

Spotlight

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STAFF AND STUDENT ACTIVITIES

2001 Ecological Society of Australia Conference

The Ecological Society of Australia held its 2001 annual conference at the University of Wollongong between September 26 and 28, 2001. Three ARCUE representatives, Amy Hahs, Mark McDonnell and Rodney Van der Ree, presented work at the conference. Amy delivered a spoken presentation, co-authored with Mark, entitled "Interactions between patch and landscape for remnants of *Eucalyptus camaldulensis* open woodland in Melbourne," Mark gave a lecture on the "The effect of 150 years of human activity in

Melbourne on the breeding range of Grey-headed Flying Foxes (*Pteropus poliocephalus*)," and Rodney presented a paper co-authored by Andrew Bennett entitled "Nest tree use by the squirrel glider *Petaurus norfolcensis* within a network of roadside habitats." For more information on the conference and to view abstracts, visit the conference web site at <http://www.uow.edu.au/science/biol/esa/index.html>.

ARCUE ADDITIONS

Mick McCarthy

Dr Mick McCarthy joined ARCUE in mid-2001 as a Senior Ecologist. His research can be broadly described as



theoretical applied ecology, with a range of interests including population ecology of plants and animals, fire ecology, forest ecology and conservation biology. He primarily uses quantitative and theoretical methods to help contribute to the management of ecological systems. At ARCUE, Mick plans to conduct research on the effects of fragmentation in urban and non-urban environments, and on invasion of

weed species. He obtained his PhD from the University of Melbourne, and has conducted post-doctoral research at The Australian National University, The University of Adelaide and the University of California at Santa Barbara. He has published over 50 scientific papers, reviews and articles and has presented numerous scientific papers in the United States and Australia.

Mick Harper



University of Melbourne student Mick Harper began his PhD with ARCUE in January 2002. Mick is a qualified arborist and recently

completed a Bachelor of Environmental Science (Hons) at the University of Queensland. His honours project investigated the viability of assessing arboreal marsupial habitat from the ground. He is currently involved in researching the population dynamics of arboreal marsupials and in particular the influence of urbanisation on their distribution.

Tom Browning

Following a successful honours year at ARCUE, Tom Browning has returned to undertake an MSc. He will continue his study of the ecology of the remnant heathlands in and around Melbourne.

Lauren Edwards

Lauren Edwards recently began an honours year with ARCUE. Under the supervision of Dr Kirsten Parris, her project will examine activity patterns of pond-breeding frogs in urban and rural areas.

Rena Stenhouse

Rena Stenhouse, a PhD student from the University of Western Australia recently returned to Perth after spending several months visiting ARCUE. Her research examines the types and effects of disturbance in urban bushlands and ways in which local governments are dealing with the degradation of bushlands in Australian cities.

RESEARCH UPDATE

Pond-breeding frogs in urban and suburban Melbourne

Dr Kirsten Parris

Cities and towns are constructed as habitat for humans. In the process, habitats for native plants and animals are often lost, fragmented into small pockets, or altered dramatically. Despite this, some native species can persist in urban environments, particularly if they are given human assistance. In urban areas, potential breeding sites for frogs such as ponds and wetlands are often highly modified and isolated from one another by unsuitable habitats such as housing estates and busy roads. This may reduce the probability of successful breeding and the persistence of a population at a pond, and will present a challenge to frogs attempting to move between breeding sites. Dr Kirsten Parris has been studying pond-breeding frogs in urban and suburban Melbourne, to investigate the effects of habitat quality and habitat fragmentation on the probability of persistence of native frogs throughout the city.

Kirsten has surveyed 110 ponds and wetlands (both “natural” and constructed) in public parks and gardens, from the inner city to the urban/rural fringe. She plans to use the resulting data to establish the current distribution of different pond-breeding frogs across Melbourne, and to determine their habitat requirements. Kirsten will also construct population models to investigate the probability that different species will persist in a given area in the long term, and the effect of

creation or removal of ponds on species persistence. The information gathered on the habitat requirements of the frogs will also be used to develop recommendations for making aquatic habitats in urban and suburban Melbourne more “frog-friendly.”

Kirsten has found nine species of frogs during the study, at an average of two species per pond. The most commonly encountered frogs include the southern brown tree frog *Litoria ewingi*, the common eastern froglet *Crinia signifera* and the striped and spotted marsh frogs *Limnodynastes peronii* and *Limnodynastes tasmaniensis*. A dam in the Royal Botanic Gardens at Cranbourne was found to support eight species of frogs, while at the other end of the scale there were a number of ornamental concrete ponds with fountains but no frogs!

