AUSTRALIAN Wildlife

WINTER Vol. 3/2023
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Celebrating a new century of wildlife preservation in Australia

Journal of the Wildlife Preservation Society of Australia Limited
(Founded 1909)

Threatened Wildlife Photographic Competition

Abbott's booby (*Papasula abbotti*). Image: Chris Bray – 2019 entrant.

Eastern barred bandicoot (*Perameles gunnii*). Image: Brett Vercoe – 2020 entrant.

Alpine she-oak skink (*Cyclodomorphus praealtus*). Image: Wes Read – 2021 entrant.

Cowtail stingray (*Pastinachus sephen*). Image: Jaelen Myres – 2022 entrant.

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Threatened Wildlife Photographic Competition

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Megan Fabian
Editor, *Australian Wildlife*

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The fat-tailed dunnart (*Sminthopsis crassicaudata*) is a small, nocturnal marsupial weighing around 15 grams. Although commonly mistaken for rodents, dunnarts have a pouch like a kangaroo. They are adorable predators that store energy reserves in their tail. The species is widely distributed across southern and central Australia in various habitats. In Victoria, they are primarily confined to grasslands and open woodlands. Images: Emily Scicluna.

Australian Wildlife Society

Conserving Australia's Wildlife since 1909 ®

Australian Wildlife

is the official journal of the Australian Wildlife Society
(Wildlife Preservation Society of Australia Limited).

Founded in 1909, the Society is dedicated to the conservation of our unique Australian wildlife in all its forms.

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Contact

National Office
Australian Wildlife Society
(Wildlife Preservation Society of Australia Limited)

29B/17 Macmahon Street
HURSTVILLE NSW 2220

Tel: 0424 287 297
Email: info@aws.org.au
Accounts: accounts@aws.org.au

Editor *Australian Wildlife:*
manager@aws.org.au

Website: aws.org.au

Correspondence to:
Company Secretary:
Australian Wildlife Society

29B/17 Macmahon Street
HURSTVILLE NSW 2220

Email: secretary@aws.org.au

Patron
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Member Notice

The Australian Wildlife Society (Wildlife Preservation Society of Australia Limited) is managed and controlled by an elected Board of ten volunteer Directors. The Society is a tax-deductible gift recipient and registered with the Australian Charities and Not-for-profit Commission. Its public fund is listed on the Register of Environmental Organisations under item 6.1.1 of subsection 30-55(1) of the *Income Tax Assessment Act 1997*.

Any member who might like to consider serving as a Director of the Society is invited to contact the national office for more details. The most important qualification to serving as a Director is 'a commitment to and love of Australian wildlife'.

The Society holds regular monthly meetings on the first Wednesday of each month in Sydney.

The Editor would like to feature a member's profile in the fortnightly email newsletter and occasionally in our quarterly magazine. Members are invited to consider submitting a short article with a photograph for possible publication.

Our Mission

The Australian Wildlife Society (Wildlife Preservation Society of Australia Limited) is a national not-for-profit wildlife conservation organisation, formed in 1909, and is committed to the preservation of Australia's precious flora and fauna. We act as a watchdog and provide advice to government agencies and institutions regarding environmental and conservation issues concerning all aspects of wildlife preservation.

Our mission is to conserve Australia's fauna and flora through education and involvement of the community. We are dedicated to the conservation of our unique Australian wildlife in all its forms through national environmental education, advocacy, public awareness, community involvement, and hands-on conservation work.

Our Society has always known that a conservation battle is never really won until the victory is enshrined in legislation. We have always attempted to convince politicians of the necessity to include the preservation of Australia's precious wildlife and its vital habitat in all their planning, environmental issues, and discussions.

From the President's Desk

Dr Julie Old – President

In this edition of *Australian Wildlife*, we have many new announcements! We have awarded our University Research Grants and Wildlife Ecology Research Scholarships, and opened the Society's Threatened Wildlife Photographic and Australian Wildlife Week Video Competitions and our ever-popular National Colouring-In Competition.

Welcome to the Winter 2023 Edition of *Australian Wildlife*

We are delighted to announce the winners of our ten annual University Research Grants for 2023 (page 28). In addition, the Society is very proud to have awarded our very first Dr Clive Williams OAM Memorial Wildlife Conservation Scholarship in honour of our former Director, Dr Clive Williams. The scholarship was awarded to the highest-ranked application of all our University Research Grants. This year, our recipient is Jack Bilby from the University of New South Wales with a project titled 'Beating the Heat: How do Bandicoots Respond to Extreme Heat in Burnt and Unburnt Habitat?' Jack was awarded this prestigious scholarship due to the outstanding quality of the application, the benefit to conservation, and its achievability within the proposed timeframe. We look forward to hearing more about the research conducted by Jack and all our University Research Grant recipients.

Crinkle bush (*Lomatia silaifolia*) is a plant in the family Proteaceae native to eastern Australia. This species is not considered to be at risk of extinction in the wild. Image: Megan Fabian.

These grants are only possible because of the generous donations provided by our members and donors. If you would like to donate to support the Society's ongoing conversation efforts of our next generation of up-and-coming conservationists, please do not hesitate to contact us for more information.

The Society's Threatened Wildlife Photographic competition is now open for voting, and the Australian Wildlife Week Video Competition is open and accepting submissions. The entry requirements can be viewed on page 18. Our ever-popular colouring-in competition is now open, with our Wildlife of the Year, Proteaceae, featured. We cannot wait to see everyone's entries!

Caley's grevillea (*Grevillea caleyi*) is a species of flowering plant in the family Proteaceae and is critically endangered due to habitat loss, invasion by weeds and pathogens, small population size, and inappropriate fire regimes. Image: Dr Tony Auld.

In this edition of *Australian Wildlife,* we have articles covering everything from native bees (pages 15-17), black cockatoos (pages 29-32), and sharks (pages 9-11), to koalas in South Australia (pages 13-14) and wombats in Sydney's south-west (pages 19-22). We also have an article by our Editor, Megan Fabian, on her recent visit to Tidbinbilla Nature Reserve in the Australian Capital Territory. She shares some of the wildlife conservation work currently being conducted at Tidbinbilla.

Our cover image on this edition of *Australian Wildlife* was contributed by one of our dedicated volunteers, Emma Harding. It is a fat-tailed dunnart (*Sminthopsis crassicaudata*), a small carnivorous marsupial. Readers can find out more about these fascinating carnivorous marsupials on pages 6-8.

A Dunnart in Danger

Emma Harding and Emily Scicluna

Australia is home to hundreds of unique marsupial species which have inspired people internationally, giving rise to famous characters like Taz (Tasmanian devil) from Looney Tunes and the Crash Bandicoot (Eastern barred bandicoot) series of PlayStation games. Despite this, Australia has the highest mammal extinction rate in the world and has lost thirty-nine land mammals since European settlement. A key method of conservation to help remaining populations is captive breeding and subsequent reintroduction into wild areas. These well-established methods have helped other endangered species, like the Bellinger River turtle (*Myuchelys georgesi*) in Northern New South Wales. However, captive breeding and reintroduction success can vary depending on the species.

Emily Scicluna was a PhD student who studied the captive breeding of carnivorous marsupials to see if traits like cognitive abilities, personalities or skull morphology changed during captivity and how this would affect their reintroduction success. Overall, she aimed to understand how we can optimise the captive breeding of carnivorous marsupials to give them the best chance of success in the wild.

The carnivorous marsupials (Family Dasyuridae) include many well-known species, such as the Tasmanian devil (*Sarcophilus harrisii*) and quolls, and some lesser-known marsupials like dunnarts and antechinus. As some of these species are endangered and quite rare, Emily decided to study a more common species, the fat-tailed dunnart (*Sminthopsis crassicaudata*), as a 'model' for the family – whatever she learned from the dunnart could also be applied to its endangered cousins.

The fat-tailed dunnart is a small, nocturnal marsupial that is a bit smaller than a house mouse, weighing around 15 grams (about three grapes). They are incredibly cute, ferocious predators (of insects) who store energy reserves in their tail, much like a camel's hump. Although commonly mistaken for rodents, dunnarts have a pouch just like a kangaroo.

Soon after starting her research, Emily noticed some incongruencies between what she read in scientific literature and what she saw. Fat-tailed dunnarts were apparently 'common' in Victoria and broadly accepted to be of stable population size. However, after a year of surveys and fieldwork, she found no sign of fat-tailed dunnarts, their nests, or their scats in the location of the supposed largest population of dunnarts in Victoria.

Emily then surveyed a further forty sites across Victoria with fat-tailed dunnart observations recorded in the past ten years, yet only found signs of the species at seven of those forty sites. It turned out that the fat-tailed dunnarts were assumed to be 'common', based on historical records, but there had been no species-specific surveys conducted since the early 1970s.

"*I realised I was no longer working with a model species for their endangered relatives… I was working with a threatened species in their own right. The dunnarts were disappearing, so I committed to finding out why.*"

After this realisation, things began to make a lot more sense. Basalt grasslands that fat-tailed dunnarts reside in used to cover roughly 30 percent of Victoria but now have shrunk to cover less than 1 percent. Other small marsupials that live in these grasslands, like bandicoots, potoroos, and bettongs, have been driven to extinction as these environments shrunk. It was no surprise that the fat-tailed dunnart population would also be shrinking when viewed in this context.

Whilst conducting her PhD, Emily compiled detailed information about populations of fat-tailed dunnarts from her notes, other surveys, the Victorian Biodiversity Atlas, and the Atlas of Living Australia – an enormous task usually completed by a team of researchers. Following the international standards of *The International Union for Conservation of Nature Red List of Threatened Species*, Emily was able to show that the

Top: Four fat-tailed dunnarts (*Sminthopsis crassicaudata*) snuggling. While predominantly a solitary species, they will nest-share to keep warm. Image: Emily Scicluna.

Victorian population had declined by more than 60 percent from 2000-2009 to 2010-2019. This result satisfied the threshold for population decline (criterion A) of at least 30 percent over the past ten years (Vulnerable). She also demonstrated that fat-tailed dunnarts now only occupied 1,427 square kilometres in Victoria, meeting the threshold for Vulnerable under criterion B (geographic range). She satisfied not one but two International Union for Conservation of Nature criteria for the nomination of the fat-tailed dunnart for conservation status.

After being submitted in 2020, the Scientific Advisory Committee of Victoria finally supported her application in 2022, and in 2023 it was signed by the Agricultural and Environmental Ministers. In May 2023, the Governor in Council signed the proposal, and finally, the fat-tailed dunnarts had protection in Victoria.

Listing a species on the *Flora and Fauna Guarantee Act 1988* means it is legally recognised as threatened with extinction. Consequently, future developments in relevant landscapes are legally obliged to look for this species. Fifty-five percent of Victoria is now freehold agricultural land, so as Emily identified, the vast majority

A wild fat-tailed dunnart (*Sminthopsis crassicaudata*) having his morphological measurements collected, including head length. Image: Emily Scicluna.


A captive fat-tailed dunnart (*Sminthopsis crassicaudata*) balances between her egg carton and bark hide. Image: Emily Scicluna.

One of the thylacine's smallest carnivorous cousins, the skull of a fat-tailed dunnart (*Sminthopsis crassicaudata*) is less than 2.5 cm long. Image: Emily Scicluna.

of suitable habitat for fat-tailed dunnarts is now on private land. Moving forward, landowners will play a crucial role in the preservation of this species.

A lot of help will come from small actions: being aware if they are on your property by looking out for them under old fence palings or corrugated iron sheets during the day or running around chasing insects at night. Secondly, leaving rocks and logs around the landscape or lining the side of the property provides valuable places for dunnarts to hide from predators. Finally, aiming to reduce the number of invasive species that prey on dunnarts, like foxes, feral cats, and black and brown rats.

Threatened species' habitats continue to be cleared at alarming rates, pushing more species towards extinction. The process for listing threatened species is rigorous, but unless threatened species laws are enforced and strengthened, the effort required to have a species listed as threatened will be in vain.

