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Our environment, our future

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NEWSLETTER OF THE LAND FOR WILDLIFE SCHEME

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BUGS IN THE BUSHES -

how oil mallees are contributing to biodiversity in the Wheatbelt

Anita Lyons

Mallees are small eucalyptus trees, usually less than 10m tall, with multiple stems arising from the base. They are common to low rainfall, arid and semi-arid regions of Australia. Oil mallees are known for their high levels of essential oils, which can be extracted for use in perfumes, solvents and a variety of other products. They have also been promoted as a good source of raw material for renewable energy production through biomass combustion. Today however, the major reason that oil mallees are grown in the wheatbelt of Western Australia is as a potentially valuable asset in the prevention and reduction of dryland salinity.

Oil mallees growing in alleys

It has recently been suggested that the use of commercial perennial crops will soon be the only effective way to reduce groundwater recharge sufficiently to prevent the spread of dryland salinity. The lack of suitable options for use in low rainfall regions, combined with the salinity control potential of mallees, has made them the obvious choice for farm forestry development in the wheatbelt of Western Australia.

The major benefit of oil mallees over some other perennials is that, when established in alleys, they can reduce recharge while still allowing a profit to be made from conventional farming between the rows of trees. While some work has been done on aspects of mallee ecology in order to maximise productivity, little is known about their value as a source of biodiversity in natural and agricultural systems. As a result, it is not known if oil mallees are beneficial or could somehow pose a threat to farming systems. Some claim that growing trees in paddocks simply gives pests a place to shelter and causes them to multiply. Others suggest that overall biodiversity of paddocks could be vastly improved by planting oil mallees and that they could encourage beneficial species such as predatory insects and insectivorous birds.

As part of PhD research at Curtin University of Technology, I have been conducting a study in the wheatbelt of WA to determine the level of invertebrate diversity associated with oil mallee plantings. The timing and location of this study are opportune, as the oil mallee industry, while still in its infancy, is growing rapidly. This

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Greetings all!

I hope you all had a pleasant and relaxing festive season.

Land for Wildlife staff finished the year with a workshop at Muresk Campus, Northam, and we invited staff from WWF and The National Trust to join us. This proved to be an excellent way to exchange practical information and network with some of our colleagues who are also working with private landholders on biodiversity extension.

We spent a whole day discussing vegetation assessment, to see if more quantitatively based measurements could be useful for reports to landholders. Quadrats and transects are much more time-consuming than the random walk that we usually do, but their data is more easily translated into State and National databases.

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EDITORIAL

In the Questionnaire Survey distributed in January 2005, we asked a question about the level of detail in the *LFW* property reports. 97% of the respondents were satisfied with the level of detail provided, while 3% thought the report was too long. With this endorsement, we carried on as before. But there **is** a higher level of detail, such as is produced by biological surveys, and it is this extra detail we were discussing at the workshop. Some *LFWers* have experienced both a *LFW* report and a biological survey undertaken on their property, the latter either by the Wildflower Society of WA or by WWF and The Herbarium under the aegis of the 'Woodland Watch' or 'Healthy Ecosystem' projects.

If you have had both types of reports, could you please let me know whether the extra level of detail from the quadrat-based survey has provided you with valuable information that you can use for the management of the bushland site? Or is it just interesting detail without direct management reference?

It is a pleasure to announce that there will soon be two new *LFW* Officers, one at Bridgetown and one at Kojonup. Ring Claire Hall for their contact details.

Best wishes for 2008.

Penny Hussey

LFW staff, Muresk, November 2007.

Front row, from rear: Irene Vo, Mal Harper, Cherie Kemp, Dorothy Redreau, Avril Baxter, Kara Kivell.

Back row, from rear: Fiona Falconer, Heather Adamson, Penny Hussey, Claire Hall, Wayne Gill.

Contact details for *Land for Wildlife* Officers

Name	Location	Phone	Email
Heather Adamson	Mandurah	(08) 9582 9333	heather.adamson@dec.wa.gov.au
Avril Baxter	Narrogin	(08) 9881 9218	avril.baxter@dec.wa.gov.au
Fiona Falconer	Coorow	(08) 9952 1074	fiona.falconer@dec.wa.gov.au
Wayne Gill	Esperance	(08) 9083 2100	wayne.gill@dec.wa.gov.au
Claire Hall	Perth	(08) 9334 0427	claire.hall@dec.wa.gov.au
Mal Harper	Merredin	(08) 9041 2488	malcolm.harper@dec.wa.gov.au
Penny Hussey	Perth	(08) 9334 0530	penny.hussey@dec.wa.gov.au
Cherie Kemp	Busselton	(08) 9752 5533	cherie.kemp@dec.wa.gov.au
Zara Kivell	Mundaring	(08) 9295 9112	zara.kivell@dec.wa.gov.au
Dorothy Redreau	Albany	(08) 9842 4500	dorothy.redreau@dec.wa.gov.au
Irene Vo	Perth	(08) 9334 0404	irene.vo@dec.wa.gov.au

FAUNA

THANKS FOR YOUR HELP!

Kellie Mantle

With a pink body and purple claws, the Dunsborough burrowing crayfish is a colourful animal.

Surveys in early October 2007 confirmed the presence of the endangered Dunsborough burrowing crayfish (*Engaewa reducta)* on four *Land for Wildlife* properties with several other *LFW* properties also likely to contain them.

Conditions for looking for these small terrestrial burrowing crayfish were ideal with recent, much needed rainfall recharging the watertable in the vegetated swamps and seepage areas. This prompted the burrowing crayfish to do a bit of 'spring cleaning', building and maintaining their burrows. The characteristic surface mud chimneys of the burrowing crayfish were easily identifiable by looking for the freshly dug piles of dirt pellets. There were some pretty impressive structures observed, ranging from a few centimetres in height up to 30-40cm and seeming to defy gravity.

Attempts to look for burrowing crayfish in March of this year proved to be quite challenging. Not only are the swamp areas rather warm and a tiger snake's haven, but it appears that over the summer months the burrowing crayfish retreat down to the water table via their extensive burrow system to sit out the hot dry periods. Burrowing activity practically ceases over this time and the existing surface chimney structures erode and collapse into an indistinguishable pile of sand.

