AUSTRALIAN Wildlife

SUMMER Vol: 1/2020
$10 (non-members)

Celebrating a new century of wildlife preservation in Australia

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

BEAUTIFUL SCENERY OF **KANGAROO ISLAND**

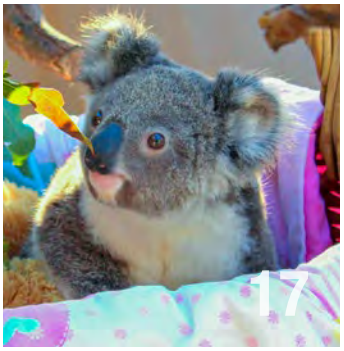
FULL STORY ON PAGE 22

Photo: Q. Chester

Photo: Q. Chester

Contents

features



regulars

Suzanne Medway AM
Editor, Australian Wildlife

Sabine Borgis
Sub-Editor, Australian Wildlife

ON THE COVER:

Front Cover:
Red-necked wallaby at Wollemi National Park; part of the Greater Blue Mountains World Heritage Area. Photo: Derek Truong, Amateur nature photographer.

Back Cover:
Beautiful scenery of Kangaroo Island. Photo: Q. Chester

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.

Print Post Approval No: PP 100024559

ISSN 0155-266X

Price $10 (for non-members)

Membership

Student Membership: $0 (Conditions apply)

Individual Members: $55

Family Members: $70
(being husband, wife and children jointly)

Concession: $50
(pensioner, student, child)

E-mag Members: $30
(Australian Wildlife magazine will be distributed via email as a pdf document - no hard copy of the magazine will be sent)

Associate Members: $85
(being schools or incorporated or unincorporated associations with a principal object related to conservation, nature study or education)

Corporate Members: $125
(being incorprated or unincorporated associations not being associate members)

Includes postage within Australia.
Add $40 for overseas postage

Three Year Membership

Individual Members: $150
Family Members: $190
Concession: $135
E-mag Members: $81
Associate Members: $230
Corporate Members: $340

Includes postage within Australia.
Add $100 for overseas postage

Contact

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

PO Box 7336
MOUNT ANNAN NSW 2567

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

Editor "Australian Wildlife":
president@aws.org.au

Website: aws.org.au

Membership Hotline:
Mob: 0424 287 297

Correspondence to:
Hon Secretary:
Australian Wildlife Society

PO Box 42, BRIGHTON LE SANDS NSW 2216
Email: secretary@aws.org.au

Directors 2020

Notice to our members

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 registered company limited by guarantee with ASIC and is responsible for complying with all its regulations.

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 an independent, voluntary, non-profit 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 programs, political lobbying, advocacy 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 tried to convince politicians of the necessity to include the preservation of Australia's precious wildlife and its vital conservation habitat in all their planning and environmental issues and discussions.

From the President's desk

Suzanne Medway AM - President

Fire plays a huge role in Australian ecosystems and has been used extensively for thousands of years by Aboriginal people to enable easier access through the landscape and encourage new growth. But it is still devastating to learn of the loss of lives, homes, millions of hectares of bushland and loss of our natural habitat and wildlife.

I am sure most Australians were shocked and concerned at the extent and the ferocity of the bushfires burning at the end of spring last year, continuing into the beginning of summer.

For those of us living in an urban environment, it is almost impossible to imagine what toll bushfires have on the lives of people living in bushfire-prone areas, but it is also horrifying to imagine how native wildlife must suffer during bushfires. Wildlife carers and rescuers must find it very hard to cope when they see the level of pain animals experience when they are injured in a bushfire.

The extent of wildlife destruction is enormous – something I have not seen in my lifetime. Many wildlife rescue organisations are saying that some wildlife species may never properly recover from the loss of life and the loss of habitat.

Ironically, one of our featured articles in this magazine is on the beautiful natural landscape of Kangaroo Island. At the time of going to print about a third of the island has been charred. The fire has devastated the Flinders Chase National Park, which is home to koalas, kangaroos, rare birds and marsupials.

We're helping wildlife that is affected by fires

The scale and severity of bushfires sweeping New South Wales and Queensland are currently testing the resources of wildlife rescue groups. Many groups have issued public pleas for financial support and donations of goods, to help them meet the needs of native wildlife that are suffering from the impact of these fires. Wildlife rescue groups and wildlife hospitals cannot keep up and need extra support to help native wildlife going through this traumatic time.

The Australian Wildlife Society wanted to do more to help wildlife rescue groups and native wildlife affected by the bushfires. If you have also been wanting to help, here is your chance! We are asking you to join the echidna hunt to help us raise funds for native wildlife that are affected by bushfires.

Did you know that the echidna is the symbol of our Society and that the echidna is featured on the 5 cent coin? If you are interested in collecting 5 cent coins to participate in this fundraising process, please deposit the funds at your nearest Commonwealth Bank of Australia or via electronic funds transfer using the account details below.

Account Name:
Wildlife Preservation Society of Australia trading as Australian Wildlife Society
BSB: 062-235
Account: #10696157
Description: Wildlife affected by fires

Once the coins have been banked, let us know your details and how much has been banked (info@aws.org.au), and we will send you a tax-deductible receipt. Donations of $2 or more are fully tax-deductible.

To help spread the word, share the message via your social networks and don't forget to tag us via your social media. Invite friends, colleagues and local businesses to join the echidna hunt to raise funds for wildlife affected by the bushfires.

100% of donations will be distributed to wildlife rescue organisations. The first two recipients of the wildlife affected by fires funds are:

The Pridmore's, NSW

Mike and Sue Pridmore have dedicated their lives to conservation. Previously they established Badger Ground Native Nursery at Rylstone, NSW, supplying native plants from providence seed. Despite retiring from nursery life, they continue conservation efforts at Badger Ground through their continued preservation of both native flora and fauna. Donations provided to Mike and Sue will be used to supplementary feed wildlife at Badger Ground suffering enormously in drought conditions.

Cedar Creek Wombat Rescue, New South Wales

Over 38 years ago, Roz and Kev Holme recognised the plight of the bare nosed wombat. The loss of habitat, road hazards, and debilitating sarcoptic mange have all contributed to the steady decline of the common or bare-nosed wombat (*Vombatus ursinus*). Along with wombats, they care for many species native animals with the focus being on animals that are in need of more than routine care to get them to the point of release.

We were delighted at the response so far and have donated to these organisations.

For further information and updates about the initiative, please visit https://www.aws.org.au/news/

Fire Management

At the 2019 Australian Wildlife Management Society 32nd Annual Conference several speakers presented on mosaic fire management practices. Sam Banks from Charles Darwin University, in his presentation, pointed out that "understanding how animals recover from fire events can help us to design fire management strategies that yield improved outcomes for biodiversity". He suggested that protection of unburnt refuges would enable persistence of threatened mammals in fire-prone landscapes.

A victim of the bushfires.

Have you ever heard of a kultarr?

JULIE M. OLD & HAYLEY J. STANNARD

The kultarr (*Antechinomys laniger*) is a small carnivorous marsupial. While it is a member of the Dasyuridae family, which also includes the dunnarts (*Sminthopsis spp.*), quolls (*Dasyurus spp.*) and the well-known Tasmanian devil (*Sarcophilus harrisii*), it is unique and is the only member within its genus. While the kultarr was first described in 1856 by Gould as a phascogale (*Phascogale lanigera*), it was not given its genus name by Krefft until 1866, and the subspecies, spenceri, was first described in 1906. Archer considered the kultarr a member of the Sminthopsis group; however, more recent genetic studies suggest the kultarr and dunnarts were equivalent to sister groups because it was more than likely that they originated from a common ancestor. At present there are two subspecies (*A. laniger laniger* and *A. laniger spenceri*) of kultarr. They differ in their geographic range as well as some of their physical features, including body and tail length, mammary glands and some cranial measurements.

General Description

Kultarrs are physically around the same size as a house mouse (7–10 cm in length), with males being larger and heavier than females (14–30 g). Their fur is brown, fawn or sandy coloured, but their belly is white. They are nocturnal and have characteristically large ears and eyes. They also have a long tail with a brush-like tip, and large elongated toes on long hind legs, making them similar in appearance to our native hopping-mice. However, despite having legs that are similar in appearance to that of native hopping-mice, and both running up to speeds of 13 to 14 kilometres per hour, kultarrs are quadrupeds, while hopping-mice are bipedal, meaning kultarrs use all four feet, while hopping-mice use two.

The similarity in appearance between the marsupial kultarr and eutherian (the major group of mammals that includes us) hopping-mice has likely occurred due to evolutionary convergence. Both species have needed to adapt to the harsh arid and semi-arid zones of the Australian inland to conserve energy and are required to move quickly to evade predators.

Conserving energy is essential for many of our native species living in the hot, dry interior of Australia, where variable rainfall and fluctuating temperatures occur. Kultarrs can spontaneously use torpor to conserve energy. Torpor is a reduction in body temperature and metabolic rate. It is similar to hibernation but occurs in shorter, often daily, bouts rather than over longer periods. Bouts of torpor used by kultarrs can occur for 2–16 hours. Kultarrs use this energy conservation strategy when food is scarce or ambient temperatures are low. Kultarr diets are currently based on anecdotal observations, but they are believed to consume a similar diet to that of other small dasyurids: primarily, insects (crickets, cockroaches and beetles) and arachnids.

Above: Photo: Mark Marathon (Wikimedia Commons)

Reproduction

Reproduction varies across the range of the kultarr; however, photoperiod is a controlling factor, with most kultarrs breeding after the winter solstice. For example, kultarrs in Queensland breed from July to February and in Western Australia from August to January.

While male kultarrs become sexually mature at 9–10 months, females sexually mature at 11–12 months of age. Females are polyoestrous and can enter oestrus up to six times in a breeding season, with gestation taking between 12 and 17 days. In captivity two- and three-year-old females can produce young, but success rates and maximum ages at which they can breed successfully in the wild are unknown.

Once born, the young, like all marsupials, are permanently attached to the teat, with the maximum number of teats indicating the maximum number of individuals a mother can rear (usually 6–8). Permanent teat attachment lasts for 30–48 days, after which time the young are left in the nest while the mother forages. Kultarrs are weaned at 80–90 days, at which point they become independent.

Distribution and abundance

Kultarrs are regarded as a cryptic species, meaning they are rarely observed, even by field researchers. Further, populations likely migrate to other locations, and this phenomenon may explain why fluctuations in population densities occur within an area. The populations of kultarrs are also known to fluctuate seasonally in response to environmental conditions, being observed more often in drier rather than wetter conditions, suggesting they may prefer hunting for food on open plains compared to dense vegetation.

In total there have been over 1000 records of kultarrs in the wild in Western Australia, the Northern Territory, Queensland, New South Wales and Victoria. These recordings have included observations, captures, and museum voucher collections. Individual kultarrs have also been recorded as a result of being captured and brought home by domestic cats, being run over by vehicles, or identified in owl pellets. The subspecies *laniger* inhabits semi-arid savannah zones vegetated with *Acacia* spp. in New South Wales and southern Queensland, whereas *spenceri* are found in deserts in Western Australia, Northern Territory, western Queensland and South Australia vegetated with *Acacia*, *Eremophila* and *Cassia* spp. Population declines have been observed, and kultarrs have disappeared from southern New South Wales, south-eastern South Australia, and Sandringham Station in Queensland. The last recorded sighting of a kultarr in north-west Victoria was in 1857.

One captive colony was established at Alice Springs Desert Park, Northern Territory, in 2002, and some of the captive-bred specimens were subsequently sent to establish a colony at the University of Western Sydney in 2007. Both colonies have since been disbanded, and there are currently no kultarrs held in captivity.

Threats to kultarr populations

Habitat degradation, pesticides, introduced predators, natural flooding events and fire are the main factors affecting kultarrs. All these factors can impact an individual or a population, via reduced food availability. Degradation of habitat by introduced European rabbits, sheep and cattle grazing, and agricultural insecticides impact arthropod abundance, hence kultarr food availability. Impacts on

Family of kultarrs.

kultarr populations have flow-on effects for the wider environment and other species, as kultarrs are prey items for larger animals, including owls and snakes. Threats such as agricultural land-use, feral predators and habitat degradation must, therefore, be managed to assist the conservation of the kultarr.

