Department of Environment and Conservation

Western Wildlife

July 2006
Vol. 10, Number 3

NEWSLETTER OF THE LAND FOR WILDLIFE SCHEME

REGISTERED BY AUSTRALIA POST PRINT POST: 606811/00007

QUOKKA HABITAT MANAGEMENT AND FIRE IN THE SOUTH-WEST

Marika Maxwell

The quokka is a very elusive creature so it is no wonder that so many people believe that they are only found on Rottnest Island. In truth the quokka has always been on the mainland but its nocturnal behaviour and habitat preferences mean that is it rarely seen. The quokka (*Setonix brachyurus*) has a rounded body with grey-brown fur and a relatively short and almost hairless tail with rings similar to that of rats. They have small rounded ears and a wide face. The adult head-body length can reach up to 55cm. Adult females range from 1.6-3.3kg and males 2.5-4.5kg.

The species is declared threatened under the WA Wildlife Conservation Act because it has declined in numbers and extent.

On the mainland quokkas once occurred along the coast and adjacent high-rainfall forested areas from Jurien Bay to 50km east of Albany. Now they are mainly restricted to higher rainfall areas of the south-west. Isolated populations exist on the Darling Plateau to the east of Perth, south through the jarrah and karri forests and along the coast to Two Peoples Bay. There is also a population in the Stirling Range.

Quokka populations are more at threat to the north of their geographical extent than in the southern areas. In the north quokkas are found in smaller isolated populations in suitable habitat, while in the higher rainfall areas they are not confined to gully systems or swamps. For example, within the Nannup / Bridgetown area, quokkas are often sighted away from the creek lines because they can move around relatively protected from predators under the dense understorey of species such as *Bossiaea aquifolium* (water bush) that extends throughout the forest.

The distribution and conservation of the quokka was recently reviewed by one of the Department of Environment and Conservation's predecessors, CALM, and the quokka was shown to have suffered a decline in geographic range in the 1930s. Predation by the fox was identified as a major cause of the initial decline, while ongoing predation, habitat destruction and modification through altered fire regimes have contributed to their continued decline. It is considered that predator control alone is insufficient to ensure the long-term conservation of the quokka - there is a requirement for habitat management as well.

The quokka is habitat specific, occurring in densely vegetated creek lines over much of its range. The dense vegetation provides overhead cover from aerial predators and impenetrable dense ground cover protection from ground predators such as foxes and cats. Generally quokkas remain hidden during the day and at night venture out to more open areas to forage, however they tend not to travel across cleared areas, such as paddocks. Quokkas have a varied diet but a PhD study of quokkas in the northern jarrah forest found that *Dampiera* and *Thomasia* shrubs compose a large part of their diet.

A quick and quite reliable method for determining

continued on page 4

EDITORIAL

Greetings all!

You will have seen in the news that the Department of Conservation and Land Management (CALM) and the Department of the Environment (DOE) are merging to form the Department of Environment and Conservation (DEC). This formally happens on the 1st July 2006. As yet we do not know how this will affect *Land for Wildlife* but no changes are envisaged. You will notice that the new name and acronym is being used throughout this magazine.

There are a number of staff movements to report:

We are delighted to say that Wayne Gill will soon be starting as *LFWO* in Esperance. Originally from the local area, he has recently returned from Tasmania where he was working in their tall wet forest ecosystems. If you are in the Esperance or Ravensthorpe area, you might like to give him a ring to say hello.

Teagan Smith who, for the last year, has been working with landholders in the Metro area, has left to take up work with 'Western Shield'. She was a great person to work with, and we wish her well in her future career.

Avril Baxter will be on long-service leave for most of the rest of the year, visiting lots of exciting places overseas. Leon Sylvester (whom some of you may know from when he was a CALM Wildlife Officer) will be filling in for her, but the *LFW* Narrogin contact phone number and email will remain the same. Give Leon a ring to say Hi!

(Nb: In the last issue I mentioned that Heather Adamson was moving to Mandurah because of her childrens' educational needs – please note that this referred to Tertiary education.)

It is getting closer to our tenth birthday in Feb. 2007 - remember to check our website for tenth anniversary events near you.

Penny Hussey

INDEX

LFW staff at the workshop in May 2006
Back row, L-R: Julia, Teagan, Sylvia, Mal, Avril, Fiona, Penny
Front row, L-R: Claire, Zara, Cherie, Heather, Kathleen

Contact details for *Land for Wildlife* Officers

Name	Location	Phone	Email
Heather Adamson	Mandurah	(08) 9582 9333	heathera@calm.wa.gov.au
Avril Baxter	Narrogin	(08) 9881 9218	avrilb@calm.wa.gov.au
Julia Boniface	Nannup	(08) 9756 1465	juliab@calm.wa.gov.au
Fiona Falconer	Coorow	(08) 9952 1074	fionafa@calm.wa.gov.au
Wayne Gill	Esperance	(08) 9083 2100	to be arranged
Claire Hall	Perth	(08) 9334 0427	claireh@calm.wa.gov.au
Mal Harper	Merredin	(08) 9041 2488	malh@calm.wa.gov.au
Penny Hussey	Perth	(08) 9334 0530	pennyh@calm.wa.gov.au
Cherie Kemp	Busselton	(08) 9752 5533	cheriek@calm.wa.gov.au
Zara Kivell	Mundaring	(08) 9295 1955	zarak@calm.wa.gov.au
Sylvia Leighton	Albany	(08) 9842 4500	sylvial@calm.wa.gov.au
Kathleen O'Brien	Katanning	(08) 9821 1296	kathleeno@calm.wa.gov.au

FAUNA

POTOROOS ON BALD ISLAND

Tony Friend

Bald Island from Mt Gardner.

Since the early 1900s Gilbert's Potoroo (*Potorous gilbertii)* was thought to be extinct, apparently just one more of the small marsupials that had disappeared since European settlement. There was great excitement in 1994 when it was rediscovered during a survey at Mt Gardner in Two Peoples Bay Nature Reserve, near Albany. But still it is one of the most critically endangered mammals in Australia, as the total population of the species is only 40 animals.

As with several other rare fauna species still hanging on at Two Peoples Bay, it appears that long-unburnt vegetation provides important habitat, perhaps because a large part of the potoroo's diet consists of the underground truffle fungi that are associated with established native plants (see WW 2/2), so they are very vulnerable to wildfire.

To increase the security of the species, the decision was made to try to found another colony on an island. Bald Island Nature Reserve was chosen because of its climate and suitable habitat – and also because it is free of foxes and cats.

Three Gilbert's potoroos, two males and one female, were released on the island in August 2005. They established home ranges quickly and by early October 2005, all had put on weight. Another female was transferred to the island in December and, days after her release, was found to have given birth to a young female, despite the disruption of being transported to the island. A recent monitoring visit recorded more success. Not only were all the animals from the first release alive and well, but the female had produced the first island born and bred young, a male almost ready to leave the pouch!

Gilbert's Potoroo's chances of long-term survival are now looking more hopeful.

Tony Friend is Principal Research Scientist based at DEC, Albany.

Mother and son.

continued from page 1

FAUNA

Quokka habitat and fire

presence of quokkas is through the identification of characteristic runnels (tunnels used by quokkas through thick and dense understorey vegetation along creek lines), combined with the presence of quokka droppings (scats) within the runnel. Tracks can also be used as a sign of quokka presence and this is an ideal observation method in sandy substrates and after rain. These observations allow for activity levels to be inferred based on the freshness and number of runnels and the quantity of scats in the area. (Fig 1)

Fig 1: a quokka runnel under sedges

Other animals create tunnels through dense riparian vegetation including quenda, rabbits and feral pigs. The latter are a significant threat to the quokka. They create large tunnels, often opening up and destroying quokka runnels when present. They also cause extensive digging and uprooting of plants, destroying or significantly modifying the habitat. They are also known to eat small animals if they get a chance.

Quokka survey by monitoring runnels has been adopted as a suitable technique by the agency and a rapid broad scale survey was recently conducted over the entire southern forest. It recorded the presence / absence of quokka, dominant associated plant species, vegetation condition and disturbance factors such as feral pig damage. In my area, from Leeuwin-Naturaliste National Park to Bridgetown, over 650 sites within creek lines have been inspected and about a quarter have shown signs of quokkas.

