April 1999
Vol. 3, Number 2

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

Western Wildlife

LAND FOR WILDLIFE

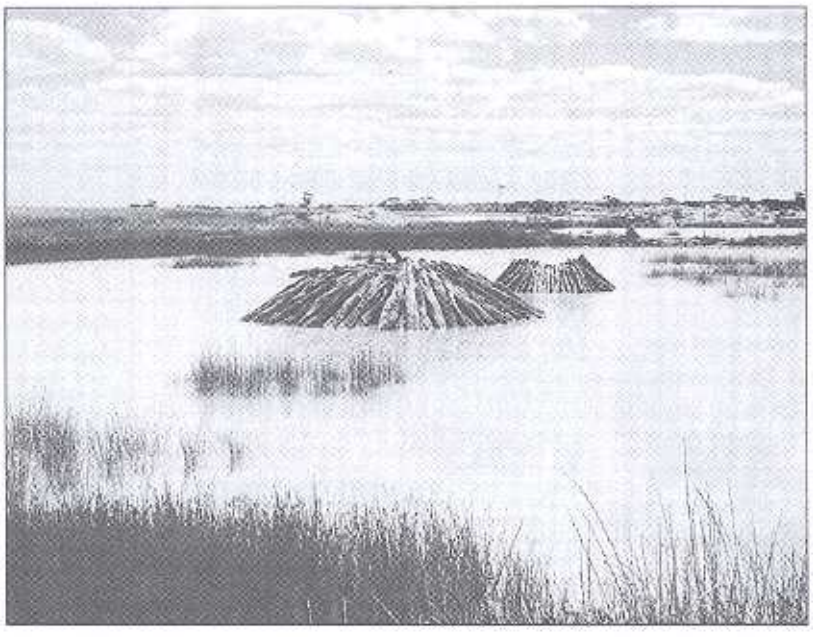
NEWSLETTER OF THE *LAND FOR WILDLIFE* SCHEME

Registered by Australia Post Print Post: 606811/00007

YEBWEN - "A WIGWAM FOR A GOOSE'S BRIDLE"

by Sylvia Leighton

THE Newbey property is one of the most impressive landcare properties I have observed whilst working in the Landcare industry for the past eight years. At a time when many farmers in the region despair about the encroaching salt problems, Stephen Newbey has been applying his energy and effort into slowing this process on the family property. He has installed a creative whole-farm, revegetated corridor network across the family property incorporating most of the remnant bush and linking it to vegetation corridors adjoining the property. It is a great example of how a broadacre farm can protect its remnant vegetation and promote regeneration. It also provides a great corridor system to encourage wildlife back on to the property.



One of the wetland sites Steve is recreating around one of the farm dams. Note the "Wigwam for a goose's bridle" structure made from old jam fence posts to act as a waterfowl hide from predators.

The area, north west of Ongerup in the southern wheatbelt, was opened up for agriculture in 1911. The Newbeys purchased their 1080 ha property, "Yebwen", in 1938. The property was slowly cleared for cropping and grazing through to 1962 with approximately 5% remnant vegetation remaining. Many small mammals and birds have disappeared from the area over the last 60 years. Stephen's grandfather remembered bilbies occurring on the farm until the late 1940's. Numbats, phascogales, chuditch, emus and echidnas were also present. The most recent disappearances have been malleefowl in 1955, blue wrens in 1962, curlews in 1994 and red capped robins have not been seen for a while.

The native vegetation of this area is a combination of brown mallet, blue mallet, York gum, morrel, *Eucalyptus annulata* (tree form), merrit, salmon gum, moorts and southern wheatbelt eucalypt mallee species on the slopes; with samphire salt flats bordered by swamp mallet, yate and paperbark species in the valley bottoms. Yebwen probably has one of the most detailed plant lists of any individual property in WA, with over 180 species identified so far by Steve and regional botanist, Jack Mercer. An interest in the botanical diversity of the property began with Steve's father, Ken, who had a great interest in botany and native plant seed collection.

Stephen believes in integrating conservation and agriculture where possible. He believes you need to look for their ability to complement each other, eg weeds can become habitat, so can dams. He designed a vegetation corridor network across the property so that it linked all the remnant vegetation and most of the farm dams into the corridor system. He revegetated alleys which are usually 40-100 m wide but sometimes extend out into areas encompassing up to 8 ha. He has experimented with both direct seeding and planted seedlings and installed species from all vegetation storeys

continued on page 3

EDITORIAL

Greetings everyone!

I hope all the hard work put into NHT submissions bears fruit! But it is never too early to begin planning how you will carry out your project, especially if you intend to grow understorey. Collecting the right seed means you have to think about it from about September (for early wattles and peas) the year before you want to plant. Even commercial seed suppliers need that sort of advance warning, especially if you want them to supply local provenance seed. Don't be like a couple of people who approached us this March, saying something like: "I've just got the money for my 10 km of direct seeded creeklines that I intend to establish this year. What plants should I use and where do I get the seed?" ... Properly planned projects give the best long-term results! Incidentally, direct seeding is not difficult, as another short article shows.

Direct seeding is excellent for bush corridors, and this issue contains information on how birds use corridors, with a request from the researchers for catchment groups who are planning revegetation to contact them to help with the study. Another article gives details about how one landholder has used creekline revegetation to link all his property and its remveg into a network of multi-purpose corridors.

During summer, many people remark on the number of mistletoes on roadside trees, and an article discusses these fascinating native plants. There is also a little story from the Nyoongar people - one of a series we'll be featuring over the next few issues.

Did you 'watch' the solar eclipse? We set up a pair of binoculars (tied to a chair!) as illustrated in the Jan issue of Western Wildlife, in the car park here at Como. At one time there were about 30 people standing around, watching!

Last issue, we asked if any Afrikaans speakers could help with the correct spelling for the common name of *Ehrharta calycina*, veld grass. Apparantly the correct spelling is "veld", but it is pronounced "felt", so that's where the spelling "veldt" comes from. Thanks to Ann McEvoy of Helena Valley. Please let us know if you find this Newsletter interesting and useful (or if you don't!), and if there is any particular topic you would like included.

Best wishes for the coming season,

Penny Hussey

***PS:** We now have 400 landholders registered with LFW WA! Wow!*

Oops!

Two bloopers in the last issue! On p6, the illustration of *Austrodanthonia bipartita* was not really representative of austrodanthonias, as that species is now in a genus of its own, called *Monachather paradoxa*. This drawing (from "Australian Grasses" by N.T. Burbidge) is more like the commoner SW WA species. The second mistake was on p14, where the photograph captions were reversed. Sorry!

The LFW, CALM, GWA and Bushcare display at Mingenew Expo was very popular. Note the granite rock and malleefowl mound. Photos: A-M O'Callaghan.

REVEGETATION

YEBWEN continued from page 1

except the 15-30 cm range (to avoid rabbit harbourage). The property now has about 12% vegetation cover. The whole corridor network is linked to fenced-off remnant bushland and creek corridors which adjoin the property.

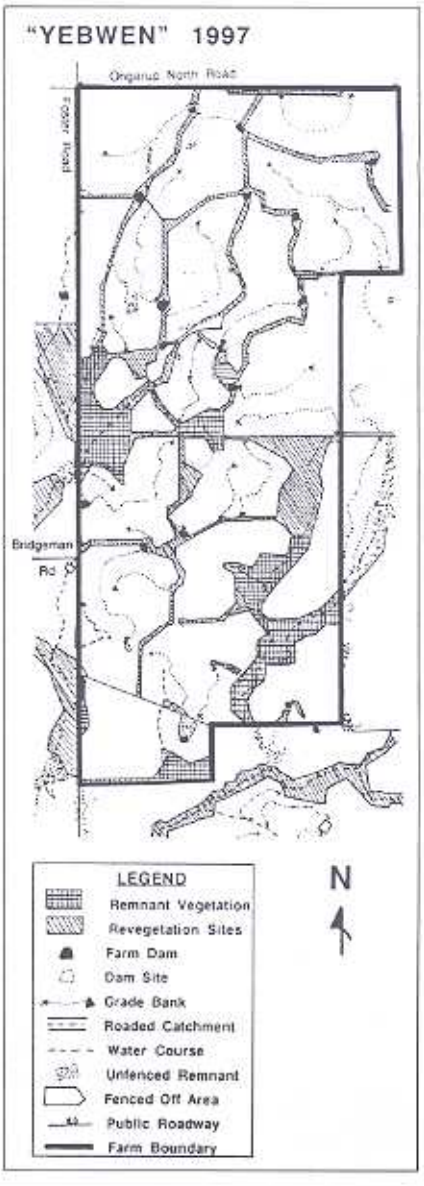
A tributary of the upper reaches of Warperup Creek extends in a north to south direction through the southern half of the farm. Stephen has revegetated the catchment area, expanding the vegetation in most of the degraded drainage sites.

Ten more dams have been added to the property in the last ten years and they have been sited to reduce evaporation. On some of the dams Stephen has recreated wetland sites by encouraging recolonisation of reed and sedge species along with the shrub and tree species associated with this habitat. Where required, he has left one side of the dam open to stock access. He also provides shelter for the wetland bird species in the middle of his dams by using old jam fence posts constructed into various shapes. This gives the birds protection from birds of prey and allows them to roost at night safe from cats and foxes. Some of Steve's more creative shelter structures include a wigwam shape, a fort, and a BBQ and wall. As a child, when asking his mother what she was making, she often used to come out with the saying; "A wigwam for a goose's bridle", and Stephen feels his original waterfowl hide fits this saying! He has observed black ducks, wood ducks and grey teal successfully breeding this season and a majority of the duckling broods survived through to adulthood.