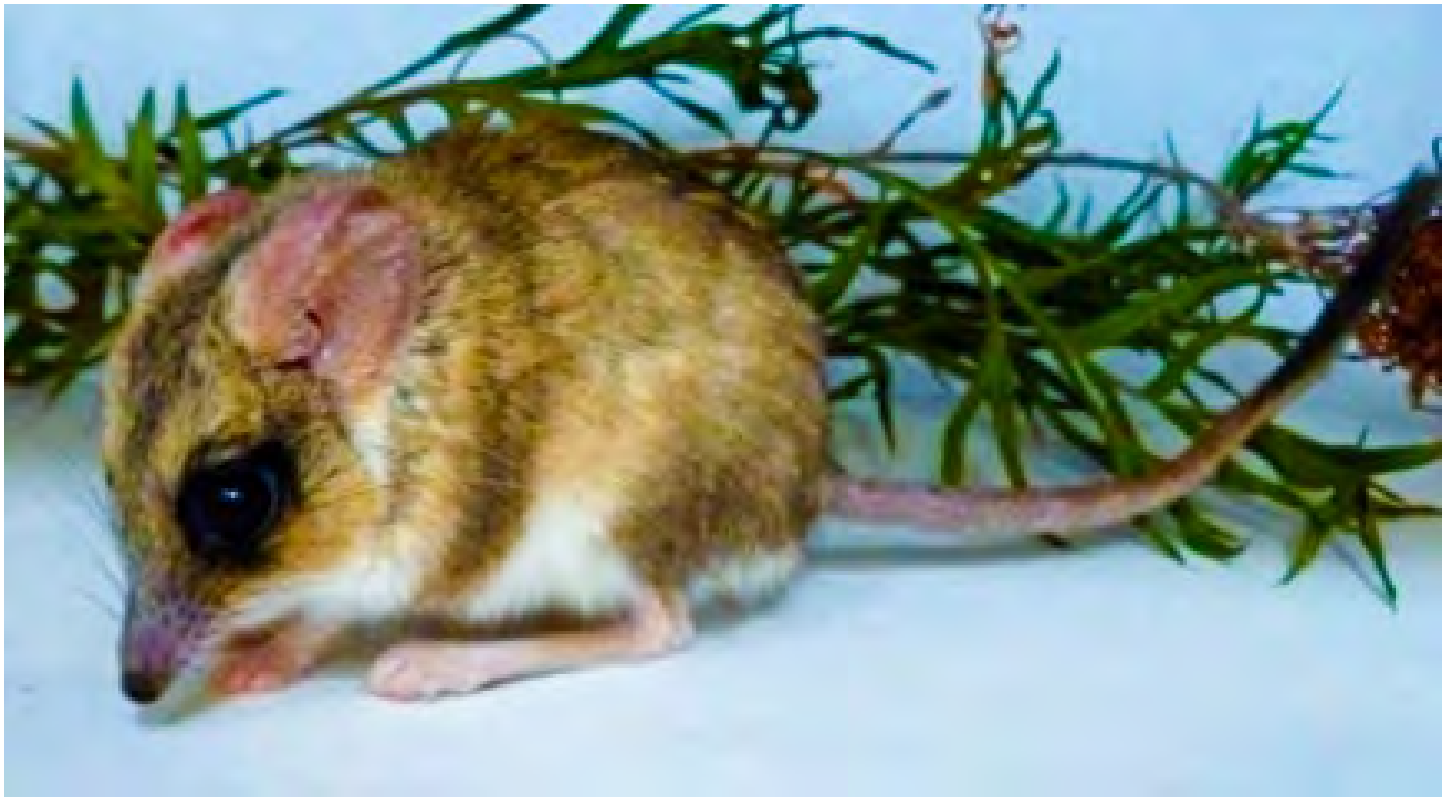
Conservation

The kultarr is listed as 'Endangered' under the *Threatened Species Act 1995* in New South Wales, and an action plan has been written but not implemented due to their cryptic nature and fluctuating species densities. It is also listed as 'Near Threatened' under the *Territory Parks and Wildlife Conservation Act 1978* in the Northern Territory. The kultarr is not listed as a threatened species under any other state legislation (Queensland, Victoria, Western Australia and South Australia), or under Commonwealth legislation. Internationally, the kultarr was listed as 'data deficient' on the International Union for the Conservation of Nature Red List of threatened species in 2008. Since that time, the kultarrs status has been upgraded to 'Least Concern'. However, despite the upgrade in international status, a lack of data on wild populations means knowledge of current population stability and current threats impacting the species in the wild remains very limited.

Conclusions

Kultarrs inhabit areas sparsely populated by people, which has contributed to minimal data collected on their ecology in the wild. They are a cryptic species and population densities vary across their geographical distribution, and for this reason, we still know only a little of their biology. In particular, we need to gain a greater understanding of wild kultarr population fluctuations, current geographical ranges, habitat preferences, home ranges and population densities.

Genetic studies would also benefit the species to gain further insights into whether the kultarr is one species or subspecies, particularly given its morphological features, such as mammary gland number, are unreliable to conclusively define subspecies. In addition, future research will provide more information to conservation managers regarding the kultarr's conservation status throughout its range and enable more appropriate and effective management of the species.



SCIENTIFIC WILDLIFE Illustrations

Damian Smith

Nature and wildlife have always been my passion, providing inspiration for my art. I find animals so interesting, and it's a lifelong journey learning about them through my illustrations. I completed my Bachelor of Fine Arts in Illustration in 2003 and have been exploring themes of nature and wildlife, and the beauty I find in these subjects ever since. I've exhibited my paintings in over 30 exhibitions, mostly in Australia, with a few across the United Kingdom and Asia.

I have recently rekindled my love of scientific illustration, examples of which I have featured here. These illustrations will also be displayed as part of the Hidden Vale Wildlife Centre nature walk. After completing the series for them, I have continued with more illustrations of various animals and will continue to build this folio, focusing on work in this area.

I find these illustrations very enjoyable to complete, and thankfully people seem to love them as much as I do. One of the great things about scientific illustration is that it gives me a platform to create art which is accessible to a wider audience, compared to my oil paintings, though I will also continue with my current series of oil paintings.

I have started a series of wave paintings which capture the mood and grandeur of the ocean, and I am aiming to raise funds for marine science conservation with the sale of these paintings. The best way for people to keep up with my work is via Instagram DamiansArt82 or Facebook DamiansART.

I graduated from Griffith University Queensland College of Art in 2003 majoring in Illustration. I have sold my paintings in over 30 exhibitions, and my illustration work in the traditional mediums of pencil/pen drawings and oil paintings often reflect on subjects of nature and fantasy. My work translates well to book illustrations, journals, scientific illustrations, signage and commissioned artwork to name a few, though I pride myself on being adaptable. Recent work includes a series of wildlife drawings for signage at the new Hidden Vale Wildlife Centre and a large-scale commissioned painting of Mary Mackillop for Highfields Catholic College.

Purple swamp hen

Eastern long-eared bat

Wombat

Kookaburra

Huntsman spider

Mahogany glider

Glossy black cockatoo

Novel assessment of the relationship between plastic ingestion and fatty acid profiles in three species of Australian shearwaters

Peter Puskic, School of Biological Sciences, University of Tasmania

Shearwaters: sentinels of strange tides

The journey so far

After spending the first 80-90 days of life inside a sandy burrow, hunger and instinct force her to leave the comfort of the only home she has ever known. Stepping out into the daylight she stretches her wings for the first time in anticipation for the epic journey ahead. She must travel to the Sea of Japan, navigating and foraging without the help of any adults, who have already migrated in the weeks before. She will not return here for at least another five years when she will breed. She must undertake this journey never having seen the ocean before!

This timeless story is familiar to many species of Australian shearwater who undertake a migration of epic proportions. Unfortunately, the odds are stacked against them.

Shearwater fledgelings spend their early days of life being provisioned by their parents. Diet varies among species, but populations tend to be faithful to their foraging areas and opportunistically feed in these regions. These first meals are vital in promoting the fledgelings' growth and building up fat stores which are critical for the young birds' early life.

Like most seabirds, shearwaters are regarded as sentinel species, reflecting pressures and changes in their environment. This is because their migration patterns and feeding grounds are predictable and the birds return to the same breeding sites each season allowing us to study individuals and populations over time.

On Lord Howe Island, New South Wales, the largest breeding colony of flesh-footed shearwaters (*Ardenna carneipes*) has been declining for many years. Adults of this species ingest plastic from the surrounding waters of the Tasman Sea, offloading it to their chicks during feeding. Almost every single fledgeling on Lord Howe Island has ingested plastic ranging from 20 to 200 pieces of varying size, type and colour. The ingestion of plastic has many physical effects on the bird, including lacerations and ulcers in the stomach, and in cases where birds have ingested large amounts of plastic, this may lead to death by starvation. Similar impacts are likely being felt by two other Australian species, the short-tailed shearwater (*A. tenuirostris*) and the wedge-tailed shearwater (*A. pacificus*).

Plastics have other, more sinister impacts when ingested. Plastics are manufactured using toxic chemicals and when in the marine environment, the surface of plastics provides the perfect medium for persistent organic pollutants (POPs) to sorb to the plastics creating a chemical cocktail. When ingested, these chemicals leach directly into the organism where they accumulate in the tissues, particularly those high in fats.

Fat is important for wild animals as it provides an energy reserve. For young fledgelings, having high-fat stores is vital to surviving their first big migration.

Above: Eight pieces of plastic found within the stomach of one bird. The plastic pieces can be dull (as shown here) or quite colourful.

Fledglings that have ingested high amounts of plastic may have variable growth and are often malnourished. Understanding the dynamics of this – for example, whether utilising fat stores liberates accumulated POPs – will provide insights into the health of an individual and the likelihood of success during migration.

The use of fatty acid and total lipid analysis will provide robust, quantitative information on tissue lipid composition in healthy and emaciated birds. Gas chromatography mass spectrometry (GC-MS) will provide crucial data on the concentrations of plastic-derived chemicals present in the birds.

Our team at the Institute for Marine and Antarctic Studies is doing exactly this. To better understand the threats posed by marine plastics, including the less visual impacts of plastic ingestion and associated chemicals, we are analysing muscle, liver and fat tissues of three species of Australian shearwater: flesh-footed and wedge-tailed shearwaters from Lord Howe Island and short-tailed shearwaters from Great Dog Island, Tasmania. We recently completed the first stage of processing (bird necropsy) and have begun dehydrating and extracting the resulting tissue samples in preparation for GC-MS analysis.

The journey ahead

Our knowledge of the processes impacting shearwaters can assist us in understanding these impacts and can be used to call on governments and policy makers to make much-needed changes.

Limiting the impacts of marine plastic pollution is possible, but it requires the assistance of every single one of us. Making small changes in our behaviours and attitudes can have enormous impacts. We can refuse to buy products wrapped in unnecessary plastics and simply say no to single-use plastic items such as straws, bags and coffee cups. Perhaps you can organise a community beach or park clean-up or better yet, create change at the highest, most impactful level by petitioning your local governments to change policy.

There is still a lot of work to be done by researchers, governments, communities and individuals. Working together to prevent plastics from entering our oceans is possible and is the only way to ensure the continued survival of shearwaters and marine life around the world.

Chick growth is highly variable. Two same-age Tasmanian short-tailed shearwaters side by side. The smaller one (left) has ingested 11 pieces of plastic and the larger individual has only ingested two pieces.

Thirteen pieces of plastic found within the stomach of one individual Tasmanian short-tailed shearwater.

Peter working on his honours project.

About the Author

Peter Puskic is an honours student at the Institute for Marine and Antarctic Studies, University of Tasmania, studying the sublethal impacts of plastic ingestion on Australian shearwaters. He studied zoology and archaeology in his undergraduate degree exploring how people use, impact and depend on the natural world and is passionate about education and outreach to create social and environmental change.

Wild Smarts: Do Animal Personalities Impact Survival?

Emily Scicluna

The problem

Species extinction has reached a crisis point globally, and the need to develop effective and efficient ways of managing remaining endangered populations is greater than ever. Despite the short amount of time since European settlement, Australia holds the record for the highest number of species extinctions and is a world leader in the number of species listed as vulnerable and at risk of extinction. In an effort to combat biodiversity loss, population management strategies have been implemented, including translocation of a species from one location to another, establishment of long-term insurance populations where release of animals is not immediately possible, and captive breeding programs for reintroduction, which have formed the foundations for many international conservation programs. Prevention of species endangerment and protection in their natural habitat is preferable; however, when alternative means of population management and threat abatement are unavailable, captive management provides a viable opportunity for rapid intervention and species recovery. It is of paramount importance that individuals selected for reintroduction postcaptive breeding have the highest chance possible of being able to contribute to the success of the population once released.

Research significance

While captive breeding and reintroduction have been identified as key approaches to conservation, the success of such programs is debatable with the survival of these animals after release often being low. The choice of candidates for release back to the wild is often based on age, sex and physiological indicators, e.g. health status. However, there is growing recognition that an individual's behavioural type may be important for survival. The study of behavioural traits has been used in wildlife to assess the suitability of individuals for captive environments (for example, for exhibition in zoo environments), but has been utilised less for the selection of candidates for endangered species release projects. While the existence of different personality traits within our household pets is obvious, the notion of applying this idea to wildlife in the context of reintroduction programs has been neglected. An additional problem lies with what physiological changes may be happening as animals adapt to captivity, and unfortunately captive breeding has been linked to brain size

Above: Fat-tailed dunnart recently released to a sanctuary.

reduction, which in turn has been associated with behavioural changes in domestic animals. For example, consider the immense physiological difference between a pet pug and its ancestor, the wolf. It is hard to believe that they are the same species as domestication, artificial selection and inbreeding has led to immense physical changes in these animals, which is particularly obvious when comparing the pug and wolf skulls. Now consider the difference between the behaviour, or personalities, of these two animals as well; there are no points in guessing whether a wolf or a pug is better suited to the wild. Long-term captivity, artificial selection and domestication have led to dramatic changes in the dog family (Canidae), and we need to ensure that by captive breeding our wildlife in attempts to save species we are not accidentally causing similar, potentially irreversible changes.

