



Fire, Fauna & Ferals

from backyards to bush



2017 BUSHFIRE CONFERENCE
May 30th to June 1st



**Nature
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Council** The voice for
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WELCOME FROM NATURE CONSERVATION COUNCIL'S BUSH FIRE ADVISORY COMMITTEE

Dear Distinguished Guests, Presenters, Representatives and Delegates,

On behalf of Nature Conservation Council's (NCC) Bushfire Program, we would like to welcome you to the 11th Biennial Conference – *Fire, Fauna and Ferals: from backyards to bush*. As well as providing the opportunity to share your experiences in using fire with like-minded people, this program focuses on current thinking in fire management, the triumphs and disappointments of topical projects and the progress being made in integrating fire management with other natural area management objectives.

The conference this year expands on the themes of our last Conference held in 2015 - *Fire and Restoration: working with fire for healthy lands*, exploring how fire management can actively support and enhance ecological values across the landscape. It investigates community perceptions about fire management, considers the effective implementation of Asset Protection Zones around our homes, the challenges of managing the interface between urban areas and bushland, and how fire management can be most beneficial in the broader landscape.

Presentations will provide insights into the interactions between fire and fauna across a range of landscapes and look at integrated approaches to managing fire, native fauna and flora, weeds and pest animals and the challenges involved in applying them. The conference draws on the science that supports the appropriate use of fire to manage risk, add value to ecological restoration, and assist the management of habitat, native fauna, weeds and ferals. The benefits of an integrated approach to bushfire management will be demonstrated by a number of case studies which show practical implementation of policy initiatives.

Over the next two days we will learn from the knowledge and expertise of a wide range of land managers linking scientific evidence, on-ground case studies, Aboriginal cultural knowledge and practical risk management strategies to demonstrate the use of fire as a critical component of land management. The aspirations and experiences of land managers will be explored as will the different values that underpin their work, taking into account the logistical and practical considerations faced by those in the field. Finally, the program will look at how to build greater confidence and capacity to effectively integrate fire programs into land management.

Large conferences such as this could not proceed without the financial commitment of our sponsors. We would like to express our deep appreciation to the platinum conference sponsors - NSW Rural Fire Service, Travers Bushfire and Ecology and the NSW Office of Environment and Heritage; and to our bronze sponsor Department of Industry - Lands. Their continued and very generous support is essential to enable the community to be updated with new and relevant information about bushfire management.

Conference Committee

Professor Don White

Jane Gye

Rob Pallin

Anne Reeves

Grahame Douglas

Bob Conroy

Waminda Parker

Greg Banks

Michelle Rose

Micaela Hopkins

CONFERENCE PROGRAM DAY 1 – TUESDAY 30 MAY 2017

Opening Addresses: 9am – 9.45am

Don White	Nature Conservation Council NSW	Welcome
Uncle Alan Madden	Metropolitan Local Aboriginal Land Council	Welcome to Country
Corey Shackleton	NSW Rural Fire Service	Opening Address (RFS Director of Community Resilience)
Kate Smolski	Nature Conservation Council NSW CEO	Address

Session 1: Buildings and backyards for people, plants and animals – risk, resilience and adaptation 9.45 – 10.50am

Prof. Ross Bradstock Keynote	University of Wollongong	Coexistence with fire at the interface: sensitivities, opportunities and impediments
Justin Leonard Keynote	CSIRO	What is Community Bushfire Adaptation?

Morning Tea 10.50 – 11.20am

Session 1: Buildings and backyards for people, plants and animals – risk, resilience and adaptation (Continued) 11.20 – 12.45pm

Wayne Kington	AFAC (Australasian Fire & Emergency Service Authorities Council)	A Framework for addressing Ecological Risk in Prescribed Burning
Lloyd Van Der Wallen	NSW Rural Fire Service	Review of the Bush Fire Environmental Assessment Code
Brad Murray	University of Technology Sydney	Landscape variation in plant flammability: will gullies be safe refugia for native fauna?
Kellie Langford	Central Coast Council	A Local Government Perspective on Bridging the Gap: Fire Management at the Interface
Den Barber =S=	Koori Country Firesticks Aboriginal Corporation	Revival of Aboriginal Cultural Burning to restore Country

Lunch 12:45 – 1:45pm

=S= Speed Talk

DAY 1 TUESDAY CONTINUED

Session 2: Fire, restoration and biodiversity 1.45 – 3.15pm

Denna Kingdom	Tasmanian Land Conservancy	Lessons from the past: learning how to manage highland native grasslands in Tasmania
Dr John Hunter	University of New England	Is re-introduction of burning necessary for threatened Themeda headland grassland EEC restoration: new evidence suggests caution
Kirstin Abley =S=	South Australia Department of Environment, Water and Natural Resources	When Preconceptions are Misconceptions – the Importance of Ecological Monitoring to Inform Prescribed Burning
Ross Peacock	NSW Rural Fire Service	Quantifying the flammability of fire-sensitive rainforest habitats
Michelle McKemey & Lesley Patterson	University of New England and NCC Firesticks Banbai Enterprise Development Aboriginal Corporation	Collaborative monitoring of two culturally important species before and after fire at Wattleridge Indigenous Protected Area: preliminary results for the echidna and threatened black grevillea

Afternoon Tea 3:15 – 3:45pm

Session 2: Fire, restoration and biodiversity (Continued) 3.15 – 5pm

Dr Elizabeth Tasker	NSW Office of Environment & Heritage	Vegetation change associated with reduced fire frequency in Border Ranges: loss of grassy forests and associated endangered fauna
Oliver Costello	NSW National Parks & Wildlife Service	NSW National Parks & Wildlife Service Cultural Fire Management Policy
Craig Holland Matthew Anderson Suzanne Pritchard	Lake Macquarie Council Fire & Rescue NSW Coal Point Landcare	Using fire for restoration – case study of a prescribed burn at Coal Point Reserve
Rochelle Lawson =S=	Central Coast Council	Ecological burn to restore habitat for a critically endangered orchid on the Central Coast

Posters and Drinks Session (open to all) 5 – 6.20pm

Conference Dinner: 6.30pm
Rydges Sydney Central Hotel, 28 Albion St, Surry Hills

=S= Speed Talk

CONFERENCE PROGRAM DAY 2 – WEDNESDAY 31 MAY 2017

Opening Addresses: 9am – 9.30am

Rob Pallin	Nature Conservation Council NSW	Welcome
Naomi Stephens	NSW Office of Environment & Heritage	Address
John Travers	Travers Bushfire and Ecology	Address

Session 3: Fire & fauna 9.30 – 10.40

Assoc. Prof. Alan York Keynote	University of Melbourne	Managing fire for fauna conservation: what have we learnt and where to next?
Scott Hetherington	Tweed Shire Council	Managing fire and koalas on the Tweed Coast
Max Beukers	NSW National Parks and Wildlife Service	People, Bushfires, Houses and Koalas on the Far South Coast of NSW

Morning Tea 10.40 – 11:10am

Session 3: Fire & fauna (continued 10.40 – 12.15)

Luke Smith & Emily Cordy	Vic. Department of Environment, Land, Water and Planning	Reducing the effect of planned burns on hollow-bearing trees
Dr John Hunter (on behalf of Peter Croft)	University of New England	Habitat features of open forests and woodlands in relation to disturbance by fire
Dr Matthew Swan	University of Melbourne	Using a long-term research project to investigate the immediate effects of fire on fauna
Jacob Sife =S=	Ku-ring-gai Council	If we burn it, will they come? (Monitoring fauna impacts of ecological burning)

Lunch 12.15 – 1 pm

=S= Speed Talk

DAY 2 WEDNESDAY CONTINUED

Session 4: Fire, ferals and weeds 1pm – 3.05pm

Prof. Chris Dickman Keynote	Sydney University	Fire, feral and native animal interactions: perspectives from central Australia
Bronwyn Hradsky	University of Melbourne	Managing invasive predators and fire to improve native mammal persistence in forest landscapes
Mark Graham and Kevin Taylor	Nature Conservation Council NSW	The Interaction between Fire and Weeds in Native Vegetation in NSW: A review by the Hotspots Fire Project
Troy Lessels =S=	Campbelltown City Council	Re-introducing fire into Cumberland Plain Woodland to reduce weeds and disrupt Bell Miner Associated Dieback
Various	PANEL DISCUSSION	Managing weeds and ferals pre- and post-fire. What are the challenges and opportunities? How can we improve this?

Afternoon Tea 3.05 – 3.25pm

Session 4: Fire, ferals and weeds 3.25pm – 4.35pm

Dr Diana Virkki	Griffith University and Ten Rivers	More burning, more warts: Frequent burning favours cane toads
Jonathan Sanders	NSW National Parks & Wildlife Service	Using plant population ecology to improve the effectiveness of both fire and weed management
Richard Brittingham and Sian Hromek	Nature Conservation Council of NSW	The NCC Firesticks Project: Applying Aboriginal knowledge, science and integrated fire, weed and pest species management to restore and maintain biodiversity, habitat connectivity and landscape resilience
Kate Smolski	Nature Conservation Council of NSW	Where to from here and Closing address

4.35pm Close

=S= Speed Talk



OFFICIAL ADDRESSES

Corey Shackleton

NSW Rural Fire Service

For the past 15 years Corey has been involved in bush fire management, initially as a bush fire consultant and most recently with the NSW Rural Fire Service (NSW RFS). Corey joined the NSW RFS in 2006 and is currently Director Community Resilience. He is responsible for the management and implementation of the legislative planning framework for developments in bush fire prone areas, environmental approvals, bush risk management (including: Community Protection Plans, Hotspots, Neighbourhood Safer Places) and fire behaviour analysis.

Corey's experience has been gained across a broad spectrum relating to bush fire management including bushland management, land management, fire fighting, risk management, building and development in Bush Fire Prone Areas and regulation. Corey also represents NSW RFS on many state and national committees and projects.

Kate Smolski

Nature Conservation Council NSW

Kate Smolski is the Chief Executive Officer of NCC. Kate is an environmental advocate with over fourteen years experience in grassroots organising, campaign strategy, media relations, policy and lobbying. Kate has a background as a grassroots organiser and campaigner with several leading US environmental non-profits including Green Corps, the Sierra Club and Greenpeace. Through innovative campaigns and training she has worked with a range of groups to effectively advocate for action on climate change, clean energy and lands and wildlife protection. Kate worked as Campaigns Director for the Nature Conservation Council providing highly effective leadership for the protection of the state's natural environment, delivering high-impact campaigns, building new alliances and growing the base of supporters before moving to her current role as NCCs CEO.

Naomi Stephens

NSW National Parks & Wildlife Service

Naomi Stephens is the Director, Fire and Incident Management for the National Parks and Wildlife Service, NSW Office of Environment and Heritage. She is a member of the NSW Bush Fire Coordinating Committee and represents the Office of Environment and Heritage on the Australasian Fire and Emergency Service Authorities Council (AFAC), the AFAC Rural Land Management Group and the national Forest Fire Management Group. Naomi is a Director on the Board of the Bushfire Natural Hazard Cooperative Research Centre and the Lead End User Representative for the Prescribed Burning Cluster research program under the CRC. She is a member of the steering committee for the research program NPWS partners with the NSW Rural Fire Service at the UoW Centre for Environmental Risk Management of Bushfire (CERMB).

