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Issue 130 **Winter** 2024 *Time of Makuru and Djilba in the Noongar calendar.*

The 2024 vegetation die-off in the southwest

Photo – Joe Fontaine, Murdoch University.

GOVERNMENT OF WESTERN AUSTRALIA

Department of **Biodiversity, Conservation and Attractions**

PARKS AND WILDLIFE SERVICE

Bushland News *is a quarterly newsletter of the Urban Nature program to support community involvement in bushland conservation.*

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Time of Makuru and Djilba in the Noongar calendar.

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Next issue

Spring *Bushland News*

Spring *Bushland News* contributions should be sent to Urban Nature by **8 August 2024**. *Bushland News* seeks original contributions. If your submission has been or may be published elsewhere please let us know. Compiled and edited by William Fowler.

The 2024 vegetation die-off in the southwest

By Dr William Fowler and Dr Katinka Ruthrof

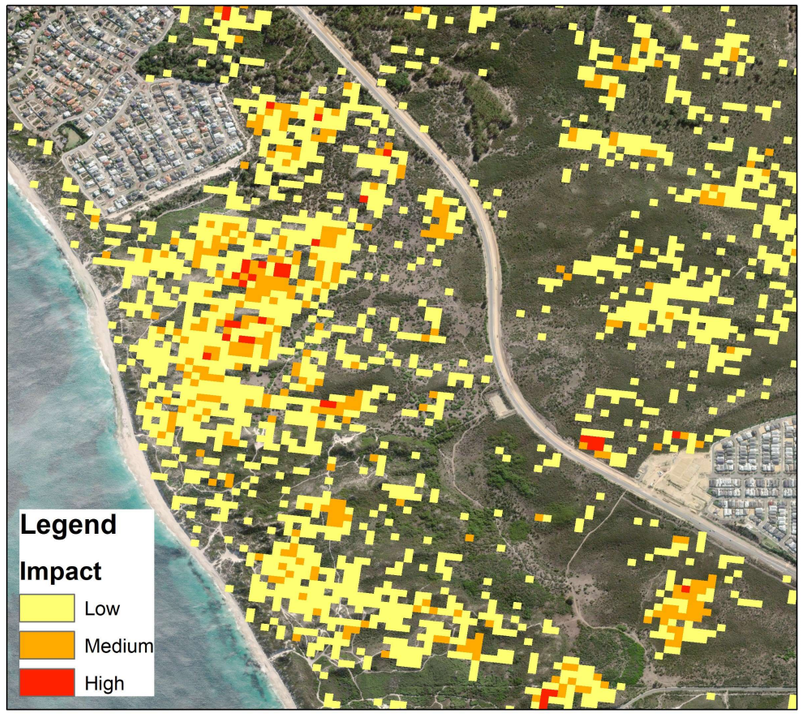
This summer and autumn, you have likely noticed substantial drought and heat-related impacts to vegetation, with many areas of bushland and even streetscapes showing signs of stress and die-off. This die-off event has been reported from as far north as Shark Bay, and as far south as Albany.

For some of you, this may seem familiar, with a previous die-off event having occurred in 2011. Heat waves in summer 2010-2011 coincided with a drought characterised by an extremely dry winter in 2010 (40–50% below the average rainfall).

This year, Western Australia had the warmest summer on record since observations began in 1910. Perth also just had the driest six months (Oct-Mar) since records began in 1910.

DBCA scientists and land managers are working with university researchers and community groups (such as 'Friends of' groups) to monitor and document the impacts of this drought to better understand how vegetation responds to these conditions. Satellite imagery has been used to identify areas of die-off across the south-west, which are then 'ground-truthed' by visiting areas of high, medium, and low impact to verify if and how die-off is occurring in these areas.

Front cover: Die-off affected vegetation at Paganoni swamp during the 2023/2024 drought. Photo – Joe Fontaine, Murdoch University.



Sentinel-2 satellite imagery die-off detection vs. on ground comparison near Yanchep. Photo – Richard Van Dongen and Katinka Ruthrof.

The observed impact of heat and drought conditions varies from location to location. From monitoring that has been undertaken so far, the majority of severe die-off sites seem to occur in shallow soils, such as those near granite outcrops (in the Northern Jarrah Forest) or limestone outcrops (in coastal heath). Die-off has also been recorded in deeper sandy soils of banksia woodland, though.

As different plant species respond to drought and heatwave conditions differently, some species may resprout and recover over the coming winter and spring. Others may not be able to respond in this way and be reliant on recruitment from seed to persist at affected locations.

There is potential for the composition of plant communities to change due to these varying responses, especially if events such as these become regular or more frequent, or act in combination with other stressors such as wildfire. The monitoring currently being undertaken suggests that species affected include jarrah, marri, bull banksia and sheoak in the forest; understorey species in coastal locations including *Spyridium globulosum* and *Banksia sessilis*; and species of Ericaceae such as *Brachyloma preissii*.

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What was learnt from the 2011 die-off?

In 2011, vegetation die-off was mainly seen coinciding with drought and heatwave conditions in the Northern Jarrah Forest but also tuart woodland, banksia woodland, and Eneabba sandplains.

A range of research projects were undertaken into forest health since the 2011 die-off event in the Northern Jarrah Forest. This research focused on investigating the immediate response of vegetation, along with the recovery of key forest tree species such as jarrah and marri. In addition, research efforts have focused on which site factors contributed to drought related die-off and how native fauna responded during these significant events.

There has been much learnt from the 2011 die-off in the Northern Jarrah Forest, including:

- changes in vegetation density and structure towards reduced height but higher stem density
- site properties related to the die-off included rocky soils with low water holding capacity; proximity to rock outcrops; steep slopes; higher elevations; and dry areas
- how other organisms such as fauna, microbes, and insects were impacted by the die-off.
- how some insects and birds benefitted from the die-off. For example, how wood boring insects such as the native *Phoracantha semipunctata* beetle (a long horned borer, which can be heard by a human as it feeds on stressed trees), increased in density, and then became a feed for cockatoos, who strip the bark away in order to reach the larvae.
- implications of die-off for fuel loads: fire modelling suggested a fire rate of spread would be 30% greater in die-off areas.

Die-off impacted understory vegetation in Banksia woodland. Photo – Joe Fontaine, Murdoch University.

Importantly, this research has enabled the development of vulnerability maps which allows land managers such as DBCA to help predict how the jarrah forest might be impacted in future drought and heatwave conditions. Together with the use of predictive models, this mapping has helped inform the development of proactive management strategies in the Forest Management Plan 2024-2033 such as ecological thinning, which aims to reduce drought stress in the forest.

The collaborative field and laboratory research being undertaken around the 2023/2024 die-off event will contribute to understanding the response and thresholds of plant species and communities. This will aid in predicting vulnerability so that adaptive management strategies can be developed and implemented to reduce the future die-off risk in certain circumstances.

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Effects of die-off in Jarrah forest. Photo – Joe Fontaine, Murdoch University.

Die-off impacts at Mount Brown reserve in coastal heath on limestone in autumn 2024, Below: same location in Spring 2015. Photos – William Fowler.

How can you help?

You can help by documenting die-off in your area. The Australian Citizen Science Association has an ongoing project called 'The Dead Tree Detective' where volunteers can report any dead trees one observes. The project aims to collect observations of dead or dying trees around Australia. Knowing where and when trees have died will help researchers to work out what the cause is, identify trees that are vulnerable, and take steps to protect their ecosystems.

You can also consider joining a local conservation group and assisting in caring for your local bushland. You can find your local group on the find a conservation group page.

Urban Nature update

By Dr William Fowler

In the lead up to winter, the Urban Nature team has been busy preparing for another field season, by finalising last year's data analysis and preparing for upcoming projects.