Several burrowing crayfish specimens were collected from *LFW* properties by rather laborious means (digging a deep hole in the sticky mud!) and will be crucial to Quinton Burnham's PhD study on the *Engaewa* (pronounced en-GAY-wah) genus which is currently known to contain five species, three of which are listed as threatened fauna under the *Wildlife Conservation Act* 1950. Quinton will be investigating *Engeawa* DNA to try and understand the evolutionary relationships, patterns of distribution as well as habitat requirements. This will vastly improve our knowledge of the burrowing crayfish and help in developing appropriate conservation management strategies.

Burrowing crayfish are referred to as a 'short-range endemic species'. These are usually relict species from the Gondwanan era that have become tied to habitats that still provide moist conditions (eg. wetlands, swamps, caves or constructed shelters). Other examples of short-range endemics include some arachnid, snail and millepede species. Poor dispersal abilities, seasonal activity patterns and very restricted distributional ranges are characteristic of short-range endemic species, which makes them particularly vulnerable to human disturbance and gives rise to their poor conservation status. This is certainly the case for the Dunsborough burrowing crayfish which is ranked as endangered because of its limited geographical distribution, <200km2, known from only a handful of locations, poorly represented in the conservation reserve system and threatened by stock trampling, dam construction and continuing habitat fragmentation.

A chimney composed of pellets of sticky grey mud.

Efforts by *LFW* property owners to protect remnant vegetation on their properties are contributing significantly to the conservation of this species. Many thanks to all those landholders for their hospitality, enthusiasm and help in our search for the beautiful and unassuming Dunsborough burrowing crayfish.

Kellie Mantle is Project Officer Fauna, DEC, Kensington. She can be contacted on 9334 0579

ECOSYSTEMS

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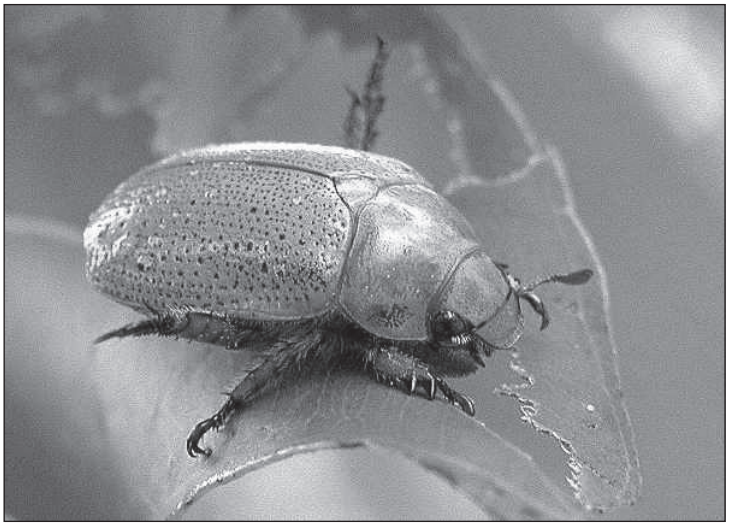
Bugs in the bushes

means that results from this work will be available to assist in the early decision-making processes of a large proportion of growers and investors, and will provide baseline data to support future work on oil mallees by other researchers. With Western Power testing a processing facility at Narrogin to produce oil, activated carbon and electricity concurrently from oil mallees this is an ideal time to further explore the potential benefits of these plants.



Christmas beetle eating eucalyptus leaves

As part of this study, I have conducted comparisons of the diversity observed in mallee plantings with that of local remnant vegetation. I have also compared some of the commonly grown mallee species with each other to determine if some species of oil mallee are better suited to promoting biodiversity than others. Invertebrate biodiversity might not be the first thing that comes to mind when we think about conservation issues. Invertebrates however, do have important roles to play in natural systems through the large number of vital ecosystem functions they perform and their place in many major food chains.

This study will concentrate on the canopy invertebrate fauna of the mallees. While canopy research involving invertebrates is common in tropical systems, there is limited information on temperate systems and still less relating to agro-forestry or conservation plantings in the agricultural areas of Australia. Hence this work will fill a void in the scientific literature by using commonly used techniques in a different environment.

Seven experimental sampling sites were set up in the wheatbelt of Western Australia in 2005. Four of these sites were used to examine differences between the oil mallee species *Eucalyptus polybractea*, *E. horistes*, and *E. loxophleba* subsp. *lissophloia*. The other three sites compared oil mallees to *E. wandoo* subsp. *wandoo* (wandoo) and *E. astringens* (brown mallet) in remnant vegetation. Sampling took place during spring 2005 and autumn 2006.

Trees at both alley and remnant sites were sampled primarily by canopy fogging, which involves spraying insecticides with a fogging machine into the canopy of individual trees. Sheets were placed beneath the trees before fogging, and 60 minutes after spraying the trees were shaken to dislodge any remaining insects. Insects were removed from the sheets by shaking into trays by hand. Once collected, samples were stored in alcohol until sorting.

For each tree, samples of each type of scale, gall, sedentary insect and other formation of interest were also taken by branch clipping. This was intended to demonstrate the diversity of invertebrate fauna not collected by canopy fogging. After field collection, all samples were taken to Curtin University of Technology for sorting and identification.

Preliminary results indicate that mallees could have a positive impact on biodiversity in the wheatbelt. The invertebrate diversity found in planted oil mallee is much greater than that which we would expect to encounter in a paddock containing crop or pasture alone. However, oil mallees do not support all of the invertebrate species that are found in the nearby remnant vegetation. This may be due to the distances required to be travelled by invertebrates moving from native vegetation to reach and colonize the oil mallee alleys. Another possibility is that the planted mallee vegetation does not contain all of the requirements needed to support the entire complement of species found in remnants.

As this project progresses it is hoped that this work will show how oil mallees can provide multiple benefits to both farmers and the environment.

