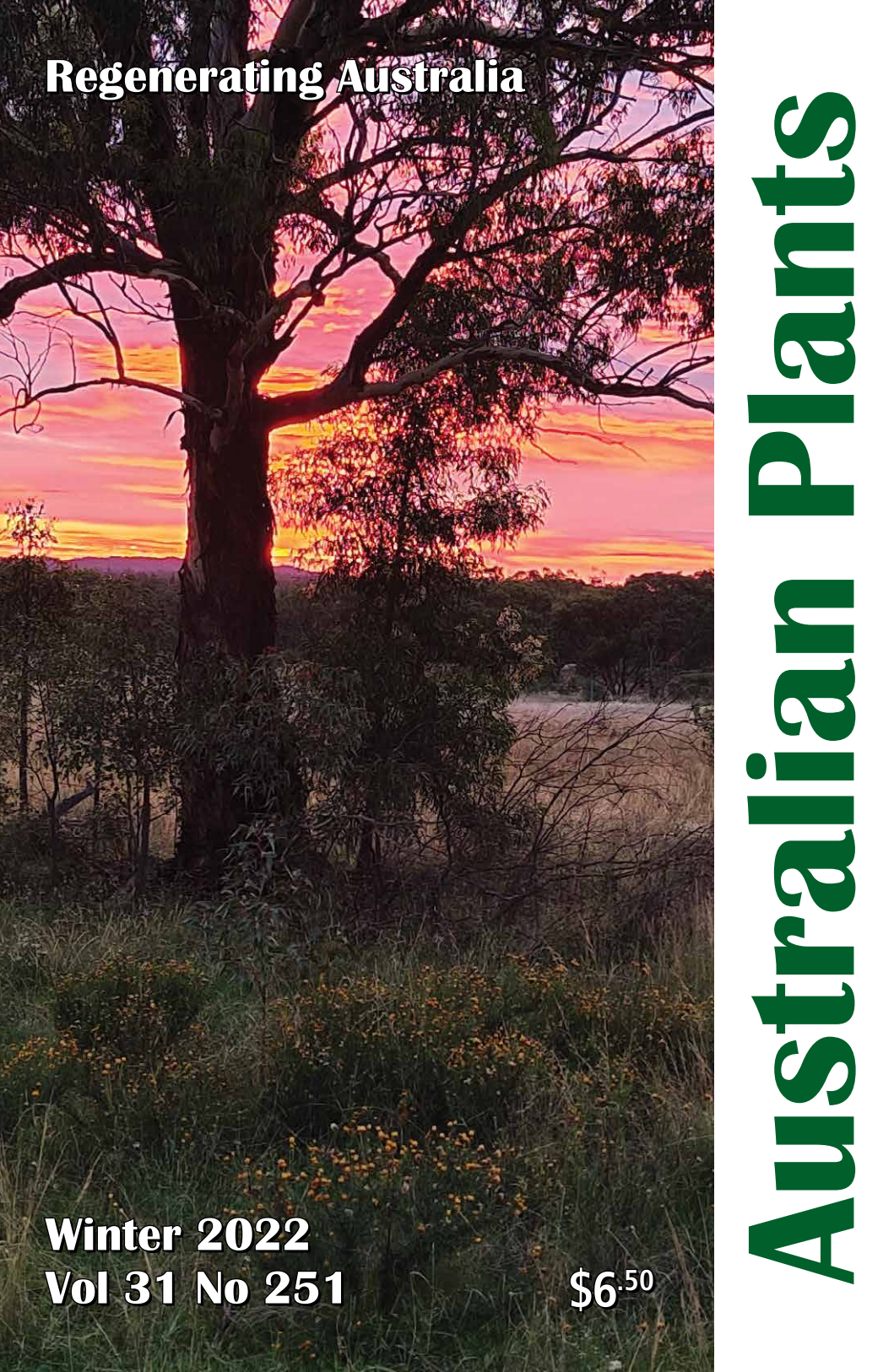




Regenerating Australia

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Australian Plants

Contents

Editorial	John Aitken and Merle Thompson OAM	263
Building resilience through diversity	Andrew Knop	264
Our journey in land restoration using regenerative agricultural procedures	Sylvia Leighton & Peter McKenzie	275
Sanford Eco-Corridor project, South-East Queensland	Peter Storer	281
Farmers take the lead on habitat restoration for giant freshwater crayfish recovery	Lauren Bird	288
Lal Lal, Victoria: Bushland restoration, with a little help from my friends	Susan Meyer	293
Hinterland Regional Park Bushcare project	Graham McDonald	301

Photography

Cover: Summer sunset on restored box gum grassy woodlands in Wiradjuri country, south of Dubbo. Feature trees are yellow box *Eucalyptus melliodora*, with a native herbaceous understorey. Andrew Knop

All photographs are by the authors unless stated otherwise.

Australian Plants articles

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Editorial

John Aitken and Merle Thompson OAM

This edition of *Australian Plants* on regenerating Australia was inspired by a visit by APS NSW members to six properties in the Central West, NSW. Three of the property owners had regenerated their properties which had been degraded by a combination of intensive farming, and feral pigs and goats. The group also visited three farms where the owners have implemented farming principles and practices that increase biodiversity, enrich soils, improve watersheds and enhance the natural ecosystem.

In restoring degraded areas to their original habitats, how do we know what the vegetation of an area was like before European settlement? Some may be fortunate enough to know local First Nations people with traditional knowledge passed down from generation to generation. We may have the writings of early European explorers and settlers or knowledge handed down through their families. Hopefully there will be some remnant areas in which the vegetation retains its original nature.

Andrew Knop (NSW) and Susan Myer (Victoria) share their experiences on regenerating their degraded properties. Andrew gained information about the original flora on his property from the diaries of two early explorers. Susan employed the services of Steve Murphy, author of *Recreating the Country*, to conduct a survey of flora and fauna on her property and to guide her and her husband Bill in the best ways of achieving as natural a regeneration as possible.

Clearing of the land for agriculture, housing, industry and infrastructure means that the concept of “remnant areas” is a very appropriate term. In fact, from colonial times and even with the post WWI army settlement scheme farmers were required by law to clear their land. Sylvia Leighton and Peter McKenzie explain how when Susan’s family first acquired a ‘conditional purchase’ property on the south coast of Western Australia, they were required to clear 12% of the farm of its natural vegetation each year. Sylvia and Peter recount how they have “restored some balance” to the farm and how they pass on their knowledge to others.

There are also numerous local community groups involved in regenerating cleared or degraded areas. The articles by Peter Storer (Queensland), Lauren Bird (Tasmania) and Graham McDonald (Queensland) highlight what community groups can achieve over a long period of time to restore badly degraded areas.

We owe a great deal of gratitude to these people who share the common goal of protecting, improving and rehabilitating our natural environments.

Building resilience through diversity

Andrew Knop

Andrew and his wife Jenny are committed to the conservation and restoration of native ecosystems. They manage two registered conservation properties near Dubbo in the Central West, NSW.

Ecosystems describe the huge variety of life that makes our planet unique. Most ecosystems are based on the principle of turning the sun's energy and landscape's resources into biomass. An often overlooked characteristic of ecosystems is that they are self-sustaining. Provided the sun shines and they have suitable space, ecosystems will self-replicate and evolve.

Millions of years of evolution have developed robust, self-replicating organisms that efficiently convert sunlight into biomass. The vascular plant classes, along with other major contributors such as bryophytes, algae and fungi, set the scene for energy and minerals to be combined and recycled. The animal kingdom then evolved to use this rich biomass, ultimately creating the diverse world we know and love today. The aptly named 'web of life' is our way of describing the amazing and complex interactions and relationships seen in our landscapes.

As land managers with an interest in history and sustainability, we are drawn to the issue of how to nurture sustainable landscapes. Early explorer observations describe botanically and structurally rich ecosystems. Landscapes were carpeted with diverse understories which fix atmospheric nitrogen, revitalising our ancient nutrient-poor soils.

