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PRESENTATIONS – DAY 1 (in order of appearance)

Mega-challenges for Australian plant diversity: fires, threats and restoring diversity at scale

KEYNOTE - Professor Rachael Gallagher
Hawkesbury Institute for the Environment, Western Sydney University

Most Australian plant species occur nowhere else globally - a product of our isolation, evolution and environment. Australia's strong gradients in climate conditions and the prevalence of extreme conditions, coupled with the vast impacts of disturbances like fire and land clearing make lessons learned from this

continent highly relevant to global conservation research. Given the hyper-diversity of our national flora (c. 26,000 species) and the vast scales of our landscapes, the task of systematically assessing and ultimately protecting plants in Australia is immense. As a result, plant species are often overlooked in the national conversation around threatened species, yet crises such as the 2019-20 bushfire season highlighted ways in which plants can be considered in systematic national level conservation initiatives. In this address, I'll discuss the ways in which three major challenges in Australian plant conservation – high frequency fire, key threatening processes and broad-scale ecological restoration – can be addressed. Specifically, I'll discuss how combining data on species traits, geographic ranges and field-based ecology can inform a 'whole-of-flora' approach to Australian plant conservation and how strong collaborative networks are an essential ingredient for success.

Enhancing bushfire recovery of Kangaroo Island's rare and threatened, endemic flora on private land and roadsides

Dr Richard Davies
Nature Conservation Society of SA

Kangaroo Island of South Australia has 29 plant taxa which are rare or threatened, and endemic to the island. Seventeen of these were totally or largely confined to areas burnt out by bushfires in January 2020. We studied these species to determine mode and extent of postfire regeneration, as well as threats to this regeneration. Emergence and survival of propagules of these species were monitored in 35 quadrats from October 2020 to November 2021. This included over two period of well below average rainfall, over summer-autumn, providing information on seedling susceptibility to the more frequent and severe droughts occurring with global warming. All taxa were found to regenerate despite the fires being mostly of high intensity. All but three taxa were obligate seed regenerators (OSR), making seedling survival pivotal to successful postfire regeneration. Poor seedling survival over the dry spells were observed in three such species: EPBC-listed *Correa calycina* var. *halmaturorum*; and *Logania scabrella* and *Choretrum spicatum* ssp. *spicatum* (both rare). The Correa was also significantly affected by severe flooding in January 2022. Such events are already becoming more frequent and extreme with climate change. Other threats were weed invasion and browsing by over abundant macropods (with EPBC-listed *Leionema equestre*); hydrological change and pigs rooting (threatened *Asperula tetraphylla*); and potentially Phytophthora (*Correa calycina* and *Hakea aenigma*). The most widespread threat was post-fire invasion by Tasmanian Blue Gums. Densities a year after the fire averaged 900 wildlings/ha where burnt vegetation occurred adjacent to plantations, increasing to 30,000 wildlings/ha in wet heath.

It's grass! It's a twig! No, it's Superbum! Post-fire recovery of the threatened Superb Midge Orchid (*Genoplesium superbum*) in south-eastern NSW

Erika Roper
NSW Department of Planning and Environment

The Superb Midge Orchid (*Genoplesium superbum*) is an endangered small native terrestrial orchid that flowers between summer and autumn. It is threatened by small population sizes, low pollination rates, loss of pollinators, drought, herbivory, damage from roadworks, and trampling. The Saving our Species (SoS) program monitors five known populations, undertaking annual population census, threat

monitoring, demographic studies, caging of plants, and seed collection. Two populations were severely burnt in the Currowan bushfire in February 2020. In 2021, burnt and unburnt populations were surveyed between January and June to collect population and demographic data, including pollination rates. Survey and pollination data collection are currently underway for 2022. In 2021, 100 new plants were located, bringing the total number of known plants up to 201 individuals. No herbivory was recorded in burnt populations, likely due to delayed recovery of herbivore populations, and only one unburnt population experienced herbivory. Although the mean flowering rate was similar across burnt and unburnt populations, the pollination rate was three times higher in unburnt populations than burnt populations, at both a population level and an individual level. This suggests a temporary loss of pollinators at burnt populations followed by a failure of those pollinators to return, possibly due to loss of understory vegetation in the fire. Long-term monitoring of these burnt populations is critical to determine the recovery of pollinators and their services, as the loss of pollinators is a major threat and may result in decreased recruitment in the near future.

Management and restoration of temperate grasslands

KEYNOTE - Dr Jodi Price
Charles Sturt University
Temperate grasslands in south-eastern Australia are critically endangered, and remaining remnants are often degraded requiring restoration. While decades of research have identified the importance of disturbance, specifically fire, for maintaining diversity, questions remain around the effects of fire on plant diversity in long unburnt degraded grasslands. Here, I will explore three key questions in the management and restoration of degraded grasslands. First, I will discuss a review of the plant diversity responses to switches in disturbance type in grasslands. Second, I will explore the re-introduction of fire into long unburnt grasslands that have a history of stock grazing. Third, I will discuss the relationship between fire-cues and seed germination for grassland species. The findings of these three components will be used draw conclusions on recovery of grasslands with the re-instatement of fire and removal of grazing stock.

Self-determination and practice

KEYNOTE - Amos Atkinson & Dr Nathan Wong
Spirit Officer Djandak Dja Dja Wurrung Clans Corporation

This talk will be focused on the Right Plant Right Way report, a report into the revegetation sector led by Djandak with other First Nations across Victoria during 2020 and 2021. The talk aims to support the audience in gaining a greater depth of understanding around what self-determination means to Dja Dja Wurrung in the revegetation space. The talk will explore the basic premise of self-determination and what it means to Dja Dja Wurrung and how it relates to the activities that are conducted in the process of revegetation and conservation. Examples of how this may be applied will be explored and the impact on First Nations of exclusion of the process will be discussed.

The emotional rollercoaster of Bredbo Gentian conservation following fire.

Laura Canackle
NSW Department of Planning and Environment

There are four species of Gentiana in Australia, all of which are endemic to NSW and all of which are threatened. Two of these Gentiana species have not been seen for many years. Threats to these species are somewhat similar, with all species occurring in boggy habitats vulnerable to changes in climate, rainfall and hydrology. The critically endangered Bredbo Gentian (*Gentiana bredboensis*) is a site endemic annual herb, found in just one 40 metre stretch of a drainage line on private property in the Southern Tablelands of NSW. In 2019 only 12 plants were found and with only one seed collection ever undertaken, and no subsequent populations found, things were looking desperate for the Bredbo Gentian. In early 2020, half of the tiny site was affected by the black summer bushfires. Regular site monitoring post-fire showed positive signs of recovery throughout the year, with numerous tiny gentian seedlings popping up inside the fenced population area, especially within the burnt area. This culminated in a count of 279 flowering plants in November-December 2020, and subsequently a large collection of approximately 7000 seeds was sent to Australian PlantBank for storage and germination testing. Despite the increase in numbers in 2020, monitoring in 2021 located only three tiny seedlings, all in the unburnt area. The reasons for this are unclear and suggest either an interesting ecological mechanism at work or an unknown threat preventing this plant from emerging.

In case of fire: collaborate for conservation

Bradley Desmond
Australian Seed Bank Partnership
Co-author: Damian Wrigley

Securing seeds in ex situ conservation collections is a critical step to insure plant populations against the risk of threatening processes. In the wake of the impacts from the 2019–20 bushfires, this management option has become even more significant. Since this catastrophic event, the Australian Seed Bank Partnership (the Partnership) has worked to support plant conservation and recovery across Australia, with a strong focus on the native flora prioritised by the Australian Government's Bushfire Expert Panel. Through six of our bushfire recovery projects, the Partnership has banked seed from over 250 taxa, collected crucial recovery data for more than 160 taxa, and completed germination trials for over 150 taxa. This work incorporated plants from more than 50 families located across each state and territory, including 84 listed under the EPBC Act. In this presentation we will explore outcomes and challenges of these projects; highlight the importance of collaboration across governments, industry and communities; and discuss how our work will provide crucial information and reccomendations for management and conservation in the face of future threats.

From the ashes: predicting the need for restoration in fire-affected landscapes

Dr Melinda Pickup
Greening Australia
Co-authors: Dr Tein McDonald, Juan Pablo Riveros, Samantha Craigie

The fires in Australia in 2019/2020 were unprecedented in terms of their scale, severity and impact on native flora and fauna communities. These wildfires also occurred in the context of many ongoing threats (e.g., pests, diseases, habitat fragmentation) and stressors (e.g., drought), which can influence the inherent regenerative capacity of fire-affected communities. Given the level of extent and impact, it is crucial to understand how and where restoration strategies can be used to facilitate post-fire recovery and how these can be used for risk amelioration and improving landscape resilience to future fire events. These activities may range from providing protection to allow natural regeneration or assisted regeneration, to targeted seed inputs to facilitate the recovery of non-regenerating groups or species. We present the results of our predictive framework to help identify the vegetation communities and locations in greatest need of intervention to assist natural regeneration. This framework and spatially based model focusses on fire history, fire severity, pre-fire drought and proximity to cleared areas, but also considers the context of pre-disturbance vegetation condition. For each community, we also use plant trait data such as fire response (obligate seeder and resprouter) and regeneration (e.g., soil seed banks, time to seed production, seed storage) to help identify at risk communities and develop strategies to promote resilience to subsequent fire events. Our aim is to develop a practical and applicable model to assess the need for post-fire intervention while considering landscape resilience and that recovery will occur in a rapidly changing world.

The Global Restore Project: Knowledge Sharing for Shared Success

Dr Emma Ladouceur
German Centre for Integrative Biodiversity Research Halle-Leipzig-Jena (iDiv)
Co-author: Nancy Shackelford

The Global Restore Project (GRP) aims to bring together restoration researchers globally to pool existing data and knowledge for a deeper understanding of restoration science. Since our launch in 2019, we have partnered with the Global Arid Zone Project (GAZP), to bring together restoration data across global aridity gradients. We are collecting vegetation community monitoring data from actively restored (where seeding or planting treatments have been applied), passively restored and undisturbed remnant reference habitats for a rich, flexible, comparative framework to assess success. We are bringing together fragmented datasets collected over time by different teams, connecting references with local restoration and are developing tools for practitioners to be able to use. We envision that identifying spatial and temporal patterns of restoration success and failure has the power to inform predictive restoration science, to improve outcomes and reduce risk in restoration projects, and inform practical applications and policy. We will make these data completely open access and available to the community wherever possible, and intend to continue to grow these resources and tools over time. Here, we give an update on progress made, on our current status and invite interested people to reach out to us to chat about the many opportunities to get involved.

