Bush Matters

Newsletter of the Conservation Partners Program
NSW National Parks & Wildlife Service part of the
Department of Environment and Conservation (NSW)

No 1 2006
ISSN 1446 - 8441

Landholders and DEC staff looking at Grassy White-box Woodland
Photo © DEC: L Brodie

DEC plans more visits to Wildlife Refuges

It is exciting for us at the Department of Environment and Conservation to be able to continue our expanded program of visits to Wildlife Refuges. In the last edition we featured visits to Wildlife Refuges in western NSW with project officer, Laura Kelly. We are pleased that the NSW Environmental Trust has granted the funding to continue the program. This time we will be focusing on properties in the NPWS Southern Branch area, initially in the NSW South Western Slopes Bioregion.

In western NSW, fourteen properties were visited and a rich and diverse range of native plants and animals were recorded. Landholders were enthusiastic about the property visits. They also received follow-up reports that provided information about their properties and gave some general management advice relating to issues found on each property. The project also provided the opportunity to visit Wildlife Refuges that are Travelling Stock Reserves, with eight being visited in the Riverina, Central West and Northern Tablelands. This was made possible through a grant from the NSW Environmental Trust.

It is anticipated that in this next phase, a larger number of Wildlife Refuges can be visited. Landholders with Refuges in the South West Slopes will be contacted over the next few months regarding the project. We are keen to involve as many landholders as possible, so check your mail boxes!

CONTENTS

From the Director General

The Conservation Partners Program assists landholders to protect the special natural and cultural heritage conservation values on their properties. In the six months to December 2005, Conservation Agreements and Wildlife Refuges have been placed over a further 12 properties. These are protecting 840 hectares in 11 areas from the Far South Coast to the Mid North Coast, as well as one on the Northern Tablelands. The addition of these new properties brings the totals to 190 Conservation Agreements covering 14,015 hectares and 624 Wildlife Refuges covering 1,715,044 hectares across New South Wales.

This edition features three properties and the interest of their owners in conservation management. 'Five Corners' highlights the landowner's desire to learn more about her property as well as provide others the opportunity to gain skills and knowledge about biodiversity survey techniques. Managing with nature at 'Lana', features a sheep grazing property which is a Wildlife Refuge where the owners are using the 'holistic management' technique, which highlights the importance of understanding local ecosystems. The third property, 'Neverdie Wilderness', is situated in the gorge country of the upper Shoalhaven River. This Conservation Agreement protects geological, natural and cultural values and the owners are justifiably proud of such a magnificent place.

One of the aims of the Conservation Partners Program is to assist landholders in their conservation management by providing technical information and networking opportunities. This edition features the Brush-tailed Rock-wallaby, research about soil bacteria, techniques for revegetation, new publications, and opportunities for workshops and training. I also draw your attention to the revised Conservation Partners Program website and the opportunity for South West Slopes Wildlife Refuge owners to meet with DEC staff.

LISA CORBYN
Director General
Department of Environment and Conservation

Distance education courses in natural area restoration

Do you work in landcare, degraded land restoration, weed control, or bush regeneration areas either as a career or in a voluntary capacity?

- The TAFE NSW Open Training and Education Network (OTEN) provides training in these fields.
- Training leads to a Certificate 2 in Conservation and Land Management (Natural Area Restoration).
- This qualification complies with the Australian Quality Training Framework (AQTF) and meets the requirements of the National Training Package.
- OTEN provides training by Distance Education. This means that you complete most of the course work at home and in your workplace. You will have to attend a number of compulsory practical sessions, usually conducted at weekends.

Contact: TAFE NSW OTEN
Primary Industries & Natural Resources Section

Phone: 02 9715 8513
Freecall: 1300 652 947
Fax: 02 9715 8522

Photo: Virginia Bear

Conservation Partners website update

An exciting addition to our website is 'Upcoming Events and Workshops'. Watch this to find out what is happening in your area.

We have established a shortcut to access the updated Conservation Partners Program site on the DEC website: www.nationalparks.nsw.gov.au/conservationpartners. Add this to your favourites to have easy access in the future.

Are you arranging events which may be of interest to landholders with Conservation Agreements, Wildlife Refuges or Land for Wildlife? Let us know and we can arrange to put the information onto the website. Contact Louise 9585 6671 or Sally 9585 6040 to organise this.

Involving the community in biodiversity surveys

Rebecca Mooy from the National Parks Association, and Shirley Handy, a landholder with a VCA worked together on a community training day

In 2005, Shirley Handy signed a Conservation Agreement to ensure protection of around 235 hectares of bushland on her property "Five Corners" at Nullamanna, north of Inverell.

One of Shirley's wishes is to involve others in learning about vegetation and wildlife habitat. "I am interested in using the property for future environmental education activities including bird watching, bushwalks, spotlighting, and plant identification days".

It was with great excitement that Shirley was able to work with Rebecca Mooy, Project Officer with the National Parks Association (NPA) of NSW, at a training session in September 2005, learning how to use the NPA Community Biodiversity Survey Manual.

Last year, Rebecca ran several workshops to train individuals and groups across NSW in the methods of flora and fauna survey. They were held at Mudgee, Lake Macquarie, Alstonville, Lithgow, Inverell and in Sydney at Castle Hill and North Sackville. The methods are based on those published in the Community Biodiversity Survey Manual.

Twenty participants, mostly locals from around Inverell, came to the workshop. Together they discussed the importance of biodiversity and the methods to look for, identify and record the plants and animals. The afternoon was spent with participants dividing into two groups to practice these techniques.

Dr Stephen Debus, a long time researcher of woodland birds, showed those in the fauna team how to observe birds and their calls, look for scats, search for reptiles and insects and record frog species by listening to their calls. On the day 48 species of birds were recorded on the property. Some of the highlights were watching the flight of a square-tailed kite and listening to the chatter of the yellow-faced and white-throated honeyeaters.

Senior Ranger Peter Croft (right) and the botany team

Peter Croft, a local National Parks Senior Ranger, demonstrated the finer points of plant identification. The Botany team identified many species that Peter previously had recorded on the property including native herbs, grasses, and orchids.

Shirley was thrilled to participate in the practical experience of setting out a quadrat and recording the plant species. Everyone "thoroughly" enjoyed the workshop which Shirley feels is a start towards educating the community in "common sense conservation".

The day has produced further results for Shirley. She has participated in a project run by the DEC to identify and assess grassy box woodland vegetation. In February Shirley will host another day where local people will be involved in looking at the vegetation and wildlife on the property, with the assistance of ecologist Wendy Hawes.

