Feral Herald

Newsletter of the Invasive Species Council, Australia

Issue 25 September 2010

Myrtle Rust outbreak threatens NSW
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Bitou bush is just one of hundreds of weeds imperilling NSW wildlife.

Photo: Tim Parkinson, http://www.flickr.com/photos/timparkinson/

Report takes aim at NSW's creeping peril

The Invasive Species Council has launched a weed campaign in NSW with a reform agenda backed by more than 40 community groups and outlined in the report 'Stopping NSW's Creeping Peril'.

The NSW Government has committed to reducing the threats of invasive species by 2015, but its own review of progress has found that on current trends the target will not be met.

There are more than 1660 naturalised plants in NSW, of which over 340 are environmental weeds. The majority are unregulated and there are no restrictions on the entry of thousands of other species already in Australia (both exotic and native) that are weedy elsewhere in the country or overseas.

Download the report
> Get the full report from our website, www.invasives.org.au.

ISC is advocating the adoption of a permitted list approach (limiting new introductions to those assessed as low risk), eradication of new or potential weeds and containment to prevent spread into new areas, and prioritised control of other invaders. Other recommendations address the need for more funding, a general duty of care, implementation of the polluter pays principle, and more focus on weed management for climate adaptation.

ISC will also publish a report analysing the state and drivers of weed invasion in NSW and the adequacy of current responses.

ISC is very grateful for the financial and other support provided by the Paddy Pallin Foundation, through Rob and Nancy Pallin, and several other donations. We need further funding to sustain this campaign, so please, consider donating.

ISC staff working on this campaign are Andrew Cox (but about to leave for a year's volunteering on Solomon Islands) and Carol Booth, with assistance from John Sampson and Tim Low.

Stopping NSW's Creeping Peril can be downloaded from the ISC website.

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Fungus threatens nightmare outbreak

The discovery of myrtle rust on coastal NSW could herald the arrival of a dangerous new player threatening Australia's native biodiversity.

A nightmare scenario for Australia would be the arrival of a disease affecting eucalypts, tea trees, and other trees and shrubs in the family Myrtaceae, the biggest plant family in Australia, dominating numerous ecosystems, including forests, woodlands and wetlands.

This nightmare could be unfolding right now with an outbreak of myrtle rust (*Uredo rangelii*) on NSW's central coast in NSW. Since being reported in April 2010, the rust (a type of fungus) has been found infecting eight cultivated native species on six commercial properties (cut flower farms and wholesale nurseries). Native eucalypt forest adjoins the property where the rust was first discovered.

The most feared disease of eucalypts, eucalyptus rust (also known as guava rust, *Puccinia psidii*) has been spreading around the world from its native South America, and was reported in Hawaii in 2005. It can infect a wide variety of Myrtaceae species and has caused severe disease in Australian species grown overseas.

The myrtle rust just discovered in Australia is closely related to the eucalyptus rust, part of the same complex of rusts known to infect Myrtaceae. It was first described only in 2006 and recorded in Argentina and Jamaica, and little is known about it. Some of the overseas disease outbreaks attributed to eucalyptus rust may have involved myrtle rust instead. Plants that could be susceptible include those in the following genera: *Acmena, Angophora*, *Austromyrtus*, *Eucalyptus*, *Leptospermum*, *Melaleuca*, *Syzygium*, *Xanthostemon*.

Rust diseases can spread very quickly, with spores blown by the wind or picked up by bees and other animals (including humans). In Hawaii, eucalyptus rust was first reported in April 2005, and had spread to all but one island by the end of the year. In Jamaica it reportedly spread over 5000 km^2 within one year. Once a rust has spread into bushland, eradication is usually impossible.

The authors of the paper reporting the outbreak of myrtle rust in Australia, Angus Carnegie and colleagues, suggest it "may have a serious impact on native plant communities and on plant industries based on members of the family Myrtaceae".

As yet, there have been no tests to determine which species in Australia are susceptible to infection by myrtle rust. Of the 83 native Myrtaceae species tested with eucalyptus rust in Australia, 73 (88%) showed some degree of susceptibility. There are 1646 native Myrtaceae species known in Australia, including more than 140 that are federally threatened. If those testing results are indicative of Myrtaceae species generally and apply also to myrtle rust, this recent incursion could seriously impact on many Australian ecosystems. Morag Glen and co-authors of a review of eucalyptus rust point out that even species with low levels of susceptibility can play "a significant role in maintaining the pathogen and facilitating its survival and spread".

The eucalyptus rust kills shoot tips, which can lead to the death of young trees, and has caused extensive damage in eucalyptus plantations, with the loss of almost entire plantings in Brazil. In Hawaii, the disease has caused severe dieback of the common paperbark (*Melaleuca quinquinervia*), infecting it at all ages.

Predicting the impact of any of these rusts in Australia is very difficult, according to Glen and colleagues. New pathogens can have severe unpredictable impacts, and the eucalyptus rust has dramatically increased its host range following its arrival in new areas. The rust is thought unlikely to kill mature trees, but could affect regeneration and have long-term effects on biodiversity and ecology. Genetic diversity could be greatly reduced in highly susceptible species, and the composition of affected ecosystems could change.

Analyses of areas thought to be climatically suitable for eucalyptus rust in Australia show the highest-risk areas to be on the east coast of Australia and across the top of the Northern Territory.

It's not known how myrtle rust entered Australia, but it highlights the inevitable risks associated with importing live plants. Australia permits the entry of Myrtaceae plants as nursery stock from many different countries, but not from the United States and other countries known to host eucalyptus rust or *Phytophthora ramorum*.

The Invasive Species Council questions whether any imports of Myrtaceae species should be permitted, because of the potential for pathogens to spread into new countries and escape detection until it is too late, and for the potential for new pathogens to arise. Lloyd Loope in a review of eucalyptus rust in Hawaii notes of another eucalyptus pest, *Leptocyble invasa* (the blue gum chalcid wasp), that it "represents the phenomenon of new pests spreading ... and being described as a new species elsewhere before even being discovered in Australia".

The incursion also highlights the risks of siting commercial plant operations next to bushland. The property where the rust was first detected borders eucalypt forest and has eucalypts growing on the property. ISC recommends planning laws establish conditions for commercial plant operations that limit risks of pathogen spread into bushland by requiring buffer zones.

The NSW Government has responded to the incursion by declaring a Quarantine Area in the Gosford and Wyong local government areas, and is conducting surveillance in surrounding nurseries and bushland. The federal and other state governments have agreed to contribute funds for an eradication attempt.

ISC has been concerned that the response has been slow, with quarantine restrictions only imposed four months after detection, but is pleased that the incursion is now recognised as a national priority. Most states have announced movement conditions for cut flowers and nursery stock of Myrtaceae species.