The southern brown tree frog has distinguished itself as a true urban dweller, and males of the species can be heard calling in many city parks including the Fitzroy Gardens, the Carlton Gardens and the Royal Botanic Gardens.

Left: Southern brown tree frog (*Litoria ewingi*)



Mammals of Greater Melbourne

Rodney van der Ree

Prior to European settlement, 50 species of native mammal roamed the area that we now call Melbourne. Since that time, the number of species and their abundance has changed dramatically. Some animals no longer occur in the local area (e.g. eastern quoll), while others appear to be quite common and can be found in many suburban backyards (e.g. common brushtail possums). There is also a group of small mammals about which we know very little, except that they may be in danger of going the way of the

quolls and becoming locally extinct (e.g. southern brown bandicoot).

Rodney van der Ree is using information contained in the Atlas of Victorian Wildlife (a database of mammal sightings compiled by DNRE) to look at the distribution of mammals across the greater Melbourne area. This data is being used to highlight species which may be at risk of decline or extinction and therefore require additional conservation effort. So far largely a desk-based study, Rodney will incorporate a broadscale survey of mammals to discover what animals still live in the remnants of the size, shape and quality of a piece of bush affect which animals can live there.

Native Grassland Research

Nick Williams, Emma Seager and Mark McDonnell

Native grassland is one of Australia’s most endangered ecosystems with only 0.4% of the area once covered by the ecosystem remaining today. In Victoria, Western Basalt Plains Grassland is recognised as one of the state’s most endangered vegetation communities and is listed as a threatened community under the Flora and Fauna Guarantee Act. By the mid 1980’s the basalt plains, immediately west of Melbourne, encompassed many of the best large remnants of native grassland in Victoria. However, over the past two decades, the decline and destruction of these endangered ecosystems has intensified. On the western fringes of Melbourne linear remnants along road and rail reserves are being destroyed through neglect and by changes in management practices, and larger blocks of native grassland are facing subdivision and residential and industrial development.

Due the increasing threat to Melbourne’s native grasslands from development and weed invasion associated with urbanisation, ARCUE has commenced a major new research project focusing on Melbourne’s native grasslands. The first component of our research involved the identification and mapping on our Geographic

Information System of all existing remnant patches of native grassland in the western and northern suburbs of Melbourne.

Using our extensive library of government and consultant reports, we then constructed a map of the patches that were known to exist in the late 1980s. By comparing the two extents we have been able to determine the amount of native grassland destroyed in the Melbourne area in the past 15 years and the characteristics of patches that make them susceptible to development and weed invasion.

Recent fieldwork has focussed on the persistence of some of the rare and uncommon grassland flora species across a range of grassland sites in Melbourne. In conjunction with Dr John Morgan from LaTrobe University, we intensively sampled the flora at approximately 30 urban and rural grassland sites during spring and early summer 2001. Although the results of this work have not yet been analysed, the study has already resulted in the discovery of a number of new populations of the nationally vulnerable Spiny Riceflower (*Pimelea spinescens*) and a new population of the nationally endangered daisy, Button Wrinklewort (*Rutidosis leptorhynchoides*) in suburban Sunshine.



Above: Narrow patch of grassland beside a railway line retained as a native plant reserve in St Albans.

2001 HONOURS GRADUATES

Andrew Binns - The Use of High-Resolution Satellite Imagery in the study of Urban Ecology

Remote Sensing is a relatively new technology in the field of urban ecology, providing valuable data capture and analysis capabilities. High-resolution satellite imagery, eg. up to 1 metre resolution, has become available since around 1999, allowing urban areas to be analysed in greater detail. Before this, the lower resolution of satellite imagery, eg. ~20 metre resolution, restricted the remote sensing of urban landscapes.

Andrew Binns completed his Final Year (honours) Project in 2001, investigating the potential for the use of high-resolution satellite imagery products and techniques in the study of urban ecology. Andrew, an undergraduate in the Department of Geomatics at the University of Melbourne, was co-supervised by Dr Paul Dare in the Department of Geomatics and Emma Seager from ARCUE.

The research undertaken was divided into two main objectives:

1. A comparison of two types of high-resolution satellite imagery, IRS and Ikonos, to determine which is best for mapping vegetation cover in metropolitan Melbourne.
2. A review of the current techniques used to process high-resolution satellite imagery.

