



Western Wildlife

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NEWSLETTER OF THE LAND FOR WILDLIFE SCHEME

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KINGIA'S REMARKABLE ROOTS

Katherine Baker

Kingia is a type of grasstree that has only one species, *Kingia australis*. It is endemic to the south-west of WA and mainly occurs in wetter shrublands, woodlands and forests between Perth and Albany, although populations also occur in the Lesueur National Park. They look slightly like another type of grasstree, *Xanthorrhoea* sp., but differ in having multiple flowering spikes with rounded heads. *Xanthorrhoeas*, in contrast, have a large single flowering spike at the end of branches. Even though these plants are all grasstrees, they are actually in different families, *xanthorrhoeas* are in the *Xanthorrhoeaceae* whereas *kingias* are in the *Dasypogonaceae*. The *Dasypogonaceae* was recently featured in *Western Wildlife* (October 2007) because it is an ancient family. *Kingias* are also interesting because they have an amazing anatomy, their roots grow from their shoot tips taking many years before they reach the soil. This is found in no other type of grasstree in Australia.

In these unique plants, up to 50 roots form in a ring at the growing



Kingia australis tree, and close-up of flowering spikes.
Photos: K. Baker.



tip of the stem and then grow downward at the rate of 2 cm a month, between the true stem and persistent leaf bases. Thus these plants have concealed aerial roots that are not visible simply by looking at the plant. Plants that are less than one metre tall form roots each winter, whereas plants taller than one metre only develop roots in response to fire. Root primordia (roots in their earliest stage of development) can remain dormant for up to 60 years in the absence of fire.

Having roots arising from the shoot apex, rather than the base of plants as is normal, allows *kingias* to grow taller and live longer than would otherwise be possible. *Kingias* are monocots and hence do not form secondary thickening (wood) in their stems. However, the roots form girders around the stem which increases its strength. Thus *kingias* can grow up to eight metres tall even though their stem is pencil thick at the base. The formation of roots from the shoot apex also enables these plants to remain alive even after the stem base starts to die. These plants have been recorded to live for more than 400 years.

Greetings all!

I hope everyone had a satisfactory end to the farming year and a great festive season. It was wonderful to hear some of our *LFWers* in the northern wheatbelt describing a good season at last. The bushland has also benefited from the rain, and good seed crops have been reported. If we get an adequate follow-up season this year, regeneration in newly fenced areas should be excellent – provided, of course, that good weed control has already been undertaken where paddock weeds previously dominated the site.

In my role as Chair of my catchment group, I have to continually remind the people who plan revegetation projects using hand planted seedlings that, for best results, two full years of weed control should be undertaken on a site before seedlings are replanted in the third calendar year. Larger projects, using a tree-planter, may get away with only one year of weed control before planting, as

EDITORIAL

the planter itself is designed to also remove weeds. How many times have you seen poor little plants swamped by weeds? What a waste of time, effort and money! If anyone would like to discuss this further (**especially** if you disagree with me!) please give me a ring. It is a subject I feel very strongly about!

One of the articles in this issue, about how you can reduce your personal energy use, is a topic the author obviously feels passionate about. It raises an issue we all should seriously consider. True, it is not directly about managing for wildlife, but if we don't do something soon, we will all be losers – humanity as well as the millions of other species that share our planet.

LFW has an important milestone coming up. Sometime during 2009 we will register the 2,000th *Land for Wildlife* property. Isn't it inspiring to

think that there are so many people managing their land with wildlife in mind! Hopefully we will be able to organise a celebratory event.

Very best wishes for the coming year.

Penny Hussey

Email is very useful as a quick way for *LFWOs* to let *LFWers* in their area know of forthcoming workshops or other events that might be of interest.

But in many cases we do not have an email address recorded, or the one we have is incorrect.

Have you changed your email address since your *LFW* visit? Or perhaps you didn't have an email address then?

Please would you email your local *LFW* Officer (see contact below) and Claire Hall in Perth, to ensure we have your current email address.

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Vale Julia Boniface

It is with considerable sadness that we note the passing of Julia Boniface, who died on 9th November 2008, after a long battle with cancer. Julia was for some time *Land for Wildlife* Officer based in Nannup and she was an inspiring colleague and friend. We extend our sympathy to Phil and family for their loss.

Contact details for *Land for Wildlife* Officers

Name	Location	Phone	Email
Heather Adamson	Mandurah	(08) 9582 9333	heather.adamson@dec.wa.gov.au
Avril Baxter	Narrogin	(08) 9881 9218	avril.baxter@dec.wa.gov.au
Fiona Falconer	Coorow	(08) 9952 1074	fiona.falconer@dec.wa.gov.au
Wayne Gill	Esperance	(08) 9083 2100	wayne.gill@dec.wa.gov.au
Claire Hall	Perth	(08) 9334 0427	claire.hall@dec.wa.gov.au
Mal Harper	Merredin	(08) 9041 2488	mal.harper@dec.wa.gov.au
Sheila Howat	Bridgetown	(08) 9761 2405	sheila.howat@dec.wa.gov.au
Penny Hussey	Perth	(08) 9334 0530	penny.hussey@dec.wa.gov.au
Cherie Kemp	Busselton	(08) 9752 5533	cherie.kemp@dec.wa.gov.au
Zara Kivell	Mundaring	(08) 9295 9112	zara.kivell@dec.wa.gov.au
Sylvia Leighton	Albany	(08) 9842 4500	sylvia.leighton@dec.wa.gov.au
Dorothy Redreau	Albany	(08) 9842 4500	dorothy.redreau@dec.wa.gov.au
Philip Worts	Kojonup	(08) 9831 0832	philip.worts@dec.wa.gov.au

www.dec.wa.gov.au/landforwildlife

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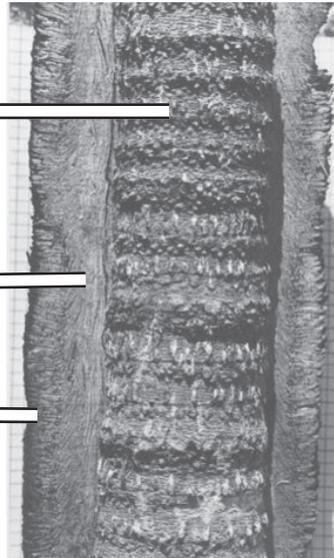
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Kingias

Primary stem with roots removed showing annual growth increments (depicted by changes in the width of the stem)

Roots descending around the primary stem (not woody)

Leaf bases



Although a number of Western Australian species have persistent leaf bases, kingia is the only one to use them as a source of nutrients. This is partly because of the unique location of the roots between the stem and leaf bases. Moisture is also derived from the kingia leaf bases. These features help this species survive in an environment with dry summers and nutrient-poor soils. Acquiring nutrients and moisture in this way is beneficial because most of the roots that reach the soil do not grow laterally, where nutrient levels are highest, but vertically. Furthermore, the amount of water and nutrients available in the leaf bases is greater than that in an adjacent equal volume of soil, especially during summer. Not only do the aerial roots help these plants survive dry conditions, it also enables these plants to grow in waterlogged soil because the plants can take in oxygen through their aerial roots.

