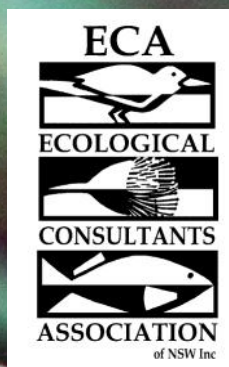


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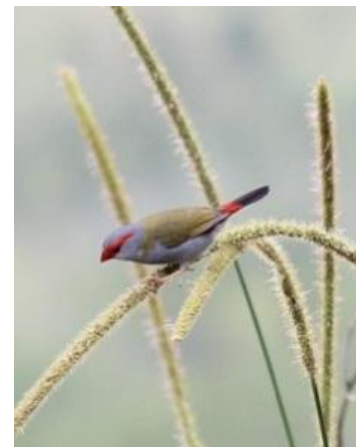
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Newsletter of the Ecological Consultants Association of NSW



Red-browed Firetail. (See Page 19).

Photo courtesy of Renae Baker

VOLUME 32 February 2014

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Eastern Pygmy-possum, post-fire Newnes Plateau (See page 14).

Photo courtesy of Andrew Lothian



Ray Williams (See Eulogy page 28).

Photo courtesy of Narawan Williams.

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Design and Layout: Amy Rowles

Front Cover Photo: Eastern Yellow Robin. *Photo Courtesy and Copyright of Steve Sass.*

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Message from the President

Dear members,

This message is dedicated to Ray Williams, who sadly passed away in February after a long struggle with cancer. On behalf of all at the ECA I send our sincere condolences to his family and all at Ecotone. The ECA will be forever indebted to Ray for his tireless contributions, service and belief in the objectives of the ECA. His influence on the organisation has helped make it the peak body in NSW for ecological consultants and his passing will be sadly missed by all. Ray was a kind-hearted man, and a highly ethical and competent ecologist...an inspiration to all. Our thoughts are with you.

A number of ECA council and other members attended Ray's memorial service at the Hunter Wetlands Centre. The ECA contributed to the *Bush Heritage Donation in Memory of Ray*. If any of you would like to make a donation yourselves you can do so via the Bush heritage website (<http://www.bushheritage.org.au/>) and indicate that it is "in memory of Ray Williams" in Address Line 1 of the donation form.

The 2014 ECA Conference and AGM is to be held on the 8th August at Noah's on the Beach in Newcastle, so put it in your diary. The subject of this years conference will be *Ecological Impact Assessment - what is acceptable loss and appropriate mitigation*. Determining what is an acceptable loss for species and communities is a perennial problem for ecological consultants, so it will be very informative to understand different approaches to assessing impacts. Special thanks to John Travers and Rebecca Hogan for organising the conference this year.

Many of you may have noticed that the ECA website has been down for some time. Unfortunately it has become the target of hackers and despite it being restored on numerous occasions it was almost immediately hacked again each time. We believe we have now outwitted the hackers and will continue to get the website in good working order over the next few weeks. Some features, such as the consultants list is currently available on the website and Amy will notify the membership via email when the website is fully operational. When you can access the website's features, I would like to encourage you to post on the ECA forum, as it is a good communication tool!

I hope to see you all at the ECA Conference.

Rhidian Harrington

EUROKY

Euroky: ability of an organism to adapt to changes in the environment

If you have any interesting observations or useful hints and information that you would like to share in the euroky column, please forward them to the newsletter editor or administration assistant to be included in the next edition.

SUBURBAN BARKING OWL OBSERVATIONS

Brendan Smith



The above Barking Owl has been resident in a Reserve on Sydney's Northern Beaches for at least the last 7 months and has been observed on an almost weekly basis during this time. Records of the species in the locality are very limited, two of which in recent years were wildlife rescues that did not survive. The owl is clearly well accustomed to humans and frequently roosts directly over a well-used pedestrian trail which has attracted some deal of attention from both twitchers and local residents. Unfortunately, during the recent breeding season some twitchers had reportedly resorted to call playback just to locate the bird and get that special photograph. Not exactly best practice.

The owl frequently calls from its roost during the day and despite a second Barking Owl being briefly detected nearby, no nesting was observed in the season just passed. It's possible that its mate was killed in a previous Barking Owl fatality which occurred on the edge of the same reserve as a result of an impact injury (probably a car). Roost trees used by the owl are typically Cabbage Tree Palms (*Livistona australis*) and Cheese Trees (*Glochidion ferdinandi*). Based on a few reports of late night calls heard by some well versed local residents, the owl appears to be moving into the directly adjoining suburbs at night, where there is reasonable bushland and or canopy connectivity to the reserve.

Birds are clearly forming part of the diet for this owl, with broken bird skulls discernible amongst other bones including rodent jaw bones, as shown in the photograph of the owls pellets below.



MISCELLANEOUS OBSERVATIONS DURING HOLLOW-BEARING TREE FELLING MONITORING

*Jason Berrigan
Consulting Ecology Editor
Darkheart Eco Consultancy*

Below are a series of miscellaneous observations during clearing monitoring over the last few months.

1. Sugar Gliders using termitaria and decorticating bark for dens

Some years ago, I asked members if they'd recorded gliders (specifically Squirrel Gliders) using termitaria for den site. Michael Murray reported sightings of both species. Despite nearly 17years of surveying, and about

7 years of monitoring hollow-bearing tree removal, I'd not had the chance to confirm the fact myself until recently. I recorded a family group of Sugar Gliders denning in a termitaria, and to my surprise, a pile of decorticated bark within the bough of a large Blackbutt.

The termitaria shattered on impact when the tree was felled by a bulldozer, revealing 2 adults and 3 sub-adults. After I'd scooped them up and secured them, I examined the remains of the termitaria. I was unable to ascertain the entrance size, but a semi-central cavity appeared to have been about 20cm in diameter. The host tree was a near mature Blackbutt, located in mostly regrowth dry sclerophyll forest with minimal understorey.

Nearby (within 80m), a very large mature Blackbutt which had a dense collection of decorticated bark lodged between the leader and a secondary limb was found to contain another clan of Sugar Gliders. The pile of bark was tightly wedged in the fork of the limbs, and about 25cm deep. Within the near-centre was the glider's leafy nest (a few days old). I retrieved 2 adults and 3 sub-adult young again. I was surprised to see the gliders in this structure given the exposure to predators, but also as hollows were locally abundant in the semi-detached remnant they were in. This finding was important as such collections of decorticated bark are not often picked up for clearing supervision during Phase 2 (removal of habitat trees), and thus should be given due consideration.

Of interest, I also found 5 colonies of Feathertails in the same remnant, which was barely 10ha in extent and comprised almost entirely of grassy Blackbutt forest with White Stringybark (*E. globoidea*), Pink Bloodwood (*C. intermedia*) and some Tallowwood (*E. microcorys*). Most were along the gravel road adjacent to the site where hollows were locally common in the old road reserve.

2. Wattled Bat maternity roost

This is one of two Wattled Bat active maternity roosts found in a tree hollow. Both were located in a road reserve dominated in this local part by an abundance of senescent trees, within <100m of each other.

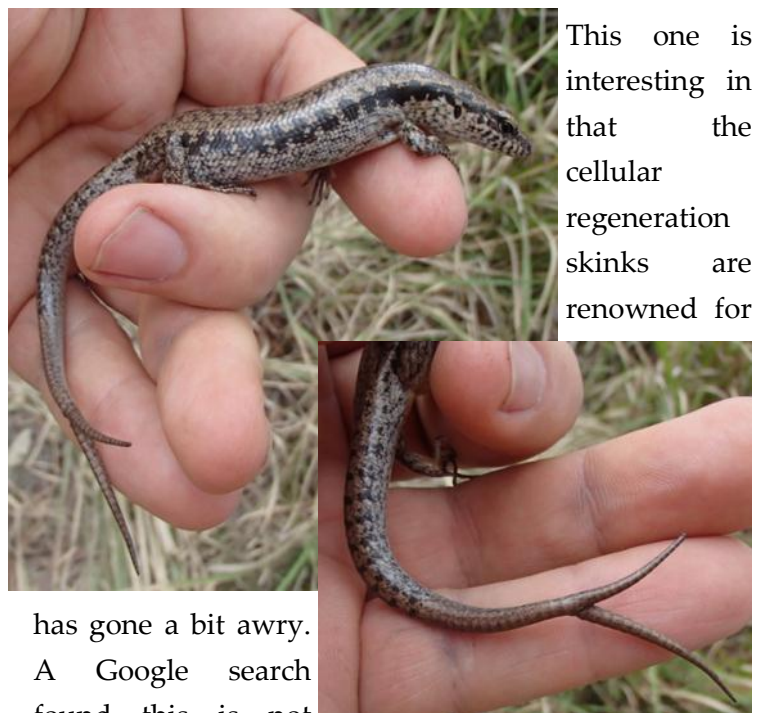
The branch had a southern aspect and was <10m above

ground. Interestingly, the orientation of the limb suggested the hollow was a lateral pipe, not a vertical pipe one would normally expect bats to reside in. It was full of guano, indicating long term use. Two adults and about 6 pups were retrieved from this hollow.



3. Mutant skinks

This is a Greater Bar-sided Skink (*Eulamprus tenuis*), commonly found in tree hollows and thus seldom seen. I found many in Blackbutt-dominated dry sclerophyll, often in stags, but only in localised part of the project. Younger animals may be more brown dorsally and have a tighter scale pattern that looks like fish scales. Extremely quiet, lovely to handle, and definitely enjoy being photographed.



This one is interesting in that the cellular regeneration skinks are renowned for

has gone a bit awry. A Google search found this is not

uncommon and may happen when the break has been uneven or doesn't come off entirely, yet the stimulus



A normal adult

for growth is triggered. I have to admit, I was wondering if there was something in the water (as suggested by some of the locals I'd met).

CICADAS EMERGING AT MIDDAY AND OTHER CICADA SNIPPETS

Brian Wilson
Ecotone Ecological Consultants

On a recent visit to the forested land north of Dungog, I noticed a number of cicadas partially emerged from their shell near the base of several trees and on other artificial structures. They were all a relatively large cicada species (Double Drummer, *Thopha saccata*). It was midday and reasonably hot but all appeared to successfully emerge despite a large known population of lace monitors and birds that prey on cicadas.

From many years wandering around the bush and observing adult cicadas in the Sydney area as a child, I had always thought that they only emerged at night or early morning to avoid desiccation (and predators - including children). While they had all probably come out of the ground during the night, has anyone else observed cicadas emerging from their shells in the middle of the day?

In the weeks preceding this observation I had also seen for the first time Lace Monitors actively searching out cicadas that had unsuccessfully emerged from their shell in the same locality, but maybe these cicadas too were in the process of emerging. The Lace Monitors were getting a good feed. See attached photos. There were also other cicada species such as Red Eye (*Psaltoda moerens*) and Flourey Baker (*Aleeta curvicosta*) and the Cicada Killer Wasps (*Exeirus lateritius*) in the area.