Prior to any image processing, Andrew undertook fieldwork at three test sites. Field data relating to vegetation cover was collected. The ground truthing of a fourth test area was completed after the imagery was processed. This enabled the accuracy of the techniques used throughout the processing stages to be assessed.

Processing of the imagery was undertaken in gradual stages, from firstly trying to distinguish

between vegetation and non-vegetation, to determining different types of vegetation, to finally attempting to determine different species. Various spectral enhancement techniques were trialed at each stage, and the processing was undertaken on both image types.

The results showed that both types of high-resolution satellite imagery can be used to help in the effective management of urban ecological areas. The IRS imagery was useful in providing an overall classification of the amount and distribution of vegetation across metropolitan Melbourne. This enables fragmentation and vegetation corridors to be readily monitored and is a more time effective way of detecting vegetation change within the urban environment than traditional methods such as aerial photography.

The Ikonos imagery was found to be the most useful for delineation between different vegetation types. When it came to determining vegetation species however, the results showed that the spectral characteristics of different species were too similar to gain accurate results.

More information about Andrew's project can be found at <http://webraft.its.unimelb.edu.au/451450/students/ajbins/pub>

Ben Hamilton - The Ecology and Spread of *Spartina* in Western Port Bay

A participant in the Parks Victoria Research Partners Program, Ben Hamilton completed honours with ARCUE in March 2001 under the supervision of Dr Mark McDonnell. His project investigated the ecology and spread of the weed *Spartina* in Western Port Bay. Introduced to the Bass River, which flows into the south-western corner of Western Port Bay, in the early 1930s, *Spartina* has spread along the river banks and out on to the mudflats around the Bay. The plants accumulate sediments causing water flow over the mudflats to be altered. Colonisation of an area by *Spartina* can lead to the exclusion of wading birds

from feeding and roosting grounds, such as has occurred on the northern side of the Bay at Nolan's Bluff which was a significant site for migratory waders in the 1980's but has now been deserted by the birds.

Ben's aim was to assess the threat *Spartina* poses by determining which species is invading the Western Port Bay, measuring its current range and predicting the potential future range of the species.

Analyses of pollen fertility revealed that the taxon present is *Spartina anglica*, which can spread via seed dispersal as well as vegetatively, rather than the sterile *S. townsendii*.

Aerial photographs and ground searches were used to measure the current distribution of the species which was found to extend approximately three kilometres either side of the mouth of the Bass River. Potential distribution was estimated using transplant experiments in which potted plants were anchored in the mudflat between the high and low tide marks along five transects in the study area. After more than nine months, *S. anglica* plants survived 500 m from shore. This suggests that, if not managed, the species has the potential to invade an area of at least 300 ha of mudflats along the six kilometres of coastline included in the study alone, with negative effects on the birds and invertebrates that live and feed on the mudflats.



Above: Ben collecting samples of *Spartina* for transplantation.

The effects of Urbanisation on the Soil Seed Bank of *Leptospermum myrsinoides* Heathland - Tom Browning

Tom Browning, a University of Melbourne honours student supervised by Dr Mark McDonnell, continued ARCUE's research into the effect of urbanisation on the heathlands of south-eastern Melbourne with a project investigating the effect of urbanisation on the soil seed bank of the heathland. Specifically, he aimed to determine the composition, the effect of fire exclusion and the effect of edges on the soil seed bank of heathland remnants and whether the effects vary between urban and rural sites.

To do this, Tom collected soil samples from burnt and unburnt sections of six heathland sites in urban and rural areas south-east of Melbourne. The soil samples were treated with heat and smoke, which are known triggers of germination of the seeds of many heath species, and transferred to a glasshouse. The emergent seedlings were identified and counted.

In total, seeds of 97 species germinated. At urban sites, the composition of the soil seed bank displayed strong variation between burnt and unburnt sections of vegetation, with seeds of very few heath species germinating in the soil of unburnt areas. This is due to the fact that, in the absence of fire, urban heathlands become dominated by a dense canopy of *Leptospermum laevigatum* which excludes almost all other species. *Leptospermum laevigatum* had not invaded the rural sites, which displayed much less variation in the soil seed bank between burnt and unburnt sections of the vegetation. The edge effect on the soil seed bank of heathland that has been burnt in the last 16 years was found to be less than ten metres wide. There was some evidence to suggest that edge effects are wider in unburnt areas or rural heathlands.

In terms of vegetation management, the results of this study suggest that *L. myrsinoides* heathland should be burned at least every 16 years in order

to maintain a soil seed bank with abundant seed of heath species. It may also help to keep the vegetation dense at the edges, reducing invasion of non-indigenous species.

