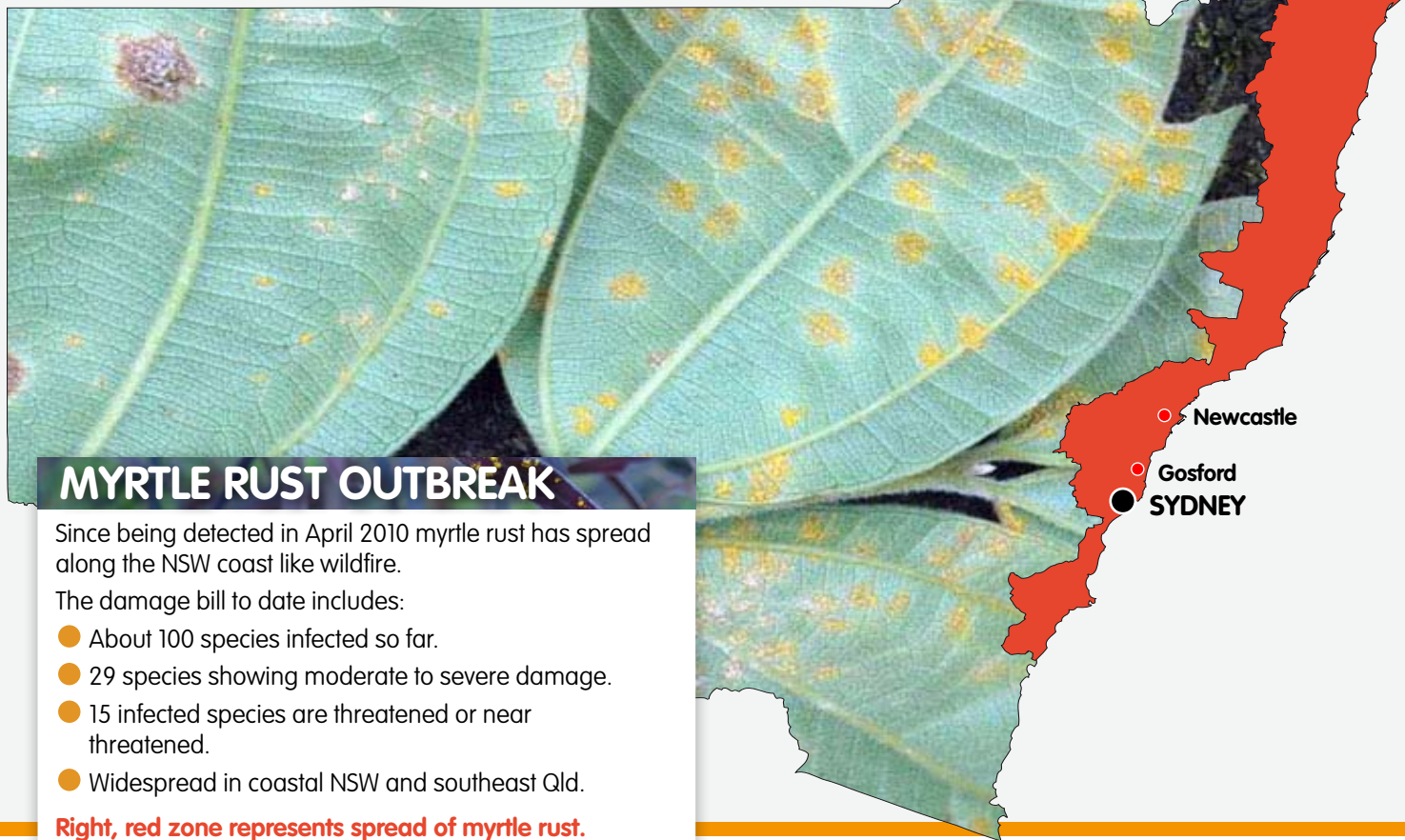


Feral Herald

Newsletter of the Invasive Species Council, Australia

Issue 27 June 2011



MYRTLE RUST OUTBREAK

Since being detected in April 2010 myrtle rust has spread along the NSW coast like wildfire.

The damage bill to date includes:

- About 100 species infected so far.
- 29 species showing moderate to severe damage.
- 15 infected species are threatened or near threatened.
- Widespread in coastal NSW and southeast Qld.

Right, red zone represents spread of myrtle rust.

Overseas incubators

Carol Booth
ISC Policy Officer

New plant diseases that could one day blight Australian ecosystems are incubating in overseas plantations and crops of Australian plants.

One of the few potential advantages of the incursion of myrtle/eucalyptus rust into Australia is that it may focus biosecurity attention on these other disease threats.

Biosecurity holes can be blamed for the recent arrival in Australia of the South American rust *Puccinia psidii* (or *Uredo rangellii* depending on taxonomic resolution). But the likely disaster now unfolding for our dominant plant family due to this rust was probably initiated when Australia started exporting its eucalypts around the world, including to South America, there to be exposed to pathogens native to South American Myrtaceae. The rust was recorded jumping host to eucalypts in Brazil in 1912 and first caused a serious

disease outbreak in a *Eucalyptus* plantation in 1973.

By exporting eucalypts and acacias for large-scale cultivation in plantations, Australia has set up the conditions for new pathogens to shift and adapt to Australian natives. An estimated 18 million hectares in 80 countries are planted with eucalypts. Australian acacias are grown in Africa and South East Asia. The same risk may apply to other Australian plants grown as crops – native floral species such as Geraldton wax cultivated for the cut flower trade, for example – or that become dominant weeds, as Australian acacias have done in Africa or *Melaleuca quinquenervia* in Florida.

Monocultures are favourable habitats for new pathogens to invade and can support far greater pathogen densities than are typically found in natural situations. Global trade and travel then provide the means for pathogens adapted to Australian species overseas to eventually make it into

Australia, where many more hosts await them in natural ecosystems or in cultivation. Plants newly exposed to pathogens can be devastated by disease.

Eucalyptus rust is just the first of several pathogens that could follow this path. We provide several examples of others here.

There is little awareness of these threats and no serious biosecurity preparations. South African fungal researcher Michael Wingfield (2003) has highlighted the risks:

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

continued p2

Wingfield notes that plantation forestry in the tropics and southern hemisphere has occurred for more than a century, but that this is a short time for pest and pathogen development. New diseases are rapidly emerging in plantations – some are due to pathogens arriving from the native range of the plant; others, including some of the most serious, are due to native pathogens jumping host to the non-native plantation species.

Eucalyptus disease threats

Chrysosporthe spp: The fungi *Chrysosporthe cubensis*, which naturally infects plants from the family Melastomataceae in South and Central America and South East Asia, and *Chrysosporthe austroafricana*, which infects *Syzygium* species in Africa, have both become new pathogens of eucalypts in plantations, causing serious stem canker diseases. According to Gryzenhout and Wingfield (2008), these and other members of the Cryphonectriaceae family affecting eucalypts ‘probably occur on the vastly unexplored native vegetation surrounding many of these *Eucalyptus* plantations’.

A related fungus *Cryphonectria parasitica* causes chestnut blight, a disease that has virtually eliminated American chestnuts (*Castanea dentate*) from the US.

Ceratocystis fimbriata: This fungus causes disease and death of eucalypts in the Republic of Congo, Uganda and Brazil but its origins are as yet unclear. *C. fimbriata* is considered a complex, probably consisting of numerous species.

Erwinia psidii: Teresa Coutinho and colleagues have reported a new disease of eucalypts in South America caused by this bacterium, one of the most important pathogens affecting guava in central Brazil. In eucalypts, it causes shoot and branch die-back, and secondary infections cause cankers on branches and growing shoots. So

far, it has damaged young trees up to two years of age.

Puccinia psidii: There are likely to be dozens of different strains of Eucalyptus rust that may infect Australian Myrtaceae grown in the native or exotic range of the pathogen and which may eventually supplement the strain invading Australia. Greater genetic diversity could exacerbate disease severity and increase the number of hosts.

Other potential pathogens come from the fungus family Botryosphaeriaceae. Tests of various members of this family native to Myrtaceae in Uruguay (from the *Neofusicoccum ribis* – *N. parvum* group and *Lasiodiplodia pseudotheobromae*) found they were highly pathogenic on Eucalyptus, killing stem tissue and causing large cankers. They could become plantation diseases in the future.

Acacia disease threats

At least three Australian wattles (*A. mearnsii*, *A. crassicaarpa* and *A. mangium*) are extensively grown in plantations in Africa and South East Asia, and others are serious weeds in southern Africa.

Ceratocystis albifundus: This is an African fungus that infects trees in more than seven native genera (including *Protea*) but rarely causes disease. It has shifted host to *A. mearnsii* and causes rapid wilting, dieback and death in plantations. It also infects *A. decurrens*. At least four other recently discovered *Ceratocystis* species may have the potential to infect Australian acacias in Africa.

Ceratocystis acaciavora: Probably native to Indonesia, this fungus has recently caused severe canker wilt disease in *A. mangium* plantations in southern Sumatra.

Other cultivated Australians

Many other Australians are also cultivated overseas: for forestry (casuarinas, in addition to eucalypts and wattles); the cut flower trade (Geraldton wax and kangaroo paw for example); and pharmaceuticals (*Duboisia myoporioides* for example).

Spreading Australian pathogens

The converse – Australian pathogens spreading to non-native species planted here – is also occurring, with potential adverse consequences for ecosystems overseas. Ronald Heath and colleagues (2007) reported the discovery of *Holocryphia eucalypti*, a fungus probably native to Australia, on diseased stems of *Tibouchina urvilleana* suffering dieback in Australia. *T. urvilleana* is a South American plant in the family Melastomataceae (related to Myrtaceae) traded as an ornamental all over the world. *H. eucalypti* generally causes mild canker in eucalypts,

but can kill stressed trees. The strain infecting *T. urvilleana* is more pathogenic on *T. urvilleana* than those from eucalypts, suggesting adaptation to the new host. If it is accidentally transported to South America, it could be ‘a major threat to the native *Tibouchina* population and possibly other native Melastomataceae.’

Policy implications

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

The serious risks to Australian plants and animals associated with exotic diseases warrants a strong biosecurity focus. We need a research and policy body for the environment along the lines of Plant Health Australia and Animal Health Australia, which focus on risks to animal and plant industries.

