Feral Herald

Magazine of the Invasive Species Council, Australia

Issue 29, July 2012

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KEEPING NATURE SAFE

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National taskforce to put biodiversity first

The Invasive Species Council this month launched Environment Health Australia, a bold new proposal for a national body to focus on Australia's most difficult environmental challenge – reducing the threat of invasive species to biodiversity.

The Invasive Species Council proposes the establishment of Environment Health Australia as the 'brains and relationships' infrastructure essential to drive a more effective national response to invasive species. Its core function would be to facilitate solutions-focused collaboration between the multitude of community, government, research and industry participants in environmental biosecurity to work on the highest priority gaps and needs.

Currently, biosecurity policy processes are divided between jurisdictions, three levels of government and multiple agencies; largely exclude the community sector; and are not strongly focused on the distinctive challenges of environmental biosecurity, which differ in many ways from industry biosecurity.

Environment Health Australia would be sister to Plant Health Australia and Animal Health Australia, which are government-industry bodies focused mostly on biosecurity for plant and animal industries respectively.

Get it online
> For the full report visit www.invasives.org.au

As the State of the Environment report attests (see story page 5), invasive species threats are growing and current responses are direly insufficient. The scale and complexity of invasive species threats warrant a national environmental biosecurity body. The number of threats and threatened, the complexity of ecosystems under threat and the numbers of participants in environmental biosecurity greatly exceed that for industry. It is not sufficient to simply tack on the environment to existing industry-focused bodies and processes.

ISC has been working towards having Environment Health Australia considered by the Federal Parliament at the same time it considers new biosecurity laws, scheduled to be introduced this month. The proposal has already received support from several players within government and research communities, who recognise that effective biosecurity requires collaboration by all sectors and inclusion of the community in policy processes.

Invasive species problems are generally caused and exacerbated by people. And it is people as individuals and within various institutions who must solve these problems. The proposed body would focus on social drivers needed to inculcate responsible behaviour and participation in biosecurity.

Over the coming weeks we will be seeking endorsement from other biosecurity stakeholders. Please read our proposal (it's on our website), and let us know if your organisation is interested and can offer support.

Here is an outline of proposed functions. Much more information is available in the proposal on the ISC website.

Create strong environmental biosecurity foundations

Eg. Develop and promote more ecologically informed approaches to protect species, ecological communities and ecological processes from invasive species through partnerships with biosecurity and research organisations.

Improve Australia's biosecurity preparedness

Eg. Develop biosecurity plans for high-risk potential environmental invaders, and surveillance protocols for environmental incursions, undertake foresighting and reporting to identify emerging and future threats, and develop strategies to limit the exacerbation of invasive species impacts under climate change. Make recommendations on more effective policy and regulation for environmental biosecurity.

Promote effective responses to environmental invasions

Eg. Participate in National Environmental Biosecurity Response Agreement processes and commission, co-ordinate, facilitate and manage nationally agreed environmental health and biosecurity projects, and lead preparation of AusEnvPlans to establish detailed emergency response arrangements under NEBRA.

Enhance community awareness, vigilance and biosecurity action

Eg. Build public awareness of environmental biosecurity and support the community to become involved in biosecurity policy development and implementation, develop best practice communication and community activation approaches in

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Australia's Great Barrier Reef is recognised globally for its outstanding biodiversity. Photo: brewbooks, Flickr

environmental biosecurity, and harness support of foundations and NGOs.

Improve environmental biosecurity capacity

Eg. Facilitate governments, community groups and researchers to work together to improve environmental health in Australia, identify high priority research needs for environmental biosecurity, and identify and prioritise invasive species management actions which can be implemented to deliver carbon offsets. Develop, with state and federal regulatory partners, an invasive species offsets policy that directs offset payments to mitigate priority invasive species threats.

Improve coordination and collaboration between jurisdictions, agencies and sectors

Eg. Collaborate with industry biosecurity bodies to jointly develop biosecurity responses where invaders have both environmental and industry impacts, and conduct joint research projects.

Monitor and report on Australia's progress in environmental biosecurity

Eg. Develop indicators for monitoring progress on meeting environmental biosecurity targets, and monitor and report on the establishment, spread and containment of ecologically important invasive species.

Blue Mountains Tree Frog, *Litoria citropa*.
Photo: Benjamint444, GNU Free Documentation Licence

White Terns on Lord Howe Island.
Photo: Fanny Schertzer, GNU Free Documentation Licence

Wildlife corridor planners cautioned

Tim Low

There is a big national push for the protection and restoration of wildlife corridors as a conservation response to climate change. The Invasive Species Council supports the need to reduce fragmentation and expand areas of habitat but cautions that planners need to assess invasive species risks and the costs of managing weeds and pests.

Some of the recent statements being made about the benefits of corridors show poor understanding of invasive species problems. ISC requested the following misleading statement be removed from the draft National Wildlife Corridors Plan:

'Natural connectivity in landscapes helps ensure that native species are more resilient to threats, such as those posed by invasive species.'

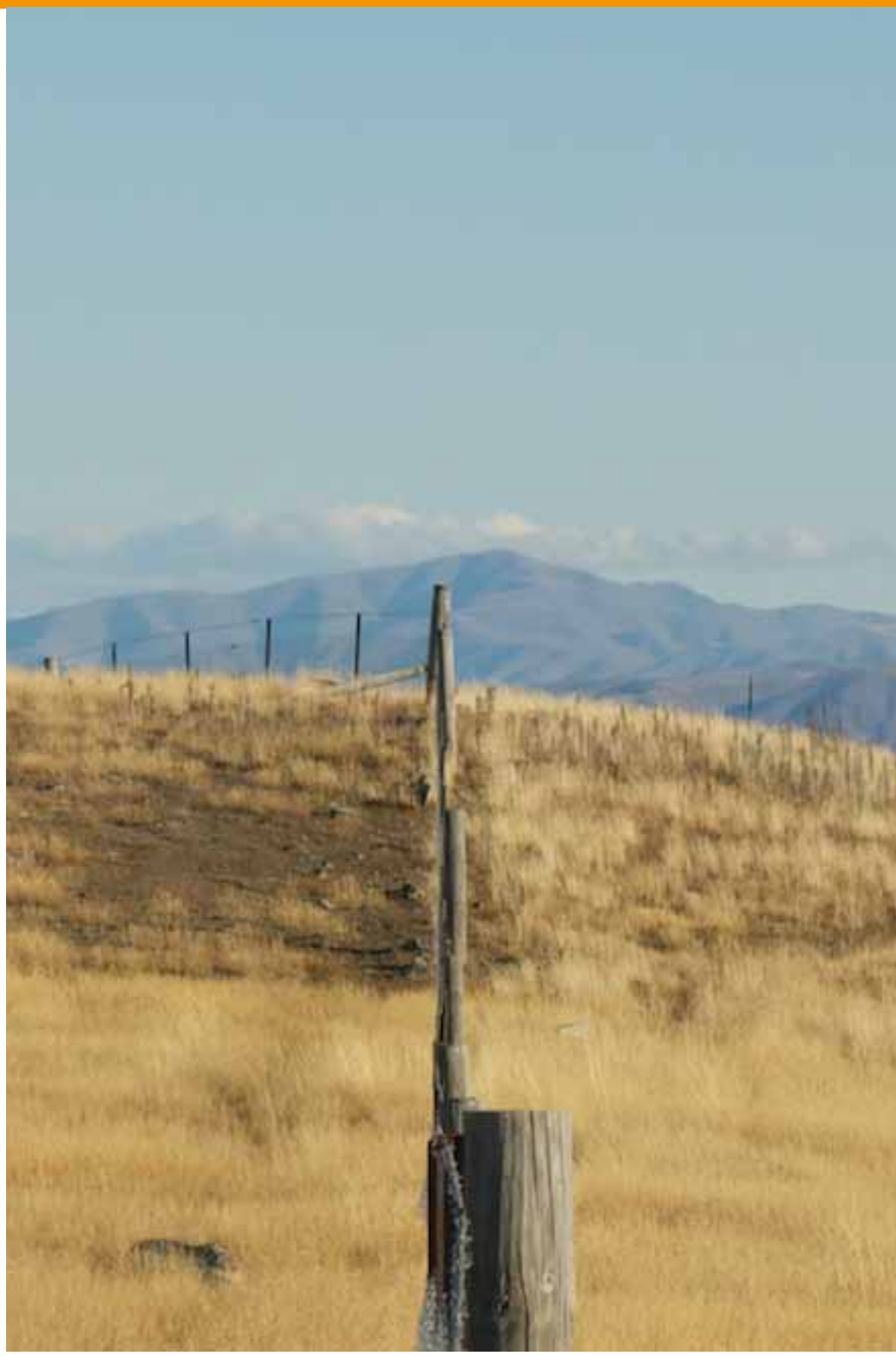
Our submission about this plan points out that most animal extinctions in Australia have been caused by invasive species – foxes, cats, rats and chytrid fungus – under circumstances where connectivity was high.

Conservation in Australia is often about reducing connectivity – about conserving rare species on small islands or behind predator-proof fences, and this approach won't change anytime soon. A recent report Into Oblivion: The Disappearing Native Mammals of Northern Australia (Fitzsimons et al. 2010) warns that extinctions loom in the region of Australia where connectivity is highest. Feral cats and intense fires are the main threats.

Corridors provide benefits for biodiversity, but to claim that these include invasive species control could see funding directed away from real invasive species control into corridor creation, to the overall disadvantage of biodiversity. Corridors are a reason to invest more in direct invasive species control because they will often increase suitable habitat for them, for example when bare paddocks are converted into woody thickets.

Corridors may have the potential to make some invasive species problems worse. Our submission highlights the potential of a Great Eastern Ranges Corridor to facilitate spread of sambar deer from Victoria to northern New South Wales and Queensland.

We cited a major CSIRO report about climate change that calls for 'careful assessment of the risks' inherent in corridors (Dunlop and Brown 2008), and we advocate Corridor Risk Assessments to be undertaken before new corridor components are approved. These could assess the risks posed by fire and problem native species as well as weed and feral animal risks. In the vast majority of cases we would expect the benefits of corridors to outweigh the risks.



Conservation often requires reducing connectivity – for example by fencing out feral animals. A rabbit proof fence around the Tekapo Scientific Reserve, New Zealand. Photo licence: Mollivan Jon, Flickr

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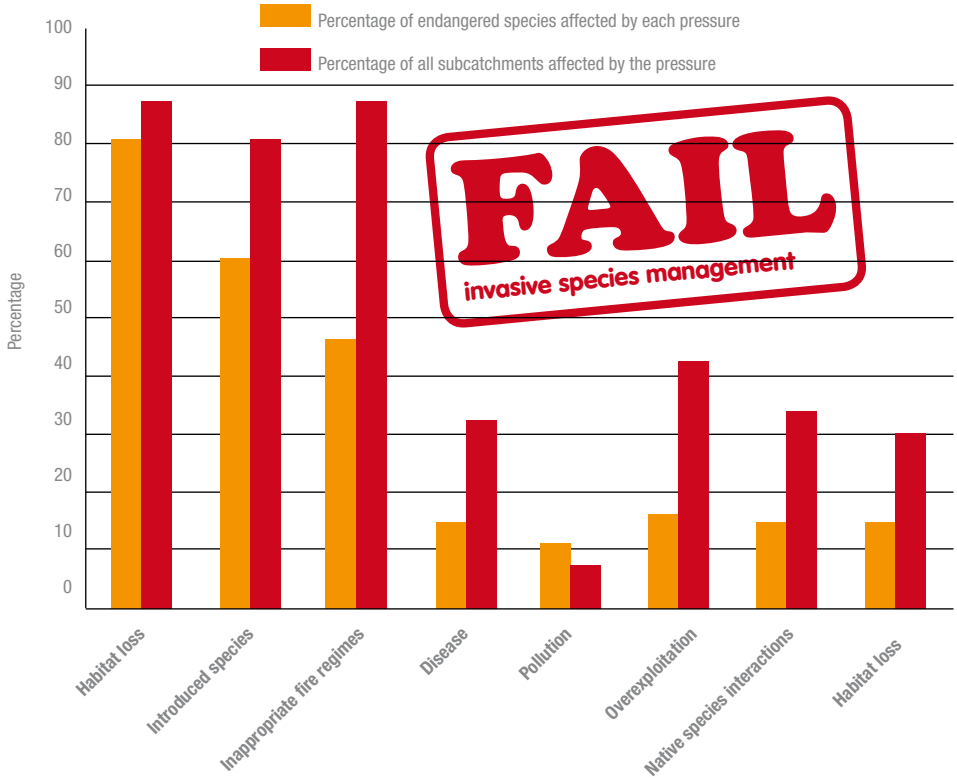
State of the environment

Carol Booth
ISC Policy Officer



Source: Evans et al. 2011
http://www.fullerlab.org/wp-content/uploads/2011/08/Evans-et-al-2011.pdf

As 2011 drew to a close, on the same day that Prime Minister Gillard announced a Cabinet reshuffle, the federal government released its five-yearly report card on the environment. The new Cabinet was front page news in all major newspapers, the State of the Environment 2011 did no better than page 7.