Thus *Kingia australis* is a very unique species. Next time you see one of these plants in the bush you can marvel at the fact that beneath the leaf bases are roots that are growing from the shoot tip (sometime if you look carefully you can actually see rootlets among the leaf bases). They not only gather nutrients and moisture from the leaf bases, but also support the structure

of the plant and contribute to their great longevity.

Most of the information in this article was sourced from: Lamont, B. B. (1981). Morphometrics of the aerial roots of *Kingia australis* (Liliales). Australian Journal of Botany **29**: 81-96.

Katherine Baker is a research associate for Prof. Byron Lamont and has a particular interest in native seeds. Contact: ksbaker@graduate.uwa.edu.au



Thanks Leah for this fascinating piece of natural history!

FAUNA

A DIFFICULT MEAL

There is a myth in the bush that bobtails keep snakes away, but Leah Manuel of Arthur River has seen otherwise. When Leah and her friends were heading out of the house one morning to say their goodbyes, they disturbed a bobtail and dugite having a stand-off on the lawn, thankfully the dugite left in a hurry. However, after the visitors had gone, Leah noticed another commotion in the carport. The dugite had wrapped itself around the bobtail! As the snake seemed fully occupied, Leah bravely went inside to get the camera and filmed the action for about ten minutes before her husband Neil arrived home and dispatched the snake.

Leah had not observed venomous snakes coiling around prey before, and had assumed they just struck and then swallowed. She asked "Is this behaviour common?" LFW asked DEC's Principal Zoologist, Peter Mawson, if he had any ideas.

Peter said snakes may coil – not to kill by constriction but to keep the prey steady while they try to get it down. "After all" he pointed out, "the snake has got a real problem here,

having, so to speak, bitten off more than it can chew – except, of course that it has no teeth to either bite or chew, nor has it hands or talons to tear off bits. Instead it has to dislocate its jaw and swallow the much bigger prey whole. To push that big head down its

throat will take quite a bit of force, so it is using its own body as a steady point."

WEEDS

WEEDY NATIVES IN WESTERN AUSTRALIA

Greg Keighery

Introduction

When weeds are mentioned, we automatically think of exotic species introduced from overseas that are completely out of place in Western Australia. Occasionally we include eastern states' species, such as Victorian tea tree. However, any plant outside the checks and balances of its natural habitat can potentially be a weed and WA native species are no exception. Currently there are 71 species of WA natives that have documented feral populations and some are already serious weeds of the natural environment

Another important issue is that although our understanding of the distribution and ecology of many native taxa has improved greatly over the past 50 years, weedy populations of native species can lead to an erroneous impression of the true native ranges of species. For example the highly restricted *Reedia spathacea* has a planted population at Hamel, on the Swan Coastal Plain, giving an apparent several hundred kilometre range extension for this rare species. Similar issues can be noted in the south coast endemics *Kennedia nigricans* (weedy populations on the Swan Coastal Plain), *Hakea laurina* (jarrah forest and Swan Coastal Plain), and the listing of a feral population of *Melaleuca diosmifolia* in the Stirling Ranges as a new record for this priority species.

I have been preparing an annotated list of the populations and collections of the 71 weedy natives to enable allocation of populations to native and feral (especially in FloraBase), so that native weeds are recorded as such, an example of the text is given in the adjoining box.

Native weeds range from the aquatic Indian water fern (*Ceratopteris thalictroides*) and waterlillies (*Nymphaea macrosperma*) introduced into pools at Millstream early last century to tall trees such as warty yate (*Eucalyptus megacornuta*) introduced to the Kings Park arboretum in the 1960s and invading surrounding bushland before its removal in the 1990s.

They come from 23 families and 36 genera with the 'weediest' genera being *Acacia* (9 species that are weedy), *Callitris* (5), *Calothamnus* (6), *Eucalyptus* (5), *Hakea* (5) and *Melaleuca* (5).

Most serious weeds

The most serious native weeds have the capacity to completely alter the structure of communities that they invade and include: *Ceratopteris thalictroides*, peppermint (*Agonis flexuosa*), Geraldton wax (*Chamelaucium uncinatum*), rock she-oak (*Allocasuarina huegeliana*), *Eucalyptus megacornuta*, Rottneet tea tree (*Melaleuca lanceolata*) and ribbed hakea (*Hakea costata*).

An example of a serious native weed is *Melaleuca lanceolata* in Kings Park where roadside plantings of this species have resulted in a dense monoculture in banksia woodland after fires have killed the adults and stimulated germination of seedlings. These dense stands have virtually no understorey species present in what is normally species-diverse open woodland.

How can we spot potential weeds?

It would appear that very weedy species are those that are easily grown from seed, set copious amounts of seed, respond well to fire to aid invasion and are re-seeders rather than slow growing resprouters. Some future major native weeds in this category

Hibbertia cuneiformis (Labill.) Sm.

Cutleaf Hibbertia

NATURAL DISTRIBUTION: Esperance Sandplains, Swan Coastal Plain, Jarrah Forest, Warren IBRA Regions.

WEEDY DISTRIBUTION: Swan Coastal Plain IBRA Region.

HABITATS: Banksia woodland, coastal heath, *Eucalyptus rudis*/*Melaleuca preissiana* woodland..

FIRST RECORD: Hollywood Reserve, Nedlands, G.J. Keighery 16675 (PERTH).

OTHER RECORDS: Blue Gum Lake, K. Brown 505; Piney Lakes Reserve, Melville, G & B Keighery 1316, Pinnaroo Cemetery Bushland, G. Keighery 17313, Kings Park, G. Keighery 17104, Woodvale Nature Reserve, G. Keighery 17311 (PERTH).

NOTES: Keighery (1998) discussed how this species planted as an amenity species in the Naval Base on Garden Island was self seeding into disturbed bushland. The species is also considered a potentially serious bushland weed in Eastern Australia (Elliot and Jones, 1990). Appears to be spread into bushland by birds consuming the orange fleshy seed coat in garden or amenity plantings.

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WEEDS

weedy natives

may include *Homalanthus novoguineensis*, *Acacia celastrifolia* and *Calothamnus quadrifidus*, all of which are widely planted or used as revegetation.

Invasion process

Over 95% of the 71 native species recorded as weeds were deliberately introduced into bushland areas, or spread from adjoining plantings.

Unintentional spread

The other 5% of weedy native species arise from several causes, chiefly movement of soil along transport corridors or with roading materials, which have spread some lateritic hills species such as blue leschenaultia (*Lechenaultia biloba*) into Shenton Bushland, a coastal plain reserve.

