Australian Biosecurity Group

Invasive Weeds, Pests and Diseases

Solutions to Secure Australia

CRC Weed management

WWF

Invasive Animals Cooperative Research Centre

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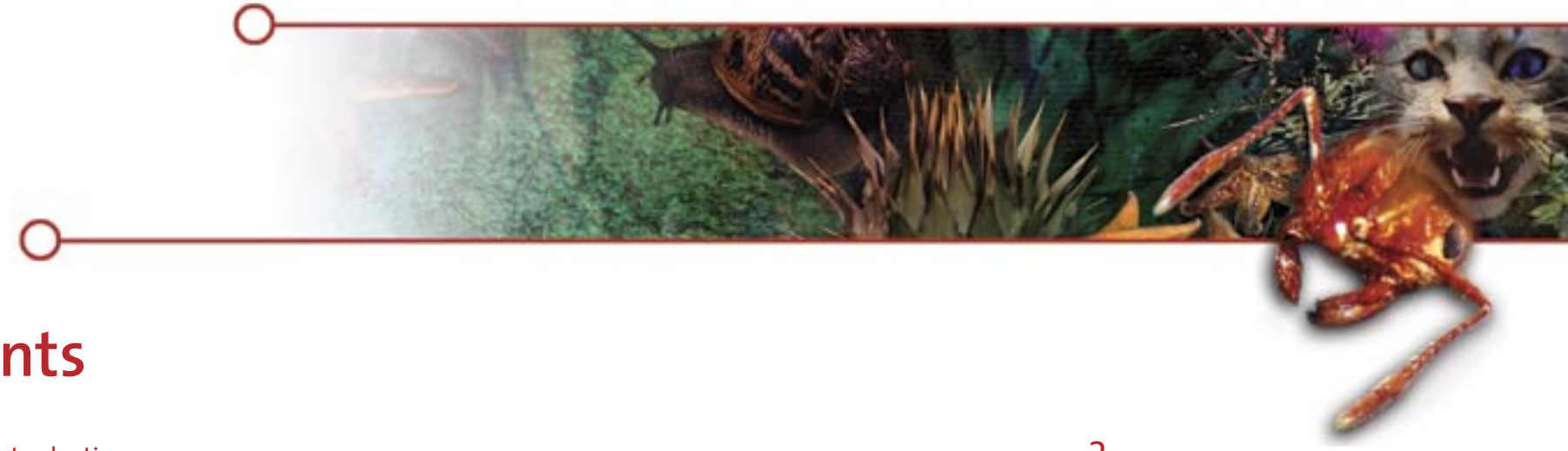

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Introduc

tion

Every Australian knows of the havoc wreaked upon this nation by foxes, rabbits, carp, prickly pear and other invasive species.

To protect ourselves from more pests like these, we have developed one of the very best quarantine systems anywhere. Australia is among the world leaders in airport, marine and weed biosecurity.

But in this fast-changing world, evidence is mounting that we are not securing Australia properly.

Pests are invading or spreading in unacceptable numbers.

For example, Australia is gaining ten new weeds each year.[1] One newcomer, an imported grass, went on sale in 1988 only to end up on Australia's list of 20 worst weeds eleven years later[2]. A quarter of these worst weeds are still available for sale.[3]

Of greater concern are the thousands of invasive plants that are already here, but yet to escape and invade the environment or agricultural lands.[4]

These are disturbing and embarrassing facts, all well documented by leading experts.

Recent animal incursions are also worrying.

In Tasmania, three major new pests have been found in recent years: the fox, Indian myna bird, and American mosquito fish.[5]

Fire ants have struck Brisbane twice in recent years, and if the $175 million eradication attempt fails, they will cost us $8.9 billion over 20 years and ruin our outdoor way of life.[6]

Few problems confronting Australia match this one in size. The 2004 Senate inquiry into invasive species came to the conclusion that 'the scale of the problem is enormous and the challenges daunting'.[7] Yet most politicians do not rank invasive species highly.[8] They assume our current policies work.

In truth, Australia lacks a coherent framework for tackling those plant, animal and disease invaders already in Australia. The result is that too many invaders are slipping between the cracks of mismatched State and Territory laws and policies.

We are paying a high price for this. Weeds and major pests cost Australia over $4.7 billion each year, and can threaten the international competitiveness of our agricultural industries.

Australia needs to tackle this growing menace head on. Evidence presented to the Prime Minister's science committee shows that a focus on prevention and early intervention to invasive species is one of the few areas that can deliver significant results.[9]

Australia needs a flexible and efficient national system to overcome these problems and meet new challenges head on.

We can achieve this if we try. The choice is ours.

Weeds and major pests cost Australia over $4.7 billion each year, and can threaten the international competitiveness of our agricultural industries

Fire ants have struck Brisbane twice in recent years, and if the $175 million eradication attempt fails, they will cost us $8.9 billion over 20 years and ruin our outdoor way of life

What are Invasive Species?

Invasive species are animals, plants or diseases that have entered Australia from elsewhere, and which now cause economic, social or environmental harm.

They include animals and plants brought in deliberately (starlings and blackberries for example), and other organisms that entered on ships or planes accidentally (ants, wasps, snails, rats, starfish and many diseases).

Invasive species are sometimes likened to pollution. Like toxic chemicals they escape into the environment and do harm, often avoiding early and easy detection. But bio-pollutants differ from other forms of pollution by multiplying. Usually they 'pollute' the landscape forever.

Exotic species are everywhere: inside our cities, farms, forests, rivers and seas. There are rabbits on Uluru, weeds on Mt Kosciusko, diseases in the Murray River, and flies in the Australian Antarctic Territory. Every national park hosts pests.

The scale of the problem defies easy analysis because the invaders are so diverse. They include camels, Indian mynas, toads, turtles, fish, crabs, sponges, earthworms, centipedes, anemones, seaweeds, trees, shrubs, vines, ferns, mosses, and hundreds of diseases. Some of them are well known, but most are not.

The CSIRO estimates that Australia gains 20 new pests or diseases each year.[10]

Global warming is expected to increase their prospects of establishing.

Invasive species are sometimes likened to pollution

Usually they 'pollute' the landscape forever

Exotic species are everywhere: inside our cities, farms, forests, rivers and seas

The CSIRO estimates that Australia gains 20 new pests or diseases each year

How Many?

No one has ever counted all our introduced species.

We know there are more than 2,800 foreign weeds.[11] Of the twenty worst ones, 16 were deliberately introduced.[12]

Calculating the number of foreign insects and diseases is mere guesswork. Many have never been identified, and new ones slip through the quarantine net each year.

The larger invasive animals that have established wild populations on mainland Australia include 25 mammals, 20 birds, four reptiles and 34 fish.[13]

The number of identified invasive marine species exceeds 100 and may exceed 400.[14] Melbourne's Port Philip Bay boasts more than 100, with three or more new species establishing every year.[15]

Invasive species now dominate in many places. There are camphor laurel forests replacing pastures in New South Wales, prickly acacia thickets in Queensland, and Japanese kelp beds along the Tasmanian coast. New Zealand screwshells have smothered an area of seabed larger than Tasmania at densities sometimes reaching hundreds of shells per square metre.[16] Along some rivers 90 per cent of fish are carp

Economic and Social Impacts

Invasive species can be put into perspective by comparing them with salinity, a land-use problem that gets special attention.

Dryland salinity is costing Australia more than $200 million a year.[17] Weeds cost us $4 billion each year,[18] feral animals $720 million.[19] No costs are available for marine pests, freshwater pests, invertebrates generally, or diseases. But during the 1990s, $55 million was spent eradicating one small fly, the papaya fruitfly.[20]

By any criteria, invasive species are harming Australia far more than salinity.

Half of all farmers rank weeds as their worst land management problem.[21] One in every seven dollars of farm income is lost to weeds.[22] Weeds invade crops, smother pastures and occasionally poison stock. Wild oats – a single weed – costs grain farmers $42 million each year.[23] Prickly mesquite, brought from the Americas for fodder, has overrun 150 000 hectares on just one farm,[24] plus larger tracts elsewhere. Whenever one weed is quelled there is often another to take its place.

Australia's overseas markets are put at risk by weeds. Malaysia refuses wheat shipments from regions in Queensland infested by parthenium, while several grain markets will close if branch broom-rape invades crop-growing regions in South Australia. Weeds put at risk Australia's image as a grower of clean, green produce.

Feral animals destroy crops and livestock. Pigs alone cost farmers $100 million a year in lost crops and pastures and fence damage.[25] Introduced insects, mice and diseases ravage whole fields. Rabbits, foxes, goats, hares, starlings, sparrows, snails and nematodes compound the toll. Fire ants, in America where they are well established, destroy crops, harass fruit-pickers and kill foals, calves and chickens.[26]

Half of all farmers rank weeds as their worst land management problem

One in every seven dollars of farm income is lost to weeds

Introduced insects, mice and diseases ravage whole fields. Feral pigs alone cost farmers $100 million a year in lost crops and pastures and fence damage

The Kakadu community had to stand by helplessly while cane toads invaded in 2001, causing mass deaths of wildlife

Darwin is now on the brink of being invaded and over-run

Vast tracts of land have been eroded by rabbits, goats and donkeys. Weeds alter water flows in catchments, increasing siltation.

Marine pests threaten seafood farms and wild shell beds. Toxic dinoflagellates contaminate oysters and render them dangerous and even fatal to eat; they have led to closures of Tasmanian oyster farms for up to six months.[27] North Pacific oysters have cost the NSW native oyster fishery $90 million.[28] Northern Pacific seastars, giant fanworms and Japanese seaweeds invade aquaculture farms and destroy or displace wild scallops and other seafoods.

Pests threaten our very way of life. Fire ants sting so fiercely that, in America, elderly people have died.[29] In Brisbane, residents in fire ant zones were abandoning gardens, locking pets indoors and letting children play on roads.[30] Property values dropped. If fire ants ever escape our control, fewer Australians will play sport, go fishing, picnicing, or strolling in rubber thongs.

Australians are also stung by European wasps, brown widow spiders, and nettles. Parthenium weed causes severe allergies, and rye grass is one of many weeds that triggers asthma and hay fever.[31]

Australia even has weeds threatening our drinking water. A waterweed that once graced fish tanks – cabomba – now covers 75 per cent of one dam near Caloundra. The city spent $300,000 draining the dam in a failed attempt at eradication.[32]

Pests are a serious matter on indigenous lands. In the Northern Territory alone more than $3 million is spent each year tackling weeds on Aboriginal lands.[33] The Kakadu community had to stand by helplessly while cane toads invaded in 2001, causing mass deaths of wildlife. Darwin is now on the brink of being invaded and over-run.

Phytophthora dieback impact on forest

Environmental Impacts

In Australia, exotic pests are the number one cause of animal extinctions.[34]

We have lost more mammals than any other nation, 22 species in all,[35] and although the extinctions defy simplistic explanations, foxes, cats and rabbits are the most culpable for these losses.[36]

Several endangered mammals now survive only on fox-free islands, and fox and cat baiting elsewhere has allowed rare numbats and quolls to multiply. Cats and rabbits probably contributed to some of the extinctions.

Black rats wiped out unique birds on Lord Howe and Norfolk Islands.[37] After Lord Howe was invaded by rats (in 1918), Alan McCulloch wrote: 'Within two years, this paradise of birds has become a wilderness, and the quietness of death reigns where all was melody.' [38] The rats attacked chicks and eggs in their nests.

