

Woodland Wanderings

Newsletter of the Grassy Box Woodlands Conservation Management Network

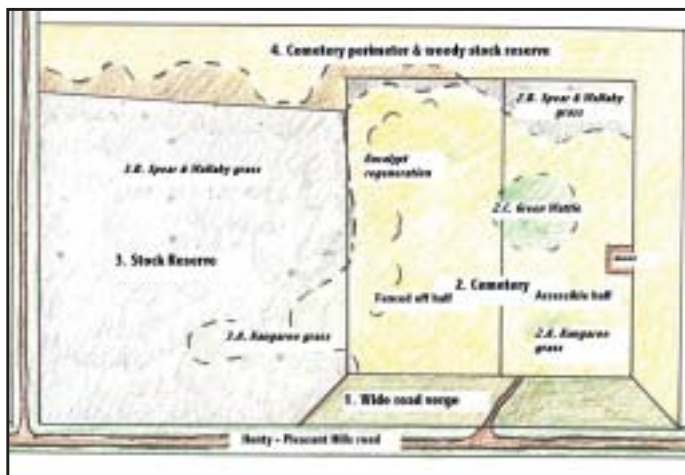
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Autumn 2004

Mundawaddery Cemetery and Stock Reserve

By Tim Atkins - Eastern Riverina Landcare Coordinator

Like many old country cemeteries and stock routes the Mundawaddery Cemetery and Stock Reserve is an important remnant containing a variety of native understorey species. It is a diverse fragment of the once extensive Grey Box Grassy Woodland, which lies between Henty and Pleasant Hills in South-East NSW. The 16ha site provides an example of the way different management regimes can encourage distinct vegetation outcomes. Several vegetation structures are present due to the range of management treatments within each part of the reserve over time. There are around 80 species recognised at the Cemetery including the rare Dookie Daisy and the area shows us what a Kangaroo Grassland may have been like before the landscape was modified (*Greening Aust, 2000*).



Above: Site map showing vegetation management zones (photos at right correspond to Sections 1 and 2A) (*Greening Australia, 2000*).

Management of Mundawaddery Cemetery has basically remained the same over the past 100 years. Today it is carried out by the current neighbouring property owners, the Male family, the local Landcare group and the Lockhart Shire Council. Management practices include mowing, weeding, occasional grazing and strategic burning in various parts of the reserve to meet the biodiversity objectives and to allow public access to the gravesites and natural features.

The Alma Park/Pleasant Hills Landcare Group hold field days to highlight this important remnant which has become a focal point for the group. The group have studied the site through vegetation collections and surveys, which confirm the variety of plant compositions as a result of management.

The Mundawaddery Cemetery forms part of the Eastern Riverina Eco-Tour - a self guided tour of significant ecological sites throughout this productive cropping and grazing area.

Ten sites were chosen for their regional importance by the Landcare Groups of the Eastern Riverina Landcare Network. The sites have various managers and each Landcare Group looks out for their Eco-Tour site and conducts activities within them. The Eco-Tour was funded through the Environmental Trust.

If you would like information on management outcomes at Mundawaddery Cemetery or a copy of the Eastern Riverina Eco-Tour brochure please contact Tina Atkinson, Natural Resource Community Support Officer PO Box 59 Henty, NSW, 2658, ph 02 69 29 3170 or 0427 288 001, email:tina.atkinson@dipnr.nsw.gov.au

References: *Greening Australia (2000) Mundawaddery Cemetery Recommendations for Flora Conservation, NSW.*



Top: The wide road verge (Section 1) is similar to the original vegetation (*Greening Aust, 2000*).

Above: Kangaroo grass section (Section 2A) in the Cemetery. Photos: Tina Atkins



Toni McLeish - Editor

Welcome to Issue 2 of Woodland Wanderings

I was hoping to be celebrating the end of the drought by now, but even though the North-West had a reasonable 2003 the effects of the 2002 drought have not completely gone nor has the 2002-2003 drought for those of you in the South-West. As I write this we all hope for an autumn break.

Thank you to those members that replied to the survey in the last issue, I have taken your comments on board and will endeavour to act upon them over the next three years. Yes we have received a further three years' funding through the National Heritage Trust, with the focus to be on the South-West slopes in Year 1, Central-West in Year 2 and North-West in Year 3. This funding will allow us to reinstate the GBW CMN web site and to restart the GBWCMN e-mail chat group. Our project was titled "Biodiversity on the Sheep Wheat Belt" and includes another Department of Environment and Conservation (DEC) project, identifying priority areas and actions for the conservation of key threatened species through landscape-scale biodiversity planning.

The South-West Slopes local government organisations have shown great enthusiasm and support for the development of nature-based tourism, with the first initiative a self-drive

eco-tour for bird watchers. Russ Watts of Barraba Bird Routes fame and Ian Fraser, a Canberra eco-tour guide and ABC identity inspired all participants at a forum held at Cootamundra.

The threat of introduced perennial grasses to woodlands is once again being highlighted in the North-West with a Regional Coolatai Grass Workshop coordinated by the North West Vegetation Forum. I will keep you posted as to developments.

As a member of the Grassy Box Woodland Conservation Management Network with a GBW site you are entitled to a membership sign for your front gate or fence. The cost of the sign and postage will be met by the project, but as you can see from the sample below, we have left a space for your property name, which you have the choice of inserting yourself, or we can arrange the addition at the cost of \$20. Please contact me if you would like a sign, my details are on the back page.

I'm looking forward to being able to communicate with you all more frequently once we have the e-mail chat group up and running.

Grassy Box Woodland Conservation Management Network

eg. 'Kurrajong Hills'

Managing for conservation in an agricultural landscape.

contact GBWCMN project manager 02 6298 9709



Hooded Robin - *Melanodryas cucullata*



Description The Hooded Robin is a large Australian robin reaching 17cm in length. The male is strikingly marked black and white, with the bold black hood extending down the white breast. The back is black with a distinct white shoulder and wing bar. The tail is black with prominent white side panels. Females and immatures are duller with light brownish-grey

upperparts, but the same striking black and white wings. Flight is short and swiftly undulating. The call is a series of descending, fading, mellow notes.

Distribution The Hooded Robin is a widespread species, found across Australia except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. The species is common in few places, and rarely found on the coast. It is considered a sedentary species but local seasonal movements are possible. The population density of the South-Eastern subspecies has been greatly reduced over much of its range, with major declines recorded in central NSW and the Southern Tablelands, and also in Victoria and South Australia. Declines have occurred in small remnants that have been isolated or fragmented for many years, and even larger remnants appear unable to sustain the subspecies.

