



SAVANNA LINKS

Cooperative Research Centre for the Sustainable Development of Tropical Savannas

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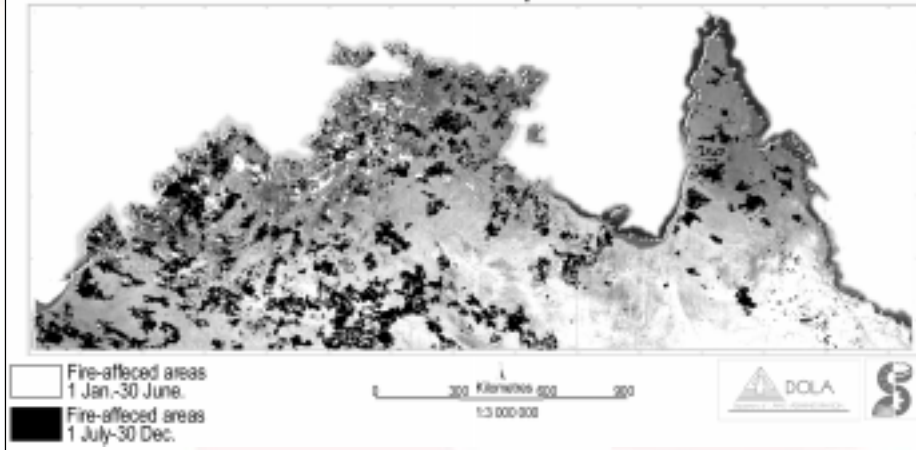
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Fire control moves to the stratosphere

Fire-affected areas of the Tropical Savannas: 2000



This map was produced on 18/4/01. Fire scars were mapped from 1 km ground resolution NOAA-AVHRR satellite images. Early-season fires (white areas) cover 5.8 million hectares while late-season fires (black areas) cover 40.4 million hectares.

On the ground, bushfire brigades across northern Australia are bracing themselves for what could be a record fire season. But one of their most potent weapons is information that comes from the stratosphere: satellite imaging. Turn to pages 8-10 to read how the north's agencies—and landholders—are revolutionising fire control and management.

Northern view: sustaining the fragile frontier

"To know this country is to love it and to be humbled. I love it passionately and I love sharing its magic with our visitors."

This issue we interview Kimberley tour guide Meg Hornabrook (pictured right) on how she sees the challenges and potential of the expanding ecotourism industry. Turn to page 8



Weed control: Bad seeds to power plants

A new pilot power plant fuelled by mimosa is the latest move to help deal with one of the NT's most invasive weeds. See page 2 for the full story. On page 6 read about a study looking

at the longevity and viability of bellyache bush seedlings in a bid to eradicate the plant and on page 7 you can read about a more traditional approach to controlling mimosa.

Cotton pushes into northern grazing frontier

A 400-HECTARE research cotton crop at Richmond in north Queensland is the latest in a number of trials evaluating cotton production in northern Australian environments. The three-year trial, being run at Silver Plains Station in the southern Gulf, aims to determine if cotton crops—using the genetically modified INGARD cotton—can be environmentally sustainable.

Broadscale plantations of INGARD cotton are currently being trialled in the Ord Irrigation Area. The NT Department of Primary Industry & Fisheries has also been running a trial for three years to gauge how productive broadacre cotton would be on country around Katherine.

In the Gulf however, while there is strong producer and community interest in diversification in the region's pastoral areas, there are still widespread concerns about the long-term environmental impacts of establishing an irrigated cotton industry on the Flinders River.

A community forum was held in Richmond at the beginning of May in response to those concerns. Hosted by the Southern Gulf Catchments Inc., in conjunction with the Richmond Shire Council, the forum drew more than 100 stakeholders including conservation groups, shire councils, graziers, and commercial fishing groups. Technical representatives from scientific and government bodies were present to answer stakeholder questions.

Andrew Humpherys, Coordinator of Southern Gulf Catchments Inc. said the forum provided an opportunity for discussion over a range of issues, including the

economic, social and environmental concerns of local people. "The major feeling from the forum was that conflict was avoided and that people were willing find common ground and cooperatively address issues," he said. The forum identified key issues and nominated stakeholders for a Flinders River Catchment Advisory Panel.

The cotton trial is a collaboration between the Queensland Department of Primary Industries and the Australian Cotton CRC. It aims to refine a sustainable production system for cotton that is based on extensive field trials of INGARD cotton and insect resistance management protocols carried out at Emerald and Theodore in central Queensland during the late 1990s. INGARD cotton has been genetically modified to resist the main pest, heliothis, which closed down cotton production in the Ord in the 1970s. Any stakeholders with an interest in the Flinders River catchment are invited to express their views on the proposed developments in writing to Andrew Humpherys.

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More information on INGARD cotton:
Australian Cotton CRC
www.cotton.pi.csiro.au/
Graeme O'Neill article on INGARD cotton
www.irysec.vic.edu.au/sci/goneill/btgene.htm

Tropical Savannas CRC: Linking the North

The Tropical Savannas CRC is a joint venture of the major organisations involved in land management of the savannas of north Australia. It comprises two universities, two divisions of CSIRO, four NT, three Queensland, two WA government agencies and one federal agency.

The Centre promotes sustainable use and conservation of Australia's tropical savannas by acting as a bridge between agencies engaged in land-management research and industries representing land users: e.g. pastoralists, Aboriginal groups, the tourist industry and conservation managers; and by looking for ways to ensure more research ends up being used on the land.

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Weed power: mimosa to fire pilot power plant

MIMOSA pigra, one of the most invasive weeds plaguing Australia's north, is to go up in smoke: but as briquettes to generate power in a new experimental 350 kilowatt power plant in the Northern Territory. The \$3.3 million pilot plant will be built on a property on the Adelaide River flood plain, and will use mimosa pigra as a source of fuel.

The pilot plant is being built and run by the NT Power and Water Authority (PAWA). Because it provides an alternative to fossil fuels it has attracted \$1 million funding from the Australian Greenhouse Office. It has, says the Office, the potential to reduce greenhouse gas emissions by up to 24,000 tonnes over a decade.

The pilot plant will be built over the next year and the following five years will be spent assessing its performance. Trevor Horman, from PAWA, said if the scheme did work the authority may then build a 3.5 MW power plant using the technology.

The Federal Minister for the Environment Robert Hill has also mooted the possibility of using the technology as a way to deal with

western Queensland's enormous prickly acacia infestations.

However, as Trevor said, it has to be proven to work first.

"The harvesting alone is an enormous challenge," he said. "It's a woody tree with branches up to 75 mm in diameter. It's quite a challenge to harvest."

The pilot plant is being built on a cattle property with a significant mimosa infestation and since news of the mimosa-fired plant broke, Trevor says he has been deluged with calls from other landowners with mimosa infestations who are keen to join in.

However, PAWA won't be taking them up on their offer. Project personnel want to ensure that the weed does not propagate further while it is being used to fuel the plant. Hence the entire project is self-contained: the pilot plant is on the property where the harvesting and production of the briquettes will take place.

Contact: Trevor Horman, NT Power & Water Authority Tel: 1800 245 091

To read about how another community is dealing with mimosa, turn to page 7.

Eureka! Territory scientist wins national science award



Premier win: John Woinarski awarded Eureka Prize for Biodiversity Research

DARWIN scientist Dr John Woinarski has been awarded the 2001 Eureka Prize for Biodiversity Research. This prize, sponsored by the Royal Botanic Gardens Sydney and the Australian Museum, is one of Australia's premier awards for scientific research. John is principal research scientist with the Parks & Wildlife Commission and a research project leader with the Tropical Savannas CRC. His award recognises more than 10 years of outstanding research examining the distribution

and status of animals and plants in northern Australia, the response of this wildlife to land use and management, and conservation issues in northern Australia generally.

Professor Henry Nix, from the Australian National University, said that few Australian ecologists could match the range, scope and depth of John's contributions to our understanding of biodiversity.

John said that he was delighted to win the award, and that it recognised the excellent work undertaken by the PWCNT and a range of other agencies in the north.

"In Darwin, we now have a particularly productive community of environmental research scientists," he said. "From Parks and Wildlife, CSIRO, the Tropical Savannas CRC and the Key Centre for Tropical Wildlife Management at NTU, who do work of national and international significance."

Contact: John Woinarski Tel: (08) 8944 8451
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TS-CRC Project: Vertebrate Biogeography
<http://savanna.ntu.edu.au/research/projects/verteb.html>

Tropical savannas information sheets

The TS-CRC now has 38 new information sheets on sustainable land management in the tropical savannas. You can find them on our website in the publications section. They are also available on the Qld Department of Primary Industries' latest Prime Notes CD-ROM, which has more than 1000 fact sheets on natural resource management and agriculture.