Diseases pose new and frightening threats. Chytrid fungus is blamed for the extinction of seven unique rainforest frogs since 1975.[39] One of these, because it reared its tadpoles in its belly, was under investigation as a cure for stomach ulcers. [40]

In the wildflower belt of Western Australia an Asian die-back fungus, *Phytophthora cinnamomi*, spreads through the soil killing hosts of colourful plants.[41] Several endangered species, including feather-leaved banksia and Gilham's bell, have eluded extinction only because fungicides are applied inside national parks. The same disease kills Queensland rainforest trees and stands of jarrah, an important habitat and timber tree.

Rat-mauled booby chick

There are also diseases brought in with aquarium fish that sparked mass deaths of Murray cod and bony bream, and a mystery virus that killed millions of pilchards at sea in 1995 and again in 1998.[42] Pilchards washed up on beaches in rafts up to three kilometres long.[43]

On Christmas Island, crazy ant swarms have killed more than 15 million red land crabs.[44] They also pose a threat to unique birds, and are now being strongly suppressed. They recently invaded Queensland where eradication is underway.

Weeds pose many threats. Just six of Australia's worst invasive weeds have degraded over 20 million hectares of grazing and natural lands.[45] In NSW alone, African bitou bush is a major cause of population decline in 63 rare and threatened native species.[46] African grasses fuel very hot bushfires that scorch rainforest pockets and stop young trees from establishing in Top End woodlands.[47] In one national park, Kakadu, nearly $1 million a year is going into the fight against just one weed, mimosa.[48]

Often we do not know what impact exotic species are having.

Invasive species are proving so harmful, globally, that experts now rank them as one of the worst threats to biodiversity after habitat loss.[49]

In Australia, exotic pests are the number one cause of animal extinctions

Rubbervine – an escaped garden plant – destroying native vegetation along the Burdekin River in Queensland. It infests over 700,000 ha of Queensland and is present over 20 per cent of the State

How Do They Get Here?

Many foreign species are prohibited by our quarantine laws, but Australia still imports large numbers of garden plants and aquarium fish.

New plants are supposed to pass through a screening system – Weed Risk Assessment – to assess their weed risk, but due to a loophole almost half the world's plant species were until recently able to circumvent its scrutiny.[50] The Australian Government has now moved to fully close the loophole by or before the end of 2006.

Many invasive fish species slip into Australia through its large quarantine list of permitted live fish. It is a telling point that more than 40 per cent of the introduced aquarium fish now established in Australian waters are on the permitted list.[51]

It is no surprise then that the number of pest plants and fish is rising.

Of the ten new weeds recorded each year, two thirds are escaped garden plants.[52] They undermine rural productivity. More than four in ten weeds causing the biggest impacts to sheep and cattle producers are escaped garden plants. Of the grazing weeds now emerging as problems, a third remain available for sale as garden plants, hastening their spread and future impact.[53]

The number of exotic fish in Australian waters jumped from 22 in 1990 to 34 today. All but one of the newcomers originated from the aquarium trade.[54]

New pests also arise from old introductions.

Mimosa bush only became a problem 70 or so years after it was first imported. Cultivated plants keep escaping our control. The pool of over 30,000 cultivated native and exotic plant species includes many oddities grown by botanic gardens and collectors, ensuring a vast reservoir for future escapes.

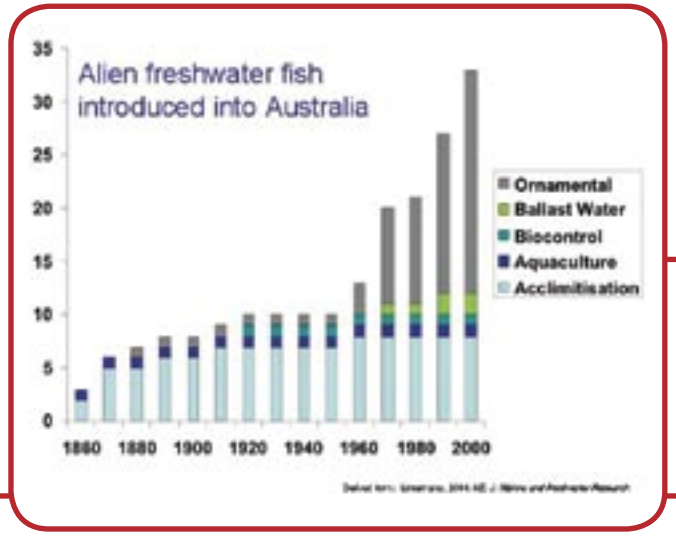
Many of the fish and even caged birds that we keep may go wild in the future.

Trade and travel assist other invaders.

Snails, insects, spiders and seeds often travel with cargo. They are sometimes not detected by quarantine inspectors coping with increasing volumes of trade. Australia is now importing far more fresh fruit and vegetables, cut flowers, seafood and bait than previously. Quarantine protocols apply, but incursions do occur.

Statistics on marine invaders suggest a strong link with trade. Back in 1978 Australia was thought to have about 20 exotic species in her seas. By 1995 the figure had grown to 100; and may now exceed 400.[55] The number keeps rising, partly because we are now better informed, but also because more ships are visiting. Today's supertankers circle the seas more quickly than ever before, carrying more ballast water (see box) and more hidden hitchhikers.

Pests also travel on yachts and refugee boats.



There is a very high risk that the Green Swordtail – an aquarium fish – will become an environmental pest in Australia. Forty per cent of the introduced aquarium fish now established in Australian waters are still on the quarantine live fish permitted list

The Trouble With Ballast

In recent years the potential of ballast water to spread pests has become a major global concern.

To maintain stability, large cargo ships carry water drawn from the sea, and this liquid regularly contains larval fish, worms, algae and disease.

Each year more than three billion tonnes of water, containing billions of organisms, are shifted around and discharged somewhere new. The International Maritime Organization (IMO) has estimated that marine invaders (including those that fasten to hulls) are costing the world tens of billions of US dollars each year.[56]

Ballast invaders caused the deaths of more than 10,000 people from cholera in South America during the 1990's,[57] contributed to the recent collapse of the Baltic Sea fisheries,[58] and pose an imminent threat to the Amazon River ecosystem.[59] The rate of invasion is increasing as world trade grows.

No satisfactory way has been found to stop ballast organisms. As an interim measure the IMO recommended ballast water exchange at sea, which reduces but does not stop invasions. Australia became the first country to require high risk vessels to undertake ballast water exchange in 2001. In 2005, Australia signed (subject to ratification) the 2004 IMO convention requiring ballast water management for all vessels. Cargo ships continue to spread invasive species on their hulls, a problem not addressed by the IMO, but soon to be addressed by Australia as part of the National System for Prevention and Management of Marine Pest Incursions, expected to come into force in October 2006.

The 2004 APEC Ministerial Meeting in Chile called for more understanding of marine pests, 'along with coordinated regional action to help prevent their spread.'[60]

The sea floor in Melbourne's Port Phillip Bay is now dominated by invasive species.

Among the worst is the Northern Pacific Seastar, a giant orange starfish with a voracious appetite for scallops, oysters and clams. First acknowledged as a threat to Australia in 1975, it arrived in Tasmania during the 1980s, then reached Victoria in 1995. Australia now has 100 million hungry starfish to contend with. A large female can lay 19 million eggs.[61] They transform the environments they invade. Pacific Seastars are expected to spread west along the Great Australian Bight and north into the shallows of New South Wales unless action is taken to stop them.

Who's Next?

There are many more pests that could invade Australia soon. Many are already here but yet to establish and invade. Here are a few examples of those already here and others that could arrive soon.

A disease, guava rust, has spread from the Amazon rainforest onto eucalypt plantations in South America, killing seedlings and saplings by the thousands. The CSIRO rates it 'a severe threat to native plant communities' and the main threat to eucalypt plantations worldwide.[62]

In recent years black-spined toads have spread south on ships through the islands of Indonesia to New Guinea. One was found on a ship in Cairns in 2002.[63]

A serious outbreak of the devastating disease, citrus canker, appeared under suspicious circumstances on a farm in Queensland in 2004. Hundreds of thousands of orange trees were destroyed at a cost of $10.9 million to eliminate the incursion.[64]

Blackbuck antelope were released in 2004 onto unfenced land on Cape York Peninsula by a landholder wanting to establish a game hunting business.[65]

The CSIRO knows of 36 marine pests which have invaded the ports of Australia's trading partners and which are expected to appear here soon.[66] One of them, the Asian green mussel, was found on an illegal fishing boat towed into Cairns Harbour.

Monkeys (long-tailed macaques) escaped into the wild in Irian Jaya about 50 years ago,[67] and if they are not removed soon they will spread across New Guinea and could be carried as pets to Cape York.

Barbary doves escaped from captivity in the 1990s and established a feral population in Alice Springs, and despite a government cull a small colony still remains. These doves have invaded large areas of Europe where they sometimes become pests of granaries and farms.

Electric ants are related to fire ants and they also sting ferociously. Having spread from Latin America to many Pacific islands, they are often intercepted at Australian airports.[68]

Siam weed, a major pest in tropical Asia and considered one of the world's worst weeds, has a toehold in north Queensland and is subject to an eradication campaign. If it 'gets away', Siam weed could cost farmers $290 million a year.[69]

A report to the Prime Minister's Science, Engineering and Innovation Council (PMSEIC) noted that Australia 'may not yet have seen the worst of this biosecurity risk – there are still many potential invaders waiting in the wings.'[70]

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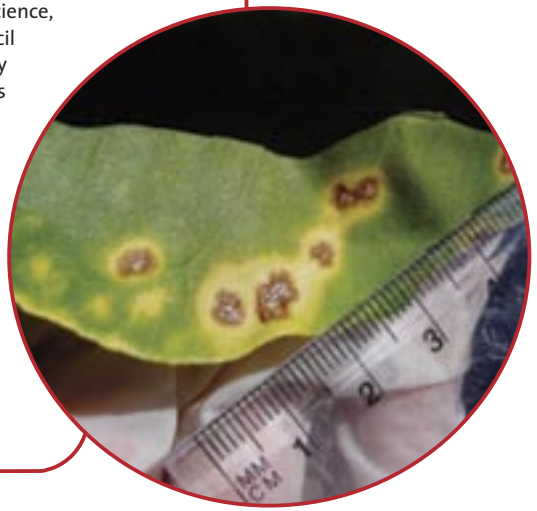


Cow in Indonesian paddock, smothered by Siam weed

The Speed and Ease of Invasion

Mexican feathergrass or white tussock (*Nassella tenuissima*) was imported legally in 1996 due to a quarantine law loophole (now being closed) and lack of strong State weed laws.