The landscape below is one the explorers would readily recognise.



Mugga ironbark *Eucalyptus sideroxylon* dry sclerophyll forests near Dubbo with *Acacia buxifolia*, *A. decora*, *A. deanei*, *Pultenaea microphylla*, *P. foliolosa* and the wonderful habitat forming grass *Rytidosperma pallidum*.

John Oxley who traversed these landscapes in 1817 observed:

".... the ground being absolutely covered with acacia of various species, some extremely beautiful. Proceeded on our course, which led us for nine or ten miles through what might be termed an open forest country, with respect to the timber growing on it, but it was overrun with mimosa and acacia bushes, many of which were coming into flower, relieving in some measure the sombre foliage of the cypress and box trees which were scattered among them."



An adjacent grey box, *E. microcarpa*, dry sclerophyll forest with *Acacia buxifolia*, *A. decora*, *A. deanei*, *Pultenaea microphylla* and *P. foliolosa*.

An adjacent grey box, *E. microcarpa*, dry sclerophyll forest with *Acacia buxifolia*, *A. decora*, *A. deanei*, *Pultenaea microphylla* and *P. foliolosa*.

This grey box dry sclerophyll forest landscape shown above has regenerated after managing the feral goats. Feral goats have been eradicated from the area for eight years. The *Pultenaea* species were particular favourites of the goats with only a few dozen plants surviving in the area when we purchased our property in 2006. The 2017-19 drought followed by over two years of the La Nina climate influence has set the scene for a series of regeneration events.

The explorers also described rivers and creeks with clear waters and deep ponds within their channels. They noted the ponds to be the landscape's "proof against drought". Beds of *Typha*, *Phragmites* and other riparian grasses protected the ponds by filtering water and reducing evaporation. The majestic river red gum, river she-oak and other canopy and understorey plants enveloped the banks and channels providing additional protection from the wind, sun and heat.

The following observation by Thomas Mitchell showing how quickly this landscape balance was altered by the intense livestock grazing practices

of the squatters. The first quote is from Mitchell's 1835 expedition journals, and sets the scene for his observations 13 years later. The landscape he refers to is near the Parkes Radio Telescope, halfway between Parkes and Peak Hill. A plaque commemorating his expeditions can be seen on the Newell Highway near the telescope turn off.

CROSS GOOBANG CREEK, 1835 April 13.

The party moved off at half-past eight o'clock, and at half-past nine it crossed Goobang creek, or chain of ponds. This channel contained some deep pools, apparently proof against the summer drought. The Goobang has its sources in the ravines between Harvey's and Croker's ranges, the course being towards the Lachlan. In this and other tributaries of the same river I observed that all the permanent pools were surrounded by reeds.

In 1848 Mitchell had cause to retrace his footsteps on an ambitious venture to find an overland route to the Gulf of Carpentaria. He followed the water and resources that had previously served the expedition so well. The landscapes he traversed had now fundamentally changed.

20th December 1848, Goobang Creek:

Reaching a hill laid down on my former survey, and from which I recognised Mount Laidley, I returned directly to the camp. We had encamped near those very springs mentioned as seen on my former journey, but instead of being limpid and surrounded by verdant grass, as they had been then, they were now trodden by cattle into muddy holes, where the poor natives had been endeavouring to protect a small portion from the cattle's feet, and keep it pure, by laying over it trees they had cut down for the purpose. The change produced in the aspect of this formerly happy secluded valley, by the intrusion of cattle and the white man, was by no means favourable, and I could easily conceive how I, had I been an aboriginal native, should have felt and regretted that change.

Over the next two weeks Mitchell followed approximately 200 km of western NSW riparian systems. All were similarly impacted by the early squatters' droving activities. As Mitchell neared the western limit of droving operations he proclaimed, *"We hoped to find within the territory of the native, ponds of clear water, unsoiled by cattle"*.

Today these landscapes are notorious for extensive reaches of incised channels, and the 'chains of ponds' are now very rare. These modern, channelised reaches cut through and disconnect the floodplain. They are characterised by a lack of aquatic habitat and simplified channel geometry and morphology. Floodplain soil formation, nutrient cycling

and groundwater hydrology is compromised. An epoch of complex interwoven relationships unravelled in the mere blink of an eye – unravelled not by cataclysmic dramas involving asteroids or volcanos but simply by intense, relentless grazing practices and the erosive force of water impacting exposed soil.



The Goobang Creek landscape, 2022.

The Goobang, previously a chain of ponds in a grey box woodland ecosystem, is now drained by a creek that functions like a gutter. Local landholders describe these systems as 'either bone dry or a raging flood'. The eroded soils continue downstream filling aquatic habitat with sediment, and ultimately the estuary of the mighty Murray River.

Mitchell's sombre observations are a wakeup call and an opportunity to learn, improve and restore.

It is the nature of any ecosystem to strive to survive and restore balance. Above all, life is tenacious, robust and resilient. To repair the damage, all we need is to recognise the issues and facilitate nature's inherent resilience response.

The solution involves three key principles.

1. Maximise ground cover.
2. Maximise species diversity.
3. Maximise structural diversity.

Ground covers: A diverse mix of perennial herbs and bryophytes protects the soil from erosion, facilitates rainfall infiltration and reduces evaporation. It also provides complex habitat and nutrition for animals ranging from insects to the largest herbivores. These animals then



This red stringybark dry sclerophyll forest features flowering *Stackhousia monogyna*, *Glossodia major*, *Diuris goonooensis*, *Bulbine bulbosa* with a diverse assortment of palatable grasses and forbs.



The critically endangered Box gum grassy woodland features a display of flowering *Murdannia graminea*, *Wahlenbergia* sp and *Sporobolus creber* with many other beneficial grasses, forbs and bryophytes.

contribute to the nutrient cycle in their own unique ways, as ‘the web of life’ in action.

Healthy herbage translates to healthy soils. The pictured woodlands have close to two dozen species in a square metre. Importantly, this diversity translates to multiple pathways for energy and nutrients to be synthesised and exchanged.

Species diversity: Plant diversity equals more pathways to move energy and resources throughout the system. This is very important as plants, bryophytes, fungi, cyanobacteria and algae are the only

terrestrial organisms that can directly synthesise solar energy, water and minerals into new materials.

Each species achieves this governed by their individual environmental tolerances and constraints. Individually they are limited in what they can achieve. Limits include minimum and maximum temperature tolerances, water, sunlight and nutrient requirements. But combined in a healthy ecosystem with several hundred other ‘producer’ species the scope expands considerably. This diverse base translates to growth potential across a very broad range of temperature and moisture conditions. It creates the resilience to resist and ultimately adapt to highly variable environmental conditions.

Animal diversity interacts and enhances these landscape relationships. In Australia many of our ecosystems are moisture limited. Woodland birds, reptiles and small mammals such as dunnarts and antechinus have evolved to use the food and moisture available in the huge biomass of insects which interact with the diverse native plant base.

The diverse floral displays within intact chains of ponds and swampy meadow landscapes can still be seen today. These landscapes are very susceptible to grazing and trampling by hoofed animals.



Goodenia macbarronii, *Isotome fluviatilis*, *Drosera burmannii*, *Haloragis heterophylla*, *Utricularia* sp, *Hydrocotyle* sp and a variety of *monocotyledon* species carpet these ephemeral wetlands.

When the warm months stay wet, *Utricularia* can flower from spring to autumn. Along with the sundews, they help to maintain landscape balance by harvesting the nutrients of the abundant insects which flourish in these favourable conditions.



Utricularia sp puts on a spectacular landscape display.



Above: An unidentified native truffle fungi species.

Left: Fruticose lichen on *Callitris endlicheri* bark.

Lichen, fungi and bryophytes also play a very important role in all ecosystems. Their ability to synthesise compounds, tolerate extremely harsh environments, decompose rock and lignin, and have symbiotic relationships with vascular plants and soil organisms uniquely contributes to the web of life.