Plants also respond to changed conditions and, like animals, spread into new areas when opportunity and habitats are presented. Vehicles are spreading native plants into new areas, for example speargrass (*Austrostipa tenuifolia*) has been introduced by vehicles into Woodvale Reserve during the past five years and is beginning to spread via mowing of the verges in late spring to reduce fire risk. It is probably also an introduction to Kings Park as it was not recorded in detailed surveys previously and is currently restricted to road and trail verges. The perennial form of bottlewashers (*Ptilotus polystachyus*) is a common weed of old paddocks and road verges. It has become more frequent in many reserves on the Swan Coastal Plain over the past 20 years. Like speargrass, this species is probably expanding its range into the higher rainfall areas of south western WA. It is dispersing naturally via wind, by grading and by vehicles. Tarweeds (*Boerhavia* species) are also spreading in a similar fashion from the arid zone into the wheatbelt.



In this Perth roadside planting, the northern sandplain lignotuberous form of *Banksia menziesii* has been planted next to the local tree form. There is obvious potential for hybridisation. Photo: G. Keighery

There are several tropical taxa with sporadic records from the Perth Region. These include *Glinus lotoides* (Molluginaceae), *Pseudoraphis spinescens* (Poaceae), *Ottelia ovalifolia* var. *chrysobasis* (Hydrocharitaceae) and *Epaltes australis* (Asteraceae). While some of these such as *Pseudoraphis* appear to have been recently introduced into Herdsman Lake Regional Park, there is no obvious method of introduction of the other three whose populations occur in natural bushland.

While it is important to document this spread, there is perhaps little point in actively opposing it, unlike the invasive natives which are adversely affecting bushland areas.

Genetic pollution

Weeds can threaten another level of biodiversity, genetic diversity, by mixing local and introduced gene pools. Although poorly documented there are already several examples of mixing of gene pools between local and non local forms (or even species). For example, tuart (*Eucalyptus gomphocephala*) seed produced by trees in Kings Park has many hybrid genes present, apparently

because of extensive crossing to many species planted in the Botanic Gardens and along the road verges. Marri (*Corymbia calophylla*) has hybridised extensively with red flowering gums (*C. ficifolia*) in Kings Park. This is the result of extensive plantings of red flowering gums as avenue trees during the 1920s for the centenary celebrations of Western Australia in 1929. Local and non-local forms of Geraldton wax have hybridised at Bold Park, potentially leading to the loss of the local form, the Wembley wax.

Future

Currently some horticulturalists and reserve managers are advocating using species from 'drier' regions for revegetation in the light of climate change predictions. However, many of the serious bushland weeds documented here are from 'wetter' regions than the areas they are affecting, suggesting that such moves are premature and could potentially cause serious weed problems in remnant bushland. We lack the ecological understanding of what limits the ranges of most of our native species to begin such potentially damaging and expensive experiments.

With increasing attempts to restore, rehabilitate and revegetate disturbed areas of WA, it is vital that we understand the natural distribution and ecology of our native flora. This enables the use of local provenance material that should minimise the actual and potential introduction of potentially damaging weedy taxa that can alter the local bushland habitats, fire regimes or even cause the loss of local forms through hybridisation.

Greg Keighery is a Principal Research Scientist at DEC's Woodvale Research Centre. Weeds are one of his research interests.

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FIVE YEARS CARING FOR WANDOO

Liz Manning

Background

Last October, a seminar on wandoo conservation, held in York and hosted by the Wandoo Recovery Group (WRG), attracted 100 delegates including community group leaders, land managers, scientists and researchers. It highlighted major achievements in research and mapping, shared information, and acknowledged the enormous contribution of local communities.

Wandoo (*Eucalyptus wandoo*) is a valuable woodland tree species of south-western Australia, and endemic to the region. It provides essential habitat for wildlife, a source of high-quality honey, yields first-class structural timber, plays a vital role in watershed protection and amenity and is a keystone species and indicator of ecosystem health. Unfortunately, since at least the 1980s, wandoo trees across their range have suffered deteriorating health, indicated by a decline in the tree crown. This has raised considerable concern.

The WRG was formed in 2003 to investigate the causes of decline in wandoo and coordinate appropriate strategies and actions. The WRG focuses on four priorities:

- research – to identify the causes of decline;
- mapping – to understand the extent, frequency and progression of decline;
- communication – through an ongoing public education programme; and
- building partnerships with stakeholders and interest groups.

Survey and mapping

To better understand when and where declines occur, WRG coordinates a Woodland Recovery Project, assisted by the Department of Environment and Conservation (DEC), WWF–Australia and a \$71,295 Lotterywest grant. The project includes an historical review of wandoo, community surveys to record and monitor wandoo health, and a public education program.

Historical review: Dr Andrea Gaynor from the University of WA (UWA) undertook this research to find out whether the current decline episode is historically unique or cyclical. It involved interviews with people who have lived and worked in wandoo country, together with photographic, archival and other historical literature. Two focus areas were chosen for the study: Kojonup and surrounds, and the areas north and east of Mundaring (including Julimar). A booklet *Wandoo in health and decline – a history* has been produced and

its findings strongly suggest wandoo decline has only emerged at significant levels since the 1980s.

Community surveys: Volunteers, TAFE colleges and conservation workers are helping the WRG assess the health of wandoo trees at sites across the south-west. Twenty-two sites have been established on private property, reserves and national parks between Chittering and Cranbrook. Results from the surveys give information on stand structure (number and density of trees), extent of recent branch death and current crown health at each site. Results indicate:

- there are no obvious geographical trends in crown decline across these sites, with healthy and unhealthy sites widely distributed;
- wandoo crowns can decline quickly when extensive flagging occurs;
- progression of decline and recovery is determined by flagging and epicormic growth;
- the intensity of flagging and vigor of the trees' response ultimately determines the strength of decline or recovery; and
- the three years of these surveys have shown relatively little change - gradual improvement, no change, or slow decline.

Review of wandoo decline across the wheatbelt and State forest

In 2002, a survey of wandoo decline created a snapshot of wandoo health across three broad transects covering 600 km (129 sites), spanning wandoo's east-west range. In 2008, a second survey was undertaken to examine factors thought to predispose trees to decline, and establish trends in wandoo health. While decline continues to occur, recovery is evident at some sites appearing strongest along the northern transect around York, decreasing along the central transect (near Wickpin) and the southern transect (around Cranbrook) respectively. The WRG coordinated the project with funding from Regional NRM Councils and DEC. WWF helped administer these funds.

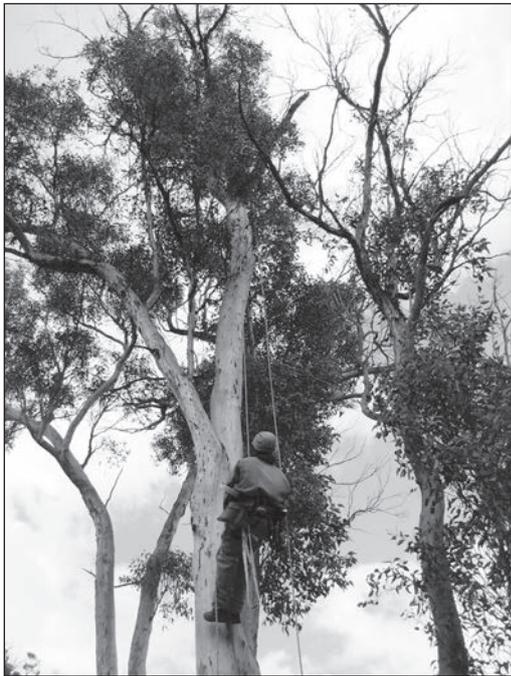
Research

Research through UWA and supported by DEC, is studying the relationships between climate, tree physiology and the insects and fungal pathogens thought to be contributing to wandoo decline.