Anita Lyons worked for seven years as a broad acre agronomist in Esperance. She has now returned to Curtin University of Technology to conduct this PhD project.

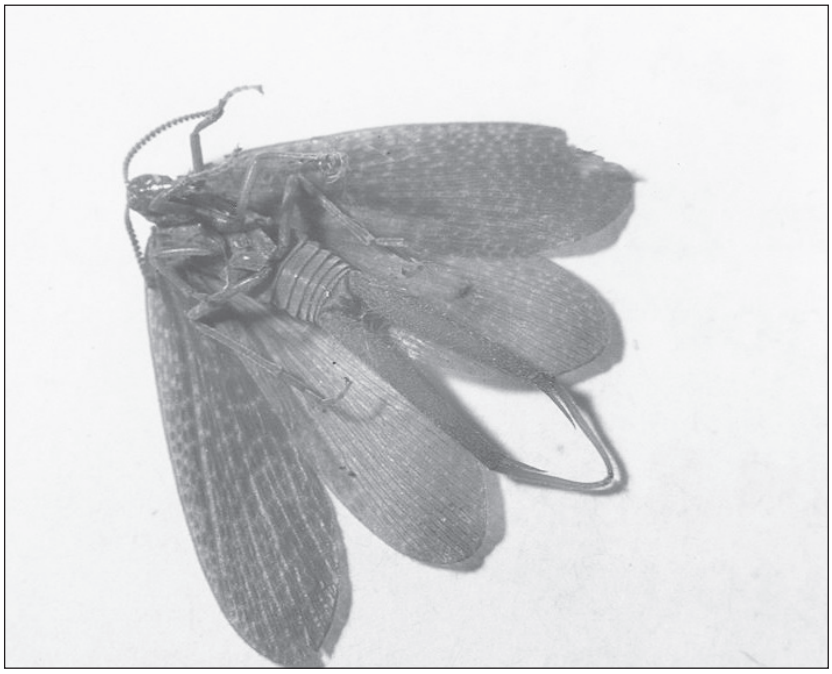
FAUNA

EARWIG FLIES? ANCIENT AND MYSTERIOUS INSECTS

Allan Wills

Earwig flies have large forceps at their tail end that remind us of earwigs but they are not earwigs, and they have two pairs of wings and fly but they are not flies, which have only one pair of wings. They look at first glance more like a strange brown cockroach - but they are very much more interesting and mysterious than any of these everyday insects.

Earwig flies are ancient insects with fossils dating back almost 200 million years. For such an ancient insect almost nothing is known about its biology and life history. Only adults and eggs from captured adults are known, as larval stages have never been found or recognised.



Austromerope poultoni. *Underside view of a male about 20 mm length. Photo courtesy Dr Jan Taylor*

Like marsupials, for example the marsupial possums in Australia and the marsupial opossum of North America, existing earwig flies (family name Meropeidae) have a strangely disjunct distribution. Meropeidae exist today only as two species: *Merope tuber* found in the forests of eastern USA, and *Austromerope poultoni* in south-west WA. Fossils of an extinct species are known from Siberia. The WA species is found in a variety of habitats ranging from woodland near Kojonup, jarrah forest near Walpole north to Darlington, and in sand plain vegetation near Eneabba. Maybe there are some in bushland near you!

What to look for: Earwig flies fly at night and are also active on the ground and in litter. Adults seem to be most active in spring, but specimens have been captured from August to December. Specimens found during the day have been collected on the ground, while flying specimens are attracted to ultraviolet lights at night. Ground active specimens have been collected in pitfall trap surveys. Crawling specimens are brown, like a small slender cockroach with two pairs of long wings of similar form and colour to each other that do not tightly overlap like cockroach wings. Males have the distinctive forceps.

You can collect non-protected invertebrate specimens from private property with the owner's permission. While exploring the bush, if you find what you think is an earwig fly and would like a formal identification, capture it (use a small paint brush to flick it into suitable small container with a lid, something like a baby food jar), place it in a small, rigid, ventilated container enclosed in an envelope and post it to Allan Wills, Department of Environment and Conservation, Locked Bag 104 Bentley Delivery Centre 6983, Western Australia. Be sure to enclose details of your return address and telephone number, as well as the capture location (GPS, map reference, or precise description), habitat, and date of capture.

Allan Wills is a Technical Officer, Science Division, DEC, specialising in entomology.

Further reading:

I Abbott, T, Burbidge and A. Wills (2007) *Austromerope poultoni* (Insecta, Mecoptera) in south-west Western Australia: occurrence, modelled geographical distribution, and phenology. *J. of the Royal Society of Western Australia*, **90**: 97-106.

FLORA

WESTERN AUSTRALIAN ORCHIDS - THE MASTERS OF DECEIT

Andrew Brown

While some south-west Western Australian orchid species are able to multiply vegetatively (asexually) by producing two or more tubers each year, most rarely multiply this way. They must instead rely upon seed dispersal as a means to increase their numbers and this dependence requires the flowers to be actively pollinated by insects or, in rare cases, by self-pollination or apomixis.

Western Australian orchids use a variety of contrivances in order to attract pollinating insects. Some are no different to most other flowering plants in offering food to potential

Oswald Sargent unwittingly observed the pollination of the dragon orchid (Caladenia barbarossa*) by a black wasp.*

pollinators. However, many circumvent the system by providing neither nectar nor pollen. Instead, they engage in pretence and deception. There are flowers that resemble fungi, some that smell like rotten meat, others that have structures like pollen laden anthers of lilies and some flowers simply mimic other flowers to catch the unwary or inexperienced bee. The masters of deception, however, are those orchids that deceive male wasps or flying ants by successfully emulating females of the insect species. This is done by emitting chemical attractants and also, occasionally, by visually resembling the female. This is an evolutionary theme that reaches its most diverse and sophisticated development in south-west WA.