Within this area quokkas are mostly found within ti-tree dominated creeks and swamps. The most commonly recorded species include an overstorey of *Eucalyptus megacarpa* (bullich), *E. patens* (blackbutt) over *Taxandria linearifolia* (swamp peppermint) and other ti-tree sp. including *Astartea* sp., as well as *Acacia divergens*, *Mirbelia dilatata* (holly-leaved mirbelia) and *Hakea lasianthoides*, over sedges such as *Lepidosperma tetraquetrum* and *Gahnia decomposita*, as well as other small shrubs including *Hypocalymma cordifolium* and *Thomasia* sp. Sites are often surrounded by an understorey of *Taxandria parviceps* and / or water bush. This survey has provided the agency with very valuable information on the distribution of quokkas, location of high priority areas, habitat requirements and threatening processes and has allowed management of the species on a larger scale.

The quokka is also fire regime specific. Inappropriate fire regimes are a threat to the species as wildfires can cause local extinction, while long unburnt – or, conversely, too frequently burnt – creek lines result in unsuitable habitat conditions. A quokka's habitat must contain vegetation that provides refuge from predators as well as adequate food. The structure of the habitat, not necessarily its age, is the key factor in maintaining quokkas within a site. Structure within the creek line or swamp varies with the dominant flora species present and this is different over the quokkas' range. Once an area becomes very old much of the understorey collapses and protection from predators is not provided and the creek becomes unsuitable for quokka inhabitation. A specific mosaic of mature vegetation (for daytime refuge) and recently burnt vegetation (for food) appears to provide optimal habitat.

Interim guidelines for quokka management in regards to fire have been developed by the agency, based on the best scientific knowledge available to date and operational requirements. The management recommendations aim to use fire as a tool to create and maintain a mosaic of specific fuel ages and to ensure suitable habitat is available for dispersing quokkas. A landscape approach has been applied to ensure patches of suitable habitat are within the quokkas' dispersal range and interpatch distances are short. At the most simplified this is achieved by protecting known quokka populations and 'healthy' suitable quokka habitat from fire whilst regenerating unsuitable (senescing) and unoccupied quokka habitat.

In addition, the agency has adopted the concept of adaptive management with its fire operations for quokka management, that is, the results are monitored and future actions will be adapted based on operational outcomes.

These adaptive management guidelines have been implemented in this area over the last two years for a number of prescribed burns where quokkas or potential quokka habitat have been identified. The broad scale survey results provided the baseline information and more extensive survey work identified areas to be excluded from fire where quokka activity was high and vegetation structure suitable. Strategies adopted to protect creek lines involved utilising existing roads as physical barriers, or using the moist conditions within creek lines to prevent riparian vegetation burning.

continued on page 5

continued from page 4

FAUNA

A sequence of monitoring photos

Fig 2: Within creekline, pre-burn, 23/10/04

Fig3: Immediately post-burn, 3/11/04

Fig 4: Regenerating vegetation, 24/5/06

In some areas creek lines were prescribed for a burn mosaic to achieve a patchwork of burnt and unburnt areas. Other creeks were targeted for burning to regenerate the senescing vegetation. Strategies were adopted based on the quokkas' dispersal and colonisation potential. Sites have also been selected within these prescribed burns to monitor regeneration of the vegetation and quokka activity. (Figs 2-4 - Photo point on Ellis Creek).

In each situation immediate 1080 hand baiting has been conducted to control foxes and cats and then continued on a monthly basis for a year or until the vegetation provided adequate refuge from predators. All of these burns have been within 'Western Shield' aerially baited zones. Feral pigs have also been monitored and control programs conducted where necessary. All personnel involved in the prescribed burn are briefed to ensure that the desired outcomes are achieved and, as a measure of field performance, all quokka sightings are recorded during the burn. Operational guidelines are also in place to ensure quokka habitat is not disturbed by mechanical sources such as firebreaks or tracks through riparian zones. These actions are to be avoided as they allow increased access opportunities for predators and also act as a barrier to quokka movement within the creek line.

Thus fire can be utilised as a management tool for quokkas if applied correctly and the results monitored and adapted depending on the outcomes. However, fire cannot be used alone, but needs to be undertaken together with other management practices, including control of predators, feral pigs and weeds.

If you think you may have quokkas on your property in the south-west area and you would like management advice, please contact your local *LFW* Officer.

Marika Maxwell is Nature Conservation Officer with DEC based at Kirup

[A list of references will be supplied on request – *Ed.*]

Community Workshop, Blythe Reserve, Dunsborough

A community workshop was held in Dunsborough last March to discuss the management of some local bushland, Blythe Reserve, which is in the middle of suburban developments and is only a hectare in size. It has houses on three sides and the community hall, golf course and primary school to the north.

Lots of people use the reserve. Primary school students use it as an educational facility for environmental studies; local residents walk through it on their way to the beach and tourists are sent there by the tourist bureau to look at the array of wildflowers throughout the year.

Blythe Reserve is a listed Threatened Ecological Community, Marri Woodlands Type 3B. It also has a 'Priority' plant species and there is habitat for quendas and western ringtail possums which are both listed as 'Vulnerable'. Thus, despite its small size, it is a very important piece of bushland.

Prompted by the local community, the Shire of Busselton has recognised the status of the reserve and has asked LFW to assess it and write a management plan. Comments on the plan have been called for from the community to ensure everyone has input into how this reserve is to be managed for conservation, biodiversity protection and community values. The workshop was part of this process. It was well attended and the issues, discussions and comments raised have been incorporated into the management plan which will be presented to the community for final input later in the year.

Cherie Kemp

SOIL

REFERENCE SOILS OF SOUTH-WESTERN AUSTRALIA

W.M.McArthur

In 1986 the WA Branch of the Australian Society of Soil Science received a grant from the Australian Bicentennial Authority to establish a system of Reference Soils in the south-west province of WA. I applied for and was awarded the contract for the project and began site selection in mid 1987. My brief was to select and document sites on reserved land (eg Nature Reserves, National Parks) where the soil surface and native vegetation were undisturbed and where the soil type was representative of important agricultural, horticultural or forestry land.

Sandplain site at Coorow.

To ensure an even spread of sites the area was divided into natural regions (eg Swan Coastal Plain, Wheatbelt etc) and these formed the basis for selection of sites and for discussion of the Reference Soils.

What's in the book?

Each natural region is treated in a separate chapter beginning with a brief history of European settlement and leading to a discussion of the relationships between past and present land use and the attributes of the Reference Soils. There are soil maps and diagrams to indicate the spatial and stratigraphic relationships between soil types of each region. The book may be used at a general level, or in as much detail as is required.

The properties of a Reference Soil and associated site data are generally set out on a single page. There is an accurate location, a record of site properties (geology, landform, drainage status and native vegetation) and a detailed description of the soil profile usually to a depth of one metre but sometimes deeper; chemical and physical analysis data are also included.

The assembled descriptions and discussions together with explanatory data and a comprehensive bibliography were published in book form in 1991 and reprinted in 2004.

"Reference Soils of South-western Australia" W.M. McArthur. 2004 reprint. Dept of Agriculture and Food, Perth. $11.00 Obtainable from DAFWA, Jarrah Rd, South Perth, but only to personal callers, no postal sales.

Using the book

While the prime objective of the project was to preserve sites for demonstration and comparison purposes, the assembled data will be useful to agriculturalists, foresters and biologists. By reference to descriptions, maps and diagrams, those with interest in the land will have little difficulty in identifying the different elements of the landscape as exemplified by the Reference Soils.

The morphological descriptions, using defined terminology, show the minimum depth of the soil profile and the thickness of the various horizons. It is also clear that there are orderly changes in the colour, texture, structure, consistence and the incidence of gravels with depth. These changes have implications for productivity through permeability, water-holding capacity, root penetration and ease of cultivation.

The chemical attributes, which also show orderly changes with depth, combine with water to supply nutrients to plant roots. However they do not act independently but rather through complex interactions both between attributes and with clay minerals, iron and aluminium oxides, and organic matter. Thus acidity or alkalinity (pH values) can affect nutrient uptake with extreme values causing deficiency for some elements. The effects of surface salinity are obvious but, in some soils, salts are confined to deeper subsoils and crops are not affected. Phosphorous levels in most WA soils are very low. In the Reference Soils most surface horizons contain <10mg/kg of available phosphorous, indicating that they would respond to P applications. Potassium levels are generally adequate for crop production in

continued on page 7

SOIL

continued from page 6

all except the sandy profiles where potassium is readily leached. Those soils derived from wind-blown lake deposits (eg KELL 9; q.v.) have very high levels of potassium.