The Community Biodiversity Survey Manual is one tool that can assist land managers, farmers, community members, teachers and others to assess bushland health. Using the techniques used in the manual it is possible to develop a species list of the plants and animals using the bushland and to determine how to best manage them.

The manual is now available in its 3rd edition and also in a new condensed version. They have been designed to ensure that data collected by community groups is suitable for integration into environmental decision making processes at a range of levels. The new condensed version is ideal for groups surveying animals and plants using methods that don't require the assistance of experts.

Interested in hosting a workshop?

NPA is looking for landholders and groups interested in helping to coordinate workshops in their local area of NSW in 2006. Contact Andrew Cox at the NPA office on 02 9299 0000, email biosurvey@npansw.org.au or visit www.npansw.org.au/biodiversity

Community Biodiversity Survey Manual 3rd edition and Condensed Version

Both manuals are co-published by the DEC and NPA. The condensed version costs $50 and covers survey methods for baseline surveys ideal for secondary and tertiary school teachers, private land owners and community groups.

The third edition covers baseline and comprehensive survey methods and costs $104.50. Add $7 postage on the price of each manual in NSW. Order directly from the NPA on (02) 9299 0000.

Looking for Brush-tailed Rock-wallabies

Helping threatened species survive in the wild relies on gaining as much information as possible about the species. Suzanne O'Neil from DEC tells us how you can help

Photo: Sean Leathers

The elusive nature of the Brush-tailed Rock-wallaby (BTRW) *Petrogale penicillata* means that this species is also known as the 'shadow' . They are difficult to see in the wild and are extremely shy.

This threatened species occurs in New South Wales, Victoria and Queensland. They were once considered abundant and during the late 1880s were widespread across the rocky country of south-eastern Australia from southern Queensland to Victoria. However they have suffered a dramatic drop in numbers, particularly in Victoria and southern and western NSW where many colonies are now extinct and many more are facing extinction.

The BTRW is currently listed as Endangered under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The BTRW is also listed as Vulnerable in Queensland, Extinct in the Australian Capital Territory, and Critically Endangered in Victoria.

Whilst hundreds of thousands of BTRW were shot as agricultural pests and hunted for fur from 1900 until about 1920, their numbers appear to have continued to fall in most localities.

Foxes are believed to be the most common reason for this decline. Foxes were introduced to Australia in the 1870s and have contributed to the decline of a range of native species. Foxes are agile climbers and are well-sized to fit into the crevices where young wallabies shelter while their mothers feed.

However there are additional factors which are thought to contribute to the decline and extinction of local BTRW populations. These include:

- being preyed on by wild (or feral) dogs and cats
- competition with goats and rabbits for shelter and food
- habitat loss by clearing and fragmentation
- changes to local vegetation through weed invasion, inappropriate fire regimes and other human disturbance
- disease, especially from introduced species e.g. toxoplasmosis which is spread by cats and hydatidosis which is carried by foxes, dingoes/ wild dogs and sheep
- inbreeding due to isolation of colonies and a reduced gene pool.

It is hard to know how far their numbers have fallen and it is now estimated that there are between 15,000 and 30,000 animals left in total.

Friends of the Brush-tailed Rock-wallaby

The Friends are a local community group established in 1995 to work with the DEC in protecting the Brush-tailed Rock-wallaby population in Kangaroo Valley.

Landholders were concerned about the disappearance of the rock-wallaby, which was largely attributed to foxes. By getting together and working with National Parks Officers in the area, a major fox baiting program in Kangaroo Valley was initiated and continues today.

The Friends encourage landholders to be involved, and have an educational and liaison role. They also raise funds to assist in undertaking a variety of projects.

To find out more about how such a group could work in your area, contact Melinda Norton on 02 4887 8256
www.rockwallaby.org.au/about

How can you help?

On your own property:
- control foxes, goats, rabbits and wild dogs
- ensure pet dogs and cats do not roam in rock-wallaby habitat
- protect rock-wallaby habitat by retaining native vegetation, undertaking weed control and keeping grazing stock out
- see if there are local habitat protection and restoration projects which you can get involved in.

If you are a bushwalker, you can:
- minimise disturbance to rock-wallabies when moving through their habitat. Never chase animals or crawl into refuge sites
- keep rock-wallaby habitat free of refuse by removing all litter and food scraps.

If you see any evidence of Brush-tailed Rock-wallabies, please let us know. You can use either of the following options:
- fill in an online species sighting form
- download a printable form to fill in and send it to us.

How do I identify them?

These rock-wallabies can be quite difficult to see in the wild as they are well camouflaged and quite timid by nature.

They are a small-sized dark brown wallaby (5 to 8 kg) with a reddish-brown rump, grey shoulders and a long brush-tipped tail. They are sometimes confused with the larger, more common swamp wallaby. However BTRW can be distinguished by their black and white cheek stripes. They are strong, agile and have rough pads on their feet for rock grip. As their name implies, they have a long, thick, bushy tail which is used for balance when bouncing around on rocks and boulders.

Other factors which assist in identifying them are their behaviour and where they live:

- they live in rocky terrain like escarpments and boulder piles. They prefer sites that are north-facing with numerous ledges and crevices, and one of their favourite past-times is sunbaking in the afternoon sun
- they are mainly active between dusk and dawn, which is the period when they leave their rocky refuges to graze
- they create trails or tunnels through the bush heading from the open grassland (foraging sites) towards rocks/shelter.

Their reliance on refuges leads to the rock-wallabies living in small groups or colonies, with individuals having overlapping home ranges of about 15 hectares each. Within their colonies they seem to be highly territorial with a male's territory overlapping one or a number of female territories. Even at night the wallabies do not move further than two kilometres from their home refuges.

The presence of their distinctive scats around highly rocky habitat is often the best sign of their presence. Brush-tailed Rock-wallaby scats can be found throughout their rocky habitat, particularly on ledges and boulder piles where they sit to sun themselves. The scats have a distinctive shape and size—usually a cylindrical shape with a pinch at one end. Scats can be collected for identification by experts. Scats need to be handled carefully for health reasons and both the location of the site and the location of the scats within the site recorded.

Where are they ?

In NSW, the populations in the Shoalhaven and the Warrumbungle Ranges are the most southerly and westerly known populations, respectively. Although fragmented, habitat in the north is more continuous along a number of the major river system gorges, for example, the Apsley-Macleay and Clarence Rivers.

