



Western Wildlife



NEWSLETTER OF THE LAND FOR WILDLIFE SCHEME

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MANAGING GRANITE OUTCROPS



"This is how we'll organise things!" - Ken Wallace



"Off you go, girl!" - Jack Kinnear



"Even the small plants are interesting!" - Steve Hopper



"Ecotourism can work for you!" - Trish Nanni

Land for Wildlife's first Field Day!

OVER 50 people - landowners and advisors - assembled at Tammin in October for a day discussing how to manage granite outcrops. Speakers concentrated on wildlife and ecotourism values, and most of the talks were at Mt Caroline Nature Reserve, where fox control has allowed the rock wallaby population to increase in numbers. It generated a lot of interest in how to encourage native plants and animals back onto outcrops where they once occurred.

The day proved very popular, with more people wanting to attend than there was space for them. Consequently, it will probably be repeated next year.

The Field Day was organised by the LFW Officer at Narrogin, Avril Baxter, who did a magnificent job. Thanks to her and all her helpers! If you'd like to know more about next year's event, contact Avril on (08) 9881 1444.

Dates for the next workshop are on the back page

EDITORIAL

AS we start *Land for Wildlife's* third year in Western Australia, I would like to thank everyone concerned with the scheme for the wonderful experience of working with you. It is such a pleasure to visit a *LFW* property and see the tremendous efforts people are making to ensure the long-term survival of our native flora and fauna. In total, *Land for Wildlife's* are managing an area greater than Walpole-Nornalup National Park! Whenever I get depressed at dealing with bureaucracy, I turn with pleasure to the real world and am infused with hope again! You're inspirational, folks!

Especial thanks to David Lamont for holding the fort while I was away during last winter and spring. He put a lot of effort into sorting out funding matters, for example, and we are all very appreciative of his help. Hopefully he will retain an interest in *LFW* and give us the benefit of his considerable knowledge and experience.

Thank you also to all the *LFW* Officers, who are doing a great job of actually communicating the bush management and revegetation message to interested landholders. We're lucky to have such a great team of knowledgeable enthusiasts working with us. To help you contact the correct person, a map showing the Shires where they work is given below.

This issue of *'Western Wildlife'* contains two excellent, detailed articles on our smaller wildlife that often seem more numerous in summer, ants and ticks. There is also information on native grasses, a subject which is generating great interest among a number of people.

Please let us know if there is any topic you would particularly like included in a future issue.

It's project-writing time - see back page for some contacts. Good luck with the next funding round!

Penny Hussey

Land for Wildlife statistics to the end of Oct 1998

Total registrations	192 landholders
Total property area	136 837 ha
Total area of <i>LFW</i> sites	17 474 ha (on average, 12.8% of the property)
Yet to be visited	122 landholders

Contact details for *Land for Wildlife* Officers

ORCA	Location	Phone number (work)
Heather Adamson	Merredin	(08) 9041 2488
Avril Baxter	Narrogin	(08) 9881 1444
Emma Bramwell	Perth	(08) 9334 0427
Jenny Dewing	Bridgetown	(08) 9761 2318
Bob Huston	Mundaring	(08) 9295 1955
Cherie Kemp	Busselton	(08) 9762 1677
Sylvia Leighton	Albany	(08) 9842 4500
Robyn Stephens	Morawa	(08) 9971 1598



ERRATA

Page 2 of the last issue *D. quadrifolia* should have read *D. quercifolia*.

FAUNA

THE wide variety of invertebrates which occur in any bush remnant were discussed in the first issue of *Western Wildlife* (WW1/1, pp 4-5). If you took ALL of the animals, from the smallest mite to the largest kangaroo, from any area of bush and weighed them, you would be surprised to find the invertebrate animals collectively weighed more than all of the birds, mammals, reptiles and amphibians in that area. Their diversity is just as impressive - invertebrate animals make up over 99 per cent of all the terrestrial animal species.

One group of invertebrates, however, consistently attracts our attention and leads to the greatest number of enquiries - the ants (family Formicidae). Along with bees and wasps, ants are members of the insect order Hymenoptera ('narrow waisted insects'). The name of this order is particularly applicable to ants, since members of this family always have one or two reduced waist segments, unlike bees and nearly all wasps.

Ants are true social insects. Most females in an ant colony have forfeited their birthright in order to rear the offspring of their mother. The females which do this are the workers of the colony, and the young that they help rear are actually their siblings. Mathematical biologists have demonstrated that this colonial co-operation is a more efficient strategy for ensuring the spread and survival of the ants' genes than living and attempting to reproduce alone or as breeding pairs. Thus, a typical colony consists of one or more queens, non-reproductive female workers (the recent film "Antz" is incorrect in portraying workers as males!), males and brood. Winged queens are produced when environmental conditions are suitable, and these will mate

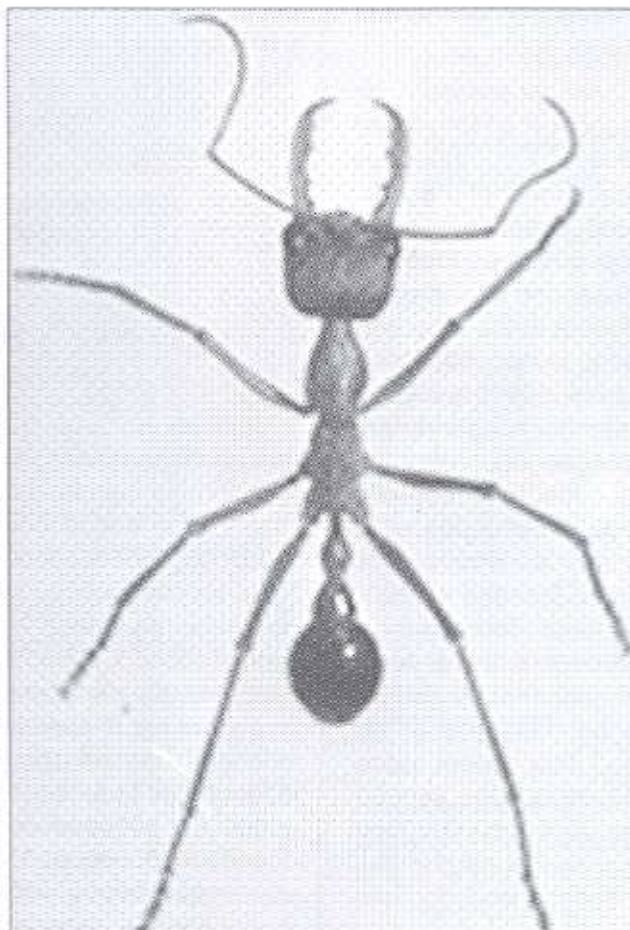
ANTS IN YOUR REMNANT

by
Jonathan Majer
and
Brian Heterick



▲ Close up of a bulldog ant head, showing the powerful, toothed mandibles characteristic of this genus.

▼ A large bulldog ant (*Myrmecia* sp.).



with males from the same or other colonies. Inseminated females may establish new nests or return to the old colony.

Ants are enormously diverse, and researchers consider there may be as many as 4000 Australian species. At Curtin University we have pinned specimens of approximately 550 species from Western Australia alone! A previous student at Curtin University, Anne Brandenburg, surveyed the ant fauna of fenced and unfenced remnants in the Kellerberrin district. Anne found 105 species, with 76 species occurring in fenced remnants and 69 occurring in non-fenced sites. Intrusion by livestock had resulted in alteration to the composition of the ant fauna in the unfenced remnants, possibly due to changes in soil and vegetation structure.

As is the case with all other plants and animals, ant species can be classified into different genera. The ants in the remnant study belonged to 17 genera, all of which are typical of what is found in the WA wheatbelt. Readers may wonder how such a high diversity of ants can co-exist in the relatively small remnants which occur on the typical farm. Many mechanisms allow this situation to occur: these include differing diets or feeding strategies, different nesting sites and differing foraging times. The following notes discuss and illustrate interesting ant genera that are commonly found in wheatbelt remnants.

Myrmecia (bulldog or sergeant ants).

Bulldog ants have a very distinctive appearance, being in general large with big eyes and long, menacing mandibles. Bulldog ants are a primitive group, formerly confined to Australia and New

continued on page 4

continued from page 3

Caledonia. One species, however, has been introduced to New Zealand by human activities. Many species of bulldog ants have a powerful sting and potent, histamine-laden venom that can seriously affect people who are sensitive to wasp and bee stings. Cases are known where healthy adults have become dangerously ill after being stung, and one Tasmanian woman who had been envenomated died within 15 minutes from a massive allergic reaction. Clearly these are insects worthy of respect.

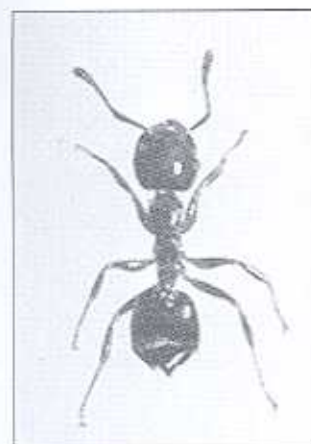


The greenhead ant (*Rhytidoponera metallica*).

