

STOPPING NEW INVASIVE SPECIES

CASE STUDIES

ATTACHMENT TO PRIMARY SUBMISSION

Submission to the inquiry into the adequacy of arrangements to prevent the entry and establishment of invasive species likely to harm Australia's natural environment conducted by the Senate Environment and Communications References Committee

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Case Studies

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CONTENTS

Case studies of 12 incursions detected since 2000.....	3
1. Red imported fire ants	3
A case study of Australia’s largest eradication program that is being put at risk by failures to prevent and detect new incursions and a looming lack of government commitment.	3
2. Yellow crazy ants.....	7
A case study of multiple incursions of a highly threatening invader and failures to eradicate.	7
3. Myrtle rust	14
Case study of a failure to prevent entry of and eradicate a devastating new plant disease	14
4. Smooth newts	22
A case study of the establishment of a new amphibian in Victoria and a failure to proceed with eradication.	22
5. Asian black-spined toads.....	26
A case study of efforts to prevent a potential new toad invader	26
6. Mexican feathergrass.....	29
A case study of the critical importance of correct labelling and the laxness of enforcement on illegal internet sales.	29
7. Asian honey bees	33
A case study of a prematurely abandoned eradication effort	33
8. Pigeon paramyxovirus.....	36
A case study of a failure to prevent, eradicate or contain a new bird disease	36
9. Argentine ants on Norfolk Island	44
A case study of the potential to eradicate Argentine ants on Norfolk Island and impediments to protecting island biodiversity from tramp ants.	44
10. Red-eared slider turtles.....	47
A case study of the risks associated with illegal pet keeping.....	47
11. Jack Dempsey cichlids	50
A case study of an aggressive aquarium fish probably illegally released into the wild.....	50
12. Emerald furrow bees.....	53
A case study of a neglected incursion of a new bee species.....	53
Case studies of future incursion risks	55
13. Pathogens of wattles and eucalypts.....	55
A case study of emerging diseases in overseas plantations of wattles and eucalypts that are a biosecurity risk for native plants in Australia.	55
14. Fish pathogens and parasites	57
A case study of the aquatic disease risks of importing aquarium fish	57

15.	Avian bornaviruses	60
	A case study of a neglected disease risk in Australian captive parrots that could threaten wild parrots and other birds.	60
16.	Green iguanas	63
	A case study of a high risk species illegally kept in and smuggled into Australia.....	63
	Case study of biosecurity enforcement	65
17.	Internet purchases of prohibited plants	65
	A case study of the ease of buying prohibited imports off ebay	65

CASE STUDIES OF 12 INCURSIONS DETECTED SINCE 2000

1. RED IMPORTED FIRE ANTS

A case study of Australia's largest eradication program that is being put at risk by failures to prevent and detect new incursions and a looming lack of government commitment.

Species: Red imported fire ant (*Solenopsis invicta*)

Origin: South America

Australian occurrence: An accidental introduction on goods transported on ships. They have established in southeast Queensland and central Queensland (Gladstone). Genetic studies show that fire ants have arrived on four separate occasions, establishing twice in Brisbane (detected 2001) and twice in Gladstone (detected 2006 and 2013)¹.



Potential ecological impacts: Fire ants have been listed by the federal government as a key threatening process because they are harming a wide range of animals in the United States and similar impacts are expected in Australia if they are not eradicated.² They are listed as one of 100 of the worst invasive species in the world.³ The animals at most risk in North America include ground-dwelling animals and those that hatch from eggs in the soil; animals are typically stung to death. In Florida red-bellied turtles, only 29% of hatchlings in fire-ant invaded sites survived compared to 100% away from fire ants. In loggerhead turtles, nests with fire ants had 15% fewer hatchlings.⁴ Fire ants are implicated in declines of bobwhites, some of which have been precipitous, ground doves, the Texas horned lizard, the southern hognose snake and the peninsular intergrade kingsnake.⁵ They have also been recorded reducing breeding success of deer, rails and terns. Anecdotal evidence indicates impacts on many other species.⁶



In Australia there are concerns for many species that are declining already from other impacts, including threatened turtles (green turtle, leathery turtle, Pacific ridley, Bell's turtle, Mary River tortoise, hawksbill turtle and the Bellinger River Emydura), crocodiles, lizards, frogs, and ground-dwelling birds such as the malleefowl, black-breasted button-quail and plains wanderer, among many others.⁷

Australian plants may face risks from fire ants grazing on seedlings and disrupting seed dispersal, pollination and germination.⁸ Fire ants have more ecological impacts than most ants because they can reach extremely high densities of up to 2600 mounds per hectare.⁹

Potential social and economic impacts: Red imported fire ants in the United States cause many serious economic and social impacts. They sting people, occasionally causing the deaths of infants and elderly people, damage some crops, rob bee-hives, harm young domestic animals, and damage roads, footpaths and electrical

¹ <http://www.ccfqld.com/News-page/update-from-biosecurity-qld-fire-ants-in-the-gladstone-area/>

² Allen et al. (2004), Department of the Environment

³ Lowe et al. (2000)

⁴ Allen et al. (2004)

⁵ Allen et al. (2004)

⁶ Allen et al. (2004), Vinson (2013)

⁷ Moloney & Vanderwoude (2002), Department of the Environment

⁸ Department of the Environment

⁹ Department of the Environment

equipment, often seriously.¹⁰ They have caused more than 80 human deaths.¹¹ Stings easily become infected and may leave permanent scars. They provide some benefits by reducing certain crop pests. The damage caused in the US has been costed at \$7 billion each year, including actual control costs.¹² Modelling by the Queensland government indicates that in Southeast Queensland alone, if left untreated, fire ants would impose costs in the order of \$43 billion.¹³ To 30 June 2014, the federal, state and territory governments collectively spent \$292 million attempting to eradicate the ants.¹⁴ This doesn't include the significant costs borne by local governments, energy utilities, industry and others.

Pathways: Fire ants travel with cargo.

Summary of biosecurity issues: Of all the invasive species that should be kept out of Australia, red imported fire ants represent one of the most serious. They are also one of the most costly, and any flaws in quarantine that result in new incursions put at risk the >\$300 million already spent trying to eradicate them. The two incursions in Gladstone show that despite a strong quarantine focus it continues to breach Australia's borders. The incursions also highlight inadequate surveillance in Australia for high priority threats. The first incursions in Brisbane were not detected probably until 10 years after arrival, and the 2014 detection at Yarwun for probably 3 years after arrival.¹⁵ Because of national decision-making processes, even a single state can cause the eradication to be abandoned. Failure on a >\$300 million project looms unless sufficient continued funding is forthcoming.

Particular biosecurity issues

Quarantine and surveillance: The multiple incursions of red imported fire ants highlight serious gaps in quarantine. The fact that the incursions weren't discovered for several years after they established – maybe 10 years for the Brisbane incursions and 3 years for the most recent incursion at Gladstone imply lack of systematic surveillance.

Emergency response: In 2001, RIFA were found in two locations in Brisbane – around the main cargo port at Fisherman Islands, and in the suburbs of Wacol and Richlands. They were found later to be genetically distinct, indicating two incursions. The Queensland government immediately 'mounted an emergency response to delineate the invasion and if possible eradicate the fire ant, despite scepticism that eradication could be achieved, given no other country has been able to eradicate them.'¹⁶

An analysis of the eradication program shows that it came very close to eradication in 2003 but because it had failed to fully 'delimit the invasion' part of the infested area remained outside the searched and treated areas.¹⁷ 'If accurate estimates of the invasion boundary had been available, resources could have been reallocated to fully cover the infested region.' Keith and Springer note this result highlights 'the crucial importance of mathematical modelling of biological invasions'. Because of this missed opportunity the infested area has approximately doubled between 2004 and 2010.¹⁸ Keith and Spring recommend that the eradication strategy be designed to be more pre-emptive by modelling the likely expansion front of the ants and treating areas beyond where nests are detected to keep pace with their predicted movements. It highlights the importance of applying the very best science to eradications and involving external experts.

¹⁰ Vinson (2013)

¹¹ Vinson (2013)

¹² Avant (2014), Lard et al. (2006)

¹³ Antony et al. 2009

¹⁴ Costs to 30 June 2014, Mike Ashton, personal communication. Hafi et al. (2014) said the costs were \$411 million (but they don't give a source for it).

¹⁵ International Plant Protection Convention (2010). The 2001 detections were at Brisbane's main cargo port (Fisherman Islands), and in the southwestern suburbs of Wacol and Richlands.

¹⁶ Keith and Spring (2013)

¹⁷ Keith and Spring (2013)

¹⁸ Keith and Spring (2013b)

In May 2012 a new strategy was implemented using remote surveillance technology to detect new nests and determine the full extent of the infestation (ground-based surveillance is more expensive and inefficient).¹⁹ The program aims to search up to 100,000 ha per year.

The researchers and Biosecurity consider it is feasible to achieve success in this eradication.²⁰ However, it needs a long-term funding commitment so that the program can make decisions to optimise its chances of success. Eradications don't succeed if they are half-hearted.

National cost-sharing: Soon after their detection the National Red Imported Fire Ant Eradication Program was established with cost sharing from Australian state and territory governments. The NEBRA was triggered for the 2013 Gladstone incursion. Earlier incursions were handled under ad-hoc arrangements.

This massive and expensive eradication effort represents an admirable commitment of Australian governments to eradicate red imported fire ants, which has been justified on the basis of the extremely high costs that will result if they are not eradicated. However, the commitment by some governments has been tenuous at times and there is as yet no funding commitment in place for 2014-15. One or more state governments are apparently wavering in their current commitment to the program²¹, which could put at risk the entire program because national cost-sharing arrangements rely on consensus from all federal, state and territory governments. That one state can veto an eradication response highlights the problematic nature of decision-making processes under the various agreements (in this case NEBRA). The National Management Group is not required to consult or publish reasons for decisions, so they can be made for reasons that have nothing to do with the public interest.

The implications of abandoning the eradication or it failing are extremely severe. There should be a transparent process to make such decisions so that the Australian public can be confident that decisions are well justified and in the public interest. This program needs a 5-10 year allocation so that managers can plan ahead.

Issues for the inquiry

Quarantine, surveillance

- What is going wrong with quarantine to allow fire ants to arrive in Gladstone twice?
- Can we be confident that fire ants are not entering through other ports and escaping detection?
- A large number of ant species are spreading around the world with trade. How confident can we be that other invasive ants are not entering Australia?
- What actions have been taken to reduce the risk of new arrivals of red imported fire ants?
- What procedures are in place pre-border and at border to reduce the risk of arrival of red imported fire ant and when were these procedures last reviewed?

Decision-making

- What resources are allocated for red imported fire ant eradication beyond 1 July 2014?
- What is preventing the allocation of additional resources over a 5-10 year time period?
- How can decision-making under nationally-funded eradication programs be improved to maximise the success of eradication.
- Should the National Management Group be required to consult on decisions and provide reasons for them?

Eradication planning

- What lessons have been learnt from efforts to eradicate the red imported fire ant that can be applied to eradications of other invasive species?

¹⁹ Keith et al. (2013)

²⁰ Keith et al. (2013)

²¹ SCoPI (2013)

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2. YELLOW CRAZY ANTS

A case study of multiple incursions of a highly threatening invader and failures to eradicate.

Species: Yellow crazy ants (*Anoplolepis gracilipes*)

Origin: South-East Asia (probably)

Australian occurrence: Established on Christmas Island, in the Northern Territory and Queensland. Eradicated from NSW.

Potential ecological impacts (more detail below):²² Yellow crazy ants (YCA) can form large-scale supercolonies, extending over more than 100 hectares. On Christmas Island, they have killed tens of millions of the iconic and ecologically important red crabs and robber crabs. Prior to a multi-million dollar baiting program, they had invaded more than a quarter of the island's rainforest, reaching densities of more than 2000 foraging ants a square metre and transforming the ecosystem. In many places where YCA flourish, not much else does. They can remove nearly all insect life, leaving none for other animals, and kill small animals such as lizards, crabs and bird chicks. They are on the World Conservation Union's list of '100 of the World's Worst Invasive Alien Species'. Queensland's Wet Tropics World Heritage Area is at grave risk, for the ants' preferred habitat is moist lowland tropical forest. But climate matching suggests they are capable of inhabiting most of northern and north-eastern Australia, from the Kimberley through Darwin, Cape York Peninsula, and down the eastern seaboard of Queensland into coastal and inland parts of northern NSW.²³ Their impacts vary considerably from site to site and can take decades to manifest (as occurred on Christmas Island). They have probably been responsible in part for Australia's two most recent vertebrate extinctions – the Christmas Island pipistrelle (2009) and Christmas Island forest skink (2014).



Photo: John Tann(creative commons licence)

Potential economic impacts: YCA are likely to compromise eco-tourism in infested areas, including in the Wet Tropics. They are likely to reduce yields of sugarcane, coffee and coconut crops by nesting at the base of these plants and exposing the roots to disease. By farming sap-sucking bugs, they promote sooty mould disease in fruit trees. They also kill young animals, including chickens and pigs. According to a recent newspaper report about impacts on a farm in the Wet Tropics, yellow crazy ants 'have destroyed Frank Teodo's crops, his home appliances, and they've scorched his eyes and attacked his dogs'.²⁴ The economic impacts also include the costs of control programs, which exceed \$10 million in the past 5 years, including:²⁵ (a) Arnhem Land, \$250,000 (2008/09) to the Dhimurru Aboriginal Corporation, (b) Christmas Island, Parks Australia \$4 million up to 2010/11 and another \$4 million until 2014-15. In Queensland, there has been \$2 million federal funding provided for eradication in the Wet Tropics, and the Queensland government had previously spent an unknown sum on an abandoned eradication program.

Pathways: Predominantly timber imports. According to 2004 data, most tramp ant incursions (not specific to YCA) have derived from South East Asia and the Pacific, most often Singapore, New Guinea and Fiji.²⁶ There is no publicly available up-to-date data on pathways for YCAs.

²² O'Dowd et al. (2003), Merrin and O'Dowd (2004), Abbott (2005), Commonwealth of Australia (2006), Lach and Barker (2013), Hoffmann (2014).

²³ Merrin and O'Dowd 2004

²⁴ Bateman (2014)

²⁵ Department of Sustainability, Environment, Water, Population and Communities (2012)

²⁶ Commonwealth of Australia (2006)

Summary of biosecurity issues: Australia has failed both to prevent new incursions and to eradicate existing incursions. Since 2000, an average of >2 new outbreaks/year have been detected (>30 in Queensland). There may be many more outbreaks due to a lack of surveillance. YCA were intercepted in Australian ports at least 161 times from 1988-2011 (on average 7 times/year) and at least 40 times from 2008-2013 (on average 8 times/year).²⁷ YCA represent a failure over many years to fix quarantine holes that have led to multiple incursions into Queensland, a failure to accord this very high environmental threat the priority it warrants, a lacklustre and abandoned effort to eradicate them in Queensland, and limited implementation of a threat abatement plan. It is important to prevent further incursions as new genetic material (as a general principle) can greatly exacerbate invasive impacts by enhancing adaptive evolution of invasive species.²⁸ Given their potentially devastating impacts on biodiversity, there should also be a thorough national assessment of the potential for eradication in the various outbreak sites. However, this requires that the gaps in quarantine allowing new incursions be identified and addressed.

Particular biosecurity issues

Prioritisation: YCA are recognised as a serious threat to biodiversity but there has been a limited focus on them at a national level despite a national threat abatement plan (for tramp ants in general). The limited focus for this primarily environmental threat contrasts with the concerted focus on red imported fire ants and electric ants. Although they were belatedly an eradication target in Queensland program funding was far too low and the job was never properly done. YCA are not mentioned as a risk for timber imports – in either general information pages or the ICON import database. (Those mentioned as a risk include mostly known risks for the forestry and horticultural industries.)

Pathway and risk analysis: We are not aware of any detailed pathway analysis or risk assessment for YCA incursions. The 2012 review of the tramp ant threat abatement plan by the environment department noted there had been no specific risk assessments for tramp ant species. This seems rather astonishing given the clearly high risks of YCAs (and other tramp ants) continuing to enter and establish, the risks of new genotypes exacerbating threats, and the millions of dollars spent so far on eradication and control. It should be a high priority to conduct species-specific risk assessments and pathway risk analyses to determine how best to prevent new incursions.

A decade ago, there was an analysis of tramp ant interceptions from 1986-2002 (by Market Access and Biodiversity, summarised in the background report for the tramp ant threat abatement plan).²⁹ This found that the introduction pressure of tramp ants seemed to be accelerating – 90% of interceptions had been recorded in the most recent 5 years.³⁰ Intercepted ants derived from diverse source areas but predominantly from neighbouring regions, and arrived by a diversity of pathways in association with a wide range of commodities. The summary did not contain information specific to YCA. We can find no specific mention of YCA or other tramp ants in the ICON database import requirements for timber imports.

New Zealand has developed risk assessments of eight high priority tramp ants.³¹ The environment department in its review of the threat abatement plan noted that 'A similar set of assessments but framed for the Australian context could benefit Australia's preparedness.'³²

Pre-border biosecurity: Given the high rate of ant interceptions in Australia, improving biosecurity practices in countries of origin should be a high priority. (Depending on the rate of quarantine inspections at the border, interceptions probably represent the 'tip of the iceberg' of exotic ants making it to Australia.) The 2006 threat abatement plan for tramp ants noted a lack of focus on pre-border prevention: 'preborder checks for invasive ants are not yet required nor are high-risk commodities treated pre-emptively at their origin to assure

²⁷ Dominiak et al. (2011), Minister for Agriculture, Fisheries and Forestry (2013).

²⁸ Sakai et al. (2001). Thomas et al. (2010) found there have been probably at least two separate invasions on Christmas Island, the first between 1915 and 1934. It was not until the early 1990s that significant ecological damage was observed.

²⁹ Commonwealth of Australia (2006), page 36

³⁰ Some of the increase in interceptions would also be due to more rigorous quarantine.

³¹ Lach and Barker (2013)

³² Department of Sustainability, Environment, Water, Population and Communities (2012)

elimination of tramp ants'.³³ We are not aware of any improvement in this situation. The 2012 review of the threat abatement plan noted there had been 'limited off-shore work'.³⁴

At border biosecurity: The large number of YCA interceptions and incursions show that quarantine processes have major gaps for ants. The average of 8 interceptions a year (in the past 5 years) and average of 2 outbreaks detected a year (since 2001) are likely to represent only a proportion of YCAs arriving in Australia. The 2006 threat abatement plan notes that the 'system of detecting tramp ants at the border relies on external inspection of all cargo', which will 'detect a proportion of ant contamination, and relies on the presence of actively foraging ants on the container exterior'.³⁵ With no dedicated surveillance programs for timber imports, there are likely to be several undetected incursions each year, and there would have been many incursions that failed to establish.