Help us find out more

To help the Brush-tailed Rock-wallaby the Department of Environment and Conservation has prepared a Recovery Plan. Already key actions are taking place. Brush-tailed Rock-wallaby protection is a key element in the DEC's Fox Threat Abatement Program and goat control specific to BTRW habitat is now being undertaken in a number of national parks.

Other actions include monitoring and research programs to improve Brush-tailed Rock-wallaby habitat management and protection, and working with the community to improve knowledge of the species.

The DEC needs more information to determine the current distribution of Brush-tailed Rock-wallabies.

More information helps everyone work out better ways to protect this endangered species. Gaining a more precise estimate of numbers is difficult due to the inaccessible habitat. With approximately half of all Brush-tailed Rock-wallaby colonies in NSW found on private property, the support of landowners is essential.

For more information:

go to: www3.environment.nsw.gov.au/npws.nsf/content/find_brush-tailed_rock-wallabies

Or contact the Brush-tailed Rock-wallaby Recovery Program
(02) 9995 5592
btrw@environment.nsw.gov.au
Biodiversity Management Unit, PO Box A290, Sydney NSW 1232

© DEC: G Gatenby

Managing with nature at Lana

Tim and Karen Wright talk about how they have been successful in managing their property 'Lana' for production and for biodiversity.

The 'Lana' Wildlife Refuge is one of the earlier Wildlife Refuges, being proclaimed in 1967. We have carried on this tradition which started with Tim's father, Peter. When the Wildlife Refuge was gazetted, one of Peter's aims was to demonstrate that productive farms could also be managed for wildlife.

Sheep at 'Lana' in the height of the 2002 drought.

Over many years we, and previously Tim's father, Peter, sought to find management techniques and tools which suit the property and our management philosophy. In the mid-1960s Peter started to implement pasture improvement on about 20% of the property. This included aerial seeding and application of superphosphate from around the 1960s, and using slow grazing rotation regimes. However this form of management barely broke even over 5 years after 'improving' a paddock. After droughts in 1981 and 1994, we found that the lowest yielding paddocks were the sown paddocks. By 1990, we decided that something had to change.
In the 1990s we undertook the *Grazing for Profit* and *Holistic Management* courses which taught us the importance of the ecosystem, and how better to read the land and recognise healthy water, mineral and energy cycles, and the different pasture and other plant species.

We moved to planned grazing in 1995, based on Holistic Management guidelines. This involves intensive grazing with a high stock density for short periods followed by long rest periods. Using planned grazing means that 95% of the property is in recovery mode at any one time. This change obviously involved a new fencing and stock water plan with some major outlays. We were able to fund this through a reduction in other costs such as fertiliser, and not doing any pasture sowing and renovation.

We developed a 'holistic goal': "We aim to develop and maintain our property as a pleasing, ecologically balanced environment. We also aim for a chemical free product. By doing this we believe our wool and meat production enterprises will be healthier and more cost efficient. In turn, we believe this will lead to healthier profits for the future, as well as improving human health. We endeavour to expand the horizons and opportunities for both ourselves and the community".

The whole property is a wildlife refuge, being basically all natural except for the airstrip. There is diverse and abundant birdlife, and there are also koalas. Other wildlife includes wallabies, echidnas, snakes, bats and frogs. Both the creeks have platypus and there are also water rats in one of the creeks.

We believe in the importance to the business of a healthy natural resource base including the native vegetation across 'Lana'. Managing for biodiversity gives a better balance. "More is good".

Forested hills and dense timber cover more that one third of our property. We find that the trees are important for stock shade and shelter. Benefits include the presence of good winter-active grasses such as Microlaena, and the insect and bird life which affects everything including pest control. The large timber areas are still stocked but there is not much pressure on these areas.

Maintaining and developing corridors across the property is also part of our management. This has been achieved through allowing natural regeneration. We are very pleased that this has occurred as we know that lack of natural regeneration is a problem on many farms.

The regeneration has been achieved with planned grazing, and so avoided costs of planting trees and building fences to protect remnants. By allowing corridors to develop using natural regeneration—as opposed to planting trees—the trees come up where they should be. Otherwise you run the risk of planting the wrong tree in the wrong place.

The use of planned grazing has protected the watercourses and minimal erosion is the result. Allowing 95% of the property to be in recovery at any one time, means that riparian zones do not need to be fenced off, but are rested as part of the normal grazing regime. If any signs of erosion are seen, livestock are removed and the area allowed to fully recover.

We have to grapple with problems such as pest animals and plants. Rabbits are our biggest problem and mistletoe is a concern. Weeds are not such a problem as in the past. The increase in competitive grass and pasture species has helped reduce weed growth, especially thistles.

We hope our experience and success with Holistic Management is a wonderful example of how wool growers can produce quality fine wool and healthy profits while looking after and restoring the natural resource base. This is what we now hear of as being the triple bottom line, as opposed to the bottom line which only deals with economic outcomes.

The Holistic Management and Resource Consulting Services' courses had a huge impact on us.

Holistic Management helped us sort out our decision making and put the jigsaw puzzle together. It's not only about grazing but biodiversity and ecology, as well. Some of the other programs don't go as much into ecology or goal setting. With planned grazing, biodiversity and ecosystem function on our property have improved, along with wool and beef profits. We have found we have more time for social obligations and community service and our family.

Holistic Management is about using a decision making framework which includes development of a clear, focused vision for the future and planning how to get there in the most economically, environmentally and socially sound way. Working within such a framework enables us to manage for the long term.

Trees are important for stock shade and shelter at 'Lana.'

For more information on Holistic Management visit: www.holisticresults.com.au

'Lana' is one of the case studies for the Land, Water and Wool Project on Native Vegetation and Biodiversity. The project they are involved in is 'Profitable, biodiverse wool production systems for the Northern Tablelands (NSW).'

For reports on the project and more detailed descriptions of farm management on these properties, visit www.landwaterwool.gov.au and click on the biodiversity topic. Or order reports and fact sheets from freecall 1800 776 616, or telephone (02) 6295 4444.

The project on the NSW Northern Tablelands is one of several being undertaken across Australia by Land, Water & Wool.

Land, Water & Wool is a joint investment between Australian Wool Innovation Limited, and Land & Water Australia. Recent research has found that 9 out of 10 woolgrowers consider natural resource management to be an important part of their farm business—91% have either adopted practices in the past or are currently doing something about it. This national Land, Water & Wool initiative is connecting woolgrowers and researchers, to ensure viable, practical and beneficial solutions for national resource management (NRM) on farms are developed.