Viewing ecological restoration through an impact lens to generate benefit in landscapes

Dr Blair Parsons
Greening Australia
Co-author: Elisa Raulings

The way land is currently used in Australia's agricultural landscapes is unsustainable and this is affecting our biodiversity, landscape health, agricultural productivity and economic resilience. Further, the collective restoration response to date has been referred to as a "mere cautious fiddling" that is insufficient to prevent ongoing decline and degradation. Recently, the Australian National Outlook has called for re-establishment of trees and habitat over an unprecedented area (ie. 11 to 20 Mha by 2060) as part of a national vision for a bright and prosperous future. Recent analysis shows that recovery of these degraded ecosystems at this scale is both attainable and affordable. Aligned with this vision of recovery, Greening Australia is implementing an ambitious restoration program across Australia's Great Southern Landscapes. The program aims to move beyond business-as-usual and match the scale of intervention to that of the problem, but this requires a new approach. We have framed our work in terms of impact, challenging existing assumptions around ecological restoration and demanding new thinking to meet the challenge of achieving core benefits at scale. During this presentation, we will share new approaches to ecological restoration at scale, including planning and design, applied research, supply chain interventions, on-ground innovation, accounting frameworks, and monitoring and evaluation.

A time for action

Martin Driver & Samantha Craigie
The Australian Network for Plant Conservation | Greening Australia

Many factors are compelling us to act on improving environmental outcomes at the local, national and global scale. With the private and corporate sectors investing more than ever before in environmental restoration, strategic interventions are required in the Australian native seed and plant sector at the national, state, and regional scales to incentivise businesses, support community action, provide opportunities for Traditional Owner groups, integrate the learnings of research networks and support emerging industries. As native seed is the foundation of many restoration programs, we need to massively increase native seed supply if we are to meet large-scale restoration goals. This however, places additional pressure on systems that are unsupported by governments, uncoordinated and unsustainable despite the best efforts of sector participants. Greening Australia's Project Phoenix and ANPC's Healthy Seeds Project are two contemporary native seed focused projects that have collaborated widely to develop supported solutions to complex problems underpinning the practical restoration of native landscapes. The outcomes of these national and state-based projects are available to everyone and we call on all members of the community including governments to engage with the these plans to implement a more resilient and prosperous future.

Characteristics of the Australian seed sector that present challenges to meeting UN Decade restoration goals

Dr Paul Gibson- Roy
Restoration ecologist

The Australian native seed sector is critical for undertaking ecological restoration but, it faces serious challenges from many interacting factors, including fragmentation and loss of native vegetation, low

levels of restoration funding, and climate change impacts. Based on a national survey of industry practitioners, the ANPC Australian Native Seed Survey Report was released in 2020. Among its many findings were that the sector is underpinned by a remarkably small and under resourced work force, composed primarily of sole- or small-operators presenting a clear risk to all users of native seed. Also highlighted were many issues of concern that respondents believe to be constraining the sector, among them that future demand for seed will be difficult to meet from wild harvest; that the market is unwilling to pay for the true cost of seed collection/seed production; that there is a lack of seed available from a broad range of species; and that demand for seed is inconsistent and /or unpredictable. Findings on sector practice were equally concerning, showing that the diversity of species available for restoration is typically low; that native seed is seldom quality tested; and that most annual seed collections (wild or production) are small in volume suggesting overall seed yields are modest in quantity and not sufficient to support large-scale restoration. The report raises serious concerns about the ability of the sector, as currently constituted and resourced, to meet projected future increases in the demand for seed or for achieving greater effectiveness and efficiency in undertaking ecological restoration.

Constraints in industry capacity in meeting UN Decade of Ecosystem Restoration goals

David Carr
Stringybark Ecological

The UN Decade on Ecosystem Restoration encourages the world to set ambitious goals. Large-scale projects require the restoration industry to have the capacity to deliver the goods and services to meet these goals - seeds, seedlings, equipment, nurseries and restoration ecologists and practitioners. The industry has limited capacity to provide these goods and services due to the intermittent nature of restoration work. In the usual 'boom and bust' environment it is difficult to retain capacity to a point where it can be quickly switched on for a large project. Practitioners are unable to invest in equipment (ground preparation, spray rigs, seeders) without some surety of work. Seed suppliers are unable to suddenly produce large volumes of seed, especially with species that are intermittent seeders. Any targets for large-scale restoration project, whether funded by government, private industry or NGOs, need to commit to a minimum of 5-year projects if industry is to build and maintain capacity. In northern NSW, we have seen significant investment in koala habitat and restoration and bushfire recovery projects by NGOs and government, without the industry having the capacity to deliver within the time-frames expected. This has seen projects using inappropriate species or with inadequate preparation, simply because timeframes were too short to build this capacity. We propose and use seed supply strategies as one means to identify and overcome constraints relating to seed supply. These strategies estimate seed requirements against project targets for restoration and identify the skills development, resources and timescales required. This may include training, capital investment, seed production areas or advanced seed storage equipment.

The Australian Seed Bank Partnership – ex situ conservation as a tool for ecosystem restoration both locally and globally

Damian Wrigley
Australian Seed Bank Partnership

The Australian Seed Bank Partnership brings together more than 13 Partner and Associate seed banks, gene banks and flora focussed organisations that work collaboratively to understand, conserve and utilise native plant germplasm. Our efforts are delivered locally by experts across each Australian state and territory. These contributions enable communities, business and governments to meet their obligations under state, territory and federal legislation, as well as Australia's international commitments at the United Nations, including the UN Decade on Ecosystem Restoration and the Convention on Biological Diversity and associated forthcoming Post-2020 Global Biodiversity Framework. The Partnership is committed to supporting ecosystem restoration efforts through the utilisation of the germplasm and associated data held in ex situ facilities and through the Australian Seed Bank online; by contributing knowledge and expertise to national guidelines and standards for ex situ conservation, translocation and restoration; and by contributing to the work of likeminded organisations and emerging efforts such as through the Restoration Decade Alliance. While it is important to identify high level goals and aspirations to guide ex situ conservation programs, it is essential that local and regional priorities play a key role in national strategic planning and implementation. By supporting our Partners and Associates to deliver strategic priorities individually and collectively, the Partnership hopes to enable the expertise and capabilities of Australia's ex situ conservation facilities to prosper and contribute knowledge and seeds to the recovery of Australia's unique flora and the ecosystems they support on country.

Using state-and-transition models to support woodland restoration and monitoring in the Goulburn Broken catchment

Dr Libby Rumpff
The University of Melbourne
Co-authors: Jim Begley, Megan Good, Jenny Wilson

Eucalypt woodlands constitute some of the most extensive and yet highly cleared and degraded ecosystems in Australia. Restoration of the nationally threatened Grey Box (*Eucalyptus microcarpa*) woodlands has been a focus of the Goulburn Broken Catchment Management Authority (GBCMA) for many years. Recent investment in a 5-year restoration program has come through from the Australian Government's National Landcare Program, where landholder engagement and monitoring are crucial to specifically link and communicate management outcomes to conservation objectives. In this talk, we present a state-and-transition model that was co-developed with GBCMA practitioners (Landcare Facilitators) and explain how the model was used to support communication with landholders, management and monitoring in a woodland revegetation project. State-and-Transition models were developed for managers to represent that there may be multiple condition states, pathways of change ('transitions'), and barriers to restoration. The Landcare Facilitators used the State and Transition Model approach to communicate to landholders the relevant starting point and end goals for restoration for their property or project, the key threats that would impede recovery, and the interventions to be used to best target those threats. As the condition states are defined using a suite of vegetation and habitat attributes, the Landcare Facilitators are now monitoring these attributes to identify when a transition to an alternative condition state has been achieved. The outcomes of monitoring will now be used to learn about the effectiveness of management in meeting specific restoration goals, and to report back to funders on the objectives of the program.

PRESENTATIONS – DAY 2 (in order of appearance)

Seeds and plant species persistence under shifting fire regimes

KEYNOTE - Dr Mark Ooi
University of New South Wales

Fire regimes are changing and recent megafires, both in Australia and around the world, are examples of the extremes that fire events can reach. Plant species are adapted to historic fire regimes, persisting within thresholds of fire frequency, seasonality, severity and extent. Developing an understanding of how shifting fire regime elements can impact persistence and recovery of plant species is therefore essential for conserving biodiversity. Seeds provide an incredible resource in this endeavour. They are key drivers of plant population dynamics and their study can allow us to predict the trajectories of functional groups of species. Seeds are also critical for applied restoration, where plant populations have been pushed past the limits for natural recovery. Drawing on the results from recent research, we will look at how different elements of the fire regime, including extreme fire severity and out-of-season burns, interact with plant and seed ecological processes to determine which species may persist and which will struggle. There will also be a focus on advances in applied aspects of restoration from seeds, as a tool for restoring areas or species that may have a limited capacity for natural regeneration. While the reduction of climate change impacts requires a global effort, a clear understanding of local processes can help to provide informed conservation management, while local restoration efforts can help to minimise negative impacts for those species most at risk.

Identifying and storing freezing-sensitive seeds

Dr Karen Sommerville
Australian Institute of Botanical Science
Co-author: Cathy Offord

Recent research on Australian temperate and subtropical rainforest plants demonstrated that around 74% of species tested could tolerate the drying necessary for seed banking, but a subset of the desiccation tolerant species were either sensitive to freezing or short-lived in storage at -20°C. Analysis of the thermal response of these seeds during freezing and thawing has shown that the storage temperature of -20°C often falls within a temperature range in which frozen seed components begin to thaw. This indicates that seeds held under standard seed banking conditions are not actually stored in a stable state. In this presentation we look at methods for identifying 'freezing-sensitive' seeds and more appropriate temperatures for storing them. Using species from several families, we show that simple cryopreservation of whole dried seeds is one option suitable for long-term storage of a number of rainforest species, while storage at temperatures higher than -20°C may be more appropriate for others.

A data framework for predicting seed germination under climate change using R

Dr Nathan Emery

Australian Institute of Botanical Science
Co-authors: Justin C. Collette, Karen D. Sommerville, Mitchell B. Lyons, Catherine A. Offord, Graeme Errington, Zoe-Joy Newby, Lotte von Richter

Seed germination is strongly influenced by environmental temperature. Global temperatures are predicted to increase under climate change leading to potential changes to the seed germination window for many plant species. In this talk, I will provide an overview of our recently published data framework developed in R that uses bidirectional thermogradient plate (TGP) data with appropriate modelling to analyse and predict seed germination responses to temperature. Our framework generates over 40 germination indices which are used to populate statistical models to predict germination under current and future monthly maximum and minimum temperatures anywhere in the world. After running through an example using this framework, I will present outputs from several species to illustrate different predictions of germination seasonality under current and future temperatures. Our experimental workflow is a significant leap forward in the analysis of data generated from TGP experiments increasing its many potential benefits, thereby improving research outcomes, and providing substantial information to inform management and conservation of plant species globally.