TS-CRC Website

<http://savanna.ntu.edu.au>

For the Prime Notes CD-ROM

Contact: DPI Publications

DPI, GPO Box 46,

BRISBANE, Qld, 4001

Tel: 1 800 816 541

Email: books@dpi.qld.gov.au

Web: www.dpi.qld.gov.au

Tropical Topics

THIS issue of *Savanna Links* has another *Tropical Topics*—the interpretive newsletter extraordinary for the tourism industry. Published by the Queensland Environmental Protection Agency, this issue features the impact of dry times on the wetlands of the savannas.

Contact the Editor, Stella Martin, Environmental Protection Agency, Tel: (07) 4046 6674 Fax: (07) 4046 6604 Email: Stella.Martin@env.qld.gov.au

TSM-CRC research program under way

FOLLOWING lengthy consideration, the leaders for Themes 1 and 2 of the Tropical Savannas Management CRC have been appointed. Dr John Ludwig will lead Theme 1, Landscape Ecology and Health, and Dr Jill Landsberg will lead Theme 2, Industry and Community Natural Resource Management. John is based at CSIRO Sustainable Ecosystems in Atherton, Queensland, and Jill is based at the Cairns campus of James Cook University, also in Queensland.

John is already well known within the original CRC and is also a project leader with the new TSM-CRC. He specialises in landscape ecology and modelling, restoration ecology, rangeland and minesite rehabilitation. John has broad experience in landscape ecology within Australia and internationally.

Jill's research areas include forest dieback, rangeland grazing and threatened species. Her background includes the Biograzing project, run in conjunction with Dr Craig James and a team based in Alice Springs, which sought to uncover biological and economic consequences of managing water point distribution in the rangelands.

Jill has been working most recently in Cape York for the Queensland Parks & Wildlife Service developing management strategies for conserving threatened flora.

She also holds the position of Adjunct Senior Lecturer in the School of Tropical Biology at JCU's Cairns Campus.

The new research program for the TSM-CRC is also several steps closer after being approved by the CRC's Board and Consultative Committee in May. Eleven new projects have now received the go-ahead, with projects on education and communication continuing. You can read about the new research program and themes on the TS-CRC website's research section.

For more information, contact Cheryl Arnott

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John Ludwig: john.ludwig@tffc.csiro.au

Jill Landsberg: Jill.Landsberg@env.qld.gov.au

Qld aims to limit ponded pastures

The Queensland Government is to limit the use of ponded pastures in an effort to combat the growing problem of environmental damage from escaped exotics. It is also developing a protocol to assess the weed potential of all pasture and fodder plant stocks prior to their release for use.

See *Savanna Bites*, page 13, for full story.

Guides' effort to sustain a fragile frontier

Savanna Links talks to tour guide Meg Hornabrook about the rewards and challenges of guiding tourists in one of Australia's most ancient and remote regions.

You've been a guide at El Questro for more than four years. What is it that makes you stay in this job?

I came to El Questro in 1996 in order to experience the Kimberley. It was my intention to spend one or maybe two years up here. I had no idea how compelling this country could be. I fell for it, hook, line and sinker! The clear air, stark horizons, the new and varied vegetation struggling to hold on in the wet and to hang out through the dry, the timelessness of the landscape, the beauty of a spring-fed stream and everywhere the *rocks*—a silent measure of the antiquity of this land. All of this and much, much more contribute to a truly moving experience. To know this country is to love it and to be humbled. I love it passionately and I love sharing its magic with our visitors.

How has the industry changed since you first began at El Questro? Have visitor numbers increased?

The Kimberley is no longer one of Australia's secret destinations visited by the privileged few. It has become one of the 'in' destinations and information about its many and varied attractions is readily available through the Internet, travel outlets, media features and of course through word-of-mouth feedback from those who have already visited. El Questro has definitely seen a dramatic increase in visitor numbers during my time here.

Has there been a noticeable impact from tourism on the environment?

It is difficult to imagine tourism without some form of impact on the environment. Take vehicle transportation for example: roads and tracks are etched onto the landscape and these in turn lead to roadside gravel pits

and dust-covered vegetation. Then there is the disposal of human and general waste, one could go on and on; these things have both a visual and physical impact.

El Questro is a developing wilderness park and is committed to the sustainable development of its attractions and resources. My present concern is for our beautiful, but fragile, pockets of rainforest where increased visitor numbers are causing soil erosion and compression, to the detriment of the vegetation. The challenge is to manage this impact without detracting from the pristine appearance of the attraction or having to close it altogether. We also seem to have an increased number of unwanted fires on the property, however the origin of these is uncertain and may not necessarily be attributable to visitors to any great extent. One must also remember that El Questro is a privately run business without outside resources. It must also be economically sustainable.

Is there much more interest in conservation issues coming from visitors? Have their interests changed in other ways?

I am convinced that our visitors are more aware of conservation issues today than when I first arrived. Our visitors frequently raise their concerns about the burning and other environmental issues. They are not just interested in visual images; there is definitely increased demand for educational and interpretative activities.

What sort of knowledge does El Questro use in managing the country? What are the major land-management issues on El Questro, and how does the fact that it is a tourist resort affect these issues?

Go to page 5

tourism

Season warms up with tour guides' schools in training



THE first school of the NT branch of the Institute of Australian Tourist Guides was held in March at Ian Morris's property at Noonamah, outside Darwin. Partially funded by the Tropical Savannas CRC, the school drew around 50 people, including many guides and some agency people. Attendees were treated to a tour of Ian's property, akin to an outdoor natural museum and containing a great diversity of plant and bird species. Presentations included rainforest biodiversity, accreditation in the NT, talks on spiders and snakes, identifying birds by their call and developing effective communication and interpretation skills. See **page 13** for our story on tour guide accreditation.

A NEW association is now being formed for Northern Territory tour guides.

Wendy Kelton is trying to reach as many guides and other interested parties as possible. Anyone interested in guiding is welcome.

If you send your contact details to Wendy she will keep you informed of the new association's progress.

Contact: Wendy Kelton

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Casuarina, NT 0811.



Meg Hornabrook on the Cockburn Plateau above Emma Gorge in the Kimberley

From p. 4 The country is managed by knowledge gained through past experiences and with input on new techniques from different sources such as CALM (WA Department of Conservation & Land Management), Tropical Savannas CRC, Savannah Guides, AGWEST (Agriculture Western Australia) and other government organisations.

The major issues are fire management, erosion and land degradation and the impact of visitors on the environment.

Satellite imagery shows a tremendous increase in uncontrollable and destructively hot fires in recent years, the majority of which have been deliberately lit. Some weeds, especially wild passionfruit (*Passiflora foetida*) are making their presence felt, however they are still largely regarded as harmless.

Tourism raises certain land-management issues. More visitors earn more revenue but increase the environmental impact and this in turn requires more funds to prevent and so it goes on. There are guest safety issues that must be addressed also especially in relation to fire.

Is there any attempt at integrating some of the land-management practices with tourism, like say taking folk out on a muster? Or letting people stay for nothing if they'll help clear out weeds etc.?

This is an area yet to be explored. There is great potential for our guests to be involved in aspects of research into land-management issues. For instance, monitoring the effect of fire on the insects and reptiles of an area or the changes that annual burning brings to the flora of a specific area. From time to time, we take on casual labour in exchange for board and keep and this could have greater environmental application.

El Questro is part of a wider Aboriginal land claim over large areas of the Kimberley. Has this affected the relationship with traditional owners? Do they contribute to management/ interpretation/ guiding? If not, are there plans to get them more involved in the future?

Yes, El Questro, like most of the pastoral leaseholders throughout the Kimberley, is subject to Aboriginal land claims. The issue as to whether there are any legitimate traditional owners has yet to be resolved. Meanwhile, local members of the Aboriginal community have ready

access to the property in order to fish or enjoy other leisure pursuits. El Questro has also introduced a walk that incorporates a traditional site, bush tucker and bush medicine. A young Aborigine has been employed to guide this walk. I believe there will be further opportunities for local indigenous folk to present their perspective of the land and its natural resources to our visitors in the future. Unfortunately, we have been unable to find any people associated with any of the cultural sites on El Questro who are able assist with interpretation.

Northern Australia competes with many wilderness destinations across the world. Is enough being done to ensure that industry standards are

internationally competitive? If not, what needs to change?

I am aware a change in direction towards environmentally sustainable tourism has been under way for a couple of decades. This change has really gathered momentum over the past five years or so, as proprietors of these destinations realise the increasingly high expectations of the consumer and the level of competition from similar providers.

How do you see the future of tourism in the Kimberley?

With the worldwide increase in leisure time and an ongoing demand for educative and nature-based tourism and adventure activities, I believe this industry has a positive future throughout Northern Australia.

Are there any major threats to the industry?

