



# SAVANNA LINKS

Cooperative Research Centre for the Sustainable Development of Tropical Savannas

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## New era for Aboriginal pastoralism

Across the north's savannas, Aboriginal pastoralists are looking for new and sustainable economic opportunities. *Dennis Schulz reports.*



Photo: Dennis Schulz

Around Australia, one of today's most active buyers of pastoral properties and other significant land holdings is the Indigenous Land Corporation. The ILC is an independent Commonwealth statutory authority set up in 1993 as part of Mabo, with a mandate to acquire land for dispossessed Aborigines. Last year alone, the corporation spent more than \$28 million on a wide range of properties from Cape York to Perth, including two cattle stations in the Kimberley region of Western Australia.

Myrooday/Luluigui and Roebuck Plains were added to the 26 stations in that area already owned and operated by Aborigines. With further acquisitions currently in progress, it is projected that early in the new century half of the Kimberley's 94 pastoral properties will be under Aboriginal management. What effects will this change in direction have to the northern cattle industry?

"How the industry changes depends on the degree to which the new leases purchased on behalf of Aboriginal communities do or do not choose to develop a commercially viable cattle enterprise," says Paul Novelty, the WA Agriculture manager for sustainable development, and one of the Tropical Savannas CRC's research theme leaders. "You may end up with an industry with a smaller base cattle population and there needs to be a sufficiently large cattle population to ensure the retention of services associated with the pastoral industry."

Many see Aboriginal-run stations as non-

productive and not economically viable. But that is not the case according to Stuart Gunning, the manager of the Kimberley Aboriginal Pastoralist's Association (KAPA), which represents 24 of Aboriginal operations. "There's a spectrum [of Aboriginal leases] that goes from very sophisticated contemporary cattle businesses, right through to those that are much smaller and simply don't have the capacity to operate commercially," he explains. "Many of them aren't really actively market-oriented but even the smallest still turn off cattle from time to time."

Stuart Gunning says that one of the major differences between Aboriginal and traditional European operated stations is that communities of over 200 people, most of whom see that property as their traditional homeland, often live on a particular station. Nearly 700 live on Frazier Downs south of Broome, once known as the Lagrange Mission. While many of those in residence are involved in the cattle enterprise, some families are interested in living on the stations for social and cultural reasons, rather than in commercial activities.

These community-based stations add a new dimension to modern Australian pastoralism. Whether the property is a going commercial concern or the smallest of leases, the station management provides fresh beef for the entire community. "Even the most commercially successful Aboriginal station has a requirement to provide

*Continued on page 2*

# New era for Aboriginal pastoralism

Continued from page 1

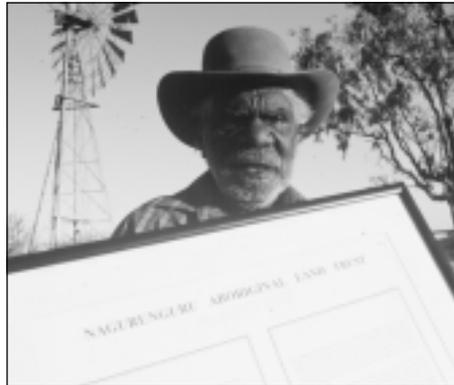
'killers'. It's a collective lease and you must provide meat to the collective owners," says anthropologist Dr Richard Davis, currently studying Aboriginal pastoralism with the TS-CRC.

Many Aboriginal acquisitions were almost defunct properties when they were purchased. Some of the stations bought in the early '90s by ATSIC on behalf of Aboriginal groups were grossly run down after years of over-stocking, with poor infrastructure and depleted cattle numbers. In 1994 the Kimberley Aboriginal Pastoralist's Project called for an injection of sufficient funds to enable those properties to realise their full commercial potential. But when it became known that a figure of \$25 million was required

to fulfil that task, KAPA was brought in. "A sum like that was outside what was likely to be found by any government agency," says Stuart Gunning. "So we're looking to see what can be done with the injection of much more modest sums of money."

Unlike traditional properties operated commercially by large concerns or families, the workforces on all Aboriginal stations are paid by the CDEP (Community Development Employment Project: or "work for the dole").

Many of the older Aborigines living on the properties once also worked as stockmen in the days when Aboriginal ringers formed the backbone of the industry. Some of them have now taken over management roles. "There's not one white manager on any of our member stations," says Lloyd Tucker, the landcare projects officer for KAPA. "They are all Aboriginal managed." Many of the new managers have taken courses developed to train them in modern pastoral management techniques. A course was developed in Brisbane by Resource



Aminbiji elder and former stockman, Ginger Packsaddle holds the deed to his property after his people were granted the land back. Photo: Dennis Schulz

Consultative Services called "Grazing for Profit," and repackaged for Aboriginal use by the Management Services Unit in Broome, re-titling it, "Station Business."

"They're currently training their third group," says Paul Novelly. "It is hoped that by the end of this year most Aboriginal leases will have one or more community members who have taken this course." Social changes are also taking place on station communities. Richard Davis is studying the shift from European to Aboriginal-owned stations, and the profound changes taking place.

Aborigines are unique among the world's indigenous pastoralists. For Australian Aborigines, pastoralism is a relatively new pursuit, while their counterparts in Zambia, Kenya, and Scandinavia enjoy centuries-old traditions.

"Aboriginal pastoralism wasn't around 150 years ago. What has developed today has emerged over the past century of colonialism," he explains. "It's no small thing taking up an operation that's been run into the ground. To commit yourself to its success and get training to produce export quality cattle. That's an enormous effort."

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Information on the Kimberley  
www.kimberley.wa.gov.au/  
North Australia Research Unit

<http://online.anu.edu.au/naru/welcome.htm>  
The Central Land Council  
[www.clc.org.au/](http://www.clc.org.au/)  
TS-CRC Research:  
Aboriginal Land Management  
[savanna.ntu.edu.au/research/projects/aborlan.html](http://savanna.ntu.edu.au/research/projects/aborlan.html)  
TS-CRC Research:  
Aboriginal Pastoralists  
[savanna.ntu.edu.au/research/projects/aborpa.html](http://savanna.ntu.edu.au/research/projects/aborpa.html)

## More maps, better maps for the north

If you've ever been frustrated in a search for maps that are about more than finding your way about town, Tropical Savannas CRC, courtesy of AUSLIG, Australia's national mapping agency, is about to come to your rescue.

