

# Australasian Plant Conservation

Bulletin of the Australian Network for Plant Conservation Inc



Volume 26 Number 3 December 2017 – February 2018



Arid Australia – Albert Morris Award and Field Trip, bush regeneration in Broken Hill, seed predation, fire and grazing, and more

## ANPC INC. MISSION STATEMENT: To promote and improve plant conservation

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### Australasian Plant Conservation

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diary dates are welcome. General articles on any  
plant conservation issue are most welcome.

The deadline for the March – May 2018 issue  
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issue is Translocation of threatened plants.  
If you are intending to submit an article or wish  
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# From the Editors

PAUL ADAM AND HEIDI ZIMMER

The restoration and rehabilitation of degraded ecosystems is a major global challenge. This is particularly so in the world's arid and semiarid zones where the environment is inimical to plant growth and is subject to a high level of temporal variability.

In this issue we celebrate the pioneering work of Albert and Margaret Morris and the City of Broken Hill in the establishment of a Green Belt around the City. The 'Regen', as it is known, has not been well publicised in Australia, but it was a world first. We are faced with the need to revegetate large areas of former mine sites, many of them within the arid/semiarid zone. Practitioners of restoration may well be able to learn from the Broken Hill experience. Long-running experiments in applied ecology are rare – the 80 years of history represented by the 'Regen' could be of great value as a model for rehabilitation elsewhere,.

The Australian Network for Plant Conservation was one of the partner organisations of a very successful event held in Broken Hill in August 2017 to commemorate the 80th anniversary of the Regen and to celebrate the work of Albert and Margaret Morris. This issue contains a personal reflection by one of Australia's most distinguished botanists, Barbara Briggs, on the Morris's work and legacy, an account of the 2017 event, and an example of Albert Morris's writing.

The arid zone is the subject of much continuing botanical research, and two examples of current studies which address issues of direct relevance to management of arid vegetation are presented in the issue. Australia is widely considered to have an exceptionally large number of plants species in which seed dispersal is

mediated by ants. It is certainly true that ants play a very significant role in seed dispersal but Charlotte Mills casts doubt on whether the extreme dominance of ants as dispersers has always been the case, or whether it may reflect long-term declines in small mammal populations. If whole ecosystems, including their small mammals, are restored what would be the consequences both for plant regeneration and ant populations?

Landscape scale fire in the arid zone is a relatively infrequent event. Nevertheless, Auld *et al.* suggest that fires, which may be several decades apart, are important determinants of ecosystem structure and function. If we are to understand and re-establish ecosystems then we will need to know much more about responses to historic fires in order to manage the land as fire regimes change.

This issue also includes a report from the ANPC President, Linda Broadhurst, who provides a breath-taking review of ANPC's activities in the last 12 months, as well as a synopsis of plans for the year to come.

The regular features included in this issue encompass News from the Australian Seed Bank Partnership, a member profile, a digest of media coverage of plants, and the always useful Research Roundup.

Last but not least I would like to mention that the editorship of APC is in a state of transition from the retiring Paul Adam, to the incoming Heidi Zimmer. Heidi Zimmer is a scientist with the NSW Office of Environment and Heritage, with a keen interest in Australia's threatened flora, and will be leading the editing of the forthcoming issues of APC on translocation.

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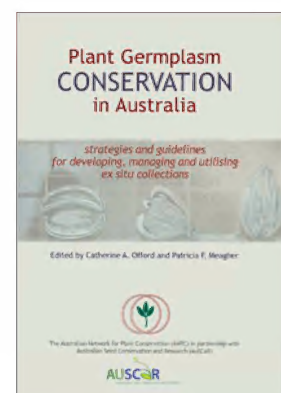
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# President's Report

## To the Annual General meeting, 29 November 2017

LINDA BROADHURST

ANPC President

Email: [anpc@anpc.asn.au](mailto:anpc@anpc.asn.au)

This is the 26th year of the ANPC and it is pleasing to see that we continue to maintain our role as Australia's key plant conservation organisation.

Involvement in submissions to government either through participation in workshops or commenting on proposed legislative changes or guidelines highlight areas where the ANPC has been active this year. For example, this year the ANPC undertook joint submissions with the Invasive Species Council - on the *Review of the Intergovernmental Agreement on Biosecurity Draft Report* and the *Review of the National Environmental Biosecurity Response Agreement*. We also provided comments on the *Draft Conservator Guidelines for Translocation of Flora and Fauna in the ACT*.

I have also attended several environmental biosecurity stakeholder meetings organised by the Department of Agriculture and Water Resources. The purpose of these meetings is to provide an opportunity for relevant stakeholders to discuss environmental biosecurity matters and share ideas, with the focus on better engagement and collaboration on key environmental biosecurity issues, such as Myrtle rust and other plant pathogens.

This year we assisted the Society for Ecological Restoration Australasia (SERA) with the revision and production of the 2nd edition of the *National Standards for the Practice of Ecological Restoration in Australia* and which will be launched in Canberra tomorrow at Parliament House.

There continues to be a high level of community interest and support for plant conservation and the ANPC continues to enhance its capacity to play a key role in facilitating and communicating plant conservation initiatives throughout Australia. This is reflected in the ongoing participation of land managers, government departments, industry, the volunteer conservation movement and the broader community in ANPC workshops and conferences, and the requests we get from other organisations and government to participate in and comment on various flora conservation initiatives.

While I continue to be greatly impressed by the dedication and breadth of knowledge of ANPC members, we still face many significant challenges. We need to ensure that we effectively promote the increased

recognition among the broader Australian community of the inherent value and cultural significance of the flora. We also need to ensure that we remain focussed on our core business of facilitating the conservation of a unique flora, the recovery of threatened species, ecological restoration and the management of remnant vegetation.

### 2016 ANPC Conference APCC11

The ANPC's 11th national conference, the 11th Australasian Plant Conservation Conference, was successfully held in Melbourne in November 2016.

The conference brought together a diverse range of participants including botanists, ecologists, land managers, and on-ground plant conservation managers from around Australia to review and highlight plant conservation achievements and challenges. The theme for the conference is "*New Approaches to Plant Conservation Challenges in the Modern World*". Together we explored existing approaches to plant conservation across Australia, highlighting significant achievements and evaluating the effectiveness of our current approaches. The conference also provided an important opportunity to explore the major challenges Australian plants will be facing in the next few decades, and to identify new directions and approaches that will be required if we are to continue to conserve our unique floral heritage.

Changing climates and ongoing extensive habitat degradation continue to challenge many plant species. Being at the leading edge of this change, we will be held to account by future generations of Australians should we not do everything possible to arrest and reverse species decline. Developing the logistical and technological capacity to ensure that we have sufficient high quality seed for species restoration and understanding how to best use mutualistic organisms will undoubtedly improve our capacity to recover and conserve plant species. Perhaps a more significant challenge is how to reconnect Australians with our many wonderful and unique plants, and developing conservation approaches that maximise the benefits for people and plants are required to do this successfully. By exploring the frontiers of Australian plant conservation through new and emerging ideas we will begin developing adaptive approaches to conservation that will be necessary to respond to future challenges.



Chair of the APCC11 conference organising committee, John Morgan from La Trobe University, presenting at the ANPC's conference. Photo: Jo Lynch

I would like to thank all the conference sponsors and the conference organising committee: John Morgan, Ben Zeeman, Susan Hoebee, Trevor Edwards, Susanna Venn, David Cantrill, Paul Gibson-Roy, David Coates, Jo Lynch, Martin Driver and Karina Salmon for their huge effort in coordinating the conference, along with the team of La Trobe University student volunteers. In particular, Jo Lynch and Carly Westbye in the ANPC office worked tirelessly to ensure that the conference ran smoothly.

### Workshops, Projects and Outreach

One of our major projects in the last year as been the Review of the ANPC Translocation Guidelines in association with the National Environmental Science Programme's Threatened Species Recovery (TSR) Hub. In May, Dr Lucy Commander was appointed Project Manager of this revision. The ANPC, in association with the TSR Hub, Royal Botanic Garden Sydney and NSW Office of Environment and Heritage, ran two translocation events in Sydney. On 1 August, 90 people gathered at the RBG's Maiden Theatre for the Threatened Plants Translocation Information Day, demonstrating a huge interest in plant translocation. Sebastian Lang, from the Office of the Threatened Species Commissioner opened the series of invited presentations from local and national experts, including several ANPC committee members. Audio recordings of the presentations are now available with the Powerpoint slides on the ANPC website. On the following two days, an invitation-only workshop was held with 30 specialists to commence the process of updating the Translocation Guidelines. The ideas and suggestions generated at the workshop were incorporated into the draft of the third edition. Currently, workshop attendees are revising the content, which will be edited by the Project Manager and the ANPC Translocation Guidelines steering committee early in the new year. In addition to the Guidelines, translocation case studies will be published next year in APC and on the ANPC website. A pro-forma for these

case studies is currently being developed, and a number of authors have been approached to submit their projects. Thanks to the ANPC Steering Committee, Dave Coates, Cathy Offord, Bob Makinson and Maria Matthes.

ANPC Project Manager, Martin Driver has delivered many workshops over the past year including a Plant Identification workshop at Booligal Wetlands, which included presenting at a one day Rangelands Forum, supported by the NSW Environmental Trust, and a Sandhill Pine Woodland Walk at Oolambeyan National Park supported by Riverina LLS, Landcare and Greening Australia. A Native Pasture Management Workshop was supported by Corowa District Landcare, and a Plant Identification workshop was held in the Western LLS region at Mount Hope. More of these workshops are planned for next year. These workshops have been a great opportunity to provide private land managers with information on how to improve biodiversity management on their properties.

Two workshops were held for the Bring Back the Banksias project in collaboration with Trust for Nature Victoria and North East CMA, as well as Glenelg Hopkins CMA and the Victorian Volcanic Plains Friends of the Forgotten Woodlands. Funding has recently been received for Stage 2 of this project from the Norman Wettenhall Foundation for continuation of the ANPC's networking and communications role between researchers and practitioners, and a future workshop to communicate findings and implications is planned for 2018.

In August Martin participated as an ANPC partner representative in developing and attending the Albert Morris Award and Regeneration Project field trips and associated plant ID workshops held in Broken Hill 22-24 August, in conjunction with the Australian Association of Bush Regenerators (AABR). More information on this event will soon be provided in an edition of APC.

Martin also participated in the NSW State Landcare Conference / LLS Forum in Albury, 25-27 October 2017 and was involved in several workshops over the 3 days with good networking opportunities. He presented an ANPC promotional poster which Carly had prepared and distributed ANPC brochures and membership forms. It is likely that this will result in at least 3 ANPC workshops in 2018 (subject to LLS funding) and the opportunity to further develop at least 5 others with LLS/ Landcare partners.

In late 2016 Australian seed collectors, growers/sellers/suppliers, purchasers/distributors and other interested parties were invited to participate in a survey organised by the ANPC on the status of the Australian native seed industry. The aim of the survey was to gauge the structure and capacity of the native seed industry to meet current and future demand, and to gather feedback on issues experienced within the industry. The initial survey results were disseminated at the Australian Native Seed Industry Review workshop. Due to high demand, the survey was

extended to April 2017 and the results are currently being collated with funding provided by Greening Australia and will soon be disseminated. Thanks to Dr. Nola Hancock (Department of Biological Sciences, Macquarie University), Dr Paul Gibson-Roy (Greening Australia) and Martin Driver (ANPC) for developing and analysing the survey.

The Australian Native Seed Industry Review workshop was held on 18 November 2016 at the Royal Botanic Gardens Victoria as part of the APCC11 conference. This 'Call to Action' Workshop drew on both Dr Paul Gibson-Roy's plenary conference review of the American native seed industry and the industry-wide on-line survey mentioned above, to identify the key issues, gaps and opportunities in the Australian native seed industry. The workshop identified what are some of the key issues and gaps in the Australian national and regional seed supply chains and how we fare against learnings from the American scene. This has helped to identify and prioritise some critical elements that need to be addressed and identify opportunities, actions and key players to assist in creating a true native seed supply industry. The results of the workshop are available on the ANPC website.

