WA'S PARKS, WILDLIFE AND CONSERVATION MAGAZINE

LANDSCOPE

Volume 34 Number 3 Autumn 2019 $7.95



DOLPHIN WATCH
Community science

Scat!
Eradicating feral cats from Dirk Hartog Island

Cape Le Grand
Exploring one of Australia's whitest beaches

Quolls on Country
Spotted in new places



ROTTNEST ISLAND
KINGDOM OF THE QUOKKA









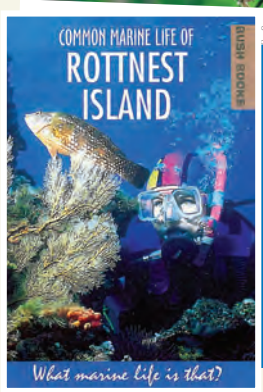




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GOVERNMENT OF WESTERN AUSTRALIA

Department of **Biodiversity, Conservation and Attractions**



ON THE COVER

Front cover As many as 26 Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) live in the Swan Canning Riverpark, where they can occasionally be seen leaping playfully into the air. Indo-Pacific bottlenose dolphins can be long-lived and survive up to 40 years in the wild. The average length of a male adult is 2.4 metres and they can weigh up to 155 kilograms.
Photo – Rick Dawson

Back cover The Swan Canning Riverpark.
Photo – James Collins



One of the best things about living in a place like Western Australia, is that often you don't have to travel far to enjoy our beautiful natural areas or encounter our fascinating wildlife. The Swan Canning Riverpark is just one great example, where people need only venture down to the river's edge for a chance to see the resident Indo-Pacific bottlenose dolphins.

The extent of the community's affection for this population was felt in 2009, when a series of dolphin deaths brought the health of the river into question. At the time, the community was identified as an untapped resource for much-needed data about how the river ecosystem was faring, and the wellbeing and behaviour of the resident dolphins. *Dolphin Watch* – the flagship program of the department's *River Guardian* initiative – was developed, and over the past 10 years has gone from strength to strength.

Dolphin Watch collects observations from more than 1000 'dolphin watchers'. This information is used by researchers who are studying the impact of human activities on dolphins and helps to inform planning for and management of the Swan Canning Riverpark. *Dolphin Watch* has more recently been expanded to Mandurah and Broome, providing people living in other areas of the State the opportunity to contribute important information to our understanding of dolphins in these areas. You can read more about the program, including how to get involved, on page 12.

Dolphins and whales have also recently been given greater protection with the full proclamation of the *Biodiversity Conservation Act 2016* and Biodiversity Conservation Regulations 2018, with penalties for unlawfully taking or disturbing these animals being significantly increased. More information on the new legislation is available on page 7.

This issue of *LANDSCOPE* also recognises one of WA's and indeed the world's greatest champions for these iconic animals, Doug Coughran, a long-time friend and colleague who is sorely missed.

Dr Fran Stanley, ***Executive Director, Conservation and Ecosystem Management***
Department of Biodiversity, Conservation and Attractions

Contributing



Dr Harriet Mills is a terrestrial zoologist who has worked with numerous mammal species across Western Australia. Harriet has an interest in the ecology of small and threatened populations, and in the management of pest species. She has worked previously as a Lecturer in Conservation Biology, and her current role involves working with students and industry partners as the Coordinator of Work Integrated Learning in the School of Science at Edith Cowan University. Harriet is also currently serving as a board member for the Perth Zoo.



Dr Holly Raudino is a research scientist with DBCA's Marine Science Program. She has had a varied 15-year career with DBCA and its predecessors and now leads the tropical dolphin research program in north-western Australia. Her passions are applied research of threatened species, particularly marine mammals, and working with Indigenous people on sea Country to improve the conservation outcomes for and management of marine fauna.



Dr Allan Burbidge is a wildlife ecologist with DBCA's Animal Science Program and holds an adjunct position within the School of Science at Edith Cowan University. He has a broad background in biological survey across many parts of Western Australia, but specialises in research related to the management of threatened birds, and has a particular interest in working closely with regional staff and community members to ensure optimal outcomes for WA's amazing biodiversity values.

Editor Rhianna King.

Scientific/technical advice Margaret Byrne, Steve Crawford, John Huisman, Lachie McCaw, Keith Morris.

Design and production coordinator Tiffany Taylor.

Design Katie Bryden, Gwendolen Monteiro, Gooitzen van der Meer, Lynne Whittle.

Illustration Gooitzen van der Meer.

Cartography Promaco Geodraft.

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By free post Reply Paid 25, Locked Bag 29, Bentley DC, Western Australia 6983

@waparkswildlife

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This page The Bibbulmun Track, which journeys through Gloucester National Park.
Photo – Michael Willis/Alamy

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

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Snap shot



READERS' PIC

by Renee O'Callaghan

Watercolour painting

"I am driven by colour and enjoy experimenting with non-traditional watercolour techniques. I am inspired by my early years, which were spent watching birds, looking for wildflowers and bush camping with my family. My mother and grandparents were avid naturalists and wildlife photographers and I wish my Pop, Ian Edgar, could have seen my birds.

I hope that by looking at my paintings, viewers will be reminded of the impact their environmental footprint has on the Earth's fragile environment and its amazing creatures."

Have you got a fantastic nature photograph or artwork you would like to see published in *LANDSCOPE*? Send it, along with a 100-word description of the species or how and where you took the shot or created the piece, to landscope@dbca.wa.gov.au.

New package for subscribers

For more than 35 years, and 137 issues, *LANDSCOPE* has worked tirelessly to delight its readers with stories and features about Western Australia's parks and reserves, the cultural values they hold and the plants and animals they house, and what's being done to protect and conserve them.

LANDSCOPE is proudly Western Australian – it is written, compiled and designed by locals, and its pages are adorned with the stunning work of Western Australian photographers and artists. It is printed in WA and distributed to subscribers through Activ Industries, which has partnered with the magazine for more than 20 years.

In response to rising prices of production, print and distribution, *WA Naturally* is increasing the cost of annual subscriptions delivered within Australia from $30 to $33 from 1 July 2019 for all new and renewed subscriptions. As part of this package, *LANDSCOPE* is proud to offer a new feature – exclusive access to *LANDSCOPE's* digital edition. From 1 July 2019, subscribers will be able to access *LANDSCOPE* on their computers and smart devices, wherever they have internet access, and enjoy bonus features, including species profiles, mini-documentaries, photo galleries and interactive maps.

For more information, please contact *WA Naturally* on (08) 9219 9000, visit shop.dbca.wa.gov.au or turn to page 36 for a special subscription offer.

Calling all cocky counters





Registrations are open for the tenth Great Cocky Count – a citizen science census of black cockatoos in the State's south-west.

Last year 750 registered volunteers surveyed 426 roost sites. This count showed the number of Carnaby's cockatoos had stabilised, following a nine-year decline of 42 per cent. The number of Baudin's cockatoos counted continued to decrease, while red-tailed black cockatoo numbers had increased on the Swan Coastal Plain, which is likely to be a seasonal redistribution of birds from forested areas.

The 2019 Great Cocky Count will take place on Sunday 7 April 2019 and registrations are open until 17 March. Visit birdlife.org.au for more information.

Above Red-tailed black cockatoos.
Photo – Doug Coughran

Above right Volunteers take part in the Great Cocky Count.
Photo – Stella Stewart-Wynne



Wildlife champion honoured



The *D.K. Coughran* has taken to the waters as the latest in DBCA's fleet of management vessels.

The 10.5-metre vessel will be used by DBCA to respond to marine mammal incidents; help manage the commercial whale watching industry; and carry out marine park, Riverpark and island patrol duties in the Perth metropolitan area.

The new vessel was named in honour of Doug Coughran, who spent much of his career developing techniques that have been instrumental in helping to free entangled whales. Sadly, Doug passed away last year (see 'Doug Coughran: a man of stature', *LANDSCOPE*, Spring 2018).

Above Parks and Wildlife Service staff with the *D.K. Coughran*.

Above right The new vessel *D.K. Coughran*.
Photos – DBCA

Greater protection for WA biodiversity

The *Biodiversity Conservation Act 2016* and the Biodiversity Conservation Regulations 2018 have replaced the Wildlife Conservation and Sandalwood acts and their regulations. The new Act and its Regulations provides greater protection for WA's plants and animals, with increased penalties for taking or disturbing threatened species and ecological communities. There are also new provisions for biodiversity covenants and agreements, which will support landowners to manage their land.

Most activities that were licensed under the previous Regulations will be licensed under the new arrangements. There are some activities, such as feeding of wildlife; wildlife rehabilitation; sandalwood supply, processing and dealing; and flora and fauna bioprospecting, that will now require a licence.

For more information, and to apply for a licence, visit www.pws.dbca.wa.gov.au/plants-and-animals/licences-and-authorities or contact DBCA Wildlife Licensing at wildlifelicensing@dbca.wa.gov.au.

Guest column



Linda Daniels
Executive Director of the Bibbulmun Track Foundation and Executive Officer of Trails WA

Before joining the Bibbulmun Track Foundation more than 15 years ago, trails were something I took for granted. Whether I was cycling along a riverbank or hiking in the hills, I didn't give much thought to how the path got there, who maintained it or produced the map and signage. They were just a wonderful way to explore an area, share time with friends or family and get some exercise.

I am now fully aware of the huge amount of planning, time, money and expertise it takes to build a good trail, and of the ongoing challenges of maintaining it. I am also aware of the enormous number of benefits that trails bring to local communities and trail users, ranging from improved physical and mental health to economic benefit and small business opportunities.

Trails also provide social and community benefits through volunteering with thousands of people around the State donating their time, money and skills to help build, maintain and promote their favourite trail or network. Bibbulmun Track volunteers alone logged more than 33,000 hours last year.

These benefits have been articulated in strategic plans for mountain bike, trail bike and equestrian trail development across the State, with the bushwalking and trail running strategy due for release in May. Developed in collaboration between government and the community, the vision and strategies are second to none in Australia. However, to realise the full benefits, a financial commitment into building, improving and maintaining quality trails is needed from all levels of government. The realisation of these plans would put WA on the map as an outstanding trails destination, attracting visitors from around the world.

Trails WA has an important role to play in advocating for this quality trail network and encouraging tourism organisations to promote our trails. The Trails WA website (trailswa.com.au) now features more than 500 trails – half of which are managed by Parks and Wildlife Service and it's proving to be very popular – more than 250,000 users viewed over one million pages on the website last year. From local bike rides to remote gorge trails, Trails WA is developing a central source of information to inspire Western Australians and visitors to discover WA on a trail. So take a look and choose your next adventure.

Trails WA







Cape Le Grand National Park

The dazzling white sand and pristine turquoise waters of Cape Le Grand National Park have put this area firmly in the running as one of Australia's most beautiful stretches of beaches. Each year, thousands of visitors flock to the park to soak up the scenery, enjoy time in and on the water, and explore the park on a network of trails. And now, upgrades to Lucky Bay campground, which can be booked online, are making discovering this stunning area more comfortable and convenient than ever.

Located 50 kilometres from Esperance by sealed road, the 32,000-hectare Cape Le Grand National Park is truly spectacular. The pristine squeaky white sand and the unimaginably blue water of the bays dotted along the coastline are fodder for daydreams, while the inland sandplain erupts with colour in spring when wildflowers bloom. In the south-western part of the park, massive granite and gneiss outcrops form a chain of peaks, including Mt Le Grand, Frenchman Peak and Mississippi Hill, which can be explored on one of the park's walk trails.

Lucky Bay, one of the park's most popular beaches, is made even more charming by the population of 10 to 20 kangaroos – mostly females and their joeys – who spend much of their time lounging on the beach and hopping around the campground, seemingly unperturbed by the presence of delighted visitors. A shyer local – the tiny honey possum – feeds on the various banksias that occur in the park, while quenda can occasionally be seen scurrying in the vegetation. Black-flanked rock-wallabies were reintroduced to the area in 2003, and this population plays an essential role in ensuring the State's genetic and geographic diversity of these precious mammals (see 'Rebounding rock-wallabies', *LANDSCOPE*, Summer 2018–19).

ANCIENT CONNECTION

The local Nyoongar people have long revered the area that is now known as Cape Le Grand National Park. In fact, stone artefacts, middens, man-made structures and tools that have been uncovered in the park indicate that humans have used the area for as many as 13,000 years. There is











"Cape Le Grand has become a haven for campers and those on day trips from Esperance and other south coast locations ... And now, visitors to Lucky Bay campground are enjoying world-class facilities, thanks to recent infrastructure upgrades. "

evidence that Aboriginal people occupied caves in granite outcrops at Smiths Block and Cheetup, and Mandooboornup (Frenchman Peak) and Mandoowernup (Mount Le Grand) both play an important role in Aboriginal mythology. Several sites in the park have been added to the National Heritage List on the Western Australian Register of Heritage Places for their Aboriginal cultural values.

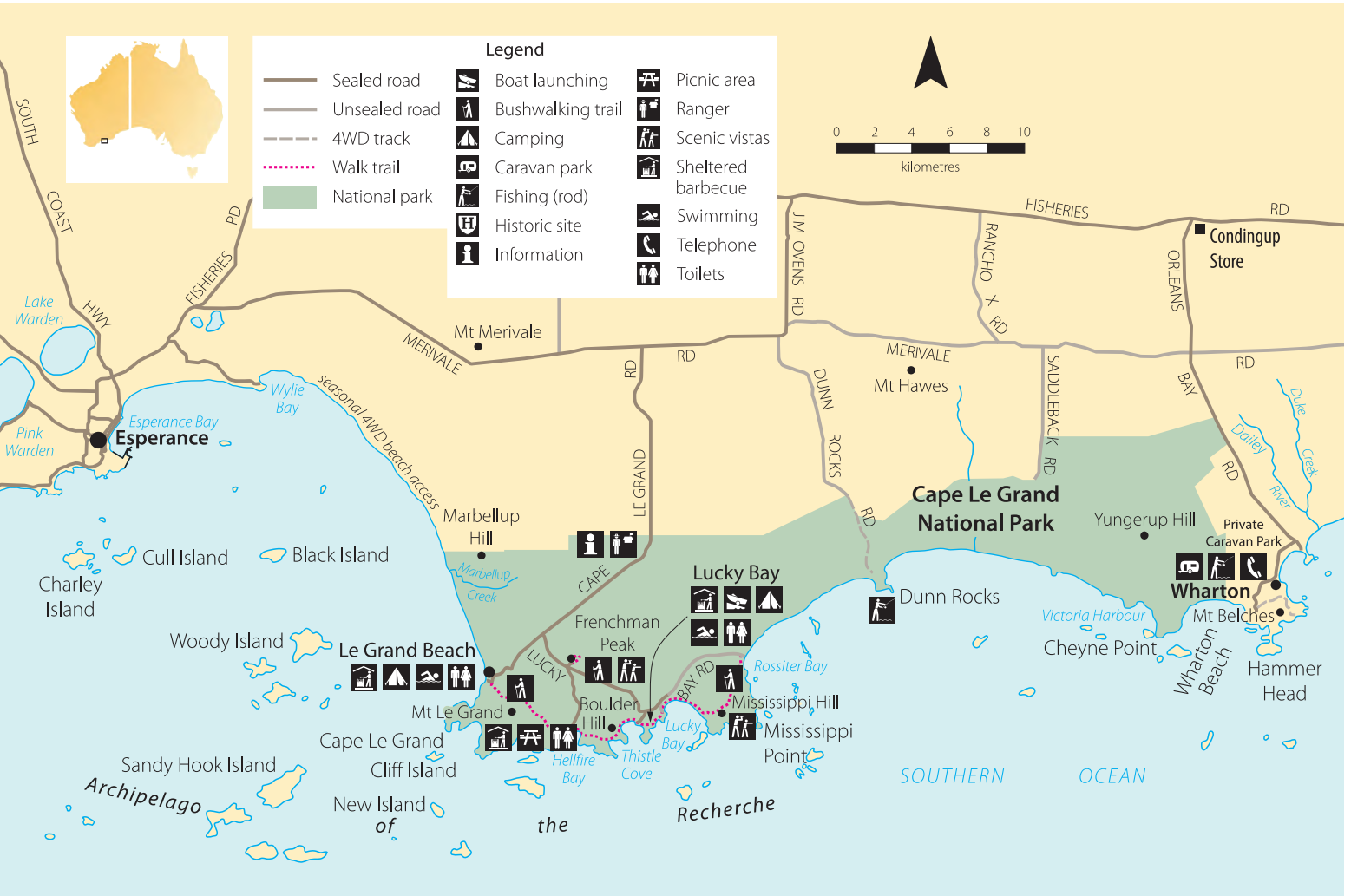
NEW DEVELOPMENTS

In modern times, Cape Le Grand National Park has become a haven for campers and those on day trips from Esperance and other south coast locations. The area receives as many as 189,000 visitors each year, of whom about a equarter stay at least one night. And now, visitors to Lucky Bay campground are enjoying world-class facilitates, thanks to recent infrastructure upgrades.