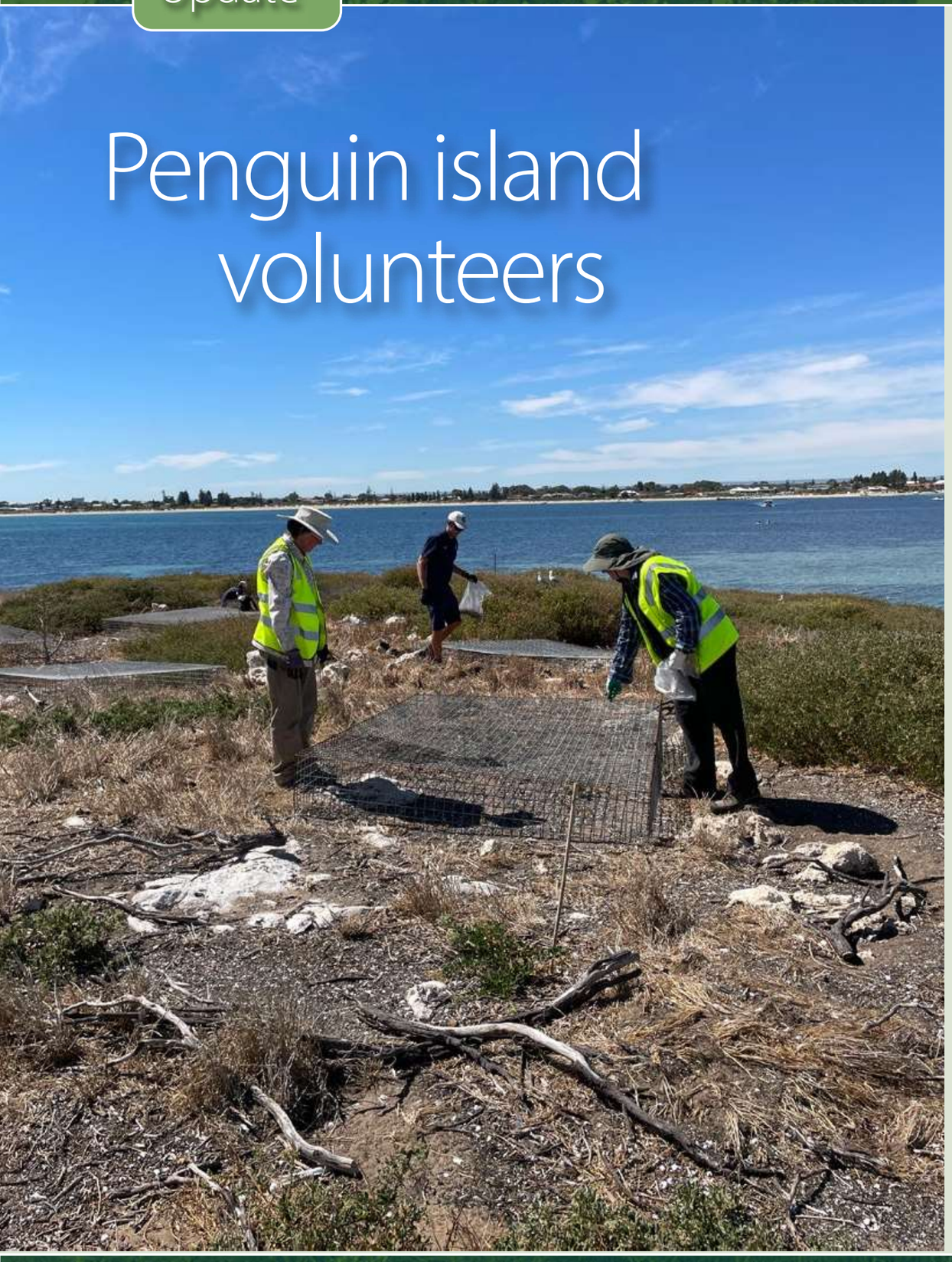
Whilst preparing this edition of Bushland News I have been finalising a couple of projects that Alex Hutchinson began while she was in the Urban Nature team. This has resulted in my spending some time in the field at Port Kennedy Scientific Park, and some in the office running analyses.

Additionally, as many others have been, we have contributed to monitoring the ecological impact of the drought at some of our frequented sites, of which this information has been feeding into broad scale monitoring from the department on this issue.

Julia Cullity will be returning for the next edition of Bushland News, if you have any queries or article ideas for the spring issue, feel free to contact me until Julia returns on July 8th.

William Fowler examining a threatened ecological community at Port Kennedy scientific park — Sedgelands in Holocene dune swales of the southern Swan Coastal Plain. Photos – Willa Veber.

Penguin island volunteers



Penguin Island habitat restoration activities are back for 2024. After a hot and very dry summer/autumn period, we are back on the island to continue with our vegetation restoration activities.

Penguin Island volunteers preparing the ground to be brushed with Rhagodia baccata fruits and then covered with cages to protect the restoration from nesting bird disturbance.

We are also working on trialling methods for restoration of perennial vegetation on the island's sand dunes. So far, we discovered that planting seedlings has worked well but the fruit brushing has not been as effective as on the guano rich limestone soils. This year we will trial burying/covering the brush with some 3-4cm of soil to see if it facilitates the germination.

Photos – Grazyna Paczkowska.

Noogoora burr (*Xanthium occidentale*) *By Jasmine Leighton*

Noogoora burr (*Xanthium occidentale, syn. X. strumarium*), also known as burweed, cocklebur, and sheep's burr, is a declared pest in Western Australia. Prompt action is required to control the spread of Noogoora burr. It is declared under section 22(2) of the BAM Act as Category 3 (Management) for Kimberley and Category 2 (Eradication) for the rest of WA. This means that land managers are legally obligated to eradicate infestations of the weed in WA. While in the Kimberley where it has established beyond feasible eradication, infestations must be managed to at least alleviate the impact and prevent spread.

Noogoora burr infestation and close-up at Yanchep National Park. Photo – Glen Coupar.

Originating in Mexico, southern North America, and the Caribbean, it first arrived in Australia in the 1860's where it was found on Noogoora station, Queensland. Since its arrival in Australia, it has become a serious and widespread weed along the eastern coast, the Northern Territory, and parts of Western Australia. It was first recorded in WA in 1949, where it was detected at a Northam flour mill attached to a sack. Under further inspection, the sack was found to contain over 300 mature burrs. Following this report, plants were then found at several sites within the Perth metropolitan area and eradicated. More recently, problematic infestations have been found around Manjimup, the Kimberley, and some of Perth's northern suburbs.

Local eradication works

Noogoora burr has been detected at several wetland sites within Perth's northern metropolitan suburbs, including Yellagonga Regional Park, Lake Gwelup, and Yanchep National Park.

Initial works to eradicate the weed within Yellagonga six years ago resulted in a substantial reduction. Large infestations were treated with herbicide and frequent follow up surveys dealt with any emerging seedlings. Treatment is ongoing in the north-eastern section of Lake Joondalup with follow up occurring every three months. Only a small number of plants required treatment in the last round, none of which had seeded. A team of DBCA and DPIRD staff were pleasantly surprised with the results following a walk-through of Yellagonga six months ago.

Continued next page ...

Noogoora burr infestation and close-up at Yanchep National Park. Photo – Glen Coupar.

Close-up of XXYY at Yanchep National Park. Photo - Glen Coupar. Insert, close up of fruit. Photo – Mark Varley.

A few isolated plants were spotted at Lake Gwelup and swiftly removed about a year ago. It's believed the weed was spread by burrs adhering to the feathers of waterbirds. Fortunately, follow up monitoring has found no further plants at the site.

The infestation within Yanchep was first detected in 2015. The site sits on a dry wetland with a deep surface layer of highly mobile peat. The risk of injury from falls or sinking meant the site is often too dangerous for staff or volunteers. To minimise risks, initial treatments involved aerial herbicide application via helicopter. The recent on-ground treatments completed in mid-March this year successfully killed a large area of Noogoora burr. Revegetation works have also been recommended to restore the site once the weed is successfully eradicated.

Biology & life cycle

Noogoora burr is an erect annual herb typically growing to 1-2.5m, sometimes 4m, in height. The many hooked spines of the burrs readily attach to wool, fur, feathers, and clothing, spreading seed via animal and human movement. A pocket of air surrounding the seeds allows the burrs to float, aiding their transport via watercourses. A single plant will typically produce 500-5,400 burrs but can produce up to 11,000 burrs. Each burr contains two viable seeds, where one germinates during the first season of favourable conditions and the other remains dormant until the following season. Seed viability is estimated at six years, resulting in a moderately long seedbank persistence.

Stems are blotched or streaked with purple and covered with short, upward-pointing hairs. Isolated plants form branched stems, while clustered plants develop single stems. Leaf shape has been likened to that of grape leaves; described as broad-ovate, typically 50-150mm long and wide, 3- or 5-lobed, with a lobed base and toothed margins. Leaves are predominately 3-veined, and covered in minute bristles and glandular hairs, resulting in a rough texture. Stalks and veins are reddish or purple, and the upper leaf surface is darker than the pale-green lower surface.

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Before & after photos of herbicide treatment completed mid-March 2024. Image one (green, living weed) taken end of Feb 2024 prior to treatment. Image two (brown, dead weed) taken mid-April 2024. Photos – Mark Varley.

Flowers are greenish and inconspicuous. Male flowers form in clusters at the end of branches or in the upper leaf axils, while female flowers form at the base of leaves and the end of stems. Flowering is usually summer-autumn, followed by the formation of burrs. In the Kimberley, flowering typically occurs during April and May and ripe fruits appear in June.