ALTERNATIVE SITE FOR FLYING FOX CAMP

In March 2001, the Minister for Environment and Conservation, Ms Sherryl Garbutt established a Task Force to investigate the feasibility of establishing an alternative Grey-Headed Flying Fox (GHFF) camp in Melbourne to reduce the impact of the species on the Fern Gully at the Royal Botanic Gardens. The project was established within the DNRE and was chaired by Dr. Tim Clancy of DNRE's Arthur Rylah Institute. The charge to the Task Force included undertaking a survey of potential campsites within the Melbourne metropolitan area, the evaluation of the most appropriate sites according to a set of ecological and practical criteria, and the creation of a series of recommendations on how to move forward. Dr McDonnell was appointed to the 11 member committee and was able to incorporate ARCUE's research products and staff expertise to achieving the Task Force goals. Using our Open Space Database and the expert skills of Emma Seager, ARCUE's GIS Officer, the committee was able to quickly assess some 7,716 potential sites within the greater Melbourne area and select 41 sites for more intensive analysis. By incorporating aerial photographs (supplied by DNRE) into our GIS system we were able to efficiently quantify other features of each site such as distance to open water and houses as well as vegetation cover that proved critical to the final analysis of suitable GHFF camp sites. In September 2001 the Task Force submitted its final report to the Minister which recommended the creation of an alternative camp site at Horseshoe Bend on the Yarra River in Ivanhoe. Just before this newsletter went to press, Banyule City Council voted to support the establishment of GHFF camp at Horseshoe Bend. More information about the creation of an alternative GHFF site in Melbourne can be found on the

Royal Botanic Gardens' web site at <http://www.rbg.vic.gov.au/flyingfoxes/roosting.html> and the DNRE website at <http://www.nre.vic.gov.au>

WEBSITE

The new-look ARCUE website is now up and running. As well as everything that was available on the previous version, it contains new sections on education, conservation and our research interests. In the near future we hope to add a searchable database of references relating to the ecology and biodiversity of the Melbourne area and a full list of publications by ARCUE staff and students. Please let us know if you have any suggestions for the website or any relevant upcoming events that we can let people know about.

Our web address is <http://arcue.rbg.vic.gov.au>

MAPPING MELBOURNE'S NATIVE VEGETATION

During 2001, ARCUE, in collaboration with DNRE's Arthur Rylah Institute for Environmental Research (ARI), identified and mapped all remnant vegetation in the Port Phillip Region. ARCUE focussed on remnant vegetation in the urban area while staff from ARI mapped the outer suburban municipalities and the Mornington Peninsula.

ARCUE identified and mapped all patches of remnant native vegetation over 10m² in area in suburban Melbourne. The patches were then classified according to the Ecological Vegetation Class (EVC) system used by DNRE, and their location and any biological data collected was integrated into a spatial GIS database. The GIS database provides the opportunity for data management and analysis of spatial patterns in the data. Preliminary results indicate that relatively little native vegetation remains in suburban Melbourne (2.5 % of our 114, 425 ha study area).

The vegetation that does remain is quite varied, representing over 40 different EVCs. The map and associated data provide a valuable research tool for the urban ecology of Melbourne and will greatly assist with conservation, research and management of this valuable resource.

UPCOMING EVENTS

March 3-6, 2002: Sustaining Our Communities

Adelaide, South Australia

http://www.adelaide.sa.gov.au/soc/soc_intro.htm

March 11-12, 2002: Getting it Right - What are the guiding principles for resource management in the 21st century?

Adelaide, South Australia

<http://www.plevin.on.net/GIR>

April 7-12, 2002: Enviro2002 Convention and Exhibition

Melbourne, Victoria

<http://www.ntu.edu.au/faculties/science/sbes/iale-oz/worldcongress.html>

April 23-27, 2002: 17th Annual Symposium of the International Association for Landscape Ecology – Landscapes in Transtition: Cultural Drivers and Natural Constraints

Lincoln, Nebraska, U.S.A.

<http://www.calmit.unl.edu/usiale2002>

September 8-13, 2002: 13th Australian Weeds Conference: Weeds – Threats Now & Forever?

Perth, W.A.

Contact Convention Link: email:
convlink@inet.net.au, Ph: (08) 9450 1662

<http://members.com.au/~weeds>

July 13-17 2003: International Association for Landscape Ecology World Congress 2003

Darwin, N.T.

<http://www.ntu.edu.au/faculties/science/sbes/iale-oz/worldcongress.html>

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