Bush Matters

Newsletter of the Conservation Partners Program of the Department of Environment and Climate Change NSW

No. 9

Conservation PARTNERS PROGRAM

Photo: Renee Shepherd.

The striking colours of Western New South Wales can be seen in this photograph of Churinga Wildlife Refuge, west of Wilcannia. Churinga Station is one of the properties in The Enterprise Based Conservation (EBC) Program, initiated through West 2000 Plus. This part of Churinga is a conservation area where reduced grazing pressure has allowed bluebush to regenerate.

Seven properties involved in this program were gazetted as Wildlife Refuges in 2006 as part of the ongoing support for landholders in the program. Read about the program on pages 4 and 5.

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Department of Environment & Climate Change NSW

NATIONAL PARKS & WILDLIFE SERVICE NSW

Winter 2007

From the Director General

The Department of Environment and Climate Change (DECC) is our new and expanded Department. Our new Ministers are Phil Koperberg, who is the Minister for Climate Change, Environment and Water and Verity Firth, the Minister assisting the Minister for Environment.

DECC has been created to enable us to progress reforms in and improve the sustainable management of our land, water and energy resources and protect our environment and natural and cultural heritage. This expanded role will enable us to better work with industry, business, the rural sector, environment groups, Aboriginal communities, other key stakeholders and the broader community to respond to environmental challenges, including the potential implications of climate change.

Developing partnerships and networks is an important part of sharing responsibility for protecting and managing our environment, our natural heritage and our cultural heritage. Everyone working together means we can better manage land across New South Wales. With approximately 8% of the land area of the state protected and managed in national parks and reserves, the complementary role of private and other public lands is important in protecting and conserving a range of significant natural and cultural heritage values. There are currently over 1000 conservation partners across the state managing over 1.95 million hectares of land under statutory Wildlife Refuges and Conservation Agreements, as well as many landholders with property registrations for wildlife conservation on their properties.

Partnerships and networks allow the sharing of experience, knowledge and resources for conservation of our natural and cultural heritage. This edition of Bush Matters contains stories showing different aspects of land management by individual landowners and by non-government organisations who are part of the DECC Conservation Partners Program.

LISA CORBYN
Director General
Department of Environment and Climate Change NSW

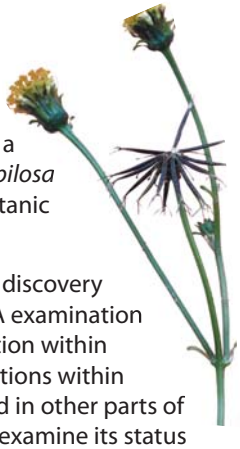
When is a weed a weed?

Most of us are familiar with the plant *Bidens pilosa,* which has a variety of common names, including farmer's friend, cobbler's peg or pitch-forks—names which recognise the appearance of its seeds and their ability to stick to clothes. It is widespread in eastern Australia, especially in disturbed bushland and has long been regarded as an introduced weed species from South America.

Recent research from the Royal Botanic Gardens in Sydney may change that perception.

Plant ecologist Doug Benson compiled a list of the plant species collected at Botany Bay in 1770 by Joseph Banks and Daniel Solander, the naturalists who accompanied James Cook on the *Endeavour.* Using an unpublished list of specimen material held at the British Museum together with previously unavailable specimens from the National Herbarium of NSW, there is now a list of 132 plant species collected at Botany Bay in 1770.

Among the specimens are many species which still occur in remnant vegetation around Botany Bay. A particularly interesting record is a specimen of *Bidens pilosa* held at the Royal Botanic Gardens, Sydney.



The next step in the discovery process may be DNA examination to identify the variation within *Bidens pilosa* populations within eastern Australia and in other parts of the world and to re-examine its status as a native or exotic species.

Conservation Partners Program

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Would you like to hear about upcoming events?
Go to the Conservation Partners website, or send us your email address

Bush Matters is mailed to landholders with Conservation Agreements, Wildlife Refuges and those in Land for Wildlife or Property Registration Programs. It can be seen in full colour on the Conservation Partners website.

Could your property feature on the cover of *Bush Matters*? Do you have some wonderful photographs? Contact us at the Conservation Partners Program and you may star in an upcoming edition.

Southern NSW Biodiversity Inventory

Maya Beretta, DECC Project Officer, writes about visiting Wildlife Refuges in the south west slopes and south eastern highlands.

What a year! During the spring and summer of 2006-07, I visited Wildlife Refuges to meet the owners and managers of those areas and determine the conservation value of the Wildlife Refuge network. It was fantastic—so let me tell you a little about it.

These visits are part of the Biodiversity Inventory Project, funded by the NSW Environmental Trust. The project involves visiting Wildlife Refuge properties in the South West Slopes and the South Eastern Highlands Regions from spring 2006 through to spring 2008. The aim of the project is to meet the landholders, look at the conservation values on the property and find out how these properties and their management contributes to wildlife habitat in the region.

In the South West Slopes Region there are nearly 65,000 hectares proclaimed as Wildlife Refuges, while in the South East Highlands, Wildlife Refuges cover nearly 85,000 hectares. These properties have a range of land uses including high conservation value bushland, farm dams and natural wetlands, grazing, agriculture and mining.

Habitat tree, Kalimna Park. Photo: © DECC D Reynders.

Last spring we contacted many of the landowners in these areas, and were able to arrange visits to around 50 Wildlife Refuges. Much of the time I was accompanied by Dieuwer Reynders, who also worked on the project for several months, by other staff from DECC and sometimes staff from the local catchment management authority.

We looked at the areas of native vegetation on the property and the quality of the habitat. We noted the presence of wildlife over the entire property, as often valuable habitat can be found in modified areas where there is little native vegetation.

It was great to meet so many landholders, who were a great source of information about the animals and plants on their property. In turn we were able to answer many landholder queries, and gave landholders a copy of the book *Wildlife on Farms* which provides a lot of background information on how to improve wildlife habitat on your property.

We looked for essential habitat features such as tree hollows—large and small—as these are used by birds, bats and lizards. Scattered fallen timber is also really important as shelter for ground-dwelling fauna and foraging habitat for birds like the threatened grey-crowned babbler. Wetlands and farm dams can also contribute to habitat. Most areas surveyed possessed a range of such features helping to protect our native flora and fauna and often provided habitat for threatened species.

We also saw some wonderful native vegetation and those of you who have met me know how excited I get about plants. Even though the surveys were carried out in drought conditions, I still saw some amazing flora like the donkey orchid pictured here. I amazed some landholders with my cries of excitement when I saw orchids or other beautiful plants in flower! I hope the landowners found it equally exciting!

