was developed by the Victorian DPI and released in 1999.

There has been belated recognition in some quarters, including agricultural departments, that Tall Wheat Grass is an environmental risk, but the response has been merely to recommend management guidelines such as buffer zones. These guidelines are voluntary, untested and not likely to make much difference. There are currently no efforts to prevent or control the spread of Tall Wheat Grass in significant environmental areas such as Ramsar-listed wetlands.

Gamba Grass (*Andropogon gayanus*) is an African grass planted for cattle pastures in northern Australia. It grows up to 4 m tall, competes with native plants, fuels very intense fires (at up to eight times the intensity of fires fuelled by native grasses) that kill trees and changes the hydrology over large areas.[35] Gamba Grass has the potential to turn vast areas of northern Australia into a pyrogenic grass monoculture.

Gamba Grass is a threat to matters of national environmental significance, including federally listed threatened species (Yellow-snouted Gecko *Diplodactylus occultus*, Darwin Palm *Ptychosperma bleeseri (macarthurii*), Eastern Partridge Pigeon *Geophaps smithii smithii*, Gouldian Finch

34 Booth et al. (in preparation).
35 Rossiter et al. (2003); Douglas & Setterfield (2005).

Erythrura gouldiae, and Northern Quoll *Dasyurus hallucatus*) and the values of Kakadu World Heritage Area.[36]

Gamba Grass has recently been prohibited in Western Australia and declared in Queensland and the Northern Territory. It was declared in Queensland and the Northern Territory only after considerable and extended pressure was exerted on the governments to do so (in Queensland three years after an initial risk assessment recommended declaration) and in the face of opposition by the grazing industry. When it takes so long and so much effort to achieve declaration of what is likely to be Australia's very worst weed, with the potential to transform the savannah woodlands of northern Australia, it suggests the system of state declarations is not working well.

Most states are failing to regulate the trade and use of invasive species that are harmful or potentially harmful to biodiversity and matters of national environmental significance. Although we haven't focused on it here, this includes species native to Australia that naturalise beyond their native range.

The existing pool of invasive or potentially invasive species in Australia is one of the major environmental problems that should be addressed by the review. Tall Wheat Grass and Gamba Grass are two of the worst invasive weeds, threatening numerous matters of national environmental significance, yet the former is not regulated at all and the latter has been belatedly regulated. Invasive garden plants (discussed in case study 7.2.2) are also typically not regulated. Feral deer (case study 7.2.4) undoubtedly threaten matters of national environmental significance, including the Wet Tropics World Heritage Area (WHA), but they are mostly not controlled because of the political influence of hunters. In contrast, the threat to the Wet Tropics World Heritage Area that Cecropia represented was recognised and that plant has been banned. It is unfortunately a very rare example, and numerous other high-risk plants that represent future threats to the Wet Tropics WHA are not being investigated or eradicated (case study 7.2.3).

With most states and territories using a 'prohibited list' system in which all species apart from those specifically prohibited can be freely traded and used, most invasive species are not regulated. Only a few hundred plant species are declared weeds in the states/territories. This is a small proportion of the approximate 2700 plant species that are recognised weeds in Australia and the additional approximate 6000 species that are weeds overseas.[37]

In the declarations processes used in most states, invasive species are not regulated unless there is an onerous, costly and often politically charged risk assessment and declaration process. The system of declarations cannot keep up with the rate of new environmental weeds, and fails to result in the declaration of many/most high priority invasive species.

Because of the limited management focus on a small pool of declared invasive species, states/territories are failing to eradicate/control high risk invasive species at an early stage when it is most effective and cost-effective to do so.

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36 Listed in the nomination of 'Ecosystem degradation, habitat loss and species decline due to invasion of Top End NT by introduced gamba grass (Andropogon gayanus)' as a key threatening process under the EPBC Act.
37 Randall (2007).