John Travers

Travers Bushfire and Ecology

John Travers is a landscape ecologist and is the Director of Travers bushfire & ecology. John spent 12 years with NSW National Parks and Wildlife Service as a park manager in various locations in NSW before joining the Department of Bush Fire Services as Manager of Planning & Research. This experience led John towards private practice and the eventual undertaking of many exciting fire/ecological management projects. This year marks John's 36th year working with fire and ecology and his passion remains strong.



PRESENTATIONS

SESSION 1: Buildings and backyards for people, plants and animals – risk, resilience and adaptation

Coexistence with fire at the interface: sensitivities, opportunities and impediments

Senior Professor Ross Bradstock

Director – Centre for Environmental Risk Management of Bushfires
University of Wollongong
PhD

Risk posed by fires to urban development is strongly affected by attributes of closely adjacent vegetation: aka. the bushland interface. Considerable evidence suggests that manipulation of vegetation in and around property (including gardens) has a strong effect on the magnitude of losses from fires. Modification of vegetation/fuel at the interface to mitigate risk from unplanned fires provides a seemingly simple and cost-effective way to reduce risk. There are, however, formidable impediments and challenges for implementation of solutions of this kind that hinge on the perceptions, attitudes and capacity of residents, and the limitations of overarching policy and legislation. To what extent can we reimagine the interface with bushland if we are to improve our ability to co-exist with fire? What would such a dream look like and how would people react? What barriers limit the degree to which dreams can become reality?

What is Community Bushfire Adaptation?

Justin Leonard

Research Leader – Bushfire Urban Design
Commonwealth Scientific and Industrial Research Organisation (CSIRO)
Scientist

Unfortunately, most of us have grown accustomed to the idea that fire should be excluded from our landscape, except when it is “prescribed” to reduce fuel. We have made our houses out of combustible materials and surrounded them with more combustible things, and interestingly, the thought of having even a low intensity fire spread onto our properties would immediately have us reaching for the phone to call our insurance provider.

When did things start going wrong? Well, pretty much from the start of mass urbanisation. Our builders replicated houses from their country of origin, fenced the landscape (with fences that needed to be replaced after fire) and built open sheds full of items that could easily burn. Fire was no longer welcome on the landscape.

How do we change our ways of thinking to accept that fire is an inevitable process and an integral part of our landscape?

We need to rethink our bushfire planning regulations by focusing on the fuel loads under the trees rather than the trees themselves.

We also need to rethink our bushfire building regulations by focusing on the use of non-combustible materials in all areas where embers and flame can reach. These houses would then be able to resist low intensity fires. We will then be able to invite regular “cool burning” fires back into the landscape – including our backyards. Expensive materials that are highly resistant to fire are not needed because intense fires are managed in the landscape.

The regular use of fire as a management tool by our communities and the incorporation of indigenous knowledge in our fire management practices would present a key opportunity to create and pass on knowledge and understanding throughout different generations.

A Framework for addressing Ecological Risk in Prescribed Burning

Wayne Kington

Project Specialist, National Burning Project

Australasian Fire and Emergency Service Authorities Council (AFAC)

BSc Environmental Sciences

The challenge for land managers today is to understand and apply the right kind of fires with the right techniques at the right times and places, to deliver the various outcomes that prescribed burning can achieve. In an environment where the competing objectives for fire and land management are increasingly complex, underpinning our prescribed burning with the best possible ecological outcomes is an important part of fire management.

Despite the large variation in fire regime and the various approaches to fire management across Australia, there are some key common principles that emerge. Through the National Burning Project, AFAC has sought to engage with prescribed fire practitioners throughout Australia to draw out these common principles and derive a common operating framework for addressing ecological risk associated with fire and fire regimes, at all levels of prescribed burning management.

The Risk Management Framework for Ecological Risks Associated with Prescribed Burning (AFAC 2015) provides a way to consider the steps and processes that all land managers can take when seeking the best ecological outcomes. It offers a synthesis of concerns, approaches and activities that organisations across Australia engage in to manage ecological risks associated with prescribed burning.

In this conference presentation we outline the key features of the risk management framework and highlight the principles that all prescribed fire managers can utilise to manage risk.

Review of the Bush Fire Environmental Assessment Code

Lloyd Van der Wallen

Supervisor Environment Officer, NSW Rural Fire Service

BSc Environmental Science

The NSW Rural Fire Service has undertaken a review of the Bush Fire Environmental Assessment Code (the Code) in consultation with key stakeholders including the Nature Conservation Council of NSW. The review process includes placing the draft revised Code on public exhibition for the purpose of enabling public submissions to be made. This presentation highlights the key proposed amendments to the Code.

The Code is a 'one-stop shop' environmental assessment and approval process for bush fire hazard reduction works. The Code has been in operation since 2003 with an initial revision in 2006 which is currently in-force. A bush fire hazard reduction certificate (Certificate) may be issued for works that are in accordance with the Code.

Bush fire hazard reduction work to protect life and property typically involves the clearing and/or burning of vegetation. NSW has a range of environmental legislation regulating these types of activities, as they can potentially have an environmental impact on matters such as native vegetation, threatened species, heritage, soil erosion, and air and water pollution.

The Code provides an alternative 'single' environmental approval for landholders who would otherwise need to consider the range of environmental approvals that might be required under the regular environmental legislative framework.

Private landholders at risk from bush fire may simply apply for a free Certificate from the NSW RFS. Major public land managers, such as National Parks and Wildlife, councils, and the Forestry Corporation of NSW, can also use the Code to assess and approve their own hazard reduction activities.

The revised Code will assist public authorities and private landholders to better undertake hazard reduction works for the benefit of our communities whilst minimising impacts on the environment.

Landscape variation in plant flammability: will gullies be safe refugia for native fauna?

Dr Brad Murray, Dr Daniel Krix

Senior Lecturer, University of Technology Sydney

BSc (Hons), PhD

Increases in very high fire danger weather linked to climate change will increase bushfire frequency and intensity in temperate forested areas of NSW. One outcome of this hotter, drier scenario is that vegetated areas which usually burn infrequently may burn more often. This poses a considerable problem for gully habitat in temperate forested areas typically found in the Sydney region and in remnant habitat in suburban areas. Gully habitat burns less frequently than ridge habitat in these systems, and as such, gullies have become important refugia for native fauna. If refugia such as gullies are placed at greater bushfire risk, then there are worrying implications for the persistence of native fauna. If their plant assemblages are highly flammable, gullies are at an even higher bushfire risk. Our work on plant flammability has been addressing this possibility, by exploring how measures of intrinsic leaf flammability spanning ignitibility, sustainability and combustibility differ between gully and ridge habitats. In this talk, I will present our work that shows that gully plant assemblages are highly flammable, comparatively more so than assemblages on ridges. Given that gullies are also prone to exotic plant invasion, I will present some of our work that shows that exotic plants are more flammable than native plants. Thus, there is a triple threat from gully plant flammability, climate change and exotic plant invasion that could lead to catastrophic losses of gully habitat for native fauna. The native fauna most at risk of loss of gully habitats will be discussed.

A Local Government Perspective on Bridging the Gap: Fire Management at the Interface

Kellie Langford

Bushfire Officer, Central Coast Council

BAppSc Coastal Management,
Grad Dip Design in Bushfire
Prone Areas

Bushfire risk management at the local level is both a moral and legal obligation of all local governments in NSW. The Central Coast region is already experiencing a greater number of extreme fire weather days than ever before. According to recent climate science, further shifts towards a warmer, drier climate are likely to intensify bushfire risk for the region. Fires present a unique challenge for local government in the management of vegetated natural assets, as there is often limited quantitative data in respect to biodiversity. This data is important as it helps to inform ecological restoration pre and post fire. Whilst Council is responsible for the mitigation and minimisation of bushfire risks across all land vested in their control and management, there are no formal or legislative requirements for Councils to either conduct post-fire monitoring on sites from ecological perspectives or undertake bushland restoration post fire. Yet, this is key to understanding the role fire plays in these environments, as well as ensuring that the delicate balance between the protection of life, property and the environment is both maintained and enhanced. This paper presents the various mechanisms adopted and being developed by Central Coast Council to overcome this gap and sustain the ecological value of the local bushland. A few of these initiatives are: a multi-criteria analysis to map bushfire hazard risks, a pre/post fire monitoring program on selected Council managed sites, further refinement of ecological fire regimes and Wyong Pilot Retrofit Project. The paper also provides insight into future opportunities to enhance the local Government's capacity for bridging the gaps between fire risk management, enhancing community resilience to bushfire risks and ecological restoration or management of bushland in the Local Government Area (LGA), in light of the intensifying bushfire weather conditions.

Revival of Aboriginal Cultural Burning to restore Country

Den Barber

Founding Director, Koori Country Firesticks Aboriginal Corporation and Local Land Services Officer - Aboriginal Communities BAppSc
Aboriginal Cultural Fire Practitioner

Koori Country Firesticks Aboriginal Corporation (KCFSAC) is a non-profit organisation that aims to revive Traditional Aboriginal cultural practices of burning Country as an alternative approach to Hazard Reduction techniques used by private and public landholders and managers. KCFSAC's primary objective is to care for Country (Our Mother Earth), regardless of tenure or ownership. This knowledge has been passed onto KCFSAC by Aboriginal Cultural Elders and knowledge holders. Whilst the Australian landscape is broad and extremely diverse, it is the underlying principles and methodologies of Aboriginal cultural burning that remain the same. KCFSAC now pass on this knowledge to other Aboriginal and non-Aboriginal people to help restore Country that has been impacted by wild fire, the absence of fire and/or infestation of exotic weeds. Cultural burning also acts to reduce fuel loads that surround urban developments, regional towns and properties.

Members of KCFSAC all share similar values of and love for the land. Aboriginal members especially share an overwhelming desire to fulfil what they perceive to be their custodial responsibilities to care for Country. Whilst cultural burning activities by members have been undertaken as part of cultural practice, they have done so voluntarily and at their own personal expense. There is an opportunity for land holders to engage with cultural fire practitioners and assist them with ecological restoration, hazard reduction and weed management, through the use of cultural burning. Imagine the many environmental, cultural, spiritual, social and economic benefits that may be afforded to both Aboriginal communities and to the land holders that utilise this knowledge and practice. KCFSAC is well placed to act as a facilitator to cultural learning pathways for fire and land management, for both Aboriginal and non-Aboriginal people. Cultural burning may be a valuable part of integrating other land management activities in achieving ecological restoration outcomes.



PRESENTATIONS

Session 2: Fire, restoration & biodiversity

Lessons from the past: learning how to manage highland native grasslands in Tasmania

Denna Kingdom

Reserves Manager, Tasmanian Land Conservancy
BSc Resource and Environmental Management, B Antarctic Studies (Hons)

The Vale of Belvoir is a subalpine valley in north western Tasmania, supporting approximately 1,000 ha of native grasslands. The grasslands provide habitat for numerous threatened flora and fauna species, and include the highland grassland vegetation communities that are recognised as rare and endangered in Tasmania.