Habitat and ecology Hooded Robins prefer lightly-wooded country, usually found in open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. The species requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a groundlayer of native grasses. This requirement is related to their hunting strategy; they often perch on low dead stumps and fallen timber using a perch-and-pounce method of hunting insect prey. Territories range from around ten hectares during the breeding season to thirty hectares in the non-breeding season. Birds may breed any time between July and November, often rearing several broods. The nest is a small neat cup of bark and grass bound with webs, in a tree fork or crevice, from less than one metre to five metres above the ground. The nest is defended by both sexes with displays of injury-feigning, tumbling across the ground. A clutch of two to three is laid and incubated for fourteen days by the female. Two females often cooperate in brooding.

Threats and conservation actions

- Clearance of remnant open forest and woodland habitat for paddock management reasons and for firewood.
Raise landowners' awareness about the presence of Hooded Robins and provide information on how their management actions will affect the species.

Retain existing vegetation along roadsides, in paddocks and remnant stands of native trees.

- Poor regeneration of open forest and woodland habitats.

Encourage regeneration of habitat by fencing remnant stands and undertaking new plantings.

- Modification and destruction of ground habitat through removal of litter and fallen timber, introduction of exotic pasture grasses, heavy grazing and compaction by stock and frequent fire.

Increase the size of existing remnants, planting trees and establishing buffer zones of unimproved uncultivated pasture around woodland remnants.

Fence off suitable woodland habitats, particularly those with unimproved pasture and an intact native ground plant layer.

Retain dead timber on the ground in open woodland areas.

Limit firewood collection.

- Habitat is lost and further fragmented as land is being cleared for residential and agricultural developments.

Searches for the species should be conducted in suitable habitat in proposed development areas.

Assess the importance of the site to the species' survival.

Include the linkages the site provides for the species between ecological resources across the broader landscape.

The Department of Environment and Conservation should be consulted when planning development to minimise impact on populations.

Since Hooded Robins cannot survive in small isolated remnants, establish corridors to link areas of remnant habitat.

Status of recovery planning

Recovery Plan in preparation.

Reference: Department of Environment and Conservation (2003) Threatened Species On Line, not yet published.

Add Sugar and Kangaroo Grass and Burn in Spring - A Recipe for Success in Woodland Understorey Restoration?



This project is funded by the
NSW Environmental Trust

We were seeking to explain why the groundlayers of grazed and degraded remnants rarely recover well after fencing and livestock exclusion. We compared the topsoils of a range of degraded and undisturbed remnants, and found that undisturbed remnants are extremely low in soil nitrate (one of the most important forms of available nitrogen used for plant growth), while progressively weedier sites were progressively higher in soil nitrate.

Informed by these results, we established some groundlayer restoration trials at two woodland remnants near Young in Central NSW. Our aims were to promote native grasses and deplete annual weeds. The groundlayer of one remnant was almost entirely dominated by weedy annual grasses and Paterson's Curse (*Echium plantagineum*), while the other had an equal mix of weedy annuals and native perennial grasses, particularly Red Grass (*Bothriochloa macra*). We planned a three-pronged approach, aiming to reduce weed growth by reducing soil nitrate levels, to reduce weed seed banks by removing the standing weed crop before it set seed, and to enhance native grass establishment by adding native grass seed.

Reducing Soil Nitrate

So first, how might we reduce soil nitrate levels? There is an enormous quantity of information on how to increase soil nitrogen to improve crop growth, but very little on doing the reverse. One way might be to remove nitrogen by removing the standing crop of lush green weeds, by burning, slashing or grazing during spring. We took this approach by burning in mid-October. This did not appear to reduce soil nitrate in the short-term at least (Figure 1, although it had other positive effects; see below).

Another method we tried was to increase the carbon:nitrogen ratio in the soil by adding carbohydrate. Most farmers will be aware that crop stubble can temporarily reduce plant growth because soil microorganisms that break down the stubble use up available soil nitrogen. So we tried the same thing by adding sugar, a faster acting form of carbon than crop stubble, hoping to reduce weed growth and thus reduce their competition with the natives. We found that adding half a kilogram of sugar per square metre every three months almost eliminated soil nitrate during the autumn, and dramatically reduced the growth of all annual weeds (Figures 1 & 2).

In the last issue of Woodland Wanderings, we described the first phase of our studies on the restoration of woodland groundlayers.

Reducing Weed Seed Banks

Our second aim was to reduce weed seed banks. This was attempted using the same two treatments, burning and carbohydrate addition. Spring burning effectively removed the entire year's seed crop of cool season annuals, and this in turn led to a dramatic reduction in the abundance of annual grass weeds the next spring (Figure 2). However, broad-leafed weeds like Paterson's Curse did well after the burns, probably because they have longer-lived seed banks than the grasses.

The dramatic reduction in weed growth resulting from the sugar treatments is likely to have also reduced seed set in these weeds. However, even very small plants were able to set seed, providing some replenishment of the weed seed bank.

Enhancing Native Grass Establishment

The aim of reducing soil nitrate and the weed seed bank was to give us a window of opportunity to establish native grasses while the weeds were suppressed. For this, we added seed of Kangaroo Grass (*Themeda australis*) and Snow Grass (*Poa sieberiana*), the two original native grass dominants of the grassy White and Yellow Box woodlands. Unfortunately this was during the severe drought of 2002-3, and no Snow Grass plants successfully established. Surprisingly, Kangaroo Grass established after a short period of good rain in February 2003, and some plants survived despite prolonged dry periods in the following autumn and winter.

Kangaroo Grass established very sparsely on untreated plots that still had a thick layer of dead annual weeds. Establishment was enhanced by the sugar treatments, and was most successful on burnt plots (Figure 3).



Figure 1 Soil nitrate levels over a 15 month period in a grassy White Box woodland remnant near Young. Half a kilogram of sugar per square metre was added every three months to sugar plots, burn plots were burnt in October 2002 and control plots were untreated.



Figure 2 Early effects of burning and sugar addition on annual weeds in a site initially dominated by Wild Oats (*Avena* spp.), bromes (*Bromus* spp.) and Patersons' Curse (*Echium plantagineum*).

Two years on.....

Two years after the beginning of these trials, the best of our experimental plots are beginning to resemble native grassy swards. Best results were obtained when Kangaroo Grass seed was added to plots that were burnt or 'sugared'. Plots without Kangaroo Grass seed were generally poorer in quality, and were very variable, depending on whether any other native plant seeds were already present to replace the weeds.

