Biodiversity Across the Borders

‘Biodiversity conservation: drawing from the past to foster hope for the future’

Conference Abstracts

Federation University Australia

7th June 2024

ISBN: 978-1-922874-19-1 **(Print);** 978-1-922874-20-7 **(e-Version)**

'*Biodiversity across the Borders*' Conference

Conference Theme: "Biodiversity conservation: drawing from the past to foster hope for the future"

ABSTRACTS

Future Regions Research Centre
Federation University Australia
Mt Helen, Ballarat,
Victoria

Edited by: S. K. Florentine

7th June 2024

Organisers


Federation University
FUTURE REGIONS Research Centre


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PROGRAM

10th Biodiversity Across the Borders Conference

Biodiversity Conservation:
Can we learn from the past to foster hope for the future?

Friday, 7 June 2024
Caro Convention Centre

Mt Helen Campus,
Federation University

Federation University | FUTURE REGIONS Research Centre

SESSION ONE: INTRODUCTORY AND KEYNOTE ADDRESSES	
VENUE: Caro Convention Centre (Building M)	
8:00	**REGISTRATION** (FOYER)
8:40	**WELCOME** Acknowledgement of Country, housekeeping announcements, welcome Vice-Chancellor, and introduce the Keynote speaker. **PROF. KEIR REEVES** (Co-Director, FRRC)
8:50	**OPENING 10th Biodiversity conference** **PROF. DUNCAN BENTLEY, Vice-Chancellor** – Federation University
9:00	**KEYNOTE ADDRESS** **PROF. PETER VESK** – The University of Melbourne Vegetation conservation and management: generality, specificity and progress.

PLENARY SESSION - Chair: Prof. Andrew Bennett	
VENUE: Caro Convention Centre Main Hall Theatre (Building M)	
9:35	**PROF. SARAH BEKESSY** - RMIT Designing cities for 'everyday nature'
9:55	**DR. LILY VAN EEDEN** - RMIT It's all about us: Understanding and influencing human behaviour to protect nature.
10:15	**DR. MARK NORMAN** - Parks Victoria How to act for nature in a rapidly changing climate.
SPECIAL PRESENTATIONS	
10:35	**EM. PROF. MARTIN WESTBROOKE** Biodiversity Across the Borders Conference 2004 to 2024.

10:45 - 11:25	**MORNING TEA** (Caro Main Hall, Foyer) Poster session (Caro Main Hall, Studio Theatre)

Keynote speaker

Professor Peter Vesk
The University of Melbourne

Vegetation conservation and management: generality, specificity and progress

Plenary Speakers

Professor Sarah Bekessy

RMIT
Designing cities for 'everyday nature'

Dr. Lily Van Eeden

RMIT
It's all about us: Understanding and influencing human behaviour to protect nature

Dr Mark Norman

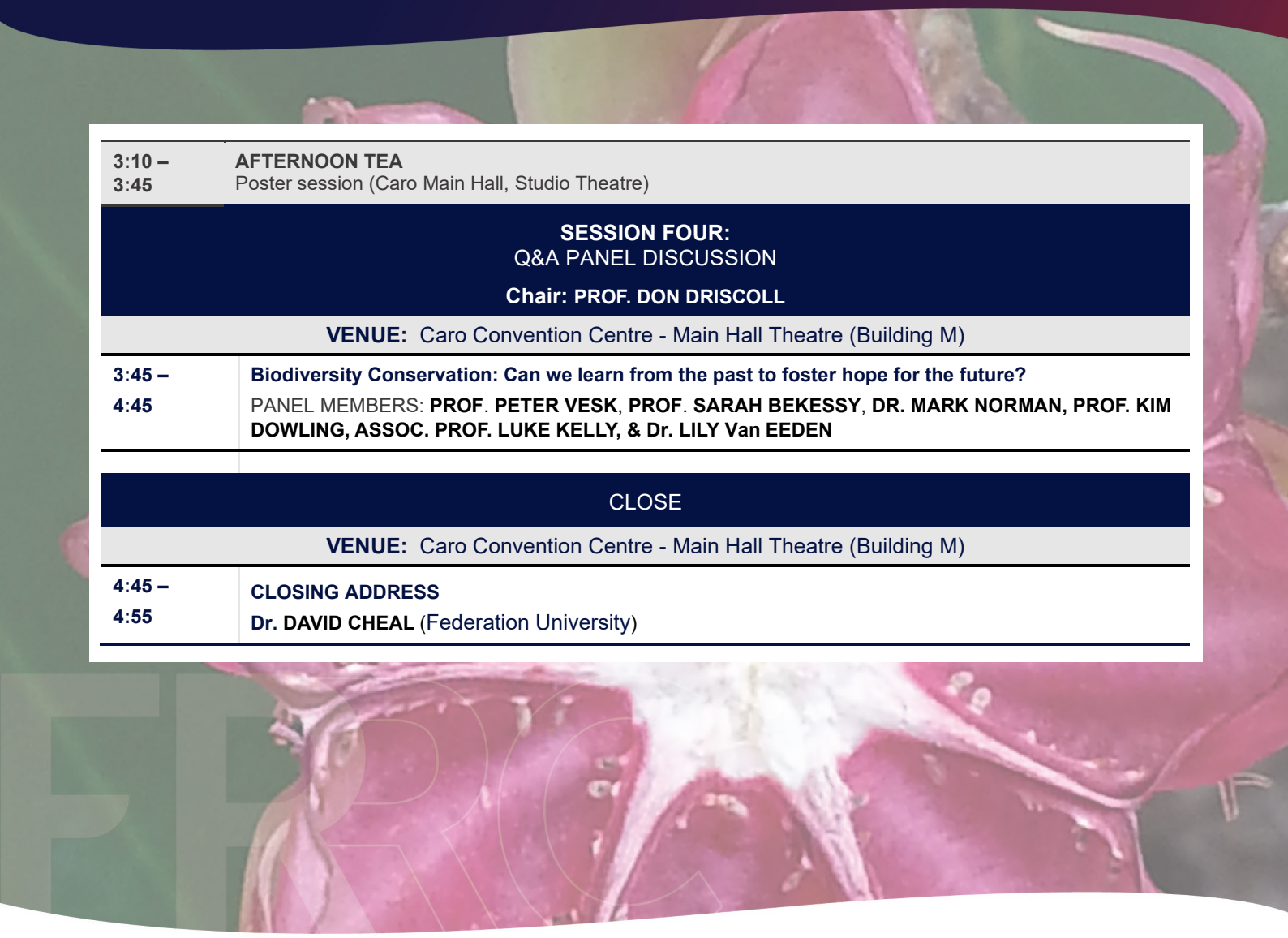
Parks Victoria
(Chief Scientist Conservation and Climate action)
How to act for nature in a rapidly changing climate

SESSION TWO

	VENUE: Caro Main Hall Theatre	VENUE: Geoffrey Blainey Auditorium (Building C)
	Key Insights for Future Biodiversity Management CHAIR: **CHRIS PITFIELD**	**Examining the impact of ecological restoration** CHAIR: **PROF. EUAN RITCHIE**
11:25	**ASSOC. PROF. SAVIN CHAND** Weather and climate extremes in Australia: Implications for biodiversity conservation.	**MS. AVIYA NACCARELLA** Opportunities and considerations of using digging mammals to aid ecological restoration.
11:40	**DR. DAVID DEANE** Risks and opportunities for future wetland contributions to biodiversity in regional landscapes.	**DR. ANGIE HASLEM** Tracking the recovery of bird communities following restoration: insights from a long-term, multi-scale study.
11:55	**DR. NICHOLAS SCHULTZ** Multiple, complementary approaches to grassland conservation.	**DR. HEATHER NEILLY** Ecological restoration on arid zone rangelands; where less is often more.
12:10	**PROF. KIM DOWLING** Biodiversity needs mining or mining needs biodiversity: Oxymoron or obvious truth?	**DR. SAMANTHA WALLACE** Does using environmental water to lifeboat threatened frogs through drought kill them with chytrid?
12:25	**DR. GEOFFREY WESCOTT** The "Great Outdoors", Future Forests and 30:30: a great opportunity for Victorian biodiversity conservation?	**DR. MEAGAN DEWAR** Avian Influenza in Antarctica: consequences for biodiversity, research and conservation challenges.
12:40	**DR. ADAM BESTER** 25 years of Integrated Catchment Management – so what's next?	**PROF. SHAMSI SHOKOOFEH** Why biodiversity research overlooking parasites can be misleading.
12:55 – 1:55	**LUNCH** Albert Coates Complex Poster session (Caro Main Hall, Studio Theatre)	