"*We need ongoing protection of our remaining grasslands, and we need long-term data to work out where the stronghold populations of fat-tailed dunnarts remain. This is what I aim to achieve next.*"

Emily Scicluna conducted her PhD at La Trobe University and the Research Centre for Future Landscapes. She continues her research at the University of Melbourne in the Thylacine Integrated Genetic Restoration Research (TIGRR) laboratory.

Emily Scicluna releasing a fat-tailed dunnart (*Sminthopsis crassicaudata*) as part of her PhD reintroduction research. Image: La Trobe University.

Emily Scicluna conducted her PhD at La Trobe University and is now a Postdoctoral Research Associate at The University of Melbourne. Image: La Trobe University.

Ancient Predators

Dr Julie Old

Sharks are ancient predators. They have existed for around four million years, well before the dinosaurs and most plant species were present on the land. One of the earliest species of shark is Cladoselache, a two-metre-long animal with a mouth at the tip of its snout and broad pectoral fins. However, most of the four hundred or so species of sharks we are familiar with today are descended from sharks that existed around one hundred million years ago.

Having existed for so long, sharks are well adapted to their environment, with a streamlined body and fins often uniquely shaped in each species. The most recognisable fin is the dorsal fin (located on their back), which keeps a shark upright. Thresher sharks (*Alopias* spp.) have a long caudal (tail) fin, which they use to stun their prey, whilst tiger sharks (*Galeocerdo cuvier*) have caudal fins that provide support for sudden bursts of speed. Sharks use their pectoral fins, on either side of their chest, in a similar way that birds use wings, for lift, and much like if a bird were to stop flying, it would plummet to the ground, sharks would sink to the bottom if they stop swimming. Some bottom-dwelling sharks, like wobbegongs (Family Orectolobidae) also use their pectoral fins to help move around on the seafloor.

All sharks have a skeleton made of cartilage, and are members of the Elasmobranch subclass with skates and rays, rather than being classified as bony fish. Hence, whilst bony fish utilise a swim bladder to support buoyancy, sharks utilise squalene in their liver for this purpose.

Interestingly, some pelagic (oceanic) shark species need to continuously swim to ensure water crosses their gills, without which they cannot extract oxygen from the water and would suffocate. In contrast, many bottom-dwelling sharks have a specialised pump that they use to move water across their gills to obtain oxygen when not swimming.

Despite the many differences, sharks also have some of the features of other fish. They have a lateral line, which looks like a series of pores along the side of the shark. Many fish that live in caves and deep in the oceans have well-developed lateral lines. This specialised structure allows fish to detect water currents and aids shoaling behaviour, and in the case of sharks, it also supports prey detection and possibly hearing. Electrical fields can also be detected by the shark's lateral line, as does the ampullae of Lorenzini, a specialised structure that helps with navigation. Hammerhead sharks have large numbers of these structures on their enlarged rostrums (snouts), which enable them to locate rays, their primary prey species.

Of course, though, when we think about sharks, we think about their teeth. Their teeth are not attached to their jaw but rather their gums, and they are slowly replaced one by one. As a shark can have as many as thirty thousand teeth during their lifetime, I suppose that is why we never see them at the dentist.

In Australia, we have many species of shark that are unique as well as many species that are found throughout other areas of the world. One species, the bull shark (*Carcharhinus leucas*), is probably one of the best-known species. Fully mature males can reach up to around 2.25 metres and females 2.4 metres, with a maximum of around 3.5 metres and weighing up to around 230 kg. Its name is derived from not only the shape of its rostrum (snout), being flat and broad, but also because of its unpredictable and aggressive behaviour. Unfortunately, it is also often feared, being one of the top three shark species known to impact humans worldwide.

Bull sharks are effective predators and have no specific dietary items. Hence, in the murky waters of river mouths and estuaries, their typical habitat, their prey usually do not see them coming. They can quickly ambush their potential prey using a 'bump and

Top: Bull sharks (*Carcharhinus leucas*) are effective predators that use a 'bump and bite' technique to capture their prey. Image: Berthold Grünhagen.

A critically endangered eastern grey nurse shark (*Carcharias taurus*). Image: Tom Rowe.

An eastern shovelnose ray (*Aptychotrema rostrata*). Image: Megan Fabian.

bite' technique before a fast dispatch. Whilst bull sharks have eyelids, they do not close; instead, they utilise nictitating membranes to protect their eyes during attacks. Not all sharks have these specialised membranes; some, such as the white shark (*Carcharodon carcharias*), roll their eyes backwards when attacking prey.

Bull sharks can move between salt and freshwater environments and tolerate varying levels of salinity, using a specialised rectal gland in combination with their kidneys to maintain their water/salt balance. They also conserve energy by moving with tidal flows, reducing the need to actively osmoregulate. Interestingly, despite this ability to reside in both freshwater and saltwater, most adult bull sharks are found in saltwater areas as they have developed the ability to tolerate higher salinity levels, whilst young bull sharks have not. Adult females, therefore, give birth to live young (1-3 pups per litter) in freshwater, thus enabling the young to develop their saltwater tolerance before moving out to more saline-rich waters. Living in freshwater, young bull sharks are also more likely to survive potentially being eaten by larger bull sharks as the numbers of adult bull sharks are lower, and they also avoid much larger shark species such as white and tiger sharks. Nevertheless, if threatened, a bull shark of any size can regurgitate its last meal to distract predators and escape!

Like all shark species, bull sharks are referred to as a k-selected species, meaning they take a long time to mature and give birth to small numbers of well-developed young after a long gestation period. Male bull sharks start to reproduce around fifteen years of age, and females at eighteen. Female bull sharks must also be at least 175cm in length to produce viable eggs.

The life span of bull sharks has been suggested to be around the same as other sharks at around twenty to thirty years. The filter-feeding whale shark (*Rhincodon typus*) is believed to have lived for over one hundred years, whilst the Greenland shark (*Somniosus microcephalus*), native to the northern hemisphere, is believed to live for two hundred years, with a recent study suggesting one individual over five metres in length was at least 272 years old.

It has been estimated that one hundred million sharks are killed each year. Many of us are aware of the brutality associated with shark fin soup, where fins continue to be cut from live animals and the animal thrown overboard back into the sea, where they subsequently die a slow and painful death by suffocation. Squalene from their livers is utilised in cosmetics, and cartilage in nutritional supplements. Others are trapped in shark nets and drumlines along our beaches, a system that has existed since at least the 1970s. Understandably, fifty years later, we

Shark nets may protect us but endanger sharks and other marine life. A beach view, Lakes Entrance, Victoria. Image: Megan Fabian.

A southern eagle ray (*Myliobatis australis*) is found in waters from southern Queensland to the south-west coast of Western Australia. Image: Megan Fabian.

have better technologies that we can use to protect our beaches, and their continued existence remains highly politicised and largely unsupported.

One of the biggest threats to sharks, however, is habitat degradation. If we think about the bull shark, we have witnessed the widespread removal of mangroves and important nursery sites for this species and many other plants and animals. Pollution of waterways and climate change also have impacts. Higher temperatures and increased ocean acidity, a direct result of increased atmospheric carbon dioxide, impact their life cycle.

At present, sharks are one of the most threatened animal species. In the last five decades, 70 percent of all shark species have declined in numbers, with one-third now threatened with extinction. The Convention on International Trade in Endangered Species of Wild Fauna and Flora, or CITES, first recognised the basking and whale sharks as needing protection in 2003. Since then, white sharks were protected in 2005, seven sawfish species (*Pristidae* spp.) in 2007, the porbeagle (*Lamna nasus*), oceanic whitetip (*Carcharinus longimanus*), and three species of hammerhead sharks (*Sphyrna* spp.) in 2014, and the thresher and silky sharks (*Carcharhinus falciformis*) in 2017. It is worth noting that all these shark species are listed under CITES Appendix II and not Appendix I. Appendix I only allows trade to occur in exceptional circumstances because the species are threatened with extinction, whereas Appendix II lists species that are not necessarily under threat from extinction but have been recognised as species that trade needs to be controlled to ensure their utilisation remains compatible with their survival.

The filter-feeding whale shark (*Rhincodon typus*) is believed to have lived for over one hundred years. Image: Leonardo Lamas.

In Australia, the Environmental Protection and Biodiversity Conservation (EPBC) Act 1999 protects only a few species, including those listed by CITES, as well as the critically endangered east coast population and the vulnerable west coast population of the grey nurse (*Carcharias taurus*) shark, the critically endangered speartooth shark (*Glyphis glyphis*) and the endangered northern river shark (*Glyphis garricki*). However, a further change to the EPBC Act also occurred in 1999, allowing flexibility for migratory species, now meaning that recreational and game fishers can legally catch the porbeagle shark. Only four recovery plans exist under Australia's threatened species legislation. These plans are developed to guide actions to support species recovery, including plans for the grey nurse, whale and white sharks, and one plan combining three sawfish species listed by CITES.

More recently, in November 2022, when the CITES Convention of Parties met in Panama, they agreed to list a further seventy-five Elasmobranch species under Appendix II. Several of these species included critically endangered sharks impacted by the loss of habitat and overfishing or individuals misidentified during shark finning. Some familiar species now listed in Appendix II include the blue shark (*Prionace glauca*) and grey reef shark (*Carcharhinus amblyrhynchos*), as well as several other requiem sharks (*Carcharhinidae* family).

Despite the difficulties in conserving sharks, everyone can contribute and help conserve sharks. Everyone can continue to #snipringsforwildlife, advocate for the removal of shark nets and drumlines, reduce pollution entering waterways, and take action to limit the impact of climate change. We can also give 'flake the flick', and when choosing cosmetics and nutritional supplements, ensure they are shark free. It is the least we can do to protect these ancient predators from extinction.

The Port Jackson shark (*Heterodontus portusjacksoni*) is a nocturnal, egg-laying shark of the family Heterodontidae. Image: Megan Fabian.

Whitetip reef shark (*Triaenodon obesus*) is found in tropical marine waters, often associated with coral reefs, or lying on the bottom in caves and under ledges. Image: Bec Souter.

Australian Wildlife Society

NATIONAL COLOURING-IN COMPETITION

The Australian Wildlife Society colouring-in competition is designed to inspire the younger generation to learn about Australia's native wildlife via visual art and creativity. We hope that the experience provides participants with the opportunity to explore and develop a deeper understanding of environmental and wildlife-related issues.

There will be one first, second and third place winner in each state and territory of Australia. The first place finalist in each state and territory will go into a draw to have their artwork published in the Society's magazine *Australian Wildlife*. All first place winners will receive an annual family membership, valued at $70, and a certificate of congratulations. Their artwork will be published in the Society's e-newsletter and social media platforms. Second and third place winners will receive a certificate of congratulations and their artwork will be published in the e-newsletter and social media platforms.

TERMS AND CONDITIONS

When you submit your entry, please include the following information:

- Your name and age
- Your state of residence
- Telephone number and/or email address (this is how we will notify the winners)
- Parent/guardian signature as consent for entry into the competition

SUBMITTING YOUR ENTRY

- Entries are limited to one (1) entry per person
- To submit your entry, please take a photo or scan the completed artwork and email a copy to info@aws.org.au
- Please name your file according to the format: Name, Age, State (For example: Mark5yoNSW)

CLOSING DATE FOR ENTRIES: 30 NOVEMBER

PARTICIPANTS WILL BE NOTIFIED BY EMAIL/PHONE IN MID-DECEMBER

A Focus on South Australia's Koalas and the Rehabilitation of Ellie and Jellybean

Cathy Jackson

Adelaide and Hills Koala Rescue –1300KOALAZ Inc. is a group of similar-minded koala rescuers and carers with valid specialist koala permits in Adelaide, South Australia. We are a registered not-for-profit organisation with approved charity status. Our mission is to protect koalas (*Phascolarctos cinereus*) in the wild by enhancing and protecting their natural habitat and following the principles of rescue, rehabilitation, and release.

We assist in improving existing koala habitat, educating the public about the threats to wild koalas and their environment, and encouraging actions that can be implemented to address these threats. The work of 1300KOALAZ is promoted by word of mouth and social media to raise awareness and inform the public about the vital research implemented to protect wild koala populations. We also create partnerships with other organisations involved in koala conservation, habitat regeneration, and environmental protection to ensure the preservation of this species.