In 1998 large numbers of these plants were bred for sale by a nursery.[71] By 2004 it had escaped from gardens and become a weed.[72]

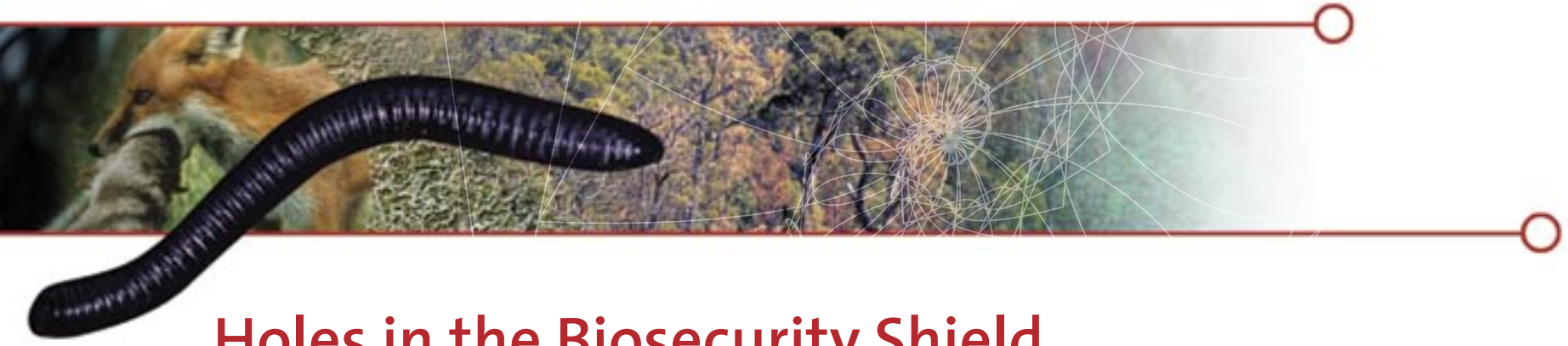
Mexican feathergrass is closely related to serrated tussock (*Nassella trichotoma*), one of Australia's 20 worst weeds, which costs agriculture $50 million each year.[73] Both grasses pose high weed risks because they are hardy, well-matched to our climate, and unpalatable to stock.

Government scientists warn that Mexican feathergrass could invade 14 million hectares of land, much of which is prime grazing country.[74]

A spokesman for Meat and Livestock Australia, Wayne Hall, voiced industry fears: 'It's the last thing we want. It would be an absolute disaster for Australia.'[75]

Mexican feathergrass was imported because gardeners, faced with restrictions on water use, want new drought-hardy plants to choose from.

It was not assessed for weediness. If it had been it would not have been allowed into Australia.



Holes in the Biosecurity Shield

Australia needs a strong biosecurity shield to protect us from weeds, pests and diseases both invading and spreading through Australia. A shield cannot work properly if it has gaping holes, and many holes are evident, especially in Australia's post-border biosecurity system.

Holes include:

- **Gaps in our quarantine law lists** that still permit many invasive fish species to be legally imported. A quarantine list loophole that allowed the legal import of over 5,000 weeds is now being closed; the Australian Government recently prohibited the import of about 3,300 of these and has committed to prohibit the remainder when the loophole is fully closed by or before the end of 2006.[76]
- **No comprehensive early warning surveillance.** Australia is paying dearly for not having comprehensive national early warning programs in place. Because fire ants in Brisbane were overlooked for several years, they will cost $175 million to eradicate.[77] On the other hand, New Zealand has a National Invasive Ant Surveillance Program that surveys ports, airports and other high risk sites, and which detected fire ants at Napier only about a year after they invaded. Those ants will cost $1.38m[78] to eradicate instead of $175 million here.
- **Mismatches between laws**. Australia lacks an effective national regulatory approach to tackling weeds, pests and diseases. Laws vary dramatically from state to state, and there is no over-arching Commonwealth law. This creates problems for industries that trade nationally, such as the nursery industry, and leads to serious anomalies. A major weed, Ceylon Hill Cherry, is targeted for eradication by the AQIS Northern Australia Quarantine Strategy, yet is sold legally in Queensland and New South Wales. Efforts to develop a *National System for the Prevention and Management of Marine Pest Incursions* were until recently stymied by jurisdictional differences over management of ballast water.
- **Inadequate contingency plans for environmental weeds, pests and diseases**. Australia has effective contingency plans in place to quell incursions by agricultural pests, and is developing a system to combat marine pests. To complete the biosecurity shield a similar set of defences needs to be developed for other environmental pests, weeds and diseases.
- **A deficient approach to invertebrates.** Australia has no comprehensive database of introduced insects, spiders, snails, nematodes and other invertebrate pests, much less a proper understanding of their impacts, nor a coherent strategy for their detection and eradication. Given the enormous drain on the economy attributed to such pests, this is a foolish oversight.
- **Lost opportunities for integrated control of both agricultural and environmental pests.** The same pest is often targeted by different groups working in isolation on different land tenures.
- **The legal sale of major weeds** including a quarter of the Weeds of National Significance, a fifth of the Alert List of Environmental Weeds and one Northern Australia Quarantine Strategy target weed.
- **Inadequate funding for environmental weeds and pests**. Despite increased opportunities through the National Heritage Trust, funds are still very difficult to obtain for purely environmental weeds and pests.
- **Inadequate protocols to decide eradication priorities and who pays.** When a new pest is found, vital action is often delayed by uncertainty about which agency should accept the responsibility and cost.[79] This is a major concern for pests with mainly a social or environmental impact.
- **Poor sharing of information**. Excellent work is often done detecting, identifying and controlling a pest in one region, but because Australia is so vast, with many agencies involved in pest control, the expertise often does not reach other regions battling the same pest.
- **Lack of community awareness**. Most Australians do not understand the scale of the threat. The recent Senate Inquiry on invasive species recommended that the government develop and deliver national community education campaigns on invasive species. It also urged that curriculum materials be made available to schools.[80]

Australia needs a strong biosecurity shield to protect us from weeds, pests and diseases

The invasive species problem needs a strong national solution. It is too big and pressing for buck-passing between different levels of government.

Investment in pest control is no funding drain – quite the reverse. A report to the Prime Minister's Science, Engineering and Innovation Council concluded that "limiting the spread of pests, weeds and imported diseases is one of four areas of investment likely to have the greatest impact".[81] It found that prevention and early control, combined with biocontrol for major weeds and pests, are the most cost-effective interventions that governments and industry can take.[82] The fire ant example shows that prevention and early warning surveillance (as practised in New Zealand) is much cheaper than control.

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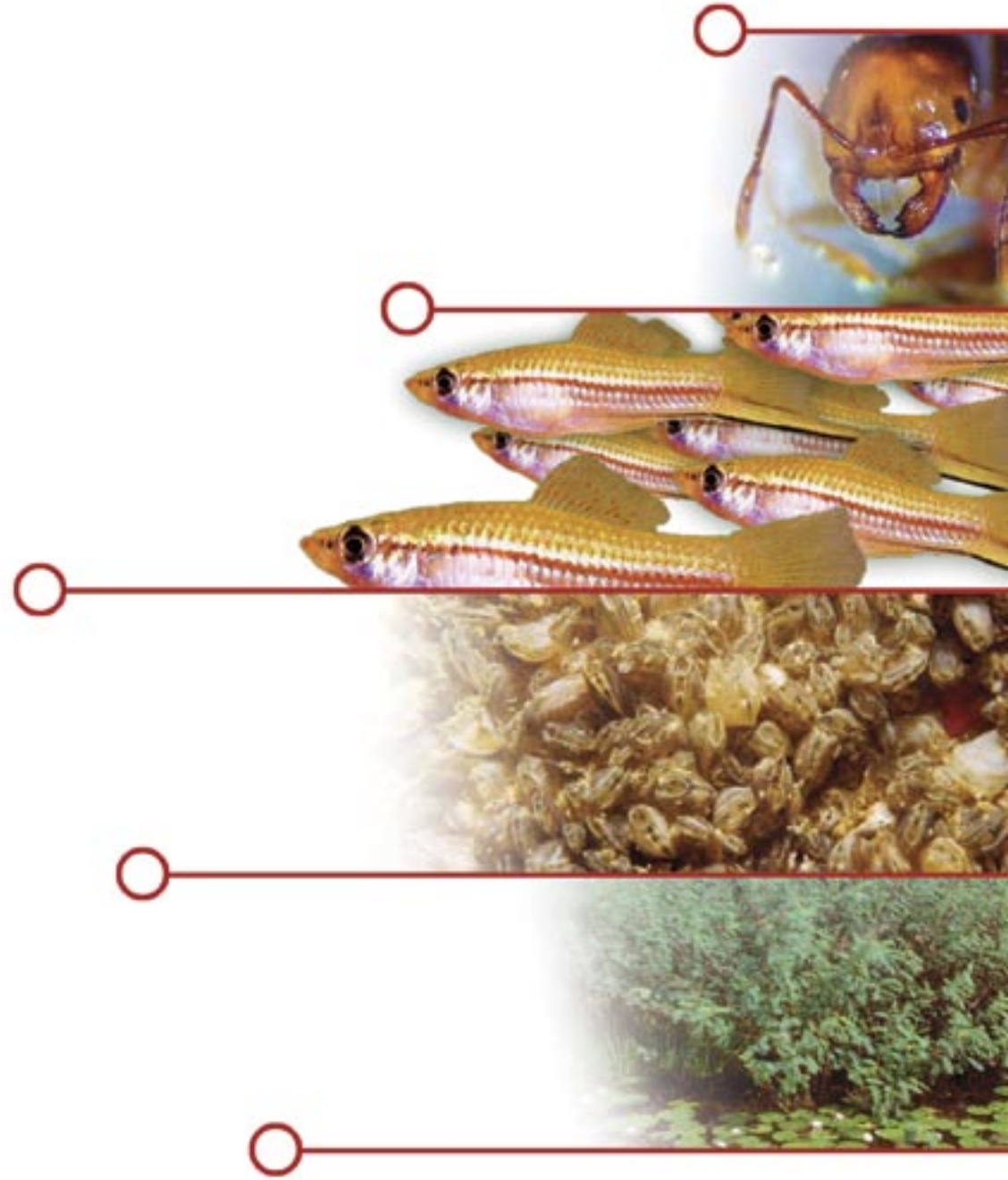


The Way Forward

The National Framework to Prevent and Control Invasive Species provides the opportunity to develop a complete policy package

Limiting the spread of pests, weeds and imported diseases is one of only four areas of investment above all others likely to return greatest impact in heading off the diminishing value of Australia's natural systems and biodiversity.

– Sustaining our Natural Systems and Biodiversity. A report to the Prime Minister's Science, Engineering and Innovation Council

The recent invasions by fire ants, Mexican feathergrass and citrus canker prove that Australia needs a stronger biosecurity shield. The eradication of the harmful black-striped mussel provides an example of what can be done.

We need to close the holes in our defences, but we also need to shift our thinking from the traditional focus on border control, to a biosecurity continuum that extends from our trading partners right down to the level of the farm, nursery, household, and even yacht.

The Australian Biosecurity Group welcomes the decision by Australian, State and Territory governments to develop a 'robust' *National Framework to Prevent and Control Invasive Species*.[83]

The Framework provides an opportunity to develop a complete policy package. To achieve success, governments must work together to resolve inconsistencies in state and federal laws, policies and practices.