You could be next! If you are a Wildlife Refuge owner in the South West Slopes or the South Eastern Highlands that I have not yet met, I may be contacting you this spring and summer to request a meeting. I have no doubt that in the next year I will have just as much fun meeting amazing people and seeing amazing places and I sincerely hope I can give our wonderful landholders some support and encouragement in the process.

Goanna, Sandy Falls. Photo: © DECC D Reynders.

Donkey Orchid Diuris *sp.. Photo: © DECC D Reynders.*

Managing high quality bushland in western NSW—The Enterprise Based Conservation Program

By Renee Shepherd, Project Manager

Enterprise Based Conservation Program overview

The Enterprise Based Conservation Program (EBC Program) is an innovative program being implemented in the Western Division of NSW, initiated through West 2000 Plus. West 2000 Plus was a program funded by the NSW and Commonwealth Governments from 2001-2005, to work with primary producers in the Western Division to improve the economic viability of the area. The EBC Program is encouraging landholders to balance production and conservation values in semi-arid landscapes whilst remaining economically viable.

Whilst other programs throughout Australia have focused on fragmented landscapes where funding has been channelled into rehabilitating highly degraded natural resources, the EBC Program focuses specifically on intact landscapes.

The conservation of landscapes in their present, unmodified state promotes a concept of 'prevention is better than a cure'.

Ten landholders are participating in the program, with 70,000 hectares being managed for conservation for a five-year period across a variety of landscapes. The average cost of the program including on-ground works and annual conservation payments totals approximately $2 per hectare per year— much less than similar programs. The proclamation of the areas as Wildlife Refuges was also identified as a desirable outcome, to enable the formal recognition of the landowners' contributions to biodiversity conservation for the long-term. Most landholders pursued this option.

The major management issues that are being addressed in the program include the conservation of Aboriginal and European cultural heritage sites, conservation of threatened species and their habitats, improved river-bank stability through the management of stock along riverine corridors, and large-scale management of total grazing pressure.

Environmental monitoring

As grazing pressure creates one of the greatest impacts on natural resource condition in western NSW, its management is one of the key requirements that landholders must undertake within the EBC Program.

Participating landholders have elected to either completely remove domestic stock for the five-year period, or alternatively manage stocking rates to achieve a minimum groundcover level.

In addition, landholders must manage grazing pressure from feral animals such as feral goats.

It was recognised during the development of the program that given the nature of the rangelands, where prolonged dry periods with little vegetation growth are common, it may be difficult to notice a change in the conservation areas within five years. In addition, if changes were observed, how could landowners tell if they were caused by management practices, or just seasonal conditions?

In order to record environmental changes, two monitoring programs are currently underway. For those landholders involved in the groundcover-based model, an annual monitoring program is undertaken by the Department of Primary Industries. For the landholders that have removed domestic stock, monitoring is being undertaken by the University of New England.

The value of networks

Whilst one of the key elements of the program is to attempt to record the environmental changes, another key element is the interaction between the participating landholders, the relevant agency and community organisations.

Given that the project sites are located throughout the Western Division, it was important to ensure that each landholder was made to feel part of a small but very important network of people undertaking innovative management practices on their properties in this region. The activities that these landholders are undertaking are commonplace to other conservation-minded people. However, a supportive network means landowners who may be conservation pioneers in a traditional production-focused landscape do not become isolated in their new pursuit.

An important component of the EBC Program therefore is the establishment of annual landholder gatherings. The inaugural gathering at Lightning Ridge in 2004 allowed the landholders to meet one

Sand Monitor at Churinga. Photo: Renee Shepherd.

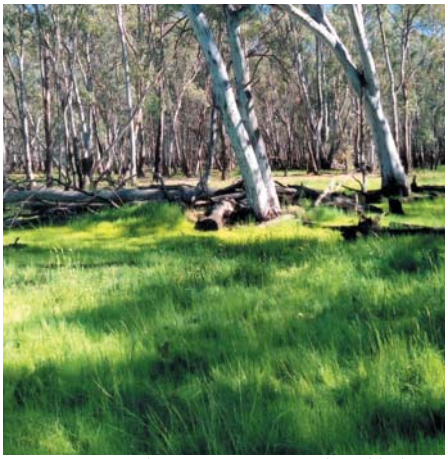
another and establish an identity for the program.

Subsequent gatherings have focused on providing landholders with access to information and experts in the conservation and rangeland management fields, and focusing on the future direction of the program.

In addition, the landholders who have proclaimed their land as Wildlife Refuges are now part of a network through the Conservation Partners Program of the NSW Department of Environment and Climate Change.

Despite their geographical isolation from one another, the unique landscapes they manage, their different production systems, and their differing knowledge of conservation, the landholders share common attributes such as openness to new ideas and a commitment to forging a sustainable yet profitable path in the Western Division.

It is this combination of active management of the conservation areas and the strong network of innovative people involved that has been the major contributor to the program's success.



A property in the EBC Program at Balranald. Photo: Renee Shepherd.

Case study–Garry Hannigan and Churinga Station

Garry Hannigan owns the 49,000-hectare Churinga Station located between Wilcannia and Broken Hill. The property runs meat sheep breeds, cattle and goats which are all certified organic produce.

Churinga Station. Photo: Renee Shepherd.

The 4000-hectare conservation area features escarpment country consisting of caves, creeks and gorges, and open-timbered, saltbush and bluebush flats.

While rainfall has been below average since the program commenced in October 2003, Garry has noticed that an absence of grazing in the conservation area has resulted in an excellent response from the vegetation when rain has fallen.

'Shrubby species have been the most responsive to the reduced grazing pressure, with bluebush, saltbush, *Eremophila* sp., and leopardwood being the most successful', Garry said.

'Little grazing competition allowed grass species to respond quickly to much-needed summer rain in January which also saw the grasses set seed. This kind of response rarely occurs in set-stocked paddocks'.

Garry noted that although his conservation area boasts good groundcover during the ongoing dry period, it also attracts large numbers of feral goats from neighbouring properties.

More than 4000 feral goats have been removed since the commencement of the program, indicating the ongoing grazing pressure being placed on the rangeland country.

'Whilst I have always been interested in Churinga's natural assets, being involved in the EBC Program has made me notice plants and animals and their response to seasonal conditions which I might have overlooked before', Garry said.

Garry believes that the conservation area perfectly complements his organic production enterprise which allows him to 'produce a world-class product in harmony with the environment'.

Garry's involvement with WEST 2000 Plus programs and the commencement of organic certification for his property saw the beginning of his involvement in networks many years ago. Since Garry became involved in the EBC Program he has gone on to be awarded the NSW Farmer of the Year in 2004, obtained a Nuffield Scholarship in 2005 and has enjoyed extensive involvement in organic organisations across Australia.

