

THE ECOLOGICAL IMPERATIVES FOR CONSERVATION AND MANAGEMENT OF NATIVE VEGETATION

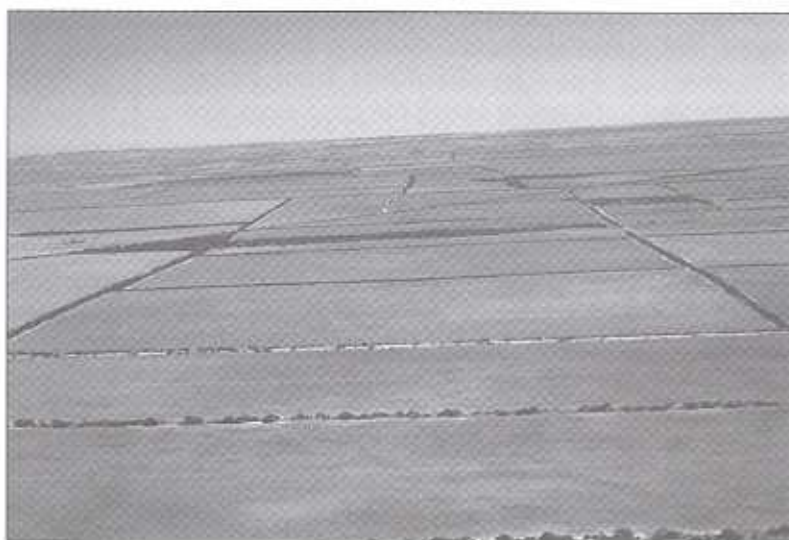
Denis A Saunders

WE are told that over most of the extensively cleared areas of Australia, clearing has ceased. Unfortunately this statement is not true; clearing is still going on, but it is clearing by ecological processes and these must be managed. It is not sufficient to put a fence around remnant vegetation and say we are protecting it. We will need to manage

actively because the ecological imperatives are leading to the degradation of remnant patches with detrimental feedback to ecological processes.

Ecological consequences of clearing and fragmentation of native vegetation

The removal of native vegetation on a broad scale is a non-random process that leads to a collection of fragmented vegetation patches in a matrix of different vegetation and/or land uses. The result is a series of fragments or remnants located in different positions in the landscape, on different soil types, possessing different vegetation types and associated fauna, and varying in size, shape, isolation and type of ownership. What are the ecological



"When you fly ... you quickly realise that nature grows in straight lines ..."

consequences of this reduction and fragmentation of native vegetation?

As soon as a patch is created so is an edge. Over most of the country subject to large scale clearing, remnant vegetation is mainly edge and in many cases these are fairly linear. When you fly over these regions you quickly realise that nature grows in straight lines and that is the way we manage these landscapes. We are starting to think about fencing to soil type but the compartmentalisation of our landscapes is still a major problem for management. If we look at the trees, shrubs and grasses along an edge of a patch of remnant vegetation we can see how they are now exposed to a whole series of forces they were not exposed to before that land was cleared. This is

simply illustrated by thinking about standing outside on a very cold, windy day. Much more protection is afforded by standing in the middle of a group of people as it is a damn sight colder on the edge than the middle.

Removal of native vegetation results in changes in radiation fluxes with increases in solar radiation leading to higher

temperatures during the day. There are also increases in re-radiation at night resulting in lower night temperatures. Surface and soil temperatures increase in range and may be very much greater by day and lower at night than before clearing took place. There also may be an edge-effect in relation to solar radiation depending on the angle of the sun; the higher the latitude, the more it penetrates the edge of the remnant. The implications of these factors alone are significant. Changes in microclimate may result in changes in the species composition at the edges of remnants and may have major impacts on the soil biota with potential effects on ecological processes such as nutrient cycling. In addition, species present before clearing may not be able to be re-established because the changed microclimate may not

EDITORIAL

Greetings everyone!

In this issue we have some great members' contributions - observations, tips and stories. We hope you enjoy reading them as much as the editorial team did!

This is now the sixth year in which *Land for Wildlife* has been operating in WA and we are concerned about how we are managing to keep in touch with individual landholders. Some people ring up, for a chat, or to ask for specific help. Some we see on courses, field days, or at shows. But in some instances our only contact has been the newsletter. So, in 2002, we are hoping to revisit a few of the landholders whom we first visited in 1997. We'd like to know how you are getting on, whether our advice was helpful, and what more we could have done, or be doing, etc.

If you are an early registration - 001-200 - and would like another visit, please ring your *Land for Wildlife* Officer. And think up some curly questions for us!

This issue has another fencing article, this time a rather detailed description of feral-proof fencing,

based on one landholder's research into the topic. I know a lot of people are considering this option, but think carefully before you proceed - and not only about the cost. A small enclosed area becomes a zoo. Better by far, if possible, is to persuade your neighbours to band together to control foxes and so allow the native fauna a free range.

Because Western Wildlife won the WA section of the Landcare Media awards, I will be visiting Canberra in May for the National competition. Wish us luck! I hope to take the opportunity to meet some *Land for Wildlife*s from other States, to search out good ideas we can promote here.

Best wishes to everyone for 2002.

Penny Hussey

DO YOU WANT A SECOND BINDER?

If you have been with LFW for several years, and are filing all your Western Wildlifes, your binder will be getting quite full. If you would like a second one, they are available for sale:

Binder + GST = \$5.00
(if you collect it personally from a LFW Officer)

Binder + GST + postage in WA = \$7.70

(please make cheques payable to *Land for Wildlife*)

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Note: *Melaleuca stereophloia* was part of the *M. uncinata* group. It can be distinguished from typical *uncinata* as it has small leaves, <2cm, with a dumb-bell shaped cross-section and two rows of oil glands, one on each edge of the leaf. It is also genetically quite distinct. (See page 3)

Did you know?

That the early settlers cured dysentery by swallowing a lump, about the size of a little fingernail, of the red gum that oozes from Marri trees? (Efficacy not personally vouched for! - Ed)

From Tom Muir, Manjimup.

ECONOMIC ASPECTS OF BIODIVERSITY

THE SEARCH PROJECT - MELALEUCAS

Dan Huxtable

What is the SEARCH project?

The SEARCH project aims to develop a range of profitable woody perennial plant crops and products, suited to the different climatic regions and soil types in the WA wheatbelt. The project is being co-ordinated by the Department of Conservation and Land Management Farm Forestry Unit, with funding assistance from the Natural Heritage Trust.

As part of this project, several Melaleuca species (commonly known as tea-tree or broombush) have been identified as having commercial potential for leaf oil and biomass production. These are the same products that come from oil mallees. The project wants to further explore this potential by making a significant number of seedlings available for planting, so that farmers can gain experience in using these species and so that the beginning of a commercial resource might be established.

A role for Melaleucas?

Several Melaleuca species, all of which occur naturally in the wheatbelt, are being investigated (Table 1). The production system envisaged for Melaleucas is very similar to that of oil mallees. Therefore, there should be good opportunities for Melaleucas to complement the oil mallee resource and utilise oil mallee harvesting, transportation and processing equipment.

What is the 2002 Melaleuca planting package?

Seedlings of several species of Melaleuca are available for farmers to plant in 2002, together with fencing assistance where necessary. Landholders will have to prepare the site and be responsible for its on-going management. Details of the package are obtainable from the contact given below.

*Further details: contact David Kabay (Project Manager):
Ph (08) 9349 0401 Mb 0417 950 508
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Table 1: Melaleuca species available.

Approximately 2 million seedlings will be available to farmers across the wheatbelt. The availability of each species for individual farmers will be subject to demand. These will be grown from seed collected from parent trees in the wild that have been shown to have above average leaf oil content.

Species	Landscape Position	Soil Texture/Profile	Number available	Comments
<i>M. acuminata</i>	Lower Slopes Valley Floor Hillside seep	Grey/Brown/ Red, shallow duplex soils	220,000	Widespread across the wheatbelt, has high tolerance to waterlogging.
<i>M. lateriflora</i>	Lower Slopes Valley Floor Hillside seep	Grey/Brown/ Red clays or shallow duplex soils	1.25 million	Widespread across the Wheatbelt, has high tolerance to waterlogging
<i>M. stereophloia</i>	Midslopes Lower slopes Valley Floor	Red/brown loamy or duplex soils	50,000	Occurs in North and NE Wheatbelt.
<i>M. uncinata</i> "hamata"	Midslopes Lower slopes Valley Floor	Brown/yellow duplex soils	50,000	Widespread across the wheatbelt. Medium-high waterlogging tolerance
<i>M. uncinata</i> "spicate"	Upper and Midslopes	Yellow/brown sands/sandy loams	100,000	Occurs in North and NE Wheatbelt.
<i>M. uncinata</i> "stubby leaf"	Midslopes Lower slopes	Red/Brown loamy soils	100,000	Occurs in NE and Eastern Wheatbelt.
<i>M. uncinata</i> "uncinata"	Lower Slopes, Valley Floor Hillside seep	Red/brown clays or duplex soils	230,000	Occurs in South and SE Wheatbelt. Medium-high waterlogging tolerance

Notes on Salt Tolerance

- **High** - *M. lateriflora*, *M. acuminata* (EM38 horizontal mode <200 mS/m²)
- **Moderate/High** - *M. stereophloia*, *M. uncinata* forms "hamata", "stubby leaf" and "uncinata" (EM38 horizontal mode <150 mS/m²)
- **Moderate/Low** - *M. uncinata* "spicate" (EM38 horizontal mode <100 mS/m²)

Highly saline sites (bare scald, samphire flats) are likely to adversely affect plant growth for all species and are not recommended.