Understanding seed biology to inform *in situ* and *ex situ* conservation actions: a case study on *Geijera parviflora*

Dr Ganesha Liyanage
Australian Institute of Botanical Science
Co-authors: Catherine A Offord, Amelia J Martin Yenson

Geijera parviflora (Wilga) is found in both dry woodlands and dry rainforests in Australia. It is widespread in dryland areas, whereas it occurs in many smaller and isolated remnants of dry rainforests which may disappear. The species is a high priority for mine site restoration, as well as a drought tolerant street and fodder tree. Limited natural recruitment and difficult germination impedes its use for these purposes. In this study, we tested fresh seeds of *G. parviflora* and measured germination response to a range of dormancy breaking treatments, as well as soil burial for 6 and 12 months. In fresh seeds, the highest germination (67±5.5%) was achieved when seedcoats were removed, and no germination was observed for intact seeds, indicating 100% initial dormancy. In soil stored seeds, germination of intact seeds increased from 0 to 11% within six months. Interestingly, almost all seeds were nonviable after 12 months, with most seeds having decayed. Though some seeds had initiated germination, no seedling establishment in the field was observed. This indicates a complete depletion of the soil seed bank of *G. parviflora* within 6-12 months after dispersal. Results suggest that *G. parviflora* seeds are short lived and may release their dormancy within 12 months in the soil seed bank. A lack of favourable conditions for seedling establishment may negatively affect natural recruitment in the field.

There are giraffes in the seed orchard - again!

Andie Guerin
Regent Honeyeater Project (Lurg Hills, VIC)

Everyone knows of giraffes- One species (with some sub-species). Recent DNA testing of Giraffes has revealed instead 4 species and some sub-species. Each species has a distinct natural area in Africa- some areas adjoining another. Species identification can be assisted by visual clues like skin marking patterns. Hybrids occur- but are very rare. Some breeding programs in zoos have good results and others very poor- presumably because of a mix of species. The total number of giraffes in Africa was seen as reasonably secure- but when spread over 4 species some are greatly diminished in number and genetic diversity. As revegetation practitioners in the field setting up Seed Production Areas (SPA) we are regularly forced into decisions regarding our own 'giraffes'- species that have provenances with physical differences that we may suspect are a different species. Examples to discuss are Varnish Wattle; Eutaxia; and Gold-dust Wattle. Recent testing of *Acacia verniciflua* and *leprosa* complex has resulted in recommendations of splitting into 5 species- one with 4 sub-species. The species can be identified by Scanning Electron microscopes analysis of the phyllode resin glands and their head cell numbers. How are practitioners in the field to get this right? 300 plants of a species might seem a good representation in a SPA- but not if it's actually several species. Where does this leave the practitioner trying to increase genetic diversity within the SPA? Is it just a numbers game- the higher the safer?

Native Seed Supply, Seedbanks and Seed Production

KEYNOTE - Natasha Lappin & Jim Begley
Murray Local Land Services | Goulburn Broken CMA

Seedbank storage, processing and establishing Seed Production Areas (SPAs) is critical in ensuring native seed supply to the revegetation industry. This presentation shows how a coordinated approach to ethical and strategic native seed collection from SPAs, with seed treatment and data storage through regional Seedbanks is working for both the NSW Murray region and Goulburn Broken catchment in Victoria. Issues associated with this model are identified and also how critical regional scale seedbanks are in implementing native vegetation back at scale. The benefits of SPAs include the ability to collect a high volume of seed annually (over 200 kg/year in the Murray Region in recent years), increased genetic diversity through strategic planting from a range of sub-populations, increased availability of species and seed, reduced impact on wild flora populations, improved efficiencies and reduced fuel and travel costs. State and Federal governments, private corporations and landholders are increasing the demand for seed exponentially through carbon and biodiversity projects (e.g.target for Vic State Government is 200,000 ha of revegetation by 2037). There is a need to upscale seed production areas, but there are a number of barriers limiting the potential to realise the quantity of seed required. Sustainable, ethical native seed supply which supports large scale revegetation is a fundamentally important requirement to tackle issues such as habitat loss, climate change and flora conservation in Australia.

Florabank Guidelines / Seed supply chain

Dr Lucy Commander
The University of Western Australia

Everyone that works with native seed across Australia – from policy makers to planters – can now access the latest knowledge from across the seed sector. The Florabank Guidelines, originally published two decades ago as a user-friendly guide, have been updated to include 20 years of research and practical experience. Over 40 national and international experts including practitioners, agency staff and researchers generously gave their time and expertise for the much-needed update. The Florabank Guidelines contain modules which follow the seed supply chain from sourcing through to final use. The revision also includes additional information on working with Indigenous Australians, approvals, record keeping, and tips for seed purchasers. Improving our knowledge about how to collect and use native seeds is critical for everyone who is restoring land across Australia.

Propagating recalcitrant and threatened species for rehabilitation

Ben Croxford
Nuts About Natives

Western Australian flora is extremely diverse and within most rehabilitation projects there are opportunities to increase biodiversity or preserve endangered species by utilizing horticultural solutions. This presentation will give some insight into the research and methods we have been undertaking into the nursery propagation of recalcitrant or rare plant species and the application of specialist propagation techniques including plant tissue culture to aid this

***Ex situ* collections for conservation and translocation of Australian native plants**

Dr Amelia Martyn Yenson
Australian Network for Plant Conservation
Co-authros: Chantelle Doyle, Emma Dalziell, Leonie Monks, Andrew Crawford

Seeds, cuttings and other forms of germplasm in *ex situ* collections are utilised for a variety of purposes, often many years after collection. Conservation translocation relies on seeds and nursery-grown plants from *ex situ* collections to augment small and declining populations. This is usually part of a broader recovery plan to prevent extinction of species and loss of biodiversity. It is important to consider the end use of collections entering ex situ storage when planning and undertaking the germplasm collection. These considerations are presented as part of a case study on *Grevillea calliantha* (Proteaceae), a species listed as Critically Endangered in WA and Endangered in the EPBC Act. A variety of other end uses are outlined, and the importance of partnerships such as the Australian Seed Bank Partnership for achieving conservation goals is highlighted. This presentation has been prepared as a 9 minute video as part of the Plant Treasures video series associated with the third edition of '*Plant Germplasm Conservation in Australia: strategies and guidelines for developing, managing and utilising* ex situ *collections in Australia*'. An additional video (3 minutes) is available for this workshop and showcases the technique of cutting propagation in the conservation nursery, demonstrated by Mandy Thompson of the Royal Botanic Gardens Victoria, Cranbourne Garden.

Native Plant Restoration on Norfolk Island

Leah Dann
The University of Melbourne
Co-authors: Lydia Guja, Mark Scott, Melinda Wilson, Nigel Greenup, Salit Kark

Norfolk Island is a remote subtropical island in the South Pacific with 46 threatened plant species, most of them endemic. Deforestation and biological invasions have resulted in the decline of native plant populations, necessitating continued conservation and restoration activities to protect native species and increase their populations. Local landowners are increasingly interested in growing native plants on their property, and local land managers have determined that planting nursery-propagated plants is the most suitable technique when revegetating sites where woody weeds have been removed. To assist with revegetation activities, we have put together a handbook using information from practitioners, local knowledge, field and nursery data, and literature and database searches. This handbook, titled "*A guide to propagating Norfolk Island's native plants and seeds*," details seed collection, storage, and propagation techniques for many of Norfolk Island's rare or endemic native plant species. It also provides descriptions and photos of plants and seeds, information about suitable habitats for each species, seed collection times, seed storage methods, dormancy information, time to seedling emergence, time to plant maturity, and cultural information. The handbook is a resource for those who are interested in propagating Norfolk Island's native trees and shrubs and aims to help optimise germination success, improve seedling establishment, and expand seed-based restoration efforts. The following link provides access to a downloadable pdf version of the handbook: https://www.nespthreatenedspecies.edu.au/publications-and-tools/a-guide-to-propagating-norfolk-island-s-native-plants-and-seeds. This is the first compilation of propagation information for Norfolk Island's native plants, and we hope it encourages future research and development to maximise propagation success.

The National Native Nursery Network

Ian Cranwell
KG2
Co-author: Pat Heaslip

Mapping the National Native Nursery Network PROJECT PHOENIX Activity 2.3
KG2 (agricultural research company) conducted a phone survey in 2021 to identify the size and composition of the native plant/seed market as well as current supply and demand. The survey investigated operations by size, production, seed sources, and supply. KG2 interviewed 220 nursery operators. Of these, 92 respondents did not grow native plants or produce seed and completed an abridged survey. Among the 220 respondents to the full survey, 184 (84%) were general nurseries, 25 (11%) council nurseries, five (2%) were seed producers and five (2%) were Indigenous nurseries. Overall, 55% of nurseries surveyed grew native plants for seed, including 100% of council nurseries and 51% of general nurseries, but only 20% of the five indigenous nurseries. Overall, 24% produced native seed for restoration, mostly among council (52%) and indigenous (40%) nurseries. Less than one in five general nurseries produced native seed. Among the 128 nurseries who grew native plants for restoration, 41% grew between 10,000 and 25,000 plants annually, with 49% growing at least 25,000. Among nurseries that produced native seed for restoration, 59% produced more than 50 kilograms. Councils averaged the

largest weight of native seed, with 77% producing more than 50 kg. The survey data was used to extrapolate an estimate of native seed supply and demand in the nursery network. A separate survey was conducted among 181 farmers considered most likely to have a native nursery. The survey found six had a native nursery and three had some capacity but did not produce seed.