The information exists for making hundreds of maps of anything from fire scars to the distribution of fire-tailed finches. This information represents thousands of hours of work by researchers who have painstakingly collected the data; but

much of it is not as useful as it could be because it sits on computers as raw data. Together with five other groups around the country, the TS-CRC has been awarded a federal government grant to help get these numbers out of databanks and onto maps. The TS-CRC will do this through its Clearinghouse of Savanna Information—see story opposite page. The other groups that received grants are the Inner Metropolitan Regional Organisation of Councils (IMROC) in Sydney; the Herbert

Resource Information Centre (HRIC) in Townsville; Airesearch Mapping in Brisbane; and the CSIRO Division of Marine Research, and the Fisheries Research & Development Corporation (FRDC). These groups will focus on other areas such as converting raw data into useful maps and images.

The grants were awarded by AUSLIG, which leads the development of the Australian Spatial Data Infrastructure — which aims to deliver useful geospatial data using distributed systems.

Websites: AUSLIG: [www.auslig.gov.au](http://www.auslig.gov.au)  
Tropical Savannas CRC: [savanna.ntu.edu.au](http://savanna.ntu.edu.au)



Savanna Information on the TS-CRC website will bring together information on grazing, weeds, fire, ferals, plants and animals, climate and geology from right across northern Australia

## Website explores research on our tropical savannas

How many times have you heard about research on some land management issue, but then never been able to get your hands on it? Or if you've managed to track some research to a scientific journal found you couldn't make head or tail of it?

Thousands of hours of research have been carried out on important land management issues in the tropical savannas but in many cases land managers or extension officers can't get hold of it because it is in scientific journals in city libraries, and written in the hard-to-decipher language of science. By the same token there is an awful lot of local knowledge about land management that is also difficult to come by because it hasn't been put to paper.

To to make such information accessible, the Tropical Savannas CRC (TS-CRC) has developed a website of Savanna Information. It will enable people to find technical manuals, scientific papers, popular articles, maps, lists of contacts and events relevant to major land management issues via the Internet. Just go to our Website, click on Savanna Information, and you will have a choice of three areas: Savanna Explorer, Savanna Map Maker and a search function.

Our Savanna Explorer has information organised around topics and regions. For example, if you want information on a topic such as fire management in Cape York, just click on the navigation bar (shown above) for the region and topic you are

interested in. A couple of clicks on the mouse will take you to a summary of fire management in Cape York followed by a number of sub-topics and listings of relevant papers, articles and contacts. A couple of extra clicks can give you an overview of fire management across the whole of the savannas or of land management in Cape York across all topics.

The Savanna Map Maker, only available for the Victoria River District currently, allows people to view and manipulate different "layers" of the VRD on a computer. These layers include soils, rainfall, vegetation or fire history. As not everyone has access to the Internet, and the TS-CRC will also be packaging information from the Clearinghouse into its Education and Extension programs in CD-ROMs, booklets and hand-outs. Savanna Information will be available from August 1999.

Go to <http://savanna.ntu.edu.au/> and click on Savanna Information



## 'Weed prevention is the intention'

Woody Weed is back again for another Weedbuster Week around Australia. From 10 to 17 October, there will be hundreds of weed busting activities around the continent including weed clean-ups, displays, competitions, seminars, on-ground weeding and replanting activities, field and machinery days, in-store displays and weed identification workshops.

Last year there was even a weed fashion parade! In fact there were more than 600 events/activities throughout Australia. Thousands of Weedbusting Australians attended, participated or visited a Weedbuster Week event and it is estimated Australians saw, read or heard something about weeds and Weedbuster Week over 1.5 million times between mid-September and mid-October.

The 1999 slogan is "Weed prevention is the intention". The national program is coordinated by a committee composed of representatives from each state and territory

and three education officers from CRC Weeds. Community input and suggestions for Weedbuster Week activities are welcome through the following contact points.

- |   |   |
|---|---|
| <p> National Website:<br/> <a href="http://www.weedbusterweek.info.au/">www.weedbusterweek.info.au/</a><br/>                 Contacts:<br/> <b>National:</b> Salvo Vitelli<br/>                 Qld Department of Natural Resources<br/>                 Tel: (07) 3406 2859<br/>                 Fax: (07) 3406 2875<br/> <a href="mailto:salvo.vitelli@dnr.qld.gov.au">salvo.vitelli@dnr.qld.gov.au</a><br/> <b>NT:</b> Leslee Hills<br/>                 NT DPIF<br/>                 Tel: (08) 8999 2349<br/>                 Fax: (08) 8999 2049<br/> <a href="mailto:leslee.hills@nt.gov.au">leslee.hills@nt.gov.au</a><br/>                 Website: <a href="http://www.nt.gov.au/dpif/">www.nt.gov.au/dpif/</a></p> | <p><b>Qld:</b> Leanne Parkes<br/>                 Qld DNR<br/>                 Tel: (07) 3406 2867<br/>                 Fax: (07) 3406 2875<br/> <a href="mailto:Leanne.parkes@dnr.qld.gov.au">Leanne.parkes@dnr.qld.gov.au</a><br/>                 Website: <a href="http://www.dnr.qld.gov.au/landprotection/weedbuster/home.htm">www.dnr.qld.gov.au/landprotection/weedbuster/home.htm</a><br/> <b>WA:</b> Sandy Lloyd<br/>                 Agriculture WA<br/>                 Tel: (08) 9368 3760<br/>                 Fax: (08) 9474 3814<br/> <a href="mailto:slloyd@agric.wa.gov.au">slloyd@agric.wa.gov.au</a><br/>                 Website: <a href="http://www.agric.wa.gov.au/progserv/plants/weeds/buster/buster.htm">www.agric.wa.gov.au/progserv/plants/weeds/buster/buster.htm</a></p> |
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## Letters to the Editor

### Praise

AS A student of the Heritage and Interpretive Tourism Course conducted at the Cairns College of TAFE, I have found your publication invaluable about the savanna lands. I was introduced to *Savanna Links* by our Course Coordinator Russell Boswell, who is heavily involved in this majestic part of Australia through his company Wilderness Challenge.

I have already referred to your up-to-date information to aid me in commentaries that are part of the course requirements. Most recently I presented a commentary on the impact of feral pigs on the savannas (Feral Pigs in the Savannas, *SL*, No. 8). I found your interview in Issue 8 to be the most useful of the resources offered to me. Keep up the fantastic work! My dream is to work as a guide in this unique part of Australia when my course finishes.

*William McDonald, Cairns Qld*

### Clearing Trees 1

PLEASE ALLOW me some space in your magazine to reply to the concerns that have been raised by Fiona Fraser, regarding the article about part of our family's enterprise.

First of all, the title in *Savanna Links* Issue 9 article was not correct (*How one producer broke the bush cycle of debt*). Our business is not free of debt, but the rest of the article is accurate. As a businessman my main interests, other than sharing the management of the family cattle station, is developing a new organic beef export market. As chemicals and supplementary feeding play no part in the production steps of this product, the only way it can be produced is by sustainable management practices. In business, unless we carefully nurture our resources, our future will be bleak. Unfortunately, cattle eat few of our

native trees, so to provide pastures, the trees must be removed. In this environment, with tree basal densities of 7 to 12 square metres per hectare and tree canopy areas of in excess of 75 per cent, grass growth is suppressed to 100 to 250 kilograms of grass per hectare.