The study species

The fat-tailed dunnart (*Sminthopsis crassicaudata*) is a nocturnal, carnivorous marsupial from the family Dasyuridae. This species is currently identified as 'Near-threatened' in Victoria (Advisory List of Threatened Vertebrate Fauna in Victoria); however, this classification is based on historical surveys, and like most Australian small mammals, their numbers have been hard-hit by invasive predators and habitat loss. Recently I have conducted surveys on sites with known populations, and unfortunately my research observations suggest that they are a lot less common than people think. While there are two proposed subspecies of fat-tailed dunnarts, one of which predominantly occupies grassland habitat (*Sminthopsis crassicaudata crassicaudata*) and the other occupying deserts (*Sminthopsis crassicaudata centralis*), my research focuses on the grassland dunnarts as La Trobe University has held a captive colony of these animals for almost a decade.

As fat-tailed dunnarts are mouse-sized (10 cm long and weighing around 15 g), they are commonly mistaken for rodents; however, this couldn't be further from the truth, as the dunnarts are the little cousin of the extinct Tasmanian tiger (*Thylacinus cynocephalus*)! These aptly named creatures store fat in their tail as a resource not dissimilar to a camel's hump, and they predominantly live off arthropods and small vertebrates. Don't let the dunnarts' looks fool you;

Juvenile fat-tailed dunnarts in a nest.

A wild-caught dunnart.

Fat-tailed dunnart skull.

they might look cute and fluffy, but they are surprisingly cunning! During the cooler months of the year they cuddle up and share their nests with house mice to keep warm, but come the warmer months when snuggle-buddies are no longer necessary, the dunnarts make a meal of the mice instead!

Management implication

My research aims to 1) determine if captivity has had an effect on brain size by studying the skulls of naturally deceased fat-tailed dunnarts, 2) assess behavioural and cognitive traits in captive-bred and wild fat-tailed dunnarts to identify any impacts of captive breeding on these traits, and 3) identify behavioural and cognitive traits in fat-tailed dunnarts linked to increased survival post-release. I will be releasing 180 dunnarts to the La Trobe Wildlife Sanctuary in 2020 following personality and cognition testing. Findings from my PhD research will inform recovery teams on the release of individuals with traits linked to increased survival, with the knowledge gained delivering significant outcomes for many Australian species at risk of extinction. In particular, there are many other members of Dasyuridae that are the focal point of national recovery programs including the Tasmanian devil (*Sarcophilius harrisii*), Julia Creek dunnart (*Sminthopsis douglasi*), Sandhill dunnart (*Sminthopsis psammophilia*), Kangaroo Island dunnart (*Sminthopsis aitkeni*), tiger quoll (*Dasyurus maculatus*) and Northern quoll (*Dasyurus hallucatus*). This means that my research will not only influence the success of the dunnart reintroductions, but also that of all of their cousins. By identifying individuals who are more likely to survive and therefore better suited to release, we can incorporate this new information into our current breeding programs. By doing so we can give our precious native species the best chance in an ever-changing world and work toward relocating Australia off the shameful leader board of species extinctions.

Acknowledgements

I would like to acknowledge the following institutions and collaborators for their contribution to this research: La Trobe University, Melbourne Museum, The Holsworth Wildlife Research Endowment, The Ecological Society of Australia, Victorian Institute of Forensic Medicine, and in particular: Dr Kylie Robert (La Trobe University), Dr Marissa Parrott (Zoos Victoria), Dr Christy Hipsley (Melbourne Museum), Dr Richard Hernandez (La Trobe University) and Dr Richard Peters (La Trobe University).

About the author

The author is a current PhD student of La Trobe University, studying personality and cognitive assessment of individuals as a conservation tool for improving reintroduction/translocation success, using fat-tailed dunnart (*Sminthopsis crassicaudata*) as a model species. This project has stemmed from a strong passion for conservation research, and endangered species captive breeding, reintroduction and population management. Emily believes that humans have an undeniable obligation to embrace and catalyse the progression necessary to secure the future of our wildlife, and her research is dedicated to that goal.

FRIENDS of the KOALA - AMINYA'S STORY

Claire Agnew, Manager, Friends of the Koala

Marley Christian, our Vet Nurse, had just finished her shift on a Friday evening in June when she got a call on the Friends of the Koala rescue hotline. A member of the public had witnessed a koala fall from a tree. Sadly, she was dead on impact, but upon closer inspection, the individual noticed movement in her pouch. Her little joey was still alive!

When Marley arrived, both the mother and the joey were wrapped in a blanket so that the joey could stay safe and warm in her mother's pouch. This is exactly the right thing to do, as whenever a mum and joey are found, they should always be kept together – even if the mother is dead.

While carefully examining the mother koala, Marley found injuries on her back leg that was indicative of a car hit, which could explain her lack of strength and subsequent fall from the tree. The little joey was a female and looked to be about four months old. She was slightly dehydrated but seemed to be otherwise in a relatively good condition. Marley took her home, gave her some subcutaneous fluids and placed her inside a double pouch with a toy teddy bear to cuddle. As the joey was extremely thirsty, Marley slowly fed her glucose mixed with warm water from a 1-millilitre syringe. This can be a very tricky procedure with a young joey as they can inhale the mixture and aspirate if it is fed too fast, but fortunately, the joey was taking it well. The person who found the joey named her "Aminya", after the name of the property where she was rescued. Aminya means "quiet" in the local Aboriginal language, ironic as she heartbreakingly mewled for her mum all night, demanding to be fed every two hours. Marley continued to feed her into the early hours of the morning.

Ordinarily, joeys are with their mothers until they are about 12 months old. As Aminya is now an orphan needing round-the-clock care, she had to be transferred to a volunteer koala carer named Anika. Anika will care for Aminya for about seven to eight months where she will be hand-raised alongside other orphaned joeys. Aminya is doing incredibly well in Anika's expert hands. She still loves to live in her 'pouch' basket with the toy teddy bear but will hopefully become more adventurous soon. She loves her bottle, feeding four times a night and twice during the day – she has even started nibbling on leaves! She is long and skinny but steadily gaining weight. Anika thinks she is destined to be a big, healthy girl like her mum who weighed 8.2 kg, which is above average as female koalas generally weigh 6–7 kg.

Before Aminya is ready for release, we must ensure that she is independent and no longer relies on humans for food and security. This process lasts for a few weeks, during which time there is no physical or verbal interaction with caretakers – only monitoring and observation. Most joeys protest at first, but eventually, they are confident and ready to embark on the next step of their journey.

Aminya in her 'pouch' basket.

Aminya clutching her toy teddy bear for comfort.

Aminya ventures out, testing her climbing skills.

For the final part of her rehabilitation, Aminya will return to Friends of the Koala, where she will stay in the koala kindergarten pre-release area for two to three weeks. At this rate, Aminya will likely be released in February or March of 2020. In the fleeting moments of her return to the wild, all those sleepless nights and arduous days will be worthwhile. Watching these animals take their first climb, look back at us briefly, and swiftly scale up the tree into the top branches is the most rewarding part of our work!

PLATYPUS (*Ornithorhynchus anatinus*)

Megan Fabian

The platypus is a semi-aquatic mammal, endemic to Australia. Platypuses are grouped in a separate order of mammals known as monotremes, which are distinguished from all other mammals because they lay eggs. The platypus is one of only two mammals in Australia that lay eggs; the echidna is the other. Platypuses forage for food underwater using their sensitive bill to find food. Platypuses are bottom feeders; they scoop up insects and larvae, shellfish, and worms in their bill along with bits of gravel and mud from the bottom of a river. Platypuses do not have teeth, so the bits of gravel help them to 'chew' their food.

Threats to platypuses and other air-breathing aquatic wildlife

There is increasing evidence that platypus populations are declining due to multiple stressors, including habitat loss and poor river management. Furthermore, the platypus is now listed as Near Threatened, under the IUCN Red List. In New South Wales, air-breathing aquatic wildlife such as platypuses, turtles and rakali are being caught and drowning horrible deaths in 'set and forget' enclosed yabby traps (such as opera house nets). These vile traps allow the air-breathing aquatic wildlife to enter but not find their way out, and so in just a few minutes, the results are inevitable and tragic. Another concern, specifically to the female platypuses, is that many enclosed yabby traps are used during the summer months when the females are foraging for food to nourish their babies. If a mother platypus dies, her young will certainly also starve to death.

Wildlife conservation action is needed

The use and possession of enclosed yabby traps are banned in public waters east of the Newell Highway and three stretches of the river west of the Newell Highway: the Edward River upstream of Stevens Weir, the Murray River upstream of the Echuca/Moama Road Bridge and the Murrumbidgee River upstream of Darlington Point Road Bridge. All enclosed yabby traps are required to have a bycatch reduction device with a maximum diameter of

90 mm (fixed ring) fitted to all entrance funnels. However, there is still confusion around current regulations. Traps with any entrance size are being used illegally in freshwater waterways and still causing deaths.

Formation of the New South Wales Platypus and Turtle Alliance

The Australian Wildlife Society and the New South Wales Platypus and Turtle Alliance are advocating for a full ban (sale, use, and possession) on enclosed yabby traps in New South Wales to protect Australia's air-breathing aquatic wildlife. The alliance was formed off the back of the success of the Victorian Alliance for Platypus Safe Yabby Traps and the Queensland Alliance for Platypus. The Victorian success in banning enclosed yabby traps across the state has been a push for other states to step up and do the same. Legislation in the Australian Capital Territory has also been passed. For more information, please visit our website https://www.aws.org.au/nsw-platypus-and-turtle-alliance-2/

Meeting with the Minister for Energy and Environment

Minister Matt Kean MP is committed to wildlife conservation issues. He has offered us his full support as we work with government agencies to save our native wildlife for the next generation of young Australians. The Minister expressed his strong support for our new alliance, is committed to banning enclosed yabby traps (such as opera house nets), and has promised to give us a 'timeline' for the implementation of the ban. We also requested that he implement a net exchange program to ensure we are working towards removing enclosed yabby traps from circulation.

How you can help

Contact your local or state politicians – politely ask them to support a change in regulations which ban the sale, ownership and use of enclosed yabby traps, and explain why.

Spread the word – many people are unaware of the regulations or about the risks that these traps pose, so please pass this information on. If you find an enclosed yabby trap being used illegally, immediately report this to the relevant authorities. In New South Wales, report to Fishwatch – 1800 043 536.

Talk to the retailers – if you go into a fishing/outdoor store, ask if they sell enclosed yabby traps such as opera house nets and if the answer is yes, explain the issue to them and then ask them if there is a good reason they won't stop selling them.

Buy wildlife-friendly traps – such as open-top or hoop nets – they catch just as many yabbies!

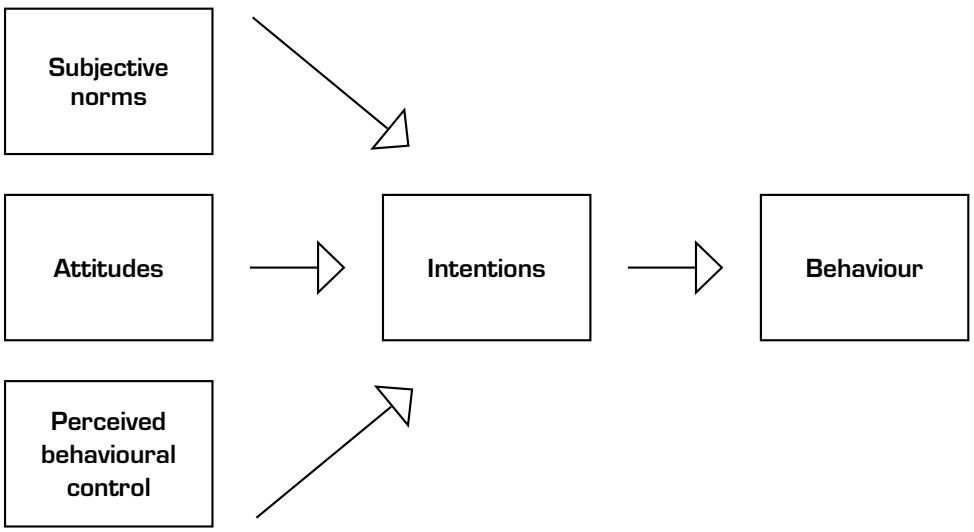
Woma python.

