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AND LAND MANAGEMENT
Conserving the nature of WA



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NEWSLETTER OF THE LAND FOR WILDLIFE SCHEME

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WHALE BEACHINGS IN BUSSELTON

Cherie Kemp

The first whale stranding occurred in the early hours of Sunday 3 April 2005 and continued through to Monday 4 April 2005. Nineteen Long-finned Pilot Whales had beached themselves along 20km of the Geographe Bay foreshore from Peppermint Beach to Siesta Park.

The telephones started ringing at CALM, Busselton between 7AM and 8AM in the morning with people reporting sightings in various locations along the coast, the main pod being at Port Geographe. The word was put out throughout Busselton that volunteers were needed on the beach at different locations and people started arriving all along the beaches willing to help the whales.

Wetsuits were donated from local dive shops, boats were offered from owners and the phones were ringing hot with offers of assistance in all areas. Tents were erected with a media tent, catering tent and volunteer station for volunteers to sign in. Food and drinks were delivered and were provided continuously throughout the day, and volunteers changed shifts when they felt too cold or needed something to eat or drink.

With the whales being scattered along the coastline, it was decided that, because Long-finned Pilot Whales are a social group of marine animals, the best approach was to get the whole pod together before taking them into deep waters. So, an operation proceeded to look



Long-finned Pilot Whales on Busselton beach before volunteers arrived. (Photo: Murray Dix)

after the main pod at Port Geographe while the other whales were transported by various methods to the Port Geographe location.

Volunteers had many interesting stories to tell. One lady said that when one of the largest male whales (7m) was brought around the groyne by a boat, all the other whales started moving around and making noises, apparently happy to see him. Another noted that when photographers entered the water to take photos of volunteers, the whales lifted their heads to

smile at the cameras. Everyone had their favourite whale and many volunteers even named their whales – Moby, Baby, Nemo and Sponge Bob were among the names.

It was decided that the whales would need to be kept overnight, looked after and taken to deeper waters in the morning, so the operation was expanded to accommodate this. Fires, barbecues, hot showers, hot food and drink and big lighting systems were bought down onto the beach. A second shift of CALM staff and volunteers arrived to take over for the night and allow the daytime shift of volunteers to go home and rest to return the next day. The following day volunteers were called in with surfboards, surfskis and small boats to assist in the release of the whales. These were used to herd the whales out, with the assistance of all the spectators on the beach and the volunteers in the water making noises. Once out past the groynes the larger boats took over and escorted all the whales in the pod around the Cape and into deeper

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EDITORIAL

Greetings all!

We have some great stories in this issue covering a wide range of topics, from fauna, such as possums, whales and owls to management issues, such as plant diseases and fire regimes. We have also received some great contributions from members for this issue, including some more fox stories and a couple of interesting notes about Acacias, one that lead to the Weed Alert article for this edition.

LFW is continuing to grow at a rate of knots and has taken on two new staff to help cope with demand. Kathleen O'Brien is based at CALM, Katanning and started work with us on 26 May 05. The Katanning area has been without a *LFW* Officer for some time, and Kathleen will be contacting all the local members to see how they are going and if they would like another visit. Also, as part of a South West

Catchments Council funded project initiated by the Katanning LCDC, Kathleen will be assisting with rapid appraisal of private bushland sites for suitability as Carnaby's Cockatoo habitat. Teagan Smith commenced with *LFW* on 13 June 05 and is based at CALM, Kensington. Teagan will be assisting us to reduce the backlog of property visits on the Swan Coastal Plain and in the Perth Hills. So, if you are in these areas and have been waiting a while for a visit from us, just hang on, we will be calling to arrange a visit soon! If you would like to speak with Kathleen or Teagan, their contact details have been included in the list below.

Many of our staff have also been involved in assisting current and new *LFW* members with Bushland Benefits applications. Penny Hussey, the current Bushland Benefits Coordinator, has been working hard on the assessment process and results of this should be known soon. Hopefully many of our *LFW* members will be successful and able to undertake some of the suggested management actions on their property as a result of funding

assistance from the Bushland Benefits program.

Well, this will be my last Western Wildlife before I hand the reins of *LFW* back to Penny Hussey. As of July, I will be coordinating the National Trust's (WA) Covenant Program three days per week and coordinating the continuation of CALM's Bushland Benefits program two days per week. I would like to thank all the *LFW* members and staff for their energy and enthusiasm - it has made the last six months working with *LFW* an absolute pleasure.

Anthea Jones



Teagan Smith

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waters, the larger males then took the lead and showed them the way. A job well done by all involved.

The second whale stranding in Busselton occurred on Thursday 2 June 2005. At 8AM on the Thursday morning the calls came, this time of over 100 whales had beached themselves. There are stories of the whales "making a rush for the beach" as spectators watched in horror at two locations approximately 500 metres apart. A smaller pod of whales stayed out in the water. The difference this time was the weather, there were storms due and the water was freezing cold and rough.

Again, the operation geared up with tents, wetsuits, food and drink, and very quickly lots of volunteers turned out from local areas. Local schools arrived with food because even though children under 16 could not be in the water, they wanted to assist in some way. The tide was going out and volunteers used slings to get the whales back into the deeper water and off the beach. Backhoes were bought in to dig trenches either side of the whales to assist the volunteers,

The weather was getting worse and by lunchtime it was extremely cold on the beach and even colder in the water. Volunteers needed to change over more regularly to get warm and have hot food and drink. Because the bad weather was moving in fast, the decision

be greeted by the awaiting boats. The second last whale was a bit of a straggler and everyone stood on the beach to watch. The boats slowly and gently closed in behind the last straggler as some of the front whales had already joined with the pod out in the water. The Wildlife

Officers said that once all together, the whole pod supported the slowest one as they moved into deeper waters and around the Cape. One whale had unfortunately died on the beach - possibly being already ill - and could have been the cause of the stranding.

The call came in later that afternoon and night that the operation was successful and all returned whales were out and around the Cape. In the morning the spotter plane was sent up to have a look and as the whole community held their

breath, the word came back that there were no signs of the whales. Another successful operation!

The funniest story from this stranding came the following day when it was all over and a little boy arrived in the CALM office at Busselton demanding to see the whales, when he was told they had gone out to sea, he said "No, bring them back - I want to see them".

All age groups, from all areas of life and all areas of the State, not just Busselton, were involved in these operations which were so successful only as a result of the generous support of the community.

Cherie Kemp is LFWO, Busselton. She can be contacted on (08) 9752 5533.



Volunteers at Busselton assisting the stranded whales.
(Photo: Gary Farrally)

was made by CALM staff to get the whales back into deeper water that very afternoon to avoid the storm. The volunteers were informed of this.

The first and smaller pod of whales were taken into deeper water by the volunteers, turned towards awaiting boats and released with the boats herding them out to a waiting area approximately 100m offshore. This was very successful and so it was the second pod's turn to go. Loud speakers were battling against the strong winds with CALM Wildlife Officers informing the volunteers what would happen and what was required of them for the successful release of the pod. Within minutes, one by one, the volunteers quickly and efficiently turned their whales around and sent them off to



Kathleen O'Brien

FAUNA

THE WESTERN RINGTAIL POSSUM - A RESILIENT SPECIES OR ANOTHER TAXON ON THE DECLINE?

Paul de Tores, Nadine Guthrie, Jennifer Jackson and Ian Bertram

The western ringtail possum, *Pseudocheirus occidentalis*, known by its Noongar name of ngwayir, ngora, or wamp, is one of only two medium size arboreal marsupials from the south-west of Western Australia. It is immediately distinguishable from the common brushtail possum, *Trichosurus vulpecula*, which occurs over much of the of the ringtail's range. The ringtail is a smaller possum with smaller rounded ears. The fur or pelage of the ringtail is shorter than the brushtail's and varies from deep chocolate brown to grey over its back and shoulders and is usually creamish-white on the belly. The tail pelage is noticeably short-cropped and invariably

has a creamish-white tip, although the extent of white varies from a few millimetres to over 70% of the tail length. Brushtail possums can also have white on their tail, and the amount of white on the tail can also vary, however, as the name suggests, the brushtail always has a thick, bushy tail. The tail length of the brushtail is usually 65–80% of the head/body length, whereas the tail length of the ringtail is approximately equal to the head-body length. Most

strikingly, the ringtail has a truly prehensile tail which it uses as an additional limb.

Western Australian Museum (WAM) records and reliable historic accounts confirm the ringtail was once distributed widely within the south-west of Western Australia. Known locations included Tutanning Nature Reserve, near Pingelly, where in the 1970s it was regularly recorded in she-oak woodland. There are several

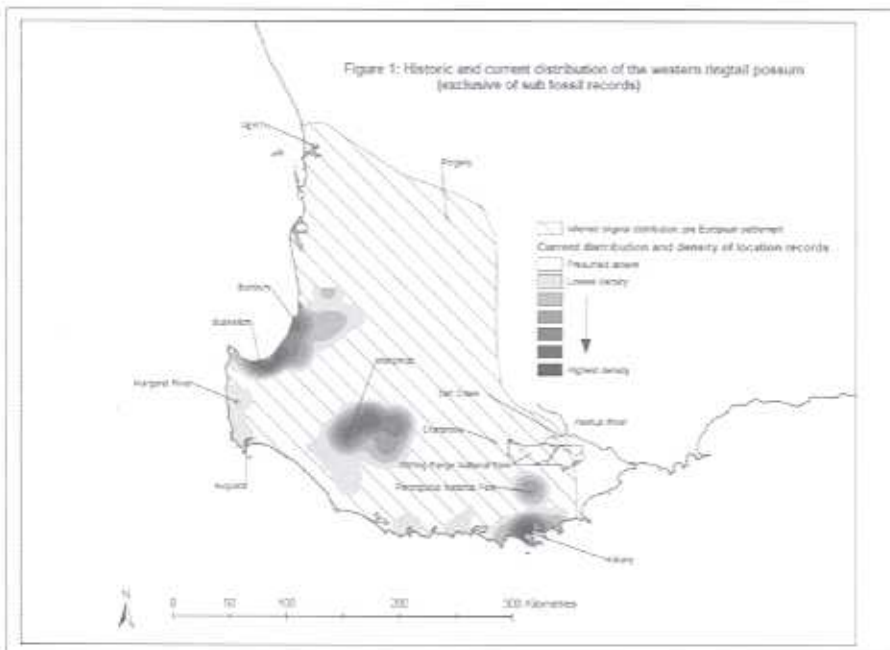
Weelawadji Cave, near Geraldton and extended east as far as the Hampton Tableland.