'Once you get involved in one particular issue, it all just snowballs', Garry said.

'I am part of a large network that includes organics, alternate meat sheep breeds, grazing management and conservation. This allows me to provide input to the decision makers for issues that affect my region and my interests.

'The networks also provide me with an amazing source of knowledgeable people that I can bounce ideas off,' he said.

Garry believes that he has only just scratched the surface of the possibilities that exist for conservation, organic produce and sustainable production in western NSW.

Signage for the project. Photo: Renee Shepherd.

Bush Heritage Australia—building networks for conservation

By Chantal Fowler, Conservation Programs Assistant, Bush Heritage Australia

Bush Heritage Australia is a leader in private land nature conservation and has recently changed its name and logo (from Australian Bush Heritage Fund). It is a national not-for-profit organisation that protects the natural environment by acquiring and managing land of high conservation value. Bush Heritage currently owns 27 reserves across Australia.

Building landscape links—Kosciuszko to Coast

In New South Wales, Bush Heritage is working on a new landscape restoration project that will re-establish a network of habitats between the Australian Alps and the remnant bushland of the coastal ranges to the east. This project, called Kosciuszko to Coast or K2C, is a collaborative effort between local, regional, state and national non-government and government organisations including the NSW Department of Environment and Climate Change (DECC).

The land in this corridor has been heavily cleared and the remaining habitats fragmented and degraded. Much of the land is in private ownership, and re-creating this habitat corridor will mean working with landholders on properties with a range of tenures and management regimes. The project will develop a regional conservation network to support the people and organisations involved.

Once established, it will allow animals to move through the landscape again. It will increase the protection of poorly reserved ecosystems and the resilience of the landscape, and better enable species to respond to climate change. We also hope that it will increase national and international awareness of the scientific, social and economic benefits of managing entire landscapes for conservation.

Scottsdale Reserve

Bush Heritage's acquisition of Scottsdale signals the start of the K2C project. Scottsdale Reserve is a unique property of 1328 hectares, just 45 minutes south of Canberra. It is one of the largest remaining bushland properties in the region, highlighting its role in reconnecting the eastern fringes of the Namadgi National Park in the Australian Alps and the coastal ranges of the Eastern Escarpment.

The ecosystems on Scottsdale are poorly reserved and have the potential to be 'engine rooms' for improved regional conservation of populations of native animals and plants.

What is found on the property ?

The reserve protects threatened natural temperate grasslands and grassy woodlands. The box-gum woodlands, comprised mostly of yellow box (*Eucalyptus melliodora)* and Blakely's red gum *(Eucalyptus blakelyi)*, are endangered. These woodlands are particularly important for a range of threatened and declining woodland birds such as the speckled warbler and diamond firetail. Swamps, bogs, springs and vulnerable stream-side vegetation communities are also protected on Scottsdale.

The endangered golden sun moth and vulnerable diamond firetail, hooded robin, gang gang cockatoo and Rosenberg's goanna occur there. The silky swainson-pea (*Swainsona sericea)* and silver-leaved gum (*Eucalyptus pulverulenta)*, both of which are listed as vulnerable, are also found on the property.

A striking feature of Scottsdale is the Murrumbidgee River. It forms the western and northern boundaries of the property

The Murrumbidgee River and the banks of Scottsdale Reserve. Photo: Nicole Pyne /courtesy Bush Heritage Australia.

A2A—a network for climate change

Many readers may be aware of the announcement in February 2007 by the former NSW Minister for the Environment—The Honourable Bob Debus—regarding the decision by the NSW Environmental Trust to fund the implementation of a connectivity conservation initiative for the NSW section of the Alps to Atherton (A2A) conservation corridor. This concept had previously been enthusiastically endorsed at a national level by the states involved.

A2A is identified as a national conservation project because of its special unfragmented and essentially natural status, the richness and significance of species found there, its cultural and social values and the importance of its connectivity. The significance of the threats to Australia's natural heritage posed by climate change provided an urgent impetus for the A2A initiative.

Brogo Reserve. Photo: Wayne Lawler/Ecopix, courtesy Bush Heritage Australia.

for a distance of four and a half kilometres and provides a protected environment for platypus and the vulnerable Macquarie perch and trout cod.

How are we managing it ?

By acquiring Scottsdale we have removed the main threats to the property: rural subdivision, agricultural intensification and further weed encroachment.

The key management issue is weeds, particularly African lovegrass. Effective weed control and rehabilitation of the grasslands on parts of the property are likely to be costly, but there is strong support from a range of groups and agencies to set up a regional demonstration site at Scottsdale for the control of the significant weeds of the region.

Brogo Reserve

The 120-hectare Brogo Reserve is situated at the north-eastern end of the Bega Valley in south-east NSW, and is one of the larger bushland properties in the valley.

Brogo Reserve demonstrates how a protected area network can be achieved. An adjacent property and several properties nearby have areas under Conservation Agreements through DECC as well another nearby property being a Wildlife Refuge. This protected bushland is a major part of a linkage between Wadbilliga and Biamanga National Parks.

The property

Brogo Reserve contributes to the protection of four significant vegetation communities by protecting a mixture of wet and dry sclerophyll forest, with patches of dry rainforest and one small patch of degraded warm temperate rainforest. These vegetation communities are generally representative of the past vegetation cover of the dry rainshadow valleys on granite-derived soils in the district. Of the grassy vegetation types originally occurring in the Bega Valley, less than seven per cent remain, and most are poorly reserved. The reserve also contributes considerably to the overall scenic qualities of the Brogo River valley.

Brogo Reserve protects seven fauna species considered at risk: sugar gliders, long-nosed bandicoots and five bat species, four of which are insectivorous microchiropterans and the fifth, a megachiropteran, the grey-headed flying fox.

Seventy native bird species have been recorded on the reserve, including boobook and powerful owls. Species associated with a range of different habitat types are represented, reflecting the diversity of the reserve's vegetation.

What are we doing ?

Brogo Reserve was acquired by Bush Heritage in 1995, and logging, clearing and grazing are no longer a threat. There has been ongoing management work to control weeds and feral animals such as rabbits, foxes and deer, and repair and realign tracks and roads which had been damaged by erosion. Good access to the reserve is important for fire management and to allow our staff and volunteers easy passage into the reserve. Ongoing weed and feral animal control has been effective at reducing these threats to the reserve, and ongoing monitoring enables us to modify our management activities to meet any new or continuing threats.