Although the devastating impacts of invasive species rated just a couple of mentions in the media, they were accorded prominence in the report, with a judgement that government responses are 'critically under-resourced'.

Habitat loss and introduced species were recorded as the most common and widespread pressures on threatened species – 60% of nationally endangered species are affected by introduced species and 15% by disease (mainly from introduced pathogens). Australia's natural heritage is under pressure from a 'fast-growing number of invasive species'. Under climate change the 'current replacement of native species with a smaller number of introduced species capable of supporting a narrower range of ecological functions will intensify. An explosion in the number and impacts of invasive species is plausible ....'

The report card assessments on invasive species were bleak: high to very high impacts of invasive species with deteriorating or unclear trends. Impacts on biodiversity and management outcomes received the worst possible ratings.

The report notes deficiencies of management, information and resources for invasive species, for example:

On management: 'Government responses to invasive species are uncoordinated at the national level, reactive, focused on larger animals, biased towards potential impact on primary industry at the expense of the total ecosystem, and critically under-resourced.'

On resources: 'Most jurisdictions admit they are unable to provide sufficient resources to control existing invasive species and most now focus on preventing establishment of new invasive species. New pressures are emerging and are of high concern due to the limited resources available for control.'

On information: State of environment reports by states and territories 'mostly list plans, strategies and inputs to management, but rarely report on the effectiveness of processes or on outputs and outcomes' for invasive species. The Assessment of Australia's terrestrial biodiversity 2008 is quoted: 'The scale of the impacts from [invasive species] is such that the voluntary and uncoordinated approaches adopted to date will not be effective.'

The new invaders myrtle rust and Asian honeybees are noted. Of myrtle rust, the report says that because of its high mobility and the dominance of Myrtaceae, its potential impacts are 'profound' and 'could transform the Australian environment in major ways'.

None of the invasive species information in the State of the Environment 2011 is new or revelatory. We've heard it all before, and perhaps that is the most concerning message of all: that Australian governments are failing to heed and seriously try to reverse these alarming trends. Also concerning is the media's collective yawn: reports of biodiversity decline have become so commonplace the latest report is barely considered newsworthy.

More information

> State of the Environment 2011 Committee. 2011. Australia State of the Environment 2011. Independent report to the Australian Government Minister for Sustainability, Environment, Water, Population and Communities – http://www.environment.gov.au/soe/2011/summary/index.html

REPORT CARD ON IMPACTS, TRENDS AND MANAGEMENT EFFECTIVENESS

Environment component	Degree of impact	Trend	Management effectiveness – outputs & outcomes
Biodiversity	Very high	Deteriorating	Ineffective
Heritage values	Very high	Deteriorating	NA
Inland water environments	High	Deteriorating	Partially effective
Land environment	High	Deteriorating	Partially effective
Antarctic terrestrial environment	High	Unclear	Effective

Rio+20. Have we sold out nature?

Australia can't meet its international commitments to protect nature unless it greatly improves its performance on invasive species. **Carol Booth** reports.

Twenty years ago, at the first United Nations Earth Summit, the Australian Government signed the Rio Declaration, which led to three international agreements intended to overcome the great planetary threats of climate change, biodiversity loss, and desertification and degradation.

Since Rio, each of these threats has escalated, and future prospects for people and biodiversity almost everywhere are being diminished. Rio+20, the third Earth Summit (20-22 June in Rio), has provoked much analysis of these dismal global failures.

The spread of invasive species is one of many reasons why the world is failing to protect biodiversity (invasive species are recognised as the second leading cause of decline), remediate desertification (invasive species such as goats cause major degradation), and prevent climate change (eg. ruminant invasive species emit greenhouse gases, plant pathogens can reduce carbon stores).

With the highest per capita emissions of greenhouse gases and biodiversity decline in the OECD, Australia has been a world leader in the failure, and a major cause is the dire and growing threat of invasive species, which are:

- The leading cause of animal extinctions in Australia (one more mammal has gone extinct since Rio, due to invasive species – the Christmas Island pipistrelle).
- The second most prevalent factor imperiling threatened species and ecological communities (more than 70% of nationally endangered species and 80% of ecological communities).
- The greatest threat to biodiversity on Australia's 8000 islands.

Here is a brief summary of some major advances and failings on invasive species in Australia since Rio.

Prevention

Advances: Reform of quarantine and environmental laws to require risk assessment of new organisms proposed for introduction. Improved quarantine methods and technologies to detect incursions. Legislation to control ballast water nearing completion. Introduction of laws in WA that require risk assessment of new plant introductions.

There have been recent catastrophic declines in mammals in Kakadu National Park, with feral cats a likely major cause. Photo: Tseyin, creative commons

Failings: Continued introduction of high risk organisms due to holes in quarantine (continued import of invasive species that are not under 'official control', including new varieties). Failure to prevent incursions of severe environmental threats such as myrtle rust, Asian honeybees, yellow crazy ants and red imported fire ants. Lack of effective surveillance programs to detect new environmental incursions and lack of contingency plans for environmental invaders. Lack of state/territory regulations (except WA) to require risk assessment of new plant introductions.

Eradication

Advances: Eradications of invasive species, particularly goats, foxes and rabbits, from more than 100 islands. Eradication of feral animals from a growing number of fenced sanctuaries. Current programs to eradicate rabbits and rodents from Macquarie Island, red imported fire ants from Southeast Qld, foxes from Tasmania.

Failings: Under-investment in eradication, particularly for weeds, and many lost opportunities for eradication in initial stages of invasion.

Containment and control

Advances: Improved control methods for some invasive species. Coordinated national effort on some serious invaders such as Weeds of National Significance. Some successful integrated large-scale programs such as such as Operation Bounceback in South Australia and Western Shield

continued next page...

Christmas Island has suffered at least four extinctions due to invasive species. The Christmas Island red crab has suffered massive declines due to invasive yellow crazy ants.
Photo: Diac Images, creative commons

INTERNATIONAL AGREEMENTS ARISING OUT OF THE FIRST EARTH SUMMIT

Focus	Agreement	Ratified	Main goal for Australia
Climate change	United Nations Framework Convention on Climate Change (1992)	1992	Reduce Australia's greenhouse gas emissions
Biodiversity loss	United Nations Convention on Biological Diversity (1993)	1993	Halt the loss of Australia's biodiversity
Desertification and land degradation	United Nations Convention to Combat Desertification (1994)	2000	Prevent and remediate degradation in semi-arid and arid Australia

in Western Australia. Increasing focus on bushland restoration, and massive community contribution.

Failings: Severe under-investment in control programs and consequent decline of biodiversity. Failure to prevent sale and movement of the majority of environmental weeds, thereby allowing introduction into new areas.

Research

Advances: Some high-quality research efforts, including the in the Weeds CRC and the Invasive Animals CRC.

Failings: Extremely limited knowledge about the majority of environmental invaders and their impacts. Funding far from commensurate with the scale of threats and need for knowledge about impacts and control methods. Weeds CRC terminated with no effective replacement.

Australia has laws, policies, strategies and programs galore on invasive species, and there have been some successes but on the measure that counts – whether biodiversity is being protected from invasive species – Australia is failing dismally. As recorded in the latest State of the Environment, the impact of invasive species is very high and deteriorating. There is no plan to meet the 2015 invasive species target set in Australia's Biodiversity Conservation Strategy (see Feral Herald issue 28).

Australia needs a more ecologically informed approach to invasive species management and investment that is commensurate with the scale of the threat.

More information

> An assessment of Australia's Rio record: Race to the Bottom – http://larissa-waters.greensmps.org.au/sites/default/files/race_to_the_bottom_final_15.06.12.pdf

Pacific seastar discovered at 'the Prom'

An infamous predatory seastar that eats anything it can catch – molluscs, barnacles, crabs, worms, sea urchins, sea squirts included – and lays up to 20 million eggs per season has recently been discovered in Tidal River, Wilsons Promontory National Park.

Victorian Government officers and volunteer divers removed about 160 of the invasive northern pacific seastars (*Asterias amurensis*) from the area, and have been searching for other populations in surrounding waters.

Environmentalists will be holding their breath while searches continue – the seastar is impossible to eradicate once established.

No northern pacific seastars have been found yet beyond the Tidal River watercourse, and Parks Victoria is hoping that recent heavy rains flushed enough fresh water down the rver to kill the invading seastars.

However, with spawning season approaching, it's become imperative that divers, fishers and anyone else entering Victoria's coastal waters clean their gear to avoid spreading the marine pest. They're advised to wash gear in fresh water and always dry before entering and after exiting water.

A diver finds a northern pacific seastar in Tidal River. Photo: courtesy of Parks Victoria

The northern pacific seastar is already well established in Victoria's Port Phillip Bay and Tasmania's Derwent River estuary after having arrived in Tasmanian waters more than 20 years ago, probably in ballast water from Japan. It was first found in Port Phillip Bay in 1995. An eradication attempt failed and there were 12 million within a couple of years.

One previous outbreak in Victoria – at Inverloch, detected in late 2003 – was eradicated. This was achievable because the seastar was in a small area and had not reproduced. Divers were able to remove the entire population.

Southern areas are highly vulnerable to invasion, as seastars are spread by boats and the free-swimming larvae can travel long distances. Northern pacific seastars can have a major impact on prey populations, particularly on native shellfish, which are important in marine food chains.

They are now the dominant invertebrate seastar in the Derwent estuary. The commercial shellfish industry is also worried, as outbreaks in Japan are very costly.

More information

> Get more information from the Victorian Department of Environment and Sustainability:

http://www.dse.vic.gov.au/coasts-and-marine/marine/marine-pests/northern-pacific-seastar

http://www.dse.vic.gov.au/coasts-and-marine/marine/marine-pests/case-study-eradicating-a-small-outbreak-of-the-northern-pacific-seastar

RIRDC puts risk assessment first

The Invasive Species Council has long been a critic of the Rural Industries Research & Development Corporation (RIRDC) for promoting new crops and livestock with little or no regard for the fact that some are invasive species that could do more harm than good.

We are thus pleased to report that RIRDC has now committed itself to doing what ISC has long been calling for it to do – conduct risk assessments before investing in new crops and livestock. The organisation recently published a risk assessment framework for use by RIRDC and by researchers seeking its financial support.

The foreword, by RIRDC managing director Craig Burns, states that RIRDC 'has a particular responsibility to ensure that activities which it supports do not result in Australia's biosecurity status being compromised.'

Risk assessment should preclude promotion of giant reed (*Arundo donax*) as a biofuel.
Photo: Maryanne Bache

This is a responsibility the organisation, until now, has largely refused to accept. Last year (in Feral Herald 27) we criticised one RIRDC report promoting the cultivation of weeds as biofuels, which said that although their use 'may be resisted by environmental groups' this should not discount their use.

We expect that RIRDC in future will fund no more reports about high risk crops such as the one produced in 2010 about giant reed (*Arundo donax*) (see Feral Herald 27). For crops that pose a risk under limited circumstances we would expect to see a risk assessment section in the report that warns against using a species under circumstances where escape into the wild is likely.

We congratulate RIRDC for producing this report and look forward to seeing evidence of its implementation in future reports.