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Feral Herald

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This copse of dead rose apple (*Syzygium jambos*) trees in Hawaii shows that eucalyptus rust is capable of killing adult trees.

Photo: Forest & Kim Starr

Myrtle rust poses more questions than answers

The disease officially known as myrtle rust (*Uredo rangelii*) that is rapidly invading eastern Australia has thus far infected about 100 Myrtaceae species. In the year since it was detected it has spread from the central NSW coast to South East Queensland with infestations as far north as Cairns.

Ever since the rust was detected in Australia, there have been debates about its identity. Some taxonomists and pathologists consider that it is one of numerous variants of Eucalyptus/guava rust (*Puccinia psidii*) rather than a separate species. The only difference observable is a smooth patch on the myrtle rust urediniospores, one of the spore types. No differences in teliospores and DNA have been detected. The Queensland Government signifies the lack of resolution on its website by using both scientific names against myrtle rust.

There are many unknowns about the relationships of related rusts. One important issue for us is the status of other varieties that could also reach Australia and exacerbate the disease impacts. There are even more questions about the pathology of

HOST JUMPING

This refers to when a pathogen acquires a new host. The shift may be ecological – when the pathogen is already adapted to that host – or may involve evolutionary change.

Tatiana Giraud and colleagues (2010) consider that successful disease emergence mostly requires the pathogen to adapt, usually due to selection among existing genetic variants or novel mutations. Pathogenic fungi such as Eucalyptus rust are particularly adaptable because infection on one plant can yield billions of spores, which can maintain infection even if adaptation is low and thus foster mutations.

The risks of host jumping are likely to be higher if (a) a plant is related to existing hosts – as is the case with Australian eucalypts grown in South America, which has many native Myrtaceae; (b) the new host grows in close association with existing hosts – such as when eucalypt plantations are established close to native forests; and (c) the new potential host is grown in high densities, as occurs with plantations.

Reference

> Giraud T, Gladieux P, Gavrillets S. 2010. Linking the emergence of fungal plant diseases with ecological speciation. *Trends in Ecology and Evolution* 25(7): 387-95.

this disease – see Plant-Pathogen Dynamics, p12).

The importance of this rust to Australian conservation and the multitude of uncertainties warrant the development and funding of a national research plan to

identify and prioritise research questions.

More information

> Invasive Species Council Fact Sheet - Environmental Impacts of Myrtle Rust.

> QLD primary industries and fisheries website.

> NSW primary industries biosecurity website.



Mexican poppy has been identified by a RIRDC report as being one of 10 native species that can be 'readily used as biodiesel feed stocks', even though it is a weedy exotic. Photo: Wiki, GNU Licence

RIRDC bites the bullet

Late last year the Invasive Species Council wrote to the Rural Industries R&D Corporation (RIRDC) to suggest that 'RIRDC develop a policy on invasive species with the goal of ensuring that new rural industries or expansion of existing industries fostered by RIRDC do not add to Australia's invasive species' burden.'

All new crops and livestock should undergo risk assessment before they are promoted or supported and any invasive potential should be disclosed in relevant RIRDC communications. RIRDC has in the past promoted many species with invasive potential without suitable warnings.

RIRDC has at last agreed to do what ISC has been calling for it to do for some time now. The following item appeared on the Invasive Animals CRC's website (Feral Flyer 186):

Minimising the risk of promoting new pests and weeds

The Rural Industries R&D Corporation (RIRDC) has announced that Dr Rob Keogh will undertake a Corporation-funded project to develop a risk assessment framework to inform of potential threats associated with proposed new animal- and plant-based production activities in Australia.

It is intended that the framework be consistent with those in use by

other sectoral agencies, and that it be considered when determining suitability of proposed activities for Corporation funding. In doing so, RIRDC's activities will aim to be consistent with those aspects of the Australian Pest Animal Strategy (www.apas.net.au) and the Australian Weeds Strategy (www.weeds.gov.au) designed to minimise the unintended introduction and spread of invasive species.

The Invasive Species Council commends RIRDC for moving towards adoption of a risk assessment framework.

In our last newsletter we criticised RIRDC for producing a new report about growing dates that failed to mention the serious weed risk they pose to inland waterways. This led to an interview in February on ABC radio's Bush Telegraph, during which Tim Low drew attention to two new RIRDC reports on weedy biofuels. One of these reports is devoted to giant reed (*Arundo donax*), the weediest of all plants promoted as a biofuel feedstock, and the other to native and naturalised plants suitable for biofuels.

The first report, Commercial Potential of Giant Reed for Pulp, Paper and Biofuel Production, declares that giant reed is 'in the premium group of crops for biomass yields, and carbon accumulation'. Of all the crops proposed as biofuels in recent years,

this is the plant that ISC is most worried about, given its global status as one of the world's worst weeds. This report is considered further on the next page.

The second report, Evaluating Biodiesel Potential of Australian Native and Naturalised Plant Species, has a specific focus on weedy plants, as the title indicates. It operates from the perverse premise that weeds, because they grow well on degraded lands, could be the ideal biofuels.

The recommendations (page xiii) conclude that 'up to 10 native species can be readily used as biodiesel feed stocks', but four of the plants listed are weedy exotics rather than native plants, as is mentioned elsewhere in the report: Mexican poppy (*Argemone mexicana*), castor oil (*Ricinus communis*), neem (*Azadirachta indica*) and queen palm (*Syagrus romanzoffiana*).

Other weedy species that earn praise include ochra (*Ochna serrulata*), mock orange (*Murraya paniculata*), and cadagi (*Corymbia torrelliana*).

The report notes of ochra, castor oil and Mexican poppy that their use 'may be resisted by environmental groups' but says this should not discount their use. Of Mexican poppy, a serious crop weed, it concedes that 'its cultivation, if any, requires careful weed management

continued next page...

RIRDC report recognises giant reed threat

The report Commercial Potential of Giant Reed for Pulp, Paper and Biofuel Production is a milestone as the first produced by RIRDC that fully acknowledges the pest threat posed by a new rural industry. This came about, not because of the new risk assessment protocols that RIRDC is implementing, but because giant reed is such a controversial plant that a risk assessment was deemed necessary.

The weed risk section is commendably detailed and frank, acknowledging that giant reed is 'an aggressive competitor' perceived as 'potentially disastrous' for riparian habitats, which 'presents fire hazards, often near urbanised areas, more than doubling the available fuel for wildfires'. It mentions the IUCN listing of giant reed as one of 100 of the World's Worst Invasive Alien Species and the concerns we raised about it in our 2008 biofuel report (see ISC's report The Weedy Truth About Biofuels).

The report notes that giant reed is a serious weed only near watercourses:

In riparian areas it poses a very high weed risk due to the capacity for flood events to disperse vegetative root and shoot fragments to new areas of suitable moist habitat, in which it forms dense monocultures. In areas not subject to flooding (ie. away from floodplains, creeks, drains) A. donax will readily persist in a wide range of climate conditions, but clumps have very slow lateral spread and humans are the main potential dispersal agent (eg. through soil cultivation, grading, slashing).

We therefore find it surprising that the risk management guidelines say (p68) that giant reed 'should be planted a minimum of 20m from natural watercourses and constructed drains'.

from page 4

strategies'. These are the only comments in the report about the topic of invasiveness, in sharp contrast to the giant reed report, which has a large section on weed risk assessment.

If a farmer grew a large field of ochna, castor oil or neem, the risk would be high of these plants invading adjoining grazing land or natural vegetation. The risk would be especially high if these crops were grown speculatively and not harvested. We hope that the introduction of a risk assessment process means that RIRDC will no longer advocate high risk crops, and that any crop that poses a significant weed risk will come with a warning.

In this report, not only is weed risk

Giant reed does not produce seed but does sprout from small pieces of stem. After harvesting there will be many opportunities for pieces of stem left on the ground to be moved 20m downslope by wind or rainwater. The report acknowledges this risk by advising strict protocols (page 69):

'Hygiene practices should be undertaken to prevent inadvertent spread of A. donax during harvesting, transport and processing. Harvesting equipment should be cleaned of any fragments by brushing, air or water pressure sprays, prior to leaving a plantation. A. donax fragments on the ground after cleaning harvesters and loading trucks should be raked and burnt.... Harvested material should only be moved in sealed containers (or fully tarped enclosed loads).'

But this is in a report suggesting that giant reed could become a major new crop for Australia, to be grown on a vast scale. The suggestion that all the fragments will be raked and burnt every time a crop is harvested is highly unrealistic.

In areas subject to significant flooding the report recommends (p68) that giant reed be grown no closer to water than the 1 in 50 year flood line. This gives further cause for concern. The report does not discuss how weed problems will be solved when a 1 in 100 year flood occurs.

More sensible guidelines are not proposed because giant reed is most productive when grown on floodplains. Just imagine the consequences if recent flooding in Queensland, New South Wales and Victoria had ripped through giant reed plantings. In Australia, a land so prone to dramatic flooding, it is a crop that ultimately promises disaster. The control costs would likely dwarf economic benefits and they

ignored, but no attention is given to suitability for cultivation or harvesting, resulting in tests of seed oil of plants that are in some cases extremely slow growing (*Macrozamia riedlei*, *Xanthorrhoea latifolia*), low-yielding (*Dodonaea triquetra*, *Xanthorrhoea latifolia*), impractical to harvest (*Dianella revoluta*, *Elaeocarpus grandis*, *Cupaniopsis anacardioides*, *Citriobatus spinescens*, *Trema orientalis*, *Ficus microcarpa*), are root parasites (*Santalum acuminatum*, *S. album*), are vines that would require support (*Abrus precatorius*, *Cissus oblonga*).

This is yet another report that sells short a sustainable Australian biofuels industry, at the same time diminishing the reputation of RIRDC. The Invasive Species Council believes that fast-growing native plants such

would be borne by the community as a whole rather than those who would profit from the industry.

The report is honest enough (p65) to note that formal protocols to manage weed spread from crops are rare, and that protocols are more likely to succeed for species of high economic value. Giant reed has very low value. The report's summary (p72) praises the biomass it produces as comparable in quality to the straw left over when wheat and sorghum are harvested.