Brenda Newbey, Stephen's stepmother, lived on the property for 10 years and compiled a list of over 90 bird species, of which 34 were observed to be breeding. White-fronted chats have been observed using the samphire sites, western yellow robins, elegant parrots, mudlarks, scrub wrens and bronzewings nest in the moorts, while quails and Richard's pipits like the grass cover.

A revegetation site. Stephen scalp-mounds all sites using a Chatfield tree planter, whether the site is prone to waterlogging or not. No chemical weed control was used at this site.

Steve believes it is too early to gauge the effects of the corridor network on the farm production. Before drawing up his farm plan, Steve read everything that he could find on farm planning and designed the plan to address all of the problems he perceived that Yebwen might have. One of these was lack of stock shelter. Ongerup is the coldest place in WA during the winter and spring months and is often overcast in the afternoons. Although the farm had patches of what was called 'timber', most of these were badly degraded and had little understorey. On cold days the sheep often sheltered in the 'timber' and Steve observed sheep that had died overnight, curled up behind individual trees. Lambing percentages were also poor and on occasions up to 50 lambs died overnight where the mob had camped, presumably from exposure. Within the next few years, the corridor network will provide adequate shelter to all paddocks from winds coming from any direction. (Wind erosion is not a real problem on "Yebwen" under the present management.)



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REVEGETATION

continued from page 3

Over the years Stephen has also observed better crop and pasture growth on the western side of the remnant vegetation. He believes this is due to the fact that during the winter and spring months these areas are sheltered from chilly winds and this allows the morning sunshine to raise the temperature somewhat more quickly. This improved micro-climate enables greater plant growth during these months. Whilst doing his research reading, Steve remembers he came across articles describing farms with replanted shelter belts of up to 30% of the farm area without overall loss of farm production. He is confident that in the medium term the farm production on Yebwen will increase more than enough to compensate for the land replanted to bush. However, this is not an easily measured condition!

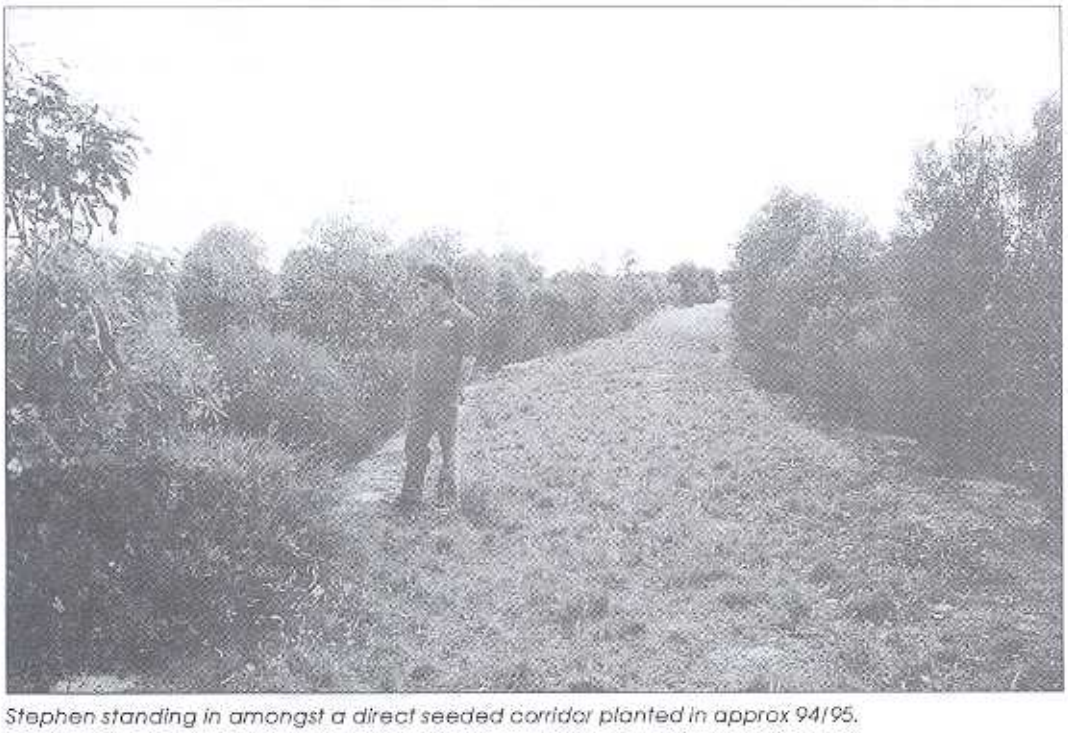
Stephen described in detail his success story with direct seeding. He collects as much local native seed as possible and buys in some seed of the species he has missed - mainly acacias. His seed mixes are based on his knowledge of what species grow, or probably grew, locally on each soil type and in each situation, while taking into account what is practical to grow ("It would be nice to muck around with things such as orchids, but I can't spare the time.") He includes as many species as is practical with mallees, melaleucas, acacias and hakeas forming most of the mix but also including many other species. Up to 100 species are now used. If trees are required, he plants them as seedlings so that they do not dominate the understorey species. Stephen tries to mix his seed to gain extended flowering periods, fire tolerance, prickly habitat and locally rare species, while avoiding rabbit-harbouring species and weeds like *Acacia saligna*.

Stephen says he has never conquered weed control. If he gets good weed control prior to and/or at seeding, he usually ends up with a huge wireweed problem later in the year. At the moment he opts for post emergent grass weed control. He admits this is not ideal, but wireweed is the greatest problem his reseeding faces. He scalp mounds all sites using a Chatfield tree planter, whether the site is prone to waterlogging or not. He has found that often the seeds wash away and mounding reduces this problem. He doesn't rip as deep as he would like, as ripping to a depth of greater than 15cm usually drags up huge clods of clay, making seeding extremely difficult. Stephen seeds in rows and spaces the rows to allow access in the following year to reseed between them and get a double chance of succeeding. If everything in one year is a disaster, he finds it difficult to reseed over scalped areas successfully. If there are individual areas of poor germination they are replaced in following years with a variety of seedlings.

Stephen Newbey is employed as the Gnowangerup Landcare District Coordinator so he is continually encouraging and advising farmers in the district to incorporate landcare into their property operations. He also encourages catchment groups to design revegetation corridors which extend across farm boundaries and link up whole catchments. His most ambitious project has been the "Pallinup - North Stirlings Bushlands and Wetlands Management Plan". He is definitely setting an example of creative landcare 'in his own backyard.'

Stephen Newbey can be contacted on (08) 9828 2023.

Jack Mercer can be contacted on (08) 9841 5205



Stephen standing in amongst a direct seeded corridor planted in approx 94/95.

Sylvia Leighton is Land for Wildlife Officer at Albany.
She can be contacted on (08) 9842 4500

FLORA

MISTLETOE: FRIEND OR FOE?

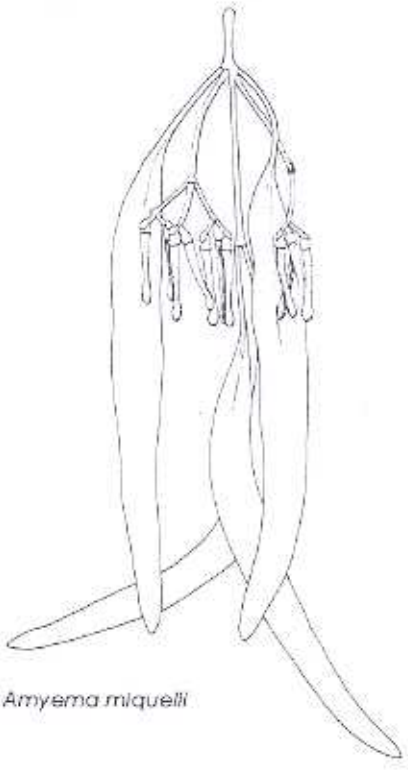
by A.N. Start

THE question seems simple and the answer is often short. Foe! After all, mistletoes are parasites and parasites are inherently bad, like tapeworms or ticks - aren't they? Nowadays, justice requires us to examine the evidence before finding them 'guilty'. So let's do so.

Parasitic plants

There are two levels of parasitism among plants. Real parasites obtain all their water, minerals and nutrient from their hosts. They have no chlorophyll and so they cannot make their own sugars and starch. *Rafflesia*, the world's largest flower, is an example. It lives entirely within the stem of a rainforest vine until a bud bursts through the host's bark, swells to cabbage-size, opens into a flower almost a metre wide, and eventually sheds seeds and falls off. Nevertheless it seems that the hosts are not debilitated by their free-loaders.

Mistletoes are hemiparasites. They take water and minerals from their hosts but they have green leaves in which they photosynthesise their own nutrients. They may even contribute carbohydrates to their hosts. There are many hemiparasites, but we are oblivious to most of them because they grow from the ground where, unseen, their roots tap into those of their hosts. Quandong and sandalwood are examples. They both belong to a family (Santalaceae) that is closely related to the mistletoes (Loranthaceae). It may come as a surprise that the WA Christmas tree is a real mistletoe - a primitive one that taps into the roots, not the branches, of its hosts. All our other mistletoes grow on their host's branches. *[There is another family of mistletoes (Viscaceae) but its members are rare in WA. This article is concerned with the mistletoes that are familiar to most Western Australians.]*



Amyema miquelii

Mistletoes are an ancient group of plants. They existed on the great continent, Gondwana, before it broke up to become Antarctica, Africa, India, South America and, of course, Australia. However, most Australian mistletoes are derived from stock that was on the African and Indian plates. Their ancestors reached Australia via the rainforests of the Indonesian archipelago. Within Australia, the immigrants evolved into new species and spread across tropical latitudes and down the east coast. Thus a few species have entered south eastern WA from south eastern Australia, but most came across the top end to the Kimberley, from where they have successfully colonised the arid zone. Once again, the WA Christmas tree is an exception; its ancestors have always been on the Australian plate.

