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MANAGING DISTURBANCE - A COMPONENT OF REMNANT RESTORATION

Richard Harris

Fig. 1: The Allocasuarina / Acacia *thicket with the chained area in the foreground. (Photo: R. Harris)*

Agricultural development in the wheatbelt has resulted in fragmentation of the native vegetation. Remaining remnants are mostly small and are surrounded by agricultural land. The long-term sustainability of these remnants is dependent on both processes within them, such as its size and disturbance history, its location within the broader landscape, and its management. Fencing to protect remnants is becoming common practice, but alone may be insufficient to ensure biodiversity enhancement and may promote maintenance of a 'climax' plant community – one dominated by a few long-lived species. The incorporation of disturbance into the management of native fragments is an important consideration.

Fire is a common natural disturbance. However, the flora of small remnants are highly susceptible to increases in the frequency of fire, as death of adults and exhaustion of the seed bank can occur. Conversely, the incidence of fire in many remnants has declined significantly with less clearing and active suppression in these agricultural landscapes. If fire events continue to be excluded from small remnants then can alternate disturbances be introduced?

A fortuitous event, the chaining and subsequent land abandonment of about ⅓ of a16 ha *Allocasuarina* / *Acacia* thicket in the Shire of Westonia (Fig. 1), has allowed the effects of a human induced disturbance to be studied by comparing species in quadrats 2-3 and 4-5 years after the disturbance. The disturbance resulted in distinct zones within the chained area: cfleared – chained vegetation was cleared; burnt – piles of cleared plants were burnt leaving areas with ash on the ground; mulched – vegetation was chained and the debris left as it fell.

The study found that two to three years after

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EDITORIAL

Hello everybody!

I hope you are all enjoying a bountiful spring season and that the rains, though low so far, come frequently enough to ensure good growth of both crops and bushland.

One question that *LFW* gets asked increasingly often is "How does one give regeneration a kick start in insolated farmland remnants?" We all know that remnants should be fenced to keep stock out, but then what? Usually, the site is just left to its own devices. There may be a brief flush of new growth, but not as prolific as the growth spurt that occurs after a fire. Indeed, as the community matures without disturbance, the vegetation community may appear to be static, or even to decline in diversity. Yet fire could be unacceptably destructive, especially in woodland or in an isolated area.

The lead article in this issue uses an investigation into regeneration after chaining to explore what effect this type of disturbance has had on a mature tamma/wattle thicket in the eastern Wheatbelt. The results are encouraging enough to suggest that managers of such sites might like to consider putting in a chained strip through such a remnant, to create a rejuvenated stand of vegetation. If done over several years, a mosaic of different age classes could be created. Not a technique to be undertaken lightly, but worth thinking about. You might like to discuss the ecological ramifications with your *LFWO*.

If you do undertake any work of this nature, please remember to keep good records, and be sure that you establish photopoint monitoring locations.

During Conservation Week, 23 to 30 October, please help with the documentation of climate change effects by listening for the White-striped Bat. The more observers there are, spread over the widest possible area, the more accurate will be the results. So please, will as many people as possible take part in this? (See p. 4).

There is a diverse range of other articles in this issue – how heat affects wattle seeds, for example, or possible financial returns from carbon storage. There are also some fascinating contributions from readers – check out the Porongorup Morning Glory; no, its not a new weed!

Please let me know what you like or do not like about the magazine, and suggestions for articles are always welcome.

Best wishes for the end of the year.

Penny Hussey

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

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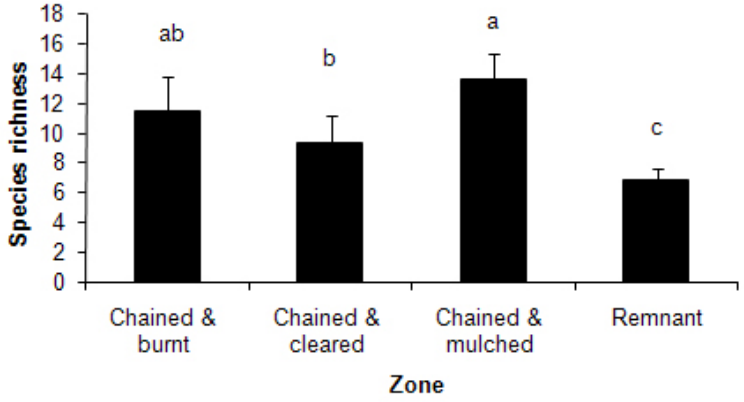
Managing disturbance

FLORA

Fig. 2: Comparison of number of species in 4x4m quadrats among zones in chained area and the unchained remnant. Species richness was greater in the chained area than in the unchained remnant.



disturbance, distinct assemblages occurred within each zone and the chaining clearly promoted above ground diversity, with all three zones having more species than the unchained remnant (Fig. 2), which is generally species-poor mature vegetation with no evidence of recruitment. Each disturbed zone had a number of abundant taxa largely restricted to that zone, such as *Keraudrenia integrifolia* and *Dampiera luteiflora* in the burnt zone. Some early colonisers were absent four to five years after disturbance having flowered, seeded and died, for example *Gonocarpus confertifolius* var. *helmsii* which was very abundant earlier.

Located in the chained zones, but absent from the remnant was Barbalin Boronia (*Boronia adamsiana*), a Declared Rare Flora species not previously recorded from Westonia (Fig. 3). Like many of the species, it was not restricted to the burnt area. Clearly many species have survived in the seedbank in this remnant, despite what is probably a long period since disturbance by fire. It appears likely that the different zones have different successional pathways and will lead to slightly different species compositions in the assemblages in years to come. For example, species that resprout after disturbance were in greatest abundance in the mulched zone and least abundant in the burnt zone.

Physical disturbance caused by the chaining appeared adequate for recruitment of many species and greatly increased the overall diversity of species growing at the site. Only a small proportion of the species colonising the chained area were restricted to the burnt zone. Therefore chaining could be a useful management tool to promote diversity and maintenance of seral species in areas where fire is unwanted or needs to be limited so as not to risk destroying the entire remnant. The chained vegetation does not necessarily need to be removed, although its remaining *in situ* would increase the fuel load and subsequent risk of fire.

