



Western Wildlife



NEWSLETTER OF THE LAND FOR WILDLIFE SCHEME

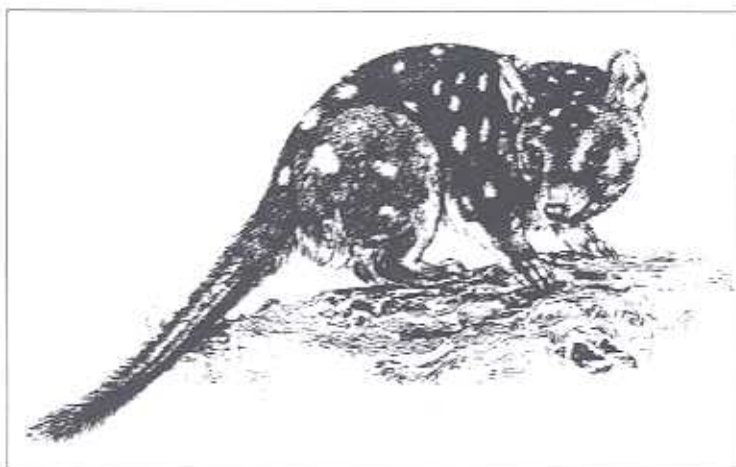
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WESTERN SHIELD: WHAT IS IT AND WHAT IS IT DOING?

WESTERN SHIELD is the name given to CALM's coordinated program of feral predator control for wildlife recovery. Under this program some 5,000,000 to 6,000,000 hectares of our State (an area half as big as England or Tasmania) is being managed for native fauna recovery.

Foxes and cats have literally been eating our native fauna out of existence. This has been demonstrated beyond doubt by research conducted by CALM staff over the last 10 to 15 years. Basically, depending on the climatic area involved, foxes and/or cats have been able to eat most of the young small native mammals produced in areas as well as some of the adults.

I am reminded of a paper given at a conference in Victoria about 10 years ago, concerned with the decline towards extinction of the Victorian population of the Eastern Barred Bandicoot, a relative of our own threatened Western Barred Bandicoot. The last known population was centred on the small town of Hamilton. While interviewing residents to find out what they knew about the bandicoots one of the researchers came across a lady who regularly encountered the bandicoots on her property, mostly when one of her cats was playing



Chuditch

with one on the lawn. The lady was most surprised that anyone should be concerned about the future of the bandicoots and the impacts cats were having on the species, for as she remarked "there is nothing to worry about, the cats only bring home the baby bandicoots, they leave the adults alone". Clearly if all or nearly all of the young native animals are taken out of a population, that species population eventually crashes as the adults finally die out, with virtually no replacements from their young.

For years scientists failed to be able to prove the link between fox predation and the decline of small native animals. This was because they looked at stomach contents and faeces to find out what the foxes were eating. The diet was almost always composed of a mix of insects and other invertebrates, introduced species like rabbits and mice, and

the occasional native mammal. CALM's Dr Jack Kinnear and others felt that foxes must be having an impact on native animals and looked for another way to find out how severe this impact might be. The solution was to measure how many native animals were in an area with foxes present, remove the foxes and see what happened to the native animals. The results were astounding.

In the case of Black-flanked Rock Wallabies, in fox baited areas at Nangeen Hill rock wallaby sightings rose from around 25 in 1982 at the start of baiting to 110 in 1990. Over the same period at an unbaited location, rock wallaby sightings have hovered between 6 and 7 animals each year. The dietary approach failed to account for the fact that while foxes were not totally dependent on native mammals for food, they ate almost all of the young native mammals they encountered, thereby preventing these reaching maturity and replacing their parents.

Similar population recovery results have now been achieved with a whole suite of species, including Numbats, Chuditch, Woylies and Quendas.

A precursor to Western Shield was the Operation Foxglove program. This program took the results from the work on fox control

EDITORIAL

Hi everyone!

I am pleased to report that, to help with your queries, *Land for Wildlife* has two new staff members. Emma Bramwell is the telephone voice at the Como office, while Avril Baxter is working from CALM, Narrogin. They are both great people, we're very lucky to have them!

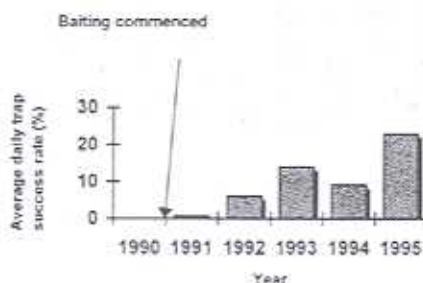
Because it is coming up to the wildflower season, this issue of *Western Wildlife* has a number of articles which highlight the inter-relationship between plants and the animals which pollinate them. When doing any remnant management or revegetation, it is important to ensure that the right environment is maintained/created so that the appropriate pollinators will visit the areas. Otherwise, the plants will not set seed and so the area will not be sustainable in the long term.

Best wishes to everyone for a bumper season.

Penny Hussey

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WOYLIE TRAP SUCCESS AT BATALLING FOREST



conducted by Jack Kinnear and others and applied it over broad areas of the northern Jarrah forest. In addition to fox baiting, the researchers involved took woylies from secure populations and reintroduced them into baited areas in the forest. The reintroduced woylies have thrived, leading to the removal of the species from the State threatened species list and national endangered species list, a first for native mammals as a result of management action.

Buoyed by the success of Foxglove and other programs, CALM's Executive Director Dr Syd Shea, decided that fox and feral cat control could be used more widely to recover a broad range of native species. Western Shield is this program. Along with broad scale fox baiting (predominantly laid from aircraft to reduce costs), Western

Shield incorporates research into an effective technique for feral cat baiting (cats are a major problem in drier areas of the State and do not take dried meat baits designed for foxes), monitoring of fauna recovery in baited areas and reintroductions of native fauna to their former range in baited areas. Within a few years, it's hoped that up to 30 native fauna species will be significantly more abundant and more widespread than they are today.

All mammals need food, access to mates for breeding and shelter from predators. Western Shield does not provide additional food for native mammals, but it provides a shield from feral predators and so greatly increases the shelter component of the animals' habitat. By reducing predation, Western Shield also increases the chances of animals finding a mate and breeding, and of the young produced surviving to maturity.

Land for Wildlife registrants and other private landowners can do a lot to help recover native mammals by protecting native vegetation, replanting native vegetation and local fox control measures. CALM has received numerous reports of landholders adjacent to reserves with fox control seeing bandicoots, woylies and other native animals on their properties.

CALM is considering ways to bring private properties into the baiting component of the Western Shield program, but has some logistical problems to overcome, including our ability to use aircraft to lay baits on smaller properties and the legal responsibility for any impacts such baits may have on domestic dogs. While these matters are being investigated, private landowners can certainly conduct their own fox baiting programs or cooperate with neighbours or LCDC groups in the laying of baits. Please contact your local Agriculture Western Australia office for more information on private property fox baiting.

The future prospects for feral predator control are looking good.

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Meet Emma!

Emma Bramwell has recently been appointed as *Land for Wildlife* Administration Officer.

Emma is a graduate of Murdoch University, with a double major in the disciplines of Environmental Science and Biological Science.

Prior to uni, her father's employment overseas gave Emma the opportunity to experience various cultures, Saudi Arabia being one of them.

She is a passionate animal lover, and keeps an assorted menagerie including four horses.

Emma is currently in the process of completing the Gold Certificate of the Duke of Edinburgh's Award, and enjoys walking extensive sections of the Bibbulmun Track as a component of the scheme. This has enabled her to further develop an empathy for the environment (and experience in the treatment of blisters!).

If you think Emma will be able to assist you with an assessment of your *Land for Wildlife* site, she is very keen to meet you and help wherever possible.