Environmental studies have revealed important differences in how wandoo tolerates drought conditions compared to other eucalypts like jarrah and marri.

*continued from page 6***Wandoo decline**

Wandoo is able to extract large amounts of water from dry soils, but this produces enormous tensions in the sapwood, which can ultimately lead to hydraulic failure if soils dry out too much. UWA's Erik Veneklaas, Pieter Poot and visitor Fabiano Scarpa are investigating whether the tensions previously observed in the different species are likely to cause embolisms (air bubbles that render vessels useless for water transport) that would reduce the tree's ability to supply foliage with water.



Ryan Hooper installs monitoring equipment in a wandoo in the Helena Catchment. Photo: L. Manning

Insects and fungal studies undertaken by Ryan Hooper identified a wood-boring insect (Coleoptera: Buprestidae), as the primary contributing factor in dieback and decline of wandoo trees. Fungal pathogens isolated on dying branches were not particularly aggressive and are commonly found in eucalypt trees. Rather, it is thought activity of the insect and its high emergence rate during the recent severe decline in Talbot forest (in the 1990s) facilitated damage by these normally benign organisms. Active populations of the borer were evident in areas recently affected by decline. Understanding the balance between borer populations and tree response is a crucial factor in the decline and recovery cycle, which must be viewed in a time frame relevant to wandoo's life span. To aid in this understanding, Ryan is currently monitoring phenology (development of bud formation, flowering and seed set) and growth in the wandoo forest.

Future research into tree decline will be coordinated

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through the State Centre of Excellence; Woodland and Forest Health and embodied in four programs:

- climate change, woodland and forest declines;
- decline ecology;
- restoring biodiversity values ; and
- policies and action for woodland restoration.

Other WRG initiatives include an action plan to direct research, mapping and communications with an emphasis on public participation. News bulletins are widely circulated and stories about wandoo have appeared in DEC publications, rural papers and NRM newsletters. Information days and workshops have been held at Dandaragan, York, Wyalkatchem, Dryandra, Helena catchment, Cranbrook and Chittering. A public forum and science workshop hosted in 2005, and a woodland decline symposium in 2006, were strongly supported.

The WRG greatly appreciates the enormous interest and support by community groups, TAFE colleges, NRM councils, conservation workers, DEC, WWF and Lotterywest. Without this support many projects would not have been possible.

For more information and references contact WRG Executive Officer, Liz Manning on 0427 441 482 or email: lizmanning@bigpond.com.

Congratulations!

To the Botanic Gardens and Parks Authority and Rocla Quarry Products for winning a Golden Gecko Award, in recognition of their ground-breaking research that is finally unlocking the secret to restoring banksia woodland. (Golden Geckos are awarded to the mining and development industry for excellence in environmental management - and the competition is fierce.)

In 1995, Rocla Quarry Products engaged Kings Park with a research proposal to restore the original banksia woodland community after sand mining. The current compliance standard was the return of native vegetation. Thirteen years later, this partnership has achieved beyond compliance standards of rehabilitation and demonstrated excellence in banksia woodland restoration. The improved scientific understanding of banksia woodlands has applications right across the Swan Coastal Plain for the management of similarly cleared areas and urban woodlands.

Not only do we congratulate Kings Park on unravelling the science, but also Rocla for continuing to support that research after the legal minimum requirements had been met. Well done to all concerned!

For more information, visit www.bgpa.wa.gov.au

NEWS

MAWSON FIELD DAY

Mal Harper

The Mawson area is in the south-western corner of the Quairading Shire. It is noted for having a large area of remnant vegetation - significant in a shire which has only 3.6% remnant vegetation in total. The probable reason for the relatively large amount of bushland in the area is the fact that there are a lot of breakaways and deep white sand over gravel soils, which are agriculturally unproductive, as well as supporting populations of poison plants.

The Mawson area also has a significant number of small landholders and life-style blocks, some landholders living in the area and others visiting on most weekends. As many of them were city-based, it was thought the landholders may be interested in some assistance with the management of the bushland.

As a result, *Land for Wildlife* and WWF arranged a field day and walk at the end of September. It was held during a long weekend to cater for those who are absentee owners.

The format of the day was a series of short talks held in the Quairading hall after morning tea, followed by lunch and then a walk and talk through some excellent remnant vegetation on two private properties.



Brown mallet woodlands are a distinct community, unique to the central wheatbelt. Photo: M. Harper

The morning talks by LFW's Penny Hussey and Mal Harper covered the management of native vegetation and designing a revegetation programme. Helena Mills of WWF then spoke about the flora of the area and specifically the rare species found around Mawson.

Following these talks the crowd of about 40 people then proceeded to Mawson for a light lunch on one of the two properties to be visited, after which the bush walk began, led by Penny Hussey and Helena Mills. The Mawson area has had an excellent season and wildflowers were still blooming. The participants were able to pick up a wealth of information and spend a pleasant three hours on a lovely spring day walking through the bush. The insights provided by the two leaders were an inspiration to the crowd.

Major threats to remnants in the shire were pointed out, the worst of these being the threat of weed invasion and the presence of rabbits, foxes, feral and not so feral cats.

Even though the remnants in the Mawson area are relatively large and numerous compared to the rest of the shire they are generally too small to maintain populations of mammals previously present in the area. Revegetation and the provision of corridors, along with control of introduced weeds and feral animals, may give landholders the hope of being able to reintroduce some of these locally extinct species.



Dryandra (Banksia) ferruginea has large, golden-brown flowers. It grows on white sand over ironstone and forms a dense cushion-shaped shrub. Photo: P. Hussey



A beely on a painted featherflower, Verticordia picta. Photo: P. Hussey



Studying annuals on the sandplain. Photo: P. Hussey

NEWS

Not even the wet and windy conditions were going to stop Charlotte Powis from the Fitzgerald Biosphere Group getting a life-sized papier mâché emu into the Albany Show last October! This large creation by school children from Jerramungup and Ongerup was part of the *Land for Wildlife's* papier mâché competition. After a journey in the back of a ute with its head covered in a bucket and a big tarpaulin over its large body, the emu joined 50 other entries (none quite as big) to be judged on accuracy of size, proportion and colour.

The entries were all of a very high standard and ranged from the emu to a house spider, including local animals like the grey kangaroo, Gilberts potoroo, brush tailed possum, tiger snake, dugite,

JERRAMUNGUP'S 'OLD MAN EMU' MAKES IT TO THE SHOW!