Anyone who reads this report closely should be able to see through its assurances that giant reed can be grown with 'negligible weed risk'. We know that weed authorities in some states are very concerned about plans to grow it. We have previously reported on one company proposing to grow 300,000 hectares in northern Australia.

State development agencies are losing some of their earlier enthusiasm for biofuels following all the unrealistic hype surrounding jatropha (see Feral Herald 21) and the global controversies about government subsidies, displaced food crops, and rainforest destruction. Under these circumstances there may be little enthusiasm for this dangerous crop in Australia.

But it may prove different overseas, in countries where weed awareness is limited. This report, which is freely available over the internet, recommends an international forum on giant reed, and one of its authors was advocating this plant at a new crops conference in Tanzania in 2008.

Reference

> Williams C, Biswas T. 2010. Commercial Potential of Giant Reed for Pulp, Paper and Biofuel Production. RIRDC.

as eucalypts have enormous potential as biofuels, but as second generation biofuels grown for biomass rather than as oil crops producing biodiesel.

We trust that the risk assessment framework that RIRDC is developing means that no more reports like this will appear. RIRDC was invited to appear on Bush Telegraph to respond to the ISC criticisms but declined to do so.

More information

> Ashwath N. 2010. Evaluating Biodiesel Potential of Australian Native and Naturalised Plant Species. RIRDC.

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> Invasive Animals CRC. Feral Flyer 186.

Deer damage in our sights

ISC has recently compiled the evidence for a nomination of feral deer as a key threatening process under national environmental laws (the Environment Protection and Biodiversity Conservation Act 1999).

It is obvious that as deer become more populous in Australia they will cause serious damage to the environment. You'd expect this from medium to large hard-hoofed animals that eat a lot of vegetation from diverse sources in diverse habitats and have destructive habits such as antler-rubbing and wallowing.

However, because population expansion has been relatively recent and Australian research has been limited (in contrast to extensive overseas studies of damage, including in their native range), the evidence for environmental harm is sparsely documented.

Nonetheless, ISC was able to compile sufficient information for feral deer impacts on 18 species and ecological communities either listed as threatened under the EPBC Act or warranting such listing. Experts consulted for the nomination said they strongly suspected feral deer were a threatening process for vastly more species than identified to date. Much of the evidence comes from conservation biologists or managers striving to protect particular threatened species.

TAKE ACTION

In Victoria neither the Coalition nor the Labor Party have effective policies to help tackle the growing deer problem in that state.

Please help us convince both parties they need to rethink their stance on this issue.

[▶ Take action now](#)

Damage will unfortunately become only too evident as deer populations continue to expand under lax management. Many of the threats identified for the nomination are of recent origin due to recent population increases.

As an example of the rapid development of the feral deer threat, when Shiny Nematolepis (*Nematolepis wilsonii*) was listed as vulnerable under the EPBC Act in 2000 there was no deer damage observed on the one population then known. Sambar numbers then escalated in Victoria's Yarra Ranges National Park and within just a few years have rendered this species critically endangered (despite discovery of a second population, also affected by sambar). Sambar were recognised as the principal threat to this species in the 2006 recovery plan.

The majority of deer in Australia derive

from acclimatisation herds established in the 1800s. However, the majority of feral deer populations derive from the recent rise and fall of the deer farming industry. During the 1970s and 1980s the number of farmed deer grew an average 25 per cent annually. When the market collapsed in the early 1990s, some farmers released their deer or failed to maintain adequate fencing. Others were bought cheaply by hunters and released into new areas. That more than 90 per cent of Australia's feral deer populations are only recently established implies a worryingly large potential for population expansion in the near future.

As ISC has long advocated, action now to eradicate or contain new and expanding populations will save future Australians from a much worse problem. But while the Queensland Government has recognised the importance of this in its recent declaration of feral deer as pests, deer are protected for hunters in NSW, Victoria and Tasmania.

ISC's purpose in nominating feral deer as a key threatening process is to engender a more consistent and conservation-focused approach to deer in Australia.

The nomination was compiled by ISC policy officer Carol Booth with valuable assistance from volunteer Doug Laing and information contributed by the many biologists and conservation managers observing deer damage.

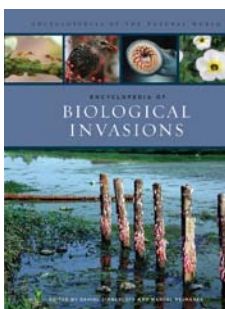
Encyclopedia of Biological Invasions

Australia has fared so badly from invasive species that it is one of only three countries to earn its own entry in the Encyclopedia of Biological Invasions, an important new book published recently by the University of California Press (New Zealand and South Africa are the other two.)

ISC's Tim Low was commissioned to provide the Australian entry, the writing of which was funded by the Norman Wettenhall Foundation. The entry summarises Australia's invasive species problems, reviewing problem vertebrates, invertebrates, weeds, pathogens and parasites, on land and in fresh and salt water.

"Islands are often more susceptible to invasive species than continents," the entry states, "and in this respect, Australia – known as the 'island continent' – has proved more like an island than a continent."

ISC also appears in the section on climate change, with our Double Trouble ebulletin listed as further reading.



Available online
> Visit the University of California website.

This 792 page encyclopedia, edited by Daniel Simberloff and Marcel Rejmánek, is an important addition to the invasive species literature. The many essays provide useful summaries of current thinking about many significant issues, such as the role of disturbance, climate change, native invaders, ants, aquaculture, biological control, vines, allelopathy and propagule pressure.

One of the more interesting entries is on xenophobia. Every few years an attack is launched on invasion biology by some

writer who thinks they have stumbled on a profound truth when they declare that concerns about exotic invaders are really disguised fears about foreign immigration. Silly accusations are made about 'botanical xenophobia, biological nativism, plant racism and plant Nazism'. The entry by Peter Coates turns the tables on these attacks by subjecting them to careful analysis.

The entry on climate change mentions the various issues ISC has raised over the years, including our concerns about growing giant reed and jatropha as biofuels. The author, Jeffrey Dukes of Purdue University in Indiana, suggests that policymakers only permit non-invasive plants to be grown.

This encyclopedia will prove a valuable resource for those requiring contemporary summaries of key issues in invasion biology. We value our participation as evidence that the work we are doing has global value. We thank the Norman Wettenhall Foundation for making this possible.

Asian honeybees, a national biosecurity risk

Asian honeybees have hit the news in recent months with Greens senator Christine Milne criticising the Federal Government's decision not to support their eradication from Queensland.

An intergovernmental committee set up to manage the incursion had decided in January eradication was no longer possible but this conclusion was far from unanimous, with Queensland and some other states saying eradication was achievable and wanting the program to continue.

Speaking on ABC Radio National's Breakfast in March, ISC's Tim Low criticised the lack of support Queensland was then receiving for its eradication work. Asian honeybees pose a national threat to industry and the environment, but the Federal Government and other states were reluctant to contribute funding.

After a couple of years a cost-sharing agreement was finally agreed upon but on 31 January this year, before many funds from outside Queensland were forthcoming, the controversial decision was made that eradication was impossible. This brought strong criticism from the honeybee industry and from Senator Milne, and on 3 March this year ISC was again invited by the



Asian honeybees are smaller than honeybees but look similar. Photo: wiki, GDFL licence

Breakfast Show's Fran Kelly to provide an independent perspective.

Tim called for a review of the Asian Honeybee National Management Group committee's decision because of a strong perception eradication had been deemed impossible only because of reluctance by some states to contribute funding.

Biosecurity Queensland, as the lead agency conducting the eradication, commissioned an independent review, which found that more information was needed to determine whether eradication was possible, but the findings

of this review were ignored.

With the bees currently confined to the Cairns region, they look like a Queensland problem, but Asian honeybees are found in cold and dry regions such as Afghanistan, Pakistan and the Himalayas, and it is short-sighted for governments of other states to think the bees will remain in Queensland.

Tim pointed out that the domestic honeybee industry in the Solomon Islands has all but collapsed following the arrival of Asian honeybees, apparently because the Asian species outcompetes domestic honeybees for food. Asian honeybees thus pose grave threats to crop pollination in Australia because they cannot be managed like European honeybees, the hives of which are taken into almond and stone fruit orchards to ensure a good crop set.

The Federal Government is now funding a containment program. The hope is that this operation may be expanded into a new eradication program in the future.

More information

- > DAFF update on response to Asian honeybees
- > Fresh Fruit Portal.com
- > The Australian Beekeeper

European honeybees spread disease

Feral honeybees (*Apis mellifera*) threaten biodiversity in Australia by competing for hollows and flowers even as we rely on them to pollinate our crops and gardens. Recent US research suggests they could also be spreading diseases to native pollinators.

Farmers world-wide are worried by declines in pollinators, with recent severe losses of honeybee colonies in the US labeled 'colony collapse disorder'. Disease is likely to be contributing to the decline but to an unknown extent in combination with other factors.

Worryingly for native pollinators, Rajwinder Singh and co-researchers have found that pathogens infecting honeybees in the US can spread to numerous other bees and wasps through pollen.

Singh and colleagues investigated the spread via pollen of four RNA viruses common in the US (more than 18 viruses have been identified from different stages

and castes of honeybees). These viruses tend to persist as 'inapparent, asymptomatic infections', and then under certain conditions replicate rapidly and cause disease often leading to colony losses.

The researchers found one or more of the four viruses in 11 species of non-*Apis* bees and wasps collected from flowering plants near honeybee apiaries (the species were from widely varying genera: *Bombus*, *Xylocopa*, *Ceratina*, *Augochlora*, *Andrena*, *Vespa*, *Polistes* and *Bembix*). Pollen is thought to be the mediator of transmission.

Their finding that these RNA viruses have a broad host range and are circulating among pollinators has important implications for both agriculture and the environment. Disease impacts have been studied to some extent in honeybees but not in other species. At least three of the four viruses studied by Singh and colleagues are found in honeybees in Australia. Disease

organisms that infect native bees and wasps may also have arrived with Asian honeybees and European wasps.

The researchers emphasise the need, among others, of encouraging use of native pollinators to overcome the dependence of agriculture on single pollinator species.