References

> http://www.rirdc.gov.au/news-&-events/news-display.cfm?article=5C00BB6C-C13D-CF46-64DF-3079D06FD212

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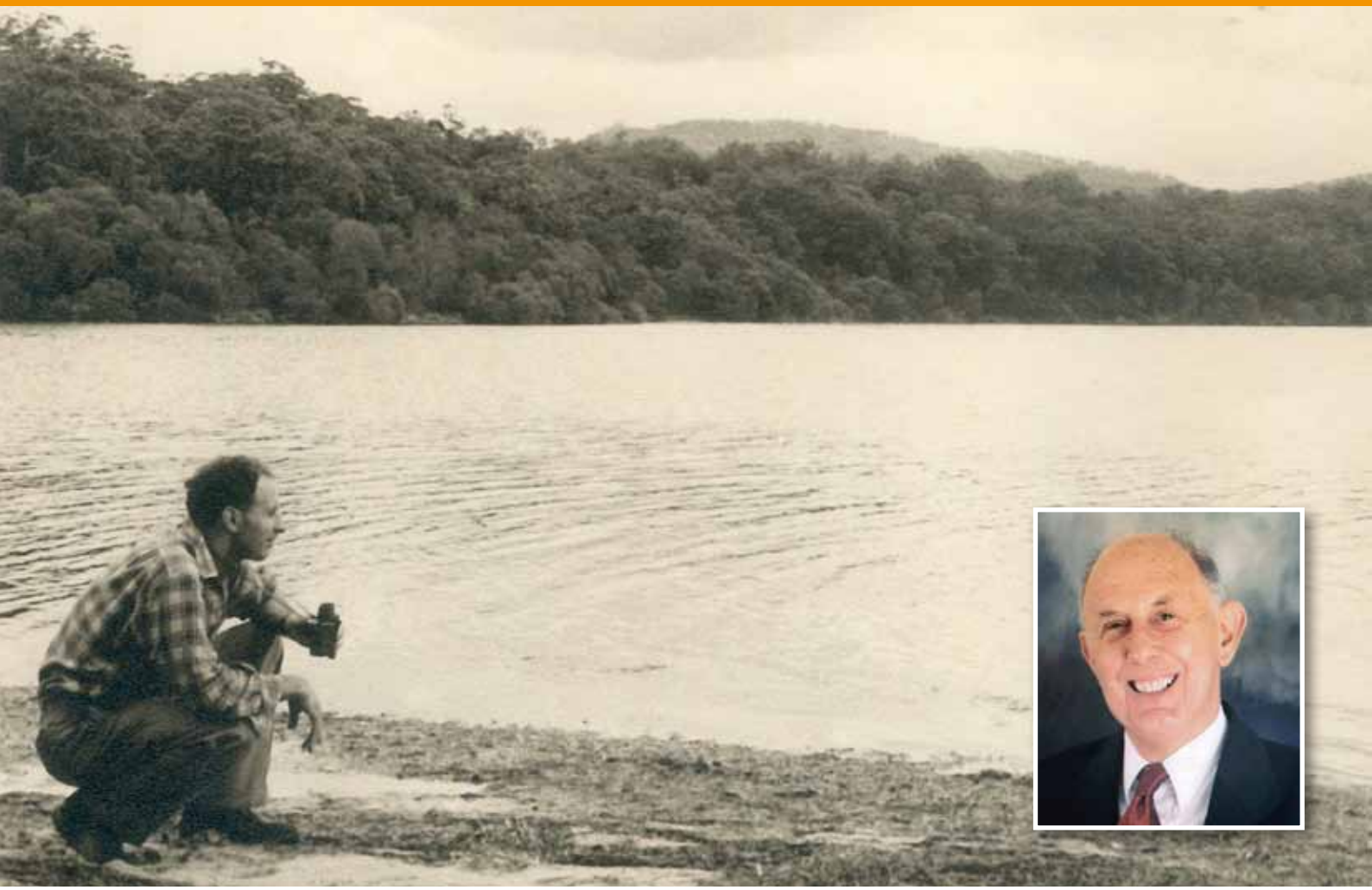

Champion athlete John Landy was the first Technical Officer employed by the Victorian National Parks Authority (forerunner of Parks Victoria) in the early 1960s.

Photo: Dr L. H.Smith, Director of National Parks 1958-75, courtesy of Helen Kosky

Welcome to our new patron, sporting legend John Landy

John DeJose
ISC CEO

The Invasive Species Council is delighted to welcome John Landy, AC, CVO, MBE as our new patron.

John has accepted the appointment because he shares the organisation's deep concern about the impacts of invasive species in Australia.

As a keen naturalist, and with more than 20 years experience as an agricultural scientist, he understands the magnitude of the challenge and has intimate knowledge of the competitiveness and persistence of invasive species.

John knows a thing or two about competition and persistence. His native ability and persistence led him to the top of the competition and he became only the second man on the planet to break the four minute mile in 1954, a highlight of his distinguished sporting career. He has held the world record in the mile and 1500 metres and been an Olympic and Commonwealth Games medallist.

Yet, an accident in a later race and his response to it came to define his contribution to Australian sport. Mid-race, a competitor in front fell and John couldn't avoid treading on him. He turned, sacrificing his chance for a world record, and helped up the fallen runner. Incredibly, he then went on to win the race.

John's love of nature inspired him to write two books ('Close to Nature' and 'A Coastal Diary') and he contributed to landcare and conservation through membership and leadership roles in a diversity of Australian organisations before serving as Governor of Victoria from 2001 to 2006.

"I have decided to support the work of the Invasive Species Council because what they do is so important now and for future generations," Mr Landy said.

"Australia boasts a world-class quarantine system, largely built to protect the agricultural sector. Improving our systems to protect the environment from weeds, feral animals and pathogens is the next big challenge.

"Twenty or so new exotic plants establish in Australia each year, and compounding this are large numbers of 'sleeper' weeds set to become problem weeds and take over native habitats..."

Invasives often defeat native species because they are great competitors and highly persistent – the same qualities that define a great sportsman. The race to protect Australia from this high-powered threat to our ecosystems will be challenging and full of surprises. The Invasive Species Council is fortunate and proud to be in the race with John Landy.

Skuas are predatory birds that can benefit from invasive rabbits or rodents, and the resulting build up in their numbers can then increase predation pressures on threatened seabirds.
Photo: Glenn Ehmke, www.glennehmke.com

Invasives twice as deadly for seabirds

A new conservation issue emerged a couple of decades ago when Tasmanian wildlife officer Nigel Brothers showed that fishing operations were driving down albatross and petrel numbers by accidentally killing them as bycatch.

The threat of long-line fishing caught public attention and led to reformed fishing practices, though seabird numbers continue to fall.

The high profile of this issue may encourage the idea that mortality from fishing is the main threat seabirds face today, but a recent survey placed it a distant second.

A review of Birdlife International's assessments of threatened birds around the world found that invasive species harm twice as many seabird species and represent the main problem for seabirds today. In the review, published in Bird Conservation International, John Croxall and seven colleagues found that 75 per cent of threatened seabird species are threatened or potentially threatened by invasive species compared to 41 per cent threatened by bycatch and 40 per cent at risk from climate change plus severe weather.

The invasive species causing problems on seabird breeding islands around the world include rodents, cats, pigs, goats, dogs, rabbits and cattle, all of which have been removed from some islands to improve seabird survival. By late 2006, rodents had been eradicated from 332 islands. Seabirds are especially vulnerable to predators on land because their extreme adaptations for life at sea render them clumsy on ground.

Subantarctic Macquarie Island is the Australian island with the best-known problems. The combined impacts of cats, rabbits and rats have been devastating for some seabirds. Endangered blue petrels were nesting only in small numbers on offshore stacks in the years before cats were eliminated. The problems were complicated by subantarctic skuas multiplying on a diet of rabbits and then becoming major predators of prions and other small petrels at their burrow mouths.

Other Australian seabird islands facing predator problems include Norfolk Island, Lord Howe, Christmas Island and Phillip Island. The New South Wales government has promised to eradicate rats from Lord Howe Island, and ISC is represented on the technical committee advising on the NSW Environmental Trust.

References

> Croxall, J.P et al. (2012) Seabird conservation status, threats and priority actions: a global assessment. Bird Conservation International 22: 1-34

NEW WEEDS ADDED TO NATIONAL WONS LIST

A dozen new weeds were recently listed as Weeds of National Significance (WONS), opening the door to greater control effort.

This brings the number of WONS to 32 (some of which include multiple species). ISC welcomes the addition of several very damaging environmental weeds such as gamba grass and cat's claw creeper.

New Weeds of National Significance:

- **African boxthorn (*Lycium ferocissimum*).**
- **Asparagus weeds (includes *Asparagus aethiopicus*, *A. africanus*, *A. asparagoides*, *A. declinatus*, *A. plumosus* and *A. scandens*).**
- **Bellyache bush (*Jatropha gossypiifolia*).**
- **Brooms (*Genista monspessulana*, *G. linifolia*, *Cytisus scoparius*).**
- **Cat's claw creeper (*Dolichandra unguis-cati*).**
- **Fireweed (*Senecio madagascariensis*).**
- **Gamba grass (*Andropogon gayanus*).**
- **Madeira vine (*Anredera cordifolia*).**
- **Opuntioid cacti (*Opuntia* spp., *Cylindropuntia* spp., *Austrocylindropuntia* spp.) excluding *O. ficus-indica*).**
- **Sagittaria (*Sagittaria platyphylla*).**
- **Silverleaf nightshade (*Solanum elaeagnifolium*).**
- **Water hyacinth (*Eichhornia crassipes*).**

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NSW national parks opened up to recreational shooters

The NSW Government has passed legislation to open up national parks to recreational hunting. This was the price the Shooters and Fishers Party demanded to support the government's plans to privatise power generators.

The Game and Feral Animal Control Amendment Bill 2012 passed on 21 July excludes hunting from only 48 reserves, leaving open the potential for the environment minister to allow hunting in more than 90 per cent of NSW's reserves.

Environment groups, including the Invasive Species Council, had previously fought off a similar Bill in 2009 (which also proposed private game reserves, the release of exotic bird species), and back then, the NSW Coalition opposed hunting in national parks. The Coalition confirmed this opposition subsequent to gaining government, but political expedience in a hung parliament now has them declaring the virtues of so-called conservation hunting.

It's unclear how it is intended to operate, with the Shooters and Fishers Party implying it will be an expansion of the current regime in state forests (recreational hunting is permitted across 2 million hectares of public lands) and the Coalition implying that hunters will be closely managed and part of existing feral animal control programs. There is a huge difference between these two approaches. Skilled recreational shooters can assist feral animal control if they are part of professionally managed programs.

There is widespread opposition to the Bill, including by the national parks rangers who are expected to implement it but have said they will refuse to do so.

The Invasive Species Council opposes the legislation on the grounds that ad hoc recreational killing is not effective for feral animal control and hunters can exacerbate feral animal problems by undermining professional programs (eg. making feral animals more wary and difficult to trap or shoot), by deliberate spread of feral animals (although illegal, maverick hunters have spread deer and pigs), and by opposing control programs that reduce hunting opportunities.

The Bill maintains the current anti-conservation protection of feral deer for hunters, with the requirement for shooters on private lands to acquire a Game Council licence (except for landowners, their household and employees). When the Game and Feral Animal Control Act was introduced in 2002, the Shooters Party made clear that the intention was to conserve deer, with MP John Tingle telling Parliament:

"The whole purpose of the licensing system is, first, to effectively manage the game animal and, second, to ensure that the status of that game animal is recognised, whether it is on private or public land, as a game animal and not a pest animal."

What is typically the most effective method of deer control, spotlight shooting at night, is forbidden. The Bill requires that the Game Council is consulted before any pest control order is made, giving them the opportunity to oppose control programs.

The Shooters & Fishers demonstrate a poor grasp of population biology in claiming great conservation benefit from recreational hunting, citing numbers of feral animals killed by hunters as their only proof. They have conducted no monitoring in state forests to demonstrate any benefits and the small numbers killed by hunters (relative to feral animal numbers) suggests no benefit at all. To achieve a reduction in feral animals typically requires killing 60 to more than 90 per cent of populations (see Feral Herald, issue 26 for an explanation), something that recreational hunters cannot deliver.

In their 2010-2011 annual report, the NSW Game Council boasts that 15,000 licenced hunters killed a total of 14,000 feral animals across 2 million hectares of state forests. Half were rabbits. So, that means the mean annual outcome per 'conservation hunter' in state forests was less than one dead rabbit, and the year's tally equated to an average of one feral animal per 133 hectares of state forest.

There is a dire need for effective control of feral animals in NSW for the sake of both the environment and agriculture. Conservation and animal welfare (including the welfare of feral animals and native animals affected by feral animals) are both important issues that should not be trivialised by being subject to political deal-making.

TAKE ACTION

Visit www.npansw.org.au to find out how how you can support the campaign to keep recreational hunting out of NSW's national parks.

More information

> Download our policy on recreational hunting http://www.invasives.org.au/documents/file/Policy_rec_hunting.pdf

> For background information on the ineffectiveness of recreational hunting, see http://www.invasives.org.au/mediaReleases.php?MediaReleaseId=30&year=2012

MYRTLE RUST CALAMITY UNFOLDS

As myrtle rust spreads, it is becoming clearer that several species are at grave risk. One researcher has told ISC he expects some Rhodomyrtus and Rhodamnia species to disappear from the landscape.