The grasslands at the Vale of Belvoir are thought to have been managed by indigenous burning practices until the 1830s and have been continuously managed from the 1830s to the present through low intensity stock grazing and burning. Today, the floral species diversity of the grassland vegetation communities is considered to be high and the grasslands are relatively weed-free, both of which indicate that the grasslands are in good condition. The grasslands are now being managed for conservation, with the objective of maintaining the condition of the grasslands, floral species diversity and maintenance of habitat for grassland-dependent threatened fauna. Management of the property since 2007 has been based on the burning and stock grazing regime maintained by previous graziers, with experiments being conducted to determine what aspects of the previous management regime are affecting the condition of the grasslands.

Management options assessed in the experiments include low-intensity stock grazing, cool burning, both or neither. Analysis of the data indicates that cool burns combined with low-intensity stock grazing and cool burning without stock grazing produce similar floral diversity ($x = 12.5$ and 11.5 , respectively) four years after burning. Areas that were neither grazed nor burnt resulted in the lowest floral species diversity ($x = 8$).

Further experiments are being conducted to determine the optimum management regime to maximise floral diversity in the grasslands.

Is re-introduction of burning necessary for threatened Themeda headland grassland EEC restoration? new evidence suggests caution

Dr John T Hunter

Adjunct Associate Professor,
School of Environmental and
Rural Science, University of New
England

BSc PhD

Themeda grasslands on seacliffs and coastal headlands are a listed Endangered Ecological Community in NSW. On the north coast of NSW, listed threatened flora occur within them (*Pultenaea maritima*, *Zieria prostrata*, *Thesium australe*), along with a number of unique ecotypes that may require formal recognition. The conceptualisation of these as grasslands, and results from a single burn trial in the Narooma region, have led to the re-introduction of fire as a perceived necessity for the continued health of the system. Some propose fire re-invigorates the Themeda grassland and keeps invasive native and exotic shrubby species at bay. Fire intervals have been suggested, from yearly to a minimum of every six years. Based on these assumptions, funds have been made available for cultural burns and other burns along the NSW coast.

Results from our monitoring of 242 permanent plots suggest this community is not a traditional grassland, but a complex mosaic that includes some small grassland areas amidst a prostrate shrub grass interlaced system. The life history traits of endemic dominant prostrate shrubs indicate that infrequent fire must have been the norm for thousands of years on north coast NSW headlands. Our results suggest that the introduction of regular fire on north coast NSW headlands would be an entirely inappropriate management strategy. Regular burning (1-6 year intervals) would likely cause the extinction of endemic headland species and ecotypes, reduce plot and landscape richness, and limit functional diversity significantly. The floristics of this system would be homogenised and simplified. The species that would be lost include important structural and floristic groups that provide varied ecosystem services, such as nitrogen fixation and important functional roles for fauna such as provision food and shelter. Furthermore, the responses of the system to single burns are complex and result in unpredictable outcomes.

When Preconceptions are Misconceptions – the Importance of Ecological Monitoring to Inform Prescribed Burning

Kirstin Abley

Fire Ecologist, South Australia
Department of Environment,
Water and Natural Resources

BSc (Hons)

The vegetation remnants of the Mount Lofty Ranges (MLR), particularly in the peri-urban landscape, are subject to prescribed burning to reduce fuel loads, primarily to protect human life and property. A number of threatened species occur within this landscape and ecologically informed fire management practices are essential to ensure these species are not negatively impacted. For some threatened species, opportunities exist to use prescribed burns to improve habitat quality and assist with conservation goals.

The Endangered Mount Lofty Ranges Chestnut-rumped Heathwren (MLR CRHW) *Hylacola pyrrhopygius parkeri* is one such species whose population viability depends on careful burn planning processes. For the last ten years, habitat suitability for the MLR CRHW has been mapped across key sites in the MLR to improve our understanding of the quality and extent of MLR CRHW habitat.

However monitoring and habitat mapping conducted after prescribed burns and bushfires have revealed the most interesting information about the relationship between time since fire, fire intensity, habitat quality and the response of MLR CRHWs to these factors. The findings have 'turned the tables' on our preconceptions about this species' habitat suitability, suggesting the species may prefer early successional habitats. This information is being used to adjust our burn planning to ensure the habitat requirements of the MLR CRHW are being catered for.

Quantifying the flammability of fire-sensitive rainforest habitats

Ross Peacock

Bush Fire Environmental
Assessment Code Review
Coordinator

NSW Rural Fire Service

PhD Plant Science, BSc (Hons)
Botany

The Gondwana rainforest communities of northern NSW provide habitat to a wide range of primitive rainforest plant families and over 200 rare and threatened species many of which considered sensitive to habitat disturbance and global climate change. Managing fire exclusion in these relictual habitats has historically been achieved by relying on the natural occurrence of rainforests within fire protected topographic refuges and differential fuel moisture content and fuel ignitability across the Eucalyptus to rainforest boundary. Temperate rainforests are also hypothesized to lack the fire-adaptive traits of sclerophyllous vegetation such as fire stimulated germination from persistent soil and canopy held seed banks and instead are potentially anti-flammable and act as flammability dampers when exposed to the head or flank of a fire or spot ignition. Recently northern NSW has seen the emergence of earlier spring fire seasons which is challenging both the reliance of land managers on these natural landscape wildfire containment strategies and the persistence of relictual rainforest species. In order to provide land managers and fire behaviour analysts with a clearer understanding of fire behaviour across the eucalyptus-rainforest boundary and the risk and consequences of wildfires entering rainforest we quantified profile fuel characteristics, rates of fine and coarse fuel inputs and decay and the classic components of fuel flammability; ignitability, combustibility, sustainability and heat output across this ecological boundary. We examined these laboratory-scale flammability components by igniting fuels at three experimental scales (individual canopy species fuel fractions, profile fuel samples and complete litter beds in a wind tunnel), by implementing Australia's first hazard reduction burn in cool temperate rainforest and finally by examining the impacts of the Brushy Mountain Complex wildfire which burnt 12,000 ha in northern NSW in 2013. The results of these experiments will be presented to provide advice to land managers on the appropriateness of existing wildfire containment strategies for the Gondwana rainforest communities of northern NSW.

Collaborative monitoring of two culturally important species before and after fire at Wattleridge Indigenous Protected Area: preliminary results for the echidna and threatened black grevillea

Michelle McKemey

PhD student at University of
New England

NCC Firesticks Project

Lesley Patterson

Banbai Enterprise Development
Aboriginal Corporation

Wattleridge was the first Indigenous Protected Area declared in New South Wales and is located in the New England Tablelands. With support from the Firesticks project, Banbai rangers have been reintroducing cultural burning into the long unburnt landscape. A mosaic burn was undertaken in August 2015, which formed part of a broader-scale Before-After-Control-Impact (BACI) experiment undertaken through PhD research at the University of New England. Some of the key research questions are: how do Aboriginal communities and scientists work together to effectively monitor the ecological and cultural changes associated with cultural burning? Which species are important to monitor, and why? How will Aboriginal communities continue to monitor these species independently into the future?

We will present the preliminary results of collaborative monitoring for the targeted species including the echidna (*Tachyglossus aculeatus*) and black grevillea (*Grevillea scortechinii* subsp. *sarmentosa*). The echidna is a culturally significant species which features in rock art and as a totem for the Banbai people. The black grevillea is listed as vulnerable in NSW and has a highly restricted range with a stronghold population at Wattleridge IPA. For these reasons, the Banbai community feel that it is important to understand any impact that fire may have on their populations.

We will discuss the methods used to develop effective collaborative monitoring and present the results of pre- and post- fire monitoring of these species. We will discuss other collaborative monitoring at Wattleridge IPA, such as the development of the WINBA=FIRE, fire and seasons calendar, and the overall implications of the research for fire ecology, cross-cultural research and Indigenous fire management.

Vegetation change associated with reduced fire frequency in Border Ranges: loss of grassy forests and associated endangered fauna

Dr Elizabeth Tasker

Principal Scientist Fire Ecology,
NSW Office of Environment & Heritage

PhD Fire Ecology, BSc Hons

The mountainous and fertile landscapes of the Border Ranges in north-eastern NSW have experienced major changes in land-use over the past century and a half. The dominant vegetation in the region is rainforest, but forms a complex matrix with wet sclerophyll forests in gullies and slopes, cleared pasture on the flats, and grassy eucalypt forests on the drier more exposed ridges. Since the 1960s major changes in land-use have occurred, particularly reductions in burning and other disturbances in the grassy forests, and locals have observed major changes in the vegetation and a loss of grassy forests. Simultaneously, populations of the endangered Eastern Bristlebird, which lives in and around these areas of grassy forest, have plummeted (80% in the last 40 years), and it is now on the verge of extinction in north-eastern New South Wales. The decline of the species appears to be closely linked to the loss of open grassy eucalypt forests.

This talk presents an update on our presentation at the 2015 NCC conference, and focusses on our mapping of the condition and extent of the grassy eucalypt forests. Since 1966 they have declined massively, with the change resulting from a combination of invasion of the understorey by weeds, rainforest pioneers and wattles. The decline is much more pronounced in areas where fire frequency had greatly reduced. Our vegetation studies on the effects of experimental prescribed burns on tagged invasive plants suggest that it may be a single long interval between fires that is critical in allowing invasive plants to escape the 'fire trap' and become established. Once established at a site, most are capable of either vigorous resprouting or germination from soil seedbanks allowing them to rapidly expand their populations.

NPWS Cultural Fire Management Policy

Oliver Costello

Project Officer Position –
Aboriginal Heritage and Joint Management

NSW National Parks and
Wildlife Service (NPWS)

BA Adult Education and
Community Management,
Visiting Fellow at Jumbunna
Indigenous House of

Learning, University of
Technology Sydney

The National Parks and Wildlife Service (NPWS) recognises the importance of working with Aboriginal communities to manage NPWS reserves. Aboriginal communities are custodians of their culture and Country. NPWS recognises Aboriginal people use of fire to enhance and protect natural and cultural values; to express and maintain culture, kinship and identity; and to continue to share knowledge and practice.

A new NPWS cultural fire management policy aims to support Aboriginal community aspirations to connect to and care for Country through cultural fire management on parks. The policy encourages and supports partnerships between NPWS and Aboriginal communities for cultural fire management on parks. The term cultural fire management covers the full spectrum of Aboriginal community involvement in fire management, from consultation with communities about NPWS fire management activities to community presence on the fire ground for low risk cultural burning.

The policy supports culturally informed burning. This is defined as burns with cultural objectives and Aboriginal community partnership involved in their planning and approval. Further guidelines that define the required conditions for activities are being trialled. These include guidance on burn planning, prescriptions, supervision, fire awareness and safety, obligations for fire fighters and other participants during burns, planning and initiation and the roles of people attending the burn. The policy and guidelines aim to balance NPWS's responsibility for safety with the socially inclusive methods traditionally used by Aboriginal people. In sharing our knowledge and abilities while planning, conducting and monitoring burns together, we build capacity and respect between Aboriginal communities, fire agencies and the broader community.