Fruits, or burrs, turn from green to brown as they ripen. They are ellipsoid in shape, 12-20mm long and 4-8mm wide. Ripe burrs are woody and densely covered with hooked spines and two longer, straight, terminal 'beaks'. Ripe burrs remain attached until the plants begin to die off. The two seeds in each burr are brown-black, 6-10mm long, and flattened on one side.

Impacts

Like many weeds, Noogoora burr competes for moisture, nutrients, and light, often outcompeting local Australian flora. Dense thickets exclude other understorey plants, threatening the biodiversity of wetlands. Dry burrs may cause discomfort and injury to Australian animals. It can cause contact dermatitis in humans and animals, and seedlings are highly toxic to stock if ingested. The burrs can also get stuck in sheep's wool, reducing the commercial value of their wool due to the cost of removal.

Management and control

Small infestations may be removed by hand, although labour intensive and complicated due to the risk of injury from the burrs and the habitat they occupy. Partial control of a population proves meaningless, as sparsely spaced plants grow large and multi-stemmed, producing more burrs, and thus having little effect on the total output of burrs within the population.

Team of DBCA Wanneroo district staff and DPIRD personnel at Yellagonga, August 2023. Left-to-right: Phill Jacka (DPIRD), Trystan Ahrens (DBCA), Amber Kennedy (DBCA), Tim Stevens (DPIRD), Tahlia Wood (DBCA), Darryl Stewart (DPIRD), and Glen Coupar (DPIRD). Photo – Glen Coupar.

Serious infestations, like that at Yanchep National Park, are best managed using herbicide application. Different herbicides applied at different life stages have the highest impact to the weed. Follow up monitoring and further herbicide application is crucial to exhausting the seedbank and ultimately eradicating problematic populations.

Suspect you have found Noogoora burr? Report it through the MyPestGuide.

Thank you to the DBCA district staff and Glen Coupar (DPIRD) for the works updates, images, and all their hard work towards eradication.

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What reptiles in Bold Park can teach us

By Prof. Ric How

Bold Park is a jewel among the remnant bushlands remaining in Perth's inner metropolitan area. Covering 437ha of mainly natural, near-coastal bushland, the park is managed by the Botanic Gardens and Parks Authority for passive recreation and conservation. Its central area of 338ha is bounded by dual-carriageway and double-lane bitumen roads but still supports a diverse array of native vegetation communities, a rich flora of 310 native and 232 non-native plant species and around 480 species of macro fungi. Three native and five introduced mammal, 91 bird, four frog, 29 reptile and several hundred invertebrate species have also been documented.

Line-spotted Robust Lerista – A moderate sized burrowing lizard with much reduced limbs and toes. It feeds exclusively on invertebrates and lays up to 5 eggs in early summer. Photo – Mark Cowan.

Commencing in 1986, a 38-year study of reptile species in the park illustrated intricate patterns of activity and reproduction under Perth's Mediterranean-type climate; a climate that's declined by 15% in average annual rainfall and increased by over 1°C in average maximum temperatures during the last 50 years.

All reptiles are cold blooded and rely on environmental heat for activity, therefore they are primarily mobile during the warmer months from spring to autumn. Species breed during spring and eggs are laid in late spring before hatching in summer; some species carry their young and give live birth in the early autumn. Adults are most active in the spring and early summer months but in many species appear to become inactive over the late summer and autumn when the young hatch or are born. The commonest species are skinks and geckos, but dragon lizards, legless lizards, snakes and a goanna also make up the total reptile assemblage of 29 species. Nearly all species feed on invertebrates, some on other reptiles, while bobtails regularly eat plant material and dugites some mice. Species range from climbing to burrowing in their habits but, because sandy soils prevail in the park, there are abundant burrowing species, especially amongst skinks and snakes.

The 20 commonest reptiles are the most informative about species' biology and how reptiles respond to seasonal and annual changes; the remaining nine are uncommon, either because they are difficult to sample or are genuinely rare. Rare species are infrequently encountered and three have not been recorded for over 25 years and are now presumed to be locally extinct.

Western Slender Bluetongue – A small relative of the Western Bluetongue that feeds mainly on invertebrates but occasionally browses vegetation. Gives birth to young in autumn. Photo – Mark Cowan

Those losses are two snakes and gecko, however, two others (a legless lizard and a heath dragon) have been recorded just once in the last two decades and are possibly also locally extinct. All those species showed declining activity before their absence and add to species that probably became locally extinct before this study started. Western bluetongues and King's skinks, plus southern scaly foot legless lizards are still found in some near-coastal bushlands of Perth, while carpet pythons were last seen in Bold Park in the mid-1970s.

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All animals require adequate population sizes to persist but fragmentation of natural bushland into smaller patches is not conducive to retaining large population size, thereby assisting local extinctions. Additional pressure is imposed on native species by predation from introduced cats, foxes and kookaburras.

Fires are infrequent in Bold Park, but the largest occurred in 2000 when over 100 hectares was burnt in the central area; this provided remarkable insights into reptile responses to fire. The first two to three days following the fire, reptile activity increased markedly as surviving individuals sought other refuges after vegetation, logs and litter were burnt; at the same time ravens and kookaburras were abundant while hunting over the burnt region. The medium-term response to fire was a rapid decline in numbers within all species, numbers that took six years to recover to pre-fire levels. Fascinatingly, there was no decline in the number of species, with a similar number being recorded every year after fire as before it!

Probably the most interesting finding of the study is the relationship between rainfall patterns over the last 30 years and the number of reptile individuals observed. Increased numbers of individuals were observed when rainfall was above average for between two to four years before sampling; concomitantly, there was a decline in number of individuals when rainfall was below average for a similar timeframe before sampling. This time-lag response can be explained by altered breeding and survival within species in response to changed productivity in their invertebrate food resources.

Black-striped Burrowing Snake – This snake occurs only on the Coastal Plain and feeds on burrowing lizards. It lays up to 4 eggs in spring but is most active over the latter months of summer and autumn. Photo – Mark Cowan.

The reptile assemblage in Bold Park remains the richest of all inner urban bushlands but, like all isolated areas, there is an inherent risk of extinction to some species remaining as they strive to maintain population viability in small natural habitats subjected to a changing environment and increased human disturbances.

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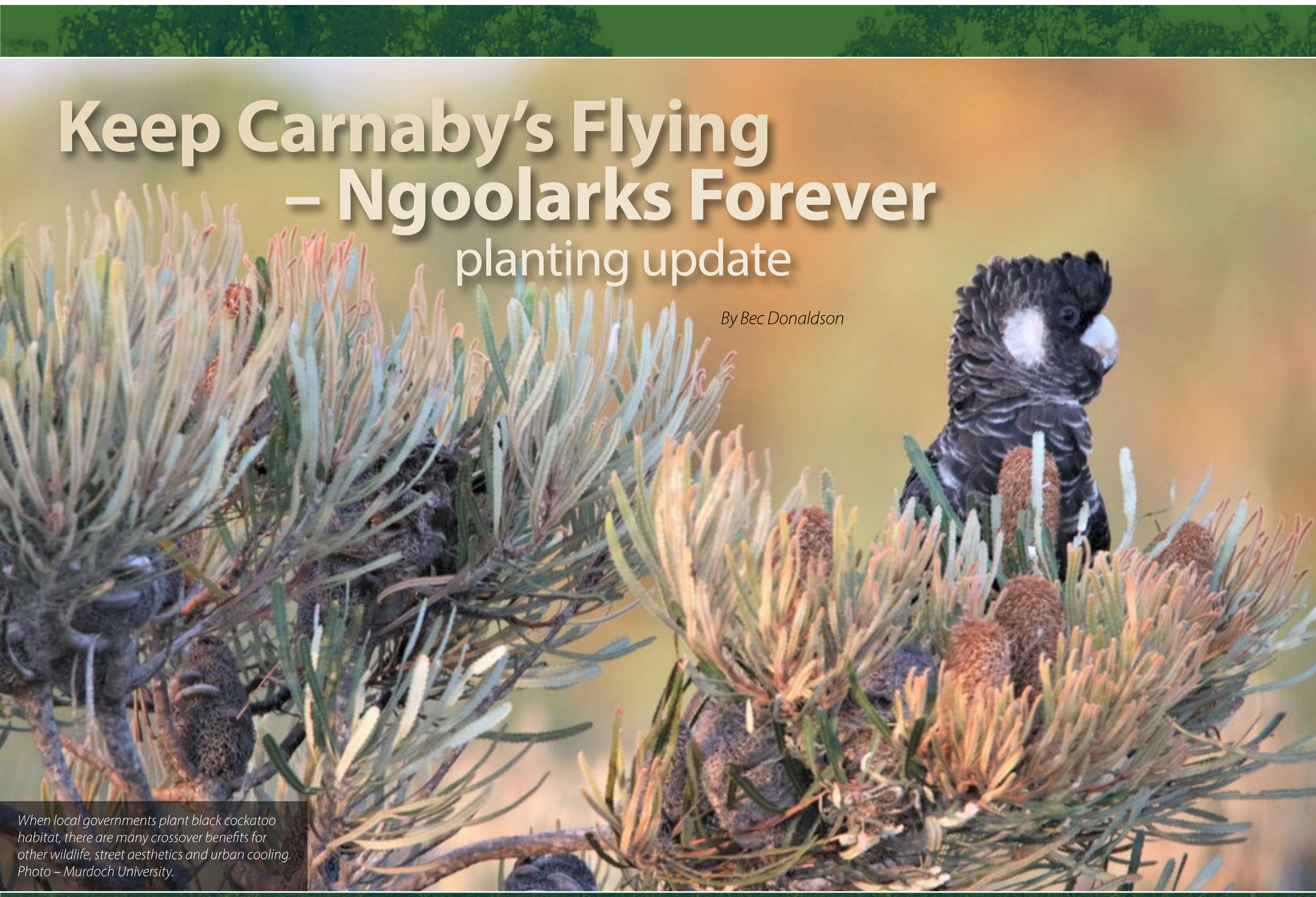
Keep Carnaby's Flying – Ngoolarks Forever