The exchangeable cations – calcium, magnesium, sodium and potassium – react in a very complex manner with clay particles and affect soil structure. It is sufficient here to state that, in clay soils, where calcium is the dominant ion soil structure is stable but, where magnesium and/or sodium are dominant, the soil disperses when wet and sets very hard when dry.

The description of Reference Soils and the associated analytical data may also be used to make comparisons between sites from different regions. Thus there are several samples from yellow sandplain soils stretching from Geraldton south and east through the wheatbelt; their morphology and chemistry are remarkably similar. There are also several diverse sites that support karri forest and it is clear that, in this instance anyway, soil morphology does not determine distribution.

Discussion

The project has raised some interesting ideas and questions especially in relation to rehabilitation of abandoned farmland. It is relatively simple to replace some of the original above-ground components but the soil, particularly the surface, has been subject to significant alteration. Cultivation, herbicides, insecticides, fertilizers, animal trampling and introduced bacteria have produced an entirely different growth medium. How long would it take for the soil to return to a condition with original microflora and microfauna? Would the low pH values (acid soils) revert to normal values and would hardpans caused by compaction disappear over time? The high nutrient status under farming may not favour establishment of some native plants (eg Proteaceae) in soils other than deep sandy profiles.

What of the future? It is clear that 150 sites to represent the SW of WA is a pitifully small sample but the result was worthwhile – a published record of descriptions of those 150 undisturbed soils together with detailed analyses. It provides a baseline for future comparisons. The project has limitations and reservations but it could be seen as a reminder that protection of natural phenomena will never be easier than now!

Bill McArthur worked in CSIRO (Divisions of Soils and Land Resources Management) for 30 years, then as a Consultant in land resource assessment – and he hasn't given up yet!

PRACTICALITIES

PRESERVING OBSERVATION BORES

Alison Doley

A visitor to our property at Easter, Geoff Blacklock, noted that the observation bores on our farm have been lined with white pvc pipe which extends up to 50cm above ground. As an irrigation pipeline expert, Geoff commented that when exposed to sunlight, white pvc pipe becomes brittle and is easily shattered. He recommended that the pvc class 6 pipe should be given two coats of white water-based paint. The caps are heavier, but he recommended painting them as well.

At about the same time, one of the external white pvc pipes installed in 1983 outside our bathroom crumbled into a hole. Fiona Falconer (*LFW* Coorow) advised that one of the observation bore pipes installed in 1996 on her property shattered when accidentally knocked. A neighbour who has used white pvc pipe for stock troughs said it has 'upvc' stamped on it and will last 20 years. This is not long enough.

As a result of this information, it was decided that Lindsay Burke, who works for the Buntine-Marchagee Natural Diversity Recovery Catchment within which we farm, will paint the exposed portions of all the monitoring bores, as he goes around recording the data from them this year. I strongly suggest that all *LFWers* who have bores on their properties, or in their catchments, do the same.

Alison Doley farms at "Koobabbie", Coorow.

Protecting ringtail possums from rat bait.

It is a regulation in the Shire of Busselton that all buildings to be demolished must be treated to kill rodents – usually with rat bait. Unfortunately the bait is also attractive to possums.

If you have to use bait, LFW suggests that you put the poison out of possum reach, inside a poly pipe secured to a beam in your roof space. The pipe should be about 1m long and no more than 50mm diameter. Another way is to place a plastic icecream container with small arches upside down over the rat poison. The arches should be a maximum height and width of about 50mm and the container secured to a rafter.

For further information or advice, contact DEC, Busselton on 9752 5555.

FLORA

ARROWGRASS - THE TRIGLOCHINS

Penny Hussey

WA is the world centre of diversity for annual triglochins, or arrowgrasses. These tiny wetland annuals are found around the damp margins of both fresh and naturally saline lakes. They are often very numerous, but easy to overlook as, not only are they small, but their flowers are green or brown and so do not stand out from the background. If you have an undisturbed wetland – granite outcrop pool, clay-based ephemeral swamp or natural saline lake – chances are you will have some, take a look!

Triglochins are in the Arrowgrass Family, Juncaginaceae, a small worldwide family of wetland plants. The name 'arrowgrass' comes from the arrow-head shaped seedpods found in some species. '*Triglochin*' has a similar derivation; it means 'three pointed fruit'. Worldwide, there are some 60 species in 5 genera. We in WA have only the one genus, *Triglochin*, with officially 18 species (one introduced), some only recently discovered during the Wheatbelt Survey.

Triglochin calcitrapum, *spurred arrowgrass, life size*

The species that will be familiar to anyone looking at freshwater areas in the southwest is water ribbons, *T. lineare* (has been incorrectly called *T. procera*), an aquatic or dampland perennial with long, strap-like leaves and a flowering stalk that can reach 2m high. The small green flowers don't attract the eye until you brush against them when a great cloud of pollen is released. The plant grows from a thick rhizome buried in the mud from which some of the roots develop tubers. In the eastern States, Aboriginal people were reported to have baked and eaten these, but we have no record of Noongyars eating them, or even having a name for the plant.

Water ribbons, Triglochin lineare, *Bullsbrook. Photo: T. Smith*

Water ribbons, or closely allied species, are widespread worldwide. The tiny annual species, however, are not. It is these little fellers that, once again, demonstrate that WA is a centre for biodiversity.

Open, winter-wet soils on granite outcrops or around the shallow edges of undisturbed fresh or salt lakes are a good place to look. In good seasons they can be covered by a great drift of tiny annuals and geophytes. (Nb: a 'geophyte' is a plant whose aerial portions die off in summer, reshooting again next year from a bulb, corm or tuber.) Tiny sedges, daisies, hydrocotyls and triggerplants (in the wheatbelt, look especially for the minute hundreds-and-thousands, *Stylidium inundatum*) abound, along with the arrowgrasses. It is not uncommon to find three or four different *Triglochin* species at the same site, all with slightly different substrate requirements and flowering times. The geophytes are equally diverse, with various members of the 'lily-like' and orchid families specializing in this niche. Often the swamp specialist, *Tribonanthes*, can be so numerous as to cover the swamp floor with a foam of furry white flowers.

It is this extreme biodiversity that is threatened by secondary salinity, as, although many of these plants grow well on the brackish surface moisture in the wet season, they cannot cope with surface salt crusts. For a start, their seeds cannot germinate in highly saline water.

The main threat to the granite outcrop species is the destruction of the shallow, winter-wet soils by hard-hoofed stock or wheeled recreational vehicles.

This winter, look for the great diversity of little tiny things growing around the edges of wet areas, and think how you are going to manage for those, as well as for the more obvious shrubs and trees.

MICRO-ORGANISMS

STROMATOLITES - LIVING FOSSILS

Claire Hall

Stromatolites are rock-like structures built by micro-organisms. These micro-organisms, mainly blue-green algae (cyanobacteria) and various green unicellular algae, form mats covering large areas of lake shores, marine intertidal and shallow subtidal environments. In ancient times, stromatolites formed extensive reef-like structures on the edges of lakes and seas. The stromatolites we see today could be described as 'living fossils' - a biological link to these ancient life forms.

ancient history

The unremarkable appearance of stromatolites belies their importance in understanding the origins of life on earth. Geologists had long been puzzled by fossil stromatolites and the discovery in 1956 of living stromatolites at Hamelin Pool, Shark Bay, helped scientists to understand the significance of micro-organisms in the environment. Scientists have been able to study both the fossil record and the living representative of an ancient life form.

The oldest known fossil stromatolites in the world, discovered near the mining centre of North Pole in the Pilbara, are about 3,500 million years (my) old. They were the dominant form of life until about 650 my ago, forming extensive reef tracts like modern coral reefs.

The oxygen they produced was important to the formation of iron ore deposits such as those in the Hamersley Range in the Pilbara, and started the oxygenation of the atmosphere. Increasing levels of oxygen in the atmosphere and oceans enabled the first oxygen-breathing animals to evolve. Stromatolites declined as it became more efficient for microbes to exist in faster growing organisms such as corals, or in the digestive tracts of ruminant animals.

stromatolites or thrombolites

Today, marine subtidal stromatolite-dominated ecosystems exist only at Hamelin Pool and in the Bahamas. Hamelin Pool is twice as salty as sea-water and sea-grasses and other marine life cannot survive there, resulting in minimal competition for the micro-organisms that form the stromatolites.