RAM vegetation condition assessment - a tool for land managers

Ian Davidson
Regeneration Solutions P/L

Before any decisions are made regarding site restoration it is vital that the land manager has an understanding of the current condition of the vegetation so that the suitability of various methods e.g. grazing, burning, planting, scalping etc. and the likelihood of success can be understood. The Rapid Assessment Method for vegetation condition is a field assessment that involves the application of a standard method to score a range of vegetation elements characteristic of the site. The RAM is a practical method developed to assist those involved in native vegetation management to undertake field assessments and make informed decisions regarding its condition and management, including grazing and revegetation. The RAM is able to capture important vegetation characteristics e.g. tree and shrub regeneration status and ground layer character that are difficult to identify remotely and are useful to monitor over time, to determine whether the current management is correct. The skill competencies required use the RAM in the field is the application of basic vegetation identification skills (e.g. main tree species and whether the ground layer is mostly native perennial grass or weedy). The RAM provides a vegetation condition rating score at a point in time which can be, along with photo points, monitored over time to determine vegetation condition change. The condition assessment informs a modified Vegetation Assessment State and Transition (VAST)

A broadly applicable genomic workflow to support plant conservation and management

Professor Maurizio Rossetto
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Carefully planned management strategies can improve the fitness and viability of populations, increase their resilience to change, as well as reduce the overall risk of extinction. Ideally a managed population should be genetically diverse and consist of fit founding individuals, but without the necessary genetic information designing such a population can be challenging, especially when responding to a range of objectives, constraints and trade-offs. Owing to decreasing costs and increased efficiencies, it is now conceivable that landscape and conservation genomic information should be regularly used to improve the effectiveness of most plant translocation programs (for either threatened or common taxa). In most cases including a simple genomic study as an initial decision-making step of many flora conservation projects, will inform long-term recovery and restoration efforts in multiple ways. Using examples, we present a simple, standardized, and cost-effective workflow for genomic research that can guide efficient collection, analysis and application of genomic information in a time- and resource-effective manner across disparate settings. Interpretations do not require prior genetic knowledge about the target taxa,

and directly support on-ground, applied activities while allowing for flexible inputs, the imposition of realistic constraints, and the examination of conflicting goals. Conservation and management outcomes range from lineage delineation, to genetic rescue, the establishment of 'climate-ready' seed production areas, and more.

Strengths and weaknesses of plant data in the Atlas of Living Australia

Dr Jenna Wraith
Atlas of Living Australia, CSIRO
Co-authors: Martin Westgate, Dax Kellie, Shandiya Balasubramaniam

Access to open biodiversity data is increasingly important for conservation research and management. The Atlas of Living Australia (ALA) mobilises biodiversity data by providing open access to ~100 million biodiversity records for more than 110,000 species from over 800 sources. With over 21 million records of 38,000 species, the ALA is an unparalleled resource for plant conservation and ecological research. Here, we review the plant data available in the ALA to identify taxonomic, spatial, and temporal strengths and weaknesses. Forty-four plant families have over 10,000 records in the ALA; our data show 65 plant families that contain over 100 species each. The most recorded species are from Poaceae with approximately 2.5 million records, followed closely by Myrtaceae and Fabaceae. Fabaceae is the most speciose family with data on 3,418 species. There are fewer records in hard-to-survey areas such as arid zones of Western Australia and South Australia as well as the Arnhem Land and areas near Cape York. Thanks to the continuous work of citizen scientists, researchers, and data custodians the availability of plant data is increasing rapidly, however there are clear spatial and taxonomic gaps that still need to be addressed, even in large data infrastructures like the ALA.

Strengths and weaknesses of planning the EcoCommons platform to run species distribution models

Rob Clemens
Atlas of Living Australia, CSIRO
Co-authors: Dr Robert Clemens, Dr Emilia Decker, Dr Jessica Fenker, Dr Elisa Bayraktarov

Recent technologies have enabled consistent and continuous collection of ecological data at high resolutions across large spatial scales. A big challenge that all ecologists and practitioners face is to find the best available data and then to apply appropriate methods to that data. EcoCommons is building a platform where an increasing number of datasets are accessible at the click of a button. It includes a huge upgrade of the functions that have been available in the Biodiversity & Climate Change Virtual Laboratory (BCCVL) and the ecocloud platform. The EcoCommons platform provides a Virtual Laboratory where you can run species distribution models, make climate projections, do ensemble modelling, and run species trait models with only a few clicks of your mouse. These time saving steps give you more time to focus on the most important and hardest part: your Science. We also offer users the ability to write and run code in the cloud using either R or Python. Here we present a brief overview of the kinds of things you can do on the EcoCommons platform and give a brief demonstration on how you can run a point-and-click species distribution model. Species Distribution Models (SDM) can be used to

understand the potential distribution of a species based on available species occurrence records and environmental variables.

Revegetation Guide for the Goulbourn Broken Catchment

Carolena Helderman
Goulburn Murray Landcare Network and Goulburn Broken Indigenous Seedbank

Goulburn Murray Landcare operates in the agricultural floodplains of the Goulburn Broken and North Central catchments of Victoria. It covers approximately 3,000 square kilometres and services Landcare and environmental groups. The *Revegetation Guide for the Goulburn Broken Catchment* (2001) manual was originally produced and edited by Gill Earl, Fleur Stelling, Mary Titcumb and Sue Berwick, we acknowledge their contribution which paved the way for the updated online version. We also acknowledge Kim Wilson for her tireless work in revisiting and updating species and information in the new format and to Fiona McCallum for her Information Technology skills. The GB Revegetation Guide is the Go-To manual for selecting appropriate species for a revegetation site in the catchment and is utilised broadly by practitioners in the revegetation/ botany/ biodiversity industry. One of its best attributes is the choice of three species lists, specific to your site- Standard Revegetation list, Enhanced Revegetation List and Full Ecological Vegetation Class List. A demonstration will be shown for navigating the Guide.

Trees Near Me NSW

Dr Tim Collins
NSW Department of Planning and Environment
Co-authors: Adam Roff, Bob Denholm, Mike Day, Jill Thonell et. al.

There is a new app available for Android and Apple called Trees Near Me NSW. It is driven by the NSW State Vegetation Type Map and provides anyone with a phone the power to identify native vegetation. It displays both current day vegetation mapping as well as a snapshot of the type of vegetation that would have existed before clearing. We worked hard to make our app simple to use and fast to respond to your inputs. There are no instructions. You just open it up and go to your current location or pinch to zoom to an area of interest. I know from experience that even a simple vegetation query can involve a lot of work. Whether it is finding and downloading maps, looking up community descriptions or finding information about a single species. Now you can do it all in one place intuitively on your phone. Go to any location and select a Plant Community Type (PCT) near you. The app provides a detailed description of the community, including a full species list. Selecting an individual species will guide you to PlantNet or Wikipedia. You can share your location via email or link and the app will generate a custom webpage for that location. The maps will also be available on the NSW government data portal (SEED.nsw.gov.au). SEED now allows users to provide direct, spatial feedback on vegetation in their neighbourhood. The State Vegetation Type Map is a living map and will respond to new data as it is collected.

Seeding resilience: restoration in a rapidly changing world

Dr Melinda Pickup
Greening Australia
Co-author: Dr Elisa Raulings

A key challenge in conservation and restoration is managing Australia's biodiversity under scenarios of rapid environmental change. When undertaking restoration (of communities and/ or species), a key goal is ensuring that restored populations have the genetic diversity and adaptive capacity to survive in current and future environments. But this leads to the question: how do we ensure that restored populations have the adaptive capacity to survive in current and future environments? In this talk we will discuss how applying evolutionary thinking into restoration can help achieve the goal of establishing and conserving resilient populations and ecological communities. We will outline and discuss Greening Australia's approach to climate resilient revegetation that includes: (i) applying GIS models to assess climate risk, (ii) strategic seed sourcing for climate adaptation, and (iii) assessing the suitability of ecological renovation approaches in restoration. By combining practical approaches with the best available science, we aim to implement novel strategies for seed sourcing and into our on-ground restoration works. We will also discuss the challenges of these approaches and the need for monitoring and evaluation to assess the success of climate-targeted approaches – both now and in the future. Together, these strategies aim to implement science-based approaches to maximise ecological resilience in a rapidly changing world.

Provenancing using climate analogues: a program guide to climate-adjusted provenancing

Dr Peter Harrison
University of Tasmania

Climate-adjusted provenancing is becoming a widely adopted seed sourcing strategy in ecological restoration. The strategy mixes local seed with seed from non-local provenances currently occupying future climates to bolster the genetic diversity in the revegetation plantings and enhance resilience in the face of future climate change. To assist practitioners to implement climate-adjusted provenancing, I here present the program 'Provenancing Using Climate Analogues' (PUCA) that identifies seed sources matched to current and future climates for a restoration site. I briefly provide a conceptual overview of the program and demonstrate the features of PUCA using a restoration site in Tasmania, Australia, as a case study. I conclude with a brief discussion on the assumptions of PUCA and the application of this program that extends beyond guiding seed sourcing decisions to identify critical seed sources for targeted in situ and ex situ conservation actions.

EcoPlots: Plot-based survey data integration platform

Dr Siddeswara Guru
TERN
Co-authors: Edmond Chuc, Habacuc Flores Moreno, Javier Sanchez Gonzalez, Anusuriya Devaraju

Lack of a data aggregation platform to access a wide range of ecological survey-based observations from multiple organisations is severely impeding trans-geography and trans-disciplinary research. Some of the challenges to integrate ecological survey-based observation are: lack of agreed standards to represent and exchange data and absence of agreement between different institutes and organisations to share data. TERN is developing a data integration platform, EcoPlots, to overcome the challenges expressed before. In collaboration with multiple organisations including state and federal government agencies, EcoPlot aims to harmonise and aggregate survey-based observations from multiple sources and enable users to access integrated data. The platform will enable users to query data from multiple organisations and download comparable datasets for further reuse. We will present the working of EcoPlots and describe how data are integrated from multiple sources. We will showcase how to access vegetation related data from the survey data collections currently available in a platform.

POSTERS – DAY 2

Remote, rare and ravaged: harnessing genomics and working with community to restore resilience in East Gippsland's threatened flora.

Dr Susan Hoebee
La Trobe University
Co-authors: Bryce Watts-Parker, Tamandra D'Ombrain, Mark Clifton, Max Elliott, Abigail Wills

East Gippsland, Victoria, is unique in terms of its natural environments and biodiversity. Approximately three quarters of the land area comprises national parks and other public land reserves, and there are 125 species that rely on East Gippsland for 50-100% of their recorded range. Thirty percent of these species occur nowhere else on Earth. Despite the importance of East Gippsland for biodiversity, surprisingly little environmental research has been undertaken in support of on-ground efforts to conserve, maintain and restore species and ecosystems in the region. Over 100 plant species in East Gippsland are listed as vulnerable or endangered at the national- or state-level, while the status of a further 90 remains uncertain. Many of these plants exist as small and/or localised populations and, for a great majority, their known distributions were severely burnt in the 2019/20 bushfires. Together, Envite Environment, La Trobe University, the Friends of Mallacoota and partners have embarked on an initiative to secure the future of East Gippsland's threatened flora through: (1) surveys to assess the post-bushfire status and distribution of ten species in the wild; (2) assessment of the genomic diversity and structure of surviving, resprouting or emerging plants from six of these species to aid practical management recommendations, e.g. in case translocation is necessary to ensure survival; and (3) establishment of *ex situ* 'insurance' populations in case of future environmental catastrophes. The post-fire recovery and establishment of plans that mitigate risks to the survival of our chosen plant taxa are the focus of this collaborative work.