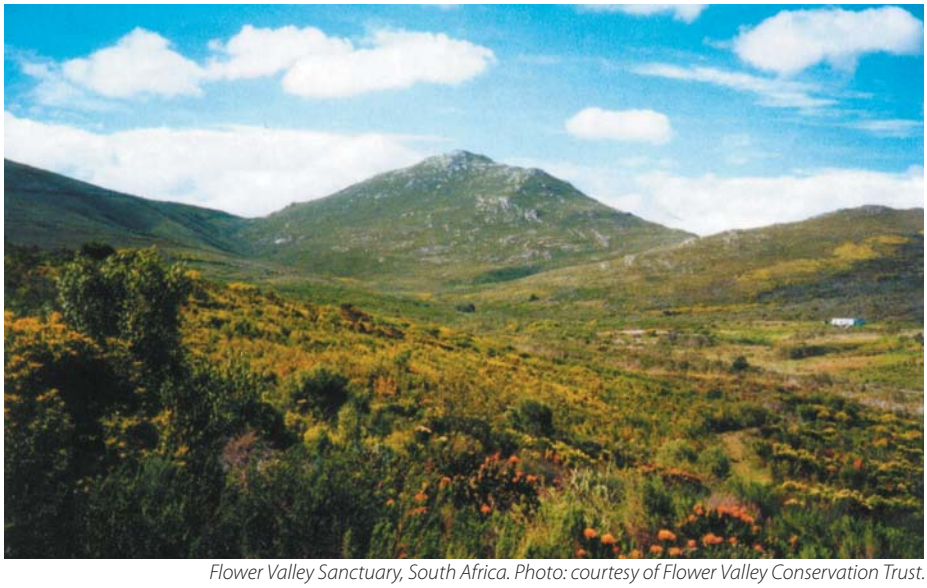
Getting involved

Networks do not only apply to land, but also to people. Getting involved with others interested in managing their land for conservation has benefits for all participants.

There are many ways to get involved in the exciting and challenging work of Bush Heritage Australia. You may wish to volunteer your time or seek employment with us. Becoming a monthly donor is a wonderful way of contributing directly to buying and protecting more key areas of habitat. You may prefer to leave a bequest. As a supporter you can visit our reserves and participate in events. To find out more or for further details on the work of Bush Heritage Australia, please visit our website at www.bushheritage.org.au or phone 1300 NATURE (1300 628 873).

International Wildlife Land Trust comes to Australia

The Wildlife Land Trust (WLT) was established in the United States of America in 1993 by the Humane Society of the United States (HSUS) to protect wildlife by preserving their natural habitats as permanent sanctuaries. Since then, with wildlife habitat continually being lost across the world, this program has been extended to other countries.



Flower Valley Sanctuary, South Africa. Photo: courtesy of Flower Valley Conservation Trust.

Protecting the world's streams, grasslands, forests and wetlands is essential to the survival of wildlife on Earth. Working under the guiding principle of 'humane stewardship' the Trust protects vast and impressive landscapes, as well as smaller places that provide for the needs of all wildlife—rare and common species alike. These efforts are undertaken in partnerships with individuals, non-government organisations and government agencies.

A global sanctuary system

The WLT has sanctuaries in North America, Canada, South Africa, Romania, Belize, Indonesia, and now Australia.

In the United States, over 80 sanctuaries are owned, protected with Conservation Easements (similar to Conservation Agreements), or otherwise managed by the WLT. Examples include the 517-hectare Meadowcreek Wildlife Sanctuary in the Ozark Mountain Region of Arkansas which provides habitat for an abundance of wildlife. In the high desert region of Northern California, a landowner has placed a Conservation Easement over his 208-hectare property, which includes native pine forest and other valuable wildlife habitat. This is now part of the WLT network.

Internationally, the WLT has partnered with other organisations to expand the global network. In southern Belize, Central America, from 1999 the WLT with Fauna & Flora International (FFI) and the community run Ya'axche Conservation Trust protect nearly 4167 hectares of critical tropical rainforest. This sanctuary, the Golden Stream Corridor Preserve, is home to five of the world's most endangered cat species: the jaguar, jaguarundi, puma, ocelot and margay.

South Africa's Cape Floristic Kingdom, is one of the world's great biodiversity hotspots, with nearly 70% of the 8600 vascular plant species found here occuring nowhere else on Earth. In this region, WLT partnered with Flower Valley Conservation Trust and FFI to preserve the 550-hectare Flower Valley Sanctuary. This sanctuary is home to more than 1500 native animals and plants including animals such as klipspringer, bontebock, blesbock, duiker, serval, and leopard. The property is a working farm and is one of the largest exporters of wild-harvested fynbos flowers in the Cape. This is being continued under the Flower Valley Conservation Trust with harvesting rates and patterns dictated by scientific criteria. The continuation of this operation demonstrates that sustainable wildflower harvesting is a viable form of land use which achieves a balance between conservation and sustainable use of fynbos.

The Wildlife Land Trust in Australia

In 2006, the WLT program was established in Australia by Humane Society International (HSI) to enable landowners to participate in the global sanctuary system. The first two Australian sanctuaries to become a part of this international network are properties in New South Wales with Conservation Agreement and Wildlife Refuge status under the *National Parks and Wildlife Act 1974* and part of the Conservation Partners Program.

'Warriwillah' was recently acquired by HSI. The previous owner had the property of 112 hectares formally proclaimed a Wildlife Refuge in 1986 and later entered into a Conservation Agreement over 103 hectares of the property. It is a spectacular property less than an hour's drive south of Canberra, situated only three kilometres from Namadgi National Park and eight kilometres from Tinderry Nature Reserve.

The Conservation Agreement provides perpetual legal protection of habitat important to the survival of the peregrine falcon, wedge-tailed eagle, the endangered Macquarie perch, the nobbi lashtail and a large population of platypus. The sanctuary also contains 2.5 kilometres of significant riparian habitat at the confluence of the Murrumbidgee River and Michelago Creek, a major north-south migration route for bird species such as the yellow-faced honeyeater. The previous owners of the property were supported with management funding under the Conservation Partners Program to assist with weed control and fencing.

'Curricabark Wildlife Refuge', the second property in the WLT Australian global sanctuary system, was formally

The Murrumbidgee River at Warriwillah. Photo: HSI.

proclaimed as a Wildlife Refuge in 1980. This 245-hectare sanctuary is owned by two of HSI's Directors and their family and friends. The property is situated about an hour north-west of Gloucester and is a few kilometres from Woko National Park.

The Wildlife Refuge status provides long-term legal protection of the nationally endangered rainforest climber, *Cynanchum elegans* (and a moth *Dichromia quinqualis* that feeds on the vine). There are important dry rainforest areas (83 hectares) and other native vegetation assemblages which are at the limit of their range, and habitats for the koala and glossy black cockatoo which are listed as vulnerable under the state's *Threatened Species Conservation Act* 1995.