Some of the first observations of pollination events were made in the 1870s by Robert Fitzgerald who is well-known for his perceptive studies on the pollination of species of sun orchids (*Thelymitra*). Using jars to cover flowers, Fitzgerald demonstrated that, unlike most other Australian orchids, some sun orchid species were capable of pollination without insects. In the 1900s Oswald Sargent unwittingly observed the pollination of the dragon orchid (*Caladenia barbarossa*) by a black wasp. This was followed by Edith Coleman's observation in the 1930s of the pollination of slipper orchids (*Cryptostylis*), thus putting Australia firmly on the map as a place where unusual and unique pollination systems occur.

A diverse group of insects pollinate orchid

*Several orchid groups in the south-west offer nectar and attract a range of insects as pollinators. A beautiful example is the fringed leek orchid (*Prasophyllum fimbria*).*

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FLORA

Orchids

It will be noticed that there is a close similarity between the central parts of the donkey orchid (Diuris) *flowers and those of co-blooming pea flowers, including the colours - yellow, brown and mauve.*

flowers. These include beetles, fungus gnats, midges, mosquitoes, flies, bees, wasps and flying ants. Although it would appear that bees are the most common pollen vector used by orchids, it is in the latter two groups that some of the closest ties between orchid and pollinator occur.

There are several orchid groups in the south-west that offer nectar and attract a range of insects as pollinators. The two largest are the leek orchids (*Prasophyllum*) and the mignonette orchids (*Microtis*), both of which advertise their nectar by producing sweet floral fragrances and, in some species, colourful flowers.

A typical example of *Prasophyllum* is the beautiful *P. fimbria*. Like others, it advertises the droplets of nectar found near the base of its brightly coloured lip by its sweet floral scent. The flowers of both this and other *Prasophyllum* species attract many nectar-feeding insects, including flies, beetles, bees and wasps, many of which will pollinate the flowers.

Flower bees respond to certain fragrances and colours, and usually seek pollen and nectar from flowers. A diverse array of Western Australian orchids have flowers specially modified to attract bees as their major pollinators. Some fairy spider orchids (*Caladenia*) exemplify this specialisation. The lip and column combine to form an open-mouthed tube that can be forced apart only by bees of the required size, shape and strength.

Many insects, such as beetles and bees, are attracted to bright colours, a feature shown in several south-west orchids. The intense yellow of the common cowslip orchid (*Caladenia flava*) and the bright pink of pink fairies (*C. latifolia*) are familiar sights in the spring. These orchids often produce massed displays, particularly following summer fire.

On first inspection, the intricate and delicate flowers of donkey orchid (*Diuris*) species make little sense in terms of pollination. Neither perfume nor nectar are offered. When seen in the wild, however, it will be noticed that there is a close similarity between the central parts of donkey orchid flowers (dorsal sepal and lip) and those of co-blooming pea flowers. Studies have shown that bees regularl visiting pea flowers for their rich source of nectar occasionally explore the donkey orchid flower in the same way. This is often referred to as 'floral mimicry' because the orchid appears to mimic another flower.

*The spectacular queen of sheba (*Thelymitra variegata*) mimics flowers of the tinsel lilies (*Calectasia*) and is pollinated by the same native bees. It is fabulously coloured in orange, purple and yellow. (For a photo of a tinsel lily, see WW 11/4 - Ed.)*

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FLORA

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Orchids

As William Dampier first observed at Shark Bay in 1699, Western Australia has an unusually high number of blue-flowered herbs and shrubs, most of which attract bees as pollinators. These flowers are mimicked superbly by some species of sun orchid (*Thelymitra*). The nectarless scented sun orchid (*Thelymitra macrophylla*), for instance, has a prominent yellow apex to the column that bees appear to mistake for the bright yellow pollen-bearing anthers of native lilies. Bees are known to collect pollen from these lilies by a special mechanism called "buzz pollination", achieved by audibly vibrating their wings to release pollen from the flower's anthers. Occasionally these bees mistake a sun orchid species for an associated lily and, in an attempt to buzz the false anther, inadvertently pollinate the flower. Other sun orchid species that mimic associated native flowers include the spectacular Queen of Sheba (*Thelymitra variegata*) which resembles species in the genus *Calectasia* (tinsel lilies) and the blue lady orchid (*Thelymitra crinita*) which is a close match for the blue morning iris (*Orthrosanthus laxus*).

The dank floor of WA's south-west forests or the sodden margins of swamps are the home of the inconspicuous helmet orchid.

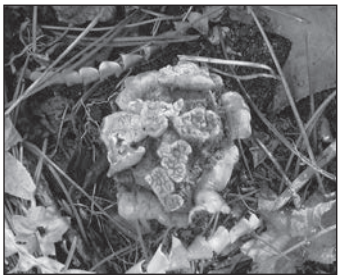
The dank floor of south-west Australia's forests or the sodden margins of swamps are the home of the inconspicuous helmet orchid (*Corybas*) species. Fungus gnats appear to be attracted to these orchids, probably due to their fungus-like odour and dull purple and brown colouration. This combination may well deceive the gnat into perceiving the orchid flower as a fungal fruiting body and on visiting the flower they achieve pollination.

Many *Caladenia* species offer neither nectar nor pollen, nor do they contain false anthers, pseudopollen or mimic other flowers. However, they do attract a large range of insect pollinators such as flies, beetles, hoverflies, bees and wasps. This group of orchids are known to emit various scents ranging from sweet and fragrant to obnoxious, the latter often like rotting meat. It would appear that insects are attracted by these odours. Interestingly, a group of flower spiders have specialised in using the *Caladenia* flowers as traps for unwary prey. Beautifully camouflaged to look like the anther at the top of the column, the spiders often capture insects attracted to the flower.

(To be continued next issue.)

Andrew Brown is Coordinator Threatened Flora, at DEC Kensington, with a special interest in orchids and eremophilas. He can be contacted by email: andrew.brown@dec.wa.gov.au

Bush Detective



This object, growing in sand near a pine plantation in Perth, is a yellowish egg-shaped ball that has cracked open to reveal a crumbly, sandy-brown mass inside. The leaves around it (banksia and liquidamber) give scale. What is it? Hint, when dry, the interior mass will disperse like dust if touched or blown in the wind.