Managing Native Vegetation and Biodiversity is one of the seven sub-programs under Land, Water & Wool. The sub-program recognises that native vegetation is an important part of our natural environment as well as being important for wool production.

Tim and Karen Wright

Neverdie: a spectacular bush landscape rich in cultural heritage

Ken and Sam Kenchington talk about how they came to live on this wild and beautiful piece of land

"It's miles too big and much too expensive"... We were considering an offer to purchase a property of approx. 2000 acres of gorge country 65 kilometres south east of Goulburn on the NSW Southern Tablelands. The lady who owned the property then had the good sense to walk us down to the area we later came to know as the 'Southern Beach'. There we sat on a rock outcrop and looked up and down the magnificent Shoalhaven River Gorge. Opposite from us the rockface soared a hundred feet vertically from a white sand beach. Upstream a waterfall fed the 250 metre pristine swimming hole before us while just downstream a ridge spanning the width of the river formed a double waterfall which we could hear cascading down upon the rocks below.

On our way home to Melbourne we said, "If we don't buy this place we'll be kicking ourselves the rest of our lives". The next day we took the 'career decision' and bought 'Neverdie Wilderness'.

We found later that the original property of 5000 acres had only had two occupants before us since the land was ceded by the Crown. In the 1870s there had been extensive gold mining in the area (the famous Welcome Reef mine was just a few kilometres upstream), and we have evidence of a small settlement at the north of the property called 'Fernbank' which had a school, a butcher's shop, general store and at least one pub.

Having resigned from our city jobs on consecutive days, we took up residence on our new property i.e. in a tent! A caravan followed a couple of months later, but the homestead and machinery shed plus garden, dam and associated infrastructure took another 22 months. All the promised assistance from city 'friends' having mysteriously evaporated.

The Shoalhaven River at Neverdie

Whilst we were toiling away building, we soon came to realise we were living in the midst of a wildlife haven. Each morning a pair of Wedge-tailed Eagles appeared over the home site, and we were delighted by hearing lyrebirds 'in stereo' at close quarters.

As the building progressed we were befriended by a small group of Eastern Grey Kangaroos and one very inquisitive Red-necked Wallaby, whose name turned out to be 'Willoughby'.

Once the building was finished we found more time to explore the place, finding interesting relics around several old gold mines as well as a magnificent stand of Yellow Box trees in a gully not far from the house. 12 kilometres of Shoalhaven River frontage forms a major part of the property boundary, and provides a first class white-water rafting venue as well as revealing some spectacular examples of uplifted strata to astonish our geologically minded friends.

During the last 18 years we have had the privilege of living with kangaroos, wallabies, wombats, echidnas, lace monitors, birds and the entire range of native species. Each year a 'crop' of Eastern Grey joeys has been raised, literally on the front verandah, to the amazement of our visitors both local and from overseas.

This year we have finally been able to establish a voluntary Conservation Agreement over 460 hectares comprising the entire northern half of Neverdie, which makes it the fifth largest in NSW currently. Appropriately this very area forms the entrance to the Bungonia Gorge which, at a vertical depth of 300 metres (1000ft), is the deepest limestone gorge in the southern hemisphere. We would like to give a vote of thanks to Louise and Sally and all the troops at NPWS for bringing the whole project to fruition.

Discovering the past: how one property can reflect a region's cultural and geological heritage. A report by DEC

The gold sluicing works

Aboriginal heritage

In general, Aboriginal sites tend to occur adjacent to creeks and rivers on low flat areas, elevated saddle areas, ridges and spurlines. Ridges and spurs provide easy access from one area to another. River corridors not only provided pathways for movement between areas but are also rich resource zones.

It is therefore likely there was moderate to intensive occupation in the Shoalhaven River corridor area in the past. Sites are most likely to occur on flat level ground along the river, especially at the confluence with other rivers and in flowing creeks. There is also potential for sites along ridges and in the flatter sections along the elevated saddle areas where travel through forested land is easier. However the local archaeological record may have been disturbed by historic and existing land use activities, such as early mining, agricultural activities, and road construction.

Two stone artefact scatters were recorded on 'Neverdie' during a survey in 2003. The landform features and the number of sites in the surrounding area indicate a reasonable likelihood of more unrecorded Aboriginal sites. There have been a small number of archaeological surveys and incidental site recordings in the surrounding region. Most of the sites found were stone artefact scatters, but modified or scarred trees have been recorded in vegetated forest areas.

Rock wall at the gold sluicing works

Although little is known of the traditional significance of this area to Aboriginal people, sites of spiritual significance and locations of traditional ceremonies are often noteworthy features in the landscape. Rocky outcrops and views of the surrounding landscape may have potential for natural significance to the local Aboriginal community.

Many of the valleys and ridgelines were routes used by Aboriginal people travelling through the hinterland and between the highlands and the coast. After European settlement many of these routes would have become an important part of the early bridle trail network used for movement of stock.

Relics of agriculture and mining

The surrounding tableland country would have been extensively grazed with livestock since the 19th century. Much of the upper Shoalhaven River catchment is under grazing leases, although the land is considerably more marginal for supporting cattle or sheep than on the tablelands.

Alluvial gold mining commenced on the Shoalhaven River as early as the 1850s with works in the Bungonia and Nerriga areas suggesting that mining sites are located in almost every major gully or at the least every second gully feeding into the Shoalhaven River (McGowan

1996). As such, the exact number of mining sites in the area is difficult to ascertain because of the scattered nature of the workings. The remains of mining sites have the potential to contribute to a wider understanding of the history of European occupation of the area. Any mining sites located on the property would be an extension of the extensive mining activities that occurred to the north at Timberlight, north west at Nadgigomar Dam and south west at Welcome Reef and Oallen.

One historic mining site was found, consisting of shallow alluvial workings with mounded tailings and possibly associated with pan and cradle workings and common sluicing activities, and there is potential for more sites of this type. Although the site is not significant in terms of potential for further research or demonstrating any distinctive aspects, it does provide supporting evidence of the extensive nature of mining activities in the Shoalhaven River area.

