



DEPARTMENT OF  
**Conservation**  
AND LAND MANAGEMENT  
*Conserving the nature of WA*

# Western Wildlife



April 2003 Vol. 7, Number 2

NEWSLETTER OF THE LAND FOR WILDLIFE SCHEME

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## CAN YOU FIND A SANDGROPER?

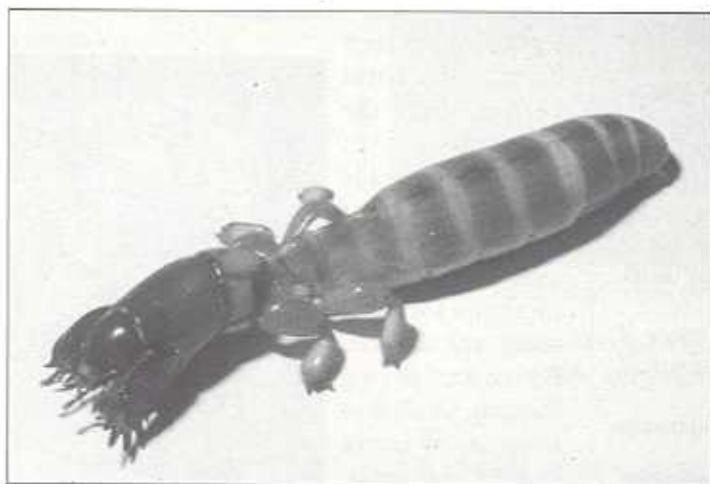
*Terry Houston*

**S**ANDGROPER' is not just a colloquial name for Western Australians, it's also the name for some very strange, wholly subterranean insects known to entomologists as cylindrachetids.

These rather odd-looking animals are believed to be descended from grasshoppers. Their streamlined bodies with no trace of wings are well-adapted to their

burrowing mode of life. The insects part the soil ahead of them with breast-stroke-like motions of their highly-modified and very powerful fore legs, running backwards or forwards within their galleries on the comparatively tiny mid and hind legs. Raised trails across bare sand are a sign of their presence.

My interest in sandgropers developed out of an awareness that almost no reliable information had been published on their biology, yet the insects were virtually right under our feet here in Perth as the city is built on a sand plain. Surely, I thought, one could easily learn something about their biology if only enough fresh specimens could be obtained. So, in April 2002 I began spreading the word with the help of newspapers and radio that I wanted specimens for study. I asked people who found a live sandgopher to freeze it as soon as possible to preserve gut contents, ovaries and other internal organs, and to contact me at the Museum. I received a very good public response, although most of the calls I got concerned the superficially similar mole crickets (these have long antennae, long feelers extending from the rear of the body, hind legs as long or longer than



*A sandgopher*

the abdomen and the adults are usually winged). Several farmers from Dandaragan to Northampton and beyond proved to be the best source of sandgopher specimens for they occasionally ploughed them up while preparing for sowing new crops.

I have learned that sandgropers are active near the surface and produce surface trails only one or two days after

rain and while the surface soil is moist (mainly from April to September). They create open tunnels as they burrow through the soil and they can back-pedal in these fairly swiftly if they are disturbed or strike a barrier. The tunnels are just slightly greater in diameter than the insects making them and don't permit turning. It seems to be chiefly the males that make the long surface trails and probably they travel in search of females. However, a small percentage of trails are made by females and juveniles.

My dissections are still underway but already have revealed that the insects consume a wide variety of native and introduced plant material including roots and leaves. Farmers' claims that sandgropers destroy some cereal plants by feeding on the bases of the stems and pulling the plants down into the soil have been supported by my analysis of gut contents. In several instances the gut contents have also included various kinds of soil-dwelling insects and some specimens had obviously feasted on termites. Dissections have also revealed that females produce eggs over most (if not all) of the year. The large eggs are laid singly in deep burrows.

*continued on page 3*



## EDITORIAL

*Greetings everyone!*

This issue contains a number of articles about our smaller critters, including the life story of a wasp less than 2 mm long. Often we tend to forget these less obvious inhabitants of our bushland, but they are a vital part of the whole web of life, and very little is known about them. Perhaps there are some readers who can help fill in the picture about Sandgropers, at least?

Smaller plants are often overlooked, too. Ray Cranfield throws a spotlight on lichens, showing how widespread and how important to the ecosystem they are.

Clive Malcolm's article about growing samphires interested me for a couple of reasons - firstly it's nice to know that people do read this magazine! - and secondly to realise that research into samphire germination and establishment has already been carried out. In the rush to find new ideas and new ways of doing things, we should not forget past lessons, or let past good work slide into oblivion.

Please could you let me know if you have any information you would like to share with readers.

*Penny Hussey*

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## USE OF ARTICLES FROM WESTERN WILDLIFE

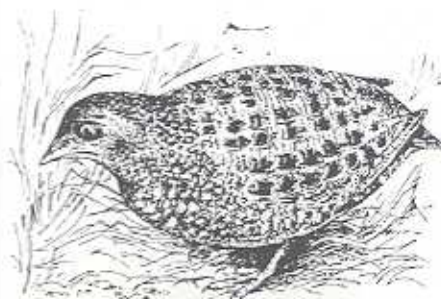
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## MEMBERS' PAGE

JENNY MACKINTOSH from Mt Helena sent us this pic taken on 25<sup>th</sup> Feb 2003 in a jarrah forest area and asked: "I wondered if you had any idea who or what made these scrapes. They are 20cm. across and very shallow as if the leaves have just been pushed aside. No droppings near them."

John Blyth of WA Threatened Species and Communities Unit says: "If the little disturbed patches are as symmetrical and plate-like as they appear in the photo, I strongly suspect the Painted Button-quail, which I know are widely dispersed through lighter jarrah forest. I have not seen their characteristic scratchings in such deep leaf litter before, but the formation of circular platelets is characteristic of several Button-quail species. It is foraging for both seeds and insects. Bronze-wing Pigeons, which also scrape away leaves looking for seeds, do not make such neat and circular platelets."

Button-quails are shy and well camouflaged, so not often noted. Anyone with eastern jarrah or wandoo woodland could look for these scrapes to get an idea if they might be present.



*Painted Button-quail*

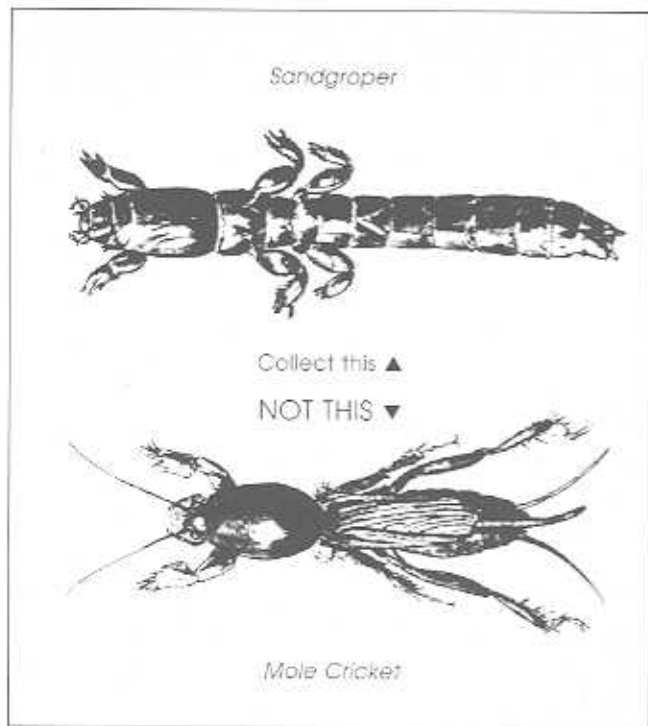


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Sandgroper continued from page 1



Don't confuse sandgroper and mole crickets.

Almost all of the specimens obtained for my study have come from the coastal plain from near Mandurah to Shark Bay. Possibly this reflects the drought conditions that prevailed in more inland areas during 2002. However, very few Museum specimens have ever been collected from inland areas and none are from the southern wheatbelt or the south coast. Whether this means that sandgroper do not occur in southern WA is open to conjecture. Consequently, should anyone find a specimen east of the Darling Range and particularly from a southern locality, I would greatly appreciate receiving it.

I would prefer to receive specimens alive or freshly killed (e.g. by freezing and forwarded on ice or preserved in 75% alcohol or formalin) but even dead, dry specimens would be useful to fill gaps in known distributions. Dry specimens to be mailed should be packed in a stiff container with tissue paper packing to prevent movement



Studying sandgroper trails

and breakage. Precise details of locality and date of collection should accompany all specimens.

For further details of preservation and packaging, together with a colour picture of the animal, contact: Dr Terry Houston, Senior Curator (Entomology), Dept. of Terrestrial Invertebrates, Western Australian Museum, Francis Street, Perth W.A. 6000. Phone (08) 9427 2742, or email: [terryhouston@museum.wa.gov.au](mailto:terryhouston@museum.wa.gov.au)

## Bush Detective

Mary Bremner sent in this photo from the Rudall River area. Large (5-6 cm), hollow, apple-sized woody lumps were growing on many bloodwood trees. They can be found on bloodwoods throughout the Kimberley and Pilbara. What are they? (Hint, inside some of the lumps is a fat grub.)

Ans: p 13

(Mary also noted that many of the fallen 'apples' had been chewed open. Rock Rats, perhaps?)