It is a puffball, Scleroderma sp. These are common fungi, found throughout Australia among leaf litter in forests and woodlands. There are probably several different species and our WA expert, Neale Bougher, calls them all just 'sp'. They are almost certainly mycorrhizal with the trees and shrubs under which they grow. That is, despite their rather scruffy appearance, they are definitely one of the good guys!

FLORA

MORE ON TREES WITH SUNSTROKE

In April 2007 (WW 11/2) Avril Baxter and Peter White highlighted the problems that high temperatures can cause to trees, inducing total defoliation that looks like sudden death. It is not only the high temperatures that can affect plants, increased amounts of incoming solar radiation (insolation) can also be harmful. This is especially important for paddock trees, which get no shade, as the potentially damaging insolation can impact on the whole tree for the whole day.

Light provides the energy source for photosynthesis, but damage can occur whenever the light energy absorbed surpasses the amount that can be used. This could potentially occur on many of our brilliant, clear summer days, and especially if the plant is under water stress at the time – water being another ingredient for photosynthesis, of course.

We are all aware that insolation can damage human skin, causing sunburn or skin cancers, and that humans have various mechanisms such as skin pigments to counteract the problems. If plants have a similar problem, how do they manage?

Plants have multiple photoprotection mechanisms that operate together. One strategy operates at cellular level and is based on a chemical process of dissipating energy by metabolising antioxidants. The second strategy involves changes to the structure and morphology of the leaf.

One obvious adaptation is to have leaves that hang vertically, thus the flat leaf blade will only get the full sun in the morning or the afternoon, when the insolation is less intense. Many eucalypts show this feature. Another possibility is to make the leaves more reflective and so dissipate light in that way. Salmon gums show both features, and their crowns shimmer and ripple with reflected light on a sunny day.

Typical hanging leaf, marri.

But what makes the leaf reflective? It may involve a layer of wax covering the cuticle of the leaf. Raquel Esteban of the University of Basque Country, Spain, has been investigating the photoprotective role of waxes in juniper trees. These normally evergreen trees can defoliate under conditions of extreme environmental stress (like our wandoos and salmon gums) and this is their main photoprotective response, but it has a very drastic effect on the overall health of the tree. Raquel wanted to know if reflecting more light was a useful and less damaging protective feature.

Some Junipers have glaucous (greyer) leaves, caused by a higher than usual wax layer, which she found do reflect more light than the greener ones. So, does this extra reflectance help the tree cope? Maybe, but, the glaucous-leaved types showed worse defoliation under extreme stress than the greener-leaved ones – woops! Perhaps the extra wax helps under mild stress conditions, but is a hindrance – perhaps a drain on resources – during severe ones?

Next time you are in a wheatbelt woodland, look at the two species, salmon gum and inland wandoo, which often grow side by side. Both have similar-shaped hanging leaves, but the salmon gums' are light green and shiny, while the inland wandoos' are dull grey-green. Same stresses – two different approaches to the problem. Which will be more successful in a changing climate? Perhaps a PhD student in WA would like to look into these adaptations?

Penny Hussey

FUNGAL DIVERSITY IN KARRI FOREST

A recent survey* examines fungal diversity in burnt and unburnt karri regrowth near Pemberton. A total of 322 species of macrofungi were recognised, only 127 of which could be identified to species. This is an amazing diversity, given that the total area of all 36 replicate plots sampled was only 900 square metres. There was slightly more diversity on the burnt sites. It has been claimed that there are more species of fungi in WA bushland than there are of understorey plants – this certainly seems to support that point of view!

* Robinson R.M. and V.L. Tunsell. 2007. A list of macrofungi recorded in burnt and unburnt *Eucalyptus diversicolor* regrowth forest in the southwest of Western Australia: 1998-2002. Conservation Science W. Aust. **6:** 75-96.

IN BRIEF - FAUNA

NATIVE SEED-EATING FAUNA - NEED NATIVE PLANTS TO EAT THE SEEDS OF!

Western ground parrot eating semaphore sedge.

Western ground parrot eating Daviesia teretifolia

WA's rarest endemic bird, the western ground parrot (WGP), was recorded on videotape for the first time this year by Mike Barth, the WGP Recovery Project Officer. At the same time, Brent Barrett was taking some still pics, two of which are shown here. As well as being excellent shots of this very rare and elusive bird, they record what the bird is feeding on. Mike notes that while they were observing the bird, it fed on all sorts of low heath plants, pulling the fruits down to beak level. The most common food items were small semaphore sedges (*Mesomelaena* sp.) but they also ate the seeds of *Daviesia teretifolia*, as well as sundry other plants.

As well as other parrots, quite a number of native birds feed on seeds and fruits when they are available. From the emu, through bustards, bronze-wing pigeons, malleefowl, button-quails, and various parrots to pipits and finches, seeds are an important part of their diet. Although in the south-west area agricultural seeds – weeds and crops – have largely taken the place of native plants, it is still important to ensure that revegetation contains low-growing seeders for the smaller, ground-feeding birds. It is possible that this activity could be important to distribute the seeds, as some may survive to germinate in the droppings. The seed dispersal of many low sedges, curly grasses and twine rushes, for example, is not well understood, nor, unfortunately, is their seedling cultivation.

Daviesias (bitter peas) are another matter. These low-medium height shrubs are widespread across the whole of WA, so there will be one or more species suitable for every area. They are often prickly and form dense, low nest sites. The flowers are red or brownish-russet and usually very attractive. They are followed by a small triangular pod shaped like a sailboard sail. Being peas, they contribute nitrogen to the soil. Easy to collect seed, easy to grow – why not included some daviesias in your next replanting project? If you are on heath on the eastern side of the south coast, try *D. teretifolia* – some other animal will thank you, even if you are not fortunate enough to have a western ground parrot!

Photos: Brent Barrett

CARNABY'S COCKATOOS USE ARTIFICIAL NESTS

On Alison Doley's farm, 'Koobabie', at Coorow, there were 33 active Carnaby's cockatoo nests this year, including four in the seven artificial nest boxes that have been installed. They are supported by 4" galvanized pipes which have a major advantage in that no nest predator can reach them. As well they should be safe from fire, unless an ember should blow into the wooden nest. This lady of the house seems quite content with her accommodation!