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provide a suitable environment for them. These effects will be exacerbated by grazing.

Clearing native vegetation also results in changes to the pattern of wind flow across the landscape, with less resistance and protection. Species that established themselves when the vegetative cover was continuous were relatively well-protected from the effects of wind. Increased exposure often results in increasing rates of wind throw and wind pruning of dominant plant species. This creates gaps in cover with increased chances for invasive species to establish. Increased exposure to wind can lead to increases in evapo-transpiration, reduced humidity and increasing desiccation rates. Increased wind may also lead to increases in fall of litter with potential for changes in the litter fauna and changes in nutrient cycling. In addition, there may be increasing movement of dust and seed into patches from the outside, further increasing the chances of invasion by species from outside the remnant.

One of the interesting things about native vegetation is that it is resistant to weed invasion until two things happen: disturbance and enrichment. With the combination of forces now operating, patches are often subjected to both. There are some interesting examples of this. It is possible in some patches to see where farmers have thrown dead sheep, and in doing so, they have created a disturbance and as the carcass rots nutrient enrichment follows. There is usually a tremendous seed source in the wool and it is easy to see these foci of weed invasion with the invaders radiating from them. The same phenomenon can be seen in a patch with an active wedge-tail eagle's nest. The adults bring parts of sheep carcasses back to that nest, tear them apart, drop the wool, often containing seed, onto the ground and void their faeces over the edge of the nest. Scavengers, like foxes, scrape around and again there is disturbance, enrichment, and a seed source. These might sound like small ecological processes within small

patches, however, over time they may become major degrading impacts.

Major changes in the hydrological cycle result from the removal or thinning of native vegetation. Problems with changes in the water table, including waterlogging and increased salinity, will be familiar to all West Australians, but clearing can also lead to more soil erosion, larger flood events, and redistribution of nutrients from farmland into remnants. Dryland salinity is now a major problem in many parts of Australia. In addition, saline waters flow into watercourses leading to destruction of freshwater ecosystems and loss of potable water. It is ironic that in the driest continent after Antarctica, some of our major environmental problems stem from too much water in the landscape.

Loss of native vegetation and its fragmentation have a number of biotic consequences that can be moderated by a number of factors. For example, time since isolation or creation of the remnant is a major modifying factor. The Theory of Island Biogeography states that at the time of isolation the island (in this case remnant patch) is carrying more species than it is capable of carrying over time and so species will be lost. This is the process of 'species relaxation'. Comparing the

species component of Tasmania with mainland Australia illustrates the truth of this theory. Tasmania is poorer in species. This is a function of area. The longer a remnant has been isolated the more species it will lose. The extensively cleared areas throughout Australia have already lost much of the native vegetation dependent fauna. That has been a fairly rapid response but the flora is following the same path, although the loss of plant species will take much longer. The dominant tree species may take hundreds of years before they disappear from regions, but unless we bear this in mind and work to counteract those losses we are going to see that ecological clearing continue. The point to note is that remnants will lose species over time and this will pose major management problems.

The number of species lost will also be modified by the distribution of native vegetation and the dispersal mechanisms of the plants and animals of the remnant. The shorter the distance between remnants and the greater the number of species with the ability to cross that distance, the greater will be the chances of the species remaining. Some species, which require other species to help them move around the landscape, are doomed if their transport is lost from the area, eg some species of the genus *Santalum* when the emu is lost from an area.



Quandong seeds in an emu plop (photo: F. Falconer)

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The debate about the value of landscape linkages (bush corridors) in nature conservation has been one of the most heated in academic conservation circles. Corridors may aid movement of species dependent on native vegetation; provide extra habitat; provide samples of former vegetation associations; and increase landscape aesthetic appeal. Linear strips of vegetation also have some disadvantages in their potential to aid the spread of pathogens, disease and pests and the high costs of maintenance due to the long length of edge compared to the area of the vegetation.

Remnants now occur in a matrix of human-dominated landscapes. Every one is likely to be affected by what is happening in the surrounding land. Nutrients and seeds being deposited in the remnant have been mentioned earlier. Species that depend on the surrounding land can also have an effect. Domestic stock are obvious examples but there are other more subtle ones: like the galah that has expanded its range because of human activities and competes with remnant-dependent species for nest hollows, damages and kills trees, and introduces the seed of invasive species via its droppings.

There are a number of characteristics of remnants that help to modify some of the degrading processes. Remnant size is an obvious one. The larger the remnant the longer it will be able to resist some of the degrading processes. Unfortunately we have no general information on how large remnants should be; that will be determined on a case by case basis, depending on position on the landscape, etc. However, the non-random nature of clearing of native vegetation will almost always ensure that the larger privately owned remnants are usually on the poorer soils and are not representative of the original vegetation associations.

The shape of the remnant will also help modify the effects of degrading processes, as will the position of the remnant in the landscape. Larger remnants have less edge compared with their area



'Paddock trees ... the quintessential Australian landscape'

than smaller remnants and are therefore subject to fewer edge effects. Those remnants lower in the landscape can be exposed to more of the impacts from the surrounding matrix.

The first rule of management of fragmented landscapes is that all the native systems left should be preserved, because they are going to be the skeletons on which we rebuild these landscapes.

What of the ultimate remnants?

These are the stately old paddock trees isolated from other elements of native flora by 'parkland clearing'. These contribute to what many regard as the quintessential Australian landscapes painted so evocatively by Hans Heyen. These sort of rural landscapes epitomise the way many urban Australians think about Australia. In 50 years time, most of these landscapes will have changed dramatically. How many single paddock trees are being considered in revegetation programs? There are billions of these trees - many of which are dying rapidly. I believe our rural landscapes are going to be looking considerably poorer and people are losing something of great cultural importance.

In addition, these single paddock trees have important ecological functions. They are very important to bats and many other animal groups for food, shelter and movement. We need to bear the capacity of the biota to move around the landscape in mind. I have had farmers say to me, "I'm interested in all you say, but why should we worry about a single species?" The answer is that we really don't know the functional significance of most of our biota. However, let us express the significance in terms of what we need to survive in this landscape. If we need our native vegetation surviving, most of it is pollinated by animals. We have lost many of the invertebrates which served this purpose and we are now losing many of the honeyeaters which are important in pollination. If we lose the honeyeater community, plants may have lost the ability to move round the landscape. Once that happens, we are going to have to take over that function for them or we will have patches which consist of the 'living dead'.

What follows from the ecological imperatives?

The era of broadscale clearing has finished; if only because most of the land suitable for agricultural,

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horticultural, etc (but not for urban development) purposes has been cleared. However there is still the danger of whittling away at the remainder; the supposed 'death of a thousand cuts'. There is no doubt that both education and legislation are required to halt this process. Legislation needs to put all applications for clearing into a perspective that shows transparently that the planned clearing will not result in the loss of a remnant of high conservation value or of high ecological value, or lead to further degradation of ecosystem processes. That means

identifying and weighing its value as part of the ecological function of the area; in its water use, moderation of erosion, etc. Individual trees also require this type of protection.

At present we hear talk of 'net gain' of vegetation. Unfortunately, unless there is considerably more action and very much greater expertise in landscape design, anybody talking about a net gain of vegetation is deluding himself. In Australia at the moment - and despite all the rhetoric in terms of revegetation - we face a massive net loss. We hear of off-set programs where one patch could be cleared subject to creation of an equivalent patch. Creation involves all strata, from dominant trees through understory, including grasses. It also involves establishing fungal-plant associations and other ecologically functional elements. We do not yet have the ability to restore to the same functional level of that which we destroy.

The critical need of native vegetation is management. Most remnants are degrading. Management of internal dynamics of remnants is necessary in order to halt the process. With larger remnants it may be necessary to manipulate disturbance regimes like



With no regeneration, this patch of woodland could be termed the "living dead".

fire as well as the population dynamics of key organisms. In addition it will be necessary to examine external influences and see if they can be moderated. On smaller remnants it will be necessary to concentrate on the external influences. This means integrated landscape management on an ecological basis with knowledge of what each remnant contributes to the ecological whole.

We need to value remnant vegetation better in an economic context. At present, remnant vegetation on agricultural land is valued on the basis of the economic value of the land on which it occurs, if put into agricultural production, or on the contribution it adds aesthetically to the resale price of the property. This valuation system is fundamentally flawed because it takes no account of the contribution the remnant vegetation makes by providing a range of ecosystem services from local to regional scales.