Our focus is to rescue, rehabilitate, and release wild koalas in Adelaide, South Australia, and we receive a number of calls for help. Unfortunately, South Australia's koalas often succumb to dog attacks, vehicle strikes, and disease. Koalas that enter our care usually range from having broken bones from being hit by a car or attacked by a dog, being affected by chlamydia and requiring treatment or gut dysbiosis, or being an orphaned koala joey that has been displaced from its mother's pouch. When a koala joey is found without its mother, we will send out a search party to find the mother as we believe that a koala joey is always healthier and better with its mother, provided it has not been involved in an accident.

We had an extraordinary rescue in 2022 that involved a mother koala, Ellie, and her joey, Jellybean. One day, a local Adelaide resident was approached by Jellybean, wanting to be held and fed, which was unusual as a mother and its joey are generally close together. We rescued Jellybean, who was only 800 grams and very dehydrated. We searched for Jellybean's mother, Ellie, and fortunately, she was found, and both koalas were reunited under our care. Ellie's mammary glands had collapsed and could not produce enough milk to feed Jellybean. Both Ellie and Jellybean were very thin and in urgent need of care. The veterinarian advised us that Ellie would need to be euthanised if her weight remained exceedingly low. Ellie was also rejecting Jellybean, so there was only one thing left to do – increase Ellie's body weight and hand-rear Jellybean.

Over the coming weeks, Ellie's weight increased significantly, and the veterinarian gave her the all-clear. Ellie came into care with a body count score of 1 and left our Carer's care with a score of 4.5. Jellybean also thrived and gained 2.5 kilograms in two weeks. Ellie was released back into her territory. However, it was not viable to introduce Jellybean back to Ellie as she

Top: Ellie the koala (*Phascolarctos cinereus*). Image: Alona Tester.

Mother koala, Ellie, with her joey, Jellybean, in the fork of a eucalyptus tree. Image: Alona Tester.

Jellybean the koala (*Phascolarctos cinereus*). Image: Alona Tester.

Jellybean and Betsy – the best of friends. Image: Alona Tester.

no longer produced the milk that Jellybean required. Jellybean remained in care, where she made friends with another koala, Betsy. The two became friends and were released on the same property where Jellybean had been rescued. Jellybean remained in care for nine months and was released back into the wild at 5.3 kilograms.

Funds generously contributed by the Australian Wildlife Society have assisted 1300KOALAZ in purchasing Makita fans and battery packs to keep koalas cool whilst in rehabilitation care. During the scorching summer months, these fans come in very handy. A koala in care can become incredibly stressed if they are overheated, significantly reducing their chances of a successful recovery. Keeping a koala nice and cool helps to reduce its stress levels and makes them more comfortable to receive treatment.

Over the past fifteen years, koala habitat in the Adelaide Hills has been significantly reduced due to several bushfires. In 2015, the Samson Flat bushfires affected the northern part of Adelaide Hills, which burned 49,000 hectares of prime koala habitat. In 2019, a further 25,000 hectares of prime koala habitat was lost in the north-east of the Adelaide Hills with the Cudlee Creek bushfires. In 2021, 2,700 hectares of koala habitat were lost in the Cherry Gardens Bushfires. Subsequently, only one area of Adelaide Hills has not been devastated by bushfires which is a refuge for koalas. In addition, the 2019-2020 bushfires on Kangaroo Island resulted in the loss of 211,272 hectares of prime koala habitat, and this koala population was chlamydia-free. Unfortunately, Adelaide did not receive federal funding to target habitat loss.

Adelaide has only one unscathed population of koalas remaining, which runs along the South Eastern Freeway – a busy highway that claims the lives of twenty koalas each month on average. Koalas are particularly vulnerable during the breeding season from September to February, as this is when they move across the landscape in search of a mate, cross busy roads and get hit by a car. South Australia is the only state in Australia not to have any wildlife bridges or fencing, and there is still no government funding available to address the issue.

To find out more and make a donation to help 1300KOALAZ rescue, rehabilitate and release South Australia's koalas and conserve their habitat, please visit 1300koalaz.com

Top Right: Makita fans, a compact portable cooling solution, are used to keep koalas (*Phascolarctos cinereus*) cool during warmer months. Image: 18V Mobile 180mm Makita Fan, viewed 20 June 2023, https://www.makita.com.au/building-construction/category/lighting-fans/dcf102z-18v-mobile-180mm-7-jobsite-fan







Checking in at Bee Hotels in the Burbs

Dr Kit Prendergast, the Bee Babette

Urbanisation is a rapidly expanding form of land-use change. It poses a threat to native bees through the loss of natural habitats, such as foraging resources as well as nesting resources. Bee hotels – artificial nesting structures – are sold in many gardening centres. However, based on the artwork of exotic honeybees and plant selection, it is pretty clear they have not been designed based on empirical research on native bees in Australia.

During my PhD research in the urbanised region of the south-west Western Australian biodiversity hotspot, I conducted systematic surveys of native bees and their visitation to flowers at seven bushland remnants and seven residential gardens over spring and summer for two years. My research revealed bushland remnants were considerably superior habitats for native bees, whereby a greater abundance, diversity, species richness, and a number of rare species were recorded. The bushland remnants also had fewer honeybees, and the pollination networks in these habitats were 'healthier'. However, all these results were based on bees visiting the flowers. Fitness – the key metric for evolution – is based on survival and, most importantly, reproduction, and this is where my current research comes in.

Using bee hotels, I was able to assess how well bees were reproducing in the different habitat types, as well as what environmental variables contributed to increased fitness. I also looked at how successful bee hotels were at providing nesting habitat for native bees.

At each of my fourteen study sites, I installed eight bee hotels made of jarrah wood, with holes drilled to depths of 10 centimetres of three different widths (4 millimetres, 7 millimetres and 10 millimetres). Many drill bits were broken in the process. I inserted custom-made cardboard nesting tubes so that once a tube was capped, meaning the bee had completed its nest, I could take these and rear them in the lab.

This research had never been conducted in Perth, Western Australia, and I was worried that all my efforts would be in vain. I remember when

Top left: *Megachile aurifrons* at Dr Kit's bee hotel. Image: Dr Kit Prendergast.

Bottom left: *Meroglossa rubricata* on a nesting tube in one of Dr Kit's bee hotels. Image: Dr Kit Prendergast.

Top middle: *Megachile speluncarum* at one of Dr Kit's bee hotels. Image: Dr Kit Prendergast.

Middle: *Meroglossa rubricata* on one of Dr Kit's bee hotels. Image: Dr Kit Prendergast.

Bottom middle: *Megachile erythropyga* sealing up a nest at one of Dr Kit's bee hotels. Image: Dr Kit Prendergast.

Top right: *Rozenapis ignita* in a bee hotel – its nesting habits were documented for the first time, and it was revealed to be the only bee known to use *Banksia* fuzz in its nests. Image: Dr Kit Prendergast.

Bottom right: *Megachile aurifrons* at Dr Kit's bee hotel. Image: Dr Kit Prendergast.

A pair of female *Megachile aurifrons* newly emerged from a nesting tube. Image: Dr Kit Prendergast.

Hylaeus violaceus – the most common hylaeine bee to use the bee hotels. Image: Dr Kit Prendergast.

A male *Megachile (Mitchellapis) fabricator* emerged from Dr Kit's bee hotels. This species only used 10 millimetre tubes, being one of the largest bees. Image: Dr Kit Prendergast.

Megachile speluncarum at one of Dr Kit's bee hotels. Image: Dr Kit Prendergast.

I was putting another batch of plastic takeaway containers, each labelled with the date and location where I collected the nest, into my lab (which would soon be filled floor to ceiling with hundreds of nests) a couple of months after I began my surveys, I noticed a movement in the corner of my eyes. Surprisingly, about six Hylaeus violaceus bees were running around one of the containers, newly emerged from their nesting tube. I ran down the university hallway to barge excitedly into my supervisor's office, Associate Professor Bill Bateman, triumphantly holding my box of bees.

Each month, when I visited my sites, after three hours of stalking flowers and recording every bee that visited a given flower species, I then did a round of the bee hotels, using tweezers to remove the nests – noting what type of nest cap it had: resin or chewed up leaves or leaves means it was Megachile or cellophane-like secretion means it was Hylaeinae. I also noticed unusual nest caps of *Banksia* fuzz. Each time, these nests revealed that the bee to emerge was *Rozenapis ignita* (previously *Megachile ignita*) – this was the first time its nesting behaviour had been recorded. Furthermore, this was a novel finding, as no other bee is known to pack its nest with this unusual material. I published my novel observations in a paper titled 'Nesting Biology of *Megachile ignita* Smith, 1853 (Hymenoptera: Megachilidae) in artificial nesting blocks in urbanised southwestern Australia' in the journal *The Australian Entomologist.*

In my lab (turned bee nursery), I checked the containers, each with its own nests, every few weeks. I meticulously recorded how many offspring emerged and their sex, identified what species they belonged to, and measured them with Vernier callipers. I then slit open the nests to record how many cells there were and how many larvae did not develop successfully. Nests were also parasitised at times, so I recorded if this occurred. My favourite parasitoids were the Gasteruptiid wasps – long-lanky alien-like wasps. I also recorded some novel host associations, including with a bombyliid fly, and a new mite-bee association, which I published, with entomologist Professor David Yates, in a paper titled 'New records of bee fly (Diptera: Bombyliidae) and mite (Acari: Pyemotidae) parasites of Australian megachile bees (Hymenoptera: Megachilidae) in Western Australia' in the journal *The Australian Entomologist.*

I knew that bees could undergo diapause for the nests where no bees emerged, so I X-rayed the nests to determine if there were still larvae offspring developing or if the larvae had died. Strangely, some bees would cap their nests without putting anything in them!

What results were found? Occupancy of the nests available was within the range of other studies and relatively low – between 6-13 percent. Most of the unused holes were the 10 millimetre holes, and thus it was mainly the 4 millimetre and 7 millimetre holes that were nested in. What was remarkable was that my bee hotels were nested

in by twenty-four species – much higher than most other studies and all studies published in Australia. Five species made up most of the 'check-ins'. *Megachile erythropyga* in particular loved them! What was also interesting was that the composition of the bees using the bee hotels differed markedly from the composition of cavity-nesting bees I observed foraging in the field. Bushland remnants had more check-ins compared with the residential gardens. I also found that male bees that emerged from the nests in the bushland remnants had larger body sizes, which is often associated with greater fitness. High proportions of native flowers near bee hotels increased the success of offspring developing in the nests. In contrast, the high diversity of flowers reduced the likelihood of bees occupying hotels – likely because of the specialised nature of the diets of many bees. These results were recently published in a paper titled 'Checking in at bee hotels: trap-nesting occupancy and fitness of cavity-nesting bees in an urbanised biodiversity hotspot' in the journal *Urban Ecosystems*, supported by the Australian Wildlife Society.

Overall, installing bee hotels with the correct dimensions can provide additional nesting resources for a relatively high diversity of cavity-nesting native bees in urbanised areas. Providing high proportions of native flora in the vicinity should enhance the success of the bees that use them.

The study also revealed how the commercial cheap-n-nasty bee hotels sold in Bunnings and Aldi are inappropriate for bees. These holes are typically much larger than 7 millimetres, and the seed mixes supplied with them include exotic flowers. The good news is that bee hotels are relatively easy to make, and I know some wonderful local craftsmen who make them.

What next? Well, I still need to work on additional publications from this dataset, including a paper on the Gasteruptiid wasp-native bee host associations, the impact of honeybees on the fitness of native bees, the effect of removing feral honeybees on native bees, pollen resources used by bee-hotel using bees based on pollen acetolysis and scanning electron microscopy, and an experiment where I put bees reared from bee hotels into flight cages with and without honeybees to see how this impacts native bee foraging and nesting.

A male *Megachile (Schizomegachile) monstrosa* emerged from a nesting tube. Image: Dr Kit Prendergast.

I also have a dataset that citizen scientists have been contributing to in my Facebook group, 'The Buzz on Wild Bees', where they record their bee hotel data. In addition, I look forward to publishing results from a project where I installed five hundred bee hotels in burnt areas of the Jarrah Forest as a bushfire recovery strategy. Hopefully, with funding and time, you will see these results made public.