Trees with great value for wildlife such as the paperbark *Melaleuca quinquenervia* are also being severely affected.

The rust has spread to North Queensland, including the Atherton Tablelands and the Daintree, and to Victoria, including Shepparton, Ballarat, Tynong North and East Gippsland. The latest update from the Queensland Government says this about its risks in the north:

Myrtle rust represents a significant risk to North Queensland's national parks and World Heritage areas, including the Wet Tropics and islands on the Great Barrier Reef, due to the hot and humid climate which is ideal for disease development and spread, and the number of potential host species in the area.

Many rainforest species are known to be susceptible to myrtle rust and there is increasing concern as to the long term impacts of the disease on the values of Queensland's World Heritage areas.

Myrtle rust also represents a significant risk to the natural regeneration of the Wet Tropics and the resilience of these vegetation communities following significant cyclonic and other environmental events.

ISC has helped raise awareness of the myrtle rust threat in recent media interviews.

Myrtle rust a sign of the times

More than 150 native Australian plant species have been infected by myrtle rust so far.

Diseases have caused few extinctions in modern times but according to a recent review in the journal Nature by Mathew Fisher and colleagues, there are worrying signs that fungal and fungal-like diseases of wildlife are globally on the rise.

The recent arrival of myrtle rust in Australia is one of a recent upsurge in pathogen invasions, which are causing 'some of the most severe die-offs and extinctions ever witnessed in wild species'.

For example, in the United States, white nose syndrome (caused by Geomyces destructans), first detected in 2007, is killing more than 70 per cent of some bat species in infected sites. It is likely to cause extinctions, and ecosystem and crop damage due to reduced insect predation. (It has been estimated it could result in an additional $US3.7 billion in agricultural costs per year).

Yet, of 833 documented species extinctions world-wide, just 31 (less than 4 per cent) have been ascribed to infectious disease. As Fisher and colleagues explain, the relative rarity of extinction due to infection is consistent with theory predicting that pathogens coevolve with, rather than wipe out, their hosts. As their hosts become rare, pathogens tend to decline and fade out.

But some fungi (or fungi-like organisms such as Phytophthora cinnamomi) don't abide by this theory, and can maintain high virulence even as their host declines.

Some fungi reproduce so quickly that all individuals in a large host population become infected before the population is driven to densities low enough to prevent pathogen spread.

The capacity of fungi to live outside their host facilitates their spread to naive hosts. Their dispersal stages can often survive long periods under quite hostile conditions.

Although many fungi are specialised for particular host species, others are generalists and can infect hundreds of species. Chyrtid fungus, for example, can infect more than 500 amphibian species and laboratory tests suggest that 90 per cent of Australia's more than 2000 Myrtaceae species may be susceptible to myrtle rust. Host species that are tolerant of high infection loads can act as community 'superspreaders'.

The spread of fungi by human trade and travel can accelerate the evolution of virulence by bringing together different fungal lineages that exchange genetic material.

The worst example so far of disease-driven decline is chytridiomycosis caused by Batrachochytrium dendrobatidis (chytrid fungus), which has led to decline in almost half of all amphibian species worldwide and many extinctions (including probably at least four in Australia).

Some areas of central America have lost over 40 per cent of their amphibian species due to this disease.

The authors call for a much greater focus on preventing the spread of fungal diseases, particularly those that infect wildlife:

International biosecurity against the spread of plant fungal pathogens, while not perfect, is more advanced than protocols to protect against the introduction of animal-associated fungi. This owes fundamentally to a financial dynamic: wildlife is not correctly valued economically whilst crops are.

A high priority should be monitoring of fungi in wild populations and tighter control over the transport of biological material.

The authors note the importance of a 'raised political and public profile for the effects of fungal diseases in natural habitats' to highlight the importance of a focus on fungal disease control outside of the managed agricultural environment.

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As we're all discovering, myrtle rust never sleeps

Since August last year **Jake Hazzard**, manager of the Coolum Community Native Nursery in Queensland, has been on a steep learning curve as he comes to terms with the fact myrtle rust is here to stay.

For more than 10 years at the Coolum Community Native Nursery and another facility I have produced well in excess of half a million native plants for revegetation, landscaping, civil and domestic projects. The nursery has been accredited by the Nursery Garden Industry Queensland (NGIQ) under the NIASA accreditation scheme.

Our customers include local and state governments, large-scale nurseries in Brisbane, Gold Coast and Sunshine Coast, tree farmers, revegetation and landscaping contractors, private landholders, and various community groups.

We use pesticides and fungicides of very low toxicity to humans and the environment, such as white oil, pyrethrum and neem-based products.

When myrtle rust was detected in Queensland, we began monitoring stock for symptoms, and it arrived last year, around August 2011, first on paperbarks (Melaleuca quinquenervia) planted on our boundary, and soon spread into the propagation rooms onto Acmena hemilampra seedlings.

With NIASA accreditation we were provided with a management plan for myrtle rust. Fortnightly spraying of all Myrtaceae ensued, using the fungicides Triadimenol and Oxycarboxin in rotation, and Copper Oxychloride. It seems to work at keeping the myrtle rust off fresh young stock.

Then NGIQ issued an updated plan which directs us to use Mancozeb and Azoxystrobin along with Triadimenol and Oxycarboxin on a four-fortnight rotation and stop using Copper Oxychloride. This is the recommendation for propagation nurseries in high risk seasons (this would apply, I imagine, nine months of the year, if not all year, here in subtropical Southeast Queensland). So, two more fungicides to buy and learn how to mix and apply.

I am the only one at this small community nursery with a Chemcert certificate to apply chemicals. So I do the spraying. The timing is complicated by the fact that we are also open to the public, so I have very limited windows in which to spray. Having the buying-public walk through the stock means we are more susceptible to myrtle rust re-infestations. My health and potentially the health of others are threatened by the use of these chemicals.

Coolum Community Native Nursery manager Jake Hazzard.

Once the ratios have been worked out, it takes one hour every fortnight to spray all our Myrtaceae stock. There is an hour a week spent inspecting and throwing away (or pruning and isolating) affected stock. There is also the research time taken to learn the symptoms and keep abreast of new developments, researching different chemical types and brands and sourcing them, updating spraying equipment and chemical storage and mixing areas, signage, training of volunteers and staff, and the endless discussions with staff, volunteers and the general public.

Doesn't sound like much? Imagine if the nursery was 100 times the size of us, such as the larger propagation nurseries in this region.

Following are questions that I have to consider.

Should we grow less Myrtaceae?

Should we discourage customers from buying and planting Myrtaceae?

Are we doing the environment a disservice by selling plants that may possibly be carrying myrtle rust even though they are showing no visible symptoms?

Should we stop growing Melaleuca quinquenervia because it is extremely susceptible, regardless of the fact that is a dominant tertiary canopy plant in all the freshwater wetland areas on which Coolum District is largely built? There are forests of it remaining all around this area, with one individual tree in adjacent remnant littoral rainforest approximately 35m tall and with a 1.6m wide trunk. And if we keep selling it, are we increasing the risk of myrtle rust spread, even if we follow NQIG management guidelines, and do everything in our power to reduce risk?

Will all our Melaleuca quinquenervia forests be decimated? Will it jump over to Eucalyptus as it has in South America and decimate all our Eucalyptus forests? Perish the thought.

Will certain species manage to fight back while others fail and perish? Should we wait and see what happens or just continue business as usual? Or do we wait for the lab techs and plant breeders to clone resistant varieties?

A large part of our ethos is to collect local seeds from a large number of populations and individual plants as is possible, to maintain genetic diversity, and leave plenty of seeds for fauna and natural plant reproduction. We go seed collecting twice a week throughout the year. Are we inadvertently spreading myrtle rust despite our efforts to remain "clean" before heading out in the field? Are we bringing myrtle back into the nursery to then distribute it amongst our stock and back out into the environment? How do we manage our habits to truly minimise spread of myrtle rust?

Do we change our wild plant ethos and start growing hybrid, myrtle rust resistant varieties?

Will the humble lilly pilly, a national treasure in native gardening terms, be relegated to the chainsaw as hedges far and wide look unsightly and "melt" under the influence of the dreaded myrtle rust?

To contain or not to contain?

When eradication of a pest fails, containment is an obvious fallback option – trying to keep it confined to a particular area or slowing its spread.

This is the official goal now for two species that were until recently the target of eradication programs: Asian honeybees (*Apis cerana*) in north Queensland and branched broomrape (*Orobanche ramosa*) in South Australia. But there has been little work on the feasibility of containment to guide decision-makers. It is important that scarce resources are not wasted on futile containment efforts, and to know when it is a fruitful option.

Dane Panetta and Oscar Cacho have recently published an analysis of containment issues with a framework for determining its feasibility for weeds.

Containment is most effective for weeds that either spread slowly with short-distance movements or where barriers to dispersal exist or can be established.

Weed spread is driven primarily by the dispersal ability of seeds (or other propagules such as plant fragments), most of which land close to the parent plant. The greatest challenge to containment is likely to be where some seeds repeatedly travel long distances, which is most likely to occur where humans and their agents (vehicles, for example) are involved.

An analysis of noxious weeds in Australia found that humans contributed to the dispersal of nearly 90 per cent, and 21 per cent were dispersed by humans alone. Human-mediated dispersal is likely to be more manageable than that by wind, water and animals. 'The most useful approximation of the potential for managing dispersal will therefore be an estimate of the degree of human involvement,' say Panetta and Cacho.

A major determinant of whether containment is feasible is the detectability of new sites of infestation, which is influenced by the distance and predictability of dispersal. If dispersal distance is high but its direction is predictable it should be possible to search where it is likely to occur. If the distance is less but direction is unpredictable the search area may need to be very large.

In one study in Queensland, about three-quarters of detections were from chance detection by informed land managers and members of the public rather than from active searches. The importance of public education is highlighted by a modeling study that found 'even small increases in the probability of passive detection led to marked increases in the probability of containment, together with substantial cost savings'.

Miconia (*Miconia calvescens*), which is subject to a national cost-shared eradication program, is dispersed over substantial distances by fruit-eating birds (and no longer by humans), with one infestation recorded more than 1 km from a source plant. Although it is a distinctive plant with large leaves, it is difficult to detect in the rugged rainforest terrain of the Wet Tropics where it is invading. The feasibility of containment is thus low. In contrast, branched broomrape has a high feasibility of containment. Machinery seems to be the most important dispersal vector and is subject to strict wash-down procedures, and there has been an intensive surveillance program.

Panetta and Cacho have developed a model based on dispersal distance, habitat suitability, search speed and detectability to help assess the feasibility of containment.

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Fear factor may increase feral damage

Foxes and cats may cause declines not only by eating native species but by scaring them. Research on song sparrows (*Melospiza melodia*) on islands in British Columbia by Liana Zanette and co-researchers found that sound playback of predators in areas they were excluded from by fencing and netting dramatically altered bird behaviour and resulted in 40% fewer fledglings.

Birds exposed to predator sounds were compared with those exposed to the sounds of non-predators. They nested in denser and thornier plants, laid fewer eggs, and spent less time keeping them warm. More babies starved as their mothers made fewer feeding trips – an average of <8 an hour compared to the normal 11 – and travelled only half the distance from the nest to find food.

The impact of predators can thus be much greater than that due to direct killing. Fear is an extra factor to consider when managing threatened species.

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Appetite for destruction far from peaches and cream

A desire for win-win solutions sometimes blinds promoters to biological and social realities, and exacerbates rather than solves problems.

In a recent paper, Martin Nunez and colleagues warn about the risks of promoting culinary-based control solutions for invasive species, because these may entrench or spread invaders.

Sometimes, the authors say, 'doing nothing (do not eat them) may be better than promoting their incorporation into the local culture or creating a market that can be a problem for future management programs'.

Nunez and co-authors note that the idea of eating invasives for control has surged in popularity among government agencies, conservation groups, and the media.

Examples include the Illinois Department of Natural Resources "Target Hunger Now!" campaign that seeks to feed the hungry and decrease non-native Asian carp, the US National Oceanic and Atmospheric Administration's "Eat Lionfish" campaign and the Mid-Atlantic Exotic Pest and Plant Council's "Eat Those Invasives!!" initiative that suggests harvest strategies and recipes for common weeds. One example in Australia that warrants close analysis is commercially motivated harvesting of feral goats.