The NSW Government is asking community members to keep an eye out for signs of the disease (see box for description).

It is vital to do as much as possible to eradicate the rust and prevent further incursions. There are probably hundreds or thousands of different genotypes of myrtle and eucalypt rusts, some of which would be more invasive and infective than others, and which in combination could have catastrophic impacts.

ISC has written to the federal and state governments to urge a comprehensive response to this incursion and strong measures to prevent further incursions.

Feral Herald

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Feral Herald is produced by the Invasive Species Council. We welcome story ideas and contributions.

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Views expressed in this newsletter are not always those of ISC.

ISSN 1449-891X

Keep your eyes peeled for myrtle rust infection

Myrtle rust infects leaves of susceptible plants producing spore-filled lesions on young actively growing leaves and shoots, as well as fruits and sepals.

Leaves may become buckled or twisted as a result of infection.

On turpentine and callistemon rust lesions are purple in colour, with masses of bright yellow or orange-yellow spores. Older lesions may contain dark brown spores.

Reports of potential sightings can be made by calling the Exotic Plant Pest Hotline 1800 084 881.

Myrtle rust growing on *A. flexuosa* (willow myrtle cv. Afterdark).

Left, the top and underside of willow myrtle leaves infected by myrtle rust.

Right, newly formed bright yellow pustules of myrtle rust on turpentine, *Syncarpia glomulifera*.

Information taken from Industry & Investment NSW. Photos courtesy CSIRO

The risk of new plant pathogens arriving in Australia

"As native, locally adapted plant communities evolved, guilds of unique pathogenic microorganisms, viruses and viroids evolved in association with them. Today these organisms often cause little noticeable damage to their host plants, having developed a natural balance through co-evolution. However, major problems may arise if a pathogen escapes – or is introduced – to another region of the world where the native plants have little resistance and the pathogen has eluded its natural enemies. Such events can trigger damaging disease episodes that may also have long-term negative impacts on the environment, economy and cultural heritage. Movement of plants and plant products between biogeographical zones by human activities is now generally accepted to be the primary mode of introduction of exotic pathogens and pests."
– CM Brasier 2008

Potential pathways for rust incursions (the spores of eucalypt rust can remain viable for at least two months outside hosts):
> Importation of Myrtaceae products, including plants, seed, pollen, flowers, timber products.
> Illegal movement of plant material.
> With travelers, on clothing or luggage.
> Dispersal on air currents.

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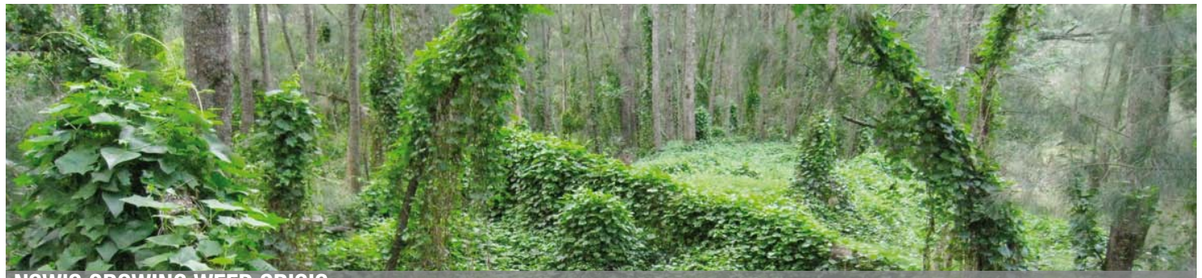

Cape Ivy. Photo: Andrew Cox

NSW'S GROWING WEED CRISIS

STAGES OF INVASION PROCESS	INTRODUCTION	ESTABLISHMENT	INVASION – PROLIFERATION	INVASION – IMPACT
NUMBERS	~11,000 exotic and native plant taxa introduced for cultivation into NSW. ~30,000 exotic plant taxa in Australia.	~1665 species naturalised (25% of NSW flora, 14% of introduced taxa).	>340 environmental weeds.	**~130 impacting threatened biodiversity.** **134 ranked moderate-extreme threat.**
MANAGEMENT OPTIONS	Prevent introduction/ escape, eradicate if escaped.	Eradicate if feasible, otherwise contain and control to prevent spread.	Contain and control to prevent spread.	**Control to protect biodiversity and other values.**
CURRENT MANAGEMENT	No restrictions on sale/ movement of most species; no requirements for risk assessment of introductions.	No state eradication programs in NSW.	No restrictions on sale/move-ment of majority of environmental weeds; Some successful programs but insufficient control to prevent spread of many serious invaders.	**No restrictions on many threatening weeds; good control focus in national parks; insufficient control in many other locations.**

Report takes aim at NSW's creeping peril…

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NSW's wicked weed statistics

Number of species naturalised in NSW (established self-sustaining populations in the wild):

- At least 1665 plant species have naturalised in NSW (cf Australia: at least 3100 naturalised species).
- Naturalised species now constitute about 26% of NSW's total vascular flora (cf Australia: about 14% of total vascular flora).

Rate of naturalisations

- An average 7.2 species have naturalised every year in NSW since European colonisation in 1778 (cf Australia: average 13.4 species/year).
- The rate of naturalisation has increased in recent decades: an average 20 newly naturalised species a year have been recorded since 1990 (although that is due partly to more rigorous botanical searches and more comprehensive record-keeping) (cf Australia: an average 45 new species recorded naturalised/ year since 1990, again due in part to better records).

Number of environmental weeds in NSW

- At least 340 weeds (about 20% of naturalised species) have been assessed as having a 'significant impact' on NSW's environment; 135 species are rated a moderate to extreme threat (cf Australia: about 30% of naturalised species are considered a 'major problem' and 50% a 'minor problem' for natural ecosystems, about 16% are a major problem for agriculture).

Weeds threatening biodiversity

- In 2006, weeds were ranked as the second-biggest threat to NSW biodiversity, after land clearing, and equivalent to inappropriate fire regimes.
- At least 127 weed species are an identified threat to threatened species or endangered ecological communities listed under NSW legislation. This is a considerable underestimate, due to lack of information about the impacts of many weed species.
- At least 341 threatened species (40% of the total listed under NSW legislation in 2006) are threatened by weed invasion.
- At least 64 endangered ecological communities (89% of the total listed under NSW legislation in 2006) are threatened by weed invasion.

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The Kroombit tinker frog is hanging on for survival in a few patches of rainforest near Gladstone, Queensland. Photo: Harry Hines

Koombit tinker frog – assaults on a survivor

Tim Low
ISC Project Officer

Several Australian frog species have recently become extinct from amphibian chytrid fungus (*Batrachochytrium dendrobatidis*), a pathogen believed to be indigenous to Africa. Now one endangered survivor is facing a new invasive threat.

