Issue 13 Spring 2007

# Buntine-Marchagee Catchment News

## Editorial

The Buntine Marchagee Natural Diversity Recovery Catchment (BMNDRC) contains 2472 hectares, or 1.8 per cent, of land that is classified as revegetation through the Landholder Survey 2003 (Buntine-Marchagee Catchment, CALM). Landholders have undertaken revegetation primarily to address salinity and water use and other priorities such as erosion control, aesthetic value, wildlife habitat and farm forestry.

Whatever the priority, revegetation represents a big planning, management and cost commitment. Knowledge that can be applied to improve the success of revegetation is constantly evolving.

In this issue of *Buntine-Marchagee Catchment News* we draw together information about revegetation. We follow the steps from species recognition, seed selection and propagation to planting design, including work being done in the BMNDRC to determine how effective current and future plantings of native vegetation are in improving habitat for bushland birds. In addition, we learn about the complex relationship of Australia's native fungi with flora and fauna in helping sustain the health of restored vegetation.

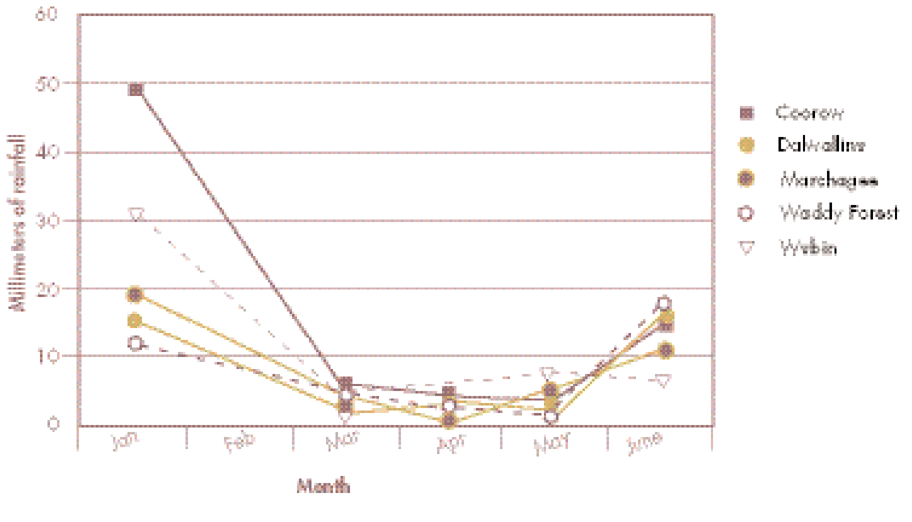
Peter Vesk, from Melbourne University's School of Botany, discusses how we are attempting to rebuild rural landscapes in southern Australia and the habitats for birds and animals that these areas provide. He also challenges us to think about the likely outcomes of revegetation: What will happen over time? How successful will our efforts to rebuild biodiversity in agricultural landscapes be in 100 years time? Will we have avoided a 'biodiversity bottleneck' in the intervening period when neither the old or restored vegetation may be providing the resources needed for birds and animals?

We profile Megan Jones who has recently joined the Recovery Catchment Team as Research Officer-Geographic Information Systems (GIS).

Best wishes,

Fiona Falconer

### Rainfall data comparisons January-June 2007

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Buntine Marchagee Catchment

## Contact the editor

**Fiona Falconer**
Communications Officer
DEC Midwest Region
PO Box 34,
Coorow WA 6515
Phone: (08) 9952 1074

## Contact the authors

**Peter Vesk**
School of Botany
University of Melbourne
Creswick VIC 3363
Phone: (03) 8344 7480

**Kimberlie Rawlings**
Florabank
Greening Australia
PO Box 74
Yarralumla ACT 2600
Phone: (02) 6281 8573

**Gavan Mullan**
A/Recovery Catchment Officer
DEC Midwest Region
PO Box 72
Geraldton WA 6531
Phone: (08) 9921 5955

**Peter White**
Rural Advisory Officer
DEC Wheatbelt Region
PO Box 100
Narrogin WA 6312
Phone: (08) 9881 9222

**Dr Neale Bougher**
Mycologist – Senior Research Scientist
WA Herbarium
Locked Bag 104
Bentley Delivery Centre WA 6983
Phone: (08) 9334 0500