Over the past 12 months, the ANPC has coordinated the final year of our subcontract of the Orchid Conservation Program to the Royal Botanic Gardens Victoria (RBGV). This has involved one final project to conserve the endangered Melblom's Spider-orchid (*Caladenia hastate*). Seed was collected from two sites at Portland Aluminium/ Point Danger and Wilkin Flora and Fauna Reserve. Mycorrhiza was isolated from both sites and 200 plants propagated. The pollinator data collected from this project has now been published. A total of 446 plants have been introduced to two sites, doubling the number of plants of this species in the wild. All of the individual projects in this Program are now complete, with the Program now run through the RBGV.



ANPC Project Manager, Martin Driver, presenting at the Booligal Wetlands Plant ID Walk May 2017. Photo: Annabel Lugsdin

More broadly our outreach efforts continue to expand through a range of social media with the regular sharing of news and events in plant conservation via Twitter, Facebook, Google+, and LinkedIn. The email newsletter ANPC News continues to be sent out monthly and currently reaches 626 subscribers. The ANPC website is currently being redeveloped into a new, more user-friendly platform which will enable us to install many new features that will streamline office management and membership services. The new Kids Page has been further developed with additional activities to encourage the interest of young people in plants and plant conservation.

The ANPC office received new computers this year, thanks to the Australian National Botanic Gardens and the Department of Environment and Energy. This has enabled the introduction of a new financial system (Xero) which has significantly improved office procedures and replaced the outdated MYOB software. It has also enabled the purchase of graphic design software (InDesign) for the development of educational and promotional material.

Our bulletin, *Australasian Plant Conservation*, has continued to publish high-quality articles relevant to a broad range of plant conservation practitioners and managers, under the editorship of Paul Adam. On behalf of the Committee and all members I would like to sincerely thank Paul for his significant effort in ensuring that APC continues to be a quality and well respected publication for the communication of plant conservation issues in Australia. And I'd also like to thank Carly Westbye and Siobhan Duffy for all their work on each edition.

## Staffing

Many thanks to our office staff Jo Lynch and Carly Westbye, who continue to work well beyond the call of duty for the ANPC. Their dedication and the quality of their work make my job and the work of the Committee so much more effective, and ensures that the ANPC continues to function as a highly respected conservation organisation. Also thanks to our office volunteers this year – Jenny Michelle, Lily Berry and Lyndsay Bassett who have greatly helped Jo and Carly with various tasks including website, social media, ANPC News and database activities.

I am grateful to Committee members for their tremendous support over the year. All of the Committee members have significant commitments outside the ANPC and it is often challenging to devote the time required as active committee members. The involvement in the committee by all Committee members is a clear demonstration of their dedication to the ANPC and its goals in improving plant conservation. I would like to thank ANPC Committee members Doug Bickerton, Anne Cochrane and Natalie Tapson who are leaving the committee this year and I sincerely thank them for their time and support over the terms they have served.



Linda Broadhurst and Lucy Commander presenting at the Translocation Guidelines Review workshop August 2017. Photo: Jo Lynch

I would especially like to thank Merryl Bradley who is resigning as Treasurer this year after four years. Her experience and assistance in this role, as well as additional volunteering in the office, has been a huge asset to the ANPC over this time. This includes many hours helping with the transition to Xero over the last 18 months. We wish her all the best for the future and look forward to still seeing her occasionally at ANPC events.

## Funding

Our financial situation will be reported on in detail separately at the AGM but we continue to broaden our sources of income including from:

- Threatened Species Recovery Hub for the Review of the ANPC's Translocation Guidelines.
- NSW Environmental Trust's Lead Environmental Community Groups grant for website development and Plant ID workshops.
- Normal Wettenhall Foundation biodiversity conservation grant for Stage 2 of the *Bring Back the Banksias Project* – coordination, communication and workshop.
- Greening Australia for *Sandhill Woodland Communities* field day.
- Riverina Local Land Services for one day Plant ID workshops.
- Western Local Land Services for a Plant ID workshop.
- Biodiversity On-ground Action grant from the Victorian government for Saving the threatened Audas Spider-orchid (*Caladenia audasii*) from extinction.
- Two large confidential donations, one of which is going towards the website upgrade.

I would particularly like to thank Jo Lynch and Martin Driver for the great efforts they have put in with these successful projects and grant applications, and acknowledge their efforts with other unsuccessful grant

applications such as the Threatened Species Recovery Fund, Australia-China Council, ACT Environment Grants and the NSW Environmental Trust.

## The coming year

Many projects are already in the planning stage for the coming year. These include:

- Coordination of the 12th Australasian Plant Conservation Conference in Canberra 12-16 November 2018.
- Finalising the review of the ANPC's Translocation Guidelines and production of the 3rd edition of the Guidelines.
- Undertaking a Plant Translocation workshop in Canberra either before or after the conference, in conjunction with the launch of the new Guidelines.
- Seeking additional funding for the publication of the 3rd edition of the Guidelines as well as additional workshops.
- Undertaking Stage 2 of the Bring Back the Banksias project.
- Undertaking our new project Saving the threatened Audas Spider-orchid (*Caladenia audasii*) from extinction with RBGV.
- Coordinating more seed collection and plant ID workshops.
- Completing the introduction of the new website platform and online membership database.
- Investigating the potential for an ANPC Forum in 2019.

I have thoroughly enjoyed my first term as President and look forward to my second term over the next 2 years. It has been a pleasure and a privilege to work with all of you and for an organisation that does so much for plant conservation in Australia. I see an important future for the ANPC playing a key role in plant conservation across Australia and the region more broadly.



# Bush Regeneration at Broken Hill: 'radical for their time'

BARBARA BRIGGS

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Broken Hill holds an honourable place in vegetation restoration in Australia and more widely, as one of the earliest projects, with greatest community benefit.

By the 1930s, after forty years of mining at Broken Hill, the land surrounding the city had become a degraded wasteland, denuded by rabbits, grazing and cutting of timber. Severe dust storms were a frequent scourge, with constant sand drift; seen as regrettable but inevitable results of living in that arid environment. It was Albert Morris who saw a remedy, that he passionately advocated, of regenerating a green belt of vegetation around the city. In this I am proud to claim an unearned connection, Albert's wife and partner in the work was Margaret, my Aunt Meg, and he was my 'Uncle Bert'. When Albert died in 1939, aged 52, I was too young, at five years in Sydney, to understand his work in distant Broken Hill, but I learnt of the reserves as Margaret continued the work. The history of the regeneration and the way that its success influenced regeneration projects elsewhere has been excellently told by Angela Denton (1988), Horace Webber (1992), David Jones (2011, 2016) and Peter Ardill 2017a, b).

Albert Morris was Senior Assessor at the Broken Hill Central Mine but his great enthusiasm was for plants, learning about them and using them to improve the living environment. He found a kindred spirit in local doctor and ornithologist Dr William McGillivray and together they were active – with others – in establishing the Barrier Field Naturalists' Club, named after the local Barrier Range. Also, since 1935 he had been involved in a field trial of regeneration by fencing and ploughing a denuded area (Ardill 2017a). He sought out anyone who would listen to his message of vegetation regeneration and tree planting, and found valuable contacts through the Field Naturalists. Albert gained the support of senior executives of the Zinc Corporation, Maurice Mawby and James Keast, who started the work on Corporation land and recommended to the City Council the setting aside of the first reserve. This proved the feasibility of the plan and justified the allocation of further land for revegetation.

Albert and Margaret raised thousands of seedlings in jam tins in their backyard, testing different species for use in planted areas in the city and parks. From these trials they found that local provenance species, from seed collected locally, were generally the most resilient and successful.



Success of regeneration and planting of Old Man Saltbush in regeneration reserve, about 1939. Source: Charles Rasp Library, Broken Hill



Devastated area near Broken Hill, about 1930, before protection by rabbit-proof fencing. Source: Charles Rasp Library, Broken Hill

Descriptions of their methods, along with other botanical articles and notes by Albert Morris, were later compiled by the Barrier Field Naturalists Club (1966, 1975). Albert wrote that, in the regeneration areas, 'Native seeds will be freely scattered in some paddocks, while others will be left to Nature alone, and these methods will supply valuable information in the campaign against sand. ... Even without the rain, it is surprising how many plants have come up and are doing well.' Also 'if only we could get an area a mile wide fenced around the town to keep

stock and rabbits off, to allow the natural vegetation to come back, we could stop sand drift.' Scald areas, where the topsoil had been completely removed, were ploughed to form furrows that would hold drift sand and seeds as well as retaining any water. 'Even without much rain ... mulgas and cassias [are] over a foot high and a few 'Dead Finish' [*Acacia tetragonophylla*] have come back apparently from nearly dead stumps between rock cracks that have had no chances to grow for 40 years.' (A. Morris 1938).

Mine Manager Keast employed Morris to advise on the plantings and he allocated resources for Jack Scougall with a team of men to fence the reserves, set up and manage a plant nursery at the mine using waste water, and to plant trees. After early success, Keast enlisted the support of the adjacent North Broken Hill and Broken Hill South mines to share the costs and to add reserve land to the south and west of the city. There was strong lobbying in support from members of the Field Naturalists, but it was not all plain sailing. Some Broken Hill residents objected to the town common being enclosed and out of bounds, so they repeatedly broke down parts of the fencing. Morris, Keast, and the Field Naturalists persevered, rebuilding it each time, knowing they had wide support from most residents who looked toward better living conditions without sand drift and dust.

The area that is now Albert Morris Park was planted, and trees raised for street planting and parks around the town. Lines of trees were sometimes planted as windbreaks at boundaries of the regeneration reserves but more innovative at that time was leaving the remainder of the protected area for natural regeneration.

Rabbit-proof fencing had started in May 1936. Seeds were collected, seedlings raised and early in October about 1000 Oldman Saltbush, *Atriplex nummularia*, were planted about 1 m apart for wind protection and to stop sand drift. To save time, with help from the Field Naturalists, 1600 young River Red Gum (*Eucalyptus camaldulensis*) were transplanted from the edge of the town reservoir. Their tops and roots were pruned and 'when the warmer days of spring arrived, the trees planted in the kerosene tins put out tiny red shoots from the dry looking sticks. About 95% of them grew'.

Albert died from a brain tumour in 1939, aged 52, and did not see his work come to fruition. Most areas then had only two years of growth, but the land had been secured and success of the process demonstrated. His wife Margaret took over and, with Jack Scougall, continued the project. She made surveys reporting how many native species had regenerated and wrote articles to make the success of the regeneration known locally and nationally (M. Morris 1939a, b).

Spear Grass, *Austrostipa*, was the first to show good growth in the reserves. A survey in September 1939 found 'The ground cover in all the enclosures is very satisfactory ... including a large number of perennial species.' and



Albert and Margaret Morris. Source: Charles Rasp Library, Broken Hill

'This natural regeneration has been most surprising. Mulgas and Cassias [now *Senna*] are two or three feet high. The good rains this year have brought up seeds of many plants not seen in these parts for many years.' (M. Morris 1939b).

The Broken Hill regeneration program was ahead of prevailing ideas on vegetation restoration so that Sydney University botanists asked to review it found few comparable examples. They noted that they saw it in a season of good rainfall but reported that, after only two years, 'The effect of fencing is most beneficial. Areas which previously were only sparsely-populated sandy wastes are now occupied by a good cover of grasses and native shrubs. Consequently the amount of dust on windy days and the drifting of sand have been reduced. Residents on the outskirts of the town are no longer forced to abandon their homes.' (Pigeon and Ashby 1940).

As regrowth in the reserves continued, the improvement in living conditions in Broken Hill was noticeable. Keast moved to other mining projects, to Port Pirie in South Australia and later Mary Kathleen in the Northern Territory. In each place he set about making the mining towns green and liveable, spreading the methods that had been successful in Broken Hill (Webber 1992). However, so far as I know, the Broken Hill experience did not contribute when new approaches to bush regeneration were developed by Joan and Eileen Bradley (Bradley 1988) in Sydney.