DO AUSTRALIANS HAVE THE WILLINGNESS TO PARTICIPATE IN WILDLIFE CONSERVATION

Megan Fabian (Supervisors: Dr. Amelia Cook & A/Prof Julie Old)

As the National Office Manager of the Australian Wildlife Society, I wanted to share with you the research that I undertook while studying a Master of Research Degree at Western Sydney University. The 'human dimensions of wildlife' emerged as a field in the 1960s and includes the investigation of societal values, behaviour and knowledge relating to wildlife and wildlife management issues. Studies that have researched peoples'attitudes and behaviours propose that there is a value-attitude-behaviour hierarchy, where peoples' underlying values determine what type of attitude they hold and can help to explain their intention to participate in wildlife conservation action. For this very reason, I was intrigued to study peoples' attitudes and behaviour towards the conservation of Australia's wildlife. I thought to myself, humans are one of the key threats to our natural world, and therefore by gaining an increased understanding of peoples' attitudes and intentions, we can better understand what management strategies to implement to protect our wildlife. Human dimensions research not only aims to understand the values, attitudes and behaviours of the general population but the underlying factors that influence them, such as socio-demographic factors, previous experiences and culture. My research identified the following results:

- Most people hold an 'ecoscientistic' attitude towards wildlife conservation, highlighting that Australia's wildlife is appreciated for the role it plays within our ecosystems.
- Peoples' previous experiences, such as growing up around animals, growing up on land and participating in animal and environment-related activities, influenced the type of attitude they held.
- There was a strong preference for conserving mammals over any other class of animal.
- Despite strong conservation attitudes, participants' intent to engage in conservation action was low.
- Barriers such as time, money, travel, family commitments and household responsibilities prevented people from taking action to conserve Australia's wildlife.
- People are willing to participate in an action that is relatively easy to achieve and not physically



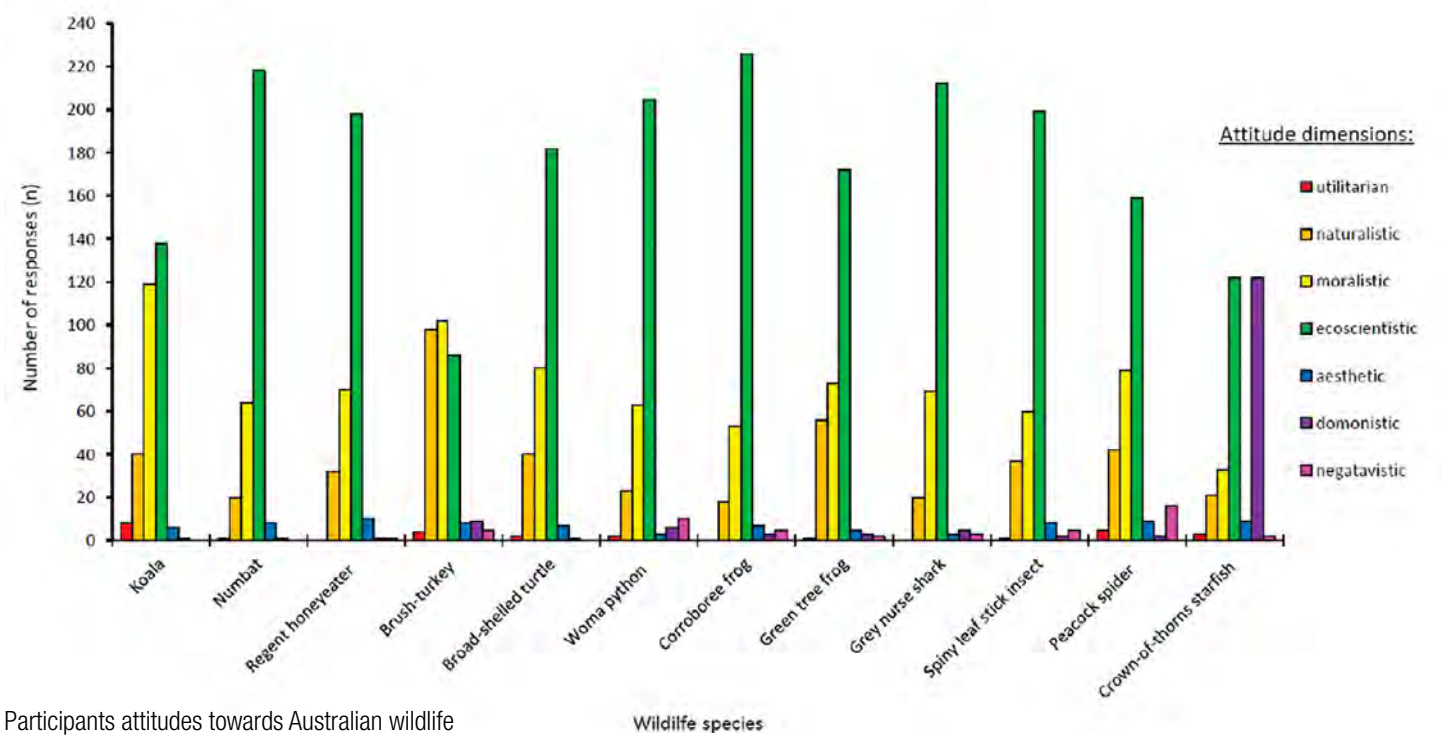
demanding, such as raising awareness about the threats to endangered wildlife via social media, donating funds towards conservation initiatives and reporting the location of Australian wildlife via applications such as WomSAT.

- People obtain their information about wildlife conservation mainly from the internet and social media, followed by television. These platforms prove to be an effective source of information to encourage people to engage in conservation action.

Overall, most people support and agree that action should be taken towards wildlife conservation. Nevertheless, there remains a gap between attitudes and intention to engage in conservation action. Developing strategies that assist conservation managers to overcome the barriers to conservation action and implement initiatives that encourage people to protect wildlife is important. Providing people with opportunities and positive experiences to gain an understanding about wildlife is likely to foster pro-conservation attitudes, community support and ignite a passion that encourages conservation action. People are likely to engage in behaviours that are easy to achieve; therefore, conservation programs that are locally based, cost-effective, short and not physically demanding are likely to be successful.

Numbat

Further research on how to overcome barriers and achieve increased conservation action is much needed. Furthermore, to achieve effective and successful wildlife conservation outcomes, it is now widely recognised that the 'human dimensions of wildlife' must become a part of future wildlife conservation approaches. Although the 'human dimensions of wildlife' is a complex field of research because we are attempting to understand humanity, I reiterate we, humans, are the only ones that can make the change and take action for the sustainability of our future.



Participants attitudes towards Australian wildlife

Protecting Protected Areas - A Difficu

Sophie Petit, Associate Professor of Wildlife Ecology, University of South Australia

Among the beautiful islands of Australia is Kangaroo Island, in South Australia. One hundred and fifty thousand people come from all over the world to visit the island each year, drawn to the magic of its wilderness. Few are the places on earth where one can still admire pristine wilderness and abundant wildlife in the relative safety of a nation that is considered "developed". Unlike in most places on the mainland, invasive foxes and rabbits do not occur on the island, and feral goats have been removed. This unique environment is heaven not only for tourists but also for field naturalists and residents, including many artists, who are there because they love this extraordinary nature – the flagship for economy and wellbeing.

Unfortunately, Kangaroo Island is not immune to the epidemic of greed that is sweeping the planet with tragic consequences. Wilderness is threatened as more habitat is to be cleared.

In a year when the IPBES Global Assessment Report on Biodiversity and Ecosystem Services delivers the news that one million species are at risk of extinction, and over 500,000 of the world's estimated 5.9 million terrestrial species do not have enough habitat for long-term survival, it is clear that habitat protection is of utmost importance. The IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) report was produced by 145 expert authors and 310 contributing authors using 15,000 professional references. It demonstrates that loss of biodiversity has not only environmental dimensions, but also developmental, economic, security, social and moral ones.

The Senate, this year as well, released its Interim Report on Australia's Faunal Extinction Crisis, which highlights the failure of the federal government to protect our wildlife. It lists habitat loss,

lt Concept?

degradation and fragmentation as the primary drivers of faunal extinction (54 Australian animal species are listed as Extinct, and 463 are Threatened under the EPBC Act List of Threatened Fauna).

Golden Kroner et al. (2019, *Science* 364, pp. 881–886) show the risk to biodiversity associated with undermining protected areas (Protected Area Downgrading, Downsizing, and Degazettement – PADDD) worldwide. Chaplin-Kramer et al. (2019, *Science* 366, pp. 255–258) identify the threat to people of continued loss of natural areas, along with the ecosystem services they provide. These authors are not intoxicated lifestylers. They are renowned scientists.

Arguably the easiest and most logical way of conserving biodiversity is to keep protected areas (and areas zoned for conservation) protected. Why then is the Government of South Australia so intent on handing over the public, protected areas to private developers? Stopping this action, which is against all scientific advice, would go a long way towards wildlife protection.

"Unlocking the potential of our parks", another way of describing encouragement of private developments in our public natural protected areas, has been adopted by several states. It was started in South Australia by the previous Labor government and embraced by the current Liberal government, which is aiming to legislate for this dangerous move. The Productive Economy Policy Discussion Paper of November 2018 stated:

> *A policy response will be particularly important to support eco-tourism in our more pristine areas. Nature-based tourism is a significant growth area for our state and managing development activities within these locations (such as Kangaroo Island and the Eyre Peninsula) requires a level of policy reform to create a more enabling environment*.

The Draft Planning and Design Code for South Australia is now being reviewed, with tourism accommodation "envisaged" in conservation zones. If developments are planned for "pristine" areas, it is not difficult to understand that these areas will no longer be pristine.

A coastal reserve zoned for conservation on windy Kangaroo Island cliffs, rich in biodiversity and Aboriginal artefacts, was first handed over in 2017 to a private consortium for a golf course, resort comprising multiple accommodation buildings and other facilities, and residential allotments. However, public consultation, demanded by the community, resulted in 775 submissions against the sale of the Crown Land and five in favour. The Labor government abandoned the plan, but newly arrived Minister for Environment and Water, David Speirs, contrary to scientific advice and the wishes of the community, leased the reserve to the private developers without further consultation in early 2018. The construction of a 35-km water pipeline, which puts at risk the water security of the island, was approved this year. The development has not yet started, and the campaign to save the reserve near Pennington Bay must continue.

The next blow to nature protection on Kangaroo Island hit Flinders Chase National Park, which recently celebrated its 100th year. It is the largest park in South Australia without fox, rabbit, goat or deer, and a beautiful stretch of wilderness protecting a profusion of threatened species. This park is of significance to Aboriginal and early European heritage. The state government of South Australia reportedly paid the Australian Walking Company $916,000 of taxpayer money to develop a business in the park, our park. The amended Flinders Chase Management Plan (2017), a legally binding document that allowed for small-scale, ecologically sensitive accommodation at designated sites (minor development zones), was ignored. In 2018, and with support from the state government, developers proposed to place two accommodation villages and associated facilities on pristine, wild headlands. Their location is a considerable distance from the Kangaroo Island Wilderness Trail and requires additional clearance for the tracks and vehicle access roads to reach and service them.

All three Friends of Parks groups on Kangaroo Island are on a protest strike, and many on the mainland are supporting them. The community and various organisations are fighting this proposed development with letters, submissions, and a "Public Parks NOT Private Playgrounds" Facebook page and website (https://ppnotpp.org). The Kangaroo Island Council unanimously voted to express its opposition to the development. A crowdfunding campaign aims to finance a case in court based on the following arguments: the development is illegal under the *National Parks and Wildlife Act 1972* (SA) and the Management Plan for Flinders Chase National Park and the Kelly Hill Conservation Park

Above: Some of the coastal geological formations at Flinders Chase National Park: Sandy Creek Beach. Photo: Q. Chester

Some of the coastal geological formations at Flinders Chase National Park

Sandy Creek. Photo: Q. Chester

Sanderson Bay. Photo: Q. Chester

Sandy Creek Beach. Photo: Q. Chester

Sandy Creek and Sanderson Bay headlands at Flinders Chase National Park, covered with rugged native vegetation, near proposed development sites of the Australian Walking Company: Sandy Creek Beach. Photo: Q. Chester

1993 (amended 2017); inadequate community consultation; and no legitimate environmental assessment of the potential impacts on nationally threatened species. In addition, there was no referral under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). The matter will be presented before the South Australian Supreme Court at the beginning of February 2020.

Several other key parks in South Australia are targeted for development activity, including Lincoln National Park and Innes National Park. The paradox of this form of luxury ecotourism is that it will kill the goose that lays the golden egg. The money generated for the people of South Australia will be trivial compared to the loss of biodiversity and income from tourists wanting to see true wilderness. The ever-dwindling area of wilderness left on earth is invaluable. The size of the developments, considerable in the case of Flinders Chase National Park and the coastal reserve near Pennington Bay, should be irrelevant. One private brick in a public, protected area represents an irreversible precedent towards more development and the extinction of nature, with all that means for human survival.

Keeping protected areas protected is the best way to start tackling the deep extinction crisis. It is not a political issue; it is a survival issue. Scientists and policy-makers in environmental and social disciplines cannot ignore it and must get involved in campaigns to ensure that the remaining functional natural ecosystems are kept safe. We all must engage. Ignoring advice from reputable environmental scientists is a certain way to destroy our planet fast.