The facilities were constructed by local contractors, after consultation with the local community and include a large area, which provides a special communal space for campers. Buildings such as an ablution block, toilets and barbecue shelters have

Previous page
Left Visitors enjoy the pristine white sand and turquoise waters of Hellfire Bay.
Photo – Tourism WA
Top right Frenchman Peak can be explored on one of the park's many walk trails.
Photo – Brett Dennis/Lochman Transparencies
Bottom right Honey possums occur in the park and can occasionally be spotted feeding on the nectar of banksias.
Photo – David Bettini

Above (clockwise from top left)
World-class facilities cater to campers at Lucky Bay campground. *Photo – Peter Nicholas/DBCA*; A population of kangaroos delight visitors at the area. *Photo – Craig Williams/DBCA*; Wildflowers are spectacular during spring, including the pink starflower. *Photo – Peter Nicholas/DBCA*; A new toilet and ablution block provides creature comforts for visitors; The park boasts a number of fantastic walk trails. *Photos – Ian Hughes/DBCA*



been constructed using marine-grade colorbond steel that is designed to weather so it will blend in with the environment. The solar showers in the campground, which are treated with UV light to ensure the water quality is maintained, are proving popular among visitors. And new signage is helping visitors appreciate the natural and cultural values of the area.

The upgraded campground offers 56 campsites, which accommodate tents, caravans and camper trailers in one of the State's most beautiful settings. Additionally, the nearby Le Grand Beach campground offers 14 more campsites, which have also been refurbished.

Many would argue that photos don't do the area justice, but Optus users who do snap an 'insta-worthy' shot can take advantage of internet and phone coverage, courtesy of an optics tower that was installed in the park. Others can access the online campground booking system and park information through Parks and Wildlife Service's wifi network.

Being able to book campsites online, through parks.dbca.wa.gov.au, provides surety for visitors who can now secure their spot up to six months in advance, making it easier for people to visit this beautiful park and enjoy the new facilities.

Discover more about Cape Le Grand National Park

Scan this QR code or visit Parks and Wildlife Service's '*LANDSCOPE*' playlist on YouTube.

Do it yourself

Where is it? 30 kilometres south-east of Esperance, 50 kilometres by bitumen road.

Total area: 32,000 hectares.

What to do: Walking, camping, boating, picnicking, sightseeing, nature study, swimming, photography, fishing.

Facilities: Gas barbecues, toilets, campsites, solar showers, picnic areas, shade shelters, water, walk trails.

Entry and camping fees apply. Visit parks.dbca.wa.gov.au for more information.

Camping: For campsite bookings visit parks.dbca.wa.gov.au/park-stay

Nearest offices:
DBCA Esperance District
92 Dempster Street, Esperance WA 6450

Cape Le Grand National Park
PO Box 234, Esperance WA 6450
Phone: (08) 9075 9072

BUSHFIRE WARS

DOCO



Bushfire Wars takes viewers on a gripping, world-first, behind-the-scenes journey with the Parks and Wildlife Service men and women who battle hundreds of fires each bushfire season.

This enthralling 12-part series was produced by the world-renowned and award-winning documentary makers at Sea Dog TV International, and provides a fascinating insight into the dangers and challenges faced by the fire crews who work tirelessly to protect Western Australian lives and assets.

State-of-the-art camera equipment fitted to helicopters, fixed-wing planes and ground vehicles collected vision that depicts the harsh and dangerous conditions crews experience, including inhospitable terrain, unpredictable bushfire behaviour and unfavourable weather conditions. While footage gathered by specially-trained camera crews and 'body-cams' worn by Parks and Wildlife Service personnel, provides an intimate insight into what it's like battling a bushfire on the ground. Viewers meet some of the department's lovable larrikins along the way.

As well as being riveting, *Bushfire Wars* is an important resource for the community to gain a greater appreciation of what's involved in fighting bushfires and the role of fire preparedness and prescribed burning.

Bushfire Wars *was shown on Foxtel's National Geographic Chanel. For more information, visit www.seadogtvinternational.com*

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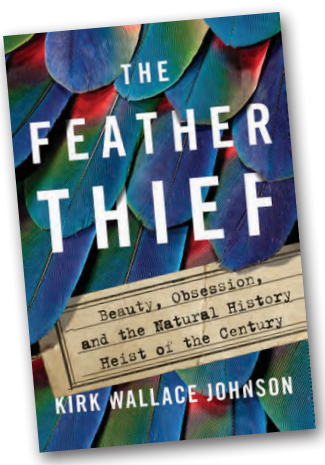
APP



As the Scouts of the world will tell you, it's always good to 'be prepared' and *Emergency Plus* is an invaluable tool for anyone who is heading off the beaten track. This easy-to-use app was developed by Australia's emergency services and uses a mobile phone's in-built GPS function to generate location coordinates, which can be shared with emergency services, should the need arise. It also provides other contact details, such as the SES and police assistance lines for when the call is not urgent.

With a conservation estate as vast as Western Australia's, if the unthinkable happens, being able to provide accurate location coordinates could be the difference between life and death. It's also handy to know your location coordinates for navigation too.

This free app is available for download through the App Store and Google Play.

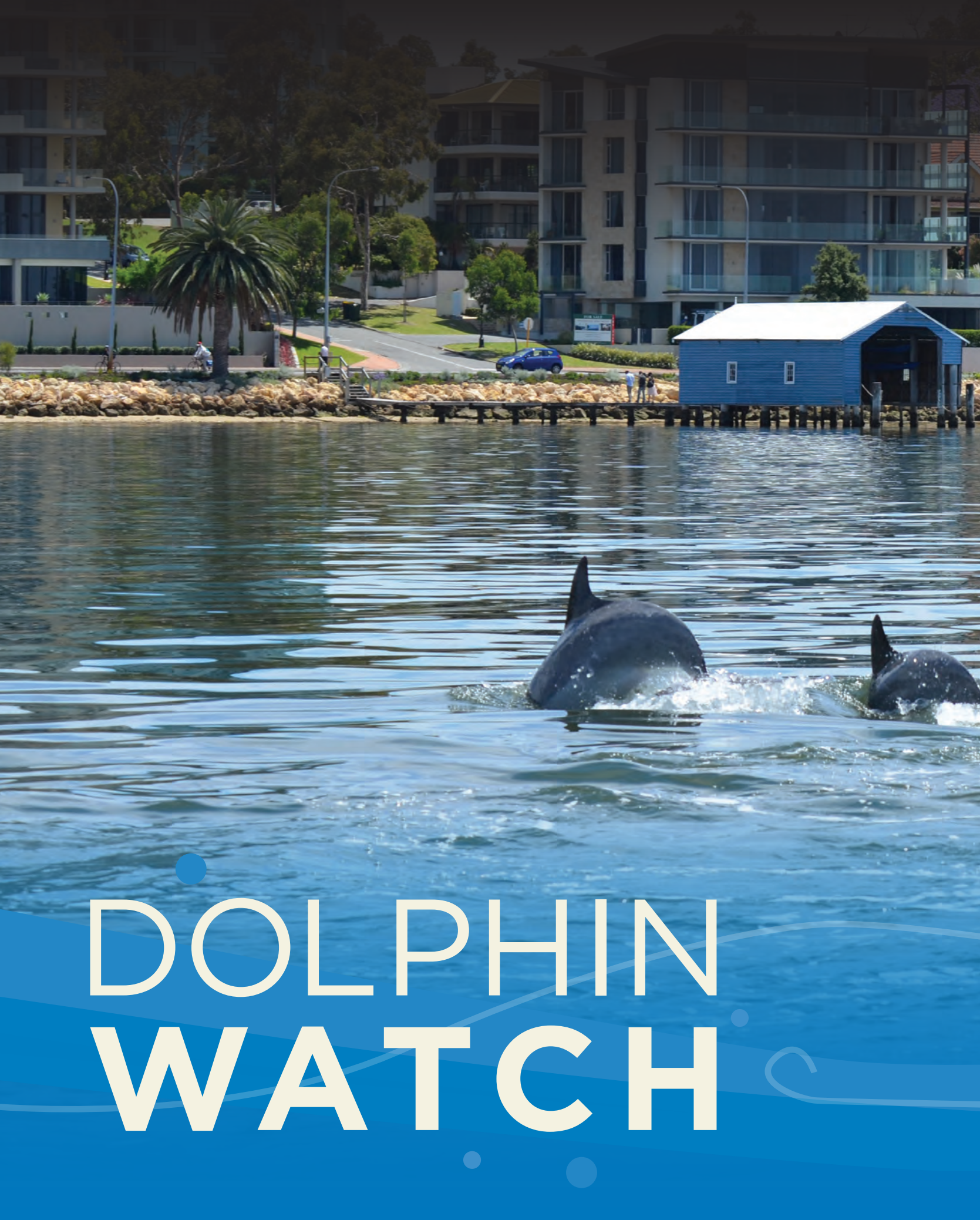


THE FEATHER THIEF

BOOK

This captivating tale by Kirk Wallace Johnson (who is a fascinating character himself) combines ornithology, history, travel and obsessive hobbies into a true crime biography – a glorious combination that makes for a fantastic read. I'll admit, I am drawn to books with a quirky story line so when I read this book was about an American flautist who had a passion for salmon fly-tying and had pulled off a heist of hundreds of rare and precious bird specimens from the British Museum of Natural History, I figured it was right up my alley. But this is far more than a story about flautists, birds and fly-tying (however interesting they are – and I've learnt a lot about all of them), this book looks at obsessiveness, just how far people will go for their passions, and how they justify it to themselves and others when they get there.

The Feather Thief *was published by Viking and is available from online and in-store bookshops.*



DOLPHIN WATCH



A series of tragic dolphin deaths in the Swan Canning Riverpark in 2009 sparked the development of a citizen science research and education project, which has bolstered the management and conservation of some of Western Australia's most beloved marine mammals through unprecedented community engagement. Now, 10 years on, the program, known as *Dolphin Watch*, has been expanded to monitor dolphins in other parts of the State through the work of more than 1000 registered 'dolphin watchers', who provide invaluable information about the health of WA's dolphins and the ecosystems in which they live, and support other research projects.

by Delphine Chabanne, Sarah Marley, Jason Menzies, Krista Nicholson, Holly Raudino and Chandra Salgado Kent

In 2009 the Western Australian community was rocked by the sudden death of six Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) in Perth's Swan Canning Riverpark. An inquiry into the deaths was undertaken by Carly Holyoake and Dr Nahiid Stephens from Murdoch University, and it was recognised that the health of the local dolphins was an indicator of the state of the entire Riverpark ecosystem.

To this end, *Dolphin Watch* – a pioneering citizen science program – was launched in April 2009. The program was developed by the Swan River Trust (now part of DBCA) and run in partnership with Murdoch and Curtin universities to collect data to improve our understanding of the health of the Swan Canning Riverpark dolphin population. Now, 10 years on, it continues through a collaboration between DBCA and Murdoch and Edith Cowan universities and helps researchers and the community at large learn more about the dolphin community that calls the Riverpark home. Last year, *Dolphin Watch* reached another milestone, when it was expanded to help monitor the resident Indo-Pacific bottlenose dolphins in the Peel-Harvey Estuary, Mandurah, as well as the Australian snubfin dolphins (*Orcaella heinsohni*) in Roebuck Bay, Broome.

COMMUNITY SPIRIT

River Guardians was launched in 2009 to help engage and educate all sectors of the Perth community, and to help keep our rivers and waterways healthy. *Dolphin Watch* quickly became the program's flagship project.

Dolphin Watch and other *River Guardians* training initiatives help its volunteers become better informed about conservation issues and provides them with opportunities to support the waterways and coastline, and the wildlife that inhabits them.

The community of more than 1000 volunteer 'dolphin watchers' receive training from researchers from Edith Cowan and Murdoch universities in techniques for monitoring the movement and behaviour of dolphins. These citizen scientists play an essential role in collecting data on the dolphins that occur in the Swan Canning Riverpark, Peel-Harvey Estuary and at Roebuck Bay to assist our understanding of population health

Using the *Dolphin Watch* smart phone app, volunteers record information – such as the location and behaviour of the dolphins they observed – and capture photographs and video. These data help build a picture of the dolphin communities that use the three survey areas. This information is then collated and shared with industry bodies, government authorities and the community to help inform management activities and policy-making.



Learn more about Indo-Pacific bottlenose dolphins

Scan this QR code or visit Parks and Wildlife Service's '*LANDSCOPE*' playlist on YouTube.



Previous page
Main 'Bottomslice', 'Arrow' and 'Tworakes' chase fish in the Swan Canning Riverpark in Crawley.
Photo – Delphine Chabanne

Top Registered 'dolphin watchers' contribute data about dolphin observations to research projects.
Photo – Chandra Salgado Kent

Above 'Highnitch' fell victim to the dark side of inhabiting waters so close to where humans live.
Photo – Jason Menzies/DBCA

PROTECTING PERTH'S DOLPHINS

Anecdotal accounts indicate that Nyoongar people once used the dolphins that occur in what is now known as the Swan Canning Riverpark to help them catch fish. In fact, diaries written by early settlers suggest dolphins were so ubiquitous that they were killed to be used as dog food and their skin was used to make shoes. These accounts even suggest they were considered pests, as they ate the fish the early colonists relied on for food. Nowadays, a beloved population of Swan Canning Riverpark dolphins delight locals and visitors with their antics year-round. They can be long lived – up to 40 years in the wild – and some of the dolphins identified during surveys conducted between 2001 and 2003 are still alive today.