Fig. 3: Barbalin Boronia was only sampled in the chained zones. It is a new record for the Shire of Westonia. (Ph: R. Harris)

Plants that respond to fire for recruitment (many *Acacia* for example) may also have fewer opportunities for regeneration if fires were eliminated altogether. Although not directly affected by fire, some of the species may have been stimulated to germinate from the soil seed bank by the smoke or heat generated from the nearby burnt vegetation piles. If this is the case then incorporation of fire into some part of a disturbed area would be needed to aid persistence of more species. Timing of fire if used is likely critical, as areas that are chained and then burnt will likely have an under-representation of canopy (serotinous) seeders (in this case *Allocasuarina* and *Hakea*) compared to the other zones, and a greater representation of soil seed bank species such as *Acacia* that respond to fire with germination.

Somewhat surprising was the relatively low abundance of weed species in the chained area after disturbance. In highly weedy environments, management of weeds after a disturbance would likely be needed to maximise native species recruitment.

Disturbance does promote above ground diversity, but promoting disturbances such as chaining at a site should only be necessary if other natural disturbances are so infrequent that the soil-stored seedbank is at risk of being diminished, but in this case chaining has clearly promoted native species diversity without promoting weed invasion.

Richard Harris is a lecturer in the Department of Environment and Agriculture at Curtin University. The research was conducted with the assistance of third year ecology students who attend a week-long camp at Westonia. He can be contacted on: R.Harris@curtin.edu.au

[For ref. to the scientific paper this is taken from, contact Ed.]

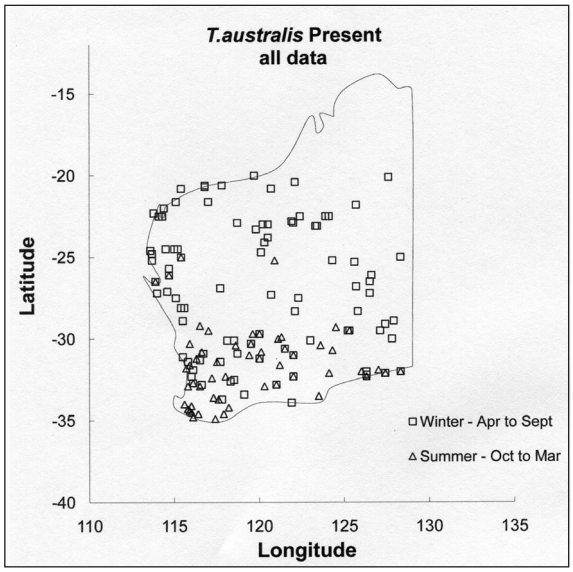
CLIMATE CHANGE

WHITE-STRIPED BATS - BELLWETHERS OF CLIMATE CHANGE?

Nic Dunlop and Bob Bullen

The White-striped Bat (*Tadarida australis*) is one of the largest insectivorous (microbats) in Australia, adults weigh around 40 g. It has dark brown to black fur with a bright white-stripe at the junction of the body and wings. Some individuals also have an area of white fur on the chest. The White-striped Bat is in the 'freetail' family (Molossidae) which have a strong, stiff tail projecting beyond the tail membrane. These bats are also called Mastiff Bats because their wrinkled facial features resemble those of a mastiff dog.

The White-striped Bat is a fast flyer and tracks the open space above the tree canopy. Its speed gives it a wide foraging range and as a result it is one of the few bats routinely encountered over urban areas. Unlike most other microbats in southern Australia, the White-striped Bat cannot hibernate and so may be encountered foraging at relatively low temperatures. It also uses its fast energetic flight to migrate northwards across the arid zone during the winter months. Unlike other microbats, part of the White-striped Bat's echolocation call is audible. Most people with reasonable high frequency hearing can identify its distinctive metallic 'ting ting' once they've been tuned in.



Researchers Bullen and McKenzie* found that the White-striped Bat was a partial migrant. During the summer months (the reproductive period) all records were from south of 29°S latitude. During the winter months a proportion of the population moved northward into the arid zone as far north as the Great Sandy Desert and Broome.

The large flight muscles in this species generate significant heat and impose a temperature limit on activity and foraging time. During summer White-striped Bats are restricted to areas where the mean monthly minimum (night-time) temperature does not exceed 20°C. These conditions exist over most of the south-west of Western Australia but this situation is anticipated to change quite rapidly as the result of human-induced climate change. As nocturnal temperatures rise, the foraging period available for these bats will be reduced. The initial response may be the cessation of breeding activity. The next will be a contraction in summer range towards the south coast of the state.

The White-striped Bat is easy to detect and its behaviour, distribution, migratory timing and population size are all potential indicators of climate change. Can the White-striped Bat adapt and, if so, how and where? These are questions you can help us answer.

CITIZENS, COUNTRYMEN, LEND US YOUR EARS!

The White-striped Bat is being groomed as a climate change indicator species for both the EarthWatch Initiative, ClimateWatch and the Conservation Council of Western Australia's Citizen Science Program. If you are interested in becoming a 'bat-listener' please take the following simple steps.

1. Visit the ClimateWatch website and register as a participant (http://www.climatewatch.org.au).

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White-striped Bats

CLIMATE CHANGE

Sampling Protocol

The 'bat-listening' project will commence with the launch of the ClimateWatch WA indicators during Conservation Week, 23 to 30 October 2010. It would be great if all our bat listeners could do at least one observation in that period, so that we can get a spring snapshot of where the bats are distributed. Thereafter, ClimateWatch would be keen to get your records at any time and will contact you about other coordinated observation periods.

We suggest the best way to sample is this:

- Make time available to listen for a 10 minute period.
- The best time to listen is around 90 minutes after dark, later on really warm nights.
- Listen to the sound-bite before you go out to 'tune in'.
- Choose a quiet area with an open sky - grassy paddocks, near dams or under street lights may be good spots although this bat can be heard almost anywhere if present.
- Choose a still night if possible as this reduces background noise.
- You only need to record whether the bat is present or absent but counts of the number of calls (over 10 minutes) may be a useful index of activity levels.
- Remember that 'nil' results are just as important to record as positive contacts (and that things will change seasonally).
- The more repeated (replicate) 10 minute samples ClimateWatch can get the better.

