Feral Herald

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Invasive animals research at a crossroads p4

Biosecurity: when one size does not fit all

Carol Booth
ISC Policy Officer

Agriculture and the natural environment have stark differences that warrant distinctive approaches to biosecurity. Environmental biosecurity cannot just be bolted on to industry biosecurity.

These are points that ISC is making as a response to the 'One Biosecurity' concept signalling a national intent to adopt a seamless cross-sectoral, cross-jurisdictional approach to invasive species threats to Australia's environment, industry and public health.

The One Biosecurity integration advocated by the Beale review is essential in a federal system, with biosecurity functions spread across three levels of government under numerous laws and policies, and with invasive threats having a multitude of pathways and drivers. Many invasive species have both economic and environmental impacts, and sometimes social impacts as well, warranting a joint approach. However, Australia's biosecurity system was established primarily to protect agriculture and is managed primarily by agricultural agencies. The dominant culture and concepts in biosecurity have been born from agriculture.

What are some of the differences that underpin distinctive requirements of environmental biosecurity?

The values to be protected – biodiversity and environmental health: Conservation requires a biosecurity focus on hundreds of thousands of species, from microbes to macropods, and their interactions that constitute ecosystems and ecosystem processes in terrestrial, freshwater and marine systems. In contrast, industry biosecurity is mostly focused on protecting individual species that are of economic value and number no more than a few dozen (except for the nursery and aquarium industries, which use a wider although largely replaceable range of species). The values at stake for industry are quantifiable in economic terms and are sometimes replaceable (by new breeds, species or enterprises). The values at stake in conservation are not replaceable – each species and ecosystem is important – and cannot be quantified in economic terms. This means they are often undervalued when biosecurity priorities are decided.

Photo of haystacks: Ron Knox - flickr.com/photos/limn/

"The approach used to manage biosecurity risks to human health, food safety and the environment (including aquatic environments) needs to be consistent with the approach used to address risks that primarily affect the agriculture sector."

– One Biosecurity: A Working Partnership. Beale review of quarantine and biosecurity arrangements (2008)

Invasive species threats – scale and complexity: Because of the diversity of taxa and ecological communities to protect, there are far more invasive species that are of threat to environmental values, far too many to compile into a target list. Both environmental and industry threats mostly derive from global and domestic commerce, but a greater proportion of environmental threats are deliberate imports because of their economic or social value. Environmental threats are typically far more complex, involving direct and indirect impacts arising from biotic and abiotic interactions. For example, the threat

continued p2

from p1

to industry of myrtle rust consists of direct impacts on particular cultivated species (native forestry is the exception) but in the environment it consists of impacts on susceptible species as well as dependent wildlife, ecosystems and ecosystem processes such as fire regimes. The impacts of Asian honeybees on industry will be reduced crop pollination services and honey production because of competition with European honeybees. In the environment, Asian honeybees will compete with the pollinators of unknown numbers of plants with flow-on impacts on the unknown numbers of species relying on these plants.

State of knowledge: Much more is known about cultivated species and the invasive threats to them than about biodiversity and invasive threats. The lack of knowledge about our native biota, particularly invertebrates and microbes, means that most invasive species impacts are not documented or monitored. As Burgman and co-researchers (2009) say of fungi, 'far less than about 10 per cent of species scientifically documented... Many ... arrive each year. It may be many years before their effects are felt in Australian ecosystems. As a consequence, lists of potentially damaging invaders rarely make reference to fungi.' Invasive earthworms can have dramatic impacts on soil properties and plant composition but scant interest has been paid to the more than 60 exotic species in Australia (Woodman et al. 2008). The impacts of even high-profile species are poorly known. Development of the NSW threat abatement plan for bitou bush increased the number of known species at risk from six to 158 (Coutts-Smith & Downey 2006). Because of the vast pool of potential invasive species, including many about which little is known, it is not possible to develop advance guidelines for the eradication of incursions, except for a small subset of species.

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Some implications of these differences for biosecurity laws, policies and programs

- Biosecurity policy needs to be shaped by ecological principles and address biodiversity priorities, rather than be an add-on to agricultural biosecurity.
- Because of ecological uncertainties and limited management options, applying the precautionary principle is vital.
- Biosecurity policy units and advisory bodies need more ecologists and conservationists.
- Biosecurity should be a high and joint priority for both environmental and agricultural agencies.
- There needs to be more research into potential environmental invaders, the impacts of invasive species on biodiversity and environmental management.
- The imbalance in resources for industry and environmental biosecurity needs to be redressed with increased public funds going to public good biosecurity priorities.
- There is need for an environmentally meaningful way of quantifying and prioritising environmental threats and comparing threats across sectors.
- Post-border biosecurity needs to be much more preventive and ecologically defensive.
- Environmental biosecurity needs meaningful involvement of the community and environmental NGOs in policy development.

ISC is currently developing a proposal to advance environmental biosecurity.

Predictability and timeframes: While impacts on cultivated species can be predicted with reasonable accuracy, there are high levels of uncertainty about impacts in the natural environment due to complex interactions, long timeframes (millennia) and lack of knowledge. Many impacts are facilitated by or synergistic with other threats, such as fragmentation and climate change. Invasive impacts in the natural environment may not be observed for decades due to lag effects, lack of monitoring or their insidious nature. A cow killed by a new pathogen is much more easily detected than a dead bird in a forest. The combination of great uncertainties, long timeframes and limited management options warrants an especially precautionary and defensive approach in environmental biosecurity.

Management approaches and options: There are many more management options in relatively simple, delimited agricultural systems than there are in complex natural environments. For example, in response to myrtle rust, plant industries can use fungicides, breed resistant varieties or use tolerant species, none of which are options in the natural environment. Weeds cannot be controlled with broadacre mechanical or chemical control in many natural situations. Australia's post-border biosecurity (managed by the states and territories) is more reactive rather than defensive, with the focus mostly on controlling or proscribing a small subset of listed invasive species that are causing proven harm. A much more precautionary approach is warranted because of the limited options for control once a species is established.

Stakeholders and resources: There are commercial incentives for industry management of invasive species but environmental biosecurity relies on government and community investment for the public good. Commercial incentives and greater government spending also mean that industry biosecurity is much better resourced than environmental biosecurity. When funding cuts occur, environmental biosecurity suffers more than industry biosecurity. And when incursions of major economic pests occur, environmental biosecurity is often compromised by the diversion of staff to deal with agricultural incursions. When biosecurity agencies are dominated by agricultural experts there can be cultural barriers to environmental biosecurity. A multitude of stakeholders, often with conflicting agendas, makes environmental biosecurity a much more socially and politically challenging policy area than industry biosecurity. Some of the most damaging environmental invaders are ignored because of economic or social reasons that are rarely subject to cost-benefit analysis – many aquarium fish, pasture grasses and garden plants for example.

Reference

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invasive species council

Trees and shrubs take over

Tim Low
ISC Policy Officer

A review of weedy shrubs and trees has found that Australia is the most invaded region in the world, with 183 species, well ahead of Europe with 107 and South America with only 75 species.

The review by David Richardson and Marcel Rejmánek provides a list of the 357 trees and 265 shrubs known to be invasive somewhere in the world.

Pines (*Pinus*) and Australian wattles (*Acacia*) emerge as the weediest groups, with 22 and 23 invasive species respectively. Black wattle (*Acacia mearnsii*) turns out to be one of the world's most widespread woody weeds, with only castor oil (*Ricinis communis*) found in a larger number of regions.

Not surprisingly, horticulture emerges as the main source of woody weeds, responsible for 62% of species, followed by forestry (13%), food (10%) and agroforestry (7%). Birds are the most important agents of dispersal, responsible for spreading about 43% of trees and 61% of shrubs.

This paper will be very useful for those wanting up to date information on the global distributions of invasive trees and shrubs.

The fact that 323 species (52%) are known to be invasive in only one region is cause for great concern about the future, as is the comment by the authors that "we have almost certainly overlooked many species that merit inclusion on the list".

Reference

Richardson D, Rejmánek M. (2011) Trees and shrubs as invasive alien species – a global review. Diversity and Distributions 17: 788–809

REAP what we sow

Effecting change needs force of numbers to drive the political process. First, people need to be attracted to invest the time to listen to what we say.

With invasive species, it's not sexy, obvious or simple. For many people, weeds and pests are mostly irritants not worth getting excited over. Grass in the footpath, bunnies on the lawn; what's the big deal?

How, then to get more people interested in, learning about and committed to achieving biodiversity benefits through better invasives responses?

The Ian Potter Foundation has backed ISC with a grant to do just that. We will establish contact and relationships with the hundreds of groups across the country who are weeding reserves, regenerating bushland and controlling pests and who therefore already have a visceral understanding of pests and weeds.

Practical experience, seeing the same problems recur year after year, is a sure inspiration to discover more systemic approaches to invasives threats.

Volunteers remove weeds from Sydney Harbour National Park. Photo: NPA/Dave Roe

Reaching, extending our messages to and analysing the intentions and impacts of this vast unpaid army on the front lines of the invasives threat are key objectives. Putting in this effort to connect will reap benefit for nature. That's why we call this the Reach, Extension and Analysis Project – REAP.

With the consent of groups, we'll publish results in directory format to help drive further value from the stores of knowledge amassed by them.

Contact us

If you know a group involved in this field please let us know at: isc@invasives.org.au

Invasive Animals CRC's future at a crossroads

At our invitation, Chair of the Invasive Animals CRC Board **Helen Cathles** explains why the CRC warrants refunding. Helen is also a grazier, and runs a 4000ha property at Wee Jasper, NSW, in partnership with her husband.

The Invasive Animals CRC is at an extremely important crossroad. We have made it to the final stage (the interview) of the Round 14 CRC program selection process in a bid for a five-year extension. November this year is when this round of bids are considered and the future of our CRC will be announced early 2012.

Our bid coincides with mouse plagues and surging carp and pig numbers, all of which pose significant threats to our country's long-term sustainability and prosperity. These issues have heightened awareness of invasive animals and lifted the profile of our CRC, strengthening our case that invasive animals have the capacity to affect all aspects of Australian productivity, trade, environmental and social well being.

Wild dogs have become a huge problem for sheep farmers in Queensland. Photo: Mick Davis

No magic bullets

Nationally and internationally the control of invasive animals is a never-ending challenge. Experience has shown that there are no magic bullets to reduce damage by pest species and in many cases there are no permanent solutions.

