Feral Herald

Newsletter of the Invasive Species Council, Australia

Working to stop further invasions

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Savannah Cats Banned

After a strong public outcry, the federal government has decided to ban the import of savannah cats.

In early August Environment Minister Peter Garrett decided that he would not allow the import of savannah cats, a hybrid of the domestic cat and African servals (a serval is shown above).

The Minister will change the legal definition of 'domestic cat' to exclude cats with serval genes.

With 523 submissions in favour of the ban and just 23 in favour of allowing imports, it will be a popular decision. Most Australians are horrified by the wildlife slaughter of feral cats and do not want to risk increasing the predation pressure merely because some people want a different sort of pet.

But this is a one-off decision, which fails to address the systemic problem associated with a species approach to import approvals. Unless the Minister takes similar case-by-case action with other proposed imports, it won't affect the import of other new variants and hybrids that increase the invasiveness risks of existing weed and pest species.

High-risk variants that can be freely imported (highlighted in the last issue of *Feral Herald*) include Boer goats, Kalahari goats, Asian breeds of water buffalo, coyote and wolf breeds of dogs, Bengal cats, and olives.

The Minister has said he is prepared to use his powers under the *Environment Protection and Biodiversity Conservation Act 1999* to prevent the import of species or breeds that posed a significant risk to the environment or wildlife. ISC believes he

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Printing Feral Herald
If you have problems printing Acrobat (.pdf) files on inkjet printers, try printing just a few pages at a time.

ISC UPDATING VICTORIAN WEED BOOK

According to the much cited *Environmental Weed Invasions in Victoria* by Carr, Yugovic and Robinson (1992), the 'garden state' has over 580 environmental weed species.

But it was published way back in 1992, and weeds do not stand still. Victoria now has more environmental weed species, threatening more environmental values, and the policy and social contexts have changed.

It's time for an update. ISC has decided to take on this task, led by vice-president Geoff Carr (lead author of the 1992 text), with Jeff Yugovic, Valentino Stajsic, Lisa Crowfoot and Steve Mathews. There may be one or more partners in the project.

The aim of this project is to raise the profile of weed invasions as a major threat to Victoria's environment, and to provide a comprehensive list of species involved with various distributional, ecological and biological data. The book will also analyse the legal, institutional and social responses to weeds.

Environmental Weed Invasions in Victoria was revolutionary when first published, drawing attention to the category of invasive plants that harm the environment when virtually all of the weed focus was on agricultural and economic weeds. ISC intends that the updated version will continue to inform, shock and prod reform. It is particularly important in this period when Victoria is reconsidering its environmental future through the White Paper process.

The planned publication date is towards the end of next year.

CRAZY ANTS UPDATE

ISC has been pressuring the Queensland Government to scale up its poorly funded crazy ant eradication campaign. In a *Courier Mail* article published in February 2007, Tim Low criticised the government for not inspecting timber importers when there was clear evidence that crazy ants (*Anoplolepis gracilipes*) are entering Australia with shipments of timber.

Tim recently met with Biosecurity Queensland and was told that many timber importers have now been inspected without further infestations being found. This is very good news, because it means that eradication remains a realistic prospect.

There can be no doubt that

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ISC TALKS TO GRANT GIVERS

In late July, ISC project officer Tim Low addressed the annual meeting of the Australian Environmental Grantmakers Network, to argue the need for more action and campaigning on invasive species.

As ISC members well know, invasive species are often not a high priority for conservation groups in Australia. Vast sums are spent controlling weeds and feral animals on conservation lands, but very few NGOs engage with governments to improve invasive species policies.

Tim talked about the value of conservation campaigning in this area, citing the recent savannah cat controversy, gamba grass, and rabbits on Macquarie Island as recent examples of invasive species campaigns that served an important role.

Other issues on which governments should be pressured include deer management, salinity grasses, crazy ants, and biosecurity policies on eucalyptus rust and the alga rock snot.

The capacity of organisations to work with governments on these issues is contingent on funding, and Tim made the point that current funding levels could be greatly improved. Some AEGN members have a focus on climate change, and Tim cited evidence indicating that climate change is worsening invasive species problems, both in Australia and overseas. The recent extinction of 70 frog species in Latin America, following the spread of chytrid fungus in response to climate change, provides a dire example.

Tim was invited to speak at the Melbourne event along with Dr Rachel McFadyen, the CEO of the Weeds CRC. Rachel spoke of the need for more education of politicians and the public about the scale of weed problems, and suggested more funding for biocontrol agents that attack environmental weeds.