Land clearing is producing 4200 kilograms per hectare. These new grasslands are returning our lands back to the state they appeared in when white settlement selected this country in the 1860s. Proof of this is found in early Land Department survey records, as well as recent soil analysing work (delta 13 carbon measuring) by Dr Bill Burrows.

In all forms of enterprise, some items or resources must be sacrificed for others to prosper. Clearing trees for cattle is no different from clearing trees to build universities, houses, roads, etc.

Our enterprise is presently undertaking a feasibility study to see if a further 8000 hectares of tree clearing will be of benefit. In view of your concerns Fiona, we are willing to offer a joint venture project to investors to purchase shares in the remaining forest country on the station. The reality of this project would be a privately owned National Park. In exchange for the proposed development, destocking, the removal of all man-made waters and fences and providing open access to shareholders/investors at all times, our business would require an annual reimbursement of our lost income from this area of land.

In a developed state, that would include tree clearing and improved pasture seeding with introduced species like buffel grass and verano stylo, this area would support 1800 breeders. They will annually produce \$460,000 worth of yearling Wagyu feeder cattle. If the numbers of concerned citizens are an indication of the likely shareholders, investors wishing to purchase a portion of the unique environment portfolio would be advised to contact Keen-Gea immediately.

*Dennis Fahey, Keen-Gea Station, Torrens Creek*  
*SL: We do apologise for the inaccurate title.*

### Clearing Trees 2

I WISH to reply to the letter from the PhD student, Fiona Fraser, who wrote to your last issue concerning the clearing of native vegetation (*Savanna Links* Issue 9, March-April, Letter to the Editor).

I wish to invite Fiona to visit us here in the Desert Uplands and I would be happy to show her around different landholdings around here, some with almost no tree clearing at all and others with tree clearing and introduced pastures, so she can judge for herself the effects of clearing on native vegetation in the area.

I wish to tell you the stories of two of our close neighbours. One cleared and introduced buffel grass to approx. 1200 ha of Gidyea country,

less than 10 per cent of their holding. They are now able to run their entire cattle herd on this area from December, or soon after the first rains, for approximately six months. Sometimes, in a good La Nina year, for the whole year. This means they rest their remaining country, which is all native vegetation, for at least six months every year, and especially during the valuable wet period from December to March. As a result their native vegetation is in an extremely healthy state. There is so much growth they are able to carry out a regular burning regime which further enhances the health of native trees and grasses.

Our second neighbour has done things a little differently. They have very little Gidyea country, mostly Iron

Bark and Box country. They chose to clear or partially clear and sow buffel and Stylos to a portion of each paddock. As a result the cattle concentrate almost entirely and almost all of the time in the "developed" areas, only moving to the timbered native areas when it is raining, or during periods of severe drought when the introduced species are eaten out. Again, their native vegetation, and in particular the native grasses, which are still in a majority even in the "cleared" areas, are in a wonderfully healthy and sustainable state. You can observe where the buffel grasses are definitely grazed while the native species which intermingle with the clumps of buffel are untouched, tall and lush.



## Slow ocean wobbles El Nino

Australia's climate, and notably its rainfall, is influenced by year-to-year variations in sea surface temperatures in the tropical Pacific Ocean. At opposite ends of the spectrum lie El Nino; associated with drought in Australia's and La Nina; associated with floods.

But research led by Dr Scott Power of the Bureau of Meteorology Research Centre, and by the CRC for Southern Hemisphere Meteorology has shown that another cycle of rising and falling sea surface temperatures in the Pacific Ocean—a longer-term, so-called Inter-decadal Pacific Oscillation (IPO)—is acting in the background to influence Australia's rainfall and temperature.

While El Nino and La Nina are generally year-to-year events, the IPO has been shown to last decades and has been described as a slow wobble in ocean temperatures in the central Pacific.

Research to be published in *Climate Dynamics* by the Bureau and the CRC shows that when the IPO warms the central Pacific the impact of El Nino and La Nina on Australia wanes. Conversely, when the IPO cools the central Pacific, El Nino and La Nina events have a stronger influence on Australia's climate.

The IPO appears to modulate the strength of El Nino and La Nina, and this may help to explain the long-standing mystery as to why El Nino or La Nina events do not always have

a profound influence on Australia's climate. The cause of the slow ocean wobble is not entirely clear, but it is thought by some scientists to involve changes in the heat transported by slow moving, large-scale ocean currents in the Pacific Ocean.

The finding has implications for climate prediction in Australia and overseas, and it may eventually affect the way the Bureau of Meteorology's National Climate Centre produces its three-month outlook for rain for the entire Australian continent: the seasonal climate outlook. The outlook has been issued each month for a decade and proves useful to a wide range of Australians, including pastoralists. The Bureau is working with the CRC, the Land & Water Resources Research & Development Corporation, CSIRO and Queensland research institutes on long-term projects to see if the information can benefit pastoral decision making.

Contact: Scott Power, Bureau of Meteorology  
Tel: (03) 9669 4085 or (03) 0419 587174  
Email: [s.power@bom.gov.au](mailto:s.power@bom.gov.au)

 Websites  
Science NOW!  
[www.asnevents.net.au/sciencenow](http://www.asnevents.net.au/sciencenow)  
Bureau of Meteorology  
[www.bom.gov.au/climate/glossary/el\\_nino/el\\_nino.shtml](http://www.bom.gov.au/climate/glossary/el_nino/el_nino.shtml)  
Seasonal climate outlook  
[www.bom.gov.au/climate/ahead/rain\\_ahead.shtml](http://www.bom.gov.au/climate/ahead/rain_ahead.shtml)  
Frequently asked questions  
[www.bom.gov.au/climate/ahead/rain\\_ahead.shtml#faq](http://www.bom.gov.au/climate/ahead/rain_ahead.shtml#faq)

## Social mapping charts damage of droughts

**A new insight into the effect of drought on Australian farmers has found the drought which gripped large areas of eastern Australia during the '90s had such a strong impact that rural communities changed fundamentally and may never be the same again. The two-year study of more than 100 individuals from 56 properties in central Queensland and northern NSW, is the first of its kind to chart social experiences in dealing with drought. *Drought in the 1990s, Australian Farm Families' Experiences* is a collaborative study by Central Queensland University (CQU), Charles Sturt University, with support from the Rural Industries Research & Development Corporation. According to Daniela Stehlik, from CQU, the cost of drought could be measured not only in stock losses, but also in deterioration of family cohesion and loss of community networks. "In some cases, there is a sense of being abandoned by the rest of (urban) Australia," she said.**

The full report is available from RIRDC  
Tel: (02) 6272 4819.  
Dr Daniela Stehlik Tel: (07) 4930 9405  
Website: [www.rirdc.gov.au/](http://www.rirdc.gov.au/)

## Letters to the Editor

These neighbours, too, have had a yearly burning regime.