One of the many problems with state/territory regimes is there are conflicts of interest within state government departments with responsibility for regulation of invasive species. In many cases the same departments are also responsible for promoting agriculture and horticulture. These conflicts of interest are signalled, for example, in the stated mission of the Queensland Department of Primary Industries and Fisheries, which also includes Biosecurity Queensland, "to maximise the economic potential for Queensland s primary industries on a sustainable basis." Biodiversity is not their priority, and the agricultural and horticultural interests within such departments block attempts to regulate the planting of exotic pasture grasses and other commercially valued plants. In the case of Tall Wheat Grass it is the same Victoria department that was responsible for developing (and now promoting) the major variant now used that would have to declare it noxious. There also tends to be a bias in invasive species focus in most stage government departments towards managing those species that are economically harmful, particularly for agriculture, and much less focus on those harmful to the environment.

There needs to be much more consistency between the approach taken to potentially invasive species not yet in Australia and invasive species that are already here. The approach to the former is federally controlled and based on the precautionary approach of risk assessment. However, the approach to invasive species post-border is controlled by the states, is typically opposed to precaution, and allows for almost unregulated use of most harmful invasive species.

The elements of an effective system would include:

precaution – unless assessed as low risk, the use of species not indigenous to a region (whether exotic or native to Australia) should be regulated to prevent the establishment or spread of harmful invasive species.

prevention – a priority focus should be to keep invasive species out of regions where they have not naturalised and out of areas that are of high conservation value

consistency and transparency – adopt a consistent approach across Australia rather than relying on ad hoc state processes of declarations, and adopt processes that are ecologically based and minimise political bias.

There is potential under Section 301A of the existing EPBC Act to develop regulations for the control of non-native species that could overcome many of the shortcomings of the current approach. The Section allows for the development and maintenance of a list of species, other than native species, whose members threaten or would likely threaten biodiversity; and the regulation of trade in those species and actions involving those species.

Recommendations: As a high priority, develop regulations under s301 of the EPBC Act to develop effective approaches to nationally significant invasive or potentially invasive species. This includes developing national lists of invasive species (identifying those species for prevention, eradication, containment, control and mitigation) and regulating trade and use of these invasive species to achieve environmental goals.

Although the planting of invasive pasture grasses near a Ramsar-listed wetland or the habitat of threatened species, are arguably controlled actions and should be assessed under the EPBC Act,

there is no precedent or trigger to alert the landowner or government authorities to this responsibility. There are no means by which third parties, such as governments would be informed, of the intention of the landowner to take these actions.

At the very least, this should be partially redressed by identifying specific examples of actions involving invasive species that are likely to have significant impacts, conducting public education about potential controlled actions, and actively seeking to identify potential actions that should be assessed as controlled actions under the Act so as to set precedents. It may also be necessary to identify triggers for referral of potential controlled actions for assessment, such as commercial plantings or farming of identified invasive species near nationally significant environmental assets, such as Ramsar wetlands, world heritage areas or habitats of threatened species.

Recommendations: Identify examples of and triggers for referral of potential controlled actions involving invasive species that are likely to significantly affect matters of national environmental significance. Conduct public education about potential controlled actions involving invasive species and seek to establish precedents for referral of actions for assessment.

While tall wheat grass and gamba grass have commercial value, some of those who are benefiting from them are doing so at the expense of the natural environment and taxpayers who will have to bear the costs of weed management. There is no 'polluter-pays' system in operation for invasive species, which means their benefits are privatised but the costs are socialised.

Landholders may have obligations for a generalised duty of care but this is generally not enforced with respect to invasive species. In many circumstances there are laws to stop people knocking down trees, but there are none to stop them planting an exotic pasture grass that carries fierce fires and destroys the vegetation. Those who commercially exploit or otherwise use invasive species are generally not held responsible for those that escape cultivation or captivity.