The distribution of the western ringtail possum has now contracted to the wetter parts of the south-west of Western Australia. It is thought to be absent from the wheatbelt region and Palinup River area, however, there have been some recent unconfirmed reports from Pingelly and from the Stirling Range area.

Despite the decline in distribution, there are areas where the ringtail is locally common. High density populations are known to occur in Busselton townsite and the immediate vicinity, where vegetation consisting of peppermint, *Agonis flexuosa*, and tuart, *Eucalyptus gomphocephala*, woodland are present. Other localised

concentrations of the western ringtail possum are in jarrah, *E. marginata*, wandoo, *E. wandoo*, and marri, *Corymbia calophylla*, forest at Perup and nearby areas, northeast of Manjimup, and peppermint woodland in the environs of Albany (Figure 1).

The western ringtail possum has shown considerable resilience and low density populations have been able to persist at several locations. Populations have recently been confirmed in the Harvey River area



WAM records from the early 1900s from the Cranbrook area. Records and specimens held by the Australian Museum show the western ringtail possum was collected from the Salt Creek / Palinup River area (formerly the Salt River) in 1869 by the museum collector, George Masters. Masters' records represent the southern-most, inland records for the western ringtail possum.

The fossil records indicate the western ringtail possum previously occurred as far north as

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and these represent the northern most known extant populations. However, the security of these extremely low density populations is unclear. Concern for the possible decline in extent of occurrence of the western ringtail possum was first raised in the 1980s. In 1983 the western ringtail possum was listed as "fauna which is rare or likely to become extinct" in accordance with the Western Australian Wildlife Conservation Act 1950. It is listed nationally and internationally as a threatened species in the sub category "Vulnerable".

In recognition of the decline in distribution and in response to the need to release ringtails held by wildlife carers, a translocation program for the western ringtail possum commenced in 1991. The translocated possums were those which had been brought into care in the Busselton area. Once deemed sufficiently rehabilitated and suitable for release, these possums were fitted with radio collars and released at Leschenault Peninsula Conservation Park, immediately north of Bunbury. Prior to the first releases at Leschenault, a 1080 baiting program had been initiated for control of foxes. Results from monitoring showed the released possums had built and established regular use of dreys (constructed nest sites, usually built from peppermint foliage or other locally available plant material), established regular use of tree hollows and had produced young. Diurnal rest sites also included refuges on the ground in debris and fallen logs, under sedges and reeds and in disused rabbit warrens. The young produced were also monitored and were shown to survive to sexual maturity and in turn produce young. Spotlighting of the site in 1996 and 1998 confirmed the population was increasing. On the basis of what appeared to be translocation success, additional

ringtails were translocated to Yalgorup National Park, south of Mandurah and Lane Poole Reserve, near Dwellingup. These sites were also baited for control of foxes.

The results from the Yalgorup releases were consistent with the results from Leschenault. The released possums built dreys and established regular use of these dreys and tree hollows. A noticeable difference from Leschenault was the regular use of grass trees, *Xanthorrhoea preissii*. The released ringtails were regularly recorded seeking diurnal refuge in the dense green fronds of grass trees. The individual grass trees preferred were those with overhanging foliage which enabled ringtails to access the grass tree from above. As was the case at Leschenault, diurnal rest sites were also recorded in fallen logs and debris on the ground. Spotlighting in 2002 confirmed the Yalgorup populations were increasing and follow-up spotlighting is planned this year.

The results from the Lane Poole releases were far from conclusive. Released ringtails did establish use of dreys and tree hollows. They also used a suite of diurnal rest sites, including grass trees. Young were produced, however, we were unable to confirm if young survived to sexual maturity. There was a continued and high loss of animals as a result of predation by chuditch, or western quoll, *Dasyurus geoffroii*. There have been no releases at Lane Poole since 1999.

The combined results were equivocal. Translocations to coastal sites appeared to be successful, however, the forest translocation cannot yet be seen as successful. Confounding the issue were the results from the 2002 spotlight transect monitoring at Leschenault. For the same spotlighting effort of 1996 and 1998, which resulted in 72 and 100 sightings respectively,

the 2002 spotlighting resulted in only two sightings of the western ringtail possum. Further searches of the Leschenault site confirmed the Leschenault population of ringtails had declined. Possible reasons for the decline include changes to the 1080 baiting regime, competition with the common brushtail possum, prey switching (i.e. the predators present may have switched prey from the once very abundant rabbit, to the western ringtail possum), predation by cats, pythons, raptors, owls or chuditch (the chuditch was first recorded at Leschenault in 1998 and cats and pythons were also known to have been present prior to the translocation commencing) or disease (toxoplasmosis was detected in one individual western ringtail possum at the Yalgorup release site and cats are the definitive host for toxoplasmosis). The site may also turn out to be unsuitable habitat.

'Where to from here?'

**TO BE CONTINUED
NEXT ISSUE**

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Ian Bertram is a Masters student from the University of Glasgow, Scotland, and has spent the past 10 months involved in the western ringtail possum program.

FAUNA

MOUSE CONTROL IN CROPS - A NATURAL ALTERNATIVE (SOMEBODY SHOULD GIVE A HOOT!)

Peter Mawson

In southwest Western Australia there are four species of owl (Boobook *Ninox novaeseelandiae*, Barking owl *Ninox connivens*, Barn owl *Tyto alba* and Masked owl *Tyto novaehollandiae*). The Boobook and Barn owl are still fairly common in many parts, but the Barking and Masked owl are very rare these days.

Boobook owls eat very small birds, small mammals (in particular house mice) and large night-flying beetles, moths and locusts when they are available. They inhabit a wide range of habitats from forest to desert. Barking owls inhabit forest and woodland and feed on mammals (in particular rabbits, rats, mice and small marsupials up to the size of possums). They also feed on birds and larger invertebrates.

Barn owls are found all over the State from forest through open wooded country to grassy plains. In southern Australia the house mouse has become the Barn owl's chief food source, but they will also take other rodents, small marsupials, small birds, lizards and geckoes and night-flying insects.

The Masked owl usually keeps to heavier forested areas, never more than 300km from the coast. They feed on small terrestrial mammals up to the size of rabbits, with occasional possums and medium-sized birds such as magpies and kookaburras.

Alterations to the landscape associated with farming and cropping have meant that the opportunities for these four owl species to hunt across all of the landscape have been reduced. The reduction in hunting opportunities is not just strictly limited to those areas cleared for farming. Barn and



Boobook owl.
Photo: Christine Freegard

Boobook owls have benefited greatly from the increased abundance of house mice that are intimately linked to cereal crops and pasture, but with the loss of hollow-bearing trees and perches within those croplands they are often restricted to edges of paddocks, roadsides and vegetation corridors.

Research conducted in New South Wales in the late 1980s indicated that when additional perches were provided in croplands, the population density of owls (and day-flying birds of prey such as kestrels and kites) increased significantly. The perches used in these experiments were simple structures 2-3m high with a solid wood cross piece 0.5-1.0m in length fixed at the top. The perches were spaced at 200m intervals across paddocks, and if they followed drainage channels or were located in rock piles, they did not disrupt any machine operations during cropping or spraying.

The reason these perches are so important to owls is that they have limited stamina for hovering and most of the prey they capture is first located by the sounds it makes (e.g.

rustling in grass or squeaking). Once the owl has pinpointed the source of the sound it flies towards the sound and pounces on the prey. If it can't see its prey or the vegetation is too thick, the owl must rely entirely on its hearing to pinpoint the prey.

So, if you think that some biological control of rodents and invertebrates in and around crops or orchards would be a good thing, you might want to erect a few perches. It is a simple enough process to check on how welcome these hunting platforms are to raptors. Either drive by the perches during the day or night and watch for the kestrels, kites and owls or look for the tell-tale droppings and regurgitated pellets (containing the indigestible parts of prey such as bone, teeth, insect exoskeleton and the fur) that are left beneath the perches. Remember if you are planning to use a spotlight to locate owls at night make sure you use a 55W globe instead of the normal 100W and direct the beam to one side of the birds so as not to cause distress to their light-sensitive eyes.

The other advantage of providing artificial perches in paddocks is that it gives birds of prey an opportunity to hunt away from roadsides where they are at risk of being involved in collisions with motor vehicles.

Peter Mawson is the Principal Zoologist at CALM. He may be contacted at email: peterm@calm.wa.gov.au or ph: (08) 9334 0421.

WW 5/1, Jan 2001, contains further info on owls, including 'Owls in the South West of WA' and 'Owl Survey - A Community Group First in WA'. Contact LFW on (08) 9334 0427 if you would like a copy.