In our own case, however, we have cleared less than 2 per cent of our property, and have very few introduced grasses. As a result our cattle graze the native grasses and edible native shrubs and trees most of the time. We rest one paddock each year, which means each paddock, and its native vegetation, is spelled approx. once every 10 to 12 years. Unfortunately not nearly enough. Prior to last year we experienced, like our neighbours, seven years of drought. Unlike them we didn't have enough fuel to burn, as our native pastures, although not "flogged", didn't provide enough fuel until last year for burning. We have Grass Check sites and photo sites which we regularly

monitor. We run less stock than our objectively estimated "carrying capacity". Yet, overall, our native vegetation isn't nearly as robust, plentiful and healthy as that of our neighbours' . . . except in those two paddocks in which we have done some clearing, and introduced buffel grass and Stylos in recent years.

Perhaps, by clearing sensibly, we can enhance sustainability, especially on smaller and less viable properties by improving the viability of the landholders, and the condition of the native vegetation. It is important we all keep very open minds on the subject; take a holistic view; and take a look at as many "on-ground" results as possible. Please, Fiona, come and see for yourself!  
*Margaret House, "Fortuna", Aramac, Queensland*



# Introduced grasses: triumph or Trojan horse?

**David Bowman of the Northern Territory University argues that one of the most profound threats to the tropical savannas is developing under our noses yet little research is being carried out on the issue.**

Over the past 50 years agronomists have undertaken a massive evolutionary experiment in northern Australia by introducing more than 450 grasses and legumes in the hope of discovering species that improve cattle production. Species from distant parts of the world have been brought into contact with north Australian savanna ecosystems in a flash of evolutionary time.

In 1994 Mark Lonsdale reviewed the consequences of this program in a paper called *Inviting Trouble*<sup>1</sup>. The reason for this provocative title was that the agronomy project has back-fired badly.

He showed that of the 463 species that had been introduced between 1947 and 1985 only four species were found to be useful and had not become weeds while 60 species had become listed as weeds and 17 were listed as weeds despite being identified as being useful. Even useful exotic pasture plants come with a considerable risk that they will become environmental weeds.



*Gamba grass produces robust tussocks that can reach a height of 4 metres, producing fuel loads for fires four to 10 times that of native savanna grasses. By changing fire regimes, the grass may be irrevocably transforming the landscapes of northern Australia.*

Photo: Sam Setterfield

## Playing with fire

There are few ecosystems in northern Australia that are weed-free, so a reasonable person may accept the escape of a pasture plant as the price paid for the economic utilisation of north Australian savannas. However, this sanguine view overlooks the dramatic, irreversible ecological consequences that some exotic grass species can have on fire regimes. These consequences have been ably reviewed by the highly respected north American scientists Carla D'Antonio and Peter Vitousek<sup>2</sup>.

They concluded that of all the ecological changes caused by invading grasses the most significant is due to the interaction between grass and fire. Grasslands are highly flammable given the abundance of quick-drying and well-aerated fine fuels. Further, perennial grasses can recover rapidly from fire because of underground buds.

The real danger comes from exotic fire-loving grasses which can trigger fires that are more intense, frequent and widespread. The cycle would unfold as follows: firstly the more intense fire feeds off the exotic grass

and destroys many of the woody plants, which in turn increases the dominance of the following year's exotic grasses that suppress more native herbs and grasses. Eventually this grass-fire cycle can convert a diverse habitat with many different species and forms of plants to a grassland dominated by a few exotic grasses with little capacity to be recolonised by native species.

Such changes can also cause drier microclimates, further adding momentum to the grass-fire cycle. Furthermore, because some elements, such as carbon and nitrogen, are volatilised and lost in smoke while other nutrients, such as phosphorus, are made more chemically mobile and thus susceptible to leaching, nutrient cycles are disrupted with the consequent decline in overall stored nutrients for plants. These changes further reinforce the grass-fire cycle because the fire-loving grasses thrive on the temporary increased availability of soil nutrients.

## Gamba grass threat

D'Antonio and Vitousek's model is relevant to understanding the future

of northern Australian savannas. A number of exotic grass species are aggressively invading native vegetation here with consequent changes in fire regimes. Examples include parra grass (*Brachiaria mutica*) on freshwater floodplains, mission grass (*Pennisetum polystachion*) and gamba grass (*Andropogon gayanus*) in eucalypt savannas.

Since the early 1990s there has been a growing consensus among biologists and managers that gamba grass poses by far the biggest threat<sup>3</sup>. Why? The primary reason concerns the structure and size of this plant and how this influences wildfires. Gamba grass has robust tussocks that reach a height of 4 m.

High densities of this grass produce standing crops of between 10 to 20 tonnes per ha, four to 10 times more fuel than native tropical grasses<sup>4</sup>. Unlike the other invasive exotic grasses there are no equivalents to gamba grass in northern Australian savannas<sup>5</sup>.

The lifecycle of gamba grass is also different to native grass species. It flowers in the early dry season and continues to grow well into the mid-dry season, presumably reflecting extremely efficient use of water and root systems that can exploit moisture in the subsoil. This leads to a dangerous combination: great height

and above-ground biomass in the late dry season. This creates fires for which there is no previous parallel. Indeed gamba can behave more like a short flammable tree than a grass; flames of these fires can reach the leafy canopy of eucalypts and defoliate or kill them. Gamba grass fires can be so intense that the efforts of fire fighters to contain blazes are thwarted.

In sum, we have unwittingly pitted fire-tolerant northern Australian eucalypt trees against an extremely fire-adapted west African grass in a potentially fierce evolutionary struggle.

Garry Cook of CSIRO Wildlife & Ecology, is of the view that gamba grass and its associated intense, late dry-season fires have the potential to radically transform north Australian eucalyptus savannas, by causing the loss of biodiversity dependent upon a continuous tree and shrub layer<sup>5</sup>. Eucalypt savannas could become fire-promoting weed infestations.

Existing data on the effect of invasive grasses in northern Australia is remarkably sparse given their scope for fundamental and irreparable ecological change. Without more research it is difficult to know how best to tackle the problem of invading grasses generally, and gamba grass specifically.

Equally, it is difficult to know if a species actually has the capacity to destroy the tall-grass savanna ecosystem in northern Australia as has been suggested by Gary Cook<sup>5</sup>.