ISC Now Alone

The conservation group WWF Australia no longer has a dedicated invasive species focus, following the recent departure of WWF campaigner Julie Kirkwood.

In recent years WWF has played a leading role in campaigns to eradicate rabbits and rats from Macquarie Island, and to force the federal government to close the loophole in Weed Risk Assessment, an issue first brought to light by ISC.

Only a year or so ago, WWF had three campaigners working largely or wholly on invasive species issues, including the very effective Andreas Glanznig.

But WWF no longer has any campaigners in this field.

ISC had a friendly relationship with WWF invasive staff, and we were supportive of each other's campaigns. We regret the loss of this campaign presence.

ISC is now the only conservation group in Australia with campaigners dedicated to invasive species issues.

SAVANNAH CATS

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should take a more systematic approach to variants, and has written requesting a review of current processes (we have not yet received a response). We will also be raising these issues in a submission to the senate review of the federal EPBC Act.

Congratulations to the Pests CRC for first raising the Savannah cat issue, and for helping to rouse such a strong public response to it.

GROWING ISC'S CAPACITY

- from the president

Time for another AGM. I invite all members (and friends) to come along to hear our guest speaker ISC vice president Geoff Carr talk about the weed nightmares being created in the name of addressing salinity problems.

Not because we want you to feel dismal, but because it is necessary to generate much greater awareness about this issue in the community of those already concerned about invasive species issues.

Because weeds are being promoted ostensibly to help the environment in this case, it is important to understand the environmental values at stake and the arguments advanced by weed proponents.

Action on invasive species issues – probably more than most other environmental issues – requires people to be knowledgeable and thoughtful about the many complex issues involved.

It is not sufficient to try to evoke a gut reaction by just saying that exotics are bad and natives are good. Exotic species are far too entwined in our lives and environments for this to work. And they are too diverse in their uses, cultural associations and impacts. There are many ethical and social issues associated with trying to limit the harm that invasive species do.

That's why I'm very pleased that ISC has been provided with a grant from the Norman Wettenhall Foundation to write a series of short essays on the conceptual, biological and ethical issues associated with invasive species and the environment. It will allow us to present ways of understanding invasive species issues as a basis for concerted action to reduce and prevent their harms.

I'm also very excited about another grant we have just received to do work on climate change and invasive species, an issue we have previously highlighted in *Feral Herald*, and which our report *The Weedy Truth about Biofuels* addressed in part. We will be developing a detailed strategy in the coming months and will be inviting our members and associates to participate in the campaigns that follow.

In this time of increasing pressure on governments to solve the problems arising from our profligate western lifestyles, ISC needs to raise a strong voice to pressure governments to reform the ways we manage invasive species.

We need your help as committed, thinking active citizens concerned about invasive species issues.

Steve Mathews

ISC Annual General Meeting

30 September, 6 pm, at **"Space 39", Level 2, 39 Little Collins Street, Melbourne (between Spring Street and Exhibition Street)**

Guest speaker: Geoff Carr (7.30 pm) ***Deliberate introduction of salt-tolerant plants for treatment of agricultural salinity problems: Nightmare in the Making*** **(for details see p. 14)**

Do you have information on where TALL WHEAT GRASS (*Lophopyrum ponticum*) has naturalised? Please forward information about any sites anywhere in Australia to isc@invasives.org.au.

Queensland Biosecurity under Review

A discussion paper released by Queensland Biosecurity promises more environmental focus but neglects key issues.

Biosecurity Queensland (BQ), the agency vested with the control of pest species in Queensland, has released a discussion paper, prior to preparing new biosecurity legislation. ISC has submitted a response to this.

The paper is to be commended for recognising that Queensland's current biosecurity approach, based mainly on the protection of primary production, does not adequately consider environmental and social pests.

"Queensland's current approach", states the paper, "is predominantly based on protecting valuable primary production; while this must always be important, the future approach must also consider the range of emerging environmental and social pests – including exotic birds, and animal and plant pathogens that primarily have an environmental impact."

However, BQ is proposing a vision statement that fails to consider the environment: "Queenslanders are confident that our way of life is adequately protected from the negative impacts of pests, diseases and contaminants." ISC's submission calls for a more appropriate statement.

Another concern is that the discussion paper implies that Queensland's future pest problems will result from new incursions from overseas, when most of the new weeds and vertebrates that establish in the state represent garden plants and aquarium fish that escape from cultivation or captivity. The discussion statement does not provide much in the way of guiding principles for better management of these.