Rhytidoponera
(the greenhead ant and allied species).

Ants belonging to the genus *Rhytidoponera* are common in south western Australia. The iridescent greenhead ant is found throughout much of Australia, and is an important dispersal agent for seeds of native plants. The greenhead and other ants feed greedily on a nutritious appendage (the elaiosome) found on

certain plant species. The plants producing the seeds also benefit, since the greenhead ants drag seeds into their nest. In ant nests the seeds are protected from seed predators and adverse weather conditions, while the ants' faeces and dead insect remains provide a fertile seedbed for the emerging seedlings.

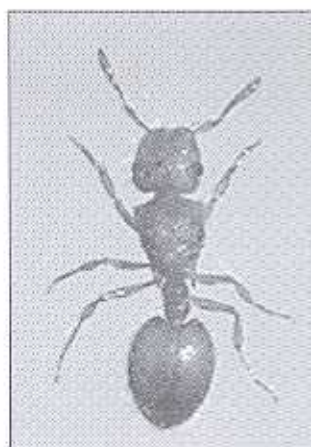


A cocktail ant (*Crematogaster* sp.). There are several common wheatbelt species.

Crematogaster
(cocktail ants).

Cocktail ants are commonly seen crawling on trees and dead timber. Other species are soil nesters. All *Crematogaster* ants have a distinctively heart-shaped gaster (the gaster being that part of the abdomen in bees, wasps and ants that looks like the full abdomen of insects in other orders). Species of *Crematogaster* have two reduced waist

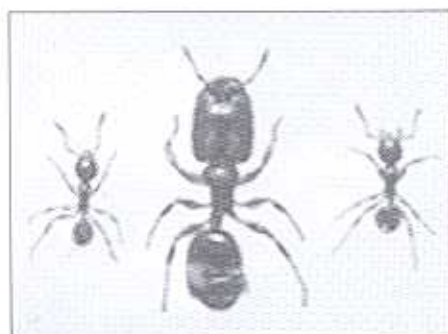
segments, but are distinct from related ants in that the second segment is attached to the dorsal part of the gaster, rather than to its midline. This feature makes members of this genus readily identifiable under a microscope. When alarmed, cocktail ants raise their gasters above their trunks. They possess a sting but also rely for defence on tacky and noxious exudates from glands in the rear of the gaster.



A small species of *Meranoplus*. Note the flattened shield on the foreparts.

Meranoplus
(no common name).

The very many Australian species of *Meranoplus* possess a characteristic shield that covers the front section of their trunk. Once seen they can be readily recognised on subsequent occasions. Local species often have translucent patches, like windows, near the spiny edges of their shields. When disturbed these ants will retract their legs and antennae into grooves on the body and head capsule respectively. They also curl up and sham death, so that they resemble nothing more than small orange or brown seeds. These adaptations, together with thick hairs, protect them from potential predators (such as other ants). A more northern group of *Meranoplus*, common in the Kimberley and Pilbara regions, are significant seed-harvesters and help to disperse plants like spinifex.



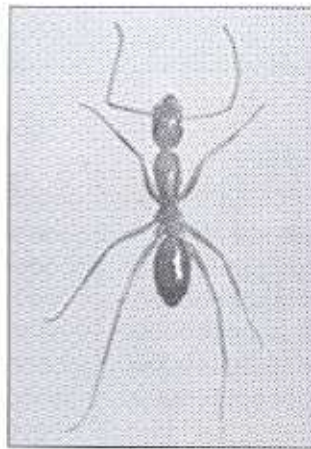
A native species of *Pheidole*. The middle worker is a major

Pheidole
(no common name)

Species of *Pheidole* are among the most ubiquitous and abundant of Australian ants. All Australian *Pheidole* have two worker casts, a small minor worker and a much larger major worker with a hugely developed head. The inner margin of the mandible also differs: minor workers have alternating large and small teeth or denticles, but the major has a sharp toothless edge like the blade of a pair of scissors. Most ants seen are minor workers, as majors rarely leave the nest. In well-watered wheatbelt townships, you may see an introduced species of *Pheidole*, the coastal brown ant (*Pheidole megacephala*). This species looks much like the native *Pheidole*, but is a real pest in houses and gardens and it also displaces harmless native ants. Unfortunately, the coastal brown ant is abundant in settled parts of several Australian states, and is widely distributed overseas.



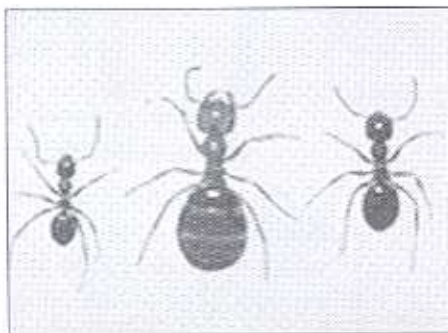
Camponotus claripes *maricensis* major worker. This species is commonly found on trees in the Darling Range.



Camponotus claripes *maricensis* minor worker.

***Camponotus*
(sugar ants and their allies).**

The genus *Camponotus* is one of the biggest in Australia with well over 100 Australian species. Most species of *Camponotus* are polymorphic with big-headed majors, smaller minor workers and other workers with features of both majors and minors. *Camponotus* love honeydew, the watery, nectar-like faeces of certain plant-sucking bugs. Moreover, one group of *Camponotus*, the true sugar ants, includes one or two species that will enter houses looking for sweet foodstuffs. They can be a minor nuisance, but more so in the eastern states of Australia where the main species (*Camponotus consobrinus*) occurs. Very large major workers in this genus can be intimidating in appearance, some specimens reaching 2 cm in length. However, they do not possess a sting, and will inflict no more than a sharp nip!



A wheatbelt *Melophorus*, minor, major and media workers.

***Melophorus*
(including some 'honey-pot' ants).**

In the heat of a scorching summer's day, when all sensible creatures are taking a siesta, you may see a nest being excavated by shiny brown or reddish ants of different sizes. These will be *Melophorus*. Workers are physiologically adapted to be most active in summer, and in the middle of the day when the heat is at its peak. In this way the members of this genus avoid competition with other ant species. The genus *Melophorus* is

confined to Australia, with many of its numerous constituent species still undescribed. Workers of some arid area species of *Melophorus* store honeydew in their gasters, and this part can be greatly distended (the same behaviour is found in other ants in the subfamily to which *Melophorus* belongs). These 'honey-pot' ants have long been a valuable food source for Aboriginal tribes.



A worker of one of the many small *Iridomyrmex* species.

***Iridomyrmex*
(including the meat ants
and allied species).**

The genus *Iridomyrmex* is arguably the most successful in Australia, with a cluster of species in nearly all temperate habitats. Only in tropical rainforest or in highly disturbed sites are *Iridomyrmex* species likely to be absent or present only in small numbers. The most visible members of the genus are the meat ants, with twelve Australian species. The common meat ant of the WA wheatbelt is *Iridomyrmex greensladei*. Most country dwellers would be familiar with the pebble mounds in which this species lives. Meat ants are highly aggressive, and are important scavengers in the natural environment. Even the meat of kangaroo carcasses can be removed by these voracious insects, though their normal diet is dead insects and honeydew.

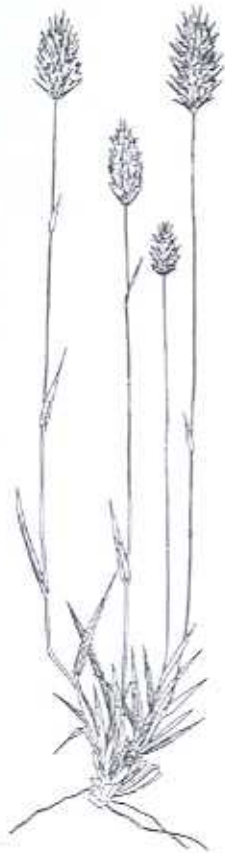
This review of a selection of the ant genera found in the wheatbelt indicates that even the smallest remnant can contain fascinating species. Seen under a microscope some ants are as spectacular as any colourful bird or reptile. For example, a small, nondescript-looking black ant (*Dolichoderus ypsilon*) will be found to have a beautiful, glassy, dimpled exoskeleton and red-tipped spines, or a barely visible orange species (*Colobostruma* sp.) sports delicate lacy flanges on its waist segments, like the wings of an embryo aircraft. Equally fascinating are the complex and vital interactions between ants, plants and other animals. By looking after your remnants, you will maintain these components of the ecosystem, and contribute to the conservation of wheatbelt diversity. Although we have written about the ants of these remnants, areas which are diverse in ants tend to support an equally wide array of other invertebrates. So for every interesting story to tell about ants, there are hundreds more to say about the other invertebrates in your remnant.

Acknowledgement: All photos were taken by the late Dr George Lowe

Jonathan Majer is Professor of Invertebrate Conservation and Brian Heterick is a Research Associate in the School of Environmental Biology, Curtin University of Technology, Perth.

