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NEWSLETTER OF THE LAND FOR WILDLIFE SCHEME

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SCORPIONS – ANCIENT LIFE FORMS IN WESTERN AUSTRALIA

Mark S. Harvey

It is generally agreed that life on Earth arose in the oceans about 3.8 billion years ago. These life forms consisted of single cells, gradually forming larger organisms over time. The Cambrian explosion witnessed a variety of different life forms evolving in the oceans, some of which eventually later moved on to land evolving the ability to breathe and move without recourse to aquatic environments. Incredibly, some of these ancient life forms are still with us today, and none are more interesting than scorpions.



Urodacus planimanus

The earliest scorpions are represented as fossils from the Silurian period, 443–416 million years ago, and are generally considered to have been aquatic. Later scorpions show all the hallmarks of being fully terrestrial, and all modern scorpions breathe air and live away from water.

So why have scorpions been so successful, surviving for hundreds of millions of years? Their basic body plan consists of a hard exoskeleton – like other arthropods – allowing them to retain water without desiccating (drying out) and to protect them from some predators. Their large pedipalps furnished with strong pincers allow them to grasp food and defend themselves. And their tail bears a sting at the tip, killing prey and warding off enemies. This armory has suited them for a very, very long time.

But what of modern scorpions? There are some 1,300 species recognised by specialists, but many

new species are discovered and described each year. They are mostly found in tropical and sub-tropical environments, but others range well into the temperate zones of both the northern and southern hemisphere. They are particularly well-suited to desert environments and their diversity and abundance can be truly staggering. In Western Australia, the Shark Bay region is home to a large

burrowing scorpion, *Urodacus hartmeyeri*, whose burrow entrances are easily visible on the red soil. Count the burrows next time you're there.

Many scorpions construct deep burrows in which they rest and bear their young. Most species of the Australian genus *Urodacus* dig deep spiral burrows that may extend down for more than one metre. These burrows keep the scorpion cool during the day and retain moisture so that they don't become too dry. Other scorpions live in shallow scrapes under rocks on the ground. Others live in leaf litter, and others live between sheets of rock such as granite. Perhaps the most amazing Australian scorpion is the recently recognised Barrow Island cave scorpion, *Aops oncodactylus*. It has evolved for life inside caves and has lost its eyes, and has pale colouration, like many other cave-dwelling creatures such as spiders and cockroaches.

Despite their fearsome appearance and aggressive nature, scorpions have a caring maternal nature. After courtship, which consists of a male and female 'dancing'

EDITORIAL

Meet Nina!



Hello everyone! I am pleased to introduce myself as the new Technical Officer for *LFW*. I have a strong interest in environmental issues, and hope to exchange information and knowledge with you all. Look forward to working with you in the future!

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Hello all readers!

Thank you for your very positive comments about the use of colour in *Western Wildlife*. Lots of people responded with remarks about how much more useful it made the photos as aids to identification of flora, fauna and fungi. As well, I was delighted to discover that, due to changes in print technology, it was not as costly as I had thought! So we will be staying with colour from now on. However, the mix

of informative articles, snippets and members' stories will stay the same. Please remember to contact me if there is any particular topic you would like to be covered in the magazine.

One of *LFW's* longest-serving staff members, Technical Officer Claire Hall, has moved to another section in DEC – we wish her well in her new position. Please welcome Nina Stick, who is now in that role. Give her a call to say hello!

Penny Hussey



LFW staff workshop, May 2010. L-R, back row: Fiona Falconer, Cherie Kemp, Penny Hussey; middle row: Zara Kivell, Heather Adamson; front row: Phil Worts, Nina Stick, Avril Baxter, Mal Harper, Dorothy Redreau, Sheila Howatt, Sylvia Leighton, Wayne Gill.

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www.dec.wa.gov.au/landforwildlife

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Scorpions

FAUNA



Isometroides sp.



Liocheles sp.

with each other prior to the transfer of the sperm packet from the male to the female, the female gestates the embryos internally. After a few weeks they emerge alive from the mother, and crawl onto her back where they stay for a few weeks prior to dispersing and fending for themselves.

All scorpions are predators, usually feeding on other invertebrates such as insects. Species of *Isometroides* seem to feed only on spiders and have been found in the burrows of wolf spiders and trap-door spiders.

The venom of a few scorpion species are known to be extremely dangerous to humans and in some parts of the world prove fatal to hundreds of people each year. Luckily, no Australian scorpion can – as far as we are aware – inflict a deadly sting, and stings from Australian scorpions are generally no more painful than a

bee sting. In general, the most painful stings are from species of the family Buthidae – which have long slender pedipalps – rather than from the other families, which have stocky pedipalps.

A feature unique to scorpions can be found on the underside of the body – the pectines. These comb-shaped organs are covered with tiny sensillae and are used to sense the environment.

The easiest way to find a scorpion is by using a UV lamp at night. Scorpion exoskeleton glows under UV light, and the scorpions fluoresce brightly. The scorpions are easily illuminated, but remember to protect your eyes as UV lamps can be harmful.

harmful.

There are five different groups of scorpions in Australia and all occur in Western Australia.

Members of the genus *Urodacus* (family Urodacidae) are generally large with long tails and thick-set pedipalps. Males have longer tails than females and in many species the segments have large spines on the dorsal side. There are about 20 species of *Urodacus* recognised and all are from mainland Australia. However, there are at least 60 new species of *Urodacus* waiting to be named.

Related to *Urodacus* is the blind cave scorpion mentioned previously, *Aops*. The lack of eyes is an evolutionary adaptation to life underground. Like *Urodacus*, it belongs to the family Urodacidae, although it is clearly an ancient separate evolutionary line.

Species of *Liocheles* are flattened

dark-greenish scorpions found throughout tropical Australasia. In Australia, they range as far south as south-eastern Queensland. In Western Australia, they occur in the Kimberley district. Although some species are known to dig shallow burrows, they generally occur under rocks, where their flat pedipalps and body enable them to squeeze into very small gaps.

The Bothriuridae are represented in Australia by several species of *Cercophonius*. They are small scorpions with tan and brown mottled colour patterns. They are most common in eastern and south-western Australia, and are the only scorpions occurring in Tasmania.

The remaining group, the family Buthidae, are represented by several species of the genera *Lychas*, *Hemilychas*, *Isometrus*, *Isometroides* and *Australobuthus*. They tend to be small or medium sized and are generally yellowish in colour. The pedipalps are always slender, in contrast to other scorpion families. They do not dig deep burrows but can be found under logs or rocks, under tree bark, or at night, climbing on shrubs. Although only a handful of species are known, there are many different undescribed Australian species, particularly in Western Australia.

So next time you are lucky enough to see a scorpion, don't scream with horror – admire their durability. They've been on Earth a lot longer than our branch of the evolutionary tree, and survived all of the big catastrophes from giant meteors to global freezing and warming. I'm sure they will survive the next global disaster, but will we?

Mark Harvey is Senior Curator, Terrestrial Invertebrates at the WA Museum. He can be contacted by: Mark.Harvey@museum.wa.gov.au

MEMBERS PAGE

BIODIVERSITY OF WARWICK BUSHLAND

Karen Clarke

Warwick Bushland consists of the Warwick Open Space Conservation Area (Bush Forever Site 202) and the Warwick Senior High School bushland, both of which are *Land for Wildlife* sites. Together they comprise 60 ha of high quality urban bushland. Warwick Bushland is located in the suburb of Warwick, bounded by Erindale, Beach, Warwick and Wanneroo Roads. The Warwick Open Space Conservation Area is managed by the City of Joondalup in conjunction with the Friends of Warwick Bushland.

Warwick Bushland is one of the few examples of the natural ecosystems, once widespread on the eastern side of the Spearwood sand dunes on Perth's Swan Coastal Plain, that remain in good condition. The vegetation complex it represents (Karrakatta Vegetation Complex – Central and South) has mostly been cleared and less than 8% remains protected for conservation.