As the Kangaroo Grass plants become more established in our plots, we hope to monitor whether this species can maintain low soil nitrate levels without further sugar additions, thus providing a long-term resistance to annual weeds. As well, we hope to add more diversity to the plots by adding seeds of the many native wildflowers that were once common in these woodlands.

Implications for Woodland Understorey Restoration

Carbohydrate addition and spring burning show promise for restoring many degraded woodland groundlayers, and we suspect that a combination of burning plus carbohydrate addition (which we didn't try) may be even more effective. They are likely to be most effective where annual grasses are the dominant weeds, as is the case in many Box woodland remnants in winter-rainfall areas. However, they won't be appropriate for restoring all remnants. A different strategy will be needed where invasive perennial weeds such as Coolatai Grass (*Hyparrhenia hirta*) are the main problem. For remnants that retain few native plants in the ground layer, cultivation and sowing of native seed may be a more efficient option if the site is easily ploughed, but carbohydrate addition may still assist

establishment of natives by reducing the nutrient pulse after cultivation and subsequent weed competition.

Good spring burns can be difficult to achieve when weeds are actively growing and there's little dry fuel. We sprayed the weeds with a contact (non-systemic) herbicide, then burnt them using a gas-powered weed burner once the top growth had dried off. This could easily be scaled up for broadscale restoration. An advantage of spring burning is that it is very safe as the rest of the country is still green. It's important though, that burns are undertaken in patches only, to minimize soil erosion and to retain habitat for native fauna. Short duration, high intensity grazing or slashing are other possible methods to reduce seed-set in annual grasses, but we don't know how these techniques will affect soil nitrate levels.

Our results are preliminary, but very exciting. We were able to reduce soil nutrients and weeds and promote native grasses in

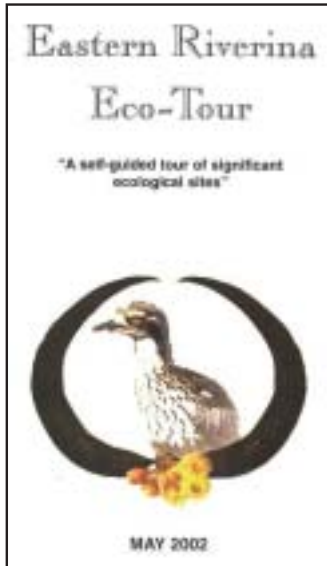


Figure 3 Establishment of Kangaroo Grass on untreated plots was poorer than on burnt plots and plots with sugar added. Loss of seedlings on burnt plots later in the season was due to an extended dry period.

two remnants within two years, using very simple techniques. Clearly further trials are needed to investigate how well this approach works across a wide range of sites, to identify cheaper forms of carbohydrate (refined white sugar is probably the most expensive form available!), and to develop practical ways to 'scale-up' the method so it can be used across larger areas. With further R&D, our sweet restoration recipe may provide a simple, inexpensive way to restore many degraded Box Woodlands in the future.

Eco-Tourism: Friend of Woodlands or a Threatening Process?

Well OK, any generalisation is intrinsically silly, but that's the dichotomy which is often posed with eco-tourism. I must declare my interest straight away; for the past 19 years I've been earning part of my living as a (small) nature-based tour operator.



My clientele are overwhelmingly locals, which gives me extra satisfaction in that local people are likely to want more depth and detail than visitors, and are more likely to 'do something' with the information I give them. On the other hand of course it also means that I must be creative about constantly coming up with new ideas for tours. One of my clients has been on over 70 tours; another has spent over 300 days on the road with me. That part of it actually suits me too – I'd get

stale doing the same tour all the time. In fact I rarely repeat even a day tour in consecutive years.

The word 'eco-tourism' is a modern – and unfortunate! – coining, but the concept is not. Victorian Australians were fascinated by mountain scenery, and especially by waterfalls and caves. Nineteenth century people suffered considerable expense and discomfort to visit areas such as Kosciusko, the Grampians, the Blue Mountains, Fitzroy Falls, and Jenolan, Abercrombie, Yarrangobilly, Bungonia and Wombeyan Caves. In 1892, 85 people are recorded as having visited Bungonia Caves, even though there was no road and the locals were hostile. To visit Jenolan in the same decade they caught a train to Newbridge south of Bathurst, arriving at 4.30 a.m. to be taken by coach to the caves, arriving at breakfast. They reversed the trip to get back to work on the Monday morning.

Once at their destination, they have been served by resorts and tour guides for well over 100 years. When James Spencer, Jindabyne's candidate for the model for 'The Man From Snowy River' retired from swinging his stockwhip round his head and racing unfortunate ponies down mountains, he became a very successful nature-based tourism operator, running tours from Jindabyne to the Kosciuszko summit.

One of the features of the visit to Jenolan was to be handed a newly broken stalactite as a personal disposable drinking straw. And that underlines something important that has changed – these days, any nature-based tourism guide worth the name has

(or should have) a conservation ethos, which, if necessary, must include not visiting an area if it is likely to suffer therefrom. I'll never take people to see Corroboree Frogs – though I could – because doing so inevitably damages their habitat.

If we adopt the definition of eco-tourism (which glib term I detest) provided by the 1991 Brisbane Eco-Tourism conference of tour operators, conservation groups, government officials and academics, it gives a starting point to require appropriate standards of the industry and its practitioners. "Eco-Tourism is ecologically and socially responsible nature-based tourism that fosters environmental appreciation and understanding. "To be able to actively and consciously carry out this fostering, an operator must be both knowledgeable and sympathetic enough to be able to foster, and have the skills to impart the knowledge. It is incumbent on me to keep up with current thinking on ecology, taxonomy, threatened species listings and reserve management.

I believe that there is an obligation on my industry not only to comply with any legal requirements – that's not a virtue – but to contribute. So far I'm not sure that any jurisdiction in Australia has been at all creative in thinking about what form such a contribution might take, beyond just charging fees to operators.

So, it's up to me to work that out for myself. It is sometimes a difficult matter, even when intentions are honourable, to do the cost-benefit analysis for an area as to whether the potential negative impact on an area by visiting it outweighs the benefits. If I'm doing my job, the effect should never be neutral – the world should always be a better place for my having taken a group on tour!