In conclusion I would like to say that Australians are currently standing at an ecological cross-road. There is no way we can go back to the landscapes of pre-1750. Where do we want to go? We can continue

down our present path; this will see an estimated 15 million hectares of agricultural land affected by salinity, many rivers further degraded and further loss of native plants and animals. Or do we wish to deal with the environmental problems in order to limit further loss of biodiversity and other environmental degradation? This means setting priorities for action and reaching thresholds of intervention to effect change. These are the decisions we, as a society, need to make.

I will finish with a conundrum that interests me greatly. Anybody who has been to a financial planner or who reads the business section of their newspaper will know that a prime rule in ensuring a viable financial future is not to put all our financial eggs in one basket. Why are we doing the opposite with biodiversity, our greatest resource?

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AFTER zigzagging our way down through the inland, our great Grevillea discovery trip then headed south to the wonderful Fitzgerald River National Park. Along Hammersley Drive we soon located *Grevillea tripartita*—they were only young plants as vast areas of the park had been burnt out by wildfires in the last couple of years. This Grevillea normally grows to several metres in height and has masses of large orange and yellow flowers for many months of the year. Not much further on the road drops down and crosses West River – here the soils change to granite and immediately we came upon *G. rigida*, a species with stiff prickly leaves and bright red toothbrush flowers for much of the year.

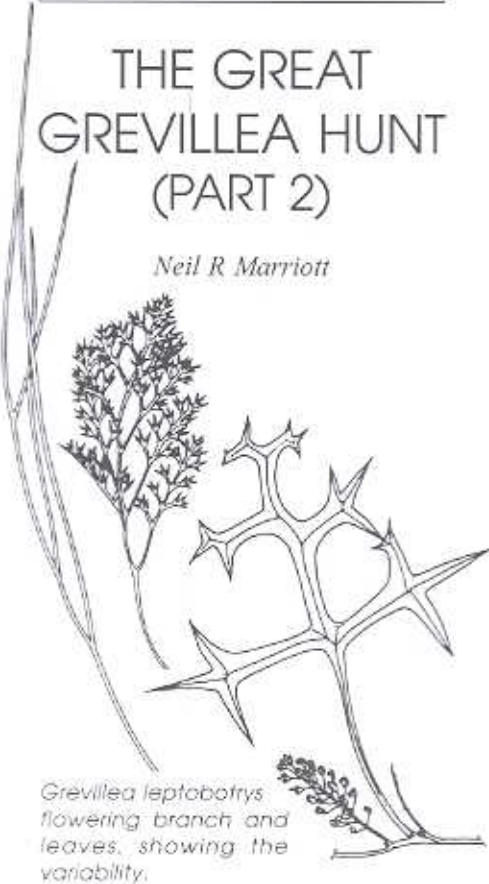
On the Quoin Head Track we came upon deeply divided-leaf specimens of the Comb-leaf Grevillea *G. pectinata* with attractive pink flowers. Further on as we ascended a low heathy ridge we came upon one of the National Parks endemics, *G. fistulosa*. These were erect shrubs to around 1m with masses of showy orange-red flowers with curious tiny yellow styles. As we approached Quoin Head we came upon *G. nudiflora*. These were low spreading shrubs to around 0.3m x 1m with narrow leaves and red and yellow flowers on long leafless stems running in all directions along the ground.

One of the Grevilleas Peter Olde and I have been searching for for quite a few years has previously only been recorded from Doubtful Island, off the coast at the western end of the Park. We felt that it would be worthwhile checking out the mainland adjacent to the island just in case! This entailed travelling along a rough and at times treacherous 4WD track out to Hood Point – outside the Park and the home of a tumble of run down fishermen's shacks. The entire coastline along this part of the West is spectacular, and Hood Point was no exception. No sooner had we

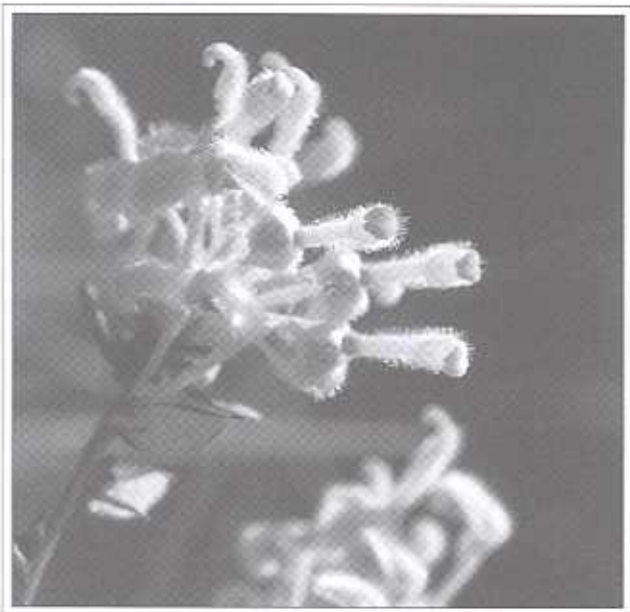
FLORA

THE GREAT GREVILLEA HUNT (PART 2)

Neil R Marriott



Grevillea leptobotrys flowering branch and leaves, showing the variability.



Grevillea candolleana.

driven up on to the high headland above the beach than we came upon big rounded Grevilleas with beautiful large bright red toothbrush flowers. Here, without any need for painstaking searching was another new and beautiful Grevillea species! From high up on the headland, the

view looking back along the coastline is breathtaking – crystal clear azure-blue water, dazzling white beaches and pristine green bushland make for a memorable sight. Why this huge area is not in the National Park is beyond me!

We went on to Albany and then west along the Muir Highway where we found a beautiful prostrate form of *G. depauperata*. This name was given to the species by Robert Brown and we are not exactly sure what he was referring to. The name 'depauperata' means 'starved or reduced', possibly in reference to the sparse foliage or open habit of many forms. At this site however the plants formed beautiful low mats with massed displays of brilliant fiery red flowers. In my garden it has become one of my most spectacular groundcovers.

A recently described species, the Lake Unicup Grevillea *G. acropogon* is a very rare and localised species from near Lake Unicup west of Frankland. We had searched for this species previously, only to find that the location we had been given was incorrect. This time we were determined to find it and came armed with a GPS unit so we could pinpoint the location. We scoured the site, finding a beautiful form of *G. leptobotrys* with deeply divided very fine foliage and showy racemes of bright pink flowers. But alas there was no Unicup Grevillea, despite standing on the exact GPS site as given to us by botanists from Canberra!

Reluctant to admit defeat, but now running short of time, we headed off to the Mitchell River, in the heart of the wet Karri Forests. Here an unusual divided leaf form of *G. diversifolia* ssp. *subtersericata* had been recorded. We searched the area, finding many plants, as well as *G. trifida* – low shrubby form - and *G. quercifolia* the Oak-leaf Grevillea with its beautiful long toothed leaves and showy pinky-mauve flowers.

We then headed back through Frankland to investigate a broad

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leaf form of *G. trifida*, which had been recorded on a road reserve to the east of that town. On arrival at the site we immediately found the plant and just as immediately realised that here we had a most distinct new subspecies of *G. trifida*. The new plant had very coarse, leathery wedge shaped leaves, was only around 0.3 m high and was suckering vigorously through the grassy undergrowth. At this site we also found *G. pulchella* ssp. *ascendens*, while a little further up the road we found another lovely form of *G. leptobotrys*.

Continuing our dash back north we wanted to find a most unusual simple leaf form of *G. leptobotrys* in Monadnocks Conservation Park between the Albany Highway and the Brookton Highway. At the turnoff on the Albany Highway we found a population of *G. manglesii* ssp. *dissecta*, including several with attractive pink flowers. Heading east into the Marri forest we stumbled on a population of *G. pimelioides*. Growing to around 1 metre they formed attractive rounded shrubs with massed yellow and orange flowers, with several characteristics that may warrant the recognition of this population as a distinct subspecies. We then headed along Qualen Rd where we located the amazing simple-leaf form of *G. leptobotrys*, looking the spitting image of a clump of grass!! Anyone not seeing the plants in flower would certainly be fooled. This also will most likely finish up as a new subspecies.

Another suspected new *Grevillea* species had been collected in the hills to the west of York. We were keen to locate it and eventually did so on Gunapin Ridge. The plants were lightly scattered through the open forest, and were full of fine white flowers. They formed sparse open shrubs, with bushy bases topped with long lanky flowering branches up to 2m and occasionally even 3m in height. They were clearly a new species, with closest affinities to *G. acrobotrya* from way up near Mt Lesueur north of Badgingarra! At another population nearby we also found several attractive pink flowered forms, as well as the rare *G.*

FLORA



Grevillea candolleana in a Toodyay road verge.

scabra, *G. synapheae* ssp. *synapheae*, and numerous other showy shrubs.