With the summer of 2013/14 being a very big year for a range of cicada species (at least in the Hunter Valley

area) I decided to further research cicada ecology. I found that while there is much that is still poorly known about cicadas, there are a number of good web sites for cicada enthusiasts around the world. See

- www.magicicada.org
- www.cicadamania.com
- Australian Museum web site

It soon became apparent that others had noticed that it was an exceptionally good year for cicadas in eastern Australia, See article <http://www.dailytelegraph.com.au/news/nsw/cicadas-having-a-blast-this-year/story-fni0cx12-1226774566796>

All the newspapers had an article on cicadas this summer. When you go to these sites, you can see some of the 700 species in Australia (the continent with the greatest number of species), although only around 50% have been fully described. Cicadas occur in temperate and tropical parts of the world and unlike most Australian cicadas, the south-east Asian species are very colourful, including the wings. It appears that the cicadas in the US have got their life cycle pretty strongly synchronised, so that cicada enthusiasts can predict the years that a particular species will emerge in big numbers.



I hope you get a chance to look at some cicadas in your area. Since they can produce 120 decibels of sound, you might need your ear plugs if up close!

BULGA WATTLE

Ted Smith

Peak Land Management

The photos below of the Bulga Wattle *Acacia bulgaensis* along Putty Road in the Milbrodale Area. This Acacia species is restricted to the Bulga-Milbrodale-Broke area and is considered rare, listed as a ROTAP 2RC-.



An Artistic Display Of Nature



An 'art' instillation at MONA in Hobart. Part of a whole wall of hanging insects pieces. Photo courtesy of Judie Rawling

IT'S NO WONDER INTRODUCED PREDATORS ARE DECIMATING OUR WILDLIFE

Amy Rowles

ECA Administrative Assistant

Ecotone Ecological Consultants

I would like to share some of my personal encounters with some of our native critters that highlight just how vulnerable they are to introduced predators.

Whilst sitting in my garden after dark, enjoying a chamomile tea (with all four children asleep!!!) a Northern Brown Bandicoot, who was sniffing out stray compost, came right up to my boots with no comprehension that I was present. I had to fight the urge to reach out and give it a pat.

A few years ago we had a Brush-tailed Phascogale regularly coming into our house – a big smile beaming on my face every time I heard the plop, plop, plop sound of their characteristic jerky hops. Then a cute little face would appear over the back of the lounge as we watched TV. Unfortunately the visits of these lovely critters had to come to an end when the more destructive and messy rats and mice were also using

the same entry point. The Phascogales only ate into a bag of sugar and a packet of hundreds and thousands (perhaps bait should be more colourful and a high sugar content, when targeting this species in fauna surveys). The Phascogales are still living in our roof, shed and shipping container. I cannot understand how they can live in a closed shipping container, that is supposed to be animal proof, in the middle of summer and not cook. The Phascogales are surprisingly not destructive, bringing in feathers and leaves to make a nest in the lap of a large soft toy, rather than chewing up everything to make a nest as rats and mice do. Judging by the copious amounts of faecal matter, they have plenty to eat, but everything in storage now has a distinctive odour. I am however refusing to evict the Phascogales, until I put up some nest-boxes around the container for alternative accommodation.

I am sure that many of you have had similar close encounters, which can make an ecologists day, but demonstrate the poor predator evasion skills of some species.

Roosting microbats appear to be better prepared to deal with predators, readily exiting from under bark or from a tree hollow roost with the smallest disturbance. This provided me with some valuable roosting information during my honours project studying micro-bats in the Simpson Desert, when a roosting *Nyctophilus geoffroyi* took off from behind bark, whilst I was measuring tree circumference for another part of my thesis.

We have three species of macropod on our property. The Red-necked Wallabies seem to be the most confident around the house (and noise). The Grey Kangaroos will pass through when things are quieter, but the Wallaroos only come near the house when we are away, taking off when we arrive home.

It is the presence of these valuable native species with poor predator evasion skills that make the decision of whether to add a dog to our family a very difficult one.

WHAT YOU CAN FIND ON GOOGLE

Deryk Engel

LesryK Environmental Consultants

Whilst doing a Google search for a job I came across this image. The location is the entrance to Lane Cove National Park off Ryde Road in NSW. Given its size, colour and locality a betting person may identify the road kill as a fox. I'm wondering if anyone else has come across any other examples of road kills using Google images. No prizes for contributions but any pictures will included in the next Newsletter.



Upcoming Events in 2014

ECA Events

- **PROPOSED ECA WORKSHOPS**

2014

- ◆ **Business Development and Practices Workshop**

The dates and venues for these workshops are yet to be determined. You may register your interest in any of these workshops by emailing admin@ecansw.org.au.

Non - ECA Events

- **60th Annual Scientific Meeting of the Australian Mammal Society**

Date: Monday 7th July - Thursday 10th July 2014

Venue: Melbourne Zoo

Details: www.australianmammals.org.au/conferences

- **Native Orchid Identification at Richmond College**

Date: Thursday 15th May 6-9pm and Saturday 17th May 2014 8.30am-3.30pm.

Venue: Richmond College (Western Sydney Institute)

Cost: \$130

Details: helen.bodill@tafensw.edu.au

www.tafensw.edu.au

- **Local Eucalypts and Distribution**

Date: Thursday 10th April 6-9pm and Saturday 12th April 2014 9.30am-4pm or Thursday 14th August 6-9pm and Saturday 16th April 2014 9.30am-4pm

Venue: Richmond College (Western Sydney Institute)

Cost: \$115

Details: <http://wsi.tafensw.edu.au/resource/course/8397/69480.pdf>

- **Identification of Vegetation Communities**

Date: Thursday 28th August 6-9pm and Saturdays 30th August and 6th September 2014 9.30am-4pm

Venue: Richmond College (Western Sydney Institute)

Cost: \$275

Details: <http://wsi.tafensw.edu.au/resource/course/8396/69479.pdf>

- **Australasian Bat Society 2014 Conference and AGM**

Date: 22-25th April 2014

Venue: Rydges Hotel, Townsville, QLD

Details: www.ausbats.org.au/#/2014-conference-agm

- **Australasian Network for Ecology and Transportation (ANET) Conference**

Date: 20th -23rd July 2014

Venue: Coffs Harbour

Details: www.ecoltrans.net

February 2014 ECA Membership Report

Amy Rowles

ECA administrative assistant

In total we have 171 members, comprised of 141 Practising Ecological Consultants, 16 Associate (Government Ecological/ Environment Officer), 10 Associate (Non-practicing), 3 Associate (Subscriber) and 1 Student. We have had five new members and three current applicants over the last six months. The new members are introduced below:

- Jane Book
- Shilpa Shashidharan
- Peter Ridgeway
- David Fell
- Stacy Mail

2014 Ecological Consultants Association Conference August 8th

'Noahs on the Beach' Shortland Esplanade, Newcastle

Last years conference in the Blue Mountains was a huge success with 110 people attending. This year we go north to Newcastle and our topic moves on slightly from biobanking and seeks to discuss

'Ecological impact assessment - what is acceptable loss; and can consent conditions really assist as appropriate mitigation measures'

The topic of biobanking is changing the way we, as ecologists, think about ecological loss. Ecologists need to not only define the extent of biological loss but also make practical recommendations on mitigation options.

This year's conference seeks to discuss appropriate loss and how to assess the acceptability of these measures? Is species based, habitat based or community based the best approach ...or should all three be combined ?

Is negotiation and communication a part of the ecologist role? Should the ecologist be an advocate for their own opinions or should they spell out the facts and let others argue the balance. Whom would 'others' be? Is there a need for an 'ecological planner'?

Somewhere in the mix there is a pathway for ecologists to follow but for now that pathway is hazy. As the representative professional organisation for most consulting ecologists in NSW, the Ecological Consultants Association has decided to bring this emerging issue into the spotlight to spur its consideration into policy and application.

Call for Papers:

The conference steering committee would like to hear from practicing ecologists, government assessing officers and others whom can bring their experience on this topic to our members. We aim to provide a 20min period for each speaker.

Contacts

Conference program:

John Travers - 0418 630 048 or at info@traverseecology.com.au
Rebecca Hayes – rhayes@hayesenv.com.au

Conference arrangements:

Amy Rowles - admin@ecansw.org.au

Further Information

The conference program will be distributed to members email's when it is finalised.



*Photo source: Noahs on the Beach
Website
www.noahsonthebeach.com.au*

Recent Literature and New Publications

Recent Journal Articles / Literature

The following link to an article about the use of a tiny e-tag, small enough to be fitted to a bee. This technology is being used by the CSIRO as part of their research into disease control for the honey bee. The use of such technology to study other small fauna species, such as microbats may be very advantageous.

<http://www.smh.com.au/environment/animals/bee-etag-unlocks-swarm-secrets-20140115-30u8r.html>

xxxxxx

Steven Sass been involved in the description of a new species; the Barrier Range dragon, which was previously known as *Ctenophorus decessi* in NSW, but the NSW populations are now a separate species, *Ctenophorus mirrityana*.

News article can be found on the following link:

<http://www.begadistrictnews.com.au/story/2013897/tathra-ecologists-help-discover-new-dragon-species/?cs=509>

Published Manuscript can be found at the following link:

<http://australianmuseum.net.au/journal/McLean-2013-Rec-Aust-Mus-653-5163>

xxxxxx

Rae S. and Rae D. (2014) **Orientation of tawny frogmouth (*Podargus strigoides*) nests and their position on branches optimises thermoregulation and cryptic concealment.** *Australian Journal of Zoology* - <http://dx.doi.org/10.1071/ZO13090>

Borchard P. and Eldridge D. (2014) **Does artificial light influence the activity of vertebrates beneath rural buildings?** *Australian Journal of Zoology* - <http://dx.doi.org/10.1071/ZO13063>

Bilney R. (2014) **Geographic variation in the diet of the powerful owl (*Ninox strenua*) at a local scale.** *Australian Journal of Zoology* **61(5):** 372-377 <http://dx.doi.org/10.1071/ZO13048>

Bond A. and Jones D. (2014) **Roads and macropods: interactions and implications.** *Australian Mammalogy* **36(1):**1-14. <http://dx.doi.org/10.1071/AM13005>

Drury R and Geiser F (2014) **Activity patterns and roosting of the eastern blossom-bat (*Syconycteris australis*).** *Australian Mammalogy* **36(1):** 29-34 <http://dx.doi.org/10.1071/AM13025>