In 2010, the Coastal and Estuarine Dolphin Project (CEDP) was established to examine the health, ecology and


Jabberwocky, Roebuck Bay


Snow, Roebuck Bay


Grunge, Roebuck Bay

DOLPHIN WATCH®

Derby
Roebuck Bay
INDIAN OCEAN
WESTERN AUSTRALIA
Karratha
Exmouth
Shark Bay
Geraldton
Perth
INSET 1
Mandurah
INSET 2
Bunbury
Albany

Legend
- *Dolphin Watch* locations
- Sealed road
- River
- Marine park
- National park

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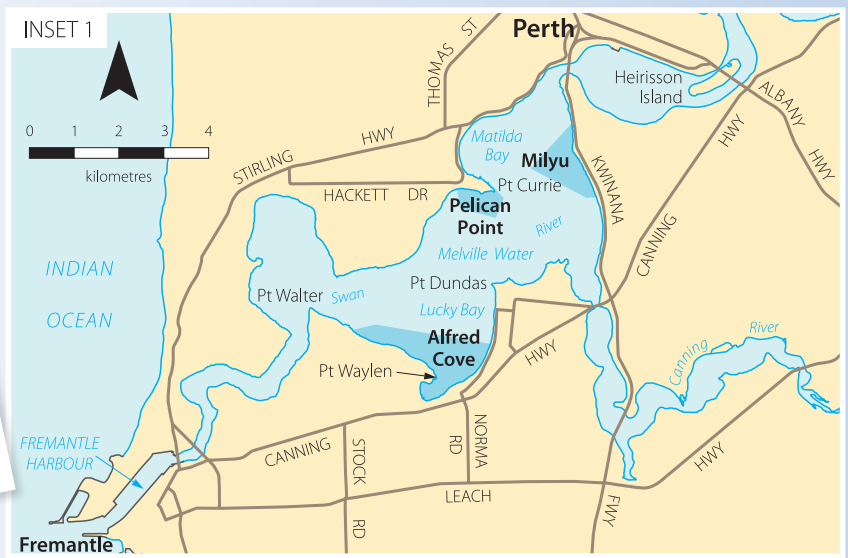

Lovis, Mandurah

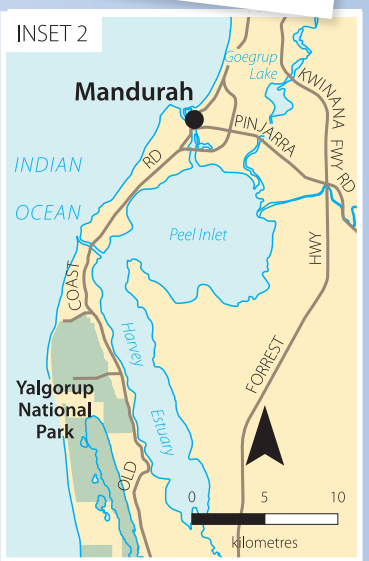

Echo, Swan Canning Riverpark


Blake, Mandurah


Extreme, Swan Canning Riverpark


Nala, Swan Canning Riverpark











Top Dolphin behaviour was observed from high vantage points.
Photo – Phil Bouchet

Above One of the river dolphins carries the scars of having been struck by a boat.
Photo – Jason Menzies/DBCA

Above right Dolphins provide a wonderful spectacle for users of the Swan Canning Riverpark.
Photo – Delphine Chabanne

conservation in the Perth region. With support from the Swan River Trust and Fremantle Ports, the project is driven by the premise that the best future for Perth's Indo-Pacific bottlenose dolphins lies with ecosystems that are healthy and resilient, which are protected by communities that are actively engaged in caring for their local dolphin populations. The project is a collaboration among researchers at the *Dolphin Watch* partner universities (Murdoch and Edith Cowan universities) and works in partnership with State and local government, industry bodies and the WA community.

Since the study's inception, researchers have been monitoring the community of dolphins in the Riverpark because of its small size and exposure to anthropogenic (human) activities. The research is ongoing, and includes an assessment of abundance; distribution; how closely related Riverpark dolphins are to each other and to those found in coastal waters outside of the Riverpark; how dynamic the sound environment is that they depend on to navigate, forage and survive; their responses to human activities; and specialised foraging strategies specific to the Swan Canning Riverpark.

During boat-based surveys between 2011 and 2015, researchers found that some resident dolphins were making short visits to adjacent waters and interacting with dolphins from neighbouring communities. However, they always returned home to the Swan Canning Riverpark, a few times accompanied with visitors. Although the largest group of dolphins seen in the Swan Canning Riverpark was 19, including calves, dolphins are generally found in groups of four individuals, if not less. Dolphins spend considerable time with the same peers, over many years. They have been observed throughout the Swan Canning Riverpark, yet boat-based surveys detected them most often in the narrow channels up the estuary, as well as in the Fremantle Harbour. For logistical reasons, it has not been possible to survey the entire Riverpark, but data collected through *Dolphin Watch* indicates they also frequent areas not yet surveyed.

During the 2011–15 study, researchers also looked at the connection between dolphins in the Swan Canning Riverpark and other populations by comparing genetic material taken from skin and blubber samples. The results indicated that the Swan Canning Riverpark dolphins are genetically connected to neighbouring communities. In fact, the genetic results specifically indicated that the Swan Canning Riverpark acted as a 'sink', with dolphins from the adjacent coastal communities (the 'source') migrating into the Swan Canning Riverpark. This highlights the importance of the Fremantle Harbour in connecting these populations.

The study has examined dolphin behaviour at the water surface as well as beneath it. Underwater can be surprisingly dark and murky, and be difficult to see in, so dolphins have become 'acoustic specialists' and they use sound to communicate with each other, find food, avoid predators, and employ echolocation to sense objects around them.

Researchers have used underwater microphones called 'hydrophones' at several locations in the Riverpark, including Fremantle Harbour, Matilda Bay, Perth Waters and Heirisson Island, to record environmental sounds, such as wind and rain, as well as biological sounds from snapping shrimp, fish and





Above left A resident population of about 80 dolphins live in the Peel-Harvey Estuary.

Above Mandurah 'dolphin watchers' can now share their observations with researchers. *Photos – Krista Nicholson/AMRU*

dolphins. While some sites remained relatively 'natural', other areas showed a strong anthropogenic influence. Human activities such as vessel traffic, shoreline construction, pile driving, and even traffic over bridges all emit noise into the aquatic environment. These all have the potential to change the natural 'soundscape', and mask important acoustic cues that the dolphins use, causing changes in their behaviour.

In order to see how dolphins alter their behaviour in the presence of pile driving activities, vessel traffic and underwater noise, researchers used a combination of visual and acoustic monitoring methods. Made possible through the support of Fremantle Ports, cameras were mounted on a tower and a surveyor's theodolite was positioned at a high vantage point, to track the movement of vessels and dolphins. Meanwhile, acoustic recorders were used simultaneously to monitor underwater sounds. The results showed that dolphins occurred less frequently in areas where there was pile driving, than in areas where it was not occurring. The research also revealed that dolphins may remain in busy, noisy areas that are important for foraging, but then exhibit subtle changes in their behaviour. For example, during times of high vessel traffic, dolphins spend less time resting and socialising and tend to travel more quickly through these areas, than in quieter periods. Their communication whistles were also recorded. In noisy environments, their whistles tended to become longer in duration and covered a wider frequency range. These responses could place additional pressure on dolphins. But all boaters can play a part in reducing these effects by slowing down when they spot a dolphin and giving them plenty of space. This will give them room to behave normally and reduce the amount of underwater noise they are exposed to. Boaters will be rewarded with a better view of the dolphins too.

This research is being complemented by data collected by *Dolphin Watch* volunteers to provide a 'big picture' view of the Swan Canning Riverpark dolphins. The information collected will help to identify any changes in the health of the Riverpark, including variations caused by human activities, as well as longer-term effects from climate change. These data indicate that high-use areas – including Fremantle Harbour, which is heavily used in autumn, winter and spring; Melville Waters near the Narrows Bridge, which is mainly used in autumn and winter; and the entrance to the Canning River – are consistently used by dolphins, mostly to forage and socialise. These locations include the. In other locations, dolphins will forage when opportunities arise and socialise when accompanied by others, but the dolphins are commonly observed travelling en route to areas where fish may be more abundant and their foraging efforts may pay off more quickly.

DOLPHIN WATCH DOWN SOUTH

Further south, the Mandurah Dolphin Research Project (MDRP) was established in 2016 to determine the number of dolphins occupying the Peel-Harvey Estuary and adjacent coastal waters. MDRP is a partnership between Murdoch University and the City of Mandurah, with significant support provided by the Peel Development Commission, Mandurah Cruises, Mandurah Volunteer Dolphin Rescue Group, and John and Bella Perry. Since the project began, about 130 dolphins have been counted in the Peel-Harvey waterways, but there is a year-round community of about 80 individuals using the Peel-Harvey that have been identified. These dolphins occupy all areas of the estuary and some individuals occasionally venture out to coastal waters. About 30 coastal dolphins have showed high site fidelity to Dawesville Cut, which is one of

"Human activities ... all emit noise into the aquatic environment. These all have the potential to change the natural 'soundscape', and mask important acoustic cues that dolphins use."









Above Dolphins herd fish into shallow waters and against the river's edge.
Photo – Matt Kleczkowski

Above right A Mandurah dolphin tosses an octopus before eating it.

Right 'Hayley' – one of the Peel-Harvey Inlet dolphins – displays scarring, caused by sunburn she received while stranded.
Photos – Krista Nicholson/AMRU

Far right Snubfin dolphins occur in the tropical waters of northern WA.
Photo – Deb Thiele

the two entrances connecting the estuary to the ocean. Although these individuals belong to a separate social community, they occasionally associate with the estuary residents who venture into Dawesville Cut.

The Mandurah dolphins have shown a remarkable variety of social and foraging behaviour. The peak calving and mating season appears to be early autumn, with calves mainly being born in March and April. Since 2016, 24 calves have been born into the community, of which, sadly, six did not survive. Interestingly, however, one of the 2016 calves was orphaned at eight months, and, although he was observed on his own for a long time, he has now become part of the community and is regularly seen with other resident juveniles, mainly in the Harvey estuary.

The dolphins use the many canals and rock walls to trap fish, and even tackle adult Western Australian salmon in autumn during the salmon run. Occasionally, they have also been observed catching octopus, and even an eel on one occasion. They are skilled at catching estuary catfish, known as cobbler, and toss them around up to 30 times – presumably to ensure they are safe to eat. Most often, however, the dolphins feed on mullet, which they mostly catch in the shallows of the estuary, after a high-speed chase, sometimes by hydroplaning. Then they send the fish flying into the air with a whack of the tail.

Mandurah has been identified as a live stranding hotspot for dolphins in WA. Since 1987, there have been at least 40 live stranding events, of which some have been mass strandings, involving three or more dolphins. Of the current resident dolphin community, 25 per cent have live stranded at least once, some multiple times. Although more research is required to understand this local phenomenon, it is thought the dolphins venture to the shallows of the estuary in pursuit of fish and then get caught out by extreme low tides in between or on sandbars. While they are stranded, dolphins are at high risk of getting sunburnt. And, although many resident dolphins have survived severe sunburn, which has left bright white scarring on their skin, others have lost their lives – two in 2018.

By studying historical records, we have identified that the stranding hotspots are at Lake Goegrup along Serpentine River and the southern end of the Harvey Estuary. We hope, through *Dolphin Watch*, citizen scientists can not only help us monitor how and when the resident dolphins use the estuary shallows, but also report any stranded individuals as quickly as possible so they can be relocated to deeper waters.

DOLPHIN WATCH GOES TROPPO

Australian snubfin dolphins (*Orcaella heinsohni*) call the tropical waters of northern Australia home. Last year, the species was recognised as vulnerable on the International Union for Conservation of Nature's Red List of Threatened species. The population size of snubfin dolphins in Australia is thought to be fewer than 10,000 mature individuals across their range. And this number is declining. A few key sites in the Kimberley region, such as Roebuck Bay, Broome, are exceptional, and support a relatively large population of snubfins.





Do it yourself

The *Dolphin Watch* app is available to download for free from the App Store (iPhone) or Google Play (Android). For more information about *Dolphin Watch* and to download your free copies of *FinBook*, visit riverguardians.com/projects/dolphin-watch





In 2014, Dr Alex Brown of Murdoch University, estimated there were 130 individual snubfins using Roebuck Bay. Fortunately for the local snubfins, Roebuck Bay was declared the Yawuru Nagulagan / Roebuck Bay Marine Park in 2016. The marine park provides a refuge for snubfins and excludes activities, such as commercial gill net fishing, which can result in entanglement injuries and fatalities for dolphins. Other threats to snubfins include habitat loss through coastal development and resource extraction, vessel strikes, noise and chemical pollution, reduced prey and climate change.

This year, as part of the expansion of *Dolphin Watch*, DBCA marine research scientists and *Dolphin Watch* staff held two training sessions in Broome for Yawuru rangers and other interested local community members. The program enables locals to easily record which tropical dolphin species they see, particularly snubfin dolphins in Roebuck Bay, and identify individuals using the *Broome FinBook* – a photo-identification guide of more than 200 individual snubfin dolphins known to occur in the Broome area – which builds on the earlier work by Dr Deb Thiele.

A bay-wide dolphin census is planned for Broome in April 2019 to determine how many dolphins are in Roebuck Bay and which individuals are present. This will be an opportunity for Broome locals to apply their newly acquired dolphin-watching skills and work together as part of a collaboration between DBCA, Yawuru country managers, Environs Kimberley, Roebuck Bay Working Group, commercial tour operators and residents. The aim of this dolphin 'Big Day Out' is to obtain an updated population estimate of snubfin dolphins in Roebuck Bay and hopefully confirm that a healthy population size of snubfins is being maintained. This information will be used by local country managers to track trends in the snubfin population over time.

Roebuck Bay not only supports an abundance of snubfin dolphins, but also a diversity of other tropical dolphin species, including Australian humpback and Indo-Pacific bottlenose dolphins. Occasionally, false killer whales visit the bay, much to the delight of tourists and locals. Now that these additional tropical species have been added to the *Dolphin Watch* app it is hoped that *Dolphin Watch* monitoring will reveal more on the frequency of these visits and other marine mammals using Yawuru Nagulagan / Roebuck Bay Marine Park.

By contributing information through *Dolphin Watch*, members of the public really can make a difference. The program is collecting much-needed data about the health, wellbeing and habits of WA's beloved dolphins and much of it would not be collected without the help of these dedicated citizen scientists.

Above Humpback dolphins occur in the Yawuru Nagulagan / Roebuck Bay Marine Park. *Photo – Holly Raudino/DBCA*

Above right 'Dolphin watchers' contribute data about dolphins in the State's north. *Photo – Jason Menzies/DBCA*

Dr Delphine Chabanne is a researcher from Aquatic Megafauna Research Unit at Murdoch University. Her research focuses on dolphins in WA, including Perth's Swan Canning Riverpark

Dr Sarah Marley is a lecturer in Marine Vertebrate Zoology at the University of Portsmouth in the UK. Her PhD at Curtin University focused on the behavioural and acoustical responses of coastal dolphins to noisy environments in WA.

Jason Menzies is DBCA's volunteers and community manager. He can be contacted on (08) 9278 0932 or by email (jason.menzies@dbca.wa.gov.au).

Krista Nicholson is a PhD candidate at the Aquatic Megafauna Research Unit at Murdoch University. Her research focuses on the Peel-Harvey dolphin population while extending to coastal waters up to 20 nautical miles offshore.