Photo courtesy of Peter Odekerken.

NEWS - FAUNA

MALLEEFOWL IN MERREDIN PEAK RESERVE

Mal Harper

Malleefowl (*Leipoa ocellata*) were reported to be widespread in the early days of colonisation by Europeans but are now threatened with extinction. The causes are probably habitat destruction or decline in habitat quality, and predation by introduced species such as cats and foxes. Whilst this decline has been noted it is important that it be researched and documented.

In the Shire of Merredin many sightings of malleefowl have been made on roads close to reserves and in one case in a backyard in town. These included some sightings in the Merredin Peak Reserve, which is an area of approximately 1800 hectares adjacent to the town and vested in the Shire of Merredin. The newly formed Merredin Malleefowl Group felt that it was important to survey the reserve because, being close to town, the effects of cats, dogs and humans on malleefowl populations was not known, so the Malleefowl Preservation Group (MPG) was approached to help carry out a baseline survey of malleefowl numbers and habitat.

Thirty local residents attended an induction evening. With the benefit of local knowledge from community members and malleefowl expertise from Susanne Dennings of the MPG, an area of approximately 370 hectares within the reserve was chosen as the area to be surveyed. The survey took place over one week in June 2006 and 21 people were involved during the week, 11 of whom were visitors from as far away as Denmark.

The Merredin Peak Reserve is composed of a number of vegetation associations ranging from dense thicket, mainly *Acacia* and *Allocasuarina* species, which is very difficult to traverse, to open salmon gum and inland wandoo woodlands.

The survey methodology was to form a team of volunteers along a base line and have a leader and a tail end person both with GPS systems. The leader then walked into the bush on an east-west line and was followed by the next team member after having walked 10 to 15 metres. The team members were spaced 10 metres apart. These small distances were necessary due to the dense bush, where it was difficult to see people at any greater distance, and to ensure that no malleefowl mounds were missed. The density of the bush required that the searchers wear long sleeved shirts, long trousers and eye protection.

If a mound was found, the line halted to record all relevant mound attributes such as position, recent activity, mound dimensions and shape, soil type, habitat, litter trails scats, vegetation, tracks, presence of eggshells and any other relevant observations. Once the record was made the survey continued. During the survey, sightings of other birds and animals were also recorded. We were fortunate to have an expert on birds as a volunteer and 57 species of birds were noted during the week.

It was very successful! Thirty-one malleefowl mounds were recorded, eight of which showed signs of fresh malleefowl activity and 22 were determined to be old or very old. A follow up monitoring survey of all the active mounds was undertaken in October 2006 to determine if the level of activity had changed. This survey found that seven of the eight original mounds were still active, which was a very pleasing result.

Another monitoring survey was conducted in October 2007, coordinated by Carl Danzi from WWF-Australia who is the WA Malleefowl Network Facilitator. All 31 previously discovered mounds were monitored but none of the mounds were found to be active. This was very distressing – perhaps it is due to the current drought conditions?

All data collected during this survey was recorded on a number of palm computers. One of the participants was a ten-year-old girl who was given the job of recording with one of the computers. This greatly contributed to her interest in the survey and her determination to do the hard work of walking through the difficult terrain. There may be a lesson to be learned here!

The Merredin Malleefowl Group have now committed to maintain the monitoring of the mounds every year between October and December and to do a complete survey of the site every five years so that the Merredin community retains ownership of the results.

Mal Harper is LFWO at Merredin. He can be contacted on 9041 2488.

NEWS

THE 'GREAT BIODIVERSITY BUS TOUR'

16th September 2007. A group of keen *Land for Wildlife*rs and members of the Esperance Bird Observers Group and Esperance Wildflower Society met with a common goal - to participate in the Great Biodiversity Bus Tour. The aim was to raise awareness of the high level of diversity we have in the area with particular respect to biodiversity hotspots such as the Fitzgerald River National Park and associated Ravensthorpe Range. We planned to experience it first hand by visiting the Ravensthorpe Wildflower Show and then conducting surveys at Louise Lodge's *LFW* property in Hopetoun. To take the hassle out of transport and to provide an atmosphere where the participants could freely chat and exchange ideas, I hired the Esperance Residential College's bus for the day and I put on my bus driver's hat. Thanks to Peter Jarzabek, manager of the College, for providing the bus at half the going rate.

Australia is one of the five most ecologically diverse countries in the world. The Fitzgerald River NP is a hotspot. A hotspot, by definition, is rich in plant and animal species with a high degree of endemism and under immediate threat from factors including land clearing, development pressures, salinity, weeds, feral animals and disease. The Australian Government announced the identification of 15 national hotspots in October 2003, including the Fitzgerald which has more than 1800 species of plant with about 70% endemism. To put this into perspective, more than 18% of Western Australia's plant species are within the Fitzgerald River NP. The main threat here is from the 'biological bulldozer' known as dieback, *Phytopthora cinnamomi*, which has been found within the national park. With a high proportion of plants susceptible to the disease and no known remedy the threat is very real.

We spent just over an hour at the Wildflower Show intrigued by the diversity of species found within some of the genera on show and impressed by the palate of colour. Some took the opportunity to purchase new books while others just enjoyed stretching their legs before continuing the tour to Hopetoun.

On arrival we gathered together and I planted some seeds of thought by asking if someone could define biodiversity? Why is any loss of biodiversity important? Left to ponder these questions, people started wandering spurred on by the myriad of form and function on show. A test of species richness as the most basic measure of biodiversity was conducted. As time dwindled we gathered together for some LFW-sanctioned bakery treats and a quick chat about our respective finds. I reminded all of a quote I found whilst researching the trip;

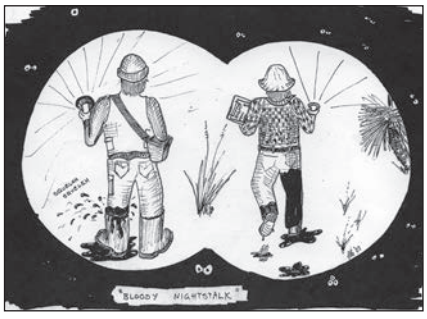
"A definition of biodiversity that is altogether simple, comprehensive, and fully operational ... is unlikely to be found." (Noss, 1990)

The final statistics showed a flora list in excess of 80 species including one priority and a bird list of 14 species. Finally it was time to load the bus and head for home. On arrival back in Esperance the feedback was excellent. Taking a bus load of enthusiastic nature lovers touring around the country side was a great way to spend a Sunday.

