

Inquiry into the operation of the *Environment Protection and Biodiversity Conservation Act 1999*

by the Senate Environment, Communications and the Arts Committee

SUBMISSION

Invasive Species Council Inc

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Executive summary

In this submission we respond to the 4th Term of Reference, with a focus on the threat of invasive species to Australian biodiversity. We argue that the EPBC Act is failing to provide the basis for preventing, containing or managing the serious harms caused to Australia's biodiversity and matters of national environmental significance by invasive species.

Currently, the main ways that invasive species are addressed in the EPBC Act are through (a) the assessment of proposals to import new species that may harm biodiversity and (b) through the declaration of Key Threatening Processes and the development of Threat Abatement Plans.

There are major gaps in this two-pronged approach, both gaps of regulation and gaps of implementation. In particular, there is no federal or state regulation of the trade or use of thousands of species already in the country that are a threat or potential threat to biodiversity (and which mostly are not listed as key threatening processes).

To the extent that regulation via the EPBC Act is the appropriate response to successfully address 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:

- ★ Prevent new introductions of 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 caused by invasive species that are key threatening processes
- ★ Manage the synergistic threats to biodiversity of climate change and invasive 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 matters of national environmental significance.

1. Prevent new introductions that are potentially harmful to biodiversity

Progress has been made in Australia to limit the introduction of new invasive or potentially invasive species with the systems for risk assessment under the EPBC Act and the Quarantine Act. However, as illustrated by case studies, there are still improvements that should be made.

Systems for environmental biosecurity do not match those for industry. We need ways to protect the Australian environment from new high-risk genetically distinct variants of species permitted for import, and quarantine processes for permitted species need improvement. We need programs with a stronger environmental focus to protect against accidental introductions of invasive species harmful to the environment. Although many of the quarantine responsibilities do not rest with the environment department and are not regulated under the EPBC Act, there is need for much greater involvement of the environment department in quarantine matters, which perhaps should be facilitated through the EPBC Act.

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.

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.

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.

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.

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.

2. Prevent the establishment or spread of introduced species potentially harmful to biodiversity

The major source of emerging invasive species threats is the very large pool of exotic species already in Australia, whose regulation and management are largely not affected by the current operation of the EPBC Act. There are already more exotic plants than there are native plants in Australia, and more than a thousand different freshwater aquarium fish species. Many of these introduced species have already caused great environmental harm and many more are likely to become invasive over time. They represent potent threats to biodiversity and ‘matters of national environmental significance’, but most states are failing to regulate the trade and use of invasive

species to prevent and mitigate this threat. As illustrated by various case studies, the EPBC Act provides very limited means to regulate the human activities that result in these threats or to act to prevent emerging threats.

Although many actions involving invasive species potentially have a significant impact on matters of national environmental significance they are not being referred for assessment under the EPBC Act. There is also a lack of federal action on other problems caused by invasive species that affect matters of national environmental significance. For example there is no federal action to prevent a very serious weed threat emerging for the Wet Tropics World Heritage Area.

There is no 'polluter-pays' system in operation for invasive species, which means their benefits are privatised but the costs are socialised, and duty of care requirements are not specified or enforced.

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.

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.

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.

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

3. Manage the key threats caused by invasive species as key threatening processes

The EPBC Act provides for the listing of key threatening processes (KTPs) and the development of threat abatement plans (TAPs) to address these threats. 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 not effective, and they cover only a small proportion of the key threats to biodiversity from invasive species.

To improve the capacity to address existing key threatening processes:

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

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.

4. Manage the synergistic threats of climate change and invasive species

Climate change will worsen the world's invasive species problems, and many of the threats of climate change to biodiversity will be manifested by invasive species benefiting from climate change.

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

- ★ 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
- ★ 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

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 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 move of agriculture into northern Australia.

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.

Introduction

Who we are

The Invasive Species Council (ISC) is a non-government environmental 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.

Invasive species and harm to biodiversity

We respond in particular to the 4th Term of Reference, with a focus on the threat of invasive species to Australian biodiversity.

> 4. the effectiveness of responses to key threats identified within the EPBC Act, including land-clearing, climate change and invasive species, and potential for future measures to build environmental resilience and facilitate adaptation within a changing climate

We argue here that the EPBC Act is failing to provide the basis for preventing, containing or managing the serious harms caused to Australia's biodiversity and matters of national environmental significance by invasive species.