Native truffles have important mycorrhizal relationships with most native plants. There are an estimated 1,500 plus indigenous truffle species, many of which are undescribed. The moisture and nutrient efficiency of inoculated plant roots increases several thousand-fold! Bettongs and hare wallabies were once important dispersal vectors digging up the ripe fruits and spreading the spores. The large wallabies, such as swamp and red-necked, continue this important dispersal role.

Structural diversity: These are the living and dead structures which transform an ecosystem. Herbaceous plants, sub-shrubs, shrubs, vines, and subcanopy and canopy species create the resources and structures for wildlife to forage, shelter, build a home and raise a family (or two or three!). When plants die the 'dead' material becomes a unique and essential resource. Many of our struggling species rely on this ecological complexity – woodland birds need a diverse shrub layer, owls and gliders need tree hollows, and lizards need fallen timber and large senescent tussock grasses.

The diversity of spiny plants, fallen woody debris, decaying logs and luxuriant old growth wilderness is one of the hardest things for the



Tussocks of native lemongrass, *Cymbopogon refractus*, along with fallen timber provide protection, shelter and forage for animal such as the charismatic boggi or shingleback (bottom right)

human condition to accept because it makes 'management' difficult and perhaps conjures ancient fears. In any landscape scenario try and consider what 'wild' wilderness characteristics you can live with and encourage in your patch.

Consider incorporating 'spiny' shrubs or nesting hollows into your plantings or using fallen timber as habitat. These actions will produce immediate beneficial results for wildlife.

We noticed lizards of all sizes loved our firewood stack, so we have created hundreds of substitute structures on our properties. Ecological thinnings are cut and positioned as shown below to create the cosy nooks and crannies that wildlife love. They are spread around revegetation groves as habitat links. Revegetation sites would normally take a hundred years to naturally accumulate this quality of fallen debris.



Ecological thinnings of cypress pine (*Callitris* species) are positioned amongst revegetation areas to enhance the habitat character of the newly created ecosystem for geckos, antechinus, dunnarts, echidnas or any wildlife that needs shelter from the predators and the harsh Aussie climate.

'Keep It Messy Mate' was a 1990s' Landcare catch cry for landscape conservation management. We heartily endorse the concept! The image below shows strategically felled invasive species left as wildlife habitat and a protective nursery for understorey regeneration. Thinning stimulates a biomass growth spurt in the remaining plants, sequestering carbon in new growth and storing old carbon in the felled habitat structures. This carbon will decay over time but typically lasts a decade or more – an environmental problem transformed into a benefit.



Eucalyptus blakelyi – *Callitris glaucophylla* shrubby woodlands show strategically felled invasive species left as wildlife habitat and a protective nursery for understorey regeneration.

Things you can do!

Everyone can play their part in enhancing biodiversity and tackling climate change.

Some suggested activities to consider:

- If you love gardening, diversify your plant base and expand the landscape impact by encouraging your neighbours to join in. Woodland birds will quickly respond by colonising gardens with suitable habitat.
- Talk to your local councils and other Crown land managers to see if there are bushland areas that you or your group could adopt. If it takes off, Bushcare, Dunecare or Landcare may be able to help facilitate your activities.
- Consider donating to on-ground wilderness protection organisations such as Bush Heritage Australia or Australian Wildlife Conservancy. These organisations specialise in purchasing and managing high conservation private lands.
- Lobby all levels of government to expand our nature reserve network for future generations.
- Secure your own acreage and start your own regenerative journey and experience!

Editor's note:

Andrew and Jenny have two properties, one at Dubbo and the other at Narromine. At their Dubbo property "Mottlecrah", Andrew is maintaining and restoring 2,025 acres, which is permanently protected by a registered conservation agreement. It consists of a range of ecosystems

including woodlands with currawang, ironbark, grey box, yellow box and allocasuarinas. Andrew is strategically restoring open areas, which had been previously cleared, to their original ecotypes. This has mainly been achieved by eradicating weeds and planting *Acacia* seedlings and other seeds, establishing about 1,500 plants per year.

He has eliminated feral pigs and goats through the use of entrapment techniques. Overgrazing by kangaroos is controlled by removing old dams established for livestock. To avoid open areas being swamped by callitris trees, they are cut down and the resulting logs are used to create habitat for small vulnerable fauna.

Below is a small example of the many grazing-sensitive plants that have bounced back as a result of reducing the destructive influence of feral goats and pigs.



The finger flower *Cheiranthra linearis*.



Common Fringe Lily *Thysanotus tuberosus*.



Milkmaids *Burchardia umbellata*. This uncommon western woodland lily is unfortunately a favorite food for feral pigs.



Purplish Beard Orchid, *Calochilus robertsonii*.

Our journey in land restoration using regenerative agriculture principles

Sylvia M. Leighton and Peter B. McKenzie

Sylvia's professional background is in landscape ecology and Peter's is in farming and agroforestry. They are dedicated to Landcare and live on a farm 100 km north east of Albany in Western Australia. The farm motto is 'Seeking Balance'. The property has had a complete redesign over the last 7 years to integrate wildlife habitat restoration into an economically viable 'broadacre' commercial agriculture property.



Sylvia Leighton & Peter McKenzie

Wilyun Pools Farm is 1,214 hectares and located on the south coast of Western Australia, in mallee country. Sylvia was a 6-month-old baby when the Leighton family arrived at this 'conditional purchase' property in 1965. The family set about clearing the native bush for agriculture under the state guidelines that required 12% of the farm area to be cleared annually. Sylvia calculated that over a 15-year period the family possibly cleared 55 million native plants along with the wildlife that used to reside in it.

The Leighton family managed the property as a sheep grazing operation for 30 years. Then in the 1990s Sylvia's parents leased 840 hectares of the property to grow plantation blue gums for 20 years. When Sylvia's father passed away her mother welcomed Sylvia and Peter's vision to 'restore some of the balance' on the farm. Neither Peter or Sylvia could return to agriculture and slip back into 'old ways of doing things'. The biodiverse remnant vegetation on the farm is viewed as the 'precious jewel'.



Aerial photo of farm, 1989.

Notes from Sylvia and Peter: Between 2015 and 2022 we have revegetated a 120-hectare network of provenance native plant wildlife habitat corridors reconnecting over 180 hectares of highly diverse Southwest Australian Floristic Region (SWAFR) remnant vegetation. The rotational-grazing system allows close management of stock nutrition ensuring there is always 100% ground cover at all times. In the last five years we have installed 120 gates, 90 km of fencing, and a drought-proof stock watering system with a solar powered ground water bore supplying a large water storage dam. We have also installed 20 hectares of agroforestry shelterbelts. These include eight species of favoured agroforestry timber species which can be harvested for commercial wood values in 20–30 years. We are guided by regenerative agriculture philosophies and continually seek a balance between sustainable commercial agriculture and wildlife conservation. We are focused on ‘alive soils’, maximising the benefits of building microbes in the soil and increasing deep carbon in the soil. Our vision is for Wilyun Pools Farm to become a local, state, national and international demonstration site.



Revegetated wildlife corridors are networked across the property.

We believe it is important to maintain detailed and accurate records of data and information for the next custodians of this property. We want to provide valuable information demonstrating it is possible to balance commercial agriculture with wildlife conservation. We conduct regular monitoring of the farm soils, undertake fauna surveys in the revegetated wildlife corridors, monitor revegetation successes and failures and undertake long-term management of weeds and feral animals (foxes and cats). We love our revegetated wildlife corridors which adjoin most of the paddocks. Seeing the wildlife return gives us the greatest pleasure.



Banksia coccinea

We undertook a Masters research project examining the bacterial community suites living in soils under undisturbed remnant native bushland compared to bacteria found under 50-year-old pasture and under 20-year-old blue gum plantations. We want to keep on monitoring these bacterial populations to make sure we are supporting them – not causing them to continually decline.

In 2016, Menang elders Carol Pettersen and Lynnette Knapp, along with archaeologist Myles Mitchell, visited the farm. We feel it is ‘core’ to future land management to involve and welcome traditional custodians back on to country to sit quietly and ‘feel the land’. They identified significant cultural sites near Wilyun Creek.