ECONOMIC VALUE OF BIODIVERSITY

GROWERS WORKING TOGETHER TO DEVELOP THE SANDALWOOD INDUSTRY

Tim Emmott and Geoff Woodall

Given the scale of the perennial revegetation required to address natural resource management issues, commercial drivers for revegetation are required, particularly on private land with a high opportunity cost. It is critical that new profitable industries based on perennial systems are developed and become part of normal land management practice.

The developing Sandalwood industry can enhance the likelihood of WA land managers looking beyond annual crops to systems that will provide both long term income and natural resource protection.

In WA, revegetation for landcare benefits alone has been "hard to sell" particularly in low rainfall areas (less than 500mm). Areas that are revegetated for landcare benefit alone are usually those with a very low opportunity cost, where the profitability of traditional agricultural systems is marginal.

Productive agricultural land within locally or regionally strategic conservation areas (ie productive soils located between high value remnants) are rarely revegetated with biodiverse mixes of locally native plants because "they do not pay their way".

Recent experience in the development of sandalwood plantations in the South Coast and Avon regions has shown that landholders are however prepared to revegetate productive areas with commercial native plant species that are capable of generating real revenue at some future stage.

There is the potential to establish approximately 50,000 ha of biodiverse sandalwood plantations in the Western Australian wheatbelt. An industry of this size will



Beverley farmer and ASN member Patt Butterworth inspecting seed ripening in a direct seeded, biodiverse sandalwood plantation near Narrogin.

have major outcomes for broader NRM issues. For example, there is concerted effort in the South Coast region to re-establish a native vegetation link between two of the state's most biodiverse National Parks (the Stirling Range National Park and the Fitzgerald National Park). This approach can be repeated state wide with biodiverse commercial sandalwood plantations.

The revegetation of 50,000 hectares with biodiverse sandalwood plantations would have broader NRM implications for the protection and enhancement of biodiversity assets, groundwater recharge and for the protection of land and water assets.

The re-establishment of sandalwood within the wheatbelt of WA may have broader fauna conservation benefits. The nuts of sandalwood trees are an important food source for various animals including the Bush Rat (*Rattus*

fuscipes) and the restricted woylie (*Bettongia pencillata*). These animals also require a dense understorey and the establishment of biodiverse sandalwood revegetation can provide both habitat and food.

Development of the Avon Sandalwood Network

In the Avon region, a grower driven sandalwood group has formed, called the Avon Sandalwood Network Inc (ASN). The aim of the ASN has been to increase the quality and quantity of information available to growers and investors, enable growers to come together to share experiences and work together to further develop this industry. The ASN now has 65 members, consisting of growers, researchers, industry and NRM practitioners.

Since its development in 2003, the ASN has produced three newsletters, and held four workshops and field trips throughout the wheatbelt, with the most recent event held in Narrogin in March 2005, attended

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FIRE

BUSHFIRE DIVERSITY CAN PROMOTE BIODIVERSITY

Neil Burrows

Flammable vegetation and seasonal conditions of warm, dry weather have ensured that fire is a natural environmental factor, which together with climate, landform and soils, has operated over thousands of years to forge the remarkable biodiversity of south-west ecosystems. Plants, animals and ecosystems have evolved in this fire-prone environment and have developed a range of physical and behavioural traits that enable them to persist with, and in some cases, depend upon a variety of fire regimes.

For many plant species, reproduction and regeneration are cued or enhanced by fire and for many plant communities, particular fire regimes are necessary for the maintenance of floristic and structural diversity. A particular sequence and scale of fires are necessary to provide habitat diversity and opportunity for animals to recover their populations. However, the way in which species and communities respond to fire is variable. Some assemblages are quite resilient to frequent fire and recover to their pre-fire state relatively quickly, while others are more sensitive to frequent fire, or severe wildfire, and can take many decades to recover. Thus, no fire regime, or history of fire interval, season, intensity, patchiness and scale is optimal for all species and communities. Thus although fire diversity can promote biodiversity, some extreme fire regimes - such



Large and high intensity wildfires not only threaten life and property, but are environmentally damaging.

as prolonged periods of high fire frequency, recurrent large and high intensity fires, or long periods of fire exclusion applied over large areas - can threaten biodiversity.

The damage potential and difficulty of suppression of a bushfire is determined by the amount of vegetation that burns, its moisture content and the weather conditions. Prior to European settlement, regular burning of parts of the landscape by Noongar people probably maintained a mosaic of vegetation at different stages of post-fire development (seral stages) - from recently burnt patches to infrequently burnt patches, although there is mounting evidence that much of the landscape was maintained in an early post-fire state. This fire mosaic contained the spread and intensity (severity) of wildfires. Very large and very intense wildfires were neither in the best interests of Aboriginal people, nor the environment generally, and were probably rare events.

On lands managed by CALM,

the primary aim is to manage fire to conserve biodiversity and to ensure an acceptable level of protection to human life and property. Fire management is complex and potentially dangerous and requires the skilful combination of art, experience and science. Fire science, including fire behaviour and ecological effects of fire on natural ecosystems, has advanced as a result of ongoing research undertaken by a range of organizations over the last 40 years or so. Although

our knowledge is incomplete, fire management is underpinned by current scientific understanding and is a process of continuous learning and adaptation.

With respect to the ecological effects of fire, several themes consistently emerge from the modern scientific literature, including a recent (2003) synthesis of fire ecology published in the book "Fire in ecosystems of south-west Western Australia: impacts and management". Firstly, no one fire regime, or combination of fire interval, season and intensity, suits all organisms. For example, some elements of the biota benefit from frequent fire (e.g. native grasses, annual herbs, some re-sprouters, large macropods, some fungi and some invertebrate groups), while others are disadvantaged (e.g. some late maturing obligate seeders, some mammals, some birds, some invertebrates). At the other end of the spectrum some elements benefit

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from longer intervals between fire and others are disadvantaged. A second emergent theme for conserving biodiversity at the landscape scale is that of spatial heterogeneity, or of a small-grained fire-induced habitat mosaic. A third theme to emerge is the need to protect ecosystems sensitive to fire from frequent fire or large intense fires. Examples of fire sensitive, or more correctly, fire regime specific ecosystems include some riverine, aquatic, wetland and heathland complexes and granite outcrops. However, even these require fire at some stage for their rejuvenation – an exception perhaps being peat swamps.

In south-west ecosystems, proactive fire management is an essential component of conservation and land management, simply because the region is fire-prone and most ecosystems are fire maintained. In the absence of proactive fire management, the 'default' regime will usually be one of reoccurrence of potentially damaging wildfires, started either by lightning or by people (accidentally or deliberately). The fire regime applied depends on the management objectives, and could include regimes that aim to:

- o manage flammable fuel levels based on fuel accumulation rates,
- o protect or promote specific threatened species or communities based on known life histories or habitat requirements,
- o enhance biodiversity

continued from page 7 "Sandalwood"

by 58 people. At the inaugural AGM held in September 2004, an enthusiastic executive committee was elected, and a membership fee of \$50 per annum was introduced.

At present the ASN has been focusing mainly on agronomic, licensing and wood marketing issues. Future focus areas for the ASN may include the development of sandalwood nut markets, as there will be increasing amounts of

FIRE

generally, based on vital attributes of key fire sensitive taxa,

- o enhance and protect biodiversity at the landscape scale by using fire to create fine grain habitat mosaics, or interlocking patches of vegetation at different post-fire (seral) stages,

- o advance scientific knowledge (including experimental fires and fire exclusion reference areas),

- o regenerate specific species, such as silvicultural burning following timber harvesting.

Managing fire in highly disturbed and fragmented landscapes, such as remnant bushland on the Swan Coastal Plain and in the Wheatbelt, is particularly challenging because of the potential for invasion by weeds and other introduced pests, and because fragmentation disrupts natural processes of dispersal and recolonisation. Small, recently burnt patches in a matrix such as cleared land or urbanisation, can also be subject to intense grazing pressure from large macropods and herbivorous insects. However, it may be necessary to introduce fire into patches of remnant vegetation to protect them from the ravages of wildfire, or to rejuvenate them – in the long absence of fire, some species and habitats will senesce and decline and vegetation structures will become simplified. After a fire, whether planned or unplanned, it

may be necessary for follow-up work, such as weed or fox control.

Because we do not have complete knowledge of the ways in which all organisms and ecosystems respond to fire regimes, we can use diversity of fire regime as a surrogate for conservation of biodiversity based on the well-founded premise that in fire-prone environments, fire diversity can promote biodiversity. A good starting point for developing ecologically appropriate fire regimes is to apply the following test;

- o Does fire management reduce the likelihood of large and intense wildfires?

- o Does the fire regime maintain a mosaic of different post-fire (seral) stages at the appropriate scales?

- o Does the fire regime include seasonal diversity?

- o Does fire interval allow for replenishment of seed banks?

- o Does the fire regime include a fire-free period to allow for maturation of special habitats?

- o Does the fire regime protect fire sensitive ecosystems from frequent fire?

For further reading on this subject, see "Fire in ecosystems of south-west Western Australia: impacts and management", edited by Ian Abbott and Neil Burrows. Limited copies are available from Glenda Lindsey at CALM (08 9334 0463) at a cost of \$79.00.

Dr Neil Burrows is the Director of Science Division at CALM.

plantation grown sandalwood nuts available in coming years.

The ASN has been successful due to the enthusiasm of our members and executive committee and our funding support.

The ASN will be holding its AGM and spring workshop / field trip in September 2005. For more information, contact the Avon Sandalwood Network secretary Tim Emmott from Greening

Australia (WA) on (08) 9621 2400 or temmott@gawa.org.au

Tim Emmott works for Greening Australia (WA) in Northam and Geoff Woodall for the Centre of Excellence in Natural Resource Management in Albany ((08) 9892 8532).