planting update

By Bec Donaldson



When local governments plant black cockatoo habitat, there are many crossover benefits for other wildlife, street aesthetics and urban cooling. Photo – Murdoch University.

Keep Carnaby's Flying – Ngoolarks Forever is undertaking its second planting season, getting food in the ground for black cockatoos. The project is a Lotterywest- supported initiative by Murdoch University's Black Cockatoo Conservation Management Project , partnering with environmental NGOs, Aboriginal organisations, Curtin University and selected local governments, to undertake community-led activities for black cockatoo conservation across the Perth-Peel region.

Carnaby's-friendly urban greening

Carnaby's cockatoos, or Ngoolarks, are threatened with extinction and urgently need more food to halt their declines. Perth-Peel councils recognise the need for urban greening, but often plant trees that are not useful to black cockatoos. Our project helps councils undertake Carnaby's-friendly urban greening, with information about what and where to plant, informed by research and monitoring data by Murdoch University and BirdLife Australia.

21,000 new food trees in 2023

In 2023 we partnered with the cities of Melville, Cockburn, Wanneroo and Shire of Serpentine Jarrahdale, planting Carnaby's cockatoo food plants at 2-6 sites per local government area, choosing site-appropriate species as guided by black cockatoo data and council requirements. These efforts saw 21,000 tubestock (e.g. banksia, hakea) planted across 15 sites, plus 200 mature native trees (marri and jarrah; valuable foods for Carnaby's cockatoos, Baudin's cockatoos and forest red-tailed black cockatoos) and 100 macadamia trees planted at appropriate locations.

DBCA staff, Landcare SJ staff, Winjan Bindjareb Boodja Rangers and Peel Harvey Catchment Council staff holding a planting day in Year 1 of the Keep Carnaby's Flying – Ngoolarks Forever project. Photo – Mathew Read.

We also delivered six Cockitrough bird waterers for councils to install near roosts, to protect birds from heat stress and disease associated with lack of access to fresh drinking water.

Community participation

The community helped at many planting days; sometimes in such numbers that planting was over by mid-morning! Huge thanks to Booragoon Rotary Club, Stantec, Friends of Piney Lakes and Booragoon/Blue Gum Lakes (for planting at Piney Lakes), Bankwest and Murdoch University Environmental Restoration Group (planting at Murdoch), Friends of Southbank (planting at Bibra Lake), Green S Force and Friends of Manning Park Ridge (planting at Manning Park), and Winjan Bindjareb Boodja Rangers, Friends groups and the public (Serpentine Jarrahdale).

Planting days were coordinated by councils and our partners SERCUL, PerthNRM, Peel Harvey Catchment Council and Landcare SJ, supported by Winjan Aboriginal Corporation, Urban Bushland Council and DBCA.

What's ahead this year – and how to help

By mid-year, planting will be in full swing across four new councils: cities of Mandurah, Kwinana and Swan, and Town of Cambridge. To help save Ngoolarks, contact these councils about planting days, join a 'Friends of' group, or plant a Carnaby's café in your garden or school. Our Keep Carnaby's Flying – Ngoolarks Forever website has more ideas!

Contact

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Snail Snap takes off for 2024!

By Corey Whisson and Dr Lisa Kirkendale, Western Australian Museum

Whilst many of us are saddened as WA's hot, dry summer draws to a close, there is plenty of excitement here at the WA Museum. Winter is coming, and that means cool, wet days and active land snails!

We have been studying a special group of native land snails called *Bothriembryon* (or boths!) for several years now and we are amazed at their resilience and diversity. Typically found in the cooler, wet south-west region of WA, they are macro sized (1cm and larger) and are often encountered by members of the public. They are commonly found in undisturbed areas across a range of habitats, including rocky slopes and gullies, southern woodlands, sandy coastal plains and even swamps!

Whilst the WA Museum collection has a plethora of 'boths', the specimens were generally collected decades ago, and are either shells or animals preserved in formalin—so they cannot be used for DNA sequencing. We needed fresh material to help construct a molecular phylogeny! Working in the WA Museum collection one afternoon, we lamented how vast the south-west region was and wondered how, given all the other important tasks we needed to complete, we would find the time to locate and collect more specimens.

Enter the snail squad, harnessed to deliver 'Snail Snap'! We realised we needed help from the public, from citizen scientists. It took a little time to find the right platform, but in 2022 we launched Snail Snap using the iNaturalist app. The program runs for three months during winter (June-August) when the snails are out and about, and we ask the public to look out for crawling 'boths' or even shells.

Using a device (usually a phone), Snail Snap participants simply take a photo and upload it through the iNaturalist app. The record filters back to the Snail Snap project on the iNaturalist platform, where we help identify species and provide additional information.

Snail Snap not only allows us to document where named species live, but it has also highlighted numerous new species that will be collected and documented in the coming years. In its inaugural year (2022), over 160 observations were recorded with at least six undescribed species seen! And the numbers are growing every year. This year we are really interested in seeing how 'boths' are going in areas previously snapped, given how hot and dry the past summer has been.

Whilst the public can participate without being members, we encourage them to join.

Contact

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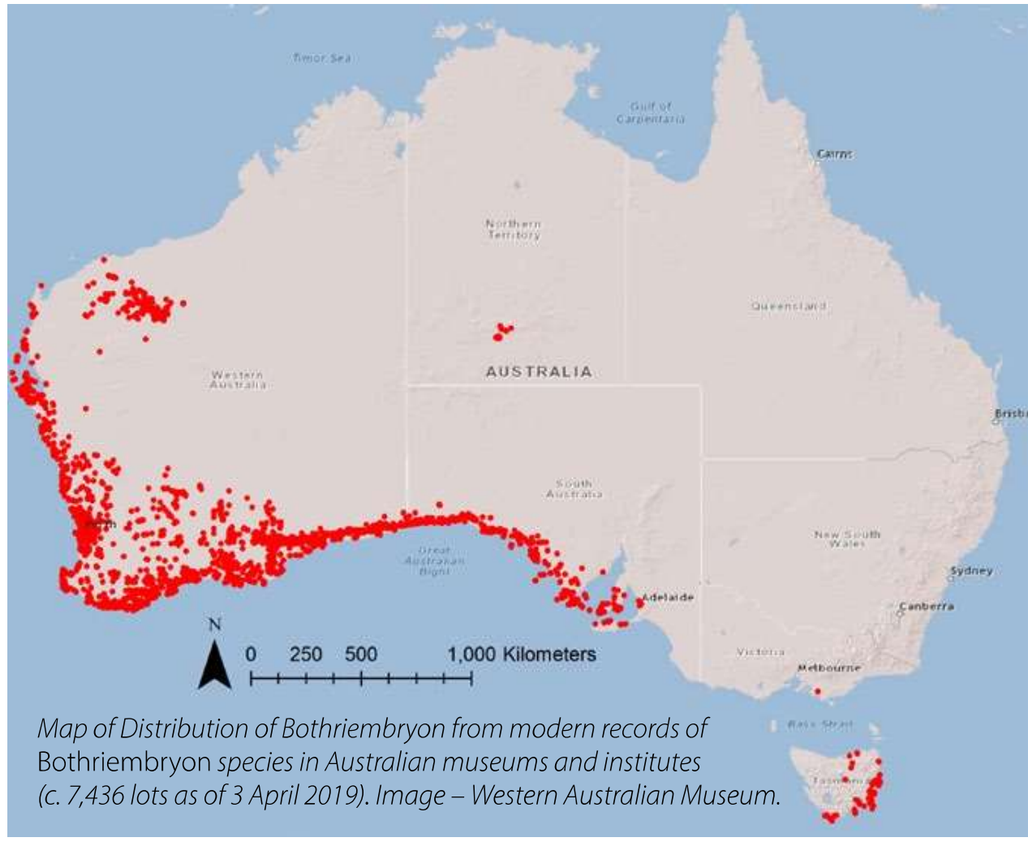
Beautiful Crawling Both Snail. Photo – Loxley Fedec.



