

Urban Spotlight

Newsletter of the Australian Research Centre for Urban Ecology (ARCUE)

For online version and back issues: <http://arcue.rbq.vic.gov.au>

Volume 6

June 2006

CONTENTS

Staff Changes	1
Student Research	2
Bayesian Statistics Update	2
Hawkweed Invasion Research	2
Urbanisation and Plant Traits	3
Fauna Housing Shortage	3
Slugs and Snails and Native Grass	4
Measures of Urbanisation	4
TreeTime Phenology Project	5
Wetlands Relocation	5
Roads and Ecology	6
Flying-fox Research Update	6
Visitors	7
Meetings, Workshops, Talks etc	7
Upcoming Events	8

STAFF CHANGES

Peter Baxter

Dr Peter Baxter has left ARCUE in October of last year, after two years as a post-doctoral fellow with us. He has been working with Dr Michael (Mick) McCarthy in collaboration with Hugh Possingham (Professor in Zoology and Mathematics) of the University of Queensland in Brisbane to develop ways of identifying efficient conservation management options

for threatened and over-abundant wildlife populations. He has been also been looking at predator-prey mathematic modelling and weed eradication. Peter has now moved to Brisbane for two years to continue this work, but will keep the collaboration with ARCUE going and visit occasionally to work with Mick.

Julia Stammers



Julia joined ARCUE in September 2005 as the new Administrative/Technical Officer, taking over from Jeannie Campbell who left to follow an exciting

new career as a flying instructor. Julia is originally from England but has recently settled in Melbourne. She has a varied background with administrative assistance experience in an Oxford University science department, hospitals, a publishing company and the Australian Red Cross, and also has an environmental Masters degree.

She is keen to combine her experience in helping contribute to the work of ARCUE, whose goals she greatly values, and is enjoying learning more about urban ecology.

2005 Ph.D., M.Sc. AND HONOURS GRADUATES

PhD Students

Three ARCUE students completed their PhDs in late 2005 and early 2006. Mike Harper's research is entitled 'The Availability and Use of Resources by Urban Wildlife', Nick Williams' thesis is 'The Ecology of Fragmented Native Grasslands in Urban and Rural Landscapes' and Amy Hahs' PhD thesis is entitled 'Measurements of Urbanisation and the Ecology of Remnant Woodlands along an Urban-Rural Gradient'.

A number of students with ARCUE commenced PhDs in 2005. Lauren Keim is researching the impact of urbanisation on spider fauna diversity in metropolitan Melbourne, Mark Newbound is studying ectomycorrhizal fungi associated with native Eucalyptus species along an urban to rural gradient, Pavlina Shukuroglou is looking at bird assemblages in urban areas and response to habitat manipulation and Michelle Ensbey is looking at incorporating predictability in monitoring. Also, three PhD students are researching the effects of roads and traffic on ecology: Chris Stewart - wildlife populations utilising population modelling, Jodie Taylor - invertebrates and reptiles, and Silvana Cesarini - survival and dispersal of the Squirrel Glider.

MSc Students

Marty Gent successfully completed her MSc degree in January, with her thesis researching the ecology of coastal vegetation in the Greater Melbourne Area.

Honours Student Projects

Two Honours students finished their Honours projects in 2005. Kelly Holland completed her investigation of the impact of molluscs on vegetation dynamics in native grasslands, and Emma Warren finished her study on the

effects of urbanisation on bryophytes distribution and composition.

Two new students started Honours projects in 2005 and have now successfully completed them. Hayley Broecker researched the detectability of small mammals in urban areas, and Katrina Thomson studied the spatial organisation and habitat use by the Sugar Glider in an urban mosaic landscape.

Aaron Dodd has started investigating seedbank dynamics and plant invasions of Western Victoria grasslands for his Honours project. Two students have started Honours projects researching the effects of roads and traffic on small mammals - Nadine Gulle on the movement of the Brushtailed Possum and Ashley Herrod on the yellow-footed Antechinus.

BAYESIAN STATISTICS

Dr Mick McCarthy has finished writing a comprehensive book on Bayesian statistics and ecology this year which has now been submitted to Cambridge University Press for publication.