This area of research will always be needed if we are to protect our biodiversity from invasions by pest species, reduce impacts on agricultural production, help prevent invasions in urban centres and ease associated burdens on families whose enterprises supply food and fibre to the nation.

Invasive animals destroy livelihoods

Today on the national stage, sheep numbers are at a record low. Millions of hectares have been decommissioned due to the impacts of wild dogs. In Queensland wild dogs are cited to be the most important cause of the dramatic decline of sheep flocks and associated infrastructure from 16 million in the late 1980s to approximately 3 million sheep today. Wild dogs are literally driving sheep out of Queensland.

Adding to these statistics are demographic and other environmental trends. Rural demographics have had a major shift with fewer experienced and knowledgeable people to do the work and new people who have no knowledge and little understanding that sometimes animals do have to be killed. This places enormous pressure on invasive and pest management. And the environment, such as our management of landscape erosion caused by escalating pig and rabbit numbers, continues to underpin Australia's status in the trading arena. Few commodities are sold today without some reference to their environment and how it is impacted, preserved or enhanced by production.

Pressure on land use has also heightened the need to use our resources well. Globally, in an effort to satisfy a demand for a higher protein diet and green energy for the production of ethanol, we are experiencing an unsustainable growth trend (in the millions of hectares) planted to coarse grain. In just 20 years, an additional 75 million hectares has been planted to crops and there is a predicted increase in 2012 alone, of a further 14 million hectares. Concurrently, the average yield has increased by 0.72 tonnes per hectare. To meet world grain demands and lower the environmental impact from new areas being cleared, lowering crop damage is essential.

Commitment to tackling invasive animals

With all this in mind, the Invasive Animals CRC Board has looked to the long-term structure of our sector to help draft the

continued next page...

Baby carp aggregate below the Menindee Main Weir on the Darling River in NSW. Photo: courtesy Nigel Harriss NSW Office of Water

Support the Invasive Animals CRC's extension bid

An impending end-of-year decision about funding for the Invasive Animals CRC will be a measure of the federal government's commitment to environmental and biosecurity research.

If it succeeds, it offers the prospect of practical solutions to help control some of Australia's most devastating environmental threats.

Vertebrate pests that have already caused the majority of animal extinctions in Australia.

If it is refused, it will follow most other environmental CRCs, including the Weeds CRC, into oblivion. That would be highly detrimental to our national capacity to manage invasive threats.

The Invasive Species Council is supporting the IA CRC's bid by writing to the Federal Government and urging all conservationists to do the same. Please add your voice.

The IA CRC bid has both environmental and economic goals. Its proposed 2017 outcomes include:

1. No new vertebrate pests established in Australia.
2. Recovery of key land and water regions after humane control of rabbits, wild dogs and carp
3. New social networks and institutional architecture around pest animal control
4. Prediction and control of emerging outbreaks (especially mice) and
5. An enduring entity for research, training and support of pest animal control.

Specific project proposals include more effective strains of Rabbit Haemorrhagic Disease Virus to boost existing rabbit biocontrol, Australia's first carp biocontrol agent, DNA-based detection systems, a new humane rodenticide, more effective regional and peri-urban wild dog control and an institutional and community engagement program.

The CRC program and environmental research

The CRC program has been biased in favour of industry with CRCs focused on public good biodiversity outcomes failing to be funded or re-funded. Of 44 current CRCs, just 4 have any substantial focus on biodiversity outcomes (Antarctica, bushfires, water and invasive animals), compared to 11 for primary industries and 13 for mining and manufacturing. The IA CRC is the only bid making it to stage 2 with a focus on biodiversity.

Professor Tony Peacock of the CRC Association has commented that the CRC program is 'too competitive for the funding available'. Last year's success rate was a low 13%, which means that 'proposals that are important to the country simply can't be funded.' Funding has declined from $211 million in 2007-08 to $165 million this year.

The IA CRC have bid for $19.7 million over 5 years to supplement a committed $53 million cash and in-kind.

ISC wishes the IACRC all the best in making it through as one of a likely four or five successful CRCs this year.

Take action

Write a letter supporting the extension of the Invasive Animals CRC to the following:

- **The Hon Tony Burke MP**
Minister for Sustainability, Environment, Water, Population and Communities
Parliament House
Canberra ACT 2600
Email: Tony.Burke.MP@aph.gov.au

- **Senator the Hon Joe Ludwig**
Minister for Agriculture, Fisheries and Forestry
Parliament House
Canberra ACT 2600
Email: senator.ludwig@aph.gov.au

- **The Hon Dr Mike Kelly AM MP**
Parliamentary Secretary for Agriculture, Fisheries and Forestry
Parliament House
Canberra ACT 2600
Email: Mike.Kelly.MP@aph.gov.au

Tip: Provide your postal address and request a written response to your letter.

More information

> For more information on the IA CRC's work download their extension proposal.

shape of the next stage of our CRC and to pinpoint how we can continue to build on the investment we have all made, the outstanding collaboration of scientists, commercial partners, communities and government.

Our goal is to ensure that if a further round of our CRC goes ahead, there is an enduring organisation committed to tackling these issues and to lead the international charge through excellent science and collaboration. The Board is focused and working to that goal.

Dawning of a new era

What does the future hold? Will our extension bid be successful – can we change the history of invasive animal pest management?

Our future is just making its way onto the horizon. Just how it will evolve is yet to be determined.

I, like many end users, have been in that place of great despair and have experienced pest dilemmas of increasing magnitude while being ill-equipped to deal with such dilemmas. Right now, as the Invasive Animals CRC Chair and an end user, I have a great sense of excitement about the potential that is opening up before us. I see the dawning of an entirely new approach to pest animal management in our extension bid.

However, it is just that: it is the first rays of the sun as day breaks, when the sun's rays hit the ground and on their own are not yet strong enough to promote growth.

That is exactly where the IA CRC is.

No more KTP listings for invasive species?

The national listing of invasive species as key threatening processes could be a threatened process itself.

A Federal Government proposal to encompass all invasive species within a 'novel biota' listing will confirm them as a major threat to biodiversity, but ironically seems likely to preclude national action on particular invasive species threats.

The only value of key threatening process (KTP) listings comes from the development of threat abatement plans (TAPs), which outline the research, management and other actions needed to protect native species and ecological communities from the listed threat. TAPs have no regulatory force but can provide impetus for action (see story page 9 about the TAP for five invasive grasses).

The Environment Department has advised the Invasive Species Council that the Threatened Species Scientific Committee, which assesses nominations and has developed the Novel Biota nomination, intends it to capture all invasive species and 'avoid the need to assess and list every invasive species individually'.

The Environment Department recently advised ISC that two KTP nominations we submitted 'fall fully within the assessment of the broader KTP Novel biota and its impact on biodiversity and therefore would not be assessed individually.'

There is no point developing a threat abatement plan for such a broad threat category as novel biota (encompassing invasive plants, animals, pathogens) and the draft nomination recommends against this. A similar fate – recognition but no action – has already befallen the escaped garden plant KTP listing. Likewise, the land clearing and anthropogenic climate change KTP listings have no practical conservation benefit.

As testament to their ubiquity, diversity and level of threat, invasive species threats account for more than two-thirds of KTP listings. The 12 other invasive listings all have TAPs (one draft, one under review) (see table).

ISC nominated tall wheat grass and feral deer as KTPs because a national TAP offers the best prospect to achieve stronger and more coordinated action under existing regimes. Currently, the Victorian Government promotes and profits from rather than bans the sale of tall wheat grass (although it has recently been listed as a potential threatening process in that state) and the NSW, Victorian and Tasmanian Governments protect deer for hunters rather than protect biodiversity and agriculture from deer. With both at an early stage of invasion in many parts of their range, there is an opportunity to prevent threat escalation and, ISC considers, a fiduciary duty on the part of government to do so.

Both more than qualify as KTPs, with the nominations providing evidence that at least 18 species and ecological communities (ECs) are threatened by feral deer and 28 by tall wheat grass (see www.invasives.org.au). A threatening process is eligible to be treated as a KTP if:

a) it could cause a native species or EC to become eligible for listing as threatened

b) it could cause a listed threatened species or EC to become eligible to be listed in another category representing a higher degree of endangerment; or

c) it adversely affects 2 or more listed threatened species or ECs.

The numbers show that deer and tall wheat grass nominations are more than competitive as priorities in terms of threat level. Recent KTPs have been listed on evidence of threats to five species or ECs (invasive grasses), ten (exotic rats on islands) and one (cane toads).

Other 2011 KTP nominations have also been rejected, with just one making it on to the assessment list, in addition to a nomination from 2009:

- Biodiversity decline and habitat degradation in the Australian rangelands due to the proliferation, placement and management of artificial watering points (nominated 2009, assessment due September 2012).
- Aggressive exclusion of birds from potential woodland and forest habitat by overabundant noisy miners Manorina melanocepla (nominated 2011, assessment due September 2014).

ISC suspects one of the main drivers for the rejection of recent nominations is inadequate provision of resources for assessments of threatened species, ECs and KTPs, with no more than 12 assessments due to be finalised in the next 12 months (2 threatened species, 9 ecological communities and 1 KTP).

The move to reject invasive species KTP nominations is inconsistent with government commitments to improve the KTP listing process made in response to the Hawke review. This 10-year review of the EPBC Act recommended and the Government agreed that:

- KTPs be better defined.
- There be greater flexibility in the criteria for listing a KTP.
- There be strategic identification of KTPs at a range of scales.
- There be greater flexibility in the development and implementation of TAPs.
- There be a transition to regional planning approaches and strategic threat management.

The NSW Scientific Committee, which conducts similar assessments for NSW, made several recommendations about the federal listing process during the Hawke review, which unfortunately were not adopted. These included making the Threatened Species Scientific Committee a statutory authority with power to make determinative listing decisions rather than simply advising the Minister, making the Committee functionally independent of the Minister and Department, publishing the criteria and reasons for priorities and having priorities determined by the Committee rather than the Minister. Specific to KTPs, the NSW Scientific

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Red imported fire ants (*Solenopsis invicta*), native to South America, have a deserved place on the national list of key threatening processes. In the future, other equally threatening invaders may not be considered for listing. Here a worker fire ant is shown in stereotypical defensive posture, her sting extruded, waving a droplet of venom in the air.
Photo: Alex Wild Photography

Committee recommended that under-representation of particular types of threat (including disturbance regimes and invasive introduced plants) be redressed.