SESSION THREE

	VENUE: Caro Main Hall Theatre	VENUE: Geoffrey Blainey Auditorium (Building C)
	Conservation efforts – rare and endangered species, community involvement CHAIR: **ASSOC. PROF. JIM RADFORD**	**Navigating Fire, Flood, and Fauna Management: Future Directions** CHAIR: **DR. LEAH KEMP**
1:55	**DR. RYAN PHILLIPS** Plant-animal interactions and the conservation of threatened flora.	**MS. ANGE PESTELL** Fire, predators and mammals of the Wimmera-Mallee.
2:10	**MS. KRISTIN MONIE** Conservation and management of the endangered ecological community *Tecticornia lylei* low open-shrubland.	**DR. MATTHEW SWAN** Fire and biodiversity across multiple ecosystems.
2:25	**DR. ALEX MAISEY** Counting the birds and the bees: Incorporating biodiversity into environmental accounting for improved conservation outcomes in agricultural landscapes.	**ASSOC. PROF. LUKE KELLY** The role of flooding rains and flammable plains in shaping small mammal distributions.
2:40	**MS. KAREN ROWE** Communities of sound: nature engagement through ecoacoustics.	**MS. JACINTA RICHARDSON** Behaviour, not physical limitations, determines movement between preferred and non-preferred habitat by the dasyurid, *Ningaui yvonneae*, in a fire-prone landscape.
2:55	**MR. RHYS MAKDISSI** Mapping abundances of rare bird species across 1M hectares – some things you can't do alone.	**DR. LILIAN PEARCE** Finding hope in the archives: A case for environmental history.



3:10 – 3:45	**AFTERNOON TEA** Poster session (Caro Main Hall, Studio Theatre)

SESSION FOUR:
Q&A PANEL DISCUSSION

Chair: PROF. DON DRISCOLL

VENUE: Caro Convention Centre - Main Hall Theatre (Building M)

3:45 – 4:45	**Biodiversity Conservation: Can we learn from the past to foster hope for the future?** PANEL MEMBERS: **PROF. PETER VESK**, **PROF. SARAH BEKESSY**, **DR. MARK NORMAN, PROF. KIM DOWLING, ASSOC. PROF. LUKE KELLY, & Dr. LILY Van EEDEN**

CLOSE

VENUE: Caro Convention Centre - Main Hall Theatre (Building M)

4:45 – 4:55	**CLOSING ADDRESS** **Dr. DAVID CHEAL** (Federation University)

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10th Biodiversity Across the Borders Conference – Program

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KEYNOTE ADDRESS

Vegetation conservation and management: generality, specificity and progress

PETER VESK

The University of Melbourne

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Abstract

In this talk, I draw on my experiences straddling fundamental science and helping nature. I try to thread an imperfect understanding of plants, vegetation and ecology, into effective conservation management. One major challenge is 'the species problem'. Wallacean and Eltonian shortfalls highlight our lack of understanding on species distribution, abundance, dynamics and interactions with environment and other organisms. We have lots of conservation and ecological management problems. We are limited in our knowledge and capacity to address them. So how do we learn fast? How do we make best use of our knowledge? We seek to generalise and test the limits of generalisation. I will discuss three aspects of generalisation—data synthesis and meta-analysis, trait-based ecology and ecological modelling. I will draw on a range of work, including woodland landscapes with legacies of European settlement and land use. Along the way I will consider some common management actions, grazing exclusion, disturbance management, revegetation and translocation.

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PLENARY TALK

Designing Cities for Everyday Nature

SARAH BEKESSY

RMIT University

***Email**: sarah.bekessy@rmit.edu.au*

Abstract

The motivations for designing for nature in cities have arguably never been more compelling. Re-enchanting urban residents with nature can deliver a range of health and well-being benefits, while creating more climate change-resilient cities. Creating 'everyday nature' in cities presents opportunities to reverse the fate of many threatened species and connect people with nature and living cultural traditions. But this requires more than just urban greening; it involves ensuring daily doses of nature in a way that also supports non-human organisms. The future of liveable cities may well depend on this new conceptualization, but a major shift in the way nature is conceived of and designed for is required. Key to achieving this shift is establishing meaningful professional engagement between ecologists, planners and designers. Building on our experience working in this interdisciplinary space, I outline principles, processes and challenges for effectively designing for everyday nature in cities.

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PLENARY TALK

It's all about us: Understanding and influencing human behaviour to protect nature

LILY VAN EEDEN

RMIT University

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Abstract

Nature conservation is about people and our priorities for landscapes and the species that live in them. Our policies and management objectives are informed by our values, cultures and the relationships we want to have with nature. Societies are diverse, so not everyone has the same perceptions and priorities for environments and their management, which results in conflict. I apply social psychology and systems-thinking to understand how people shape, and can solve, conservation issues. In recognition of the human nature of nature conservation, people became a focus of Victorian biodiversity conservation policy through the *Victorians Value Nature* framework. I spent three years developing behavioural insights to inform this framework and associated government programs, seeking to understand how Victorians interact with and value nature. I will describe examples from my research in human behaviour change and human-wildlife conflict that illustrate how social factors underpin environmental problems, demonstrating how an understanding of how and why people do what they do should inform design of conservation interventions. In doing so, I encourage conservationists to widen their lens and consider how human values and systems shape their work processes.

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PLENARY TALK

How to act for nature in a rapidly changing climate: application of the Resist-Accept-Direct (RAD) Framework in parks management

MARK NORMAN

Parks Victoria

***Email**: mark.norman@parks.vic.gov.au*

Abstract

Nature and natural systems are increasingly being impacted by our rapidly changing climate. As the managers of more than 3,200 parks and reserves across the state, Parks Victoria and partners are seeking ways to conceive of and help nature in these unprecedented times. Impacts are manifesting in visible and well-documented ways, but also are occurring in more subtle, hidden or gradual circumstances. These changes are happening on three timescales: (i) impacts already happened or happening right now (for example major bushfire impacts), (ii) those coming soon (one or two seasons away), and (iii) those on longer timeframes. Each category requires different conservation management responses, ranging from standing up incident management teams under emergency frameworks (for example AIIMS), through to planning for differently conceived nature futures. In response to major ecosystem transformations occurring in North America, the US National Parks Service and US Geological Survey created the Resist-Accept-Direct (RAD) Framework, a management approach that is open and honest about these impacts, and is constructive and action-focused on the likely prognoses for different natural systems. The RAD framework creates a decision trichotomy for action:

- '**Resist'** where species and their habitats are likely to persist, for example through supporting climate-buffered refuges;
- '**Accept'** that for some ecosystems and species, change is inevitable and/or irreversible, and instead of adopting alternative actions to manage staged retreats, play roles in wider geographic responses and/or minimise extinctions. This could involve species extractions and translocations, and/or establishing insurance options, including elsewhere;
- '**Direct'** habitats/landscapes to potentially novel nature configurations, particularly for already transformed or degraded systems, for example replacing failing historical forest types with surrogate canopy-forming, fire-resilient tree species, including non-local species.