In Australia, the Aussie Bee group says native bees, of which there are 1500 species, may be better pollinators of some crops than honeybees. Stingless social native bees (genera *Trigona* and *Austroplebeia*) are 'valuable pollinators of crops such as macadamias, mangos, watermelons and lychees' and may also benefit strawberries, citrus, avocados and many others.

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- > Aussie Bee Online: Crop Pollination with Native Bees.

DOWN THE RABBIT HOLE

with ISC CEO John DeJose



As we hit mid-year, please consider how you can support a vital environmental cause (and reduce your tax bill) by donating to the Invasive Species Council. The stories in this issue of Feral Herald highlight the ever-growing need for our advocacy as new invaders arrive and governments dither.

Australia's trade and aid programs have often involved sending native plant species to other nations, where their effects have ranged from beneficial to calamitous (see story p19). We regret having been the cause of some of the world's worst weed invasions but few of us realised that these well-intentioned activities might also have bad consequences at home. What other nasty surprises might be brewing in the 'great big science experiment' of Australian native plantations overseas ('Overseas Incubators' p1)? Australia needs to be looking beyond our horizons and preparing for the disease threats of the future.

Nature will always have surprises for us that we can't include in our contingency plans. What's more troubling is the failure to implement existing contingency plans and political prevarication in the face of known threats. Responses to two recent incursions, of Asian honeybees and myrtle rust, determined by government-industry committees in processes that lack transparency, seem likely to have been more politically than science-based. Governments feeling a budgetary pinch are inclined to the short-termism that endows future generations with invaders we could have stopped.

I can't see any justification for the first response to myrtle rust being to claim the infestation ineradicable. It took loud noise from potentially affected industry to get government to haul its two contingency plans out of the bin where they'd been summarily chucked.

Now that myrtle rust is clearly ineradicable, our challenge is to protect the dozens, possibly hundreds, of native species

at risk. But just how one protects precious places (like the cloud forests of Lord Howe Island – see story p20) against a fungus that produces billions of microscopic airborne spores is unknown if not impossible. Far from surrendering, Australia needs a national research program to focus on these vital conservation conundrums.

Our article on a killer fungal disease of bats in North America (p15) as well as emerging diseases of eucalypts and wattles overseas reminds us how vulnerable we are to pathogens more frequently arriving with the increase in world trade and travel. A conservation priority should be the development of contingency plans for these likely invaders of the future – just as plant and livestock industries have done for their priority threats with substantial government funding. The environment deserves at least equal protection.

Biodiversity strategy

We can tell from Australia's Biodiversity Conservation Strategy 2010-2030 that environmental invasives rank high in what the government says about conservation. After a review of the first (1996) biodiversity strategy, this one sets long term visions that include a future in which 'we have reduced the impacts of existing threats such as invasive species so that their impact on biodiversity is negligible'.

But the Federal Government is forsaking opportunities essential to meet this objective (see story opposite) with its failure to implement the recommendations of important, well-founded reviews of Commonwealth biodiversity protection and biosecurity arrangements. With this year's budget, the recommended independent biosecurity commission was stillborn. In keeping DAFF at the helm of biosecurity, the government ensures the agricultural tail continues to wag the environmental dog. ISC will continue to pressure governments to more adequately represent the needs of the environment in weed, pest and disease

programs. Plant and animal industries have their own biosecurity organisations with substantial government funding to develop responses to biosecurity threats. As with other nationally significant issues – climate change and mental health for example – it will take strong public pressure to focus the Federal Government on these vital reforms.

RIRDC bucking the trend

We report on page 4 that one government agency, at least, is bucking the trend and improving in its responses to potential threats from invasives. RIRDC is developing a weed and pest risk assessment framework after representations from ISC. We applaud them for taking this positive step in what the Invasive Animals CRC called 'minimising the risk of promoting new pests and weeds'. The companion article on their Giant Reed report (see p5), however, shows that even with risk assessment in place, vigilance from the NGO sector must be maintained. Applause to RIRDC, too, for their thoughtful list of weed research projects recently approved, some of which are encouragingly multi-disciplinary (p18).

Other positive news is emerging from efforts to eradicate invaders from islands (see the stories on Lord Howe Island, p20, and Macquarie Island, p14).

ISC is working hard to strengthen the foundations necessary for more success stories – a permitted list approach to weeds (p19), regulation of weeds under our national environmental laws (see opposite) and more funding for control programs (p18) – as well as promoting concerted action on high priority threats such as deer (p6) and myrtle rust.

To this work we bring a strong commitment to nature and science – but very little funding, operating largely on a voluntary basis. Please consider donating to help us address many more of the invasive threats to our precious natural environment (check out the last page for details of how to donate).



Australia needs a strong voice on invasive species issues

The Invasive Species Council works hard with limited resources to help bridge the gap between today's problems and tomorrow's solutions.

Your help is sorely needed.

Please donate today at www.invasives.org.au

OCTOBER 2009

On the federal front...

The implementation of two major Commonwealth initiatives has been eagerly awaited by those with an interest in improved responses to invasive species. These are the Hawke review of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and the Beale Review of Australia's quarantine and biosecurity arrangements.

Australia's core environmental legislation, the EPBC Act, commenced in July 2000. Its mandated 10 year review was undertaken by Dr Allan Hawke, a recently-retired senior public servant with a science background, with advice from an expert panel. His review was characterised by extensive public and stakeholder consultation. A year and a half have passed since Dr Hawke delivered his final report in October 2009 with no formal response from the government.

The Invasive Species Council was conscientiously involved in the review from the outset, devoting countless hours to discuss, craft, lodge and explain evidence-based submissions – our best possible advice on how the Act could be improved to respond to invasive species threats. Dr Hawke agreed existing laws are failing to prevent the spread of invasive species and made some solid recommendations.

We have been disappointed by extensive delays in responding to the review and are greatly concerned that much of our work will be ignored in the final response – not due to any lack of merit but because the government has no appetite for major reform, particularly if it is opposed by industry. Indeed, we and other environmental NGOs have been advised by federal environment minister Tony Burke not to expect substantial reform. On the other hand, the Greens will be keen to see stronger national environmental laws, suggesting there may be political opportunities to boost outcomes.

However, Tony Burke, formerly the agricultural minister and in charge of biosecurity, has shown interest in improving invasive species management by directing environmental offsets to this purpose.

Offsets are often required to compensate for environmental impacts of approved developments. They are widely criticised as facilitating environmental destruction and failing to achieve conservation outcomes. ISC does not support any diminishment of environmental assessment standards but agrees with Minister Burke that funding invasive species management is a high priority for achieving environmental outcomes from offsets.

Notwithstanding that it is right and proper for government to allocate public resources to preventing, eradicating and controlling environmental invasives, no government in our history has tackled these needs effectively. There has grown up a fear that invasives is a budgetary black hole. While it is true that controlling established environmental pests and diseases is difficult and expensive, and that eradication of new threats may, if left too late, become impossible, there is much that can be effectively accomplished.

Indeed, because invasive species are implicated as a primary threatening process in endangerment of many species and communities, their control is often the single most effective conservation action that can be taken. More than 80 per cent of EPBC-listed ecological communities are threatened by weed invasion.

Leaving aside the offsets opportunity, much can be done now for better invasives outcomes. The Act can be used in its current form activated by regulations to limit deliberate movement of unsafe organisms within Australia (using the never activated section 301A of the EPBC Act).

Other actions we have advocated that are partly or fully recommended in the Hawke review include:

- Moving to a consistent nation-wide 'permitted' list approach for species deemed 'low risk' through a COAG agreement.
- Publishing regular 'outlook' reports to identify emerging threats to biodiversity to facilitate preventive action.

- Ensuring the environment is better represented in federal biosecurity processes.
- Applying risk assessment to potentially invasive new variants of introduced species and permitting only low-risk variants.

Politics might move at a glacial pace but invaders don't sit still. They are making use of the time spreading more widely into the Australian environment.

Biosecurity Review

Commissioned in early 2008 by the Minister for Agriculture (then Tony Burke), a review of national biosecurity arrangements was conducted by an independent panel led by Roger Beale. The government's response to the resulting comprehensive review 'One Biosecurity: a working partnership' was delivered in late 2008. It gave 'in principle' agreement to each of the 84 Beale recommendations and work commenced on their final form for implementation.

ISC strongly supported the major recommendations to ensure biosecurity decisions are made by an independent expert commission based on policy direction from the government.

ISC has been participating in a small working group set up by DAFF to respond to the government's reform proposals. Our main concern has been to ensure environmental considerations are accorded appropriate priority.

But there has been little activity over the past several months and it now appears that the government has backed away from the structural reforms proposed by Beale, with biosecurity to remain the responsibility of the Department for Agriculture, Fisheries and Forestry. We will continue working with DAFF to see how the bits still left might be wired up to provide better protection against environmental threats from invasive species. Watch this space for evidence that the Commonwealth is seriously considering addressing invasives issues. When we find it, we will let you know.

Cattle and weed spread

One reason among many for keeping cattle out of Victoria's alpine parks (and other conservation areas) is their propensity for spreading weeds. ISC was one of many groups to sigh with relief when Australia's environment minister Tony Burke ordered cattle out after Victoria's new government let them in.

Jim Hogan and Clive Phillips of the University of Queensland have recently reviewed the ways in which weeds can be spread by livestock via seeds attached to their body, via consumption and defecation of seeds, and via vehicles used for transport. With grazing the most extensive industry in Australia, weed spread is likely to be considerable.

Translocation on animals: Many plants have mechanisms for attachment: hooks or spikes for entanglement in hair or stickiness for example. The outer coat of seeds of giant rat's tail (*Sporobolus pyramidalis*), for example, becomes sticky when wet, allowing adhesion to animals or vehicles, which is lost when it dries out. Seeds can be transported in mud on animals or vehicles that transport them. Parthenium (*Parthenium hysterophorus*) can be present in the soil at a density up to 34,000/m².

Passage through animals: A variable proportion of seeds eaten by cattle survive passage through the gut and are viable when deposited within faeces, a source of nutrients and water for germination. Most studies show that most seed is defecated within about 30 to 70 hours but the last of it may take more than 10 days. A 1992 meta-



Cattle cause considerable damage in fragile alpine areas, including being a vector for spreading weeds. Photo: courtesy the Victorian National Parks Association

analysis of research on seed viability found that about one-third of seeds eaten by cattle and 22 per cent of those eaten by sheep remained viable. A 1994 study of three clovers found survival of 20 to 43 per cent of seed. The majority of hard seeds survive. Cattle tend to masticate feed less thoroughly than sheep and goats, leaving more seed intact. This may help explain why prickly acacia (*Acacia nilotica*) spread more quickly when cattle replaced sheep in northern Australia.