Given the current wait-and-see approach of land managers we will have an answer to this great evolutionary experiment in the next few decades.

Dr David Bowman is Principal Research Fellow Northern Territory University, Darwin. Tel: (08) 8946 7762 Fax: (08) 8946 7755 Email: d\_bowman@banks.ntu.edu.au.

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2. D'Antonio, C.M. & Vitousek, P.M. (1992) Biological invasions by exotic grasses, the grass/fire cycle, and global change, *Annual Review of Ecology and Systematics*, (23), pp 63-87.
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## Cut and dried: the issue is how to manage disturbance

The above article raises valid concerns about the potential for introduced plant species to spread beyond what was originally intended and then disrupting ecosystems through disturbing existing fire, hydrological or competitive regimes. The need for caution in introducing plants from overseas is self-evident and would be shared across many interest groups.

For example, exotic woody weeds in northern Australia are a major threat to both ecological integrity and pastoral production, and these weeds have often been a consequence of the plant's introduction to Australia for ornamental or other reasons. So there needs to be care, whether the plants are intended for pastoral use or gardens.

The specific question of introducing plants as potential pasture species is not always cut and dried. For example, the precautionary principle taken to the extreme would indicate no introduction of exotic plants: no roses, no wheat, no ryegrass. Clearly this position is extreme

and narrow. Pasture plants have been important to the livestock industries in most parts of Australia, and in extensive areas, a good pasture plant must be hardy as well as palatable. So, there will always be some potential for the plant to go beyond where it is intentionally planted. There is always some risk.

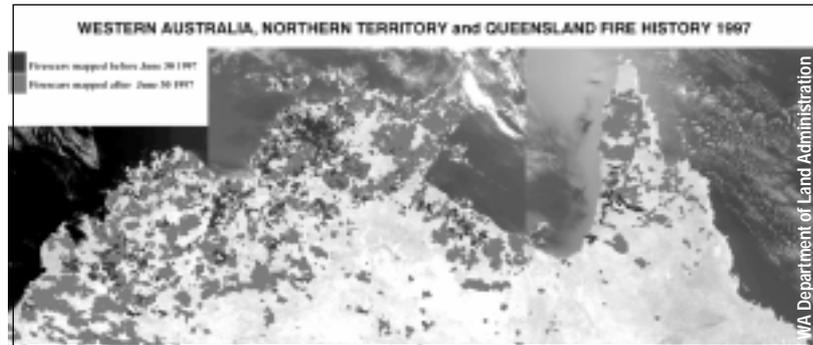
Obviously, we should learn from past mistakes and be more cautious and stringent about plant introduction and evaluation. We should be especially careful about introducing plants that have characteristics not found amongst the native plants (gamba grass appears to be an example) or that are adapted to particular habitats (e.g. waterways).

Much of the Australian environment has already been disturbed in one way or another, even in far northern areas, so the issue is really about how we manage these changes based on a sound ecological understanding.

Mick Quirk, Queensland Department of Primary Industries Charters Towers



Over the last wet season, Dr Sindre Langaas, a satellite data specialist from the Royal Institute of Technology in Sweden, visited north Australia courtesy of Tropical Savannas CRC. *SL* asked him how remote sensing in north Australia differed to that of Europe.



Map of 1997 firescars created from AVHRR data

## Remote sensing: the view from above

**Sindre:** The fascinating thing about savanna regions in northern Australia is that you have immense land regions that are being extensively used by stakeholders. Pastoralists and Aborigines are very keen on getting types of land information that can hardly be obtained from any source other than satellite remote sensing.

**SL:** Is the demand for remote-sensing information in Australia from land managers, whereas in Europe there is a greater interest from the research community?

**Sindre:** Yes, that is the main difference. In Europe there are much smaller parcels

of land, more intensively managed and well-mapped. They demand high-quality data and detailed information, so they use aerial photographs rather than satellite data. Here with the more remote areas that are less managed, the lower quality of information you get from AVHRR satellite sensors is sufficient. In Europe, the demand for satellite data focuses more on oceanographic and weather forecasting. When it concerns ecological/land monitoring using AVHRR, which is my specialty, there isn't the same demand.

**SL:** Are AVHRR images used to generate firescar pictures?

**Sindre:** Yes, this is the sort of image being used by DOLA (Department of Land Administration WA) in Perth for creating images of firescars, where fires have already been (see map) and hotspot information in which they detect active, ongoing fires. They also they use it to characterise fuel-load build-up and the curing rate for fuel. It's very well suited for the large remote areas as you find here in north Australia.

**SL:** What about Africa and other countries that have similar remote areas, any idea of how what we are doing with satellite data in Australia compares to research in those countries?

**Sindre:** In the tropics you find quite substantial research activities in South America, Africa and South East Asia. Quite often these activities are driven from European or American research groups. In terms of methodologies being applied, there is a slight difference between Australia—at least as I've seen it in the northern part—

and what is going on in these countries. Essentially in Australia there are the same type of techniques, but sometimes they do not link with groups that have a larger research capacity.

**SL:** Does that mean that maps of firescars, for example, aren't necessarily an accurate picture of what's happening on the ground?

**Sindre:** I've been carrying out a small study in comparing these firescar maps currently being produced and developed by DOLA in Perth and comparing

them to reference data from aircraft and helicopters, and the results I've found are good.

**SL:** What about other sorts of remote sensed data?

**Sindre:** I think one particular sensor that from an Australian perspective could be very interesting is a satellite to be

launched by the Japanese later in the year. It is a geo-stationary satellite which is based over the same location all the time [NOAA/AVHRR have polar orbits so they are moving around all the time] but this is fixed like a TV satellite. They have an image frequency of half or one hour, and they have a sensor that is comparable to the AVHRR, but with coarser spatial resolution. While the AVHRR is one square kilometre pixel on the ground, this sensor has a 4k x 4k resolution. It will be possible to get very high frequency information about fire fronts from that: you could actually follow the development of big fires. I'm not sure how useful it is for land managers because of the very coarse resolution, but from a scientific perspective it is a very interesting new sensor.

*Interview: Peter Jacklyn*

### Websites

An overview of international remote sensing

[www.mtv.sai.jrc](http://www.mtv.sai.jrc)

WA Department of Land Administration NOAA-AVHRR satellite data

[www.rss.dola.wa.gov.au/apps/firewatch.html](http://www.rss.dola.wa.gov.au/apps/firewatch.html)

The International Fire Information Network

[www.csu.edu.au/firenet/firenet.html](http://www.csu.edu.au/firenet/firenet.html)

TS-CRC Research: Fire and Savanna Landscapes

[savanna.ntu.edu.au/research/projects/firsav.html](http://savanna.ntu.edu.au/research/projects/firsav.html)

### Hot crocs and T-Rex

LARGE saltwater crocodiles from north Queensland stay warmer than small salties—a finding with implications for our understanding of dinosaur biology. The study by Gordon Grigg and colleagues from the University of Queensland (reported in the *Journal of Experimental Biology*, vol 202, p77) found that the largest crocs stayed a few degrees warmer than smaller crocs. Their body heat also fluctuated less—partly because there is relatively less surface area for heat to escape from compared to their great bulk. The implication is that other bulky reptiles, e.g. *Tyrannosaurus rex*, may also have been warm bodied and “warm-blooded” with the speed and endurance normally associated with birds and mammals.