Pic: M. Bremner





## FLORA

# Mystic Lichens

R.J. Cranfield

LICHENS form part of a group collectively known as cryptogams (spore producing plants). Most of us would probably know what lichens are, but may not know much more about them other than seeing the familiar crusts on roofs or gravestones. Aspects of lichens such as how they reproduce, what they live on, where they grow, how many species we have in Western Australia, or what uses they have, are not common knowledge. But lichens are a biologically fascinating, ecologically important, surprisingly biodiverse and often very attractive part of our flora.

Lichen is a symbiotic partnership between a fungus and a green algal or a cyanobacterial (blue green algal) partner. Most of the structure is made up of the fungus, which plays the role of providing support and anchorage, absorbing water, and helping to obtain mineral nutrients by breaking down substrate material. The algal partner is photosynthetic and so produces food for both partners. This alliance has been so successful that 20,000 species of lichens are recognised in the world.

The diversity of Australian lichen taxa is estimated to be around 2,820 species and about 2,000 of them are endemic, which indicates that the lichen flora is mostly unique to this country. They are included in 363 genera. It is currently estimated that the lichen flora for WA would be around 900 species in 145 genera.

Historically lichens have played an important role as indicators of air pollution based on species presence or absence in industrial or mining areas of Europe. They can also take an environmental monitoring role in Australia, although here it is as a measure of land quality that lichens can be most valuable. Lichens can

be found on most stable habitats, with species diversity and population sizes becoming smaller in the very arid areas of Australia. However, although fewer in arid areas, their value in soil stability is actually much greater, especially in WA, with our large expanses of arid and semi-arid landscapes. Monitoring of lichens in these and other landscapes is essential, considering the levels of modification resulting from agricultural and other practices.

A first requirement for using lichens in environmental monitoring is to know what species are present. Collection and recording of our lichen flora has until recently been a low priority which has led many people to consider that lichens were not an important feature of our landscape and that the species diversity was low. My work in preparing a Lichen Census has indicated that this State has a relatively large flora and as more collections are made it is expected that the number of known species will increase. Communities and Land Care groups in Australia have an increasing need for information regarding soil microflora, and their role and interactions in maintaining soil health.

Several lichen species form extensive soil crusts, while some exist as isolated groups associated with other cryptogam species in arid areas. An excellent example of soil crusting lichens is *Diploschistes*, which at first glance might appear to be a dried bird dropping. Lichen assemblages have several recognised desirable functions that can be used as a factor to measure soil health of a given area. Lichens are digesters of organic and inorganic materials releasing many

nutrients including nitrogen into the soil, improving it for other plants. Dense crusts formed by soil lichens contribute to the protection of soil surfaces from wind and water erosion. Many of these crusts can withstand heavy rain by buffering the soil surface from splash erosion. Soil crusts have been recognised as moisture soaks by acting as a partial barrier, slowing the flowing water and retaining quantities of moisture longer in areas associated with crusting. Several of these arid area soil lichens appear to be able to withstand elevated levels of salt and mineral concentrations.

Although lichen crusts sound robust, hot fires and hard hooved livestock cause damage, especially during periods of extreme dryness when lichens become brittle. Lichens are a good example of an interesting botanical phenomenon called resurrection plants, which concerns the very rapid softening and greening of highly desiccated, apparently dead, plants. Many arid area lichens respond to the presence of water vapour from dews and frosts by absorbing this moisture within a few seconds. An example of resurrection lichen is *Chondropsis semiviridis*; a common soil surface species that turns yellow and rolls up when dry and when re-hydrated unrolls and turns green. If this moisture can be retained for an extended period the lichens usually rapidly reactivate their tissues preparing for a quick spurt of food production while the moisture is available. Extended periods of moisture availability commonly associated with the winter months promote growth and fruiting body development but appear also to be linked with a temperature requirement.



# FLORA

## Three main lichen growth forms



Crustose: *Diploschistes*



Foliose: *Menegazzia*



Fruticose: *Ramalina*

Forest lichens can be found mainly in the tree and shrub layers, with a few species occurring on the ground. Old logs are an ideal habitat to observe lichens where they can form extensive populations that contribute to the break down of the wood, thus releasing nutrients to both micro and macro flora and many species of invertebrate fauna. The reduced number of lichens found on the forest floor may be the result of lowered light levels and the rapid build up of litter that smothers them. Regular fires may also contribute to the reduced numbers as most lichens are slow developers and some are sensitive to scorching. Woodland areas appear to have larger populations of lichens on all strata with areas of high densities especially around wetlands and water bodies.

Lichens can traditionally be divided into three main growth forms. These forms are crustose, fruticose and foliose, which form a convenient starting point for identification.

Many lichen species are determined by observing morphological characters and the testing for presence of chemical compounds. New techniques have enabled many of these compounds to be formally identified and this data can be used to identify specific species. Until a few years ago interested collectors were frustrated by the lack of available published identification texts. Although many publications have been written on lichens, the compiling of this

scattering of data across the world has begun. Three lichen volumes of the Flora of Australia have been published, with more to follow.

The fungal component of the lichen partnership produces the reproductive structures (usually disc-like in shape) known as apothecia or perithecia. These structures contain fungal ascospores which vary in shape, size and structure and are important for the identification of certain taxa. Species that reproduce by means of ascospores can only develop into lichens by the random meeting with a suitable algal partner.

Although many lichens produce ascospores, others mostly reproduce by asexual or vegetative methods. Fragments of lichens are either shed or broken off and easily transported to where these fragments can develop into new populations if a suitable habitat is present. The inland species *Chondropsis semiviridis* spreads by vegetative fragmentation, and although fruiting bodies have been recorded none have been seen in WA. *Menegazzia* is a genus that can reproduce by both vegetative methods and the production of apothecia (seen in photo).

The varied structures and forms located in any given area are what fascinate and encourage the lichenologist. The variations observed range from tiny microscopic specks to large mats on rock outcrops, or to wispy pendulous strands festooning branches of trees. *Ramalina* is a genus which grows

on the branches of shrubs and trees and can be located in areas of high humidity usually associated with wetland areas.

Because we know so little about them, I would be really delighted if you could collect lichens from your area and send them to me! The sampling of lichens is straight forward as most collections are whole plants with some of the growth substrate, eg bark pieces. Transporting of lichen material is the difficult part as dry lichens are brittle and easily damaged. If you are interested, contact me and I can explain.

(Note: Lichens are a protected flora and, similar to all native flora, their collection from Crown land requires a licence from the Department of Conservation and Land Management, or the permission of the owner of private land.)

*Ray Cranfield is a botanist based at the Department of Conservation and Land Management, Manjimup. He has recently completed a census of lichens in WA.*

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LFW Tasmania produced an article with a slightly different slant on lichens in their Dec 2002 edition. If you would like a copy of that article, email Claire on claireh@calm.wa.gov.au



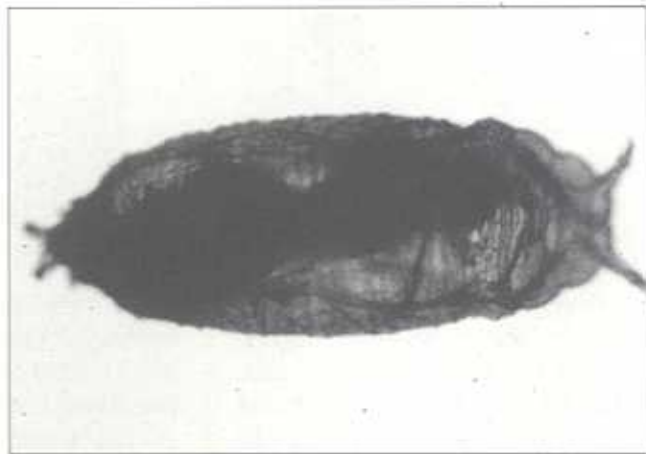
## FAUNA

# A SMART LITTLE WASP

Geoff Prince



1. *Phaenocarpa persimilis* laying an egg in a *Drosophila* larva. The thin ovipositor is guided by the tip of the ovipositor sheath.



2. A *Drosophila melanogaster* pupal case containing a *P. persimilis* ready to hatch. The wasp uses its large jaws to bite its way out of the pupa.

**P**ARASITES are not generally considered a suitable topic for polite conversation. When asked, most people would probably think of the tapeworm, several species of which can live in humans. They attach themselves to the wall of the small intestine, and like many parasites have no obvious sensory or locomotory organs, and in fact have no mouth or intestinal tract; they absorb nutrients through their surface by diffusion, and their bodies are adapted for little else than using this nourishment to make gametes. The tapeworm embryos develop in an intermediate host, such as a cow or sheep, and they are totally dependent on the infected (raw or undercooked) meat or other organs being eaten by a human to complete their life cycle.

But it is not universal that parasitic animals will always show regressive anatomy, physiology and behaviour. Ants, bees and wasps (order Hymenoptera) are possibly the most highly developed of all insects, with many species showing sophisticated navigation, learning and memory, and social behaviour. Many wasps are parasitoids, that is they have parasitic larval stages, but true to their family tree and in

contrast to many other parasites, they use a variety of complex behaviours to find their hosts and sophisticated physiology to complete their life cycles. One Australian example is *Phaenocarpa* (sometimes known as *Asobara*) *persimilis*, whose hosts are the famous *Drosophila*, commonly called vinegar flies.