FLORA

NATIVE grasses were the backbone of our early grazing industries - yet today most people cannot distinguish them from the weed grasses that dominate a grazed bushland.



Neurachne allopecuroidea

While southwestern WA does not have extensive grasslands such as the basalt plains of Victoria, our native grasses can be found peppered throughout our bushland and are a major food source for mammals and ants. Their often tussocky nature makes good habitat for lizards and other small creatures.

Most of our native grasses are perennials and some could be incorporated into mixed permanent pastures within our farming systems, however a major constraint is the lack of local seed sources. There is much work to be done in selecting and bulking up the seed of our local grasses. Learning to recognise them is the first step in this process.

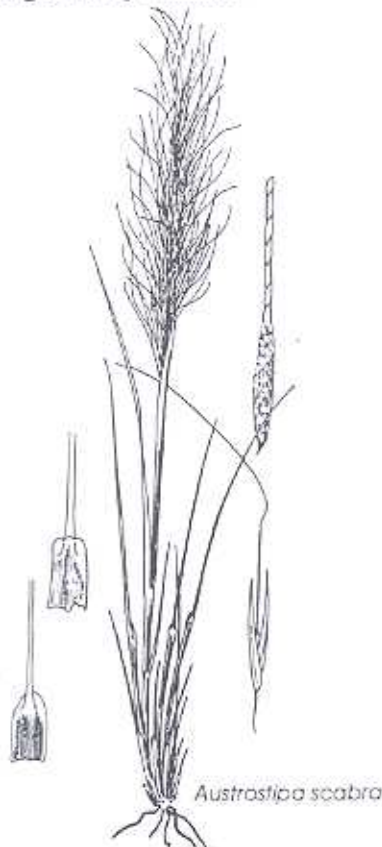
NATIVE GRASSES - THE UNSUNG HEROES

by Terry Macfarlane and Avril Baxter

The major groups of grasses are easily identified by their distinctive seed heads. Some of the major groups, found throughout the landscape, include:

Fox Tail Mulga Grass (*Neurachne allopecuroidea*)

The leaves of this clumping grass are flat and dark green with large, widely spaced hairs on the edges. The seed head is very compact, resembling *Phalaris* (Canary grass) except that it has a slightly greyish colouring. This grass is very common and present in most bushland in south western WA, and it is grazed by animals.



Austrostipa scabra



Austrodanthonia bipartita

Spear grasses (*Austrostipa species*)

Here, a sharply pointed seed is attached to a long shaft or bristle which curls and twists as the seed matures. The seed head can either be dense and compact (as wheat is) or loose and branched, like oats. There are a number of species in south western WA, occurring in most bushland areas. They range from a couple of annual species present after a fire, to tufted perennials, one semi-climber and a couple of species that inhabit damp and somewhat saline places. They are known to be palatable to grazing animals, but the sharp seeds are a problem in spring.

FLORA

Wallaby grasses (*Austrodanthonia* species)

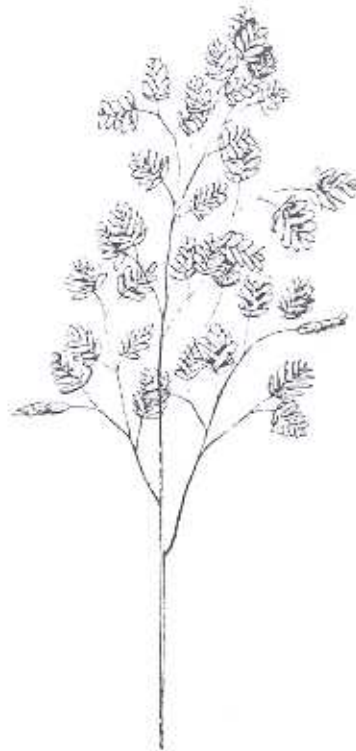
These small tufted grasses can tolerate quite tough conditions, being often seen on roadsides, but also in bush. Their leaves can be either flat or rather fine. The seed heads are compact and resemble those of wild oats, when the seeds have fallen. The seeds themselves have very short bristles and can be instantly recognised by the distinct rows of hairs across them when viewed with a magnifying glass.



Microlaena stipoides

Weeping Rice Grass (*Microlaena stipoides*)

With its wide, flat and soft-looking leaves, this grass may look somewhat delicate, but it is in fact quite tough. It occurs mainly in forest and higher rainfall wheatbelt areas. Under intensive grazing in bushland areas it forms a dense pasture or lawn-like cover. The seed head is slender and the seeds bear a straight bristle, which is not very troublesome. There is probably considerable scope for selecting useful variants of this grass.



Poa drummondiana

Forest poa (*Poa porphyroclados*)

A large bunch grass that is common in coastal areas and high rainfall forest. It has a large amount of rather soft leaf material and loose seed heads. The seeds are small and have no bristles. In suitable areas this species would probably grow very densely and productively.

Terry Macfarlane is a Senior Research Scientist at CALM, Manjimup. His special interest is grasses. He can be contacted on 9771 7980. Avril Baxter is Land for Wildlife Officer at CALM Narrogin, phone 9881 3297.

Besides Avril and Terry, some West Australians with an active interest in native grasses include:

- Una Bell, bush regenerator, Mundaring, 9295 1668
- Roy Butler, AgWA, Merredin 9081 3111
- Don Cochrane, farmer, Duranillin 9334 0336
- Jenny Dewing, LFW Officer, Bridgetown 9761 2318
- Penny Hussey, LFW, Perth 9334 0530
- Richard McLellan, Landcare Services Pty Ltd, York 9641 4064
- Paul Sandford, AgWA, Albany 9892 8444
- Dave Stapleton, Bushcare Support Officer, Wagin 9823 1661

Illustrations by CA Gardner from 'Flora of Western Australia', Vol 1, Part 1. Govt Printer, Perth, 1952.

?

Would you like to arrange a Field Walk to learn to distinguish between native and introduced grasses? If you can collect together a group of interested people, and a suitable site, contact your local LFW Officer to set a date for next growing season - October or early November are the best months. - Ed.

FAUNA

TICKS

by Gordon Paine

TICKS are external parasites of a wide variety of vertebrates, including reptiles and birds. Although particularly common in the tropics, some also occur in temperate parts of the world.

Having a structure similar to that of insects, with jointed legs and a hard outer casing, ticks were classed in the Phylum ARTHROPODA. Recently they have been transferred, with spiders, scorpions and mites, to the CHELICERATA, with only one Class, ARACHNIDA. They differ from insects in having four pairs of legs in the imago or adult stage. Ticks are grouped with mites, which are very similar but smaller, in the Order ACARINA.

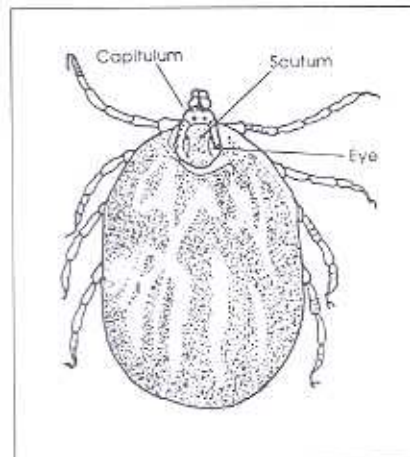
There are two families of ticks, the ARGASIDAE and the more common IXODIDAE. Also known as hard bodied ticks, the Ixodidae have a hard scutum or shield on the upper surface which can be seen in all stages with a lens.

All ticks feed on the blood of vertebrates. They fasten themselves to their hosts by means of a barbed structure, the hypostome.

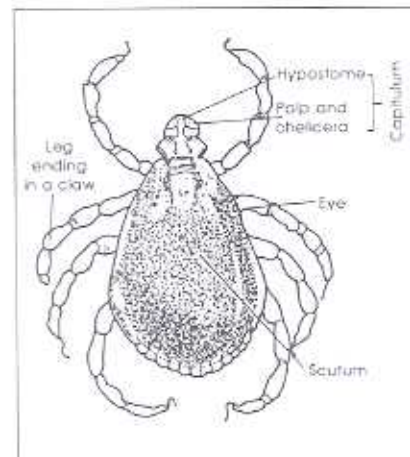
Ixodid Ticks

Tick bodies have no segments; they consist of an oval body which contains the digestive and reproductive organs and a capitulum with the mouthparts. All stages remain attached to the host for several days until feeding is completed. Females engorge themselves, their bodies distending to a centimetre or more long. These are the ticks usually seen by owners on their animals. Some appear a bluish colour due to the engorged blood which is being digested. The males are small and do not enlarge as they feed.

Mating occurs while the ticks are feeding. If the body of a female is raised, the male may be seen beneath her. Both sexes have a genital pore on the under surface. When a female is fully engorged she falls to the ground, seeks a sheltered spot such as under a tuft of grass, where she lays her eggs and dies. The males also die, but may remain in situ on the host for a while.



Engorged female ixodid tick - dorsal view.



Dorsal view of a male ixodid tick.