I think the principal threats to tourism are:

- The threatened loss of 'pristine' or 'last frontier' experience through increased and unlimited access to all areas;
- The possible closure of stations and their attractions as a result of successful Aboriginal land claims;
- Most tourist operators in the north have a shorter period in which to gain a return on their capital outlay due to seasonal constraints. The resultant highly priced product is vulnerable to a fluctuating national economy and gives the perception the industry in this region is overpriced and uncompetitive with other destinations;
- It will soon be possible to have uncontrolled access to the most remote and presently inaccessible areas of the Kimberley. This will open the way for likely plundering and desecration of Aboriginal cultural sites and rock- art galleries.

—Kathryn Thorburn

This article represents the opinions of Meg Hornabrook, and should not be taken as representative of El Questro management.

El Questro is open all year round.
Tel: (08) 9161 4388 Web: www.elquestro.com.au

Bad seeds: Project targets bellyache bush regrowth

The demise of the toxic shrub bellyache bush in northern Australia is the aim of new research by the Tropical Weeds Research Centre in Charters Towers.

Despite control measures such as herbicides, bellyache bush is still causing landholders headaches because of the large amount of seedling regrowth that occurs once plants are treated. A new project by the Tropical Weeds Research Centre—which is part of Queensland’s Department of Natural Resources and Mines (NRM)—is going to develop strategies to deal with initial infestations and subsequent regrowth of bellyache bush.

NRM’s Dr Faiz Bebawi, who will lead the project, said ecological studies would try to answer questions such as how long seed remains viable in the soil once adult plants are removed and how long it takes seedlings to mature and start setting seed.

Control techniques will include the use of chemicals, machinery and fire.

Two study sites are currently being established in the Charters Towers region: one at Larkspur Station on the Lynd Highway and the other at Riverview Station on the banks of the Burdekin River.

One ecological study that has already begun is testing seed longevity.

“We’ve also done a slashing trial at Larkspur Station where we slashed the plant in summer, when the plant is actively growing, and in winter when it is dormant,” said Faiz.

“In general, if you slash plants during summer you can kill all the older plants but results were variable for younger plants depending on the height at which they were slashed.

“However, if all the plants are slashed at ground level in either season all of the plants can be destroyed.

“We have also been trialing large-scale burns in riparian habitats as a means of managing this invasive weed on a cattle station at Sandy Creek, 20 km north-west of Charters Towers.”

Faiz said the trials had been some of the most successful undertaken for controlling the weed.

“Within the experimental plots, the first burn produced a kill of 80 per cent of the Bellyache Bush.

“However, if that first burn was followed up with a second burn 12 months later, a staggering 92 per cent of the weed was killed.

“Bellyache bush is very susceptible to fire but where green fuel prevails, fire will not carry through. This is the main reason why we could not achieve 100 per cent kill.”

Seedling survival and recruitment post-fire were also monitored. Seedling recruitment was three-fold greater after the first burn than in control plots.

“The trials have shown the follow-up burn is essential.



Bellyache bush

If a follow-up isn’t done, the 20 per cent of the weed that is not killed will set seed and re-infest the area, a factor compounded by the effects of the fire on seedling recruitment,” explained Faiz.

Bellyache bush, a native of tropical America is a garden escapee, which has spread throughout northern Queensland, the Northern Territory and into the Kimberley region of Western Australia. In Queensland, the largest infestation is on the Burdekin River and its tributaries where it is believed to infest more than 40,000 hectares.

“The problem with bellyache bush is that it out-competes native vegetation, reduces pasture growth and hinders mustering,” Faiz said.

The fruits of the plant are also poisonous to humans and animals, with a number of livestock deaths within Queensland and the Northern Territory attributed to Bellyache Bush in recent years.

The project began in March 2001 and it is hoped that it will run for 10 years, provided funding remains available.

“Hopefully at the end of the day we will have a wider range of control options available and know a lot more about this noxious weed,” Faiz said.

Faiz is also interested in identifying potential study sites in the wet tropics which have heavy infestations of bellyache bush.

Please contact him if you know of such a site.

Contact Dr Faiz Bebawi, Tropical Weeds Research Centre
Tel: (07) 4787 0616 Fax: (07) 4787 3969 Email: bebawiff@dnr.qld.gov.au
Web: NRM’s Bellyache Bush Fact Sheet
www.dnr.qld.gov.au/fact_sheets/pdf_files/pp45.pdf

Plan to fight wet tropics invader

A draft strategic plan has been released to address the environmental impact of pond apple in Queensland and its potential spread to other Australian states and territories. Pond apple is a highly invasive woody weed that threatens wetland and riparian ecosystems of wet tropics world heritage areas and beyond. Listed as a Weed of National Significance, pond apple currently infests approximately 6000 hectares of north Queensland and has the potential to invade a further 9 million hectares of Queensland, the Northern Territory and New South Wales. Copies of the draft pond apple strategic plan are available on the National Weeds Strategy website <http://www.weeds.org.au>.

Diligence reclaims floodplain from mimosa

The ongoing success of Mak Mak people on the Finnis River in the Top End is showing that mimosa infestations can be successfully removed and country brought back to health.

By Kathryn Thorburn

In 1995 the Mak Mak Marranunggu won a controversial land claim on the Finnis River, south-west of Darwin. The country they won back however, was in a poor state. Within the approximate 440 square kilometres of the claim, about 8000 ha was infested with mimosa—one of the most invasive weeds in northern Australia.

Over the last six years this group has had enormous success in reclaiming their country from mimosa spreading over the floodplain. To manage the land, the Mak Mak Marranunggu established the White Eagle Corporation under the Land Rights Act. The corporation then received funding assistance from the Indigenous Land Corporation (ILC), technical and logistical support from NT Department of Primary Industry & Fisheries, and support from the Northern Land Council.

Land lost forever

Mimosa is a threat to many wetland areas of the Top End, and has already invaded and altered the ecology of major floodplain systems. Because they are so difficult to eliminate, large infestations are often regarded as land lost forever, and control attempts have ceased in some areas. But for the Mak Mak, giving up on the land so recently returned to them was not an option. The mimosa had invaded more than 15 sites of cultural significance and would have continued to spread if nothing was done. Cleaning up these places was the first priority.

The floodplains were also valuable in terms of bush tucker, and many favourite foods had disappeared as the weed encroached. There were financial costs associated with the weed too; the corporation was developing a cattle agistment business and the floodplain zones represented the most productive grazing country on the property.

More recently, there are plans afoot for an ecotourism enterprise.

“To do this, we need to save the cultural areas,” said Margaret Daiji, traditional owner and elder. “There is also great potential for this property to become a pastoral enterprise and provide an economic base for the indigenous owners.”

Mimosa however, invades quickly. By the time the White Eagle Corporation won an ILC grant for its control, the Leichardt trees under which the land-claim meetings had taken place a few years earlier were already in the middle of an impenetrable thicket.

The corporation’s plan therefore, needed to be highly strategic. It involved:

- aerial application of herbicide;
- clearing large stands with bulldozer and chaining;
- removal of dead bushes with fire;



Lois Peller (Indigenous Land Corporation) and Linda Ford (traditional owner) inspect a satellite outbreak of mimosa on Mak Mak Marranunggu land on the Finnis River

- ground control by spot spraying on foot;
- encouraging native grass regeneration after clearing;
- light stocking rates to allow grasses to return; and
- creating a biomass that naturally suppresses the regeneration of mimosa.

Future battles

There is nothing especially unique in this approach to mimosa control. That the Mak Mak have been so successful is a tribute to their diligence in implementing the control strategy. Monitoring of cleared areas is ongoing as is the removal of new outbreaks at the end of every wet season. Arguably, good financial management has played a role too, which in turn has continued to put the White Eagle Corporation in good stead for ongoing funding. In the future, the battle front will move upstream to the head waters of each watercourse flowing onto the property, for this where re-infestation will come from. This will involve cooperating with adjoining landholders, a process already under way.

More than 5000 ha are now in various stages of reclamation. Eleven sacred sites are accessible again, and people are returning with their children to these places to tell the stories of the floodplain. The turtle and fish are coming back, along with the native vegetation and the magpie geese that rely on it. And the last season saw White Eagle turn off over 9000 head of agisted cattle to the live export market.

“The hard work has only just begun,” said Margaret, “but with continued effort we will bring back our cultural areas and turn the property into a viable grazing and ecotourism enterprise for our younger generations.”

Contact: White Eagle and Twin Hill Aboriginal Corporation.
Mark Ford, Tel: (08) 8945 4441
Email: makmak2@white-eagle.aust.com
More information on mimosa: NT Dept. Primary Industry & Fisheries
Mimosa Strategic Plan
www.nt.gov.au/dpif/weeds/w_index.shtml
Savanna Explorer: Weeds
<http://savanna.ntu.edu.au> — Go to Explorer Section.

Fire control moves to the stratosphere

In an effort to combat wildfire threats—and to use fire as a land-management tool more effectively—the north's fire managers are identifying, tracking and controlling fire through satellite imaging.