This approach poses a number of challenges: the move away from traditional 'resist-only' conservation, requiring communication with and engaging stakeholders for 'accept' landscapes that are transforming, and breaking new ground by considering non-local species to create new nature directed combinations. The RAD framework was developed for place-based management of ecosystems, as in protected area networks, asking questions like 'what can we do here to help nature?'. Conservation organisations or programs that focus on species or specific ecological communities could be alternatively characterised as 'buying time' in order to minimise loss and extinctions. The two approaches are compatible and can work well together through pangeographic, multi-sector, multi-tenure, cross-jurisdictional collaborations, where the former sector provides the sites of RAD-informed responses, while the latter considers wider geographic landscapes, options and solutions. Current, planned and potential RAD applications for place-based managers will be presented.

Weather and climate extremes in Australia: Implications for biodiversity conservation

SAVIN CHAND

Federation University Australia

***Email**: s.chand@federation.edu.au*

Abstract

In Australia, we are exposed to just about every weather- and climate-related hazards annually, ranging from severe thunderstorms, tropical cyclones and devastating floods to extreme bushfire and heatwave events. Over recent years, these extreme events are observed to occur in multiple combinations, referred to as compound events, causing widespread risks to various sectors across Australia. With future projections of increased level of greenhouse global warming, risks associated with weather and climate events are very likely to exacerbate. According to the recent IPCC-AR6 Report, anthropogenic climate change has altered marine, terrestrial and freshwater systems globally. Extreme weather and climate events, comprising conditions beyond which many species are adapted, are also having severe consequences on biodiversity through changes in, for example, ecosystem structure, species range shifts and changes in timing. A number of extreme weather and climate events have unfolded in recent past – such as the severe Black Summer bushfires in 2019-20 season over many parts of Australia, as well as the Grampians' region bushfire and the South Gippsland severe thunderstorm, which both occurred sequentially in February 2024. These events caused widespread destructions to biodiversity and inhibited efforts biodiversity conservation efforts. Given the huge risk weather and climate extremes pose to biodiversity in Australia, providing the much-needed information on present and future state of extreme weather- and climate-related hazards is more important now than ever before. In this presentation, I will highlight observed and projected changes in weather and climate extremes in Australia, and their impacts on biodiversity.

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Risks and opportunities for future wetland contributions to biodiversity in regional landscapes

DAVID DEANE

La Trobe University

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Abstract

Wetlands in agricultural landscapes are recognised biodiversity assets across much of temperate Australia. Many are listed as 'Threatened Ecological Communities' under the *Environment Protection and Biodiversity Conservation Act* (1999). These wetlands, by their nature, are not usually clustered closely, but are distributed across working landscapes, often in places where little native habitat exists. Most are located on private land. While these characteristics mean wetlands are under-represented in formal protected areas, they do result in two biodiversity benefits. First, wetlands increase native biodiversity at paddock-to-landscape scales; second, they provide patches of native habitat that help connect biodiversity isolated within other remnant native habitats, including reserve networks. Yet wetlands typically only persist in these working landscapes because they are simply too wet for other uses. A changing climate risks altering this delicate balance, and we ask what might this mean for their contribution to biodiversity? More particularly, what changes to wetlands are likely to occur, when will they happen, and how should we prepare? To make such questions tractable, I propose taking a dual focus. First, by quantifying the hydrological conditions preferred by different water plant groups, we will obtain a high-level framework to predict the nature of wetland vegetation for a given water availability scenario. Second, by characterising possible climatic extremes of wetting and drying, we can overlay this water plant framework with attempts to explore possible consequences and develop strategies to cope with each situation. To a first approximation, a climatic trend of gradual drying seems most probable for temperate Australia. However, this will be periodically interrupted by unprecedented extremes of flooding, constituting a short-term reversal in this trend. Initially, under gradual drying, wetlands will shift to support different species but largely retain their current area. The water plant framework predicts limited drying could result in wetlands with higher species diversity and greater structural complexity, potentially increasing their biodiversity value. However, with further drying, wetland habitat will change, and worst case scenarios will likely involve loss and reduction of wetland area. There is a community discussion to be had about how to prepare for such scenarios as permanent wetlands becoming seasonal, or seasonal wetlands becoming ephemeral. One option could be to preserve the former native habitat area by planting wetland fringes with terrestrial species that can expand as the wetland dries. In most of the anticipated cases, ecological resilience means having the diversity of species composition to allow wetland plant communities to 'track' short and long-term changes in water availability. However, this presents a challenge in landscapes which are largely devoid of other native vegetation. Exploring management and policy responses to probable worst-case scenarios will help us draw guard rails on likely outcomes and prepare our working landscapes for an uncertain climatic future.

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Multiple, complementary approaches to grassland conservation

NICK SCHULTZ

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Abstract

Temperate grasslands are among the Australia's most threatened ecosystems, having been decimated in extent and quality since European colonisation. As a consequence, grassland restoration is vital to promoting grassland diversity, ecosystem function and cultural connection with grassland landscapes. The challenges facing grassland restoration includes exotic species, changes in climate, urban expansion, and philosophical and cultural challenges related to land tenure. These concerns overlay the ecological challenges presented by isolation, dispersal limitation, land use legacies and inappropriate disturbance regimes. Nevertheless, there are a range of techniques and approaches to grassland restoration that vary in their targeted outcomes. The goals of grassland restoration can include the conservation of threatened plant species, maintenance of fauna habitat, improving landscape function and connectivity, or reinstating cultural connection to Country. In the spirit of the conference theme (*Drawing from the past to foster hope for the future*), this talk will consider the synergies among the multiple approaches to grassland conservation, and how small-scale intensive grassland restoration methods can facilitate broad-scale grassland restoration and management. For example, smaller areas of high species diversity can be achieved through seed addition, translocation, and intensive methods for overcoming site limitations. Such areas situated within broader grassland landscapes can act as seed sources to facilitate dispersal and recruitment, increasing the value of both approaches. I will consider the evidence for the complementarity of such approaches, which, whilst currently thin, offers hope for future landscapes with more secure, diverse, functional, and valued grassy landscapes.

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Biodiversity needs Mining: Oxymoron or inconvenient truth?

KIM DOWLING[1,2]

RMIT University[1]
Federation University Australia[2]

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Abstract

The human use of land, water and air has transformed our terrestrial biosphere into segmented anthropogenic biomes, with distinctive ecological patterns, attributes and processes. Consequently, our planet has more brownfields sites (transformed landscapes which are often contaminated) than it has pristine (intact or undisturbed landscapes) environments. The term pristine is misleading and with the evolving climate emergency, such sites will come under significant threat. If we are to holistically address planetary health, we must also consider modified landscapes. Such a focus does not detract from work on pristine/protected areas which may provide a designated refuge for biodiversity in times of accelerated climatic change, but we must address the need to normalise biodiversity discourse across all environmental sectors of our planet. Biodiversity does not exist only in the rainforest and will need to be supported in new and emerging environments, since, in this regard, modified landscapes account for more than 75% of our land surface. Most modified landscapes are linked to agriculture, deforestation, urbanisation, human infrastructure development and industrialisation. In the industrial category, mining accounts for 0.3% to 0.6 % of the global ice-free land surface. Even though the actual surface footprint of mining is small, the long and complex history of mining means that off-site effects may extend significantly beyond this small footprint. Global demand for minerals is growing at a significant rate and some of this demand is to support new and green technologies in the energy, storage battery and carbon recovery sectors. Recycling alone cannot address the needs of our growing human population, and in this complex environment, the need to mine for resources will persist. The environments that result from resource extraction are enormously diverse in character (such as artisanal, metalliferous, hydrocarbon, large industrial scale to community scale, ancient and modern) with many embedded and diverse landscape components and should be a primary target for improved biodiversity planning and delivery. Many jurisdictions have strong requirements for rehabilitation at closure, and this makes them a good starting point for targeting gains in biodiversity. A critical factor in biodiversity is sustained ecological resilience. It does not speak to returning to some ancient ideal, since the reality of our planet is one of continued evolution of biota and landscapes. Rehabilitation of a mine site starts well before mining commences, and support for biodiversity must run for the life of the mine and beyond. The willingness and capacity for authorities, corporations, and individuals to see "rehabilitation" as an ongoing process will be critical in the future. Can biodiversity (with an implied increase in species and genetic variety and abundance) be enhanced and even targeted at mine sites? This work puts mining as the focus, but it just one of many industries that are environmentally disruptive but not necessarily destructive. This work explores the negative perceptions of mining and how this perception may hamper positive action on biodiversity both during and after mining. It considers the context of mining in time and space, the value of biodiversity in evolving landscapes and the practical values of engaging with biodiversity in all environments.