FLORA

ORCHIDS OF A SMALL BUSHLAND REMNANT IN THE WHEATBELT

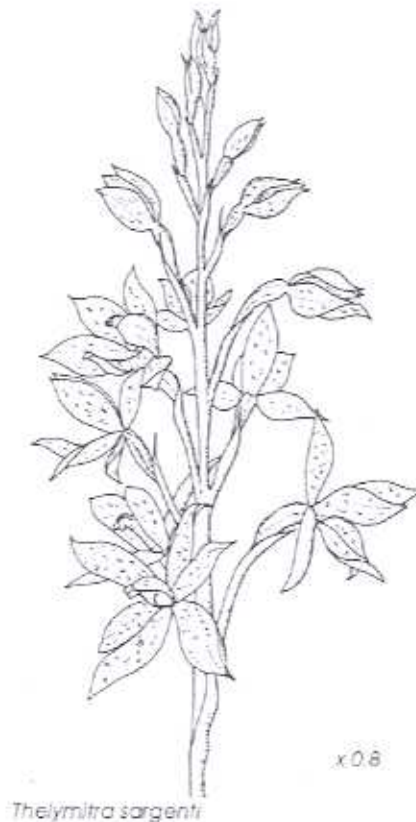
BUSHLAND remnants in the WBA Wheatbelt are often small and more or less degraded, but they provide a refuge for a surprising number of native orchid species, some of which are found no-where else. I'd like to describe to you my experiences with just one of these bushland remnants, located west of the small town of Babakin.

Although small (108 ha), the area contains a variety of different habitats, including an area of open wandoo woodland, mallee heath and tall shrubland. In places, sandy soils dominate, while in others, heavier clay loams are found. There are also a small granite outcrop and even a seasonally moist drainage line. Each of these areas contains its own suite of orchids which, when combined, total over 65 species.

All the orchids in this area are terrestrial and annually resprout from underground tubers (small, potato-like structures) following autumn rains. They flower during the autumn, winter, spring and early summer and then die back to dormant tubers again to survive the long, hot summer.

All produce thousands of tiny, pepper-like seeds which are wind-dispersed and require a specific fungus to germinate. This association continues throughout the

by Andrew Brown



Thelymitra sargentii

life cycle of each orchid plant and is essential for its survival. The fungus sends tiny threads called hyphae into the outside layers of the orchid's underground stems. The plant digests these, providing itself with essential sugars and starches that it is unable to manufacture.

Orchid flower shape varies enormously, as it is designed to attract specific pollinators. Some have bizarre flowers that hardly resemble flowers at all, like the greenhoods, or the elbow orchid.

Orchids at Babakin

You may be surprised to learn that orchids can be found flowering in the bushland for over 10 months of the year, with the first appearing after the autumn rains in Apr-May, and the last in Nov-Dec. Some species are quite common and widespread throughout the bushland. The cowslip orchid (*Caladenia flava*) grows in most habitats and is often found in large numbers. Rarer species are restricted to specific habitats, for instance, the elbow orchid (*Spiculaea ciliata*) is found on a single granite outcrop.

Autumn flowering species, including the diminutive pygmy orchid (*Genoplesium nigricans*), the common white bunny orchid (*Eriochilus dilatatus*) and the unusual hare orchid (*Leporella fimbriata*), use the energy that has been stored in their tuber from the previous year to rapidly send up a flowering shoot. This happens so

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We already have encouraging signs that an effective cat control bait may not be too far off being a reality. There is also the hope that within the next decade or so, biological control of foxes and cats will be possible. In the shorter term, technological advances may provide us with "pre-programmed baits". It may be possible to produce baits with a guaranteed period of toxicity, meaning that landholders could lay baits they know will be toxic for

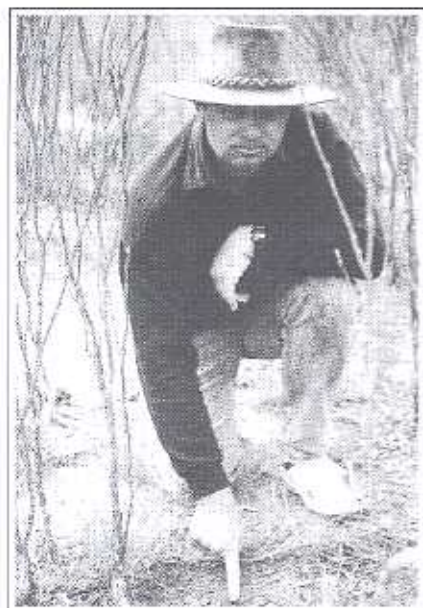
only one or two days, or whatever period they desire. This would effectively cut baiting times by half as landholders would not have to recover uneaten baits in order to protect their dogs.

If you require any further information on "Western Shield", please contact CALM's Wildlife Branch (08 9334 0455). Further updates on the Western Shield program will be provided in later editions of Western Wildlife. There

are also Western Shield Newsletters that can be posted to you, if you are interested. For those with Internet access, information on Western Shield is available from CALM's Web site at: <http://www.calm.wa.gov.au>.

*Gordon Wyre
Manager Wildlife Branch
08 9334 0420*

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Andrew Brown finds an underground orchid.

quickly that flowering can occur within 2-3 weeks from the time that they sprout.

May-June is the time of year when the rare underground orchid (*Rhizanthella gardneri*) blooms. Found exclusively under broombush (*Melaleuca uncinata*), this orchid is an unusual plant which spends almost its entire life below the surface of the earth. Just the tips of the fleshy overlapping floral bracts emerge in autumn and early winter, but they are hidden by a layer of leaf and bark litter. The species lacks true leaves and does not produce chlorophyll, instead it relies entirely on an association with soil fungi for its survival.

Also found flowering at this time are the winter spider orchid (*Caladenia drummondii*) and two shell orchid species. Although the only spider orchid to flower at this time of year, the winter spider orchid is often difficult to locate in its preferred habitat of open mallee heath, due to its subdued maroon, brown and cream colouration. By contrast, the green-veined shell orchid (*Pterostylis scabra*) and brown-veined shell orchid (*P. aspera*) are easy to spot as they grow in large colonies, sometimes amounting to thousands of plants spread over several square metres of ground. Shell orchids are

FLORA

interesting in that they have different shaped leaves, depending on whether or not they are in flower. Non-flowering plants have rosettes of broad leaves which lie flat on the ground, while flowering plants produce only narrow stem leaves that are held well up from the ground.

A few species flower in July. These include the laughing leek orchid (*Prasophyllum gracile*) which is found in shallow soil pockets on granite and along a small drainage line and the little pink fairy orchid (*Caladenia reptans*) which forms clumps of up to 10 or so flowering plants in shrubland areas.

The best time is spring

Easily the best time to see orchids at Babakin is between mid-Aug and mid-Oct. As many as 46 species flower at that time of the year, including most of the spider orchids, sun orchids, donkey orchids, mignonette orchids and blue orchids.

In late Aug, the rosy-cheeked donkey orchid (*Diuris aff. corymbosa*) appears in great abundance. It is the most widespread donkey orchid in the remnant and, although most common along the edge of a winter-damp drainage line and the moist surrounds of a small granite outcrop, it is found scattered in most habitats. A population of the bee orchid (*D. laxiflora*) can be seen growing in the moist seepage area and a few weeks later a small colony of the granite donkey orchid,

(*D. picta*) can be seen in the same habitat. This orchid is a widespread species of inland areas and this population is the furthest west that it has been recorded.

One of the most attractive orchids found in the remnant is the clown orchid (*Caladenia roei*). Appearing in early Sept., it occupies a variety of habitats, including in mallee heath, tall shrubland and thickets of low shrubs surrounding granite. Other spider orchids that are found in these habitats and flower at the same time of year include the blood spider orchid (*C. filifera*), the fringed mantis orchid (*C. falcata*), the chameleon orchid (*C. dimidia*), the slender spider orchid (*C. pulchra*), the cowslip orchid (*C. flava*), the crimson spider orchid (*C. footeana*) and the pink candy orchid (*C. hirta*).