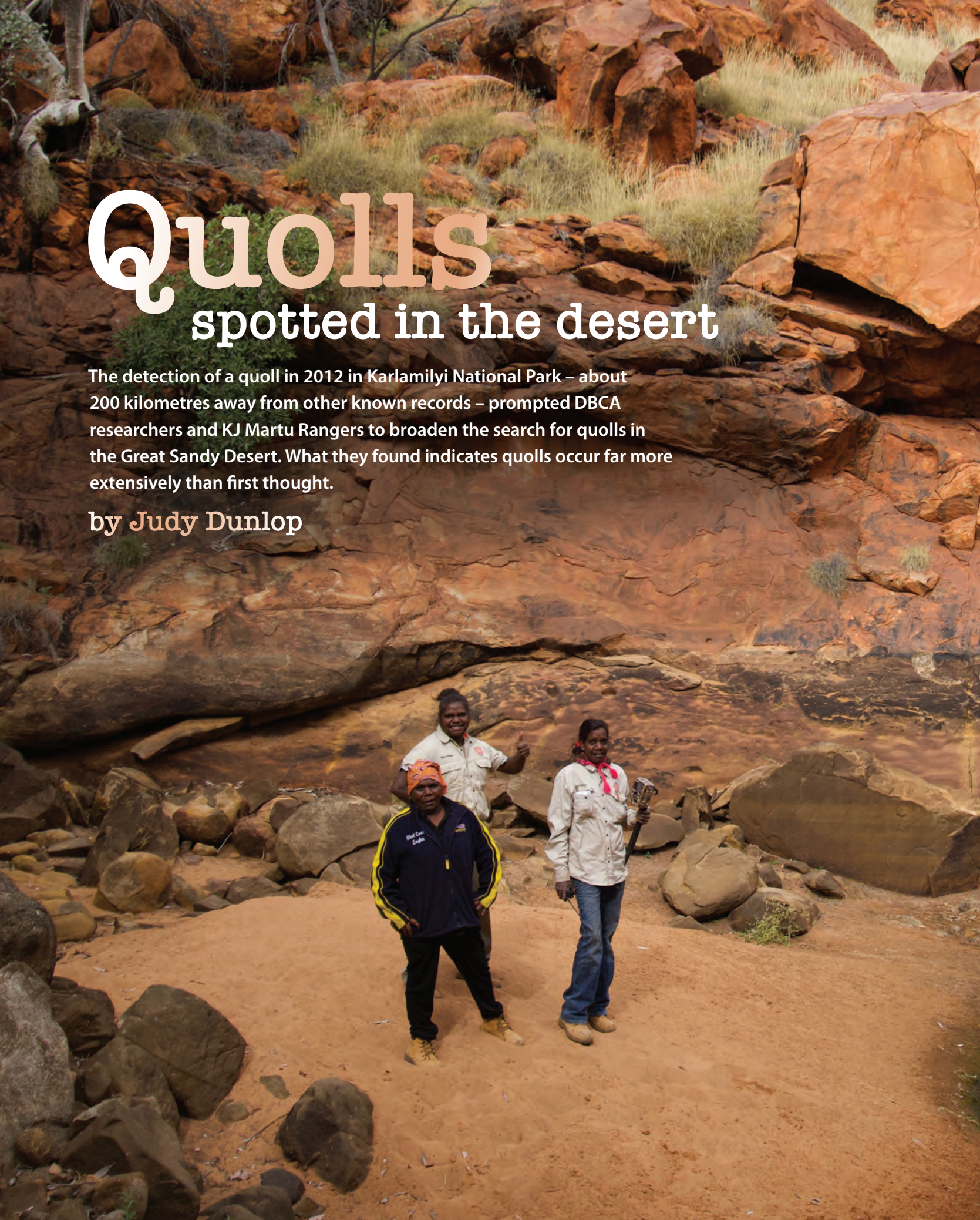
Dr Holly Raudino is a research scientist in the Marine Science Program of DBCA, her research focuses on tropical dolphins in the Pilbara and Kimberley regions.

Associate Professor Chandra Salgado Kent is a researcher at the Centre for Marine Ecosystems Research at Edith Cowan University. Her research focuses on dolphins, whales and pinnipeds; threats on marine wildlife; and conservation and management.

Quolls spotted in the desert

The detection of a quoll in 2012 in Karlamilyi National Park – about 200 kilometres away from other known records – prompted DBCA researchers and KJ Martu Rangers to broaden the search for quolls in the Great Sandy Desert. What they found indicates quolls occur far more extensively than first thought.

by Judy Dunlop





In 2012, ecologists who were working at Desert Queen Baths in Karlamilyi National Park – Western Australia's largest and most remote national park – set up motion-sensing cameras to observe what animals were living in the area. The cameras snapped a number of species going about their gorge-dwelling lives. But one animal in particular piqued our interest. The cameras captured a lone northern quoll (*Dasyurus hallicatus*) that was visiting the waterholes around Desert Queen Baths. This was a significant discovery, as it was about 200 kilometres further east than most other records of northern quolls. And it was the first time since the 1960s that the Martu elders, who live on this Country, had seen a quoll there.

After a couple of attempts, DBCA researchers and Kanyirninpa Jukurrpa (KJ) Martu Rangers managed to trap a single male quoll at Desert Queen Baths in 2016 (see 'Quolls on Country', *LANDSCOPE*, Autumn 2017). We took DNA samples and collected other data, before releasing it back into the gorges. This capture broadened the known range of this elusive mammal, and made us wonder just how extensively quolls occur through the rocky areas of the Great Sandy Desert.

WIDENING THE SEARCH

So, in 2017–18 we broadened the search for northern quolls and set camera traps in likely habitat. KJ Martu Rangers and DBCA staff set 25 cameras in six clusters in likely habitats, such as rocky caves, breakaways and ranges. We chose the sites by examining mapping data for likely habitat that was steep, rocky, and was close to ephemeral waterholes or creeks. The areas we selected were only accessible by helicopter, but MetalsX (Nifty Minesite) staff were working with the KJ Martu Rangers to carry out aerial burning on traditional lands, so we were able to tag along to assess the areas by air, before landing and setting the cameras.

The cameras remained *in situ* for nine months before we returned in June 2018 to collect them. Once we had collected the cameras, groups of people huddled around laptops, by the campfire, and excitedly flicked through several thousand photos, to see what had been snapped. More than 40 different species of bird, reptile and mammal, including native and introduced animals were recorded. These included echidnas foraging at night, perenties, feral cats, wallaroos and red kangaroos, birds of prey, camels and a fox.

QUOLLS!

Much to our delight, northern quolls were captured by three of the six camera groups, in caves and by waterholes; one within 10 hours of the camera being deployed! Northern quolls had never been recorded at any of these locations before,



Previous page
Main KJ Martu Rangers, whose traditional lands include Karlamilyi National Park and the surrounding Martu Determination Area, worked with DBCA scientists to set camera traps in likely northern quoll habitat.
Photo – Judy Dunlop/DBCA
Background Northern quoll.
Photo – Jiri Lochman
Insets Northern quolls were captured by six of the 25 camera traps set up.

Left The camera traps captured pictures of 40 species of bird, reptile and mammals, that were attracted to the scent lure, including (clockwise from top left) Euros, spotted harriers, crows, magpies, painted finches, feral cats, dingoes and perenties.
Photos – DBCA





and the groups of cameras were about 20 kilometres apart from each other, so it's unlikely that the same individuals were traversing between groups. We used the quolls' individual spot patterns to estimate that there were most likely six quolls in total, of both sexes. Smaller, young quolls were seen after the breeding season, indicating the population is having some success at maintaining itself.

WHAT DOES IT ALL MEAN?

Quolls have now been detected in this area in four of the last five years, with the searches getting broader each time. This indicates that the marginal desert habitat is supporting a low-density population of quolls that are successfully breeding and surviving. Northern quolls have a frenetic life cycle whereby all the one-year-old males expend so much energy in the breeding season, and have such extreme hormonal spikes that their immune system collapses, that they die in October after they have bred – similar to many other small dasyurids. Young emerge from their mothers' dens in January to February, so the photos of small animals in January confirms breeding is occurring there.

This project demonstrates the value of collaborative efforts between multiple groups to undertake novel work; in this case, a government department, traditional owners and industry worked together to achieve conservation goals.

And it is another example of how many secrets the arid zone and natural environment hold – science is still discovering new records of species and even making new discoveries in some places. We will continue working with Indigenous ranger groups on Country to survey for threatened species and enhance the natural values of their traditional lands.

Scan here to see what else was spotted

Scan this QR code or visit Parks and Wildlife Service's '*LANDSCOPE*' playlist on YouTube.

"This project demonstrates the value of collaborative efforts between multiple groups to undertake novel work; in this case, a government department, traditional owners and industry worked together to achieve conservation goals."

Partnerships

KJ Martu Rangers live on their traditional land, which includes Karlamilyi National Park and the surrounding Martu Determination Area. They have been working hard to improve the burning regime of an area almost as large as Tasmania, clean up waterholes, map culturally important areas and survey threatened species like quolls, bilbies and rock-wallabies. MetalsX (Nifty Minesite) is supporting this work, which is improving the nature conservation values of the landscape surrounding their copper mine. And, in partnership with DBCA, these projects are contributing to the protection of this remarkable area and the species that occur there.



Top left Northern quolls occur in habitat that is typically steep, rocky and close to ephemeral waterholes and creeks.
Photo – Jiri Lochman

Above left The spectacular Karlamilyi National Park.

Above DBCA staff worked with KJ Martu Rangers.

Below A helicopter was used to identify likely quoll habitats.
Photos – Judy Dunlop/DBCA



Dr Judy Dunlop is a DBCA research scientist. She can be contacted on (08) 9405 5174 or by email (judy.dunlop@dbca.wa.gov.au).

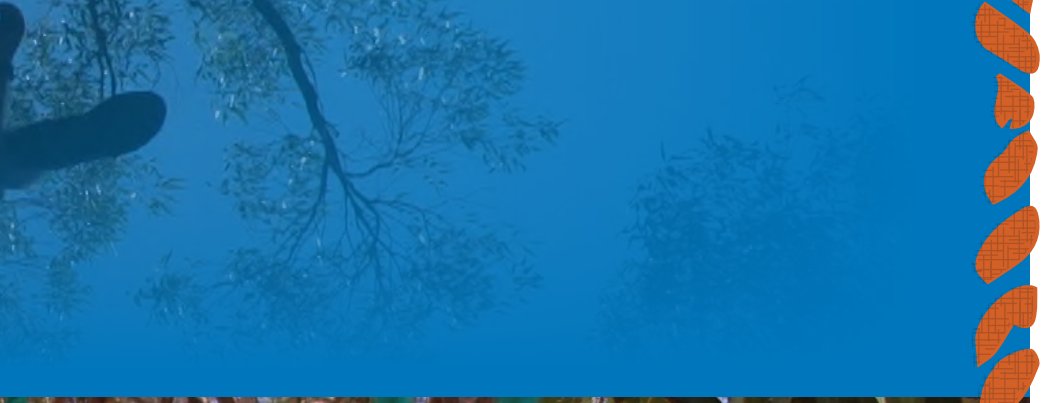
Trees Adventure

Yanchep National Park

by Rhianna King

Trees Adventure is providing an exhilarating new way to experience Yanchep National Park and an opportunity for users of all ages to challenge themselves, and have a whole lot of fun.









Nestled in the bush behind Bull Banksia Oval in Yanchep National Park, 45 minutes drive from Perth's CBD, is a thrilling and unique way for visitors to experience the park. Trees Adventure is a network of ziplines and high ropes that ribbons through the trees like a giant spider web and looks like where Peter Pan and the Lost Boys would hang out if Neverland was in the Australian bush.

ONE STEP AT A TIME

Once I arrived at Trees Adventure, my inner-child, which I'm sure was awoken by the squeals of "woo-hoos" and "yee-hows" coming from those on the ziplines, was chomping at the bit to start climbing and zipping through the trees. But my inner-adult, which has a healthy sense of responsibility and self-preservation, was happy to listen to the safety instruction and be fitted with a helmet and harness before we got going.

Once we were kitted up, we moved to the 'home tree', from where each of the seven colour-coded levels start. Two 'yellow' courses – designed for kids aged four to seven – run two metres off the ground at their highest point, and provide youngsters with the opportunity to use their problem-solving skills, expend some energy and challenge themselves physically across 20 challenges and four flying foxes.

The next most challenging is the 'green' course, which reaches up to four metres, and is a good way for adults and older kids to warm-up and get used to the equipment.

Two 'blue' courses up the ante, and challenge participants with less stable obstacles, including tight ropes, wooden bridges, uneven planks and cargo nets that are climbed over, clambered through and balanced on at heights of up to six metres.

Several ziplines traverse over the bush, and provide a spectacular bird's-eye view over ancient grass trees and zamia plants.

The 'red' course raises the stakes (and the distance from the ground) even further. Twelve challenging sections, including one that is notorious for transforming many participants into Cirque du Soleil-type acrobats, is open to users aged 10 and above. An 80-metre zipline is a thrilling end to this course.

The 'black' course, which soars to 10 metres at its highest point, is open to adrenaline junkies aged 13 and above. This has a number of very challenging sections, which I was happy to observe from the safety of the ground.

ALL IN THE PLANNING

The Trees Adventure in Yanchep National Park is one of seven across Australia with the others located in Lane Poole Reserve and in Victoria, NSW and Tasmania. It is run through a lease arrangement with DBCA and was opened in November 2018 following the success of the one located in Lane Poole Reserve (see also 'Canopy capers', *LANDSCOPE*, Winter 2016).

The course was carefully and thoughtfully designed to make use of existing trees, avoid the removal of any native plants and include other natural features. The platforms, which separate each challenge (and provide an opportunity to pause and catch your breath), and other infrastructure, are secured to the trees without any penetrating fixtures such as nails or screws. Instead, each one is fastened to the tree using a three-tonne strap, which securely holds it in place but enables the tree to continue to grow. Daily checks of the entire course ensures the safety of participants and maintains the well-being of the bush in which its set.

WHAT THE PEOPLE ARE SAYING

Trees Adventure park manager Matt Baker said the attraction was growing in popularity with thousands of people doing the course since it opened last year.

"We get lots of visitors to WA coming through the course, but it's great that we're seeing locals come to try it out as well," he said.

He also said that he had observed an increase in voucher sales, as people are moving towards 'experience' gift-giving.

Yanchep National Park manager Julia Coggins said she had received positive feedback from park visitors about the Trees Adventure and inquiries from schools planning their excursion programs.

"The Trees Adventure provides park visitors with yet another nature-based opportunity, which caters to people of all ages," she said.

"There is already so much to do and see at Yanchep, but the Trees Adventure is attracting new visitors to the park who, when they get here, are experiencing all the other wonderful things that are on offer. And many returning visitors are 'rediscovering' the park.

"This is especially true for campers, who can easily fill several days with fun and unique nature-based opportunities."

THE HIGHS AND HIGHLIGHTS

There's no question that spending time in nature nourishes our soul, but for at least one Trees Adventure user – nine-year-old Justin – the course represented a much more character-building experience. Justin spent 30 minutes gathering the courage to step off a platform to zipline into the arms of his waiting mother, who patiently and lovingly offered words of encouragement to coax him along. By the time he did take the plunge, Justin had a community of people rooting for him and he made the



Journey to the Trees Adventure

Scan this QR code or visit Parks and Wildlife Service's '*LANDSCOPE*' playlist on YouTube.



Previous page
Main Trees Adventure users make their way over tight ropes, wooden bridges, uneven planks and cargo nets.
Photos – Peter Nicholas/DBCA

Above Safety harnesses, gloves and helmets offer protection while on the course.

Right The age of users ranges from four to 77-plus.
Photos – Trees Adventure





"... it was a reminder of how important it is for kids to be given opportunities to challenge themselves physically and emotionally so they can experience the satisfaction of doing something they didn't think they could."

journey to the platform on the other side accompanied by the sound of heartfelt cheering and clapping. While the zipline was about 20 metres of moderate incline, it seemed to be light-years outside Justin's comfort zone. He had every reason to be proud of himself for facing his fears, and the smile on his face as he reached the other side was priceless. For those of us watching Justin's personal triumph, it was a reminder of how important it is for kids to be given opportunities to challenge themselves physically and emotionally so they can experience the satisfaction of doing something they didn't think they could.

For me, one definite highlight was spotting a kangaroo and her joey feeding in the undergrowth beneath the course; which came towards the end of my session and was a welcome distraction from my tiring arms. And I always enjoy hearing the raucous screeches of the endangered Carnaby's cockatoos, which roost in the park, echoing through the sky.

CLIMB ABOARD

Bookings are required for the attraction and tickets provide participants with 2.5 hours on the course, which includes a safety briefing. The safety equipment includes a robust harness and helmet, and it was reassuring to know that I would only fall as far as my harness would let me. And I was grateful for the special gloves that protected my hands from rope burn and provided much-needed grip. It was also comforting to know that Trees Adventure staff, who are constantly roaming around the course, are never far away to offer words of encouragement, tips to make the experience easier and even rescue those who need it.