Just as mining companies and developers are in some circumstances required to remediate harms and sometimes to pay a bond to cover the costs of potential environmental remediation, so should those who use invasive species for commercial benefit be required to take responsibility for remediation should the species spread as a result of their activities. In some cases payment of a bond may be the best way to ensure that remediation occurs. Florida has such a system for high risk commercial crops (Florida Statute 581.083):

> (e) Each permitholder shall maintain for each separate growing location a bond or a certificate of deposit in an amount determined by the department, but not less than 150 percent of the estimated cost of removing and destroying the cultivated plants. The bond or certificate of deposit may not exceed $5,000 per acre, unless a higher amount is determined by the department to be necessary to protect the public health, safety, and welfare or unless an exemption is granted by the department based on conditions specified in the application which would preclude the department from incurring the cost of removing and destroying the cultivated plants and would prevent injury to the public health, safety, and welfare.

There should also be much more explicit duty of care requirements for those who use invasive or potentially invasive species that ensure they are responsible for any resulting environmental harm. For example, those who plant invasive crop species should be required to eradicate any plants that escape cultivation within a defined radius of the planting.

Another duty of care failure is the lack of labelling of nursery plants. It is too much to expect that individual gardeners know which plants are potentially invasive in their region. It should be part of a basic duty of environmental care that anyone selling invasive or potentially invasive species should be required to warn the buyer. (We don't endorse the selling of invasive species; as discussed earlier there should be regulations to prevent the trade and use of nationally significant invasive or potentially invasive species.)

This gap also applies in the case of aquarium fish. There are no signs in aquarium shops warning buyers of the risks of environmental harm if they release fish, water weeds or snails into waterways.

There should be a requirement for appropriate warnings to be provided whenever a potentially invasive species is sold. For example, nurseries should be required to provide species-specific information about the potential for escape, spread and environmental harm and aquarium shops should be required to provide customers with warnings about the potential harm that may result should they dump their fish, water weeds or other aquarium organisms in the environment.

Recommendations: Implement a polluter pays system that includes bond requirements for the use of invasive species that may escape and harm the environment. Develop explicit duty of care requirements for those selling and using invasive species, including requirements to eradicate invasive species if they escape from cultivation or use, requirements for labelling potentially invasive species at point of sale and for providing buyers with warnings about the dumping of aquarium products.

7.2.2 Murraya and duranta – invasive garden plants that weren't stopped

Murraya or Mock Orange (*Murraya paniculata*) and Duranta (*Duranta erecta*) are environmental weeds in eastern Australia that escaped from gardens into bushland. They invade a variety of natural habitats. With their bird-attractive fruits, it is not at all surprising they have become weedy.

Although both species are now recognised as environmental weeds – Murraya is probably the fastest spreading woody weed in southeast Queensland and Duranta is listed among the 50 most invasive species in the New South Wales North Coast environmental weed survey – they have not been declared by state weed agencies. There are no restrictions on their sale by nurseries. There are not even any labelling requirements to warn buyers of the environmental risks. The process of spread by gardening activities is ongoing.

The nursery industry strongly objects to any restrictions on the plants they sell or even mandatory labelling, and argue for voluntary measures. However, to date they have demonstrated that voluntary measures do not work.

7.2.3 Trumpet Tree, lawyer vines – and a tropical nightmare of potential weeds

Trumpet Tree (*Cecropia peltata*) is native to Central and South America, and a significant forest weed in many countries. It wasn't until ISC project officer Tim Low received a letter from a landowner near Mission Beach in the Wet Tropics who was growing the tree and was concerned that it was spreading that it was brought to official attention in Queensland. At the urgings of ISC, a risk assessment was conducted and the species was declared and its eradication required.

This is a rare case study of a potential weed disaster averted. Cecropia is on the IUCN's list of 100 of the world's worst alien invasive species and could have become a very serious invader of rainforests in the Wet Tropics World Heritage Area. The declaration in this case was fairly straightforward because there were not many plantings and there was no one calling for it to be maintained.