References may be provided upon request.

The 'Great Outdoors', Future Forests and 30x30: a great opportunity for Victorian biodiversity conservation?

GEOFF WESCOTT[1,†] **AND JAMES FITZSIMONS**[1,2,3]

Deakin University[1]
The Nature Conservancy[2]
University of Tasmania[3]

[†]***Email***: *geoffrey.wescott@deakin.edu.au*

Abstract

Nations around the world have recently committed to protecting 30% of lands, freshwaters and oceans by 2030 (the 30x30 target), with Australia making this commitment at the national level, with the support of the States and Territories. At the end of 2023, the Victorian Government phased out native timber harvesting from state forests (1.8 million hectares) and has established a 'Great Outdoors Taskforce' to explore different land uses to accommodate a range of recreational and commercial uses, as well as new protected areas. This will be the single largest public land use transition process in Victoria's history and presents opportunities to ensure Victoria establishes a comprehensive, adequate and representative protected area system, that is well connected and protects areas of importance for biodiversity and ecosystem services. If the opportunity is fully grasped, this action could make a very important contribution to Australia's 30x30 targets. We discuss options and opportunities for Victoria's forests on public land in order to meet National and State biodiversity conservation policy commitments, and suggest how conservation scientists can and should contribute.

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25 YEARS OF INTEGRATED CATCHMENT MANAGEMENT – SO WHAT'S NEXT?

ADAM BESTER

Glenelg Hopkins CMA

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Abstract

Victorian Catchment Management Authorities have been in place for over 25 years and, in that time, have worked with a range of partners to deliver significant land, water and biodiversity improvements across Victoria. Key partners have included agencies, Non-Government Organisations, Traditional Owners, Landcare, Industry and Academic institutions together with a host of community groups. Together, these partners have helped deliver 21 million ha of pest plant and animal control, constructed 18,300 km of fences, undertaken 136,700 ha of vegetation enhancement and engaged with over 1.8 million people at biocultural events. Improvements in natural resources takes time, and we are just now seeing noticeable biodiversity outcomes from these works. For example, support for the Eastern Barred Bandicoot recovery efforts since the 1980s has resulted in the bandicoot being the first Australian animal to move from 'Extinct in the Wild' to 'Endangered' in 2022. Long-term funding support for threatened birds has resulted in population increases in species such as the Orange-bellied Parrot, Hooded Plover and Plains Wanderer. Large-scale river restoration and water recovery projects have resulted in range expansions, population increases and new local populations established for species such as the platypus, and numerous threatened and recreational fish species. However, we face some massive challenges ahead such as extreme events from the impacts of climate change, land use change, growing populations and declining investment into natural resource management (NRM). How best can we capitalise on the changing policy environment and growth opportunities in NRM, learn from approaches and successes of 25 years of integrated catchment management including thousands of years of Traditional Ecological Knowledge, to best equip us to protect our biodiversity into the future.

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The contribution of digging mammals to ecosystem function and restoration

AVIYA NACCARELLA[1,†] ANTHONY RENDALL[1], DUNCAN SUTHERLAND[2], AMY COETSEE[3], CAMILLE TRUONG[4], EUAN RITCHIE[1]

Deakin University[1]
Phillip Island Nature Parks[2]
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Royal Botanic Gardens Victoria[4]

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Abstract

Digging mammals can be viewed as ecosystem and biotic engineers. They contribute to a range of ecosystem functions and services, including improving soil health, providing habitat for other species, and facilitating seed and fungal spore dispersal. Whilst digging mammals were once common across most of Australia, habitat loss and degradation, combined with the introduction of invasive meso-predators, has greatly reduced their geographic range, population size, or driven some species to local or complete extinction. Without these species, we have lost many of the ecosystem services they once maintained. While the capacity of digging mammals to alter soil properties is well established, key knowledge gaps remain as to how we can apply these species, their ecosystem services, and these mechanisms of soil-turnover, to conservation efforts. This project aimed to explore how we can apply native digging mammals as agents of ecological restoration. We approached this from the perspective of conservation organisations, undertaking a questionnaire and series of semi-structured interviews across Australia, to understand what opportunities, challenges and knowledge gaps exist in the management of native digging mammals. This information is being used to develop management recommendations and an operational framework. The framework aims to provide a strategic tool for researchers and practitioners to guide the assessment, planning, implementation and monitoring of digging mammals for the purpose of conserving and restoring ecosystem function.

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Tracking the recovery of bird communities following restoration: insights from a long-term, multi-scale study

ANGIE HASLEM[1,†] ALEX MAISEY[1] ROHAN CLARKE[2], JIM RADFORD[1], ALISTAIR STEWART[2] AND ANDREW BENNETT[2]

La Trobe University[1]
Monash University [2]
Department of Department of Environment, Parks and Water Security[3]

[†]***Email**: a.haslem@latrobe.edu.au*

Abstract

Returning vegetation to agricultural landscapes is a key component of ecological restoration. Revegetation has benefits for agricultural production, native biodiversity and human wellbeing, and is consequently a major area of on-ground investment. Revegetation plantings provide habitat for fauna, and contribute to the overall amount of habitat in the landscape. Because revegetation is dynamic over time, its conservation value changes as plantings mature. This talk reports on a multi-scale empirical study tracking the recovery of birds over time following revegetation. Our findings at the landscape scale (replicated in 800 ha study landscapes) show that revegetation facilitates catalyze the return of many species of woodland birds to landscapes from which they have been lost due to clearing of remnant vegetation. Revegetation provides complementary resources to native habitats, and can support bird communities distinct from those found in the remnant vegetation. This finding serves to emphasize the importance of protecting and retaining existing remnants of native vegetation (including patches of plants and individual mature trees) because they provide crucial habitats that revegetation apparently does not replicate within at least 50-years post planting. Our findings at the planting scale (replicated, 1 ha study sites) show that local decisions about revegetation location and management influence the value of plantings for fauna. At both local and landscape scales, the value of revegetation increases over time and offers long-term benefits for biodiversity. It is recognised that revegetation is an effective investment for on-ground biodiversity conservation, with plantings being largely a 'one-off' investment which can be undertaken incrementally over time. In this way, collective revegetation activities from a range of stakeholders (individual landholders, community groups and Catchment management authorities) have the capacity to transform rural landscapes.