A number of studies of the flora, vegetation, fauna and fungi have been carried out over many years and new studies are continuing to be initiated. So far at least 200 native plants, 100 larger fungi, 60 birds, 12 reptiles and one mammal (a bat) have been recorded. Normally flora and macro-fauna (large visible fauna) are the components of biodiversity most people hear about. However, on the basis of predictions of the number of species on Earth, most of our biodiversity is made up of invertebrates, fungi and various microscopic organisms.

A number of significant invertebrate species are present in Warwick Bushland. These include the Graceful Sun-moth, Western Jewel Butterfly and Sciron Skipper

(a butterfly). The Graceful Sun-moth (*Synemon gratiosa*) is listed as endangered and is specially protected under state and federal legislation. This moth only occurs on the western side of the Swan Coastal Plain and population numbers are very low. It is a day-flying moth, that looks and acts like a butterfly and loves hot, still, sunny weather. Most of the year this moth lives underground in its larval stage and feeds on the roots of mat-rushes, specifically *Lomandra hermaphrodita* or *L. maritima*. During late February to late March they emerge as adult moths to mate and lay eggs. Each moth only lives between two to six days and does not feed. They are well camouflaged (Figure 1) and usually the male is seen during his mating flight when he flashes his brightly coloured orange hind wings (Figure 2) to attract a female. Warwick Bushland is one of only a few sites containing a reasonably sized population of these rare moths.

Another interesting story of the local ecology occurs in the leaf litter. Despite frequent wildfire started by arson, Warwick Bushland still contains substantial populations of *Bothriembryon* snails (Figure 3) that feed on leaf litter and can burrow underground for protection. These

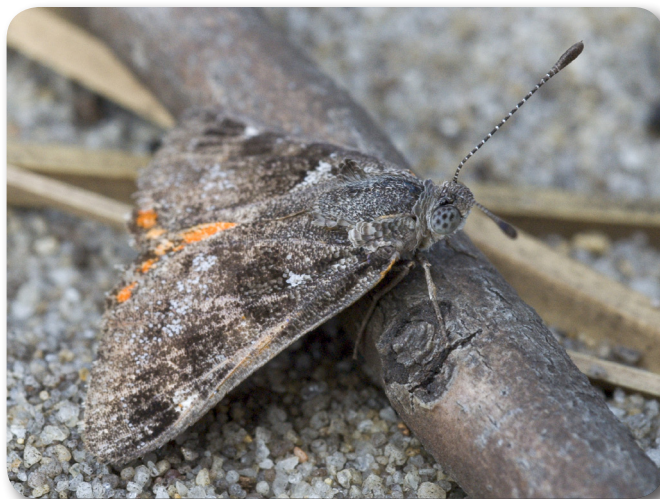


Figure 1. Camouflaging of the Graceful Sun-moth. Photo: M. Brundrett



Figure 2. Bright orange hind wings of the Graceful Sun-moth. Photo: M. Brundrett

snails, like many species that feed on leaf litter, cannot digest plant cellulose or lignin. They rely on decomposer organisms such as fungi (Figure 4) to begin the break down process so they can then eat the more digestible parts of plants. Warwick Bushland supports a wide range of fungi in various micro-habitats. Fungi are important components of the local ecology, for example, they act as decomposers, symbiotic partners with plants (mycorrhizas) helping plants grow and maintain their health, as well as parasites controlling invertebrate

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Warwick bushland

MEMBERS PAGE



Figure 3. Native snail (*Bothriembryon* sp.) on leaf litter. Photo: K. Clarke



Figure 4. The Eye-lash Cup Fungus (*Scutellinia scutellata*), a decomposer of plant material. Photo: M. Brundrett

and plant populations.

On the flora and macro-fauna front Warwick Bushland also has a number of significant species. Due to the presence of large fallen jarrah logs that survive wildfire, this site is home to the Speckled Stone Gecko (*Diplodactylus polyophthalmus*), which is rare elsewhere on the Swan Coastal Plain. Warwick Bushland is a breeding site for the Brown Goshawk, Rainbow Bee-eater, Grey Butcherbird and several hollow-

nesting species such as the Red Capped Parrot. It is also a significant feeding site for the endangered Carnaby's Black Cockatoo. A number of important locations for plant species have been recorded, these include the Orange Morrison (*Verticordia nitens*) and Yellow Pop Flower (*Glischorocaryon aureum*), both significant occurrences in the metropolitan area.

Despite the large number of disturbance factors affecting

Warwick Bushland, it still continues to be an important island of biodiversity in the urban landscape. The more we look, the more we find and many more stories remain to be told of this and every other remnant of urban bushland in the Perth metropolitan area.

[Ref list available – Ed.]

Karen Clarke is a member of the Friends of Warwick Bushland.

BUSH DETECTIVE

Strange diggings, who made them, and what for?

Occasionally we have seen diggings like this on sandy areas of the property. We assumed they were made by rabbits until, one day, we saw a Thorny Devil (*Moloch horridus*) in one. It was doing the digging.

It seemed that what it was doing was covering up its eggs that had just been laid. There is always something new to learn, isn't there!

Bob Porter, Ajana.

[Thank you, Bob, for this interesting natural history observation. Has anyone else observed this activity by Thorny Devils? - Ed]



FLORA

LIFE ON THE ROCKS – A CRACKING GOOD PLACE TO LIVE

Colin Yates, Phil Ladd and Dave Coates

In 1970 a young English school teacher came to visit a friend in Western Australia. Being interested in plants she spent some time in the ‘bush’, and when walking on a granite rock in the State’s wheatbelt noticed an unusual small shrub which caught her imagination. Keen to know more, she took a sample to the Western Australian



Herbarium, where the then Duty Botanist Alex George exclaimed “This hasn’t been seen for 50 years”. This is the story of how one of Western Australia’s rarest plants *Verticordia staminosa* subsp. *staminosa* was re-discovered, and the beginning of Penny Hussey’s remarkable career in bringing attention to, and enabling conservation of, Western Australia’s extraordinary flora.

Some 30 years later, scientists Colin Yates and Dave Coates from the Department of Environment and Conservation (DEC), and Phillip Ladd from Murdoch University, investigated the evolutionary history and ecology of *Verticordia staminosa* and discovered much more about this shrub. Their studies revealed a remarkable and enduring natural history, and highlighted the importance of protecting remnant native vegetation from livestock grazing and other threatening processes.

The population of *Verticordia staminosa* subsp. *staminosa* which Penny re-discovered in 1970 is still the only known population of the shrub. A comprehensive census of the population undertaken by the research team estimated that there were about 1,200 plants distributed among 49 sub-populations, varying in size from one to 160 plants. The number of plants in each sub-population increased with the availability of rock cracks in the massive granite pavements. A second sub-species, *Verticordia staminosa* subsp. *cylindracea*, which is also rare, is known from a cluster of granite rocks some 400 km away (see map). There are numerous granite rocks in between the two subspecies but extensive searching has failed to reveal new populations.

Genetic studies undertaken by the research team revealed exceptionally high levels of genetic divergence between the two subspecies. Because neither has any obvious mechanism for long-distance dispersal there must have been a very long period of historical separation, with the subspecies originating from a

common progenitor sometime in the early Pleistocene (1–1.5 million years ago). The period of Earth’s history since has been marked by the Great Ice Age when glaciers advanced and retreated numerous times across much of the Earth’s surface. In south-west WA there was no ice, but climate oscillated between cooler arid phases and warmer wetter phases.