2. Confirm your registration by clicking on the automated email in your inbox.

3. Check out the field guide on the White-striped Bat. Click on the sound-bite to listen to the bats' metallic 'ting ting' call (you may need to turn the sound up a bit on your computer). If you can hear that you will be able to detect the real thing outside on a still night.

Acknowledgement

This is an initiative of the Council of Australian Museum Directors, and is funded with assistance from the Science Connections Program within the Department of Innovation, Industry, Science and Research.

Nic Dunlop and Bob Bullen are Citizen Scientists at Bush Heritage's Charles Darwin Climate Change Observatory. (Illustration: Elizabeth Rippey)

[* For ref. contact Ed.]

And the world gets warmer . . .

The annual *State of the Climate Report*, compiled by more than 300 scientists from 48 countries, declares 'Global warming is undeniable'. The report, released by the US-based National Oceanic and Atmospheric Administration, is the 20th in a series. As before, it focuses on 10 indicators of change. Seven of these are increasing over decades: average air temperature, the ratio of water vapour to air, ocean heat content, sea surface temperature, sea level, air temperature over the ocean and air temperature over land. Three indicators are declining: snow cover, glaciers and sea ice.

The first 10 years of the 2000s is now the warmest decade on record. The report does not speculate on the cause of these changes, only reports the fact that they have occurred.

CROW OR RAVEN?

The following delightful comment has been copied from the newsletter of the Wildflower Society of WA. Enjoy!

"It seems to me that systematic botanists are always arguing about boundaries. You know the sort of thing: this is a separate species; no it isn't, it is a subspecies. Such differences remind me of the differences between crows and ravens. You may have been told that it is a matter of the ruff of feathers about the neck, or maybe about the kind of call. But the real difference depends on the feathers at the end of the wing. These feathers have a special name. They are called pinion feathers. The real difference is that ravens have three such feathers whereas crows have only two. Or perhaps it is the other way around. Anyway, the main message is that the difference between crows and ravens is a matter of a pinion."

Jim Barrow

RESEARCH-FLORA

SEEDY GAP IN NATURE

Shane Turner

When seeds from species such as native peas (*Daviesia* or *Jacksonia* species) or wattles (*Acacia* species) are placed into hot water, it is commonly assumed that the heat 'cracks' the seed coat or leaches some type of germination inhibitor from the seed, a treatment which is therefore critical for germination in these species. While the hot water treatment is indeed essential to stimulate germination, the manner in which it works is remarkably different and reflects the amazing but mysterious ways in which nature works.

The seeds of most hot water responsive species are technically referred to as 'physically dormant' which in laymen's terms simply means that the seeds are impervious to water, a condition caused by a physical barrier within the outer part (testa) of the seed that excludes water – even if seeds are soaked for months at a time. Within the greater Perth region up to 200 native species are thought to have physically dormant seeds, found in plant families such as Convolvulaceae, Fabaceae, Geraniaceae, Malvaceae, Rhamnaceae, Surianaceae and Sapindaceae, and include well-known locally occurring genera such as *Convolvulus*, *Gompholobium*, *Geranium*, *Alyogyne*, *Trymalium* and *Dodonaea*. The unique feature of virtually all these species is that their seeds possess a 'water gap' of some type which is the tiny but vital structure that acts as an 'environmental signal detector' regulating water uptake into the seed.

Water gaps (Figure 1) rupture, split or blister creating a channel through which water can freely move in response to a change in the seed's environment, such as a fire or a hot summer's day, and are typically smaller than 500 µm (0.5 mm). However, this change can also be stimulated in many (though not all) cases with a brief dip (one minute) in hot water, a simple to apply treatment which also renders the seed water permeable. Once ruptured, the water gap acts like a valve allowing water to move into the seed slowly at first but more rapidly later on as imbibition proceeds. Uniquely, water only moves into the seed through the water gap at the start of the imbibiton process and, once the seed has become fully hydrated, germination normally occurs shortly after (three to 28 days) – unless the seed has 'physiological dormancy' as well, which is another story best left for next time!