At the risk of wasting time on a wild goose chase we headed east through York to investigate yet another supposed new *Grevillea* species recorded at the base of the Needling Hills. Sadly most of this area is now cleared, and what is not cleared is infested with invasive exotic annual grasses. Not exactly the best location to look for new species! However we checked out every road, track and patch of bush in the area and eventually discovered a gravel reserve with relatively intact native casuarina woodland vegetation. Here we found not a new species but a number of natural hybrids between *G. vestita* and *G. paniculata*. They formed attractive rounded shrubs to c. 1.5m high, and may well be the 'unnamed species' collected for the area.

Our last day took us north of Perth, where the first stop was past Bindoon where the recently named *G. synapheae* ssp. *latiloba* grows. We had no trouble finding the plants as they grow right by the roadside

and are a massed display of showy cream catkin-like flowers. Not much further on we found another population growing with the extremely rare *G. drummondii*. This is a lovely small shrub less than 1 metre in height with massed small creamy-green flowers that curiously turn bright rose-red as they mature.

On the way back we inspected a population of beautiful prostrate Fuchsia *Grevillea G. bipinnatifida* growing along the road to Chittering Valley. Sadly, spraying, weeds and roadworks had destroyed most of the population. A common story in the West. We headed up into the Darling Range, saddened by the massive weed invasions that had occurred since our last visit. Just out of Toodyay we inspected *G. candolleana*, another extremely rare dwarf *Grevillea*, this one with massed cream spider flowers. Fortunately at present this species is holding on in an area unaffected by man and his weeds!!

It had been a momentous trip, in four short weeks we had uncovered several new species and numerous new subspecies of our favourite genus the *Grevilleas*. We came to realise that every piece of bush in the West has the potential to be something special—there is nowhere else in the world where new species of plants can be discovered growing in small bushland remnants, be they on a roadside or on private property. Take care of your bit of bush, who knows what treasures it may be hiding? If you DO have a plant on your block or growing nearby that you cannot identify, contact your local Community Herbarium. You just might finish up getting a plant named after you!! More importantly though, you may be helping to save yet another rare native plant.

As for Peter and I, we can't get enough of the West and are now preparing for our return trip this spring!

Remember, you can purchase our *Grevillea* Books Vols 1-3.

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ECONOMIC ASPECTS OF BIODIVERSITY

AGONIS FRAGRANS ESSENTIAL OIL – AN UPDATE!

Chris Robinson

WAY back in the April 2000 edition of Western Wildlife, regular readers may remember an article I wrote, 'Agonis oil and the curse of potential!'. Essentially I was looking at a 'where to now' situation for the commercialisation of an essential oil from a south coast native plant species.

Well, there have been some interesting developments since then.

Firstly the species which was undescribed and commonly called coarse tea tree was formally described by Department of Conservation and Land Management botanists, Judy Wheeler and Neville Marchant, early in 2001 as *Agonis fragrans* in Nuytsia, 13(3). This publication was funded by AGWEST's New Industries program and the Great Southern Development Commission. Having a legal scientific name will allow precise identification of this species in the commercialisation process.

Secondly, shortly after the article appeared in Western Wildlife, I was contacted by John Day of Perth. John and his wife Peta have a partially cleared paper bark bush block on the coastal plain west of Harvey, registered with Land for Wildlife and are readers of Western Wildlife. There they are growing *Melaleuca alternifolia* (eastern Australian tea tree) for the production of oil, which has recognised therapeutic properties. John (an industrial engineer) explained that he had built a large commercial still and had already produced a commercial quantity of tea tree oil, which they hoped to market in the near future.



He also indicated that in the longer term they were interested in expanding their range of essential oils and as a consequence of reading my article in Western Wildlife had rung to express his interest in *Agonis fragrans* oil. I saw that the Days may be able to take a role in the commercialisation and marketing of Agonis oil.

Soon after the call I headed to Harvey loaded up with 700 kg of mulched cultivated *Agonis fragrans* leaf material to run through John's still. It is extremely efficient and distilled about 5 litres of oil in about 75 minutes. This was a reasonable return as the material was relatively woody. We later supplied some of this oil to an industrial chemist to create a range of prototype cleaning products.

The Days have had great success in value adding to their tea tree oil, marketing under the Paperbark

Company label in small 25 ml bottles and are interested in producing their own Agonis oil to add to their range. Consequently, early in 2001 we established a trial planting of 5000 irrigated plants on the Days' property at Harvey and another 5000 plants were established on irrigated effluent at the Water Corp's Albany tree farm (see pic). These plantings will allow commercial quantities of oil to be produced in the next few years.

Introduction of *Agonis fragrans* oil to the market in this way may facilitate market familiarity and acceptance and eventually see a demand for greater commercial volumes.

Chris Robinson is a Development Officer at AgWA Albany. He can be contacted on 9892 8486.

An albino Scarlet Robin?

MARGARET SCOTT of Duranillin noticed a very unusual bird, it was white with a rose-coloured breast. It was hopping along with two Scarlet Robins, so she said: could it be an albino?

Senior Zoologist, Peter Mawson, confirmed that it could be an albino. The genes that control different colours in feathers operate independantly. The 'failure' of a gene for one colour can result in that colour being replaced by white (albino) or black (melanistic) forms. How long the animal survives probably depends on whether it becomes more conspicuous to predators.

(Mary Bremner has noted an albino Willy Wagtail on the eastern side of Lake Monger, where it had established a territory.)

Has anyone else noticed any odd colour variations? - Ed.

MEMBERS' PAGE

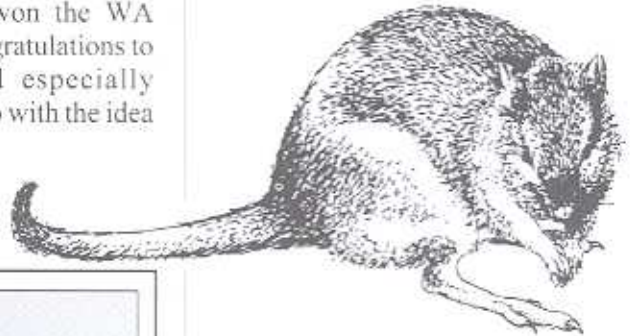
The first step
is someone
with an idea ...

ADELPE KING talked to 70 students at the York District High School about the need to control Bridal Creeper and suggested they breed leaf hoppers to help control the spread of the weed along the Avon River. The project was taken up and then extended to make a video 'Bridal Creeper Uncovered'. This was entered in the Waterwatch national 'Race Around the Catchment' video competition and it won the WA schools section. Congratulations to all concerned, and especially Adelpe who came up with the idea in the first place!

Woylies at 'Wildwater'

IN Western Wildlife 5/1 we reported that, in Dec 2000, woylies were released onto two properties in Harvey. This was the first time they had been put back onto private property that didn't have a fox-proof fence - but, of course, both have strict fox-baiting regimes.

Well, in October, Don Watts did some monitoring on 'Wildwater'. He reports that, of the 19 woylies released, he has retrapped 15 and many of the females have pouch young! In addition, he trapped 3



untagged females, the offspring of the original woylies. Don said: 'I was excited to find that one of the untagged females had a joey in the pouch, indicating that the woylies are settling in and breeding'. The woylies have spread up to 3 km from the release point and their diggings were found near the Harvey River in summer 2000 and on the higher ground last October. Don will continue his monitoring programme with spotlighting this summer and trapping in autumn 2002.

Peter Orell, the Western Shield Zoologist responsible for the translocation programme, was delighted with these results. 'This is a very high retention rate' he says. 'It shows that this is excellent habitat for woylies and that it is possible to reintroduce them into the wild without exclusion fencing, providing that the fox control is adequate'.

Claire Hall



Collecting local provenance seed for revegetation

UNDER the direction of local revegetation expert Bill Butler, Dwarlaking Catchment Group members collected seed from 4 local salt-tolerant Melaleucas for their 2002 project (this is *M. lateriflora*). These plants would have formed 'tea-tree thickets' on the now waterlogged and marginally saline areas that are to be revegetated. The group hopes to create new thickets which will provide excellent small bird habitat as well as helping to manage water and slow the spread of salt.

(Haven't collected seed, yet you've got some suitable wet sites to revegetate? You might be interested in the SEARCH project, see p3 - Ed.)

A Boost to the Environment

THE Ferreira family live at "Greenacres" in Wellard and every year, as part of their general support for the environment, undertake volunteer tree-planting with Western Power and Men of the Trees. This year's saga follows:

Mr and Mrs 'F' did it again ... this time with a bone cracking difference!!! In July we embarked on another weekend of tree planting, this time at Moora. Together with 90 other volunteers, we boarded the old Hotham Valley train, complete with a restaurant car, sleeping compartments, showers with hot water and toilets that actually flushed, all beautifully restored. The carriage we called 'home' for the weekend was just over 100 years old, but preserved with loving care. The seven car train was pulled by an antique steam engine that huffed, puffed and hissed it's way through the night from Midland to Moora. There we stayed, from dawn to dusk happily planting a grand total of 33,000 'little darlings' (seedlings) on hundreds of hectares of furrowed fields for the Shire and local farmers. Each evening we returned tired, cold, wet (it rained every day) and sometimes a little hungry, but everyone happy and content with the over-powering feeling that we were all doing something worthwhile for a change - the overall boost to the environment, no matter how little, was our reward.