Along with land clearing and climate change, invasive species are one of the three top threats to Australia's biodiversity. They have caused extinctions and are a threat to a high proportion of federally listed threatened species. Invasive species transform ecosystems and undermine ecological processes; for example, when fire-promoting weeds change fire regimes or when water-demanding weeds reduce the flow and availability of water. They come to dominate some ecosystems, completely changing the character of whole landscapes.

Although many people think that the environmental problems resulting from invasive species are due to the mistakes of the past, the problem is not declining with time, and the rate of naturalisations is increasing. by their use of invasive species, Australians are still engaging in activities that entail a high risk of harming Australia's biodiversity. Furthermore, the management of existing problems caused invasive species is not in any way commensurate with the scale of their threats.

Invasive species cause complex, multi-faceted problems, involving thousands of different agents of ecological harm and complex biological and social interactions that often cannot be predicted. Invasive species include pathogens, parasites, weeds and pest animals (include some that are native to Australia), and affect all environments and numerous ecological processes. Problems caused by Invasive species are also socially complex, for many people value particular harmful species and object to restrictions on their use of invasive species or to control of invasive species.

For these reasons there are no simple answers to invasive species problems. An effective policy and regulatory framework for such a complex issue has to be multifaceted.

Gaps in the EPBC Act – framework and implementation

Currently, the main ways that invasive species are addressed in the EPBC Act are through (a) the assessment of proposals to import new species that may harm biodiversity and (b) through the declaration of Key Threatening Processes and the development of Threat Abatement Plans.

There are major gaps in this two-pronged approach, both gaps of regulation and gaps of implementation. In particular, there is no federal or state regulation of the trade or use of thousands of species already in 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 threat abatement plans are not properly funded or implemented. Nor are other plans or strategies relevant to invasive species.

To the extent that regulation via the EPBC Act is the appropriate response to successfully address 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:

- ★ Prevent new introductions of 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 caused by invasive species that are key threatening processes
- ★ Manage the synergistic threats to biodiversity of climate change and invasive species

The EPBC Act currently addresses just the first and third of these to some extent. A large proportion of actions that affect invasive species harmful to the environment (whether to the benefit or harm of biodiversity) are not regulated under the EPBC act.

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 matters of national environmental significance. 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 federal departments? In this submission we recommend this should be the case, as existing approaches are cumbersome and are not working to prevent and manage the threats of invasive species to the environment.

In this submission, we identify major holes in the current approaches, exemplifying them through case studies, and recommend reforms in each of the four categories identified above.

1. Prevent new introductions that are potentially harmful to biodiversity

Progress has been made in Australia to limit the introduction of new invasive or potentially invasive species. With the requirement for assessment of proposed imports of new species under the EPBC Act ('Imports of regulated live specimens') and the Quarantine Act 1908, we have a reasonable prospect of preventing the deliberate import of new high-risk invasive species (at least in some categories) into Australia. This system is a rare example of implementation of the precautionary principle that should be supported and strengthened.

However, as the case studies below illustrate, there are still improvements that should be made. Systems for environmental biosecurity do not match those for industry. We need ways to protect the Australian environment from new high-risk variants of species permitted for import, and quarantine processes for permitted species need improvement. We need programs with a stronger environmental focus to protect against accidental introductions of invasive species harmful to the environment. Although many of the quarantine responsibilities do not rest with the environment department and are not regulated under the EPBC Act, there is need for much greater involvement of the environment department in quarantine matters, which perhaps should be facilitated through the EPBC Act.

1.1 Case studies demonstrating current inadequacies

Case study 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.

Case study 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.[1] 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 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."[2] 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."[3] 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.[4]

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.

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[1] Lintermans, M. (2004) Human-assisted dispersal of alien freshwater fish in Australia. *New Zealand Journal of Marine and Freshwater Research* 38: 481-501

[2] Ibid.

[3] Ibid.

[4] McKay (1984), cited in ibid.

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."[5] 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."[6]

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*.[7] This strategy addresses some of the problems and it is important that it be properly funded and implemented.