Non-marine stromatolites (thrombolites) exist in a number of lakes throughout the world. The best examples in WA occur in Lake Richmond (Rockingham), Lakes Clifton and Preston (Yalgorup National Park, south of Mandurah), Lake Thetis (Cervantes), and Pink Lake (Esperance).

Externally, stromatolites and thrombolites may look similar, but in cross-section stromatolites have a layered appearance and thrombolites have a clotted structure composed of carbonate cement.

Although they are invisible to the naked eye, the micro-organisms form communities of diverse inhabitants numbering over 3000 million individuals per square metre. By a combination of trapping, binding and precipitation of sediment, the stromatolites construct mats that provide protection from erosion and allow a stable microbial community to develop and thrive.

Stromatolites will only form when the micro-organisms grow slightly faster than the rate at which sediment is deposited, and the mats must be able to keep pace with destructive grazing by other organisms. Growth is very slow at only 0.5 mm a year and the height of the structure varies depending on water depth, reaching a maximum

Thrombolite community at Lake Clifton may be formed by micro-organisms precipitating calcium carbonate from upwellings of fresh groundwater as they photosynthesise.

continued on page 11

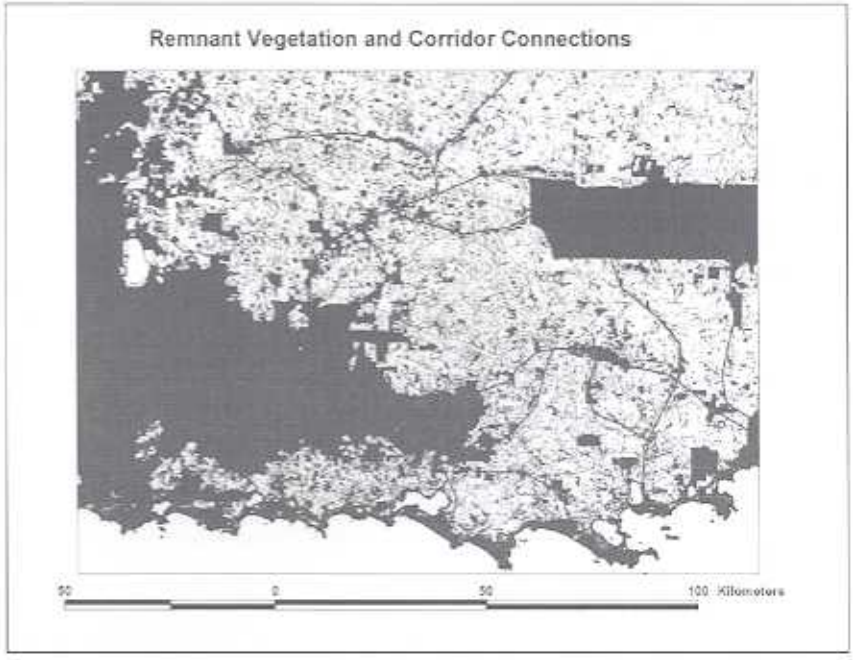
REVEGETATION

CONNECTING THE STIRLING RANGE TO THE SOUTH-WEST FORESTS

Sylvia Leighton

Recently I attended a seminar promoting a community-based program called 'Gondwana Link West'. The seminar was organised by Green Skills and was held at Kendenup Hall. The aim of the project is to reestablish stronger environmental links between the Stirling Range westward to the southern forests involving landscape-scale conservation works between the Stirling Range, Porongorup, Mt Lindesay and Mt Roe National Parks.

The principal speaker at the seminar was Steve Hopper who is Professor of Plant Conservation Biology at the UWA. His research publications have contributed towards international recognition of the Southwest Australian Global Biodiversity Hotspot. The main message from Steve's talk was to impress upon us not to rely on research from overseas and interstate to provide us with suitable techniques for conservation and land management in the south-west of Western Australia. Many other parts of the word have had recent glacial action resulting in the soils of that landscape being much younger and more fertile than our ancient more infertile soils. He reminded us that unlike those younger landscapes most of our soil fertility lies only in the top 5 centimetres.



'Macro-corridors' and potential 'Gondwana Link East'.

Our landscape has been unglaciated since the Permian (270 million years ago (my)), it has been oceanically buffered since the Jurassic (150 my) and is a relatively stable landscape with few mountains. It experiences a Mediterranean climate and is dominated by old, weathered nutrient deficient landscapes, yet it is floristically rich with high endemism.

Our plants have evolved many extraordinary physiological features over thousands of years to deal with this difficult landscape. Steve provided examples of some of the special root adaptations many of our plants have developed to survive in these extremely infertile soils. Some have set up root adaptations like cluster roots (see WW 9/2), others have developed nitrogen producing nodules using bacteria to convert nutrients (WW 4/3) whilst others have established symbiotic relationships with fungi to absorb extra nutrients from the soils (WW 2/2, 3/3, 6/3 etc).

Steve also reminded us not to be tricked into assuming that plants with similar physical features and appearance belong in the same taxomonic group. Our local native plants have indicated many times over that this is not the case (hence the continuous taxonomic name changes we have to deal with). He

Steve Hopper explaining ecological interactions. The bushland is recovering from a very severe wildfire – note that the grass is mostly native species, which are natural pioneer plants after a major fire.

continued on page 11

REVEGETATION

continued from page 10

provided the example of the kingia grass tree (*Kingia australis*) that was assumed to be related to the balga grass tree (*Xanthorrhoea* spp.) because physically they look quite similar. However taxonomists indicated that the genus *Kingia* was actually more closely related to the *Dasypogon*, *Calectasia*, and *Baxteria* genera and they were all placed in the Order Dasypogonales. Recent DNA and fossil research has dated the Dasypogonales back to 120 million years and the Order is not related to any of the plant Orders in existence today!

Other speakers at the workshop were Wendy Bradshaw (Greening Australia), Simon Judd (Wilderness Society), Keith Bradby (Gondwana Link East) and myself (DEC *Land For Wildlife*) each providing different input on other aspects of land management.

The morning's sessions were followed by a bus trip to look at key 'stepping stone' bushland remnants and inspiring revegetation works on farms adjacent to the Stirling Range NP. We were privileged to be able to visit *Land For Wildlife* members Eddy and Donna Wajon's property. Unfortunately their beautiful wandoo woodland was burnt out by the Tenterden fires three years ago but they have been doing some inspiring weeding and habitat restoration to assist the property to regenerate back into previous healthy condition. Of particular interest were the nest boxes they have installed for the Carnaby's Cockatoo. Just getting these large nest boxes up into the wandoo trees is a challenge in itself. The property provided a great opportunity for lots of discussion, so thank you to Eddy and Donna for allowing the large group of seventy workshop participants onto their property. The Wajons had provided water baths for each participant to clean their shoes of dieback spores (*Phytophthora cinnamomi*) before we entered their bush block.

It was a great day. Look out for further updates as the Gondwana Link West project develops.

Sylvia Leighton is LFWO at Albany

Many readers will already have heard that Prof. Hopper is leaving WA to become Director of Kew Gardens in England - arguably the most prestigious position a botanist could hold. Steve has always been supportive of *LFW*, speaking at Field Days and writing articles, and I am sure all *LFWers* will join with me in wishing him every success in his new position. *Ed.*

Note: Celebrate 10 years of LFW in the Albany area with Prof. Hopper as keynote speaker - Friday 25th August. *See p. 20.*

MICRO-ORGANISMS

continued from page 9

stromatolites

height of about 1.5 metres in the shallow sub-tidal zone. Stromatolites can form club, column or loaf shaped structures.

future for stromatolites

If we are to retain these 'living fossils' and maintain one of the longest continuous biological lineages, some careful management will be needed. They may appear rock-like but they are very fragile and can be damaged by being walked on. Observation walkways have been constructed at Hamelin Pool and Lake Clifton to minimise any impact from visitors.

The Lake Richmond thrombolite community has been classified as a Threatened Ecological Community. It's proximity to an urban environment makes it vulnerable to excess nutrients in groundwater which could cause algal blooms that smother the thrombolites. A wide buffer zone of vegetation around all lakes containing thrombolites is important for maintaining the quality of ground water. The Hamelin Pool stromatolites could be affected by climate change. If the inflow of seawater is restricted, Hamelin Pool will dry out, but if sea levels rise and normal sea water flows in, then seagrasses and corals could displace the stromatolites.