Above Straps are used to 'fix' the course to existing park trees to avoid the need for any penetrating fixtures.
Photo – Rhianna King/DBCA

Above right The highest course reaches up to 10 metres.
Photo – Brandon Boyd/Trees Adventure

Right Ziplines provide users with a bird's-eye view of the bush.
Photo – Peter Nicholas/DBCA



Do it yourself

Where is it?: Yanchep National Park is 51 kilometres north of the Perth CBD.

What to do: Cave tours, bushwalking, culture appreciation, picnicking, camping, wildlife appreciation.

Contact: Yanchep National Park, corner Indian Ocean Drive and Yanchep Beach Road, Yanchep, Western Australia, 6035
Phone: (08) 9303 7759 **Fax:** (08) 9561 2316
Email: yanchep@dbca.wa.gov.au
Camping: For campsite bookings visit parks.dbca.wa.gov.au

Visit www.parks.dbca.wa.gov.au for more information.

Bookings can be made and gift vouchers purchased at treesadventure.com.au. National park entry fees also apply.

Bringing back the birds of the

Montebellos

by Allan Burbidge, Mark Blythman,
Alan Danks and Neil Hamilton

The islands of the Montebellos off the Pilbara coast once housed a variety of species. However, the effects of introduced predators and British atomic testing in the 1950s led to the loss of several types of birds and mammals. A plan to reintroduce some species has seen populations of spinifexbirds and fairy-wrens breeding successfully. But they're not out of the woods yet, and ongoing monitoring is being carried out to see how they're faring.







The Montebello Islands is a spectacular archipelago of about 180 islands, islets and rocks located 20 kilometres north of Barrow Island and 130 kilometres off the Pilbara coast. Most islands are dominated by *Triodia* (spinifex) with scattered *Acacia* thickets and there are also patches of mangroves and tidal lagoons.

Despite its remoteness, this unique ecosystem has not been immune to the effects of humans and a number of species that once occurred there no longer do so. Spinifexbirds, for example, once lived on Hermite and Trimouille islands, and there is an unconfirmed record of the black-and-white fairy-wren from Trimouille Island. But, neither species had been observed on these islands since 1950, probably because they fell victim to the ravages of feral cats and rats, or were impacted by the atomic testing that was carried out by the British in the same decade.

HOMECOMING

In 2010, the then Department of Environment and Conservation (DEC) embarked on an ambitious project to reintroduce animals, including several mammal and bird species, that once lived on the Montebello Islands. In preparation, DEC staff had already removed all the feral cats and rats from the islands that would have predated on the small–medium-sized mammals that were reintroduced and the birds that nest on or near the ground, such as spinifexbirds and fairy-wrens. The team also ascertained that the most serious effects of the atomic tests were significantly reduced. Then, in 2010 and 2011, 36 fairy-wrens and 47 spinifexbirds, which had been fitted with uniquely numbered leg bands, were translocated from Barrow Island to Hermite Island, the largest of all the islands in the archipelago. The fairy-wrens, in particular, are poor fliers and would not have made that 20-kilometre crossing unaided. Luckily, environmental conditions were just right for the translocation, and the island experienced good rainfall before and after the release.





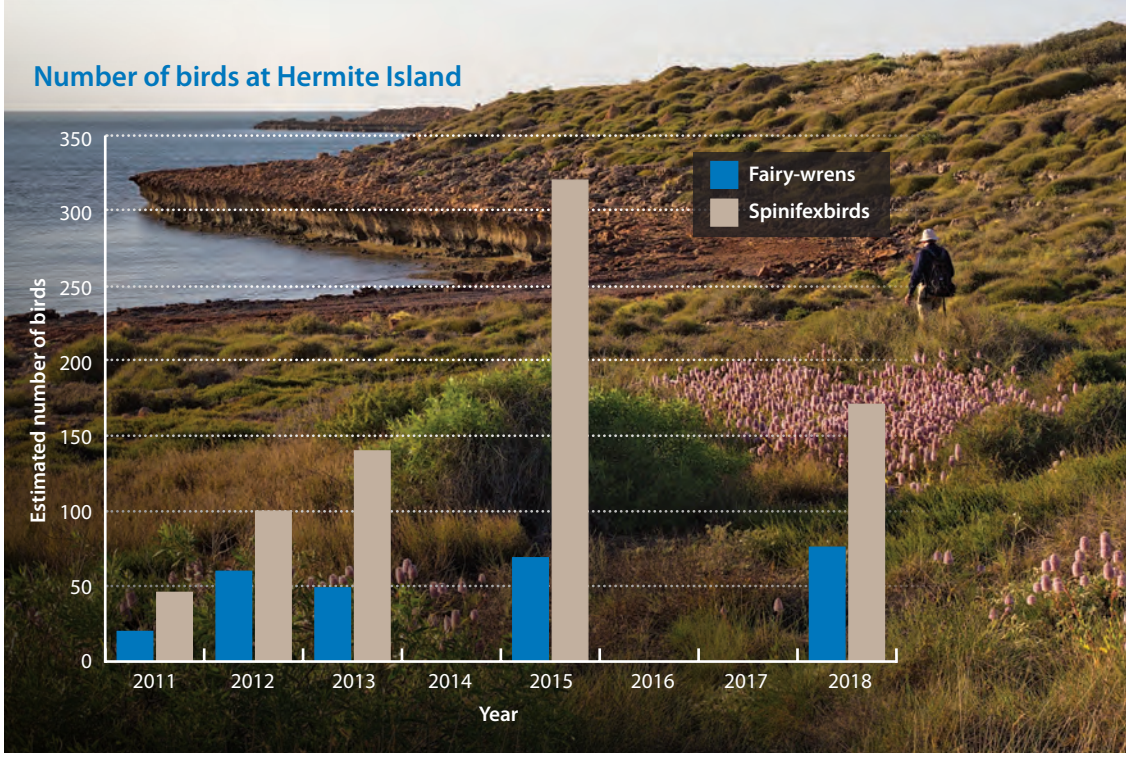
Previous page
Main left Hermite Island is one of 180 islands in an archipelago 130 kilometres off the Pilbara coast.
Photo – Col Roberts/Lochman Transparencies
Main right A spinifexbird.
Inset left A black-and-white fairy-wren.
Photos – Alan Danks/DBCA
Inset right Department researchers returned to the island to monitor the success of the translocation.
Photo – Mike Burbidge

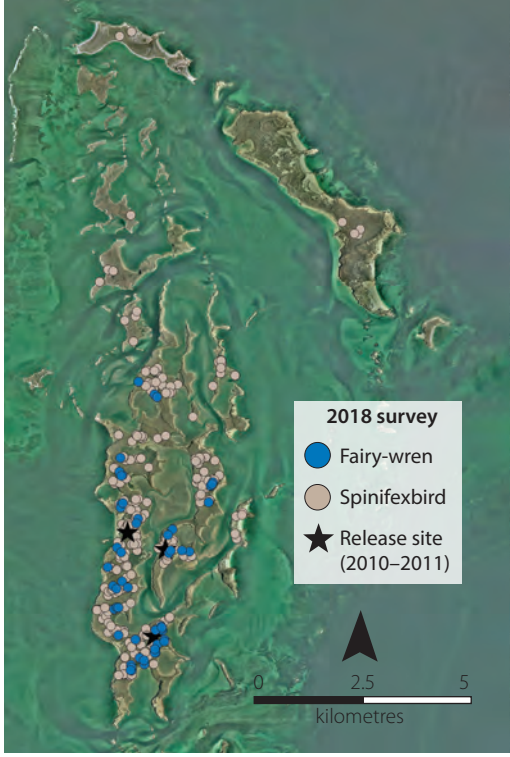
Above A view of Hermite Island, which shows stands of mangroves (bright green vegetation), ideal fairy-wren habitat (the darker shrubs), the spinifexbirds' preferred habitat (the intervening flats) and shorebird feeding ground (mudflats in the shallow tidal lagoons).
Photo – Allan Burbidge/DBCA

PLEASING RESULTS

It was pleasing for the team of five researchers who returned to the island in September 2012 to monitor the populations of fairy-wrens and spinifexbirds to find that more than 80 per cent of the birds of these species did not have leg bands. Why? Because the birds without leg bands were not translocated birds, but ones that had been bred on Hermite Island since the first translocation in mid-2010. In other words, fewer than 20 per cent of birds observed were from the founder stock, indicating that both species had been breeding well.

Not only had the spinifexbirds been breeding, they had also spread well beyond the areas where they were released. To begin with, the team stayed at the aptly named Cyclone Hut on Hermite Island, and walked out each day to monitor the bird populations. However, the further the birds spread, the more difficult this became, especially once the spinifexbirds started hopping between the islands. Walking up to several kilometres to a survey an area before dawn, or returning after sunset, was impracticable, especially in areas of uneven terrain. Fortunately, skipper Andy Edwards provided transport on his specially fitted-out expedition vessel, the *Keshi Mer*, and more recent visits have been boat-based. This meant the team could be dropped off or picked up at points convenient to the survey locations, providing much safer conditions and allowing for more effective use of their time.







Above left background Hermite Island has a range of vegetation types, including the mulla-mulla.
Photo – Alan Danks/DBCA

Above Results of the 2018 survey. The black stars indicate where black-and-white fairy-wrens and spinifexbirds were introduced in 2010 and 2011.

Left Researchers travelled to the islands in 2010, 2011, 2012, 2015 and again in 2018.
Photo – Mike Burbidge

A return visit to the islands in 2015 revealed a spectacular increase in the number of spinifexbirds – there were about six times the number of birds that had been translocated. And, adding to the team's excitement, was the revelation that the birds had colonised an additional six islands. This was well beyond initial expectations. The fairy-wren population had increased to at least 69 birds – not as spectacular, but a solid increase – suggesting that the translocation would continue to be successful in the long-term.

A CHANGE OF MOOD

Unfortunately, the results of a 2018 survey were not as pleasing, and revealed a reduction in the number of spinifexbirds. The team couldn't be certain of the cause, but suspected it was related to rainfall. There are no rainfall records for the Montebellos, but there is a weather station on Barrow Island, about 20 kilometres to the south. In 2015 there was much higher-than-average rainfall on Barrow Island in autumn, which perhaps set the scene for a better-than-average breeding season, which would occur in winter in this area.

On the other hand, autumn rainfall in 2016–18 was well below average in each year, which likely resulted in less healthy vegetation, and therefore fewer invertebrates – the main food source for these birds.

"Spinifexbirds have self-introduced to eight other islands, with the new locations being up to 10 kilometres from the original release sites ..."

But it's not all doom and gloom. Spinifexbirds have self-introduced to eight other islands, with the new locations being up to 10 kilometres from the original release sites, and have included water crossings of up to 500 metres. And, despite the drop in numbers, there are still about four times as many spinifexbirds present than were translocated in 2010 and 2011. The lesson here is that, especially in arid and semi-arid areas where rainfall can be highly variable from year to year, it is important to monitor





Above Spinifexbird on Hermite Island.
Photo – Allan Burbidge/DBCA

Above right Researchers used monitoring equipment to detect birds on the island.
Photos – Alan Danks/DBCA

through a number of breeding seasons to check whether the population has reached a level where it can withstand such variations. This will provide the opportunity to supplement numbers if necessary, as it's not possible to determine the real success of a translocation until the population has been through a series of variable seasons.

And why weren't the numbers of fairy-wrens similarly affected? That's still unknown. But it may be that, because they occur in family groups, there were behavioural adaptations, or there might be some physiological differences that have helped them through the drier times. There have been a couple of pairs of fairy-wrens cuckolded by a Horsfield's bronze-cuckoo, so it can assumed that they did not contribute to the population in that season, but that would have been a natural event and probably hasn't made a significant impact on the population. In any case, in 2018 about double the number of birds that had been translocated in 2010 were recorded in 2018, which is cause for optimism that this translocation is also experiencing long-term success.

OPPORTUNISTIC OBSERVATIONS

The bird fauna of the Montebellos is similar to that on Barrow Island. However, as Barrow is much larger, and there has been much more work done there, more bird species are known from there – about 140 species compared with about 90 in the Montebellos. However, the islands of the Montebellos are still a very important bird refuge, and the islands do have some very important values.

Being boat-based, and needing to visit a range of islands across the Montebello group, gave the team a chance to make opportunistic observations on a range of bird species. The data collected adds to information gathered by various other researchers, including department staff working on earlier feral cat and rat eradication. These observations have brought the total number of bird species recorded on the islands to 90. Like some other Pilbara islands, these islands support important breeding colonies of some seabirds, such as wedge-tailed shearwaters, which nest on a number of islands, sometimes in large numbers (e.g. more than a thousand pairs on South East Island). The osprey has been recorded breeding on more than 30 different islands and rocks in the Montebellos, but the Brahminy kite, which prefers to nest in mangroves, has only been recorded breeding on Crocus Island and Hermite Island. Five different species of terns were recorded breeding in the Montebellos, and sometimes there were hundreds of pairs of fairy terns (listed as vulnerable) and thousands of pairs of crested terns and roseate terns nesting, making the islands a highly important site for these species. The tidal mudflats, especially in the lagoons around Hermite Island, are home to a range of migratory shorebird species during the non-breeding season. This population comprises small numbers of several threatened species, including eastern curlew, curlew sandpiper, great knot, greater and lesser sand plovers and bar-tailed godwit. The long shorelines of the islands, which are free from foxes or feral cats, means that the area is important also for breeding sooty and pied oystercatchers, and beach stone-curlews. In all, the islands support about 27 species (seabirds, shorebirds and land birds) that have been recorded breeding there, some regularly, some only occasionally. It is for these reasons that BirdLife International lists the area as an Important Bird Area.

There is no permanent freshwater on any of the islands so the resident bush birds, including Australian pipits and two







open country raptors – nankeen kestrels and spotted harriers, are those suited to the arid environment. When walking along survey transects or between sites the team was often accompanied by the resident white-breasted woodswallows, which followed just a couple of metres behind, hawking the grasshoppers that flee on their approach. Brown quail are common and, perhaps because feral cats and rats have been removed, stubble quail have been recorded for the first time. Yellow white-eyes, brown honeyeaters and bar-shouldered doves are common, usually seen in and around the mangroves.

In good years, welcome swallows are present and breeding, and the diminutive zebra finch also occurs some years. Occasionally, irruptions of white-winged trillers and Horsfield's bronze-cuckoos have been observed transiting through. And vagrants such as a single budgerigar and the occasional magpie-lark have also been recorded.

WHAT'S NEXT?

The spinifexbird population in the Montebellos is probably secure now. The likely fate of the fairy-wren population is promising, but not certain. While they have done well so far, it is still a very small population, and is therefore susceptible to chance events such as a series of droughts. Monitoring of both species will continue for at least another five years. Results of this monitoring will be used to consider whether some new individuals should be introduced to improve the genetic vigour of the translocated population. In the meantime, monitoring for feral cat and rat incursions will continue, in order to safeguard the future of not only these birds, but also the translocated mammal populations in the Montebellos.

Top The Montebello islands are an important area for breeding sooty oystercatchers.

Above Dozens of ospreys nest in the Montebello islands.

Above right Australian pipits are common in the more open areas on the islands.

Right Male and female fairy-wrens on Hermite Island.
Photos – Alan Danks/DBCA



Allan Burbidge is a DBCA principal research scientist based at Woodvale. He can be contacted on (08) 9405 5109 or by email (allan.burbidge@dbca.wa.gov.au).

Mark Blythman is a DBCA technical officer based at Woodvale. He can be contacted on (08) 9405 5181 or by email (mark.blythman@dbca.wa.gov.au).