On the Sunday, we left the wet, soggy fields and returned to our mobile hotel. We ambled back with pleasant thoughts of a hot shower, a

MEMBERS' PAGE

relaxed meal on board and a long restful train ride through the night, back to Midland. However, this fairytale ending was not to be, for within a few metres of the train, Mrs 'F' slipped on a gravel incline and shattered her ankle!



Within seconds, 90+ helpers converged on the scene with every type of advice and physical help. The caring response from all was very heart-warming. Finally, a Hotham Valley official drove us to Midland Hospital where first aid was administered, followed by a long ambulance ride (no flashing lights and siren) to Fremantle Hospital. A four hour long operation the next day, followed by a few days in hospital, brought our tree-planting episode to a close for this season.

We have already booked in to do our bit again next winter with the same group, Men of the Trees, and hopefully be transported by the huffing, puffing Hotham Valley steam train again. What a way to go! As I write this (November), I am happy to report that Mrs 'F' has graduated from a wheelchair with an 'L' plate attached, to crutches, and today, just a walking stick!

The healing powers of tree planting know no boundaries!

Vic Ferreira



Natural regeneration - grab the chance!

AFTER the very heavy summer rains of 1999, Gary Butcher of Pithara, noticed seedlings from a lone paddock tree appear among the crop. (We think it is *E. kochii* - Ed.) He put a fence around them and now they have formed bushes while the roots are getting established. This is the natural growth pattern of mallee eucalypts, which establish roots and lignotuber first, to ensure long-term survival, before they start growing tall. "It's a good idea to watch for such seedlings and fence them out", Gary said, "as natural regeneration like this is a bonus to your revegetation plans."

PRACTICALITIES



OUR interest in this area has evolved over the past few years and is now a five year project on 'the list'. We offer our ideas here for suggestion and comment from other people in *Land for Wildlife*. The reasons for proceeding in our case are threefold: -

- 1 nature conservation reasons - we have recently placed a conservation covenant over the block
- 2 production reasons - we grow Proteas commercially and look forward to excluding most kangaroos and all rabbits
- 3 privacy reasons - we live in a high tourist visitation area (the Leeuwin-Naturaliste Ridge) and often have uninvited visitors; the introduction of dieback is also an issue.

Vermin proof fences can never be considered absolute; they do have to be well maintained and periodically checked for breaches. Fencing costs vary enormously depending upon their design, quality of materials used and whether you build it yourself or have it contracted out. We chose to build the best possible affordable design using good quality second hand materials and our own labour. We are fencing 1.7kms to enclose 45 acres, fortunately mostly on well-drained sands, but we do have a substantial creek to cross twice, plus one small winter creek.

Our choice? ... you can see by the sketches we are very confident of succeeding! We think we will use 1.8m standard hingemesh, an apron along the ground and up the fence plus an electrified overhang, all suspended on 40mm galvanised water pipe uprights 3 m apart (Figs. 1 and 2). To date we have built nothing, but we have started to collect all the materials needed. Can anyone offer comment and suggest anything that might be better or simpler to build?

VERMIN PROOF FENCING

Neil and Gail Taylor

Materials to be used:

- ▶ 50x50x3.2gge galv. hingemesh 1.8 m high. We have currently salvaged 0.7 km from various sources. For aesthetic reasons we will buy new material (black plastic coated) for erecting adjacent to our main entrance.
- ▶ the 40mm galv. pipe (plus larger sizes for strainers and creek crossings) is a big scrounge! So far we have well over half of the 630x3m uprights needed - small bits here and there all add up and are at least a third the cost of new material.
- ▶ plain fencing wire: we plan to buy the new 'life wire' on the market as once wire is in the fence it will be difficult to replace.
- ▶ insulators: we propose to drill all uprights to take the wire. Each hole will have inserted a 4mm HD poly pipe (with the tool shown) with ends sticking out 30mm to stop short circuits. Corners will be different, requiring a stout arrangement to take the strain ideas?



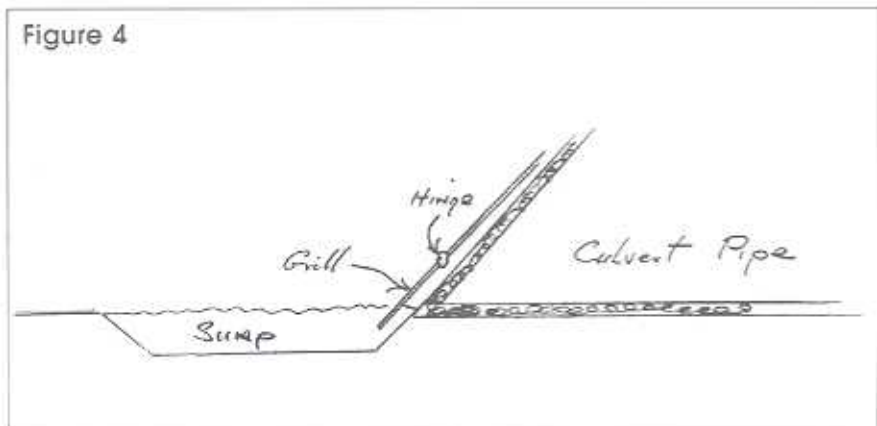
- ▶ creek crossings: our fence must cross a creek that is prone to flash flooding. We will be installing twin concrete culverts 1050mm diameter. The sketches (Fig. 3) show the broad idea - fence over the top and a grille at the pipe exit to stop entry. Finer points that are not obvious in the sketch:-

2m out from the culvert pipe entrance will be a low 0.5m mesh/grille to catch debris in low/moderate flow conditions. This can be manually cleaned as required - we anticipate annually due to the vegetated nature of the creek upstream.

The exit grille is hinged at the top, the end of the culvert is cut at 45° and the bottom third of the grille ends underwater (see fig. 4) with a gap below to allow debris in a flood to pass freely. The gap would be plugged in the dry.

The project is a big one for us as we both currently work full time. We are aware of a few other local properties going down a similar path and encourage others to take up the challenge. We look forward to feedback and can be contacted at PO Box 77, Yallingup, 6282, or phone/fax 9755 2189 or email: neilta@gov.wa.au

Figure 4



PRACTICALITIES

Vermin Proof Fencing continued from page 12

Figure 1
Side Profile Av. Post.

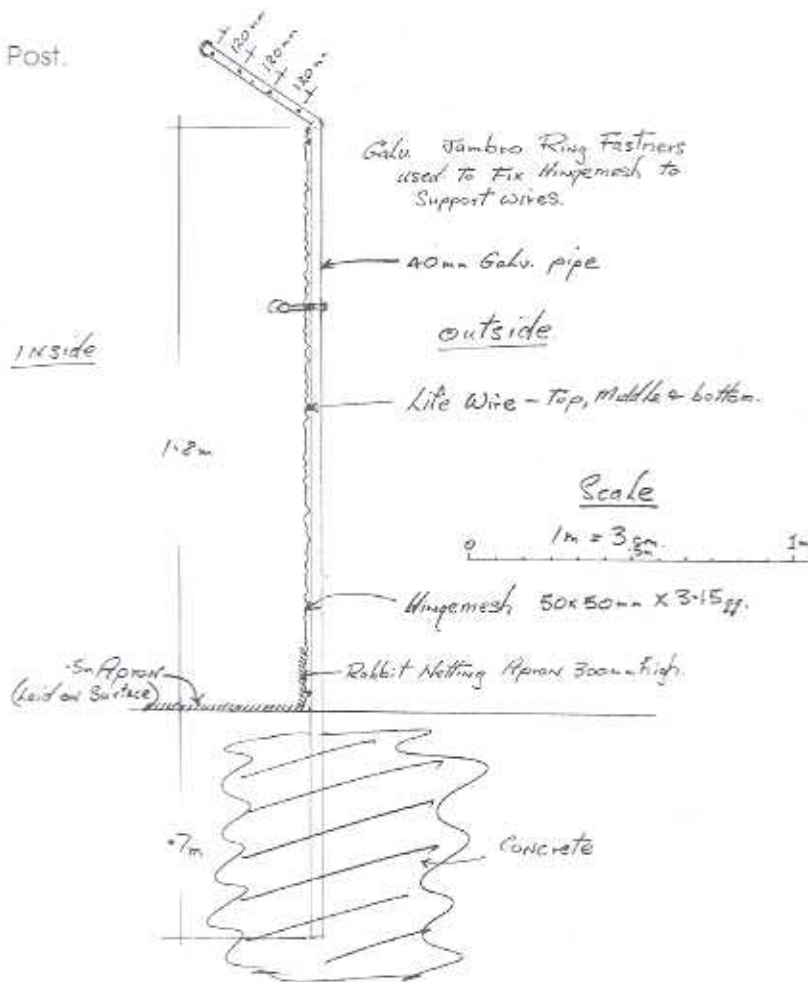
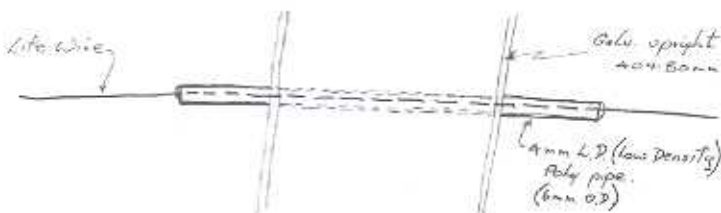