Fire can induce flowering

In most years the common red beak orchid (*Pyrorchis nigricans*) appears in areas of sandy, unburnt shrubland only as leaves, often known as elephants' ears. The rabbit orchid (*Leptoceras menziesii*), which is found in a single winter-wet area also produces masses of leaves that come up year after year without ever producing one or two flowers. However, if the habitat of either of these orchids is burnt in the summer, the following Sep-Oct almost every plant bursts into bloom. Several of the leek orchids, including the frilled leek orchid (*Prasophyllum sargentii*) and the blue orchids, such as the powder blue china orchid

DID YOU KNOW - ? LOVE POTION

The word 'orchid' comes from the greek for 'testicle' since in the common european species the two tubers - the current year's being used up and the next year's being filled up - hang like a nicely balanced pair of nuts ... This led early herbalists to believe that you could increase a man's vigour by feeding him orchid tubers - the nice firm one, of course! (If you want to slow the brute down, you'd make a paste from the flaccid one ...)

Aboriginal people ate the tubers of many different orchids (see 'Bush Tucker Plants of the South-west', CALM 1997) but there's no record of them being considered an aphrodisiac.

Penny Hussey

(*Cyanicula ashbyae*), are also stimulated into flowering by fire. It is believed that chemicals produced in the smoke are the trigger that promotes flowering.

The purple enamel orchid (*Elythranthera brunonis*) is one of the most distinctive orchids found at Babakin. Appearing in Sept, its glossy purple flowers are like no other species and are therefore readily identified.

In late Sept-Oct the granite sun orchid (*Thelymitra* aff. *macrophylla*) and freckled sun orchid (*T. sargentii*) burst into colourful bloom. The sun orchids differ from all other orchids found there in that they lack a prominent labellum (lip). In sun orchids the labellum is just like the other petals and sepals in shape and provides evidence of the ancestral link orchids have with members of the lily family. The sun orchids are also interesting in another way. As their name suggests, they open only on warm sunny days, remaining closed at night and when the weather is cool and cloudy. Perhaps the most beautiful sun orchid here is curly locks (*T. spiralis*). Although uncommon, it is always well worth searching for in the shallow soils that surround the granite outcrop. Its mauve and purple striped flowers are a delight to see. It flowers a little earlier than most, reaching its peak in Aug.

In early Oct the South African orchid (*Monadenia bracteata*) flowers in disturbed areas near the edge of the remnant, often among introduced grasses. This orchid first appeared in WA near Albany in 1944 and since then has spread as far as Northampton and Esperance. It also now occurs in South Australia and Victoria.

The last orchid to flower is the elbow orchid (*Spiculaea ciliata*). An unusual plant, it stores all the moisture and nutrients that it needs within the stem, so that, as the base of the stem begins to wither and die in late spring, the plant continues to grow. It flowers in the hot dry months of Nov and Dec when the shallow soil in which it grows has become powder dry. This species is

FLORA



Pterostylis barbata

Pterostylis sargentii

pollinated by a small wasp which mistakes the labellum of the flower for a female insect.

Bizarre pollination mechanisms

All the orchids in this remnant are pollinated by insects. The hare orchid, for example, is pollinated by male flying ants that swarm for only on or two days in a year. These primitive ants are attracted to the wingless females of their species by a chemical odour known as a pheromone. The orchid has a similar scent which is not detectable to humans but on warm days it attracts the male ant to the labellum of the flower which, due to its colouration and shape, tricks the insect into thinking that it is mating with a female of its own species. Several other orchids in the bushland use similar trickery to attract pollinators, eg the narrow-lipped dragon orchid (*Drakonorchis mesocera*), the elbow orchid and the clown orchid.

The white bunny orchid uses quite a different strategy to attract pollinators. It produces nectar and a sweet scent to attract native bees to

the flowers and the pygmy orchid attracts minute gnats. It is thought that these are attracted to the flower by its drab colour and odour.

Other orchids found at Babakin use a variety of different, and sometimes devious, methods to attract pollinators. The brightly coloured cowslip orchid attracts beetles and the occasional bee; the leek orchids produce pseudo pollen and nectar to attract a variety of beetles, bees and wasps; donkey orchids mimic associated pea flowers to attract native bees and sun orchids also attract native bees but use a combination of colour and scent.

This spring, why not look at some remnant bushland near you? I'm sure you will be surprised at how many interesting native orchid species are finding refuge there.

Andrew Brown is a botanist working with WATSCU at the Wildlife Research Centre, Woodvale. His speciality is orchid distribution and taxonomy. He can be contacted on 08 9405 5166.

Andrew provided us with a list of all 65 orchids found at Babakin. It is too long to print here, but if you would like a copy, ring 08 9334 0427 and we'll send you one.

Line drawings by Sue Patrick

LFW orchid news

Elaine and Henk Hendriks have at least 16 orchids in their remveg at Muntadgin. On the LFW visit, literally dozens of the first species to flower, the white bunny orchid, were observed. Elaine hopes this is the precursor to a bumper year - for both crop and bush! Andrew will be visiting this site during an excursion to Merredin in Sept.

Judy Schilling of West Dale fenced off a patch of wandoo woodland behind the house, and, within one year, donkey orchids had returned.

Has anyone else had a similar experience?

LONG before the domesticated honeybee was brought to Australia by European settlers, our continent was populated by a wealth of bees - the native bees - with upwards of 2000 species having been recorded to date. Native bees are found right across Australia from coastal regions to the central 'deserts' and, while being well-represented in the wetter, forested zones, are the most abundant and diverse in semi-arid regions. Prior to clearing, the Wheatbelt of WA would have supported one of the richest bee faunas in the world and, fortunately, many species still survive in bushland reserves and remnants within this area today.

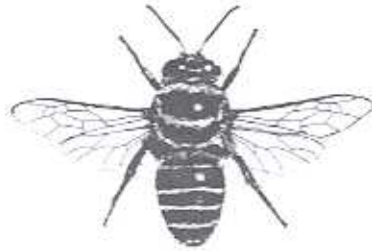
If native bees are so numerous, why is it then that so few people are aware of them? Some explanation may be found in the fact that many are tiny and wasp-like, visit only native flowers and are active for only a month or two each year.

There are some moderate-sized species, however, which occur commonly in suburban and country gardens and which most observers would recognise as bees. The blue-banded bee, *Amegilla pulchra*, for example, is only slightly smaller than the honeybee, is more rotund and has a black and white banded abdomen (a faint blue tint often suffuses the white bands). Like the honeybee, it has a very catholic taste in flowers and visits both native and introduced plants to obtain pollen and nectar. While working about flowers the bees hum audibly, move jerkily and frequently hover.

FAUNA

NATIVE BEES

by Terry Houston



Male of the bee *Ctenocolletes rufescens* a species confined to southern Western Australia

This species is active in southern WA from about Sept to April.