If we cannot protect protected areas, what hope is there for biodiversity? What hope is there for us?

How you can help:

- Contact the South Australian Minister for the Environment and Water to request that the proposed golf course be moved out of the coastal reserve to its original proposed location, further inland.
- Consult the Public Parks NOT Private Playgrounds web site (https://ppnotpp.org) and click "How you can help" (you can send emails, donate money, sign up for the newsletter, follow them on Facebook).

Location of the proposed golf course near Pennington Bay, on the Coastal Conservation Reserve. Photo: S. Petit

The western side of the proposed golf course, at the edge of the windy cliffs of the Coastal Conservation Reserve. Photo: M. B. Stonor

Sandy Creek and Sanderson Bay headlands at Flinders Chase National Park, covered with rugged native vegetation, near proposed development sites of the Australian Walking Company: Sanderson Bay. Photo: Q. Chester

Lotus australis (near threatened on Kangaroo Island) at the proposed golf course on the Coastal Conservation Reserve. Photo: M. B. Stonor

Marianthus bignoniaceus (rare on Kangaroo Island) at one of the proposed development sites of Flinders Chase National Park. Photo: M. B. Stonor

Euphrasia collina ssp. tetragona (near threatened on KI) at the proposed golf course on the Coastal Conservation Reserve. Photo: M. B. Stonor

- Are similar developments proposed for YOUR parks? Write to the federal Minister for the Environment about your concerns. Public parks and reserves are OURS, not to be given away to private developers.
- Follow the review of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth); terms of reference include 3 (b) *making decisions simpler, including by reducing unnecessary regulatory burdens for Australians, businesses and governments*; 3 (e) *streamlining and integrating planning to support ecologically sustainable development* (https://epbcactreview.environment.gov.au/resources/terms-reference). Is this what you expect from a review of the *Environment Protection and Biodiversity Conservation Act*?
- Encourage people to become members of the Australian Wildlife Society, which puts the weight of a large national organisation towards conservation advocacy.

Photographs by:

Quentin Chester
(http://www.quentinchester.com/)

M. B. Stonor
(https://www.facebook.com/mbstonor/)

Two of the many generous and talented artists of Kangaroo Island supporting biodiversity protection.

Sandy Creek and Sanderson Bay headlands at Flinders Chase National Park, covered with rugged native vegetation, near proposed development sites of the Australian Walking Company: Sanderson Bay. Photo: Q. Chester

AUSTRALIA'S FUTURE IS IN YOUR HANDS!

Megan Fabian, National Office Manager

We have observed and/or experienced extreme weather events, flooding and earthquakes. Greenhouse emissions are gases that trap heat in the earth's atmosphere and are responsible for a warming climate, particularly in Australia. These changes have threatened the life of several species such as flying foxes and microbats. These animals have a narrow range of optimum temperature and are therefore sensitive to the impacts of climate change, particularly heat stress.

What is sustainability?

The Australian Wildlife Society believes that as individuals we need to avoid depletion of the earth's natural resources, such as water, vegetation, wildlife and energy, to ensure that we maintain healthy ecosystem functioning.

Threats to Australia's natural resources

Sadly, a variety of factors have led to the exploitation of natural resources, most of which already exist in limited amounts.

Environmental pollution

Environmental pollution is caused by companies that produce and use chemicals and plastics in their manufacturing processes. The chemicals leak into soil and water systems and alter and destroy the composition of natural resources and its inhabitants, such as marine life. We are experiencing a plastic pollution epidemic at present. Each Australian generates 27 kg of plastic waste each year, of which approximately 2–5 percent ends up in our oceans. Plastic is designed to last forever, is often single-use and harms wildlife and natural ecosystems.

Urban development

The creation of new industries and infrastructure in Australia requires a great deal of natural resources such as land, energy and water. In most cases, urban development encroaches on the natural environment and destroys vegetation and wildlife.

Climate change

Climate change is a reality! We cannot continue to exploit natural resources and expect that our impact won't alter the functioning of natural ecosystems.

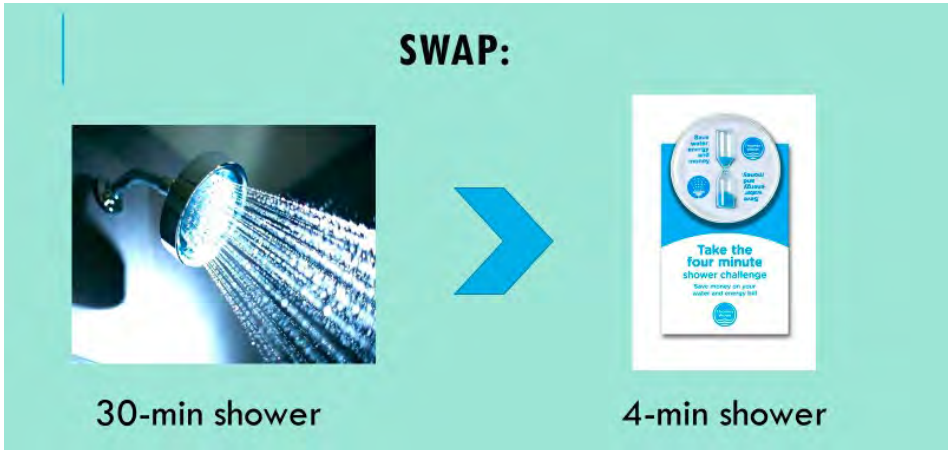
Agricultural practices

Agriculture is currently the fourth largest source of greenhouse gas emissions in Australia, responsible for 13 percent of Australia's emissions (Australian Government 2017). Agricultural activities have increased due to increasing demand for food and export industries, with almost 83 percent of Queensland being used for agricultural production.

Agricultural activities are increasingly leading to the degradation of natural resources, as land is often cleared for agricultural practices to take place.

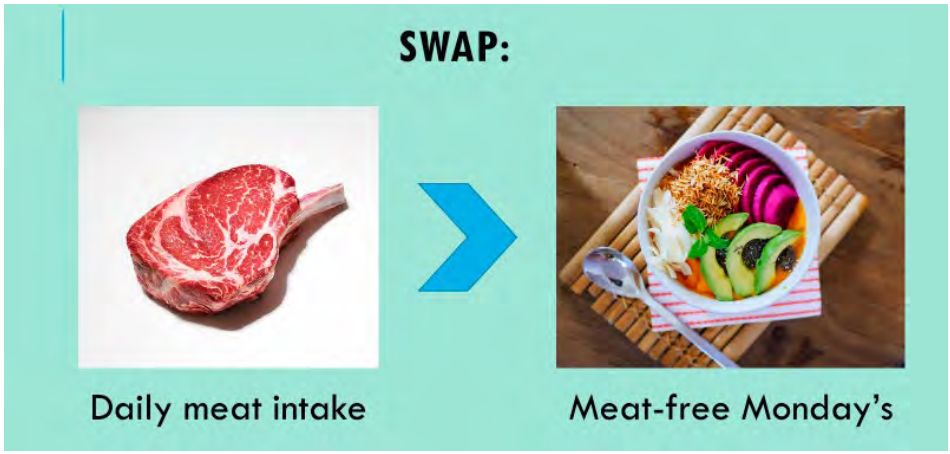
Water Quality

Australia is the driest inhabited continent on the earth and one of the world's largest consumers of water – we use more than 1 million litres of water per capita per year. Around 75 percent



Let's be conscious of our water usage and aim for water security and sustainability.

Opt for an eco-friendly alternative to plastic rings and proactively choose 'lift & peel seals'. This is our buying power!



Attempt meatless Mondays, if you're a big meat eater. Your body will feel better for it and so will the environment.

of this water is used for irrigation, and urban and industrial use accounts for around 20 percent. Droughts have highlighted the important part water plays in our way of life. Water is a precious resource and despite Australia's best efforts to "stop the drop" there are still many easy ways we can help to save water.

Increasing population and modern lifestyle

According to the Australian Bureau of Statistics (2019), Australia's population grew by 1.6 percent during the year ending 31 March 2019. Human population growth is expected to continue on an upward trajectory. As the number of people increases, so does the demand for natural resources. Not only that, but our lifestyle of high consumption in a globalised economy requires vast resources and produces greenhouse gas emissions. This level of consumption places immense pressure on Australia's natural resources. Due to the advanced way of life, more resources are needed to meet human demand. We consume a considerable amount of energy using vehicles, electronics in the home, and during recreational activity. This increased consumption has led to high demand for fossil fuels and energy production, which will ultimately result in the depletion of these natural resources.

Natural resources continue to be destroyed at an alarming rate, and now it is time to act!

Conservation of Australia's natural resources

In 1909, the Wild Life Preservation Society of Australia (now known as Australian Wildlife Society) saw the need for environmental protection and preservation of natural resources, especially the protection of Australia's unique wildlife (flora and fauna). Today, the conservation of Australia's environment and natural resources is regulated by federal and state laws and local bylaws. There are protected areas in all states and territories that have been created to protect and preserve Australia's unique ecosystems that include national parks and other reserves, as well as 64 wetlands, which are registered under the Ramsar Convention, and 16 World Heritage Sites. However, due to the ever-increasing threats as outlined above, what we are currently doing is not enough, and we need to act now before it is too late.

By making small but significant changes in our lifestyle and buying choices, we CAN create real impacts and safeguard Australia's future.

- If everyone in Australia requested 100 percent renewable electricity on their power bill, we would force our electricity providers to invest in renewables, with or without a change in government policy. This action is probably the single most powerful thing you can do to bring down Australia's carbon emissions.
- We can reduce reliance on our cars by cycling, walking, using public transport, car-pooling and planning to minimise car trips will make an enormous difference to our petrol emissions. We can also look into choosing hybrid or electric cars, provided the electricity used to charge it is renewable. When flying by aeroplane, pay for the carbon offset if possible. Alternatively, we could fly less or use an alternate mode of transportation entirely.
- We can reduce our reliance on animals in agriculture by cutting back our consumption of meat, dairy and plant and/or animal fibres.

This will significantly reduce our emissions of methane. If you chose not to adopt a whole food plant-based lifestyle, try having a meat-free Monday if you are a big consumer of meat. Buy organic food, clothing and cosmetics to support agriculture that has fewer emissions than conventional agriculture.

- As individuals, we can express our dissatisfaction with the continued mining of fossil fuels, either by writing to our MPs and ministers. At the same time, we can express our support for and investment in industries powered by renewable energy.
- We can produce less waste and live within our means. Only purchase items that we need and grow products at home where possible. **Overall, Reduce, Reuse and Recycle.**
- We can choose sustainably sourced wood and plant fibres for furniture, building materials and household items, or buy second-hand, and we can choose organic food products when buying produce. This is our buying power!
- We can reduce our water usage by watering during permitted hours, taking shorter showers, washing clothes when we have a full load and fixing any dripping taps.
- We can implement environmentally friendly alternatives to plastic such as using glass jars, paper straws, bamboo cutlery, eco-friendly and reusable coffee cups and shampoo bars as opposed to plastic shampoo bottles.
- The opportunities are endless, and we need to take the next step and act! Let's safeguard Australia's future and take action together starting TODAY!

The Australian Wildlife Society has already implemented the action of becoming a 'paperless society'. We are committed to reducing our waste.

Shortly, the Australian Wildlife Society intends to:

1. Continue going ZERO WASTE! Our partner, Zero Co, has officially gone live with their crowdfunding campaign! They've got an audacious mission to eliminate single-use plastic packaging from every Aussie kitchen, laundry and bathroom and

We need to reduce the negative impact of plastic on wildlife and the environment for a sustainable future.

we are on board. The best news is that they are giving us $5 from every $129 Starter Box if you buy one using our referral link below. Together, we can win the war on waste! https://www.kickstarter.com/projects/zeroco/zero-co-win-the-war-on-waste-at-your-place?ref=3a8zj6

2. Educate the community and the younger generation on the importance of wildlife conservation. We are offering complimentary membership to school students in the hope that students will explore and develop a deeper understanding of environmental issues, engage in problem-solving, gain skills to make informed decisions and take action to improve the environment.

Q1. What is one sustainable action you will implement today?

Q2. What are two sustainable actions you intend to implement in the near future?

AWS and ZERO CO. Partnership Starter Box. Let's go zero waste together.

NATIVE WILDLIFE DESPERATE FOR WATER REFUGE, AT RISK OF ENTRAPMENT

Tamielle Brunt

In November last year, members of the Bellbird Park Preservation Group were enjoying a wander through the bush at Eugene Street Reserve. In Woogaroo Creek, there is a pool that is a refuge for wildlife in this time of drought.

Their vigilance has retrieved an abandoned enclosed yabby trap (opera house net, or OHN) with two eastern water dragons trapped inside. One drowned and the other was exhausted and taken to the RSPCA to try to save its life.

This is an alarming find for the area because of the abundance of aquatic wildlife. These nets indiscriminately trap and drown a number of air-breathing animals – not only water dragons but platypus, rakali, turtles and even water birds. The presence of the iconic platypus has been detected by environmental DNA (eDNA) methods in this waterway over the past four years and one platypus has been observed by a local person earlier last year.