An invitation to join the Wildlife Land Trust

Landholders in Australia have the opportunity to become part of the WLT global sanctuary system. Joining this international network involves landholders registering a non-binding voluntary commitment to the principles of stewardship of land to protect and conserve wildlife and their natural habitats.

HSI is working in partnership with the Conservation Partners Program to promote the Wildlife Land Trust to all landowners in the Conservation Partners Program. Landholders who are not yet involved in a formal conservation program on their land but would like to, are particularly encouraged to join in.

The benefits of registering with the Wildlife Land Trust

WLT as an international program aims to complement existing legal protection measures for conservation of natural and cultural heritage in New South Wales, and encourage existing and new landholder involvement in wildlife conservation.

Joining the WLT provides an opportunity to become part of a continually growing international network of wildlife sanctuaries voluntarily committed to the principles of protection and conservation of wildlife and their natural habitats around the world.

Properties will be highlighted in a special Australian section of the global WLT website www.wlt.org, a regular copy of the international 'Wildlife Lands' newsletter will be mailed, and a Wildlife Land Trust sign provided as desired.

What can I do now?

Visit www.wlt.org/australia.asp and have a look at what like-minded people have been doing around the world to protect wildlife and its habitats.

If you have an interest in becoming a member of the WLT, you can down-load the application from the above link, or call Michael Kennedy on 1800 333 737 or email michaelk@hsi.org.au.

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Grass trees at Curricabark. Photo: HSI.

Fauna-friendly fencing

We use fencing on our properties to mark the boundary of the area which we look after and to contain and manage livestock so that pastures can be maintained in good condition or to ensure that valuable native vegetation is not damaged. Barbed wire is now used widely in fencing and is a major threat to wildlife in Australia.

History of barbed wire

Barbed wire was invented in the United States of America when ranchers started to settle the prairies. Its introduction was controversial, and it was given the name 'The Devil's Rope' due to the suffering caused to livestock.

Applications were made for around 570 patents, when it was first invented in the1870s. After 20 years of legal battles in the United States Supreme Court, Joseph F. Glidden was declared the 'winner'.

The greatest opposition to barbed wire was by free-range graziers and cowmen whose access to the plains and waterholes was now restricted. Initially fences were simply cut, but in Texas this escalated in the 1870s and 1880s into what were known as the wire-cutting 'wars', and legislation was introduced to protect barbed wire fences. Thus barbed wire played a part in bringing about the end of the 'Open Range' on the prairies.

Minimising the impacts of fences on wildlife

Any fencing can have an impact on local fauna. Fences inhibit the ability of native animals to move freely through the landscape. Wildlife needs to move to allow free access to good food sources, breeding places and to follow natural migration and social patterns. Fencing should be constructed to allow easy movement of wildlife.

Wildlife carers and others have been concerned about the impact of barbed wire on wildlife. Entanglement and deaths occur which is an animal welfare issue. In addition, threatened species are affected. In New South Wales, barbed wire fences are noted as a threat to the squirrel glider, which is listed as vulnerable under the NSW *Threatened Species Conservation Act* 1995.

The importance of minimising the impact of barbed wire was recognised when the Threatened Species Network (TSN) of the World Wide Fund for Nature (WWF) gave a grant to the Tolga Bat Hospital on the Atherton Tablelands in 2006, to draw up guidelines for fauna-friendly fencing. Although there has been little or no research on fencing and wildlife, the project has produced some principles and advice on fencing to reduce the toll on wildlife, with further guidelines to come.

To fence or not to fence?

Sometimes fencing is done because it is the 'norm'. On reassessing, a fence may be unnecessary. In some locations especially around home paddocks and gardens, a hedge may be a better option. This can have the added bonus of providing protection and habitat for wildlife.

Old unwanted fences can be removed, and old bits of barbed wire can be moved to a place where they pose no danger to humans, livestock and wildlife

Hotspots for entanglement

Wildlife tends to move along regular routes especially to enable access to food and water. Your fence can be located so that 'high-risk' areas are avoided. Places to avoid or where to remove fences include:

- Fences across the flight or glide path of larger birds, flying foxes and bats.
- Fences on ridge lines or where they are higher than surrounding vegetation.
- Fences near food trees.
- Fences around water—flying foxes and water birds get entangled on their flight to and from water.
- Fences across watercourses or barbed wire submerged in water, where platypus and water birds can become entangled.

Squirrel gliders are sometimes injured or killed on barbed wire fences. Photo: © DECC

Alternatives to barbed wire

There are different opinions about how necessary barbed wire fencing is for controlling livestock. Some graziers find that high tensile plain wire is effective.

Where fences without barbed wire are not practical, an option is to replace the top one or two strands with plain wire. This will reduce the number of birds, gliding possums and bats which will get snagged on the fence.

The top strand of barbed wire has been replaced with plain wire. Eungella, Queensland .

Landowner Brian Naughton with old electric fence tape as a marker. Photo: Ashleigh Johnson.

The comparative costs of plain wire and barbed wire can vary. However plain wire is currently cheaper than barbed wire, and is quicker to run out. The disadvantage of hi-tensile plain wire is that it is difficult to work with as it is hard to tie off and hard to strain using old-style strainers (although twitchers and wire joiners make it easy).

Some landholders also remove the bottom wire from the fence, or replace it with plain wire, so that wildlife such as kangaroos, wallabies and wombats are able to get under the fence with little or no damage to the fencing, reducing any subsequent repair costs.

There are products used for horse fencing include Borderline and Nightline, which are solid high-tension nylon sighter 'wires' (no steel) that are particularly wildlife-friendly. They are more expensive than plain wire but would be useful in high-risk areas.

Electric fences may be effective in some cases although they may not restrain cattle and can also kill and injure some native wildlife.

Covering the barbs on existing fences can be an excellent option especially in high risk locations. Barbs can be covered with tubing and there are gadgets which have been designed for splitting poly pipe quickly and for applying the pipe to the fence. Another option is to install an 'apron' of chicken mesh or similar over the fence.

Improved visibility

Barbed wire can be made easier for animals to see by adding visible (and often audible) objects to the fence. Considerations include the potential introduction of waste to the environment, the effort required for installation and maintenance, and the cost.

Protective tape

One landholder who needs to use barbed wire to control cattle, keeps the top strand 100mm below the top of the post. Along the top of the post he then secures, using fencing staples, old electric fence tape that is no longer conductive. This offers good visibility, as it is white and flickers in the wind; it also acts as a physical barrier. It is cheap, quick and easy to put up, especially over long distances.

Individual markers

These are only practical for short lengths of fence and can include the following options.