The revegetated wildlife corridors are sown with local provenance native plant species with many of them having bush tucker and medicinal values to Noongar Peoples and future generations. The elders shared that there are special ‘feelings’ within the land that tell them if landholders are ‘doing things right’.

Since returning to the land, we have welcomed over 400 members of the public to Wilyun Pools Farm to learn about the provenance-based habitat restoration techniques and regenerative farming philosophies. We particularly enjoy school groups visiting and organise different excursions focused around seedling planting, bush seed collection, and observing fauna and natural heritage values of the land. We have an on-farm nursery in which we annually grow 4,000–6,000 nectar rich plants such as hakeas and banksias so visitors and students can connect with plants and engage in ‘planting for a better future’.





We believe it is very important to retain provenance genetic integrity until science more fully understands the ancient and complex nature of southwestern floral genetics. The remnant bushland on the property has 14 *Eucalyptus* species along with four hybrid eucalypts. Over 300 native plant species have been recorded on Wilyun Pools Farm and in the near surrounds. Much of the property contains vegetation communities that belong to the Threatened Ecological Community of *Proteaceous Dominated Kwongan Shrubland*.



Direct seeding is the most economic way to sow the large wildlife corridor areas. It costs about \$2,500 per hectare compared to revegetating with nursery seedlings which take more time and resources and can cost two to three times more per hectare. The seed for the revegetation is collected from the 180 hectares of remnant vegetation on the property. The seed mix incorporates 30–50 native species with germination rates of up to 30,000–40,000 seedlings per hectare. We prefer high levels of germination so the sites out compete weed species within the first 12 months. Post sowing monitoring has recorded the sites self-pruning down to about 20,000 stems per hectare by their fourth year.



Wilyun Pools Farm has an active Facebook page. We are very aware that publicity and education are the most powerful tools of change. We use social media to keep people informed and share our vision for the incorporation of protected wildlife habitat restoration into agricultural lands. We promote the three core pillars of landcare and regenerative agriculture: healthy environment, healthy society and healthy economy.

We are deeply concerned about the ever-increasing large industrial style cropping operations in our surrounding district. Since 1965, the local district population has declined by 75%. We are shocked that once again the summer dust storms can be seen in many of the agricultural districts of Western Australia and wonder if the landcare knowledge of the 1990s has been lost. We are also deeply concerned about the long-term impact of herbicides and pesticides on soil health, landscape health and human health. We support greater transparency of agricultural food production processes so consumers can trace the 'paddock to plate' food production journey. We feel that the most persuasive tool to show other farmers different styles of farming is to provide a farm model as an example.



Lambertia inermis



Hakea cucullata



Banksia baueri

We deliberately installed an entrance farm sign to emphasise that we don't see ourselves as 'land owners'. We promote we are the present day 'Landcarers' of Wilyun Pools Farm and one day it will be passed onto future 'Carers'. We hope we can use all our 'human smarts' to stabilise the land, reduce its degradation and try to retain the ecological health of the freshwater creek called 'Wilyun'.

We feel extremely privileged to have had the responsibility of caring for the natural heritage values of a piece of land in Australia. Our biggest pleasure is watching the native animals, such as blue wrens, Carnaby cockatoos, quenda (southern brown bandicoots), honey possums and pygmy possums, use the revegetated wildlife corridors to once again move safely across the landscape. We are excited about the worldwide movement to gain more understanding about the intricate and complex ecological systems core to our planet. We will keep on learning, adjusting and trying to do our bit to create a more balanced, positive future.



Samford Eco-Corridor project, South-East Queensland

Peter Storer

Peter is a member of the Samford and District Progress and Protection Association (SDPPA) Eco-Corridor Sub-Committee and President of Native Plants Queensland, Samford Branch.

Background

In 2011, the SDPPA undertook the 'Samford Futures' process, where the community was asked in a questionnaire to create a 'wish list' for the district. One suggestion was to enhance the environment along the South Pine River in the Samford Parklands, part of the old CSIRO Pastoral Research Station, and part of which became public land after subdivision and development. CSIRO had used the land to test grass and legume species for quality of forage and palatability for cattle. Many of these introduced species have since become serious environmental weeds (e.g. *Leucaena* sp.).



In 2012, the trees along the South Pine River in Samford Parklands were badly infested with introduced vine weeds, such as morning glory.

In 2012, the SDPPA was successful in being awarded a Queensland State Government 'Everyone's Environment' grant, with funding matched by Moreton Bay Regional Council, to enable a 4,500 m² section of the Samford Parklands along the South Pine River to be revegetated using local indigenous rainforest species, and for some weed control and rehabilitation in remnants along the adjacent river

bank. The main aim was to recreate a section of nationally Critically Endangered regional ecosystem 'RE12.3.16 Complex notophyll to microphyll vine forest on alluvial plains' (a type of gallery rainforest), very little of which is currently protected in reserves in Queensland. Small parcels of this special habitat can be found in other parts of the local district, such as the Day's Road Environmental Reserve at Wights Mountain and at Ward's Scrub at Highvale (on private property).

The other aims of the project were to:

- enhance biodiversity in the Samford Parklands along the South Pine River
- improve the public amenity of the area
- educate the Samford and district community about the original local flora and fauna, especially threatened species and ecosystems
- provide a model for landholder revegetation along our creeks and waterways
- use citizen science monitoring to show the progress of the site.

Rainforest vegetation

In early 2013, the Eco-Corridor formed a close partnership with the Samford Branch of Native Plants Queensland to help source a diverse range of suitable rainforest plant species, based on the Native Plants Queensland lists for Ward's Scrub dating from 1972 to 2004 and the more recent list for Day's Road West Reserve compiled by botanist Paul Grimshaw. In July 2013, the revegetation area was mulched thickly in preparation for planting.



In 2013, the area to be planted with rainforest plants was mulched thickly.

In mid-March 2014, we planted about 1,900 trees and shrubs at a community planting day that attracted over 160 volunteers, including many families. We found that managing this number of people was challenging and we had to go around afterwards and re-plant many of the plants.



By 2015, the rainforest was establishing well, but there were some losses from frost in the foreground.

Our planting density was 5 m spacing for large trees, 2.5 m for small trees and 1.5 m for shrubs. Our aim to establish a closed rainforest canopy within two years was achieved, thus reducing 'sun-weed' germination significantly and enabling the first batch of understorey plants to be planted just before the end of the 2-year grant period.

The rainforest revegetation areas comprise 148 species of indigenous trees and shrubs from Samford's subset of RE12.3.16 and 19 understorey species and groundcovers, which have dramatically increased the biodiversity of the site. Important canopy species include *Drypetes deplanchei*, *Niemeyera antiloga*, *Dissiliaria baloghioides* and *Barklya syringifolia*. Unusual local species include *Acacia bakeri*, *Atalaya multiflora*, *Backhousia subargentea* and *Medicosma cunninghamii*. One of the most significant inclusions is *Macadamia ternifolia*, which is

number 12 on Moreton Bay Regional Council's priority list of species of flora and fauna.

In 2017, we cleared and revegetated a very weedy section of the adjacent river bank to reduce the weed seed pressure on our plantings and to help with erosion control.

The first unexpected problem for the rainforest areas was a severe frost in mid-2015. When we saw the forecast, we sprayed the young plants with a 'frost guard' solution and re-installed the corflute plant guards for protection, but it was to no avail and we lost almost 90% of the plants in the section below the adjacent hillside. Most of this area had to be re-planted. To try to protect from future frosts, we planted a 'barrier' of quick-growing *Acacia fimbriata* along the southern edge of the planting. The area recovered well after subsequent milder winters.