Promoting culinary motivations for feral animal control is futile in most cases because it does not result in removal of a sufficient proportion of invasive populations. One study found that a 60-95 per cent reduction in growth or fecundity is necessary to reduce weed populations, and research shows a similar threshold applies for many invasive animal populations. Harvesting is likely to have an effect only when the targeted species is rare and at an early stage of invasion. It could complement other programs, and generate a stronger combined effect.

Although dining is unlikely to directly assist in control, Nunez and co-authors identify three potential benefits: increasing awareness of invasive species, assisting in early detection and rapid response efforts, and boosting local economies.

But it is important to avoid the potential downsides:

- Creating a market for a problematic species that, with time, will need to be maintained – if a species becomes a genuine economic resource, it is likely to become harder to encourage eradication or control
- Promoting further invasions – if a species becomes a genuine economic resource, people living in uninvaded regions may relocate invasive individuals to start their own business
- Promoting incorporation of invasives into local cultures – if a species becomes a desirable target, local people can make it impossible to eradicate or control it.

Carp for lunch and as a pest control method anyone? Creating markets for pest species could end up entrenching the presence of invasive species. Photo: 5telios, flickr

The first two issues are reasons why ISC has concerns about the promotion of commercial harvesting of feral goats as the major control method in NSW and Queensland. Goat numbers are growing despite a high rate of commercial harvest, and increasing financial returns are likely to entrench the industry in locations vulnerable to damage by goats.

As Nunez and co-authors note, what begins as a control attempt can lead to demands for a species to be kept at levels at which harvest for commercial purposes is viable: 'Invasive species with high economic value tend to be protected'.

The only other example in Australia we are aware of is the promotion of hunting for feral animal control, but hunting for eating is usually secondary to hunting for recreation.

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Time to make Australian biosecurity a team game

A recent federal government focus on community engagement for biosecurity has been narrow, mostly ignoring the environment sector and reinforcing the view of community's primary role in biosecurity as brawn not brains.

Engagement is one of those cynicism-evoking buzzwords of modern governance – it is said to be vital but those who are 'engaged' often feel as if they are part of a box ticking endeavour rather than genuinely involved in decision-making.

Contrast the 'here is what we intend to do' consultation the Federal Government has had with environment groups over changes to national environmental laws and the negotiations they had with the big miners that resulted in a drastic lowering of the Minerals Resource Rent Tax.

By stressing the need for a biosecurity 'partnership' between governments, industry and community, the 2008 Beale review of biosecurity threw the Federal Government a mighty engagement challenge. In One Biosecurity: A Working Partnership, the reviewers emphasised the need for a broad collaborative approach:

Engagement with business and the general community on biosecurity must occur consistently and continually at several levels, from policy setting through co-regulatory alternatives to actions by individuals and companies, before, at and after the border.

A 'partnership' will require substantial changes to the way that biosecurity agencies interact with the environment sector, including facilitating a much greater role for the sector in policy development, support for participation at all levels, and institutional arrangements that reflect the importance of environmental biosecurity.

Currently, biosecurity agencies at both federal and state levels have little interaction with environmental NGOs, and the dominant focus on primary industries and the business culture within biosecurity agencies often promotes an adversarial relationship.

In part response to the Beale review, the federal government initiated a 3.5 year Engaging in Biosecurity project that culminated recently in the publication of a biosecurity engagement framework and guidelines, which are intended 'to provide guidance, insights, tips and tools to conduct effective community engagement for biosecurity purposes.'

Unfortunately, the project was focused primarily on industry biosecurity, and the environmental NGO sector was mostly not involved. Just one environmental NGO participated in regional workshops, and ISC provided some email comment at a very late stage. Our contribution resulted in the addition of the following paragraphs to the main consultation report:

In addition, there appears to be scope for the environmental sector to play a greater role in addressing biosecurity issues. It was pointed out that, despite invasive species being the second greatest threat to biodiversity in Australia, interaction between biosecurity agencies and the environmental sector is limited.

The environmental non-government sector needs to play a greater role in biosecurity policymaking and decisions relevant to the environment by, for example, including a representative from an environmental non-government organisation on the Biosecurity Advisory Council. There is also room to strengthen the environmental sector's involvement in decision-making processes relating to pest eradication.

The engagement project was also limited in its focus on the community sector as 'doers' of biosecurity – the detectors and controllers of invasive species – with little mention of their role in policy development. The community sector is seen as biosecurity brawn rather than brain.

ISC is seeking to engage both the federal biosecurity agency and the environment sector in frank discussions about biosecurity engagement. There has been some improvement in recent times – ISC was invited to a meeting of the Australian Weeds Committee, for example – but we are a long way from the 'partnership' approach advocated by the Beale review. Recent attempts to engage with the minister responsible for biosecurity have been rebuffed.

In contrast to the environment sector, industry bodies are intimately engaged in biosecurity policy development with biosecurity agencies and a strong industry-focused culture prevails within agencies. An agricultural organisation would not have had the biosecurity minister's door barred to them.

ISC endorses the importance of eight 'pillars' identified in the project as necessary to support biosecurity engagement:

A motivated community

- Raising the profile of biosecurity.
- Engaging effectively.

A resourced community

- Finding and optimising resources.
- Making the most of technology.
- Capitalising on existing information.

An enabling environment

- Monitoring engagement progress.
- Enabling sound governance.
- Building and maintaining scientific capability.

MAKING PARTNERSHIPS WORK

Achieving genuine environmental biosecurity partnerships will require at least the following:

- **Commitment by biosecurity agencies to the goals of environmental biosecurity, such as the invasive species target in the National Biodiversity Conservation Strategy.**
- **Recognition of the important role of the community and environmental sectors in biosecurity and support for participation at all levels.**
- **Institutional arrangements that reflect the importance of environmental biosecurity and promote collaboration between biosecurity and environmental agencies within and between governments.**
- **Greater environmental focus and expertise within biosecurity agencies at all levels.**

More information

> DAFF 'Biosecurity Engagement Guidelines http://www.daff.gov.au/bsg

Adélie penguins on sea ice near grounded iceberg close to Mawson Station, East Antarctica. Photo: courtesy David Neilson, from his new book *Southern Light*

Antarctica: our last great wilderness under attack

More than 70,000 seeds from other continents are being taken to Antarctica annually by visitors, and most are coming in with scientists. This implies a high risk of weed establishment in the ice-free areas of Antarctica, which currently host native microbes, mosses, invertebrates and two species of flowering plant.

The seed count emerged from a survey of about 2 per cent of the more than 40,000 tourists and scientists visiting Antarctica in 2007-08. Researchers vacuumed seeds from pockets, trouser and sleeve cuffs, shoes and bags, and found an average of 9.5 seeds per person.

Disconcertingly, although scientists made up only 17 per cent of visitors, they carried in more than half (55 per cent) of the seeds. Tourist support staff also posed a high weed risk. More than half the visitors had travelled to cold-climate areas in the year prior to their visit to Antarctica, potentially picking up seeds from other continents that could survive in the hostile Antarctic climate. Scientists are likely to present a high risk because of their propensity to work in natural areas and to use gear and clothing in multiple locations.

The authors of the survey concluded that 'several areas of Antarctica are at considerable risk from the establishment of nonindigenous species'.

Among seeds discovered were the Iceland poppy (*Papaver nudicaule*) tall fescue (*Festuca arundinacea*), velvet grass (*Holcus lanatus*) and annual winter grass (*Poa annua*), all from cold climates and capable of growing in Antarctica. The last is already widely established at subantarctic islands and Antarctic research stations.

One of the report's authors, Dana Bergstrom, told the ABC, 'When we take things in through hitchhiking then we get species which are competitive. The plants and animals there are not necessarily competitive, so there's a good chance ... we'd start losing various precious biodiversity on the (Antarctic) continent.'

ISC and others hope that more stringent protocols are adopted for visitation to Antarctica to reduce the risks of weed invasion. At the time of writing, invasive species are a hot topic at the 35th international Antarctic Treaty consultative meeting in Hobart. Amongst many concerns, the deliberate sowing of barley for religious reasons by a gospel group from Canada, reported by the International Association of Antarctic Tour Operators, was bizarre enough to catch media attention.

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More information

> 'Biosecurity fears after Antarctic tourists sow barley' – http://www.smh.com.au/travel/travel-news/biosecurity-fears-after-antarctic-tourists-sow-barley-20120611-20606.html#ixzz1y1zJ3Urp

What does the future hold?

Being able to imagine alternative futures is essential for motivating action on invasive species. Most of the impacts of current species introductions won't manifest until decades and centuries hence.

A recent European project known as ALARM (Assessing Large-scale environmental Risks for biodiversity with tested Methods) has attempted to model biodiversity trends under three different future scenarios – liberalisation, business as might be usual, and sustainability. The overall projections are that implementing current European Union policies will slow biodiversity losses in most biomes but not halt or reverse the losses, that liberalisation will accelerate biodiversity losses, while a sustainability scenario will reduce losses but not halt them in all cases.

Rather different outcomes were obtained when these scenarios were applied to plant invasions, recognised as one of the large-scale risks for Europe. Milan Chytry and several co-researchers intersected predictions of land use and plant invasion to develop maps of expected future patterns of alien plant invasions under the three scenarios for 2020, 2050 and 2080.

Under all scenarios, invasions will increase most in north-western and northern Europe, due to weed spread to landscapes with biofuel plantations grown on former grasslands. In contrast, eastern Europe and some parts of southern Europe may experience no increase or a decrease due to the abandonment of arable land.

Land use patterns, which are the dominant influence on weed invasions, are the main reason for the unexpected result that overall levels of invasion may be lowest under the liberalisation scenario. This is because deregulation and globalisation will result in large-scale abandonment of agricultural land in some areas, allowing the re-establishment of competitively strong native species in the mid and late successional stages. However, the impacts of serious established invaders in these areas are not likely to decline, and this same scenario would see more plant invasions in other areas due to the establishment of biofuel plantations.

By supporting agriculture in less productive areas and land uses that promote invasions, sustainability policies may increase weeds in some areas. Reducing invasion risks will require policies beyond those on the current sustainability agenda.

The business as usual scenario is expected to result in the largest increase in invasions.

Important caveats are that none of the projects takes into account that more than six alien species capable of establishment arrive in Europe every year, so increases are likely to be even larger than projected, and the models are based on all alien species rather than specific environmental invaders.

The authors conclude that the important lesson 'is that none of the currently dominating policy options in itself will be able to stop or reduce the ongoing process of plant invasions, although minor reductions are possible in some regions.'

Three future scenarios

- **Liberalisation scenario supposes** that deregulation and globalization rather than biodiversity and sustainability policies will mainly determine future decision-making. Environmental policies will focus on damage repair and limited prevention.
- **Business as might be usual** scenario assumes that current policies will be implemented by European states, including mitigation of climate change.
- **Sustainability scenario combines** what is considered necessary for sustainability and biodiversity and desirable from a social and political perspective. It aims at a competitive economy, a healthy environment and international cooperation.

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Running the risks of global worming

Little beings get less attention than big ones, and little beings living underground are even more neglected. It's little wonder then that the potential impacts of invasive earthworms, of which Australia has several dozen, are rarely considered.

A recent study led by Scott Loss has linked invasive European earthworms (Lumbricus species) to a decline in ovenbirds (*Seiurus aurocapilla*), a ground-nesting migratory songbird, in forests in the northern Midwest United States.

The earthworms, spread by recreational fishers for bait, are invading forests that previously had no earthworms, and consuming the rich layer of leaf litter on the forest floor. Although the earthworms may provide a food benefit to ground-foraging birds, the resulting habitat changes seem to outweigh any benefits.

This is a classic example of the essential unpredictability of the outcomes of exotic species introductions due to complex ecological interactions. The herbaceous plants and shrubs that grow in deep litter forests are being replaced by sedges and grasses that provide less cover for ground-nesting birds, making it harder for ovenbirds to conceal their nests from predators. They avoid nesting in areas invaded by the earthworm. The reduced litter layer probably means fewer insects for ovenbirds to eat.

Previous studies have found that ground-nesting songbirds were absent from an earthworm-invaded sugar maple forest in southern Indiana and that woodland salamanders declined exponentially in invaded areas in the northeastern US.

A 2008 Australian report on soil biodiversity and ecology noted the 'scant interest' in investigating the impacts of invasive earthworms in Australia despite overseas research documenting major ecosystem impacts.

Australia has at least 66 invasive earthworms (that was the number known in 1999), some of which were introduced for waste management or agricultural reasons and others which entered accidentally. Included among them are several exotic Lumbricus species but there is little known about their capacity to invade native ecosystems in Australia and their impacts.