Yeah, I know it sounds a bit Pollyanna-ish, but I actually believe it. How can I justify that? In the past couple of years I've made a point of taking people to a series of woodland and grassland remnants in the region. I must confess that persuading people to pay to come to cemeteries, travelling stock reserves and roadside remnants has not always been easy, but in November 2002 I filled a bus to spend a bit over 24 hours tramping the area between Bigga, Crookwell and Taralga.

So, how did I benefit those areas? One of the problems of conserving woodlands and grasslands, compared with nice lush forests, has been persuading people that the pricklies and scalies are of equal importance to the pretties and furies. (And until recently the environment movement has generally been as hard to convince as the rest of the population). When I take people out I undertake to be able to identify – and more importantly say something about – any bird or mammal we come across, virtually any tree, shrub or wildflower, reptile or amphibian, >>

Ecological Management & Restoration Journal

The 'EMR' journal is designed to provide a serious and informative forum for those of us engaged in ecosystem conservation and restoration. The journal is now in its 5th volume, and continues to strike a chord with researchers and land managers alike.

Volume 4 articles that would interest Woodland Wanderings readers include David Brunckhorst and Phillip Coop's article on a successful Armidale trial to collectively manage stock and woodland conservation areas on three neighbouring farms and applying grassland rehabilitation principles to pasture management. Sue McIntyre's article on 'The Landscape Game' will also interest anyone involved in demonstrating to landholders the rationale for habitat linkages, as will Greg Martin's article on the role of small ground-foraging mammals in topsoil health and biodiversity.

Articles coming up in Volume 5 that relate to woodlands include notes and articles on grassland restoration and rehabilitation, a mammal re-introduction trial, new approaches to planning and financial incentives and a feature on The Wilderness Society's radical new program for landscape level conservation in Australia called 'Wild Country'.

So don't miss out on these and many, many other articles – and spread the word. Remember too, that if you are a member of Greening Australia or ESA, you can purchase a year's subscription to the journal (3 issues) at the discount price of \$49.50 incl gst (instead of \$55.00). To subscribe, phone Blackwell Publishers 03 9347 0300 or go to the website: www.blackwell-science.com/emr/ or email: subscriptions@blacksci-asia.com.au

New Publication “Farming Without Farming” by Daryl Cluff

Darryl like many of us understands the limits of bandaid solutions to degradation issues which address the problems, not the cause and therefore only provide temporary solutions. A fourth generation farmland manager who after taking the reins saw that a management change was needed to address land degradation and economic issues.

“By dismantling the current accepted methods of farmland production and re-assembling the parts in a different order, this publication describes how ‘farming and grazing’ can be

combined into a single, compatible land management technique.” The Pasture Cropping technique was established by Darryl with the assistance of his wife Lorraine on their Gulgong property.

Copies of this publication can be obtained through Stipa Native Grass Association Inc c/o Sue Rahilly, PO Box 19 Wellington 2820 NSW @ \$48 + \$4.00 postage. Order forms are available online at www.stipa.com.au

Reference: Comments by Peter Austin, The Land

and say at least something sensible about invertebrates, geology, history and ecology. Wherever you are there is a story to tell. And I make a point of encouraging people to focus – literally, on hands and knees and with a hand lens where necessary – on the inconspicuous and unappreciated. Where appropriate, which means invertebrates and most reptiles, which are not likely to be stressed if handled properly, I handle animals and encourage others to at least touch them, to gain familiarity. (I don't 'do' snakes – that's just showing off).

I can say confidently that at the end of my Crookwell tour, I had 20 advocates for protecting grassy woodlands, without any explicit proselytising on my part – these were people who'd just paid to enjoy and to learn. When on another grassland tour people expressed concern about a cemetery that had been quite inappropriately mown, I suggested they write to the relevant

shire council; some did. Having knowledge gives people confidence to speak out when required.

On that same tour our group found and I could identify an endangered grassland orchid in a place where it had not previously been recorded. Those people will know that orchid again – and will look out for it in appropriate places. So of course I have a vested interest in saying I'm good for woodlands, but I also believe it. I'm happy to be judged by others though.

ianf@pcug.org.au

(Ian Fraser has been running the Environment Tours programme in association with the Canberra Conservation Council and Environment Centre since 1984. He is also the co-author of six books on local natural history and an ABC natural history broadcaster.)

Sitings now in
South-Western NSW

Coolatai Grass

threatening the biodiversity of grasslands and grazing in north-western NSW



Paired seed heads of Coolatai Grass. The seeds are easily carried by animals, machinery and motor vehicles, spreading the weed over farms and along roadsides.

Coolatai Grass
(Hyparrhenia hirta)
is an invasive grass from Africa and the Mediterranean, which is now widespread in north-western NSW.

It can quickly spread from roadsides and other disturbed areas into undisturbed bush.

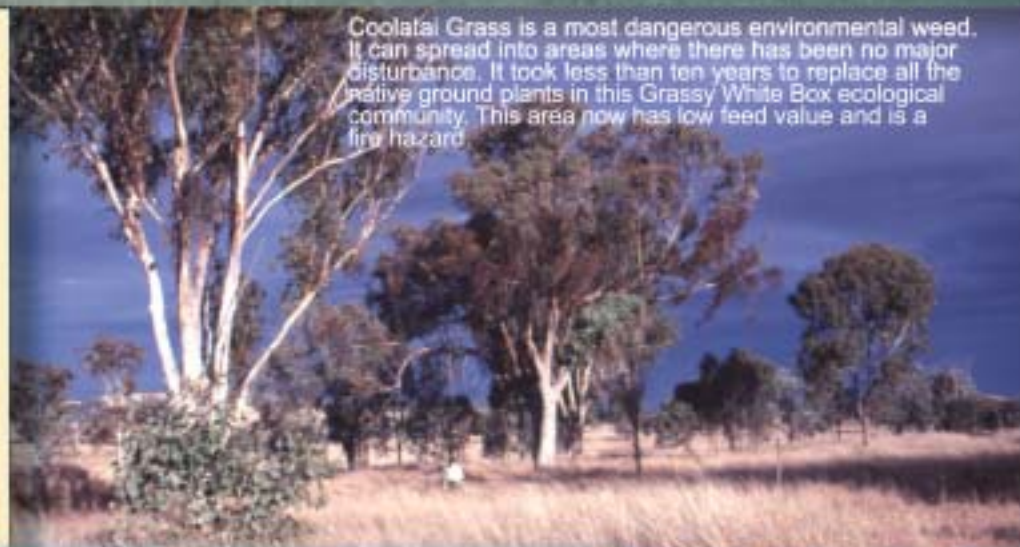
It grows so densely that it

This study assesses the impacts of infestation by Coolatai Grass on the plants and animals in grasslands and grassy woodlands.