Moore T., Valentine L., Craig M., Hardy G. and Fleming P. (2014) **Does woodland condition influence the diversity and abundance of small mammal communities?** *Australian Mammalogy* **36(1):** 35-44 <http://dx.doi.org/10.1071/AM13007>

de Oliveira S., Murray P., de Villiers D. and Baxter G. (2014) **Ecology and movement of urban koalas adjacent to linear infrastructure in coastal south-east Queensland.** *Australian Mammalogy* **36(1):** 45-54 <http://dx.doi.org/10.1071/AM12046>

Taylor B., Goldingay R. and Lindsay J. (2014) **Horizontal or vertical? Camera trap orientations and recording modes for detecting potoroos, bandicoots and pademelons.** *Australian Mammalogy* **36(1):** 60-66 <http://dx.doi.org/10.1071/AM13012>

Zewe F., Meek P., Ford H. and Vernes K. (2014) **A vertical bait station for black rats (*Rattus rattus*) that reduces bait take by a sympatric native rodent.** *Australian Mammalogy* **36(1):**67-73 <http://dx.doi.org/10.1071/AM13010>

Goldingay R. and Dobner B. (2014) Home range areas of koalas in an urban area of north-east New South Wales. *Australian Mammalogy* **36(1):** 74-80 <http://dx.doi.org/10.1071/AM12049>

Vernes K. (2014) **Seasonal truffle consumption by long-nosed bandicoots (*Perameles nasuta*) in a mixed rainforest–open forest community in north-eastern New South Wales.** *Australian Mammalogy* **36(1):** 113-115 <http://dx.doi.org/10.1071/AM13040>

Franklin M., Morris C. and Major R. (2013) **Relationships between time since fire and honeyeater abundance in montane heathland.** *Emu* **114(1):** 61-68 <http://dx.doi.org/10.1071/MU13016>

Marsh K., Moore B., Wallis I. and Foley W. (2014) **A Continuous monitoring of feeding by koalas highlights diurnal differences in tree preferences.** *Wildlife Research* **40(8):** 639-646 <http://dx.doi.org/10.1071/WR13104>

Lintott P., Fuentes-Montemayor E., Goulson D. and Park K. (2014) **A Testing the effectiveness of surveying techniques in determining bat community composition within woodland.** *Wildlife Research* **40(8):** 675-684 <http://dx.doi.org/10.1071/WR13153>

McDonald K., Burnett S. and Robinson W. (2014) **Utility of owl pellets for monitoring threatened mammal communities: an Australian case study.** *Wildlife Research* **40(8):**685-697 <http://dx.doi.org/10.1071/WR13041>

Recent Book Releases

Information Source: CSIRO Publishing
Website <http://www.publish.csiro.au>

Title: Finding Australian Birds

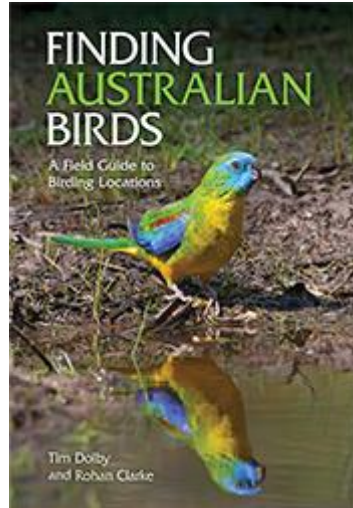
Author: Tim Dolby and Rohan Clarke

RRP: \$49.95

No. Pages:624

Publisher: CSIRO Publishing

Date: May 2014



Title: Australian High Country Raptors

Author: Jerry Olsen

RRP: \$69.95

No. Pages:336

Publisher: CSIRO Publishing

Date: June 2014

Title: An Eye for Nature: The Life and Art of William T Cooper

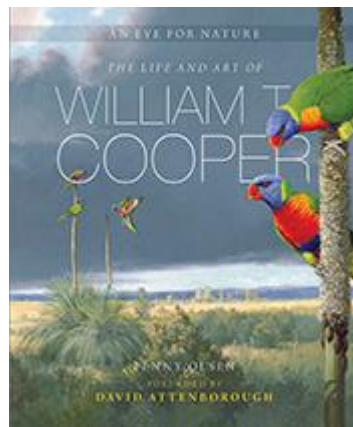
Author: Penny Olsen

RRP: \$49.99

No. Pages:288

Publisher: National Library of Australia

Date: March 2014



Title: Reptiles and Amphibians of Australia

Author: Harold Cogger

RRP: \$150.00

No. Pages:1064

Publisher: CSIRO Publishing

Date: March 2014

Title: The Action Plan for Australian Mammals 2012

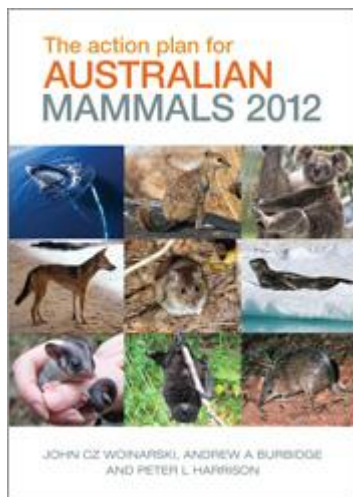
Author: John Woinarski, Andrew Burbidge and Peter Harrison.

RRP: \$120.00

No. Pages:1056

Publisher: CSIRO Publishing

Date: June 2014



Title: A Guide to the Cockroaches of Australia

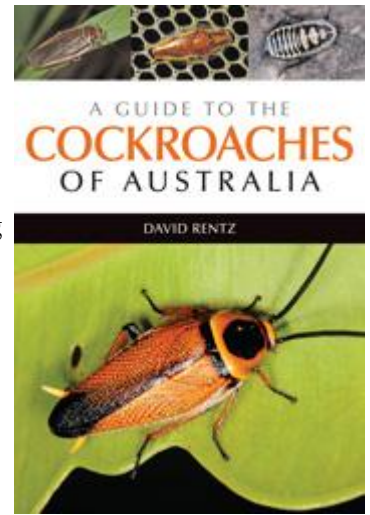
Author: David Rentz

RRP: \$49.95

No. Pages:328

Publisher: CSIRO Publishing

Date: May 2014



Title: A Guide to Southern Temperate Seagrasses

Author: Michelle Waycott, Kathryn McMahon and Paul Lavery

RRP: \$29.95

No. Pages:112

Publisher: CSIRO Publishing

Date: February 2014

Title: Flooded Forest and Desert Creek: Ecology and History of the River Red Gum

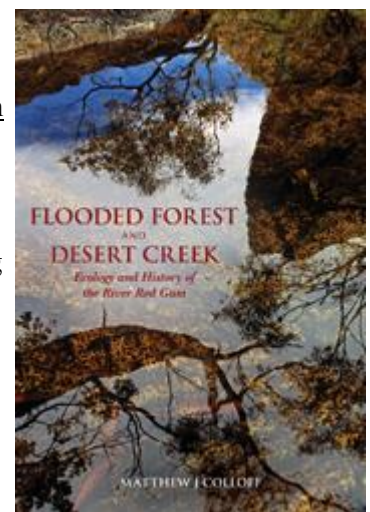
Author: Mathew Colloff

RRP: \$69.95

No. Pages:344

Publisher: CSIRO Publishing

Date: August 2014



Title: Climate Change Adaptation Plan For Australian Birds

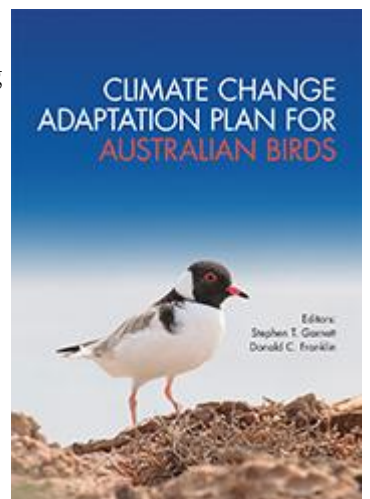
Author: Stephen Garnett and Donald Franklin

RRP: \$69.95

No. Pages:272

Publisher: CSIRO Publishing

Date: May 2014



2014 Annual Subscription

Is Now Due

Subscriptions unpaid by the 30th of April will be cancelled. Membership may be reinstated at anytime, provided yearly subscription is paid in full.

If you did not receive your subscription renewal in the post please contact administration admin@ecansw.org.au



Heath Monitor enjoying a meal of Green Tree Snake in a suburban backyard in Berowra (Photo courtesy of James Coroneos)

FOR SALE / WANTED

If you have 2nd hand ecological equipment that you would like to sell or would like to purchase you can place an ad in this newsletter. Free for members or \$40 for non-members.

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PHOTO COMPETITION

Congratulations! to **Steve Sass** for winning the last photo competition with his photograph featured on the front cover of a Eastern Yellow Robin.

Thank you to everyone who entered our photo competition. All entries have been included in the ECA Photo Gallery on the back cover and central pages of the newsletter.

Email your favourite flora or fauna photo to admin@ecansw.org.au to enter a competition and have your photo on the cover of the next ECA newsletter. Win your choice of one year free membership or free entry into the next ECA annual conference. The winner will be selected by the ECA council. Runners up will be printed in the photo gallery

Photos entered in the competition may also be used on the ECA website



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A Case for Revision of the Method of Assessing Shale Sandstone Transition Forest

David Thomas

Consultant Botanist

Shale Sandstone Transition Forest (SSTF) was gazetted on 11.9.1998 as an Endangered Ecological Community (EEC). This was prior to detailed plant community mapping by NPWS (2002) and NPWS (2003) that described some of the complexity of shale sandstone transitional vegetation.

In 2006 and in 2009, *Tozer et al* (2006) and DECCW (2009) released vegetation reports and maps of parts of the Sydney district that described SSTF and closely related map units: notably a lower sandstone influence community common on the Mittagong Formation geology (named *Sydney Hinterland Transition Woodland* and *Hinterland Sandstone Transition Grey Gum Forest* respectively). *Tozer et al* (2006) did not consider this community to be threatened under the TSC Act or EPBC Act. Since then, DECCW (now OEH) released a final report in 2013 in which the comparable vegetation is not considered part of the SSTF EEC.

Based on the above and other mapping information, there has been a growth in understanding of the nature and dynamics of plant communities in the Sydney area and Sydney Basin Bioregion. Each report has built on previously available information to show similarities and differences between increasingly fine divisions of map units, as well as aerial extent and distribution. These have also given more potential accuracy to assessments of conservation significance.

Owing to the nature of vegetation community mapping methodologies and personal interpretations, there continues to be errors and gaps in information provided. However, in general, the current mapping is an excellent guide to the vegetation in the district. Best practice compatible fieldwork will be able to fill many gaps and inaccuracies, and it would be useful for practitioners to provide OEH with such information to assist with ongoing improvement of mapping and

details of threatened communities in NSW, not only in the Sydney Basin Bioregion.

Mapping and description of most kinds of transitional vegetation has been and continues to be difficult as minor local variations can produce different but closely related plant communities.