Mick also ran a workshop on 'Bayesian Statistics for Ecologists', at the University of New South Wales in Sydney in September 2005, and has recently lead further ones in Hobart, Adelaide and Brisbane. A workshop is planned to be held in Melbourne 10-11 October '06, and one in Perth on a date yet to be confirmed. These valuable workshops, to be run again next year, are on behalf of the Ecological Society of Australia and members will get priority for them. For more information, contact Mick McCarthy – tel 8344 6856 or email mamcca@unimelb.edu.au .

HAWKWEED INVASION RESEARCH

Urban areas of all sizes are recognised as introduction sites of exotic plants and animals. Orange Hawkweed (*Hieracium aurantiacum*) is a State prohibited weed that

was first observed as a naturalised plant spreading from Falls Creek village in 1999. The species is native to Europe but has invaded large areas of alpine New Zealand and has the potential to spread throughout Australian alpine national parks.

Dr Nick Williams and Dr Amy Hahs from ARCUE, together with Dr John Morgan from Latrobe University, have been contracted by Parks Victoria to develop a GIS model that predicts the dispersal and potential distribution of Orange Hawkweed in the Falls Creek area. Using knowledge about the habitat preferences of the species and meteorological data the researchers hope to produce a model that will enable Parks Victoria to detect and control Orange Hawkweed populations more effectively than present approaches that largely rely on opportunistic sighting of the species by bushwalkers, Parks Victoria and Alpine resorts staff. The model was tested during summer field courses by Melbourne and Latrobe University botany students and continues to be refined by the researchers.

URBANISATION AND PLANT TRAITS

Why do some plant species fare badly and become extinct in urban areas whereas others do very well and become weeds? These are questions that a new working group established under the auspices of the Australian Research Council Network for Vegetation Function hope to answer. Dr Nick Williams has received funding from the network to hold up to three workshops where Australian and international experts will be brought together to discuss and analyse urban flora data from cities worldwide.

By synthesising data from many cities that records species that increase or decrease in abundance it is hoped that the characteristics that advantage or disadvantage plants in urban areas can be identified. The findings of this research can be used to prioritise groups of species for conservation action and select species tolerant of the negative effects of

urbanisation for re-vegetation and landscaping. The first working group meeting is scheduled to take place in January 2007.

FAUNA HOUSING SHORTAGE

Similar to most of the worlds' cities, rapid urban growth in Melbourne has lead to the loss and degradation of native vegetation. The eucalypt forest that once dominated Melbourne's eastern suburbs is today mainly confined to small bushland parks. Bushland parks are an important refuge for many species of fauna as they provide resources that are not available in more developed areas. In particular, they provide shelter for many species that den/nest in tree hollows.



Unfortunately, Melbourne's bushland parks contain only a third of the number of tree hollows that they once contained, and even with careful management, new tree hollows are unlikely to become available for more than 50

years. Therefore, it is important to preserve tree hollows that are presently available, and find short-term solutions to the 'housing shortage' facing native fauna. One potential short-term solution may be providing nest boxes. Although this idea has promise, it requires careful planning to ensure nest boxes suit the fauna they are built for, and careful monitoring so as not to provide homes for unwanted pest species.

Given the lack of tree hollows in Melbourne's bushland remnants, it is encouraging to note that some hollow-dwelling mammals such as possums, gliders and bats; and birds such as rosellas, lorikeets and galahs, still call Melbourne home. However, we have work to do to ensure that this remains the case.

THE POTENTIAL IMPACT OF SLUGS AND SNAILS ON NATIVE GRASSLANDS

Urban grasslands have a higher abundance and species richness of exotic slugs and snails. Given that no native molluscs are known from open grasslands in Australia, exotic slugs and snails represent a potential threat to grassland plant communities that is commonly overlooked. Kelly Holland (ARCUE's Research Assistant), for her Honours project in 2004, investigated the potential impact of invasive slugs and snails on native grasslands.

Molluscs were surveyed across a range of native grassland sites, including those surrounded by urban areas of Melbourne, and in agricultural districts of western Victoria. This revealed a range of exotic slugs and snails that have invaded native vegetation, with 5 slug species and 3 snail species observed. The most commonly encountered species was the brown field slug (*Deroceras panormitanum*). Some sites also supported high densities of the vineyard snail (*Cernuella virgata*).

