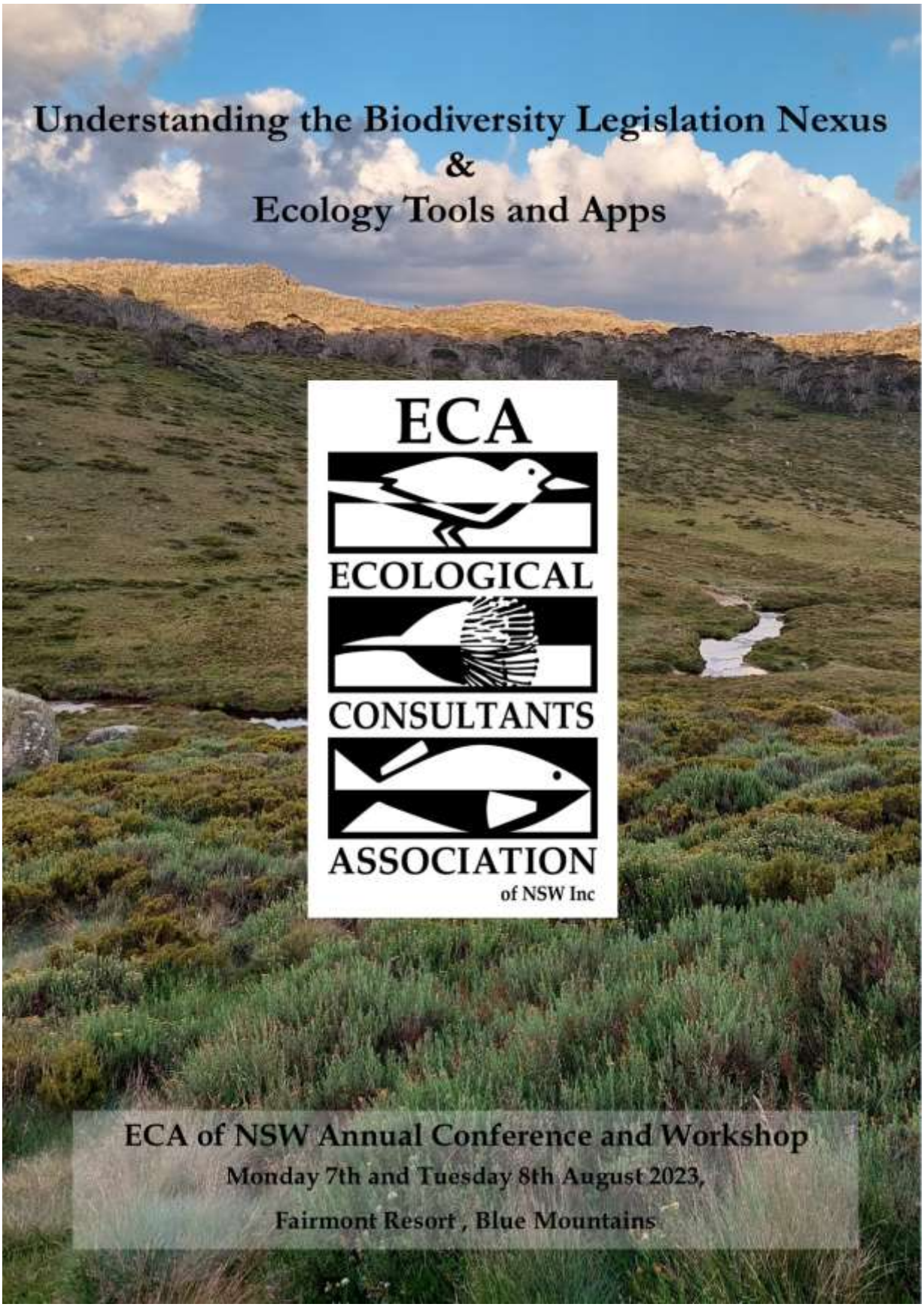
Understanding the Biodiversity Legislation Nexus
&
Ecology Tools and Apps
ECA
ECOLOGICAL
CONSULTANTS
ASSOCIATION
of NSW Inc
ECA of NSW Annual Conference and Workshop
Monday 7th and Tuesday 8th August 2023,
Fairmont Resort , Blue Mountains

Ecological Consultants Association of NSW

Annual Conference 2023

Monday 7th August Fairmont Resort,
Leura, Blue Mountains

Program

Understanding the Biodiversity Legislation Nexus

8:30 - 9:00	***REGISTRATION***	***Tea and coffee available***
	TOPIC OF PRESENTER	PRESENTER
9:00 – 9.05	*Conference Welcome*	**Rebecca Hogan** ECA President
9.05 - 9.15	*Welcome to Country*	**David King (Dingo Darbo)**
	SESSION 1: LLS Act and the BC Act and EPBC Act	**Chair: Jessica O'Leary**
9.15-9.45	*The Land Management Framework*	**Luc Farago** Local Land Services
9.45-10.00	*Interactions between Part 5A of the LLS Act and Biodiversity Legislation*	**Jessica Rossell** Local Land Services
10.00-10.15	*Q & A Session 1*	
10.15-10.45	***MORNING TEA***	
	SESSION 2: Rural Fires Act and the BC Act	**Chair: Rebecca Hogan**
10.45-11.05	*PFBP 2019 – Overview of APZ, expectations for Management, Monitoring / compliance*	**Grahame Douglas** Senior Lecturer at School of Computing, Engineering and Mathematics, Western Sydney University
11.05-11.45	*Controlled Burning: Legal Aspects, Practices and Management*	**Jim Killen** Community Protection Planning & NSP Coordinator Planning & Environment Services East NSW Rural Fire Service
11.45-12.20	*Fire as a management tool and bush fire preparedness on land with a BCT agreement*	**Dr Chels Marshall and Melissa Huntsman** NSW Biodiversity Conservation Trust
12.20-12.30	*Q & A Session 2*	
12.30-1.15	***LUNCH***	
1.15 – 1.35	*The NSW State Vegetation Type Map undermines ecological fire management in dry sclerophyll forests on the NSW north coast*	**Andy Baker** Wildsite