If you would like to learn more about native bees, their foraging preferences, and how to create bee hotels, I have a book full of photos of our cute bees called 'Creating a Haven for Native Bees'. Please feel free to email me at kitprendergast21@gmail.com for a copy. I will also publish an educational booklet on native bee hotels shortly, generously supported by the Australian Wildlife Society. Stay tuned!

If you have any native bee questions or want to learn more, you can follow me on Instagram @bee.babette_performer, subscribe to my YouTube channel 'The Bee Babette', and join my Facebook group, 'The Buzz on Wild Bees'.

I want to thank the Australian Wildlife Society for supporting my research. Funds provided by the Society assisted me with researching native bee hotels and publishing the results of my study. Writing up results after your PhD is the most time-consuming and laborious part of the process, yet there are few opportunities to seek funding for this component. Doing the fieldwork is fun, but if the results are not published, they cannot inform the public, stakeholders, or policymakers and contribute to the scientific canon on evidence-based ways to save our native bees.

Megachile erythropyga sealing up a nest at one of Dr Kit's bee hotels. Image: Dr Kit Prendergast.

Australian Wildlife Week
Video Competition

Australian Wildlife Society
Conserving Australia's Wildlife since 1909

The Australian Wildlife Society's Australian Wildlife Week Video Competition coincides with Australia Wildlife Week celebrated during the first week of October to encourage a positive relationship between humanity and nature by awarding and promoting the plight of threatened Australian wildlife through the medium of videography.

The Australian Wildlife Society invites videographers to raise the plight of threatened wildlife in Australia and encourages the production of videos taken in Australia by Australians that reflect the diversity and uniqueness of Australia's threatened wildlife.

An annual judge's prize of $1,000 will be awarded.

Rules of entry:

1. The subject of each entry must be a threatened Australian species - fauna or flora - and officially listed as either Vulnerable, Endangered, or Critically Endangered.
2. The entry must be the work of the entrant.
3. All videos must have been made specifically for Australian Wildlife Week, the Australian Wildlife Society's website and YouTube channel.
4. By submitting an entry, entrants grant the Australian Wildlife Society rights to the video. Entrants retain the copyright to their entries but accord the Australian Wildlife Society the right to use the video in any of its marketing or promotional material arising therefrom.
5. All videos must include a message on how to conserve the threatened species featured in the video, be no longer than 5 minutes (including titles and credits) and include the Australian Wildlife Society either as an end frame or in the closing credits.
6. There shall be no charge for entry, and entrants may submit more than one entry.
7. The name of the threatened species, videographer, and date the video was created must be in the 'file name' of each video submitted, e.g., Koala_John Smith_6.6.66.
8. Entries will be submitted in mp4 format via a compressed file to video@aws.org.au
9. All entries must be accompanied by a short paragraph (maximum 100 words) describing the status of the threatened species, the location the video was taken, and the reason for choosing the threatened species featured in the video.
10. Directors of the Australian Wildlife Society or their families are ineligible to submit entries.
11. The final result is at the Directors' discretion.

The closing date for entries is 31 August.

The winner will be announced towards the end of September.

REGISTERED CHARITY
acnc.gov.au/charityregister

Australian Wildlife Week
Held during the first week of October every year

Caring for Camden's Wombats

Belinda Goldsworthy and Laura Hill

Camden Wombats Landcare Inc. was established in 2021 with the assistance of Greater Sydney Local Land Services after discussions with environmentally conscious wildlife advocates identified a need to conserve, support and restore the habitat of bare-nosed wombats (*Vombatus ursinus*) in the Camden region of New South Wales.

Camden Wombats Landcare is a small but dedicated group that aims to protect the local wombat population and promote biodiversity through the restoration and protection of the river-flat eucalypt forest, an endangered ecological community adjacent to the Nepean River within the environmental protection zone at Camden Airport. This site on the edge of south-west Sydney is an important wildlife corridor and supports the vulnerable Camden white gum (*Eucalyptus benthamii*) and endangered rufous pomaderris (*Pomaderris brunnea*).

The work of Camden Wombats Landcare volunteers includes remote burrow-flap treatment of deadly sarcoptic mange infestation in wombats, habitat restoration, invasive weed control, and upcoming plantings of native species with Greening Australia. Camden Wombats Landcare conducts ongoing wildlife monitoring of the local wombat population and other native and introduced species using remote wildlife cameras. Our members are also actively trying to educate and improve community awareness about wombats. Our recent advocacy work with Camden Airport and Camden Council has resulted in the installation of road signage to help reduce and prevent road-strike deaths of this iconic native animal.

Wombats are efficient ecosystem engineers with their digging improving the surrounding environment by turning over and aerating hard, compacted soils, making nutrients more available to other animal and plant species, and increasing water availability for eucalyptus and other trees, particularly during drought. Native plants and grasses, such as the wombats' preferred weeping grass (*Microlaena stipoides*), particularly benefit from the wombat's digging activity. Soil turnover also provides habitat and resources for many invertebrates that are a food source for birds, reptiles, and larger mammals sharing the wombats' home range. In addition, wombat burrows provide refuge for many species during natural disasters such as bushfires and extreme hot and cold weather.

One of the main aims of Camden Wombats Landcare is to save wombats suffering from the parasitic mite (*Sarcoptes scabiei*), commonly known as mange. This deadly infestation is prevalent throughout the wombats' range, with up to 90 percent of wombat populations being somewhat affected. The devastation caused by this microscopic mite cannot be understated. The mite eats through the wombat's thick skin, causing hair loss and decreasing the usually highly energy-efficient animal's ability to stay warm (i.e., loss of thermoregulation). Furthermore, the mite's life cycle and bacteria

Top: A bare-nosed wombat (*Vombatus ursinus*). Image: Laura Hill.

The President of Camden Wombats Landcare Inc. completing camera maintenance at a wombat burrow. The cameras need fresh batteries every month. The photos downloaded from the SD cards are analysed and tagged by members remotely. Image: Megan Fabian.

from external sources impact the wombat's immune system and cause dehydration and subsequent starvation.

The suffering of the wombat from this mite is immense, with each female mite tunnelling into the deeper layers of skin, causing uncontrollable pain and itching as it lays its eggs and leaves waste and faeces in each tunnel wound. Death can be cruel and agonizingly slow, with progressive loss of condition as exponential damage occurs with each new hatching of mites creating new tunnels through the ravaged skin every few weeks. The damage caused by the mites leads to dehydration, distress, loss of eyesight and hearing, and increased metabolic pressures. If left untreated, unfortunately, it is fatal and can wipe out localised populations.

Bare-nosed wombats are facing a multitude of other challenges locally, including habitat loss, habitat degradation, and fragmentation through housing development, destroying their preferred native grasslands throughout their natural range. Decreased suitable habitat has a compounding effect on wombats,

A mange treatment flap is installed at the front of a wombat burrow and filled with anti-parasitic medication (Cydectin). These flaps must be refilled regularly as wombats require multiple doses to treat mange effectively. Image: Megan Fabian.

leading to forced burrow sharing and increased crossover between other mature wombats. This crossover increases stress and infestation of sarcoptic mange mites in wombat populations. These parasitic mites can live for up to three weeks in a cool, humid burrow environment. In short, the lack of social distancing between wombats causes increased sharing of infested burrows and compounded stress levels, leading to compromised immune function. Wombats also face the devastating impacts of road deaths (as mentioned above), domestic dog attacks, and increased competition for food resources by feral pest species, such as rabbits, deer, and goats.

The collaborative approach between environmentally conscious wildlife advocates, conservationists and bush regenerators is heartening. We encourage local landholders and members of the community to join us in gaining an appreciation for our amazing ecosystem engineers and taking action to protect wombats on both private and community property, such as being a responsible dog owner, driving cautiously between dawn and dusk, and reporting any burrow sightings or incidents of manage to local wildlife groups or via WomSAT.

Camden Wombats Landcare will continue to conserve, support, and restore more of the local wombats' natural habitat by monitoring the health of wombats, improving their landscape, and responding to mange outbreaks. We hope to promote

A bare-nosed wombat (*Vombatus ursinus*) receives a dose of anti-parasitic medication (Cydectin) from a mange treatment flap as it exits its burrow. Image: Remote wildlife camera, TRAILCAM0D.

A bare-nosed wombat (*Vombatus ursinus*) suffering the deadly effects of mange. Image: Mel Johnstone.

Remote cameras help monitor and identify any wombats suffering from mange with minimal stress to the animals. Image: Remote wildlife camera, RECONYX HyperFire 2™ Covert IR Camera.

Camden Wombats Landcare Inc. logo. Image: Laura Hill.

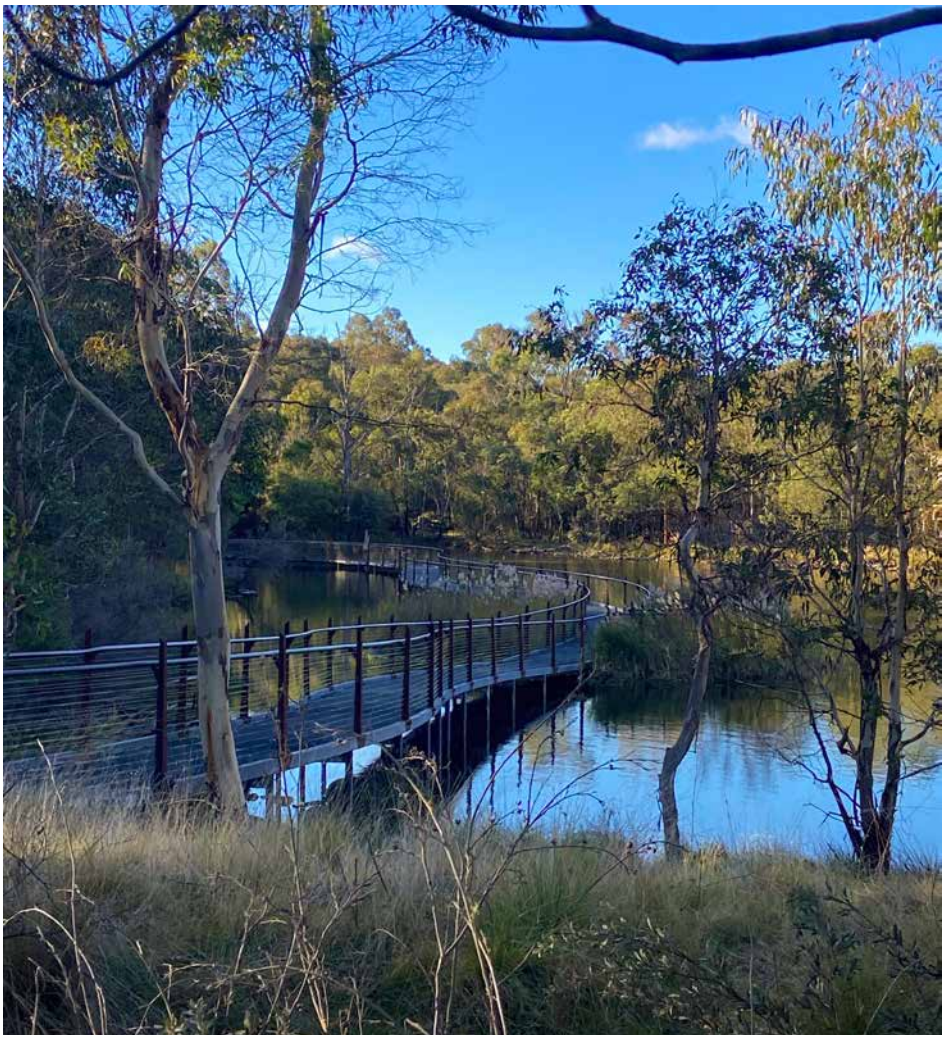
A patch of Camden white gums (*Eucalyptus benthamii*) overgrown by the exotic weed, green cestrum (*Cestrum parqui*). Image: Laura Hill.

sustainable land practices in which native wildlife is a key feature, promoting healthy ecosystems and improving biodiversity. In the future, we hope to offer site tours that demonstrate the benefits of wombats as landcarers, and involve the community in interactive workshops and demonstrations to gain knowledge and an appreciation of the amazing contributions of our iconic bare-nosed wombats.