In 1991 the National Trust of New South Wales classified the Regeneration Areas as essential cultural heritage and stated that:

- The Broken Hill Regeneration Reserves (dating from 1936) are one of the earliest, major land-use initiatives in Australia aimed at combating land degradation.
- The Reserves have importance in demonstrating an early and successful commitment to Australian environment enhancement largely based on the

adaption of natural processes observed in the local Broken Hill area.

- The city of Broken Hill is ringed by the Regeneration Reserves and these vegetated areas are held in high esteem by the community for their aesthetic qualities.
- The Reserves exhibit the successful application of innovative regeneration techniques, radical for their time, but now commonly applied throughout Australia.
- The Regeneration Reserves were an important element in 2015 when the whole City of Broken Hill was the first city included on the National Heritage list. The Australian Heritage Council's assessment noted that 'Broken Hill is a rare example of a mining town where 'green belt' regeneration measures were researched, tested and implemented.' It continues to be a 'high quality ecological restoration project' where 'native vegetation communities [have] developed and persisted over the last 80 years' (McDonald 2017).

### Acknowledgements

Although Albert and Margaret Morris were part of my family's conversation for as long as I can remember, there is much that I did not know about their work. I thank Tein McDonald, Peter Ardill and David Jones for information about the regeneration work, based on their extensive research, and for providing photographs. I also thank Alison Wayman of the Charles Rasp Library, Broken Hill, for photographs.

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# Report on the Albert Morris Inaugural Award Field Trip to Broken Hill August 21-24, 2017

REPORT PREPARED BY TEIN McDONALD OF AABR, WITH SOME ADDITIONS BY PAUL ADAM

Email: [president@aabr.org.au](mailto:president@aabr.org.au)

The inaugural Albert Morris Ecological Award Dinner was held at the Palace Hotel, Broken Hill on 24 August 2017, and marked the culmination of a week of activities to celebrate the 80th anniversary of the commencement of the fencing of the Regeneration Reserves (popularly known as 'The Regen') around the City of Broken Hill in far western New South Wales.

The initiating force behind the event was the Australian Association of Bush Regenerators (AABR) with the proud support and sponsorship of several organisations, including Australian Network for Plant Conservation.

The program was a full one, but still left time for participants to sample the attractions of Broken Hill, the only city in Australia listed in its entirety on the National Heritage List.

**Monday 21st – Welcome Reception** at the Broken Hill Regional Art Gallery. Approximately 65 attended, including the Mayor, councillors, council staff and representatives of all local collaborating organisations. Barrier Field Naturalists and the Gallery hosted a unique exhibition of Margaret Morris' photographs of the local flora. These were sold by slow auction during the evening.

**Tuesday 22nd – Morning. Bus tour** of the Regeneration Reserves system. Over 95 people, including about 30 locals, attended this very interesting tour, led by Peter Ardill and based on his recently published chronology of important dates in the history of the Reserves (Photo 1).

**Tuesday 22nd – Afternoon. Botanists' meeting.** Four visiting botanists met to validate the plant list and specimens prepared by local botanists Lindy Molesworth and Ann Evers for the plant survey.

**Tuesday 22nd – Afternoon. Supervisors' meeting.** Council's Darrell Ford and the four AABR supervisors prepared the equipment and fine-tuned the program for the working bees.

**Tuesday 22nd – Evening. Information evening at the Synagogue.** A total of 74 visitors and locals attended the event. This was a facilitated discussion on the topic of the history of the reserves and tapped into the knowledge of locals and interested visitors. Comments on future management and the role of local communities enlivened the evening, which was rounded off by a short presentation by Russell Sinclair. He shared the story of the 90-year old Koonamore Reserve in South Australia, which is one of the world's oldest fenced enclosures established for the purpose of ecological research.



Photo 1. Inspecting 'The Regen'. Dr Tein McDonald is the figure in the Hi-Vis jacket. Photo: Paul Adam

**Wednesday 23rd and Thursday 24th – Four working bee projects** (Each was run on two mornings) – with morning teas provided by council. These working bees involved more than 60 people working each day – with most visitors and some locals attending both days. Two of these projects aimed to trial whether cutting and painting methodologies used in other regions could be of use in the Broken Hill Regeneration Reserves for the reduction of woody weeds including Mesquite, African Boxthorn, Pepper tree, African Daisy and a newly detected weed in the area, Willow Rhus (*Searsia lancea*), as well as Giant Reed (*Arundo donax*) (Photo 2). The third working bee involved a plant survey of Reserve 1A and the fourth involved a trial of collecting and translocating biocrusts from healthy sites to sites with no biocrust. The supervisors reported that all achieved good outcomes in terms of contributing some useful work and providing an enjoyable experience for the visitors.



Photo 2. Cut and paint eradication of *Arundo donax* on the weeding working bee. Photo: Paul Adam

**Wednesday and Thursday 12.30-2pm – Lunch mixer at Broken Hill Art Exchange.** Lunches were provided by Council with tables and seating provided by Broken Hill Art Exchange. On both days the lunch period offered opportunities for visitors and locals to visit the Pop Up gallery exhibition of a series of short films including 'The Regen, Interviews with Lilian Pierce' filmed by Bruce Green and Grant Bennett. Many also joined in a Public Art Workshop (a mural on the wall of the Broken Hill Art Exchange celebrating aspects of the regeneration area, Photo 3). The Art Exchange and Council collaborated to make the lunches very successful and enjoyable and the art exhibits proved highly popular



Photo 3. The mural at the Broken Hill Art Exchange. Margaret and Albert Morris feature prominently. Photo: Paul Adam

### Afternoon tours Wednesday and Thursday 2-3.30pm.

A bushwalk on Wednesday led by Wayne Lovis of Landcare Broken Hill proved very popular with more than 30 people attending, half of whom were locals. A free tour of the Living Desert (Photo 4) was held on Thursday afternoon and was more popular than was expected, with us having to turn away some disappointed visitors.

### Thursday evening. Albert Morris Award Dinner.

Approximately 115 guests attended the smorgasbord dinner at the Palace Hotel, including at least 35 local residents. The hotel features spectacular murals, and achieved international fame when it featured in a number of scenes in the film "The Adventures of Priscilla, Queen of the Desert". Representatives of six individuals and organisations received citations, presented by the project partners, for their roles in bringing the Regeneration Reserves to fruition. Moving thank-you speeches were given by the recipients.

**Video recording** was ongoing throughout the events and over a period of 2 weeks as AABR is raising funds to produce a documentary on the work of Albert Morris and the Regeneration Reserves. During the week the events gained considerable coverage in the local media.



Photo 4. The Sculpture Park in the Living Desert. Photo: Paul Adam

## The Awards

The inaugural Albert Morris Ecological Restoration Award celebrates one of the oldest ecological restoration projects in the world - and the first to deliberately employ a natural regeneration approach.

At the Awards Dinner the main Albert Morris inaugural award for 'The Regen' was a sculpture by renowned Australian artist, and Aboriginal Elder, Badger Bates. Entitled 'Regeneration' it was carved from the timber of a plant native to 'The Regen', Dead Finish (*Acacia tetragonophylla*) (Photos 5 and 6). This was presented to the Mayor of Broken Hill, Darriea Turley, representing all the people of Broken Hill and all the individuals, agencies and organisations who made the project a success. Citations were presented to key individual agencies, the Barrier Field Naturalists Club, the Mining Industry Association, Broken Hill City Council and the NSW Government - as well as, posthumously, to the two key individuals involved in the project, Albert Morris and Margaret Morris.

As the event was the first of its kind it is important to assess its success as well as to plan for the future. AABR therefore sought the views of participants through a survey.

### Feedback from attendees

AABR sent out a survey to those who had booked for the event, requesting feedback on the festivities to enable us to learn from the experience. In summary, five local residents and around 40 visitors filled in our feedback survey (out of approximately 60 visitors and 30 locals on the list). The overwhelming response to all six questions was positive, with over 75% approval rating for the activities and a lot of complementary comments provided. Around 75% answering 'yes' and 25% answering 'maybe' to the question asking whether the respondents would consider returning for a similar trip involving field work in the future.

The survey and information evening showed that there is considerable interest among locals and visitors in the ongoing management of the reserves so that their quality is maintained and improved wherever possible. There was also a strong interest in seeing higher numbers of locals involved in the work of Landcare. Some regret was expressed that the events were not used to the extent they could have been to attract more local participation in Landcare's activities and in botanical surveying in the reserves.

### Feedback from AABR

The fact that the work days were on week days rather than a weekend is likely to explain some of the low attendance by Broken Hill locals at the working bees in the reserves. However, Landcare and the Barrier Field Naturalists report that there are currently only relatively

small numbers of local people actively interested in undertaking botanical surveys and on-ground works compared to Broken Hill residents in previous decades. This may be partly due to a sense that the reserves do not need ongoing maintenance or a sense of disengagement by local people from the reserves. The history of the reserves is no longer taught in schools and the community access policy remains focused on keeping people out of the reserves rather than being based on regulated and limited positive access.



Photo 5. Barkantji sculptor Badger Bates with the Albert Morris Award Trophy commissioned for the Broken Hill project. Photo: Tein McDonald



Photo 6. Martin Driver presenting the Award to Broken Hill Mayor Darrlea Turley, representing the people of Broken Hill and all the organisations responsible for the Broken Hill Regeneration Reserves Project. Photo: Louise Brodie

The recent visit demonstrated that there is substantial potential for locals to become engaged in plant surveying and detailed bush regeneration work in the reserves. In the past Broken Hill has boasted many people with strong botanical skills, yet there is little encouragement of botany in the reserves today. This places excessive pressure on a small number of older botanists and places many of the reserves in a more fragile position as knowledge of both native species and weeds is essential for appropriate management. In terms of weed control, our view is that there does appear to be potential for bush regeneration work similar to that carried out in other parts of NSW in some areas. This is not to replace contractors but to supplement their work in some of the riparian sites, such as where multiple weeds are competing with regenerating natives. Such work – along with environmental education work such as the biocrust trials – also provides substantial positive outcomes in terms of not only improved reserve condition but improved attitudes of the public to natural areas and higher levels of appreciation, pride and environmental knowledge among more residents.

### Partners and sponsors of the Albert Morris Award

#### ALBERT MORRIS ECOLOGICAL RESTORATION AWARD PARTNERS



#### COLLABORATING ORGANISATIONS

**Broken Hill Art Exchange**

**Barrier Field Naturalists' Club Inc.**

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AABR is willing to assist locals with future ecotourism involving the visitors attending working bees in The Regen. However, this would require at least a few more locals to be involved in the botanical surveys and on-ground works so that the visitors are assisting the locals rather than replacing them. Ways to increase this interest include utilising the momentum from the August visit to run *occasional* working bees in the Reserve. We suggest any such work be deliberately

planned for community engagement and be held on a weekend – after consultation with Landcare, bushwalkers and Barrier Field Naturalists with publicity through the service groups.

AABR will follow up with Council the potential to share the tour booklet and additional information with the Desert Archive and the Broken Hill Tourist Information Centre. The Albert Morris documentary will be an important ongoing project.

## Plant life of the West Darling (1975) Book Review

PAUL ADAM

Compiled from the writings of Albert Morris by the Barrier Field Naturalists Club 2nd edition  
ISBN 0 9598430 0 0

The arid and semi-arid zones of Australia occupy much of the continental landmass. The rangelands within the zone are capable of supporting valuable agricultural enterprises, but only if properties are large and the human population is small. Large population centres could not be sustained by local agriculture and only developed when other resources, principally minerals, were discovered and exploited. Scattered across the zones are the relics of numerous mines which after brief booms were abandoned when the resources were either exhausted or became uneconomic to exploit. A notable exception is Broken Hill in western New South Wales, where one of the richest mineral deposits in the world has been mined continuously for well over 100 years. Currently only two mines are operational but the output still contributes substantially to the economic prosperity of the state.