The sites

Two sites were studied. Each had infested and uninfested areas, and a similar disturbance history. The two sites are:

1. Grassy White Box endangered ecological community on a travelling stock route near Manilla; and
2. native grassland at Arakoola Nature Reserve, north of Inverell.



Coolatai Grass is a most dangerous environmental weed. It can spread into areas where there has been no major disturbance. It took less than ten years to replace all the native ground plants in this Grassy White Box ecological community. This area now has low feed value and is a fire hazard.



Researchers trapping

The results

This continuing study is already showing that Coolatai Grass infestation:

- has a big impact on the native plant cover, reducing the number of species present and the abundance of each species (native ground cover plants were so reduced that the area could no longer be considered the endangered ecological community);
- significantly reduces the abundance of ground-active invertebrates;
- may reduce the abundance and variety of frogs



displaces native ground cover plants and is likely to change the number and species of ground-dwelling animals.

It quickly dominates pastures, creating large amounts of dead leaf and stem that has little food value and is unpalatable to stock.

Authors:

Peter Croft, Phil Sparks, Chris Mackenzie and Ian White.

Acknowledgements:

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 Staff from the Department of Infrastructure, Planning and Natural Resources
 Parks and Wildlife Division, Department of Environment and Conservation (NSW)
 staff setting up and monitoring pit traps and Peter King and Kerry Cooper for
 poster development and design.

Photographers:

Peter Croft, John Courtney (terrestrial photographs)

Coolatai Grass quickly forms dense tussocks that exclude native and pasture plants.

ground-active insects in Coolatai Grass found insect numbers were significantly reduced.

present,

may reduce the abundance and variety of reptiles, giving advantage to some species and not others.



Wildflowers like the Purple Beard Orchid (left) and Purple Donkey Orchid (above) will disappear as Coolatai Grass spreads.



Invasion by Coolatai Grass threatens the rich variety of Australian plants that live in our grasslands, including the less obvious lilies and orchids.



Green Tree Frogs were found in native grasslands but not adjoining areas infested by Coolatai Grass.



Reptiles, like this Legless Lizard (*Delma inornata*) were caught in both uninfested and infested areas suggesting dense Coolatai Grass may provide favourable cover.

What is needed?

- Identify and implement coordinated actions for all land managers to reduce the spread of Coolatai Grass, particularly to protect areas of high conservation value native vegetation;
- Identify where effective control is possible, particularly areas of new infestation;
- Increase land manager awareness of the need to act quickly to maintain grazing, before major costs are incurred; and
- Research to identify possible biological control methods.

This study clearly shows that the diversity and abundance of native plants and animals, and the White Box-Yellow Box-Blakelys Red Gum endangered ecological community are threatened by the spread of Coolatai Grass, an aggressive environmental weed.



Flora and Fauna Impact Assessment of Coolatai Grass (*Hyparrhenia hirta*) Invasion

FIRST MONITORING REPORT FOR RESEARCH PROJECT

ABSTRACT

The North-West Vegetation Forum is a committee of people representing a cross section of the community and government agencies, who concern themselves with vegetation conservation issues of the North-West Slopes and Plains. Their concerns about Coolatai



Grass invasion led to the instigation of this project to determine the environmental impact of Coolatai Grass invasion on native flora, and fauna (vertebrate and invertebrate). This project is a co-operative effort, involving Department of Environment and Conservation, University of New England, Department of Infrastructure Planning and Natural Resources, Manilla Landcare Group, and Rural Lands Protection Board.

The two sites selected in the North-West (Manilla TSR and Arakoola Nature Reserve) provided optimal experimental conditions to compare and contrast the flora and fauna present in Coolatai Grass-infested areas adjoining areas dominated by native grasses. The sites selected for comparison were in the same landscape position and had the same disturbance history, the only variable was the dominance of Coolatai Grass at half the sites.

Survey methods included: 6 x 5 m and 20 x 20 m flora surveys, pit trapping with 20 litre buckets and Elliott trapping for vertebrate fauna, and small pit trapping for invertebrate fauna. The sites have been set up as permanent sites to enable repeat monitoring at later dates.

The results after one monitoring in February 2003 have found:

Vertebrate Fauna

The results, so far, indicate trends which may prove to be significant after more sampling. Unfortunately the sample size is not large enough for conclusions to be made at this stage. It is intended to re-open the pits again in spring and summer. Additional monitoring techniques will also be used at Manilla

TSR, bird counts will be carried out over four seasons, and spotlighting for arboreal mammals will occur during each monitoring period.

Trends that are appearing are:

- Species diversity for reptiles, frogs, and invertebrates is similar for both native grassland and Coolatai Grass.
- However species assemblages could differ significantly between native and Coolatai Grass sites, for example the reptiles *Ctenotus robustus*, *C. tetradactyla*, and frog *Litoria caerulea*, all seem to prefer native

grassland. On the other hand the burrowing skink *A. leuckartii* appears to prefer Coolatai Grass.

- Frog abundance may be significantly greater at native grassland sites.
- Frog species diversity was significantly greater in native grassland sites at Manilla TSR, whereas Arakoola NR had similar diversity at both sites.
- Combined vertebrate abundance (frogs and reptiles) may be significantly greater in native grassland areas.
- There was a dearth of small mammals at both locations, that result is likely to be linked to the drought.

Invertebrate Fauna

Invertebrate results were obtained from opportunistic captures in the large pits at both Manilla TSR and Arakoola NR, and from the targeted invertebrate survey using small pits at Manilla TSR.

Invertebrate results do show significant differences favouring native grassland areas.

- The small pit trapping at Manilla TSR found that native grassland supports a greater abundance of invertebrates; 3123 captures in native grassland as compared to 2331 captures in Coolatai Grass.

The large pit trapping at Arakoola NR also found invertebrate abundance greater in native grassland sites; 123 captures in native grassland and 87 captures in Coolatai Grass.

- Diversity of invertebrate orders at Manilla TSR was similar for native grassland (19) and Coolatai Grass (18).
- Some orders show more variation in abundance than others, for example Termites, Beetles, Spiders, Slaters, and Cockroaches all recorded double the abundance in native grassland as compared to captures in Coolatai Grass. One order was favoured by Coolatai Grass, which was Booklice.
- Invertebrate captures in big pit traps at Arakoola NR and Manilla TSR show no correlation, captures were completely the opposite between them.