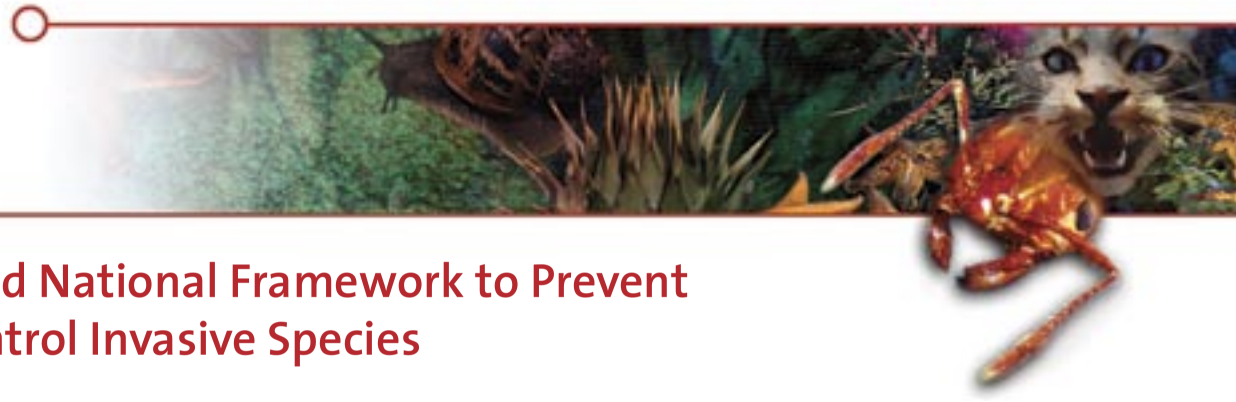
The National Framework must:

- address the complete spectrum of invasive species, including environmental pests, invasive invertebrates and environmental diseases;
- fix once and for all the anomalies that arise due to the mismatches between different government agencies, between the Australian Government and State and Territory governments, and between different State and Territory governments;
- build a next-generation suite of integrated policies that deliver consistent, uniform and effective prevention and control;
- develop a seamless biosecurity system that extends from pre-border control right through to control of widespread pests ('end-to-end' biosecurity management), with sound processes to determine priorities; clear roles and responsibilities for governments, industry and the community; and a focus on high-risk pests and invasion pathways;
- set up quarantine, surveillance, cost-sharing, eradication and control arrangements for environmental invasive species that match those for agricultural pests;
- heighten the focus on prevention in order to keep invasive species out of Australia and out of those States and Territories that have not been invaded; and
- embrace biosecurity as a dynamic discipline that requires adaptive management approaches based upon sound science, and learning from successes and failures.

An Australian framework could also serve as a model in the Asia Pacific region for a regional approach to the problem. Recent support by APEC ministers for the *Regional Management Framework for Control and Prevention of Introduced Marine Pests* shows that interest is growing in developing regional solutions to what is a global threat.[84]

A robust National Framework needs the following 10 elements:

1. National institutions (including a lead Australian Government body) dedicated to invasive species
2. A coherent policy framework
3. A strong regulatory framework
4. A seamless and stream-lined response framework
5. A national framework for prevention and early detection
6. A national education, training and action program
7. A national information system
8. A fund for strategic research
9. Equitable industry contributions to improve detection and eradication
10. Cost-sharing arrangements to fund detection and eradication of both environmental and agricultural threats

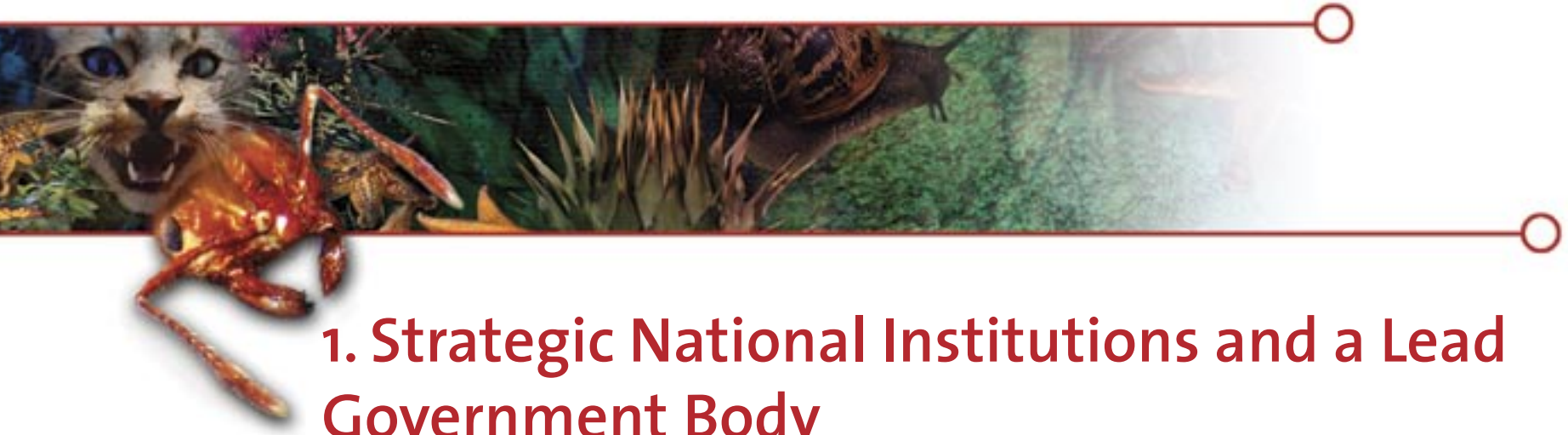


Proposed National Framework to Prevent and Control Invasive Species

** New proposals in bold italics*

National Framework	***National Framework to Prevent and Control Invasive Species*** • Aims to institutionalise efficient Federal governance arrangements • Provides overarching institutional, policy, legislative, and program framework to enable efficient national control and program delivery • Sets out general goal, principles and policy targets • Develops uniform national and State and Territory invasive species control classes • Provides overarching policy context to harmonise and standardise invasive species group policies for marine weeds and pests, land and aquatic pests and weeds, and diseases • Develops a national invasive species education and action framework • Develops a national invasive species information system • Develops national cost-sharing and co-financing arrangements			
National Biosecurity Policy	National Biosecurity Strategy (under development)			
Lead Australian Government Agencies	***Lead responsible and accountable Australian Government body*** Department of Agriculture, Fisheries and Forestry Department of Environment and Heritage Australian Quarantine Inspection Service Biosecurity Australia			
Commonwealth Statutory Framework	*Quarantine Act, 1908* *Quarantine Proclamation, 1998*			
	Environment Protection and Biodiversity Conservation Act Part 13A ***Environment Protection and Biodiversity Conservation Act regulations (section 301A)***			
Lead Government-Industry Bodies	Animal Health Australia, Plant Health Australia			
National Institutional Arrangements	Natural Resource Management Ministerial Council, Primary Industries Ministerial Council, Australian Transport Ministers Council ***NRM Standing Committee Invasive Species Executive Group***			
Invasive Species Groups	Marine Weeds and Pests	Land and Aquatic Pests (Vertebrates and Invertebrates)	Land and Aquatic Weeds	Diseases
National Coordination Arrangements	National Introduced Marine Pest Coordination Group (reports to the NRM Ministerial Council through the Marine and Coastal Committee, and the Australian Transport Ministers Council)	Vertebrate Pests Committee (VPC) (reports to the NRM Ministerial Council through the Natural Resource Policies and Programs Committee on terrestrial and aquatic vertebrate pest issues) ***Broaden scope of VPC to include invertebrates or establish a National Invasive Invertebrate Animals Committee*** (reports to the NRM Ministerial Council through the Natural Resource Policies and Programs Committee on terrestrial and aquatic invertebrate pest issues)	Australian Weeds Committee (AWC) (reports to the NRM Ministerial Council through the Natural Resource Policies and Programs Committee)	***National Invasive Diseases Committee (reports to the NRM Ministerial Council through the Natural Resource Policies and Programs Committee)***
National Policy and Plans	Australian Ballast Water Management Action Plan, and National System for the Prevention and Management of Marine Pest Incursions • ***National Quarantine List*** • ***National Alert List*** • ***National Control List***	***National Pest Animal Strategy*** *(under development)* • ***National Quarantine List*** • ***National Alert List*** • ***National Control List*** ***National Strategy on Invasive Invertebrate Animals*** • ***National Quarantine List*** • ***National Alert List*** • ***National Control List***	***National Weeds Strategy*** *(under revision)* • ***National Quarantine List*** • ***National Alert List*** • ***National Control List***	***National Invasive Diseases Strategy*** • ***National Quarantine List*** • ***National Alert List*** • ***National Control List***

National System for Coordinated Prevention and Management	National System for the Prevention and Management of Marine Pest Incursions	***National System for the Prevention and Management of Introduced Land and Aquatic Invasive Animals***	***National System for the Prevention and Management of Introduced Land and Inland Water Weeds***	
National Surveillance Response	National port monitoring program (under development) ***Targets need to include marine pests on national quarantine list***	AQIS Northern Australia Quarantine Strategy ***Targets need to include national quarantine list species***		
	National strategic surveillance system in place that includes expert and community involvement in surveillance and monitoring (focused on national Alert List species)			
National Emergency/ Rapid Response	Australian Emergency Marine Pest Management Plan	***Australian Emergency Invasive Animal and Diseases Management Plan***		
National Coordinated Emergency Response Mechanism	Coordinating Committee for Introduced Marine Pest Emergencies (CCIMPE) Operates through the National Office of Animal and Plant Health, within DAFF	***Consultative Committee for Exotic Pest Animals***	Consultative Committee on Exotic Plant Incursions (CCEPI) under the Australian Weeds Committee. Operates through the Office of the Chief Plant Protection Officer	Consultative Committee on Emergency Animal Diseases
National Emergency Response Funding Protocol	Agreed cost-sharing arrangement in place.	***Agreed cost-sharing arrangement in place***	***Agreed cost-sharing arrangement in place***	***Agreed cost-sharing arrangement in place***
Emergency/Rapid Response Funding	Commonwealth: $5m/yr 50% Commonwealth/50% shared by the States and the Northern Territory	***Committed Commonwealth-State funding***	***Committed Commonwealth-State funding***	
	Industry co-financing mechanism for surveillance and eradication			
National Eradication / Containment Response	***Plans for Alert List species***	***Plans for Alert List species***	***Plans for Alert List species***	***Plans for Alert List species***
National Control Response	***Plans for Control List species eg:*** • Northern Pacific Sea Star Action Plan	***Plans for Control List species eg:*** • Fox, cat, rabbit, goat, pig threat abatement plans • Tramp ant threat abatement plan (in prep.)	***Plans for Control List species eg:*** • Weeds of National Significance action plans	***Plans for Control List species eg:*** • Dieback Caused by the Root-rot Fungus *Phytophthora cinnamomi* threat abatement plan • Draft threat abatement plans for infection of amphibians with chytrid fungus, and Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species
National Education and Community Action	***National Invasive Species Education and Action Framework***			
	Nationally coordinated programs to promote community involvement in surveillance, monitoring and control			
National Research Response	CRC for National Plant Biosecurity	CRC for Invasive Animals CRC for National Plant Biosecurity	CRC for Australian Weed Management	CRC for National Plant Biosecurity
	Centre of Excellence for Risk Analysis ***National invasive species control research fund***			
National Monitoring Response	***National invasive species monitoring network***			



1. Strategic National Institutions and a Lead Government Body

Necessary Outcomes.

High-level Australian, State and Territory government institutions that respond strategically and cooperatively to the growing invasive species threat.

One lead Australian Government body to provide a coordinated approach that includes risk assessment, emergency response, information management, and strategic planning and coordination.

Present arrangements under the Natural Resource Management Ministerial Council (and Standing Committee) cannot deliver the outcomes we need. They do not encourage government to see the big picture nor to respond at a high enough level. The NRM Standing Committee is not able to consider invertebrates or diseases, which are serious omissions.

The high-level group established to develop the *National Framework to Prevent and Control Invasive Species* is a start, but it needs to evolve into an on-going Executive Group to oversee and review the Framework.

Australia needs one lead body to coordinate and integrate the relevant functions of the Department of Agriculture, Fisheries and Forestry and the Department of the Environment and Heritage. Models for this include Animal Health Australia, Plant Health Australia, the Australian Greenhouse Office and the Commonwealth Regional Natural Resource Management Team.