ECONOMIC VALUE OF BIODIVERSITY

COMMERCIALISING NATIVE FLORA PROFITABLY

Gerry Parlevliet

Commercialising our Australian flora is a long and complex task. To ensure that native flora can be grown profitably involves many years of plant selection and breeding, years of development of agronomic packages and a good understanding of the cost and returns associated with the product.

Western Australian flora has been of interest for cutflowers and amenity planting for over 50 years. The American cutflower industry adopted *Chamelaucium* (waxflower) and developed a large industry which currently produces 300,000,000 to 500,000,000 stems annually. Waxflower is the largest export product in the cutflower industry in Australia. This species has also extended to Israel, Africa and South America with small interest in Portugal, India, Thailand and China. Other products commercialised are *Verticordia*, *Boronia*, *Banksia* and kangaroo paw. A wide range of foliage products is also produced.

In WA the exports initially came from bush harvested products, but as demand increased, the need for more consistent quality product and the reduction in available bushland for harvesting created increased interest in cultivation. The commercial cultivation of these plants soon led to a need for a wider range of flowering times, different colours and product with better vase life. Better agronomic knowledge of irrigation, nutrition and pruning, as well as post harvest management, meant that research was required. The demand for potted colour and amenity plants has also increased, resulting in work to develop appropriate forms and management protocols.

Production of better planting material and the associated agronomic packages to improve quality and yield and correct post harvest management does not always translate into grower profit. Grower management is vital to any successful production. Growers need to examine their production costs and returns and make decisions on which crops to grow. Reducing costs is fundamental to profitability. Growing old varieties may eventually lead to reduced profit and adopting new varieties may maintain current profit margins.

The Floriculture Group of the Western Australian Department of Agriculture (DOA) has specialised in commercialising the flora of WA. Capturing



Mechanical pruning of *Banksia coccinea* on the South Coast.

the horticultural benefits of the biodiversity of Western Australian flora and turning it into a viable commercial crop for Australian growers is the principle activity of this dynamic group. In recent years the Floriculture Group has worked on a wide range of species which have cutflower and amenity horticultural applications. This has included selecting material from the vast genetic resources throughout the State. Waxflower, *Boronia*, Yellow

Bells, *Verticordia*, smokebush and everlasting daisies are some of the plants selected, brought into nursery cultivation, crossed, hybridised and in many cases commercialized.

As part of the full commercialisation of native plants the viability of the industry needs to be assured.

Domestication of native flora

The Department has looked at a wide range of native flora with the aim of developing commercial product. The process requires time and skills to recognise the commercial possibilities. Most of the work has been focused on Waxflower, *Verticordia*, *Boronia*, *Scholtzia*, smokebush and Qualup bell. These have been initially evaluated for their cutflower potentials, but are also tried as 'potted colour'.

Smokebush (*Conospermum* spp.) is one example. There are over 50 different species including white and blue flowered forms. A project managed by Dr Kevin Seaton evaluated the available range and selected 12 species that had some potential. Further selection work was backed up by agronomic, vase life, production and market suitability studies. Three species were released in 2002. Propagation of cuttings is still one of the constraints on this product line.

Developing new plants and hybrids

Exporters and growers continually call for new forms, colours, improved quality and new product to improve their capacity to sell our native flora on the export market in the face of stiff competition from southern hemisphere producing countries.

New seedlings of waxflower are generated in an uncontrolled way in the wild and in plantations. The

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ECONOMIC VALUE OF BIODIVERSITY

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general understanding of 'hybrid' is a cross between two different species (or genera). This is rare 'in the wild', but happens more frequently in plantations or gardens, or where there has been roadside disturbance (eg Southern Stars). Some of these new seedlings have characteristics which make them suitable for the cutflower market. However a deliberate breeding program enables specific characteristics such as colour, maturity and yield to be focused on. The Pearlflower series developed by the Department under Digby Growns' management is a good example. They are crosses between *Chamelaucium megalopetalum* found in the south with *C. uncinatum* growing on the west coast. The hybrid has shiny white petals and a green centre with a terminal flower form, excellent vase life and good yields.

The program has released varieties with a range of flowering times – these include Esperance Pearl, Denmark Pearl, Albany Pearl, Crystal Pearl, Bridal Pearl and the latest Laura Mae Pearl. Ivory Pearl and Blondie are similar hybrids developed by private breeders.

This program requires large numbers of crosses, carried out manually and under controlled conditions. The hybrid seeds are often dormant or recalcitrant and may not germinate. Since each cross and seed is a potential new commercial variety the program employs embryo rescue techniques at an early stage to ensure success. The material is then propagated in tissue culture before testing in the field. The current program achieved 20,000 such crosses last year, with about a 5% success rate for producing seed.

A further 5-7 years of evaluation and testing (including cutflower appearance, yield and post-harvest requirements) with strong culling of material on a wide range of parameters may see 1-2 varieties released.

Developing and using technology to help commercialise native flora

Each new domesticated species has its own problems. Poor propagation by cuttings is often a feature of plants that traditionally propagate from seed. To gain the benefit of the intensive selection, clones from the original superior selection are required. A number of techniques have been developed in WA to increase development of roots on cuttings.

One such technique has been named IVS (In Vitro Soil-less) that has increased propagation success of tissue cultured material from unacceptably low levels (<20%) to commercial levels (>90%). Although it was developed from the waxflower breeding program it has been developed further to solve similar problems in other horticultural and tree crops, including sandalwood.

Another technique is the use of somatic fusion to develop totally new forms and colours of the plants. This sophisticated technique has been tried with some preliminary success. The Holy Grail of a red or orange waxflower will still be many years away.

In the case of potted colour, Max Crowhurst has been working with the arid zone daisy to improve its germination to levels suitable for mechanical seeding in commercial nurseries. He has improved germination of the usually dormant seed from 20% to 98%. The varieties he has developed are commercialised by licensing nursery operators and by the DOA providing treated seed.

Agronomic management is critical to successful cutflower enterprises.

Generating new varieties is only part of the commercialisation process. It is equally important for new hybrids to be supported by appropriate agronomic techniques and information. Integrating research and development with industry development is critical to a new plant's commercial success.

Hybrids will have different agronomic features which need to be catered for. They may require different climatic conditions to maximise yield, they may need closer spacing to maximise labour efficiency and they will require appropriate nutrients and irrigation.

A project on nutrition in waxflower, is in its early stages clearly showing the benefits of good nutrition management. Gone are the days when waxflower was considered a native flower that did not need extra fertiliser. Preliminary results by Kevin Seaton indicate that fertigation and good irrigation are essential to maximising yield and quality of waxflower. It may also impact on the time of flowering.

To maximise the gain from new varieties, and especially the hybrids, growers need to get the management right. Irrespective of the cutflower grown there is a best bet system available, but that system can and should be refined to maximise returns. Growers must search for the information they need – it generally will not come on a plate.

Gerry Parlevliet is the Senior Development Officer (Floriculture) at the DOA, contact gparlevliet@agric.wa.gov.au or on (08) 9368 3219.

DOA also produces a newsletter called 'Floriculture News' which is available on their website at www.agric.wa.gov.au.

FLORA

WATTLE - SYMBOL OF A NATION

Claire Hall

In 1988 Australia celebrated its bicentennial year and one of the many events that occurred was the official proclamation of Australia's national floral emblem, the Golden Wattle (*Acacia pycnantha*).

It may seem surprising that it had taken 200 years to decide which of our native flora should be elevated to this lofty position. The reasons can be traced back to our so-called 'new world' settler societies, which struggled to master an alien environment and placed little value on its intrinsic beauty. The decision was influenced by patriotism, political and social powerplays, economic imperatives, and inter-colonial rivalry.

By the late 19th century the first generations of native born Australians were developing a "sense of place" and beginning to acknowledge their connection with the land and its flora and fauna. The Australian Natives Association (ANA) was established in 1871 as a mutual benefit or friendly society with birth in an Australian colony being a pre-requisite for membership. Its members, predominantly children of the gold-rush immigrants in Victoria, wanted to gain political and social power by challenging the misconceptions about the Australian-born being lazy, sport-loving, foul-mouthed and lacking respect for authority.

By the 1880s the ANA was pushing hard for a federated Australia and looking for symbols to reflect their national pride. The ladies' committee of the ANA inaugurated the Wattle Blossom League in 1890 to promote a sense of patriotism among Australian women and the younger generation.

Inspired by Canada's adoption of the maple leaf as its floral emblem the ANA campaigned for the wattle to be nominated as Australia's national flower. The Silver Wattle (*A. dealbata*), Black Wattle (*A. mearnsii*) and Golden Wattle (*A. pycnantha*) were suggested as being suitable species. In its favour, the wattle was present in all Australian colonies, it was important in the tanning industry and it had a beautiful flower.

Not everyone agreed, and there was strong support for the Waratah (*Telopea speciosissima*), a more spectacular



Wattle used as an ornamental accessory to the shield on the Commonwealth Coat of Arms granted by Royal Warrant in 1912. Permission to reproduce granted by the Department of the Prime Minister and Cabinet.

but geographically restricted species, to be named Australia's national flower. Ultimately, the ANA with the support of the Wattle League won the day and the Golden Wattle was chosen as Australia's national floral emblem. Despite this decision, official proclamation for a national floral emblem was not forthcoming.

In 1901 Australian symbols were largely absent from federation celebrations in Sydney and Melbourne as they were thought to be irrelevant to international trade. Interestingly, it was the Victorian German community who displayed an arch featuring the local lyrebird.