Sylvia Leighton



'Old Man Emu' guarding his eggs at the Albany Agricultural Show. Photo: S. Leighton

turtle, racehorse goanna, butterfly, spotted thigh frog, numbat, splendid blue wren, scorpion, bobtail lizard, cockatoo and many other fabulous creations. They were all displayed in a bush setting in the 'Mountains to Coast' marquee and drew much attention from the crowd.

It is really inspiring to see all the effort the kids and teachers put into making their papier mâché animals. It is actually far more time consuming than most people imagine and takes a lot of patience to end up with a final result that looks the right size and shape as the real animal out in our local bush. We wished we could have awarded every entry a prize because they were all so fabulous!

Eleven prizes were awarded and 'Old Man Emu' won a special prize for being the 'Best Community Group Creation'.

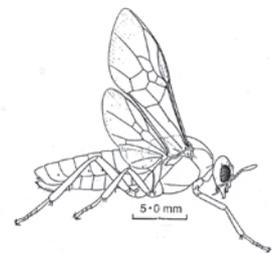
Bush detective

What are these ugly things?



Jenny Sandor of Busselton sent in this pic, with the question, "Are these a pest? The eucalypt tree they were on has had most of its new leaves eaten right down. The larvae are bristly, and are greenish-black with shiny black heads. When disturbed they wave their abdomens in the air and exude a bright yellow liquid from their mouths."

They are spitfires, the larvae of a sawfly, *Perga* sp., which is in Hymenoptera, the bee, ant and wasp family, and they are trying to look as repulsive as possible to deter predators. The foul yellow gunge is concentrated eucalyptus oils from the leaves they eat, stored until needed. At night they spread out over the tree, eating the younger leaves first. They keep in touch with one another by tapping their abdomens on the branch in a sort of Morse code, reforming into a defensive huddle during the day. If in large numbers they can easily defoliate trees. When mature, they follow each other down to the ground and pupate in leaf litter. The female's ovipositor is serrated, and she saws a



cut into a leaf in order to deposit an egg – hence the name sawfly.

There is a delightful and informative description of spitfires in Vincent Serventy's *Dryandra: the story of an Australian forest* on pp 128-130.

(They can't really be called a 'pest', although they can do serious damage to trees. They are native, but I personally find them quite disgusting! If they occur on a tree around the house, I hose them off with a high-pressure spray, thus dispersing the group. Biodiversity isn't always cute and cuddly, is it? – Ed.)

SUSTAINABILITY

YOUR CARBON FOOTPRINT => MEASURE => POLICY => REDUCE => SWITCH => OFF-SET => COMMUNICATE =>

Fleur Crowe

The International Panel on Climate Change (IPCC) report, *Summary for Policy Makers* (2007) described the average global warming over the past few decades as unequivocal; further stating global greenhouse gas (GHG) emissions must peak by 2015 at 450 parts per million (ppm) to limit average global warming to a rise of only 2°C. Currently the GHG are around 430 ppm and rising. Sir David King, in his book *The Hot Topic*, felt that this target looks increasingly out of range, whereas 450 – 550 ppm with its associated rise of between 2-5°C seems more likely, referring to this consequence as alarming.

In the south-west of WA, a 2°C increase in temperature and our current 25% reduction in rainfall will result in the likely loss of 66% of *Dryandra* and a large number of *Acacia* species. Furthermore, a shift in climate belts associated with rising temperatures will cause a shift in budburst, shorter growing seasons, earlier harvest dates, lower crop quality and changes in soil temperatures. The northern wheatbelt is likely to lose much economic viability while the south will be dramatically reduced - this in an industry worth more than \$2 billion. Changes in the climate belts will result in an increase in weed species across all of WA, for example gamba grass is just starting to make its presence known in the Kimberley.

As a *Land for Wildlifer* what can you do about this?

MEASURE – understand where your emissions come from

Sadly 50% of Australia's emissions of CO₂ come from our past choice with respect to energy production options, namely coal, natural gas and oil. Sir David King refers to these as the three wicked witches of the climate change story. During the past 15 years, residential energy consumption per capita has increased by 15% (e.g. dishwashers, air conditioners, computers, televisions). You may think you're paying more per unit with every bi-monthly bill, but across WA, energy tariffs per unit have not increased in over 15 years - you're simply using more. Average daily electricity use of 21 kWhrs a day (21 units) for regional homes, equates to around 8,400 litres



A domestic solar power array. Ph: F. Crowe

or 42 drums of CO₂ each day!

Belching by cows (methane) and other agricultural land uses account for a further 22% of Australia's emissions. While suggesting Australians should become vegetarian is fraught with opposition, it is necessary to understand that your individual level of red meat consumption is a part of the problem. Methane as a GHG is 20 times more

harmful in its ability to warm the atmosphere, but has a plus side that it is the shortest lived of the GHGs. Therefore immediate reduction in cattle production would have a significant reduction in Australia's GHG emissions. Recent CSIRO research indicated removal of Victoria's cattle industry could reduce that State's emissions by one third by 2020.

In dread of alienating readers even further I'll raise the issue of your choice of vehicle! Transportation accounts for 14% of total emissions and it simply makes no sense to own or run a vehicle with efficiency above 7 litres/100 km, be that a diesel, gas or petrol vehicle. Whether or not you support the science of climate change, fuel costs dictate a significant personal financial benefit from selecting a more energy-efficient vehicle. In Australia the average vehicle trip is less than 5 km, and many of these trips could easily be replaced by the use of a bicycle or walking.

You can choose to measure your carbon footprint at www.acfonline.org.au/consumptionatlas. or

www.acfonline.org.au/ecocalculator.

POLICY – commit to not emit

As individuals we need to commit to our own personal reduction targets, along with business and government. McKinsey Consulting proved a significant reduction in Australian GHG emissions (of 30 % below 1990 levels by 2020 and 60 % by 2030) is achievable without major technological breakthroughs or lifestyle changes. Reducing emissions is affordable, with an average annual gross cost of approximately A\$290 per household... about the cost of a latte per week.