1.35-1.55	*Increasing the supply of in-demand biodiversity credits*	**John Seidel** Credits Supply Taskforce DPE
	SESSION 3: EPBC Act and its interactions	**Chair: Jason Berrigan**
1.55-2.15	*The NSW Biodiversity Offsets Scheme and its interaction with the EPBC Act*	**Amy Dumbrell**, DPE
2.15-2.50	*EPBC Act reform update followed by EPBC Act referral, assessment and bilateral process*	**Martin Paull** Director, Southern NSW Assessments Section DCCEEW
2.50-3.20	*Q & A Session 3*	
3.20-3.40	***AFTERNOON TEA***	
	SESSION 4: Student Presentations	**Chair: Paul Burcher**
3.40-3.55	*Passive monitoring facilitates assessment of the multi-scale factors driving bat box usage in urban reserves*	**Elsa Kohane** Sydney University
3.55-4.10	*Comparing artificial intelligence (AI) models for the detection of mammals in camera trap images*	**Jess Tam** UNSW
4.10-4.25	*Microphytobenthos biomass as a potential indicator of bushfire impact*	**Thayanne Lima Barros** UNSW
4.25-4.40	*Does fire affect the relationship between plants and their pollinators, or are they capable of rekindling things when burned out*	**Joshua Whitehead** University of New England
4.40-4.55	*Restoring Drylands from the Ground Up: Soil health response to reintroduced semi-fossorial mammals*	**Jana Stewart** UNSW
5.00-5.45	***ANNUAL GENERAL MEETING***	
6.00-9.00	*Conference Dinner and Trivia*	

SESSION 1: LLS Act and the BC Act and EPBC Act

Chair: Jessica O'Leary

9.15-9.45 *The Land Management Framework*

Luc Farago
Local Land Services
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Abstract:
This presentation provides an overview of the Land Management Framework that includes the following components which work together to regulate native vegetation management on private rural land in New South Wales:

- The Native Vegetation Regulatory Map, Land Management (Native Vegetation) Code 2018, Allowable Activities, and the Native Vegetation Panel under the *Local Land Services Act 2013*.

- Private Land Conservation delivered by the Biodiversity Conservation Trust under the *Biodiversity Conservation Act 2016.*
- The Biodiversity Offset Scheme under the *Biodiversity Conservation Act 2016*, and
- Changes to the management of native plants and animals via the Save Our Species program, wildlife licensing, Areas of Outstanding Biodiversity Importance, and modernising threatened species listings.

Biography:
Luc is an environmental scientist who is working as a Principal Policy Officer within Local Land Services' Policy Team. He lives on the Northern Tablelands of NSW with his wife and family and has worked across a range of resource sectors over the last 20 years, including renewable energy, sustainability rating tools, carbon markets, natural resources management, and agricultural sustainability. Luc is now utilising his range of operational experience in a policy context within Local Land Services, with his recent focus being the Statutory Review of the native vegetation provisions in the *Local Land Services Act 2013*, working with the Australian Government on supporting landholders through dual State and Commonwealth legislative requirements, implementing private native forestry monitoring in partnership with the Natural Resources Commissions, and working with the NSW Government's Biodiversity Credit Taskforce.

9.45-10.00 *Interactions between Part 5A of the LLS Act and biodiversity legislation*

Jessica Rossell
Local Land Services
jessica.rossell@lls.nsw.gov.au

Abstract:
An overview of the relationship between the native vegetation provisions in the LLS Act and the Land Management (Native Vegetation) Code with the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) and compliance and enforcement under the *Biodiversity Conservation Act 2016* (NSW).

Biography:
Jessica is a Principal Policy Officer in the Policy Team at Local Land Services. Prior to joining the Policy team in early 2022 Jessica successfully coordinated delivery of on-ground Bushfire Recovery projects and development of flood recovery funding proposals for North Coast Local Land Services. Jessica trained as a lawyer and has worked in a diverse range of public policy areas in central and portfolio NSW agencies, including exploration and mine rehabilitation, energy, public forestry, land management and climate change adaptation. Jessica has also worked for the Australian Government coordinating delivery of COAG Closing the Gap reforms in remote Aboriginal communities in NSW. Jessica is based in Sydney.

SESSION 2: Rural Fires Act and the BC Act

Chair: Rebecca Hogan

10.45-11.05 *PFBP 2019 – Overview of APZ, expectations for Management, Monitoring / Compliance*

Grahame Douglas
Senior Lecturer at School of Computing, Engineering and Mathematics, Western Sydney University
G.Douglas@westernsydney.edu.au

Abstract:
Bushfire protection through the use of asset protection zones (APZs) may be seen as conflicting with biodiversity values, however, the real issue is that failure to account for bushfire early in the planning process can be critical is delivering both bushfire safety as well as biodiversity outcomes. The process of identifying and implementing APZs will be considered as well as issues of retention of biodiverse areas. Key decisions of the Land & Environment Court will also be considered.

Biography:
Dr Grahame Douglas is the academic course advisor of the Postgraduate Construction programs with the School of Engineering, Design and Built Environment, Western Sydney University. He has research interests in bushfire protection measures through planning and construction practice as well as in the impact of climate change on bushfire behaviour. Grahame previously worked with the Rural Fire Service of the New South Wales for more than 17 years and was responsible for developing the legislative provisions, policies and guidelines relating to bushfire risk management planning, development control for bushfire prone areas, environmental impact of hazard reduction activities and assisted in initial changes to the state's variations to the Building Code of Australia. He is the principal author of *Planning for Bushfire Protection* (2001 and 2006) and co-authored many journal and conference publications in the relevant area. He completed his PhD in 2017 and has held a number of public positions including a member of the FP-020 committee for the Australian Standard AS3959 *Construction in Bushfire Prone Areas*. He is a Hon Life member of the Bushfire Protection Association of Australia.

11.05-11.45 *Controlled Burning: Legal Aspects, Practices and Management*

Jim Killen
Community Protection Planning & NSP Coordinator; Planning & Environment Services East, NSW Rural Fire Service
jim.killen@rfs.nsw.gov.au

Abstract:
The NSW Rural Fire Service is responsible for a number of pathways to allow for bushfire hazard reduction works, Ivan will explore the various approval pathways and the differences between an assessment application and an entitlement under the Rural Fires Act. There are various legal obligations with controlled burning that need to be understood before lighting that fire, these are aimed at protection of life, property and the environment and should not be viewed as a hindrance. Ivan will give an oversight of the synergies that exist between fire and the environment along with some practical examples of outcome focused works.

11.45-12.20 *Fire as a Management Tool and Bush Fire Preparedness on Land with a BCT Agreement*

Melissa Huntsman and **Chels Marshall**
NSW Biodiversity Conservation Trust
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chels.marshall@bct.nsw.gov.au

Abstract:
The NSW Biodiversity Conservation Trust landholders interact with the BC Act and Rural Fires Act in the implementation of burning for cultural, ecological or hazard reduction purposes, as well as bush fire preparedness activities.

BCT is continually working to improve cultural appropriate support available for Aboriginal landholders with a BCT agreement, so they can lead the continuation and renewal of cultural burning as a component of Aboriginal land management. The use traditional ecological knowledge combined with cultural protocol, used to inform interactions with Country and implement cultural practice is consistent with the objectives of the BC Act and Australia's international obligations.

BCT has and is continuing to develop guidance to support landholders understand the interactions between their agreement and the Rural Fires Act, including the Bush Fire Environmental Assessment Code. For implementing burns, the 'Guide to the implementation of fire as management tool' provides a framework to support landholders understand if burning is an appropriate management tool and help landholders through the complexity of the planning and implementation process. For bushfire preparedness, close engagement with the Rural Fire Service has been essential to support landholders mitigate bush fire risk while adhering to the terms of their agreement.