Surveillance: Due to the eradication program for red imported fire ants and electric ants, we presume there is improved surveillance more generally for tramps ants, which would also improve the capacity to detect YCAs. The 2012 review of the tramp ant threat abatement plan noted there had been a 'modest improvement' in national surveillance for tramp ants, in part due to 'some specific surveillance close to ongoing active eradication programs'.³⁶ The 2006 threat abatement plan for tramp ants noted that while state and territory governments had conducted surveillance for fire ants in high risk areas (eg. freight terminals and nurseries) there appeared to be 'no routine monitoring or surveillance' for tramp ants in other high-risk or high-value areas.³⁷ We have been advised there has been no dedicated surveillance for YCAs, including in facilities that receive timber imports, which are high risk areas for YCAs. We understand a substantial proportion of YCA colonies have been detected in the vicinity of such facilities, many (or most) detected due to reports from the public rather than from surveillance. The threat abatement plan notes that 'shortfalls in current surveillance mechanisms for tramp ants are illustrated by chance discoveries of incursions, such as by members of the public'.³⁸ One impediment noted in the review of the tramp ant threat abatement plan is the low and declining diagnostic capacity in most state and territory governments for invasive ants (and other invaders), due to a lack of taxonomists.³⁹ The diagnostic accuracy for ants – as revealed in the Pest and Disease Information System database (1986–2003) – is low, with only 25% of >6700 recorded ant interceptions recorded to species level.⁴⁰ There is also no national body charged with responsibility for collecting and analysing surveillance data on tramp ants. The role of the national Tramp Ant Consultative Committee has been downgraded to providing advice on the two national eradication programs. There is no focus on preventing further incursions and 'There is no longer routine reporting of surveillance data'.⁴¹

Responses to incursions: Since the first detection of YCA in Queensland in 2001, it has been found in >30 sites including at Cairns, Townsville, Hervey Bay, Maryborough, Caboolture and Brisbane.⁴² In 2004 it was also detected for the first time in NSW. This is the only incursion known in NSW even though 40% of interceptions were occurring in NSW ports.⁴³

In some respects, yellow crazy ants are ideal candidates for eradication because they do not spread as easily as other ants, since the queens mostly cannot fly (the colonies bud to become super-colonies). In 2004, the NSW government acted quickly to eradicate a population on Goodwood Island near Yamba. In the Northern

³³ Commonwealth of Australia (2006)

³⁴ Department of Sustainability, Environment, Water, Population and Communities (2012) says the 'only regional work is being conducted in the Pacific with the Secretariat of the Pacific Community developing a General Response Plan for Invasive Ants Incursion in the Pacific as a guide to Pacific nations preparing plans'.

³⁵ Commonwealth of Australia (2006)

³⁶ Department of Sustainability, Environment, Water, Population and Communities (2012). The modest improvement was also due to improved surveillance generally for pests; a heightened profile and awareness of tramp ants and DAFF Biosecurity augmenting some state and territory government surveillance activities.

³⁷ Commonwealth of Australia (2006)

³⁸ Commonwealth of Australia (2006)

³⁹ Department of Sustainability, Environment, Water, Population and Communities (2012)

⁴⁰ Commonwealth of Australia (2006)

⁴¹ Department of Sustainability, Environment, Water, Population and Communities (2012)

⁴² Biosecurity Queensland (2013)

⁴³ Office of Environment & Heritage (2005)

Territory, yellow crazy ants have been eradicated from at least 20 locations over 100 hectares, showing there is high eradication potential of small populations.⁴⁴ Much is being learned about control of YCA due to control efforts on Christmas Island and in the Northern Territory.

Because yellow crazy ants were already established in the Northern Territory and on Christmas Island, eradication in Queensland was not eligible for national funding under cost-sharing arrangements with other governments. This meant that it had to be funded by the state government. Because of this, the Queensland government was very slow to act, and the eradication program when it was implemented, was starved of funding. The government ended it in late 2012, saying that it was 'no longer feasible'. The Queensland government website on yellow crazy ants reports that 'known infested areas have increased since 2007' and that several had been discovered in the previous year (2012-2013), 'significantly increasing the total area of infestation'.⁴⁵ This is indicative either of continued breaches of biosecurity or a lack of effective surveillance (or both). As a result of the Queensland government abandoning eradication, the federal government has provided \$2 million to the Wet Tropics Management Authority to eradicate an outbreak near Cairns.

ISC questions the decision by the Queensland government to abandon eradication and is concerned that it is simply due to unwillingness to allocate resources. Most biosecurity funding in Queensland goes to agricultural priorities (dingoes, wild dogs and bovine johns disease). Our most recent information was that an eradication program needed about a million dollars annually. We suspect the problem is one of priorities rather than feasibility or unaffordability. The work in the Northern Territory shows there is high eradication potential of small populations (such as are in Queensland).⁴⁶ There is no feasibility or cost-benefit analysis publicly available to justify the decision by the Queensland government.

However, a serious eradication attempt in Queensland would require considerable improvements in quarantine to prevent new incursions. In December 2013, the Queensland government said one reason for abandoning the program is the high rate of incursions, which 'threatens the long term success of any eradication program.' From 2008-2013, there was an average of 8 interceptions a year, 57% in Queensland.⁴⁷ From 1988 to 2011, there were 161 interceptions, an average of 7 a year.⁴⁸ We suspect that only a small proportion of YCA arriving in Australia are intercepted.

The lacklustre eradication program for YCA in Queensland contrasts with those for the two nationally funded programs for red imported fire ants and electric ants, which are economic, social and environmental threats, and not established elsewhere in Australia. National funding is restricted to species that can be totally eradicated from Australia. For a country of such vastness and ecosystem diversity, this is a short-sighted approach that means neglect for many incursions that are of national environmental significance.

Learning lessons: Despite the multiple incursions of YCA there have been no reviews of biosecurity arrangements that we are aware of and no serious attempt to stop incursions. The rates of interceptions and detections of outbreaks has increased in recent years, implying growing biosecurity gaps (and/or improved detection). Recent federal government funding of eradication in the Wet Tropics could be wasted unless there are improvements to biosecurity to prevent further incursions. There should be a public review of the lessons that should be learnt from the multiple breaches of biosecurity leading to establishment of YCA in Queensland.

Threat abatement: Effective management of tramp ant incursions in Australia requires a coordinated national approach such as envisioned under the 2006 threat abatement plan. Lach and Barker (2013) comment that 'to date it appears very little, if any, of [the plan] has been implemented'. There is no national coordinating body for threat abatement and no significant allocation of funds for YCA management.⁴⁹ Implementation of the

⁴⁴ CSIRO (2014)

⁴⁵ Biosecurity Queensland (2013)

⁴⁶ CSIRO (2014)

⁴⁷ Minister for Agriculture, Fisheries and Forestry (2013)

⁴⁸ Dominiak et al. (2011).

⁴⁹ The 2006 threat abatement plan for tramp ants says: 'The Department of the Environment and Heritage will convene a National Implementation Team to assist and advise on the implementation of the plan. The team will include people with expertise in the research and management of tramp ants. It will also include stakeholders such as state and territory agencies.' Initially, a National Tramp Ant Committee was set up with a

threat abatement plan would presumably have resulted in fewer YCA incursions and more effective responses. Lach and Barker note that:

‘if some of the high priority or very high priority short-term Action Groups had been acted upon, such as Action 2.1 “Improve diagnostic capacity and service”, Action 3.2 “Develop generic, specific, and context-dependent contingency plans” or Action 4.2 “Accelerate response to new detections of tramp ants” it is likely that the tramp ant incursions on Lord Howe Island and Norfolk Island and their threats would have been recognised earlier, and coordinated management could have commenced sooner and more efficiently.’

Research: There has been limited research on YCA and other invasive ants in Australia.⁵⁰

Issues for the inquiry

Pathway and risk analysis

- Has there been any detailed pathway analysis or risk assessment for YCAs?
- Has there been analysis of why there continues to be a high rate of YCA interceptions and incursions? If so, has anything changed as a result?

Pre-border and at-border biosecurity

- What work has been conducted pre-border to try to reduce YCA incursions into Australia? What pre-border work is being done on any tramp ant species?
- Given the recorded rates of interceptions and detections of established populations, what is the likely rate of undetected incursions?
- What is considered medium to high risk cargo for YCA? What proportion is inspected and what proportion of inspections are likely to reveal YCA contamination (taking into account the difficulty of detection)?
- What is the risk to the current \$2 million eradication effort in the Wet Tropics from new incursions?

Surveillance

- What proportion of YCA detections in the environment have been detected through biosecurity surveillance? How have others been detected?
- What surveillance programs are in place that are likely to detect YCAs? Are there any dedicated surveillance programs for YCA? What programs are in place for acknowledged high risk sites such as facilities that receive and store imported timber?
- What is the current capacity of governments to diagnose new ant incursions? How long does it take on average? What resources are needed to ensure optimal diagnostic capacity for ants?

Incursion responses:

- Has there been any analysis by the Queensland government of the cost to eradicate all or some populations?
- Was there a feasibility assessment of eradication?
- Was there a cost-benefit analysis underpinning the decision to abandon eradication?
- How much would eradication cost?
- Should there be a national assessment of all populations to determine the feasibility for eradication, containment or control?

Lessons learned

fairly wide mandate but it has been replaced by the Tramp Ant Consultative Committee, which focuses primarily on ‘emergency responses to tramp ant issues’ (Department of the Environment website). The 2012 review of the threat abatement plan notes there is no national coordination on other tramp ant species. That review (conducted by the department rather than independent review) recommended the 2006 plan be maintained as is and supplemented by a threat abatement advice, a non-statutory document. 1.5 years since the environment minister agreed to this (19 Feb 2013), no such advice has been published.

⁵⁰ Lach and Thomas (2008)

- Has there been any analysis of biosecurity relevant to YCA to determine how future incursions can be prevented and what lessons apply for other tramp ant species?

Threat abatement:

- How can YCA threat abatement be improved?
- Should there be national coordination and national funding for nationally significant threats such as YCA?

More about yellow crazy ants

Yellow crazy ants demonstrate the power of numbers and the benefits of social cooperation. They are able to dominate large areas by forming super-colonies with multiple nests and multiple queens. The largest have up to 300 queens and extend over several hundred hectares. They spread mostly by budding. A mated queen leaves her birth nest with some workers and sets up a new nest nearby. The boundary of a super-colony can advance by 3 metres a day.

The adults eat nectar and honeydew and feed their brood on animals killed or scavenged. They don't sting but squirt formic acid, which blinds and debilitates their prey. Their great numbers allow them to overwhelm animals far exceeding them in size – crabs, lizards, bird chicks.

Although their preferred habitat is moist tropical forest they also live in the subtropics and in harsh, dry areas such as Arnhem Land. They invade horticultural plantations and urban areas.

Australia has seen how bad yellow crazy ants can get. An 'invasional meltdown' on Christmas Island triggered by crazy ants has resulted in a "rapid, catastrophic shift in the rain forest ecosystem", as summarised by Dennis O'Dowd and co-researchers:

In invaded areas, crazy ants extirpate the red land crab, the dominant endemic consumer on the forest floor. In doing so, crazy ants indirectly release seedling recruitment, enhance species richness of seedlings, and slow litter breakdown. In the forest canopy, new associations between this invasive ant and honeydew-secreting scale insects accelerate and diversify impacts. Sustained high densities of foraging ants on canopy trees result in high population densities of host generalist scale insects and growth of sooty moulds, leading to canopy dieback and even deaths of canopy trees.

Yellow crazy ant impacts have varied, depending on their density and on the invaded ecosystem. The Queensland Government's risk assessment says the impacts are hard to predict but are likely to result in "a general decline in biodiversity". They can cause damage by killing animals, monopolising resources and compromising tree health by farming sap-sucking bugs.

Robber, red and blue crabs are completely eliminated in crazy ant areas on Christmas Island. They kill small animals, including bird chicks, turtle hatchlings and lizards.

Crazy ants are highly aggressive to other ants. Only two of 40 ants on Christmas Island are able to coexist with yellow crazy ants. In Hawaii, yellow crazy ants aggressively defend flowers from other nectar-eaters. Their large-scale removal of insects deprives other insect-eaters, such as lizards and birds, of food. Monopolization was noted at a site near Cairns.

Yellow crazy ants farm sap-sucking bugs for their honeydew (excreted sugary liquid) and protect them from predators. The build-up in bugs and sugar encourages the growth of sooty mould, which can severely compromise tree health and is sometimes fatal.

Yellow crazy ants also cause agricultural damage. They have killed young chickens and pigs. They reduce yields of coffee, coconut and sugarcane crops by nesting at the base of these plants and exposing the roots to disease, and promote sooty mould disease in fruit trees. On one of the Seychelles islands, the abundance of a sap-sucking insect associated with sooty mould on citrus and cinnamon increased up to 100-fold in the presence of yellow crazy ants, and up to 90% of leaves were infected.

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3. MYRTLE RUST

Case study of a failure to prevent entry of and eradicate a devastating new plant disease

Species: Myrtle rust / Eucalyptus rust (*Puccinnia psidii*)

Origin: South America

Australian occurrence: First detected in April 2010 in NSW. Now established in Queensland (east of the Great Dividing Range as far north as the Wet Tropics), NSW and Victoria.



Potential ecological impacts:⁵¹ Australia is in the very early stages of invasion by the fungus myrtle rust, which causes disease of Myrtaceae species, Australia's dominant plant family. The impacts so far indicate it will have very serious ecological impacts. There is no known method of controlling the disease in the wild except perhaps for application of fungicides in very small areas as a last resort for high priority assets. Myrtle rust has been listed as a key threatening process in NSW and nominated under the EPBC Act.

So far, more than 350 native species (more than 10% of native Myrtaceae) have proven to be susceptible (in the laboratory or in the wild). This number is expected to increase. About 20% of the >300 species susceptible in the wild so far are 'highly' or 'extremely' susceptible. In Queensland, 48 species have been rated as highly or extremely susceptible. The impact on flower and fruit production in some species is 'significant'. The pathogen is established in a wide variety of natural ecosystems – rainforests, heathlands, woodlands and wetlands – as well as in urban areas.

Myrtaceae species currently listed as 'threatened' (under state or Commonwealth legislation) that are susceptible include:

- Angle-stemmed myrtle (*Gossia gonoclada*), endangered (federal)
- Peach myrtle (*Uromyrtus australis*), endangered (federal, NSW)
- Narrow-leaved malletwood (*Rhodamnia angustifolia*), endangered (Qld)
- *Backhousia oligantha*, endangered (Qld)
- Giant ironwood (*Choricarpia subargentea*) (NSW)
- Sweet myrtle (*Gossia fragrantissima*), endangered (federal, NSW)

Other species, hitherto not regarded as of conservation concern, such as scrub turpentine (*Rhodamnia rubescens*) and native guava (*Rhodomyrtus psidioides*) are already showing such high rates of dieback, reduced reproduction and mortality that they could be at risk of regional or total extinction.

Disease impacts on keystone species have broader ecological ramifications. Of 15 susceptible *Melaleuca* species in Queensland about half are 'highly or extremely susceptible'. Several – such as *Melaleuca quinquenervia*, *M. leucadendra* and *M. viridiflora* – are important sources of nectar for birds and flying-foxes, and the forests they form serve as habitat for many animals.

About 19 eucalypt species so far have proven susceptible in the wild but little is known about potential impacts. Dozens more have shown susceptibility in laboratory tests. Deaths have occurred in South American eucalypt plantations after repeated infection. Eucalypts are likely to be most vulnerable to the disease as

⁵¹ Tommerup et al. (2003), NSW Scientific Committee (2011), Carnegie & Lidbetter (2012), NSW Department of Primary Industries (2012), Pegg et al. (2013), Makinson (2014), Pegg et al. (2014), Queensland Government (2014), Bob Makinson, personal communication.

seedlings and after fire. Infection causing shoot and stem dieback and death of coppice growth has been recorded on adult trees of *Eucalyptus curtisii*.

Potential economic impacts: Some susceptible species have economic importance, eg. medicinal tea tree (*Melaleuca alternifolia*), lemon myrtle (*Backhousia citriodora*) and Geraldton wax (*Chamelaucium uncinatum*). The nursery industry has suffered costs due to loss of stock and the need for disease management through plant selection and fungicide programs. The disease could also affect the timber industry, with commercially important plantation species such as *E. agglomerata*, *E. pilularis*, *E. cloeziana*, *E. grandis*, *Corymbia citriodora*, *C. henryi* and *C. torelliana* susceptible.⁵²

Pathways: The way in which myrtle rust entered Australia is unknown. In 2006, seeds, nursery stock, bark crevices, lumber and wood packaging material, including dunnage with attached bark, were identified as potential pathways for the importation of spores.⁵³ Its spread within Australia was initially mainly via infected nursery stock. It is also spread by humans, wind, rain and animals.

Summary of biosecurity issues: As Geoff Pegg, plant pathologist with the Queensland government, said, 'This has been the pinnacle of pathogens we wanted to keep out of Australia.'⁵⁴ Its establishment in Australia in 2010 represents a very serious failure of biosecurity for it had been recognised as a high risk disease for several years and response/contingency plans had been developed.⁵⁵ However, there was no surveillance program in place (as far as we are aware) and the emergency response to the incursion was seriously flawed, with a premature decision made not to eradicate (revised four months later to suppression with a goal of long-term eradication). By not proceeding rapidly with an eradication program (as was specified in the contingency plan) Australia may have missed a small window of opportunity (of about 6 months) to eradicate the rust before the weather became conducive to spread of the rust's spores. A very high priority biosecurity focus should be to prevent introductions of new variants of the rust, which could exacerbate its threat, as well as other pathogens that cause disease in Myrtaceae species.

Particular biosecurity issues

Risk assessment and quarantine: For more than a decade before it arrived, myrtle rust was regarded by plant pathologists as a serious biosecurity risk for Australia.⁵⁶ Concern was heightened when Eucalyptus rust reached Hawaii in 2005.⁵⁷ In 2006 the Primary Industries Ministerial Council stated that it was 'one of the most serious threats to Australian production forests and natural ecosystems'.⁵⁸ There have been quarantine restrictions for several years to reduce the risk of infected Myrtaceae material from countries known to host the rust. In 2004, AQIS detected viable spores on shipments of timber from Brazil (including on the surface of the shipping container) which led to a suspension in trade of eucalypt timber from countries with eucalyptus rust.⁵⁹ We do not know how adequate the import restrictions were (and are) and how well they were (and are) enforced.

Contingency planning: The Office of the Chief Plant Protection Officer released a national response plan in 2007 and Plant Health Australia published a contingency plan for the nursery and garden industry in 2009.⁶⁰ The PHA plan identified *Puccinia psidii* as a 'high-extreme' risk for the nursery industry. (Oddly and unjustifiably, the plan gave a lower risk rating for the environment – 'high' – which has been contradicted by current impacts.) The response plans recommended pathway risk analysis, early detection systems and awareness raising awareness with businesses using Myrtaceae. We are uncertain how many of the recommendations were implemented.

⁵² Pegg et al. (2013)

⁵³ Primary Industries Ministerial Council (2006)

⁵⁴ Deighton and Higgins (2011)

⁵⁵ Glen et al. (2007), Plant Health Australia (2009)

⁵⁶ Coutinho et al. (1998)

⁵⁷ Uchida et al. (2006)

⁵⁸ Primary Industries Ministerial Council (2006)

⁵⁹ Grgurinovic et al. (2006)

⁶⁰ Office of the Chief Plant Protection Officer (2007), Plant Health Australia (2009)

Surveillance: Although it is not known how rust spores entered Australia (whether on imported plant material, attached to other imported goods or via a traveller), it is thought that the rust had been in Australia for several months prior to detection, suggesting surveillance was inadequate.⁶¹ Australian biosecurity agencies were highly aware of the risk of the rust entering Australia, particularly after it arrived in Hawaii in 2005.⁶² In 2006, the Primary Industries Ministerial Council said the best defence to Eucalyptus rust was 'early detection through the use of hazard site surveillance using sentinel crops in Australia, the South West Pacific and South East Asia.'⁶³ The Office of the Chief Plant Protection Officer was said to be investigating costs and options for early detection. As far as we are aware, 5 years after it was reported in Hawaii, no early detection systems or specific surveillance programs had been established.

Risk reduction measures: The horticultural industry is a very high risk industry for the environment – because of the invasive plants they sometimes sell and the pests and diseases accidentally imported and spread with nursery plants. We have been told by biosecurity officers that biosecurity practices in many wholesale plant breeding establishments and nurseries are poor. Many are sited next to bushland, with no buffer, which means that any pests or diseases introduced on nursery stock have a high risk of spreading into the natural environment. The origins of myrtle rust in Australia are unknown but for many weeks the only infestations found were in nurseries, and the pathogen was spread through the nursery trade even after it was identified in April 2010. It is important to inquire into the state of biosecurity within the nursery industry, determining the risks and measures that could be taken to reduce those risks.