ISC has previously raised the issue of very slow risk assessment of new weeds, most of which represent escapes from cultivation.

The Biosecurity Queensland discussion paper can be downloaded from www.dpi.qld.gov.au.

Federal Legislation under Review

Australia's conservation laws do far too little to prevent the spread of harmful invasive species and manage their threats to biodiversity.

Now, the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) is to be subject to a senate review. ISC will be proposing major reforms.

Currently, invasive species are regulated via the EPBC Act in two main ways. Firstly, proposals to import new species that may threaten biodiversity – eg. bumble bees – are assessed under the Act and, secondly, invasive species may be listed as a key threatening process for which a threat abatement plan (TAP) is prepared.

These are both vital processes. The risk assessment to which new species proposed for import are subject (if not on a permitted species list or already prohibited) is one of the few examples of the precautionary principle in action. However, it is too narrowly applied. As exemplified by the TAP for *Phytophthora* (see story page 9), many recommended actions in threat abatement plans go unfunded.

As well as any requirement that actions be funded, there is much missing from the Act. There are already more exotic plant species in the country than there are native species, and the source of most future weeds and pests will be those species already here. But the Act does nothing to regulate their trade or movement within Australia. The federal government leaves it to the states, with the result

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Asian Honeybees at Large

Queensland authorities are on a search & destroy mission to rid Australia of an invidious new invader – the Asian honeybee.

When Biosecurity Queensland (BQ) destroyed colonies of *Apis cerana* on Admiralty Island near Cairns last year it was thought the incursion had failed. But the recent discovery of a nest on a farm near Gordonvale, 40 km south, plus a nearby swarm of 2000 bees, has rekindled fears that Asian honeybees are established in Australia.

Asian honeybees are the dominant large social bees in South East Asia. They are slightly smaller than European honeybees, and more willing to forage inside rainforest. By no means confined to the tropics, their native range extends as far north as Vladiovostock, suggesting a capacity to colonise vast areas of Australia. They are, in fact, more tolerant of cold than the European honeybee.

The European honeybee has become a major pest in Australia, competing with birds and insects for nectar, and displacing birds and mammals from nesting hollows. The Asian honeybee will presumably add to competition pressure, especially by targeting smaller flowers and by foraging and nesting deep inside rainforest, a habitat largely avoided by European honeybees.

The Asian honeybee is a species of great concern to biosecurity authorities, but mainly because it hosts varroa mite (*Varroa destructor*), a parasite that destroys honeybee hives. Australia is almost the only country left without these mites.

The bees found around Cairns, which presumably entered on a ship, were not carrying varroa mites. BQ has assured ISC that it is nonetheless taking this incursion very seriously, with staff doorknocking in the Gondonvale area, and visiting sugar mills (which attract bees) and sweeping flowers in search of more bees.

On 26 August a few more bees were found 7km south of Gordonvale, and it is hoped they can be traced back to their hive. We are liaising with BQ about this operation and will keep you informed.

Information about the bee can be found at Wikipedia, and tips for identification are available at the Pests and Diseases Image Library at:http://www.padil.gov.au/viewPestDiagnosticImages.aspx?id=39

Salinity vs Weeds

Is the fight against salinity going to worsen weed problems?

Australian pasture scientists have been responsible for introducing many of Australia's worst environmental weeds and a large proportion of exotic pasture plants turn into weeds. Mark Lonsdale's classic and much-quoted 1994 study found that of 463 exotic legumes and grasses introduced to northern Australia between 1947 and 1985, 13% had become weeds (more have since revealed themselves as weeds), and just 5% were useful in agriculture.*

But these weedy pasture plants were introduced in the bad old days when most agronomists cared only for grazing production values and could disregard impacts on the natural environment. These days, agronomy researchers are not only subject to improved federal quarantine procedures that require weed risk assessments before approval is granted to import new species, but research institutions have internally adopted weed risk protocols. The Farm Future Industries CRC has instituted weed risk assessment processes for all species not subject to federal assessments.

But how much has really changed? Are the changes sufficient to prevent the introduction, development and promotion of pasture plants that invade natural environments and harm conservation values? And what about all the existing pasture species that are environmental weeds and are not subject to risk assessment because they are already naturalised? These are some of the questions that ISC is asking in a new project in partnership with The Wilderness Society. ISC is preparing a report on this topic for release later in the year.

*Lonsdale WM (1994) Inviting trouble: Introduced pasture species in northern Australia. *Australian Journal of Ecology* 19, 345-354.