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Ecological restoration on arid zone rangelands; where less is often more

HEATHER NEILLY[1,2,†], PETER CALE[2], MARTIN WESTBROOKE[1] AND SINGARAYER FLORENTINE[1,3]

Federation University Australia[1]
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RMIT University[3]

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Abstract

It is predicted that, currently, 44% of Earth's terrestrial area requires conservation attention, either through the preservation of existing intact systems, or the restoration of degraded areas. One way this may be achieved is through the conversion of rangelands, which are properties used for livestock grazing, to conservation reserves. This is particularly so in the arid zone, where land productivity is low and will likely become less suitable for agriculture under climate change. When rangelands are converted to conservation reserves, destocking is often the first management action. However, livestock grazing leaves a complex legacy of impacts that have altered ecological processes and need to be addressed to achieve long-term recovery of biodiversity. Therefore, in addition to destocking, land managers may need to manage invasive plants and animals, reinstate natural disturbance regimes such as intermittent fire events, decommission infrastructure, including water-holding dams, control grazing pressure by other herbivores, revegetate and reintroduce natural fauna. Property owners need to know how to prioritise these actions in order that limited resources can be used effectively. In arid zones this is particularly important as more active, expensive restoration interventions, such as planting seedlings or direct seeding, often fail. This is because success is highly dependent on rainfall. We suggest that more passive and indirect restoration can be highly effective in facilitating restoration in arid systems. This may include indirect facilitation via threat removal, such as reducing total grazing pressure by closing water-holding dams, or in more degraded areas, introducing novel site preparations that promote natural regeneration. This latter approach can, for example, involve mechanical ripping to promote root suckering. We discuss examples of passive/indirect arid zone restoration from the Murray Mallee region of SA/NSW including work carried out at Federation University's Nanya Research Station.

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Does using environmental water to lifeboat threatened frogs through drought kill them with chytrid?

SAMANTHA WALLACE[1,2,†], **LAURA STANIC**[1], **JAWAD JILANI**[1] AND **DON DRISCOLL**[1]

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Abstract

Infection caused by the pervasive amphibian chytrid fungus, has resulted in pronounced declines and extinctions of frog species across Australia and around the world. Exacerbated by the increased prevalence and severity of drought conditions, infection with chytrid can decimate frog populations that are already contending with increasingly dry microhabitats. In this respect irrigation and provision of artificial refuges represents an exciting possible solution to help combat drought and encourage reproduction among terrestrial-breeding frogs. However, there is potential for the additional moisture beneath artificial refuges to encourage chytrid growth and infection. We investigated whether the provision of artificial refuges and supplementing moisture to these refuges increases the susceptibility of Bibron's toadlet (*Pseudophryne bibronii),* to infection by chytrid fungus. We also examined the overall susceptibility of Bibron's toadlet to chytrid, and whether infection is likely to result in mortality for this species. We experimentally tested the prevalence of chytrid infection among Bibron's toadlets at ten paired sites, with each site pair consisting of twenty roof tiles (the artificial refuges) that were irrigated with additional water or left dry. We assumed that artificial refuges may be more attractive as breeding sites due to their increased potential for moisture retention and temperature regulation compared to natural refuges. Whilst analysis of chytrid loads is still ongoing, our initial results indicate that chytrid infection rates differ between frogs found beneath artificial and natural refuges. Indeed, any trend in chytrid loads present in frogs between irrigated and non-irrigated sites is not yet apparent. Although these results are preliminary, there are important implications for the management of Bibron's toadlet and the use of artificial refuges to supplement breeding habitat and success.

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Avian Influenza in Antarctica: consequences for biodiversity, research and conservation challenges

MEAGAN DEWAR[1,2,†], LINEKE BEGEMAN[3], ANTONIO ALCAMÍ[4], BEGOÑA AGUADO[4], ANNE GÜNTHER[5], ARVIND VARSANI[6], RALPH VANSTREELS[7], MATTEO IERVOLINO[3], FLORENCIA SOTO[8], BEN WALLIS[9], AND MICHELLE WILLE[2,10]

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Abstract

Once considered primarily a threat to the poultry industry, the highly pathogeniic avian influenza is rapidly becoming a global threat to wildlife populations around the globe, with millions of seabirds and tens of thousands of marine mammals lost since 2021. Globally, it is estimated that 485 species from 25 avian orders and 37 new mammal species have been infected during this time, with Oceania the only region not impacted by the global outbreak. Antarctica, once considered one of the last pristine environments on earth due to its isolation, is its latest victim, with confirmation that HPAI H5 had finally arrived on the continent in late February. Since then, it has been confirmed in five other locations along both sides of the Peninsula and into the Northern Weddell Sea. It is, however, suspected that HPAI arrived much earlier on the continent with suspected cases being reported as early as December 2023. Because over a 100 million seabirds breed in dense colonies in Antarctica every summer, when this is coupled with the fact that many species are already facing significant population declines due to climate change, habitat destruction and prey depletion, the impact of a highly infectious disease could seriously impact biodiversity in the region. It is suspected that the virus now poses significant conservation challenges for species that are already under significant pressure, and more research is required to understand how the virus will impact species in the region, how it will spread around the continent and the impact it has already had.

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Why biodiversity research overlooking parasites can be misleading?

SHOKOOFEH SHAMSI

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Abstract

Parasites, which are often unseen and underappreciated, constitute a significant portion of our ecosystems, both in terms of number of species and number of individuals within a species. Despite their ubiquity, they are frequently overlooked in biodiversity research, leading to potentially misleading conclusions. This presentation aims to examine the crucial role parasites play in shaping ecological dynamics, revealing the necessity of integrating parasite ecology into broader biodiversity studies. By emphasising the interconnectedness of all organisms within ecosystems, we advocate that shedding light on this oversight through selected case studies, will reveal the intricate interplay between parasites and biodiversity, allowing for a more inclusive approach to biodiversity research that encompasses the often-neglected realm of parasites.

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Plant-animal interactions and the conservation of threatened flora

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Royal Botanic Gardens Victoria[2]

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Abstract

Plant-pollinator and plant-herbivore interactions both have important consequences for plant reproductive success. As such, failure to account for these interactions may reduce the likelihood of success in plant conservation programs, including conservation translocations. Research with threatened orchids in southern Australia has revealed that pollinator availability in the landscape can be a limiting factor for selecting sites for conservation translocation, although a review of Australian flora suggests that this issue may extend to other plant groups that exhibit specialised pollination systems. To improve how we account for pollinators in plant conservation translocations, we propose a strategy of investigating pollinator availability in the landscape, optimising the planting design to increase pollinator visitation, and evaluating hybridisation risk at the selected site. Like the lack of pollinators, grazing by herbivores is also a potentially an important determinant of the persistence of wild and translocated plant populations. We show that rates of herbivory of threatened flora is highly variable between locations and plant species, but that game cameras are an effective tool for identifying when vertebrate species are responsible. This information can be used to prioritise the need for herbivore management and to help develop strategies for the exclusion or reduction of herbivores.

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Conservation and management of the endangered ecological community *Tecticornia lylei* low open-shrubland

KRISTIN MONIE[1,†], **SHANE TURNER**[2], **GRANT PALMER**[1], **AND SINGARAYER FLORENTINE**[1,3]

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Abstract

In arid regions, distribution and recruitment patterns of salt lake plant communities are influenced by environmental extremes such as high temperatures, water and salinity stress, and to improve management of these communities, it is increasingly important to understand the physiological limits that regulate recruitment of threatened species. In this regard, knowledge related to *Tecticornia lylei* low open-shrubland is lacking. As a consequence, we surveyed all known populations in NSW (n=14) to understand the habitat and floristics of this community, particularly following high rainfall events. We assessed *Tecticornia lylei* seed germination responses to light, temperature, water and salinity stress, and seed longevity and persistence under controlled ageing and field conditions. Grazing effects on *in situ* regeneration were also investigated. We noted that floristic diversity in this community was low following extended drought and increased significantly following high rainfall events. Optimal germination of *Tecticornia lylei* seeds occurred at lower temperatures under reduced salinity and moisture stress, however seeds survived more extreme conditions and germinated rapidly following exposure to fresh water. Seeds were long-lived under experimental storage conditions and viability remained high after 18 months in field soils. Regeneration of established plants and seedlings was impeded under stock grazing, and we found grazing exclusion promoted seedling and plant regrowth, flowering and fruiting. This indicates that management of stock grazing is essential to ensure *T. lylei* plants reach reproductive maturity and disperse seeds, and that recruitment opportunities are maximised in cooler conditions following rainfall to allow seed germination and establishment to occur. By intervening during these critical periods, we can assist this resilient community to sustain and improve current populations, as they are faced with increased stressors expected with climate change.