The Kroombit tinker frog (*Taudactylus pleione*), only named in 1986, is found in a few patches of rainforest at Kroombit Tops near Gladstone in Queensland, totalling just 140 hectares. Its disappearance from the largest patch of rainforest in about 1997 is attributed to chytrid fungus.

The surviving populations occur in smaller patches of rainforest along steep drainage lines. The frogs survived in these places, it is thought, because there is too little surface water for other frog species, which serve as reservoirs for the disease.

But now it is threatened by feral pigs, grubbing and wallowing in the muddy drainage lines. They invaded the frog's habitat only about ten years ago.

A third and longer term threat is climate change, which could reduce water flows in the gullies, and increase the intensity of fires that burn deep into the narrow rainforest strips. A wildfire in 1984 caused significant damage to some of the rainforest patches.

Kroombit Tops National Park is about 120 km south of Rockhampton.

The Queensland National Parks and Wildlife Service wants to control the pigs but they are very difficult to trap or shoot in the steep terrain, and seldom take poison baits.

A tour to Kroombit Tops to hear about the pig problem was part of the Queensland Pest Symposium held in Gladstone in August. It was an opportunity for pig experts to come together with the parks service to discuss control options.

Unfortunately, there is no easy way to control pigs, and the parks service has a very limited budget. The patches of rainforest the frog survives in are very insubstantial and difficult to access. The two we visited both showed recent fire damage.

I came away thinking that the Kroombit tinker frog is likely to find its way onto Queensland's extinct list.

Feral cattle and feral horses were also threats to the frog, but no longer, for the simple reason that the frogs now survive only on land too steep for them.

FROM THE PRESIDENT

Steve Mathews

Hello everyone, there is quite a bit of news to report from ISC.

Firstly, the we are about to appoint a new coordinator, as Carol Booth needs more time to work on other projects. We have been incredibly lucky to have had Carol work with us these last couple of years. She has worked extremely hard, far beyond 'the call of duty', and has consistently produced timely work of the highest possible standard. We are extremely grateful for her enthusiasm, vision, ability and input. Luckily for us, she has very kindly offered to continue to help ISC in the area of invasives policy and lobbying.

ISC received more than 50 applications for the position of coordinator, and the interview panel was very impressed and gratified by the standard of applicants.

It was very difficult for the panel to decide as there were many well-qualified applicants with a passion for the job. We hope we can employ some of the candidates in future roles as we increase our resources.

It is gratifying to have so many people with a desire to work in conservation on invasive species issues. We will introduce the new coordinator to members and colleagues soon.

ISC's strategic plan

We have been very fortunate to have assistance from Andrew Cox and Carol Booth in preparing ISC's five-year strategic plan (2010-2015) – both have worked extremely hard to see this process through from start to finish.

Andrew has given his time freely and both of them have done a fantastic job.

The plan refocuses our efforts on tackling the large and complex invasive species problem. We will focus on three main objectives:

1. Build ISC's (organisational) capacity for powerful advocacy.
2. Build strong public support for effective action [on invasive species]
3. Achieve law, policy and program reforms in high priority areas.

The strategy is essential in setting the direction for our work and explaining our reform agenda to supporters and funders.

The strategy also sets out a new structure for ISC, which focuses on building our supporter base. All members will receive a letter outlining the changes.

Please email ISC isc@invasives.org.au to receive a copy of the 5-year strategic plan.

Thank you again to Andrew Cox and Carol Booth for their fantastic work on this strategy, to Karen Alexander and Robert Perey for advice, to members and supporters who completed the online survey, and to the ISC board members for their participation in developing it.

Funding

We have had a number of generous donations from members and supporters, to help us with our work. This has been very encouraging, and gives us all the confidence that we have the support from our members to continue our work.

Many, many thanks to those who have made donations to ISC – you are helping continue the fight to get invasives issues adequately addressed.

ISC's AGM

ISC's AGM will be held on 8 September, 5.45 pm at Space 39 Gallery, Level 2, Little Collins St, Melbourne.

Unfortunately a talk by Professor Tony Peacock, CEO of the Invasive Animals CRC, has been cancelled.

We are also seeking people to serve on the board. In particular, we need someone prepared to act as secretary. Please contact ISC isc@invasives.org.au for information about the board and to discuss your interest.

I will be retiring as ISC president at the AGM. It has been a very gratifying role and a pleasure working with really excellent people such as Carol, Tim Low and John Sampson, as well as the members of the board.

Thanks to everyone for working so hard and giving up so much of your time to achieve progress in the area of invasives.

I strongly urge your continued support for ISC and its advocacy on invasive species. I believe this is the best way to make widespread gains for biodiversity conservation. Despite being recognised as one of the top threats to biodiversity, if not the most serious threat, it is still vastly under-represented in terms of conservation focus, and still just seems to slip under the radar of NGOs, government and the community in general. It is up to us to change this scenario.

Update on federal biosecurity work

The federal election has delayed a Federal Government response to the 2009 Hawke review of the *Environment Protection and Biodiversity Conservation Act 1999*. Environment groups, including ISC, have made joint and individual recommendations to the government to adopt most of the recommendations.

There was uniform joint support for the reforms relevant to invasive species, which received a strong focus in the review due to ISC advocacy. More than 30 weed scientists also wrote a joint letter to the government supporting the Hawke review proposal for a COAG process to develop post-border protocols for invasive species.

New federal biosecurity laws

New federal biosecurity laws to implement the recommendations of the 2008 Beale review of quarantine and biosecurity are being drafted, but have been delayed due to other government priorities.

ISC's Carol Booth has been participating in a working group established by the Federal Government to respond to proposed reforms. While the new independent Biosecurity Authority proposed by the Beale review will be provided with broad powers and flexible tools, ISC is concerned that there will be insufficient environmental focus. We have recommended that the environment minister be accorded authority in the new regime (to make appointments and set policy) similar to that of the agriculture minister.

Greater powers for the environment minister in federal biosecurity is consistent with recommendations by Dr Allen Hawke, in the review of the EPBC Act.

He has recommended that biosecurity responsibilities in the EPBC Act (concerning the assessment of live imports) be transferred to the new biosecurity agency provided the environment is given sufficient priority in the new arrangements.

The federal and state/territory governments have been negotiating a new biosecurity agreement, which will include new cost-sharing arrangements for incursions.

