Biodiversity across the Borders Conference

Theme 2007:
Maintaining biodiversity in modified landscapes

Abstracts

Centre for Environmental Management

University of Ballarat

Mt Helen, Ballarat

Victoria

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11:25	**Stacey Gowans, Martin Westbrooke, Matthew Gibson and David Cheal** Vegetation recovery in Victoria's Mallee Parks.
11:40	**Nicky Bruce** Using remote sensing to monitor changes in grassland cover patterns: a case study from Terrick Terrick National Park.
11:55	**Nathan Wong and John Morgan** Management of grasslands in Northern Victoria: past, present and future.
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Program

Session 3 -	Theme: **Ecology and management of avifauna** Chair**:** Dr Kate Callister
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1:45	**Victor Hurley** A comparison of breeding by the Peregrine Falcon in urban, rural and extensive natural environments.
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2:15	**Rick Taylor, Joanne Oldland and Mike Clarke** Habitat preferences of Noisy Miners and the implications for restoration work.
Session 4 -	Theme: **Biodiversity** **Chair:** Dr. Simon Cook
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3:00	**Lisa Spence-Bailey, Mike Clarke, Brian Malone, Dale Nimmo, Andrew Bennett and John White** Reptiles in the Fire and Mallee Biodiversity Project.
3:15	**Matthew Hatton** Helophyte plant responses to increasing salinity in modified wetlands.
Session 5 -	Panel Discussion **Theme:** How can ecological research better inform management practices? **Chair:** Prof. Mike Clarke
4:00	Prof. Richard Hobbs, Prof. Paul Boon, Prof. Martin Westbrooke, Dr. Phil Suter, Craig Whiteford (DSE), Dr. John Wright (PV), Nick McCristal (CCMA), & Geoff Park (North Central CMA).
5:00	**Close**

KEYNOTE ADDRESS:

Science for conservation in modified landscapes - are we making progress?

Prof Richard Hobbs
Murdoch University, Perth, Western Australia

Abstract:

At the “Nature Conservation 5” conference in New Zealand a decade ago, I presented a paper entitled “Nature conservation in agricultural landscapes: real progress or moving deckchairs?” that considered whether we were making useful progress in furthering conservation in altered landscapes. Ten years on, it is worthwhile revisiting the same question, particularly from the perspective of the science we use to help answer pressing questions relating to conservation and management in modified landscapes. I argue that, while the tools available for analysing systems at multiple scales have improved greatly, our capacity to answer important but difficult questions has not necessarily increased very much. The way our science is set up still encourages the detailed study of individual components of systems rather than the whole system or interactions amongst components. Such study is necessary but not sufficient to help guide management decisions in real landscapes. Hence the challenge is to encourage the use of multiple tools and approaches that together can provide a more complete picture of the complex systems we are trying to understand and conserve.

Symposium Abstracts

The trials and tribulations of environmental water applications: lessons learnt from a four-year R&D project on rehabilitating brackish-water wetlands along the Gippsland Lakes

Paul Boon
Institute for Sustainability and Innovation
Victoria University, Melbourne, Victoria

Abstract:

The Gippsland Lakes in south-eastern Victoria are fringed by a large number of brackish-water wetlands, many of which are listed under the Ramsar Convention and are on the Register of the National Estate. Despite their regional, national and international significance, these wetlands suffer from a wide range of environmental insults: their water regimes have been modified markedly, almost all are subject to secondary salinisation, and acid-sulfate soils have resulted in dramatic drops in pH. For example, water-column salinity may exceed 20 g L^{-1} despite a management objective of < 5 g L^{-1}, and soil pH values of < 2.5 have been recorded. These physico-chemical changes are reflected in serious and widespread degradation of the wetlands' vegetation, especially of the dominant Swamp Paperbark (*Melaleuca ericifolia*) and Common Reed (*Phragmites australis*) communities. A four-year R&D project, supported by a range of bodies, leveraged off core funding by Land & Water Australia, aimed to rehabilitate Dowd Morass, a 1,500 ha Ramsar-listed wetland fringing Lake Welllington. A substantial component of the R&D project involved the landscape-scale manipulation of water regimes using a BACI-type experimental design. Five lessons learnt from this R&D project are: a) the involvement of the regional community and NRM (natural resource management) agencies is essential for successful rehabilitation of degraded wetlands; b) nevertheless, anecdotal "evidence" on changes in wetland condition is no replacement for empirical, quantitative fact-based assessments; c) despite the importance placed in National Heritage Trust-type projects on revegetation, efforts to revegetate coastal wetlands with tube-stock may be spectacularly unsuccessful; d) landscape-scale hydrological manipulations are fraught with risk; and e) differences in objectives among institutions and stakeholders complicate attempts at wetland rehabilitation and environmental-water applications.

Notes:

Questions:

Floods, salt and other hairy situations - how often do Swamp Paperbarks (*Melaleuca ericifolia* Sm.) establish seedlings?

Randall Robinson
Institute for Sustainability and Innovation
Victoria University, Melbourne, Victoria

Abstract:

Swamp Paperbark (*Melaleuca ericifolia*) is a small clonal tree in the family Myrtaceae that grows in coastal (freshwater and brackish-water) swamps across southern and eastern Australia, from Tasmania through to northern New South Wales. Since the distribution and abundance of this species has decreased markedly with the clearing or draining of wetlands in which it formerly occurred, a high priority of natural-resource management agencies and non-government organisation throughout Australia is the rehabilitation of high-value coastal wetlands that contain, or did contain, Swamp Paperbark or other *Melaleuca* species. Swamp Paperbark, being a clonal tree, is not reliant on seed regeneration in the short-term but needs to sexually reproduce to establish in new environments or to increase genetic diversity in existing populations. This study investigated the recruitment dynamics of Swamp Paperbark, especially in relation to climatic and on-ground site conditions, notably: rainfall, salinity, temperature and light levels. Strong correlations between various abiotic factors were found that help us to understand seedling recruitment of this keystone tree species. Changes to climate and impacts of changing site conditions on the future reproduction of this species have major implications for the structure and function of coastal wetlands.

Notes:

Questions:

River biodiversity in modified landscapes

Belinda Robson
School of Life and Environmental Sciences
Deakin University, Warrnambool, Victoria

Abstract:

There are two main processes that fragment rivers in agricultural landscapes: loss of riparian vegetation and stream drying due to water extraction. Most of the faunal biodiversity in rivers consists of aquatic invertebrates, mainly insects and crustaceans. Fragmentation of habitat and food resources may cause local extinction and interfere with reproduction and dispersal, reducing local and regional biodiversity and also limiting the success of restoration efforts. Results from two projects suggest that these forms of fragmentation do negatively affect biodiversity. They also suggest that efforts at rehabilitation or restoration need to consider how invertebrates disperse and colonise new sites. For example, riparian revegetation needs to connect existing remnant patches of native vegetation that retain higher levels of biodiversity, to provide source patches for recolonisation.