This common name derives from the fly's attraction to fermenting fruit, including wine, which may be contaminated by bacteria on the fly's body and hence turn to vinegar. But the fly's fame, amongst scientists at least, is because of its ubiquitous use as a subject in the study of genetics, and more recently many other areas of biology as well. There can be few universities in the world which do not have a selection of *Drosophila melanogaster* cultures in a lab somewhere, and there may be more scientific papers published on this one species than any other.

Although most of the hundreds of *Drosophila* species have a limited distribution (roughly half of them are found only on the Hawaiian Islands), a few have spread around the world with human urbanisation, so we call these cosmopolitan species. They are stout insects about

two millimetres long. The adults typically lay their eggs in rotting fruit and vegetables, in which the maggot-like larvae burrow and eat. Generally the larvae climb clear of the rotting material to pupate. In favourable conditions, for example in laboratory culture, the entire life cycle—from egg laying to eclosion (the adult fly hatching out of the pupal case) takes less than two weeks.

*P. persimilis* belongs to the family Braconidae, whose members all parasitise other insects. The adult is more lightly built than its host, and is uniformly brown/black. The female is attracted to the same fermenting vegetable matter which the flies breed in, and as it walks over the surface it feels for vibrations from the *Drosophila* larvae feeding underneath. When it detects one, the wasp probes the substrate with its long, flexible brown ovipositor, guiding it through the tip of the ovipositor sheath, until it "hits" the larva. Generally the larva responds violently, but before it can burrow away the wasp injects an immobilising chemical and the larva goes limp. The wasp lays a transparent banana-shaped egg, and in about a minute the larva "wakes



## FAUNA

up" and carries on feeding, showing no immediate ill-effects from the operation.

The wasp egg hatches into a grub which lives within the *Drosophila* larva, slowly consuming its internal organs. When the fly pupates, the growing parasite consumes the entire contents of its host's body and eventually pupates inside the fly's pupal case. About two weeks after pupation, the adult wasp bites its way out of the pupal case.

If we could empathise closely enough with the fly, we might find a *P. persimilis* grub as repulsive as a tapeworm taken from our own digestive tract, but where insects are involved most of us are happy to take a more detached view and can appreciate the adaptations which make this wasp species successful.

In ideal conditions adult *P. persimilis* can live for up to two months, but in nature it's typical lifespan is liable to be a lot less than this. At hatching the female contains 300 - 400 eggs, and she wants to find as many hosts as possible as soon as possible. To avoid wasting time in areas where hosts are rare, she searches non-randomly, spending more time in places where the host density is higher. The behavioural mechanism involved may in fact be simple - the more hosts she finds, the greater her tendency to make sharp turns in her searching pattern.

One *Drosophila* larva represents just enough food to support one full-sized *P. persimilis*. This fact has prompted some of the most impressive adaptations by the wasp. The first of these is demonstrated by the female when she finds a host. Despite the fact that just the tip of the ovipositor enters the larva, she can tell if it already contains a wasp egg or grub. Unless most of the hosts she finds have already been "used", she will avoid laying an egg in them.

The physiology of the developing wasp shows why this behaviour is so important. Where

two parasites are found in one host, the older one almost invariably kills the younger, so an egg laid in a parasitised host will almost certainly be wasted. The developing wasp also faces challenges from the host which it has to overcome. Insects have a primitive (compared to mammals) "immune" reaction, where foreign bodies are recognised and surrounded by blood cells, which then lyse and adhere to form an enclosing capsule. Melanin is deposited in this capsule, which can persist from the larval stage through to the adult, where it can usually be seen near the surface of the abdomen. Both eggs and larvae of *P. persimilis* totally circumvent this process - apparently they are just not recognised as foreign.

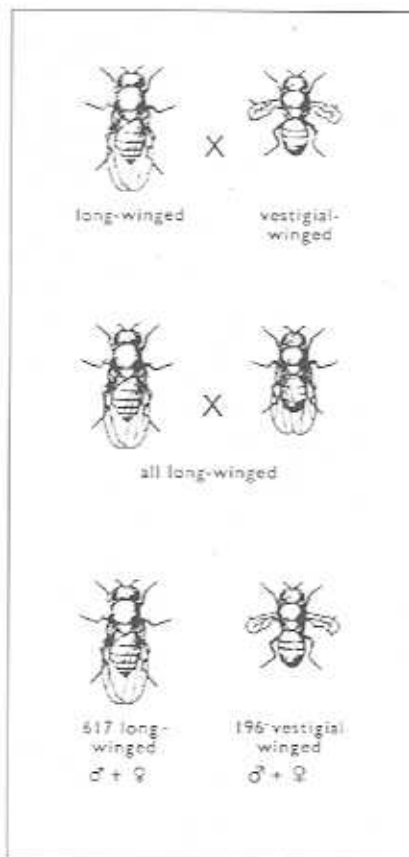
Another challenge for the wasp grub is to grow inside its host without preventing the host from growing and pupating normally; in this it seems always to be totally

successful. It manages this by targeting non-critical organs, such as the fat body, first, and avoiding any vital organs until the pupa is fully formed. This delicate diet selection is an impressive ability for a grub hatching from an egg which may be laid anywhere in the host larva, and in larvae of varying ages and species.

The known range of host species which *P. persimilis* can successfully use as hosts is interesting. It includes the common cosmopolitan species *D. melanogaster*, *D. simulans*, the less common *D. hydei* and *D. buskii*, and the Australian natives *D. fumida* and *D. nitidithorax*, as well as *Scaptomyza australis*. *Scaptomyza* is a genus closely related to *Drosophila*, but *S. australis* adults are a bit smaller than the *Drosophila* species listed above, and its larvae generally grow in rotting leaf litter. Strangely, there is one common cosmopolitan *Drosophila* species, *D. immigrans*, in which *P. persimilis* readily lays eggs but they never successfully develop. How this species is protected from the parasite is not known. It does not use the melanin-mediated "immune" reaction, since the melanin capsules are not seen in adults whose larvae have been attacked.

The known distribution of *P. persimilis* includes the metropolitan areas of Perth, Adelaide and Melbourne, country areas in Victoria and New South Wales and around Auckland, New Zealand. Related, but as yet not formally described species, are known from the tropical areas of Australia. It is interesting that an insect with such a specialised life style is flexible enough to use the newly-arrived cosmopolitan species as hosts.

There are so many things about *P. persimilis* which we don't yet know, for example, we have no real idea of how this wasp species interacted with its hosts before Europeans (and cosmopolitan *Drosophila*) came to Australia (actually we do not have much idea



3. *Drosophila* from the Year 11-12 text "The Web of Life".



IN *Western Wildlife* vol 7 no 1, Penny Hussey made an appeal for information on how to grow samphires. In the 1960s I carried out research in this area. Seeds of two species of samphire, *Arthrocnemum halocnemoides* varieties *pergranulata* and *pterygosperma* (now named *Halosarcia pergranulata* and *H. pterygosperma*) were harvested and germination tests made at a range of temperatures and salinity levels (Malcolm, 1964). Some of the seeds were scarified with sandpaper to try to break their dormancy. Germination was tested at four concentrations of sodium chloride and eight temperature regimes. Salinity caused a reduction and delay of germination in both varieties. A 50% reduction in germination for *pterygosperma* occurred at about 8 g/L and for *pergranulata* at about 20 g/L. *Pterygosperma* was very temperature specific only giving significant germination at the temperature range 5-35C, the temperature range at which *pergranulata* gave the best germination. Scarification of seeds of *pergranulata* increased and accelerated germination. There was an interaction between scarification and temperature.

The next step was to try to establish samphire on highly saline and waterlogged lands which were refusing to respond to sowing with saltbushes and bluebush. Field observation showed that if areas of saltland close to samphire bushes were protected from grazing the samphire spread by seeds. To revegetate areas remote from a seed source it was necessary to harvest and sow seeds. There is a problem with harvesting of samphire seeds because the seedheads remain green and succulent after the seeds are mature. Tests showed that for *H. pergranulata* the mature black seeds could be seen in the fleshy inflorescences in late summer, a good time for working with harvesting machinery on severe saltland. The seeds used in the above germination tests were carried out on seeds harvested in green material,

## PRACTICALITIES

# GROWING SAMPHIRE

Clive Malcolm

In February 1964, with the co-operation of the late Grant MacDonald of Toolibin, a forage harvester was used to harvest the tops of a stand of mature black-seeded samphire. The resulting material was spread on bare saltland to dry for about two weeks. A side delivery hay rake was used to knock the seed heads off the sticks and rake the sticks aside. Feeding the dry seed heads into a grain harvester did not produce a clean seed sample and clogged up the machine. A clover harvester managed to produce

a clean seed sample. But the best solution was to put the material through a hammer mill to thresh the seeds out, turn the remainder into a fine bran and probably give the seeds a degree of scarification. The resulting seed-rich material was spread on cultivated soil in the autumn at a wide range of wheatbelt sites resulting in the establishment of seedlings. Only black seeded samphire was used in this work.