Urban wildflower meadows - making native understorey restoration accessible and affordable in cities and towns. A case study from Melbourne, Australia

Katherine Horsfall
University of Melbourne

Co-authors: Nicholas Williams, Steve Livesley, John Delpratt

Wildflower meadows are an increasingly prominent landscape treatment in cities and towns around the world, owing to their lower maintenance requirements and improved aesthetic and biodiversity potential when compared to mown turfgrass. Adapting the direct-seeding methods traditionally used in grassland restoration to urban contexts can, in many instances, require initial efforts to ameliorate edaphic challenges, such as soil contamination, high weed-seed loads and soil nutrient enrichment. Where the well-established and proven method of soil scalping is untenable, nutrient-poor substrate surface treatments can be deployed to receive seed, reducing competition from the weed species that feature prominently in urban landscapes. An experiment in Royal Park Melbourne has demonstrated the potential of a substrate surface treatment to reduce weed loads and maintenance inputs, whilst still allowing the establishment of a diverse indigenous understorey from seed. Trialling sharp sand as a medium to receive seed, the study examined species establishment and weed management requirements on two depths of sand as well as site soils. Sown in Autumn 2020 under established eucalypts, the meadow featured good cover of native understorey species one year after sowing. The project shows that wildflower meadows afford a new opportunity to re-establish species from threatened plant communities in south-east Australia's cities and towns, to improve the native biodiversity of the urban realm.

The Victorian Conservation Seedbank: Victoria's primary facility for the conservation of threatened plants.

Dr Megan Hirst
Royal Botanic Gardens Victoria
Co-author: Daniel White

Based at Royal Botanic Gardens Victoria (RBGV), the Victorian Conservation Seedbank (VCS) is Victoria's primary facility for the conservation of the state's most threatened plants. Seeds of native Victorian plants, particularly endemics and at-risk species, are wild collected and securely stored, forming the basis for research into effective long-term germplasm storage, determination of germination characteristics, and the propagation of recalcitrant native species. The VCS currently holds over 2,100 collections covering 1,434 taxa and, with the support of our associated laboratories and plant propagation units, forms part of RBGV's Bushfire Plant Recovery and Care Unit. The unit's role is to safeguard threatened species, preserve their genetic diversity, and support the restoration of fire damaged landscapes and ecosystems.

Predicting seed lifespan for the improved curation of conservation seed banks

Dr Emma Dalziell
University of Western Australia / Kings Park Science - Department of Biodiversity Conservation and Attractions, WA
Co-authors: David J. Merritt, Fiona R. Hay, Sean Tomlinson, Andrew Crawford, Philip C. Withers

The storage of seeds in seed banks is a primary strategy for plant conservation world-wide in the face of unprecedented biodiversity loss. For example, the Western Australian Seed Centre is responsible for >16,000 accessions of almost 4,000 wild species, including collections that represent the sole remaining wild populations of a species, or populations now extinct in the wild. As these seed collections continue to grow, their effective curation is an ever-increasing challenge. Identifying the storage behaviour and predicting the lifespan of seeds in storage for diverse wild species remains a key component of developing evidenced-based seed bank management practices. Our current research pursues the utility of techniques including respirometry and multispectral image analyses for non-destructively identifying viability decline, in concert with a focus on identifying and developing alternative seed storage procedures for problematic seeds (exceptional species) within our collections. We are also exploring novel statistical methods for the analysis of seed storage data to characterise seed population response to time in storage and better predict viability decline. Our aim is to develop new high throughput technologies and data interrogation techniques to allow seed bank managers to more effectively triage and curate their seed collections to ensure irreplaceable collections are not lost and that viable seeds are available when required to support species and habitat restoration in the wild.

PRESENTATIONS – DAY 3 (in order of appearance)

Combining *ex situ* and *in situ* research to achieve conservation outcomes of threatened species and communities

KEYNOTE - Dr Nathan Emery
Australian Institute of Botanical Science
Supported by the Australian Institute of Botanical Science, Royal Botanic Gardens and Domain Trust.

A key outcome for threatened species and community conservation is to assume a holistic strategy that combines *in situ* and *ex situ* research actions. For example, understanding the ecological processes that impact population persistence in situ can improve the success of supportive ex situ actions such as germplasm conservation, population supplementation and reintroduction. Similarly, germplasm research or iterative translocation programs can inform best practise to manage extant populations. In this talk, I present my work on threatened Persoonia species as case studies to illustrate how determining species ecological preferences and tolerances enhances future management practise and short-term translocation success. Specifically, I will discuss research on reproductive ecology, seed biology and soil parameters. I will also present an overview of my recent work on threatened ecological communities in northwest New South Wales involving monitoring remnant sites and seed conservation research. These data are critical to quantify remnant community condition and help predict vulnerability of plant species within and help to prioritise future conservation actions.

Opportunities in the genomic era for conserving myrtle rust impacted species

Stephanie Chen
UNSW Sydney/Australian Institute of Botanical Science
Co-authors: Samantha Yap, Craig Stehn, Veronica Viler, Maurizio Rossetto, Richard Edwards, Jason Bragg

Myrtle rust is a plant disease caused by an invasive fungal pathogen (*Austropuccinia psidii*) and over 480 Myrtaceae species are known hosts, globally. The disease was first detected in Australia in 2010 and has caused the rapid decline of native species, including critically endangering *Rhodamnia rubescens* (brush turpentine) and *Rhodomyrtus psidioides* (native guava). These species are being conserved and protected in *ex-situ* collections, and genetic information is needed to assess whether the collections are representative of natural populations. Increasingly it is possible to generate these data at genome-scale, facilitated by rapid technological advances in sequencing coupled with decreasing cost. We have generated long-read reference genomes for these at-risk species. In conjunction with whole-genome (n = 80) and reduced representation (DArTseq; n = 482) sequencing, these data have been used to characterise genetic variation across and within Rhodamnia and Rhodomyrtrus populations. The research is supporting *ex-situ* conservation in through screening living collections for clones, and maximising the genetic diversity of germplasm for preservation. Rust assays to screen for resistance across different genotypes are also underway. The genomic data are informing the management of these at-risk species, and are enabling the development of methods that are broadly applicable to species where we need to manage genetic diversity and other threats, such as disease or changing climate.

Management of *ex situ* seed collections: threatened grassy ecosystems

Dr Gemma Hoyle
National Seed Bank, Australian National Botanic Gardens
Co-authors: Joshua Hodges, Rhys Tooth, Lydia Guja

The recent listing of Natural Temperate Grassland communities as Critically Endangered has heightened the need for *ex situ* conservation of south-eastern Australian grassy ecosystem species. Seed banking is a widely applied *ex situ* conservation tool for preserving plant biodiversity and carrying out critical research into species-specific seed characteristics. Curating seed bank collections requires differentiating between seeds that are viable but 'difficult to germinate' and those that are empty or dead. This avoids underestimating the germination potential of a seed lot and misplacing time and resources in recollecting seed or further investigating germination requirements. Many grassy ecosystem species continue to present us with questions relating to seed viability and germination. Here we present data on 37 conservation collections of 28 Australian native grassland species to optimise collection management. Comparing maximum germination with tetrazolium chloride staining and X-ray analysis helped differentiate between collections that can be banked confidently, those that warranted further investigation and those that required re-collection. We concluded that 'difficult to germinate' collections need not be further investigated or re-collected where there is no significant difference between germination and estimated viability. On the other hand, collections that achieved low germination that could not be explained by viability or seed fill offer future research opportunities required to effectively secure these species in seed banks.

Tackling plant conservation within a botanic garden

Kathryn Scobie
Australian National Botanic Gardens
Co-author: Zoe Knapp

Botanic gardens have an increasingly important role in the conservation of native flora. In recent years, the Australian National Botanic Gardens (ANBG) has increased its focus on the conservation of threatened species, primarily through collaborative projects. The ANBG displays the most comprehensive living collection of Australian native plant species in one location, including almost a quarter of Australia's threatened taxa (as listed under the Environment Protection and Biodiversity Conservation Act 1999). With over 50 years' experience in growing Australian plants, the ANBG has made important contributions to increasing knowledge, appreciation, and conservation of Australia's flora. Our living plant and seed collections, combined with extensive taxonomic, seed biology and horticultural expertise, provide 'end-to-end' solutions for plant conservation, from wild-sourced plant material collection to propagation of plants for translocation. This presentation will outline some of the ANBG's collaborative research and conservation projects, including horticultural research and development of propagation and specialised growing techniques, pollination and seed orcharding, facilitating genetic and other research, and supporting conservation in Commonwealth terrestrial reserves. We will also outline some of the risks and challenges of managing plants in the nursery and living collection, and considerations for planning projects involving *ex situ* conservation.

Going for the gold standard? Lessons learnt from threatened plant translocations in western Sydney

Dr Peter Cuneo
Australian Institute of Botanical Science
Co-authors: A. Sherieff, N. Emery, D. Pasqualini and P. Harvey

Western Sydney is the fastest growing urban area in Australia, and also home to more than 12 threatened ecological communities and 22 threatened plant species. Rapid growth and large infrastructure projects continue to place pressure on remaining native vegetation and threatened species. Conservation gains are expensive and hard won in western Sydney, with salvage and translocation of threatened plants often used as a 'last resort' conservation option for large infrastructure projects. This talk will focus on conservation efforts and translocation for the critically endangered *Hibbertia puberula* subsp. *glabrescens* (Bankstown Hibbertia) in western Sydney, as well as similar efforts to translocate *Pimelea spicata* (Spiked Rice Flower) impacted by construction of the Western Sydney International airport. Both projects were well planned and resourced, and included genetic analysis to select genotypes and inform the design of the translocated populations. We look at the challenges of translocation planning and implementation in this urban context, and the lessons learnt in taking the projects from detailed scientific design through to plant production and in-ground establishment. We highlight the importance of collaborative efforts, including public-private partnerships to deal with this complexity and achieve on-ground conservation outcomes.