INVASIVE BRINE SHRIMP IN AUSTRALIA

David Ruebhart

The North American brine shrimp *Artemia franciscana* is an economically important species widely used in aquaculture, the aquarium trade and for increasing the efficiency of sodium chloride production in solar saltfields.

It is often wrongly referred to as *Artemia salina* and it is under this name that it has been historically imported into Australia without the need for import permits. The establishment of permanent, non-indigenous populations of *A. franciscana* has been the focus of several recent overseas studies.

They have found that once released, *A. franciscana* becomes widespread and dominant, often outcompeting native brine shrimp. Concerns about the importation and use of *A. franciscana* in Australia have recently been reported by David Ruebhart and co-authors and their key findings are summarised here.

Emergence of *A. franciscana* nauplius (Courtesy of D. Ruebhart)

The first record of the intentional release of *A. franciscana* in Australia was in about 1960 at a coastal solar saltfield near Rockhampton, Queensland. Other populations have been reported elsewhere in Queensland, Western Australian and South Australia; however, these records are likely to be outdated since they are largely based on field studies from the 1970s and 1980s. The authors recommended new field studies to ascertain the current distribution of this species.

A. franciscana was considered to be a potential threat to the biodiversity and ecology of Australian inland hypersaline water bodies inhabited by the native brine shrimp species *Parartemia.* As *A. franciscana* can be dispersed by wind and birds, it is possible that that inland hypersaline water bodies could be colonised.

The degree of niche separation between *Parartemia* and *Artemia,* and/or if *Parartemia* is outcompeted by *Artemia,* is currently unknown and warrants investigation. In addition to its biodiversity and ecological value, the potential economic value of *Parartemia* for its use in aquaculture was also recognised.

In recognition of the possible risk that *A. franciscana* poses to Australian biodiversity, the authors recommended that, "the development of future salt works should involve consideration of the potential environmental risks associated with the introduction of *Artemia*; clearly if the site is near a natural saline lake it should be vehemently opposed."

Upon publication of this report, Biosecurity Australia (BA) forwarded these concerns to the federal Department of the Environment, Water, Heritage and the Arts (DEWHA). As pointed out by BA, the only species of *Artemia* on the list of specimens approved by DEWHA for importation at the time was *A. salina* (import permit not required). However, subsequent to DEWHA receiving advice on the invasive character of *A. franciscana*, the List of Specimens taken to be Suitable for Live Import (*Environment Protection and Biodiversity Conservation Act 1999*) was updated on 11 August 2008 to include *A. franciscana* in the category of specimens requiring an import permit.

Ruebhart, D.R., Cock, I.E., Shaw, G.R. (2008). Invasive character of the brine shrimp *Artemia franciscana* Kellogg 1906 (Branchiopoda: Anostraca) and its potential impact on Australian inland hypersaline waters. *Marine and Freshwater Research* 59(7):587-595. http://www.publish.csiro.au/paper/MF07221.htm

Major New Weed Resource

A newly released DVD, ***Environmental Weeds of Australia***, fills an important gap in the Australian weed literature. It is the first publication to describe and illustrate most of our environmental weeds.

Produced by Sheldon Navie and Steve Adkins of the Weed CRC and University of Queensland, it covers more than a thousand weed species from all over Australia, including Christmas Island, Norfolk Island and Lord Howe.

One advantage of digital publication is freedom from space constraints, and this DVD is packed full of images and text. The photos are not always of the highest quality, but the large selection for each species, and the jargon-free text, facilitate easy identification. Vast numbers of common names and synonyms are provided, a necessary feature when names keep changing (bluebell creeper *Sollya heterophylla*, for example, is now *Billardiera fusiformis*). Weeds can be sought out by name, or identified by a Lucid3 key which offers identification choices when characteristics of an unidentified plant are provided. You can click on descriptive words such as 'pubescent' or 'pinnate" and view their definitions.

The text is occasionally very detailed, with 3,000 words devoted to gamba grass (*Andropogon gayanus*), pointing out that it poses a threat to seven rare species, including an endangered atlas moth (*Attacus wardi*), a gecko (*Diplodactylus occultus*), the squatter pigeon, yellow chat, and a cycad (*Cycas armstrongii*). The gamba grass text is backed up with 24 references.

The DVD is sufficiently up-to-date to include trumpet tree (*Cecropia peltata*), a weed that was brought to official attention by ISC only a few years ago (see Feral Herald issue 9 & 13).