Figure 2

Electrification Detail: not to scale
(Power source will be mains using an off the shelf Electric Fence energiser)

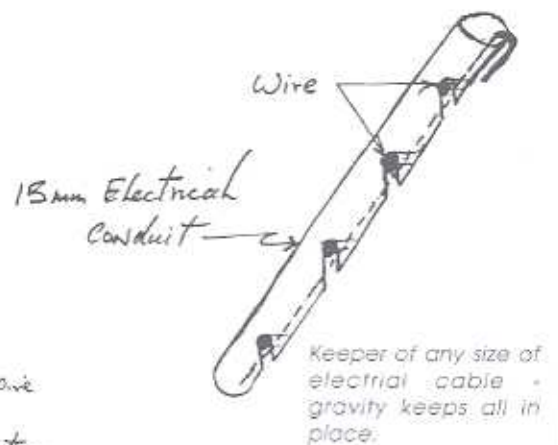


Notes:
6mm hole drilled in pipe
Black poly insulator inserted protruding out each edge by 30mm
Black poly insulates and seals upright so that no water runs down the wire and is deposited inside upright
Tool to push in poly to get tight fit



Std. Fencing technique of going underground below gates will be used - Isolating Switches will be used to enable the fence to be "broken up" into sections for maintenance purposes

Insulator to keep wires exact distances apart between uprights
not to scale

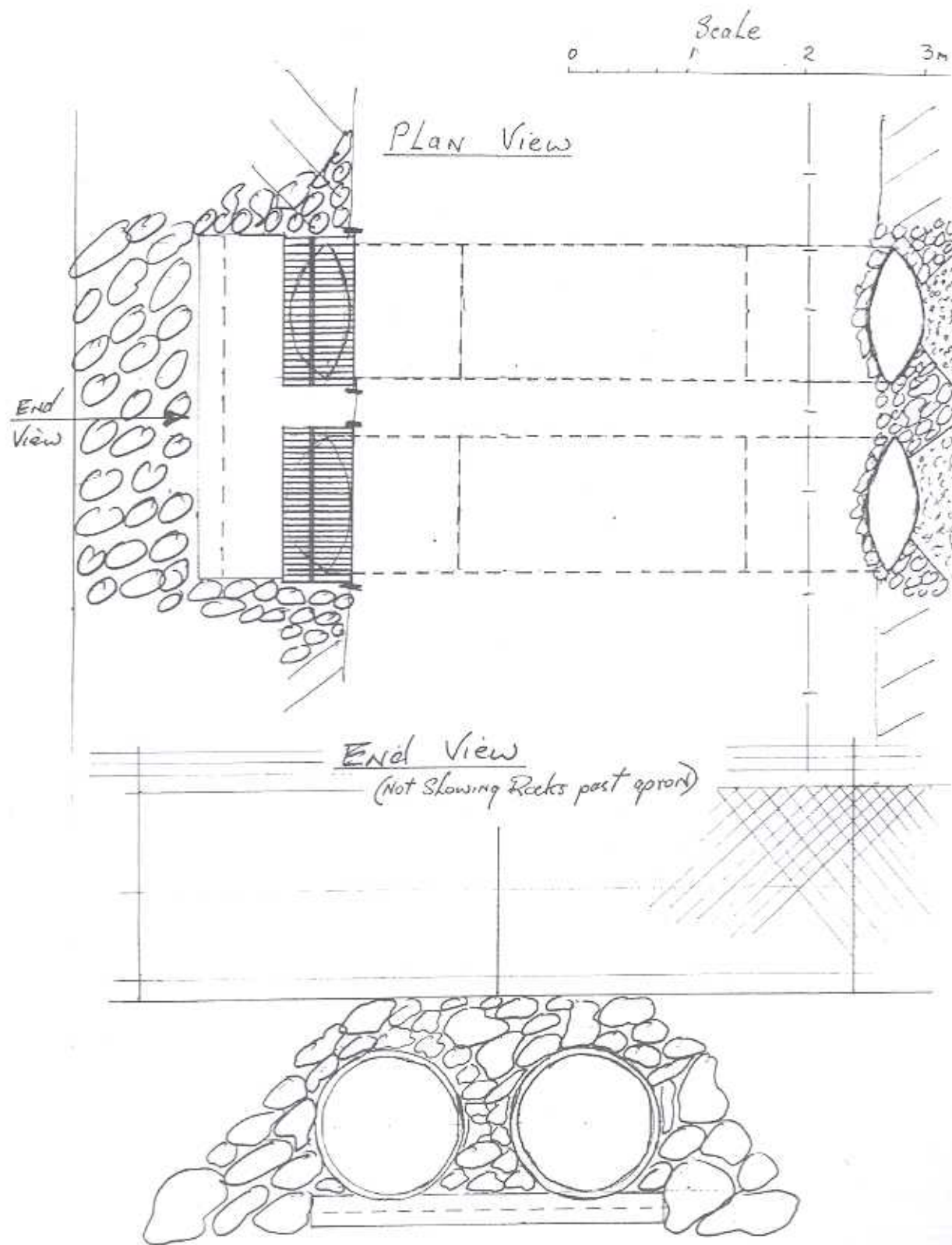


PRACTICALITIES

Vermin Proof Fencing continued from page 13

Figure 3

Major Creek Crossings TYPE 1



LFW NEWS

'BROOMEHILL AQUAFEST'

AVRIL BAXTER, *LFWO* at Narrogin, reports that this event was so wet the boats were in their element! The *LFW* display was in the tent next to the winetasting, a useful juxtaposition for customers on both sides!

MANAGING YOUR BUSHLAND WORKSHOP - MUNDARING

LFW combined with the Department of Conservation and Land Managements' Hills Forest to organise another popular 'Managing Your Bushland' workshop. It is hoped to continue the series next year, perhaps with the workshops having specific themes, eg 'fauna', 'flora' or 'fire'. What would *LFWers* like?

Bob Huston

FAUNA FIELD DAY, COOROW

A very successful Field Day was held by *LFW* in the Waddy Forest Catchment, when we considered the needs of fauna in our fragmented bushland/farming landscape. There were general talks as well as specialist ones on birds, invertebrates and fungi. The complexity of the natural system was an eye-opener to many participants! In the afternoon we visited bushland where the experts led groups in search of their own speciality. An astonishing variety of smaller creatures were seen.

Among the attendees were two local school students who had wagged school (well, with permission, we hoped!) because they are fascinated by fauna. Are they going to be the research scientists of the future? The whole day generated a lot of interest and was great fun, so we hope to run something similar next year.

Fiona Falconer

AN INTRODUCTION TO OUR WILDLIFE - MERREDIN

IN mid September at Booran, 11 km east of Merredin, Geoff Burrow did some fauna trapping with *LFW*. Geoff, together with Arthur Adamson and Buddy Kent, put in 30 pitfall traps and 50 Elliott traps on the Adamson property and in a nearby bushland. Various people helped check the traps twice daily for seven days.

We trapped pygmy possums, dunnarts and Mitchell's hopping mice, as well as a gecko, skinks and different frogs. It was wonderful to see these animals close up! Together with other observations - including scats, tracks and bird calls - we recorded 5 native mammals and 4 introduced ones; 28 bird species; three reptiles; two frogs and many different invertebrates.

It was most surprising to find that we had so many pygmy possums throughout the bushland despite the fact that many foxes and cats were present. Hopefully a baiting programme can be organised in the near future.

At first we were still experiencing early morning frosts and even thick fog some mornings, but by the Monday the weather had changed to hot and many small ants started to invade the traps. We therefore decided to discontinue and remove the traps.

Heather Adamson.



A pygmy possum



▲ *Kastelle Adamson checks a pitfall trap on a misty morning*

A wheatbelt stone gecko. ▼



LFW NEWS

FAUNA SURVEYS ON A PROPERTY IN YELVERTON BROOK NEAR MARGARET RIVER:



Quenda mother and baby. (photo: David Marshall)

IN October fauna surveys were carried out on a *Land For Wildlife* property to ascertain what species of fauna were in the bushland.

The property consists of a lovely creekline full of reptiles and birds, it is well vegetated with a diverse variety of flora. There are dense thickets of shrubs and sedges - but the most attractive to the many birds is the scarlet flowered swamp bottlebrush. Jarrah/banksia bushland to the north of the property has a wealth of species. At the western end of the property is banksia bushland where the vegetation is sparse but there are plenty of bobtail skinks.