Such reforms are without merit unless there are adequate resources not only to conduct assessments, but also to develop and implement threat abatement plans. There is no dedicated funding stream for implementation and current levels of funding are far from sufficient to implement existing TAPs. Caring for our Country funds are available for TAP projects but there is far too little funding to go round. Could this lack of resources be another reason why further invasive listings have been curtailed?

ISC has written to the Threatened Species Scientific Committee to request an explanation of how the 'novel biota' listing would generate improved biodiversity outcomes and to recommend that the novel biota KTP, if listed, be used to identify and prioritise invasive species threats that warrant threat abatement plans. ISC will also continue to advocate to the Federal Government that invasive species, including those recognised as KTPs, should be regulated under the EPBC Act where this can assist in protecting biodiversity.

CURRENT KEY THREATENING PROCESSES LISTED UNDER THE EPBC ACT

	Listed KTP (abbreviated)	Threat Abatement Plan
Exotic vertebrates	Rabbits	Current (2008)
	Feral goats	Current (2008)
	Red foxes	Current (2008)
	Feral cats	Current (2008)
	Exotic rats on offshore islands	Current (2009)
	Cane toads	Current (2011)
	Feral pigs	TAP (2005) under review
Exotic invertebrates	Yellow crazy ants (*Anoplolepis gracilipes*) on Christmas Island	Current (2006) for tramp ants
	Red imported fire ant, Solenopsis invicta	Current (2006) for tramp ants
Exotic plants	5 invasive grasses in northern Australia	Draft (2011) for consultation
	Escaped garden plants	No TAP
Exotic pathogens	Root-rot fungus (*Phytophthora cinnamomi*)	Out of date (2001) after Senate disallowance of inadequate 2009 TAP
	Chytridiomycosis (chytrid fungus)	Current (2006)
Other	Coastal otter trawling – turtle bycatch	No TAP but recovery plans for threatened turtles cover this threat
	Oceanic longline fishing – seabird bycatch	Current (2006)
	Marine debris impacts on vertebrate marine life	Current (2009)
	Land clearance	No TAP
	Anthropogenic climate change	No TAP
	Psittacine circoviral (beak and feather) disease	Out of date (2005)

A virus new to Australia is killing hobby pigeon flocks in Victoria and could be a risk for native birds. **Carol Booth** reports.

Pigeon virus outbreak

The pigeon paramyxovirus was detected in late August in Victoria and has infected fancy pigeons, racing pigeons and a few feral pigeons, killing up to 90 per cent of infected flocks.

Although the virus has not yet been detected in native birds, overseas evidence suggests that Australian pigeons, doves and other bird species are at risk.

Since the early 1980s it has spread from a likely north African origin into many other countries in Africa, Europe, Asia and America, probably largely through the export of infected pigeons for racing and ornamental purposes.

The virus has infected wild birds (see list) but there is very little known about its impacts on wild populations. A South African paper reported that large die-offs have sporadically occurred there in wild doves and pigeons since the virus invaded in the 1980s and has also killed a rare African ground hornbill. Researchers isolated the virus from 1400 dead pigeons in an urban area in the US, and concluded that it was 'a significant ongoing threat to domestic and wild bird populations.'

Pigeon paramyxovirus is one of several avian paramyxovirus variants. It can infect poultry and is closely related to Newcastle disease virus, which is infectious to hundreds of bird species and has caused large-scale losses of poultry. There have been six outbreaks in Australia since 1998, resulting in the slaughter of about 2 million chickens in one case.

Genetic research suggests that pigeon paramyxovirus emerged as a result of multiple events of chicken-to-pigeon transmission of strains of Newcastle Disease Virus in northern Africa, with the researchers Dorina Ujvari and colleagues commenting that:

As yet it is not clear whether the initial host-switch occurred between infected chickens and free-living pigeons during natural contact, or between infected chickens and domesticated pigeons in the course of forced contact promoted by human activity (for instance, during household rearing and in live bird markets).

Adapting to its new host before spreading around the world, the pathogenicity of the virus increased in pigeons and decreased in chickens.

Pigeon paramyxovirus is usually transmitted by direct contact with diseased or carrier birds but can also be spread through faeces, where it can survive several weeks.

Overseas, the disease in racing and show pigeons is controlled by vaccination, but the virus continues to circulate in wild birds.

Andrew Peters, a veterinarian researching infectious diseases in migratory pigeons in northern Australia and New Guinea, has warned that the pigeon paramyxovirus is a risk for native birds.

"Our region including Australia and New Guinea is a hotspot for biodiversity in pigeons and doves, and it has more than one-fifth of the few hundred species that are found in the world," Dr Peters said in a media release.

"We have a precious and unique resource to protect in our native pigeons and doves, and yet have little idea about the impact diseases of domestic birds might have on them."

As of 25 October, the virus had been isolated from pigeons on 44 Victorian properties in Sheparton and Melbourne and in feral pigeons in five locations close to affected properties. The Victorian Government has quarantined affected properties in an attempt to stop spread of the disease. Other states have banned the importation of pigeons from Victoria.

BIRDS INFECTED BY PARAMYXOVIRUS OVERSEAS

- **Pigeons and doves.**
- **Kestrels.**
- **Falcons.**
- **Cockatoos.**
- **Budgerigars.**
- **Pheasants.**
- **Swans.**
- **European robin.**
- **African ground hornbill.**

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http://www.dpi.vic.gov.au/agriculture/pests-diseases-and-weeds/animal-diseases/pigeon-virus/avian-paramyxovirus-fact-sheet

http://news.csu.edu.au/director/latestnews.cfm?itemID=6BB1E521EF4C84694BEB2F6730534C2D

Plan a TAP tap tapping for northern pasture grasses

Carol Booth
ISC Policy Officer

One of the greatest environmental challenges for Australia is management of invasive high-biomass pasture grasses that fuel intense fires and outcompete native species.

It is technically challenging to control such rampant grasses and politically and socially challenging because some graziers still want to grow them.

A plan under development for managing five of these grasses (gamba grass, para grass, hymenachne, mission grass and annual mission grass) in northern Australia will be a test of our national resolve and capacity to do so. Following the federal listing of the five grasses as a key threatening process in 2009, a draft threat abatement plan (TAP) has been released for public comment (open until 21 November).

The key threatening process is known as 'Ecosystem degradation, habitat loss and species decline due to invasion of northern Australia by introduced gamba grass (*Andropogon gayanus*), para grass (*Urochloa mutica*), olive hymenachne (*Hymenachne amplexicaulis*), mission grass (*Pennisetum polystachion*) and annual mission grass (*Pennisetum pedicellatum*)'.

The grasses greatly increase fuel loads and promote intense late season fires, displace native species, and alter the nitrogen cycle and water availability.

Examples of impacts include increased mortality of the endangered yellow-snouted gecko through increased predation after fire and reduced food resources for the endangered Gouldian finch due to exclusion of native grass species. The draft TAP lists 32 species/ecological communities that may be adversely affected, including 27 that are listed as nationally threatened.

ISC successfully campaigned a few years ago to have one of the grasses – gamba grass – declared a weed and is represented by Tim Low on the national hymenachne management group. Gamba grass and hymenachne are declared weeds across northern Australia but perennial mission grass is declared only in the Northern Territory and the other two not at all. One of the actions in the draft TAP is to encourage the state/territory governments to coordinate on declaring these grasses.

The inconsistent and inadequate regulation of such weeds by states/territories is one reason ISC advocates use of existing provisions in the federal EPBC Act to list and regulate invasive species that are a significant threat to biodiversity. The Australian Government can list invasive species as key threatening processes but refuses to use its powers under the Act to regulate them.

Weedy grasses in Northern Australia pose a threat to the endangered Gouldian finch by driving out native grasses that are an important food sources for the finch.

The grasses were each imported into Australia for testing and/or use as pasture grasses. Unfortunately, the qualities sought for pasture grasses – productive, palatable, competitive – are also those that make grasses amongst Australia's worst weeds.

Despite their threats to the environment and other agricultural land uses, three of the grasses are still favoured for pasture. Some pastoralists vehemently opposed the declaration of gamba grass and hymenachne as weeds and will continue to use them. The draft TAP proposes the development of best practice guidelines to minimise the adverse impacts of continued pastoral use.

Other proposed actions include mapping of the grasses, identification of assets for priority protection, ensuring that removal of outlier infestations is included in management plans, and developing guidelines for control.

A TAP does not compel action. Its advantage is to coordinate and prioritise actions across boundaries, promote research, and generally focus attention on the problem. The usual challenge of competing for insufficient public resources will apply. And as usual, the public will be paying while those responsible for the problem will be unaffected – and probably even continue to perpetuate it.

More information

> The draft TAP and background document are available at http://www.environment.gov.au/biodiversity/invasive/weeds/draft-tap.html. They are open for public consultation until 21 November. ISC will make a submission.

DOWN THE RABBIT HOLE

with ISC CEO John DeJose

Why is the environmental impact of invasive species, the 1st, 2nd or 3rd worst threat to biodiversity in Australia, an 'orphan' issue, relying on handouts from here and there, with no central home in either environmental or biosecurity institutions in which it can be lavished with the care and attention warranted? A big part of the answer lies in biosecurity's origins as an agricultural issue.

Australia applies advanced governance arrangements to industry biosecurity, including private/public partnerships with Animal Health Australia and Plant Health Australia. These two corporations connect federal and state governments with various industry associations and carry planning responsibility to protect primary production.

Because there is no such entity to undertake a similar role in respect of the environment, AHA and PHA are also tasked with some environmental tasks, but this doesn't sit easily with their culture and leaves the community out in the cold. The difficulties inherent in assigning environmental protection to agricultural agencies have been recognised for decades. Although a range of efforts have been made to close the gap, our environment is still protected from many invasive threats only by the happenstance that they are also an economic threat.

Thankfully, the need to close the gap on environmental biosecurity is increasingly recognised and the Federal Government is intending to apply to the environment some of what has been developed for industry, including a National Environmental Biosecurity Response Agreement for emergency environmental incursions. But see our lead story on the important differences between environmental biosecurity and industrial biosecurity that warrant institutional arrangements to foster the distinctive approaches to environmental biosecurity needed. It needs a home, not just a bedroom to share.