**Dr Margaret Byrne**
Principal Research Scientist
DEC Science Division
Locked Bag 104
Bentley Delivery Centre WA 6983
Phone: (08) 9334 0299

**Dr Andrew Huggett**
Ornithologist
Insight Ecology
PO Box 6287
Coffs Harbour Plaza NSW 2450

Department of Environment and Conservation
Our environment, our future

# Beating the clock: time-lags in landscape reconstruction

© Peter Vesk

The problems of biodiversity decline and altered ecological processes in the Australian agricultural heartlands are widely known. We are in a phase of trying to rebuild these landscapes and the habitats they provide for birds and animals. The fantastic efforts of the community are to be applauded, yet we also need to think about likely outcomes of revegetation. There is useful information on how and where to revegetate but less about what will happen over time.
Specifically, we need to think about time and habitat resources and their affect on how we go about revegetation.

**Native habitat is declining and there are long time-lags in the development of new habitat by revegetation. To avoid a looming biodiversity bottleneck, we need to conserve current habitat and accelerate the development of new habitat.**

Many birds and animals rely on trees for the habitat and 'habitat resources' – features that animals need for food, shelter and breeding – they provide. The bulk of habitat resources are provided by large, old trees, with young, small trees providing relatively little in comparison. For example, tree hollows are used by more than 300 species of native birds and animals for shelter and breeding. Also, large boughs on trees (thicker than your arm and pointing nearly horizontally from the trunk) are important nesting sites and, when they detach, provide fallen timber that ground-foraging animals search for food and shelter in. Large trees provide a profusion of flowers, from which many birds and mammals collect nectar or seeds.

Trees are long-lived, but not immortal. Many of the trees in agricultural landscapes are veterans, probably retained because their size provided shelter for stock. Regeneration of new trees has been restricted by grazing, cropping and felling, as well as competition from grasses, crops and mature trees. The current generation of large trees are inexorably declining in health and number, with very few expected to last another 50 or 100 years.

Trees grow slowly. Even though canopies of leaves, fine twigs and bark for foraging all develop within five to 20 years, there are long time-lags – 50 to 150 years – in the formation of resources such as tree hollows, large boughs and fallen logs. The decline in the habitat provided by current large trees and the time-lag in development of habitat by revegetation means that we are headed for a biodiversity bottleneck in the intervening period. This means that at some point neither the old or restored vegetation may be providing the habitat needed for birds and animals.

Revegetation design matters as planting at high densities slows growth in tree girth and, more importantly, the development of important habitat resources that many birds and mammals need. The incidence of hollows, boughs and critical loads of fallen logs can all be delayed by decades by planting at high densities (~4000 stems per hectare) compared to low densities (~100 stems per hectare).

Time-lags in supply and resulting biodiversity bottlenecks will have serious consequences for biodiversity in agricultural landscapes and point to the urgent need for conservation of existing habitat and acceleration of new habitat development.

**Acceleration** – We need to speed the development of new resources by revegetation. The most obvious way is to plant at lower densities, allowing trees to quickly develop large, spreading canopies. This does not mean that all sites be evenly planted with widely spaced trees, since native vegetation is naturally patchy with diverse structure. Presently, most revegetation aims for high density, which can control weeds and provide dense vegetation that is attractive to some small bush birds. However, this is a short-term benefit and we need to have an eye for the long term. We need also to revegetate some productive areas, which yield faster growth and greater supply of habitat resources, and are under-represented in remnant vegetation.

**Conservation** – No matter how much we speed development of new habitat, we must slow the loss of current resources and protect old trees by actively improving their

*Figure1. 111-year-old, high density planting, with 620 trees per hectare. Note the row planting, the slender pole-like trees, without large boughs, and no fallen timber.*


*Figure 2. A 111-year-old, low density planting, currently 80 trees per hectare. Large trees have a spreading form with large boughs and fallen timber. Photos Rachel Nolan.*

health and, when they die, not removing them as some of the resources, like hollows, continue to be provided. Planting tree seedlings and removing a paddock tree is not a fair swap – they are not equivalent.