Platypus forage for insect larvae and yabbies along the bottom of a creek. OHNs become baited trap which also attract platypus. Once the platypus enters, it cannot find its way out and dies a horrific death within minutes.

The regulations for these traps are not promoted or enforced. You can purchase them, cheaply, with no information about laws or animal welfare issues.

In 2015 the Queensland fishing regulation was updated as follows:

> A funnel trap must be no longer than 70 cm or no more than 50 cm in width or height. The trap entrance must be made of rigid material. If the trap does not have a mesh made of a rigid material, the size of the mesh must be no more than 25 mm.

Above: Two eastern water dragons trapped in an enclosed yabby trap. One drowned; the other was exhausted and transported to the RSPCA. Photo: © Bellbird Park Preservation Group.

The use of certain funnel traps east of a line following the Great Dividing Range and east of the Gore Highway (Highway 39) is prohibited outside of certain impoundments.

This means that:

- funnel traps with a rigid opening size of up to 5 cm maximum in all its dimensions can be used in all non-tidal waters; and
- funnel traps with a rigid opening size between 5 cm and 10 cm can only be used in listed impoundments east of a line following the Great Dividing Range and south of the Gore Highway (Highway 39) or in non-tidal waters west of the boundary mentioned above.

Confusing, isn't it?

The net retrieved from Woogaroo Creek was an old-style trap: it has no rigid entrance and expands to over 12 cm. It wasn't labelled with an owner identification. Therefore, there is never any consequence and education.

Even with the entrance holes being reduced to 5 cm, platypuses (as well as rakali) are small and streamlined and will squeeze through such an opening for a feed. When platypus juveniles emerge from the nest in February, they can weigh as little as 300–400 grams.

The good news is there are already alternative nets on the market that will capture just as many yabbies, without the risk of drowning other air-breathing wildlife: opentop or hoop nets!

It is an animal welfare issue that needs to be addressed in all states. Victoria has led the way, with a swap-out scheme and a complete statewide ban on these traps from July last year. New South Wales is also following.

It is time for Queensland to step up and act now, not when it is too late! Besides legislation, we all have the power to make a change by encouraging and educating family and friends.

You can report any suspicious or illegal fishing activity to FishWatch Queensland 1800 017 116 and Victorian Fisheries 13 FISH (133 474).

Contact the PlatypusWatch Network website to report platypus sightings or get further information.

Entrance size of the illegal enclosed yabby trap. Photo: © Bellbird Park Preservation Group

Two eastern water dragons trapped in an enclosed yabby trap. Photo: © Bellbird Park Preservation Group

FLYING-FOXES

by Vanessa Wilson

Bats

One-quarter of all mammal species in the world are bats, which belong to the order Chiroptera, meaning 'hand-winged'. Bats can be divided into two suborders:

- Megabats (Megachiroptera), which includes flying-foxes, as well as the lesser-known tube-nosed bats and blossom bats.
- Microbats (Microchiroptera), which are smaller insectivorous bats.

Megabats differ greatly from microbats (see Table 1 on page 8); their main similarities are that they are the only winged mammals and are primarily nocturnal.

Flying-foxes

Flying-foxes, otherwise known as fruit bats, are members of the Pteropodidae family. They have the largest body size of all bats, weighing up to one kilogram, with a wingspan which may exceed one metre. There are eight known species of flying-fox in Australia, of which only four are relatively widespread on the Australian mainland. These are the black, the spectacled, the grey-headed and the little red flying-foxes. The first three of these have similar habits and lifestyle but are found in different parts of Australia, their ranges partially overlapping. The little red flying-fox is smaller and gives birth at a different time to the others and tends to follow the flowering of the eucalypts inland, moving to the coast irregularly.

The grey-headed flying-fox (*Pteropus poliocephalus*) is the largest member of the family and is a native species that is endemic to Australia on the eastern seaboard – southern Queensland, New South Wales and Victoria. It is listed as Vulnerable under New South Wales and Australian legislation.

The spectacled flying-fox (*Pteropus conspicillatus*), which is only found in tropical rainforest areas in north-eastern Queensland. It is listed as Vulnerable under Queensland legislation and Endangered under Australian legislation.

The black flying-fox (*Pteropus alecto*) was previously listed as Vulnerable under New South Wales legislation, ranging across most of the coast of northern Australia, but was delisted in 2008 due to increasing numbers in New South Wales. However, many believe that this is likely to be due to a range shift southwards, rather than a range expansion or any actual overall population increase.

The little red flying-fox (*Pteropus scapulatus*) is both more numerous and more nomadic than the other three species. They roost much closer together in larger numbers and because of this often cause a lot of damage to vegetation where they decide to camp. This is one reason they are so nomadic – if they were to stay too long in one place, the vegetation would struggle to recover, but if they keep moving regularly, the vegetation gets the chance to bounce back so it will be healthy again in time for their next visit.

Flying-fox diet

Although flying-foxes are commonly known as fruit bats, their favourite food is the pollen and nectar of eucalypt blossoms, followed by other native hardwood blossoms, such as melaleuca (paperbark) and banksia, and rainforest fruits including lilly pillies and figs. Exotic fruits are generally not preferred, but often lack of preferred food sources will force flying-foxes into orchards and backyard fruit trees, where they face such dangers as shooters and loose netting.

This lack of preferred food sources is caused by two main factors:

- Eucalypt forests are naturally unreliable. Nectar and pollen production varies considerably from year to year, with many species flowering only every three to five years. Because different species flower at different times throughout the year, most flying-foxes travel great distances, often hundreds of kilometres, following large flowering events to find enough of this high-energy food to eat.
- Much of the flying-foxes' native food sources have been cleared. Rainforests and eucalypt forests have largely been cleared for agricultural land, while paperbark swamps have more recently been targeted for the popular canal developments in Queensland.

Table 1. Summary of general differences between megabats and microbats:

	Megabats	Microbats
No. of species	More than 180 species worldwide More than 10 Australian species	More than 1060 species worldwide More than 60 Australian species
Size	Large: wingspans about 1 metre	Small: wingspans about 25 centimetres
Diet	Nectar, pollen and fruit	Insects
Navigation	Sight and smell	Echolocation*
Roost location	Hang from tree branches	In caves, roof cavities, under bridges, in tree hollows, under bark, etc.
Winter habits	Travel to locations where food is more abundant	Hibernation until insects become more abundant

* Echolocation involves emitting high-frequency sounds that bounce off objects to allow the bats to find their way around in pitch darkness.

With their natural food sources depleted, it is no wonder many people are experiencing a higher level of conflict with flying-foxes than they used to. With the increase in popularity of native garden plants, backyard fruit-growing, and native street and park trees, flying-foxes are finding a lot more food in urban and residential areas. These food sources tend to be more reliable than those in native bushland because they are regularly watered and well cared for, and with a greater variety of species over a relatively small area, there is always something flowering or fruiting. Just like people, flying-foxes like to live close to regular food and water supply; hence, a lot more flying-foxes are now camping in areas where people live, work and play. This goes a long way to explaining why many people mistakenly believe flying-fox numbers are increasing.

Flying-fox camps

The term *camp* (or *colony*) is generally used to refer to a site where flying-foxes roost, rather than to a group of a particular number of flying-foxes, e.g. the flying-foxes have a 'permanent' camp at Ku-ring-gai north Sydney, which is occupied all year round. However, there are 'annual' camps that flying-foxes use at the same time every year, and also 'irregular' camps that flying-foxes may roost in occasionally if there is a nearby food source available at the time.

Flying-fox numbers in a camp increase and decrease throughout the year, depending on food availability. The flowering of many species occurs irregularly in different areas and at different times of the year, governed mainly by variations in weather. A camp may contain a few hundred to

The wet belly of this grey-headed flying-fox means that she's just 'belly dipped' in a nearby stream to cool and rehydrate herself. Photo: Nick Edards

Grey-headed flying-fox 'belly dips' in the Parramatta River to cool and rehydrate itself on a scorching hot Sydney summer day. Photo: Nick Edards

tens of thousands of flying-foxes (or even more in the case of little red flying-foxes). Sometimes the camp may be empty if food is not available nearby. Some of these camps have been in use for more than 100 years.

Occasionally a smaller group may roost in a location for a short period, but these small groups will usually either attract more flying-foxes to the site or will move on to join other larger flying-fox camps. Flying-foxes are very sociable, and because they are so focused on finding food in many different locations at night, they use 'camps' for both social contact and rest during the day.

Flying-foxes sleep during the day and feed on pollen, nectar and fruit at night.

Female grey-headed flying-fox stretches in the sun as her young pup takes milk from the nipple under her wing. Photo: Nick Edards

At dusk, flying-foxes depart from their camps to feed on various local food resources. As dawn approaches, some flying-foxes gradually start to return to the camp from which they came, whereas others may fly to another nearby camp to rest for the day. This means that camps have a constant turnover of individuals – there are different flying-foxes there every day. Camps tend to occur in relatively sheltered areas with tall trees, often in gullies and commonly near water. To drink, flying-foxes may swoop down to the water, dip their belly fur in, then land in a tree and lick the water from their fur. Belly-dipping normally occurs in still freshwater, but it has also been occasionally observed in estuarine or even salty water. Flying-foxes also lick dew from leaves.

Pollination

Most people do not realise just how essential flying-foxes are to the health of our native forests. Flying-foxes have adapted to an unreliable food resource by being nomadic. When a species of tree flowers well in part of their range, tens of thousands of flying-foxes will congregate to feed on the blossom. Radio tracking of individual flying-foxes combined with observations of population fluctuations at camp sites has confirmed that some individuals move many hundreds of kilometres to reach sites of prolific flowering events.

Flying-foxes are our most effective seed dispersers and pollinators of our rainforests and native hardwood forests (including native timber plantations). Unlike birds and insects, which are usually given all of the credit for this role, flying-foxes have the advantages of a large body size combined with a fur coat that allows much pollen to stick to and be transported potentially up to 100 kilometres in one night. Flying-foxes can also carry small seeds of rainforest fruits in their gut for up to an hour, by which time they may have flown 30 kilometres away from where the fruit was eaten. Other pollinators, such as birds, bees (including native stingless bees), moths, butterflies, wasps, flies, beetles, other small mammals such as gliders, and the wind, operate over much smaller areas.

By dispersing rainforest seeds over wide areas and across cleared ground, flying-foxes give seeds a chance to grow away from the parent plant, and potentially

expand remnant patches of valuable rainforest vegetation. It is estimated that a single flying-fox can disperse up to 60,000 seeds in one night.

Through pollination and seed dispersal, flying-foxes help support many other native plant and animal species and also help sustain Australia's hardwood timber, honey and native plant industries. But to be effective in this role, flying-foxes need to be in large numbers.

Reproduction

It is sad how difficult it is to find an article or news item in the media about flying-foxes that does not use phrases such as 'bats out of hell', 'disease risk' or 'plague proportions' (author's note: this seems to have improved a bit over the past ten years). This kind of propaganda not only fosters unnecessary hatred of these beautiful, intelligent and social animals that form an essential part of our ecosystem, but it also gives momentum to lies that are circulated as truth.

Plagues occur when environmental conditions allow a localised 'explosion' of numbers of a particular species that can reproduce at a very rapid rate. For example, a single Australian plague locust can lay 100–200 eggs, and one breeding pair of mice and their offspring has the potential to produce 500 mice in just 21 weeks. It is simply not possible for a flying-fox plague to occur – their slow rate of reproduction does not allow it.