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Counting the birds and the bees: Incorporating biodiversity into environmental accounting for improved conservation outcomes in agricultural landscapes

ALEX MAISEY[†], **FRED RAINSFORD**, **AND JIM RADFORD**

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Abstract

The extent to which biodiversity can co-exist with agriculture, has a large bearing on conservation outcomes, globally and in Australia. To restore ecosystems and reverse biodiversity loss, we need new ways to value, measure and manage biodiversity in agricultural landscapes. Natural Capital Accounting (NCA), sometimes called Environmental Economic Accounting, has often been promoted as a tool for quantifying and valuing natural assets and reporting on environmental performance. However, previous approaches lack the spatial and ecological resolution necessary to account for biodiversity and ecosystem services *at the farm-scale,* which is a problem given that this is the scale at which management decisions that impact most on biodiversity are made. We have therefore developed the framework, structure and tools to quantify natural capital assets and generate Natural Capital Accounts at the farm-scale. In the process, our research has demonstrated the current value of farms for biodiversity conservation, with 227 bird species, including 34 threatened species, being recorded from 50 farms. This represents less than 1% of the total study area, but contains 71% of all bird species expected in the study region. This observation emphasizes the importance of improving landscape management for restoration of biodiversity and ecosystem services. Farm-scale Natural Capital Accounts represent a significant advance in environmental-economic accounting, having the potential to revolutionize sustainability reporting in agriculture. The accounts are farm-scale, data-driven, time-stamped, transparent, robust and repeatable. They contain verifiable information about the extent and condition of natural capital assets such as soil, vegetation and biodiversity), in conjunction with ecosystem services such as forage, carbon sequestration, pollination, soil regulation, shade and shelter. In addition, environmental performance, which includes Greenhouse Gas emissions and general pollution, is noted at the farm-scale. Australian farmers face increasing pressure from international markets and their supply chain to report on their environmental performance and demonstrate their sustainability credentials. In this respect, farm-scale NCA will play a critical role in environmental performance reporting. The accounts will provide farmers with information to improve their management of natural capital and biodiversity, which can be leveraged for productivity and business outcomes, which critically include market access, sustainability reporting obligations and price premiums. Simultaneously, the accounts provide the agricultural supply-chain and emerging biodiversity markets with verifiable information on the environmental performance of farm businesses, overcoming problems associated with 'greenwashing' claims of companies and retailers.

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Communities of sound: nature engagement through ecoacoustics

KAREN MC **ROWE**[1,2,†], **AARON GRINTER**[3], **AND SERA BLAIR**[4]

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Abstract

In Australia, public connection to nature, caring for country, and the sharing and building of nature knowledge has become a National priority (Australia's Strategy for Nature 2019 – 2030). To underpin this work, there is a need for the continued collection of distributed, standardised biodiversity data to track threatened species trajectories, document wildlife population dynamics and assess the overall health of ecosystems. This data is critically needed for effective and ongoing conservation policy and management. Engaging communities in ecoacoustic surveys and monitoring can combine these two objectives and provide unique and varied opportunities for citizen scientists to participate in scientific research for improved policy and management outcomes. In this talk, we explore the components of two different and successful community ecoacoustics projects – the Victorian Plains-wanderer song meter program and Communities Listening for Nature. While differing in their approach and depth of engagement, both programs use ecoacoustics to document species and soundscapes, providing examples of how to empower researchers and practitioners to apply this method as part of a community engagement biodiversity monitoring strategy.

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Mapping abundances of rare bird species across 1M hectares – some things you can't do alone

SIMON VERDON[1], RHYS MAKDISSI[1,†], WILLIAM MITCHELL[1,2] AND JIM RADFORD[1]

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Abstract

Management programs that are based on the needs of rare species are often ineffective because they fail to collect enough data to reliably estimate abundance and map distributions for their target species. In this way, information that does exist for rare species is often based presence-only data, because it is difficult to collect sufficient data on abundance for such species. In this project, we sampled across a large reserve system (1M hectares) in the Southern mallee region of Western Victoria and Eastern South Australia, with the aim to (i) collect sufficient abundance data, (ii) identify important gathering locations and (iii) estimate population sizes for ten rare and secretive mallee bird species that have been excluded from previous studies due to insufficient data. We undertook intensive field surveys, using repeated 2-hour, 25-ha area searches of 660 independent sites. Total survey effort was 2,640 hrs across 16,500 ha (with two surveys per site). We engaged 57 volunteers (citizen scientists) and three staff to achieve the required survey intensity, with most surveys undertaken by volunteers. This survey effort returned enough high-quality data on nine rare bird species to identify important locations and update estimates of population size. For example, our population estimate for the threatened Red-lored Whistler (*Pachycephala rufogularis*) was nearly 16 times larger than the previous estimate. Our mapped important locations are already being used by fire agencies to inform the planned burn program in part of the study region. Volunteers also detected two Mallee Whipbirds (*Psophodes nigrogularis leucogaster*), which represents the first such record in Victoria for 40 years. Given the rarity of the target species, a collaborative approach between scientists and skilful, engaged and dedicated citizen scientists was the only way to achieve the ambitious project goals. We identified this requirement early, designing our data collection and analysis to account for multiple observers with variable skill levels. This is something that can be done for most similar projects. We also note that people engaged with our project because we were able to articulate the contributions of volunteers and the direct links between our research and conservation management.

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Fire, Predators and Mammals of Northwest Victoria

ANGE PESTEL[†], **RACHEL MASON**, **ANTHONY RENDALL**, **DON DRISCOLL**, **AND EUAN RITCHIE**

Deakin University

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Abstract

The mallee-heath of the Big Desert-Wyperfeld Park complex on Wotjobaluk Country, is located in semi-arid North-western Victoria. The native mammalian fauna of the region are impoverished because of the exclusion of First Nations' cultural practices, introduced predators, and widespread habitat destruction and fragmentation associated with the intensification of agriculture since European colonisation. The species that persist may therefore be regarded as somewhat resilient to changes that have occurred in the region, but interactions between fire, introduced predators, and native mammals still require further examination to inform effective management. This region has a history of large bushfires and is managed with regular prescribed burning aimed at preventing future large-scale fires. Invasive red foxes (*Vulpes vulpes*) are also managed through lethal baiting across the park complex for biodiversity protection. Working with land managers, we investigated how management decisions shape this ecosystem by (i) determining how fire history and other environmental variables affect mammal community composition and invasive predators, and (ii) identifying how fire management practices influence the outcomes of invasive predator control for both target and non-target species. In this presentation, we will summarise some of the key results of our research and provide recommendations for integrated fire and pest management of this region and its ecosystems.

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Fire and biodiversity across multiple ecosystems

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Abstract

The intensity and frequency of wildfires are changing rapidly, and many animal species are at risk from megafires and inappropriate application of fire regimes. Accordingly, land managers need to predict the effects of different fire management strategies on fauna to aid species persistence. However, it is recognised that accurate prediction is limited by insufficient knowledge of many species' basic fire ecology and their interactions with fire, vegetation structure and climate. In this talk I will outline an extensive fire-effects study across sites in five major ecosystems of South-eastern Australia. Whilst in general, these ecosystems are thought to be fire tolerant, as the dominant overstorey trees are resprouters, the effects of varying fire regimes for fauna in these ecosystems is less well known. The objectives of this study were to (i) determine the effects of time since fire and fire frequency on birds, mammals and vegetation structure, (ii) determine ecologically sensitive fire management targets that incorporate faunal fire responses, and (iii) investigate the role of climate and other landscape drivers in shaping species fire responses. Overall, we found that many bird and mammal species were resilient to a wide range of variation in fire patterns. Nevertheless, preferences for vegetation conditions mediated by particular fire regimes were evident for some species, including threatened species. This work provides key new knowledge that will inform ecologically sensitive fire management in resprouting forests.