Emergency response:⁶⁴ The rust was confirmed on 23 April 2010 in a NSW central coast nursery on willow myrtle plants (*Agonis* species). The grower said the disease has been present since mid-March 2010. It was also found at low levels on turpentine trees (in a windbreak) and bottlebrush plants up to 500 metres away but not in bushland.⁶⁵ On 30 April 2010, although the rust had been found only on two properties and not in bushland, the National Management Group deemed it ineradicable. This was based on advice from the Consultative Committee on Emergency Plant Pests (CCEPP) that there was a 'high likelihood that its spores may have spread to other areas'.⁶⁶ This position was maintained for the next four months. In July, the CCEPP advised that it had 'become clear that the host range of [myrtle rust] in Australia is more limited than anticipated' (contrary to the eventual outcome).

After considerable criticism⁶⁷ and more surveys showing there had been only limited spread (only four infected properties had been identified by mid-August), the earlier decision not to eradicate was revised. On 2 July 2010, the National Management Group agreed to the Interim Response Plan for myrtle rust, which was to attempt to suppress the rust with a long-term goal of eradication. It activated the Emergency Plant Pest Response Deed which triggered 100% cost-sharing by the federal and state/territory governments (no industry funding).

The rust was first detected in bushland in late October 2010, 6 months after its first detection in Australia. By 7 December there were 127 infected premises, 1034 premises had been inspected and 1330 surveillance visits had been completed. In December the rust was found in Queensland. The emergency response was stood

⁶¹ Trace studies indicated that it had been present since October 2009. Many nursery detections were traced to a supplier in north western Sydney (National Management Group 2010b).

⁶² Uchida et al. (2006)

⁶³ Primary Industries Ministerial Council (2006)

⁶⁴ Carnegie and Cooper (2011) outline the sequence of events and the on-ground surveillance and eradication program in NSW.

⁶⁵ Consultative Committee on Emergency Plant Pests (2010)

⁶⁶ National Management Group (2010a)

⁶⁷ On 6 May Plant Health Australia requested that the CCEPP reconsider the decision that it was not technically feasible to eradicate the rust, and also requested that NSW be supported in suppressing the rust and delimitating the infected area (Carnegie & Cooper 2011). For example, the Institute of Foresters of Australia wrote in June 2010 to the agricultural minister expressing 'extreme' concern that the incursion not been 'met with an adequate and speedy response to eradicate this most serious plant pathogen'. John McDonald, the industry development manager of the Nursery and Garden Industry Association said: 'The jurisdictions are quick to define the pest as established so that they can walk away from it without having to commit any funds . . . at the first stage of that incursion, all jurisdictions washed their hands and ran away.'

down on 22 December after technical advice that eradication was no longer feasible because the rust was spreading naturally in bushland.⁶⁸

ISC considers the emergency response was inadequate in the following ways:

- The 30 April 2010 decision that myrtle rust was ineradicable was far too premature, given it had been detected only in two nurseries and not in bushland. It was also inconsistent with the process outlined in the contingency plan.⁶⁹
- Given the recognised extreme risks of the disease, and the lack of information about the extent of establishment and likely impacts, the precautionary principle should have been applied.⁷⁰ We are concerned (in general) that short-term budgetary considerations prevail over environmental and longer-term economic considerations in many emergency response decisions. One state (or industry in some cases) reluctant to contribute funds can veto an eradication.
- The decision-making lacked transparency and did not appear to consistently involve experts in ecology or plant pathology. It did not involve environment NGO stakeholders.⁷¹ A Scientific Advisory Panel was appointed only in July but it is not clear that it had ecological/conservation expertise.⁷²

Environmental risks were not given sufficient weighting in the decision-making process. We very much doubt that the same decision would have been made in the event of the rust being something like foot and mouth disease or equine influenza (industry equivalents in terms of its significance).

Carnegie and Cooper (2011) report that until November-December (when weather conditions conducive for spread and infection occurred) the rust was spreading only due to movement of infected plants and people. This leaves open the real possibility that had more resources (flowing from national cost-sharing arrangements) been dedicated to surveys and eradication in the initial stages after detection, the rust's spread into bushland could have been prevented. Carnegie and Cooper (2011) say that the conditions in the few months after detection (until late spring) 'provided an ideal situation to attempt to eradicate the rust'. ISC is of the opinion that the very high risks of myrtle rust warranted an early full-scale eradication attempt, which would have been consistent with the contingency plan. It is unclear why the National Management Group did not follow the contingency plan.

Resources: Compared to the potential impacts of this disease – both economic and environment – extremely modest sums were invested in the emergency response. On 9 April 2011, it was reported (in *The Australian*) that the NSW government had spent \$5 million detecting, controlling and attempting to eradicate the rust (to December 2010), Queensland had spent \$970,000, and the federal government \$1.4 million.⁷³

Learning from failure: In January 2013, in response to a question on notice, the agricultural minister told Parliament 'The department has not separately reviewed or assessed surveillance measures or decisions of

⁶⁸ See Carnegie and Cooper (2011) for an outline of the response.

⁶⁹ The contingency plan for Eucalyptus rust by Plant Health Australia (2009) stated: 'If the initial detection is contained within an area small enough and/or isolated enough that eradication is considered feasible, eradication procedures should also be implemented immediately, without waiting for the results of delimiting surveys, as any delay will allow further spore production and dissemination, reducing the likelihood of successful eradication.'

⁷⁰ The decision by the National Management Group was the opposite of what is required by the precautionary principle. It justified the decision to not proceed with eradication by saying that 'based on information currently available, the CCEPP can not assure the NMG that eradication is technically feasible'. (National Management Group 2010c). FOI material, National Management Group Out of Session Paper No. 1, 13 May 2010.

⁷¹ One example of a lack of environmental expertise on the CCEPP was this suggestion that long-term management of myrtle rust may be achieved with chemical treatment: 'In the natural environment the use of defoliant in combination with fungicides to assist canopy penetration might be a useful approach to control.' (Consultative Committee on Emergency Plant Pests 2010).

⁷² According to NMG notes, the members were 'drawn from the three technical committees that prepared the projects for the response plan and have expertise in forest health, diagnostics, plant pathology, myrtle/guava rust taxonomy and science, economics and risk analysis.'

⁷³ Deighton and Higgins (2011)

National Management Group relating to the interim myrtle rust response' and 'the National Management Group did not seek an efficiency review of the interim myrtle rust response.⁷⁴ We are aware there have been reviews by Plant Health Australia and the NSW government, but have been denied access to these documents.

Preventing future incursions: It is vital to try to prevent further incursions of eucalyptus/myrtle rust because any new genetic material could exacerbate the disease threat by:

- expanding the pathogen's host or geographical range
- Increasing the aggressiveness or persistence of the disease
- increasing the pathogen's capacity for genetic change and adaptive evolution.

The evidence from South America indicates that strains present there are more harmful to eucalypts than the strain currently in Australia. With the rust already in Australia it will be very difficult to detect new incursions, so there needs to be a rigorous focus on preventing entry. Australia needs an independent risk analysis and review of current import, quarantine and surveillance arrangements.

In 2013 import conditions for Myrtaceous timber were changed: the prohibition on imported consignments of Myrtaceous timber from countries hosting Eucalyptus rust were lifted, and such imports are now subject to the same treatment options as for Myrtaceous timber from non-Eucalyptus rust countries.⁷⁵ This presumably increases the risks of further incursions of the rust.

Australia should be considering the risks of other exotic diseases of native plants as well. Plantations of Australian native species overseas greatly increase the risks of host jumps by pathogens in these export locations and then invasion of the pathogen into Australia (as has occurred with myrtle rust). Another serious disease of Eucalyptus has recently been discovered in South America and there are various pathogens of Australian eucalypts and wattles in Africa and Asia that are of concern.⁷⁶ Overseas experts have warned about the risks posed by two pathogens harming Australian wattles in South Africa (*Ceratocystis acaciavora* and *C. albifundus*)⁷⁷ but there is no contingency planning that we are aware of for these disease threats – in part because there is no environmental body the equivalent of Plant Health Australia and Animal Health Australia (which undertake contingency planning for industry).

Preventing spread from Australia: Australia should also be concerned about the risks of this disease spreading to other countries with Myrtaceae such as Papua New Guinea, and assist their biosecurity services to implement surveillance and rapid response. Myrtle rust was detected in New Caledonia in 2013.⁷⁸

Disease management: The federal government invested a very modest sum of about \$1.5 million for management of myrtle rust as part of the Transition to Management Plan but little of this was dedicated to environmental issues. None of the recommended environmental monitoring projects were funded. ISC is concerned that the level of funding and the proposed activities are far from sufficient for such a nationally significant disease. (Compare this to the \$12 million recently granted for Hendra virus research.) There should be a national research and management plan to identify priority research questions and management options relevant to the environment. Issues that need research include:

- Which susceptible species are a priority for conservation management and how can they be assisted?
- What are the impacts on eucalypts post-fire?
- What is the potential for biocontrol?
- Are there strategies such as removal of highly susceptible species (eg. *Syzygium jambos*) from street plantings, bush regeneration and from sale that could assist in disease management (by removing prolific sources of spores)?

⁷⁴ Minister for Agriculture, Fisheries and Forestry (2013)

⁷⁵ International Plant Protection Convention (2013)

⁷⁶ Summarised in Booth (2011)

⁷⁷ Wingfield et al. (2011)

⁷⁸ Giblin (2013)

Community engagement: Myrtle rust is one of the most threatening invaders of the natural environment, yet there has been minimal engagement of the environment sector (in government and the community) in preparing for and responding to the incursion. As far as we are aware, there was no consultation with environment NGOs in the development of contingency plans and no involvement in decision-making by the National Management Group. In contrast, the nursery and garden industry sector (but not the forestry industry) was involved in both – as a party to deed arrangements between industry and governments for emergency responses and due to the existence of the industry-government body Plant Health Australia. There is no environmental equivalent for Plant Health Australia and Animal Health Australia. The National Management Group consists of agricultural agencies and industry bodies, although the federal environment department was also included in the NMG for myrtle rust. There are no community environmental representatives because none are party to the Emergency Plant Pest Response Deed. Although agricultural agencies are meant to bring a whole of government perspective to the NMG, this does not ensure a strong environmental perspective in decision-making. If environmental NGOs (and state environmental agencies) had been involved in the myrtle rust NMG, it is almost guaranteed that the initial decision would have been more precautionary and favoured a stronger eradication response. The National Myrtle Rust Transition to Management Program (2011) identified the need for a national ‘transparent, consistent and informative communications process’. This has mostly not occurred.

Issues for the inquiry

Quarantine

- Were quarantine restrictions and practices sufficiently rigorous?
- Have quarantine conditions and processes been reviewed or altered (strengthened or weakened?) since the 2010 incursion?
- Are other eucalypt pathogens, and those that harm wattles, now listed as quarantine targets?

Contingency planning

- To what extent were contingency plans for Eucalyptus rust implemented?
- Was there sufficient preparation by Australia to prevent and respond to a recognised very high priority biosecurity risk?

Surveillance

- Had surveillance mechanisms and practices been developed and implemented? Was there sufficient awareness and preparation within the nursery industry?

Prevention

- What should Australia be doing to reduce the risks of future incursions of eucalyptus rusts that would exacerbate disease impacts?
- What should Australia be doing to reduce the risks of incursions of other diseases of Australian native plants (eg. in eucalypt and acacia plantations overseas)?
- What should Australia be doing to reduce the risk of myrtle rust spread to other countries?
- Should there be rules to require buffer zones between sites where plants are bred and bushland to limit the risks of disease spreading into the natural environment?

Emergency response

- Was the initial April 2010 decision to not proceed with eradication a reasonable decision based on the evidence?
- Were the severe potential impacts on the environment properly considered?
- Was it sufficiently precautionary given the very high threat of the rust?
- Could the decision-making process be made more transparent?
- Should decision-making be informed by an independent scientific panel?

Management

- Are sufficient resources committed to monitoring and managing myrtle rust in the natural environment?
- What should Australia be doing to protect susceptible threatened species and ecosystems?

Reviews of eradication

- What did the eradication reviews by Plant Health Australia and NSW Primary Industries reveal?

Community engagement

- To what extent has the environment sector been involved in preparing for and responding to myrtle rust?
- How could the community environment sector be better engaged in arrangements for responding to environmental incursions?

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4. SMOOTH NEWTS

A case study of the establishment of a new amphibian in Victoria and a failure to proceed with eradication.

Species: Smooth newt (*Lissotriton vulgaris*)

Origin: Europe and western Asia

Australian occurrence: First detected in Melbourne in June 2011. Found at 6 sites in 2012 and 6 sites in 2013, including 4 of the 2012 sites.⁷⁹ The extent of its establishment is unknown.

Potential ecological impacts:⁸⁰ The smooth newt is the only salamander in the wild in Australia (the only member of an entire amphibian order) and the first invasive population of this species in the southern hemisphere, so it is hard to predict likely impacts. Tingley et al. (2014) note that 'On average, exotic species with only distant relatives in their invaded ranges tend to have greater impacts' because the native species probably lack co-evolved defences against them.



Photo: Melbourne museum.

The smooth newt is able to live in a wide range of habitats, and climate matching suggests that large parts of NSW, Victoria, eastern Tasmania, southern South Australia, and south-western Western Australia are particularly suitable for it.

Potential impacts could arise from predation, competition, toxicity and disease spread. The smooth newt is a generalist carnivore, eating invertebrates, crustaceans, and frog and fish eggs and larvae. Therefore it 'may compete with and prey upon a wide range of terrestrial and freshwater species in Australia'.

There is a risk that smooth newts could poison their predators (like cane toads do). Some salamanders produce a neurotoxin (tetrodotoxin) on their skin. Tests have previously shown that the European smooth newt has low levels or no tetrodotoxin but because Australian predators 'have no evolutionary history of exposure to tetrodotoxin ... the effect of even low doses of this toxin on Australian frog-eating predators remains unclear.' If the toxin is potent, it could affect a wide range of potential predators (invertebrates, wading birds, snakes, lizards, turtles and mammals which prey on species occupying similar environments or are morphologically similar).

A close relative of the smooth newt carries chytrid fungus, which has caused extinctions and declines in Australian frogs, so there is a risk that smooth newts will spread the disease.

Potential direct economic impacts: None known apart from potential costs of control.

Pathways: The most likely pathway for establishment is deliberate release or escape from illegal pet keeping. The keeping of smooth newts is prohibited Australia-wide but it used to be allowed. (In Victoria prior to it being declared a 'controlled pest animal' in 1997 it could be kept and traded without a permit; it was prohibited in 2010). Another possibility is it arrived as a stowaway with cargo or in a container.⁸¹

⁷⁹ Tingley et al. (2014)

⁸⁰ Most of this information has come from Tingley et al. (2014)

⁸¹ Grgurinovic et al. (2006) detected viable spores on a wood shipment to Australia from South America

Summary of biosecurity issues: ISC's view is that governments have not taken the potential environmental impacts of the smooth newt seriously enough. Decision-making was exceedingly slow, with a decision by the National Management Group to not attempt eradication taken at least 22 months after detection, allowing the newt to spread and making eradication much more difficult (perhaps impossible) and costly. The precautionary principle was ignored and the decision-making lacked transparency and had limited input from independent experts on ecology and amphibians. This case particularly highlights the lack of precaution applied in decisions about whether to eradicate. Because the smooth newt has not established invasive populations in the southern hemisphere and there are no salamanders in Australia, there are high levels of uncertainty about the likely impact. This uncertainty should have resulted in a higher risk rating and more strongly favoured a decision to attempt eradication. By the time its impacts become apparent it will be far too late to eradicate the smooth newt. A decision on whether to eradicate the smooth newt should be revisited.

Particular biosecurity issues

Emergency response: The smooth newt was discovered in an outer suburb of Melbourne in June 2011. A trapping survey in June-November 2011 found it at 4 locations. Surveys in 2012 found it at additional locations, suggesting it had spread.

Sometime in 2012 the incursion was referred by the Victorian government to a Consultative Committee for a decision under NEBRA on whether it would be eradicated with national cost-sharing. An FOI request for all National Management Group meeting agendas for 2012 showed no evidence that the smooth newt was discussed at that level.

In January 2013 ABARES (Australian Bureau of Agricultural and Resource Economics and Sciences) completed a 'national significance assessment' (as required under NEBRA).⁸² The expertise of the authors of this assessment and the extent to which they consulted with experts is unknown. However, the references suggest the assessment was based solely on published literature. Given the limited extent of the literature, particularly with respect to Australia, which has no salamanders, this seems inadequate. The ABARES assessment 'did not identify any likely severe and/or extensive impact'. However, it acknowledged that the impact on Australian biodiversity, particularly frogs and reptiles is 'somewhat uncertain'. In ISC's view this downplays the extent of uncertainty (contrasting with the analysis of Tingley et al. 2014, who emphasise the unknowns arising from the lack of evolutionary history of salamanders in Australia). The assessment also dismissed the potential for the newt to be toxic to predators (in contrast to Tingley et al 2014, who warn that its effects could differ on Australian species due to their lack of evolutionary exposure to the toxin).

On 16 April 2013 the Victorian Department of Primary Industries completed a NEBRA Preliminary Technical Feasibility Analysis, which concluded that the technical feasibility of eradication was 'moderate' or 'low to moderate' depending on how criteria were weighted (but with many unknowns).⁸³ We do not know how valid the conclusion is, although clearly the almost two years of inaction since detection, allowing the newt to spread, had by this date greatly undermined the potential for eradication. Such assessments would engender more confidence if they were subject to peer review by independent experts. The NEBRA feasibility assessment shows that the criteria need refinement (better definition and weightings).

On a date unknown, a consultative committee or the National Management Group decided to not support an attempted eradication of the smooth newt. This decision was made at least 22 months after the newt was detected, by which time it is likely to have spread, considerably reducing the prospects of eradication and increasing the costs. Due to the lack of transparency of decision-making by the National Management Group and consultative committees, ISC does not know why the proposal for eradication was rejected. As far as we are aware, the decision-making process did not involve ecological or amphibian experts. ISC is aware that opinions (within government) differ as to whether eradication should have been attempted.

We recommend the decision on eradication of the smooth newt be revisited, with advice from an environmental scientific panel on the significance of the newt impacts and the feasibility of eradication.

⁸² Parsons & ten Have (2013).

⁸³ Victorian Department of Primary Industries (2013).

Treatment of uncertainty: By deciding not to eradicate the smooth newt, Australian governments have in effect decided to proceed with the experiment of allowing a new order of amphibians to establish and spread in Australia. This is despite high levels of uncertainty about its impacts – due to the lack of salamanders in Australia and the lack of invasive populations elsewhere in the world. As Tingley et al. (2014) point out, invasive species impacts are on average more severe when there is a large phylogenetic distance between the invader and native species because there has been no evolutionary opportunity for native species to evolve defences. Despite the precautionary principle being fundamental to environmental decision-making (and required for decisions under the EPBC Act), there is no mention of the precautionary principle in NEBRA or other biosecurity policies.

Community engagement: During the first year of investigating the incursion the Victorian DPI strove to avoid publicity about the smooth newt to avoid revealing the location of the incursion. ISC respected this need for secrecy when we found out about the outbreak. DPI officers stated to ISC that this restriction was to prevent amateur collectors from collecting the smooth newt and spreading the risk into new illegal collections. This secrecy meant that there was no opportunity for the community with an interest in the environment and a stake in the consequences to be involved in decision-making. In hindsight, given the poor decision-making, we believe that it is more important to open up decision-making to public scrutiny than to keep new outbreaks secret.

There has been no information published about the decision-making regarding the smooth newt. ISC obtained some documents after applying for them through FOI. We are gravely concerned that the secrecy of decision-making under NEBRA and the other agreements undermines the quality of decision-making and encourages governments to prioritise short-term financial considerations over the longer-term public interest in environmental protection.

Enforcement: The smooth newt incursion raises questions about the extent of investigation of illegal pet keeping and trading and the resources invested in enforcing prohibitions. Do compliance officers properly monitor illegal pet-keeping and trade? We suspect not. There was one seizure in Melbourne in 2004 reported in the media.⁸⁴

Issues for the inquiry

Decision not to eradicate

- Should there be reconsideration of the decision not to eradicate the smooth newt, with an independent peer-reviewed assessment of significance and feasibility?