Biography:

Dr Chels Marshall
A Gumbaynggirr woman and Knowledge Keeper, Chels is a leading Indigenous systems ecologist and with extensive experience in marine ecology, cultural landscape management and regenerative design. She has over 27 years of professional experience in cultural ecology, environmental planning, design and land management within, government agencies, research institutes, Indigenous communities, and consulting firms.

Melissa Huntsman
Mel has more than 12 years experience working across a roles in environmental management, environmental planning and biodiversity conservation. She has worked in BCT since 2018 where she has led the development and contributed to the operation of a range of policy and guidelines to support the delivery of private land conservation in NSW.

1.15-1.35 *The NSW State Vegetation Type Map Undermines Ecological Fire Management in Dry Sclerophyll Forests of the NSW North Coast*

Andy Baker
Wildsite
andybaker@wildsite.com.au

Abstract:
Reliable vegetation maps are crucial for managing fire frequencies for the conservation of biodiversity and bushfire risk. In New South Wales (NSW), recommended fire intervals vary by structural formation and include dry sclerophyll forests (DSF; fire every 7-30 years) and wet sclerophyll forests (WSF; 25-60 years). However, the recent NSW State Vegetation Type Map (SVTM) reclassifies extensive areas formerly mapped as DSF in regional maps, to WSF, effectively doubling the recommended interval between fires in these forests. To assess the validity of SVTM classification of sclerophyll forests, data from BioNet Survey Plots (5213) across the NSW north coast were compared to the diagnostic features of the NSW key to vegetation formations (tree height >30m, floristic indicators). SVTM mapping of WSF was found to be highly inaccurate, with 80.8% of corresponding plots not meeting the diagnostic canopy height threshold for WSF (>30m) and 24.8% of plots meeting neither canopy height nor floristic indicator criteria for WSF. Floristic indicators of *dry sclerophyll forest* were also widespread among plots misclassified to WSF, including in the understorey (50% of plots) and canopy trees (42%). Most plots misclassified to WSF were long-unburnt at the time of survey (73%), likely increasing the cover-abundance of WSF indicators ('soft-leaved shrubs') at the expense of DSF 'grasses' and 'hard-leaved shrubs'. Vital attribute analysis indicates that most taxa on misclassified sites are sensitive to infrequent fire – vulnerable to localised extinction (55%) or decline (3%) - highlighting potential consequences of extended fire intervals following misclassification. Low-frequency fire is already a major threat to the region's dry sclerophyll forests, causing widespread structural change and habitat decline. The widespread misclassification of dry- to wet-sclerophyll forests identified in this study and the subsequent lengthening of recommended fire intervals is likely to further promote ongoing fire exclusion and biodiversity decline in the region's dry sclerophyll forests.

Biography:
Current positions: Senior Ecologist – Wildsite Ecological Services; Lecturer - Southern Cross University
Qualifications: PhD BSc (Fire Ecology & Management)
Dr Andy Baker is a fire and vegetation ecologist with over 25 years' experience in ecosystem survey, management and restoration on the NSW North Coast. Since founding Wildsite Ecological Services in 1997, Andy has established himself as a leading authority on ecological fire management and the restoration of fire-dependent open forests and heathlands. Since 2011, Andy has contributed to the development of the *NSW State Vegetation Type Map* via regional expert panels and the survey of hundreds of full floristic plots. Andy is also a researcher and lecturer in *Fire Ecology and Management* at Southern Cross University, Lismore, where his core research focus is the ecological consequences of fire-exclusion in sclerophyll forests and the restoration of Aboriginal fire regimes.

1.35-1.55 *Increasing the Supply of In-demand Biodiversity Credits*

John Seidel
Credit Supply Taskforce, DPE
John.Seidel@environment.nsw.gov.au

Abstract:
This presentation will cover the current focus and work program of the Credit Supply Taskforce to increase the supply of in-demand biodiversity credits. The presentation will outline new products that will assist to increase the supply of biodiversity credits, improve operation of the credit market

and make it easier for landholders to establish Biodiversity Stewardship Agreements. It will also highlight the work undertaken by the Taskforce over its first 12 months of operation.

Biography:

John is Director of the Negotiation and Delivery Branch, Credits Supply Taskforce that sits within the NSW Environment and Heritage Group. In this role, John leads four teams charged with delivery of one the NSW Government's innovative conservation programs through engaging with landholders, ecological consultants and industry groups to establish Biodiversity Stewardship Agreements. Since 2008, John has played a lead role in the design and implementation of innovative approaches to biodiversity assessment and offsetting through the implementation of programs such as the NSW Biodiversity Offsets Scheme and Biodiversity Banking Offsets Scheme.

SESSION 3: EPBC Act and Its Interactions

Chair: Jason Berrigan

1.55-2.15 *The NSW Biodiversity Offsets Scheme and its interaction with the EPBC Act*

Amy Dumbrell
DPE
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Abstract:

This presentation focuses on the interactions between the NSW Biodiversity Offsets Scheme and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In 2020, the Australian Government endorsed the NSW Biodiversity Offsets Scheme under the EPBC Act Condition-setting Policy. Under the terms of the NSW Assessment Bilateral Agreement, the NSW Government assesses development applications on behalf of the Australian Government, which remains the decision-maker for EPBC Act approval.

The endorsement has resulted in streamlined benefits for the assessment and determination of major projects requiring both Australian and NSW Government approval. Both Governments continue to work on achieving ever greater alignment, including progressing work under the Common Assessment Method to better align threatened entity listings.

The presentation will provide information about how these streamlined arrangements operate and how assessors accredited under the *Biodiversity Conservation Act 2016* can navigate the process when preparing a Biodiversity Development Application Report.

The Australian Government is progressing reforms to the EPBC Act which will have impacts on the endorsement of the scheme and operation of the Assessment Bilateral Agreement. NSW is looking to ensure existing streamlined benefits are maintained and enhanced during this reform.

Biography:

Amy Dumbrell is the acting Director of the NSW Biodiversity Offsets Scheme Branch within the Department of Planning and Environment. She has worked in roles related to the scheme for seven years, including working with the Australian Government to gain their endorsement of the scheme. Prior to working with the NSW Department of Planning and Environment, Amy worked for the former Australian Government Department of Climate Change, managing the Australian Climate Change Science Program. Amy holds a Bachelor of Environmental Management and Bachelor of Laws (Honours) from Macquarie University.