Dense shelterbelt-style plantings will not provide the habitat that many native birds and animals need. Some substantial fraction of plantings needs to be aimed at low density, to accelerate the development of quality habitat.

## Further reading:

Vesk, P.A. & Mac Nally, R. (2006) The clock is ticking – Revegetation and habitat for birds and arboreal mammals in rural landscapes of southern Australia. *Agriculture, Ecosystems & Environment,* 112, 356-366.

# Provenance – there are new rules

Kimberlie Rawling

In an effort to maintain local genetic diversity and prevent 'genetic pollution', all Natural Heritage Trust (NHT) and regional natural resource management groups or Catchment Management Authorities (CMAs), specify that revegetated areas use local species and seed collected from 'local provenance'. While the desire to maintain local genetic diversity is well founded, seed collected using strict 'local provenance' principles may limit the quality of seed and be restrictive to the success of the project.

The term *provenance* is French for *'origin'* and was initially used to describe variations in survival, growth rates and form when differences were noticed within the same species. Provenance for seed collection generally refers to the site or area from which the seed has been collected in a natural population. This is different from seed collected from cultivated sources such as plantations or ornamental plantings. The term has also come to describe genetic variation that species may show over a geographic range.

### Four things you should know about seed provenance.

Understanding the provenance of your seed is important for seed collection and revegetation activities. However, there is more to best-practice seed collection than simply trying to stay within 'provenance'. Greening Australia has drawn on new research, such as the work of Andrew Young and Linda Broadhurst from CSIRO Plant Industry to consider what is most important for seed collection:

1. **Local provenance isn't always the best.** Seed collected from small, isolated populations can be highly inbred, leading to plants with low vigour and poor resistance to disease or disturbance. For example, studies of the endangered daisy *Rutidosis leptorrhynchoides* show that small populations produce much less seed (Morgan, 1999). In the rare small purple pea (*Swainsona recta*) seed is still produced but the seedlings are often weak and have low genetic diversity (Buza et al., 2000). Also, local provenance plants may not be the best suited for particular revegetation aims such as salinity or erosion remediation.

2. **It's more important to collect from a sufficient number of parent plants to maximise genetic diversity.** The more plants that are used for collection the greater the chance of capturing high genetic diversity. This improves the chances of producing high quality seed that will germinate, grow and produce more viable seed for future generations. By maximising genetic diversity we can also provide an important genetic resource to help plants adapt to the possible impacts of climate change (Ellstrand & Elam, 1993).

3. **Collect seed from widely spaced individuals within a population.** Plants that grow close together are more likely to be related, and have similar genetic makeup (Adams, 1993).

4. **In most instances local provenance isn't best defined by distance.** It can be better defined by similarities in soil type, topography, climate, vegetation communities, and the means of pollination and dispersal (Young, 2005).

Greening Australia is well placed to provide information about seed supply and the increasing demand through the Florabank program.

florabank

### What is Florabank?

Florabank aims to improve the availability and quality of native seed for revegetation and conservation purposes by providing quality information for seed collectors and users. Florabank started in the late 1990s, and published the 10 Florabank Guidelines, Model Code of Practice and the Florabank website.

The initial funding for Florabank finished in 2001 but it has now been given new funding by the Australian Government through the NHT.
It continues to provide high-quality native seed information and brings together the leading research in native seed management into practical formats.

Reprinted from *Thinking Bush, Thinking Seeds,* special insert to *Thinking Bush* Issue 4. Land and Water Australia, Canberra (2006)

### Want to know more?

Contact: Kimberlie Rawlings, Florabank Manager

Phone: (02) 6281 8585
Email: general@FloraBank.org.au
www.florabank.org.au

Greening Australia

Australian Government

# Seedling container design makes a lasting difference

Peter White and Gavan Mullan

Often when people are checking the quality of nursery seedlings they focus on the easily visible parts such as leaves and stems. However, it is the design of seedling containers and the subsequent effect on seedling root growth that has possibly the strongest influence on the success of revegetation. Container design influences plant survival and longevity and has a permanent effect on plant productivity for both nature conservation and commercial outcomes.