Alan Danks is a DBCA technical officer based in Albany. He can be contacted on (08) 9842 4533 or by email (alan.danks@dbca.wa.gov.au).

Neil Hamilton is a senior technical officer based in Woodvale. He can be contacted on (08) 9405 5124 or by email (neil.hamiliton@dbca.wa.gov.au).

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Fat-legged wasps

Searching for food is a primary concern of all animals, and different organisms use a variety of sensory systems including sight, smell and sound. Even humans can attest to sometimes having a preoccupation with finding their next meal. Who hasn't started salivating at the sound of a crisp piece of fruit being chopped or had their stomach start to growl at the smell of a curry? On the flip side of the coin, humans are on the dinner menu for other animals too. But, in Australia we are mainly targeted by mosquitoes or leeches, who dine on our blood rather than consume us as a full-course meal.

Insects are the most diverse group of organisms on Earth. They have a long evolutionary history, numbering millions of species, most of which are yet to be formally described or named in scientific literature. The oldest insects are primitive wingless forms known from Devonian fossils, which existed about 400 million years ago. That's given them plenty of time to exploit virtually every terrestrial and freshwater habitat on the globe, and plenty of time to evolve novel ways of finding food.

A new study published in the journal *Insect Systematics and Diversity* by an international team of scientists, including Nikolai Tatarnic from the Western Australian Museum and Ben Parslow from Flinders University, has found that a distinctive group of wasps use fat bodies – an insect organ analogous (or equivalent) to the human liver – within their legs to detect prey. These wasps, members of the family Gasteruptiidae, are found in many ecosystems around the world and there are currently about 500 named species. They usually have long thin bodies, an elongated head and 'neck' and rather long hind legs. If you have a good eye for wasps, you may have seen females hovering near logs or trees where they are searching for the nests of solitary bees and wasps. Once a female wasp locates a nest, she lays her egg within it. Once the larva has hatched, it consumes the host egg or early instar larva and then consumes the cell contents, which were stocked by the mother.

A rather peculiar feature of many gasteruptiids is the presence of enlarged tibiae of the hind pair of legs, which the authors of the study found possessed unusually large fat reserves that occupy most of the space within the leg segment. They used a variety of methods, including "microscopy, chemical analysis, gene expression, and behavioural observations" to determine what role these fat bodies serve. As clusters of fat cells in the legs are virtually unheard of in insects, the authors were curious about their function. They found that besides its normal detoxification function, the fat body also helped in two ways. The first is that the fat bodies may function to amplify vibrational signals transmitted through the air, enabling them to accurately pinpoint the location of nests. The fat bodies are located near internal mechanoreceptors, the subgenual organs, which are as sensitive as vertebrate hair cells in the cochlea of the inner ear. The fat bodies are thought to accentuate the vibrational signals being delivered to the subgenual organ, which enables the wasps to pinpoint faint movements within wasp and bee nests.

The second possible function is that they enable the wasps to balance themselves and hover around the nest of their host. Many wasps and bees use their hind legs to stabilise themselves while flying, and gasteruptiids are no exception. Indeed, the legs seem to dangle below them. Experiments with wasps have shown that removing their hind legs inhibits their ability to balance and hover accurately.

So, next time you're searching for a nice meal in a restaurant, perhaps you should feel relieved that you don't have to rely on the fat in your legs to search for the perfect snack and marvel at all the ways insects have evolved to help them survive.

Above *Gasteruption longipleurale* are characterised by the unusal fat reserves in their legs.
Photo – Ben Parslow

Discovered is a regular series prepared by scientists at the Western Australian Herbarium (Department of Biodiversity, Conservation and Attractions) and at the Western Australian Museum (Department of Culture and the Arts).

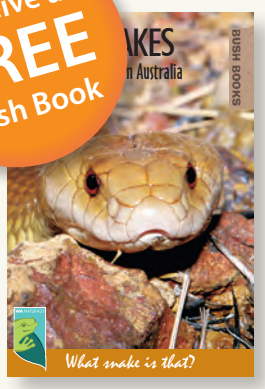
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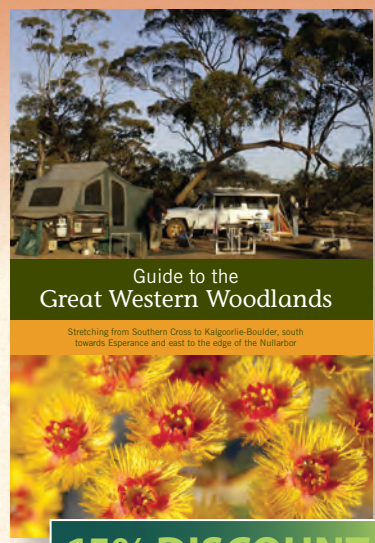
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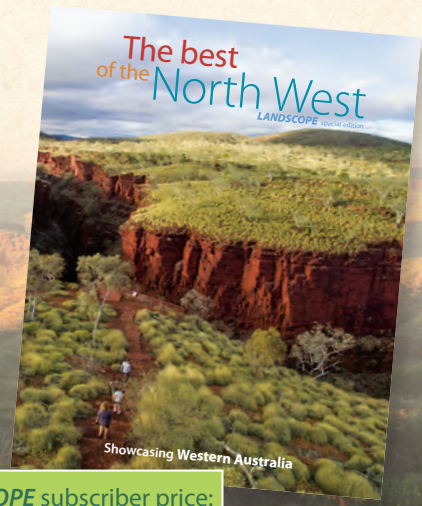
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Out-of-place platypus

by Harriet Mills



The platypus might be considered an iconic Australian animal, but at least one unsuccessful attempt to introduce them to Western Australia since colonisation proved that not all native Australian animals are suited to all Australian environments. So how do we explain the occasional reports of platypuses in WA waterways?



The platypus (*Ornithorhynchus anatinus*) is an Australian icon, known alongside the kangaroo and koala as uniquely 'Australian'. Every Australian school child can identify a platypus, but those of us who grew up in Western Australia have probably only seen them in books, on TV, or during visits to zoos in other states of Australia.

Platypuses are found along the eastern coast of Australia – from the tropical streams in northern Queensland to the cold alpine regions in Tasmania. As far as we know, they have never existed in WA of their own volition, with no sub-fossils or fossils being found and no mention of them in Indigenous rock art or stories. The nearest platypus population is an introduced group on Kangaroo Island off the South Australian coast. They were once found in the Adelaide Hills and Mount Lofty Ranges, but are probably now extinct on the South Australian mainland, apart from occasional sightings of animals that swim downstream along the Murray River from Victorian populations.

FAILED INTRODUCTION

Since the arrival of Europeans, there has been at least one attempt to establish a platypus population in WA. In 1951, a pair was flown to Perth from Healesville, Victoria, via a brief stop-off in Adelaide. They landed at the Perth Airport (then known as the Guildford Aerodrome) in early March, reportedly after 'years of negotiations' between the State Gardens Board of WA and the Victorian Fisheries and Game Department. Despite that, newspapers of the day reported that the planning for the event was not very thorough, and 'hasty' arrangements had to be made for the platypuses to be housed overnight at the private residence of the Chairman of the State Gardens Board, Mr H. E. Smith. Then (after they escaped from their box and were retrieved from behind a fireplace) they were released into a newly constructed dam on the Mahogany Creek in the area we now know as John Forrest National Park.

The dam is a few hundred metres upstream from the popular main picnic area, and can still be viewed by bushwalkers following the track on the southern side of the Mahogany Creek. Before the platypuses' arrival, wire was placed across the top of the dam, supposedly to prevent them escaping by swimming upstream. It was thought the dam would provide plenty of food, although there was a plan for the animals to also be hand-fed worms and boiled eggs, as had been done in their captive environment at Healesville. Newspaper reports point out that this hand-feeding was carried out in the afternoon for the benefit of the visitors and was not in the best interests of the platypuses, which are naturally nocturnal.

FEARING THE WORST

Only a few days after their release, there were already concerns that the platypuses had not been sighted. By the end of May, *The West Australian* reported that there were no signs of either platypus, although this was put down to their nocturnal behaviour, and also to the reluctance of the park's caretaker to venture out on cold nights to look for



"The fate of the pair remains a mystery. In their natural habitat, platypuses can live for up to 20 years ..."

Previous page
Main Platypuses occur along the east coast of Australia.
Photo – Dave Watts/Lochman Transparencies
Inset John Forrest National Park.
Photo – Lynne Whittle/DBCA
Inset bottom left *The West Australian* reported on the arrival of the Australian icons.

Above right In their natural habitats, platypuses can live for up to 20 years.
Photo – Dave Watts/Lochman Transparencies





Above The platypuses were released at a dam on Mahogany Creek in John Forrest National Park.

Right Interpretive signage at John Forrest National Park shares the story of the platypuses with visitors.
Photos – Harriet Mills/DBCA

them. More than a year later, in June 1952, it was reported that the platypuses had actually been seen regularly in the first few weeks after their release, but that they had since vanished and were believed to be dead.

The fate of the pair remains a mystery. In their natural habitat, platypuses can live for up to 20 years, but it seems likely that this ill-fated duo perished after being devoured by a fox or other predator, or were not able to find sufficient food. They feed on macro-invertebrates that they find in the water using their sensitive leathery bill and forage on the bottom of ponds and streams, searching for aquatic insects, worms and small crustaceans. This keeps them busy as they require an abundant food supply and need to eat approximately 20 per cent of their body mass each day, with lactating females requiring much more. They have specific habitat requirements including permanent water and they are slow to breed, producing only one to three young per year. It seems unlikely that they would ever have become abundant in the Perth area. In fact, efforts to maintain them in captivity outside their natural range have been almost entirely unsuccessful, with only one zoo outside Australia (the Bronx Zoo in the USA) managing to keep any alive, and then only for a few months in 1947.

This begs the question of why they were brought to WA in the first place.

TRUE BLUE

Perhaps what led to platypuses being brought to WA was the pervasive idea that some species are 'typically Australian' and are therefore 'missing' in other parts of Australia outside their natural range. Certainly, this misconception has been observed surprisingly often in the past, such as when laughing kookaburras from the eastern states were released in Perth, around the time of Federation as they were considered to be 'useful' and 'interesting'. At the time, there was a plea for the public to protect the birds, and prevent small boys from molesting them, so that they might become established. More than a century later they are well



Above Laughing kookaburras were also introduced to WA but have become so prolific they are now considered pests.
Photo – Jiri Lochman

Right Platypuses are listed as near threatened.
Photo – Dave Watts/Lochman Transparencies

Status of an icon

Platypuses are listed as near threatened by the IUCN. Although it can be difficult to obtain an accurate population estimate, it is suspected that they have declined across much of their natural range. Threats to platypus populations include habitat degradation such as the clearing of vegetation along waterways; poor water quality including sedimentation and water pollution; reduced water flows caused by water extraction, drought and climate change; and predation by foxes and feral cats. Another significant factor is drowning, which is caused by the animals being caught in yabby traps and being snagged by fishing gear.



and truly established in WA. In fact, they are considered a pest and cause minor damage to aquaculture and, more significantly, predate on native fish, reptiles, frogs and small mammals, and compete with native species for food.

These days, translocations of a species to areas outside of the known original range are called 'assisted colonisations' and these sometimes form part of conservation programs when species can no longer survive in their existing range due to threats such as loss of habitat or climate change. However, the motivation behind the platypus translocation to WA in 1951 seems to have been purely for increasing tourism to the park, based on a misguided sense of patriotism.

A ONE-OFF ATTEMPT. OR WAS IT?

While the 1951 release is the only confirmed case of platypuses in WA, there are unconfirmed reports that another pair was introduced by David Fleay to an 'artificial lake south-east of Perth' sometime around 1940. David was an Australian naturalist who was well known as the first person to breed several Australian species in captivity, including the platypus at Healesville Sanctuary, and was instrumental in the 1951 release. There is an earlier unsubstantiated report that two pairs of platypus were introduced from Tasmania to a site near Pemberton in about 1898, and there have been various other sightings, extending from several sites in the south-west to just north of Perth near Bindoon. Retired DBCA





Above Early European naturalists marvelled at platypuses, which were unlike anything they'd seen before.
Painting – John Gould

Above right Rakali water rats are often mistaken for platypuses.
Photo – Neil Edwards

Below right A zookeeper cradles rare twin platypus babies known as puggles.
Photo – National Geographic Image Collection/Alamy

scientist Dr Ian Abbott has published a thorough account of all known sightings of putative platypus in WA.

There is a plausible explanation for most of the sightings of platypus in WA. The Australian water rat or 'rakali' (*Hydromys chrysogaster*) (see 'Rakali: the Aussie otter', *LANDSCOPE*, Autumn 2011) is similar in size and colour, and can easily be mistaken for a platypus when swimming. This potential confusion is well recognised by platypus researchers in eastern Australia, who commonly encounter examples of mis-identification across their regions. Both the platypus and rakali have brownish fur and swim low in the water, so it can be very difficult to distinguish them, especially if you have a brief glimpse in low light or from a distance, which is often the case. The area of supposed sightings of platypus in WA overlaps quite convincingly with the known range of rakali throughout the south-west, and a community survey carried out by the World Wildlife Fund in 2014–15 indicates that rakali are still seen regularly along the Swan and Canning rivers, Murray River, Peel-Harvey Estuary and in the Walpole-Nornalup Inlet.

So, while you are extremely unlikely to spot a platypus in WA, stranger things have happened. You just have to consider the discovery of a Tasmanian devil in the suburb of Balga in 1997, which was presumably illegally imported into WA and eventually made its home at Perth Zoo. While it is possible that individual platypus have been illegally released into WA waters over the years, their specialised habitat and diet mean that it is unlikely they would have survived for very long, or that a population would establish. It is much more likely that the splash of brown fur you catch a glimpse of in the water is an Australian water rat – in which case, you have still been lucky to see a marvellous Australian mammal.



Dr Harriet Mills is a terrestrial zoologist and is currently serving as a board member for the Perth Zoo. She can be contacted by email (harriet.mills@ecu.edu.au).



Declaration



An epic project carried out over several years to eradicate feral cats from Dirk Hartog Island National Park has set the stage for reintroducing native animals to the island and returning it to its pre-European state.

on Dirk: feral cats eradicated

by Michael Johnston, Dave Algar, Mike Onus, Gary Desmond, Cameron Tiller, Jason Fletcher and Neil Hamilton







Previous page
Main Quadbikes were used to survey the island to confirm feral cats were no longer on the island.
Photo – Michael Johnston/DBCA

Top left A 2.5-kilogram female was detected by one of the cameras set up across the island.

Above left The last remaining feral cat was captured on the island on 9 October 2016.

Above *Eradicat* baits were dropped from an aircraft across the island.
Photos – Michael Johnston/DBCA

Sunday 9 October 2016 was an auspicious day for the conservation of Australian wildlife – the last feral cat on Dirk Hartog Island National Park was captured. At 620 square kilometres, Dirk Hartog is the largest island on the planet to be rid of these invasive predators, and this milestone paves the way for a number of threatened species to be reintroduced, as part of a project called *Return to 1616*.

HUNTING THE HUNTER

Three days prior to this significant day, cat footprints were observed on the track to Charlie's Harbour, on the west coast of the island. This was the first sign of a feral cat on the island in 100 days, since a spotted grey tabby was photographed in June by two of the 160 trail cameras installed across the island. While the number of observations and camera detections of feral cats were declining, it was not known precisely how many remained. The team laid poison baits during July throughout the area north of the barrier fence that bisects the island. Each bait was placed in view of a camera but this feral cat was obviously able to find sufficient prey, as it did not consume a bait and was not detected again until those prints were seen on the sandy track surface on 6 October.