Case study 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 suggest this is because they are primarily an environmental threat rather than an economic and social threat.

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5 Chong, R. & Whittington, R. (2005) *A Review of Australian Ornamental Fish Import Risk Management for the Period 1999 - 2004. A Report to the National Aquatic Animal Health Technical Working Group (NAAH-TWG*). Department of Primary Industries and Fisheries, Yeerongpilly and University of Sydney, Sydney.

6 Chong et al (2005). Ibid.

7 Marine and Coastal Committee of the Natural Resource Management Standing Committee (2005) *A Strategic Approach to the Management of Ornamental Fish in Australia.* Consultation draft. Department of Agriculture,Fisheries & Forestry, Canberra.

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 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.[8] As far as we know, there has only been limited action thus far.

[8] Department of the Environment and Heritage (2006) *Threat Abatement Plan to Reduce the Impacts of Tramp Ants on Biodiversity in Australia and its Territories*. see <http://www.deh.gov.au/biodiversity/threatened/publications/tap/trampants/index.html>

Case study 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.

Case study 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 has thus far prevented, and should 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 not proceeded beyond the draft report produced in 2006. We presume this is because there were very strong objections to the proposal, which the proponents are unable to address to protect the Australian environment. We hope the end result will be that bumblebees are prohibited for import.

1.2 Issues arising for the review to consider

1.2.1 New variants of existing permitted species give rise to new risks

The import of genetically distinct varieties of existing permitted species is a major source of pest and weed risk for Australia. As noted in case study 1.1, 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.[9]

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. To prevent new biotypes being admitted under the original permit, it may be necessary to bar code permitted imports.

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.

1.2.2 There is insufficient protection against imports of high-risk aquarium fish species and other permitted species

Case study 1.2 highlighted deficiencies in the regulation of the import of aquarium fish, which 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.

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

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9 FAO (1995) International Standards for Phytosanitary Measures. Principles of Plant Quarantine as Related to International Trade. Secretariat of the International Plant Protection Convention Food and Agriculture Organization of the United Nations. Rome. 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"

naturalisation and spread due to extreme climate events and the increased vulnerability of some native species to harm caused by invasive species (see section 4).

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.

1.2.3 There is insufficient focus on prevention of new accidental imports/release of invasive species harmful to the environment

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, particularly in contrast to economic pests. The contrast between the efforts to control red imported fire ants and yellow crazy ants (case study 1.3) 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."[10] 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."[11] 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 Department of Environment, Water, Heritage and the Arts (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

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10 CSIRO (2008) Review of Australia's Quarantine and Biosecurity Arrangements. CSIRO Submission 08/283 to the Quarantine and Biosecurity review.

11 CRC for Plant Biosecurity (2008). Submission to the Quarantine and Biosecurity Review.

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:[12]

> 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.

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.

1.2.4 Environmental risks are not accorded sufficient priority in quarantine

The same lack of environmental focus is evident in other areas of quarantine. For example, the failure to implement risk protocols for the import of edible fungi, which may be a threat to Australian trees (case study 1.4), suggests that the environment is not accorded sufficient priority in Import Risk Analysis for imported commodities. 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."[13]

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.

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[12] Department of the Environment, Water, Heritage and the Arts (2008). Submission to the Quarantine and Biosecurity Review.

[13] Department of the Environment, Water, Heritage and the Arts (2008). Submission to the Quarantine and Biosecurity Review.

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."[14]

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."[15] 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.

1.2.5 There needs to be greater independence in risk assessments

As exemplified in case study 1.5, 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.

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[14] ibid.

[15] Department of the Environment, Water, Heritage and the Arts (2008). Submission to the Quarantine and Biosecurity Review.

2. Prevent the establishment or spread of introduced species potentially harmful to biodiversity

The major source of emerging invasive species threats is the very large pool of exotic species already in Australia, whose regulation and management are largely not affected by the current operation of the EPBC Act.