By visiting these unique life forms you can imagine what life was like when the earth began.

Claire Hall is LFW Technical Officer at DEC Kensington

Stop press!

New study of ancient Pilbara stromatolites

Further studies of the Pilbara's ancient rocks have revealed even more information about ancient stromatolites. A new paper states that organisms flourished on a broad peritidal platform 3,430 my ago, rapidly taking hold and creating a reef-like build-up in shallow waters as surfaces became submerged.

Read: Abigail Allwood et al. "Stromatolite reef from the Early Archaean era of Australia". Nature. Vol 44/18, 714-718, June 2006.

BIOSECURITY

BEWARE OF EUCALYPTUS (GUAVA) RUST

Rusts are very damaging plant pathogens that have caused periodic devastation of wheat crops since earliest times - indeed Joseph, sold into slavery in Egypt around 1800 BC, got himself out of jail by interpreting Pharaoh's dreams and getting him to store grain against the forthcoming years of famine, which would have been caused by wheat rust. Somewhat later, Aristotle's pupil Theophrastus, writing in Greece two centuries before Christ, described the disease quite accurately.

But rusts attack all sorts of plants, not just grasses, and in the 1880s a rust wiped out the coffee plantations in Ceylon (now Sri Lanka) forcing the desperate planters to convert to tea instead. Within the space of 15 years, Britain went from controlling the world's largest coffee supplier to having almost none growing in its economic sphere of influence – thus the scions of Empire turned to tea for 'the cup that cheers' rather than coffee, which contains far more of the stimulant, caffeine.

So, rusts can affect world events – why should we care? Because the possibility for an Australian disaster is looming. Rust spores are light and easily spread on the wind, but Australia's isolation has probably helped to protect the indigenous flora, at any rate, eucalypts, melaleucas, teatrees and many other plants from the Myrtaceae family don't harbour any native rusts. That means, of course, that if an introduced one should arrive here, our plants would have little resistance to it.

In Western Wildlife 6/4 (Oct. 2002) we alerted readers to a very worrying development – in Brazil the virulent pathogen, guava rust *Puccinia psidii*, had jumped host onto eucalyptus trees. It has become a serious disease of young trees and can kill up to 90% of seedlings. CSIRO scientists have been working on how to contain the potential problem, should the disease spread. It has the potential to do severe damage to commercial and natural ecosystems right across the country.

Just think of an Australia without eucalypt forests.

The threat has just got much closer - the disease has been confirmed in Hawaii.

As with any potential problem from an exotic organism, early detection is a key factor in mobilizing defences to destroy the invader. Be aware of this potential problem. Read the fact sheet "Look out for Eucalyptus (guava) rust". It is obtainable from the Dept. of Agriculture Fisheries and Forestry, GPO Box 858, Canberra, ACT 2601. Or download in pdf format from the DAFF's website.

SLIDERS - VIGILANCE IS VITAL

"What on earth is that?" mused a sharp-eyed early-morning walker at Tomato Lake in Belmont. The strange animal was reported to the Department of Agriculture, who, with help from a number of other organisations, eventually caught it and determined that it was a yellow-bellied slider turtle, native to America. She proved to be in very good condition, showing, perhaps, that she had not been in the wild for very long. She was carrying over 20 eggs. Exotic turtles are a threat to WA as they can establish breeding populations and upset the balance of the natural ecosystem. In addition, they could spread disease and parasites not present in the local animals.

How did she get into Tomato Lake? It is illegal to keep exotic reptiles privately in WA, illegal to bring them into the State, and illegal to release them in the wild. How did this animal's former owner get around our biosecurity regulations?

In this instance, a prompt report from a vigilant member of the public enabled the animal to be captured and continued surveillance has shown (hopefully) that there was only the one. If any reader is aware of any people who hold reptiles illegally, please urge them to surrender the animals to the authorities. Every effort will be made to house surrendered exotic reptiles in facilities authorized to hold them.

Did you know?

...that WA supports the richest mangrove bird fauna in the world? Dense mangrove stands along the coast of the Kimberley and Pilbara enable birds to survive within them, that elsewhere in Australia range more widely across the landscape through rainforests.

Ron Johnstone, WA Museum

FERALS

THE FOX DNA PROJECT – CAN YOU HELP?

Oliver Berry

This project uses the genetic tools typically used in forensics to design more effective fox control. For it we need tissue samples (ears) from everywhere in WA. Can you help with samples, please?

The feral fox is a major pest in Australia, costing $227.5 million annually in stock and biodiversity losses as well as money spent trying to control them. Finding the most efficient and cost-effective way to control foxes is a long-standing goal of land managers. One of the key questions is – at what scale should control (such as baiting) take place so that controlled areas are not immediately re-invaded by foxes from surrounding regions?

A key to this is to determine how far foxes move. The problem is that measuring dispersal in foxes is very difficult. Techniques like radio-tracking require a lot of effort for a small amount of very detailed information. Also, foxes show quite different movement behaviours in different landscapes, so results can't be generalised across studies.

New DNA-based methods provide good information on fox dispersal and population structure across Australia, while requiring much less effort than other techniques. They work by measuring how the relatedness of foxes decreases with their distance apart.

In this project we are attempting to generate a genetic map of foxes throughout WA. It will allow us to identify precisely the relevant scale at which fox control should take place. The use of such biologically meaningful management units is similar in concept to catchment-based management for water resource management. Similar genetic mapping projects conducted on feral pigs in the south-west [see WW 8/4, *Ed.*] and feral rats inhabiting islands, have been highly effective.

It is an ambitious plan, and to be successful we are asking as many people as possible to provide samples of foxes they shoot, trap, or find as roadkill. We will accept samples up to Dec 2006.

To make it easy, we have developed some easy-to-use kits that fit into a normal postal envelope, and which contain all the information and equipment required to take samples. Just contact me and I will send you one. They easily fit into a glove box or toolkit. Once a sample is taken, put it into a reply paid envelope and send it for analysis at the University of Western Australia.

If you would like to contribute or to find out more, see www.foxDNA.animals.uwa.edu.au, or call me on 08 6488 4509.

Oliver Berry is a Postdoctoral Research Fellow supported by the Invasive Animals Cooperative Research Centre and based at Animal Biology, UWA.

TAPEWORMS IN SHEEP - ANOTHER GOOD REASON TO POISON FOXES

Alison Doley

The unusual weather conditions this past summer, with 103mm of rain falling by early February, produced a new problem for our sheep enterprise at Coorow, and according to our marketing agent (WA Meat Marketing Co.) it was a general problem. We sell our prime lambs through them and this summer a small, but financially significant, percentage of carcasses was downgraded because they contained cysts of the dog tapeworm, *Taenia ovis*.

This tapeworm can grow to 2m in the intestine of dogs (or foxes). Periodically segments break off and thousands of eggs are released in the dogs' faeces, to contaminate pasture, yards, or wherever the dogs were. The next part of the life cycle takes part in the sheep, when they eat pasture contaminated by tapeworm eggs. The larval stages hatch in the gut and burrow through the internal organs, eventually forming a resting stage as a fluid-filled cyst – commonly in the heart, diaphragm, tongue or cheek. Affected sheep show no signs of any disease. The cycle is completed when a dog (or fox) eats raw meat that contains these cysts.

Responsible landholders take precautions to prevent the spread of this parasite by worming their dogs every 6-12 weeks, and feeding them manufactured or thoroughly cooked food – never sheep offal. But no-one supervises the foxes.

Land for Wildlife members destroying foxes for environmental reasons are also doing sheep producers a good turn.

REVEGETATION

HEALTHY ECOSYSTEMS – INLAND WANDOO WOODLAND CASE STUDY WYALKATCHEM NATURE RESERVE

Liz Manning and Teagan Smith

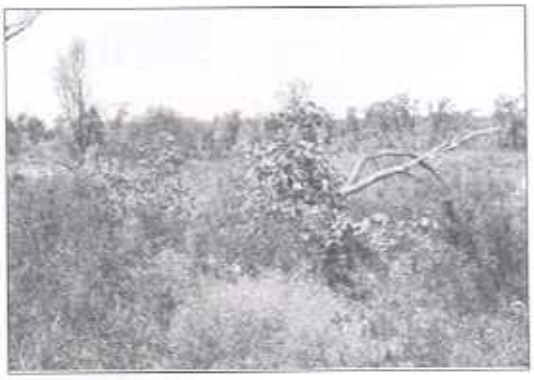
On the 23rd March a group of people converged on the small town of Wyalkatchem to take part in the Healthy Ecosystems workshop. The message behind the free community information day was to raise public awareness of woodland decline, highlight the importance of protecting remnant vegetation and demonstrate the role that fire can play in maintaining balanced and functional woodlands.