Coal Point Burn to manage *Asparagus aethiopicus*

Craig Holland

Natural Areas Officer (Bush Fire Mitigation), Lake Macquarie City Council

Matthew Anderson

Bushfire Office, Fire & Rescue NSW

Suzanne Pritchard

President-Secretary, Coal Point Progress Association Inc

BSc Biology, BA Communication Studies

Lake Macquarie City Council (LMCC) identified a Coal Point reserve as a site that would benefit from prescribed fire to assist the local Landcare Group with management of Asparagus Fern (*Asparagus aethiopicus*), African Olive (*Olea europaea* subsp. *cuspidata*) and broad leaf Privet (*Ligustrum lucidum*). It was understood from local knowledge that the area had not been subject to fire for over 50 years. LMCC, in conjunction with Fire and Rescue NSW, carried out the hazard reduction burn in April 2016. LMCC owned the majority of the land, with seven private property owners consenting to include areas of their land.

Approximately 80% of the eastern side of the land was covered by a layer of *Asparagus aethiopicus* to a depth of 500mm. The Landcare group were actively involved in site preparation, including weed treatment and support with construction of a containment line along one edge of the site. LMCC obtained environmental approval to increase the intensity of the burn to medium intensity, which was carried out very successfully by Fire and Rescue NSW. The burn provided hazard reduction benefits to the adjacent interface and created a 'clean slate' in terms of weed mass, significantly reducing the hours of work and funds needed to manage extensive weed issues.

As a result of the burn there has been a significant reduction in the extent of the Asparagus Fern (*Asparagus aethiopicus*) which has allowed manual or chemical treatment on a manageable scale and a significant increase in the propagation of native species, in particular a range of grasses. The community feedback from this burn was very positive, including responses from residents on the adjacent interface and the Landcarers who have toiled away for years losing a battle.

Ecological burn to restore habitat for a critically endangered orchid on the Central Coast

Rochelle Lawson

Senior Ecologist, Central Coast Council

BSc Biology, MSc Ecology

Small area cool burn techniques were trialled on a Council reserve dominated by exotic grasses and environmental weeds. The Wyong Sun Orchid (*Thelymitra adorata*) is critically endangered and occurs on the reserve in places where there is little competition from other vegetation. Herbicide and tractor slashing biomass reduction techniques may damage the underground tubers. Therefore, careful use of fire may be one of the only manual options at this site for restoring open habitat. Hopefully, the orchid population will expand into the 1 Ha area treated by fire in 2017. Ongoing post-burn weed control is another challenge that will be trialled with various low impact techniques. Follow up orchid population surveys, counts and vegetation monitoring will confirm the results of the trial burn.



PRESENTATIONS

Session 3: Fire and fauna

Managing fire for fauna conservation: what have we learnt and where to next?

Associate Professor Alan York

Research Leader, Fire Ecology and Biodiversity Group, School of Ecosystem and Forest Sciences, University of Melbourne

BSc (Hons), PhD

While it has long been recognised that requirements for shelter, food and breeding largely determine an animal species' response to fire and post-fire successional patterns, until recently explicit fire management strategies for fauna were limited to those regarded as of particular conservation significance. Additionally, ecological fire management has often been underpinned by the assumption that meeting the needs of plant species will automatically meet the needs of animals. Over the past 40 years in Australia, we have accumulated considerable information on the response of many animal species to individual fires and to regimes of fire. This knowledge, and a move towards a landscape view of fire management, has seen substantial change in the way we manage fire for biodiversity conservation. Here I provide a brief overview of some studies that have contributed to our increased understanding, outline some current research directions, and discuss some of the evolving fire management strategies being implemented by land management agencies.

Managing fire and koalas on the Tweed Coast

Scott Hetherington

Senior Program Leader Biodiversity, Tweed Shire Council

High intensity wildfire has been identified as one of the key causes of a severe decline of the coastal koala populations in Tweed and Byron shires, on the far north coast of NSW. Analysis of the fire history of the Tweed Coast identified a severe lack of fire with significant negative outcomes forecast for the persistence of koala habitat, together with the guaranteed likelihood of further high intensity wildfires. This scenario presents a similarly grim outlook for human life and property in a landscape matrix of urban settlements, rural land and extensive bushland reserves.

An integrated approach to identifying the highest priority areas for hazard reduction burns to prevent wildfire and also bring areas of koala habitat back to within recommended fire intervals, has been developed and is currently being implemented. The project has thus far delivered a Koala Fire Management Plan, Guidelines for Hazard Reduction Burns in Koala Habitat and a Wildfire Response Procedure.

The development of this fire management response has benefited from a collaborative relationship with local Rural Fire Service brigades, National Parks and Wildlife Service land managers and the Northern Rivers Fire and Biodiversity Consortium. There has also been the opportunity to 'live test' strategies during response development through application of the plan and guidelines to the planning and implementation of local hazard reduction burns and involvement in wildfire response.

The development of these materials will be explained with a view to promoting their application in other locations and relevant situations. This presentation will also discuss some of the key lessons learned, ongoing challenges and delivery status.

People, Bushfires, Houses and Koala's on the Far South Coast of NSW

Max Beukers

Senior Planner Fire, Incident and Aviation Branch

NSW National Parks and Wildlife Service (NPWS)

BAppSc (Ecology)

Conserving koala habitat, while protecting dwellings for bushfires in a forested landscape, presents a challenge to communities and government agencies. In 2016 the NSW Office of Environment and Heritage commissioned the University of Melbourne to assess the risk versus benefit of alternate, hypothetical hazard reduction programs, to determine which provided the best trade-off between conserving koalas and protecting houses on the Far South Coast of NSW. The forested coastal hills and valleys between Bermagui, Tathra and Bega contain a very small, well monitored koala population and around 2000 people who live in small rural districts beside or within the forests. About 30,000ha of the land has been reviewed, of which 24000ha is a mix of dry and moist eucalypt forest on coastal ranges, with 6000ha of cleared or partially cleared valley farmlands.

OEH designed twelve hypothetical hazard reduction programs of between seven and ten years rotation across all tenures. The NSW Rural Fire Service and the NSW Forest Corporation assisted. These were tested using specialist GIS modelling, which estimated the probable impact on mapped dwellings and core koala habitat of each alternative. The relative reduction in the probability of wildfire impact on koalas or dwellings of each alternative was then compared. A report on this analysis was presented to the communities using the RFS Hotspots program. It has also been accepted for publication in International Journal of Wildland Fire for later this year.

This application of scientific analysis by operational fire managers to connect and explain the impact of alternative fire programs was well received by the community. The program is now being extended to other parts of NSW where small koala populations live in close proximity to people in rural landscapes. It has given clear direction to local fire agencies that are now using the preferred alternative to design a 10 year burn program.

Reducing the effect of planned burns on hollow-bearing trees

Luke Smith, Emily Cordy, Dr Lucas Bluff, Assoc. Prof. Wendy Wright

Luke Smith

Planned Burning Senior Biodiversity Officer
B NRM (Hons)

Emily Cordy

Graduated Honours Student (specialising in fire ecology, Faculty of Science and Technology, Federation University Australia
BSc (Hons)

Hollowing bearing trees (HBT) are a vital ecological asset in most mature forest ecosystems, especially in Australia, as hollows often provide habitat for a broad range of native fauna species. Hollows can often take up to 220 years to form naturally. In Australia, loss of hollows through tree collapse, caused by harvesting, bushfires and planned burns, is thought to be exceeding hollow formation

This study was initially instigated by a report conducted by the Department of Environment, Land Water and Planning, which quantified the rate of HBT collapse during planned burns in eastern Victoria. Based on this report's findings, the authors sought to investigate the effectiveness and efficiency of manual vegetation clearing as an approach to protecting HBT from planned burning in Lowland Forest ecosystems in the Victorian Gippsland Plain Bioregion. Various attributes of HBT were examined in order to identify characteristics that make this tree type more vulnerable to collapse.

Clearing surrounding vegetation to widths of either 1m or 2m around HBT protected trees from the effects of planned burning. Fewer of these trees collapsed during or following fire, compared to HBTs which had no clearing of surrounding vegetation, or which were cleared to 0.5 m. However, application of treatments at a greater width is more resource intensive, resulting in fewer trees being treated (and protected) per fire crew worker, per day. A 1m clearing treatment was found to be the most efficient method of preventing HBT collapse. The results also show that fire intensity is a major factor influencing the number of HBT that collapse during or immediately following fire. Conducting a planned burn with lower fire intensity is another effective and efficient way to reduce HBT collapse. The study also identifies key characteristics of HBT which make the tree more susceptible to collapse; allowing identification of such trees as candidates for pre-burn manual clearing treatments.

Habitat features of open forests and woodlands in relation to disturbance by fire

Peter Croft, John Hunter & Nick Reid

Peter Croft

BSc, Postgrad Dip Nat Res, PhD
(presented by John T Hunter)

Wildfires and hazard reduction burns can affect both the quality and amount of fauna habitat in Australian forests and woodlands. Fallen timber, bark, litter, tree hollows, log hollows, shrubs and ground cover are some habitat attributes that are either partially burnt or totally consumed during the passage of fire. Experiments utilising charred logs and scorched bark show a reduction in use of these features for shelter by invertebrates and vertebrates. A survey of reserved land in northern NSW measuring the amount of habitat features in open forests and woodlands with varying fire histories recorded a marked reduction in fauna habitat in more frequently burnt vegetation communities. Long unburnt vegetation, with optimum fauna habitat, is rare in the landscape and will continue to decline with community demands for increased areas of hazard reduction burning to protect life and property. Exacerbating the loss of habitat is the application of fire thresholds based on minimum recovery time for plant reproduction after fire in fuel management that neglect the needs of fauna. Fauna habitat is under threat across the landscape from clearing, under-scrubbing and potentially from fire management. An increase in upper fire thresholds is recommended, along with the protection of long unburnt vegetation communities while allowing for fuel management.

Using a long-term research project to investigate the immediate effects of fire on fauna

Dr Matthew Swan

Research Fellow School of Ecosystem and Forest Sciences, University of Melbourne PhD

Managing fire for biodiversity conservation requires an understanding of both the long term effects of fire regimes and the immediate effects of fire events on species and communities. Studying the short term effects of fire on fauna is challenging, however, because it is risky to design studies based on highly unpredictable events. As such, studies often lack pre-fire data and are un-replicated, limiting the scope of inference. Here, data from a long term fire effects study conducted at the landscape scale in the Otway Ranges since 2010 has been used to opportunistically conduct a replicated fire experiment. Planned burning has been continually rolled out in different parts of the 50,000 ha study area since the beginning of the project, allowing for multiple fire events to be incorporated into a before-after-control-impact study design. This design allows for greater ability to generalise than studying a single fire event. The results from this study will provide insight into the immediate effects of fire on the abundance and distribution of ground dwelling mammals and their use of refugia in the short term after fire events.

“If we burn it, will they come?”