The property owners obtained a licence to survey fauna during October. They used casual observations, spotlight and sand surveys along the boundary fencing to see what might be coming through or under the fences. There were many tracks seen on the smooth sand and quite a few observations on a daily basis. For four days a consultant, Dr. Per Christensen, and myself, together with students from Busselton TAFE Land Management course and the property owners, carried out fauna surveys by different methods.

Two years ago there were signs of tiger snakes, bobtails, a range of birdlife, frogs and quendas. This was before fox baiting had started and before a boundary fence was constructed. Foxes are still entering the property, as shown clearly by the

sand surveys but appear to be controlled. Baiting has been in place for the past two years and our results show that although the same species are on site, their numbers have increased, especially the quendas. More quenda diggings are visible and quendas with young were seen near the creek.

Some very clear messages arose from this survey:-

- (a) Fauna surveys can be carried out in many ways - observations and sand surveys being less invasive but still very interesting and accurate survey methods.
- (b) Fox baiting is essential if you want to bring wildlife back.
- (c) Fencing of bushland can fence in wildlife as well as fence out ferals.
- (d) Feral proof fencing is not always completely feral proof.

If *Land For Wildlife* property owners would like to carry out fauna surveys on their own properties, take a pair of binoculars and go for a gentle walk every morning and take a torch or spotlight out with you every night, and smooth sections of yellow builders' sand out along firebreaks. This is always a great start - you see what is on your property and it has less impact on your little inhabitants. There is also the Fauna Survey Booklet available through *LFW* Officers.

Cherie Kemp

CREEKLINE REVEGETATION WORKSHOP - BUSSELTON

LFW and Ribbons of Blue held a workshop on the 28th Nov. at Busselton TAFE Campus. Of the 41 people who attended, 31 were *LFW*ers.

Among the most popular of the topics discussed was the inter-relationship between plant species and fauna habitat, and during the picnic lunch under the peppy trees we were able to see a ringtail possum drey and possum box where the resident possum sleeps, and raids the nursery by night. All attendees of the workshop were encouraged to take advantage of looking at and taking home some tubestock of indigenous species grown by the TAFE students, to use for next year's plantings.

After lunch everyone travelled to Dunsborough to visit a streamlining project which involved community members including Toby Inlet Group, Greencorps, TAFE students and other volunteers.

Immediately following this was a visit to the refreshing property of Jan and John Hemsley in Dunsborough which has a diverse range of vegetation from a creekline, granite outcrop areas, ironstone areas and jarrah/banksia forest. John explained how the property was once part of a large farm owned by his family and when subdivided he was given custody of the only patch of bush remaining on site. It also adjoins a reserve where the locals enjoy bushwalks and the company of many kangaroos hopping through the bush beside them. We had a lovely bushwalk with local botanists Richard Clark, Mary Hughes and Daniel Winton assisting with the identification of plants and seed type.

It was a very warm day outside but a very pleasant day was had by all. This one was so successful, and so much fun, we will definitely be having more next year.

Cherie Kemp

LFW NEWS

WALLABY RELEASE AVON VALLEY NATIONAL PARK

Jim Maher

It is now six months since the release of the black flanked rock wallabies (*Petrogale lateralis lateralis*) and the tammar wallabies (*Macropus eugenii derbianus*) into the Avon Valley National Park and all is looking very good for both species. The most important aspect of the translocations is that there has been only one reported fatality, a tammar which was hit by a car on Plunkett Rd approximately one and a half kilometres from the release site, however the pouched young was saved and is being cared for by a local wildlife carer in the Chittering area.

The black flanked rock wallabies have been very hard to view due to their secretive nature, and this has been very frustrating for the support groups that have been attempting to monitor them. Craig Pentland, a student at Edith Cowan University, has been observing them as his project under the direction of Adrienne Kinnear, and he has been able to view them at various times of the day. As the ranger in charge of the park I have also been very fortunate to view them at both locations but it is very hard to pick up which ear the yellow tags are in because they move so quickly, and I have not been able to view their activities for long periods.

In all areas that the translocations took place, the animals have moved away from the original release sites, but it appears they revisit these sites as I have located scats there. Two students from Murdoch

University, Lisa Ang and Gabriella Martinez, have also contributed to the project by working on the vegetation grazing aspect at the black flanked rock wallaby sites and also a control site south west of the original release site on the southern side of the park, and they are preparing a report of their findings. By the time this article goes to press I will have also completed some spotlight transects of the tammar wallaby release sites and I will be able to report on these in a future issue.

Finally, to all those who took part in the translocations don't lose heart because you have not been able to view these wonderful creatures as yet, as I will keep you all informed of the animals' locations and possible viewing sites.

*Jim Maher is Ranger in Charge,
Avon Valley National Park.*

A VISIT TO HQ

THE Minister for the Environment and Heritage, Dr. Judy Edwards, recently visited the Operations Headquarters of the Department of Conservation and Land Management at Kensington. Apart from chatting at morning tea, she also toured some offices, and *Land for Wildlife* was one of those. Claire Hall explained what happens from receipt of an application form to the production of a property report - three days' work in one minute flat! Dr Edwards said that if she had a suitable property, she would definitely register!

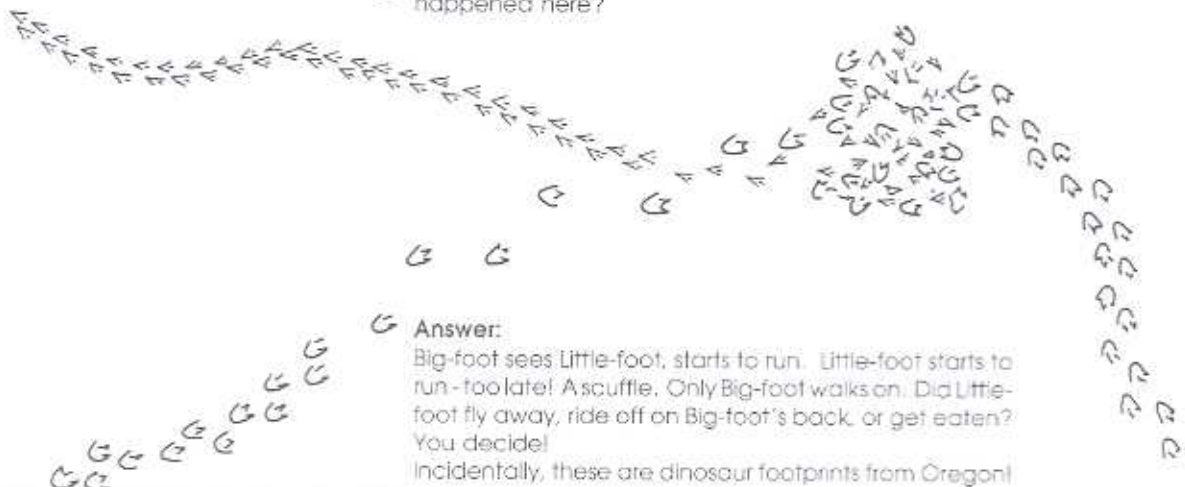
Penny Hussey

BUSH DETECTIVE



Question:

Looking for tracks in sandy ground can tell you a lot about the animals in an area. What do you think happened here?



Answer:

Big-foot sees Little-foot, starts to run. Little-foot starts to run - too late! A scuffle. Only Big-foot walks on. Did Little-foot fly away, ride off on Big-foot's back, or get eaten? You decide!
Incidentally, these are dinosaur footprints from Oregon!

ECONOMIC ASPECTS OF BIODIVERSITY

FIELD DAY ON PROFITABLE REVEGETATION WITH SANDALWOOD ATTRACTS INTEREST

Chris Robinson

THERE is no doubt that landholders in the wheatbelt will respond to the need to revegetate if there is some prospect of a commercial return in the medium to long term. This was clearly demonstrated with the good turn out at a field day held around Gnowangerup and Borden in October 2001. The purpose of the day was to showcase field trials and new establishment methods which will encourage landholders to adopt the WA native sandalwood as a profitable revegetation option.

Interest was high with over 60 people attending from all over the south-west. Most were farmers but at least three commercial tree companies were also represented. Many of these people are already growing sandalwood on a smaller scale but the level of interest indicates that there will soon be some bigger plantings.

The day was sponsored by the NHT project *Sandalwood to protect biodiversity and sustainability* which is a joint initiative between the Gnowangerup LCDC and Department of Agriculture Albany Office staff, Chris Robinson and Geoff Woodall. This project is focusing on using a wide range of local species, direct seeded as host revegetation to support sandalwood. The range of species (mostly acacia, other legumes, sheoaks and hakeas) will have a significant nature conservation value and be more likely to sustain sandalwood over a longer period than a host monoculture. In the Pallinup River



One year old sandalwood on the right with haustorial attachment straight into its one year old jam host on the left.

valley, which drains the country around Gnowangerup, remnant sandalwood trees parasitise a wide range of native legumes and some non-leguminous plants. This revegetation will link up numerous remnants and reserves along the valley.