From *New Scientist* 9 January 1999

### Spiders nectar brewmasters

A US STUDY has shown that by scaring off damaging insects some jumping spiders can help plants boost seed production (*Oecologia*, vol 119, p227). Jumping spiders are mobile and aggressive predators on various insects, but they don't generally harm plants like the yellow-flowered legumes in the study. Why hang around a plant if you're a jumping spider? Apparently the spiders are attracted by extra nectar on the plants in extrafloral nectaries. In the study, the legumes with spiders on them had seed production raised by an average of 8 per cent compared to the spiderless plants.

From *New Scientist* 15 May 1999

### Noxious plants in ID line-up

It can be quite confusing to know which plants have been declared under legislation in which State or Territory. Where is *Lantana camara* declared noxious? Can I sell pampas grass in Victoria? Are there restrictions on the transport of St John's Wort between Qld and NSW? There is now a Website that can help to answer these questions. John Thorp and his team with the National Weeds Strategy (NWS) Executive Committee have opened the site attached to the NWS website—just follow the links to the noxious weed list. You can print

## Desert Uplands 2001: A festival odyssey

Get out your diaries, because in 2001 the people of the Desert Uplands are planning a major celebration of their region and the federation centenary. A spectacular musical is being mounted based on the legendary Captain Starlight (on whose exploits *Robbery Under Arms* was based), which will be shown at Mailman's Gorge. The festival will tie in with existing events around the region such as the Charters Towers Country Music Festival the International Quarter Horse Challenge at Alpha and the Barcardine Arts festival. Also on the drawing board is a photography and art exhibition and competition, and a tour by the ACTU Combined Union Choir to the birthplace of Australian unionism. Eco-cultural tours across the areas are also being planned, which will follow historical routes, including those of Cobb & Co.

If you'd like to help out call Tim Fairbairn of the Desert Uplands Committee Tel: (07) 4652 1002 Fax: (07) 4651 1001.

off listings of declared weeds, state by state. It also has a split screen so you can look at legislation categories at the same time as the list, making it easier to understand the different terminology and categories used. The lists will be updated quarterly unless important changes are made in the shorter term. It will highlight some of the areas of legislation that could be strengthened particularly across state borders and some of the inconsistencies of where plants are declared.

Go to: [www.weeds.org.au](http://www.weeds.org.au)

### New ecological journal

THE Ecological Society of Australia (ESA) and the Land and Water Resources Research & Development Corporation (LWRRDC) have agreed to jointly establish a new journal, *Ecological Management and Restoration*. A primary purpose of the journal is to strengthen linkages between the science and research of ecosystem management, and its application through practice.

### Get your updates on grants

*Australian Update* is a free news service designed to keep you up to date on the latest grant opportunities in Australia and abroad, including study grants, scholarships and fellowships, prizes and paper awards, travel opportunities, and internships. *Australian Update* is published regularly by Community of Science (COS) and draws on new and updated information in COS Funding Opportunities, the world's largest source of

funding information on the Web with more than 15,500 awards from around the world. News items in *Australian Update* link to detailed records, describing each grant opportunity. You may also subscribe to COS, a free weekly *Funding News* email bulletin.

For Update, go to *Australian Update*: [fundingopps2.cos.com/news/australia/](http://fundingopps2.cos.com/news/australia/)

You will need username: **australia**; and password: **olympics**

For COS, go to [fundingopps2.cos.com/news/](http://fundingopps2.cos.com/news/) and click on “Subscribe now.”

### Info package for producers

AN information package on locally relevant information is now available for north-west Queensland beef producers. Compiled by the Qld Department of Primary Industries, the extension note folder will be distributed to beef producers across the state's north-west. Issues covered include grazing management and financial management, growth and nutrition, breeder management, breeding and genetics, cattle handling, marketing, animal health, cattle tick movement and control, quality assurance, chemical residues, client services and assistance schemes. Cloncurry-based beef extension officer Felicity Hill organised, collated and edited the folder. Local DPI staff, from a number of institutes authored most of the articles.

Call Felicity Hill  
DPI Queensland Beef Industry  
Institute Tel: (07) 4742 1311

## **Ecology & Environment**

### **Global Change Transects Workshop**

**July 11-16, 1999, Darwin**

**Venue:** Novotel Atrium, Darwin for presentations; workshop sessions Red Centre Resort, Alice Springs.

Global change research is concerned with the effects of changes in atmospheric composition, climate and land use that are currently occurring at unprecedented rates. This international workshop is sponsored by CSIRO and Tropical Savannas CRC. Speakers will address various research strategies to deal with the uncertainties of predicting future changes to terrestrial ecosystems as diverse as the Kalahari Desert in southern Africa and the central Russian boreal forests.

**Contact:** Garry Cook CSIRO Wildlife & Ecology, Darwin

**Tel:** 8944 8427 **Fax:** 8944 8444

**Email:** Garry.Cook@dwe.csiro.au

### **VI International Rangelands Congress People & Rangelands: Building the Future**

**17-23 July 1999, Townsville**

**Venue:** ITT Sheraton Townsville Hotel Casino & Townsville Entertainment & Convention Centre.

**Plenary speakers:** Dr Tim Flannery and Dr Frank (Fee) Busby.

Six workshops will be held prior to the congress from 16-17 July. Sessions embrace issues of scale, multi-disciplinarity and multiple use.

**Contact:** Secretariat Townsville Bronwyn Dawson

**Tel:** (07) 4771 5755 **Fax:** (07) 4771 5455

**Postal Address:** VI International Rangeland Congress Registrations PO Box 764, Aitkenvale Townsville Qld 4814

**Email:** secretariat-irc@unsw.edu.au

**Website:** <http://irc.web.unsw.edu.au>

### **MODSS '99 International Conference on Multiple Objective Decision Support Systems for Land, Water & Environmental Management**

**1-5 August 1999, Brisbane**

**Theme:** The broad spectrum of decision support through five themes and multiple sessions.

**Contact:** Dr Paul Lawrence

**Postal Address:** Department of Natural Resources, Resource Sciences Centre, 80 Meiers Rd, Indooroopilly Qld 4068

**Tel:** (07) 3896 9560 **Fax:** (07) 3896 9898

**Email:** modss99@dnr.qld.gov.au

**Website:** <http://www.dnr.qld.gov.au/events/modss99/index.htm>

### **Undoolya Wattle monitoring August 1999, Alice Springs**

Join the Threatened Species Network and Parks and Wildlife Commission of the NT in a weekend out at N'Dhala Gorge, east of Alice Springs, to monitor populations of the threatened wattle.