Jacob Sife

Natural Areas Officer, Ku-ring-gai Council

BSc Environmental Science and Management

Ku-ring-gai Council manages significant tracts of bushland which include many endangered and critically endangered ecological communities and provides habitat for numerous species of threatened and significant flora and fauna. Our large bushland team seeks to regenerate, restore and enhance our bushland communities and increasingly utilises fire as a tool to improve the structure and complexity of our reserves.

There have been demonstrable results in terms of floral diversity and structure. However, in regards to fauna the results are less understood. Burning has been conducted from a vegetation-centric perspective with an “if we burn it they will come” philosophy towards fauna.

What happens to animal biodiversity during ecological burns and are there management measures that could improve the outcome for fauna? How do animal populations recover post fire and how long does recovery take? What species benefit and what species may be negatively impacted?

In an effort to assess and monitor the results of ecological burning on fauna within the local government area, Ku-ring-gai Council have started to develop a monitoring methodology.

The challenges faced relate to limited resource availability, a very sensitive post-burn environment, unavailable or limited baseline data and identification of species or guilds which could serve as bio-indicators.

The monitoring methodology utilises passive survey techniques and seeks to incorporate citizen science where possible.

With a long-term monitoring methodology in place, Ku-ring-gai Council aim to continually improve our management of biodiversity in the Local Government Area.



PRESENTATIONS

Session 4: Fire, ferals and weeds

Fire, feral and native animal interactions: perspectives from central Australia

Professor Chris Dickman

Professor in Ecology, The University of Sydney

BSc (Hons), PhD

Episodic floods or heavy rains in arid environments usually herald pulses of productivity that trigger 'booms' in the numbers of consumer organisms and dramatic but short-lived increases in local and regional biodiversity. But these times of reward can also be times of great risk, providing opportunities for invasive plants and animals to move into arid regions at the expense of native biota. As 'bust' times of low resources begin, wildfires often sweep through large areas and provide further hazards for biota. In this talk, we describe long-term (25-year) trends in vegetation, lizards and small mammals in the Simpson Desert, central Australia, focusing in particular on the effects of wildfire. We show that feral cats and red foxes make disproportionately intense use of recently burned areas and increase their hunting attacks on small mammals at recent fire scars where above-ground vegetation has been removed. The numbers of all small mammal species are unaffected by the direct effect of fire, but fall to very low levels ($< 1 / \text{ha}$) within six months of fire due to predator activity. Lizards show divergent responses to fire at the species level, but lizard diversity declines in the months and years post-fire. Wildfires are predicted to become more frequent and intense in the future due to climate change, thus exacerbating hazards for fauna. We suggest that management should prioritize what can best be managed: feral animals. Feral animal activity can be reduced by strategically targeting hot-spots of activity and identifying refuges that act as ecological traps during dry periods. Alternatively, small prey can be protected from predation using modular predator-proof shelters that provide 'safe houses' for prey in open habitats post fire. We present preliminary results to show the efficacy of these shelters, and advocate further investigation of them in fire-prone landscapes generally.

Managing invasive predators and fire to improve native mammal persistence in forest landscapes

Bronwyn Hradsky

Research Fellow, University of Melbourne

BSc (Hons), PhD

Red foxes (*Vulpes vulpes*) and feral cats (*Felis catus*) pose a major threat to Australia's native fauna. Although the landscapes where these predators occur are frequently affected by wildfire and prescribed burning, little is known about how forest-dwelling foxes and feral cats respond to fire, or how fire affects the resilience of native prey populations to predators. Using a prescribed burn experiment in the Otway Ranges, south-eastern Australia, we found that fire reduced understorey cover, and resulted in a 5-fold increase in occurrence of invasive predators. Concurrently, relative consumption of medium-sized native mammals by foxes doubled, and fox selection for long-nosed bandicoots (*Perameles nasuta*) and short-beaked echidnas (*Tachyglossus aculeatus*) increased. GPS tracking data revealed that some forest-dwelling foxes strongly selected for human-modified habitats (including recently burnt forest) at a landscape and within home-range scale. However, behaviour and resource selection also differed substantially between individuals. A spatially-explicit, individual-based model is under development, which will capture our current understanding of how invasive predator management and fire affect native mammal persistence. The model is parameterised as a case-study of southern brown bandicoot (*Isodon obesulus*) persistence in a Victorian forest landscape, but has the potential to be adapted to other species and ecosystems. Model-based evaluation of population persistence can provide new insights into effective, coordinated management of fire and invasive predators at a landscape scale.

The Interaction between Fire and Weeds in Native Vegetation in NSW: A review by the Hotspots Fire Project

Kevin Taylor

Hotspots Ecologist, Nature Conservation Council of NSW
BAppSc (Coastal Management)

Mark Graham

Hotspots Ecologist, Nature Conservation Council of NSW
BSc (Environmental Resource Management)

A review of Fire of and Weeds in the Native Vegetation of NSW was instigated by the Hotspots Fire Project in 2016 due to considerable interest from landholders and natural resource practitioners and managers in recent years.

The review builds on the framework of the Hotspots Fire and Vegetation literature reviews prepared for eastern NSW; in doing this it improves on the state of knowledge of the interactions of fire and weeds in the native vegetation of the state. The review investigates literature regarding the ecological dynamics of weeds within native vegetation communities, how these impact biodiversity, influence fire regimes and have implications for weed control and fuel hazard reduction. Weeds which are known to have a significant degrading influence on native vegetation and where fire may have a role in its management are reviewed in detail and profiled, this includes Weeds of National Significance such as Lantana (*Lantana camara*) and Bitou Bush (*Chrysanthemoides monilifera* ssp. *rotundata*).

For many of the weeds reviewed such as Coolatai Grass (*Hyparrhenia hirta*) and Scotch Broom (*Cytisus scoparius* subsp. *scoparius*), fire was found to contribute to the establishment or promote existing infestations, in these instances fire should be excluded from infestations. In a limited number of instances fire was found to be a suitable management intervention, although combinations of fire with other management techniques such as herbicide application or implementing a range of additional ecological restoration techniques were found to be required to achieve the best possible weed management and ecological restoration outcomes.

The review provides a foundation from which land managers and landholders can discuss, plan and implement the best management responses to weeds, and this is being incorporated as a core component of Hotspots workshops across NSW.

Re-introducing fire into Cumberland Plain Woodland to reduce weeds and disrupt Bell Miner Associated Dieback

Troy Lessels

Bushland Management Officer,
Campbelltown City Council

Dip Mant, Cert II Bush
Regeneration

Campbelltown City Council has been trialling the use of fire as a landscape tool in reducing woody weeds and disrupting Bell Miner Associated Dieback (BMAD) processes to support the regeneration of native biodiversity in areas of critically endangered Cumberland Plain Woodland (CPW) vegetation. The project, co-funded by the Greater Sydney Local Land Services, aims to determine the most effective adaptive weed management techniques for improving the integrity and resilience of CPW remnants by re-instating natural fire regimes.

Located in the north-eastern portion of Noorumba Reserve, Rosemeadow, the site exists in a highly degraded state, characterised by a monoculture of exotic woody weeds, which supports the colonisation of opportunistic species, such as the Bell miner (*Manorina melanophrys*). As a result of the increased presence of Bell miners and psyllids in the study area, significant tree canopy dieback characteristic of BMAD have continued to spread in the Reserve. Fire is considered to be a useful tool for landscape level management of BMAD, as it is understood to disrupt the interspecific territoriality and strong socio-communal network displayed by Bell miners.

As part of the project, fire was used in a controlled trial in conjunction with other weed management measures. Site preparation works associated with the burn were undertaken utilising mechanical means (eg chainsawing, brushcutting and/or trittrering) with the intent of increasing the ground layer fuel and allowing them to cure prior to the burn. Botanical monitoring plots were established to measure changes in pre- and post-burn floristics.

Although it's too early to tell what the results of the fire will be, the monitoring of trial zones will enable the effectiveness of the techniques to be compared and understood, which will help to guide Council on the future management of CPW remnants in urban matrices.

More burning, more warts: Frequent burning favours cane toads

Dr Diana Virkki

Environmental Programs
Officer, Griffith University and
Ten Rivers

PhD, BSc (Hons)

Frequent burning is commonplace as a land management tool, however the effects of this on anuran communities remains poorly understood. The southeast Queensland region has been long impacted by the invasive cane toad (*Rhinella marina*) but the relationship between fire regimes, native anurans, and cane toads has not been investigated. This study aimed to determine if differing fire regimes (i.e. repeated fires, variable fire histories and wildfire) influence native ground-dwelling anuran communities and cane toad abundance in sclerophyll forests of southeast Queensland. Using a long-term fire experiment (Bauple State Forest) and surrounding state forests, eight fire treatments of varying frequencies were used among three sites, where anurans were surveyed using pitfall traps. Habitat structure and heterogeneity were also measured.

Cane toad numbers were considerably high in frequently burnt areas (annually burned and triennially burned sites) due to a preference for grassy, frequently disturbed habitats. Nonetheless, no species appeared to be negatively affected by fires and anurans were generally positively influenced by fires. Eastern pobblebonk (*Limnodynastes dumerilii*) abundance was significantly negatively correlated with time since fire ($P < 0.05$), and cane toad abundance as well as overall anuran abundance, richness and spotted marsh frog abundance were all positively correlated with total number of fires ($P < 0.05$).

Despite fire-driven changes to habitat structure, anuran communities were fairly resilient to the effects of fire, including repeated burning and wildfires. It is likely that the low intensity, patchy and slow moving fires, such as those applied at the frequently burned areas, are beneficial for anurans as they provide sufficient refuges for species survival. However, the significant increase in cane toad numbers in frequently burnt areas is an undesirable outcome that should be considered by land managers in areas where cane toads may pose a significant risk, i.e. vulnerable wetland areas or the occurrence of threatened anurans.

Using plant population ecology to improve the effectiveness of both fire and weed management

Jonathan Sanders

Area Manager, Cumberland
Area

NSW National Parks & Wildlife
Service

BSc (Hons)

Jonathan Sanders has worked in vegetation survey and ecology and land management since 1984, mostly for the NSW NPWS. He has worked on the Cumberland Plain with Dr Charles Morris of Western Sydney University since 2001, focusing on recovery of disturbed landscapes and the role of fire and weed management in achieving effective recovery. This collaboration has yielded promising results on the restoration of disturbed landscapes using fire, weed treatment and soil management.

Both fire and weed management actions have a major influence on the population dynamics of plant species. While a management action may kill one cohort of a plant species population, it may stimulate the recruitment or growth of other cohorts in the same or other species. Decisions about management are often made on the basis of a short-term outcome, without taking into account the longer-term changes that will result. This paper looks at the factors governing plant life cycles, and the ways in which fire and weed management actions may interact with them in both positive and negative ways. It proposes that integrating fire and weed management is essential in many disturbed landscapes, and discusses ways in which consideration of plant population dynamics over several cycles of management can lead to more effective management, and better environmental outcomes.