Map of Distribution of Bothriembryon from modern records of Bothriembryon *species in Australian museums and institutes (c. 7,436 lots as of 3 April 2019). Image – Western Australian Museum.*

Please send us your regional report (400 words) and one or two photos by Thursday 8 August 2024. Text may be edited in response to volume of submitted reports.

Friends of Paganoni Swamp – 20 year celebrations

By Leonie Stubbs

This year Friends of Paganoni will celebrate 20 years of volunteering at Paganoni Swamp Reserve—a 700 hectare conservation reserve situated in Karnup, comprised of banksia tuart woodland with a winter wet swamp running north-south through the centre. It is managed by the Department of Biodiversity, Conservation and Attractions (DBCA), with whom we have a strong working relationship.

Our group was formed in 2004 in response to the threat of *Euphorbia terracina* (Geraldton carnation weed) encroaching into the reserve from its western boundary. It was evident that herbicide control would be required along with hand weeding to successfully control the weed, so access to grant funding necessitated the group's formation. Due to the scientific expertise and ongoing commitment exemplified by Kate Brown and Grazyna Paczkowska of Urban Nature (a program of DBCA) we achieved a reduction in the density of *Euphorbia terracina* from approximately 35% to less than 1% over a five year period (results from 15 quadrats set up by Kate and Grazyna to monitor the success of the project).

The group's efforts concentrated solely on controlling *Euphorbia terracina* up until around 2012, but once the density had been reduced to such an extent, we turned our attention to other major weed species present.

Due to the reserve's isolation and having been surrounded by bushland for so many years, the majority of vegetation is in excellent condition. So, for most areas, weed control alone is sufficient.

However, the boundaries, in particular the western boundary, require more work. We finally instigated a planting program, and where possible, constructed fences (exclosures) to exclude the herbivores. They remain in place for a couple of years and work extremely well.

Whilst our group's volunteering efforts are, and have been, fantastic, we were well aware from inception that to achieve our goal of conservation, funding was required. In this regard, we are fortunate to have SERCUL as our sponsor. We work closely with Cat Williams who has been exemplary in assisting us on planting days, weed mapping and of course with our grant applications.

Whenever possible, feral animal control is undertaken twice a year to reduce the impact of foxes, cats and rabbits on our native species. We also have some of the carcasses analysed to see what the predators are consuming in the reserve.

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Volunteers Planting within areas fenced to exclude kangaroos at Paganoni swamp reserve. Photo – Grazyna Paczkowska.

Leonie Stubbs presenting to the attendees of the Friends of Paganoni 20 years celebration at Paganoni swamp reserve in May 2024. Photo – Grazyna Paczkowska.

Photo of swamp area at Paganoni swamp reserve. Photo – Leonie Stubbs.

A number of bat boxes and phascogale tubes have been installed and both are inspected for signs of habitation. There are also a few cameras dotted around the reserve to ascertain the presence/absence of native species. We also participate in bat surveys during the summer months.

The contractors we work with are extraordinary in controlling weeds, feral animals and feral bees, and growing up our seedlings for our revegetation program. It highlights the fact that no groups work successfully in isolation—it's a team effort.

As I write, we are seeing a fair number of tree deaths in the reserve due to the lack of rain. It is devastating, but we will continue our volunteering efforts to reduce the impact of feral species. At the same time we expect our state and federal governments to play their part by stopping the clearing of native bushland, implementing stronger nature laws to protect the growing number of threatened native species and to robustly address the challenge of climate breakdown which the world is currently facing.

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New local law for golden crownbeard

By Mike Norman

At the City of Joondalup council meeting held on 26 March 2024, Council adopted the Pest Plant Amendment Local Law 2023. That amendment added the invasive weed golden crownbeard (*Verbesina encelioides*), a member of the daisy family, to the City's Pest Plant Local Law—the only other weed listed is the thorny prostrate vine, caltrop (Tribulus terrestris), which impacts on public amenity.

The Pest Plant Amendment Local Law 2023 was published in the Government Gazette on Friday 19 April 2024, and came into operation on Friday 3 May 2024.

This means that, like caltrop, golden crownbeard must be controlled on both private and public property, wherever it occurs.

The inclusion of golden crownbeard into the City's Pest Plant Local Law was requested by the community group Joondalup Community Coast Care Forum, Inc, as part of our submission made in 2023 regarding the City's draft *Weed Management Plan 2022-2032*.

Our group noted this weed has become widespread in the mid-west of WA, and we saw it was starting to appear on vacant blocks, roadsides, bushland and coastal reserves within the City of Joondalup, and in other local government areas in the north-western metro corridor too. This weed demonstrated all the signs of a very invasive weed species indeed, given the way we had seen it germinate, grow rapidly and flower on vacant blocks multiple times per year, even in the middle of the very dry hot summer, then rapidly disperse to nearby locations, somewhat like the widespread weed fleabane. Although this weed is superficially attractive (a resident has even been seen watering one that popped up in their garden), it is both toxic to animals (we suspect that includes dogs) and humans.

We are pleased to see it declared as a pest plant by the City of Joondalup, as it would otherwise just increase our volunteer work manually removing high priority weeds (before seed shed) from the natural areas we are restoring, but also means the City would need to spray even more herbicide to control it in public areas, at a time when the community is pushing for a decrease in the use of herbicides.

We would hope other local government authorities, in the metropolitan area at least, add golden crownbeard to their schedule of pest plants.

Contact

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Golden crownbeard on sorento beach dunes. Photo – Mike Norman.

Tiny beetle causing big problems in Perth

By Dominic Castledine

The polyphagous shot-hole borer (PSHB) is a tiny beetle causing big problems in the urban forests throughout the Perth metro area.

About the size of a sesame seed, PSHB (*Euwallacea fornicatus*) bore tunnels in trees, where they grow a Fusarium fungus as a food source. The growth of the fungus disrupts the flow of water and nutrients around the tree and can lead to whole trees dying in as little as two years.

The Department of Primary Industries and Regional Development (DPIRD) has been targeting PSHB across the Perth metropolitan area for more than 18 months. It is the largest plant pest surveillance and eradication program ever undertaken in WA, with over 1.7 million trees inspected across 47,000 properties.

Hosts

PSHB has been known to infest over 400 plant species. The main preferred host plants in Western Australia are the:

- box elder maple (*Acer negundo*)
- black locust (*Robinia pseudoacacia*)
- coral tree (*Erythrina sp.*)
- Moreton Bay fig (*Ficus macrophylla*)
- London plane tree (*Platanus x acerifolia*).

PSHB has been detected in a number of Australian native species, however these appear to only be susceptible under specific circumstances. This includes when there is a large number of infested, preferred hosts in close proximity, or when the host is growing in an unsuitable location and is in poor health, such as on a reclaimed waste site.

Treatment options

So how do we go about getting rid of this tiny pest? Unfortunately, there are no known effective chemical treatment options for PSHB. Pruning infested branches, or removing infested trees, followed by wood chipping, remains the only way to prevent this pest from spreading to other healthy trees.

Global research has shown that the damage to the tree's vascular system caused by the borer and the fungus makes it difficult for chemicals to be delivered and taken up by the tree.

DPIRD is working with local and international scientists to continue research into treatment alternatives to tree removal.