The Shire of Wyalkatchem and the Land Conservation District Committee hosted the event while the Department of Environment and Conservation's *Land for Wildlife* and the Wandoo Recovery Group designed the workshop, with support from WWF – Australia.

The workshop evolved out of Penny Hussey's keenness to show people a brilliant example of fire in inland wandoo (*Eucalyptus capillosa*) woodlands and how it affects the vegetation community composition. Penny had personally been on site a few days after the fire in 1998 and had documented the initial damage caused by the fire which was accompanied by photographs. In spring 2005 Penny returned to the site to evaluate the changes over time through photographic monitoring.

The workshop covered a number of topics in addition to fire, including the importance of woodlands and woodland decline. The latter is the particular concern of the Wandoo Recovery Group.

Eight days after the fire, 30/11/1998.



A line of wandoo saplings on the ashbed, dense shrubby plants elsewhere. 15/09/2005.

The area that was burnt starts at the flowering shrubs, foreground unburnt for at least 60 years. 15/09/2005.

A tremendous amount of information was delivered on the day in relation to woodlands being more than 'just a stand of trees'. They provide many important resources including habitat and food sources for many fauna, recreation, enjoyment and visual beauty, successful pollination of many plant species and windbreak and shelter for stock. Healthy ecosystems comprise a suite of components that interact to keep the system functioning. Co-occurring species such as sedges, rushes, liverworts and fungi are important indicators of a healthy system. A healthy cryptogam layer on the surface of the soil (soil crust) ensures that the soil has a suite of micro-organisms which are extremely important for plant growth. Salinity, weeds, climatic change and tree decline threaten woodlands and biodiversity richness in general across the entire region. Protecting our remaining woodlands and recognising their tremendous value is crucial if these last stands are to survive intact for future generations to enjoy.

Feedback from participants showed the excursion to Wylie Nature Reserve to be the highlight of the day. The practical experience of utilising one's senses to look, listen and feel is by far the best method of learning and appreciating the bush. Participants visually observed the complete change in vegetation composition between the areas burnt and those unburnt. It was noted that areas that were not burnt were predominantly low understorey vegetation with a mixture of grasses and herbaceous species, interspersed with mature wandoo. This was in stark contrast to where the fire had passed through, with a definite line of transformation, which displayed a low dense shrubby understorey, many of which were nitrogen-fixing plants such as *Acacia* and *Gastrolobium* species, with dense clusters of regenerating wandoo growing on the ashbeds. Wandoo regeneration is triggered

continued on page 15

NEWS

WAGIN WOOLORAMA - SUPPORTING CONNECTIONS

Avril Baxter

Heat, dust, thunderstorms, floods and even pleasant weather, Wagin Woolorama, the largest agricultural show held in March each year, has had it all. And every year, thousands of people pour through the gates to see the excellent displays and to catch up with old friends.

Land for Wildlife began exhibiting at Woolorama in 1997. We started with a small display, shared with CALM's Wheatbelt Regional Ecologist, Brett Beecham. Our message to the public was how nature and farming could live hand in hand and even support each other. We also received tremendous feedback from the public on where they had seen endangered animals such as Carpet Pythons and Bush Stone-Curlews, all useful information.

Some exhibitors at the show realised they had a common focus - the broad picture of managing the rural environment. This included rural towns, farming land, river systems and bushland, native and feral animals. We also covered a wide variety of organisations from government, to industry and community, from school based educational programs to specific interest and catchment support groups.

We wanted to create a One-Stop-Shop for the public and to support and spend some time with each other, catching up on our respective programs. We started to work together and each year the number of people who exhibited grew.

In the third year, Jill Karena, the Communications Coordinator for the Blackwood Basin Group took on the role of coordinating the event. We'd meet and decide on a theme and design our individual displays around that theme. Any aspect of environmental management was relevant to each group and themes have included "Keeping it Fresh" during the International Year of Fresh Water and "Growing Our Families' Future".

The think tank in 2006 had us asking ourselves "what holds us together as a group and perhaps also sets us apart?" The answer? We support the connections both physically and socially in our environment.

In 2006, 14 exhibitors ran a jam packed display under the theme of Supporting Connections. The exhibitors included the South West Catchments Council, Blackwood Basin Group, BestFarms Environmental Management Systems, Katanning Landcare, Wagin/Woodanilling Landcare, Dumbleyung Landcare, Beaufort Landcare Zone, CALM's Narrogin District and *Land for Wildlife*, Roadside Conservation Committee, Birds Australia, Great Southern Care Wildlife, Blackwood Waterwatch and Friends of Wagin Lakes.

Each exhibitor has something really valuable to offer to the conservation and sustainable development of our environment. And of course, thank you to the public for your enthusiasm and interest, it makes it all worthwhile.

Avril Baxter is LFWO at Narrogin

continued from page 14

Wandoo and fire

by fire and ashbeds are nursery sites for germination of the seed that falls afterwards. Close to the burnt out stumps where the ashbeds were deepest, the wandoo saplings were tallest. This illustrates that regeneration on ashbeds can be a practical and cost effective method of revegetating areas of wandoo.

Lessons learnt

Always be aware of and look for change. Use your observations to monitor and evaluate the health and quality of vegetation.

Appropriate fire management techniques are guided by the size of the remnant, location, time of year that burning will be carried out, fuel litter load, species present, weed invasion and the seed bank present.

Community days such as this are terribly important as a means of getting together with people, to talk and learn from each other in a way that is friendly, inspiring and memorable.

Liz Manning is the Executive Officer of the Wandoo Recovery Group, contact lizmanning@bigpond.com. Teagan Smith is Project Officer with DEC's Western Shield programme.

FLORA

WHAT WILDFLOWER IS THAT?

Erica Shedley

How many times have you wandered through your bushland, or a nearby Reserve, and thought "I'd love to know the name of that plant" or "I wonder if this plant is different to the one in my neighbour's bush?" Once your bushland or wetland is fenced off and regenerating, you may be seeing new plants emerging that have not been seen on your property before. Now is the time to find out what you really have - it might be something quite special.

There are now more than 80 regional herbaria throughout Western Australia, which create and maintain local reference collections of plants to be used as a community resource. Regional herbaria are usually run by local volunteers who collect wildflowers (and weeds) in their districts and send duplicates to the WA Herbarium for identification. The volunteers also collect information about where the plants are growing, their height, form and habit, the soil and landform, associated vegetation and fire history which greatly increases our knowledge about the species. Many new species and subspecies have been discovered through the regional herbarium network, as well as range extensions of known species.

Volunteers in regional herbaria are trained to collect and identify plants and are available to assist local landholders to identify plants growing on their properties. This local expertise can be used by other community groups and shires involved in revegetation projects, by school groups for Eco-education programs, by visitor centres interested in conducting wildflower walks or publishing local wildflower brochures or booklets, and by wildlife photographers. Most regional herbaria also maintain a collection of local weeds that is a valuable resource for landholders needing to identify invasive species.

Annual, 15cm, cream flowers. On white gravelley sand under mallee. Year following fire. Kukerin, Sep 05

Low shrub to 70 cm, leaves needle-like, dense and crowded. Flowers bright red. On laterite under powderbark. York, Apr 06.

Annual to 70 cm, delicate white flowers. On alluvium under flooded gum, year following fire. Helena Valley, July 05

Regional herbaria have an important role in documenting and conserving our biodiversity. Thousands of specimens have been collected through this network and catalogued by the WA Herbarium. Many new populations of threatened species have been found, allowing better understanding of the responses of these species to disturbance leading to improved management practices. A number of volunteers are also members of threatened flora recovery teams and are actively involved in survey, monitoring and recovery work with DEC district flora officers and botanists.