It is at the nests of native bees it becomes apparent that most have habits very different from those of the honeybee. Our native bees are predominantly 'solitary', each female living and working independently, constructing her own nest(s) without the aid of subservient 'workers'. A majority of species nest in the ground and their females are efficient burrowers. Other species prefer to use existing holes in which to nest - the abandoned burrows of other insects, hollow plant stems or vacated galleries of wood-boring beetles. Man-made holes also provide ideal nesting sites. After constructing and provisioning a series of brood cells and depositing an egg in each, the female seals the nest entrance and dies. The larvae

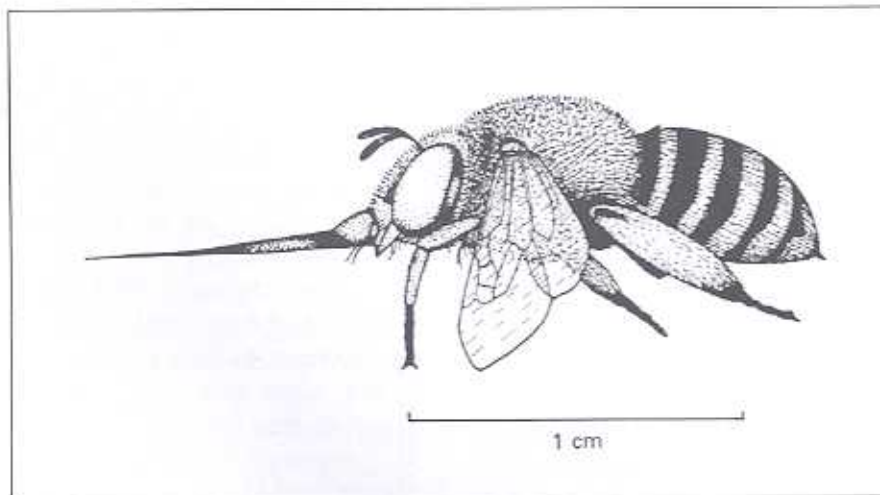
are left to feed and develop in total isolation within their cells and newly emerged adults have to chew and dig their way out.

In those species that have just one generation a year (timed to coincide with the flowering of their preferred forage plants), the larvae remain dormant in their cells for many months and pupate just a few weeks prior to the commencement of the activity season. Floral specialisation is the norm among solitary bees, some species confining their foraging to a particular family of plants (such as Myrtaceae or Proteaceae) and some being specific to a genus (such as *Verticordia* or *Grevillea*) or (rarely) to a single species.

The Wheatbelt of WA is home to some wonderful bees including a brilliant metallic green species, *Ctenocolletes smaragdinus*. Much larger than honeybees, the females of this species work flowers of various heathland plants including *Verticordia* species during late winter and spring. In summer, when eucalypts are in flower, the brilliant yellow (or even white) euryglossine bees come into their own and may be found nesting gregariously in hard bare ground around homesteads. Sometimes milling swarms of tiny yellow males will be seen in open areas near flowering trees. Resin bees (*Chalicodoma* species) also forage at eucalypts and commonly nest in holes in verandah posts, plugging them with resin or masticated leaf pulp.

Semisocial habits occur in some bees. For example, tiny bees in the family Halictidae nest colonially, with a few to dozens or even hundreds of females sharing a common nest entrance in the ground. Beneath the entrance the common shaft divides and ramifies into a complex burrow system with each female constructing and provisioning her own cluster of brood cells.

The only highly social native bees to occur in WA (the 'sugarbag' or stingless bees, *Trigona* species) are restricted to the Kimberley and



Amegilla pulchra, Blue-banded Bee showing long proboscis.

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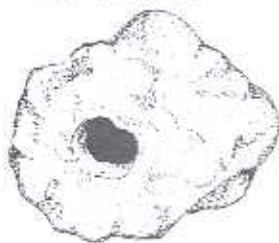
northern Pilbara. With the exception of *Trigona*, no native bees can be exploited for honey because they do not build separate honey stores. Instead, they mix their honey with pollen to serve as larval food, either in the form of a moist solid mass or a semiliquid paste.

Females of most native bees are equipped with stings but will use them on humans only if they are squeezed against the skin. They are never aggressive in the way that honeybees can be. They can, however, sting several times and do not leave the sting behind in their victim.

Dr Terry Houston is Curator of Insects at the WA Museum. His special interest is native bees. He can be contacted on 08 9328 4411. Illustrations from WA Museum Information sheet. Drawn by Jill Ruse.

BUSH DETECTIVE

Is it a ... 
time capsule? ...
dinosaur's thimble? ...
no its a ...



In some laterite areas, gravel nodules with a smooth cylindrical hole in the centre may be found. They are the remains of the burrow of a solitary bee, which laid its egg in a cell constructed in soft clay while the laterite was forming, millions of years ago! The fossil closely resembles the larval structures of some modern native bees.

... fossil bee's nest!

FLORA AND FAUNA

POLLINATE OR PERISH

by Liz Brown



Honey possum (*Tarsipes rostratus*) getting nectar from *Beaufortia* sp. (photo: S.D. Hopper)

POLLINATION is a vital part of any sexually-reproducing plant's life-cycle. Many plants rely on animals such as birds, insects and mammals to transfer pollen from one flower to another and enable the plants to set seed. Although most plant species have both male and female reproductive parts on the same plant, the best seeds result from cross-fertilisation of different plants. The incentive for animals to visit flowers is usually nectar, although sometimes pollen is the only reward available. Some orchids even attract their pollinators (male flower wasps) under false pretences - the flowers smell and look like female wasps, and in the males' attempt to mate with the deceptive flower, the bundles of pollen

(pollinia) are inadvertently dislodged by the wasp and carried to the next flower it visits in its pursuit of sex.

Some plants have a wide array of pollinators visiting them. Eucalypts are a good example - they may attract birds, honey possums, native bees and wasps, jewel beetles, butterflies and introduced honey bees. Other plants seem to be dependent on only a few species of insects. For instance, certain orchid species are only ever pollinated by a particular species of flower wasp. Such specific relationships are uncommon, but more prevalent in those plants pollinated by insects.

Regardless of whether the plants are visited by many different

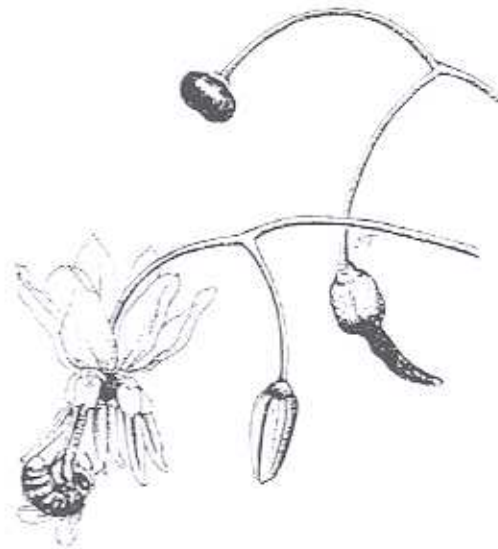
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pollinators or require a specialist one, the fact that there is an inter-relationship between the plants and animals is important. What happens to the one will invariably affect the other, and in many cases cause a ripple effect involving the whole community. These relationships can be disturbed very easily, and often quite unwittingly. There is growing concern in the Northern Hemisphere that pollution, habitat loss and disease are killing off pollinators (mainly insects) at a scale sufficient to endanger crop survival. In a similar vein, remnant or rehabilitated bushland in Australia will not be self-sustainable if it no longer supports, or is visited by, the animals necessary to pollinate the plants.

To understand the impact of losing pollinators, we need to know as much as possible about what animals pollinate what plants. There is a large resource of information about animals visiting plants in WA, but it is often inaccessible and spread out through scientific literature, field note books, anecdotal knowledge in peoples' heads, records on herbarium sheets and other places. To be useful for management and for our own interest, all this knowledge needs to be centralised and easily accessible. This is why the WA Naturalists Club, with funding from the Gordon Reid Foundation, has created a "Pollinator Database".

The database has records of birds, mammals (eg the honey possum) and insects visiting species in over 50 different families of native plants from all over WA. (Few records actually confirm pollination - they are mainly records of animals visiting the flowers for nectar or pollen. Hopefully though, at least some of these visits will actually lead to successful pollination). The completed database will be available as a handbook, from the WA Naturalists Club, and hopefully Landcare Offices. It can be used to look up a particular plant and see what animals have been recorded visiting it, or to look up certain animals and see the range of plant species they have visited.