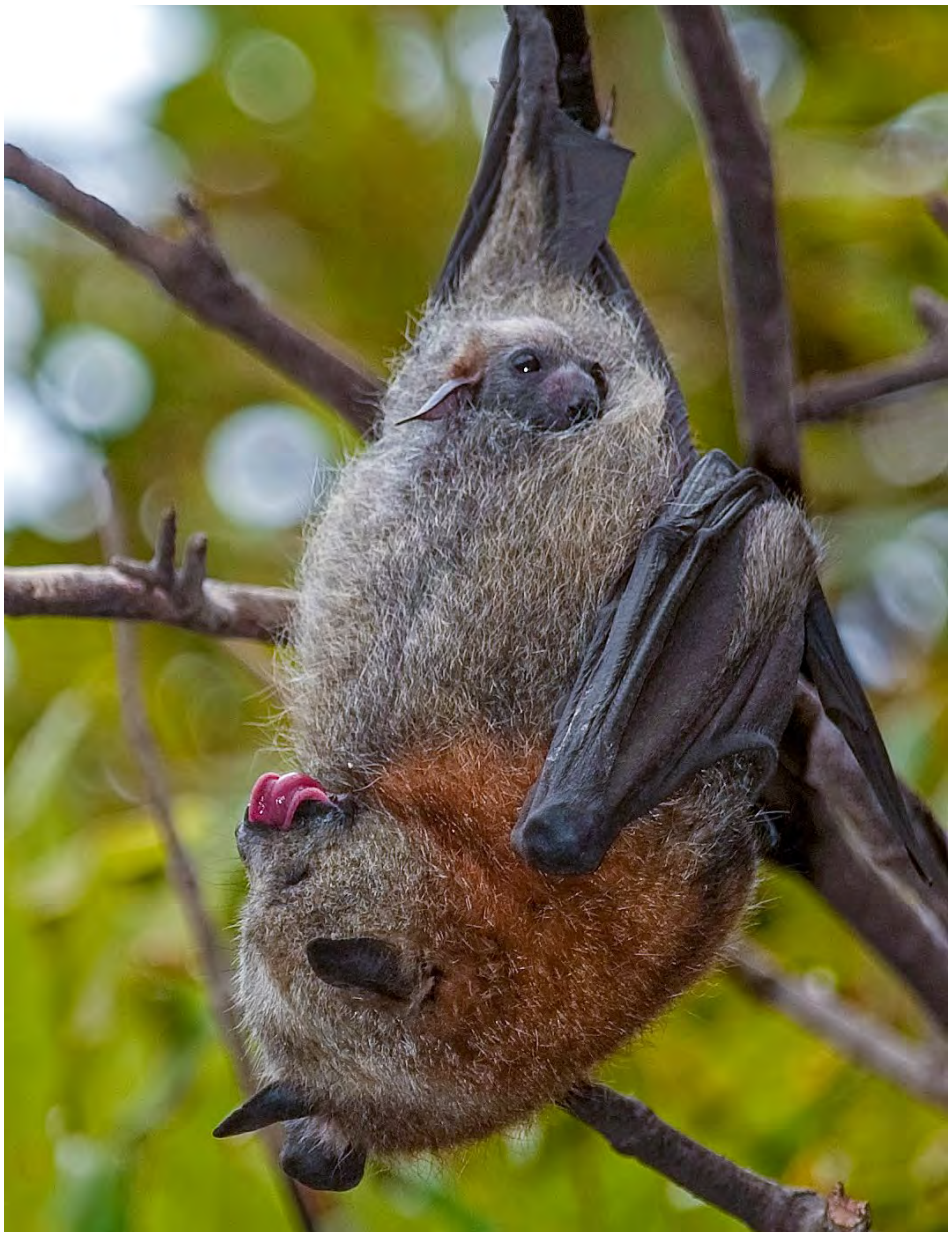
Mating occurs between March and May and often results in excess noise in the camps as males mark territory in a tree and defend it from other males. Females become pregnant in autumn (March–April), and after a gestation period of about six months, give birth in spring (mainly October–November) to a single young (twins are rarely born, but often only one will survive).

As soon as the pup is born, it begins to suckle from its mother. Its milk teeth curve backwards so that it can keep a firm hold. The mother protects her young with her wings during the daytime. At night when she flies to search for food, the pup clings to its mother, with its mouth around the nipple and its claws in her fur. The pup is not able to maintain its body temperature until it is 15–17 days old, so it stays close to its mother in the early weeks of its life. Once the pup gets heavier and can thermoregulate, it is left behind with a group of other pups in the camp at night while the mother goes out to feed. When the adults start returning to camp early the next morning, the mothers call out to their pups, and the pups call back. The mothers each recognise the voice of their pup, and this helps them to find their little pup among the branches and give it its morning feed. At this stage, the pups are still unable to fly and are dependent on their mother's milk. Unfortunately, these pups commonly become the unseen victims of orchardists who shoot their mothers as they resort to their less preferred exotic fruits in a desperate attempt to get enough nutrition to produce milk for their pups waiting for them back in the 'creche'.

Pregnant grey-headed flying-fox enjoys the spring sun in a Sydney flying-fox camp.
Photo: Nick Edards (www.enigmatech.com.au)

Although both the Queensland and New South Wales governments still grant licences to shoot flying-foxes as a method of fruit crop protection in limited circumstances, they are committed to reviewing their policies to reduce the need for this inhumane and largely ineffective practice. Survey results indicate shooting is, at best, around 60 percent effective as a crop protection measure, while properly installed full-exclusion netting is 100 percent effective. Installing such netting also has the added benefit of protecting fruit from damage by other animals, such as birds and possums. Many fruit growers have now netted their crops after recognising this as a very good investment, while others need financial assistance to get started. The Australian Wildlife Society fully supports government subsidies for orchard netting.

If flying-fox pups survive the fruit-growing season, they begin to practise flying within the camp at night around December, and by January are flying out with the adults to feed.



Grey-headed flying fox giving birth. Photo: Nick Edards

Threats

The grey-headed flying-fox was listed as Vulnerable in Australia after its population declined by around 30 percent between 1989 and 1999. The conservation status of the spectacled flying-fox in Australia was recently upgraded from Vulnerable to Endangered when its population declined by around 78 percent between 1985 and 2000, with a sharp decline of 35 percent in the last two of these years. Some scientists believe these species could be functionally extinct (as an effective pollinator and seed disperser) by 2050. It is believed that the main factor contributing to this decline is habitat loss (including loss of both roosting habitat and food trees), although shooting, electrocution, entanglements and severe heat events are also major contributors.

Predators known to eat flying-foxes include carpet pythons, goannas, sea-eagles and the powerful owl. Currawongs and ravens are known to attack flying-foxes found on their own in the daytime. These predators do not significantly reduce the overall flying-fox population. The most likely victims are the young, sick or old. Predators contribute to the health of a population by removing the least fit individuals.

Flying-foxes do not cope very well in extreme temperatures. Their ability to fly long distances means they can usually avoid the extremes of summer and winter by migrating. Although flying-foxes do have behavioural mechanisms for cooling themselves down, severe heat events (e.g. where temperatures reach over 40ºC for more than one day in a row) have been known to result in thousands of flying-foxes dying of heat stress. This can be exacerbated if circumstances (such as scarce food or forced relocation) have forced flying-foxes to camp in a site that may have less than adequate shelter. At the other end of the scale, black flying-foxes that used to be found primarily in northern Australia, but are now shifting southwards, are used to warmer temperatures. Only as far south as Sydney, individuals have been sighted with frostbitten ears, and some seem to have died from these cooler temperatures.

Parasites and diseases tend to affect flying-foxes more when the population is under stress (by lack of food, camp disturbance, etc.). The Australian bat lyssavirus is one disease that is fatal to them, though quite uncommon. But when the immune system is low, flying-foxes are more susceptible, so parasites that have adapted to living in the flying-fox population without causing undue illness suddenly start to make their hosts sick. Some of these issues have slightly more complex reasons for occurring, such as tick poisoning in Queensland.

Flying-foxes have a very short intestine and absorb their mostly liquid diet very rapidly. The average time from eating to producing faeces is about 20 minutes, although some material takes up to an hour to digest. This is important for seed dispersal because the small seeds contained in the faeces fall and germinate in new areas where they grow into new plants.

In the past, some fruit-growers used electric grids to electrocute flying-foxes attempting to eat their fruit – these are now illegal. Now electrocution is mainly caused by overhead powerlines, which kill flying-foxes if they touch two wires at the same time. If the animal happens to be a mother carrying a pup, the pup often survives the shock only to die a slow death of dehydration.

Entanglement is another problem that is happening more often as starving flying-foxes searching for food come closer to humans. Barbed wire is common in rural and industrial areas, which flying-foxes are most easily entangled in when it is installed near flying-fox food trees. The wing of a flying-fox is essentially like a large, elongated hand with a thin, stretchy webbing that joins the fingers. If a small amount of damage occurs to the webbing, then it can heal. But if large holes are torn or if severe damage occurs to the bones or ligaments that

support the wings, then it is very unlikely that the animal will ever fly again – which is a death sentence for a flying-fox. Other animals, such as gliders, suffer horrific injuries from barbed wire. Studies show 86 percent of wildlife entanglements occur on the top strand of wire, so if not all of the barbed wire can be replaced with wildlife-friendly fencing (see www.wildlifefriendlyfencing.com), then even replacing just the top strand with plain wire would make a lot of difference.

In residential areas, the more common entanglement problem is backyard fruit tree netting. If white knitted netting is installed correctly and pulled taut over a frame, then both wildlife and fruit can be kept safe. But unfortunately, many people are unaware that the cheap black monofilament netting they buy from the local shop, with few (if any) instructions, is essentially a death trap for not only flying-foxes but also other wildlife such as birds, possums, lizards and snakes. The trap works by providing an attractive lure (the fruit or the insects attracted to the fruit), with a net that is hard to see but easily entangles anything that tries to get to the tree. The monofilament strands painfully cut into the skin of the animal as it struggles to get out. These animals often die of dehydration, or if they are rescued in time, may still die from the severe wounds that can result from their struggles. And of course, for flying-foxes during summer, there is always the possibility these are mothers with young pups waiting for them back at the camp.

With the increasing tendency for flying-foxes to find reliable food and water near people, there is increasing pressure from humans who sadly do not want to share their lives with flying-foxes. Camps can be noisy, particularly when bats are mating or disturbed, and have a distinctive smell that is not to everyone's taste. For these reasons, many people object to camps being set up near their homes. Other people don't like flying-foxes because of the mess they make when feeding, or simply because they have been taught through folklore, media propaganda and rumours that flying-foxes are scary, diseased, ugly animals. If only they knew the truth! Unfortunately, too many people know very little about bats, and what they think they know is often misinformed. There is intense pressure on governments to relocate 'problem' flying-fox camps, but flying-fox advocates fear that there are so few 'acceptable' places for them to go, they may end up being chased all over the country to no avail. Relocations are expensive and rarely successful, and often end up causing bigger problems than they solve. However, in the past, where governments resisted communities wishing to move the bats on, colonies have occasionally been illegally disturbed, physically attacked, or even bulldozed by communities taking matters into their own hands. It is so important people are taught how to live with and appreciate flying-foxes.

A young black flying-fox (*Pteropus alecto*) roosting in a Sydney colony which is the far southern end of their range. Photo: Nick Edards (www.enigmatech.com.au)

Living with Flying-Foxes

Regardless of what many people would have you believe, it is possible for people and flying-foxes to live harmoniously side-by-side if only the people are willing. The first step is to learn more about flying-foxes – facts, not rumours. The more you understand about an animal, the more you can appreciate it. And whatever you learn, teach it to others – because the more everyone understands the real cause of these issues, the closer we will get to finding real solutions.

If you live near a flying-fox camp and the noise is bothering you during the day, first look at why they are noisy. Are people disturbing them? Maybe some community education is needed to help the flying-foxes get undisturbed sleep, thus also reducing disturbance to people. Is it the mating season? Maybe you could plan some extra day trips during the season to avoid being around the noise. Or you could even get yourself some binoculars and find a good vantage point to watch the camp.

Although still dependant on its mother for nutrition, this young grey-headed flying-fox is starting to take a lot of interest in its surroundings. Photo: Nick Edards

If you start to enjoy watching their social antics, you may find the noise doesn't bother you so much anymore. People learn to ignore and even enjoy many bird noises – why not flying-foxes? But if all else fails, maybe soundproofing your home might be the way to go.

If flying-foxes are visiting your trees at night, be proud your garden is providing much-needed food for a species that is so important to our unique Australian environment. But if they are feeding on the fruit of cocos palms, it is best to remove these palms, as the unripe fruits are toxic to the bats. If the flying-foxes (or other wildlife) are feeding on your fruit trees, you can either place paper bags over the low-hanging fruit you wish to eat, or, if you don't want to share, place a sturdy frame over the whole tree and stretch a white knitted bird net (or wire mesh) over the frame and secure it to the ground to exclude animals from accessing the tree without entangling them.

If the noise of flying-foxes feeding at night is keeping you awake, remember they will only be there for as long as that particular tree is flowering or fruiting, then they will move on to another food source. Ear plugs can be effective to get through that short period. Or if you have trees nearby that are being visited regularly by flying-foxes, you might want to consider investing in soundproofing your house. If the tree is particularly close to your bedroom window, pruning some branches back away from the window may help reduce the noise.

Flying-foxes have a very fast metabolism. Food travels through their gut completely in about 20–60 minutes. For this reason, most of the mess is made by flying-foxes at night where they feed. If you have flying-foxes feeding around your home at night, we suggest bringing in your washing before going to bed and parking your car in a carport or garage or using a car cover. If you do get 'mess' on your car, it should lift off with a wet rag. Although there is no known risk of disease transmission through flying-fox urine or faeces, when flying-foxes leave behind a mess on your property, basic hygiene and cleaning practices are recommended, e.g. washing any outdoor food preparation surfaces with an appropriate cleaning solution, and cleaning with water any walking surfaces that may present a slip hazard.