ISC gets big response to online survey

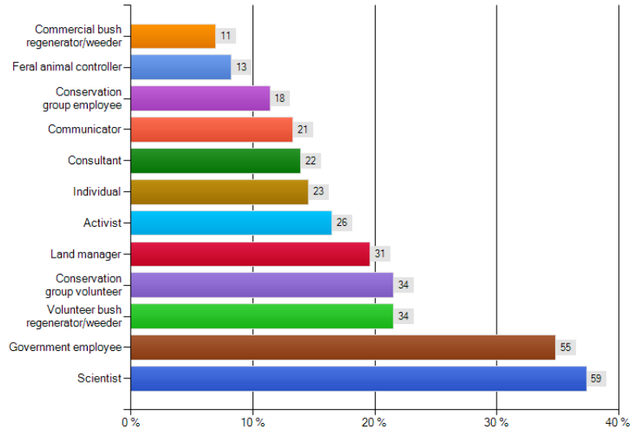
Andrew Cox

We were delighted by how many people responded to our online survey in May. A total of 158 people participated, including 30% who were members, while the rest were extremely interested in our work.

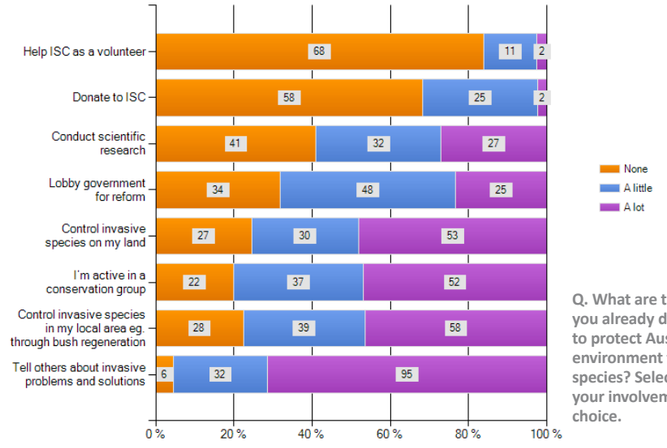
The survey yielded useful results that have already helped us develop a new five-year plan.

Respondents come from a broad range of backgrounds and are very active on invasive issues, mostly weeds. Just over half are active on their land and in their local area controlling weeds. Most (95%) are actively telling people about invasive issues.

Most respondents said they are willing to continue to help on invasives issues, and 40% or more would like to help 'a lot' when it comes to lobbying government for reform, controlling invasive species in their local area and on their land, conducting scientific research and telling others about invasive problems and solutions.



Q. How would you describe your role in relation to your interest in invasive species? Select one or more.



Q. What are the main things you already do to contribute to protect Australia's environment from invasive species? Select the extent of your involvement for each choice.

The response to ISC's performance on five difference indicators averaged about 4 (very good) on a scale of 0 to 5. The *Feral Herald*, the quality of our work, then *Double Trouble* were rated highest, while our fundraising letters were rated the lowest.

We received more than 200 suggestions for what people regard as the most pressing issues in the future. Of course many of the issues raised were similar. The most frequent response was climate change and new weeds.

Interestingly, 10% of our respondents were from overseas, from countries such as Canada, Kenya, the Philippines, USA and New Zealand. We had good representation from most Australian states, except NT and Tasmania, with Victorians being the strongest.

We received a huge range of general comments and feedback about our work through the survey. One person said: "There is a strong strategic need for the ISC, so great to see you working on keeping the dream alive" while another said ISC "should continue & expand the independent research, publication, lobbying & publicising of issues". In expectation of greater things, another said "I would like the Council to be more media savvy and pro-active politically. Independent (non-paid, volunteer) science needs to have a voice that is different from government and consultancy (paid) science.

Thanks all who contributed to the survey. While we can't respond to all the ideas and offers of help, we have thought long and hard about the issues you raised and will remain on the path of continued improvement.

Top science gong for feral crusader

Professor Tony Peacock received one of Australia's top science awards, the prestigious Australian Museum Eureka prize, in Sydney last month.

Chief Executive Officer for the Invasive Animals Cooperative Research Centre based at the University of Canberra, Professor Peacock took out the gong for the highly contested category of 'Promoting Understanding of Science'.

The award recognises his efforts to investigate and communicate the devastating effect feral animals have on Australia's environment.

One of Professor Peacock's priorities is stopping the next wave of feral animals – hybrid pets, animals with a mix of wild and domestic genes – from making it into Australia.

His repeated warnings of the likely devastating impact of Savannah Cats on Australia's environment convinced the Federal Government to ban their importation in 2008.

Invasive Animals Cooperative Research Centre CEO Professor Tony Peacock received an Australian Museum Eureka prize last month.

Giant reed, a fuel for super hot, giant fires

Proposals to plant giant reeed (*Arundo donax*) as a biofuel in Australia combine two of ISC's major concerns in recent years – hot-burning invasive grasses and weedy biofuels.

Gamba grass (*Andropogon gayanus*) and other large invasive grasses produce very hot fires when they burn, often killing shrubs and trees, and facilitating further invasion of the grasses via a fire-driven cycle of invasion. In recent reports about climate change and fire (see Bradstock 2010 and Williams et al. 2009), the potential of these grasses to increase fire risk has received much emphasis.

Weedy biofuels have the potential to invade vast areas because enormous plantings will be needed to make any dent in greenhouse gas emissions. The two crops concerning us most have been giant reed and jatropha (*Jatropha curcas*) (see ISC's report on weedy biofuels by Low and Booth 2007).

Giant reed is a much larger grass than gamba grass, and we have been aware of it fuelling very large fires in California, a problem that has now been properly documented. In a recent article in Biological Invasions, Gretchen Coffman and two colleagues at the University of California assessed its success following fire.

After a 2003 wildfire burned through riparian woodlands along the Santa Clara River, Coffman and colleagues found that recovering giant reed grew 3-4 times faster than native woody plants, reaching 2.5 metres height within three months of the fire.

'One year post-fire, *A. donax* density was nearly 20 times higher and productivity was 14–24 times higher than for native woody species,' they reported.

Giant reed resprouted much faster than native plants, making good use of the nutrients released by ash. A year after the fire it made up 99% of the post-fire vegetation.

Giant reed is valued as a biofuel because it grows so fast – as much as 10cm in a day – which also explains its success as a weed. The finding that it is a fire-exploiting grass provides another reason not to grow it.

In 2009 the South Australian government ended trials of giant reed after a series of complaints from ISC (see *Feral Herald* 24), but interest has emerged from other quarters.

In January 2010, Norwegian company ENEnergy was reported on ABC News to be proposing to plant more than 300,000 hectares of giant reed in northern Australia. The company's website lists three field development projects underway or in planning in Australia.

Australia has the most flammable vegetation in the world, and the most to fear from an increased fire risk under climate change. But climate change has become a justification to grow a flammable grass, when it should be an additional reason to ban it. Giant reed is on the IUCN list of '100 of the World's Worst Invasive Alien Species'.