However, Trumpet Tree was only one of many exotic plants being grown by that landholder. Convinced that there was going to be nuclear catastrophe, he had imported plants from all over the world to set up his own self-sufficient garden haven.

One of the other plants growing on that property was an exotic lawyer vine (*Calamus sp.*). The landholder mentioned it had spread and taken over a part of the property. If this very prickly vine became invasive it would have very serious consequences for rainforest habitats. Lawyer vines are the prickliest of all vines in the forests where they grow.

There appeared to be numerous high risk invasive species in that landholder's garden, many of which were seen to be spreading during a site visit. And there are many other properties like his with the potential to become the source of a tropical weed nightmare, and cause significant harm to the values of the Wet Tropics World Heritage Area. Many landholders in this region specialise in growing unusual tropical plants such as gingers, palms, fruit trees or bromealiads, the weed risks of which are unknown. With climate change predicted to bring more severe cyclones to north Queensland, which will provide more opportunities for weeds, there will be increasing risks of the naturalisation and spread of these plants from gardens.

But there is no action being taken on these weeds in the making. Local council weed officers are already overburdened with the declared weeds on their list for control. The Wet Tropics Management Authority has no strategy and no budget to address emerging weed problems, despite the international significance of the rainforests. The Queensland government has a list of many plants invasive in the Wet Tropics that are potential candidates for eradication, but funding for assessment and control is inadequate. While governments at all levels talk about the importance of prevention, there is little more than lip service. Local councils and the Queensland government are spending something on weed control, but the federal government is spending nothing, despite the global significance of the region.

The problem will be exacerbated by climate change. With increased damage to forests from cyclones, for example, weeds will be given greater opportunities to establish and spread. To

prevent future weed problems - and ultimately save vast management costs - there should be a strategy to identify and eradicate potentially invasive species from properties in the Wet Tropics region.

Prevention and early eradication circumvent the need for much more costly control or management actions later. While all governments agree on this principle, and have participated in the development of strategies that say so, there has been very limited action to advance it. Both the *National Weed Spread Prevention Plan* and the *Australian Pest Animal Strategy* (which includes an objective to develop an alert list of emerging pest animals and fund the eradication of priority pests that can be eradicated successfully) need to be implemented in full. There is urgent need to allocate sufficient funds for this vital preventative work.

Recommendations: Allocate funds to implement in full the actions to prevent weed and pest problems identified in the *National Weed Spread Prevention Plan* and the *Australian Pest Animal Strategy.* Develop a program to identify and eradicate weeds that could harm the values of the Wet Tropics World Heritage Area.

7.2.4 Deer – invasive pest animals that are not controlled

The six species of feral deer in Australia (Red Deer, Hog Deer, Rusa Deer, Fallow Deer, Sambar, Chital) represent an expanding and potentially devastating feral pest problem in eastern Australia. There are more than 200 feral deer populations in Australia, about one-third of which have established recently as escapees from deer farms, and more than a half of which were established from recent illegal translocations.[38]

Despite a benign image – encouraged by deer hunters – deer can cause as much environmental harm as wild goats or pigs. A recent international review of feral deer concluded:

> Deer often have a profound impact on ecosystem structure and act as keystone species in many forest systems. Deer herbivory can determine the structure and composition of forest herb layers, subcanopy and ultimately forest canopies through their impacts on regeneration, generally with an increase in unpalatable species or those resistant to browsing. In turn, this can have cascade effects on biodiversity, including songbird abundance and species composition, nest predation rates, the abundance and density of invertebrates, and the abundance and seed predation activity of small mammals. [The associated references have been removed from this quote.][39]

An assessment of the impacts of Sambar in Victoria documented serious impacts by sambar deer on rainforest vegetation. The researchers noted that “The effects of browsing can be devastating”, especially for rainforest plants during drought. Antler rubbing is also a serious threat to some rainforest plants, including the endangered Buff Hazelwood (*Symplocos thwaitsii*). “It appears only