Federal foment

The past few months have been a busier than usual 'season of submissions'. The effort that ISC has put into legislative review alone is quite staggering for a compact NGO. When compared to the results out the other end, we must simply celebrate whatever small gains have been made and get back to work on the rest.

An over-cautious government is pushing ahead with mystery legislation after resiling from their earlier enthusiasm for comprehensive biosecurity reform and has, finally, presented a lacklustre response to the robust Hawke review of our primary environmental legislation.

Minister Burke has declared himself unwilling to have an independent scientific panel to advise on what he regards as his responsibility in assessing EPBC matters. Why then is he willing to pass the decision-making buck through 'approval bilaterals' to state and territory governments?

On the EPBC Act reform front, of 13 recommendations made by ISC there is partial agreement or hints of it on nine in the government response published in August. As legislation is developed and debated and policies are formulated, there will be considerable work for us to inch towards stronger arrangements for invasive species.

Of concern is that the Minister states that the extent of reform and, by extension, enhancements to invasives responses, will depend upon the extent to which cost recovery can be implemented. It is never easy to convince industry to pay for anything, let alone the regulatory apparatus necessary to protect the environment from negative impacts from their activities. As we have said to the government, we support full cost recovery for those environmental protection activities which service the needs of business but government must fund measures to reverse biodiversity declines as core business. They must also avoid the temptation to 'sell' approvals for destruction in the form of offsets. There are serious flaws in the doctrine of substitutability which underpins many offset proposals (see story page 13).

Public good invasives research

Funding for public good research, including the tools and knowledge essential for management of invasive threats to the environment, also warrants consistent and high budgetary priority. A decision due by year's end will determine whether yet another public good (and also industry-benefiting) CRC will be assigned to the scrap-heap (to join the Weeds and various biodiversity-focused CRCs) or be re-funded for five years. See the article from the Chair of the Invasive Animals CRC on page 4. Supporting the IACRC bid (see page 5) is one way to try to ensure that at least some CRC funding goes to public environmental good.

Armchair psychologising

Don't we all turn into armchair psychologists when we disagree with someone? You're probably familiar with the five stages of grief - denial, anger, bargaining, depression and acceptance. While death and dying are for many the ultimate trauma, people can experience similar emotional upsets when dealing with other of life's challenges so the five stages have been used to model reactions to great change.

In my first year of advocacy on invasive species, I have wondered at the extent to which the five stages could be discerned in common reactions to invasives issues. So here's a lighter look at this serious subject, with apologies to Kübler Ross.

Denial – 'this is not a national problem, so we're not contributing to fixing it', 'it's all the fault of national parks' , 'of course, they won't escape', 'that's not an invasive

continued page 11

ISC elects new president

The October AGM saw Andrew Cox elected as President of the Invasive Species Council, taking over from Geoff Carr.

Andrew comes to ISC with over two decades of experience in the environmental sector, most recently as Executive Officer of National Parks Association of NSW and a one-year stint working with landholders to protect a rainforest clad island in the Solomon Islands.

In 2010, Andrew worked with Carol Booth to prepare ISC's five-year plan and lobbied NSW major political parties for invasive species reform.

Andrew told the AGM that 'ISC is too important not to succeed' in tackling the invasive threat in Australia.

He plans to be an energetic president to take ISC 'to the next level' both in terms of its internal capacity and in changing national laws and policy.

He is keen to draw on leading scientists with a new Scientific Committee and find ways of converting our members' passion for the issue to political action and financial support to help ISC's work.

Support warmly welcomed

We'd like to offer very big thankyous to:

- **The Ian Potter Foundation** a big thank you for a grant to enhance civil society engagement with invasive species threats to biodiversity.
- **The Mullum Trust, The Melbourne Community Foundation** and individual donors for their ongoing financial support.
- **The Garry White Foundation** for Rapid Response funding.
- **Our voluntary policy guru** for advice and support.
- **Geoff Carr, retiring ISC President,** for carrying the torch for so long.
- **Steve Mathews** for strategic planning support.
- **Luke Gadd,** Macquarie Island Pest Eradication Project, for a great presentation at our AGM.

Thumbs up for

- **The South Australian Government** for eradicating the speckled livebearer, see story page 14.
- **The Invasive Animals CRC** for making it through to the final stage of their five-year extension bid.
- **The Wet Tropics Management Authority** for highlighting increasing invasives threats in their recent State of the Wet Tropics Report.

Thumbs down for

The EPBC Act for wasting scarce resources by requiring full due process be applied to the ridiculous application to import more foxes into Australia!

A sign at Nelson Lakes National Park in New Zealand warns about the harm brushtail possums are doing to native vegetation, incuding rare mistletoes.

Tim Low opens biosecurity seminar in New Zealand

As the opening keynote speaker at the New Zealand Biosecurity Seminar held in Auckland in July, ISC spokesperson Tim Low spoke about climate change and invasive species, highlighting the work ISC has done in this area, including production of the Double Trouble ebulletin.

The seminar was run by the New Zealand Biosecurity Institute (NZBI), an organisation whose members include weed control officers, quarantine officers and conservation managers. It has no counterpart in Australia.

One topic of concern discussed at the conference was kauri dieback. The magnificent kauri pines in the north of New Zealand are dying from infection by an undescribed species of Phytophthora. It is thought this pathogen was introduced to New Zealand when foreign kauri species were imported for forestry trials.

After the seminar Tim travelled to Nelson Lakes National Park, where honeydew produced by sapsucking bugs on beech trees supports large populations of sugar-feeding birds, including tuis, bellbirds, kakas and silveryes. The viability of the honeydew system is seriously threatened by European wasps (Vespula vulgaris) that harvest the honeydew at such high levels that bird numbers decline. The beech forest around Nelson Lakes is baited to kill wasps, and lines of traps are set to control stoats, rats and other mammalian predators.

In New Zealand, viable populations of forest birds are only found on predator-free islands, or in mainland forests that are fenced or baited to remove mammalian predators.

LAW & POLICY ROUNDUP

On the federal front

- In August, the Government made a formal response to the recommendations of the Hawke review of the EPBC Act and amendments to the Act will be introduced to Parliament within the next few months. See http://www.environment.gov.au/epbc/publications/epbc-review-govt-response.html for the response.
- An EPBC Environmental Offsets Policy is under development – see draft policy at http://www.environment.gov.au/epbc/publications/consultation-draft-environmental-offsets-policy.html, story on page 13 and the submissions page on the ISC website – www.invasives.org.au.
- The Department of Sustainability, Environment, Water, Population and Communities released a consultation paper on potential cost recovery mechanisms under the EPBC Act. The Government says the scope of EPBC reforms is dependent upon cost recovery. See http://www.environment.gov.au/epbc/publications/pubs/consultation-draft-cost-recovery.pdf
- The Productivity Commission is seeking views on regulatory and policy barriers to effective climate change adaptation- see http://www.pc.gov.au/projects/inquiry/climate-change-adaptation, with submissions due 16 December. ISC will make a submission, focusing on the impediments to invasive species management that limit adaptation potential in the natural environment.
- Biosecurity legislation is under development and an Exposure Draft will be introduced to Parliament early next year. The Government has moved away from its preliminary 'in principle' agreement to all 84 recommendations.
- An Intergovernmental Agreement on Biosecurity (IGAB), negotiated by the Federal and State/Territory Governments, is nearing finalisation.
- The National Environmental Biosecurity Response Agreement (NEBRA) is nearing finalisation. It will apply to emergency 'biosecurity incidents that primarily impact the environment and/or social amenity where a national response is for the public good'.
- A draft threat abatement plan for five exotic grasses invasive in northern Australia has been released for public comment – see http://www.environment.gov.au/biodiversity/invasive/weeds/draft-tap.html and story page 9.
- The Federal Government has released a draft Australian Government Biodiversity Policy – see http://environment.gov.au/epbc/publications/consultation-draft-biodiversity-policy.html.
- The Australian Pesticides and Veterinary Medicines Authority has suspended the use of the pesticide dimethoate on a number of food crops, following a risk assessment which found that its use on many crops could exceed the recommended public health standard – see http://www.apvma.gov.au/products/review/current/dimethoate.php.

In the states and territories

- The Biosecurity Bill 2011 was introduced to the Queensland Parliament on 25 October – see http://www.parliament.qld.gov.au/en/work-of-assembly/bills-and-legislation/current-bills-register. The Bill combines seven previous Acts into one.
- Biosecurity South Australia is inviting public comment on a review of policies on weeds declared under the Natural Resources Management (NRM) Act, with the first batch of revised policies available for comment at www.nrm.sa.gov.au/GetInvolved/PlantDeclarationReview.aspx. This is the first comprehensive review of regulated weed species since 1991.
- Western Australia's Cat Bill 2011 – intended to provide for control and management of cats, and promote responsible ownership – has been passed. The law will require pet cats to be registered, microchipped and sterilised by 6 months of age. See http://www.parliament.wa.gov.au/web/newwebparl.nsf/iframewebpages/Bills+-+Current. The relationship between domestic moggies and feral cats is somewhat elastic, however any recruitment to feral populations is unwanted as are the mainly urban and peri-urban depredations of un-owned cats.
- After seeking consultation on a proposal to change conditions for the keeping of various exotic vertebrate species in line with risk assessments, the NSW Government has decided to delay until 2012 to develop a new Non-indigenous Animals Regulation. See http://www.dpi.nsw.gov.au/aboutus/about/legislation-acts/review/non-indigenous-animals-regulation for information about the proposed changes and the ISC submission on our website. Various groups wanting to keep, breed and sell exotic species assessed as a high invasion risk are lobbying to have the proposals watered down.
- On 1 October the Victorian Government initiated its $4 million bounty program for wild dogs and foxes – see http://dpi.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals/fox-wild-dog-bounty. The science says that bounties don't work, and ISC has been critical of the program as a waste of scarce public funding for invasive species control, see story Feral Herald issue 27.

Down the rabbit hole ...

from page 8

species, it's heritage', 'that's not an invasive species, its Bambi', 'what difference does it make, they're all green'.

Anger – 'those extremist greenies', 'what I do on my own property is my business', 'polluters must pay', 'more red tape? all I want to do is import a few pet fish!', 'we hate ferals'.

Bargaining – not a direct correlation as in bargaining with a deity for more time, but, in reference to the need to protect the environment from invasives, 'let this be shown in our mission and annual report but, please keep it away from our budget' or 'let us ignore this, as no one really expects us to be able to do anything about it (see depression)'.