Why is the growing container so important? The inside of the containers can be shaped very differently – some are smooth, others have vertical 'root training ribs' (Figure 1), and some have open slots in the sides of the container walls and an open base (Figure 2). For seedlings being raised for broad-scale revegetation, the individual containers are about 50 to 70 millimetres deep and about 30 to 35 millimetres wide. With such a small container volume, root spiralling and binding can occur. Research shows that where seedling roots are strongly 'shaped' by the growing container, especially when spiralled (even slightly), roots will tend to maintain this deformed growing pattern even after planting.

Open side wall air-root pruning slots are one of the most recent changes to container design. When lateral roots are pruned on reaching the side wall, new lateral root formation is promoted. This feature is beneficial, with Australian and New Zealand forestry research showing a strong correlation between seedling performance (growth rate) and the number and distribution of lateral roots. Also, a seedling with active root growing tips at the base and on all side walls will have a better chance of taking root into the planting environment.

The container types used by nurseries that have shown the worst influence on revegetation are cylindrical shaped containers; containers without vertical 'root training ribs'; 'jiffy' containers (compressed peat containers) and plastic inserts. The former two designs are responsible for unabated root spiralling. The jiffy containers caused severe 'shaping' of roots, resulting in poor productivity. The plastic inserts were designed to be used in conjunction with a root inhibiting paint which needs stringent quality control to be effective.

Because root distribution in the planting environment is reduced by this 'shaping', plants are highly vulnerable to the extremes of seasonal conditions. Plants have far less tolerance to dry conditions and waterlogging; and plants will blow over in wet and windy conditions. And if the roots are strongly shaped, especially spiralled, the continued expansion in diameter of entangled roots will eventually block the transport of water and nutrients in the roots, committing the plant to a short life (Figure 3). That is, seedlings are permanently compromised even before they are planted.

We promote and implement revegetation for a whole range of land management reasons. Our revegetation endeavours become 'lost opportunities' if seedlings have roots that are deformed by the container or nursery management practices. That is, if a seedling is restricted in its ability to grow there will be less water use, less shade and shelter, less habitat, less commercial potential and reduced ability to compete with weeds.

In the science of revegetation, we aim to develop and apply practices that enable revegetation to be as productive as the soil and climate resource allows. By looking at elements in the process of seedling propagation we aim to identify and eliminate any unproductive effects. The design of seedling growing containers is a critical element in successful revegetation. Modern container design minimises root shaping and gives the opportunity for optimal productivity.

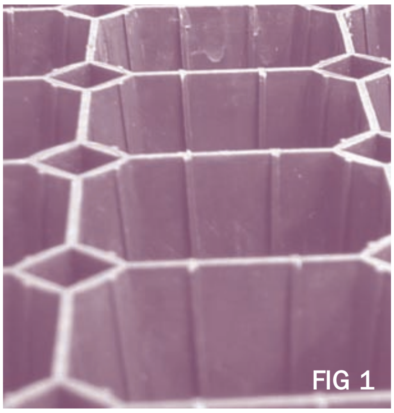


FIG 1

*Figure 1. There are 12 vertical 'root training' ribs per growing container (or cell).*

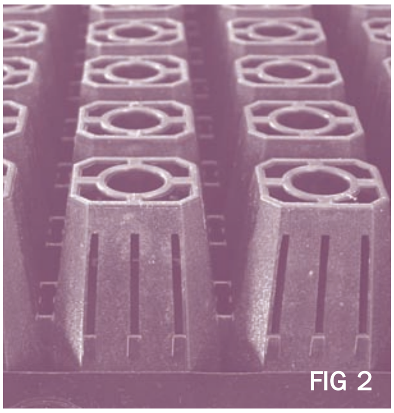


FIG 2

*Figure 2. Growing containers (cells) with full 'air root pruning', i.e. at the base and side walls of the cell.*

FIG 3

*Figure 3. The extreme entangled root mass (viewed from the underside) committed this three-year-old plant to a short life.*

# Native fungi assist the health and rehabilitation of native vegetation

Dr Neale Bougher

Australia's native fungi interlink with flora and fauna to help sustain the health of our natural vegetation. In recent years there has been an increasing interest among conservation bodies and landholders to monitor the diversity and roles of native fungi in vegetation and to recognise where fungi can be used in revegetation.