Broken Hill grew rapidly and soon had the trappings of prosperity in the form of imposing buildings of late Victorian municipal architecture, including the Courthouse, Town Hall and Police station and Post Office – buildings which contributed to the heritage listing of the city. Despite the prosperity, life in the city was not easy – work in the mines was dangerous, as shown by the Miners' Memorial which commemorates the lives of all those killed in accidents and the climate was harsh. The Common around the city soon became a barren waste, devoid of vegetation as a result of overgrazing and felling of trees for firewood. In consequence, windblown sand was a major problem, requiring regular removal to keep open access to houses.

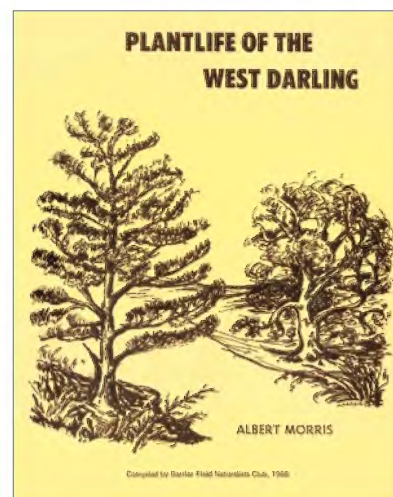
The city was fortunate in that amongst the population were Albert Morris and his wife Margaret, dedicated botanists and natural historians. For many years they had

been documenting the flora of the surrounding area and Albert had been presenting lectures, illustrated with lantern slides hand-painted by Margaret. (The original photographs were taken by Albert, using a small folding Kodak camera.

He developed the film himself and transferred the images to glass slides). The substantial collection of glass slides has been preserved for posterity in the Charles Rasp Collection in the Broken Hill City Library. In 1920, with local GP, Dr MacGillivray, Albert founded the Barrier Field Naturalists Club (BFNC), named after the Barrier Range. The Club is still active and was one of the groups who organised the celebration to mark the 80th anniversary of the regeneration project commenced by Albert

Albert had experimented with growing native and other arid adapted species in his garden and had long advocated revegetation of the Common. Albert was able to commence the project but tragically died long before completion, but he had seen the first stages.

In 1966 the BFNC published 'Plantlife of the West Darling' compiled from the writings of Albert Morris. The revised second edition was published in 1975.





View over the Mundi Mundi Plains, North of Broken Hill. Photo: Paul Adam

This book is a classic work on arid zone botany and ecology, and a memorial to a remarkable pioneer. The Foreword is by Sir Maurice Mawby, then the Chairman of CRA (Conzinc Riotinto of Australia) and a leading figure in the mining industry. Sir Maurice had been born in Broken Hill, and was familiar with the BFNC and its work, and as the Mill Superintendent in the mid 1930s was instrumental in seeking Albert's advice as to how the sand drift issue could be addressed. He points out that Albert's work had considerable influence on the mining industry worldwide. Margaret Morris provided a concise but informative biographical sketch of her husband. The first of Albert's writings is an account of 'The Flora between the River Darling and Broken Hill' which was written at the request of the Mine Managers' Association for the use of those scientists attending the 1923 Pan Pacific Congress who visited Broken Hill. This demonstrates that his skills and knowledge were already recognised by the mine managers and that he was able to write for his botanical peers. Another chapter is 'Notes on the Flora of Cockburn District' which was written at the request of J M Black, the author of the 'Flora of South Australia', as access to the area was easier for Morris than it would have been for Black. Black clearly had sufficient respect for Morris's botanical skills to rely on his information in compiling his Flora. Other chapters deal with the flora of the Mt Robe district and the area between Broken Hill and Mootwingee.

The chapter of most interest to restoration ecologists is "Broken Hill fight Sand-drift," written for the popular magazine 'Walkabout'. (An abridged version of this article appears in this issue). This provides an overview of the sand drift problem and its solution. Particularly interesting in the light of modern concerns is the discussion of what would now be called provenance, and the reasoning behind reliance on the in-situ propagule bank. Given that the regeneration area had been barren for a number of decades the success of natural regeneration once disturbance was excluded was remarkable.

There is a chapter on growing native plants from seed – information and techniques which would now be commonplace, but at the time, before much attention was given to native plants, would have been innovative.

Albert Morris was much involved with what would now be called outreach, giving many lectures and writing articles for the local media. A number of these are reproduced in the book, and provide a demonstration of his range of interests and of the education style of the time.

In terms of his thinking about the restoration of degraded land and his practical dedication to achieving a successful outcome, Albert Morris was well ahead of his time. The establishment of the Regen was a first in Australia. Albert kept up with work overseas, and had undertaken seed exchanges with several overseas



Sturts Desert Pea (*Swainsona formosa*). Photo: Paul Adam



View of Broken Hill from the Line of Lode. As well as the surrounding Regen areas, the environment of the City has been enhanced by extensive street plantings. The prominent building with the covered veranda is the Palace Hotel, venue for the Awards dinner. Photo: Paul Adam.



workers, but his ideas about regeneration using natural processes of recruitment and establishment were very much his own. The 1930s were the dustbowl period in the USA and as part of the New Deal substantial resources were employed on soil conservation measures and revegetation. However, programs in the USA were not influenced by Morris's work, but the Broken Hill regeneration and major projects in the USA started at roughly the same time - possibly a case of necessity being the mother of invention, leading to a convergence of ideas. In Australia the Broken Hill approach was followed at other arid zone mine sites, but it is much more recently that the importance of Broken Hill as an exemplar of best regeneration practice has been recognised by ecologists and environmentalists.

A review of a book last published more than 40 years ago would seem to be of academic interest only, but the Barrier Field Naturalists Club still has some copies available.

Copies can be ordered from BFNC at: bfnbrokenhill@gmail.com for \$20 including postage anywhere in Australia (as of early 2018). Please contact BFNC for details of payment.

The book is soft cover and has been reproduced from a type written master, with line drawings and black and white photographs. Some of the taxonomic nomenclature is outdated, but it is easy enough to update species names.

## Broken Hill Fights Sand Drift

### Extract from *Plant life of the West Darling*

BY ALBERT MORRIS

This article was abridged by James Bourne, Secretary of the Barrier Field Naturalists Club from the article which originally appeared in 'Walkabout' in November 1938, and was reproduced in *Plantlife of the West Darling*. Omissions from the original printed versions are indicated by [...]. Plant names in the originals were not in italics or underlined, and that convention is followed here. Nomenclature is as in the original.

"Erosion - wind erosion - is what we will have to fight if we are to put our new Broken Hill works where they should go; the position is open to the south and west winds, which pile the sand over every fence and low building in the area. How can the new works be protected?"

That was the question facing the management of the Zinc Corporation in 1936. The outlook was not encouraging, as the country stretched for miles without the vestige of anything green, and each stone or old tin can had a streamer of sand tailing out from it. The fences were piled high with sand, inside and out, and it looked as if the intended railway lines would just be buried every dusty day, which was every windy day.

One could put up iron fences, but in wind-swept areas they would only form sandhills and need endless labour to keep them clear. If only there were trees to break the wind! Could we plant anything that would grow on that wind-swept area?

At this stage, Mr Mawby, the Mill Superintendent, remembering my love for botany and interest in plants,

asked me two questions: "Can we grow anything, and do you think it will help?" My reply was: "It will not only help, but it will wholly remove the problem. There are a great number of trees and shrubs you can grow, and the grasses and sub-shrubby plants will come back after the first rain, providing you fence a fairly large area with stock- and rabbit-proof fencing, and give some help for the first few years."

This perhaps sounded too good to be true, but, after seeing the results of some of my experiments in previous years, the Manager, Mr. A. J. Keast, was convinced that it was worth a trial. The management of the Zinc Corporation deserves great credit for being enterprising enough to try and find a cure for this great problem, and, when they were ready to spend money to give it a trial, I offered my fullest cooperation, although my position as an officer of another mine limited the help to my spare time.

My studies over many years have been mostly directed toward desert and semi-desert plant forms, both Australian and from other arid parts of the globe, and I am quite convinced that Australia has all the plants she needs to regenerate her dry places. It is necessary to select plants according to similar rainfalls and temperatures, soils and the like, and to take for purposes only seeds from plants growing under arid conditions, in types of plants having a wide range. The propagation of native vegetation has many peculiarities, and, while studying such a wide field, the best methods for the propagation have not been overlooked.

The meeting to discuss things was held in May, 1936, with the result that a nursery was constructed, fencing around the mine was begun, and No. 1 plantation of about 22 acres was placed on the south-west side of the new works. The fencing consisted of iron fences on two sides and the balance was rabbit-proof, one-and-a-half-inch mesh netting, fitted to iron rail posts and barbed wire topping. With a tank placed on the rise marking the highest point, the contours enabled the whole area to be watered by gravitation.

Seeds of trees and shrubs were collected for spring planting, and old man saltbush grown. To save time and to help in getting a good start, about 1,600 young gum-trees were brought in from the edge of the reservoir. The roots and tops were pruned, and they were then planted in kerosene tins in the nursery. When the warmer days of spring arrived, the trees planted in the kerosene tins put out tiny red shoots from the dry looking sticks. About 95% of them grew.

Early in October, 1936, the first planting in No. 1 plantation – now called “The Albert Morris Park” – was begun, and about one thousand old man saltbush (*Atriplex nummularium*) were planted about three feet apart. These were for wind protection and to hold any sand drift which might occur. By this time the paddock was showing effects of keeping stock off and grasses were showing in all directions. Nine kinds were observed during the first few months, but the principal one was Spear Grass (*Stipa scabra*). Sida of several kinds and other native plants were plentiful, and the inside of the paddock was quite green, in striking contrast to the surrounding areas.

This demonstrated so clearly what could be done that Mr. Keast listened to the dream of my life. “If only we could get an area a mile wide fenced around the town to keep stock and rabbits off, to allow for natural vegetation to come back, we could stop sand drift.”

I had been preaching this for fifteen years, but folk usually smiled. Of course, it would be costly, but it costs the individuals who live on the outskirts of Broken Hill a considerable sum to keep their homes habitable. Most of them get half buried and then abandon their homes or move them away. They can do very little else, as sand when shifted will either move back again or on to an adjoining property. It is impossible to fight it without plant protection on the common surrounding the town. We were able to obtain the willing help of the two other big mining companies, North Broken Hill and Broken Hill South, and undertook to fence, with iron posts and rabbit-proof netting, a strip half-a-mile wide and about five miles long, with lanes for roads along the south-western end of the town, work commencing almost immediately.

Meanwhile men in the plantation area were getting busy. Holes for approximately 3,000 trees were prepared and drains for water service were ploughed by camel team.



Albert Morris Park. Regeneration 18 March 1938.  
Photo: Albert Morris. Hand coloured by Margaret Morris.



Albert Morris Park May 1936 before regeneration.  
Photo: Albert Morris. Hand coloured by Margaret Morris.

On January 9, 1937, 500 saltbushes were planted outside the iron fence, in one of the regeneration paddocks, and in a few days the planting of trees in the Albert Morris Park commenced with sixty “red gums” (*Eucalyptus rostrata*), the local dry-country strain of this valuable tree. Each day saw from 60 to 90 trees planted and staked. No guards were used of any kind, thus keeping expenses as low as possible. By the beginning of February, 1,188 trees had been put in position, there being fifteen different kinds, and planting went on daily for some months. Other areas on the mine lease had been fenced and a general windbreak and beautification scheme was commenced around the mine cottages on the Zinc Corporation.

When the mine nurseries became depleted, young seedling Eucalypts, Wattles, etc, in jam tins, were removed from my nursery and planted into kerosene tins, about 500 at a time.

In front of the Manager’s residence is a flat piece of ground that is always wet with seepage from the accumulated residue dumps, and the surface is always

white with salt, a very depressing strip of land. The water taken from a tree hole showed 850 grains of salts per gallon. On this area we use chiefly species of tea tree, the main one being *Melaleuca halmaturorum*. After eighteen months these trees are doing very well, so that soon this area will be a green park instead of a slimy, salty flat. [...]