Orchid conservation at the Australian Institute of Botanical Science: current challenges and Achievements

KEYNOTE - Dr Zoe-Joy Newby

Australian Institute of Botanical Science

The Royal Botanic Gardens has a long history of working in the conservation of terrestrial orchids, particularly in the area of taxonomy, but also in aspects of propagation and storage. In the last three years, we have re-invented our orchid conservation research, working with the initiative of the NSW Saving our Species Program. Utilising the facilities and expertise we have available, we aim to contribute to the conservation of specific species, but also terrestrial orchids generally, considering aspects of pollination and seed production, symbiotic germination and mycorrhizal relationships, population genetics, propagation, *ex situ* storage methods and translocation. We have a long way to go and a lot to learn, but building on existing knowledge, successes have been achieved. We've amassed a large seed collection of at least 38 threatened species from NSW in the last three years, holding these in our seed bank and cryogenic storage facilities. Mycorrhizal fungi able to germinate seeds of several species have been identified. Propagation conditions have been trialed for a number of species and we maintain a large potted collection of over 30 species. In some cases, germination requirements elude us, but we are endeavouring to improve our knowledge for each species by trialling different isolation and germination techniques, media, cultures, seed batches and germination conditions. More broadly, we're investigating the possibility of storing orchid pollen, and trialling methods of fungal storage, to ensure efficacy is maintained in both cases. This work aims to conserve NSW species but will inevitably benefit orchids distributed elsewhere.

Conservation of *Prasophyllum murfetii* (Fleurieu Leek orchid), a critically endangered orchid from the Threatened Ecological Community - Swamps of the Fleurieu Peninsula in South Australia

Jerry Smith
Hills and Fleurieu Landscape Board

The Fleurieu Leek orchid (*Prasophyllum murfetii*) is a critically endangered orchid restricted to a very small number of the Swamps of the Fleurieu Peninsula, Threatened Ecological Community in the Southern Fleurieu region south of Adelaide in South Australia. In 2018 at the commencement of the 'Back from the Brink' project this swamp orchid was only reliably known from a small population numbering a few individuals and the occasional sighting of an individual flowering plant in a forest reserve. The Australian Government listed this species in the top 30 threatened plants, and prioritised investment to support a recovery effort. Through Back from the Brink which is funded by the Australian Government's National Landcare Program, there have been dedicated surveys discovering four new populations and on-site conservation actions such as ecological burns, habitat augmentation and site slashing, weed management and constructed protective exclosures to mitigate grazing pressure. This has been complemented by a number of *ex-situ* actions such as the banking of seeds and the symbiotic in-vitro propagation of this species for translocation projects by partners such as the SA Seed Conservation Centre & Royal Botanic Gardens Victoria. As of 2021 the total flowering plant count now exceeds 500 with an expanded range, representing five populations, additionally *ex-situ* plants are now approaching a stage ready for translocation to further improve wild population numbers. This presentation will discuss the multi-faceted conservation actions that were undertaken to improve the outlook for this critically endangered orchid.

Conservation genomic research reveals the impact of the 2019-2020 bushfire on a critically endangered rainforest species *Eidothea hardeniana* and guides species recovery

Dr Samantha Yap
Research Centre for Ecosystem Resilience (ReCER)
Co-authors: Maurizio Rossetto, Robert Kooyman, Justin Mallee

Eidothea hardeniana or Nightcap Oak (Proteaceae) is a critically endangered species with an extremely small population in the Nightcap National Park, making it almost as rare as the Wollemi Pine. As part of its management, the species distribution was mapped following its discovery in 2000 and extensive targeted surveys and demographic tagging of all individuals were subsequently undertaken. In the summer of 2019-20 unprecedented bushfires impacted the species habitat, and while capable of resprouting post-fire, the amount of within species diversity loss was unclear. Known to produce large poorly-dispersed seeds that fall close to maternal trees, which suggests the species may be suffering from inbreeding, the fires therefore increased species vulnerability. To secure its survival in case of the threat of future fires and to avoid further inbreeding within the wild population, seeds were collected to set up an *ex situ* collection. However, whether the collection retained enough diversity to sustain the species' long-term survival was unclear. As a consequence, the Research Centre for Ecosystem Resilience (ReCER) at the Royal Botanic Gardens and Domain Trust was contracted by the SoS officer in charge to conduct a conservation genomic study on *E. hardeniana* with the aim to study its genetic health and guide any relevant management strategies. The opportune timing of the sampling enabled almost all known individuals to be collected for the study including those that we now know perished from the fire, and from the *ex situ* collection. As a result, not only was the species' genetic health examined, but genetic loss due to the fire was estimated and representativeness of the *ex situ* collection was assessed. We present the results of that study and demonstrate the applicable outcomes that are currently being used to inform the species' seed collecting strategy and guide translocation efforts as part of the species recovery program. This study is part of many that demonstrates the practicality of the conservation genomic framework developed by ReCER, with the relevant genetic information informing priority actions that improve conservation outcomes and secure species survival.

Urban landscape plantings: an under appreciated opportunity for species conservation

Professor Nicholas Williams
University of Melbourne
Co-authors: Katherine Horsfall, Steve Livesley, John Delpratt, Lee Harrison

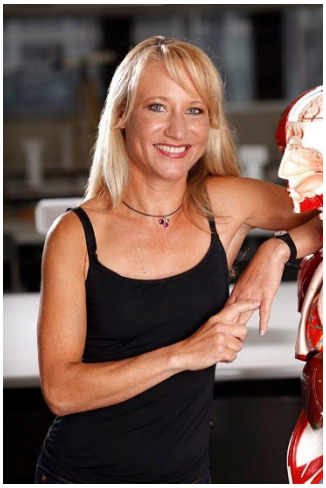
Ecological restoration occurs along a continuum from largely natural systems to novel habitats. In urban areas there are unrecognised opportunities to explicitly incorporate species conservation into designed landscapes that often attract significant resources from sources that do not compete with conservation funding. Meadow plantings are to a garden design style where understorey species are planted to achieve dense vegetation cover with a naturalistic look and feel. International experience has shown that wildflower meadows can enhance urban biodiversity and deliver maintenance savings to councils and public land managers when compared to alternative designed landscapes Studies have also demonstrated that urban residents prefer flowering grassy vegetation to less structurally diverse vegetation. In south-east Australia, an opportunity exists to respond to the growing global popularity of

wildflower meadows by developing low-cost and reliable techniques to replicate this planting style using species from critically endangered ecological communities such as the temperate grasslands and grassy woodlands. This will require adapting established direct-seeding methods to urban contexts, investigating designed substrates to overcome issues such as soil contamination or high nutrient loads and a reconsideration of species provenance issues. An adequate seed supply is critical but designed planting present an opportunity to overcome this significant industry barrier. This presentation will provide an overview of a range of recent projects to demonstrate the opportunity to create urban native wildflower meadows that reflect south-east Australia's native grassy ecosystems and will discuss the range of benefits that will derive from such actions

Australian native tree species for carbon capture and bioenergy production: species and provenance testing reveals sustainable opportunities for threatened species in economic revegetation

Dr David Bush
CSIRO
Co-author: Fabiano Ximenes

Much of Australia's farmland has been cleared of its deep-rooted woody vegetation. This has led to problems such as dryland salinity and fragmentation of species and ecological communities, but replacing the vegetation presents significant opportunities for farmers. Re-establishing trees on farms is an essential part of revegetation efforts, as very large areas of the southern sheep-wheat belt and northern rangelands are under private ownership. The concept of economic revegetation involves re-establishing trees and understorey that will provide direct economic benefits to farmers. Carbon sequestration and biomass bioenergy plantings are both options that might provide income streams to farmers, encouraging them to plant and help society to address climate change. Both types of revegetation are likely to be most attractive on unproductive parts of farms: hardy species that are capable of being managed on a short-term coppice cycle (i.e., the shoots are harvested repeatedly while the roots remain intact) including mallee eucalypts and acacias may therefore be ideal candidates for planting. CSIRO in partnership with others including NSW Department of Primary Industries have been testing a range of mostly eucalypt species for biomass and carbon sequestration planting for over a decade. Previously untested and largely uncultivated mallees have shown considerable promise on a range of sites in NSW and Queensland. Among these are *Eucalyptus infera*, *E. pumila* and *E. castrensis*, each of which are threatened species. Aspects of testing and selecting trees for economic revegetation including biomass bioenergy, carbon sequestration and other bioproducts are discussed.



GUEST SPEAKER: Jonica Newby

Science reporter, author, speaker, TV presenter and director.
Jonica will talk about her personal journey through climate grief and beyond, and her latest book 'Beyond Climate Grief: a journey of love, snow fire and an enchanted beer can'. [Courtesy of Celebrity Speakers]

KEYNOTE - It's more them than you; why do people get involved and stay involved in conservation projects?

Chantelle Doyle
University of New South Wales

Conservation and restoration actions often rely on the support, active participation, or volunteered contributions of people. This support can translate to substantial cost savings and conservation outcomes that are otherwise unachievable. Engaging people in restoration and conservation can also lead to attitudinal shifts in perceptions towards our environment, understanding of nature and its complexities, and our increasing role as custodians. It isn't always simple though, to firstly engage and then retain people's interest and support. Drawing from interviews, solicited and unsolicited responses to edu-tainment videos and podcasts, we will explore: i) What piques people's interest in conservation? i) Why people want to be involved in projects and why they stay involved? iii) How we can use these drivers of interest to increase the relevance of our projects and iv) What approaches we could consider when developing a project which requires engagement with people, be they policy makers, volunteers, peers, researchers, or students. Strap in for a multi-media experience, to hear and see firsthand, what worked and what hasn't.

Surprises in the re-growth

Dr Christine Allen
Threatened Species Conservancy

Citizen science has an important place in the recovery of communities and plants after fire. By engaging the local NSW south coast community in our project "Working Together to Secure Threatened Flora in NSW" we have been able to collect data on the survival and recovery of five threatened flora species: Dense Cord-rush (*Baloskion longipes*), Bombay Bossiaea (*Bossiaea bombayensis*), Chef's Cap Correa (*Correa baeuerlenii*), Bredbo Gentian (*Gentiana bredboensis*) and the Nerriga Grevillea (*Grevillea renwickiana*). Results have sometimes been surprising and demonstrate the remarkable resilience to fire. The project also had social outcomes by instilling a sense of hope and empowerment for local communities by helping them achieve positive and tangible outcomes for threatened species.