Geological Values

The gorge country of the Shoalhaven River and its tributaries dramatically dissects the tightly folded Upper Ordovician shales, slates, phyllites and quartzites of the Lachlan Fold Belt. The present day landscape is moderately to heavily dissected with deeply entrenched streams, some cliff like features and scree slopes. Some Tertiary undifferentiated sediments of gravel, sand, clay, quartzite, sandstone and conglomerate exist in the middle portion of the property, running from the west and petering out towards an easterly direction before reaching the Shoalhaven River.

Overall, the property is characterised by yellow earths and yellow podzolic soils which are infertile, stony and highly erodable. The rocky plateaus and steep slopes have especially shallow soils and are therefore easily eroded. The general landscape of the area consists of plateaus dissected by deep gorges featuring cliffs, crevices, waterfalls and rocky river beds.

References and further reading

Flood, J. (1980) *The Moth Hunters.* Australian Institute of Aboriginal Studies, Canberra.

McGowan, B. (1996) *Bungonia to Braidwood: An archaeological account of the Shoalhaven and Mongarlowe goldfields*. Canberra Times Fine Print, Canberra.

Adapted from an unpublished report by Jackie Taylor, NPWS Archeaologist

New books Aboriginal Scarred Trees in NSW: A Field Manual

A gap in the literature about our *cultural and natural* heritage has just been filled by this attractive and informative book. Stylishly produced and generously illustrated with photographs and historic artwork, it brings together knowledge from written sources and experts and makes it accessible for all.

The book focuses on identifying Aboriginal scarred trees. The biggest trap is differentiating them from scars produced naturally, (eg from lightning strike, insect damage or fire) or by other human factors (ring barking, motor vehicle impacts). We can't always be certain - even with this manual in hand, but it will now be much easier for landholders, agency staff and other interested people to understand what they are looking at.

The author reminds us that "Australia is one of the few developed agricultural regions where signs of pre-modern indigenous activities are preserved in the fabric of living plants. There were numerous reasons Aboriginal people took bark from trees … including the construction of shelters, watercraft and containers." Sometimes trees were deliberately carved or toe holes were cut to aid climbing.

"There is an enormous amount of information that can be gathered from scarred trees, although so far this potential has not been widely explored."

Unfortunately, these priceless artefacts are very vulnerable to land clearing, firewood collection, stock damage, vandalism, bushfires, rotting or collapse.

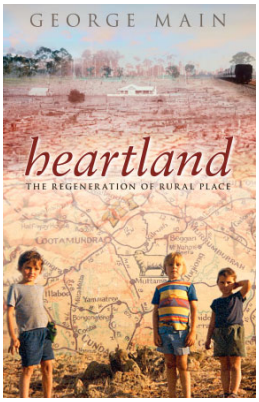
This book should encourage people to look more closely at damaged trees, with the result that more of our archaeological treasures are recorded, protected and studied. Everyone with an interest in our landscape and cultural heritage needs a copy.

Author: Andrew Long. Published by NSW Department of Environment and Conservation 1995. 80 pages.

How to get one:

Download in PDF format from www.nationalparks.nsw.gov.au. Purchase from NSW Government Bookshop for $10.95

Heartland: Regeneration of a Rural Place



In *Heartland* George Main takes us on a personal journey through the southwest slopes of New South Wales, a rich and productive agricultural region where he grew up. He explores the region's culture and history to help us understand why and how changes in landscape and landuse have occurred. He suggests that once we understand this, we might develop alternative ways of imagining and engaging with rural places, enabling ecological and social regeneration of our agricultural heartlands.

The ecological changes since European settlement are vast. Main describes the complex interactions underpinning these changes, including the beliefs and values underlying British colonisation, industrial agriculture and the interaction of urban and rural domains. Intertwined with these themes are the stories of the Wiradjuri clans and their use of these highly productive ecosystems prior to the dramatic changes resulting from European farming systems. The word pictures painted are evocative descriptions of a former landscape.

Whilst Main talks with landholders and the community about their past, he also looks forward, discussing possibilities for future landholders to care for these farmlands. For those who are interested in the story of changing landuse in Australia and the influences behind it, the book is well worth reading. For people who know the country around Cootamundra, the descriptions of former landscapes will capture the imagination.

How to get one:

- www.unswpress.com
- UNSW Bookshop 02 9385 6689
- your local bookshop

Price & Postage $9.90

Heartland: published by UNSW Press in August 2005. 304 pages

Managing Grassy Ecosystems

Grassland, east of Adaminaby and Lobe-seed Daisy at Bibbenluke cemetery

Treeless grasslands and grassy woodlands once covered vast areas of south-eastern Australia. They probably developed as a result of drying and cooling of the Australian climate, and may have been influenced by lightning strikes or burning by Aboriginal people.

Since early European settlement, these areas have been recognised as prime sites for agricultural production, due to the flat or gently rolling terrain, water-holding capabilities and generally deeper, more fertile soils. In addition they required little or no tree clearance. Many grassy ecosystems have been destroyed for urban development and the associated network of roads and railways. The remaining grasslands and grassy woodlands in Australia have been changed as a result of different fire regimes, mowing, grazing, cultivation and pasture improvement.

The most intact sites have a diversity of wildflowers and a range of small animals, including birds, reptiles, mammals and many invertebrates. Although very few grassy remnants were deliberately conserved, some have survived, fortuitously, as a by-product of other land uses.

If grassy ecosystems are to be conserved or managed for the future, it is important that government and community work in partnership.

A new resource is available for landholders with areas of grassland or grassy woodlands...

Grassy Ecosystems Management Kit: a Guide to Developing Conservation Management Plans

This kit is designed to help people to understand and manage grassy ecosystems on their land. It has a set of steps to follow to develop a conservation management plan.

Because landholders already have experience in managing their land, and insights into its unique features, the processes outlined in the Management Kit can be modified to suit the site and its individual needs.

The kit includes a copy of the booklet *Managing Native Grassland* by David Eddy.

Authors: Sarah Sharp, Josh Dorrough, Rainer Rehwinkel, David Eddy and Anne Breckwoldt. Illustrated by Michael Bedingfield.

Publisher: Environment ACT, Canberra 2005

How to get one:

please contact Sarah Sharp: sarah.sharp@act.gov.au

Environment ACT PO Box 144 Lyneham ACT 2602.

$30.00 + $10.00 postage.