Determined to capture this remaining feral cat, the team 'freshened' their traps with an aromatic blend of cat faeces and urine, which successfully lured the 2.5-kilogram female. An examination of the feral cat indicated it had never had a litter. This was a promising sign, as the last adult male feral cat was trapped on 6 May and camera and field observations suggested that the last few feral cats were travelling long distances, probably in search of mating opportunities. And, since the gestation period for cats is about 65 days, the fact that these animals had not mated bolstered the team's confidence that this female was indeed the last feral cat.

The absolute certainty of eradication success came after two more years of surveillance, during which time the team visited the island and employed multiple techniques to detect feral cats. After the capture of the 'last' feral cat, the team covered more than 46,000 bone-jarring kilometres on quadbikes without making any more observations of feral cats. The cameras did not record any more photos of feral cats during 114,000 camera trap-nights. And a team of detector dogs searched more than 800 kilometres during a month of intensive surveys (see 'Noses on Legs – detector dogs helping with feral cat control', *LANDSCOPE*, Spring 2016). These surveys were walked during the cool early morning hours to minimise the potential of the dogs encountering snakes. To illuminate their path, the dog handlers wore high-intensity head torches but did not report any eyeshine reflections, which would indicate any cats in the area.

The combined nil results achieved using these different methods over a two-year period, gave DBCA sufficient confidence to declare that all feral cats had been removed from the island.

HOW THE WEST WAS WON

The plan to eradicate feral cats from the island was based on data collected during preliminary studies conducted during 2009 and 2012. GPS radio-collars were fitted to feral cats to record data on their ranging behaviour. This was used to estimate that 300 to 500 adult feral cats were present on the island at the start of the program. Field operations to eradicate the feral cat population began in February 2014 with 15 feral cats being trapped,







Hear more about feral cat eradication on Dirk Hartog Island

Scan this QR code or visit Parks and Wildlife Service's '*LANDSCOPE*' playlist on YouTube.

"The absolute certainty of eradication success came after two more years of surveillance, during which time the team visited the island and employed multiple techniques to detect feral cats."

fitted with radio-collars and released. *Eradicat*® baits were dropped from an aircraft over the island in late May and were responsible for poisoning 14 of these collared feral cats. The remaining feral cat was last seen alive 12 days after baiting and was believed to have also consumed an *Eradicat*® bait but died in a location where the collar could not be detected. Trapping to capture surviving (uncollared) cats, removed seven more feral cats from south of the barrier fence.

This 13-kilometre barrier fence was constructed east–west across the 620-square-kilometre island to create two management areas, as it was not practical to monitor feral cat activity across the entire island. The floppy-topped fence was designed to limit movement of 'northern' feral cats into the south of the island and vice versa.

In 2015, five more feral cats were collared in the area north of the fence before it was baited. Only one of these feral cats ate a bait; the remaining cats were recovered in the subsequent months. Rainfall associated with Cyclone Olwyn is thought to have contributed to the reduced baiting efficacy in 2015, which led to a flush in grass seeding and supported an irruption of mouse (*Mus musculus*) numbers. However, intensive trapping removed 42 feral cats north of the fence.

As the project went on, the team was pleased to observe an increase in the number of camera detections of native mammals such as the little long-tailed dunnart (*Sminthopsis dolichura*) and ground-nesting bird species including the painted button quail (*Turnix varius*) and brown quail (*Coturnix ypsilophora*), among others. Informal observations suggest that populations of fairy terns (*Sterna nereis*), Australian bustards (*Ardeotis australis*) and the endemic white-winged fairy wrens (*Malurus leucopterus leucopterus*)



Above left A team of detector dogs joined the search for feral cats on the island. *Photo – Mark Holdsworth*

Above centre A floppy-topped fence was erected to limit movement around the island.

Above Quadbikes covered 29,000 kilometres of the island in search for remaining feral cats. *Photos – Michael Johnston/DBCA*





Michael Johnston was employed as a senior project officer in Biodiversity and Conservation Science at DBCA. He has worked on feral cat management techniques for the past 22 years. He can be contacted by email (curiosity.catbait@gmail.com).

Dave Algar is a principal research scientist with Biodiversity and Conservation Science at DBCA. He has worked throughout WA conducting research on feral cat control for the past 30 years. He can be contacted by email (dave.algar@dbca.wa.gov.au).

Cameron Tiller was a senior technical officer with Biodiversity and Conservation Science at DBCA. He has worked on threatened species protection and feral cat management programs for the past 10 years.

Jason Fletcher is a technical and field services officer with Biodiversity and Conservation Science at DBCA. He has worked throughout WA conducting research on native and invasive species for the past 10 years.

Mike Onus is a senior technical officer with Biodiversity and Conservation Science at DBCA. He has worked throughout WA conducting research on native and invasive species for the past 42 years.

Gary Desmond is a technical and field services officer with Biodiversity and Conservation Science at DBCA. He has worked throughout the Shark Bay District for 10 years.

Neil Hamilton is a senior technical officer with Biodiversity and Conservation Science at DBCA. He has worked throughout WA conducting research on native and invasive species for the past 17 years.

The Dirk Hartog Island Restoration and Recovery project is funded by the Gorgon Barrow Island Net Conservation Benefits Fund.

also appeared to benefit from the removal of feral cats.

GAZING BACKWARDS TO THE FUTURE

Dirk Hartog Island is named in honour of the captain of the *Eendracht*, who landed on the island on 25 October 1616. It is believed that feral cats become established on the island following the arrival of early pastoralists in the 1860s. The impact of invasive species on the island has led to the loss of 10 native mammal species from the island – most of which are listed as threatened species throughout Australia. The removal of feral cats provides the critical foundation to restore populations of these species back onto the island and into the future.

Pilot releases of banded hare-wallabies (*Lagostrophus fasciatus*) and rufous hare-wallabies (*Lagorchestes hirsutus*) were undertaken in August 2017. With these being judged successful, further individuals of these species were released in September 2018 (see 'Welcoming wallabies to Wirruwana', *LANDSCOPE*, Winter 2018). As native species re-establish on the island, the footprints left in the sand will once again reflect those that Dirk Hartog and his crew would have seen in 1616.

Above and inset The white-bellied sea eagle is one species that occurs on the island that is expected to benefit from the eradication of feral cats.

Above right Feral cats have not been detected on the island since 2016.
Photos – Michael Johnston/DBCA and Neil Hamilton/DBCA

Professor Susan Moore

by Tracy Shea and Amanda Smith

Professor Susan 'Sue' Moore believed that in order for people to advocate for the protection of our natural world, they must first experience and enjoy it in a sustainable and responsible way. During her illustrious career, Sue was at the fore of nature-based tourism research and made a lasting contribution to the conservation of Western Australia's natural values.





As a child, Susan 'Sue' Moore was an enthusiastic member of the Gould League and loved spending time in the wetlands and billabongs around her home in Jerilderie. She developed an understanding that people needed to spend time in nature, in order to appreciate it and want to protect it. This notion guided her career, and she was a keen believer that parks needed visitors in order to gain advocates and community and political support. However, as an environmental scientist, she knew this had to be done in a sustainable and responsible way, in order to protect the very thing that visitors come to enjoy. So, she dedicated her career to championing the importance of the environment and the role of social science in conservation and protected area management.

Through her work, Sue became highly regarded as an expert voice in nature-based tourism, both in Australia and overseas; and was a respected and revered innovative, multi-disciplinary researcher. She brought passion and humour to her work and embodied the concept 'if you choose work that you love, you will love what you do'.

Sadly, Sue passed away in December 2016. But she leaves behind a legacy of research, a band of former students who benefitted from her generous tutelage, and a throng of colleagues and friends who remember her as a truly wonderful person who contributed much to nature-based tourism and conservation.



Previous page
Main Professor Susan 'Sue' Moore was instrumental in developing the management plan for Fitzgerald River National Park.
Photo – Friends of Fitzgerald River National Park
Inset Professor Susan Moore.
Photo – Courtesy of the Moore family

Above Sue liaised with the community at Fitzgerald River National Park.
Photo – DBCA

THE EARLY YEARS

Sue was born in Finley in New South Wales in 1960. She grew up in Jerilderie in the southern Riverina region of New South Wales before her family moved to Camden – 70 kilometres south-west of Sydney. She completed a first-class honours degree in natural resources at the University of New England in 1981, and then joined the public service in Western Australia, working with the Department of Fisheries and Wildlife as its first female scientist. An integral part of her role was to coordinate community participation – a new concept at the time – for the planning process of the first nature reserve and national park management plans in the Perth metropolitan area. Later, with the former Department of Conservation and Land Management (CALM), she became involved in surveying flora and fauna, ensuring ecological knowledge was included in field activities such as prescribed burning, weed control and the development of roads and trails. She also applied her skills to the development of the management plans for the Fitzgerald River National Park – one of the largest and most botanically significant national parks in Australia, and WA's only UNESCO Biosphere Reserve – and D'Entrecasteaux National Park.

After nine years, Sue took leave from the department to undertake a PhD at the University of Washington, Seattle, USA, where – as a prestigious Harkness Fellow – she compared park planning in WA with that of the USA as part of her investigation into natural resource sociology. It was here that she also gained her first teaching experience.

She returned to CALM in 1994, and used what she'd learned to develop WA's first Directory of Nature-Based Tourism Opportunities. Then, in 1995, she accepted a lecturing post in the School of Environmental Science at Murdoch University. She became a full Professor in 2013 and merged her academic skills with her practical experience, and her extensive network of contacts, to co-found the highly successful Nature Based Tourism Research Group and a series of pioneering courses in ecotourism, including a new ecotourism degree in the School of Environmental Science. This put Murdoch University on the world map for its nature-based tourism research. While at Murdoch University, she also brought in numerous research grants, and received a number of teaching and research honours and awards, including the Vice-Chancellor's Award for excellence in research.

ENDURING LEGACY

During her career, Sue supervised 19 PhD students and lectured thousands more in environmental science, nature-based tourism and protected area management. For many of these students, she continued to be their champion, advisor and sounding board even after they completed their studies. Perhaps one of Sue's most enduring legacies will







be the significant number of students who benefitted from her passion and teaching, and will go on to help protect the environment for decades to come. International scholars are still undertaking sabbaticals at Murdoch University on the strength of contacts Sue established with people overseas. In recognition of her contribution to the university and its students, Murdoch University established the 'Susan Moore Memorial Prize in Nature-Based Tourism'. And she was posthumously awarded the Murdoch University 2016 Senate Medal in the School of Veterinary and Life Sciences.

But it wasn't just her students who she inspired through her outstanding communication skills; she was able to deftly communicate scientific findings to a broad audience. And her success as a teacher and researcher was grounded by her practical land management experience. She seamlessly married well-considered and researched theory with practical examples to enlighten audiences about nature-based tourism management, including through 60 international conference papers and almost 100 national and local conference papers. She was also a prolific writer, and published more than 100 articles, chapters, reports and books, including the best-selling academic works *Natural Area Tourism: Ecology, Impacts and Management,* and *Wildlife Tourism*. She also sat on the editorial boards of respected international journals for tourism and ecotourism and reviewed a number of manuscripts each year for various international journals.

As well as leaving an impression on the government and academic sectors, Sue left her mark on the tourism industry. She was an active member of the Forum Advocating Cultural and Eco Tourism (FACET) and was involved in countless FACET workshops and conferences either as a presenter or attendee. Sue embraced these opportunities to share ideas and have discussions with others about nature-based/ecotourism and protected area management. Her significant contribution was recognised in 2017, when she was posthumously awarded the Pat Barblett Medal at the joint FACET/WA Parks Foundation Conference.

Those who knew and worked with Sue will remember her as a truly great friend and colleague. She is survived by her husband Warren Tacey and her children Jess and Sam. And, while she is sorely missed by those who knew and loved her, her profound research and enduring influence on her students, will no doubt see her impact on tourism and nature conservation on a local and international scale continue for many years.

Above Sue at Murdoch University.

Above right Sue arranged for Emeritus Professor Paul Eagles from the University of Waterloo, Canada (second from right) to visit Murdoch University. They are pictured here with Dr Ross Dowling and Dr David Newsome. *Photos – Murdoch University*

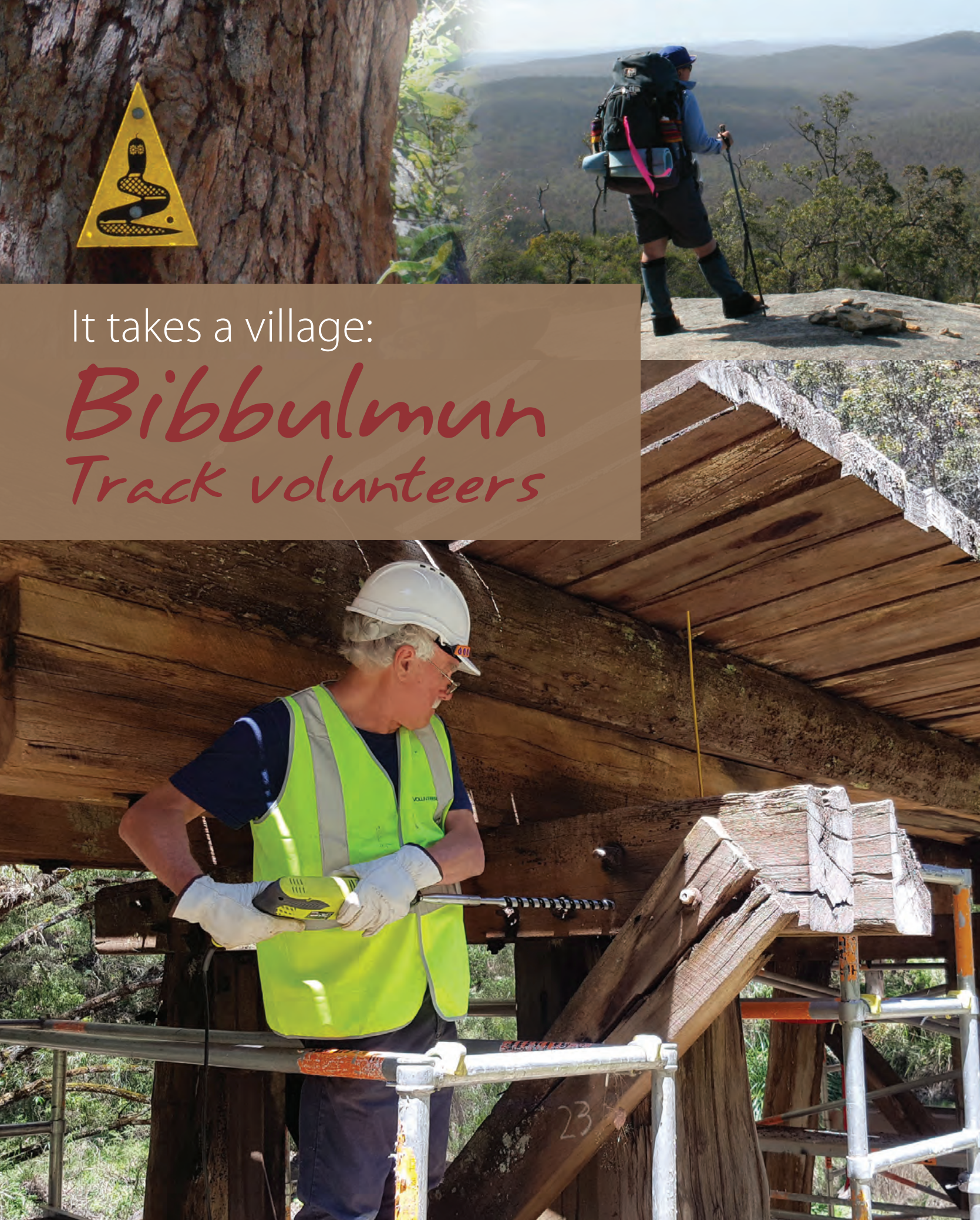
Above inset and right Sue coordinated a project that looked at the values and tourism opportunities of the coastal waters of the Kimberley. *Photo – Tourism WA*



Tracy Shea was DBCA's Parks and Wildlife Service assistant director policy and planning until her retirement in 2018. She is now a Park Ambassador for the WA Parks Foundation (www.ourwaparks.org.au) and runs her own consulting business – Tracy Shea Communications. She can be contacted on 0434 131 174 or by email (tshea@q-net.net.au).