In the poor soils that dominate much of Australia, mycorrhizal fungi are prevalent and have particularly significant roles in bushland health. Extensive fungal networks transport nutrients and carbon throughout the soil and can act like an extra root system delivering nutrients to plants. Fungi also have roles such as decomposition and nutrient cycling, binding soil, providing food and/or habitat for many animals such as woylies and insects, and buffering plants against some stresses such as disease.

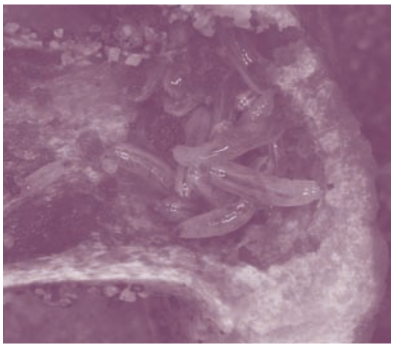
In Australia, hundreds of species of native ectomycorrhizal (mycorrhizal fungi that contact plant roots by enveloping them and penetrating between the cells) fungi partner and benefit many trees and shrubs such as eucalypts, wattles, sheoaks and poison peas. Ectomycorrhizal fungi produce large spore-bearing structures such as mushrooms, toadstools, corals and truffles. In Wheatbelt woodlands fungal fruiting may be briefer and less consistent than in wetter regions.

**'Native fungi may take a long time to return to restored vegetation, if they do at all, with subsequent detrimental consequences for long-term viability and biodiversity'.**

However, this does not necessarily indicate that fewer fungi are present. In both regions a diverse range of fungal networks may be active below ground. Healthy natural woodlands are likely to have a high diversity of native fungi, but relatively few fungi may be observed by the untrained eye because many of the fungi fruit below the ground or barely emerge. Most species of ectomycorrhizal fungi associated with native Australian plants are unique to Australia. Many of them are yet to be discovered or named. Some of the fungi may be rare, such as those only known from several remnant woodlands in Western Australia.

The 'self-return' of a diversity of fungi can be expected into revegetated areas where the revegetation consists of native plants and is adjacent to substantial areas of remnant vegetation. However, in some other regions with extremely diminished and fragmented natural vegetation such as the central Wheatbelt in WA, few of the native ectomycorrhizal fungi found in remnant bushland are self-returning to revegetated areas on former farmland. Exceptions include some fungi that thrive and persist after disturbance such as the puffball *Pisolithus*. The remaining bank of native fungi in natural vegetation is becoming depleted in the WA Wheatbelt, limiting opportunities for colonisation of fungi from remnants into revegetation. Also, the soil on farms may differ from that of remnant woodlands and may not favour colonisation by many native fungi.

In regions such as parts of the WA Wheatbelt, many native fungi may take a very long time, if ever to return to restored vegetation unaided. Low diversity of native fungi may be detrimental to establishing and maintaining the long-term viability and biodiversity of restored vegetation. If an assessment of native fungi is undertaken and indicates they are not self-returning, these organisms may need to be assisted/or monitored in local vegetation restoration programs – especially if a main goal is to nurture biodiverse native vegetation. Some methods are now available to help promote and monitor the return of local fungi diversity and to avoid pitfalls such as introducing persistent weed fungi (e.g. see Fungibank at www.fungibank.csiro.au)



***Top*** *Many native fungi produce large fruit bodies that can be assessed visually in biological surveys. Pictured are fungi volunteers from DEC's WA Herbarium, Phylis Robertson (left) and Val Preston.*

***Above*** *The fruit bodies of fungi provide food and/or habitat for many animals including the insects shown. Photos — Neale Bougher*

Not all fungi are mycorrhizal; others are decomposers and some cause disease. Confident monitoring and selection of native fungi can best be achieved by attaining at least a basic knowledge of how to recognise some types of fungi. Using local plants is a well-established principle for bush restoration, and this may apply to fungi as well. In some regions of Australia, the natural reservoirs of native fungi may be rapidly depleting, and it may become a race against time to source the fungi before they become locally extinct.