There was a clear difference between urban and rural sites, with significantly higher mollusc abundance and species richness in urban areas. This suggests that native grasslands may be more at risk from exotic molluscs as the landscape surrounding sites becomes increasingly urbanised.

There was also a negative relationship between mollusc abundance and fire frequency. Site management, including appropriate fire regimes, may help to control mollusc populations.

The palatability of a range of native grassland plants was investigated for the black-keeled slug (*Milax gagates*). The slugs consumed a wide variety of plants, and highly palatable species came from a range of plant families. Variable glycine (*Glycine tabacina*) was a particular favourite, meaning that slugs may preferentially graze legumes. Other highly palatable species included daisies, such as the endangered button wrinklewort (*Rutidosis*

leptorrhynchoides), and some lilies e.g., small vanilla-lily (*Arthropodium minus*).

It remains to be seen what impact exotic slugs and snails are having on native grassland communities. Despite this, they could be limiting plant recruitment, particularly of palatable native forbs. Molluscs are known for targeting young seedlings, and will also feed underground on roots and seeds that are just beginning to germinate.

If you are concerned about slugs and snails,



look for evidence such as chewed leaves, silvery trails or empty shells. During the day molluscs can often be found sheltering under cover such as rocks or logs. For further information, contact Kelly

Holland at ARCUE on (03) 8344 9981 or e-mail hollandk@unimelb.edu.au

MEASURES OF URBANISATION

Dr Amy Hahs has been researching measures of urbanisation and woodland remnants along an urban-rural gradient, where urbanisation decreases in varying degrees out from an urban area to a rural area.

In the past, there has been no standard way of defining these gradients, and measurements used included population, temperature, road coverage. Often gradients are not quantified and they are difficult to compare, for example between cities of different population sizes and spatial extents.

Landscape metrics have commonly been used to measure urbanisation. They quantify different aspects of landscape pattern, related to the composition and configuration of patches in the landscape. However, these metrics are often calculated from one or two simple measures, such as the area or

perimeter of patches in the landscape. Therefore, landscape metrics are often highly correlated. Similar correlations are also found within the physical (e.g. density of roads, houses) and demographic (e.g. density of people, average income) measures of urbanisation.

Amy used principal components analysis to attempt to find the least amount of repetitive information for urbanisation measures. She found that four measures captured most of the variability in urbanisation across Melbourne: 1) an index of urbanisation based on land cover characteristics and census data (Weeks et al. 2003), 2) the number of people per unit urban land cover, 3) landscape shape index, and 4) dominant land cover type. She was then able to use these four measures to quantify the urban-rural gradient in Melbourne.



The results of this research are currently in press in the journal *Landscape and Urban Planning*. Copies of the paper ('Selecting independent measures for quantifying

Melbourne's urban-rural gradient', Amy K. Hahs and Mark J. McDonnell) can be downloaded at: <http://www.sciencedirect.com/science/journals> ; go to the journal and then Articles in Press.

TREETIME PHENOLOGY PROJECT

ARCUE is developing a phenology data website called 'TreeTime'. Data will be collected from the public on flowering and fruiting seasonal patterns of trees and shrubs from across Melbourne and surrounding areas. The data, submitted via the website or by post, will be combined with information collected by ARCUE staff. This should assist us in monitoring the abundance and distribution of food for wildlife. In the longer

term this information may be used to assess the extent and impact of environmental change.

To participate in TreeTime volunteers can register on the website or by post and 'adopt' a small number of trees they can monitor regularly. The adopted trees may be in their backyard, a local park or reserve or along the street where they walk to the bus stop or local milk bar. Currently the focus is on thirteen species that are commonly planted as street trees and provide fruit or nectar for animals. This list may be expanded at a later date. After selecting their trees, volunteers will need to log in monthly to report on the presence and abundance of flowers and fruit on their trees.

There have been few phenological studies conducted in Australia, making any information gathered valuable for increasing our knowledge about seasonal patterns. It may also provide important base-line information for future studies on environmental change, including climate change.

The website is due to be launched soon.