By Dennis Schulz & Kate O'Donnell

Bushfire brigades across northern Australia are bracing themselves for what promises to be a record fire season following a series of big wet seasons that have yielded a major fuel build-up. According to fire experts, conditions for central Australian bushfires are the most dangerous since the mid-70s.

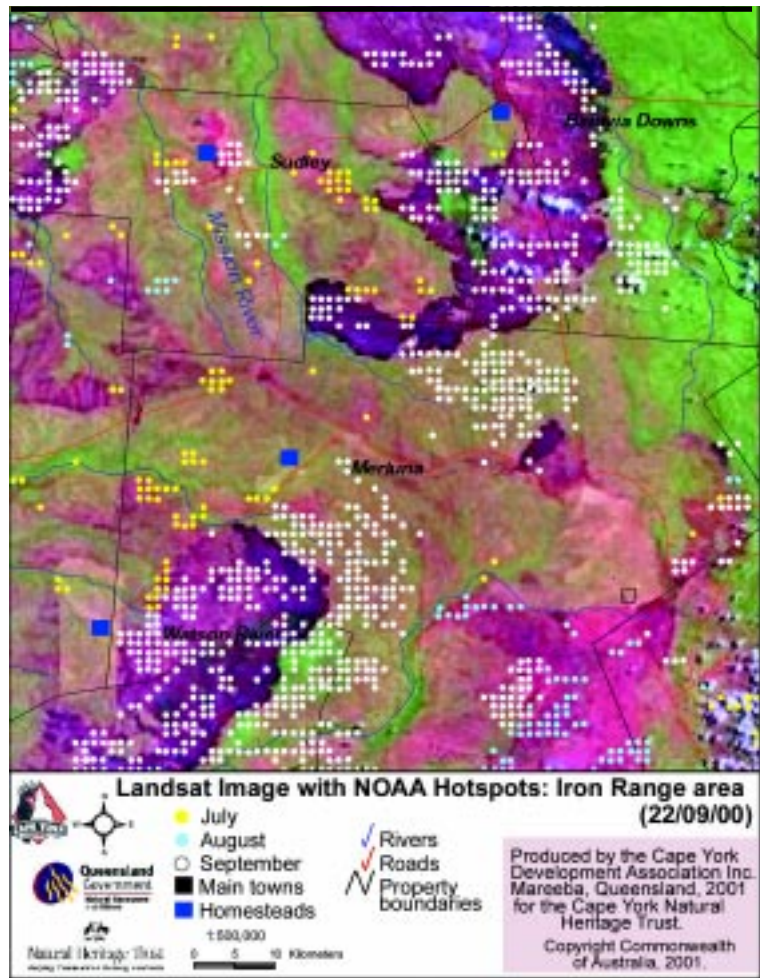
Already major wildfires have raged for weeks across central Northern Territory savannas into West Australia. "The potential is there for absolutely vast fires," observes Jeremy Russell-Smith, consultant to the Bushfires Council of the NT, and leader of the Tropical Savannas CRC fire research project.

But now, in an effort to combat the growing wildfire threat, northern firefighters are employing and refining a tool that is proving a valuable asset in the identification and tracking of remote area bushfires—satellite imaging. While some satellite information has been available to bushfire agencies for more than a decade, the technology has now advanced to the stage where it plays a major practical role in bushfire prediction across the vast, sparsely populated north.

"We rely on it extensively," says Peter Cann, regional director of WA's Pilbara and Kimberley Fire Services. "It allows us to detect the fires, manage them and by using the history of fire scars from previous years, we can create fire-fighting strategies even in very remote areas."

While more uncontrolled fire than usual is likely this year, fire is an inevitable part of the northern Australian landscape every year. Peter Thompson, Fire Management Coordinator of an NHT project in Cape York, points out that eliminating fires altogether from the landscape is not desirable and they need to be managed appropriately.

"There are legitimate benefits in the use of fire as a land management tool in the landscape—for pastoral, conservation and indigenous purposes. What is important really is to ensure landholders have effective control over the fires that they light. And satellite imagery is an important tool to provide the information for this."



This LANDSAT satellite image shows fire scars in the Iron Range area of Cape York. The fire scars are coloured from light pink to purple—the darker the shade, the more recent or intense the fire. The green areas in the eastern section of Cape York represent more luxuriant vegetation associated with higher rainfall in this area. The dots in white, yellow and blue are NOAA Hotspots that show the location of the centre of a 1 km x 1 km square in which a fire was detected. The dots show the locations detected on different dates during July, August and September 2000.

Satellite imagery

From outback Queensland to the Indian Ocean, a variety of satellites provide data that is revolutionising fire control. Foremost among those employed across the north are the four US-based NOAA (National and Oceanographic and Atmospheric Administration) satellites. Originally orbited as weather prediction devices, NOAA is now involved in everything from measuring the intensity of solar storms to forecasting the effects of the El Niño phenomenon.

NOAA's snapshots of Australia are received by WA's Department of Land Management and, along with other agencies, the Tropical Savannas CRC contracts DOLA to transmit its weekly maps to WA regional fire authorities as well as the Territory's Bushfire Council. Queensland's Centre for Climate Applications (QCCA) takes the NOAA service in the east, identifying wildfires and notifying those on the ground that may be affected.

"We have a listing of landholders, defence operations, national parks and forestry organisations," explains Wayne Hall, from the QCCA. "Whenever we detect a fire in their area we automatically send them an email and put that information on our website. They take it from there."

NOAA provides broad-brush images with each pixel recording an area one kilometre square. But attached to each satellite is a thermal sensor called AVHRR: the

Continued on Page 10

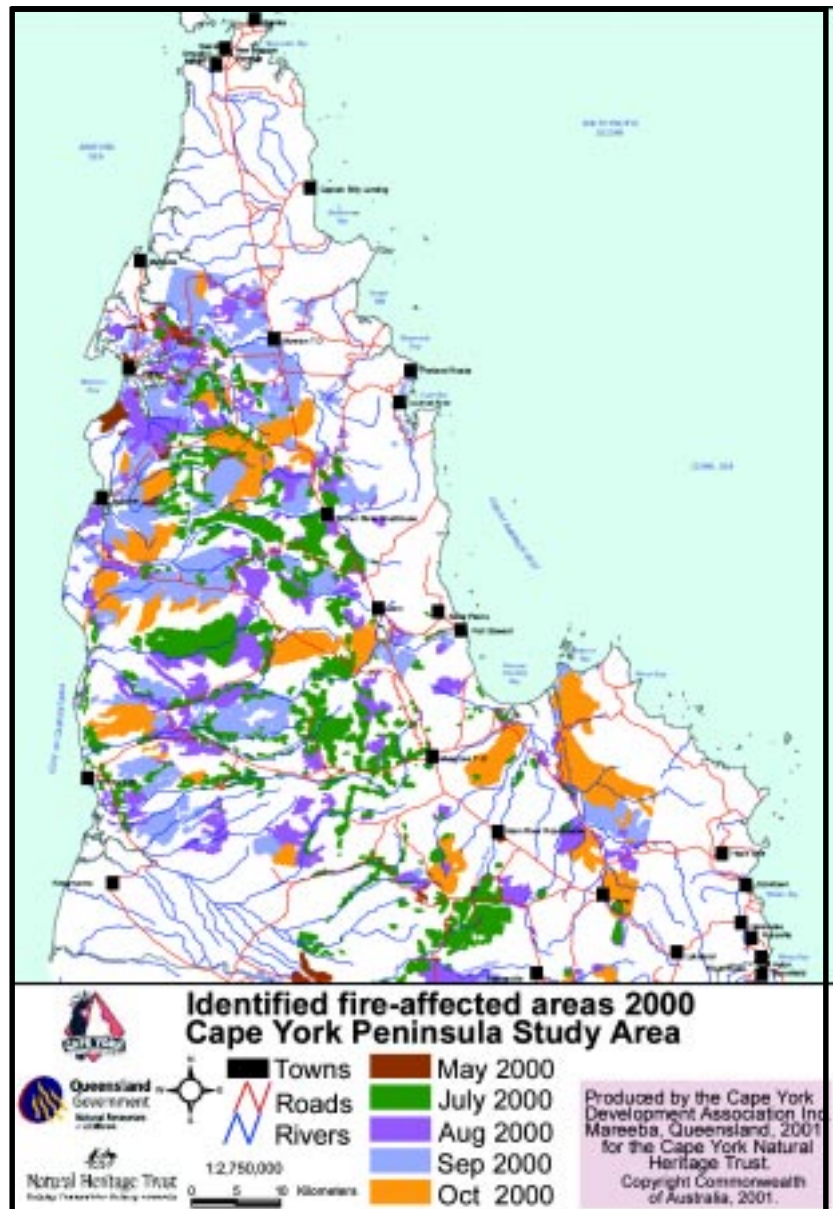
Fire in the Cape

THE Cape York Peninsular Sustainable Fire Management Project is using satellite information to create a fire history—illustrated by the Fire Scar map for the Cape at right—for the past five years and to document fire activity from 2001 onwards. The project is coordinated by the Cape York Peninsula Development Association, and aims to provide a basis for developing sustainable fire management strategies and practice on the Peninsula, through involving the whole community. Its two main partner organisations are the Balkanu Cape York Development Corporation and the Peninsula Cattlemen's Association.