You can make your commitment to not emit at

www.whoonearthcares.com

continued from page 10

Your carbon footprint

SUSTAINABILITY

REDUCE – your emissions

There are many simple and small steps you can do to make a change. To give you an idea I've listed a few below:

- Switch to compact fluorescent or LED lighting. And if not using the room turn the lights off.
- Turn all your appliances off standby power, e.g. computer and television. The average large TV uses \$200 per year of energy in standby, if you have a plasma screen it's even more. If you must have a big TV, buy LCD as this unit uses less energy.
- Buy electrical appliances that use the least amount of energy in comparison to their size. Consider a chest fridge over an upright. As we all remember from school warm air rises and cold air falls... or in the case of an upright fridge the cold air falls out whenever you open the door and you need to use more energy to replace this loss.
- Turn the bar fridge off and only use when you have a party.
- Install a solar or heat pump hot-water system to replace your fossil fuel (electricity or gas) unit.
- Insulate your home, seal drafts, use blinds and curtains for insulation and consider double glazing windows.
- If building, face your house north on an east/west axis to maximise solar design. You will need to include thermal mass to assist with winter warming and a solar pergola for summer cooling.
- Consider installing a solar power system to assist in running your pool or if you don't have one, your household. But only do this after you ensure your hot-water system is not from a fossil fuel source.
- Convert your current vehicle to LPG. Lower emissions and lower price per litre, plus the government currently provides a \$3,000 rebate to convert your domestic vehicle.
- Use a bicycle for short trips. These days, bikes are very comfortable and you can get a version that folds. Folding bikes are allowed on trains at any time of day and if in a bike bag you can take them on a bus.
- Consider a laptop over a desktop computer. But as a minimum, ensure you have a LCD flat screen and you turn the computer off when it's not in use.
- Eat one less red meat meal a week. Better still, eat roo! Kangaroos don't fart, so no methane.
- Upgrade your airconditioning to the most efficient and if you're not home – turn it off! Keep doors closed to keep the cool air in. A higher setting uses less energy.
- Avoid flying. A single engine on a Boeing 747 during takeoff is equal to running a 20MW power station.
- Upgrade your vehicle to an energy efficient type of less than seven litres per 100 kms. And why not consider

car pooling?

- Limit your consumption of 'stuff'. Everything we do and consume produces emissions.

To learn more visit

www.acfonline.org.au/greenhome

SWITCH – to 100% GreenPower

Western Australia has abundant opportunities for renewable energy, such as wind, solar photovoltaic, solar-thermal, geothermal or wave, with the last three options infinitely capable of providing base load energy (24/7). Choosing to buy 100% of your energy from an accredited GreenPower scheme ensures your electricity dollar is invested in renewable energy projects.

To switch visit www.greenelectricitywatch.org.au

OFFSET - the rest and go carbon neutral

What you can't reduce or switch can be offset by purchasing carbon offsets from accredited providers. Generally these providers will plant trees on your behalf to offset the carbon you have consumed. You can calculate your personal carbon footprint for your home, office, vehicle and flights and pay to the provider an amount in trees to offset your carbon impact annually.

Offset here www.acfonline.org.au/carbonneutral

COMMUNICATE – spread the word

We all need to communicate these messages to all Australians. To get your community involved you can request an Al Gore Climate Project presentation at www.acfonline.org.au/requestpresenter. Consider joining your local Climate Action Group or starting your own. For tips visit www.acfonline.org.au/communityclimatekit.

We must urge our leaders to pass legislation and our organisations and individuals to voluntarily adopt actions that will reduce our global emissions and increase the use of renewable energy. Demand management technology and energy efficiency appliances.

As David Suzuki said: "If you don't take your car to work for one day it's a drop in the bucket. But if 400,000 people leave their car at home for one day a week, that's huge. You as an insignificant person are part of a much bigger movement."

Why this work is important to me, is succinctly stated in the words of Professor Ian Lowe: "A sustainable future is clearly a better future. Working for it is our moral duty to the countless millions of other species that we share this planet with ... and the future generations for whom we hold it in trust." (Reference list available – Ed.)

Fleur Crowe is a Volunteer Al Gore Climate Project Leader, Land for Wildlife and Sustainable Development Coordinator, Horizon Power.

FERAL FAUNA

HAVE YOU SEEN AN INDIAN PALM SQUIRREL?

When I first arrived in Western Australia in 1970, I lived in a flat on Mill Point Road, and was delighted to see pretty little Indian palm squirrels froliccing in the grounds. They were released in the Perth Zoo in the 1900s, and have spread gradually through the leafier Perth suburbs. People (like me!) tolerated them as they are very attractive and did not seem to be causing any problems.

But attitudes have changed and DAFWA is trying to locate feral populations before they become yet another introduced pest rodent species. They are spreading out into the peri-urban surroundings of the metropolitan area, having been found in Wanneroo, Forrestdale



Photo: DAFWA

and Kelmscott, and one was recently captured at Canning Vale.

Indian palm squirrels can cause damage to houses and electrical wiring, damage fruit and vegetable crops and eat birds' eggs. They are about the size of a rat, brownish with a bushy black tail and five white stripes on the back. They move quickly and are excellent climbers.

For more information, look for the Pestnote 'Indian palm squirrel' on www.agric.wa.gov.au. Please report sightings to DAFWA on:

freecall 1800 084 881.

Penny Hussey

INVADING CANE TOADS CAUSE MASS FRESHWATER CROCODILE DEATHS ON THE VICTORIA RIVER, NT

Cane toads (*Bufo marinus*) produce a virulent toxin, and you will have heard it said that eating them causes the death of the predator, but there have been few detailed studies to investigate this. Mike Letnic and colleagues from the University of Sydney recorded the effects of the advancing 'toad front' on freshwater crocodiles (*Crocodylus johnsoni*) along the Victoria River in the Northern Territory*.

In this arid area, animals that depend on permanent water at all times (such as cane toads and freshwater crocodiles), would be restricted to the river course during the dry season. Freshwater crocodiles are the top predator in these waters. They are long-lived, and carcasses are very seldom found. However, once cane toads invaded the Northern Territory in 2000-2001, tourist operators and others reported seeing large numbers of dead crocodiles in the upper reaches of rivers draining into the Gulf of Carpentaria.

The research team decided to investigate what happened along the Victoria River upstream of Katherine. They surveyed four permanent pools on the river where

both toads and crocodiles would have to congregate during the dry season, firstly before the toads invaded, then again afterwards.

They documented massive mortality of freshwater crocodiles at the toad invasion front. Population densities plummeted by as much as 77% following toad invasion, and population size-structure changed, as it was mainly the intermediate-sized animals that died. This change could have a dramatic effect on the whole ecosystem; herbivore numbers will increase; the numbers of smaller predators will increase due to the absence of competition or predation by larger carnivores, and the plant community will alter due to changed pressures from herbivores.

A big effect from a small creature.

* Letnic, M., Webb J.K., and R, Shine. 2008. Invasive cane toads (*Bufo marinus*) cause mass mortality of freshwater crocodiles (*Crocodylus johnsoni*) in tropical Australia. *Biological Conservation*. **141**: 1773-1782.

News

GREAT TIPS ON BEAUTIFUL PLANTS

For some, bushland management is on a grand scale, for others the work is in the detail.



Barbara Abbot explains how to take a cutting, while Peter Lightfoot looks on.
Photo: A. Baxter

At the request of some *Land for Wildlife* members in the Wheatbelt Region, a very successful training day was held on propagating bushland plants. Barbara Abbott, a *LFW* member from Brookton, has devoted her life to preserving some of the special plants in the area. Barbara's background is in propagating plants

from cuttings and after moving to Brookton, she obtained permission from the Shire to take cuttings from attractive flowering plants that were about to disappear under the grader at the rubbish tip! She shared her experiences in what makes a good cutting and when to take cuttings for different plant species.