NCC Firesticks Project

Richard Brittingham

Firesticks Project Coordinator,
Nature Conservation Council of
NSW

BAppSc, Master of Protected
Area Management and
Governance (current study)

Sian Hromek

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Conservation Council of NSW

BEnvDesign

Until recently, many Aboriginal people were denied access to their ancestral lands and the opportunities to manage Country in a way that preserves and enhances its cultural and ecological values. This situation is changing with the creation of Indigenous Protected Areas (IPAs) around Australia, where Aboriginal land managers are directly involved in managing conservation lands. IPAs currently make up more than 40% of our National Reserve System and provide core habitat and connectivity for a diverse range of species in New South Wales, including many Threatened Species.

In north-eastern New South Wales, the NSW Nature Conservation Council's federally-funded Firesticks Project has been coordinating a unique collaboration among community members and personnel from four Indigenous Protected Areas, three Aboriginal Land Councils, the Northern Rivers Fire and Biodiversity Consortium (NRFABCON), the University of Technology Sydney and government agencies, including the NSW Rural Fire Service (RFS), Local Land Services (LLS) and the Office of Environment and Heritage (OEH).

Through the development of fire management plans, relevant training opportunities, and expert guidance, the project is building capacity for land managers to implement integrated fire, weed and pest species management strategies to enhance landscape health and effectively protect and maintain ecological and cultural values.

The project is implementing on-ground works and conducting long-term scientific monitoring to establish a greater understanding of the ecological impact of applying low-intensity prescribed burns in a mosaic pattern across different ecosystems. A diverse range of species are being monitored in the program including: Glossy Black-cockatoo, Spotted-Tailed Quoll, Turquoise Parrot, Long-nosed Potoroo, Greater Glider and Koala. The program aims to employ fire to enhance ecosystem health by improving habitat condition and connectivity within culturally significant but often degraded and highly modified landscapes. It provides educational pathways that enable and empower Aboriginal and non-Aboriginal communities to work collaboratively. The project is also raising awareness for the high biodiversity conservation value of Aboriginal Lands, particularly for maintaining populations of 58 Threatened Species identified in the four IPAs.



POSTERS

Hotspots Fire Project: collaboration can strengthen traditional fire management in contemporary settings

Inspector Phil Paterson

Environment Officer (Hotspots)
NSW Rural Fire Service

Adv Dip. Science (Horticultural
Science)

A number of Aboriginal groups have been proactive in seeking strategic approaches to regain knowledge needed to actively manage their lands in the context of contemporary issues regarding fire management. One of these groups is the Mogo Aboriginal Land Council (MLALC). Their Land and Sea Country Plan identifies training opportunities to build the capacity of their people to engage in land management. In October 2016 the Hotspots Fire Project delivered a modified workshop program to rangers from MLALC and neighbouring Bateman's Bay to increase the teams' understanding of when, why and how to incorporate fire on their land. This included ongoing assistance to develop detailed property bush fire management plans for a number of landholdings. The workshop provided a positive and empowering fire and land management experience for the teams. The resulting plans of management are an example of risk management being led at the community level and are accompanied by a sense of ownership and pride.

To complement this work, the NSW Rural Fire Service (NSW RFS) has been delivering fire-fighter training to the rangers. This is a capacity-building strategy and may also assist the team in attracting future grant funding. It will also aid employment opportunities with the NSW RFS State Mitigation, and is reinforcing Service values of respect and inclusivity across diverse cultural backgrounds. Already, a number of collaborative opportunities are emerging between the NSW RFS, the Office of Environment and Heritage, MLALC and other Aboriginal groups. These include investigating trial and train methods to tackle environmental weeds such as African Lovegrass, and using strategic mosaic burning to restore the structural integrity of the vegetation communities required to support populations of the Vulnerable Scarlet Robin (*Petroica boodang*) and Endangered Tarengo Leek Orchid (*Prasophyllum petilum*).

Candling

Penny Richards

Student, University of
Melbourne

Post Grad Certificate in Bushfire
Planning and Management

Candling in Victoria - the What, Why, When & How

Candling is a useful technique used in Victoria to reduce bark hazard and spotting potential in high risk bushfire areas and is carried out by agency staff and CFA volunteers. An inter-agency Candling Community of Practice has been formed to increase the knowledge and skills of planned burning practitioners to undertake candling across Victoria.

An Overview of the National Burning Project

Wayne Kington

Project Specialist, National Burning Project Australasian Fire and Emergency Service Authorities Council (AFAC)
BSc (Environmental Sciences)

The National Burning Project is a large scale project managed by the Australasian Fire and Emergency Service Authorities Council (AFAC). It is bringing together inter-related aspects of prescribed burning across Australasia to design guiding frameworks and principles for a more holistic and consistent approach to prescribed burning, including ecological management.

The benefits of national frameworks and guidelines lie in the improved strategies that come from accessing best practice, the ability to align varying approaches, a greater economy derived from using common standards and through achieving improved results.

Over the years, many enquiries have called for the development of national principles around prescribed burning. AFAC, the National Council for fire and emergency services in Australasia and the Forest Fire Management Group, who report to the Council of Australasian Governments, have addressed these recommendations through the National Burning Project.

The consultation phase has brought together practitioners from all over Australasia to formulate a number of best practice guidelines and frameworks including: the National Position on Prescribed Burning; national best practice guidelines for planning and implementing prescribed burns; national frameworks to address prescribed burning risks associated with ecology, fuel management, smoke, greenhouse and operational safety issues; training manuals to support a range of prescribed burning competencies; objectives and monitoring frameworks; case studies; and reviews of science, best practice and capability.

This poster presentation outlines the key products emerging from the National Burning Project.

Satellite-based fire severity and vegetation indices in monitoring vegetation regrowth at the selected National Parks of New South Wales, Australia

Shahriar Rahman

PhD Researcher

Department of Environmental Sciences, Macquarie University
MRes in Geo-information Science and Earth Observation for Environmental Modelling and Management, MSc and BSc (Honours) in Environmental Sciences

Forest fire is a natural and periodic event in Australia. Around two thirds of the Australian continent is affected by fires due to long dry spells. Fire severity is the degree of the impact of fire on vegetation and soil. There are a number of scientists who have published research related to fire severity mapping using burn severity indices. A few researchers utilised moderate to high-resolution time-series data to assess the fire severity on vegetation regrowth, whereas satellite-based information is valuable to predict the potential long-term ecological effects of fires. We have used satellite-derived fire severity and vegetation indices to monitor vegetation regrowth at selected fire-affected national parks (Royal National Park, Ku-ring Gai and Wollemi National Park) of New South Wales, Sydney. Two established fire severity indices, differenced Normalized Burn Ratio (dNBR) and Relative differenced Normalized Burn Ratio (RdNBR) from the year 2000 to 2016 were used to detect fire severity. Time series analysis of vegetation indices [NDVI (Normalized Difference Vegetation Index) and LAI (Leaf Area Index)] derived from temporal MODIS (Moderate Resolution Imaging Spectro-radiometer) and Landsat imageries were used to understand the changes in phenological cycles for different vegetation types after the fires events. We found that classifications based on RdNBR are more accurate than the dNBR-analysis for the spatial fire-severity assessment. Vegetation recovery rates are much higher in grasslands and low-open Eucalypt forests, whereas the recovery rate is very slow for the Eucalypt-medium open and woodland forests. The research findings will be helpful in further ecological research, wildlife habitat monitoring and biodiversity assessment for the fire-prone and fire-affected national parks of Australia.

Did the 2013 fire eliminate hollow trees and their associated wildlife from Warrumbungle National Park?

Dr Jennifer Taylor

Senior Lecturer, Australian Catholic University

Murray Ellis

PhD in wildlife ecology, Office of Environment and Heritage

In 2013 fire burnt over 90% of Warrumbungle National Park, mostly at high severity. It was feared this “catastrophic” bushfire had destroyed most of the hollow-bearing trees, with consequential severe impacts on associated fauna. Our surveys conducted two to four years post-fire showed detectable impacts of fire on birds, bats and reptiles, but a diverse range of species remaining in the park. Many hollow-dependent fauna were present, including Turquoise Parrots nesting in burnt trees, and Greater Long-eared Bats which shelter under bark but raise their young in large hollows. Close inspection of vegetation structure is showing low abundance of hollow-bearing trees. However, this current paucity seems unlikely to be solely due to the 2013 fire, with evidence of a long history of human disturbance. Large areas of the gently sloping parts of the park are post-1950s regeneration from clearing for grazing and cropping, resulting in many young trees with few hollows. Woodlands of the north of the park have evidence of widespread stem mortality with basal re-sprouting, probably from 1951 and 1967 fires. There is evidence that even prior to this, three periods of cutting and ringbarking in the park have affected current abundance of hollow-bearing trees: one using chainsaws; one using axes about waist high; and older, heavily weathered ringbarking marks often below knee height. Much of the oldest dead timber has rotted or burnt, but evidence suggests some current live stems are forth incarnation of trees that have repeatedly had their above ground parts killed by people or fires. Conversely, other large trees seem untouched. It seems the 2013 fires consumed dead timber and live trees, some of which were hollow, but this fire also generated new fallen and standing dead timber plus scarred some trees which may accelerate hollow development.

Flammability of forest litter: applications for land management

Angela Gormley

Master of Philosophy (Agriculture) student Faculty of Agriculture and Environment, School of Life and Environmental Sciences, University of Sydney

GradDip Environmental Management, BSc (Physics)

The majority of people that live in New South Wales live or work in the Sydney Basin. Just over half of this area is under conservation as National Parks, Nature Reserves, Flora Reserves and areas under voluntary conservation agreement. Other areas under some form of management include State Recreation Areas, Regional Parks, Crown Reserves and Wildlife Refuges. Regardless of the level of conservation protection afforded, much of the vegetation in these areas is flammable forests and woodlands. This puts a considerable proportion of the population of Sydney at risk from bushfires.

The research project described will use empirical data to characterise the physical and chemical attributes of litter, a component of forest and woodland fuels that is particularly important for propagation of fire. Differences in amounts, arrangement and flammability of components of litter (e.g. whole leaves and twigs, partially and fully decomposed material) will be determined for common vegetation types in the Sydney Basin, such as Wet Sclerophyll forest and Dry Sclerophyll forest. The information gained will be used to guide land managers in fire management to mitigate risk from bushfires. In addition, this information will be useful for improving emission factors from common vegetation types in the Sydney Basin by incorporating fuel moisture content, fuel load and fire intensity with combustion conditions.

Quantifying the effectiveness of thermal weeders as an ecological tool for native plant regeneration

Geraldene Dalby-Ball

Director, Kingfisher Urban Ecology and Wetlands

BSc (Hons)

Thomas Taylor

BSc Natural Science - Environmental Management (current study)

It is well known that lack of fire or inappropriate fire regimes contribute to the decline of flora species and communities. Inappropriate fire regimes are listed as a key threatening process under the threat and species conservation act. However, the capacity to apply appropriate fire in urban environments is often restricted by proximity to dwellings and resource limitations.