Together, fire scars and Hotspots (NOAA images) can provide a comprehensive and accurate representation of where wildfires occurred in Cape York (see map Page 8). However, because of cloud cover it is very difficult to obtain information from October onwards, and often NOAA Hotspots are the only indication that there is a fire.

Input from pastoralists, Queensland Parks & Wildlife Service, Aborigines and the wider community will enable an even more comprehensive compilation of current and historical wildfire locations in the region. Also, the project will aid in developing best practice fire management for sustainable pastoralism, biodiversity conservation, traditional indigenous approaches and broad community issues and aspirations. The satellite fire information will be dispersed via email, fax, post or the Internet to landowners to keep everyone informed of the current wildfire situation in the Cape and in order to obtain feedback on the accuracy of the information.

Contact: Peter Thompson
Cape York Peninsula Development Association
Tel: (07) 4031 3432 Fax: (07) 4031 3049
Email: peter@cypda.com.au



Maps by GIS Officer, Virginia Cooper, Cape York Development Association, Mareeba.

This map shows the extent of fires in Cape York during 2000 from LANDSAT imagery. It illustrates just how extensive fire (much of it uncontrolled) is on the Cape, even though, because of cloud cover in October, it actually underestimates fires on the Cape. These types of maps are of enormous value in fire prevention planning. The map of the Iron Range (page 8) can be used by land managers to locate the current extent of burnt areas at the time of the LANDSAT image. When combined with Hotspot information they can monitor the direction, rate of spread and threats posed by a fire. The length of time taken to relay this information to those on the ground is critical.

Satellites pick up ecological disaster in the sandstone

ACROSS northern Australia, many species of flora found in the sandstone heathlands are in danger of disappearing due to repeated burnings at far too regular intervals. That is the determination of two major scientific papers published in the international journal, *Biological Conservation*. Destructive fires were also responsible for similar damage in the sandstone heathlands of Kakadu National Park.

"We have an ecological disaster happening at the moment in the north, especially the Top End, the VRD and the Kimberley," states report signatory, Jeremy Russell-Smith of the NT Bushfires Council. "The sandstone country is fire-sensitive and the frequency of burning there is ecologically unsustainable."

A second report examining fire regimes in Litchfield and Nitmiluk (formerly Katherine Gorge) National Parks in the Northern Territory published in the *International Journal of Woodland Fire* reached the same conclusion. Satellite imagery

played a major role in assembling the data in both reports.

"Fire histories of both parks," says the *Woodland* report, "were derived from interpretation of LANDSAT TM imagery supplemented with NOAA-AVHRR." The fire-sensitive flora most at risk include sandstone shrubs and cyprus pine. In Kakadu, between 1980 and 1995, 69 per cent of the heath habitats had been burnt at least once by fires re-occurring every three years while only 11 per cent were burned only once or went unburnt.

The report stated that many of these plants required minimum fire return intervals of at least four to five years to be sustainable. Without LANDSAT images, the fire histories of these remote area parks could never have been achieved. "We haven't been assembling this data just for archival purposes," says Dr Russell Smith. "We want to use it to look at what's happening to the fire-sensitive end of the landscape." — Dennis Schulz

Fire control moves to the stratosphere

From page 8 Advanced Very High Resolution Radiometer. Each evening as the satellite passes over Australia this sensor picks up hot spots—active fires still burning at night that are registered as a dot on the print-out. On successive days the progression of a fire can be charted and the long-term fire patterns of particular properties, national parks, or entire regions can be put on a database.

Landholder management

Mega-accurate LANDSAT images are also used, with each pixel covering an area only 30 metres wide. LANDSAT images are only available every 16 days, but a number of agencies are now combining NOAA and LANDSAT images to create an even more detailed look at fires in the landscape. Such close scrutiny of an area allows fire managers to know where management fires have worked to halt wildfires and where they have not.

The NHT project Peter Thompson is leading aims to bring together the recent fire history of the Cape. But Peter is also exploring ways to bring satellite technology into the hands of land managers throughout the Cape (see boxed story, Page 9). He says the Cape's land managers, which include graziers, Aboriginal landholders and Qld Parks & Wildlife staff, are very interested in the technology's application. "The key relevance is that it's potentially a way of forecasting where those fires are going, and giving land managers forewarning of the problems that they face," he said.

There are also wider implications for improved land management. Currently, landholders in Cape York provide information on fires on their properties by filling out incident reports—a practice which Bryan Cifuentes, a District Inspector of the Queensland Rural Fire Service, says has a number of disadvantages. Chief among them

is that only about 30 per cent of forms that are sent out ever come back. He points out that satellite mapping could prove far more useful to landholders, and to the rural fire agencies. "A picture paints a thousand words—and that's what satellite imagery is going to do for these property owners," he says. "If we can scale it (satellite imagery) to a property by property basis, it can dovetail into management plans."

The Bushfires Council of the NT is also combining the various satellite images to develop strategic fire-management responses. Brent Williams, Chief Fire Control Officer at the Council, says the combined imagery helps the organisation to establish how effective they have been in fuel reduction and strategic burning programs. But, he points out, there are still huge areas of land in northern Australia that have very few people on the ground to manage fire.

"There are massive areas in the Northern Territory, particularly on Aboriginal land, where people don't live and it's hard to coordinate effective management on that country," he says. "But we are becoming more effective."

Contact: Brent Williams Tel: (08) 08 8984 4000

Email: brent.williams@nt.gov.au

Bryan Cifuentes Tel: (07) 4039 8243 Email: bryancifuentes@hotmail.com

Peter Cann Tel: (08) 9143 1227 Email: pcann@fesa.wa.gov.au

Twice-yearly the TS-CRC holds the North Australia Fire Managers Forum which brings together fire agency managers across the north.

Contact: Peter Jacklyn Tel: (08) 8946 6285 Email: peter.jacklyn@ntu.edu.au

Websites WA Dept. of Land Administration:

www.dola.wa.gov.au/home.nsf/LinkDocuments/Frame++Products+and+Services. Click on satellite images, then on Fire detection and scar history maps

Dept. Natural Resources & Mines' trial satellite fire monitor:

www.dnr.qld.gov.au/longpdk/SatelliteFireMonitor/

Results out for Munmarlary fire experiment

ONE of the longest running fire experiments in north Australia came to an end a few years ago and the final results are now out. So what did it tell us about fire in the savannas? The Munmarlary experiment, as it is known, ran from 1973 until 1996 in lowland Eucalypt savanna on Munmarlary station, now part of Kakadu National Park, NT. Numerous 1-hectare blocks, separated by 50-metre wide buffer strips, were subjected to four different patterns of burning throughout the 23 years of the experiment. These patterns were: Early dry season burning every year; Early dry season burning every two years; late dry season burning every year; and fire exclusion.

The blocks were also on two types of country: open forest (with taller trees and quite a bit of canopy cover) or woodland (shorter trees, less canopy cover). Researchers were interested in the intensities of the different fire regimes, how the different types of fire affected soil properties and how they affected the species mix and structure of grasses, shrubs and trees.

Fire Intensity. Fires were typically of low to moderate intensity, even in the late dry season. They ranged from less than 1000 kW per square metre to around 2500 kW per square metre. This compares with intensities of more

than 50,000 kW per square metre for southern bushfires.

Soil Properties. On unburnt sites, the soil was more acidic, had a higher level of nitrogen containing nutrients, but roughly the same levels of organic carbon as the burnt sites. Otherwise the effect of fire regimes on soils varied between the woodland and the open forest sites.

Grasses. The yearly burns (both early and late dry season) favoured the dominance of annual *Sorghum* species. In blocks without burning, annual grasses generally declined, while some perennials increased and most decreased. Mostly these changes occurred in the first five years of the experiment.

Trees and Shrubs. As long as fires were of low to moderate intensity, frequent burning regimes did not change the trees' structure (tree height, density etc.). Once fire was excluded for at least five years, however, then the blocks saw an increase in shrub height. Rainforest species became more abundant in some woodland sites, particularly in unburnt plots. Eucalypt growth, however, was not stimulated by either frequent burning or absence of burning.

More information contact: Dr Jeremy Russell-Smith

Bushfires Council of the NT Tel: (08) 8984 4000 Fax: (08) 8947 2263

Email: jeremy.russell-smith@nt.gov.au

AS more land is earmarked for agricultural development in the Top End, researchers are asking if there is a way biodiversity can be maintained within broadscale clearing. And if there is a way to do this, what type of bushland, and how much of it, is needed to sustain animal species?