Decision-making processes

- Why did it take close to 2 years or longer for a decision to be made not to proceed with a national eradication of the smooth newt? ISC has been advised that the time taken to consider an eradication greatly diminished its chances of success.
- How was the decision to not proceed with eradication made and by whom? Was it a unanimous decision by all governments? What was the rationale?
- What consultative committee considered the feasibility analysis? Why is there no record of the national management group making a decision not to undertake an eradication when the national management group is the decision-making body under NEBRA?

Ecological expertise

- Were relevant experts involved in providing advice on the potential impacts and the potential for eradication?
- Given that ABARES is an agricultural research organisation, are they the appropriate body to conduct the national significance assessment under NEBRA?
- Were ecological experts consulted for the NEBRA national significance report? Was the report peer reviewed? Should such reports be published and independently peer-reviewed?

⁸⁴ <http://www.abc.net.au/news/2004-10-14/exotic-newts-seized-from-melbourne-house/568564>

Precautionary principle

- Should the precautionary principle be applied in decision-making under the emergency response arrangements? Given the great uncertainty of potential impacts of the smooth newt and the fact that eradication becomes much more difficult and costly – often impossible - should eradication have proceeded as soon as possible after detection despite the uncertainty about impacts?

Environmental weight

- Was sufficient weight given to potential environmental impacts? Researchers (Tingley et al. 2014) emphasised the potential significance of the smooth newt representing a completely new amphibian order, an issue not even considered in the significance assessment.

Enforcement

- Have there been any risk analyses conducted on the risks associated with the illegal pet trade and illegal pet-keeping in Australia?
- Are there national and state compliance strategies for these activities?
- Has there been any follow-up to determine the likely sources of the smooth newts now established in the wild?
- Are there other amphibian species illegally being kept?

Transparency

- Should decision-making by consultative committees and the national management group be subject to public scrutiny?
- Should decisions be published and the rationale explained?

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5. ASIAN BLACK-SPINED TOADS

A case study of efforts to prevent a potential new toad invader

Species: Asian black-spined toad (*Duttaphrynus melanostictus*)

Origin: Asia (from north Pakistan through Nepal, Bangladesh, India, Sri Lanka, southern China, Myanmar, Lao People's Democratic Republic, Vietnam, Thailand and Cambodia to Malaysia, Singapore, and Indonesia).⁸⁵ The toad has recently spread to southern Indonesia, East Timor and Papua New Guinea.⁸⁶

Australian occurrence: Has been detected at least 3 times in the wild in Australia.⁸⁷ The most recent incursion, in 2014, was in suburban Melbourne, where so far just one toad has been located. Only warm summer weather will confirm whether the toad is established at this location or not. The details of the surveillance effort have not been

revealed so we are uncertain whether all surrounding areas have been fully surveyed.



Photo: Vic DEPI.

Potential environmental impacts: The Asian black-spined toad 'may cause serious ecological problems, comparable to the impact of the cane toad' due to competition with native species, its potential to spread exotic parasites and pathogens and its toxicity.⁸⁸ Like cane toads, the black-spined toads secrete poison from glands in their backs to ward off predators. The toxins contain several bioactive compounds with lethal, hypotensive, hypertensive, neurotoxic, cardiotoxic, haemolytic and sleep inducing factors that could severely affect the snakes, goannas and quolls likely to prey on the toad.⁸⁹ The toad is a prolific breeder with the females typically producing 40,000 eggs at a time.

Potential economic impacts: It is difficult to estimate potential costs. They may include reduced tourism, blocking of drains, health impacts on children and the spread of human diseases. Costs for control include efforts to slow the toad's incursion or maintain areas free from the toad. The economic impacts of cane toads have not been quantified.⁹⁰

Pathways: Usually found in international vessels, shipping containers, machinery and personal effects such as bags, shoes, boxes and cartons.⁹¹

Summary of biosecurity issues: This toad is widely accepted by governments as a high-risk target for interception and presumably a high priority for eradication if there is an incursion. The recent rate of interceptions (about 10 a year) and 3 detected incursions since 2000 suggest a high likelihood of establishment. It is unclear what plans have been developed to respond to incursions and whether they will be sufficient to prevent permanent establishment.

Particular biosecurity issues

Planning and surveillance: This toad is regarded by DAFF as one of its 10 'most unwanted' species and 'potentially more damaging than the cane toad'.⁹² A 2008 risk assessment (by the Western Australian

⁸⁵ Cshures (2010)

⁸⁶ Csurhes (2010)

⁸⁷ Henderson and Bomford (2011)

⁸⁸ Department of Environment and Primary Industries (2014), also Cshures (2010)

⁸⁹ Department of Environment and Primary Industries (2014)

⁹⁰ Taylor and Edwards (2005)

⁹¹ Cshures (2010)

⁹² Department of Agriculture, Fisheries and Forestry (nd)

government) found it had a 'serious' risk of establishment and a 2010 assessment by the Invasive Animals CRC found it had an 'extreme' establishment risk rank. There is no publicly available pathway risk analysis or contingency plan.⁹³ We believe it should be a high priority to develop a contingency plan that includes a surveillance strategy.

Pre-border and at-border biosecurity: This toad is frequently intercepted as a stowaway: 75 times from 2003-2010 (involving at least 79 animals) and 25 times from 2009-2012.⁹⁴ It has arrived with 'stone, straw, personal effects, baggage, containers by air and ship' from Brunei, China, India, Indonesia, Malaysia, Thailand, United States.⁹⁵ Since 1999, has been detected 3 times in the wild in Australia: 2 times in Victoria, 1 time in Western Australia.⁹⁶ The toad is abundant in Bali and Papua New Guinea, and also found in East Timor.⁹⁷ Massam et al. (2010) note there has been some pre-border focus on black-spined toads in some countries, with a report of AQIS import clearance officers visiting the Freeport Mine in West Papua in 2006.⁹⁸ They also note that a toad barrier was installed around the unloading dock at Cairns Port to prevent the escape of these and other introduced amphibians.

Emergency response: We assume that, unlike many other invasive species, governments would be willing to commit to eradicate black-spined toads even if there were risks of failure because of strong public interest due to the notoriety and the negative impacts of the cane toad on biodiversity. The 2014 incursion response by the Victorian Department of Primary Industries focused on searching the immediate area near the incursion including a local creek. We believe that a nearby industrial area that may have been the source of the toad was not searched. The National Environmental Biosecurity Response Agreement was not activated since only one toad was located and the Victorian government determined that additional resources were not needed.

Issues for inquiry

Prevention

- This species is regarded by DAFF as one of its 10 most unwanted and therefore is presumably subject to optimal biosecurity preparation and response. What has this involved?
- What steps has Australia taken to prevent new incursions – pre-border, at-border and post-border?

Surveillance

- What surveillance is being conducted that would detect new incursions?

Contingency planning

- How well prepared is Australia to respond quickly and effectively to incursions of this toad?

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⁹³ Page et al. (2008), Massam et al. (2010).

⁹⁴ Henderson and Bomford (2011), Minister for Agriculture, Fisheries and Forestry (2013)

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⁹⁶ Henderson and Bomford (2011), REF for recent incursion?

⁹⁷ Cshures (2010)

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6. MEXICAN FEATHERGRASS

A case study of the critical importance of correct labelling and the laxness of enforcement on illegal internet sales.

Species: Mexican feathergrass (*Nassella tenuissima*)

Origin: North and South America

Australian occurrence: Imported illegally or in ignorance by the nursery trade several times and sold widely. Recorded spreading from a garden at Tamworth in 2004 but eradicated.⁹⁹ Recorded naturalised in the ACT in 2004 but eradicated.¹⁰⁰ It is highly likely to have naturalised somewhere.



Photo: C Lin (creative commons licence)

Potential ecological impacts: Mexican feathergrass has been described by weed experts as ‘a potential disaster for the Australian environment’.¹⁰¹ It is a high-fibre, low-protein grass of no grazing value to livestock,¹⁰² that presumably has no value to kangaroos and other native grazers. Its unpalatability gives it an edge over native grasses which, because they have to contend with grazing pressure, are at risk of being displaced. In South Africa Mexican feathergrass has become so invasive in native grasslands it is one of seven grasses to be listed a Category 1 weed.¹⁰³ In New Zealand it forms pure stands in low-growing plant communities, especially in harsh sites, and prevents the seedlings of native species establishing.¹⁰⁴ It is listed as a noxious weed in California.¹⁰⁵ In Australia it is considered a threat to eucalypt woodlands and native grasslands, with modelling by the Queensland government indicating that up to 169 million hectares could be at risk, in a wide band extending across Queensland to include more than half of New South Wales and large areas of Victoria, South Australia and Western Australia.¹⁰⁶ In its native range it habitats range from semi-arid woodlands to alpine meadows on soils and in sites of ‘extreme variability’ over a wide altitudinal range.¹⁰⁷ It is closely related to serrated tussock (*N. trichotoma*), which is causing severe environmental damage to native grasslands in NSW.¹⁰⁸

Pasture experts often talk about ‘increasers’ and ‘decreasers’, referring to the responses of plants to grazing pressure. Mexican feathergrass and other *Nassella* species are classic increasers that take advantage of the grazing pressure on palatable grasses to replace them. Mexican feathergrass is a popular ornamental grass in North America because it is so easy to grow, but nursery websites there warn about its propensity for rapid spread. The closely related Chilean needle grass can produce more than 20 000 seeds per square metre.¹⁰⁹

Potential economic impacts: Mexican feathergrass is closely related to serrated tussock and Chilean needle grass (*N. neesiana*), which were both designated Weeds of National Significance because they displace palatable grasses from pastures and have seed awns that contaminate wool.¹¹⁰ A Queensland government pest plant risk assessment concluded that if Mexican feathergrass spreads widely ‘the impact on beef and wool

⁹⁹ Maguire (2005)

¹⁰⁰ Csurhes (2008)

¹⁰¹ McLaren et al. (2004)

¹⁰² Csurhes (2008)

¹⁰³ Milton (2004)

¹⁰⁴ Weedbusters (nd)

¹⁰⁵ California Department of Food and Agriculture (2003)

¹⁰⁶ Csurhes (2008)

¹⁰⁷ Jacobs et al. (1998)

¹⁰⁸ McLaren et al. (1998)

¹⁰⁹ Csurhes (2008)

¹¹⁰ Csurhes (2008)

production could be substantial'.¹¹¹ Serrated tussock, which is estimated to cost NSW agriculture more than \$40 million annually,¹¹² is said to be causing a greater reduction in pasture carrying capacity than any other weed in Australia,¹¹³ yet Mexican feathergrass is thought to be capable of occupying 6 times the area of Australia.¹¹⁴ In New Zealand Mexican feathergrass is banned from propagation, distribution and sale by the Waikato Regional Council because it is considered a serious threat to New Zealand's agricultural industries.¹¹⁵

Pathways: Imported as a nursery plant under incorrect or outdated names. In 2009 a nursery imported Mexican feathergrass seeds by incorrectly labelling them as *Stipa lessingiana*, which is a permitted import.¹¹⁶ Mexican feathergrass is not. A similar violation had occurred in 1996 when a Victorian nursery imported the seeds by labelling with an earlier valid scientific name, *Stipa tenuissima*.¹¹⁷ Mexican feathergrass has also been sold by a Sydney nursery as a native grass 'elegant spear *Austrostipa elegantissima*', perhaps as a result of another improper importation.¹¹⁸ In 2007-2008, it was sold widely in Queensland after being labelled as *Stipa capillata* and *Stipa capriccio* by an interstate supplier.¹¹⁹

Mexican feathergrass can easily be bought online through Ebay, as demonstrated by ISC (see case study 17). Complaints to Ebay have not resulted in any action to stop such sales. Interception of illegal goods in the postal system is difficult given the volume of items.

Summary of biosecurity issues: The multiple quarantine breaches show how easily a ban on importation of a plant can be rendered useless by importers labelling seeds with erroneous or out-of-date names. The demonstrated ease of buying this plant illegally from overseas through Ebay and other online traders exposes major enforcement weaknesses.

Particular biosecurity issues

Quarantine: Mexican feathergrass is a prohibited import but was accepted through quarantine in 2009 because the seeds had been labelled as something else.

Taxonomic expertise: The quarantine service lacked the expertise to know if the imported seeds were those of *Stipa lessingiana*, as claimed on the label, or something illegal. Quarantine officers regularly place trust in the names applied by importers rather than having the skills to confirm identifications.

Learning from past failures: After a nursery imported Mexican feathergrass seeds in 1996 by labelling them '*Stipa tenuissima*', a paper was written about this serious breach, titled 'Mexican feather grass (*Nassella tenuissima*) a potential disaster for Australia', by five experts, including a member of the Australian Quarantine and Inspection Service.¹²⁰ The 2009 violation of quarantine was remarkably similar to the 1996 violation, showing that nothing had been learned. The public can have no confidence that similar mistakes will not keep recurring. Because ornamental grasses are typically very hardy they have become popular for landscaping traffic islands, golf course roughs, parks and gardens and further importations of grass seeds by nurseries can be expected. The nursery trade often markets plants under the names of horticultural varieties rather than the correct scientific names, or under incorrect scientific names, making it likely that mislabelled seeds will be imported in future.

Enforcement: A Victorian-based seed importer and distributor, Ball Australia, was fined in May 2009 for illegally propagating and distributing Mexican feather grass. It was a very small fine – just \$12,000. The

¹¹¹ Csurhes (2008)

¹¹² Jones and Vere (1998)

¹¹³ McLaren et al. (2004)

¹¹⁴ McLaren et al. (2004)

¹¹⁵ Waikato Regional Council (ND)

¹¹⁶ Minister for Agriculture (2009)

¹¹⁷ McLaren et al. (1999)

¹¹⁸ Jacobs (1998)

¹¹⁹ Anonymous (2008a), Anonymous (2008b)

¹²⁰ McLaren et al. (1999)

company also paid \$20,000 compensation to DPI to help with clean-up costs. One of the wholesale nurseries involved, Oasis Horticulture, was fined \$3000 for a similar offence and paid \$5000 contribution toward clean-up costs.

The fact that Mexican feathergrass has been illegally (even if unintentionally) sold through nurseries multiple times over many months suggests a lack of surveillance by biosecurity compliance officers. The grass was brought into the country as seeds and incorrectly labelled and sold throughout Australia. A nation-wide recall and search was carried out in an effort to locate all the plants, but some may still be growing in gardens. It was reportedly sold for over a year in many Queensland nurseries before being detected in 2008.¹²¹ ISC has been advised by the Victorian Department of Environment and Primary Industries that Mexican feathergrass is regularly observed in Melbourne gardens.

As outlined in case study 17, ISC conducted a test to determine how easy it is to buy Mexican feathergrass online from overseas. This was done after advice from a state government biosecurity officer that repeated requests to Ebay to stop illegal sales of Mexican feathergrass had failed and after ISC also reported illegal sellers to Ebay with no action resulting. ISC was able to buy seeds (for \$4.44) reported to be those of Mexican feathergrass from the United States, with the seeds arriving in the mail 9 days after the order through Ebay. The seeds of two other banned plants were also bought through Ebay. A link to information on Ebay about Australian quarantine regulations for postal items resulted in a 'page not found' error. In August 2014 there were at least 3 sellers of Mexican feathergrass advertising through Ebay to Australian buyers. Australia urgently needs a compliance program to monitor online sales and enforce biosecurity laws to prevent illegal sales of prohibited plants and other organisms.

We strongly recommend the development of a strategy to reduce the risks of online selling of non-permitted organisms.

Issues for the inquiry

Pathway risk reduction

- What are the flaws in biosecurity that have made it easy for nurseries to repeatedly import a prohibited plant?
- Should Australia be allowing the importation of grass seeds when grasses make up such a large proportion of Australia's weediest plants and when mistakes in grass seed identification are easily and repeatedly made? Why allow the importation of risky foreign grasses when they bear such close resemblance to native grasses that mistakes about identification have been made?
- Has any pathway analysis been done for Mexican feathergrass to identify biosecurity gaps?

Surveillance and enforcement

- Has there been any assessment of the range of prohibited imports available for sale online and the extent of illegal sales online?
- Does Australia have a compliance strategy for illegal internet sales of prohibited imports? If so, how has the strategy been implemented?
- Is there regular surveillance of nurseries to check whether prohibited plants are being sold?

Commercial behaviour

- What are the policies of online traders when they receive complaints about the sale of prohibited plants to Australia? How often are complaints received and for what items?
- What can be done to prevent online traders selling highly invasive species?

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7. ASIAN HONEY BEES

A case study of a prematurely abandoned eradication effort

Species: Asian honey bee (*Apis cerana javana*)

Origins: Asia and some Asian Pacific islands. The Javan strain is native to Indonesia and has spread to Papua New Guinea.

Australian occurrence: The Asian honey bee was first detected in the Cairns region in 2007 and as of October 2012 was established across 500,000 hectares in far north Queensland.¹²²

Potential ecological impacts: Poorly known due to limited research. The Asian honey bee is likely to compete for pollen and nectar with native birds, mammals and insects, and for nesting sites in tree crevices. It is likely to benefit weeds by increasing pollination.¹²³ An initial study found it was not possible to determine whether Asian honey bees would outcompete or displace European honeybees (also an invasive species).¹²⁴



Photo: muzina shanghai(creative commons licence)

Potential economic impacts: Asian honeybees are likely to impact on commercial beekeepers and farmers who rely on the pollination services of managed honeybees. By competing for floral resources, robbing managed hives and transmitting disease, Asian honeybees could have detrimental impacts on European honey bees, which are themselves an invasive species that harm the natural environment. Asian honeybees are also a natural host for the varroa mite, a parasite of honeybees.¹²⁵ The costs also include at least \$4 million of control costs, which include \$1.3 million by the Queensland government (to February 2010), \$2.4 million by federal and state governments for the eradication program, \$500,000 by the honeybee industry.¹²⁶

Pathways: The Asian honey bee is thought to have arrived as a nest inside parts of a ship from Papua New Guinea or Indonesian Papua.¹²⁷

Summary of biosecurity issues: This incursion was subject to a failed eradication program, regarded by many as prematurely abandoned because some states did not want to provide financial support. A senate inquiry (by the Rural Affairs and Transport Reference Committee in 2011), triggered by concerns about the impacts on commercial beekeepers and farmers that depend on managed honey bees for pollination, concluded that the response to the Asian honey bee was flawed in several respects, including that the decision to abandon the eradication effort was not well justified and failed to apply the precautionary principle.¹²⁸ The committee also criticised the risk assessment for Asian honey bees used to justify the initial eradication effort as having failed to assess their potential impacts on biodiversity.

Particular biosecurity issues

Surveillance: The Asian honey bee has been spreading from Asia over the past 30 years. It was detected in Papua New Guinea in 1986, then in Sabai, Dauan and Boigu (Torres Strait islands) in 1993. There has been active surveillance for Asian honeybees since a single bee was detected at the Port of Brisbane in 2003/04 on a ship from Papua New Guinea. Surveillance included monitoring of vessels by AQIS at all international ports in

¹²² Koetz (2012).

¹²³ Biosecurity Queensland (2010).

¹²⁴ Commerford and Koetz (2013)

¹²⁵ The Senate Rural Affairs and Transport References Committee (2011)

¹²⁶ The Senate Rural Affairs and Transport References Committee (2011)

¹²⁷ Biosecurity Queensland (2013).