On World Swallowtail Day in June 2019, we ran a workshop on the Richmond Birdwing butterfly in association with Wildlife Queensland's Richmond Birdwing Conservation Network (RBCN) and the Butterfly and Other Invertebrates Club (BOIC), which drew over 100 people. Afterwards, attendees planted about 50 *Pararistolochia praevenosa* host vines in the riverside remnant and revegetation areas, and we continue to add to this number as the site expands. This makes the Eco-Corridor a major hub in the vine corridor the Richmond Birdwing Conservation Network is creating on public land and Land for Wildlife properties, which aims to link the relict populations of butterflies in the rainforests of the Sunshine and Gold Coast hinterlands.

The most frequent problem in the past eight years since the initial planting has been repeated drought conditions, which peaked in 2019 (the summer of bushfires). We suffered patchy losses of rainforest trees in the early years, but, once the canopy closed, losses were minimal. Our dense border of lomandras and low shrubs planted inside the boundary helps to protect the plantings from drying winds.

Ironically, our most recent challenge in the rainforest section was major flooding, with the South Pine River breaking its banks in the deluge of February 2022. Our riverbank revegetation area was badly damaged by the very fast-flowing water, but the trees and shrubs in the main revegetation zones on the alluvial flat held up pretty well, with some limited scouring of the understorey and all the remaining mulch washing away. We did not replace the mulch because the canopy is now very dense, protecting the soil from the hot sun, and we know the groundcover grasses, such as *Oplismenus* spp. and *Ottochloa gracillima*, will spread quickly over the bare soil.

Woodland revegetation

As a result of ex-Cyclone Debbie in early 2017, we were offered well over 200 m³ of mulch from a local landscape supplier at the cost of delivery only. By lucky coincidence, this occurred just after Moreton Bay Regional Council had temporarily 'dumped' 400 m³ of topsoil (which had been removed while making a new road nearby) at the top of the weedy hillside above the rainforest plantings. We acted quickly to secure the topsoil for the site and persuaded the council to rip the hillside, effectively 'ploughing in' all the weeds and adding organic matter to the soil. We contracted a bobcat owner to spread the topsoil evenly over the ripped hillside and then cover the area with mulch to about 150 mm deep to suppress weed re-growth. We then allowed the mulch to break down over several months, re-applying it in areas where it had thinned.

Even though this process should have improved the aeration and friability of the formerly compacted soil, the hillside is quite steep and exposed, making it unsuitable to extend our rainforest plantings. Instead, we decided to create a grassy eucalypt woodland habitat, guided by relevant Native Plants Queensland species lists from the Samford and Pine Rivers districts. The resultant species list comprises a mix of regional ecosystem types, in contrast to the single rainforest ecosystem we have planted on the alluvial flats below.

Our second major community planting (of this eucalypt woodland) took place on Earth Day, 22 April 2018, and was a huge success, attracting over 80 volunteers from far and wide, including many families. Lessons learned from our first attempt in 2014 were to use a contractor to pre-dig the holes, and to have several supervisors (1 per 15 people) to ensure good quality control. As a result, we planted the whole hillside with over 2,000 plants, watered them and pulled the mulch back around them in just 1.5 hours. Furthermore, we did not have to 're-plant' a single plant – quite an achievement when young children are involved.

During layout, we had placed trees more tolerant of drier conditions (such as *Eucalyptus fibrosa*) at the top of the hill, with more 'demanding' species (such as *E. moluccana* and *E. microcorys*) planted on the lower slope. We included several 'koala species' such as *Eucalyptus propinqua* and *E. tereticornis*. We sourced seven local wattle species, including *Acacia complanata* with its distinct flat stems and *A. irrorata* with true leaves. We hope our two species of she-oaks, *Allocasuarina torulosa* and *A. littoralis*, will eventually attract glossy black cockatoos from their current haunts in nearby Samsonvale. Our understorey

shrubs include *Hovea acutifolia*, *Jacksonia scoparia* and *Pultenaea villosa*. We managed to source seven local grass species, including the dainty *Eragrostis sororia* and the attractive *Microlaena stipoides*, as well as the more common *Cymbopogon refractus*, *Imperata cylindrica* and *Themeda triandra*.

We do not water again after the initial planting, but we are careful to put plants in the ground only at times when there is deep soil moisture, thus encouraging strong, deep root growth. Despite the very dry, and often windy, conditions for four months after planting, over 90% of the plants on the hillside thrived because the high soil moisture levels were maintained by the thick layer of mulch, which was replenished as required at our monthly bushcare working bees. The growth rate was phenomenal, with some of the eucalypts and wattles reaching 4 m within a year.



In July 2018, the young trees, shrubs and grasses were beginning to establish, 4 months after planting.

The hillside planting covers 2,300 m², bringing our total area of revegetation to over 6,600 m². The biggest challenge in the eucalypt woodland has been weed control because of the more open habitat structure and the huge seed pressure from the surrounding area, so this has been a key focus of our monthly bushcare program for the past few years.

The woodland provides a second model for landholder vegetation for those residents living on drier hillsides, rather than along creeks or rivers.



By July 2019, the woodland habitat structure in this area was already well developed.

Community education

The project is not just about revegetation, though. One of our main aims is to educate the community about Samford's flora, fauna and ecosystems. We invite the wider community to take part in surveys of butterflies with Butterfly and Other Invertebrates Club and of spiders with expert Greg Anderson. Future surveys will include frogs and freshwater invertebrates. During National Bird Week in October, we run guided bird walks, which are very popular. The Eco-Corridor has also been used as an educational resource by Marist 180 environmental trainees, University of Queensland architecture students, and schools.

To learn more about the Eco-Corridor, please visit our Facebook page (www.facebook.com/EcoCorridor/).

Farmers take the lead on habitat restoration for giant freshwater crayfish recovery

Lauren Bird

Lauren is a Biodiversity Coordinator with Natural Resource Management (NRM) North in Launceston. She works with landholders and stakeholders in northern Tasmania to protect, rehabilitate and enhance native vegetation and waterways for the benefit of ecological communities and threatened species. Lauren is currently responsible for coordinating and delivering the Partnerships for Giant Freshwater Crayfish Recovery Project, supported by NRM North through funding by the Australian Government, which aims to expand the distribution of existing populations of the species in north-east Tasmania by improving habitat and water quality conditions within high priority river reaches.

Situated within the Pipers River catchment in the picturesque rural community of Lilydale in north-east Tasmania is Summerlea Farm, a 69 hectare Angus beef property run by the Mahnken family for six generations. Over a kilometre of the Second River flows through the property which directly links to remnant wet stringybark (*Eucalyptus obliqua*) and mountain ash (*Eucalyptus regnans*) forest with known populations of many unique Tasmanian threatened species including spotted tail quoll (*Dasyurus maculatus*), Mount Arthur burrowing crayfish (*Engaeus orramakunna*), grey goshawk (*Accipter novaehollandiae*), and the Tasmanian giant freshwater crayfish (*Astacopsis gouldi*).

The giant freshwater crayfish is the largest freshwater invertebrate in the world, and only found in rivers that flow into Bass Strait (except for the Tamar catchment) and the Arthur catchment. Giant freshwater crayfish can grow up to 80 cm in length and weigh 6 kg, but there are very few individuals of this size left in the wild. The species is now listed as vulnerable under the Tasmanian *Threatened Species Protection Act 1995* and the national *Environment Protection and Biodiversity Conservation Act 1999*.



Left: Adult Tasmanian giant freshwater crayfish (*Astacopsis gouldi*) can live up to 68 years, grow to over 80 cm and weigh 6 kg. However, in recent years the recorded weight of most large mature adults has been less than 3 kg.

Giant freshwater crayfish feed almost entirely on decaying wood and leaf litter, and rely on streams and rivers with dense, overhanging native vegetation, in-stream logs, undercut banks, and rocks or boulders to shelter. Key threats to *A. gouldi* include habitat loss or disturbance, sediment accumulation, drought, climate change, and poaching. Any form of land clearing resulting in sediment and silt accumulation in waterways presents a high risk for juveniles as it fills in gaps and crevices in the stream substrate, leaving them nowhere to hide and exposing them to predation or being washed away.