Fortunately, interest in all things Australian continued to grow. Wattle enthusiast Archibald James Campbell was an ornithologist, newspaper columnist, and founder of a Wattle Club in Victoria in 1899. He promoted appreciation of acacias through visits to wattle-rich places in Victoria, usually around the 1st of September. Campbell took up the cause of promoting wattle as a national symbol and in 1908 he presented a lecture to the Photographic Clubs of the Melbourne Technical College entitled 'Wattle time; or Yellow-haired September'. He stated that 'by numbers, the Wattle is almost exclusively Australian, and should undoubtedly be our National Flower'.

A Wattle Day League was formed in Sydney in 1909 and subsequently branches were formed in South Australia, Victoria and Queensland. In 1912 in a move which appears to be the first call for *A. pycnantha* exclusively to be the Australian national flower, the Adelaide branch of the Wattle Day League formally adopted as one of its aims: 'to establish golden wattle (*Acacia pycnantha*) as the national flower and emblem of Australia'.

In 1911 the belief by many Australians in their exclusive right to use the wattle as a national symbol was challenged. Readers of the *Evening News* in South Australia were upset by a report of South Africa's proposal to use the wattle for patriotic purposes. When South Africa elected to have wattle embroidered on

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FLORA

King George V's coronation stole it caused outrage among some Australians who believed that this wattle was imported from Australia. Unless the embroidery featured the distinctive thorns of the South African species 'Doornbloom' *A. karroo*, it could have been mistaken for an Australian species.

The use of the wattle blossom as an Australian national symbol continued during the early part of the 20th century and on 13th August 1912 buttonholes of wattle and boronia (then the WA floral emblem) were sold in Perth. On 26th January 1913 Selfridges department store in London had a display of 'mimosa' to mark Australia's 125th birthday.

In 1912 a new Commonwealth Coat of Arms was designed, but the wattle depicted is not botanically accurate and may not be *A. pycnantha*. The following year the Australian Wattle Day League held the first pan-Australian Wattle Day Conference. The importance of the event was evidenced by the formal opening of the conference by the Prime Minister, the Rt Hon. Andrew Fisher who recommended the wattle for inclusion in the design of the Australian armorial bearings. Delegates from Victoria, NSW, SA, WA and Tasmania attended the conference which led to the federalization of the Wattle Day League movement.

World War I delayed the proclamation of wattle as the national floral emblem, but Wattle Day was used to encourage patriotism and to raise funds for Australia's war effort.

Wattle Day reached its peak in the 1920s when farmers within a day's drive of Melbourne began to complain about over-enthusiastic members of the public tearing limbs from trees to festoon their cars then leaving gates open. Wattle Day continued to be celebrated through the 1930s, but not in WA and the Northern Territory, and

the tradition declined after World War II.

On 1st September 1988 the Golden Wattle was officially gazetted as Australia's national floral emblem. In 1992 the Governor-General declared that 1st September would be observed as 'National Wattle Day' – 'an opportunity for all Australians to celebrate our floral heritage, particularly through the planting of an Acacia species suitable for the area in which they live'.

The wheatbelt of WA is wattle-rich and two local government authorities in that area have a wattle species as their floral emblem. The Shire of Dalwallinu has *A. anthochaera* (Kimberly's wattle) and the Shire of Hyden has *A. lanei* (Lane's wattle). In September each year the Shire of Dalwallinu hosts an Annual Wattle Week Festival that includes day tours and other events (see coming events in this Newsletter).

The wattle, has been a popular subject for artists, embroiderers, architects and designers over the years, and has featured on many Australian postage stamps. Golden Wattle motifs feature on the ribbons of the Order of Australia insignia.

Critics of the choice of the Golden Wattle as Australia's floral emblem may say that it is not a 'truly national' flower because it is not endemic to all states. The chances of finding a species that is found in every state, has suitable characteristics and which everyone agrees on would be extremely remote and could take another 200 years to decide upon. The best solution is to view any wattle in your local area as the symbol of our nation.

Claire Hall is the LFW Technical Officer, Kensington and can be contacted on 9334 0427

Note: A. pycnantha is an environmental weed in WA! - Ed.

Are present day koalas much more common than they have been in the past?

Fossil records show that, while both koalas and eucalypt trees were present as long ago as 24 million years, it is only about 1.8 million years ago that koala fossils become abundant in deposits. Prior to this time, rainforests covered much of Australia, and eucalypts were confined to particularly nutrient-poor soils. This meant that the gum-leaf-specialist koalas were also uncommon. But when the rainforests collapsed and eucalypts spread out to take their place, so koala numbers boomed. Koalas are thus a species that has only recently (in evolutionary time) become common.

In recent history, numbers were kept low by Aboriginal hunting. When the advent of alternative foods altered the hunting practice, in some places koala numbers increased to such an extent that they caused severe damage to their habitat forests. For example on Kangaroo Island, SA, koalas now have to be culled or moved to prevent further tree deaths.

For more on this, and other stories about how to adapt to living in Australia, read "Going Native: living in the Australian environment" by Michael Archer and Bob Beal. Pub: Hodder, 2004.

Penny Hussey

MICRO-ORGANISMS (mostly!)

SCUMBOOK!

Jane Chambers

scum (skm)

n.

1. A layer of dirt, froth, or impurities etc. forming at the top of liquid, esp. in boiling or fermentation
2. (foll. by of) the most worthless part of something
3. (colloq.) a worthless person or group

Scum doesn't have very nice connotations according to the Australian Concise Oxford Dictionary (1997) definition. In general, that is the reaction people have when you mention a scum formed by algae and aquatic plants in our waterways. People think of smelly, decomposing stuff in a swamp, fish deaths, creatures from the black lagoon... but do scums really deserve this bad press?

Scums and algal blooms are certainly hot topics at the moment with a number of toxic algal blooms in the Swan River dominated by the dinoflagellate, *Karlodinium micrum*, resulting in odours and fish deaths. Blooms like this get lots of media coverage which reinforces the common perception that scums are bad. Alas, many people see scums or any prolific growth of algae or aquatic plants as undesirable - a problem to be removed.

Many of the blooms that we perceive as problems are harmless native species that have undergone prolific growth through the introduction of excess nutrients e.g. fertilisers from agricultural properties or suburban gardens. In fact, only a few algae such as *Karlodinium*, pose a serious health risk. Dinoflagellates, the group to



Spirogyra bloom at Swan Lake, Bayswater. A natural bloom - *Spirogyra* rarely causes problems although at this site the bloom has probably been promoted by extra nutrients from suburban gardens. Photo: Wassele Hosja.



Myriophyllum, an angiosperm (flowering plant) and *Chara*, an alga. Photo: Suzi Wild.

which *Karlodinium* belongs, are a diverse and fascinating group. Species range from harmless, unicellular algae that swim around using little flagella that whip through the water and fuel a healthy food chain, to those that are able to produce light known as bioluminescence, to others that produce saxitoxin, a neurotoxin 100,000 times more potent than cocaine. In this case it is vital to know which species - literally the difference between life and death.

Most algae and aquatic plants inhabit their natural environment and exhibit a normal cycle of growth and decay, sometimes forming "blooms" in spring and summer. The algae and plants form an integral part of the wetland or estuarine ecology and provide vital functions to the ecosystem. For example, they provide a food source, habitat and nursery for animals, stabilise and aerate sediments, trap particles, and filter nutrients and pollutants from the water.

The diversity of plant life in wetlands and estuaries is profuse. It includes tiny singular cells that to the naked eye only serve to colour the water, slightly larger filaments that might float as a scum on the water, large forms that are readily identifiable as filamentous algae, and more typical plants with stems, leaves and roots. These plants often grow together in communities, disguising their individual forms.

Sometimes the difference between algae and aquatic plants is not so clear. Consider the alga *Chara* and the angiosperm *Myriophyllum*, both have a long stem with whorls of "leaves" at intervals along the stem, looking something like an elongated bottlebrush. But *Chara*

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MICRO-ORGANISMS

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is an algae and doesn't really have any leaves at all – it just looks like it has leaves. This is a case of convergent evolution, where the best design for survival has been achieved by two very different types of plants, such that they look similar! Charophytes are thought to be an evolutionary link to the development of higher plants. They are very beneficial to wetlands filtering the water, so where charophytes occur the water is often crystal clear.

So how is the average person visiting a lake or river to know whether the waterway is healthy or toxic?

Scumbook! is a new book developed by the Department of Environment, the Swan River Trust, Murdoch University and the Water Corporation of Western Australia to help people do just that. Often identification books are very technical requiring some knowledge of botany. Scumbook! is designed to help people without any previous knowledge, identify plants and algae and distinguish them from other substances in a wetland or estuary. The book is set out in four sections (Aquatic Plants, Macroalgae, Scums and Water Colour) which can be rapidly accessed by a simple key at the beginning of the book. The "Stick Test" requires the reader to pull the plant, algae or substance out of the wetland with a stick (no getting wet or touching toxic substances) and by comparing its appearance on the stick with photographs, the reader is directed to one of the four sections. A further key at the beginning of each section enables identification of the plant. Bright symbols on the photographic page (eg Toxic: skull and crossbones) indicate whether the plant is harmful or healthy, and what role it plays in the ecology of the wetland. The book is restricted to plants found in the open water, not weeds and emergent plants in the fringing vegetation, but it also includes common substances in the water (eg tannin, iron bacteria, oil films, foam).

Scumbook! provides a user-friendly resource for practitioners in the aquatic environment and the wider community, and aims to promote a better understanding of the diversity of algae and aquatic plants and the role that they play in the natural ecology of our waterways.