Please make cheques payable to 'Receiver of Public Monies'

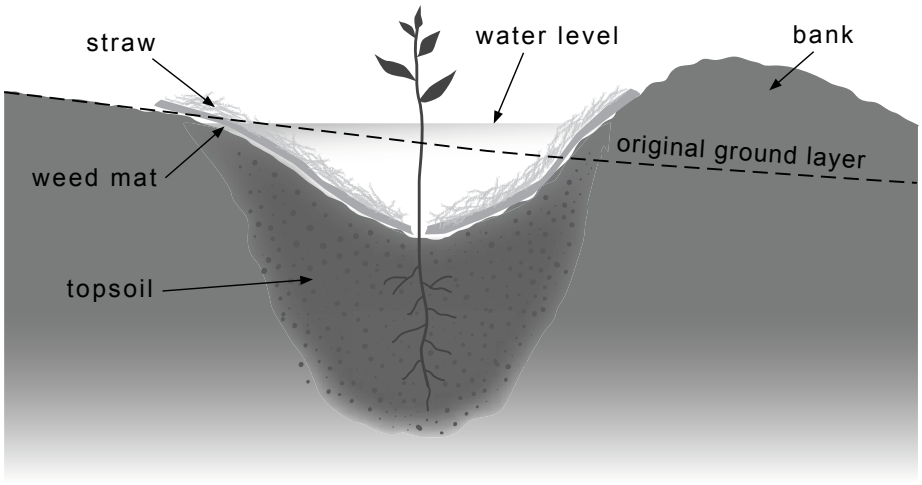
Ventures in rural revegetation

Garth Dixon, whose Southern Highlands property is a Wildlife Refuge and has a VCA, shares ideas gained from 10 years of planting. His first tip is "plant only into damp soil".

Most of us have witnessed, or experienced first hand, the disappointment that follows the failure of large-scale planting in rural areas—its all too common —leading to disillusionment or even giving up the fight.

Here are alternative 'techniques' or methods I have found successful in several areas of the Southern Highlands. By success I mean a 90% survival rate. This is achieved without any further watering after initial planting even during drought periods such as we have suffered over the last ten years. Even the failures can usually be attributed to causes other than lack of water, e.g. poor tubestock, careless planting and physical damage. The surviving trees grow strongly and quickly. Acacias respond particularly well.

The results may be seen on my property 'Warriwillah'.



Graphics: Virginia Bear, from drafts by Garth Dixon

1 Backhoe method

A backhoe operator can dig a hole quickly, efficiently and cheaply. Especially if holes are close together or trees are to be planted in clumps rather than lines.

Digging the holes

Holes are dug by backhoe (rather than ripping or shovel) to a depth of at least 60–70 cm, 30–40 cm wide. (The bigger and deeper the better.)

Holes should be dug about 3 months before planting to allow for 'settling' i.e. the exclusion of air bubbles (by rain or contraction).

Holes are backfilled by the operator, with subsoil first and topsoil on top.

It is laborious to fill holes by hand, so ensure it is done by the operator. The hoe also breaks up the clods and makes the soil more workable.

Building the "dam"

As soon as possible after the digging, the 'dam' into which the tree is planted should be formed. Clods should break up easily.

It is critical that this 'dam' (section illustrated above) should hold AT LEAST two full buckets (plastic) of water—preferably more— to be applied at time of planting.

This quantity of water is necessary to completely fill the hole - expelling any air bubbles which would hasten the drying out process. But more importantly it provides a reservoir of damp soil which persists, especially if there is underlying clay. (In some circumstances there is a danger of waterlogging but we haven't had any sign of that for ten years or more.)

Note that the bottom is usually only about 10 cms below the level of the surrounding ground. This is because the depth of the dam is made up mainly of the dam wall being formed on the downside at a height well above the ground level.

Planting

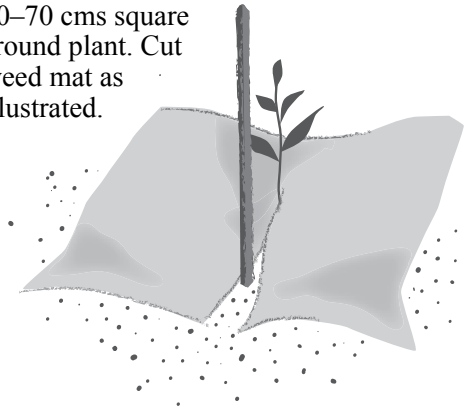
Ideally tubestock should not be too small, i.e. Less than 15 cms, or too 'leggy', i.e. More than 35–40 cm.

Plant tube in the bottom of the 'dam'.

Press soil firmly around the bottom roots of the plant. Cover stem to original level in tube.

Mulching and protecting

Place weed mat no smaller than 60–70 cms square around plant. Cut weed mat as illustrated.



Knock in stake (if required).

Place straw (clean) around plant and over the weed mat. The straw provides insulation from heat and cold and also inhibits weeds.

Fix wire netting guard over stake, straw, and plant. If guard is not required the straw should be protected from wind with stones, sticks, or logs —but not clods as they will induce weed growth on top of weed mat.

Watering

Gently apply two full buckets (plastic), filling dam to capacity, but not overflowing.

No further watering will be needed, except perhaps in very exceptional circumstances.

In weedy areas, spray with Roundup around the edges of the weed mat if

weeds look like becoming a problem.

Should watering ever be required, i.e. if 'climate change' has really set in, remember two full buckets of water are best. Lesser amounts evaporate rapidly and will encourage a surface and therefore fragile root system.

Further experience is needed to fully assess the virtues or otherwise of 'backhoe planting'.

2 Contour bank method

This method combines soil conservation with revegetation. Provided a dozer is readily available, it is a cheap, easy and quick way of planting hundreds of trees and shrubs, especially bird-attracting grevillea, hakea, leptospermum, and nitrogen-giving acacias and casuarinas—it lends itself to decorative plantings.

Planting into contour banks can produce quick and spectacular results, because the banks are composed mainly of well-worked topsoil.

Preparation

Contour banks are formed by a dozer in soil conservation style. Width, depth length and direction of contours may be varied.

Planting

Wait for 3 months or so before planting —plant only when soil is damp.

Plant into the loose, deep topsoil of a bank. Dig holes (with shovel) while soil is still loose and friable. Dams should be formed, as outlined earlier, to take at least two buckets of water or for other plantings.

Mulching and protecting

Weed mat and straw are used in the same way as in the 'backhoe method.'

As this method is better suited to larger areas and more intensive plantings it is wiser to fence the whole area after the bulldozing is done, rather than use guards.

The swales collect all rain that falls on the area. Therefore there is no run-off and with each heavy rain the trees are well watered.

Weed control is relatively easy if the banks are sprayed with Roundup before planting.