Giant reed, proposed as a biofuel in Australia, has been fuelling very large fires in California. Photo: John Sullivan, http://www.flickr.com/photos/mollivan_jon/

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Fox detection in Tasmania boosted by DNA lab

Detection of foxes in Tasmania was given a boost last month with the opening of a new DNA testing lab at the University of Canberra.

The lab will allow scientists to study samples of biological material, like scat, hair, or bone, that contain only small amounts of DNA or have DNA that is degraded.

Professor Stephen Sarre, Deputy Director at the Institute for Applied Ecology at the University of Canberra, said it would enhance work the university is already doing to detect the presence of foxes in Tasmania using scats collected on the island.

The lab will focus on the study of Australian wildlife and many invasive species such as feral cats, foxes, deer and pigs.

Professor Stephen Sarre with a storage unit that holds DNA samples in the new laboratory.

DNA testing of a scat collected from North Bruny Island off Tasmania has confirmed it comes from a fox, precipitating intensive monitoring on the island.

Anything for a view

In coastal areas, bushcare groups often find their work vandalised by landowners trying to keep ocean views.

Some councils reduce the incentive for such vandalism by erecting a barrier similar in size to any trees lost. However, NSW's Shoalhaven Council has decided to prioritise views over bush regeneration.

In late July they asked for a new bushcare policy that preserves ocean views, removes some existing buschare plantings and uses buffalo grass (*Stenotaphrum secundatum*) as anti-erosion vegetation.

Buffalo grass is an environmental weed that invades forests, open woodlands, and coastal areas. Local bushcare volunteers are outraged, and ISC is supporting their endeavour to have the decision reversed.

You can help by writing to The General Manager, Shoalhaven City Council, at PO Box 42, Nowra NSW 2541.

Australian islands deserve tougher national protection

With more than 8300 offshore islands in Australia we need a nationally consistent approach for the protecting them from invasions, writes **Ray Nias**.

Expensive efforts to control invasive species on islands in Australia are evidence we need a more comprehensive and strategic biosecurity regime for Australian islands at risk.

WWF Australia and Reef Catchments Mackay Whitsunday Inc, with support from the Invasive Species Council and other groups, produced a proposal for such an initiative to coincide with the Australian federal election and review of the Caring for our Country program.

The proposal argues that for a modest investment of around $1 million Australia could establish a strategic framework for island biosecurity based on an assessment of island biodiversity values and a risk assessment approach to potentially invasive non-indigenous species.

Of the 8300 offshore islands in Australia it is likely that the vast majority are directly relevant to one or more Matters of National Environmental Significance under the EPBC Act. The Commonwealth should therefore take a leadership role in developing a nationally consistent approach and standards for the prevention of invasion, early detection and rapid eradication of organisms that threaten island ecosystems through a National Island Biosecurity Initiative that includes:

- Establishing biosecurity priorities for all islands based on their ecological values and risk assessment.
- Development of biosecurity management systems for all islands. High priority and high risk islands (e.g. those with development or people living on them) should have an individual biosecurity management system; those with a lower risk can be managed via regional management systems.
- Biosecurity management systems that include both the prevention of incursions through quarantine approaches and establishment of systems to control importation of species for domestic and agricultural purposes. Biosecurity management systems should cover both terrestrial and marine organisms.
- Regular surveillance of high and medium priority islands, e.g. those with populations of threatened species that would be threatened by an invasive species such as cats or rats, and occasional surveillance of lower priority islands.
- Best practice approaches developed and/or modified from existing resources and appropriate training for island managers.
- Establishment of ready response capability including the ready availability of equipment.
- A range of tailored education programs targeted at island dwellers and visitors.

A National Island Biosecurity Initiative could lay the foundations for an effective, nationally consistent approach to post-border island biosecurity assisting directly in the prevention of extinction of hundreds of threatened species and ecosystems and protection for globally significant populations of migratory species.

– Ray Nias is from TierraMar Consulting

More information

> The proposal is available from the Island Arks website, www.islandarks.com.au. Comments about how to promote the concept as well as suggestions for additional proposals to address island conservation and sustainable use are welcome.

Kakadu mammals in deadly decline

A 13-year survey program (1996–2009) in Kakadu National Park has found a catastrophic decline in small mammals, probably due in large part to invasive species and too frequent fires.

John Woinarksi and co-authors reported in *Wildlife Research* earlier this year that there had been a 71% decline in small mammal abundance and a 54% decline in the number of species observed (trapping, spotlighting, scats) in each study area.
The number of areas where not a single mammal was observed increased from 13% in 1996 to 55% in 2009.

The most marked declines were for the northern quoll (*Dasyurus hallucatus*), fawn antechinus (*Antechinus bellus*), northern bandicoot (*Isoodon macrourus*), common brushtail possum (*Trichosurus vulpecula*), and the pale field-rat (*Rattus tunneyi*).

It is "disconcerting", the authors say, that these declines have occurred in one of Australia's "largest and best-resourced national parks", and that many of the declining species are "closely related in ecology or taxonomy to the mammal species that became extinct elsewhere in Australia over the period of ~1860–1960."

Apart from the known impacts of cane toads on northern quolls, there is little evidence to point to any particular causes for the declines. Cane toads may be affecting other carnivorous mammals, but they were in decline before the arrival of toads.

The nationally endangered northern quoll is particularly susceptible to cane toad poison.
Photo: Wildlife Explorer, http://picasaweb.google.com/wildlifeexplorer.oz

Fire is likely to be a major factor, but cannot alone explain the rapid decline because frequent fire has been characteristic of the park for at least 30-50 years.

Feral cats could be a major factor. Although cats have been present for more than a century, numbers may have increased recently due to loss of dingos infected with heartworm.

There is no evidence for disease, but the authors note the increasing presence of black rats (*Rattus rattus*), which carry parasites that have previously affected native species, including two endemic Christmas Island rats rendered extinct.

Threats are likely to be operating in tandem – for example, predation by cats is likely to be more intense in extensively burnt areas.

The authors call for "an urgent management response", including a substantial reduction in the extent and frequency of fire and research to determine the relative contribution of predation by cats, poisoning by toads and disease to the declines.

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Woinarski JCZ, Armstrong M, Brennan K et al. 2010. Monitoring indicates rapid and severe decline of native small mammals in Kakadu National Park, northern Australia. Wildlife Research 37: 116–126.

Exotic species sold online inherently risky

In 2006, New Zealand authorities seized 16 smuggled lizards advertised for sale on the NZ version of eBay. They included emerald tree monitors infected with a protozoan and iguanas infected with a Salmonella serotype, both new to New Zealand. This was one example of the risks of online trading in exotic species provided in a brief overview by Jose Derraik and Simon Phillips.