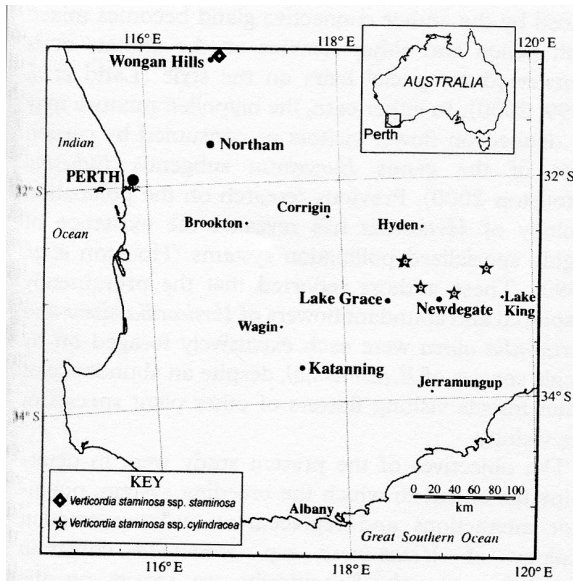
The insight from the genetic studies is that the present populations of *V. staminosa* have survived *in situ* on the same granite outcrops through multiple cycles of previous climate change. How might this have happened? What are the implications of this for managing the shrub in the face of anthropogenic climate change and the warming and drying projected for the south-west? The research team’s investigations of *V. staminosa*’s ecology, physiology, population dynamics and pollination biology provide some answers.

The rock fissures where *V. staminosa* plants grow, concentrate water run-off from the surrounding massive granite surfaces, so that even the smallest amount of rainfall or heavy dew can result in moisture reaching plant roots. These water gaining sites may provide refuges for plants in a drying climate. The shrub is also very drought tolerant with plants becoming dormant over extended dry periods and re-hydrating rapidly when rain falls. Plants are long-lived and because they are drought tolerant, rates of mortality are low. Some seedling recruitment occurs in most years but rates are highest in the very wettest years. Plants are self-compatible which means they do not require pollen from other plants to produce seeds. This

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Verticordia staminosa

FLORA



may be an especially important trait if, under drier and warmer climatic conditions, the population declines to a small number of plants. Indeed low levels of genetic variation within the subsp. *staminosa* and subsp. *cylindracea* indicate populations

may have declined to a smaller number of plants and genotypes in the past subsequently expanding but with a restricted gene-pool.

Integration of the research findings into a model enabled the research team to investigate the potential impact of different climate scenarios on the *V. staminosa* population. Under more arid conditions the population was remarkably stable and extinction risk marginally increased compared to a simulation using historical climate conditions. A key finding of the model was the importance of protecting adult plants from any disturbances that could result in high rates of mortality. On a

granite outcrop in the wheatbelt this would include livestock grazing and inappropriate fire regimes.

Verticordia staminosa subsp. *staminosa* faces an uncertain future. What the shrub's actual climate tolerances are, and the role of granite outcrops as climate change refuges is the subject of ongoing research. Nevertheless, the story of its rediscovery and remarkable natural history provide some hope and highlights the importance of conserving and sympathetically managing the remnants of native vegetation in the south-west of Western Australia.

Dave Coates is Programme Leader and Colin Yates Principal Research Scientist in DEC's Science Division. Phil Ladd is Senior Lecturer in Ecology at Murdoch University.

Did you know ...?

That Australian agriculture contributes around 3% to our gross domestic product and accounts for about 65% of water use and almost 60% of Australia's land area?

2008 Year Book Australia (p 477)

Note that all 90 volumes of the Year Book Australia, going back to the first edition published in 1908, are now available free of charge from the Australian Bureau of Statistics website. Using these, you can easily chart the changing course of the nation over time.

More info: <http://www.abs.gov.au/>

CALLING ALL BATMEN AND BATWOMEN!

PLEASE HELP RECORD A CLIMATE CHANGE BIO-INDICATOR!

During Conservation Week (23 – 30 October)

go outside and spend 10 minutes listening for the White-striped Bat.

Full details will be in the October *Western Wildlife*.

FLORA

NOTES ON GROWING NATIVE GRASSES: PT 2

Una Bell

Many native grasses are easy to grow – the hard part is probably recognising the native grasses! Knowing a few basic things about the type of grass you want to propagate can really help your success rate. A few simple questions to ask yourself are: Is this grass annual or perennial? Summer-active or winter-active? What type of soil does it normally grow in? Does it grow in wet or damp areas, or prefer drier sites? Does it have above-ground runners (stolons) or rhizomes?

The following native grasses are all species that I have managed to grow, and I am not a great gardener! Many of these grasses can be used for revegetation, although not all are pasture grasses. A lot of native grass seed is usually kept for a year to overcome dormancy problems. If growing from seed, use a shallow planting depth.

Swamp Wallaby Grass (*Amphibromus nervosus*)



Perennial winter-active clumps; collect seed in spring to summer, seeds tend to fall quickly as they mature and seem to have a six-month dormancy period. Sow in autumn, spring or even summer as it can germinate in hot weather but plants need to be kept moist. Grows on flood plains and in winter-wet depressions and copes with seasonal inundation. Will grow in bog gardens, use for rehabilitation of wetland areas and it is also a native pasture grass.

Graceful Speargrass (*Austrostipa acrociliata*)



Perennial, winter-active large clumps. Floret has only a small hard tip, whereas most speargrasses have a hard tip which makes them difficult with stock. It grows in coastal and inland sandy soils, common around Hopetoun and also collected in the wheatbelt. Possible agricultural use for grazing, landcare and soil stabilisation.

Feather Speargrass (*Austrostipa elegantissima*)



Perennial winter-active clump with large, attractive, feathery panicles that break off and blow away when mature. Flowers spring to early summer. Collect the whole panicle for the seed which is on the end of the panicle branches. Widespread, it grows in a range of soil types, including the edges of salt lakes. Use for native gardens, rehabilitation and possibly agriculture, as it is a tough, if somewhat unconventional looking, grass which is usually grazed out if stock or rabbits are present.

Silkyheads or Native Lemon Grass (*Cymbopogon oblectus*)



Perennial summer-active clump, leaves are blue-green and lemon scented when crushed. Inflorescence has leaf-like bracts (spathes) that go from green to rusty brown when mature. Florets are soft, white and fluffy. Grows easily from seed and does not seem to have a dormancy period. Prefers heavy red soils such as in the Avon Valley and rocky outcrops such as along the Darling Scarp. Use for native gardens and, if already present in the local area, for rehabilitation but it is not useful for pasture as stock dislike the lemony smell/taste. Under conditions of summer watering, it can be invasive.

Clustered Lovegrass or Lavender Grass (*Eragrostis elongata*)



Perennial summer-active clump, flowering stems carry attractive purple clusters from spring to autumn. Seed can have a dormancy period and is very small – like dust – so collect whole seedheads when they have matured and gone grey-brown. Crush seedheads over the surface of potting mix or where direct seeding, or throw down whole mature seedheads into damp areas. Germinates in late summer.

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Native grasses**FLORA**

Grows in or near seasonally wet areas such as wetlands and roadside drains and copes with dying out in summer once established. Good for rehabilitation, but may only live for five years. Use in damp areas or bog gardens. Looks very attractive when grown with Knotted Club Rush (*Ficinia nodosa*) as both have clusters along the stem.

Matgrass (*Hemarthria uncinata*)

Perennial summer-active spreading grass which grows along creeklines and other damp areas and likes shade. It can be confused with Kikuyu Grass (*Pennisetum clandestinum*) but Matgrass has a smooth, hairless,

thinner leaf and a distinctive inflorescence. Do not attempt to collect seed – it is best propagated from rhizomes or stolons. Use for rehabilitation of wetlands and in bog gardens, where it will need space to spread. Good frog habitat.

Blowngrass (*Lachnograstis filiformis*)

Annual or short-lived perennial clump, winter-active, which produces plenty of tiny seeds with a high germination rate. Collect panicles when mature and spread on rehabilitation site. It often appears on wetland sites of its own accord, as it likes disturbance and damp areas. Very attractive grass, some populations have a purple tint to the inflorescence. If growing in a nursery, it can spread easily!