Large numbers of Australian plants that are now invasive outside their native range are featured, including, as well as the usual suspects, such species as cypress pines (*Callitris endlicheri, C. rhomboidalis*), kangaroo apples (*Solanum aviculare, S. laciniatum*) and the lillypilly (*Syzygium smithii*).

However, the DVD is not comprehensive, with a few glaring omissions such as the coconut (*Cocos nucifera*), a serious weed of north Queensland beaches, and tall wheat grass (*Lophopyrum ponticum*), an emerging problem in wetlands in Victoria.

Enormous effort that has gone into this DVD, resulting in a very detailed yet use-friendly resource, which is a tribute to the authors, the Weeds CRC, and the University of Queensland.

***Environmental Weeds of Australia*, by Sheldon Navie and Steve Adkins, can be ordered at http://www.cbit.uq.edu.au/**

CRAZY ANTS

Continued from page 2

timber imports represent a major route for crazy ant invasion, but most timber yards in Queensland appear to be free of the ants, based on the sample surveyed so far. Even when timber yards do contain ants, viable colonies are not readily transported when timber is sold.

Biosecurity Queensland has assured ISC that it is committed to eradicating the ants. More needs to be known about the pathways by which they are spreading into and within Australia.

On Christmas Island, where there is no prospect of eradicating crazy ants, biological control of scale insects is considered the best option for long term control. The ants on the island obtain much of their food by 'farming' introduced scale insects for sugar.

These scale insects are pests in America, and Australia stands to benefit from recent biocontrol research undertaken by American scientists. Potential biocontrol agents were recently collected in Malaysia, the native home of the insects.

Plans are also underway to develop an alternative bait to fipronil, which was used in the past but which harms the island's crabs.

PHYTOPHTHORA DIEBACK REVIEW

In a recent review of the plant-killing pathogen, *Phytophthora cinnamomi*, scientists warn that climate change may aid its advance.

"A changing climate in the coming decades will probably push it into places still unimagined," note David Cahill and colleagues in a recent article in the *Australian Journal of Botany*.

Lower rainfall across temperate Australia should reduce the number of *Phytophthora* attacks, but these could increase in severity if there are more extreme rainfall events, as predicted by climate scientists. In Tasmania the disease is limited by low summer temperatures, but these will rise in future.

Phytophthora cinnamomi is a major cause of native plant death in Australia. It is especially serious in Western Australia, where some 2300 plant species are thought to be susceptible, including eight highly susceptible endangered species. "The full extent of the catastrophe in the west may not yet be clear", the review warns. Major dieback of jarrah (*Eucalyptus marginata*) occurred in the 1940s and 1950s when roads constructed for forestry carried the zoospores into new areas.

In Stirling Range National Park the dramatic spread of the pathogen is attributed to the construction of management tracks. Almost half of the 330 plant species tested in the park are susceptible, including 16 of the park's 24 threatened species. "Highly susceptible endemic species such as the giant andersonia (*Andersonia axilliflora*) face extinction, warn Cahill and colleagues.

Although the pathogen has no direct impacts on animals, its indirect impacts are dramatic because plants of great importance to animals disappear from ecosystems. Banksias – a major source of nectar for birds and mammals – are among the most heavily affected plants, and so too are grasstrees, which provide nesting sites for small marsupials. The very distinctive honey possum is one species at risk from further spread.

In Australia the production of management plans by governments is increasingly serving as a substitute for action, a situation that appears to hold true for *Phytophthora*.

"The listing of *P. cinnamomi* as a key threatening process in Australia has resulted in the preparation of a Threat Abatement Plan . The success of the plan is heavily reliant on adequate funding of actions. Few actions in the first plan (Environment Australia 2001) were commenced."

The reviewers call for urgent research into alternatives to phosphite as a chemical control for the disease, for diagnostic techniques for rapid identification of *P. cinnamomi*, for more communication with senior management and politicians about the problem, and for a national repository of literature about the pathogen.

In Australia the production of management plans by governments is increasingly serving as a substitute for action, a situation that appears to hold true for Phytophthora.

"Adequate funding of the Threat Abatement Plan, currently in Draft form (CPSM 2006), will go a long way to addressing these issues," they note.

The review ends on a severe note: "if we do not act now, accept that *P. cinnamomi* is a national and urgent priority and adopt some new thinking and approaches, then Australian vegetation and its dependant biota will undergo further destructive and potentially irreversible change."

ISC has written to environment minister Peter Garrett, drawing his attention to the review and asking him to implement the Threat Abatement Plan in full. We invite ISC members to do so too.