2.15-2.50 *EPBC Act Reform Update followed by EPBC Act Referral, Assessment and Bilateral Process*

Martin Paull
Director, Southern NSW Assessments Section, DCCEEW
martin.paull@dcceew.gov.au

Abstract:
The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Bilateral Agreement with the NSW Government provides for a single assessment of State and Commonwealth matters. Under the Agreement, the NSW Department of Planning assesses impacts to Matters of National Environmental Significance (MNES) on behalf of the Australian Government. This includes projects designated as NSW State Significant Development (SSD), State Significant Infrastructure (SSI), Critical State Significant Infrastructure (CSSI), and Modifications (Mods) to the above. The Bilateral Agreement with the NSW Government means project proponents deal with one level of Government during their project's assessment. This minimises duplication for both Governments and proponents.
It is the NSW Government that determines whether a project is assessed under the Bilateral Agreement. If projects have progressed too far under the NSW State assessment process before referral under the EPBC Act, the Bilateral Agreement may not be able to apply to a project's assessment. When environmental consultants are working on SSI, CSSI or SSD projects, and MNES are likely to be significantly impacted, consultants should ensure a referral is made under the EPBC Act before the EIS under the NSW assessment is exhibited.

Biography:
Martin Paull has been the Director of the Southern NSW EPBC Act Assessment Section for the past three years. Martin has worked for the Australian Government since his commencement with the Department of the Senate in 1995. Martin has extensive environmental impact assessment experience with government, having worked for the Australian Heritage Commission, various iterations of the Department of the Environment, the Department of Industry, and the Great Barrier Reef Marine Park Authority.

SESSION 4: STUDENT PRESENTATIONS

Chair: Paul Burcher

3.40-3.55 *Passive monitoring facilitates assessment of the multi-scale factors driving bat box usage in urban reserves*

Elsa Kohane
Sydney University
ekoh4131@uni.sydney.edu.au

Abstract:
Artificial bat boxes are a popular tool for offsetting natural hollow loss. However, bats often use some boxes within a reserve but not others, and the causative factors are poorly understood. Research has focused on characterising physical attributes of boxes, and struggles to account for bats' unique high mobility and roost switching behaviour. This project aimed to address these gaps by investigating the interactive influence of biological, behavioural, and multi-scale landscape factors on box selection, as well as to test the utility of using camera trapping and new bioacoustic technology to develop novel approaches for capturing bat roost switching and species interactions. We deployed passive acoustic recorders (AudioMoth or Anabat Swift) and remote sensing cameras (Reconyx PC800) on every bat box within four urban reserves across metropolitan Sydney. Boxes were simultaneously and continuously monitored for fourteen nights, allowing monitoring of whole-site box usage over a short but intensive period. Additionally, we measured landscape, microhabitat, box design, and species-specific factors to evaluate their impact.

With this method we successfully captured data on roosting behaviour across a network of boxes. We found moon phase and rainfall strongly influenced roost selection, while spatial factors had less of an effect. We also observed unexpectedly low roost switching, high reuse of boxes as day and night roosts, and high occupancy of some central roosts. This may suggest boxes in these reserves do not sufficiently mimic a natural roost network. Furthermore, results showed that, although camera traps and acoustic detectors were not definitely more accurate than standard methods of manual box checks, they did provide far richer detail about fine-scale occupancy and bat behaviour within boxes. Overall, these results demonstrate the importance of addressing multiple scales, and the potential application of passive recording technology to improve both research and management of bat boxes.

Biography:

I recently completed my Honours thesis at the University of Sydney. My project investigated bat box use across urban environments, and the application of new technology to answer these questions in new ways. I currently work in eco-acoustics with the Forest Ecology team at NSW Department of Primary Industries, where I help develop recognisers using AI to identify species from acoustic recordings.

3.55-4.10 *Comparing artificial intelligence (AI) models for the detection of mammals in camera trap images*

Jess Tam
UNSW
j.tam@unsw.edu.au

Abstract:

The development of artificial intelligence (AI) has opened many doors for the automatic analysis of large volumes of data. Applications of AI technology to analyse imagery data have exploded in the last decade following the success of deep learning models in the ImageNet Large Scale Visual Recognition Challenge (ILSVRC) in the 2010s. However, these tools are emerging relatively slowly in the ecological space, especially for the use of detecting threatened species and facilitating their conservation. As the volumes of imagery data increase in the forms of camera trap, aerial, and satellite imagery, there is a need to develop automated tools to improve the efficiency of which ecologists analyse data. In my study, I will compare the performance of different object detection models for the analysis of camera trap images. YOLOv5 and RetinaNet are single-stage detectors, where localisation of individuals and classification of the species are completed in one stage. Whereas Faster R-CNN is a two-stage detector, where localisation and classification are done separately. I will also compare the performance of the detectors on differing number of images to find the threshold that is needed for a viable model. I will then explore the use of data augmentation methods, where new images are generated from existing ones to test if there are any improvements to the performance of the models when there are limited images available.

Biography:

I am a second year PhD student from UNSW working on using computer vision to automatically identify species of wildlife in camera trap images, supervised by Richard Kingsford, Shinichi Nakagawa, and Arcot Sowmya. I have a background in ecology but have mainly worked on data-centric projects as I am interested in applying tools from the cyberspace to aid wildlife conservation. In my spare time when I am not programming, I enjoy going on photo walks, playing video games, reading, cooking, playing and listening to music, building model kits, and more.

4.10-4.25 *Microphytobenthos biomass as a potential indicator of bushfire impact*

Thayanne Lima Barros
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Abstract:
The 2019-2020 Black Summer bushfire season was declared the worst in Australian history. Such megafires have the potential to create unique environmental impacts and have recently been documented to change phytoplankton productivity far offshore. Post-fire runoff flushes nutrients and contaminants into the waterbodies, that may degrade water quality and harm aquatic life and ecosystems. An increase in the nutrient influx to waterways following bushfires and subsequent rainfall events may promote algal blooms, which can harm aquatic biota that are important for the healthy functioning of the ecosystem. However, we have very limited knowledge of the impact of the fires on the biological state and health of these systems. Estuarine ecosystems are one of the most productive and biologically diverse coastal ecosystems. They provide important ecosystem services such as carbon storage and nutrient cycling, breeding grounds and critical food-chain linkages to broader marine ecosystems, and benefit humans through the provisioning of food and medicinal and genetic resources. Understanding how estuarine systems are affected by bushfires is crucial for conservation strategies and the development of effective management plans that will ensure maintenance of ecosystem functions. Post-fire analyses are also important to assess for an increased risk of algal blooms that may lead to broader impacts to the ecological health of estuaries. To address this knowledge gap, we measured changes in the microphytobenthos biomass (MPB) in soft sediments of six estuaries in New South Wales immediately before (August–September 2019) and after (February–March 2020) the Black Summer bushfire. Microphytobenthos are found in the surface layer of sediments, and it has frequently been used as indicator of environmental quality. Moreover, soft sediments are a vital habitat in marine and coastal ecosystems worldwide and play major roles in global biogeochemical cycles. Sediments provide a long-term indicator of contaminant status and, although the impacts of contaminants on sediment condition are well studied, very little is known about the effects of bushfire-derived material that could be deposited in these habitats. This project's main goal was to assess the impact of bushfires on the ecological health of estuaries using microphytobenthos biomass as indicator of ecological impact. We predicted an increase in the concentration of MPB in the fire-impacted estuaries. Our experimental design included 2 control and 4 fire-impacted estuaries. Soft-sediment samples were collected from the lower estuarine section of each estuary. Each one of these estuaries (Hastings, Karuah, Georges, Shoalhaven, Clyde, and Moruya) had different fire intensities, scale, different background stressors, and distance from the catchment to the burnt areas. As predicted, we detected a significant increase in the concentration of Chl-a (our proxy for MPB) in Moruya. However, no significant differences were found in the other estuaries, independent of fire-impact. Moreover, chl-a levels varied considerably among estuaries independent of bushfire impact. This highlights the importance of a before-impact dataset to detect a short-term change in MPB due to fires. Our results might be, however, reflective of a short-term impact. It is possible that post-fire material continued being transported from the tributaries all the way to the lower estuarine section, mainly after heavy rainfall events. Therefore, we recommend long-term assessments to further our understanding of the long-term impacts of bushfires.