Notes:

Questions:

Aquatic macroinvertebrates of alpine bogs: biodiversity beyond the vegetation

Nathan Ning, Sarie Los and Phillip Suter
Department of Environmental Management and Ecology
La Trobe University, Albury-Wodonga Campus

Abstract:

Alpine peatlands or bogs have received considerable scientific study, particularly of the unique and diverse water-dependent vegetation associated with this threatened and endangered habitat. The importance of the diversity of the vegetation communities and the limited distribution of this habitat type in the Australian Alps has led to the listing of the Alpine Bog Communities as threatened habitat under the Victorian Fauna and Flora Guarantee Act 1988. In contrast, the aquatic invertebrate fauna has received very limited study and knowledge of the fauna associated with the Alpine Bog communities is virtually limited to a few taxonomic studies and specific project based studies. There has been no systematic study of these communities in the Australian Alps. Recent studies associated with the 2007 bushfires have indicated that not only are the aquatic macroinvertebrates highly diverse in the Alpine Bogs, but that there are distinct invertebrate communities associated with the pools and the flowing sections within the bogs. The invertebrate diversity varies within individual pools influenced by the dominant vegetation type. Comparisons between bogs show high variability in the macroinvertebrate communities and indicate the importance of the maintenance of high diversity of the vegetation communities. In addition, many of the species present in these systems remain unnamed and may be under threat with global climate change.

Notes:

Questions:

The regeneration status of the arid woodland tree *Myoporum platycarpum* ssp. *platycarpum* in arid south-east Australia

Martin Westbrooke
Centre for Environmental Management
School of Science and Engineering
University of Ballarat, Ballarat, Victoria

Abstract:

Concern has been expressed regarding loss of 'old-growth' in vegetation communities. In the arid woodlands of southern Australia the greater concern is lack of young growth, in that most of the community is in the old-growth stage with little or no regeneration of the overstorey since European settlement. *Myoporum platycarpum* ssp. *platycarpum* is one of a number of arid woodland trees for which concern has been expressed regarding lack of regeneration The regeneration status of *M. platycarpum i*n south-eastern Australia was investigated. Assessment of flowering, fruiting, germination and seed viability demonstrated that, despite the age and senescence of many trees, viable seed will be available when soil moisture conditions are suitable for germination. Simulated grazing trials showed that young seedlings are reasonably tolerant of grazing pressure, persistent defoliation being needed to kill them. Root suckering was recorded but is a rare event. Age structure of communities was determined from analysis of data from sites where known regeneration events were reliably reported, growth rings from cut and polished sections, stem diameter histograms and reference to long term rainfall records. Data indicate that, even in the absence of high grazing pressure, widespread regeneration is only likely following events involving well above average rainfall. Such events have occurred infrequently since settlement and high grazing pressure has prevented widespread recruitment at most opportunities. Even in areas where recruitment has occurred as a result of good rainfall and low grazing pressure, recruitment is not at a level that will replace the original community. Under pastoral use, or on conservation reserves without control of grazing pressure, populations face a steady decline as the cohort of old trees senesces and dies.

Notes:

Questions:

Vegetation recovery in Victoria's Mallee Parks

Stacey Gowans[1], Martin Westbrooke[1], Matthew Gibson[1] and David Cheal[2]

[1]Centre for Environmental Management
School of Science and Engineering
University of Ballarat, Victoria.

[2]Arthur Rylah Institute for Environmental Research
Department of Sustainability and Environment
Heidelberg, Victoria.

Abstract:

A recent study of the woodland communities in Victoria's Mallee Parks has demonstrated that vegetation recovery can be achieved with long-term management commitment. The woodland communities of Victoria's Mallee Parks have been impacted by past land use, including overgrazing by native and introduced herbivores. In addition to the removal of stock at the time of park establishment, rabbit and kangaroo management programs have been implemented across the parks to help reduce total grazing pressure to assist in the rehabilitation and conservation of the woodlands. Anecdotal observations in recent years have suggested some recovery in vegetation condition following a reduction in grazing pressure. A more systematic study was conducted in 2006 involving reassessment of data collected from a range of past surveys to determine evidence of vegetation recovery in the Mallee parks following grazing management. Some of the observed differences between 2006 and past surveys indicate recovery of vegetation condition, however in other cases there is either no evidence of recovery, or signs of continuing decline. Whilst changes in community condition may relate to a number of factors, it is essential that we continue to control grazing pressure as it is clear that this factor is playing a role in the changes detected. Regular monitoring of the woodland communities is necessary to increase our understanding of the factors influencing vegetation condition, and to provide information as to whether management efforts result in environmental improvement.

Notes:

Questions:

Using remote sensing to monitor changes in grassland cover patterns: a case study from Terrick Terrick National Park

Nicky Bruce
Institute for Land, Water and Society
Charles Sturt University, Albury, NSW

Abstract:

Satellite remote sensing has not been used as a monitoring tool in the conservation management of native grasslands in south-eastern Australia. The provision of such a management tool may lead to improved planning and decision making by enabling a greater understanding of the dynamics of these grassy ecosystems. This study was conducted at Terrick Terrick National Park (TTNP), which contains one of the largest known remnants of the Northern Plains Grassland community in Victoria. Managers of TTNP were concerned that existing monitoring activities were not focussed on the reserve as a whole and requested a 'bird's eye view' monitoring tool. In order to address this objective, an exploratory approach was taken using a range of published vegetation indices and raw wavebands, in an attempt to develop a remote-sensed index to accurately detect changes in grassland cover across a wide range of seasonal conditions (from wet years to droughts) using multi-temporal Landsat imagery. The developed index showed a capability for detecting broad plant cover changes across TTNP as well as within-paddock changes related to management impacts. Rainfall influences were difficult to distinguish due to the strong role rain actually plays in determining grazing management activities. The index displayed some limitations in detecting very high and low senescent plant cover. Irrespective of these known limitations, this multi-temporal study highlighted key areas of both broad plant cover changes and more specific impacts relating to historic and current management activities at TTNP. Though management approaches were found to have changed at TTNP since reservation, it has not been to the detriment of the native grassland's inherent heterogeneity.

Notes:

Questions:

Management of Grasslands of Northern Victoria, Past, Present and Future,

Nathan Wong and John Morgan
La Trobe University
Bundoora

Abstract:

This talk will discuss the impacts of land-use types on grasslands quality and restoration efforts. It will discuss recent research that has been carried out into the recovery of grassland ecosystems following cultivation. Our current understanding of how grazing impacts on flora will be discussed. This will then be used to further explain what we know about the current condition and history of Northern Plains Grasslands. Our understanding of the future potential impacts of different land-uses, in particular cultivation, grazing, fire and resting, on conservation and restoration efforts will be discussed.

Notes:

Questions:

Ecological mechanisms that promote species richness in riparian bird assemblages

Grant Palmer
Centre for Environmental Management
School of Science and Engineering
University of Ballarat, Ballarat, Victoria.