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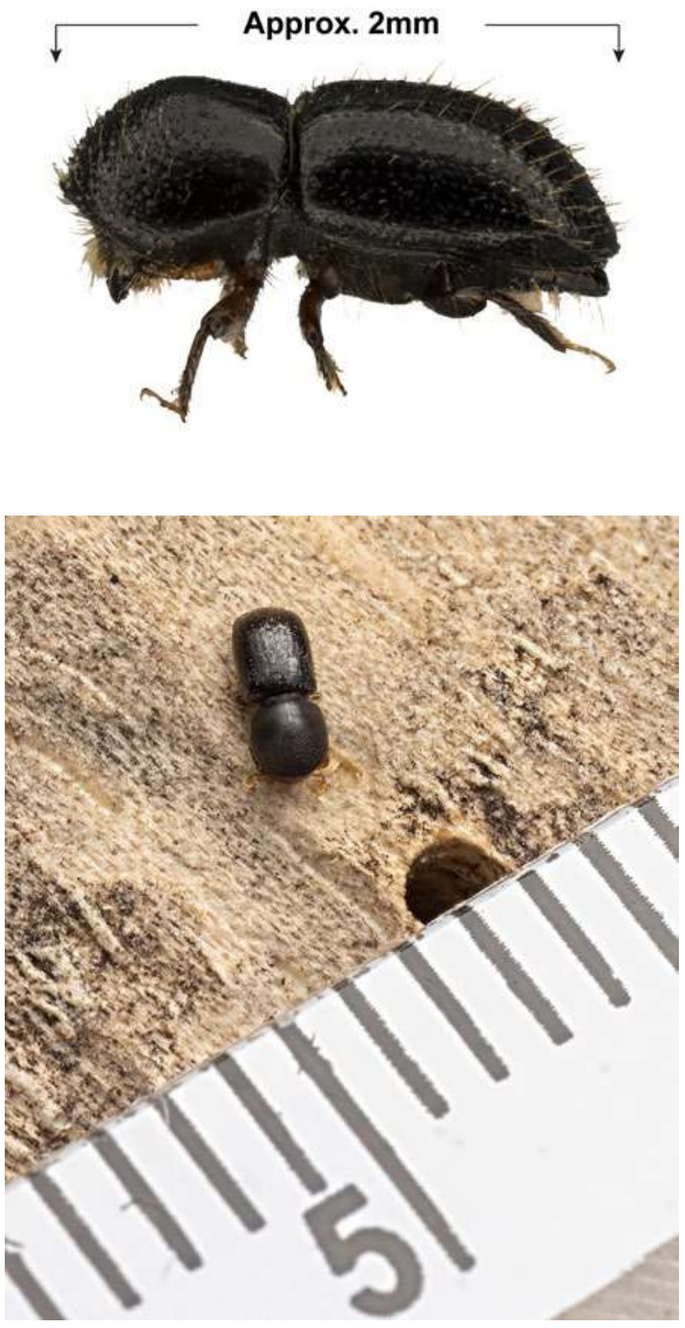


Close up of Polyphagous shot-hole borer, ruler for scale with 1 mm increments. Photo – DPIRD.

What to look for

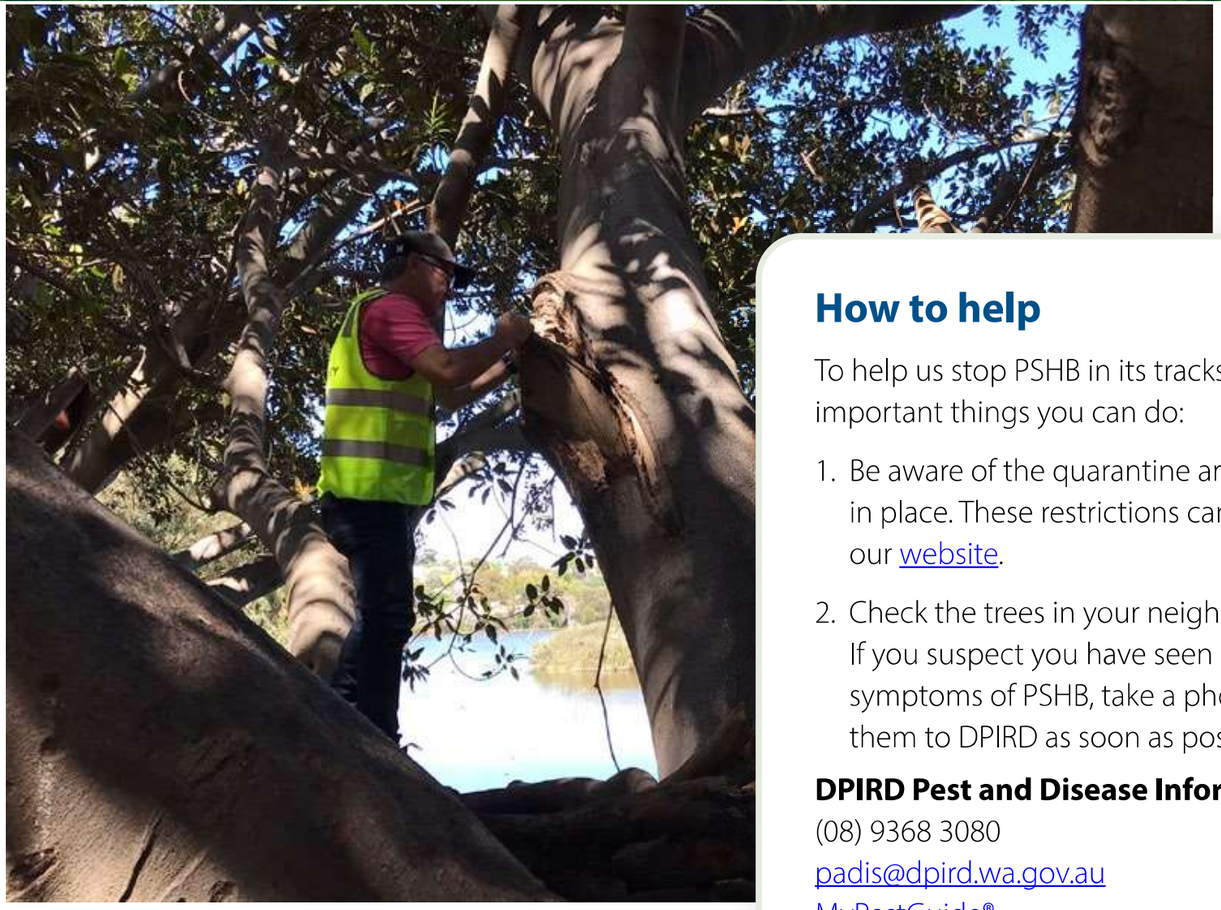
Because the beetle is so small, the symptoms of PSHB damage are usually noticed before the beetle.

Symptoms vary between host species but may include:

- **beetle entry/exit holes** – approximately the size of a ballpoint pen tip
- **galleries** – when pruning branches or inspecting fallen branches, check for evidence of galleries caused by the tunnelling action of PSHB beetles
- **discoloration/staining** – this is caused by the Fusarium fungus
- **gumming** – thick resin or sap
- **frass** – produced by the beetles' tunnelling, frass or 'noodles' may be seen on the tree exterior. This can indicate a high level of infestation
- **sugar volcanoes** – a common sign of infection on avocado trees, where crystalline foam is exuded from entry/exit holes
- **dieback and tree death** – the fungus disrupts the tree vascular symptom causing dieback and death.

Symptoms are not always obvious. Look for early signs of dieback and inspect trees closely for evidence of small bore holes, about the size of a ballpoint pen tip (1mm diameter). There are often large numbers of holes in a shotgun pattern.

Susceptible trees and shrubs should be inspected and monitored for PSHB damage.



DPIRD staff inspecting host tree. Photo – DPIRD.

The symptoms of a tree infested with polyphagous shot-hole borer are not always obvious. Be on the lookout for early signs of dieback and inspect closely for small bore holes 1mm in diameter, about the size of a ballpoint pen tip. Photo – DPIRD.

How to help

To help us stop PSHB in its tracks there are two important things you can do:

1. Be aware of the quarantine area restrictions in place. These restrictions can be found on our website.
2. Check the trees in your neighbourhood. If you suspect you have seen some symptoms of PSHB, take a photo and report them to DPIRD as soon as possible via:

DPIRD Pest and Disease Information Service
(08) 9368 3080
padis@dpird.wa.gov.au
MyPestGuide®
MyPestGuide® Reporter app

For all the latest information and developments regarding PSHB please visit agric.wa.gov.au/borer

Contact

DPIRD Pest and Disease Information Service
email padis@dpird.wa.gov.au
phone 9368 3080
website agric.wa.gov.au/borer

Friends of Lake McLarty

By Terry Ryan

The Lake McLarty Nature Reserve is located on the Swan Coastal Plain of Western Australia, located 30km South of Mandurah and is 219ha in area. Lake McLarty is a seasonal freshwater lake occupying up to 163ha of the reserve, and is part of the Peel-Yalgorup Ramsar site. It is one of the few fresh water wetlands with a large waterbird population and available for migratory waders. Over 20,000 water birds were recorded on the reserve on 19 separate dates between 1996 and 2008.

Lake McLarty is now situated in the Shire of Murray subdivision of Birchmont. This area was originally settled by Arthur Birch in 1862, son of Lewis Birch an early WA settler. Arthur Birch established the farm with homestead and outbuildings. Immediately to the north of the house was the big lake (now Lake McLarty) which provided good water for the stock and a plentiful supply of wild fowl.