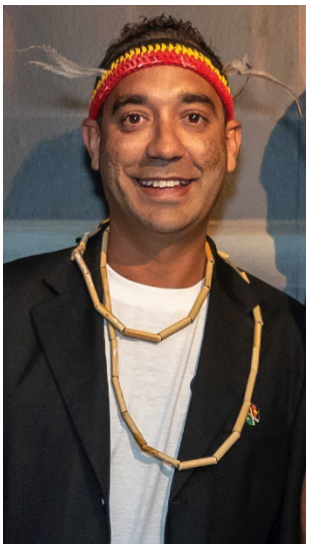
Collaborating with local communities is an important consideration for long term management of fire-affected threatened species.

Restoring diverse native grassland in south-west Victoria by direct seeding - a success story.

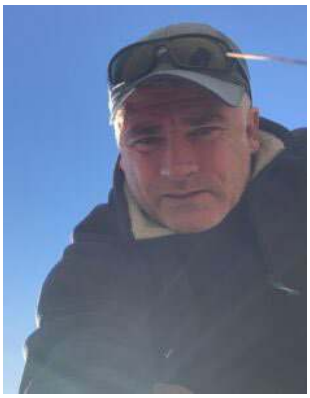
John Delpratt
The University of Melbourne
Co-author: David Franklin

The Woorndoo district in south-western Victoria supports numerous, high-quality examples of critically endangered Natural Temperate Grassland and Grassy Eucalypt Woodland, both Nationally Threatened Communities of the Victorian Volcanic Plain. Many of these remnant communities persist on wide ('3 chain') rural roadsides and are remarkable for the diversity and abundance of both rare and common grassland species. They largely owe their continued existence to a consistent burning regime carried out over many decades for fire safety. While intact, diverse communities are extremely resistant to invasion by potentially dominant exotic perennial species (e.g. *Phalaris aquatica*), they are very vulnerable to soil disturbance, herbicides, altered hydrology and the cessation of regular burning. In recent decades, roadside cropping and large-scale ploughing for fire breaks has removed large areas of significant native grassland. In 2013, the Woorndoo Land Protection Group (now Woorndoo Chatsworth Landcare Group), undertook the restoration of diverse native grassland on 1.25 ha of previously cropped roadside. They applied recently developed grassland restoration techniques that combine topsoil removal with the direct sowing of a diverse local native seed mix (here, comprising eight native grasses and twenty-two wildflower species). Topsoil removal to a depth of approximately 100 mm reduced the soil exotic seed and bud bank and nutrient levels, allowing a competitive advantage for the establishing native community. Initially dominated by Wallaby Grass (*Rytidosperma* spp.) and four daisy species, eight years after sowing, the community is rapidly transitioning to a Kangaroo Grass (*Themeda triandra*) grassland in which 60% of sown species have been recorded.

KEYNOTE BIOGRAPHIES (in alphabetical order)



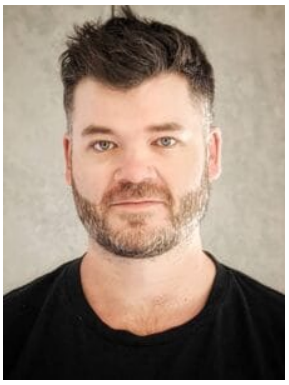
Amos Atkinson is a proud Way Wurru, Bangarang, Dja Dja Wurrung, Barrapa Barrapa, Wemba Wemba, Daug Wurrung, Ngura-illam Wurru Wiradjuri Man. Having extensive knowledge in the history of colonisation genealogy and bio culture. For the last 10 years Amos has been working in cultural heritage and land management practices specifically over the last 6 years reviving cultural fire in Victoria. Amos is a trained forest fire officer having spent a couple of years working with DELWP in central Victoria. Before that he has worked at Yorta Yorta Nation on the Woka Wolla team before moving into the cultural heritage team protecting cultural heritage on Bangarang/Yorta Yorta country where he has lived all his life. Now at Djandak as a cultural fire practitioner working on the mapping and planning of cultural burning in the 6 Dja Dja Wurrung parks that have been handed back under Aboriginal title to Dja Dja Wurrung. This is part of Dja Dja Wurrung's RSA having the state of Victoria formally recognise Dja Dja Wurrung being the traditional owners of their Country. Amos is a member of Firesticks Alliance which is an Aboriginal community run organisation running yearly workshops around empowering communities to lead the way in land and cultural heritage work connecting Aboriginal people from all over Australia to build knowledge to fill the gaps of knowledge that may have been dormant for centuries. One of Amos's proudest achievements to date has been a main driver in bringing the Annual Firesticks Workshop to Barmah state forest as well as his role in supporting other Aboriginal nations in Victoria to think about returning cultural burning as a way of managing country.



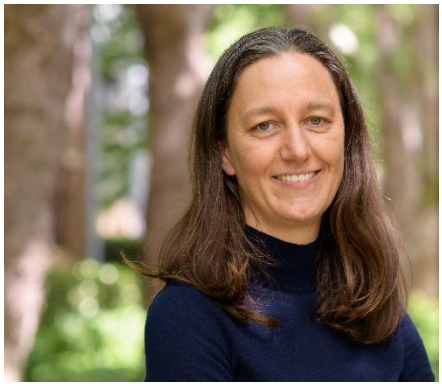
Jim Begley, Landscape Restoration Officer with Goulburn Broken CMA, has worked in the environmental management / revegetation industry for the past 20 years. Over this time native seed supply has been one critical focus for a team dedicated to the supply of native seed for the ongoing demand for habitat restoration, ecosystem services and species conservation, not to mention saving the planet.

Chantelle Doyle has wandered through the worlds of arts and science from childhood - simultaneously loving biology and theatre. This tradition continued into undergraduate studies (where she completed a BA/BSc) and then despite her best efforts reappeared in working life. First, she worked in Roma QLD with an NRM group whilst simultaneously producing the stage musical of Grease (with no singing or dancing experience). She then took a position with Greening Australia whilst studying at the National Institute of Dramatic Arts (NIDA) and finally moved to ecological consulting whilst producing a weekly science radio show (Boiling Point) which showcased Australian researchers. Currently Chantelle is completing a PhD focused on personal and practitioner experiences of threatened plant translocation and produces the accompanying website (plant-heroes.com) which shares

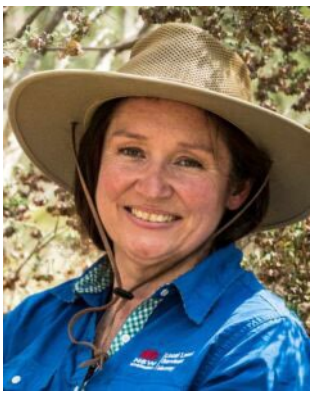
some of those practitioner stories. Her experience in plant conservation and ecology, as well as a desire to elevate the expertise and experience of others has recently culminated in the production of a video series, accompanying the updated Germplasm Conservation Guidelines.



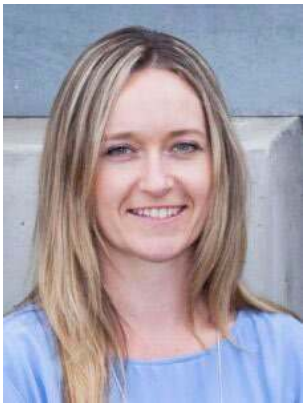
Dr Nathan Emery is a Restoration Biology Officer at the Royal Botanic Gardens and Domain Trust, based at the Australian PlantBank, part of the Australian Institute of Botanical Science. Nathan's research is a combination of plant ecology, seed biology and restoration. He has worked with difficult to propagate species, such as Actinotus and threatened Persoonia species, and has led several threatened plant translocation programs. He also works on the seed biology and conservation of threatened ecological communities in northwest NSW, with a focus on understanding the tolerance of seeds to temperature and moisture stress.



Professor Rachael Gallagher is Associate Professor in plant conservation at the Hawkesbury Institute for the Environment at Western Sydney University. She trained as a plant ecologist and is passionate and uses her skills to contribute to the knowledge and protection of plant species. Rachael has worked in plant science since 2004, initially at the National Herbarium of NSW and subsequently as an Australian Research Council Discovery Early Career Research Fellow (DECRA 2017-2021) after completing her PhD on the functional ecology of climbing plants in 2012. She joined the Commonwealth Threatened Species Scientific Committee in 2020, having served on the NSW Threatened Species Scientific Committee from 2016-2021 (Deputy Chair 2019-2021). Her research is routinely used to address the needs of conservation programs, including the Saving our Species program in NSW. In 2020, Rachael was awarded NSW Premiers Prize for Early Career Research (Biological Sciences) in recognition of her national assessment of the impacts of the 2019-2020 bushfire season on 26,000 Australian plant species. Her work prioritising plant species for recovery actions after the fires has been widely applied to inform planning, management, and extinction risk assessment at the State and Commonwealth level. This work was informed by data in national and international initiatives on plant traits and ranges developed with collaborators, including the AusTraits database which houses more than 1 million observations of the traits of Australian plant species. She also uses these rich sources of data to inform other continental and global scale studies in plant biogeography and conservation.

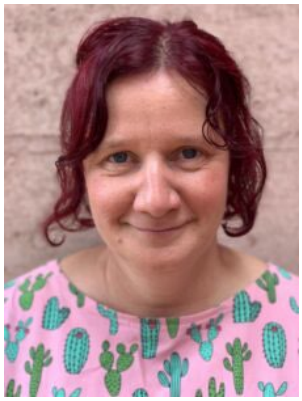


Natasha Lappin works as a Senior Land Services Officer with Murray Local Land Services and manages the Seed Services unit of Murray LLS. Natasha coordinates the annual native seed harvest and direct seeding program and oversees the operation of the Murray seedbank. Natasha has over 20 years' experience in native vegetation management and restoration including native seed collection and supply.



Dr Zoe-Joy Newby completed her PhD in 2014 in phytopathology, and using her experience in working with fungal organisms, began working with orchids thereafter. For the last five years she has been a member of the Germplasm Conservation team at PlantBank, working on orchids as well as the Rainforest Conservation Project. Most recently her work has involved conservation research on several endangered orchid species under the NSW Save Our Species initiative.