38 Moriarty (2004).
39 Domnan & Waber (2008).

a matter of time before Sambar totally eliminate some species from an area," the authors conclude.[40]

Yet in Victoria, NSW and Tasmania, deer are managed as an asset for deer hunters and they are partially or fully protected under legislation. They are mostly not controlled for environmental protection, even in national parks. Victoria is developing a scheme to increase deer hunting opportunities on farms that is likely to increase the population and spread of feral deer herds.[41] In Queensland, again partly because of the political sway of deer hunters but also because of inadequate attention and funding, there has been little effort to control their spread. Deer are a threat to the the Wet Tropics World Heritage Area. Many deer continue to escape from deer farms into the wild and are being spread to new areas by recreational hunters.[42]

7.3 Case studies relevant to managing the threats of invasive species

7.3.1 Phytophthora cinnamomi – a listed KTP not being addressed

The pathogen Phytophthora (*Phytophthora cinnamomi*) is a major cause of native plant death in Australia. It is especially serious in Western Australia, where some 2300 plant species are thought to be susceptible, including eight highly susceptible endangered species. In Stirling Range National Park the dramatic spread of the pathogen is attributed to the construction of management tracks. Almost half of the 330 plant species tested in the park are susceptible, including 16 of the park's 24 threatened species.

Although the pathogen has no direct impacts on animals, its indirect impacts are dramatic because plants of great importance to animals disappear from ecosystems. Banksias – a major source of nectar for birds and mammals – are among the most heavily affected plants, and so too are grasstrees, which provide nesting sites for small marsupials. The very distinctive honey possum is one species at risk from further spread.

Climate change may aid the advance of Phytophthora. "A changing climate in the coming decades will probably push it into places still unimagined," warn scientists in a recent review.[43] Lower rainfall across temperate Australia should reduce the number of Phytophthora attacks, but these could increase in severity if there are more extreme rainfall events, as predicted by climate scientists. In Tasmania the disease is limited by low summer temperatures, but these will rise in future.

Phytophthora is listed as a key threatening process. A threat abatement plan was adopted in 2001, and a second draft TAP was recently released for public comment.[44] But very few actions in the first plan were funded, so little progress has been made.

40 Peel et al. (2005).
41 Booth (2008).
42 Moriarty (2004).
43 Cahill et al. (2008).
44 Environment Australia (2001); Department of Environment Water Heritage and the Arts (DEWHA) (2007).

There is urgent need for research into alternatives to phosphite as a chemical control for the disease, for diagnostic techniques for rapid identification of *P. cinnamomi*, for more communication with senior management and politicians about the problem, and for a national repository of literature about the pathogen.

The review by Cahill et al (2008) ends on a severe note: "if we do not act now, accept that *P. cinnamomi* is a national and urgent priority and adopt some new thinking and approaches, then Australian vegetation and its dependant biota will undergo further destructive and potentially irreversible change."

Threat abatement plans are meant to address the most serious of our environmental threats, but as the case study suggests, at least some of them are not receiving the funding necessary for implementation. While the case study was of just one example, we understand that many other plans also lack proper funding. With the need for more TAPs to address the nationally significant threats of many invasive species, funding needs to be greatly scaled up.

Recommendation: Improve funding for threat abatement plans so that they can be properly implemented.

7.3.2 Flammable pasture grasses – an undeclared key threatening process

There are many more key threatening processes to Australian biodiversity than there are listed KTPs. Not one single weed or group of weeds are listed as KTPs. This is surprising given that weeds have been identified as threats to numerous threatened species. A NSW assessment found that weeds contribute to the threats for more than 400 listed threatened species in that state alone.[45]

One obvious contender for KTP status is flammable pasture grasses, such as Buffel Grass (*Pennisetum ciliare),* Gamba Grass (*Andropogon gayanus*) and Mission Grass (*Pennisetem polystachion*).