Abstract:

Riparian zones are widely considered to provide high quality habitats for wildlife and are frequently reported to harbour a rich and abundant fauna in comparison with that of surrounding non-riparian habitats. To examine the ecological mechanisms by which riparian assemblages are richer and support more individual birds, the number of ecological groups (foraging, nest-type and body mass groups) represented, and the species richness of these groups, were compared between riparian and non-riparian assemblages in eucalypt forests in the Victorian Highlands. The structurally complex vegetation and distinctive habitat features (e.g. aquatic environments, damp sheltered litter) provided in the riparian zone resulted in the consistent addition of ecological groups to riparian assemblages (e.g. sheltered-ground – invertebrate foraging group) compared with non-riparian assemblages. Greater species richness was accommodated in most foraging, nest-type and body mass groups in riparian than non-riparian assemblages. Riparian zones facilitated greater richness within ecological groups by providing conditions (i.e. more types of resources and greater abundance of resources) that promoted ecological segregation between ecologically similar species. Riparian zones in continuous eucalypt forest provide high quality habitats that contribute to the diversity of habitats and resources available to birds in the forest mosaic, with positive benefits for the landscape-level species pool.

Notes:

Questions:

A comparison of the breeding by Peregrine Falcons in urban, rural and extensive natural environments

Victor Hurley
Department of Life and Environmental Sciences
Deakin University, Melbourne, Victoria

Abstract:

Peregrine Falcons have a near-global distribution and breeding populations appear to be increasing in urban environments wherever they are studied. In the current study, begun in 1991, 260 Peregrine Falcon (*Falco peregrinus macropus*) nest sites have been recorded across Victoria in temperate Australia. These were classified according to the major land use within a 15 km radius of each. Twenty-eight percent remain in extensive natural landscapes, 61% in rural and agricultural lands and the remaining 11% are found in areas with greater than 33% urbanisation within the designated radius. Urban landscapes are the only type in which the proportion of nests has increased over the past ten years. A total of 126 nest sites across these three land-use categories has been monitored over 434 breeding attempts. Clutch size, brood size and the number of breeding Peregrines produced from each site were recorded. Clutch size was largest in urban environments (2.84 eggs) and smallest in territories found in extensive natural landscapes (2.48 eggs). Egg hatch rates showed the opposite trend, varying from the highest rate in extensive natural areas (70.8%) down to 67.4% in urban environments, but these did not differ significantly. Hence, brood sizes mirrored the size hierarchy of clutch sizes, with those in urban territories being highest (average 1.91 nestlings), extensive natural areas the smallest (1.76 nestlings) and rural territories in between with 1.88 nestlings. However, of all the nestlings fledged, 13.2% from natural areas became breeding adults compared to 8.4% amongst rural areas and only 7.0% from urban areas. These last results are the true indication of the contribution territories within each land system make to the conservation of this species.

Notes:

Questions:

Conserving the curlew: habitat use by Bush Stone-curlews in agricultural landscapes

Elisa Tack, Gary Luck and David Watson
School of Environmental Sciences
Charles Sturt University, Albury, NSW

Abstract:

The Bush Stone-curlew *Burhinus grallarius* has suffered a dramatic decline in abundance across southern Australia in recent years. The majority of recent records throughout southeastern Australia are from private, agricultural land and there is increasing community interest in on-ground conservation programs aimed at improving curlew habitat. To date very little research has examined Bush Stone-curlew habitat requirements, in particular in agricultural landscapes. This study is examining patterns of habitat use by Bush Stone-curlews at multiple spatial scales including landscape, home range and micro-habitat scales. Initial analyses indicate different landscape and patch-level attributes relating to curlew occupancy at different scales. The results of this research will be used to develop a set of management guidelines for landholders to assist them in effectively managing curlew habitat on their properties.

Notes:

Questions:

Habitat preferences of Noisy Miners and the implications for restoration work

Rick Taylor, Joanne Oldland and Mike Clarke
Department of Zoology,
La Trobe University, Bundoora, Victoria

Abstract:

This research investigated the habitat preferences of the Noisy Miner (*Manorina melanocephala*) along farmland/woodland edges of large remnants within Victoria. We examined the influence of edge geometry on Noisy Miners' occupation of edges and those factors affecting the depth from remnant edges penetrated by this species. We identified projections of remnant vegetation from the patch edge into the agricultural matrix (e.g. corners of patches, roadside corridors), and clumps of trees in the agricultural matrix within 100 m of the edge, as significant predictors of occupancy of an edge by Noisy Miners. The preference of Noisy Miners for edges with projections may confer advantages in interspecific territorial defence. Penetration depth by Noisy Miners differed significantly across four broad habitat types but commonly ranged from 150 m to more that 300 m from the remnant edge. In light of these results, we advocate revegetation strategies that attempt to enclose projections within 100 m of the edge, with fencing placed out to this new boundary, to reduce the likelihood of colonisation and domination of an edge by Noisy Miners. If Noisy Miners colonise a site, their capacity to penetrate in from a remnant edge has implications for the size remnants need to be (>36 ha) to contain any core 'Noisy-Miner-free' habitat and the width habitat corridors need to be to avoid domination by Noisy Miners (>600 m).

Notes:

Questions:

Ecological processes: a key element in strategies for conserving biodiversity

Andrew Bennett[1], Angie Haslem[1], David Cheal[2], Mike Clarke[3], Roger Jones[4], John Koehn[2], Sam Lake[5], Lindy Lumsden[2], Ian Lunt[6], Brendan Mackey[7], Peter Menkhorst[8], Tim New[3], Graeme Newell[2], Tim O'Hara[9], Gerry Quinn[1], Jim Radford[1], Doug Robinson[10], James Watson[11], Alan Yen[12]

[1]School of Life and Environmental Sciences, Deakin University, [2]Arthur Rylah Institute for Environmental Research, Department of Sustainability & Environment, [3]Department of Zoology, La Trobe University, [4]CSIRO Marine and Atmospheric Research, [5]School of Biological Sciences, Monash University, [6]School of Environmental Sciences, Charles Sturt University, [7]School of Resources, Environment and Society, Australian National University, [8]Department of Sustainability and Environment, Victoria, [9]Museum Victoria, [10]Trust for Nature, Victoria, [11]The Wilderness Society, [12]Department of Primary Industries, Victoria

Abstract:

A common approach for conserving biodiversity is to develop priorities based on protecting natural 'assets', such as threatened species or depleted ecosystems. This essential approach has a major limitation: asset protection alone cannot conserve biodiversity unless the ecological processes that sustain assets are also maintained. Here, we describe a complementary approach that emphasizes the essential role of ecological processes in sustaining biodiversity; using the state of Victoria, south-eastern Australia, as a case study. Key processes that sustain biodiversity were grouped into seven themes: (1) climate, (2) primary productivity, (3) hydrological processes, (4) biophysical habitats, (5) interactions between organisms, (6) movements of organisms, and (7) natural disturbance regimes. These key processes are being affected by six major threats: climate change, degradation and loss of biophysical habitats, altered hydrological flows, nutrient and chemical additions to ecosystems, harvesting of natural resources, and introduced species. Each of these threats extends across terrestrial, freshwater and marine systems, and interacts with or modifies multiple ecological processes. The full consequences of these threats may not be experienced for lengthy periods, their effects extend across land tenures, they commonly have off-site effects and many changes may be irreversible. A range of policy and management approaches will be required to maintain key ecological processes, including: developing ecological vision, targets and monitoring schemes; addressing socioeconomic drivers underlying threats; incorporating varied perspectives on valuing 'nature'; refining resource harvesting approaches; and prioritizing preservation and restoration activities to strengthen ecological processes across landscape scales. We suggest that conservation strategies that are explicitly directed toward maintaining the integrity of ecological processes will have greater potential to sustain biodiversity and evolutionary processes in the long-term.