By Leonie Norrington

Survey finds patches needed for wildlife

Some early findings of a recent survey in the Northern Territory's Litchfield Shire suggest that if large enough patches of bushland are left intact within agricultural developments, they may benefit biodiversity and therefore the overall environment.

The survey was part of a project at the Parks and Wildlife Commission of the NT—a partner agency with the Tropical Savannas CRC—investigating the effects of clearing on native animals and the place patches of bushland might have in minimising local animal extinction.

Through his research, project leader Dr Owen Price hopes to find out how clearing impacts on local wildlife and if biodiversity can be maintained within agricultural areas, what type of bushland is needed to sustain animal species. The research will provide guidelines for sustainable landscape planning.

The survey collected information on plants and animals at six different sites in the Shire; patches of bushland, mango orchards, cleared land and uncleared bushland. The patches of bushland varied in their isolation; corridors connected some, while others were completely isolated and surrounded by cleared land. The smallest patch was a one-quarter hectare 'bush block', the largest a 50-hectare patch of crown land that has never been cleared. Researchers then sampled plant and animal numbers within a 4 km radius of the centre of each site.

The study found that most species will not use cleared sites or mango orchards. The abundance of 28 animal species in the 4 km radius zones decreased if bushland patches in those zones were too small or if the animals



Sally Jakka and Brooke Rankmore (right) trapping animals during the survey of patches of bushland in Litchfield Shire

were isolated from bushland. Many mammals and small bird species were in this group. For example, quolls were found only in fragments where at least 65 per cent of the surrounding area (within 4 km) was also woodland.

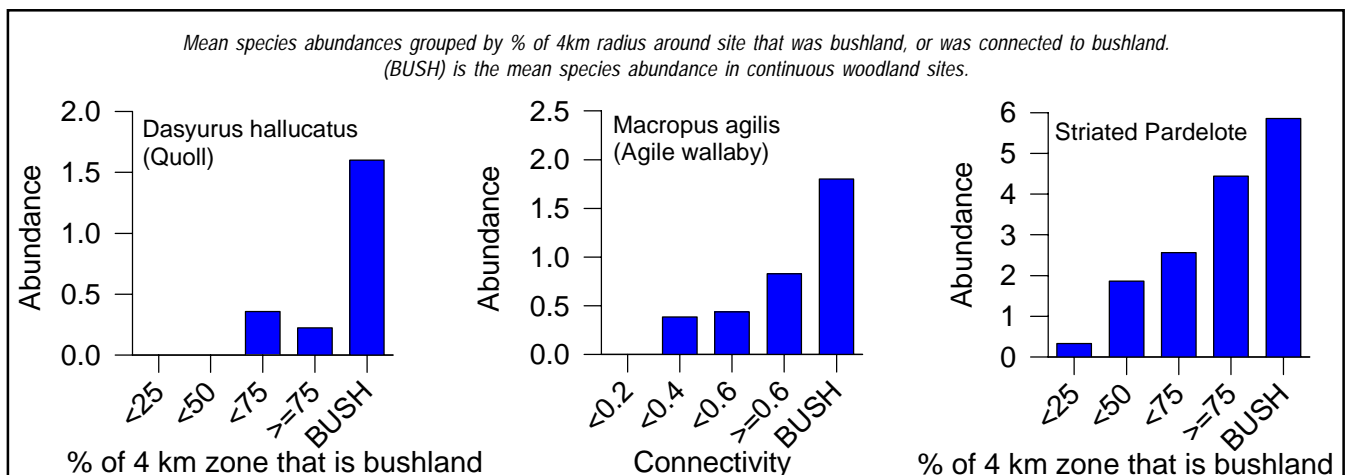
However, a few species, such as the bandicoot and crow, responded positively to fragmentation. This suggests that they prefer the new habitat mosaic created by changed land uses. According to Owen, bandicoots might use a bushland patch as a base from which they can feed in the surrounding agricultural land at night. The quality of bushland in these patches may also be important, as well as the amount and quality of the bushland in surrounding areas.

Broad-scale clearing, and the subsequent destruction of habitat, is the major cause of animal extinction. Until recently there was little broadscale clearing in the Top End, but more areas are now being proposed for development. Already 100 km² of Litchfield Shire, on the outskirts of Darwin, has been cleared for horticultural and rural living. There is now a proposal to develop 2700 km² of land for agriculture in the Daly Basin, south of Darwin.

"Wherever habitat is changed, some species will be lost," says Owen. "But other species may maintain a stable population if we retain the right mix of bushland within the agricultural matrix. We have to find a balance."

PhD student Brooke Rankmore's work will also add to the picture when she studies, in more detail, the movements of some of the species identified.

More information contact: Dr Owen Price, PWCNT
Tel: (08) 8944 8467 Fax: (08) 8944 8455 Email: owen.price@nt.gov.au



Remote Australia online

REMOTE Internet users in northern Australia stand to gain from a new Commonwealth Government scheme that provides users with untimed calls at the local call rate and unlimited Internet access. The scheme (being put in place by Telstra, which won the \$150 million contract) has established more than 100 'extended charging zones' in remote areas of the country. These range from about 8000 to 300,000 square kilometres in size. Call costs to the nearest community service towns are also being reduced. There is also an optional two-way satellite-based Internet service, with a choice of access speeds and prices. During the initial roll-out stages, free satellite equipment, installation and assistance is also on offer. The scheme begins from July 30. We will be bringing you more information in the next issue of *Savanna Links*.

Web: www.telstra.com.au.

Strategic plan for northern gulf

A STRATEGIC plan for sustainable development in the northern Gulf is now almost complete. The plan, developed by the Northern Gulf Resource Management Group Inc, will now go to the Queensland State Government Landcare Catchment Management Council for approval. If accepted, it will direct future land use and management in the northern Gulf. According to Noeline Gross, the group's Bioregional Coordinator, while the plan is close to completion, comments are still welcome. The Northern Gulf Resource Management Group was established as an incorporated community organisation to advise government agencies on the management of natural resources in the Norman, Gilbert, Staaten and Mitchell River catchments. The group also aims to facilitate and assist land managers with projects, sustainable development and management.

Contact Noeline Gross,
Northern Gulf Resource Management Group, Savannah House, St George St, Georgetown Tel: (07) 4062 1330
Fax: (07) 4062 1285
Email: ngrmg@tpg.com.au

Land rehabilitation report

A RECENT report breaks new ground in recording the history of land management in the NT. *Pastoral Land Rehabilitation in the semi-arid tropics of the Northern Territory*



New policy limits poned pastures

THE Queensland State Government is introducing new measures to protect coastal wetlands, fish habitat and cane-growing areas by limiting the use of poned pastures. Aleman grass, hymenachne and/or para grass will no longer be recommended in poned pastures.

These species were introduced to Queensland for dry-season cattle fodder but have since spread from where they were originally planted

and are now recognised as weeds. Minister for Natural Resources, Stephen Robertson, said the new policy also excludes development of poned pastures from areas below high tide, in or adjacent to wetlands, and areas of high conservation or fish habitat value.

The cattle industry will be encouraged to prepare guidelines, in consultation with other interest groups and government agencies,

for the safe development, use and management of poned pastures.

In a separate initiative, government agencies will develop a protocol to assess the weed potential of all pasture and fodder plant stocks held by public agencies and private companies prior to their release for use.

Go to: Queensland Dept. Natural Resources & Mines
Web: www.dnr.qld.gov.au

1946-96 outlines, property by property, the rehabilitation and research work undertaken on pastoral lands in the northern savannas of the NT over the last 50 years. The report also assesses critical factors that enhance the chance of success when undertaking mechanical rehabilitation, such as soil type, time of planting, cultivation methods, plant species and seeding techniques. The report is a culmination of work undertaken by the Natural Heritage Trust, Department of Lands, Planning and Environment, the Victoria River District Conservation Association and cattle property owners and managers in the Top End. Its authors are Sally Sullivan and Maria Kraatz.

Contact: Natural Resources Division of Department of Lands, Planning & Environment Tel: (08) 8999 4455

Australia's insects online

BUG-BOTHERERS now have a comprehensive website to refer to when trying to find out the common or scientific name of insects. In addition to names of insects, the site features maps of insect distribution and images. The site is also open to contributions of coloured illustrations, photographs or black and white drawings from bug enthusiasts. The

Australian Insects Common Names (AICN) website is a joint effort of CSIRO Entomology and the Office of the Chief Plant Protection Officer, part of Agriculture, Fisheries and Forestry Australia. Information on the website could previously only be found in the CSIRO Handbook of Australian Insect Names.