The South West Catchments Council recently funded a project to support the activities of 14 regional herbaria in the South West Natural Resource Management region. Two liaison officers are currently assisting volunteers with flora surveys, maintaining and expanding their collections, and training new volunteers. Frances Kirchner is operating from the Bunbury DEC regional office and supports the western and northern herbaria, while Erica Shedley operates from Bridgetown and supports the eastern and southern herbaria. Erica and Frances are organising workshops this spring on plant collection and plant identification for interested herbarium volunteers and landholders.

So if you thought that a herbarium was just a collection of dead plants, think again! Now is the time to find out what is actually growing in your bushland. Ask your local regional herbarium volunteers to visit your property and collect some plant material for identification. Better still why not learn how to do this yourself?

Erica Shedley can be contacted on 9761 7512 or eshedley@bigpond.com Frances Kirchner can be contacted on 9725 5952 or francesk@calm.wa.gov.au

IN BRIEF

REDISCOVERY OF *HALORAGIS PLATYCARPA*

James Drummond was a tireless and very observant collector of SW WA flora, and he had the great advantage of traveling in areas where European settlement had not yet occurred. His plants were named by the eminent European botanists to whom he sent the specimens. Some of these plants have not been collected again, and there is always great interest when one of them is rediscovered.

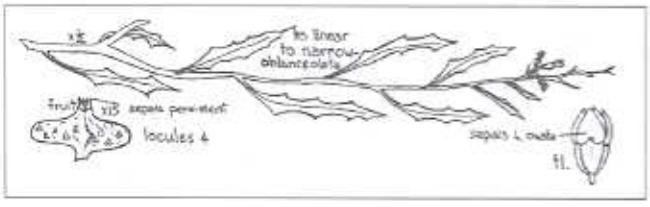
A problem with trying to find a Drummond plant is that he was not precise as to locality, often merely recording 'Swan River' for everywhere from Chapman Valley to the Barren Ranges. After all, places didn't have names in his day - well, not English ones, anyway. So finding something a bit unusual could lead to an exciting rediscovery.

This happened to Herbarium botanist Mike Hislop in October 2000, during a survey of a reserve near Dalwallinu in order to install an interpretive trail. He found an unusual *Haloragis*. Now, it has to be admitted that haloragises are pretty boring and unspectacular plants! Low-growing perennials with brown or green flowers, they are the sort of thing most of us step over to get to something more interesting. But botanists on surveys, of course, study everything! And so he collected a piece, and then sent it off to the expert in Canberra. Back came the response – hmm, maybe, but a fruiting collection was required. This was sent in a couple of months later by Joy and Colin Wornes who were co-ordinating the trail project for the Shire. And there it was, *Haloragis platycarpa* – a plant not collected since Drummond sent it to Europe in his first collection in 1842! The plant was growing in jam woodland on brown loamy soil. As with all rare plants, the exact site is confidential.

If you have some jam woodland, why not have a look for haloragises this spring? They all look somewhat alike, but there's a good illustrated key in Blackall & Grieve Part III (see pic below). You may be surprised at the number of native - but not eye-catching – plants you find maybe, even, another population of this one!

Ref: Nuytsia 15 (3): 431-443 (2005)

Penny Hussey



RARE FLORA IDENTIFICATION

Would you like to be able to recognise the Declared Rare Flora in your area?

DEC Merredin, in partnership with the Wongan-Ballidu Bush Care Group and the Wongan-Ballidu Shire, are currently developing a book containing information and photographs of the 49 species of Declared Rare and Priority flora that occur in the Wongan-Ballidu Shire. The hills around the town contain an amazingly rich botanical heritage. The aim of the book is to provide members of the public with information to assist with the identification and to raise awareness of rare flora and the threats to these species.

Currently it is planned to launch the book on National Threatened Species Day on the 7th September 2006 in Wongan Hills, hopefully with a bushwalk in conjunction with *Land for Wildlife*. For more information contact Wendy Johnson on 9041 2488 or by email: wendyj@calm.wa.gov.au

In addition, DEC has produced individual leaflets for the Moora/Jurien area, contact DEC Jurien on 9652 1911.

Plants from Katanning eastwards are the subject of a recently-released booklet "Declared Rare Flora in the Katanning District", contact Bethea Loudon on 9821 1296 for more information.

MORE ON HOW SOON BALGAS FLOWER

The Wildflower Seed Company sells packets of balga seed badged 'Australian Wildflower Seeds'. It was pointed out to the Editor that on the back of the packet is the following advice to growers:

"This striking, unusual plant grows rapidly in its early stages producing an attractive spread of 1m (3') leaves in about 4 years. If cut back to ground level at this stage it will soon produce new leaves and usually send up a flower spike. The black trunk takes many years to develop."

Well – can anyone confirm this?

Erratum: In the last issue we gave an incorrect price and contact point for the Drummond Symposium papers. Please note that they are obtainable from the Toodyay Naturalists' Club for $25, not $10 from Dr Stephen Davies as stated. The Editor apologises to all concerned.

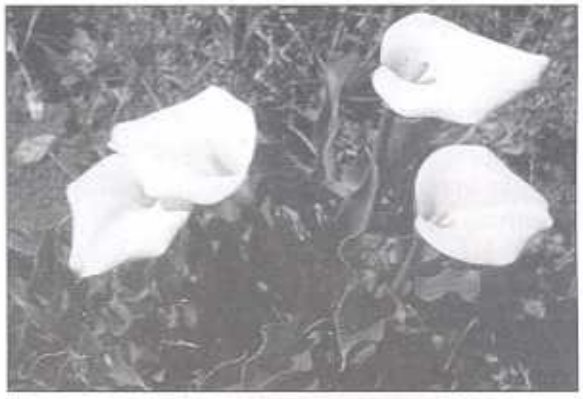
IN BRIEF

SALE OF ARUM LILIES BANNED

Sale and trade of Arum Lilies (*Zantedeschia aethiopica*) will be banned throughout Western Australia from September this year. The plant was already banned in some south-west Shires, where it is a severe environmental weed, invading thousands of hectares of pastures, parks, forests and wetlands. It is steadily increasing in other areas of the State.

There was clearly a double standard, with nurseries in Perth able to sell the plant, while it was illegal to do so in other areas. It will now also be illegal to sell or trade it at weekend markets or fetes. The ban not only applies to the wild white form, but also to named varieties such as 'Green Goddess' or 'Pink Marshmallow'.

Apart from its invasive qualities, every part of an Arum Lily is toxic. It must taste bad, as it is not usually eaten by stock, but one wonders what effect the berries have on the native birds that eat them. There have been



reported cases in Australia of children being poisoned after consuming the berries.

Home gardeners will not be required to remove their Arum Lilies, but they will not be allowed to plant more. It is beautiful but, do we really want it in our gardens? Perhaps readers can help to spread the concept of a total ban on cultivation.

THE WILDCARE HELPLINE NEEDS MORE VOLUNTEERS

The Wildcare Helpline is a 24 hour telephone operating service, staffed by DEC Volunteers to provide support and service to the public for all matters relating to sick/injured or 'unwelcome' wildlife in WA. This season the Wildcare Helpline received over 5500 calls from members of the public requesting help with problems ranging from emus wandering into petrol stations to orphaned kangaroo joeys found on the side of the road.

The Helpline requires day time volunteer telephone operators. There are two shifts per day, 9am-1pm and 1pm-5pm, and the line operates from the community involvement office at DEC Head Offices in Kensington. Experience in wildlife is not essential as full training and support is provided to the telephone operators.

If you have any spare time during office hours and feel you can help by volunteering on the Wildcare Helpline, please contact Michelle Rouffignac at the Community Involvement Unit on 9334 0279 or 0334 0582.

WA SEABIRD RESCUE

Every year, seabirds become entangled in fishing gear. Sometimes this can lead to their death. A new leaflet briefly outlines steps to be taken if you inadvertently hook a bird, or come across one that has been entangled. It is obtainable from DEC or the City of Mandurah.

For immediate help and advice with an actual situation, contact the Wildcare Helpline 9474 9055.

Bush Detective

What made these wavy bands?

This rock has been cut to show its interior. It is formed from very thin, wavy bands of material, coloured from white through to dark red. Can you suggest what made it? (Hint: it was found at an ironically-named spot near Marble Bar, is very old, and is mentioned elsewhere in this magazine.)

Ans: Microbes caused the bands to form - cyanobacteria perhaps. It is the original North Pole stromatolite, whose discovery in 1960 sparked the continuing world-wide debate on the origin of life.