Notes:

Questions:

Discovering the diversity of insects and spiders that inhabit mistletoe plants in fragmented eucalypt woodlands

Anna Burns
School of Environmental Sciences
Charles Sturt University, Albury, NSW

Abstract:

Insects and spiders fulfil a multitude of roles in natural and agricultural systems, in addition to being an important food source for a variety of animals. To optimally conserve invertebrate communities, we need to determine their diversity and patterns of spatial distribution, a task more difficult for invertebrate than vertebrate fauna. Mistletoe has been proposed as a keystone resource for birds and mammals in woodlands and forests worldwide, and it could be crucial for supporting a higher diversity of organisms in fragmented landscapes. However, we do not yet have a full understanding of the ecological interactions between mistletoe and the invertebrate fauna. I collected insects and spiders from box mistletoe clumps and eucalypt foliage in remnant woodlands on farms in southern NSW. Overall, the density of insects and spiders was higher on the eucalypt foliage. The species composition, richness and evenness of psyllids, the most abundant insect family collected (order Hemiptera [true bugs]), differs between mistletoe and the eucalypts. Further analyses will include evaluating the role of host environment and spatial scale in driving diversity patterns in these “arboreal islands”.

Notes:

Questions:

Reptiles in the Mallee Fire and Biodiversity Project

Lisa Spence-Bailey[1], Mike Clarke[1], Brian Malone[1], Dale Nimmo[2], Andrew Bennett[2], and John White[2]
[1]Zoology Department, Latrobe University, Bundoora, Victoria
[2]School of Life and Environmental Sciences, Deakin University, Burwood, Victoria

Abstract:

A fundamental premise of many managers is that landscapes exposed to a greater diversity of fire regimes equates to landscapes with greater biodiversity when compared with landscapes that have a more uniform fire history (i.e. 'pyrodiversity begets biodiversity'). Consequently, the aims of most fire management plans in southern Australia are to maintain a visible 'mosaic' of vegetation patches of differing time-since-fire status in a landscape. In Victoria and New South Wales, appropriate burning regimes are determined using the Vital Attributes approach. In this approach, minimum and maximum tolerable fire intervals are determined by the life history attributes of Key Fire Response Species (KFRS). The major assumption of this approach is that these KFRS are good indicators of how the rest of biota would cope with shorter or longer fire intervals. Therefore, the aims of the Mallee Fire and Biodiversity Project are to determine (i) the type (properties) of mosaics that we should be aiming for in mallee vegetation, and (ii) whether KFRS serve as reliable surrogates for other plants and animals (birds, mammals, reptiles and macro-invertebrates). The major aim of my part of the project is to identify the properties of fire mosaics and sites that enhance the status of herpetofaunal communities/assemblages in the mallee. To date, half of the pitfall data has been collected, with 4269 individual captures and 56 species being trapped across the region. Preliminary analyses will be presented.

Notes:

Questions:

Helophyte plant responses to increasing salinity in modified wetlands

Matthew Hatton
Institute for Sustainability & Innovation
Victoria University, Melbourne, Victoria

Abstract:

Many wetland plant species form mono-specific stands that rarely recruit sexually into existing populations and instead rely on asexual or clonal growth for long-term persistence. For helophytic wetland species (those that form perennating buds under the ground or more specifically in mud), reliance on vegetative reproduction is often crucial, especially in wetlands with increasing salinity loads or modified water regimes. In contrast to halophytic species, which are specifically adapted to saline environments and may have specialised salt exclusion mechanisms, helophytic plant species have a limited ability to sequester and compartmentalise salt while growing. Senescence and translocation of assimilates into underground storage organs such as tubers and rhizomes during autumn allow helophytes to shed their salt load and enter dormancy so they may over-winter and re-emerge in the spring. Helophytes prefer to grow in fresh water, yet are often out-competed in such conditions and are therefore generally restricted to narrow ecological niches within the littoral zone of saltier sites. These margins offer sanctuary as they are inhospitable to fresh water macrophytes. However, conditions in these areas are also predominantly detrimental for the germination of seeds and survival of seedlings irrespective of life-history type. Modifications that prevent former flushing events from lowering salinity levels may have serious implications for many helophytic species, such as lowered sexual recruitment and genetic isolation. The presentation will attempt to discuss some of the mechanisms and responses utilised by helophytic / clonal wetland plant species that enable persistence in otherwise hostile environments. A focus on two members of the genus *Bolboschoenus* (Cyperaceae) will offer a platform for discussion on concepts and theories of clonal plants and their recruitment dynamics.

Notes:

Questions:

Session- 5 Panel Discussion
Theme: How can ecological research better inform management practices?
Total time available: 4.00 pm – 4.55 pm
Chair: Assoc. Prof. Mike Clarke

Outline and instruction to panel members:
We have divided up the topics among the researchers and managers (see below), with the intention of having the identified panel members briefly address the question posed. Where there is obvious interest generated, we would then seek additional responses/comments from the floor.

Panel members please prepare a very brief **comment** (**2 mins**) beforehand on the question you have been allocated. Panel members will obviously be free to chip in on other questions, but we are conscious that members of the audience will have been listening fairly passively for nearly the whole day by the time this session commences. Therefore, we are keen to create opportunities for them to participate in the discussion. To this end we have kept the last 15 minutes for general questions from the floor.

Researchers: Prof. Richard Hobbs, Prof. Paul Boon, Prof. Martin Westbrooke, Dr. Phil Suter

Industry Members
Craig Whiteford (DSE), Dr. John Wright (PV), Nick McCristal (CCMA), & Geoff Park (North Central CMA)

4.00- 4.02 Assoc. Prof. Mike Clarke introduces panel members and topic

4.02- 4.35 Prepared Questions to be considered:

1. **Are the questions we ask in research relevant to management? If not, how can the questions be modified so that research outcomes are more relevant to real-world management issues?**
    - possible respondents: Craig Whiteford, Richard Hobbs (max. 2 min each)
2. **What kind of management practices are currently constrained by a lack of ecological knowledge or understanding?**
    - Possible respondents: John Wright, Geoff Park (max. 2 min each).
3. **What opportunities do you see for researchers to get better value (from a research perspective) out of the vast number of 'management experiments' that are happening all the time? How feasible is it to design management actions so that they can function as research 'treatments'?**
    - Possible respondents: Nick McCristal, Paul Boon (max. 2 min each).
4. **What are some of the primary impediments to researchers addressing these kinds of applied questions?**
    - Suggestions from the floor.
5. **Integrating researchers and managers in project teams.**

What case studies or examples can you give where researchers and managers have worked together to achieve positive outcomes for both?