Flower of dianella being visited by blue-banded bee. The bee takes hold of an anther and buzzes; the pollen is shaken out and collects on the bee's hairs. Quite a number of local plants have flowers designed for 'buzz-pollination'.

Illustration by Susan Tingay from 'Growing Locals' by Robert Powell & Jane Emberson. WA Naturalists' Club, 1996.

How could this be of use to you? Well, if you are replanting salmon gum woodlands, you could look up all the plant species (trees and understorey) which require animal pollination, and see what animals have been recorded at them and are likely to be necessary to continue pollinating these plants. (Many of the most common species used in revegetation - acacias, melaleucas, eucalypts, grevilleas - require animal pollinators to set seed.) Another example might be if you wanted to know what plants would attract certain birds in a particular area, or at a certain time of year - look up the birds and see what they have been recorded visiting. Of course, a database like this will never be complete, and any extra information is always valuable. If you have any information to add to the database, or wish to find out more about it, please contact me.

What happens in rural land is important for pollinators. Observing what's in flower and what's visiting these flowers is a good start to appreciating the inter-relationships between plants and their pollinators. (Especially with insect pollinators, you might uncover some pretty

bizarre systems.) Replanting the understorey provides more habitats and food for pollinators than plantations or monocultures, and linking remnants or revegetated areas by bush corridors (where possible) will encourage reintroduction of the less mobile pollinator species. But apart from conservation, what's the benefit to the farmer? Regardless of why you're revegetating, many of the plant species will need pollinators to produce viable seed for the next generation, unless you plan to continually replant with greenstock. Attracting pollinators can also bring other benefits - increasing the diversity of birds may help to reduce the number of insect pests attacking crops and shelter belts - and even stock; and increased diversity of pollinators and flowers could provide additional income from cut wildflowers and ecotourism (eg farmstay).

Liz Brown is a biologist based at Kings Park Research Laboratory, West Perth.

She can be contacted on

08 9480 3640

email: lizb@kphg.wa.gov.au

ECONOMIC ASPECTS OF BIODIVERSITY

BIRDS, TREES - AND FLY STRIKE

by Ann Smart

WHEN our property at Jerramungup was cleared, a lot of vegetation was left - around lakes, for example - and we have planted trees, so that now the property has 20 % tree and shrub vegetation. We also grow lucerne, which has performed excellently, lowering water tables and providing good feed.

One of the results of this policy is that there are always plenty of birds on the farm. Wherever the stock are, birds such as willie wagtails, flycatchers, mudlarks and others can often be seen moving around among them. We have occasional fly strike, nothing really serious, but noted that the next-door neighbours, with only 2 % remnant vegetation (and that all in one place, around a lake), always had it much worse. Robie suspected that it was because their sheep were a different bloodline. Then we bought the neighbouring property for our son.

With cash being tight at the time (when isn't it!) we didn't buy in new stock, but split the existing flock, half onto the 'new' property, half to remain on the 'old'. Those on the 'new' property were hit by severe fly strike - the bloodline theory was out. It has to be that on the 'new' property, there were no birds to keep the pest insects down.

Fly strike causes an economic loss to a sheep operation. Even if stock don't die, they lose condition. This affects wool quality and, if they are going to be sold, it also prolongs the period of time before they can go for sale. There is also the cost in time and materials to treat the condition. We had not realised it before, but by keeping the incidence of fly strike down to a low level, the birds on the 'old' farm were actually saving us quite a lot of money.

Another point - we decided to do some serious tree-planting on the 'new' block, and put in 15,000 seedlings. Beetles and grasshoppers ate the lot. We've never had that problem before, obviously the insects' predators are present on the 'old' block, but not on the 'new'. The lack of birds costing us money again!

These 'intangible' savings are not usually taken into account when assessing the 'value' of retaining

remnant vegetation and revegetation, since it is difficult to prove their existence. But we are very happy that wildlife shares our farm!

Ann and Robie Smart farm at 'Girraween', Jerramungup. They have a strong interest in growing perennials, especially lucerne, and are considering storing surplus runoff to begin irrigation. They can be contacted on 08 9835 6033.



Blue-breasted Fairy wren with a blowfly. (photo: Babs and Bert Wells, CALM.)

XANTHORRHOEA PREISSII, or Grasstrees as we commonly know them as in Western Australia, are dying as the result of browsing by parrots in many agricultural areas such as Boyup Brook, Kojonup, West Arthur, Beverley, York, Toodyay and Victoria Plains. Grasstrees are long-lived (to hundreds of years old) and have survived grazing in remnant vegetation due to their height (usually greater than one metre). They are often the only understorey species present within stands of Wandoo, Jarrah and Marri. Farmers have observed the death of Grasstrees from parrot damage as early as fifteen years ago, but damage to individual trees and the loss of whole stands has become most noticeable in the last six to seven years.

The Boyup Brook LCDC (with support from Kojonup LCDC, West Arthur LCDC, CALM and the Conservation Council) initiated a study during 1996 to record damage to Grasstrees by parrots. One of the main aims of the study was to provide evidence that it is a problem, and hopefully initiate support for efforts in management and research to reduce (if not stop altogether) the loss of trees.

The Port Lincoln Ringneck ('28' parrot) is the only species to date that has been observed feeding on *Xanthorrhoea* fronds, which they do during the summer and autumn months. This coincides with the time when the paddocks have dried out and the crops have been harvested, until a month after the first winter rains. In 1996 the damage was greatest in January and March (it dropped in February when the Marri was in flower), and lowest during July to November. During August to November, damaged fronds which were only 2-6cm long, were able to grow to a length of 30-50cm.

I have observed the birds to fly onto crowns, chew off a long frond, place it in one of their feet (holding it like an icecream cone!) and then proceed to chew small pieces off the end of the frond. The parrot eventually drops the long frond to

FLORA

LOSS OF GRASSTREES IN REMNANT VEGETATION

By Shapelle McNee



the ground and starts on another one. This is why long sections of frond are sometimes seen at the base of damaged trees. I also watched a parrot feeding on the short damaged fronds of a crown for 37 minutes, where it took a total of 416 bites from approximately 160 fronds.

The parrot does not consume the chewed off pieces (the size of oaten chaff) but rather compresses them between its bill, leaving bite marks along the length before dropping them onto the crown. When parrots feed on the softer, young centre fronds, the pieces of frond are chewed to a pulp before dropping them. It appears that the parrots are after the juice of the frond – not that the fronds are that juicy! They taste a bit like eating grass (and the drying chaff sitting on the crown smells like hay, at least until it starts to rot). It is probable that the parrots are getting a particular nutrient from these fronds at a time when there isn't much else green around. However, it is with much consternation that we see the death of *Xanthorrhoeas* as a result of their activity.

It may be that the Port Lincoln Ringneck has always fed on Grasstree fronds, although very infrequently. Today the parrot is very adept at feeding on cultivated grain (eg stored grain, grain fed to

road and in the stubble) as well as introduced pasture weeds (eg Guildford grass, corkscrew, capeweed). Thus it has a large food source available in agricultural areas and the species appears to be doing very well such that they have increased in abundance in many areas over the last twenty years. However, parrots cannot live on dry grain and seed alone. Most parrots feed on some other plant material such as flowers, stems, bark and leaves. Although adult birds may be able to survive on dry seeds for a period of time, the young birds, fledged in spring, may need other sources of food to supplement their diet (eg *Xanthorrhoea* fronds) especially during the summer and autumn months. This needs further investigation.

Six Grasstree sites surveyed during 1996 had high levels of parrot damage. More than 90% of their crowns had most, if not all, of their fronds chewed back by parrots. The death rate of *Xanthorrhoea* trees at these sites was 24% (38 trees out of 161 surveyed from January to November). Given this death rate these sites are likely to lose all their trees with only the blackened stumps remaining. The density of Grasstrees can be quite high, most of the sites surveyed ranged from 102 to 392 live trees per hectare. At one site, where a large number of deaths had occurred, there were only 36 live *Xanthorrhoea* trees per hectare.