NEW BOOKS

"Acacias of the Wellstead District"

Pattie Leighton et al for the Wellstead Historical and Heritage Committee

Cost: $15.00 + $2.60 p&h.

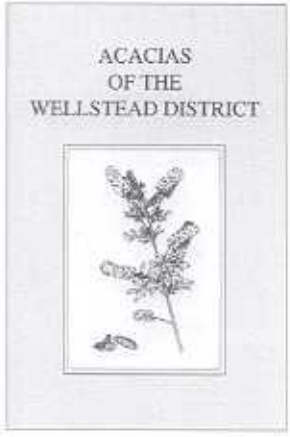
Contact: Secretary, Wellstead Historical and Heritage Committee, Wellstead Resource Centre, WELLSTEAD, WA 6328.

It's printed at last! The Wellstead group have published their book! (See WW 8/3, July 2004.) And a great book it is too. It describes and illustrates 57 different taxa of acacias from the Wellstead area, a lot more than the group thought were around before they started! The descriptions are clear and succinct, while the line drawings capture the very essence of the plant. There are also colour photos of many species.

This project shows just how diverse Western Australia's bushland is, once you really start looking, and it highlights how much we have to lose if we don't look after our land. In addition, acacias have a most important place in revegetation, as they contain micro-organisms in their roots which fix nitrogen from the atmosphere, thus eventually building up the store of soil nitrogen available for all plants.

South Coast and Great Southern residents and visitors will find this booklet very useful for identification, but it will also be appreciated by anyone else who just likes wildflowers.

The Committee has previously published "Birds", "Eucalypts", Banksias" and "Mammals" – now "Acacias". What's next, folks?!



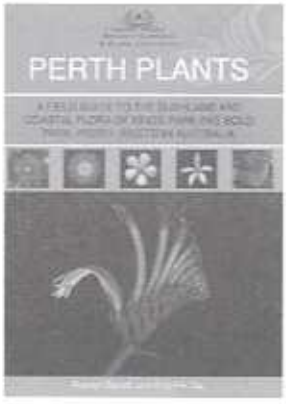
"Perth Plants: a field guide to the bushland and coastal flora of Kings Park and Bold Park, Perth, Western Australia"

Russell Barrett and Eng Pin Tay

Botanic Gardens and Parks Authority

Cost: $49.95

This information-packed book is a must for anyone interested in plants in the Perth area. Covering 756 species, that is most of the plants on the Coastal Plain (not the Scarp and Hills), it has descriptions on one page with photographs on the opposite one, making it quite easy to flick through, glancing at pics, until you see something that looks like the plant you are interested in. There are several photographs for each species – flowers, fruits, whole plant – that should enable identification at any time of the year.



This feature is especially useful for the grasses and 'reedy things' that are notoriously hard to identify.

The plants are organised in families, but people used to using the "Flora of the Perth Region" will find that there are a few changes. Taxonomists do like changing names! (Fortunately, the flowers still look as they always did – "a rose by any other name ..."!) One point that, for me, was a negative is that the non-native plants are presented in a separate section of the book, so it is not as easy to compare native and introduced members of the same genus.

That aside, this is an excellent book that everyone can use and enjoy.

"Ernest Hodgkin's Swanland: estuaries and coastal lagoons of Southwestern Australia"

Anne Brearley

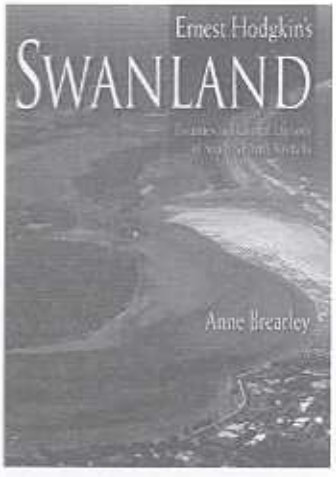
University of WA Press

Cost: $75.00

The late Ernest Hodgkin spent many years studying estuarine environments from the Murchison River to Esperance. He inspired students and amateur naturalists alike with a desire to know and understand their environment. Now Anne Brearley has brought together this information with her own research and produced a comprehensive and fully illustrated guide that contains a wealth of information for readers at all levels from scientist to interested visitor.

It focuses on individual estuaries: their formation, geography, geology, water flows, plants and animals, change since European settlement and the pressures of current land use. It is easy to find the information by theme or location, or to browse by glancing at figure captions, or reading 'boxes' on specific topics. There are all sorts of gems, from historical to present day interest; for example George Grey's 1839 account of the extensive areas of fertile coastal soil where Aboriginal people harvested warrine tubers (see WW 8/2).

For its size and quality, this book is very reasonably priced, no doubt due to financial support from the National Trust and the Ernest Hodgkin Trust.



Not something to be read in one sitting, rather, this superb book will be a reference and mine of information for years to come.

COMING EVENTS

A Walk on Wild Horse Hills

(Shire of Williams)

Sunday 16th July 10am - 3pm

Bushland management in the company of friends

Meet at "Knotwood", the home of Avril Baxter and Ned Crossley, for morning tea, later move to Richard and Lu Higham's. Picnic lunch provided.

We will sit and chat, then wander in the bush, discussing animal habitat, feral animal control, regeneration and rehabilitation. People with specialist knowledge (eg pig control, plant ID, bird calls etc) will be coming along. We can discuss our problems and our solutions and learn from each other.

For catering purposes and a map to "Knotwood", please reply to Avril Baxter on 9881 9218 or avnlb@calm.wa.gov.au

A LFW 10th Anniversary event.

Celebrate 10 years of *LFW* in Albany!

(Albany Golf Club)

Friday 25th August 9.30 am - 12 noon

Join us for a celebration and a 'thank you' to all friends and helpers over the 10 years of LFW in the South Coast area. A highlight will be Prof. Stephen Hopper who will talk on aspects of the future for biodiversity in the south-west, one of the last chances to hear him before he goes overseas. And there will be a ***scrumptious*** *morning tea!*

For more info, contact Sylvia Leighton on 9842 4500 or email: sylvial@calm.wa.gov.au

A LFW 10th Anniversary event.

Rare flora book launch/bushwalk

(Shire of Wongan-Ballidu)

Thursday 7th September

This event is planned but not confirmed yet. For information contact Wendy Johnson on 9041 2488 or by email: wendyj@calm.wa.gov.au or Mal Harper on 9041 2488 or malh@calm.wa.gov.au.

A LFW 10th Anniversary event.

From the Hills to "Koobabbie"

(Shire of Coorow)

Sat 2nd - Sun 3rd September

Spend the weekend helping Alison and John Doley celebrate 100 years of farming on their outstanding property, "Koobabbie". Heritage, wildflowers, landcare - an inspiring place to visit! Bus from Perth, small fee. Booking essential!

For details contact Fiona Falconer on 9952 3255, 9921 5955. email: fionaf@calm.wa.gov.au ; or contact Zara Kivell, 9295 1955, zarak@calm.wa.gov.au

A LFW 10th Anniversary event.

Acid Sulphate Soils Field Day

(Shire of York)

Workshop and field day planned.

For details contact Zara Kivell, 9295 1955, zarak@calm.wa.gov.au

A LFW 10th Anniversary event.

Landscape and Landcare Weekend

8th - 9th September 2006

Fri 8th - 6pm, Art Exhibition, Millbrook Hmstd, **Williams**
Sat 8th - 9am-4pm, Tarwonga Hall and field sites
"Photographing the Landscape" - Richard Waldendorp
"Landcare" - Bill McArthur

Sat 8th - dinner and show at Williams Woolshed, show presented by the Shearing Shed Theatre Group.

Bookings for all events: Williams Woolshed: 9885 1300.

Sharp Rush (*Juncus acutus*) Workshop

4th August 2006 8.45 – 3.30

Wollaston College, Bold Park

The workshop will cover the occurrence of rushes in WA, then focus on the control and management of Sharp Rush. Though most of the case studies will be Swan Coastal Plain based, anyone involved with trying to control this pest would probably find the day interesting.

For further info. contact: Greg Keighery, DEC. 9405 5100.

Perth Urban Bushland Fungi Project

Workshops and walks (fungal forays) will be held in June and July. For dates, see the LFW website, coming events section,or the PUBF website at www.fungiperth.org.au.

Country Wildflower Shows

For a list of country wildflower shows, see the LFW website, coming events section.

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.