There are already more exotic plants (>27,000) than there are native plants in Australia,[16] and more than a thousand different freshwater aquarium fish species.[17] Many of these introduced species are likely to become invasive over time. One study found that already naturalised shrubs and trees in South Australia (8.4% of introduced species over 160 years) represent only about half of those woody species that are likely to naturalise over time, and that the average time for naturalisation is in the order of centuries.[18] Species native to Australia that are taken out of their range can also be invasive and cause harm to biodiversity. For example, *Acacia saligna* is native to Western Australia but a serious environmental weed in south-eastern Australia. Many of the naturalised and yet-to-naturalise species in Australia represent potent threats to biodiversity and 'matters of national environmental significance'.

Yet the EPBC Act provides very limited means to regulate the human activities that result in these threats or to act to prevent emerging threats. The following case studies demonstrate many of the problems with the current approach to post-border regulation of invasive species.

2.1 Case studies demonstrating current inadequacies

Case study 2.1: Tall wheat grass and gamba grass, invasive pasture grasses that should be banned

Tall wheat grass (TWG) (*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. TWG has the potential to

[16] Randall, R.P. (2007) The Introduced Flora of Australia and its Weed Status. CRC for Australian Weed Management: Adelaide.

[17] The Bureau of Rural Science undertook a desktop review of exotic freshwater fish species in Australia, which identified 1181 exotic fish species that have been recorded as present in Australia over the past 40 years. Of those, at that time 481 were on the current permitted import list.

[18] Caley, P., Groves, R.H., & Barker, R. (2008) Estimating the invasion success of introduced plants. Diversity and Distributions 14: 196-203.

invade numerous habitat types across about half of southern Australia, and is tolerant of drought, frost, alkalinity, salinity and waterlogging.[19]

Although TWG 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 TWG, and the most commonly planted variety of TWG was developed by the Victorian DPI in 1999.

There has been belated recognition in some quarters, including agricultural departments, that TWG 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 TWG 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.[20] 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 *Erythrura gouldiae*, and northern quoll *Dasyurus hallucatus*) and the values of Kakadu World Heritage Area.[21]

Gamba grass has recently been prohibited in Western Australia and declared in Queensland, the latter preventing further sales and plantings but not requiring eradication. It can still be freely traded and planted in the Northern Territory. Gamba grass was declared in Queensland only after considerable and extended pressure was exerted on the government to do so (3 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 (or not achieve in the case of the Northern Territory) declaration of one of Australia's very worst weeds, with the potential to transform the ecology of northern Australia, it suggests the system of state declarations is not working well.

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[19] Booth, C. and Low, T. (in preparation). Case study of tall wheat grass in a report examining the environmental harms caused by the planting of weedy pasture plants for salinity mitigation in Victoria.

20 Douglas, M.M. and Setterfield, S.A. (2005). *Impacts of exotic tropical grasses: lessons from gamba grass in the Northern Territory*. Tropical Savannas CRC, Darwin.
Rossiter, N.A., Setterfield, S.A., Douglas, M.M. and Hutley, L.B. (2003). Testing the grass-fire cycle: exotic grass invasion in the tropical savannas of northern Australia. *Diversity and Distributions* 9: 169-176.

21 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.

Case study 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.

Case study 2.3: Trumpet tree, lawyer vine – 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 could have become a very serious invader of rainforests in the Wet Tropics World Heritage Area (it is on the IUCN's list of 100 of the world's worst alien invasive species). 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 or other catastrophe, he had imported plants from all over the world intending 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 appear 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 risk of which is 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 national 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.

Case study 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.[22]

Despite a benign image – encouraged by deer hunters – deer can cause as much environmental harm as wild goats or pigs. As 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.][23]

An assessment of the impacts of Sambar deer in Victoria documented serious impacts by sambar deer on rainforest vegetation inside national parks. 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 a matter of time before Sambar totally eliminate some species from an area,” the authors conclude.[24]

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22 Moriarty, A. (2004) The liberation, distribution, abundance and management of wild deer in Australia. Wildlife Research 31: 291-299

23 Domnan, P.M. and Wäber, K. (2008) Ecosystem and competition impacts of introduced deer. Wildlife Research 35: 202-214.