Weeping Grass (*Microlaena stipoides*)

Perennial winter-active tufts with a strong rhizome and long flowering stems in spring. Has growth spurts in autumn and spring. Propagate from

seeds and rhizomes; established pots can be divided. Seed is mature by December, but do not clean the seed as this can damage it. While some fresh seed will germinate, it has a higher germination rate after six months. This is in keeping with the natural growth pattern, as the seed is mature in early summer and would normally germinate six months later after the first rains. It grows along creeklines and as forest understorey, often on lower slopes, and prefers shade or part-shade. Will grow under trees, including Marri. Forms open patches of native lawn along creeklines and is a native pasture grass. It is being investigated as a native grain-bearing crop.

Foxtail Mulga Grass (*Neurachne alopecuroidea*)

Perennial short grass in very low spreading clumps, with straight flowering stems topped by a grey inflorescence. It is winter-active,



but the genus is unusual in that it also includes summer-active species, and one species is both! Grows well in hotter conditions.

Widespread and versatile grass, eaten by kangaroos but most sheep do not like it. Seed matures in early summer and does not have a dormancy period but older seed may give a higher germination rate. Responds to smoke treatment but not essential. Seedlings can be very slow-growing.

Marine Couch (*Sporobolus virginicus*)

Perennial summer-active spreading grass. It is salt-tolerant and is found in estuaries, on river banks and damp areas as well as coastal dunes

and among rocks, particularly along the south coast. Has a grey-brown, spike-like inflorescence, from which the seed is rapidly shed. (*Sporobolus* means either to throw the seed like dice, or to sow a crop in a clod of earth.) Grow from rhizomes or stolons. Use for rehabilitation of brackish damp areas and it can be grazed by stock. It has even been used as a lawn where plentiful saline water was available for irrigation.

Una Bell is a volunteer Research Associate at the WA Herbarium, where she can be reached by phone, 9334 0500. Photos: U. Bell.

ECONOMIC VALUE OF BIODIVERSITY

NEW MALLEE HARVESTER LAUNCHED

John Bartle

Many WA wheatbelt farmers have planted mallee usually in the form of long narrow belts on cropping land. This practice evolved during the 1990s as a response to a range of threats and opportunities. Landcare concerns, especially salinity, were a major motivation. The concept that landcare objectives could be efficiently met by developing native mallee eucalypts to be a profitable crop strongly appealed to farmers. With landcare benefits as a sure return they were ready to participate in the more uncertain prospect of commercial development of mallee biomass production and the processing industries that would buy it. Farmers' major contribution to commercial development has been to establish a potential resource of some 12,000 ha of mallee belts and in the process to build up considerable knowledge and experience in mallee cultivation. Farmers also set up the Oil Mallee Association (OMA) to push for mallee industry development.

The OMA was closely involved in the early investigation of methods to harvest mallee. In the mid-1990s under the leadership of the OMA President, the late Don Stanley of Kalannie, a small group of farmers purchased a second-hand sugar-cane harvester. Cane harvesters had been modified to cut woody crops like willow and poplar in Europe and so it appeared to be a good place to start. After many hours in farm sheds and less time running the machine along mallee belts, it was concluded that there were several features in cane harvesters that made them unlikely to do the job on mallee. In particular, the cane harvester drove over the plants before cutting them, and used a swinging knife action to break cane stems, but this was not going to work on the taller, larger diameter and much denser mallee stems.

This initial experience led to a second phase of development under the leadership of legendary agricultural engineer Harley Pederick of Dumbleyung Engineering. Along with input from Rick Giles of DEC (then CALM), Harley's business partner Mike Dennett, and with volumes of commentary from passing mallee farmers, the sugar-cane harvester was cannibalised for parts, and the fundamentals of a new design and a research prototype machine were created. This design consisted of a ground level cutting head using conventional forestry technology, a transfer apparatus to move the erect stems into the jaws of the final component, a drum chipper. The research prototype was assembled and was able to clock up enough running time to be a convincing confirmation of the design elements. The third phase of harvester development delivered the machine launched

by the Future Farm Industries Cooperative Research Centre (FFI CRC) at Narrogin on 13 April 2010. It is a prototype incorporating the same design elements identified in the previous phase but built using modern engineering design and practice. It integrates the design elements into a balanced machine designed to operate at more than 20 green tonnes of throughput/hour. The machine has still to undergo an extended period of field tests. However, there was an air of optimism at the launch – the machine was impressive in scale and power and close followers of the harvester development seemed convinced.

This phase of development was supported by a \$1.5 million grant from the State Government's Low Emission Energy Development fund. The project is under the umbrella of the FFI CRC and funding was conditional upon FFI CRC attracting additional private sector funding. The project engineer is Biosystems Engineering, an entrepreneurial company that also took an equity position in the development. During 2010 it is hoped to conclude this phase of harvester development with successful demonstration of the design and performance of this prototype and preparation of specifications for a commercial prototype machine that will have an output exceeding 60 green tonnes/hour. This level of performance will reduce harvest cost down to a level where the overall cost of mallee biomass production should be commercially viable.

John Bartle is Manager, Revegetation Systems Unit, DEC.



Rick Giles and Harley Pederick enjoying the company of the newly launched mallee harvester. Photo: J. Bartle

FAUNA

COCKIE HUNTING

Denis Saunders

With regard to the article 'Cockie hunting - with a metal detector?' in *Western Wildlife* 14/2, I did revisit the Carnaby's Black Cockatoo population at Coomallo Creek to resurvey it using the same protocols I used in my earlier research on the population. This resurvey was ably supported by Rick Dawson and Peter Mawson from DEC, who also provided all logistical support. I had first surveyed this cockatoo population in September 1969. The last complete survey was in the spring of 1996, just before I was transferred from WA to Canberra with CSIRO.

The survey in September last year was very interesting. During that trip we identified three breeding females which had been banded by CSIRO. Rick Dawson was able to photograph the legs of these females using a hand-held digital camera with a telephoto lens. We were able to read the numbers using photo-enhancing software on his laptop computer in the evening. Two were banded as breeding adults in the area; one was at least 25 years old and the other was at least 19. The third was 19; she had been banded as a nestling in November 1990 in a hollow about 2km from where she was nesting in 2010.

Wedge-tailed Eagles are significant predators on Carnaby's Black Cockatoo. So, during the November trip, we searched for the trees supporting a Wedge-tailed Eagles' nest in the past, hoping to use a metal detector to search for stainless steel bands and wing tags used on cockatoos. Unfortunately the trees had gone. We did find a recently active eagle's nest, but found no bands or wing tags around it. However, on the subject of predation, we did find a well-fed female Carpet Python curled up in a tree hollow that had been used by a pair of Carnaby's Black Cockatoo. On the floor of the hollow was a small, freshly dead cockatoo nestling pushed to one side and the python with a large bulge in the area of her stomach. The bulge was almost certainly caused by the breeding cockatoo female she had ingested! In my 40 years of research on breeding Carnaby's Black Cockatoos, this was the first time I had seen an example of python predation on a breeding bird. In fact, during the course of my research in the Coomallo Creek area, there have been more than 4,000 inspections of tree hollows and on only one other occasion was a python recorded in a hollow. That was in the spring of 1969 and the hollow was not in use by a black cockatoo at the time.

Denis Saunders is a Research Associate with CSIRO

BIRD'S-EYE VIEW

Susan and Greg Griffin

We bought our property in Toodyay in 2004 and feel privileged to be the custodians of this land for our tenure here. At 2.2 hectares with masses of very old wandoos, it's nesting heaven for the numerous species that seem to have quadrupled during the past five years. At first we did not have any idea about the flocks of black cockatoos.... all we knew was that they came in big groups of 30-40 in June-July and did not leave until as late as February. We put the huge glazed bowls out for water and kept them topped up each day in summer – obviously appreciated as they came to drink morning and evening in large numbers. After researching we found out about the recovery programme and how valuable the old trees are to the breeding of this endangered species.