The plantation work has been done by mine labour, not by trained gardeners, but so loyal has been the effort that the losses have been negligible, very few replacements have been necessary, which also speaks well for the methods used.

It was only two years ago, last May, that the project was first mooted, and only eighteen months since the first tree was planted, but many of the trees are now 15 feet high, the general average being 10 feet. The Eucalypts appear to be the fastest in attaining height, but the best average must go to the Casuarinas, although there is only a small number of them. The old man saltbush has completely hidden the 6 foot iron fence, and if the fence were to be removed it would scarcely be missed.

With the exception of the section behind the Albert Morris Park, which has been extensively planted with saltbush, myoporum, etc, the regeneration paddocks have been left to nature, no planting having been done. They showed good growth of Spear Grass up to two feet high, and looked, from a distance, almost like a crop of grain.

There are now eight of these paddocks, and several of them are still waiting for a rain to enable vegetation to grow. The rain this year (1938) has not been sufficient to start any plants; the first six months we had 84 points of rain, made up of a number of small showers, the greatest being 25 points. In spite of the dry weather in the short time since the paddocks were fenced, quite a noticeable difference in the amount of dust and sand has been observed. In fact this is been so evident that residents of South Broken Hill twice asked for the registration area to be extended.



**Early stages of the Regeneration.** A very sharp contrast between the outside of the fence, still exposed to grazing and other disturbances and the vigorous regrowth inside the protection of the fence. Photo: Albert Morris. Hand coloured by Margaret Morris

One portion was done by the three big mining companies and now the New South Wales Government is supplying the money to do a new paddock, south-east of South Broken Hill. When this paddock is enclosed there will be a strip more than half-way round Broken Hill, all fence by the three mining companies with the exception of this latest paddock.

Native seeds will be freely scattered in some paddocks, while others will be left to Nature alone, and these methods will supply valuable information in the campaign against sand. Bare patches on some of the worst abraded areas, whether topsoil has been blown away, would be better if ploughed into furrows to hold drift sand and seeds. Little has been done and it is quite successful. It has been proven in many places. The foreigners also hold the water and prevent run-off. Even without much rain, it is surprising how many plants have come up and doing well.

Mulgas and Cassias over a foot high and a few "Dead Finish" (*Acacia tetragonophylla*) have come back between rock cracks apparently from nearly-dead stumps that have had no chance to grow for over 40 years. [...]

The plants will be watered till well-established and then the natural rainfall will be all that is required.

This is the principle we have worked on, and that is one good reason why local native plants must be the best for the work. The main introductions are plants from other areas of Australia with a ten inch rainfall. Some plants from Arizona and other somewhat dry parts of America do fairly well, but we find they always need water over and above the rainfall. Some South African plants also do well, but need favourite spots. Our cold winters restrict the number of kinds we can use; for instance, trees from the western Queensland border, only 200 miles north of us, often die with frost in the winter, although they seem all right in the summer time.

We are using about 18 kinds of Eucalypts and 13 Wattles, with quite a number of other types, so that we have sufficient variety to prevent monotony. Although the saltbush and *Eucalyptus rostrata* are grey in colour, *Myoporum* and many of the wattles are green. Some of the Eucalypts, such as *Salmon Gum* (*E. salmonophloia*), *Bimble Box* (*E. populifolia*) and *E. flocktoniae* and *E. dundasii* are quite green. We therefore get many shades of foliage, which makes a contrast.

[...]

The whole scheme is a marvellous example of what has been made possible by the co-operation of the three Broken Hill mining companies and their generous financial assistance. As the years roll by we feel sure that it may point the way to others to improve their lot. What Broken Hill can do, others can also do.

*This article was written for the "Walkabout", and published in November 1938. Albert Morris did not see this in print, he being dangerously ill at the time it appeared.*

(Extracted from "*Plantlife of the West Darling*" by Albert Morris, compiled by the Barrier Field Naturalists' Club, Broken Hill, 2nd Edition, 1975, pages 43-51.)

# Norfolk Island Flora Week



28 September to 05 October 2018 from Sydney  
29 September to 06 October 2018 from Brisbane

During one incredible week explore the unique plants and forests of remote Norfolk Island with the island's foremost flora authorities



## Your Presenters and Guides

**Dr Kevin Mills** is a botanist and vegetation ecologist based in southern NSW. He is the author of a series 'The Flora of Norfolk Island', 'The Vegetation of Phillip Island, Norfolk Island Group', 'Allan Cunningham: Journal of a Botanist on Norfolk Island in 1830' and other papers on the plants of Norfolk and Phillip Islands. His research includes rainforests and island ecology, coastal vegetation, threatened plants and weeds. He has been involved in the management of National Parks in south-eastern NSW for more than 30 years.

**Margaret Christian** is an experienced local Norfolk Island flora expert and President of the Norfolk Island Flora and Fauna Society. During her 20 years with the Norfolk Island National Park she managed and propagated 50 endemic species of critically endangered flora and fauna. Margaret had significant input into Vol. 49 of the Flora of Australia Series (NI & Lord Howe). Author of 'The Birds of Norfolk Island' for the past 15 years she has run an eco-tourism business on Norfolk Island.



## Lectures and Tours

### The History and flora of Norfolk and Phillip Island's

The flora of the Norfolk Island Group is unique, many of the species and the combination of species is found nowhere else. So how did these plants get to these remote islands? Are they still arriving and what changes have occurred since European settlement? These lectures will look at the issue of plant dispersal and colonisation as it applies to Norfolk Island and what makes this flora unique.

### Native or Exotic, How Can we Know

Norfolk Island has about 181 native species and over twice this number of species have become naturalised (growing wild) having been introduced from other parts of the world since 1788. It is sometimes difficult to decide whether a species is native or naturalised. This talk will look at the introduced flora, its status and its implications for the island, such as managing the rainforest.

### Rainforest, National Park, Reserve, Private Property and Forestry Walks

**Botanic Gardens Walk:** The 5 ha. of the Botanic Garden show-case most of the island's plants, some that are hard to find elsewhere, a great introduction to the flora of Norfolk. **Rainforest Walk in upper National Park:** Some of the best rainforest is along the upper ridges in the National Park. An easy on-track walk, with plenty of time to look at plants along the way. **Rainforest Walk in lower National Park:** The Palm Glen track passes through some fine palm forest, with good views across the island, while the walk up to the top ridge is on-track. Weed control program also on display. **One Hundred Acre Reserve Walk:** This low altitude, coastal forest on the SW corner of the island is very different to the moist forest in the National Park. Also a great place to see seabirds. **Bird Rock area Walk:** This track from Red Road car park to Bird Rock is steep in parts but most people should be able to manage it. From the top ridge, the track is a loop walk. **Private property Forest Regeneration:** An inspiring insight into a local property owners work to restore native habitat on their property. **Duncombe Bay area walk:** This area on the NW corner of the Island overlooks the landing place of Captain Cook. **Forestry area walk:** An insider's view to the Island's own Forestry management efforts and challenges.

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Joyce Judd at [joyce@travelcentre.nf](mailto:joyce@travelcentre.nf) or call 1800 1400 66. [www.norfolkislandtravelcentre.com](http://www.norfolkislandtravelcentre.com)

# Norfolk Island Flora Week



28 September to 05 October 2018 from Sydney  
29 September to 06 October 2018 from Brisbane

Norfolk Island is a tiny speck of volcanic rock in the vast western Pacific Ocean; Australia, the closest continent, is over 1,500 kilometres to the west. The closest lands are New Caledonia and New Zealand, both about 750 kilometres away. For some 2.5 million years, Norfolk Island has existed above the waves, its extent waxing and waning as sea levels rose and fell. Over this geologically short history, a unique ecosystem containing unique plants and animals has evolved.

Whether by wing, wind or wave, plants found their way to Norfolk Island. Very slowly, a green mantle of vegetation began to spread across the new land, culminating in the dense subtropical rainforest that grows on the island today. The native plants on the island are a reflection of the floras of the closest lands; the result is that the rainforest is composed of subtropical and temperate species from lands to the west, north and south. Palms grow along side tree ferns and plants related to those in New Zealand are found in association with species shared with New Caledonia.

The rainforest on Norfolk Island is unique; neither the endemic species nor the combination of plant and animal species found on Norfolk occur anywhere else in the world. The isolation of the island in the middle of a large ocean, the subtropical latitude and the geographic location between Australia, New Zealand and the tropical islands to the north, were paramount in determining the character of the rainforest that was to evolve on Norfolk Island and that we see today. Like many islands, endemism is high, endemic plants accounting for about 24 percent of the total indigenous flora.

This trip to Norfolk Island will explore the plants and forests of the island with the foremost authority on the flora of this remote island. Daily walks in the forest will be complemented with lectures on the flora, with particular reference to its origins and conservation.

With Dr Kevin Mills Botanist & Vegetation Ecologist,  
local Norfolk Island flora expert Margaret Christian &  
Derek Ball, CEO Wildmob Wilderness Conservation & Chair of Island Arks Australia

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**Holiday Package price includes:** • Return economy class 'seat plus bag' airfare to Norfolk Island • Meet & Greet at the Norfolk Island airport • Seven night's accommodation • Seven day's car hire (petrol additional and payable direct) • Half Day Island Tour • Welcome Dinner • Farewell Dinner • Botanic Garden Walk • Rainforest Walk in lower National Park • Sunset at Puppy's point with Kevin Mills & Marg Christian • Rainforest Walk in Upper National Park • Evening Lecture " The History and flora of Phillip Island" • Evening Lecture " Native or Exotic, how can we know" • One Hundred Acres Reserve walk • Duncombe Bay area walk • Forestry Area plantation walk • Bird rock area walk + Norfolk Island Travel Centre bonuses



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# Reconsidering seed predation paradigms in arid Australia

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## Introduction

Australia is a world leader in mammal extinction, with around 30 species of mammals becoming extinct and many more suffering severe range and population declines in the last 200 years. Mammal decline and extinction has been particularly pronounced in arid and semi-arid Australia, where many digging species such as bettongs (*Bettongia* spp.), bilbies (*Macrotis* spp.) and bandicoots (Family: Peramelidae) have been lost primarily to fox and cat predation (Woinarski *et al.* 2015).

The loss of mammals such as bettongs, bilbies, bandicoots and native rodents has also meant the loss of the ecosystem services which they performed. Indeed, many of these species were lost before we understood the role they played in the ecosystem (Gordon *et al.* 2017).

There are now several programs which have successfully reintroduced rare mammal species into feral-free fenced reserves (e.g. Australian Wildlife Conservancy, Arid Recovery Reserve). Such reintroduction programs provide an opportunity to understand how rare native mammals interact with and shape their environment. As a result, bettongs and bilbies are recognised as “ecosystem engineers” as their foraging and burrowing activities create microsites with increased water filtration rates, improved leaf litter capture and decomposition, higher nutrients and greater seedling germination (James & Eldridge 2007, Valentine *et al.* 2017). However, their role as consumers, whether herbivores, insectivores or omnivores, has largely been overlooked.

Here I will synthesise and discuss the implications of recent work on the role of native mammals as seed predators in arid and semi-arid Australia.

## Seed predation paradigms in arid Australia

Since Morton (1985), the established paradigm for seed predation in arid Australia has been that ants are the primary seed predators while mammals are unimportant seed predators. Morton (1985) notes that his study areas represented depauperate mammal communities, and therefore may not have been a true representation of the role of Australian desert mammals in seed predation. Recently, colleagues and I have tested these paradigms in areas which have thriving populations of rare

mammals including hopping mice (*Notomys* spp.) and bettongs. These species are known to consume seeds as a component of their diet but are not recognised as significant seed predators.

I used a foraging tray experiment to compare seed predation by mammals and ants at two fenced reserves: Scotia Wildlife Sanctuary in semi-arid NSW and Arid Recovery Reserve in arid South Australia. Foraging trays contained seeds from either *Dodonaea viscosa* subsp. *angustissima* or *Acacia ligulata*, both shrub species which occur within the reserves. By comparing seed predation rates inside (where mammals were common) and outside (where mammals were rare) fenced reserves and applying treatments to the trays which selectively excluded ants and mammals, I was able to quantify the relative contribution to seed predation by each taxa (Mills *et al.* 2017).