- Possible respondents: Martin Westbrooke, Phil Suter (max. 2 min each).

6. **Communicating research findings to managers.**

There are large numbers of scientific papers around that are never read by managers and whose content may never filter through to effective management. Is this inevitable? Should we / can we do better? What are the most effective ways of improving communication between researchers and managers?

- Possible respondents: Craig Whiteford, Phil Suter (max. 2 min each).

4.35-4.50 **Questions/comments from the floor.**

4.50-4.55 **Wrap-up –** Mike Clarke.

Poster Abstracts

An emerging indigenous weed— the ecology and control of the grass *Lachnagrostis filiformis* (G. Forst.) Trin.

Andrew Warnock, Singarayer Florentine, and Patrick Graz
Centre for Environmental Management,
School of Science and Engineering,
University of Ballarat, Ballarat, Victoria

Abstract:

Lachnagrostis filiformis (Fairy Grass) is an emerging native weed in Australia that has colonised extensive areas of dry lakebeds in western Victoria during the current drought. Large numbers of the plants' detached mature panicles lodge against housing, fences, railway lines, and other obstacles creating a fire hazard and general nuisance to community members in lakeside towns. When established outside its natural distribution it out–competes and displaces native vegetation. Since current control methods only provide short–term solutions it is essential to identify an economically viable long–term solution to the problem. The overall objectives of this study are: i) to understand the environmental conditions that facilitate establishment and persistence of *L. filiformis* and ii) to understand the effects of various control methods on *L. filiformis* and associated plant species. Current control methods will be assessed, reviewed, modified and potential long–term management solutions developed. To understand the environmental conditions that facilitate its establishment and persistence, population dynamics of the grass will be investigated on four undisturbed dry lakes in western Victoria. To determine efficiency of control measures, herbicide, slashing, controlled grazing and seed broadcasting of native species have been applied and will be monitored over three years on dry lakebeds in western Victoria, including Lake Learmonth. Knowledge gained from this study will assist in the development of long term control measures that are relevant nationally and internationally. Results may also assist in the development of control of other similar weed species.

Notes:

Questions:

Avian invasion: the European Starling *Sturnus vulgaris* in semi-arid Australia

Louise Mortimer, Simon Cook, and Martin Westbrook
Centre for Environmental Management,
School of Science and Engineering,
University of Ballarat, Ballarat, Victoria

Abstract:

The Common or European Starling is one of the world's most invasive species of bird. It has been introduced to many countries on almost all of continental Asia, the Americas and also into many new areas of Europe. In many of these countries, particularly Australia where populations are concentrated across a small area near the coast, starlings have become serious agricultural and viticultural pests. They are also considered pests in urban areas where their flocking and roosting behaviour causes serious fouling of water resources and depreciation of infrastructure due to noise, unsightliness and smell. Because of their adaptability and flexibility in their nesting and foraging behaviour, the species is considered a serious threat to the environment and regional economy in many countries throughout the world. The Eyre Peninsula is the location of a series of major export ports for grain, minerals and livestock, and an important stopping point for tourists travelling to and from the west. During the summer, communities along the coast struggle with a seasonal influx of flocks of starlings numbering in their tens of thousands. There have also been documented effects on local and regional industries, including the pastoral industry and agriculture/viticulture, as well as tourism in the area during the busy summer season. There are also thought to be ecological effects, such as interspecific competition for nest sites with native hollow-nesting species, as well as the spread of environmental weeds such as African Boxthorn, although very few studies have conclusively documented such effects. Current research focuses on what allows the starling to adapt to such a variety of habitats, from their genetics and physiology to their behaviour and ecology, whilst also investigating control methods and developing more effective control programs on a regional basis.

Notes:

Questions:

Fragmentation leads to 'shrubification' in a grassy woodland landscape

John Morgan and Fiona Sutton
Department of Botany
La Trobe University, Bundoora, Victoria

Abstract:

Woody plant encroachment is an important mechanism of vegetation change in many grassy ecosystems but has received little attention in fragmented landscapes. It is potentially important in fragmented grassy woodlands in western Victoria, given that many of these woodlands are now rarely burnt? We used a revisitation approach to address the question: is there evidence for shrub encroachment in fragmented woodlands typically found in the sheep grazing belt of western Victoria? By surveying 13 remnant woodlands in 2006 on roadsides and railway verges that were initially surveyed for their floristic composition and abundance in 1975, we determined the extent of the change in richness and abundance of shrubs that has occurred since this time. By linking these changes with an understanding of the changes in disturbance regime in the district, we hypothesise a model of vegetation change that occurs in fragmented woodlands. We found that all sites had increased shrubbiness since they were initially surveyed. This possibly occurred because frequent fire was no longer applied to remnants after the 1980s. Additionally, soil disturbances from machinery and stock have continued during this period. The conversion of herb-rich grassy woodlands to shrubby woodlands may affect the diversity of these important woodland remnants. Such changes may undermine attempts at maintaining regional woodland diversity.

Notes:

Questions:

The influence of time-since-fire on the soil seed banks of the Murray Mallee, Australia.

Sally Kenny and John Morgan
Department of Botany,
La Trobe University, Bundoora, Victoria

Abstract:

Fire is a natural component of many Australian ecosystems, having occurred over millennia. This history of fire has helped shape present day vegetation communities and the fauna inhabiting them. Fire affects not only the standing vegetation but also the composition of the soil seed bank. It is the availability of propagules – in both the soil seed bank and present in the canopy of serotinous species – that determines the path of vegetation succession following fire. Results indicate that species diversity in the standing vegetation decreases with increasing time-since-fire (6 months to >30 yrs). Is this decrease in diversity related to a similar decrease in the diversity of species within the soil seed bank? In this study, we ask: 1) what is the role of the soil seed bank in vegetation succession; 2) how does the soil seed back change with time-since-fire; and 3) what environmental cues are required for the germination of the soil seed bank? Soil samples were collected during Autumn 2007. Thirty soil samples were collected at 60 sites in each of 'recent' (>2004), 'intermediate' (1980s) and 'long unburnt' (pre-1970s) vegetation in the Murray Mallee. Glasshouse germination trials using fire-simulation treatments such as smoke water and heat will be used to assess the size and diversity of the soil seed bank. It is hoped that this study will enable greater understanding of the role that time-since-fire plays in Mallee vegetation dynamics.