Actions

Australian, State and Territory Governments, through the NRM Ministerial Council, establish:

- an Invasive Species Executive Group under the NRM Standing Committee
- an Invasive Invertebrates Committee under the NRM Standing Committee, or broaden the scope of the Vertebrate Pest Committee under the NRM Standing Committee to include invasive invertebrate species
- an Invasive Diseases Committee under the NRM Standing Committee

The Australian Government establish a lead body that provides a national response to invasive species.

2. A Coherent Policy Framework

Necessary Outcomes.

A consistent set of national strategies and action plans for all groups of invasive species – marine pests, weeds, invasive animals, and diseases – that fit together into a complete policy framework, ensuring integrated program delivery.

National strategies that identify all high-risk invasion pathways and reduce the risks they pose.

National strategies that explain how national priorities will be achieved and delivered at both a national level and through regional NRM approaches.

Australia is now revising its National Weeds Strategy, developing a new National Pest Animal Strategy, and developing a National System for Prevention and Management of Marine Pest Incursions, giving policy-makers a once-in-a-decade 'clean slate' to look at the whole invasive pest policy picture.

The time is ideal to develop a comprehensive and coherent invasive species policy framework.

Too often, national strategies are developed in isolation. This results in major inefficiencies in the administration and delivery of programs.

National strategies for invasive animals and diseases currently do not exist, thwarting strategic and coordinated action on these pressing problems.

On the other hand, Australia has made sound progress on national approaches to weeds and marine pests. These provide models of how industry, community and environmental goals can be integrated.

The National Framework should provide a standard approach and template across the policy board, and down to program delivery. The result will be a coherent set of integrated strategies. Integration will enable smooth exchange of information and consistent and efficient approaches by managers and researchers.

The National Framework also needs to enshrine best-practice thinking to solutions, focusing on prevention by identifying and better managing invasion pathways.

Actions

Australian, State and Territory governments:

- develop and adopt standard terms, definitions, principles, pest categories, and a standard policy template in the national weed strategy, national pest animal strategy, and proposed national invasive diseases strategy.
- develop an agreed *List of Invasive Species of National Importance*, which is adopted as a matter of National Environmental Significance.[85] The List should be made up of three classes: National Quarantine List, National Alert List, and a National Control List. It should cover invasive marine pests, invasive weeds, invasive vertebrate animals, invasive invertebrate animals, and diseases, and be based on strict risk-based guidelines that could be applied to other non-listed species.
- agree to include invertebrates in the proposed national pest animal strategy, or develop a national invasive invertebrate strategy.
- develop a national invasive diseases strategy.

3. A Coherent and Efficient Regulatory Framework

Necessary Outcomes.

Coherent national invasive species laws made up of Commonwealth legislation and complementary State and Territory laws.

Uniform national and State/Territory statutory invasive species control classes.

Nationally important invasive species banned from sale throughout Australia.

Revised permitted fish list stops legal import of known invasive fish.

Closure of the quarantine law loophole stops the legal import of new plant species without risk assessment.

While Australia adopted a standard railway gauge decades ago, the States and Territories continue with their own inconsistent categories and lists of invasive species. Because of these inconsistencies, many of Australia's worst weeds can still be sold, including five of Australia's 20 Weeds of National Significance.[87]

At present, for example, the States and Territories have a total of 25 major weed control classes. These could easily be reduced to a small set of nationally uniform control classes.[88]

Governments have done this for protected areas: 47 different categories of protected areas on land and 11 marine classes were rationalised into six uniform protected area classes.[89] The benefits have been enormous for planning, evaluation and reporting.

Uniform invasive species control classes are long overdue and should be applied to all groups of invasive species. One benefit will be less red tape for industries that trade nationally in plant and animal species (that may include invasive species).

Another major goal is an agreed *List of Invasive Species of National Importance*. A sound precedent was set by the nationally agreed Weeds of National Significance, which are a matter of National Environmental Significance. This approach should be broadened to include a National Quarantine List, a National Alert List and a National Control List embracing all groups of invasive species (see Appendix 1).

At an over-arching level, the Australian Government needs to show leadership in fusing Commonwealth, State and Territory invasive species laws into a coherent national regulatory framework.

This can best be achieved by the Australian Government taking a leadership role with regulations under section 301A of the *Environment Protection and Biodiversity Conservation Act, 1999* , and the Australian, State and Territory governments developing complementary Model State Legislation to achieve consistent State and Territory laws. Uniform national and State and Territory invasive species control classes would form part of the Model. The Model will need to build in flexibility to account for different delivery approaches, for example through regions or local government areas, used by different States and Territories.

At a more specific level, Australia's permitted fish list needs to be reviewed, in light of evidence showing that most of the new fish invading Australia are species approved by AQIS for importation. Some of these fish are known to be invasive overseas and should be removed from the approved list.

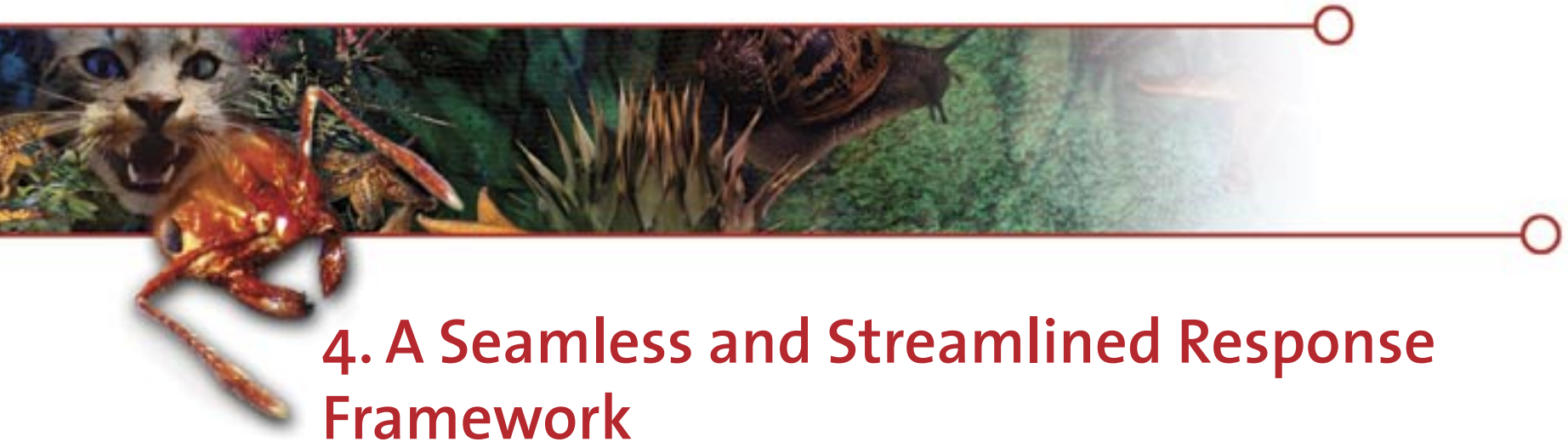
The Australian Government also needs to sustain its accelerated effort to close the major quarantine law loophole by or before the end of 2006 to stop the potential import of new invasive plants.[91] This action should not impede controlled research that aims to enhance Australia's crop varieties.

Actions

- Australian, State and Territory governments develop and enact a coherent national regulatory framework by:
  - Australian Government making regulations under section 301A of the *Environment Protection and Biodiversity Conservation Act, 1999*
  - Australian, State and Territory governments developing complementary Model State Legislation, which is then enacted by all States and Territories (or used as a model to amend existing laws).
- Australian, State and Territory governments develop an agreed statutory *List of Invasive Species of National Importance* to be banned for sale throughout Australia.
- Australian, State and Territory governments develop and adopt agreed uniform national, and State and Territory, statutory invasive species control classes (see Appendix 1).
- Australian government review its permitted fish list, to remove those species that pose a high risk of escaping into and invading waterways.
- Australian Government fully close the permitted seeds list quarantine law loophole by removing all plant genera and replacing them with a comprehensive list of permitted plant species.

While Australia adopted a standard railway gauge decades ago, the States and Territories continue with their own inconsistent categories and lists of invasive species. Because of these inconsistencies, many of Australia's worst weeds can still be sold, including five of Australia's 20 Weeds of National Significance, eg: Lantana (*Lantana camara*), pictured above, is still legally sold in some States

The Australian Government also needs to sustain its accelerated effort to close the major quarantine law loophole that currently permits nearly half of all plant species on Earth to be legally imported with no weed risk assessment



4. A Seamless and Streamlined Response Framework

Necessary Outcomes.

Information on quarantine interceptions and new incursions flows to all relevant Australian Government and State agencies.

Specific emergency response mechanisms for those invasive species with solely environmental impacts.

Decision-making processes for useful species that are also invasive, to reconcile conflicts.

Clear government, industry and community responsibilities defined for weeds and pests with a solely environmental or social impact, including early warning surveillance and emergency response.

A risk-based approach to evaluating and responding to hazards.

National control based on invaded systems approaches rather than species by species approaches.

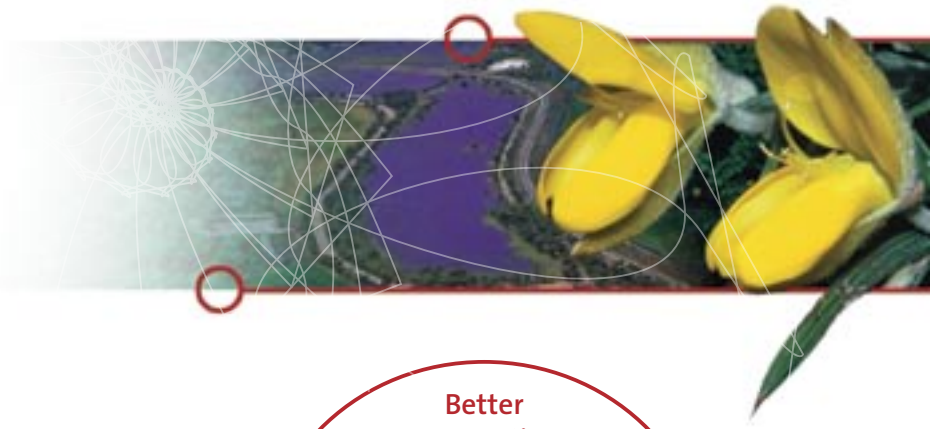
Australia's Federal government system challenges Australian, State and Territory governments to achieve coordinated responses to pest problems where these overlap state borders or are of national importance.

Better cooperation is needed between Australian Government agencies responsible for quarantine interceptions and new incursions, and the State and Territory agencies that become responsible for their control. Clear protocols and information systems need to be developed. In this regard, the work of the Primary Industries Ministerial Council to develop national capability for surveillance, quarantine, control and recovery is welcomed.[92]

The example of fire ants in Brisbane showed that emergency responses are inadequate for pests with a major impact on society and the environment. In this case federal funds came from primary industry sources. The example highlights the need for an Australian, State and Territory government emergency response fund for incursions of major importance to the environment (see also Cost Sharing section).

Protocols should also be developed to reconcile the benefits and costs of useful plants that are also invasive. Too many conflicts are arising between different industries, and between agriculture and environment agencies. For example, Paterson's curse costs farmers $30 million each year but provides a benefit to honey producers,[93] while hymenachne has been promoted as a ponded pasture grass but is also a Weed of National Significance.

Implementation of national control of Weeds of National Significance and other important weeds also needs to change from a species by species approach, to a site based (or invaded systems) approach.