Faecal deposition: With cattle at a density of four per hectare, faecal output covers about 12 per cent of the pasture each year. Plants beneath the dung die and gaps are generally

filled by plants germinating from seeds in dung. Pellets defecated by sheep create much less shading and a less favourable environment for weed invasion.

When cattle are transported, on a journey taking 46 hours with a prior 12 hour curfew, about 80 per cent of faeces and much of the seed are deposited during the journey. A significant proportion of seed is deposited after arrival. Hogan and Phillips make the following observation about cattle transport:

Faecal output must be contained within the transport vehicle in New Zealand, where effluent disposal facilities are

continued p18

Victoria closer to tackling feral horses

John Sampson
Victorian National Parks Association

The Victorian Government could soon be forced to address the state's ballooning feral horse problem if a nomination to list the damage they cause to native ecosystems as a potentially threatening process under the Flora and Fauna Guarantee Act is successful.

Introduced into the high country in the 1820s, feral horses have become a particular menace in slow-growing alpine and sub-alpine plant communities, where they foul wetlands, trample vegetation, erode streams

and spread weeds. In far east Victoria there are now very few areas of high-altitude wetland, grassland or open snowgum woodland unaffected by feral horses, with bare ground, tracks and piles of dung common.

Recent surveys have unearthed evidence of horse damage in more than 85 per cent of alpine peatlands investigated. The majority of those peatlands are threatened alpine bogs and fens.

The largest concentration of feral horses in Victoria is found in the Cobberas and nearby areas, including the headwaters of

the Buchan River. They are also found on the Bogong High Plains, Nunniong Plateau and Wonnangatta-Moroka unit of the Alpine National Park. The Barmah Forest also suffers from feral horse damage.

The nomination follows a report released last year which showed feral horse numbers in the Australian alps tripled in just six years from 2003 to 2009.

More information

> The preliminary recommendation report is available from the Department of Sustainability and Environment website.

\$4 million fox bounty a waste of tax dollars

Carol Booth
ISC Policy Officer

The Victorian Government has announced it will embark on a four-year bounty scheme for foxes and wild dogs in the face of a mountain of evidence that it will only waste taxpayers' money. A national review by Hassall & Associates found that 'no bounty scheme in Australia has had a noticeable short or long-term impact on vertebrate pest populations that have a high reproductive rate' and a review of the 2002-2003 fox bounty in Victoria by biologists David Fairbridge and Clive Marks concluded it was a failure, despite an apparent tally of almost 200,000 foxes.

The new scheme will cost taxpayers \$4 million over four years by offering hunters \$10 for each fox and \$50 for each wild dog shot. With funding for feral animal control programs so scarce, it is appalling to squander large sums of public money on what has repeatedly proven not to work.

Why this bounty won't work

Ad hoc shooting is not efficient enough to reduce populations. Foxes can increase their population by more than 100 per cent in a year (given enough food), which means that at least 65 per cent must be killed annually to ensure reduced abundance. This is impossible to achieve over a large area by ad hoc ground shooting. Fairbridge and Marks, reviewing the 2002-2003 bounty scheme, concluded that it failed to reduce fox abundance over more than 96 per cent of the state. Areas with reduced fox abundance

are quickly colonised by foxes from elsewhere searching for new territories.

Fairbridge and Marks highlighted the futility of the bounty scheme with a case study of an intensive shooting program on Phillip Island from 1994-1999. Despite 'a closed population of foxes, intensive control using conventional methods and a high motivation', the program achieved only about 50 per cent take annually and the population of foxes increased. 'In an open Victorian population with 2280 times the land mass, a fox population reduction can only be anticipated if a control intensity greater than that achieved on Phillip Island is maintained state-wide for a prolonged period and is not affected by re-invasion from NSW and SA.'

The majority of animals killed by hunters are likely to be inexperienced juveniles and part of the doomed surplus that would have died anyway due to limited resources. Experienced foxes learn to avoid spotlights and hunters, and are the most likely to breed successfully.

Shooting can be counterproductive by leaving more resources for survivors, better ensuring their breeding success and stimulating increased breeding due to disruption of social groups that suppress breeding in some vixens. Fairbridge and Marks found that the impact of the 2002-03 bounty in most regions could have been to stimulate or prime reproductive rates with the likely result of 'a return to pre-bounty density or an increase in density over subsequent breeding seasons'.

There is a mismatch between shooting

effort and where fox control is most needed. Spotlight shooting is usually conducted from vehicles in open habitats. Hunters will target areas most convenient to them rather than areas where control is most needed.

Bounties are open to fraud and create an incentive to maintain pest populations. As Hassall & Associates found, 'Fraud has become synonymous with all bounty systems with well documented evidence of widespread abuse by scheme participants.'

Fairbridge and Marks found the 2002-03 bounty was available for road kills and animals taken from outside Victoria or outside the bounty timeframe. Hunters keen to maintain future bounty payments are likely to leave breeding populations, and governments paying large sums of money for a bounty are less likely to fund effective control programs.

Fairbridge and Marks concluded that the 2002-03 bounty scheme should be 'replaced with targeted and coordinated programs to assist landholders to achieve a sustained reduction in fox abundance for a defined benefit.' Sadly for both the environment and agriculture, the Victorian Government has decided to ignore this advice.

References

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- > Hassall and Associates 1998. Economic evaluation of the role of bounties in vertebrate pest management. Bureau of Resource Sciences.
- > Invasive Species Council – Is Hunting Conservation?

Can you help?

We could do more if we had more volunteers.

> Grant applications, policy analysis and specialist expertise in invasive species are three areas in which we could benefit from more input.

Your skills and experience can help ISC succeed in making Australia a safer place for nature.

If you have skills we could use, or you just want to help, contact our CEO now!

Email johndejose@invasives.org.au or phone 0433 586 965.





Murrtle rust infection on scrub turpentine (*Rhodamnia rubescens*).

Photo: Courtesy of NSW Department of primary industries (DTIRIS)

Plant-pathogen dynamics

The arrival of Eucalyptus/myrtle rust in Australia represents a colossal uncontrollable experiment in plant-pathogen dynamics. Here we have a new disease with an extraordinarily large host range and an immense capacity for rapid evolution encountering hundreds of new potential hosts, many of which dominate natural ecosystems and plantings for horticulture and forestry.

The future of this disease is unpredictable and there are far more questions than answers – both about plant diseases in general and eucalyptus rust in particular. Which plants will evolve resistance and how quickly? Will pathogenic evolution of virulence outdo plant evolution of resistance? Will disease virulence decline over time? What difference will the huge variety of host plants in Australia make to the course of this disease?

The following is based on reviews of plant-pathogen dynamics by Ingrid Parker and Greg Gilbert, and Sonia Altizer and co-researchers.

The rapid evolution of herbicide tolerance in some weeds demonstrates the capacity for plants to evolve resistance, but it can only occur if there is existing genetic variation for resistance for selection to act upon. One hopeful factor is that natural plant populations tend to have a ‘staggering abundance’ of genetic variation for resistance to fungal diseases (wild plant populations are a major source of

resistance genes for pathogens of crop plants).

In the long-term, resistance genes can be generated by mutations. But pathogens also evolve: co-evolution of plants and pathogens can generate a high diversity both of resistance and virulence alleles. Plants are at an evolutionary disadvantage compared to pathogens because they have longer generation times and smaller populations. Because pathogens can evolve more rapidly than plants, genetic variation for disease resistance can be exhausted in a plant species. Parker and Gilbert note that in ‘several cases of novel forest epidemics, local variation for resistance has been quickly exhausted, and forest pathologists have resorted to bringing in resistance genes from distant regions or related species’. In severe diseases, the plant host may be eliminated before it can evolve resistance. Resistance may most readily evolve when the ‘pathogen’s effect on the host is strong, but not exceedingly strong’.

Altizer and colleagues comment that the ‘evolutionary potential of pathogens sets them apart from other major threats to wildlife’. Strong selection pressures following ecological changes might accelerate pathogen evolution. Because of their evolutionary potential, the effects of introduced diseases are ‘unpredictable and irreversible’.

One hope is that like myxomatosis in rabbits, the virulence of eucalyptus rust

will naturally decline. However, according to Parker and Gilbert, although it is conventional wisdom that ‘virulence should start high on a naive host and evolve to a lower, intermediate level’, there is little evidence that this occurs in natural plant-pathogen systems.

One of the vital questions about eucalyptus rust in Australia is the effect that the multitude of hosts of varying degrees of susceptibility will have on pathogen and plant dynamics. The existence of numerous alternative hosts is likely to sustain high virulence, with hosts not highly susceptible able to help maintain pathogen populations. The evolution of virulence in plant pathogens is also influenced by the relationship between virulence and pathogen fitness.

The future is likely to bring increasing specialisation as the rust adapts to different hosts in Australia: Altizer and colleagues observe that ‘Commonly observed patterns point to high pathogen evolutionary potential and selection in favour of specialization on common host genotypes’.

References

- > Altizer S, Harvell D, Friedle E. 2003. Rapid evolutionary dynamics and disease threats to biodiversity. *Trends in Ecology and Evolution* 18(11): 589-97.
- > Parker I, Gilbert G. 2004. The evolutionary ecology of novel plant-pathogen interactions. *Annual Review of Ecology, Evolution and Systematics* 35: 675-700.

North American bats fall to European fungal disease

The more than one million bats dead from white nose syndrome in the United States since 2006 are likely victims of biosecurity failure. The fungus considered responsible for the disease, *Geomyces destructans*, appears to be a recent arrival in the US from Europe, where it is widespread and apparently non-lethal.

In North America, the disease has caused more than 90 per cent mortality in many infected colonies – indicative of a newly arrived disease. In contrast, European bats appear to have evolved resistance to the pathogen (although an alternative possibility is that they are less susceptible because they hibernate in smaller colonies).