¹²⁸ The Senate Rural Affairs and Transport References Committee (2011)

Queensland, and collaboration by Biosecurity Queensland and AQIS to establish and monitor bait hives and log traps close to wharves that provide attractive nesting sites for exotic bee swarms.¹²⁹ There have been 14 detected incursions into Australia, most of single bees or swarms or nests that were dead or easily destroyed.¹³⁰

Emergency response: In May 2007, a nest of Asian honey bees was detected in the mast of a fishing boat in dry dock in Cairns and 7 live colonies were found.¹³¹ The Queensland government attempted to eradicate the bees throughout 2007 and it was thought eradication had been successful but more nests were detected in July 2008. In March 2009, Queensland submitted a response plan proposing national cost-sharing to respond to the incursion. In July 2009, the National Biosecurity Committee determined that the incursion should be managed in accordance with the Emergency Plant Pest Response Deed (EPPRD). The National Management Group agreed to allocate \$3 million to eradication, with costs split in the following way: 40% federal, 40% states and territories, 20% industry funding. Funding ceased on 30 March 2011 due to a majority decision by the National Management Group that it was no longer eradicable. This was despite an independent review (commissioned by the Queensland government) saying that more information was needed to determine whether eradication was possible. The actions undertaken and the decision-making by the National Management Group are set out in the report by the Senate Rural Affairs and Transport References Committee.

Following the recommendation of the Senate reference committee, in April 2011 the consultative committee again reviewed technical advice review and failed to reach consensus on whether eradication could be achieved and then in May 2011 the national management group concluded by majority that eradication should not proceed. Government allocated \$2 million to 'support a national pilot program aimed at creating an ongoing solution to the management of Asian honeybees'.¹³² In July 2011, the Asian honey bee Transition to Management Program was commenced.

The Rural Affairs and Transport References Committee concluded that due to scientific uncertainty and the potential spread and environmental, economic and social impacts of the Asian honey bee in Australia, 'there were no reasonable grounds on which to favour the conclusion that the pest was ineradicable'.¹³³ There is no requirement for the National Management Group to publish reasons justifying its decisions. Note also that the process is biased towards no action, with the agreement to proceed with national cost-sharing for eradication requiring consensus by all deed parties but the decision to abandon eradication was not a consensus one.

The committee said it was 'not convinced that the processes in place for the initial response to emergency plant and animal disease incursions are sufficiently capable of being appropriately adapted to deal with specific cases or incursions. In the case of the Asian honey bee, the committee is concerned that, notwithstanding the efforts of Queensland, there were insufficient resources applied to the eradication effort, given the potential consequences of the establishment of this pest in Australia.'¹³⁴

The committee said there was 'an urgent need for Australia to examine its emergency plant and animal pest response strategies to ensure that any such efforts are appropriately tailored and funded to address the practical demands of eradication, taking into account the broader implications and potential consequences to Australia of the establishment of a given pest or disease.' They are concerned that 'initial efforts are not sufficiently well planned, resourced and carried out with sufficient national and technical oversight.'¹³⁵

Risk assessment: The committee was critical that the risk assessment for the Asian honey bee incursion 'did not include an assessment of the impact on Australia's biodiversity'. This is symptomatic of the general lower priority accorded to environmental risks. The committee recommended that the environment department and relevant scientific organisations be consulted as soon as an incursion is reported to provide advice on the biodiversity consequences of the establishment and spread of the pest and that a written response is made to

¹²⁹ Biosecurity Queensland (2010).

¹³⁰ Biosecurity Queensland (2010).

¹³¹ The Senate Rural Affairs and Transport References Committee (2011), Commerford and Koetz (2013).

¹³² Department of Agriculture, Fisheries and Forestry (2011)

¹³³ The Senate Rural Affairs and Transport References Committee (2011)

¹³⁴ The Senate Rural Affairs and Transport References Committee (2011)

¹³⁵ The Senate Rural Affairs and Transport References Committee (2011)

the relevant agencies as soon as possible setting out the biodiversity consequences.¹³⁶ ISC considers the only way to ensure the environment is adequately considered is to meaningfully involve environmental NGOs and environment departments in decision-making.

Precautionary principle: The Senate Rural Affairs and Transport References Committee recommended that the Consultative Committee on Emergency Plant Pests reconsider whether the Asian honey bee was eradicable and that it 'should specifically apply the precautionary principle to areas of scientific uncertainty in its reconsideration'.¹³⁷ ISC strongly endorses the recommendation to apply the precautionary principle.

Issues for the inquiry

Eradication decision-making

- How can the arrangements for emergency responses be reformed to ensure that environmental issues are comprehensively considered in decision-making?
- Is the current decision-making process that requires consensus by all deed parties to proceed with cost-shared eradication an optimal one to achieve good decisions?
- How are the known high benefits of prevention and early action weighed against the short-term costs of eradication and the long-term impacts of a new species and how do the benefits of eradication impact on the willingness to conduct an eradication and the resources allocated to that eradication?
- Should the precautionary principle be applied when full scientific information is lacking about the potential impacts of a species or the feasibility of eradication?
- In what ways should the environment department, environmental experts and environmental NGOs be involved in decision-making about responses to incursions?

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8. PIGEON PARAMYXOVIRUS

A case study of a failure to prevent, eradicate or contain a new bird disease

Species: Pigeon paramyxovirus (an avian paramyxovirus serotype, closely related to Newcastle disease; both are serotype 1).

Origin: Probably the Middle East. The strain is genetically identical to a European strain, genotype 6.

Australian occurrence: First detected in August 2011 in Victoria in loft pigeons and in October in a wild bird (feral pigeon). Detected in loft pigeons in NSW in May 2012 (as a result of illegal movements of pigeons from Victoria), and in feral pigeons in November 2012.¹³⁸ Detected in northwest Tasmania in June 2013 in loft pigeons.¹³⁹ Now considered endemic in Australia.¹⁴⁰

Potential ecological impacts:¹⁴¹ The pigeon paramyxovirus (PPMV1) causes an often fatal disease in many bird species worldwide, not just pigeons. Overseas it has infected raptors, pheasants, swans, cockatoos and budgerigars (the latter Australian species in captivity overseas). So far in Australia the virus has infected racing, show and feral pigeons (rock pigeons and one spotted turtle dove). The one native species so far diagnosed with the disease was a collared sparrowhawk in a Melbourne park, which presumably ate a diseased pigeon.



Photo: Michael Porter

Overseas, it has caused sporadic large die-offs in wild doves and pigeons, and in Australia several hundred (600 estimated) feral pigeons died at a grain storage facility in Geelong. With feral pigeons so widely distributed, we have cause to be concerned about their potential to spread it to native birds. The Australian region has by far the world's most diverse pigeon and dove fauna, with 22 native species in Australia and more than 50 in Papua New Guinea (in combination a quarter of the world's total).

New diseases can have catastrophic consequences. A very high rate of mortality (up to 100%) has been recorded in pigeon lofts. Schuler et al. (2012) warn that 'transmission events may be rare, but single spillover occurrences could have dire consequences for native species.'

The virus is readily transmitted by direct contact between birds and by contact with faeces and other discharges. The virus can last several weeks in the environment. Where pigeons feed and drink with other species – bird feeders for example – could be high risk sites. Signs of PPMV1 include:¹⁴²

- high morbidity and mortality (up to 100% in some flocks)
- loss of appetite, lethargy
- gastrointestinal signs including regurgitation and diarrhoea
- neurological signs such as head shaking, torticollis
- respiratory signs.

Death can occur within three days of infection. However, in NSW the incubation period (from exposure to the virus to appearance of clinical signs) was observed to be as long as 4 weeks.¹⁴³

¹³⁸ NSW Department of Primary Industries (2013)

¹³⁹ Biosecurity Tasmania (2014)

¹⁴⁰ Cowan et al. (2014)

¹⁴¹ Aldous et al. (2004), Kim et al. (2008), Schuler et al. (2012), Ujvari et al. (2003), Australian Wildlife Health Network reports.

¹⁴² Department of Agriculture, Fisheries and Forestry (Qld) (2012).

¹⁴³ NSW Department of Primary Industries (2013)

Potential economic impacts: Losses to keepers of hobby and racing pigeons and their costs of managing the disease (including by vaccination). Potential losses from trade restriction on racing pigeons. Potential impacts on the poultry industry if PPMV1 is diagnosed in meat pigeons.¹⁴⁴

Pathways: PPMV1 is thought to have derived from multiple events of chicken to pigeon transmission of Newcastle disease virus. Since the late 1970s, PPMV1 has spread from a likely Middle East origin into many other countries in Africa, Europe, Asia and America, probably largely through the export of infected pigeons for racing and ornamental purposes. How it got to Australia is unknown. But smuggling of infected pigeons is suspected. (Smuggling of infected pigeons and parrots has been identified as the main source of risk for Newcastle disease.¹⁴⁵) The disease readily spreads from infected birds through the air, and via drinking water and food contaminated with nasal secretions or faeces. (With Newcastle disease, some bird species can become carriers; some parrots have excreted virus for more than a year. The virus has been recovered from over 25% of introduced pet birds quarantined in the United States.¹⁴⁶)

Summary of biosecurity issues: Despite its known potential to cause disease with high rates of mortality in many Australian bird species, and its spread around the world, there was no contingency plan for the virus (whereas there is a plan for Newcastle virus). Despite its initial occurrence for several months just in loft pigeons, there was no attempt to eradicate the pathogen. We do not believe it was ever properly assessed as a potential national eradication target. There was no comprehensive risk assessment. If this disease had been of concern to industry (as Newcastle disease is) the response would undoubtedly have been much more rigorous (it is Australian policy to eradicate virulent Newcastle disease viruses in poultry¹⁴⁷). The response was flawed in several respects and failed to prevent spread of the disease between pigeon lofts. The importation of a vaccine from overseas was refused and trials of a chicken vaccine used for Newcastle disease were slow. Vaccination of kept pigeons is recommended by state biosecurity agencies but is not a requirement. The pathogen allegedly arrived with smuggled pigeons, highlighting the need for more focus on enforcement against wildlife smuggling.

Particular biosecurity issues

Contingency planning: Because this virus has been spreading around the world for the past few decades there was a realistic likelihood that it would eventually arrive in Australia. Despite it clearly posing a significant risk for Australian birds (because it has infected a wide range of Australian species or their relatives overseas), it was not on Australia's national list of notifiable diseases¹⁴⁸ and there was no contingency plan for it because Australia lacks the environmental equivalent of Animal Health Australia.¹⁴⁹ In contrast, the closely related Newcastle Disease is notifiable and does have a contingency plan.

There was an initial delay in diagnosis because the first vet to treat sick pigeons did not consider paramyxovirus as a possible cause because the 'virus did not occur in Australia'.¹⁵⁰ (Other pigeons were infected in the veterinary clinic during the period of investigation.) The lack of preparation for this disease was epitomised by the lack of any readily available vaccine in Australia known to be effective for pigeons despite effective vaccinations being used overseas (considered below).

Preventive measures/surveillance: One of the most important preventive measures (to limit the spread of an outbreak) would have been to ensure there was ready access to a vaccine (one had been used overseas for many years). But there had been no application for its use in Australia and authorities have refused to allow its importation without a time-consuming approval process (see below). Arzey (2013) considers the inability to quickly access a vaccine 'the most critical aspect in the PPMV1 saga'.

¹⁴⁴ George Arzey, personal communication.

¹⁴⁵ Animal Health Australia (2010)

¹⁴⁶ Animal Health Australia (2010)

¹⁴⁷ Animal Health Australia (2010)

¹⁴⁸ Department of Agriculture (2013). It was also not on notifiable disease lists for Victoria, Tasmania, Northern Territory and ACT.

¹⁴⁹ Animal Health Australia (2010)

¹⁵⁰ Walker (2011)

A more general failure of prevention is in poor biosecurity practices evident in some premises with pigeons. For example, when a large number of pigeons died (from the yet undiagnosed PPMV1) in a pet shop in Melbourne (from where pigeon fanciers sell excess pigeons on consignment), the shop owner invited his customers to collect their pigeons, thus spreading the disease to many lofts.

Emergency response: The disease was first detected in Victoria in August 2011. A decision was very quickly made (presumably by the Consultative Committee on Animal Exotic Diseases) to not attempt national eradication. There was no comprehensive risk assessment or feasibility assessment done. The decision of the Victorian government was only to try to limit its spread rather than eradicate it. This decision was made despite there being no reports of the disease in wild pigeons. There are no documents publicly available that analyse the feasibility of eradication or provide any justification for the limited approach. ISC is concerned that the decision lacked precaution, that the risks to native birds of this disease were not fully considered and that eradication was not properly assessed as an option.

The disease spread rapidly, mostly between lofts of fancy pigeons; a few racing pigeon lofts were also affected. At the time of diagnosis, 12 lofts were infected. A month later (end of September 2011) 36 lofts were infected. Seven months later (March 2012) 74 lofts were affected.¹⁵¹ The first report of infection in a wild bird, a feral pigeon, was October 2011. Up to December 2012 the disease was recorded in 16 locations in wild pigeons, mostly within 5 km of infected lofts. This included a collared sparrowhawk and a spotted dove. In Geelong in March or April 2012 about 600 infected feral pigeons died at a grain silo.

The measures used by the Victorian government to limit spread were to quarantine affected flocks, conduct tracing and surveillance. Initially, the Victorian DPI recommended to pigeon keepers that shows, racing and gathering be avoided. It was only a year later on 30 September 2012 that they were banned. These restrictions have since been lifted.

The movement of pigeons from Victoria into NSW was restricted in late 2011 (a movement permit was required). But nine months after initial detection, in May 2012, the disease spread to NSW, first recorded in a hobby pigeon flock in western Sydney.¹⁵² Infections have been recorded in 13 lofts (mostly racing pigeons). It has also been recorded in a few feral pigeons, the first detected in November 2012, 6 months after disease detection in NSW domestic pigeons. A Control Order was enacted on 28 June 2012 banning all pigeon shows, racing and gathering in NSW. (These restrictions were lifted in August 2012 following 'good uptake of vaccination by pigeon owners'.)¹⁵³ Other states also placed restrictions on movements of pigeons and equipment, and some are still in place (to Queensland, Western Australia and Tasmania) while others have been lifted.

In June 2013 PPMV1 was detected in a racing pigeon in the north west of Tasmania. This is the most recent recorded event.

It is clear from the different approaches taken in the different states and the slow response (eg. in assessing a vaccine and banning pigeon events at which the virus could spread) that the approach to the PPMV1 outbreak was weak and lacked national cohesion and clear protocols. Because it was not recognised as an emergency disease (triggering a national response and national cost sharing) and regulations and approaches in each jurisdiction was different, Arzey (2013) says the approach was 'partially fragmented and lacked clear vision'.

There is a lack of knowledge in Australia of the feral pigeon population – size, movements, habitat and ecological interactions – which compromised decision-makers' capacity to assess risks. This lack of knowledge may have contributed to a premature assumption that the disease was difficult to eradicate or could not be eradicated.¹⁵⁴ A more precautionary approach would have more actively considered eradication despite this lack of knowledge.

¹⁵¹ Arzey (2013).

¹⁵² NSW Department of Primary Industries (2013)

¹⁵³ NSW Department of Primary Industries (2013)

¹⁵⁴ Arzey (2013)

Vaccination:¹⁵⁵ As outlined by George Arzey who, as a senior veterinary officer with the NSW government,¹⁵⁶ was involved in monitoring and responding to the outbreak, a major flaw in the response was the failure to quickly make available to pigeon keepers an effective vaccine. There was no vaccine registered in Australia registered for use in pigeons. (This remains the case today.) Comprehensive vaccination of racing and fancy pigeons could presumably have prevented or minimised spread of the disease. There were two possibilities: (1) import an inactivated pigeon vaccine from overseas or (2) use the Newcastle disease vaccine registered for use in chickens if it was shown to be safe and effective for pigeons (it was thought likely they could offer some cross-protection¹⁵⁷).

Two inactivated pigeon-specific PPMV1 vaccines (manufactured by Merck and Pfizer) have been widely used in Europe and the US for many years.¹⁵⁸ However, AQIS refused an initial application to import the Pfizer vaccine.¹⁵⁹ Three years later, an application by Merck is still undergoing assessment by the APVMA. Arzey, who as chair of the Committee on Exotic diseases and Importation for the Australian Poultry Veterinary Association says he 'could not fathom the arguments against the importation of these 2 widely used inactivated vaccines when such vaccines were required urgently and when at stake was possible impact on native pigeons and other native birds in Australia, not to mention possible mutation to virulence in poultry.'¹⁶⁰ Decisions about importation of vaccines seem admirably precautionary but it can perversely mean that emergency responses to outbreaks are not precautionary. The risks of importing a widely used inactivated vaccine from the United States or Europe would seem minor.

There are chicken Newcastle disease vaccines available in Australia but their efficacy and safety in pigeons were unknown at the time of the outbreak, and advice by state governments and veterinarians was contradictory and included that there was no effective vaccine for pigeons.¹⁶¹

In 2012, the Victorian government recommended that vaccination using the Newcastle disease vaccine be considered (in consultation with a veterinarian) but Biosecurity Queensland would not endorse its use in the absence of safety and efficacy data.¹⁶² A trial six months into the outbreak by a Melbourne veterinarian (commissioned by the Consultative Committee on Exotic Animal Disease) found the vaccine was ineffective. The veterinarian had limited experience in testing vaccines, and a second trial commissioned by the Victorian Homing Association produced positive results, the researchers concluding it was safe 'and resulted in antibody levels considered protective for [Newcastle disease virus] in chickens.'¹⁶³ However, by this time 'valuable time and the confidence of the pigeon sector' had been lost. Many pigeon keepers initially refused to vaccinate their flocks because of concerns about vaccine safety.

An adverse reaction to one Newcastle disease vaccine was reported in 2014. The veterinarian reporting it warns that 'Until a product is registered for use, vaccination remains off-label and the risk of adverse reaction, including sterile granuloma, must be considered.' Until there is a vaccine registered for use in pigeons, there can be no requirement for pigeon keepers to vaccinate their flocks. Infected pigeons that are vaccinated still carry and shed the virus, although at lower levels than unvaccinated pigeons.

¹⁵⁵ Arzey (2013)

¹⁵⁶ Now retired, George Arzey was Senior Veterinary Officer, NSW DPI, Elizabeth Macarthur Agricultural Institute. He is the Australian Poultry Veterinary Association Chair of the Committee on Exotic diseases and Importation.

¹⁵⁷ Department of Agriculture, Fisheries and Forestry (Qld) (2012)

¹⁵⁸ Assessed as effective by Duchatel and Vindevogel (1986), Duchatel et al. (1992)

¹⁵⁹ The reason given was that it was unable to meet all the requirements of the Australian protocol for imported biological products.

¹⁶⁰ Arzey (2013)

¹⁶¹ Walker (2012)

¹⁶² Department of Agriculture, Fisheries and Forestry (Qld) (2012)

¹⁶³ Scott et al. (2013)

Risk assessment: There has been no comprehensive risk assessment for PPMV1 in native Australian birds. There was a brief assessment by AWHN – acknowledged as rudimentary – which considered there were possible high risks for some native species. A comprehensive assessment would have taken into account the capacity of viruses to evolve to infect a wider range of hosts and the greater difficulty of detecting new strains of the virus once the disease became endemic and the risks of multiple strains exacerbating impacts of the disease. To engender confidence, any risk assessments should be publicly released and peer reviewed. Given the lack of information about the potential impacts on native birds (most of which haven't been tested), it would be appropriate to apply the precautionary principle in any significance assessment.

Learning from failure: As far as we know, there has been no review of the response to PPMV1 to assess its adequacy and what can be learned from it. As far as we are aware, there have been no changes to limit the risk of new strains entering the country.

Community engagement and communication: There were clear inadequacies in engaging different sectors and communicating about PPMV1. Arzey (2013) comments that the hobby pigeon sector was fragmented, there was little knowledge of the sector within government and it was difficult 'to establish effective communication with the industry in each jurisdiction and nationally'. In the limited publicity about this disease, most of the focus has been on racing and show pigeons and risks to poultry, with the potential for harm to native birds barely mentioned. There was also little communication with the bird watching or environmental communities. None of the sectors with a strong stake in the outcomes (pigeon hobbyists, bird watchers, conservationists, ecologists) was engaged in decision-making about the approach to the disease despite their clear stake in the outcomes.