The flocks of Carnaby's Black Cockatoos have declined in numbers; 2009 particularly noticeable, although at the peak times 20-30 are still stopping by, but most of the regulars are 3-4 family groupings. The screams that precede the landings are amazing as they scramble for a place at the bowl, with up to 10 at times. A few sips and they are off to sit in the big old wandoos to carry on beak sharpening and socialising for up to 30 minutes at sunset. We have been lucky enough to see young being fed close up, as our large deck is just metres from two popular trees, a 'birds eye view' so to speak. With hakeas, dryandras and Marri there is plenty to snack on between trips to places further away, where they seem to disappear during the day, returning at sunset for cocktails and conversation. My photography has blossomed due to the amazing subject matter with the camera and close up lenses never far from reach.

Just the simple addition of these water bowls has rewarded us with numerous species all coming in to quench their thirst, we have no domestic animals and are happy to play a small part in the daily lives of our feathered friends.

FAUNA

POSSUM HIGHWAY

Pete Malavisi

The planning department at Busselton Shire has been keen to explore ways of reducing the number of possums that are victims of motor vehicles when they endeavour to cross roads and also reduce predation of possums when they come to the ground. Possum ropes have been discussed on several occasions but there was no evidence that any had been used in WA. Last year, a condition was placed on a development requiring a possum rope to be installed but unfortunately due to a State Administrative Tribunal appeal we were not able to defend the condition due to a lack of evidence that they actually worked.

The challenge was then to get some evidence. We purchased three thin ropes which we plaited together to make one rope of approximately two cm in diameter. We then put this rope up behind the Shire buildings on Causeway Drive between two trees that showed evidence of possum activity. We set up the camera but unfortunately over a period of a couple of weeks there was no success in gaining any evidence that possums were actually using the rope.

We approached Greg Carr at the Kookaburra Caravan Park to see if he would assist. He was able to get some old marine rope almost five cm in diameter and offered to have it put up between a couple of trees across an internal roadway at the caravan park.



Within 48 hours of the rope being put up, there was anecdotal evidence that the possums were using the rope. I went along on the second night and, sure enough, just as the sun set, a possum appeared and within several minutes used the rope to get to the adjoining tree. I was then able to secure a still camera from DEC and the following day was able to attach the camera to a branch where the rope was in close proximity.

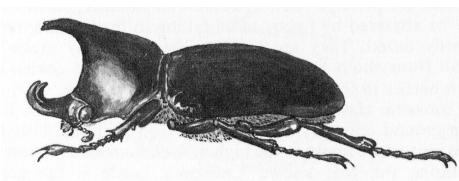
The following day I collected the camera and the evidence was there to be seen, we had created a possum highway! The trees are about six metres apart, so further study will need to be undertaken to determine how far they will travel, but at this stage it is looking good.

Pete Malavisi is the Environmental Planning Officer at Busselton Shire. He can be contacted on: p: (08) 9781 0345 or email: Pete.Malavisi@busselton.wa.gov.au

BEETLES LIKE LOGS

Restoring habitat is not just a matter of planting trees. To get the ecosystem functioning again, it is important to consider the needs of a wide range of organisms, including ground-dwelling beetles. These are an important component of the soil and leaf litter community that together facilitates recycling and soil fertility. Researchers in the ACT looked at the needs of these beetles in box-gum grassy woodland, a community similar to wheatbelt woodlands*.

They looked at three types of habitat: open ground, ground under trees and ground next to logs. Unsurprisingly, the open ground was poorest in both species diversity and numbers. The richest sites proved to be alongside logs. They conclude: "This strongly supports the idea that restoring logs to box-gum grassy woodlands would be useful for increasing beetle species



richness and assemblage heterogeneity."

It is not just beetles that like logs, they form important nodes of fertility, and are often missing in woodlands that have been heavily disturbed, by long-term grazing for example. If a tree or large branch falls on a paddock or driveway, and needs to be removed, see if you can move it into a remnant and leave it to decompose there. The beetles will thank you, and so will the fungi, and the skinks, and the centipedes, and the goannas and the seeds looking for a site to lodge and germinate, and ... and ...

[* for ref. contact Ed.]

FAUNA

SUB-FOSSIL OWL DEPOSITS REVEAL SMALL MAMMAL DECLINE

In Australia, numerous small mammals have declined in distribution – even become extinct – since European settlement. However, it is difficult to say how and when this occurred as very few records have been kept and those that exist are skewed towards the larger and more conspicuous animals. In addition, there has been some resistance to attributing small mammal decline to factors created by European settlement, with many people preferring to think that climate change caused the decline, independent of European arrival.

Can owls help? They are amongst the main predators of small mammals and moreover, they regurgitate indigestible bits such as bones that can be studied to find out what was eaten. Owls occupy the same roost for long periods – hundreds of years perhaps – and so remains can accumulate below the roost and form sub-fossil deposits. Excavate these, identify the animals and date the remains and you have got a record of what the owls fed on at a particular period in time. You can also, by noting the abundance of a particular prey species in the remains, estimate how common it was at the time. Researchers in Victoria have used sooty owl deposits to do just that*.



The Sooty Owl (*Tyto tenebricosa*) is a large forest owl found in south-eastern Australia. It is an opportunistic predator of mammals, capable of consuming virtually all non-

flying mammal species between 10 grams (eg: mice or antechinus) and 1,500 gm (eg bandicoot or quoll). Because it is not picky, if one prey species declines, it'll take more of another instead. It also roosts in caves, and so sub-fossil deposits have built up. The researchers compared sub-fossil deposits with what is produced by owls living in the same area today. The results clearly show that it was factors associated with European settlement that caused the decline in mammals.

Of 28 mammal species considered prey items of the sooty owl at the time of European settlement, only 10 species are part of today's diet – that is, a sudden loss of 18 species. They are primarily species of open woodlands; clearing and grazing for agriculture has severely altered much of this habitat. In addition to farming, predators

such as the fox and competitors such as the rabbit have also impacted on the abundance of the native mammals. Those mammals that have declined but are not yet extinct often occupy habitats that may not in any way indicate their preferred habitat under natural conditions, but instead could be considered refuge habitat where rates of decline are reduced. This decline in mammals has caused a wide range of ecosystem changes, many of which we do not yet fully appreciate.

[* for ref. contact Ed.]

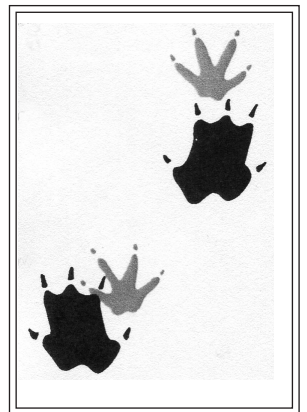
Illustration from *Birds Australia Bird Atlas*

WATER RATS

(*HYDROMYS CHRYSOGASTER*)

My LFW property backs onto the Serpentine River reserve about three or four kilometers up river from where it enters the Peel Inlet, near Mandurah. Since the opening of the Dawsville Cut in 1994 my part of the river is strongly affected by tidal movements in the estuary and when low there are sandy strips along the shoreline.

For the last few months I have been noticing small tracks on these sandy strips which seemed similar to the illustrations of water rat tracks in Barbara Trigg's book *Tracks, scats and other traces: a field guide to Australian mammals* (see pic). I consulted LFWO Heather Adamson and she came with her camera but by then the tide had risen and



there weren't many tracks left. However, a few days later I had a definite sighting of a Water Rat, I think an adult male: body about 30-40 cm long plus a long tail white at the end, a 'ratty' face with long whiskers and its hind feet were very large and webbed at the base. Although a similar size, it was definitely not a Quenda which are quite common around here.

I read in Anne Brearley's book *Swanland* that native water rats are becoming rare due to habitat destruction, so I would be interested to hear if any other LFW people had seen them on their properties or nearby.