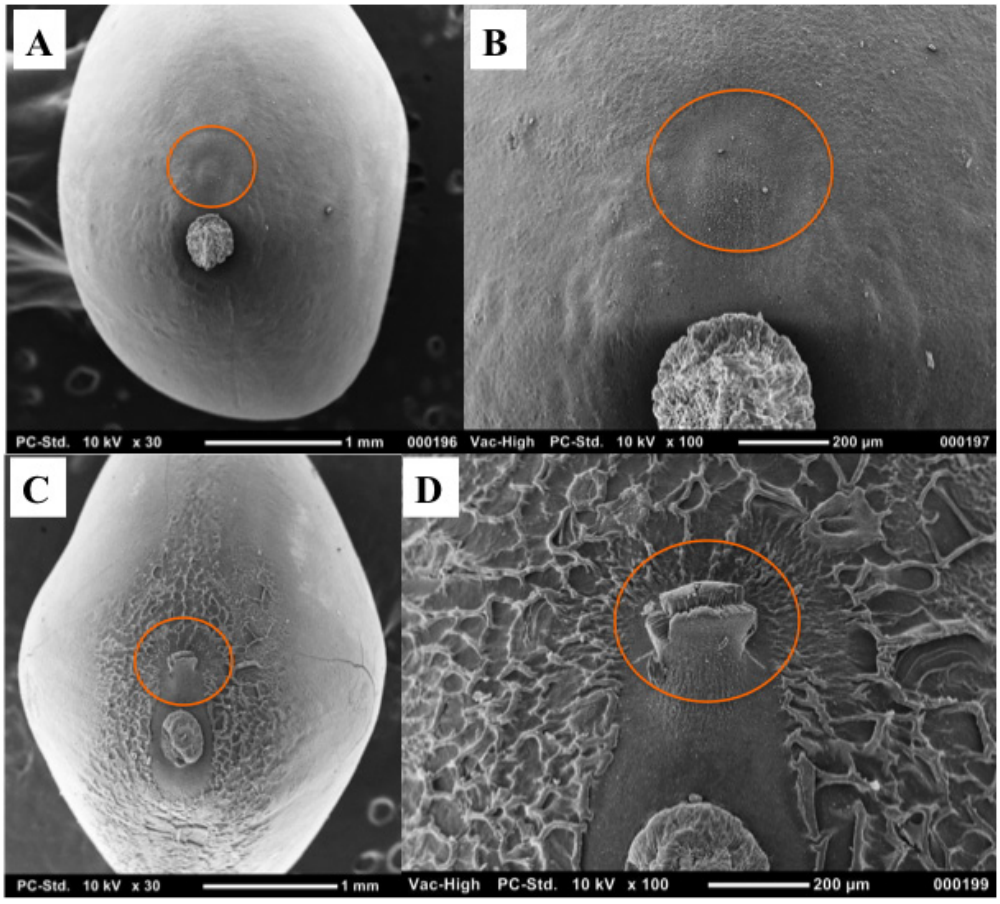

*Figure 1 A): Before hot water treatment: the slight circular indentation or 'dimple' of this wattle (*Acacia pyrifolia*) seed's closed water gap can be seen just above the hilum within the circled region. B) Before hot water treatment: close up view (100x magnification) showing the small 'dimple' of the wattle seed's closed water gap clearly visible within the circled region. C) After hot water treatment: the 'dimple' on this wattle seed has split and opened. D) After hot water treatment: the open water gap seed is clearly visible showing how the underlying layer of cells (palisade layer) has split apart creating a path through which water can move. Images: Todd Erickson.*

Shane Turner is a seed biologist with Kings Park and UWA, working on the integrated conservation of the critically endangered sp. 'Commersonia *sp. Mt Groper', supported by Grange Resources. Email: sturner@bgpa.wa.gov.au*

ECONOMIC VALUE OF BIODIVERSITY

CARBON STORAGE OF NATIVE PLANTS ON UNPRODUCTIVE SOILS EXAMINED

Mike Clarke

As part of the North Eastern Agricultural Region (NEAR) Strategy, revegetating consistently unproductive soils for carbon storage is being examined as a potential alternative land use. The work is part of the Department of Agriculture and Food's (DAFWA) plans to increase the drought preparedness and resilience of farm businesses in this region.

The project is looking at changing land use on soils that are becoming increasingly unproductive in a drying climate. A recent survey found approximately 8% of soils in the NEAR are consistently unproductive. These soils have physical and chemical limitations such as shallow depth, acid subsoil or poor water holding capacity that is rendering them uneconomic to farm with current farm practices. Tree species that are often mass planted throughout the wheatbelt such as oil mallees are often not the best choice for such inhospitable soil types. Many other local native species, however, are adapted to such environments and perform better in terms of survival and growth rates.

Mike Clarke from DAFWA in Geraldton and Fiona Falconer, a *LFWO* from DEC, have recently been assisting forestry specialists to determine just how much carbon is actually stored by native plants that thrive on these poor soils. Destructive sampling, where a quarter of a tree or shrub is pruned and weighed, has taken place and analysis is under way to look at possible financial returns from such plantings. By only removing a quarter of the vegetative material, the plant is not killed and it will sprout new growth.

Forestry specialists weighing plant material of local trees and shrubs. (Photo: M. Clarke)

Carbon storage as a potential alternative land use is just one aspect of the work under way looking at unproductive soils. The project will also define the characteristics and extent of unproductive soils in the NEAR. Data from a recent survey of growers will be used for an economic analysis to determine the contribution of these soils to whole farm viability. With input from farmers, a range of suitable landuse options for unproductive soils will be identified. The project will provide Government and the industry with policy recommendations on future management options and potential research and development opportunities.

Mike Clarke is Senior Development Officer, Agricultural Resource Risk Management, DAFWA, Geraldton. If you wish to learn more about this project, contact him on: mike.clarke@agric.wa.gov.au

Did you know . . .?

. . . that the 13th August 2010 was 210 years since the first whale was killed commercially at Albany?

When Vancouver called at St George's Sound in September 1791, his journal reported seals and whales 'spouting and playing all around the ships'. In 1800, the whaler Kingston was sent from London to investigate this, and a transcription of the ship's logbook has recently been published. It records the following events:*

The ship moored in Princess Royal Harbour on 11th August 1800. On the 13th they caught the first whale. On the 18th they stowed the first oil, '90 barralls' (sic) (2835 gallons of oil from two whales). As well as whaling, the ship's crew fished (including oysters) and also went ashore 'wooding' and 'collecting broom stuff' as well as sand for holystoning the decks. The logbook makes no mention of any Aboriginal presence whatsoever.

*[*For ref, contact Ed.]*

FAUNA

FLYING DRAGONS - OR DRAGONFLIES

Claire Hall

Recently I saw a dragonfly skimming over my backyard pond, which prompted me to investigate what part this fascinating insect plays in our local biodiversity and ask "Why is it called a 'dragonfly'?"

Dragonflies are neither dragons nor flies. The common name 'dragonfly' refers to its fierce jaws, designed to catch and chew its prey, however, there is no evidence that dragonflies are capable of biting or stinging humans. Dragonflies belong to the order of insects called Odonata of which there are more than 6,000 species worldwide with 325 species known in Australia. There are two suborders of Odonata: the Anisoptera (dragonflies) and the Zygoptera (damselflies). A guide to distinguishing between the two is that when at rest, dragonflies generally spread their wings out to the sides, whereas damselflies hold their wings along their body.

Did you know that dragonfly ancestors were here on Earth more than 300 million years ago and that they pre-dated dinosaurs by 100 million years? Primitive dragonflies were huge compared to modern dragonflies, having wingspans of up to 70 cm. The wingspan of modern dragonflies is in the range of five to eight cm. So how did dragonflies manage to survive when dinosaurs did not? That question will be answered later, but first some information about the life of dragonflies.

Dragonflies have three life stages: egg, larva, and adult. Adults are very distinctive with their two pairs of large wings extended laterally, large prominent compound eyes, a stout thorax, three pairs of legs, and a long, slender abdomen which can be coloured red, blue, green or brown.

Mating commences by males first establishing a territory and defending it against all other males. The mating of adult dragonflies has some unique features. The male has an accessory organ on the underside of his second abdominal segment to which he transfers his sperm prior to mating. When the male encounters a receptive female, he grasps her behind the head using the appendages at the tip of his abdomen, then the female bends her abdomen forward to engage with the male's accessory organ, the pair forming the characteristic 'wheel' or 'heart' position. The male will sometimes use his accessory organ to remove any sperm that may have been deposited by a previous suitor. In some species, the pair will fly in tandem with the male continuing to hold the female while she deposits her eggs, perhaps to discourage other males from mating with her until her eggs are laid.