Enforcement: There are allegations that the source of pigeon paramyxovirus was illegally smuggled pigeons, as aired in a report on ABC Radio National 'The parrot smugglers' (November 2012), which investigated deficiencies in enforcement against bird smuggling. Here are excerpts from that program:¹⁶⁴

Hagar Cohen (the reporter): Two sweeping wildlife investigations were launched in the past decade. They revealed sophisticated networks of criminals trading eggs of native parrots with eggs of exotic parrots from South Africa, Singapore and the Philippines. But as we'll hear, these two investigations were dropped at the last minute. None of the key players identified were prosecuted.

Australia has some of the toughest penalties for wildlife crime—up to ten years in jail and a \$100,000 fine—but these laws are rarely used. The previous National Manager of Investigations with Customs says smugglers operate with impunity. Here's Richard Janeczko:

Richard Janeczko: I believe with a bit more resources, effort, and equipment those people could be successfully prosecuted, so I'm concerned about that. No point in having all these great penalties without anybody who is actually going to find the crime, do the paperwork, take it to court, and prosecute people.

Hagar Cohen: So you're saying there's no one out there to police wildlife crime in Australia?

Richard Janeczko: What I'm saying is that it's not got the focus it deserves. I do think it's gone too far down the pecking order.

...

Hagar Cohen: A chilling example of the dangers involved in wildlife smuggling was documented last summer. Two diseased pigeons were smuggled into Australia. They carried the highly infectious and deadly paramyxovirus. ... A similar incident, involving exotic parrots, wasn't made public. Some of the infected parrots showed up at a vet clinic in Brisbane run by Dr Adrian Gallagher.

...

Hagar Cohen: Richard Janeczko says investigating wildlife crime is complex.

Richard Janeczko: You make a detection at the airport, you've got two options. You either just record it, take the goods away, tell the guy he's a naughty boy or a naughty girl... to actually then pursue that to court takes a lot of effort and you know that it's going to take a lot of effort. And if you want to get the organisers, you've got to do more than that. If I get you at the airport with your birds in your vest—you've

¹⁶⁴ Background Briefing (2012)

smashed them up—you've got to get DNA testing, you've got to identify the birds, you then have to work out where you were going to take the birds, because you might be only a mule, so we've got to work out who paid you, who the real organiser is. So the success rate in prosecutions, I think, or the lack of success—which is the better way to describe it—I think is down to the fact that there just isn't enough resources and priority to this sort of crime.

...

Hagar Cohen: Is it simply an issue of not enough resources?

Richard Janeczko: Well, I think firstly it's the recognition that it's a problem. And I think that's what's missing at the moment; there's not a recognition that the problem is as important as it is. So I think that's the key issue. If you accept that this is a danger to the future existence of Australia's vibrant ecology, you'd find the money.

...

Background Briefing has seen internal documents from the Department of Environment in Victoria about Operation Janitor. One document says:

(Via reader) There is ample evidence that there is a thriving illegal trade in wildlife, both into and out of Australia, and that Victoria is significant in that trade.

...

From a Department of Environment document about Operation Janitor

(Via reader) There is an ongoing criminal enterprise located in Central Victoria based on protected, notable and endangered wildlife. This enterprise is part of an established network of international traffickers in the eggs of high value wildlife. Couriers and safe houses are utilised in the operation. Profits in the order of A\$300,000 per courier per treatment are being derived. Money is being laundered and disguised through apparently legitimate businesses.

Current smuggling trends were listed as:

(Via reader) Couriers are carrying between 30 and 50 eggs on their body. There are 50 to 500 eggs entering Australia per month, a significant increase in smuggling activity over the last several years. Smuggling occurs on a weekly basis during the high season.

The intelligence was gathered between 2005 and 2009. Several properties were raided.

Issues for the inquiry

Planning and preparation

- Should pigeon paramyxovirus have been a notifiable national disease?
- Given its risks for native birds should there be a contingency plan for pigeon paramyxovirus?
- In anticipation of spread to Australia – given its spread in other countries – should there have been work to ensure a vaccine was available for pigeons?

Emergency response

- What was the decision-making process that led to the decision to not attempt eradication of pigeon paramyxovirus?
- How does the response compare to that which would have been activated if pigeon paramyxovirus had been a risk to chickens?
- Should there have been a comprehensive peer-reviewed risk assessment to inform decisions at a national level about whether there should be an eradication attempt of pigeon paramyxovirus?
- Should there be emergency provisions allowing for rapid assessment and importation of vaccines for an outbreak of an exotic disease? (Ideally this would all have been sorted out beforehand in contingency planning given the known risks of the disease entering Australia.)
- Was it justified to take several months before initiating an *efficacy and safety* trial of the Newcastle disease vaccine for use in pigeons? Should there be protocols about who undertakes such trials and methods used to ensure they engender confidence in the results?

Disease management

- Should it be a legal requirement for pigeon keepers to vaccinate their flocks to limit the risks for their pigeons and wild birds that come into contact with them? (However, before this can be done a pigeon registered vaccine must be available.)

- What can be done to limit the risks of new strains of pigeon paramyxovirus entering Australia and potentially exacerbating the threat to native birds? Has there been any assessment of pathways?

Enforcement

- Is there sufficient focus on enforcing laws against bird smuggling in Australia?
- Is there sufficient priority in biosecurity accorded to environmentally relevant breaches?

Learning from failure

- Has there been any review of the response to PPMV1?

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9. ARGENTINE ANTS ON NORFOLK ISLAND

A case study of the potential to eradicate Argentine ants on Norfolk Island and impediments to protecting island biodiversity from tramp ants.

Species: Argentine ant (*Linepithema humile*)

Origin: South America

Australian occurrence: Widely established in mostly urban areas in temperate Australia, including in southwest WA, SA (Adelaide), NSW (south of Sydney), across Victoria and Tasmania. Detected on Norfolk Island in 2005.

Potential environmental impacts: The Argentine ant is one of the world's worst invasive species. It forms super-colonies and is an aggressive competitor, displacing most other ant species. It can alter ecosystem processes such as pollination and seed dispersal of native plant species. An assessment for the federal environment department concluded that impacts on 2 (of 33) bird species, 2 (of 6) reptile species and 1 (of 1) mammal species would 'be sufficiently severe to cause population declines'. All 5 invertebrates assessed, including 4 snails listed as critically endangered, are predicted to suffer declines.¹⁶⁵ Lach and Barker (2013) say, 'The consequences for most native invertebrate species and communities will be dire, with potential ecological cascade effects to other components of the foodweb that are dependent on invertebrates as a food resource.'



Photo: Pedro Moura Pinheiro(creative commons licence)

Potential economic impacts: Argentine ants farm aphids for honeydew, and more abundant aphids can destroy or reduce the yield of horticultural crops. The permanent establishment of these ants on Norfolk Island would 'seriously threaten the island's self sufficiency in horticultural production'.¹⁶⁶ Honey production would probably be affected. The ants are a household pest and could be a threat to tourism (Norfolk Island's main source of income) if they regularly invaded accommodation facilities or food-based enterprises.¹⁶⁷

Pathways: It's unknown how the ants arrived on the island. Their dispersal to multiple sites on the island is attributed to the processing of contaminated garden waste at the island's waste management centre sold as mulch.

Summary of biosecurity issues: This incursion highlights the need for stringent quarantine on islands. The 5 years it took to identify the Argentine ant exemplifies the limited resources available for surveillance and response on islands. Substantial effort and resources have since been invested in surveillance and control of the ant on Norfolk Island, and there is good potential for eradication based on a 5 year strategy. But Australia could lose this potential unless sufficient funding is provided soon. Most ant eradication programs are threatened by insufficient or inconsistent funding.

Particular biosecurity issues

Quarantine, surveillance and early response: The ant was first identified on the island in 2005, about 5 years after its arrival (according to modelling). A survey in 2006 found it was limited to 2 properties, and some control was undertaken.¹⁶⁸ Unfortunately, one of these sites was a waste management centre selling green waste as mulch. An ant expert brought in in 2008 warned that it was likely to be spreading by this means and

¹⁶⁵ Lach and Barker (2013)

¹⁶⁶ Davis (2008)

¹⁶⁷ Thomas and Davidson (2014)

¹⁶⁸ Lach and Barker (2013)

subsequent surveys found the ant at an additional 8 sites. The expert warned that 'Norfolk Island provides an ideal environment for Argentine ants and, left untreated, they will eventually spread over its entire land surface area'.¹⁶⁹ He recommended eradication.

The arrival of Argentine ants on Norfolk Island demonstrates the need for rigorous quarantine for islands. The delayed detection illustrates the need for regular surveillance for new incursions and the need for community engagement to encourage monitoring for and reporting of new species. Davis (2008) notes that the 'existence of a new and unusual ant species on Norfolk Island had been suspected for several years'. On islands, where human populations are small, crucial time can be wasted due to a lack of local knowledge of the threats posed by tramp ants.¹⁷⁰ The preventable spread of the ants on the Island illustrates the need for early expert advice on new incursions detected. Costs are typically higher on islands due to transport and limited access to experts. There have been delays in treatment due to logistical problems with transporting the bait.¹⁷¹ Delays have made eradication a more difficult and costly task.

Eradication program: Infestations are in 10 zones covering about 240 hectares (the island is 3529 hectares).¹⁷² Treatment since 2008 has contained, fragmented and reduced the size of infestation. Some smaller infestations may have been eliminated. An eradication strategy has been developed with the goal to achieve eradication in 3 years (for a cost of \$1.3 million) with monitoring for 2 years to confirm eradication.¹⁷³

It is an ambitious program – most successful eradications worldwide are over areas less than 1 hectare and the largest in the last decade has been 41 hectares¹⁷⁴ – but the strategy developers are confident it can be achieved provided the program 'is adequately funded and consistently and rigorously implemented'.¹⁷⁵ A review of tramp ant programs in Australia found that 'Australia is at the forefront of developing methodologies to implement eradication attempts on large scales and has made considerable progress'.¹⁷⁶ Much has been learned from programs for the red imported fire ant, electric ant and yellow crazy ant (on Christmas Island and in the Northern Territory) that can be applied to other infestations. Lach and Barker (2013) note that achieving eradication at this scale 'is a long-term process, requiring a sustained, dedicated effort, and lots of trial and error along the way'. Discontinuous or insufficient funding is the major threat.¹⁷⁷ The island administration has very limited financial capacity so funding will need to come from the federal government. Caring for our Country funds were provided from 2010-2012.

Funding for eradication: The short-term cycles of most funding programs are not well suited to eradication projects, which often require consistent investment over many years and need funds for monitoring once eradication has been achieved. Australia should consider a new funding model to maximise the prospects of achieving eradications. In a review of projects funded through Caring for our Country, Lach and Barker (2013) say that it is not appropriate that Norfolk Island (and Lord Howe Island) had to apply for funding through Caring for our Country's open call for proposals to respond to invasive species incursions that threatened nationally and internationally significant biodiversity assets. Any lag between detection and treatment provides an opportunity for the ants to spread. 'Commonwealth and state governments, in a coordinated manner, need to take the lead in immediate response to biosecurity incursions'.¹⁷⁸ We recommend a fund be established for eradications not eligible cost-sharing under NEBRA to enable rapid responses after detection and financial commitments over the necessary timeframes to maximise the chances of success.

Threat abatement: Although Argentine ants are a major threat to biodiversity on the Australian mainland, threat abatement has been neglected. The 2012 review of the threat abatement plan found there had been

¹⁶⁹ Davis (2008)

¹⁷⁰ Lach and Barker (2013)

¹⁷¹ Lach and Barker (2013)

¹⁷² Thomas and Davidson (2014)

¹⁷³ Thomas and Davidson (2014)

¹⁷⁴ Lach and Barker (2013)

¹⁷⁵ Thomas and Davidson (2014)

¹⁷⁶ Lach and Barker (2013)

¹⁷⁷ Lach and Barker (2013)

¹⁷⁸ Lach and Barker (2013)

‘minimal progress with Argentine ants in relation to the objectives of the threat abatement plan to increase and improve: science-based knowledge; border detection and internal spread; and government action for this ant.’¹⁷⁹ Lach and Barker (2013) note that if the 2006 threat abatement plan had been implemented ‘it is likely that the tramp ant incursions on Lord Howe Island and Norfolk Island and their threats would have been recognised earlier, and coordinated management could have commenced sooner and more efficiently.’

Issues for inquiry

Biosecurity capacity

- How can the capacity on islands to detect and respond to new incursions be improved and supported?

Eradication

- How can funding models be adapted to maximise the prospects of successful eradication projects?

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10. RED-EARED SLIDER TURTLES

A case study of the risks associated with illegal pet keeping.

Species: Red-eared slider turtle (*Trachemys scripta*, subspecies *elegans*)

Origin: southern United States

Australian occurrence: Breeding populations have been found in NSW and Qld, and individual specimens have been detected in the wild in Victoria, ACT and WA.¹⁸⁰ The Queensland populations have probably been eradicated. We do not know the status of the NSW or ACT populations.



Photo: Jim, the photographer (creative commons licence)

Potential environmental impacts: On the IUCN list of 100 examples of the world's worst invasive species.¹⁸¹ A risk assessment by the Queensland government found there is 'considerable evidence that red-eared sliders can negatively affect locally native turtle species' – they mature more quickly than locally native turtle species, are more aggressive, have higher fecundity and grow larger.¹⁸² They could impact on rare frogs and other aquatic prey. Tadpoles of native frog species may not be able to recognise a new exotic predator.¹⁸³ There is a significant risk of captive bred red-eared slider turtles spreading diseases and parasites into wild reptile populations.¹⁸⁴ This may be a greater risk for biodiversity than the turtles themselves.¹⁸⁵ There is evidence that a malaria-like blood parasite was transferred to two native turtle species from infected red-eared slider turtles in the Lane Cove River, Sydney.¹⁸⁶ Burgin (2006) said they show 'all of the hallmarks of being the reptile equivalent to the carp' for their impacts on wetland biodiversity.

Potential social and economic impacts: The costs of control to protect biodiversity could be substantial. The Queensland government spent close to \$1 million to eradicate them from 7 sites, and removed them from at least 10 additional locations.¹⁸⁷ This investment could be wasted unless there is continued education and vigilance to prevent the establishment of new populations. They are regarded as an aquaculture threat in the US.

Pathways: Red-eared sliders are released into the wild by people illegally keeping them as pets. They are the world's most commonly traded reptile, due to low price, small size and easy maintenance.¹⁸⁸ But they can live for decades and when mature can inflict painful bites, which results in many being dumped into the wild.¹⁸⁹

Summary of biosecurity issues: There is a high risk of continued illegal releases of this threatening invader into the wild. There have been varying degrees of action by state governments ranging from a concerted eradication effort by Queensland to very little action by NSW. To prevent it establishing and spreading, Australia needs a national strategy and a concerted education and compliance program to stop illegal keeping.

¹⁸⁰ Csurhes and Hankamer (2012)

¹⁸¹ Lowe et al. (2000)

¹⁸² Csurhes and Hankamer (2012)

¹⁸³ Polo-Cavia et al. (2010)

¹⁸⁴ Csurhes and Hankamer (2012)

¹⁸⁵ Illegally smuggled specimens are likely to have passed through Asian wet markets, where they are housed in terrible conditions with multiple species from all over the world. Reptile diseases are hard to detect, with some having long incubation periods (Scott O'Keefe, personal communication).

¹⁸⁶ Department of Agriculture and Food (WA) (2009)

¹⁸⁷ Csurhes and Hankamer (2012), Scott O'Keefe (personal communication)

¹⁸⁸ Csurhes and Hankamer (2012)

¹⁸⁹ Csurhes and Hankamer (2012)

Particular biosecurity issues

Quarantine: Red-eared sliders are one of the most common smuggled, illegally kept and illegally released wildlife species in Australia. From 1999-2010, at least 67 were seized in 5 interceptions at the border in 3 states, at least 115 were seized in at least 38 or more incidents of illegal keeping and more than 235 were detected in the wild in 24 incidents in the ACT, NSW, Qld, Vic, WA.¹⁹⁰ The extent of illegal activity detected suggests a very high risk of new incursions and a high risk of new disease introductions. Henderson and Bomford (2011) recommend 'priority be given to educating the public, particularly through media coverage, about the risks posed by red-eared sliders, so that people are less likely to keep or release them, and are more likely to recognise and report sightings.'

Queensland response: A population of red-eared sliders was detected in Queensland in 2004 in six dams and one private breeding facility in the Pine Rivers Shire north of Brisbane. An eradication campaign, combined with a public awareness campaign, resulted in the detection of 2 other naturalised populations in south-east Queensland.¹⁹¹ The outbreak in Queensland was traced to an illegal breeding facility. Eradication of the known populations is thought to have been successful.¹⁹² It cost about \$1 million.¹⁹³ It was the first program of its kind to eradicate these turtles. New DNA probe technology developed as a result of the project has the potential to reduce the cost of future eradication/management programs substantially, perhaps by a factor of ten.¹⁹⁴

NSW response: A breeding population of red-eared sliders were found at Yeramba Lagoon (south Sydney) in 2006 (along with another species of feral turtle).¹⁹⁵ NSW authorities commenced a surveillance and delimiting program, but funding was withdrawn. 'The implications of the find were not recognised'.¹⁹⁶ It is currently not known whether the lagoon still supports a breeding population of red-eared slider turtles.¹⁹⁷ Individuals, including gravid females, have been found elsewhere in Sydney with no response reported.¹⁹⁸ Burgin (2006b) warned that the cost of immediate removal of emerging populations would 'be insignificant in comparison to the longer term management of their impacts'.

WA and Victoria responses: Several have been removed from urban waterbodies in these states.¹⁹⁹ In Victoria a 2008 detection resulted in removal of three turtles from a Melbourne lake.²⁰⁰

Enforcement: In 2004, there was an 8-week national exotic reptile amnesty granting exemption from prosecution for those who forfeited illegally kept animals (including 18 red-eared slider turtles). As part of the eradication program in Queensland, there was an active enforcement program targeting illegal keeping. One person in Queensland who bred and dispersed the red-eared slider turtles was prosecuted.²⁰¹ But the fine was small, and no conviction was recorded.

Prevention: Participants at a 2006 workshop on red-eared slider turtles proposed: the development of a national strategy by the Vertebrate Pests Committee; to include a formal risk assessment; a national taskforce to coordinate activities; standard operating procedures for management; a review of ways in which risks of

¹⁹⁰ Henderson and Bomford (2011)

¹⁹¹ Csurhes and Hankamer (2012)

¹⁹² DAFF (2012)

¹⁹³ Csurhes and Hankamer (2012)

¹⁹⁴ Scott O'Keefe (personal communication)

¹⁹⁵ Burgin (2006a), Csurhes and Hankamer (2012)

¹⁹⁶ Burgin (2006b)

¹⁹⁷ OEH (2013)

¹⁹⁸ Department of Agriculture and Food (2009)

¹⁹⁹ Department of Agriculture and Food (2009)

²⁰⁰ Department of Environment and Primary Industries (nd)

²⁰¹ Anonymous (2009)

invasion from the exotic reptile trade could be reduced; and a communications plan and research.²⁰² The strategy has not eventuated.²⁰³

Issues for the inquiry

Contingency planning and pathway analysis

- Has there been sufficient focus on the risks of exotic reptiles establishing due to illegal keeping?
- Should there be a national strategy to coordinate responses to threats such as red-eared slider turtles?

Eradication

- What is the current state of red-eared slider turtle populations? Has there been any effort to eradicate the population of red-eared slider turtles at Yeramba Lagoon?

Enforcement

- Do the enforcement agencies responsible for preventing the illegal animal trade coordinate their activities to prevent external and internal trade in red-eared slider turtles?

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²⁰² O'Keefe (2006)

²⁰³ There has been considerable work on Europe on this species. France, Italy, Portugal and Spain have a cooperative control program based on techniques initially developed in the Qld program (Scott O'Keefe, personal communication). They have made substantial use of detection dogs and ground penetrating radar to locate nests.