Notes:

Questions:

The North Central CMA Roadsides Conservation Project

Ben Goonan
North Central CMA
Huntly, Victoria

Abstract:

The project will deliver reliable and consistent assessments across the CMA that will provide a more meaningful and practical understanding of roadside conservation values. Educational material and training for Local Government staff is an integral part of the project. Overall, this project is considered essential to assist the relevant managers (Local Government and DSE) to effectively manage roadside biodiversity and contribute to biodiversity conservation generally.

The Roadside Conservation Project includes:

- The review or development of Roadside Management Plans within the North Central CMA area, in partnership with local government.
- The development of the North Central CMA Roadside Conservation Assessment Manual.
- The development of a new database in MS Access. This database allows maps to be generated that can include various layers of information such as:
    - Conservation value
    - Threatened species
    - Condition scores
    - Weediness
    - Canopy continuity
    - Habitat values
    - Adjoining vegetation
    - Photo points
    - Aerial photos
- Training for Local Government staff on the subjects of Environmental Care and Roadside Best Practice Management. So far, more than 200 people have been trained.
- Education materials (including a poster) and various media articles on the subject.

Notes:

Questions:

Native plant extinction rates in a fragmented agricultural landscape

Fiona Sutton and John Morgan
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La Trobe University, Bundoora, Victoria

Abstract:

In highly fragmented agricultural landscapes, remnant vegetation is often left in small disjunct patches across the landscape. The plant populations within these remnants are usually small and isolated, resulting in inbreeding and genetic erosion, which can leave populations vulnerable to local extinction. In western Victoria, 10 roadsides and two small reserves were initially surveyed in 1975 by Cliff Beauglehole and then resurveyed in 2006. The floristic composition and abundance of all native plant species was recorded and compared using Bayesian analyses. Due to the drought, all annual species were omitted from analysis. Of the initial 775 populations, of 177 native species, 25.6% are considered locally extinct in 2006. The effect of fragmentation on local extinction rates of native plant species was investigated using past population abundances, plant traits (life form, seed dispersal mode, ability to reproduce vegetatively, height) and remnant spatial characteristics (size and shape). The past (1975) abundance of populations within a site was the best predictor of extinction rates. Small populations had a significantly higher risk of extinction than more abundant populations. However, some larger populations were also found to disappear. Shorter plants had a higher risk of local extinction than taller plants. All other plant traits, as well as site area and shape (perimeter: area) did not substantially influence local extinction rates of native species. Instead, it appears that site history and management practices were greater influences on local extinctions of species: frequently burnt sites had lower extinction rates for native plant species than ploughed, sprayed and heavily grazed sites.

Notes:

Questions:

Droughts and floods: the value of long term data in aquatic macroinvertebrate studies

Marijke Hoenderdos[1], Phillip Suter[1] and John Hawking[2]

[1]Department of Environmental Management and Ecology, La Trobe University, Wodonga, Victoria, [2]Murray Darling Freshwater Research Centre, Wodonga, Victoria

Abstract:

Aquatic macroinvertebrate communities from the Murray River have been sampled twice yearly since 1980 as part of the Murray-Darling Basin Commission's biological monitoring program. The data collected from 1980 – 2000 were analysed at the lowest taxonomic level (morph-species) to determine if the macroinvertebrate communities showed any apparent trend associated with water quality or hydrology. At all seven locations there were two sudden and distinct community shifts that resulted in a changed but stable faunal community. The first shift occurred in 1985/86 and the second in 1994. Although there is no water quality parameter that correlates with these shifts, the 1985/86 shift coincides with the change in flow rates of the river from an increasing trend (high flood frequency) and the second in 1994 with the decreasing trend in flows (drought period). This suggests that the macroinvertebrate communities change in response to long term environmental changes rather than the instantaneous chemical and physical changes. Without these long term data the changes in the aquatic macroinvertebrate communities would remain undetected.

Notes:

Questions:

A test of the CSR plant strategy scheme in the Victorian Alps

Megan Good
Department of Environmental Management and Ecology
La Trobe University, Bundoora, Victoria

Abstract:

Grime's CSR plant strategy scheme is an attempt to categorise plant species according to the selective pressures that have shaped their ecologies. Grime considers stress (S), disturbance (R) and competition (C) to be the most important selective pressures. The aim of this project is to test this theory using the alpine landscape (supposedly a high stress environment) to determine whether or not the scheme can detect small scale changes in "stress". Grime defines stress as anything that decreases plant productivity, therefore we used snow-patches (which have a substantially shorter growing season than the surrounding landscape) to test the theory in the Mount Hotham area of the Victorian Alps. We found that snow-patch communities are floristically distinct from the surrounding landscape and are also less productive. However, the CSR scheme failed to detect these differences in terms of community stress tolerance (S scores). These findings raised many issues regarding the nature of stress and the role of disturbance and competition in the alpine landscape.

Notes:

Questions:

The reproductive biology and ecology of three *Swainsona* species in Victoria's Northern Plains

Anna Murphy and Peter Green
Botany Department
School of Life Sciences
La Trobe University, Bundoora, Victoria

Abstract:

The project will examine the effect of habitat fragmentation on the reproductive ecology of three *Swainsona* species in the Northern Plains of Victoria. Two of these species, *S. murrayana* and *S. plagiotropis*, are listed under the Federal *Environment Protection and Biodiversity Conservation Act, 1999* and the State *Flora and Fauna Act, 1988*. Very little is known about the ecology of the *Swainsona* genus, particularly in relation to pollination. The project will examine the effect of habitat fragmentation on the pollination ecology and reproductive success of these species. Understanding how pollination is affected by land use and habitat fragmentation can assist land managers in boosting seed set and plant recruitment. This research will also enable managers to determine the optimal population size to produce adequate propagules for long-term sustainability. On a theoretical level, this work will feed into a range of international studies that are currently investigating global declines in pollinator populations.

The proposed work is part of a PhD project being carried out by Anna Murphy under the supervision of Dr. Peter Green in the Department of Botany, at La Trobe University.

Notes:

Questions:

Determinants of Vegetation Patterns in the Dry Woodland Savanna of North-eastern Namibia

Patrick Graz
Centre for Environmental Management,
School of Science and Engineering,
University of Ballarat, Ballarat, Victoria

Abstract:

The dry woodland savannas of north-eastern Namibia are a patchwork of vegetation types that are manifested in differences in physiognomy, plant density, species composition, age classes and growth forms. Such differences, as well as the structure of individual plant populations, are the result of the actions and interactions of a number of factors that act and interact at various scales. Rainfall and landscape features such as terrain and soil formations determine the potential for plant growth. The effect of these determinants is modified by herbivory, the direct and indirect human impact and fire to produce the actual state of the vegetation. The species that constitute the woodlands have adapted to both determining and modifying factors to varying degrees. The effects of the various factors are briefly presented and their potential interactions are identified and described, to provide a basis on which management options may be developed.