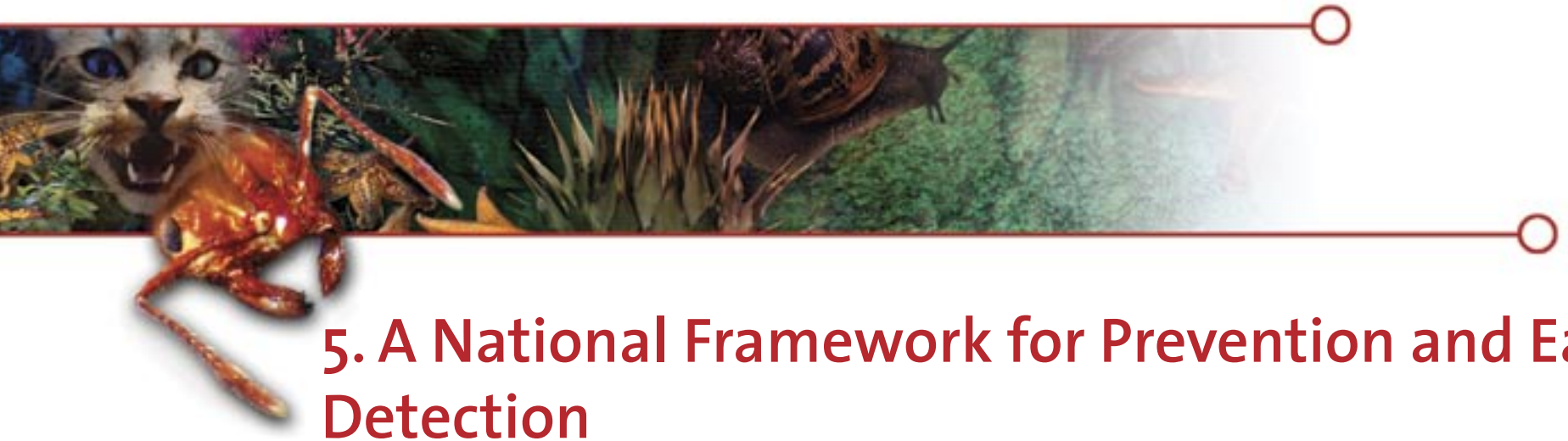
Actions

- NRM Standing Committee Invasive Species Task/Executive Group review current response arrangements to identify deficiencies, with a focus on information sharing and coordination between different levels of government.
- Australian, State and Territory governments develop an emergency response mechanism (with funding) for invasive species with mainly an environmental impact.
- Australian, State and Territory governments develop an Australian Emergency Invasive Animal and Diseases Management Plan.
- Australian, State and Territory governments develop a protocol for plants that are both useful and invasive.
- Australian, State and Territory governments develop a comprehensive risk-based approach to evaluating and responding to invasive species hazards.
- Australian, State and Territory governments develop an intervention approach based on strategic phases of invasion, that is focused on species eradication at early stages of invasion and integrated site-based approach to control in late stages of invasion.

Better cooperation is needed between Australian Government agencies responsible for quarantine interceptions and new incursions, and the State and Territory agencies that become responsible for their control

Australia's Federal government system challenges governments to achieve coordinated responses to pest problems where these overlap state borders or are of national importance

Protocols should also be developed to reconcile the benefits and costs of useful plants that are also invasive



5. A National Framework for Prevention and Early Detection

Necessary Outcomes.

Global and regional engagement to strengthen prevention.

No new species are introduced unless they are assessed as a low risk to agriculture, human welfare and the environment.

Increased detection of environmental invasive species by AQIS.

Inter-State mail screened by State and Territory quarantine agencies.

Prevention is the cheapest and best 'solution' to new invasions. While Australia is a world leader in many areas, major gaps remain.

Australia should strengthen its international and regional engagement on this issue, by working with and increasing the capacity of our trading partners and neighbouring nations. For example, the CSIRO has identified 36 marine pests that have invaded the ports of our trading partners and are expected here soon.[94]

AQIS, particularly the Northern Australia Quarantine Strategy, needs more resources to detect new incursions. At present, funding is so stretched that the discovery of new pests creates budgetary strains.

Preventing weeds, pests and diseases from invading unaffected States and Territories also needs a higher priority.

States and Territories should review their biosecurity policies, and adopt the principle that any new species is guilty until proven innocent. Western Australia has such a system for plants – a permitted list – and this should be adopted by other States.

The Australian Government should also remove barriers that impede state governments. A prime example is the current refusal of the Australian Government to allow the Western Australian Quarantine Inspection Service to scan inter-state mail for seeds and pests.[95]

Actions

- Australian, State and Territory governments re-commit to a strong policy on invasive species and adopt further actions to close high risk pathways.
- Australian, State and Territory governments adopt a notification protocol and information system that leads to routine sharing of interception and incursion information between AQIS and State agencies.
- Australian Government increase funding to AQIS to strengthen its capacity to detect environmental pests.
- Australian Government authorise appropriate State/Territory agencies to scan inter-State/Territory mail for invasive species under the *Australian Postal Corporations Act, 1989*.
- State and Territory governments implement legal measures (such as permitted lists) that ban import of new species unless they are assessed as a low risk to agriculture, human welfare and the environment.
- Australian, State and Territory governments develop a focused and cost-effective national invasive species monitoring network.
- Australian, State and Territory governments establish the *National System for Prevention and Management of Marine Pest Incursions*, to manage all vectors of marine pests and monitor high risk entry locations.

6. A National Education, Training and Action Program

Necessary Outcomes.

More informed consumers buying fewer invasive garden and aquarium plants.

Better-educated pet owners releasing fewer fish and other exotic animals into the wild.

Codes of Conduct adopted by users of vehicles, vessels and other vectors that spread invasive species.

More community involvement in early warning surveillance, monitoring and control.

Australians should know that the products they purchase may worsen the invasive species problem. Garden plants and aquarium fish are the main sources of new weeds and feral fish in Australia today. Consumers should be told about the risks to agriculture, human welfare and the environment that can result from growing invasive garden and aquarium plants, or from releasing fish into the wild.

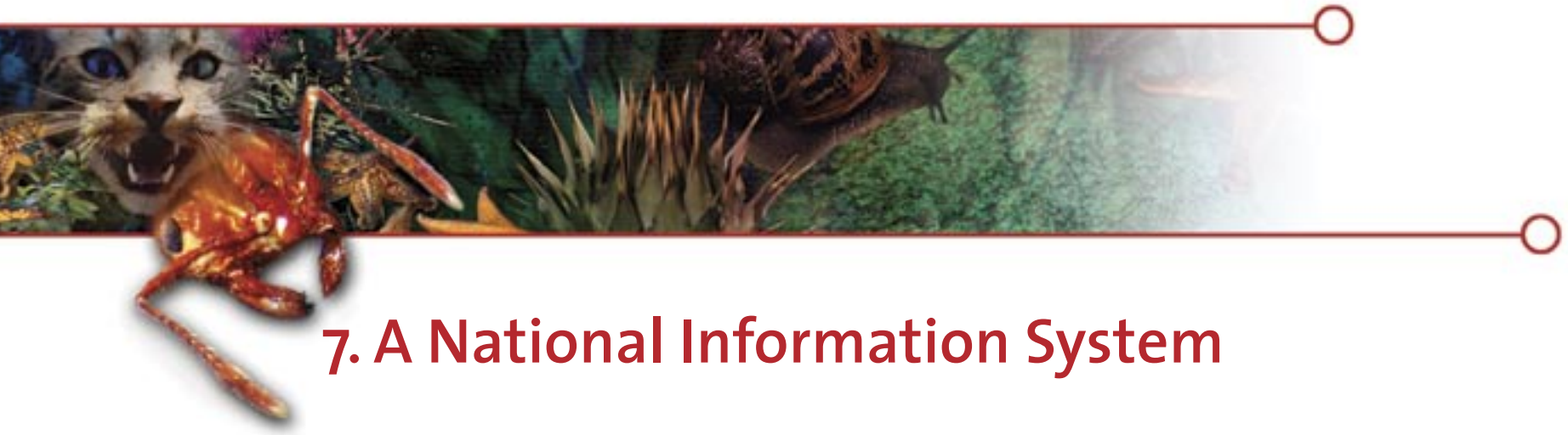
This can best be achieved through a mandatory labelling scheme. Plants and fish that pose a risk should be labelled accordingly, and alternatives that pose no risk could be certified as problem-free. Governments have already recognised the value of labelling schemes to improve consumer choice in other sectors. A *Mandatory Energy Efficiency Labelling Scheme for Australia* and a *Mandatory Water Efficiency Labelling Scheme for Australia* are already in place. The major limitations of voluntary schemes were shown in the final report for the Mandatory Water Efficiency Labelling Scheme.[96]

Additionally, Codes of Conduct (or conditions of license) should be developed for all possible vectors of invasive species, especially for users entering high value habitats. For example, marine pests are spread by dinghies, yachts and aquaculture equipment, as well as by commercial trading vessels, while cane toads can be spread to new locations by barges and dinghies.

Bushcare and landcare groups already play a key role in weed control. Marine environment groups and local residents are also becoming involved in monitoring and eradication. Governments should help communities to assist in early warning surveillance and monitoring, by providing training in identification and monitoring and providing umbrella insurance cover for relevant community groups.

Actions

- Australian, State and Territory governments establish a national invasive species education and action framework to advance awareness and information.
- Australian, State and Territory governments, working with the garden industry, pet industry and conservation organisations, develop a mandatory labelling scheme for invasive garden and aquarium plants and a mandatory labelling scheme for aquarium fish.
- Australian, State and Territory governments draw up a comprehensive list of vectors that spread invasive species, and develop Codes of Conduct or conditions of license for each vector.
- Australian, State and Territory governments develop a coordinated national program to promote community involvement in surveillance, monitoring and control.



7. A National Information System

Necessary Outcomes.

Robust strategic planning, State and regional NRM planning, adaptive management, and community involvement in early warning surveillance and control, are underpinned by a:

- **national information system**
- **national invasive species audit**
- **national list of introduced species, and**
- **national list of invasive species.**

Objective evaluation of eradication programs.

We have no idea of the number of invasive species in Australia.

Far better information is needed to support policy and strategic planning. Available information is scattered around various agencies and institutions.

There are major information gaps – such as data on foreign pests yet to reach Australia. This limits our capacity to plan for the future.

Australia has taken important steps forward in recent years with the publication of a comprehensive list of weeds established in natural or agricultural ecosystems,[97] a national port survey, and the national introduced marine pest information system.[98] To improve regional NRM delivery and community involvement, this information should be collated and made available through a national information system and web portal. A model may be the Australian Plant Pest Database, which is an on-line link of existing plant pest databases held by various agencies across Australia.

A key information gap relates to knowledge about the extent and relative risk of those introduced invasive species that have yet to establish in the environment.

An invasive species audit is also needed to provide a complete picture of the national pest threat. It should build on the proposed National Weed Assessment to be undertaken through the National Land and Water Resources Audit.

Actions

Australian, State and Territory governments:

- extend existing information systems to include all types of invasive species and maintain them as an integrated system, which includes publicly available web access.
- undertake a national invasive species audit.
- develop a national list of introduced species.
- develop a national list of invasive species.
- implement protocols for monitoring and evaluating all eradication programs.

8. A Strategic Research Fund

Necessary Outcome.

Funding in place to provide certain and committed medium term (10 year) funding for nationally important research projects, such as development of new biocontrol agents.