As one might expect from this history, in WA the greatest diversity occurs in the Kimberley (20 species in 5 genera) and decreases to the south. (Pilbara, 14 species in 3 genera, south west 6 species in 2 genera, excluding the WA Christmas tree.) All but one of our south west mistletoes are widespread in Australia.

Mistletoes and fire

For forest plants, there is an obvious advantage to living in the tree-tops. They don't have to compete for light. However, it leaves them with a problem. How do they 'plant' their seeds on the branches of another tree? Easy! They have fleshy fruits with a sticky coating around the seeds. Mistletoe birds swallow them and deposit the seeds onto a branch where they stick firm. But as the mistletoes adapt to dry climates, they are exposed to bush fires. As we all know, the plants of our fire-prone bush have means by which they survive fire. Eucalypts can reshoot from dormant buds under the bark, or from mallee roots. Banksias keep their seeds in large cones until a fire has passed, wattles have hard-coated seeds (often stored underground by ants) and orchids have tubers safely insulated in the soil - and so on.

Mistletoes (at least in the south west) can do none of these things. A fire that scorches the canopy of a wandoo woodland will kill all the mistletoes on the trees. They will have to recolonise the burnt area from elsewhere, and they depend on birds for transport. This can be a slow process; there is no incentive for mistletoe birds to visit places where there are no mistletoe berries to feed on! It is even slower for mistletoes that grow on hosts such as acacias, because the hosts are often killed. The mistletoes then have to wait for a new generation of hosts to mature before the process of recolonisation can even begin.

continued on page 6

FLORA

continued from page 5

Mistletoes and conservation

All our mistletoes are indigenous flora. No doubt, before European settlement, they would have occurred in a balanced relationship with their hosts. This is still the case over much of the State. However, it has changed:

- where clearing has eliminated them from large areas.. This mostly applies to the south west where remnant populations persist on roadsides, along rivers, in paddocks and some uncleared sites, including small and large conservation reserves
- where fire appears to have eliminated them from huge areas of spinifex grasslands (and perhaps tropical savannas)
- where lack of fire means the loss of one of the processes that assured balance in nature.

The huge fires that nowadays affect hummock grasslands and the Kimberley's savanna woodlands have just about eliminated mistletoes from vast areas, and in the south west mistletoes are among the species that will probably disappear from small patches of bush, including nature reserves, because at some time fire is inevitable. If the next patch of bush is too far away (about 20 mins flying time for a mistletoe bird, if it doesn't stop en route), they will never manage to return. Loss of mistletoes leads to a loss of other things. For example, they provide nectar for honeyeaters and the mistletoe bird depends on their fruit. Many insects, including the larvae of some of our most brilliant butterflies, eat nothing else. Nevertheless there are many populations in relatively fire-safe situations and so I am not aware of any species that may be threatened with total extinction in WA.

Mistletoes as pests in WA

Many people have expressed concern because they see mistletoes as serious pests in parts of the wheatbelt and around Perth. The table summarises the situation as I see it.

As the table shows, mistletoes are only perceived as a problem or pest in the south west. In all cases (except on prickly bark in kwongan, see below) the problem occurs in highly disturbed sites where natural processes have been curtailed; typically road verges, paddocks and remnant vegetation. These sites also tend to be highly visible, often giving casual observers the impression that the problem may be more widespread than it really is.

To be sure, there are places where the problem is real and serious. However, there is a psychological element too. "They are parasites - like tapeworms and fleas - and therefore inherently bad and must be eliminated!" I have encountered this message amongst teachers, conservation groups and farmers alike. It was the motive for a boy-scout project to eliminate mistletoes from marri trees in a Perth suburb. They got good coverage in the local newspaper too!

While such perceptions may be a little off the mark, they are very real to those conservation-minded people who hold them. We need to encourage people to care for remnant bush. Therefore we, as a community, need to provide education and solutions. Neither is easy. Where they are in balance with nature, we must respect mistletoes as members of the natural flora that play a significant support role for animals, and even the plants that are pollinated by, or have their own seeds dispersed by, those animals. Nature's relationships are a complex web and breaking one strand can have unpredictable and disastrous ramifications.

continued on page 7

Mistletoe	Affected hosts	Location	Situation
Amyema miquelii	wandoo	western wheatbelt, York to Mt Barker	patchy, usually road verges and paddocks
A. miquelii	marri	Gosnells / Martin	paddocks and remnant vegetation
A. miquelii	prickly bark	Geraldton sandplain south from Eneabba	patchy in kwongan (heaths) including many conservation reserves
Amyema preissii	jam wattle	northern and western wheatbelt, notably Toodyay-York and Mullewa-Northampton areas	patchy, usually road verges and remnant vegetation
A. preissii	acacias from the Eastern States	Perth, notably the hills and adjacent suburbs	gardens and 'escapes'
Amyema fitzgeraldii	various acacias, notably jam wattle	northern wheatbelt, Mullewa, Northampton	patchy, usually road verges and remnant vegetation

FLORA

continued from page 6

The real problem in remnant bush

It seems that mistletoes can be the final cause of death for some hosts. Eastern States wattles that have been imported for their ornamental values, e.g. *Acacia baileyana* and *A. podalyrifolia* are very susceptible to crippling infestations, especially in Perth's hills suburbs. This may not be a bad thing, as both these wattles have the potential to become weeds. However, there seem to be two indigenous hosts that experience problems more frequently than most. They are jam, *Acacia acuminata*, and wandoo, *Eucalyptus wandoo*.

Jam wattle

Like many other acacias, jam is a relatively short-lived tree. Old stands can become senescent and eventually collapse. Fire is probably important for regeneration. Pest-level mistletoe infestations are common on jam that is growing in road reserves and other remnant vegetation. No doubt the mistletoes hasten the demise of some of them. However, two pertinent factors contribute to the problem:

- many of the trees are already old, senescent or in poor health because of their situation
- the fire regimes that would have played a part in jam regeneration and mistletoe control have changed.

The mistletoes are not the underlying problem. The jam will die from one cause or another and a lot *is* dying from other causes. Unless it regenerates, it will disappear from those remnant communities, with or without mistletoes. Removing the mistletoes will not solve the problem of jam disappearing from the road verges or other remnants.

To address this problem, we need to seek methods to regenerate and manage jam in remnant vegetation, particularly road verges. The judicious use of fire may be the most effective tool to develop, because fire probably did the job before we altered things. The issue of mistletoes would take care of itself. However, managing the dense exotic grasses that usually dominate the understorey now will be a difficult problem. I suspect they are a factor in suppressing jam regeneration.

Wandoo

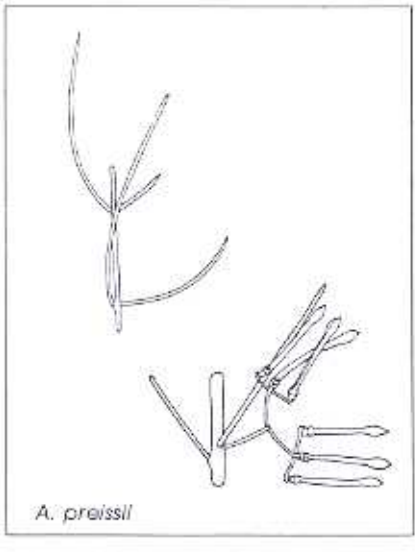
Wandoo differs from jam in that it lives longer, survives hot fires by producing epicormic shoots from dormant buds that lay sheltered below the bark, and is less reliant on seed germination after fire for regeneration. I have never seen sites where a lot of trees carry debilitating mistletoe loads in woodlands where fire scars show that fires occasionally scorch the canopy. The absence of fires that are hot enough to scorch the canopy once in a while probably explains why excessive infestations can build up along road reserves and in remnant bush.

Even so, mistletoe infestations at pest level is usually patchy. In a wandoo-lined road reserve, there may be sections of a few hundred meters every few kilometres in which infestations are excessive. Some trees will be so heavily infested that their health is affected or, in extreme cases, they have died. But, look carefully and you will see that there are 'clean' trees among them. The phenomenon can be seen on Albany and Brookton Highways. I suspect that the mistletoes are exploiting trees that are less healthy in the first place.

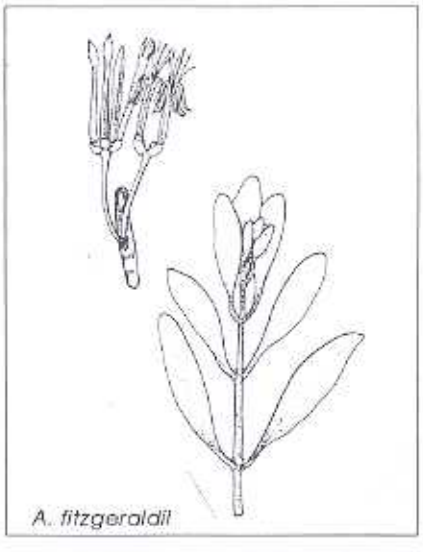
It may now be difficult to introduce fire that is sufficiently hot to scorch tree canopies in narrow road reserves except on days when the adjacent landholders would **NOT** want anyone lighting up! However, it may be possible to remove the mistletoes with tree pruning equipment. This mistletoe has a simple haustorium (join to its host) that terminates its host branch. Cutting off the mistletoe kills it.

Prickly bark

In the table, I have listed *Amyema miquelii* as a serious pest of prickly bark (*Eucalyptus todtiana*, sometimes called blackbutt) in kwongan communities north of Perth. In many of the national parks and nature reserves south from Eneabba, prickly bark occurs as a sparse overstorey to the kwongan and it is often infested by mistletoes to a debilitating level. I have observed dead trees with many mistletoe scars that suggest the mistletoe killed them. Fire is often rare in these communities. However, I have observed areas that have been



A. preissii



A. fitzgeraldii

continued on page 8

Why Mankind tells Stories

by Trevor Walley

IN the dreaming, representatives gathered at Kittaceetch for a meeting to decide who was to become the spokesperson. Five beings were there - Wagyl the rainbow, Yonger the kangaroo, Kaarda the goanna, Weitch the emu, and Mankind.