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The role of flooding rains and flammable plains in shaping small mammal distributions

LUKE KELLY[1,†], SINGARAYER FLORENTINE[2,4], JULIANNA SANTOS[1], AND HELEN WAUDBY[3,]

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Abstract

Mallee ecosystems, which lie between the dry interior and the cooler southern regions of Australia, support a range of diverse fauna, including many threatened species, and we recognise that these ecosystems are crucial for preserving Australia's biodiversity. We examined small mammal data collected at 40 sites in the mallee ecosystems of Western New South Wales from 2018 to 2023, along with long-term small mammal data from a nature reserve collected from 1997 to 2023. Some study sites were affected by recent wildfires and planned burning, and it is noted that our data spans both droughts and periods of high rainfall. We used a combination of broad-scale and long-term data to examine how changes in climate and fire impacted the distribution of two threatened species: the insectivorous Mallee ningaui (*Ningaui yvonnea*) and the omnivorous Bolam's mouse (*Pseudomys bolami*). Our findings highlight that the distribution and abundance of these threatened species are closely tied to patterns of rainfall and fire. Non-linear regression models indicated that Mallee ningaui is most frequently found in mature vegetation with dense hummock grass cover. Bolam's mouse, which is rarely observed in wider surveys, was more frequently captured following high rainfall, suggesting that increased rainfall may boost plant growth and subsequently enhance the mouses' food resources such as seeds. This study emphasises the need for tailored conservation strategies that consider the specific life histories and environmental responses of threatened species. This information is vital for land managers tasked with protecting these unique mallee ecosystems and their biodiversity.

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Behaviour, not physical limitations, determines movement between preferred and non-preferred habitat by the dasyurid, *Ningaui yvonneae*, in a fire-prone landscape

JACINTA RICHARDSON[1,†], ASHLEY OLSON[1], HELEN WAUDBY[2] AND GRANT PALMER[1]

Federation University Australia[1]

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Abstract

Fire plays an important role in the distribution of habitats throughout arid landscapes by burning various patches of vegetation. This creates a mosaic of habitat patches that are suitable for the needs of different species. However, for animals to forage effectively, or colonise new locations, they must be able to move between patches of their preferred habitat. In this respect, the Southern ningaui (*Ningaui yvonneae),* is known to prefer patches of vegetation that are approximately 20-35 years post-fire but its ability to move between patches of separated preferred habitat is unknown. We investigated the potential for Southern ninguai to move through the landscape by radiotracking individuals. We determined the permeability of the landscape by quantifying the species' abundance at paired sites (n = 5) in preferred and non-preferred habitat within close proximity (50 m apart) through pit-fall trapping. We successfully radio-tracked four Southern ningaui for between 1 and 6.5 hours. Our results demonstrated that these creatures can move considerable distances over short time periods, travelling more than 180 metres per hour, which is far further than has previously been reported over short time frames. However, of the 16 Southern ningaui we trapped in total, only one individual was detected in burnt habitat, with the other 15 captured at the nearby unburnt sites. These findings show that, although these creatures are capable of moving long distances for their size, burnt habitat appears to be strong deterrent for their movement. This suggests that their movement is constrained by a behavioural decision not to enter a non-preferred habitat rather being driven by physiological limitations. The strong impact of non-preferred habitat on Southern ningaui movements highlights the importance of considering patch connectivity and animal movement behaviour in fire management planning in fire-prone landscapes.

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Finding hope in the archives: A case for environmental history

LILIAN PEARCE

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Abstract

Have you considered how oral history research can tap into community memory and local knowledge where you are working? Do you know how much information that can potentially inform ecological baselines is hidden in archives? And what might be uncovered in the humble family photo album to inform and inspire long-term ecological research? We suggest that environmental history has a critical role to play in enhancing conservation, biodiversity, restoration and NRM work, in conjunction with strengthening community connections. In this paper, I will introduce some of the important projects which have happened through the interdisciplinary environmental humanities *Centre for the Study of the Inland* at La Trobe University. I will provide examples of surprising information found in the archives that has helped both to shape action-oriented work and also to change the way that we might think about 'problems' and their 'solutions'. By understanding conservation challenges and technologies within their historical context, different possibilities and risks can be foreseen. It is important that, in the search, we hope that we do not reduce the stories we tell to simplified narratives that foreclose possible futures. In this respect, sometimes allowing things to remain complicated and difficult is the first step in enabling honest reflections to be made that inspire innovative or hopeful interventions. The Humanities are adept at this complexity, and it is suggested that from individual stories to long histories, these skills can be an essential tool in understanding change over time, broadening research and management goals, and telling important stories that can mobilise action.

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Poster Abstracts

Evaluation of UV-C light as a viable source to control selected submersed aquatic weeds in the Macalister irrigation district, Gippsland

DIAN UDUGAMASURIYAGE[1,†], KUSHAN TENNAKOON[1], ARUNIKA GUNAWARDENA[2], CATHERINE CORKILL[3], AND GAYAN KAHANDAWA[1]

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Southern Rural Water[3]

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Abstract

The presence of aquatic weeds in irrigation canals poses several significant issues, including hindering the continuous flow of water that can leads to reduction of water supply for agricultural use. As a consequence, numerous methods for controlling aquatic weeds have emerged over time, with herbicide application being a widely used established method of weed management, notwithstanding it is now recognised to impose significant environmental risks. To address this issue, this novel industry-linked research assesses the suitability of UV-C radiation for controlling two major submerged aquatic weeds in the *Macalister Irrigation District* (MID), situated in East Gippsland. These invasive weed species are *Elodea canadensis* and *Vallisneria australis*. To assess the UV-C impact on these weeds, we examined both physical and biological changes of the leaves exposed to UV-C under controlled environments. We applied UV-C radiation at 254 nm wavelength to leaves for varying exposure times. ranging between 30 to 120 minutes, in order to determine the effect that radiation energy can have on cell bio-physical activities. To observe plant cell death, we used 0.5% Evans blue (w/v%) staining, assessing the impact on cell metabolism by quantifying the change in chlorophyll a and b levels. We observed numerous bio-physical changes in treated plants, including cell membrane disruption, loss of plant buoyancy, cytoplasmic streaming cessation and chloroplast agglomeration after exposure to a minimum UV-C radiation energy of 180 kJ/m^2. Our ongoing research addresses two questions. The first is 'What is the effective UV-C radiation energy that can kill study species by impacting cell metabolism?', and the second is 'When do plants indicate visible changes in response to UV-C?' Findings of these controlled environmental studies will be tested *in-situ* in selected canals to assess the suitability of this technique to reduce heavy dependence of aquatic weedicide applications in irrigation canals of the MID.

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A Review of Disturbance Impacts on Ant Interactions in Different Climatic zones

NORMA FERNANDO[1, †], NICK SCHULTZ[1], GRANT PALMER[1] AND PHILIP BARTON[2]

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Abstract

Ants are widely used as bioindicators in land management studies, as the composition of ant communities undergoes observable changes in response to habitat disturbances. In this respect, an understanding of the disturbances that impact ant interactions across different climates is important for land management and biodiversity conservation. Over the past 30 years, there has been a significant increase in research assessing disturbance impacts on ant interactions with other taxa, including plants, other invertebrates, vertebrates and microorganisms. We aimed to synthesize current information to identify knowledge gaps and guide future research. We conducted a systematic review, gathering data from 98 studies published between 1990 and 2023, which represented four major climatic regions. These studies were conducted across 22 countries, with the highest proportion being in Brazil (31%). Our findings revealed that studies on ant-plant and ant-ant interactions were conducted in every climatic region, whereas studies examining disturbance types such as fire, grazing, vegetation clearing and cropping, varied among climatic regions. Ants mostly interact with plants, with ant-mediated seed dispersal being particularly prominent in arid zones, and studies on ants and extrafloral nectar (EFN) plants being mainly studied in tropical regions. Furthermore, we observed a limited number of studies conducted in arid landscapes, highlighting the need for more research to identify disturbances specific to arid zones and understand ant interactions in arid regions.