# Broombush complex

FIG 1

FIG 2

## Dr Margaret Byrne

Broombush (*Melaleuca uncinata*) is a characteristic shrub of the dry woodlands and shrublands of southern Australia. It has very high morphological diversity and is actually a group of species. A recent taxonomic revision has now recognised 11 different species within what was previously known as *M. uncinata*.

Recognition of these different species means that selection and development of appropriate germplasm for revegetation can be undertaken more effectively. When a species is planted it is important to know that it has the desired characteristics and will deliver the production or environmental benefits that are required. It is also important that the species is adapted to the conditions in which it is planted.

Each of the newly defined species has a specific geographic range, but the ranges are not mutually exclusive, i.e. more than one species may occur at a given site. At most sites where more than one species occur there is no evidence of hybridisation between them. But hybrid plants have been seen at a few sites.

**There are 11 species recognised in the broombush complex so it is important to know which is which when planting broombush for revegetation.**

The species can generally be distinguished by their leaf shape and the distribution of oil glands, by the form of the infructescence (collection of fruit), and by the bark. Most species have circular shaped leaves but true *M. uncinata* has quadrate leaves (they won't 'roll' between your fingers) and two species have flat leaves. The leaves of *M. stereophloia* are flattened but dumbbell shaped in cross section. In most species the oil glands are scattered on the leaves, but in *M. uncinata* and *M. stereophloia* they are in rows along the leaf margins. The cluster of fruits is generally globular-shaped around the stem but is elongated in *M. atroviridis*. The table summarises this information. All species except for *M. atroviridis* (and possibly *M. exuvia*) resprout. There are two variants in *M. atroviridis*, one grows in saline and winter-wet depressions and doesn't resprout, and the other one occurs on upland sites and does resprout.

| Melaleuca species | Leaf shape in cross section | Oil glands | Bark | Infructescence |
|---|---|---|---|---|
| *M. uncinata* | quadrate | in rows | papery | globular |
| *M. interioris* | circular | scattered | papery | globular, open |
| *M. concreta* | linear, flat, thickened | scattered | papery | globular |
| *M. stereophloia* | dumbbell | in rows | fibrous | globular |
| *M. osullivanii* | circular, fine | scattered | papery | globular |
| *M. hamata* | circular, thick | scattered | papery | globular |
| *M. atroviridis* | circular | scattered | papery | cylindrical |
| *M. zeteticorum* | circular, short, hairy | scattered | papery/ fibrous | globular |
| *M. vinnula* | linear, flat, thin | scattered | papery | globular |
| *M. scalena* | circular | scattered | papery | globular |
| *M. exuvia* | circular | scattered | papery | globular |

FIG 3

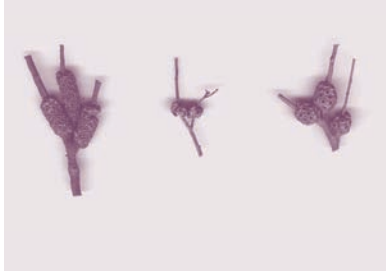


*Figure 1.* M. stereophloia *showing flat leaves and oil glands in rows.*

*Figure 2.* M. hamata *showing the typical needle-shaped hooked leaf.*

*Figure 3. Fruit clusters (infructescences), showing cylindrical, (*M. atroviridis*); open, (*M. interioris*) and the globular clusters of most species. The cluster of fruits is generally globular-shaped around the stem but elongated in (*M. atroviridis*).*

The species that are common within the BMNDRC are *M. hamata, M. stereophloia* and *M. atroviridis. M. atroviridis* is easily distinguished from the other two species as it is single stemmed and has an elongated fruit cluster. *M. hamata and M. stereophloia* are both multi-stemmed and have globular fruit clusters but *M. hamata* has circular leaves with scattered oil glands, and *M. stereophloia* has dumbbell-shaped flattened leaves with oil glands in rows along the leaf margins.