I found that inside reserves where mammals were common, seed predation from trays which mammals could access was 2-3 times higher than where mammals did not have access or to the outside of reserves. Mammals consistently consumed significantly more seeds than ants across two survey seasons and two reserves (Mills *et al.* 2017, Mills & Letnic 2018). Camera traps and tracks around trays confirmed the culprits as bettongs and hopping mice (Figure 1).



Figure 1. Camera trap footage of burrowing bettongs (*Bettongia lesueur*) at foraging tray. The frame above the tray is a procedural control designed to identify any unintended impacts of the mammal exclusion treatment on the animals (such as avoidance behaviours). Photo: Charlotte Mills

Previous work by Gordon *et al.* (2016) in the Strzelecki Desert compared seed predation in ecosystems with and without the dusky hopping-mouse (*Notomys fuscus*). Gordon *et al.* (2016) again found that hopping mice were significantly greater predators of *Dodonaea viscosa* seeds than ants.

Recent research therefore suggests that the dominance of ants in seed predation paradigms of arid Australia is a legacy of mammal extinction. We now have an opportunity to reconsider our contemporary understanding of seed predation and to realise the broader implications of underestimating the role of mammals.

### Seed dispersal

Our understanding of seed dispersal in arid Australia has been built on the paradigm that ants are the main predators and dispersers of seeds (Morton 1985). As a result, mammals have been overlooked in discussion of the adaptive benefit of dispersal syndromes. An example is myrmecochory, where seeds feature an eliasome to attract ant dispersers. Worldwide, the three main hypothesised drivers for myrmecochory are (Giladi 2006):

1. to increase dispersal distance;
2. to increase potential of finding a suitable microsite for germination and;
3. to escape mammalian seed predators.

Myrmecochory is a common strategy in Australian plants and is found in over 1500 species of plant. However, as Australian mammals are not considered significant seed predators, escape from predation is not considered a likely driver of myrmecochory (Davidson & Morton 1984).

The seeds of *Acacia ligulata*, one of the shrub species I used in my foraging tray experiments, have a known mutualism with ants and feature a prominent eliasome (Figure 2). I found that mammals are voracious consumers of *A. ligulata* seeds and will consume seeds in both winter and summer, while ants are generally more active during summer months (Mills *et al.* 2017, Mills & Letnic 2018). These results imply that our understanding of the adaptive benefit of myrmecochory in arid Australia may be an artefact of mammal decline (Mills & Letnic 2018).

### Shrub encroachment

By influencing the abundance and types of seed in the seed bank through seed predation, mammals could influence the composition and structure of vegetation communities. Recent work by Gordon *et al.* (2017) shows that mammal decline has contributed to the invasion of grasslands by dense native shrubs, a phenomenon known as shrub encroachment. Shrub encroachment has been especially pronounced in semi-arid Australia, however Gordon *e. al.* (2017) found that where there are persistent populations of dusky hopping mice, shrub density up

to 46% lower than where native mammal fauna has experienced massive declines (Figure 3). My own research in fenced reserves found that there is a significantly lower shrub density inside reserves where mammals have been reintroduced than in the surrounding outside area lacking native mammals (Mills *et al.* 2017). There is evidence that the functional extinction of mammalian seed predators has relaxed a recruitment bottleneck which once limited shrub populations. It follows that the loss of native mammals may have contributed to shrub encroachment and vegetation change that has been observed since European arrival (Gordon *et al.* 2017, Mills *et al.* 2017).



Figure 2. Seeds from *Acacia ligulata* in a foraging tray. Note the red and orange eliasomes. Photo: Charlotte Mills



Figure 3. Aerial photo of the Dingo Barrier Fence, taken with a drone. The left side of the photo is South Australia and the right-hand side is New South Wales. Notice the higher grass cover in South Australia and denser shrubs in NSW. There is diverse small mammal fauna in this part of South Australia, especially large populations of dusky hopping-mice (*Notomys fuscus*). Across the fence in NSW the small mammal fauna is depauperate. For more on this see Letnic *et al.* (2009) and Gordon *et al.* (2017). Photo: Charlotte Mills

## Conclusions

Successful native mammal reintroduction programs mean that we have been able to revisit long-held paradigms around seed predation. As a result, the evidence is growing that mammals were once significant seed predators in arid and semi-arid Australia, and there are broad implications of mammal decline for our contemporary understanding of arid ecology and vegetation dynamics.

## Acknowledgements

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# Long term conservation in an arid *Acacia* shrubland is driven by the interaction of fire and grazing

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The long-term conservation of ecological communities in arid and semi-arid Australia is dependent upon maintaining the ecological processes that allow the persistence of component species. Many of the characteristic plant communities in arid habitats have one or a few dominant trees or shrubs that play a key role in structuring the habitats for many other

species (plants, fungi, animals). Conservation of these dominant species is a key element in the conservation of ecological communities.

A number of communities dominated by *Acacia* exist in arid and semi-arid Australia (Beadle 1981), with mulga dominated communities being the most widespread.



Many of these communities are utilised for stock grazing (sheep, cattle, goats), and may support other grazers including introduced (rabbits, camels) and native herbivores (kangaroos). At the same time, the landscapes within which they occur are subject to periodic fires, although these fires may be very infrequent in some locations. In such systems, the interactions between grazing and fire may have a strong influence over the persistence of the dominant acacias and hence, the ongoing survival and conservation of the ecological communities. Adverse grazing impacts may affect the magnitude of recruitment in the acacias and other dominants (Auld *et al.* 2015), while fire may kill a proportion of mature trees and shrubs, although there may be post-fire recruitment. In combination, the key conservation issue is how will post-fire recovery of plant populations (recruitment of new plants and regrowth of existing plants) be affected by grazing pressure?

We examined an arid zone shrubland dominated by the long-lived tree, *Acacia loderi* (Fig. 1). Other structural dominants of this ecological community include *Acacia aneura*, *A. oswaldii*, *Callitris gracilis*, *C. glaucophylla*, *Casuarina pauper* and *Flindersia maculosa*. Common understorey species include *Maireana pyramidata*, *Eremophila sturtii*, and various grasses, especially *Austrostipa* spp.. There is a diverse ephemeral flora that responds to both the magnitude and seasonality of rainfall. This ecological community is found on low nutrient solonized brown and duplex soils on level to undulating plains or on calcareous red earth soils (Beadle 1981). It is found mostly in western NSW, with small occurrences in South Australia and NW Victoria.

The ecological community is largely driven by the magnitude and spatial and temporal patterning of rainfall (Fig. 2) with both the turnover of ephemeral species and the recruitment of perennials linked to rainfall events. The ecological community can be transformed to a Blackbox (*Eucalyptus largiflorens*) community if it is flooded (Fig. 2) as has happened in a few locations due to alteration of drainage and the introduction of dams and levees. Where grazing is severe enough to limit recruitment of the dominant acacias, stands of trees may become senescent over time and die out, transforming the community to a shrubland dominated by less palatable species such as Black Bluebush (*Maireana pyramidata*) (Fig. 2). Invasion by Mediterranean ephemerals may alter the species composition of the ground layer, while invasion by shrubs such as African boxthorn (*Lycium ferocissimum*) could potentially transform the community to an exotic shrubland (Fig. 2).

While it is rare for *Acacia loderi* shrublands to burn, occasionally they do after wet years that produce sufficient grass growth. We estimated from (somewhat incomplete) fire history records that some 25% of the distribution of the ecological community had experienced a fire in the last 50 years. Pickard and Norris (1994) noted that fire may kill both adults and juveniles



Figure 1. *Acacia loderi* Shrubland. Photo: A. Denham

of *Acacia loderi*. This ecological community is not associated with *Triodia* grasslands, so unlike some other *Acacia* dominated communities, such as some mulga communities, fire is a rare event and may only occur 1-2 times a century. We assessed the impacts of fire on the survival of the dominant tree *Acacia loderi*, following a number of wildfires across its range in the summer of 2012/13. In burnt sites, we found that some 69% of mature trees suffered trunk collapse (Fig. 3) during a fire, and almost all of these (98%) were killed, confirming the earlier observations of Pickard and Norris (1994). A number of plants that did not collapse were also killed by fire, giving an estimate of around 78% plant mortality due to fire. The remaining plants resprouted from branches, stem bases or rootsuckers, while the fires are also likely to have stimulated some post fire recruitment from a soil seed bank.

Prior to around 1880 (the time when rabbits and sheep were introduced to this part of Australia), we would expect that there would have been some recruitment of dominant acacias, such as *A. loderi*, after any fires that occurred, but that these species would not have been tolerant to fire at a frequency greater than around once every 50-100 years because of the slow time to maturity.

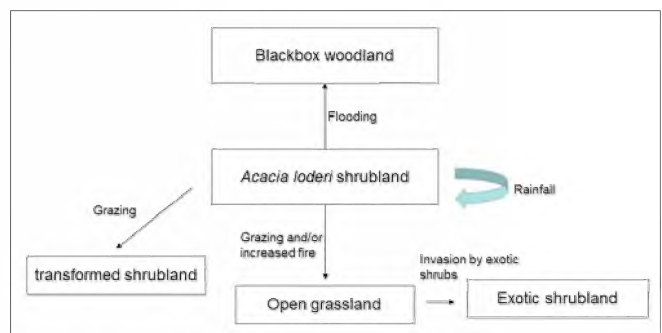


Figure 2. Model of ecosystem dynamics for *Acacia loderi* Shrubland.

The introduction of several exotic grazers into the system in the last 130-140 years has changed the relative severity of fire impacts due to the impact of grazing on post-fire recruitment. Recruitment can be eliminated by these grazers and the best evidence for at least some periodic ongoing recruitment is in National Parks where stock have been excluded and where there has been some goat and rabbit control to reduce the impacts of those herbivores. Outside the reserve system, less recruitment is evident. So now when a fire occurs, not only is there a high mortality rate of the dominant, long-lived, slow growing trees, but there is additional grazing pressure on vegetative suckers and seedlings that are the only mechanism for recovery of the acacias. This may lead to a transformation of the ecological community to a grassland/herbland (Fig 2).

### What does the future hold?

It is too early to tell what the extent of recovery will be in those parts of the range of the *Acacia loderi* shrubland that were burnt in 2012/13. Successful recovery will take decades. However, factors that are likely to promote more fires to occur could lead to a widespread decline in this ecological community. For example, any invasion by the exotic buffel grass is likely to increase fuel loads and fire frequency and hence be detrimental to the ecological community. While there is a general prediction for increased fire frequency under a changing climate (Bradstock 2010), changes to rainfall seasonality may also be important. Currently the ecological community sits in an aseasonal rainfall zone and the diversity of the ephemeral species in the community is dependent upon this aseasonality (along with persistent soil seed banks). The prediction that the northern part of the range of the ecological community may experience more summer rain (<http://climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/Climate-projections-for-your-region/Far-West-Climate-Change-Downloads>) may also result in more grass growth and an increased fire risk and this may see a decline in both the dominant acacias and the ephemeral flora.

The most urgent issue is how to best manage burnt stands for recovery after fire in environments with high grazing pressure. In NSW, the *Acacia loderi* shrublands are listed as Endangered under the *NSW Biodiversity Conservation Act 2016*. Consequently, it is timely to



Figure 3. Collapse of *Acacia loderi* tree after being burnt. Photo: A. Denham.

suggest a number of management actions both after fire and more generally to assist with the conservation of this threatened ecological community. The priority actions are:

- Assess the impact of all fires on the survival of dominant acacias and their post-fire recovery.
- Reduce grazing pressure post-fire by spelling paddocks or fencing stands of the ecological community (this may be necessary for 1-2 decades).
- Reduce adverse grazing pressure in known sites by control of rabbits and goats and spelling from livestock leading into, during and after droughts.