Biography:
MSc Barros is an environmental scientist and marine biologist investigating the impacts of the 2019/20 Black Summer fires on estuaries in New South Wales as part of her PhD at UNSW, Sydney. She has experience in estuarine ecology, ecotoxicology, and zoology, and a special interest in coastal management and the impacts of anthropogenic activities on marine ecosystems.

4.25-4.40 *Does fire affect the relationship between plants and their pollinators, or are they capable of rekindling things when burned out*

Joshua Whitehead
University of New England
jwhiteh9@myune.edu.au

Abstract:
Australia's flora and fauna have had to deal with fire for millennia, though we know almost nothing about the responses of pollinating insects. In an attempt to gain some insight, I studied plant and pollinator responses after the 2019/20 fire season at 14 locations across the northern tablelands region. Though all sites were heavily impacted by the two years of drought prior, bees in particular, exhibited notable responses to fire.

Biography:
I'm a PhD student at the University of New England (UNE) and a casual ecologist at Eco Logical Australia in Coffs Harbour with a keen interest in plant reproduction and the conservation of under-appreciated keystone species. I've also recently taken an interest in thermal drone surveying.

4.40-4.55 *Restoring Drylands from the Ground Up: Soil health response to reintroduced semi-fossorial mammals*

Jana Stewart
UNSW
jana.stewart@student.unsw.edu.au

Abstract:
Soil microbes and invertebrates play crucial roles in driving ecosystem function and biogeochemical processes in dryland environments. However, the decline in biodiversity within drylands due to high extinction rates and threats to many species has disrupted the biogeochemical processes necessary for sustaining these ecosystems. Restoration efforts require a deeper understanding of the interactions between the soil community and key ecosystem engineers. Burrowing and digging mammals have been identified as powerful ecosystem engineers, providing various benefits such as nutrient dispersal, refugia for other species, and increased landscape heterogeneity through their foraging behaviour and burrows. Previous studies have compared habitats with and without these engineers, highlighting variations in microbial and invertebrate abundance, but evidence regarding functional diversity differences is limited. Exploring these differences is crucial for comprehending the ecosystem-level benefits derived from these interactions and predicting the potential impacts if any component of this complex system is altered.
This project aims to enhance our understanding of the intricate relationships within these ecological systems and contribute to the development of effective strategies for dryland ecosystem restoration and conservation. Using 16S and 18S rRNA to identify soil taxa and their associated functional communities, in correlation with soil chemical variables the outcomes of this project will evaluate how reintroducing digging mammals can restore drylands from the ground up.

Biography:

I am passionate about applied ecology and currently 2.5 years into my PhD with the Centre for Ecosystem Science at UNSW. My research is using soil biology to measure ecosystem health in drylands, and how this is impacted under threats such as climate change and biodiversity loss. When I am not walking around looking at red dirt in far north west NSW I often find other field based ecology projects to assist with

Ecological Consultants Association of NSW

Annual Conference 2023

Tuesday 8th August Fairmont Resort,
Leura, Blue Mountains

Workshop Program

Ecology Tools and Apps

8:30 - 9:00	***REGISTRATION***	***Tea and coffee available***
	SESSION 1	Chair: Daniel McDonald
9:00 - 9.30	*NSW Wildlife Drone Hub*	**Dr Adam Roff** Senior Research Scientist DPIE
9.30-9:55	*Using Drones for Minesite Rehabilitation*	**Joshua Frappell** The Regenerative **Phil Milling** Sky Land Management
9:55-10.15	*Thermal Imaging of Wildlife for Ecological Consultancy Surveys*	**Dr Debbie Saunders** Wildlife Drones
10.15-10.30	*Seed Collection for Restoration: a practical guide*	**Paden Wilson** Greening Australia
10.30-11.00	*GIS Tools for Ecological Consultants: Enhancing Efficiency and Data Quality*	**Alex Pescud** AP Spatial
11.00-11.25	***MORNING TEA***	
	SESSION 2	Chair: Shelomi Doyle
11.25-11.40	*Trees Near Me NSW*	**Dr Adam Roff** Senior Research Scientist DPIE
11.40-11.55	*Credits Near Me App*	**Mike Day** Senior Team Leader – Spatial Services and Customer Delivery, Department of Planning and Environment
11.55-12.25	*EcoServer: BAM field data collection software*	**Lucas McKinnon and Michael Dean** EcoServer
12.25-12.55	*Using Machine Learning to Scale Wildlife Conservation*	**Anup Rajput** **Envir AI**
12.55-1.15	*Acoustic survey methods and technology*	**Dr Julie Broken-Brow** Titley Scientific
1.15-2.00	***LUNCH***	
	SESSION 3	Chair: Andrew Lothian
2.00-2.35	*Songmeters / Echometers: products and analysis*	**Harry Rust** Faunatech
2.35-3.00	*Systems and Apps BCT has developed for baseline ecological assessment and montoring*	**Shawn Capararo** BCT
3.00-3.25	*Passive acoustic monitoring and analysis*	**Dr Brad Law** DPI
3.25-3.50	***AFTERNOON TEA***	

	SESSION 4	Chair: Rebecca Hogan
3.50–4.15	*How eDNA techniques can assist Ecological Consultants*	**Josh Griffiths** Enviro DNA
4.15-4.55	*How to enter and extract flora survey plot data in BioNet Atlas to load in the Plot to PCT Assignment Tool in order to determine plant community types*	**Deyarne Plowman** Wildlife Data Officer, DPE **Elizabeth Magarey** Senior Scientists, Remote Sensing and Landscape Science Branch, DPE
4.55-5.00	*Summary and Close*	**Rebecca Hogan** ECA President

Ecological Consultants Association of NSW
Annual Conference 2023

9.00-9.30 *NSW Wildlife Drone Hub*

Dr Adam Roff
Senior Research Scientist, DPIE
adam.roff@environment.nsw.gov.au

Abstract:
The NSW Wildlife Drone Hub, or Drone Hub, was launched in February of 2022 and funded by the NSW Digital Restart Fund. It is committed to giving New South Wales a drone capability for biodiversity monitoring. Since its inception the Drone Hub has trained 60 ecologists to fly drones and collect scientific data using thermal sensors and object detection models. In the last 12 months Drone Hub pilots have conducted over 700 surveys for partners in universities, government and industry across NSW.
https://www.environment.nsw.gov.au/topics/animals-and-plants/surveys-monitoring-and-records/nsw-wildlife-drone-hub

Biography:
Adam has 20 years experience in remote sensing and spatial analysis.
He is a Senior Research Scientist for the Science, Economics, and Insights Division, that is part of the NSW Department of Planning, Industry and Environment.