More detail on the taxonomic revision and on the genetic diversity in the group can be obtained from the following papers:

Craven LA, Lepschi BJ, Broadhurst L and Byrne M (2004) Taxonomic revision of the broombush complex in Western Australia (Myrtaceae, *Melaleuca uncinata* s.l.). Australian Systematic Botany 17: 255-271.

Broadhurst L, Byrne M, Craven L and Lepschi B (2004) Genetic congruence with new species boundaries in the *Melaleuca uncinata* complex (Myrtaceae). Australian Journal of Botany 52: 729-737.

# Bringing back the bush birds in the Buntine-Marchagee Recovery Catchment

Dr Andrew Huggett

The birds of the woodland, heath/shrub/mallee and freshwater and saline wetland habitats of the BMNDRC have been recognised for what they are – precious gems of a formerly more extensive and probably more diverse bushland bird community. That we still have these amazing little feathered friends is testament to their resilience and, now, the protection and progressive restoration of their habitat.

A project to protect and recover the former diverse bird community was started by the Department of Environment and Conservation (DEC) in partnership with catchment landholders in 2001. In 2001–2002 I led a team of CSIRO scientists who surveyed 63 per cent of all remnants of native vegetation in the catchment (316 out of 503 remnants). A focal species analysis of birds recorded was undertaken to help prepare a design for the protection and restoration of this landscape. This was based on the habitat patch size, remnant area, remnant condition, and remnant proximity requirements of several focal bird species of the catchment.

In October last year, as a private consultant, I began to re-survey birds in nine clusters of remnant vegetation in the catchment for DEC. These include key remnants situated on either side of planned habitat linkages and 'stepping stones', reference remnants, recently planted habitat linkages and paddock plots. My work will help to determine whether, and how well, current and future plantings of native vegetation are working to bring back the birds to the catchment. Most of this bush occurs on the properties of several farming families in the catchment. Some of these remnants have been fenced to keep sheep out while others have not.

A total of 61 species and more than 1900 individual birds were recorded in the spring and autumn 2006–2007 surveys. All of the bush birds recorded five years ago were detected during the latest surveys. The most abundant species were brown honeyeater, galah, weebill, white-browed babbler, singing honeyeater, inland thornbill and red-capped robin. The least abundant birds, including two focal species, were western gerygone, grey butcherbird, western yellow robin, elegant parrot and regent parrot. A rare find in the autumn survey was a female Gilbert's whistler, a bird of inland scrubs and mallee. Flowering *Banksia prionotes* in the western part of the catchment attracted flocks of 40 to 80 birds of three species of nomadic honeyeater – tawny-crowned, white-fronted and spiny-cheeked. Four parrot species were recorded, foraging on autumn-seeding grasses, across the catchment. Evidence of current malleefowl activity was found at three sites.

A more detailed picture of the state of the birds of the BMNDRC and their habitats will emerge following completion of the surveys later this year.

For more information contact Gavan Mullan, BMNDRC's Acting/Recovery Catchment Officer (contact details on page 1).

FIG 1

FIG 2

FIG 3

*Figure 1. A typical scene across BMNDRC – wheatfields interspersed with York gum woodland and mallee fringing natural saline drainage systems.*

*Figure 2. Part of a new heath/shrub/mallee habitat linkage or 'corridor' to connect two key remnants on the Hyde family property 'Nulands', planted in July 2004. Photos — A Huggett*

*Figure 3. Crested bellbird – a hard-to-see bird that requires heath/shrub/mallee patches of at least 15 hectares to have a 10 per cent chance of occurring. It can also move along - roadside corridors. Photo — Babs and Bert Wells/DEC*

## Starting from scratch – a nursery experience

### By Fiona Falconer

Angela Waters, her family and staff are currently growing their nineteenth 'crop' of trees and shrubs for her business – the Kalannie Tree Nursery – which she established with her late husband Max in 1989.