Through funding from the Australian Government, NRM North is working with landholders in high priority stream reaches of the Pipers, Brid and Boobyalla catchments in north-east Tasmania to co-invest in on-ground habitat improvement works. This includes fencing livestock out of rivers, controlling riverbank weeds, establishing dense, native riverbank vegetation, and providing alternative watering sources for livestock. The works will reduce threats to the giant freshwater crayfish by improving stream shading, stabilising riverbanks, increasing resilience to flood events, filtering sediment and effluent runoff, providing a steady food source, and mitigating climate change impacts. The project is also improving community awareness and knowledge of the species, its threats, and habitat requirements.

The upper Second River is a high priority rehabilitation reach for the project. In 2020, the owners of Summerlea Farm, Rick and Liz Mahnken, approached NRM North with a keen interest in how the project could benefit their property. Liz Mahnken said rehabilitation efforts would not have eventuated without support from NRM North: "Having support from NRM North has allowed us to do what we wanted to do in terms of fencing off the river and improving our rotational grazing, so that assistance with the fencing was really helpful". Project Coordinator Lauren Bird works one-on-one with landholders to develop restoration plans that integrate best practice land and waterway management with site-specific ecology. The composition and diversity of surrounding remnant native streamside vegetation communities are studied to replicate and restore the original streamside habitat. Each restoration site typically includes between 22 to 30 species across all strata and tube stock are sourced from specialist native plant nurseries that use seed of local provenance. All seedlings are generally guarded to protect them from harsh winds and high concentrations of browsing wildlife. The project is also experimenting with using Greenpods, a compostable guard product made entirely from recycled cardboard, to reduce the impact of traditional confluence guards on sensitive waterway environments.



Stringybark (*Eucalyptus obliqua*) is an upper-bank species that prefers drier well-drained soils but can tolerate short periods of flood. It can grow up to 90 metres and is dominant in the overall species composition for this project.



White gum (*Eucalyptus viminalis*) is an upper to mid-bank tree that can tolerate both wet and dry conditions, including river flats that may flood. It can grow up to 70 metres and is dominant in the overall species composition.



Common dogwood (*Pomaderris apetala*) is a mid-bank tall shrub that can tolerate both wet and dry conditions, including soils that stay wet to very wet during typical Tasmanian winters. It can grow up to 10 metres and adds to shading and understorey species diversity.



Broadleaf hopbush (*Dodonaea viscosa*) is a mid to lower-bank bushy shrub that can tolerate periods of inundation and small flood events but also short periods of dryness in summer. It can grow to 6 metres and adds to the understorey species diversity.



Beaked hakea (*Hakea epiglottis*) is a mid-bank shrub that can cope with small flood events and soils that stay wet to very wet during Tasmanian winters but can also tolerate periods of dryness in summer. It can grow to 4 metres and adds to understorey diversity.



Silver tussock (*Poa labillardierei*) is a hardy upper to mid-bank grass that prefers drier soils but can also tolerate periods of inundation. It is an important part of the understorey for filtering overland water run-off and trapping sediment.

Liz Mahnken said having access to expert knowledge was invaluable.

We've learnt a lot about the crayfish and about different plant and animal species. The surrounding area is really green and full of life – we've started to notice so many bugs and birds and have even seen the elusive Mount Arthur burrowing crayfish at work.

The idyllic setting and success of the project so far has left Liz Mahnken contemplating possibilities in agri-tourism.

It's a really beautiful space to be in ... we like the idea of maybe some night tours and wildlife spotting, so we could integrate that into other parts of our farm business.

The project at Summerlea Farm has attracted strong interest and support from community members to get involved in on-ground restoration activities for the crayfish. In partnership with NRM North, Rick and Liz have hosted two community tree planting days that have collectively involved 70 people in planting 2,250 native trees, shrubs and grasses along the upper Second River on their property. Attendees have included local landholders who have received volunteer planting support on their own properties and have taken the opportunity to 'pay it forward' by helping out at Summerlea Farm.

Liz Mahnken said *"There's something incredible about putting trees in the ground and knowing that they will be there longer than you are going to be on Earth. This is the start of something for the future and it's incredible to be a part of that, to do something for the planet that is really going to leave a legacy"*.



Above: The project at Summerlea Farm has involved 70 dedicated community members to collectively plant 2250 seedlings for giant freshwater crayfish habitat.

Lal Lal, Victoria: Bushland restoration, with a little help from my friends

Susan Meyer

Susan is the current owner/custodian of this Land for Wildlife property, a member of the Lal Lal Catchment Landcare Group and the Australian Plants Society Victoria, Geelong Branch.

The small township of Lal Lal with its historic bluestone railway station (1862) is passed through by many tourists on their way to view the scenic Lal Lal Falls Reserve. Culturally, the falls are believed to be the earthly home of Bunjil, the All Father or Creator to most Victorian Aboriginal tribes. The name Lal Lal is thought to be the local Wadawurrung word for "dashing of waters". Lal Lal Falls is listed on the Site Registry of Aboriginal Affairs Victoria as a spiritual place. Environmentally, the reserve contains significant vegetation including 13 plant species of regional significance and one species rare in Victoria and in Australia. This vegetation provides habitat for a variety of small mammals, reptiles and birds.

Our Land for Wildlife property described in this article consists of 20 acres (9.2 hectares) which is contained within the boundaries of Phylands Lane, Lal Lal Falls Road, Halls Road, Iron Mine Road and Bounds Lane. A section of the Lal Lal Racecourse Railway Branch Line (1886–1941) also forms part of our land – a still observable relic of the past. We have been told by a neighbour that in the 1940s and 1950s the land was part of Forests Commission Victoria (FCV); the current Lal Lal Falls Cottage B&B building was once a FCV office.

The property is situated on the Victorian Volcanic Plains, and can be classified as a 'Higher Rainfall Grassy Woodland' (Ecological Vegetation Class 55–63), or possibly 'Herb-rich Foothill Forest' (EVC 23) or 'Grassy Woodland' (EVC 175). It is a relatively flat sandy well drained site with mixed indigenous and introduced vegetation. Previous sand mining has created low areas that mostly support planted and volunteer Monterey pine (*Pinus radiata*). Although there is still a diversity of remnant indigenous vegetation in pockets and on the boundaries, such as the canopy trees of both rough and smooth bark manna gums (*Eucalyptus viminalis* ssp. *cygnetensis* and *E. viminalis* ssp. *viminalis*) and messmate (*E. obliqua*). The understorey trees include blackwood, black wattle, silver wattle and an abundance of cherry ballart (*Exocarpos cupressiformis*). Lower storey plants are mostly golden wattle, hop wattle and silky tea tree. Ground layer plants of grasses and herbs

include *Lomandra longifolia*, *Dianella revoluta*, common wallaby grass and nodding greenhood orchids, cranberry heath and bracken fern (*Pteridium esculentum*) (Murphy, 2018).

This article aims to describe the journey taken to restore this privately owned property so that it can continue to be a keeping place for native flora and fauna and maintain its important role as part of a wildlife corridor situated within a patchwork of surrounding farm land.

Background, timelines and progress

Our Lal Lal property was originally purchased in 1986 by my father Les Henderson, the attraction being 20 acres with an already approved Miner's Right Licence to remove sand, and sand mining was exactly what he proceeded to do for the next decade.



1988 Les Henderson sand mining at Lal Lal (approximately 1988)

My memory of our initial 1987 visits, and also a weekend stay at the house that came with the property, was of a well treed and very hilly landscape, plus the joy of being able to see koalas sitting in trees at eye level – seemingly unafraid of humans.

Fast forward 36 years, the property now has two distinct cleared areas, with wide tracks that link the Phylands Lane entry point, all the way

through to Halls Road. Many of the original large manna and swamp gums remain in place sitting in hillocks, high above these laneways, as testament of the original level of the land and also of the ability of our native trees to survive. Unfortunately, there is also an abundance of large pine trees that mark set boundaries. The pine trees' legacy of being left untouched to rewild for two decades has resulted in acres of thin but very tall pine tree wildings. My father is regretful now about the pine tree plantings, realising with hindsight that the better option would have been local indigenous species of eucalypts and wattles.