Plastic signals: Plastic bunting or flagging can be added to barbed wire to provide a visual and aural warning to animals. Used bunting can be obtained from car yard dealers, or it may be made from surveyor's tape or from plastic warning tags such as those used on roadworks. Plastic flags made from tape are cheap, but due to deterioration, need to be regularly replaced as does bunting. Flags need to be closely placed, at least every 30cm or so. Do not use plastic on stock fences as cattle eat plastic, suffer digestive problems and may die.

Metal signals: Shiny metal tags or other metal objects, such as aluminium pie plates, can also act to make barbed wire more visible. Beer cans have been used on camel fences at Newhaven (a property in the Northern Territory owned by the Australian Wildlife Conservancy), and by iron ore mining companies in the Pilbara.

Brightly-coloured plastic balls (like airstrip powerline markers) have been used to prevent powerline strike by cranes in Europe and the US and may also be useful for fences, but might be a relatively expensive option for extensive lengths of fencing.

This article by Louise Brodie (DECC) and Jenny Maclean (Tolga Bat Hospital) has been taken from the Barbed Wire Action Plan (2007) by Carol Booth.
This Plan and more details can be obtained from the website www.wildlifefriendlyfencing.com
Or contact the Project Coordinator, Jenny Maclean at the Tolga Bat Hospital, PO Box 685, Atherton QLD 4883, tel / fax 07 4091 2683.

Mistletoe in our remnant woodlands: friend or foe?

David Watson helps us understand why mistletoe is like red wine or chocolate.

Why is there so much mistletoe around these days, and what can we do to get rid of it? As an ecologist working on mistletoe for the past ten years, I am asked this question routinely. Together with a group of research students and other collaborators, I have studied the interactions between mistletoe and animals, and the answers to these questions are becoming clearer.

Firstly, let's address the issue of mistletoe numbers. Historic data are few and far between, but it's fairly well established that mistletoe has become far more abundant over the past century. Interestingly, this pattern seems to be restricted to eastern Australia—in the wheat-belt of Western Australia the reverse has occurred, with mistletoe now absent from many areas.

To understand why they have become more abundant, we need to know more about the plants themselves and the processes that ordinarily keep them in check. Mistletoes are one of the few groups of native plants that rely on birds for both pollination and seed dispersal. Their seeds lack a protective coat and need to be deposited in a well-lit area in order to establish, using photosynthesis to fuel initial growth and penetration of the host's bark. As parasites, mistletoes rely on their hosts for all of their water and nutrient needs. By concentrating minerals in their tissues, they can divert water from their host. As such, mistletoe leaves represent a rich nutritional resource for leaf-eating animals, with a wide range of marsupials (especially possums and gliders) and leaf-eating insects (especially butterflies and lerps) preferentially feeding on mistletoes.

When we consider the changes made to Australia's forests and woodlands since settlement, many of these interactions have been modified. Most of the woodlands have been cleared, and the amount of 'edge' habitat has increased greatly. The large hollow-bearing trees required by possums and gliders are less abundant, and the nectar-bearing shrubs that support butterflies have been overgrazed. So, the average tree is now less shaded and less frequently visited by herbivores, greatly increasing the likelihood of mistletoe establishment and growth. Unlike many native plants, mistletoe has no defences against fire, and the occasional fire through an area removes most of them without killing the trees. In many regions, the frequency and intensity of bush fires has decreased.

Drooping mistletoe Amyema pendula*: a common parasite of eucalypts. Photo: DM Watson.*

Combining these interactions, it's clear that we have inadvertently made many agricultural landscapes ideal for mistletoe growth, removing many of the factors that ordinarily prevent them establishing, growing and spreading.

Interestingly, these increased numbers of mistletoe aren't necessarily problematic. Indeed, my group has been finding a whole range of benefits associated with mistletoes in remnant woodlands. Sites with more mistletoe consistently support a higher number of woodland birds. This is partly due to the popularity of mistletoe as a food source, and partly due to the use of mistletoe as a nest site. We are examining this in detail in a large-scale removal experiment near Albury. Called RIFLE (Resources in Fragmented Landscapes Experiment), this study involves long-term monitoring of 40 grassy box woodland remnants on private land in the upper Billabong Creek catchment. We have removed all mistletoes from 20 of the remnants, and are keeping track of the birds, mammals, reptiles and selected insects living in the woodlands over the next fifteen years. Dramatic differences are already clear between the removal and the control sites, with many woodland-dependent

birds now wholly restricted to those sites with mistletoe. While due partly to the fruit, nectar and nesting sites afforded by mistletoe, leaf-litter is also involved, and it is this component that may have the most pervasive effects on the overall habitat. Wendy March recently completed her PhD research which entailed the first study ever conducted on mistletoe litter, and the findings were remarkable.

Unlike most plants, mistletoes do not try to conserve nutrients or water—if they need more, they simply take it from their hosts. So, when they drop their leaves, they don't withdraw any nutrients or water, they simply drop them as is. This attribute, coupled with the high concentration of various minerals in mistletoe tissue, makes mistletoe litter surprisingly rich. Of fifteen elements examined, mistletoe litter contained significantly higher concentrations of eleven elements. So, pound for pound, mistletoe litter is a far higher quality litter than regular gum leaves. But mistletoes have another trick up their sleeves. Unlike eucalypts that grow reinforced, chemically protected leaves that they retain for many years, mistletoes grow flimsy semi-succulent leaves that they replace frequently. In leaf-litter trials carried out near Albury, mistletoe leaves were shed six times more frequently than the leaves of their eucalypt hosts. The combined effect of these differences is striking: areas beneath mistletoes have more litter, higher-quality litter, and more reliable litter-fall throughout the year. This leads to pronounced changes in the availability of every element examined in the soil, leading to a broad range of responses in understorey plants. Ongoing research will explore these effects in more detail, and look at changes in germination rate, water retention and the diversity of soil-based microbial communities.

Yet, just like chocolate and red wine, you can have too much of a good thing! Trees can become infected with such high numbers of mistletoe that they can no longer support themselves, leading to reduced growth rates and, in extreme cases, premature death. Rather than being the cause of tree mortality, however, mistletoe is quite often a symptom: an indicator of a broader imbalance. High infection levels are often associated with paddock trees or trees on the edges of woodland patches. These trees are often subjected to higher light levels, lower visitation by possums and gliders, infrequent fires and high nutrient levels (from run-off and domestic stock resting in the shade). While mistletoes can be pruned off, this is expensive, time-consuming and rarely practical. While it might be worthwhile for particular trees of high-conservation or historic value, mistletoes typically return to their original densities within a year or two, since the underlying drivers remain unchanged. By restricting stock access, replanting understorey shrubs, installing a few nest boxes and having the occasional controlled burn, mistletoe numbers will return to a more manageable level and the overall community will benefit as well.