From small beginnings, the nursery can now boast a progressive tally of 9,735,300 tree sales since 1989.

How did the business start? A friend of Angela and Max suggested the couple supplement their income as sharefarmers by growing trees. They had no previous experience in growing trees but were prepared to 'have a go'. The timing was opportune because it coincided with the launch of the 'Decade of Landcare' and the establishment of a number of Land Conservation District Committees in the region, which drove demand for trees.

In the first few years the most common species grown by the nursery were river gum (*Eucalyptus camaldulensis*), swamp yate (*Eucalyptus occidentalis*) and athel pine (*Tamarisk aphylla*). These species had been identified as salt tolerant and suitable for rehabilitation of seepage sites on farms.

*Angela Waters in her tree nursery at Kalannie. Photo — Fiona Falconer*

Staff from the then Department of Conservation and Land Management (now DEC) at the Nursery at Narrogin were a great source of information and assistance in the early days of the nursery's establishment. The relationship with DEC has continued. More recently the nursery has taken part in growing trees for DEC for use in trials, including oil mallee, melaleuca and jam wattle (as a host for sandalwood) in addition to seedlings for biodiversity revegetation projects such as in the BMNDRC.

Increased knowledge and awareness of the importance of using local provenance seed from a variety of tree and understorey species has been reflected in what is now grown in the nursery. For example, the Natural Heritage Trust insists that 85 per cent of biodiversity revegetation for which it provides funds comprise understorey species.

The labour-intensive nature of the work in the nursery has not changed much, for example all seedlings have to be graded, sprinklers maintained, precautionary spraying done for fungal disease, trays sterilised and fertiliser applied. However, a major advance has been the purchase of a seeding machine that has replaced the old method of sowing seed with a pepper shaker. Angela used to collect and grade all seed for growing in the nursery but these days that task is done by contract seed collectors.

Asked what we can do if we want seed for seedlings grown by the nursery, Angela said 'make sure the nurseries have orders early'. There is a window of opportunity for seeding. For example melaleucas must be planted by the last week of November and the end of December at the latest for eucalypts. Some seeds, for example from acacia, ripen after the nursery starts the propagation process so need to be collected almost 12 months in advance of the nursery phase.

Angela says she is always thrilled to see the plants that have been grown in her nursery showing up in the landscape.

## Megan Jones

Megan has recently moved to Western Australia, from northern NSW after completing a Bachelor of Applied Science degree majoring in Natural Resource Management from Southern Cross University.

Part of her role as Research Officer (Geographical Information Systems – GIS) with the BMNDRC team will involve planning, implementing and reviewing BMNDRC projects by utilising Geographical Information Systems.

Before taking up this position she was employed on a joint program with the NSW Department of Lands and Wetland Care Australia, on the initial stages of a new project involving the identification of land parcels with high conservation value wetlands that would benefit from potential joint management by Wetland Care Australia and landholders. This process was undertaken via the use of GIS software.

Outside work Megan enjoys travelling, especially to national parks, swimming and carving gemstones and making her own jewellery.

She is enthusiastic about the environment and working with the current team in unison with the BMNDRC landholders.

## Book Review

*Australian seeds: a guide to their collection, identification and biology* (2006) Edited by Luke Sweedman and David Merritt. CSIRO Publishing. RRP: $59.95.

If you have ever collected native seed for a regeneration project, you will appreciate this book. It is a complete guide to the collection, processing and storage of wild-collected seed, including 1260 photographs of Australian species, showing clearly their size, shape- and beauty. If you are involved in flora conservation, this book will be invaluable.

Reference *Western Wildlife* January 2007 Vol.11, Number 1

## Websites

CSIRO has a large publishing program and many of the books have agricultural or natural history themes. www.publish.csiro.au

For information on native grasses, sourcing seed and tubestock see the Native Grass Resources Group (NGRG)website at www.nativegrassgroup.asn.au

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