In their current form, the descriptions in Final Determinations are unable to adequately differentiate between closely related communities. There is even significant commonality of species between many unrelated plant communities. Sometimes there is inadequate information about useful indicator species and methodologies that can be used to separate similar vegetation.

The separation between plant communities is made more difficult by the often very fine divisions used in modern mapping. This applies especially to transitional vegetation where local variations can occur.

DECCW (2009) indicates that the total extant area of Cumberland Shale Sandstone Ironbark Forest (considered to be SSTF EEC) is approximately 9600 hectares in the Sydney Basin Bioregion, of which 240ha is suitably conserved. This represents 3% of the extant area and 2% of the original pre-clearing area.

The closely related transitional community is not considered endangered as it occupies approx 41800ha (representing 10-30% of pre-clearing area) of which 13000ha (30%) are in formal reserves (DECCW, 2009).

Owing to the great difference in conservation significance of the two related communities, it is important to be able to differentiate between them consistently and accurately.

As both are shale sandstone transition communities, it will be apparent that many species will be common to both, including clay soil species. It will therefore be necessary to accept that a more quantitative approach plus use of strong indicators (eg ironbarks) will show the overall nature of the vegetation and separate the communities more reliably. It should not be merely a matter of listing a random collection of species that are used to support a contention that the community is

specifically one of the two.

It is likely that the Final Determination for SSTF will need to be refined to reliably separate the two communities. Hopefully methodologies will be used or developed and referred to in the Final Determination to assist with community identification in the future.

In the interim, it is important that these closely-related communities be identified to provide a clear path for processing development or conservation with the minimum expense and trauma to all parties.

In order to do this it is recommended that Tozer *et al's* (2006) method of identifying plant communities (as mapped in the same report) be used. This system is quadrat-based and provides a quantitative basis for separating plant communities more consistently and accurately.

The Final Determination for SSTF was never intended to be able to differentiate between similar vegetation that was not even clearly described at the time of the gazettal. However in the light of new information and mapping it seems unhelpfully legalistic and potentially biased to not use this information.

Post Fire Surveys on Newnes Plateau

Andrew Lothian
Biodiversity Monitoring Services

At Biodiversity Monitoring Services (BMS), we conduct on-going fauna monitoring on Newnes Plateau, just out of Lithgow NSW. In mid-October 2013, a bushfire erupted from the Defence Force site at Marrangaroo (on the south-west of Newnes Plateau). The fire spread east across much of the area we survey and onwards towards Bilpin. By October 28th, the fire threat at Newnes had abated and we were granted permission to access the plateau to assess the fauna.

Below are some photos from the first few weeks of post-fire surveys. Photo 1 is from a site out on the far eastern edge of the State Forest area. By this point, the fire must have become quite intense as there is nothing left of the thick heath layer that once dominated the understorey. Even the trees had all leaves completely

burnt off. Large logs that had previously been lying on the ground had been reduced to long strips of ash. White-browed Woodswallows had migrated in and were having a field day with the insects that had come out post-fire (mostly flies). Even after a few weeks,



Photo 1

there was about an inch of green growth on the *Xanthorrhoea* leaves, but that was the only greenery.

Photo 2 is a photo of a Blue Mountains Water Skink which was found in Marrangaroo Swamp (near where the fire started). In the first few weeks of surveys, reptiles were a lot easier to find than during prior swamp surveys. There were a lot of yabby shells around which must have been cooked during the fires as they had all turned red and white. The reptiles were



Photo 2

utilising the abundance of vacant holes left by the yabbies.

Photo 3 is of an Eastern Pygmy Possum that was captured in the first week post-fire. We actually captured three individuals that week: all in areas where we had not captured them before. They were all captured in trees (two from tree-mounted Elliots, one

in a glider tube). Having had no success with the same traps in the same areas over the last few years, I'm guessing they finally decided our bait was good enough to eat. Capture rates were good in the first week post fire as animals were probably starving



Photo 3

and willing to do anything for food. By the second week of trapping however, small mammal captures were declining (perhaps a sign of them succumbing to starvation). A number of possums and macropods were found dead along tracks through the burnt areas. There were no signs of burns, so smoke inhalation or starvation may have been responsible for their deaths.

Photo 4 is of a Blotched Blue-tongue Lizard who survived the fire living down a wombat burrow. Interestingly enough, fresh wombat scats were a lot harder to come by post fire. Even though their burrows may have kept them insulated from the fire, they could



Photo 4

have moved off in front of the fire or succumbed to starvation like the possums and macropods.

Photo 5 is a photo of one of the Newnes swamps regenerating post-fire. This swamp was previously thick with shrubs, sedges and cutting grasses. Just four weeks post fire and the swamp was already starting to look green. *Xanthorrhoeas* had about 6 inches of green

on the leaves by this point. Another interesting note after the fire was the amount of rubbish that had previously been dumped in very dense areas of

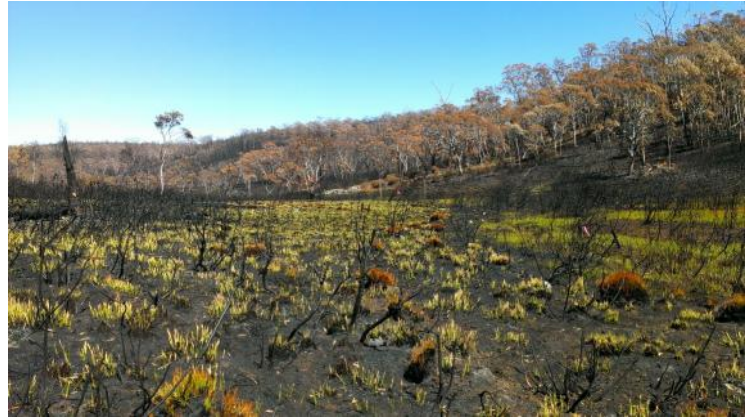


Photo 5

vegetation. Car wrecks and water heaters were turning up in places that were previously thought impenetrable (botanists not included).

The final photograph (photo 6) was taken by a Scoutguard IR monitoring camera. This Swamp Wallaby was captured looking for food in the burnt out remnants of a rainforested gully. This site was the only place on the plateau I thought would have been reasonably resilient to burning as it was dark and wet. Had I been caught out in the fires, I would have sought this site as my refuge. Turns out I would have been



Photo 6

wrong. Wet gullies burn just like the rest of it. Where tall shrubs and lush trees once grew, stands a lot of black stumps. This wallaby would have a long way to travel to find food.

As 2014 ticks over, the surveys continue at Newnes Plateau. A combination of fire and extended rain deficit

have left things pretty quiet up here at the moment. The swamps are getting greener but are still fairly sparse. I thought reptile surveys were going to be a lot easier now that the vegetation had been strategically thinned. All I have noticed so far however, is how many holes the reptiles actually have to hide in.

The iPad has become an increasingly important tool for data collection in the field. Over the last year I have been trialling a number of apps in the field including

GIS Kit / Kit Pro for Ipad Review

*Will Steggall
Darkheart Eco*

field guides, soil maps and GIS along with using pdf, word excel apps for viewing files and data entry. In this article I will discuss the features and application of a GIS mapping app called GIS Kit.

GIS Kit is a downloadable application for use with the iPad and iPhone, produced by US company Garafa. It is available in two versions: the basic GIS Kit at a cost of US\$109.99, and the GIS Kit Pro at a cost of US\$319.99. The pro version allows the user to view and export shape files (ArcGIS file format) and view imported raster (imagery) files while the standard version can only view/export KMZ, KML or GPX format. I initially started with the standard version but I found it frustrating having to convert data back and forth to view in ArcGIS and went for the upgrade.

This app operates like any basic GIS program where features (eg lines, polygons, points) are overlaid onto satellite imagery for a variety of uses such as spatial analysis, data collection, navigation or ground truthing. Features can be either uploaded to the app via iTunes or collected in the field. The app comes with a number of base map options (eg Google satellite, hybrid, terrain and Bing maps topo and satellite) which require an internet connection. This however can be overcome with the map caching system that allows viewing of selected areas of base maps in the field while offline.

GIS Kit has a lot of handy features for use in the field including:

- Viewing GIS data and aerial imagery

- Map caching for offline viewing of basemaps
- Create features in the field eg point data, polygons, linear features
- Add attributes to features eg, photos, descriptions, time, location
- Area and distance calculations
- File sharing via email and iTunes

I won't go into a detailed description of how the app works, but for those that are interested there are instructions on the website (<http://giskit.garafa.com/groups/gisprogiskitforiphoneipad/>) along with online tutorials available on Youtube.

So far I have found GIS Kit most useful for navigating around a site, mapping or ground truthing vegetation community boundaries, and mapping features in the field such as hollow-bearing trees and survey locations. I have found that it is fairly user friendly and quick to learn the basic features.

Recently it came in very handy for a Koala survey which required collecting and mapping Koala sightings from locals and conducting field surveys. I initially uploaded existing data for the study eg. cadastre, vegetation mapping, koala habitat classification and known records. Residents were asked for Koala sightings which were input directly onto the basemap and any other information for the sighting was recorded. During the field survey component, survey locations were recorded on the basemap with a geo-tagged photo and existing vegetation and Koala habitat data was checked for accuracy. The data collected was then exported to my computer to analyse results and produce figures. I found that this saved a lot of time, was accurate, and saved me carrying around maps, GPS, data sheets and a camera.

There are a few disadvantages I have found so far with GIS Kit. Firstly it is touted as a stand-alone GIS system, however I find it is only useful for data collection in the field. If you want to do spatial analysis or produce maps/figures, a more advanced GIS program is needed. Secondly, I have found that the app will either run very slow or crash if you try and upload large datasets with many features such as LGA wide cadastres, Bionet records or north coast corridors and key habitats. You need to clip an area of interest from the original dataset and upload that instead. Lastly,

ECA Photo Gallery

Photo Competition Entries



Left: Grey Goshawk . **Left, Right and Below:** Scenes from the Great Western Tiers, Tasmania. (photos courtesy of Emma Rawling)



Left: Eastern Pobblebonk, *Limnodynastes dumerilii*

Right: Ornate Burrowing Frog, *Platyplectrum ornatus*

Below Left: Jacky Dragon, *Amphibolurus muricatus*

Below Right: Broad-palmed Rocket Frog, *Litoria latopalmata*.

(Photos courtesy of Kurtis Lindsay)



ECA Photo Gallery

Photo Competition Entries



Left: Eastern Spinebill , Maraylya (*photo courtesy of Rebecca Carman*).