Several thousand eggs are laid. Six-legged larvae hatch out after a few days, the time depending on the species, temperature and humidity. They climb plant stems or other suitable objects, helped by a claw on the end of each leg, and wait for a passing animal to which they can cling. The numerous pin-head size creatures sometimes seen all over the walls of a room by pet owners are larvae, also known as seed-ticks, which have recently hatched out. After feeding, the larvae drop to the ground and moult into nymphs. The nymphs repeat the process of waiting for a new host, feeding, then falling to the ground where they moult into adults. The adults wait for a final host on which to

complete their life cycles. This life cycle is characteristic of three-host ticks. All stages, unfed larvae, nymphs and adults, can remain alive for considerable periods of weeks or months depending on the species, while waiting for a new host to which they can attach themselves.

The tropical cattle tick of northern Australia, *Boophilus microplus*, is an example of a one-host tick. This creature undergoes all the stages of development as above, but remaining on one host animal, without falling to the ground to moult.

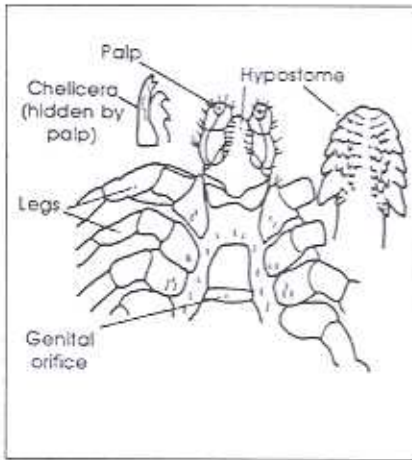
Some ticks, especially many of the Genus *Hyalomma* which occur throughout the drier parts of Africa and Asia, require two hosts, each of different species. The larvae and nymphs develop on one host, usually a small rodent, and the adults require a different host species such as a camel. It is probable that some of the camels brought to Australia during the last century were carrying *Hyalomma* ticks when they boarded ship. The females would have lain their eggs in cracks in the woodwork but the larvae found no suitable host and eventually died. There is no evidence that any are now present on outback camels.

Most ticks need to feed on particular species of host animals in order to complete their life cycles. Each species of tick depends for its distribution on the availability of suitable hosts, a climate with a particular range of humidity and temperature for feeding and breeding and a vegetation type to protect the creatures when off the host. For ticks of some species, the domestic home and garden have replaced their natural environment.

Argasid Ticks

Referred to as soft-bodied because they lack a scutum, argasid ticks also differ in the position of their mouthparts; which are underneath the body and cannot be seen from above. Their bodies are flattened.

Their life cycles are similar to those of ixodid ticks, but some species undergo several nymphal stages. Feeding is not always



Ventral surface of male Ixodid tick.

continuous in argasid ticks. *Argas persicus*, a pest of poultry, seeks refuge in cracks or crevices during the day, only emerging at night to feed from birds roosting on their perches. Females produce small numbers of eggs at a time, but lay after each blood meal.

The Effects of Ticks

By their presence and the saliva which they inject to prevent blood from clotting, ticks can cause irritation and sometimes local suppuration. Each tick species has favoured sites of attachment on the host. One African species favours the teats and udders of cows, sometimes causing the development of abscesses which lead to mastitis and loss of one or more quarters.

Heavy infestations can cause loss of blood and anaemia. Wild animals in their natural habitats have few ticks, the parasites and their hosts having adapted to one another over many generations. When domestic animals are introduced, such as cattle into Africa, ticks, especially of the genus *Boophilus*, find a new and very suitable host on which they may build up populations of many hundreds. With heavy infestations, infection develops, flies are attracted to the area where they feed and lay eggs; the maggots then destroy more tissue as they feed.

The saliva of some species of ticks contains substances which can cause paralysis in humans, sheep and some other animals. The condition may be fatal, but recovery follows removal of the ticks.



Female Ixodid tick with eggs.

The most important effects of ticks are due to the diseases that they can spread. Worldwide, they cause considerable sickness and economic loss by transmitting pathogenic viruses, rickettsia, protozoa and bacteria to humans and other animals.

The puncture wounds made by ticks mark and reduce the value of hides and skins.

Ticks in Australia

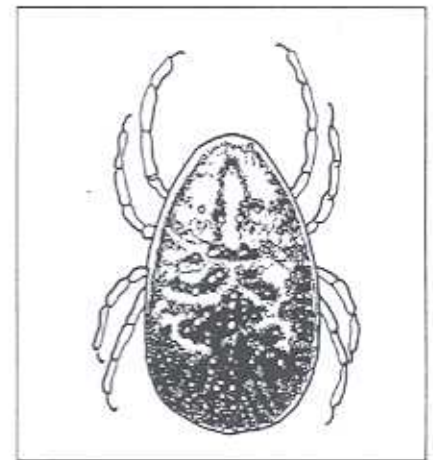
The tropical cattle tick, *Boophilus microplus*, is the most important tick economically because of the diseases that it transmits to cattle across the north of the country, babesiosis and anaplasmosis. Related diseases, but milder, have been seen in other domestic animals such as horses and dogs.

Ixodes holocyclus, a parasite of marsupials and rodents in the eastern states, is believed to transmit a rickettsial infection known as Queensland Tick Typhus to humans. This tick can also cause paralysis in man and some other animals.

The brown dog tick, *Rhipicephalus sanguineus*, is fairly widespread in Australia. It can cause tick paralysis of dogs and spread several diseases. There are many other ticks occurring on native animals which are not important from the human viewpoint.

Control of Ticks

Several chemicals are available for treating tick infections by spraying, dipping or injection. Pet



Dorsal view of an Argasid tick.

owners can prevent ticks from becoming established on their premises by treating their pets regularly during the seasons when ticks are active.

An ecologically sound method of tick control is to groom the animals daily, or run one's hands over their coats, feeling for little bumps in the hair which may be ticks. These should be picked off and crushed or burned. Once a female has been able to lay eggs in the house or garden, it can be difficult to get rid of all the ticks.

People who are sensitive to ticks can reduce their chances of being affected when walking in the bush by wearing leggings.

Removing Ticks from the Skin

The feeding tick is held firmly in place by the barbs on its hypostome. The tick is unable to withdraw this even if its back is touched by a cigarette end or one of the various substances suggested for its removal is applied.

As the parasite ingests, enzymes in its saliva probably act with the host's own reaction to break down slowly the tissues which hold the hypostome in place. By the time the tick is replete the surrounding tissues have given way so that the parasite falls to the ground passively.

Ticks can be removed with a pair of tweezers. Grasp the tick as near to the capitulum as possible and lift it upwards and away from

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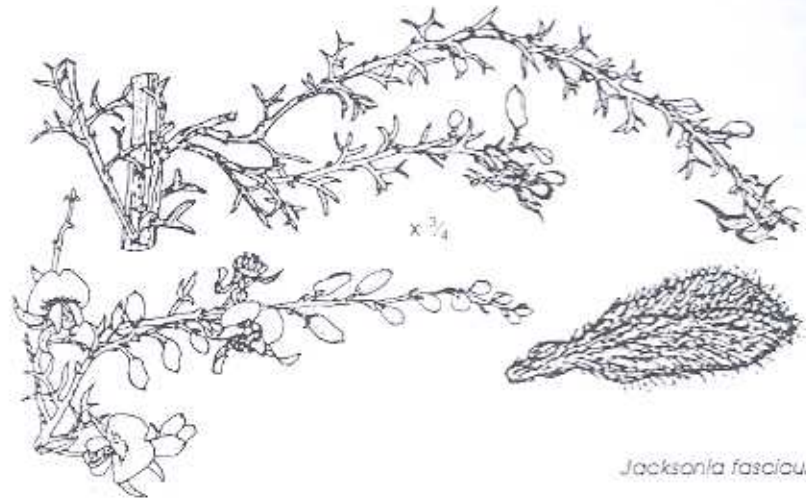
PRACTICALITIES

Jacksonias for revegetation

WHEN visiting Pat and Russell Lord's place at Botherling, in Goomalling Shire, Pat showed us a spectacular flowering pea plant growing on a sand ridge between salt lakes. She was concerned that it might be a poison.

The plant was a dense, prickly bush to 1.5m in height, which was totally covered in salmon-pink flowers. It was humming with insect pollinators, including many native bees. Grazing damage around the base showed that sheep were eating it, with no ill effects. Therefore, not poisonous!

A quick look showed that the calyx was folded backwards, suggesting that it was a *Jacksonia*. These are leafless, shrubby peas widespread in the southwest of WA. Like all peas, they have root nodules, and return nitrogen into the soil. This one was identified by Heather as *J. fasciculata*.



Jacksonia fasciculata

A nitrogen-fixer, visually attractive to humans, important for pollinators, that could be grazed without harm should stock ever get into the revegetation area - this plant would be great to include in revegetation projects on these inland sandy sites. Try it on York Gum loam or Banksia sands.

Being a pea, the seed should be easy to collect and easy to germinate.

Hopefully Pat will manage to get some this year, that can be trialed in their Botherling Springs Catchment Group projects.

If anyone is interested in which jacksonias would be suitable for your area, contact your local LFW Officer or Community Herbarium.