Wayne Gill

ON THE OTHER HAND - THE NIGHTSTALK …!

In September, a small group went nightstalking on a property near Esperance, hoping to spot a quenda. No luck – lots of frogs, though. But what we didn't spot was a deep sticky patch of quicksand --- squidge! Well, some things work well, some don't!



Wayne Gill

FLORA

USING THE BROOMBUSH KEY - INCREASING THE OPTIONS FOR REVEGETATION

Prue Dufty

A landholder east of Doodlakine recently asked us to visit his property for some information on restoration and revegetation. This property was situated on a salt lake system, so the challenge was to identify what species would have grown in that area previously, and even more importantly, would grow there again when site conditions and climate have changed. A walk in a small area of remaining vegetation revealed broombush growing around midslope on the lunette on the east side of Lake Baandee (Fig. 1). Whilst there was evidence of decline, some healthy trees were growing on obviously salt affected soils reflected by the presence of samphires as the major ground cover.

The salt lake system east of Doodlakine is typical of many areas where extensive clearing has triggered rising groundwater and, together with grazing, has resulted in deterioration of remaining vegetation. Many landholders are now prepared to fence off waterways, discharge areas and salt affected lands to protect them from stock. However revegetation of these areas is necessary to re-establish indigenous species due to the loss of seed bank and changed soil condition, as well as the establishment of an array of exotic species. The challenge is 'what native species will perform best and will also assist in reversing previous degrading trends?'

Eleven separate species of broombush are now recognised which makes identifying a particular plant difficult as most at first glance look remarkably similar. Whilst generally a flowering part is needed for a positive identification of most species, identifying broom bush species not in flower has been made easier by the key developed by Margaret Bryne, which is based on the main morphological characteristics (ref: WW 11/4).

Whilst this Broombush species found on the lunette was not in flower, the infructescence was cylindrical, the bark papery, leaf shape circular in cross section with scattered oil glands, identifying this species as *M. atroviridis*. This identification provided us with some additional options for this landholder. If this variant of *M. atroviridis* was a resprouter, as well as being a useful species in a biodiverse planting, it could also be a suitable agroforestry species (that is, if grown on suitable sites it could be harvested for an economic return). Broombush is increasingly being planted for harvesting for brush fencing, as most species within the complex have the ability to resprout, which means generally they can be harvested every 4 to 5 years. Margaret's key suggested there were two *M. atroviridis* variants, one a resprouter and the other not.

Fig. 1 M. atroviridis *growing at Lake Baandee*

Along Great Eastern Highway adjacent to this lake system we noticed a small broombush was growing on the gravel verge, as shown in the Fig 2. The base of the plant was quite thick, indicating that it had resprouted and hadn't reseeded. The leaf shape in cross section, oil glands and bark were similar to the trees growing on the lunette. It does appear this *M. atroviridis* variant growing around these lakes is a resprouter and would be suitable for agroforestry.

Prue Dufty is a Natural Resource Management Officer in the Department of Water, Narrogin. She can be contacted by email: prudence.dufty@water.wa.gov.au

Fig. 2 M. atroviridis *on the road shoulder*

[Fencing and revegetation of waterways in the Avon Catchment is an Avon Catchment Council project delivered by the Dept. of Water and funded with investment from the State and Australian governments through the NHT and the National Action Plan for Salinity and Water Quality.]

FLORA

WILD GRAPES - BUSH TUCKER

Trevor Walley

Many WA plants produce edible fruits, and Aboriginal people used to move around their country collecting them at the appropriate season. Along the coast, one such plant is the wild grape (*Nitraria billardierei).*

This is a low, spreading shrub growing on coastal limestone or limey sands. It has oblong, fleshy, greyish-green leaves and is covered in starry white flowers in late spring. The fruits are purplish, like small grapes, with a large stone surrounded by juicy flesh having a light, slightly sweet taste. Very pleasant eating!

Back in January 1831, William Shenton and friends took a boat to explore south of Fremantle, anchoring one night at Mangles Bay. He wrote: "On the rocks we found growing on low bushes great quantities of a fruit resembling half ripe black grapes, we partook sparingly of them at first but finding no ill effects continued to eat them as they were rather agreeable in flavour, and with some we made an excellent pudding the next day".

The plant grows on the coast and islands from Carnarvon right around through South Australia, Victoria, New South Wales and into Queensland. There is also an inland form, growing on natural salt lakes. In 1860, C. Wilhemi described its use as food in Victoria: "In December and January the bushes are so full of fruit, the natives lie down on their backs under them, strip off the fruit with both hands, and do not rise until the whole bush has been cleared of its load".

Unfortunately no Noongyar name for this plant has been recorded, although the existence of this summer lolly treat was certainly known. The name 'karambi' was recorded at Port Lincoln in South Australia. The English name is wild grape, or sometimes nitre bush. This latter comes from the Latin word for saltpeter, 'nitrum', as the first-named species in the genus came from salt flats in Siberia.

Last January, a group of Noongyar elders visited Weedee

Budjar (Penguin Island) to look for bush tucker and the photo shows Shane Pickett on the boardwalk, indicating a bush absolutely covered in fruit. The next time you visit a limestone coastline in summer, see if you can find some wild grapes.

Trevor Walley is a Project Officer, DEC, Kensington. He can be contacted by email: trevor.walley@dec.wa.gov.au

Illustration by E. Rippey from 'Plants of the Perth Coast and Islands'.