Dr Mark Ooi is a plant ecologist and Senior Research Fellow at the University of New South Wales, where he is a member of the Centre for Ecosystem Science in the School of Biological, Earth and Environmental Sciences. He runs a lab focused on fire, plant and seed ecology, and is particularly interested in studying the role of seeds in driving demographic processes of plant species. A key aim of his research is also to use ecological understanding to inform the conservation management of threatened species. Mark's research encompasses several themes in fire ecology, including plant population recovery in response to fires occurring in different seasons, at different severities and under increasing frequencies – elements of the fire regime that are shifting under climate change. His current work focuses on fire-prone vegetation spanning across Australia, and he has ongoing collaborative projects in semi-arid woodlands, sub-tropical savannas and cool climate grasslands in Australia, Brazil and China. He has written over 70 scientific papers and book chapters, and loves to wander around in post-fire sites to study plant recovery.



Dr Jodi Price is a Senior Lecturer in vegetation management, restoration, and fire ecology at Charles Sturt University. She is a plant community ecologist with a keen interest in management and restoration of grasslands and grassy woodlands. Jodi started her ecological research in south eastern Australia exploring diversity patterns and drivers in herb-rich woodlands for her PhD. Since then, she has worked on temperate grasslands around Australia and in Estonia before returning to the south east to take up a position at Charles Sturt University. Jodi's research group work on a range of applied ecology projects with topics such as plant diversity, restoration, seed biology, fire and grazing management.

Dr Nathan Wong is currently the Manager - Djandak Planning and Strategy with Djandak an enterprise of the Dja Dja Wurrung Group. Nathan has worked with the Dja Dja Wurrung group for the last 5 years in which time he has supported a significant expansion of the range and depth of strategy and planning that Dja Dja Wurrung has undertaken within Victoria. Nathan is also known for an extensive range of work in the grassland conservation field in both research and practice and has over the years been involved in the purchase, management and restoration of many sites across Victoria.

PRESENTER BIOGRAPHIES (in alphabetical order)

Dr Christine Allen completed a PhD in threatened flora translocations in the South-west Western Australia in 2014. Since then, she has worked for the Western Australian Government and Greening Australia in Perth and ACT. Currently, Christine manages flora recovery projects across NSW with not-for-profit the Threatened Species Conservancy.

Dr David Bush is Director of the Australian Tree Seed Centre and a forest scientist that has been involved in testing, domestication and genetic improvement of tree species for over 25 years. His research has been focused on selecting Australian tree species for commercial use in Australia and overseas and conservation of forest genetic resources in Australia and the Pacific.

Laura Canackle is a Threatened Species Officer with the NSW Department of Planning and Environment, based in Queanbeyan. She works on threatened flora species in the South East of NSW.

David Carr has 35 years' experience working in the natural resource management area, as a botanist, ecologist and restoration practitioner. David specialises in communicating environmental science to land managers through direct engagement in projects, extension, and training. He established Stringybark Ecological in 2010 and is the Principal Ecologist and Director.

Stephanie Chen is a PhD Candidate at UNSW Sydney and Scientific Officer at the Australian Institute of Botanical Science, Royal Botanic Gardens and Domain Trust. She develops and optimises genomic resources for plant conservation.

Samantha Craigie has worked in restoration ecology for over 20 years, specialising in native seed management. She recently delivered Project Phoenix on behalf of the Commonwealth, a national strategic program focused on addressing issues in the native seed and plant sector.

Ian Crenwell has over thirty years' experience and innovation in natural resources and land management in senior positions in the NSW government. He oversaw the regional forest assessments, including the restructure of the forestry industry and the major expansion of national parks in NSW. He is now a consultant, including to the agricultural research company KG2.

Dr Tim Collins is a plant ecologist with an interest in seed banking and plant propagation. Tim has undertaken taxonomic research on species of Eucalyptus and paper daisies in the genera Coronidium, Helichrysum and Xerochrysum. Tim has also worked as a plant propagator and field botanist/ecologist in Central Australia, the Northern Tablelands of NSW and in Sydney. Tim is currently mapping Threatened Ecological Communities in State Forests on the south coast of NSW.

Ben Croxford has over 20 years of experience as the owner and manager of Nuts About Natives nursery specialising in growing plants for restoration and focusing on increasing biodiversity by applying modern nursery techniques including plant tissue culture

Dr Peter Cuneo is Manager, Seedbank & Restoration Research at the Australian PlantBank (ABG Mount Annan) where he leads the statewide threatened species seed program. Peter's main research interest is

restoration ecology; including threatened plant translocations, management of invasive species and restoration techniques for grassy woodland ecosystems.

Dr Emma Dalziell is a postdoc at UWA and Kings Park Science (WA). Her current research focusses on the *ex situ* conservation of seeds from wild species, specifically, the need to find non-destructive methods for assessing viability, and for predicting longevity in storage.

Leah Dann is a PhD candidate at the University of Queensland studying plant conservation on Norfolk Island.

Ian Davidson has worked throughout northern Vic and southern NSW for nearly 40 years with government, Greening Australia and now runs his own independent environmental business. specializing in working with land managers for habitat restoration

Dr Richard Davies has PhD at Flinders University, studying conservation biology of endangered mound spring plant. Research Fellowships at CSIRO, FU & UNSW undertaking/supervising research into grazing/fire ecology of soil seedbanks and orchids. Plant ecologist for 40 years with government, industry and NGOs.

John Delpratt is an Honorary Fellow with the University of Melbourne following a 25-year career as a lecturer and academic supervisor in horticulture, seed technology and native grassy community restoration. He retains an active interest in grassland restoration theory and practice.

Bradley Desmond is a Senior Project Officer with the Australian Seed Bank Partnership. Alongside the Partnership's National Coordinator, he assists with the coordination of national and international ex-situ seed conservation programs, capacity building and research collaborations to secure Australian plants for future generations.

Dr Paul Gibson-Roy is a restoration ecologist specialising in grassy community restoration. He has also been involved in recent assessments of the native seed industry through the ANPCs Australian Seed Sector Survey and Report.

Andie Guerin Currently Coordinating the Regent Honeyeater Project- a revegetation project based around Benalla in North east Victoria, which has operated as a not-for-profit for 25 years.

Dr Siddeswara Guru is a program lead of the TERN data services and analytics platform.

Dr Peter Harrison is a forest geneticist investigating how plants, particularly eucalypts, adapt to their environment. He employs a mixed approach that integrates novel technologies such as remote sensing and next-generation sequencing with traditional ecological approaches to improve conservation and restoration outcomes.

Carolena Helderman has been the Biodiversity Officer at Goulburn Murray Landcare Network for the past four years.

Dr Megan Hirst works in the Victorian Conservation Seedbank at Royal Botanic Gardens Victoria and has an interest in alpine flora with a focus on germination and dormancy characteristics.

Dr Susan Hoebee is a plant molecular ecologist at La Trobe University whose research focuses on aspects of plant reproduction and population genomics typically, but not exclusively, in regard to native species conservation.

Katherine Horsfall is a PhD candidate at University of Melbourne. She has a background in public policy and a keen interest in how communities interact with the natural world. Her PhD research investigates direct-seeding methods to re-establish native understorey species as wildflower meadows on hostile urban soils.

Dr Gemma Hoyle is a seed scientist responsible for designing, carrying out and reporting on research projects at the National Seed Bank. Her work focuses on seed germination, dormancy and longevity to improve the conservation and management of Australia's native flora.

Dr Emma Ladouceur is a Postdoc at the German Centre for Integrative Biodiversity Research Halle-Leipzig-Jena

Dr Ganesha Liyanage has been a Plant Conservation Scientist at Australian PlantBank since 2018. Primary area of her research is seed dormancy and germination with a focus on advancing conservation of Australian rainforest species, specifically for ex situ seed storage.

Dr Blair Parsons leads GA's Science and Design team, which focuses on strategy, research and the planning, design, monitoring and evaluation of ecological restoration. Blair is passionate about accelerating Greening Australia's restoration efforts to generate benefits for biodiversity, people and productivity.

Dr Melinda Pickup holds a PhD in conservation genetics from ANU. Before joining Greening Australia, Melinda worked as a university researcher and teacher in Australia, Austria and Canada. Melinda is committed to seeing the best available science implemented into restoration and conservation practice

Erika Roper is a Threatened Species Officer in the Saving Our Species program with the NSW Department of Planning and Environment. She has a soft spot for orchids and cockatoos and works on various threatened plants and animals.

Dr Maurizio Rossetto heads the Evolutionary Ecology section at the National Herbarium of NSW and combines genetic, environmental and functional data to support flora management and conservation.

Dr Libby Rumpff is a plant ecologist at the University of Melbourne with a focus on the restoration and adaptive management of native woodlands. She works closely with government agencies to improve decision-making under uncertainty.

Kathryn Scobie is a nursery horticulturist at the Australian National Botanic Gardens (ANBG) in Canberra. She manages the permanent potted nursery collection, which consists of hundreds of vulnerable and threatened Australian plant species from a wide range of genera.

Jerry Smith is employed as the Threatened Flora Ecologist for the Hills and Fleurieu Landscape Board. He has been working in on-ground plant conservation for over 20 years and is currently delivering a project to improve the trajectory of 20 species of national significance across the Mount Lofty Ranges.

Dr Karen Sommerville is a Research Scientist leading the Rainforest Seed Conservation Project at The Australian PlantBank. Her work includes using differential scanning calorimetry and post-storage germination experiments to identify ideal storage conditions for rainforest seeds.

Professor Nicholas Williams is an ecologist who works predominantly in urban areas because although they are the cause of many of the world's environmental problems cities also offer humanity great hope for a sustainable future. He seeks to understand urban biodiversity patterns and ecosystem processes and then develop applied solutions to reduce the negative impacts of urbanization.

Dr Jenna Wraith is a conservation ecologist with a current role as the Training and Outreach Coordinator at the Atlas of Living Australia, CSIRO. Her research interests include conservation ecology, threatened species management, climate change modelling and innovative research technology.

Damian Wrigley is the National Coordinator of the ASBP; Australia's National Focal Point for the Global Strategy for Plant Conservation under the CBD; and Oceania Representative to the CITES Plants Committee. Damian is hosted by the Australian National Botanic Gardens on Ngunnawal country.

Dr Samantha Yap is part of the Research Centre for Ecosystem Resilience (ReCER) at the Royal Botanic Gardens and Domain Trust and is leading a series of conservation genomic projects across a wide range and number of threatened species, to guide conservation efforts that will help secure species survival.

Dr Amelia Martyn Yenson is currently a Project Manager at the Australian Network for Plant Conservation and coordinated updates for the third edition of 'Plant Germplasm Conservation in Australia'. Amelia has a research background investigating seed lifespan and germination, with a focus on improving seed quality for conservation storage of Australian native plant species. She also has a growing interest in science communication. Amelia's research is based at the Australian PlantBank, part of the Australian Institute of Botanical Science.

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