Adam's speciality is bringing technological innovation to ecology. He works closely with ecologists to seek a deep understanding of their requirements and then design innovative solutions that increase their productivity. His background is in machine vision, machine learning and remote sensing.

9.30-9.55 *Using Drones for Minesite Rehabilitation*

Josh Frappell
The Regenerative
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Phil Milling
Sky Land Management
phil@skylandmanagement.com.au

Abstract:
The environmental sector is undergoing a transformation driven by the emergence of drone technologies, which are revolutionizing environmental rehabilitation and conservation efforts. Drones are now utilised for diverse tasks, including aerial monitoring, surveying through photogrammetry, generating elevation models, enabling precision agriculture, and facilitating low-impact revegetation practices. The mining industry has recently embraced rehabilitation reforms, emphasising performance and completion criteria and objectives. In pursuit of enhanced mine site rehabilitation, a trial was conducted in the Central Tablelands of NSW, utilizing unmanned aerial vehicles (UAVs) or drones to establish a prescribed native vegetation community through aerial application of native seed. This presentation will delve into the benefits of incorporating up-to-date technology in drone-based seed application for site revegetation, exploring the advantages and lessons learned. Achieving a natural replication of the vegetation community is a critical requirement for the site's rehabilitation. Nevertheless, this goal presents challenges due to limitations in native seed supply and conventional seed application equipment and site preparation. The presentation will primarily focus on the research and development efforts of Sky Land Management, particularly regarding seed coating techniques for optimal germination and seedling survival. The trial will assess the advantages of coating native seed to achieve precise application, reducing wastage, and preventing extraneous weed growth compared to conventional broadacre methods. Furthermore, the trial and presentation will showcase

improvements in revegetation achieved by enabling overflight and targeted application of ameliorants and supplementary seeding, eliminating the need for large equipment. This approach enhances safety in challenging terrains where traditional machinery or manual traversals are not feasible. The outcomes of the trial will also highlight the scalability of rehabilitation areas, offering flexibility to optimise opportunities based on climate and mine planning. This agile approach can swiftly address issues like weed intrusion, erosion, and dust production in prepared lands without waiting for costjustified large-scale broadacre methods. While the trial encountered challenges, such as seed viability and purity, the development of guidelines for native seed supply promises cost savings and assists resource companies in future rehabilitation endeavours. Ensuring the quality and quantity of ordered seed supply will form a solid foundation for successful revegetation. This pioneering direct seeding with drones trial not only demonstrates numerous benefits for the resource sector but also for the broader industry. It showcases improved quality assurance in supply, enhanced safety, and the capability of achieving effective revegetation using this newly emerging technology. Moreover, the trial presents innovative solutions to address issues within the seed supply chain, thereby contributing to sustainable land management practices and environmental conservation.

Biography:

Josh is an environment & rehabilitation specialist having worked for resource companies and environmental consultancies throughout a 15-year career. Josh has been exposed to a broad variety of projects within the environmental field and is currently employed as a Principal Regenerative Advisor with The Regenerative. Josh holds a Bachelor's degree in Environmental Science and Management from the University of Newcastle along with a Graduates Certificate in Regenerative Agriculture from Southern Cross University. Josh being one of the first SCU Regenerative Agriculture Graduates is passionate about soil health, practical regeneration of landscapes and realistic rehabilitation of resource sites. Josh is a whole systems thinker and open to the ever-evolving environmental field and emerging technologies when devising rehabilitation and landscape plans. Based in Mudgee, NSW, Josh is fluid in his working locations, travelling wherever required to promote and enable the balance of the landscapes with which we interact.

Phil is a land management professional with a broad range of experience and knowledge. He holds a Bachelor of Management (Land Resources) from the University of Sydney. Since 1999 he has worked in both the public and private sector, in technical roles as well as management and community engagement.

Phil is currently the Managing Director and Chief Remote (Drone) pilot at Sky Land Management, one of the first in Australia to commence aerial application using large payload drones, back in 2014. As a new capability to the land management industry Phil has been a pioneer and innovator in the areas of weed and vegetation management, site rehabilitation and restoration using drones. Phil and his colleagues work in partnership with our clients, seed experts and scientists to develop innovations in direct seeding for native vegetation restoration and enhancement using the unique benefits drones provide.

Phil is based in the Hunter Valley of NSW, yet his work takes him far and wide. He has a practical approach and a 'can do' attitude, with a focus on achieving quality on ground results.

9.55-10.15 *Thermal Imaging of Wildlife for Ecological Consultancy Surveys*
Dr Debbie Saunders

Wildlife Drones
Debbie@wildlifedrones.net

Abstract:
Drone thermal imaging is becoming an increasingly recognised tool for rapidly and comprehensively surveying for cryptic nocturnal wildlife. With the ability to detect a wide range of both invasive and threatened species in a comprehensive, efficient and repeatable manner, opens up new opportunities for those monitoring and managing natural resources. Examples of environmental consultancy projects where this technology has been successfully deployed include environmental impact assessments, stewardship site biodiversity accounting and long term monitoring of offset sites and other lands managed for conservation. This includes surveys across a broad range of industries including extractive resources, renewable energy, large and small-scale infrastructure projects and biodiversity credit/offset projects. We provide examples of the diversity of species that can be detected and identified in real-time in the field, from tiny feathertail gliders to feral deer, as well as insights into the logistics, licencing and skills required for such operations within different ecosystems across Australia.

Biography:
Debbie is the founder and CEO of Wildlife Drones and a Conservation Ecologist at the Australian National University. She has experience across the environment sector, working as an environmental consultant, government threatened species manager and academic she also collaborates extensively with environmental NGOs. Her extensive research has focused on improving conservation of swift parrots, a threatened migratory bird that was the inspiration for establishing Wildlife Drones. Over the past six years has led the development and deployment of the world's most advanced radio-tracking drone system for rapidly and remotely locating radio-tagged animals. As the recipient of multiple business innovation awards for her creative solutions for challenging research problems, Debbie believes that drones are a highly valuable and flexible tool that provide unprecedented opportunities for new insights into the world's most complex and fascinating natural ecosystems.