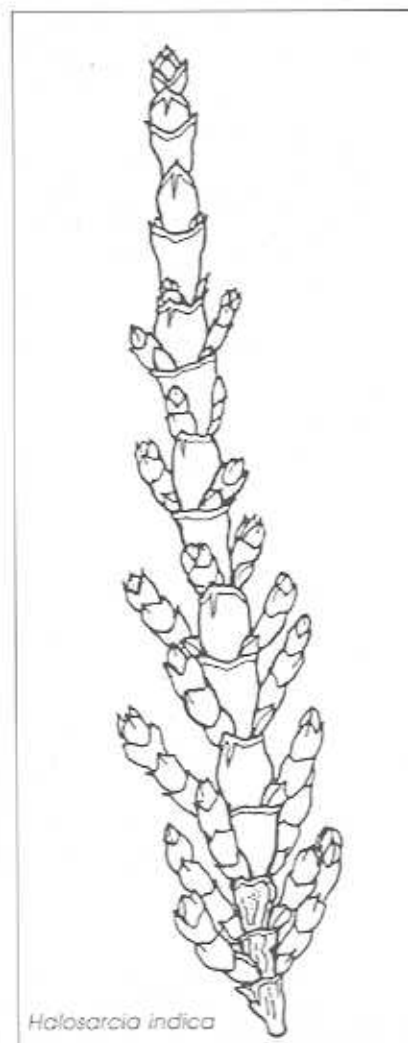
In 2002 inspection visits were made to old research sites ranging from Wongan Hills to Gutha. Samphire had been sown on some of these sites in 1964 and it had increased in presence greatly. On other sites grazing protection had encouraged samphires to colonise and a total of seven species were identified (J-P Collins, pers com.) in the old sites where no samphire had been when the sites were fenced.

The reduction in sheep numbers in the Northern Wheatbelt appears to have resulted in an enormous increase in the area of land carrying samphires. In some cases the areas are highly saline and waterlogged and there is little or no annual understorey with the samphire. In other areas colonised by samphires annual understorey is common and these areas are probably capable of growing *Atriplex* or other species.

Two examples of saline areas colonised aggressively by samphires have been observed in the past. In a grazing experiment at Kondut (Malcolm and Pol, 1986) plots of river saltbush (*Atriplex amnicola*) grazed hard every autumn for six years retained a good stand of saltbush. In the same experiment plots of marsh saltbush (*A. paludosa*) were so badly affected by grazing that they had to be rested. This enabled samphire to invade these plots. A similar case of samphire colonising around a strip of river saltbush was observed East of Gutha.

So to answer Penny's questions:

- 1 You can grow samphire (at least *H. pergranulata*) by spreading seeds on cultivated highly saline waterlogged ground in the late autumn in the wheatbelt.



*Halosarcia indica*



## PRACTICALITIES

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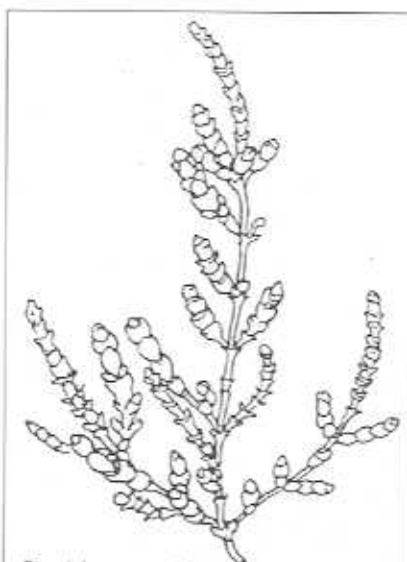
2 If there are samphire plants in the vicinity you can achieve revegetation by excluding grazing animals and allowing the plants to colonise.

Do not assume that the presence of a dense stand of samphire precludes the possibility of growing species from further up the ecotone.

There are over 250 old saltland agronomy research sites many of which have been protected from grazing for decades and some for up to 50 years. I have records and photos relating to the old sites. A programme of visits to assess the old sites includes recording colonising plants, lichens and fungi and making notes on vertebrates and invertebrates. The old sites range from Yuna to Salmon Gums and Busselton to Walgoolan. The results of this work will be used to guide the IMPULS> Project for revegetation of one million hectares of saline land in WA farming areas over ten years both for forage production and biological conservation.

References:

Malcolm, C.V. (1964) *Effects of salt temperature and seed scarification on germination of two varieties of Arthrocnemum*



Shrubby samphire  
*Halosarcia halocnemoides*

halocnemoides. *J. Royal Society of WA*, vol 47 pt 3, pp72-4.

Malcolm, C.V. and J.E. Pol. (1986) Grazing and management of saltland shrubs. *J. Agriculture WA* 27:59-63.

*Clive Malcolm worked as a Research Scientist within the Department of Agriculture, and is a pioneer of saltland revegetation. Now retired (but when do keen scientists ever really retire!) he can be contacted*

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*A Smart Little Wasp continued from page 7*

how and when the cosmopolitan *Drosophila* came here!). Maybe it's distribution was more restricted - say Queensland - and the spread of orchards and introduced hosts allowed it to move south (as *Dacus* - the Queensland Fruit Fly - seems to have done).

One researcher using yeast-baited *Drosophila* traps at a vineyard in Victoria was regularly catching, but ignoring and discarding *P. persimilis* females without realising that they had any relationship with the flies he was studying. This shows how, even for scientists, small, plain parasitic insects are easy to overlook, despite familiarity with the host species. This lack of interest is

clearly not justified - their lifestyle presents a fascinating biological story, all the more remarkable because of their small size. How many other small insects do we see each day without giving a thought to how they live their lives and what amazing adaptations they might have evolved?

"Amateur" observation can add significantly to our knowledge of the relationships between insects in Australia, where so many species have yet to be studied by science. Wasps (and some other parasitic insects) are known to use flies, butterflies and moths, beetles and numerous other groups as hosts, and any one host species (including

parasitic wasps themselves!) may have more than one possible parasite species. If you get a chance to observe the development of any insect, take a close look at what emerges from the late developmental stages or the pupal case - it might be something very different from what you expect, and you could be the first to document a previously unknown parasitoid/host relationship.

*Geoff Prince is a retired biologist and computer programmer, now living on the south coast between Albany and Denmark. He can be contacted at kg@omninet.net.au*



## REVEGETATION

**I**N 1999 the Waddy Forest LCDC (Coorow) obtained NHT funding to survey the flora of its remnant vegetation. Surveys of 33 remnants in the district were carried out by Prof. Stephen Davies and landholders. The aim was to provide information about the biodiversity of the various remnants with the aim of establishing the priority for preservation, by fencing, of the remnants, and to determine the value of linking some of them by planting corridors of vegetation.

The Waddy Forest LCDC is near the western edge of the Yilgarn Craton, a mass of Archaean granites,

### FLORA ROAD FOR WADDY FOREST

*Fiona Falconer*

gneisses, metasediments and basic rocks intruded by dolerite dykes and quartz veins. The granitic rocks date from 2,800 to 3,000 million years ago in the west near the Darling Fault, to 2,500 to 2,800 million years in the east.

The streams drain into an extensive system of salt creeks, lakes and pans that flow through the catchment as an S-shaped ephemeral watercourse. This rises in the north-east of the district and flows south-westerly to leave the catchment in the south-west.

A key finding of the surveys was the relative importance of the salt creek system for Priority Flora and its value as a corridor through the catchment. It was recommended, therefore, that corridors be planned to link remnants on the upper slopes of the landscape with the salt creek system.

As a consequence, vegetation along the Coorow-Latham Road through the Waddy Forest LCDC, was identified as the main corridor linking the upper catchment to the saline drainage system. In addition, the quality of the vegetation was seen to meet the criteria for declaration as a 'Flora Road', with its multiple values as a conservation corridor including:

- watertable and erosion control
- movement of wildlife
- comprises remnants of pre-existing vegetation communities which have been diminished, destroyed or are under threat from salinity across the wheatbelt (eg Salmon Gum woodland)
- rare fauna habitat
- tourist route
- seed source for revegetation

Cultural and historical sites are also situated along this section of road, including:

- Wynmara Well
- Waddy Forest townsite
- a pioneer grave.

Submissions to the Coorow Shire and to the Minister for the Environment for declaration as a Flora Road were ultimately successful. Waddy Forest LCDC appreciates the support of David Lamont from the Roadside Conservation Committee, including the provision of signs to identify the Flora Road.



*Wynmara Well, Coorow-Latham Road*



*A fine avenue of Salmon Gums, Coorow-Latham Road*



CSIRO Sustainable Ecosystems has recently completed field surveys of birds and native vegetation on private and public lands in Buntine-Marchagee catchment, northern wheatbelt. This is part of an interagency project being run by the Department of Conservation and Land Management's Mid West Region to help landholders better manage their impact on the fauna, groundwater and native vegetation resources of this area. The CSIRO bird team of Andrew Huggett, John Ingram and Blair Parsons surveyed birds in 213 bush remnants, recording over 18,000 individual birds from 111 different species from September to early October last year. All mapped remnants in each of three sampling zones were searched for birds in mornings and late afternoons. Point-counts were also conducted along 2 km transects in saline wetlands.

Common woodland and shrubland species recorded were Red-capped Robin, Weebill, White-browed Babbler, Rufous Whistler, Variegated Fairy-wren, and Inland Thornbill. Common wetland species were White-winged Fairy-wren and White-fronted Chat. Several woodland and heathland species considered sensitive to the effects of habitat loss and fragmentation were recorded in some of the larger remnants in the south and north-east. These include Rufous Fieldwren, Shy Hylacola, Malleefowl, Golden Whistler, Western Yellow Robin, Southern Scrub-robin, and Blue-breasted Fairy-wren. Malleefowl were only recorded in 3 remnants despite several old mounds found on lateritic or granitic rises. It seemed that the team was tracing the recent disappearance of Malleefowl from this landscape, especially in the absence of active fox baiting.

The team's work is now focusing on data collation and analysis. Bird data will be combined with the results of vegetation sampling and mapping. This is helping to identify focal bird species of Buntine-Marchagee Catchment and is enabling the design of a landscape that can help conserve the area's remnant bird communities.