Dr Jane Chambers is a Lecturer in Aquatic Management in Environmental Science, Murdoch University. Contact email: J.Chambers@murdoch.edu.au, ph: 9360 2739.

Scumbook! costs \$30.00 and is available from Murdoch University bookshop (ph: (08) 9360 2540).

BUSH DETECTIVE

What is this?

Zara Kivell spotted this unusual ball-like growth on a banksia in the Chittering area on one of her property visits. It comprised many golden-brown flower-like structures and was soft to touch. What is it?



Answer:

This large, interesting formation is a "witches' broom". The term comes from the German word *Hexenbesen*, which means to bewitch (hex) a bundle of twigs (besom). In medieval times, mysterious and unexplainable occurrences were often blamed on witchcraft. Brooms

during this time were made of bundles of twigs.

Witches' broom is the general term for a mass of small shoots near the end of a branch, resulting in dense compact growth, often startlingly different from the rest of the plant. They can occur on a variety of woody plant species, both native and commercial throughout the world.

These formations result from a number of stresses, both biological and environmental. Brooms can occur singly or scattered throughout the tree, and can vary from small and well hidden to conspicuous like the one in the photograph.

Organisms such as fungi, phytoplasmas (bacteria-like organisms), mites, aphids, and mistletoe plants can cause abnormal growth when they attack a host tree. Environmental stresses that injure the growing points of branches can also trigger the formation of witches' brooms. Some may even be caused by genetic mutations in the buds of the branches. However, unlike witches' brooms caused by living organisms, there is usually just one broom per tree when the cause is a genetic mutation.

Witches' brooms do not usually kill the plant, although they can reduce plant vigour. If you are concerned about the impacts of witches' broom on a plant, just remove the affected area. Otherwise, just enjoy them for their true uniqueness!

Zara Kivell, LFW Officer, Mundaring,

PLANT DISEASE

DIEBACK CAUSED BY *PHYTOPHTHORA CINNAMOMI*: what is at risk and what can we save?

Joanna Young

Dieback is arguably the greatest threat to biodiversity across the south-west of Western Australia. Of the 5700 plant species known to occur in the Southwest Botanical Province some 2300 species have been classified as susceptible to *Phytophthora cinnamomi*; the soilborne organism which kills by destroying the root systems of plants.

Phytophthora cinnamomi (Pc) was first identified as the culprit causing dieback in the jarrah forest over 40 years ago. Jarrah trees and susceptible species in the forest understorey such as banksias were dying. What is so sad is that it continues to spread and be spread across the south-west, being transported in soil and water. Its spread has been relentless and unfortunately few people either grasp the magnitude of this biological disaster or appreciate the great range of plant species being lost from woodlands, heaths and forests. Positive isolations of the pathogen have now been made from Eneabba in the Northern Agricultural Region, right through the south west corner of the State to the east of Esperance in Cape Arid National Park. Few people realise how important it is for us to all work to protect areas that remain healthy and free of the disease:

Recognising Dieback caused by *Phytophthora cinnamomi*

Dying banksias are one of the best indicators of the disease but many



Typical dieback site in jarrah forest
Photo: Dieback Working Group

other species of the genera listed in Table 1 are also susceptible. When patches of vegetation made up of a diverse mix of species collapse and die, Pc may well be the cause. Warm, moist conditions are most conducive to the disease, so often plants are seen to collapse and die after summer rain. The disease is often worst in plant communities growing on poor grey sands or poorly drained soil profiles. Even in the jarrah forest disease expression can vary with soil type and profile. Dieback caused by Pc not only kills plants in the bush, it can kill susceptible species in gardens and orchards including avocados and proteas.

Examples of Impact

The disease has ravaged many ecosystems and in some areas where a little of the history is known, the last individuals of some susceptible species, such as the banksias and grass trees, are dying. There are many examples of the chronic situation throughout the south-west:

- The understorey of much of the jarrah forest has lost a significant number of susceptible species over a vast area.

- The Stirling Range National Park has been devastated. Both species and communities are now threatened with extinction.

- The once-common *Banksia attenuata* is now represented by only a smattering of individuals in the Two Peoples Bay Nature Reserve.

- Thickets of *Banksia quercifolia*, once common throughout the south-west and particularly in the woodlands and forest, are now hard to find.

- Most, if not all, natural populations of *Banksia coccinea* are infected. Fine stands of this Albany banksia are very hard to find.

- Cape Le Grande National Park is largely impacted with significant loss of endemic plants including *Lambertia echinata* subsp. *echinata*, as well as its *Banksia speciosa* dominated heaths.

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PLANT DISEASE

Table 1: Species in the following genera of plants are commonly killed by *Phytophthora cinnamomi*:

Adenanthos
Andersonia
Astroloma
Banksia
Hypocalymma
Isopogon
Leucopogon
Lysinema
Macrozamia
Persoonia
Petrophile
Pultenaea
Tetratheca
Sphenotoma
Xanthorrhoea

What can you do?

Simple guidelines for landowners wishing to minimise risk of new infections in healthy bushland.

1. Schedule any activities that could involve soil movement to days when the soil is too dry to stick to machines, tyres or footwear.

2. Be wary of bringing in plants or materials from outside the area. Nursery stock can harbour all sorts of pathogens and it is worth going to nurseries that practice rigorous hygiene.

3. Don't bring in gravel or road making materials from sources that have never been checked for "dieback".

4. Check that any contractors you engage have knowledge of dieback. Find out where they have been last working and request they clean down before arrival.

5. Stay on tracks unless you have taken precautions and made sure shoes or vehicles are clean on entry to healthy areas. Do not drive off tracks and through mud and slush.

6. When exploring the bush make sure you don't walk through areas of dead banksias and grass trees before going to well drained

upland areas which are most likely to have remained disease free.

In the SCRIPT NRM Region

The South Coast Regional Initiative Planning (SCRIPT) is addressing the problem in their region by working to put "dieback on the map". The first goal of the SCRIPT dieback project is to produce a strategic broad scale map of where dieback is impacting on vegetation within the Natural Resource Management (NRM) region which runs from Walpole across to Cape Arid east of Esperance. The second goal is to identify areas that are still free of disease, supporting susceptible vegetation in conditions conducive to disease. The third goal is to put dieback management plans in place to protect special areas within the region. Best practise guidelines will also be made more readily available to anyone with a will to be involved in "arresting the threat".

As SCRIPT Dieback Project Manager, I am seeking community involvement in the project in a number of ways.

Please can you help by:

- Thinking "disease free". Discourage or avoid taking soil in any quantity into areas of bushland that look relatively healthy or undisturbed.

- Recognising "disease free". Record or note large areas of healthy banksia woodlands, mallee and heathland communities which may be worthy of more active dieback management to keep them "green".

- Nominating valued areas of disease-free native vegetation for dieback assessment. Field visits and briefings on the disease can be arranged in the SCRIPT region.

Dr Joanna Young is a plant pathologist who has worked on the management of Phytophthora Dieback for many years. She is currently project manager for the SCRIPT Dieback Project and can be contacted by phone 98401068 or email young@denmarkwa.net.au.

For more written information:

SCRIPT has just published a pamphlet about the dieback project and a copy can be requested by emailing the SCRIPT office script@agric.wa.gov.au.

Recently WWF and the Dieback Consultative Council have also published a booklet "Arresting *Phytophthora* dieback, the Biological Bulldozer" which highlights actions needed to protect some of our biodiverse plant communities and ecosystems from dieback caused by *Phytophthora cinnamomi*.

The booklet is online at www.wwf.org.au and information is provided so copies can be ordered.

Web sites with further information:

www.calm.wa.gov.au/projects/dieback

www.cpsm.murdoch.edu.au/ Information on susceptible and resistant Western Australian native plants.

www.deh.gov.au/biodiversity/threatened For the National Dieback Threat Abatement Plan.

www.ngia.com.au/niasa/ Information on best practise gardening.

WEED ALERT

ACACIA PARADOXA: NATIVE OR ALIEN?

Teagan Smith

Recently one of our *Land for Wildlife* members asked us to identify an *Acacia* from a photograph. She indicated that the species is a prolific grower and that she was interested in sourcing more for revegetation purposes. Bruce Maslin, Senior Principal Research Scientist with CALM and WA's leading expert on acacias, indicated although it was difficult to identify from a photograph, he thought that it might be *Acacia paradoxa*. This enquiry unveiled an interesting path of discovery, providing insight into the deductive reasoning behind determining whether a species is native or alien.

At around the same time as the LFW enquiry, the Albany Bushcarers Group had written to Mr Maslin regarding concerns that this particular species, *A. paradoxa*, was spreading and creating monocultures in some areas. The Albany Bushcarers were interested in its status in order to determine whether they required a licence from CALM to remove it from bushland.

With increased interest in the origin and obvious weed problem presented by the somewhat puzzling *A. paradoxa*, its origin was investigated. Bruce considered the species status and based on several supporting findings, including good historical, phylogeographic and taxonomic evidence, unveiled the truth about *A. paradoxa*.

Examining the extant records at the W.A. Herbarium, Bruce found that the earliest W.A. collections of this species are from Guildford, collected by R. Helms in 1897 (and then again in 1901 by C. Andrews), and King George Sound in Albany, by Col. Goadby in 1898. More recent records include Wagerup, by

R.D. Royce in 1952, Mt Melville in Albany by K. Newbey in 1970 and Mount Barker, near the old Government Railway Dam, collected by Kevin Kenneally in 1971. Based on these herbarium records it was evident that *A. paradoxa* had been around both the Perth and Albany areas for quite some time. However, there were no records dating back beyond about 100 years ago. Bruce concluded that this was significant because these areas had been well collected by quite a number of botanists since the beginning of the nineteenth century, including James Drummond and Ludwig Preiss (who collected extensively in the southwest, including Albany) and Robert Brown & Alan Cunningham (who collected extensively in the Albany area). Hence, had *A. paradoxa* been in either region in this early period, there would be records dating back beyond 1897.