Cahill, D.M. et al. (2008) *Phytophthora cinnamomi* and Australia's biodiversity: impacts, predictions and progress towards control. *Australian Journal of Botany* 56: 279-310

Environment Australia (2001) Threat Abatement Plan for dieback caused by the root-rot fungus (*Phytophthora cinnamomi*). Environment Australia, Canberra

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Climate Change & Aquatic Invasives

Earlier this year the journal *Conservation Biology* published a special issue dedicated to aquatic invasive species and climate change. It presented articles on monitoring, management, information systems, predicted impacts, and one on the risks inherent in assisted migration to prevent extinction.

Despite the aquatic focus, many of the conclusions reached apply more broadly. One can hardly disagree, for example, with the observation that "a major gap in our knowledge is how climate change will interact with invasive species", or with the claim that "Climate change and invasive species are 2 of the most pervasive aspects of global environmental change".

Or with this: "Few researchers have examined whether invasive species will become more abundant with climate change, although there are several reasons to think this may occur…"

Most invasive fish start out as aquarium fish, and most aquarium fish are tropical, so a hotter world is one in which more aquarium fish have the potential to become invasive.

Although none of the articles has an Australian focus, the insights they offer are useful for anyone concerned with climate change and invasive species. For example, the recommendation that riparian vegetation be restored to lower water temperatures, thereby favouring native fish over the warmth-loving mosquito fish (*Gambusia*), is very relevant to Australia.

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EPBC REVEW

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that we rely on a mishmash of inadequate and inconsistent state laws. Only a few hundred species in total are prohibited in most states (WA is the shining exception).

Although people's activities with invasive species have significant impacts on what are known as matters of national environmental significance – eg. when a grazier plants a pasture grass that then invades a Ramsar wetland, or when a deer farmer lets deer escape that then degrade the habitat of threatened species – there is no obvious way of using the Act to prevent or assess their actions in the first place or hold them responsible for the consequences.

The federal government already has the capacity in the Act to develop regulations to control the trade and use of invasive species within Australia. ISC will be urging the government to use those powers.

As noted in the story on savannah cats (page 1), we will also be recommending reforms to institute risk assessments for the import of potentially invasive variants or hybrids of existing permitted species.

Submissions are due 22 September. For further information on the review, see http://www.aph.gov.au/Senate/committee/eca_ctte/epbc_act/tor.htm.

Thank you Norman Wettenhall Foundation

The Invasive Species Council is very grateful to the Norman Wettenhall Foundation for its recent grant to us to write a series of short essays to be used as the basis for educational materials on invasive species. We will provide more information about this project in the next issue of the newsletter.

TRADE & INVASIONS

The number of invasive species in a country reflects the volume of trade, according to a new study published in the journal *Biological Invasions*.

Drawing upon the Global Invasive Species Database (maintained by the Invasive Species Specialist Group of the IUCN), Michael Westphal and colleagues set out to determine whether the number of invasive species in more than 200 countries correlated with any of a number of socioeconomic, ecological or biogeographic variables.

They found that "in most of the cases, merchandise imports was the most important explanatory variable".

Data about imports and other variables was drawn from the World Resources Institute. "The greater the degree of international trade, the higher the number of [invasive alien species]," the study concluded.

The findings will come as no surprise to anyone who knows about invasive species, but this is the first study to link the volume of trade to the number of pest species. Many invaders are known to hitchhike in shipping containers or on ship's hulls or ballast water, and others come in as imported garden plants or aquarium fish.

The authors propose that trade policy instruments such as tariffs, or tradable risk permits, be explored "to address the current market failure".

The lead author of this study, Michael Westphal, works for the Environment Department of the World Bank. The article has a disclaimer saying it does not represent the views of the World Bank.

"Our results show that the serious environmental conservation problem of invasive species is a consequence, at least partially, of economic globalization," the report notes.

Climate change and globalisation are the two main drivers of global change today, and both are strongly implicated in a worsening of invasive species problems.

Westphal, M.I. et al. (2008) The link between international trade and the global distribution of invasive alien species. *Biological Invasions* 10: 391-398

Levine, J.M. and D'Antonio C.M. (2003) Forecasting biological invasions with increasing international trade. *Conservation Biology* 7: 322-326

BOTANIC GARDENS & INVASIONS

Botanic gardens have played a serious role in the spread of weeds, by serving as points of introduction for plants that later escaped into the wild.

Botanic gardens have played a serious role in the spread of weeds, by serving as points of introduction for plants that later escaped into the wild.