## RESEARCH

### CSIRO BIRD AND VEGETATION SURVEYS IN THE BUNTINE-MARCHAGEE RECOVERY CATCHMENT

Andrew Huggett



*Malleefowl appear to have disappeared from many remnants in Buntine-Marchagee. Photo: M. Oatham*



*Typical mallee woodland habitat surveyed for birds by the CSIRO team*



*Western Yellow Robins were recorded in small and larger remnants containing dense Melaleuca and Acacia thickets with minimal ground cover*

CSIRO's Lesley Brooker is providing key focal species analysis and landscape design expertise to this process, which builds on the work of previous CSIRO projects undertaken

in other parts of the WA wheatbelt.

All 631 remnants of native vegetation in the catchment have been surveyed and mapped by the Department's contractors (Melanie Clinch, Clare Forward and Nicole Lincoln) and CSIRO Sustainable Ecosystems (Lyn Atkins). The surveys have identified different plant communities (vegetation association patches) in the remnants using satellite images. Each remnant has been visited (ground-truthed) to check the accuracy of plant community boundaries and describe communities in terms of structure and major species present.

The vegetation mapping work has produced some 'surprises', namely the number of remnants (or patches within the remnants) that are in 'good' condition, especially within the saline areas and uplands; the substantial floristic differences between aeolian 'Geraldton sandplain' shrublands in the southwest and older 'Yilgarn block' sandplain shrublands in the north and east of the catchment; and the numbers of River Red Gums (*Eucalyptus camaldulensis*) on the 'Geraldton sandplain' areas.

A smaller but more detailed survey of plant species present in each layer of vegetation in selected remnants was also completed in spring 2002. This information is being used to correlate with the bird data to see if there are specific characteristics of the plant communities that may be influencing bird responses in this fragmented landscape.

CSIRO will prepare a report based on the results of the focal species analysis and landscape design for presentation to Land and Water Australia and the Department by July 2004.

*Andrew Huggett is an ornithologist with interests in the functional ecology of declining woodland birds, landscape management, wetland ecology, bioregional planning, and science communication. He has previously worked in the temperate eucalypt forests and rainforests, coastal upland swamps, montane heath, and coastal freshwater wetlands of eastern Australia. Andrew can be contacted on ph: 9333 6458, email: andrew.huggett@csiro.au*



# CLIMATE

## GUINEA PIGS IN A LABORATORY FOR CLIMATE CHANGE?

*Observing Our Own Responses*

*Brian Sadler*

### Hindsight

Some 15 years ago the national Greenhouse 87 conference drew public attention to predictions of future rainfall decline in south-western Australia from global warming. These CSIRO scenarios, for a 20% rainfall decline by 2040, were surrounded by strong controversy. Discussion, as is still common now, was mostly in the realm of a hypothetical future.

In actuality, fifteen or more years before Greenhouse 87, in the late 60s to mid 70s, regional climate had suffered an abrupt rainfall decrease, in a real climatic shift which has persisted to this day. In 1987 however, that fact was not recognized even though the scale of decrease was similar to that which CSIRO projected in the Greenhouse 87 conference as a scenario for the year 2040.

In the mid 70s change, average winter rainfall decreased by 10% to 20% across the region of the wheatbelt, forests and coastal plain north to Jurien. The decrease came through less rain days, a later start to winter rains, less rain on extreme days and an absence of occasional "wet" winters typical of the past.

However, it not until the late 1990s, 20 or more years after the event, that climate science demonstrated a climate shift had occurred.

The abrupt rainfall decrease in the 70s has now been linked to global changes in atmospheric circulation which began at that time and which are similar to circulation changes projected for global warming. However, even now, research has not firmly determined the cause. Tentatively, it has been attributed

to a mixture of multi-decadal variability and effects of human development, particularly to increase of Greenhouse gas emissions.

Behind this rainfall decrease another change was also occurring, in line with global and national trends. Surface temperatures rose progressively. Over the past 50 years this increase has been in the order of 0.5 °C in the South West. The increase was more in winter than summer and more at night than day. Recent international reports have confirmed that the primary cause of this warming is accumulation of greenhouse gases in the atmosphere.

This history highlights the basic uncertainties of making decisions about climate change. It doesn't present with a clear "signature" and it's not easy to diagnose and separate from natural variability. Decisions on action are thus caught up with uncertainty about what exactly it is that we are trying to treat.

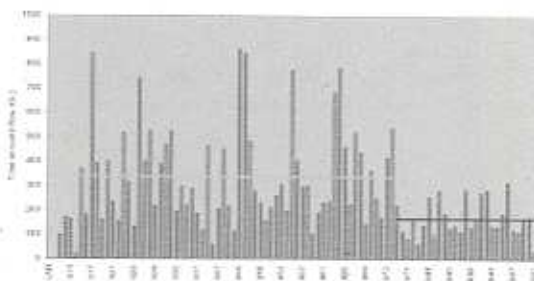
### How did we respond?

In the South West, water engineers were the first to act. The reasons were simple. The effects of the climate shift were greatly magnified in the resulting changes to river flows. Being only a small residual between rainfall and evaporation, river flows did not

simply decrease proportionately but mean annual flows followed an abrupt and exaggerated decrease of some 50% after the mid 70s. Even this change was not immediately apparent at the time above the "noise" of natural variability.

It now appears that rainfall mechanisms at that time crossed some threshold in which occasional "wet" years virtually disappeared as a feature of regional climate variability. Because such years contributed strongly to storage replenishment the change has proved very serious for water supply management and has required hundreds of millions of dollars of extra investment. Such adjustments began in the late 80s but it was only in the late 90s that water engineers were confident that they were, in fact confronted with an abrupt and persistent climate shift.

Interestingly, farming fared very well under these changes. Wheat yields actually increased without any real recognition of climate change as an explicit management issue. Broad-acre agriculture had generally adopted minimum-till as best-practice. This measure, adaptable to later seeding, proved a wellmatched, if untailed, response to later onset of winter rains which accompanied the rain decrease. Also, although a serious concern to the water sector, the absence of "wet" winters was a favourable shift for many farms. In 2002 however, the winter season stepped comprehensively over the threshold of regional crop failure. Farming is now concerned that such thresholds might be crossed more commonly in the future under sustained trends of rainfall decline and warming.



Streamflows Perth Catchments 1911-2001



## CLIMATE

continued from page 12

Environmentally, the impacts to date are less clear. For the most part attention, over the last quarter century, focussed on hypothetical impacts of projected change and emissions control rather than on treating climate change adaptation as a current action issue. However, the sharp decline of river flows in the mid 70s suggests that moisture stress has been sustained at high levels for a quarter century in this region because of climate shifts. Coastal wetlands, for some time, have shown signs of increasing stress. For such wetlands, until recently, more attention was given to the impacts of water use and pine plantations than to climatic pressure which is the primary issue. Recent work has actively considered the possible impacts of rainfall decline and warming on the current state and sustainability of tuart and wandoo woodlands.

### National laboratory?

Consistently since '87, climate modelling has pointed to the South West as the Australian region most vulnerable to rainfall decrease.

The region, for whatever physical reason, has had a quarter century start down that path, which has impacted on our natural, economic, social and decision environments.

Whilst there is much hypothesising nationally and internationally about climate change impacts and responses, real experience is a scarce global commodity. Having sought such experience and found little, it has been argued that this region might be seen as a real-time national laboratory for study of climate change impacts and responses.

### A few observations

Climate change is a somewhat insidious process surrounded by uncertainties which are difficult for decision-making.

It is not easy to map the progress of change over the noise of natural

variability. It took two decades for the region to confirm that the region had undergone a significant climate shift in the 70s and we are only able to make broad directional projections of future change.

Some changes may occur as relatively abrupt shifts rather than as steady trends.

Change impacts differently on various socio-economic sectors and there may be thresholds of change at which some specific impacts become critical.

Extreme years, such as 2002, which cross critical thresholds of drought and/or temperature will be expected to more frequently affect the natural regime in coming decades. Likewise, under declining rainfall, flood thresholds in some areas may be crossed less often with other implications for rivers and wetlands.

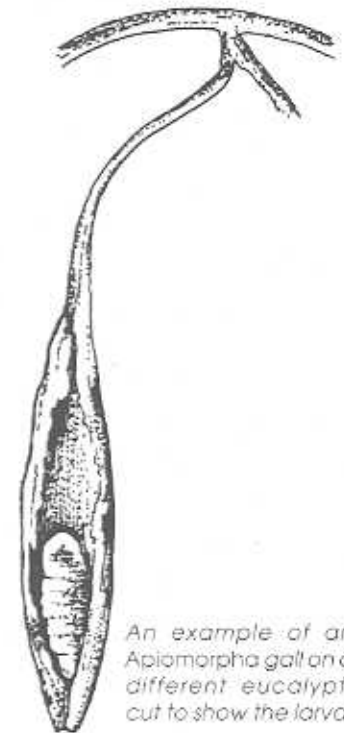
Until now, debate and decision-making about adaptation to climate change in Australia has been mostly hypothetical. In this region it is reality. Future debate and decision-making might benefit from closer study of particular aspects of actual climate impacts and responses in this region over the last quarter century.

### Decision support

The Indian Ocean Climate Initiative (IOCI) of the WA State Government is to continue with strategic investigation of climate variability and change over the next 5 years. The goal of the Initiative is to help reduce the uncertainties inherent in deciding management responses which address the impacts of change. The Department of Conservation and Land Management is a partner in IOCI.