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Integrating scenario planning and conservation action planning to support climate adaptation at Parks Victoria

MATHEW BERG[†], **PHIL PEGLER**, **FIONA SMITH**, **GENEVIEVE MATTHEWS**, **KATHRYN SCHNEIDER**, **KATHRYN STANISLAWKSI**, **MARK NORMAN**

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Abstract

Scenario planning is increasingly used to incorporate future climate uncertainty into climate adaptation planning. Typically, this involves the characterisation of multiple plausible and divergent climate futures. These can inform strategic planning, decision-making and engagement through expert elicitation, narrative development and improved climate readiness of existing plans. Despite its benefits, barriers to the development and uptake of scenario planning remain, including methodological complexity, the technical capability and resources required, subjectivity and transparency of methods, integration with established planning approaches, and translation of scenarios into improved decision-making. At Parks Victoria, Conservation Action Planning (CAP) forms the basis for strategic landscape-scale conservation planning, and plans have been developed or are in development for 18 biogeographic landscapes covering Victoria's terrestrial and marine parks and reserves. More recently, Parks Victoria has also adopted the resist-accept-direct (RAD) framework to navigate the transformational ecological change expected under climate change (refer to the Plenary by Dr Mark Norman). Here, we present our approach to scenario planning which has been developed specifically to support the CAP program and RAD thinking at Parks Victoria, and to address some of the aforementioned challenges. We show key elements of our approach including (i) the application of computational methods to objectively identify plausible, divergent climate futures at relevant scales, (ii) structured elicitation to build focussed scenario narratives, and (iii) translation of narratives into climate-ready plans through stress-testing existing goals and actions. We illustrate our approach using example outputs for Victorian park planning landscapes, demonstrating how it supports ecosystem vulnerability assessment and identification of climate-ready goals and low-regret actions, together with the development of potential pathways under the RAD framework. More broadly, our work highlights the benefits that can be achieved by using methods such as scenario planning to facilitate data-driven, climate-ready decision-making in the management of protected areas.

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An Affordable and Accessible Way for Volunteer Groups and others to replace their Photo point Monitoring with High Resolution GIS Imagery.

BARRIE TAYLOR

Wedderburn CMN Mt. Korong Ecowatch Landcare, Victoria University

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Abstract

The land drone prototype used in this area consists of a back-pack with harness, supporting a survey grade GNSS* device and two action cameras. Open-source* software is used to process the three signal files collected by the land drone. Since the National Restoration Standards* prescribe the maintaining of a Recovery Wheel* document for the lifetime of any ecological recovery project, the land drone can provide efficient and valuable data for this validation of the Recovery-Wheel data.

Hardware Used for Prototype

Emlid Reach RS2, which powers two Action cameras. These provide front nadir and rear oblique orientations.

DJI Osmo Action 4, FedoraLinux/Windows11. A dual-boot entry level gaming Desktop computer with 18 TB HDD.

Software Used for Prototype: QGIS, Linux Command Line, ffmpeg, LosslessCut

LibreOffice Calc

Workflow

A fieldwork event of 30 minutes duration was designed to collect the three source files associated with each fieldwork event. The source video file (4K 30fps MP4) is cut into 2.6 second duration video segments and a text file of an ordered list of the path to each of the 2.6s clips is saved. A Linux script was written to achieve a synchronization of the video frames and the GNSS device log file. The timestamp of each video frame was assumed to be at 29.97 frames per second as reported by the camera, with each frame being equidistant in time. A sound emitted by the GNSS device enabled the log file and the video file to be cut at the log tick that matched the frame number. The algorithm for the Linux script (which involves a small C++ program) ensures that overlap frames from one video segment to the subsequent segment are taken into account when matching the log ticks with the video frames. On completion of the Linux script, an output text file is concatenated (LibreOffice Calc) with the ordered list of video segment paths to produce a four-column spreadsheet which contains:

Latitude Longitude Accuracy Path to video segment.

This output text file can then be loaded as a Delimited Text File creating a new layer to the QGIS project's map canvas.

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Linking *ex situ* germination to *in situ* direct seeding for landscape scale restoration efforts in the semi-arid Mallee region of Victoria

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Abstract

Direct seeding has high potential for creating arid revegetation, but its success is limited by low levels of germination and seedling emergence. It is suggested that direct seeding success may be improved through developing an understanding of the germination biology and requirements of the species used for specific projects. This study looked into the germination temperature and moisture requirements of four semi-arid species from Victoria's Mallee ecosystems, to understand how their germination biology may advise the strategy for future plantings. The effect of temperature on germination was analysed by incubating the seeds under three different regimes: 30/20°C, 25/15°C and 17/7°C. Moisture requirements were determined by germinating seeds along a water potential gradient created using polyethylene glycol 8000 solutions. Results showed three different responses evidenced by the study species: (i) *Acacia ligulata* has a generalist approach, germinating well in all temperatures with a reasonable tolerance to water stress, (ii) *Eucalyptus calycongona* and *Melaleuca lanceolata* germinate rapidly under higher germination temperatures and have generally higher water stress tolerance, whilst (iii) *Callitris gracilis* germinates poorly in hot or dry conditions, restricting its germination to cooler and wetter conditions. Based on our results, *Acacia ligulata* would be the most widely applicable species for direct seeding work based on its generalist germination habits. *Callitris gracilis* would appear to do well if planted in cool wet conditions where this species prefers to germinate but would be intolerant to warm weather planting. The ideal planting time for a mixed species planting would be mid-autumn and late-spring, as that is when temperature and moisture levels would be optimum for germination

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Small mammals respond more strongly to environmental gradients and habitat resources than fire history and foraging resources in woodland ecosystems

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Abstract

It is well known that insufficient knowledge of species' resource use post-fire, significantly limits effective fire management planning, especially as random fires become more frequent and intense under climate change conditions. In this respect, there is a complex three-way relationship between fire, vegetative resources and native fauna, a relationship model which is further complicated by broad-scale environmental gradients in rainfall and temperature. This study aimed to determine the interrelationships between fire, resources, and small mammals at a range of spatial scales. Elliott trapping was used to capture four faunal specie, these being (i) the Yellow-footed antechinus (*Antechinus flavipes*), (ii) the Bush rat (*Rattus fuscipes*), (iii) the Heath mouse (*Pseudomys shortridgei*) and (iv) the House mouse (*Mus musculus*). Trapping was carried out across a time-since-fire gradient at 111 sites. We quantified habitat (vegetation structure) and foraging resources (invertebrates) at each site. Generalized linear models (GLMs) were used to determine relationships between fire, resources and small mammal occurrence. Habitat resources were found to be better predictors of small mammal occurrence than time-since-fire, and there was no relationship between invertebrate biomass and any of the four faunal species. Each species showed preferences for specific habitat resources, such as tree hollows for the Yellow-footed antechinus and dense low vegetation cover for the Heath mouse. The lack of fire responses was likely driven by the strong environmental gradients and the weak relationships between fire and resources. Our work highlights the importance of resources in facilitating species persistence in fire-prone landscapes. Fire management will be improved by developing a greater understanding of the resources that species rely on and ensuring that fire management protects and improves these resources.

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