Of course the law dictates where and how plant material can be taken and sold and DEC's Great Southern District Wildlife Officer, Cameron Craigie, detailed this process.

The training day was held on Shirley and Jim Wells' property at Moorumbine, east of Pingelly. The Wells bought their six hectare property in 1998 with the intention of creating a seed production area for local plants. 10 years later they are now picking local seed from the revegetation and have reached Shirley's goal of creating habitat for blue wrens!

Peter White, DEC's Wheatbelt Region Nature Conservation Advisory Officer, used this setting to talk on seed collection. Participants learnt about the importance of identifying plant species, which plants to collect from within the general population, determining the collection time, collection techniques, seed extraction and cleaning, storage and general hygiene and safety issues.

For *LFW*, success comes when inspiration leads to informed action.

Avril Baxter

In Brief

City of Albany passes domestic cat control by-laws

In November 2008, the City of Albany Council voted to support new domestic cat management laws within its jurisdiction. Cats will have to be sterilised unless owned by a registered breeder, microchipped and registered with the City Council. If an unregistered cat ends up in the pound, there will be a \$100 fine to retrieve it.

Acid sulphate soils, heavy metals and the food chain

A recent review paper on the environmental risks of metals mobilised from acid sulphate soils in Finland* raises some concerns. It reports that heavy metals, e.g. aluminium, can accumulate in milk, where dairy cattle are pastured on acid sulphate soils. The aluminium also accumulates in wells and streams draining these soils. High aluminium levels (usually in drinking water) have been strongly correlated with the incidence of Alzheimer's disease in humans. Everyone is probably aware that much of the wetter Swan Coastal Plain is underlain by potential acid sulphate soils, including areas drained to produce pasture for dairy cattle, and also the site of many housing estates especially those based around canals. More research is needed on this in WA.

(*For ref, contact Ed.)

New dieback signage

WA's Project Dieback team, with the State Dieback Consultative Council, Dieback Working Group and DEC have developed a unified dieback signage system. The key symbol is a stylised *Banksia grandis* leaf. Encourage your local government authority to install signs! To find out more visit www.dieback.org.au.

NT puts controls on gamba grass

The Northern Territory Government has banned the sale and planting of gamba grass, one of Northern Australia's most destructive invasive grasses (see WW 12/2). This should limit the deliberate spread of this major weed.

Half Australia's plants now from overseas

A new list, compiled by DAFWA's Rod Randall, shows that the number of plant species now growing in Australia has more than doubled since European settlement in the 1790s, and thousands of them are just 'weeds in waiting' say weed researchers. Gardeners and plant retailers will be able to use the *Introduced flora of Australia and its weed status* to see immediately whether a plant is known to be weedy outside its native range, and can then choose to avoid planting or selling it.

NEWS

BUSHLAND MANAGEMENT WITH FRIENDS, YORK AND BINDOON

Two *LFW* coffee mornings were held in the Perth area recently, one in September hosted by Jan and Keith Schekkerman at York and the other at Bindoon in October, hosted by Wendy Russell.

The Schekkermans' 32 ha block contains approximately 20 ha of bushland and has several different land formations and habitats ranging from sandy sheoak to granite outcrop and wandoo woodland. While refreshments were being enjoyed, Keith and Jan discussed their property and how they hoped it would eventually develop. Penny Hussey gave a fascinating recount of the geological history of the area, leading to the landforms that we see today. A most enjoyable ramble was undertaken through a variety of vegetation types and landforms, with nearly 150 plants being noted in flower. Of particular interest was the granite outcrop which was in excellent condition, where we were delighted to find a colony of elbow orchids. As we walked, participants exchanged ideas and suggestions, based on their own experiences.



Orchid spotting on a granite sward.
Photo: P. Hussey

Wendy Russell's property, just south of Bindoon, has mixed woodland of marri, jarrah and wandoo and is enjoyed by a wide range of native fauna. Some of the *LFW* participants were particularly interested in the problem with

dieback and its successful treatment. Wendy and her neighbours, Rhonda and Graeme Vincent, had liaised with the Chittering Landcare Group and performed a staggering 3,000 stem injections on vulnerable jarrah trees. Wendy commented that she never knew that she had so many jarrahs on her property until she had had to stem inject them! It was very pleasing to report at the end of the walk that the jarrahs on their properties were looking much healthier than on the first *LFW* visit in November 2001.



Studying the symptoms of marri canker.
Photo: C. Hall

LFW coffee mornings provide an excellent opportunity for participants to get together and meet like-minded people in a relaxed and informal atmosphere. Judging by the comments made, both events were much enjoyed, and *LFW* looks forward to facilitating further coffee mornings in the future.

If you would like to host a *LFW* coffee morning, with refreshments and organisation provided by *LFW*, please contact:

Zara Kivell (Hills and Avon Valley) ph 9295 9100 or

Heather Adamson (Coastal Plain) ph 9582 9333

Zara Kivell

Members' Page

THE JOY OF REVEGETATION

Shirley Wells

Was someone playing a trick on me? If I closed my eyes and then opened them quickly, would it still be there? Will it be gone in the morning? How did it get there? This amazing 'thing' just arrived out of nowhere!

All around us is agricultural land that, along with our little bit of land, has been worked as such for over 150 years. Added to which it was severely burnt in a bushfire. We have been here for nearly 11 years since that bushfire busily seeding and planting natives, weeding, worrying, observing and enjoying. Earlier this year we noticed blue wrens in residence and felt a great sense of accomplishment. But now this totally unexpected exciting find!

I was pruning and weeding under a eucalypt in the garden just opposite our front door and there was this little miracle - a leaf and two flowers on a slender stalk - a cowslip orchid. Did I weed out others? Did I tread on any others? As far as I could tell I hadn't done either but the question still lingers.

Andrew Brown comments:

Following pollination, Western Australian orchids produce thousands of fine, dust-like seeds that can be disbursed over a wide area by prevailing winds. If some of this seed lands in an area that contains the right mycorrhizal fungus it is able to germinate and grow into a new plant. This way, some of our common species are able to re-invade areas that have been long-cleared. The prerequisite is that these areas contain some natural vegetation or are being actively revegetated and remain relatively undisturbed. Well done Shirley! A significant milestone!

NEWS

VINCENT SERVENTY - AN INSPIRATION TO MANY

Avril Baxter

Those who love Dryandra Woodland will be familiar with Vincent Serventy's book *Dryandra: the story of an Australian forest** which documents a year in the life of this special place. Not so many will be aware that on reading this book, Australian media tycoon Rupert Murdoch, whose company owned the bushland and planned to mine it for bauxite, instructed his company to relinquish any mining claims, leaving one of the jewels in the Wheatbelt's Biodiversity Crown.

It was therefore fitting that in October last year members of the Serventy family, representatives of the local Nyoongar community, the Conservation Commission, DEC and Murdoch University staff, members of the WA Naturalists' Club, Bush Rangers from Northam District High School and interested locals and others gathered at Dryandra Woodland to unveil a tribute to his life.