What can we do to reverse this trend? Reduce the availability of cultivated grain? Reduce parrot numbers? Provide parrots with a supplement so that they no longer feed on Grasstree fronds? Increase the abundance of their predators? (For example, encourage the presence of carpet snakes, race-horse goannas and possums which predate nests in tree hollows, or birds of prey which predate on young fledged birds.) Encourage the return of the understorey to remnant vegetation to increase the variety and abundance of their natural sources of food?

The relatively high abundance of Port Lincoln Ringnecks is an indication of an imbalance between the factors that allow their

populations to increase and those that restrict their numbers, and the damage they are causing indicates an imbalance in their food supply. There is a sense of urgency to get management strategies, combined with monitoring and research, up and running in order to reduce damage that these parrots are causing.

The research during 1996 was funded by a Save the Bush grant, National Landcare Program grant, and the Hon. Monty House MLA and support from Hilda Turnbull MLA.

Boyup Brook LCDC 08 9765 1552

Shapelle McNee is a Consultant Biologist, contactable on 08 9457 5008



Have you noticed
parrot grazing of
grasstrees in your area?



Parrot damage to Grassfree.
(photo: Alan Price)

Wendy Porter, an Environmental Management student at Edith Cowan University in Joondalup is undertaking a third year management project into the impact of parrots on grass trees. Please contact her on 08 9446 7991 if you can help.

FAUNA

BANKSIAS, BARDIES AND COCKIES - A FINELY-TUNED BALANCE

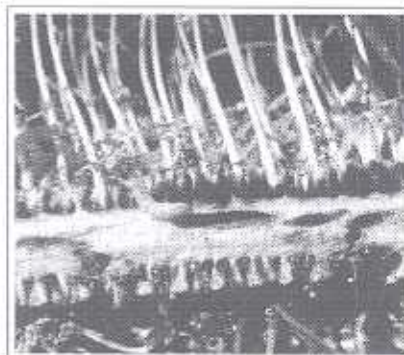
by Byron Lamont

WHEN walking through banksia woodland, it is often noticeable that parrots and cockatoos have torn off the flowers in search of nectar, or borers in the flower axis. Stephen van Leeuwen and Byron Lamont of Curtin University have been investigating what effect this has on the 'reproductive success' of the rare *Banksia tricuspis* - with some unexpected results.

B. tricuspis (Lesueur Banksia) is confined to a small area of rocky country around Mt Lesueur. Larvae (bardies) of the wood-boring moth *Arthropora* tunnel through the central axis of the flower. Port Lincoln Parrots (28s!) rip up the flowers in their search for nectar, while Little Corellas and Carnaby's Cockatoos feed on the bardies, damaging - often totally destroying - the flower spikes while they do so. All of this severely reduces the number of fruits set by each plant - 60% are destroyed by predators each year, 46% by Carnaby's Cockatoos alone.

So you might think, reduce the bird numbers and you'll get more seeds ... but, which birds? At first guess you might say - the cockies, of course! But ...

Although 46% of the flowers are destroyed by cockatoos in their search for bardies, this is actually a beneficial relationship. The birds have the uncanny ability to detect which of the flower heads contain bardies and they rip these apart, rather than those which do not have any. Some observers have noted how cockatoos turn their heads to the side before feeding and have suggested that they are able to hear the bardies munching! Others have suggested they see the frass left at the tunnel entrance holes and use this as a clue



Bardie inside Lesueur Banksia flower

as to which heads to attack. The flower heads lacking bardies, and so not attacked by the birds, are free to set seeds for the next generation.

If none of the flower heads were attacked, all the larvae would reach maturity. There would be such an increase in future insect populations that they might finally destroy all banksia flowers. This might result in the eventual extinction of the Lesueur Banksia because they would no longer produce sufficient seeds for replacement of the old plants.

Loss of habitat in the wheatbelt has made Carnaby's Cockatoo an endangered species, and its numbers are declining. As this study shows, that could have far-reaching effects on the other members of the ecosystem of which they are an integral part.

For the full story, read: S. J. van Leeuwen & B.B. Lamont, 1996. 'Floral damage by animals and its impact on reproductive success in *Banksia tricuspis* Meisner (Proteaceae)' IN: Gondwanan Heritage: past, present and future of the Western Australian biota. Ed: S. D. Hopper et al. Surrey Beatty & Sons, Chipping Norton.

Prof. Byron Lamont can be contacted at the School of Environmental Biology, Curtin University, on 08 9266 7368.

PRACTICALITIES

WEED CONTROL IN DIRECT SEEDING AREAS - SELECTIVE HERBICIDES

by Alan Grist & Peter Thompson

WEED control is crucial if direct seeding is to work. Main Roads have won numerous awards for their superb roadside revegetation projects involving direct seeding, and here they explain a little of how it is done.

Main Roads have seen tremendous results in roadside rehabilitation by direct seeding native seeds along the roadsides in the south-west. This method of establishing native vegetation has transformed what was once pasture or cleared road verge into lush vegetated strips.

Preparation prior to seeding is aimed at establishing a good seedbed by topsoil management, cultivating and adding organic matter in the form of natural mulch. Once the preparation work has finished and the seeding is complete, nature takes its course and in time the seeds begin to germinate. Due to the improved soil condition of the direct seeding sites, especially the sites in pasture areas, weeds such as capeweed, lupins, annual grasses and veldt grass start to show their presence. Grasses (narrow leaf) can be controlled in broad-leaved crops or vegetated areas with the use of selective herbicides such as *Verdict*® or *Fusilade*®. The control of broad-leaved weeds in a broad-leaved crop or natural vegetation is somewhat more difficult.

Main Roads South West (MRSW) has been conducting trials with selective herbicides to control broad-leaved weeds such as capeweed, lupins and wild radish that have germinated in some of the direct seeding sites. Trials consisting of various rates of *Lontrel*® have indicated that effective control of certain broad-leaved weeds could be



MRSW spray vehicle applying herbicides to a direct seeding site



Lupins showing signs of stress following an application of *Lontrel*

gained without off-target damage to desirable plants. Results indicated that:

- *Lontrel* @ 500ml / ha controls capeweed and lupins in their early growth stages.
- *Lontrel* @ 750 ml / ha controls capeweed and lupins in their

more advanced growth stages without damage to the desirable plants.

- *Lontrel* @ 1000 ml / ha results in damage to desirable plants.
- These results have led to our current extensive use of *Lontrel* at 500 ml / ha.

continued on page 13

continued from page 12

Herbicide blends of *Lontrel* and *Verdict* in combination with a good wetting agent have been used to successfully control both broad- and narrow-leaved weeds at our sites. On occasions *LeMat*® has been added to the tank mix to control red-legged earth mite infestations. Overspraying the sites with these chemicals in the early stages of weed growth allows the native seedlings to germinate and grow without competition for moisture and nutrients. The time of application is sometimes a difficult decision, because while you are waiting for most of the weed seed to germinate, the early-germinating ones are growing larger every day. MRSW has adopted spraying early in winter to control the early weeds and then applying a follow-up spray over the sites if necessary.

Undesirable plants that are not controlled by the selective herbicides are treated with glyphosate-based products, applied with a hand-held wick applicator. This is a very labour-intensive task, however it is very effective in the control of such weeds as wild radish, nightshades and marshmallows. Boundaries of the sites are treated with glyphosate @ 2 or 3 litres / ha depending on target growth and species.

The procedure for rehab site maintenance in general, consists of:

- firstly maintaining a chemical boundary 2-3 m wide around the site
- overspraying with selective herbicides
- treating persistent weeds with wick applicators.