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In Australia, there have been two CANV outbreaks, 1994 and 1997, in farmed crocodiles and one in captive coastal bearded dragons in 2008-09.
Photo: Wiki, MartinRe

Could a pet trade fungus be putting our reptiles at risk?

John DeJose
ISC CEO

Fungal diseases threatening biodiversity are on the rise worldwide. Now, a first report of the Chrysosporium anamorph of Nannizziopsis vriessi (CANV), a fungus normally limited to the pet trade or other captives, as a primary pathogen infecting wild reptiles has US biologists worried.

It was detected recently in lesions of dying eastern Massasauga rattlesnakes. This is a well studied endangered snake that had not previously shown evidence of CANV.

When details were released, wildlife biologists in other parts of the US began reporting similar lesions recently observed in other wild reptile species.

It is too early to say if the recent uptick in reports and severity is a result of the pathogen evolving, increases in environmental stress or other reasons.

The Centre for Disease Control has published a report as the fungus is also capable of causing a serious infection in immune-suppressed humans.

CANV is a destructive disease in captive reptiles of many species, including in Australia where the Australian Wildlife Health Network has recorded several cases of a similar infection in captive bearded dragons and crocodiles. The disease is exacerbated by stress and sub-optimal environmental conditions.

The small number of reported infections here might suggest introduction through reptile smuggling. Wendy Henderson and Mary Bomford raise concerns about reptile smuggling, and have rated many exotic reptile species as having a serious or extreme risk of establishment in Australia.

CANV is spread by contact, so could move across the country through reptile trades. Barriers between private reptile collections and the wild are known to be insecure. Illegally imported reptiles have been found in the wild.

Australia has no targeted surveillance for CANV. Nor is there an AUSVETPLAN or Import Risk Analysis.

Is Australia's biodiversity at risk from a new, more virulent strain of a common reptile pathogen? Could the global trade in reptiles be responsible for creating a fungal superbug to rival the chytrid fungus, which has caused a wave of amphibian extinctions across the planet? Is there a greater risk of CANV spreading through wild reptile populations in Australia as we see more extreme weather events with climate change?

Perhaps it is timely to consider more deeply the disease risks that may arise from introducing reptiles into Australia, legally or illegally.

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WHAT WE ASKED FOR: THE FEDERAL BUDGET AND INVASIVE SPECIES

In economic terms – if biodiversity and the natural environmental were accorded appropriate value as national assets and essential infrastructure – Australia's current approaches to harmful invasive species are guaranteeing future poverty. Despite having already suffered severe losses, the nation continues to incur large preventable cost burdens (new invasive species), and is failing to invest sufficient to stop the worsening of existing problems (invasive species spreading).

ISC made a budget submission to the Federal Treasury arguing that there needs to be much more focus on environmental biosecurity to fulfill its mission "to improve the wellbeing of the Australian people". Treasury's wellbeing framework recognises that environmental health and other non-financial values are important to human wellbeing. ISC identified the following six budgetary priorities.

Budget priority 1: An environmental biosecurity needs assessment and costed plan

Outcome sought: An assessment of the measures and funding necessary to achieve the invasive species target and goal in the National Biodiversity Conservation Strategy, and development of a costed plan.

The target defined in the National Biodiversity Conservation Strategy – a 10 per cent reduction in the impact of invasive species by 2015 (we suggest a revised deadline of 2020) – is meaningless and not achievable unless there is a detailed and costed plan showing how it can be achieved and a baseline assessment against which to measure progress. We proposed that the Productivity Commission be tasked to assess levels of funding needed to achieve the target and potential funding models by which to achieve funding needs.

Budget priority 2: Establishment of Environment Health Australia

Outcome sought: Establishment of an environmental biosecurity organisation, Environment Health Australia, to drive cross-jurisdictional and cross-sectoral collaboration.

Invaders will increasingly dominate and destroy native biota unless biosecurity structures and processes are adapted for the natural environment. It is not sufficient to bolt on environmental responsibilities to existing structures. Through partnerships, planning, research, monitoring and outreach, Environment Health Australia wouldl facilitate more effective ways to safeguard terrestrial and aquatic

environments from invasive pathogens, weeds and pests.

Budget priority 3: Implementation of biosecurity reforms recommended by Beale review

Outcome sought: Implementation of Beale review reforms for strengthened environmental biosecurity and effective operation of the National Environmental Biosecurity Response Agreement.

The Beale review of Australian biosecurity and quarantine made many recommendations that are essential to improve environmental biosecurity, including the creation of a statutory authority (the National Biosecurity Authority) and an expert-based decision-making panel (the National Biosecurity Commission). The review estimated that an extra $260 million was needed annually to achieve the proposed reforms. ISC supports the model proposed to achieve independent and evidence-based decision-making.

Budget priority 4: Reforms of EPBC Act to enhance environmental biosecurity

Outcome sought: Use of the Environment Protection & Biodiversity Conservation Act 1999 to facilitate management of priority invasive species threats to biodiversity.

The Hawke review of the EPBC Act recognised that there are major holes in Australian laws on invasive species, including that that most states and territories are failing to prevent the deliberate movement of thousands of exotic plant species, many of which are known invaders. The Federal Government already has the legal capacity to manage movement of damaging exotic species and ISC strongly recommends that the Federal Government uses the EPBC Act to implement a science-based, cost-effective national approach to limit the movement and sale of species within Australia unless they pass a risk assessment.

In hindsight, much could have been done to prevent many of Australia's invasive species problems. Rather than just respond to threats as they arise, Australia should be focused on identifying potential and future threats and setting in place preventative strategies. ISC urges that the forseighting unit recommended by Hawke review be optimally funded and empowered.

Budget priority 5: Containing and reducing the threat of established invasive species

Outcome sought: More effective containment and control of established invasive species that threaten biodiversity

The Federal Government has a vital role to play in managing the impacts of invasive species that threaten biodiversity, in providing leadership, defining priorities and funding programs. One tool that warrants a much greater focus is the listing of key threatening processes under the EPBC Act and development of threat abatement plans. These offer the means to tackle the major national threats to biodiversity but are poorly used and poorly funded. Two-thirds of the current KTPs are invasive species. As a signal of its commitment to meet the national biodiversity target, the Australian Government should at least double its funding commitment to control the threats of invasive species.

Budget priority 6: Environmental biosecurity research

Outcome sought: Research programs that address priority knowledge gaps in effective management of invasive species threatening Australian biodiversity.

As the Beale review recognised, Australia lacks much of the basic knowledge about biodiversity and invasive species impacts to effectively manage the threats:

> *[T]he principal responsibility for biosecurity research as it relates to the natural environment lies with governments and the community. These activities have not received a high priority for funding.*

There is a particularly large gap in research funds for weed management. The loss of the CRC for Weed Management has left a substantial hole in research effort that has not been replaced by the RIRDC-administered National Weeds and Productivity Program. We urge that national weed research capacity be restored in Australia, with a CRC-like program to develop effective technical and policy responses to the great challenges of weed prevention, eradication and control.

invasive species council

Just a bit of re-arrangement of words: Escaped nursery plants have been listed as a key threatening process but this does not stop the sale of harmful plants such as Japanese honeysuckle (*Lonicera japonica*). Photo: kaiyanwong223, flickr

Key threatening processes: underused and underfunded

The Invasive Species Council has been calling for better use of federal key threatening process (KTP) listings to address invasive species threats. A majority of KTP listings are for invasive species, but they are underused, underfunded and lack strong mechanisms for abating threats.

Following a recommendation made by the Hawke review of federal environment laws (the Environment Protection and Biodiversity Conservation Act 1999), the Federal Government plans to make KTP listings and threat abatement plans (TAPs) more flexible.

ISC is hoping that these impending reforms will provide the opportunity to increase the effectiveness of KTP listings in other ways. ISC's John DeJose and Carol Booth attended a recent two-day workshop on key threatening processes run by the federal environment department to explore reform options. Along with Bush Heritage and Humane Society International, we were the only NGOs represented.

KTP listings are a poor cousin to other functions of the federal environmental laws, which attract most attention for their function of assessing the impacts of mines, dams, residential projects and other developments.

The environment sector is gravely concerned about the federal government's intentions to hand back approval powers for many developments to state and territory governments. Although they are very important, these assessment functions don't address many of the most severe impacts on Australia's environment, including invasive species and fire. Although the release of an invasive plant or animal in a new area could have a much greater impact on biodiversity than a mine or urban development, there is no clear mechanism under the EPBC Act for assessing this. (The Act does assess the invasion risks due to imports of animals into Australia.)

The current KTP regime needs improving in several ways.

Obviously, listing of KTPs and preparation of TAPs need to be properly funded. With current resources, just one KTP on average is assessed annually. It takes an average two years to assess and list a KTP and close to four years to develop a threat abatement plan. The business sector would be thumping political tables (and taking out full-page media advertisements) if it took this long to get their approvals through.

There should be federal regulatory mechanisms where this is a feasible way to mitigate key threatening processes. The federal government has the capacity under the EPBC Act to regulate harmful activities involving invasive species but chooses not to. Escaped nursery plants were listed as a key threatening process under the EPBC Act but this has no practical effect in preventing the sale of unsafe plants. No threat abatement plan was produced and threat abatement relies in large part on individual states and territories declaring individual species after drawn-out assessment processes. The majority remain unregulated.

Compare the approach taken to environmentally harmful chemicals. If chemicals are assessed as a threat to human or environmental health, the Australian Pesticides and Veterinary Medicines Authority can ban their sale or regulate how they are used. Nationally significant threats to the environment caused by invasive species warrant a similar national regulatory capacity.

Just as chemicals are systematically assessed, so should key threatening processes be comprehensively listed and threat abatement plans prepared. As discussed in Feral Herald issue 28, ISC has major concerns about the intention to list novel biota as an all-embracing invasive species key threatening process if it is to preclude the listing of more specific invasive species threats and the preparation of threat abatement plans for specific threats. We recommend the novel biota listing be used as the parent listing for multiple invasive species threats and as the basis for systematically addressing gaps in abatement of invasive species threats to biodiversity.

There is a need to integrate key threatening process listings with other environmental programs, to ensure they are used to maximal effect and are funded. For example, threat abatement plans for significant invasive species should play a major role in Australia's biodiversity conservation strategy to reduce the impacts of invasive species.

There was considerable support at the meeting for a proposal to allow for multiple threat abatement plans under broad listings to address particular invasive species threats.

Wildlife gardeners join push to oust invasive bushland weeds

The first stage of a campaign to oust invasive weeds from urban backyards and help protect native habitat in bushland around Fern Tree, West Hobart, Sandy Bay and Ridgeway in Tasmania moved into top gear recently.

The campaign is part of a pilot program called Wildlife Friendly Gardens, and enlists local gardeners in the fight against some of Tasmania's most problematic weed species, including broom, gorse, blackberry, foxglove and orange hawkweed. These weeds are all well-known for their tendency to jump fencelines and escape into nearby bushland, where they push out local native plants and can poison wildlife.

NRM South's Mountain to Marine co-ordinator Holly Hansen has spent the past six months visiting gardens adjacent to bushland areas in Hobart, pointing out weedy plants and showing landowners how to treat them. She's also been teaching landowners about why some garden plants can be such a threat to Hobart's local bushlands and native wildlife.

"Many backyards in and around Hobart are near bushland reserves and are extremely important to local wildlife," says Holly. "They provide food and shelter for native birds, lizards, insects and other species, and so have a huge impact on the health of our bush.

"But if weeds get in they can push out native plants, displacing important habitat for native animals.

"Our Wildlife Friendly Gardens program is as much about teaching people how to create a garden that helps feed and nurture local wildlife as it is about getting rid of invasive bushland weeds.

David Nixon joined the Wildlife Friendly Gardens program to get help tackling gorse infestations on his property near Hobart.

"We also help people select the right local native plants for their gardens, teaching them how the plants they choose can have an impact on the health of nearby bush."

Holly says the households that have joined the program have three things in common:

1. Their gardens are near a bushland reserve.
2. They all hope to make their garden more wildlife friendly.
3. Their gardens harbour plants with a reputation for invading local reserves, pushing out native plants and reducing the amount of food and habitat available for wildlife.

The pilot project has been a three step affair, with Holly first visiting each garden to discuss problematic plants with the owners. She talked them through various options and the best methods for getting rid of particular weed species.

Holly then passed on her hitlist to professional weed management contractors, who have been treating and controlling the worst bushland weeds, and teaching the 'wildlife friendly gardeners' the best methods for keeping other weeds under control.