Recently, there has been a revival in the use of thermal weeders for managing weeds in urban bushland. This has partly been motivated by the desire to reduce herbicide use in weed management but observations have shown complementary natural regeneration of native species in reserves where they have not been recorded for 15 years. Thermal weeders have also been used to provide a pseudo ecological burn. Plots where thermal weeding was applied have also been compared with plots treated with herbicide. The results six to 12 weeks following treatment show thermal weeding plots with 80% cover, including a diversity of native plants and herbicide treatment with little to no cover.

While it is it acknowledge that plant response to fire is complex and varies between species we see the thermal weeder as a tool that can be part of an integrated approach to bringing back appropriate fire regimes (including burning seasons) for individual species within a reserve or for urban bushland in general. They also provide an opportunity for burning small patches around and within threatened species of plants which can provide valuable data about response to fire where knowledge is currently lacking.

Join us in helping to quantify the effectiveness of thermal weeders as an ecological tool for native plant regeneration and threatened species and EEC management. All we need to know is if you have areas where bush regeneration is occurring (over 100m²) where 16 x 1m quadrats could be placed and treatments applied. Monitoring will be provided for at least 7 months following treatments.

Are we getting our fire intervals right?

Jane Williamson

PhD Student, Australian Catholic University

Prescribed burning is used to limit wildfire extent and intensity but can also have conservation objectives. Such ecological burning can create mosaics of vegetation of differing successional stages based on time since last fire. In NSW, there are minimum and maximum recommended fire interval guidelines for each of 11 fire-dependent vegetation formations. Guidelines are based on responses to fire intervals by groups of plant species with shared functional life-history traits. Managers are required to maintain >50% of land defined as Land Management Zone within fire interval thresholds, and <35% below minimum and <35% above maximum intervals recommended for the vegetation formation (OEH, 2013). All fires are recorded in the BRIMS (NSW RFS) database and data are analysed to determine if these key performance indicators are met. However, there is currently no analysis of distribution of fire intervals within each formation beyond whether KPIs are being met.

My study aims to quantify temporal distribution of fires within each vegetation formation within NSW by analysing RFS and OEH fire history data. I am using GIS analysis to compare known fire history with recommended fire intervals for each vegetation formation. For each recorded fire within the 11 vegetation formations across NSW, I have determined the interval between the most recent fire and the fire before that. I have recorded where these fires occur across the fire interval timeline and in relation to threshold guidelines. This presentation presents data on the distribution of fire interval occurrence for these vegetation formations and explores whether current management is resulting in an evenly spread set of times for each vegetation formation, and look at trends within formations and regions. This study provides insight into timing of prescribed burns and feeds into work looking at effects of these guidelines on fauna habitat attributes.



SPEAKER BIOGRAPHIES

1. Senior Professor Ross Bradstock

Director – Centre for Environmental Risk Management of Bushfires, University of Wollongong

PhD

Professor Ross Bradstock is a leading, widely cited researcher in fire ecology with over 150 journal papers and book chapters and six books on fire ecology, biodiversity and management, plus more than 30 major scientific reports and policy documents. He leads a multi-disciplinary research team that is dedicated to the development of a quantitative understanding of risks posed by landscape fires to multiple values and the way such risks may be altered through cost-effective management and global change. Major funding sources for his team and other collaborations include ARC, NSW Environmental Trusts, NSW Government, CSIRO, Bushfire and Natural Hazards CRC, USGS and the European Union.

2. Justin Leonard

Research Leader – Bushfire Urban Design
Commonwealth Scientific and Industrial Research Organisation

Scientist

Justin Leonard has dedicated his research career to the understanding of how bushfire risk to life and infrastructure can be managed. This research combines learnings from bushfire exposure experiments with post bushfire survey investigations and computer modelling of bushfire interactions with buildings. The most recent activities include the development of an accreditations course on bushfire risk assessment with Melbourne University, support for the Victorian Community Bushfire Community Refuge Pilot Program, development of the bushfire planning risk maps for Queensland, development of a comprehensive life/house loss database for Australia, and assistance for various individuals and industry groups develop novel building design solutions and related standards.

3. Wayne Kington

Project Specialist, National Burning Project Australasian Fire and Emergency Service Authorities Council (AFAC)

BSc Environmental Sciences

As part of the National Burning Project team within AFAC, Wayne Kington is helping build national frameworks, guidelines and training material for improved prescribed burning outcomes. With over 20 years of experience in prescribed burning and nature conservation, Wayne worked for many years on fire and biodiversity issues within Queensland Parks and Wildlife Service, cumulating in the development of fire management systems and ecological planned burn guidelines. He then worked on planned burn procedures in the Department of Environment, Land, Water and Planning in Victoria before taking up his current position within AFAC.

4. Lloyd Van der Wallen

Supervisor Environment Officer, NSW Rural Fire Service

BSc Environmental Science

Lloyd represented the NSW Nature Conservation Council on the Pittwater/Warringah Bush Fire Management Committee in the early 90s. From 1994 through to 2003 he worked for the NSW National Parks and Wildlife Service, principally involved with threatened species from and also working in remote area firefighting teams.

He initiated and chaired the Interdepartmental Committee for Bush Fire Hazard Reduction resulting in the Bush Fire Environmental Assessment Code (BFEAC). Lloyd has been working as Environment Officer with NSW RFS since 2003 and has been involved in the development of the initial BFEAC and subsequent reviews.

5. Dr Brad Murray, Dr Daniel Krix

Senior Lecturer, University of Technology Sydney

BSc (Hons), PhD

Brad has research interests in ecology, evolution and biodiversity conservation. His research over the last 25 years has targeted a range of important conservation problems, including threatened species and rarity, invasive exotic plants and their ecological impacts, and the ecology of groundwater-dependent ecosystems. His research group at UTS has begun to explore leaf to whole plant flammability in the context of wildfire management, both within bushland and at the urban-bushland interface.

6. Kellie Langford

Bushfire Officer, Central Coast Council

BAppSc Coastal Management, Grad Dip Design in Bushfire Prone Areas

Kellie is currently a Bushfire Officer with the newly amalgamated Central Coast Council. She has worked in a range of bushfire and environmental roles over the past 18 years, from humble beginnings scrubbing Elliott traps on her first day in the private sector through to various environmental, bushfire hazard and land management roles in both state and local government agencies. She is a keen outdoor adventurer, spent a number of years as a volunteer fire fighter and enjoys working at the grass roots level with and on behalf of local government.

7. Den Barber

Founding Director, Koori Country Firesticks Aboriginal Corporation and Local Land Services Officer - Aboriginal Communities

BAppSc, Aboriginal Cultural Fire Practitioner

Den Barber is a descendant of the Traditional Custodians from Mudgee of the Wiradjuri. He holds a Bachelor of Applied Science (Parks, Recreation & Heritage) from Charles Sturt University. He has 15 years' experience as a Ranger, Aboriginal Co-Management Officer and Firefighter with NSW National Parks and Wildlife Service. He has been a cultural fire practitioner since May 2010 with learning and practical experience in Cape York, Western NSW, Yellomundee Regional Park and the Hunter Region of NSW. He is a Director of the Koori Country Firesticks Aboriginal Corporation, which is a non-profit organisation that aims to revive Traditional Aboriginal cultural practices of burning Country.

8. Denna Kingdom

Reserves Manager, Tasmanian Land Conservancy

BSc Resource and Environmental Management, B Antarctic Studies (Hons)

Denna Kingdom is a Reserves Manager with the Tasmanian Land Conservancy. Denna has extensive experience in managing fire, weeds and biodiversity on properties managed for conservation.

9. Dr John T Hunter

Adjunct Associate Professor, School of Environmental and Rural Science, University of New England

BSc, PhD

John is a landscape ecologist with over 20 years involvement in fire research.

10. Kirstin Abley

Fire Ecologist, South Australia Department of Environment, Water and Natural Resources

BSc (Hons)

Kirstin works for the Department of Environment, Water and Natural Resources in the Adelaide and Mount Lofty Ranges region of South Australia as a Fire Ecologist. She is responsible for reviewing the Environmental Assessments for prescribed burns in the region, managing a pre and post-fire weed control program and implementing monitoring programs to determine the effects of prescribed burning on flora and fauna. She has a particular interest in threatened species management and in ensuring prescribed burns are planned and conducted to achieve positive outcomes for native ecosystems.

11. Ross Peacock

Bush Fire Environmental Assessment Code Review Coordinator, NSW Rural Fire Service

PhD Plant Science, BSc (Hons) Botany

Ross is a plant ecologist with a PhD in Plant Science from UTAS and honours degree from Monash. Ross has had a varied career across NSW, Tasmania and Victoria in vegetation survey and analysis, forest research and roles in planning and policy in conservation, forest management and planning agencies. His current work focus for the NSW Rural Fire Service is the bush fire environmental assessment code. In his spare time he has an adjunct appointment in Biological Sciences at Macquarie University and leads a volunteer citizen science program for the NSW National Parks and Wildlife Service monitoring the condition of the Gondwana world heritage rainforests.

12. Michelle McKemey

PhD student at University of New England, NCC Firesticks Project

Michelle McKemey is undertaking her PhD on Indigenous fire management, studying cultural and ecological aspects of Aboriginal cultural burning. Her study encompasses sites in NSW and NT. Michelle has eighteen years' experience working in cross-cultural natural resource management and also runs Melaleuca Enterprises Environmental Consultancy Services.

Lesley Patterson

Banbai Enterprise Development Aboriginal Corporation

Lesley is an elder of the Banbai nation and ranger at Wattleridge and Tarriwa Kurrukun Indigenous Protected Areas. Lesley manages the native plant nursery at Wattleridge and has extensive botanical knowledge. She and husband Merv live at Wattleridge and have intimate knowledge of the country around them which they love to share with their children and grandchildren.

13. Dr Elizabeth Tasker

Principal Scientist Fire Ecology, NSW Office of Environment & Heritage PhD Fire Ecology, BSc (Hons)

Dr Liz Tasker is Principal Scientist in Fire Ecology with the Office of Environment & Heritage. She has worked as a fire ecologist for more than 15 years with OEH, and completed her PhD in Fire Ecology at the University of Sydney. Her research interests focus on fire regimes, their effects on animals and plants, and integration of this knowledge into fire management.

14. Oliver Costello

Project Officer Position – Aboriginal Heritage and Joint Management, NSW National Parks and Wildlife Service (NPWS)

BA Adult Education and Community Management, Visiting Fellow at Jumbunna Indigenous House of Learning, University of Technology Sydney

Oliver Costello is a Project Officer with the NPWS Aboriginal Heritage and Joint Management Team, and has worked closely with the Fire and Policy teams to develop the NPWS Cultural Fire Policy. Oliver, a Bundjalung man, co-founded the Firesticks Initiative in 2009, and in 2010 introduced Firesticks to NPWS as a cadet. Oliver has a broad range of knowledge and experience in Joint Management, natural cultural resource management, Indigenous governance and Cultural Fire. He is a founding Director of the Northern Rivers Connecting Country Alliance Aboriginal Corporation. Oliver is passionate about collaborative approaches to support Indigenous leadership, empowerment, partnerships and recognition of cultural knowledge and practices.