Flora

Flora surveys were carried out at 14 sites at Arakoola NR and 10 sites at Manilla TSR. The flora results provide significant proof that Coolatai Grass aggressively displaces native plants and dominates ground cover.



At Arakoola NR the average number of plant species per 20 x 20 m plot in native grassland sites was 24 species, as compared to 17 species in Coolatai Grass sites.

At Manilla TSR the average number of native plant species per 20 x 20 m plot in native grassland sites was 48 species, as compared to 25 species in Coolatai Grass sites.

It was surprising the diversity of native plants that were still present in the Coolatai infested plots, albeit in very low abundance. The uninfested native grassland sites are very floristically diverse, with a very low proportion of exotic taxa. The preliminary results confirm trends found by Scott McArdle in Kwiambal National Park that Coolatai Grass has a major and very consistent impact on the diversity of native species.

At Manilla TSR the percentage projected ground cover of native species in the native grass sites was 60% as compared to native species projected cover in Coolatai Grass sites of 19.6%.

The percentage projected ground cover of Coolatai Grass in Coolatai infested sites was 37%, as compared to 0% in native grassland sites.

The percentage projected ground cover of other exotic species in native grassland sites was 2.5% as compared to 1.4% in Coolatai Grass sites.

As a result of Coolatai infestation (according to the NVC Act definition) the understorey was transformed from native vegetation to exotic vegetation. Coolatai Grass has recently been included in the preliminary determination by the NSW Scientific Committee, “*Invasion of native plant communities by exotic perennial grasses*”, which identifies the spread of Coolatai Grass as a key threatening process under the

Threatened Species Conservation Act, 1995 (TSC Act).

The other major conservation implication is that many of the uncommon and rare herbs, grasses, and shrubs, presently limited to areas infrequently grazed, such as roadsides, will require listing as threatened species as they continue to decline with Coolatai Grass invasion.

Other Trends Expected:

The next monitoring period is to include bird census at the Manilla TSR sites. Ground feeding birds such as the Diamond Firetail are expected to decline in Coolatai Grass and the decrease in invertebrates found in Coolatai Grass sites is likely to affect the suite of birds, reptiles and frogs feeding on insects. Bats may also decline if the reduction in ground invertebrates results in less flying insects.

Large macropods are likely to prefer native grass, and decrease in Coolatai Grass.

The Common Brushtail Possum which feeds on native ground cover plants is also likely to decline.

Microleana or Weeping Grass

Microleana or Weeping Grass (*Microleana stipoides*) is seen as one of the most promising Native Grasses for agricultural use and for Native Lawns because of its soft attractive foliage and low growth habit.

Identification

- Small to medium, tufted to spreading year-long-green perennial grass.
- Leaves characterised by having a "pinch" near the tip - a useful field identification aid.
- Seed-heads long and drooping, barely branched, seeds the size of rice grains.
- Flowering from November to February.

Establishment

To establish Microleana, sow in autumn or preferable early spring. For paddock establishment, sow at the rate of 5-8 kg/hectare. For lawns, sow at twice the paddock rate, depending on area and soil type or mixture.

Microleana seed can be mixed with a sowing medium such as sawdust, sand or rice seed husks. This can be used as a spreader, using either conventional spray mulching techniques or a super spreader. Spread into the prepared seed-bed and lightly cover.

As in establishing all plants, invasive weeds must be controlled in the areas sown.

Management

Winter

- Encourage growth of native perennial grasses by rotational grazing followed by a period of pasture spelling.
- If annual grasses are a problem, defer grazing until late Winter or early Spring to crowd out annual grasses.
- Short-term, higher intensity grazing should then be used to control the annual grasses and prevent their seed-set.

Spring

- When perennial native grasses start to elongate their stems, reduce stock density or defer grazing to allow seed-set.
- In good seasons use short-term, high intensity grazing to stop clover and broad-leafed weeds out-competing native perennial grasses.
- To control annual Grasses, use short-term, high intensity grazing before stem elongation of perennial native grasses.



Summer

- Continue low stocking rates until after seed-set.
- Maintain 70% ground cover and a litter layer.

Autumn

- Defer grazing pastures for 6 weeks in early autumn to allow completion of seed-set and establishment of new native plants. This will protect native perennial grass seedlings. Heavy grazing will prevent seedling establishment.
- After seed-set, graze pasture but focus on retaining 70% groundcover, some residue (taller grasses) and litter.
- If pasture is heavily clover-dominant, use short-term high density grazing in late autumn to early winter to reduce the clover.
- If broad-leafed weeds are a problem, graze to maintain a high groundcover of desirable species to out-compete the weeds.

References

Eddy D. Mallinson D. Rehwinkel R. and Sharp S. (1998) *Grassland Flora – A Field Guide for the Southern Tablelands (NSW & ACT)* NCP Canberra

Betts J & Wilson AJ (2003) *Information Sheets on Native Grass Establishment* "Cowridge" Yass

Sustainable Grazing Systems No.6/99 *Tips and Tools for Grazing Systems – Grazing Management of Danthonia & Microleana-Based Native Pastures.*

Stipa Native Grasses Association Inc. Newsletter 2003
www.stipa.com.au

Why not consider using Microleana for your lawn!

Boundary Road Reserve, Bathurst

Community Landcare seeking a balance between visitation, education and management in a degraded woodland remnant.

As Australia's first inland city, the landscape of the Bathurst Plain, astride the upper reaches of the Macquarie River, has a long history of modification for grazing, gold mining and orcharding. Consequently, the city of Bathurst has been an affluent one for many years but its economic success has had a heavy impact on the natural landscape.

Boundary Road Reserve on the western outskirts of Bathurst, incorporates almost 70 hectares of modified Box-Gum Woodland. The understorey includes a mixture of native and exotic species, and ranges in condition from moderately disturbed to highly degraded.

The Reserve is Crown Land managed by the Boundary Road Reserve Landcare Group on behalf of Bathurst City Council and the NSW State Government for conservation and passive recreation.

Since its formation in 1997, the Landcare Group has fenced the Reserve and de-stocked over 50 hectares of woodland. A 4 kilometre walking track has been constructed and over 6,000 local-provenance trees and shrubs have been planted. Observation and monitoring by members of the group indicate that the understorey composition is steadily changing, with a gradual spread of native grasses and forbs to areas that were previously dominated by Black Thistle, Patterson's Curse, Phalaris, Rye Grass and other exotic species. It is becoming apparent that tree-covered areas are recovering more rapidly than areas where trees are absent. The group has planted an assemblage of upper and mid-storey trees and shrubs to the sparsely treed areas, and is now adopting a "let's be patient attitude" to revegetation, and watching nature take its course.