Depression – 'the list is endless', 'invasives are a 'black hole' for money', 'nothing can be done', 'eradication is not feasible', 'it's too late', 'public expectations exceed resources'.

Acceptance – 'learning to live with (insert name of species here)', 'we're just buying time', 'they're already here, let's worry about preventing others getting in', 'there's nothing we can do'

Psychologists advise there is variability in the order in which these stages manifest and in the speed with which they are 'worked through'. Treatment might be considered if the subject becomes 'stuck' in a stage.

If you get so frustrated hearing these common sentiments that you really want to annoy that human impediment to better invasives action, you could alert them to your diagnosis and the potential for treatment. Better yet, just imagine doing so as an emotional 'relief valve' and heap on the goodwill and cooperation.

Paradigm shift

Paradigm shift is not incremental but huge perturbation from outside the system, like a war, can galvanise the collective will. Today, even an elephant in the room can't force systemic change; the 'business as usual' paradigm is too robust. The war elephants of evidence are massed at the gate, heaving bodies steaming in the pre-dawn chill. Sentries have sounded the alarm yet the castle still sleeps.

Fifty years ago, a climate change elephant was born. After half a century of denial that the climate change elephant was the cause of increasing havoc in the land, the winds of change are stirring in the castle.

Right now, the biodiversity elephant is going ballistic, all its indicators sharply in decline. An army of bureaucrats can't keep the damn thing quiet. We don't have another half century to fiddle about on invasives.

Independent audit vital for EPBC offsets policy

The Federal Government is developing a new offsets policy under the Environment Protection and Biodiversity Conservation Act 1999. ISC has participated in meetings with Environment Minister Tony Burke about the policy and recently made a submission in response to a draft policy.

Against the backdrop of escalating biodiversity loss and environmental degradation with unceasing pressure for new destructive developments, offset policies are widely regarded as granting licences for destruction. There is no evidence yet they have functioned in Australia as intended, to compensate for residual impacts of approved developments on threatened species and ecological communities once every effort is made to avoid and mitigate impacts.

The Invasive Species Council shares the concerns of most other environmental NGOs that offset policies in Australia are misapplied to justify biodiversity losses that should not be permitted. If the proposed EPBC Act offsets policy is to gain community support it is vital that the effectiveness of existing offsets is independently audited, that approved offsets are genuinely compensatory as assessed by independent experts, and that outcomes are independently monitored and enforced.

The Invasive Species Council has made several recommendations in a submission about how to improve the potential of the policy to protect biodiversity, including by addressing invasive species threats.

Critics of offset policies have highlighted the flawed logic underpinning many offsets: that biodiversity destroyed or damaged by development is replaceable, portable, compressable or tradeable. Bedward and colleagues (2009) describe it as the assumption that 'biodiversity can be destroyed in one location and recreated in other, more convenient locations, to suit our preferred land-uses.' Burgin (2008) highlights the flaw of offsetting relic habitats or endangered species when the very reason for their endangerment is previous removal or fragmentation.

The offsets policy must make very clear what counts as genuine compensation. Protecting threatened species and ecological communities from invasive species could genuinely compensate if such control would not otherwise occur (if not required by law or under duty of care obligations), is enduring and recovers threatened populations or communities to an extent that exceeds that destroyed. In contrast to restoration offsets, outcomes from invasive species control can be achieved within a short timeframe. While restoration of threatened habitats is essential for conservation, its lack of proven effectiveness for recovery of many biodiversity values and the long time lag before biodiversity benefits are realised limit its potential for genuine offsets.

The draft offsets policy proposes allowing up to 25 per cent of offsets to provide indirect compensation measures that 'improve our knowledge, understanding and management of environmental values'. These are higher-risk offsets because they do not guarantee a compensatory outcome but they could also return greater and broader conservation benefits.

As invasive species threats are one of the major causes of biodiversity decline and mostly poorly managed, indirect offsets may productively be focused on reducing their impacts: eg. contributing to a large-scale eradication program that benefits multiple species, or funding research on more effective control measures for affected biodiversity. We consider it vital that any such proposals be assessed by independent experts.

Such assessment would have been an appropriate function for the Environment Commission proposed by the Hawke review of the EPBC Act, but rejected by the Government. Instead, we have recommended that an independent scientific panel be established, the costs for which are built into offset agreements.

It is important to account for time lags between destruction of biodiversity and compensation derived from an offset. Proponents are in effect gaining biodiversity on credit – destroy now and compensate later. When compensation is an option, it should be delivered before destruction is permitted to occur (a 'savings' analogy is more appropriate for biodiversity). However, because there is a large gap between what should occur and what will occur, we submitted that the offsets policy should adopt an approach to time lags that restricts the time permitted between destruction and compensation to what can be justified as a 'conservation timeframe', ie a timeframe specific to the species or ecological community within which compensatory benefits need to be achieved to avoid compromising their viability – again, a matter for expert assessment. Offset options involving the control of invasive species have the advantage that they can be achieved within a relatively short time (although control typically has to be ongoing to maintain the benefit).

One of the major criticisms of offset regimes has been a lack of enforcement. The extent of compliance in Australian offset schemes is unknown due to a lack of publicly available auditing and reporting.

In North America, where there has been a long history of requiring wetland creation as compensation for wetland destruction, there is evidence of extensive non-compliance; in Massachusetts, for example, 54% were non-compliant including 21.9% where there had been no attempt to construct the wetlands required as offsets (Brown and Veneman 2001).

Independent monitoring is essential to assess whether offset goals and milestones are achieved, sanctions should be applied for non-compliance and regular audits conducted. Compliance for invasive species offsets would need to focus on achievement of population recovery of the threatened biodiversity not on numbers of invasive species controlled.

Visit the Invasive Species Council website for our submission.

References

Bedward M, Ellis M, Simpson C. (2009) Simple modelling to assess if offsets schemes can prevent biodiversity loss, using examples from Australian woodlands. Biological Conservation 142: 2732–2742.

Brown S, Veneman L. (2001) Effectiveness of compensatory wetland mitigation in Massachusetts, USA. Wetlands 21:508–518.

Burgin S. (2008) BioBanking: an environmental scientist's view of the role of biodiversity banking offsets in conservation. Biodiversity and Conservation 17:807–816.

WA alarmed at cactus discovery

Jodie Gysen
Department of Agriculture & Food, WA

Department of Agriculture and Food Biosecurity Officers in Western Australia are warning the public to think twice when they next see a cactus patch, due to a spate of reported cacti never before found in that state.

Three separate infestations, initially thought to be the common prickly pear, turned out to be *Opuntia puberula*, *Opuntia polyacantha* and *Opuntia microdasys*. These cacti are of course exotic to Western Australia, and in fact are part of the *Opuntioid* (Opuntia and Cylindropuntia) group of cacti recently nominated for inclusion in Australia's Weeds of National Significance list.

Chair of the Australian Invasive Cacti Network, Mike Chuk, who this year met with DAFWA to discuss the threat of invasive cacti, says cacti are one of the greatest threats to the rangelands.

"Cacti are very hardy, can be difficult to find and are expensive to control. Finding and eradicating infestations before they spread is critical," he said.

On his visit to Western Australia, Mike travelled through regional areas, during which time he came across not only a number of established *Optunia* infestations, but also *Cylindropuntias* – many of which had spread over several kilometres. In remote rangeland areas where there are few visitors, such cacti can spread relatively unnoticed.

In relation to the recent *Optunia* finds, it was a DAFWA biosecurity officer who first raised the alarm. While out looking for locusts in the Dalwallinu area, she instead found a large cactus infestation at an abandoned homestead. Abandoned gardens make an ideal home for cacti, where they can survive without water. In fact, some infestations can be huge, and even downright scary!

This huge infestation of *Opuntia puberula* at an abandoned homestead in Western Australia demonstrates the need for improved awareness of invasive cacti, and the need for quick action to prevent further spread.

The Dalwallinu find was confirmed by cactus expert from South Australia, Bob Chinnock, who also coincidentally made a recent visit to Western Australia. Bob was given the grand cactus tour of the area, during which he spotted the second exotic infestation, on the drive back to Wongan Hills.

And with word about these cactus encounters spreading, the third find was reported by another DAFWA biosecurity officer, this time further south east in Nungarin. This find demonstrates the benefits of greater cactus awareness, and the value of DAFWA's surveillance activities throughout Western Australia.

DAFWA is taking this opportunity to urge greater vigilance, particularly by landholders and travellers. The next time you see a cactus infestation, take the time to inspect, identify and if necessary report any suspect finds. It is important that landholders seek advice on proper control methods, as even the tiniest piece can establish itself and continue to grow.

More information

> Further information and descriptions of cacti can be found on the North West Weeds website. A national website www.aicn.org.au should also be live before the end of the year.

> Any suspect cactus finds should be reported to the Pest and Disease hotline on 1800 084 881.

> For more information on identification and control options, contact Australian Invasive Cacti Network Chair Mike Chuk on (07) 4658 600 or 0427 427 695.

Aquarium fish eradicated from SA creek

The South Australian Government has succeeded in eradicating an escaped predatory aquarium fish the speckled livebearer (*Phalloceros caudimaculatus*) from Willunga Creek, south of Adelaide. It is suspected that the fish was dumped by a home aquarium owner.

The two-year program involved killing more than 200,000 of the fish along a 4km stretch with a toxin that is produced by many tropical plants. There were no native fish in the creek, which may have been due to the invader.

This species was also eradicated in NSW in 2006 from ponds in a golf course, where they were probably also dumped by a home aquarium owner. It has been recorded in other waterbodies in Western Australia and the Northern Territory.

Closely related to the mosquito fish (*Gambusia holbrooki*) and with a similar biology, the speckled livebearer is also likely to be just as invasive, according to fish biologists Jodi Rowley and colleagues.

Importation was banned in 1998 but it is still lawful in many states to keep this species. As Rowley and co-authors state, 'To the extent that *P. caudimaculatus* is maintained in captivity by aquarists there is a risk that it will be released, deliberately or inadvertently, into the wild.'

More information

> Rowley J, Rayner T, Pyke G. (2005) New records and invasive potential of the poeciliid fish Phalloceros caudimaculatus. New Zealand Journal of Marine and Freshwater Research 39: 1013–1022.