Heather Adamson
and Penny Hussey

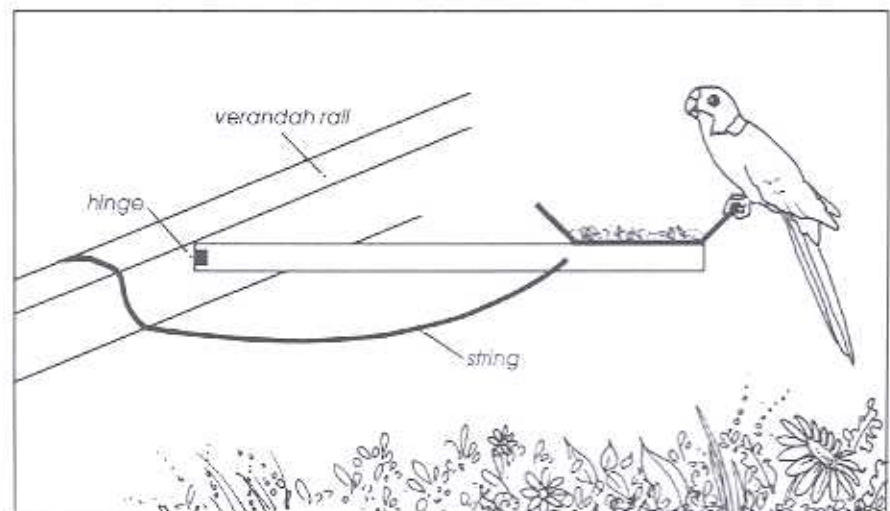
TICKS

continued from page 9

the skin. In practically every case the tick will come away complete with its mouthparts. I have removed many thousands of ticks this way from various animals, very few left their mouthparts in the host skin. In the small number that do, the reaction in the host tissues will expel the remaining parts within a few days occasionally in a little pustule.

Gordon Paine is a veterinary surgeon who has worked with ticks and tick-borne diseases of animals in South America, Africa and Asia. He can be contacted on (08) 9797 0673.

Drawings by Louise Burch from veterinary texts.



Practical bird feeder

DO you like watching birds feeding at a bird table, but don't like the mess they make on the verandah decking? John Grahonia of Helena Valley devised a simple and effective solution.

Place the feeder on a long arm, hinged at one end, so that the bird droppings (and waste food) fall onto the garden. A piece of rope pulls in for replenishing.

Easy!

WEEDS

VELD GRASS – FRIEND OR FOE?

by Bob Dixon

VELD Grass comes from South Africa. In 1924 it was growing well on sandy soil in Crawley - possibly seed originally got there from packing material blown from barges or lorries between Fremantle and Perth. A Western Mail article on 14/05/1925 said that 'Veld Grass has spread into the park (Kings Park) and there must be a quarter of an acre where it is quite thick, growing amongst the shrubs and harsh vegetation'.

Originally seen as the answer to solving the problem of supplying a reliable fodder crop, Veld Grass was keenly sought after by the farming community. It didn't take long for Kings Park to take advantage of this 'new found crop' which had the potential to make money for the park. Veld Grass was supplied to the Peel Estate in 1926.

In 1927 it was acknowledged this was certainly a grass that can establish itself in the poorest of sand west of Kings Park amongst the harsh vegetation and was worth watching - and distributing. Mr J. Heath, Superintendent of Kings Park, had also become interested, and having satisfied himself that the grass was good he went forth preaching, ultimately converting the Controller of Group Settlements and officers of the Department of Agriculture. Mr Heath let it be known that the grass was available at £1 a bag and that orders have been received for roots from all over the state south of Geraldton, also from South Australia and Victoria.

Veld Grass was advertised for sale in the Sunday Times on 18/02/1927 at £1 a bag. During the same year the grass was being ploughed and superphosphate applied to try and improve yields. Not all soils were suited to growing this grass and in 1927 it was noted in the West Australian that although perennial

*Ehrharta calycina*

Veld Grass was in East Guildford in 1900, it did not make much progress on heavy soils.

In 1927 Kings Park was awarded a prize at the Royal Show for the best 14 lb sheath of Veld Grass. During the mid 1920s the sale of Veld Grass made a significant contribution to funding the park's operating costs. Therefore protecting the Veld Grass from fire received the highest priority, rather than lose next year's income!

However, there was great concern, even in the early 1930s, that this grass was out-competing native flora in Kings Park and calls for its removal were seen in local newspapers. At the same time, others were still actively promoting its use as a fodder crop.

In 1933 Veld Grass was pulled out from Subiaco to Crawley, from along Lovekin Drive and the river frontage. Veld Grass was by then

considered to be a fire hazard. Pulling out Veld Grass became a regular event throughout the 1930s, to reduce the fire hazard and limit its spread in the park. In 1938 £65, a large sum of money at the time, was spent to try and stop it from spreading away from the southern end of the park where it was already well established and beyond eradication by these means.

Kings Park is fortunate in having reliable records on Veld Grass spread. In 1939 it first appeared in Alison Baird's (UWA Botany Dept) quadrats. A distribution map of the park also clearly illustrates the rapid spread of Veld Grass in the southern end of the park from Crawley almost to the adventure playground. The spread was favoured by cultivation along road verges and disturbance by fire. By 1945 it had spread through most of the park, though very patchy in places. Baird's quadrats in 1950, compared to the 1939 ones, also confirm Veld Grass had rapidly invaded the park's bushland.

In 1947 R. C. Rossiter reported on research work with Veld Grass. His findings included:- heavy continuous grazing could eliminate Veld Grass; there were 3 distinctive forms; seed set was very low; and, it was difficult to collect as it shattered as soon as it was mature. However, there was a form that did not shatter and this should be used to improve pasture crops

Desperate to control the grass in the park, all sorts of suggestions were made, including reducing fire frequency, replanting trees to improve the canopy (shade) and even grazing with cattle! In the mid 1950s the YMCA organised volunteers to pull the Veld Grass from around the memorial trees along the park roads. These efforts were conducted over whole weekends and were supported by

IN BRIEF

Wheatbelt Biodiversity Officer

by Liz Brown

AS part of its WA regional program, the World Wide Fund for Nature (WWF) has targeted the wheatbelt as one of its priority areas for biodiversity conservation, and has appointed me as Wheatbelt Biodiversity Officer. Preserving good quality bush for future generations to enjoy and integrating conservation with farming practices requires, among other things, sound knowledge. While there is a great deal of information being produced about the conservation of biodiversity, it doesn't always find its way to become practical landcare guidelines. Land managers and field extension officers may also have specific questions for which there is an answer but they don't have the time to sift through all the available information to find it.

My main role will be to do this sifting, both to help to provide

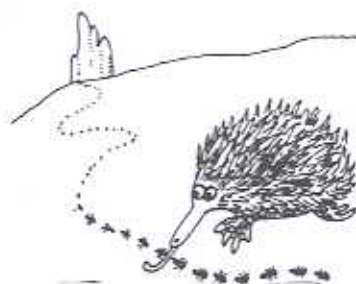
practical information on biodiversity conservation in the wheatbelt and to identify areas where there needs to be work done to improve our knowledge and landcare practices. To start this process, I will be asking people different questions such as:

- what do you understand by the word biodiversity?
- what works and what doesn't work?
- what stops you from doing things to further conservation, and what helps?

If you would like to know more detail about my project, or can help me with your opinion on the questions above, I can be contacted at WWF on (08) 9387 6444, or by email wwfperth@ozemail.com.au



From a young Land for Wildlife:
Q: What do you do when there is an echidna sleeping on your bed?
A: Sleep on the couch!



Did you know ...?
Echidnas need to eat up to 10 000 termites a day!

continued from page 11

firms such as Peters and Weaver & Lock, who provided refreshments for the volunteers. Unfortunately nothing seemed to solve the problem, they were fighting a losing battle as there was a large seedbank in the soil and new plants soon reappeared.

In 1971 herbicide trials using non-selective herbicides gave some control of Veld Grass but also damaged native plants. Therefore the results were never implemented into a control programme.

It was not until 1985 a suitable selective herbicide was trialed in Kings Park bushland. Starting with Fusilade and Sertin, extensive trials were carried out in areas with different management regimes and Veld Grass densities. In all cases the herbicides worked selectively killing Veld Grass without killing the non-target native plants. After these successful trials a 1 ha plot was sprayed in 1986 to see what it would be like implementing a large-

scale spraying programme. This, and later research using Assure and Targa, was the start of the modern control methods used today in remnant bushland. Misting behind a tractor was also tried for a number of years. However, due to the cost of large numbers of staff, which were required to effectively keep the general public out of the area, this practice was discontinued.

Kings Park continues to use Fusilade® (the only herbicide registered for the control of Veld Grass in remnant bushland) generally applied by spraying contractors. As a leading agency in bushland management and environmental weed control we provide advice to other land managers on how to effectively control one of our worst environmental weeds.

The author would like to thank Dr P Wycherley for his assistance with historic information.