11. JACK DEMPSEY CICHLIDS

A case study of an aggressive aquarium fish probably illegally released into the wild

Species: Jack Dempsey cichlids (*Cichlasoma octofasciatum*)

Origin: North and Central America

Australian occurrence: NSW – in a popular swimming pool (an isolated flooded quarry) on the far north coast near Yamba.¹⁹⁶

Potential environmental impacts: The features that make cichlids popular pets are also those that contribute to their invasive potential: ‘they are hardy, adaptable and breed prolifically’.¹⁹⁷ In their native range Jack Dempsey cichlids inhabit swampy areas with warm, murky water. Of great concern is that they are highly aggressive fish (named after the heavyweight boxer Jack Dempsey) and are likely to dominate and compete with native fish populations. They eat almost anything smaller than themselves, including fish, invertebrates and frogs.¹⁹⁸ As a relatively large carnivore they could directly impact on a wide range of native fish.¹⁹⁹ Females lay about 500-800 eggs per clutch and both parents aggressively protect the eggs. The introduction of disease into wild fish populations is also of great concern.²⁰⁰ Many pathogens and parasites have been recorded in imported ornamental fish in quarantine and post-quarantine in Australia. Jack Dempsey cichlids can tolerate low oxygen levels, so can inhabit degraded waters.²⁰¹



Photo: Gregory Heinrichs (creative commons licence)

Potential social and economic impacts: They include costs of control, impacts on recreationally valued fish and the potential spread of disease into economically or recreationally valued fish.

Likely pathways: Probably illegally released from an aquarium when the owner no longer wanted them.

Summary of biosecurity issues: In 2004/05 there was an attempt to eradicate a population of Jack Dempsey cichlids from a pool on the NSW north coast but it was unsuccessful (or the cichlids were re-introduced). They are one of about 30 aquarium fish species that have established in Australian waterways.²⁰² They highlight the importance of preventing new incursions because it is extremely difficult or impossible to eradicate feral fish populations.

Biosecurity issues

Risk assessment and contingency planning: There are >450 ornamental fish species permitted for import into Australia; in 2004-05, 15 million fish were imported.²⁰³ Corfield et al. (2008) note that risk assessments rely on overseas information and are likely to be of limited value in many cases in predicting the likelihood of environmental impacts in Australian waters. We do not know of any contingency planning for aquarium fish incursions. More than two-thirds of naturalised fish in Australia have come from the aquarium trade. As well as the risk of aquarium fish establishing in the wild, the risks of them introducing new fish pathogens and

¹⁹⁶ Department of Primary Industries (nd)

¹⁹⁷ Department of Primary Industries (nd)

¹⁹⁸ Department of Primary Industries (2004)

¹⁹⁹ Corfield et al. (2008)

²⁰⁰ Whittington and Chong (2007)

²⁰¹ Corfield et al. (2008)

²⁰² Corfield et al. (2008)

²⁰³ Corfield et al. (2008)

parasites has not been adequately addressed (see case study 14).²⁰⁴ Whittington and Chong (2007) advise that 'the number of species traded and the number of sources permitted need to be dramatically reduced to facilitate hazard identification, risk assessment and import quarantine controls.'

Response to incursion: The NSW government website explains the response to the detection of 'thousands' of Jack Dempsey cichlids in 2004:

When Jack Dempseys were first discovered in the Green Pool, Angourie they were considered an ideal target to attempt a pest fish eradication program, because the pool was relatively small, confined, and contained few native fish. However there were also some limits on what methods could be used because the pool is a popular local swimming location. After considering the options available it was decided to trial explosives – a novel technique that had been used with some success in Western Australia.

Three eradication attempts, using lines of detonation cord laid out across the pool's surface by a qualified explosives expert, were carried out between September 2004 and June 2005 (several successive attempts were necessary as eggs and larvae are not killed by the shock wave). After the use of explosives, 36 large Australian bass were released into the pool to help prey on any remaining larvae or juveniles.

Unfortunately, follow up monitoring by the department has found Jack Dempseys still remain in the pool. It is possible that the fish are very hardy and some survived the blasts, or alternatively they may have been deliberately re-introduced.

NSW DPI is not planning any further eradication work at this time.

Threat abatement: Non-native fish species are 'implicated in the decline of 42% of Australian native fish and several frog species'.²⁰⁵ The Threatened Species Scientific Committee recently judged that 'The introduction in Australian inland waters of native or non-native fish that are outside their natural geographic distribution' met the criteria for a key threatening process on the basis but the environment minister rejected the advice of the committee to list it as a KTP.²⁰⁶ The refusal to list (or even assess invasive species KTPs)²⁰⁷ has become a pattern at the federal level, undermining the capacity to take a national approach to many very serious invasive species threats.

Issues for inquiry

Risk reduction

- What measures should biosecurity agencies be taking to reduce the risks of new species of aquarium fish establishing in Australian waterways?
- Should there be listing of key threatening processes on the basis of scientific advice rather than being a ministerial prerogative and the requirement for a threat abatement plan?
- What funding is available for the implementation of threat abatement plans?

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²⁰⁴ Whittington and Chong (2007)

²⁰⁵ Moore et al. (2010)

²⁰⁶ Threatened Species Scientific Committee (2011)

²⁰⁷ The Invasive Species Council made two nominations that were refused for assessment on the basis that 'novel biota' were being assessed as a KTP. This effectively shuts down the capacity to use the national threat abatement process to assist with addressing invasive species problems not already listed.

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12. EMERALD FURROW BEES

A case study of a neglected incursion of a new bee species.

Species: Emerald furrow bee (*Halictus smaragdulus*)

Origin: The Mediterranean

Australian occurrence: NSW

Potential environmental impacts: This bee 'could have serious impacts due to its high relative abundance, long seasonal activity, and an apparent preference for introduced plants and declared noxious weeds in New South Wales'.²⁰⁸ Potential impacts of concern are competition with native fauna, transmission of parasites and pathogens, disruption of native plant pollination networks, and exacerbation of weed problems by increasing pollination of introduced plants. Too little is known yet to predict its ecological impacts but bioclimatic models suggest it will thrive across much of southern Australia.²⁰⁹

Potential economic or social impacts: Likely costs include those due to increased weed spread.

Summary of biosecurity issues: The emerald furrow bee was discovered by chance in riparian areas of the Hunter Valley in NSW in November 2004.²¹⁰ Although a recent introduction (it hadn't been observed in past surveys) it was well established, being the second most common bee trapped in some places. Apart from a few surveys in 2008-2010 funded by philanthropy, this new introduction has been ignored. Little is known about the bee's ecology, distribution and impacts. By the time impacts become clear it could be too late to do anything about it. It is important to prevent further introductions that could increase the species' environmental tolerances in Australia.

Particular biosecurity issues

Risk assessment and contingency planning: As far as we are aware there has been no risk assessment or contingency planning for this species. Ashcroft et al. (2012) warn that it 'would be prudent to prevent further introductions that could diversify the gene pool and broaden the environmental tolerance of the species in Australia'.

At-border biosecurity: It is not known how the bee entered Australia. DNA from specimens showed 2 maternal lineages, indicating the introduction of more than one individual.

Monitoring and research: This bee incursion exemplifies a catch 22 in environmental biosecurity. Governments are loath to fund management without evidence of serious impacts but by the time the impacts become clear it is typically too late to eradicate or contain invasive species. Furthermore, funding for research is extremely limited. Surveys to determine the distribution of this bee were done with philanthropic funding.²¹¹ The surveys included the involvement of citizen scientists, an increasingly viable option for some biosecurity work.²¹²



Photo: Stefan Schmidt (creative commons licence)

²⁰⁸ Ashcroft et al. (2012)

²⁰⁹ Ashcroft et al. (2012)

²¹⁰ Gollan (2009)

²¹¹ Gollan (2009)

²¹² Ashcroft et al. (2012)

Issues for the inquiry

Incursion responses

- Should new incursions automatically trigger risk assessment to determine the most appropriate response?

Risk assessment and contingency planning

- Given that three new exotic bees established in Australia have been detected since 2000, should there be risk assessments, pathway analysis and contingency planning to reduce the risks of further bee incursions, including new variants of existing naturalised species?

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CASE STUDIES OF FUTURE INCURSION RISKS

13. PATHOGENS OF WATTLES AND EUCALYPTS

A case study of emerging diseases in overseas plantations of wattles and eucalypts that are a biosecurity risk for native plants in Australia.

Species: Several pathogens not in Australia that infect *Acacia* and *Eucalyptus* species in overseas plantations include the following.²¹³

Pathogens	Countries	Impacts
<i>Chrysosporthe cubensis</i> (fungus)	South America, Central America, South East Asia	Has jumped from Melastomataceae species to cause serious stem canker disease in eucalypts.
<i>Chrysosporthe austroafricana</i>	Africa	Has jumped from Syzygium species to cause serious stem canker disease in eucalypts.
<i>Ceratocystis fimbriata</i> (fungus)	Republic of Congo, Uganda and Brazil	Causes disease and death in eucalypt plantations.
<i>Erwinia psidii</i> (bacterium)	South America	Jumped from native guavas to cause shoot and branch die-back in eucalypts. Secondary infections cause cankers on branches and growing shoots.
<i>Ceratocystis albifundus</i>	Africa	Jumped from <i>Protea</i> species and 6 other genera to cause rapid wilting, dieback and death of <i>Acacia mearnsii</i> in plantations.
<i>Ceratocystis acaciavora</i>	Indonesia	Causes severe canker wilt disease in <i>Acacia mangium</i> plantations in Sumatra.

Potential environmental impacts: As exemplified by the impacts of myrtle rust, plants newly exposed to pathogens can be devastated by disease. By exporting eucalypts and acacias for large-scale cultivation in plantations, Australia has set up the conditions for new pathogens to shift (jump hosts) and adapt to Australian natives. Wingfield (2003) discusses the increasing risk of host jumping:

... native pathogens, previously thought to be relatively host specific and non-threatening, are adapting to infect exotic plantation trees. Other than the damage that these pathogens are causing to exotics, they now pose a serious threat to the same or related tree species in their areas of origin. This tremendous threat is only just being recognised and it is little understood.

An estimated 18 million hectares in 80 countries are planted with eucalypts, and Acacias are grown in plantations in Africa and South East Asia. The same risk applies to other Australian plants grown as crops – for example, casuarinas, Geraldton wax and kangaroo paw (for the cut flower trade), *Duboisia myoporooides* (for pharmaceuticals) – or that become dominant weeds.

High-density monocultures are favourable habitats for new pathogens to infect, and can support far greater pathogen densities than are typically found in natural situations. New diseases are rapidly emerging in overseas plantations – some of the most serious due to native pathogens jumping host to the non-native plantation species. Global trade and travel then provide the means for pathogens adapted to Australian species overseas to eventually make it into Australia, where many more hosts await them in natural ecosystems or in cultivation. Myrtle rust is just the first of several pathogens that could follow this path.

²¹³ This issue was summarised in Booth (2011) based on the references listed at the end of this case study.

Biosecurity issues: Taking these potential disease threats seriously requires focusing on disease risks to Australian plants overseas as well as in Australia. Australia should be working with forest managers overseas to identify risks and adopt practices to minimise the transfer of pathogens from native forests to plantations and crops of Australian species. We should be funding research to assess disease risks and identify pathways for their potential entry into Australia. The risk of pathogen transfer either from Australia or into Australia should be taken into account when plants are developed for cropping overseas, particularly when there are large plant families in common.

The serious risks to Australian plants and animals associated with exotic diseases warrants a strong biosecurity focus. It highlights the need for the proposed Environment Health Australia to identify and undertake contingency planning for high priority environmental risks.

Issues for the inquiry

Risk assessment and contingency planning

- What work should Australia be undertaking to prevent emerging diseases in overseas plantations from reaching Australia?
- Should the potential for the generation of new disease risks be considered when native Australian species are exported?

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14. FISH PATHOGENS AND PARASITES

A case study of the aquatic disease risks of importing aquarium fish

Species: Whittington and Chong (2007) list ~50 ‘pathogens identified during laboratory examination of diseased ornamental fish held in approved quarantine premises or not associated with quarantine in Australia 1999–2004’ including 9 viruses, 14 bacteria, 5 fungi, 16 protozoa. Corfield et al. (2008) noted that 20 of the naturalised ornamental fish species in Australia were known to each harbour at least one disease exotic to Australia.

Potential environmental impacts: According to a report for the federal environment department, diseases carried by ornamental fish ‘represent a significant threat to the ecology and sustainability of Australia’s native aquatic fauna, in some cases potentially native waterbirds and mammals, and in the case of zoonotic agents, even to human health’.²¹⁴ In 2003, there was an outbreak of iridoviral disease in Murray cod in an aquaculture facility in Victoria that resulted in 90% losses.²¹⁵ It could have had devastating impacts on Murray cod, a threatened species, if it had infected wild populations. Unlike many fish farms, the affected farm fortunately did not discharge its effluent into a river. Several other related fish species in Australia are also likely to be susceptible to this pathogen, including trout cod, Mary River cod, eastern freshwater cod. Viruses carried by gouramis may also cause disease in frogs.²¹⁶

Pathways: Imported aquarium fish that carry pathogens and parasites, some of which would not cause any obvious symptoms in their hosts but could cause harm to native Australian species. The origin of the iridoviral disease in Murray cod is thought to have been imported gourami fish.²¹⁷ Of five pet shops in Sydney, two had fish that tested positive for this pathogen.

Summary of biosecurity issues: Live ornamental fish are a high risk group for introducing aquatic animal diseases into Australia, because they are vectors of numerous diseases, are widely traded widely around the world, are imported in large numbers into Australia (>10 million a year) and are frequently released into waterways by aquarium owners.²¹⁸ Current quarantine practices are known by biosecurity authorities to be ineffective in stopping the entry of diseased fish into Australia. Very little is known about specific disease risks of the hundreds of species permitted entry into Australia.

Particular biosecurity issues

Risk assessment: There has been limited focus on the disease risks of imported aquarium fish and there is a lack of knowledge of pathogens and parasites in both imported fish and native aquatic organisms to inform risk assessments.²¹⁹ Corfield et al. (2008) noted for the 23 aquarium fish naturalised in Australian waterways ‘there was little evidence that there had ever been a thorough examination for parasites undertaken by suitably qualified persons in their countries of origin’ and ‘evidence of surveillance for viruses and bacteria, appeared virtually non-existent in most cases’.

A review for the environment department by Corfield et al. (2008) found that imported goldfish, gouramis, and poeciliids were a ‘high risk’ category, hosting significant exotic viruses or parasites. A second ‘medium risk’ group of fish known to host one or two significant exotic disease agents with low host specificity or parasites of zoonotic importance included Mozambique tilapia, oriental weatherloach and rosy barb. However, because so little research has been conducted, they warn that many imported fish could harbour pathogens and parasites unknown to science. Whittington and Chong (2007) note that the hazards of the global trade in aquarium fish are little known and that from

²¹⁴ Corfield et al. (2008)

²¹⁵ Whittington and Chong (2007)

²¹⁶ Corfield et al. (2008)

²¹⁷ Whittington and Chong (2007)

²¹⁸ Corfield et al. (2008)

²¹⁹ Whittington and Chong (2007), Corfield et al. (2008)

2000-2006 there were 16 times more scientific publications on diseases in farmed fish than those in aquarium fish and 470-fold more on disease in cattle. They say a new approach to risk assessment of ornamental fish disease risks is needed:

‘The international community must consider a new model for risk analysis for ornamental finfish that is inclusive of potential and unidentified hazards. Alternatively, to retain the current risk analysis approach and use it in a meaningful way would require proper identification and assessment of hazards. The only way this could be achieved would be through a dramatic reduction in the number of species traded and the number of sources, as well as increased surveillance for emerging pathogens and virulence testing of known and emerging pathogens in a wide range of potential hosts.’

The infection of farmed Murray cod with an iridovirus likely to have come from aquarium fish eventually led Biosecurity Australia to conduct an import risk analysis of biosecurity risks associated with gourami iridovirus and related viruses. The provisional final IRA recommended that the importation of fish of the gourami, cichlid and poeciliid families for ornamental purposes be permitted only if ‘fish are batch-tested post-arrival in Australia to show they are free of megalocytiviruses or the fish are sourced from a country, zone or compartment that is recognised by Australia to be free of megalocytiviruses (based on active surveillance)’. We make no judgement about the likely adequacy of these recommendations. However, the recommendations have not been implemented.²²⁰ In 2012, the Director of Animal and Plant Quarantine decided to ‘await the completion of a University of Sydney survey of Australian fish for megalocytivirus before making a determination on the IRA’s recommendations’.²²¹ The survey was due for completion in March 2013 but there has been no decision announced on the IRA.

The Director notes that the estimation of risk in the IRA report is based on the assumption that farmed and wild Australian fish are free of megalocytivirus, and that this assumption is based on limited data. He is also aware of a Fisheries Research and Development Corporation funded survey of Australian fish for megalocytivirus currently being undertaken by the University of Sydney. The survey is due for completion in March 2013. Given that this survey will provide additional relevant information, the Director of Animal and Plant Quarantine has decided to await the survey’s outcomes before making a policy determination. In the meantime current import conditions remain in place. So, a decade after the iridoviral outbreak, there has still not been reforms to apply Australia’s ALOP to this identified disease risk.

Quarantine: Whittington and Chong (2007) note that shipments of aquarium fish commonly contain diseased fish but medications are used to suppress signs of disease. They also criticised quarantine protocols for the lack of means to trace consignments once imported fish are released from quarantine.²²² DAFF has acknowledged that quarantine processes to detect disease in aquarium fish are ‘ineffective’ – because they ‘can not address risks associated with subclinically infected fish.’²²³ The requirements include mandatory on-arrival quarantine period of one to three weeks (depending on the species) in quarantine-approved premises. The quarantined fish are observed for signs of disease, but are not tested. In 2013 it was proposed to improve quarantine processes for ornamental fish with testing for specific diseases and pathogens and ‘use of epidemiological evidence to identify pests and disease of potential biosecurity concern (ie. new and emerging pests)’.²²⁴ We do not know whether these changes have been implemented and how effective they will be.

²²⁰ Department of Agriculture, Fisheries and Forestry (2012a).

²²¹ According to the DAFF website, ‘The Director notes that the estimation of risk in the IRA report is based on the assumption that farmed and wild Australian fish are free of megalocytivirus, and that this assumption is based on limited data.’

²²² Whittington and Chong (2007)

²²³ Department of Agriculture, Fisheries and Forestry (2013)

²²⁴ Department of Agriculture, Fisheries and Forestry (2013). According to Department of Agriculture, Fisheries and Forestry (2012b), under the proposed system:

Surveillance and monitoring: Corfield et al. (2008) noted that although Australia has the expertise to identify and monitor fish disease outbreaks, the resources for monitoring are lacking. The lack of knowledge of parasites and pathogens of Australian native fishes makes it difficult to identify new introduced diseases. This is the reason the IRA recommendations for iridoviruses have not been implemented.

Issues for the inquiry

Risk reduction

- What measures should Australia be taking to reduce the risk of imported aquarium fish bringing new aquatic diseases into Australia?

Import risk assessments

- Given the lack of information about fish pathogens and parasites in both native and exotic fish what approach should be taken to risk assessments? Should the precautionary principle be applied?

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- all shipments of freshwater and marine ornamental fish would continue to be inspected on arrival
 - bags of fish showing significant mortality or morbidity would be sampled during on-arrival inspection and the remaining fish destroyed or re-exported
 - some bags would be selected randomly during on-arrival inspection for sampling and the remaining fish in the consignment released
 - fish samples would be sent to participating laboratories for a general health assessment and testing for specific disease agents of quarantine concern
 - the information obtained would be analysed and appropriate action taken to manage any biosecurity disease risk at the source.

15. AVIAN BORNAVIRUSES

A case study of a neglected disease risk in Australian captive parrots that could threaten wild parrots and other birds.