Eggs are laid directly onto water or mud at the water's edge, or on plant material near water, thus all dragonflies begin life as aquatic or semi-aquatic. The larval stage of a dragonfly can last up to five years, during which time the larva goes through up to 15 moults or 'instars'. The larvae are brownish and can be bullet-shaped or flattened with three pairs of walking legs. It breathes by sucking water into gills at the end of its abdomen and once enough oxygen has been absorbed it expels the water so that it does not have to surface for air like most pond insects. It can also escape predators by expelling this water in a jet-propelled fashion.

Dragonflies differ from butterflies and moths in that they do not

Larval casing (exuvium) of a Western Petalura (Photo: Jan Taylor)

have a pupal stage. They can be seen emerging most commonly during summer. When growth and development have been completed, the larva climbs out of the water and attaches itself to the stem of a plant, the larval casing splits and its body swells, slowly metamorphosing into an adult dragonfly. It is at this point that they are most vulnerable to being taken by birds, frogs and fish. After living most of its life in the larval stage, the adult dragonfly only lives for about three to six months.

Both the adult and larval dragonflies are voracious predators. Larvae will eat anything, including tadpoles, mosquito larvae, small fish and worms, and they can also be cannibalistic. The larva does not chase its prey, it just waits for it to come within reach then shoots out its hinged bottom lip, grasping the prey with its powerful palps located at the outer edge of the lips.

Adult dragonflies have evolved

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Dragonflies

FAUNA

Giant Western Dragonfly or Western Petalura, Petalura hesperia *(Photo: Jan Taylor)*

as specialised aerial hunters using their lightning speed, sudden stops and turns to chase prey. Their huge eyes contain up to 28,000 lenses, allowing them to see better than any other insect. Each eye is composed of two sections: one looks up for danger and one looks down for prey. They feed on flies, mosquitos and other insects and can eat up to 600 insects a day. Prey is scooped up in a basket formed by the dragonfly's spiny legs, then it eats while still in flight, ripping the prey apart with its fierce jaws.

Dragonflies have survived since pre-historic times for a number of reasons. Firstly, they experience two totally different lifestyles: the larval stage is spent in water whilst the adult stage is largely an aerial one. Following emergence, the adults immediately fly away from water, and this dispersal period has been a major factor in their survival. If a wetland dried up, dragonflies were able to find suitable alternative sites to colonise. Secondly, the basic body design of the dragonfly has proved that it is capable of adapting to the many fundamental changes that have occurred on earth during the past 300 million years. They have adapted to smaller vegetation by becoming smaller themselves. Dragonflies have occupied a niche in the environment that no other creature has ever managed to fill.

One of our Western Australian dragonflies under threat is the Western Petalura (*Petalura hesperia*) which belongs to a primitive family of dragonflies. It is known to be rare, local and sedentary and is the largest dragonfly in WA with a body length of 8-10 cm and a wingspan sometimes exceeding 11 cm. It lives in the jarrah forest of the Darling Scarp near Perth and is known from only one location on the Swan Coastal Plain at Bull Creek. It is found near the headwaters of permanent freshwater streams and the larvae are nocturnal, living in burrows in boggy locations. Compared to other dragonflies they are relatively slow fliers and generally adopt an ambush technique to secure their prey. You may see them perched on tree trunks beside forest streams waiting for insects to fly past. They dart out, catch their prey and often return to the same perch to feed.

Dragonflies are studied by ecologists to determine changes in the environment because they sit at the top of their food chain at both the adult and larval stages of their life. They are in danger because some species have very narrow habitat requirements. Some require running water and some require still water. They predate on insects, fish and frogs who in turn predate on them, a perfect food web. Whether it is in a backyard pond or a wetland, dragonflies are a crucial component of a balanced, biologically diverse ecosystem.

How can you help dragonflies? If you have a wetland on your property, have it fenced and keep it free of weeds and pollutants; provide a pond in your garden; join a wetlands 'friends group' or adopt a wetland and start your own group. By conserving our wetlands we will ensure that these special insects with pre-historic links can be enjoyed by future generations.

Claire Hall was formerly LFW Technical Officer, but currently works in DEC's Native Vegetation Conservation Branch. She can be contacted on: claire.hall@dec.wa.gov.au

Congratulations!

to Forest Rise Eco Retreat, near Margaret River, for winning two eco-accreditation awards last year, Gold for Unique Accommodation and Silver for Ecotourism!

The property has been registered with *LFW* for sevaral years, and the *LFWO* has provided advice and assistance on environmental matters. This year, as part of the International Year of Biodiversity, *LFW* will conduct flora and fauna ID days on the property for the staff. This should help to ensure that any clients' questions will be accurately answered.

Cherie Kemp

FLORA

TREASURING WANDOO - A PARTNERSHIP IN MUTUAL LEARNING

Liz Manning

Capturing the interest and support of communities and delivering an effective public education campaign are key objectives of the Wandoo Recovery Group (WRG). A project to restore wandoo bushland and the recent publication *Treasuring Wandoo* have done just that; drawing people together in a partnership of mutual learning upon which long term friendship, cooperation and trust are built.

Creating bushland links in wandoo country

In May 2009, I advertised in *Western Wildlife* for expressions of interest from private landowners to create bushland corridors and extend linkages to their Wandoo remnants and so help restore diversity and function.

I received eight responses from interested *LFW* property owners that I eagerly followed up with telephone calls and arrangements to visit each property. It was inspiring to meet these people and hear their ideas and aspirations. Three property owners joined the project with two eventually following through. Chris Burton's property is near Katanning. The small patch of remnant Wandoo adjoins a road reserve, making it important in the overall biodiversity health of the area. The Ewlyamartup Creek runs through the property forming a chain of winter billabongs and flats, frequented by many local and migratory birds. Gary Mutton's ridge top property near Narrogin supports a healthy tree layer of Wandoo, Brown Mallet, Jarrah, Marri and York Gum, as well as Rock Sheoak, banksia species and a suite of shrubs and ground layer plants. Gary is interested in nature conservation; he wants to return the majority of the property to its original vegetation, encourage the return of bush birds and establish a safe haven where small mammals could be re-introduced.