Bob Dixon is the Extensions and Development Officer, and Acting Bushland Manager, Kings Park and Botanic Garden. He was the Co-ordinator of KPBG's Bushland Management Plan and a substantial author of 'Managing Perth's Bushland'. He can be contacted on (08) 9480 3628.

?

We have been having a debate - how should the common name be spelt, 'veld' or 'veldt'? Are there any Afrikaans speakers among us? Which is correct?
- Ed.

BUDDY KENT'S property at Bodallin was recently surveyed as part of the Wildflower Society of WA's "Bushland Plants Survey Program", which is a joint WSWA, NHT Bushcare, CALM Volunteer and Ecoplan project. During 1998, six properties were surveyed. Buddy's is south of Bodallin, in Yilgarn Shire. It is a wheat and sheep property of 2552 ha, with 845 ha of bush.

The bush block we are surveying is the largest remnant on the property. It is fenced and certainly in recent times has not been used for timber cutting, firewood collecting, grazing or dumping, nor has it been burnt for more than 40 years. It has four corridors leading from it, two of which link it to a nature reserve that has extensive granite outcrops, including an area which appears to be about the same size as the bush block. On Buddy's property there are also areas of laterite breakaway, heavy gravel and deep sand, mostly all interconnected by bush corridors/windbreaks. The surrounding properties were originally cleared in 1927, but this area was considered 'light/poor' and clearing didn't start until 1958.

So far 25 people (including 12 from Bodallin, Merredin and Southern Cross; 11 from Perth and 2 from Bunbury) have joined in volunteering to either assess the site, select the sampling plots, survey the bushland plants, assist with identification or revisit the plots in search of additional species.

The initial survey was done on 8-9 Sept 1998, with the revisit on 31 Oct. We have surveyed 15 sites, which have ranged from 6 species in a 10x10m plot to approximately 40 species under salmon gum. The first herbarium day when we sorted the specimens into families and genera, and some to species, was on 30 Sept.

Botanically speaking it is part of the 'Avon District' of the 'South West Province', where the vegetation includes woodlands of gimlet (*Eucalyptus salubris*) and salmon gum (*E. salmonophloia*), mallee and shrublands. Thus far, six mallees have been identified:

LFW NEWS

Bushland Plants Survey Program - Buddy Kent's bushland at Bodallin

by Colma Keating

Burracoppin mallee (*E. burracoppinensis*); gooseberry mallee (*E. calycogona* var. *calycogona*); tall sand mallee (*E. eremophila* subsp. *eremophila*); Tammin mallee (*E. leptopoda*); Boorabbin mallee (*E. platycorys*) and *E. subangusta* subsp. *subangusta*.

Apart from this survey and being a member of *Land for Wildlife*, Buddy is also involved in Birds Australia's "Birds on Farms" project. He made us all very welcome and participated in all aspects of the program including the herbarium day in South Perth.

Three of the highlights for me are:

- the excitement of people in amongst bushland plants
- the volunteers generosity with their time and knowledge
- the enthusiasm and commitment of our host, Buddy Kent.

[This program was written up in WW 2/2, p 13. If you would like to be involved in future surveys, ring Ann Guinness on (08) 9524 2221 - Ed.]



Surveying site BBOD 01, 8/9/98. Buddy is on left. (photo: C. Keating)



Gimlet woodland (photo: B. Kent)

THE WAY WE WERE ...

Irrigation from the Moore River

by Geraldine de Burgh-Day



R.H. (Bob) de Burgh mowing irrigated lucerne on The Flat at Cowalla in 1935. The black stallion was purchased from C.J. Roberts of Dandaragan.



Farm workers mowing irrigated sorghum with Samuelson mower, 1930s.

A member of LFW in Victoria sent us this comment.

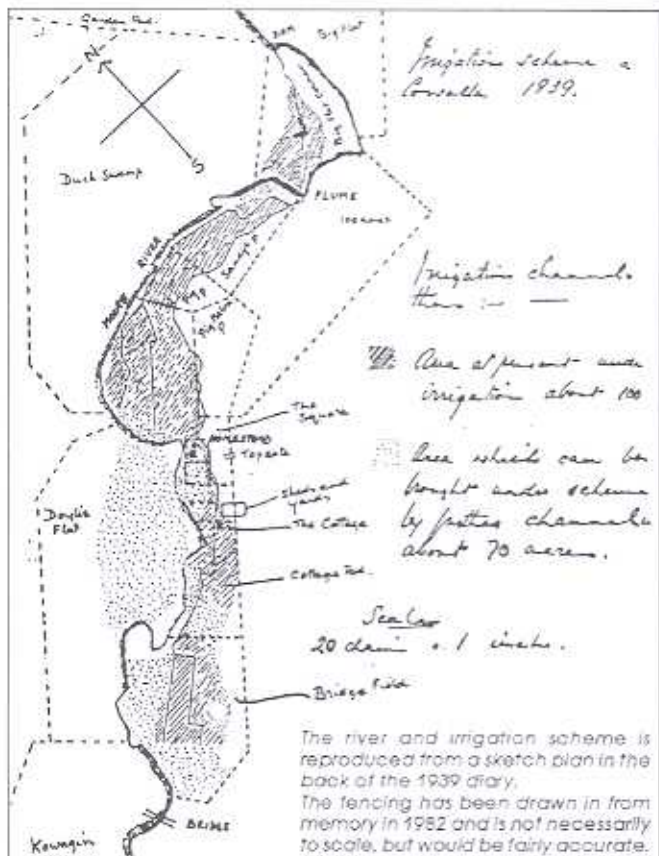
THE photos show cutting sorghum and lucerne, grown under irrigation, at Cowalla in the 1930s. As you can see, they were good crops.

Cowalla was established very early, in 1850. It is on the coastal plain north-west of Gingin, where the Moore River bends abruptly south for Guilderton and the sea. An agent's description of the property in about 1908 said: "The estate is one of the most valuable properties in WA for extensive irrigation operations. There is an unlimited supply of fresh water, which has a perennial flow. The river is flanked by rich alluvial flats ... (which) ... are abundantly adapted for the production of maize, sorghum, millet, lucerne, paspalum, rye, couch and other grasses, or clovers."

In those days, of course, all work on the property was done with horses, which needed an immense amount of feed. Drought years and economic pressures led to a bold decision in 1914, when S. de Burgh decided to implement the irrigation proposal and pump from the Moore River. It worked well, and was eventually extended to irrigate about 100 acres (see map).

Alas, by the mid 1950s clearing upstream was turning the river water saline. With regret, the system was abandoned as the water was too saline for crops.

On a recent visit, I noted that the sweet-water river pools I used to swim in are now saltier than the sea and, in addition, the water has a metallic mineral taste. A sad comment on the way we now are.



Gerri de Burgh-Day was brought up on Cowalla, but now lives at Mt Macedon. She can be contacted on (03) 5426 4188.

[More information about the early history of the Moore River area, including a page of photos of the irrigation system at Cowalla, can be found in W.J. de Burgh's "Neergabby"; pub. Shire of Gingin, 1976. - Ed.]

RESEARCH

CSIRO'S PAST AND PRESENT RESEARCH
IN WESTERN AUSTRALIA*by Richard Hobbs*

CSIRO Wildlife & Ecology has been conducting research in WA for many years. Initially, research focussed on the biology and conservation of birds, with notable work on emus, cockatoos and noisy scrub birds. In the mid-eighties, work was directed at the problems facing remnant vegetation in the wheatbelt. The research centred on questions relating to the dynamics and management of flora and fauna in these extensively modified landscapes.

Early in the program, research focussed on the impacts of fire on vegetation and fauna populations, the impacts of weed invasion, and the movement of biota around the landscape. As the research developed, the focus broadened to include more than just the biota in the remnant vegetation but also the impacts that the processes in the surrounding agricultural landscape were having. It became clear that it is impossible to manage the remnant vegetation in isolation from the rest of the landscape, and hence an understanding of the broader landscape processes was essential. This involved co-operation and discussion with agricultural scientists, hydrologists and, most importantly, with farmers and other land managers.

This research was conducted primarily in the Kellerberrin area and we learned a great deal through being able to concentrate our efforts on a single area. The information gained in this way is being translated into management guidelines and planning options for catchment groups. However, we did not know how applicable what we had learned in Kellerberrin was to the rest of the wheatbelt.

Our current research thus involves studies in other areas which aim to compress the process we went through in Kellerberrin down to shorter-term investigations. These will provide local management options and also build up to a bigger picture of the regional variation in the wheatbelt and the range of management options available in each region.

The first of these studies was carried out in collaboration with CALM and local landholders in the Dongolocking area, and further studies are underway in collaboration with Greening Western Australia and ALCOA in South Tammin and Tin Dog Creek. We aim to conduct a series of case studies across the wheatbelt, and use these to develop and test a regional framework. The outcome of this research should be a more effective way of planning management and revegetation activities and of setting management priorities, together with guidelines for actually implementing the management required.