Bill and Sue Myer and their new Land4Wildlife sign

While my father was industriously removing sand, my mother Bonnie had other ideas. In 1988, Bonnie organised the building of a large dam at the Halls Road end of the property – a necessary project for wildlife to survive the summer heat and still our only consistent water source. Bonnie also planted out the outside dam wall, the middle of the dam 'island' and a nearby large triangular area with eucalypts, wattles and hakeas. An environmentalist ahead of her time, in 1988 my mother registered this property as Land for Wildlife. It was the third property so registered in Victoria in 1988, and so it remains and maintains that early registration number.

Between 1995 when the sand mining finished and 2015, the property was left to its own devices. With the exception of occasional grass slashing of the cleared areas, the property appeared as an unkept, wild and weedy place. In effect the land had rewilded itself, with blackberries, bracken fern, gorse and pine tree wildings so thick that the sun rarely penetrated to warm the ground. The 'island' in the middle of the dam was completely covered with impenetrable blackberries. In other parts of the property, there were rabbit burrows and fox holes. There were, however, many redeeming features, such as the occasional echidna sightings, lots of frogs and lizards, native orchids coming up under the gum trees if you looked closely, and amazing fungi. Even on the hottest summer day the big manna gums always bring down the temperature several degrees.

What to do?

In 2016 we took full advantage of the Victorian Gorse Taskforce which provided funding to landowners to control gorse. This was an initiative of the Leigh Catchment Group, Moorabool Landcare Network and Moorabool Shire Council. After an inspection of the whole site by the scheme's coordinator, a list of experienced operators was provided to us. We engaged Goldfields Weed Management Services to have approximately 90% of the gorse scattered throughout the property removed, never to return. The gorse was cut down, stems poisoned and bushes removed from the site. The occasional bush is still found when in flower, which we are able to manage and control ourselves, using this same method.

In spring of 2017 the blackberries on the dam island and surrounding outer dam banks were contact poisoned. This needed to be repeated every six months to completely remove the blackberry cover from the island. It is now completely blackberry free and able to be safely accessed.

In June 2018 we engaged Steve Murphy, author of *Recreating the Country*, for a report to establish exactly what native plants, animals and introduced plant species the property had on site and importantly



2022 "The Island" in middle of dam with small bridge to get across and blackberries gone.

to guide us in the best management processes to achieve as natural a regeneration as possible over time. I have included here an example of some of the advice received: *A gradual annual staged removal of the pines is recommended because of the considerable weed suppression that they provide. The trunks of the pine trees that are cut could be left on the ground in a scattered array to provide habitat for birds, reptiles, amphibians and small mammals. The logs will rot within ten years and provide important humus for the sandy soil.*



Above: An existing cherry ballart, *Exocarpos cupressiformis*, on the property. (Photo: Stephen Murphy)



Left: The edible fruit. (Photo: PlantNet. NSW Flora online).

The report continues, outlining three methods which can be used to re-establish the indigenous vegetation in cleared and existing open areas:

1. *Natural regeneration will begin naturally after the initial pine tree removal. This will result from germination of seed blowing in from adjacent remnant patches as well as dormant seeds and tubers remaining in the soil. Shallow soil disturbance with a tractor drawn*

ripper to 10 cm deep would help stimulate germination of remnant dormant seed. This is a slow process that is likely to take five years or more for plants to appear. It is also likely to limit the number of plant species to those that already exist on the property.

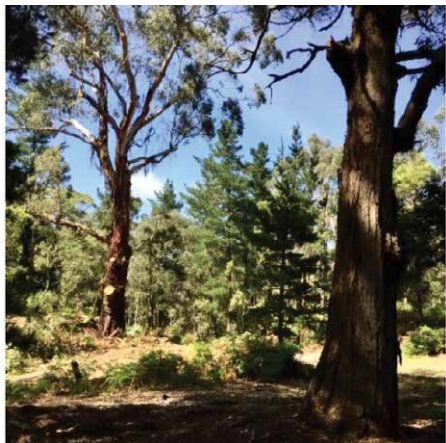
2. Direct seeding can be done by sowing seed collected from local trees and shrubs. A pinch of seed can be planted 2–3 m apart and marked by a stake to indicate their location for future reference. It would likely be necessary to put a tree guard on these germinating seedlings to protect them from rabbits and grazing marsupials. Victorian Native Seed www.victoriannativeseed.com.au/ The latter is indigenous seed though it is not likely to be native to the Lal Lal area.

3. Plant tube stock of local indigenous species. The local nursery is Ballarat Wild Plants.

The recommended revegetation design for us to follow was the mass planting in groups of the same species. This was highly recommended to enhance pollination, seed production, feeding and habitat opportunities for wildlife, and would look natural. Planting structural layers in the vegetation improves browsing efficiency, habitat and safety for wildlife (Murphy, 2018).

This is the exact plan of action that we have followed over the last four years. I can confirm that once some areas of pine were removed the dormant seeds of eucalypts and wattles are coming up just as Steve predicted. However, as at 2022, there are still large areas of pines still untouched.

In 2019 we consulted an arborist to check the safety of the large manna gum (below) at the Phylands Lane entrance. This is possibly the tree



with the largest diameter and also the tallest tree we have. As it is in a location where we park the car, we were concerned about the risk of falling branches. A 20% reduction in its upper branches and a tidy up of any damaged limbs was recommended. This has now occurred and this tree now looks to be a thriving healthy tree and doing well. In other work carried out in the dry summer of 2019, we had

the natural water drainage formed alongside the old railway line off Halls Road cleared of blackberries and other assorted debris.

In late 2020 after a very wet winter and warm spring, the growth of grass and bracken was both astonishing and worrying with summer only a few weeks away. Where this growth was able to be accessed by tractor, this vegetation was slashed and mulched. The visual result, which only lasted for a month or two, was that the cleared areas of our property looked like a well-tended golf course. Of note, the bracken came back with a vengeance after that. The effort now is to only keep the paths and tracks free of bracken fern.



2020 – tracks cleared

Pine tree clearing occurred in October 2021 (with many medium sized trees removed) and again in March 2022 when work began on removing pockets of the many thin tall wilding pines. The resulting mulched pinewood chips were piled up in heaps throughout the property. Once this has rested for a few months and broken down it has proved very useful as a mulch when planting out young trees and other native plants.

One of the difficulties we are experiencing is the very sandy soil we have, and the past removal of large areas of 'top soil' or overburden which was removed to get to the sand that was mined. However, the eucalypt trees on the property, both young and old, are all survivors



Despite the sandy soil and depth of sand taken, the trees survive.

using what nutrients they gain from this soil. Blackberries and gorse are a consistent problem to be on the constant look out for, but now the growth is just small and low to the ground with plants hidden among the grass. We have attempted to limit any use of chemicals, so weeding has been by spot burning off, mechanical pick and shovel, slashing before weeds have gone to seed and also by removing seed heads. This is hard work but rewarding with only the odd Scottish thistle now where once there were hundreds at the back of the property. As the old saying goes, 'seven years seeding equals seven years weeding'.

As a society, we are all becoming much more aware now that a walk in the bush, that just spending quiet time with nature, is good for the soul. Taking on the 'caretaking' of this Lal Lal property is something we very much appreciate as a gift, and never a burden. It has certainly made me appreciate nature and the uniqueness and wonder of the natural Australian ecosystems, of the need for 'wild' places. Hopefully such pockets of the Victorian bushland, with just a little help from us humans, can return to the way they were meant to be as a sanctuary for all the lifeforms contained therein – both above and below ground.

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Hinterland Regional Park Bushcare project

Graham J. McDonald

Graham is a life member of Native Plants Queensland. He has worked in Queensland as a secondary science teacher, horticulturalist, and consultant botanist for councils, state government and developers. His hobbies include running a native plant nursery, bushwalking, native plant photography, caravanning and gardening. He has authored two books: Growing a Butterfly Garden in South-east Queensland and Grow Natives on the Gold Coast – A practical guide for gardeners.