Email: griseldahitchcock1@bigpond.com

Griselda Hitchcock, Barragup

NEWS

BUSHLAND HERITAGE

Between 1971 and 1976 Andy Chapman, a fauna consultant now residing in Ravensthorpe, worked on the fauna of wheatbelt reserves for the Western Australian Museum. One name that often cropped up as a frequent correspondent was a 'Mrs Giles of Kulin'.

Thirty years later, Andy met Mrs Giles' son, Keven Giles, at a meeting of the Friends of the Fitzgerald River National Park. Keven still farms at Kulin and indulges his interest in natural history in a 200 hectare patch of bushland on the property, a legacy of his mother's interest in plants and animals. The bushland contains wonderful patches of salmon gum and gimlet woodland, mallee, shrubland and a large granite outcrop.

Keven and Andy decided to conduct a week-long fauna monitoring program to see what was surviving in this private wheatbelt reserve and invited other *Land for Wildlife* members to the event.



Keven Giles examines a pit trap with his grandsons. Photo: Wayne O'Sullivan

During the weekend, 17 enthusiasts braved the early morning cold to monitor animals caught in pit and Elliott traps. The most frequent small mammal caught was the endangered Red-tailed Phascogale, a small carnivore (those caught weighed between 25 and 60 grams) which spends much of its life hunting through the canopy of trees and shrubs and which provided some wonderful photo opportunities as they were released.

Trigger video cameras were used for the first time in the area. One camera focused on a *Banksia sphaerocarpha* shrub showed a Red-tailed Phascogale repeatedly visiting the shrub over the course of three nights. Visits occurred every one to two hours during the night. This same camera also showed a honeyeater enjoying the flower and a fox passing by.

However, Andy noted the general lack of small ground dwelling mammals and thought it could be the result of several years of low rainfall and/or fox predation and feels more work needs to be done to account for the low numbers. Keven is now looking to implement a fox baiting regime and hopes to monitor the bushland again at a later date.

In this International Year of Biodiversity we'd like to say thank you to Keven and Mrs Giles for maintaining this important piece of our heritage.

Avril Baxter



A Red-tailed Phascogale returning home after a night in an Elliott trap. Photo: Rob McMillan



Keven Giles' grandson weighing one of the trapped Red-tailed Phascogales with Torin Baxter looking on. Photo: Keven Giles



Pam and Claire King, Avril Baxter and Sandra Murray look on as Andy Chapman prepares to examine a pit trap. Photo: Rob McMillan

INTERSTATE NEWS

CRADLING THE NW COAST OF TASMANIA

Alison Dugand

Some readers may remember Alison when she was LFWO at Mundaring or, more recently, as the Bushcare Coordinator at Mundaring Shire. She has sent us this report on an interesting creature and an innovative soil erosion control technique used in her new area.

Inspired by the island state of Tasmania during primary school geography lessons, I developed an early passion for restoration ecology. Many years later I decided to pursue my ambition and get to know Tasmania's natural history in more detail.

So, in October 2009, I relocated to the north-west coast of Tasmania to join the Cradle Coast Natural Resource Management (NRM) team, which is one of 56 NRM regions in Australia. This fits in well with the keen interest in biodiversity conservation that I have developed over many years of being dedicated to similar work in WA.

My focus includes working with threatened species recovery, and fortuitously this includes 'the big one', unique to the north-west, the Giant Freshwater Lobster (*Astacopsis gouldi*) which can survive up to 40 years and weighs in at some six kg. This is indeed a species recognised as one of high priority to protect, given the dramatic decline in numbers due to excessive and illegal fishing, changes in land use that contribute to sedimentation of waterways, and habitat loss. This iconic species is now a driving force behind the much needed river restoration works currently being undertaken in the region.

CradleCoastNRMhasdeveloped

incentive programs to assist landholders plan and implement projects to protect and enhance natural assets by fencing off rivers and streams from stock, providing off-stream water troughs, and sourcing locally endemic native plants to rehabilitate degraded areas. Part of my brief has been to implement this program. And working alongside local expert Todd Walsh has given me a great insight in to the Giant Freshwater Lobster. Not surprisingly, land holders have actively contributed to the program and have taken a keen interest in the lobster's recovery.

To put the landscape in context, the area of Tasmania's land mass is similar to that of the Avon region in WA. The Cradle Coast region represents one third of this area, some 22,000 km², with its unique and diverse environment that includes rugged mountains and wilderness areas, numerous offshore islands, undeveloped beaches and extensive forests with a protected area measuring in excess of 12,000 km².

Due to dominant basalt soils and high rainfall, land use is extremely diverse and intense; dominated by forestry, mining, dairy, beef, pyrethrum, poppies and many vegetable crops. From the air, the landscape looks very similar to a patchwork quilt. Topsoil reaches a depth of 20 cm; rainfall varies from 1,000 mm in the eastern part of the region, up to and in excess of 3,000 mm in the west. The steep terrain provides many challenges



The ripper mulcher. Photo: DPIPW, Tasmania

for property holders – farmers in particular– in their efforts to retain the valuable topsoil.

Cradle Coast NRM has a long-term erosion control project to develop best-practice techniques. One is the 'ripper mulcher', a locally designed and built machine that lays straw mulch over a deep-rip line along the contours of the paddock. Used primarily by growers of fine seed crops (eg: carrots, onions, poppies and pyrethrum) it acts to slow the flow of surface water and provides an essential soil and moisture retention barrier. With six machines available for use throughout the region, effective farmer networks have encouraged widespread local adoption of this technique. I believe that this method of protecting topsoil would be of interest to many landholders in WA, as it helps to reduce sedimentation in waterways and to support the soil health and sustainability that is required for farmers to continue to provide valuable commodities in the long term.

Alison Dugand is Biodiversity Coordinator, Cradle Coast NRM, adugand@cradlecoast.com.

IN BRIEF

REMARKABLE TREES

THE TWISTIEST GIMLET IN THE WORLD!

While the twist in a Gimlet (*Eucalyptus salubris*) is a common and, in fact, a distinguishing feature of the species, a very twisty Gimlet always gives a thrill to tree-spotters in the wheatbelt. While driving along the Biddy Buniche Road, just north of Newdegate, WWF's Helena Mills and Mike Hislop from the DEC WA Herbarium spotted this – arguably the twistiest Gimlet in the world. Not content with the usual uni-directional twist, this Gimlet appears to have attempted a twist in each direction, resulting a series of diamond-shaped depressions along its trunk. What a beauty!

It has been suggested that the purpose of the twist is to funnel rainwater down the branches and trunk of the tree directly to the roots (check it out next time you're near a Gimlet in rainstorm). The 'Twistiest Gimlet in the World' seems to have gone too far, however, as these diamonds wouldn't do much for funnelling rain.

Helena Mills



IS THIS THE BIGGEST FLOODED GUM?

This enormous Flooded Gum (*Eucalyptus rudis*) on the banks of the Swan in the Reg Bond Reserve, Vivash, has a diameter of 2.46 metres. Many of the early explorers, from Charles Fraser in 1827 onwards, remarked on the 'gigantic trees' they saw along the banks of the Swan, perhaps this one was a sapling then? This species is fast-growing, but even so, it has to be quite old.

Photo: P. Hussey

Have any readers got a biggest/tallest/oldest/
twistiest/etc plant to highlight?

BIG TREE REGISTER

Do you know of an especially large tree in your local area? The National Register of Big Trees was started in 2009.

To find out more, go to: www.nationalregisterofbigtrees.com.au

THE NEEDS OF BIRD-WATCHING TOURISTS

Are you involved in the ecotourism industry – by provision of accommodation, for example? You may not be aware that there is a Cooperative Research Centre for Sustainable Tourism that funds research into various issues concerning the tourism industry. To learn more, ask: info@crctourism.com.au

As an example, they have recently published a report

Practices, needs and attitudes of bird-watching tourists in Australia. It concludes that most bird-watchers are well-educated and middle-aged to elderly. Identifying birds, watching what birds are doing and enjoyment of social contact topped the list of preferences for a bird walk. It was also noted that tourists find it difficult to locate the best sites to go birding. Perhaps any LFW ecotourism operators with their own websites could make sure they put in something that covers this need?