This change in management technique allows the group to put more effort into encouraging an awareness of the reserve - the recreational opportunities that it offers and the importance of its intrinsic natural values; on the understanding that increased awareness leads to increased care and conservation.

Over recent years, schools, community groups, businesses and individuals have participated in planting events. These have been very successful and hundreds of people are now able to see a canopy forming where they once planted tiny seedlings. With a pause in the planting phase however, new activities are being held to continue to foster broad community awareness and involvement.



Above: Boundary Road Reserve. Photo: Jenny Schabel

In conjunction with the local South Bathurst Primary School, Charles Sturt University and the NSW Department of Environment and Conservation (DEC), a brochure entitled "A Young Persons' Guide to Boundary Road reserve" has been produced. Year 4 and 5 students critically examined brochures from other natural areas and identified the styles and techniques used in this type of literature. Then, after a guided tour of the Reserve with members of the Landcare Group, text was written, photos taken and sketches prepared. The A4 tri-fold brochure is now available from the local office of the DEC and the Visitor Information Centre and has been sent to all primary schools in the district.

Touring Japanese study groups have since used the brochure as a guide to the Reserve, and as an exercise in reading and using English language. On one such occasion students had a great laugh when they saw that the seed heads of *Themeda australis* looked just like the Kangaroo's foot that they had seen at Taronga Park Zoo! Then they saw the resident mob of Greys lying in the tall grass catching the warmth of a chilly Bathurst morning's sunshine. The same group, as they sat on benches sharing a morning tea break, were also treated to the sight of a flock of Yellow-tailed Black-cockatoos demolishing the crown of a large Blakeley's Red Gum.

The Group believes that these are the sorts of experiences that form lasting memories and build an awareness of the natural values of a Australia's diminishing woodlands.

With the benefit of an Envirofund grant, the Landcare Group are currently designing a set of interpretive displays for installation in early 2004. The displays will present a history of the site from its traditional Wiradjuri management until now, spell out the do's and don't's for visitors and promote the conservation values of this highly significant remnant of native vegetation.

Introducing the Conservation Partners Program *Linda Bell*



As members of the Conservation Management Network, you have already demonstrated a passion and commitment to conservation of Grassy Box Woodlands. Some of you may be interested in furthering your commitment by becoming members of the statewide National Parks and Wildlife Service Conservation Partners Program.

The Conservation Partners Program aims to encourage and assist private landholders who have formed or wish to form voluntary partnerships with the NSW Department of Environment and Conservation (DEC) to look after native vegetation and provide habitat for wildlife.

By becoming members of the program, people are able to connect with like-minded landowners involved in conservation across NSW, work in partnership with experts within DEC to protect their land, receive a newsletter "Bush Matters" twice a year and receive management notes such as "Photographic Monitoring" or "Protecting Your Remnant Vegetation".

As part of the Conservation Partners Program landowners can register to be on the mailing list. Private landowners across NSW have entered into agreements that conserve their land and ensured that areas of spectacular bushland are protected and

managed so that habitat remains for native plants and animals. By protecting land either by a Voluntary Conservation Agreement or a Wildlife Refuge landowners can know that the bushland that they care for may also be enjoyed by future generations.

Voluntary Conservation Agreements require landowners and managers to enter into a legal commitment to sympathetically manage land of high conservation value that binds them and future owners of the land. This means that after they leave the property, new owners are committed to manage the land, as agreed. The agreement only needs to cover the part of the property where bushland exists. Wildlife Refuges also require a legal commitment by the owners to manage for conservation. Owners nominate part or all of their property to be declared a Wildlife Refuge. The Wildlife Refuge status remains even after sale or subdivision. The Wildlife Refuge can be revoked by the landowner on request.

If you are happy to be on the mailing list for the Conservation Partners Program let Toni McLeish know on 02 6298 9708 or email toni.mcleish@npws.nsw.gov.au and she will ensure that your details are added to the list. If you would like to discuss the Conservation Partners Program or you are interested in more details about Voluntary Conservation Agreements or Wildlife Refuges contact Louise Brodie on 02 9585 6671 or email louise.brodie@npws.nsw.gov.au or Sally Ash on 02 9585 6040, or email sally.ash@npws.nsw.gov.au.

Introducing the Threatened Species Network *Alison Colyer*



Do you care about protecting our natural environment and the creatures and plants that are found within it? Do you aim to manage your property in the most sustainable and environmentally friendly manner possible? Then perhaps you'd be interested in the Threatened Species Network.

The Threatened Species Network (TSN) is a joint program of the World Wide Fund for Nature (WWF) and the Natural Heritage Trust (NHT). TSN aims to increase public understanding of the threats to our precious wildlife and to help the community take part in projects to protect threatened species and their habitats.

Just one of the ways that this is done is through our 'Threatened Species Network Community Grants'. These are small grants to help community groups establish on-ground projects that aim

to protect threatened species and their habitat. The closing date for 2004 is 28th May. Program guidelines and application forms are available online at www.wwf.org.au/tsn, or by contacting Alison Colyer, the NSW & ACT Coordinator, on 02 8202 1222 or at tsnsw@wwf.org.au.

Another method used to provide information to the public is our free quarterly newsletter. If you're interested in receiving a copy, please let us know by emailing tsn@wwf.org.au or posting your details to PO Box 528, Sydney 2001.

Calling Landholders in the Gwydir

Currently, TSN is attempting to develop a list of landholders or community groups located in the Gwydir region who have an interest in threatened species management. If this is relevant to you and you'd like to register your interest, please contact Alison at the details provided above. Please also indicate whether you would be happy to receive and fill out a brief survey form on the region and your perceived issues of greatest concern.

Serrated Tussock – A Threat to Native Grasslands

Serrated Tussock (*Nassella trichotoma*) is a native plant of South America. It is thought to have been introduced to Australia in about 1900 but was not recorded until 1935. It was first recorded in Victoria and Tasmania in the 1950s. The extent of infestation in NSW has grown to an estimated 700,000 ha and 100,000 ha in Victoria. The weed has been formally listed as a Weed of National Significance.

Status - serrated tussock is a category W2 noxious weed in the Cooma-Monaro Council area. A W2 category weed poses a threat to agriculture, the environment or the community and has the potential to spread to other areas. It must be fully and continuously suppressed and destroyed. Land owners or occupiers should check with their Local Control Authority to see what category Serrated Tussock is within their area and then what control measures are required.