Gudrun Wibbelt and co-researchers who investigated the status of the pathogen in Europe liken the disease to chytrid fungus (*Batrachochytrium dendrobatidis*), which has spread around the world causing massive frog declines and extinctions, including in Australia.

The fact that the bat disease was first detected in a popular tourist cave suggests human involvement.

In North America, white nose syndrome has affected six bat species to date and spread 1300km from where it was first detected. It is thought that infected bats are more frequently aroused from hibernation and expend the fat reserves they rely on for winter survival. The disease may disrupt wing functions such as thermoregulation, water balance and flight. Many more bat species may be at risk, and follow-on impacts due to reduced insect predation and disruption to cave ecosystems could be substantial.



A bat with white-nose syndrome (WNS) undergoing a necropsy to help identify its cause of death. Photo: Courtesy US Geological Survey

This is yet another pathogen that Australia should strive to keep out. It is also yet more evidence that conservation is likely to be increasingly challenged by the spread of pathogens around the world facilitated by global trade and travel (see p1).

The US Government has developed a national plan to manage the disease with various component action plans that include research to resolve the many outstanding questions about this disease.

This is the sort of national approach ISC advocates for eucalyptus/myrtle rust in Australia.

Reference

- > Wibbelt G, Kurth A, Hellmann D. et al. 2010. White-Nose Syndrome Fungus (*Geomyces destructans*) in Bats, Europe. *Emerging Infectious Diseases* 16(8).
- > US Fish & Wildlife Service. 2011. A National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats.

WEEDY BIOFUELS

An article about weedy biofuels produced by ISC and the CSIRO appears in a recent issue of *Current Opinion in Environmental Sustainability*.

Written by ISC's Tim Low and Carol Booth and CSIRO's Andy Sheppard, it warns that cultivation of weedy biofuels will inevitably result in weed problems.

The journal issue it appears in (volume 3, issues 1-2) is dedicated to biofuels, containing a dozen articles from experts around the world that touch on the weed risk biofuels pose and how best to respond. It is the most concentrated collection of

papers to appear so far on an issue that ISC has been prominent in raising. Here is our abstract:

Weedy biofuels: what can be done?

Biofuels are likely to cause significant weed problems because the attributes of an ideal biofuel species—including rapid growth with minimal fertiliser and water needs—match those of typical weeds, and because cultivation will be on a vast scale. The valued biofuel giant reed is one of the world's worst invaders. To reduce weed risk, biofuels could be cultivated under voluntary guidelines or legislative controls. But self-regulation has

a poor track record, and legislative controls would impose a cost on society because biofuels are high-volume low-value crops with limited profit margins to fund weed management. Extreme weather events can exceed landholder capacity for control of escapes. Restricting candidate species to those with low weed risk is advisable, and many native species would offer safe potential.

More information

- > You can download the full article from the *Science Direct* website.

Macquarie Island a step closer to feral freedom

In exciting news for Australian conservation, work is progressing well on World Heritage listed Macquarie Island to eradicate rabbits, rats and mice.

By mid-May more than 70 per cent of the island had been covered in bait dropped from helicopters, in the first of two bait drops proposed. This contrasts with the attempt last year in which only 10 per cent of the island was baited due to bad weather.

The effort this year was assisted by the introduction of rabbit calicivirus in February, which has resulted in a substantial reduction in rabbit numbers prior to baiting. This means fewer rabbits to poison and hopefully fewer deaths of native birds due to scavenging on carcasses – a problem with the baiting conducted last year in which an estimated 800 birds died.

A Federal Government review of the program in 2010 concluded that the benefits of eradicating rabbits and rodents would



Rabbit damage of native vegetation on Macquarie Island.

Photo: Tim Low

outweigh these short-term impacts on non-target species.

Additional staff this year will attempt to remove as many bodies as possible before they can be scavenged.

The bait consists of coarsely ground grain as a lure, wax to repel water and the toxin brodifacoum, an anti-coagulant.

After baiting, shooters guided by trained dogs (springer spaniels and labradors) will

seek to eradicate any remaining rabbits.

The \$25 million eradication program, one of the largest ever attempted and offering numerous logistical challenges, will hopefully pave the way for more eradication projects in Australia. We wish it well.

More information

> Macquarie Island Pest Eradication Project.

> Progress on the eradication is being reported through the project's blog.

Climate change relocations pose a risk

Translocation of species at risk from climate change may prevent their extinction, but it may also cause pest problems – an issue that is not always recognised. Translocations of fish and crayfish over relatively short distances have had serious impacts overseas.

ISC was concerned a few years ago by some cavalier statements made about translocation, as if it was about to become a major element of conservation management. But in recent years the Australian climate change community has advocated a cautious approach.

This is exemplified in recent guidelines produced by the National Climate Change Adaptation Research Facility, as this quote shows:

A number of concerns must be addressed when considering [assisted migration]. Perhaps the most important is the potential for the translocated species to become a pest or to disrupt ecosystem functions at the newly colonised site.

An article in the latest Ecos magazine is also very cautious in tone. It quotes Macquarie University's Lesley Hughes – a

Commissioner with the recently established Climate Commission – describing translocation as an 'option of last resort'.

The article warns that translocation could become a 'distraction' from climate change mitigation and habitat protection efforts.

Tara Martin of CSIRO's Ecosystem Sciences adds another voice of caution to the article:

If you move a species too early without knowing enough about the impact of climate change and the potential risks of the species to the new habitat, we may end up wasting resources and the species becoming problematic.

One reason to hesitate is that wrong assumptions about vulnerability are easily made. Claims that one montane frog in the Wet Tropics faces extinction from a 1°C rise in temperature have been retracted, with tests showing that the boulders it shelters under provide excellent protection from heatwaves. This frog (*Cophixalis concinnus*) was thought to be the Wet Tropics vertebrate at greatest risk from climate change, but is now thought to face little if any risk.

Another species of special interest is the mountain pygmy possum (*Burramys parvus*), confined today to the Australian Alps. It is widely assumed to need low temperatures, but Mike Archer is quoted in the article saying that its fossil record indicates wide climatic tolerances.

We are pleased that Australia's biological community is giving due recognition to the risks implicit in translocation. ISC has no policy against translocation, but like Professor Hughes we see it as an option of last resort, and one that entails a measure of risk.

Further Reading

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> Isaac J. 2010. Assisted Migration as a Management Tool for Species Threatened by Climate Change. National Climate Change Adaptation Research Facility Information Sheet 2.

> Mueller JM, Hellmann JJ. 2008. An Assessment of Invasion Risk from Assisted Migration. Conservation Biology 22(3): 562-567.

> Ricciardi A, Simberloff D. 2009. Assisted Colonization Is Not a Viable Conservation Strategy. Trends in Ecology & Evolution 24(5): 248-253.

Battle continues against weedy Latin American

One of ISC's early achievements was to persuade the Queensland Government to assess cecropia (*Cecropia spp.*), a weedy Latin American tree on the IUCN 'List of 100 of the World's Worst Invasive Alien Species'. The Queensland Government risk assessment concluded that there 'seems little doubt that any *Cecropia* plants cultivated within either the Wet Tropics region or subtropical rainforests of southern Queensland will spread rapidly and invade suitable habitats nearby.' *Cecropia* was declared a Class 1 weed, committing the government to its eradication (see Feral Herald 9).

However, declaration of a weed does not guarantee sufficient resources will be committed to its control. Biosecurity Queensland is currently challenged with the eradication of 54 Class 1 declared pest plants listed under the Queensland Land Protection (Pest and Stock Route Management) Act 2002. The eradication cost for 41 of these weeds has been estimated at more than \$8.6 million for the first year alone, with cecropia eradication estimated at \$108,000 a year.

Eradication is a difficult task and requires good information about the life history traits and ecosystem interactions of the target weed. The overall cost of eradicating cecropia will be minimised by recent research on these topics by Joe Vitelli (Biosecurity Queensland), with valuable assistance from Bruce Webber (CSIRO).

Bruce Webber became interested in cecropia while a post-doctoral researcher studying ant plants in Cameroon. His colleague, Doyle McKey, had mapped out infestations of cecropia in Cameroon in the 1980s, and Bruce found time to remap the infestations. He found that cecropia had spread considerably from its introduction point and was out-competing native pioneer trees. 'Close to the point of introduction, the only native musanga trees left were a few scattered large individuals. When they go it will be entirely exotic cecropias dominating this important stage of rainforest regeneration,' Bruce notes.

In its native range in the neotropics, *Cecropia* is the main genus of trees that colonises rainforest clearings, roadsides and other sites of disturbance. A single tree can produce millions of seeds annually, which are spread widely by birds and mammals that eat the sweet, many-seeded fruits.



Cecropia is a distinctive weed, with very large soft leaves.

However, among the 60 recognised species are montane Andean trees, Amazon lowland trees and others that germinate in low light conditions or tolerate seasonal drought. Many of these species are extremely difficult to tell apart, and much confusion exists around the true identity of invasive cecropias globally. The recent work by Biosecurity Queensland and CSIRO suggests there are at least two species naturalised in Australia, and possibly hybrids as well. These populations are distributed from south of Brisbane to north of Cairns.

Accurate species identifications can give a much better picture of life history traits and climatic tolerances specific to the *Cecropia* species naturalised in Australia. Understanding novel ecosystem interactions is also important to ensure ongoing

monitoring areas are realistic. As Joe Vitelli points out 'we have found evidence of seed dispersal by kangaroos at some sites'.

Such information is vital for developing strategies for cecropia eradication. Currently without adequate funding, the scientists from Biosecurity Queensland and CSIRO are hoping that their work unravelling the complexities of cecropia invasion will persuade funders to resource the eradication of this persistent pest. ISC will continue to monitor progress and provide updates.

More information

- > Queensland primary industries and fisheries - Mexican bean tree.
- > Queensland primary industries and fisheries: Biosecurity Queensland targets bean tree.



A basket crane was needed to catch the iguana high up a tree.

Photo: Betty Roznik

Green iguana has experts reaching for the sky

On 16 April, Betsy Roznik was kayaking up a tributary of the Ross River at Townsville when she saw a big green lizard with spines down its back.

A PhD student in biology at James Cook University, Betsy realised it was an exotic iguana and tried to catch it, but it swam away. From the photo she took it was identified as a green iguana (*Iguana iguana*) from Central and South America.