Once the weeds have been removed Holly says it's important to replace them as quickly as possible, and Hobart City Council is making that job much easier by supplying local native species.

"If you're in a large busy car park and a car pulls out another comes straight in," says Holly. "That's exactly the way weeds work."

The final step will then be up to the gardeners, who have the responsibility of following up the initial weed treatment with ongoing vigilance.

The program is a joint initiative between NRM South and the Hobart and Kingborough councils.

RECENT WEED PUBLICATIONS

Weeds of Northern Australia: a field guide

Nicholas Smith (Environment Centre NT)

This is an informative field guide to help you identify high priority weeds threatening Northern Australia.

It features photos and descriptions for 150 weed species, detailed descriptions for 90 high priority species, species distribution maps, detailed botanical drawings, and information on identification, flowering and fruiting time, preferred habitat, dispersal mechanisms and recommended control methods. It can be ordered at http://www.ecnt.org/weeds-field-guide ($25.00 plus $3.00 p&h)

Biological Control of Weeds in Australia

Edited by Mic Julien, Rachel McFadyen, Jim Cullen (CSIRO Publishing)

This book reviews biological control of weeds in Australia to 2011, covering over 90 weed species and a multitude of biological control agents and potential agents. Each chapter has been written by biological control researchers and provides details of the weed, the history of its biological control, exploration for agents, potential agents studied and agents released and the outcomes of those releases.

http://www.publish.csiro.au/nid/18/pid/6509.htm

Common Urban Weeds of North Australia

Michael Schmid and Nicholas Smith (Gecko Books)

This book features some of the common invasive garden escapees found in urban areas across northern Australia.

Seeds delivered by horses come complete with fertiliser, moisture and protection from the elements, tilting the odds in favour of weeds, unwelcome intruders in national parks. Photo: Ross Tucknott, flickr

State governments trample over wilderness with horse strategy

Weed problems are likely to grow in some of Australia's most precious conservation areas as the NSW and Queensland state governments move to allow or expand horse riding in national parks.

The NSW Government has released a draft strategic directions paper to promote riding opportunities that does not even acknowledge the weed risks and proposes a horse-riding trial in wilderness areas. Queensland's new premier Campbell Newman says, "there needs to be a cultural change which says that national parks are for horse riding, mountain bike riding, four wheel driving and enjoying camping experiences, fishing and that sort of thing."

National parks cover only about 8 per cent of NSW and less than 5 per cent of Queensland, and are meant to be managed primarily for biodiversity conservation. The proposals for horse riding suggest that neither government appreciates the damage caused by weeds and horse trampling. Horses will carry weed seeds from paddocks or stock feed into national parks and foster their establishment by fertilising and disturbing the soil. Horses are also liable to spread the deadly plant pathogen *Phytophthora cinnamomi*.

But horse-riding lobby groups claim that weed spread is not an issue. The Australian Horse Association says:

> *"Although some studies have shown that certain seeds passed in manure are capable of germination we do not accept that weed dispersal by horses is an environmental issue in the practical sense. In those areas with a weed problem, we see no evidence that horses are the major contributor to the problem. There are many vectors for weed dispersal so prohibiting horse riding will probably have little or no effect."*

Their fact sheet evades the issue by stating that many protected areas to which horses have no access are weed-infested and that some of the most significant weed threats are not eaten by horses.

Of course, other users of national parks also have weed impacts – the verges of bushwalking trails and roads are often weedy. But because of their size, horses can transport much larger numbers of seeds than most other vectors, add larger amounts of nutrients (nitrogen, phosphorous, heavy metals) to the environment through faeces and urine, and cause greater levels of disturbance than humans bushwalking. An adult horse produces 17-26 kg of dung and 5-7 l of urine a day. Weeds will establish downslope of trails, in soil loosened by hoofs, and in nutrient-rich dung.

Unfortunately, there have been only a few studies in Australia and overseas to test the effects of horse riding on weed spread, and just one on the risks of pathogen spread.

It has been demonstrated that weed seeds (a substantial proportion of some species) survive passage through a horse, and may be excreted several days after ingestion with a peak at three to five days, and up to ten days after ingestion. Results from 11 international studies show that seeds from at least 216 species are viable after passing through horses, and 45 are serious environmental weeds.

One study found that horses can excrete more than 1000 viable seeds a day, and another found almost 400 seeds per litre of dung. Even when weeds are not palatable to horses they will ingest weed seeds from hay contaminated with weeds.

Seeds attach to horses, especially the tail, and horse gear. In New South Wales, horse tails spread the burrs of noogoora burr (*Xanthium pungens*), a major weed in some natural areas.

Horses damage vegetation, create bare patches and disturb the soil, which opens up space for weeds, increases solar radiation and increases the availability of nutrients. Horse hoofs are far more damaging than boots. Seeds dropped from horses may survive several years in the soil until conditions suit their establishment and be dispersed into new areas by water flow, erosion or animals.

Governments should take a highly precautionary approach in assessing the risks of horse-riding in national parks because weeds are often difficult and expensive or impossible to eradicate. National park budgets are inadequate to control all weeds and there can be no confidence that new weeds due to horse riding will be removed. If they are, it will be at the expense of other weed control or other management activity. Weeds often take a long time to establish and spread, so the impacts of horse riding may not be evident for years or decades, by which time the practice is well established.

Nor is the risk today a reliable indicator of future consequences. Weed risks are dynamic as new weeds establish in horse pastures or feedstock paddocks.

ISC will make submissions to both the NSW and Queensland Governments about the weed and disease risks of their proposals.

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DOWN THE RABBIT HOLE

with ISC CEO John DeJose

Salmon fishing in the Yemen

Australian biodiversity is in decline and its prospects are deteriorating according to Australia's State of the Environment 2011. Invasive species are a top order driver of the declines yet the report finds that '(g) overnment responses to invasive species are uncoordinated at the national level, reactive, focused on larger animals, biased towards potential impact on primary industry at the expense of the total ecosystem, and critically under-resourced.'

Cleary, our biosecurity system is inadequate and will prove to be even more so under climate change. As a thought experiment, consider assembling the best possible team to spearhead a step change in Australia's approach to environmental biosecurity. We'd need a diverse range of people with different skill sets to match the complexity of the problem.

Of course, there would be the weed, pest and pathogen experts, whose challenge is to elucidate how invasive species behave in natural environments with their mind-boggling diversity of interdependent species from soil microbes and earthworms to some of the largest organisms on the planet. This is a much more difficult task than understanding the impacts of a few species in paddocks or cropland.

Technical expertise in invasive species needs to be supplemented by the ecological knowledge essential to preserve the values of protected areas, threatened species and ecological communities.

What works in simplified production landscapes is often ineffective in natural environments, which require methods to target harmful species whilst leaving the natives unharmed and promoting their recovery, a key competency we have yet to comprehensively develop.

Look upscale to see how the science can be most appropriately applied and another layer is revealed. There is need for those with expertise about how to apply programs at a local level and how to coordinate and focus the national effort.

Invasive species are spread, deliberately or accidentally, by people and policies are influenced by community attitudes (such as antipathy to cane toads but love for deer) so we need expertise in the social sciences to achieve attitudinal and behaviour changes.

We need experts in risk analysis and decision-making to help define national objectives and prioritise actions against them. The team would also need to have skills in navigating the complexities generated by our three levels of government in Australia, each with their own responsibilities in environmental biosecurity from planning, funding and coordination to the actual doing on the ground. The 'doers', with local knowledge and responsibility, must have a seat at the table alongside those with regional and national focus.

The 'doers' are increasingly from the community sector and this component will need to increase exponentially if we are to reverse biodiversity declines. The necessity of effectively engaging the wider community is a central theme in recent major federal government reviews of relevant environmental and biosecurity legislation. Fortunately, the environment inspires passionate commitment of the personal time, expertise, effort and financial resources of many, many individuals across the country and abroad. Properly motivated, such resources can flow prodigiously and sustainably.

It is unsustainable to simply deploy community 'brawn' in pulling weeds or other simple tasks. Those giving their time rightly demand it be best used by ensuring there is alignment with the policy objectives of the 'host' organisation. Therefore, to ensure a continued provision of inspired community endeavour, we will need skills in attracting, motivating, working with and valuing volunteers - and including them in higher order deliberations.

Coming advances in communications and information technology, coupled with social networking, will allow for more effective reach than has previously been possible. The potential for delivering powerful tools directly to the smart phones already carried by most Australians is already being realised with apps for plant and even invasive plant identification, geolocation and data capture becoming available. The real-time nature of the tools, accessibility of data and more transparent application all act to drive further contribution.

The Atlas of Living Australia is a government-funded platform technology aimed at facilitating such biological data capture, analysis and sharing at national scale. Powered by such advancements, it is easy to imagine the inestimable benefits that could arise from an early detection system cost-effectively deployed by thousands of motivated biosecurity 'sentinel' volunteers. This would help drive eradication work much closer in time to the point of incursion or range expansion. It is well recognised that this makes all the difference in respect of cost-effectiveness but, in the case of environmental biosecurity, it may also make a crucial difference in our ability to have any meaningful influence on outcomes, as exemplified in the recent incursion of Myrtle Rust.

The provision of more government resources is critical. Recent modelling from New Zealand suggests we need to increase weed- and pest-related expenditure by an order of magnitude to arrest biodiversity decline but it not clear that we will ever be able to secure such funds. In an environment of constrained resources, we'll obviously need to be able to direct what funding we do have with laser-like precision. Each and every component of the national environmental biosecurity program

continued next page...

As a stimulus measure after the great depression, the US Government Civilian Conservation Corps employed 2.3 million young men whose work included insect and disease control. Photo: OSU Specieal Collections & Archives

needs to be ranked for priority, costed and fearlessly evaluated.

Engineering timely course correction into the system and using it skilfully will be essential in driving the best outcomes from scarce resources. This will require adroit managers who can keep pace with developments in knowledge, society and the environment.

The earlier quote from the SoE Report 2011 states that Australia's biosecurity investment is skewed towards primary industry.

One reason for this is that agricultural values are far easier to measure in economic terms. With commercial incentives driving this, it is to be expected that charting a course to redress the imbalance will encounter some difficulty and will rely upon skill sets in politics and negotiation. It will be necessary to ensure that the current level of investment in primary industry biosecurity is not diminished but that funding for environmental biosecurity is improved.

Making the case for increased investment in environmental biosecurity requires we develop expertise in relevant environmental accounting and in economics – the language of government. Two hurdles come to mind: firstly, that such measures by their nature diminish that which is ineffable and most valued about nature and, secondly, that the development and acceptance of environmental accounts has been excruciatingly slow and is unlikely to produce results in a useful timeframe.

All the necessary resources cannot come from government so we will need expertise in fundraising.

The philanthropic sector has largely avoided investment in reversing invasive impacts causing declines in Australia's biodiversity. Our team will need to convince the sector to invest in better ways to manage invasives.

Nothing stalls or dries up philanthropy faster than a perception that the money will replace programs usually undertaken by government. Clearly, the team needs to communicate an undertaking from government that resources donated by the community will augment rather than replace government expenditure.

Specialist communication skills will also be needed on our step change team to open public debate on invasive species threats to underpin an agenda for action. These communicators will need to find ways to present invasive species issues which catch people's attention and promote visceral understanding.

And finally, to ensure that this considerable investment and work generates maximal return, we'd need to ensure it is all nested within an adaptive, learning system in which everything is contestable.

Many of the competencies required in the team to spearhead the step change in environmental biosecurity are already resident in the existing biosecurity apparatus scattered across the country.

Bringing the appropriate expertise together is a large and complex undertaking in itself, particularly as many participants will continue to be domiciled in different institutions and across several tiers of government.

Einstein is reputed to have said something like 'the thinking that got us into this mess is unlikely to get us out of it'. History has shown this to be true in our biosecurity system over decades. Successive governments have recognised that the environment needs a better deal from the biosecurity apparatus but the various remedies applied over the years have proven inadequate.

Picture, if you will, a couple of sleek environmental biosecurity salmon struggling in their primeval battle for survival, swimming upstream in the biosecurity torrent past the rocks and the bears. Will they push through upstream to spawn a generational change delivering us into a brighter future where Australia earns a reputation for its 'can do' attitude and the results it has brought? Or, will we be too timid to design and nurture a nimble, virile step change team and just allow our efforts to be swept away into insignificance or killed by a snap of predatory jaws?

Professional, necessary and enduring vigilance

Frontline stories: passionate people protecting Australia from invasions

Western Australia has been trying to keep European starlings (*Sturnus vulgaris*) out of the state since 1895.