Go to: www.ento.csiro.au/aicn/

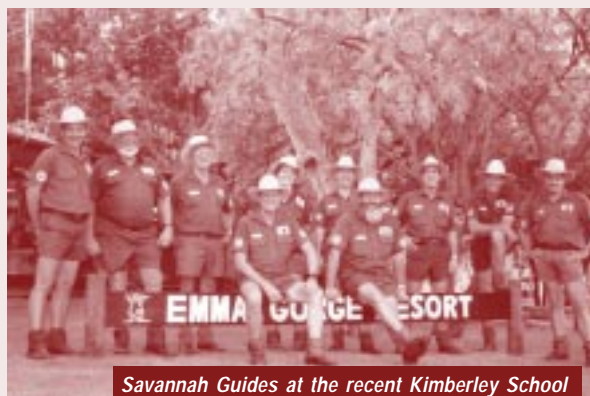
NT renewable energy rebate

A RENEWABLE energy program in the Northern Territory is encouraging adoption of alternative technologies in remote areas. The program aims to help communities introduce renewable energy sources by providing a 50 per cent rebate to cover installation costs. The program will support more than 300 renewable energy systems, to be based in Aboriginal communities, pastoral properties, tourist camps and national parks. Once established, the program aims to reduce diesel consumption by more than 10 million litres a year, and CO₂ emission by more than 500,000 tonnes per annum.

Go to: NT Department of Mines & Energy Tel: (08) 8999 5440
Web: www.dme.nt.gov.au/ Click on 'energy' and follow the links to the 'Renewable Energy Rebate Program'.

Guide accreditation: Standards defined

More than 110 people attended the Savannah Guides' first school of the year held at El Questro in the East Kimberley in April. It was the largest school ever and the first to be held in Western Australia. They came from as far afield as Cairns, Arnhem Land and Alice Springs, reflecting the growing importance placed on accreditation and quality assurance within the industry. —*Kathryn Thorburn reports.*



Savannah Guides at the recent Kimberley School

As the tourism industry grows and continues to diversify, the issue of accreditation has become increasingly complicated. At present, businesses can receive accreditation from a number of national industry bodies. The Australian Tourism Accreditation Standards (ATAS) is the major nationwide scheme but there are others such as the National Ecotourism Accreditation Program (NEAP). Being accredited under these schemes links businesses into a national industry network and brings marketing benefits and legitimacy.

The ATAS however only accredits operators in terms of business management: planning, marketing, occupational health and safety etc. These standards do not reflect the 'product', that is, the tours themselves or the guides that lead them. According to Donna Aboody, from the Northern Territory Accreditation Program, accreditation standards on that level are worked out by operators in the various sectors, for example, safari tours, bed and breakfast operators and fishing charters.

"Once the national program is satisfied that these standards are truly representative of the sector, they are added to the core requirements," said Donna. "The idea then is that the ATAS will incorporate national industry standards but also reflect local and sectorial variation."

Another industry trend is to certify individual guides. After all, these people are the public face of the industry, and are expected to provide interpretive information for tourists over a huge range of topics. Many pride themselves on knowledge of local ecology and culture, built up over years of experience. In line with this trend, the professionalism of guides was recognised for the first

time this year at the NT tourism awards (Brolga awards) via a new category, the Outstanding Interpretive Guide award.

Individuals can also be certified by bodies such as Savannah Guides and the EAA (Ecotourism Association of Australia), based on field assessment, as well as prior learning and current competencies, and formal educational qualifications. A growing number of qualifications are now available for tour guides, such as Certificates II and III in tour guiding at the Palmerston (NT) and Cairns Colleges of TAFE. Students are schooled in areas including ecology, food preparation, tour commentary, cultural awareness, first aid and vehicle maintenance. They must also do an industry placement. A similar course open to Aboriginal and Torres Strait Islanders is run at the Kimberley College of TAFE, and emphasises cultural tourism.

"In the past, tour guides just came out of the blue," said Ian Hutton, lecturer in the NT TAFE course "but businesses now expect a higher level of professionalism from their guiding staff, and this can include formal qualifications or accreditation from a body recognising prior knowledge and experience."

For tourism business operators however, it is critical that accreditation and certification schemes be effectively marketed to the public. Otherwise, those who have put in the hard yards to get accredited will have no market advantage over those who have not.

Reference

The Effect of Accreditation on Tourism Business Performance: An Evaluation, June 2000 Prepared by David Taylor, Ingrid Rosemann and Gary Prosser.

A force in the North: Savannah Guides enhance tour guide standards

THE Savannah Guides, established in 1988 in the Queensland Gulf, is a network of tour guides and companies that sees standards of tourguiding as a very important issue.

According to Tom Warnes, current president of Savannah Guides, the tourism industry and northern Australia as a whole is competing with premier wilderness destinations around the world. "Operators need to be world class and identifiable as such," he maintains.

The Savannah Guides logo is be-

coming a powerful marketing tool for those under its auspices. The group's reputation was further enhanced when they won the 2000 British Airways World's Best Tourism Organisation award.

Since then, the group has been swamped by requests for information on membership. There has also been interest from operators outside the savannas wishing to join, leading to talk of setting up other region-based offshoots such as Desert Guides.

The Guides have now produced a

manual outlining the evaluation process and criteria which include attending schools, prior learning, national accreditation and peer assessment.

Becoming a member is no simple process, and prospective members must demonstrate ongoing commitment to the industry, the Savannah Guides, and high standards before they will be allowed into the fold.

The organisation is operated by its members on a voluntary basis.

Web: www.savannah-guides.com.au/

August

Australasian Fire Authorities Council 2001 Conference 10–12 August, Darwin, Northern Territory

Theme: Risk Management and Hazard Identification.

Contact: Glenda Ramage

Tel: (08) 89 464 124 **Fax:** (08) 89 464 123

Email: glenda.ramage@nt.gov.au

Web: www.nt.gov.au/pfes/fire/AFAC_Conference.shtml

Bio-security: Counting the Cost of Agricultural Disease and Pest Management 13–14 August, Sydney

It is supported by the National Farmers Federation and *The Australian* newspaper.

Contact: Steven Cronshaw, Conference Organiser

Tel: (02) 9233 6118 **Email:** scronshaw.acr@bigpond.com

Mt Sanford Field Day Safely increasing production in the VRD 16 August 2001, Blackgin Bore

Contact: David La Fontaine

Katherine Research Station

Tel: (08) 8973 9771 **Fax:** (08) 8973 9777

Indicators of Ecosystem Rehabilitation Success Workshop August 16 2001, Perth

Venue: Perth Zoo

David Tongway (CSIRO) has been instrumental in developing Ecosystem Function Analysis as a means of assessing how well a landscape is working. This workshop will provide an introduction to the theory and applications for assessing the progress of mine-site rehabilitation.

Contact: Sandra Maynard, University of WA

Tel: (08) 9380 3827 **Fax:** (08) 9380 1050

Email: sandra.maynard@uwa.edu.au

Current Issues for Mine Closure Workshop August 17 2001, Perth

Venue: Perth Zoo

The following topics will be covered: DME Criteria for closure; Preparation of a closure plan; Mine closure: problems and prospects; Status determination of TSF prior to closure and assessment of potential risks to the environment; and Mine voids.

Contact: Sandra Maynard, University of WA

Tel: (08) 9380 3827 **Fax:** (08) 9380 1050

Email: sandra.maynard@uwa.edu.au

4th Annual Australian Women in Agriculture (AWiA) Conference and AGM 'Bridging the Gaps' 24–26 August 2001, Melbourne

Venue: St Hilda's College, University of Melbourne

This conference will be a good opportunity to hear a range of guest speakers and learn more about women's achievements in Government, industry and rural activities.

Contact: AWiA Conference 2001 Registration

Postal: PO Box 209, Sale, Vic. 3850

Contact: Jeanette Severs

Tel: (03) 5156 4888 **Email:** severs@ozemail.com.au

Megan Jenkinson **Tel:** (03) 5146 8235

Email: teslage@netspace.net.au **Web:** www.awia.org.au/

Asian Wetland Symposium 27–30 August 2001, Penang, Malaysia

Venue: City Bayview Hotel, Georgetown, Malaysia

Theme: Bringing Partnerships into Good Wetland Practice

The symposium will review and discuss the trends and emerging issues in the wise use of wetlands and their resources and biodiversity in the Asia-Pacific region.

Web: http://aws2001.domainvalet.com

September

September is Earth Alive! Biodiversity Month 1–30 September 2001, Nationwide

Help promote the conservation of Australia's species and ecosystems, and promote your community's conservation activities. This year the Community Biodiversity Network and the Threatened Species Network have developed a one-stop-shop National Biodiversity Month/National Threatened Species Day (7 September) kit. The kit includes a product order form to enable groups taking part to access a broad range of free education and promotional materials.

Contact: The Community Biodiversity Network.