Notes:

Questions:

The effect of composition on the long-term development of rangelands in the savanna biome: a modelling approach

Patrick Graz
Centre for Environmental Management,
School of Science and Engineering,
University of Ballarat, Ballarat, Victoria

Abstract:

A decline in productivity is affecting over 9.2million km^2 of Australia's savanna rangeland as a result of increases in woody plant density. This is threatening the economic viability of farming enterprises. Similar changes are reported from Africa, India, and the Americas where the biome is also represented. While changes in utilization patterns are viewed as the underlying cause of these changes the actual mechanism is unknown, making it difficult to design and implement preventative management practices. This project aims to use simulation techniques to explore the importance of changes in composition and dominant photosynthetic pathways as a cause of the problem.

Notes:

Questions:

Dry lakes and drifting seed-heads: the ecology of *Lachnagrostis filiformis* (Fairy Grass)

[1]Kate Gosney, [1]Singarayer Florentine, [2]Cameron Hurst
[1]School of Science and Engineering, University of Ballarat, Victoria
[2]Institute of Health and Biomedical Innovation, Queensland University of Technology

Abstract:

Fairy Grass (*Lachnagrostis filiformis*) has prompted widespread community concern and media attention in recent years. Large numbers of disarticulated mature panicles blow away, scattering seeds. When the mature panicles build up against fences, rail lines, and houses, they can become a severe fire hazard. *L. filiformis* is native to Australia, New Zealand and various Pacific islands. A facultative perennial grass, it tends to grow on dry lake beds and other sites with residual moisture. The range and densities of populations of *L. filiformis* have increased in recent years. Causative factors suggested include a combination of drought, climate change and human disturbance. This study aimed to increase our understanding of the environmental factors that are associated with the presence of *L. filiformis* and to investigate its ecology. This was achieved by comparing the vegetation of four lakes in western Victoria. Two have infestations of *L. filiformis* controlled by spraying, one has an infestation controlled by a firebreak around the lake and the other has had no management. Site variables collected included soil (pH, salinity and moisture), vegetation (species and cover), and roads (location and type). The results indicated that the only environmental parameter that was significant ($p<0.05$) to the presence of *L. filiformis* was 'lake'. The germination trials indicated that there was a significant difference ($p < 0.05$) between seeds germinated at constant temperatures and seeds geminated at alternating temperatures. Light was also found to have a significant effect ($F = 40.4$, $P = 0.00$), with higher germination occurring in seeds that received 12 hours of light. Climate modelling using BIOCLIM was used to predict the potential spread of *L. filiformis* in Australia. The results indicated that an increase in the range and abundance of *L. filiformis*, particularly in the south-eastern areas of Western Australia and southern parts of South Australia, is very possible. An early understanding the ecology of *L. filiformis* and factors associated with its presence could enable the development of management techniques that limit infestations and reduce possible environmental and economic impacts.

Notes:

Questions:

The lichens of cool temperate rainforest in Victoria

[1]Sharon Morley and [2]Maria Gibson

[1]Institute for Horticultural Development, Department of Primary Industries, Victoria.
[2]School of Biological and Chemical Sciences, Deakin University, Victoria.

Abstract:

Lichen floristics and distribution were examined in cool temperate rainforests (CTR) of Victoria, Australia, specifically: the Otways, Yarra Ranges, Baw Baw, and Errinundra. A total of 165 lichen species was recorded, representing 38 families and 71 genera. Of these, 30 species were new records for Victoria, with five being from newly recorded genera. Approximately equal numbers of macro- and micro-lichens were identified, 84 and 81 respectively. Errinundra was most species rich while Baw Baw was most species poor. Analysis of vascular plant communities revealed three rainforest types that agreed with published classifications of Victorian CTR: Otways CTR, Central Highlands CTR and East Gippsland CTR. Analysis of the lichen communities showed a ubiquitous suite common to all rainforests studied, although lichens from rainforests dominated by *Atherosperma moschatum* (Errinundra) were distinct from those dominated by *N. cunninghamii* (Otways, Yarra Ranges and Baw Baw). Similarly, the lichen flora from the Otway rainforests were distinguished from those of the Yarra Ranges and Baw Baw, both in the Central Highlands, by less common lichens distinct to each rainforest type.

Notes:

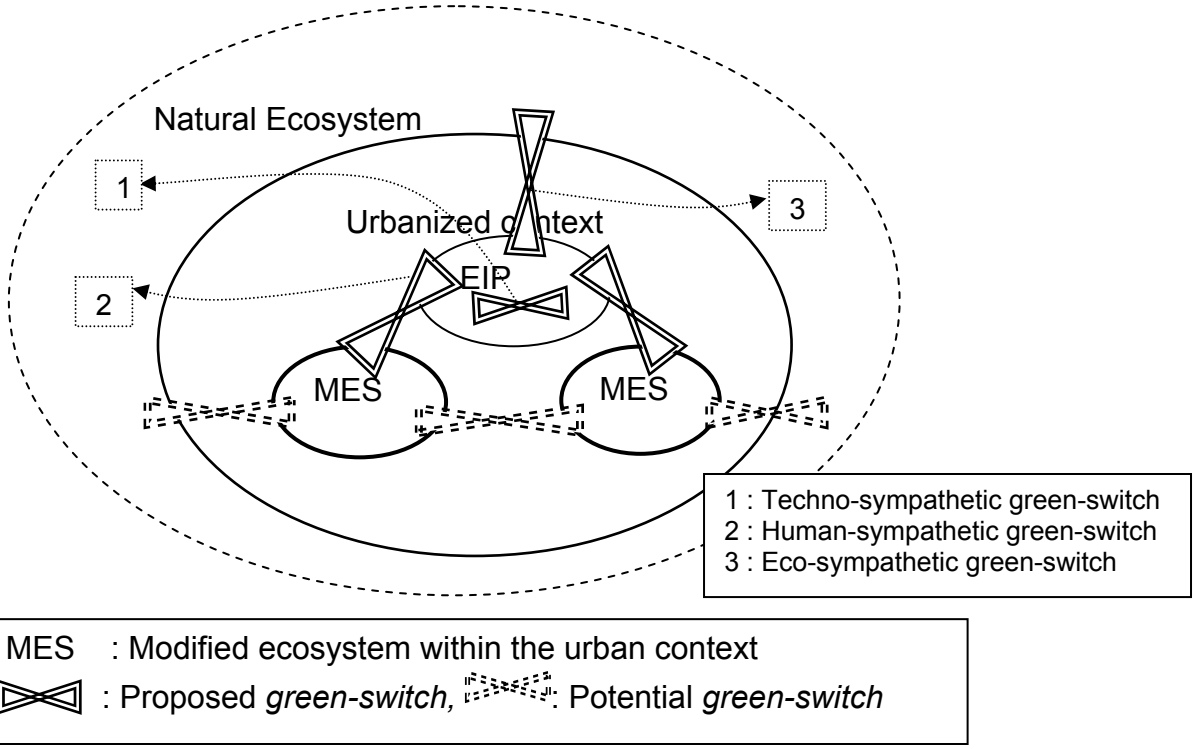
Questions:

Activating biodiversity across the borders through green-switch

Archana Sharma Bhatt
RMIT University, Victoria

Abstract:

Technology is a way of revealing (Heidegger, in Lovitt, 1977, 12). The emerging concept of green-switch overlaps the contested terrain of quasi-landscape and quasi-technology revealed through current practices of landscape and technology. A green-switch is a patch of landscape that is designed for collecting, diverting or re-distributing the paths of ecological flows; the objective is to facilitate the path of ecological and biodiversity flows by providing alternative flow-paths. It is essentially composed of a single or multiple constructed wetlands. Greenways link multiple constructed wetlands or even the cells within a single constructed wetland when it is designed as such.