In northern Australia, Gamba Grass, a grass native to Africa, produces the most extreme fires. It grows extremely tall, up to 4.75 metres, compared to 1-3 metres for the native grasses it replaces. It dries out later in the dry season and remains erect for longer, creating a taller, denser fuel load. Gamba Grass fires are eight times as intense as native grass fires, with flames scorching the crowns of trees. Repeated Gamba Grass fires kill eucalypts, turning woodlands into exotic grasslands.[46] It is a "transformer species with the potential to alter the community structure and the nutrient, water and carbon cycling processes over large areas of Australia's savanna ecosystems"[47] and poses an extreme threat to Australia's northern savannas.[48] A Queensland government risk assessment concluded:[49]

45 Coutts-Smith & Downey (2006).
46 Kean & Price (2003); Rossiter et al. (2003).
47 Rossiter et al. (2003).
48 Csurhes (2005).
49 Csurhes (2005).

> If large areas of northern Australia become dominated by gamba grass, the associated fire regime is predicted to transform Australia's eucalypt-dominated tropical woodlands into tree-free grasslands.

Mission grass produces fuel loads about four times greater than native grasses and its flames reach more than five metres high.[50] It destroys rainforest patches near Darwin by invading them after cyclones and then burning. Mission grass has been listed as one of Australia's 18 top environmental weeds.[51]

Buffel Grass is causing fire-mediated invasions across much of inland Australia. It "dramatically increases the fuel load causing hotter, larger fires; thus increasing vegetation homogeneity and in all likelihood killing native plants such as *Eucalyptus camaldulensis*"[52] In the Kimberly region it invades rainforest patches along tracks made by feral cattle, fuelling very hot fires that kill rainforest trees.[53] The fires of Buffel Grass appear to be the main threat to the federally endangered Slater's Skink (*Egernia slateri*).[54] It is of great concern for many other environmental reasons as well.

For the range and significance of environmental values they threaten, some of these pasture grasses – particularly Gamba Grass and Buffel Grass – deserve listing as single species KTPs. There is need for threat abatement plans to control and mitigate the great environmental harm they cause.

The current list of KTPs are far from comprehensive of the very serious and nationally significant threats of invasive species. For example, no invasive plant species are listed as KTPs. As well as flammable pasture grasses escaped garden plants as well as individual plant species, such as Guffel Grass and Tall Wheat Grass warrant listing.

To address many of the invasive species threats there needs to be long-term funding to allow for control programs. For example, there should be more long-term funding for the development of biological control for environmental weeds.

There is also need to consider how best to initiate threat abatement action on invasive species and other threats before they get to the stage of warranting declaration as KTPs. It may be useful to have a category of emerging KTPs.

Recommendation: Increase the list of KTPs to better encompass the serious threats of many invasive species, including flammable pasture grasses. Ensure that funding is sufficient to develop and implement TAPs for threatening processes that warrant listing as KTPs. Provide long-term funding for control programs, including the development of biological control for serious

50 Panton (1993).
51 Humphries et al. (1991).
52 Humphries et al. (1991).
53 Norris & Low (2005).
54 Pavey (2004).

environmental weeds. Investigate the potential for addressing potentially key threatening process before they warrant listing as KTPs.

8. Recommendations made to the Inquiry into the operation of the EPBC Act

Here we reproduce the recommendations made to the Inquiry into the operation of the Environment Protection and Biodiversity Conservation Act 1999 by the Senate Environment, Communications and the Arts Committee. They are in order of the categories of introduction, establishment and spread and harm phases. The priority recommendation, as discussed, is to address the problem of the large pool of invasive species already in Australia, many of which are not regulated at all under state/territory laws (recommendation 8.6).

8.1 To protect Australian biodiversity from new potentially more harmful variants of existing permitted species:

> Limit permitted status to the genetically distinct variants of invasive species that cannot be prevented entry (according to WTO trade rules) rather than entire species, and prohibit the import of new genetically distinct variants that may increase the risks to biodiversity of permitted species. Similar limitations should apply to biological control agents.