**Contact:** Threatened Species Network

**Email:** tsntnt@ozemail.com.au

**Tel:** (08) 8952 1541 **Fax:** (08) 8953 2988

**Postal Address:** PO Box 2796, Alice Springs, NT 0871

### **Frontier Australia—Contact Geographies in northern Australia**

**23-24 September, 1999, Darwin**

**Venue:** Museum and Art Gallery of the Northern Territory, Darwin

The conference is a two-day symposium dedicated to exploring historical and contemporary contact geographies in northern Australia. Its goal is to convene scholars and interested and active groups who study and are inspired by issues of cross-cultural encounters, contact history and environmental concerns in North Australia.

**Contact:** Richard Davis

**Postal address:** North Australia Research Unit

PO Box 41321 Casuarina NT 0811

**Email:** Richard.Davis@anu.edu.au

Deborah Rose

**Postal address:** Dept Anthropology, RSPAS Australian National University, Canberra ACT 0200

**Email:** Deborah.Rose@anu.edu.au

Janet Sincock **Tel:** (08) 8922 0066

**Email:** Janet.Sincock@anu.edu.au

### **Evaluating Indirect Ecological Effects of Biological Control**

**17-20 October 1999, France**

**Venue:** Agropolis International, Montpellier, France

The first two days of the symposium

comprises sessions for keynote speakers, proposed papers and posters and the last day, a workshop session.

Themes for papers will include application of ecological theory and research; case studies and analyses; and assessment methodology.

**Email:** iobc.symp@agropolis.fr

### **The Modelling and Simulation Society of Australia and New Zealand (MSSANZ), Meeting 6-9 December 1999, New Zealand**

**Venue:** University of Waikato, Hamilton, New Zealand.

**Theme:** Modelling the dynamics of natural, agricultural, hydrological, tourism and socio-economic systems.

**Contact:** Prof. Les Oxley and Dr Frank Scrimgeour

**Postal Address:** Department of Economics, University of Waikato, Private Bag, Hamilton, New Zealand

**Tel:** +64 7 838 4077 **Fax:** +64 7 838 4331

**Email:** modsim99@waikato.ac.nz

**Website:**

<http://www.mngt.waikato.ac.nz/depts/econ/MODSIM99.html>

### **International Landcare 2000 Changing Landscapes, Shaping Futures**

**2-5 March 2000, Melbourne**

**Venue:** Melbourne Convention Centre.

International Landcare Conference and Exhibition will explore issues such as sustainable agriculture and communities, biodiversity and greenhouse. It will also explore sustaining landcare into the future.

**Contact:** Waldron Smith Convention Network

**Postal Address:** 93 Victoria Avenue Albert Park, Victoria, Australia 3206

**Tel:** (03) 9690 6744 **Fax:** (03) 9690 7155

**Email:** wscn@bigpond.com

**Website:** <http://www.nre.vic.gov.au/conf/landcare2000/>

### **International Symposium of Advances in Carbon and Nutrient Cycling and Catchment Processes in Managed Forests**

**21-25 August 2000, Gold Coast**

**Contact:** Tim Blumfield

**Tel:** (07) 3875 7494

## **Fauna**

### **7th Australasian Conference on Grassland Invertebrate Ecology September–October 1999, Perth**

A forum for Australian and New Zealand scientists researching the ecology, biology, and management of invertebrates in grassland ecosystems. These include native grasslands, exotic pastures and pasture/crop rotational systems.

**Contact:** John Matthiessen  
Chair, Organising Committee  
CSIRO Entomology

**Postal Address:** Private Bag, PO  
Wembley, WA 6014

**Tel:** (08) 9333 6641 **Fax:** (08) 9333 6646

**Email:** johnm@ccmar.csiro.au

## **Indigenous Issues**

### **National Aboriginal and Torres Strait Islander (NAIDOC) Week 4–11 July 1999, National Events**

**Theme:** The theme for NAIDOC 1999 is respect. NAIDOC Week is the outcome of a long history of Aboriginal and Torres Strait Islander efforts to bring issues of concern to the attention of governments and the general public. This year Alice Springs will host national events.

**Contact:** ATSIC

**Postal Address:** PO Box 17  
Woden, ACT 2606

**Tel:** (02) 6289 3020 **Fax:** (02) 6282 2854

**Website:** <http://www.atsic.gov.au/>

## **Pastoral Interests**

### **Building Rural Leaders 31 August, 1999, Yungaburra**

**Venue:** Genezzano Centre, Yungaburra, north Queensland  
This course has built a strong reputation for the fun and innovative way that it tackles contemporary rural issues. It consists of six four-day workshops held over nine months.

**Cost:** Workshop \$300; Meals \$81; Accommodation \$35 single or \$30 twin

**Contact:** Debbie Atkins

**Tel:** 1800 356 621

### **Beef Expo 2000 9–16 April 2000, Central Qld**

**Venue:** To be announced.  
The event will highlight contributions

made by the national beef industry to the Australian society. It will focus on opportunities which will allow the beef industry to build a dynamic, secure future into the next millennium. It is organised by the Australian Beef Cattle Exposition Association Inc.

**Website:**

<http://leaky.rock.tap.csiro.au/Beef2000/beef2000-structure.html>

### **Tropical Grassland Society Conference—Pastures for Production and Protection 26–28 April 2000, Emerald**

**Venue:** Emerald Agricultural College  
The conference focuses on protecting soil, building fertility, controlling weeds. It also features field trips to inspect legumes and native grass pastures. Sessions include mine revegetation systems, pasture and cropping systems, native pastures and weed eradication.

**Contact:** Maurice Conway TGS

**Tel:** (07) 4982 8814 **Fax:** (07) 4982 3459

**Email:** conwaym@dpi.qld.gov.au

**Website:** [http://](http://www.powerup.com.au/~tgsoaust)

[www.powerup.com.au/~tgsoaust](http://www.powerup.com.au/~tgsoaust)

**To submit posters contact:**

Karen Healey, University of Queensland, Gatton College

**Tel:** (07) 5460 1307 **Fax:** (07) 5460 1112

**Email:** k.healey@mailbox.uq.edu.au

## **General**

### **The Drovers' Camp Festival 10–11 July 1999, Camooweal**

The festival includes a grand parade, bush poet competition, yarn spinning, art and photo competition, goat races, bronco branding competition, street theatre, truck sports, yabbie races, dancing, talent quest, the great mail race and an outback sports carnival.