In sum, mistletoes are a poorly known group of native plants that have a disproportionate influence over our native woodlands and forests. By altering the extent and disturbance regimes in these woodlands, we have unwittingly removed many of the factors that once kept them in check. While often seen as weeds or destructive invaders, these native plants actually play critical roles in these habitats. By providing food and shelter for native animals, and shedding high-quality litter, they act as keystone resources, boosting diversities of native animals and enhancing the biodiversity values of our remaining woodlands and forests.

David M Watson is an Associate Professor in Ecology at Charles Sturt University.

Flowers of Amyema cambagei, *needle leaf or sheoak mistletoe that closely resembles its* Casuarina *hosts. Photo : DM Watson.*

Flowers of Amyema preissii, *wire leaf mistletoe commonly seen growing on acacias. Photo: DM Watson.*

Tackling weeds on Fal Brook Wildlife Refuge

Marg McLean tells us how she used weed mapping and a combination of professional bush regenerators and volunteers to help control cape ivy on this conservation agreement property.

Fal Brook Wildlife Refuge began as an 'alternative' rural community project in 1973. However the original idea of a cooperative with settlement dispersed over the land has been replaced by a conservation trust, with more closely clustered settlement occupying a small area, and most of the land being bushland managed for conservation. The original Wildlife Refuge of 76 hectares was proclaimed in 1978. In March 2004, the Wildlife Refuge and adjacent bushland on Fal Brook were placed under Conservation Agreements covering a total of 123 hectares.

The land links with Mount Royal National Park, north of Singleton in the Hunter Valley, and is one of a cluster of six adjoining Wildlife Refuges. Having a number of Wildlife Refuges close to the park extends the area of protected habitat for a number of species for which this small park is notable. This includes the Hastings River mouse—first trapped along the Hastings River in 1921. This little known animal is listed as threatened and, until it was rediscovered in 1981, was thought to have disappeared. The possibility exists for refuge owners together with DECC to encourage habitat protection planning at the landscape-scale.

At the time of the Wildlife Refuge gazettal, people tackled the blackberries on the Refuge along the creeks to make room for gardens, but otherwise were oblivious to the weeds there except for garden annuals. Luckily, with one or two notable exceptions in the riparian zone, the land was free of weeds—apart from the blackberries. The main exception was cape ivy (*Delairea odorata)*, regarded as just another native rainforest vine until identified as an exotic species in the nineties.

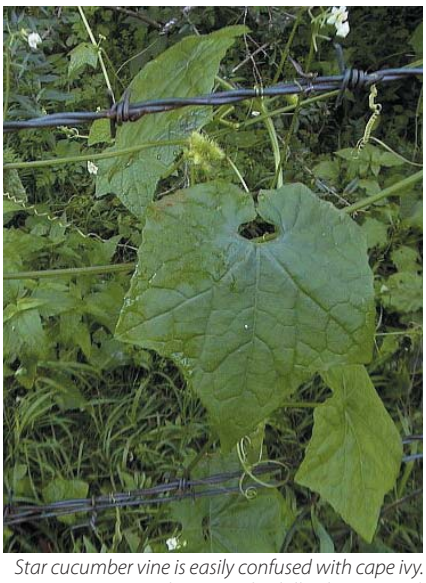
Cape ivy

Cape ivy (*Delairea odorata)* a vine native to South Africa, covers native vegetation. It is a plant which invades native vegetation in Italy, Australia and the eastern United States. It is a perennial vine with shiny, five to six-pointed leaves, usually with two small stipule-like lobes. There is one leaf at each node. Foliage is green to yellow-green and has a distinct odour. Plants have extensive waxy stolons running above and below ground. Below-ground stems are purple. Each flower is a yellow, round discoid head with flowers arranged in groups of 20 or more. Cape ivy is difficult to eliminate for two reasons: stolons and underground parts readily fragment while being removed, and plants will grow from almost any remaining fragment.

Cape ivy. Photo: DPI Victoria. Drawing: PlantNET NSW flora online

For much of the eighties the land was unoccupied, and by the mid-nineties some earlier plantings, such as elderberry (planted for culinary uses—the brown cuckoo-doves love the berries!) had escaped, becoming a problem. Elderberries are especially troublesome because unless you can uproot the entire plant, you have to meticulously 'cut and paint' every stem. Silky oak (*Grevillea robusta)*, another garden escape here, was easier to remove.

However, the main weed of concern is cape ivy. Its superficial resemblance to the native star cucumber vine (*Sicyos australis)* is almost uncanny and for the uninitiated it also, at first blush, even looks like forest hound's tongue (*Cynoglossum australe)*. Protecting regenerating rainforest species along the creeks from being smothered by the ivy is a priority here. The integrity of the vegetation as fauna habitat is also important. More than a dozen threatened fauna species have been recorded, including a number requiring gully and densely-vegetated areas, such as stuttering frog, long-nosed potoroo, rufous bettong, red-legged pademelon, yellow-bellied glider and large forest owls.



Star cucumber vine is easily confused with cape ivy. Photo: Eurobodalla Shire Council.

Cape ivy is a diabolical weed with tremendous powers of regeneration and rapid growth; trailing and climbing over seedlings, shrubs and trees. Any piece can take root, and it may set viable seed. It is more or less restricted to the riparian zone but, tolerating frost and in some places, almost full sun—who knows how far it could spread over time?

Cape ivy is very easy to remove by using manual labour. However the handpulling of this vine requires a very delicate touch as it breaks very easily but it is essential to follow the main stem right back to its source. We carried many bags of cape ivy tangle to centralized piles where it effectively 'melted' away with help of the pademelons nibbling the sproutings from the heap. The essential follow-up involves the plucking out of the little cape ivy isolates which are OK to leave securely in the fork of a tree.

So we have been getting stuck into the cape ivy. The literature records that propagation is both vegetative and by wind-dispersed seed, but we have never seen seed. We are still offering a prize for 100% certainty of cape ivy seedling establishment. However, as the flowers are so tiny, the seed would be miniscule, and it would be difficult to tell the difference between a plant growing from the small seed and one from a small piece of stem.

In 2004, under a project through NPWS we were able to use volunteer workers from Conservation Volunteers Australia (CVA) under supervision of professional bush regenerators. The crews of volunteers covered a wide range of personalities, experience and application—with at least some being meticulous.

Cape ivy is enough of a challenge with its capacity to root at every node together with its tendency to break easily. So we first chose to have the untrained volunteers do a broadscale attack over a greater area rather than the diligence of a professional team in a smaller area.

Overall, the combination of professional bush regenerators with the volunteers at this site where the cape ivy had been long-established, worked pretty well.