Right: Nesting Tawny Frogmouth, Caves Beach (*photo courtesy of Ted Smith*)



Left and Below Left: Spotted-tailed Quoll, Boyd River Camp Ground, Kanangra Boyd National Park (*photo courtesy of Ariane Weiss*)

Right: Hyacinth Orchid, Milbrodale (*photo courtesy of Ted Smith*)

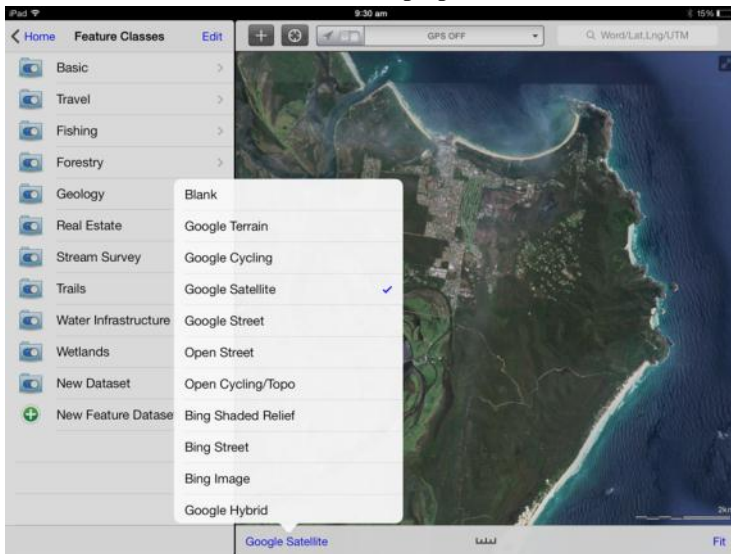
Below Right: A Little Wattlebird foraging in a *Grevillea caleyi* (*Photo courtesy of Mark Couston*).



the app chews the iPad's battery fast, especially when viewing imagery or using the GPS. There is no chance it would last a full day of use in the field, so you need to either use it sparingly or have a backup power source eg car charger.

In summary, I have found this app very useful so far and it complements the range of uses the iPad has in the field. It is a great tool for data collection and offers a cheap alternative for those not wishing to invest in an expensive GIS program.

Photo 2: Feature class and basemap options



The long awaited bilateral agreement between the various State governments and the Commonwealth appears to be getting closer given the notice by the

Commonwealth New South Wales Bilateral Agreement: Impacts on Ecological Assessment

John Travers
 ECA Councillor

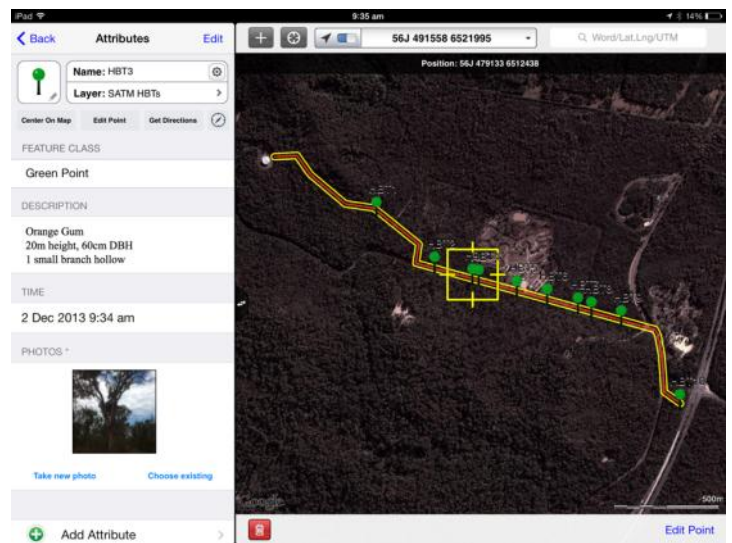
federal minister Greg Hunt in late December 2013. It means that Commonwealth *Environmental Planning and Biodiversity Assessment Act* assessments will be able to be undertaken as part of each state government's assessment procedures.

The press release advises that the proposed 'one stop shop' policy aims to simplify the approvals process for businesses, leading to swifter decisions and improve Australia's investment climate, while maintaining high environmental standards. However the procedures for that to occur are yet to be undertaken and it may be sometime before a joint assessment capability is

Photo 1: Opening screen showing projects



Photo 3: Adding attributes to a point feature



actually available to ecological practitioners. A draft approach has been published and upon that being ratified implementation of the scheme should occur.

The agreement explores the detail on how the assessment can occur given the complexity of matters that are required to be considered. Minister Hunt advised that the Commonwealth and NSW are jointly committed to maintaining high environmental standards and working together to streamline environmental assessment by this Agreement, as a step to establishing a 'one stop shop' for environmental approvals. In his words, "This is about setting the highest standards, making swift decisions and delivering certain outcomes".

The statement advised that parties will work cooperatively so that Australia's high environmental standards are maintained, by ensuring that:

- Australia complies fully with all its international environmental obligations.
- Matters of national environmental significance

are protected as required under the EPBC Act.

- There are high quality assessments of the impacts of proposals on Matters of National Environmental Significance, and authorised actions do not have unacceptable or unsustainable impacts on Matters of National Environmental significance.

A statement of reasons for entering into the agreement and a report on the comments received on the draft bilateral agreement published under section 49A of the EPBC Act can be viewed at www.environment.gov.au/epbc/bilateral-agreements/nsw.

Source: EPBC website January 2014

The Challenge of Weed Management: The Professional in Domestic Situation

Rena Baker
Ecologist

Last February, I relocated from the burbs of Sydney (Maroubra) to the northern NSW town of Bangalow. We bought a two hectare property, which sadly, is mostly dominated by weeds - ground, mid and upper: if you can name the weed, I can find it for you here.

The canopy is dominated by Ponderosa Pine (anyone wanting to collect Christmas pine cones feel free to visit!) and Camphor Laurel (of course). There are also some spindly Tallowwoods trying their best but failing. We also have the usual suspects: Lantana, Crofton Weed, Cobblers Peg (those seeds can and do get EVERYWHERE); Paspalum in the lawn; and a bunch of others that are common in this area and across NSW.

We don't have any Blackberry which I am very grateful for.

The dominant grass here is South African Pigeon Grass. I had never encountered it before - it is so tough I can't even manage to dig the tussocks out without removing a bucket load of soil in the process.

I have been here almost twelve months, and every season has seen a new weed flowering, fruiting and growing. We are planning on transforming the place over the next 10 years, and have started assaulting the Camphors, *Bauhinia*, Crofton Weed and my arch enemy, Ragweed (I *really* hate that plant). I am also trying different control techniques. Some I have sprayed - large areas I am covering with tarpaulins, and which I will then follow up treat with spray; and

in other areas, we have hand pulled.

On my daily walks down the long driveway, I have now begun to spot some natives battling back - just recently *Kennedia*, *Wahlenbergia* and *Microlaena* (these last two surviving in cracks in the centre of the drive). I am hoping that the more weeds we remove, the more natives I will spy.

Conversely, there is some joy in the flowering of the exotic grasses. A flock of Red-browed Finches feeds on it every day and I have managed to get some good snaps of that. I also watched them breaking off the tops of the Red Natal Grass, flying off with them presumably to make a cosy nest lining. It is interesting seeing the plants changing with the seasons, and the different bird species using the plants in different ways.

Hopefully as we replace the exotics with natives, we will see even more species coming to visit.



How to Rescue Native Bees

Jason Berrigan

Darkheart Eco-Consultancy

Consulting Ecology Editor

Australia has over 1600 native bee species, of which about 200 live in the north coast to Sydney region. Of these, only one species, the Stingless Native Bee (*Tetragonula carbonaria* formerly known as *Trigona carbonaria*) is social and establishes hives like the European Honey Bee (*Apis mellifera*) – the rest generally have more solitary lives. In contrast to its introduced rival which can range up to 5km, the Native Bee only has a range of about 500m from its hive.

The keeping of Native Bees has been promoted by Kuring-gai Council, and artificial hives are available commercially, particularly the OATH (Original Australian *Tetragonula* Hive) design.

During clearing monitoring, we occasionally come across native bee hives. Understanding the ecological importance of these native pollinators to indigenous plants, especially in light of current threats (eg fragmentation) and future threats (eg Climate Change) to biodiversity, we have tried to relocate the hives we have come across the best we could but with minimal success.

I was unable to attend a recent workshop on native bees on the Central Coast, but fortunately was recently contacted by a passionate member of the community who has provided a working guide to rescue native bee hives. Gail and Mick Albertoni are local residents who offer a native bee rescue service and are promoting native bees and their rescue to arborists, Landcare, local Council and ecological consultants. They provided the following advice on how to rescue and relocate native bee hives (adapted from www.aussiebee.com.au):

The Rescue Procedure:

Pre-felling:

- If seen before the tree is felled, seal up the entrance (or entrances) preferably the night before, or early morning before they start to fly.

Use a fine flyscreen mesh or cloth.

- Take note of which way the branch is facing, and mark it (eg chalk or pen) or take a note. If the tree has been felled and the hive detected later, try to estimate its original orientation and mark on the limb this direction or record this information.

Removal:

Ideally hives should be removed close to or after dusk when all bees have returned to the hive, unless the entrance has been blocked the evening before or as early in the morning as possible.

- Cut at least 60cm above and below the entrance if possible. The limb may be trimmed to a more manageable size if required once cut and the extent of the cavity ascertained. Be as gentle as possible when moving the hive to minimise stress and damage (mortalities are still likely after rescue). If one of the cuts goes through the hive, see advice following this stage of the procedure:
 - ♦ If the hive is found in a branch or tree that has been felled, it is important to do emergency repairs as follows:
 - * If cut only through the top or bottom of the hive, immediately cover it with a piece of wood, metal, cardboard or whatever you can find. A secure cap will eventually be needed to seal out water and invaders.
 - * If cut through the brood (breeding area), put it back together if possible, aligned correctly.
 - * Try to seal the cut and secure it as soon as possible from invaders with 'No More Gaps', tape, or whatever is available at the time. You must ensure a permanent seal/join before remounting. DO NOT USE 'LIQUID NAILS': IT IS TOXIC. The bees will fix any new gaps with resin and wax, but this takes time and resources, hence take care to block new holes observed or created as soon as possible.
 - * If the hive is damaged, it may be necessary to wrap it up in a tarp or plastic and seal it to stop ants, phorid flies, etc, from invasion until the holes are sealed.

- * Do not try and remove honey as this is a common cause of loss of disturbed hives.
- * It is best not to move the hive or block the entrance until after dusk or when all of the bees have stopped flying and entered the hive.

the host tree and allows for tree growth. Mounting method should minimise bumping and vibration to the hive. A simple method is to mount the section of log on a platform on top of a star picket as shown below with an OATH hive:

Temporary Storage:

Place the hive in the shade as close as possible to the original hive site, making sure it is not tipped upside down, to allow bees to return to the hive, especially if the hive has been cut into. If ants are a threat, stand the hive on top of a brick or similar in a container of water and detergent. Try to remove the hive after dusk to maximise chances of re-capturing the majority of the colony.