After a long discussion, Wagyl had enough of the meeting and left, his paths filled with water and some became rivers.

Yonger the kangaroo left and eventually came to the Stirling Range. An emu killed him and his burial place is now known as Yongermeer Peak.

Kaarda the racehorse goanna said "I am going" and promptly left for Koorda.

Weitch the emu spoke: "Let me be the spokesperson to take on the responsibilities! Look at my legs, which can carry me fast. My tracks can be seen on the ground and on the mountains." To this day, many places are named after him - Wagin, Wagerup, Wayachinicup.

Mankind stood up and said "I can represent everyone. Look at my thumb, it represents Wagyl. My thumb and finger on the end indicates the footprints of Yonger the kangaroo, and my thumb and next two fingers is the footprints of Kaarda the racehorse goanna, my middle fingers represent the prints of Weitch the emu."

After some discussion, Mankind became flesh form, and plastered his hand prints onto mountains and caves for all to see, that now we have to give a hand and care for all the plants and animals.

Trevor Walley (Goomal) is a Wildlife Officer based at CALM Como. He can be contacted on 9334 0543.

The story of Muja

MUJA, the WA Christmas tree, flowers throughout the birok (summer) period.

Muja is important for the spirits, as it is home to the recently-departed, before they finally leave this place. They sit on the tree's branches. When the tree is in flower they can leave, and my people celebrate their release.

Unwedded girls use the branches and flowers to decorate their hair. Young men hang flowering branches over the mya-mya (hut).

When the tree has finished flowering, the leaves and branches are not used as the deceased are sitting there awaiting the next flowering time to be released to the dreaming in kwobberup (the good place).

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continued from page 7

burned. The fire has killed all the mistletoes (their haustorial scars are obvious) and the trees all regenerate canopies from epicormic shoots. The new canopies are dense and healthy, in strong contrast to those that were not burned and still have mistletoes.

It appears that, if fire is permanently excluded, mistletoes could more or less eliminate prickly barks from the community. In any case, it would be worth establishing an experiment involving fire, physical pruning and a no-treatment control to examine the hypothesis. The experiment would shed light on fire frequency and mistletoe control as well as appropriate fire management in the kwongan.

[Are the any Land for Wildlifers who would like to try this on an appropriate site? - Ed.]

Other possibilities

I have emphasised the role of fire as a problem and a solution because I think it is probably the most important single factor. However, there are many other processes that may have contributed. For example, mistletoes are palatable. The loss of possums from many patches of remnant vegetation may have been significant. It has also been suggested that mistletoe birds, when confined to corridors such as road verges, exacerbate the problem. These may be contributory factors but I doubt that they are prime causes because they don't explain the patchy nature of excessive infestations, or the selection of only some trees in a population by the mistletoes.

The verdict

Guilty? I think a jury would have to conclude that mistletoes are intrinsically 'good citizens' in our bush. Nevertheless, the prosecution has good evidence that there are places and times when they are rather anti-social! However, the defence must point out that there are mitigating circumstances; people have created the conditions under which the mistletoes become pests. Making amends is up to us.

Tony Start is Principal Research Scientist now at CALM, Kununurra. He can be contacted on (08) 9168 0200.

Pics from 'Flora of Australia' Vol 22

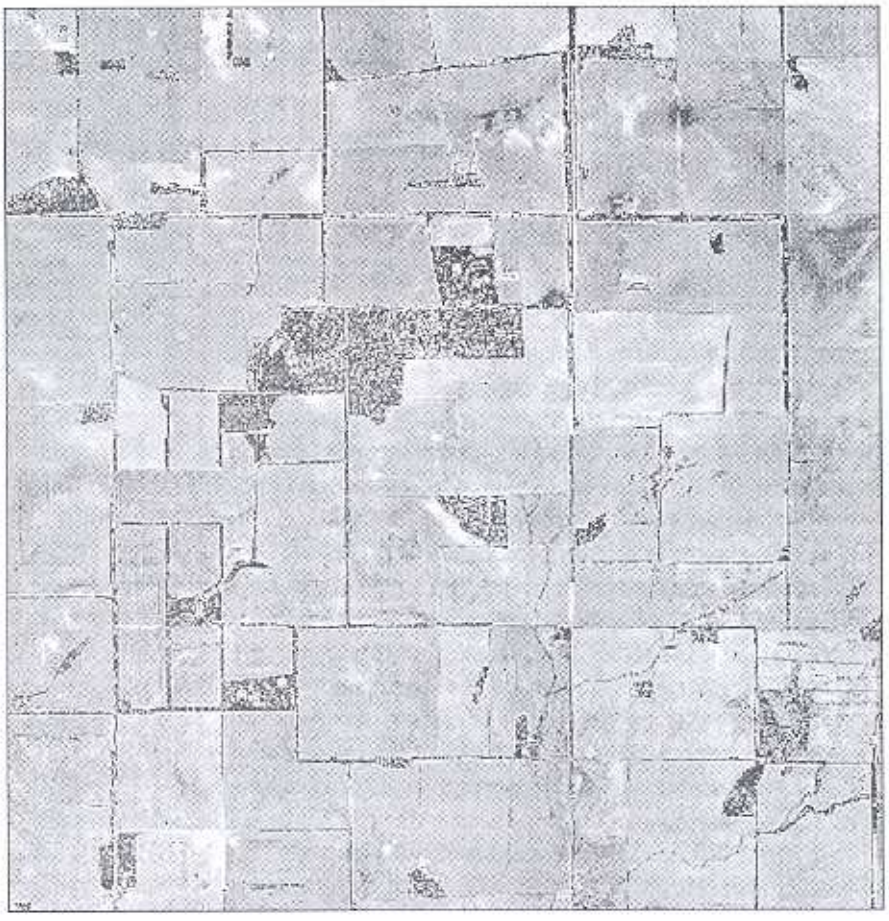
FAUNA RESEARCH

Blue-breasted Fairy-wrens depend on vegetation corridors

by Michael and Lesley Brooker

BLUE-BREASTED Fairy-wrens are tiny (10 g) jewels of the bird world. They live only in mallee-heath habitats scattered through the WA Wheatbelt and Eyre Peninsula in South Australia. Yet, despite their brilliant colouring, they are extremely shy birds, preferring to remain hidden in low undergrowth and rarely flying over open terrain for more than a few metres. This behavioural tendency means that they find it very difficult to move over long distances from one patch of habitat to another - something they need to do if they are to find a mate. The widespread clearing for agriculture that has taken place in the Wheatbelt over the last 100 years has meant the loss of most natural corridor routes, resulting in the disappearance of wrens from many patches of suitable mallee-heath habitat, where they might otherwise have survived.

By studying the movements of banded Blue-breasted Fairy-wrens in a complex network of patches and corridors south of Wyalkatchem over the last 5 years, we have discovered that these tiny birds can move as far as 15 km from the site where they were born - much further than wrens would need to move in an unfragmented habitat. Yet, despite the distances covered, the wrens in our study rarely crossed gaps in vegetation greater than about 60 m wide.



All of the remnants shown in this air-photo are privately owned. The large block supports up to 30 groups of Blue-breasted Fairy-wrens. Because there is a strong network of vegetation corridors, wrens are also present in many of the very small remnants.

The inescapable conclusion is that some remnants containing suitable habitat may be virtually inaccessible to wrens, unless suitable 'corridors' are grown to facilitate movement. Other behaviourly shy species likely to be in the same boat, are the rare and declining Southern Scrub Robin, Western Yellow Robin and Shy Hylacola (its name is no accident). Even the more common White-browed Babbler has been found to prefer corridor routes during dispersal, though individuals sometimes fly across open ground for more than 250 m.

As a way of predicting the dispersal 'quality' of landscapes, we have developed a computer simulation model to mimic the way in which dispersing animals might move through the landscape, depending on their 'gap tolerance', ie. how large a gap they are willing to cross. For any particular catchment or local area, the results of the modelling can help to determine exactly where corridors should be planted in order to obtain maximum benefit for the greatest number of species. The model can also be used to assess how effective for wildlife have been those plantings made for other purposes.

Michael and Lesley Brooker are with CSIRO Wildlife and Ecology, Floreat. They are keen to work with community groups in applying their computer model to situations involving corridor planting or revegetation assessment. They can be contacted on 08 9333 6454, email: l.brooker@per.dwe.csiro.au web site: http://www.users.bigpond.com/LesMikeBrooker/

PRACTICALITIES

The impact of trees on groundwater levels in a discharge area of the Merredin catchment

by Dawit Berhane

MERREDIN townsite is threatened by rising saline groundwaters. In 1986, a hydrogeological investigation was carried out which involved establishing a piezometric monitoring network. The bores were located along a transect stretching from the main recharge area (east of the sandplain ridge near the Narembeen road), through the townsite of Merredin, to the discharge area near Hines Hill in the west.

One of the main recommendations of this study was to plant trees in recharge and discharge areas at strategic locations. A high priority area recommended for revegetation was located immediately downslope of the town, in a salt-affected area. The Shire and LCDC organised a land swap to gain access to the required land. The trees were to provide recharge control and allowed to maintain sufficient cover to enable maximum water use.

In 1991, 70 ha of heavy-textured alluvial soils in a broad floodplain were planted with a range of eucalypt species over shallow (<2m) saline groundwater. The work was funded by 'One Billion Trees'. The site was chosen at a point where specific hydrogeologic conditions (basement ridge, narrow valley floor and permeable sediments) might allow watertable control to have maximum impact on the flow system.