Further compounding the evidence as to the alien status of *A. paradoxa*, Bruce noted that the range of the species is very discontinuous (patchy) and its pattern of occurrence is not what you would expect to see if it were a native species. Also, many of the plants grow on disturbed sites (such as road verges) or in other areas where there is a high likelihood that man could have introduced it. From a phylogeographic viewpoint *A. paradoxa* displays the characteristics of an introduced species.

Finally, Bruce noted that all of the closest taxonomic relatives of *A. paradoxa* occur in eastern Australia - there are none in Western Australia. If *A. paradoxa* were indeed a native to W.A., then it would be expected that some evolution would have occurred within this region because it is genetically a very labile species.

Based on the above information, he concluded that there is good evidence to indicate that *A. paradoxa* is not a W.A. native species. Additionally, the species is known to be invasive, not only within Australia but also abroad and therefore should be classified as an alien to W.A.

Ken Atkins, Manager of CALM Wildlife Branch, indicated that since there is sufficient evidence to support deeming *A. paradoxa* non-native to Western Australia, then it is not protected flora under the *Wildlife Conservation Act*. Therefore, no licence is required under this Act to 'take' it. As a non-native, the only permission required is that of the manager of the land on which it occurs. For example, if the species occurs in a CALM reserve, then authorisation from CALM would be required to control it.

For info on ID of non-native acacias, Bruce may be contacted on 9334 0510. For licensing, please contact CALM Wildlife Branch on 9334 0455.

Teagan Smith is the new LFWO at CALM, Kensington. She can be contacted on 9334 0404.



Photo: Florabase, CALM

NEWS

Reconstructing Links in a Fragmented Landscape

On the 7th of April this year 45 people precariously made their way across the '200mm season breaking' wetted landscape of the south coast to get to the Green Skills/Land For Wildlife workshop at Karribank Country Retreat in the Porongurup Ranges. Many participants had to weave their way across the transformed landscape dealing with closed roads which had been flooded or severely eroded from the two day downpour.

We all enjoyed an informative and inspiring day on the values of remnant bushland in creating micro and macro corridors across the landscape. This was followed by a field day which allowed further observations and discussion on the recent flood damage which had 'broken' the drought stress from the previous dry summer.

Keith Bradby of Greening Australia talked about the long term goals of the Gondwana Link program, linking the south coastal vegetation with the arid inland by



Sylvia Leighton helping a participant across the creek, still flowing strongly after the floods

a corridor of secure reserves and private bushland. Peter Luscombe of Nindethana Seeds talked about his properties that have been purchased to protect native vegetation and rehabilitate cleared areas and creek systems. Creation of corridors for fauna and habitat for rare flora are two of the main aims of his activities. Ann Burchell of the Friends of the Porongurup Range described the

purchasing of the Twin Creeks property by the Friends and its value as a key property in the dream of creating a wildlife corridor link from the Porongurup Ranges to the Stirling Ranges.

During the field trip the warm wet conditions gave Joanna Young the opportunity to impress upon all of us that we should try to restrict our movements near any bushland if there is any slight suspicion that dieback is present. She is the coordinator of a dieback project being funded by SCRIPT (see pp 16-17). She described the extent of dieback infestations in the South Coast region and the key role that management plans for properties like Twin Creeks will play in the survival of susceptible species. She said we could not imagine how many hundreds of thousands of dieback spores are activated by the warm wet conditions!

Despite the effort to get to the workshop, it was a great day!

Sylvia Leighton is LFWO, Albany.

For further information or copies of the workshop presentations, please call Sylvia on 9842 4500.

Congratulations!

to Suzanne and Peter Little of Random Valley Organic Wines who have been awarded the 2005 National Banksia Award for 'Environmental Leadership in the Rural Sector'. The Banksia Environmental Awards are about rewarding environmental excellence and innovation, and the 'Environmental Leadership in the Rural Sector' category is awarded to individuals, groups or enterprises within the rural sector that have made an outstanding contribution to the protection of the environment and sustainable management of Australia's natural resources.

For more information on the Banksia Awards visit <http://www.banksiafdn.com/index.php?page=188>.

MEMBERS PAGE

More on the pesky fox - a foxymoron?

A Bushy Tale

John Lambie's April issue article on foxes attacking small stock and kangaroos calls to mind an incident that occurred about 25 years ago near my home on the Wolery community, Denmark. Early one summer's morn, an overnight visitor went for a walk with his two-year-old daughter. On coming to a nice marri log set about with dry pasture grass, he took a seat and let his child play around for a bit.

Very soon, he became aware of a 'dog' creeping through the grass as though stalking something. Curious to see what the 'dog' was after, he kept his eye on the movement of the tall grass and soon began puzzling as to why the movement was coming towards them. Then, all of a sudden, the 'dog' rose up and charged - towards his playing daughter!

He just had time enough to leap up from the log, grab his child and whirl her away from the 'dog's' charge. But the 'dog' was persistent,

and kept trying to bite the little girl. Only when our visitor managed to give the 'dog' a hefty kick did it give up and run away.

On returning to the house, our visitor related, with much consternation, what had happened and asked if we knew the owner of a savage dog, about as big as a kelpie, but reddish in colour and with a bushy tail!

It's not only dingoes

'Roo Fights Back

Some years later, I awoke one morning to the typical screeching sound that a fox makes. Leaping out of bed, I grabbed my .22 rifle (no safety cabinets in those days) and went out to see if I could get a shot. There, about 40 metres from the house, in the early light, a fight was going on, the two combatants standing up on their rear legs and going round and round in close combat. They were so engaged that I was able to creep to about 15

metres from them and saw that a fox was trying to get a young kangaroo by the throat. But they both stood about the same height and the 'roo was valiantly fighting back. For fear of shooting the 'roo, I waited. Then, all of a sudden the fox pulled out of the fight and the 'roo took the opportunity to race away. The fox remained sitting there, licking its belly, so I was able to shoot it.

On examining the dead fox - a truly beautiful animal - I found that the whole length of its belly had been slit down the middle as if with a stanley knife. So kangaroos are far from being defenceless.

As I arrived back at the house, carrying the rifle with one hand and the fox by its tail with the other, some visitors arrived. Great was the hilarity as they joked about the *au naturel* hunter returning with his catch. I hadn't dressed!

Ian Conochie, Denmark, WA

Acacia saligna after fire



Land for Wildlife members, Richard and Anne Janes, cut down some dead *Acacia saligna* during the winter and burnt them. They sent us this great photograph showing a ring of new plants sprouting from the edge of the ash.

This is a textbook example of what happens after a fire. Around the edge of the ashbed, the heat cracks the hard seed coats of wattles and peas without killing the seeds, and stimulates them into germination. Where dense material burns, an ashbed forms, providing nutrients, and the ground is sterilised, providing the right conditions for the growth of new plants.

In managing this site, the seedlings of *Acacia saligna* should be culled to leave only the number left that you would like to grow there. The others could be transplanted, if desired, as long as they are moved when they are very small. It is also a great site to scatter some other seed, such as Wandoo seed, to see if it will germinate.

IN BRIEF

Red card for the red fox



In May the 2005 Red Card for the Red Fox Co-ordinated Fox Control Program was wrapped up after 8 weeks of intensive control activities. Over 700 farmers in 51 Shires, ranging from Morawa to Albany took part. The program focuses on co-ordinating fox control activities across a large area, making the actions more effective. As foxes can travel many kilometres in a single night, an area baited in isolation is quickly re-infested from neighbouring properties. Thus, as many Western Wildlife readers understand, co-ordinated programs greatly reduce this problem. Red Card for the Red Fox took this concept to the extreme!

Autumn is the time of the year when young foxes are mobile and spread out to seek their own territory. This is an optimum time to undertake control activities, and

with this coinciding with lambing, there is an extra incentive to get involved. Over the program, a total of 32,865 dried 1080 meat baits and 1,715 kg of 1080 rabbit bait were approved for use across the agricultural region. Nineteen Shires reported bait up-take rates, generally averaging 70%, and the remaining Shires were estimated to have 50% of their baits taken. Coupled with shoot results from twenty Shires, through which 2275 foxes, 1291 rabbits and 91 cats were destroyed, it is estimated that 19,000 foxes have been removed from the region!

So what does 19,000 foxes mean for the WA wheatbelt? With the diet of a fox being made up of 1/3 lamb and sheep, and 1/3 native animal, over the next year, 855,000 kg of stock won't be eaten, and the same body-weight of native fauna will also have been saved. These are big

wins for both agricultural production and our biodiversity.

Unfortunately we do not know enough about fox populations in the area to estimate what impact this has made on the vermin populations as a whole. Nor have we been able to collect information on lambing survival rates as indicators of agricultural benefit. These sorts of monitoring activities are on the cards for the future, when we hope to have a co-ordinator employed to facilitate the program across the agricultural region and be able to undertake these sorts of activities.

With over 50 local co-ordinators from Landcare and the Department of Agriculture working on encouraging landholder involvement and providing technical support, the project is also an excellent example of community and agencies working together and building meaningful relationships for the benefit of our wildlife and industries.