IN BRIEF

An increase in stock watering points in rangeland ecosystems leads to a decline in native bird populations.

It has long been observed in arid zone pastoral stations that the area closest to watering points can become very degraded. In an attempt to mitigate this, and to spread the grazing load wider across the property so maximising the use by stock of the available vegetation, large numbers of artificial watering points have been installed. However, since stock need water daily, and will only travel so far, distant corners of large paddocks had become *de facto* conservation areas. Installing a water point in them removed this protection. Ecologists warned that this had the potential to seriously negatively affect the unique endemic flora and fauna. A recent study* has examined what effect the expansion of the water point network has had on birds.

The researchers compared data from the Birds Australia Bird Atlas records of 1977–1981 and 1996–2001, analyzing them to see whether specific traits (eg: feeding or nesting preferences) could account for any change. They detected large-scale declines in individual species.

Rather to their surprise, the species reliant on water for nesting and feeding declined most, probably due to the direct effect of livestock degrading the habitat by trampling, muddying and fouling, as well as grazing nearby vegetation. Species that forage and nest on the ground also showed a large decline, both from the direct degrading activities of the hoofed stock and also indirectly, as the extra watering points enables dingos and foxes to also spread out. Feral animals such as rabbits and goats will also

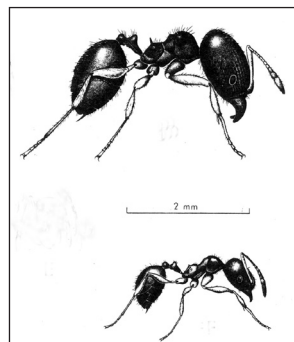
take advantage of this water and contribute to the overall degradation of habitat.

All in all, these results translate into continental-scale population declines in arid and semi-arid zone bird communities.

[* for ref. contact Ed.]

African Big-headed Ants in a Perth bushland

There are quite a few so-called ‘tramp ants’ that travel around the world with human activity, colonising the new areas where they end up. The African Big-headed Ant (*Pheidole megacephala*) is one of these.



It has been known to occur in urban WA for more than 50 years, almost exclusively in suburban parks and gardens. But recently it has been found invading bushland adjacent to Bold Park in Claremont. Researchers from Curtin University investigated what effect it might be having on other ants in the bushland*.

They found that approximately 53% of native ant species present in non-invaded bushland were not found in areas occupied by the African Big-headed Ants, while the remaining species suffered considerable declines in frequency of occurrence. This is a significant impact on ant species richness and diversity. Many of these species

perform important ecosystem functions and their loss is thought to have serious consequences to the ecosystem. There will have been changes to predation, decomposition and soil properties as well as interfering with specialised ant-plant interactions (such as the tending of extra-floral nectaries) or ant-invertebrate actions (such as the extraordinary relationship between ants and blue butterfly larvae). Finally, the ants may have an effect on insectivorous birds by displacing the type of invertebrates they like to eat.

The authors conclude that the ants pose a significant threat to urban bushland conservation. They suggest that these threats should be assessed, so that effective management may be recommended.

[* For ref. contact Ed.]

Illustration of a Pheidole species from CSIRO Insects of Australia

As foxes decline, feral cats increase

Years of wide-scale control have substantially reduced fox numbers in some areas of south-west WA. Unfortunately it appears that, as the foxes decline, feral cats increase. Partly this is because of reduced competition for prey, but also because foxes predate kittens. Feral cats are very efficient predators, though of a slightly different suite of animals than foxes. For example, it appears that they may be responsible for the dramatic and very worrying decline of the Western Ground Parrot. This year, DEC will be trialing aerial application of a new type of cat bait in south coast national parks, which it is hoped will be effective and help Western Ground Parrot recovery.

Cameron Tiller, DEC

MEMBERS PAGE

COURTEOUS COCKIES

I recently watched a trio of Red-tailed Black Cockatoos (*Calyptorhynchus banksii naso*) high up in a Jarrah tree in Stoneville. They were taking turns drinking from a hollow that had gathered rainwater. As I watched them for about 15 minutes, their behaviour struck me as courteous.

They took turns drinking and let each other consume their fill and move on before taking the others' place. Also, to change places on the branch with their neighbour, the cockie would walk sideways until beside the other cockie, facing opposite directions, and then it would lean forward such that its tail lifted up and over their neighbour without touching. An elegant manoeuvre, achieved with as much grace as a cockie can muster.

If the cockie world also has functional and dysfunctional families then this was an example of a functional family where each member was treated with respect.

Christine Groom

RED-TAILED BLACK COCKATOOS ON THE MOVE

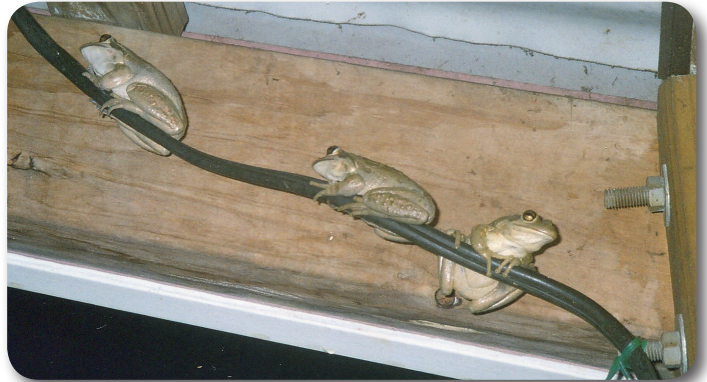
Several *Land for Wildlife* members in the Upper Great Southern observed Red-tailed Black Cockatoos on their properties for the first time this year. During March, over 60 of these birds stripped the Lemon-scented Gums, pines and Marri trees around the house and sheds of Brian and Janette Liddelw north of Williams. The Liddelows have occasionally seen the cockatoos pass through their area, but never in such numbers and for such an extended period of time. During April and May smaller numbers were reported by *Land for Wildlife* members west of Brookton and south of Narrogin, both had never seen them in the area before.

According to DEC's Principal Zoologist Peter Mawson, the movement of birds is usually a function of the quality of food and how far they are prepared to forage from their night roosts. Is the drying climate causing them to extend their range?

Avril Baxter

[In the October issue of *Western Wildlife*, we will be featuring a programme called Citizen Science, where a network of observers will be established in an attempt to document the responses of biota to changing climatic conditions. Records such as those noted above may be exactly the sort of thing that will be required. Watch this space! - Ed.]

Frog invasion!



Up to 20 frogs gather under our corrugated iron roof near the courtyard – even in the 37°C day they stayed against the roof.

Ron and Merrilyn Dorn, Albany

Grasshopper control contractor



This fellow patrols the property, including the garden and verandah, looking for things to eat. He is fond of grasshoppers, though he has difficulty getting the legs down, sometimes!

Anna Nail, Dunsborough

Did you know ...?

that the male Red-back Spider's sexual organ breaks off inside the female after inseminating her, preventing sperm from escaping? He then presents himself to the female to be killed. Apparently it's only the black widow group of spiders and the Australian Red-back where this behaviour occurs.

Mark Harvey, WA Museum

IN BRIEF

Learning about country

Last issue, under the heading 'Learning about country' we illustrated a scene and some notes from 'Lake Pleasant View' at Manypeaks. Shandell Cummings, the Cultural NRM Coordinator at South Coast NRM, was featured in the photo. She sent the text below to highlight the importance of the site, but unfortunately it arrived too late to include in that issue. So please refer back to WW 14/2, page 19, for the photo.

"Aboriginal people have been involved in caring for country for thousands of years. We have travelled throughout the country practicing land and natural resource management methods and passing our knowledge to the younger generations. The purchase of Lake Pleasant View provides us with a parcel of land to support our cultural practices and the transfer of knowledge. This land also gives us the opportunity to share our knowledge with the wider community by delivering workshops and educational projects."