The Birch farm continued to be worked until the mid-20th century when it was sold to a local developer who subdivided the area into 5-acre rural blocks for private residences, and which is now known as Birchmont.

Ten years ago in Jan/Feb 2014, a group of Birchmont residents, other environmentally concerned individuals [including Peel Preservation Group (PPG) members], birding enthusiasts (Birdlife Australia members) and the Department of Parks and Wildlife (DPaW, now DBCA) formed the Friends of Lake McLarty (FoLM) group.

FoLM is a voluntary group with the aim of carrying out activities to support DBCA in their management of the lake. Their activities include monitoring the pest status of the reserve (e.g. cotton bush, typha, other weeds, plus animals especially foxes and feral pigs), monitoring bird populations, carrying out planting and rehabilitation, surveying fauna and flora including an annual weed and vegetation condition mapping, and monitoring lake water quality and levels.

Lake McLarty after the winter rains. Photo – Rick James.

In October 2023 the FoLM group were invited by Jason Harding to hold their regular meeting at the Birch House and have a look at the now very comfortable but traditional fully restored family residence. It has been expertly done and a true visual reminder of the early settler history.

Annually, the Birdlife WA group make a count of birdlife activity at Lake McLarty. The motto for the Friends of Lake McLarty is "Bringing back the birds" and to this end, regular surveys are carried out throughout the year to monitor the birdlife on and around the lake. We are especially interested in water birds that frequent the lake, particularly the migrating birds that travel from their breeding grounds in Siberia and other parts of the far northern hemisphere, to feed at Lake McLarty.

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Lake McLarty is a seasonal waterbody that dries out every summer. The lake relies on rainfall and surface water run-off from surrounding areas. The surrounding land use is predominantly rural, rural residential and conservation. Many of the areas are farmlands and nowadays with the use of chemical fertilisers the water is high in phosphates and nutrients; not good for the lake water quality. This can be alleviated by flowing the water through reed and sedge beds which filter the water and help to remove the chemicals.

The lake water levels are dependent on the winter rainfall, and for this reason we are closely monitoring the water levels, effects on the lake vegetation and water quality. With the lake surrounded by agricultural paddocks we are seeing the winter surface water flow being high in typical fertiliser chemicals, phosphates etc, which end up in the lake effecting the water and soil bed condition.

Erection of an information board in 2016 adjacent to the lake on Birch Drive. Photo – Friends of Lake McLarty.

Over the last few years, we have seen a marked increase in the vegetation across the lake during the dry summer months. In an attempt to understand this changing state, FoLM have carried out (with the assistance from a grant from Alcoa/Shire of Murray) a vegetation survey, completed by taking two transects across the lake, east to west. A local botanist was employed to walk these lines and register the vegetation that was present, or lack thereof. Ideally we want as little vegetation as possible as it prevents the migratory wading birds that visit to feed on the macroinvertebrates that inhabit the shallows. To assess the changing status of the vegetation, surveys have been carried out each summer from 2016 to 2023.

In 2022 the Friends of Lake McLarty made a grant application to State NRM (Natural Resources Management) called 'Restoring Lake McLarty from the brink'. The purpose of the application was to source funds to find a way of channelling surface water from the surrounding areas during the winter season into the lake, thereby maintaining a satisfactory level. The proposed project would be initially to survey the surrounding areas, reserves and farmlands, find where the most amount of rain/surface water lays and how to best channel it into the lake either by existing drains or new installations.

The survey work of this project content, once completed, will enable a new grant application to be made for an ongoing project to carry out the necessary ground work to channel the surface water back to the lake and with a proposed completion by 2026.

Contact

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Above: Birch Homestead 1990 prior to restoration, Below: after recent restoration. Photo – Friends of Lake McLarty.

A Busy Bee day, FoLM volunteers planting sedges to filter and assist the drain water quality. Photo – Friends of Lake McLarty.

Dieback Information Group conference

By Pip Soulsby

The annual Dieback Information Group (DIG) conference is happening on 20-21 August 2024 in Boorloo, Perth, and online, bringing together the latest scientific knowledge, best land management practices and industry innovation in the Phytophthora science and management space.

This year's theme, 'Seeing the forest for the trees', has been selected to recognise the importance of holistic management for Australia's forest ecosystems, and the pivotal role that environmental biosecurity and disease hygiene play in the health of these landscapes.

Day 1 of the conference is available in person and online, with optional field trips on day 2.

To find out more visit the Dieback Working Group website.

Funding opportunities

Aurizon Community Giving Fund offers up to $20,000 for not-for-profits in the areas of community health and wellbeing, safety, environment and education. Applications **Next round open in September.**

Project Robin Hood by the City of Melville offers grants of $20,000 for community ideas, projects or events that bring people together and build better neighbourhoods. Expressions of interest can be registered on their website.

PHCC: Fencing and revegetation of rural drains and waterways is for property owners in the Peel-Harvey Catchment to aid with fencing and revegetation to improve water quality of the Peel-Harvey Estuary. Send your expression of interest via the PHCC website.

Lotterywest Grassroots community-led grants are for proposals that work towards sustainable ecosystems and reduction of the community's impact on the environment. Applications are **open year-round**.

Purves Environmental Fund offers up to $50,000 for projects addressing the focus areas of habitat destruction, capacity building of key NGOs and climate change adaption. Applications are **open year-round**.

Swan Canning Riverpark Urban Forest Program offers a total $3 million to public land managers to improve their urban forests in the Swan Canning catchment. Approach your public land manager to partner in projects. **Open year-round**.

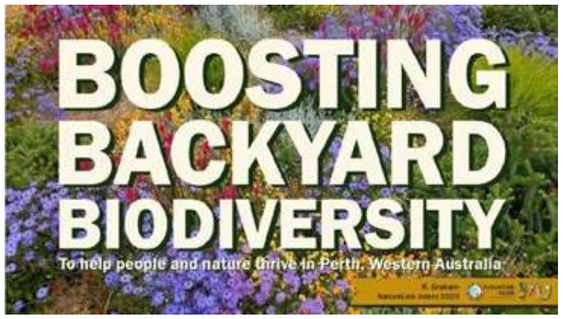
Local government and place-based community grants These local governments and groups provide small grants to their communities which may fund environmental management and restoration projects. Eligibility varies. Armadale Habitat Links **open year-round** for rural residents, Cockburn Sustainability **open all year round**, Derby/West Kimberley **round 3 closes 30 June and round 4 opens 01 July**, Gosnells **Open July 2024**, Harvey Water **open year-round**, IGA Community Chest **open year-round**, Kwinana Placemaking Grant **open year round**, South Perth **open year-round**, Swan **open year-round**, Wanneroo **open year-round**.

The Indigenous Land and Sea Corporation's Our Country Our Future Program funds land acquisition or management projects that deliver benefits to Indigenous Australians. This includes on-ground activities to maintain or improve the condition of Country (land, water, biodiversity, and cultural heritage). Applications **open on an ongoing basis**.

Resources

Websites, videos and Apps

Perth and Peel Urban Greening Strategy is in development by the Western Australian Government Perth and Peel Urban Greening Strategy (www.wa.gov.au) All Western Australians are invited to provide feedback on urban greening to help inform the strategy via the urban greening survey. The survey closes on 7 June 2024.



Boosting Backyard Biodiversity is a guide to help people and nature thrive in Perth, Western Australia.

Reimagining Naturestrips: a guide to creating native verge gardens

The Nature Play WA app makes accessing ideas to get kids outdoors easy! Nature Play WA is a not-for-profit based in Perth, Western Australia, dedicated to inspiring families, schools and community groups to help kids muck around outside more often for the sake of their health and happiness. Western Australia is home to some fantastic beaches, parks, playgrounds, picnic areas, campgrounds, unique swim spots and much more—all waiting to be explored! Our Play in WA app has a selection of our favourites. It's your directory of idyllic places to go, with detailed write ups, photos, maps, bookmarking and share functionality. Available for free online.

Research

Santoro, A., Chambers, J.M., Ebner, B.C., Sturm, A.L. and Beatty, S.J., 2024. Long-term habitat degradation affects nest site selection behaviour by a freshwater turtle (Chelodina oblonga) in Western Australia. *Aquatic conservation: marine and freshwater ecosystems, 34*(2), p.e4085.

Mansfield, T., Hardy, G., Fleming, P. and Standish, R., 2024. Recruitment failure of keystone trees in Phytophthora infested forest. *Austral Ecology, 49*(2), p.e13500.

Fowler, W.M., 2024. *Ecological effects of urbanisation on woodland plant communities of the Swan Coastal Plain, Western Australia* (Doctoral dissertation, Murdoch University).