Biological control is the best tool for controlling well-established pests. Both the Senate Inquiry[99] and a report to the Prime Minister's Science, Engineering and Innovation Council highlighted the large returns on investment it provides. The latter report calculated that the development of biocontrols for 20 weeds of national importance would save 1,600 native species and achieve collateral benefits of $1,000 million.[100] The return on investment with biocontrols typically gives a benefit-cost ratio of about 20 to one.[101]

Unfortunately it usually takes ten years or more of scientific research to develop and implement a biocontrol agent - far longer than normal budgetary and political cycles.

The Senate Inquiry highlighted the *ad hoc*, inefficient and short term funding arrangements currently in place outside of CRC and block CSIRO funding.[102] These latter institutions must obtain external investment to match core funding, which adds to their financial uncertainty.

Australia's biocontrol capability has become run down over the past decade. The Queensland Government weed biocontrol group is in decline, while the CSIRO Centre for Research on Introduced Marine Pests no longer exists as a national research group.

Because funding is unreliable, biocontrol projects are often a stop-start affair, and the uncertainty is driving away high calibre, experienced researchers.

This situation must change. Australia needs specific national invasive species research funding to guarantee funding to projects of national importance. Initial contributions could come from the Commonwealth Environment Research Facilities Program ($60m/4 years currently uncommitted) and Defeating the Weeds Menace initiative.

About $1 million is needed to develop a new biocontrol agent for a weed[103] and about $10 million to develop a biocontrol agent for an animal pest.[104] These costs are recouped many times over by the savings that biocontrol achieves.

Research by social scientists is also needed to identify the social and economic forces that promote human spread of invasive species. Policies on prevention and control need to take into account human motivations and we need to understand these.

Actions

- Australian, State and Territory governments establish a National Invasive Species Control Research Fund to provide committed funding for nationally important research projects, particularly biocontrol work.
- Co-investment from industry is sought for the Fund for specific biocontrol projects, and for other solutions to weeds and pests that affect them.

9. Equitable Industry Contributions to Improve Surveillance and Eradication

Necessary Outcome.

Improved surveillance of garden escapes around cities, and marine pests in harbours, co-funded by industry contributions, based upon the polluter-pays principle.

Many industries, such as the chemicals and petroleum businesses, are required by law to maintain certain standards of cleanliness and to clean up pollution or spills. This application of the 'pollutor pays' principle is widely accepted by government and these industries.

Industries that produce 'bio-pollutants', such as new weeds or marine pests, should also contribute to their detection and clean up. The impact of bio-pollutants is often longer-lived than that of toxic wastes.

Governments should not have to bear the full cost of surveillance and eradication. It is only fair that those industries or transport sectors (including recreational users) that contribute to the problem also contribute financially to the solution.

Australia's cities and towns are the main sources of new weeds. Escaped garden plants account for 70 per cent of Australia's agricultural, environmental and noxious weeds,[105] and for two thirds of the introduced plants that established in recent decades.[106] They also make up over 40 per cent of the most harmful weeds affecting graziers.[107]

To keep these plants out of farmland and the bush will require a nationally coordinated early-warning surveillance program. The garden sector should contribute to this through a co-financing mechanism such as an expansion of the national pot levy.[108]

The same funding approach should apply to marine pests. A levy on international and domestic vessels (including yachts, barges, aquaculture equipment, oil rigs), indexed according to the risk each vessel poses, would help fund a strong and effective marine biosecurity shield. Commercial shipping has already provided $2 million through a levy to develop the ballast water decision systems and will be charged through AQIS for inspection and management of ballast water on incoming vessels.[109]

Actions

- Australian, State and Territory governments, in consultation with the Nursery and Garden Industry Association, develop a co-financing mechanism – possibly a national pot levy – to increase funding for early warning and eradication of garden escapes.
- Australian, State and the Northern Territory governments develop a co-financing mechanism – possibly a levy on all international and domestic vessels – for early warning surveillance of vessels and eradication of hull and ballast escapes that are assessed as pests.

10. Cost-Sharing Arrangements to Fund Detection and Eradication of Both Environmental and Agricultural Threats

Necessary Outcome.

Government agencies act swiftly against new pests because of agreed cost-sharing formulae in place between Australian, State and Territory governments.

To enable quick action when new pests appear, the Australian, State and Territory governments need to agree on cost-sharing arrangements for new incursions by invasive species of national importance.

Cost-sharing arrangements have already been developed for marine pest incursions, and Plant Health Australia is facilitating a cost-sharing arrangement with industry for those plant pests of major concern to plant industries. A similar industry/government agreement is already in place to address cost sharing arrangements related to responses to animal disease incursions.

This work needs to be extended to all groups of invasive species, including pests of major importance to the environment.

Actions

- Australian, State and Territory governments develop a protocol that determines relative priority and feasibility of eradicating new pests.
- Australian, State and Territory governments develop a cost-sharing formula to fund eradication or containment of priority invasive species.

Yellow burrhead (*Limnocharis flava*), the serious weed pictured above, was discovered in Australia in 2001. It is now part of a national eradication campaign

Conclusion

The newly-released Federal Senate committee report, *Turning Back the Tide – the Invasive Species Challenge*, establishes beyond any doubt Australia's vulnerablity to emerging pest threats. The report highlights many holes in the biosecurity shield.

As outlined here, Australia needs a national framework of invasive species policies and laws to provide efficient and coordinated delivery of programs. Expenditure on pests offers a very high benefit-cost ratio – a good return on investment – if it is guided by a coherent policy.

We owe an obligation to future generations to secure Australia's rich natural resources and unique wildlife from the ongoing threats posed by invasive pests.

The policies outlined here will see us through the challenges of the years ahead.

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The policies outlined here will see us through the challenges of the years ahead

European carp (*Cyprinus carpio*) are a serious aquatic pest. Along some rivers 90 per cent of fish are carp

About the Australian Biosecurity Group

The Australian Biosecurity Group is a collection of Australia's leading invasive species scientists and policy specialists who are advocating the adoption of next generation biosecurity measures to stop invasive species from devastating Australia's agricultural lands and environment.

Dr Nic Bax
Marine scientist, CSIRO

Prof Joan Dawes
Board Chair, Pestat Ltd

Andreas Glanznig
Environmental and natural resource policy specialist, WWF-Australia

Tim Low
Environmental consultant and author of *Feral Future*

Dr Rachel McFadyen
Weed scientist, CEO of the CRC for Australian Weed Management

Dr Tony Peacock
Animal scientist, CEO of the CRC for Pest Animal Control (to become CRC for Invasive Animals, July 2005)

Prof Hugh Possingham
Mathematical ecologist, Chair Australian Government Biological Diversity Advisory Committee

John Sandow
Manager – Crop Protection, Grains Research and Development Corporation

Carolyn Tanner
Agricultural and resource economist, and member of the Australian Quarantine Review Committee (Nairn Review), University of Sydney

The Australian Biosecurity Group is convened by the Cooperative Research Centre for Pest Animal Control, Cooperative Research Centre for Australian Weed Management and WWF-Australia.

Checklist for Securing Australia from Invasive Species

Policy and Coordination

- **Institutional reform**: Under the auspices of the NRM Ministerial Council, establish a high-level *Invasive Species Executive Group*, an *Invasive Invertebrates Committee* (or broaden scope of the Vertebrate Pest Committee), and an *Invasive Diseases Committee*
- **Administrative reform**: Establish a lead Australian Government body that drives and coordinates the national response to invasive species
- **Policy reform**: Establish a national invasive species policy framework, and develop new national strategies for invasive animals, weeds and diseases
- **Legislative reform**: Enact a coherent regulatory framework that implements uniform national and State/Territory invasive species control classes and bans the sale of nationally important invasive species
  - Commonwealth EPBC Act regulations to control non-native species (s301A)
  - consistent and complementary State and Territory invasive species laws.
- **Integrated information**: Establish a national information system on invasive species
- **Education**: Establish a national invasive species education and action framework to advance awareness and information

Prevention

- Australian Government closes the quarantine law loophole to new weeds (while not impeding controlled research to enhance Australia's crop varieties) and review the permitted live fish list
- Adopt a notification protocol and information system that leads to routine sharing of interception and incursion information between AQIS and State/Territory agencies
- Australian Government increases funding to AQIS to strengthen its capacity to detect environmental pests
- Australian Government authorises appropriate State/Territory agencies to scan inter-State/Territory mail for invasive species under the *Australian Postal Corporations Act, 1989*
- State and Territory governments implement legal measures (such as permitted list systems) that ban import of new species unless they are assessed as a low risk to agriculture, human welfare and the environment
- Develop a focused and cost-effective national invasive species monitoring network
- Establish the *National System for the Prevention and Management of Marine Pest Incursions*

Early Warning and Rapid Response

- Develop a National Quarantine List covering all groups of invasive species to focus national detection and eradication efforts on high priority invasive species
- Develop an Australian Emergency Invasive Animal and Diseases Management Plan
- National strategic surveillance system in place that includes a program to promote community involvement in surveillance and monitoring
- Establish an industry co-financing mechanism to assist fund improved surveillance programs
- Adopt agreed emergency cost-sharing arrangements to enable rapid decisions

Eradication

- Develop a National Alert List covering all groups of invasive species to focus national eradication or containment efforts on a set of high priority invasive species
- Develop a National protocol that determines relative priority and feasibility of eradicating new pests
- Adopt agreed cost-sharing arrangements

Containment and Control

- Develop a National Control List covering all groups of invasive species that require national control plans
- Develop a mandatory labelling scheme for invasive garden and aquarium plants and a mandatory labelling scheme for aquarium fish
- Develop a comprehensive list of vectors that spread invasive species, and develop Codes of Conduct or conditions of license for each vector
- Implement mechanism that provides secured 10 year funding for development of biocontrol agents and other strategic research

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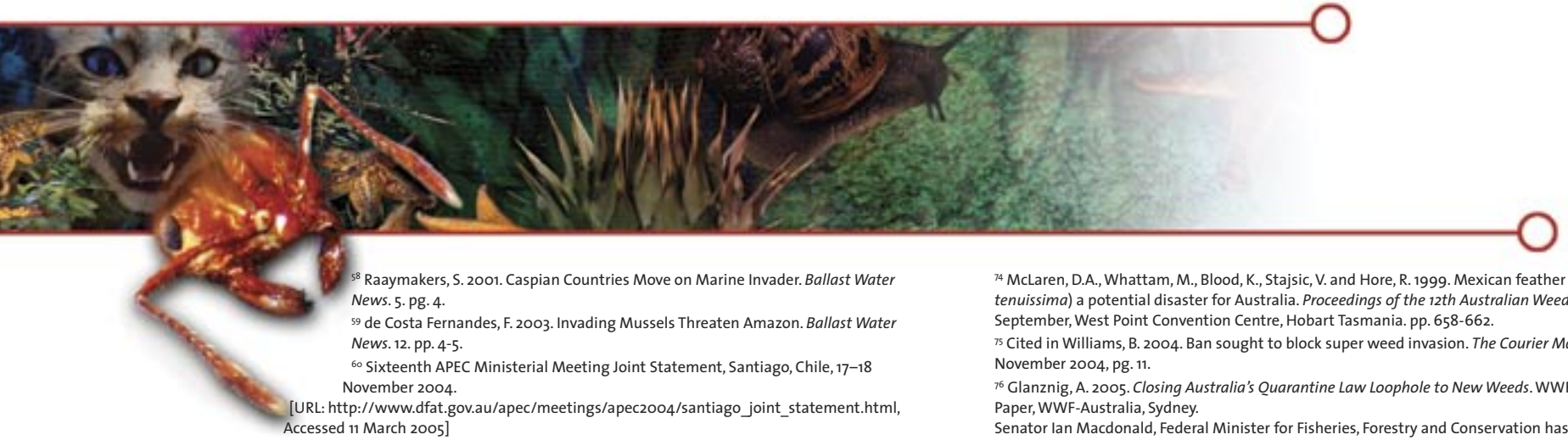

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[109] The outstanding gaps are funding for species that slip through this leaky barrier and all the other types of vessels that may introduce, or spread, invasive species around Australia.