BOTANICAL MONITORING DAY AT WAGIN LAKES

Botanists on survey study everything! Participants on the Friends of Wagin Lakes/*LFW* 'Botanical Monitoring Day' at Wagin Lakes in October were amazed by the diversity of ground layer plants, both annual and perennial, found in the quadrats. Though they were not tall or lush-growing in this dry year, yet nevertheless, there were dozens of different species in each quadrat. In wheatbelt woodlands, this is the vegetation layer that shows the most biodiversity.

The group has since completed the re-survey of all the established quadrats, and the results will be available soon.

Avril Baxter

NEWS

BUSHLAND MANAGEMENT WITH FRIENDS!

LFW COFFEE MORNING AT CHITTERING

LFW participants with properties in the Shire of Chittering were invited to attend an enjoyable and interesting *LFW* coffee morning held at 'Peace Be Still'. This stunning 170 ha property, owned by Wendy Gellard, contains walktrails and extends eastwards from the Brockman River to the Avon Valley National Park.

Examining warrine growing amongst dolerite boulders.

Whilst refreshments were being enjoyed, Wendy discussed her property and in particular the escalating problem of feral pigs. Alex, a friend of Wendy's, was introduced to the group and described how he has been tracking and identifying the resources used by the pigs prior to determine the most effective method of control. Everyone took the opportunity to talk about their properties, raise management issues and discuss points in common, with many useful suggestions being made.

The weather cleared as the group set out on a walk up the valley slope to where the lateritic plateau begins and a fenceline denotes the end of the previously grazed area. Ringbarked wandoos indicated very early clearing to promote pasture and heavy grazing continued until 20 years ago. It was interesting to see the difference in vegetation along this boundary as, although shrub regeneration has been excellent, the ground flora on the grazed section was still dominated by paddock weeds such as paterson's curse, cape tulip, capeweed and white bartsia. These weeds are very sparse in the never-grazed area away from disturbance caused by the fence and tracks. As if it were prearranged, our native wildlife put on a demonstration for us with father emu and his clutch of chicks stalking through the valley.

For many participants, the pig damage in the commercial orchard on the river flats was an eye-opener, with extensive soil disturbance and damage sustained to the reticulation. If this continues, it means that the orchard will not be able to be watered over summer and the commercial potential will be lost.

Pig damage. Wendy is holding broken reticulation.

Just as we were returning to the house, once again the skies opened up, and we ran for shelter and a final cuppa. A well-timed excursion!

Judging by the comments made, the coffee morning provided an excellent opportunity for *LFWers* to get together and meet with like-minded people and relax in an informal atmosphere. There were calls for more such events!

Zara Kivell

If you would be prepared to host a *LFW* coffee morning, with refreshments and organisation provided by *LFW*, please contact:

Zara Kivell (Hills and Avon Valley) ph 9295 9100; or

Heather Adamson (Coastal Plain) ph 9582 9333

KATANNING SHOW

The kids enjoyed themselves making badges with rare flora and fauna themes. The spiders were very popular!

Avril Baxter

COMING EVENTS

State NRM Conference

March/April 2008

The next WA Natural Resource Management Conference will be held on 31st March to 1st April 2008 at Bridgetown and Boyup Brook, hosted by the Blackwood Basin Group. The theme is 'Regional NRM – Bridging the Barriers to Better NRM'.

www.nrmconferencewa2008.com.au

See you there!

NEW BOOKS

Back from the Brink

The 'Back from the Brink' project has produced the 'Activity Book on Threatened Species and Communities' suitable for middle to upper primary school age children (or adults who like puzzles). It is well illustrated and packed full of interesting facts and activities to make learning about threatened species fun.

'Back from the Brink' is a project based in the Northern Agricultural Region that aims to raise awareness and undertake actions that will help threatened flora, fauna and communities survive. It is a collaboration between DEC and the Northern Agricultural Catchments Council.

If you know of a young person who would enjoy these activities, why not get them a copy of the book? You could find out more about the 'Back from the Brink' project too. Contact: Renee Hartley at DEC Jurien on 9652 1911.

Pests and Diseases Image Library

www.padil.gov.au

This web site has diagnostic photographs and information on almost 1000 pest organisms and more than 100 diseases that do (or could) affect Australia. Mostly they are exotic pests and diseases that affect agriculture, but some, such as guava rust, also would affect native plants. Search for your interests, or just browse – the images are superb.

IN BRIEF

EUROPEAN HOUSE BORER – DON'T MOVE PINE

This beetle is a major pest of pine timber that has somehow got into Perth. It is devastatingly destructive of pine timber – including furniture and structural timber – and the adult beetles can spread widely. Many areas of the metropolitan area are now quarantined and movement of pine is forbidden, including furniture and firewood. If you have to move any pine into or out of Perth, please check the free hotline first: 1800 084 881 or visit: www.ehb.wa.gov.au

POLICYMAKERS SYNTHESIS ON CLIMATE CHANGE

This is the summary document used at the Bali climate change conference. In just 23 pages it summarises climate change science to date, and what future predictions reveal. It urgently warns that the risks are greater, and possibly closer in time, than was appreciated even six years ago at the time of the last IPCC report. The atmosphere is rapidly warming, snow and ice are melting and the global sea level is rising at an increasing rate; yet the problem is solvable if governments act decisively.

Download it from the internet and read it yourself: www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

Did you know ...

… that the Lake Magenta Catchment is not part of the Avon Basin, although maps usually show that it is? The newest Digital Elevation Model shows that most years it is an internally draining playa with no outlet, but in extreme events it drains south into the Fitzgerald Catchment. In very extreme events, it might possibly also run north towards the Lockhart and the Avon.

Geoff Hodgson, CSIRO

This newsletter is a compendium of articles written by many different people. The views expressed are those of the authors, not necessarily those of the Department of Environment and Conservation.
Published by the Department of Environment and Conservation, Perth.
All correspondence should be addressed to: The Editor 'Western Wildlife', Department of Environment and Conservation, Species and Communities Branch, Locked Bag 104, Bentley Delivery Centre, WA 6983.