Re-Location:

As the bees will instinctively want to return to the exact original location of the hive (which is now gone), they must be moved at least 2km away (ie beyond their normal flight range) to allow them to re-orient themselves to a new hive location. If required to be returned to the source site/area, they can be relocated again about a month later.

If relocating to a new permanent or temporary area, try to select a spot where there is a variety of food sources within 100m, and ideally a water source. Cover the entrance with some porous material or cloth taped tightly on for transport ideally at night or very early morning. As always, minimise stress inducing bumping and vibration when transporting.

Re-Mounting:

The removed hive should remain in its temporary location after felling until it can be picked up and mounted in a suitable position facing its original aspect at the new location, but not left for any longer than overnight after felling.

At the new location, it may be placed as low as 30cm above ground by sitting it on top of a suitable structure, or may be mounted similar to a nest box using an attachment method which does not damage



The key is to mount the hive facing the original aspect. Morning sun is also an advantage and shade in the afternoon is preferable (hives are vulnerable to over-heating) as it can help prevent the hive over heating in summer. Again, it is critical to ensure any hollows/cavities in either end of the hive are sealed/capped to prevent invaders (particularly ants) and entry of water. Generally there should only be one entrance (ie the front).

Shattered Hives:

If the hive is in pieces, rescue success is limited. Shattered hives will not relocate by themselves as the queen cannot fly.

All you can do is try and pick up the brood and place it in a cardboard box, esky, nest box, etc, or ideally an OATH hive (to minimise handling), as subsequently detailed:

- Pick up the brood as soon as possible and place it in the box as it is UV sensitive. Put any unopened pollen or honey pots in one corner of the box. DON'T put honey pots in which are leaking.
- After dislodging any bees, pick up the remaining hive structure, honey and pollen pots and put them in a bucket or container with a lid or cover.
- Pick up the rest of the debris which has their scent and move well away. Try to get as many bees as possible out first - a paint brush works quite well.
- If the hive entrance is on a knob, lump or bulge: if possible, cut it off neatly and put it on opening of the box. It can be stuck on with a bit of resin or Blu-Tac. The bees will return to it via scent attraction, and the more bees that return, the greater the chance the hive can be saved.
- Call a native bee rescuer immediately as it may be possible to save the nest and transfer it to an artificial hive. If one is not available, you will need a hive box such as an OATH (normal nest boxes are unlikely to be suitable due to the preference for the entrance to be at the bottom of the hive to facilitate cooling). Place the materials in the box, mount in a suitable area as detailed above, and hope for the best.

If you have any questions, or you are interested in more information on boxing the hive, box designs and hive splitting, contact Gail or Mick on 6559-4390 or mobile 0421 816 171, or refer to the www.aussiebee.com.au website which has a range of booklets and an on-line newsletter featuring the latest in native research and keeping, and also sells related materials including an excellent book by John Klumpp (<http://www.aussiebee.com.au/klumpp-book.html>).

For further information (eg on how to build an OATH), some recommended references are:

<http://www.aussiebee.com.au>

<http://www.wildthings.org.au/index.php/our-projects/trigona-carbonaria/trigona-carbonaria-faq/>

http://www.kmc.nsw.gov.au/Projects_and_initiatives/Council_initiatives/Environment_sustainability/What_we_are_doing/Our_community_programs/WildThings/Native_bee_hives

<http://rochedalecommunitygarden.net.au/wp-content/uploads/2013/10/Building-a-Modified-OATH-Hive.pdf>

If interested in attending a workshop, there's more coming up this year:

<http://www.sugarbag.net/learn-more/>

From the Botany Desk

In this February 2014 newsletter edition, I take a break from the NSW North Coast Threatened plant series and instead provide a few of the more interesting and hot topic abstracts of current Australian plant research presented at the Australian Ecological Society's 2013 Conference (ESA EcoTas 2013). The Conference was held jointly with the Ecological Society of New Zealand and was held in Auckland in November 2013. The main conference Symposia comprised invasive species ecology, soil fungi ecology and climate change impacts. The abstracts provided below are largely reproduced from the EcoTas 2013 Handbook with some minor edits. I have also provided some comments for thought following each abstract.

Rapid evolution in introduced species: Will weeds in New Zealand and Australia eventually be accepted as unique native taxa?

Moles, Angela¹; Buswell, Joanna²; Brandenburger, Claire¹; Rollins, Lee Ann³.

¹Evolution & Ecology Research Centre, School of BEES, University of New South Wales, NSW 2052, Australia. ²Ministry for the Environment, 23 Kate Sheppard Place, Thorndon, Wellington, New Zealand. ³School of Life and Environmental Sciences, Deakin University, Pigdons Road, Geelong VIC 3217, Australia.

Introducing species to a new environment creates excellent conditions for evolution. A species is released from its native enemies. It is also exposed to a new suite of biotic pressures from herbivores, pollinators, pathogens and competitors, and a new suite of abiotic pressures such as different rainfall, temperature, disturbance regime and soil fertility. Work with herbarium specimens collected over the last 150 years has shown that 65% of the short-lived, sexually reproducing plant species introduced to Australia and 33% of the species introduced to New Zealand have undergone significant morphological change in at least one trait since their introduction. Glasshouse experiments suggest that differences between source and introduced populations are retained when they are grown in common conditions. As gene flow between introduced populations and their source populations is extremely limited, it seems inevitable that introduced species will eventually evolve to become unique new taxa. At this point, we will have to decide whether to

accept them as new native species, or try to exterminate them. While most ecologists don't like the idea yet, acceptance of introduced species may just be a matter of time.

Comment: This topic really got me thinking about the plant invasions we all see in our job, particularly those in conservation reserves: the Asparagus Fern invasions in the Littoral Rainforests on the mid North Coast, the African Olive infestations in Cumberland Plain Woodlands at Camden and Campbelltown, the St Johns Wort invasions in the Grassy Woodlands and Derived Grasslands of the Northern Tablelands and upper Hunter, the Lantana invasions on the Dry and Wet Sclerophyll hillslopes on the coastal lowlands and ranges, and Bitou Bush of the foredune coastal scrubs to name just a few. With its obvious impact on native species richness, I do find it hard to swallow the fact that science may indeed dictate that we 'give up' a lost cause and let these 'naturalised' species take their rightful place in the Australian environment.

Arbuscular mycorrhizal fungal communities along an soil age and fertility gradient on an arid sand dune chronosequence.

Teste, François¹; Krüger, Manuela²; Laliberté, Etienne¹; Lambers, Hans¹; Bunce, Michael³

¹School of Plant Biology, The University of Western Australia, 35 Stirling Highway, Crawley (Perth), WA 6009, Australia;

²Academy of Sciences of the Czech Republic, Praha, Hlavni mesto Praha, Czech Republic;

³Murdoch University, School of Biological Sciences and Biotechnology, South Street, Murdoch (Perth), WA 6150, Australia.

Arbuscular mycorrhizal fungi (AMF) are known to enhance phosphorus (P) acquisition by plants, but it has been suggested that AMF strategy becomes ineffective in strongly weathered soils, where P availability is extremely low. Using DNA sequencing, changes in the diversity and composition of AMF communities along a 2 million year old sand dune chronosequence in the south-western Australia global biodiversity hotspot were determined. AMF have thus far been largely ignored in biodiversity hotspots, and it is unknown how these communities vary during long-term ecosystem development. We show that AMF spore density decreased from 90,000 spores/m³ in the young dunes to 55,000 spores/m³ in the old dunes. Mycorrhizal colonisation was dominated by Rhizophagus species where it peaked to 24% in 120,000 year old dunes and then dropped again to 9% in the 2

million year old dunes. This reduction in AMF colonisation was perhaps due to antagonistic effects of non-mycorrhizal, cluster-rooted Proteaceae plants that dominate on the oldest soils, or to the very low P levels in the soil (<10 parts per million total P). Multivariate analyses showed that richness and diversity of the AMF communities are the greatest in the younger 120,000 year old dunes with a sharp 50% loss of AMF richness in the oldest dunes. The AMF community structure in the mid-aged dunes also differ from the younger and older dunes. These results are consistent with the view that the AM strategy becomes less effective when P availability declines to very low levels.

Comment: Dr Teste notes in a different paper abstract that the exceptionally broad range in nutrient availability found across the WA dunal chronosequences, coupled with their species-rich flora, make them valuable model systems to determine belowground controls over plant diversity (ie. specific nutrient limitations/thresholds which drive individual flora species and dunal plant communities may be able to be determined in the future).

For those of us who undertake sand mine rehabilitation work on the eastern seaboard, this research will no doubt have implications when detailing methods for rehabilitating Holocene versus older Pleistocene-aged dunal systems on the large coastal sandmasses of the NSW North coast.

To thin, or not to thin? Examining the understorey condition of dense stands of woody vegetation.

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²ARC – Centre of Excellence for Environmental Decisions

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Woody regeneration into previously cleared landscapes is occurring in many parts of the world. Significant ecological benefits can be gained through large-scale natural regeneration, but the process by which this regeneration occurs will influence the ecological 'condition' of the resulting vegetation. In many cases woody regeneration occurs following a mass recruitment event as a result of favourable

growth conditions, or removed disturbance, such as livestock grazing. These events develop dense stands of woody individuals, which are for many purposes considered floristically depauperate. Competition for resources reduces stem growth rates, alters growth form, and suppresses understorey vegetation. Ecosystem function can subsequently be dramatically altered in these systems.

Over time, self-thinning is expected to occur in these stands, potentially improving their condition and function. The rate and vegetation outcomes of self-thinning are slow and uncertain. In order to expedite and maximise any ecological gains from dense natural regeneration, management may be required. Ecological thinning is increasingly being considered a viable option for management of excessively dense stands; with aims of improved overstorey and understorey vegetation attributes, and ecosystem function. However, we have little understanding of how and when it might be effective. To this end, effects of dense stands on understorey vegetation attributes and their response to stem thinning within Box-Ironbark woodlands and forests in central Victoria were examined. A conceptual model of stem regeneration and understorey condition in these systems was examined, with an aim to help managers make informed decisions about when thinning might be a viable and cost effective option.

Comment: In our jobs we come across from time to time dense, monospecific regrowth stands of vegetation, often being Cypress Pines (*Callitris spp.*) on the NSW Slopes, Paperbark (*Melaleuca spp.*) on the coastal depressions, and She Oak (*Allocasuarina littoralis*) on the coastal lowlands and ranges. These stands often provide little light to the forest floor and support a dense carpet of leaf litter which further contributes to a lack of species recruitment. I think many ecologists' initial thoughts would be to hasten or supplement self thinning by active thinning management, so it is good to see research on this which may hopefully lead to a draft set of thinning guidelines for different ecosystems.