They warned that online trade in frogs is increasing risks of establishment when people tire of their pets and release them (despite it being illegal), and facilitating the spread of chytrid fungus (*Batrachochytrium dendrobatidis*).

The aquarium trade is particularly high risk. The invasive seaweed *Caulerpa taxifolia* has had dramatic ecological and economic consequences in many parts of the world after being released from aquaria. It can be readily obtained over the internet both in New Zealand and from overseas.

In New Zealand (and in Australia), no single authority has responsibility for monitoring online auction sites, so detection of illegal sales is ad hoc.

One test of the likely extent of internet trade in illegal aquarium products in the United States (reported by Maki & Galatowitsch in 2004) suggested the risks are high. The researchers found that more than 90% of orders for prohibited aquatic plant species were fulfilled and that more than 90% of orders contained a plant or animal species not requested, including noxious weeds. There were misidentified plants in 18% of orders and unordered seeds in 43%.

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Australian biosecurity should be a team effort

Carol Booth
ISC Policy Officer

Although invasive species are one of the big threats to Australian biodiversity, most regulatory authority resides within agricultural agencies, because until recently quarantine and biosecurity were focused primarily on agricultural threats.

This means that the role of environmental agencies is often limited to control programs in national parks and for threatened species. In some cases, environmental agencies or ministers are reduced to lobbying their agricultural counterparts to ban or eradicate an environmentally threatening invader.

Invasive species are undoubtedly a major threat to agriculture and the most expensive natural resource management problem for farmers, costing well over $5 billion a year in lost production and control, so it is appropriate that agricultural agencies have a major role in invasive species management. However, the environmental impacts are at least as serious.

The most effective institutional arrangement would reflect the importance of invasive species in each domain, and provide authority to each agency to manage species that threaten relevant portfolio responsibilities. The overall goals should be to promote greater cooperation between the agencies, ensure priority environmental and agricultural threats are addressed, and strengthen the priority given to biosecurity within governments and budgets.

ISC does not imply that agricultural ministers, departments and individual officers are not committed to conservation. Some are staunch conservationists, some aren't. However, institutional arrangements should maximise the potential for both environmentally and agriculturally responsible decisions, no matter which individuals make the decisions. There is greater potential for this if environmental agencies have a strong role.

At the federal level, as the government implements the recommendations of the Beale review of quarantine there is good potential to set in place new arrangements that accord authority to both environmental and agricultural ministers. ISC has recommended that both ministers have powers to appoint commissioners and set policy for the new proposed Biosecurity Authority.

Download the report
> Get our report, Weedy Pasture Plants for Salinity Control from our website, www.invasives.org.au.

Here are some of the issues that should inform institutional arrangements for biosecurity.

Conflicts of interest

Agricultural agencies can have conflicts of interest over agricultural plants that threaten the environment. This is manifest in the case of tall wheat grass in Victoria (see ISCs report 'Weedy Pasture Plants for Salinity Control'), which was released by the primary industries department with no risk assessment, and which the government is refusing to regulate despite the grave risk to many threatened species and ecosystems.

Funding

If both environmental and agricultural agencies have a strong stake in biosecurity as part of their portfolio responsibilities, there is potential for bigger budgets with two agencies jointly promoting reforms and bidding for funds.

Numerical weighting

Invasive species threatening or potentially threatening biodiversity outnumber those that threaten agriculture, because there is a greater diversity of natural environments than there are agricultural systems.

Groves and colleagues (2003) estimated that about 30% of naturalised plant species are a "major problem" for managers of natural ecosystems, compared to 16% for agriculture (see 'Weed Categories for Natural and Agricultural Ecosystem Management'). Most newly invading species are environmental rather than agricultural threats. Current lists of declared species mostly do not reflect the greater number of environmental threats. Most weed threats to the environment are not regulated.

Key threatening processes

Invasive species constitute the greatest proportion of declared threatening processes, but remedies rely in many cases on agricultural authorities. If the Victorian environment agency declares tall wheat grass a threatening process (see *Feral Herald* issue 24), it will have no authority to regulate sale and use of the species. The agency can spend taxpayers' money controlling a threatening invader another agency continues to promote or ignore.

Agency culture and priorities

The mission statements of most agricultural agencies typically do not mention the natural environment, which is often a low priority within the department overall. For example, the official purpose of the Victorian Department of Primary Industries is "to sustainably maximise the wealth and wellbeing" generated from primary industries. Environmental advocacy groups are often not regarded as important stakeholders by agricultural ministers, advisors and departmental managers, who are selected mostly for their experience with agriculture rather than biodiversity.

Public good balance

Protecting the natural environment from invasive species is much more dependent on government involvement as a public good than is protection of agriculture because there is little commercial incentive to protect biodiversity.

Conservation advantages

Increasing the responsibility of environmental agencies for environmental invaders is consistent with the need to focus conservation across landscapes, not just in the patches of habitat represented by national parks. The environmental threat of invasive species warrants a role for environmental agencies more extensive than that of a land manager. It would also assist constructive interactions with vegetation management (usually regulated by environmental agencies) and raise the profile of invasive species threats within conservation circles. Biosecurity for both environment and agriculture could benefit from a joint regulatory approach and much greater shared responsibility.

How many invaders are there?

We should find it amazing that Australian authorities do not know how many naturalised and invasive species are in the country.

But it is not amazing at all when you consider that the number of native species is also unknown.

Between 2006 and 2009, close to 9000 new plant species (excluding algae) were added to the Australian list, and there could be another 1300 undiscovered plant species, and another 130,000 insects (triple the number currently known). According to Arthur Chapman, who compiled the native species tally for the Australian Government in 2009, there are 147,579 accepted described species in Australia but the estimated total is quadruple that at more than 560,000.

In the table, right, we have done our best to tally up the number of introduced, naturalised and invasive species in Australia. Unsurprisingly, the most accurate numbers available are for vertebrate animals and plants, and there are not even estimates available for invertebrates (however, Tasmania's state of the environment report lists close to 1000 exotic invertebrates, suggesting a total for Australia in the many thousands).

As a proportion of the Australia biota, introduced species contribute the highest diversity to plants, constituting about 14% of known species. Introduced species also make up a large proportion, about 13%, of Australia's freshwater fish species.

West Australian weed officer Rod Randall, who maintains a global database of weeds, has recorded more than 30,000 of the world's plant species as having naturalised (established in the wild) somewhere on the planet. This constitutes about 8% of the world's known flora (vascular plants), a testament to the mind-bogglingly extensive transportation of plants outside their natural range in the ongoing McDonaldisation of the world's biota.