10.15-10.30 *Seed Collection for Restoration: a practical guide*

Paden Wilson
Greening Australia
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Abstract:
This presentation provides a practical guide on seed collection for ecological restoration, focusing on the implementation of the Florabank Guidelines and the significance of market demand signals. The Florabank Guidelines offer best-practice insights for collecting, processing, and storing native seeds, ensuring genetic integrity and adaptability. Additionally, incorporating market demand signals allows practitioners to prioritise species that align with restoration projects while meeting industry needs. Attendees will gain practical knowledge for more successful and economically viable restoration outcomes.

Biography:
Current positons: Operations Lead at the Native Seed Centre for Restoriaton in Richmond NSW and Canberra Seed Bank in Aranda ACT.
Organisaiton: Nindethana, a Greening Australia Company
Experience: Over a decade of working in land management and conservation with a particular focus on native seed over the past 5 years.

10.30-11.00 *GIS Tools for Ecological Consultants: Enhancing Efficiency and Data Quality*

Alex Pescud

AP Spatial
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Abstract:
Problem: GIS data is notoriously hard to collect, maintain and manage. This results in time wasting and potential reporting errors.
Solution: This presentation focuses on solutions to better manage your GIS data. From collecting data in the field to creating data files to supply to government, training and more.
We offer an easy-to-use platform to collect, manage and maintain your critical datasets. This will save time and money for ecological consultants. Digitising the workflows related to species collection, plot analysis and more is available via the platform.
Take control of your GIS data, have more confidence, and stop wasting time and money.

Biography:
Alex is a highly skilled and results-driven GIS developer and GIS specialist, providing technical expertise and delivering innovative solutions to complex spatial problems. He have over a decade of experience that spans across local, state and commonwealth government, academia, private consultancy, university, and the Surveying & Spatial Sciences Institute (SSSI) Australia. He can design, build, and maintain robust geospatial systems that are highly efficient and surpass client's expectations of outcomes. His ability to transform geospatial data into meaningful visualizations that inform decision making, and create applications that are user-friendly, is frequently acknowledged by the teams and clients he work with.

11.25-11.40 *Trees Near Me NSW*

Dr Adam Roff
Senior Research Scientist, DPIE
adam.roff@environment.nsw.gov.au

Abstract:
To support the launch of the NSW State Vegetation Type Map. the NSW Department of Planning, Industry and Environment (DPE) released a mobile app that allows anyone to perform complex spatial queries on Plant Community Types. It works just like Google Maps but for trees. We call it Trees Near Me NSW and it recently won an international design award. It is giving DPE a new way to engage directly with our customers is democratising spatial analysis. We need your input to further improve our maps. Trees Near Me NSW has simple tools that allow users to give feedback at specific locations without leaving the app.
https://treesnearme.app/

Biography:
Adam has 20 years experience in remote sensing and spatial analysis.
He is a Senior Research Scientist for the Science, Economics, and Insights Division, that is part of the NSW Department of Planning, Industry and Environment.

Adam's speciality is bringing technological innovation to ecology. He works closely with ecologists to seek a deep understanding of their requirements and then design innovative solutions that increase their productivity. His background is in machine vision, machine learning and remote sensing.

11.40-11.55 *Credits Near Me App*

Mike Day

Senior Team Leader – Spatial Services and Customer Delivery, DPE
Michael.Day@environment.nsw.gov.au

Abstract:
Credits Near Me NSW is a new and simple mobile app to support participants in the NSW Biodiversity Offset Scheme. The app is free and helps landholders discover the biodiversity credit potential on their land. It also helps credit buyers locate potential areas of credit supply. It does this by delivering an interactive and searchable map of non-threatened credit types as defined by the scheme. Credit buyers can search for like-for-like credit type locations, either by credit type name or by selecting the NSW Plant Community Type for which retirement credits are required. Bioregions are also displayed and can be used to constrain the results. If a credit type is currently in demand (sought by a buyer) the app highlights candidate supply areas and allows landholders to submit an expression of interest for a biodiversity stewardship agreement. In-demand credit type listings are sourced from the Biodiversity Offset Scheme's public demand registers and the NSW Credit Supply Taskforce. The OTG map is indicative only and derived by translation of the NSW State Vegetation Type map. Credit types are not shown over areas that are ineligible for biodiversity stewardship agreements. The app is an innovative, simple and responsive platform with potential to host future mapping such as threatened credit types and forecasted demand listings.

Biography:
Mike Day is the Senior Team Leader for Spatial Services and Customer Delivery in the Department of Planning and Environment's Science, Economics and Insights Division. The team exists to make the division's maps work for everyone.

11.55-12.25 *EcoServer: BAM field data collection software*

Lucas McKinnon and Michael Dean
EcoServer
info@ecoserver.com.au

Biography:
Michael joined NSW EPA in 1995 and has since worked for state and local government as well as non-government organisations in the environmental sector, specialising in catchment management and environmental reporting. He is currently a principal at EcoServer and develops software for environmental monitoring

12.25-12.55 *Using Machine Learning to Scale Wildlife Conservation*

Anup Rajput
Envir AI
anup@nuj.ai

Abstract:
Means to acquire data for ecological or other purposes are getting much easier than before with the proliferation of good hardy cameras and other recording devices and alternate means of connectivity, even for remote areas. But the data they generate still needs to be processed. But, when the processing is not done by the domain experts, there's a lot that gets lost in translation. Plus, doing it manually is tedious and prone to errors. We are walking you through a Machine Learning enabled workflow that helps ecologists in an end to end manner.

Biography:
Anup has had an experience in scaling Machine Learning solutions to improve service delivery and administration in large cities with upwards of 5Mn residents. Now his focus has been to help democratise access to Machine Learning to areas usually underserved by AI.

12.55-1.15 *Acoustic Survey Methods and Technology*

Dr Julie Broken-Brow
Titley Scientific
julie.bb@titley-scientific.com

Abstract:
Passive acoustic monitoring (PAM) is increasingly being used to survey for wildlife. For bats, this is a well-established method, but in the case of birds, frogs and other vocalising wildlife, it is an emerging field. The Biodiversity Assessment Method for NSW now outlines the use of PAM to assess many native species, therefore it is essential for ecological consultants to understand the method, including its advantages and pitfalls, to effectively survey for these species. This presentation will outline what wildlife groups and species can be surveyed using PAM, including several examples. The technology will also be examined, including acoustic recorders, bat detectors, differing microphone types and technological tips such as settings, with a specific focus on Titley Scientific products. Deployment tips including positioning and mounting will be covered, as well as the post-recording process of data storage and analysis.