Appendix 1: Uniform and coherent national and State/Territory invasive species control classes

The Australian Biosecurity Group proposes the following uniform national and State/Territory invasive species control classes.

An invasive species listed in a national class also needs to be listed in a State/Territory control class but not necessarily vice versa. The State/Territory class for a given species will depend on whether it is present in that jurisdiction and the control strategy deemed appropriate. A nationally important species may be listed under a range of different State/Territory control classes by different jurisdictions.

Invasive Species of National Importance Classes	Description	Statutory Requirement	Responsibility
National Quarantine List	Invasive species of national importance that pose a high risk to Australia and are not known to occur in Australia, and whose early detection will enable cost-effective eradication. A starting point should be the Northern Australia Quarantine Strategy target list and the Interim Trigger List of Introduced Marine Pest Species	Prohibited import into Australia	Australian Government
		Listed as controlled species under State/Territory laws	State and Territory governments
		Prohibited for trade	Australian, State and Territory governments
		Early warning surveillance programs	Australian, State and Territory governments
		Eradication program (where detected and feasible)	Australian and appropriate State and Territory governments
National Alert List	Invasive species of national importance that are present in the wild, but have a restricted range, are predicted to have a major impact on the environment, human welfare or industries, and which may be, are currently, or were, subject to a State or national eradication efforts. The category should also include introduced invasive plants of national importance, which are cultivated but yet to escape and are subject to national early warning surveillance and containment action	Prohibited import into Australia	Australian Government
		Listed as controlled species under State/Territory laws	State and Territory governments
		Prohibited for trade	Australian, State and Territory governments
		Early warning surveillance programs	Australian, State and Territory governments
		Eradication programs (where appropriate)	Australian and appropriate State and Territory governments
		Containment programs (where appropriate)	Australian, State, Territory and local governments
National Control List	Invasive species of national importance that are widespread in Australia, have a major impact on the environment or industry, and whose containment or control will help protect the values of areas of national environmental significance. A starting point is the Weeds of National Significance list, those invasive species that are listed as a Key Threatening Process under the EPBC Act, and those marine pests that are subject to a national action plan (eg. Northern Pacific Seastar)	Prohibited import into Australia	Australian Government
		Listed as controlled species under State/Territory laws	State and Territory governments
		Prohibited for trade	Australian, State and Territory governments
		National Control Action Plan	Australian, and appropriate State and Territory governments

Uniform State and Territory Invasive Species Control Classes	Description	Statutory Requirement	Responsibility
Class 1: Quarantine and Eradication List	Invasive species in other states that are not established in the state in question, which if introduced would cause economic, environmental or social harm	Prohibited from import and trade in jurisdiction Subject to early warning surveillance Subject to eradication if found Notifiable	State/Territory governments, land managers State/Territory governments, land managers State/Territory governments, land managers Land/port managers
Class 2: Containment List	Invasive species that are not widespread in this state or which are regionally contained, which have caused or could cause economic, environmental or social harm	Prohibited from import and trade in jurisdiction Subject to early warning surveillance on edge and outside of containment area May be subject to eradication or continual suppression Notifiable	State/Territory governments, land managers State/Territory governments, land managers State/Territory governments, land managers Land/port managers
Class 3: Control List	Invasive species that are established in the state and have, or could have, an adverse economic, environmental or social impact	Prohibited from import and trade Conditions may apply to movement of contaminated materials Landowners must take reasonable steps to keep land free of Class 3 pests Government agencies must take reasonable steps to keep land free of Class 3 pests	State/Territory governments Merchants, land managers Land managers State agencies, local governments
Class 4: Restricted List	Invasive species whose trade would result in further spread, increase the prospect of further economic, environmental and social harm either within or without the state	Prohibited from import or trade	State/Territory governments
Class 5: Regional Declaration List	Invasive species of regional importance	Regionally specific actions	Local governments or regional bodies

Image credits

Page	Image	Acknowledgement
Cover	Northern Pacific seastar *Asterias amurensis*	CSIRO Marine Research
	Bridal creeper *Asparagus asparagoides*	Colin Wilson
	Feral cat *Felis catus*	Pest Animal Control CRC
	Fire ant *Solenopsis invicta*	Fire Ant Control Centre Queensland Department of Primary Industries and Fisheries
	Cane toad *Bufo marinus*	Tim Low
	Artichoke thistle *Cynara cardunculus*	Tim Low
	Morning glory *Ipomea indica*	Tim Low
	Garden snail *Helix aspersa*	Tim Low
2	White snail *Theba pisana*	Dr Geoff H Baker CSIRO Entomology
	Japanese kelp *Undaria pinnatifida*	Simon Talbot CSIRO Marine Research
	Northern Pacific seastar *Asterias amurensis*	Pest Animal Control CRC
	Carp *Cyprinus carpio*	Pest Animal Control CRC
	Wild dog *Canis lupis familiaris*	Tim Low
	Honey locust *Gleditsia triacanthos*	Rebecca Coventry
	Salvinia infestation *Salvinia molesta*	Department of Primary Industries NSW
4	White snail *Theba pisana*	Dr Geoff H Baker CSIRO Entomology
	Japanese kelp *Undaria pinnatifida*	Simon Talbot
	European fan worm *Sabella spallanzanii*	CSIRO Marine Research
	European rabbits *Oryctolagus cuniculus*	Pest Animal Control CRC
	Rabbit damage on Philip Island	Department of the Environment and Heritage
	Prickly acacia *Acacia nilotica*	Colin Wilson

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5	White snail *Theba pisana*	Dr Geoff H Baker CSIRO Entomology
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	European fan worm *Sabella spallanzanii*	CSIRO Marine Research
	European rabbits *Oryctolagus cuniculus*	Pest Animal Control CRC
	Rabbit damage on Philip Island	Department of the Environment and Heritage
	Prickly acacia *Acacia nilotica*	Colin Wilson
6	Cane toad *Bufo marinus*	Tim Low
	Bridal creeper	Colin Wilson
	Asparagus *asparagoides*	Victorian Serrated Tussock Working Group
	Farmer	Dr Brendan Cowled
	Feral pig *Sus scrofa*	Pest Animal Control CRC
7	Cane toad *Bufo marinus*	Tim Low
	Brown widow spider *Achaearanea*	Tim Low
8	Feral cat *Felis catus*	Pest Animal Control CRC
	Fox *Vulpes vulpes*	Pest Animal Control CRC
	Wild dog damage	Pest Animal Control CRC
	Caulerpa taxifolia	John Gilliland Marine Biosecurity Program - Primary Industries and resources SA
	Rabbit damage on Macquarie Island	Tim Low
	European rabbits *Oryctolagus cuniculus*	Pest Animal Control CRC
	Rabbit damage on Philip Island	Department of the Environment and Heritage
	Masked booby *Sula dactylatra* mauled by Black rat *Rattus rattus*	Ian Hutton Lord Howe Island
	Phytophthora dieback	Marie Lochman

Page	Image	Acknowledgement
9	Rubber vine *Cryptostegia grandiflora*	Colin Wilson
	Rubber vine close-up	Colin Wilson
10	*Tilapia mariae*	Michael Hutchison Department of Primary Industries and Fisheries Queensland
	Siam weed *Chromolaena odorata*	Barbara Waterhouse Australian Quarantine and Inspection Service
	Mexican feathergrass flume *Nassella tennuissima*	David McLaren Department of Primary Industries Victoria
	Green swordtail fish *Xiphophorus helleri*	Glynn Aland Department of Primary Industries and Fisheries Queensland
11	Northern Pacific seastar *Asterias amurensis*	CSIRO Marine Research
	Vessel traffic	Trevor Gilbert
	Ship containing Ballast Water	Australian Marine Sciences Association CSIRO Marine Research
12	Bridal creeper *Asparagus asparagoides*	Colin Wilson
	Green swordtail fish *Xiphophorus helleri*	Glynn Aland Department of Primary Industries and Fisheries Queensland
	Citrus canker *Xanthomonas axonopodis pv. citri*	National Citrus Canker Eradication Program – Biosecurity – Department of Primary Industries and Fisheries Queensland
	Siam weed *Chromolaena odorata*	Barbara Waterhouse Australian Quarantine and Inspection Service
13	Mexican feathergrass (large shot) *Nassella tennuissima*	David McLaren Department of Primary Industries Victoria
	Mexican feathergrass (small shot)	Alan McGuire NSW Department of Primary Industries
14	Portuguese millipede *Ommatoiulus moreleti*	Dr Geoff H Baker CSIRO Entomology
	Phytophthora dieback *Fox Vulpes vulpes*	Jiri Lochman Pest Animal Control CRC
15	Fire ant *Solenopsis invicta*	Fire Ant Control Centre Queensland Department of Primary Industries and Fisheries
	Green swordtail fish *Xiphophorus helleri*	Glynn Aland Department of Primary Industries and Fisheries Queensland
	Black-striped mussel *Mytilopsis sallei*	CSIRO Marine Research
	Mimosa *Mimosa pigra*	Colin Wilson

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16	White snail *Theba pisana*	Dr Geoff H Baker CSIRO Entomology
	Japanese kelp *Undaria pinnatifida*	Simon Talbot
	Northern Pacific seastar *Asterias amurensis*	CSIRO Marine Research
	Carp *Cyprinus carpio*	Pest Animal Control CRC
	Wild dog *Canis lupis familiaris*	Pest Animal Control CRC
	Honey locust *Gleditsia triacanthos*	Tim Low
	Salvinia infestation *Salvinia molesta*	Rebecca Coventry Department of Primary Industries NSW
17	Feral cat *Felis catus*	Pest Animal Control CRC
	Masked booby *Sula dactylatra* mauled by Black rat *Rattus rattus*	Ian Hutton Lord Howe Island
	Wild dog damage	Pest Animal Control CRC
21	Cane toad *Bufo marinus*	Tim Low
23	Lantana *Lantana camara*	Colin Wilson
25	Patersons curse *Echium plantagineum*	Department of Agriculture WA
	Gorse *Ulex europaeus*	Tim Low
27	Invasive plant sale	Sally Vidler Weeds CRC
29	Looking for new biocontrol agents	CSIRO
31	Yellow burrhead *Limnocharis flava*	Paul Zborowski
33	Carp *Cyprinus carpio*	Pest Animal Control CRC
35	Wild dog *Canis lupis familiaris*	Pest Animal Control CRC
	Morning glory *Ipomea indica*	Tim Low
37	Japanese kelp *Undaria pinnatifida*	Simon Talbot
39	Feral goat *Capra hircus*	Tim Low
41	Acacia karroo	Peter Martin *Weeds CRC*
42	Garden snail *Helix aspersa*	Tim Low
	Bitou bush *Chrysanthemoides monilifera*	Tim Low
NB	Images on pages 1, 3, 20, 22, 24, 26, 28, 30, 34, 36, 38 and 40 are replicas of the design used on the cover