> http://www.pir.sa.gov.au/pirsa/media_list/biosecurity/aquatics/natives_return_home_after_200,000_pest_fish_eradicated

> http://www.dpi.nsw.gov.au/fisheries/pests-diseases/freshwater-pests/species/speckled-mosquitofish

Managing exotic fish invasions in Australia

Forty-four exotic fish species have established in Australian waterways, making up 13% of our total fish fauna. Of 300 native species, 76 have been shifted outside their natural range (not all have established), as have five native crayfish species.

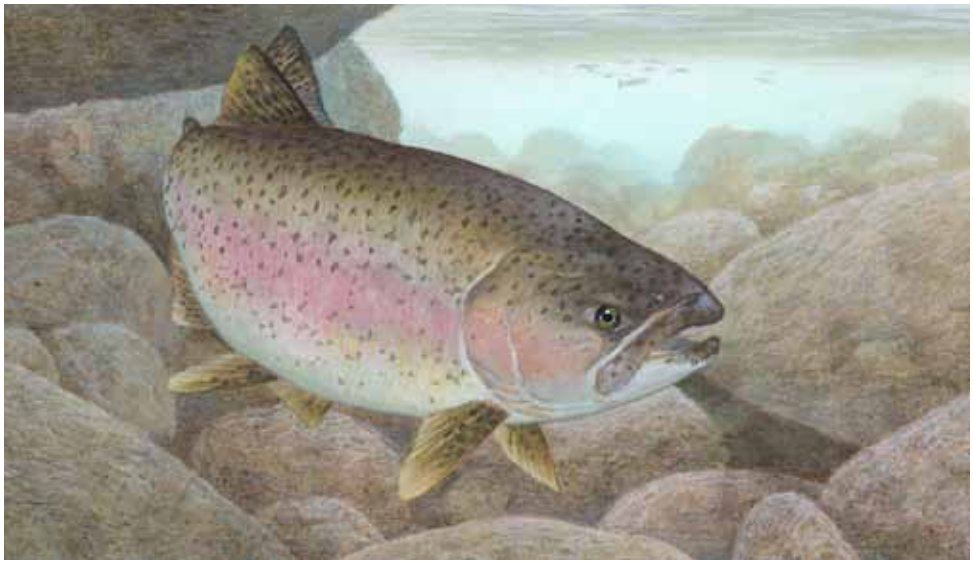
A recent report 'Management of freshwater fish incursions' by Renae Ayres and Pam Clunie published by the Invasive Animals CRC provides an excellent overview of approaches to one of Australia's most challenging and ignored environmental problems.

Globally, invasions ('biotic exchanges') are 'predicted to be the leading driver of global biodiversity change in freshwater ecosystems'. More than 600 species have been shifted into new areas. Australia has been identified as one of six global hotspots for freshwater fish invasions.

Freshwater fish invasions undermine the '10s rule' – which predicts that about 10% of introduced species become established and about 10% of these become pests – with about 50% of introductions leading to establishment and a substantial proportion of these becoming invasive (in North America 49% established, and 63% of those became invasive).

The majority of Australian introductions (77 per cent) have been ornamental fish (34 species). Eight species were introduced for recreational fishing, for aquaculture (globally, aquaculture accounts for more than half of introductions), for biocontrol and via ballast water. Most of the 76 native species translocations have occurred in the Murray–Darling Basin, most due to stocking programs.

The earliest introductions, mainly of sport species, occurred due to acclimatisation programs. From the 1920s, eastern gambusia was introduced for mosquito control. Recent introductions have mostly been via the aquarium and ornamental fish trade. This trade is valued at about $350 million a year and more than 30 million ornamental fish are sold annually through retailers. In the past 40 years, 1181 exotic ornamental fish species have been recorded in Australia despite only 481 of these being approved for importation. Introductions into the natural environment are thought to mostly occur when aquarium keepers dispose of unwanted fish.



Rainbow trout *Oncorhynchus mykiss* are just one of five exotic fish species in Australia listed among the world's worst invasive fish species.

The impacts of invasive exotic species, inadequately studied, are of the following types: competition for food, competition for habitat, predation, spatial exclusion, aggressive behaviour, for example fin nipping and sexual harassment, transmission of diseases and parasites, alteration and degradation of aquatic habitat, and reduction of genetic integrity.

'The complexity of interactions between characteristics of the alien species and the recipient environment at any given time makes it extremely difficult to predict the likelihood of a species establishing or an environment being vulnerable to an alien species incursion.'

In a global review of exotic fish management, Ayers and Clunie conclude that New Zealand has the most advanced approaches to new incursions of exotic freshwater fish. In contrast to Australia's mishmash of agencies and policies, a single government agency or coordinated group has lead responsibility for responding to all vertebrate, invertebrate, disease, flora and fauna incursions in terrestrial and aquatic systems, there is a generic response plan for freshwater fish incursions, and response actions are developed considering advice from an expert committee.

The deficiencies in Australian management they identify include:

- Inconsistent and poorly defined terminology, inconsistent classification and legislation.
- Emergency responses are mostly dealt with by states and territories on an ad hoc basis.
- No national rapid response procedure addressing freshwater fish incursions.
- Lack of surveillance programs.
- No national community education program to address the poor level of public awareness.
- No national reporting system for fish incursions.
- No universal risk assessment or decision support procedure.

Ayers and Clunie have compiled data about eradication and control attempts in Australia, noting 'Eradication has been achieved in few situations, highlighting the difficulty of eliminating alien freshwater fish species once they are introduced and the importance of prevention.'

ISC commends the authors of this report for clearly laying out reforms needed in Australia. There is need for strong community voices to promote reforms in freshwater fish management. ISC has long recognised this as a priority area for environmental campaigning but lacked resources to take it on.

Reference

> Ayres R and Clunie P. (2010) Management of freshwater fish incursions: a review. PestSmart Toolkit publication, Invasive Animals Cooperative Research Centre, Canberra, Australia.

How risky is climate change translocation?

Tim Low
ISC Project Officer

Debate about translocation as a response to climate change is heating up, with three CSIRO scientists recently comparing it to the disastrous acclimatisation practises of the 19th century. In a recent article in the journal Trends in Ecology and Evolution, Bruce Webber and two colleagues argue that translocation is not the low risk activity it is sometimes made out to be:

> *While we agree that translocation of threatened species has a place in climate change adaptation, we disagree that translocating short-range endemics to endemism 'cold-spots' beyond their projected future 'native' range is a viable low-risk strategy for conservation management; such translocations are nothing short of planned invasions. We are compelled to point out that society is still paying the price for our 19th century adventure with planned invasions, in which Acclimatization Societies attempted to make far-flung regions of the British Empire resemble a British wildlife park. We believe that it is essential to avoid the implementation of ad hoc translocation schemes to the most expedient locations.*

They wrote in response to a recent article embracing translocation by Chris Thomas of the University of York. Thomas was the lead author of the most famously pessimistic paper yet produced about projected climate change extinctions, one that attracted much criticism for its methodology and conclusions, and he recently wrote an article advocating widespread translocation.

Webber and colleagues accuse Thomas of underestimating the capacity for survival under climate change, and of overestimating the likelihood of resilience rather than extinction in the face of planned invasions.

> *The single-species translocations that Thomas contemplates are only likely to be viable for generalist species not reliant on prey or mutualists, yet the biocontrol literature tells us once again that these are exactly the species that raise the greatest spectre of severe non-target impacts in the recipient location.*

Its flowers may be beautiful but in Britain *Rhododendrum ponticum* has been known to transform diverse habitats into monocultures. Photo: 'First Light', reproduced here under CC-BY-SA-3.0 licence

Rhododendrum ponticum is despised in the British Isles and an excellent example of why translocation carries many inherent risks. Photos: copyright www.countrysideinfo.co.uk

In the face of future uncertainties, Webber and co-authors argue that translocation will increase rather than decrease the uncertainty of management outcomes, then propose ex situ conservation as the less risky option for species threatened by climate change.

Thomas demonstrates so little understanding of invasive species that he highlights the example of *Rhododendrum ponticum*, a colourful garden plant from Spain that now thrives in the wild in Britain. Had this plant been an early human introduction to Britain it would, he says, be regarded today as one of the 'flowering glories' of the British Isles.

But this plant is despised in Britain for reducing diverse habitats to monocultures. Here is the website of the Offwell Woodland & Wildlife Trust:

> *The plant is responsible for the destruction of many native habitats and the abandonment of land throughout the British Isles… It will grow to many times the height of a person, allowing very little light to penetrate through its thick leaf canopy. This effectively eliminates other competing native plant species which are unable to grow due to insufficient light. This in turn leads to the consequent loss of the associated native animals.*

Rhododendrum ponticum shows exactly

Invasive species and climate change in the Alps

Water from the Australian Alps provides about 29% of the flow into the Murray Darling Basin, but this supply, worth $4 billion to the Australian economy, is at risk from the combined impacts of climate change and feral animals, a new report has found.

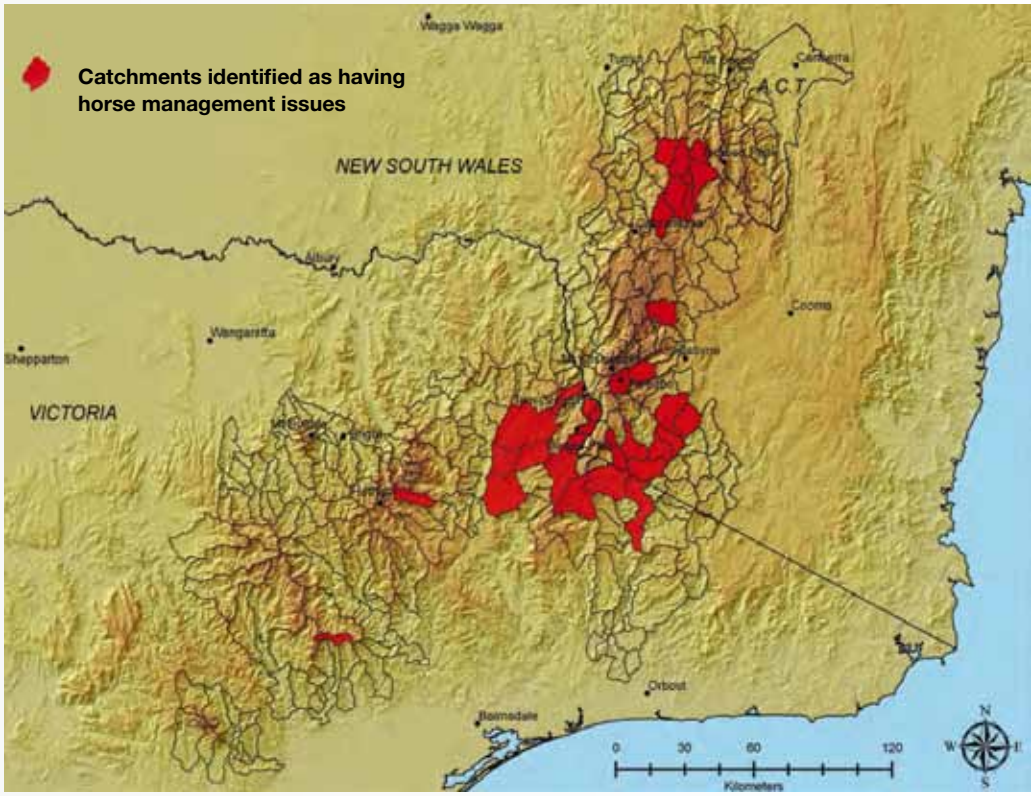
'Caring for our Australian Alps Catchments' by Graeme Worboys and Roger Good warns that more severe storm events and intense rainfall on slopes denuded by fire, feral horses, pigs and deer are likely to cause severe soil erosion and 'catastrophic flood run-off' that reduces water quality and regularity of flow.