Water levels prior to planting, 1985-91

There are two main aquifer systems in the vicinity of the revegetated area. In the shallower system, the Total Dissolved Solids (TDS) ranges from 15,000 to 25,000 mg/l, while the salinity of the deeper aquifer system is usually >35,000 mg/l. The net rise in water levels ranged from 0.2m in the lower parts of the catchment to 0.3-0.4m in the main recharge area. Prior to planting, part of the revegetated area was affected by saline groundwater discharge.

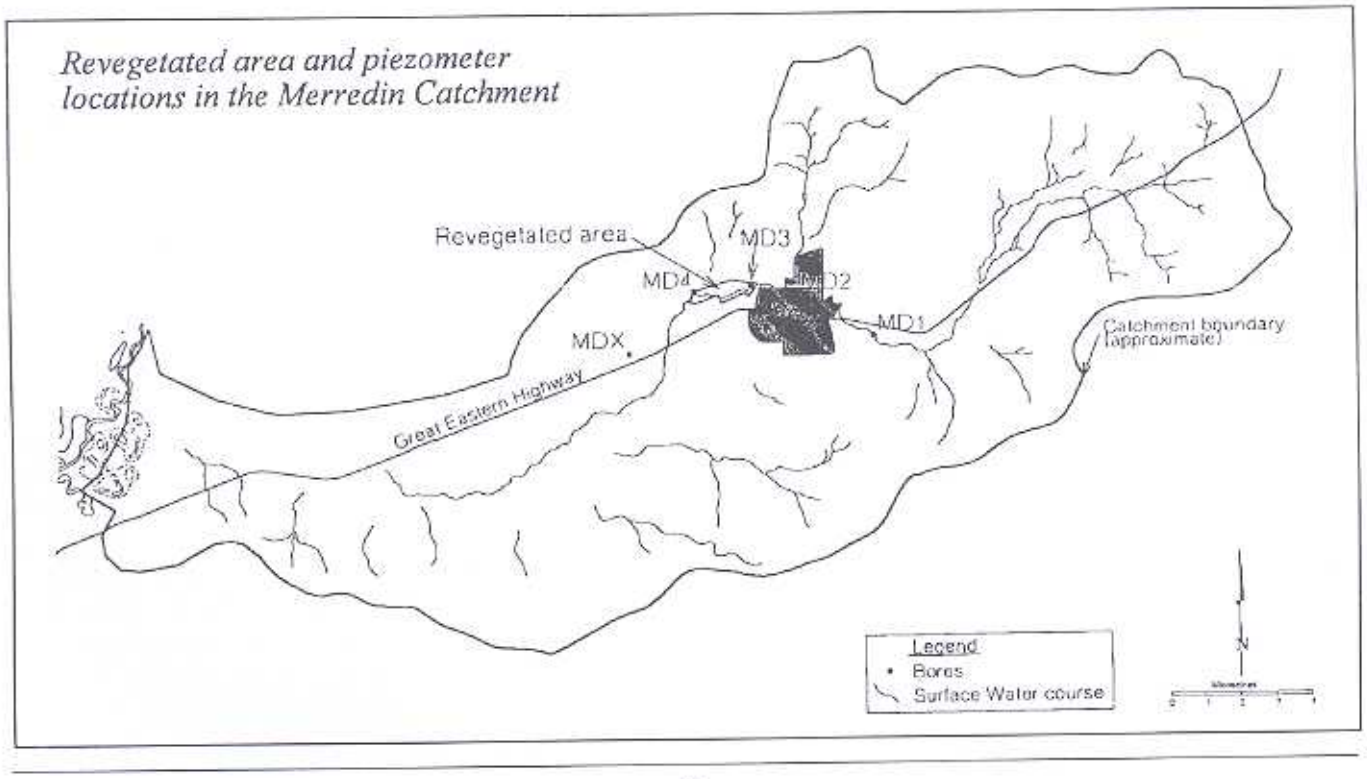
Water level change in the revegetated area, 1991-94

Two years after the trees were planted the water levels began to decline throughout the planted area (see graphs). During this period the trees started to establish and started a transition from a rising to a declining trend.

Water level change, 1994 - current

It is clear that this area at risk from salinity, downstream of Merredin townsite, has been successfully

Revegetated area and piezometer locations in the Merredin Catchment



Planting site from the air (photo: D. Saunders).

treated. The area continues to show improvement. The groundwater levels measured in Nov 1998 were about 2.5m lower than predicted from the pre-planting trend. The piezometric level is lower than the so-called 'critical water depth' below which the role of capillary action is insignificant.

It is probable that this decline in water table is due to a reduction in on-site recharge, rather than direct withdrawal from the watertable by trees. The extreme groundwater salinity probably prohibits direct use of the water by tree roots.

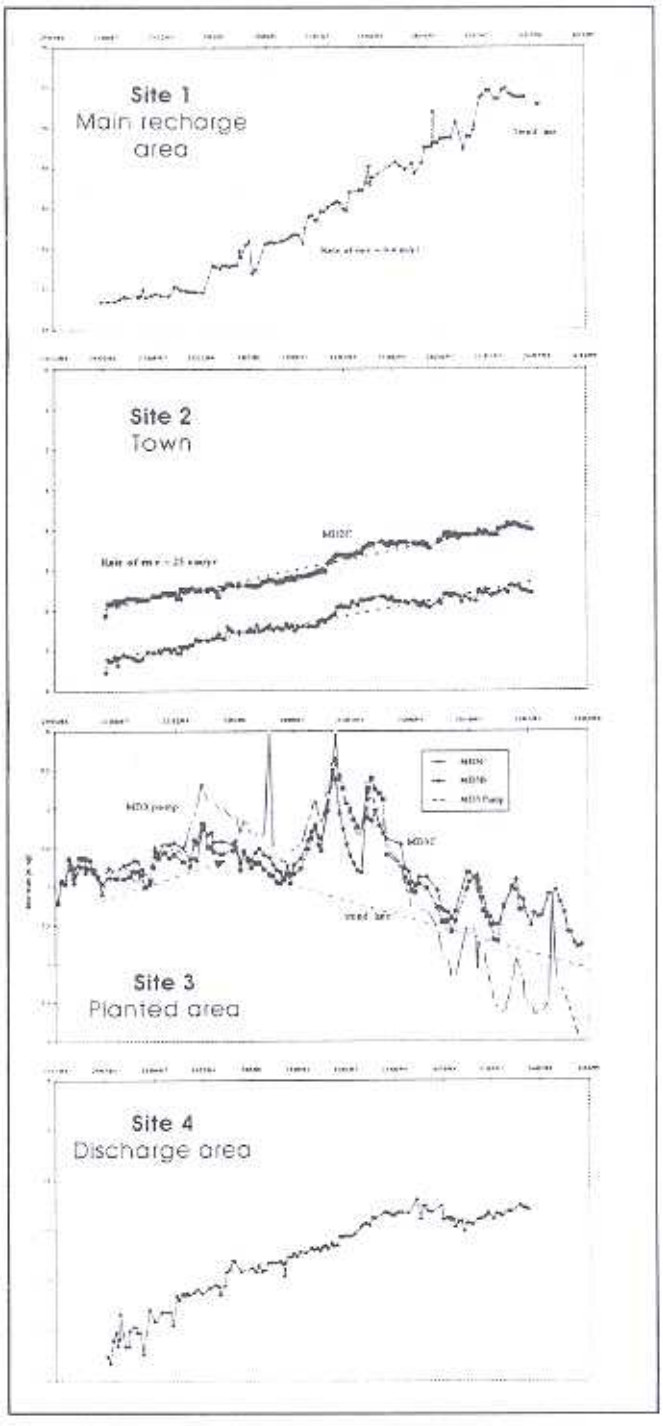
Discussion and conclusions

The Merredin project is a success case study in revegetation of a discharge area to prevent the surface expression of dryland salinity. However, the interactions between soil-water-plant are complex and there are a number of issues that require further monitoring and investigation.

One of the points of interest is whether the trees have a significant effect on the watertable more than 10-30m from the planted area. In many wheatbelt sites, this has not clearly been shown, but at Merredin, in a bore 3 km downslope of the revegetated area, the piezometric level increased as expected up to 1995. For the next three years, the trend reversed. At this stage, changes in inputs (rain) and outputs cannot explain the cause of this reversal - perhaps it is the effect of the trees?

Therefore, experience of the last decade has shown that tree planting in the area west of the town has resulted in a decline in watertables. However, to have any effect on the rising saline groundwater in the town itself, the trees need to be planted to the east - upslope. Extrapolating from current trends, the water table will come within 1m of the surface in eastern Merredin in 10 years, in the central business area in 10-12 years and in western Merredin by 12 years.

In order to have a significant impact on the watertable, a large proportion of the catchment, including the main recharge area, needs to be planted. Unlike the site of the



1991 planting, this land is still productive farmland, and so this option may not be economically feasible to landholders. Therefore, we may have to try to achieve maximum reduction in groundwater levels in the Merredin catchment by integrating both biological and engineering management options.

Dawit Berhane is a hydrologist based at AgWA, Merredin. He can be contacted on (08) 9081 3111.

More technical detail can be found in: George RJ & Frantom, PWC. 1990. Preliminary groundwater and salinity investigations in the eastern wheatbelt, 2 Merredin. AgWA Tech Rep 89. AND George et al 1998. Interactions between trees and groundwater in recharge and discharge areas - a survey of Western Australian sites. AgWA.

IN BRIEF

Mapping the birds of rural landscapes: where are our birds now?

by Cheryl Gole

You've fenced off your remnant bushland from stock. You've replanted trees and understorey. Your land is being managed for wildlife. Now its time to find out which varieties of feathered wildlife are inhabiting the land you care for so carefully. A new project enables people to help map the birds of our rural landscapes.