Camden Wombats Landcare would like to thank the generous support of the Australian Wildlife Society. Funds provided by the Society supported Camden Wombats Landcare in purchasing Cydectin and a drenching gun to treat mange in infected wombats, remote sensor cameras, SD cards, rechargeable batteries, and a GPS to map burrows. We would also like to thank Greater Sydney Local Land Services, Landcare NSW, Camden Airport (Aeria Management Group), the Wombat Protection Society of Australia (WPSA), and all our wonderful volunteers. We also acknowledge the publicly available training and support for community mange treatment of all wombats in New South Wales by Wildlife Information Rescue and Education Service (WIRES Inc.).

For more information about the work of Camden Wombats Landcare, please visit https://bit.ly/CWLInc

After removal of the weed green cestrum (*Cestrum parqui*), native grasses can thrive and be accessed by wombats and other native wildlife. Image: Laura Hill.



A Tale of the Tidbinbilla Trail

Megan Fabian

Let me take you on a journey. One that you might like to replicate if you ever visit the Australian Capital Territory.

Nestled within the Tidbinbilla Valley, and surrounded by Namadgi National Park, lies Tidbinbilla Nature Reserve. A reserve home to a wide range of animals living in diverse sub-alpine habitats, including wetlands, grasslands, wet and dry forests, and woodlands. These habitats support a wide range of wildlife, including kangaroos, wallabies, koalas, platypus, potoroos, bandicoots, wallaroos, echidnas, emus, lyrebirds, as well as many other birds and reptiles.

Tidbinbilla has 100 hectares of feral- and predator-free habitat within twenty free-ranging enclosures, allowing animals that are part of species recovery programs to exist as they would in the wild.

The first stop on our long-awaited trip to Tidbinbilla Nature Reserve was the Visitor Information Centre, where we purchased our entry ticket and collected a map. The entrance fee was $14 per vehicle. A critically endangered northern corroboree frog (*Pseudophryne pengilleyi*) was on display in the Visitor Information Centre. Tidbinbilla houses the largest captive breeding population, with only hundreds remaining in the wild. The frog was only small, about 3cm long and brightly coloured with yellow and black patterning. One of the greatest threats to this species is chytrid fungus (*Batrachochytrium dendrobatidis*) – a water-borne pathogen that attacks the keratin in frogs' skin, slowly killing them.

After filling our water bottles, we proceeded through the gate and into the reserve. We stopped at the historic Rock Valley Homestead, built by George Green and George Hatcliff in 1895, before continuing to The Eucalypt Forest.

The Eucalypt Forest is a wet sclerophyll forest on the floor of the Tidbinbilla Valley. The forest is 17 hectares, surrounded by a predator-proof fence to protect the animals and their habitat. Upon making our way through the gated entry, we were greeted by two sleepy koalas (*Phascolarctos cinereus*). We assume this pair of koalas were the breeding pair as they were nice and snug in their comfortable enclosure. Tidbinbilla also has populations of free-ranging koalas. We took a stroll along the 700m Koala Path, but unfortunately, the longer Peppermint Trail (1.8km) was closed for maintenance. However, it did not spoil our day; there was much more to see.

Across the road from The Eucalypt Forest was The Sanctuary, a large wetland ecosystem surrounded by

Top left: The Sanctuary Boardwalk – a tranquil experience amidst nature. Image: Megan Fabian.

Top right: One of the two koalas (*Phascolarctos cinereus*) rests peacefully in a fork of a eucalypt tree. Image: Megan Fabian.

Bottom right: Musk ducks (*Biziura lobata*) get their name from the strong musk odour produced from a gland on their rump. Image: Megan Fabian.

The southern brown bandicoot (*Isoodon obesulus*) is an endangered species in New South Wales due to vegetation clearing, introduced foxes and cats, and changes in the frequency of bushfires. Image: Megan Fabian.

bushland and protected by a predator-proof fence, creating a refuge for a range of native animals. The Sanctuary is home to a variety of bird species, Cunningham's spiny-tailed skinks (*Egernia cunninghami*), platypuses (*Ornithorhynchus anatinus*), reintroduced free-ranging populations of long-nosed potoroos (*Potorous tridactylus*) and southern brown bandicoots (*Isoodon obesulus*), as well as brush-tailed rock-wallabies (*Petrogale penicillata*) that have retired from the breeding program. Tidbinbilla is the only place in the Australian Capital Territory where brush-tailed rock-wallabies can be found. The last brush-tailed rock-wallaby was seen in the wild in the Australian Capital Territory in 1959. Unfortunately, the brush-tailed rock-wallabies were hiding on this particular day, and none were spotted. We also kept our eye out for the elusive platypus; similarly, we had no luck. We did, however, have a few eventful run-ins with several southern brown bandicoots and a memorable experience of a musk duck (*Biziura lobata*) charging at us, or so we thought.

The southern brown bandicoots were not bothered by the visitors and were on one important mission – to find food. They scurried among the leaf litter and dug holes, and as they moved around, they turned the soil over in search of insects, worms, plant roots, and fungi. One bandicoot ran out of the bush, crossed in front of our feet and to the other side to continue its mission of locating food. Another bandicoot was investigating quietly near the walking path; had it not been spotted, we would have completely missed it. It gave us a heart attack when we stumbled across it, as it blended in well with the ground litter – it was somewhat camouflaged. Bandicoots are such an adorable species, and we were so lucky to have seen not only one bandicoot but a handful of them. The southern brown bandicoot is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* and is threatened by habitat loss, inappropriate fire regimes and extensive wildfires, introduced predators, and isolation of populations. However, conservation actions are being implemented across the Australian Capital Territory, New South Wales, South Australia, and Victoria to protect this species from the risk of extinction.

A southern brown bandicoot (*Isoodon obesulus*) digging for food. Image: Megan Fabian.

This next story of our experience with a native animal is quite funny. We walked along The Sanctuary Boardwalk and approached a viewing platform, partially located on top of the water, where you could look across the wetlands. Suddenly, a small to medium-sized black silhouette approached us at full speed. We could not quite determine what it was because the sun was shining directly behind it. There was a suggestion of it being a small dog that decided to go for a swim, but we knew dogs were not allowed in The Sanctuary. We were excited that it could possibly be a platypus, but they do not protrude from the top of the water as high as this animal. Then someone suggested it might be a reptile, but we could not think of one that would travel along the top of the water like that. We were starting to become concerned for our safety at one point until this beautiful duck broke out from in front of the light and presented itself, with its robust bulky build, sooty-brown plumage, and a sizeable bulbous lobe of skin hanging under its bill. It was a musk duck, and it was our very first experience of seeing one. We all broke out into fits of laughter. We realised very quickly that we were in no danger at all. The male musk duck is the largest of Australia's ducks, but they are not to be feared, and they are somewhat graceful in their efforts to source food underwater. One day, I hope you also get the opportunity to witness a musk duck in nature without the sunlight impeding your vision, possibly at Tidbinbilla Nature Reserve.

Tidbinbilla has much to offer, including walking tracks, picnic areas, enclosed sanctuaries, outstanding wildlife and natural experiences, and a playground where all the kangaroos hang out, not to play on the equipment, of course, but to feed on the patches of open grassland nearby. You could spend an entire day at Tidnbinbilla, making the most of everything it offers. For further information, please refer to Tidbinbilla's Visitor Guide bit.ly/TNRMap

A southern brown bandicoot (*Isoodon obesulus*) camouflaged amongst the leaf litter. Image: Megan Fabian.

Wombat Swing Gates

Help to Solve Farmer-Wombat Conflict

Elena Guarracino, Wombat Protection Society of Australia

Many rural landholders struggle with fence damage caused by wombats. Fence damage is one of the reasons wombats are often not very popular with farmers and are sometimes persecuted. Wombats create holes in fences when they dig under or push up under a fence, enabling farm animals, such as farm dogs or lambs, to escape. Another problem for farmers is that these holes also allow other unwanted animals to get in, such as foxes, rabbits, kangaroos, and wallabies. Often farmers erect exclusion fencing to protect livestock, orchards, crops, and revegetation. However, holes in a fence create an access point that allows other animals and wildlife to move through and browse crops and cause damage.

Landholders will sometimes take matters into their own hands to deal with wombats. However, harming wombats is illegal in all states where wombats are a protected native species. It is also illegal to trap and relocate wombats in New South Wales. Given the many adverse impacts on wombats from mange, vehicle strike, climate change disasters such as drought, bushfires and flooding, and human development and habitat destruction, non-lethal solutions are needed to help wombats and people co-exist.

Since it was established almost thirty years ago, the Wombat Protection Society of Australia has provided advice to landholders on how to live with wombats, and provided legal, compassionate, and practical animal welfare solutions to mitigate the impacts of wombats on properties. The Wombat Protection Society of Australia has a section dedicated to mitigation methods on its website to assist landholders with unwanted wombats. Please visit this link for further information bit.ly/WPSAMitigate

Wombats are an essential part of the ecosystem and must be able to move freely throughout their territory or home range. Wombats have been misunderstood and not appreciated for their role in the environment. They are the largest burrowing animal

Top left: Victorian landholder Ali Martin has a wombat swing gate on her property. Lambs will not try to push through the gate, preventing them from being separated from their mothers. Image: Courtesy of Ali Martin.

Top right and Bottom right: Wombat swing gates are easy to install and should be placed along well-used wombat tracks. Installation is simple, and instructions are provided. Once installed, it is best to tie the gate up (so it does not swing) for a couple of weeks so the wombat/s can become accustomed to the change in the fence. The gate can then be lowered. Image: Jennifer Scoullar.

Under the welding shield and sparks, the Akoonah Park Mens Shed volunteers set up a production line to produce the wombat swing gates efficiently and to a high standard. Image: Akoonah Park Mens Shed.

in the world and are often called eco-engineers for their positive impact on the soil, plants, and general health of the Australian bush.

But how can we help concerned landholders? Several research papers have been published over the years on wombat mitigation, the effectiveness of wombat swing gates, and other mitigation measures. One such study by Borchard & Wright (2006, pp. 33-42) concluded that:

"*The results of this study showed that swinging wombat gates were more effective than exclusion fencing at selectively regulating access by wombats. However, both methods together probably contributed to managing wombats and other unwanted species on a whole farm basis. Wombats can make numerous breaches in fencing and the installation of gates at every breach point may be impractical. Therefore, gates should always be installed at the most well–used breaches. Exclusion fencing as described here over minor fence breaches (indicated by less fence damage and soil disturbance) should serve to 'train' wombats to use the gates over time by forcing them to utilise an*

L to R: John Marshall, Graeme Adams, Noel Phelan, David Russell, Phil Watson, and Jim Grills are pictured with the wombat swing gates they have made. The gates contain a small pocket for holding Cydectin, making them dual-purpose and capable of treating wombats with mange. Image: Jenny Mattingley.

easier access option provided by a swinging gate (Breckwoldt, 1983). According to Triggs (2009), anecdotal evidence suggests that wombats will use gates placed up to 800 m apart without making new holes… The success of swinging gates in this study shows potential for assisting with the alleviation of the strong landholder-wombat conflict that continues to exist in parts of rural Australia."

Concern about landholder-wombat conflict led the Wombat Protection Society of Australia to reach out to the Akoonah Park Mens Shed in Berwick, Victoria, to help address the problem and protect wombats. Semi-retired engineer, Jim Grills, took charge of the project and designed a very robust, well-constructed, engineered metal gate placed over the hole in the fence on the regular path of the wombat. Wombats are creatures of habit and tend to use the same tracks in their territory. The newly designed gate allows a wombat to gain entry, but other animals are reluctant to push on the heavy gate.

The wombat swing gates were successfully trialled in Victoria in 2022, with 130 landholders participating. Around two hundred gates were made by volunteers of the Akoonah Mens Shed. The driving force behind the project was Jenny Mattingley, a Director of the Wombat Protection Society of Australia, who organised the funding for the Victoria project through the Victorian Government Community Support Fund and has been involved every step of the way. The Wombat Protection Society of Australia is incredibly grateful and appreciative of the considerable commitment and enthusiasm of Akoonah Mens Shed volunteers to this ongoing wildlife conservation project.