Like all other animals, including humans, bats can be hosts to viruses and parasites. However, there are only two diseases known to be carried by flying-foxes that have ever been contracted by humans:

- **Australian bat lyssavirus** (ABL) is a rabies-like virus that has been identified in flying-foxes and microbats. Only three people have ever contracted the disease – two from flying-foxes and one from a microbat. Research indicates less than one percent of wild flying-foxes carry the virus, which is transmitted by a bite or severe scratch from an infected bat. The virus is fatal to both flying-foxes and humans, so it is important never to handle bats unless you are appropriately trained and have up-to-date rabies vaccinations. However, it is important to remember this is not an easy disease to contract – it requires blood–saliva contact. Since Australia started using rabies vaccinations (pre- and post-exposure shots) against this disease, the only person to contract it was a boy who sadly died because his parents were not told about his contact with the bat until it was too late.
- **Hendra virus** (previously equine morbilli virus) has been detected in flying-foxes as a respiratory disease similar to a cold or influenza virus. This disease can also be contracted by horses, where the virus becomes dangerous and often fatal to the horse. There have been a few human deaths associated with the handling of horses infected with this disease. But as people are becoming more aware of the disease, more precautions are being taken in the handling of sick horses. It is thought the Hendra virus is transmitted to horses through the contamination of horse feed by the urine, saliva or birth products of infected flying-

foxes – although conclusive evidence for this or any other method of transmission of the disease to horses is yet to be confirmed. No human has ever caught the Hendra virus from a flying-fox. An effective vaccination to protect horses from Hendra has been available since 2012.

- **Histoplasmosis**, a respiratory illness, may be contracted by breathing in the fungal spores found in some bird and microbat cave roosts, where there is high humidity, and these organisms breed in the guano (droppings). Avoid breathing dust in caves where microbats or swifts roost. This disease has nothing to do with flying-foxes.

If you find a bat that is sick or injured, do not touch it, but contact your local wildlife rescue organisation immediately. If the bat is on the ground, place a washing basket or similar over it and wait with it until the rescuer arrives, taking care to shield it from the sun and following any other instructions given to you by the rescuer.

Flying-foxes that are found anywhere within human reach will almost certainly have something wrong with them and will need rescue, examination and probably care. Be aware that bats are not able to flap their wings and fly off the ground like birds. They need to gain some height before they can get wind under their wings to take off. People that have been in the vicinity when a bat has crash-landed near them may have mistakenly thought that the bat was trying to attack them: the bat crawls along the ground towards the nearest tall object (in this case the person) and then attempts to climb up it. On rare occasions, bats (usually juveniles that have not yet perfected their flying skills) have crash-landed directly into people. On the off-chance that this ever happens to you, the best way to avoid being injured is to stay still and let the flying-fox get its bearings and maybe climb a little higher so it can take off again. After such a traumatic experience, it will certainly want to get out of there as quickly as possible. Trying to shake off or otherwise handle a frightened bat is a sure-fire way of getting scratched or bitten or both.

If bitten or scratched by a bat, wash the wound thoroughly with soap and water for five minutes and apply an antiseptic solution. See a doctor as soon as possible to care for the wound and to assess whether you need a post-exposure rabies vaccination (these are the same shots given to people who are bitten by monkeys overseas). People such as vets, wildlife researchers, educators or carers who handle bats should be up-to-date with their pre-exposure rabies vaccinations to protect themselves against ABL.

Little red flying-fox. Photo: Lib Ruytenberg

What can you do to conserve the flying-fox?

The two most important things you can do to help conserve the flying-fox and help reduce their apparent need for taking refuge in urban and suburban areas, where food is reliable but conflict is common, are:

- Support all efforts to protect and regenerate large areas of forests, woodlands and mangroves, including a variety of flying-fox food tree species, across the landscape to support flying-foxes throughout the year.
- Tell others the truth about flying-foxes to help dispel the common myths and to encourage appreciation of these wonderful animals and teach people how to live harmoniously with them.

Australian Wildlife Society

(ACN 134 808 790)

Formed in 1909 and dedicated to the conservation of Australia's wildlife

Patron: His Excellency General the Honourable Sir Peter Cosgrove AK MC (Retd)
Governor-General of the Commonwealth of Australia

Australian Wildlife Society
Conserving Australia's Wildlife since 1909

111th ANNUAL GENERAL MEETING
AGENDA

Wednesday 4 March 2020
Commencing at 11.30am

1st Floor Meeting Room, NSW Masonic Club (Castlereagh Inn)
169 Castlereagh Street, Sydney, NSW

1. Welcome and recording of those present.
2. To receive apologies.
3. Minutes of the 110th Annual General Meeting held on Wednesday 6 March 2019.
4. President's Report for 2019.
5. Treasurer's Report for 2019. Receive and adopt the Balance Sheet and Income and Expenditure of the Society for the year ending 31 December 2019 in accordance with our Constitution.
6. Election for the Board of Directors of the Society:
   a) Trevor Evans retires in accordance with the Constitution (10.3) and being eligible, offers himself for re-election
   (b) Wayne Greenwood retires in accordance with the Constitution (10.3) and being eligible, offers himself for re-election
   (c) Suzanne Medway retires in accordance with the Constitution (10.3) and being eligible, offers herself for re-election
   (d) Brian Scarsbrick offers himself for re-election to the Board after filling a casual vacancy (Constitution 10.5(b))
7. Appoint the Auditor for 2020 – Peter J Varley CA
8. Closure.

Issued by authority of the Board of the Wildlife Preservation Society of Australia Limited
Trading as Australian Wildlife Society.

Patrick W Medway AM
HONORARY SECRETARY/CHIEF EXECUTIVE OFFICER
15 January 2020

All members are cordially invited to attend the annual President's luncheon at the conclusion of the Annual General Meeting.

National Office: PO Box 7336, Mt Annan NSW 2567

Telephone: 0424 287 297

Email: info@aws.org.au
Website: www.aws.org.au

Australian Wildlife Society
Conserving Australia's Wildlife since 1909

The President and Directors of the Board of the

Australian Wildlife Society

Cordially invite you to the

ANNUAL LUNCHEON

to celebrate 111 years of wildlife conservation

of the Society

Wednesday 4 March 2020
Commencing at 12 noon

in

Adam Room
Level 4, Castlereagh Inn Boutique Hotel
169 Castlereagh Street Sydney

RSVP by 26 February 2020. Booking and prepayment essential

Australian Wildlife Society
Conserving Australia's Wildlife since 1909

Acceptance form:

I am pleased to accept your kind invitation to the Annual Luncheon.

$.....for ..... Tickets at $70 per person
2 course - main, dessert and coffee. Includes a glass of wine, beer or soft drink. Additional drinks to be paid on consumption.

Name ..... Address.....

..... Email .....

Cheques can be mailed to:
Australian Wildlife Society
PO Box 7336
Mt Annan NSW 2567
Telephone 0424 287 297 with credit card details.

Direct debit:
Australian Wildlife Society
BSB: 062 235
Account No: 1069 6157
Confirm details via email at accounts@aws.org.au and Cc info@aws.org.au

Book Reviews

Sounds of Nature, World of Oceans by Robert Hunter

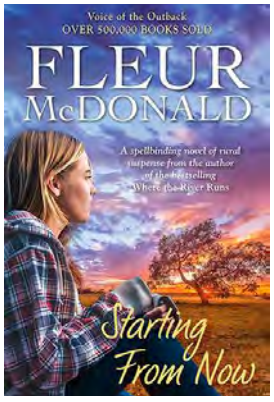
Sounds of Nature World of Oceans leads you on a journey, experiencing ten ocean habitats around the world. Immerse yourself in an auditory experience, listening to sounds of the ocean as you engage in your underwater world journey. You'll hear dugong calves communicate with their mother and the song of a humpback whale from the Great Barrier Reef. Furthermore, you'll learn captivating facts about each habitat and the wildlife it contains. You will be truly captivated by the experience.
Publisher: Allen & Unwin | RRP: $27.99

A First Book of Australian Backyard Bird Songs by Fred van Gessel

This is a book for all bird enthusiasts: whether you're big or small, you are sure to enjoy *Australian Backyard Bird Songs*. Learn about species that live in your backyard, from their vocalisations to their individual or group characteristics. The chuckle of the laughing kookaburra and the warbling twitter of the silvereye are sure to have you mesmerised. The facts, pictures and sounds may even ignite a passion and appreciation for the incredible wildlife that surrounds us.
Publisher: New Holland Publishers | RRP: $19.99

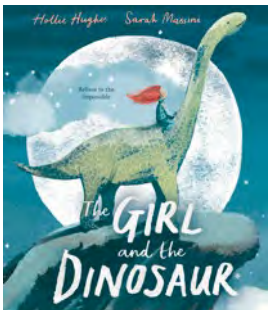
Idling in Green Places: A Life of Alec Chisolm by Russell McGregor

In *Idling in Green Places*, the author, Russell McGregor, skillfully dissects Alec Chisholm's life and work. Alec Chisholm, a passionate and somewhat controversial conservationist, illustrates his emotional connection to and advocacy for nature. Alec provides a foundation in which to inspire Australians to see the beauty of nature and encourage them to establish a connection between the natural world and themselves. The book is compelling and elegantly written.
Publisher: Australian Scholarly Publishing | RRP: $49.95



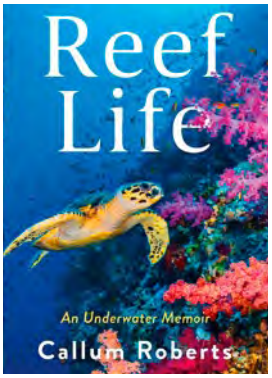
Starting from Now by Fleur McDonald

The author, Fleur McDonald, conveys a suspenseful story of rural life and real country issues, drawing inspiration from her own experiences in rural Australia. Wrapped in the love of family, friendship, crime and mystery, Zara Ellison, a twenty-five-year-old journalist, leaves her much-loved city life to relocate to Barker, the sleepy country town in which she grew up. The author touches on new technology being introduced to farming communities as well as the unintended impact protesters can have on animals, communities, and the subject matter they believe they are protecting. An engaging and authentic story that will take you on a journey of many emotions.
Publisher: Allen & Unwin | RRP: $29.99



The Girl and the Dinosaur by Hollie Hughes and Sarah Massini

The Girl and the Dinosaur is full of adventure, discovery and excitement. Marianne is an independent young girl who discovers life and adventure through passion and creativity. The story is portrayed by rhyme and the stunning illustrations set each scene, taking you on a magical journey where anything is possible. "Do fairies still exist?" you ask and is their magic in the sky? If you're really lucky, Marianne's special wish may even bring a dinosaur to life. Go along the journey with Marianne to find out.
Publisher: Bloomsbury |RRP: $22.99



Reef Life, An Underwater Memoir by Callum Roberts

Reef Life is a marine science biography, the story of how Callum Roberts, one of the world's leading oceanographers and marine conservation scientists, fell in love with coral reefs. His stories provide us with privileged access to, and an understanding of, the science of our reefs and oceans, including insights into Australia's Great Barrier Reef. The author's main research interests include documenting the impacts of fishing on marine life, exploring the effectiveness of marine protected areas and advocating for the protection of marine life.
Publisher: Allen & Unwin | RRP: $35.00

Australian Book Review

The environment issue of the *Australian Book Review* is a publication of reviews, essays, commentaries, interviews and creative writing of a scholarly standard. The environment issue features a review by Tim Flannery, a prominent Australian environmentalist, about young people's outrage at the climate crisis and highlights the work of Greta Thunberg, the Extinction Rebellion and Angus Forbes. A review by James Dunk of Simon Chapman and Fiona Crichton's book *Wind Turbine Syndrome: A communicated disease* and comment by Kim Mahood about 'The Night Parrot' are an additional two great reads. *Australian Book Review* highlights the strengths of critical and creative writing around Australia.
Publisher: Australian Book Review | RRP: $12.95

A Tribute to the Reptiles and Amphibian of Australia and New Zealand Edited by Chris Williams and Chelsea Maier

A Tribute to the Reptiles and Amphibians of Australia and New Zealand showcases 125 of the best photographs ever assembled of the countries' most spectacular reptiles and frogs. Twenty-five of the best photographers specialising in herpetology each submitted five of their most awe-inspiring images, culminating in a unique and captivating publication. Anyone interested in reptiles will love this book and the "story behind the photo".
Publisher: New Holland Publishers | RRP: $49.99

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: $0 (Conditions apply)
- ☐ Individual: $55
- ☐ Family: $70
- ☐ Concession (pensioner/student/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: $150
- ☐ Family: $190
- ☐ Concession (pensioner/student/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**
PO Box 7336, MT ANNAN NSW 2567.
Email: accounts@aws.org.au Website: www.wpsa.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

Consider - A Bequest

Another way which you can support the work of the Australian Wildlife Society is to remember us in your will.

If you would like to make a bequest, add the following codicil to your Will:

> I bequeath the sum of $..... to the Wildlife Preservation Society of Australia trading as the Australian Wildlife Society for its general purposes and declare that the receipt of the Treasurer for the time being of the Society shall be complete discharge to my Executors in respect of any sum paid to the Wildlife Preservation Society of Australia Limited trading as the Australian Wildlife Society.

"The challenge to the present adult generation is to reduce the increasing pressures on the Earth and its resources - and to provide youth with an education that will prepare them emotionally and intellectually for the task ahead.