*Brian Sadler is Chairman of the Indian Ocean Climate Initiative and Adjunct Professor at the University of Notre Dame Australia, Institute of Natural Resource Management*

## BUSH DETECTIVE



An example of an *Apiomorpha* gall on a different eucalypt, cut to show the larva.

Ans

They are popularly known as Bloodwood Apples, and are a gall caused by infestation of the plant by an insect, in this case the bug *Apiomorpha* sp. It is a member of a group of insects called the gall-makers, in the Superfamily Coccoidea, related to scale insects and mealy bugs.

The female attaches itself to a host plant, and, by a process not fully understood, it's feeding activities stimulate the plant tissue to expand and cover the larva until it is completely enclosed. Often each species stimulates a different sort of gall, which is very distinctive in size and shape. This is a big drain on the plant's resources, and a heavy infestation can severely retard growth.

In *Apiomorpha* species, the large galls contain females, male galls are probably smaller and may be a different shape. Like many of our smaller organisms, the exact details of this one are not known.



## FAUNA

# GROWING SANDALWOOD FOR NATIVE RODENTS?

Rosemary Jasper

THE nuts of the Sandalwood and Quandong are an excellent bush food. Nutritionally they have a similar food value to commercially available nuts (60% oils, 18% protein and 16% carbohydrate). Moreover the nuts fall to the ground when ripe and will stay in good condition for up to 18 months. But for most animals there is one problem – the shell of the nut is thick and not easy to crack.

It is to be expected though, that some animal in the bush is equipped to take advantage of this resource. Humans need two bits of handy rock to deftly break the shell, but which bush animals are able to access this food source?

That some animal does, and indeed makes a habit of it, is evidenced by the photo. This is a collection of empty Sandalwood shells, all of which have been neatly decapitated and the kernel extracted. They are discarded close to a small burrow, which goes back under the small granite rock. The photo was taken in spring, near Ravensthorpe in open woodland vegetation. At the time the gnawed edge of the shell looked fresh and not weathered so it is assumed that the activity was recent.

There were similar small burrows and collections of gnawed Sandalwood nuts under most of the Sandalwood trees, within a radius of about 200 metres.

The question remains as to which particular animal so effectively feasted on these nuts. Such collections of chewed shells is a sign of the Western Mouse, *Pseudomys occidentalis*, and this is possibly the only animal in this area that has teeth strong enough to penetrate the shell and a gape wide enough to get a purchase on the nut.

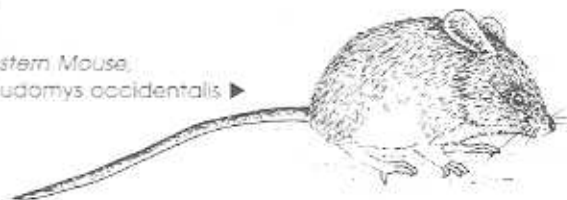
The Western Mouse is known from this general area, having been recorded in the nearby Ravensthorpe Range, and further south. Its known current distribution is restricted to an area around Lake Grace, Hyden, Ravensthorpe and Jerramungup. Historically, it has been recorded further west and the first described specimen came from Tambellup. Sub-fossil evidence suggests that it once inhabited a stretch of country from Margaret River to coastal South Australia. It is listed on the Department of Conservation and Land Management's Priority Fauna list.

The Western Mouse is one of the five native rodents found in this area – the others are the Bush Rat (*Rattus fuscipes*), Ash-grey Mouse (*Pseudomys albocinereus*), Heath Rat (*Pseudomys shortridgei*) and Mitchell's Hopping Mouse (*Notomys mitchelli*).

The Western Mouse is a moderately large nocturnal rodent with a head & body length of about 100 mm. It



Western Mouse,  
*Pseudomys occidentalis*



is reported to feed on underground tubers, seeds, fruits, flowers and various insects. It has typically been found in long unburnt vegetation (30 – 50 years without fire). The home range of an individual, which is shared with others, is up to 150 ha, and individuals can travel up to 600 metres in a night. They construct burrows, which they use communally.

So whether it is the Western Mouse that is resident at this patch or some other animal, it is exciting to find these signs of a specialist at work. It is worth looking around any Sandalwood or Quandong trees that you come across for evidence of animals eating the kernels. It is always exciting to find out there are animals in the bush that we didn't imagine were there.

P.S. If you do find caches of 'spent shells' like in the photograph contact *Land for Wildlife* or the Department's Wildlife Branch.

For more information, contact: Rosemary Jasper, ph 9838 1890, email, [rosemaryj@calm.wa.gov.au](mailto:rosemaryj@calm.wa.gov.au) ]

#### References:

- Morris, K., Whisson, L., Burbidge, A.A., & Wallace, K. (1993) *A recovery plan for the Western Mouse*, DCLM.
- Strahan, R. (1995) *The Mammals of Australia*, Australian Museum/Reed Books.
- Brand, P. & Jones, P. (May 1999) *Growing Sandalwood* (*Santalum spicatum*) on farmland in WA. Sandalwood Information Sheet, May 1999. CALM



OUR Gidgegannup retreat has been a welcome escape from the sanitized city and provides a beautiful window into the workings of the natural environment. Over the years the brush wallabies and emus have disappeared, and have been replaced by a horde of kangaroos. The kangaroos now graze and trample the whole area like a herd of cattle, progressively removing the natural vegetation, while we watch with dismay as the tide of South African weeds advances up the hill from the road. What will be left of it all in another 100 years?

Mostly we are too busy to stop and observe details - the small picture - but the call of nature forces us all to sit a while and contemplate our surroundings. There is nowhere better to do this than in the old outside dunny. On entry you are usually greeted by a flurry of Old Lady Moths - they love to rest in dark outbuildings, and there is usually plenty of other insect activity to watch while sitting there. Mud-dauber wasps are often busy building nests behind the door and provisioning them with garden spiders, while brilliant blue-green chalcid wasps come searching for these nests. Their larvae are parasitic and eat the mud-dauber larvae.

Sometimes, there is not much to see and my mind wanders - relaxed by the rhythmic movement of clots of cobweb on the wall, blowing in the breeze. Once I was brought back

## FAUNA

### DUNNY-BUGS

Jan Taylor



*"Dunny-bug" - an assassin bug (Reduviidae) belonging to the subfamily Emesinae  
Photo: Jan Taylor*


to reality when I noticed that one of the clots of web was not fixed at all. It was floating around just like the other pieces of web, but was actually walking! A close look revealed that it was a heavily disguised assassin bug. It had feathery outgrowths over its body and was using its long thin spidery legs to move forward in a web-mimicking manner. This bug looks like a mantis and is probably a very successful predator, escaping detection by its looks and behaviour. It had to be called a *dunny-bug*.

Since this discovery, looking out for dunny-bugs became an added interest during visits to the dunny. I found that the bugs often fly, seeking out dark places to land on. Their

well-developed wings even have veins made to look like strands of web. What did they prey on? Spiders? I tried presenting one with a dead spider - the bug very stealthily approached and gently inserted its proboscis into the spider's abdomen. Would it do this naturally to a living spider? Would the spider notice?

These questions still need to be answered - but time in the dunny is usually cut short by the menacing high-pitched whine of a horde of silver-banded mosquitoes emerging from the dark recesses. These tiny mosquitoes unerringly head for the tip of the nose - the only exposed biting point on most mammals. There is no doubt that each one is intent on inserting its proboscis into my living body! It is time to go out and pull up some more veld grass.

*Dr Jan Taylor is a zoologist and author: his books include "Australia's Southwest and Our Future" published by Kangaroo Press. He can be contacted by email: [jmtaylor@cygnus.uwa.edu.au](mailto:jmtaylor@cygnus.uwa.edu.au)*



Has anybody - perhaps some of our older readers - got any good stories about fauna in the dunny? If so, perhaps you would share them with us? - Ed.

## NEW GROUP

### FRIENDS OF THE WESTERN GROUND PARROT

IN all too few long-unburnt low heathland areas of the South Coast, lives a shy and secretive bird, the Western Ground Parrot. Green with a yellow underside, all heavily barred with black, it is perfectly camouflaged as it feeds, nests and even roosts on the ground, below the shrub canopy. It can fly, but usually does so only at dawn and dusk or when flushed.

Once more widespread, fragmentation, foxes and frequent fires have devastated its habitat, and the bird is in severe decline - over the past 12 years, from an estimated 380 birds to 250. That's all there are in the world! It is in danger of going the way of it's arid zone relative, the Night Parrot - presumed extinct.

This bird really needs Friends! You can help in many ways, why

not contact the organisers and find out how?

*Anne Bondin; ph: (08) 9844 1793;  
email: [albanybirds@hotmail.com](mailto:albanybirds@hotmail.com)*

*Brenda Newbey;  
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email: [sfryc@iinet.net.au](mailto:sfryc@iinet.net.au)*



## MEMBERS' PAGE

**Y**OU may remember in WW Oct 2001 and Jan 2002, the 'Grevillea Man' Neil Marriott described a trip to WA in search of unusual species. Mary Squires, of Mukinbudin, showed him and Peter Olde a plant which has now been named in her honour *Grevillea squiresae*. This is a beautiful metre-high shrub with pendant red flowers.

Like many of our rarer plants, it is confined to a few populations on road verges. This reinforces how important it is to look after roadside remnants. Perhaps you could keep an eye on the verges near you? Uncaring grader drivers can wipe out unique remnants in the blink of an eye .....