A further program of research was initiated in the late 1980s which focuses on the extinction and reintroduction of small mammals. Australia's mammal fauna has been severely depleted over the past century, with many mammal species going extinct, either completely, or from mainland Australia. An understanding of the processes leading to extinction is essential if these processes are to be reversed and mammals reintroduced. This research has focussed on mammal populations on offshore islands, and has also involved the experimental reintroduction of mammal species to a peninsula at Shark Bay.

Until 1997, our work in WA was carried out largely in isolation from the rest of the country. However, it was recognised that the work here had broader applicability in eastern Australia, and hence we became part of a larger program looking at the integration of conservation with production. At the same time, it was recognised that our Wildlife & Ecology lab needed to interact more closely with other parts of CSIRO and other agencies. To facilitate this, we decided to move from our location in the hills, in Helena Valley, to the main CSIRO site at Floreat Park. This move was completed in July 1998, and we are now established in our new building at Floreat.

The new national program of research has three main components, of which we are involved mostly in two – integrating conservation with production, and restoration ecology. The background and aims of these are discussed briefly below.

Options for integrating
conservation with
production

A major part of Australia is used for primary production – for example, cropping, forestry, pastoralism. These rural lands contain valuable and unique resources for production of food, fibre and other products; for maintenance of the quality of the environments that sustain us, and for future economic and lifestyle benefits that potentially come from understanding and utilising our natural biodiversity. However, there have been major changes to the functioning of ecosystems in rural

RESEARCH

continued from page 15

lands over the last two centuries, resulting in substantial declines in biodiversity and in the productive capacity of the land.

Most Australians, including the owners and managers of rural lands, agree that maintenance or enhancement of the natural resources of those lands for the benefits of present and future generations should be a high priority. One way to achieve this is by managing the land to meet a range of goals, including both conservation and production. The challenge for CSIRO is to contribute to the scientific basis for managing rural lands for multiple objectives; to methods for integrating physical and biological understanding with social and political understanding to stabilise current rural production and conservation of biodiversity and, where feasible, reverse the presently observed declines.

We aim, together with landowners, rural communities, land management agencies, policy makers and other stakeholders, to develop theory, design principles and methods needed to integrate conservation of biodiversity with other land-use objectives and rural policies. The goal is to produce guidelines for incorporating conservation objectives into integrated land-use, and to participate in demonstrations of applying these guidelines.

Restoration ecology

Widespread losses of production and conservation values make large-scale ecosystem restoration increasingly urgent. Tackling this problem requires the development of methodologies for assessing the current status of landscapes and identifying appropriate management strategies. Identification and development of the elements of these strategies which lead to the

maintenance or enhancement of production and conservation values are also required. A key element of restoration strategies will be the re-introduction of flora and fauna which were formerly present in the system and which either performed key system functions or are identified as having key conservation significance.

To date, little use has been made in agricultural areas of ecological expertise developed in the rangelands or mining sectors, and there is a clear opportunity to develop and extend this expertise in agricultural landscapes. There is also an opportunity to develop strategic responses which feed into current government funding programs and community demands for solutions.

The strategy for the next 5 years is to capitalise on work being completed in the rangelands and minesites and extend this into agricultural areas. In addition, work carried out in the WA wheatbelt will be continued and expanded into new areas in eastern Australia, in consultation with collaborators and stakeholders. An important component of the research strategy is the recognition of the importance of maintaining long-term research sites at which long-term system dynamics can be evaluated.

We would be happy to discuss these projects further, and welcome input regarding research directions. Indeed, our aim is to conduct research which provides useful results. We aim to conduct fundamental strategic research and to provide answers to pressing questions – ie. we want to provide answers for today's problems, but also ask questions which might prevent some of tomorrow's problems.

Richard Hobbs is Officer in Charge of CSIRO Wildlife and Ecology in WA. He can be contacted on (08) 9333 6442.

BUSH DETECTIVE



Whose egg case is this?



Commonly seen in the bush is a rather papery green egg case, stuck to a branch, or under a log or stone. Several hundred eggs are laid in a foamy case which quickly hardens into a protective shell. Some time later, the nymphs emerge, and go through several moults before they become adults.

Want more clues? It's the egg case of a carnivorous insect, whose female may eat the male, starting with his head - while his rear end still continues to mate with her!!!

(See p19 for the answer)

IN BRIEF

Is our climate changing?

THE following is an extract from the 'Position Statement on Climate Change' by the Ecological Society of Australia.

There is now strong scientific consensus that the world's atmosphere and climate are changing. The carbon dioxide concentration has increased 25% above pre-industrial levels and continues to rise at 0.4% per year. Global mean temperature has risen by 0.5°C this century and mean night temperatures have risen by an even greater amount. In the northern hemisphere, three of the last eight years have been hotter than any since, at least, 1400AD.

What kind of climate changes are predicted?

Recent models of climate change predict:

- temperature rises for a doubling of CO₂ are around 1-2°C for the southern coast of Australia, and 2-3°C for the rest of Australia.
- precipitation increases of up to 0.5mm per day are expected over much of the region, rising to 2mm per day in northern Australia and Queensland in summer.
- extreme weather, including intense rainfall and severe drought, is predicted to occur more frequently over different parts of the continent.
- sea level is predicted to rise about 50cm above current levels by the year 2100, although the actual rates of rise in specific regions and localities will vary substantially.

While a number of uncertainties surround these predictions, they give us an indication of potential changes and demonstrate that patterns of climate change will be complex and vary from place to place.

To survive, we must first be aware, then attempt to mitigate and adapt - Ed.

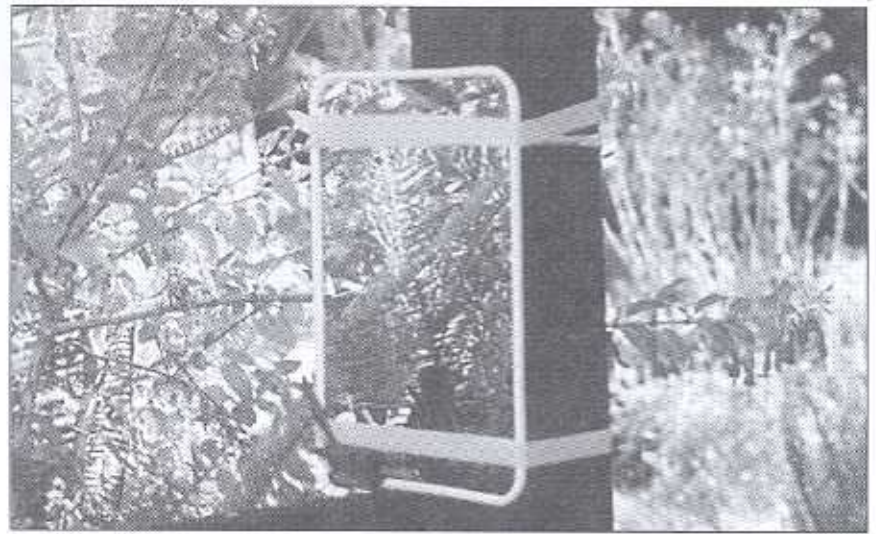


photo: Jenny Mackintosh

Wrestling Wrens

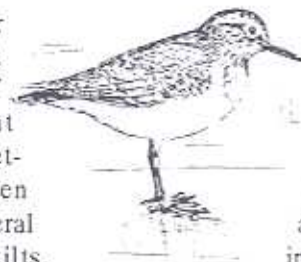
SPRING and summer represent perhaps the most active stage of many creatures' year, in fact it is often the time when they become more prolific in number.

Occasionally one might observe different species of birds (usually the males) taking offence to their own reflections in glass or mirrored objects and attempting to chase away the intruder in their territory.

One Land for Wildlifer found that their car's side mirrors were being attacked by a particularly amorous splendid wren, *Malurus splendens*, and after a bit of a thought came up with the idea of taping a similar mirror to a post on the verandah. The little bird now has his hands full trying to chase away this apparent intruder who stays so close to his nest site!

Leg-flags on waders

HAVE you ever looked with awe at the massed groups of wading birds that congregate around wetlands? There are often hundreds of birds, of several different species - stilts, sandpipers, turnstones, dotterels and plovers, to name just a few. Many of these birds migrate long distances, from Siberia to WA and back again, for example. In order to make it easier to study these migrations, bird banders are now putting coloured 'flags' on the bands.



As well as the normal aluminium leg-band, many waders now have colour-bands, some with

a small rectangular tab, the 'leg-flag'. They can be seen quite easily when observing the birds through binoculars. The flags are colour coded to indicate where the bird was banded, for example, bright yellow flags are put on birds caught in the north-west, at Roebuck Bay, Eighty Mile Beach and Port Hedland.

This summer, why not look out for these long-distance travellers? If you see one, note the species of bird, the colour of the flag and which leg it was on, and send the sighting to: Australian Bird and Bat Banding Scheme, GPO Box 8, Canberra, ACT 2601.