The threat - Serrated Tussock produces very high numbers of viable seed. These germinate readily, tolerate most soil types and are strong survivors in difficult growing conditions. Most grassy vegetation, including sown pastures and native pastures can be vulnerable to invasion. Serrated Tussock can greatly reduce the productivity of agricultural land and threaten the biodiversity of native pastures, grasslands and woodlands. It becomes established readily in disturbed vegetation where there is inadequate competition for sunlight, moisture and nutrients.

Biology - Serrated Tussock is a tussocky perennial grass often reaching 50 cm in height and a basal diameter of 25 cm. Mature plants have drooping leaves that can extend the plant diameter to 50 cm or more, but plants growing on less fertile soils are usually smaller. A mature tussock is made up of many independent clusters of leafy tillers which can grow independently.

Germination usually occurs in autumn and winter and plants rarely flower or produce seed in their first year of growth. Seed will usually only germinate within the top 2 cm of the soil but can lay dormant in the soil for as long as 15 years.

The flowering stems emerge in spring and can grow up to about 95 cm in length. They are initially erect but tend to droop with maturity. The seeds turn a deep red to purple, giving the plant distinctive pink appearance. The main method of dispersal is by wind. The seed heads are very light, highly branched and break off near the base. Seed then drops off progressively as the seed heads blow across the landscape. Seed can also be transported in the stomachs of grazing animals, on their wool and hair, on clothing, vehicles and machinery. Seed can persist in cattle for up to six days and up to ten in wethers. Livestock being brought onto a property should be quarantined in a small holding paddock to prevent introduction of seed to the rest of the property. Serrated Tussock produces only very low quality feed with a high fibre content (around 85%) and low protein content

(around 4%) and is not readily digested. Livestock usually only eat Serrated Tussock when little else is available.

Prevention

The best form of control of Serrated Tussock is to prevent establishment. Any plants found should be destroyed before seeding to prevent further recruitment. Continued vigilance for new plants is required.

Control of Serrated Tussock has historically focussed on the removal of adult plants through chemical control. There has been an increased acceptance of control by cultivation, but the technology for establishing competitive native ground cover is still in its infancy. Fertiliser and/or strategic grazing can be used to encourage desirable species to out-compete the weeds. However successful control of Serrated Tussock and other perennial grass weeds is most likely achieved with an integrated approach, using several methods concurrently.

Mechanical control

In scattered populations, chipping with a mattock or hoe is ideal and can be done at any time of the year, but autumn, winter and spring before flowering and seed production is preferred. The Serrated Tussock plant can be turned upside down on the disturbed area or a small amount of suitable grass seed and fertiliser sprinkled on the area to encourage good competition. Strategic burning may prevent Serrated Tussock setting seed in the short term, but this can also damage the background competitive vegetation if not done appropriately. Always seek professional advice before burning for management.

Biological control

No safe or effective biological control agents are available for Serrated Tussock in Australia.

Chemical control

The only herbicides registered by the Australian Pesticides and Veterinary Medicines Authority for the control of Serrated Tussock are Glyphosate and Flupropanate. A variety of application methods including spot-spraying, boom-spraying, spray-topping and wiping can be used. However both herbicides can also kill a wide variety of native grasses and other herbs if not used appropriately. You should contact your local weed control authority, agronomist or other expert for detailed advice on Serrated Tussock control in your situation. to prevent or minimise an damage to other vegetation including native grasses.



Serrated Tussock plant showing typical fine drooping yellow-green foliage and feathery seed head. Photo: Jane Tracy

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Watch This Space!

Granite Borders Region Landcare groups and SGS Northern Tablelands, and NSW Agriculture have been managing a joint project titled "Glycine – Fertilisers and Grazing Management"

Land managers in the group observed Native Glycine to be highly persistent even through drought and under conditions of heavy grazing.

The project looks at the effect of grazing management on the incidence and production of native legumes, especially Glycines. For more information contact Carol Harris NSW Agriculture on 02 6730 1900.



Woodland Wanderings (Grassy Box Woodland CMN) newsletter was edited by Toni McLeish and Lorraine Oliver of DEC and was produced with funding from the Federal Government's NHT2.

The views expressed in this publication do not necessarily represent those of either the Department of Environment and Conservation or Department of Environment and Heritage. While every effort has been made to ensure that the information in this newsletter is accurate at the time of printing, neither the DEC nor DEH can accept responsibility for any errors or omissions.

Useful Resources

Eddy D., Mallinson D., Rehwinkel R. and Sharp S. 1998
Grassland Flora - A Field Guide for the Southern Tablelands (NSW & ACT), Ref

Walker K., Burrows G. and McMahon L. 2001
Bidgee Bush, National Capital Printers, Canberra ACT

McIntyre S., McIvor J.G. and Heard K.M. 2002
Managing and Conserving Grassy Woodlands, CSIRO Publishing, Collingwood Victoria

Environment ACT 2003 *Grassy Woodlands: Natural Habitats of the ACT - Teacher Resource Book*, Environment ACT, Canberra ACT

National Parks Association *Native Trees of the ACT - Field Guide* National Parks Association of the ACT, Canberra

Carr D. 1997 *Plants In Your Pants- A Pocket Guide for Identification and Use of Common Plants of the North-West Slopes*, Greening Australia, Armidale

Useful Websites

Department of Environment and Conservation
<http://www.nationalparks.nsw.gov.au/>

Department of Environment and Heritage
<http://www.deh.gov.au/biodiversity/toolbox/educational-material.html>

www.deh.gov.au/education/activities/index.html

CSIRO <http://www.biodiversity.csiro.au/index.htm>

Australian Museum
<http://www.austmus.gov.au/biodiversity/factsheets.htm>

Australian National Botanic Gardens
www.anbg.gov.au/education

CMN Web page

Currently being updated.

Making Contact

Expressions of interest are invited from all persons or groups wishing to be involved by writing to:
Grassy Box Woodland CMN C/o Toni McLeish NSW NPWS
PO Box 2215 Queanbeyan NSW 2620 Phone: (02) 6298 9709
Email: toni.mcleish@npws.nsw.gov.au

Box-Gum Woodlands Fact Sheet

A fact sheet about the endangered ecological community White Box, Yellow Box, Blakely's Red Gum Woodland (or Box-Gum Woodland) is available on www.npws.nsw.gov.au/wildlife/thr_profiles/Box-gum_Factsheet.pdf, or call Toni McLeish NPWS Threatened Species Unit on (02) 6298 9709.