3 Direct seeding—planting by hand

This method seems best suited to restoring understorey in remnant eucalypt areas. Sites need to be chosen carefully. It is especially effective with acacias. Seedlings often grow as well as tubestock—given the right conditions. It requires minimal effort, therefore more plants can be planted.

The degree of success will depend largely on the sites chosen, the care taken in planting and eventually rainfall. We've had seed germinate and survive 6 weeks after planting without rain. This is a quick, cheap and easy way to tackle broadacre revegetation, even if netting guards are necessary. Seedlings are probably more drought-resistant than tubestock.

If you are lucky you will have the problem of thinning out the unwanted seedlings.

Provision should be made for the protection of young seedlings from rabbits, wallabies, and physical damage. Protection can sometimes be provided by placing bushes, brambles, logs etc. over the emerging seedlings. Use wire netting laid over the top or a netting guard if necessary.

Plant immediately after rain if possible, otherwise when soil is damp.

- If necessary clear selected sites of grass or weeds by spraying with Roundup.
- Prepare acacia (or other suitable seed) by pouring boiling water on seed and leave submerged for 8–10 hours. Strain.
- Dig hole as deep as practical. *20 cm is desirable, but not essential. Hole should form a mini-dam, enough to hold perhaps a litre of water. But seed need not be watered at planting.*

Each dam and hole should be about 30 cm long to allow spacing between the 8 to 12 seeds to be planted.

- Make furrow with forefinger about 4–5 cms deep and as long as the hole will reasonably allow.
- Plant 8–12 seeds in furrow.
- Cover furrow with knuckles and press down, not too firmly.
- Leave seeded area rough and ready. *Smooth and patted-down seed tends to form a hard crust and dry out more rapidly.*
- Cover lightly with mulch of some kind. Ensure that it won't blow away and is not too dense.

4 Direct seeding —broadcasting by hand

If you like a gamble and have plenty of seed you should try this technique with acacias.

Treat seed with boiling water for 20–30 minutes. This shortened time ensures that some of the seeds remain viable for several seasons.

Ideally the seed should have soil cover and moisture as soon as possible after broadcasting. The ideal time to broadcast is when substantial rain is forecast. Some of the seeds are usually washed into suitable sites and covered with soil by the rain.

We broadcast into the ashes of our recently fire-damaged landscape with remarkable results. The fire had prepared the ideal seedbed.

Direct seeding mechanically

Garth suggests this would be the cheapest and most efficient way of revegetating a landscape for larger projects in more open areas. Citing the spectacular results achieved under the guidance of Brian Cumberland of Greening Australia, where "strips or belts of mixed varieties of trees and shrubs commonly grow to heights of more than three metres after four years —this has been achieved during the recent drought years".

Don’t forget the bacteria

New research is shedding light on the role of nitrogen fixing soil bacteria in native ecosystems and their vulnerability to disturbance. Can these specialised bacteria provide the key to cost effective large scale revegetation ?

Many Australian wattles, peas and cassias rely on rhizobia (nitrogen-fixing bacteria living in nodules in their roots), to grow effectively. The rhizobia take nitrogen from the atmosphere and convert it to a form that is available to the plant.

The low nutrient levels of most Australian soils mean that nitrogan fixing partnerships between plants and soil organisms, such as rhizobia, (as well as mycorrhizal fungi and actinomycetes such as *Frankia*), have particular significance for conservation management, water quality, and sustainable agriculture.

Rhizobia are present in bushland soils, and newly germinated plants apparently have no trouble hooking up with the right bacteria—but what happens when the landscape has become degraded?

Research is now showing how, in temperate Australia, the diversity and abundance of soil organisms such as rhizobia has declined dramatically. This may be why planted peas and wattles sometimes die or fail to thrive.

Extensive soil sampling in a range of disturbed environments (grazed, cleared, pine plantations) has shown very large differences in rhizobial density compared with adjacent undisturbed areas where native vegetation still exists. In some cases, where native shrubs have been cleared or long-term grazing has occurred, native rhizobia are completely absent. These differences can occur over very short distances.

Because survival of rhizobia in soil is usually dependent on the presence of their hosts (otherwise disappearance can occur within 2–3 years, especially in more acidic soils), appropriate rhizobia may generally be lacking in those areas where revegetation is most crucial.

What causes loss of soil bacteria?

- removal of native vegetation
- physical disturbance to soil such as from mining, or cultivation
- chemical change e.g. from salt, heavy metals, acid, and fertilisers.

Native legumes nodulate almost exclusively with the rhizobium *Bradyrhizobium spp.* and only rarely with *Rhizobium spp*. (which are the common rhizobia used with many agricultural crops).

There are many different strains of *Bradyrhizobium* across eastern Australia. They vary in their ability to form associations with plants, supply nitrogen, and tolerate different environments.

Acacia dealbata seedlings 12 weeks after inoculation. The plant on the left had a rhizobial strain shown to be very poor at promoting host growth, while the plant on the right had a strain characterised as ‘elite’ (i.e. very effective in nitrogen fixation and promoting plant growth).

Rhyzobiom research roject

The CSIRO Centre for Plant Biodiversity Research is undertaking a project called “Native Legumes for Revegetation and Rehabilitation of Degraded Landscapes in Australia”.

The project aims to develop methods for revegetating degraded areas using *Acacia* species and associated nitrogen fixing bacteria.

Other aspects of the research are:

- developing strains of bacteria that are tolerant of salt, acid and heavy metal affected soil, and can assist plants to grow in these conditions
- exploring the use of other ecologically important symbiotic relationships (e.g. *Allocasuarina* and *Frankia*)
- evaluating the benefits of re-establishing plant-soil symbioses for the growth and survival of companion plants (e.g. eucalypts) when planted in association with native legumes
- assessing whether the use of appropriate rhizobia allows increased competitive ability against weeds.

The work is expected to provide:

- significant increases in establishment, growth and survival rates for host and non-host species, meaning lower seed quantity requirements (a major issue given the expense and difficulty of collecting sufficient native seed to revegetate at catchment and larger scales)
- longer-term benefits for other organisms through reestablishment of plant-symbiont relationships, leading to positive feed-backs in the restoration process

- increased participation in revegetation programs as a result of demonstrating that large-scale, low-cost approaches can work effectively.

The emphasis is on large scale revegetation—hundreds of hectares or more—and low-cost practical approaches that require little maintenance, yet can substantially enhance reliable establishment and growth of native trees and shrubs.