Seed collection on Chris Burton's property (Photo: Liz Manning)

The project took on an exciting dimension when post-doctorate research fellows, Katinka Ruthrof (a restoration ecologist) and Marleen Buizer (a social scientist) with the Centre of Excellence for Climate Change, Woodland and Forest Health at Murdoch University became involved. Katinka's research program is testing theories and research techniques to increase the success of revegetation activities - she wants to establish Wandoo restoration trials to measure early growth and establishment success of young seedlings. For Marleen, working with private landowners raises interesting questions regarding the specific local contexts, priorities and knowledge they can bring to research. For instance what does this mean for how research is conducted? Do general protocols need to adapt flexibly to local circumstances? Are landowners interested to share their growing knowledge about restoration? What would they like to know from others? How could such a social learning process be supported? Are there opportunities to bring 'urban' and 'rural' people more into touch with each other? Creating conditions for long-term joint projects that provide a basis for sharing knowledge, forming friendships and establishing trust is an important aspect of learning.

Property visits and discussions helped identify the best sites for planting as well as the problem areas. We needed to work within cropping programs and effectively deal with weeds, chemical drift and rabbits. Where possible, seeds from understorey species were collected from the properties to be grown by local nurseries, or saved for direct seeding later in the year.

Sites were selected on which to establish long-term monitoring plots. The research program would examine

Taking a break from planting on Gary Mutton's property (Photo: Liz Manning)

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IN BRIEF

THE VALUE OF PADDOCK TREES TO BIRDS

Past agricultural practices often left trees isolated in paddocks. In many cases, these are mature specimens with holes and hollows, of value to wildlife such as birds that can cross the open farmed area to reach them. However, modern agricultural practice, including changes in farm machine size and technology, is leading to an increasing rate of removal of these trees in WA – a trend that *LFW* believes will be detrimental to wildlife conservation on a landscape scale. (See Wildlife Note No. 16, Paddock trees and wildlife.) It is always interesting when research investigates our belief, even if the study is overseas.

Scientists in Oregon, USA, looked at bird use of isolated Oregon White Oak trees within a farming matrix*. Oak savanna is one of the USA's most imperiled landscapes, and in many areas 'biological legacies' from historic landscapes exist as large trees which have often been retained by landholders for cultural reasons. The researchers compared bird use of isolated oak trees in croplands, pastures and oak savanna reserves. They found, to their surprise, that the most important feature that predicted bird use was tree architecture (size etc) and that isolation within the landscape matrix was relatively unimportant. They concluded: 'Our findings demonstrate that individual remnant trees contribute to landscape-level conservation of bird diversity, acting as keystone habitat structures by providing critical resources for species that could not persist in otherwise treeless agricultural fields'. Sound familiar?

As in WA, this study team documented problems with loss of trees, both by deliberate removal and through senescence. They recommend that 'modification of existing landholder incentive programmes … recognise the potential ecological benefits of restoration at the single-tree scale'.

[*for ref, contact Ed.]

MORE SUPPORT FOR THE VALUE OF PADDOCK TREES

Researchers in NSW looked at the effect that isolated trees had on ecosystem functioning, especially for birds and bats*. They found that 'scattered trees effectively maintained moderate levels of bird and bat activity throughout largely cleared parts of the landscape'. They believe that scattered trees are keystone structures because they have a disproportionate effect on ecosystem functioning, relative to the small area occupied by any individual tree.

[*for ref, contact Ed.]

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Wandoo

changes over time and with different treatments including use of fire, ash-bed creation, scarification, nutrient supplements, removal of adult plants, weed control and controlling competition from weeds and herbivores. The combinations of treatments were dependent on the landowners' own judgments, expectations and priorities.

A planting weekend held in June saw more than 2000 Wandoo seedlings planted on Gary and Chris's properties. A dedicated group of volunteers from Friends of Island Point, Mandurah, gave their time and expertise to help plant. We also scattered seeds of understorey species collected from the properties earlier in the year. The culmination of 12 months of visioning, planning and action strengthened the bond of friendship and partnership between us. It looks set to continue as the project develops and we grow together.

Treasuring wandoo – such a marvellous tree

In December, 2009 the WRG published a small booklet *Treasuring wandoo – such a marvellous tree*. Almost 1,000 copies have been placed in public libraries and circulated to NRM Councils, environment groups and supporters of the WRG. An advertisement in *Western Wildlife* promoting the booklet generated much interest and heralded further requests for copies. I hope readers enjoyed reading about the magnificence of Wandoo and its diverse woodlands and understand the urgent need to protect our dwindling remnants. The WRG greatly appreciates the support of *Land for Wildlife*.

Liz Manning is Executive Officer for the WRG. For more information, contact her on 0427 441 482 or email Elizabeth.Manning@bigpond.com