Biography:
Dr Julie Broken-Brow is a bat biologist specializing in acoustics, ecology and detection dogs, with over 10 years experience. Currently working at Titley Scientific doing product and business development, her role bridges the gap between engineers and ecologists.

2.00-2.35 *Songmeters / Echometers: products and analysis*

Harry Rust
Faunatech
goodgear@faunatech.au

Abstract:
The popularity of bioacoustics in monitoring animal species for conservation has surged greatly in recent years. Huge quantities of data can be collected remotely and discretely with minimal human effort. This allows species, such as birds, bats, frogs, insects and mammals to be surveyed efficiently and without great cost. Within this field there are a number of devices available to assist practitioners, however it can be difficult to know which device is best suited for your project. This workshop will run through the equipment which Faunatech and Wildlife Acoustics provide for monitoring. We will take a look at the Song Meter range of passive autonomous recorders, both acoustic and ultrasonic, as well as the Echo Meter Touch 2 range of active bat detectors which can be plugged into your phone or tablet. We' ll run through some examples of projects which use this equipment, not only for conservation, but for education and community engagement too. Following this, we will briefly cover the acoustic analysis software: Kaleidoscope Pro.

Biography:
Harry is currently in the role Business Development Consultant at Faunatech, based in Sydney. He has recently achieved a first-class Honours degree in Ecology and Evolutionary Biology through the University of Adelaide, wherein he conducted over 180 acoustic microbat surveys around the Adelaide region. His work with microbats and acoustics has brought taken him across Australia, including Victoria, the Northern Territory, and Christmas Island

2.35-3.00 *Systems and Apps BCT has developed for baseline ecological assessment and montoring*

Shawn Capararo

BCT
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Abstract:
The NSW Biodiversity Conservation Trust (BCT) has developed an end-to-end solution to the collection and management of data for biodiversity assessment and monitoring. Key features include online data storage, mobile apps for BAM-compliant data collection and navigation, web mapping apps as an alternative to GIS, data-driven document production, automated analytics and operational dashboards. Tools have been thoroughly tested over four years by more than 80 field ecologists working in all parts of NSW.

Biography:
Shawn has more than 25 years' experience in biodiversity conservation in NSW and Qld. He has interests and experience in field ecology, conservation assessment and planning, and biodiversity information management. Since 2018 he has worked for Biodiversity Conservation Trust (BCT) where he has led the development of systems for planning, survey, monitoring, and reporting on the private protected area network in NSW.

3.00-3.25 *Passive Acoustic Monitoring and Analysis*

Dr Brad Law
Principal Research Scientist, Forest Science Unit, NSW Primary Industries
brad.law@dpi.nsw.gov.au

Abstract:
Passive acoustics is a rapidly evolving field involving the recording and identification of wildlife sounds. While the approach has been in use for many years with bats and frogs, it is increasingly being used for other taxa. In the last 5 years or so, hardware for extended deployments with the ability to program unique schedules has become readily accessible and a range of manufacturers have products on offer. The biggest challenge today is processing the vast quantities of data that are recorded. Automated identification, especially the use of artificial intelligence (e.g. CNN's), is currently the most promising approach for recognising sounds produced by different species. This involves collating extensive training data from different regions and testing in real world situations. I will provide examples of recent developments in this space and case studies of how the methods have been deployed in ecological research, especially targeting koalas. In short, the methods are proving to be a game changer for cost-effectively surveying and monitoring of otherwise cryptic species, especially as additional recognisers come on-line to further analyse acoustic recordings.

Biography:
Brad Law is a Principal Research Scientist at the Forest Science Unit of the Dept of Primary Industries focusing on the ecology and management of forest wildlife. Brad has over 30 years of experience in forest wildlife ecology and has published more than 150 peer reviewed papers. Brad's research covers all types of wildlife including bats, pygmy possums, Hastings River Mouse, eucalypt flowering and nectar and most recently koalas. Since 2015, koalas in the hinterland forests of north-east NSW has been a focus. The use of acoustics has been a breakthrough in better understanding where koalas occur in difficult to reach forests and monitoring them over time.

3.50-4.15 *How e DNA techniques can assist Ecological Consultants*

Josh Griffiths
Enviro DNA
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Abstract:
Reliably determining the presence or absence of threatened species is integral to making informed management decisions and Environmental Impact Assessments. However, traditional surveys can be time and labour intensive and lack sensitivity to detect rare or cryptic species. In recent years, environmental DNA (eDNA) has rapidly emerged as non-invasive, cost-effective, and potentially highly sensitive wildlife survey tool. The ability to apply eDNA techniques across a variety of ecosystems and for many species/taxa makes it a valuable tool but can also create confusion and uncertainty among non-specialists about when, where and how to use eDNA.
Here, we will provide a broad overview of eDNA techniques and applications along with several case studies. Topics covered will include:

- What is eDNA
- Single species detection or biodiversity assessments
- How to take samples
- Sampling design considerations for various species
- eDNA in terrestrial environments
- Interpreting results and limitations

Biography:
Program Manager – Field & Aquatic Ecology
EnviroDNA
Josh is a wildlife ecologist with over 20 years experience in designing and implementing monitoring programs to improve our understanding of Australia's native fauna. For the past 15 years, Josh has specialized in platypuses and is recognized as one of Australia's leading platypus experts. His extensive field experience provides a unique perspective for the use of eDNA to survey for threatened species.

4.15-4.55 *How to enter and extract flora survey plot data in BioNet Atlas to load in the Plot to PCT Assignment Tool in order to determine plant community types*

Deyarne Plowman
Wildlife Data Officer, DPE
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Elizabeth Magarey
Senior Scientist, Remote Sensing and Landscape Science Branch, DPE
Elizabeth.Magarey@environment.nsw.gov.au

Abstract:
Getting plot data into BioNet can be a complex process and is a known pain point for Accredited Assessors. Based on recent feedback, this has resulted in reduced uptake of the Plot to PCT Assignment Tool. This talk uses application screenshots to focus on the steps involved in getting your plot data into BioNet Atlas, highlighting critical steps and data that impact the Tool. We will then demonstrate how to extract sample data for upload into the Tool. We will highlight the existing resources, in addition to a new user guide that has just been developed to support Assessors. The opportunity will be provided for Assessors to ask questions while we have a number of staff members present from the BioNet and Vegetation Ecology & Classification teams to assist.

Biography:
Deyarne Plowman, Wildlife Data Officer, Biodiversity Information Systems, Remote Sensing & Landscape Science Branch, NSW Department of Planning and Environment. Bachelor of Science, 20 years working with BioNet Atlas.

Elizabeth Magarey, Senior Scientist, Vegetation Ecology & Classification Team, Remote Sensing & Landscape Science Branch, NSW Department of Planning and Environment. Liz has worked on ecological survey and analysis for 20 years, most recently on the revisions to Plant Community Types in eastern NSW.