The initial intent in the areas with heavy weed growth was to only release struggling rainforest seedling trees from cape ivy by clearing a one metre radius circle. This however, quickly evolved to broadscale clearing of this weed due to the intertwining extensive growth habit and the need to track the vine to its major rooting point. Fortunately this gross disturbance approach appears to have been successful.

If you are interested in having people assist you with work on your property
contact Conservation Volunteers Australia
www.conservationvolunteers.com.au
Freecall 1800 032 501

The necessity for serious sustained follow-up work regardless of technical skill was obvious. Since the initial work was carried out, Friends of Fal Brook have worked on the site. In 2006 and 2007, funding from the Department of Environment and Climate Change for work on our Conservation Agreement area, was able to be used to cover follow-up work by professional bush regenerators.

The initial professional site assessment and weed management plan included the schematic weed density mapping. This has been an excellent tool for gauging the impact of our treatment.

Weed density mapping

On Fal Brook a very simple way of mapping weed density has been used. This four-colour scheme has been used on bushland sites for many years. Using a map of the property or site, the area of bushland and weeds is coloured as follows:

- Green: bushland with hardly any weeds.
- Blue: minor weed infestations.
- Orange: weeds dominate the vegetation.
- Red: bushland replaced by weeds.

The condition of the site also helps determine the method of restoration. Areas coloured blue and green generally only need weeds removed to help the bushland recover from weed invasion. Areas coloured red may need some revegetation or other assistance to help recovery, while areas coloured orange may need a mixed approach.

Weed density mapping without any formal measurements or the 'windscreen survey method' is obviously subjective, but if the same person keeps doing it according to fixed parameters, it is definitely a useful yardstick. Records of other variables such as climatic conditions, fires, droughts and floods are important to keep in conjunction with the mapping. For instance, an untreated area mapped as red (100% weed) in 2004, would have been mapped as orange (bushland dominated by weeds) during the drought.

We have been trying to develop a working consistency across the scales of closeup, midrange and broadscale views, so that they nest within each other. That is to say, the broadscale view weed density mapping is reflected at the two smaller viewpoints. There are roughly the same percentages of total vegetative cover at whatever scale you are looking.

Weeding with apparently interminable follow-up can feel like soul destroying work. Mapping really helps to sustain and inspire confidence that the effort is worthwhile and that the natural regeneration is assisted by our attention to the imbalance. The mix of native raspberry *(Rubus rosifolius)* and cape ivy on the edge of the riparian zone is now native raspberry with bracken and forest hound's tongue (*Cynoglossum australe)*. Another native raspberry thicket has the native star cucumber vine twining over it, with young kangaroo apple (*Solanum aviculare)*, native hibiscus (*Hibiscus heterophyllus)* and bolly bolly or hairy-leaved bolly gum (*Neolitsea dealbata)* also emerging.

Records of approximate total person-hours worked and areas treated have been kept and compiled, providing an excellent basis for further works, calculations and planning.

Ongoing monitoring and handpulling of the inevitable occasional cape ivy sprouting will be undertaken over all the regeneration areas treated. We look forward to our follow-up work showing continued reduction in both the cape ivy and the time we need to treat it.

Bush Matters is the newsletter for the DECC Conservation Partners Program which provides ongoing support for landholders with Conservation Agreements, Wildlife Refuges, Property Registrations and Land for Wildlife. *Bush Matters* is produced twice yearly.

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To view the newsletter in colour go to www.nationalparks.nsw.gov.au/npws.nsf/Content/Bush+Matters

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Books

Interested in finding out more about the small creatures in our environment? Most of the world's creatures are invertebrates, but popular identification material is taking a while to catch up with the wonderful resources we have about plants, frogs, reptiles, mammals etc. CSIRO Publishing have now produced three books which will help you to identify moths, butterflies and dragonflies. They should be congratulated for helping fill the gap with these wonderful books.

Each book has a general introduction containing information about the general structure of the animal, habitats, distribution and behaviour.

available from CSIRO Publishing
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phone 1300 788 000, 03 9662 7666
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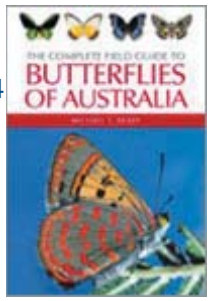
Email publishing.sales@csiro.au
and from many bookstores

The Complete Field Guide to Butterflies of Australia

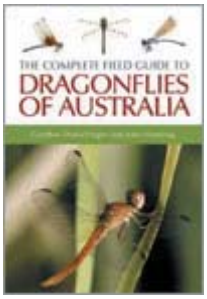


Michael F Braby 2004

This is the first complete field guide to all butterfly species on Australia's mainland and its remote islands. It covers 416 currently identified species and has clear photos and descriptions to aid identification. There is also a distribution map for each species on the Australian mainland.

It covers the five major family groups: *Hesperiidae, Paplionidae, Pieridae, Nymphalidae* and *Lycaenidae*, as well as the family *Riodinidae*, which has but a single species in Australia.

The Complete Field Guide to Dragonflies of Australia

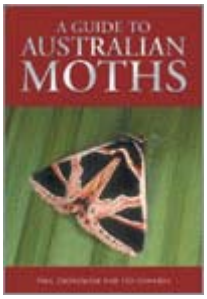


Günther Theischinger and John Hawking 2006

This book has clear colour photos and drawings and includes identification keys for adults and larvae, as well as distribution maps and habitat information.

The book covers all 30 families, 110 genera and 324 species found in Australia, and also includes general information about dragonflies.

A Guide to Australian Moths



Paul Zborowski and Ted Edwards 2007

Australian moths became world famous when one perched on singer Yvonne Kenny while she was performing in the closing ceremony of the 2000 Sydney Olympic Games. There are over 20,000 moth species in Australia, and although generally thought of as looking dull, their colours can be remarkable.

This guide illustrates all the major Australian families, including some rarely seen species. It includes many facts about moth biology and sections on interesting moths such as the iconic witjuti grubs and bogong moths.

Conference proceedings: Veg Futures 2006

Veg Futures: The Conference in the Field was convened by Greening Australia and Land and Water Australia at Albury in March 2006.

The proceedings from this conference can now be found on the website: live.greeningaustralia.org.au/vegfutures/

The conference was structured to focus on five 'big' questions confronting the management of native vegetation:

Q1. What is the role and value of native vegetation in the regional landscape?

Q2. Who pays for native vegetation management?

Q3. How do we balance conservation and production?

Q4. What are we doing about the threats to native vegetation?

Q5. How do we know if we are making a difference?

Delegates were confronted with these 'big' questions in each session of the program. On the final day delegates gathered to discuss how well they answered the big questions.

The proceedings contain a wealth of information addressing these questions.