Photo: Matthew Baker

INVASIVE SPECIES IN AUSTRALIA – NUMBERS, PATHWAYS & COSTS

	Plants (vascular only)	Vertebrates (birds, reptiles, amphibia, mammals)	Fish (freshwater)	Invertebrates (terrestrial & freshwater)	Marine organisms	Micro-organisms & fungi
Introduced – exotic species	>30,000	~650 (including in captivity)	~1200	Thousands	Thousands	Thousands
Introduced – native species	>12,000	Unknown	>50	Unknown	Unknown	Unknown
Major pathways of introduction	Mostly deliberate: horticulture & agriculture	Mostly deliberate: agriculture, hunting, pets, acclimatisation	Mostly deliberate: aquarium trade, fishing, ballast	Mostly accidental: with traded products, on wind, water & other organ-isms	Mostly accidental: hull fouling, ballast water, aquacul-ture	Mostly accidental: with traded products or with introduced organisms
Naturalised	>3,100	~60	34	Thousands	130->300	Unknown
Proportion of biota (known native species)	14% (19,324)	2% (2358) 6% mammals (386) 4% birds (828)	13% (258)	Unknown (98,700)	Unknown	Unknown
Invasive with environmental impacts	>1000	~30	~10	Unknown	Unknown	Unknown
Costs (mostly agricultural)	>$4 billion	>$1 billion	Unknown	Unknown	Unknown	Unknown

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Our love affair with Asian house guest needs a rethink

Tim Low
ISC Project Officer

One of Australia's more endearing invasive species is the Asian house gecko (*Hemidactylus frenatus*). In many homes in the northern half of Australia their presence is welcomed, both for the entertainment they provide at night by scampering across walls, and for their perceived role in reducing mosquito and cockroach numbers.

But in a recent review of this lizard in Australia, biologist Conrad Hoskin warns of its potential to become an environmental problem. Although found mainly on buildings in cities and towns, its numbers in bushland are increasing.

In the Northern Territory Asian house geckoes have been found up to a kilometre from any dwelling. The natural habitats they occupy across northern Australia now include monsoon rainforests, mangroves, eucalypt woodlands, beach forests and rocky gullies.

Numbers are invariably higher in urban areas than in bushland, leading to a popular belief that they are poorly adapted to forests. But Hoskin notes that when native geckoes live on buildings they often achieve very higher densities and he cautions against supposing they will not become common in forests in future.

In Guam, for example, they were originally confined to urban areas but are now abundant in all forest types. On Christmas Island they can also be found in forest, many miles from any buildings.

Asian house geckoes are pale lizards that are readily distinguished from native house-dwelling geckoes by the tiny spines along the sides of their tails.
Photo: http://en.wikipedia.org/wiki/File:Hemidactylus_frenatus.jpg

To other small lizards they are very aggressive, sometimes displacing them completely. In the Mascarene Islands three gecko species have been displaced so comprehensively they are now extinct. Competitive displacement of other geckoes has been noted on other tropical islands in the Pacific and Indian Oceans.

In Australia they often replace native geckoes on dwellings but it is not known if similar displacement is occurring in wild habitats.

There can be no doubt that Asian house gecko numbers have increased dramatically in Australia in recent decades. Once confined to the Northern Territory, they can now be found along the Queensland coast, in central Australia and in northern New South Wales.

Hoskin admits these lizards are endearing and entertaining. In urban areas they can be enjoyed, he says, but in forested areas some thought should be given to their removal.

Buildings inside national parks may serve as foci for invasion into natural habitats. He recommends their removal from such structures, and careful checks of building materials to stop them being introduced when toilet blocks and picnic shelters are built.

He also warns about the potential for other new reptiles to be introduced to Australia, including the closely related tropical house gecko (H. mabouia):

'Australia has thus far suffered few reptile and amphibian introductions but, with continued increases in international cargo movement, it will take rigorous quarantine inspection to prevent further species establishing.'

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KEEPING IT BRIEF

Asian honeybee fight continues

The Queensland battle to eradicate the Asian honeybee is proving very difficult, with 173 nests now found in the greater Cairns region.

Biosecurity Queensland is keeping up the battle, with sniffer dogs deployed in the front line, but success is far from guaranteed.

We will report more fully on this threat in the next issue of *Feral Herald*.

Oh deer

A recent tour to a deer farm in Central Queensland organised as part of the Queensland Pest Symposium in August proved a fizzer.

The bus arrived to be met by the manager admitting that all his deer had escaped – every single one. Australia's wild deer population continues to be augmented by new escapes from deer farms.

Websites to check out

The Invasive Species Specialist Group features an 'Invasive Species of the Week' at www.issg.org/invasive_species_of_the_week.htm.

ISC member Gordon Rowland has launched a new website focusing on the 'art of eco-friendly gardens' at www.ilda.com.au. It includes lists of recommended and to-be-avoided plants for a wide range of situations and a list of nurseries selling native plants.

CEO of the Invasive Animals CRC, Professor Tony Peacock, publishes an often entertaining blog at www.feral.typepad.com. His use of social media to promote invasive species issues was one of the reasons he won the Eureka Prize for science communication.

Invasive Species Council

For our reports and back issues of the *Feral Herald*, visit us at www.invasives.org.au.

WARNING: Weeds are a danger to your health

Carol Booth
ISC Policy Officer

“We suffer in many ways by what can be called ‘plant blindness.’ That is, when we look at nature, we are more likely to recognize the diversity of animals and only acknowledge plants as a sort of ‘green background.’ Yet, that green background ... affects every aspect of our lives ...

– Ziska et al. 2009

Weeds can be characterised as biological pollutants. This is particularly apt for considering the human health impacts of weed invasion. Exotic pollens contaminate the air for many asthma and hay fever sufferers, some weeds are toxic, and aquatic weeds can destroy water quality.

According to the Federal Government, at least 23 common weeds present a serious respiratory or toxic risk to humans, especially children (www.weeds.gov.au/weeds/why/impact.html)

Although weeds are responsible for much illness and high medical costs, the health hazards of weed invasion receive little focus as reasons for better biosecurity. Better documentation of these human impacts would add to the very strong environmental and agricultural reasons for much better weed management, but comprehensive reviews on the topic are lacking.

Weedy allergens

Pollinosis is a serious public health problem in Australia (and globally), and weed pollen is a common cause of allergic diseases, including asthma and allergic rhinitis and sinusitis.

The incidence of allergic disease in Australia is one of the highest in the world (see Kemp et al. 2006) and according to an assessment commissioned by the Australian Society for Clinical Immunology and Allergy cost $7.8 billion in 2007 (see Mullins et al. 2007).

Four of the top 10 most common long term self-reported illnesses in youth aged 12-24 years in Australia are allergic rhinitis (hay fever – 14%), asthma (9%), chronic sinusitis (5%) and undefined allergy (3.5%).

In 2005 there were more than 3 million cases of allergic rhinitis, over 2 million cases of asthma, and over 1 million cases of chronic sinusitis.