In the 15 years since the first "Atlas of Australian Birds" was published, over 10 million ha of bushland has been cleared and some 100,000 ha has been replanted. Where are our birds now? The "New Atlas of Australian Birds" wants to answer that question by mapping the distribution of all Australia's birds in all types of habitats, and we need your help to compile it.

The Atlas is the largest bird survey ever attempted in Australia. The four-year project has been funded by the Natural Heritage Trust and will give you the opportunity to put your birds on the map. Anyone can take part, as long as they have some knowledge of their local birds, a pair of binoculars and a field guide to Australian birds.

How do you atlas? Its easy, and Birds Australia, the organisation running the project, will provide you with a kit of materials to answer your questions and get you started. There are several different survey methods and the project is very flexible. If you also do a once-off habitat survey in some places, and do a bird survey in each season in those sites, that will give us extremely valuable information about how our birds are using land that has been grazed, burnt, cleared, logged, revegetated, or fenced off from grazing stock. We are particularly interested in how birds are responding to the immense effort

Jenny MacIntosh (left) and Cheryl Gole birding at 'Shelterwood', Mt Helena.

that has gone into revegetating our landscapes and fencing remnant bushland and wetland.

Australia's biggest bird survey is now under way. Become an atlasser and contribute your bird sightings and knowledge of local landuse practices to map our birds. Why not birdwatch on your land, and maybe also in local bushland or wetland, or other places where you visit or go on holiday? Its a great contribution to a very big project and, if you keep a copy of all your surveys, you will have an important record of the bird biodiversity on your own land. Australia's beautiful birds are excellent indicators of the health of our land. Wouldn't you like to know about yours?

If you would like a starter kit, or just find out more about atlassing, or nominate your farm, or offer to be an Atlas Project host, (or whatever!) contact Cheryl Gole, Atlas Project Assistant, Birds Australia (WA), 71 Oceanic Drive, Floreat WA 6014. Phone/fax 9293 4958.

Not a Birdwatcher?

You can still help map your local birds

If you do not have any knowledge of birds, you can still contribute to the mapping of birds in your area. You can nominate your farm as a place to be surveyed and Birds Australia will try to find a birdwatcher or two to do regular surveys there. Alternatively, a story in the community newspaper might net you some local birdwatchers.

All you need to do is act as host. You might, for example, be able to supply basic accommodation. You could also act as a local guide, showing the observers where little-known patches of local bush are surviving, either on your own or neighbour's properties, or in local reserves. You could even host a group to do bird surveys in your area. It might be helpful for a group to know where they could stay, or you might be able to offer a camp site or basic accommodation in shearer's quarters.

Kitless Kat Klinik

Sterilising you cat is a good start towards reducing the feral cat problem. The Malleefowl Preservation Group will help you organise a cat sterilisation day, but the organisation can be a hassle, including getting clearance from the veterinary association, etc.

Any group that would like help to do this, please ring Suzanne Dennings on (08) 9828 2018

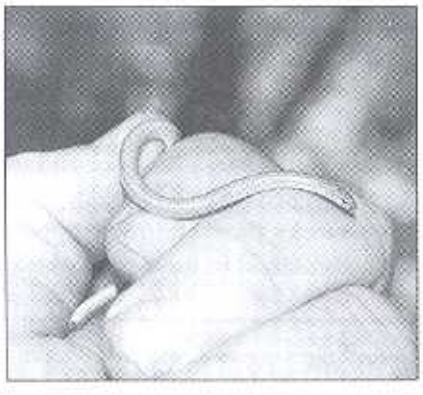
IN BRIEF

Supermarkets for wildlife

Recently a customer of Coles supermarket at Wanneroo received more than they bargained for whilst shopping for a lettuce. Upon purchasing the lettuce, it was taken home as the foundation of a salad being prepared for the evening meal. The lettuce was duly washed and the outer leaves ripped off, and surprise, surprise! out wrigged a writhing, wriggly serpent of very modest proportions ..... well, it looked like a serpent! And going by the behaviour of this little critter, it obviously thought it was a pretty mean dude of "dugite-ean" proportions - alas, delusions of grandeur.

On consulting a text on wriggly things it came to pass that the offending reptile was a south-western sandplain worm lizard. A small, slender species that grows >110 mm, foraging in loose sand and overlying litter as it searches for small invertebrates.

The offending 'lettuce lizard' was eventually captured after a chase over the kitchen bench top but in the process of capturing this fearsome critter its tail was lost. Care was taken that it did not finish in the salad!



Aprasia repens - *the 'lettuce lizard'*

Watching the Eagles

Wedge-tailed eagles have nested and reared a chick in this York gum for many years in succession. The nest is 10m off the ground. The photo of the older chick was taken in 1997, the younger one in 1998.

Thanks to Edward Nicholas of Morawa for these photos.

Landcare links with South Africa

Agriculture and the environment in South Africa have many problems similar to those of WA, including overgrazing, erosion, soil acidity and invasive weeds - only theirs are weedy Australians, where we have weedy South Africans! It's thought that 'Landcare' on the Australian model could help farmers combat these problems, and a team from AgWA is helping to develop just such a scheme. If you'd like to know more, contact Theo Nabban, Landcare Development Officer, AgWA Bunbury, on (08) 9780 6100.

?

Guess what ...

"Corymbia" is going back to being "Eucalyptus"! Well, I suppose it keeps the taxonomists busy!
(Its still "Marri" to me !!!)

PRACTICALITIES

Sand bags: a technique for establishing fringing vegetation in boggy sites

by Jenny Dewing

CLEARING and the subsequent rise in the water table has resulted in many creeklines being wet throughout the year. In addition to waterlogging, trampling by stock pugs up the banks. A poorly defined watercourse with waterlogged, compacted soil makes plant establishment difficult.

These sites are often unsuitable for site preparation techniques such as ripping and mounding. Mature vegetation growing in these conditions is more tolerant of the waterlogging. Getting young seedlings established is the challenge.

One technique that has been tried in Bridgetown is the use of sandbags to raise the seedlings out of the water while they are establishing.

Small jute sandbags of roughly 45 x 30 cm are two-thirds filled with course sand, crushed aged pine bark or other suitable material. It is important to choose a filling mix that will not introduce weed seed into the riparian area. The bag is then tied and placed on its side.

A small slit is cut into the top of the bag and the seedling is firmly planted into the bag. This is transferred to the revegetation site where the bag is wedged into a depression or excavation in the wet area, with the bag being about half way out of the water. Bags can be covered with soil to reduce the drying effect of the sun and wind on the surface of the bag.

Paperbarks, tea-trees, rushes and sedges have all been successfully established in this way. This technique should be restricted to those plants that are observed to grow in wet sites. The seedling grows rapidly through the bottom of the bag and the bag rots away over the following season.

Trials to date have involved brackish sites. Saline sites may result in the buildup of salt on the surface of the bag and could effect plants that are not salt tolerant.

Jute bags cost about $0.34 each (tax exempt) and can be purchased from bag companies in Perth.

The activity of water birds, particularly swamp hens, needs to be monitored during the first few weeks of establishment. They love to uproot new seedlings, especially rushes and sedges. The occasional seedling needs to be replanted. After a few weeks, the swamp hens appear to lose interest in the new plants.

Paperbark seedlings, Melaleuca raphiophylla, being established in sand bags.

Two year old Paperbark, M. raphiophylla, and Grey Honey-myrtle, M. incana, which were established using the sandbag technique. Riparian soak adjacent to the Blackwood River. Note weed problem.

Jenny Dewing is Land for Wildlife Officer at Bridgetown. She can be contacted on (08) 9761 2318.

WEED ALERT

Weed Action Plan

by Jenny Dewing

THE most effective control of weeds will be achieved if adjacent landholders work together to carry out a coordinated, strategic, weed action plan. This is really the only way to treat highly invasive weeds such as Blackberry and Bridal Creeper. The source of infestation may, for example, be on public land, such as a roadside and so all landowners, including the Shire, need to be involved.

An example of a basic Weed Action Plan that can be adapted for your needs is given below. (Remember to take into account all your local conditions.)

Jenny Dewing is LFW Officer at Bridgetown, and can be contacted on: (08) 9761 2318. She is extremely knowledgeable on weed management in higher rainfall areas.

Time of year	Action
April - May	Weed monitoring walk/drive. Take a roll of coloured surveyor's tape, or a couple of rolls, one for each target weed species. Mark outbreaks with tape and mark these areas onto your farm plan. An A4 aerial photograph with a plastic overlay is easy to use in the field.
June - July	Cut down and treat woody weed species such as Victorian Tea-tree, Taylorina, weedy wattles and Tagasaste. They can be heaped and burnt to create ashbeds for natural regeneration or direct seeding. Control winter-growing grass weeds.
Aug - Sep	Bridal Creeper and Watsonia control. Monitor the effectiveness of the treatment 4-6 weeks after spraying. Continue to control winter-growing grass weeds.
Dec - Jan	Blackberry control. Control summer-growing grass weeds.
April - May	Weed monitoring walk/drive and planning for coming season's weed action plan.

Weedbuster Week

October 10 - 17

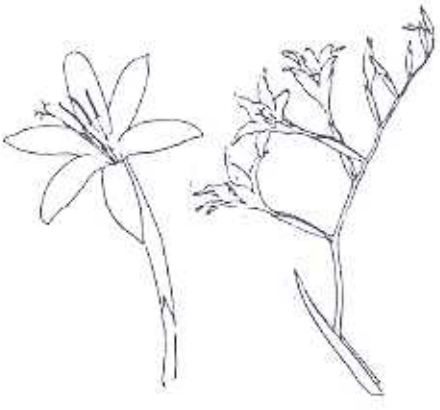
"Weed Prevention is the Intention"

What will YOU DO?

Together we can make a difference!