According to CSIRO, developing such techniques is essential if we are to cope effectively with the ongoing replanting effort that will be needed well into the future to counter and reverse the increasing salinisation and acidification of productive rural areas, and to revegetate mine sites.

Although the importance of rhizobial interactions is very well recognised in conventional agriculture, they have been grossly under-utilised in developing better approaches to the rehabilitation and restoration of natural systems.

The reliable source of nitrogen provided by rhizobia promotes rapid early seedling growth. So it is particularly important where the plant has to contend with drought or competition from weeds.

The project has provided some insight about species abundance. In some cases at least, rare *Acacia* species are less likely than common species to associate with a broad range of rhyzobia strains.

The endangered wattle, Acacia bynoeana.

Measuring Wattles

Field trials

Field trials have recently been established at degraded sites around Bendigo in north-central Victoria.

In August 2002, direct-seeded trials were established on eight properties. At each location, a range of locally native *Acacia* species (together with an assortment of non-legume natives) was sown in two treatments. In the first treatment, acacias were coated (pelleted) prior to sowing (as is done for many agricultural legumes) with an inoculant mixture of rhizobial strains known to be effective for those species. In the second treatment, the acacias were not inoculated.

Initial assessments were made in mid 2003 and the results were very encouraging. At several properties, there were considerable differences in the establishment of acacias, with the inoculated rows having from 2 to 5 times as many seedlings as rows sown with uninoculated seed. Not only were there differences in seedling numbers (particularly at the more degraded sites), but growth differences are starting to emerge as well. The trials are ongoing and monitoring will continue.

Commercial product already available

Wattle Grow™ Granular Inoculant, a granular seed inoculant using CPBR's research into *Bradyrhizobium*, has been commercialised through CSIRO Plant Industry by Bio-Care Technology Pty Ltd.

Wattle Grow™ can be applied with wattle seed prior to planting, either with seed that will be used in nurseries to establish seedlings, or with seed that will be used for direct seeding.

Wattle Grow™ is suitable for a range of south-eastern Australian wattle species including some salt tolerant ones and is available through rural suppliers and via Bio-Care Technology Pty Ltd on 02 4340 2246 or info@bio-care.com.au.

Dr Peter Thrall with Wattle Grow™.

For more information please contact: Dr. Peter H. Thrall. Centre for Plant Biodiversity Research, CSIRO Plant Industry GPO Box 1600 Canberra 2601

(02) 6246 5126
Peter.Thrall@csiro.au

Article adapted from CSIRO fact sheet "Native Legumes for Revegetation and Rehabilitation of Degraded Landscapes in Australia" and CPBR website.

What's on

Landholder gatherings for the South Coast and Southern Highlands

From time to time the Conservation Partners Program has held landholder gatherings. We have two more planned for this year, the first to be held in May, for landholders with Conservation Agreements and Wildlife Refuges.

The aim of the gatherings is to give landholders the opportunity to meet fellow conservation partners, and to meet DEC and NPWS staff from your local area. The gatherings are generally held on a property or a national park where management issues can be discussed and solutions demonstrated. Topics can include fire, pest and weed management and there is the opportunity for landholders to talk about their experiences and approaches to managing biodiversity on their properties.

Details of the gatherings will be sent to landholders whose properties are located approximately two hours drive from the venue. The gathering in May will be held on a Wildlife Refuge in the Kangaroo Valley, whilst the other (date to be confirmed) will be held in the south–west slopes.

If you have some ideas about what should be covered that will assist you in managing your property, please contact either Louise Brodie or Sally Ash.

louise.brodie@environment.nsw.gov.au 9585 6671

sally.ash@environment.nsw.gov.au 9585 6040

Seminar: The interaction of weeds and animals

March 9 9:00

At DPI/DSE Knoxfield Centre, Burwood Highway, Knoxfield.

Organised by The Weed Society of Victoria. Contact secretary on 03 9576 2949 or secwssv@surf.net.au.

Weeds can be spread by animals, especially by birds such as cockatoos and ravens which have been recorded as spreading pine nuts and prairie ground cherry. Foxes are known to feed on blackberries and other soft fruits and later spread their seed.

Other animals encourage the spread of weeds. Rabbits' behaviour encourages the spread of stemless thistles and serrated tussock because they eat everything but these weeds; while horses cause problems because they eat everything but the blackberry. Horses cause the spread of Patterson's curse as hay, containing Patterson's curse seed, is distributed far and wide during drought periods as fodder.

Weeds always grow near the sharp bends in roads along which domestic stock are transported; domestic stock also encourage shrub growth in grazing systems as they eat everything but the shrubs; cattle and horses create shrubland through a preference for grasses; goats create grassland by a preference for woody material.

Biological control of weeds is well known and has been used in Australia and overseas for some decades. This is a safe use of insects in an attempt to control introduced plants. But what impact will the introduction of a 'non-biological' control insect have on our weed systems? What does the introduction of the large earth bumble bee have on sleeper weeds?

Cost:- Students $65.00; WSV members $85.00; non-WSV members $105.00. Please note—late fees apply after 31 January 2006.

The 40th AGM will be held after the seminar. All welcome.

Veg Futures 2006: The Conference in the Field

Managing native vegetation in productive landscapes.

March 19-23

At Albury-Wodonga

Keynote speakers include Professor David Lindenmayer from the ANU's Centre for Resource and Environmental Studies and Leanne Liddle from South Australia's Department for Environment and Heritage.

Paddock sessions will use the landscapes and land uses around Albury-Wodonga to draw out vegetation management principles that are applicable to all Australian landscapes. And you will hear from a diverse range of presenters during technical workshops and symposia, and have plenty of opportunities to discuss, debate and ask questions.

A particular highlight will be Professor Ian Lowe AO, President of the Australian Conservation Foundation, speaking at the conference dinner.

Organised by Greening Australia and Land & Water Australia

www.greeningaustralia.org.au (click on the Veg Futures icon)

Bush Matters is the newsletter of the Conservation Partners Program of the NSW National Parks & Wildlife Service, and is produced twice yearly.
NPWS is part of the Department of Environment and Conservation (NSW) - DEC.
Editor/Layout: DEC (Louise Brodie) and Little Gecko Bushland Interpretation (Virginia Bear).

Department of Environment and Conservation (NSW),
PO Box 1967 Hurstville 1481 Phone 9995 5000
conservation.partners@environment.nsw.gov.au www.environment.nsw.gov.au