Find Green Money – new website

The Australian Government, individual States, Local Councils, and non-government organisations offer grants, subsidies, loans, rebates, etc to assist individuals and groups to reduce their environmental impact and to actively improve environmental conditions.

At the 'Find Green Money' website, a wide range of funding opportunities are on offer for specific energy and water saving products and services as well as for environmental management strategies and educational programmes. This is a good site to find grant opportunities.

Visit: <http://www.findgreenmoney.com.au/index.html>

Exploring Wheatbelt Woodlands

Mike Bamford

DEC: published 1995. Free.

This is a delightful little book, full of fascinating facts and beautiful, clear line drawings, especially of the smaller creatures. Although published some years ago, the information is still valid and useful.

Originally retailing at \$11.00, the last few have been 'remaindered' and LFW has some to give away to interested LFWers. If you would like one, please contact Avril Baxter (see p. 2 for contact). First come, first served!

Aquatic invertebrates and waterbirds of wetlands in the Avon region

Susan Jones, Cara Francis, Anna Leung and Adrian Pinder
Wheatbelt NRM and partners. Free.

There was a big demand for this after it was advertised in the last Western Wildlife, so Wheatbelt NRM have given us some more for distribution to interested LFWers. Contact your LFW Officer.

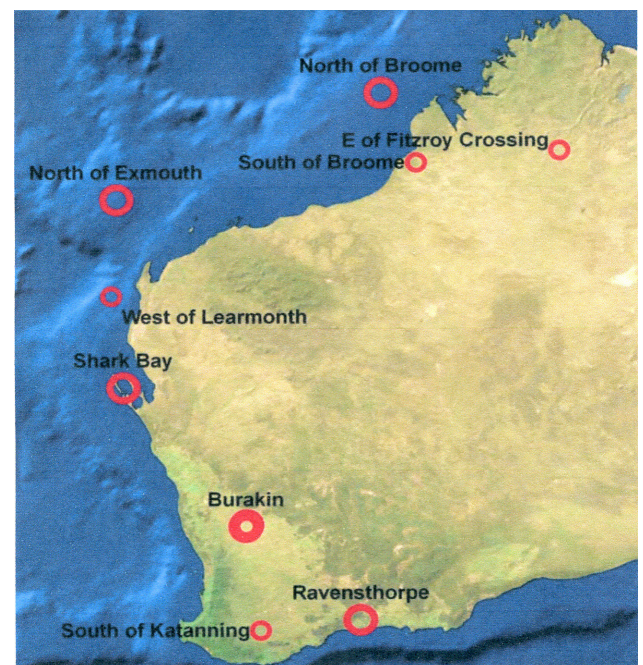
What is a suburb?

You might enjoy this definition, taken from the Wildflower Society of WA's Newsletter, August 2009:

"A suburb is a place where they cut down the trees – and then name the streets after them."

Our active Earth

WA is the most seismically active State in Australia, accounting for more earthquakes than all the other states and territories combined during the 10 years from 2000 – 2009. The map shows the 10 biggest events. Did you feel the Earth move? More info from Geoscience Australia: www.ga.gov.au



PLEASE NOTE: If you change your postal address, phone number or email, please let LFW know.

COMING EVENTS

Country Wildflower Shows

Mullewa 22–29 Aug Town Hall 9am–4.30pm
 Mt Barker 1 Sep–mid Nov Banksia Farm 9.30–4.30
 Esperance 8–12 Sep St Andrews Church Hall 9–5
 Wubin 9–12 Sep Town Hall 9–5
 Ravensthorpe 11–25 Sep 14 Morgan St 9–4
 Ongerup 13 Sep–3 Oct District Museum 9–4
 Chittering 16–19 Sep Bindoon Hall 10–4
 Mundaring 18–19 Sep Octagonal Hall, Glen Forrest 9–4
 Busselton 16–17 Sep Uniting Church 9–5
 Albany 22–25 Sep St Johns Church Hall 9–6; Sat 9–1
 Kojonup 24–29 Sep Kodja Place 9–5
 Cranbrook 26 Sep–10 Oct Cranbrook Arts Centre 10–4
 For more information, including contacts, email the Wildflower Society of Western Australia on: wildflowers@ozemail.com.au

A symposium: The ecology, management and restoration of natural ecosystem fragments in urban areas

Dates: Wed 25–Fri 27 August 2010

Venue: DEC Kensington

Cost: \$200 full registration

Organisers: Murdoch University and SERCUL

For more information contact Ms Billi Veber at w.veber@murdoch.edu.au

Conservation Week

23–30 October 2010

Listen for White-striped Bats!

For more information, including finding out about events in your area, email the Conservation Council of WA on:

conswa@conservationwa.asn.au

Toodyay Landcare:

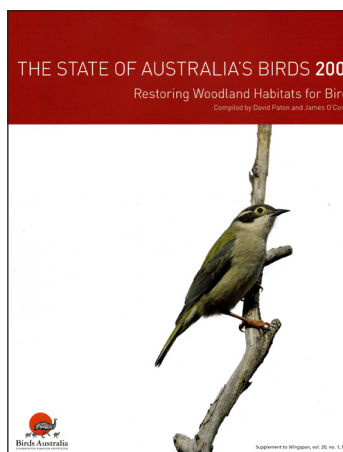
a strategy for the future

The Toodyay Land Conservation District Committee has produced a well-illustrated booklet 'Toodyay Landcare: a strategy for the future' that both reviews past landcare actions within their Shire, and sets out clear goals for the future. The document is intended to benefit the community of Toodyay by providing information on threats to sustainable landuse, as well as outlining management actions to mitigate these. The writing style is non-emotive, and a wide range of landuse actions are recommended for consideration.

NEW BOOKS

Land for birds

Many of you who are revegetating parts of your land will be wondering how much that will benefit birds. How important is the size of the revegetated area? Or its characteristics (e.g. monoculture vs mix of local tree and understorey species)? Or how it relates to remnant bushland or vegetation corridors? Useful information and advice can be found in an attractively presented and illustrated report (27 pages, in A4 format) by Birds Australia. Compiled by David Paton and James O'Connor, it is entitled 'The State of Australia's Birds, 2009: Restoring Woodland Habitats for Birds'.

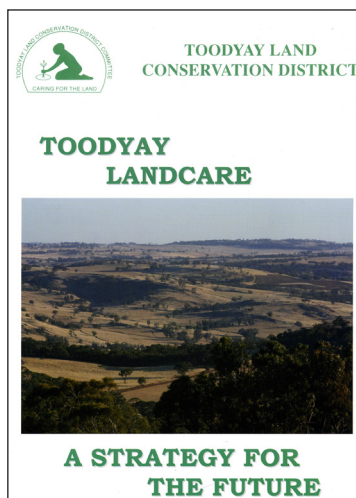


The report focuses on agricultural landscapes in the wheat and sheep belts of south-eastern and south-western Australia. It contains a useful summary and introduction and 15 articles of varying lengths on various topics. One of particular interest to Western Australians is on farmland revegetation in the State's wheatbelt. Another is on the Gondwana Link, a project to enhance and manage a vegetation link of 1,000 kilometres across the

south-west corner of Western Australia, from the karri forests to the woodlands and mallee bordering the Nullarbor Plain.

The report is free. By ringing Birds Australia's Western Australian office [tel.(08) 9383 7749], you can arrange for a copy to be mailed to your address.

Robert Powell



Every landholder in Toodyay should read this booklet, but it would also be of interest to people in neighbouring Shires. A copy will be posted on request if you provide contact details to info@toodyaylandcare.org.au. Alternatively, it is available on the website at www.toodyaylandcare.org.au.

This newsletter is a compendium of articles written by many different people. The views expressed are those of the authors, not necessarily those of the Department of Environment and Conservation.

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