MEMBERS' PAGE

PORONGURUP MORNING GLORY

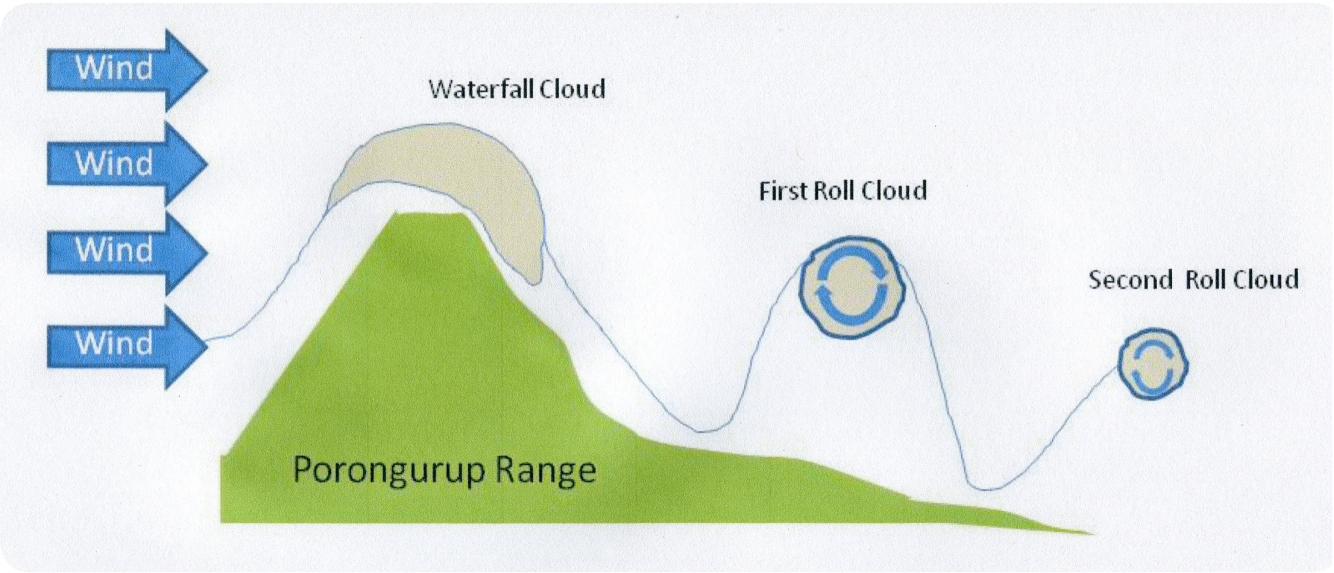
Bill Shanklin

The Porongurup Morning Glory forms just once or twice a year, if at all. It can occur at any hour but it is most spectacular at breaking dawn or at night by the light of a full moon.

On the left of the photograph is a 'waterfall' of clouds spilling over the Porongurup Range. The roiling cloud is formed by a ferocious northeast wind striking the north side of the range then being deflected upwards where the cooling condenses the airborne vapour into cloud. The cloud finds a breach in the wall at the pass called Wansbrough Walk where the clouds cascade down the south side then dissipate.

On the right of the photo is the roll cloud that stays in one position while continuously rolling around its long axis. The roll cloud is formed by the bouncing of the airstream. The air first bounces off the paddocks of Porongurup Farm then forms the long cloud which spins as it hits the overlying airstream then descends and dissipates once again.

In this 6th January 2010 instance, the bounce of the air after descending the roll cloud was strong enough to form a second roll cloud to the south (far right of photo).



MEMBERS' PAGE

Cockies relish hakea seeds

Carnaby's Black Cockatoos are seen here feeding on the seeds of the low-growing shrub Narrow-fruited Hakea (*Hakea stenocarpa*).

Alison Cawley, Brigadoon

Who the hell are you?

A pair of Tawny Frogmouths return to the yard to breed every year. This year they reared three young, one of whom was very active.

Kelly O'Neill, Ongerup

Do you know this moth?

Julie Williamson of Yallingup writes: "Do you know this moth? He was on the window frame this morning (30th August) and I've moved him to a tree because otherwise he may get eaten. The wingspan is 14.5 cm – quite an amazing creature. I hope he is a good moth and not a pest species!"

LFW asked Matt Williams (Senior Research Scientist, DEC) who says this is the Helena Gum Moth (*Opodiphthera helena*) one of the largest moths in WA. It is in the Emperor Moth family, Saturnidae. The caterpillar feeds on gum leaves and it pupates in a silken cocoon, usually in a sheltered area on the host tree. Apparently the pupae can remain dormant for many years – perhaps as long as 10? – then emerge when conditions are right. They are widespread and were thought to be uncommon but for some reason, over the last five years it is being sighted more often, especially so this year. What factor has changed, less rain, warmer temperatures, a declining predator? Who knows. Matt concluded: "Your *LFWer* is very fortunate – I've never seen one in the wild."

So, has anyone else in the lower south-west noticed this spectacular moth over the last few years? If so, please let your *LFWO* know where and when.

The Mt Clarence (Albany) fauna survey caught several scorpions that had fallen into the pit traps, where this one was photographed by Sylvia Leighton. Mark Harvey, from the WA Museum, says:

"The scorpion is a species of *Cercophonius*, of which there are several in southern Western Australia. They occur in forested areas, and commonly walk into houses and fall into swimming pools. A sting from these scorpions is painful but not considered dangerous. Males wander in search of females during the cooler months of the year."

NEWS

BUSHLAND TRAILS WORKSHOP

More than 35 people attended a talk and tour organised by *LFW* at Mount Shadforth on 9th May. Emeritus Professor John Pate presented an outline on creating and maintaining bushland trails, then some of the points and principles were illustrated during an exploration of part of the seven kilometres of trails on the property. The location provided an ideal setting with extensive views an added bonus.

John and his late wife Elizabeth decided to create trails to be able to see and safely share with others the 10 or more ecosystems and resident wildlife on the property. John said "A roll of surveyor's tape is the most important tool when you start deciding where the trails should go. It is easy to mark out a trail and to change your mind if it doesn't quite work."

John started building the trails at the age of 67, hewing them by hand out of the then-impenetrable forest. One flight of steps alone took 100 recycled fence posts to build. Most of the block is steeply sloping, but two of the walks have been designed to be accessible to wheelchairs. These took on a special significance when John's wife became ill since it was on one of these that he sadly took Elizabeth to say her last goodbyes to the property.

John told how it became possible to see much more of the wildlife once trails were made. When the bush is impenetrable, you make too much noise getting anywhere, but with a trail it is possible to see all kinds of birds and animals close up.

The talk was held in a special 'pavilion' created by John, that photographically illustrates the story of the property, the trails and the wildlife. He calls it his grey elephant, but it is actually an Aladdin's cave for anyone interested in the wildlife of Denmark. Many of the encounters that John has had with the wildlife are documented in the displays.

There were many more people who would have liked to attend but were unable to make it on the day. Therefore **another event will be held in the coming spring**, please **contact Dorothy Redreau** if you would like to come along on 9848 1085 or:

dorothy.redreau@dec.wa.gov.au

BALINGUP SMALL FARM FIELD DAY

The *LFW* stall, organised together with National Trust covenanting, proved very popular. Here Sheila Howat talks to some visitors.

PLANT PROPAGATION WORKSHOP

The plant propagation workshop that followed on from an earlier *LFW* seed collecting bushwalk at Carbanup Reserve, was well attended.