For the full description of the species, read: One new *Banksia* and two new *Grevillea* species (Proteaceae: Grevilleoideae) from Western Australia. 2002. Peter M. Olde & Neil R. Marriott. *Nuytsia* 15: 85-99

### NEW GREVILLEA NAMED AFTER MARY SQUIRES



*Grevillea squiresae*

#### Neil's footnote:

As part of the research undertaken by Peter and I with the Perth Herbarium, a new population of *G. squiresae* was "discovered" last year in a nearby bushland reserve. Amazingly, this population came to light when I found an incorrectly identified specimen when wading through the thousands of specimens in the Herbarium. This is wonderful news for the species' survival, however it still remains critically endangered. As I said in my article last year "every little piece of remnant bushland is vital for the survival of our plants and animals".

Feel free to contact me if you have a *Grevillea* you cannot identify, c/- PO Box 107, Stawell, Vic 3380, or at neilm@tfn.org.au Who knows, you may finish up having one named in your honour!

### ELECTRICAL EFFECTS?

**H**AS anyone else noted that the balga spikes under electric wires are often bent and twisted like this one? Is there any connection between the magnetic field generated by the wires and the plant's growth? Does anyone know? If there is any connection, I shall know to plant *Xanthorrhoeas* away from electric wires in future!

Jennifer Young

No-one here is able to answer your question, Jennifer. But we do know that spikes bend after damage to the growing point, so possibly line inspections by careless work crews have something to do with it? - Ed.



photo: Alison Dugand

#### Did you know?

... that you can tell the two genera of Sheoaks apart by their seed colour? *Casuarina's* seed is dull grey, *Allocasuarina's* shiny black or brown. Incidentally, their winged seed is properly called a 'samara'.



#### Did you know?

That a frog retracts its eyes (usually one at a time) to help force food down it's throat?



**I**N February I was lucky enough to be invited on board the Leeuwin Sail Training Ship to accompany the International Singapore American School on a chartered youth eco-voyage between Esperance and Albany.

Not only was I going to have the opportunity to escape from everyday life for five days but I was going to get the opportunity to visit Mondrain Island which is the second largest island off the south coast of WA and is part of the Recherche Archipelago. The island is 6.6km long and 2.6 kilometres wide and is vested as a Nature Reserve. Approximately twelve thousand years ago the island was separated off from the mainland by rising sea levels, isolating the animals that remained.

There are about 150 plant species recorded on the island and freshwater is available in seeps from granite rock catchments. Some of the vertebrate species on the island include; the threatened Recherche Rock Wallaby (*Petrogale lateralis hacketti*), the Southern Bushrat (*Rattus fuscipes*), Carpet Snake (*Morelia spilota imbricata*) and the Death Adder (*Acanthophis antarcticus*), nine species of lizard including the Kings Skink (*Egernia kingii*), and marine birds like the Flesh Footed Shearwaters (*Puffinus carneipes*) and Little Penguins (*Eudyptula minor*) which breed in burrows tucked in under the hummocks of native grasses and pigface. One frog was recorded on the island in 1921 but has not been seen since.

For me the most exciting experience was to view the threatened Recherche Rock Wallabies. There have been sightings of up to 67 animals on the island. These animals hide under the granite rock shelters and feed mainly on pigface, grasses and *Myoporum*. They are a subspecies of the mainland Black Footed Rock Wallaby (*Petrogale lateralis lateralis*) which now only exists in

## LFW NEWS

### Land For Wildlife goes sailing



year in September a lightning strike saw most of the island burn. Just a few remaining pockets of green vegetation escaped the fire and provide the surviving fauna with much needed refuge and food. Many of the chicks of the Flesh Footed Shearwaters and the Little Penguins were burnt and killed during the fire and many of the burrows remain exposed and damaged. The adults will not be able to breed on the island this following spring.

At the Doubtful Islands we had the opportunity to mingle with the Australian Sea Lion and Fur Seal breeding colony. This was an extraordinary experience especially swimming in the cool, sparkling southern ocean and coming face to face with these playful and curious creatures of the seas.

I felt exhilarated by the five day sailing experience and feel very privileged to have had the opportunity to visit Mondrain Island. Little did I know that I was also going to be part of the Leeuwin sailing adventure which saw the boat get caught in a 48 knot sea storm with half the group stranded on shore, partake in the torturous night watch between midnight and 4am and climb up masts in rolling seas to help furl sails. It was a lifetime experience and I would like to thank the Leeuwin staff for this amazing nature/adventure experience.

Sylvia Leighton



a few isolated populations in the wheatbelt having suffered from fox predation and loss of habitat.

Unfortunately these animals' populations are extremely vulnerable to fire on the island. Last

## WAGIN WOOLORAMA





## WEEDS

### CATERPILLARS ON YOUR CAPE LILACS?

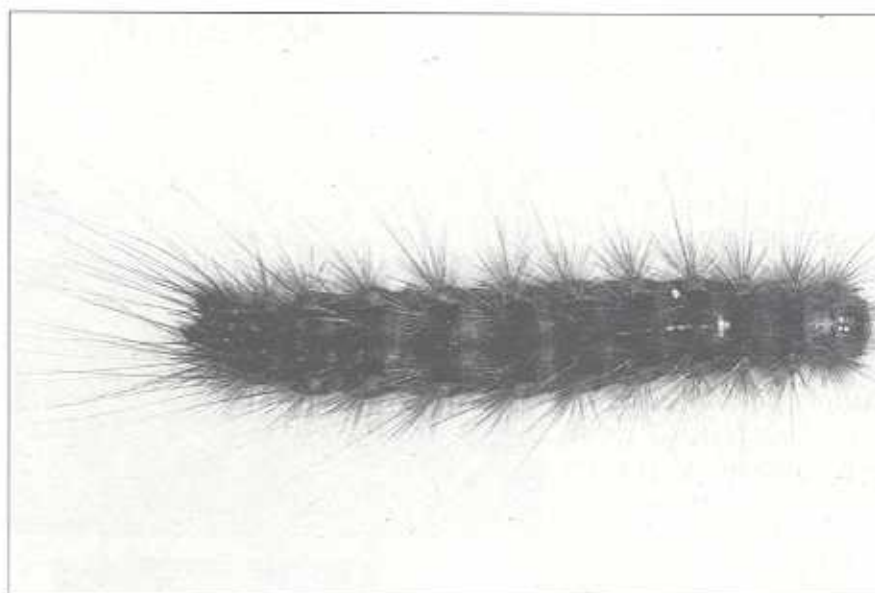
**W**HILE Cape Lilac, *Melia azedarach*, is native to the Kimberley, it was introduced to south-west WA as a garden shade tree. It has berries which are eaten and the seeds dispersed by birds, and the tree has become a weed in disturbed sites.

This year, many people noticed that, in high summer, their trees were defoliated by black hairy caterpillars. OK - but - during the day, the great mass of caterpillars looks for a shady hidey-hole ... a shed, or house, is ideal. Ian McColl of York went into his egg-packing shed early one morning to find caterpillars swarming over everything! And we have had reports of them infesting houses - even getting between the sheets in a bed! (Yeuk!!!!)

They are caterpillars of the White Cedar Moth, *Leptocneria reducta*, ('White Cedar' is the eastern states name for this tree) and it's not certain how they managed to get to south-west WA. In their natural habitat predators - probably birds - regulate the numbers, but presumably this isn't happening here, since they have only really been noticed in Perth during the last 18 months.

Killing the caterpillars inside a building would be horribly messy. The best action is to wait until they have all gone to feed, then block off all possible access holes by using quality surface insect control sprays. You could also tie some old hessian or carpet around the trunk of the Cape Lilac, and sprinkle it with vegetable or tomato dust containing carbaryl (make sure children or pets cannot contact the dust) so that the caterpillars contact the chemical as they crawl up or down the tree. Best long-term action, remove the Cape Lilac and replace it with something that's locally native.

Photos: Entomology Branch, Dept of Agriculture



Caterpillar



Larvae

#### UPDATE YOUR 'WESTERN WEEDS'

'Western Weeds' has been reprinted. Copies can be obtained from AgWA, for \$25.00 + GST. However, since the book was originally published, in 1997, there have been many changes in taxonomy, new weeds discovered, etc. Because amending the text would mean reformatting the whole book with huge costs, the Plant Protection Society of WA has reprinted it unaltered. However, an insert listing all changes up to December 2002 has also been produced. If you have an existing copy of 'Western Weeds' and would like a copy of the insert, ring (08) 9334 0530, or email me on: pennyh@calm.wa.gov.au and I will send you one.

Penny Hussey



## SALUTE THE DUNG BEETLE!

In WW 2/2 (April 1998), researcher Ian Dadour described the introduction of dung beetles to remove stock droppings from paddocks, and so reduce the number of bush flies. He recently reported that they have been definitely done a good job. At the start of the programme there were about 14,000 bush flies per hectare in Perth, now there are about 700. Great guys, eh! Pity they don't survive better in drier regions.

*(If you would like a copy of the WW dung beetle article sent to you, ring 9334 0427.)*

## AUSTRALIA'S VIRTUAL HERBARIUM

Keen plant people in WA will need no introduction to 'FloraBase', the WA Herbarium's on-line specimen information service. FloraBase has been online since 1998. Access it for descriptions, maps of distribution and many photographs of the State's 12,000 plants, plus label data from the 550 000 specimens stored in the Herbarium, all from the convenience of your home computer.