In this frontline story, Colin Parry, a biosecurity officer with the WA Department of Agriculture and Food's starling program, explains how they go about this task.

Without the program, Western Australia could be subject to as many as 12 million starlings. Colin has been working on starlings for almost a quarter of a century.

Biosecurity officer Colin Parry knows the meaning of patience. In his work as a frontline team leader with the starling program, he has had to learn plenty of it, spending long hours in hides in remote locations to spot starlings and keep them from establishing in the state.

"I've been involved in the department's starling program since 1988. It's a long-term project to keep starlings, flying in from the east, from establishing in Western Australia.

The program includes a major surveillance and trapping effort to keep the birds from coming across the Nullarbor and establishing here, and I lead teams as part of that.

These birds are called "aerial rats" for good reason. They are a major pest of primary production, and also compete with native birds for food and nesting sites. They foul buildings and can spread diseases.

The starling is listed as one of the world's worst invasive alien species and is a declared pest in Western Australia.

If they established and thrived here, the results would have a significant impact upon our primary industry, our environment, our communities and our economy. Can you imagine, for instance, what would happen to our famous Margaret River wine region if they established there!

So it is a battle I am very happy to be part of, especially as we have achieved great success with our trapping program this season, particularly in the Esperance area. It's a good step towards our goal of removing starlings from the State altogether.

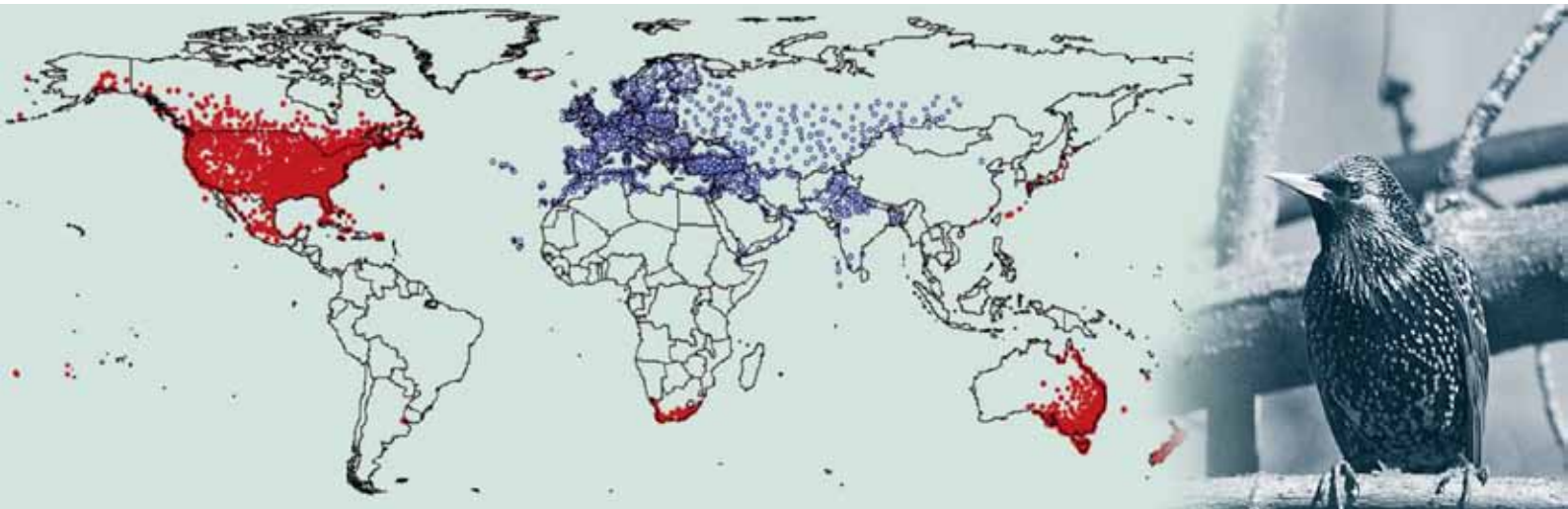
The remote and isolated environments we operate in can be harsh. We often work in swamps and lakes, and are very thankful there are no crocodiles in the south of the State. Though snakes do abound, and we're always working in their space! Conditions can be quite difficult.

Our teams are also away from home, working out in the bush, for extended periods over a large part of the year from spring to the following autumn each year. That's one of the difficult things about the job.

But team members constantly support each other, and there are plenty of wonderful moments. Working from dawn to dusk each day, we see nature at its best. The exquisite sunrises and sunsets over the Western Australian bush can take your breath away. And living and working amongst a vast range of native animal and plant species has many rewards. I feel privileged for that opportunity.

One of the best parts of my job is working with operational people in the field who are passionate about what they do. You develop great camaraderie and friendships with team members. It's also rewarding to support and mentor my team members, and seeing them develop unique skills in, netting, trapping, silenced shooting and surveillance.

I think, for all of us in the program, the greatest reward is seeing the success of our



Worldwide range of the Common Starling. Natural populations are in blue, introduced populations in red. Map by Win Kirkpatrick

Colin Parry, in camouflage, spotting starlings to keep them from establishing in Western Australia.

efforts over the years. We are winning the battle to prevent starlings from establishing in our State, and it was wonderful seeing our program commended at the International Bird conference in Fremantle several years ago.

The program continues to attract attention and accolades from around the world.

We have learnt from our failures as we have gone along and have come up with very successful strategies and inventive approaches to ensure success for our program. There has been no 'Starling Control Manual' for us to follow. I guess we've been writing it along the way!

We employ good old-fashioned surveillance methods, including all those hours in bird hides. We meticulously record all activity and nesting sites for future reference and testing.

Our database now covers a vast area of operations. Our teams have also introduced innovative technologies such as artificial nests and radio telemetry where birds are tagged with radio transmitting signal devices to help us detect new populations. This has proven very successful, particularly when starling numbers are low.

Even genetic research is useful in providing us with more information about source populations and invasion pathways that, in turn, helps us to develop better surveillance and control methods.

Despite an increase of starlings on the South Australian side of the Nullarbor in 2011, our program has been successfully keeping them from establishing in WA.

Our teams removed just over 100 starlings over this last 2011/2012 trapping season on the south coast. That included 14 from the Esperance region, four from the Eyre Bird Observatory, and 82 from the Eucla region. No juveniles have been seen or caught around Esperance for several years, a good indication that the population in the region is collapsing.

Each season brings uncertainties, and we need consistent funding to maintain the project into the future. The Department of Agriculture and Food in Western Australia provides the basis of our ongoing funding, but we are looking to extend and better promote the program through additional National Resource Management (NRM) funding.

We are also working in partnerships with other groups, such as South Coast NRM and Birds Australia. The volunteer work of Birds Australia greatly strengthens our surveillance programme.

We are also very fortunate in being well supported by the public and the agricultural community.

I do love my job, especially being able to lead and teach by practical example and finally seeing the fruits of our labours over the years. It is good knowing that we have been able to make a difference and help protect Western Australia's wonderful resources, agricultural production and environment.

Photos from the National Library of Australia

Quarantine Act – 1909

LOOKING BACK

Peeling back the history of invasive species in Australia

In our Looking Back segment, we feature voices from the past about invasive species – for what they reveal about what has and has not changed.

With the Federal Government intending to replace the century-old Quarantine Act 1909 with a completely new Biosecurity Act within the next few months, it is timely to look back at how federal quarantine powers were regarded in the past.

Here are extracts from various newspapers in 1909 when, after several years of vacillation, the Federal Government finally took over quarantine from the state governments and implemented The Quarantine Act 1908. Some welcomed the replacement of the 'separate, inefficient, slip-shod State system' but others were suspicious.

What has changed? When first promulgated, national quarantine laws were focused mainly on human and livestock diseases; they now deal with many more categories of threat.

What hasn't changed? Tensions over state-federal powers, different biosecurity laws and standards in each of the states and territories, and rivalries between states remain common themes.

Colin Parry, in camouflage, spotting starlings to keep them from establishing in Western Australia.

Federal Quarantine. State Control to Cease. The New Act

Sydney Morning Herald 26 June 1909

One of the benefits which ardent federalists said would result from the Union, was that quarantine matters in Australia, instead of being under the control of various State departments, would be placed in charge of one central authority.

Thus reciprocal arrangements could be made between the States, a uniform system of quarantine instituted, and continuity of policy made possible. Australians have waited long for this improvement …. On July 1, [the Commonwealth Quarantine Act] will come into operation. This measure concerns all action taken throughout Australia for the exclusion, detention, observation, segregation, isolation, protection, and disinfection of vessels, persons, goods, animals, or plants, having as its object the prevention of the introduction or spread of disease.

…The chief fear of the local officers has been that cases of smallpox might elude the vigilance of the authorities. Where such has been the case local officers contend that the cases have been passed by the officers of other States. At present there is certainly no uniform policy among the States. In some States the inspection of cargoes is purely a matter of form. Live stock inspection in States other than New South Wales and Victoria has been purely perfunctory. Dr Norris [Chief Federal Quarantine Officer] even went so far as to describe the system of quarantine inspection in Victoria as a 'farce.' At any rate, with the freest intercourse between the States any laxity in one State constituted a danger to the whole Commonwealth.

Federal Quarantine. The New Department

The North Western Advocate and the Emu Bay Times, 16 June 1909

According to proclamation, the federal Quarantine Act will come into operation on 1st July. If the measure fulfils its promise it will supplant a series of separate, inefficient, slip-shod State system by uniform and effective Commonwealth control. There is little reason for over-confidence.

… The new Quarantine Department, if it is not to be merely another Federal structure on top of the six existing State departments, with a number of sinecures in the central administration, is made responsible therefore for a display of

Strict quarantine measures were applied in Australia to limit the spread of the Spanish Influenza, which killed 20 to 40 million people worldwide. This was an influenza quarantine camp in Adelaide, 1919.

Crew of the SS Zealandia lined up for quarantine inspection during a smallpox scare after arriving at Fremantle in 1913 and right, passengers of the SS Zealandia lined up for quarantine inspection in 1913.

exceptional ability, activity and vigilance. Experience shows that there is an urgent demand for these qualities, and it will be interesting to watch results.

When the Bill was before Parliament, advocates of States' rights fought hard for State control of local animal and fruit pests independent of the Commonwealth, and powers in this respect were embodied in the Act only with the stipulation … regarding the spread of the disease or pest beyond the boundaries of the State.

…The total annual State expenditure on quarantine is estimated at £25,725, including £9,624 as interest on lands and buildings valued at £320,124. The cost to the Commonwealth, including central staff, is set down at slightly more than £27,000.

Federal Quarantine Act. Some Drastic Regulations

Barrier Miner, 6 August 1909

A number of regulations have been prepared by the Federal authorities at Melbourne in connection with the Federal Quarantine Act. Among other rather drastic regulations is one insisting on a dog or cat being kept on vessels with access to parts where vermin is in a harbor.

Quarantine Regulations. State versus Commonwealth

The Mercury, 10 August 1909

There has arisen some difference of opinion amongst the public health authorities as to whether the Federal Quarantine Act altogether overrides State legislation. In the same direction the difficulties of future conflicts between the State and the Commonwealth are foreseen. … The Constitution gives the Federal Parliament power to legislate on quarantine without defining the scope of the term "quarantine". …Already it is urged that some of the Federal regulations under the new Act have gone further than the Constitution would justify…

The Quarantine Act. To-day's English Mails Delayed Four Hours

The Daily News (WA), 12 August 1909

It was 4.50 am to-day when the new R.M.S. Otway reached Fremantle from London via ports, but in consequence of the new quarantine regulations being in force here, the mails on board the ship for Western Australia were subject to an unwarranted delay of four hours.

Seed Condemned. A New Zealand Consignment

Examiner (Tasmania), 28 August 1909

A consignment of seed from New Zealand, which arrived a few days ago, has been examined by the Stock Department under the Quarantine Act, and condemned. The consignment was supposed to be 30 bushels of fog grass but the officials state that they found only a small proportion of fog grass seed in the consignment. On the other hand, they found several of the proclaimed weeds seeds, and many other weeds not proclaimed under the act as noxious. The consignment has been re-shipped to New Zealand.

Case study

Southern hairy-nosed wombats already suffer habitat loss and competition from livestock. Now they face a new threat.

Introduced weeds crowd out the native plants wombats prefer to eat and poison them causing fur loss, starvation, and finally death, researchers say.

Our wildlife is poorly protected against invasive species – a major factor in declines of most of our threatened species.

ISC works hard for better laws, policies and programs to keep nature safe.

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