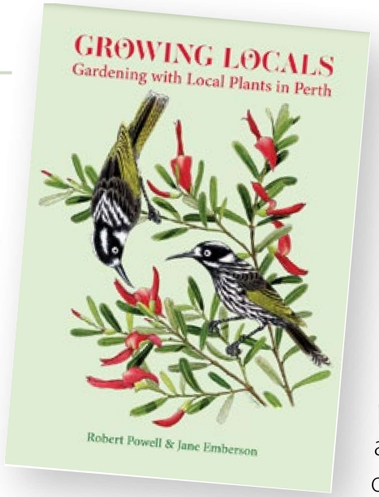
Palmer, B.J., Cowen, S.J. and Bourne, A.R., 2024. Not so fussy after all: Shark Bay mouse (*Pseudomys gouldii*) recorded using a range of habitat types on Faure Island. *Australian Mammalogy, 46*(2).

Gagnon, M.M. and Bateman, P.W., 2024. Underestimating the underdog: Camera trap observations of full-contact combat between quenda (*Isoodon fusciventer*) and black rats (*Rattus rattus*). *Austral Ecology, 49*(1), p.e13477.

Smithies, S., Fleming, P.A., Bateman, P.W., Hardy, G.E.S.J. and Dundas, S.J., 2022. Avian community changes following drought-induced canopy collapse in a Mediterranean-type forest. *Pacific Conservation Biology, 29*(4), pp.312-324.

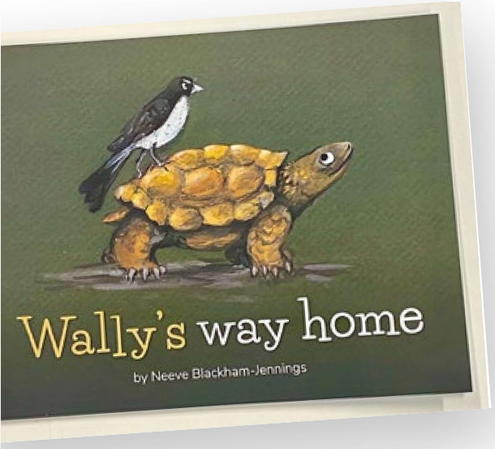
Hopkins, A.J.M., Brace, A.J., Bruce, J.L., Hyde, J., Fontaine, J.B., Walden, L., Veber, W. and Ruthrof, K.X., 2024. Drought legacy interacts with wildfire to alter soil microbial communities in a Mediterranean climate-type forest. *Science of The Total Environment, 915*, p.170111.

Publications



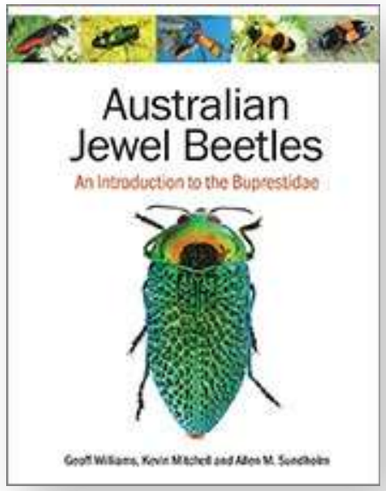
Growing Locals: Gardening with Local Plants in Perth (New edition) Powell, Robert., Emberson, Jane. WA Naturalists Club, 2024. $50. This is a new edition of Growing Locals: Gardening with Local Plants in Perth, by Robert Powell & Jane Emberson. Besides advice on how to foster a community of local native plants in your garden (or elsewhere), and discussion of why it is desirable, the book will include an updated list of native plants of the Perth Metropolitan region (over 1,800) and their distribution, compiled by Greg Keighery, Vanda Longman & Barbara Rye.

Wally's way home Blackham-Jennings, Neeve. WA Naturalist Club, 2020. $15. This charming children's book was written and illustrated by 15-year-old Neeve Blackham-Jennings. She was inspired to write it as part of a class project at Perth Waldorf School, which aimed to challenge students to make the world a better place. Neeve chose to write and illustrate a children's book to raise awareness, funds and support for the protection of the critically endangered local species, the western swamp tortoise.



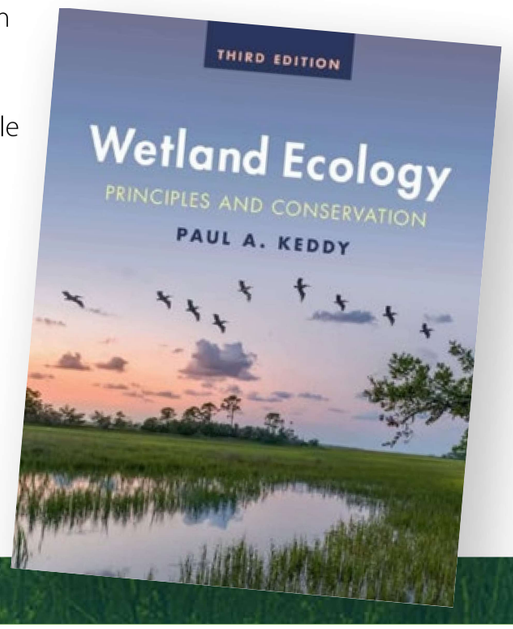
The WA Naturalists' Club helped Neeve with some funds for publishing the book and she is selling Wally's way home to raise funds for the Friends of the Western Swamp Tortoise, an organisation that supports the rehabilitation of habitat and breeding programs for the species.

Australian Jewel Beetles: An Introduction to the Buprestidae. 2024. $195. Australian Jewel Beetles: An Introduction to the Buprestidae is a comprehensive overview of Australia's buprestid fauna. It presents taxonomic, ecological and biogeographic information for all Australian genera, and their association with the world's Buprestidae more widely. It explores plant-evolution dependencies, as well as threats and conservation for this diverse fauna.



The authors bring together their extensive experience and understanding of the wealth of Australia's largely endemic species, supported by spectacular images. Australian Jewel Beetles will be valued by professional biologists and ecologists, as well as entomologists and naturalists in Australia and abroad.

Wetland Ecology: Principles and Conservation (Third Edition) Keddy, Paul A. Cambridge University Press, 2023. $95.00. Richly illustrated and packed with numerous examples, this unique global perspective introduces wetland ecology from basic principles to advanced applications. Thoroughly revised and reorganised, this new edition of this prize-winning textbook begins with underlying causal factors, before moving on to more advanced concepts that add depth and context. Each chapter begins with an explanation of the basic principles covered, illustrated with clear examples. More difficult concepts and exceptions are introduced only once the general principle is well-established. Key principles are now discussed at the beginning of Wetland Ecology: Principles and Conservation, and in order of relative importance, enabling students to understand the most important material without wading through complex theory. New chapters on wetland restoration and wetland services draw upon practical examples from around the world, providing a global context, and a new chapter on research will be particularly relevant to the advanced student planning their own studies.



Wildlife Research in Australia: Practical and Applied Methods Smith, Bradley, Helen Waudby, Corinne Alberthsen, Jordan Hampton (Editors). *CSIRO Publishing*, 2022. $200. Supports best practice research methods and helps to navigate animal care approval processes. *Wildlife Research in Australia: Practical and Applied Methods* is a guide to conducting wildlife research in Australia. It provides advice on working through applications to animal ethics committees, presents general operating procedures for a range of wildlife research methods, and details animal welfare considerations for all Australian taxa. Compiled by over 200 researchers with extensive experience in field-based wildlife research, teaching and animal ethics administration, this comprehensive book supports best practice research methods and helps readers navigate the institutional animal care approval process. *Wildlife Research in Australia* will help foster a national approach to wildlife research methods, and is an invaluable tool for researchers, teachers, students, animal ethics committee members and organisations participating in wildlife research and other activities with wildlife.

Sundews

By Dr William Fowler

Photo – Dr Emily Eakin-Busher.

Plants within the genus *Drosera*, commonly referred to as sundews, are carnivorous plants which use sticky hairs as traps for insects, which are then digested and absorbed by the plant. The name *Drosera* refers to the prominent glandular hairs, which give the appearance of being covered with dew. There are around 150 taxa in Western Australia which come in a variety of habits, from climbers to tiny herbs, and can be found in a variety of habitats, such as claypans, woodlands, to rocky outcrops.

Many species become obvious in the winter months, such as *Drosera erythrorhiza*, the red ink sundew, with its rosette of sometimes quite large leaves in dense mats or amongst the leaf litter. Elegant climbers such as *Drosera macrantha* gently meander up other plants for support. *Pygmy droseras* are tiny plants about the size of a fingernail; these are often less conspicuous until they flower, when the flower can be bigger than the plant itself.

Many of the Perth *Droseras* flower in winter to early spring, but even when not flowering they are special plants to look out for on your winter bushwalks. To get you started visit the *Drosera* iNaturalist page.

Photos – Tammy Harrison.