Dr Amanda Smith is DBCA's social science coordinator and was one of Sue's PhD students. She can be contacted on (08) 9219 8225 or by email (amanda.smith@dbca.wa.gov.au).

'Touched by nature' is a feature that tells the stories of people who have used their experiences in nature to enrich the lives of others.



It takes a village:

Bibbulmun Track volunteers







Since the early 1990s, a dedicated army of volunteers have given their time, expertise and brawn to help look after 'adopted' sections of the Bibbulmun Track – Western Australia's premier walking trail. In recent years, a special contingent, known as Support Volunteers, have also been upgrading the trail and improving key infrastructure, to help maintain and improve this world-class facility. But it's not all work and no play, volunteers get to experience some of the State's most beautiful areas and receive immense satisfaction from the work they carry out.

by Rhianna King

What do you get when you cross a couple of ex-engineers (including an ex-aircraft engineer) with an ex-builder, an ex-planner and a couple of ex-business people? (No, this is not the beginning of a joke.) The answer: an extremely impressive collection of skills. These skills, combined with some 480-plus years of experience in various industries and a passion for the Bibbulmun Track, makes the group of Support Volunteers a formidable force. And these volunteers are lending their time and skills to the Bibbulmun Track to complete a number of key priority projects, which might otherwise not be possible.

INVALUABLE VOLUNTEERS

In 1998, when the Bibbulmun Track was realigned and extended to Albany, those in the then-Department of Conservation and Land Management Bibbulmun Track project team identified that maintaining the epic track, which now stretches more than 1000 kilometres from Kalamunda to Albany, would have to rely on the support of the community. So, in 1997, the Friends of the Bibbulmun Track was established to administer and organise a team of enthusiastic volunteers to 'adopt' sections of the track on which they would carry out simple maintenance tasks. About 40 volunteers acted as the department's 'eyes on the ground' and reported any issues or work that needed to be completed. Since then this number has grown to almost 300 volunteers who continue to perform an invaluable service. In recent years, a faction of people emerged, who were keen to use their varied skills and vast experience to carry out more complex tasks.

Previous page
Main Support volunteers carry out a variety of tasks.
Photo – Dave Lathwell/DBCA

Above left The Bibbulmun Track stretches 1000 kilometres from Kalamunda to Albany.
Photos – Bibbulmun Track Foundation

ABOVE AND BEYOND

A team of about 20 Support Volunteers have undergone specialised training in disciplines such as working with chainsaws and brush cutters, working with pre-fabricated materials, providing a safe work environment for volunteers and working at heights. They also provide training for volunteers in track maintenance, construction and re-alignment.

A three-year maintenance plan has been developed by the Bibbulmun Track Foundation with DBCA's Recreation and Trails Unit, which outlines projects that need to be completed. When there is a need for particular skills, a call is put out to volunteers to help with a project. And, when their travel and grandchildren-minding schedules allow, they enthusiastically sign up for duty. They then work closely with Parks and Wildlife Service regional staff to carry out a range of projects.

PROJECT TALLY

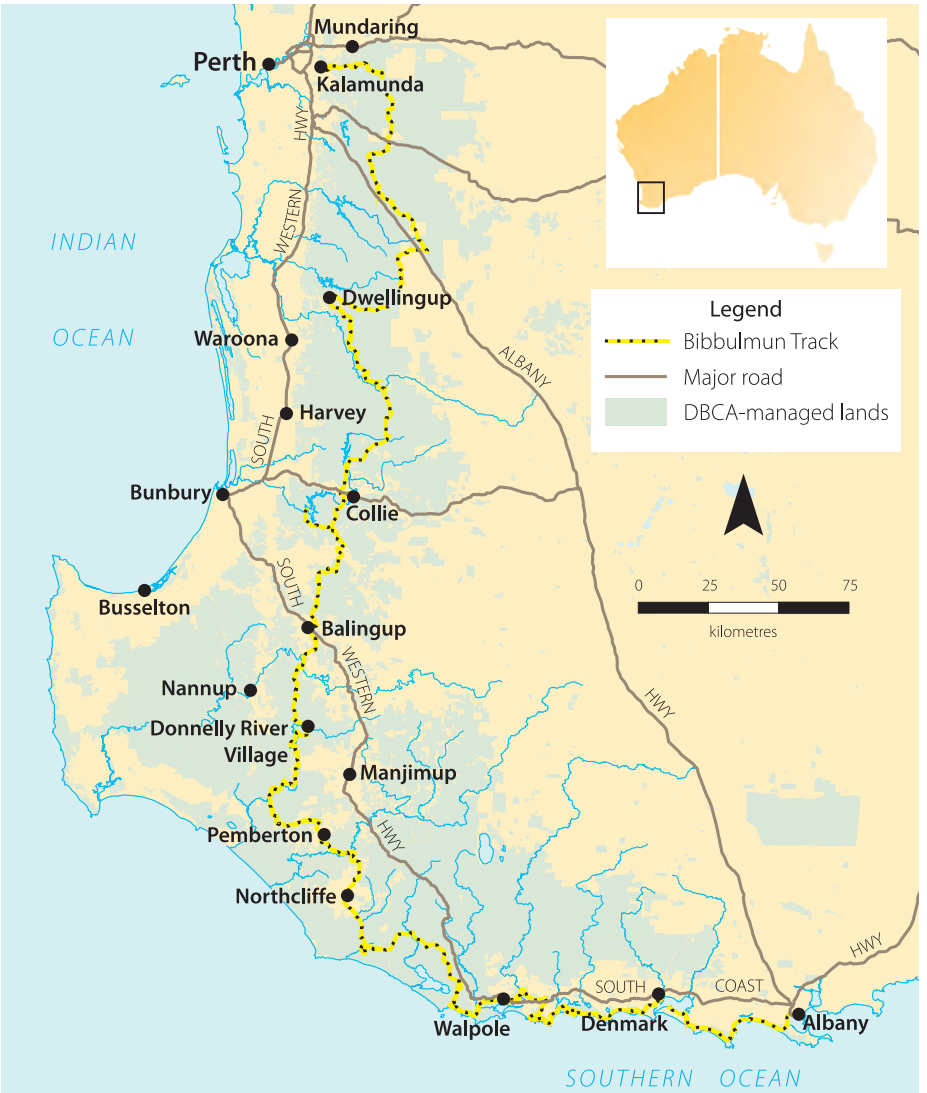
The Bibbulmun Track Support Volunteers have completed a number of tasks that may not have otherwise been possible. Since 2016, they have installed several small pre-fabricated footbridges, including one over Bell River; installed a set of steps at the new suspension bridge, which replaced the old Long Gully Bridge that was lost in a 2015 fire; performed significant restoration work at the River Road Bridge; installed box steps at Peaceful Bay; carried out campsite upgrade work at Swamp Oak Shelter; and have completed much-needed track maintenance work in the Perth hills.

Recreation volunteer Charlie Soord said maintaining the Bibbulmun Track was an epic task.

"Parts of the track and some of the infrastructure is 20 years old, so many of the facilities require repair and upgrades," he said.

"This is on top of the ongoing maintenance required to secure the Bibbulmun Track as a world-class walk trail."

But, according to DBCA project manager Dave Lathwell, the Support Volunteer program is a win-win for everyone involved.



"A lot of our Support Volunteers get involved in the project because they were looking for something interesting to do post-retirement," he said.

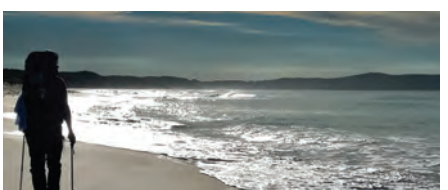
"Many of them are end-to-enders and have an affinity for the Bibbulmun Track and enjoy spending time in the bush with like-minded people. They're a great group of people and have a lot of fun together.

"A lot of them also have a keen interest in keeping some of the old bridges and fantastic structures alive; without people being committed to protecting and retaining the heritage of the trail, some of these old structures would be lost and have to be replaced."

Right The Bibulmun Track takes in various landscapes.
Photo – Deb Badger/Bibbulmun Track Foundation

Discover more about the Support Volunteer program

Scan this QR code or visit Parks and Wildlife Service's '*LANDSCOPE*' playlist on YouTube.



Rhianna King is a *LANDSCOPE* editor. She can be contacted by email (rhianna.king@dbca.wa.gov.au).

For more information about the Bibbulmun Track, visit the Bibbulmun Track Foundation's website (bibbulmuntrack.org.au) or parks.dbca.wa.gov.au/know/bibbulmun-track

by Grace Milne

kaleidoscope
kids exploring nature

A tale from the track

Winding through the heart of the scenic south-west, the Bibbulmun Track stretches 1000 kilometres from Kalamunda in the Perth hills, to Albany on the south coast. The track journeys through towering forests, down mist-shrouded valleys, over giant granite boulders and along breathtaking coastal heathlands. It can be explored as a short afternoon stroll, or as an eight-week end-to-end adventure, by walkers of all ages and abilities.

The Bibbulmun Track Foundation recently ran a writing competition for kids to share their stories of walking the track. One of the four finalists, Rebekah, shared her weekend adventure.

Did you know?

- On average it takes six to eight weeks to walk the entire track!
- WA runner Shane Johnstone holds the record for completing the track in the fastest time – 11 days, seven hours and eight minutes.
- The Bibbulmun Track is 1000 kilometres, which would be the equivalent of 200,000 cars lined up in a row.

The Bibbulmun Track



by Rebekah

I love my visits to the Bibbulmun track. Our heavy packs are full, chucked in the boot and off we go…

We drive to the start and have a little play. The carpark is mostly gravel, but there is bush on both sides of the road, so we have an energetic play in the undergrowth.

Though the walks are exhausting, I still like going through the bush because I get to see all the native plants and sometimes blue-tongue lizards too. Along the track, there are enormous logs and rocks that we stop at to explore while we rest and snack. I love it when Mum hands out chocolate to give us 'Chocolate Legs'! The chocolate makes me walk faster and gets me up the steep and tiring hills. Occasionally we pass a yellow Bibbulmun Track wagul. Sometimes we even have a little competition to see who spots a wagul first.

We get to the hut and I'm really happy. I always write in the hut book and have a well-deserved rest. When I feel lively again, I love to play on the rocks, the logs and amongst the grass trees and the gum trees as I explore the bush. I like to get charcoal all over my face. I search for witchetty grubs in all the dead grass trees that have fallen onto the leaf-covered ground. I like to gather sap from the grass trees which I melt over the fire or keep to trade with the other kids. I also collect long sticks to roast my sausages and marshmallows on. We keep an eye out for firewood to collect.

In the evenings, I like to help light the campfire with fire starters and firewood. Then we cook a dinner of couscous, peas and German sausages. Yum! Sometimes, as a treat, we roast scrumptious, marshmallows on the campfire for dessert. Burnt, gooey ones are extra yummy! We enjoy a warm cup of soup after dinner. We play Spotlight or 44-Home before we wrap up warm, snuggle up in our sleeping bags all toasty and ready for a good night's sleep.

In the morning we eagerly light the fire and warm ourselves up – it's always cold at that time of day! After we've had our breakfast and packed up our belongings, the day warms up and we have our last play. Now it's time to heave on our packs.

Once again we make our way down the track. As we get closer to the car, I start to look forward to going home.

Back in the carpark, we say goodbye to our friends and head off on the bumpy road leading home.

Yay! Home Sweet Home. I take off my sweaty boots, have a shower and wash my hair. That night I am happy to be back home, clean and warm in my very own bed.

What a great weekend away!

I'm looking forward to my next Bibbulmun Track adventure already!



Above The Bibbulmun Track provides opportunities for people of all ages to explore nature. *Photo – Tourism WA*

LANDSCOPE's **Kaleidoscope connecting kids with nature** page is an exciting regular feature for kids.



Northern quoll (*Dasyurus hallicatus*)

Northern quolls are found in the Pilbara and Kimberley regions of northern Western Australia (see 'Quolls - spotted in the desert' on page 20). They are nocturnal, and spend their nights hunting for native rodents and small marsupials, birds, reptiles and insects, and eat figs and other fruit. During the day they shelter from the heat in hollow logs and rocky crevices.

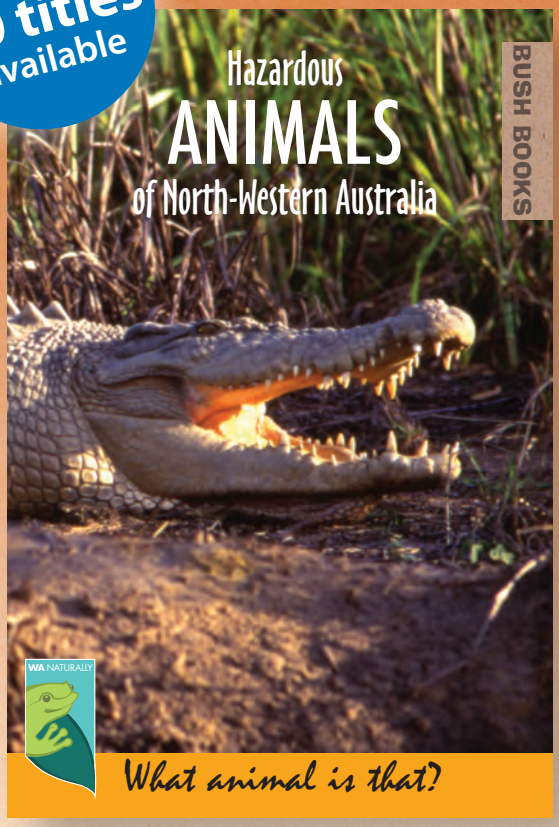
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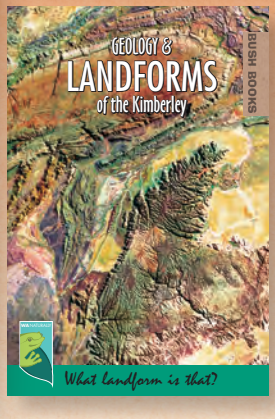




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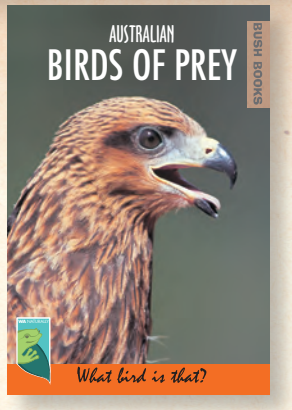
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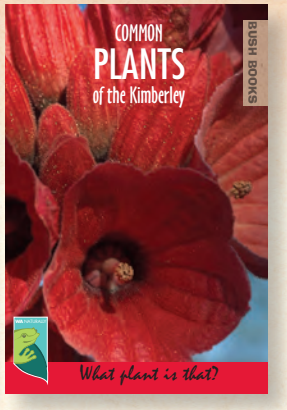


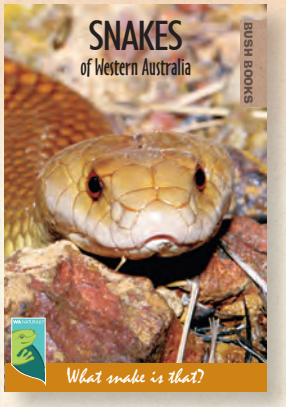












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