Ella Maesepp

Ella Maesepp is Landcare Officer for Dumbleyung. She became the co-ordinator for the Red Card for the Red Fox program by accident, as the fox control program she undertook with her local Shires in 2004 grew and grew! Ella is working to secure funding for a dedicated co-ordinator to continue the program. For more details contact Ella Maesepp on dyglandcare@westnet.com.au or 9863 4225.

More suggestions for stopping birds flying into windows:

In response to the 'Stopping birds flying into windows' article in the Jan. edition of Western Wildlife, we received a number of other suggestions from readers.

Antonia Bagshawe of Jarrahdale noted that Birds Australia used to sell a dark silhouette of a plunging bird of prey. Antonia has two of

these on her windows, and she finds them very effective. I contacted Birds Australia and it appears that they don't sell these anymore. They suggested trying The Birding Shop in Victoria, but it is probably just as easy to try creating a cut-out of one yourself.

Another suggestion came from Lyn White, who sticks 6-8 of the small adhesive 'post-it-notes' to

the outside of her windows. Some require sticky tape as well to ensure they stay put. As they flutter in the breeze, they become a deterrent to birds. Lyn remarked that 'it may look eccentric to visitors, but it seems to work!'

So, it seems our readers use many, varied techniques to stop birds flying into their windows, but I still like the 'dirty window' method best. - Ed.

COMING EVENTS

Skills for Nature Conservation

The Skills for Nature Conservation program is run by CALM (Ecoplan), Greening Australia (WA) and the Swan Catchment Centre. It provides high quality training, free of cost. New training courses are now available. For a copy of the calendar visit http://www.calm.wa.gov.au/urbannature/learning_opportunities.html or phone (08) 9374 3333 to book in.

Wattle Week Festival

Held 10-17 September at Dalwallinu. Celebrating all things wattle including a wildflower display, bush cuisine and day tours to interesting places. For further information contact the Shire of Dalwallinu, phone (08) 9661 1001 or email shire@dalwallinu.wa.gov.au

State NRM Conference

This year's State NRM Conference will be held from Tuesday 4 - Thursday 6 October at the Agricultural College in Denmark. The conference theme is 'Sustainability Side by Side' and will explore examples of sustainable production systems for agricultural land, aquaculture and farm forestry, as well as physical resources including water, wetlands and biodiversity.

For more information contact Dorothy Redreau on (08) 9848 1019 or email dorothyred@greenskills.green.net.au or Monica Durcan on (08) 9291 8249 or email: mdurcan@iinet.net.au

Advances in plant conservation: implications for flora management and restoration

The Flora Conservation Symposium "Advances in plant conservation: implications for flora management and restoration" is to be held at Technology Park, 25 - 27 October 2005.

It will cover topics such as: rarity and threat; conservation genetics; population ecology; plant microbial interactions; and restoration ecology.

For further information contact David Coates, Science Division, CALM, by emailing floras@calm.wa.gov.au.

Wings in the Wheatbelt

See below

Wings in the Wheatbelt - the Rufous Treecreeper

The scientific name of the treecreepers, *Climacteris*, means 'the rung of a ladder' and refers to the tree climbing habits of the species. Generally they spiral upwards round the trunk of a tree.

The Aboriginal names are Jin-nee or Jinni, and are probably related to their call, even though this species is not as vocal as the rest of the family.

In spite of its name, it spends a lot of time foraging on the ground, as well as feeding in the trees. It eats mainly ants and termites, but also takes a variety of insects and even small skinks.

Its range has decreased markedly in the face of land clearing and



associated ventures. This has become even more marked in the last 50 years or so.

Although not endemic to WA, it is found as far east as Eyre Peninsula, and as far north as Shark Bay. The strongholds are the wandoo and

karri forests. Dryandra Woodland is one of the best localities where they can be seen in reasonable numbers.

To see the Rufous Treecreeper and other wonderful wheatbelt birds, join Birds Australia and *Land for Wildlife* at Dryandra Woodland (near Narrogin) on September 9th - 11th for an Introduction to Birding weekend. To register, fill in the enclosed flier, or call Avril Baxter on 9881 9218.

Brice Wells, Birds Australia WA Inc.

(Photo: Bert & Babs Wells, CALM)

NEW BOOKS

A Vision Splendid

G. Borschmann, D. Salt and M. Rooney

Pub: Greening Australia Ltd.

Cost: \$22

Available from Greening Australia by ph: (02) 6281 8585; www.greeningaustralia.org.au or email: general@greeningaustralia.org.au.

The inspiring new book 'A Vision Splendid: Dreams, inspirations and experiences of farm forestry in Australian landscapes' presents the fascinating first-hand accounts of eight Australian farmers who are 'having a go' at something different. This unique compilation glimpses the journeys taken by these remarkable farmers and their families as they strive towards their own evolving visions of enjoyable, profitable, and environmentally sustainable farming and country living.

The Land of Flowers: an Australian environment on the brink

Irene Cunningham

Pub: Oxford Press

Cost: \$34.95

Irene Cunningham was born in the Midlands of Western Australia. Her childhood was spent on a farm where help from the Noongar people was essential to their success. She moved to Sydney where she studied and married, but in the 1980s returned to Western Australia where she sought to renew the connection that she had with the land of her childhood.

The author bought some land on the coastal plain, near the Darling Scarp, where she planned to run a few sheep and plant some vegetables. However, the ecological

and sociological destruction that had been and was still being wreaked around her caused Irene to hand her land back to nature.

This story artfully combines the author's experience on her property "Waylo" with her childhood, her understanding of Noongar culture and her scientific knowledge. Irene's fascination and love of the natural world and her deep appreciation of the Noongar people and their connection with the land is palpable in the depth and insight of her written word.

Parallel, intertwined and interrelated to the above, the book also gives an account of the history of Western Australia and the changes wrought on the land and its people by the invasion of Europeans and the impact of farming on the fragile land.

The book received excellent reviews from historical, aboriginal, conservation and scientific reviewers of note. Described as "mandatory reading" by Emeritus Professor Frank G. Clarke, this excellent book is written from the heart of a woman who dearly loves her country but regards it with wide open eyes.

Cressida Wilson

Congratulations!

to Men of the Trees for winning the 'Environmental Leadership in the Community' award from the Banksia Environmental Foundation. It is great to see an organisation with a proven record of on-ground action achieving this national recognition. Well done all concerned!

Trees and Biodiversity: a guide for Australian farm forestry

David Salt, David Lindenmayer and Richard Hobbs

Pub: Joint Venture Agroforestry Program

Cost: \$34

Available online from: <http://extranet.rirdc.gov.au/eshop/>

This book surprised me. Farm forestry as an option to diversify farm income has been developing steadily in the south west of WA over the last fifteen years. Plantations of all shapes, sizes and compositions are springing up across the rural landscape. Big hopes are pinned on the ability of farm forestry to provide both economic benefits to landholders as well as ameliorating some of the broad scale environmental problems of rising salinity and soil erosion. Can farm forestry also have the added benefit of providing additional habitat for native plants and animals?

Trees and Biodiversity: a guide for Australian farm forestry is the third book in series produced by the Joint Venture Agroforestry Program. It provides the most up to date information on biodiversity within agroforestry drawing on studies and observations from right around Australia. I was very impressed with the scope of this book and found it to be the most comprehensive compilation yet on faunal behaviour and movement within our disturbed agricultural landscapes. I think anyone who has a special interest in bringing fauna back onto their properties will find something very useful in this publication.

Sylvia Leighton

FUNDING

NEW FUNDING OPPORTUNITY FOR HIGH CONSERVATION VALUE PROPERTIES IN THE SOUTH-WEST

Sophie Moller and Emma Bramwell

The nature conservation covenant programs of CALM and the National Trust have received a boost with the funding of a project by the South West Catchments Council (SWCC). The project, which is a joint initiative exemplifying the cooperative nature of the two programs, will begin in July this year.

It will target properties in the South West region which have 'highest priority' flora or Threatened Ecological Communities (TECs) as identified by the project. 'Highest priority' flora are those identified by SWCC, and are generally Declared Rare Flora (DRF) specific to the South West region.

These properties will be targeted and offered up to \$10,000 per property to enter into a conservation covenant with either program. The money must be used for on-ground works, such as fencing, feral animal or weed control, or rubbish removal, that will assist with the long term protection of the sites.

A conservation covenant is a legal agreement that travels with the land title. It restricts certain activities, such as clearing and grazing, to protect the land's natural values for the long term. The management practices are specified in the covenant and a management plan, so that future landowners must protect the land and manage

it in the way the original landowner intended.

Acceptance into this project will be on a first-in, first-served basis, with letters to prospective properties to be sent out once the project begins. If you don't receive a letter, but think you may be eligible or want to know more about conservation covenants, contact either Sophie Moller at CALM on 9334 0477 or Anthea Jones at the National Trust on 9212 1111. Even if your property is not eligible for this particular project, the covenant programs may still be able to assist you with an application for an alternative funding source, such as Envirofunds.

FAUNA

Stop the Cane Toad! Keep WA Cane Toad Free!

Cane toads are poised to get into WA! We have one last chance to stop them before they reach the Kimberley. These introduced horrors will devastate our native wildlife – we will never get it back again.

It is not good enough to simply throw our hands in the air and say "It's too hard!" as has been done in the Eastern States. Even if the pests do beat us, at least, let's go down fighting! Everyone can help, even if it is by donating the money to build one of the 500 specialist traps required.

To find out how you can help, ring the Conservation Council of WA on 9420 7266, or visit the website: www.stophethetoad.com

For detailed info and photos, visit: www.agric.wa.gov.au or www.calm.wa.gov.au