Weeds have originated from botanic gardens in Hawaii, Puerto Rica, Jamaica, Indonesia, Mauritius, Sri Lanka, Nigeria, Cameroon, and many other countries. Notorious examples of escape include the mimosa (*Mimosa pigra*) that spread from the Darwin Botanic Gardens to cover vast areas of Northern Territory floodplain, and the miconia (*Miconia calvescens*) that escaped in Tahiti, where it now dominates two- thirds of the island.

Weed spread from tropical gardens is the topic of a recent article that appeared in the journal *Biodiversity Conservation*. Wayne Dawson and colleagues focused on weed spread from the Amani Botanical Garden in Tanzania, but they also comment on the global problem of botanic gardens and weed spread.

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Wildlife Research Invasive Special

In recognition of the ever-growing problem of invasive species, the journal Wildlife Research recently dedicated an issue to this topic. The 10 papers cover a wide range of topics, including the invasion ecology of mammals, rats on islands, range modelling, bird translocations, genetics, and risk assessment.

Of special interest to ISC is an article on deer, summarised below.

Climate change, as might be expected, also rates a mention or two, with an article by Piran White and colleagues having this to say:

"The ranges of alien invasive species may increase as climate change and increasing urbanisation and land clearance create habitats that favour some of them. Also, as natural ecosystems experience greater climate-induced stress, they will become more susceptible to the effects of other stressors such as alien invasive species. Thus, the impact of alien invasive vertebrate species is likely to be exacerbated by changing climate. Changing climate can also lead to native-species decline through increased spread of diseases, especially where the changing conditions favour alternative hosts or vectors of these diseases, thus increasing the survival of infectious agents." [The associated references have been removed from this quote.]

The final article, by Barry Brook, also suggests that climate change will advantage invasive species, and provides the example of humans as an 'invasive' species that spread around the world during a period of past climate change.

The ten articles make a valuable contribution to the growing body of literature on invasive species.

See *Wildlife Research* volume 35, number 3

WHAT DEER DO

In his classic book about feral animals in Australia, *They All Ran Wild* (1969), Eric Rolls made the confident claim that "Deer have done no noticeable harm to Australia". We now know this to be untrue, that deer can wreak as much environmental harm as wild goats or pigs, but a perception remains that deer are ecologically benign.

With this in mind, we draw attention to the article, "Ecosystem and competition impacts of introduced deer", that recently appeared in the journal *Wildlife Research*.

It features English biologists Paul Dolman and Kristin Wäber reviewing the ecological impacts of introduced deer around the world. They document examples of dramatic vegetation change, or competition between native and introduced deer, occurring in Europe, South America, North America, and New Zealand. Here is a quote:

"Consequently, deer often have a profound impact on ecosystem structure and act as keystone species in many forest systems. Deer herbivory can determine the structure and composition of forest herb layers, subcanopy and ultimately forest canopies through their impacts on regeneration, generally with an increase in unpalatable species or those resistant to browsing. In turn, this can have cascade effects on biodiversity,

LEFT: A sambar wallow in salt marsh from Lake Tyers. RIGHT: A sambar rutting area, in alluvial terraces warm temperate rainforest from Lake Tyers. PREVIOUS PAGE: Failed gap regeneration and loss of littoral rainforest as a result of sambar damage (Photos courtesy of Rohan Bilney)

including songbird abundance and species composition, nest predation rates, the abundance and density of invertebrates, and the abundance and seed predation activity of small mammals." [The associated references have been removed from this quote.]

These same processes have not been well studied in Australia, which led Dolman and Wäber to say:

"Introduced deer are only now emerging as an issue in Australia, with attitudes influenced by economic value for hunting and a lack of evidence of impacts on native vegetation. Consequently, populations of most introduced deer species continue to increase in Australia (Hall and Gill 2005), augmented by escapes from captive farmed populations and deliberate translocations…"

Their statement about native vegetation is incorrect. They were unaware of the important article by Bill Peel, Rohan Bilney and Roger Bilney that appeared in 2005 in *Victorian Naturalist*, documenting serious impacts by sambar deer on rainforest vegetation inside national parks. This article notes that "The effects of browsing can be devastating", especially for rainforest plants during drought. Antler rubbing is also a serious threat to some rainforest plants, including the endangered buff hazelwood (*Symplocos thwaitsii*). "It appears only a matter of time before Sambar totally eliminate some species from an area," the authors conclude.

A 2005 article by Andrew Moriarty, and the latest edition of the *Mammals of Australia* book (see *Feral Herald* 18), also mention serious damage to vegetation.