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# News from the Australian Seed Bank Partnership

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In this issue we provide readers with an excerpt from the Australian Seed Bank Partnership's 2016/17 Annual Report. The full report is available to download from our website ([www.seedpartnership.org.au/about/reports](http://www.seedpartnership.org.au/about/reports))

The Australian Seed Bank Partnership continues to work towards a future where Australia's native plant diversity is valued, understood and conserved for the benefit of all. As part of our ambitious program of work, we will focus on the following projects in 2017–18.

## Plants on the Precipice Program

Our Plants on the Precipice Program continues to be an area of focus for the Partnership. Climate change continues to put pressure on Australia's native species, and the alpine areas of Australia are not the only landscapes at risk of losing their endangered and endemic species. The Partnership is working with the Royal Botanic Gardens, Kew to mount an ambitious program of work that will see our seed collectors make significant new contributions to the Millennium Seed Bank as we get nearer to 2020.

## Global Trees Program

The Partnership will undertake a fourth year of collecting for the Garfield Weston Foundation's Global Trees Program with the Royal Botanic Gardens, Kew. We have 63 species remaining on our list to reach our target of 380 species for the program. Our collectors will be scouring the country to help achieve this. We will complement our tree seed collections by engaging in the Botanic Gardens Conservation International and IUCN/Species Survival Commission Global Trees Assessment to support the assessment of the world's trees by 2020.

## Threatened and endemic species

In the coming year, the Partners are heading to the Wet Tropics and Desert Uplands (Qld), Shark Bay, the Pilbara and South-West (WA), Eyre Peninsula (SA), Litchfield National Park and Howard River catchment (NT), Cunninyeuk and Grose River (NSW) and the eastern Victorian ranges and subalpine woodlands (Vic). We will continue to bank seeds from species that are known to be endangered, endemic, or of economic potential value.

## Seed supply standards

The Partnership is committed to pursuing opportunities for the Australian Network for Plant Conservation to bring together a consortium of conservation and restoration agencies to prepare national seed standards. National seed standards will provide guidance for practitioners and community groups to realign their seed collecting practices in a sustainable manner. This will reduce the pressure on natural populations and ecosystems that are being commonly targeted as seed sources. National seed standards will ensure that only high quality seed is used for restoration, improving the success of these projects and associated biodiversity outcomes. Having and applying seed standards will also improve the efficiency and cost-effectiveness of seed collection and use for restoration and research.

## Crop Wild Relatives

The Partnership is working closely with our Associate organisation, the Australian Grains Genebank, to secure resources for the collection of crop wild relative species. We are already developing training that aims to build the capacity of Indigenous land managers in northern Australia to collect and process seed from these important species.



*Gahnia subaequiglumis*. Photo: Neville Walsh, Royal Botanic Gardens Victoria



Gavin Phillips collects paper daisy seed on desert sand dunes Sturt National Park. Photo: Royal Botanic Gardens and Domain Trust

Crop wild relatives are wild plant species that are genetically related to common crop species. While humans have domesticated some 7000 species of plants over the last 10,000 years, only 12 of these account for 80 per cent of the foods we regularly consume.

Over the next year, the Partnership will explore opportunities with the Millennium Seed Bank Partnership and Crop Diversity Trust to support our Partners and Australia's diverse land managers to identify and collect these unique species for future research and conservation. We envisage this process will improve our understanding of traditional land management practices, and contribute significantly to the conversation about access and benefit sharing of genetic materials from Australia's native seed.

### **Australian Seed Bank online – Phase 2**

Providing open access to accurate data is an ongoing commitment of the Partnership. We will continue to seek opportunities to improve the data we collect and share through the Australian Seed Bank online. Making our data available enhances opportunities for collaboration across the botanical, conservation and restoration communities. The Partnership and Atlas of Living Australia have developed an accessible online seed information resource so that seed collections data can be shared, retrieved and utilised.

The second phase of this project is still under development and the Partnership is looking at ways to improve how we present and increase the use of our data by engaging natural resource management and landcare groups, community groups, and local government staff.

# Member Profile

## Kylie Moritz

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Email: [kylie.moritz@sa.gov.au](mailto:kylie.moritz@sa.gov.au)

### What is your current position?

For the past five years I've been working as a Restoration Ecologist with Natural Resources SAMDB delivering the region's Threatened Flora Recovery Program funded through the Federal Government's National Landcare Program (NLP).

### What projects are you working on at the moment?

I'm currently winding up the last five months of this five year NLP Threatened Flora Recovery Program in the SAMDB region which has been working with 10 nationally listed species - *Acacia menzliei*, *Acacia rheticarpa*, *Acacia pinguifolia*, *Allocasuarina robusta*, *Caladenia colorata*, *Hibbertia tenuis*, *Olearia pannosa* ssp *pannosa*, *Prostanthera eurybioides*, *Pterostylis arenicola* and *Thelymitra epipactoides*. The SAMDB Threatened Flora Recovery Team also works on the recovery of an additional four nationally listed species - *Phebalium lowanense*, *Dodonaea procumbens*, *Acanthocladium dockeri* and *Dodonaea subglandulifera*.

This has been a fabulous program to lead and has involved a diversity of work including mitigating key threats, undertaking propagation and translocations, monitoring extant populations, conducting surveys and searches for new populations, research into genetics, fire response and propagation methods, and community education. The program has been made possible through partnerships with Landcare groups, the SA Seed Conservation Centre, local councils, landholders and industry.

In the next five months a few of the key things we hope to achieve will be: undertaking fire and seed burial trials with *Phebalium lowanense*; planting 1500 *Prostanthera eurybioides* grown from seed (a significant boost to the natural population); managing kangaroo grazing of threatened orchid populations; translocating 80 *Thelymitra epipactoides* to a new site; managing post ecological burn threats for the critically endangered *Hibbertia tenuis*; and surveying populations of *Acacia pinguifolia*.

We've been quite fortunate over the past decade to have received a steady flow of funding to do threatened flora recovery works and are in the process of tendering for the current round of NLP2 funding to keep growing this project - fingers crossed we are successful.



Kylie bushwalking on Kangaroo Island. Photo: Kylie Moritz

### How did you end up working in plant conservation?

The Merri Creek Management Committee (MCMC), based in Darebin Melbourne, gave me my first real taste of plant conservation work, after working with agricultural integrated pest management for years. This was a great grounding for learning conservation skills and getting my hands dirty.

Then in 1998 I got my dream job as a Bush Management Advisor on Kangaroo Island. Kangaroo Island is a truly special place with high endemism and no shortage of threatened flora species. On the island we started a multi-species threatened flora recovery program and engaged a guy called David Taylor to write the recovery plan. Dave became an incredible ecological asset to the Island, going on to do highly valuable flora recovery works, but that's another story!

After 5 years on the Island I moved to the Riverland of SA and initiated a similar multi-species threatened flora recovery program in the SAMDB region. Shortly after we received funding for this work, I left the project to start a family but didn't leave threatened flora work behind. With a three month old in tow, I prepared recovery plans for three nationally listed species and later assisted the preparation of a nomination for the now nationally listed Kangaroo Island narrow-leaved mallee (*Eucalyptus cnerifolia*) woodland community.

In 2006 we moved to the Adelaide hills for the kids to start school. With knowledge that the threatened flora project which I had initiated was still going, I became a “squeaky wheel” at SAMDB Natural Resources Management Board until they finally gave me a job, which included working on the threatened flora project!

### **Why do you think the ANPC network is important and what do you see as our priorities?**

In 2014 I attended the ANPC conference in Hobart and was really inspired by the calibre of the presenters and the discussions that were going on around me. I felt it was very thought provoking and really pushed the status quo. For me this is critical, that people in this industry, people with a passion and interests in conservation come together to share their ideas and knowledge, to challenge and question the way that we do things and look for better ways to move forward. I think the ANPC can provide the ideal vehicle for this through its membership network.

As a new committee member and a relatively new member, I think it is really important for the ANPC to raise its profile as an advocate for flora conservation and to look for ways to keep being relevant.

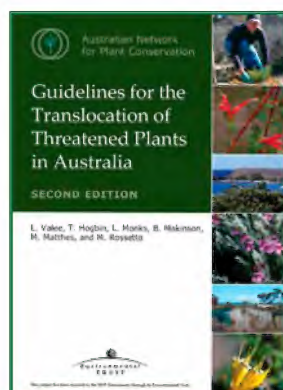
### **What is your favourite plant and why?**

*Themeda triandra*, kangaroo grass. No it's not a rare one, but I'm really taken by the form and the colour of the seed heads and the beauty of a stand of *Themeda* dancing in a breeze. Growing up in country Victoria on the River Murray, the majestic red gums also have a very special place in my heart.

### **What other projects are you working on?**

One of the other projects that I'm involved with is a restoration project in partnership with a not-for-profit organisation BioR. BioR has a Memorandum of Understanding to work collaboratively with Natural Resources SAMDB to undertake restoration works on Frahn's Farm, a 550 ha property on crown land in the eastern Mount Lofty Ranges. The property has considerable value for grassy woodland restoration and provides habitat for threatened flora and declining woodland birds.

This work is really exciting and includes opportunities for recovery works with four nationally listed plants and a range of state and regionally listed species. This is a community driven and funded project, with an annual community planting event, bird banding activities and biological survey program aimed at gaining baseline knowledge of the property. The project connects people to place, conservation and nature.



## **Guidelines for the Translocation of Threatened Plants in Australia**

The deliberate transfer of plants or regenerative plant material from one place to another (eg re-introduction, introduction, re-stocking).

**Second Edition 2004 | L. Vallee, T. Hogbin, L. Monks, B. Makinson, M. Matthes and M. Rossetto  
Australian Network for Plant Conservation, Canberra.**

For more information and to order, go to <http://www.anpc.asn.au/translocation>

## Saving the threatened Audas Spider-orchid (*Caladenia audasii*) from extinction

*Caladenia audasii* has fewer than eight plants remaining in the wild. Three of these plants (two of which were discovered in 2016) fall within the Grampians National Park and associated reserves. This population urgently needs supplementing to remain viable into the future. In partnership with the Royal Botanic Gardens Victoria, Friends of Grampians Gariwerd, and the Australasian Native Orchid Society (Victoria Group), the ANPC has received funding from the Victorian Department of Environment, Land, Water and Planning through its Biodiversity On-ground Action grants, to undertake fencing (to protect the plants from grazing by native and introduced herbivores), identify the pollinator for this orchid, undertake field surveys, collect seed, propagate seedlings and re-introduce approximately 200 plants into the wild over the next two years.

[http://anpc.asn.au/audas\\_spider-orchid](http://anpc.asn.au/audas_spider-orchid)



*Caladenia audasii* growing in the wild. Photo: Julie Whitfield

## Biodiversity Node of the NSW Adaptation Research Hub receives awards

One of the projects funded by the Biodiversity Node enabled Nola Hancock from Macquarie University to workshop the Climate-ready Revegetation Guide (hosted by the ANPC) throughout NSW last year. The workshops were highly successful with very positive feedback. Hosted by Macquarie University and established in 2013 (in collaboration with the NSW Office of Environment and Heritage), the Biodiversity Node focuses on increasing knowledge of the capacity of species, ecosystems and landscapes to adapt to current and future climate variability, identify refuges where species can survive extreme events, and explore ways to make integrated decisions for local land use plans that optimise biodiversity outcomes. Congratulations to the Biodiversity Node for recently receiving the following awards:

- Winner of the 2017 BHERT National Award for Outstanding Collaboration for National (Non-Economic) Benefit
- Highly Commended in the 2017 MQ Research Excellence awards in the *Five Future-Shaping Research Priorities – Secure Planet* category
- Winner of the 2017 Macquarie University Faculty of Science and Engineering Award for Excellence in Research

[http://anpc.asn.au/resources/climate\\_ready\\_revegetation](http://anpc.asn.au/resources/climate_ready_revegetation)

<https://www.mq.edu.au/study/find-a-course/environment/marine-biology/expandable-content/nsw-adaptation-research-hub>

<https://www.bhert.com/award-winners-2017/collaboration-for-national-benefit>



Nola Hancock delivering a Climate-ready Revegetation Guide workshop in Albury in 2017. Photo: Martin Driver

## Second edition of the National Standards for the Practice of Ecological Restoration launched in Canberra

Minister Anne Ruston, representing the Prime Minister of Australia, Mr Malcolm Turnbull, launched the 2nd Edition of the National Standards for the Practice of Ecological Restoration at Parliament House Canberra on 30 November 2017. Senator Ruston said “Never before in the history of this great continent has the restoration of our degraded lands been so urgent and the need so great as it is now. These Standards matter to everyone. From our multi-billion dollar mining sector to the billion dollar investments by government in caring for our rivers, lands and seas to community groups who volunteer millions of hours each year to restore bushland, coastal areas and wetlands across Australia”. Produced by the Standards Working Group of the Society for Ecological Restoration Australasia (SERA), with contributions from ANPC members and staff, these ground breaking Standards provide a critical resource for protecting and enhancing Australia’s natural environment. A key part of the standards is a simple tool whereby all restoration can be gauged on a five star rating system. Known as the ‘Recovery Wheel’ this tool presents a potent visualisation of just how well a restoration project is progressing towards completion and attaining the highest standard of 5-star. SERA Chair Professor Kingsley Dixon also announced the launch of a phone App for the Recovery Wheel tool. Download the Second Edition of the Standards here <http://www.seraaustralasia.com/standards/National%20Restoration%20Standards%202nd%20Edition.pdf>



Senator Anne Ruston (Assistant Minister for Agriculture and Water Resources) launching the 2nd edition of the National Standards for the Practice of Ecological Restoration.  
Photo: Jo Lynch

## Research to support Myrtle Rust management

Myrtle Rust (*Puccinia psidii*) is a serious pathogen that impacts plants in the Myrtaceae family which includes eucalypts, bottlebrushes and paperbarks to name just a few. The National Environmental Science Program and the Plant Biosecurity Cooperative Research Centre are co-funding a project led by Mr Bob Makinson – the National Review and Proposed Action Plan for Myrtle Rust. The project is delivering a comprehensive review of Myrtle Rust distribution and biology in Australia that will outline the currently known impacts on native species and ecological communities. It will identify knowledge and management gaps, primarily focussing on native biodiversity but with consideration for the potential impacts on production systems, genetic resources, social amenity and cultural values. The review will help to guide the development of a draft National Myrtle Rust Action Plan that presents options and recommendations for practical actions to secure seed and plant tissue from highly threatened species, monitoring activity implementation, research needs, and long-range actions to minimise species decline or extinction. A recent article in the Saturday Paper highlights the threat that Myrtle Rust poses to our unique native plants. <https://www.thesaturdaypaper.com.au/news/environment/2017/11/25/tree-disease-threatens-australian-forests/15115284005547>

## Cuttings: Plant news from around Australia

### Call for Applications for Research Grants from the Australian Flora Foundation

The Australian Flora Foundation was established in 1981 with the aim of fostering scientific research on the biology and cultivation of Australian plants. It was thought that by encouraging research, a greater awareness of the value of the Australian flora would be developed resulting in explicit measures for their conservation and utilisation. Funds for research are raised through the membership of the Foundation, donations from various sources and the income from bequests. Grants are available for projects, which commence from December 2018. The Foundation expects to support between two and four projects at \$5,000 – \$15,000/year each in 2019 with possible extension into 2020. Typically, projects are funded up to \$10,000 per annum for two years or up to \$15,000 for one year. Preliminary applications will be accepted until 15th March 2018. <http://aff.org.au/grants/grant-criteria/>



## **Watching Macquarie Island transform after a massive intervention**

In a time of rampant biodiversity decline, it's heartening to consider that sometimes, when we set our minds to it, grand things can be achieved. For that is exactly what happened on sub-Antarctic Macquarie Island where a multi-million dollar eradication program saw the removal of rabbits, rats and mice in 2013. Dr Justine Shaw from the University of Queensland is leading a TSR Hub project seeking to learn from this experience and monitor how ecosystems respond. <http://www.nespthreatenedspecies.edu.au/news/watching-an-island-transform-monitoring-macquarie-island-after-a-massive-intervention>

## **Microclimate determines transplantation success**

One of the key outstanding issues in applied ecology is to better inform land managers and policy makers how to adapt to climate change. Many species are currently shifting their range towards the poles or towards higher elevations in mountains. Numerous other species, however, are essentially unable to move. <https://jappliedecologyblog.wordpress.com/2017/10/31/microclimate-determines-transplantation-success/>

## **Climate change threatens Australia's rock orchid, Wet Tropics could become 'critical refuge'**

A native orchid species could be wiped out due to climate change in all but the Wet Tropics of Queensland, according to new research. <http://www.abc.net.au/news/2017-10-31/climate-change-threatens-australian-rock-orchid/9103394>

## **Protecting paradise – restoring the flora and fauna of World Heritage listed Lord Howe Island**

Hank and Sue Bower describe a unique assisted regeneration project that is aiming for complete eradication of vertebrate and weed species due to the isolation of Lord Howe Island. The World Heritage status and legal framework provides for unhindered access to all terrain across the island, enabling all pest populations to be targeted thanks to a strong community engagement, effective communication and whole of island monitoring. <http://www.aabr.org.au/portfolio-items/protecting-paradise-restoring-the-flora-and-fauna-of-world-heritage-listed-lord-howe-island-hank-bower-and-sue-bower-lhi-board-aabr-forum-2016/>

## **Why Buloke woodland species are failing to regenerate**

The Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions are an Endangered Ecological Community. Cleared over much of their original range in the Mallee regions of western Victoria to open up land for livestock grazing, the largest remaining remnants now lie inside national parks, but these are highly degraded. Park managers hoped that by removing livestock the Woodlands would regenerate naturally but, so far, this has failed to happen. Dr David Duncan and colleagues at the University of Melbourne have taken on the problem. <http://www.nespthreatenedspecies.edu.au/news/the-last-stand-for-threatened-buloke-woodlands-understanding-why-threatened-woodland-species-are-fai>

## **Rare and tiny yellow orchid deprives Albanian community group of \$15m windfall**

Intransigence, bad timing and a very rare little yellow flower have combined to deprive a community group on Melbourne's west of a possible \$15 million windfall. <http://www.theage.com.au/victoria/rare-and-tiny-yellow-orchid-deprives-albanian-community-group-of-15m-windfall-20171123-gzraci.html>

## **Abseiling botanists discover rare plants growing on cliff face in Limpinwood Nature Reserve**

Botanists from the NSW National Parks and Wildlife Service are going to great heights to identify and record some of the rarest plants in the country. Some of the species are only known to exist along one escarpment within the Gondwana Rainforests of Australia World Heritage area on the New South Wales–Queensland border. <http://www.abc.net.au/news/2017-12-07/abseiling-botanists-discover-rare-plants-nsw-national-park/9235832>

## **10 regional botanic gardens you need to visit**

Australia's regional botanic gardens are 'living museums', not merely places of scenic beauty. Botanic gardens contain living scientific collections and are defined by technical guidelines that distinguish them from public parklands. Australia has about 100 regional botanic gardens and they're often run by a team effort between local councils, community groups and volunteers with a passion for plants. <http://www.australiangeographic.com.au/travel/destinations/2018/01/10-regional-botanic-gardens-you-need-to-visit>

# Conferences and Courses

## **2018 Australian Mangrove and Saltmarsh Network Conference – Sydney, 17-20 April 2018**

This event will provide a unique opportunity to hear primarily about the current trends in saltmarsh and mangrove management with a specific focus on the complex issues faced by conservation and rehabilitation efforts in urban environments. With a theme of *'mangroves and saltmarsh – the urban survivors'*, the conference will bring together coastal and estuarine wetland researchers, policy makers, academics, students, consultants, local government wetland managers, community advocates, citizen scientists and traditional owners of the lands to share the latest information and 'on ground' experiences. Being held in Sydney for the first time, the AMSN conference will provide numerous formal and informal networking opportunities with many of the current and future leaders in the field today, giving you a chance to network and form collaborative partnerships to benefit your organisation or institute into the future. The conference will also offer opportunities to visit the urban estuarine wetlands of Sydney Olympic Park and elsewhere to see first-hand the innovative and pragmatic solutions to managing these extensive wetlands in a highly urban setting. Registrations close Monday 9 April. <http://www.cvent.com/events/australian-mangrove-and-saltmarsh-network-conference-2018/event-summary-943425ae65fb4728b31f2293cb1f1dd0.aspx>

## **2018 Australasian Network for Ecology and Transportation (ANET) Conference - Creswick VIC, 30 April - 2 May 2018**

The theme for the conference is Connecting Nature, Connecting People, and we are busy creating a program that will be of immense value to delegates from government, industry, research and community groups. The program will include the latest findings in environmentally-sensitive linear infrastructure research and practice from around the world, as well as ample opportunity for networking and creating collaborations. <http://www.ecologyandtransport.com/anet-2018/>

## **6th South Australian Weeds Conference – Adelaide, 2-3 May 2018**

Registrations are now open for the 6th South Australian Weeds Conference to be held at the Waite Campus, Adelaide. The 6th South Australian Weeds Conference is a fantastic opportunity to network and catch up with old and new colleagues in the NRM sphere. Come and share in the latest knowledge and experiences on weeds and weed management, across a range of land uses from agriculture to conservation, and across a variety of regions in South Australia. Registrations are due by Monday 23 April 2018. <http://wmssa.org.au/events/>

## **Society for Conservation Biology 5th Oceania Congress – Wellington, New Zealand, 3-5 July 2018**

Hosted by the Society for Conservation Biology (SCB) and Victoria University of Wellington, the meeting will bring together the community of conservation professionals to address conservation challenges and present new findings, initiatives, methods, tools and opportunities in conservation science and practice. Scientists, students, managers, decision-makers, writers, and other conservation professionals are invited to participate in this event. Early bird registration closes 13 April. <http://wellington2018.scboceania.org/>

## 21st Australasian Weeds Conference – Manly, Sydney, 9-12 September 2018

The Weed Society of New South Wales Inc., on behalf of the Council of Australasian Weed Societies Inc., will be hosting the 21st Australasian Weeds Conference in the popular Sydney beachside suburb of Manly. This biennial conference carries on a long tradition of bringing the weed management community together to discuss new developments and share information about cutting-edge and best weed management practices. Delegates will come together to network with peers, engage with industry sponsors, and listen and participate in presentations and field trips on a variety of topics including: new technologies in weed management; biological, mechanical, and chemical weed control and research; herbicide resistance; weeds of crops and pastures; environmental weeds and Weeds of National Significance. Registrations now open.

<http://www.21awc.org.au/>

## SER Australasia Conference 2018 – Brisbane, 25-28 September 2018

The Society for Ecological Restoration Australasia (SERA) is pleased to announce the 2018 conference 'Striving for Restoration Excellence' to be held at the University of Queensland, Brisbane. If you are a scientist, practitioner, manager, policy maker, planner or someone who cares about our bush, seas and waterways you do not want to miss this conference! If you are interested in restoration planning and management or want to ensure restoration really makes a difference then this is the conference not to be missed. The proposed themes for SERA 2018 are focused around four pillars: Principles & Practice – doing it right in restoration; Biomes – rainforests, woodlands, grasslands, seagrasses and beyond; Impact – making a change; Specialist Disciplines – seed technologies, provenance, marine restoration and more. Session Proposals are now open – sessions are 90-minutes with a 15-minute introduction, followed by five 15-minute presentations that form a cohesive theme. <https://www.sera2018.org/>



  
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Photo: *Spyridium furculentum* growing at the RBGV, Melbourne. (J. Lynch)

# Research Round up

COMPILED BY KIRSTEN COWLEY

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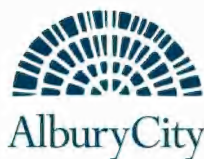
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