Location

The Hinterland Regional Park is located at Mudgeeraba on the Gold Coast. This 62-hectare area of land lies at the junction of Bonogin, Mudgeeraba and Wallaby Creeks. The area is mostly flood plain, 4 to 6 metres above sea level with about 15% of the land higher than 6 metres.

History

This land was selected in 1859 and cleared for timber and grazing. In the 1990s a large proportion of the land was purchased by a developer for a housing development. The Gold Coast City Council resumed the land after a period of community objection followed by a win in the Land and Environment Court. In April 1999, the Beaches to Bushland program was launched in this park. We are still restoring vegetation 23 years later with three original members still in the group.

Goals

The overall objective was to create habitat for local wildlife linked to trails in adjacent areas. To achieve this goal, it was necessary to eliminate or control environmental weeds which represented 40% of the total plant list for the park. As the weeds were removed, restoration of the native vegetation communities began on as much of the accessible land as possible. To this end, about 40 areas averaging 0.5 hectares each were prepared and planted with local indigenous species along the creeks and waterways. Some small areas only needed assisted natural regeneration. The planted areas of 20 hectares proved to be too great an area to control by our small bushcare group, despite working every Saturday for 10 years. Council now employs environmental contractors to assist with weed control.

At times in some areas of the park, we were aware that the entire removal of a large area of bushy weeds, like lantana, could result in total

loss of habitat for small birds and ground dwelling fauna. To overcome this, we planted adjacent areas with native species to take their place. *Lantana camara* was replaced with *Callicarpa pedunculata*, blackthorn (*Bursaria spinosa*) and native mulberry (*Pipturus argenteus*).

Other goals were to provide facilities for low-impact leisure, such as walking trails, development of a picnic area and facilities, and a playground for children.



Clearing the lantana.

Problems

The greatest problem of all has been the removal and control of a massive load of many invasive environmental weed species found throughout south-eastern Queensland. These include cat's claw creeper (*Dolichandra unguis-cati*), Madeira vine (*Anredera cordifolia*), glycine (*Neonotonia wightii*), lantana (*Lantana camara*), giant devil's fig (*Solanum chrysotrichum*), morning glory (*Ipomoea indica*), mile-a-minute (*Ipomoea cairica*), white morning glory (*Ipomoea alba*), horsegram (*Macrotyloma axillare*), Brazilian nightshade (*Solanum seaforthianum*), Easter cassia (*Senna pendula* var. *glabrata*), Chinese celtis (*Celtis sinensis*), pepperberry tree (*Schinus terebinthifolius*), South African pigeon grass (*Setaria sphacelata*), and broad-leaved paspalum (*Paspalum mandiocanum*). Some of these plants were

introduced as fodder plants for cattle when it was not realised that they could become environmental weeds. In addition to the former serious weeds, we were faced with a suite of about 20 other exotic weeds in smaller populations.

Flooding has had major impacts on some of our plantings in and near the six gullies and creeks that flow very quickly from the steep surrounding land. We developed various methods of holding soil and plants in place during flash flooding. One of these methods was to leave the weedy grasses between the planted trees in order to hold the soil and sand together during the floods. A brushcutter was used to keep the grass short. Eventually the grass died out as shade developed. It was pleasing to note that the diversity of plants used was able to prevent serious erosion during recent flood events in early 2022.

The control of grazing animals, including escaped cattle in flood events, horses, wallabies and hares, has included mesh 'cages' around the trees. They are labour-intensive to make, transport and install so they are used sparingly.

Long dry periods at times have impacted the survival of newly planted trees. We needed to carry water in buckets over long distances from the remaining waterholes, as many areas were inaccessible to vehicles due to the terrain.

Most of the bushcare sites are long distances from our tool shed and along narrow tracks, necessitating carrying tools and plants in a wheelbarrow. Access to truckloads of mulch was also impossible along narrow walking tracks and over pedestrian bridges, resulting in a lack of mulch around plants. Consequently, plants were prone to drying out and weed competition. We used anything we could find for mulch, including leaves from weed species. In addition, flooding would have carried the mulch downstream in most sites.

A lack of fire in some areas has meant that no regeneration of the Casuarina and Acacia woodland has occurred. This practice impacts glossy black cockatoos and other cockatoos, which depend on these trees for food. Many pea flower species have died out in these areas over the last 20 years as they need fire for seed germination.

Results

The greatest learning experience is that persistence, observation and immediate actions when needed are key factors in achieving good bushland restoration. I have noted that in revegetating weedy treeless ground that a tipping point is reached in around 5–10 years, when a

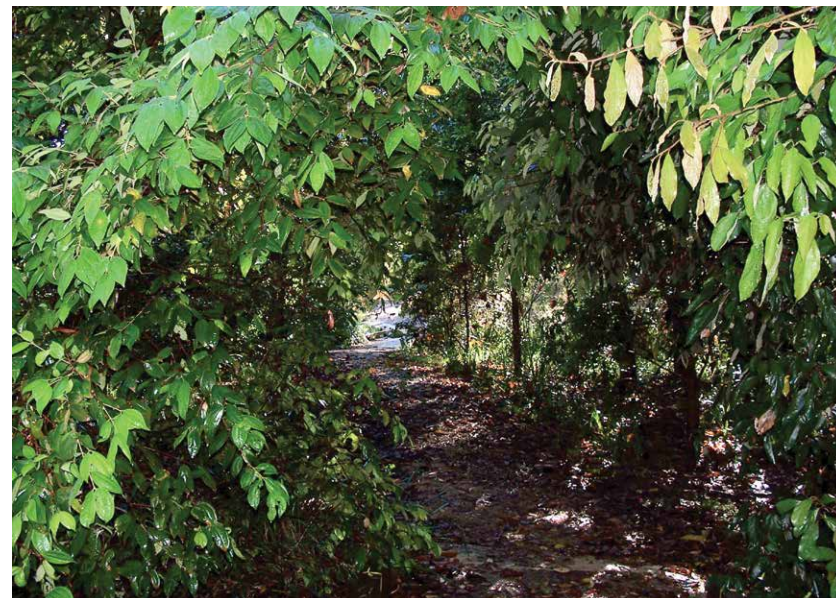
mixture of fast-growing pioneer and canopy species finally shade out the ground layer of weeds, so that some indigenous ground layer and canopy species can finally regenerate naturally. This point has now been reached over most of our 20-hectare areas and finally the hard work has subsided. The bushland regenerator should not relax completely to admire the work, as birds, floods and wind still bring in shade-tolerant weeds such as ochna (*Ochna serrulata*) and *Asparagus* species, which need to be hand-removed as seedlings.



Planting the first trees in Rainforest Gully – October 1999.



The same riparian rainforest site – June 2022.



Path leading through a canopy of *Rhodamnia rubescens* (left) and *Endiandra pubens* (right).



The regenerating rainforest 2008. Tall *Melaleuca quinquenervia* on the left, a small *Macaranga tanarius* with large leaves, the centre shrub is *Melaleuca salicina* planted on the creek edge and *Hibiscus heterophyllus* in the foreground right.

Our plantings are diverse, with melaleuca wetlands, dry sclerophyll forest, moist sclerophyll forest, riparian rainforest, dry rainforest and grass/sedgelands.

The diversity of wildlife is now exploding over the park, with several threatened fauna, including Richmond birdwing butterflies (*Ornithoptera richmondia*), glossy black cockatoos (*Calyptorhynchus lathami*) and koalas (*Phascolarctos cinereus*) taking up residence. Noisy pittas (*Pitta versicolor*) have even made the park home during the winter months where there was once an eroded weed-infested treeless gully. This is the most satisfying outcome after nearly a quarter of a century of sheer hard work by a handful of believers.



Left: Male Glossy Black-cockatoo

Below: Male Richmond Birdwing



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