The report, commissioned by the Australian Alps Liaison Committee and the Department of Climate Change and Energy Efficiency, voices strong concerns about growing numbers of horses and deer.

Feral horse numbers reportedly increased in the Alps by 300% from 2003 to 2009, and are predicted to increase by a further 55% by 2012. They 'contribute to erosion and pollution of the very highest catchments by grazing, trampling and by causing incision to mountain wetlands and streams.'

The report is one of many in recent years to warn about Australia's rapidly increasing deer populations:

> *Introduced deer have expanded across the Alps catchments. Their relatively recent rapid growth in numbers and expansion of range is of concern. These non-native pest animals have been recognised as a serious problem in New Zealand and studies there have demonstrated they have impacts on the natural condition of catchments (Husher and Frampton 2005). The rapid growth in numbers in the Australian Alps can be expected to impact habitats, ecosystem function, soil erosion and water quality. The impacts of climate change and increased deer numbers are likely to increase non-natural erosion.*



Source: NSW DECCW 2010

The report concludes that control of feral horses and deer is an important issue for park managers.

Various weeds are also mentioned in the report as impacting upon biodiversity and water flows, notably willows blackberry, broom and hawkweed (*Hieracium* spp).

More information

> The report can be downloaded from www.climatechange.gov.au/publications/water/australian-alps.aspx

why translocation is risky, and by using it as his example, along with rabbits, Thomas displays a poor grasp of the issues.

Another recent article reviews the burgeoning scientific literature on translocation (also called 'assisted migration'). Without taking any position for or against, Nina Hewitt of York University, Toronto, and eight colleagues conclude that the various risks and benefits are difficult to reconcile. The main risk is that of creating new invasive species problems, in what would generally be irreversible experiments.

Noting a sharp increase in the number of academic articles about the topic since 2007, Hewitt and colleagues make the following observation:

> *The fact that a majority of articles (30/50) generally support [assisted migration] as a climate change adaptation strategy should not be taken as evidence of a growing scholarly consensus. On the contrary, the debate is intensifying. All the articles that we classified as highly sceptical or positively opposed to [assisted migration] were published after 2007.*

This trend matches one that is evident in other areas of climate change biology with, as an example, early enthusiasm for species distribution modelling giving way to increasingly complex analysis of its strengths and major limitations.

What is obvious to invasion biologists is that those who advocate the transfer of species to new regions, be they horticulturists, fish stockers, agronomists or others, usually play down the risks involved. The recent articles on translocation include examples of biologists understating these risks. This said, translocation almost certainly has a role to play in future conservation.

The transfer of endangered mammals to predator-free islands has assisted their conservation in Australia without causing serious problems, although in New Zealand similar transfers of endangered birds have put rare invertebrates at risk. What is vital is that invasion biologists, who understand the risks, play a key role in analysis of translocation proposals. Their input should be sought whenever guidelines are developed.

More information

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Always on the hunt, with a springtail in her step

When people ask me what I do, some look at me strangely and quickly move away; others say, what good is that? Just a few want to know more about the tiny creatures living in the soil that I have spent 50 years studying. In response to the why question, I say I love Springtails because they are cute and many are beautiful. More seriously, they play an invaluable role in decomposition, enhancing soil fertility. Moreover, Springtails are abundant and species rich, so are commonly used in environmental assessments.

Of relevance to Feral Herald readers is that of the 2000 or so species in Australia, of which only 20% are named, over 60 are introduced, mainly from Europe. These 60 mainly colonise gardens, pastures and other agricultural habitats, as well as native vegetation that has been disturbed by human activities. This means that Springtails can provide a warning of native habitat deterioration before it is visually obvious (Greenslade 2007).

Collembola, known commonly as Springtails because they have a long two-forked springing organ on their underside, are arthropods (they are not insects although closely related to them). They have soft bodies (lacking the exoskeleton of insects), a head with antennae and eyes, and range from 0.5 to 6 mm in length. They live, not only in soil and leaf litter of all kinds, but also between tides on beaches, in caves, up trees and on mountain tops, in cold and hot, dry and wet environments. Densities can be up to 30,000 within a square metre on favourable sites (Greenslade 1991).

My interest in and affection for these creatures began when I was living in the then British Solomon Islands, where I was introduced to them by a visiting specialist from the London Natural History Museum. Together we surveyed the island chain at a time when the forests were relatively pristine and not subject to clear felling by overseas logging companies.

Since then, my hunt for Springtails has taken me to many other places. Deep in the rainforests of northern Burma I taught local forestry workers how to trap and identify Springtails; in Indonesia I worked with local entomologists to collect on Sulawesi and write a handbook on the country's fauna for use by quarantine officers and forest managers; and in South Africa, I helped a local student with his PhD on Collembola from subantarctic Marion Island.

However, I have mostly focused on the Australian fauna, in particular on investigating the impacts of pesticides, forestry and agricultural management practices, restoration efforts and climate change. I have been particularly interested in the introduction and spread of exotic species, of late in the subantarctic and Antarctic zones. One of Australia's two subantarctic islands, Heard Island, has no recorded exotic species but it is isolated and rarely visited. The other, Macquarie Island (a territory of Tasmania), was inhabited by sealers in the past and, more recently, scientists and meteorological officers, and is visited by summer tourists. In 1986, I recorded 30 Collembola species there, of which ten were exotic. Half the exotic species were only in greenhouses, brought in on so-called sterilised peat

Frontline stories: passionate people protecting Australia from invasions

When you think 'invasive species', exotic Springtails probably do not spring to mind. In our third Frontline story, zoologist Penelope Greenslade explains why invasive Springtails are of concern and what it is about Springtails that have kept her intrigued for 50 years.

Penny is an honorary research fellow at the University of Ballarat and serves on the ISC Board. She is involved in a project to barcode a wide range of Springtail species and prepare an interactive computer key to Australian genera.

Penny Greenslade. Photoe courtesy Chrissie Goldrick/Australian Geographic Images

Acanthanura n. sp from Tasmania.

Acanthanura n. sp. from New South Wales.

Australotomurus n. sp. from Tasmania. Watercolour by Georgina Davis.

Novacerus n. sp.. Watercolour by Georgina Davis.

Katianninae n. gen. n. sp. from South Australia. Watercolour by Georgina Davis.

Paronellides dandenongensis sp. from Tasmania. Watercolour by Georgina Davis.

moss. A few years later the greenhouses were destroyed but not before three of the exotics had spread into soils under native tussock grass (Greenslade 2006, 2010).

No exotic Collembola are known to have colonised continental Antarctica, where 16 native species occur, but occasionally a population is found thriving in hydroponics facilities run at the stations to supply fresh vegetables for station staff. This is despite the installations being tightly controlled and monitored. Collembola seem to be easily transported to hostile regions, probably in cargo.

Tight quarantine controls are also imposed on all visitors to both Australian subantarctic islands. The British subantarctic island, South Georgia, also harbours exotic Collembola, living on weeds around abandoned station buildings. They probably arrived in fresh vegetables brought to the island before quarantine controls were in place (Greenslade and Convey 2011). Using records on invasive Collembola from around the world, we were able to produce a risk assessment for both Heard and South Georgia, indicating which species were most likely to invade next and management options to reduce this risk.

The only island in the maritime Antarctic where exotic species have been recorded is Deception Island, the most visited of the South Shetland Islands. It consists of an extinct caldera and there is sporadic volcanic activity. Warm fumaroles on beaches and in organic matter in the form of dead whales, seals and birds provide suitable habitats for several introduced Springtail species.

There are several reasons why the presence of exotic species matters. Macquarie Island is a World Heritage Area, mainly for its geological formations, but this designation requires that the integrity of the whole island is maintained. Similarly, the Antarctic Treaty dictates that no exotic species should be taken into the Antarctic and, if found, they should be destroyed. This is easier said than done with Collembola. Of course, the pristine environment of Antarctica should be maintained not only because of legal requirements, but also for scientific, aesthetic, cultural, social and ethical reasons.

Nearer home, islands, of which Australia has over 8000, tend to carry faunas that have a high level of endemism, particularly oceanic islands of complex topography such as Lord Howe Island. I have recently been involved in a monitoring programme on Barrow Island, a class A nature reserve, where a major development is taking place to process liquid natural gas from an off-shore gas field. Pre-, during and post-development environmental surveys are required and strict quarantine is enforced. So far, few exotic species have been detected but recently there was a new record of an exotic Collembola in an imported timber stack despite preshipment fumigation and vacuum packing.