The field day started with a mini-seminar and went on to inspect a number of field sites. The first was west of Gnowangerup, where sandalwood and hosts were germinating on site from 2001 direct seeding. A Chatfield tree planter had been used to scalp away the weed burden and prepare the sandy soil for host seeding at a rate of 500 gm per hectare. Additionally, some pregerminated sandalwood seeds

had been planted with jam seedlings. The second site, just north of the Stirling Range, was an older host plantation of direct seeded jam established in 1998, now supporting about 200 sandalwood up to two years old.

The last site was of particular interest, as one year old plants established by the "one-pass" technique conceived by Geoff Woodall were inspected. This technique establishes a primary host jam seedling with a pre-germinated sandalwood seed, planted together over a direct seeded host mix in the one pass on the same day. The field day attendees were impressed with the exceptional growth of the one year old sandalwoods, each of which had been planted with a jam

seedling as a germinating seed in July 2000. The young jams had been directly parasitised by the young sandalwood, which had sent a root with haustorial sucker straight into the main taproot of the jam. This technique speeds up establishment time of the parasitic sandalwood by at least one year.

The day concluded with a stroll through a large bush remnant which is now vigorously regenerating in the absence of sheep. The landholder has introduced more sandalwood into this remnant by direct seeding nuts adjacent to existing jam trees.

For further information on Sandalwood growing, contact Chris Robinson 9892 8486; Geoff Woodall, 9892 8427; or Jon Brand, 9334 0327

COST OF FIRE ANTS

IN Western Wildlife 5/3 we asked you to watch out for Red Imported Fire Ants which had become established in the Brisbane area. Well, the Queensland authorities have a strategy to eliminate them - at a cost of \$123 million! Yes, that's \$123,000,000. Perhaps the figure only comes into context if you accept that if the ants spread widely, it is estimated that they could cost Australia \$6.7 billion over 20 years.

Does anyone still think that imported organisms are a small problem?

From Qld conservation biologist Tim Low, author of 'Feral Future'.

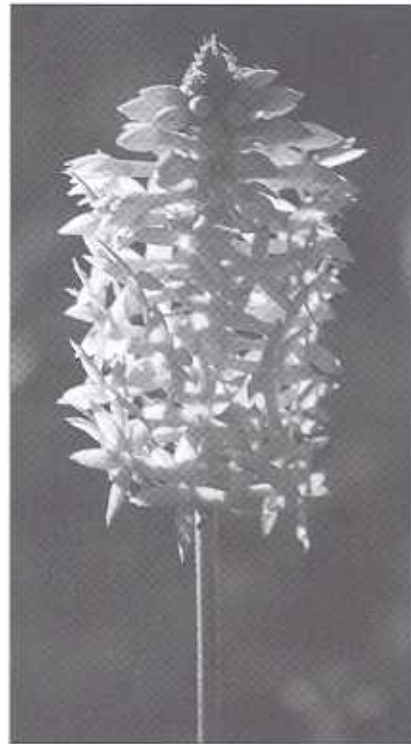
BIOSECURITY STRATEGY - NZ

BIOSECURITY' is the term being used for the protection of a nation from an influx of exotic weeds, pests and diseases. It applies to all of a nation's terrestrial, freshwater and marine environments and involves quarantine and inspection services at points of entry as well as response to outbreaks. It is suggested that, from both production and conservation viewpoints, Biosecurity should have the same priority as National Defence.

New Zealand's Minister for Biosecurity has asked NZ's Biosecurity Council to develop a Biosecurity Strategy. You can find out more about it on the website - www.biostrategy.govt.nz

It is understood that Australia is considering a similar process.

IN BRIEF



STACKHOUSIA MONOGYNA

THIS plant is widespread and common in woodland, mallee and forest throughout the south-west, often reappearing in woodlands after stock grazing pressure has been removed. But it has no 'common name' (well, apart from Common Stackhousia). It is widespread in the eastern States too, and in NSW it is called "Creamy Candles". What do you think? Should we suggest that name over here?

NEW PROJECT AT DONGOLOCKING

WHAT is the viability of remnant vegetation? A new project, based at Dongolocking, is attempting to throw some more light on this question. Researchers Margaret Byrne, Dave Coates and Colin Yates, all based at the Perth Herbarium, will investigate the effects of disturbance and population size on the viability of the remnants, using three common and widespread species, *Calothamnus quadrifidus*, *Eremaea pauciflora* and *Eucalyptus wandoo*. It is part of a national research project, funded by Land and Water Australia, with other study areas in NSW and Qld.

For more information ring Dave Coates, 9334 0490.

(Note the article by two of the authors on the persistence of rare flora in WW 5/4, pp 12-13.)

DEGRADATION OF RIPARIAN VEGETATION IN NSW - A KEY THREATENING PROCESS

UNDER NSW Fisheries legislation, the degradation of native riparian vegetation along all NSW water courses has been listed as a Key Threatening Process. It is interesting that it is fisheries that see riverine vegetation loss as a major problem ...

REVEGETATING YOUR BUSH BLOCK?

ARE you planning to revegetate and restore your bush block, create wildlife corridors and develop more shade and shelter but would like some assistance in the gathering of native seed to start you off?

Men of the Trees Nursery in Hazelmere is a non-profit, charitable organisation with a team of dedicated volunteers who regularly go out seed collecting for various projects. We would be happy to help you with

seed collecting. You would then have your own provenanced seed from which to grow your seedlings. Alternatively, our native plant nursery would be happy to propagate the seedlings for you and, if you wish, could plant them out for you the following season.

For more information contact Gemma Parry, Nursery Manager, MOTT, ph: 9250 1888



NEW BOOKS

Critters & Crops - the critical connection
Wendy Bradshaw
Pub: Greening Australia Western Australia

This delightfully presented book has been developed for the farming community to explain the services that are provided by biodiversity to agricultural enterprise, and it aims to raise farmers' awareness of the benefits and importance of protecting and managing biodiversity on their properties. It uses a series of short articles and case studies to illustrate key messages. The text is concise and easy to read, and there are lots of clear diagrams and lovely illustrations, although I question some of the concepts highlighted, including the relevance of the NSW model to the management of water in Western Australia. However, the main beef I personally have is that the layout is A4 landscape, awkward for my bookshelves.

The book is being distributed free to interested landholders, who will then be surveyed after six months to determine how useful they found it. I believe that all *Land for Wildlife*ers will enjoy reading this book - I certainly did. To obtain a copy (if there are still some left), contact your nearest GAWA Bushcare Support Officer, or LFW Officer.
Penny Hussey

FUNDING

Gordon Reid Foundation - grants for conservation works

Grants are available for on-ground conservation works to assist community groups improve their efficiency and effectiveness.

For more information contact Program Coordinator on 9340 5270 or email community_funding@lottery.wa.gov.au

NHT Version 2

At the time of going to press, no firm advice available. Contact your CLC.

Avon Catchment Council Community Grants

Grants to either community groups or individuals are available to approved projects in the Avon, Yilgarn/Lockhart Catchments. The project needs to be part of an existing farm or catchment plan and link or integrate with other works.

For more information contact Caroline Horsfield on 9690 2250 or email: chorsfield@agric.wa.gov.au

WANTED, STUDY SITES FOR ARID ADAPTED FROGS!

What we want to study

Western Australia has about a dozen frogs that are adapted to living in arid areas. These frogs remain burrowed in the ground for many months, sometimes years, waiting for it to rain. When heavy rains come, they dig their way to the surface to feed and reproduce, before returning to the ground as surface water disappears.

We are undertaking a two-part (field and laboratory) study of the physiological, anatomical and behavioural adaptations that enable these frogs to survive in arid areas. The three year field study will investigate movement patterns, reproduction, feeding and burrowing sites for a number of frog species.

How we want to do it

We wish to set up study sites to investigate (using radio-transmitters) the ecology and reproductive behaviour of three specific frogs; the Western Spotted frog (*Heleioporus albopunctatus*) that is found in the wheatbelt, and the Water-holding (*Cyclorana platycephala*) and the Desert Spadefoot (*Notaden nichollsi*) frogs that are found in central Western Australia.

The field study will commence immediately after heavy rains and we will monitor the frogs for an extended period or until they burrow into the ground. At a later date we will return to the site to find burrowed frogs.

Can you help?

We are seeking a study site in the wheatbelt that has a known large population of the Western Spotted frog and a site in central WA that ideally has a known large population of the other two frogs. We will consider two sites in central WA, one for each frog species. We are hoping for sites that have 4WD access during wet weather, basic accommodation that we can use during our fieldwork (e.g., shearing quarters) and owners/managers that are interested and supportive of our research.

If you can assist our research or want more information, please contact: Dr Graham Thompson: ph 08 9385 2398; email: g.thompson@ecu.edu.au or Prof. Phil Withers: ph 08 9380 2235; email: phillip.withers@uwa.edu.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 Conservation and Land Management.

Published by the Department of Conservation and Land Management, Perth. All correspondence should be addressed to: The Editor 'Western Wildlife', Department of Conservation and Land Management, Wildlife Branch, Locked Bag 104, Bentley Delivery Centre, WA 6983.

Design and Desktop publishing by Louise C. Barch Graphic Designer.