'Australia's Virtual Herbarium', a large national five-year project, will enable other states to catch up. The Virtual Herbarium project will eventually computerise all the records at all the major herbaria in Australia, and thus a user would be able to access all of this data through a single query. It is one of the most ambitious computerisation of botanical collections undertaken anywhere in the world.

For further information, contact: Jim Croft, Centre for Plant Biodiversity Research, Canberra on (02) 6246 5113, or Alex Chapman, WA Herbarium, (08) 9334 0500

To visit FloraBase

Goto: <http://florabase.calm.wa.gov.au>

From a young  
Land for Wildlifer:

Q: What does a maths  
teacher call a lost parrot?

A: A polygon.



## IN BRIEF

### WANDOO RESPONSE GROUP FORMED

At a meeting organised by the York LCDC on 20<sup>th</sup> Feb, the Minister for the Environment announced the formation of the 'Wandoo Response Group'. It will oversee some research and put together a Strategy Plan, similar to the one recently undertaken for Tuart. If you would like to find out more about this new group, you can contact Drew Haswell by email: [drewh@calm.wa.gov.au](mailto:drewh@calm.wa.gov.au)

Some research has already begun; Ryan Hooper, an Honours student at UWA, has started to look at the pathology (disease) of Wandoo. He will be performing a systematic study, not unlike what you might see on various 'forensic pathology' TV shows, but this time with trees. Already some root samples have been taken. For more details on the progress of this study, contact Liz Manning, CLC York, on email: [lcde@york.wa.gov.au](mailto:lcde@york.wa.gov.au)

### BIODIVERSITY CONSERVATION BILL

The booklet "A Biodiversity Conservation Act for Western Australia: Consultation Paper" was released by the State Government in late Dec 2002. It gives a brief outline of why we need new legislation and of the diversity of the State's natural resources and how they can be both protected and sustainably used. Although it is now too late to make a formal submission, you may still like to read the booklet, and so keep in touch with what is happening.

For a copy to be sent to you, ring the Department of Conservation and Land Management on (08) 9442 0300 - attention Kylie Dyson - or download from the website: [http://www.calm.wa.gov.au/biocon\\_act\\_consultation.html](http://www.calm.wa.gov.au/biocon_act_consultation.html)

## WATTLES

Last year a very successful Acacia Symposium was held at Dalwallinu. The scientific papers from this have been produced as a single issue of the Department of Conservation and Land Management's journal, Conservation Science Western Australia: "The Conservation and Utilisation Potential of Australian Dryland Acacias" Vol 4, No 3, Dec 2002.

Dalwallinu Shire has some for sale and distribution (\$22.00 inc GST + \$7.80 p&h). If you would like one, contact Brent Parkinson at the Shire of Dalwallinu, PO Box 141, Dalwallinu, WA 6609; phone: (08) 9661 1001 or email: [dallyshire@wn.com.au](mailto:dallyshire@wn.com.au)

(Nb: if you would just like a copy of my paper "Wattle 1 Plant for Wildlife" contact me on [pennyh@calm.wa.gov.au](mailto:pennyh@calm.wa.gov.au) - Ed.)

### DALLY SHIRE'S EXCITING INITIATIVE

Dalwallinu is a centre for wattle diversity in Australia, and the conference has stimulated the community to develop a Dalwallinu Environmental Interpretive Centre, to help establish Dalwallinu as a centre for excellence in environmental education. Whilst still on the drawing-board, this is a most exciting initiative, and congratulations are due to all concerned. For more information, contact Vicky Lang at the Shire on Tuesdays, or at home on (08) 9666 1014.

### REVEGETATION

Don't forget the Fungi!

Will you be growing your own seedlings for your reveg. later on this year? Want to give them the best possible chance? ADD FUNGI! This May or June, remember to collect and store spores of mycorrhizal fungi to add to your potting mix. It's easy - Inez Tommerup explained how to do it in WW 6/3. But you have to collect the fungi when the fruiting bodies appear. So, a week or so after the first rains, start looking in your woodlands!



## NEW BOOKS

### The Dating Game: One Man's Search for the Age of the Earth

Cherry Lewis  
Cambridge University Press

How old is the Earth? Today, the consensus among most geologists is that it is four and a half billion years old. This consensus was only formed in the latter half of the 20<sup>th</sup> century.

In 1650, James Ussher, the Archbishop of Armagh, added up the ages of all the important people in the Bible who had lived since Adam and concluded that the world was created on the evening of 22<sup>nd</sup> October 4004 BC. The biblicalists explained that fossils found on the top of mountains came there as the result of the flood of Noah. Then, in the late 1700s, James Hutton the father of modern geology, wrote an essay cautiously putting forward his view about the immensity of geological time. In the late 1800s, Lord Kelvin expressed the view that the earth was only 12 million years old and in 1906 he was prepared to write letters to the "Times", defending his opinion.

The book under review, "The Dating Game", explains in layman's terms the history of the differing opinions about the age of the Earth and the history of the development of the uranium/lead dating method used by scientists to conclude that the Earth is four and a half billion years old.

The hero of the book is Arthur Holmes (1890-1965) the English scientist who spent his life writing and working on the topic. In 1962 he made a short speech to the Royal Society in London and said:-

"... the Earth has grown older much more rapidly than I have - from about 6000 years when I was 10, to four or five billion years by the time I reached 60."

Cherry Lewis, the author, first studied drama and then ran a retail business before studying geology and obtaining a PhD in the subject. The style of writing is often witty. For those familiar with the books "Longitude" and the "Surgeon of Crowthorne", the style of writing is similar.

In past issues of 'Western Wildlife', there have been excellent articles about geological subjects, the most recent being by Philip Playford on the impact of glaciation on the landscape of Western Australia. "The Dating Game" will provide a useful background to those articles. I thoroughly enjoyed the book, and recommend it to all readers of 'Western Wildlife'.

Chris Pullin

### Field Guide to the Wildflowers of Australia's South West: Augusta - Margaret River

Jane Scott with illustrations by Patricia Negus  
Cape to Cape Publishing, North Fremantle 2002  
Cost: \$32.00

Western Australia is one of the world's richest areas of biodiversity with more than 8,500 native plant species described so far. This book focuses on the western half of the Shire of Augusta-Margaret River in the far south-west corner of WA and contains descriptions and illustrations of 500 of the plant species found there. It was written at the same time that the Regional Herbarium Project volunteers were collecting plant specimens throughout Western Australia. One of each specimen was forwarded to the WA Herbarium for identification and databasing and one of each specimen was held in the Margaret River Regional Herbarium. Patricia Negus painted most of her exquisite paintings from specimens vouchered in this way.

The species in the book are arranged taxonomically by family and within this by genus. Orchids are grouped according to flowering time, which should be a great help with identification. The descriptions cover the plant's form, shape, size and type of habitat in which it grows. The meaning of the plant's Greek or Latin name and historical references to early botanists and plant collectors are an interesting inclusion for history buffs.

Residents and visitors to the area will find the book a useful aid to identifying the native flora. Weeds are also included and there is a fascinating section on galls, those strange lumps and bumps caused by insects. Whilst there is no key to identification, the illustrations may appear to be a less daunting way for landowners and bushwalkers to obtain reasonably accurate identification of native plants and weeds. Many of the species are not restricted to the Augusta-Margaret River area and are found throughout the south-west enabling the book to be of use in other areas.

Whether you are walking through the bush or just doing some armchair reading, you will marvel at the variety and beauty of our native wildflowers described in this book.

Claire Hall

### Bushland Weeds - a Practical Guide to their Management

Kate Brown and Kris Brooks  
\$35 (plus GST)

contact Sue Dempster at Wildflower Society of WA on 9275 3404  
ewan\_inc@hotmail.com

Environmental weed control is the key to successful restoration projects and an understanding of how to control weeds is vital for managing intact bushland. Failure to control weeds leads to continuing degradation of natural ecosystems.

The manual provides the reader with the basic knowledge and the framework needed to effectively manage the weeds in his or her own bushland and is the culmination of four years of science-based, 'on ground' knowledge, capturing the experience of volunteers working in their patch of bushland. It is beautifully illustrated, with line drawings by Libby Sandiford, and there are many 'on site' photos. There are detailed case studies from all the sites - Shenton Bushland, Brixton Street Wetlands, Blue Gum Lake Reserve, Talbot Road Reserve, Gingin Brook and Quairading Nature Reserve.

Individual chapters of the manual look at the biology of each weed group and how it relates to dispersal, spread, control and management. Case studies examine the control of certain species at particular sites and discuss the management approach taken. They often describe the set-up of trials and monitoring programs. Each weed group has a corresponding table containing a summary of information, gathered from a wide range of sources, on the biology and control of weeds occurring in bushland. Finally there are chapters on how to map weed populations in urban bushland, an integral part of weed management, and on the issues arising from the use of herbicides in bushland.

Margo O'Byrne

## FUNDING

### Australian Government Envirofund

The 'Drought Recovery Round' has closed, but it is expected that by the time you receive this magazine a 'normal' round will have commenced. Further information from your LFW Officer, CLC or ring Anthea Jones of Bushcare Facilitation on (08) 9334 0442.

### Natural Heritage Trust

Contact your CLC for information.

## COMING EVENTS

### State Landcare Conference

The State Landcare Conference will be held at Katanning from 7-10 October 2003. For details, contact: ph/fax (08) 9821 2251 or email: yourland@westnet.com.au

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 Conservation and Land Management.

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