The gates, which cost about $50 in materials to make and around $20 for postage, were provided free of charge to Victorian landholders. Building on the success of the Victorian wombat gate trial, a similar trial is planned for New South Wales. Until funding is secured, wombat swing gates can be purchased from the Wombat Protection Society of Australia for a nominal price to cover costs and postage. Generally, two gates can be bought for $50 each, and the cost of postage for two gates is $40. Please send inquiries to gates@wombatprotection.org.au, and instructions on how to install the gates will also be provided.

L to R: Jim Grills (Engineer, Akoonah Park Mens Shed) and Jenny Mattingley (Director, Wombat Protection Society of Australia) with one of the wombat swing gates at the Akoohna Park Mens Shed, in Berwick, Victoria. Image: Reg Mattingley.

A bare-nosed wombat (*Vombatus ursinus*) demonstrates how the wombat swing gate works. There are no sharp edges, and the weight of the gate deters most other animals and the gate swings in both directions. Image: Philippa Meyer.

Reference

Borchard, P & Wright, I 2006, 'Managing fence damage by bare-nosed wombats (*Vombatus ursinus*) at the agricultural-riparian interface', *Human-Wildlife Interactions*, vol. 4, no. 2, pp. 33-42.

2023 University Research Grant Winners

The Australian Wildlife Society's University Research Grants are offered to honours or postgraduate students at Australian universities conducting research that contributes to the conservation of Australian wildlife (flora or fauna). Ten grants are awarded each year: one $5,000 scholarship and nine $3,000 grants.

The Society is proud to have awarded our very first Dr Clive Williams OAM Memorial Wildlife Conservation Scholarship in honour of former Director Dr Clive Williams. The scholarship is awarded to the highest-ranked applicant of all our University Research Grants.

Grants may be used to purchase equipment and consumables, travel expenses related to field research, or attend a conference where the student presents their research.

The Australian Wildlife Society is delighted to announce the winners for 2023:

JACK BILBY (Dr Clive Williams OAM Memorial Wildlife Conservation Scholarship Recipient)

School of Biological, Earth and Environmental Sciences, University of New South Wales.

Project Title: Beating the Heat: How do Bandicoots Respond to Extreme Heat in Burnt and Unburnt Habitat?

ANNE IBBOTSON

School of Biomedical Sciences and Pharmacy, The University of Newcastle.

Project Title: The Potential for Stress and Reproductive Hormones to Inform Conservation Decisions for Endangered Amphibians.

HANNAH GERKE

Fenner School of Environment and Society, The Australian National University.

Project Title: Measuring Movement Behaviour and Personality of Eastern Brown Snakes in Urban Areas: Snaking our Way Towards Successful Conflict-Driven Translocation.

HOLLY FARNAN

Centre for Tropical Environmental and Sustainability Science, James Cook University.

Project Title: Investigating the Effects of Insecticide Exposure and Pathogens on Bee Diversity, Abundance, and Health.

NATALIE GRASSI

School of Environmental and Conservation Sciences, Murdoch University.

Project Title: Faunal Assemblages and Ecology at Conservation Connectivity Areas Within a Fragmented Agricultural Landscape.

NATARSHA MCPHERSON

School of Biological Sciences, The University of Adelaide.

Project Title: Distribution and Density of the Southern Hairy-Nosed Wombat (*Lasiorhinus latifrons*) under the Influence of Future Climate Change and Invasive Rabbit Competition.

OCEANE ATTLAN

School of Biological Sciences, The University of Western Australia.

Project Title: Temperate Marine Ecosystems under Tropicalisation: An Insight of Species Reshuffling and Ecological Function Changes along the Western Australia Coastline.

OLIVIA JOHNSON

Institute for Marine and Antarctic Studies, University of Tasmania.

Project Title: Safeguarding Threatened Reef Species.

PAULA RUIZ

Institute for Marine and Antarctic Studies, University of Tasmania.

Project Title: Mechanisms of Stability for Degraded 'Turf-Dominated' Reef States.

RAQUEL PARKER

School of Life and Environmental Sciences, The University of Sydney.

Project Title: Using Carcasses to Investigate Ecosystem Processes in Feral Predator-Free Fenced Areas, NSW.

Science in the Skies:

Following Black Cockatoos

Black Cockatoo Conservation Management Project

After months in captivity, the bird known to scientists as 'CC57' is ready to return to the wild. She is a Carnaby's cockatoo (*Zanda latirostris*), one of only two kinds of white-tailed black cockatoo in the world, and her freedom could help save her species. The woodlands of her home in south-west Australia have been deforested, and she is one of many black cockatoos every year to succumb to the hazards of urban life, such as vehicle strikes. CC57 was lucky. Found debilitated and brought in for rehabilitation at Kaarakin Black Cockatoo Conservation Centre in Perth's hills, she is now only days from release. But first, she has an important job to do, one that could help unlock the mysteries of her species. She needs to not remove her scientific 'bling'.

High-Tech Accessories

CC57 is wearing two types of expensive, lightweight tech. On her back sits a small Global Positioning System (GPS) tag. On the underside of her long tail feathers is an ARGOS satellite tag, its thin aerial stretching slightly beyond the tail's tip. Each tag costs thousands of dollars. Their worth to science is much more. They will tell scientists where CC57 goes and whether she survives. Importantly, when she joins a wild flock, she will become a 'flock marker', allowing scientists to track the flock across hundreds of kilometres and thousands of hours – something that was previously impossible.

The tag-attachment team, wildlife biologists, and vets from the Black Cockatoo Conservation Management Project at Murdoch University hope she leaves her tags alone. They were told that tracking devices on black cockatoos would never work – these intelligent birds would simply use their gumnut-splitting beaks to snip off any tag. But tag-attachment trials revealed that the birds generally leave back-mounted and tail tags alone. Delightfully, when grooming their tails, birds have been known to give their aerial a quick groom too.

Solving Habitat Mysteries

To date, over one hundred black cockatoos have been released wearing their high-tech gadgets. The GPS tags typically last weeks to months, recording locations every 2.5 minutes and collecting fine-scale behavioural and location data. The ARGOS satellite tags can last over a year before being shed during the bird's annual tail moult, giving fewer daily locations but collecting location data over longer time spans, including capturing breeding migrations.

As well as tagging rehabilitated birds, the research team fit tags at breeding sites, removing birds briefly from nest hollows for tag attachment while also checking the health of nestlings. CC57 has been assigned to doctoral

Top: The tracking research shows that small patches of native vegetation are important food sources for urban black cockatoos. Image: Karen Riley.

Researchers attach tags to birds under anaesthesia at Carnaby's cockatoo (*Zanda latirostris*) breeding grounds. Image: Murdoch University.

For tag attachment, wild birds are removed briefly from nest hollows. With few natural hollows left, these are often artificial. A head for heights is required. Image: Murdoch University.

Tracking flocks can help scientists locate breeding trees (old trees with hollows), which can then be protected. Image: Karen Riley.

Wild Carnaby's cockatoo (*Zanda latirostris*) nestlings are health-checked and returned to their nest hollow. Image: Murdoch University.

student Karen Riley. The tags will give Karen a trove of new data about foraging, roosting, and breeding sites; priceless information for a species whose numbers have nosedived due to insufficient habitat, which can only be saved by safeguarding what is left.

Carnaby's cockatoos are not the only high-tech birds in Australia's south-west skies. The team has attached tags to Western Australia's other threatened black cockatoos: Baudin's cockatoos (*Zanda baudinii*) and forest red-tailed black cockatoos (*Calyptorhynchus banksii naso*). More than a decade after national recovery plans were developed for all three species, authorities at all levels have failed to halt their declines due to a failure to safeguard habitat. Without a new approach, the outlook is grim. From Western Australian Museum estimates, Baudin's cockatoos have plunged to as few as three thousand birds; they are 'critically endangered', the last step before extinction. This threat makes the tagged birds invaluable. We can better understand what habitat they need to survive by tracking them and their flocks.

The GPS Tag and the 'Green Corridor'

Two days after tag attachment, CC57 was released with a group of rehabilitated Carnaby's cockatoos near where she had been rescued months before. A perfect research subject, CC57 left her tags alone and quickly joined a wild flock. Her tag showed, that a fortnight later, CC57 and her flock moved to Perth's northern suburbs, taking up residence in pine plantations. In the absence of enough native habitat remaining in Perth, pine trees have become critical as night-roosts and food.

CC57's GPS back-mounted tag collected reams of data. When researcher Karen Riley analysed the data, the findings were striking. Near the flock's roost, two urban areas sat side by side. One retained its urban canopy, with trees in backyards and patches of bushland in parks and reserves. The other was a dense mass of newer developments with houses jammed to fence-lines, without a garden or a tree. The greener suburbs were brimming with GPS points. Here, CC57's flock was able to find food, embracing bushland patches and the food they offer. The treeless housing estates were barren of data; they had lost their black cockatoos.

Something else was interesting. Karen noticed a single data track threading through the housing

developments. According to the GPS data, CC57's flock had ventured deep into this urban desert on multiple days, following a specific route. To investigate, Karen 'ground-truthed' the data, visiting the suburb and following the flock's path. What she found speaks volumes about the best (and worst) practices in urban design and habitat protection.

Contrary to popular belief, black cockatoos tend not to fly long distances outside of breeding migrations, instead making short 'hops' between neighbouring habitat patches. CC57 and her flock had found the only vegetated path through the wasteland; a row of eucalypts lining a street. Investigations revealed that these were trees on private properties, which the council had protected, perhaps for their street beauty and urban cooling benefits. This 'green corridor' allowed the flock to move through the suburb to their mystery destination. Arriving at the GPS location at the corridor's end, Karen understood. Hidden behind the housing estates was an undeveloped block of banksia woodland, rich with native fruits and flowers for hungry birds. In an unfortunate twist of timing, the dozers had already arrived. Within weeks, the woodland was gone.

Combining CC57's data with those from other tagged birds, a picture emerges of the value of urban canopy, green corridors for wildlife, and retaining native vegetation. Data show that even small, scrappy-looking patches are important food sources. In the face of Australia's current wildlife extinction crisis, regulators and decision-makers are recognising that habitat protection needs to be done better. Locally, some Perth councils are working harder to protect native trees for wildlife and people. Outside urban areas, key black cockatoo forests are endangered by mining, including lithium mining for electric cars. When data reveal that a site is a breeding site for birds facing extinction, this supports calls to decarbonise without destroying nature. To safeguard wildlife, some places are too precious to destroy.

A Crooked Aerial and Ragged Feathers

What of CC57? Her tale ends with two clues for researchers. When spring arrived, and the flock flew south to a forest of ancient marri (which, being old, had good nesting

High-tech, lightweight tracking devices for black cockatoos include back-mounted GPS tags. Image: Karen Riley.

A tagged female Carnaby's cockatoo (*Zanda latirostris*) (on the left) with a mate at an artificial nest hollow, a rehabilitation and research success story. Image: Karen Riley.

A just-hatched Carnaby's cockatoo (*Zanda latirostris*) nestling in a natural hollow. Its survival depends on whether its parents have enough foraging habitat nearby. Image: Rick Dawson.

Poor urban planning: flock location data from CC57's GPS tag show that black cockatoos are lost from suburbs unless native vegetation is retained. Image: Google Scholar, Karen Riley.

Western Australia's black cockatoos are iconic in the urban landscape. All three species are facing extinction, even though authorities know what to do to save them. Image: Molly Spaulding.

hollows), CC57 went with them, the migration captured by the ARGOS satellite tag. Karen followed and found their location. She took photos of the flock at sunset. Examining the images, something caught her eye. One bird seemed to have something thin stretching from its tail. It was hard to see and strangely crooked. Could this be CC57 with a bent aerial? Or just a stick? Impossible to tell.