When the photo was emailed to ISC we contacted Biosecurity Queensland, and five days later a team of biologists and pest experts from Biosecurity Queensland, the CSIRO and the university converged on the Townsville Palmetum, the botanic garden where Betsy had seen it.

The iguana was soon located, but climbed high into a tree over the water when approached. Biosecurity Queensland organised a basket crane and some tree climbers and Eric Vanderduys from the CSIRO, while perched in the basket, was able to manoeuvre a noose on a pole over its head. Nets and people were waiting below to catch it in case it jumped.

Green iguanas are a significant quarantine concern for Australia, with escaped pets having formed feral populations in Fiji, Florida, Israel, Puerto Rico and other Caribbean islands. A very expensive eradication campaign is underway on two islands in Fiji.



Caught! The pesky green iguana finally in safe hands.

Photo: Betty Roznik

Green iguanas cannot legally be imported into Australia and this individual must have been smuggled in. Six to eight illegal iguanas come to the attention of Taronga Zoo each year, implying the presence of a large illegal

population. Like crocodiles, green iguanas make appealing pets when young, but grow to an inconvenient size, increasing the risk that illegal pets will one day be liberated.

WA turns up the heat on northern palm squirrels

Marion Massam
Department of Agriculture and Food
Western Australia

The northern palm squirrel (*Funambulus pennantii*) has been present in Western Australia for more than 100 years, but vigilance is still required to stop its spread to other parts of WA and the rest of Australia.

Recently the Department of Agriculture and Food issued a media release asking Perth residents to help locate feral populations of northern palm squirrels, after sightings to the south-east of the city.

Palm squirrels have colonised an area of about 30 square kilometres around Perth Zoo, however, squirrels have recently been found in several other Perth suburbs outside this area.

The species is a declared pest in Western Australia – all animals outside the zoo containment area are removed, and they cannot be legally imported or kept in the state. There are no other feral populations of squirrels in Australia, and in most jurisdictions it is illegal to possess the species.

A scientific risk assessment of the palm squirrel was conducted by the Department of Agriculture and Food,



Northern palm squirrels have the potential to establish further feral populations in Australia and become yet another pest rodent species.

Western Australia. It involved careful use of available information and application of the precautionary approach, indicating that the squirrel poses an extreme threat (the highest of four categories) to Australia. The risk assessment rated the squirrel as highly likely to establish further populations here as several areas of the country have climates similar to the squirrel's overseas range. The extreme threat category assigned to this species indicates that once established, it could become a pest of agriculture, the environment and the community.

It is therefore important that the palm squirrel does not establish further populations in the wild in Australia and that any found here are removed quickly.

Squirrels could cause damage to houses and electrical wiring, as well as to

commercial and backyard fruit, vegetable and nut crops, adding to the problem already caused by other rodents. They also eat birds' eggs and possibly birds themselves, and could compete for tree hollows with native birds and bats in city parks and gardens. They are considered a significant pest of orchards and nurseries in India, and cause severe damage to fruit and vegetable crops there.

The northern palm squirrel looks somewhat like a dressed-up rat, of about the same size but with a bushy black and white speckled tail. It is a grey-brown colour with five bold white stripes on its back. It moves with rapid darting movements and is an excellent climber.

Sightings of northern palm squirrels at large or illegally held in captivity should be reported to your nearest relevant government department or wildlife authority on Freecall 1800 084 881 so that appropriate action can be taken.

More information

> Further information on identifying Indian palm squirrels can be found in a Farmnote available from www.agric.wa.gov.au, by searching for 'palm squirrel', or from the Queensland Department of Primary Industries website.

> The Sydney Morning Herald quoted ISC about these squirrels being sold in NSW as pets for its story Squirrels on sale: twenty pets or just a little nuts.

Emerging pest animal alerts

If you spot a crow with a grey nape, neck and lower breast you should alert your state biosecurity agency about a possible house crow (*Corvus splendens*) incursion.

Native to Central Asia, introduced to many other locations, and an occasional traveler to Australia on ships, it has been assessed as an extreme threat by the Vertebrate Pests Committee. It would compete with native birds and is known to kill and harass other animals. The crow is also a major agricultural threat.

The house crow is one of ten emerging pest species featured so far in a Pest Animal Alert series of brochures published by the WA Department of Agriculture and Food. A well-informed public is an essential biosecurity resource – fast action on a new incursion typically relies on a member of the public alerting biosecurity officers (as occurred recently with a green iguana

in North Queensland, see page opposite.

Emerging pests include

Pacific rats (*Rattus exulans*): Have established on many islands including a few in Australian waters, and although they are not yet on the mainland, they are likely to travel as boat stowaways.

Barbary doves (*Streptopelia roseogrisea*): Have established small populations in Adelaide and the Northern Territory from aviary escapees, and could compete with Australian doves and pigeons if they became widespread.

Red-whiskered bulbuls (*Pycnonotus jocosus*): Present in a few scattered locations in Australia due to deliberate releases, and could compete with native birds and spread weeds.

Canada geese (*Branta canadensis*): Have either flown to Australia from New Zealand or escaped from captivity at least four times in the past decade and been eradicated. They

could compete with Australian waterbirds if established.

Red-eared slider turtles (*Trachemys scripta elegans*): Traded as pets, they have established small populations in Australia and are likely to compete with native turtles and could spread new diseases.

Common mynas (*Acridotheres tristis*): Established in many locations in Australia since being deliberately introduced in the 1860s for insect control, they are spreading and compete aggressively with other birds for hollows and food.

Indian ringnecks (*Psittacula krameri*): Kept as aviary birds, they have a high risk of establishing in the wild and competing with native parrots.

Further information

> Brochures can be downloaded from the WA Department of Agriculture and Food website.

NSW weed control boost

The NSW Liberal and National parties, now in government, made some welcome election commitments on weeds.

Citing the Invasive Species Council on the damage caused by weeds in the introduction to the policy, the parties said they would increase funding for weed control grants, research and development, and weed patrols along fire trails in national parks by \$6 million.

Another commitment was to subject government agencies and statutory authorities to the same weed control requirements as private landholders. The parties said they would provide \$40 million for pest control and management in national parks, an increase of \$7 million on funding in 2009-10. Another \$10 million would be committed to regenerate degraded bushland.

In 2010 ISC officers Carol Booth and Andrew Cox met with a sympathetic response from the opposition spokespersons on the environment and primary industries when we advocated more funding for weed control and policy reforms.

We also received favourable feedback about our Creeping Peril report, which we presented to the Government and opposition.

We are pleased to see that this advocacy has yielded extra funding for control programs. ISC will pursue the proposed regulatory reforms in collaboration with other NSW ENGOs.

Weed projects benefit from latest funding

The latest round of federal weed funding (Phase 2 of the National Weeds and Productivity Research Program) administered by RIRDC will provide support for a number of weed projects with important environmental outcomes.

The 33 funded projects include the following:

Weed Risk Assessment for Australian Nursery & Garden Industries

The Nursery Garden Industry Australia will draw on the weed risk assessment system developed for Australia's Botanic Gardens to screen 1000 common ornamental plants sold by Australian nurseries. It should lead to the development of an Australian white list of low risk ornamental plants for sale by production nurseries across Australia.

Invasion and impact of high biomass grasses in Queensland

Daniel Metcalfe of CSIRO will look at the options for better management of thirteen high biomass grasses in north Queensland. These grasses are a major concern because of their potential to increase bushfire intensity and frequency and thereby change woodland structure and composition.

Just how bad are coastal weeds: assessing geo-eco-psycho-socio-economic impacts

Roger Cousens of the University of Melbourne will use a multidisciplinary team, including ecologists, economists, psychologists, sociologists and geomorphologists, 'interacting with state governments, CMAs, shires and

local communities' to achieve strategic management of coastal weeds as well as more effective use of limited resources.

Manipulating weed successions when restoring native vegetation communities: Riverina Murray Area

A project to improve establishment of native vegetation by direct seeding.

The weight of the vine: Impacts of vine infestations on plant health

Kris French will study the impact of Madeira vine (*Anredera cordifolia*) and cat's claw creeper (*Macfadyena unguis-cati*) on the trees they climb over.

Other projects to receive funding include biological control of sea spurge (*Euphorbia paralias*), prickly acacia (*Acacia nilotica*) and Hudson pear (*Cylindropuntia rosea*), and ecological studies of cabomba (*Cabomba caroliniana*) and sagittaria (*Sagittaria* species).

There are projects on weeds of indigenous lands, on landholder decision-making, on weed containment, and on weed control adoption.

We are pleased to note that several of these projects are very strategic and interdisciplinary in nature, reflecting a growing recognition that weeds cannot be well managed without understanding the social environment in which they prosper.

More information

> The full list of projects can be found on the RIRDC website.

NSW closer to tougher weed regulations

New South Wales may introduce a permitted list approach to weed assessments.

As a long-time advocate for this approach – which requires plants proposed for introduction to pass a weed risk assessment – ISC was encouraged to see the proposal for a review to examine its feasibility included in the issues paper released by the NSW Government for its five-year review of the Noxious Weeds Act 1973.

ISC had prioritised this reform in the Creeping Peril report issued in 2010 and met with both the then Government and opposition parties to promote it.

ISC made a substantial submission in response to the review, jointly with other NSW environment NGOs.

STOPPING NSW'S CREEPING PERIL



Download the report

> Get Stopping NSW's Creeping Peril from our website.

We recommended the current legislation be brought up to date as environmental law by incorporating best practice elements such as ecological sustainability, the precautionary principle, a requirement for duty of care, and third party enforcement.

We advocated that threats of weeds to the environment be accorded more

recognition, with the environment department, the environment minister, and the Scientific Advisory Committee having a more substantial role in policy and regulation.

As mentioned, we emphasized the need to implement the principles of prevention and containment by a permitted list coupled with more comprehensive prohibitions.

The current approach in NSW as in most other states is to permit entry and trade without risk assessment of all but a small proportion of non-native species. This guarantees an escalating weed problem.

More information

> Email ISC for a copy of the submission.

> ISC backgrounder: Stopping weed invasions – a 'white list' approach.

Exporting misery when plants for aid turn weedy

The aid and development community has been responsible for some disastrous introductions of invasive species.