Species: Avian bornaviruses (ABV) that cause proventricular dilatation disease (PDD).²²⁵ Two genotypes (ABV 2 and 4) have been introduced into Australia (through the importation of parrots) and are present in avicultural collections.²²⁶ Other genotypes could also be present, either as introduced pathogens or naturally occurring viruses in native birds.²²⁷

Origin: Well established as a disease of captive parrots in North America, Europe and elsewhere.²²⁸ Parrot genotypes of ABV have been documented in North America, South America, Europe, Africa, the Middle East and Japan.²²⁹

Australian occurrence: There was one reported case in 1997 of a green wing macaw (legally imported in 1993). Then a cluster of cases in captive parrots occurred in southeast Queensland in 2005 to 2006 (the source of infection was not established).²³⁰

Potential environmental impacts: The impacts of bornoviruses on captive-raised parrots are sometimes 'catastrophic'. According to Wildlife Health Australia (formerly Australian Wildlife Health Network), these viruses threaten captive breeding and reintroduction programs for threatened parrots, and their escape from captive birds into wild populations would pose 'a significant risk to native parrot and passerine species'.²³¹

Many avian bornovirus infections are asymptomatic. But some infections (after an incubation period perhaps as long as 7 years²³²) result in inflammation of the nervous system, which leads to the often fatal proventricular dilation disease. It has caused deaths in wild birds overseas.

Because of the ability of these viruses to cause long-term subclinical infections, multiple genotypes have spread globally with the trade in cage birds.²³³ PDD is the most serious viral disease in captive parrots in Europe and North America.²³⁴ Globally, avian bornaviruses have been detected in or suspected to occur (based on histology) in >80 parrot species. Australian species known to develop PDD or that have been detected with ABV infection include the sulphur-crested cockatoo, palm cockatoo, red-tailed black cockatoo, galah, gang gang, cockatiel, red-capped parrot, and eclectus parrot. It is highly likely that many Australian parrot species are susceptible.²³⁵ There have also been reports of this or a similar disease in toucans, honeycreepers, canaries, weaver finches, Canada geese, roseate spoonbills and a peregrine falcon.

So far, PDD has been detected in 5 imported parrot species in Australia but there have been no reports of ABV in Australian wild birds. An informal survey of 35 Australian bird veterinarians in late 2008 found that 7 had seen cases of PDD (documented by histopathology).

²²⁵ Australian Wildlife Health Network (2013). There is 'increasing proof' that proventricular dilatation disease is caused by that ABVs are the cause of PDD'. In a small study of experimentally infected parrots, Koch's postulates were fulfilled.

²²⁶ Australian Wildlife Health Network (2013)

²²⁷ Australian Wildlife Health Network (2013)

²²⁸ Australian Wildlife Health Network (2013)

²²⁹ Australian Wildlife Health Network (2013)

²³⁰ Doneley et al. (2007)

²³¹ Australian Wildlife Health Network (2013)

²³² Gallagher (2014)

²³³ Australian Wildlife Health Network (2013)

²³⁴ Gallagher (2014)

²³⁵ Australian Wildlife Health Network (2013)

Summary of biosecurity issues: This disease infecting captive parrots could threaten a wide range of parrots and other bird species if it spills over into wild populations. But the risks have been neglected. The disease is not notifiable, there has been no risk assessment or contingency planning, and there is no surveillance or monitoring. The case would be very different if this was a commercial threat. It highlights the critical need to provide Wildlife Health Australia with resources to focus on wildlife disease risks in addition to the diseases that are a focus because they are also a commercial or human health risk. It also highlights the need for an environmentally focused biosecurity body such as the proposed Environmental Health Australia.

Particular biosecurity issues

Risk assessment and contingency planning: Despite PDD (i) being prevalent overseas including in Australian parrots, (ii) having been recorded in Australia and (iii) being an obvious risk to wild populations of native parrots (and other bird species) including threatened species, it is not a notifiable disease in Australia. There is no AUSVETPLAN for PDD.²³⁶ There has been no risk assessment or contingency planning (as far as we are aware).

At-border biosecurity: Avian Bornavirus 2 and 4 were probably introduced into Australia with imported or smuggled parrots, and it is likely that other ABVs have been introduced with passerine species including the canary and ducks such as the pekin duck and mallard.²³⁷ Because diagnostic tests are not very sensitive for bornaviruses, they could have arrived through legal imports. There are diagnostic tests for ABV infected birds, 'but even in combination, they are not sufficiently sensitive to detect many infected birds'.²³⁸

Post-border biosecurity: Brisbane-based bird veterinarian Adrian Gallagher told Radio National Background Briefing of his experience with PDD.²³⁹ He diagnosed six cases a few years ago.

Adrian Gallagher: The first case we had—which is the first case that was comprehensively diagnosed in Australia—we said to the client that, 'Look, this is an exotic disease'—at that point we knew less about it than we know now—and we said, 'Look, we really need to shut your aviary down, because we just don't know what this disease is going to do.' And this client had a very mixed collection. It was in a big, fully flighted, planted aviary; it was something like 30 sq. m. And there was a whole mixture of doves, quail, ducks, parrots, finches—everything in this aviary. Now, as soon as he knew he had a potential problem in that aviary, he actually sold all of his collection.

Hagar Cohen: And so he advertised his collection freely?

Adrian Gallagher: Exactly, exactly.

Hagar Cohen: And you saw that, that he advertised?

Adrian Gallagher: Yes.

Hagar Cohen: But there was nothing you could do about it.

Adrian Gallagher: Nothing at all.

Hagar Cohen: So that person has potentially sold a whole lot of diseased parrots and birds to other people who've got no idea about it.

Adrian Gallagher: Exactly, and they could be disseminated right round Australia.

Hagar Cohen: Dr Gallagher couldn't enforce the quarantine in that case because the exotic virus isn't officially recognised in Australia as infectious. It has no legal status; it's not officially monitored.

Surveillance and monitoring: As PDD is not a notifiable disease in Australia, there are no requirements for veterinarians to report occurrences and no formal surveillance programs for captive

²³⁶ Australian Wildlife Health Network (2013)

²³⁷ Doneley et al. (2007), Background Briefing (2012), Australian Wildlife Health Network (2013)

²³⁸ Australian Wildlife Health Network (2013)

²³⁹ Background Briefing (2012). Note that Adrian Gallagher has made a submission to this inquiry about PDD.

or wild populations. The Australian Wildlife Health Network (2013) noted that if cases are detected in wildlife they would fit within the general surveillance category of 'Interesting or unusual cases' and could be captured by AWHN wildlife coordinators.²⁴⁰ There is no guarantee of any biosecurity response to detections in the wild.

Enforcement: Veterinarians have expressed suspicions that bornoviruses have been introduced into Australia with smuggled infected birds or eggs (but it is not known whether PDD can be transmitted by eggs, which are thought to be the main item smuggled).²⁴¹

Research: With so little known about this disease in Australia – the extent of its spread in aviculture, the susceptible species, the risks to wild bird populations, the range of genotypes in Australia – there is an urgent need for research.

Issues for inquiry

Risk reduction

- What measures should be taken to limit the risks of avian bornoviruses from escaping into wild bird populations?

Surveillance and monitoring

- What resources does Wildlife Health Australia need to effectively monitor and report on wildlife diseases of biodiversity importance?
- Should there be a process for identifying notifiable diseases of relevance to conservation?

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Gallagher A. 2014. Senate inquiry submission regarding Proventricular Dilatation Disease (PDD) in psittacine birds.

²⁴⁰ Australian Wildlife Health Network (2013)

²⁴¹ Doneley et al. (2007), Background Briefing (2013) citing Gallagher.

16. GREEN IGUANAS

A case study of a high risk species illegally kept in and smuggled into Australia

Species: Green iguana (*Iguana iguana*)

Origin: Central and South America. Naturalised populations exist in the United States (including Hawaii and the Virgin Islands) Grand Cayman, Puerto Rico and Fiji.

Potential environmental impacts:²⁴² Green iguanas can grow up to 2 metres long; they are arboreal and agile climbers. A habit of diving into water (and staying submerged while swimming) makes them difficult to capture. Large areas in Australia, particularly across the north and down the east coast are considered climatically suitable for green iguanas.²⁴³ It is difficult to predict what their environmental impacts will be but a Queensland government risk assessment found they are a high risk species due to several attributes:

- a history as a pest overseas (Florida, Hawaii, etc.)
- a preference for tropical and subtropical climates
- an extensive native range
- a broad, non-specialised diet (mainly herbivores)
- relatively high fecundity.



Photo: Garen Meguerian (creative commons licence)

Biosecurity issues

Interceptions and incursions: Green iguanas are not permitted in Australia. They have frequently been intercepted: from 1999–2010, 17 animals in 10 incidents were seized, stolen or surrendered from illegal keeping in NSW, South Australia and Victoria, and 5 animals in 2 incidents were intercepted as illegal imports into NSW.²⁴⁴ From 2003–2010 least 1 green iguana was intercepted as a stowaway (in the Northern Territory). There has been at least one incursion probably of an escaped or released pet – a female was captured at large in Townsville in April 2011.²⁴⁵

Risk assessment and contingency planning: Green iguanas have been assessed as having an extreme establishment risk ranking.²⁴⁶ A Queensland risk assessment found that green iguanas are a high risk species.²⁴⁷ Despite the acknowledged risks, there is no contingency plan (as far as we are aware) to guide a national response to an incursion.

Enforcement: Eradication of a naturalised population could be difficult – green iguanas tend to live near water and can escape capture by swimming underwater; they are also well camouflaged in trees. So there needs to be a strong focus on prevention, including effective at-border biosecurity to detected illegal imports and stowaways and enforcement of regulations against possession and sale. There is a strong commercial incentive to smuggle green iguanas.²⁴⁸ Like crocodiles, green iguanas make appealing pets when young, but grow to an inconvenient size, increasing the risk that illegal pets will be liberated.

²⁴² Cshures (2011)

²⁴³ Henderson and Bomford (2011)

²⁴⁴ Henderson and Bomford (2011)

²⁴⁵ Roznik (2011)

²⁴⁶ Henderson and Bomford (2011)

²⁴⁷ Cshures (2011)

²⁴⁸ Cshures (2011)

Issues for inquiry

Risk reduction

- What measures have been and should be taken to limit the risk of green iguanas (and other species likely to be illegally kept) from establishing in Australia?

Contingency planning

- What steps have been and should be taken to maximise the prospects of an efficient and effective response if green iguanas do become established?

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CASE STUDY OF BIOSECURITY ENFORCEMENT

17. INTERNET PURCHASES OF PROHIBITED PLANTS

A case study of the ease of buying prohibited imports off ebay

After complaining to Ebay about prohibited plants being advertised for sale on the Australian Ebay site and getting no response or action from Ebay, the Invasive Species Council decided to test how easy it would be to buy these plants. All seeds have since been destroyed.

Purchase of seeds

1. Purchase of **Stipa Mexican Feather Grass** 100 seeds

2 June 2014 Order on ebay \$4.44 AUD from USA
11 June 2014 Arrives in Melbourne letterbox



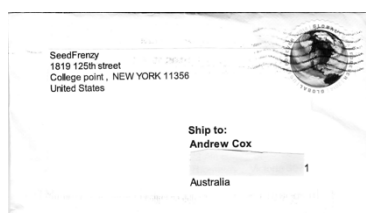
2. Purchase of **Stipa Sleepygrass** 100,000 seeds

2 June 2014 Order on ebay \$18.86 AUD from Hong Kong
16 June 2014 Pickup from post office



3. Purchase of **Kochia scoparia** grass 120 seeds

2 June 2014 Order on ebay \$1.00 AUD from China
11 June 2014 Arrives in Melbourne letterbox



Mexican feather grass 100 seeds.
No description. Seller named as
'SeedFrenzy'



Stipa Sleepygrass 100,000 seeds.
Described as 'Gift: Plastic beads 1 pack'



Kochia scoparia 120 seeds. Described on reverse side as 'Gift: 120+ Seeds
Rare Kochia Scoparia Grass Seeds Showy E~Z Grow Rapid Exotic Hardy'



Purchase process Stipa Mexican Feather Grass 100 seeds

Step 1: Listing and then click 'Buy in Now'

The screenshot shows an eBay product listing for 'Stipa Mexican Feather Grass / Needle Grass 100 seeds * Ornamental Grass * #1B81#'. The item is in 'New' condition, with a quantity of 1 available (32 sold). The price is US \$0.99 (approximately AU \$1.06). The listing includes a 'Buy It Now' button, an 'Add to cart' button, and a 'Make Offer' button. The seller is 'seedfrenzy' with a 99.8% positive feedback rating. The shipping location is Brooklyn, New York, and the item is shipped via USPS First Class Mail International. The estimated delivery date is between Thursday, 12 June, and Monday, 23 June. The listing also features a 'Have one to sell? Sell it yourself' link and a 'Shop with confidence' badge.

Step 2: Purchase confirmation

The screenshot shows the 'Review and commit to buy' page on eBay. It displays the item details: 'Stipa Mexican Feather Grass / Needle Grass 100 seeds * Ornamental Grass * #1B81#'. The price is US \$0.99 (approximately AU \$1.06). The shipping is to Australia for US \$2.99 via USPS First Class Mail International. The payment method is PayPal. A 'Commit to buy' button is prominently displayed. Below the button, a small text line states: 'By clicking Commit to buy, you are agreeing to and entering into a legally binding contract to purchase the item from the seller.'

Step 3: Payment using Paypal

The screenshot shows the 'Thank you! Please pay now to complete your purchase.' page on eBay. It displays the item details: 'Stipa Mexican Feather Grass / Needle Grass 100 seeds * Ornamental Grass * #1B81#'. The price is US \$0.99 (approximately AU \$1.06). The shipping is to Australia for US \$2.99 via USPS First Class Mail International. The payment method is PayPal. A 'Pay now' button is prominently displayed. Below the button, a small text line states: 'Visit seller's store'.

Step 4: Confirmation of payment

The screenshot shows the PayPal 'Confirm your order' page. It displays the order total of \$3.98 USD. The shipping address is Andrew Cox, Australia. The payment method is 'Change' to 'Pay after delivery: St George Bank Ltd Cheque (Confirmed) x-2040' for \$4.44 AUD. The page includes a 'Confirm and Pay' button and a 'Shipping address' section. A small text line at the bottom states: 'We'll use today's PayPal conversion rate when we debit your bank account in 21 days (1 Australian Dollar = 0.896384 US Dollars).'

Step 5: Payment receipt

G'day, Andrew! | eBay Deals | [PASSWORD UPDATE](#) | My eBay | Sell | Customer Support |

ebay Shop by category | Search... | All Categories | Search

Home > My eBay > Order details

Associations: Become the #1 JOBS marketplace for your members | **Professional REACH** | AdChoice

Order details

Postage details	Payment details
Andrew Cox Australia	

Order details			
Item title	Available actions	Postage & handling (estimated delivery*)	Price
Seller: seedfrenzy (1898 ★) Contact seller Printer version			
✓ Paid on 02-Jun-14 via PayPal			
Stipa Mexican Feather Grass / Needle Grass 100 seeds * Ornamental Grass * #18614 121313280043 - Price: US \$0.99 Quantity: 1 Having a problem with this purchase? We can help	Leave feedback	USPS First Class Mail Intl / First Class Package Intl Service : US \$2.99 Estimated delivery: Thu, 12 Jun. - Mon, 23 Jun.	US \$0.99 US \$2.99
Subtotal:			US \$0.99
Postage and packaging:			US \$2.99
Total:			US \$3.98

Step 6: Purchase receipt

ebay Shop by category | Search... | All

Thank you for your purchase!
You'll receive an email confirmation shortly.

[View order details](#)

Estimated delivery: Between Thursday, Jun. 12 and Monday, Jun. 23

What do you want to do next?

[Go to My eBay](#)
to see items you are watching or purchased

[Go to eBay's homepage](#)
to continue shopping and discover great deals

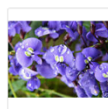
Win a Toyota Corolla with your eBay purchase
[Enter now](#)

People who shopped for this item also looked at

Feedback on our suggestions



Native Kangaroo Grass Seeds...



Maui Coral Pea Vine Seeds Drought...



20 Seeds One Pack Mixed Ranunculus...

Lodging a complaint to Ebay of illegal sales

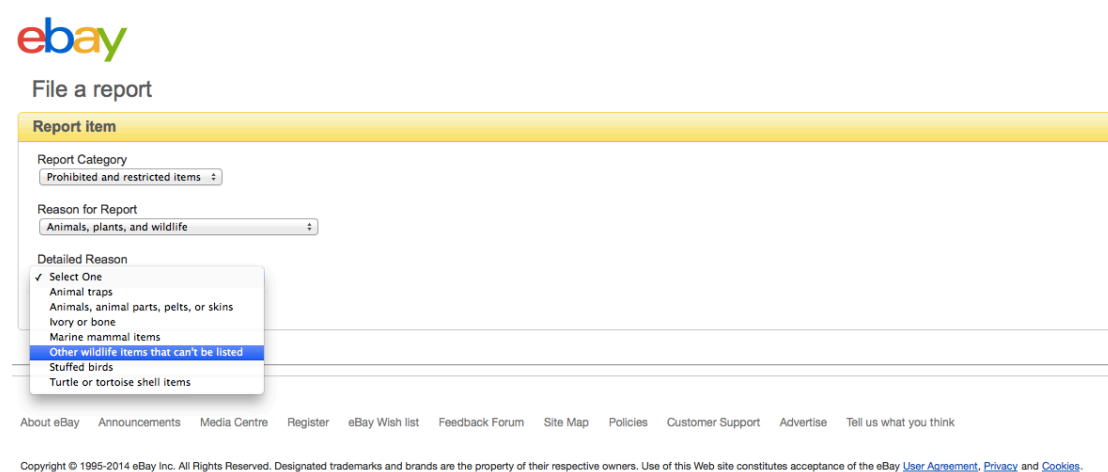
Items reported

31 May 2014	Stipa Mexican feathergrass 100 seeds
31 May 2014	Stipa sleepygrass 100,000 seeds
18 Jul 2014	Kochia scoparia 120 seeds

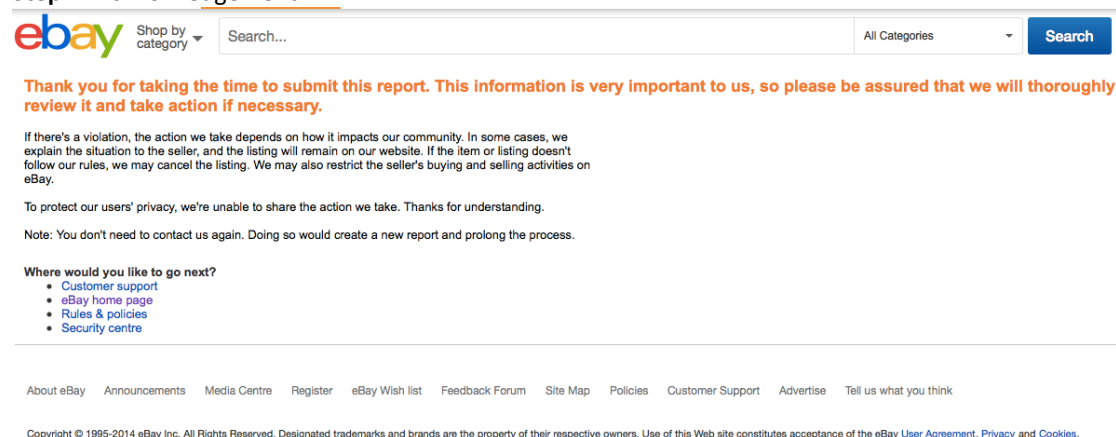
No response received from ebay after making the complaint. On 15 August 2014, between one and three months after reporting, all items remain listed and for sale.

Process for making a complaint

Step 1: Lodging of complaint



Step 2: Acknowledgement



Other Mexican feather grass seed sellers on Australian Ebay site, August 2014:



Item: [Mexican Feather Grass - 100 Seed](#)

Seller: wbut2023.

Location: Pottstown, Pennsylvania, US

Cost: \$3.17 AUD

Postage: "Worldwide" extra \$7.25 USD



Item: [Stipa tenuissima Wind Whispers Feather Grass - 10 Seeds](#)

Seller: greg17086

Location: Richfield, Pennsylvania, US

Cost: \$2.15 AUD

Postage: "Will post to Australia"