24 Peel, B., Bilney, R.J. and Bilney, R.J. (2005) Observations of the ecological impacts of Sambar Cervus unicolor in East Gipssland, Victoria, with reference to destruction of rainforest communities. Victorian Naturalist 22(4): 189-200

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 not controlled for environmental protection. 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 Queensland Wet Tropics World Heritage Area. Many deer continue to escape from deer farms into the wild.[25]

2.2 Issues arising for the review to consider

2.2.1 States/territories are failing to regulate to prevent activities resulting in environmental harm by invasive species

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 (case study 2.1) are two of the very 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 in two of three states where it is planted. Invasive garden plants (case study 2.2) are also typically not regulated. Deer (case study 2.4) undoubtedly threaten matters of national environmental significance, including the Wet Tropics World Heritage Area (WHA) (although detailed studies of their impacts on particular species are lacking), 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 2.3).

With all states except WA 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.[26]

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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[25] Moriarty 2004.

26 Randall, R.P. 2007. *The Introduced Flora of Australia and its Weed Status.* CRC for Australian Weed Management, Adelaide.

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 (case study 2.1) 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 & 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. 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
- (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 powers under the EPBC Act be used and regulations be developed. The current reform focus is on seeking to improve consistency and effectiveness of state/territory regimes through a cooperative approach to reform. However, given the national significance of the invasive species issues 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 the 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*.[27] 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.

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27 Senate Environment, Communications, Information Technology and the Arts References Committee (2004) *Turning Back the Tide – the Invasive Species Challenge: Inquiry into the regulation, control and management of invasive species and the Environment Protection and Biodiversity Conservation Amendment (Invasive Species) Bill 2002*.

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.

2.2.2 Actions involving invasive species are not being referred for assessment

The DEWHA's Significant Impact Guidelines[28] identify the following categories of potential 'significant impact' involving invasive species:

- ✦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.
- ✦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.
- ✦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.
- ✦The Commonwealth marine environment: a significant impact may result in a known or potential pest species becoming established in the Commonwealth marine area

The identification of these categories is an important first step in alerting people to their potential responsibilities under the Act (however, there should also be a category of potential significant impacts involving invasive species for World Heritage properties). But it is insufficient.

Although the planting of invasive pasture grasses near a Ramsar-listed wetland or the habitat of threatenened species (case study 2.1), 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

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[28] DEWHA (2006) EPBC Act Policy Statement 1.1 Significant Impact Guidelines. Department of Environment, Heritage, Water and the Arts

identify triggers for referral of potential controlled actions for assessment, such as commercial plantings or farming of identified invasive species (eg. those on a National Control list, see section 2.2.1) 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.

2.2.3 There is lack of focus on prevention and early eradication, and failure to tackle emerging tropical weed problems

Case study 2.3 on trumpet tree, lawyer vine and other potential tropical weeds highlights the lack of strategic action by weed agencies to prevent serious weed problems emerging. There are numerous unidentified potential weeds growing on properties near the Wet Tropics World Heritage Area that are being ignored. It is such a serious problem, affecting a matter of national environmental significance (ie a world heritage property as well as threatened species) and way beyond the capacity of local government to deal with, that it should be managed at a federal level.

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.

2.2.4 There is no polluter pays system for invasive species and limited obligations for duty of care

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.

The EPBC Act should include the 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.

3. Manage the key threats caused by invasive species as key threatening processes

The EPBC Act provides for the listing of key threatening processes (KTPs) and the development of threat abatement plans (TAPs) to address these threats. 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 not effective, and they cover only a small proportion of the key threats to biodiversity from invasive species.

3.1 Case studies demonstrating inadequacies

Case study 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.[29] 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.

29 Cahill, D.M. et al. (2008) *Phytophthora cinnamomi* and Australia's biodiversity: impacts, predictions and progress towards control. *Australian Journal of Botany* 56: 279-310

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.[30] But very few actions in the first plan were funded, so little progress has been made.

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."

Case study 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.[31]

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.[32] 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

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[30] Environment Australia (2001) Dieback caused by the root-rot fungus *Phytophthora cinnamom*i. Threat Abatement Plan. Environment Australia, Canberra. <http://www.environment.gov.au/biodiversity/threatened/publications/tap/phytophthora/index.html>.
DEWHA (2007) Disease in natural ecosystems caused by Phytophthora cinnamomi. Draft threat abatement plan. Department of the Environment and Water Resources, Canberra. <http://www.environment.gov.au/biodiversity/threatened/publications/draft-tap-phytophthora.html>

[31] Coutts-Smith, A. & Downey, P. (2006) *Impact of weeds on threatened biodiversity in New South Wales.* CRC for Australian Weed Management Technical Series No. 11, Cooperative Research Centre for Australian Weed Management, Adelaide.