Proposed strategy of green-switch: conceptual diagram

Notes:

Questions:

Victoria Naturally - a force for nature

Karen Alexander and Carrie Deutsch,
Victoria Naturally
Victorian National Parks Association
Carlton, Victoria.

Abstract:

On this year's International Day for Biological Diversity the UN warned that the world is facing the worst spate of global extinctions since the dinosaurs. UN Secretary General Ban Ki-moon said in a statement: "Biodiversity is being lost at an unprecedented rate. The global response to these challenges needs to move much more rapidly, and with more determination at all levels -- global, national and local." Since European settlement in Victoria we've lost close to 70% of our native vegetation through land clearance. This rapid development has taken a heavy toll on our wildlife, with 30 per cent of our animals and 44% of our native plants either extinct or threatened. With the added pressures of climate change, habitat fragmentation, uncontrolled weeds and feral animals it is clear that Victoria is facing a biodiversity crisis. The Victoria Naturally alliance of eight environment groups was formed to avert the crisis by promoting solutions that include protection and improved management of existing habitat and significant restoration of vegetation in order to deliver healthy, functional ecosystems. Led by the Victorian National Parks Association, the Victoria Naturally alliance includes a broad cross-section of environment groups; the Australian Conservation Foundation, The Wilderness Society and Environment Victoria, Greening Australia (Vic), Trust for Nature, Bush Heritage Australia and the Invasive Species Council. The Victorian Government is now developing a Land and Biodiversity White Paper, which got underway in April this year with the consultation paper Land and Biodiversity at a Time of Climate Change. The White Paper is a significant opportunity to set the direction for the future management of the natural environment. To be successful, the process requires broad-ranging input from Victorians. Ecologists have a key role to play in the development and implementation of science-based biodiversity targets for Victoria.

Notes:

Questions:

The effects of traffic noise and temperature on the calling behaviour of *Crinia signifera* (Common Eastern Froglet) & *Limnodynastes dumerilii* (Eastern Banjo Frog)

Joanne North

School of Life and Environmental Sciences,
Deakin University, Burwood, Victoria.

Abstract:

Frogs' calling behaviour is an integral part of their behavioural ecology and breeding success. Male frogs communicate acoustically to maintain inter-male spacing and to attract females. Females prefer low frequency calls (kHz), which are indicative of male maturity, size, and fitness. In urban areas, frog calls have the potential to be masked by human-generated sounds such as traffic noise. Two competing hypotheses were assessed in an investigation of the effects of traffic noise on frog calling behaviour: 1) species with poor auditory acuity and small active spaces (e.g. *Crinia signifera*) will suffer greater acoustic interference and demonstrate a greater frequency shift than species with better hearing; and 2) species whose calls overlap more with the frequency distribution of traffic noise (e.g. *Limnodynastes dumerilii*) will suffer the greatest acoustic interference and demonstrate a greater frequency shift than species with less overlapping calls. 499 individuals' calls across 33 sites for *C. signifera* and 88 individuals' calls across 28 sites for *L. dumerilii* were digitally recorded and analysed. Recordings were conducted across a gradient of traffic noise levels, and noise levels for each site were calculated using the Calculation of Road Traffic Noise method, and temperature measurements were obtained at each site. Regression modelling provided evidence that the call frequency of *C. signifera* and *L. dumerilii* increases in warmer temperatures, and the effect size is inversely proportional to body size. Modelling provided good evidence that the minimum call frequency of *C. signifera* increases with traffic noise, but the effect of traffic noise on the fundamental frequency of *L. dumerilii* was unclear. Results support hypothesis one but the evidence in support of hypothesis two is equivocal. The frequency shift observed in this study may have implications for the breeding success and conservation of frogs in noisy urban habitats, particularly those with poor auditory acuity and small active spaces.

Notes:

Questions:

Plant and seed bank responses to an extended drought on the exposed lakebed of Lake Wendouree, Victoria

Kerrilyn Smith, Graeme Ambrose, Singarayer Florentine
Centre for Environmental Management
School of Science and Engineering
University of Ballarat, Ballarat, Victoria.

Abstract:

Lake Wendouree is a Ballarat icon. The lake precinct is significant for sport and recreation, social activities, aesthetic appeal and tourism. In addition, the area has long provided a refuge for a wide array of flora and fauna species. However, like much of our country, Ballarat has been greatly affected by drought, causing Lake Wendouree to dry out almost completely. In southern Australia, little is known about the ecological impacts of prolonged drought on the species composition of the soil seed bank and the propagules of wetland plants. Therefore, my objective is to examine the composition of the lake's standing vegetation and soil seed bank and to ascertain the viability of the seeds and the remaining water plant propagules. Ten clusters of four soil samples were collected from each of five different habitats within Lake Wendouree. These 200 samples were placed in a glasshouse to prompt germination of the seeds, with half of the samples placed under flooded conditions and the other half kept moist. In addition, above-ground vegetation was assessed in 1 m radius circular quadrats at the centre of each cluster. Soil physio-chemical properties will be analysed for a soil sample from each quadrat. Field observations reveal that many sites within the lake have been invaded by terrestrial plants, particularly evident in the northern and western regions of the lake bed. Areas close to the shoreline host a richer flora, including both water plants and terrestrial plants. Terrestrial plant species appear to be spreading quite widely, except in formerly deeper benthos. This contains some aquatic species and a succulent halophyte, *Chenopodium glaucum*. Elsewhere, colonising terrestrial plants are predominantly wind-dispersed pioneers from the grass and daisy families. Small quantities of *Lachnagrostis filiformis* (Fairy Grass) are growing and seeding on the dry lake margins. Shed panicles are snagged in many areas, particularly on bare cracked soil. A few emergent shallow-water plant species retain reduced amounts of foliage. Only one 'submergent' aquatic is evident above ground. Spongy mats of *Myriophyllum* spp. (water-milfoils) are well mulched and some contain viable rhizomes. These have produced short aerial stems, largely confined to moist crevices. Results are not yet available for the greenhouse experiment. Whether the lake remains dry or refills, this study should enable likely outcomes to be anticipated and provide useful information for future flora management.

Notes:

Questions: