AABR NEWS

Australian Association of Bush Regenerators

working with natural processes

Nº 143
February
2020

AABR Walk and Talk
Thursday 26th March 2020

Privet management in the Coups Creek Corridor,Northern Sydney

Hosted by Wahroonga Waterways Landcare

Meeting point: Enter via 150 Fox Valley Road- Australasian Conference Association- lower carpark near tennis court. Parking on site available

Public transport: Train to Hornsby + Bus 589 or Train to Turramurra station then Bus 573 to Sydney Adventist Hospital

Time: 12.30 - 3.30 pm

For background information and to RSVP by 20/3/20 Register via Eventbrite https://www.eventbrite.com.au/e/privet-management-in-the-coups-creek-corridor-tickets-93179019957

What to bring: Afternoon tea, water, walking shoes, sun-safe clothing.

Wahroonga Waterways Landcare (WWL) is hosting our first walk & talk for the year at their 30ha site which forms part of the Coups Creek habitat corridor running into the Lane Cove National Park. Predominantly an E2 Environmental Conservation Zone, the site is owned by the Seventh Day Adventist Church, located between Pennant Hills Road and The Comenarra Parkway.

Advance Notice: Water Weeds Workshop for the Hunter-Central Coast regenerators

AABR will be once again hosting the ever-popular DPI hands-on **Water Weeds Workshop**, this time at the community hall at Coal Point, Lake Macquarie to service the Hunter and Central Coast region. The full day workshop will be held April-May. Numbers are capped at 40 and if you'd like to be notified when the date is confirmed please contact Suzanne at education@aabr.org.au or 0407 002 921.

AABR's Post-fire wildlife habitat recovery response

Read AABR's post fire response to the disastrous fires which have been taking place across Australia.

Communities are pulling together and mobilising to lend a hand to their fellow Australians and to wildlife. AABR is joining the mobilisation The AABR committee has been communicating directly with other partner groups and via social media to help spread the message that we need to allow sites time for an initial regeneration response before assessing what vegetation work is required.

Read our article on Page 3 and visit http://www.aabr.org.au/do/post-fire-wildlife-habitat-recovery-response/.

President's Perspective

This is the first AABR News since the 2019 -20 summer fires – many of which are still burning – and your AABR committee and other volunteers have been very busy with a range of activities.

Bushfire environmental recovery effort. You will hopefully not have missed the fact that AABR is joining the post-fire recovery mobilisation. Some of you will remember the successful post-fire weed response to the 1994 fires in Lane Cove National Park in which AABR supported the park's Friends group and NSW NPWS to set up 19 Bushcare groups around the urban edges of the park. We were blown away by the fact that the wildfire had triggered native plant regeneration even in sites that we had all assumed were beyond hope and would need to be planted 'one day'. Our focus quickly became not planting but weeding, to ensure the natives recovered securely.

Inspired by the success of this effort AABR has set up a dedicated post-fire bushfire recovery webpage where readers can learn about the options available to help people doing similar things elsewhere. I draw your attention to the article on Page 3 pulled together from a range of publications by Louise Brodie. This provides some timely information on post-fire weed removal in bushland.

Conservation and Land Management training review. Over the last few months AABR has facilitated a group that has been collaborating on ways to improve the units available to those studying CLM around Australia. If you have any concerns or ideas for improvements for practitioner restoration training please contact me on president@aabr.org.au

Review of Bush Regeneration Practitioner Accreditation. AABR has made great progress in reviewing our processes for accrediting practitioners. We have more than doubled the number of assessors on our team and are now in the process of developing and enacting induction for those new assessors. This is likely to involve one induction workshop in far north coast NSW / SE Queenland, and one workshop in the Sydney region.

AABR Vic – our Victorian branch is rapidly growing in membership. We hope to conduct an accreditation workshop in Melbourne in the first half of the year and that this will lead to Victorians having their own accreditation capacity.

regenTV continues to make new movies – all our videos are now on YouTube, where AABR now has its own regenTV channel. Thanks to all those who answered our call when we needed to reach our first 100 subscribers to claim our custom URL. Two new videos are being produced this year – one on restoration of rainforest sites and one on the Barrier Field Naturalists Club (BFN - the people who supported the first regeneration project in Australia, the Broken Hill Regeneration Reservest). BFN celebrate their centenary of continuous function this year.

Tein McDonald

President, AABR

Welcome to new AABR Members

Paul Adam
Julie Adorini
Sally Alldis
Ergys Alliu
Lachlan Anderson
Des Ayallew
Matthew Barker
Gail Barnes
Karen Barron
James Beattie
Sue Bendel
Richie Benson
John Blair
Samantha Bowden
Elliot Brooks
Jarrod Brown
Nathalie Caddis
Phil Caddis
Bronwen Campbell
David Carr
Stefanie Carusi
Raffaele Catanzariti
Katherine Clare
Mitchell Clark
Toni Clark
Andrew Clarke
Rob Corby
Maree Costigan
Beverley Cox
Alex Crowe
Isobel Cummings
Peter Cuneo
Tegan Dalman
Jackie D'Arcy
Peter Davis
John Delpratt
Andrew Douglas
Simon Dunne
Elisha Duxbury
Virginia Elliot
Ben Ellis
Reuben Elmira
Nathan Emery
Steve Field
Jane Forno
Lyn Fryer
Alexi Gilchrist
Kevin Glover
Jason Gooden
Ascelin Gordon
Brendon Grant
Matt Hall
Adam Halliday
Elise Hardiman
Ruth Hardy
Teagan Hartenthaler
Millie Hauritz
Paul Hawkins
Rafael Heale
Jeremy Hodged
Maddison Holmes
Annabel Hooghuis
Karmen Hughes
David Irving
Paul Irwin
Jojo Jackson
Jennifer Johnson
Robyn Kaczmarek
Sheila Keane
Jane Kenny
Michael Kneipp
Helen Knowles
Rob Laird
Katie Littlejohn
Patrick Lloyd
Adriana Lucas
Victoria Lugovoy
Jillian Macintyre
Bob Makinson
Theresa Malin
Annie Marlow
Karen Maxwell
Nat McDonald
Clare McElroy
Mathew Misdale
Polly Mitchell
John Moen
Charles Morris
Arian Moshefi
Richard Mullen
Lucienne Naef
Dominic Noonan
Cathy Offord
Daniella Pasqualini
Jade Paton
Gordon Patrick
Vanessa Patterson
Penny Paul
Kathleen Pearce
Susanna Pereboeff
Paul Rendell
Robbie Renu
Beth Rickwood
Thomas Roberts
Martin Roberts
Richard Rye
Hugh Sarjeant
Peter Saunderson
Andrew Scott
Geordie Scott-Walker
Reid Singleton
Belinda Smart
Daniel Smart
Eli Stead
Greg Steenbeeke
Shane Stephenson
Kerry Thompson
Alex Thomsen
William Thurston
Nita Tinok
Christian Tuckey
Damien Vella
Mark Viler
Linda Vizcaya
Gidja Lee Walker
Maree Whelan
Katy Wilkins
David Willyams
Alex Wilson
Stacy Wilson
Suzie Wright
Lilian Wycisk
Daniel Young

Businesses

Rakali Consulting Pty Ltd
Bushscapes
Diverse Bush Management
Indigenous Design Environmental Management

Agencies

Yarra City Council

Organisations

Corowa District Landcare
Victorian Indigenous Nurseries Cooperative

Congratulations on Accreditation

Christopher Bowdler
Sai Buckley
Thomas Hickman
James Hook
Ramnarayan Krishnan
Roger Lodsman
Yann Riou
Christian Tuckey

Giving bushland a chance to recover after wildfires

Louise Brodie,
Australian Association of Bush Regenerators
Email: bushfire-recovery@aabr.org.au
http://www.aabr.org.au/do/post-fire-wildlife-habitat-recovery-response

The recent bushfires throughout Australia have resulted in a variety of reactions from the community. As the immediacy of the devastating effects on communities and bushland diminish, a genuine concern has emerged for the fauna and flora of our burnt bushland.

Our reactions to fire and bushland are many. The burning of bushland has changed existing vegetation into burnt blackened sticks over very large areas. This is tragic, especially when we know wildlife has been lost in large numbers and wildlife habitat, which cannot be replaced instantly, has been affected. Our response to help the survival of fauna needs to be rapid and extensive. The first focus of the coordinated national wildlife recovery response is on supporting efforts to rescue injured wildlife and deliver food drops and water to surviving populations until their habitats recover. This will be rapidly followed by a focus on the control of feral predators and herbivores to avoid further impacts upon wildlife. The control of weeds has also been identified as an early priority to assist more rapid recovery of weed-compromised habitats for both plants and animals.

In the experience of regenerators, we can substantially improve habitat recovery rates of sites compromised by weed if we take timely, well-informed and skilled action. Fires give us a rare opportunity, perhaps the unique positive of this tragedy, to facilitate the removal of entrenched weed which is hampering the regeneration of many plants which will provide the new food source and habitat for unknown numbers of fauna such as invertebrates, reptiles, birds and mammals.

Many members of the public assume that planting is going to be needed after fire but the need for planting is likely to be rare in our fire adapted ecosystems, even after extreme fire. Instead, past experience shows that interventions to control weed are often all that is needed to reinstate processes of regeneration by a diversity of native plants that then provide habitat for fauna – and that if this is not done, pre-existing weed substantially worsens, further reducing faunal habitat.

Our job as regenerators then becomes one of assisting the natives in their competition with weeds - a competition they would not win without our help. The ultimate aim is to avoid wasting what could be an unrepeatable opportunity to support recovering natives that have been triggered to germinate from the soil seed bank by fire.

Planning for post fire restoration

It is easy to get excited about post-fire opportunities for bush regeneration work. Fire substantially reduces weed biomass, providing better access to sites to control weed regrowth. But without careful planning and thinking about what you are doing, this elated feeling will be lost some months later, as weed growth overtakes the site!

The following hints have been gained from previous experiences in post fire regeneration.

1. Allow the site to show a recovery response before undertaking any work on site

Regenerators experienced in post-fire regeneration recommend that regenerators need to be patient and allow the site time to show an initial resprouting and germination flush before commencing any works. It is necessary to visit the site regularly to start to plan your strategy and to periodically observe the regeneration response - but don't open the site up for bush regeneration workers or others too early.

This period of initial resprouting and germination will vary in duration and depends largely on season and rainfall. Every site will be different but some generalisations can be made. Resprouting can commence within days for some species while seed germination may commence within a couple of weeks after good rain. But because of the need for substantial rainfall, some sites might not start to substantially recover for several months.

This initial recovery period where we 'watch and wait' will allow native seedlings to establish without disturbance. The recovering vegetation (even if this initially includes regenerating weed) will protect the soil surface and minimise erosion, including of soil

> ***Remember:*** *Fire leaves bare soils which are prone to erosion. Weed growth might be the only thing preventing your soil with its native (and weed) seed bank ending up in the nearest creek!*


V Bear

crusts and may benefit fauna which may start to revisit the site during this period. (Fauna, particularly invertebrates and reptiles that are lower in the food chain, are likely to benefit from any cover they can find during this very early stage.)

2. But still undertake early site visits to assess the site after fire

Assessing safety issues. Although it is recommended to avoid bush regen work during the initial recovery response period, it is important to assess recently burnt sites early to check for dangers such as trees that may fall, or walkways and bridges that may be damaged. Are there bulldozer tracks that need to be closed to restrict unwanted access? Is there a need for erosion measures to stop large quantities of loose soil entering waterways? Do fences need to be repaired? Such an inspection should be undertaken by people with awareness of potential hazards (e.g. underground stumps which are still burning) and with a sensitivity to post-fire recovery. All such issues will need to be communicated up the chain for current and future planning.

Assessing impact and potential for assisting regeneration. Early inspection by knowledgeable people is also desirable to determine the fire impact and identify where restoration works may be needed or beneficial to maximise regeneration and control weed growth.

Burnt forest near Nowra NSW South Coast January 2020. Photo K Brodie

When assessing the site for work think of the following:

- Where were the weeds growing prior to the fire? Naturally these are the areas where weed growth will be the highest. Which areas are likely to have good resilience and produce regeneration of native species?
- How hot was the fire? Hot burns will result in the loss of vegetation cover and leave the soil surface prone to erosion.
- Find out the response of particular weed species to different intensities of fire, as response will be different for different species. This can influence how you will treat the site.
- Intense burns can kill some weed individuals while others will resprout from burnt bases. Fire may kill a proportion of the weed soil seed bank, while stimulating much of the remainder to germinate.
- Correct identification of seedlings of regenerating weed and native species is essential. The post fire regeneration flush will be highly diverse and we need to ensure losses of important natives do not occur, particularly uncommon or threatened species.
- Even in weed dominated areas, fire, particularly hot fire, can stimulate native seed to germinate even after storage in the soil seed bank for many decades. Past wildfires have resulted in excellent native regeneration in totally weed-dominated sites even when regenerators themselves had classified these sites as requiring planting.

Links to wildlife rescue and planting programs.

It is very heartening to see the concern by the broader community for the care of wildlife to ensure their survival as habitat recovers. There are many organisations involved in co-ordinating and providing advice on wildlife rescue, both national and local. In addition there are many organisations involved in coordinating the planting of additional habitats on previously cleared (unburnt) land. Links to both animal rescue and new habitat planting organisations are provided on the post-wildfire habitat recovery response page *on AABR's website (*http://www.aabr.org.au/do/post-fire-wildlife-habitat-recovery-response*)*

- What resources will you have? As with any bush regeneration project the amount of work which can be done depends on the resources available. And remember that there is follow up to consider, particularly for highly weed dominated sites - although the duration of the follow up phase will be lower after fire if the weed seed bank has been flushed.

3. Develop your strategy

The approach to your post-fire regeneration work will be very similar to that of a standard bush regeneration follow-up program, as the primary work has been done by the fire. This involves detailed and very careful weed removal guided by people with excellent native and weed recognition skills and a knowledge of a wide range of weed control techniques. These must be appropriate to ensure each weed species is efficiently and effectively killed while leaving the natives unaffected. Repeated follow-up treatment will be needed until the natives dominate the site and the weeds are no longer a threat to either native plant or animal habitat.

Some things to consider:

- It is essential prior to implementation that you have the appropriate permissions from the landholders and have consulted all stakeholders. Involve them in the development of the strategy and in the process of learning about post-fire bush regeneration.
- From the start, design a monitoring program that should at the very least include before, during and after 'photo-point' photography - ideally including video pans of the site – and if possible, quantitative monitoring. Observe wildlife on the site and note how they are using the regenerating bushland eg when birds are starting to nest.
- While access is restricted to the burnt site during the initial recovery response period, take the opportunity to judiciously manage the threat of weeds from adjacent

Post fire weeding Photo. D Holloman

unburnt areas (e.g. by seed head removal) to prevent these spreading into the burnt areas. Comprehensive clearing should be avoided in these areas as they are usually of low native resilience and can be useful buffers to prevent nutrient-enriched soil moving into bushland.

- Care should be taken to leave weed if you judge it is providing valuable soil stabilisation, shade to the ground, cover for fauna and/or where early flowering weed might be useful to support invertebrates. Ensure you remove these weeds before they seed and rebuild a seed bank or before they get to a size where they compete with natives for resources or their removal risks damage to natives.
- Once killed, weed debris should be retained on site to add to the process of litter accumulation and decomposition, supporting ground dwelling invertebrates including decomposers. A good rule of thumb is to think of weed removal truly as a process not of 'weeding' but of 'releasing natives' from competition from weed. This will help guide the operator as to when the native is big enough to survive in the open or when the weed is beginning to compete with the native.
- Hand pulling of weeds can result in disturbance or uprooting of adjacent native seedings or disturbing the soil so that it dries out. Consider whether careful hand removal can be carried out or whether you should minimise disturbance by applying herbicide directly to the weed by cut and paint. Sometimes weeds germinate before natives and this can offer opportunities for skilled spot spraying with spray equipment with adjustable nozzles or shields – or this can be done after 'marking' or covering the natives and employing 'dribble' techniques. (If no one in your team or group has this sort of training and experience, consider engaging someone who does.) If natural regeneration has occurred at high densities, perhaps some native seedlings can be sacrificed.
- Allow weeds that survive fire by suckering or coppicing (eg lantana, blackberry and privet) to grow up to at least knee high before treating with herbicide. Alternatively these can be allowed to grow for longer periods if needed to provide temporary habitat for fauna, as it may be many months before they fruit and present a threat to the natives.
- Some species, such as inkweed (*Phytolacca octandra*) and *Solanum* species such as blackberry nightshade, may germinate in large numbers soon after fire. Although they generally do not persist on a site for the long-term, you will need to consider if they are suppressing regeneration of native species in the short term or may build up excessive seed banks in the future.
- Fire can promote mass germination of some weeds that have long term soil seed banks. Removing these weeds can be a rare opportunity for reducing the weed seed store of these highly persistent species in one go. For example, weed species of the pea family have long soil seed storage and yet are triggered to germinate in large numbers after fire in the same way as native species such as wattles.
- Other problem weeds may be similarly 'flushed out' in this way, including bitou bush, crofton weed, African love grass, Parramatta grass and others, even though they do not have as long a seed store. If they are not treated however, these species pose a considerable threat after fire as they can produce large quantities of seed very rapidly.
- Tall herbaceous weeds can be lightly over-sprayed or side-sprayed, so that native species underneath are not affected. This will prevent the weed growth from suppressing the growth of the native plants. However once again this should be done carefully so that regenerating natives are not damaged and any temporary habitat is retained.

4. Implement your strategy.

Once the native vegetation germination flush slows down and the regrowing plants become better established, it is then time to commence work on weed removal and implement your normal bush regeneration strategy. The work program, supervision, reporting and monitoring is managed in a similar way to that conducted at any bush regeneration site.

Post-fire regeneration and your community

Concern for the bushland and fauna habitat after fire can provide the impetus to galvanise the community. It is beneficial to be able to direct this energy into worthwhile activities, and even to obtain funding to support the community input. (There may be some funding for coordinating volunteers through the 2019-20 bushfire recovery response or local government.) Sometimes people offer to go into burnt areas of bushland and replant. As regenerators we know that we need to allow the bush to regenerate naturally before any such drastic intervention is considered. Regenerators find that controlling weed and feral animals will provide more effective and far more rapid reinstatment of faunal habitat than planting. Indeed, indiscriminate planting in bushland will compromise the integrity of the area and distort the natural species mix which results after a fire. It is best to direct planting projects to areas where habitat and linkages can be created. (See box page 4)

A keen and active community is a great asset to help the bushland recover. One such example is the response to wildfire in Lane Cove National Park in Sydney in 1994, which burnt 83% of the bushland. In this case, 18 groups were formed, and an AABR person assisted each group. The fire did the primary clearing of privet and other weeds from drainage plumes and stimulated unprecedented regeneration of a high diversity of natives at the same time. The groups prevented the weed taking over again and secured new habitats for fauna. In addition, funding was made available to support the program. The story of this project was published in the journal *Ecological Management & Restoration* Vol 6 No 2 August 2005 and can be found on the AABR website http://www.aabr.org.au/_upload/MemberPublications/LaneCoveBushcareEMR.pdf

Acknowledgements: This article has been pulled together from post-fire records and contributions by a variety of people with post-fire regeneration experience including Tein McDonald, Louise Brodie, Lynn Rees, Karin Nippard, Soren Mortensen, Scott Meier, Jane Gye, and Peter Dixon.

Post fire removal of the weed of *Polygala myrtifolia* at Coal Point NSW January 2017 Photo. S Pritchard

The Deer Catastrophe in Victoria

Richard Francis, Abzeco Director
Mark Adams, Local Native Flora Director
AABR Victoria.

"Deer could potentially occupy most of our continent including parts of the arid interior. The most significant effects are likely to occur through direct impacts of herbivory, with cascading indirect effects on fauna and ecosystem processes." Naomi Davis – School of Biosciences. University of Melbourne [1].

As many of you are aware already, we have a problem with the rapidly increasing populations of deer in Victoria. There are six species of wild deer in Victoria - Sambar, Red, Hog, Fallow, Chital and Rusa. The two largest species, Sambar and Red Deer are very well suited to our Victorian climate and are having a significant effect on vegetation in our state's forests, national parks, reserves and on privately owned land ([2] Page 4).

Effect of fire in bushland on the deer population.

Fire reduces the cover for deer and allows land managers a narrow window of opportunity to control the population. The time to target deer is in the first 24 months after fire, before regrowth provides a dense layer of vegetation cover. The regrowth then provides deer with perfect cover that makes control measures quite difficult. While the bush cover is vastly reduced by fire, control of Sambar deer by firearms is a very efficient approach. Professional shooters using helicopters are by far more economical. Some deer species such as Fallow Deer may also be trapped at this time while food is scarce. While forests are denuded water sources are key area to focus deer control during the first year after a fire.

However over the last two decades deer have increased significantly after fires due to inaction to control deer by the Victorian government (and government legislation that protected deer from being hunted) during the two year window of opportunity. After a year or two post the fires, regrowth in forests provides ideal habitat for deer to breed successfully at their maximum birth rate.

Environmental Effects of Sambar Deer.

Sambar Deer in particular have a very destructive impact on our biodiversity. They create wallows in water holes, wetlands and along drainage lines (where they roll, bathe and males urinate to mark territory) that have affected the water quality in these catchments. They graze a wide range of indigenous plants from seedling stage up to about 2.5 metres high. The males rub their antlers on young trees and shrubs and frequently break the plants a metre or so from the ground. They also rub their antlers on mature trees and this can lead to the death of the tree over time (See Appendix 2). There is also the potential of deer to spread diseases and Protozoan parasites that can affect other animals (e.g. foot and mouth disease) and humans (e.g. Cryptosporidium and Giardia) ([1] Page 523). A study is currently being conducted on disease spread to stock from deer by ARI.

Population of Deer.

The population of deer in Victoria is estimated to be up to one million. This is a huge problem, especially in the case of Sambar Deer as they are extremely difficult to trap or bait. In vast areas that they occupy they are difficult to shoot as they are very aware of human scent. The Victorian Game Management Authority claim that around 100,000 over all deer species are destroyed by recreational hunters in Victoria. However the population is estimated to be growing at approximately 400,000 per year. It is estimated that removal of 40-50% of the Sambar population is required annually to prevent maximum population growth ([3] Page 1). Sambar Deer have been the most successful colonisers of all deer species in eastern Victoria occupying from the alpine areas to the coast. They are now spreading rapidly around Melbourne's outer suburban fringe, the Otway Ranges, Wilson's Promontory and along the Murray River. Both Fallow and Rusa Deer populations and distribution are also increasing.

Control Methods.

Abzeco, a company that undertakes land and wildlife management is carrying out a large Sambar deer control project in one of the outer Melbourne council areas. The method they are using to reduce numbers is targeted shooting with carcasses taken to an abattoir for processing. The ongoing management of wild deer in the region will require an integrated program that includes reducing harbour and access to water along with annual culling.

1 NE Davis, A Bennett, DM Forsyth, DMJS Bowman, EC Lefroy, SW Wood (2016) A systematic review of the impacts and management of introduced deer (family Cervidae) in Australia *Wildlife Research* 43 (6), 515-532. https://www.publish.csiro.au/wr/wr16148

2 Victorian National Parks Association (October 2018) *Framing a Deer Management Strategy for Victoria* https://vnpa.org.au/deer-invasion-gone-too-far/

3 Invasive Species Council (August 2012) Recreational hunting NSW: claims v facts https://invasives.org.au/publications/recreational-hunting-nsw-claims-v-facts/

Motion sensor camera photos of Sambar Deer in the Watsons Creek Corridor, Nillumbik Sugarloaf Link Deer Control Project.
Photos: Richard Francis, Abzeco Pty Ltd.

Dense stands of Burgan (*Kunzea ericoides*) regeneration in former pasture areas are providing ideal cover, there is ready access to farm dams and open grazing land. By fencing off farm dams and providing water troughs only filled while there is stock in the paddock, deer will have less access to water which could reduce breeding potential. Some environmental weeds e.g. *Kunzea* spp provide good cover for Deer to rest in. Removal of this vegetation can reduce breeding potential, improve visibility and the manager's ability to control deer with firearms. Fencing off some of the *Kunzea* thickets where feasible is also an option in order to reduce harbour for Deer.

Parks Victoria has done some aerial shooting from helicopters in Gippsland this year in an attempt to get the numbers down and to see if this is a cost effective method.

In the Flinders Ranges SA, bait stations are being trialled. They are trying to exclude Macropods by a foot mechanism so that only deer can access the bait station.

In New Zealand a net type trap has been invented that is manually activated by a field worker when the deer walks into the capture range.

With advances in photographic recognition technology, there is hope for some improvements to help us control deer in the future. Research work is currently being conducted on cats in this area which may be more broadly applied to other species in the future.

The Future.

We are only seeing the tip of the iceberg at the moment. The potential for deer to spread over Australia is horrendous ([1]). The recommendations in his letter to the Victorian Government ([4]) by Phil Ingamells from the Victorian National Parks Association should be implemented and taken on by the relevant agencies. We have to act now and decisively. If we are serious about saving our biodiverse ecosystems into the future we have to do everything we can to control the deer population explosion in Australia. As AABR members we have to take on new technology, invent new ways to control deer and perhaps some of us need to get licenced and skilled in the use of firearms. We must utilise whatever lobbying power we have to ensure our government makes a concerted effort to control deer and other feral animals in Australia. We have an obligation to prevent the further expansion of this extremely destructive feral animal that has so much potential to significantly impact large areas of our highly biodiverse ecosystems across the continent.

4 Victorian National Parks Association (May 2019) *Controlling deer in Victoria* https://vnpa.org.au/call-for-andrews-government-to-act-decisively-on-feral-deer/

Vale John Diamond *19.9.1947 - 31.12.2019*

Taken from Virginia Bear's words at John's Service

On behalf of AABR the Australian Association of Bush Regenerators I offer our condolences to John's family, friends and colleagues. Also on behalf of our indigenous ecosystems, particularly those of Western Sydney, who have lost a champion.

John had a deep understanding of our bushland and what was needed to bring it back to health when it was damaged. He directed his passion and determination towards making sure it happened. He was a powerful force. He was an authority who other regenerators and land managers turned to for guidance on repairing the landscape in the most effective way. He had high standards and expected a lot of others, but had a way of inspiring and encouraging people to rise to the challenge. He helped bring out the best in us.

At a time when the bush regeneration movement was establishing and needing to gain credibility and status, John's example helped build our reputation as a professional and necessary industry that could deliver results. Bush regen is taking its rightful place as part of the fabric of the Australian culture and economy. We still have a very long way to go, but we can thank John Diamond for helping us advance as far as we have. And his legacy will continue with those he inspired and taught.

John worked as a bush regenerator in Western Sydney widening his area throughout Sydney and becoming a member of AABR in 1992. John worked for a number of organisations both as a regenerator and team leader as well as a supervisor of Bushcare groups. More recently he and Georgina San Roque founded the Bush Habitat Restoration Co-operative.

From the bush regen community:
Noela Kirkwood: "the best technique of weeding with a knife of anyone I know. John was a passionate protector of the environment and we and the Bush will miss him".

Robyn Becket: "When we were both trainees for the National Trust in 1990 he had a sharp wit that entertained us.

Jane Gye: "He was so passionate about bush regeneration, and sometimes found it hard to contain his frustration when others couldn't see it the same way". **Louise Brodie** added "Ah, the frustration. It's so important to have those people with high standards who won't compromise and John was one."

Bill Jones: "As an original director of Bush Habitat Restoration Cooperative formed by John and Georgina saw John in action. There was the chance to have a company established with the ability to act on a site in an efficient, experienced and correct manner. We have lost one of the best Bush Regenerators in Sydney".

Nerida Gill remembered the brilliant work that John did with Bush Habitat Co-op on Eastern Suburbs Banksia Scrub at Bunnerong Road.

Tein McDonald: His shining smile will be missed by all whose lives have been touched by him. John has left us at the dawn of a new decade, facing a difficult situation where we have to navigate an uncertain new normal. Its going to be that much harder without Johns wisdom and guidance. I hope we can draw on his life and legacy for the inspiration and courage we need to meet the challenges ahead.

Rolling Out regenTV

Thank you to everyone who subscribed to our YouTube channel regenTV - we met our goal of 100 subscribers just before the New Year and got our name youtube.com/c/regenTV.

We've just published the first round of videos from the Seeds for the Future Forum including the Introduction, Thanks and some of the Q and A sessions plus those by

- Tein McDonald: Greater Sydney or Lesser Sydney? Putting restoration standards into practice,
- Paul Gibson-Roy: National Seed Survey, aspirations vs reality. Are the issues relevant to Sydney?
- Martin Driver, ANPC: Healthy Seeds – What's needed? The current barriers and future opportunities.

If you'd like to be alerted as more videos come online please subscribe to the regenTVchannel youtube.com/c/regenTV.

We're also extremely grateful to our first exclusive sponsor of a video The Paddy Pallin Foundation (PPF). Thanks to PPF's support in the not too distant future you'll be able to view the story of The Big Scrub's Decline & Recovery featuring sites and stories from across the Big Scrub landscape.

Another regenTV project in the pipeline is a video to celebrate 100 years of the Barrier Field Naturalists' (BFN) Club. AABR collected interviews and footage during the 2018 Broken Hill field trip and is keen to create a tribute to the BFN's dedication and longevity. We are seeking donations or sponsorship to make it happen. You can donate online https://hub.benojo.com/campaigns/regentv-best-practice-ecological-restoration-case-studies or if you'd like to be a sponsor of the video please get in touch education@aabr.org.au

Seeds for the Future

Forum- Summary of Presentations Part 2

Greater Sydney or Lesser Sydney?
Putting restoration principles and standards into practice

Tein McDonald

Greater Sydney has many valuable bushland parks and reserves, but these represent only small fragments of the extensive bushland that once occurred in the area. This has left a threadbare fabric of Endangered and even Critically Endangered ecosystems across the region - remnants which are increasingly threatened by further urban expansion and fragmentation. Improving the condition of these remnants (through assisted regeneration works) is essential, but so is linking them by new reconstructions (planting and direct seeding) wherever possible. But will our governments and their agencies rise to the occasion to restore these or miss the opportunity and see a further loss of these ecosystems over time?

Restoring an ecosystem to a condition that has highly similar physical and functional qualities to a healthy ecosystem of its kind is a highly challenging task – as explained in the *National and international ecological restoration standards*.

Particularly with reconstruction, success has not been widely demonstrated, so great care must be taken to get it right. This is especially important, as explained by other speakers, if any funding is coming from offsets payments that assume losses elsewhere will be 'offset' by gains made through restoration.

Why is it so important to get seed selection and sourcing right?

Getting the species right is essential if the reconstructed ecosystem is to be functional and able to persist over time. Not only do we need the appropriate plant species, suited to the physical conditions and likely stresses of the site, but we also need to ensure sufficient genetic diversity to ensure that the population can breed and adapt under changing conditions, points which other speakers will also refer to). This requires a great deal of attention to quality seed supply to address issues including appropriate genetics.

The National and International Standards use a 5-star system ecosystem for 6 ecological attributes to track recovery at a restoration site relative to the reference ecosystem. Using the six attributes encourages practitioners to look at the whole ecosystem. (Graphic: Virginia Bear Little Gecko Media)

For example an 80-yr old tree plantation at Broken Hill showed no recruitment of young trees. In this case the target (or reference) ecosystem selected for the project may not have been appropriate for the site's recruitment conditions – which might be enough on its own to explain recruitment failure as flooding is required for this species. However another very likely explanation for the failure is that all the individuals of the main species planted were siblings. It is not species composition alone we have to get right, but also the population's genetic composition if functionality is to be restored.

If we are serious about rising to the occasion and voiding Greater Sydney becoming 'Lesser' Sydney, three main questions need to be asked:

1. **Where will the ecologically appropriate seed come from for the necessary expanding and linking remnants?** Appendix 3 of the National Standards talks about the issue of provenance in seed collection and shows models of to mitigate loss of external exchanges in fragmented ecosystems. Seed Production Areas (SPAs) are often used to support the provision of seed with both species and genetic diversity.
2. **Where will the appropriate sites come from to link and expand to increase population size and provide external exchanges?**

- Will they be acquisitions? These will be needed whether or not new sites are planted to compensate for recent losses (e.g. current offsets) or past losses (e.g. to offset the debt accumulated prior to the current offset system).
- Will they be private land conservation? There will continue to be rural and urban initiatives funded through public incentives.
- Will they be public land dual use area? There will be opportunities to retrofit public parks and gardens and utilities areas. This is an option that is currently under-utilised.

3. **What is needed for the promise of conservation in the greater Sydney area be fulfilled?**

Imagination and willingness. Agencies need to be very serious about their responsibilities to meet the need to offset old and new impacts - and they need to get the public excited by the possibilities in order to gain the necessary social support for the work needed.

Greater commitment and collaboration. The appropriate agencies need to develop local, regional and state-wide roadmaps for expanding and linking remnants plus strategic actions for incorporating provenance and genetics into propagule supply.

See Tein's talk on regenTV youtube.

Restoration in the context of Offsetting

Dr Ascelin Gordon, ICON Science
School of Global, Urban and Social Studies, RMIT University

A lot of restoration funding is generated through biodiversity offsets. What is the philosophical underpinning of offsetting and what is the ideal versus how it is implemented currently?

Biodiversity offsetting

Biodiversity offsetting involves trading losses of biodiversity in one location (e.g. from clearing for development) with biodiversity gains from actions in a different location (e.g. restoration).

Biodiversity offsets links the development intervention with the offset intervention with the objective that the gains from the offset should counterbalance or be greater that the losses from the development. Thus, the combined development and offset should result in 'no-net-loss' of biodiversity.

Offsets gains may be through avoided losses (avoided destruction or declines in ecological value) and also gains through restoration or revegetation.

How do we calculate and account for losses and gains in biodiversity?

Impact evaluation

It is useful to apply thinking from the field of impact evaluation to biodiversity offsetting. Using this approach, we carry out an 'intervention' on a system and then measure the 'outcome'. But to determine how much of that outcome is attributable to the intervention, we need to think about the 'counterfactual', i.e. what would have happened without intervention (often referred to as 'control sites'). We can measure outcome, but we need to estimate or infer the counterfactual, and we need 'models' or some statistical method involving controls to do that.

The 'impact' is the different between the outcome and the counterfactual and this is the change we can attribute to the intervention. There can be a big difference between impact and outcome. These often get confused but the outcome alone often tells us nothing about the impact.

To evaluate policy performance, we need to measure both the impact of the offset and development. But what can we measure in reality?

We can measure outcome at the development location, but we cannot measure the counterfactual – have to estimate through controls.

In principle we can measure the outcome at offset site. In practice final outcome of the offset may not be seen for decades, so in practice we have to estimate. Again, we cannot measure the counterfactual.

Biodiversity gains from offsetting

Offset actions to deliver gains

- Habitat reconstruction
- Restoration of existing habitat
- Avoided condition decline
- Avoided clearing

Crucial points

- Gains should counterbalance losses (by when?)
- All these gains are uncertain, accrue gradually through time. Losses are not – they are permanent and immediate
- Uncertainty in outcome and counterfactual gives uncertainty in gains
- Different levels of uncertainties associated with different actions

Restoration and offsets

- Role of restoration: provides additionality in biodiversity gains
- Offsetting requires metrics for measuring/trading losses and gains
- How do we measure 'condition' or 'quality'?
- Metrics are based on a similarity to a reference benchmark vegetation community e.g. Habitat Hectares (Vic), Vegetation Integrity (NSW), BioCondition (Qld)
- The metrics provide a limited indication of ecological function but don't tell us if it is a perfectly functioning ecosystem
- There is a trade-off between complexity of the metric, and practically of implementation in policy

Case study in restoration for offsetting: Cumberland Plain Woodlands

Work was undertaken for NSW DPIE for Cumberland Plain Conservation Plan. This plan is seeking Biocertification (BC Act) and a Strategic Assessment (EPBC Act) for impacts of growth of Western Sydney.

This case study focused on one Plant Community Type - PCT 849 CWP. There were two parts: expert elicitation for outcomes under management as an offset and landscape scale modelling of losses from development and gains from offsetting

Expert Elicitation

This involved five experts over two sessions. The 'Vegetation Integrity Score' (the metric from NSW Biodiversity Assessment Method (BAM) was used.

They estimated 2 components - Richness and Cover – for 3 Growth form types: Trees, Grass and grass-like Forbs. There were 4 levels of initial condition quality - (Low, medium 1 and 2, high) and 3 actions (Typical private land activities, Low-intensity management, High-intensity management) to consider. Default benchmark values for each provided

Each expert provided 50 curves of 20, 40, 60 years independently, then they were able to see each other's results, discuss and revise. Each curve: best estimate, upper and lower bound

Expert Elicitation Results and implications for CPW restoration

- There was significant variation ***within and between*** experts. This was largely due to some fuzziness in initial condition definitions and also experts were experienced in different areas
- Offsetting should account for uncertainty, and time delays
- Results shows how (partial) Vegetation Integrity score predicted to change, however other aspects are important
- Populations need to be self-sustaining, reproduce, recover from disturbance etc.,
- Seed quality and genetics relevant here

The context of restoration shows a difference been funds leveraged from offsetting, and conservation investment. Offsetting is generated by losses and results in no gains in biodiversity, if everything works perfectly.

Additionality of the offset gains crucial

- Uncertainty in gains comes from uncertainty in both outcome and counterfactual
- Ecosystem being restored needs to have high levels of similarity to a baseline in terms of composition and function
- Seed quality paramount for this.

Seeding the Cumberland Plain Conservation Plan

Greg Steenbeeke
Green and Resilient Places
Dept of Planning, Industry and Environment

The Cumberland Plain Conservation Plan is part of the NSW Government's commitment to protect the region's threatened plants and animals and the communities needs through the creation of conservation lands and enhancing areas and quality of green spaces close to homes. The NSW Department of Planning, Industry and Environment (DPIE) is seeking Biodiversity Certification (Biocertification) of parts of western Sydney under the *NSW Biodiversity Conservation Act 2016* and Strategic Assessment under *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*.

The intent is to forecast development and provide limits on the impacts in four growth areas, while identifying and securing opportunities for a landscape-scale (IBRA subregional) conservation outcomes. If approved, the Plan provides for development offsetting until 2056 for the areas identified. NPWS-managed Reserves and Biodiversity Stewardship Agreements (BSAs) (on private or public lands) are seen as the primary means of securing biodiversity offsets.

The use of strategic biodiversity certification enables places in the landscape where we get the best opportunities for restoration to be identified. Restoration as a component of the process provides the capacity to ameliorate the threats and improve condition, and this is enhanced by the opportunities to amalgamate areas strategically across the landscape.

Restoration as a component of the Plan

The Plan would require management of the sites to return the vegetation to better condition. Restoration is enhancing the condition of a vegetation community and may be as simple as managing the weed and pest burden, or as complex as reconstructing the structural and diversity elements that should be present at a site. The plant community types under management are to be restored towards (or to) the accepted benchmarks of the community expected to occupy that location. The Bionet Vegetation Information System data provides the diversity and values for these benchmarks.

The plan will result in a demand for biodiversity credits and areas of habitat managed for improvement to offset the impacts. These lands will be within the Cumberland subregion in all but a few cases. In identifying the ability of a site to be an offset, the management action plan will identify to the land manager the required actions. Some actions generate a few credits and some result in a lot more credits, depending on the starting state and the amount of work the manager is willing to do to generate credits. The main role of seed and plant suppliers will be to address the latter, as generally these sites have lower initial conditions with poor diversity values (these being a strong driver in providing the Vegetation Integrity score that underpins the assessment). Assessment of offset sites will occur through the Biodiversity Assessment Method (BAM) which identifies the 'Required' and 'Active' management actions to be used to improve site condition. Required actions are landholder obligations (weed control, etc.) (Table 6 in BAM) while the Active are landholder opportunities – e.g. supplementary/enhancement /restoration planting (Table 7 in BAM). Active management generates more credits per ha, but also has a higher input cost in terms of materials and effort.

What expectations are built into the system?

The Plan will identify where the opportunities for restoration exist, and the limitations the stewardship process will have in terms of works implementation and materials supply. The Management Action Plan for a BSA sets out the first 20 years of the actions at a site – generally considered as those which are moving the site from major weed control, through active restoration to maintenance, and also defines those actions which will continue after the 20 years (as maintenance) and the frequency with which they will occur. The utilisation of restoration planting (either as tube plantings, direct seeding, broadcast seeding or facilitated establishment) will vary both throughout a site and between sites, making a general, steady (probably higher in the early years) draw on the materials (seeds and seedlings) needed to recreate habitat.

It is worth remembering that this article was prepared before the 2019-20 fire season with impacts only now becoming apparent. Adaptive management is built into the Plan to allow us to consider and adapt to these impacts. The area of the Cumberland subregion impacted to date is very low, so it is likely that the impacts will be availability of seed and plant stock rather than towards available areas for offset consideration.

The management actions that are expected to contribute to the offset program will need to be costed appropriately and will need to include sufficient opportunity to cover rising and dynamic pricing of components over time.

Restoration under the Plan

To be considered as offset for the plan – and indeed for any other form of development where the Biodiversity Offset Scheme is in play – the land must have a perpetual covenant on title. This can be a BSA or a formal reserve under the NPW Act. Restoration in terms of the Plan only counts when the land where restoration occurs has a perpetual covenant.

There will be a diversity of planting required as the array of species in the Cumberland communities most impacted is diverse. Species are rarely only found in one community and many will be shared between communities. This reduces the overall diversity, although there will also be a need to include those species which are generally only found in one of the targeted / favoured PCTs such as grey gum (1395 mainly). The species which will be required for restoration are within the defined growth-form groups. These groupings are trees; shrubs; grass and grass-like; forbs; ferns; and 'other', which is a catchall for vines, twiners, mistletoes, palms and grasstrees, as well as an array of other things. The assignment of a native species to one of these growth form groups is formalised in the Bionet dataset and has a published method.

Seed and seedling supply

It is acknowledged that if the draft Plan is accepted, there may be issues with supply. A diversity of material and suppliers will be required; will the Plan add some certainty to market?and what limits the available opportunities? Over time, the plant community restoration requirements of the Plan will become clearer, and as sites move from weed control to habitat reconstruction there will be a ramp-up in need. This pace and progress through the management plan of a BSA gives the industry an opportunity to expand and cater for any shortfall. However, limitations are still present in the form of the available suppliers, location of facilities, size and scale of facilities and associated business risks.

Future planning

The Draft Plan is addressing the proposed impacts within the western Sydney growth areas until 2056, but restoration will be in the landscape for much longer - essentially indefinitely in reserves and BSAs.

In addition to planning for planting and supplementing the existing biota, what do we need to consider for the future in the context of climate change? A few critical considerations will be: composition and structure of plant communities; population genetics (and ploidy) – although the complexities here are both accepted and poorly understood; landscape connectivity; and, supplementary needs of the planted lands, in particular monitoring, implementation and reporting. Also feedback to suppliers regarding species, lots and sources which have succeeded (or even exceeded expectations) and those which have failed.

Complexities arise with determining the extent to which the 'local is best' paradigm still applies in the context of a rapidly changing climate. Various papers over the years have not necessarily clarified matters, with some showing no advantage to using local stock but also identifying that there are issues with inbreeding as well as outcrossing. Ploidy – applicable in some species such as Themeda – also plays a part – the establishment of heteroploid populations can lead to breeding failures.

Many of these factors will only be manageable through a coordinated and open exchange of information about the works undertaken and the successes and failures experienced in undertaking it.

Seed supply successes and challenges

Samantha Craigie, Greening Australia

Western Sydney Seed Production Area

Little remnant vegetation remains within Western Sydney with ecological communities such as Cumberland Plain Woodland reduced to 9% of original extent with areas fragmented and impacted by a range of threats. Ecological restoration provides the opportunity to improve landscape health. Large amounts of native seed are required to do this work. Seed production areas (SPA) provide an opportunity to increase seed supply without negatively impacting native remnants. The Greening Australia SPA has made 50ha of highly diverse direct seeding in Western Sydney possible.

Greening Australia initiated the SPA in 2012 and spent several years scouring the landscape for species. Starting with 500 foam boxes, with an ongoing increase in size and species complexity. Now 10,000m2 - (1ha) wildflowers and 3.5ha native grasses - around 120sp.

Nothing could have been achieved without the collaboration of government agencies, community groups and the passion and dedication of our team. We've been very fortunate to attract really great staff, with a variety of disciplines; horticulture, agronomy, botany, ecology who believe in the work and this has enabled us to produce the scale of seed we require.

What are the seed challenges?

- Access to seed - limits to quantity of remnants.
- Access to land – often significantly impacted by weeds and have limited native species diversity.
- Limited commercially available quantities.
- Seed availability – not all plants set seed routinely. Fire regimes and a lack of disturbance limit seed!
- Establishment timelines – restored areas can be used when developed and collection doesn't inhibit recruitment
- What is the restoration incentive - compliance or conservation? It makes a difference.
- Starting condition, weeds, browsing - native & exotic
- Expectations & Opposition

Bulbine bulbosa Greening Australia Seed Production Area Photo S Craigie

- Weather
- Licensing
- Recognition of the value of seed and the real cost of supplying seed which enables cost recovery and sustainability.
- Creating species diverse assemblages
- Instituting standards for seed sales (purity, germination, viability). How can we compare the cost of 1 bag of seed to another if we're not sure how to value it?
- Longer term project timelines that enable forward planning and forward collection
- Collecting and managing native seed is labour intensive and so there is always the temptation to reduce the species complexity and therefore the cost of supply
- These constraints are compounded when trying to access multiple patches for a single species, which is critical for capturing the maximum local genetic diversity
- Lack of genetic testing for species and populations
- Knowing how widely to collect for a single species is challenging when so little data is available on the genetics of species and populations.

Seed Technical development & Knowledge

Restoration seedbank seed testing. We test at multiple stages of our operation - when seed enters our seedbank, periodically in storage and also sub-sample the direct seeding mixes on the day of installation, straight out of the hopper. The samples go into nursery trays to help understand what the likely outcome in the field is given the right amount of moisture availability.

Managing wild species in a production setting provides the opportunity to study plant morphology, flowering times, seeding times, seed biology, seed storage longevity and plant life cycles.

There is so much to learn about seed. We use tools like ID books, microscopes, imagery and the practice of doing to constantly improve what we do.

What can be achieved? 50ha of restoration outcomes

We have created 50ha of restoration outcomes from direct seeding complex groundlayer species on the Cumberland Plain. It is true to say that some sites have worked much better than others, but we are very proud of what we have been able to achieve, and these sites will all continue to improve over time.

We have also shown that it is possible to create a sustainable supply of seed from a **Critically Endangered Ecological Community** and that will make a difference to what we all think is possible in the future.

Read more about this in AABR Newsletter No 128

Volunteering for growth

Maree Whelan

Greater Sydney Local Land Services

Looking at volunteers working in a community nursery the obvious social benefits for groups are easy to understand. They also play a role in the collection of local native seed to help maintain and restore relatively large amounts of native remnant vegetation. Some nurseries are run by Council often located on Council land which are solely managed by volunteer groups. In the Greater Sydney region there are over 20 community nurseries and this is a snapshot of three of these.

Budgewoi Dunecare

This nursery supports the work being carried out on the dunes by the Dunecare group. In 1995 Dunecare founding members decided to only plant local indigenous plants on the site, as the dune vegetation was in poor conditions due to a mono-culture of weeds. The group knew the value and reasoning for using endemic species. This was key reason for starting the nursery.

Seed was collected from the Dunecare sites and grown using nursery resources, so the plants from this local seed are equipped to withstand the salty conditions. The nursery also provides a variety of work tasks for the group and it supplies plants to Lake Macquarie Council, 12 km up the coast.

The overall challenge for the group is the maintenance of the dune sites. It is also an ongoing challenge to ensure local government recognises the value of what the group is doing. http://www.budgewoibeachdunecare.com.au

The Habitat Nursery, Ryde

The Habitat Nursery in Ryde was set up in 2012 to provide an affordable source of local native plants for the community including Bushcare groups, schools, and supplying plants for a project in the area to reconnect small bird habitat. The nursery sells plants to the community and gives plants to others.

The plants are all grown from seeds and cuttings from Ryde and Hunter's Hill Council areas. Seeds are collected, stored in appropriately labelled brown paper bags with all details recorded on a database. They are then grown up by batch number and a record kept where the plants go.

Seed and cuttings are collected from 246 different species of native plans. Information regarding timing for sowing or propagating of some local material has been sparse, so there has been a fair bit of experimentation, with mixed success. The group seeks technical advice from other nurseries, and Hornsby Council Nursery in particular, has helped out with some of the shale species seed.

The nursery is coordinated by volunteers from the Habitat Network and is totally reliant on the goodwill of volunteers which includes those who hand water the nursery tubestock (the only automatic watering system is for seedlings in the glasshouse).

The volunteer system is relatively flexible as people are encouraged to lend a hand for one visit or repeat visits and so volunteer numbers are a little fluid. In 2018 a total of 221 people volunteered at the nursery with 53 of these characterised as being regular/ semi-regular volunteers.

The challenges include:

- Scarcity of seed stock with some hard to secure. Recently pollinators and pollinated plants (and hence seed production) seem to be less than in previous years leading to less seed .
- Some plants are already locally rare and with drought and increased pressures are unlikely to survive, e.g.*Leucopogon lanceolatus* is locally quite rare and hard to propagate.

Habitat Nursery, Ryde Photo: M Whelan

- Some corridors are so narrow that very small remnants exist, and do not provide any viable source of plant materials. Mostly the large parks are used for seed collection.

The groups likes to keep up with current thinking around climate change and issues of provenance.
https://www.habitatnetwork.org/CommunityNursery.htm

Megalong Valley Public School, Blue Mountains

The school was inspired by the local Biraban bushcare group located at Katoomba High and wanted to incorporate Landcare into the school as they felt it would help embed Aboriginal perspectives into the curriculum.

This happened at around the same time that students and the local Megalong community were concerned about the future of a critically endangered Callistemon species within the Megalong Valley known as the *Callistemon megalongensis*. They procured seeds from across the valley to get genetic diversity. The seed was mostly from private landholders. The students approached their local community and private landowners directly with the Callistemon plants to grow in their own backyards providing a living seedbank to ensure the future survival of the species. Local aboriginal elder David King taught the students how to collect and propagate local seed. They also sought technical advice from the Blue Mountains Conservation Society Nursery.

The school was Regional Junior Landcare winner for 2019. They developed a film https://www.youtube.com/watch?v=pT1Z3eUaO30 which is a great way to raise awareness.

The main challenge for the school is that it is a very small school with limited time and resources to maintain this project. Ideally an injection of people power from within the region would also help secure the future of this critically endangered species.

Conclusion

This snapshot shows opportunities and challenges for these nurseries which may help us better understand the role these groups have, and provides us with an opportunity to reflect on the support they might need in the future.

Megalong Valley P S Photo: M Whelan

AABR Achievements

November 2018 to November 2019

Eleven committee meetings were held since the last AGM (5 full committee and 6 with the executive). The AABR Mission and Vision Statements were developed. The committee progressed the following activities for AABR's membership

Communications

- 4 Newsletters since the last AGM - #139 January 2019, #140 April 2019, #141 July 2019, #142 November 2019 – to >600 people.
- 11 e-bulletins were sent out between Aug-Oct: 10 included content relating to the Forum. The eNews goes to 1493 people which includes members plus a broad audience of contacts.

Social Media

- Participation in the Gain & Retain program has provided opportunities to explore and expand social media use.
- **Facebook** likes are at 1882, up from 1504 last year.
- Followers are 2007.
- The reach of the Facebook page over the past year peaked at 10,515 (last year 7640).
- The majority of forum registration came through Facebook.
- A Social Media Strategy is in development. LinkedIn and YouTube platforms being developed

The AABR Website

- There were 25,519 users (~500/week) who viewed 75,296 pages for an average of 2 minutes. 55% access the site from desktop, 36% by mobile and 8% by tablet.
- 14% are returning visitors. 65% of visitors are finding the website organically
- Bush jobs draws in 14% of the web visitors. (10,628 views); business directory - 2.4% (1796 views);regenTV - 2.1% (1620 views)
- What is bush regeneration - different Australian vegetation types 3% of views (2275 views)
- Seeds for the Future 1.8% (1336 views)
- The online listing of accredited practitioners and mentors has 63 practitioners.

Events

- Site Visit to to Cumberland Land Conservancy Wallaroo Field Day, 31st August – Rapid Assessment with the Recovery Wheel – 30 attendees
- Presentation: Crowdy Bay Celebration and AABR/Recovery Wheel presentation and site assessment, 18 – 19 May (with NPA)
- Water Weeds, Biosecurity Act, National Restoration Standards Workshop, 5th November, Western Sydney – information display and National Restoration standards presentation - 44 attendees

Promotion: Displays

- Greater Sydney Local Land Services Landcare-Bushcare Forum. , 8th August – AABR information display
- Greater Sydney Landcare – Groovin' Grassroots Festival, 25h May 2019– AABR display and information stall

Industry advocacy: Representation and Submissions

- Australian Industry and Skills Committee - Amenity Horticulture, Landscaping, Conservation and Land Management - Jen Ford
- NSW Environmental Trust Grant Assessment Panels: Community applications – Mary-Lou Lewis; Government applications – Louise Brodie
- Tein McDonald represents AABR on the Healthy Seeds Consortium
- Tein McDonald will represent AABR at the February 2020 Fenner Conference on the Environment "Managing Wild and Weedy Australia across boundaries and disciplines".
- Glyphosate position statement developed and quoted in media
- Submission on the Snowy 2.0 - Main Works (SSI-9687).
- Signatory on the Invasive Species Council's Submission to the draft National Environmental Biosecurity Response Agreement

VET/CLM Advisory Group established

- 4 meetings to discuss and collate VET issues across the states
- 4 meetings to discuss CLM and develop contributions for the national review
- AABR members participating in industry workshops

Membership and Accreditation

AABR has 716 members comprising of the following categories: Accredited - 228; Pioneers - 40; Individuals – 368; Businesses - 25; Students - 34; Agencies - 13; NFP orgs – 5; Complimentary - 14

An Accreditation Officer was contracted from 1/5/19 to support expansion of the accreditation program. 12 members were approved for Accreditation during the year.
Accreditation drive for Standard applicants underway
Accreditation review undertaken of 12 AABR competencies

Seeds for the Future Forum cohosted with ANPC

This was held in Sydney on the 8th October 2019 with 154 attendees and produced a communique to be distributed to 88 government/ agency representatives. The forum has been filmed for regenTV.

regenTV

The regenTV Environmental Trust Grant is completed.
Currently on regenTV - 53 videos with 6500 plays. Wistia hosts 40 videos with 5600 plays and YouTube hosts 13 videos (Feb-Nov)
There is an ongoing commitment to produce more videos realised through ANPC/Healthy Seeds project.
Fundraising was trialed and corporate sponsorship sought. The Paddy Pallin foundation has committed $10,000 over 2 years

Collaboration and partnerships

- ANPC Seeds for the Future Forum
- Archive of Broken Hill Materials
- AABR has deeded multiple archival materials on the Broken Hill field trip and essays by Peter Ardill to the Outback Archives, Broken Hill. (We particularly thank Peter Ardill)

Victorian Branch of AABR established

The Victorian subgroup had a productive planning session attended by around 20 people in June which set priorities, the first one being to grow the membership.

Completion of ET Grant funded regenTV work

The 3-year regenTV project funded by the NSW Environmental Trust has been completed. Below is a summary of what was achieved.

- Fifty-four professional videos and accompanying indexes were produced from field days during the project period and forums & conferences held 2014 - 2018. An additional index of 3rd party videos was produced. The videos have been viewed 4895 times.
- Five sets of learning resources including a Fact Sheet and a Worksheet were produced aligned to the National Restoration Standards. Five additional Information sheets on bush regeneration were produced.
- Thirty 'events' were held attended by 616 people. Two were multiday events - Broken Hill the Big Scrub (northern NSW).
- Evaluation surveys were conducted to garner feedback the viewing community of AABR's website with low feedback levels.
- The contractors were exceptionally generous in the provision of services providing at least $10,765 worth of pro-bono support.
- AABR's committee contributed over 611 hours of expertise in the production of the learning materials, coordinating and hosting field trips, attending meetings and overseeing the project, conservatively valued at $33,600
- AABR contributed $19,218 in cash towards the project for additional video recording, website hosting of videos and costs associated with conducting events
- The project has been promoted in 12 editions of the AABR News newsletters, 19 e-news bulletins and on social media with 276 Facebook posts.There are 10 websites with links to the regenTV resources from AABR's network .

Restoring stream aquatic fauna: facilitating natural processes

Peter Ardill, Lawson Bushcare and StreamWatch, AABR accredited practitioner

Bushcare groups and restoration teams can maintain and facilitate restoration of aquatic fauna populations and ecological functioning within stream and riparian ecosystems by implementing relatively simple measures. These measures also boost species resilience to impacts resulting from hotter and more frequent bushfires and changing weather patterns

Aquatic indigenous fauna species such as water insects (generally known as macroinvertebrates or bugs), crayfish, frogs and tadpoles are an essential component of the indigenous species composition of riparian zones and their ecological functioning. When dealing with the restoration of aquatic fauna species, complying with restoration guidelines may present special challenges.

The Australian National Standards for Ecological Restoration indicate that securing substantial to high diversity of characteristic reference ecosystem species within a restoration site is desirable; measuring species composition is vital to assessing restoration progress and obtaining maximal ecological outcomes. Restoration intervention should be undertaken at appropriate levels. The capacity of the species for natural resilience and regeneration are essential considerations when contemplating intervention. [1]

With severe degradation of riparian areas such as a stream and its associated aquatic life and their habitat, how can the restoration of indigenous aquatic fauna species be carried out in accordance with these guidelines? This article confirms, within the context of an observed stream restoration process, that the presence of stream bank indigenous flora species, as well as connectivity to ecologically healthy riparian zones, are important factors that influence indigenous aquatic fauna re-colonisation, and that these factors can be appropriately enhanced and managed by bushcarers and restorationists.

In 2010 the upper reaches of Lawson Creek at Lawson in the Blue Mountains of NSW, west of Sydney, were overwhelmed by massive amounts of sand and sediment deposition resulting from a combination of heavy rains, a collapsed walking track and poor sediment controls on a building site. A long section of healthy bushland creek was reduced to a shallow trickle of water (Image 1). More than a decade of previous systematic volunteer StreamWatch[2] and professional aquatic surveys had recorded a wide range of aquatic fauna species in the stream, but they and their natural habitat, such as logs, leaf litter, pools, riffles and aquatic vegetation, were gone.

Fortunately, as it turned out, cost and site restrictions precluded or limited extensive restoration interventions; some coir logging was installed to help spread the sand. In reality, natural recovery of the stream, and its associated aquatic fauna habitat, commenced immediately after the occurrence of the sediment event.

As part of the 1990s NSW government funded Blue Mountains Urban Runoff Control Program, much professional bush regeneration, and subsequent volunteer bushcare work, had been carried out within the stream's riparian zone. Thus in 2010 the natural bushland of the zone was in very healthy condition, with extensive tree canopy cover, shrub layers and groundcovers (Image 1). This proved to be highly relevant to the recovery of the stream and its indigenous aquatic fauna.