A global review that appeared in 2004, "Ecological Impacts of Deer Overabundance", also rates as an important contribution to the growing body of information about deer. This article focuses on the serious impacts of native deer on vegetation and fauna when their numbers escalate in the absence of predators. It finds that deer "can tip forest ecosystems towards alternative states by acting as 'ecosystem engineers' or 'keystone herbivores', greatly affecting the structure and functioning of temperate and boreal forests".

What Australia urgently needs are studies that assess the impacts of deer on birds, mammals and invertebrates. Are any postgraduate students out there willing to take this on?

Domnan, P.M. and Wäber, K. (2008) Ecosystem and competition impacts of introduced deer. *Wildlife Research* 35: 202-214.

Côté, S.D. et al. (2004) Ecological Impacts of Deer Overabundance. *Annual Review of Ecology, Evolution and Systematics* 35: 13-47

Moriarty, A. (2004) The liberation, distribution, abundance and management of wild deer in Australia. *Wildlife Research* 31: 291-299

Peel, B., Bilney, R.J. and Bilney, R.J. (2005) Observations of the ecological impacts of Sambar *Cervus unicolor* in East Gipssland, Victoria, with reference to destruction of rainforest communities. Victorian Naturalist 22(4): 189-200

BOTANIC GARDENS

Continued from page 11

This risk was highlighted recently at the 2nd World Botanic Gardens Congress, resulting in a recommendation that all botanic gardens carry out invasive species risk assessments of their collections and management practices. The Missouri and Chicago Botanical Gardens are highlighted in this article for having implemented suitable practises.

"The Chicago Botanical Garden model presents an integrated approach, incorporating the use of an adapted Weed Risk Assessment scheme, regional invasive plant lists, on-site plant evaluation of collections and information on commercial availability," the study notes.

The issue of weediness has been discussed by botanic gardens in Australia, and action has been taken to remove high risk species such as thorny African acacias, but as far as we know no Australian garden has an integrated approach to risk assessment.

Prior evidence of spread is widely considered the most reliable indicator of invasiveness, but this criterion only has value for plants with a history of cultivation, a situation that may not apply to some of the more obscure plants growing in gardens. As an example of this, Dawson and his colleagues recorded spread by of Congo rubber vine (*Landolphia ovariensis*), a plant that has no prior history of invasiveness.

Dawson, W. et al. (2008) Assessing the risks of plant invasions arising from collections in tropical botanical gardens. *Biodiversity Conservation* 17: 1979-1995

PHTYTOPHTHORA

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Several species of exotic *Phytophthora* occur in Australia, and there is always the prospect of additional species entering Australia and causing harm. A member of ISC has drawn our attention to a *New Scientist* article that summarises concerns in North America about the spread of *P. ramorum* and other plant-killers. According to author Stephanie Pain: "the mass movement of plants is responsible for a malevolent form of matchmaking, bringing together species of pathogen that would never normally meet and paving the way for the evolution of new and potentially dangerous diseases."

The article, 'Felled by Fungus', appeared in *New Scientist* 182 issue 2450: 5th June 2004

AGM GUEST SPEAKER

Continued from page 5

Geoff Carr, ISC Vice President, botanical consultant and environmental weed authority

Deliberate Introduction of Salt-tolerant Plants for Treatment of Agricultural Salinity Problems: Nightmare in the Making

In Australia secondary salinisation resulting from pervasive land clearing, particularly in wheat and sheep growing regions, has caused massive negative impacts to agricultural production, biodiversity values, soil stability, and water quality in wetlands. For several decades government agencies have been scouring the world for salt-tolerant pasture species capable of agricultural production in these extreme environments.

But is the cure worse than the disease? As we have seen with so many other deliberate plant introductions (especially grasses) many of these salt-tolerant species are exemplary weeds. Most serious of all is Tall Wheat Grass which is proving itself to be one of the worst grass weeds in Australia (easily as bad as Phalaris) and one of the most devastating of weeds in saline and non-saline environments.

Come along and hear Geoff Carr outline the issues which have emerged from this important ISC campaign, hear about the roles of government, the devastating impacts of these species, and what we may do about these deliberate introductions. You may have some suggestions about the way forward; we would love to hear your views.

Invasive Species Council

Membership application form

ABN 27101522829

Invasive Species Council Inc
PO Box 166, Fairfield, Vic 3078
isc@invasives.org.au
www.invasives.org.au

Name: ----------

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I would also like to make a donation[1] (does not include GST): $----------

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Total: **$----------**

Thank you for joining us.
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