In Kenya, mesquite (*Prosopis juliflora*), promoted for afforestation and erosion control, has invaded cropland and pastures over wide areas, displacing people and livestock. In South East Asia, golden apple snails (*Pomacea canaliculata*) became major rice pests after they were promoted as food, despite tasting unpalatable.

In an article recently submitted to the journal *Biological Invasions*, ISC's Tim Low warned aid and agroforestry agencies that they must heed the warnings issued by invasion biologists about the risky species they are promoting. Mistakes continue to be made because of an unrealistic belief that 'miracle' crops such as jatropha (*Jatropha curcas*) can quickly lift people out of poverty.

History shows that 'special' plants that promise quick returns usually become sources of regret. The attributes of these plants that seem so desirable, such as rapid growth rates on degraded ground, are those of typical weeds.

Tim's article followed from an invitation to attend a conference in South Africa last October on weedy Australian acacias. Several Australian acacias have become major weeds in South Africa and elsewhere (including *Acacia cyclops*, *A. mearnsii*, *A. melanoxylon*, *A. saligna*), yet Australian acacias continue to be widely promoted around the world for agroforestry.



Golden wreath wattle (*Acacia saligna*) from Western Australia has become a weed all over the world, and especially in Africa.

Golden wreath wattle (*A. saligna*), for example, is widely planted as a fodder tree in North Africa despite a high tannin content that limits its digestibility for livestock, and despite being one of South Africa's worst weeds. Sown over 300,000 hectares, it lacks any real virtues apart from

rapid growth and hardiness.

New plants should not be treated as a form of technology transfer when they often end up being weeds donated as aid. (See our page 1 story for the risks to Australia of large-scale plantings of Australian Acacias.)

Cattle and weed spread...

...from p10

being constructed on major stock routes (Environment Waikato Regional Council 2010). There is no similar requirement in Australia and with the longer distances travelled and the more extreme climatic conditions of livestock transport, especially in wet weather, the spillage of excreta from transport vehicles is a regular occurrence. No information has been found on the extent of loss of faeces from livestock transport vehicles or of the spread of weeds that might result.

Seeds may be spread through waste from feedlots and abattoirs. The latter is

poorly recognised as a potential source of weed spread, say Hogan and Phillips, with disposal destinations including landfill, sewers and paddocks.

Live export

Hogan and Phillips raise concerns about live export spreading Australian weeds to other countries. Journeys of less than 100 hours to Indonesia and Malaysia would deliver animals still excreting weed seed from feeds eaten in Australia. Manure from destination feedlots is spread on the land.

Recommendations

Measures that prevent cattle weed spread:

- Washing machinery and vehicles and collecting the wash water.
- Providing animals with a seed-free diet for several days (at least three, preferably seven days) before transport
- Quarantining animals at the destination and collecting faeces, including that deposited during the trip, for safe disposal
- Replacing live export with meat export.

Reference

> Hogan J, Phillips c. 2011. Transmission of weed seed by livestock: a review. *Animal Production Science* 51: 391-398.

Eradicating despoilers of Lord Howe Island

One of Australia's most loved island paradises, Lord Howe Island, has more than its fair share of invasive species. **Sue Bower** reports.

Renowned for spectacular scenery, rich biological diversity and the most southern coral reef system in the world, Lord Howe Island World Heritage Area may also rank as the eradication capital of Australia. Three invaders have already been eliminated, and many more are targeted.

Like most islands, Lord Howe is highly vulnerable to invasive species. Numerous native species have been exterminated or are threatened despite more than 70 percent of the island being protected in a reserve and more than 85 percent vegetated. But its island status also provides the opportunity to completely eradicate certain invaders.

Part of NSW, Lord Howe is managed by the Lord Howe Island Board (LHIB), a statutory authority under the LHI Act 1953. Over the past 30 years LHIB has focused on managing invaders as the primary means to restore and protect the island's ecosystems. This is essential also to improve the island's resilience to climate change. The work involves eradicating the most problematic weeds and pests and implementing recovery actions for threatened species.

Introductions date from the 1820s when sailors released pigs and goats as a food source. Since settlement in 1834 cats and hundreds of exotic plants have been introduced.

Ship rats (*Rattus rattus*) were accidentally released in 1918 when the ship SS Makambo ran aground at Ned's Beach. The rats exterminated at least five endemic birds and 11 invertebrates. Many other species have also been affected, notably the endemic Lord Howe Island phasmid (*Dryococcus australis*), which was thought to be extinct until 2002 when it was rediscovered on Ball's Pyramid, 26 km south of Lord Howe. Rodents also affect plants by eating their seeds, seedlings and invertebrate pollinators.

Eradicating pest animals

In 1979 feral pigs (*Sus scrofa*) and cats (*Felis catus*) were eradicated, to the great benefit of the Endangered Lord Howe Island

Frontline stories: passionate people protecting Australia from invasions

With invasive species, the frontline is everywhere – on wharves, in bushland, in laboratories and offices.

The second frontline site featured in our new series is Lord Howe Island, where there is a concerted and highly strategic effort to eradicate weed and pest species threatening the island's precious biodiversity. Lord Howe has 113 plants, 6 vertebrates (1 bird species, 3 bird and 2 lizard subspecies) and several invertebrates found nowhere else.

Sue Bower writes here of the ambitious and inspiring 30-year project to rid Lord Howe of many of its worst invaders.



Sue Bower, Flora Management Officer with the Lord Howe Island Board.

woodhen (*Gallirallus sylvestris*), which was down to about 30 individuals and now numbers more than 300. Goats have also been effectively eradicated, with only three females left in the wild and a small non-reproductive population in captivity.

An additional three pest animals are targeted for eradication: the house mouse (*Mus musculus*), ship rat and African big headed ant (*Pheidole megacephala*). The rodent eradication project is based on methods developed in New Zealand. Cereal pellets with brodifacoum will be air-dropped over non-settled parts of the island and hand dispersed in settlements. Now in the final planning stages, the project is planned to proceed once approvals and funding are obtained. The eradication will benefit endangered species and allow for reintroductions of some bird species. One of the many benefits of rodent-free living will be no more rodenticides.

Invasive weeds

Over 600 exotic plants have been recorded on the island and 270 of these have invasive characteristics. They outnumber the 239 native plant species, of which 113 are endemic. Weed mapping in 2002/3 found weeds had spread into the southern mountains, a biodiversity hot spot.

The LHIB Weed Management Strategy provides for eradication of at least 15 priority species, based on a model

developed by the New Zealand Department of Conservation for Raoul Island in the Kermadecs. Eradication targets include three Weeds of National Significance - bitou bush (*Chrysanthemoides monilifera*), bridal creeper (*Asparagus asparagoides*), and lantana (*Lantana camara*) – as well as other species that are wind or bird dispersed and can colonise intact habitats. Over \$3.5 million dollars has been invested in weed removal from 1200 hectares since the Strategy commenced in 2004. Over 80 per cent of the Island has undergone primary treatment and nearly 70 per cent has received two follow-up sessions.

The island has been mapped into 414 management blocks across nine landscape units. Each block is systematically grid searched, and target weeds, are controlled using hand or spray techniques. To ensure all parts of a block are searched string line is set out and progressively followed. Weeds on cliffs and remote areas require abseil or heli based access.

In just over 100 years cherry guava (*Psidium cattleianum*) has spread to the northern hills and into the southern mountains. More than 600,000 individual plants have been removed since 2004. Recent Caring for Our Country funding allowed for control of a remote patch at high elevation on Mt Gower. Staff were trained in helicopter safety and winch access and the area systematically searched and controlled.



LHIB bush regenerator Jai Shick controlling a remote mature patch of the introduced cherry guava (*Psidium cattleianum*) on Mt Gower.

Significant financial investment from the NSW Environmental Trust, the Northern Rivers Catchment Management Authority and Caring for our Country has been vital in helping to progress the invasive species work. This work complements efforts by the LHIB and volunteers, especially the Friends of Lord Howe Island with over 30,000 volunteer hours invested to date.

The investments will be protected through the LHIB's plant importation policy, which prohibits the import of invasive species and requires a weed risk assessment for plants not previously known from the island. The LHIB is committed to funding bush regeneration positions and seek funding to realise eradication goals over a 30 year period.

New threats on the horizon

The threat of Myrtle Rust to the island's endemic Myrtaceae plant species, especially mountain rose (*Metrosideros nervuolsa*), is of great concern, as mountain rose is a dominant plant in the mountains and in the cloud forest.

Marine environment

LHI Marine Park consists of state and marine waters which together cover 300,510 hectares - the largest marine protected area in NSW. The marine environment is in a very fortunate position. Annual monitoring



Lord Howe Island phasmid (*Dryococelus australis*). Rodent eradication will enable this unique insect and other species to be repatriated back to the main island.

since 2006 has not detected any invasive marine pests. Lord Howe's isolation and limited visitation of vessels reduces the risk of marine invaders, but ongoing monitoring and quarantine are essential.

Lord Howe Island's unique terrestrial and marine ecosystems are certainly well worth protecting for current and future generations!

More information

- > DECC. 2007. Lord Howe Island Biodiversity Management Plan.
- > LHIB. 2006. Draft Lord Howe Island Weed Management Strategy. Report to the Lord Howe Island Board prepared by LeCussan . NB: The strategy is currently being updated.



LHIB bush regenerator John Trehy getting winched into the cherry guava hotspot on the north-west face of Mt Gower by Park Air. To access the site on foot is a 3 hour one way hike. Heli-access means fresh legs and more weeds controlled each day.

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.

PERSONAL DETAILS

Mr/Mrs/Ms/Other _____ First name _____ Surname _____

Address _____ Suburb/Town _____

Postcode _____ Tel (home) _____ Tel (work) _____ Mob _____

Email (please print clearly) _____

Affiliations _____

Don't send me ebulletins or news from the Invasive Species Council. **Yes**, I would like to help ISC with my skills. Please contact me.

REGULAR GIVING CONTRIBUTION

I would like to make a regular contribution* of \$20 \$50 MY CHOICE \$ _____

* Regular Giving donations are managed by direct debit only, with debit made on the 28th of each month. You will receive a tax receipt at the end of each financial year, and can stop or change your donation any time.

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