15. Craig Holland

Natural Areas Officer (Bush Fire Mitigation), Lake Macquarie City Council

Craig started at Lake Macquarie City Council managing weeds, trees and bushfires as a Bushland Management Officer 10 years ago, and later became a Natural Areas Officer (Bushfire Mitigation). Through this work, he has gained experience with environmental education, land management, firefighting and fire management Prior to working at Council Craig had his own business as a horticulturist and sub-contractor. Craig has been a volunteer with the New South Wales Rural Fire Service for 6 years, gaining knowledge and experience of bushfires. Craig has carried out 32 hazard reduction burns for Lake Macquarie City Council, concentrating on the protection of life and property, while knowing these burns will help restore healthy lands.

Matthew Anderson

Bushfire Office, Fire & Rescue NSW

Matt has been employed as a professional firefighter for 20 years, with Fire and Rescue NSW for 14 years, the last four as the Bushfire Officer Metropolitan North (Newcastle). Matt has been supporting FRNSW Operational Command and Land Management agencies to manage and mitigate the risk of bushfire impact on communities located in the urban interface, during this time he has conducted numerous burns, both Simple and Complex in varying landscapes and vegetation types.

Suzanne Pritchard

President-Secretary, Coal Point Progress Association Inc

BSc Biology, BA Communication Studies

Suzanne Pritchard has been actively landcaring on the Coal Point peninsula since 1995. She has secured over \$350,000 of grant funding for various local landcare projects in this time in her capacity as the President of the Coal Point Progress Association. Suzanne has also worked with local government and community organizations as a community engagement officer. Suzanne is currently managing the 6-year Environmental Trust funded grant Threatened Species Last Stand on the Coal Point peninsula, a project that has seen detailed knowledge garnered on the local flora and fauna.

16. Rochelle Lawson

Senior Ecologist Central Coast Council BSc Biology, MSc Ecology

Rochelle is Senior Ecologist at the newly amalgamated Central Coast Council. Her role includes planning for conservation at the landscape scale, and managing and protecting high value conservation areas and threatened species on Council-owned land.

17. Associate Professor Alan York

Research Leader, Fire Ecology and Biodiversity Group School of Ecosystem and Forest Sciences, University of Melbourne

BSc (Hons), PhD

Alan leads the Fire Ecology and Biodiversity research program within the School of Ecosystem and Forest Sciences at the University of Melbourne. His research group is currently investigating how fire causes patterns in the landscape, and how plants and animals respond to these patterns. Alan has been involved in applied fire ecology research for over 30 years; working primarily in universities and State research agencies in NSW and Victoria. His research interests are varied, but he has a particular interest in the ecology and conservation of insects and other invertebrates, and their roles in nutrient cycling and ecosystem function.

18. Scott Hetherington

Senior Program Leader Biodiversity, Tweed Shire Council

Scott Hetherington is an ecologist who has worked in conservation and environmental management for nearly 20 years. Scott has particular interests and expertise in private land conservation and wildlife management and works in the Natural Resource Management Unit at Tweed Shire Council. Scott is managing the recovery response for the endangered Tweed Coast koala population, including seeking to address the threats of high intensity fire and fire exclusion.

19. Max Beukers

Senior Planner Fire, Incident and Aviation Branch, NSW National Parks and Wildlife Service (NPWS)

BAppSc Ecology

Peter (Max) Beukers is currently working on fire management policy and procedures where he has leveraged on 26 years of fire management, biodiversity monitoring and conservation assessments. He has work as a fire-fighter, area manager, project officer, scientist and ranger with the NSW and Tasmanian NPWS. He is interested in developing systems that link regional emerging observations into the review of standards and guidelines. He thinks these developments will make for a better legacy when decision makers consider practical alternatives in conservation management.

20. Luke Smith, Emily Cordy, Dr Lucas Bluff, Assoc. Prof Wendy Wright

Luke Smith

Planned Burning Senior Biodiversity Officer

B NRM (Hons)

Luke works in strategic bushfire planning within DELWPs East Central Bushfire Risk Landscape team, mainly focusing on ecological planning and implementing the department's ecosystem resilience policy.

Emily Cordy

Graduated Honours Student (specialising in fire ecology), Faculty of Science and Technology, Federation University Australia

BSc (Hons)

Emily has recently graduated from a Bachelor of Science (Hons), specialising in techniques to prevent the collapse of hollow bearing trees during planned burns. She has a strong interest in ecology, as well as maintaining and preserving the habitats of native Australian fauna species.

21. Peter Croft, John Hunter & Nick Reid

Peter Croft

BSc, Postgrad Dip Nat Res, PhD

I have worked and studied in several fields including being a keeper at Taronga Zoo, eight years in agricultural research and 28 years as a ranger, biodiversity officer and senior ranger. I have been privileged to undertake many fauna and flora surveys on the Northern Tablelands and North West Slopes of NSW, and have been able to contribute to the conservation and reservation of special landscapes. More recently, I have become concerned about the potential impact of increased hazard reduction targets on fauna and flora while being aware of the necessity to protect life and property.

22. Dr Matthew Swan

Research Fellow School of Ecosystem and Forest Sciences, University of Melbourne

PhD

Matt is a postdoctoral researcher in the fire ecology and biodiversity group based at the Creswick campus of the University of Melbourne. His research interests include the effects of disturbance regimes on processes such as animal movement, resource acquisition and species interactions.

23. Jacob Sife

Natural Areas Officer, Ku-ring-gai Council

BSc Environmental Science and Management

Ecologist with experience in the private sector for a large multinational focusing on infrastructure and mining projects, within the local government sector as a biodiversity and natural resource officer and also as an independent ecological consultant. Passionate about wildlife and focused on urban ecology and conservation.

24. Professor Chris Dickman

Professor in Ecology, The University of Sydney

BSc (Hons), PhD

I have long been fascinated by patterns in biological diversity and the factors that affect it. My current work focuses mostly on mammals and other biota in arid environments, but also encompasses a range of other projects in applied conservation and management. I am particularly interested in how factors such as feral animals, grazing, fire and climate affect dryland biotas. I have published widely on this topic, and have successfully supervised many Honours and PhD students.

25. Bronwyn Hradsky

Research Fellow, University of Melbourne

BSc (Hons), PhD

Bronwyn Hradsky is a research fellow with the Quantitative and Applied Ecology group at the University of Melbourne. She is investigating interactions between invasive predators (foxes and feral cats), threatened native mammals and fire in the forests of south-eastern Australia. Her research involves both simulation modelling and field studies, and is currently focused on bandicoot and potoroo responses to fox control and fire in south-western Victoria and the Great Otway National Park. Bronwyn blogs about her research at wildzoologist.wordpress.com.

26. Kevin Taylor and Mark Graham

Kevin Taylor. Kevin has been involved with conservation assessment, natural resource management and environmental protection planning in various roles since 1991. He has undertaken ecological assessment at the property level and on a landscape scale. His ecological knowledge comes from conducting field surveys for fauna and flora, working with electronic natural resource management systems for state and local government and as an environmental consultant. Kevin is the Hotspots Fire Project Ecologist focusing mainly in the central west and southern regions of NSW.

Mark Graham. After studying Environmental Resource Management at Southern Cross University, Mark has worked for the last 20 years as an ecologist within government, industry and non-government sectors. He has mostly worked across the north of New South Wales from the coast to beyond the Darling River. Mark has worked in biodiversity assessment, environmental planning, threatened species management, landscape analysis, environmental education and on-ground environmental management and restoration in this time. This experience has provided him with a good understanding of the management needs of our internationally significant biodiversity. Mark is the Hotspots Fire Project Ecologist focusing in the northern and central west regions of NSW.

27. Troy Lessels

Bushland Management Officer, Campbelltown City Council

Dip Mant, Cert II Bush Regeneration

I have 14 years' field experience in natural area management focusing on bush fire behaviour and suppression. During this time, I have managed and undertaken various natural area projects, encompassing the use of fire as a landscape tool.

28. Dr Diana Virkki

Environmental Programs Officer, Griffith University and Ten Rivers

PhD, BSc (Hons)

Diana has over 7 years' experience in fire management and ecology with a strong understanding of the role of fire in the landscape, biodiversity and management. Diana's passion is ecology, gaining experience through her own research and various employments. Diana completed her PhD through Griffith University investigating faunal and floral responses to fire regimes in dry sclerophyll forests of southeast Queensland. During this project, she surveyed for reptiles, small mammals and anurans at one of the longest running fire experiments in the country.

29. Jonathan Sanders

Area Manager, Cumberland Area, NSW National Parks & Wildlife Service

BSc (Hons)

Jonathan Sanders has worked in vegetation survey and ecology and land management since 1984, mostly for the NSW NPWS. He has worked on the Cumberland Plain with Dr Charles Morris of Western Sydney University since 2001, focusing on recovery of disturbed landscapes and the role of fire and weed management in achieving effective recovery. This collaboration has yielded promising results on the restoration of disturbed landscapes using fire, weed treatment and soil management.

30. Richard Brittingham

Firesticks Project coordinator, Nature Conservation Council of NSW

BAppSc, Master of Protected Area Management and Governance (current study)

After completion of a Bachelor of Applied Science at Southern Cross University, Richard moved to Alice Springs to pursue a personal interest in Aboriginal land management perspectives and work for Charles Darwin University and the Central Land Council. For 8 years, he had a range of responsibilities including the development of Aboriginal Ranger Groups, development and consultation for Indigenous Protected Areas, coordination of Joint Management arrangements at National Parks, coordination of fire and invasive species projects and coordination of threatened species recovery projects. Richard is currently working for NSW Nature Conservation Council coordinating the federally funded Firesticks Project.

Sian Hromek

BEnvDesign

Sian Hromek is a proud Saltwater Woman who's family comes from the Yuin tribe of the South Coast of NSW. She completed a Bachelor of Environmental Design with Griffith Uni, and has been working as a Project Officer with Firesticks and Nature Conservation Council of NSW for the past 3 years. Sian also works as a practitioner of Conservation Land Management in Northern NSW for over 10 years and manages a Native Fruit Orchard on the family farm.



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Nature Conservation Council's Bushfire Program

promotes ecologically sound fire management policy and planning by supporting representatives on Bush Fire Management Committees across the state, providing written submissions on fire policy and participating on panels. The Program has been actively involved in fire management, bushfire education and advocacy for sustainable land policy since 1979, disseminating peer-reviewed science and encouraging knowledge exchange between fire and land management agencies, scientists, conservationists and community members. Bushfire Conferences have been held every second year and since 1994 over 88 successful community workshops have been facilitated throughout NSW. These workshops provide important opportunities for the community to meet agency representatives and discuss the on-ground application of policies and how management issues can be dealt with at a local level.

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Fire & Restoration Network

Building on interest from the 2015 Bushfire Conference the Bushfire Program developed the Fire and Restoration Network, providing a place for practitioners, researchers and land managers to share stories, information, challenges and new ideas about how fire is being used to rehabilitate degraded landscapes and restore ecological integrity. The network is creating a 'community of practice' for people with a shared passion and interest in using fire for ecological restoration. Our aim is to maintain an open and inclusive network where practitioners can inform, support and advise each other and help build on-ground capacity.

www.fireandrestoration.org.au

Notes:



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