Following the sediment event, natural debris from the trees and shrubs, such as large branches, bark, sticks and leaf litter, continued to be deposited in the silted stream. This material further dispersed the sand and created small riffles (splash zones) and also the deeper pools essential to aquatic habitat, as well as steadily replacing the food resources that had been smothered in the sand. The fact that natural vegetation and the debris deposition process were in place and occurring from the time of the sediment event may have facilitated and speeded up the aquatic fauna recovery process: recent research indicates that it is well decayed material, rather than fresh woody material, that

1 Standards Reference Group (SERA) 'National Standards for the Practice of Ecological Restoration in Australia'.Second Edition 2017 Society for Ecological Restoration Australasia, 6,15 www.seraustralasia.com

2 now administered by Greater Sydney Landcare Network

Image 1: Silted Lawson Creek 2010 Photo: P Ardill

Image 2: Natural debris in previously silted section Lawson Creek 2018
Photo: P Ardill

provides the best habitat for aquatic bugs. [3] There was weed growth of creeping buttercup on the sediments but this was not treated with the group dealing with blackberry and woody weeds in the bushland.

Nevertheless, the stream remained heavily silted for a number of years, and it was only in 2015 that the volunteer StreamWatch Group recommenced water quality testing (not bug testing, as there was still no bug habitat) along the damaged section of stream, with good results: the water had appropriately low levels of salt and phosphates, was well oxygenated, chemically balanced and clear. Due to the increasing layers of decomposing natural debris, the deposited sand and sediments were continuously being spread over an increasing area of the riparian zone and gradually became vegetated. By 2018 the creek was starting to resemble its former healthy condition, displaying a few deep pools and small rapids, some good natural habitat of decayed logs, other fallen timber, and a layer of leaf litter along the banks and channel (Image 2).

In May, 2019, the StreamWatch volunteers tested for bug life in the water, and the results were pleasing. Mayfly nymphs, which are very sensitive to pollution, damselfly nymphs, dragonfly nymphs, boatmen and water treaders, plus crayfish and tadpoles, were all recorded. It appeared that the deposition of a variety of natural debris had created the range of suitable habitats, such as pools, riffles and food resources, that encouraged the recolonisation of diverse aquatic fauna species, but where did all of this life come from?

Amy St Lawrence, Blue Mountains Council's Aquatic Systems Officer, offered explanations: 'Bug re-colonisation relies on having intact bug populations/communities nearby…different types of water-bugs will recolonise in different ways, providing their water quality and habitat requirements recover…insects probably hatched at the site from eggs laid by adults that decided your pools were suitable; adults that possibly came from further downstream on Lawson Creek. Your large crayfish may have been there all along despite the sedimentation, or may have moved overland from a pool downstream or a nearby creek.'

Often it is erosion concerns that motivate riparian zone and stream bank restoration, but the Lawson Creek experience suggests that the indigenous flora within the riparian zone of a restoration site should be well managed for other good reasons as well: enhanced habitat boosts aquatic fauna natural regeneration rates, degraded riparian zones and water assets under restoration will re-establish mutual ecological connections more rapidly. This will result in increased potential for the further establishment of ecological connectivity with healthy riparian resources. Enhanced riparian zone vegetation condition will promote the stronger natural regeneration that may assist with natural buffering of the results of impacts such as sediments, ash and chemically enriched runoff resulting from intense bushfires [4]. Healthy habitat provides aquatic fauna species with better conditions in which to cope with changing weather patterns. Healthy riparian vegetation means re-colonising terrestrial fauna will be less prone to exposure and predation when accessing water resources.

Summary

- Successful restoration of the indigenous aquatic fauna at Lawson Creek had been brought about by the same factors that influence re-colonisation by terrestrial fauna: the availability of appropriate habitat plus connectivity with intact natural areas. Good water quality proved to be only one part of the restoration equation.
- Managed riparian zone vegetation quality should be continually checked for degradation and loss of species diversity, particularly in urban areas.
- Riparian zones and stream banks under restoration should be intensively planted with a variety of indigenous flora species if natural regeneration is limited.
- Naturally deposited, decayed debris is best for actual in-stream restoration.
- Decayed ground debris as well as freshly cut material should be utilised for in-stream restoration if overhead debris is not present.
- Don't clean up your stream; messy is best!

3 Czarnecka, M. & Miler, O. 2018. 'Decay processes in woody debris influence the taxonomic and functional composition of littoral macroinvertebrates'. Canadian Journal of Fisheries & Aquatic Sciences 75, 1596–1605. https://www.nrcresearchpress.com/doi/abs/10.1139/cjfas-2017-0364#.XfcIpW5uLIU in Freshwater Research News 2019, Kev Warburton, Charles Sturt University KWarburton@csu.edu.au

4 Paul McInerney, Gavin Rees, Klaus Joehnk, 'The sweet relief of rain after bushfires threatens disaster for our rivers' The Conversation January 2020 https://theconversation.com/the-sweet-relief-of-rain-after-bushfires-threatens-disaster-for-our-rivers-129449

AABR Movie Socials to lift the spirits

The Gondwanalink project has produced an inspiring, uplifting 48 minute documentary 'Breathing life into Boodja-social and ecological restoration in an ancient land'. AABR has been given permission to screen the movie prior to its public release mid-year.

Would you like to connect with other AABR members in your area, and gather some like-minded folk in the one spot for a movie and be social? We are seeking Expressions Of Interest to host community screenings of 'Breathing life into Boodja'. AABR can assist with the promotion. Contact Suzanne at education@aabr.org.au

What's happening

AABR Walk and Talk Thursday 26th March 2020

Privet management in the Coups Creek Corridor,Northern Sydney

Hosted by Wahroonga Waterways Landcare

Time: 12.30 - 3.30 pm

Meeting point: Enter via 150 Fox Valley Road- Australasian Conference Association- lower carpark near tennis court.

RSVP and more information at https://www.eventbrite.com.au/e/privet-management-in-the-coups-creek-corridor-tickets-93179019957

Monday 18th to Sunday 24th May 2020

Crowdy Bay Annual Bush Regeneration Camp

AABR visitors will be able to join in the annual bush regeneration camp at beautiful Kylies Beach.

Fire has wiped out the great bulk of the park but patches including several littoral rainforest patches have survived. There will be plenty of work firstly masses of morning glory vine to get out of Kylie's rainforest and we expect mass germination of bitou in some areas that we haven't worked for a while. Therefore lots of volunteers are needed. Contact Sue at suebaker15@bigpond.com

Tuesday 19th to Wednesday 20th May 2020 (Field Visit Thursday)

Nature Conservation Council's 2020 Bushfire Conference

Cool, Warm, Hot: the burning questions

Where: NSW Teachers Federation Conference Centre at 37 Reservoir Street, Surry Hills, Sydney, NSW.

Conference Tuesday and Wednesday. Field Visit Thursday

Call for Abstracts.
Please submit abstracts by Wednesday 26th February

Information; visit the website

contact (02) 9516 0359 or email BushfireConf2020@nature.org.au

Friends of Grasslands

For a whole swag of interesting events, check out the FoG calendar.

Friends of Grasslands is a community group dedicated to the conservation of natural temperate grassy ecosystems in south-eastern Australia. FoG advocates, educates and advises on matters to do with the conservation of grassy ecosystems, and carries out surveys and other on-ground work. FoG is based in Canberra and holds a number of events and activities

www.fog.org.au/

Australian Association of Bush Regenerators

The Australian Association of Bush Regenerators Inc (AABR) was incorporated in NSW in 1986, and has several hundred members from all over Australia. AABR is pronounced 'arbor.'

Our aim is to promote the study and practice of ecological restoration, and encourage effective management of natural areas.

All interested people and organisations are welcome to join. AABR members include bush regeneration professionals, volunteers, natural area managers, landowners, policy makers, contractors, consultants, nursery people, local, state and commonwealth government officers—and lots of people who just love the bush and want to see it conserved.

AABR also offers accreditation for experienced practitioners.

AABR News is usually published in January, April, July, and November.

Membership fees

Individuals	$30 (unwaged $15)
Organisations *(does not confer membership to individuals in the organisation)*	
• business (< 5 staff)	$120
• business (5-20 staff)	$300
• business (> 20 staff)	$480
Government	$60
Not for profit	$30 *(or $0 with newsletter exchange)*

Benefits of Membership:

- discount admission to all AABR events
- four newsletters per year
- increased job opportunities
- discount subscription to the journal Ecological Management & Restoration
- opportunities to network with others involved in natural area restoration
- helping AABR to be a strong and effective force to promote natural area restoration, and support the industry.

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Newsletter contributions and comments are welcome

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Opinions expressed in this newsletter are not necessarily those of AABR