[32] Kean, L. and Price O. (2003). The extent of Mission grasses and Gamba grass in the Darwin region of Australia's Northern Territory. *Pacific Conservation Biology* 8: 1-10.
Rossiter, N.A., Setterfield, S.A., Douglas, M.M. and Hutley, L.B. (2003). Testing the grass-fire cycle: exotic grass invasion in the tropical savannas of northern Australia. *Diversity and Distributions* 9: 169-176.

ecosystems"[33] and poses an extreme threat to Australia's northern savannas.[34] A Queensland government risk assessment concluded:[35]

> 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.[36] 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.[37]

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*"[38] In the Kimberly region it invades rainforest patches along tracks made by feral cattle, fuelling very hot fires that kill rainforest trees.[39] The fires of buffel grass appear to be the main threat to the federally endangered Slater's skink (*Egernia slateri*).[40] 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.

3.2 Issues arising for the review to consider

3.2.1 Threat Abatement Plans are not being adequately funded

Threat abatement plans are meant to address the most serious of our environmental threats, but as case study 3.1 suggests, at least some of them are not receiving the funding necessary for

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33 Rossiter et al. (2003) Ibid.

34 Csurhes, S. (2005) *An assessment of the potential impact of Andropogon gayanus (gamba grass) on the economy, environment and people of Queensland*. Queensland Department of Natural Resources, Brisbane.

35 Csurhes (2005) Ibid.

36 Panton, W.J. (1993) Changes in post World War II distribution and status of monsoon rainforests in the Darwin area. *Australian Geographer* 24(2): 50--59.

37 Humphries, S.E., Groves, R.H., et al. (1991) *Plant Invasions of Australian Ecosystems: A Status Review and Management Directions*. Kowari 2. Australian National Parks and Wildlife Service, Canberra.

38 Humphries et al (1991) Ibid.

39 Norris, A. and Low, T. (2005) *Review of the Management of Feral Animals and their Impact on Biodiversity in the Rangelands*. Pest Animal Control CRC, Canberra

40 Pavey, C. (2004) *Recovery Plan for Slater's Skink, Egernia slateri, 2005-2010.* Northern Territory Department of Infrastructure, Planning and Environment, Darwin.

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.

3.2.2 There are many more key threatening processes arising from invasive species than are recognised in listings

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 discussed in case study 3.2, flammable pasture grasses warrant listing. Also warranting listing are the category escaped garden plants as well as individual plant species, such as buffel grass and tall wheat grass.

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

4. Manage the synergistic threats of climate change and invasive species

Climate change will worsen the world's invasive species problems,[41] and many of the threats of climate change to biodiversity will be manifested by invasive species benefiting from climate change.

Likely interactions between climate change and invasive species include the following:[42]

- ★ 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
- ★ 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

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.[43]

Another concern is that climate change will be used to justify the use of invasive species in new areas (eg. as agriculture shifts into northern Australia in part due to climate stress) or as new industries. For example, weedy plant species are proposed for use as biofuels.[44]

4.1 Issues arising for the review to consider

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 address the harms of invasive species.

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41 Dukes, J.S. and Mooney, H.A. (1999) 'Does global change increase the success of biological invaders?' *Trends in Ecology and Evolution* 14(4): 135-39.

42 Low, T. (2008) Climate Change and Invasive Species: A Review of Interactions. Department of the Environment, Heritage, Water and the Arts.

43 Thomas et al. 2006; La Marca et al. 2005; Pounds et al. 2006.

44 Low, T. and Booth, C. (2007) *The Weedy Truth About Biofuels*. Invasive Species Council, Melbourne.

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 move of agriculture into northern Australia.