WETLANDS RELOCATION

Translocation of endangered plant species or vegetation communities is often proposed as a mitigation action for urban development projects. However, there are very few successful examples and the techniques used are largely untested. Consequently, translocation must be regarded as an experimental process and an action of last resort. In an effort to better understand the requirements of a successful translocation project and determine if it has been successful, ARCUE have been contracted by ConnectEast to monitor the success of a wetland translocation. In what is the first project of its kind in Australia, ConnectEast decided to translocate the highest quality 0.4 hectares of the endangered Herb Rich Plains Grassy Wetland at Boggy Creek, Frankston, due to public concerns about its imminent destruction by the new Mitcham to Frankston

Tollway. Dr Nick Williams and Kelly Holland of ARCUE have provided management advice and undertaken the first of many regular monitoring assessments. Initial results suggest that the majority of the herbaceous wetland plants have survived the translocation process but some native grasses have declined in abundance due to prolonged inundation immediately after translocation.

ROADS AND ECOLOGY

Roads are critical to the social and economic health of all Australians and there are ongoing programs to widen and straighten roads to increase travel efficiency and human safety. While roads are expensive to build and maintain, they also have costs to the environment that are rarely fully considered. Conflict often arises where new or upgraded roads dissect areas of natural vegetation that are home to native plants and animals.

Rodney van der Ree is leading a research team (with collaborators from Monash University, The University of Melbourne and VicRoads) that aims to quantify the extent to which major roads form a barrier to the movement of wildlife, either through increased mortality due to roadkill or by animals avoiding the road and traffic. The team will then investigate the effectiveness of different mitigation measures designed to decrease the negative environmental effects of roads.



This research is innovative because we are building on the foundations of road ecology and expanding it to include the novel and important study area of animal movement and population viability. This project is also innovative because it will be the first study to combine three different techniques (empirical observations [trapping, radiotracking], genetic analyses and metapopulation modelling) to specifically address questions related to the barrier effect of roads on mammals and invertebrates. By combining studies of two distinctly different taxonomic groups, we expect to gain powerful insights into the relative effects of roads on the two groups. Because of their lower mobility relative to the mammals, the invertebrates may provide an indication of the potential long-term effects of reduced movement on mammals. They may also reveal the need for very different mitigation strategies for different faunal groups, since the major factors affecting their mobility are amount, distribution and nature of coarse woody debris. Finally, and perhaps most importantly, this research is highly significant because it will assess the effectiveness of measures that have been proposed for numerous road projects in eastern Australia, and which potentially will have great impact on reducing barrier effects. This project is a significant collaboration between researchers with expertise in modelling, genetics, and ecology, with senior personnel from a road construction agency that crosses taxonomic boundaries.

The project includes participation by a number of dedicated students who are tackling different aspects of the project. The three PhD students on the team are Silvana Cesarini (Squirrel Gliders), Jody Taylor (Garden skinks and cockroaches), Chris Stewart (population modelling) and Honours students are Ashley Herrod (Yellow-footed Antechinus) and Nadine Gulle (Common Brushtail Possums).

UPDATE ON THE ECOLOGY AND MANAGEMENT OF GREY-HEADED FLYING-FOXES IN MELBOURNE

Research and monitoring continues of the new roost for the Grey-headed Flying-Fox at Yarra Bend Park, relocated from Melbourne's Royal Botanic Gardens in 2004. Static counts of the roost take place every two weeks, and once a month a dozen or so people count a fly-out when the flying-foxes leave the roost for the night.



More volunteers are needed to help with these exciting fly-out counts, which take place on the Wednesday closest to a full moon. For more information, please contact Rodney van der Ree at ARCUE on (03) 8344 3661 or by email rvdr@unimelb.edu.au.

VISITORS

Erik Anderson a PhD. student at Stockholm University, Sweden, visited ARCUE for the month of November 2005 to learn more about the Centre and our studies of biodiversity in cities and towns. His own PhD research will focus on preserving bird diversity in Stockholm.

MEETINGS, WORKSHOPS, TALKS, and CONFERENCES

Staff and students have participated in numerous conferences or smaller events, both in Australia and overseas.

Associate Professor Mark McDonnell, ARCUE's Director, has recently returned from an Urban Ecology workshop held in May at Duluth, Minnesota, USA. Its focus was on developing a strategy for advancing urban ecology and Mark presented a talk on the uses and findings of the urban-rural gradient approach.