Elevated CO₂ enhances phosphorus availability in a P-limited eucalypt woodland

Power, Sally A., Hasegawa, Shun, Macdonald, Catriona

Hawkesbury Institute for the Environment, University of Western Sydney

The response of forest ecosystems to elevated CO₂ has been the subject of much recent debate. However, to date, field-scale CO₂ experiments in forests have been confined to Europe and North America where climate and soil conditions differ considerably from those in the southern hemisphere. In particular, the low P availability of Australian soils may constrain ecosystem responses to rising CO₂ concentrations, reducing the future C sink capacity of forest systems. A recently initiated Free Air CO₂ Enrichment experiment in a native *Eucalyptus* woodland in western Sydney provides a unique opportunity to quantify the response of a woodland ecosystem to increasing CO₂. The experiment, which began in September 2012, exposes a mature woodland to two CO₂ treatments – ambient (390 ppm) and elevated (540 ppm) – in replicate 25 m diameter FACE rings. CO₂ concentrations were initially ramped up gradually, with increments of 30 ppm over the first 6 months. Here, we describe the effects of elevated CO₂ on nutrient dynamics in a Cumberland Plain woodland. Preliminary results indicate that even small increases in atmospheric CO₂ drive a rapid increase in P availability and P turnover. This suggests that some of the CO₂ fertilisation response observed in N-limited, northern hemisphere woodlands may be realised in P-limited Australian ecosystems, at least in the short term.

Comment: This paper suggests that the Cumberland Plain Woodlands may survive an elevated CO₂ world but one would think the increased bushfires that will likely accompany such a rise may negate any predicted ‘positive’ impacts from an increase in photosynthesis, growth and carbon sequestration. Most of the climate research these days focuses on impacts to ecosystems from elevated CO₂ but few field experiment studies research an increase in actual warming. My view is that only when this is done (in concert with elevated CO₂ studies), will we have an idea of likely climate

change impacts on terrestrial ecosystems.

Evaluating the restoration potential of transferred topsoil.

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¹*Environment and Conservation Sciences, Murdoch University, Perth, Australia*

²*Department of Environment and Agriculture, Curtin University, Perth, Australia*

Global change, population growth and urbanisation are ever-increasing pressures on biodiversity and ecosystem function. Given that conservation of existing natural fragments will not be sufficient to maintain extant biodiversity or meet conservation goals, there is a major need for the practice of ecological restoration whereby degraded lands are managed to increase and maintain indigenous species. However, technical capacity lags and research on restoration tools is vitally needed. One increasingly common restoration tool is topsoil transfer, moving quality topsoil and its associated soil seed bank (SSB), nutrients, and soil fauna to degraded areas. To assess the capacity of topsoil transfer, several key aspects of the SSB were examined parallel to a real-world topsoil transfer in south-west Australia. We evaluated restoration values of topsoil transfer, by investigating plant functional traits, SSB similarity to extant vegetation, exploring mechanisms to improve restoration outcomes, and what influence the process of topsoil transfer has on germinable seed. Glasshouse germination was monitored over 13 weeks from 24 pre and 24 post-transfer soil samples. Treatment included soil depth and smoke plus heat combined. Topsoil transfer resulted in significant seed dilution, equal mixing through the soil profile relative to pre-transfer soils and a marked change in species composition (including lack of perennial species). Smoke and heat failed to stimulate additional germination post-transfer. Topsoil transfer, while successfully translocating native seeds, influences restoration success through dilution and lack of perennial species, thus suggesting a need for topsoil transfer to be supplemented by other restoration techniques, and therefore limiting its cost effectiveness.

Comment: Another hot topic of debate these days among restoration ecologists is this need to

supplement topsoil translocation with direct seeding, brush mulching, tubestock to account for the significant species seed dilution from topsoil translocation.

The effect of natural flooding on floodplain understorey vegetation, following extended drought in Northwestern Victoria

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¹Murray-Darling Freshwater Research Centre

²La Trobe University

This study looks at the ability of flood-responsive plant species to regenerate following a natural flood, after extended drought, on the floodplain. River regulation has reduced flood variability of the Murray River on Hattah Lakes, Lindsay, Mulcra and Wallpolla (LMW) Islands. As a result it is anticipated that flood-responsive vegetation habitat will reduce and communities will be replaced with drought tolerant species. Current research recommends River Red Gum (RRG) vegetation communities be inundated once in three to five years, and Black Box Woodland (BBW) communities be inundated once in ten years for the survival of flood-responsive species. Little work has been undertaken to understand the specific requirements of floodplain understorey vegetation communities in this region. Floodplain understorey vegetation has been surveyed annually (2006–07 to 2012–13) at Hattah Lakes and LMW as part of condition monitoring under The Living Murray program. Natural flooding in 2010–11 provided opportunity to monitor response to disturbance in a natural habitat. Prior to the natural flood, sites in RRG communities had not been inundated for 10 to 15 years and were dominated by drought tolerant species. Following the flood, these sites recorded an array of flood-responsive species. This response demonstrates the resilience of floodplain communities to withstand extended drought. Most BBW sites were not inundated in 2010–11 and have now been dry for ~20 years and remain dominated by drought tolerant species.

Comment: Another hot topic of current debate amongst floodplain ecologists is the need to ‘engineer’ more frequent flood events to the remaining large River Red Gum and Black Box forests of the Central Murray State Forests (eg. Barmah, Perricoota) to halt their reported decline during extended periods of drought. The research above may have implications with respect (and will no doubt contribute) to the

water management practices proposed by Forests NSW of ‘drought-proofing’ the Central Murray floodplain forests through large scale engineering works.

Eucalypt psyllid population dynamics and psyllid-induced tree decline – a case study from Western Sydney

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The Cumberland Plain Woodland (CPW) of Western Sydney is experiencing massive infestations by a psyllid species belonging to the lace lerp genus of *Cardiaspina*. CPW is listed as a critically endangered ecological community under the Threatened Species Conservation Act 1995. This psyllid outbreak severely impacts ecosystem function and is raising severe community concerns as the only host species of this psyllid, *Eucalyptus moluccana* (Grey Box), is the dominant tree species in the region. Trees throughout a large portion of CPW remnants have been severely defoliated, with apparent mortality increasing due to consecutive years of defoliation. The psyllid outbreak has been surveyed over a 12 month period. This study included examination of the biology of the psyllid, its antagonists, climate factors and overall tree decline. We found a significant decline in tree health over time with increasing tree mortality and subsequent spread of the outbreak. This psyllid species is able to achieve four generations per year. Four parasitoid morphospecies were recognised to be involved as parasitoids and hyperparasitoids. Molecular characterisation of the parasitoids confirmed four distinct clades and facilitated the study of their ecological role. Although parasitism rates reached up to 40%, leaf availability and not parasitism more strongly regulated this psyllid outbreak. Finally, our study demonstrated that climate variables, in particular rainfall and temperature, are key drivers in initiation, intensity and collapse of this outbreak.

Comment: An interesting one as my thoughts on the initial cause of the infestation were based on the degree of CPW fragmentation, the large reduction in pre-1750 CPW areal extent, and the growth of urbanisation in western Sydney (with all its indirect impacts on adjoining bushland) ; rather than macro variables such as rainfall and temperature changes.

Germination syndromes in *Boronia* (Rutaceae): complex interactions between heat shock, smoke and season

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¹University of New South Wales

²Office of Environment & Heritage (NSW)

³University of Wollongong

The timing of seedling emergence has important consequences for seedling survival and growth, and ultimately for plant community composition, and is determined by the type of seed dormancy and germination cues required. Physiologically dormant seeds require stratification at certain temperatures to overcome dormancy. Once dormancy is broken, non-dormant seeds persist in the seed bank and remain viable but will not germinate until they receive specific germination cues. These commonly include a particular seasonal temperature, and may include additional fire-related stimuli such as heat shock and/or smoke to promote significant levels of germination, often resulting in a seasonal post-fire flush of seedling emergence. Multiple germination cues are rarely assessed in combination and recent research is revealing the complex ways in which multiple fire cues interact with one another, and with other environmental cues such as seasonal temperatures, light and moisture. We used a fully factorial experimental design to investigate seasonal patterns in dormancy and germination responses of fresh and buried seeds to multiple interacting cues in seven species of *Boronia* (Rutaceae) from fire-prone south-eastern Australia. Germination syndromes were highly variable between species but broad patterns correlated well with seed size and morphology. Temperature significantly influenced interactions between different fire cues in several species, suggesting the potential for fire season to affect the magnitude of seedling recruitment and depletion rates of soil seed reserves. This has important implications for current fire management practices and population persistence under climate change where fire season is predicted to widen.

Comment: Another current hot topic of debate is the focus on an increase in temperature from climate change causing more frequent bushfires and increases in 'lethal' soil temperatures, triggering more frequent seed germination events for a host of obligate and facultative seeder species and associated potential impacts on seedbank depletion and seedbank viability

leading to possible localised extinctions.

Testing assumptions about herbivory and plant defence on islands

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Since the days of Darwin and Wallace, islands have acted as nurseries for some of the most influential theories in ecology, most of which are still firmly ensconced in contemporary thought. As a result, ecologists hold assumptions about fundamental community processes and species traits on islands. It is largely accepted that island plants suffer less herbivory and have lower levels of defence in comparison to mainlands. These assumptions are based on observational studies or anecdotal evidence such as missing large mammalian fauna and the loss of spines or chemical defences in some plants on islands. Despite the age of these assumptions and the importance of herbivory and plant defence as drivers of speciation and community structure, our study is the first to quantitatively test these long-held beliefs at a large geographic scale. We compiled data from studies that measured herbivory and defence traits on islands and mainlands. For the first time, our results show that plants on islands suffer about 50% more herbivory and are about 50% less defended than mainland plants. These results challenge the assumption of lower herbivory in island ecosystems and present opportunities to explore the relationships between species diversity, herbivory, and plant defence. Our results about island communities are useful for ecologists interested in fundamental ecosystem processes, and also for managers protecting island biota from existing and emerging pressures

Comment: With the Lord Howe Island Rat Eradication program proposed for 2016, further island ecology research will no doubt contribute to future management of the island post-rats.

Ray Williams



8/03/1946 - 10/02/2014

“A kind, generous man with a light-hearted and simple approach to life, and a quiet passion for wildlife”

Eulogy by Amy Rowles, Anne Williams, Narawan Williams and Brian Wilson

Ray was born on the 8th of March 1946 as Charles Raymond Williams, but never liked Charles, and Charlie was even worse, so he has always been known as Ray or Raymond. Ray grew up with his Mother Elsie and Father Eric, older Brother Tony and younger sister Diana at Heald Green, in Cheshire, England.