SOLAR ECLIPSE

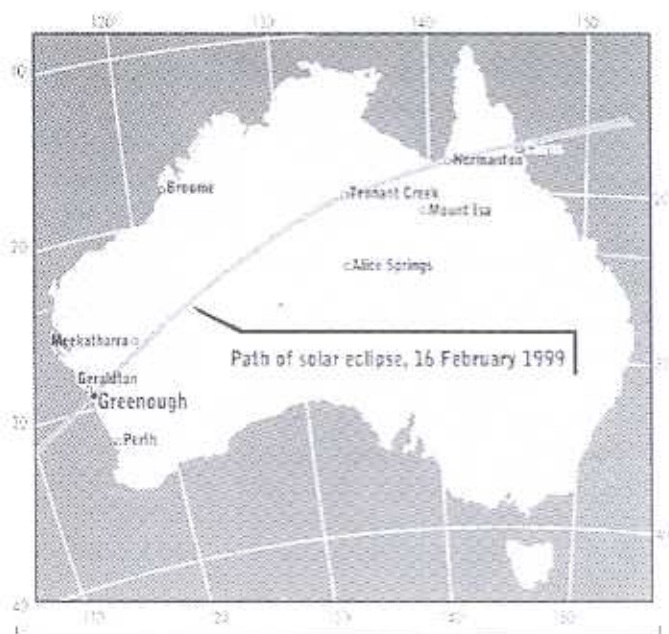
LAND FOR WILDLIFERS in Greenough! On 19th Feb 1999, between 2.30 and 3.50 pm, you can witness a very rare event, an annular solar eclipse. On that day, the Earth, the Moon and the Sun come into perfect alignment and the Moon will almost cover up the Sun. All that will be visible of the sun is a thin ring of sunlight.

The last annular solar eclipse visible from WA, was in 1959, the next due in 2013.

Some of the effect will be visible elsewhere in WA, but remember - looking directly at the sun can permanently damage your eyes.

One way to 'view' the eclipse is to set up your binoculars - wrong way round - to focus on a piece of paper as shown in the pic. (Some LFWers may even recognise the school - Mercedes College - and the science teacher, Mrs Pudovskis! - Ed)

For further information, contact the Perth Observatory, (08) 9293 8138.



IN BRIEF

WA Malleefowl Conservation Program

by Sandra McKenzie

A special program to assist malleefowl conservation has been set up in WA. It has established 10 grids throughout regional WA as part of a long-term monitoring system in places where malleefowl are known to occur and breed. The grids will allow periodic and systematic searches to determine population trends and provide baseline information for population monitoring.

In 1998, with the assistance of the Threatened Species Network, a Green Corps team undertook surveys at Nugadong and Old Well Reserves near Wubin, Canna and Koolanooka Hills near Morawa, Jaudic and Goongarrie in the Goldfields, Lake Magenta

in the eastern wheatbelt, and Peniup and Corackerup reserves near Ongerup. This project builds on the efforts of several community groups including: North Central Malleefowl Preservation Group; Goldfields/Kalgoorlie Naturalists' Club; Morawa LCDC and Malleefowl Preservation Group. This should give invaluable information for future management. The program has also had invaluable assistance from the Katanning, Kalgoorlie and Woodvale departments of CALM.

If you would like to become involved with this work in 1999, please contact me at the WA Threatened Species Network on (08) 9387 6444.



NEW BOOKS

"How to Know Western Australian Wildflowers: a Key to the Extratropical Regions of Western Australia" Part II Dicotyledons (Amaranthaceae to Lythraceae)
 Second Edition
 B. J. Grieve
 Uni WA Press 1998
 Cost \$65

This is the long-awaited revision of "Blackall & Grieve Part II", the essential reference book for finding the correct name for native and naturalised plants in WA. It covers a number of important families including wattles and peas. An excellent feature of this edition is the very clear drawings which will help to make identification easy. Anyone who is seriously interested in WA flora will need this book in their library.

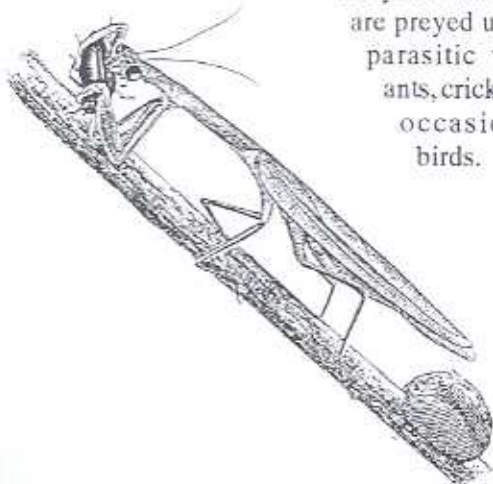
"Handbook of Western Australian Birds: Volume 1 - Non passerines (Emu to Dollarbird)"
 R.E. Johnstone & G.M. Storr
 Western Australian Museum 1998
 Cost \$120

This is a superb book which everybody will want - if you weren't a bird lover beforehand, you certainly will be once you look at the magnificent illustrations and clear, comprehensive text. Not only does it describe the bird and give its distribution, but also outlines such aspects as breeding behaviour and gives lovely, life-sized photos of eggs. Although expensive, the quality of this production justifies the cost.

Answer to Bush Detective

The egg case belongs to a praying mantis. There are about 162 species in Australia, some amazingly camouflaged.

They eat insects, and are preyed upon by parasitic wasps, ants, crickets and occasionally birds.



PRACTICALITIES

Check-list for bush corridor design

If you are putting together a project which involves creating a 'bush corridor' intended for use by native fauna (eg small birds such as honeyeaters and robins) there are a few simple rules:

- connect areas that have been connected in historical times
- connect areas that contain vital seasonal resources for fauna, eg a banksia patch for nectar, or a freshwater wetland
- don't connect areas to 'death traps', eg busy highways or rubbish tips (haunt of foxes and feral cats)
- don't create a strip going nowhere, this becomes - literally - a 'dead end'
- wider is better
- build on and thicken existing corridors
- plant to soil type
- have a mix of plants - mimic good quality local remnants with tree, shrub and understorey layers
- use local native plant species
- include 'habitat islands' of denser, more varied vegetation
- include plants that flower during the summer/autumn 'feed gap'
- include clumps of dense, prickly shrubs for safe nesting sites
- use some direct seeding, not just seedlings
- minimise barriers, eg cleared breaks
- take care that the corridors - and the site preparation for the project - aren't simply a means of spreading weeds and disease
- plan for long-term permanence - it works better and costs less
- monitor results.

For details, especially where to site bush corridors and what to plant where, contact your local *Land for Wildlife Officer*.

Note also the article on 'habitat islands' in WW 2/1 pp 5-6.

Penny Hussey

COMING EVENTS

Dates for Agricultural Shows next year include:

Woolorama, Wagin	5-6 March
Balingup	17 April
Beverley	21 August
Dowerin	24-26 August
York	28 August
Northam	10-11 September
Mingenew Expo	17-18 September
Merrédin	9 October
Busselton	29-30 October
Gidgegannup	30 October
Dinninup	3 November
Margaret River	5-6 November
Albany	12-13 November
Bridgetown	28 November

Two Granite Workshops are planned for April

"Islands in the Bush: Management of Granite Outcrops"

HYDEN - Friday to Sunday, 16 - 18 April, 1999.

Run by Royal Society of Western Australia.

(Cost, 3 days, \$120)

Friday will be a field day, then two days of talks aimed at summarising available knowledge on the management of granite outcrops at a practical level for managers.

For further information contact Philip Withers, Dept. of Zoology, UWA phone (08) 9380 2235.

"Helping People Manage Granite Outcrops"

HYDEN - Monday 19th April

Run by LFW and AgWA (Cost, 1 day \$20)

This is a special training day for those involved in the extension of granite outcrop management. It will include both flora and fauna management and an information package on the WA networks that will provide you with the necessary skills and information to talk confidently about this ecosystem.

To register interest in this special training day contact Avril Baxter, LFW, CALM, Narrogin.

Phone (08) 9881 1444 Email: avrilb@calm.wa.gov.au

FUNDING

Natural Heritage Trust

All projects should be submitted by 26th February; for further information and advice, see the contacts numbers on the back of WW 2/4, October 1998.

Gordon Reid Foundation for Conservation

Small grants (up to \$5000) especially relevant. Contact Lotteries Commission, (08) 9340 5272

Endangered Species grants

For projects which will benefit endangered species Contact: World Wide Fund for Nature, (08) 9387 6444

South West Wetland Fencing Program

For work on wetland conservation projects in the Lake Muir/Lake Unicup catchment, the Kent catchment, the Albany hinterland and in the Boyup Brook District.

Contact: Greenskills, Denmark, (08) 9848 1019

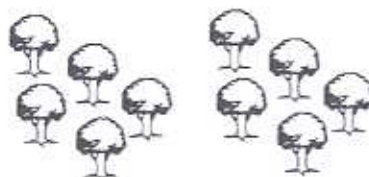
Remnant Vegetation Protection Scheme

Fencing grants for remnants - covenant usually involved.

Contact: State Landcare Program 1800 198 231

New Funding Scheme

"Bush for Greenhouse"



If you live in an area with greater than 600mm rainfall you may be interested in a new funding scheme which will be soon announced, it involves timber plantations to absorb atmospheric carbon.

Contact your LFW officer to find out more.

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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