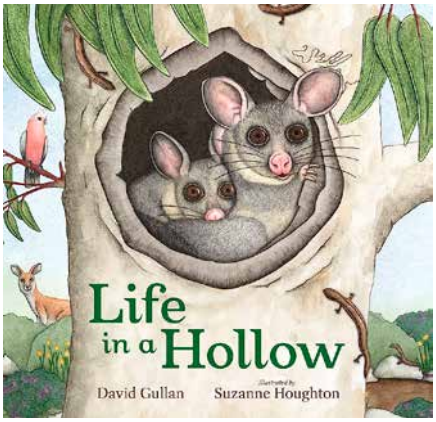
Weeks later, the tag started transmitting from a fixed location. Although in rare cases, this means the bird is dead, typically, the tail feathers have moulted out and are lying somewhere with the tag. Karen, an expert tag-finder, went searching. She found the tag still attached to feathers that had clearly been moulted but were slightly ragged. The aerial was bent, matching the photo. The bird in the photo was CC57, and the feathers were a clue to a final wonderful secret.

Usually, moulted feathers are pristine. But tails get ragged when birds go in and out of hollows, which they do when they have formed a pair bond (thought to be lifelong) and are prospecting for a nest; or, potentially, are caring for offspring. So, these ragged feathers suggest that before CC57 shed her tags and was lost to science, she had found a life partner and was engaging in what scientists call a 'breeding attempt'. We hope she was successful.

Karen Riley's research was supported by the Department of Biodiversity, Conservation and Attractions; Perth Zoo; Newmont Boddington Gold, South32, PTI Architecture; and Kaarakin Black Cockatoo Conservation Centre. To learn about the research team's science translation project to help save black cockatoos, visit KeepCarnabysFlying.org.au and get involved if you live in Perth.

Highly social, black cockatoos call to each other as they fly. Their haunting cries are well-known in Perth's skies. Image: Sam Rycken.

Book Reviews



Life in a Hollow – *David Gullan and Suzanne Houghton*

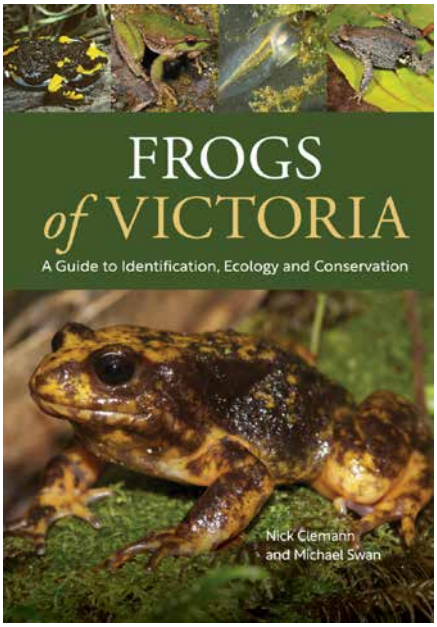
Tree hollows are incredibly special places that provide animals a space to nest and feel safe. From a small longhorn beetle (*Phacodes obscurus*) to a larger crimson rosella (*Platycercus elegans*), meet the native species who call a hollow a home in the Australian bush. You will be surprised how many choose to move in! Discover the key role tree hollows play in the environment and how we can help protect them.

Publisher: CSIRO Publishing
RRP: $24.99

The Forgotten Song – *Coral Vass and Jess Racklyeft*

A moving story of a regent honeyeater (*Anthochaera phrygia*) who forgets his song and how he learns it again. Regent's father had learnt the song from his father, who learnt it from his father too. But with Regent's species now facing extinction, no one is around to teach him. Regent tries to mimic the sounds of different birds but without success. Will Regent learn his mating call before it is too late? Or will his ancient song be forgotten forever?

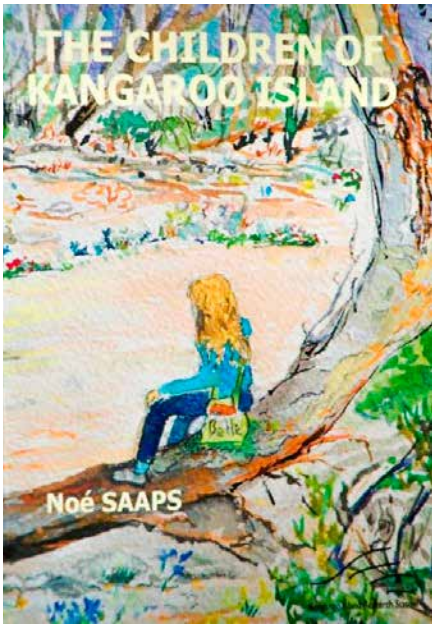
Publisher: CSIRO Publishing
RRP: $24.99



Frogs of Victoria – *Nick Clemann and Michael Swan*

Frogs of Victoria is a comprehensive photographic field guide to the frogs found in Victoria, such as the Baw Baw frog (*Philoria frosti*) and Sloane's Froglet (*Crinia sloanei*). It provides the tools to identify Victorian frogs – including keys, photographs, and comparative information on similar species – it also presents detailed information on their biology, habitats, status, and threats. The authors also detail the urgent actions required to prevent further loss of amphibian diversity in Victoria.

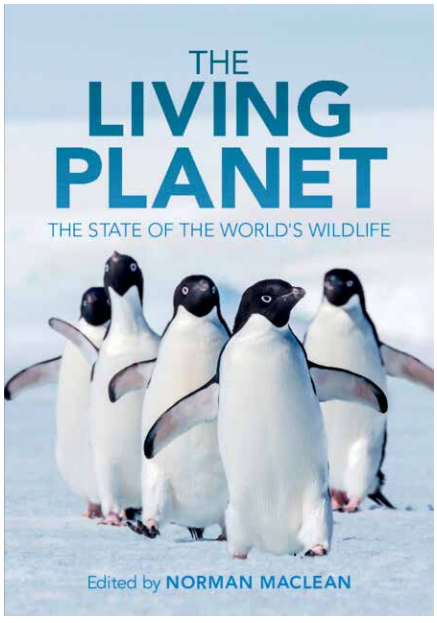
Publisher: CSIRO Publishing
RRP: $49.99



The Children of Kangaroo Island – *Noé SAAPS*

The Children of Kangaroo Island is an inspiring story for the whole family. Eight-year-old Belle loves the wilderness of Kangaroo Island, South Australia. That is where she meets Gooloo, an Aboriginal child. But why can't other people see him? Armed with courage, friendship, and the help of Vorty, Belle and Gooloo will do everything possible to save the island's threatened nature and cultural heritage.

Publisher: Kangaroo Island Research Station
RRP: $34.95

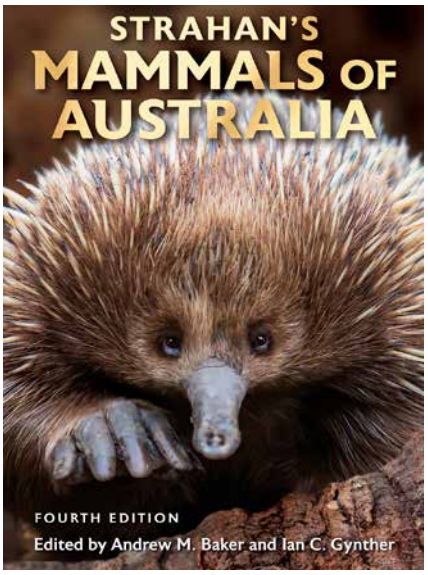


The Living Planet: The State of the World's Wildlife – *Norman Maclean*

Since 1970, there has been an overall decline in wildlife populations by 52 percent. This book documents the present state of wildlife on a global scale, using a taxonomic approach and serving as a one-stop place for people involved in conservation to be able to find out what is in decline and the success stories that have occurred to bring back species from the brink of extinction – primarily due to conservation management techniques. The book presents us with a tremendous opportunity to rescue many species before it is too late.

Publisher: Cambridge University Press
RRP: $75.95

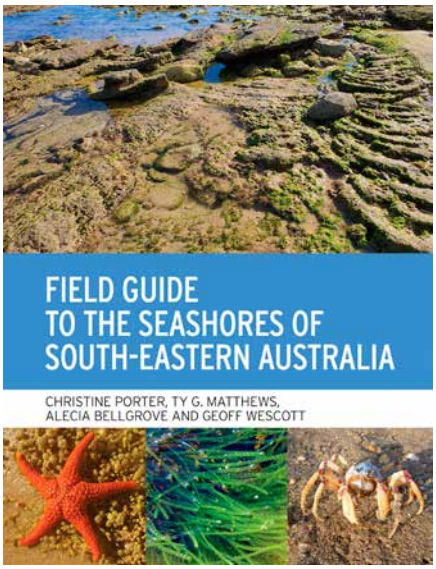
Book Reviews



Strahan's Mammals of Australia (4th Edition) – *Andrew Baker and Ian Gynther*

With several contributors, including the Treasurer of the Society, Dr Hayley Stannard (pages 118-119), *Strahan's Mammals of Australia* provides a written account of every species of native mammal known to have existed in Australia since European settlement, with 403 species covered in total. It is beautifully illustrated with more than 1,500 colour photographs, while each species account includes a detailed description of the animal and its behaviour. Hayley's co-contribution, titled 'Kultarr (*Antechinomys laniger*)', details the Kultarr's anatomy, biology, and ecology and provides current knowledge about where the animal lives, what it eats, and how it reproduces and grows. Species covered range from marsupials and monotremes, such as the eastern pygmy possum (*Cercartetus nanus*) and short-beaked echidna (*Tachyglossus aculeatus*), to bats and marine mammals, such as the central-eastern broad-nosed bat (*Scotorepens* sp.) and the Dugong (*Dugong dugon*). The new edition also sees the addition of fourteen newly described species.

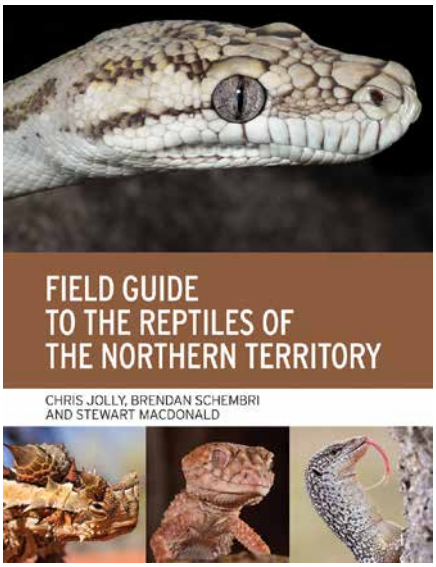
Publisher: New Holland Publishers
RRP: $199.00



Field Guide to the Seashores of South-Eastern Australia – *Christine Porter, Ty Matthews, Alecia Bellgrove, and Geoff Wescott*

Field Guide to the Seashores of South-Eastern Australia provides a detailed guide to the common plants and animals found on rocky, sandy, and muddy shores along the coastline of South Australia, New South Wales, and Tasmania. It features colour photographs, descriptions, and ecological notes for around 240 species, from marine plants such as the sea nymph (*Amphibolis antarctica*) to marine animals such as the crimson sea star (*Meridiastra gunnii*). The book also highlights human impacts and the conservation and management of south-eastern Australian shores.

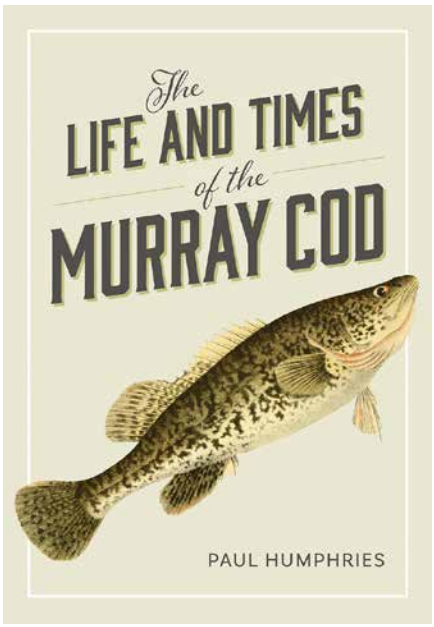
Publisher: CSIRO Publishing
RRP: $39.99



Field Guide to the Reptiles of the Northern Territory – *Chris Jolly, Brendan Schembri, and Stewart Macdonald*

Field Guide to the Reptiles of the Northern Territory is the first regional guide to the crocodiles, turtles, lizards, and snakes of this megadiverse region. The Northern Territory's arid deserts and monsoonal forests harbour some of Australia's smallest reptiles, such as the lined fire-tailed skink (*Morethia ruficauda*) and some of the world's most venomous snakes, such as Weigel's snake (*Pseudechis weigeli*). Extensively illustrated, the book presents introductions to order, family, and genus; keys to family, genus, and species; and species profiles, including descriptions, photos, distribution maps, and notes on natural history.