Mark was invited to give a lecture at Museum Victoria in November 2005. This was the Norman Wettenhall Memorial Lecture, with Professor George Seddon AM, and was called 'Preventing the globalisation of Australian landscapes'. In August 2005, Mark was the Plenary Speaker at a conference held at Lincoln University, New Zealand, on the 'Meaning and Design of Nature for the Urban Built Environment'. The talk was about 'Maintaining Biodiversity and Ecosystem Processes in Cities and Towns'.

Dr Rodney van der Ree was invited to give a lecture in Spain in September 2005, at the Road Ecology Workshop at the International Restoration Ecology Meeting. Rodney spoke on the barrier effect of roads on Australian wildlife and ways of measuring and reducing the effect. He also travelled to the Netherlands in September to further his research, where he discussed road ecology and management issues with urban/road ecologists and gave a talk on urbanisation and road effects on Australian wildlife at a government research centre on biodiversity in Alterra, as part of a lecture for Urban Ecologists and Landscape Ecologists.

Dr Nick Williams and Rodney were invited to speak at the Australasian Urban Ecology Research Colloquium at the University of Queensland, Brisbane, in December 2005. Nick gave a talk on grasslands along an urban-rural gradient, and Rodney spoke on his work with Dr Mick McCarthy on local extinction of indigenous mammals and urbanisation. Dr Amy Hahs gave a talk at the Ecological Society of Australia conference in

Brisbane in December on measures of urbanisation.

Mick also gave a talk on Bayesian statistical methods in ecology at the Closing Plenary of the Ecological Society of Australia, at the University of Queensland in December 2005.

Nick presented a seminar at the Department of Botany, Stockholm University, Sweden, in September. This was on 'The ecology of fragmented native grasslands in urban and rural landscapes.' Nick also attended the British Ecological Society Annual meeting in September, held at the University of Hertfordshire, Hatfield, UK. Here he presented a paper (co-authors John W. Morgan, Mark J. McDonnell, Michael A. McCarthy) entitled, 'Plant traits and local extinctions in natural grasslands along an urban-rural gradient.'

Amy gave a talk to the Australian Plant Society (Southeast) in September last year. The title of the talk was 'River red gum woodlands in Melbourne – investigating the tapestry.'

Chris Stewart, a new PhD student with ARCUE, flew to Germany in November 2005 for an international workshop on 'Landscape-scale Effects of Roads on Biodiversity', held at the Castle of Rauischholzhausen, in Hesse state. It was organised by Dr Jochen Jaeger, from the Swiss Federal Institute of Technology, Zurich, and Ms Inga Roedenbeck, a PhD student at the University of Giessen in Germany. Chris presented a poster entitled "Quantifying and mitigating the barrier effect of roads on Australian wildlife".

UPCOMING EVENTS

Society for Conservation Biology – 20th Annual Meeting

24th – 28th June 2006

San José, California, USA

<http://www.conbio.org/2006/>

International Association for Landscape Ecology – 7th World Congress, with symposia, workshops, posters

8th – 12th July 2007

Wageningen, The Netherlands

<http://www.iale2007.com/>

New Zealand Ecological Society and the Ecological Society of Australia – joint conference 'Ecology across the Tasman'

28th August – 1st September 2006

Victoria University of Wellington

<http://www.nzes.org.nz/meetings.html>

'Urban Ecology Down Under' Symposium – at the NZES & ESA joint conference above

<http://www.vuw.ac.nz/ecology06/Proposals.html>

To begin subscribing to *Urban Spotlight* or to change your details, please email us or fill in the details below and send to the address at the bottom of this page

- I do not currently receive *Urban Spotlight* but I would like to subscribe *
- I would like to continue receiving *Urban Spotlight* but my address has now changed (please provide new address below)*
- I do not want to receive future issues of *Urban Spotlight*

*Subscription is free of charge

Name: _____

Address: _____

If undelivered return to:

ARCUE

SCHOOL OF BOTANY

THE UNIVERSITY OF MELBOURNE VIC 3010



Australian Research Centre for Urban Ecology

School of Botany

The University of Melbourne VIC 3010

Telephone: +61 3 8344 0146

Facsimile: +61 3 9347 5460

Email: arcue@rbg.vic.gov.au

Internet: <http://arcue.rbg.vic.gov.au>