Although the contribution of weeds to this burden is unknown, it is substantial and the cost would be in the hundreds of millions of dollars, if not billions.

Blown by an ill wind

Plants from the Northern Hemisphere are more likely to have allergenic pollen because they are mostly wind-dispersed, in contrast to Australian species, which are more often bird, mammal and insect-dispersed, and have less and heavier pollen, which does not travel on the wind.

About 80% of “serious” allergenic plants in Australia are weeds, according to a summary of weed impacts by the Australian Academy of Science.

Asthma: Sensitisation to pollen is an important risk factor in asthma and a trigger for allergic asthmas. Studies in Melbourne have found a high correlation between seasonal asthma and counts of grass pollen, deriving from pastures north of Melbourne (see Schappi et al 1998). Some of the invasive grasses produce large amounts of pollen, and are very widespread (one hectare of ryegrass releases hundreds of kilograms of pollen per season, according to the Australian Society for Clinical Immunology and Allergy).

Pollen allergy has been found in 80-90% of childhood asthmatics and 40-50% of adult-onset asthmatics, although no causal relationship between the allergic response and asthma has been clearly established, (see Taylor et al. 2007). In Melbourne, asthma incidence in children almost doubled from mid-1980s to mid-1990s to 27%, but then declined to 20% by 2002. In a suggestive coincidence remarked on by Taylor and coauthors, the decline occurred when there was below average rainfall across the more populated regions of south-eastern Australia resulting in reduced atmospheric pollen and fungal counts.

Thunderstorms have often been linked to epidemics of asthma, especially when grasses are flowering. In one documented case (by Gergis et al. 2000) a storm in Wagga Wagga in 1997 sent 215 asthmatics to emergency, 41 of whom required hospitalisation. During thunderstorms, there is a large increase in ruptured pollen grains in the air (due to osmotic shock) and it is likely that storms wash pollen down to a band of air at ground level (see Marks et al. 2001).

Hay fever (allergic rhinitis): Worldwide, the incidence of hay fever has dramatically increased, and an estimated 10-20% of people suffer from it seasonally according to Dykewicz (2010). Pollen is the most common cause of seasonal rhinitis (in contrast to perennial rhinitis triggered by dust mites, pets and other factors). Many of the plants known to trigger hay fever (eg. grasses, asthma weed, ribwort, privet) are weeds in Australia.

Noting the rising prevalence of allergic diseases in tropical regions, a recent study in Darwin (by Fay Johnston et al. 2009) found a strong correlation between grass pollen counts and daily sales of medicine for hay fever. The two dominant grasses were the invasive gamba grass (*Andropogen gayensis*) and the native sorghum (*Sarga* species).

The authors suggested that the invasive grass-fire cycle (by which high biomass invasive grasses such as gamba grass both promote and benefit from fire) could be a health hazard, as well as a safety and ecological hazard. “The global spread of tropical grasses due to ongoing loss of tropical forests, introduced species, and changing fire regimes could be contributing to the increased burden of disease due to allergic rhinitis in these regions,” Johnston and co-authors conclude.

Other allergies: A review for the Australian Society for Clinical Immunology and Allergy noted that more than 2000 contact allergens have been identified, of which plants, including dozens of weeds, are among the most common. Dermatitis also often occurs on warm windy days, when wind-blown allergens come into contact with exposed skin.

About 10% of people with seasonal allergic rhinitis or conjunctivitis also have an allergy to some foods due to proteins that are common to pollens and foods.

Climate change and weed allergies: Allergic weed hazards could get worse under climate change due to greater weed abundance and growth, higher pollen production and reduced capacity for weed control. Studies of western ragweed in the US have found that warming increases pollen production by 84% and CO_2 stimulates much greater production of pollen and may make the pollen more allergenic. In addition, higher CO_2 levels may reduce the chemical efficacy of herbicides (see Ziska et al 2009; Ziska and Runion 2007).

Other weed hazards: Many weeds are poisonous, some extremely so. Tiny amounts of hemlock (*Conium maculatum*) and castor bean (*Ricinus communis*) can kill people (ricin in castor bean is more potent than cyanide). The spines or seeds of many weeds may cause physical injury. Many weeds taint milk and meat.

Aquatic weeds such as water hyacinth (*Eichhornia crassipes*) and cabomba (*Cabomba caroliniana*) can affect the quality of drinking water within water supply dams. Aquatic weeds, such as salvinia (*Salvinia molesta*), can also be safety hazards. Small children have apparently drowned when they thought a floating carpet of weeds was solid ground.

Weeds such as high-biomass grasses and gorse are fire hazards, and smoke can cause respiratory illness.

The health impacts of weeds would add considerably to the more than $4 billion dollars annually that they cost agriculture. A comprehensive costing would add to the rationale for weed management.

Photo: VJ_FLick, http://www.flickr.com/photos/vj_flicks/

Some allergenic weeds causing respiratory or skin problems

Family	Allergenic species
Amaranthaceae	Fat hen (*Chenopodium album*)
Anacardiaceae	Rhus tree (*Toxicodendron succedaneum*)
Asteraceae	Mugwort (*Artemisia vulgaris*) Parthenium weed (*Parthenium hysterophorus*) Sunflower (*Helianthus anuus*) Ragweed (*Ambrosia artemisiifolia*)
Boraginaceae	Paterson’s curse (*Echium plantagineum*)
Cannabaceae	Japanese hop (*Humulus japonicus*)
Euphorbiaceae	Castor bean (*Ricinus communis*) Mercury (*Mercurialis annua*)
Fagaceae	English oak (*Quercus robur*)
Lauraceae	Camphor laurel (*Cinnamomum camphora*)
Oleaceae	Olive tree (*Olea europaea*) Privet (*Ligustrum vulgare*)
Pinaceae	Radiata pine (*Pinus radiata*)
Plantaginaceae	Ribwort (*Plantago lanceolata*)
Poaceae	Ryegrass (*Lolium perenne*) Johnson grass (*Sorghum halepense*) Winter grass (*Poa annua*) Bahia grass (*Paspalum notatum*) Couch grass (*Cynodon dactylon*) Canary grass (*Phalaris aquatica*) Cocksfoot (*Dactylis glomerata*) Timothy grass (*Phleum pratense*) Wild oat (*Avena fatua*) Yorkshire fog (*Holcus lanatus*)
Ulmaceae	Chinese elm (*Celtis sinensis*)
Urticaceae	Pellitory, asthma weed (*Parietaria judaica*)

Sources: Australian Society for Clinical Immunology and Allergy; Marcos et al. 2001; Andersson and Lidholm, 2003; Gadermaier et al. 2004; Rodriguez et al. 2007; Taylor et al. 2007; Salamanca 2010.

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