Publisher: CSIRO Publishing
RRP: $49.99



The Life and Times of the Murray Cod – *Paul Humphries*

The Murray cod (*Maccullochella peelii*) is Australia's largest and most iconic freshwater fish. This book describes its history, biology, cultural significance, and conservation, and reveals the many roles the species has played throughout history. Today, the Murray cod is a popular target for recreational fishing, but its future is anything but guaranteed. In the face of climate change, river management, and fishing pressure, much must be done to ensure this remarkable fish swims confidently into the future.

Publisher: CSIRO Publishing
RRP: $59.99

WILDLIFE PRESERVATION SOCIETY
OF AUSTRALIA LIMITED TRADING
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Australian Wildlife Society
Conserving Australia's Wildlife since 1909 ®

YOUR LEGACY FOR AUSTRALIA'S WILDLIFE

The Wild Life Preservation Society of Australia was founded in 1909 by a group of enthusiastic bushwalkers. Our founders suggested the need for such a group in a talk with the Naturalists' Society of New South Wales. The Swedish Consul-General for Australia, Count Birger Mörner, organised the first preliminary discussion in the Consulate on 11 May 1909. As an outcome of this discussion, it was decided to call a public meeting for the formation of the Society. Fifty people attended and were enrolled as the first members of the Society. Within one week, the newly formed Wild Life Preservation Society of Australia had grown to more than one hundred members.

The Provisional Committee worked hard and in the same year, the inaugural meeting adopted a constitution and elected the first chairman, the Hon. F E Winchcombe MLC, head of a large firm of woolbrokers, skin and hide merchants. There were six women on the first council of twenty-five people, and some who were later to become famous as naturalists.

Our Society pioneered the recognition of the need for legal protection for Australia's animals and plants.

Today we are known as the Australian Wildlife Society (AWS). We are a national not-for-profit wildlife conservation organisation. Our mission is to conserve Australia's wildlife (flora and fauna) through national environmental education, public awareness, advocacy, hands-on conservation work, and community involvement. AWS is a tax-deductible gift recipient and registered with the Australian Charities and Not-for-profit Commission. Its public fund is listed on the Register of Environmental Organisations under item 6.1.1 of subsection 30-55(1) of the Income Tax Assessment Act 1997. AWS is funded through membership fees, sponsorships, partnerships, donations, and bequests. The Society is managed and controlled by an elected

board of ten volunteer directors. We hold regular monthly meetings, on the first Wednesday of each month, to discuss important wildlife conservation matters and make a number of significant decisions.

Furthermore, we act as a watchdog and provide advice to government agencies and institutions regarding environmental and conservation issues concerning all aspects of wildlife preservation. Our Society has always known that a battle is never really won until the victory is enshrined in legislation. We have always tried to convince politicians of the necessity to include the preservation of Australia's wildlife and the conservation of its vital habitat in all their planning, policies and discussions.

YOUR BEQUEST WILL HELP US TO CONTINUE TO PRESERVE AUSTRALIA'S WILDLIFE FOR FUTURE GENERATIONS

HOW YOUR BEQUEST WILL BE USED

By remembering AWS with a bequest in your will, you are making a unique commitment. Your bequest to AWS will help us continue to preserve Australia's wildlife for future generations.

We rely on our supporters' generosity to enable us to continue working towards the conservation of Australian wildlife (flora and fauna) in all its forms through national environmental education and advocacy. Without you, our work would simply not be possible. Whatever the amount you bequeath to AWS, your contribution is invaluable.

A bequest is one of the most effective and long-lasting ways you can help AWS. Your promise of future support is deeply appreciated. If you have included a bequest to AWS in your will, please let us know. We thank you personally for this bequest of support. At all times your privacy will be fully respected and the information you provide will remain strictly confidential.

Your bequest will go directly to our wildlife conservation projects across Australia. Some examples listed below:

- Supporting wildlife rescue groups rehabilitating injured wildlife.
- Active involvement in national environmental education.
- Lobbying and advocating for the protection of wildlife habitat.
- Offering university grants and scholarships to honours or postgraduate students at Australian universities.
- Offering annual conservation group grants.
- Conservation activities during Australian Wildlife Week.
- The presentation of our four prestigious annual awards.
- Platypus Alliance conservation activities to preserve platypus populations and other semi-aquatic air-breathing species.
- Our #SnipRingsforWildlife Campaign to protect wildlife from the risk of entanglement and death.

HOW TO MAKE A BEQUEST

If you already have a will but would like to leave a bequest to AWS, you can do so by making a simple addition to your existing will. This is called a codicil. If you do not have a will at the moment, you can simply include a bequest when you write a new will. Whatever your circumstances, we would advise you to see a solicitor to ensure that your wishes will be followed.

When catastrophic events occur and our immediate action is required, it is essential that all our programs continue without interruption. Financial flexibility is crucial to our ability to respond to priority needs, so we ask that you do not designate your gift to a particular project or region.

Types of bequests:

1. A residuary bequest is the most effective way to leave a bequest to AWS. It is a gift of what remains after you have made provisions for your loved ones. A residuary gift will keep up with inflation. It will mean your bequest will achieve as much in our projects in the future as you would like it to now.
2. Leaving a percentage of your estate allows you to decide what proportion of your total estate you would like to give to AWS. A percentage gift will also keep up with inflation.
3. A pecuniary bequest is a fixed sum of money to be left to AWS. This type of gift will not keep up with inflation.

Recommended Bequest Wording

Please take this information with you when you visit your solicitor to draft or update your will. We suggest the following wording:

"I give and bequeath

- the residue, or
- [……] percentage of my whole estate, or
- [……] percentage of the residue, or
- the specific sum of $[……]

to the Wildlife Preservation Society of Australia Limited, for its general purposes, and declare that the receipt of the Treasurer for the time being of the Wildlife Preservation Society of Australia Limited shall be a complete discharge to my Executors in respect of any sum paid to the Wildlife Preservation Society of Australia Limited."

Your solicitor may also require the following detail:

ABN: 13 817 470 816

L to R: Wayne Greenwood, John Creighton, Noel Cislowski AM, Trevor Evans, Dr Julie Old, Patrick Medway AM, Dr Robin Crisman, and Stephen Grabowski.

FREQUENTLY ASKED QUESTIONS

What is a bequest?
A bequest is a gift left in your will. It's also known as a legacy. You can leave a bequest by writing a new will, or by adding a codicil (an addition) to your existing will. We recommend you consult a solicitor who can help you write your will.

What is the best way to leave a bequest in my will to AWS?
The best way to leave a bequest to AWS is to leave a monetary bequest (i.e., not property, shares, etc.) and a residuary bequest. This is a gift of what remains after all your other provisions have been made, enabling you to put your loved ones first. A residuary bequest also keeps up with inflation, and is the most effective way to provide a gift to AWS. You can also leave a percentage of your estate or pecuniary bequest, which is a fixed sum of money to be left to AWS.

I want to leave a bequest to a specific project. Can I do this?
Having flexible funds is essential to our ability to respond rapidly and where the need is greatest. Leaving a bequest for the Society's general use is the most effective as it means that your gift will definitely be used where it is needed most. Leaving a bequest to a specific type of work or location might mean that it cannot be used. This can occur if we are no longer working there or doing the kind of work specified in the future. As such, we ask that you do not designate your gift to a particular project or region.

Can AWS help me write my will?
No, we don't have that kind of legal expertise. We recommend you consult a solicitor who can help you write your will. There is also a public trustee in every state of Australia that offers will-writing services.

Can I make AWS the Executor of my will?
No, we appreciate your trust in the Society but we do not have the necessary resources. We try to keep administration costs low so that the maximum amount can go towards our projects in the field. As such, we choose not to take the role of Executor of a will as this can often be a lengthy and involved legal process.

Can I leave you my house, other property or shares?
Yes, but monetary gifts are preferred as AWS would need to convert any property or shares into cash to be able to use them. This means additional time and resources spent trying to get the best price and sell these items before we can put your bequest to use.

My relative has passed away and left a bequest in their will for AWS. What do I need to do?
We very much appreciate bequests left to us from generous supporters. Please ask the Executor to notify us in writing of the bequest by sending a letter to the National Office Manager, 29B/17 Macmahon Street, Hurstville NSW 2220 or via email manager@aws.org.au and we can start the process of transferring the bequest to AWS.

Why is having a will so important?
If you do not have a will when you die, state laws will determine how your assets will be distributed. Leaving clear instructions and sharing your decisions with your family and friends can give you the peace of mind that your final wishes will be understood and respected after you are gone. We recognise that writing a will is one of the most significant decisions you'll ever make. That's why we know it's important to take your time and have all of the information you need to help you make up your mind.

Wildlife Preservation Society of Australia Limited
Trading as Australian Wildlife Society

Address: 29B/17 Macmahon Street,
Hurstville NSW 2220, Australia

Tel: +61 4 24 287 297
Email: manager@aws.org.au
ABN: 13 817 470 816
Web: aws.org.au/bequest

Australian Wildlife Society
Conserving Australia's Wildlife since 1909

REGISTERED CHARITY
acnc.gov.au/charityregister

Membership Form

Membership

Become a member of the Australian Wildlife Society

Simply fill out this form.

Australian Wildlife Society
Conserving Australia's Wildlife since 1909 ®

Name:.....

Address: .....

City/Suburb:.....Postcode:.....

Telephone:.....Fax: .....

.....Email:.....

Membership category (please tick)

- ☐ Student (conditions apply): $0
- ☐ Individual (hardcopy magazine): $55
- ☐ Family (hardcopy magazine): $70
- ☐ Concession (pensioner, student, and child): $50
- ☐ E-mag (emailed as PDF, no hardcopy will be sent): $30
- ☐ Associate (library, school, conservation groups): $85
- ☐ Corporate: $125
- ☐ Life: $2,000

(Includes postage within Australia. Add $40 for overseas postage)

Three year membership (please tick)

- ☐ Individual (hardcopy magazine): $150
- ☐ Family (hardcopy magazine): $190
- ☐ Concession (pensioner, student, and child): $135
- ☐ E-mag (emailed as PDF, no hardcopy will be sent): $81
- ☐ Associate (library, school, conservation groups): $230
- ☐ Corporate: $340

(Includes postage within Australia. Add $60 for overseas postage)

Payment details (please tick)

☐ Direct Debit ☐ Cheque ☐ Money Order ☐ Mastercard ☐ Visa Card Security Code (CSC) __ __ __ __

Card Number:

Name on Card:.....Expiry:.....

Signature:.....

Amount $.....

Donation $.....

Total $.....

Mail to the: **Australian Wildlife Society**
29B/17 Macmahon St, HURSTVILLE NSW 2220
Email: accounts@aws.org.au
Website: www.aws.org.au

Direct debit: **BSB:** 062 235
Account No: 1069 6157
Account Name: Wildlife Preservation Society of Australia trading as the Australian Wildlife Society

Membership Hotline: Mob: 0424 287 297

Note: All cheques to be made out to the Australian Wildlife Society

Membership Benefits

Magazine: Receive the quarterly issue of *Australian Wildlife* via email or post to keep up-to-date with the collective work promoted nationally.

E-Newsletter: Receive the monthly e-newsletter. Keep up-to-date with news from our members and on the work of the Society.

AWS Portal: Access the Members' Resource Centre – your destination for resources and materials on various wildlife-related topics.

Social Media: Contribute to our social media platforms: Instagram, Twitter, Facebook, LinkedIn, YouTube, and Website.

Right to Vote: You have the right to vote on important matters at Society general meetings (financial members only).

Other Benefits: Awards, Scholarships, Grants, and the opportunity to network with like-minded people.

LEAVE A BEQUEST IN YOUR WILL

If you would like to find out how to leave a bequest to the Society or how your bequest can make an impact, please download our bequest information pack.