8.2 To protect Australia from imports of high-risk aquarium fish species and other permitted species:

> Strengthen processes controlling the importation of aquarium fish and other categories of live imports to reduce the risks of introduction and release of invasive species. This includes revising the permitted list for aquarium fish, and implementing better quarantine processes to identify imported fish and plant species and fish diseases. There should be continuous efforts to improve the quality of risk assessments, which includes taking better account of the ways that climate change will affect invasive species.

8.3 To better protect the environment against the threat of accidental import or release of invasive species:

> Develop a stronger environmental focus to improve environmental biosecurity and prevent/manage the accidental import and release of environmentally harmful invasive species. Develop prevention, surveillance and eradication/control programs to address environmentally significant threats. Mandate the federal environment department to expand their role and take a lead in programs to address nationally significant incursions. Provide the capacity for DEWHA to have an oversight role in environmentally relevant quarantine processes.

8.4 To improve quarantine processes for environmentally relevant invasive species:

> As above, develop a stronger environmental focus to improve environmental biosecurity. Provide for stronger involvement of the federal environment department in import risk analysis and development/implementation of import risk protocols. Mandate the federal environment department to expand their role in environmentally relevant quarantine processes.

8.5 To improve the independence of risk assessments:

Improve the assessment of proposals for import of new species by requiring that independent experts write the assessment reports. They should not be selected by the proponent.

8.6 To improve the regulation of invasive species or potential invasive species already in Australia:

As a high priority, develop regulations under s301 of the EPBC Act to develop effective approaches to nationally significant invasive or potentially invasive species. This includes developing national lists of invasive species (identifying those species for prevention, eradication, containment, control and mitigation) and regulating trade and use of these invasive species to achieve environmental goals.

8.7 To improve the rate at which potential controlled actions involving invasive species are referred for assessment:

Identify examples of and triggers for referral of potential controlled actions involving invasive species that are likely to significantly affect matters of national environmental significance. Conduct public education about potential controlled actions involving invasive species and seek to establish precedents for referral of actions for assessment.

8.8 To more effectively prevent weed and pest problems and eradicate potentially invasive species:

Allocate funds to implement in full the actions to prevent weed and pest problems identified in the *National Weed Spread Prevention Plan* and the *Australian Pest Animal Strategy.* Develop a program to identify and eradicate weeds that could harm the values of the Wet Tropics World Heritage Area.

8.9 To ensure that those who use or trade invasive species exercise a duty of care and to ensure that they take responsibility for resulting harms:

Implement a polluter pays system that includes bond requirements for the use of invasive species that may escape and harm the environment. Develop explicit duty of care requirements for those selling and using invasive species, including requirements to eradicate invasive species if they escape from cultivation or use, requirements for labelling potentially invasive species at point of sale and for providing buyers with warnings about the dumping of aquarium products

8.10 To improve the capacity to address existing key threatening processes:

Improve funding for threat abatement plans so that they can be properly implemented.

8.11 To properly address key threatening processes:

Increase the list of KTPs to better encompass the serious threats of many invasive species, including flammable pasture grasses. Ensure that funding is sufficient to develop and implement TAPs for threatening processes that warrant listing as KTPs. Provide long-term funding for control programs, including the development of biological control for serious

environmental weeds. Investigate the potential for addressing potentially key threatening process before they warrant listing as KTPs.

8.12 To address the synergistic threats of climate change and invasive species:

Develop a federal environment strategy to address the synergistic threats of climate change and invasive species. Prioritise reforms to federal responses to invasive species, as proposed in this submission, as part of adapting to climate change. Implement reforms to prevent climate-change-motivated industries, such as biofuels, or climate-change-motivated changes in land use worsening the invasive species problem. Ensure that risk assessments for invasive species and management approaches take climate change into account.

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