There are several examples in Australian native forests of exotic Collembola (from the families the Hypogastruridae and Onychiuridae) competitively excluding native Springtails. One is *Hypogastrura purpurescens*, which has gradually spread

continued next page

from page 19

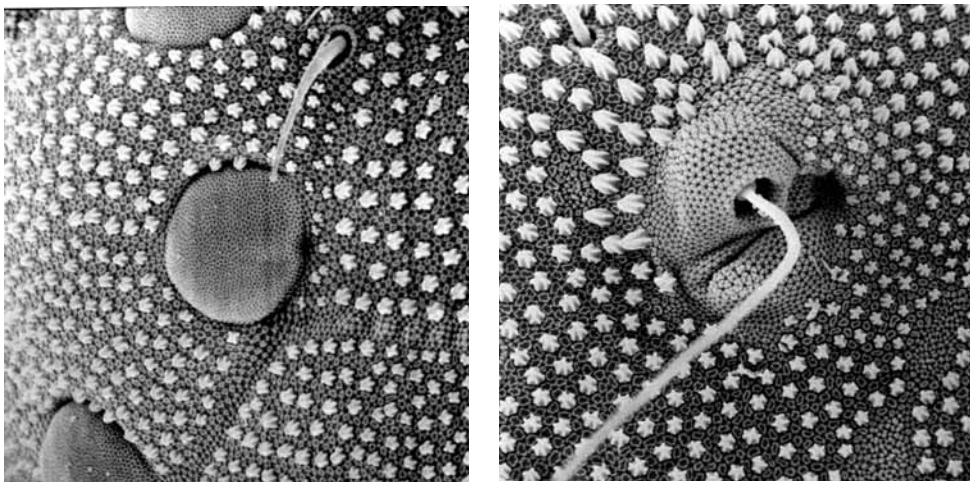
throughout Tasmanian *Nothofagus* rainforests along water courses, on vehicles and maybe also on wind currents. My colleagues and I have shown that another hypogastrurid living on fungal fruit bodies in forests excludes the specialist endemic brachystomellid Collembola from its obligatory feeding on spores. In the warmer forests of northern New South Wales and Norfolk Island, an exotic onychiurid is often dominant. These species almost certainly arrived on plants, in soil and produce in the early days of colonisation. Another example is in supralitoral habitats of South Georgia, where *Hypogastrura viatica* seems to exclude the native *Cryptopygus antarctica*, which is otherwise found in large numbers. The former species is spreading southwards with climate warming, being carried on ships hulls and on floating flotsam and jetsam.

In a comparison of native grass (*Themeda australis*) and improved pasture in northern NSW, exotic Collembola were three times more abundant on exotic grasses in improved pastures than on *Themeda* but native species were ten times as abundant on the native grass. Exotic species numbers also increased with increased intensity of grazing (King et al. 1986).

Exotic hypogastrurids are proving particularly useful in assessing the success of revegetation efforts. An audit of catchments revegetated with a variety of native plants, mainly eucalypts and acacias, found that hypogastrurids were absent from sites carrying native vegetation but common on revegetated sites except where there was an understorey of native poa grasses. Although the native vegetation was healthy and growing well and leaf litter was well developed on the revegetated sites, native Collembola had not been able to colonise. The only planted site with native Collembola was a 30 year old plantation, which was adjacent and downhill from remnant forest. The broader conclusion we draw from the Springtail data is that a local source area for native biodiversity is necessary before degraded sites can be fully restored and contribute substantially to conservation of Australia's fauna (Greenslade et al. in press).

My adventures chasing Springtails have enabled me to roam far and wide, not only having fun but also, I hope, contributing to our knowledge of ecosystem functions and how and why they are changing. In the process, I hope I have been able to feed into improved management for conservation of the Australian region's environments.

An exotic species, *Hypogastrura* sp. cf vernalis, floating on water. Photo: John Green



Scanning electron microscope image of *Adelphoderia regina* from Victoria, ocelli and a seta inserted in cuticle (left), an abdominal trichobothrium inserted in cuticle (right). Images: Colin Beaton

An exotic species, *Onychiurus* fimetarius-group. Photo: flickr.com/photos/selago

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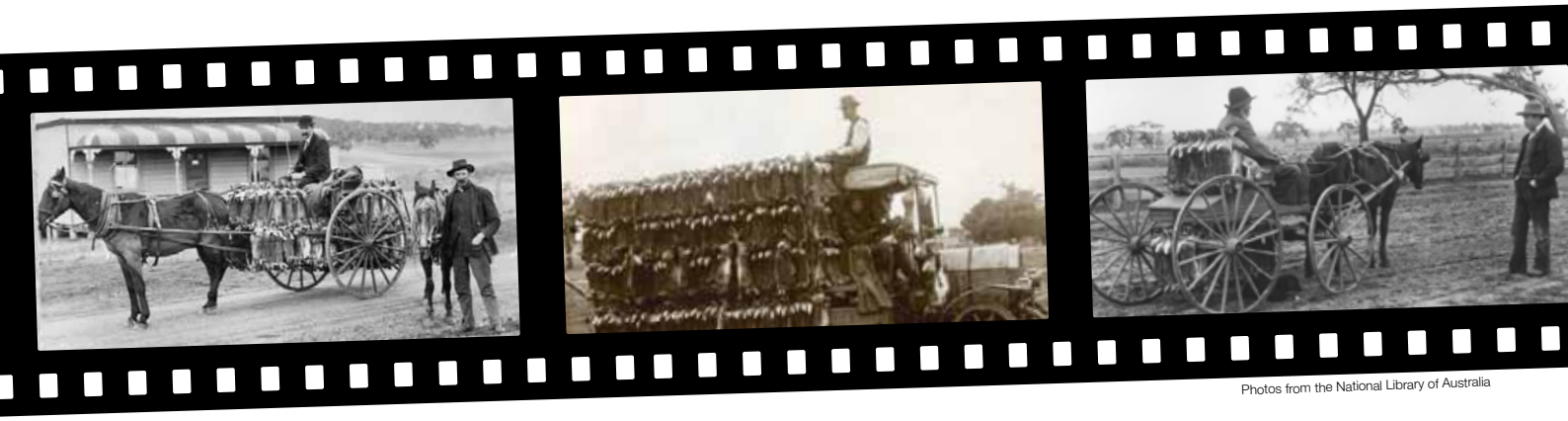

Photos from the National Library of Australia

Bunny bounty boondoggle

LOOKING BACK

Pealing back the history of invasive species in Australia

The history of invasive species is entwined with that of the humans who introduced them into new lands, cultivated them or battled to contain them. In our Looking Back segment, we feature voices from the past about invasive species or issues of current concern – for what they reveal about what has and has not changed.

Here is a story from The Mercury, 16 March 1917, about conflict between graziers and trappers over rabbits.

What has changed? There is stronger consensus about the need for rabbit control; feral animal trappers are not considered at risk of moral deterioration.

What hasn't changed? Rabbits cause serious damage; people who make money out of invasive species typically want to keep them in the landscape; hunting and bounties are ineffective.

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It is nothing new to have discussion on rabbits, nor to have much variance of opinion about them. Year ago they were looked upon as an unmitigated nuisance, a pest for the eradication of which enormous amounts of money might justifiably and usefully be spent.

There was a time when in New South Wales and Victoria, especially the former, pastoralists paid away hundreds of thousands of pounds in bonuses to hunters, who received payment for scalps.

Tho bodies, including the skins, were left to rot, except for an occasional few which might be used for food. After a very fair trial of this method, the pastoralists gave it up. They found that all their expenditure failed to keep the rabbits from increasing cut of all bounds, and, indeed, that the trappers encouraged the increase by liberating does.

There carne a period of wire netting, poisoning, end fumigating and digging up the burrows where the country lent itself-to that method. This was expensive, but effective, and many districts which had been almost abandoned as runs for stock came again into profitable use. But a later development came with the recognition that the rabbits had a market value for food and for manufacturing.

The export of frozen and tinned rabbits to England became a large and important industry, and large refrigerating works were established, where, they were received and prepared for the market.

About the same time the skins came into extensive use for hat-making and other purposes. The trappers no longer looked to the pastoralists for bonuses, but were glad to obtain the right to trap on good runs, and even in some cases paid for the privilege. In this way the rabbit has become a money maker, and a large population is employed, many of the trappers making high wages during the season.

It may easily be supposed that these people are very much averse to the use of poison and efforts have been made, notably in Tasmania, to obtain legislation to forbid it. This suggestion is now being made quite seriously, in view of the shortage of food in the United Kingdom and the Prime Minister has a decided leaning towards its adoption.

In all this, the rights and interests of the landholders are ignored. The interests of the trappers are against the extermination of rabbits, and they use some careful discrimination in their methods.

Notwithstanding the millions which come into the market each year, there is no diminution of the number, except in those districts where poisoning and other methods of extermination are used systematically.

The landholders have even to fight the trappers, some of whom will not hesitate to kick holes in rabbit proof fences to stock up good paddocks which have been cleared.

Quite evidently, from the point of view of the landholder, the rabbit is not a source of wealth, but a detriment and a hindrance to the use of the land for pasture and agriculture.

If, then, poisoning is to be discountenanced, or even forbidden, it must be shown that rabbits are more profitable to the nation, if not to the pastoralists, than sheep.

An estimate has been made, which may not be accurate, that thirteen to twenty rabbits eat as much grass as one sheep. It is acknowledged, at any rate, that the prevalence of rabbits diminishes the sheep capacity of paddocks, and the thing then resolves itself into a comparison of values.

It is said that with a shortage of meat, no restrictions should be placed on the gathering of a cheap food like rabbits. But the answer is that the existence of rabbits is one of the causes of the dearness of meat. The food and clothing value of one sheep is very much greater than that of the number of rabbits which take its place and eat its food, and therefore the proposal to farm rabbits at the expense of sheep is one which must entail loss, not only to stockowners, but to the community, whose capital wealth is diminished according as rabbits replace more profitable stock.

There are other reasons which may be urged and, in particular, the training of so many boys and youths to the business of trapping, with its consequences of moral deterioration, instead of to some more settled and useful avocation. It is certainly better to sell the rabbit than to allow them to run unchecked, but if their extermination were possible it would add millions to the capital wealth of Australia.

Australia, a continent under threat

Australia has the worst mammal extinction record in the world, due mainly to invasive species.

With Eucalyptus rust now invading along the eastern seaboard, Asian honeybees in Queensland and ongoing pest, weed and disease spread, invasive threats are growing. For more effective protection, Australia needs a strong community voice.

The Invasive Species Council is the main conservation group pressuring governments to do more about weeds, pests and diseases that threaten the nature of Australia.

Help make us stronger. With your donation we can do more.

– Tim Low, a founder of the Invasive Species Council

Tim Low on Australia's Macquarie Island, a World Heritage site now overrun by rabbits.

Yes, I want to help protect Australia's native plants and animals from weed, pest and disease invasions.

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