Contact your *LFW* Officer for ideas and assistance.

Weeds of the Year - Watsonia and Gladioli



The Environmental Weeds Action Network has produced a brochure for identifying these weeds. Ring *LFW* if you would like one.

The Esperance Wildflower Society has also produced a brochure on their local weeds. Contact Esperance Shire on 9071 1666 if you would like a copy.

BUSH DETECTIVE

What's that crusty stuff on the rocks and trees?

Is it a coral? - No!

Is it a moss? - No!

Is it a fungus? - No!

Is it an alga? - No!

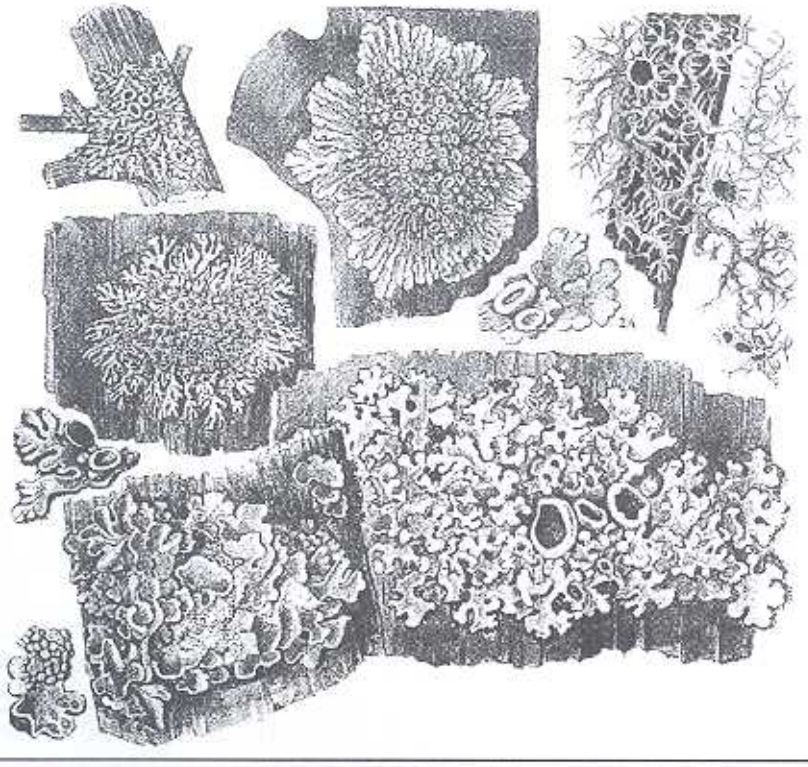
It's a lichen!

LICHENS are complex organisms made up of both alga and fungus, often more than one species of each. They are classified (named) according to the fungus componant. They have no true roots, leaves etc, only a 'thallus' which is often, though not always, flat to the surface on which it is growing. Like fungi, they reproduce by spores, and the 'cups' where the spores are produced can often be seen - they may be a different colour from the rest of the organism, for example. Some lichens grow very slowly, and have been used to 'age' the exposed surface of rocks.

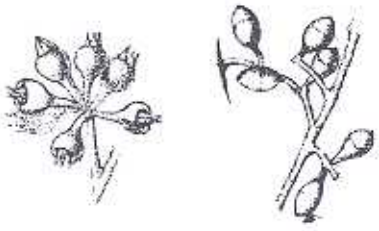
Lichens grow on rocks, tree-trunks and even crusty soil. They are mostly greenish-grey, but some can be black, white or bright orange. They produce chemicals which decompose the rock on which they are growing, and so are important in the process of weathering and soil formation.

Humans do occasionally use lichen products - all schoolkids will be familiar with litmus paper for testing acidity - litmus is made from a lichen found around the Mediterranean. Another Mediterranean species is believed to be the 'manna' which sustained the Israelites during the flight from Egypt (you'd have to be desperate - the acid in the lichen fights with the acid in your stomach ...!)

Lichens are easily damaged, so are one of the first plant groups to disappear when woodlands and granite outcrops are grazed. Lots of lichens usually means good quality bushland.



RESEARCH



Salmon gum study

THE stunning pink bark of the salmon gum makes it a favourite eucalypt for many people. However, in the wheatbelt this tree now only occupies a fraction of its former range and its future is uncertain. Your help is needed for a research project focussed on conserving these wonderful trees.

With the aid of CSIRO funding, Patricia Fox from UWA is presently studying the flora of remnant salmon gum woodlands to provide much-needed information for regional conservation. "The salmon gum is a native Western Australian and over 80% of the woodlands have been cleared from the wheatbelt area," she said. "Little is known about what other species grow with this tree and how that flora varies across the wheatbelt.

"While some of the remaining woodlands are on reserves, many are on private land, and I'm looking for landholders to let me know if they have any salmon gums. I'm also looking at the effects of grazing on the flora, so ideally would like to have a range of sites on the same property, including grazed and ungrazed."

Patricia has already started work on one *LFW* property in the northern wheatbelt, and she will be continuing with her surveying in spring. She would like to hear from people in the southern and eastern wheatbelt, and also the York area, who have salmon gum woodlands on their property.

Contact: Patricia Fox, Botany Dept, UWA, Nedlands 6907; Ph: 9380 2219; fax: 9380 1001; or email: pfox@cyllene.uwa.edu.au

Min-min lights

HAS anyone ever seen these weird lights, hovering in the bush, or swooping across open spaces? The Aboriginal people feared the Min-min as a bringer of bad luck, a spirit that flies about in the night stealing children, for example. In England, a similar phenomenon called 'Will o' the Wisp', has been known for centuries. It bobs along lanes, rises to glide over hedges, streaks off across fields and alights on tombstones, thus striking fear into the hearts of watchers. But what actually is it?

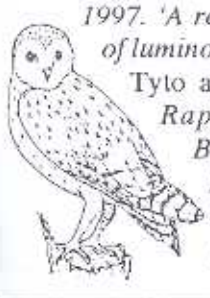
It has been suggested that it is actually luminescing barn owls!

The lights behave in a very similar way to hunting owls. In England, they have occasionally been shot, and found to be owls (only once in Australia, near Winton in 1980). A very telling quote from Queensland reads:

"Looking around I saw a funny light which seemed to be following us. It scared me a little, the hair on the back of my neck stood up. 'Don't worry,' Moogoody said. 'You watch, I make light go.' Turning his horse towards the light he cracked his stockwhip and the light went out. 'That fellow bird follow cattle,' he said. 'They stir insects from grass and he make light to catch insects.'"

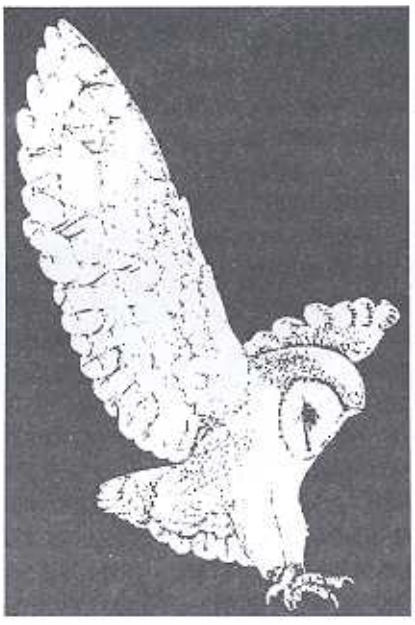
But if it is a barn owl, what makes the luminescence? Perhaps the birds had been roosting in a tree which contained luminescent fungi, and had become contaminated. Alternatively, perhaps the barn owl is intrinsically luminescent? After all, many fish are ...

What do you think? Has anyone any comments on Min-min lights to add to the debate?



For detail, read Silcock, F. 1997. 'A review of accounts of luminosity in Barn Owls Tyto alba.' *Australian Raptor Studies II, Birds Australia Monograph 3. Ed. G. Czechura & S. Debus.*

IN BRIEF



Owls on freeways

When racing along one of Perth's newer freeways at night, watch out for owls. Open and lightly vegetated sandy banks are ideal hunting grounds for them and, unfortunately, they are occasionally hit by cars. As the revegetation becomes more shrubby, the owls tend to move elsewhere.

Owls around Perth live mostly on house mice, and each bird kills about 2000 mice a year. Clearly they are important in controlling mouse plagues, so, if you can do so safely, try and avoid hitting them!

FUNGAL FORAY

May to July are the best months for finding fungi. A 'Fungal Foray' can be an interesting treasure hunt. Remember that a good fungal flora is essential for the health of your remnant vegetation - check out your patch!

For more information, refer to Western Wildlife 2/2, April 98. If you'd like help to organise a Fungal Foray, ring your local LFW Officer.

Luminous fungi

The next time you go down to the woods at night - turn off the torch and walk in the dark. You might see the ghost fungus, *Omphalotus (Pleurotus) nidiformis,* glowing eerily on a rotting log. It is beige coloured, turning darker with age, and can be either a parasite on living trees, causing a white rot, or a saprophyte on dead wood. It is widespread, growing on wattles, peppermints, banksias, eucalypts, WA Christmas trees, and even pines and plane trees.

The amount of luminescence varies, but persists for a while even after it it has been picked. Sometimes it even glows so much you can read by it! The luminescence is apparantly caused by chemical action between fungal enzymes and oxygen.

The first time I saw this fungus it gave me a bad scare - I thought I'd had too much plonk around the campfire! It must have had a reputation as some sort of 'bad medicine' with Aboriginal people (who were nervous of things which occurred in the dark) but I have been unable to find any recorded stories.

PS: Don't eat it! It has a mild taste, but after a few hours will cause you to vomit the entire contents of your stomach!

Penny Hussey

Ghost fungus by Katie Syme from 'Fungi of Southern Australia' by N. Bougher and K. Syme.