Thus the combination of selective and non-selective herbicides play a major role in the maintenance and success of MRSW's rehabilitation projects.

The authors work at Main Roads, Bunbury. Alan Grist is Project Manager Maintenance, and can be contacted on 08 9725 5670.

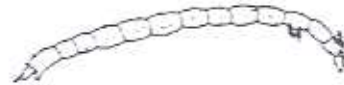
Peter Thompson is Roadside Management Officer, and can be contacted on 08 9725 5667.

RESEARCH

AQUATIC INVERTEBRATES AND RIVER HEALTH



by Mick Smith



If you live in the Wheatbelt, and are concerned about the health of your local rivers or wetlands, here's how you can help find out what state they are in.

During the last three years a team of researchers from CALM and three universities have been collaborating to build models which will be used to assess river health throughout WA. The work has been developed under the Commonwealth's Monitoring River Health Initiative (MRHI), and aims to assess river health using biological indicators - in this case, aquatic invertebrates.

Firstly, we built a computer model that could predict the invertebrates that live along a stretch of river that was unaffected by human activity. We did this by taking a set of environmental measurements (latitude, depth etc.) that are used to characterise a site on the river. The aquatic invertebrate community predicted to occur at the site is then compared with the community actually observed when a sample is taken with a pond net. Following this, the ratio of observed to expected animals is used as a direct measure of river health.

This stage involved sampling nearly 200 minimally disturbed sites to provide baseline information. Some heavily disturbed sites were also sampled, and these were used to test if the model was capable of detecting environmental disturbance. It seems the model works reasonably well, but needs some refinement to be capable of detecting more subtle impacts.

We now want to assess the health of rivers in the Wheatbelt, and we would really like some assistance. We need 135 sites in the area between Geraldton and Esperance, in the 250 - 600 mm rainfall belt. To ensure that the most appropriate places are sampled, could you please suggest some sites?

The kind of river sites we are interested in include:

- sites that are minimally disturbed and represent the most pristine sites in your region
- sites that are heavily disturbed and are typical of, and indicative of, the main impacts in your region
- sites that are of historical or recreational importance in your region
- any other sites that you consider worthy of sampling,

We are attempting to combine the MRHI assessment of Wheatbelt rivers with a wetlands project under the WA Government's Salinity Action Plan. This project will be sampling aquatic invertebrates from different wetlands, including lakes, swamps, mound springs and rock pools. These wetlands could be saline, brackish or fresh but, for this project, they should all be least-disturbed sites. Again, have you any suggestions for locations, please? Ring me on 08 9405 5158 - asap!

Mick Smith is a consultant biologist at CALM's Wildlife Research Centre, Woodvale.

Disaster - drowned Honey Possum

When I arrived at John and Dianne Lewis's property at West Gingin for a *Land for Wildlife* visit, I was greeted by a sad event; the night before, a Honey Possum had drowned itself in the swimming pool. Its not the first time that it has happened, apparently, and I know that they have drowned in swimming pools in the Hills. Has anyone else had this problem?

In the Lewis' case, the pool is set in lawn, surrounded by exotic shrubs, and the banksia woodland where one might have expected the animal to be, is several hundred metres away. Although its nice to know that Honey Possums still occur in the area, its sad to find out in such a manner.

Why do they do it? Are they looking for water? Do they get disorientated? What can be done to prevent such tragedies? I asked Peter Mawson for the answer ...

"Its very unlikely that the Honey Possums are looking for water as they get all of their moisture requirements from nectar and dew. They do move quite considerable distances, so being away from native vegetation is not surprising. Like all mammals, Honey Possums can swim, but not for extended periods. Once in the pool, they cannot climb out over the slippery surface of the pool edge. It would probably help if a floating boom was placed around the edge of the pool such that the Honey Possums could scramble up onto it. Lizards and other unfortunate creatures would also benefit from it."

Penny Hussey

Peter Mawson is Senior Zoologist in Wildlife Branch, CALM, Como.



IN BRIEF

Your Local School and Land for Wildlife

by *Judy Fisher*



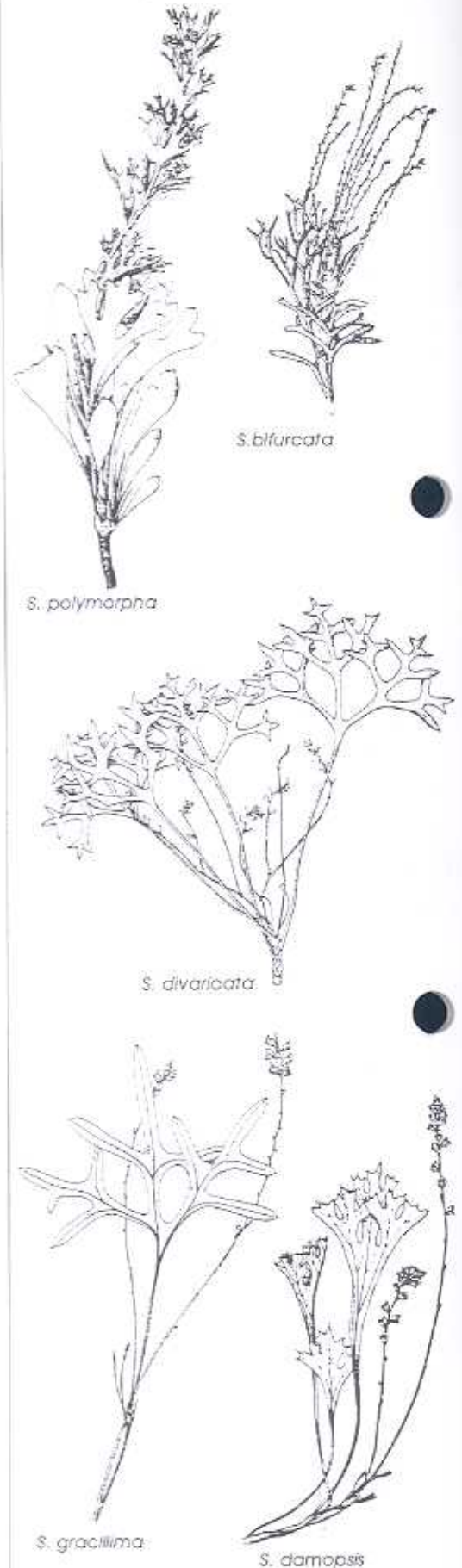
Schools can play a vital role in enhancing habitats for wildlife. The enthusiasm of children in adopting and caring for an existing habitat, or creating new habitats, is infectious and spreads to members of the surrounding communities. In helping to restore and care for a natural habitat, children will discover a myriad of wildlife from tiny invertebrates in and on the soil, to reptiles, birds and marsupials, and learn to appreciate their inter-relationships with the flora. These inter-relationships and the cycles of nature are easily integrated across the curriculum, providing real life relevance to classroom subjects.

Wildlife projects provide a perfect avenue for all members of the school community, no matter how young or old, to feel they play a valuable role in becoming responsible for the habitat and wildlife in their local environment. This engenders respect among individuals and provides a positive focus for the whole school. The knowledge gained by the children makes them great teachers of the wider community.

Why not encourage your school to give it a go? Wildlife projects enhance all learning areas in a relevant way. The children love it - the teachers love having happy kids - and the wildlife will love it even more.

Judy Fisher is a parent and coordinator of the environmental group Bush Guardians at City Beach Primary School - a school which has won awards for its ground-breaking work in bushcare and curriculum. If you would like to know more, Judy can be contacted on 08 9385 9920.

Synaphea



Illustrations from 'Flora of Australia' Vol 16.

Wanted - new populations of *Synaphea*!

by Ryonen Butcher

Hi! I'm a PhD student at the Dept of Botany, UWA. Please, can anyone help me find new populations of *Synaphea*?