Tel: (02) 9262 4743 **Email:** earthalive@cbn.org.au

Web: www.cbn.org.au/projects/earthalive2001/home.html

The National Conference of Interpretation Australia 3–7 September 2001, Alice Springs

Venue: Red Centre Resort, Alice Springs

Theme: Getting to the Heart of it: Connecting people to heritage

The conference will focus on cultural and natural heritage, technology, arts and the media, and community projects. It will be relevant to tour managers and guides, rangers, education and community education officers, and people involved with community projects such as World Wildlife Fund, Greening Australia, Land Care, Water Watch, Bush Care, and Coast Watch.

Contact: Robin MacGillivray, Conference Convenor.

Tel: (08) 8999 4408 **Web:** www.vicnet.net.au/~interpoz

Postal: Eileen Boocock

Action Enterprises PO Box 1381, Alice Springs NT 0870

Tel/Fax: (08) 8952 4061 **Email:** eileenb@ozemail.com

3rd International Conference on Land Degradation and the Meeting of the IUSS Sub-commission C. Land Degradation: New Trends towards Global Sustainability 17–21 September 2001, Brazil

Venue: Hotel Glória, Rio de Janeiro

The conference will focus on monitoring land quality and global climate change; land-use ethics; social implications of land degradation; land-reclamation technologies; and

public policies to achieve sustainable land use.

Contact: Embrapa Solos - ICLD3

Postal: c/o Beáta Madari

Conference Secretary, Rua Jardim Botânico, 1024
22460-000 - Rio de Janeiro, RJ, Brazil

Tel/Fax: +55 21 294 8039

Tel: +55 21 274 4999 **Fax:** +55 21 274 5291

Email: icld3@cnps.embrapa.br

Web: www.cnps.embrapa.br/icld3/

AIATSIS Indigenous Studies Conference

18–20 September 2001, Canberra

Venue: Manning Clark Centre, Australian National University, Canberra

Theme: The Power of Knowledge and the Resonance of Tradition in Indigenous Studies'. There will be formal papers, workshops, discussion groups, debates, performances, and poster presentations.

Contact: Dr Graeme Ward, Research Fellow

Postal: AIATSIS, GPO Box 553, Canberra ACT 2601

Fax: (02) 6249 7714 **Email:** gkw@aiatsis.gov.au

14th Australia–New Zealand Climate Forum

18–21 September 2001, Darwin

Venue: Darwin Entertainment Centre

The main focus will be tropical climate: monitoring and prediction, the research and impacts of climate on habitat, rainforests, building and construction, trade and weather related natural hazards.

Contact: Hakeem Shaik

Tel: (08) 8920 3814 **Email:** h.shaik@bom.gov.au

www.bom.gov.au/weather/nt/inside/anzcf_2001/index.shtml

4th International Archaean Symposium

24–28 September 2001, Perth

Venue: University of Western Australia

The 4th International Archaean Symposium will be the fourth in a the series on Early Precambrian terrains held each decade in Perth, WA.

Contact: Ms Jocelyn Thomson, Secretariat

4th International Archaean Symposium

Postal: PO Box 80, Bullcreek WA 6149, Australia

Tel: (08) 9355 2164 **Fax:** (08) 9355 2164

Email: jaytee@inet.net.au

Web: www.geol.uwa.edu.au/ias/

October

Wise Use of Wetlands Workshop

2–4 October 2001, Darwin

Venue: Northern Territory University, Darwin

This workshop, organised by the NTU Centre for Tropical Wetlands Management, focuses on sustainable grazing management in wetlands and riparian habitats in north Australia. It will be of interest to pastoralists, indigenous land managers, government officers and scientists.

Contact: Bronwyn Myers

Tel: (08) 8946 7103 **Fax:** (08) 8946 6847

Email: bronwyn.myers@ntu.edu.au

Australasian Pacific Extension Network Conference

3–5 October, Toowoomba

Venue: University of Southern Queensland, Toowoomba

Theme: Contemporary extension as a powerful vehicle for regional change.

Contact: Convenor, John James

Tel: (07) 5460 1495

Email: jamesj@dpi.qld.gov.au

Web: www.apen.org.au/apen2001

The 4th Production and Environmental Monitoring Workshop

17–19 October, Armidale

Venue: University of New England, Armidale

The workshop's focus is to give participants a practical understanding and hands-on application of production and environmental monitoring practices.

Contact: UNE Partnerships Pty Ltd.

Postal: PO Box U199,

University of New England, NSW, 2351

Tel: (02) 6773 0002 **Fax:** (02) 6772 5230

Email: inforequest@unepartnerships.com.au

Web: www.dpi.qld.gov.au/environment/3183.html

World Tourism Convention Week

28 October–2 November, Hobart

28–30 October: Sustainable Wildlife Tourism Convention

30–31 October: ATRI Tourism Outlook Conference

1–2 November: World Tourism Convention

2 November: Australian Tourism Awards

Sustainable Wildlife Tourism Convention

Venue: Wrest Point Hotel Casino Hobart Tasmania

Theme: Wildlife Tourism: Endangered or Sustainable Growth?

Contact: Kelley Rann

Tel: (02) 6620 3921 **Email:** krann@scu.edu.au

Web: www.scu.edu.au/schools/tourism/wildlife/index.html

ATRI Tourism Outlook Conference

Venue: Wrest Point Hotel Casino, Hobart, Tasmania

Contact: Sue Clifford-Loomes

Tel: (02) 6620 3000 **Email:** scliffor@scu.edu.au

Web: www.crctourism.com.au/outlook

World Tourism Convention

Venue: Hotel Grand Chancellor, Hobart, Tasmania

Australian Tourism Awards

Venue: Hotel Grand Chancellor Hobart Tasmania Australia

Contact: John Andrewartha

Tel: (03) 6230 8122

Email: info@worldtourismconvention.com

Web: www.worldtourismconvention.com

Email: info@worldtourismconvention.com

2002

13th Australian Weeds Conference 8–12 September, 2002, Perth

Venue: Sheraton Perth Hotel, WA.

Hosted by the Plant Protection Society of Western Australia Inc.

Theme: Weeds: threats now, and forever?

Expressions of interest. To be put on the mailing list, and for registration brochures when they are available, please register your interest with the conference organiser: Convention Link

Postal: PO Box 257, South Perth, WA 6151

Tel: (08) 9450 1662 **Fax:** (08) 9450 2942

Email: convlink@inet.net.au

Web: <http://users.wantree.com.au/~weeds/>

Seminars

Tropical Ecosystems Research Centre

Venue: CSIRO Conference Room
McMillans Road, Darwin
Time: 3.45 pm, Fridays (monthly)

Contact: Barbara McKaige

Tel: (08) 8944 8411 **Fax:** (08) 8944 8444

Email: barbie.mckaige@terc.csiro.au

Web: www.dar.dwe.csiro.au/seminars.asp

Friday, July 20

Method Madness: Measuring landscape health in savannas

John Ludwig, CSIRO Sustainable Ecosystems, Atherton & Tropical Savannas Management CRC, Darwin

Friday, August 10

Pattern and process of century-scale landscape change in Northern Australia

David Bowman, Key Centre for Tropical Wildlife Management, Northern Territory University, Darwin

Friday, August 31

Figuring out the figs: Systematics of Australian Ficus

Dale Dixon, Herbarium, Parks and Wildlife Commission of the NT,

Friday, September 21

Hunting for sustainability: Wildlife management in Maningrida

Tony Griffiths & Tim Schultz, Key Cntr for Tropical Wildlife Management, Charles Godjuwa, Djelk Rangers, Bawinanga Aboriginal Corp, NTU and Maningrida

Friday, October 12

On the hop in the Top End: Foraging ecology of Agile Wallabies

Simon Stirrat, Parks and Wildlife Commission of the NT, Palmerston

Friday, November 2

Metabolic depression in the wet/dry tropics: Who needs it and who has it?

Keith Christian, Faculty of Science, IT and Education, Northern Territory University, Darwin

Friday, November 23

More magnificent mangoes: Prospects for the mango industry in the Top End

Richard Brettell, CSIRO Plant Industry, Darwin

Friday, December 14

How I learned to love cows: Biodiversity Conservation and Pastoralism in the Mitchell Grasslands

Alaric Fisher, Parks & Wildlife Commission NT.

CSIRO Seminars, Townsville

Venue: Conference Room, Davies Lab.

Time: 11am, Fridays

Contact: John Gross

Email: John.Gross@tag.csiro.au

Queensland Herbarium seminars, Brisbane. Held on a monthly basis

Toowong, Brisbane, Qld 4066.

Contact: Dr Rod Fensham

Tel: (07) 3896 9547 **Fax:** (07) 3896 9624

Email: rod.fensham@env.qld.gov.au

See our calendar section on our website for more events: <http://savanna.ntu.edu.au>

OUR STAKEHOLDERS



ABORIGINAL COMMUNITIES



PASTORALISM



TOURISM



MINING



CONSERVATION



DEFENCE

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