NEW BOOKS

ATTRACTING BIRDS TO YOUR BACKYARD

by Emma Bramwell

ATTRACTING birds to your backyard and encouraging them to take up residence is not as difficult as it may sound. Watching their antics can provide hours of enjoyment, and is a great way to feel at one with nature.

With natural bushland being encroached upon more and more, suburban gardens may be one of the most important areas in which some wildlife can still survive. In creating a haven for some of these animals you can consider what individual species eat, how best to provide water, and what plants are most likely to mimic their natural habitat, yet still provide an aesthetically pleasing design to your backyard. In this way a garden can be both a peaceful retreat from the real world as well as a shared environment for the local wildlife.

In a beautifully-presented and useful book called "Attracting Birds to your Garden", author John Dengate (of "Burke's Backyard" fame) has provided us with an insight to many hours spent observing birds and plants, and has published this guide to planning your garden to appeal both to you and the local wildlife based on his experiences.

Western Australian gardens are commonly frequented by a variety of small birds including honeyeaters, who can be encouraged to take up residence by plantings of dense shrubs such as grevilleas, hakeas, bottlebrushes and other nectar-rich species. Such plants will also provide suitable nesting sites, and also attract insects which in turn will attract insect-eating birds such as willie wagtails.

Attracting wildlife doesn't have to be limited to planting suitable shrubs. A water feature such as a pond can be planted around the edges with attractive, small native rushes and sedges to provide habitat for frogs. Even the lawn can be modified to include some native grasses suitable for finches, doves or parrots.

Although there is a huge variety of native plants and native cultivars suitable for gardens, species that grow naturally in your area or at least in your State and soil type are best. These will have the best chance of survival, and will be most suitable for birds and other animals who will have adapted to these particular plants as a food source or habitat.

An added benefit to attracting wildlife to your garden is natural pest control. Wrens and willie wagtails can be observed picking off flies and midges. Bobtails are thought to relish snails and slugs, but will need rocks and logs to hide under. Ladybirds have long been known to feast upon aphids. Parastic wasps will help to keep the number of spiders and caterpillars under control, while praying mantises enjoy a diet of small insects. Be warned, though, that the use of pesticides might deter the pests, but will also deter the control!

This article is adapted from "Attracting Birds to your Garden" by John Dengate (1997, New Holland Publishers Pty Ltd, NSW). The retail price for hardcover is $39.95, available from most bookstores.

Dragon Rocks Reserve - Early Morning

by Rhoda Giles

Bird song liquid sweet,
ants busy busy, near our prudent feet,
Salmon Gums and Morrell, aged and stately tall
and the early morning sunlight, jewel-like over all.

Dear Lord, let this green woodland where all is alive
forever and always grow and survive.

Now in her 82nd year, Rhoda Giles has spent her whole life working and farming in the Kulin district. She is deeply appreciative of the bush and wildflowers, and has published a book of poetry celebrating farm life and the beauty of the bush. If you would like to read more of this lovely poetic imagery, she has a few books left. Ring her on 9880 1268

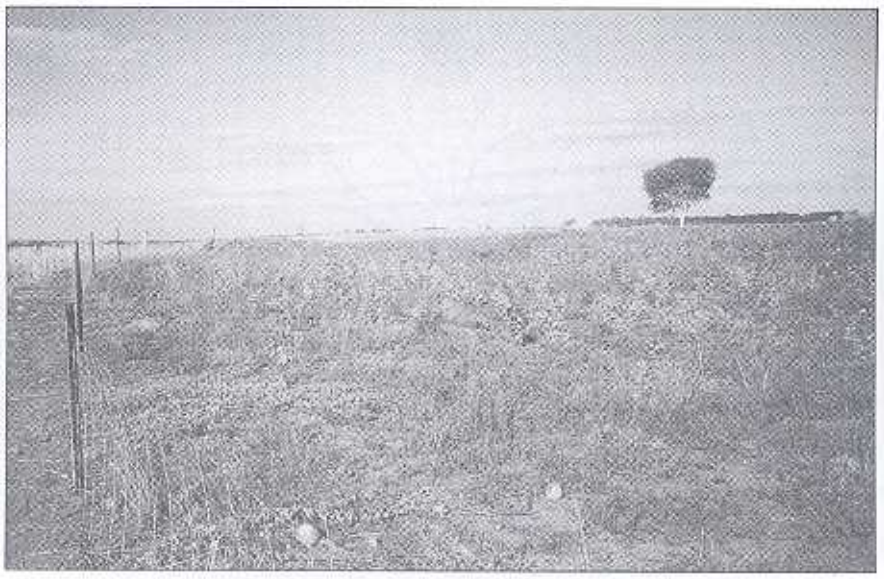
THE WAY WE WERE ...

DIRECT SEEDING

by Joanna Seabrook

OUR farm, "Seabourne" at York, was settled very early on, and mostly cleared by the 1900s. This site is a stoney ridge, and there is no shelter in the paddocks. In 1991 it carried a crop but in 1992, after normal site preparation for a crop, this segment was seeded with wandoo, York gum, manna wattle, rock sheoak and scrub sheoak. A superspreader was used, with sand to bulk out the seed. The first photo was taken at the end of 1993, the second in 1995. It is now so tall that you can no longer see this 'view' across the site. Direct seeding works!

Joanna Seabrook is well-known for her concern about the need for revegetation, and the availability of seed. She can be contacted on 9299 6816.



1993

1995

The 1999 Western Australian Landcare Awards

Entries are now being invited from individuals, groups and organisations involved in caring for our land. If you know of someone or you yourself have been involved in a Landcare project over the last year, please enter your project in one of the 12 categories.

- North Ltd Landcare Education Award
- Telstra Landcare Local Government Award
- Fuji Xerox Landcare Business Award
- BHP Landcare Research Award
- Ford Landcare Media Award
- NLP Individual Landcare Award
- BP Landcare Catchment Award
- Bushcare Nature Conservation Award
- Cotton Australia Landcare Primary Producer Award
- Alcoa Landcare Community Group Award

There are two special state awards:

- Living Streams Award
- Shirley Balla Wetland Conservation Award

These State awards are not carried through on a National level, however you may apply for one of these State awards in addition to the National categories.

LFW landholders may find the Bushcare one especially relevant.

Entries close on the 15th of June and awards are presented at the Gala dinner of the State Landcare Conference in Esperance.

For further information, please contact:

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Agriculture WA
Narrogin
Ph: 9881 0222 Fax: 0881 1950
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ABOUT GROUPS

LAND MANAGEMENT SOCIETY

THE Land Management Society (LMS) is a WA voluntary farming organisation started in 1983, that focusses on sustainable agriculture. The membership consists of broadacre farmers and landcare/government personnel.

What does LMS do?

1 Demonstration farm tours - two tours are run each month. Watkins tour at Frankland looks at the way the unique whole farm plan has incorporated tree-lined drains, remnant bushland, wildlife corridors and water conservation. The second tour is of Jenkins agroforestry and farm forestry property at Bridgetown. It covers agroforestry plots, growing trees for sawlogs, integration with stock and benefits of trees on farms.

2 Natural resource courses for farmers - three courses are offered.
'Know your soils' is designed to identify problem soil, address soil testing and improve management of difficult soils.
'Know your farm hydrology' is a basic course on how the geology and hydrology of an area influences the surrounding landscape.
'Soils are alive' is a soil biology course looking at the benefits of microscopic animals that live in your soil.

3 Farm monitoring program and kit - is aimed at encouraging and assisting farmers to monitor their whole farm environment with the aid of the 'LMS Farm Monitoring Kit'. The kit has equipment to undertake tests such as water salinity, soil pH, soil compaction, erosion, frosts, depth to groundwater and others. A one-day workshop, offered with the purchase of the kit, focusses on how to do the tests, interpret the data collected and from it make farm management decisions.

4 LMS Newsletter - is produced 3 times a year on different topics of sustainable agriculture in WA. Articles are submitted by farmers, government and landcare personnel and researchers working in the relevant fields.

For further information contact:
Gaye Chambers, LMS, PO Box 242, Como, WA 6152.
ph: (08) 9450 6862;
fax: (08) 9450 1763;
email: lmsinfo@space.net.au

Answers to the 1999 Western Wildlife quiz

To all of our readers who took part in this quiz – thanks for the huge response! We hope you had fun with it. Almost all entries received were 100% correct, so well done to all of you.

Congratulations to our winners, who will receive a selection of Bush Books:

R. Mifflin of Mount Hawthorn
M. Meares of Bridgetown
R. Soullier of Yandanooka
D. Mathwin of Kojonup
B. Hastie of Busselton

Now for the answers ...

Across

4. calicivirus (vol 2 no 2)
5. parasitic (vol 2 no 2)
9. watsonia (vol 2 no 4)
11. bogrush (vol 2 no 3)
12. admiral (vol 2 no 2)
13. woylie (vol 2 no 2)
16. tammars (vol 2 no 1)
17. eagle (vol 2 no 3)
18. bird (oh, come on now!)
19. ANZECC (vol 2 no 1)

Down

1. aestivate (vol 2 no 3)
2. malleefowl (vol 2 no 1)
3. riparian (vol 2 no 1)
4. casemoth (vol 2 no 3)
6. cossidae (vol 2 no 3)
7. habitat (vol 2 no 1)
8. buffalo (vol 2 no 2)
10. riffles (vol 2 no 1)
14. osprey (vol 2 no 4)
15. dryandras (vol 2 no 4)

Look out for our next quiz, same place, same time, next year!

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.
Published by the Department of Conservation and Land Management, Perth. All correspondence should be addressed to:
The Editor 'Western Wildlife', CALM Wildlife Branch, Locked Bag 104, Bentley Delivery Centre, WA 6983.
Design and Desktop publishing by Louise C. Burch Graphic Designer.