Synaphea is a member of the Proteaceae family, and all the 50 or so species are small shrubs with variable, usually divided, leaves, and spikes of tiny tubular yellow flowers. They are found throughout the South-west from east of Esperance to Kalbarri, with the three richest areas being the sandplains around Eneabba and Hyden, and in the jarrah forest. I am studying the taxonomy of the plants, their distribution and rarity.

If you have any species of *Synaphea* on your land, and would be interested in helping me out with my studies, please contact me at: Dept of Botany, UWA. on 08 9380 2215 or e-mail: ryonen@cyllene.uwa.edu.au.

Chocolate Bilbies



At Easter, it's traditional to eat chocolate (yum!). Apart from eggs, people sometimes eat chocolate Easter Bunnies. But, in the last couple of years, chocolate Easter Bilbies have appeared. This year, Coles Supermarkets donated \$14,500 from the sale of Easter Bilbies to help fund the Bilby breeding program. A good reason for all conservationists to switch their Easter eating habits!

ABOUT GROUPS

WESTERN AUSTRALIAN NATIVE ORCHID STUDY AND CONSERVATION GROUP



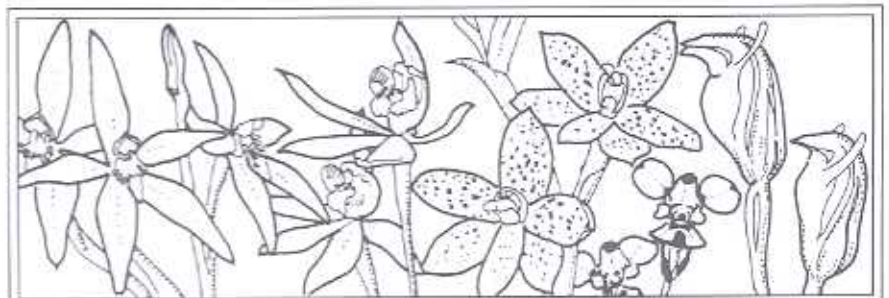
MOST people will have encountered orchids in one form or another. The majority of the brightly-coloured ones in florists' windows are hybridised tropical species. But there is another group, the terrestrial or ground orchids, which are often small and subtle in nature, but can be of immense beauty. All but a few of the Western Australian orchids are terrestrial.

The white spider orchid, common donkey orchid and cowslip orchid would probably be the most familiar. However, there are at least 300 more, many of which are yet to be named. They are found growing throughout the South-west, from Shark Bay to Eucla, and many are unique to this corner of the world. They vary in size from the minute *Microtis atrata* - 5cm high with flowers 1 mm across - to spider orchids 1 metre tall with 25 cm-long petals and sepals, to the giant leek orchid - 2 m high with over 100 flowers to a spike. One only has to look around the bush in Aug - Oct to discover just how rich and diverse the WA orchid flora is.

The Western Australian Native Orchid Study and Conservation Group (WANOSCG) concerns itself specifically with these fascinating plants. The group has members with many and varied interests including orchid photography, cultivation of native orchids, study of orchid biology and ecology, as well as just general interest.

Monthly meetings (visitors are very welcome) are held at Kings Park on the third Wed. of each month at 8.00pm. Meetings usually include a display of pot-grown specimens, reports of field trips and a talk by an expert. Excursions to search for orchids throughout the south-west are arranged, and on several of these, previously undiscovered orchid species have been found. WANOSCG has published a book 'Orchids of Western Australia' which is a mine of useful information.

For more information write to: WANOSCG, PO Box 323, Victoria Park, 6979, or ring the President, Steve Phillips on 08 9448 8904.



COMING EVENTS

▶ **STATE LANDCARE CONFERENCE**
1 - 3rd Sept. Geraldton.

Very interesting program - keynote speakers outstanding. From the 'sustainable future' point of view, both Dr Mary White (author of the wonderful books 'The Greening of Gondwana' and 'The Browning of Australia') and Prof. Harry Recher, an ecologist of national stature, will be giving an address. The tour programs are great too, including specifically visiting a *Land for Wildlife* site. Remember, if you're an LCDC delegate, the SLCC will subsidise your attendance. Ring Jane Keefe: 08 9961 1388.

▶ **'SPRING FLING'**
14th Sept.

Wildflower Society of WA's expo and family day at Perry House, 71 Oceanic Drive, Floreat. For more information phone 08 9383 7979.

▶ **ONGERUP WILDFLOWER SHOW**
Sept 15th to end of month

▶ **KINGS PARK WILDFLOWER EXHIBITION**
20 - 29 September

(not October as we said last time!)
Entrance fee: \$4.00 adult

▶ **LOCAL HERBARIUM WORKSHOPS**
Two dates, 22nd and 26th September.

All day, at the WA Herbarium, South Perth. For more detail, contact: Dorothy Redreau, Greening Western Australia, on 08 9481 2188

▶ **'WEED BUSTER WEEK'**
Oct 12 - 19th.

What can you organise in your area to highlight and/or attack the problem of environmental weeds?

▶ **RURAL BIODIVERSITY COORDINATOR'S COURSE**

Run by Greenskills, Denmark; four-week live-in course, 10th Nov - 5th Dec,

Rylington Park, Boyup Brook. Cost \$140 / week. For further information contact Basil Schur 08 9848 1019



NEW BOOKS

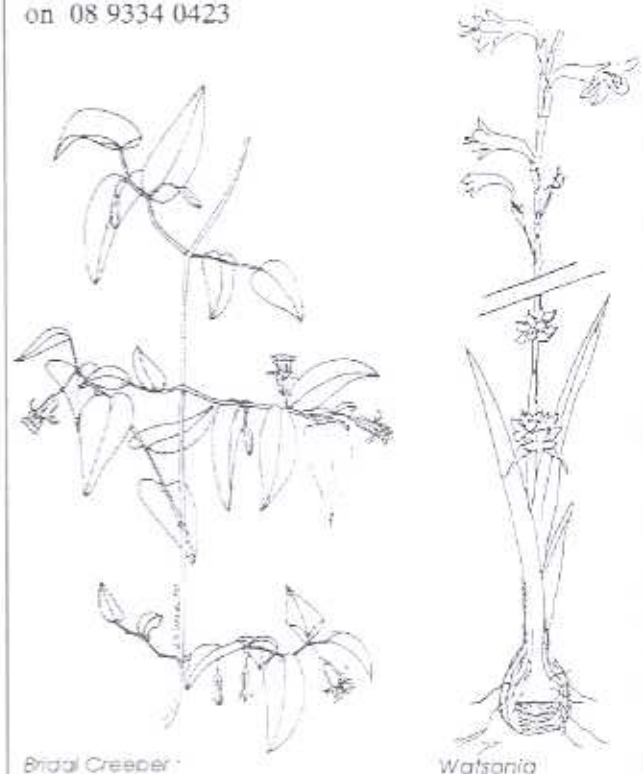
PROCEEDINGS FROM BRIDAL CREEPER SEMINAR AND WATSONIAS WORKSHOP

If you have a problem with either Bridal Creeper or Watsonia, have we got a deal for you !!!

In past years CALM and the Roadside Conservation Committee, being aware of community concern over Bridal Creeper and Watsonia have held a workshop and Symposium to draw together interested persons from the scientific and general community to discuss and consider the latest advancements in control of these two devastating environmental weeds.

The proceedings from both of these forums have been combined and reprinted from the Plant Protection Quarterly in booklet form, of 105 pages, A4. This publication provides the current status on the control of both of these species and is available from CALM, Como @ \$10.00 over the counter or \$12.00 posted to your home address.

If you require any further information on this excellent publication please contact David Lamont at the Roadside Conservation Committee on 08 9334 0423



Bridal Creeper

Watsonia

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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