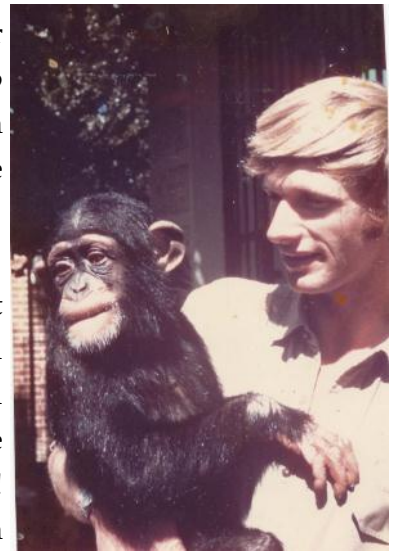
Ray always had an interest in nature and animals. He didn't think much of school, other than biology related subjects. A book 'Listening in the Dark' sparked his interest in micro-bats, a group of animals which he maintained a passion for throughout his life.

Everyone remembers Ray as an easy going man, with a smile on his face, a great sense of humour and full of ecological knowledge. Only a few things ever got Ray riled up: animal cruelty; cars that break down 500km from the nearest source of parts; computer technology that will not do as it is told; and being caught out in the rain.

Ray began his working life at Chester Zoo as a keeper. He liked to tell his zoo stories: For example, the otters stealing his keys out of his pocket and depositing them

at the bottom of their pond and Stella the chimp putting her fists through her birthday cake on live TV.

Ray moved to Australia at the age of 21. He could clearly recognise a good bargain as he took the famous 10 pound flight! His first position in Australia was at the



Adelaide Zoo. It was also at the Adelaide Zoo that he met his future wife, Anne, who was admiring the two chimpanzees he was holding in his arms. After two years in Adelaide he and Anne moved to NSW. They married in 1972 and were blessed in 1978 with the birth of the twins, Narawan and Amy. He continued looking after mammals at the Reptile Park and Univ. of NSW, providing material for more stories, like the time he was coming back from a university expedition to western NSW, probably Fowlers Gap, near Broken Hill, and as they were driving down one of the major arterial roads in Sydney, it was discovered that the western brown snake which they had carefully bagged, was no longer in its bag. Handbrake on, all four doors open in the middle of the road, but the snake was nowhere to be found. Although Ray was never really comfortable handling snakes and usually tried to avoid it, he eventually drew the short straw as driver to move the car around the corner to ease the traffic jam they were causing. I believe the snake was eventually located curled up under one of the seats.



Ray enjoyed the diversity of wildlife and warmer weather in Australia and although he liked to go back to the UK for visits, he decided to stay in Australia and became an Australian Citizen.



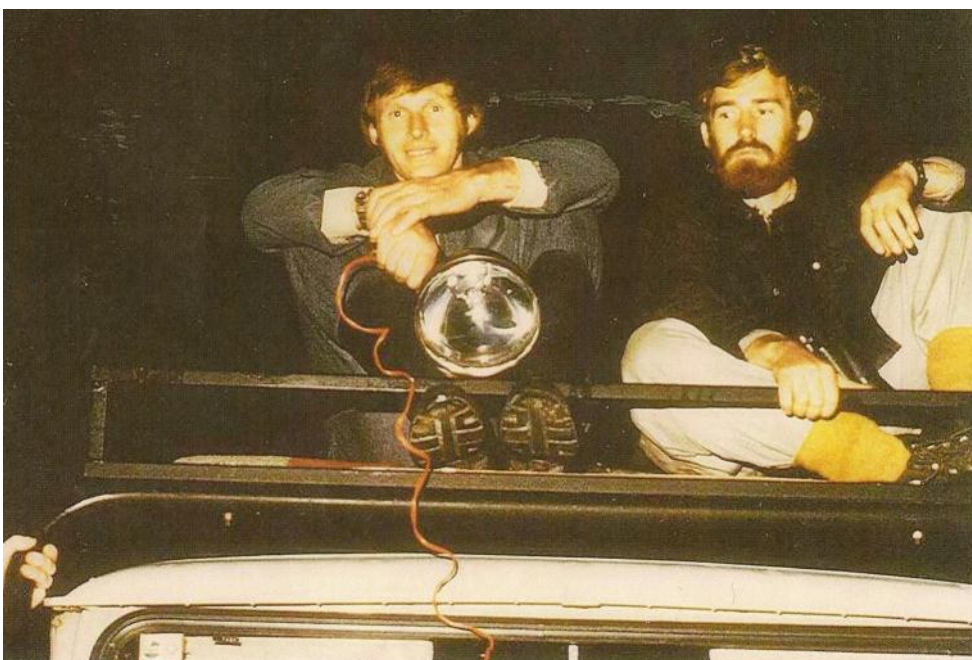
Anne and Ray processing microbats

In the 90's Ray began environmental consulting full time with long-time friend Brian Wilson as Ecotone Ecological Consultants. In the 1990s they did numerous field surveys within State Forests and National Parks requiring them to spend many months camped in the forest and working very long days and nights in very remote locations. During those years they spent more time together than most married couples do and still remained great friends despite some very testing situations. They literally carried out tens of thousands of trap-nights together. Ray had an annoyingly good memory for survey sites and species and was perplexed on several occasions when I (Brian) could

not remember the specific animal we captured or the topography at one of 100s of survey plots we may have visited - sometimes weeks earlier!!!

Ray much preferred to be out in the field than sat at a computer. He did have to do some long hours on the computer writing reports in the latter years which was a challenge with his one finger typing, punctuated by a loud sigh and occasional swear at his computer.

Ray's first-hand knowledge of many Australian Mammals, gained through working at zoos and maintaining captive populations for research at the UNSW Cowan Field Station, was unique. He and Anne also hand-reared many species that had become orphaned or were injured, so they really understood the life stages and temperament of many mammals and birds. He could accurately identify most kangaroos and wallabies from fleeting glimpses as they shot out of view, based on size, colouration and stance. He was also very observant once he had an animal in his hand and could pick up minor coloration or morphological features of animals that allowed him to accurately distinguish species. Ray must hold the Guinness World Record for the number of times his hand has been photographed. The hand usually had dirty fingernails and a small terrestrial mammal or bat in it!



Ray and Brian, on the roof rack ready for spotlighting. In the good old days before Work Cover took over. A bang on the roof meant STOP: I have eye shine, or I am about to get wiped out by a branch.

Ray was also very willing to pass on his knowledge to others and was always a magnet for people wanting to learn about animals. He could easily adapt from talking about animals, to the head of a museum, to talking to a visitor to Australia with virtually no knowledge of Australian animals. Ray shared his knowledge by teaching at TAFE, organising workshops and long-term involvement in the Royal Zoological Society (organising regular weekend survey trips and the occasional longer trips to National Parks throughout NSW), Mammal Society, Australasian Bat Society, Riversleigh and the Ecological Consultants Association, as well as wildlife rehabilitation groups.

Ray and Anne's love of the bush led them to purchase a bush acreage near Dungog. Over the last 35 years the Williams and Wilson families have spent many a weekend enjoying this natural escape, including the long-term and ongoing construction of a mud brick hut.



Above: Narawan, Ray, Amy, Wendy and Brian making the mud bricks and Below: the (almost finished) hut.



The Williams Subaru and the Wilson Landrover on the way to Riversleigh in 1985

Ray enjoyed many trips across Australia with a keen interest in the more remote areas, particularly if the trip involved a wildlife survey. Anne recalls some of the early trips four wheel driving in their Mini Moke. Ray was also a keen wildlife photographer, until Nara took over the camera gear and shared the photographic passion with him. Later in life some overseas trips included a visit to Africa, and a trip to North America, which included a micro-bat fly out numbering hundreds of thousands from a bridge and a cave in Texas. Ray also enjoyed many visits back to the UK to visit relatives which gave him much pleasure.



In his later years Ray's life was further blessed with the arrival of his four wonderful grandchildren, Kacia, River, India and Jasmine.

Ray peacefully passed away on the 10th of February at the age of 67 after a two year battle with Bowel Cancer that spread to his liver and throughout his abdomen. Ray is so greatly missed and we would like to thank our friends and colleagues for their support. We would also like to thank the ECA and other friends and family for contributing to a donation to Bush Heritage Australia in Memory of Ray.



Papa with River



Christmas Day 2014



Ray with some of his favourites. As I put this collage together, I couldn't help but think 'Dad will get a good laugh when he sees this', momentarily forgetting that he would be the only person not to see it.

Advertising Opportunities with the ECA

Website:

\$200 for a banner

\$300 for company name with some detail and a link

\$500 for company name within box, logo, details and web link

All website packages run for one financial year and include a small ad in any newsletter produced during the financial year.

Newsletter:

\$100 for a third of a page

\$250 for a half page

\$500 for a full page

\$1 / insert / pamphlet

Advertising is available to service providers of the Ecological Consulting industry. The ECA will not advertise a consultant or their consulting business.

**If you wish to advertise, please contact the
ECA administrative assistant on
admin@ecansw.org.au.**

Contributions to the Newsletter, Volume 33

Contributions to the next newsletter should be forwarded to the administration assistant Amy Rowles admin@ecansw.org.au by the

15th of July 2014.

- Articles may be emailed in WORD, with photos included or referenced in an attached file as a jpg.
- Please keep file size to a minimum, however there is no limit on article size (within reason)
- Ensure all photos are owned by you, or you have permission from the owner
- Ensure that any data presented is yours and you have permission from your client to refer to a specific site (if not please generalize the location).
- All articles will be reviewed by the editorial committee, and we reserve the right to request amendments to submitted articles or not to publish.
- Please avoid inflammatory comments about specific persons or entity

The following contributions are welcome and encouraged:

- ◇ Relevant articles
- ◇ Anecdotal ecological observations
- ◇ Hints and information
- ◇ Upcoming events
- ◇ Recent literature
- ◇ New publications (including reviews)
- ◇ Photographs

ECA Photo Gallery

Photo Competition Entries



Left: Flannel Flower, North Head (photo courtesy of Belinda Fellow).

Right: Common Brushtail Possum, Merewether Heights (photo courtesy of Ted Smith)



Left: Red Beard Orchid, Tumbi Umbi (photo courtesy of Ted Smith)

Right: Spotted Harrier near Denman, Upper Hunter (photo courtesy of Ted Smith)



Left: Sub-adult Lace Monitor, near Heathcote (photo courtesy of Steve Sass)

Right: *Cymbidium suave* (photo courtesy of Isaac Mamott)

Below: *Grevillea humilus* subsp. *humilus* (photo courtesy of Isaac Mamott)



ECA Photo Gallery

Photo Competition Entries



Left: Runner Up. Roosting Barking Owl with dinner, Northern Beaches (photo courtesy of Brendan Smith).

Right: Rainbow Bee-eater, Migratory Species (EPBC Act) (photo courtesy of Steve Sass).



Right: 'Go Away' Bearded Dragon in bumble box woodlands near Nyngan (photo courtesy of Steve Sass).



Below Right: Montane Vegetation, Great Western Tiers, Tasmania (photo courtesy of Judie Rawling).

Left: *Cryptostylis erecta* (photo courtesy of Isaac Mamott).