**Contact:** Drovers Camp Association

**Postal Address:** PO Box 4  
Camooweal, Qld 4828

**Tel:** (07) 4748 2155 **Fax:** (07) 4748 2132

### **Desert Sands 2000 The Great Camel Race 17–18 July 1999, Boulia**

This annual event sees up to 80 camels showing their paces at the racetrack of central Queensland town Boulia. There is also a concert, fireworks and other celebrations.

**Contact:** Paddy McHugh

**Tel/Fax:** (07) 4721 6720

### **RAPI National Congress: Planning in the Hot House 19–23 September 1999, Darwin**

**Venue:** Darwin Entertainment Centre  
**Topics include:** Regional, remote and indigenous issues; links to South East Asia and the Pacific countries; multi-disciplinary approaches to planning practice and development.

**Contact:** The Congress Secretariat  
Convention Catalysts International

**Postal Address:** GPO Box 2541  
Darwin, Northern Territory, 0801

**Tel:** (08) 8981 1875 **Fax:** (08) 8941 1639  
[convention.catalysts@norgate.com.au](mailto:convention.catalysts@norgate.com.au)

**Websites:** <http://www.rapi.com.au/~rapi>

## **Tourism**

### **Tourism Outlook Conference Practical Research for a Sustainable Tourism Industry 13–14 September 1999, Sydney**

**Venue:** Hotel Intercontinental, Sydney  
The Outlook conference, presented by ATRi (Australian Tourism Research Institute), Southern Cross University, WTTC, Tourism Council Australia and CRC Tourism will communicate local and international research outcomes, and explore the role of research in the growth of sustainable tourism opportunities.

**Contact:** Sue Clifford-Loomes

**Email:** scliffor@scu.edu.au

### **Ecotourism Association of Australia National Conference—The World's Natural Theme Park 14–17 October 1999, Fraser Island**

**Venue:** Kingfisher Bay Resort and Village, Fraser Island.

The EAA conference is an opportunity to explore how the industry can best build on and ensure the sustainability of Australia's unique assets.

**Contact:** Tony Charters  
Conference Convenor,

Tourism Queensland  
GPO Box 328 Brisbane, Qld, 4001

**Tel:** (07) 3406 5493 **Fax:** (07) 3406 5483

**Email:** [charterst@qtcc.com.au](mailto:charterst@qtcc.com.au)

**Website:** [www.qtcc.com.au/ecotourism/conference99](http://www.qtcc.com.au/ecotourism/conference99)

**Weed Management**

**Weedbuster Week**

**10 to 17 October 1999, National**

**Venue:** National

**Theme:** "Weed prevention is the intention"  
There are hundreds of events around the country during Weedbuster Week. Activities include weed clean-ups, displays, seminars, workshops and competitions. Contact your state or territory coordinator to join in.

**National:** Salvo Vitelli

**Tel:** (07) 3406 2859 **Fax:** (07) 3406 2875

**Postal Address:** Department of Natural Resources, Locked Bag 40  
Coorparoo Delivery Centre, Qld 4151

**Email:** salvo.vitelli@dnr.qld.gov.au

**NT:** Leslee Hills

**Tel:** (08) 8999 2349 **Fax:** (08) 8999 2049

**Postal Address:** NT Primary Industry and Fisheries PO Box 990, Darwin, NT 0810

**Email:** leslee.hills@nt.gov.au

**Website:** <http://www.nt.gov.au/dpif/>

**Qld:** Leanne Parkes

**Tel:** (07) 3406 2867 **Fax:** (07) 3406 2875

**Postal Address:** Department of Natural Resources Locked bag 40  
Coorparoo Delivery Centre, Qld 4151

**Email:** Leanne.parkes@dnr.qld.gov.au

**Website:**

<http://www.dnr.qld.gov.au/land/landprotection/weedbuster/home.htm>

**WA:** Sandy Lloyd

**Tel:** (08) 9368 3760 **Fax:** (08) 9474 3814

**Postal Address:** Agriculture WA, Locked Bag 4, Bentley D.C., WA 6983

**Email:** slloyd@agric.wa.gov.au

**Website:**

<http://www.agric.wa.gov.au/progserv/plants/weeds/buster/buster.htm>

**ACT:** Helen Peade

**Tel:** (02) 6284 7234 **Fax:** (02) 6284 7235

Griffin Promotions, PO Box 1684,

Tuggeranong, ACT 2601

**Website:** <http://www.ento.csiro.au/research/weedmgmt/weedmgmt.html>

**Vic:** Kate Blood

Environment Weed Education Coordinator

**Tel:** (03) 9785 0111 **Fax:** (03) 9785 2007

CRCWMS, KTRI, PO Box 48,  
Frankston, Vic 3199

**Email:** Kate.Blood@nre.vic.gov.au

**Website:** <http://www.nre.vic.gov.au/plntanml/pests/weedbuster/index.htm>

**Australian Weeds Conference  
September 12-16 1999, Hobart**

**Venue:** Hobart, Tasmania, Australia

**Contact:** Conference Design,

**Postal Address:** PO Box 342

Sandy Bay, Tasmania, 7006 Australia

**Fax:** 61-03-6224-3774

**Email:** mail@cdesign.com.au

**Website:**

[http://www.css.orst.edu/weeds/iwss/Newsletter/0798/dates\\_events.htm](http://www.css.orst.edu/weeds/iwss/Newsletter/0798/dates_events.htm)

**17th Asian Pacific Weed Science  
Society Conference  
November 1999, Bangkok**

**Venue:** Bangkok, Thailand

**Contact:** Dr Sombat Chinawong

APWSS Secretary, Department of Agronomy  
Faculty of Agriculture, Kasetsart University  
Chatuchak, Bangkok 10903, Thailand

**Fax:** 662 579 8580

**Email:** agrsbc@nontri.ku.ac.th

**Website:** [http://www.css.orst.edu/weeds/iwss/Newsletter/0798/dates\\_events.htm](http://www.css.orst.edu/weeds/iwss/Newsletter/0798/dates_events.htm)

**Weed Science Society of America  
5-10 February 2000, Lawrence, US**

**Venue:** Westin Harbour Hotel, Toronto, Canada

**Contact:** J. Breithaupt

**Postal Address:** PO Box 1897

Lawrence, KS 66044, US

**Tel:** 1 913 843 1235 **Fax:** 1 913 843 1274

**Email:** jbreith@allenpress.com

**OUR STAKEHOLDERS**



**ABORIGINAL COMMUNITIES**



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**TOURISM**



**MINING**



**CONSERVATION**



**DEFENCE**

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**Views expressed in Savanna Links are not necessarily those of the Tropical Savannas CRC.**

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