The following recommendations to address the interacting threats of climate change and invasive species have been made in a report for the federal environment department, *Climate Change & Invasive Species: A Review of Interactions*.[45]

> 1) Reduce Climate Impacts
> Invasive pests add more urgency to the need to reduce global emissions. Because climate change scenarios rarely take full account of invasive pests, they underestimate the risks to the future.
>
> 2) Increase Awareness about Invasive Species
> Invasive species should be recognised as a major component of the climate change problem. They warrant more publicity, research focus, policy development, and funding for prevention and control. ....The Australian government has a key role to play in bringing parties together to improve understanding.
> ....
>
> 3) Reduce Invasive Pest Impacts
> Climate change adds more urgency to the need to prevent and control pest invasions.
>
> Because decisions about pest management seldom take into account worsening problems under climate change, they underestimate the scale of response required. More should be invested in pest prevention and control. Funding for quarantine work should increase to reflect the growing pest threat to Australia posed by the main drivers of world change – globalisation and climate change.
> ....
>
> 3a) Remove 'Sleepers' and Leading Edge Outliers
> Small outlying populations of pests, as yet unable to multiply because temperatures are too low, should be eradicated. ...
>
> The other sleepers to target are species that could multiply dramatically after extreme events such as cyclones, floods and fires. ...
>
> A national program to identify and remove climate change sleepers that threaten biodiversity would be very cost-effective. ...
>
> 3b) Control Invasive Flammable Grasses
> Flammable grasses may represent the single most serious category of introduced invasive species identified by this report, because they can destroy native vegetation over immense areas via a positive feedback loop, which would worsen under climate change. Australia needs a national strategy to coordinate management of these and other flammable grasses.
> ...
>
> 3c) Controls over Biofuel Crops

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[45] Low, T. (2008) *Climate Change & Invasive Species: A Review of Interactions*. Department of Environment, Heritage, Water and the Arts. Canberra.

Plants proposed as biofuel crops are often hardy, low maintenance plants of untested economic value but posing a high weed risk, such as physic nut (*Jatropha curcas*) and giant reed (*Arundo donax*). Controls should be imposed over the cultivation of such plants.
...

4) Incorporate Climate Change into Pest Management
Pest managers need to pay more heed to climate change in pest planning. When risk assessments are undertaken, climate change is seldom explicitly considered. When it is considered, the focus is usually on changing temperatures and rainfall, and not on an increasing frequency of extreme events.
...

5) Build Ecosystem Resilience
Ecosystems and species face many threats, and biodiversity loss often results from multiple threats operating together. While it may be impossible to avert climate change or to eradicate invasive species, it may be possible to ameliorate other contributing threats, such as pollution, salinity, livestock grazing, nutrifaction, or overharvesting. Healthier ecosystems are usually more resistant to invasion.
....

6) Prepare for Extreme Events
Policy frameworks are needed that anticipate the invasive risks posed by cyclones, floods and other extreme events. Scenario planning could be used to predict the outcomes of different events on different regions. The planning activities should consider which actions have the potential to promote invasions after extreme events, and generate plans to mitigate the risks. Emergency plans for cyclones and floods should include protocols for preventing the spread of weed seeds and other invasive organisms during rescue and clean-up operations. ...

In cyclone and flood-prone zones, protocols should apply to the design and management of deer farms, zoos, aviaries, quarantine facilities, research laboratories and fish-breeding facilities, to minimise the risk of escapes. ...

7) Conduct Strategic Research
There is a need for more research on the interactions between climate change and invasive species. More needs to be known about the interactions between carbon dioxide and C3 and C4 plants, fire, soil nutrients, and herbivorous insects and pathogens.
...

8) Reassess Conservation Values
Native species that benefit from climate change may create conceptual dilemmas if they threaten other native species (Hannah et al. 2005). ...

Debate is needed about the guiding principles for a world in which conservation is no longer about saving existing ecosystems but about preserving biodiversity by facilitating change.

The relevance of the EPBC Act to this issue cannot be contained in any single reform. The Act needs improving as part of a suite of strategies to improve responses to invasive species problems.

Recommendations: 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.

5. List of recommendations

Following are the list of recommendations. We emphasise the importance of recommendations 5.1, 5.3, 5.6, 5.8, and 5.11. In particular, it is vital that the federal government 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 5.6).

5.1 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.

5.2 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.

5.3 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.

5.4 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.

5.5 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.

5.6 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.

5.7 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.

5.8 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.

5.9 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

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

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

5.11 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.

5.12 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.