Dr Vincent Serventy (1916 – 2007) was born in Armadale WA and graduated from the University of Western Australia. In his first career as a teacher he succeeded in installing the wonder of nature in many a school child. Taking time off from teaching to research, travel and write, he soon became a well-known naturalist and author, producing television documentaries and more than 70 books and publications.

Vin fought for the conservation of many areas including the Great Barrier Reef, Tasmania's south-west forests, the Shark Bay region and, closer to home, was involved with Kings Park, the Swan River, Ellenbrook freshwater turtle refuge and Star Swamp.

He was also deeply involved



The totem pole symbolising inspiration from nature. Photo: A. Baxter.

with many organisations such as the Wildlife Preservation Society of Australia, WA Naturalists' Club, Gould League, National Trust (WA) and the Tree Society. He worked tirelessly in executive positions and as a speaker to spread the message that natural bushland is precious, and we must look after it. He also served on the first Australian Heritage Commission and other

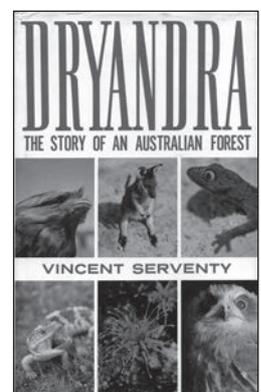
government advisory bodies.

Vin's words for December in Dryandra are a fitting finale:

"The forest settles into its long summer sleep. The bustle of spring-time is over. Like any period of sleep, there will be those for whom the period of quiet is a period of opportunity, but for most the year is finished. Many animals must still keep searching for food. Here and there in the forest, both those too old and too young have paid the price of waning skill or lack of it. Nature begins to weed out the new crop, selecting the differences which are advantageous, wiping out the differences which harm the race. There are minor catastrophes. A falling tree limb kills fit and unfit alike. A grey kangaroo loping through the forest may stamp on a promising colony of ants, destroying it before it can show its potential. Yet these are only ripples on the slow ground swell of evolution, as life moves on to its hidden destinies." *

**Dryandra: the story of an Australian forest*. Vincent Serventy. AH and AW Reed 1970

I met Vin through the WA Naturalists' Club where he impressed me with his deep understanding of 'natural history', that complex inter-relationship of living things and their environment that shapes the world we live in. He wasn't just concerned with the names of things, or statistically analysable numbers – though he understood these aspects as well – but rather was fascinated with the minutiae of living within the functioning whole. He believed, too, in communicating knowledge, so that, as people came to understand the bushland and its inhabitants, they would love it more and manage it better. Hence the book *Dryandra: the story of an Australian forest* to showcase a very special place. The book was instrumental in helping me – an incomer from the Northern Hemisphere – to appreciate how unique the rhythms of life in Australia are. I am sure that thousands of other people will also thank Vin for helping them develop their understanding of this complex land. – Penny Hussey



Where on the Coast is That?

Ian Murray with Marion Hercock

Hesperian Press, Perth 2008

\$45.00 obtainable from publisher: books@hesperianpress.com

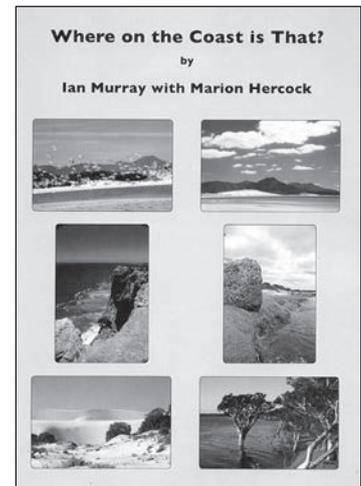
Have you ever wondered how a particular place got its name? For example who was Burrup, of Burrup Peninsula, and who named Sugarloaf Rock at Yallingup? If you like interesting historical snippets, you will enjoy the new book *Where on the Coast is That?*

Western Australia's position at the eastern margin of the Indian Ocean has resulted in its coastal features having an uniquely rich legacy of Indonesian, Dutch, French and British place names in addition to the Aboriginal names. This book summarises the where, what and why of 3,890 named geographical features on our WA coastline. In addition to capes and bays, rivers, creeks, headlands and beaches, the features listed in the book include nearby offshore reefs, shoals and islands, as well as the islands in the state's major rivers and lakes.

This is not a picture book – it is a reference book for all travellers who, sometime or other, visit the coast for work or recreation and want to know the stories associated with named features. It gives those features character and history and will give all who read it a greater understanding of WA's history and geography.

Penny Hussey

NEW BOOKS

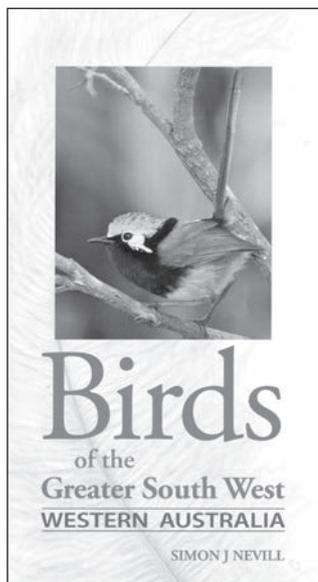


Birds of the Greater South West

Simon J. Nevill

Simon Nevill Publications, Perth. 2008

\$34.95 obtainable from good booksellers



Is your bird field guide too heavy or too awkward to carry into the field? Does it have birds from all of Australia, so that when you look at the illustrations, something you are sure you just saw in the karri forest turns out to only occur in northern Queensland? You need *The Birds of the Greater South West!* This book is sized to fit into a glove-box or the side pocket of a backpack and covers the area south and west of Carnarvon to

Kalgoorlie and the Esperance region.

This new field guide uses photographs to illustrate the birds, rather than the paintings used in most such books. And what photos they are – clear, distinct, large enough to see clearly and with the bird in a typical pose. The descriptive text is a little more detailed than found in most field guides and includes some local detail and a distribution map. The introductory chapters include information on ecosystems and tips

for birding, including good sites for visiting.

The author has watched birds for 40 years – for 20 of them leading specialist birding tours – and has drawn on that fund of knowledge and experience to write this book. Whether you are an experienced birdwatcher or just a person who likes our feathered friends, you will find that this book is a pleasure to read and enjoy.

Penny Hussey

Coming Events

Wonderful Wongan Hills Bushland Field Day

planned for March/April – details will be put on the 'Coming Events' section on the LFW Website.

Alternatively, contact Fiona Falconer on fiona.falconer@dec.wa.gov.au

World Conference on Ecological Restoration: making change in a changing world

Perth, 23 – 27 August 2009

For further information, see: <http://www.seri2009.com.au/>

State NRM Conference 'Changing Environments: new challenges for a living country'

Geraldton, 27 - 31 October 2009

Contact: ctc@nacc.com.au

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

Published by the Department of Environment and Conservation, Perth.

All correspondence should be addressed to: The Editor 'Western Wildlife', Department of Environment and Conservation, Species and Communities Branch, Locked Bag 104, Bentley Delivery Centre, WA 6983.