All aspects of growing native plants were covered, from seed cleaning to taking cuttings and finally potting. It was held at Geographe Community Nursery, where examples of successful plant propagation were all around for us to study, from tiny seedlings to display gardens. Many thanks to Richard Clark for this informative day.

Cherie Kemp

IN BRIEF

BORER DAMAGE?

Several times over the years we have featured articles on the effects of borers on trees, from WW 2/1 (1998) to most recently in WW 13/4 (2009). In July the issue was raised again, this time in Jarrah trees. Phil Anderson of Nannup queried the cause of these horizontal scars on a Jarrah trunk. Although we were pretty sure that they were caused by borers, we decided to pass on the query to Janet Farr, DEC's Forest Entomologist at Manjimup. She responded:

"It is always a bit tentative when identifying tree problems from a picture but from the pictures you sent me the main problem is borers. In fact, the Marri alongside the affected Jarrah exhibits the symptoms more clearly. But in both species the culprit is the same. The borer causes those cracks and fissures you show in the photos plus in Marri the black/red resin dribbles down the stem. The beetle borer is in the family Cerambycidae and the genus is *Phoracantha*. It is most likely to be *Phoracantha acanthocera*, otherwise known as the Bulls-eye Borer which is common in many eucalypts including Karri. In Karri, because of its white stem, the symptoms are very visible as brown dribble stains. When emerging as adults in summer the insect cuts a crescent shaped exit

Scars on a Jarrah trunk (Photo: Sheila Howat)

A typical beetle borer. This is Phoracantha impavida*, the Tuart Borer, but it is very similar in appearance to* P. acanthocera. *(Photo: Allan Wills)*

hole in the bark. The main cause which increases beetle numbers is mild water stress, and given our dry summer and autumn, this is very likely the problem for these trees. Therefore trees on shallow soils will suffer more. The borers won't cause mortality and the tree can heal in time, but if you are interested in these trees for timber then the galleries will downgrade the timber quality but don't affect structural integrity unless there is some brown rot. I have included a picture of the possible borer for your information.

To manage for this, manage for stress. In other words, improve the water catching and holding potential of your soil, and perhaps give a light fertilise with a slow release nitrogen fertiliser (but only light application). For individual garden trees I also suggest an application of seasol, to improve root health, but the photos look like a bush block and so this may be impractical."

Janet Farr is Forest Entomologist, Science Division, DEC Manjimup. She can be contacted on: janet.farr@dec.wa.gov.au

[Please look out for a large, dark-coloured, rectangular-bodied beetle attacking and eating the longicorn beetle adults. This predatory beetle will probably be a member of the family Cleridae and it follows the same scent trail to the stressed trees as do the longicorns. I haven't a photo of it, so if anyone does have a picture, I'd appreciate it. – Ed.]

GILBERT'S POTOROOS ON BALD ISLAND - UPDATE

Gilbert's Potoroo is the world's rarest marsupial. Indeed, it was thought to be extinct until rediscovered in 1994 at Two Peoples Bay Nature Reserve near Albany. In *Western Wildlife* 10/3 (July 2006), the scientist in charge, Tony Friend, reported on an attempt to make the animal more secure by setting up a new colony on Bald Island, off the South Coast.

We are delighted to report that the colony appears to be thriving, with 49 animals captured during the latest monitoring programme! And this is despite some animals being removed earlier in the year to help found a population in the new predator-proof enclosure in Waychinicup National Park. This is a very heartening result, especially when it is remembered that, at the time of rediscovery, it was believed that there were no more than 40 Gilbert's Potoroos left in the whole world.

Congratulations to Tony and his team!

COMING EVENTS

Conservation Week

23 to 30 October 2010

Listen for White-striped Bats!

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

conswa@conservationwa.asn.au

IN BRIEF

TAR SPOT ON MYRTLE HAKEA

In WW 14/1 (January 2010) Elaine Davison wrote about Tar Spot disease in Myrtle Hakea. The data has now been published as a scientific paper. If you would like the reference, please contact the Editor.

WELL, IT'S ARRIVED – ALAS

Western Wildlife first warned of a plant disease problem, Guava Rust, on the way to Australia in WW 6/4 (Oct 2002), with an update in 10/3 (July 2006) – well in April this year it was detected in Australia. You remember the story: plants in the Australian Myrtaceae family, eucalypts, bottlebrushes, wax flowers etc, have never been exposed to a rust fungus, therefore it would be expected that they would have no resistance to rusts if they ever did arrive here.

In South America, Guava Rust jumped host onto planted Australian eucalypts, causing devastation to the plantations. By 2006, it had reached Hawaii. In April this year a member of the Guava Rust complex, Myrtle Rust (*Uredo rangelii*) was confirmed from a plant nursery in NSW. The WA Peppermints (*Agonis flexuosa* cv. 'Afterdark') that the nursery was growing for foliage proved extremely susceptible and young shoots were severely damaged.

The occurrence of the rust here in Australia raises questions about the effectiveness of our biosecurity precautions. Also, will the response be adequate to contain the infection, or to stop this wind-borne disease from spreading, including into native forests? *Western Wildlife* does not wish to appear alarmist, so we have held off reporting this potential disaster at least until the causative agent was definitely identified. But think about the appalling possibilities if it becomes established over a wide area …

A recent paper* concludes: 'If this rust spreads, it may have a serious impact on native plant communities and on plant industries based on members of the family Myrtaceae."

[*For ref contact Ed.]

REMARKABLE TREES

IS THIS THE TALLEST GRASS TREE?

To celebrate the unique and impressive physical forms of our native plants in this International Year of Biodiversity we are trying to find the *Land For Wildlifer* who has seen and photographed the tallest *Xanthorrhoea* grass tree in our state. The picture at right comes from our *LFWO*, Sylvia Leighton, who found this *Xanthorrhoea thorntonii* in 2009 about 350 kms north-east of Kalgoorlie past Victoria Springs. Sylvia is 171cms tall so she has calculated that the grass tree is almost six metres tall if you take the measurement from the foot of the plant on the ground right to the tallest frond of the skirt on top of the plant.

Based on known growth rates, some tall *X. preissii* are estimated to be 350 years old, while radio carbon dating gave ages up to 600 years.

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